State BMP Verification Procedures

Forestry Workgroup Meeting June 2017

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West Virginia

http://www.chesapeakebay.net/documents/WV_BMP_Verification_QAPP_Final.pdf

Table 4: West Virginia Forestry BMP Program Design (*Table 8 in the guidelines*)

		Initial Inspection (and throughout lifespan period)					Follow Up Check (Post-lifespan)					
WIP Priority	**BMP Name**	**Method**	**Frequency**	**Who Inspects**	**Documentation**	**Standard**	**Follow Up Inspection**	**Statistical Sub-Sample**	**Response if Problem**	**Lifespan**	**Data QA, Recording and Reporting**	**Adjusted Lifespan**
Low	**Forest Harvesting BMPs**	Visual Inspection	100% Initial inspection and 100% final Reclamation	WVDOF LSCA foresters	Timber Harvest inspection reports	State	Additional inspections probable during the operation	100%	Work with loggers to address concerns – verbal warnings & Compliance orders. If Severe – have regulatory action (fines).	Life of the Notification	Database – GIS polygons provided at parcel level to WVDOF BMP db. (LONIE)	Beyond notification only if problems exist
Low	**Forest Conservation BMPs**	Visual	100% after Conservation. WVDOF receives aerial Photo to verify.	Managing agency	Electronic files maintained by the managing organization. WVDOF maintains historical record to prevent double counting	State/ Federal	Vary depending on Managing agency policy					
Medium	**Expanded Tree Canopy**											
High	**Urban Riparian Forest Buffers**	Visual	100% receive initial inspection	WVDOF WVCA NGO	Written Notes and Electronic Files	Federal	WVCA WVDOF NGO et al.	Visual	Refer to Technical Resource or Sunset	15		
High	**Forest Buffer**	Visual	100% receive initial inspection	NRCS FSA WVDOF WVCA NGO	Written Notes and Electronic Files	Federal	WVDA WVCA WVDOF NGO et.al.	Visual	Refer to Technical Resource or Sunset	15	Toolkit/PRS; WVCA Electronic; WVDA Electronic + new database; WVDOF electronic	

D.2.1 Forest Harvesting BMPs

Forest Harvest BMPs Description: Forest harvesting practices are a suite of BMPs that minimize the environmental impacts of logging, including road building and site preparation. These practices can greatly reduce the suspended sediments and other pollutants that can enter waterways as a result of timber operations. The CB model currently assumes an average of 1% of forest is harvested in any given

year, unless more accurate data are supplied by the state. The modeled pollution load from forest harvesting is reduced based on the annual number of acres of forest harvesting BMPs reported.

Current procedure: All States have adopted recommended BMPs for timber harvesting and forest management activities (also called Silvicultural BMPs) that have the potential to impact water quality. These water quality BMPs have common elements although they may vary from state-to-state and their use is site dependent. For the purposes of monitoring, WV harvest BMPs are grouped by area of concern such as:

- Roads and timber loading areas
- Stream crossings
- Stream Management Zones or Riparian areas

D.2.1.1 BMP verification

WV's Logging and Sediment Control Act (LSCA) (WV Code 19-1B-12) requires all timber harvest operations to notify the WV Division of Forestry (WVDOF). Additionally, timber operators must complete an initial BMP course and refresher courses every 3 years.

All BMPs associated with registered timber harvest operations on public and private land will be inspected at least three times according to DOF policy. WV law mandates only a final inspection for reclamation. It depends upon whether all LSCA positions are filled, whether additional inspections are completed.

Trained WVDOF LCSA Foresters will conduct inspections. Timber operators also receive training on BMPs, and must refer to the BMP manual. WVDOF LCSA Foresters will record whether BMPs are in place, meet prescribed standards, and are functioning as designed. If any of these are lacking, it will be recorded.

Table 5: Prescribed standards by Forest Harvesting BMP type

General Forest Harvesting BMPs	Haul/skid Roads and timber loading areas	Streamside Management Zones (wetlands managed same way)	Stream Crossings
Reclamation on all areas after harvest is complete.	Road surface and grades, proximity to streams, good drainage practices including culvert size/waterbars. Landings, location and water control structures.	Landing and roads offsets. No equipment allowed except for crossing at 90 degrees with water structures. Seeding and mulching after construction	Water structures standardized, seeding and mulching after construction

Enforcement is triggered by inadequacies in the following categories: license, logging certification, notification, signage, muddy water, operating in a stream, skid/haul road (see Table 5), condition of County/State road, tops in stream, job not reclaimed. The law empowers the WVDOF to issue compliance orders to correct problems and, when necessary, to suspend a logging operation until specified conditions are made to bring the operation into compliance with the law.

The inspecting agency does have a BMP manual, but there is no QA plan in place to check against. 56 The collected data is recorded in the LONIE (Logging Operation Notification, Investigation and Enforcement) database. The following information is digitally entered in the LONIE database: First visit: "Notification Form;" Second and subsequent visits: "Investigation Form;" Final visit: "Final Inspection

Form." If problems are found with the BMPs during the process, "Compliance Orders" and hard-copy "Tickets" are issued, and "Suspensions" and "Suspension Releases" are used as needed.

The acres of forest registered as timber operations are aggregated by county and entered into the NEIEN (National Environmental Information Exchange Network) for annual progress reporting.

D.2.1.2 BMP validation

By law, all timber harvest operations are required to notify the WVDOF prior to beginning operations. The notifications include, among other items, acreage to be harvested, what type of harvest, location, and time period. Data from the notifications are entered into the LONIE system. The system was developed by the Appalachian Hardwood Center at West Virginia University.

The procedure used to compile data is the LONIE system, which can be queried to report on a number of different requests and compile them as an Excel spreadsheet. For acreage reporting, we use job start dates only to avoid double counting. WVDOF reports acres to WVDEP staff.

Ninety eight percent (98%) of the registered acres with BMPs applied are reported. The rationale for this is that occasionally, we do have illegal logging activity that is discovered after the fact and does not get reported. We do not track these because there are others that we never discover. 2% is an estimate of unknown illegal activity that may or may not have BMPs applied. Therefore, the WVDOF adds this 2% to the total number of known harvest acreage.

The process to prevent double counting is basic. First, we are certain of not double-counting because only unique close-out dates are queried. Second, there is a database check of the query to ensure that the same tract of harvested timber was not reported by two or more harvest companies.

WVDOF is the regulatory agency that will conduct the data validation. They employ three LSCA foresters. Staff includes supervisor of LCSA foresters and the Assistant State Forester. These positions are fully staffed.

D.2.1.3 BMP performance

Assessment of BMP performance and consistency with the Chesapeake Bay Program's approved BMP efficiency will be conducted by the Region 1 LSCA Specialist.

The BMP manual is revised at least every 5 years by a committee including university researchers, WVDEP, and industry representatives. Also, Federal (USFS) Fernow Research Forest provides recent information through committee networks. WVDOF staff participate in Chesapeake Bay Program Office (CBPO) Forestry Workgroup.

The WVDOF will collect BMP effectiveness data

D.2.2 Forest Conservation BMPs

There are currently many agencies coordinating land conservation in the West Virginia Potomac drain counties. The WVDOF works with the Forest Legacy Program. Other NGO's involved include: Potomac Conservancy, Cacapon & Lost River Land Trust, Land Trust of the Eastern Panhandle, Nature Conservancy, and Conservation Fund. Also each county has a Farmland Protection Board. In addition,

other land is 57 protected through programs such as the American Battlefield Protection Plan and The Outdoor Heritage Conservation Fund.

D.2.2.1 BMP verification

The 2007 Forest Conservation directive is the driver for BMP installation. Inspections will be completed by the managing organization. Inspections will occur one time after conservation, and additional inspections will vary depending on the agency. The number of acres of forestland conserved will be inspected. The first inspection will be completed through aerial coverage and the method of subsequent year inspections will be determined by the controlling agency.

WVDOF staff contacts the region's land trusts and other local organizations involved in conserving land, e.g. county farmland protection agencies, to determine the number of acres conserved in each county. WVDOF attempts to track location of acres reported, or a property name, so they will not be double counted in the future. WVDOF staff will also conduct aerial coverage analyses.

Data will be maintained by the managing organization. Information recorded describing each conservation project and QA varies by managing organization.

The collected data, acres of forestland conserved, is recorded by county in an excel spreadsheet by WVDOF. This information is currently reported annually by the WVDOF to the US Forest Service.

Forest Conservation acreage is expected in perpetuity.

D.2.2.2 BMP validation

The WVDOF staff will contact the region's land trusts and other local organization to verify.

The location of acres reported, and/or property names are recorded so that acres will not be double counted. The region is small therefore, if an unreasonably large number of acres in any of those categories are reported by agencies, the locations could be questioned.

D.2.2.3 BMP performance

WVDOF staff will collect the data to assess the BMP performance and confirm consistency with the Chesapeake Bay Program approved BMP efficiencies by contacting the region's land trusts and other local organizations involved in conserving land, e.g. county farmland protection agencies, to determine acreages to report in this category.

D.2.3 Expanded Tree Canopy

Expanding tree canopy involves increasing the overall percent of tree cover in a geographically defined locality on developed land. Credit is applied according to the number of new acres (net gain) of tree cover, i.e., amount of canopy expansion. If trees are not planted in a contiguous area, such as for street trees, then number of trees can be converted to acres using the following conversion factor: 100 trees = 1 acre of new tree cover. All tree planting data is aggregated and submitted to the state by a locality for further aggregation to the CB model per land-river segment.

D.2.3.1 BMP verification

BMP installation was/is driven by the Forest Restoration Strategy.

All tree canopy expansion areas will be inspected. Every 5 years, a locality should re-assess the tree canopy in its defined boundaries to show that there has not been a decrease in overall canopy.

Cacapon Institute, in cooperation with the WV Chesapeake Bay Forester and WV Urban & Community Forestry Council, will determine frequency and locations to be inspected. WV Bay Program aggregates all BMP reporting through the WVDEP. Any Tree Canopy Expansion will be evaluated for each municipality reporting tree plantings. (Note: The CBP Forestry Workgroup is working on an Urban Tree Canopy land cover map for the entire Bay Watershed that could be completed as early as 2018. Thereafter, every five years, a new UTC land cover map will be produced. The verification method discussed here and in the riparian forest section are intended to be stop-gap measures to ensure verification interim, prior to the improved verification anticipated under the Forestry Work Group's plan.)

This is important especially since tree canopy losses may occur despite good policies and practices for urban forestry. Ongoing problems for tree canopy are the expansion of invasive pests such as emerald ash borer, required tree trimming for electrical reliability standards, and natural aging of trees.

Tree canopy will be assessed every two years by Cacapon Institute using iTree Canopy or similar human-eye interpretation of aerial imagery. iTree Canopy produces a statistical assessment of land cover and can be used to evaluate aerial imagery. Similar tools are available in Arc GIS. Statistical assessment does NOT map tree canopy, it projects the likelihood of land cover change over time. Expanded Tree Canopy will cover only developed lands, not forest, agriculture, or riparian areas. "Developed lands" are determined by the Chesapeake Bay Program and the GIS shapefiles are available from CBP. Riparian areas will be clipped, or removed, from the study area using CBP shapefiles for HUD stream data sets by setting 35' riparian buffers aside. (These will be assessed separately – see Urban Riparian Forest Buffers below).

The method of inspection is as follows. iTree Canopy type surveys utilize NAIP (National Agriculture Inventory Program) <2 meter resolution natural color aerial imagery for human-eye land cover interpretation. Land cover will be assessed using the USDA Forest Service-University of Vermont 7-land cover sets: canopy, green space, bare soil, water, building, road/railroad, and transportation-other (impervious). From this classification of points, a statistical estimate of the amount or percent cover in each cover class can be calculated along with an estimate of uncertainty of the estimate (standard error (SE)). iTree explains this as follows:

"To illustrate how this is done, let us assume 1,000 points have been interpreted and classified within a city as either "tree" or "non-tree" as a means to ascertain the tree cover within that city, and 330 points were classified as "tree". To calculate the percent tree cover and SE, let:

N = total number of sampled points (i.e., 1,000)

n = total number of points classified as tree (i.e., 330), and

p = n/N (i.e., 330/1,000 = 0.33)

q = 1 – p (i.e., 1 - 0.33 = 0.67)"

To ensure a rigorous assessment/analysis a Standard Error (SE) of >90 (i.e. +/- 5%) is desirable.

Standard Error (SE) = √ (pq/N) (i.e., √ (0.33 x 0.67 / 1,000) = 0.0149)

Using iTree Canopy in the most recent NAIP a set of data points will be established. These can be compared to NAIP imagery from six years prior (NAIP is collected on odd-numbered years). The analysis will show, statistically speaking, if Tree Canopy is expanding or declining.

Cacapon Institute has been conducting iTree Canopy inventories since 2006. iTree Canopy is provided by the USDA Forest Service. WVU and Shepherd University graduate and undergraduate students, and WVDEP or WVDOF personnel, even volunteers may assist in the analysis but the iTree Canopy report will be managed and produced by Cacapon Institute for the WVDOF and WVDEP. Cacapon Institute is the WVDEP Bay 59 Program partner endorsed to represent WV urban forestry issues to the CBP Forestry Work Group. WVDEP and WVDOF will have oversight.

In addition to two-year iTree Canopy statistical analysis there will be annual inspection of new plantings. Since the Expanded Tree Canopy goal, ultimately, is measured by iTree Canopy type statistical analysis, the annual tree inspections are not a final conclusion. However, annual, on-the-ground, inspections are crucial to detecting early problems with tree establishment or mortality. The iTree statistical analysis is not intended as a management tool and does not provide insight into site-specific challenges. Therefore, annual inspection is required. As the number of tree planting sites increases a random sampling regiment will be required. Annual inspection of every site newer than three years is required. Once a site has been in place for four or more years it should be moved into an inspection routine of random sites (i.e., only 20% of sites >4 years old are physically inspected).

Table 6: Data to record for expanded tree canopy projects

New Plantings	Natural Regeneration Areas	Voluntary Acres
For new plantings, the following information should be collected: 1. Date of planting 2. Location 3. Number of trees by: a. Species b. Stock size (i.e., tree size at time of planting) Anticipated management regime (e.g., care will be weekly watering and care , monthly, annually, or "plant-and-forget") Urban tree canopy plantings can be credited once planting is confirmed. Plantings that fail must be replanted (no additional credit) or removed from the NEIEN database.	Natural regeneration will show in the iTree Canopy assessment. On the ground verification is not required. However, if areas are delineated and intentionally set aside for natural regeneration they should be inspected annually and the regeneration documented with photographs.	Like natural regeneration, voluntary planting on private land will present increased tree canopy in the iTree Canopy assessment. Volunteers should be encouraged to report private land plantings. WV is adopting a SMART Tool type of online volunteer reporting mechanism. Volunteer, self-reported, plantings should be inspected on a random basis based on resources available. A rate of 20% inspections of self-reported volunteer plantings is a minimum if credit is claimed.

The Expanded Tree Canopy data for urban and developed lands will be collected by Cacapon Institute in partnership with the WVDOF and reported to the WVDEP who will, in turn, report the information to the EPA Chesapeake Bay Program.

D.2.3.2 BMP validation

To provide accountability, state forestry agencies regularly spot-check a subset of a locality/urban forest partner BMP project files and/or 5-year assessments of net gain for accuracy and thoroughness.

This may also entail site visits to tree planting sites on record.

The state oversight process needs to be transparent and publicly accessible so that NGOs, watershed groups and other stakeholders can be confident that BMP implementation is real. Improvements on reporting are suggested. The state forestry agency should coordinate with the state MS4 oversight program, where local partners are implementing tree planting BMPs regulated by that program.

Cacapon Institute's work will be validated by the WV Urban & Community Forestry Council; the WV State Urban Forester, and WV Chesapeake Bay Forester. Cacapon Institute will maintain a public and accessible program under oversight from WVDOF, WVDEP, and the Bay Forestry Workgroup.

D.2.3.3 BMP performance

Cacapon Institute, with WVDOF and WVDEP Bay Program Partners will collect data and assess BMP performance. WVDEP, as state lead in BMP reporting, will ensure the BMP inspection process conforms to, and is consistent with, the Chesapeake Bay Program's approved BMP efficiencies.

D.2.4 Urban Riparian Forest Buffers

Urban forest buffers are described as an area of trees at least 35 feet wide on one side of a stream, usually accompanied by trees, shrubs and other vegetation that is adjacent to a body of water. An urban riparian forest buffer is any riparian buffer not in an agriculture or forest setting—it is on developed land.

D.2.4.1 BMP verification

Assessment of total urban forest buffer cover in a locality will be completed every 5 years to ascertain that there is not a net loss of urban buffer. iTree Canopy will be used to assess the urban riparian forest buffers (see Expanded Tree Canopy verification method above).

The inspection will be completed by an urban forest partner. The partner would be endorsed by WVDOF, which provides oversight and support with training, tools, etc. In turn, urban forest partners can provide outreach and technical assistance on urban tree planting, tree care, and other issues that arise.

The urban forest partner should maintain information at a local level of each new urban riparian forest buffer.

- For new plantings, data to be recorded should include:
    - location (lat/long) and name of property
    - acres planted (if appropriate) and width,
    - and date(s) planted.
- For natural regeneration acres, data to be recorded should include:
    - location,

- acres of treatment,
- width, and
- date started.

Naturally regenerating urban buffers are reported after 4 years of establishment if there are 100 or more live native trees per acre. For this practice, iTree Canopy data points would be located in the riparian area of a given locality. Other software may be equally useful in demonstrating there has not been a loss of buffer. If a loss of urban buffer in a locality is detected, the credits received over that 5-year period will be decreased by the same amount.

D.2.4.2 BMP validation

To provide accountability, state forestry agencies will regularly spot-check a locality/urban forest partner BMP project files on urban forest buffer establishment and/or 5-year assessments of net gain for accuracy and thoroughness. This may also entail site visits to buffer sites on record.

The state oversight process needs to be transparent and publicly accessible so that NGOs, watershed groups and other stakeholders can be confident that BMP implementation is real. An oversight report should be communicated with the locality/urban forest partner to underscore what is being done well and what needs improvement.

D.2.4.3 BMP performance

None at this time.

D.2.5 Riparian Forest Buffers

Riparian forest buffers on agricultural land uses are implemented through the Farm Service Agency's Conservation Reserve Enhancement (CREP) Program, Natural Resources Conservation Service's EQIP Program, Chesapeake Bay Program Implementation Funding, Clean Water Act Section 319 grants, and other programs.

Forest Buffer: Agricultural riparian forest buffers are linear wooded areas along rivers, stream and shorelines. Forest buffers help filter nutrients, sediments, and other pollutants from runoff as well as remove nutrients from groundwater. The recommended buffer width for agricultural riparian forest buffers is 100 feet, with a 35 feet minimum width required. min width = 35', recommended 100' … defined as having a vegetative cover of 60% or greater (SB 8.4.9).

D.2.5.1 BMP verification

Federally cost-shared projects are verified according to agency procedures referenced in the agriculture section D.1, above. Currently, FSA or NRCS staff may also alert WVDOF staff to verify condition/needs of projects that were previously implemented, when needs arise. Factors to inspect will include dominance of invasive species, concentrated flow paths, survival rate (70% with natural regeneration, or 60% canopy cover) and presence of three-zone forest structure (ground cover, mid-story, and over-story levels).

Initial Inspection:

CP22 projects reported to NEIEN from WV are considered to consist of fencing and riparian forest buffers, unless otherwise recorded on the reporting form. In order to appear on this reporting form, the initial visual inspection would have already occurred. Personnel conducting the initial visual inspection could be WVDOF foresters, CREP foresters, NRCS forester, or the Chesapeake Bay Watershed Forester. Projects funded through the other sources will be visually inspected after being planted and before being reported to NEIEN.

Follow-up Inspection(s):

A second inspection will be performed on 100% of riparian buffer plantings within the first 4 years. A third inspection will occur on at least a 10% subsample of the projects between years 5-10. Within the last 2-3 years of the end of CREP contracts (10 or 15 years,) sites up for contract renewal or voluntary retention of the buffer will receive another inspection. Non-farm-bill projects will follow the same protocol. WVDOF's Chesapeake Watershed Forester will track verification inspections of projects implemented with Chesapeake

The inspection dates and results will be recorded through written records and electronic documentation. CREP Foresters will track verification activities for all CREP buffer projects. The WVDOF Chesapeake Watershed Forester will coordinate the tracking of verification efforts for all non-farm-bill funded projects.

D.2.5.2 BMP validation

Riparian Buffer projects that are discovered to be no longer in place will be coded as "retired" in the annual NEIEN BMP Progress submission. See section B for avoidance of double-counting of this BMP.

D.2.5.3 BMP performance

None at this time.

D.2.6 Tree Planting (Agricultural)

Tree Planting: (Row Crop): Any tree plantings on any site except those along rivers and streams that have already been counted in a forested buffer. Tree plantings do not include reforestation of areas that were recently harvested. Targets land that is highly erodible or identified as a critical resource area. Density should be sufficient to produce forest-like cover over time. CRP planting given as an example (SB 8.4.4).

D.2.6.1 BMP verification

Similar to the urban tree planting section above there needs to be annual inspection of new plantings. Annual, on-the-ground, inspections are crucial to detecting early problems with tree establishment or mortality. As reporting improves and the number of tree planting sites increases a random sampling regiment will be required. Annual inspection of every site newer than three years is required. Once a site has been in place for four or more years it should be moved into an inspection routine of random sites (i.e., only 20% of sites >4 years old are physically inspected).

Tree planting data that does not fall under urban and developed lands will be collected by WV Bay program partners to include Cacapon Institute and WVDOF and reported to the WVDEP who will, in turn, report the information to the EPA Chesapeake Bay Program.

D.2.5.2 BMP validation

To provide accountability, state forestry agencies will regularly spot-check a subset of tree planting BMP project files and/or 5-year assessments of net gain for accuracy and thoroughness. This may also entail site visits to tree planting sites on record.

BMP collection data will be validated by the Cacapon Institute and WVDEP. They will maintain a public and accessible program.

D.2.5.3 BMP performance

The WVDOF and WVDEP Bay Program Partners will collect data and assess BMP performance. WVDEP, as state lead in BMP reporting, will ensure the BMP inspection process conforms to, and is consistent with, the Chesapeake Bay Program's approved BMP efficiencies

Table 7: Verification strategies for forestry sector BMPs

A. Program Component	B. Program Elements	Forest harvesting BMPs	Forest conservation	Expanded tree canopy	Urban riparian forest buffers
i. BMP Verification	1. What was the driver for BMP installation?	Regulation	Forest Conservation directive	Forest Restoration Strategy	
	2. How many BMPs will be inspected?	All registered timber harvest operations will be inspected	All	All	All
	3. How is inspection frequency and location determined?	All are inspected at least once due to law. If all inspector positions are filled, additional inspections will be completed	All are inspected at the time it enters a conservation agreement. Depending on the managing agency's capacity and policies, some are inspected on additional occasions	Determined by Cacapon Institute in collaboration with the WV Chesapeake Bay Forester and WV Urban & Community Forestry Council, will follow Forestry Workgroup guidance when it is completed	All assessments are completed every 5 years. Naturally regenerating buffers are reported after 4 years of establishment
	4. How often are BMPs/groups of BMPs inspected?	At least once following reclamation, and possibly up to 3 times during the duration of harvest operations	At least once at the time the conservation agreement begins. Additional inspections vary in frequency	Localities re-assess their tree canopy cover every 5 years. All new plantings are inspected annually, Cacapon Institute	All assessments are completed every 5 years
	6. Who will conduct the inspection and is he/she certified/trained?	WV Division of Forestry LCSA Foresters	Managing organization staff and/or WVDOF staff WVDOF staff are trained	Cacapon Institute staff with assistance from WVU and Shepherd University graduate and undergraduate students. They are all trained.	Urban Forest Partners, who would be endorsed and trained by WVDOF
	7. What needs to be recorded for each inspection?	Whether BMPs are in place, meet standards, and are functioning as designed	Acres and location or property name	iTree Canopy reports include a statistical estimate of the amount or percent of cover in a variety of land cover categories (see Section D.2.3.1, above) For new plantings date, location, and number of trees by species and stock are reported	New plantings: location, property name, acres planted, width of buffer, date planted Natural regeneration: location, acres of treatment, width, date started
	8. Is execution of the inspection process documented in and checked against an updated quality assurance (QA) plan?	No, but the inspecting agency does have a BMP manual	No	No	No
	9. How is collected data recorded?	Logging Operation Notification, Investigation, and Enforcement (LONIE) database	WVDOF staff collect acreages in conservation from all managing organizations	Database and spreadsheets	iTree Canopy
	10. At what resolution are results reported to EPA and/or the public?	County	County		

ii. BMP Data Validation	11. What is the QA/QC process to prevent double-counting or counting of BMPs no longer in place?	Database query	Acreages are reported for a specific location or property name. Only one acreage value will be counted per location	WVDOF staff spot-check of partner agency project files	WVDOF staff spot-check of partner agency project files
	12. What is the method used to validate state's ability to collect and report correct data?	Database query	Data review	Data review	Data review
	13. If data is provided by external independent party or industry, what method is used to provide adequate QA for acceptance by the Chesapeake Bay Program?	NA	Data review	Cacapon Institute will maintain and collect all data, and WVDOF and WVDEP will provide oversight and will review data submitted	WVDOF staff spot-check of partner agency project files
	14. Who conducts data validation?	WV Division of Forestry	WV Division of Forestry with support from managing organizations	WV Division of Forestry, the Bay Forestry Workgroup	WV Division of Forestry
iii. BMP Performance	15. What is the process to collect data to assess BMP performance and confirm consistency with the Chesapeake Bay Program's approved BMP efficiencies?	WV Division of Forestry staff inspectors will collect data during field inspections at the outset of reclamation	WV Division of Forestry staff will perform a data review and seek confirmation of accuracy of conservation easements in place from managing organizations	Cacapon Institute, with oversight from WVDOF and WVDEP, will collect data and assess performance	
	16. Who collects BMP effectiveness data?	WV Division of Forestry staff	WV Division of Forestry staff	Cacapon Institute	

Note: for agricultural tree planting and riparian forest buffers' verification strategies in tabular form, see the "Structural/Agronomic" column of Table 3, which is in section D.3.

Maryland

http://www.mde.state.md.us/programs/water/TMDL/TMDLImplementation/Documents/BMP%20Verification/MD_Verification%20Protocols_Master_Doc_1.4.16.pdf

Summary

Method for Tracking and Verifying Riparian Forest Buffers

Consistent with the majority of Visual Multi-year BMPs, riparian forest buffers in Maryland are largely implemented through a co-cost share agreement between MACS (State) and USDA (federal) programs. Specifically, riparian forest buffers are installed through the USDA Conservation Reserve Enhancement Program (CREP). Site eligibility determination is consistent with USDA protocols, and site design and technical specifications are followed by SCD staff according to the NRCS standards. SCD staff also coordinates with a Maryland DNR Project Forester to develop a site specific "Planting Plan" for species selection, planting density, etc. Additional details regarding the partnership with Maryland DNR are provided in Maryland's Forestry sector narrative.

At the time of planting or upon completion of the BMP, a final site review is performed by qualified SCD staff in coordination with Maryland DNR to ensure that the project meets appropriate NRCS standards and specifications. This process is completed for 100% of buffer plantings and represents initial verification reported through Conservation Tracker. Documentation within Conservation Tracker

distinguishes riparian buffers as narrow buffers (less than 10' wide), forest buffers (greater than 35' wide), herbaceous buffers (greater than 35' wide), or as non-streamside buffers.

Documentation of Riparian Forest Buffer Verification

Once any BMP is designed and installed in accordance with established NRCS standards, trained SCD staff enters appropriate BMP information into MDA's Conservation Tracker system. SCD staff are responsible for the timely submission of data into Conservation Tracker including Maryland's DRAFT Best Management Practice Verification Protocol 24 spatial location of the BMP, extent or amount of BMP installed in NRCS established official unit of measure, date of final inspection performed by qualified SCD staff, and any cost-share sources (state, federal, farmer or NGO).

In addition, MDA Headquarters receives an annual report from NRCS at the conclusion of the state fiscal year of federally funded practices. This report is cross-referenced with Conservation Tracker to confirm all installed practices have been accounted for by MDA.

All riparian forest buffers implemented under Maryland MACS and USDA co-cost share agreements occur adjacent to agricultural lands and will be reported by MDA through its outlined protocols. MDA staff will coordinate annually with Maryland DNR to ensure no double counting of forested acres

Independent Verification of Riparian Forest Buffers

Re-verification of riparian buffers is subject to the MACS annual spot checks as outlined previously. Additionally, landowners installing riparian forest buffers through USDA-CREP are subject to additional reviews according to the USDA contract. The USDA contracts for riparian forest buffers outline required maintenance and operations expectations for the landowner for the duration of the cost-share contract. Such language includes a recommended annual site review occurring between Years 1 to 3 to determine if the forest planting has successfully established. Currently, site reviews are coordinated between the USDA, SCD staff, and Maryland DNR to revisit 100% of sites in Year 1 to document planting survival. Later, a midcontract site review is required by USDA at 10% of active contracts between Years 6 to 9 (depending on contract length). Reviews are coordinated between the USDA and SCD staff with subsequent follow-up to Maryland DNR if needed. Documentation of these site review findings and any completed MACS annual review will determine if the project status is satisfactory and will serve as 10% re-verification. The BMP status will be updated in the Conservation Tracker system to indicate a "satisfactory" or "unsatisfactory" condition with appropriate notation. A hard-copy report is also filed in the farm's Conservation Plan folder. If the BMP has been determined to be unsatisfactory, trained SCD staff may assist the farmer to bring the practice back into a satisfactory condition within one year. If repairs are not made within the specified time period, the practice will be flagged as unsatisfactory and credit removed as per the National Environmental Information Exchange Network (NEIEN) reporting protocol.

3.1 Forest Conservation

Table 3-1. Forest Conservation Verification Protocol Design Table Summary

Verification Element	Description	Description
BMP or Group	Forest Conservation	Forest Conservation
Geographic Scope	Statewide	Statewide
A. WIP Priority	Low	N/A
B. Data Grouping	Forest Conservation	Forest Conservation
C. Sub-grouping	Forest Conservation Act (FCA)	Land Acquisition and Planning
D. BMP Type	Land Use	Land Use
E. Initial Inspection		
Method	Review of land development application	Visual and GIS-based
Frequency	100% where legally required	100%
Who Inspects?	Local FCA Program Coordinator, verified by state Urban Forester	Various; MD DNR or local conservation NGO employees
Documentation	Approved development plan, stand delineation document, summaries in FCA database	Stewardship Assessment Form; Land conservation easement.
F. Follow-up Check		.
Method	Visual and aerial photos	Visual. 100 %; Annual; Various; MD DNR or local conservation NGO employees; Monitoring report.
Completeness ; Frequency	Varies by jurisdiction Typical practice is 100% ; minimum 3-year intervals	
Who Inspects?	Local planning department	
Documentation	Inspection form, or record in electronic database	
G. Response if Problem	Work with landowner to bring back into compliance	Work with landowner to bring back into compliance; fines or other legal action possible.
H. Lifespan/Sunset	No sunset - permanent protection	No sunset - permanent protection
I. Data QA, Recording & Reporting	FCA Database - summary sent to MDE	FCA Database - summary sent to MDE

3.1.1 Forest Conservation Data Verification

Method

Currently, Forest Conservation Act (FCA) reporting is the sole source of forest conservation data reported by the Maryland Department of Natural Resources Forest Service for BMP credit in the Chesapeake Bay model. Data are generated at the local level (i.e., by counties and some municipalities) by licensed professional planners and foresters from scaled drawings and maps, which are considered to be accurate to the nearest acre. Data are documented in approved development plans held by the local planning department. A small proportion of annual FCA activity occurs at the state level. In this case, data are generated by each of the four regional urban foresters (MD DNR Forest Service) for their respective regions.

Verification Team

Jurisdictions are required, by statute, to submit annual summaries of FCA activities for the previous fiscal year to the Central Region Urban Forester (MD DNR Forest Service). The Central Region Urban Forester verifies all data for completeness and does not accept data if acreage reports are incomplete.

Documentation of Verification

Annual data summaries are maintained in a central electronic FCA database that is backed-up on the Department of Natural Resources server.

Independent Verification

There is currently no independent verification system in place for FCA activities.

3.1.2 Forest Conservation Data Validation

Quality Assurance

In contrast to many BMPs, forest conservation is unique because these lands have fully developed ecological function that supports high water quality. Easement encroachment and/or unapproved forest clearing are the primary concerns for conserved forest. Many local jurisdictions monitor FCA easements at a minimum of 3-year intervals and visits are frequently documented through inspection reports or comments in an electronic database. Only a few jurisdictions do not have the capacity to monitor easements on a regular basis.

Data Entry

The FCA Coordinator sends out requests for data annually to local jurisdiction FCA contacts. Jurisdictions supply the required data in hard copy or electronic form to the Central Region Urban Forester. Typically, data are supplied by the planning department with professional staff, and are summed from forms that ask for the required information with each plan submission. The Central Region Urban Forester sums the data, organizes it into a summary table, and supplies the tabular information as a digital spreadsheet to the FCA Coordinator. The Urban Foresters for each of four regions sum the acreages of conserved lands on state land projects within their regions, and submit the regional summary to the Coordinator for statewide tables.

Separate tables are prepared for Counties, Municipalities, and State Land Projects. Analysis for reporting consists of simple summation, typically done in spreadsheets, which avoids mathematical error and allows for quick review for data accuracy (no extra digits, double entries, etc.). Data are routinely backed up on the Forest Service central server. Digital data and map shapefiles have been collected since 2010. Methods vary by jurisdiction. These data are assembled at DNR by the Chesapeake Bay Forester and then provided to MDE's NEIEN coordinator for submittal to the Chesapeake Bay Program (see Figure 2-1).

External Data

Data are provided from external government agencies as mentioned above.

Historic Data Verification and Double Counting

Historical data is an important component to FCA reporting as the number of jurisdictions that submit annual reports varies from 50-90%. Reporting is more complete during the 5-year program reviews. 5-year reviews also include updated acreage on all projects. Forestry records were provided back for the draft submission, but will be revised to include more historic data in the final submission.

There is no known pathway where FCA activities could be double counted.

3.2 Riparian Forest Buffers

Table 3-2. Riparian Forest Buffers Verification Protocol Design Table Summary

Verification Element	Description	Description	Description
BMP or Group	Riparian Forest Buffers	Riparian Forest Buffers	Riparian Forest Buffers
Geographic Scope	Statewide	Statewide	Statewide
A. WIP Priority	High	Medium	Low
B. Data Grouping	Federal Cost-Shared Agricultural Forest Buffers (CREP/CP-22)	Non-Federal Cost Shared Agricultural and Urban Forest Buffers	"Backyard Buffers" Urban Forest Buffers
C. BMP Type	Structural	Structural	Structural
D. Initial Inspection			
Method	Visual ; typically within 1-year of planting date	Visual ; typically within 1-year of planting date	No inspection
Frequency	100%	100%	No inspection
Who Inspects?	MD DNR or SCD district staff	County staff often with support from MD DNR Forest Service staff	No inspection
Documentation	Conservation Plan	Planting plan and riparian forest buffer data sheet	Pre-registration form for program
E. Follow-up Check			
Method	Visual	Visual and GIS-based	Visual tree survival self-reported by landowner (2013 - 2014)
Frequency	100 % ; 1-2 years after planting and 2-years prior to contract expiration by a certified technician	100 % ; 1-2 years after planting	37% response rate; single survey:
Who Inspects?	MD DNR or SCD district staff	County staff often with support from MD DNR Forest Service staff	Landowner
Documentation	Survival and/or compliance report	Survival and/or maintenance report	Survival report
F. Response if Problem	Work with landowner to bring back into program standards	Work with landowner to bring back into program standards	Adjust reported acres by survival rate (65%); no consequence to landowner
G. Lifespan/Sunset	15-years with possibility of re-enrollment	Non-contractual after establishment	Non-contractual
H. Data QA, Recording & Reporting	MD Dept. of Agriculture reconciled with NRCS	Riparian Buffers Database - summary sent to MDE	Riparian Buffers Database - summary sent to MDE

3.2.1 Riparian Forest Buffers Data Verification

Method

All riparian forest buffers reported at the state level, in which a state DNR forester provided technical assistance, are reported through Riparian Forest Buffer Tracking forms. Forms contain information on site physical attributes (e.g., buffer width and length) and planting stock, and data is maintained in a centralized Riparian Forest Buffer database. Funding source and GPS coordinates of riparian forest

buffers are the critical factors that determine the level of verification required by contract, and to distinguish agricultural from urban buffers for reporting purposes.

Agricultural riparian forest buffer restoration that are funded through state (MACS) and federal (USDA) co-cost shared programs (i.e., CREP) involve many partners including local Soil Conservation District staff, MD Dept. of Agriculture technical service providers, and often but not always MD DNR foresters. Contract information is maintained through the Maryland

Agricultural Cost-Share Program (MACS) database, which is a more complete data source for cost-shared agricultural buffers compared to the DNR database due to data-sharing privacy restrictions. For this reason, acres of cost-shared agricultural riparian forest buffers are reported directly by MDA, and are excluded from DNR reports. 100% of co-cost shared agricultural riparian forest buffers are initially verified through a site inspection the year after planting, and documented through a tree survival or equivalent report.

Non-cost shared forest buffers typically have less stringent contract requirements than costshared agricultural buffers. Nevertheless, these plantings follow the same initial verification and documentation standards as cost-shared buffers with 100% of forest buffers verified through a site inspection the year after planting. Non-cost shared riparian forest buffers are distinguished as either agricultural or urban using GPS coordinates combined with the U.S. Census (2010) Urban and Rural Classification digital map layer.

A second data source for urban forest buffers is the Backyard Buffers Program. This program was created by the Potomac Watershed Partnership in collaboration with the Maryland DNR Forest Service to assist landowners with riparian buffer restoration on their property by providing them with approximately 25-30 tree seedlings (4-5 species per seedling bundle) for self-planting. Due to the scale and nature of this program, there is no initial verification protocol for seedling planting.

Verification Team

Agricultural riparian forest buffer restoration funded through state (MACS) and federal (USDA) co-cost shared programs (i.e., CREP and CP-22) involve many partners including local Soil Conservation District staff, MD Dept. of Agriculture technical service providers, and often but not always MD DNR foresters.

Documentation of Verification

All riparian forest buffers reported at the state level, in which a state DNR forester provided technical assistance, are reported through Riparian Forest Buffer Tracking forms. Forms contain information on site physical attributes (e.g., buffer width and length) and planting stock, and data are maintained in a centralized Riparian Forest Buffer database.

Best management practices funded through state and federal co-cost shared programs are documented in Conservation Plans prepared by trained SCD staff based on site-specific eligibility criteria and data following NRCS guidelines. Non-cost-shared riparian forest buffers are documented through Riparian Buffer Tracking forms.

The number of saplings distributed through the Backyard Buffers Program is reported each year by county foresters to the Back Yard Buffer Coordinator, who is also responsible for maintaining long-term data records.

Independent Verification

There is currently no independent verification system in place for non-federal cost share riparian buffer or Backyard Buffer Program activities.

3.2.2 Riparian Forest Buffers Data Validation

Quality Assurance

For cost shared agricultural buffers, validation of continued performance is required by contract (15-year duration) and occurs through several mechanisms to ensure data quality. In addition to the verification site visit, natural resource partners complete visual site inspections at a minimum of 3-years after planting (the approximate time until establishment), and 2-3 years prior to contract expiration/renewal (the approximate time required to re-establish failed buffers). Inspections at these strategic intervals are completed on 100% of cost-shared projects, and are documented through survival and/or compliance reports. Site visits may occur at more frequent intervals if assistance is requested by the landowner. If a problem is detected, CREP partners work with the landowner to bring the buffer back into compliance, or if the issue is not resolved BMP acres are removed from agency reports.

Non-cost-share riparian forest buffer plantings lack a formal agreement between the grantor and the landowner. Instead, validation of buffer establishment is the responsibility of the grantee, which is often a county, state, or NGO. In Maryland, continued performance is validated through visual sites inspections 2-3 years after planting (the approximate time until establishment) performed by Maryland DNR foresters or with their assistance. Inspections at this strategic interval are completed on 100% of projects, and are documented through survival, compliance, and/or grant progress reports. If a problem is detected, DNR foresters work with the landowner to bring the buffer back into compliance, or if the issue not resolved BMP acres are removed from agency reports. In 2014, the Maryland Forest Service began GIS based assessments for non-cost share buffers at a 10% sampling rate; however, reestablishment of failed buffers may be limited by available funding.

The Backyard Buffer Program does not have an established plan for continuously validating BMP data. Currently, acreage reported for credit is adjusted based on the results of a statewide survey of Backyard Buffer Program participants. In this survey, landowners were requested to self-report survival rate, maintenance activities, causes of tree mortality, and desired tree species. The survey had a response rate of 37%, and a self-reported survival rate of 65%. This rate was confirmed by DNR staff that visually inspecting 10% of the respondents' properties. Therefore, Backyard Buffer acreage is multiplied by 0.65 prior to reporting for BMP credit. High-resolution forest cover imagery could be used in the future to validate Backyard Buffer acreage.

Data Entry

Agricultural riparian buffers are tracked in the Conservation Tracker database by MDA while other riparian buffer data are reported by the DNR regional forester and assembled by the Chesapeake Bay Forester before being provided to MDE's NEIEN coordinator and submitted to the Chesapeake Bay Program (see Figure 2-1).

External Data

Data are provided from external government agencies as mentioned above. Data are sometimes provided by landowners as described above, but typically confirmed by SCD staff or DNR foresters.

Historic Data Verification and Double Counting

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

To avoid double counting acreage between MS-4 and Chesapeake Bay TMDL reporting, county and state submissions are cross referenced for duplicate entries.

At least two areas of double-counting could occur. Projects reported through the state tracking form could also be reported by a planting project partner through the CBP on-line tracking tool, although this has not been seen due to the low volume of information submitted through that venue. This is avoided by having the state riparian forest buffer coordinator check entries from the CBP system against the existing database for duplicate entries, based primarily on location, date, acreage, and length of projects. Another source of double-counting is tracking done through cost-share practices such as the MACS program, which helps fund many but not all of the buffers planted in coordination with the Conservation Reserve Enhancement Program. Double-counting is avoided at the state level by counting the MDA acreage for CREP/CP-22, and reporting non-CREP acreage to MDE from the DNR Forest Buffer Database. MACS acres are likely to be entered one year after the riparian forest buffer database acres, since MACS payments are made after a survival check at the end of the growing season. Duplicates within tracking forms submitted to the database (e.g., more than one forester involved in the planting) are avoided by the duplicate-checking routines set up within the database.

3.3 Upland Tree Planting

Table 3-3. Upland Tree Planting Verification Protocol Design Table Summary

Verification Element	Description	Description
BMP or Group	Upland Tree Planting	Upland Tree Planting
Geographic Scope	Statewide	Statewide
A. WIP Priority	Medium	Medium
B. Data Grouping	Tree planting on mixed land uses (FCA)	Agricultural tree planting
C. BMP Type	Structural	Structural
D. Initial Inspection		
Method	Review of land development application	Visual and GIS-based
Frequency	100% where legally required	100%
Who Inspects?	Local FCA Program Coordinator, verified by state Urban Forester	MD DNR Forester
Documentation	Approved development plan with annual data summaries in FCA database	Forest Stewardship Plan
E. Follow-up Check		
Method	Visual	Visual
Frequency	100% ; 2-years after planting	100%; every 3-5 years depending on tax incentive program
Who Inspects?	Local planning dept. staff	MD DNR Forester
Documentation	Bond release form	Inspection report
F. Response if Problem	Bond will not be released until planting is successful	Potentially severe financial penalties
G. Lifespan/Sunset	Permanent	15-years
H. Data QA, Recording & Reporting	FCA Database - summary sent to MDE	SMART and PMAS Database - summary sent to MDE

3.3.1 Upland Tree Planting Data Verification

Method

Upland tree planting on agricultural and mixed-use land each have a sole source for BMP data. The USDA Forest Service Performance Measurement Accountability System (PMAS) is the basis for reporting technical assistance on private lands including recommended actions on upland agricultural tree planting. Land management recommendations (i.e., initial verified acreage data) are developed through visual property inspections that are compiled into a Forest Stewardship Plan, and are considered to be accurate to the nearest 1/10th acre. Stewardship Plans are written or at a minimum reviewed by a licensed forester, and are required to enroll in cost-share and tax incentive programs, such as Conservation Reserve Enhancement Program – Highly Erodible Lands (CREP-HEL) and Woodland Incentives Program (DNRWIP). Data are Maryland's DRAFT Best Management Practice Verification Protocol 50 reported quarterly by the four Regional Foresters to the state Stewardship Coordinator (Maryland DNR Forest Service).

Forest Conservation Act reporting (see Forest Conservation) is also the sole source of upland tree planting data on mixed-use land. Data are generated at the local level by professional planners from scaled drawings and maps, which are considered to be accurate to the nearest acre. A small proportion of FCA activity occurs at the state level. In this case, data are generated by each of the four regional urban foresters (Maryland DNR Forest Service) for their respective regions. Jurisdictions are required, by statue, to submit annual summaries of FCA activities for the previous fiscal year to the Central Region Urban Forester (Maryland DNR Forest Service). The Central Region Urban Forester verifies all data for completeness and accuracy, and does not accept data if acreage reports are incomplete. Acres of tree planting reported to the Chesapeake Bay Program for credit are considered to be conservative because the number of jurisdictions that submit annual reports varies from 50 to 90%.

Verification Team

FCA data are generated at the local level by professional planners from scaled drawings and maps. FCA activities at the state level are generated by the four regional urban foresters (Maryland DNR Forest Service) for their respective regions.

For PMAS, data is collected by county foresters and summarized by the 4 regional foresters.

Documentation of Verification

As stated above, initial verified acreage data collected through the USDA Forest Service PMAS are compiled into a Forest Stewardship Plan. Stewardship Plans are written or at a minimum reviewed by a licensed forester, and are required to enroll in cost-share and tax incentive programs, such as Conservation Reserve Enhancement Program – CREP-HEL and DNRWIP.

Forest Conservation Act data are documented in approved development plans held by the local planning department, although mitigation planting may take place offsite. Annual data summaries are maintained in a central electronic FCA database that is backed-up on the DNR server.

Independent Verification

There is currently no independent verification system in place for FCA or PMAS activities.

3.3.2 Upland Tree Planting Data Validation

Quality Assurance

Similar to cost-share agricultural riparian forest buffers, cost-share and tax incentive programs have stringent validation protocols for agricultural tree-planting. MD DNR foresters visually inspect upland agricultural tree plantings on 100% of properties every 3-5 years depending upon the cost-share or tax incentive program in which the landowner participates. If a problem is found, MD DNR foresters work with the landowners to bring the planting back into Maryland's DRAFT Best Management Practice Verification Protocol 51 compliance. However, severe financial penalties may be imposed (e.g., payment of back taxes) if a landowner fails to implement recommended actions, and for this reason historical implementation rates have consistently exceeded 95%.

For the FCA Program, developers must post a bond that is released upon successful establishment of the planted area. Plantings are visually inspected 2 years after the planting by the local planning department prior to bond release.

Data Entry

PMAS reports are prepared quarterly, and sum activity by region and county or project area (usually a two-county area) for the quarter. Acreages are supplied from each Forest Service employee to the Regional Forester for each of four regions. The Regional Forester reviews data for each county and enters it into a formatted Excel spreadsheet. The spreadsheet is emailed to the Stewardship Program Manager, who combines each region's data into a statewide summary by region and county for each quarter. The PMAS spreadsheets are backed up on the Forest Service central server to allow access to reporting information to authorized users, and the server is routinely backed up by the IT Division. Summary reports are available to the staff that submitted the data, so there is an opportunity to correct information if needed. Typically, performance evaluation criteria for forestry staff include meeting numeric goals associated with one or more items from PMAS reports, which encourages attention to accuracy in reporting.

USDA Forest Service PMAS data and FCA data are compiled by the Chesapeake Bay Forester at Maryland DNR before being provided to MDE's NEIEN coordinator and submitted to the Chesapeake Bay Program (see Figure 2-1).

External Data

Data are provided from external government agencies as mentioned above.

Historic Data Verification and Double Counting

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

There is no known pathway where FCA or PMAS activities could be double counted.

3.4 Forest Harvest

Table 3-4. Forest Harvest Verification Protocol Design Table Summary

Verification Element	Description	Description
BMP or Group	Forest Harvest	Forest Harvest
Geographic Scope	Statewide	Statewide
A. WIP Priority	Low	Low
B. Data Grouping	Forest Harvest on State Lands	Forest Harvest on Private Lands
C. BMP Type	Management	Management
D. Initial Inspection		
Method	On-site supervision	Review of forest harvest application; visual inspection of timber marking
Frequency	100%	100%
Who Inspects?	MD DNR Forester	Local Soil Conservation District Employee and/or Forestry Board
Documentation	State forest harvest contract; Master Logger certification	Sediment and erosion control permit
E. Follow-up Check		
Method	On-site supervision	Visual and GIS-based assessment targeting properties with stream crossings
Frequency	100% ; continuous over the contract period	approx. 10% ; 10-years
Who Inspects?	MD DNR Forester	MD DNR Forest Service employee or contractor
Documentation	Forest Harvest BMP monitoring form	Forest Harvest BMP monitoring form
Response if Problem	BMP implementation rate reduced	BMP implementation rate reduced
F. Lifespan/Sunset	Effect is approx. 3-years in model; rate determined approx. every 10-years	Effect is approx. 3-years in model; rate determined approx. every 10-years
G. Data QA, Recording & Reporting	State Timber Sales Database - Summary sent to MDE	SMART and PMAS Database - summary sent to MDE

3.4.1 Forest Harvest Data Verification

Method

Forest harvest data are obtained from two sources: harvest contracts on state land and approved sediment and erosion control (SEC) permits on private land. Data for harvested acres on state land are computer generated in Arc-GIS, and timber sale summaries are compiled annually by State Forest Supervisors and the Maryland Forest Service GIS technician. SEC permits are required for forest harvesting on private land in Maryland and are maintained by local Soil Conservation District or County offices depending on the delegation of responsibility from MDE. For private land harvests, when funded, the Maryland Cooperative Extension prepares a quarterly report of timber stumpage prices, and includes a summary of SEC plans reported as summed acreage information from the districts or counties that chose to submit information on request. When the Extension report is not available, harvest acreages are taken from the harvest plan reviews reported by DNR foresters on the PMAS forms, which represent voluntary reviews in counties where forms allow landowners to sign off on DNR technical assistance, and Critical Area, where District Forestry Boards have harvest plan oversight. The private acres reported as using BMPs are calculated by multiplying the permitted acreage by the average BMP

implementation rate found in the most recent statewide study (MD DNR unpublished data, 2007 from 2004/2005 field work). All forest harvest data are considered to be accurate to the nearest acre; however, there is no consistent means for determining the completion of harvest. For example, saturated soils caused by inclement weather can restrict site access and reduce the number of acres harvested. Harvest permits are valid for 2 years across land ownership sectors.

Verification Team

On-site visits of BMP implementation are routinely made by state forestry staff during harvests, and documentation of the visits is increasing as forest certification requires proof of monitoring. Harvesting on State lands requires that the operator be a certified Master Logger, a program that requires additional training in sediment BMPs and safety measures, coordinated by the Maryland Forest Association. Master Logger also requires ongoing education and site visits. The Master Logger BMP checklist is one tool used to document BMP compliance on state lands.

Documentation of Verification

Quarterly timber harvest reports are submitted by Regional Foresters to the Stewardship Program Manager, who maintains long-term records in the PMAS database (see upland agricultural tree planting).

Independent Verification

Data is verified by cross checking sediment and erosion control permits for forest harvest held by local soil conservation offices.

3.4.2 Forest Harvest Data Validation

Quality Assurance

Implementation of forest harvest BMPs are validated through visual and GIS-based assessments. Forest Service staff regularly monitors forest harvest operations on all state forest land throughout the contract period, and implementation of BMPs is estimated to be 99% (Koehn and Hairston-Strang 2009). Inspection reports have improved over the past decade as sustainable forestry certification requires proof of monitoring. In addition, to be eligible to bid on state timber contracts operators must be certified through the Master Logger Program, which includes specialized training in sediment management.

In contrast, validating BMP implementation is more difficult on private land where access for monitoring is at the discretion of the landowner. Where site access is granted, implementation of forest harvest BMPs are validated using the same methods as state owned land through visual and GIS-based assessments. Assessments conducted by MD DNR in 1995 and 2007 found very similar BMP implementation rates on private land (81 and 82 %, respectively), and a more recent assessment is expected to be completed later this year. Approximately 230 sediment and erosion control permits are issued annually for forest harvest on private land, and while the number of monitored sites can span several years, it has consistently exceeded the 10% standard for data quality assurance. Moreover, sites that contain stream crossings and forest buffers are given the highest priority for monitoring due to the disproportionate effect harvest operations may have on water quality in these areas.

Data Entry

Forest harvest data are collected by DNR's Forest Stewardship Coordinator and compiled by the Chesapeake Bay Forester at Maryland DNR before being provided to MDE's NEIEN coordinator and submitted to the Chesapeake Bay Program (see Figure 2-1).

External Data

Data are provided from external government agencies as mentioned above.

Historic Data Verification and Double Counting

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

Pennsylvania

http://files.dep.state.pa.us/Water/ChesapeakeBayOffice/PADEP%20BMP%20Verification%20Program%20QAPP%20Addendum_FINAL.pdf

Riparian Buffers

Verification Procedures

Table 12. Jurisdictional Verification Protocol Design Table: Riparian Buffers

Verification Element	Description
BMP or Group	Riparian Buffers
Geographic Scope	All counties within the Chesapeake Bay Watershed
A. WIP Priority	High
B. Data Grouping	Agriculture
C. BMP Type	Annual, Multi-Year, Structural, Management
D. Initial Inspection	
Method	**NRCS/FSA**: On-site certification. **DEP**: On-site verification conducted by local grant administrators and follow-up by DEP staff initially and on a recurring basis.
Frequency	**NRCS/FSA**: At installation and annually thereafter (depends on practice to some degree). **DEP:** At installation and periodically by DEP staff in the Office of Water Resources Planning. After an initial installation inspection, another inspection will occur within the first 4 years of the establishment period, equaling approximately 25 percent of buffer sites visited annually for verification purposes. Each site is inspected again between years 5 and 10.
Who Inspects	**NRCS/FSA**: Technical Specialist, or a TSP. **DEP**: Program Specialist in the Office of Water Resources Planning.
Documentation	**NRCS:** Immediate reports to District Conservationist and inclusion of a summary of completed spot checks in the year-end Quality Assurance Report. **FSA:** Form FSA-848B. **DEP:** Final project reports. DEP staff collect data during site visits that is used to populate an internal database.
E. Follow-Up Check	
Follow-Up Inspection	**NRCS/FSA**: On-site. **DEP:** Approximately 25 percent of buffer sites are visited annually for verification purposes.
Statistical Sub-Sample	**NRCS:** 5% follow-up on-site inspections. **FSA:** up to 10% follow-up on site-inspections each year.
Response if Problem	**NRCS:** If a practice does not meet specifications, the program participant and the TSP will be notified in writing of the deficiencies and corrective actions needed. A reasonable time period will be specified for the corrective action needed. For TSP assisted practices, failure to correct the deficiency within the specified time period may trigger the TSP decertification process by the STC. When corrective measures have been taken, a final check is to be made and the case closed. If corrective work is not done, the agency providing cost sharing is to be given the information and take further action in accordance with program regulations. The functional success of the riparian forest buffer will be noted; if it is not adequate or not existent, the practice should be downgraded or removed from the NRCS NEIEN report. **FSA:** NRCS or TSP will provide COC signed copies of the annual status reviews and the following information, if applicable: • the reason why the practices have not been established • why the practice does not meet the design standards and specifications • what action must be taken for the practice to meet the standards and specifications • the estimated time it will take to meet the standards and specifications. The functional success of the riparian forest buffer will be noted; if it is not adequate or not existent, the practice should be downgraded or removed from the FSA NEIEN report. **DEP:** Staff coordinate with program leads. If a buffer is not functioning properly (ie, introduction of invasive species, increased mortality, etc), measures will be taken to address those issues. If the buffer longer exists, data is to be removed from the NEIEN report.
F. Lifespan/Sunset	**NRCS/FSA**: Checks practices throughout contract lifespan. The minimum lifespan for riparian herbaceous cover (grass buffer) is 5 years and for a riparian forest buffer is 15 years. **DEP:** The minimum lifespan for riparian herbaceous cover (grass buffer) is 5 years and for a riparian forested buffer is 15 years. Buffer data removed from NEIEN if buffer no longer exists.

G. Data QA, Recording & Reporting	**NRCS/FSA:** Immediate reports to District Conservationist and inclusion of a summary of completed spot checks in the year-end Quality Assurance Report. Data from NRCS/FSA are assumed accurate by DEP. Double-counting is addressed based on funding source information. **DEP:** Data from site visits recorded in an internal database.

Programs Involved in Verification

Pennsylvania reports forest and grass buffer implementation data to the Watershed Model from several sources. Table 11 summarizes information on buffers that is collected and reported through NEIEN:

Table 11. Buffer practices and associated programs.

Source BMP Name	Chesapeake Bay Model BMP Name	Source
Grass Buffers	Grass Buffers	NRCS, CBIG, NMA, 319, REAP, Growing Greener
Riparian Buffer	CREP Riparian Forest Buffer	FSA
Riparian Forest Buffer	Riparian Forest Buffer	NRCS, CBIG, NMA, 319, REAP, Growing Greener

Method

The majority of riparian buffer acreage is implemented under USDA programs. FSA relies on NRCS for technical assistance, taking advantage of their expertise for initial certification and follow-up checks. See Conservation Plans/SCWQA above for information on NRCS initial and follow-up verification procedures. However, FSA also has additional procedures of its own for verification of riparian buffer implementation and maintenance, including a spot-check on up to 10 percent of all CRP-1's (i.e., contracts) before the end of each fiscal year until all practices in the plan are applied and the approved cover is established. The 10 percent required is based on the total number of CRP-1's approved in the previous fiscal year. FSA and NRCS or a TSP are to work together to prioritize and select the contracts and practices on which to complete an annual status review. These procedures are documented in FSA Handbook 2-CRP.

For forest buffers, NRCS or a TSP is required to spot check the site at the end of the second year to determine whether the riparian buffer is established and meets the standards and specifications for NRCS conservation practice code 391A, Riparian Forest Buffer. Information assessed during this process includes:

- Implementation of the approved conservation plan, including tree thinning, if applicable
- Condition of installed practices
- Need for revisions or additional assistance

DEP staff annually visit riparian buffer sites, and determinethe existence and functional success of buffers. Sites visited include projects funded by CBIG, 319, REAP, and Growing Greener. Via a checklist, staff will capture the following data: Location; Type of Buffer; and status of the buffer (to include photos). Upon site visitation PADEP will be fully documenting the current situation and each project site (riparian buffer project) including photos/videos, verification checklist and or site visit form similar to that used by NRCS field staff, major and minor watersheds and pin points GPS location. Buffers will be visited at least three times within a tenyear period. The first visit will be shortly after installation. The

second visitwill be between years one and four and third will be between years five and ten. In the event of an outstanding weather event DEP will revisit ten percent of all plantings within the past two years. In addition, Pennsylvania will be engaging a number of NGO partners to determine interest in assisting with accomplishing this task.

Verification Teams

Staffing

See Staffing under Conservation Plans for information on USDA programs. In addition, Department staff conduct site visits. DEP's annual goal is to visit 25 percent of all buffer sites to conduct verification, and DEP has been able to meet that goal the past few years.

Qualifications, Training, and Certification

See Qualifications, Training, and Certification under Conservation Plans above for information on USDA programs. DEP staff enroll in NRCS training classes.

Training and Certification

See Training and Certification under Conservation Plans above for information on USDA programs. DEP staff enroll in NRCS training classes.

Data Collection and Entry

Information on BMPs implemented through NRCS programs and by FSA through the Conservation Reserve Program (CRP) and Conservation Reserve Enhanced Program (CREP) are obtained for DEP by CBPO staff working under a 1619 Agreement set up between USDA and the USGS. On a yearly basis, USGS staff (or their contractor) provide a specially-prepared Excel file that contains information on FSA-implemented BMPs for a given time period pertaining to that year's NEIEN submission. This information is subsequently reviewed by DEP and reformatted for inclusion in its NPS BMP database.

Data collected by DEP staff visiting buffer sites are entered into an internal database.

Independent Verification of Data

See Independent Verification of Data under Conservation Plans above for information on USDA programs. No independent verification of DEP data is needed, since staff are well trained.

Validation of External Data

Information on BMP implementation obtained from USDA is assumed to be accurate, and the data are not further checked or verified prior to inclusion in the annual submission to CBPO via NEIEN. As described above, BMP data from USDA are obtained and compiled by USGS under an existing 1619 agreement. It is assumed that data tracking and verification protocols followed by USDA meet the requirements established by the CBPO.

Since DEP conducts site visits and collects data, there are no external sources of data to validate.

Addressing Historical Data and Double Counting

Section 3.2.8 of the PA QAPP ("USDA – Farm Services Agency) contains additional information on how historical data is addressed, and how double-counting is prevented. In 2013, DEP addressed historical data issues by correcting the units of BMPs funded by FSA programs. This addressed a reporting error

that occurred when DEP transmitted data in 2009. Since this has been corrected, historical data has been addressed.

The Conservation Plans section of this document explains how DEP prevents double-counting of BMPs that are cost-shared. DEP compares federal and non-federal data and only reports federal data when more than one program funds a BMP.

While developing this document for the PA BMP Verification Program, a determination was made that DEP staff visiting buffer sites will now inform NEIEN data entry staff when a riparian buffer site is determined to no longer be in place. NEIEN data entry staff will remove BMP information in NEIEN to reflect the change in status. This programmatic change will enhance the accuracy of the data being reported.

Verification Gaps

No gaps have been identified for verification of riparian buffers, as federal and state efforts result in nearly 1/3 of sites being verified annually. No gaps have been identified for verification of grass buffers reported from federal sources. Grass buffers reported from state funded sources could be considered, but an analysis to determine the contribution of loading and number of BMPs reported would need to be conducted first to determine if the effort would have merit.

It should also be noted that federal verification protocols used by NRCS, FSA, and others may not be consistent with the technical workgroup verification guidance. Additionally, the Department is not provided the locational data to the federally reported sites, therefore has no means of follow up upon the completion of the federal contract. However, the Department will pursue verification protocols that mirror as closely to the workgroup guidance as possible.

As stated previously, another means of verifying riparian buffers is through the use of high resolution land cover mapping. Riparian buffers are a natural system, and as such, the established buffer acreage should be picked up by routine mapping. This will decrease or eliminate the need for field verification, which will assist Pennsylvania by freeing up staff resources for verification of other BMPs.

Expanded Tree Canopy Protocol

Verification Procedures

Table 22. Jurisdictional Verification Protocol Design Table: Urban Tree Canopy.

Verification Element	Description
BMP or Group	Urban Tree Canopy
Geographic Scope	All counties within the Chesapeake Bay Watershed
A. WIP Priority	Low
B. Data Grouping	Forestry
C. BMP Type	Management
D. Initial Inspection	For new plantings, grantees to the TreeVitalize program are required to submit a final report that includes number of trees planted, species of trees, and date of planting. DCNR Service Foresters act as third party confirmation, signing-off on a grantees request for trees. Any changes to a grantees planting plan must be approved by a TreeVitalize staff member. All new planting projects occur in tandem with TreeVitalize Staff, Service Foresters, Penn State University Extension Foresters, and municipal staff.
Method	Site visit
Frequency	Twenty percent of the tree planting grants will be assessed every year.
Who Inspects	TreeVitalize Staff, PSU Extension Forester, DCNR Service Forester, Tree Tender
Documentation	GIS Geodatabase to track efforts, Excel spreadsheets, and other monitoring related materials
E. Follow-Up Check	
Follow-Up Inspection	Monitoring will begin after trees have been established for two years. To verify the survival of plantings, a random sample will be taken two years after planting on 20% of grants in a given year with 100% of trees within each sample being assessed.
Statistical Sub-Sample	For each of the sampled grants, 100% of the trees will be assessed.
Response if Problem	First, determine why did trees die? Was it lack of work on our part (accepting a poor project), lack of maintenance (a municipality problem), poor species selection, failure to water, etc. The response will be formulated based on the underlying reason for tree mortality.
F. Lifespan/Sunset	The initial lifespan is for 10 years. Our assumption is that after the initial 10 years, the verified plantings will continue to grow, result in a change in land-use, and will be monitored via remote sensing.
G. Data QA, Recording & Reporting	Data will be recorded as GPS data points in a GIS Geodatabase. Site history will be recorded at initial sampling and will be updated as new information is collected. Reporting can take many

Programs Involved in Verification

TreeVitalize® is a public-private partnership established by the Pennsylvania Department of Conservation and Natural Resources (DCNR) to restore tree cover in Pennsylvania communities. The program was launched in 2004, following two influential research reports showing that urban tree canopy, particularly in the greater Philadelphia region, had decreased significantly. Partners rallied together to fund the program, which paid for tree plantings and training of citizens and municipal officials through the PA Horticultural Society's Tree Tenders® program. The program has since spread to all corners of the state, and what began as a tree planting and citizen education program has grown to encompass much more than that. TreeVitalize now covers a broad range of urban and community forestry subjects:

- Provide technical assistance to communities in a variety of tree-related subjects
- Give financial assistance to communities for tree planting, tree inventories, urban tree canopy assessments and tree improvement
- Create urban tree canopy assessments and plans
- Provide training for professionals and communities on how to complete tree inventories that assist communities in planning efforts – with additional value in combating threats such as the emerald ash borer

- Train citizens and municipal officials on how to properly select, plant, and maintain trees in their local communities
- Provide coupons for private citizens to purchase trees at local nurseries
- Get the word out about trees by partnering with local sports teams and public radio station membership drives

Total Impact of the program (2004-2014): Trees Planted—426,720; Tree Tenders Trained— 6,165; Stormwater Reduced--1.5 billion gallons; Stormwater savings--$11.8 million.

In addition to TreeVitalize funding for trees, communities may receive other funds for tree plantings and where possible we will track this information.

Method

For new plantings, grantees to the TreeVitalize program are required to submit a final report that includes number of trees planted, species of trees, and date of planting. DCNR Service Foresters act as third party confirmation, signing-off on a grantee's request for trees and verifying that the trees were planted. Any changes to a grantees planting plan must be approved by a TreeVitalize staff member. All new planting projects occur in tandem with TreeVitalize Staff, Service Foresters, Penn State University Extension Foresters, and municipal staff.

To verify the survival of plantings, monitoring will begin on grantee plantings after trees are established for two years. A random sample will be taken on 20% of grantee projects in a given year with 100% of trees within each sample being assessed. Research shows that mortality is generally the greatest among recently planted trees in year two to three following planting (Miller and Miller, 1991; Richards, 1979; Roman et al., 2013). Numerous criteria and variables exist that affect tree survivability, including: quality and type of nursery stock, installation procedure, urban conditions, site type, presence or absence of irrigation, etc. (Koeser, Gilman, Paz, Harchick 2014). Instead of sampling based on these diverse criteria, a random sample will be selected to ensure that we capture the full range of variability. A random number generator will be used to generate the random sample. Every tree in the sample will be assessed for presence or absence, species, and diameter. TreeVitalize Staff, Penn State Extension Foresters, DCNR Service Foresters, and Tree Tenders will all conduct the tree assessments initially. After several years, the intent is for Tree Tenders to conduct the majority of the assessments.

Survivability will be reported to the Department's Chesapeake Bay Office and the data will be updated in the model.

Verification of forestry practices for TreeVitalize meets the inspection conditions recommended by the Forestry Workgroup. Other cost-share programs may also meet these conditions on a project by project basis, depending on the program. Over a relatively short period of time (<10 years) these BMPs will be captured by the Land Cover imagery and incorporated within the model's land use data such that long-term verification of these practices becomes unnecessary.

Verification Teams

Staffing

There are 5 TreeVitalize Staff, 5 Penn State University Extension Foresters, 23 DCNR Service Foresters, and Tree Tenders.

Qualifications, Training, and Certification

TreeVitalize Staff have Master and Bachelor degrees in Forestry, Social Science, and other relevant fields. Current certifications: ISA Certified Arborist, TRAQ, TCIA, CF and other industry certifications.

Penn State Extension Foresters have Master, PhD and Bachelor degrees in Forestry, Social Science, and other relevant fields. Current certifications: ISA Certified Arborist, TRAQ, TCIA, CF and other industry certifications.

DCNR Service Foresters have Master and Bachelor degrees in Forestry, Social Science, and other relevant fields. Current certifications: ISA Certified Arborist, TRAQ, TCIA, CF and other industry certifications.

Tree Tenders—have taken advanced tree care training.

Data Collection and Entry

Independent Verification of Data

Not applicable

Validation of External Data

Not applicable

Addressing Historical Data and Double Counting

The system of reporting Tree Plantings is managed by a grant administration system that includes project reporting and accounting. A similar system will be setup for future monitoring information and will be managed to ensure against double counting.

Verification Gaps

Gaps in the verification protocol were not identified.

Forest Harvesting Practices Protocols

Verification Procedures

Table 27. Jurisdictional Verification Protocol Design Table: Forest Harvesting Practices.

Verification Element	Description
BMP or Group	Forest Harvesting Practices
Geographic Scope	All counties within the Chesapeake Bay Watershed
A. WIP Priority	Low
B. Data Grouping	Forestry
C. BMP Type	Management
D. Initial Inspection	Before sale starts – Forester meets with logging crew leader and key subordinates to ensure operator understands sale requirements, including E&S plan, logging plan, and haul road construction standards. Inspections are not sampling-based. Agency foresters visit 100% of the sites to verify compliance with harvesting BMPs.
Method	Site visit
Frequency	Weekly (more frequently for right-of-way clearing, haul road construction, wet weather and seasonally high water conditions.) Guidelines for review include: • Water Quality BMPs are in place • Aquatic Buffer Guidelines and set-backs are observed • SFI trained loggers are on site • Timber sale contract compliance • Earth disturbance comprises no more than 10% of sale area
Who Inspects	Sale administrator – agency forester
Documentation	Timber Sale Inspection & Completion Form (FMT-9) (BOF) or Timber Sale Inspection Record (PGC)
E. Follow-Up Check	At sale retirement
Follow-Up Inspection	Closeout
Statistical Sub-Sample	No. 100 percent of sites are inspected.
Response if Problem	All deficiencies must be corrected by operator before closeout.
F. Lifespan/Sunset	Closeout - If any E&S issues emerge thereafter – Agency staff will remediate as needed
G. Data QA, Recording & Reporting	Harvested acres are reported annually and are vetted through headquarters staff before they are submitted to CBP.

Programs Involved in Verification

Pennsylvania reports forest harvesting practices implemented on state forests and state gamelands. State forests are managed by DCNR, Bureau of Forestry (BOF), and state gamelands are managed by the Pennsylvania Game Commission Bureau of Wildlife Management Forestry Division (PGC). Combined, these agencies manage nearly 3 million acres of land within the Chesapeake Bay Watershed.

Method

Each agency individually establishes harvesting goals. These goals are translated into definable objectives through harvest allocation models that set sustained levels of timber harvesting to achieve definable landscape conditions and balanced age classes for a variety of habitat and timber types. Goals are further outlined in the Bureau of Forestry's Silviculture Manual, which is a condensed version of policy, procedure and resource management goals and the PGC's Forestry Manual produced by the PGC's Bureau of Wildlife Habitat Management's Forestry Division.

Agency forester begin scouting for timber sales by following the previously mentioned guidelines. Scouting usually occurs through examining landscapes for all management goals. Potential sales are then inventoried intensively and information gathered is entered into the prescription writer software.

SILVAH, the prescription writer used, was developed collaboratively with the USFS Kane research station. A "prescription" is standard forestry terminology for a type of harvesting to be applied to reach a specific objective or desired outcome. Prescriptions can range from deferment of harvesting, to shelterwood cutting and other preparatory cuts to establish regeneration, to full removal of the overstory if desirable forest regeneration is ready for release.

At every stage of the timber sale process, BMPs are followed to ensure adequate protection of water resources. Streams are buffered, and in the case of state forests, are buffered at a level that exceeds Forest Stewardship Council™ (FSC) certification criteria. Timber haul roads and skid trails are laid out with planned broad-based dips and culverts to prevent accelerated sheet flow and subsequent erosion. During active timber operations, agency foresters conduct weekly inspections and document the inspections on a timber sale inspection form. An example of the BOF sale inspection form (FMT-9) is provided as Attachment 2 to this document. Each sale is inspected to ensure water quality BMPs are properly installed and functioning – every site is visited weekly by a forester while the sale is being actively harvested. During the timber sale inspections, roads and skid trails are monitored weekly for protection of the resource and corrective measures are taken to address any washing, or plugging of drainage measures. The forester also checks environmentally sensitive areas, such as wetlands and stream buffers. If necessary, sales will be shut down during the course of operations to wait for drier weather and/or the operator to correct the issue at hand. Additionally, the forester ensures that all wet areas are avoided and operational buffers are adhered to. After sale operations are completed, roads are re-crowned and ditched prior to seeding with a mix of mostly native herbaceous material to prevent soil translocation. All skid trails are retired and water barred, and roads are blocked and gated to prevent access from by the general public.

Verification Teams

Staffing

There are BOF and PGC foresters whose duties include timber sale administration.

Qualifications, Training, and Certification

Agency Foresters have four year – baccalaureate degrees in forestry, or 2-year technical degrees with at least 2 years' experience working in the field of forestry. All foresters are vetted through the PA State Civil Service System.

Data Collection and Entry

All timber harvest records are filed at agency headquarters in Harrisburg. BOF annually collects timber harvest data from each agency for reporting to the Chesapeake Bay Program. Acreage of the harvest area is digitally derived, based on a GPS survey of the boundaries. Acreages are calculated and the total is provided to DEP for entry in NEIEN.

Independent Verification of Data

The BOF manages nearly 2 million acres of state forest land within the Chesapeake Bay Watershed. These forest lands are managed in accordance with the FSC® standards and are certified (FSC ®

C017154) by Scientific Certification Systems (SCS) under these standards. The FSC ®is an independent organization supporting environmentally appropriate, socially beneficial, and economically viable management of the world's forests. SCS conducts an annual certification audit of a portion of DCNR state forest lands. These audits are rotated across the 2.5 million acre state forest system, so that each forest district is audited at least once over a 5-year period. These audits include an in-depth review of timber harvesting procedures and recordkeeping. More information regarding these certification standards is available at https://us.fsc.org and http://www.scsglobalservices.com/fsc-certified-responsible-forestry. Timber harvests on Pennsylvania Gamelands are not FSC certified and are not subject to independent verification.

Validation of External Data

Not applicable.

Addressing Historical Data and Double Counting

At sale closeout, all timber harvest records, including dates of harvest initiation and completion, acreage, latitude /longitude, county and township location of sale and administrating forester are entered into an electronic database. BOF has maintained this database for several decades. These DRAFT Page | 115 unique harvest records safeguard against double counting. FSC certification began in 1998, so historical data back to this time has a strong verification record.

Verification Gaps

This verification program covers only public lands managed by BOF and PGC.

Harvesting on private lands is not accounted for in this verification program; however, BOF and PGC have no oversight or data on BMP implementation on these lands and they are not reported to NEIEN.

Virginia

http://www.deq.virginia.gov/Portals/0/DEQ/Water/ChesapeakeBay/BMP%20Verification/Virginia%20DEQ_VerificationProgramPlan%204-4-2016.pdf

Riparian Forest Buffers

(See Appendix 4, Table 1)

Forestry BMPs

Verification procedures for BMPs in the Forest sector are outlined in Appendix 3, Table 3. The two BMPs included in this sector can be found in Appendix 4, Table 3. The forest harvesting BMP is an annual practice in the Bay Program modeling systems. This practice requires operators to notify the Virginia Department of Forestry (VDOF) of the operation which then allows VDOF to conduct inspections in

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

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

There are BMPs included in the agricultural and urban sectors that involve trees, such as riparian forest buffers, but these practices will be verified in accordance with the protocols specific to those sectors. The proposed site inspections for these forest related practices include consideration of the common maintenance issues related to water quality for such practices (e.g. tree survival, channelization).

In addition to the verification protocols described in Appendix 3, the VDOF has a Memorandum of Understanding with FSA, NRCS and DCR to provide technical assistance in support of Riparian Forest Buffer establishment projects. VDOF's role is to provide a planting plan to include species selection, planting density, and site preparation if needed (either mechanical, chemical, or both). During the planting operation or shortly thereafter, a VDOF forester will perform a planting quality check to insure that the trees were planted according to the plan and correctly planted, including species size and type, planting density, installation of tree shelters and mats (if required) and appropriate competition control. Two years post planting, a VDOF forester will again perform an inspection to check on planting survival, competition from planted seedlings and to determine any maintenance that may be required. This information is provided to the landowner as well as the agency that is providing the cost-share funding for the project. Any planting failures would be required to be re-planted at that point. The agency that provided the cost-share (NRCS, FSA, DCR through SWCD's) would then be responsible to perform periodic (5 year) spot checks for continued maintenance of the project through the contract period. VDOF partners with those agencies to perform some of these spot checks as time allows. VDOF has also been involved through a technical service agreement to re-visit CRP/CREP Projects to insure adequate tree density for CREP Re-enrollment, this is likely to occur annually as projects come up for re-enrollment. In addition to the cost-share practices that fall under this agreement, planting quality inspection and survival inspection are identified as standard operating procedure for all DOF buffer planting projects as well as hardwood open field planting projects in the Commonwealth.

Analyses of Virginia localities' urban tree canopy (UTC) to determine where and what BMPs are needed was carried out at the request of VDOF in collaboration with the participating localities and funded by the Chesapeake Bay Program, the USDA Forest Service, the Virginia Department of Conservation and Recreation, the Virginia Coastal Zone Management Program at the Department of Environmental Quality and the National Oceanic and Atmospheric Administration. The analysis was performed by VDOF and the Virginia Geospatial Extension Program (VGEP) at Virginia Tech's Department of Forest Resources and Environmental Conservation in consultation with the Center for Environmental Applications and Remote Sensing (CEARS) and the Spatial Analysis Laboratory (SAL) of the University of Vermont.

The goal of the project was to apply the USDA Forest Service's UTC assessment protocols to the participating localities. These analyses were conducted based on year 2008 data. Under the program, localities first conduct an Urban Tree Canopy assessment to set a baseline tree canopy from which they can establish an Urban Tree Canopy target, BMPs and timelines for implementation of that target. To-date, 19 communities have completed tree canopy assessments and several of those having set targets for canopy improvements along with favored BMPs to meet those targets. The Chesapeake Bay Forestry Workgroup is currently working on a Tree Canopy assessment tool that could be utilized by localities with VDOF assistance. This tool is expected to be available by 2017.

Lastly, VDOF currently provides urban forestry management related training through workshops and conferences. A future goal is to Train DOF employees to assist localities in assessing a community's tree composition and distribution and their associated ecosystem services.

Delaware

http://www.dnrec.delaware.gov/swc/wa/Documents/Chesapeake%20BMP%20Verification/DE_NPS_BMP_QAPP_2015_NOV16.pdf

B10.2.1 – List of Forestry BMPs

BMP	BMP Short Name	BMP Description	Unit	Data Source
Streamside Forest Buffers	ForestBuffersTrp	Converts streamside areas to forest. In the model, converts degraded riparian pasture to hay without nutrients. Should be used with Stream Access Control with Fencing to convert from hay without nutrients to forest.	acres in buffers	NRCS, DNREC, DFS
Vegetative Environmental Buffers	Delaware definition only	Tree planting includes any tree planting, except those used to establish riparian forest buffers, targeting lands that are highly erodible or identified as critical resource areas.	acres	DDA, DNREC
Forest Buffers	ForestBuffers	Agricultural riparian forest buffers are linear wooded areas along rivers, stream and shorelines. Forest buffers help filter nutrients, sediments and other pollutants from runoff as well as remove nutrients from groundwater. The recommended buffer width for riparian forest buffers (agriculture) is 100 feet, with a 35 feet minimum width required.	acres in buffers	DDA, DNREC, USFWS
Tree Planting	TreePlant	Tree planting includes any tree planting, except those used to establish riparian forest buffers, targeting lands that are highly erodible or identified as critical resource areas.	acres	NRCS, USFWS, DFS, DelDOT, DNREC
Forest Harvesting Practices	ForHarvestBMP	Forest harvesting practices are a suite of BMPs that minimize the environmental impacts of road building, log removal, site preparation and forest management. These practices help reduce suspended sediments and associated nutrients that can result from forest operations.	acres	DDA
Urban Tree Planting; Urban Tree Canopy	UrbanTreePlant	Urban tree planting is planting trees on urban pervious areas at a rate that would produce a forest-like condition over time. The intent of the planting is to eventually convert the urban area to forest. If the trees are planted as part of the urban landscape, with no intention to covert the area to forest, then this would not count as urban tree planting	acres	DDA

Summary

DDA Forestry Harvesting

The DDA Delaware Forest Service (DFS) provides acreage of harvested forestland. DDA-DFS provides GIS coverage of permitted timber harvest practices in the Chesapeake Bay watershed. HUCs are identified using GIS by intersecting the Timber Harvest coverage with the USGS HUC12 coverage to determine the HUC 12 for each harvest area.

Historical Harvested Forest Data

DNREC-DWS-WAMS and DDA-DFS worked collaboratively in the summer of 2013 to update forest harvest area data by digitizing harvested forest areas with ArcGIS. The digitization of these harvest areas are linked to an Access database containing all permit information, creating a spatial reference. Capturing these data will allow Delaware to report these historical harvested forest data for inclusion in the CBWSM. A complete methodology is listed in Appendix D.

DDA Forestry Tree Planting

The Department of Agriculture's Delaware Forest Service (DFS) provides acreage of afforestation tree plantings. DDA provides GIS coverage of tree planting in the Chesapeake Bay watershed. HUC12s are identified by using GIS for each planting area. The GIS coverage includes an attribute table that includes the "type" of project (either afforestation or reforestation). Only "afforestation" records are included in the progress run. Most of Forestry's reforestation projects are cost-shared through NRCS funds; and therefore, are already counted by NRCS data. When the project is paid by DDA Forestry or the private landowner that information will not be reported by NRCS and only DFS acreage will be used in the progress run.

DDA Urban Tree Planting

The DDA-DFS provides number of trees planted, by the Urban and Community Forestry Program, in Microsoft Word. The data are entered into Excel with unique identifier, implementation date, number of trees, and HUC.

DNREC Restoration Database

DNREC –DWS-WAS maintains a restoration database that captures restoration practices like wetland restoration, tree plantings, forest buffers, and grass buffers. These practices are compiled from various projects throughout DNREC. The restoration database links DNREC BMPs to NRCS practice codes. The database is not set to match the BMPs reporting to EPA-CBPO. Therefore, DNREC-DWS-WAMS must make judgment calls when assigning acres (or other units) to specific EPA-CBPO BMPs. Double counting is unlikely to occur for forestry harvesting practices because they are being provided by one agency (DDA). The same is true for urban tree planting data. This data is only submitted by DDA-DFS. Forest buffers are submitted by multiple agencies and funding sources are distinctively tracked by the QA Manager. As a result, double counting is avoided.

2.2.1 Forest Buffers, Tree Planting, and Urban Tree Planting

These three BMPs – forest buffers, tree planting, and urban tree planting - were grouped together because they all follow the same verification and validation protocol. Table B10.3.1 in Section B.10 of

this QAPP provides definitions for each of these BMP types. Details regarding verification and validation procedures for these three practices are contained in Table 2.2.1.1 and summarized in the following sections.

2.2.1.1 Table - Forest Buffers, Tree Planting, and Urban Tree Planting

A. BMP Priority	B. Data Grouping	C. BMP Type	D. Initial Inspection (is the BMP there?)				E. Follow-up Check			F. Lifespan/ Sunset (Is the BMP no longer there?)	G. Data QA, Recording & Reporting
			Method	Frequency	Who Inspects	Documentation	Follow-up Inspection	Statistical Sub-Sample	Response if Problem		
High	Visual Assessment: Multi-Year	Cost-Shared Agricultural Forest Buffers	Visual Inspection	100% post installation	NRCS staff	Inspection form and signed contract	Visual assessment – FSA	5% annually or 100% by end of contract lifespan	Bring back into compliance or loss of money – must pay back funds.	Contract Lifespan 15 yrs	Toolkit, 319 Program Database; if fail inspection documented and filed at FSA. If reenrolled information is updated in NPS BMP database.
High	Visual Assessment	CREP RFB	Field Inspection	100% post installation (1 year after)	Delaware CREP Coordinator (Partnership between USDA FSA and DNREC 319 Program)	319 Program Data Tracking	Mid - Contract	100% Initial by DDA, 100% post installation, 100% Mid-Contract, 100% sampled by end of contract	Compliance Letter	10-15 yrs.	100% Tracked by FSA and 319 Program database
High	Visual Assessment: Multi-Year	Cost-Shared Agricultural Tree Planting – NRCS EQIP	Visual Inspection	100% post installation	NRCS staff	Inspection form and signed contract	Follow-up inspection conducted via aerial imagery thru CBPO. No inspection required due to Land Use change.	GIS analysis; 100%	Bring back into compliance or loss of money – must pay back funds.	10 yrs – Land Use change in Model	Toolkit. If reenrolled information is updated in NPS BMP database.
High	Visual Assessment: Multi-Year	Cost-Shared Agricultural Tree Planting – Delaware Forest Service (DFS)	Visual Inspection	100% during installation and post installation (1 year after)	DDA foresters	Forestry database entered using cost share forms (DDA funding)	Survival Checks conducted one year after implementation	100%	Work with landowners to bring into compliance	10 yrs – Land Use change in model	DDA Forestry Database – files sent to NPS BMP database.
High	Visual Assessment Multi year	Cost Share Ag Tree Planting – DFW	Visual Inspection	100% during instllation and post installation (1 year after)	DFW biologists	Spreadsheet form – LIP inspections	Annual Inspection for each project in contract	100% Initial; 100% Mid-Contract; 100% by end of contract lifespan	Work with landowner to resolve	10 yrs	LIP database to NPS BMP database.
High	Visual Assessment Multi year	Ag Tree Planting – public lands	Visual Inspection	100% during installation and post installation	DFW biologists	DFW database	Survival Checks conducted one year after implementation	100%	Work to establish per planting specification	10 yrs – Land Use change in model	DFW Database – files sent to NPS BMP database.
Low	Visual Assessment Multi year	Cost Share Urban Tree Planting	Visual Inspection – reported by # trees	100%	DDA urban foresters	Urban database	Visual Inspection for each project before payout	100% within 3 years	Work with contract (local govt) to resolve	10 yrs	Urban Database

2.2.1.2 Data Verification

Method

One hundred percent of all forest buffers, tree planting and urban tree plantings are inspected during the lifespan of the contract (ag tree planting and buffers) or project (urban). BMPs are collected by multiple agencies:

- Ag forest buffers – USDA standard - implemented by USDA and DNREC
- Ag tree planting – USDA standard – implemented by USDA, DNREC and DDA
- Urban tree planting – CBP definition – 100 trees/acre – implemented by DDA

The listed BMPs meet NRCS, State, and Chesapeake Bay Program definitions for forestry practices. All are inspected by visual on-site inspection during the time of BMP implementation as required by NRCS and CREP contracts, and DNREC/DDA projects. Funding for these BMPs are provided by USDA programs or state cost share funding. Additional funding is available through CWA Section 319 Grant, US Forest Service, and Chesapeake Bay Implementation (Section 117) Grants funds.

In Delaware, DDA DFS installs most large scale buffer and tree planting projects. DFS inspects 100% of plantings post installation. Approximately 1 year after planting, DFS inspects the projects again (100%). One hundred percent of the buffer and tree planting projects are spot checked on average every 7.5 years by the cost sharing agency (NRCS, DFW, DFS, etc). During this time, projects are assessed for water quality impacts. NRCS verification timing will be at the organization's discretion. A final inspection is completed at contract or lifespan expiration (approximately 10-15 years). Once project lifespan or contract expires, Delaware will use high resolution imagery and Light Detection and Ranging (LiDAR) data to determine the existence of riparian forest buffer and tree planting practices.

Data collection includes implementation date, project type, and project size. Projects submitted by NRCS are reported at the county level. An outline of practice data submissions can be found in section B10 of Delaware's QAPP. Additionally, in 2010, an agreement (Basinwide 1619 Agreement) was reached to have federal agencies, such as the USDA's NRCS and FSA, report practices directly to the USGS for CBP modeling rather than have jurisdictions report on their behalf. All other submitted practices are reported at the site-level, with corresponding latitudelongitude coordinates. All BMPs currently reported are approved by CBP for inclusion in model application.

Verifiers

All practices are inspected by visual on-site inspection during the lifespan of the BMP as required by the cost sharing agency. BMP data are collected for several years by the aforementioned agencies to determine if BMPs are functioning properly. The time and frequency of sampling has a large influence on quality of information gained. While forestry practices are present year-round, most of the verification will occur during the growing season.

BMP inspectors are trained NRCS, DDA, or DNREC agency employees. Training is ongoing as all new personnel are trained in the collection of BMP data; however, there is no "certification requirement" for staff collecting BMP data. If any of the data collectors have questions regarding functionality, contact is usually made with USDA NRCS.

DFS Urban foresters have made great strides to capture urban forestry grant funded tree planting projects and verify historical practices. For urban tree planting, DFS urban foresters have reviewed

historical grant files and visited tree projects and evaluated the location of trees. For each tree planting project, site observations are made and geolocated – presence and absence of trees are noted.

Documentation of Verification

BMPs are inspected and entered into databases by trained NRCS, DFS Foresters, or DNREC Scientists or Biologists. Each Agency has separate databases for their reportable BMPs:

- DDA DFS Planting Database – agricultural tree planting data implemented by DDA DFS is geolocated and stored in GIS shapefiles. DFS foresters are responsible for entering their own planting data. Additional QA is performed by a senior forester and GIS manager on data entries. Planting projects performed on State Forest owned lands are also entered into the Planting database.
- DDA DFS Urban Database – urban tree planting data implemented by DDA DFS urban foresters are geolocated and stored in an Urban Database. The Urban forestry coordinator enters and stores information in the database provided by the urban foresters.
- DNREC Landowner Incentive Program (LIP) Database – DNREC DFW biologists maintain spreadsheets for those landowners enrolled in LIP. The LIP manager maintains the database and submits data for CB progress.
- USDA Toolkit – NRCS cost shared practices
- 319 USDA FSA CREP Program – riparian forest buffer data are maintained on private servers within DNREC in excel and GIS databases at the Delaware 319 NPS Program Office. The CREP coordinator maintains data and submits for CB progress.

Data regarding the location of each BMP, visual functionality, and whether or not the practice is meeting standards and specifications are recorded in written files as well as the respective databases. Due to the large number of contracts held by cost sharing agencies like USDA NRCS and FSA, Delaware is confident that 90% of all riparian forest buffers are avoiding water quality impacts because landowners comply with contract requirements to receive monetary payment.

End of contract/project lifespan

All CREP contracts will be fulfilled to contract end date; federal funding is secure and payments will continue through the active period of the contract up until re-enrollment. After contract end date, if State funding is secured, contracts will be re-enrolled for another term; however, if State funding is not secure, the acreage will not be re-enrolled. The CREP Coordinator will inspect riparian forested buffers if the landowners' will continue to allow the BMP to function. If contracts are renewed or inspected without incentive payments, the DNREC CREP coordinator will submit updated data to the DNREC Quality Assurance Officer for inclusion in Delaware's reporting and tracking database. Draft Plan provided to EPA on November 16, 2015 99 All other forestry BMPs will be reviewed after contract end date. All implementers will work together to inspect tree planting projects after contract end date. In order to prioritize forestry needs, it is essential to have a good understanding of the current resource. Once project lifespan or contract expires, Delaware will use high resolution imagery and Light Detection and Ranging (LiDAR) data to determine the existence of riparian forest buffer and tree planting practices. The Delaware Forest Service has quantified the spatial extent of forests and urban tree canopy coverage in the State. Periodically, DNREC and DFS will use these original datasets developed by DFS to determine if a net gain occurs over time and practices exist upon expiration.Additionally, the U&CF with

DNREC will utilize Davey i-Tree software to set tree canopy goals and facilitate proper urban forest management strategies. Furthermore, the CBP Forestry Workgroup will release new High Resolution Land Cover dataset for the Phase 6 Watershed Model. This imagery will allow jurisdictions to further enhance verification programs.

2.2.1.3 Data Validation

Quality Assurance

All (100%) forestry practices are inspected within the contract/project lifespans. Additionally, checks are made upon implementation and before contract end dates – hence, BMPs are verified for functionality. Inspection records (pass/fail) will be provided to DNREC's Watershed Assessment and Management Section (WAMS) for inclusion in Delaware's existing NPS BMP Database and submission to the CBP through NEIEN.

The DE NPS BMP Database is an online database that serves as a means of reporting and tracking BMPs in the state of Delaware. The use of this tool allows for a more streamlined approach for generating reports needed for water quality assessment and monitoring purposes. This database is used to submit data for inclusion in the Chesapeake Bay Watershed Model. Individual organizations are responsible for entering their practices with their provided login information and are only be permitted to review their own data.

The data are entered into the agriculture Excel template (Appendix I) for upload into the NPS BMP Database. To confirm that the correct information has been copied into the templates from the raw data, the total area (e.g., acres) or numbers for each BMP type are summed and compared to the original dataset to be sure there were no errors in translating the data. Data are also compared to previous years' submissions to see if numbers are consistent (i.e., no extreme increases or decreases in acreage or count). The methodology for entering data for each BMP type is recorded every year so that the same methodology is consistently used year to year. See QAPP Section B10.3 for specific urban BMP submittal methodology.

The DE BMP database is currently stored on a secure server by Tetra Tech, Inc. However, it is likely that within the next year, the database will be moved to DNREC's server where DNREC staff will have access to it for uploading data to NEIEN and CBP on an annual basis. The BMP progress data are currently submitted to CBP every year by Tetra Tech, but once the database is moved to DNREC's server it is assumed that DNREC staff will take over the data submission process with assistance from Tetra Tech through an O&M contract supported by CBRAP funding.

Data Entry

Data are collected and entered into the respective cost sharing entity's database by trained staff. Forestry data are provided to Tetra Tech to input into the DE NPS BMP Database using the NEIEN input template with the correct NEIEN BMP names (see QAPP Section B10 for additional details on the parties involved in data submission to NEIEN). DE's NPS BMP Database is mapped to provide the data required to NEIEN and the CBP.

The lifespan or credit duration of each BMP is also entered in the template based on the CreditDurations05222015.xlxs spreadsheet provided by CBP. The code in the DE NPS BMP Database has been modified so that the lifespan/credit duration is added to the implementation date of a particular BMP to calculate the Lifespan End Date. Once the Lifespan End Date has been passed, that BMP will be tagged as "retired" unless that BMP been inspected or maintenance has been performed. If an inspection or maintenance has occurred and the BMP is functioning properly, the BMP is credited with a new lifespan.

Double counting is unlikely to occur for these forestry practices because they are being tracked by the funding agency.

Training for entering data into DE NPS BMP Database has been provided by webinar in the past (2013) and an additional face to face training will occur at DNREC in 2016. Tetra Tech will conduct the training to review use of the database and any updates to the database since the original training. The NPS BMP Database also contains a link to the user's manual. There will be no "certification" required to enter data. However, the person entering data will receive some training on how to use the database and enter data properly. DNREC will likely have an O&M contract with Tetra Tech to address any issues with the NPS BMP Database in the future and to provide any additional training if necessary (e.g., if there have been significant updates).

External Data

Data are provided from external government agencies as mentioned above. The data are checked to be sure that they have been provided for the correct time period and that all necessary fields for NEIEN have been included.

Historic Data Verification

Historic data were provided by some of the cost sharing agencies. Data quality assurance and data entry were conducted the same way as in the past (as discussed in the above sections). For additional information on historic data collection, please see Appendix H.

BMP Performance

During the visual field assessment, the BMPs are inspected for compliance or failure by implementing agency. If a BMP is not performing up to its standards and specifications, a maintenance inspection report or letter is provided to the landowner. Agency staff work with landowners to bring the BMP back into compliance or the landowner must pay back the funds used to implement the BMP.

2.2.2 Forest Harvesting Practices

Through the Erosion and Sediment Program, the Delaware Forest Service ensures forest management activities follow Best Management Practices (BMPs), and thus comply with the Forest Harvesting Practices via the Forest Practices Erosion and Sedimentation Law (Title 3, Chapter 10, Subchapter VI). Loggers or operators submit a permit prior to commencing forest management activities, and DFS staff reviews the site during the operation. Forest harvesting practices are temporary, while the other BMPs

have a much longer lifespan. Details regarding verification and validation procedures for erosion and sediment control practices are contained in Table 2.2.2.1 and summarized in the following sections.

2.2.2.2 Data Verification

2.2.2.1 Table – Forest Harvesting Practices

A. BMP Priority	B. Data Grouping	C. BMP Type	D. Initial Inspection (is the BMP there?)				E. Follow-up Check			F. Lifespan/Sunset (Is the BMP no longer there?)	G. Data QA, Recording & Reporting
			Method	Frequency	Who Inspects	Documentation	Follow-up Inspection	Statistical Sub-Sample	Response if Problem		
Low – CB WIP High - Forestry	Visual Assessment Regulatory	Forest Harvesting Practices	Visual Inspection	100% inspected initially; upon receipt of E&S Permit from landowner/ logger	DDA FS Staff	Timber Harvest Inspection Reports	Possibly multiple times during the permit cycle. At least 1 inspection- done after job is completed.	100%	Work with loggers to address concerns – verbal warnings & remediation plan. If Severe – have regulatory action (fines).	3 yrs.	Database – GIS polygons provided at parcel level to NPS BMP db.

Method

Forest harvesting practices are regulatory and 100% of all practices are inspected during the duration of an Erosion and Sediment Control permit. The forest harvesting practices comply with the Forest Practices Erosion and Sedimentation Law (Title 3, Chapter 10, Subchapter VI). All BMPs are inspected by visual on-site inspection during the time of permit application, during silviculture operations. Operators provide written notification to DFS at least five (5) business days prior to initiation of covered silviculture operations greater than one acre.

Site operators are responsible for following BMPs as indicated on the Erosion and Sediment Law Notification Form and Permit until a forester has made a final inspection of the site and issued a final inspection report. Forest Harvesting BMPs are collected by the Delaware Forest Service. All practices are reported at the site-level, with implementation date (date of permit), and corresponding latitude-longitude coordinates. All BMPs currently reported are approved by CBP for inclusion in model application.

Verifiers

DFS Foresters visit silviculture operation tracts, perform BMP inspections, and record total acreage of forest harvesting BMPs. During the course of the inspection, a forester will determine the status of the effectiveness of BMPs in protecting water quality and record this determination on the inspection forms. If a potential water quality problem exists, as defined by the law, the forester will document the problem on the BMP inspection forms.

Documentation of Verification

BMPs are inspected by a DFS forester and documented on the BMP inspection form. Water Quality (WQ) classifications are used to determine severity of problems:

1. No WQ problem
2. Potential WQ problem – a typical problem that would cause excessive sedimentation and erosion during a normal rainfall.
3. Severe WQ problem – any silvicultural activity which is causing sediment deposition or will immediately create serious sediment deposition in a rainfall event.

If no WQ problem exists, the landowner and operator are notified on site, if possible, and in writing within five (5) business days following the inspection. However, if a potential WQ problem exists on an initial field visit, the Forester will note the problem on the BMP inspection form, including written directions to alleviate the potential problem, to the operator and landowner, and a time limitation of up to five (5) business days to correct the problem. The Forester will notify his/her immediate supervisor of the existence of a potential WQ problem. When the time limitation specified in the recommendation for a potential WQ problem has elapsed, the Forester will return for a second visit. If the problem persists with no extenuating circumstances such as bad weather, all operations will be halted until specified corrective actions have been made to the satisfaction of the Forester.

If a severe WQ problem exists, such as skidding logs across a stream or ditch with no bridge, the Forester will cause all operations to cease immediately, issue a written warning containing Draft Plan provided to EPA on November 16, 2015 104 instructions how to immediately correct the problem. If WQ problems are not resolved, the Department will take actions on the operator including no further issuance of permits or a fine.

Forest harvesting practices are entered into the DFS GIS database by DFS Foresters. Data regarding the location of each BMP, visual functionality, and whether or not the practice is meeting standards and specifications are recorded in written files.

End of contract/project lifespan

Harvest permits are annual practices and thus have a lifespan of one year.

2.2.2.3 Data Validation

Quality Assurance

All (100%) forestry practices are inspected within the contract/project lifespans. Additional, checks are made upon implementation and before contract end dates – hence, BMPs are verified for functionality. Inspection records (pass/fail) will be provided to DNREC-DWS-WAMS for inclusion in Delaware's existing NPS BMP Database and submission to the CBP through NEIEN.

The DE NPS BMP Database is an online database that serves as a means of reporting and tracking BMPs in the state of Delaware. The use of this tool allows for a more streamlined approach for generating reports needed for water quality assessment and monitoring purposes. This database is used to submit data for inclusion in the Chesapeake Bay Watershed Model. Individual organizations are responsible for entering their practices with their provided login information and are only be permitted to review their own data.

The data are entered into the agriculture Excel template for upload into the NPS BMP Database. To confirm that the correct information has been copied into the templates from the raw data, the total area (e.g., acres) or numbers for each BMP type are summed and compared to the original dataset to be sure there were no errors in translating the data. Data are also compared to previous years' submissions to see if numbers are consistent (i.e., no extreme increases or decreases in acreage or count). The methodology for entering data for each BMP type is recorded every year so that the same methodology is consistently used year to year. See QAPP Section B10.3 for specific urban BMP submittal methodology.

The DE BMP database is currently stored on a secure server by Tetra Tech, Inc. However, it is likely that within the next year, the database will be moved to DNREC's server where DNREC staff will have access to it for uploading data to NEIEN and CBP on an annual basis. The BMP progress data are currently submitted to CBP every year by Tetra Tech, but once the database is moved to DNREC's server it is assumed that DNREC staff will take over the data submission process with assistance from Tetra Tech through an O&M contract supported by CBRAP funding.

Data Entry

Data are collected and entered into the respective cost sharing entity's database by trained staff. Forestry data are provided to Tetra Tech to input into the DE NPS BMP Database using the NEIEN input template with the correct NEIEN BMP names (see QAPP Section B10 for Draft Plan provided to EPA on November 16, 2015 105 additional details on the parties involved in data submission to NEIEN). DE's NPS BMP Database is mapped to provide the data required to NEIEN and the CBP.

The lifespan or credit duration of each BMP is also entered in the template based on the CreditDurations05222015.xlxs spreadsheet provided by CBP. The code in the DE NPS BMP Database has been modified so that the lifespan/credit duration is added to the implementation date of a particular BMP to calculate the Lifespan End Date. Once the Lifespan End Date has been passed, that BMP will be tagged as "retired" unless that BMP been inspected or maintenance has been performed. If an inspection or maintenance has occurred and the BMP is functioning properly, the BMP is credited with a new lifespan.

Double counting is unlikely to occur for these forestry practices because they are being provided by one agency (DDA) and there are no cost-share practices.

Training for entering data into DE NPS BMP Database has been provided by webinar in the past (2013) and an additional face to face training will occur at DNREC in late 2015. Tetra Tech will conduct the training to review use of the database and any updates to the database since the original training. The NPS BMP Database also contains a link to the user's manual. There will be no "certification" required to enter data. However, the person entering data will receive some training on how to use the database and enter data properly. DNREC will likely have an O&M contract with Tetra Tech to address any issues with the NPS BMP Database in the future and to provide any additional training if necessary (e.g., if there have been significant updates).

External Data

Data are provided from external government agencies as mentioned above. The data are checked to be sure that they have been provided for the correct time period and that all necessary fields for NEIEN have been included.

Historic Data Verification

Historic data were previously captured by a joint project with DFS and WAMS – see Appendix D. Data quality assurance and data entry were conducted as discussed in the above sections. For additional information on historic data collection, please see Appendix H.

BMP Performance

During the visual field assessment, the BMPs are inspected for compliance or failure by implementing agency. If a BMP is not performing up to its standards and specifications, a maintenance inspection report or letter is provided to the landowner. Agency staff work with landowners to bring the BMP back into compliance or the landowner must pay back the funds used to implement the BMP.

District of Columbia

http://www.chesapeakebay.net/documents/Revised_District_of_Columbias_DRAFT_Best_Management_Practice_BMP_Verification_Protocol_-_November_2015.pdf

Summary

District Department of Transportation (DDOT) Urban Forestry Administration (UFA)

DDOT Urban Forestry is responsible for tracking the number and location of trees planted in the public right of way. DDOT Trees QA/QC's this data and then provides it to DOEE Planning and Restoration Branch, who reviews, standardizes, and incorporates the information into the tracking & reporting database

Tree Planting and Preservation

Existing trees can be preserved or new trees can be planted to reduce stormwater runoff. Tree canopy can intercept a significant amount of rainfall before it becomes runoff, particularly if the tree canopy covers impervious surface, such as in the case of street trees. Through the processes of evapotranspiration and nutrient uptake, trees located on a development site have the capacity to reduce stormwater runoff volumes and improve water quality. Further, through root growth, trees can improve the infiltration capacity of the soils in which they grow.

DOEE recognizes the need to perform regular assessments of tree canopy as suggested in the forestry verification guidance. This assessment will be required to evaluate progress toward Revised Final Draft - November 2015 11 meeting the district's Sustainable DC Plan's goal of increasing the district's tree canopy to 40% by 2032. As discussed in A7: Potential Bias, the district anticipates incorporating DDOT UFA data for tree mortality into NEIEN submissions, with the goal of better representing the net gain in trees.

Data Reporting

The District currently tracks tree planting in the city from three sources: District Department of Transportation, Urban Forestry Administration (UFA) tree planting activity, DOEE grant funded tree planting activities, and tree planting efforts reported by other non-funded groups such as the National Park Service and Casey Trees. DDOT-UFA is currently tracking and reporting individual, verifiable tree

plantings using GIS. Casey Trees also reports unique tree planting Revised Final Draft - November 2015 20 records for DOEE funded projects, but does aggregate (or compile) privately-funded tree plantings by block in order to protect consumer privacy. The reporting for each of these activities is on a "pull" basis where DOEE makes an information request to the major tree planters requesting the tree planting information. UFA provides DOEE with a list of planted trees, their species and the closest address to their planting location. DOEE grantees are required to report on their deliverables and DOEE WPD confirms that the grantee has indeed completed the reported work. Finally, DOEE asks other tree planting organizations to provide information on the number and location of trees they planted over the past fiscal year. These plantings are non-regulatory and the numbers are not confirmed. DOEE PRB collects this information from each of these sources, geocodes the data when possible, and QA/QCs it. PRB and SMD transmits the geocoded data to the Bay Program. Trees that were planted but not geocoded are assigned proportionally to each of the District's four 10 digit Hydrologic Unit Code watersheds and reported to the CBP.

Urban Tree Planting

The Urban Forester maintains a GIS database for all street trees detailing the last inspection date, inspector, tree species, tree condition, notes, and the data enterer. The table below documents the following verification and follow-up validation procedures.

Maintenance Tasks	Frequency	Time of Year / Timing
Inspect tree for health and establishment and report any changes to UFA via 311 or 311.dc.gov.	Three times during establishment; Every five years for life of tree	Spring 1st season Fall 1st season Fall 2nd season
Remove stakes and wires.	One time	One year after planting
Water tree – first year	25 gallons Weekly via slow release device	April-October
Water tree – second & third year	25 gallons Bi-Monthly via slow release device	April-October
Remove weeds and trash	Quarterly	March-November
Mulch with 3 inches double ground shredded hardwood mulch. Place much in a ring to capture rain water. Mulch shall not be mounded around tree.	Annually or as needed.	Feb-April
If tree pruning is needed, call 311 or 311.dc.gov to request an inspection by UFA.	As-needed	
Remove sediment and trash from any inlets and slot drains	Annually	

New York

http://www.dec.ny.gov/docs/water_pdf/nycbaynpsqapp.pdf

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