DISTRICT OF COLUMBIA
CHESAPEAKE BAY PROGRAM
BEST MANAGEMENT PRACTICES
DATA MANAGEMENT, REPORTING, AND VERIFICATION

QUALITY ASSURANCE PROJECT PLAN

Revised Final Draft

November 16, 2015

A1: Title and Approval Sheet

District of Columbia Chesapeake Bay Program Best Management Practices (BMP) Data Management, Reporting, and Verification

Quality Assurance Project Plan (QAPP)

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A2: Table of Contents

A3: Distribution List

Customers and Stakeholders

- Customers: U.S. Environmental Protection Agency
- Stakeholders: District of Columbia government agencies, DC Water, federal agencies, and the general public.

A4: Project/Task Organization

Table A4. Overview of Sector verification prioritization and subgroupings.

Verification Sectors	Importance / Prioritization	Key Subgroupings and prioritization
Wastewater	High	Blue Plains WWTP (& other minor facilities), CSS Control through grey and green infrastructure. The district does not have a septic sector.
Urban Stormwater	High	Stormwater retrofits required by Stormwater Regulations, Government investment (Federal Agencies, DDOT, DGS, DOEE).
Stream Restoration	Medium	Stream restoration efforts are performed with the primary intention of improving stream ecological function and habitat restoration. Projects are often designed to reconnect streams with floodplains, attenuate peak flows, and stabilize banks. When successful, these results provide the added benefit of reducing sediment and associated nutrient pollution.
Forestry	Low	Urban tree planting in the district is primarily conducted to increase canopy cover and provide stormwater retention. The majority of forested lands in the district are protected parklands.

Wetland Restoration	NA	Wetland BMPs have historically been implemented as stormwater controls, rather than habitat restoration.
Agriculture	NA	The district has not been assigned nutrient or sediment waste load allocations for the agricultural sector.

Section 1) Data Sources

BMP data provided to the Chesapeake Bay Program Office (CBPO) by DOEE consists of point source reductions from DC Water, urban BMPs that treat stormwater from new development or redevelopment, retrofits of existing areas, and non-structural BMPs such as street sweeping, urban stream restoration work, and tree planting. The District's primary reductions come from upgrades to the Blue Plains waste water treatment plant, the Long Term Control Plan to reduce combined sewer overflows, and from permitted stormwater treatment facilities installed as a part of new development or redevelopment of areas larger than 5,000 square feet.

Program and/or Project Organization and Responsibilities

DOEE

The WPD Planning and Restoration Branch and the Stormwater Management Division (SMD) are charged with compiling, geo-coding, and processing the stormwater BMPs installed and non-structural stormwater BMP activities. DOEE WPD and SMD collect stormwater BMP data from sources described below, verifies implementation location through geo-coding, and organizes this information and reports it to the CBP. DOEE has multiple roles and responsibilities for assuring QA/QC of data reported to CBP. These roles are broken out by DOEE branches below.

DOEE Stormwater Management Division (SMD) – Collects the street sweeping data from DPW, QA/QC's it and reports to the Bay Program. They also coordinate the collection of data on BMPs installed on federal lands, QA/QCs it, and ensures it does not duplicate records of BMPs in the DOEE plan review database.

DOEE WPD Plan Review Branch (PRB) – Tracks, reviews, and records all plans for new development or redevelopment in the District. The Plan Review Branch ensures that all permitted construction over 50 square feet has a plan to have appropriate erosion and sediment control devices in place and that all permitted construction over 5,000 square feet has plans to install stormwater suitable BMPs. The Plan Review Branch records all submitted construction plans in its plan review database, manages the database, and QA/QCs the recorded data.

DOEE WPD Inspection and Enforcement Branch – Inspects sites under construction to make sure that they are in compliance with erosion and sediment control regulations, performs inspections during the installation of BMPs, the final inspection on constructed BMPs, and maintenance inspections of installed BMPs. This Branch inspects all installed BMPs every five years to ensure that they are in good working order. If the BMPs require maintenance the Branch requires the landowner to perform the required maintenance to bring it into compliance. The Inspection and Enforcement Branch maintains records of inspections and QA/QCs recorded data.

DOEE WPD Planning and Restoration Branch – Compiles, geo-codes, QA/QCs the information on stormwater BMPs installed and non-structural stormwater BMP activities

from the various reporting agencies, divisions and branches. The Planning and Restoration Branch also maintains and manages a database of stormwater BMPs that it or its grantees install that are not tracked in any other database. DOEE WPD then works with SMD to report the BMP data to the CBP including the location of the BMP, the type of BMP installed, the volume capture of the BMP, and the number of acres treated by the BMP. DOEE WPD and SMD also QA/QC and report the inspection, maintenance and/or removal of any previously installed and reported BMP.

DC Water

DC Water is tasked with overseeing and implementing upgrades to it Blue Plains waste water treatment plant and to it combined sewer system. These upgrades are closely tracked by DC Water and are regulated by the EPA as a part of its discharge permit and it's Long Term Control Plan. DC Water also monitors discharges from the Combined Sewer System and Blue Plains, QA/QC's these point source loads, and submits load data to the Metropolitan Washington Council of Governments (MWCOG) for reporting to the CBP. DC Water is also responsible for installation of Grey and Green Infrastructure as determined by the Long Term Control Plan. The permitting of stormwater treatment facilities is regulated and permitted by DOEE's Watershed Protection Division (WPD), Technical Services Branch and their installation and maintenance is overseen by WPD Inspection and Enforcement Branch. DOEE WPD keeps a database of all permitted stormwater facilities and of all inspection and enforcement efforts.

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.

District Department of Public Works (DPW)

DPW is responsible for tracking the lane miles swept, how often they are swept, the type of sweeper used, and the location of street sweeping activities as a part of the District's street sweeping efforts. DPW is also responsible for tracking the actual amount of material collected through their street sweeping efforts. DPW QA/QC's this data and provides it DOEE's Stormwater Division who also QA/QC's it and reports it to the CBP.

Federal Agencies

Federal agencies are responsible for installing BMPs on federal lands, which make up almost 1/3 of land area in the district. The federal agencies are required to submit stormwater management plans to DOEE for stormwater plan review and approval, as all other projects are required to do in the District. If federal agencies fail to follow stormwater regulations, the federal agencies can report their activities directly to SMD; however projects not properly permitted and inspected may not be accepted by DOEE nor reported to the Bay Program.

Table A4(1): Reporting Agencies, Contact Person, BMP Types, and data management system.

Type	Agency/ Organization	Type of BMP	Contact Person	Database
Local	WMCOG (DC Water)	Point Source - Blue Plains	tspano@mwcog.org	Custom Excel Report
Local	DDOT UFA	Urban Tree Planting	earl.eutsler@dc.gov	ArGIS Layer

Type	Agency/ Organization	Type of BMP	Contact Person	Database
Local	Casey Trees	Urban Tree Planting	JSanders@caseytrees.org	ArGIS Layer
Local	DOEE Planning & Restoration Branch	Urban Tree Planting	lauren.linville@dc.gov	Custom Excel Report
Local	DPW	Street Sweeping	eetienne@dpwsolutions.com	Trakster
Local	DOEE Plan Review Branch	New Development & Redevelopment	matthew.espie@dc.gov	QuickBase
Local	DOEE Plan Review Branch	Stream Restoration	josh.burch@dc.gov	Custom Excel Report
Local	WMCOG	Wastewater	tspano@mwcog.org	Custom Excel Report
Local	DC Water	Wastewater	William.Pickering@dcwater.com	Discharge Monitoring Reports
Local	DC Water	Wastewater/CSS	John.Cassidy@dcwater.com	Clean Rivers Project
Federal	AOC	New Development & Redevelopment	dhelmann@aoc.gov	NEIEN Excel Template
Federal	AFRH	New Development & Redevelopment	David.Watkins@afrh.gov	NEIEN Excel Template
Federal	USACE	New Development & Redevelopment	Heather.R.Cisar@usace.army.mil	NEIEN Excel Template
Federal	DOD	New Development & Redevelopment	jennifer.l.steele@navy.mil	NEIEN Excel Template
Federal	DOD	New Development & Redevelopment	Shabir.A.Choudhary@usace.army.mil	NEIEN Excel Template
Federal	DOD	New Development & Redevelopment	Lia.Gaizick@us.army.mil	NEIEN Excel Template
Federal	DOD	New Development & Redevelopment	Jagdish.P.Tarpara@usace.army.mil	NEIEN Excel Template
Federal	FRA (Fed Railroad Admin)	New Development & Redevelopment	Sydney.schnier@dot.gov;	NEIEN Excel Template
Federal	FRA (Fed Railroad Admin)	New Development & Redevelopment	david.valenstein@dot.gov	NEIEN Excel Template
Federal	GSA	New Development & Redevelopment	nia.francis@gsa.gov	NEIEN Excel Template
Federal	GSA	New Development & Redevelopment	phyllis.carr@gsa.gov	NEIEN Excel Template
Federal	GSA	New Development & Redevelopment	robin.snyder@gsa.gov	NEIEN Excel Template
Federal	NPS	New Development & Redevelopment	Tammy_Stidham@nps.gov	NEIEN Excel Template
Federal	NPS	New Development & Redevelopment	Kristen_Hamilton@nps.gov	NEIEN Excel Template
Federal	NPS	New Development & Redevelopment	Nick_Bartolomeo@nps.gov	NEIEN Excel Template
Federal	NPS	New Development & Redevelopment	marian_norris@nps.gov	NEIEN Excel Template
Federal	Smithsonian	New Development &	SpoffordM@si.edu	NEIEN Excel

Type	Agency/ Organization	Type of BMP	Contact Person	Database
		Redevelopment		Template
Federal	Smithsonian	New Development & Redevelopment	trowbridgea@si.edu	NEIEN Excel Template
Federal	USDA	New Development & Redevelopment	Cary.coppock@ars.usda.gov	NEIEN Excel Template
Federal	USDA	New Development & Redevelopment	Ramon.Jordan@ars.usda.gov	NEIEN Excel Template
Federal	USDA	New Development & Redevelopment	donald.williams@ars.usda.gov	NEIEN Excel Template
Federal	USDA	New Development & Redevelopment	Dana.Jackson@ARS.USDA.GOV	NEIEN Excel Template

List of Supporting Documents and Attachments

1. NEIEN Appendix (attached)
2. DOEE Stormwater Management Guidebook (http://doee.dc.gov/node/610622)
3. DOEE Soil Erosion and Sediment Control Handbook (http://doee.dc.gov/node/65302)
4. DOEE Stormwater Database User Manual (https://octo.quickbase.com/up/bitf22c4r/a/r35/e6/v0&)
5. Consolidated TMDL Implementation Plan - Comprehensive Baseline Analysis (http://dcstormwaterplan.org/wp-content/uploads/Final_Comp_Baseline_Analysis_2015-with-Appendices.pdf)
6. DC Water Clean Rivers Project Construction Management Plan (Attached)
7. DC Water Clean Rivers Project Quality Plan (Attached)
8. DC Water CSS Long Term Control Plan – Final Report (https://www.dcwater.com/workzones/projects/longtermcontrolplan.cfm)
9. DC WASA First Amendment to Consent Decree (http://www2.epa.gov/sites/production/files/2015-05/documents/firstamendment-dcwasa-cd.pdf)
10. Permit No. DC002199 (DC WASA Blue Plains facility) (http://www3.epa.gov/reg3wapd/npdes/dcpermits.htm)
11. DC Water Proposal modifying Clean Rivers Project for Green Infrastructure (https://www.dcwater.com/education/green.cfm)
12. DC Water LTCP Modification for Green Infrastructure Briefing Slides (https://www.dcwater.com/education/gi-images/green_infrastructure_briefing_slides.pdf)
13. District of Columbia NPDES Compliance Monitoring Strategy 2015 (http://doee.dc.gov/sites/default/files/dc/sites/ddoe/service_content/attachments/DC%20FY15%20Proposed%20Compliance%20Monitoring%20Strategy%20Report.pdf)
14. DC Water Combined Sewer System Annual and Quarterly Reports (Nine Minimum Controls. (https://www.dcwater.com/wastewater_collection/css/css_reports.cfm)
15. US EPA NPDES Compliance Inspection Manual (http://www2.epa.gov/sites/production/files/2013-09/documents/npdesinspect_0.pdf)
16. DDOT Green Infrastructure Standards Maintenance Schedules (http://ddot.dc.gov/GreenInfrastructure)

17. CBPO Partnership Verification Framework (http://www.chesapeakebay.net/documents/Complete%20CBP%20BMP%20Verification%20Framwork%20with%20appendices.pdf)
18. Stream Restoration Functional Lift Documentation (http://www.chesapeakebay.net/channel_files/18279/stream_health__and_the_functional_lift_pyramid.pdf)
19. Recommendations of the Expert Panel to Define Removal Rates for Individual Stream Restoration Projects (http://chesapeakestormwater.net/wp-content/uploads/dlm_uploads/2013/10/stream-restoration-short-version.pdf)
20. Casey Trees Survivability Report (2014) (http://caseytrees.org/wp-content/uploads/2015/03/Tree-survivability.pdf)
21. NPDES Compliance Inspector Training Laboratory Analyses Manual. (1990. EPA)
22. Water Compliance Inspection Report (Example: NPDES DC0000248) (http://doee.dc.gov/sites/default/files/dc/sites/ddoe/service_content/attachments/Kennedy%20Center%20Compliance%20Inspection%20Report%20FY14.pdf)
23. RiverSmart Washington Project Factsheet (http://www.rockcreekconservancy.org/images/stories/riversmart/FactSheet.pdf)
24. National Park Service Management Policies (2006) (www.nps.gov/policy/mp2006.pdf)

Federal Grants Associated with the Program

a. EPA Section 319(h) Grant
b. EPA Chesapeake Bay Program Implementation Grant
c. EPA Chesapeake Bay Program Regulatory Assistance Program Grant

A5: Problem Definition/Background

As a part of its Chesapeake Bay Program commitments, the District of Columbia reports its nutrient and sediment load reduction activities and those of federal agencies within its borders to the Environmental Protection Agency, Chesapeake Bay Program (CBP) Office. The Department of Energy & Environment (DOEE) is the District government agency tasked with collecting this information and verifying that it is correct.

The purpose of this Quality Assurance Project Plan is to document:

- How the District of Columbia collects information on the BMPs installed throughout the city for CBP reporting purposes;
- How the District maintains it database of BMPs installed;
- How the District performs quality assurance/quality control (QA/QC) to identify and replace inaccurate and missing data;
- How the District tracks the maintenance, verification and removal of installed BMPs; and
- How the District reports BMP data to the CBP.

BMP Verification Principles

The Chesapeake Bay Program partnership defined and adopted five principles to guide partners' efforts as they build on existing local, state and federal practice tracking and reporting systems and make enhancements to their BMP verification programs (Table A5).

Table A5. Chesapeake Bay BMP Verification Principles

Principle	Description
Practice Reporting	Affirms that verification is required for practices, treatments and technologies reported for nitrogen, phosphorus and/or sediment pollutant load reduction credit through the Bay Program. This principle also outlines general expectations for BMP verification protocols.
Scientific Rigor	Asserts that BMP verification should assure effective implementation through scientifically rigorous and defensible, professionally established and accepted sampling, inspection and certification protocols. Recognizes that BMP verification shall allow for varying methods of data collection that balance scientific rigor with cost-effectiveness and the significance of or priority placed upon the practice in achieving pollution reduction.
Public Confidence	Calls for BMP verification protocols to incorporate transparency in both the processes of verification and tracking and reporting of the underlying data. Recognizes that levels of transparency will vary depending upon source sector, acknowledging existing legal limitations and the need to respect individual confidentiality to ensure access to non-cost shared practice data.
Adaptive Management	Recognizes that advancements in practice reporting and scientific rigor, as described above, are integral to assuring desired long-term outcomes while reducing the uncertainty found in natural systems and human behaviors. Calls for BMP verification protocols to recognize existing funding and allow for reasonable levels of flexibility in the allocation or targeting of funds.
Sector Equity	Calls for each jurisdiction's BMP verification program to strive to achieve equity in the measurement of functionality and effectiveness of implemented BMPs among and across the source sectors.

DOEE has adopted these principles and worked to incorporate them into processes and procedures associated with TMDL reporting. A brief discussion of elements associated with these principles is provided below; with details provided in the appropriate sections of this document:

- *Practice Reporting* – DOEE has invested significant resources in establishing routine processes, data validations, relationships with staff in federal agencies, and an improved stormwater database enhanced with data elements to support verification and .
- Scientific Rigor – DOEE is tracking, inspecting, and reporting individual (verifiable) BMP installations and is committed to performing special studies to verify performance and confirm expert panel assumptions associated with BMP pollution reduction efficiencies. It also provides confidence that reductions can be reliably assigned to the correct sector (MS4, CSS, direct drainage).

- Public Confidence – The majority of DOEE's pollution reduction strategies are implemented through NPDES and District Stormwater Regulations, with program-specific annual reports available to the public.
- Adaptive Management – DOEE's Consolidated TMDL Implementation Plan relies on adaptive management strategies with the goal of meeting TMDL milestones. Examples of anticipated adaptive management strategies are focused implementation efforts in specific watersheds where BMP installation is lagging, continuing improvements in information gathering efforts with federal partners and other district agencies, and pilot studies to confirm assumptions on pollution reductions. Furthermore, DOEE has demonstrated adaptive management in recent years by modifying processes to implement expert panel recommendations, performing pilot studies for emerging BMPs, and improving tracking reporting mechanisms (See Section: *New or Emerging BMP definitions*).
- Sector Equity – DOEE demonstrates sector equity by focusing verification elements on key sectors, Point Sources, and Urban Stormwater (including urban tree planting and urban stream restoration). The district has no agricultural sector, no septic sector, and current & past restoration activities, including tree plantings, have been implemented primarily as urban stormwater BMPs.

Section 1) Historic Reporting Practices

Stormwater Sector

Historically, BMP data had been summarized and reported geographically by HUC 10 and regulated area (whether the practice occurred in the MS4 or CSS). Prior to 2010, the district provided information directly to CBPO. From 2010 through 2012, DOEE utilized contractor support (Tetra Tech, Inc.) to convert implementation data into a National Environmental Information Exchange Network (NEIEN) compatible format. Since 2013, DOEE has internally revised the reporting process and reported individual BMP installation information when available instead of summarized of implementation data.

In 2012, DOEE began a thorough review of stormwater BMP records in order to support development of a consolidated TMDL implementation plan and to comply with the CBPO request to submit revised and corrected historic BMP data by June, 2015. This effort culminated with an improved inventory of BMP implementation data throughout the district.

Wastewater Sector

Historically, data received from all Point Source facilities, both major and minor, are aggregated into a spreadsheet to calculate loads (both nutrients and sediments) to assess compliance with TMDL wasteload allocations. Wasteload allocations were enforced in each facility (major or minor) depending upon nutrients discharge limits specified in their individual NPDES permits. Additionally, the Washington Metropolitan Council of Governments (MWCOG) has assisted DC Water with parsing loads between jurisdictions and reporting Discharge Monitoring Report (DMR) data to the EPA CBPO Point Source Data Administrator for annual progress reporting.

Section 2) Rationale

DOEE uses is using this BMP inventory to support assessments of progress through time towards meeting local TMDLs, as well as the Chesapeake Bay TMDL. The data are reported in

standardized formats and codes via NEIEN. The CBPO creates annual progress scenarios using the CBP Partnership's Watershed Model to describe, assess and report the status of the restoration efforts, and anticipated reductions in nitrogen, phosphorus and sediment loadings to Chesapeake Bay and its tidal tributaries. The data is similarly loaded to the districts Implementation Plan Modeling Tool in order determine progress toward meeting the milestones laid out in the Consolidated Plan.

Section 3) Data Management and Governance

Stormwater best management practices (BMPs) data for the Bay Program are tracked on a continuous basis and reported annually to CBPO for Bay TMDL progress runs. The data are reported and incorporated into the CBP's Watershed Model to estimate progressive nutrient load reductions from implementation of these BMPs over time.

Historic data inventory

DOEE plans to load the entire BMP historic inventory into the district's new Stormwater Management Database after the one-time verification effort of those practices has been completed (this verification effort is discussed in A7: *Potential Bias - Historic BMP Record*). The historic record would then be available to the full set of features and inspection tools (mapping, scanned plans, inspection forms, notices of violation, etc.) and stormwater retention calculation features. The stormwater database has already been updated with the ability to export data in XML format and is being enhanced to support the newly developed NEIEN data elements (such as model version, maintenance and inspection reporting, & urban stormwater BMP measures).

BMP lifespan tracking & reporting

In the Stormwater Management database, each BMP has a unique ID. DOEE's data management governance processes prohibit a unique BMP from being reported more than once. If a record submitted in one year is inspected or maintained in another year, the unique BMP record is updated (via NEIEN) with the new event status codes, dates, and results. These updates are done in a manner consistent with WTWG recommendations on BMP lifespan reporting and the CBPO NPS-BMP plug-in and Scenario Builder rules that implement BMP lifespans and flag BMPs for specific reporting years. In a similar fashion, DOEE does not report a unique BMP multiple times simply from having a BMP name change; rather, that unique BMP record is updated and reported. DOEE implements these updates using the *GetBMPFullRefresh* data service and uses WTWG-recommended procedures to identify, update, replace, or delete unique XML data submissions

Units

BMPs are reported with associated units of measure (area, length, count, volume, etc.) and no units are determined using percentages of available land.

Agricultural sources

The district does not implement BMPs associated with the Agriculture sector, and therefore does not implement federal agricultural cost-share practices, NRCS practices, or have a 1619 data sharing agreement with the U.S. Department of Agriculture.

A6: Project Description

Section1) Project Description

On July 19, 2013, DOEE released the 2013 Rule on Stormwater Management and Soil Erosion and Sediment Control (2013 SW Rule), which amended Chapter 5 (water Quality) of Title 21 (Water and Sanitation) of the District of Columbia Municipal Regulations (DCMR). The new requirements are based upon standards for volume retention, representing a shift of focus from the 1998 regulations, which were more focused on water-quality treatment. Major land-disturbing activities must retain the volume from a 1.2-inch storm event, and major substantial improvement activities must retain the volume from a 0.8-inch storm event. By keeping stormwater on site, retention practices effectively provide both treatment and additional volume control, significantly improving protection for District waterbodies. This Stormwater Retention Volume (SWRv) can be managed through runoff prevention (e.g., conservation of pervious cover or reforestation), runoff reduction (e.g., infiltration or water reuse), and runoff treatment (e.g., plant/soil filter systems or permeable pavement). In 2013, DOEE also developed the Stormwater Management Guidebook, which provides technical guidance on complying with the 2013 Rule on Stormwater Management and Soil Erosion and Sediment Control (2013 SW Rule). All BMP design standards, criteria, and definitions are documented in the Guidebook.

DOEE also launched a new Stormwater Database that will enhance transparency and effectiveness of the stormwater plan review process for regulated and voluntary projects. Applicants are now able to check the status of plans being reviewed by DOEE and submit supporting documentation online. The new database also streamlines participation in the Stormwater Retention Credit (SRC) and RiverSmart Rewards programs, which incentivize installation of runoff-reducing Green Infrastructure (GI). Applications for these programs can also be completed through the database using information already submitted in a stormwater plan. Further, the database will support participation in the SRC trading program by providing public access to the SRC registry, which lists SRCs that are currently for sale. Access to the online database and documentation is provided in the stormwater management database user manual.

Section 2) BMP Definitions

Urban Stormwater BMP definitions in the district are best defined by the time period associated with stormwater regulations: plans submitted after January 1, 2014 and the legacy (or historic) record. The differences between BMP definitions for the two periods are discussed below.

2013 SW Rule

Chapter 3 (pages 29 through 252) of DOEE's Stormwater Management Guidebook (SWMG (see *List of Supporting Documents and Attachments*)) provides extensive information on BMPs, including definitions and performance criteria. BMP performance criteria are based on several critical design factors to ensure effective and long-lived BMPs. For each BMP, the following factors are discussed:

- General Feasibility
- Conveyance
- Pretreatment
- Design and Sizing

- Landscaping
- Construction Sequencing
- Maintenance
- Stormwater Compliance Calculations

These BMPs will be reported to CBPO through NEIEN using the data elements and recommended methods associated with the new urban stormwater protocols for determining pollution reduction.

BMPs discussed in the SWMG are:

Green Roofs

Practices that capture and store rainfall in an engineered growing media that is designed to support plant growth. A portion of the captured rainfall evaporates or is taken up by plants, which helps reduce runoff volumes, peak runoff rates, and pollutant loads on development sites. Green roofs typically contain a layered system of roofing, which is designed to support plant growth and retain water for plant uptake while preventing ponding on the roof surface. The roofs are designed so that water drains vertically through the media and then horizontally along a waterproofing layer towards the outlet. Extensive green roofs are designed to have minimal maintenance requirements. Plant species are selected so that the roof does not need supplemental irrigation and requires minimal, infrequent fertilization after vegetation is initially established.

Design variants include extensive and intensive green roofs.

- G-1 Extensive green roofs have a much shallower growing media layer that typically ranges from 3 to 6 inches thick.
- G-2 Intensive green roofs have a growing media layer that ranges from 6 to 48 inches thick.

Rainwater Harvesting

Rainwater harvesting systems store rainfall and release it for future use. Rainwater that falls on a rooftop or other impervious surface is collected and conveyed into an above- or below-ground tank (also referred to as a cistern), where it is stored for non-potable uses or for on-site disposal or infiltration as stormwater. Cisterns can be sized for commercial as well as residential purposes. Residential cisterns are commonly called rain barrels. Non-potable uses of harvested rainwater may include the following:

- Landscape irrigation,
- Exterior washing (e.g., car washes, building facades, sidewalks, street sweepers, and fire trucks),
- Flushing of toilets and urinals,
- Fire suppression (i.e., sprinkler systems),
- Supply for cooling towers, evaporative coolers, fluid coolers, and chillers,
- Supplemental water for closed loop systems and steam boilers,
- Replenishment of water features and water fountains,
- Distribution to a green wall or living wall system,
- Laundry, and
- Delayed discharge to the combined sewer system.

In many instances, rainwater harvesting can be combined with a secondary (down-gradient) stormwater practice to enhance stormwater retention and/or provide treatment of overflow from the rainwater harvesting system. Some candidate secondary practices include the following:

- Disconnection to a pervious area (compacted cover) or conservation area (natural cover) or soil amended filter path (see *Impervious Surface Disconnection*)
- Overflow to bioretention practices (see *Bioretention*)
- Overflow to infiltration practices (see *Infiltration*)
- Overflow to grass channels or dry swales (see *Storage Practices*)

By providing a reliable and renewable source of water to end users, rainwater harvesting systems can also have environmental and economic benefits beyond stormwater management (e.g., increased water conservation, water supply during drought and mandatory municipal water supply restrictions, decreased demand on municipal water supply, decreased water costs for the end user, and potential for increased groundwater recharge).

Impervious Surface Disconnection

This strategy involves managing runoff close to its source by intercepting, infiltrating, filtering, treating or reusing it as it moves from an impervious surface to the drainage system. Disconnection practices can be used to reduce the volume of runoff that enters the combined or separate sewer systems. Two kinds of disconnection are allowed: (1) simple disconnection, whereby rooftops and/or on-lot residential impervious surfaces are directed to pervious areas (compacted cover) or conservation areas (natural cover) or soil amended filter paths, and (2) disconnection leading to an alternative retention practice(s) adjacent to the roof (see Figure 3.11 in the SWMG). Alternative practices can use less space than simple disconnection and can enhance retention. Applicable practices include:

- D-1 Simple disconnection to pervious areas with the compacted cover designation
- D-2 Simple disconnection to conservation areas with the natural cover designation
- D-3 Simple disconnection to a soil compost amended filter path
- D-4 Infiltration by small infiltration practices (dry wells or French drains) (see *Infiltration*)
- D-5 Filtration by rain gardens or stormwater planters (see *Bioretention*)
- D-6 Storage and reuse with a cistern or other vessel (rainwater harvesting) (see *Rainwater Harvesting*)

Disconnection practices reduce a portion of the Stormwater Retention Volume (SWRv). In order to meet requirements for larger storm events, disconnection practices must be combined with additional practices.

Permeable Pavement Systems

This is a paving system that captures and temporarily stores the Stormwater Retention Volume (SWRv) by filtering runoff through voids in an alternative pavement surface into an underlying stone reservoir. Filtered runoff may be collected and returned to the conveyance system, or allowed to partially (or fully) infiltrate into the soil. Design variants include:

- P-1 Porous asphalt (PA)
- P-2 Pervious concrete (PC)
- P-3 Permeable pavers (PP)

Other variations of permeable pavement that are DDOE-approved permeable pavement surface materials, such as synthetic turf systems with reservoir layer, are also encompassed in this section. Permeable pavement systems are not typically designed to provide stormwater detention of larger storms (e.g., 2-year, 15-year), but they may be in some circumstances. Permeable pavement practices shall generally be combined with a separate facility to provide those controls. There are two different types of permeable pavement design configurations:

- Standard Designs. Practices with a standard underdrain design and no infiltration sump or water quality filter (see Figure 3.13 in the SWMG).
- Enhanced Designs. Practices with underdrains that contain a water quality filter layer and an infiltration sump beneath the underdrain sized to drain the design storm in 48 hours (see Figure 3.14) or practices with no underdrains that can infiltrate the design storm volume in 48 hours (see Figure 3.15 in the SWMG).

Bioretention

Practices that capture and store stormwater runoff and pass it through a filter bed of engineered soil media composed of sand, soil, and organic matter. Filtered runoff may be collected and returned to the conveyance system, or allowed to infiltrate into the soil. Design variants include:

- B-1 Traditional bioretention
- B-2 Streetscape bioretention
- B-3 Engineered tree pits
- B-4 Stormwater planters
- B-5 Residential rain gardens

Bioretention systems are typically not designed to provide stormwater detention of larger storms (e.g., 2-year, 15-year), but they may be in some circumstances. Bioretention practices shall generally be combined with a separate facility to provide those controls. There are two different types of bioretention design configurations:

- Standard Designs. Practices with a standard underdrain design and less than 24 inches of filter media depth (see Figure 3.17 in the SWMG). If trees are planted using this design, the filter media depth must be at least 24 inches to support the trees.
- Enhanced Designs. Practices with underdrains that contain at least 24 inches of filter media depth and an infiltration sump/storage layer (see Figure 3.18 in the SWMG) or practices that can infiltrate the design storm volume in 72 hours (see Figure 3.19 in the SWMG).

The particular design configuration to be implemented on a site is typically dependent on specific site conditions and the characteristics of the underlying soils.

Filtering Systems

Practices that capture and temporarily store the design storm volume and pass it through a filter bed of sand media. Filtered runoff may be collected and returned to the conveyance system or allowed to partially infiltrate into the soil. Design variants include:

- F-1 Non-structural sand filter
- F-2 Surface sand filter
- F-3 Three-chamber underground sand filter
- F-4 Perimeter sand filter

Stormwater filters are a useful practice to treat stormwater runoff from small, highly impervious sites. Stormwater filters capture, temporarily store, and treat stormwater runoff by passing it through an engineered filter media, collecting the filtered water in an underdrain, and then returning it back to the storm drainage system. The filter consists of two chambers: the first is devoted to settling and the second serves as a filter bed consisting of a sand filter media.

Stormwater filters are a versatile option because they consume very little surface land and have few site restrictions. They provide moderate pollutant removal performance at small sites where space is limited. However, filters have no retention capability, so designers should consider using up-gradient retention practices, which have the effect of decreasing the design storm volume and size of the filtering practices. Filtering practices are also suitable to provide special treatment at designated stormwater hotspots. A list of potential stormwater hotspots operations can be found in Appendix P of the SWMG.

Filtering systems are typically not to be designed to provide stormwater detention (Qp2, Qp15), but they may be in some circumstances. Filtering practices are generally combined with separate facilities to provide this type of control. However, the three-chamber underground sand filter can be modified by expanding the first or settling chamber, or adding an extra chamber between the filter chamber and the clear well chamber to handle the detention volume, which is subsequently discharged at a predetermined rate through an orifice and weir combination.

Infiltration

Infiltration practices capture and temporarily store the design storm volume before allowing it to infiltrate into the soil over a two day period. Design variants include:

- I-1 Infiltration trench
- I-2 Infiltration basin

Infiltration practices use temporary surface or underground storage to allow incoming stormwater runoff to exfiltrate into underlying soils. Runoff first passes through multiple pretreatment mechanisms to trap sediment and organic matter before it reaches the practice. As the stormwater penetrates the underlying soil, chemical and physical adsorption processes remove pollutants. Infiltration practices are suitable for use in residential and other urban areas where field measured soil infiltration rates are sufficient. To prevent possible groundwater contamination, infiltration must not be utilized at sites designated as stormwater hotspots.

Open Channel Systems

Vegetated open channels that are designed to capture and treat or convey the design storm volume (Stormwater Retention Volume (SWRv)). Design variants include:

- O-1 Grass channels
- O-2 Dry swales/bioswales
- O-3 Wet swales

Open channel systems shall not be designed to provide stormwater detention except under extremely unusual conditions. Open channel systems must generally be combined with a separate facility to meet these requirements.

Grass channels (O-1) can provide a modest amount of runoff filtering and volume attenuation within the stormwater conveyance system resulting in the delivery of less runoff and pollutants than a traditional system of curb and gutter, storm drain inlets, and pipes. The performance of grass channels will vary depending on the underlying soil permeability. Grass channels, however, are not capable of providing the same stormwater functions as dry swales as they lack the storage volume associated with the engineered soil media. Their retention performance can be boosted when compost amendments are added to the bottom of the swale (see Appendix J of the SWMG). Grass channels are a preferable alternative to both curb and gutter and storm drains as a stormwater conveyance system, where development density, topography, and soils permit.

Dry swales (O-2), also known as bioswales, are essentially bioretention cells that are shallower, configured as linear channels, and covered with turf or other surface material (other than mulch and ornamental plants). The dry swale is a soil filter system that temporarily stores and then filters the desired design storm volume. Dry swales rely on a premixed soil media filter below the channel that is similar to that used for bioretention. If soils are extremely permeable, runoff infiltrates into underlying soils. In most cases, however, the runoff treated by the soil media flows into an underdrain, which conveys treated runoff back to the conveyance system further downstream. The underdrain system consists of a perforated pipe within a gravel layer on the bottom of the swale, beneath the filter media. Dry swales may appear as simple grass channels with the same shape and turf cover, while others may have more elaborate landscaping. Swales can be planted with turf grass, tall meadow grasses, decorative herbaceous cover, or trees.

Wet swales (O-3) can provide a modest amount of runoff filtering within the conveyance. These linear wetland cells often intercept shallow groundwater to maintain a wetland plant community. The saturated soil and wetland vegetation provide an ideal environment for gravitational settling, biological uptake, and microbial activity. On-line or off-line cells are formed within the channel to create saturated soil or shallow standing water conditions (typically less than 6 inches deep).

Ponds

Stormwater ponds are stormwater storage practices that consist of a combination of a permanent pool, micropool, or shallow marsh that promote a good environment for gravitational settling, biological uptake and microbial activity. Ponds are widely applicable for most land uses and are best suited for larger drainage areas. Runoff from each new storm enters the pond and partially displaces pool water from previous storms. The pool also acts as a barrier to re-suspension of sediments and other pollutants deposited during prior storms. When sized properly, stormwater

ponds have a residence time that ranges from many days to several weeks, which allows numerous pollutant removal mechanisms to operate. Stormwater ponds can also provide storage above the permanent pool to help meet stormwater management requirements for larger storms. Design variants include:

- P-1 Micropool extended detention pond
- P-2 Wet pond
- P-3 Wet extended detention pond

Stormwater ponds should be considered for use after all other upland retention opportunities have been exhausted and there is still a remaining treatment volume or runoff from larger storms (i.e., 2-year, 15-year or flood control events) to manage.

Stormwater ponds do not receive any stormwater retention value and should be considered only for management of larger storm events. Stormwater ponds have both community and environmental concerns that should be considered before choosing stormwater ponds for the appropriate stormwater practice on site.

Wetlands

Wetland practices create shallow marsh areas to treat urban stormwater which often incorporate small permanent pools and/or extended detention storage. Stormwater wetlands are explicitly designed to provide stormwater detention for larger storms (2-year, 15-year or flood control events) above the design storm (Stormwater Retention Volume (SWRv)) storage. Design variants include:

- W-1 Shallow wetland
- W-2 Extended detention shallow wetland

Stormwater wetlands, sometimes called constructed wetlands, are shallow depressions that receive stormwater inputs for water quality treatment. Wetlands are typically less than 1 foot deep (although they have greater depths at the forebay and in micropools) and possess variable microtopography to promote dense and diverse wetland cover. Runoff from each new storm displaces runoff from previous storms, and the long residence time allows multiple pollutant removal processes to operate. The wetland environment provides an ideal environment for gravitational settling, biological uptake, and microbial activity.

Stormwater wetlands should be considered for use after all other upland retention opportunities have been exhausted and there is still a remaining treatment volume or runoff from larger storms (i.e., 2-year, 15-year or flood control events) to manage.

Stormwater wetlands do not receive any stormwater retention value and should be considered only for management of larger storm events. Stormwater wetlands have both community and environmental concerns that should be considered before choosing stormwater ponds for the appropriate stormwater practice on site.

Storage Practices

Storage practices are explicitly designed to provide stormwater detention (2-year, 15-year, and/or flood control). Design variants include:

- S-1 Underground detention vaults and tanks
- S-2 Dry detention ponds
- S-3 Rooftop storage
- S-4 Stone storage under permeable pavement or other BMPs

Detention vaults are box-shaped underground stormwater storage facilities typically constructed with reinforced concrete. Detention tanks are underground storage facilities typically constructed with large diameter metal or plastic pipe. Both serve as an alternative to surface dry detention for stormwater quantity control, particularly for space-limited areas where there is not adequate land for a dry detention basin or multi-purpose detention area. Prefabricated concrete vaults are available from commercial vendors. In addition, several pipe manufacturers have developed packaged detention systems.

Dry detention ponds are widely applicable for most land uses and are best suited for larger drainage areas an outlet structure restricts stormwater flow so it backs up and is stored within the basin. The temporary ponding reduces the maximum peak discharge to the downstream channel, thereby reducing the effective shear stress on the bed and banks of the receiving stream.

Storage practices do not receive any stormwater retention or treatment volume and should be considered only for management of larger storm events. Storage practices are not considered an acceptable practice to meet the SWRv. Storage practices must be combined with a separate facility to meet these requirements. Upland practices can be used to satisfy some or all of the stormwater retention requirements at many sites, which can help to reduce the footprint and volume of storage practices.

Proprietary Practices

Proprietary practices are manufactured stormwater treatment practices that utilize settling, filtration, absorptive/adsorptive materials, vortex separation, vegetative components, and/or other appropriate technology to manage the impacts stormwater runoff.

Proprietary practices may be used to achieve treatment compliance, provided they have been approved by the District and meet the performance criteria outlined in this specification. Historically, proprietary practices do not provide retention volume. Proprietary practices will not be valued for retention volume unless the practice can demonstrate the occurrence of retention processes.

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

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.

Sediment and Erosion Control

In several decades of implementing the stormwater management and soil erosion and sediment control regulations of the District and undertaking numerous restoration projects, the Department has acquired substantial firsthand knowledge and experience of the damage to District waterbodies from impervious development and inadequately managed stormwater. Stormwater impacts District waterbodies with its powerfully erosive volume and the pollution it contains.

DOEE's Soil Erosion and Sediment Control Handbook (see: *List of Supporting Documents and Attachments*) provides technical guidance on complying with the 2013 Rule on Stormwater Management and Soil Erosion and Sediment Control. This handbook defines the standards and specifications to design, review, approve, install, and maintain erosion and sediment control practices on land undergoing clearing, grading, and development. It also provides information on how to evaluate site-specific conditions, such as soils, drainage, proposed clearing, and grading and should be considered the source for detailed information for erosion and sediment control. This document provides an overview of the BMP with a focus on the verification elements.

DOEE organizes Erosion and Sediment control practices into eleven functional categories:

- Road Stabilization
- Sediment Barriers
- Dikes & Diversions
- Sediment Traps and Basins
- Downdrains and Flumes
- Inlet & Outlet Protection
- Dewatering Strategy
- Waterways and Stream Protection
- Site Preparation
- Vegetative Stabilization
- Other Practices

The control practices described above include both temporary and permanent structural practices. Temporary structural practices are those used for relatively short periods of time (e.g., straw bale dikes, which are effective for three months). These practices should not be used for longer than the periods of time prescribed. Such measures are usually implemented to ensure erosion or sediment control during certain phases of construction.

Permanent structural practices are designed to remain in place and to function, following completion of construction. Such controls include diversions and grassed waterways. Permanent controls require individual designs in order to fit the practice to individual situations. Structural practices are constructed to control the flow of water and possible resultant erosion, or to trap sediment so that off-site sedimentation does not occur. Vegetative practices are concerned with

stabilizing the soil surface to prevent erosion. The retention of natural buffer areas along the periphery of the site may assist in ensuring that grading and construction activities will not adversely affect adjacent property or water resources.

All construction projects requiring soil Erosion and Sediment Control (ESC) plans must post a District-approved sign that notifies the public to contact the DOEE in the event of erosion or other pollution from the site. This signage requirement will help to protect the District's natural resources by identifying and correcting sites that are causing erosion and/or discharging sediment to local waterbodies. This is a requirement of the 2013 Rule on Stormwater Management and Soil Erosion and Sediment Control (2013 SW Rule) which calls for the prominent posting of a sign that:

- Is in plain view of and readable by the public at a distance of twelve feet (12 ft);
- Placed at each entrance to the site or as directed by DDOE; and
- Provides contact information identified by the Department, including phone number, e-mail address, and 311 mobile app.

1998 Storm Water Regulations

The historic record of legacy BMPs reported to the CBPO for Bay TMDL progress are similar, or in many cases, the same as those in the SWMG, however the electronic record does not contain the detail or granularity (required by the newer urban protocols) that is currently being tracked. The historic record of BMPs (which will be targeted for a comprehensive one-time verification effort in 2016) has been compiled so that an external independent review team can visit locations, document presence/absence, condition, and retention volume if applicable; and verify contributing drainage area. The effort includes digitization of historic as-built plans, inspection reports, and digital photos that will be added to the stormwater management database. Confirmation of the location of BMP implementation on the ground, and the work flow process described in *B10: Data Management* will determine which sector (MS4/CSO/direct drainage) will be assigned a pollution reduction. This effort also allows for the identification and addition of "discovered BMPs." Discovered BMPs would be held to the same verification standards as other practices in the legacy system. Their coordinates, installation date, maintenance records, contributing area, landcover types, and retention volume would be entered into the Stormwater Database (and automatically assigned a new NEIEN-compliant "unique state identification number." This verification effort will target the BMPs documented below in Table A6(2.1).

Table A6(2.1): Structural BMPs Reported to the Bay Program

Structure Name	Structure Function	Reporting Units
Bioretention	Landscape designed such that stormwater runoff collects in shallow depressions before filtering through fabricated planting soil media	Acres treated/volume captured
Cisterns/Rain Barrels	Rain barrels and cisterns capture and store stormwater runoff from rooftops and other impervious catchment areas, providing water for non-potable uses such as landscape irrigation.	Acres treated/volume captured
Detention Structure (Dry	Designed to store runoff without creating a permanent pool	Acres

Structure Name	Structure Function	Reporting Units
Pond)		treated/volume captured
Extended Detention Structure (Two types): 1) Extended Detention Structure, Dry 2) Extended Detention Structure, Wet	Designed to temporarily detain a portion of runoff for 24 hours after a storm using a fixed orifice to regulate outflow at a specific rate, allowing solids & associated time to settle out Designed for the temporary storage of runoff associated with at least a 24 hour 1-year storm without creating a permanent pool of water. Designed for the storage of runoff associated with at least a 24 hour 1-year storm. The detained water drains partially & the remaining portion creates a permanent pool.	Acres treated/volume captured
Bioswale	Open vegetated channel used to convey runoff and provide treatment by filtering pollutants and sediment.	Acres treated/volume captured
Green Roof	Green roofs absorb, store, and later evapotranspire initial precipitation, thereby acting as a stormwater management system and reducing overall peak flow discharge to a storm sewer system.	Acres treated/volume captured
Hydrodynamic Structure aka: 1) Oil grit separator 2) Bay Saver© 3) Stormceptor©	An engineered structure used to separate sediments and oils from stormwater runoff using gravitational separation and/or hydraulic flow.	Acres treated/volume captured
Infiltration Basin	Designed to allow stormwater to infiltrate into permeable soils. It differs from a retention structure in that it may include a back-up underdrain pipe to ensure eventual removal of standing water.	Acres treated/volume captured
Disconnection of Rooftop Runoff	Impervious area reduction	Acres treated/volume captured
Infiltration Trench (Three types): 1) Complete Exfiltration 2) Partial Exfiltration 3) Water Quality Exfiltration	An excavated trench that has been backfilled with exposed or unexposed stones to form an underground reservoir (Also see Dry Well) Runoff can only exit the trench by exfiltrating through the stone reservoir into the underlying infiltration system. Runoff exits the trench by exfiltrating a) through the stone reservoir into the underlying soil, and b via a perforated underdrain at the bottom of the trench that diverts runoff to a central outlet Storage volume is set to receive only the first ½" of runoff (first flush) from an impervious area of the watershed	Acres treated/volume captured
Porous Pavement	A porous asphalt surface designed to have bearing strength similar to conventional asphalt but provides a rapid conduit for runoff to reach a subsurface stone reservoir	Acres treated/volume captured

Structure Name	Structure Function	Reporting Units
Sand Filter	A bed of sand to which the first flush of runoff is diverted. Water leaving the filter is collected in underground pipes & returned to a waterway. A layer of peat, limestone, and/topsoil may be added to improve removal efficiency	Acres treated/volume captured
Stream Restoration	Stream restoration in urban areas is used to restore the urban stream ecosystem by restoring the natural hydrology and landscape of a stream, help improve habitat and water quality conditions in degraded streams.	Linear feet restored/linear feet restored – enhanced treatment
Wetlands	A structure with a permanent shallow pool planted with wetland vegetation often designed to provide extended detention	Acres treated
Vegetated Buffer	A vegetated protective zone of variable width located along both sides of a waterway	Acres treated

Table A6(2.2): Non-Structural BMPs Currently Reported to the Bay Program

Structure Name	Practice Function	Reporting Units
Street Sweeping	Street sweeping on a regular basis reduces nitrogen, phosphorus, and sediment whereas less regular street sweeping reduces only sediment.	Acres swept
Tree Planting	Urban tree planting is planting trees on urban pervious areas.	Number of trees
Erosion & Sediment Control	Erosion & Sediment control BMPs help prevent destruction of property and natural resources caused by soil erosion, sedimentation and nonagricultural runoff from land-disturbing activities.	Acres treated

For additional information on BMPs, please see the attachment titled "*DOEE QAPP Attachment A (NEIEN Appendix*).xlsx."

New or Emerging BMP definitions

Catch Basin Cleaning

DOEE has partnered with DC Water on a pilot project to improve tracking and reporting of catch basin cleaning efforts. In FY 2013 and FY 2014, DC water began measuring the total weight (in tons) of catch basin debris on a monthly basis. DOEE is currently working on an MOU with DC Water that would improve upon the pilot effort by tracking the following additional information:

- Locations and dates of cleanings
- Separate quantification of organics and sediment on subset of catch basins
- Verification of the relative amount of trash
- Confirmation of conversion factors from wet mass to dry weight
- Confirmation of nutrient (N&P) enrichment factors for sediments and organic materials.

DOEE anticipates updating this QAPP when the BMP definition and verification methods have been finalized, prior to reporting for Bay TMDL progress reporting.

Street Sweeping

DOEE is working with DPW and Federal partners to obtain more detailed information and confirmation that regenerative air sweepers (and not mechanical broom) are being consistently used for routes located in the MS4. DPW Trackster reports do currently contain dates and route mileage per date for georeferenced routes that are required by the latest recommendations by the street sweeping expert panel for Bay TMDL progress reporting.

Wetland Restoration

As described in Table A6(2.1), wetlands have historically been reported to CBPO as BMPs designed to provide extended detention for stormwater. In the future, DOEE may engage in activities focused primarily on restoring wetlands that provide additional nutrient and sediment reductions. At that time, DOEE will update the QAPP with additional information needed to define the practices and provide confirmation of data review, verification and validation information. DOEE will ensure that reporting processes distinguish between wetlands implemented as stormwater BMPs for regulated activities and efforts undertaken to restore habitat where native wetlands have been lost.

Tree Planting for Urban Stormwater Retention

As described in Table A6(2.2), tree planting activities by DDOT UFA and Casey Trees are being planted to increase canopy cover in the district. The stormwater database may capture additional details for trees planted as part of a stormwater management plan. These plantings may capture details (total contributing area, impervious contributing area, stormwater retention volume) to be reported and treated using the new urban stormwater BMP protocols. DOEE will work with CBPO expert panels, the Watershed Technical Workgroup, and the CBPO NPS data manager to confirm the appropriate methods that should be used to report tree planting for retention if appropriate and update this QAPP as needed.

Urban Nutrient Management

DOEE has not reported Urban Nutrient Management practices because of a lack of verification that policies have been properly implemented. A more comprehensive discussion on this subject is provided in the *Potential Bias* section of this document. DOEE hopes to obtain confirmation of implementation consistent with the CBPO practice definition, and to report this BMP with the appropriate verification elements. At that time, DOEE will update this QAPP to reflect the information available.

Point Source Reductions

As a part of its Chesapeake Bay Program commitments, the District of Columbia (DC) reports its nutrient and sediment load reduction activities to the Environmental Protection Agency, Chesapeake Bay Program (CBP) Office. The Department of Energy & Environment (DOEE) is the District government agency tasked with collecting this information and verifying that it is correct.

The wastewater sector is at the core of DOEE strategy to meet DC commitments to reduce nutrients loadings to the Chesapeake Bay. The facilities covered under this sector are classified as major and minor (see Attachment 1), and are subject to enforceable National Pollutant Discharge Elimination System (NPDES) permit discharge limits on the amount of total nitrogen and total phosphorus. However, to ensure that permit limits are met, it is necessary to verify that

the monitoring values reported are both valid and were determined using correct procedures. It is also important to verify on a consistent basis that treatment technologies put in place to make the needed reductions are actually installed and are functioning as required.

DOEE verifies compliance of Best Management Practices (BMP) for wastewater dischargers through existing regulatory tools and functions including permits, inspections and monitoring requirements that ensure accountability, proper design, implementation, operation and maintenance. Compliance verification through existing regulatory programs ensures the upgraded wastewater facilities, Combined Sewer System (CSS)/Combined Sewer Overflows (CSOs) or on-site treatment systems are designed, installed and maintained over time in order to meet their assigned load reduction targets.

DC WASA operates a wastewater collection system comprising both separate and combined sewers. Approximately two-thirds of the District is served by separate systems, which consist of two independent piping systems: one system for sanitary wastewater (i.e., sewage from homes and businesses) and one system for storm water. The remaining one-third is served by a combined sewer system (CSS), which conveys both storm water and sanitary wastewater in one piping system.

Combined Sewer Overflow

During dry weather, sanitary wastewater collected in the CSS is conveyed to DC WASA's Blue Plains Advanced Wastewater Treatment Plant. During periods of heavy rainfall, the capacity of a combined sewer may be exceeded and the excess flow, which is a mixture of storm water and sanitary wastewater, is discharged directly to the Anacostia River, Rock Creek, the Potomac River, or their tributary waters. This excess flow is called Combined Sewer Overflow (CSO). Release of this excess flow is necessary to prevent flooding in homes, businesses, and streets. DC WASA's Long-Term Control Plan (LTCP) is currently being implemented to prevent or mitigate wastewater discharge into the local waterways. The original estimate was for the LTCP to reduce CSOs by 96 percent across the District. General activities outlined in the LTCP include:

- Consolidation or separation of select CSOs
- Implementation of Low Impact Development Retrofits
- Rehabilitation of Pumping Stations
- Construction of storage tunnels
- Improvements to excess flow treatment at Blue Plains

Some of these activities are already underway or have been completed. In accordance with EPA's CSO Policy, DC Water's NPDES Permit (Part III) requires implementation of EPA's nine minimum controls (NMCs) to keep track of the activities. The NMCs are non-structural and low cost management practices intended to optimize the existing sewer system to reduce CSOs. The NMCs are as follows:

1. Proper operations and maintenance
2. Maximize use of the collection system for storage
3. Review and modify pretreatment requirements
4. Maximize flow to the Publicly Owned Treatment Works (POTW) for treatment

5. Eliminate dry weather overflows
6. Control solids and floatables in CSO
7. Pollution prevention
8. Public notification
9. Monitoring

The permit requires DC Water to submit an annual report on the NMCs by March 31 of each year covering the prior calendar year. In addition, DOEE and the Bay Program also use the following to track and verify the CSO performance at Blue Blains:

- Regular filing of the extent of CSO separation (acres).
- Monitoring of discharge through Outfall 001(a CSO-related bypass). Discharges vary with weather conditions.

It is important to note that CSO contributions to the overall nutrient load are highly dependent on the rainfall patterns from year to year. Additional QAPP details covering CSS/CSO verification and validation are included in the Verification Checklist for the *Waste Water Sector.*

Green Infrastructure CSS controls

The District and DC Water announced an agreement to modify a 2005 federal consent decree (CD) allowing DC Water to incorporate green infrastructure in its long-term strategy for curtailing CSOs on May 20, 2015. The modification authorizes DC Water to pursue an integrated green/gray infrastructure approach to address water quality issues resulting from CSOs in the Rock Creek and Potomac watersheds. The use of GI in this manner emphasizes EPA's preference for green infrastructure mechanisms over concrete "gray" infrastructure such as stormwater tunnels. The rationale for EPA's preference is based in part on the fact that stormwater stored in tunnels must be treated and discharged, while water stored in green infrastructure will mostly evaporate or be absorbed into soil. The elements of the modification that touch on verification and or validation include:

- Using green infrastructure to retain the first 1.2 inches of rainwater on 365 acres in the Rock Creek area, and 133 acres in the Potomac watershed.
- Potentially eliminating the Rock Creek storage tunnel and significantly decreasing the size of the Potomac tunnel depending upon the success demonstrated by green infrastructure.

In 2011, when DC Water proposed incorporating GI into its overflow control strategies for the Potomac and Rock Creek watersheds, it submitted to EPA an analysis demonstrating that modified CSO controls in the Potomac and green infrastructure in Rock Creek could provide equivalent pollution reductions to those in the original plan and were economically feasible. These submissions should be a good starting point in formulating strategies to verify that equivalent reductions are actually being achieved. Current status summary QAPP for the GI project is provided in the Verification Checklist for the *Waste Water Sector.*

Verification Priority

DOEE prioritizes verification of the controls in place at the single, major permitted point source in the district, the Blue Plains WWTP, the grey and green infrastructure associated Combined Sewer System, and the new urban stormwater BMPs required by the 2013 Stormwater Rule.

DOEE does not prioritize verification within the suite of urban stormwater BMPs; construction inspections are required on all permitted projects, and key variables required to determine pollution reduction (retention volume, contributing drainage area, and impervious area treated) are tracked.

For purposes discussed in detail in sections *A7: Quality Objectives and Criteria* and *A9: Documentation and Records*, DOEE also considers the verification of the historic record of BMPs an important priority. DOEE anticipates verifying the entire record of implementation in the district in the next two years. Inspection efforts will prioritize BMPs with the largest contributing drainage areas, since these may be associated with larger estimated pollution reductions, but will also perform verification inspections based on logistical concerns (routing and timing).

BMP Lifespans

BMPs reported by DOEE are inspected according to schedules outlined in section D1: *Urban Stormwater Sector*. If documentation associated with inspection and maintenance is not available for a specific BMP, the records in the CBPO NPSBMP-NEIEN database will lack the reporting information (Event Status Codes for inspection and/or maintenance, the associated dates, and inspection results) needed to verify continuing function. This will trigger the CBPO partnership's practice lifespan and sunset recommendations and the records (lacking verification) will expire and no longer be credited for pollutant reductions. DOEE anticipates scenarios where BMPs have been installed & reported, then retired for a period of time because of the lack of verification, but then re-activated as of the date when maintenance was performed, verified, and reported. DOEE will report this verification information to CBPO using the Watershed Technical Workgroup's NEIEN reporting recommendations. *Section 3) Data Management and Governance*) of this document includes more detailed information on this verification element.

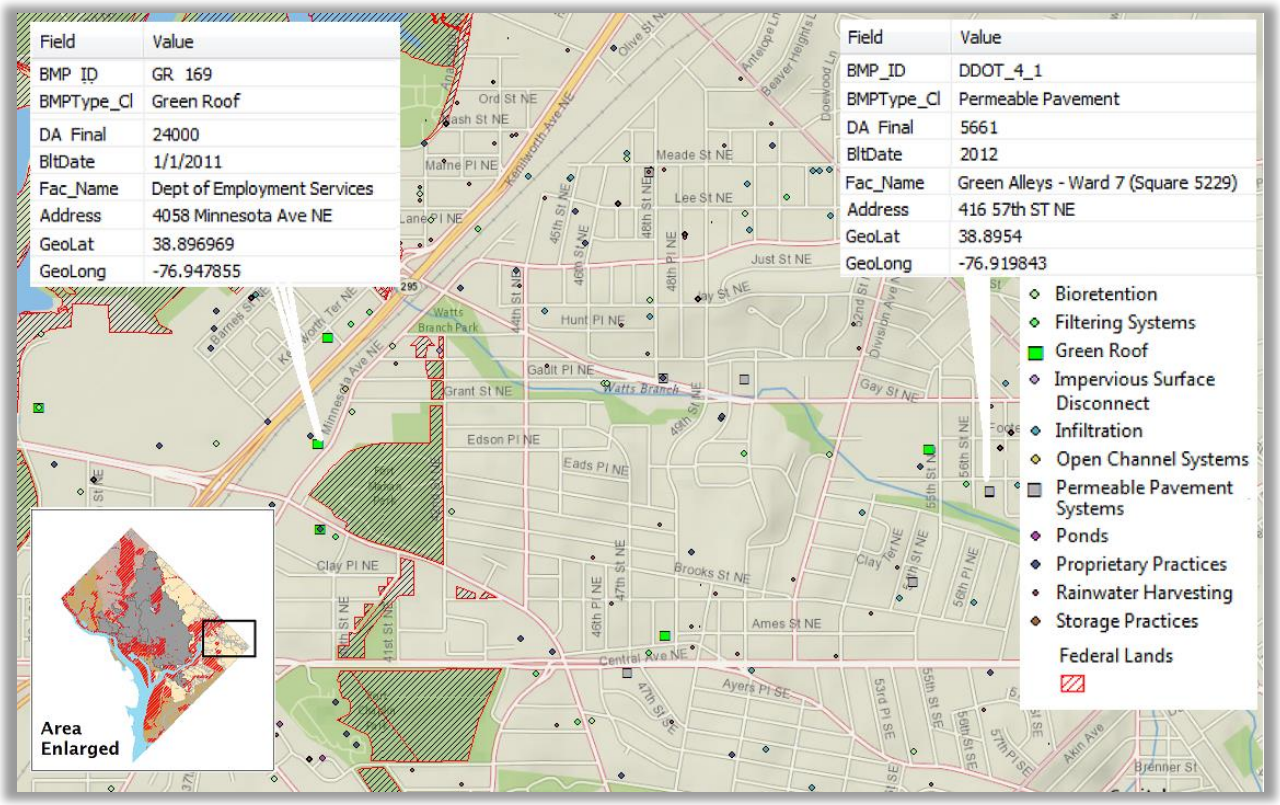
Procedures used to compile data

BMP tracking and reporting in the district differ from other jurisdictions in the partnership, primarily because of the smaller geographic scale and smaller number of agencies involved in the process. DOEE tracks and reports the majority of BMPs by *stormwater management plan*. For the district's historic record, "compilation" of BMPs can be illustrated by an example that although multiple filtration practices may have been implemented on the ground, only the total (or cumulative) area associated with the practices was tracked and reported. Future verification efforts for these legacy BMPs will are expected to result in the inspection and separation of these into unique practices.

Structural Practices in the Historic Record

As part of the Consolidated TMDL Implementation planning process, DOEE's project team compiled a standardized inventory of the historic BMP record (all BMP types). The methodology and technical approach are documented in *Appendix F - BMPs and BMP Implementation of the TMDL IP Final Comprehensive Baseline Analysis* deliverable of the Implementation Plan. This inventory currently represents the historic record in the district through 2013. DOEE's new stormwater database is used as the source of BMP and verification data from 2013 to the present. As an example of how DOEE's BMPs are tracked and reported to CBPO, see Figure A6(4), a map of structural BMPs in Watts Branch.

1Figure A6(4). Example map of structural BMPs in Watts Branch in the Anacostia watershed.



Street Sweeping

For legacy reporting, DPW street sweeping has been compiled and reported by 12-digit HUC. DOEE has worked with DPW to improve the tracking and reporting of street sweeping, and now receives detailed mileage swept by routes delineated in GIS. DOEE anticipates reporting summarized mileages per route by sweeper type (vacuum assist vs. mechanical broom).

Stormwater Database

Urban stormwater BMPs are no longer compiled in the new system. Detailed attributes (including stormwater retention volume) are calculated and tracked for each unique BMP. DOEE's stormwater database has multiple layers of data entry with roles for owners, installers, plan reviewers, inspectors, and data administrators so that BMP installation can be tracked during the lifecycle of the project (and beyond). The database also supports the attachment of electronic files to a stormwater management plan. Types of files include, but are not limited to, scanned images of as-built plans, DOEE inspection reports, digital photographs, and Notice Of Violation (NOV) forms.

Tree Planting

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

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.

Stream Restoration

The majority of stream restoration work is initiated by PRB. Regardless of the originator of stream restoration work, these projects must be reviewed and approved by the Plan Review Branch of the Watershed Protection Division. Submitted plans and their treatment areas are entered into a database and are double-checked by the engineer performing the plan review. On an annual basis, the Planning and Restoration Branch queries the database for stream restoration projects installed, geocodes the locations of each project, determines the linear feet of stream restored, and reports it to the CBP.

Street Sweeping/Catch Basin Inserts

The District Department of Public Works (DPW) is the lead agency for sweeping District of Columbia roadways. DPW uses an ArcGIS database of polygons representing the boundaries of signed sweeping routes along with arterial and highway sweeping routes. DPW also uses Trakster®, a web-based software application designed specifically for public works operations. The FieldTrak module of Trakster® stores data on the dates, sweeping routes, mileage of road swept, and the type of sweeper used. This information is then passed on to the SMD who QA/QCs the data and reports it to the CBP.

Development/Redevelopment and all other BMPs

The second largest proportion of load reduction acreage reported to the Bay Program after point source load reductions comes from the redevelopment of the District. The vast majority of the District was developed before the advent of stormwater BMPs so new development in the District invariably reduces stormwater and pollutant loads to our local waterways.

A7: Quality Objectives and Criteria

Section 1 & 2) - Accuracy & Completeness Objectives

DOEE plan reviewers go over calculations and confirm designs and plans are consistent with the stormwater regulations. Inspectors conduct on-site inspections with as-built documents to confirm that implementation reflects the approved plan. The stormwater database contains validations and governance processes to minimize data entry error. NEIEN administrators review data for consistency and required elements before transmitting data to CBPO.

The stormwater management data collected by PRB and SMD from other agencies is not provided on a mandatory basis, but are instead provided through inter-agency cooperation.

DOEE's Planning and Restoration Branch objectives for reporting to the Bay Program are:

- To receive data on all BMPs listed under NPDES Permits (ongoing)
- To receive data on all BMPs being installed and inspected (ongoing)
- To receive data on all federal BMPs (ongoing)
- To accurately record location data for all BMPs in the database (ongoing)
- To update the database to meet new District stormwater regulations which require a stormwater retention standard (complete)
- To receive data on all BMPs installed on a voluntary basis (non-permitted activities such as tree planting) (ongoing)
- To verify BMPs installed on a voluntary basis (ongoing)
- To provide the BMP data in the format necessary for the CBP Model (ongoing)
- To provide the CBP with stormwater volume capture data (stormwater performance standard information) for each newly installed BMP (ongoing)
- To provide the data through the National Environmental Information Exchange Network (NEIEN) (ongoing)
- To perform a comprehensive, one-time, verification effort of the District's stormwater BMP inventory (ongoing: estimated completion date: May 2016)
- To post the BMP data and their associated load reduction estimates on the internet for the public (May 2016)

Potential Bias

DOEE acknowledges and accepts the potential for *low bias* of not capturing BMPs that were installed without stormwater management plans being filed. These BMPs are considered to be unverified until reported to DOEE and inspected by the Inspection & Enforcement Branch staff. DOEE anticipates capturing previously-unreported BMPs during the comprehensive one-time verification effort of the BMP inventory (May 2016).

Federal Reporting

DOEE acknowledges and accepts the potential for *low bias* for BMPs implemented on federal lands in the district. Many Federal agencies have not historically files stormwater management plans with DOEE, but have started reporting BMPs to DOEE on an annual basis using the reporting template shared between the district and Maryland. In order to avoid double counting, these BMPs are not included in the CBPO NPSBMP NEIEN reporting work flow until they can be reconciled with BMPs in the stormwater management database. At the end of a reporting cycle, DOEE prepares a summary report of all data received (and also agencies who neglected to submit data) and shares the document with CBPO.

One example of unconfirmed, unreported BMP implementation is the National Park Service and Urban Nutrient Management. Section 4.8.2.4 (Soil Resource Management) of the National Park Service Management Policies (See: *List of Supporting Documents and Attachments*) states:

"When use of a soil fertilizer or other soil amendment is an unavoidable part of restoring a natural landscape or maintaining an altered plant community, the use will be guided by a written prescription. The prescription will be designed to ensure that such use of soil fertilizer or soil amendment does not unacceptably alter the physical, chemical, or biological characteristics of the soil, biological community, or surface or groundwaters."

Because of the lack information and confirmation that these policies have been implemented, the district has never reported Urban Nutrient Management as a BMP on NPS properties to CBPO for Bay TMDL pollution reductions. DOEE hopes to obtain confirmation of implementation consistent with the CBPO practice definition, and to report this BMP with the appropriate verification elements. At that time, DOEE will update this QAPP to reflect the information available.

Historic BMP Record

DOEE acknowledges and accepts the potential for high bias in the legacy (historic) stormwater management database. In some cases, the exact date of BMP installation was not recorded in the database. In these cases, the stormwater management plan approval date was used to determine the progress reporting year and used to approximate the installation date. DOEE anticipates confirming installation and proper function of these BMPs during the comprehensive one-time verification effort of the BMP inventory (May 2016).

Tree Planting

In future reporting cycles, DOEE intends to take advantage of the recently enhanced NEIEN capacity to report multiple BMP event status code dates, and will report dates (where available), for planting, condition inspection, *and mortality.* This verification reporting will provide additional confidence to CBPO that tree coverage in the district is not overestimated by the failure to account for tree mortality.

Double Counting (Prevention)

Tree Planting

Special considerations are taken with urban tree planting to avoid double counting. For trees planted by the DDOT UFA and Casey Trees, tree planting mortality (death) results in trees that are *replaced*, in accordance with program warranty. These trees are not included in counts of trees planted. For street trees, tree condition, species, DBH (diameter at breast height), and mortality (date) is captured in the UFA's GIS layer. In 2014, DOEE phased in the reporting, through NEIEN, of the tree species information and DBH measurement (along with coordinates (latitude and longitude) which have been reported since 2012) for verification purposes.

Casey Trees is the implementing agency for the RiverSmart Homes program, as well as other grant sources, of tree plantings. Planting data is tracked and organized by program/funding source, which ensures that a Casey Tree planting is not double counted.

Completeness

For some legacy (historic) BMPs, implementation may have been tracked by progress reporting year, or month and year; the exact date may not have been available to DOEE. Because NEIEN requirements require implementation date in the format YYYY-MM-DD, DOEE procedures

applied default dates (such as 2010-01-01) in order to successfully validate and submit progress submissions.

For cases in the legacy stormwater database when site locations did not report valid addresses, BMP locations were geo-referenced manually using project descriptions (intersections of cross streets, or lengths of roads between bounding streets), in order to obtain the most accurate location information as possible for the practice.

A8: Training and Certification

DOEE Inspection and Enforcement Branch

Technical staff positions titles within the Inspection and Enforcement Branch (I&EB) of the DOEE's Watershed Protection Division include both *Environmental Engineer* and *Environmental Protection Specialist*, though duties performed for these two titles are the same. IE&B Inspectors must have a degree in engineering, chemistry, biology or environmental science.

The following trainings and certifications are required for DOEE inspectors:

- Basic Inspector training;
- OSHA Confined Space;
- Personal protection training
- Construction Site Entry,
- Vehicle Accident Reporting,
- Inspector Ethics,
- Erosion and Sediment Control training; and
- Stormwater BMP installation and maintenance training.

Staff inspects construction sites for compliance with district regulations for erosion and sediment control, stormwater management, and complaints related to these subjects for construction sites and land disturbance activities where a building permit is required as describe by the District Code of Municipal Regulations.

Staff training described in performance plans are required to be completed with satisfactory ratings, including training for all types BMPs, including gray or conventional stormwater infrastructure, and green infrastructure practices; such as green roofs, bio-retention, harvest reuse in order to support the performance of competent inspections for construction, and operation and maintenance of these Erosion and Sediment Control and other stormwater BMPs.

Staff are also required to have expertise in using digital cameras, smartphones, desktop computers, field laptop computers, Google Earth, working knowledge of GIS, database software, and experience completing reports and recording of inspections and enforcement actions. Inspectors are required to maintain accurate records and site files with information related to onsite inspection and enforcement for the land disturbing activity and construction and maintenance of all BMPs approved as required by the administrative procedures for the Building Permit and as described by Standard Operating Procedures for the Branch.

Inspectors are also provided with training in the areas of environmental regulatory enforcement compliance, including:

- writing investigative reports,
- Issuing warnings or tickets (corrective Actions, Directives, Notice of Violations, Notice of Infractions and Stop Work Orders),
- Testifying in court,
- Supplemental USEPA approved Inspector training, and
- DOEE Office of Enforcement training to support effective inspections for enforcement.

DOEE has also recently instituted a cross-training program for all staff with site review and inspection responsibilities. This program is envisioned to facilitate communication and information sharing that will alert stormwater inspectors when staff from other branches discover potential problems while performing their assigned duties, with the ultimate goal of increasing compliance with district regulations.

Erosion & Sediment Control Outreach

DOEE's Watershed Protection Division provides educational programs and materials to assist the construction industry and governmental construction management agencies with the implementation and maintenance of erosion and sediment controls on developing sites. The program's materials are designed to enhance the technical capability of supervisors in charge of implementing and maintaining erosion and sediment control measures, and to assist inspectors responsible for erosion and sediment control plan compliance monitoring. These programs are available to any group or person seeking a better understanding of sediment pollution and control.

DC Water Clean Rivers Construction Managers

It is the responsibility of Consultant Construction Managers (CCM) to coordinate the provision of manufacturer or vendor-provided training as provided for in the construction contract documents and in accordance with DETS SOP 5480. The CCM shall review all training submittals, conduct training coordination, and arrange for the delivery of the training required under the construction contract.

- Review and approve all lesson plans specified in the construction contracts, ensure that lesson plans are consistent with the operations and maintenance manuals.
- Coordinate training classes including the scheduling of classrooms and arrangement of support equipment and material.
- Monitor and evaluate quality of classroom training to ensure material is covered adequately.
- Review and approve videos prepared by the construction contractors.

The identification of individuals to receive training will remain the responsibility of DC Water. The CCM will be required to coordinate the time(s) for training with DC Water to ensure the maximum availability of maintenance and operations personnel.

Wastewater Sector

DOEE Data Managers

The DOEE stormwater database manager has over 2 years (4000+ hours) of experience developing databases for environmental programs using QuickBase and completed Softek training for design of relational databases in 2013. Contractor support staff (Karder Corporation) for the stormwater database have over 3 decades of database experience and are an Intuit-approved QuickBase Solutions Provider. DOEE's NEIEN data manager has 5 years of experience working with CBPO's NPSBMP-NEIEN plug-in, Windsor Node Client software, preparing NEIEN-compliant XML data, and is a member of the CBPO Watershed Technical Workgroup.

Contractor Support

DOEE, with the assistance of CBPO funding to support verification principles, has engaged contractor support to perform a one-time inspection and verification effort. Legacy BMP implementation (historic record) has been compiled so that an external independent review team can visit locations, document presence/absence, condition, verify contributing drainage area, and retention volume if applicable. A description of the qualifications of the assembled project team is provided below.

- Experience:
    - extensive watershed-scale stormwater management planning experience,
    - local knowledge of the district's land use, stormwater system, permit-related issues, and monitoring requirements
    - local and national TMDL expertise
- Certifications, Degrees, and Technical Expertise:
    - Professional Engineers
    - Bachelor's degrees in Civil and Environmental Engineering,
    - Bachelor's degree in Environmental Studies
    - Bachelor's and Master's degrees in geography with emphasis on hydrology & water resources

A9: Documentation and Records

Section 1) Data Providers

DOEE receives BMP information from data providers (including Federal partners) in electronic format, usually by email, in an excel template format that is also used by the state of Maryland. Data received by email is archived within 5 weeks of transmission and stored on a hard drive. Emails and attached files are also saved on hard drives in folders specific for progress year and data provider. At the end of a progress submittal, DOEE compiles and reports information on data received, processed, and reported.

Section 2) Electronic Records Retention and Back up Procedures

Data from DOEE's legacy stormwater management database has been archived and migrated into the new stormwater database. DOEE's new Stormwater Database is a Quickbase application that is backed up daily. The encrypted backup files are stored within Intuit-owned data centers. Intuit does not use a third party to maintain backup files. Local backup for applications is done as

a snapshot every 24 hours, and the most recent 14 daily snapshots are kept. In addition to the daily snapshots, intuit keeps the most recent six months' worth of weekly snapshots past the 14 days' worth of daily snapshots.

Section 3) Inspection Forms

DOEE Regulated Stormwater Retrofit

Inspections before, during and after construction are required to ensure that SWMPs are built in accordance with the approved plan specifications. Inspectors use detailed inspection checklists that require sign-offs by qualified individuals at critical stages of construction to ensure the contractor's interpretation of the plan is consistent with the designer's intent.

DOEE construction inspection forms are documented in Appendix K (pages K1-K21) of the Stormwater Management Guidebook:

- Green Roof Construction Inspection
- Rainwater Harvesting Construction Inspection
- Impervious Surface Disconnection Construction Inspection
- Permeable Pavement Construction Inspection
- Bioretention Construction Inspection
- Filtering System Construction Inspection
- Infiltration Practice Construction Inspection
- Open Channel System Construction Inspection
- Ponds, Wetland, and Storage Practice Construction Inspection
- Generic Structural BMP Construction Inspection
- Tree planting and Preservation Construction Inspection
- Stormwater Facility Leak Test

DOEE recommends that an annual maintenance inspection and cleanup be conducted at each BMP site, particularly at large-scale applications. Maintenance inspection forms are documented in Appendix L (pages L1-L14) of the Stormwater Management Guidebook:

- Green Roof Maintenance Inspection
- Rainwater Harvesting Maintenance Inspection
- Impervious Surface Disconnection Maintenance Inspection
- Permeable Pavement System Maintenance Inspection
- Bioretention Maintenance Inspection
- Filtering System Maintenance Inspection
- Infiltration Practice Maintenance Inspection
- Open Channel System Maintenance Inspection
- Wet Ponds and Wetlands Maintenance Inspection
- Storage and Underground Detention Practices Maintenance Inspection
- Generic Structural BMP Maintenance Inspection
- Tree Planting and Preservation Maintenance Inspection
- Maintenance Service Completion Inspection

Riversmart Homes

DOEE Riversmart homes provides incentives to homeowners to implement BMPs voluntarily on private property. An initial inspection is required for all Riversmart BMPs by DOEE auditors in order to receive incentives. Site drawings are created and saved in an ArcPad database and PDF reports are generated and provided to homeowners. Follow-up audits are performed on approximately 10% of installations by DOEE auditors or non-profit partners. Examples of Riversmart Homes inspection forms are provided below:

Rain Barrels

RiverSmart Homes

Clean Water Starts in Your Yard

DISTRICT DEPARTMENT OF THE ENVIRONMENT

Rain Barrel Inspection Report

Site Address:_____ **Name of Inspector:** _____

Number of Barrels: _____ **Date of Site Visit:** _____

☐ **Photo**

Installation Site

☐ Rain barrel is elevated and level.
Notes:_____

☐ Rain barrel is located near vegetation.
Notes:_____

☐ Rain barrel is oriented so homeowner can easily remove diverter to clean filter.
Notes:_____

Inlet

☐ Downspout is connected and aligned properly to rain barrel inlet.
Notes:_____

☐ The inlet is clean and clear of obstructions and debris (leaves, etc.)
Notes:_____

Overflow

☐ Rain barrel's overflow is secure and routed away from the house's foundation.
Notes:_____

☐ The overflow is clear and unobstructed.
Notes:_____

Filter

☐ A filter is present on the inlet.
Notes:_____

☐ The filter is clean and clear of debris (leaves, etc.)
Notes:_____

Comments: _____

_____

_____

_____

_____

Circle appropriate ranking below	
0	No hose, no downspout disconnect, overflow is not directed away from house, no vegetation nearby, barrel is not level/elevated
1	Filter has not been cleaned, barrel appears unused
2	
3	Filter moderately clean. Vegetation within reach of hose, but further than 15' away.
4	
5	Elevated and level, downspout connection secure, overflow is directed away from house/structure, vegetation nearby, filter clean, hose attached.

Rain Gardens

RiverSmart Homes

Clean Water Starts in Your Yard

DISTRICT DEPARTMENT OF THE ENVIRONMENT

Rain Garden Inspection Report

Site Address:_____ **Name of Inspector:**_____

Contractor: _____ **Date of Site Visit:**_____

- ☐ **Installation Photo (can be acquired from ACB)**
- ☐ **Site Visit Photo**

Placement

☐ Rain garden is a minimum of 10 feet away from any existing foundation or retaining wall.
Notes:_____

☐ Downspout is extended into rain garden at a 2% grade down and away from the house.
Notes:_____

Content

☐ Bioretention soil mix ratio is 50% sand, 25% topsoil, 25% compost/leaf mulch.
Notes:_____

☐ Rain garden is at least 18-24"deep.
Notes:_____

☐ Rain garden has a 2-3" hardwood mulch layer.
Notes:_____

☐ Downspout outfall into the garden is protected (i.e. covered with river rock).
Notes:_____

☐ Plants native to the Chesapeake Bay were used.
Notes:_____

☐ Plant material totals at least 22 gallons (size of perennials can be substituted at a 2 quart: 1 gallon equivalency). Each rain garden must have a minimum of 2-3 shrubs at 3 gallons each.
Notes:_____

☐ A 3-6" berm is present on the downslope side of the garden.
Notes:_____

☐ Garden has at least 6" of ponding depth. If garden location is flat, ponding depth is greater than 6".
Notes:_____

Maintenance

☐ Inflow is covered with river rocks to disperse water (but not block it from entering the garden)
Notes:_____

☐ Connection at downspout is secure
Notes:_____

☐ Garden is free of weeds
Notes:_____

☐ Plants are alive and thriving.
Notes:_____

Comments:_____

Circle the appropriate ranking below	
0	This task has not been completed, plant material has died or feature has been removed. Signs of significant erosion. Weeds have taken over garden.
1	0-25% or less of the plant material is alive. Garden is badly in need of water, weeding, and/or mulching.
2	26- 50% of plant material looks alive. Garden is in need of water, weeding, and/or mulching.
3	51-75% of plant material or tree appears alive. Garden could use moderate mulching or weeding.
4	More than 75% of plant material is alive, but could use some light mulching or weeding.
5	Garden is thriving: it looks healthy and alive, mulch is at least 3" deep, few or no weeds present.

Tree Planting

RiverSmart Homes
Clean Water Starts in Your Yard

DISTRICT DEPARTMENT OF THE ENVIRONMENT

Tree Inspection Report

Site Address:_____ **Name of Inspector:** _____
Type of Installation: _____ **Date of Site Visit:** _____

☐ **Photo**

Check if completed:

☐ Tree is alive and thriving, appears free of disease.
Notes:_____

☐ Area around tree is mulched and weeded.
Notes:_____

☐ A water bag is present around the base of the tree.
Notes:_____

☐ Tree is 10" from the foundation of a house.
Notes:_____

Comments:_____

Circle appropriate ranking below	
0	No tree present at specified location or tree has died.
1	0-25% or less of the plant material is alive. Tree is badly in need of water, weeding, and/or mulching.
2	26- 50% of plant material looks alive. Tree is in need of water, weeding, and/or mulching.
3	51-75% of plant material or tree appears alive.
4	More than 75% of plant material is alive, but could use some light mulching or weeding.
5	Tree thriving.

Permeable Pavement

RiverSmart Homes

Clean Water Starts in Your Yard

DISTRICT DEPARTMENT OF THE ENVIRONMENT

Impervious Surface Removal & Replacement Project Inspection Report

Site Address:_____ **Name of Inspector:**_____

Contractor: _____ **Date of Site Visit:**_____

☐ **Installation Photo (can be acquired from ACB)**
☐ **Site Visit Photo**

Check if completed:

☐ Final installed product is pervious (either pervious pavers or planting beds/grass).
Notes:_____

☐ Permeable paver system is not sloped towards house.
Notes:_____

☐ Downspout piping is not perforated within 10 feet of house.
Notes:_____

☐ If a downspout is routed into the permeable paver system, a filter is installed on that downspout.
Notes:_____

Comments:_____

NPDES Compliance Inspection forms.

For both major and minor facilities, DMR self-monitoring submissions are reviewed. The reported values are checked against laboratory reports/log books maintained onsite; hard copies of which are submitted to DOEE and EPA. For major facilities, the verifications and field inspections are performed annually. For minor facilities, inspection frequency varies.

The forms are documented in APPENDIX J - FORM 3560-3 of the NPDES Compliance Inspection Manual (link supplied in the supporting documents section of this document).

DC Water Construction Management

DC Water has processes in place to assure that the construction work is performed and completed in accordance with the contract documents. Projects are staffed with various discipline inspectors as needed for the specific work activities. These disciplines include civil, tunnel and shaft, grouting, piping, welding, mechanical, electrical, instrumentation, structural and in-factory inspections, and environmental compliance.

On Design-Build Contracts the CCM Inspector(s) assume the duties of an IVA Inspector and will coordinate with the PCO for Independent Verification Inspection, Sampling and Testing as required.

Duties may include:

- Monitor contractor's quality process, and coordinate field sampling and testing.
- Prepare daily inspection reports and other quality records as needed.
- Observe and document the safety performance of the contractor.
- Assist Field and Office Engineers in the verification of schedule performance and quantity.

The following inspection forms are documented in Appendix 4 of DC Water's Construction Management Plan:

- QA Audit/Inspection Forms
- Material Supplier Audit (MSA) Precast Segment Plant
- Material Supplier Audit (MSA) Ready Mix Concrete
- Quality Surveillance Report (QSR)
- Field Activity Audit (FAA)
- Field Document Audit (FDA)
- Monthly Record Document Audit (MDA)
- Quality Observation Report (QOR)

DDOT -UFA

UFA Inspection forms track the following data elements, which are reported to DOEE electronically:

Field Name	Field Description
FACILITYID	Unique ID for tree
VICINITY	Nearby Street Address

Field Name	Field Description
WARD	District of Columbia Ward
TBOX_L	Length of tree box
TBOX_W	Width of tree box
WIRES	High voltage, low voltage, or both types of wires nearby
CURB	Temporary, permanent, or no curb nearby
SIDEWALK	Temporary, permanent, or no sidewalk nearby
TBOX_STAT	Tree box status (planted, open, proposed, retired)
RETIREDDT	Date tree retired (removed)
SCI_NM	Scientific Name
CMMN_NM	Common Name
DATE_PLANT	Date tree planted
DBH	Diameter Breast Height
DISEASE	Type, if present
PESTS	Type, if present
CONDITION	Tree condition (excellent, good, fair, poor)
CONDITIODT	Date of condition determination
OWNERSHIP	UFA, NPS, Private, other
TREE_NOTES	Text comment field for forester notes on non-standard items
WARRANTY	Warranty period for tree planting
FAM_NAME	Taxonomic Family Name
CREATED_US	Name of arborist creating a new record (planting)
CREATED_DA	Date of creation for new record (planting)
EDITEDBY	Name of arborist updating information for a record (tree planting)
LAST_EDI_1	Date updates made for a tree planting record

Casey Trees

Tree Rebate Program

Casey Trees performs inspection audits of approximately 10% of plantings associated with their tree rebate program. Spreadsheet logs are maintained that confirm presence/absence by street address. Additionally, Casey Trees conducts an annual Survival Study which looks at the more than 17,000 trees that have been planted since 2003.

Riversmart Homes

Casey trees is responsible for planting trees associated with the Riversmart Homes program. These plantings are automatically included in Casey Tree's long term tree survival study, which inspects approximately 10% of plantings after their establishment period, typically the third year after the planting date. Electronic forms on devices in the field. These forms track the following fields:

Field Name	Field Description
Date_Ptd	Date Planted
Date_Ins	Date Inspected

Field Name	Field Description
SciName	Scientific name
Lat	Latitude
Long	Longitude
Cond	Tree condition

B9: Non-direct Measurements

DOEE has consistently reported direct numeric assessments of implementation for progress reporting. All jurisdictions were requested to clean-up of the CBPO historic BMP implementation record for model calibration. Furthermore, jurisdictions were requested to fill annual gaps in the historic record. DOEE used a CBPO-recommended technical approach to fill gaps in the record from between 1986-1992 and 1993–1997. DOEE assumed implementation occurred at a fixed rate and interpolated between known data points to fill the two gaps. DOEE anticipates updating these records with superior information after the one-time verification effort targeting the historic record.

B10: Data Management

DOEE contacts federal agencies, along with other partners (Casey Trees, DPW) in mid-August with a request to provide BMP implementation data by mid-October. DOEE receives BMP information from data providers in electronic format, usually by email, in an excel template format that is also used by the state of Maryland. Data received by email is archived within 5 weeks of transmission and stored on a hard drive. DOEE also processes stormwater management plan data in the stormwater database and notifies federal partners of any BMP records (in the current progress year) implemented on federal lands. This is done to avoid double counting and to confirm implementation with the appropriate agencies.

Procedures for Emergency Situations

Data is backed up weekly by District government information technology staff. The District government has contingency plans in case of an information technology disaster. DOEE IT Branch maintains this plan.

Section 1) Work Flow

Upon receiving urban stormwater BMP data, the PRB and SMD staff consolidates and standardizes the information. This includes the following steps:

- Historically, urban stormwater BMPs have been georeferenced using site descriptions and address information from stormwater management plans. These addresses were standardized so that they could be properly geo-coded with the Office of the Chief Technology Officer (OCTO) Matching Address Repository (MAR) tool. This facilitates sorting and helps in the recognition of replicates (preventing double counting). Note: The new stormwater database contains coordinate information for all BMPs associated with a plan.
- Data are imported to ArcGIS, and intersected with the district's TMDL Waterbody delineations, the boundary between the combined and separate sewer system (CSS and MS4), and the CBP Federal Lands layers.

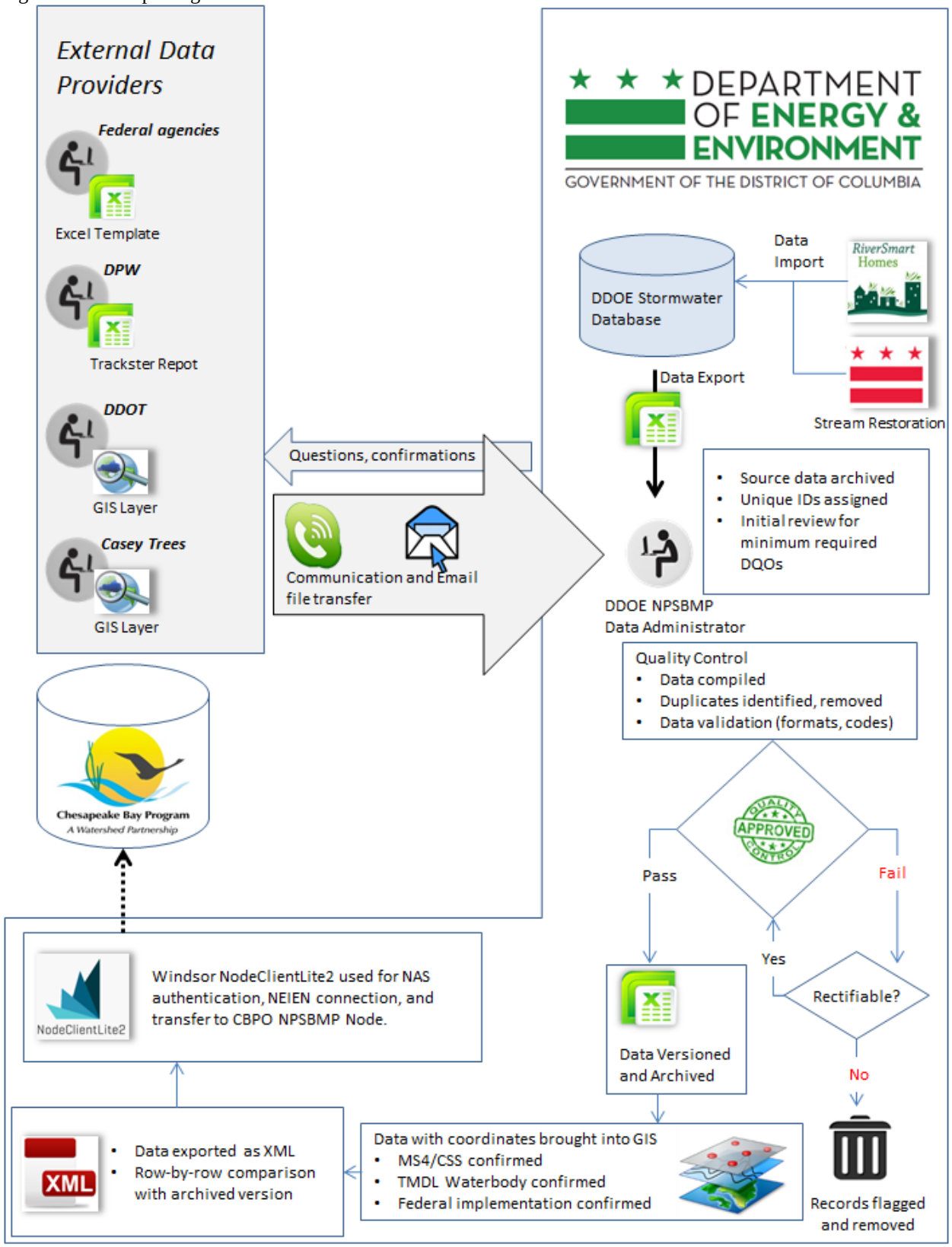
- The compiled data are verified to include geospatial information, BMP type, stormwater volume captured (if applicable) and area treated by each BMP.
- The data is converted to a NEIEN-NPSBMP compliant XML file, and submitted to the CBP.
- Range checks are performed to ensure that implementation numbers are within expected and reasonable (previously encountered) levels. If detected, outliers are reviewed and corrected or confirmed (as appropriate).
- DOEE works with CBPO staff to review any processing errors to resolve issues. This can be accomplished by contacting the data source and reconciling issues in the source data and simultaneously updating XML documents.

Additional details in workflow procedures are provided in the following sections of this document:

- A6 (*Procedures used to compile data*)
- A7 *Section 1 & 2) - Accuracy & Completeness Objectives)*

The workflow diagram below depicts the lifecycle of implementation from external data providers to DOEE, additional processing performed, and the final reporting to the Chesapeake Bay Program through NEIEN.

Figure B10.1: Reporting Data Flow



Section 2) NEIEN Reporting

DOEE has prepared an attachment titled "*DOEE QAPP Attachment A (NEIEN Appendix*).xlsx." that identifies the exact BMP codes reported to the NPSBMP database through NEIEN. The appendix lists the matching Scenario Builder BMP, BMP unit codes, any conversion rules applies, along with reference to the stored procedures used by the NPSBMP plug-in to process the data.

DOEE is committed to using valid codes for all NEIEN data elements published in the *NEIEN Chesapeake Node Codes List*. XML reporting of BMP implementation data for progress determination (or model recalibration) will not be submitted without validated codes.

Section 3) BMP Lifespan tracking

As described in other sections of this document, DOEE tracks several dates associated with BMPs, including the stormwater management plan approval date, final construction inspection date, maintenance inspection dates, and maintenance dates. DOEE is currently maintaining two types of BMP implementation data, a legacy database (1988-2014) and a newer, more comprehensive stormwater database that has been designed to track elements associated with critical urban stormwater BMPs, geographic references, and data elements to support verification principles.

The District's new stormwater regulations require that all BMPs be inspected within a 5-year period. DOEE has migrated the historic record, with its limited set of data elements into the new stormwater database and is assembling a team of inspectors tasked with visiting and inspecting the legacy BMPs to document their condition. Once completed, DOEE expects all BMPs to be inspected and maintained on a regular basis. Any records that have not been inspected or maintained within the CBPO approved BMP lifespan recommendations should be considered non-functional for progress determination until required verification components are obtained.

C1: Assessment and Response Action

Section 1) Data Suitability

A variety of assessments are performed on BMPs implemented in the District of Columbia. DOEE inspectors are responsible for inspecting BMPs associated with urban stormwater retrofits. Contracted Services are in the process of being obtained to assist with a backlog of historic BMP records targeted for verification.

Federal agencies have also supplied facility-specific BMP inventory and inspection records that DOEE is reconciling with historic implementation records. Any BMPs reported by federal partners that are that appear to be new (no instance in DOEE's Stormwater Database) will be added to the stormwater database and flagged for DOEE inspectors for maintenance inspections.

DOEE staff are also responsible for follow-up site visits and assessments for BMPs implemented through the Riversmart Homes program (homeowner BMPs). DDOT's Urban Forestry Administration is responsible for inspecting and maintaining street trees, and Casey Trees also performs assessments of privately-funded tree plantings. Verification and validation details are supplied for project-specific BMPs in sections D1 and D2.

Section 2) Sector Prioritization

The verification of stormwater retrofits implemented to meet stormwater regulations have been prioritized by DOEE, as they are expected to drive pollution reductions associated with stormwater in the district. DOEE is also committed to having inspections of BMPs implemented prior to development of the regulations and stormwater database, since these practices are critical to an accurate assessment of pollution reductions. As discussed in *Section 3) Data Management and Governance*, the district's new stormwater database is being enhanced to serve as the consolidated BMP inventory, with access to the full suite of inspection tools (mapping, scanned plans, inspection forms, notices of violation, etc.), stormwater retention calculation features, and reporting (NEIEN and Implementation Plan Modeling Tool for local TMDLs).

C2: Reports to Management

On an annual basis, DOEE staff prepare assessments of BMP implementation as part of quality assurance procedures. DOEE also works closely with CBPO NPS data managers to review BMP implementation and address any issues or outliers that are identified during the progress reporting process.

D1: Data Review, Verification, and Validation

Verification is normally conducted to ensure that monitoring data or BMP performance information (including their maintenance) meets agreed standards. Verification provides the opportunity to test data quality, consistency, and specifications, including traceability. Validation, on the other hand, is done to see if the data sets used in measuring compliance are acceptable (have integrity, e.g., files/databases are properly maintained; no anomalies and no chain of custody issues) and provide the correct information (correct unit of a measure, etc.). While verification and/or validations are done periodically, compliance checks can be done at any time and as many times as required. For the Chesapeake Bay Program, verified and validated data and/or information are acquired and used not only for compliance assessments (including as model input data), but also to encourage the jurisdictions to comply with their commitments to reduce nutrients and sediment loadings into the Chesapeake Bay. How the District of Columbia specifically verifies and validates its monitoring data or BMP performance information within its wastewater sector for purposes of Bay TMDL compliance is summarized in Section D2: Verification and Validation Methods -Wastewater Sector).

For the purposes of reporting BMP data, the Chesapeake Bay Program partners have agreed upon the following definitions for data review, verification, and validation:

> **Data Review** – Data reviews should be independent, meaning that they are carried out by someone within the same organization having technical expertise in the subject matter to a degree at least equivalent to that needed for the original work, but who was not involved as a participant, supervisor, technical reviewer, or advisor in the development or operations of the program/practice under review. An external independent review is done by someone from an outside organization with technical expertise in the subject matter to a degree at least equivalent to that needed for the original work. (CBP 2014)
>
> **Verification** – BMP verification is: "the process through which agency partners ensure practices, treatments, and technologies resulting in reductions of nitrogen, phosphorus, and/or sediment pollutant loads are implemented and operating correctly." (CBP 2014).

Data Validation – BMP data validation is defined as a QA/QC check of a data record. The CBP's preferred validation method is a visual field check of an adequate statistical sample. It is expected that all BMPs, both internal and external, have at least a basic database or paper check of an adequate statistical sample.

This document has organized discussion of these three aspects by sector, program, or implementing agency immediately below table D1(a).

Table D1(a)

A. WIP Priority	B. Data Grouping	C. BMP Type	D. Initial Inspection				E. Follow-up Check			F. Lifespan/Sunset	G. Data QA, Recording and Reporting
			Method	Frequency	Who Inspects	Documentation	Follow-up Inspection	Statistical Subsample	Response if Problem		
High	Urban Stormwater - Regulatory Enforcement Inspection	DOEE Regulated Urban Stormwater Retrofit	Final Construction Inspection required to obtain occupancy permit	One time	DOEE Inspector	*Historic:* hardcopies *Currnt:* PDF attachements in stormwater database	Maintenance Inspection within 5 years of Final Construction inspection	N/A	Inspector notifies property owner of deficiency and re-inspects when issue addressed.	Follow-up inspection within 5 years of previous successful inspection.	Stormwater Database Inspection Module
High	Point Source - Regulatory Enforcement Inspection	WWTP Controls	DOEE and EPA NPDES Compliance Inspection	One time	DOEE and EPA Inspector	Online Compliance Inspection Form Results	EPA and DOEE Inspections verify self-reporting	Future parnership effort between DOEE, EPA, and MWCOG	Data correction	NA	DMR, MWCOG reporting to EPA
Medium	Urban Stormwater - Voluntary BMPs	Residential Stormwater Retrofit	Stormwater Site Audit required to receive incentive	One time	DOEE RiverSmart Homes Auditor	Site drawing in ArcPad database. Word/PDF reports emailed to homeowners	Inspected by DOEE Auditors. Non-profit partners also conduct independent inspections	10%	N/A	BMP specific	Inspection Reports
Medium	Urban Stormwater - Restoration	DOEE Stream Restoration	Visual Inspection for health and establishment; as-built plans	Quarterly photo survey in first year then annual; annual geomorphic/benthic survey	DOEE for photo monitoring; 3rd party for geomorphic/benthic	Photo survey report; geomorphic report with graph; benthic report	Yearly	NA	Plan for corrective action	5 years to comply with 404 permit	Monitoring Reports
Medium	Urban Tree Planting - DDOT UFA	Urban Tree Planting	Visual Inspection for health and establishment	Three times during establishment	Urban Forester	electronic - data table associated with GIS layer	Every 5 years after establishment	N/A	Replacement, pruning, mulching, weeding, watering	Reinspection every 5 years, mortality tracking and reporting	GIS data layer maintained

A. WIP Priority	B. Data Grouping	C. BMP Type	D. Initial Inspection				E. Follow-up Check			F. Lifespan/Sunset	G. Data QA, Recording and
			Method	Frequency	Who Inspects	Documentation	Follow-up	Statistical Subsample	Response if		
Medium	Urban Tree Planting - DDOT UFA	Urban Tree Planting	Visual Inspection for health and establishment	Three times during establishment	Urban Forester	electronic - data table associated with GIS layer	Every 5 years after establishment	N/A	Replacement, pruning, mulching, weeding, watering	Reinspection every 5 years, mortality tracking and reporting	GIS data layer maintained
Medium	DC Water	Catch Basin Cleaning	Pilot Effort	-	-	-	N/A	N/A	-	Annual practice	MOU to increase tracking and verification
Low	Urban Tree Planting - Casey Trees	Tree Planting (Other Funding Sources)	arborist site visit	3rd year after planting	Casey Trees	iPad electronic reports	Annual	10% for Rebate Program, 25% for annual survivability	Re-planting	Tree inspection and mortality tracking	Annual Casey Trees Survivability Report
Low	Urban Stormwater - DPW	Street Sweeping	None	None	None	None	None	None	None	Occurs annually March through October	DPW maintains Trackster database of route miles swept each day.
Low	Stormwater Management (Historic)	DOEE Wetland Restoration	Final Construction Inspection	One time	DOEE Inspector	hardcopies of Stormwater Management Plans	Special project to inspect BMPs in historic record	N/A	BMP may become obsoleted if problems not addressed	CBPO lifespan applied	Stormwater Database Inspection Module
Low	Land Management	Urban Nutrient Management	Plan Implementation Verification Required.	Future BMP Reporting. To be determined	Land Manager, 3rd party verification.	TBD	TBD	TBD	TBD	Annual practice	Nutrient Management Tracking Module required

Point Source Sector

Verification

The cornerstone of the District's compliance verification is the self-monitoring requirements included in the NPDES permits issued to all permitted facilities. For all major and minor facilities, DMR self-monitoring submissions are reviewed. The reported values are checked against laboratory reports/log books maintained onsite; hard copies of which are submitted to DOEE and EPA for further evaluation. For major facilities, the verifications and field inspections are performed annually. For minor facilities, inspection frequency varies.

Both the federal and DOEE staff conducting regular inspections on permitted facilities are well trained on the required processes and procedures - and follow these required processes and procedures at all times, including QA/QC plans. Each permitted facility has dedicated on-site operational manuals. For example, Blue Plaines utilizes a SCADA system for data capture, and operational manuals are maintained on-site. Additional information can also be found in the NPDES Compliance Inspection Manual (*List of Supporting Documents and Attachments*). The specific processes that DOEE follows, including forms that are used to conduct inspections and document observations in the wastewater sectors, are provided in the appropriate sections and tables of this document. DOEE also uses random inspections and enforcement actions when and where necessary to compel compliance. DMR data is submitted through an online form and maintained in a database. Table D1(b) lists both major and minor wastewater treatment facilities in DC with NPDES permit.

Effluent limitations, self-monitoring and reporting is performed according to NPDES permit requirements. As part of prior preparation, generally a week before the appointed inspection day, inspection staff normally reviews DMRs to identify problem potential unit processes to target for spot checks. Otherwise, the target and how to target is randomly selected based on what is revealed when inspectors are onsite.

Table D1(b): Current NPDES permits issued for the District of Columbia by EPA Region 3

Current final and draft NPDES permits issued for the District of Columbia by EPA Region 3.					
Permit No.	**Facility Name**	**Type**	**Issue date**	**Expiration Date**	**Fact Sheet**
DC0021199	D.C. WASA (BLUE PLAINS)	Major	8/31/2010 (PDF 62pp, 2.3M)	9/30/2015	Fact Sheet (PDF 34pp, 740K)
DC0022004	Gen-On Potomac River Generating1 Station (formerly Mirant)	Major	4/20/2000 (PDF 44pp, 1.6M)	4/19/2005	Fact Sheet (PDF 8pp, 356K)
DC0000221	MS4 -Government of the DC	Major	10/07/2011 (PDF 54pp, 647K)	10/07/2016	Fact Sheet (PDF 38pp, 212K)
DC0000094	PEPCO-Potomac Electric CO2	Major	6/19/2009 (PDF 30pp, 2.0M)	6/18/2014	Fact Sheet (PDF 22pp, 732K)
DC0000019	WASH Aqueduct-Dalecarlia Plant3	Major	10/20/2008 (PDF 57pp, 2.5M)	11/19/2013	Fact Sheet (PDF 24pp, 497K)
DC0000248	JFK Center for Performing Arts	Minor	7/25/2007 (PDF 20pp, 1.2M)	7/24/2012	Fact Sheet (PDF 3pp, 24K)
DC0000345	National World War II Memorial	Minor	4/5/2010 (PDF 16pp, 650KM)	4/30/2015	Fact Sheet (PDF 8pp, 72K)
DC0000141	Naval Station Washington	Minor	12/23/2009 (PDF 54pp, 986K)	1/22/2015	Fact Sheet (PDF 40pp, 739K)
DC0000175	Super Concrete	Minor	11/25/2008 (PDF 23pp, 95k)	11/24/2013	Fact Sheet (PDF 3pp, 24K)
DC0000361	Walter Reed Army Medical Center4	Minor	7/23/2008 (PDF 20pp, 284K)	7/31/2013	Fact Sheet (PDF 6pp, 116K)
DC0000337	Washington Metro Authority	Minor	4/20/2012 (PDF 21pp, 217.5K)	4/20/2017	Fact Sheet (PDF 9pp, 62.1K)
DC0000035	GSA West Heating Plant5	Minor	4/25/2012 (PDF 17pp, 114K)	5/24/2017	Fact Sheet (PDF 6pp, 103K)

Photographic Record

EPA and DOEE inspectors often include photographs taken during the inspection in the inspection report to support their observations. Guidance on the usage of digital photography and recommended procedures listed in NPDES Compliance Inspection Manuals are followed. Examples of usage of photographic record are provided in two example inspection reports provided in Section 1) (*List of Supporting Documents and Attachments*).

Allocation of PS loads to Jurisdictions

The Blue Plains WWTP treats waste water from the District, Maryland, and Virginia. The Washington Metropolitan Council of Governments (MWCOG) assists DC Water with parsing loads between jurisdictions and reporting DMR data to the EPA CBPO Point Source Data

1 Facility ceased operations in October 2012; however, the permit has been administratively continued to address stormwater discharge from the mothballed facility.
2 Facility ceased operations on June 1, 2012 and was decommissioned. The permit has been administratively continued to address stormwater discharges and investigate DMR exceedance over the past several years.
3 Facility is no longer authorized to discharge residual solids from the Georgetown Reservoir; however, through bypass requests the facility has discharged twice over the past 4 years.
4 Facility's NPDES permit was terminated in March 2014.
5 Facility closed down on but the permit is still inforce because there is still some discharge coming out.

Administrator for annual progress reporting. Data analysis worksheets are maintained by EPA and WMCOG.

Use of Statistical Approaches

DOEE handles a large amount of datasets/records pertaining to its wastewater sector. To be able to verify the accuracy of these datasets, it would be more efficient to take samples out of the entire record, including its various layers/strata/BMPs, etc., and review those against allowable source documentation to ensure compliance with DOEE and/or federally agreed upon standards. However, DOEE has not built this capability in-house yet. Because of this, DOEE stands ready to collaborate with EPA and be part of the EPA Funding Available to Support Verification through statistical approaches.

Historic Record

EPA is the permitting authority for the facilities listed in Table D1(b) in the District of Columbia, and is responsible for data storage, review, correction, and verification of the historic record for these point sources. DOEE requests to be provided with DMR data to perform a third party review, however, this is not a requirement of NPDES permits in the district. In 2015, the CBPO Wastewater Technical Workgroup acknowledged EPA as the entity responsible for reviewing and correcting the historic record for point sources in the district.

Validation

DOEE staff performs regular assessments of DMRs and other pieces of information submitted by permitted facilities. Because EPA is the permitting authority in the District of Columbia, it receives the original data; DOEE only receives copies. It is important to note that Blue Plains submits Blue Plains' data to the Chesapeake Bay Program [DOEE, DC Water and EPA Region 3 are working to streamline MWCOG's role in this regard, including the development of process procedures and protocols].

Data received by DOEE from all the facilities, both major and minor, are aggregated into a spreadsheet to calculate loads (both nutrients and sediments) to assess compliance with TMDL wasteload allocations. Wasteload allocations are enforced in each facility (major or minor) depending upon nutrient discharge limits specified in their individual NPDES permits. DOEE is in the process of initiating discussions with EPA to put in place an ICIS-NPDES data flow to make this entire process run more smoothly and efficiently going forward. Reviews of self-monitoring reports (under NPDES permit requirements), and load calculations described above are opportunities to perform data validation and schedule follow-up inspections (verification) if needed.

All DMR data is submitted by each permittee under a statement certifying that all the data is true and accurate. Analytical laboratories must also be certified to perform permit self-monitoring analyses. DOEE could also make use of the "Statistical Support Team" that the Bay Program has constituted to help DOEE develop a more technically sound basis for data validation.

Urban Stormwater Sector

Regulated Development - DOEE

New development and redevelopment projects in the district, including projects occurring on federal lands must apply for permits through the District Department of Consumer and

Regulatory Affairs (DCRA). Construction projects that disturb 50 square feet are automatically directed to DOEE Plan Review Branch for erosion and sediment control plan review. Likewise, construction that disturbs over 5,000 square feet must meet District stormwater regulations and their plans are sent to the Plan Review Branch for stormwater plan review.

Urban Stormwater BMPs and associated data are reviewed, verified and validated multiple times from the time they are reported to DOEE to the time they are reported to the Bay Program. The following verification and validation protocols for stormwater BMPs and stream restoration are as currently in place:

1) Plans are submitted to DOEE that include the following information for each BMP associated with the plan:
    a. Characterization of pre- and post-project contributing drainage area
    b. System-generated calculations of storage volume achieved
    c. Additional treatment volume (if applicable)
    d. BMP treatment train information (if applicable)
    e. Location information

2) WPD Plan reviewers check the information provided and, if needed request revisions. Once the plan is accepted as final the project is permitted for installation and construction begins;

3) WPD Inspection and Enforcement inspectors oversee the construction of the BMP, perform a data review and verify (on the ground) that it has been done according to plan. If changes had been made, inspectors ensure that as-built plans are submitted that include corrected volume capture and area treated information. (Copies of inspection forms are described in this document and provided in appendixes of the SMG;

4) Once the BMP is installed to the satisfaction of the inspector, final inspection is performed and a final approval is issued;

5) During annual progress assessment, DOEE PRB and SMD staff perform another layer of review and validation (outlier checks, confirmation of initial determination of the regulated area) of the record to ensure it is accurate, is not duplicative of other agency reporting, and the data is properly formatted for the CBPO NEIEN reporting.

6) Once a final approval is issued a countdown begins for the installed practice. Inspectors perform BMP inspections on all permitted District BMPs within five years of their final construction inspection date to ensure that they continue to be in place and maintained per their design. If they are found to not meet their design or be in need of maintenance the inspectors require that this work is performed to their satisfaction. Once the BMP is found to be in good working order the clock begins for the next inspection date.

A similar review process has been in place prior to the 2013 stormwater rule, however DOEE is instituting a one-time verification and validation effort of the historic practices (in 2016) to increase confidence that practices were installed properly on the ground.

Addition details on DOEE's Inspection Requirements are documented in Section 5.3 – Inspection Requirements of the Stormwater Management Guidebook (SWMG - in *List of Supporting Documents and Attachments*). The guidebook outlines requirements for:

- Inspection Schedules and Reports
- Inspection Requirements before and During Construction
- Inspection Requirements by BMP type
- Final Construction Inspection Reports
- Inspection for Preventive Maintenance
- Maintenance, Maintenance Responsibility, and Maintenance Agreements.

Additionally, chapter 3 of the SWMG contains detailed descriptions of BMPs. For each BMP, a sub-section specific to maintenance schedules and criteria is provided.

Other Verification Opportunities

A mapping component of the stormwater database provides DOEE inspectors in the field with location information for nearby BMPs that facilitates opportunistic inspections. Also, district residents, visitors, and property owners can request inspections out-of-cycle through DOEE's 311 mobile app.

Additional data reviews associated with DOEE regulated development are discussed in detail in Section *B10: Data Management* of this document.

Erosion and Sediment Control

Inspection of all projects constructed in the District of Columbia, including federal agencies is the responsibility of DOEE. The erosion and sediment control inspector ensures that implementation of the approved control plan is carried out in an effective manner. In addition to this primary function, the inspector must constantly evaluate the adequacy of the plan for preventing sediment pollution. If the inspection reveals that the erosion and sediment control plan has not been implemented or maintained, then appropriate enforcement actions are initiated to correct deficiencies.

RiverSmart Programs

DOEE also oversees several incentive programs aimed at encouraging stormwater retrofits. These programs include RiverSmart Homes, RiverSmart Communities, RiverSmart Rooftops, and RiverSmart Rewards. The BMPs installed through these programs often do not meet the size threshold to require stormwater review so they are not captured in the plan review module of the stormwater database. Instead DOEE developed a separate, program specific database to track these installs. With each of these programs DOEE staff:

1. Visit the property to verify that the installs did indeed take place (*verification*);
2. Perform follow up visits on a subset (10%) of the installations on an annual basis to ensure that BMPs are still present and are being properly maintained (*validation*).
3. RiverSmart staff provide data on an annual bases to the DOEE NEIEN coordinator, who performs additional reviews as described in A7 Section 1 & 2) - Accuracy & Completeness Objectives (*Data review*).

Casey Trees

Tree plantings done by Casey Trees are automatically included in their long term tree survival study, which inspects approximately 10% of plantings after their establishment period, typically the third year after the planting date. Electronic devices are used in the field to document condition of plantings.

DDOT Retrofits

In 2014, the District of Columbia Department of Transportation (DDOT) published Green Infrastructure Standards, which include maintenance schedules for BMPs implemented and maintained by DDOT. Descriptions of maintenance and verification processes are described below for permeable pavement practices and bioretention cells below. A further level of data review and validation occurs if the BMPs triggered stormwater regulations and when BMPs are reported to DOEE for annual progress reporting.

Permeable Pavement Practices

Maintenance Tasks	Frequency	Time of Year / Timing
In the first year following construction, inspect the practice and contributing drainage area twice , within 24 hours after storm events that exceed 1/2 inch of rainfall. Conduct any needed repairs or stabilization.	Twice after installation	Within 24 hours after storm events that exceed 1/2 inch of rainfall
Conduct a maintenance inspection	Annually	
Mechanically sweep pavement with a regenerative street sweeper, or a vacuum sweeper to remove sediment	4 times per year in potential high sediment load areas 2 times per year otherwise	During Spring clean-up following final snow storm; During Fall clean-up following leaf fall
Remove any accumulated sediment in pretreatment cells and inflow points	Once a year	
• Stabilize contributing drainage area within public land to prevent siltation of practice • Remove any soil or sediment deposited on pavement. • Replace or repair any pavement surfaces that are degenerating or spalling • Blow-out cleanouts using compressed air, high pressure water hose, or drain snake in practices that show evidence of clogged underdrain	As needed following Annual Inspection	
• Conduct maintenance using a regenerative street sweeper, a vacuum sweeper, or power washing (< 500 psi, at an angle 30 degrees or less). • Replace any necessary joint material	If clogged	
• Mow grass in grid paver applications • Spot weed for grass applications	Once every 6 weeks during the growing season Annually	April through October

Bioretention Practices

	Maintenance Tasks	Frequency	Time of Year / Timing
Initial Tasks during Establishment (first three years)	Within 6 months following construction, the practice and drainage area should be inspected after storm events that exceed 1/2 inch of rainfall.	Twice after installation	Following storm events that exceed 1/2 inch of rainfall
	Remove stakes, wires, and tags	One time	6 months after planting
	Water plants – initial three years	Weekly during first 2-3 months after installation, and when rainfall is less than 1 inch per week	April-October
	Spot fertilization	One time as needed in First-second year of installation	Early spring
Routine Inspection	• Conduct a maintenance inspection • Check curb cuts and inlets for accumulated grit, leaves, and debris that may block inflow • Identify maintenance tasks needed • Look for erosion, bare areas, and where mulch needs to be applied	Quarterly	
Routine Maintenance	• Spot weed • Adjust mulch as needed to ensure full cover • Remove trash and animal waste • Remove any dead or diseased plants • Remove sediment in pretreatment cells and inflow points • Mow grass filter strips and bioretention with turf cover	Quarterly	March - November
	Mulch with 3 inches shredded hardwood mulch	Annually	February - April
As-Needed Maintenance	Prune trees and shrubs	As-needed	Feb-April and Sept-Nov as appropriate
	Water plants – after three years	Weekly during droughts (more than 2 weeks of no rain)	April-October
	• Remove invasive plants using recommended control methods.	As needed following Inspection	At appropriate time for disease or pest treatment.
	• Add planting to maintain desired vegetation density.		October-April per DDOT Std Specs
	• Replace stone at curb cuts, inflow, weirs, & check dams		November-March
	• Blow-off cleanouts using compressed air, high pressure water hose, or drain snake in practices that show evidence of clogged underdrain		As-needed
	• Stabilize the surrounding drainage area to prevent erosion		As-needed
	Remove and replace the mulch layer	Once every 3 years	Feb-April

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	

Stream Restoration

Verification, Validation, and Data Review are discussed below in context of the specific areas highlighted as critical by the stream restoration verification expert panel.

Professional Design Requirements & Key Functional Features

Stream restoration projects in the district are now using the Functional Uplift Pyramid (see List of Supporting Documents and Attachments) recommended by the USFS to assess stream function pre-restoration and to predict where the stream should be post-restoration. All projects in the district will also have a Bank Assessment for Non-point Source Consequences of Sediment (BANCS) analysis (or similar method) performed pre & post-restoration to assess the project's stability. Stream restoration projects in the district also require stormwater management plans with as-built plans be submitted within thirty days of project completion. A DOEE inspector will send the project implementer a notice of approval after inspecting and verifying construction was consistent with the as-built designs. At this time, this approval notice for stream restoration does not provide certification or confirmation of functional uplift. If a project fails a post-construction inspection, the DOEE inspector will assess the problem, determine the root cause, and then give the project owner a specified period to time to address the issue and update as-built plans to reflect the final implementation.

PRB ensures that methods and documentation used are consistent with the CBPO Recommendations of the Expert Panel to Define Removal Rates for Individual Stream Restoration Projects (2014). For Bay TMDL progress reporting, DOEE reports the linear feet of these projects through NEIEN.

Post-Construction Assessments

DOEE and its contractors will use the Functional Pyramid and the BANCS analysis methods to measure post-construction performance. Where applicable, DOEE will also perform pre and post-restoration monitoring for macroinvertebrates and fish using MBSS protocols. DOEE also preforms photo monitoring both pre and post-restoration and regimented locations that both helps document vegetative growth and project stability. Photo monitoring takes place every 3 months post restoration for the first year then once a year for the next four years. DOEE also performs geomorphic monitoring by annually taking both cross sectional surveys and longitudinal surveys to confirm and compare the stability of the restored channel.

Frequency of field verification

DOEE mirrors its field verification with conditions laid out in 404 permits when applicable. When projects do not require a 404 permit, photographic documentation and standard monitoring protocols take place as follows:

- Photo monitoring: Quarterly in Year One; Annually in Years 2-5
- Geomorphic Survey: Years 1, 3, & 5
- BANCs: Years 1 & 5
- MBSS: Annually

Nutrient Trading and Progress Reporting Standards

The District does not participate in nutrient trading and complies with Bay reporting standards. Analyses are performed and documentation provided to ensure that project removal rates are applied properly.

D2: Verification and Validation Methods

Section 1) Verification Checklists

Stormwater Sector

Sector(s): Urban Stormwater, Stream Restoration and Urban Tree Planting		
QAPP Title: District of Columbia QAPP for Chesapeake Bay Program BMP data management, reporting, and verification.		
	BMP Verification Component	**QAPP Section**
1	**BMP's Collected**	
	Type (structural, management, annual, etc.)	Section A6: • *Section 2) BMP Definitions* • *Procedures used to compile data*
	BMP Funding/Cost shared (federal, state, NGO, non-cost shared)	Section 1) Data Sources • *Federal Grants Associated with the Program*
	Distinct state standards/specifications	*List of Supporting Documents and Attachments* • 2013 Rule on Stormwater Management and Soil Erosion and Sediment Control

Sector(s): Urban Stormwater, Stream Restoration and Urban Tree Planting		
QAPP Title: District of Columbia QAPP for Chesapeake Bay Program BMP data management, reporting, and verification.		
	BMP Verification Component	**QAPP Section**
		• DDOT Green Infrastructure Design Standards • Green Area Ratio Final Rulemaking • NEIEN Appendix A5: - *Section 1) Historic Reporting Practices*
	Matching CBP BMP definition/efficiencies	*List of Supporting Documents and Attachments* • NEIEN Appendix
2	**Method/System of Verification/Assessment**	
	Description of methods/systems to be used	A6: - *Verification Priority* A7: - *Section 1 & 2*) - Accuracy & Completeness Objectives *B10: Data Management* *D1: Data Review, Verification, and Validation* • *Table D1* • *Urban Stormwater Sector*
	Documentation of procedures used to verify BMPs	A5: - *Section 1) Historic Reporting Practices* A9: Documentation and Records • *Section 3) Inspection Forms*
	Instruction manual for system users	*List of Supporting Documents and Attachments* • Stormwater Management Guidebook • Stormwater Database User Manual (draft)
3	**Who will Complete the Verification**	
	Qualification requirements	A8: Training and Certification • *DOEE Inspection and Enforcement Branch* • *DC Water Clean Rivers Construction Managers* • *DOEE Data Managers*
	Training requirements	
	Certification requirements	
	CEU follow-up training requirements in the future	Must recertify in Confined Space before it expires. Encouraged to attend trainings to further understanding of stormwater management. One training per year fully funded for all inspectors.
4	**Documentation of Verification Finding**	
	Date of installation	A5: - *Section 3) Data Management and Governance*
	Location (lat/long if applicable)	

Sector(s): Urban Stormwater, Stream Restoration and Urban Tree Planting		
QAPP Title: District of Columbia QAPP for Chesapeake Bay Program BMP data management, reporting, and verification.		
	BMP Verification Component	**QAPP Section**
	Level of reporting (watershed, HUC, county, site specific, etc.)	A6: - *Procedures used to compile data*
	Units (number, acres, length, etc.) needed for NEIEN	A5: - *Section 3) Data Management and Governance* B10: - *Section 2) NEIEN Reporting*
	Ownership (public, private)	A5: - *Section 3) Data Management and Governance* A6: - *Procedures used to compile data* D1: - *Regulated Development - DOEE*
	Documentation:	
	Pictures	A6: - *Stormwater Database* • Digital Photos D1: Data Review, Verification, & Validation • *Regulated Development - DOEE* • *Stream Restoration*
	Worksheets	
	Electronic Tool	A6: - *Stormwater Database* A7: - *Section 1 & 2) - Accuracy & Completeness Objectives*
	Aerial Photos	No
	Maps	A5: - *Section 3) Data Management and Governance* A6: - *Stormwater Database* A6: - *Procedures used to compile data* B10: - *Section 1) Work Flow*
	Other	A6: - *Stormwater Database* • Plan Drawings • As-built Drawings • Notice of Violation documents
	Report Generator	A6: - *Stormwater Database* • Inspection Reports • SRC Reports • NEIEN XML Report
5	**How Often Reviewed (Cycle of review)**	
	1-2 years	See *Table* D1 and program-specific discussions of
	5 years	

Sector(s): Urban Stormwater, Stream Restoration and Urban Tree Planting		
QAPP Title: District of Columbia QAPP for Chesapeake Bay Program BMP data management, reporting, and verification.		
	BMP Verification Component	**QAPP Section**
	10 years	inspection and review cycles.
	Other	
6	**Independent Verification of Finding**	
	Is this a requirement?	No.
	Internal Independent	Yes. D1: *Urban Stormwater Sector*
	External Independent	A7: *Section 1 & 2) - Accuracy & Completeness Objectives* (One-time inspection & verification project).
	BMP Data Validation	
7	**Quality Assurance/Spot Checking**	
	Who-qualifications/ training/certification	D1: *Urban Stormwater Sector* • Plan Reviewers / Inspectors • Stormwater database manager • NEIEN data manager
	Method to select BMP for follow-up check	A6: *Verification Priority* A7: *Section 1 & 2) - Accuracy & Completeness Objectives)* B10: *Section 1) Work Flow*
	Method to select the number of BMPs to review	DOEE does not currently employ a method that requires a minimum number of data reviews.
	Other	NA
8	**Data Entry of BMP Implementation**	
	What is the system?	A6: *Stormwater Database* A7: *Section 1 & 2) - Accuracy & Completeness Objectives* D1: *Regulated Development - DOEE* A9: *Section 1) Data Providers* • Riversmart Homes (electronic devices) • Federal Submission (NEIEN template) • DDOT UFA (electronic devices) • Casey Trees (electronic devices)
	Who enters data (training/certification)?	
	Does the system connect to NEIEN?	A6: *Stormwater Database* • NPS-BMP XML exports

Sector(s): Urban Stormwater, Stream Restoration and Urban Tree Planting		
QAPP Title: District of Columbia QAPP for Chesapeake Bay Program BMP data management, reporting, and verification.		
	BMP Verification Component	**QAPP Section**
	System in place prevent double counting	B10: *Section 1) Work Flow*
9	**External Provided Data Validation Meeting CBP Partnership Guidance**	
	Method to validate data	B10: *Section 1) Work Flow*
	Who will validate data (training/certification)?	A8: Training and Certification: *DOEE Data Managers*
10	**Historic Data Verification**	A5: *Section 1) Historic Reporting Practices* A7: *Section 1 & 2) - Accuracy & Completeness Objectives* (one-time verification effort).
	System to re-certify or remove	A6: *Stormwater Database* (governance process)
	Who will verify historic data training/certification)?	A8: Training and Certification: • *DOEE Inspection and Enforcement Branch* • *Contractor Support*
	Documentation of action	A5: *Section 3) Data Management and Governance* A6: *Verification Priority*
	BMP Performance	
11	Does state collect data to assess BMP Performance?	Yes
	Systems used to collect BMP performance data?	Special studies will assess performance and Quality Assurance. • A4: *List of Supporting Documents and Attachments*: The RiverSmart Washington project will include pre- and post-implementation monitoring of stormwater flow after LID installations. • A6: New or Emerging BMP definitions - *Catch Basin Cleaning* • D1: Stream Restoration - *Post-Construction Assessments* • A4: *List of Supporting Documents and Attachments*: Consolidated TMDL Implementation Plan - Comprehensive Baseline Analysis, Appendix F, Technical Memorandum: BMP Implementation, *Section 3.1.c Database Review and Drainage Area Analysis*
	Who collects BMP performance data?	

Sector(s): Urban Stormwater, Stream Restoration and Urban Tree Planting		
QAPP Title: District of Columbia QAPP for Chesapeake Bay Program BMP data management, reporting, and verification.		
	BMP Verification Component	**QAPP Section**
	Who analyses collected data and report to CBP?	DOEE will share analyses with CBPO when available.

Waste Water Sector

Sector(s): Waste Water Treatment		
QAPP Title: Waste Water Treatment Section (Applicable to facilities named in Table D1(b) and CSS/CSO**)**		
	BMP Verification Component	**QAPP Section**
1	**BMP's Collected**	
	Type (structural, management, annual, etc.)	(Structural and Management) Section 2) BMP Definitions • *Point Source Reductions* • *Combined Sewer Overflow*
	BMP Funding/Cost shared (federal, state, NGO, non-cost shared)	Non-cost shared
	Distinct state standards/specifications	District's and Federal standards; List of Supporting Documents and Attachments • Construction Design Standards QAPP
	Matching CBP BMP definition/efficiencies	Not Applicable
2	**Method/System of Verification/Assessment**	
	Description of methods/systems to be used	D1: Data Review, Verification, and Validation -*Point Source Sector*
	Documentation of procedures used to verify BMPs	*List of Supporting Documents and Attachments* • Page 48 of Permit DC0021199 (Blue Plains Facility) • Water Compliance Inspection Report (3560-3). • Annual 2013 Inspection Report (NPDES Permit #DC0021199). • USEPA's Compliance Monitoring Strategy (CMS). • DC Water Clean Rivers Project Construction Management Plan

Sector(s): Waste Water Treatment		
QAPP Title: Waste Water Treatment Section (Applicable to facilities named in Table D1(b) and CSS/CSO**)**		
	BMP Verification Component	**QAPP Section**
		• DC Water Clean Rivers Project Quality Plan • DC Water Nine Minimum Controls Annual Report For Combined Sewer System (example) D1: Data Review, Verification, and Validation • *Point Source Sector*
	Instruction manual for system users	D1: Data Review, Verification, and Validation • *Verification* *List of Supporting Documents and Attachments* • NPDES Compliance Inspection Manual. • DC Water Clean Rivers Project Construction Management Plan • DC Water Clean Rivers Project Quality Plan
3	**Who will Complete the Verification**	
	Qualification requirements	*List of Supporting Documents and Attachments* • NPDES Compliance Inspection Manual • NPDES Compliance Inspector Training Laboratory Analyses Manual • DC Water Clean Rivers Project Construction Management Plan (Sec 3.10.8 - DCRA Special Inspections Program)
	Training requirements	(EPA approved inspector training courses) *List of Supporting Documents and Attachments* • NPDES Compliance Inspection Manual • NPDES Compliance Inspector Training Laboratory Analyses Manual • DC Water Clean Rivers Project Construction Management Plan (Sec 3.3.5 - Training)
	Certification requirements	(EPA courses / associated certification programs) List of Supporting Documents and Attachments • NPDES Compliance Inspection Manual • NPDES Compliance Inspector Training Laboratory Analyses Manual • DC Water Clean Rivers Project Construction Management Plan (Sections 3.3.5 – Training & 3.14.3 Vendor/Contractor Supplied Training) • Industry specific operator training and certifications, including CEU's.

Sector(s): Waste Water Treatment		
QAPP Title: Waste Water Treatment Section (Applicable to facilities named in Table D1(b) and CSS/CSO**)**		
	BMP Verification Component	**QAPP Section**
	CEU follow-up training requirements in the future	EPA and DOEE staff attend regular annual training courses
4	**Documentation of Verification Finding**	
	Date of installation	NPDES Permit specification
	Location (lat./long if applicable)	**WWTP:** NPDES Permit specification **CSS Green Infrastructure:** Green Infrastructure installed by DC Water will be included in DOEEs A6: *Stormwater Database* BMP information collected and stored within both GIS and Maximo (asset management system). See also: *List of Supporting Documents and Attachments* • DC WASA LTCP First Amendment • DC Water Proposal modifying Clean Rivers Project for Green Infrastructure (and briefing slides).
	Level of reporting (watershed, HUC, county, site specific, etc.)	District-wide with watershed-specific unique requirements *List of Supporting Documents and Attachments* • DC WASA Long Term Control Plan (LTCP). • DC Water Proposal modifying Clean Rivers Project for Green Infrastructure (and briefing slides).
	Units (number, acres, length, etc.) needed for NEIEN	D1: Data Review, Verification, and Validation • *Verification* (DMR Submission & Database) • *Allocation of PS loads to Jurisdictions* *Note*: PS data is not reported directly to CBPO through NEIEN.
	Ownership (public, private)	*List of Supporting Documents and Attachments* • Water Compliance Inspection Reports (Example: NPDES DC0021199 (Section 2.

Sector(s): Waste Water Treatment		
QAPP Title: Waste Water Treatment Section (Applicable to facilities named in Table D1(b) and CSS/CSO**)**		
	BMP Verification Component	**QAPP Section**
		Facility Description))
	Documentation:	Standardized EPA reporting forms and narrative reports. Refer to: *List of Supporting Documents and Attachments* • DC WASA Long Term Control Plan (LTCP). • DC Water Quarterly and Annual CSS reports (on the nine minimum controls).
	Pictures	Section D1) Verification- *Photographic Record* *List of Supporting Documents and Attachments* • Water Compliance Inspection Report (Example: NPDES DC0000248) • Water Compliance Inspection Report (Example: NPDES DC0021199) • Nine Minimum Controls Annual Report for CSS (Example: Section 3)
	Worksheets	*List of Supporting Documents and Attachments* • Water Compliance Inspection Reports Section D1) Verification- • *Allocation of PS loads to Jurisdictions*
	Electronic Tool	D1: Data Review, Verification, and Validation • *Verification (DMR Submission & Database)* • *Allocation of PS loads to Jurisdictions*
	Aerial Photos	*List of Supporting Documents and Attachments* • Water Compliance Inspection Reports (Example: NPDES DC0021199 (page 4 of 45))
	Maps	*List of Supporting Documents and Attachments* • Water Compliance Inspection Reports (Example: NPDES DC0021199 (page 2 of 45))
	Other	*List of Supporting Documents and Attachments* • Nine Minimum Controls Annual Report for CSS (Example: Section 3 Site Detail Plans)
	Report Generator	Section 3) Inspection Forms

Sector(s): Waste Water Treatment		
QAPP Title: Waste Water Treatment Section (Applicable to facilities named in Table D1(b) and CSS/CSO**)**		
	BMP Verification Component	**QAPP Section**
		• *NPDES Compliance Inspection forms.* DI) *Verification* (Blue Plains SCADA system) *List of Supporting Documents and Attachments* • Water Compliance Inspection Reports (*Example: NPDES DC0021199 (pages 6 & 36*))
5	**How Often Reviewed (Cycle of review)**	
	1-2 years	Inspection schedules based on Facility type. Refer to Section D1- *Verification* (Table D1(b))
	5 years	
	10 years	NA
	Other	
6	**Independent Verification of Finding**	
	Is this a requirement?	Independent verification is a federal and DOEE requirement.
	Internal Independent	Each facility has dedicated staff who verifies self-monitoring.
	External Independent	Annual inspections by DOEE and EPA staff are independent verification of facilities self-monitoring and self-verification. *List of Supporting Documents and Attachments* • DC Water Clean Rivers Project Construction Management Plan (Sec 3.10.7- Third-Party Inspections (IVA))

Sector(s): Waste Water Treatment		
QAPP Title: Waste Water Treatment Section (Applicable to facilities named in Table D1(b) and CSS/CSO**)**		
	BMP Verification Component	**QAPP Section**
	BMP Data Validation	
7	**Quality Assurance/Spot Checking**	
	Who-qualifications/training/certification	**WWTP:** D1) *Verification* • Supervisory Control and Data Acquisition (SCADA). EPA and DOEE trained staff; NPDES Training *List of Supporting Documents and Attachments* • Permit Audit Inspection (PAI) • US EPA NPDES Compliance Inspection Manual - Appendix A (Training and Development for Compliance Inspectors/Field Investigators **CSS Green Infrastructure:** *List of Supporting Documents and Attachments* • Appendices E (pages: 687-709) and F (pages: 709-720) of the first amendment to the DC WASA LTCP.
	Method to select BMP for follow-up check	**WWTP:** *D1: Data Review, Verification, and Validation* • Permitted Facility Inspection Schedules **CSS Green Infrastructure:** *List of Supporting Documents and Attachments* • Appendices E (pages: 687-709) and F (pages: 709-720) of the first amendment to the DC WASA LTCP.
	Method to select the number of BMPs to review	**WWTP:** *D1: Data Review, Verification, and Validation* • Permitted Facility Inspection Schedules • Point Source Sector *Validation* **CSS Green Infrastructure:** *List of Supporting Documents and Attachments* • Appendices E (pages: 687-709) and F

Sector(s): Waste Water Treatment		
QAPP Title: Waste Water Treatment Section (Applicable to facilities named in Table D1(b) and CSS/CSO**)**		
	BMP Verification Component	**QAPP Section**
		(pages: 709-720) of the first amendment to the DC WASA LTCP.
	Other	**WWTP:** It would be helpful if CBPO could work with DOEE to develop a statistically based approach that can be used to guide the QA/Spot Checking process. The process could include using DMR data to help identify which BMPs/Unit processes are under performing. **CSS Green Infrastructure:** *List of Supporting Documents and Attachments* • Appendices E (pages: 687-709) and F (pages: 709-720) of the first amendment to the DC WASA LTCP.
8	**Data Entry of BMP Implementation**	
	What is the system?	**WWTP:** Site specific. Dependent on NPDES permit requirements. D1: Data Review, Verification, and Validation • *Allocation of PS loads to Jurisdictions* **CSS Green Infrastructure:** BMP information collected and stored within both GIS and Maximo (asset management system).
	Who enters data (training/certification)?	Qualified and responsible facility representatives identified in the permit. MWCOG for Blue Plains WWTP.
	Does the system connect to NEIEN?	PS data is not reported to CBPO directly through NEIEN. Section D1) *Validation* (ICIS NPDES discussion)
	System in place prevent double counting	NA (NPDES Permitted Facilities)
9	**External Provided Data Validation Meeting CBP**	

Sector(s): Waste Water Treatment		
QAPP Title: Waste Water Treatment Section (Applicable to facilities named in Table D1(b) and CSS/CSO**)**		
	BMP Verification Component	**QAPP Section**
	Partnership Guidance	
	Method to validate data	Section D1) *Validation* (MWCOG discussion)
	Who will validate data (training/certification)?	Section D1) *Validation* • MWCOG and the EPA CBPO NPS Data Manager
10	**Historic Data Verification**	
	System to re-certify or remove	Section D1) *Validation* • EPA Region 3 (Permitting Authority) • MWCOG and the EPA CBPO NPS Data Manager.
	Who will verify historic data training/certification)?	
	Documentation of action	
	BMP Performance	
11	Does state collect data to assess BMP Performance?	Effluent limitations, self-monitoring and reporting under NPDES permit requirements that are consistent with the TMDL wasteload allocations
	System used to collect BMP performance data?	EPA working collaboratively with DOEE.
	Who collects BMP performance data?	DC Water (Clean Waters)
	Who analyses collected data and report to CBP?	DC Water (Clean Waters) and EPA as part of the CBP performance requirement.

Sections 2 -3) Data Verification and Validation Methods

For the purposes of reporting BMP data, validation is defined as a QA/QC check of a data record. It is preferred that validation reviews are independent and that validation methods are based on a visual field check of an adequate statistical sample. The minimum procedure is to conduct a basic database or paper check of an adequate statistical sample.

Examples of independent and multi-layered data reviews are more prevalent in the district's high priority sectors, especially for the district's major point source (Blue Plains WWTP) and the Urban Stormwater sector. Discharge Monitoring Reports are prepared by DC Water, reviewed and parsed out to jurisdictions by staff at WMCOG, and again reviewed by EPA during

preparation of the point source input deck. Stormwater BMP data is entered by engineers or designers during plan submission, checked by DOEE plan review staff, then again by on-the-ground inspectors, and finally, the NEIEN data manager before submission to CBPO. A final layer of data validation is performed during reviews of CBPO progress submission feedback reports. A discussion of DOEE's one-time verification of historic data record is included in A6: Section 2) *1998 Storm Water Regulations*.

Expired BMPs, Double Counting, and External Data Providers

Discussion of expired BMPs in relation to data reviews, verification, and validation have been consolidated in this document by the responsible program, sector, or BMP in other sections of this document.

- The treatment of expired BMPs and BMP lifespans is addressed primarily in Sections A6: Project Description (*BMP Lifespans*) and *B10: Data Management*.

- Discussions on processes to avoid double counting are addressed in Sections *A7: Quality Objectives and Criteria* and B10: *Data Management*.

- Discussions related to external data providers can be found in Sections *A7: Quality Objectives and Criteria*, A8: *Training and Certification*, and B10: *Data Management*.