COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF CLEAN WATER

INSTRUCTIONS FOR USING THE MEP CALCULATOR SPREADSHEET

Draft, January 2025

Introduction

DEP has developed the Maximum Extent Practicable (MEP) Calculator Spreadsheet to standardize the determination of MEP volume management objectives (VMOs) for the PAG-13 General Permit. One of the objectives of PAG-13 is for MS4s to manage the volume of stormwater runoff from impervious surfaces to the MEP. A lookup chart has been developed by DEP to identify the VMO for the 2026-2031 PAG-13 General Permit term as a function of total impervious area within the Census-designated Urban Area (UA) of a municipality or other designated MS4 entity and the percentage of the total impervious area that is treated by stormwater control measures (SCMs).

Each MS4 must complete the MEP Calculator separately. The lookup chart is used to establish the annualized VMO for the MS4. The VMO may be reduced by calculating a feasibility index and by collaborating with other MS4s to achieve collective volume management objectives. The total impervious area is that which was determined under the 2010 Census supplemented with any additional impervious area identified by the 2020 Census.

Questions on the use of the spreadsheet can be directed to DEP's Bureau of Clean Water at **RA-EPPAMS4@pa.gov**.

General Information

The spreadsheet was designed using the latest version of Microsoft Excel® and is in Excel macro-enabled workbook (XLSM) format. If prompted by Excel after opening the spreadsheet, enable editing and macros. *Note that you may need to add additional Trusted Locations in the Trust Center Settings of Excel in order to run the macros*. These locations may include server drives and/or locations where you intend to save the file for use. The following steps may be taken:

1. File > Excel Options > Trust Center > Trust Center Settings > Trusted Locations
2. Check the box to "Allow Trusted Locations on my network"
3. Select "Add new location"
4. Browse to select the folder (or server) where the file will be saved, check the "Subfolders of this location are also trusted" box, and then OK.

In addition, if you receive a message that your operating system has blocked macros from executing in the spreadsheet, you will need to unblock the file (in general, right click on the file, select "Properties," and check the box for "Unblock").

The spreadsheet contains two primary worksheets: MEP Calculator and SCM Types. The SCM Types worksheet allows the user to select the type of SCMs that the MS4 would like to report in their SCM Inventory. The SCM Inventory must be populated in order to determine the percentage of total impervious area treated, which is needed to determine the VMO. If the SCM Inventory is not completed, it is assumed that 0-5% of the impervious area is treated. The SCM Inventory includes five different worksheets: Floodplain Restoration, Stream Restoration, Retrofits, Volume SCMs, and Other SCMs.

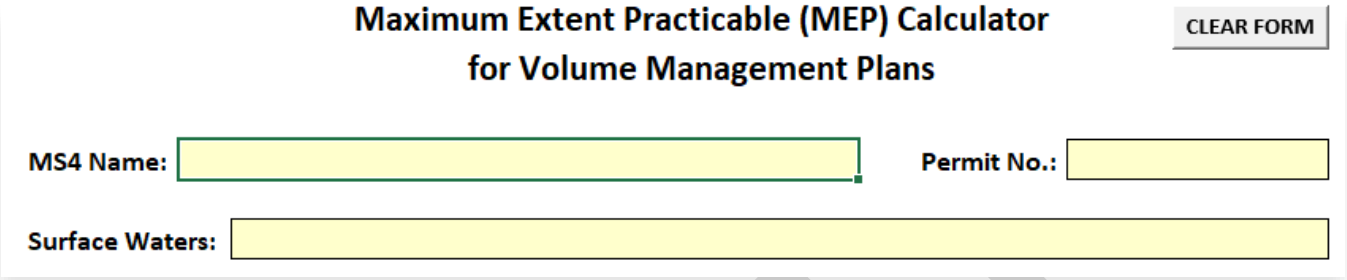
At the top of the MEP Calculator and SCM Inventory worksheets there is a "Clear Form" button. The user may click the "Clear Form" button at any time to delete **all** data from the worksheet.

All cells available for data entry or selection from a drop-down menu are highlighted. The user may use the Tab, arrow, or Enter keys to move from cell to cell.

Throughout the spreadsheet, cells are formatted to display a set number of decimal places. As such, the number displayed in a cell is not necessarily the exact number that is stored by the spreadsheet (e.g., the displayed number

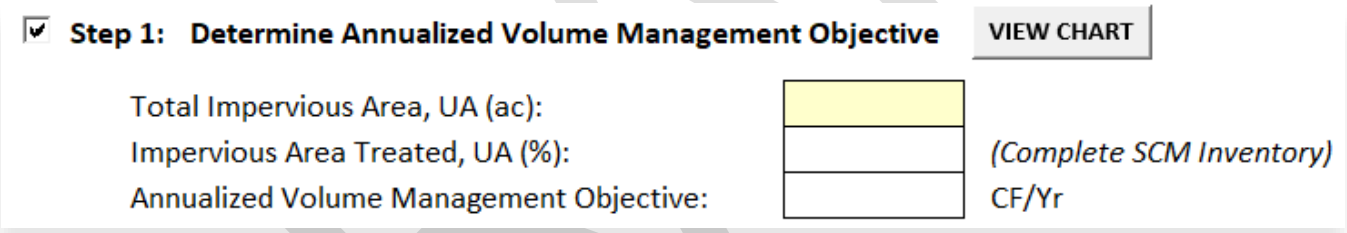
may be rounded up from the exact number stored in the spreadsheet). Therefore, users may not be able to replicate a calculated value using only the numbers displayed in the cells due to the spreadsheet's rounding of input values to meet formatting requirements.

Completing the MEP Calculator Worksheet



- **MS4 Name** – Enter the name of the MS4 entity as identified on page 1 of the NPDES permit.
- **Permit No.** – Identify the NPDES Permit Number(s) held by the MS4.
- **Surface Waters** – List the impaired surface waters covered by the MEP analysis. For MS4s within the Chesapeake Bay watershed, include any local impaired waters as well as "Chesapeake Bay."

Step 1: Determine Annualized Volume Management Objective



- **View Chart Button** – See the discussion below on the Volume Management Chart.
- **Total Impervious Area, UA (ac)** – Select the range representing the Total Impervious Area within the UA in acres. All impervious area in the UA must be reported; no parsing is allowed. Report the total impervious area using the 2010 census map overlain by the 2020 census map. Report the total impervious within the combined 2010 and 2020 UA area.

  Do not include impervious area that drains to a combined sewer system (CSS) or impervious area that is on properties owned by another entity with NPDES permit coverage for MS4 discharges (like counties or state agencies). Do include all other impervious areas (including areas covered by an NPDES permit for industrial stormwater discharges), both publicly and privately owned. Impervious areas are areas meeting criterion 1 and either 2, 3, or 4, below:

  1. Land covers that do not allow for infiltration and contain the term "impervious" in the description under the Natural Resources Conservation Service (NRCS) Publication TR-55. Compacted gravel areas and bodies of water, including surface waters and pools, should be considered impervious. Elevated structures, such as decks where pervious surfaces exist beneath them, should not be considered impervious; and

  2. Areas mapped as impervious by the MS4 using high-resolution aerial photography or LIDAR or is field verified in preparing the MEP Calculator Spreadsheet; or

3. In the absence of municipal-scale mapping, it is acceptable to use the latest National Land Cover Database (NLCD) to estimate impervious areas. If this is done, the permittee must assume that percent impervious for developed lands are as follows: Developed Open Space – 19% impervious; Developed Low Intensity – 49% impervious; Developed Medium Intensity – 79% impervious; and Developed High Intensity – 100% impervious. Impervious areas are expected to be field verified before the Volume Management Plan (VMP) is submitted to DEP; or

4. Permittees located in the Chesapeake Bay watershed may use the most current Chesapeake Conservancy high-resolution land cover classification data set. If this data set is used, all areas shown as impervious and tree canopy over impervious must be considered impervious. Impervious areas are expected to be field verified before the VMP is submitted to DEP.

- **Impervious Area Treated, UA (%)** – The range that represents the percentage of impervious area within the UA that is treated will be calculated and displayed upon completion (or partial completion) of the SCM Inventory. Treated impervious area is that in which at least the first inch of runoff is captured by an SCM that reduces volume by infiltration and/or evapotranspiration (ET) or manages volume through a Managed Release Concept (MRC) SCM, with certain exceptions. The SCM must be maintained and functional to be counted toward treatment of impervious surface. Additional information is provided below for the SCM Inventory.

From the user's entries the Annualized VMO is derived from the Volume Management Chart and is displayed in cubic feet per year (CF/Yr).

Step 2: Calculate Feasibility Index

A feasibility index is calculated using multiple factors that estimate the MS4's ability to achieve the Annualized VMO calculated in Step 1. MS4s that are not municipalities should skip factors A through D. Numbers in parentheses correspond to input parameters in the MEP Calculator Spreadsheet.

Financial / Socioeconomic Factors

A. **Ratio, Municipal:PA LQI, 2020**: Enter the Lowest Quintile Household Income (LQI) for the municipality ***(2)***. This value is divided by the Pennsylvania LQI of $14,400 ***(1)*** to determine the ratio of the municipal LQI to the Pennsylvania LQI. To determine LQI for the municipality the following steps should be taken:

1. Access the American Community Survey (ACS) 5-Year Estimates Subject Table for Mean Household Income of Quintiles.

2. Select "Geos" in the table header.

3. In the Select Geography window, scroll to select "County Subdivision" from the list of All Geographies and select Pennsylvania for the state.

4. Select the appropriate county and click in the check box for the municipality, then close the Geography window.

5. Enter the value displayed for Lowest Quintile into the MEP Calculator Spreadsheet.

B. **Ratio, Municipal:PA Poverty Rate**: Enter the municipal poverty rate based on the latest available published data ***(4)***. This value is divided by the Pennsylvania poverty rate of 12% ***(3)*** to determine the ratio of the municipal poverty rate to the Pennsylvania poverty rate. DEP recommends that the following steps be taken to determine the municipal poverty rate:

1. Go to the Small Area Income and Poverty Estimates tool on the U.S. Census Bureau's website.

2. Filter by state, county, and school district for all ages. Select the school district that is located within the municipality's urban area. If there are multiple school districts the average poverty rate should be used.

C. **Ratio, Municipal:PA Unemployment Rate (UR), current**: Enter the Pennsylvania ***(5)*** and municipal ***(6)*** URs, as of the time of the analysis, to determine the ratio of the municipal UR to the Pennsylvania unemployment rate. It is recommended that data published on the Pennsylvania Department of Labor and Industry website be used for Pennsylvania and the municipality. The latest Pennsylvania Civilian Labor Force Data by City / Borough / Township of Residence report is recommended for municipal UR. Locate the most recent report by clicking on Monthly News Releases under the Workforce Statistics (CWIA) heading and clicking the button for View the Civilian Labor Force Packet. County unemployment data may be used if no other local data are available or applicable. Report unadjusted unemployment rates.

D. **Ratio, Municipal:Standard Utility Bill**: Enter the total annual utility bill for the average household in the municipality ***(7)***. Include water, sewer, and stormwater fees (do not include electric, gas, refuse, etc.). The ratio of the annual utility bill to the municipal LQI ***(2)*** is calculated and displayed ***(8)***. This value is divided by a standard utility bill of 8% of LQI ***(9)*** to obtain the ratio of the municipal to standard utility bill as a percentage of LQI. The 8% standard was derived by using a statewide average utility bill of approximately $1,200/year divided by the LQI for Pennsylvania ($14,400).

E. **Long-Term Affordability Indicator**: Enter the total revenues received in the prior year ***(10)***; the total debt as of December 31 of the prior year ***(11)***; and the fund balance/retained earnings as of December 31 of the prior year ***(12)***. For municipalities, this information is reported to the Pennsylvania Department of Community and Economic Development (DCED). The long-term affordability indicator is calculated by subtracting total debt ***(11)*** from the fund balance/retained earnings ***(12)*** and dividing by total revenues ***(10)***, where the minimum and maximum values of the indicator are 0.5 and 1.5, respectively.

SCM Opportunities

This indicator takes into consideration several MS4-specific factors to qualitatively assess the potential for SCM opportunities.

F. **SCM Opportunity Indicator**: The SCM Opportunity Indicator is calculated as the product of ***(13)*** through ***(17)***. The higher the value, the lower the estimated opportunities for SCMs.

- **Percent of impervious area that is owned by the permittee**: Enter the percent of the Total Impervious Area, UA reported in Step 1 for the MS4 that is owned by the permittee ***(13)***. If the entered percent is greater than or equal to 20%, a value of 0.5 is assigned. If the percent is greater than or equal to 15% but less than 20%, a value of 0.75 is assigned. If the percent is greater than or equal to 10% but less than 15%, a value of 1 is assigned. If the percent is greater than or equal to 5% but less than 10%, a value of 1.25 is assigned. If the percent is less than 5%, a value of 1.5 is assigned. The higher the percent, the higher the estimated opportunity for SCMs (and the lower the assigned value).

- **Percent of public impervious that is untreated**: Enter the percent of the publicly owned impervious area (reported in ***13***) that is untreated by stormwater SCMs ***(14)***. If the entered percent is greater than or equal to 80%, a value of 1.5 is assigned. If the percent is greater than or equal to 60% but less than 80%, a value of 1.25 is assigned. If the percent is greater than or equal to 40% but less than 60%, a value of 1 is assigned. If the percent is greater than or equal to 20% but less than 40%, a value of 0.75 is assigned. If the percent is less than 20%, a value of 0.5 is assigned. The higher the percent, the lower the estimated opportunity for SCMs (and the higher the assigned value).

- **Localized flooding problem in the municipality?** Indicate (Yes or No) whether there is a localized flooding problem in the municipality ***(15)***. If Yes, a value of 0.75 is assigned, otherwise a value of 1 is assigned. If Yes is selected, the permittee should keep on file documentation of localized flooding issues. Relevant documentation may include site photographs, public works maintenance reports, and records of any state or federal level flood mitigation assistance provided within the permittee's jurisdiction.

- **No. development/redevelopment projects/year**: Report the average number of development and redevelopment projects that have occurred over the previous three years ***(16)***. If the number is greater than or equal to 10, a value of 0.5 is assigned. If the number is greater than or equal to 7 but less than 10, a value of 0.75 is assigned. If the number is greater than or equal to 4 but less than 7, a value of 1 is assigned. If the number is greater than or equal to 2 but less than 4, a value of 1.25 is assigned. If the number is less than 2, a value of 1.5 is assigned. The higher the number, the higher the estimated opportunity for SCMs (and the lower the assigned value).

- **Is there an ordinance requiring PCSM < 1 acre?** Indicate (Yes or No) whether there is a local ordinance that requires PCSM for projects with less than 1 acre of disturbance ***(17)***. If Yes, a value of 0.75 is assigned, otherwise a value of 1 is assigned.

Feasibility Index: The Feasibility Index is calculated as the product of A through F, where the minimum value is 1. The higher the Feasibility Index, the lower the estimated opportunities for SCMs.

Step 3: Determine MEP

Adjusted Annualized VMO – The Annualized VMO that is determined in Step 1 is divided by the Feasibility Index calculated in Step 2, rounded to the nearest 100 CF/Yr.

Collaboration credit:

- **Number of additional MS4s collaborating in VMP** – Enter the number of additional MS4s collaborating in the development and implementation of the VMP (if any). MS4s that have been granted a waiver may participate in a collaborative VMP as long as the permittee that was granted a waiver completes the MEP Calculator Spreadsheet and the VMO of the waived MS4 is included in the total VMO of the collaborative VMP. A 1% credit is applied for each MS4 that is collaborating, up to a 50% maximum credit. For example, if a VMP is being developed and implemented by 10 MS4s, a 10% credit will be applied. Non-MS4s including but not limited to non-profit organizations, and municipalities that do not need an NPDES permit or waiver, may participate in a collaborative VMP but may not be included in the number of MS4s collaborating in the VMP.

- **Are the collaborating MS4s co-permittees?** As an incentive for those MS4s that are collaborating in the development and implementation of PRPs to also be co-permittees, an additional credit is provided for co-permittees. If the response is Yes, 10% is added to the credit calculated above for the number of additional MS4s collaborating in the VMP. For example, if a VMP is being developed and implemented by 10 MS4s, and they will be co-permittees, an additional 20% credit (10% for the 10 collaborating MS4s + 10% for the 10 MS4s being co-permittees) will be applied.

The collaboration credit is the product of the two credits described above, up to a maximum of 50%. For example, if a VMP is being developed and implemented by 10 MS4s, a 10% credit will be applied and a value of 0.9 is assigned (1 – 0.1). If the collaborating MS4s will be co-permittees, a 20% credit will be applied and a value of 0.8 is assigned (1 – 0.2). The product of 0.9 and 0.8 is 0.72 or 72%. That product is then subtracted from 100% to calculate the collaboration credit (100% - 72% = 28%).

The **MEP Annualized VMO**, in CF/Year, is the Adjusted Annualized VMO minus the collaboration credit, rounded to the nearest 1,000 CF/Yr. The minimum value is 1,000 CF/Year (unless the Volume Management Objective determined in Step 1 is 0). Report this value in the Volume Management Plan section of the NOI.

The **Volume Management Objective for 2026-2031 Permit Term** is two times the MEP Annualized VMO, representing two years' worth of volume management efforts under PAG-13. Report this value in the Volume Management Plan section of the NOI.

SCM Inventory Worksheets

Report all functional and maintained SCMs that treat impervious surfaces within the UA in this worksheet, as long as they are able to capture and treat, through infiltration and/or ET, at least one inch of runoff (including MRC

SCMs), with certain exceptions. Existing SCMs do not necessarily need to be designed to current DEP standards. The purpose of the SCM Inventory is to establish a baseline of the impervious area treated within the urban area.

NOTE – Users cannot paste into the SCM Inventory Worksheets. Entries must be made manually. DEP has disabled pasting functions to ensure that cell-specific validations are not bypassed.

The qualifications for SCMs to be identified in the SCM Inventory are discussed below.

1. The SCM could have been constructed at any time, for any size project, and regardless of whether the SCM was installed to meet regulatory or permit compliance (such as Chapter 102 Post-Construction Stormwater Management (PCSM), SCMs constructed for Pollutant Reduction Plans (PRPs), etc.).

2. The SCM should have been designed to capture and manage at least one inch of runoff from impervious surfaces in the contributing drainage area. All structural PCSM SCMs implemented for compliance with Chapter 102 can be assumed to meet this criterion. If there is no available information on the design of the SCM, the MS4 may make observations of the SCM during a 1.2-inch/2-hour storm event (producing approximately one inch of runoff from impervious surfaces) or greater to determine whether the SCM qualifies. If there is no overflow from the SCM during or following this storm event, and stormwater recedes to the SCM surface within 72 hours, the SCM qualifies. If it is determined that the SCM qualifies, documentation on how the SCM was evaluated must be kept on file by the permittee and may be requested by DEP.

3. SCMs that capture and manage less than one inch of runoff from impervious surfaces may qualify for the SCM Inventory, but the impervious area treated must be decreased in proportion with the runoff managed. For example, SCMs that treat 10 acres of impervious but only manage 0.1 inch and 0.5 inch of runoff can be identified in the SCM Inventory as treating 1 and 5 acres of impervious, respectively.

4. All SCMs reported in the SCM Inventory must have been inspected by the permittee or owner of the SCM within the past two years (that is, no later than two years prior to submission of the NOI). The SCMs must be considered functional, meaning no significant maintenance or repairs are necessary to manage runoff (or such maintenance or repairs were completed prior to reporting the SCM in the SCM Inventory). SCM design documentation and calculations do not need to be submitted with the MEP Calculator; however, it is expected that permittees will maintain this information on file and update the file when SCMs are inspected. DEP may request additional SCM documentation during review of the NOI or during an inspection. It is recommended that MS4s utilize someone who is trained and experienced in SCM performance to evaluate the functionality of SCMs.

5. Historical street sweeping, inlet or storm drain cleaning, and related non-structural sediment removal activities do not qualify for the SCM Inventory. Street sweeping and inlet or storm drain cleaning may however receive credit for future activities when proposed in a VMP.

6. Wet and dry detention basins designed primarily to reduce peak flow rates generally do not provide a volume management function and do not qualify for reporting in the SCM Inventory. However, retrofits of rate control or flood control SCMs to improve infiltration and/or sediment capture may qualify for the SCM Inventory. Where a retrofit of a rate control or flood control SCM was completed to improve sediment capture or other pollutant removal but did not improve infiltration capabilities, 50% of the impervious area in the SCM's drainage area may be claimed.

7. Vegetated channels and swales designed primary for stormwater conveyance generally do not provide a volume management function and do not quality for reporting in the SCM Inventory. However, if the design of the swale includes check dams this will increase infiltration and ET. These swales can be reported in the SCM Inventory under the SCM name of "Vegetated Conveyance with Check Dams".

8. Historical soil amendments on individual lots do not qualify for the SCM Inventory unless a certified soil scientist demonstrates through soil characterization testing that the amended soils continue to provide a volume management benefit in relation to soils that have not been amended on the same or adjacent lots. Other on-lot SCMs such as dry wells, rain gardens, rain barrels, etc. may qualify if designed to capture and manage at least one inch of runoff from impervious surfaces.

9. Stream restoration projects with a floodplain restoration component will qualify for the SCM Inventory. The impervious area treated is that which is within the drainage area of the restored floodplain (that is, contributing stormwater perpendicular to the floodplain within the permittee's jurisdiction), not the drainage area of the surface water at that location.

10. Stream restoration projects without a floodplain restoration component qualify only if these projects accomplished a sediment load reduction exceeding the reduction required under the 2018 PAG-13 General Permit for PRPs. To determine the credit, in terms of area of impervious treated, complete the following calculation and attach documentation to the MEP Calculator Spreadsheet supporting the credit:

    Stream Restoration Credit (Equivalent Impervious Treated, Acres) = ((TC / TR) x (TR – RR)) / $200,000

    Where:

    TC = Total Cost to implement all PRP projects (provide documentation);
    TR = Total Pounds (lbs) of Sediment Reduced for PRP (provide documentation, such as, Final Report);
    RR = Required Reduction (lbs) of Sediment for PRP (as identified in the approved PRP).

    Note that TC is the total cost to the permittee; any grant funding received towards PRP implementation should not be included in TC.

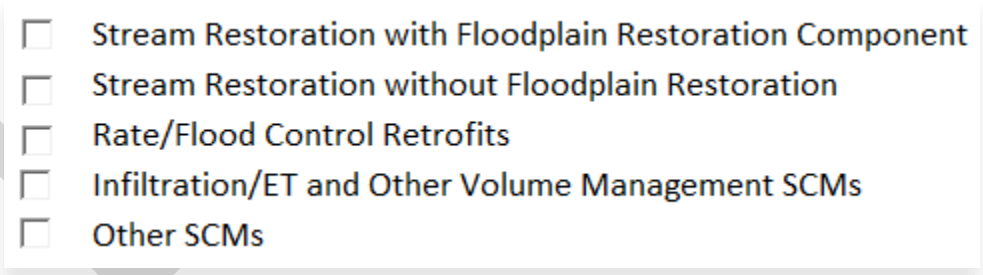
    The calculation uses an estimate of $200,000 to account for all costs associated with treating one inch of runoff from one acre of impervious surfaces using infiltration and ET. If an MS4 can document a lower cost, its research may be submitted for justification (although DEP will not approve costs lower than $100,000 per acre).

    For example, if an MS4 was required to reduce 500,000 lbs of sediment, and a stream restoration project was implemented that achieved a reduction of 1,000,000 lbs at a cost to the permittee of $2.5 million (with no grant funds received), the equivalent impervious acres treated would be as follows:

    (($2,500,000 / 1,000,000 lbs) x (1,000,000 lbs – 500,000 lbs)) / $200,000/acre = 6.25 acres

SCM Types Worksheet

Check the appropriate boxes to indicate the types of SCMs within the MS4's SCM Inventory. Checking the box activates the corresponding SCM worksheet.



Floodplain Restoration Worksheet

- Select the number of floodplain restoration projects or locations from the drop-down list ("No. SCMs:").
- Enter the name of the surface water whose floodplain was restored.
- Enter the latitude and longitude coordinates at the center of the restored area, in decimal degrees. Report coordinates to six decimal places. Use a negative ("-") symbol to report longitude.

- Enter the name of the owner of the project, typically the landowner.

- Enter the restoration area, in acres. Include only the restored floodplain area, not area associated with streambank restoration or stabilization, if completed.

- Select "One" or "Both" from the drop-down menu to indicate the side(s) of the stream that were restored.

- Enter the impervious area that is located within the restored area's drainage area, perpendicular to the restored floodplain. A validation warning is shown if the value entered exceeds 25 acres. If the value entered is more than two times the size of the restored area, the cell will turn red to indicate that the entered value exceeds the expected treatment capacity of the restored floodplain. DEP may require additional information to justify values in cells highlighted in red.

- Select "Yes" or "No" from the drop-down menu to indicate whether the SCM was installed to comply with Chapter 102 Post-Construction Stormwater (PCSM) requirements for a project site.

- Select the year the SCM was installed (completed) from the drop-down list.

- Select the year the SCM was last inspected from the drop-down list.

- When all data have been entered for a row, and assuming the SCM was inspected within the past 2 years, the impervious areas treated are summed.

Stream Restoration Worksheet

The purpose of this worksheet is to provide an equivalent impervious area treatment credit for stream restoration SCMs that did not include a floodplain restoration component. Only use this worksheet if the MS4 exceeded their sediment reduction objective during the previous permit term using stream restoration (and other SCMs, if applicable). If an MS4 implemented stream restoration project(s) during the previous permit term, but the amount of the sediment load reduction achieved did not exceed the sediment reduction objective of a Pollutant Reduction Plan (PRP), the project(s) should not be reported. See examples below.

- Enter the name of the surface water whose streambanks were restored.

- Enter the latitude and longitude coordinates at the center of the restored area, in decimal degrees. Report coordinates to six decimal places. Use a negative ("-") symbol to report longitude.

- Enter the name of the owner of the project, typically the landowner.

- Enter the total cost to the MS4 to implement the PRP (all projects completed for the PRP). Exclude costs that were paid for by grants. Provide documentation to support the value entered.

- Enter the total sediment reduction achieved for all projects implemented under the PRP. This value should be consistent with the value identified in the final report submitted to document PRP implementation activities.

- Enter the total sediment reduction required to meet the objective of the PRP (i.e., minimum 10% reduction in existing sediment load).

- An estimate of $200,000 per acre of impervious area treated is listed by default. This is considered an average cost to treat impervious area through infiltration and evapotranspiration (ET) throughout the state. If a lower cost per acre is entered, attach documentation to support the lower cost. The lowest value that can be entered is $100,000.

- The equivalent impervious area treated, in acres, is calculated and displayed once all data have been entered, assuming the SCM has been inspected within the past two years. If the value calculated exceeds 25 acres,

the cell will be highlighted in red. DEP may require additional information to justify values in cells highlighted in red.

- Select "Yes" or "No" from the drop-down list to indicate whether the stream restoration project was approved by DEP as part of a PRP project.
- Select the year the SCM was installed (completed) from the drop-down list.
- Select the year the SCM was last inspected from the drop-down list.
- When all data have been entered for the row, and assuming the SCM was inspected within the past 2 years, the total equivalent impervious area treated is displayed.

Example 1 – The sediment load reduction objective in a PRP is 100,000 lbs. One stream restoration project is completed on Blue Stream at a cost to the MS4 of $212,000 and resulted in a sediment reduction of 100,000 lbs. Since the sediment load reduction objective of the MS4's PRP was not exceeded, this SCM should not be identified in the SCM Inventory.

Example 2 – The sediment load reduction objective in a PRP is 100,000 lbs. One stream restoration project is completed on Blue Stream at a cost to the MS4 of $393,000 and resulted in a sediment reduction of 150,000 lbs. The equivalent impervious treated is determined to be 0.66 acre.

Surface Water Name	Latitude	Longitude	Owner Name	Total MS4 Cost to Implement PRP ($)	Total Sediment Reduced for PRP (lbs)	Total Sediment Reduction Required (lbs)	Impervious Treatment Cost Estimate ($/ac)	Equivalent Impervious Treated (ac)	Approved in PRP?	Year Installed	Year Last Inspected
Blue Stream	42.219921	-77.568212	Park Township	$393,000	150,000	100,000	$200,000	0.66	Yes	2022	2024
							TOTAL:	0.66			

Example 3 – An MS4 decides to implement two projects for its PRP; one involves the retrofit of a flood control basin and the other involves stream restoration on Muddy Creek. The sediment load reduction objective for the PRP is 300,000 lbs. Both the retrofit and stream restoration projects result in a sediment load reduction of 200,000 lbs (each) and the total cost to the MS4 of $725,000. The equivalent impervious treated is determined to be 0.91 acre.

Surface Water Name	Latitude	Longitude	Owner Name	Total MS4 Cost to Implement PRP ($)	Total Sediment Reduced for PRP (lbs)	Total Sediment Reduction Required (lbs)	Impervious Treatment Cost Estimate ($/ac)	Equivalent Impervious Treated (ac)	Approved in PRP?	Year Installed	Year Last Inspected
Muddy Creek	40.901020	-76.299200	Eagles Eye Golf Course	$725,000	400,000	300,000	$200,000	0.91	Yes	2023	2024
							TOTAL:	0.91			

Example 4 – An MS4 decides to implement two stream restoration projects for its PRP. The sediment load reduction objective for the PRP is 1,000,000 lbs. The restoration project on Clear Run cost $584,000 to the MS4 and resulted in a sediment load reduction of 698,000 lbs. The restoration project on Little River cost $845,000 overall, resulting in a sediment load reduction of 861,000 lbs. Fifty percent (50%) of the Little River project was paid for by the MS4. The Little River project was most recently completed and will be reported in the table. The equivalent impervious treated is determined to be 1.8 acres.

Surface Water Name	Latitude	Longitude	Owner Name	Total MS4 Cost to Implement PRP ($)	Total Sediment Reduced for PRP (lbs)	Total Sediment Reduction Required (lbs)	Impervious Treatment Cost Estimate ($/ac)	Equivalent Impervious Treated (ac)	Approved in PRP?	Year Installed	Year Last Inspected
Little River	41.865220	-77.945221	Little River Fish & Game	$1,006,500	1,559,000	1,000,000	$200,000	1.80	Yes	2023	2024
							TOTAL:	1.80			

Retrofits Worksheet

The Retrofits worksheet is intended for MS4s to report rate or flood control SCMs that were modified as a PRP project or for other purposes to improve infiltration capabilities and/or pollutant reductions. Do not report SCMs that were installed for Chapter 102 PCSM rate control purposes or other existing flood control basins that were not modified to improve infiltration and/or water quality treatment.

- Select the number of retrofit SCMs from the drop-down list ("No. SCMs:").
- Enter the name of the SCM as it is known locally. For example, "10th Street Flood Control Basin Retrofit".
- Enter the latitude and longitude coordinates at the center of the SCM, in decimal degrees. Report coordinates to six decimal places. Use a negative ("-") symbol to report longitude.
- Enter the name of the owner of the project, typically the landowner.
- Select the type of retrofit from the dropdown menu. Select "Infiltration and Water Quality Improvements" if the height of the lowest orifice was increased and soils were amended to enhance infiltration capabilities (preferably deep-rooted vegetation would also have been established). Select "Water Quality Improvements" if the height of the lowest orifice was not increased and/or a channel within a basin was removed to promote sheet or shallow concentrated flow rather than concentrated flow through the basin (preferably deep-rooted vegetation would also have been established).
- Describe the retrofits made in the space provided. Alternatively attach a more thorough description of the retrofits.
- Enter the SCM surface area, in square feet (SF). Include the bottom of the SCM only (not side slopes).
- Enter the depth to the lowest orifice within the SCM, in feet, measured from the SCM bottom to the invert of the first outlet. If the value is zero, enter "0.001". The value must be less than 10 feet. If the value exceeds 5 feet, the cell will be highlighted in red. DEP may require additional information to justify values in cells highlighted in red.
- Enter the SCM storage volume in CF. In general, the storage volume is the product of the depth to the lowest orifice and the SCM surface area. If the value exceeds 125% of the product of the depth to the lowest orifice and the SCM surface area, the cell is highlighted red and calculations should be attached to show how storage volume was computed.
- The area of impervious treated by the SCM is determined by the SCM storage volume that is entered. The storage volume is divided by a factor of 3,630 CF/acre to determine acres in which 1 inch of runoff is treated (43,560 ft^2/acre x 1 ft/12 inches x 1 inch runoff).
- Select "Yes" or "No" from the drop-down menu to indicate whether the SCM was installed to comply with Chapter 102 PCSM requirements for a project site.
- Select the year the SCM was installed (completed) from the drop-down list.
- Select the year the SCM was last inspected from the drop-down list.
- When all data have been entered for a row, and assuming the SCM was inspected within the past 2 years, the impervious areas treated are summed.

Volume SCMs

The Volume SCMs worksheet is used to report SCMs that have an infiltration, ET, or volume management function. Table 1 presents a list of SCMs that can be selected for this worksheet. Table 1 includes a crosswalk between the

SCM Names in the Volume SCMs worksheet and Chesapeake Bay Program best management practices (BMPs), which may have been used by MS4s for BMP inventories.

Note that wet and dry detention/retention basins are not in the drop-down list because they do not provide appreciable volume management benefits. However, naturalized detention basins, which are constructed similarly to a surface infiltration basin and have deep-rooted vegetation to promote ET, can be reported in the SCM Inventory (select Surface Infiltration Basin as the SCM name). Wet and dry detention/retention basins (i.e., rate and flood control basins) that are modified to provide infiltration and ET or water quality benefits should be reported in the Retrofits worksheet.

Table 1: SCMs Available in Volume SCMs Worksheet with Chesapeake Bay BMP Crosswalk

Volume SCMs	Equivalent Chesapeake Bay BMPs
Bioinfiltration	Bioretention/raingardens - A/B soils, no underdrain
Bioretention [1]	Bioretention/raingardens - all soils, underdrain
Engineered Stormwater Treatment Wetland	Wetland Creation – Floodplain or Headwater
Green Roof	N/A
Infiltration Trench	Infiltration Practices with and without Sand, Veg. - A/B soils, no underdrain
Managed Release Concept (MRC) SCM [1]	Bioretention/raingardens – all soils, underdrain
Permeable Pavement	Permeable Pavement with or without Sand, Veg. - all soils, with or without underdrain
Regenerative Step Pool Systems	N/A
Retentive Grading	Infiltration Practices with and without Sand, Veg. - A/B soils, no underdrain
Riparian Buffer	Forest Buffer
Stormwater Capture and Use	N/A
Surface Infiltration Basin	Infiltration Practices with and without Sand, Veg. - A/B soils, no underdrain
Underground Infiltration Basin	Infiltration Practices with and without Sand, Veg. - A/B soils, no underdrain
Vegetated Filter Strip	Bioswale, Filter Strip Stormwater Treatment, Filter Strip Runoff Reduction
Vegetated Conveyance with Check Dams	Bioswale, Filter Strip Stormwater Treatment, Filter Strip Runoff Reduction

1 Select MRC if the design includes an internal water storage (IWS) zone, typically created by the use of an upturned elbow on the underdrain, otherwise select Bioretention.

- Select the number of Volume SCMs from the drop-down list ("No. SCMs:").

- Select the name of the SCM from the drop-down list. If assistance is needed in selecting SCM Names, contact DEP's Bureau of Clean Water at RA-EPPAMS4@pa.gov.

- Enter the latitude and longitude coordinates at the center of the SCM, in decimal degrees. Report coordinates to six decimal places. Use a negative ("-") symbol to report longitude.

- Enter the name of the owner of the project, typically the landowner.

  Enter the SCM surface area, in square feet (SF), between 1 and 87,120 SF (2 acres). Include the bottom of the SCM only (not side slopes). For riparian buffers, enter only the area associated with buffers than have been designed, implemented and are being maintained as SCMs. Do not report existing vegetated areas adjacent to streams that were not implemented as SCMs.

- Enter the depth to the lowest orifice within the SCM, in feet, measured from the SCM bottom to the invert of the first outlet. If the value is zero, enter "0.001". The value must be less than 10 feet. If the value exceeds 5 feet, the cell is highlighted in red. DEP may require additional information to justify values in cells highlighted in red.

  For SCMs without a designed outlet structure (e.g., infiltration trenches, vegetated filter strips, retentive grading, etc.), enter a value corresponding to the height at the top of berm or grade.

- Enter the SCM storage volume in CF. In general, the storage volume is the product of the depth to the lowest orifice and the SCM surface area. If the value exceeds 125% of the product of the depth to the lowest orifice and the SCM surface area, the cell is highlighted red and calculations should be attached to show how storage volume was computed.

- The area of impervious treated by the SCM is determined by the SCM storage volume that is entered. The storage volume is divided by a factor of 3,630 CF/acre to determine acres in which 1 inch of runoff is treated (43,560 ft^2/acre x 1 ft/12 inches x 1 inch runoff).

- Select "Yes" or "No" from the drop-down menu to indicate whether the SCM was installed to comply with Chapter 102 PCSM requirements for a project site.

- Select the year the SCM was installed (completed) from the drop-down list.

- Select the year the SCM was last inspected from the drop-down list.

- When all data have been entered for a row, and assuming the SCM was inspected within the past 2 years, the impervious areas treated are summed.

Other SCMs Worksheet

This worksheet is used for SCMs that have a different method to calculate impervious area treated and includes tree planting and impervious area reduction. Other SCMs may be added in the future.

- **Tree Planting** – a volume management credit is provided for tree plantings since 2018 as follows:

  - 3 CF for every new native tree that is planted within an urban area with a caliper (the diameter at breast height of a tree) of less than 2 inches;

  - 6 CF for every new native deciduous tree that is planted within an urban area with a caliper of 2 inches or more; and

  - 6 CF for every new native evergreen tree with a height of at least 6 feet.

  If the number of trees entered exceeds 300, the cell is highlighted red. DEP may require additional information to justify values in cells highlighted in red. The volume management credit is summed and divided by a factor of 3,630 to determine the equivalent impervious area treated in acres.

  MS4s do not need to submit location, ownership, and inspection information for each tree listed on the Other SCMs worksheet; however, it is expected that permittees will keep this information on file and ensure that any trees that die are replaced or removed from the Tree Planting inventory. DEP may request this documentation during review of the NOI or during an inspection.

- **Impervious Area Reduction** – The change in land cover results in less runoff, which is quantified as a volume reduction and converted to equivalent impervious treated for one inch of runoff.

  - Enter the area converted from impervious to pervious within the urban area since 2018.

- Select a Hydrologic Soil Group (HSG) from the drop-down list for the ***land cover***. Soil groups are based on NRCS' National Engineering Handbook (Chapter 7, Hydrologic Soil Groups). The NRCS Web Soil Survey tool may be used to characterize soils present at a site (instructions on using the Survey tool to determine HSG are available – use this link); preferably a certified soil scientist will verify the HSG. For soils assigned dual soil groups (e.g., A/D, B/D, etc.), use the first group for your selection.

- The runoff volume reduction at the 1.2-inch/2-hour storm (i.e., a storm that results in one inch of runoff) is estimated assuming that the new land cover is "Open Space in Good Condition".

- The runoff volume reduction is converted to an equivalent impervious area treated by dividing by a factor of 3,630.

Volume Management Chart

This chart is used to determine the Volume Management Objectives for MS4s. The Volume Management Objectives have been calculated as follows:

- The long-term goal of MS4 Volume Management Plans is the treatment of 88% of impervious surfaces (i.e., only 12% of impervious surfaces are untreated). This goal is based on numerous studies estimating surface water degradation as a function of impervious area. See, for example, Impervious Surfaces and Water Quality: A Review of Current Literature and Its Implications for Watershed Planning. Based on consideration of these studies, DEP believes that the control of stormwater to a level equivalent to 12% (or less) imperviousness throughout a watershed or sub-watershed will, in most cases, result in attainment of state water quality standards. The 12% threshold has been used by DEP in other contexts including the PAG-01 General Permit for Discharges of Stormwater Associated with Small Construction Activities.

- The first step in calculating the Volume Management Objective is to find the total untreated impervious area, i.e., the difference between 88% treatment and the existing level of treatment. The midpoint of the range of total impervious and percentage of impervious area treated is used for the calculation.

  Example – An MS4 selects the range "100-199" for total impervious area in the UA and "6-10%" is calculated for the percentage of impervious area treated, based on the MS4's SCM Inventory. The untreated impervious area is determined as follows:

  (150 x 0.88) – (150 x 0.08) = 120 acres untreated

- Untreated impervious area is to be treated over 50 years, i.e., 2% per year. For the 120 acres that are untreated in the example above, each year 2.4 acres would need to be treated (120 acres x 0.02).

- To determine the equivalent volume for the annual impervious to be treated, one inch of runoff is used. One inch of runoff from one impervious acre equals 3,630 CF of volume. For the 2.4 acres that would need to be treated in the example above, 8,712 CF of runoff would need to be treated each year (rounded up to 9,000 CF).

Revision History

Date	Version	Revision Reason
1/2025	1.0	Draft