MRC
the Managed Release Concept

Westmoreland Conservation District

Engineers Workshop

March 19 & 20, 2026

MRC, the Managed Release Concept

- A method of controlling stormwater from small storms
- Helps to protect the geomorphologic features of small streams
- Improves runoff water quality
- Features an underdrain that has an upturned elbow
- You can use MRC to help you meet PA DEP's PCSM requirements

GEOMORPHOLOGIC

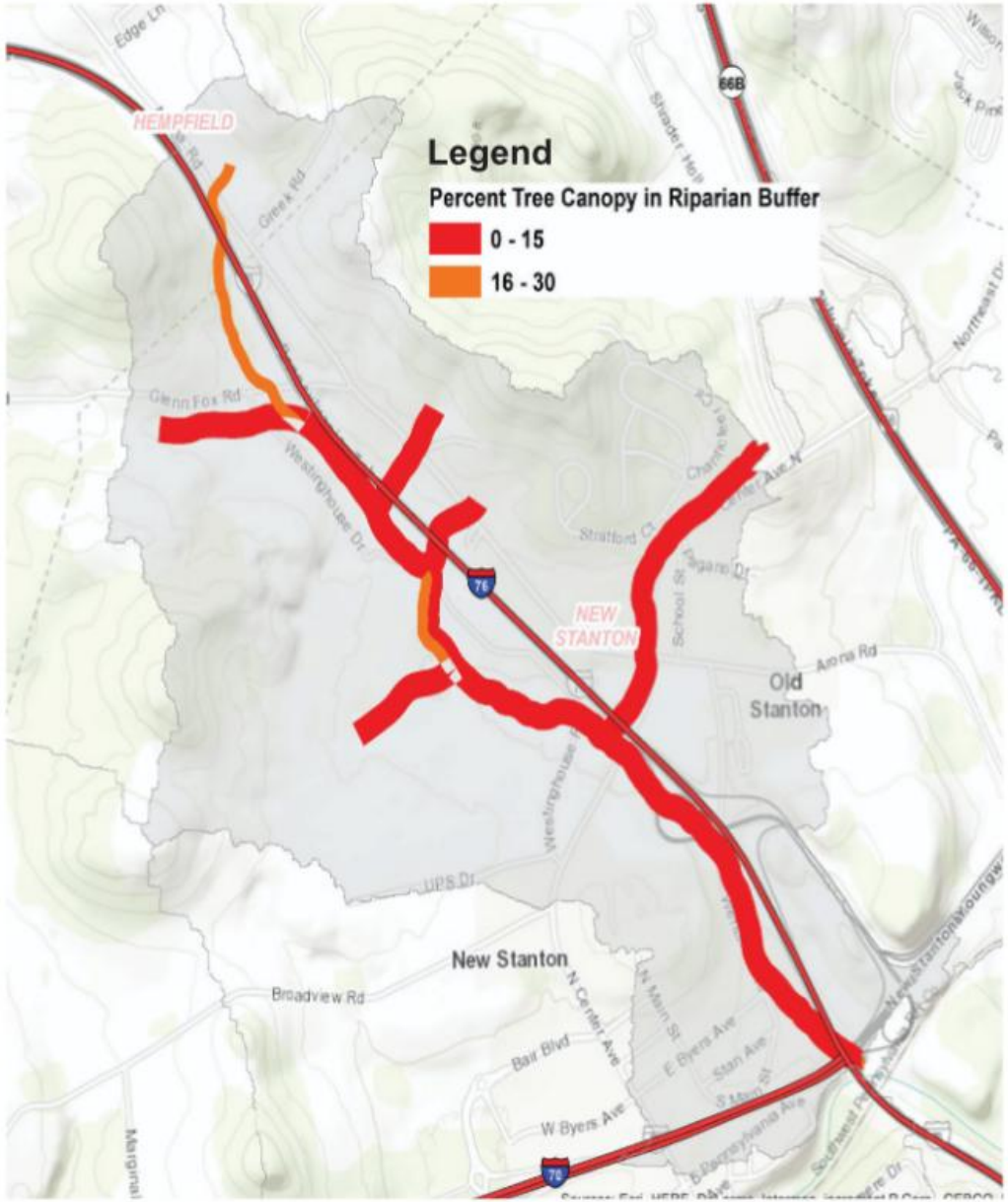
MRC is not automatic

- Please provide a demonstration that all available non-discharge, infiltration, evapotranspiration, non-structural, and other WQ SCM's were utilized prior to managing the remaining credit using MRC. Please note that this is not an *all or nothing* situation. All credit which can be taken must be taken prior to authorizing the remainder of the required credit using MRC. SCM's in Chapters 5 and 8 of the SWM Manual should be explored. Also, ET credit should be explored via BMP's such as, but not limited to, vegetated swales as conveyance features, small dispersed rain gardens, tree planting, etc. Evaluate the potential to use riparian forest buffers, green infrastructure including green roofs, water reuse, etc. *--DEP guidance*

ET Credit from a rain garden


Permeable
Pavement

An SCM that has ET credit



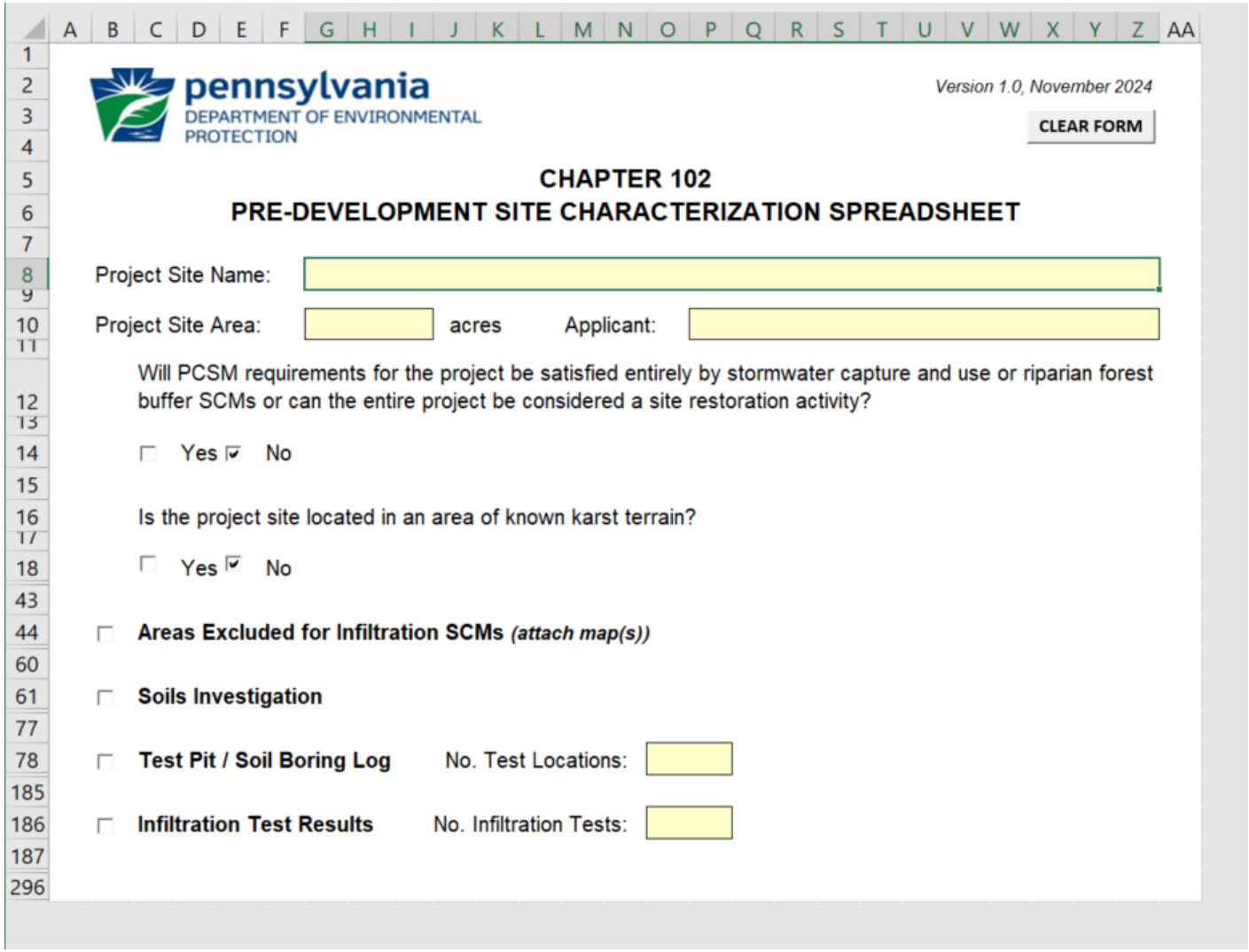
Establishing a riparian buffer in a location which has none

Photo by Tom Keller

Sewickley Creek Watershed Association volunteer tree planting at Jack's Run

How do you justify using MRC?

The PDSC spreadsheet is a tool to show that you are justified in using MRC



pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

Version 1.0, November 2024

CLEAR FORM

CHAPTER 102
PRE-DEVELOPMENT SITE CHARACTERIZATION SPREADSHEET

Project Site Name:

Project Site Area: acres Applicant:

Will PCSM requirements for the project be satisfied entirely by stormwater capture and use or riparian forest buffer SCMs or can the entire project be considered a site restoration activity?

☐ Yes ☑ No

Is the project site located in an area of known karst terrain?

☐ Yes ☑ No

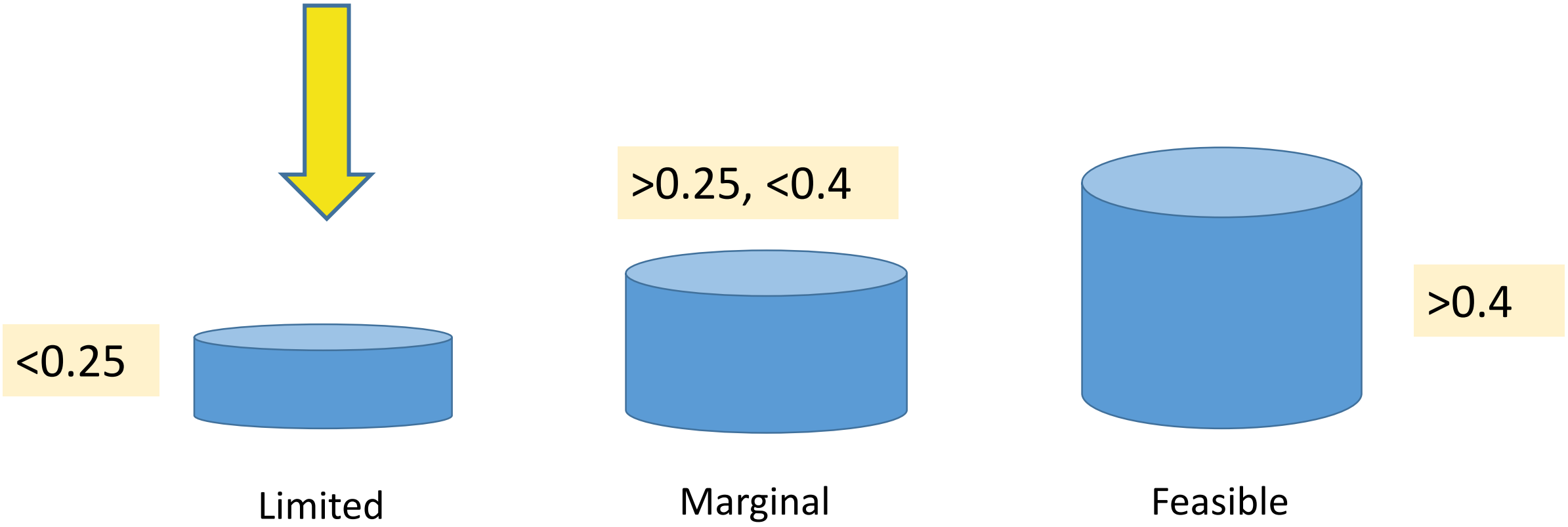
☐ **Areas Excluded for Infiltration SCMs** ***(attach map(s))***

☐ **Soils Investigation**

☐ **Test Pit / Soil Boring Log** No. Test Locations:

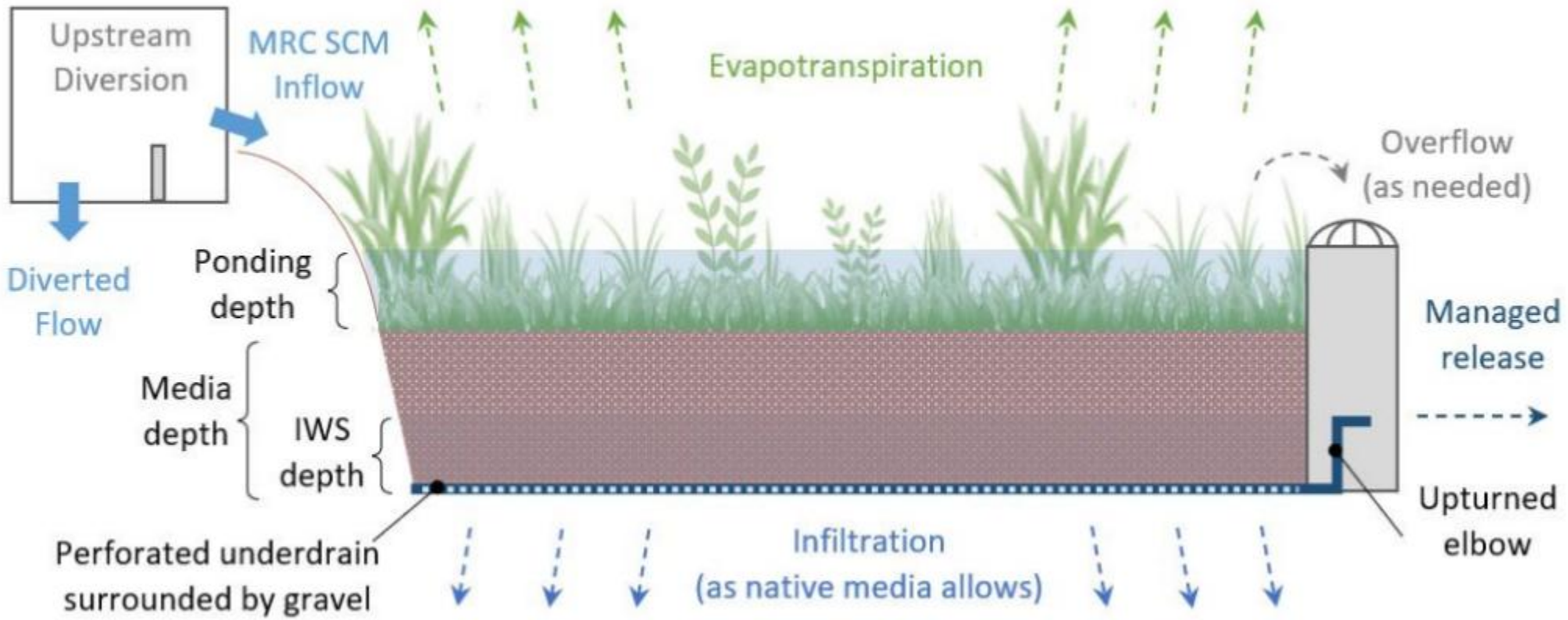
☐ **Infiltration Test Results** No. Infiltration Tests:

Infiltration tests done across the site will show areas where you can use MRC.



The usual illustration of an MRC SCM…

Note the MRC features—vegetated, soil media, internal water storage, underdrain with upturned elbow, ponding depth, flow splitter, outlet.



Some definitions from the MRC Paper

Definitions

Controlled Release Rate means a flow rate not exceeding 0.02 cfs / acre of equivalent impervious surface from the underdrain of an MRC SCM during the 1.2-inch/2-hour storm event.

Diversion means directing a portion of stormwater flows from the drainage area of an MRC SCM around the MRC SCM to a downstream SCM (typically a rate control SCM).

Equivalent Impervious means the area (in acres) that is determined by dividing the total volume of runoff (in cubic feet or CF) directed to an MRC SCM during the 1.2-inch/2-hour storm by a factor of 3,630 (1 ft/12 inches x 43,560 SF/acre).

Geomorphologic Protection means the management of the 2-year/24-hour storm for volume and water quality (tributary to the MRC SCM) by detaining the full volume of the post-construction 2-year/24-hour storm and releasing it at a rate less than or equal to the peak rate expected for the pre-construction 1-year/24-hour storm.

Managed Release means the combination of discharge at the controlled release rate and geomorphologic protection.

PCSM Objectives—see Attachment A in the MRC spreadsheet instructions

- **PCSM Objective A SCMs:**
  - **A.1: Protect and Preserve Natural Landscape Processes**
    - Protected Natural Stormwater Features
    - Preserved Natural Open Spaces
  - **A.2: Enhanced Natural Landscape SCMs**
    - Disconnection of Impervious Surface with Filter Strip
    - Riparian Buffer Establishment and Enhancement
    - Floodplain Restoration
    - Revegetation and Soil Restoration
    - Retentive Grading
    - Vegetated Conveyance

Must be documented on the permits and plans.
Must be preserved in the field during construction.
Must be in an easement.

Objective A SCMs are useful…

- If you can manage at least 10% of the site's runoff with an Objective A SCM, the MRC spreadsheet will allow you to have a larger drainage area to the MRC SCM.

Maximum Storm Event Routed to SCM	Maximum Equivalent Impervious Drainage Area (acres)
1.2-Inch/2-Hour Storm (or less), **with** 10% PCSM Objective A	6
1.2-Inch/2-Hour Storm (or less), **without** 10% PCSM Objective A	5
2-Year/24-Hour Storm (or less but greater than 1.2-Inch/2-Hour Storm), **with** 10% PCSM Objective A	2.5
2-Year/24-Hour Storm (or less but greater than 1.2-Inch/2-Hour Storm), **without** 10% PCSM Objective A	2
> 2-Year/24-Hour Storm, **with** 10% PCSM Objective A	1.5
> 2-Year/24-Hour Storm, **without** 10% PCSM Objective A	1

PCSM Objectives from Attachment A in the MRC spreadsheet instructions

- **PCSM Objective B SCMs:**
  - **B.1: Infiltration-Based SCMs**
    - Bioinfiltration
    - Surface Infiltration Basin
    - Permeable Pavement
    - Infiltration Trench
    - Underground Infiltration Basin
  - **B.2: Non-Infiltration SCMs**
    - Bioretention
    - Green Roof
    - Regenerative Step Pool Systems
    - Stormwater Capture and Use
    - Blue Roof
    - Engineered Stormwater Treatment Wetland
    - Water Quality Filtration and Treatment

Remember, if the site will infiltrate adequately, PA DEP Guidance says that you can't use MRC.

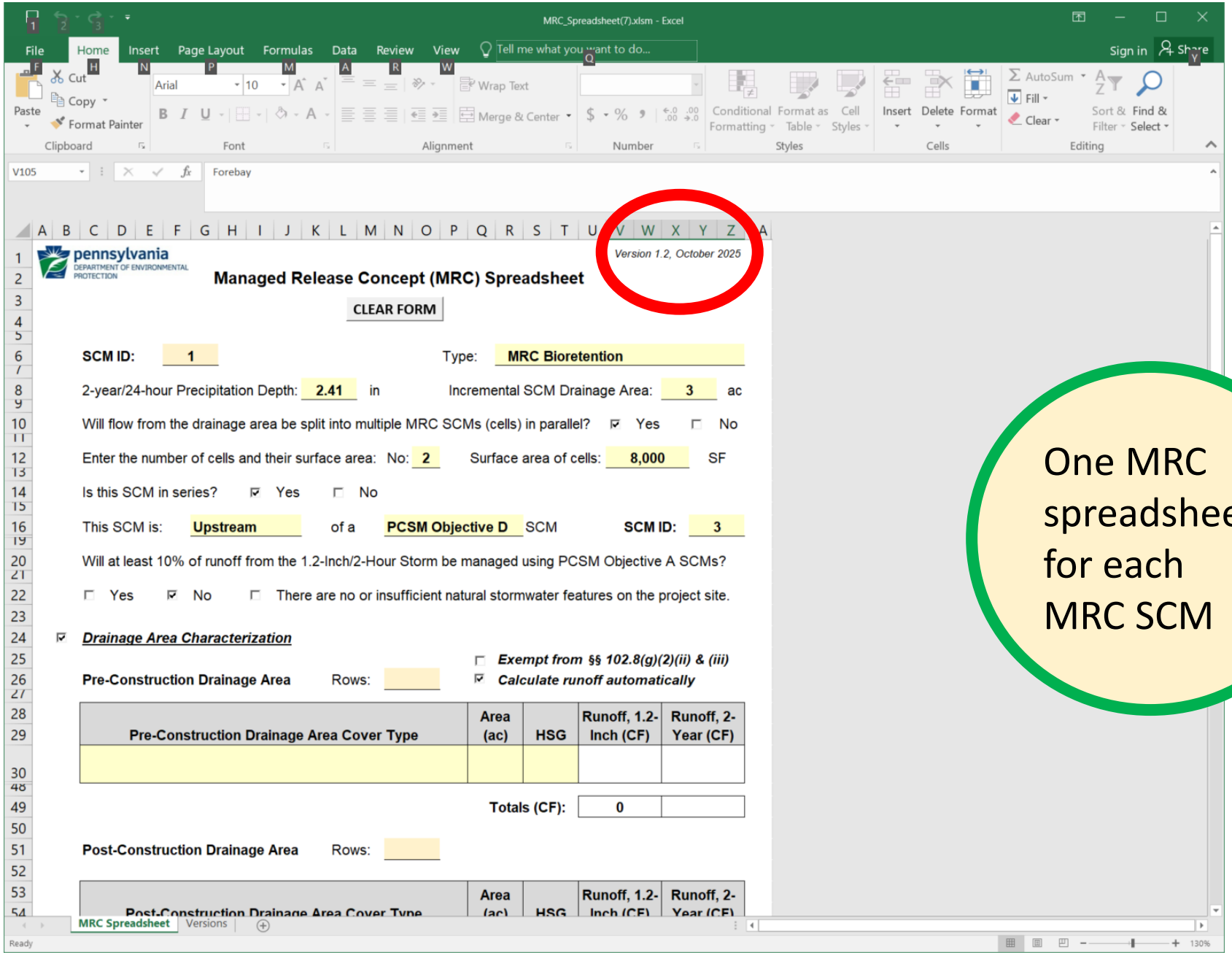
PCSM objectives from Attachment A in the MRC spreadsheet instructions

- **PCSM Objective C SCMs:**
  - Managed Release Concept (MRC) Bioretention
  - MRC Storage Systems
- **PCSM Objective D SCMs:**
  - Wet Basin
  - Naturalized Detention Basin
  - Underground Detention

MRC SCMs work best in a “treatment train” where something is upstream to protect the MRC, and something is downstream to receive its discharge

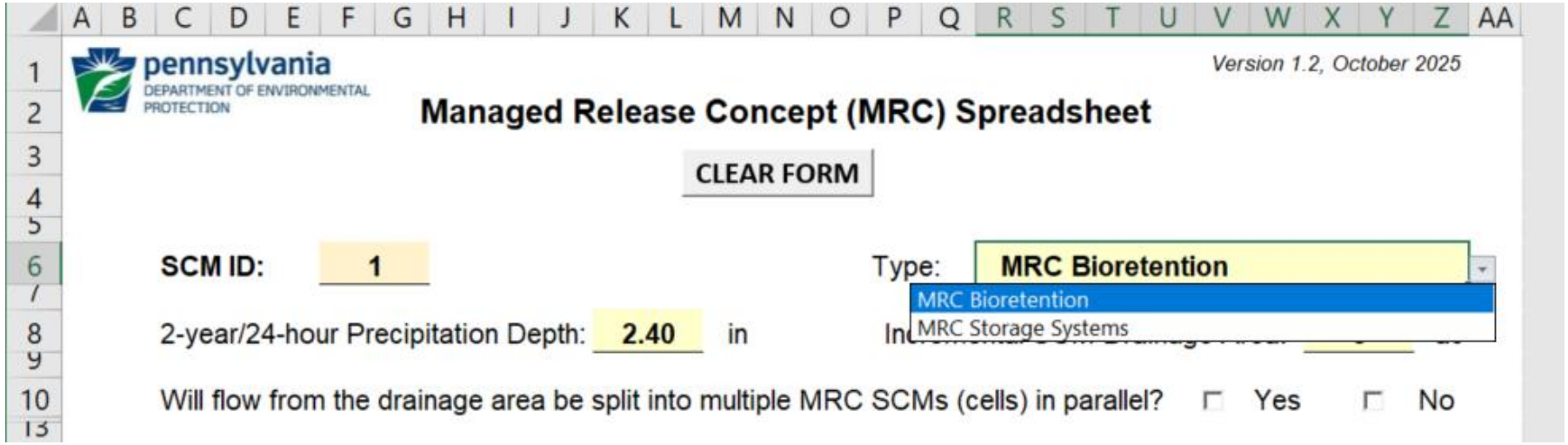
MRC Spreadsheet

- Expands as you enter information
- Updated frequently
- Generates a WQ number for you to put into the PCSM Spreadsheet



One MRC spreadsheet for each MRC SCM

The MRC spreadsheet allows for two types of MRC's: bioretention and storage systems

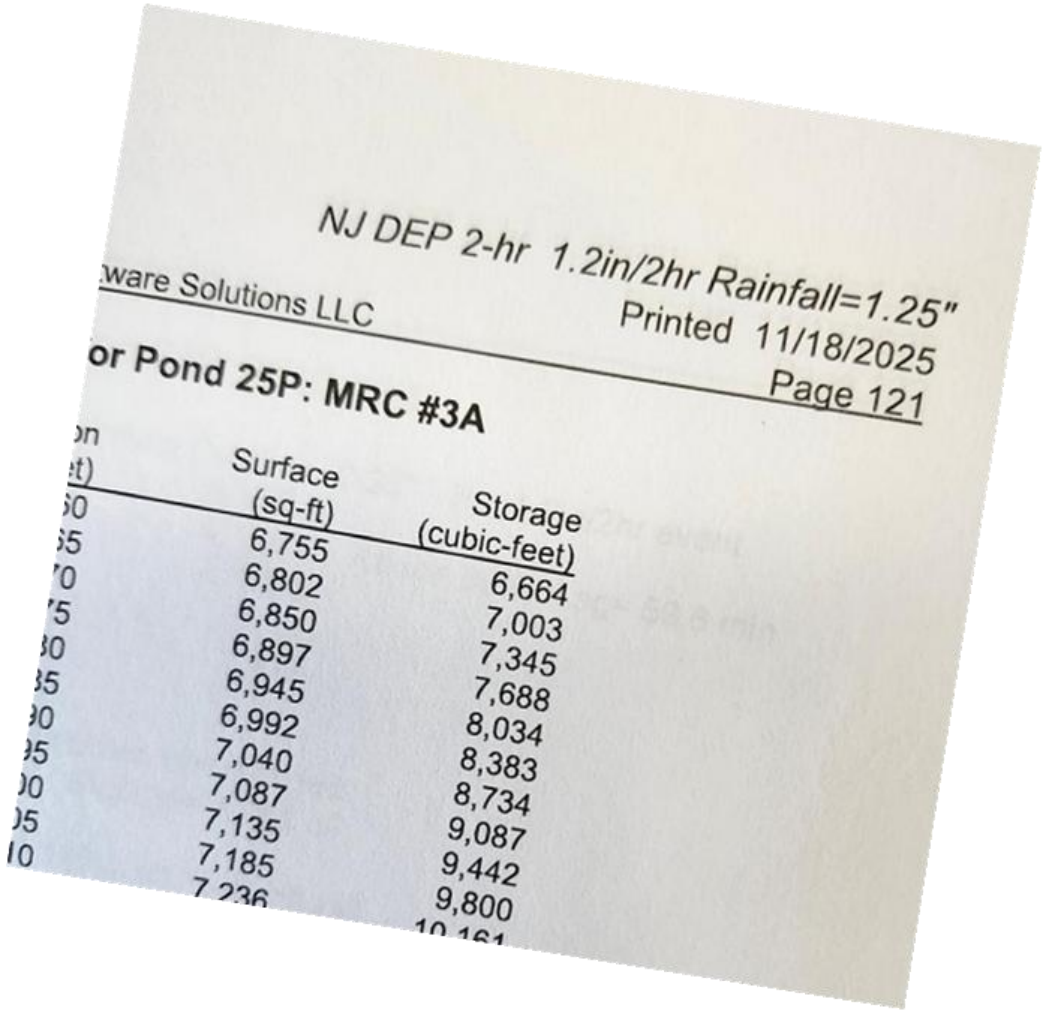


MRC Bioretention is a vegetated system with Plug Plantings for ET. Vegetation must cover 75% of the surface of the SCM.

MRC Storage Systems are underground storage units with an Internal Water Storage (IWS)

MRC and Runoff Capture

- The MRC SCM must capture and treat, without any overflow, the runoff from the 1.2 inch 2 hour storm.
- The MRC SCM can achieve Volume and Water Quality credit for up to the 2 year 24 hour storm.

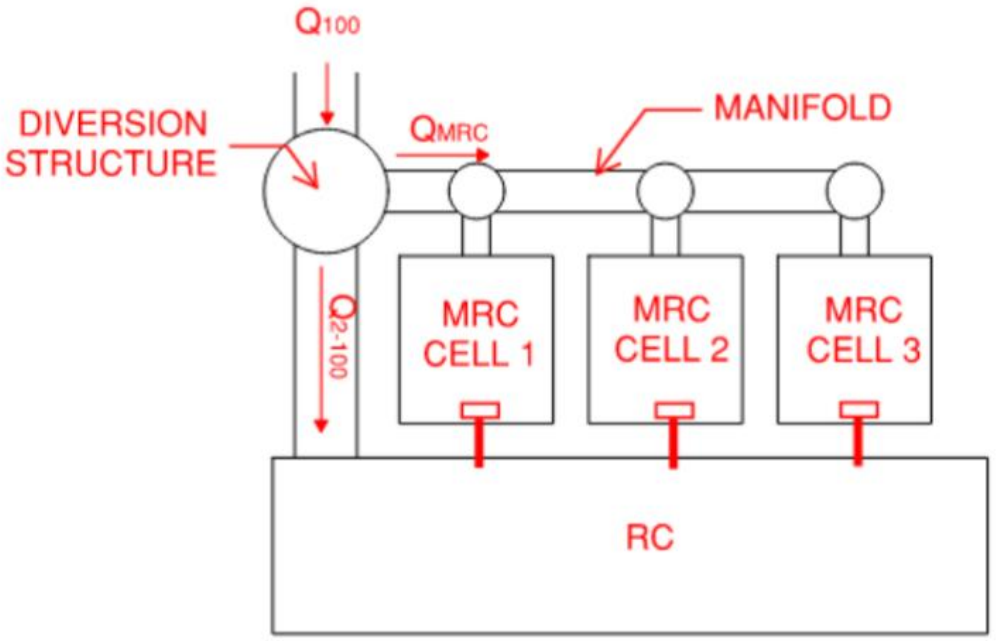


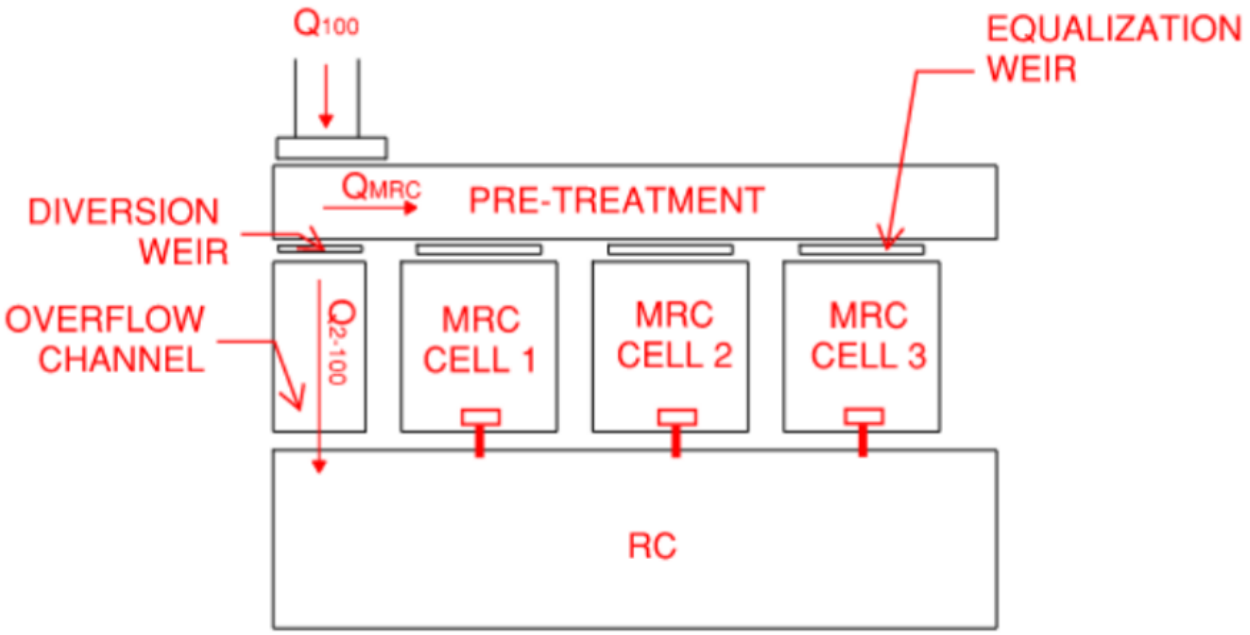
NJ DEP 2-hr 1.2in/2hr Rainfall=1.25"
ware Solutions LLC Printed 11/18/2025
Page 121

or Pond 25P: MRC #3A

on t)	Surface (sq-ft)	Storage (cubic-feet)
60	6,755	6,664
65	6,802	7,003
70	6,850	7,345
75	6,897	7,688
80	6,945	8,034
85	6,992	8,383
90	7,040	8,734
95	7,087	9,087
00	7,135	9,442
05	7,185	9,800
10	7,236	10,161

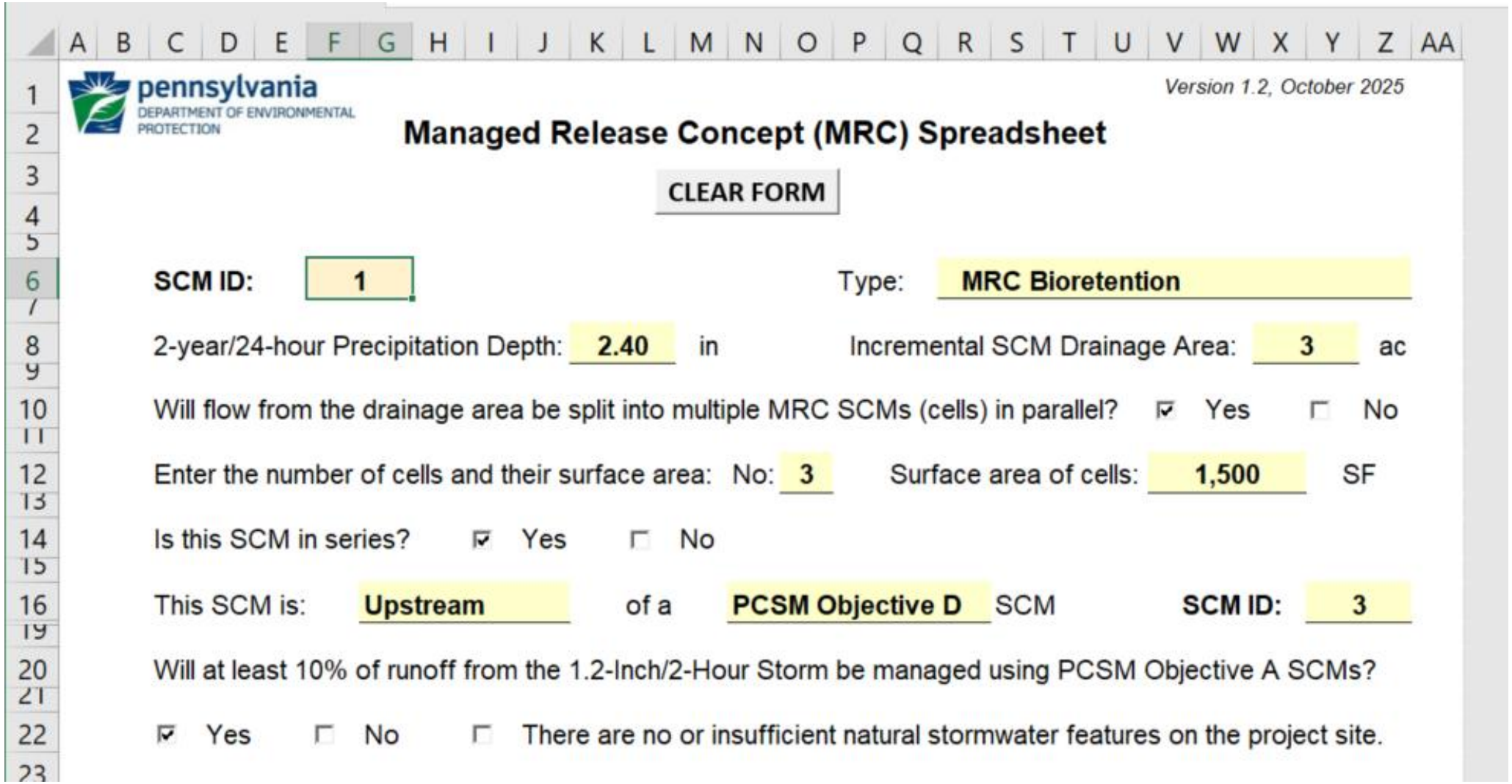
Using MRC cells in parallel with a flow splitter allows you to **manage a larger drainage area** and avoid running flows > the 2 year 24 hour storm through the MRC cells.
Note that you need to have pre-treatment with MRC cells.





DEP Guidance allows the use of an “isolator row” for a Stormtech™ underground MRC Storage device.

Using parallel MRC cells and a “treatment train” on the Spreadsheet



pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

Version 1.2, October 2025

Managed Release Concept (MRC) Spreadsheet

CLEAR FORM

SCM ID: 1 Type: **MRC Bioretention**

2-year/24-hour Precipitation Depth: **2.40** in Incremental SCM Drainage Area: **3** ac

Will flow from the drainage area be split into multiple MRC SCMs (cells) in parallel? ☑ Yes ☐ No

Enter the number of cells and their surface area: No: **3** Surface area of cells: **1,500** SF

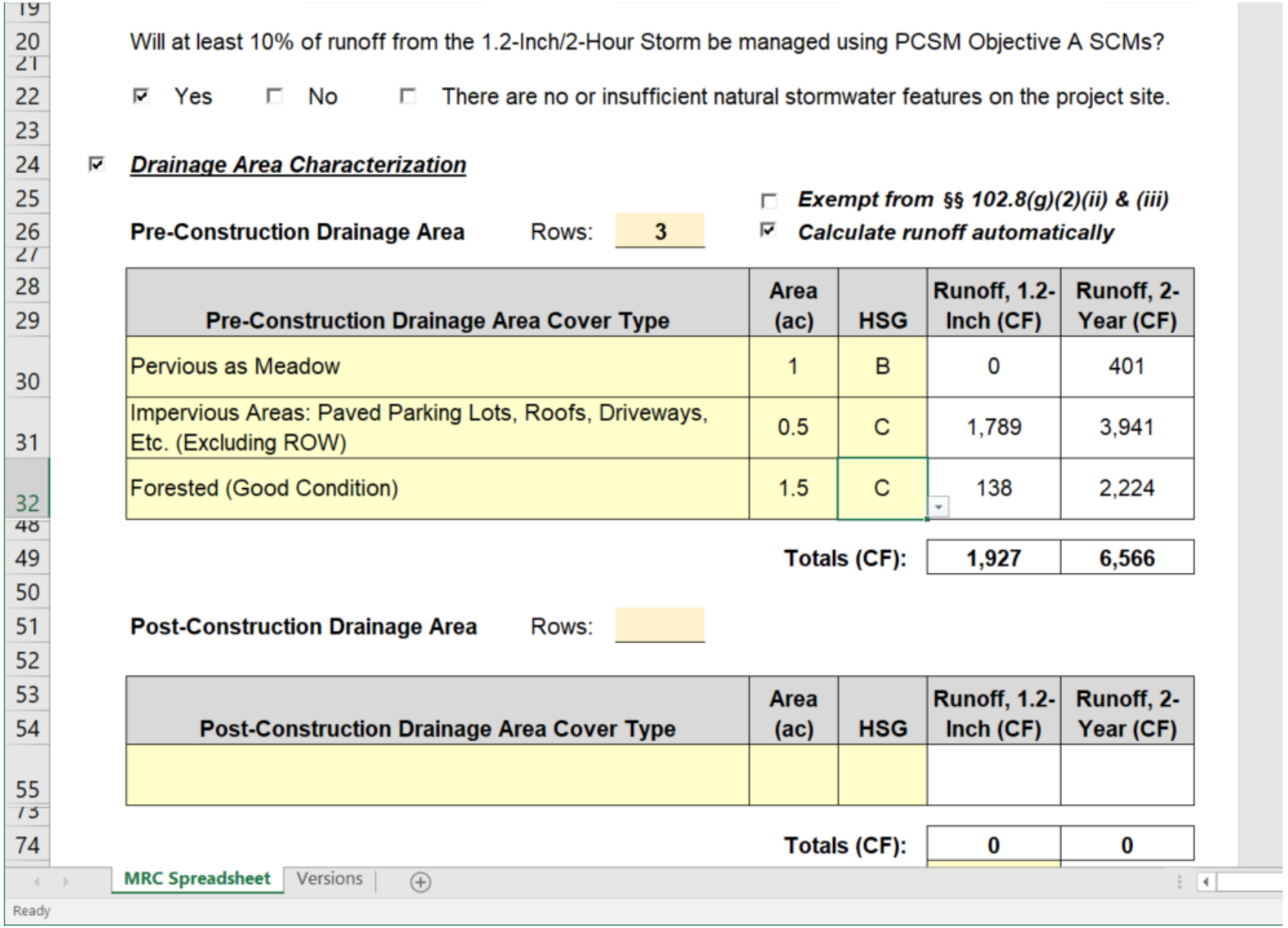
Is this SCM in series? ☑ Yes ☐ No

This SCM is: **Upstream** of a **PCSM Objective D** SCM **SCM ID:** **3**

Will at least 10% of runoff from the 1.2-Inch/2-Hour Storm be managed using PCSM Objective A SCMs?

☑ Yes ☐ No ☐ There are no or insufficient natural stormwater features on the project site.

Fill this spreadsheet in as you would the others. The cells open up as you go along. Remember that these drainage areas and their area must agree with the drawings and the calculations and the PCSM Spreadsheet information.



Will at least 10% of runoff from the 1.2-Inch/2-Hour Storm be managed using PCSM Objective A SCMs?

☑ Yes ☐ No ☐ There are no or insufficient natural stormwater features on the project site.

☑ ***Drainage Area Characterization***

☐ ***Exempt from §§ 102.8(g)(2)(ii) & (iii)***

Pre-Construction Drainage Area Rows: 3 ☑ ***Calculate runoff automatically***

Pre-Construction Drainage Area Cover Type	Area (ac)	HSG	Runoff, 1.2-Inch (CF)	Runoff, 2-Year (CF)
Pervious as Meadow	1	B	0	401
Impervious Areas: Paved Parking Lots, Roofs, Driveways, Etc. (Excluding ROW)	0.5	C	1,789	3,941
Forested (Good Condition)	1.5	C	138	2,224
		Totals (CF):	**1,927**	**6,566**

Post-Construction Drainage Area Rows:

Post-Construction Drainage Area Cover Type	Area (ac)	HSG	Runoff, 1.2-Inch (CF)	Runoff, 2-Year (CF)
		Totals (CF):	**0**	**0**

MRC Spreadsheet | Versions

Ready

Post-Construction Drainage Area

This info must match the Pre-Construction info as well as matching the drawings and the calculations and the PCSM Spreadsheet

Pre-Construction Drainage Area Cover Type	Area (ac)	HSG	Runoff, 1.2-Inch (CF)	Runoff, 2-Year (CF)
Pervious as Meadow	1	B	0	401
Impervious Areas: Paved Parking Lots, Roofs, Driveways, Etc. (Excluding ROW)	0.5	C	1,789	3,941
Forested (Good Condition)	1.5	C	138	2,224
		Totals (CF):	**1,927**	**6,566**

Post-Construction Drainage Area Rows: 3

Post-Construction Drainage Area Cover Type	Area (ac)	HSG	Runoff, 1.2-Inch (CF)	Runoff, 2-Year (CF)
Impervious Areas: Paved Parking Lots, Roofs, Driveways, Etc. (Excluding ROW)	2	C	7,156	15,764
Open Space (Lawns, Parks, Golf Courses, Cemeteries, Etc.) - Good Condition (Grass Cover > 75%)	0.5	B	0	304
Woods (Good Condition)	0.5	B	0	118
		Totals (CF):	**7,156**	**16,186**
		Total Volume Routed to SCM (CF):		
		Total Volume from Off-Site Sources (CF):		
		Equivalent Impervious Area (ac):	**2.0**	

Design Standards

MRC Spreadsheet | Versions

Ready

The total volume routed to the SCM box comes from your stormwater calculations

56	Good Condition (Grass Cover > 75%)	0.5	B	0	304
57	Woods (Good Condition)	0.5	B	0	118
74	**Totals (CF):**			**7,156**	**16,186**
75	**Total Volume Routed to SCM (CF):**			**18,000**	
76	**Total Volume from Off-Site Sources (CF):**			**0**	
77	**Equivalent Impervious Area (ac):**			**2.0**	

79 ☐ ***Design Standards***

166

167 ☐ ***Volume Management Credit***

181

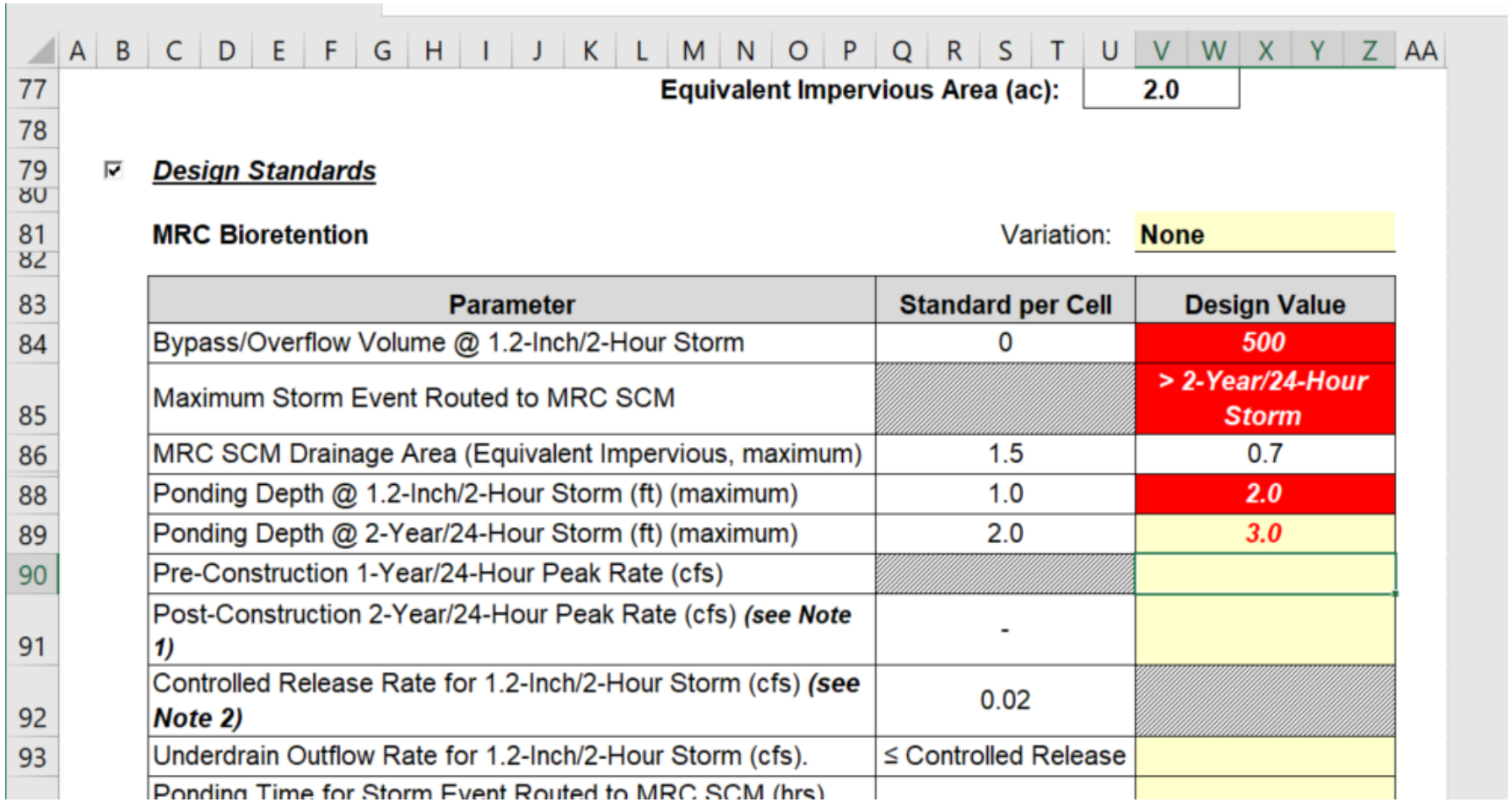
182

Remember not to overload the MRC SCM… use a flow splitter

As you fill in the Design Standards of the spreadsheet, some boxes may turn red. This indicates that you have exceeded the design standard. The spreadsheet will continue to function, but you will receive an automatic deduction of the MRC credit at the end.

Red Box: deduction of at least 50%.

Red letters: deduction less than 50%.



Equivalent Impervious Area (ac):	**2.0**	

Design Standards

MRC Bioretention Variation: **None**

Parameter	Standard per Cell	Design Value
Bypass/Overflow Volume @ 1.2-Inch/2-Hour Storm	0	*500*
Maximum Storm Event Routed to MRC SCM		*> 2-Year/24-Hour Storm*
MRC SCM Drainage Area (Equivalent Impervious, maximum)	1.5	0.7
Ponding Depth @ 1.2-Inch/2-Hour Storm (ft) (maximum)	1.0	*2.0*
Ponding Depth @ 2-Year/24-Hour Storm (ft) (maximum)	2.0	*3.0*
Pre-Construction 1-Year/24-Hour Peak Rate (cfs)		
Post-Construction 2-Year/24-Hour Peak Rate (cfs) ***(see Note 1)***	-	
Controlled Release Rate for 1.2-Inch/2-Hour Storm (cfs) ***(see Note 2)***	0.02	
Underdrain Outflow Rate for 1.2-Inch/2-Hour Storm (cfs).	≤ Controlled Release	
Ponding Time for Storm Event Routed to MRC SCM (hrs)		

If you are unable to get rid of the RED boxes or letters, you can send the information to DEP Central Office.

If the user selects TRUE next to this statement, the MRC spreadsheet displays, "The design has been approved by DEP's Bureau of Clean Water (attached)."

The applicant is seeking full management credit for this design	**TRUE**
Volume Management Credit (CF):	**0**
The design has been approved by DEP's Bureau of Clean Water (attached)	

If the applicant is seeking full management credit for an MRC design with deviations of at least 50%, the following steps must be taken:

- Submit electronic files containing the following information to DEP's Bureau of Clean Water at RA-EPAlternativeBMP@pa.gov ***prior to submitting an NOI or application for a Chapter 102 permit***:

Central Office staff will study your proposal and get back to you.

Carefully study each input to make sure your design matches the standard

Parameter	Standard per Cell	Design Value
Bypass/Overflow Volume @ 1.2-Inch/2-Hour Storm	0	0
Maximum Storm Event Routed to MRC SCM		2-Year/24-Hour Storm
MRC SCM Drainage Area (Equivalent Impervious, maximum)	2.5	0.7
Hydraulic Allowance for Diversion (inches) (maximum)	6	0
Ponding Depth @ 1.2-Inch/2-Hour Storm (ft) (maximum)	1.0	1.0
Ponding Depth @ 2-Year/24-Hour Storm (ft) (maximum)	2.0	2.0
Pre-Construction 1-Year/24-Hour Peak Rate (cfs)		0.30
Post-Construction 2-Year/24-Hour Peak Rate (cfs) ***(see Note 1)***	0.30	0.3
Controlled Release Rate for 1.2-Inch/2-Hour Storm (cfs) ***(see Note 2)***	0.02	
Underdrain Outflow Rate for 1.2-Inch/2-Hour Storm (cfs).	≤ Controlled Release	0.02
Ponding Time for Storm Event Routed to MRC SCM (hrs) (maximum)	72	50
Soil Media Depth Above Internal Water Storage (IWS) (ft) (minimum)	1.0	1.5
IWS Depth (ft) (minimum)	1.0	1.0
Inflow Velocity for Storm Event Routed to MRC SCM (fps) (maximum)	2.0	2.0
Separation Distance Between MRC SCM Bottom and SHWT (in)	12	12
A Synthetic Liner Will Be Installed		FALSE
Diameter of Managed Release Orifice (in)		0.5
SCM Embankment Slopes	33%	33%
Pretreatment	-	SCM Surface
SCM Bed Bottom Area (SF)		1,500

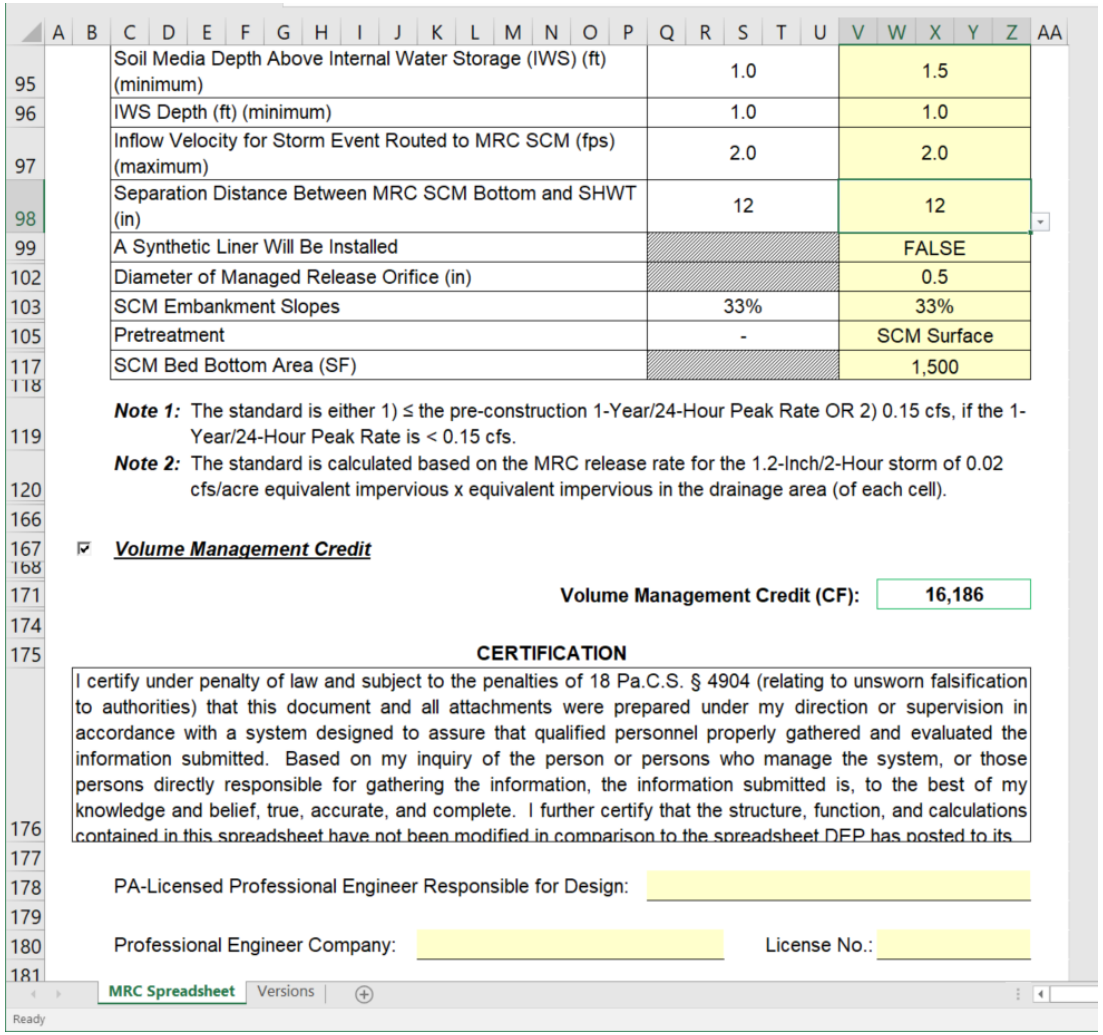
Note 1: The standard is either 1) ≤ the pre-construction 1-Year/24-Hour Peak Rate OR 2) 0.15 cfs, if the 1-Year/24-Hour Peak Rate is < 0.15 cfs.

Note 2: The standard is calculated based on the MRC release rate for the 1.2-Inch/2-Hour storm of 0.02 cfs/acre equivalent impervious x equivalent impervious in the drainage area (of each cell).

MRC Spreadsheet | Versions

Ready

Ultimately, the MRC Spreadsheet gives you a Volume Management Credit which you will enter into the PCSM Spreadsheet.



Soil Media Depth Above Internal Water Storage (IWS) (ft) (minimum)	1.0	1.5
IWS Depth (ft) (minimum)	1.0	1.0
Inflow Velocity for Storm Event Routed to MRC SCM (fps) (maximum)	2.0	2.0
Separation Distance Between MRC SCM Bottom and SHWT (in)	12	12
A Synthetic Liner Will Be Installed		FALSE
Diameter of Managed Release Orifice (in)		0.5
SCM Embankment Slopes	33%	33%
Pretreatment	-	SCM Surface
SCM Bed Bottom Area (SF)		1,500

Note 1: The standard is either 1) ≤ the pre-construction 1-Year/24-Hour Peak Rate OR 2) 0.15 cfs, if the 1-Year/24-Hour Peak Rate is < 0.15 cfs.

Note 2: The standard is calculated based on the MRC release rate for the 1.2-Inch/2-Hour storm of 0.02 cfs/acre equivalent impervious x equivalent impervious in the drainage area (of each cell).

☑ ***Volume Management Credit***

Volume Management Credit (CF): 16,186

CERTIFICATION

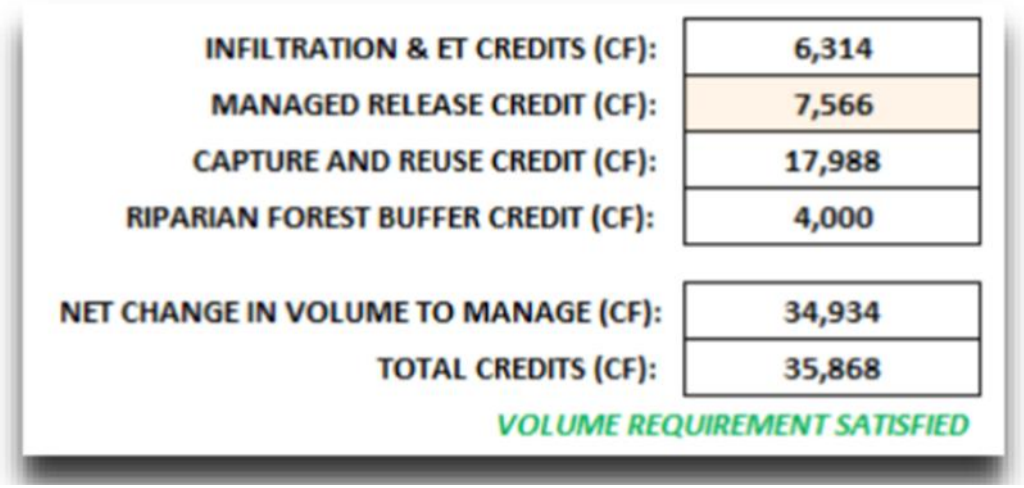
I certify under penalty of law and subject to the penalties of 18 Pa.C.S. § 4904 (relating to unsworn falsification to authorities) that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I further certify that the structure, function, and calculations contained in this spreadsheet have not been modified in comparison to the spreadsheet DEP has posted to its

PA-Licensed Professional Engineer Responsible for Design:

Professional Engineer Company: License No.:

MRC Spreadsheet | Versions

Ready



INFILTRATION & ET CREDITS (CF):	6,314
MANAGED RELEASE CREDIT (CF):	7,566
CAPTURE AND REUSE CREDIT (CF):	17,988
RIPARIAN FOREST BUFFER CREDIT (CF):	4,000
NET CHANGE IN VOLUME TO MANAGE (CF):	34,934
TOTAL CREDITS (CF):	35,868

VOLUME REQUIREMENT SATISFIED

MRC white paper to help you

pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION
Bureau of Clean Water

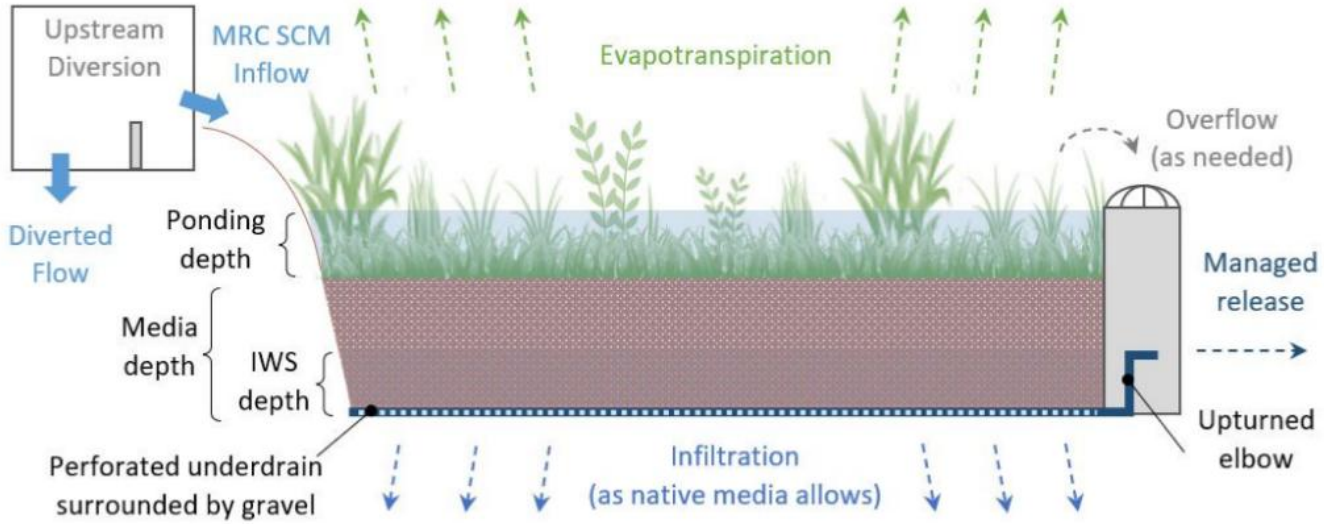
Managed Release Concept

Revised, August 15, 2025
Version 1.5

Description

Managed Release Concept (MRC) is a post-construction stormwater management (PCSM) strategy that consists of the collection, management, and filtration of captured runoff from the contributing drainage area through a stormwater control measure (SCM) that is preferably vegetated and includes the controlled release of the runoff through an underdrain within the SCM. MRC is intended to be used for project areas or subareas where infiltration is considered infeasible to meet regulatory requirements under § 102.8(g)(2) or otherwise undesirable. **Figure 1** illustrates the components of a typical MRC Bioretention SCM.

Figure 1: MRC Bioretention SCM with Internal Water Storage (IWS) and Upturned Elbow



MRC Instructions to help you

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF CLEAN WATER

MANAGED RELEASE CONCEPT (MRC) SPREADSHEET INSTRUCTIONS

Revised, September 10, 2025

Introduction

The Department of Environmental Protection (DEP) has developed the **Managed Release Concept (MRC) Spreadsheet** to facilitate calculations necessary for determining the amount of volume management credit that may be claimed for MRC stormwater control measures (SCMs). The MRC Spreadsheet replaces the ***MRC Design Summary Sheet***, which was previously used to report design parameters for these SCMs. The volume management credit for all MRC SCMs must be calculated using the MRC Spreadsheet with the exception of MRC SCMs that meet the **MRC Simplified Design Standards**. SCMs that will meet the MRC Simplified Design Standards must be documented on the **MRC Simplified Design Spreadsheet**. Volume management credit for either spreadsheet must be reported in DEP's **PCSM Spreadsheet** (Volume Worksheet). When entered into the PCSM Spreadsheet, water quality (WQ) management credit is also applied.

Users should check DEP's website periodically for updates to the MRC Spreadsheet and instructions by visiting www.dep.pa.gov/constructionstormwater and selecting "E&S Resources". In general, DEP/CCD will accept older versions of the spreadsheet no more than 6 months following the revision date of the spreadsheet. DEP/CCD also reserves the right to request completion of the latest version of the spreadsheet for any project.

The spreadsheet was designed using the latest version of Microsoft Excel® and is in Excel macro workbook (XLSM) format. Questions on the use of the MRC Spreadsheet can be directed to the Bureau of Clean Water at **RA-EPCHAPTER102@pa.gov**.

MRC FAQ to help you!

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DEPARTMENT OF ENVIRONMENTAL PROTECTION
Bureau of Clean Water

Managed Release Concept
for Post-Construction Stormwater Management

Frequently Asked Questions (FAQ)
Revised, August 15, 2025
Version 1.7

Background

Managed Release Concept (MRC) is a post-construction stormwater management (PCSM) strategy which, when designed according to standards established by the Department of Environmental Protection (DEP), ensures the protection of surface waters and satisfies regulatory requirements under 25 Pa. Code § 102.8. The use of MRC within a stormwater control measure (SCM) is considered an approved alternative SCM under the Chapter 102 regulations.

There are two options for demonstrating volume management credit by MRC SCMs:

- **Option 1** – Adhere to the MRC Simplified Design Standards, as identified in DEP's MRC Concept Paper, and complete the MRC Simplified Design Spreadsheet. ***MRC Simplified Design Standards only apply to MRC Bioretention SCMs*** (i.e., vegetated surface SCMs). Complete one spreadsheet for each SCM meeting MRC Simplified Design Standards. Submit the electronic file(s) or a printout(s) of the MRC Simplified Design Spreadsheet with PCSM Module 2. Enter the total volume routed to the MRC SCM up to the 2-year/24-hour storm into DEP's PCSM Spreadsheet, Volume Worksheet as managed release credit for the point of analysis (POA) or surface water that is analyzed.

Managed Release Concept…

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