

MRC SCM Calculations

Managed Release Concept (MRC) Spreadsheet

SCM ID: **1**

Type: **MRC Bioretention**

2-year/24-hour Precipitation Depth: **2.55** in Incremental SCM Drainage Area: **11** ac

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

Is this SCM in series? ☒ Yes ☐ No

This SCM is: **Upstream** of a **PCSM Objective D** SCM SCM ID: **2**

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**

Pre-Construction Drainage Area

Rows: **6**

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

☒ Calculate runoff automatically

Pre-Construction Drainage Area Cover Type	Area (ac)	HSG	Runoff, 1.2-Inch (CF)	Runoff, 2-Year (CF)
Pervious as Meadow	2.85	C	340	5,341
Pervious as Meadow	17.81	D	7,563	53,047
Forested (Good Condition)	2.32	C	214	4,037
Forested (Good Condition)	5.83	D	2,141	16,335
Impervious Areas: Streets and Roads - Paved; Curbs and Storm Sewers (Excluding ROW)	0.29	D	1,038	2,443
Impervious as Meadow	0.07	D	30	208

Totals (CF): **11,325** **81,411**

Post-Construction Drainage Area

Rows: **2**

Post-Construction Drainage Area Cover Type	Area (ac)	HSG	Runoff, 1.2-Inch (CF)	Runoff, 2-Year (CF)
Meadow-Continuous Grass, Protected from Grazing and Generally Mowed for Hay	0.2	C	24	375
Meadow-Continuous Grass, Protected from Grazing and Generally Mowed for Hay	10.78	D	4,578	32,108

Totals (CF): **4,602** **32,483**

Total Volume Routed to SCM (CF): **8,561**

Equivalent Impervious Area (ac): **1.3**

☒ **Design Standards**

MRC Bioretention

Variation: **None**

Parameter	Standard	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)	2.0	1.3
Freeboard (inches) (maximum)	6	6
Ponding Depth @ 1.2-Inch/2-Hour Storm (ft) (maximum)	1.0	0.2
Ponding Depth @ 2-Year/24-Hour Storm (ft) (maximum)	2.0	1.1
Pre-Construction 1-Year/24-Hour Peak Rate (cfs)		11.76
Post-Construction 2-Year/24-Hour Peak Rate (cfs) (see Note 1)	11.76	3.66
Controlled Release Rate for 1.2-Inch/2-Hour Storm (cfs) (see Note 2)	0.03	
Underdrain Outflow Rate for 1.2-Inch/2-Hour Storm (cfs).	≤ Controlled Release	0.03
Ponding Time for Storm Event Routed to MRC SCM (hrs) (maximum)	72	56
Soil Media Depth Above Internal Water Storage (IWS) (ft) (minimum)	1.0	2.5
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)		0.8
SCM Embankment Slopes	33%	33%
Pretreatment Will Be Provided	TRUE	FALSE
SCM Bed Bottom Area (SF)		2,325

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

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 and Water Quality Management Credit**

The applicant is seeking full management credit for this design

FALSE

Volume Management Credit (CF):

16,242

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 website.

PA-Licensed Professional Engineer Responsible for Design:

Nicolas Slater

Professional Engineer Company:

Michael Baker International

License No.: **PE095171**

Managed Release Concept (MRC) Spreadsheet

SCM ID: **6**

Type: **MRC Bioretention**

2-year/24-hour Precipitation Depth: **2.55** in Incremental SCM Drainage Area: **13.81** ac

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

Is this SCM in series? ☒ Yes ☐ No

This SCM is: **Upstream** of a **PCSM Objective D** SCM SCM ID: **7**

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**

Pre-Construction Drainage Area

Rows: **6**

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

☒ Calculate runoff automatically

Pre-Construction Drainage Area Cover Type	Area (ac)	HSG	Runoff, 1.2-Inch (CF)	Runoff, 2-Year (CF)
Pervious as Meadow	5.26	C	627	9,858
Pervious as Meadow	18.57	D	7,886	55,311
Forested (Good Condition)	3.21	C	296	5,585
Forested (Good Condition)	0.81	D	297	2,269
Impervious Areas: Streets and Roads - Paved; Open Ditches (Including ROW)	0.08	D	177	530
Impervious as Meadow	0.02	D	8	60

Totals (CF): **9,293** **73,614**

Post-Construction Drainage Area

Rows: **2**

Post-Construction Drainage Area Cover Type	Area (ac)	HSG	Runoff, 1.2-Inch (CF)	Runoff, 2-Year (CF)
Meadow-Continuous Grass, Protected from Grazing and Generally Mowed for Hay	3.75	C	447	7,028
Meadow-Continuous Grass, Protected from Grazing and Generally Mowed for Hay	10.06	D	4,272	29,964

Totals (CF): **4,719** **36,992**

Total Volume Routed to SCM (CF): **10,648**

Equivalent Impervious Area (ac): **1.3**

☒ **Design Standards**

MRC Bioretention

Variation: **None**

Parameter	Standard	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)	2.0	1.3
Freeboard (inches) (maximum)	6	6
Ponding Depth @ 1.2-Inch/2-Hour Storm (ft) (maximum)	1.0	0.1
Ponding Depth @ 2-Year/24-Hour Storm (ft) (maximum)	2.0	1.1
Pre-Construction 1-Year/24-Hour Peak Rate (cfs)		9.23
Post-Construction 2-Year/24-Hour Peak Rate (cfs) (see Note 1)	9.23	5.5
Controlled Release Rate for 1.2-Inch/2-Hour Storm (cfs) (see Note 2)	0.03	
Underdrain Outflow Rate for 1.2-Inch/2-Hour Storm (cfs).	≤ Controlled Release	0.03
Ponding Time for Storm Event Routed to MRC SCM (hrs) (maximum)	72	66
Soil Media Depth Above Internal Water Storage (IWS) (ft) (minimum)	1.0	2.5
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)		0.8
SCM Embankment Slopes	33%	33%
Pretreatment Will Be Provided	TRUE	FALSE
SCM Bed Bottom Area (SF)		3,219

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

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 and Water Quality Management Credit**

The applicant is seeking full management credit for this design

FALSE

Volume Management Credit (CF):

18,496

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 website.

PA-Licensed Professional Engineer Responsible for Design:

Nicolas Slater

Professional Engineer Company:

Michael Baker International

License No.: **PE095171**

Managed Release Concept (MRC) Spreadsheet

SCM ID: **10**

Type: **MRC Bioretention**

2-year/24-hour Precipitation Depth: **2.55** in Incremental SCM Drainage Area: **12.05** ac

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

Is this SCM in series? ☒ Yes ☐ No

This SCM is: **Upstream** of a **PCSM Objective D** SCM SCM ID: **11**

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**

Pre-Construction Drainage Area

Rows: **4**

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

☒ Calculate runoff automatically

Pre-Construction Drainage Area Cover Type	Area (ac)	HSG	Runoff, 1.2-Inch (CF)	Runoff, 2-Year (CF)
Pervious as Meadow	7.62	C	909	14,281
Pervious as Meadow	6.79	D	2,884	20,224
Forested (Good Condition)	0.01	C	1	17
Forested (Good Condition)	0.04	D	15	112

Totals (CF): **3,808** **34,635**

Post-Construction Drainage Area

Rows: **2**

Post-Construction Drainage Area Cover Type	Area (ac)	HSG	Runoff, 1.2-Inch (CF)	Runoff, 2-Year (CF)
Meadow-Continuous Grass, Protected from Grazing and Generally Mowed for Hay	3.19	C	380	5,979
Meadow-Continuous Grass, Protected from Grazing and Generally Mowed for Hay	8.86	D	3,763	26,390

Totals (CF): **4,143** **32,368**

Total Volume Routed to SCM (CF): **7,230**

Equivalent Impervious Area (ac): **1.1**

☒ **Design Standards**

MRC Bioretention

Variation: **None**

Parameter	Standard	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)	2.0	1.1
Freeboard (inches) (maximum)	6	6
Ponding Depth @ 1.2-Inch/2-Hour Storm (ft) (maximum)	1.0	0.3
Ponding Depth @ 2-Year/24-Hour Storm (ft) (maximum)	2.0	1.1
Pre-Construction 1-Year/24-Hour Peak Rate (cfs)		5.16
Post-Construction 2-Year/24-Hour Peak Rate (cfs) (see Note 1)	5.16	3.36
Controlled Release Rate for 1.2-Inch/2-Hour Storm (cfs) (see Note 2)	0.03	
Underdrain Outflow Rate for 1.2-Inch/2-Hour Storm (cfs).	≤ Controlled Release	0.03
Ponding Time for Storm Event Routed to MRC SCM (hrs) (maximum)	72	46
Soil Media Depth Above Internal Water Storage (IWS) (ft) (minimum)	1.0	2.5
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)		0.8
SCM Embankment Slopes	33%	33%
Pretreatment Will Be Provided	TRUE	FALSE
SCM Bed Bottom Area (SF)		1,883

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

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 and Water Quality Management Credit**

The applicant is seeking full management credit for this design

FALSE

Volume Management Credit (CF):

16,184

CERTIFICATION

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Managed Release Concept (MRC) Spreadsheet

SCM ID: **13**

Type: **MRC Bioretention**

2-year/24-hour Precipitation Depth: **2.55** in Incremental SCM Drainage Area: **4.53** ac

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

Is this SCM in series? ☒ Yes ☐ No

This SCM is: **Upstream** of a **PCSM Objective D** SCM SCM ID: **14**

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**

Pre-Construction Drainage Area

Rows: **4**

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

☒ Calculate runoff automatically

Pre-Construction Drainage Area Cover Type	Area (ac)	HSG	Runoff, 1.2-Inch (CF)	Runoff, 2-Year (CF)
Pervious as Meadow	2.35	C	280	4,404
Pervious as Meadow	1	D	425	2,979
Impervious Areas: Streets and Roads - Paved; Open Ditches (Including ROW)	0.21	C	423	1,326
Impervious as Meadow	0.4	D	170	1,191

Totals (CF): **1,298** **9,900**

Post-Construction Drainage Area

Rows: **3**

Post-Construction Drainage Area Cover Type	Area (ac)	HSG	Runoff, 1.2-Inch (CF)	Runoff, 2-Year (CF)
Meadow-Continuous Grass, Protected from Grazing and Generally Mowed for Hay	1.42	C	169	2,661
Meadow-Continuous Grass, Protected from Grazing and Generally Mowed for Hay	0.6	D	255	1,787
Impervious Areas: Paved Parking Lots, Roofs, Driveways, Etc. (Excluding ROW)	0.75	D	2,683	6,317

Totals (CF): **3,108** **10,766**

Total Volume Routed to SCM (CF): **3,959**

Equivalent Impervious Area (ac): **0.9**

☒ **Design Standards**

MRC Bioretention

Variation: **None**

Parameter	Standard	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)	2.0	0.9
Freeboard (inches) (maximum)	6	6
Ponding Depth @ 1.2-Inch/2-Hour Storm (ft) (maximum)	1.0	0.8
Ponding Depth @ 2-Year/24-Hour Storm (ft) (maximum)	2.0	1.1
Pre-Construction 1-Year/24-Hour Peak Rate (cfs)		1.67
Post-Construction 2-Year/24-Hour Peak Rate (cfs) (see Note 1)	1.67	1.55
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	36
Soil Media Depth Above Internal Water Storage (IWS) (ft) (minimum)	1.0	2.5
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)		0.7
SCM Embankment Slopes	33%	33%
Pretreatment Will Be Provided	TRUE	FALSE
SCM Bed Bottom Area (SF)		675

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

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 and Water Quality Management Credit**

Volume Management Credit (CF): **10,766**

CERTIFICATION

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