COMMON PCSM SPREADSHEET ISSUES

Michael Wilk PE
Monroe County Conservation District

Monroe County Conservation District

Pike County Conservation District

- **Walk Through Various Tabs, Cells**
  - **Common Errors, Missing Information**
- **Informal Checklist For QC**

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DEP PCSM Spreadsheet

- DEP PCSM Spreadsheet (XLSB) (Version 1.9, October 2021) – This spreadsheet developed by DEP is intended to assist with stormwater analyses required by Chapter 102 for PCSM Plans. The spreadsheet is a macro-enabled Excel binary file. Instructions and training for the spreadsheet are available to assist users. ***Updated 10/18/2021.*** **Note** – It is recommended that users check this site periodically for the latest updates to the spreadsheet. Updates are made as calculation or functional errors are identified and corrected. A new version number will be provided only when changes or enhancements are made to the spreadsheet, not when errors are corrected.

- *Latest Version 1.9. Make sure you are using the most current spreadsheet*
- *Use the Current Instruction Document (October 18,2021)-Read the Instructions*

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The Basics

- **Spreadsheet is set up to input data from the *disturbed area* for the project. BMP Rate and Volume inflow / outflow data may be different from the Rate Control Analysis.**

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Number of Spreadsheets Correct?

- **One complete spreadsheet is needed for discharges to *each surface water.* *OR***
- **Complete one entire spreadsheet for *each discharge point* from the project.**
- **A Spreadsheet for each Discharge Point will aid in the evaluation of offsite discharges to non-surface waters.**

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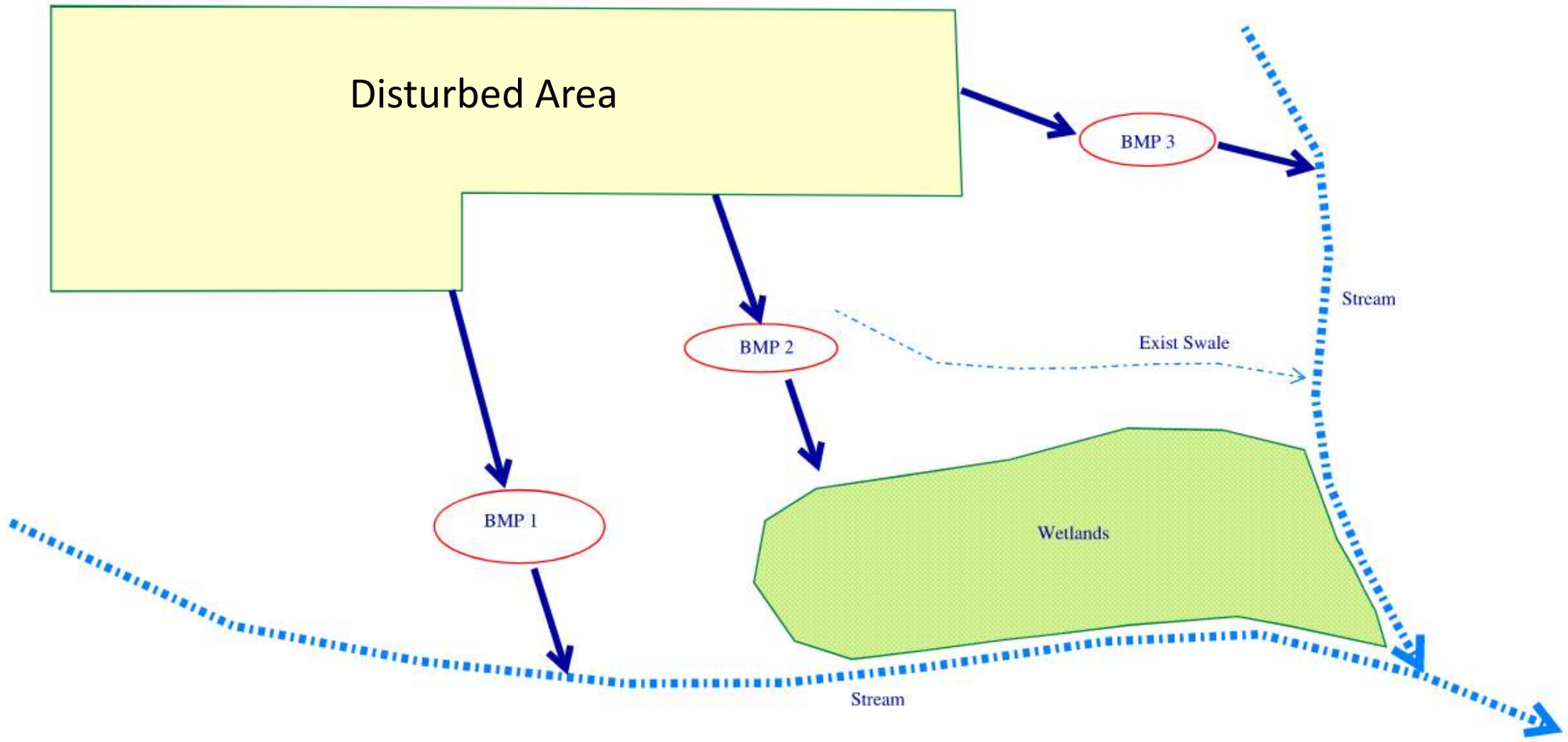
How Many Spreadsheets?



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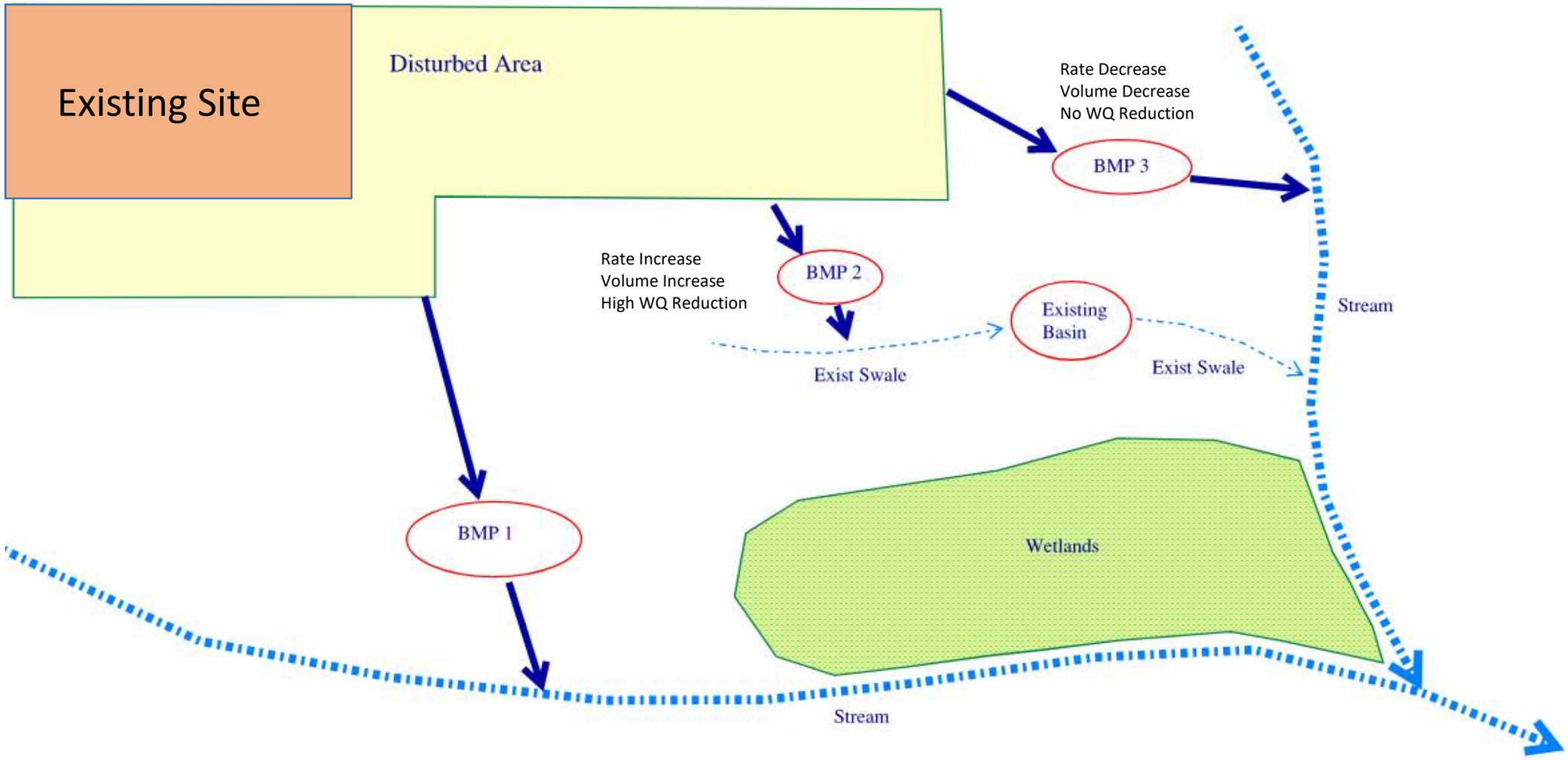
- 3 Spreadsheets
- 3 Distinct Surface Waters

How Many Spreadsheets?



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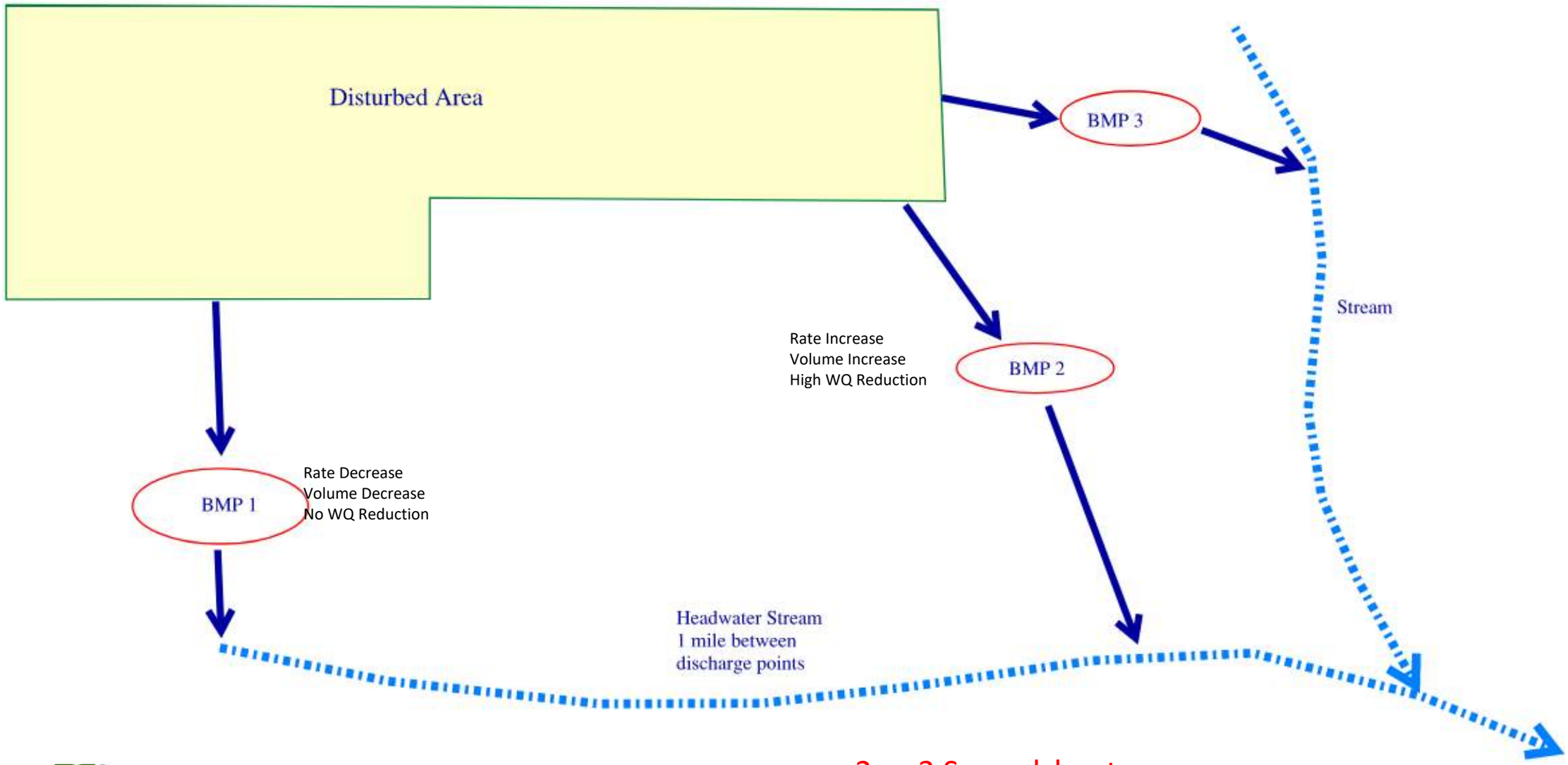
- May use 2 or 3 Spreadsheets
- Change in Basin Performance?
- Impacts to Swales above/below basin?

How Many Spreadsheets?



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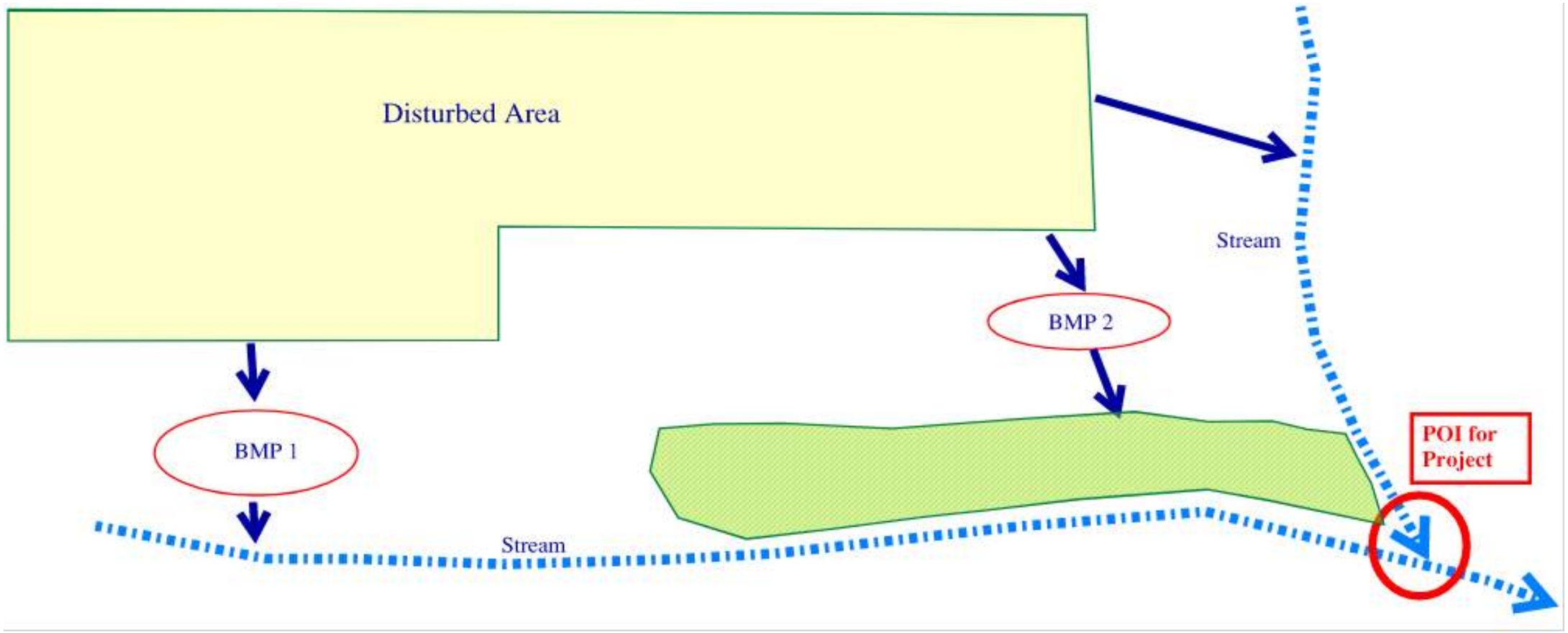
- 2 or 3 Spreadsheets
- Impact to Headwater Stream?

What About This?



- "But it all gets to that point eventually"
- All Surface Waters are evaluated equally
- You cannot degrade one surface water and "over-clean" another one
- Need to Delineate Wetlands AND Perennial, Intermittent Streams

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DEP PCSM Spreadsheet
Version 1.9, October 2021

General Information

CLEAR PROJECT
CLEAR FORM

Instructions | *General* | Volume | Rate | Quality

Project Name:	2022 Workshop Project	Application Type:	Individual NPDES Application
County:	Monroe	Municipality:	Barrett Township
Project Type:	Commercial Building	◉ New Project ○ Minor / Major Amendment	

Total Project Site Area: 59.62 acres *(In Watershed)*

Total Earth Disturbance: 27.59 acres *(In Watershed)*

No. of Post-Construction Discharge Points: 3

Start DP Numbering at: 001

Discharge Point (DP) No.	Drainage Area (DA) (acres)	Earth Disturbance in DA (acres)	Existing Impervious in DA (acres)	Proposed Impervious in DA (acres)	Receiving Waters	Ch. 93 Class	Structural BMP(s)
001	26.36	19.86	1.65	10.96	Discharge to Non-Surface Waters	HQ-CWF, MF	Yes
002	5.00	1.00	0.00	0.00	Discharge to Non-Surface Waters	HQ-CWF, MF	No
003	5.00	1.00	0.00	0.00	EV Wetlands to Brodhead Creek	EV	No
Undetained Areas	10.26	5.73	2.56	2.56	Brodhed Creek	HQ-CWF, MF	
Totals:	**46.62**	**27.59**	**4.21**	**13.52**			

- *Top Section Matches the NOI*

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Version 1.9, October 2021

General Information

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County: **Monroe**

Municipality: **Barrett Township**

Project Type: **Commercial Building**

(•) New Project ( ) Minor / Major Amendment

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Totals:	46.62	27.59	**4.21**	**13.52**			

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- *Total Site Area (All Spreadsheet) matches the Site Area on the NOI*
- Drainage Area Total should match the Earth Disturbance value-No Error Message Displayed

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- *Earth Disturbance (All Spreadsheet) matches the Earth Disturbance on the NOI, Plans.*
- Total in Table matches Value Above.

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General Information

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- *Number of Discharge Points Accurate?*
- Spreadsheet will auto number the Discharge Points-Does it match the Plans?

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13.52-4.21=9.31 Acres New Impervious

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CRITICAL ITEM

- *The Change in Impervious Surface (New Impervious being created on the project) across All Spreadsheets should match your NOI (Project Site Information and Earth Disturbance Section)*
- The Change in Impervious Surface for each discharge point should match the Rate Control Analysis.
- Most common incomplete comment which may cause *significant redesign* of the project.

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NPDES Application

PROJECT SITE INFORMATION				
1.	Project Site Name:			
2.	Total Project Site Area:	acres		
3.	Project Site Impervious Area – Pre-Construction:	acres	Percent of Total:	%
4.	Project Site Impervious Area – Post-Construction:	acres	Percent of Total:	%

EARTH DISTURBANCE INFORMATION				
1.	Total Earth Disturbance Area	acres		sf
2.	Pre-Construction Impervious Area:		sf	
3.	Post-Construction Impervious Area:		sf	

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General Information

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Project Site Meets Small Site Exception-Rate Worksheet not Required

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- Receiving Waters should match NOI
- Non-Surface Waters-Offsite Discharge Analysis
- EV Wetlands-Antidegradation Analysis
- Receiving Waters is a Pull Down Menu OR you can type in Stream Name.

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Small Site Exception

If the following two items are true, the applicant does not need to complete the Rate Worksheet or otherwise complete an analysis of peak rates: 1) the ***Total Earth Disturbance*** area is less than 5 acres; and 2) the area of post-construction impervious surface within the watershed is less than or equal to one acre. Note that **this exception applies on a surface water basis rather than a discharge point basis** (i.e., if there are multiple discharge points to a surface water but the spreadsheet is completed for a single discharge point, the user should not assume that a small site exception applies to either the single discharge point or all discharge points to the surface water, regardless of the message displayed).

The Rate Worksheet utilizes the design standard that applicants must manage the net change in peak rate for the 2-, 10-, 50- and 100-year/24-hour storm events. Peak rates are determined using the Graphical Peak Discharge Method in TR-55. The Rate Worksheet is intended for drainage areas less than 5 acres or for sites that contain simple land cover conditions (i.e., those projects where the limitations of the Graphical Peak Discharge Method do not apply). Any applicant with a project utilizing hydrological calculations that involve pond routings or otherwise involve multiple land covers may report a summary of peak rates in this worksheet but should not use the calculations in this worksheet to determine peak rates. In such cases the output of hydrologic modeling software should be attached to the permit application to demonstrate rate control requirements have been met.

- Site Restoration Projects.
- Act 167 Plans usually have lower limit for Requiring a Rate Control Analysis (5,000 SF Impervious)

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DEP PCSM Spreadsheet
Version 1.9, October 2021

Volume Management

Project: 2022 Workshop Project

Instructions | General | *Volume* | Rate | Quality

CLEAR FORM

2-Year / 24-Hour Storm Event (NOAA Atlas 14): inches

Alternative 2-Year / 24-Hour Storm Event: **3.25** inches

Alternative Source: **Act 167 Plan-Brodhead McMichael**

Pre-Construction Conditions: *No. Rows:* 5 ☐ *Exempt from Meadow in Good Condition* ☑ *Automatically Calculate CN, Ia, Runoff and Volume*

Land Cover	Area (acres)	Soil Group	CN	Ia (in)	Q Runoff (in)	Runoff Volume (cf)
Impervious Areas: Commercial	2.01	C	98	0.041	3.02	22,015
Impervious Areas: Paved Parking Lots, Roofs, Driveways, Etc. (Excluding ROW)	1.36	A	98	0.041	3.02	14,896
Impervious as Meadow	0.84	C	71	0.817	0.91	2,770
Forested (Good Condition)	13.71	C	70	0.857	0.86	42,667
Pervious as Meadow	8.47	B	58	1.448	0.36	11,037
TOTAL (ACRES):	26.39				TOTAL (CF):	93,385

Post-Construction Conditions: *No. Rows:* 4

Land Cover	Area (acres)	Soil Group	CN	Ia (in)	Q Runoff (in)	Runoff Volume (cf)
Impervious Areas: Industrial	11.47	C	98	0.041	3.02	125,629
Impervious Areas: Streets and Roads - Paved; Curbs and Storm Sewers (Excluding ROW)	2.05	C	98	0.041	3.02	22,453
Open Space (Lawns, Parks, Golf Courses, Cemeteries, Etc.) - Good Condition (Grass Cover > 75%)	12.86	B	61	1.279	0.46	21,687
Meadow-Continuous Grass, Protected from Grazing and Generally Mowed for Hay	1.21	A	30	4.667	0.00	0
TOTAL (ACRES):	27.59				TOTAL (CF):	169,769

NET CHANGE IN VOLUME TO MANAGE (CF): 76,385

- Total Acres should match Earth Disturbance total on General Tab.
- Pre and Post Acreage may vary but higher value should match the Value on the General Tab.
- Total Pre = Total Post (All Spreadsheets)

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DEP PCSM Spreadsheet
Version 1.9, October 2021

Volume Management

Project: 2022 Workshop Project

Instructions | General | *Volume* | Rate | Quality — CLEAR FORM

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NET CHANGE IN VOLUME TO MANAGE (CF): **76,385**

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- *Land Cover Has Been Properly Categorized*
- *Impervious Surfaces have been properly categorized and match the plans.*
- *20% Rule has been properly applied. "Impervious as Meadow" should be segregated from other "Meadow" land covers to verify 20% rule.*
- *Amount of Impervious and Change in Impervious matches General Tab.*

Existing Impervious in DA (acres)	Proposed Impervious in DA (acres)
1.65	10.96
0.00	0.00
0.00	0.00
2.56	2.56
4.21	**13.52**

Impervious Surfaces

- **Impervious Areas: Paved Parking Lots, Roofs, Driveways, Etc. (Excluding ROW)** – select this impervious land cover for all parking lots, roofs, and driveways that are not associated with commercial, industrial or institutional sites. For example, roofs on residential and agricultural structures would fall into this category.
- **Impervious Areas: Streets and Roads - Paved; Curbs and Storm Sewers (Excluding ROW)** – select this impervious land cover for all streets and roads that are paved, are curbed, and direct stormwater to storm sewers, including such streets and roads located on commercial, industrial and institutional sites.
- **Impervious Areas: Streets and Roads - Paved; Open Ditches (Including ROW)** – select this impervious land cover for all streets and roads that are paved but are not curbed, and direct stormwater to roadside ditches, including such streets and roads located on commercial, industrial and institutional sites.
- **Impervious Areas: Streets and Roads - Gravel (Including ROW)** – select this impervious land cover for all gravel roads, including such roads located on commercial, industrial and institutional sites.
- **Impervious Areas: Streets and Roads - Dirt (Including ROW)** – select this impervious land cover for all dirt roads, including such roads located on commercial, industrial and institutional sites.
- **Impervious Areas: Commercial** – select this impervious land cover for all impervious surfaces (including roofs, parking lots, walkways, etc.) on commercial sites except for streets and roads, in which one or more of the selections above should be made.
- **Impervious Areas: Industrial** – select this impervious land cover for all impervious surfaces on industrial sites except for streets and roads, in which one or more of the selections above should be made.
- **Impervious Areas: Institution** – select this impervious land cover for all impervious surfaces on institutional sites (e.g., college campuses) except for streets and roads, in which one or more of the selections above should be made.

- Residential , Agricultural Projects
- Urban Roads, Commercial Main Driveways, curb with inlets and gutter systems.
- Roads With Shoulders , roadside swales, cross pipes
- Suggest Applicants Consider/ Design Gravel and Dirt Roads assumed as Paved Roads. If paved in the future, amendment process may be simpler (Minor vs. Major Amendment).
- Warehouses are considered Commercial Activities in many Zoning Ordinances. Water Quality Impacts (High Truck Traffic) create higher pollutant loads than traditional Commercial Uses (Passenger car traffic)
- Has the design considered other impervious surfaces?
  - PennDOT Roadway Widening-HOP Permits
  - Shoulder Upgrades
  - Residential Pools, Garages, Decks
  - Waste Storage Facilities, Concrete Pads

MONROE COUNTY CONSERVATION DISTRICT

Adding BMP's-Tree Planting/Other :

Non-Structural BMP Volume Credits:

☑ Tree Planting Credit

Number of new deciduous trees that will be planted within disturbed area:	32	CREDIT (CF):	192
Number of new evergreen trees that will be planted within disturbed area:	20	CREDIT (CF):	200

☑ Other (attach calculations):

Description:	Soil Amendments, Roof Leader Disconnection	CREDIT (CF):	389

Structural BMP Volume Credits: *No. Structural BMPs:* 5 *Start BMP Numbering at:* 1

DP No.	BMP No.	BMP Name	MRC?	Discharge	Incremental BMP DA (acres)	Volume Routed to BMP (CF)	Infiltration / Vegetated Area (SF)	Infiltration Rate (in/hr)	Infiltration Period (hrs)	Vegeta-ted?	Media Depth (ft)	Storage Volume (CF)	Infiltration Credit (CF)	ET Credit (CF)
001	1	Vegetated Swale	-	to BMP No. 2	0.65	3,300	2,500	0.00	12	Yes	0.5	0	**0**	**429**
001	2	Vegetated Filter Strip	-	to BMP No. 3	0.87	6,071	3,200	0.15	12	Yes	0.5	0	**432**	**549**
001	3	Infiltration Basin	-	Off-Site	10.58	123,794	39,526	0.67	56	Yes	0.5	42,589	**66,423**	**6,779**
001	4	Constructed Filter	-	to BMP No. 5	1.85	12,523	1,500	0.50	24	No	0.5	12,523	**1,350**	
001	5	Rain Garden / Bioretention	-	Off-Site	1.50	13,273	5,289	0.25	72	Yes	2.0	13,273	**7,140**	**2,782**
												Totals:	**75,345**	**10,538**

INFILTRATION & ET CREDITS (CF):	**85,884**
NET CHANGE IN VOLUME TO MANAGE (CF):	**76,385**
TOTAL CREDITS (CF):	**86,665**

VOLUME REQUIREMENT SATISFIED

- **Tree Planting:**
- Number of Trees matches plans.
- Native Species
- **Other:**
- *Calculations Provided and accurate.*
- *BMP's shown on Plans.*
- *BMP's claimed meet the key design elements of the BMP per the Manual.*
- "Saying it so doesn't make it so"

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Adding BMP's-Volume Tab:

Non-Structural BMP Volume Credits:

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												Totals:	68,205	10,538

INFILTRATION & ET CREDITS (CF):	78,743
MANAGED RELEASE CREDIT (CF):	10,491
NET CHANGE IN VOLUME TO MANAGE (CF):	76,385
TOTAL CREDITS (CF):	90,015

VOLUME REQUIREMENT SATISFIED

- DP No. is accurate and shown on plans
- BMP No. matches the plan
- *BMP's claimed need to meet the key design elements of the BMP per the BMP Manual.*
- "You can't just dig a hole and call it a rain garden".
- *Discharge column is correct , notably BMP's in series are accurate.*
- MRC-if Yes must meet MRC Criteria and provide calculations and Design Summary.
- MRC Credit=Volume in-(Inf+ET) (13,273-2782)

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Volume PCSM BMP's

In Drop Down Menu

- Porous Pavement with Inf. Bed-Infiltration
- Inf. Basin-Infiltration , ET
- Inf. Bed-Infiltration
- Inf. Trench-Infiltration
- Rain Garden/ Bioretention-Infiltration, ET
- Dry Well / Seepage Pit-Infiltration
- Constructed Filter-Infiltration, ET?
- Vegetative Swale-ET, Infiltration?
- Vegetative Filter Strip-ET, Infiltration?
- Infiltration Berm/Retentive Grading-Infiltration, ET
- Capture/ Reuse-Separate Line Item-Inflow Volume
- Constructed Wetland-ET, Infiltration?
- Wet Pond/ Retention Basin-ET
- Dry Extended Detention Basin-ET
- WQ Filter / Hydrodynamic Device-WQ only
- Floodplain Restoration-ET, Infiltration
- Vegetative Roof-Infiltration, ET
- Riparian Forest Buffer-Separate Line Item-Inflow Volume

- Infiltration-Soil Testing Required
- ET-Above Ground , Open Water Surface, Vegetated.
- BMP's should be added even if provided for WQ only . Will Auto Calculate Pollutant Removal on WQ Tab

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Adding BMP's-Inflow Volume:

Non-Structural BMP Volume Credits:

☑ Tree Planting Credit

Number of new deciduous trees that will be planted within disturbed area:	32	**CREDIT (CF):** 192
Number of new evergreen trees that will be planted within disturbed area:	20	**CREDIT (CF):** 200

☑ Other (attach calculations):

Description: Soil Amendments, Roof Leader Disconnection — **CREDIT (CF):** 389

Structural BMP Volume Credits: *No. Structural BMPs:* 5 *Start BMP Numbering at:* 1

DP No.	BMP No.	BMP Name	MRC?	Discharge	Incremental BMP DA (acres)	Volume Routed to BMP (CF)	Infiltration / Vegetated Area (SF)	Infiltration Rate (in/hr)	Infiltration Period (hrs)	Vegeta-ted?	Media Depth (ft)	Storage Volume (CF)	Infiltration Credit (CF)	ET Credit (CF)
001	1	Vegetated Swale	-	to BMP No. 2	0.65	3,300	2,500	0.00	12	Yes	0.5	0	**0**	**429**
001	2	Vegetated Filter Strip	-	to BMP No. 3	0.87	6,071	3,200	0.15	12	Yes	0.5	0	**432**	**549**
001	3	Infiltration Basin	-	Off-Site	10.58	123,794	39,526	0.67	56	Yes	0.5	42,589	**66,423**	**6,779**
001	4	Constructed Filter	-	to BMP No. 5	1.85	12,523	1,500	0.50	24	No	0.5	12,523	**1,350**	
001	5	Rain Garden / Bioretention	Y	Off-Site	1.50	13,273	5,289	0.00	12	Yes	2.0	13,273	**0**	**2,782**
												Totals:	**68,205**	**10,538**

INFILTRATION & ET CREDITS (CF):	**78,743**
MANAGED RELEASE CREDIT (CF):	**10,491**
NET CHANGE IN VOLUME TO MANAGE (CF):	**76,385**
TOTAL CREDITS (CF):	**90,015**

VOLUME REQUIREMENT SATISFIED

- BMP DA is Disturbed Area to the BMP.
- This value may be different from the Rate Control Analysis if undisturbed areas discharge into the BMP.
- Volume Routed to BMP is also from the disturbed area only, and may be different from the Rate Control Analysis
- Calculations should be provided for inflow value, usually through Worksheet 4 procedure, or Rate Analysis if runoff only from Disturbed Areas.

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Inflow Volumes to BMP:

Worksheet 4

WORKSHEET 4. - CHANGE IN RUNOFF VOLUME FOR 2-YR STORM EVENT

PROJECT: 2022 Workshop Project-to Constructed Filter
Drainage Area: 1.85 (acres)
2-Year Rainfall: 3.25 in.

Total Site Area: 1.85 acres
Protected Site Area: 0.00 acres
Managed Area: 0.00 acres

Existing Conditions:

Cover Type/Condition	Soil Type	Area (sf)	Area (ac)	CN	S	Ia (0.2*S)	Q Runoff[1] (in)	Runoff Volume[2] (ft³)
		0			0.00	0.00	3.25	0.00
		0			0.00	0.00	3.25	0.00
		0			0.00	0.00	3.25	0.00
		0			0.00	0.00	3.25	0.00
		0			0.00	0.00	3.25	0.00
		0			0.00	0.00	3.25	0.00
		0			0.00	0.00	3.25	0.00
		0			0.00	0.00	3.25	0.00
TOTAL:		0	0.00					0.00

Developed Conditions:

Cover Type	Soil Type	Area (sf)	Area (ac)	CN	S	Ia (0.2*S)	Q Runoff[1] (in)	Runoff Volume[2] (ft³)
Impervious	C	44,333	1.02	98	0.20	0.04	3.02	11,117.11
Grass	B	36,320	0.83	61	6.39	1.28	0.46	1,406.13
		0			0.00	0.00	3.25	0.00
		0			0.00	0.00	3.25	0.00
		0			0.00	0.00	3.25	0.00
		0			0.00	0.00	3.25	0.00
		0			0.00	0.00	3.25	0.00
		0			0.00	0.00	3.25	0.00
		0			0.00	0.00	3.25	0.00
TOTAL:		80,653	1.85					12,523.24

2-Year Volume Increase (cubic feet): 12,523.24

2-Year Volume Increase = Developed Conditions Runoff Volume - Existing Conditions Runoff Volume

Separate Spreadsheet

Volume Management

Project: Inflow to Constructed Filter

Instructions | General | *Volume* | Rate | Quality — CLEAR FORM

2-Year / 24-Hour Storm Event (NOAA Atlas 14): inches — Alternative 2-Year / 24-Hour Storm Event: 3.25 inches

Alternative Source: Act 167 Brodhead McMichael Creek

Pre-Construction Conditions: *No. Rows:* ☐ *Exempt from Meadow in Good Condition* ☑ *Automatically Calculate CN, Ia, Runoff and Volume*

Land Cover	Area (acres)	Soil Group	CN	Ia (in)	Q Runoff (in)	Runoff Volume (cf)
TOTAL (ACRES):	0.00				TOTAL (CF):	0

Post-Construction Conditions: *No. Rows:* 2

Land Cover	Area (acres)	Soil Group	CN	Ia (in)	Q Runoff (in)	Runoff Volume (cf)
Impervious Areas: Paved Parking Lots, Roofs, Driveways, Etc. (Excluding ROW)	1.02	C	98	0.041	3.02	11,117
Open Space (Lawns, Parks, Golf Courses, Cemeteries, Etc.) - Good Condition (Grass Cover > 75%)	0.83	B	61	1.279	0.46	1,406
TOTAL (ACRES):	1.85				TOTAL (CF):	12,523

NET CHANGE IN VOLUME TO MANAGE (CF): 12,523

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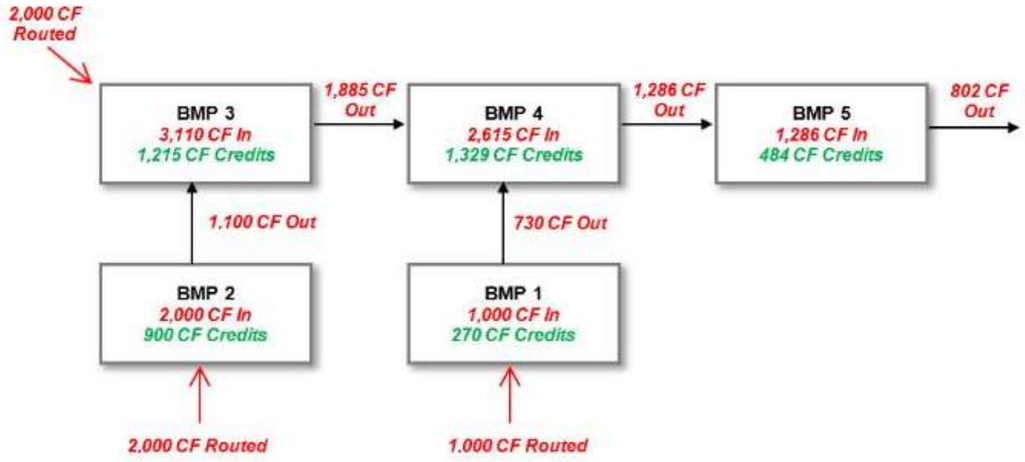
BMP's in Series:



The spreadsheet enforces a rule that downstream BMPs in series must receive volume routed to it that is at least as large as the outflow from upstream BMPs. The following (abbreviated) table illustrates how this scenario appears in the Structural BMPs table:

DP No.	BMP No.	BMP Name	MRC?	Discharge	Incremental BMP DA (acres)	Volume Routed to BMP (CF)
001	1	Vegetated Swale	-	to BMP No. 4	4.00	1,000
001	2	Rain Garden / Bioretention	-	to BMP No. 3	3.00	2,000
001	3	Vegetated Swale	-	to BMP No. 4	2.00	3,100
001	4	Infiltration Basin	-	to BMP No. 5	0.00	2,615
001	5	Infiltration Basin	-	Off-Site	0.00	1,286

NOTE 27 – A BMP that is in series with another BMP for the same discharge point should have a volume routed to the BMP that is no less than the preceding BMP in the series, minus infiltration and ET credits. Volume that is permanently removed by infiltration or ET cannot be counted as volume contributing to a subsequent BMP in a series. Applicants should develop a water balance for complex BMPs in series scenarios (see Example 5).

Provide a diagram to explain the routing scenario if complicated

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Adding BMP's-Surface Area:

Non-Structural BMP Volume Credits:

☑ Tree Planting Credit

Number of new deciduous trees that will be planted within disturbed area:	32	**CREDIT (CF):** 192
Number of new evergreen trees that will be planted within disturbed area:	20	**CREDIT (CF):** 200

☑ Other (attach calculations):

Description: Soil Amendments, Roof Leader Disconnection — **CREDIT (CF):** 389

Structural BMP Volume Credits: *No. Structural BMPs:* 5 *Start BMP Numbering at:* 1

DP No.	BMP No.	BMP Name	MRC?	Discharge	Incremental BMP DA (acres)	Volume Routed to BMP (CF)	Infiltration / Vegetated Area (SF)	Infiltration Rate (in/hr)	Infiltration Period (hrs)	Vegeta-ted?	Media Depth (ft)	Storage Volume (CF)	Infiltration Credit (CF)	ET Credit (CF)
001	1	Vegetated Swale	-	to BMP No. 2	0.65	3,300	2,500	0.00	12	Yes	0.5	0	**0**	**429**
001	2	Vegetated Filter Strip	-	to BMP No. 3	0.87	6,071	3,200	0.15	12	Yes	0.5	0	**432**	**549**
001	3	Infiltration Basin	-	Off-Site	10.58	123,794	39,526	0.67	56	Yes	0.5	42,589	**66,423**	**6,779**
001	4	Constructed Filter	-	to BMP No. 5	1.85	12,523	1,500	0.50	24	No	0.5	12,523	**1,350**	
001	5	Rain Garden / Bioretention	Y	Off-Site	1.50	13,273	5,289	0.00	12	Yes	2.0	13,273	**0**	**2,782**
												Totals:	**68,205**	**10,538**

INFILTRATION & ET CREDITS (CF):	**78,743**
MANAGED RELEASE CREDIT (CF):	**10,491**
NET CHANGE IN VOLUME TO MANAGE (CF):	**76,385**
TOTAL CREDITS (CF):	**90,015**

VOLUME REQUIREMENT SATISFIED

- Vegetated Area-Surface Area at *First Outlet* from the Facility
- Area where infiltration and ET is the only way water can leave the basin.
- Provide calculations for BMP's not considered for Rate Analysis (Swales, Filter Strips, etc.)
- Example: Swale 10' wide at top x 250' long =2500 sf.

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Adding BMP's-Storage Volume:

Non-Structural BMP Volume Credits:

☑ Tree Planting Credit

Number of new deciduous trees that will be planted within disturbed area:	32	**CREDIT (CF):** 192
Number of new evergreen trees that will be planted within disturbed area:	20	**CREDIT (CF):** 200

☑ Other (attach calculations):

Description: Soil Amendments, Roof Leader Disconnection — **CREDIT (CF):** 389

Structural BMP Volume Credits: *No. Structural BMPs:* 5 *Start BMP Numbering at:* 1

DP No.	BMP No.	BMP Name	MRC?	Discharge	Incremental BMP DA (acres)	Volume Routed to BMP (CF)	Infiltration / Vegetated Area (SF)	Infiltration Rate (in/hr)	Infiltration Period (hrs)	Vegeta-ted?	Media Depth (ft)	Storage Volume (CF)	Infiltration Credit (CF)	ET Credit (CF)
001	1	Vegetated Swale	-	to BMP No. 2	0.65	3,300	2,500	0.00	12	Yes	0.5	0	0	429
001	2	Vegetated Filter Strip	-	to BMP No. 3	0.87	6,071	3,200	0.15	12	Yes	0.5	0	432	549
001	3	Infiltration Basin	-	Off-Site	10.58	123,794	39,526	0.67	56	Yes	0.5	42,589	66,423	6,779
001	4	Constructed Filter	-	to BMP No. 5	1.85	12,523	1,500	0.50	24	No	0.5	12,523	1,350	
001	5	Rain Garden / Bioretention	Y	Off-Site	1.50	13,273	5,289	0.00	12	Yes	2.0	13,273	0	2,782
												Totals:	68,205	10,538

INFILTRATION & ET CREDITS (CF):	78,743
MANAGED RELEASE CREDIT (CF):	10,491
NET CHANGE IN VOLUME TO MANAGE (CF):	76,385
TOTAL CREDITS (CF):	90,015

VOLUME REQUIREMENT SATISFIED

- Storage Volume-Volume at *First Outlet* from the Facility OR the Inflow Volume, whichever is less.
- For BMP's with outlet at the bottom or infiltration not occurring, Storage Volume=0.
- Provide calculations for BMP's not considered for Rate Analysis (Swales, etc.)
- Example: Swale with 6" Check Dam, 2' at bottom, 10' at top, 1% slope, dams every 50', 6 total sections
- V=(0.25' Avg. Depth)(6' Avg Width)(50' length) (6 sections)= 450 cf.

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Adding BMP's-Infiltration:

Non-Structural BMP Volume Credits:

☑ Tree Planting Credit

Number of new deciduous trees that will be planted within disturbed area:	32	**CREDIT (CF):** 192
Number of new evergreen trees that will be planted within disturbed area:	20	**CREDIT (CF):** 200

☑ Other (attach calculations):

Description: Soil Amendments, Roof Leader Disconnection — **CREDIT (CF):** 389

Structural BMP Volume Credits: *No. Structural BMPs:* 5 *Start BMP Numbering at:* 1

DP No.	BMP No.	BMP Name	MRC?	Discharge	Incremental BMP DA (acres)	Volume Routed to BMP (CF)	Infiltration / Vegetated Area (SF)	Infiltration Rate (in/hr)	Infiltration Period (hrs)	Vegeta-ted?	Media Depth (ft)	Storage Volume (CF)	Infiltration Credit (CF)	ET Credit (CF)
001	1	Vegetated Swale	-	to BMP No. 2	0.65	3,300	2,500	0.00	12	Yes	0.5	0	**0**	**429**
001	2	Vegetated Filter Strip	-	to BMP No. 3	0.87	6,071	3,200	0.15	12	Yes	0.5	0	**432**	**549**
001	3	Infiltration Basin	-	Off-Site	10.58	123,794	39,526	0.67	56	Yes	0.5	42,589	**66,423**	**6,779**
001	4	Constructed Filter	-	to BMP No. 5	1.85	12,523	1,500	0.50	24	No	0.5	12,523	**1,350**	
001	5	Rain Garden / Bioretention	Y	Off-Site	1.50	13,273	5,289	0.00	12	Yes	2.0	13,273	**0**	**2,782**
												Totals:	**68,205**	**10,538**

INFILTRATION & ET CREDITS (CF):	**78,743**
MANAGED RELEASE CREDIT (CF):	**10,491**
NET CHANGE IN VOLUME TO MANAGE (CF):	**76,385**
TOTAL CREDITS (CF):	**90,015**

VOLUME REQUIREMENT SATISFIED

- *Infiltration Rate from Testing with Factor of Safety.*
- *High Rates-Design with Higher Factor of Safety (Construction changes to Inf. rate)*
- Infiltration Period= Depth of Water at first outlet(inches) divided by Infiltration Rate OR minimum of 12 hours
- Time for Ponded Water to Drain.
- Vegetated-Yes for above ground facilities-Used for ET Calculation. NO for underground systems.

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Dewatering Time:

Summary for Pond 8P: BMP 1 - Inf Basin

Inflow Area = 34,848 sf,100.00% Impervious, Inflow Depth = 3.07" for 2-Year event
Inflow = 2.79 cfs @ 12.11 hrs, Volume= 8,907 cf
Outflow = 0.09 cfs @ 14.75 hrs, Volume= 8,906 cf, Atten= 97%, Lag= 158.1 min
Discarded = 0.09 cfs @ 14.75 hrs, Volume= 8,906 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 101.07' @ 14.75 hrs Surf.Area= 7,196 sf Storage= 5,464 cf

Plug-Flow detention time= 659.0 min calculated for 8,906 cf (100% of inflow)
Center-of-Mass det. time= 658.9 min (1,414.9 - 756.0)

Volume	Invert	Avail.Storage	Storage Description
#1	100.00'	39,500 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
100.00	3,000	0	0
101.00	7,000	5,000	5,000
102.00	10,000	8,500	13,500
103.00	13,000	11,500	25,000
104.00	16,000	14,500	39,500

Device	Routing	Invert	Outlet Devices
#1	Primary	99.00'	**24.0" Round Culvert** L= 50.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 99.00' / 98.50' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf
#2	Device 1	102.00'	**6.0" Vert. Orifice/Grate** C= 0.600
#3	Device 1	103.50'	**2.0" x 4.0" Horiz. Orifice/Grate** C= 0.600 in 2.0" x 4.0" Grate (100% open area) Limited to weir flow at low heads
#4	Discarded	100.00'	**0.500 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 90.00'

- Inflow Volume = 8,907 cf
- Surface Area=10,000
- Storage Volume=13,500 cf (Use 8,907 cf)

- <u>Dewatering Time:</u>
- Depth of Water =102-100 = 2 feet =24”
- Infiltration Rate 0.50”/hr
- Dewatering=24” / 0.5 = 48 hours.

- Many Consultants will use the Peak Elevation from the Green Highlighted Area. This is incorrect since these values already take into account the infiltration.

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Vegetated?

Vegetated? – Select “Yes” if the structural BMP will be “vegetated.” A vegetated PCSM BMP is a permanent BMP where vegetation is a dominant or significant component within the storage area. To qualify for ET credits, vegetation must include plug planting with a mix of native woody, herbaceous, and grass species. Seed mixes may be used in addition to plug plantings but must not be the only form of vegetation planted to qualify for ET credit. Grasses may be used, but may not be the only species planted, because other species with deeper penetrating root systems are needed to achieve the infiltration and ET credits calculated by the spreadsheet. Grasses within the vegetated area may be mowed twice per year to a height no lower than 6 inches (or cut back every year) but not more frequently. The choice of seed mixes and plantings is to be made by the designer in consultation with the site owner.

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INFILTRATION CREDITS

Infiltration Credit (CF) = Infiltration Rate (in/hr) x 0.9 (factor of safety) / 12 in/ft)) x 12 hrs (infiltration during storm) x Infiltration Area (ft^2) + (the lesser of Storage Volume or (Infiltration Period (hrs) – 12 hrs x (Infiltration Rate (in/hr) x 0.9 (factor of safety) / 12 in/ft) x Infiltration Area (ft^2)), where Infiltration Credit may not exceed the Volume Routed to the BMP.

- **Yellow Component-Infiltration Occurring During the Storm (12 hours)**
- **Green Component- Infiltration after Storm Ends – (Volume left in the BMP that infiltrates after runoff ends)**
- **The Green Component is how the loading ratio is taken into account (Infiltration that occurs up to 96 hours). High dewatering times (high depth of water + slow infiltration rate) will result in green component being less than storage volume. (Water is left in the basin after 96 hours)**
- **If dewatering time is > 96 hours, need to expand footprint and lower depth of ponded water.**

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Dewatering Time/ Loading Ratio Effect:

DP No.	BMP No.	BMP Name	MRC?	Discharge	Incremental BMP DA (acres)	Volume Routed to BMP (CF)	Infiltration / Vegetated Area (SF)	Infiltration Rate (in/hr)	Infiltration Period (hrs)	Vegeta-ted?	Media Depth (ft)	Storage Volume (CF)	Infiltration Credit (CF)	ET Credit (CF)
001	1	Vegetated Swale	-	to BMP No. 2	0.65	3,300	2,500	0.00	12	Yes	0.5	0	**0**	**429**
001	2	Vegetated Filter Strip	-	to BMP No. 3	0.87	6,071	3,200	0.15	12	Yes	0.5	0	**432**	**549**
001	3	Infiltration Basin	-	Off-Site	10.58	123,794	39,526	0.67	56	Yes	0.5	42,589	**66,423**	**6,779**
001	4	Constructed Filter	-	to BMP No. 5	1.85	12,523	1,500	0.10	96	No	0.5	3,000	1,080	
001	5	Rain Garden / Bioretention	Y	Off-Site	1.50	13,273	5,289	0.00	12	Yes	2.0	13,273	**0**	**2,782**
												Totals:	**67,935**	**10,538**

DP No.	BMP No.	BMP Name	MRC?	Discharge	Incremental BMP DA (acres)	Volume Routed to BMP (CF)	Infiltration / Vegetated Area (SF)	Infiltration Rate (in/hr)	Infiltration Period (hrs)	Vegeta-ted?	Media Depth (ft)	Storage Volume (CF)	Infiltration Credit (CF)	ET Credit (CF)
001	1	Vegetated Swale	-	to BMP No. 2	0.65	3,300	2,500	0.00	12	Yes	0.5	0	**0**	**429**
001	2	Vegetated Filter Strip	-	to BMP No. 3	0.87	6,071	3,200	0.15	12	Yes	0.5	0	**432**	**549**
001	3	Infiltration Basin	-	Off-Site	10.58	123,794	39,526	0.67	56	Yes	0.5	42,589	**66,423**	**6,779**
001	4	Constructed Filter	-	to BMP No. 5	1.85	12,523	4,500	0.10	80	No	0.5	3,000	2,700	
001	5	Rain Garden / Bioretention	Y	Off-Site	1.50	13,273	5,289	0.00	12	Yes	2.0	13,273	**0**	**2,782**
												Totals:	**69,555**	**10,538**

- "There's a Problem with the Spreadsheet. I keep making the system deeper and I'm not getting any more credit".
- Original Design: 24" deep narrow system. Dewatering = 24"/0.1=240 Hours.
- *System is holding water 10 days after the storm.*
- Too much water, too small an area.
- Revised Design: Wide System 8" Deep. Dewatering = 8"/0.1=80 Hours
- Same size system, 170% more volume credit.
- We will check all 96 hour dewatering times. Is it accurate or just using default max value.

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ET CREDITS

ET Credit (CF) = ET Volume Reduction (%) (from Table 1) x Media Depth (ft) x Infiltration Area (ft^2), where ET Credit plus Infiltration Credit may not exceed Volume Routed to BMP.

NOTE 36 – This calculation assumes that all infiltrating area is vegetated.

DEP recognizes that this method is a simplification of the site-specific and regional factors that go into estimating potential ET. If an applicant wishes to pursue estimation of ET Credit in a different or more comprehensive manner, a separate analysis may be conducted and attached to the permit application or Volume Worksheet.

Table 1: Total Void Space (ET) Credit Used by Spreadsheet for Vegetated Systems

Media Depth (ft)	ET Volume Reduction (% Volume)	Media Depth (ft)	ET Volume Reduction (% Volume)
0.5	34.3	2.8	25.5
0.6	33.6	2.9	25.4
0.7	32.9	3.0	25.3
0.8	32.2	3.1	25.2
0.9	31.5	3.2	25.1
1.0	30.7	3.3	25
1.1	30	3.4	25
1.2	29.3	3.5	24.9
1.3	28.5	3.6	24.9

- "We can't get anything to grow in the bottom of the basin. Can't we just line it with gravel"
- ET Assumes Vegetated Area.
- Media Depth matches plans?

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Water Quality Tab

- **Required to be used on all projects-including Major Amendments**
- **Need to Complete General and Volume Tabs for WQ to Populate**

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WQ Tab-Target Reduction Values

Pre-Construction Pollutant Loads:

Land Cover (from Volume Worksheet)	Land Cover for Water Quality	Area (acres)	Soil Group	Runoff Volume (cf)	Pollutant Conc. (mg/L)			Pollutant Loads (lbs)		
					TSS	TP	TN	TSS	TP	TN
Impervious Areas: Commercial	Commercial	2.01	C	22,015	61.7	0.22	2.02	84.85	0.30	2.78
Impervious Areas: Paved Parking Lots, Roofs, Driveways, Etc. (Excluding ROW)	Residential	1.36	A	14,896	65.0	0.29	2.05	60.46	0.27	1.91
Impervious as Meadow	Grassland/Herbaceous	0.84	C	2,770	48.8	0.22	2.30	8.44	0.04	0.40
Forested (Good Condition)	Deciduous Forest/Evergreen Forest/Mixed Forest	13.71	C	42,667	45.0	0.13	1.05	119.89	0.35	2.80
Pervious as Meadow	Grassland/Herbaceous	8.47	B	11,037	48.8	0.22	2.30	33.63	0.15	1.59
	TOTAL (ACRES):	**26.39**					**TOTALS:**	**307.27**	**1.11**	**9.46**

Post-Construction Pollutant Loads (without BMPs):

Land Cover (from Volume Worksheet)	Land Cover for Water Quality	Area (acres)	Soil Group	Runoff Volume (cf)	Pollutant Conc. (mg/L)			Pollutant Loads (lbs)		
					TSS	TP	TN	TSS	TP	TN
Impervious Areas: Industrial	Industrial	11.47	C	125,629	81.0	0.24	2.01	635.41	1.88	15.77
Impervious Areas: Streets and Roads - Paved; Curbs and Storm Sewers (Excluding ROW)	Urban Highway	2.05	C	22,453	142.0	0.32	3.00	199.09	0.45	4.21
Open Space (Lawns, Parks, Golf Courses, Cemeteries, Etc.) - Good Condition (Grass Cover > 75%)	Open Space	12.86	B	21,687	78.0	0.25	1.25	105.63	0.34	1.69
Meadow-Continuous Grass, Protected from Grazing and Generally Mowed for Hay	Grassland/Herbaceous	1.21	A	0	48.8	0.22	2.30	0.00	0.00	0.00
	TOTAL (ACRES):	**27.59**					**TOTALS:**	**940.13**	**2.67**	**21.67**
							POLLUTANT LOAD REDUCTION REQUIREMENTS (LBS):	**632.86**	**1.56**	**12.20**

- Note Requirement is to Reduce Post Development Pollutants back to Predevelopment Conditions. This is different than previous requirements of 85% -85%-50% reduction of Post Development Pollutant Loadings
- In General, Easier Standard to Achieve (Depends on Land Cover)

TOTAL DISTURBED AREAS:

	LAND COVER CLASSIFICATION	POLLUTANT TSS EMC (mg/L)	POLLUTANT TP EMC (mg/L)	POLLUTANT Nitrate - Nitrite EMC (mg/L as N)	COVER (Acres)	RUNOFF VOLUME (AF)	POLLUTANT LOAD* TSS** (LBS)	POLLUTANT LOAD* TP** (LBS)	POLLUTANT LOAD* NO_3 (LBS)
Pervious Surfaces	Forest	39	0.15	0.17	0.00	0.0000	0.00	0.00	0.00
	Meadow	47	0.19	0.30	1.21	0.0092	1.17	0.00	0.01
	Fertilized Planting Area	55	1.34	0.73	0.00	0.0000	0.00	0.00	0.00
	Native Planting Area	55	0.40	0.33	0.00	0.0000	0.00	0.00	0.00
	Lawn, Low-Input	180	0.40	0.44	0.00	0.0000	0.00	0.00	0.00
	Lawn, High-Input	180	2.22	1.46	12.86	0.4979	241.97	2.98	1.96
	Golf Course Fairway/Green	305	1.07	1.84	0.00	0.0000	0.00	0.00	0.00
	Grassed Athletic Field	200	1.07	1.01	0.00	0.0000	0.00	0.00	0.00
Impervious Surface	Rooftop	21	0.13	0.32	6.88	1.7299	98.09	0.61	1.49
	High Traffic Street / Highway	261	0.40	0.83	2.05	0.5155	363.24	0.56	1.16
	Medium Traffic Street	113	0.33	0.58	0.00	0.0000	0.00	0.00	0.00
	Low Traffic / Residental Street	86	0.36	0.47	0.00	0.0000	0.00	0.00	0.00
	Res. Driveway, Play Courts, etc.	60	0.46	0.47	0.00	0.0000	0.00	0.00	0.00
	High Traffic Parking Lot	120	0.39	0.60	4.59	1.1541	373.93	1.22	1.87
	Low Traffic Parking Lot	58	0.15	0.39	0.00	0.0000	0.00	0.00	0.00
						TOTAL LOAD:	1078.40	5.37	6.49
						REQUIRED REDUCTION (%):	85%	85%	50%
						REQUIRED REDUCTION (LBS):	916.64	4.56	3.24

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Undetained Areas:

☑ Characterize Undetained Areas (for Untreated Stormwater) *No. Rows:* 3

Land Cover	Area (acres)	Soil Group	CN	Ia (in)	Q Runoff (in)	Runoff Volume (cf)
Impervious Areas: Paved Parking Lots, Roofs, Driveways, Etc. (Excluding ROW)	2.56	C	98	0.041	3.02	28,039
Meadow-Continuous Grass, Protected from Grazing and Generally Mowed for Hay	1.28	A	30	4.667	0.00	0
Open Space (Lawns, Parks, Golf Courses, Cemeteries, Etc.) - Good Condition (Grass Cover > 75%)	1.89	B	61	1.279	0.46	3,187

Non-Structural BMP Water Quality Credits:

Total=5.73 Acres

☑ Pervious Undetained Area Credit

TSS	TP	TN
2.43	0.01	0.07

General Tab:

Discharge Point (DP) No.	Drainage Area (DA) (acres)	Earth Disturbance in DA (acres)	Existing Impervious in DA (acres)	Proposed Impervious in DA (acres)	Receiving Waters	Ch. 93 Class	Structural BMP(s)
001	26.36	19.86	1.65	10.96	Discharge to Non-Surface Waters	HQ-CWF, MF	Yes
002	5.00	1.00	0.00	0.00	Discharge to Non-Surface Waters	HQ-CWF, MF	No
003	5.00	1.00	0.00	0.00	EV Wetlands to Brodhead Creek	EV	No
Undetained Areas	10.26	5.73	2.56	2.56	Brodhead Creek	HQ-CWF, MF	
Totals:	**46.62**	**27.59**	**4.21**	**13.52**			

- Optional to Use
- Land Covers Properly Categorized?
- Total area should match ED of Undetained Area on General Tab.
- Credit Based on 25%-20%-15% Pollution Reduction for Pervious Area.
- Should include discharge points with No BMP's (Should be 7.73 acres total)

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Other WQ Credits

☑ Other (attach calculations)

Description: **Street Sweeping-2.6 acres**

TSS	TP	TN
95.09	0.24	0.36

WORKSHEET 13.1. POLLUTANT REDUCTION THROUGH BMP APPLICATION*

** FILL THIS WORKSHEET OUT FOR EACH BMP TYPE WITH DIFFERENT POLLUTION REMOVAL EFFICIENCES. SUM POLLUTANT REDUCTION ACHIEVED FOR ALL BMP TYPES ON FINAL SHEET*

BMP TYPE: Street Sweeping

DISTURBED AREA CONTROLLED BY BMPs (AC)	2.60

DISTURBED AREAS CONTROLLED BY THIS BMP TYPE:

		POLLUTANT					POLLUTANT LOAD**		
	LAND COVER CLASSIFICATION	TSS EMC (mg/L)	TP EMC (mg/L)	Nitrate - Nitrite EMC (mg/L as N)	COVER (Acres)	RUNOFF VOLUME (AF)	TSS*** (LBS)	TP*** (LBS)	NO_3 (LBS)
Pervious Surfaces	Forest	39	0.15	0.17	0.00	0.00	0.00	0.00	0.00
	Meadow	47	0.19	0.30	0.00	0.00	0.00	0.00	0.00
	Fertilized Planting Area	55	1.34	0.73	0.00	0.00	0.00	0.00	0.00
	Native Planting Area	55	0.40	0.33	0.00	0.00	0.00	0.00	0.00
	Lawn, Low-Input	180	0.40	0.44	0.15	0.02	7.80	0.02	0.02
	Lawn, High-Input	180	2.22	1.46	0.00	0.00	0.00	0.00	0.00
	Golf Course Fairway/Green	305	1.07	1.84	0.00	0.00	0.00	0.00	0.00
	Grassed Athletic Field	200	1.07	1.01	0.00	0.00	0.00	0.00	0.00
Impervious Surface	Rooftop	21	0.13	0.32	0.00	0.00	0.00	0.00	0.00
	High Traffic Street / Highway	261	0.40	0.83	0.00	0.00	0.00	0.00	0.00
	Medium Traffic Street	113	0.33	0.58	0.00	0.00	0.00	0.00	0.00
	Low Traffic / Residental Street	86	0.36	0.47	0.00	0.00	0.00	0.00	0.00
	Res. Driveway, Play Courts, etc.	60	0.46	0.47	0.00	0.00	0.00	0.00	0.00
	High Traffic Parking Lot	120	0.39	0.60	0.00	0.00	0.00	0.00	0.00
	Low Traffic Parking Lot	58	0.15	0.39	2.60	0.66	104.07	0.27	0.70
						TOTAL LOAD:	111.87	0.29	0.72
						BMP POLLUTANT REMOVAL EFFICIENCIES FROM APPENDIX A (%):	85	85	50
						POLLUTANT REDUCTION ACHIEVED BY THIS BMP TYPE (LBS):	95.09	0.24	0.36
						POLLUTANT REDUCTION ACHIEVED BY ALL BMP TYPES (LBS):			
						REQUIRED REDUCTION FROM WORKSHEET 12 (LBS):	0.00	0.00	0.00

** Pollutant Load = [EMC, mg/L] x [Volume, AF] x [2.7, Unit Conversion]
*** TSS and TP calculations only required for projects not meeting CG1/CG2 or not controlling less than 90% of the disturbed area

- *Calculations Attached Justifying Removals*
- WQ Inlets
- Manufacturers Test Data on Pollutant Removal Efficiencies?
- Treated Area, Inflow Values Meet Manufacturer Design Criteria

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WQ Summary

Structural BMP Water Quality Credits:

☑ *Use default BMP Outflows and Median BMP Outflow Concentrations*

DP No.	BMP No.	BMP Name	MRC?	BMP DA (acres)	Vol. Routed to BMP (CF)	Inf. & ET Credits (CF)	Capture & Buffer Credits (CF)	Outflow (CF)	Outflow Conc. (mg/L)			Pollutant Loads (lbs)		
									TSS	TP	TN	TSS	TP	TN
001	1	Vegetated Swale	-	0.65	3,300	429		2,871	-	-	-	-	-	-
001	2	Vegetated Filter Strip	-	0.87	6,071	981		5,090	-	-	-	-	-	-
001	3	Infiltration Basin	-	10.58	123,794	73,202		50,592	10.00	0.24	0.96	31.59	0.76	3.03
001	4	Constructed Filter	-	1.85	12,523	1,350		11,173	-	-	-	-	-	-
001	5	Rain Garden / Bioretention	Y	1.50	13,273	2,782		10,491	-	-	-	-	-	-

	TSS	TP	TN
POLLUTANT LOADS FROM STRUCTURAL BMP (TREATED) OUTFLOWS (LBS):	31.59	0.76	3.03
POLLUTANT LOADS FROM UNTREATED STORMWATER (LBS):	129.33	0.56	3.84
NON-STRUCTURAL BMP WATER QUALITY CREDITS (LBS):	97.52	0.25	0.43
NET POLLUTANT LOADS FROM SITE, POST-CONSTRUCTION (LBS):	63.40	1.07	6.44
POLLUTANT LOADS FROM SITE, PRE-CONSTRUCTION (LBS):	307.27	1.11	9.46

WATER QUALITY REQUIREMENT SATISFIED

- Not Using Default Concentrations-Provide Justification
- Pollutant Reported at End of BMP's in Series
- 100% Removal if no Outflow from BMP

A=Pollution Loads from Volume BMP's
B=Untreated Pollutant Loads
C=Pervious Undetained + "Other" Credits
Total=A+(B-C)
Predevelopment Pollutant Loads

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Review Checklist

1. **General**
    a. Correct Version of the Worksheet was utilized
    b. Number of Spreadsheets and Discharge points provided is correct
    c. Final Page signed and sealed
2. **General Information Tab**
    a. Top Section (Project Name, Location, type) Matches NOI and Plans
    b. Total Project Site Area (across all spreadsheets) matches Plans and NOI
    c. Total Earth Disturbance (across all spreadsheets) matches Plan and NOI
    d. Number of Discharge Points is accurate and match Plan Designations
    e. *Change* in Impervious Surface (all Spreadsheets) match the NOI, Rate Analysis and Plans.
    f. Receiving Waters are correct and match NOI.
    g. Is Small Site Exception Valid?
3. **Volume Tab-Volume to Manage**
    a. Precipitation value is accurate. Adequate reference has been provided
    b. Exempt for Meadow Correctly selected.
    c. Alternate Calculations provided if required.
    d. Land Cover properly categorized
    e. Impervious Surface type is accurate
    f. 20% Rule has been applied properly
    g. Change in Impervious is correct and consistent with General Tab and Rate Analysis
4. **Volume Tab-BMP Volume Credits**
    a. Tree Planting Credit Matches Plan
    b. "Other" Section Accurate and Calculations attached.
    c. BMP's have been Correctly Selected and Consistent with Key Design Elements
    d. BMP's Properly Routed in Series
    e. Inflow Volume is Correct and calculations provided if required
    f. Area, Storage Volumes are correct - reported at first outlet
    g. Infiltration Rate, Dewatering Time Properly calculated.
    h. Infiltration rates match soil testing results with appropriate Factor of Safety
    i. Media Depth Matches Plans
5. **WQ Tab**
    a. Undetained Ares Properly Categorized
    b. "Other" Credits-Calculations provided and BMP's Meet key design elements
    c. "Other" BMP's identified on the plans.
    d. Manufacture Data on pollutant removals, proper sizing provided for manufactured items

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Questions?

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