

Christina Basin Urban BMP Load Reduction Calculation Tool

prepared by:

Center for Watershed Protection (CWP)

and

Chester County Water Resources Authority (CCWRA)

in consultation with:

Barry Evans, Ph.D., Pennsylvania State University

and

Bill Brown, PA Department of Environmental Protection (PADEP)

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PURPOSE AND LIMITATIONS: This Excel workbook tool was developed for use by municipalities that have MS4 discharges and load reduction responsibilities within the PA portion of the Christina Basin. This tool calculates urban BMP load reductions using calculations, methodology, assumptions, and land use pollutant loading data based on and consistent with the desktop Christina Basin MapShed model, and consistent with PADEP's 2017 TMDL and PRP instructions for MS4s. This tool is not recommended for use in other geographic areas or with other load calculation methodologies, other load reduction calculation methodologies, other land use load data, or for calculating agricultural BMP load reductions. The desktop Christina Basin MapShed model was developed by CCWRA (2012, revised 2017) in conjunction with Dr. Barry Evans (Pennsylvania State University) and in consultation with Mr. Bill Brown (PADEP).

On behalf of the Christina Watersheds Municipal Partnership, the Chester County Water Resources Authority gratefully acknowledges the assistance provided to this effort by Dr. Barry Evans (Pennsylvania State University), Mr. Bill Brown, PA Department of Environmental Protection, and the Center for Watershed Protection.

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Pennsylvania State University by
PA Department of Environmental Protection

the Center for Watershed Protection by
National Fish and Wildlife Foundation

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FOR USE WITH MAPSHED LOADING RATES

INSTRUCTIONS -

When using the Christina Basin MapShed methodology, follow these steps to calculate URBAN BMP load reductions. The tool provides individual and combined load reduction calculations for multiple BMPs located within the same drainage area. It is recommended that the user create a separate workbook for each watershed. This tool cannot be used to calculate load reductions for inlet clearing or agricultural BMPs.

This tool and instructions are presented for use in calculations for 2012 land uses and 2012 -9/2017 BMP load reductions but can also be used for 1995 land uses and pre-1995 land use area for input herein.

PerformStdApproach Tab

1. This tool employs the Performance Standard Approach to determine BMP efficiencies. The user must first determine the type of BMP (e.g., ST or RR) as this will affect how the BMP reduction efficiency is applied. Refer to the "PerformStdApproach" tab, the PADEP TMDL and PRP instructions, and consult any relevant Chesapeake Bay expert panel reports (including "Recommendations of the Expert Panel to Define Removal Rates for Urban Stormwater Retrofit Projects" (2015)) for further guidance. Also see step 5 below.

Loading Tab

2. The municipality must refer to the "Christina Basin Land Use Loading Rates Calculation Tool" and its 2012 "Land Use Loading Rates" Look-Up Table for the watershed in which the BMP is located (i.e., Brandywine Creek, Red Clay Creek or White Clay Creek watersheds). Enter the corresponding loading rate values for sediment, phosphorus, and nitrogen for each listed land use category into the "Land Use Loads Input

A) For the land use categories in the Input Table that are marked "For Urban BMPs", copy/paste the "Total Land Use Loading Rates" from the 2012 Land Use Loading Rates table. These loading rates include loads apportioned for both stream bank erosion and farm animals (as described in the Christina Loading Rates Calculation Tool documentation).

B) For the land use categories in the Input Table that are marked "For Street Sweeping", copy/paste the "From Land Use" (upland) loading rates presented in the 2012 Land Use Loading Rates table. The loadings used for street sweeping are considered to be only those from upland sources and therefore do not include stream bank erosion or farm animal loads.

ExistingBMPs Tab

Proposed BMPs

3. Two separate worksheets are provided for "existing" and "proposed" BMPs. The equations and the calculation process are the same for each. Select the desired tab and enter as many BMPs as desired. Three (3) input tables are provided on each worksheet that can be used as needed if more than one area of interest is in the same watershed. Delete the extra tables if you only have one area of interest or no desire to organize the BMPs in separate tables. One BMP should be inserted per row. The instructions below apply to both the "ExistingBMPs" and "ProposedBMPs" tabs. Enter data for all the ORANGE cells. All other cells will be automatically calculated and populated by the tool.

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4. Determine the type of BMP using the Performance Standard Approach guidance (see "PerformStdApproach" tab and references cited above for more information) and enter it into the column "BMP Type".

BMP TYPE: A) RR (Runoff Reduction): ex. infiltration basin

B) ST (Stormwater Treatment): ex. wet pond/retention basin

C) Street Sweeping

i. The removal efficiencies are averaged for the most common type of street sweeping equipment and are based on the Chesapeake Bay Expert Panel efficiencies. See "Loading" tab for a table presenting the efficiencies used by this tool to calculate street sweeping load reductions. These are not to be altered.

ii. The street sweeping load reduction calculation addresses only the portion of loading generated from the percent of each land use that is assumed to be impervious in the MapShed model (using the percent impervious assigned within MapShed for each land use; see the Christina MapShed Land Use Loading Rates Calculation Tool documentation for explanation).

iii. This tool is to be used ONLY for street sweeping that meets the qualifications presented in PADEP's MS4 "BMP Effectiveness Values" table and their TMDL and PRP instructions. Further information can also be found in "Recommendations of the Expert Panel to Define Removal Rates for Street and Storm Drain Cleaning Practices" (May 2016).

D) Stream Restoration

i. The removal efficiency rate used herein is presented on the "Loading" tab.

ii. This tool is to be used ONLY for stream restoration projects that meet the qualifying requirements for Protocol 1 of the "Recommendations of the Expert Panel to Define Removal Rates for Individual Stream Restoration Projects" (September 8, 2014). All other stream restoration projects are not included herein and the user must consult the Expert Panel report and consult PADEP to determine appropriate removal rates/calculation procedures for the type of restoration completed.

5. Input each of the specific BMP data called for in the BMP calculator table (ORANGE CELLS ONLY):

A) Name of BMP

B) Year Installed, if existing BMP

C) Dominant Land Use in the BMP drainage area: Only one land use can be entered per row. If a BMP has multiple land uses in the BMP drainage area, use the dominant land use. If approximately equal parts, a BMP can be spread to two rows with specific drainage area information for each. The "Treatment Depth (in)" must be the same in each row. If the secondary drainage area does not have any impervious cover, manually type in the "Treatment Depth (in/imp. ac)" value from the drainage area containing impervious cover in the "Treatment Depth (in/imp. ac) Manual Override – use if no impervious area" column.

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D) Drainage Area draining to the BMP

E) Treatment Depth/Runoff Treated (inches): The tool will automatically calculate and populate the acres of impervious area (using the percent impervious assigned within MapShed for each land use; see the Christina MapShed Land Use Loading Rates Calculation Tool documentation for explanation) and will automatically re-calculate and enter treatment depth.

F) For "Street Sweeping" or "Stream Restoration" BMP types, enter the appropriate project length in feet (use thalweg feet for stream restoration). These cells are a slightly different shade of orange and are marked out if an RR or ST BMP is selected.

6. To add another row (or BMP), right click on the table, move your mouse to "Insert" and select "Table Rows Above".

7. The calculation results are presented for sediment, phosphorus, and nitrogen as:

A) Total load for BMP drainage area

B) Percent reduction

C) Annual volume reduction (lbs/yr)

D) Cumulative total annual volume reduction (lbs/yr)

8. Include in the submittal to PADEP a map showing the BMP drainage area with land use types for all BMPs included in the calculations, as supporting documentation.

9. After finalizing all calculations, it is recommended that ALL tabs (including the Cover Page, Instructions, and all input, calculation and output tabs) and a map of BMP drainage area(s) be printed off into a hardcopy package and included within the MS4's submittal to PADEP as supporting documentation.

PERFORMANCE STANDARD APPROACH (as referenced in PA DEP permit materials; original source citation at bottom of page.)

MUNICIPALITY: For the BMP of choice, consult the Expert Panel Table below and Report cited below to determine if the BMP is an RR, ST or Other type of practice. The type of practice, runoff reduction versus stormwater treatment, is calculated differently with different efficiency curves.

Table 4 Classification of BMPs based on Runoff reduction capability¹	
<i>Runoff Reduction (RR) Practices</i>	<i>Stormwater Treatment (ST) Practices ²</i>
<i>Non-Structural Practices</i>	
Landscape Restoration/Reforestation	Constructed Wetlands
Riparian Buffer Restoration	Filtering Practices (aka Constructed Filters, Sand Filters, Stormwater Filtering Systems)
Rooftop Disconnection (aka Simple Disconnection to Amended Soils, to a Conservation Area, to a Pervious Area, Non-Rooftop Disconnection)	Proprietary Practices (aka Manufactured BMPs)
Sheetflow to Filter/Open Space* (aka Sheetflow to Conservation Area, Vegetated Filter Strip)	Wet Ponds (aka Retention Basin)
Non-Structural BMPs, PA 2006 BMP Manual, Chapter 5	Wet Swale
<i>Practices</i>	
All ESD practices in MD 2007	
Bioretention or Rain Garden (Standard or Enhanced)	
Dry Channel Regenerative Stormwater Conveyance (aka Step Pool Storm Conveyance)	
Dry Swale	
Expanded Tree Pits	
Grass Channels (w/ Soil Amendments, aka Bioswale, Vegetated Swale)	
Green Roof (aka Vegetated Roof)	
Green Streets	
Infiltration (aka Infiltration Basin, Infiltration Bed, Infiltration Trench, Dry Well/Seepage Pit, Landscape Infiltration)	
Permeable Pavement (aka Porous Pavement)	
Rainwater Harvesting (aka Capture and Re-use)	
*May include a berm or a level spreader	
¹ Refer to DC, MD, PA, VA or WV State Stormwater Manuals for more information	
² Dry ED ponds have limited removal capability , their efficiency is calculated using rates in Table B-4, Appendix B	

Source:

Recommendations of the Expert Panel to Define Removal Rates for New State Stormwater Performance Standards

Stewart Comstock, Scott Crafton, Randy Greer, Peter Hill, Dave Hirschman, Shoreh Karimpour, Ken Murin, Jennifer Orr, Fred Rose, Sherry Wilkins

Revised: January 20, 2015

Prepared by: Tom Schueler and Cecilia Lane, Chesapeake Stormwater Network

Below, these BMP Removal Rate Curves have been incorporated into this spreadsheet tool.

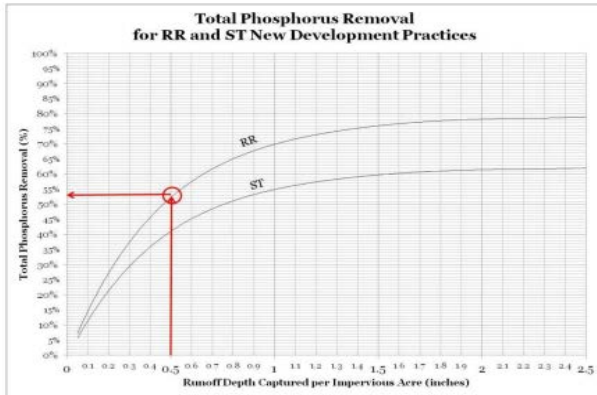


Figure 1. New BMP Removal Rate Adjustor Curve for Total Phosphorus

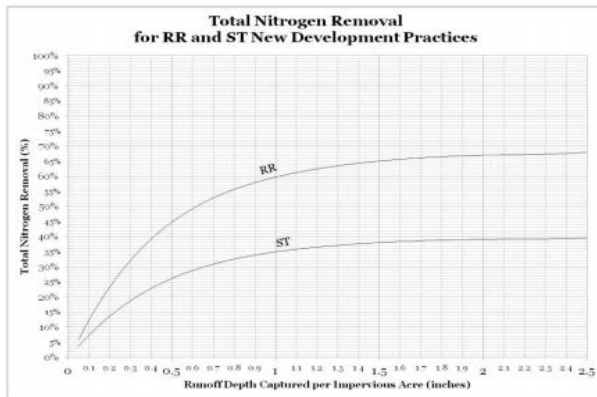


Figure 2. New BMP Removal Rate Adjustor Curve for Total Nitrogen

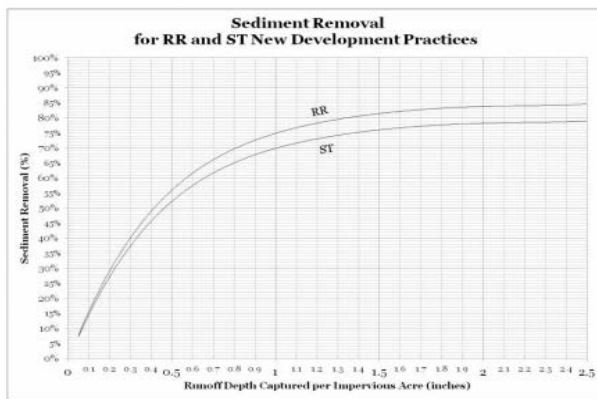


Figure 3. New BMP Removal Rate Adjustor Curve for Sediment

In the rare cases that the runoff volume captured by the practice exceeds 2.5 inches, simply use the pollutant removal values associated with 2.5 inches.

Source:

Recommendations of the Expert Panel to Define Removal Rates for New State Stormwater Performance Standards

Stewart Comstock, Scott Crafton, Randy Greer, Peter Hill, Dave Hirschman, Shoreh Karimpour, Ken Murin, Jennifer Orr, Fred Rose, Sherry Wilkins

Revised: January 20, 2015

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Land Use Loading Rates per Watershed for TSS, TN and TP - INPUT TABLE

MUNICIPALITY: For Urban BMPs, please refer to the Christina MAPSHED Land Use Loading Rates Look-Up Tables for the applicable watershed for the year 2012 , and enter the "Total Land Use Loading Rates" below. EACH WATERSHED (Brandywine, Red Clay and White Clay) HAS ITS OWN LOADING RATES - Be sure to enter data for 2012 for the correct watershed and the correct pollutant. Numbers are shown below FOR DEMONSTRATION PURPOSES ONLY.

For Street Sweeping, the municipality must refer to the Christina MAPSHED Land Use Loading Rates Look-Up Tables for the applicable watershed for the year 2012 , and enter the "From Land Use" loading rates (upland loading rate) into the rows below that reference "Upland"; loads from stream bank and farm animals cannot be included in street sweeping BMP load reduction calculations.

Watershed: XXXXXXXXXXXX

Municipality: XXXXXX

Source	Sediment (lbs/ac/yr)	TP (lbs/ac/yr)	TN (lbs/ac/yr)	
Hay/Past	10.00	0.50	0.50	For Urban BMPs
Cropland	0.00	0.00	0.00	
Forest	0.00	0.00	0.00	
Wetland	0.00	0.00	0.00	
Disturbed	0.00	0.00	0.00	
Turfgrass	0.00	0.00	0.00	
Open_Land	0.00	0.00	0.00	
Bare_Rock	0.00	0.00	0.00	
Sandy_Areas	0.00	0.00	0.00	
Unpaved_Road	0.00	0.00	0.00	
Ld_Mixed	8.00	0.50	5.00	
Md_Mixed	8.00	0.50	5.00	
Hd_Mixed	8.00	0.50	5.00	
Ld_Residential	8.00	0.50	5.00	
Md_Residential	8.00	0.50	5.00	
Hd_Residential	8.00	0.50	5.00	
Ld_Mixed - Upland	1.00	0.05	0.50	For Street Sweeping Only!
Md_Mixed - Upland	1.00	0.05	0.50	
Hd_Mixed - Upland	1.00	0.05	0.50	
Ld_Residential - Upland	1.00	0.05	0.50	
Md_Residential - Upland	1.00	0.05	0.50	
Hd_Residential - Upland	1.00	0.05	0.50	

BMP Load and Efficiencies used in the Load Reduction Calculations (DO NOT ALTER):

Street Sweeping	TSS Reduction (%)	TP Reduction (%)	TN Reduction (%)	Road Width (ft)
Average	10.0%	10.0%	10.0%	20

Stream Restoration - Protocol 1	TSS (lbs/ft/yr)	TP (lbs/ft/yr)	TN (lbs/ft/yr)
Default	115	0.174	0.192

Existing BMP Load Reduction Calculation Table

INSTRUCTIONS TO MUNICIPALITY: Each row in the table below should represent a different BMP drainage area. Choose the dominant land use draining to the BMP.

If a BMP has multiple land uses in the drainage area, these drainage areas should be represented on a subsequent row with the same BMP name. The treatment depth should be the same for a given BMP (even if it has multiple drainage areas).

If one of the drainage areas to the same BMP has NO impervious cover, use the Manual Override column to type in the treatment depth (in/imp. ac) of the primary drainage area containing impervious cover.

The examples below show the various options and should be deleted before tallying reductions. Notice one example demonstrates when a drainage area covers two land uses (see row 15 and 16).

MUNICIPALITY: TO ENTER BMP DATA IN THE ORANGE HIGHLIGHTED CELLS

Watershed: XXXXXXXXXX
Municipality: XXXXXX

* See Instructions tab for what qualifies for stream restoration and street sweeping.

Area of Interest 1

Name	BMP Type	Year Installed	MapShed Land Cover of Drainage Area	Drainage Area (ac)	Treatment Depth (in)	Stream Restoration* Length (ft) - Qualified projects only	Street Sweeping* Road Length Swept (ft) - Qualified projects only	Impervious Area (ac)	Treatment Depth (in/imp. ac)	Treatment Depth (in/imp. ac) Manual Override - use if no impervious area
BMP 1	RR	2009	Ld_Mixed	1	1.00			0.15	2.50	
Filter BMP - Sunnybrook	ST	2015	Hd_Residential	32	1.50			27.84	1.72	
SUNNY FARM HOA BASIN RETROFIT	RR	2010	Ld_Residential	6	0.25			0.90	1.67	
BMP - Multiple DA (part 1)	RR	2010	Md_Residential	3	1.00			1.56	1.92	
BMP - Multiple DA (part 2)	RR	2010	Hay/Past	1.5	1.00			0.00	#N/A	1.92
Apple Stream Project	Stream Restoration	2014				500		#N/A	#N/A	
AppleValley Street Sweeping	Street Sweeping	2012	Ld_Mixed - Upland				2000	0.00	#N/A	
Extended Sweeping	Street Sweeping	2015	Hd_Mixed - Upland				20000	0.00	#N/A	
Total										

Area of Interest 2

Name	BMP Type	Year Installed	MapShed Land Cover of Drainage Area	Drainage Area (ac)	Treatment Depth (in)	Stream Restoration* Length (ft) - Qualified projects only	Street Sweeping* Road Length Swept (ft) - Qualified projects only	Impervious Area (ac)	Treatment Depth (in/imp. ac)	Treatment Depth (in/imp. ac) Manual Override - use if no impervious area
BMP 1	RR	2009	Ld_Mixed	1	1.00			0.15	2.50	
Filter BMP - Sunnybrook	ST	2015	Hd_Residential	32	1.50			27.84	1.72	
Extended Sweeping	Street Sweeping	2015	Hd_Mixed - Upland				20000	0.00	#N/A	
Total										

Area of Interest 3

Name	BMP Type	Year Installed	MapShed Land Cover of Drainage Area	Drainage Area (ac)	Treatment Depth (in)	Stream Restoration* Length (ft) - Qualified projects only	Street Sweeping* Road Length Swept (ft) - Qualified projects only	Impervious Area (ac)	Treatment Depth (in/imp. ac)	Treatment Depth (in/imp. ac) Manual Override - use if no impervious area
BMP 1	RR	2009	Ld_Mixed	1	1.00			0.15	2.50	
Filter BMP - Sunnybrook	ST	2015	Hd_Residential	32	1.50			27.84	1.72	
Extended Sweeping	Street Sweeping	2015	Hd_Mixed - Upland				20000	0.00	#N/A	
Total										

Existing BMP Load Reduction Calculation Table

Effective Treatment Depth (in/imp. ac)	Impervious (%)	TSS Load (lbs/yr)	TP Load (lbs/yr)	TN Load (lbs/yr)	TSS Reduction (%)	TP Reduction (%)	TN Reduction (%)	TSS Reduction		TP Reduction (lbs/yr)	TN Reduction (lbs/yr)
								TSS Reduction (lbs/yr)	(tons/yr)		
2.50	15.0%	8.00	0.50	5.00	84.9%	78.8%	67.7%	6.79	0.00	0.39	3.39
1.72	87.0%	256.00	16.00	160.00	77.3%	60.8%	38.7%	197.99	0.10	9.72	61.86
1.67	15.0%	48.00	3.00	30.00	82.7%	77.1%	65.9%	39.68	0.02	2.31	19.78
1.92	52.0%	24.00	1.50	15.00	83.7%	78.0%	66.7%	20.10	0.01	1.17	10.01
1.92	0.0%	15.00	0.75	0.75	83.7%	78.0%	66.7%	12.56	0.01	0.59	0.50
#N/A	#N/A	#N/A	#N/A	#N/A	0.0%	0.0%	0.0%	57,500.00	28.75	87.00	96.00
#N/A	15.0%	0.14	0.01	0.07	10.0%	10.0%	10.0%	0.01	0.00	0.00	0.01
#N/A	87.0%	7.99	0.40	3.99	10.0%	10.0%	10.0%	0.80	0.00	0.04	0.40
								57,777.93	28.89	101.23	191.94

Effective Treatment Depth (in/imp. ac)	Impervious (%)	TSS Load (lbs/yr)	TP Load (lbs/yr)	TN Load (lbs/yr)	TSS Reduction (%)	TP Reduction (%)	TN Reduction (%)	TSS Reduction		TP Reduction (lbs/yr)	TN Reduction (lbs/yr)
								TSS Reduction (lbs/yr)	(tons/yr)		
2.50	15.0%	8.00	0.50	5.00	84.9%	78.8%	67.7%	6.79	0.00	0.39	3.39
1.72	87.0%	256.00	16.00	160.00	77.3%	60.8%	38.7%	197.99	0.10	9.72	61.86
#N/A	87.0%	7.99	0.40	3.99	10.0%	10.0%	10.0%	0.80	0.00	0.04	0.40
								205.58	0.10	10.16	65.64

Effective Treatment Depth (in/imp. ac)	Impervious (%)	TSS Load (lbs/yr)	TP Load (lbs/yr)	TN Load (lbs/yr)	TSS Reduction (%)	TP Reduction (%)	TN Reduction (%)	TSS Reduction		TP Reduction (lbs/yr)	TN Reduction (lbs/yr)
								TSS Reduction (lbs/yr)	(tons/yr)		
2.50	15.0%	8.00	0.50	5.00	84.9%	78.8%	67.7%	6.79	0.00	0.39	3.39
1.72	87.0%	256.00	16.00	160.00	77.3%	60.8%	38.7%	197.99	0.10	9.72	61.86
#N/A	87.0%	7.99	0.40	3.99	10.0%	10.0%	10.0%	0.80	0.00	0.04	0.40
								205.58	0.10	10.16	65.64

Proposed BMP Load Reduction Calculation Table

INSTRUCTIONS TO MUNICIPALITY: Each row in the table below should represent a different BMP drainage area. Choose the dominant land use draining to the BMP.

If a BMP has multiple land uses in the drainage area, these drainage areas should be represented on a subsequent row with the same BMP name. The treatment depth should be the same for a given BMP (even if it has multiple drainage areas).

If one of the drainage areas to the same BMP has NO impervious cover, use the Manual Override column to type in the treatment depth (in/imp. ac) of the primary drainage area containing

The examples below show the various options and should be deleted before tallying reductions. Notice one example demonstrates when a drainage area covers two land uses (see row 15 and 16).

MUNICIPALITY: TO ENTER BMP DATA IN THE ORANGE HIGHLIGHTED CELLS

Watershed: XXXXXXXXXXXX

Municipality: XXXXXX

Area of Interest 1

Name	BMP Type	Year Installed	MapShed Land Cover of Drainage Area	Drainage Area (ac)	Treatment Depth (in)	Stream Restoration* Length (ft) - Qualified projects only	Street Sweeping* Road Length Swept (ft) - Qualified projects only	Impervious Area (ac)	Treatment Depth (in/imp. ac)
BMP 1	RR	2018	Ld_Mixed	1	1.00			0.15	2.50
Filter BMP - Sunnybrook	ST	2018	Hd_Residential	32	1.50			27.84	1.72
SUNNY FARM HOA BASIN RETROFIT	RR	2018	Ld_Residential	6	0.25			0.90	1.67
BMP - Multiple DA (part 1)	RR	2018	Md_Residential	3	1.00			1.56	1.92
BMP - Multiple DA (part 2)	RR	2018	Hay/Past	1.5	1.00			0.00	#N/A
Apple Stream Project	Stream Restoration	2018				500		#N/A	#N/A
AppleValley Street Sweeping	Street Sweeping	2018	Ld_Mixed - Upland				2000	0.00	#N/A
Extended Sweeping	Street Sweeping	2018	Hd_Mixed - Upland				20000	0.00	#N/A
Total									

Area of Interest 2

Name	BMP Type	Year Installed	MapShed Land Cover of Drainage Area	Drainage Area (ac)	Treatment Depth (in)	Stream Restoration* Length (ft) - Qualified projects only	Street Sweeping* Road Length Swept (ft) - Qualified projects only	Impervious Area (ac)	Treatment Depth (in/imp. ac)
BMP 1	RR	2018	Ld_Mixed	1	1.00			0.15	2.50
AppleValley Street Sweeping	Street Sweeping	2018	Ld_Mixed - Upland				2000	0.00	#N/A
Extended Sweeping	Street Sweeping	2018	Hd_Mixed - Upland				20000	0.00	#N/A
Total									

Area of Interest 3

Name	BMP Type	Year Installed	MapShed Land Cover of Drainage Area	Drainage Area (ac)	Treatment Depth (in)	Stream Restoration* Length (ft) - Qualified projects only	Street Sweeping* Road Length Swept (ft) - Qualified projects only	Impervious Area (ac)	Treatment Depth (in/imp. ac)
BMP 1	RR	2018	Ld_Mixed	1	1.00			0.15	2.50
AppleValley Street Sweeping	ST	2018	Hd_Residential	1	1.00		2000	0.87	1.15
Extended Sweeping	Street Sweeping	2018	Hd_Mixed - Upland				20000	0.00	#N/A
Total									

Proposed BMP Load Reduction Calculation Table

Treatment Depth (in/imp. ac) Manual Override - use if no impervious area	Effective Treatment Depth (in/imp. ac)	Impervious (%)	TSS Load (lbs/yr)	TP Load (lbs/yr)	TN Load (lbs/yr)	TSS Reduction (%)	TP Reduction (%)	TN Reduction (%)	TSS Reduction (lbs/yr)	TSS Reduction (tons/yr)	TP Reduction (lbs/yr)	TN Reduction (lbs/yr)
	2.50	15.0%	8.00	0.50	5.00	84.9%	78.8%	67.7%	6.79	0.00	0.39	3.39
	1.72	87.0%	256.00	16.00	160.00	77.3%	60.8%	38.7%	197.99	0.10	9.72	61.86
	1.67	15.0%	48.00	3.00	30.00	82.7%	77.1%	65.9%	39.68	0.02	2.31	19.78
	1.92	52.0%	24.00	1.50	15.00	83.7%	78.0%	66.7%	20.10	0.01	1.17	10.01
1.92	1.92	0.0%	15.00	0.75	0.75	83.7%	78.0%	66.7%	12.56	0.01	0.59	0.50
	#N/A	#N/A	#N/A	#N/A	#N/A	0.0%	0.0%	0.0%	57,500.00	28.75	87.00	96.00
	#N/A	15.0%	0.14	0.01	0.07	10.0%	10.0%	10.0%	0.01	0.00	0.00	0.01
	#N/A	87.0%	7.99	0.40	3.99	10.0%	10.0%	10.0%	0.80	0.00	0.04	0.40
									57,777.93	28.89	101.23	191.94

Treatment Depth (in/imp. ac) Manual Override - use if no impervious area	Effective Treatment Depth (in/imp. ac)	Impervious (%)	TSS Load (lbs/yr)	TP Load (lbs/yr)	TN Load (lbs/yr)	TSS Reduction (%)	TP Reduction (%)	TN Reduction (%)	TSS Reduction (lbs/yr)	TSS Reduction (tons/yr)	TP Reduction (lbs/yr)	TN Reduction (lbs/yr)
	2.50	15.0%	8.00	0.50	5.00	84.9%	78.8%	67.7%	6.79	0.00	0.39	3.39
	#N/A	15.0%	0.14	0.01	0.07	10.0%	10.0%	10.0%	0.01	0.00	0.00	0.01
	#N/A	87.0%	7.99	0.40	3.99	10.0%	10.0%	10.0%	0.80	0.00	0.04	0.40
									7.60	0.00	0.43	3.79

Treatment Depth (in/imp. ac) Manual Override - use if no impervious area	Effective Treatment Depth (in/imp. ac)	Impervious (%)	TSS Load (lbs/yr)	TP Load (lbs/yr)	TN Load (lbs/yr)	TSS Reduction (%)	TP Reduction (%)	TN Reduction (%)	TSS Reduction (lbs/yr)	TSS Reduction (tons/yr)	TP Reduction (lbs/yr)	TN Reduction (lbs/yr)
	2.50	15.0%	8.00	0.50	5.00	84.9%	78.8%	67.7%	6.79	0.00	0.39	3.39
	1.15	87.0%	8.00	0.50	5.00	72.4%	56.9%	36.2%	5.79	0.00	0.28	1.81
	#N/A	87.0%	7.99	0.40	3.99	10.0%	10.0%	10.0%	0.80	0.00	0.04	0.40
									13.38	0.01	0.72	5.59