Appendix M: Voluntarily Installed BMP Spreadsheet for Determining Loading Rates and Removal Rates for Pollutants of Concern

Site Characteristics

Total Area _____ Acres (Draining to BMP)
Impervious Area (IA) _____ Acres (Draining to BMP)
Pervious Area (PA) _____ Acres (Draining to BMP)

Design Characteristics

Type of BMP Installed _____
Design Guidelines DEQ Clearing House / Bay Program *(Circle One)*
Enter appropriate removal efficiencies based on design guidelines see attached tables
Phosphorous Removal Efficiency (TP) _____ *% Use Table V.A.1 DEQ or Table V.C.1 Bay*
Nitrogen Removal Efficiency (TN) _____ *% Use Table V.A.1 DEQ or Table V.C.1 Bay*
Suspended Solids Removal Efficiency (TSS) _____ *% Use Table V.C.1**
**If BMP is not located in Table V.C.1, see Public Works Staff*

Calculations *(Round Calculations to 2-decimal places)*

TP Loading

_____	X	1.62	=	_____	lbs TP/yr
IA		TP Loading		IA Load	
_____	X	0.41	=	_____	lbs TP/yr
PA		TP Loading		PA Load	

TP Removal

_____	X	_____ %	=	_____	lbs TP/yr
IA Load		TP		IA Removal	
_____	X	_____ %	=	_____	lbs TP/yr
PA Load		TP		PA Removal	
_____	+	_____	=	_____	lbs TP/yr
IA Removal		PA Removal		**Total TP Removed**	

TN Loading

_____	X	16.86	=	_____	lbs TN/yr
IA		TN Loading		IA Load	
_____	X	10.07	=	_____	lbs TN/yr
PA		TN Loading		PA Load	

TN Removal

_____	X	_____ %	=	_____	lbs TN/yr
IA Load		TN		IA Removal	
_____	X	_____ %	=	_____	lbs TN/yr
PA Load		TN		PA Removal	
_____	+	_____	=	_____	lbs TN/yr
IA Removal		PA Removal		**Total TN Removed**	

TSS Loading

_____	X	1171.32	=	_____	lbs TSS/yr
IA		TSS Loading		IA Load	
_____	X	175.8	=	_____	lbs TSS/yr
PA		TSS Loading		PA Load	

TSS Removal

_____	X	_____ %	=	_____	lbs TSS/yr
IA Load		TSS		IA Removal	
_____	X	_____ %	=	_____	lbs TSS/yr
PA Load		TSS		PA Removal	

_____	+	_____	=	_____	lbs TSS/yr
IA Removal		PA Removal		**Total TSS Removed**	

Summary of Removal

Total Phosphorus Removed = _____ lbs TP/yr

Total Nitrogen Removed = _____ lbs TN/yr

Total Suspended Solids Removed = _____ lbs TSS/yr

Name of Individual Completing this Form: _____

APPENDIX V.A – Virginia Stormwater Clearinghouse BMPs[14]

To be eligible for these efficiencies, the BMP must meet all the design requirements that are listed in the Virginia Stormwater BMP Clearinghouse's technical specification for that BMP, not just the one inch requirement for runoff depth treated. There are no established efficiencies for TSS in the Virginia Stormwater BMP Clearinghouse. To calculate the TSS reductions, permittees should use the retrofit curves developed by the Bay Program or the Bay Program Established Efficiencies. The methodology for using the retrofit curves is detailed in *Appendix V.B*. For additional information about the Virginia Stormwater BMP Clearinghouse requirements, permittees should see the BMP design standards and specs, which can be found at http://vwrrc.vt.edu/swc/StandardsSpecs.html.

Table V.A.1 - Virginia Stormwater BMP Clearinghouse BMPs, Established Efficiencies

Practice Number	Practice	TN	TP
1	Rooftop Disconnection[15]	25% or 50%[1]	25% or 50%[1]
2	Sheetflow to Vegetated Filter or Conserved Open Space 1	25% or 50%[1]	25% or 50%[1]
	Sheetflow to Vegetated Filter or Conserved Open Space 2	50% or 75%[1]	50% or 75%[1]
3	Grass Channel	28%	23%
5	Vegetated Roof 1	45%	45%
	Vegetated Roof 2	60%	60%
6	Rainwater Harvesting[15]	Up to 90%	Up to 90%
7	Permeable Pavement 1	59%	59%
	Permeable Pavement 2	81%	81%
8	Infiltration 1	57%	63%
	Infiltration 2	92%	93%
9	Bioretention 1	64%	55%
	Bioretention 2	90%	90%
	Urban Bioretention	64%	55%
10	Dry Swale 1	55%	52%
	Dry Swale 2	74%	76%
11	Wet Swale 1	25%	20%
	Wet Swale 2	35%	40%
12	Filtering Practice 1	30%	60%
	Filtering Practice 2	45%	65%
13	Constructed Wetland 1	25%	50%
	Constructed Wetland 2	55%	75%
14	Wet Pond 1	30% (20%)[2]	50% (45%)[2]
	Wet Pond 2	40% (30%)[2]	75% (65%)[2]
15	Extended Detention Pond 1	10%	15%
	Extended Detention Pond 2	24%	31%

[1]Lower rate is for HSG soils C and D; higher rate is for HSG soils A and B
[2]Lower nutrient removal in parentheses apply to wet ponds in coastal plain terrain

[14] These efficiencies are up to date as of the publication of this guidance. The most up to date list of approved BMPs and their efficiencies can be found on the Virginia Stormwater BMP Clearinghouse website. If there is a discrepancy between this table and the website, the efficiencies on the website supersede those listed in this table. The TN efficiencies may be found in the bodies of the individual BMP reports.

[15] **NOTE:** There are no Bay Program equivalent efficiency BMPs for Rooftop Disconnection and Rainwater Harvesting. Permittees must use the VA Stormwater Clearinghouse technical criteria and efficiencies to receive credit for these practices.

APPENDIX V.C - Chesapeake Bay Program, Established Efficiencies

As an alternative to using the Bay Program Curves, permittees may use the Bay Program's established efficiencies for BMPs. Again, these efficiencies may be used for BMPs that do not meet the Virginia Stormwater BMP Clearinghouse design specifications.

Table V.C.1 – Chesapeake Bay Program BMPs, Established Efficiencies

Chesapeake Bay Program BMPs	TN	TP	TSS
Wet Ponds and Wetlands	20%	45%	60%
Dry Detention Ponds and Hydrodynamic Structures	5%	10%	10%
Dry Extended Detention Ponds	20%	20%	60%
Infiltration Practices w/o Sand, Veg.	80%	85%	95%
Infiltration Practices w/ Sand, Veg.	85%	85%	95%
Filtering Practices	40%	60%	80%
Bioretention C/D soils, underdrain	25%	45%	55%
Bioretention A/B soils, underdrain	70%	75%	80%
Bioretention A/B soils, no underdrain	80%	85%	90%
Vegetated Open Channels C/D soils, no underdrain	10%	10%	50%
Vegetated Open Channels A/B soils, no underdrain	45%	45%	70%
Bioswale	70%	75%	80%
Permeable Pavement w/o Sand, Veg. C/D soils, underdrain	10%	20%	55%
Permeable Pavement w/o Sand, Veg. A/B soils, underdrain	45%	50%	70%
Permeable Pavement w/o Sand, Veg. A/B soils, no underdrain	75%	80%	85%
Permeable Pavement w/Sand, Veg. C/D soils, underdrain	20%	20%	55%
Permeable Pavement w/Sand, Veg. A/B soils, underdrain	50%	50%	70%
Permeable Pavement w/Sand, Veg. A/B soils, no underdrain	80%	80%	85%

BMP efficiencies for wetland restoration vary depending on hydrogeomorphic region as listed below in *Table V.C.2*. To use this table the permittee will need to determine which region their MS4 is in and use the appropriate efficiency. If the permittee is unsure which Hydrogeomorphic Region it is located in, resources are available through the USGS at http://chesapeake.usgs.gov/data.html.

Table V.C.2 – Chesapeake Bay Program BMPs, Established Efficiencies Regionally Impacted

Chesapeake Bay Program Hydrogeomorphic Region affected efficiencies				
BMPs	Region	TN	TP	TSS
Wetland Restoration	Appalachian Plateau Siliciclastic Non-Tidal	7.0%	12%	4.0%
Wetland Restoration	Coastal Plain Dissected Uplands Non-Tidal; Coastal Plain Dissected Uplands Tidal; Coastal Plain Lowlands Tidal; Coastal Plain Uplands Tidal; Coastal Plain Lowlands Non-Tidal; Coastal Plain Uplands Non-Tidal	25%	50%	15%
Wetland Restoration	Blue Ridge Non-Tidal; Mesozoic Lowlands Non-Tidal; Valley and Ridge Carbonate Non-Tidal; Piedmont Crystalline Non-Tidal; Piedmont Carbonate Non-Tidal; Valley and Ridge Siliciclastic Non-Tidal	14%	26%	8.0%