MDE Sediment & Stormwater Plan Review for State & Federal Projects

SWM Calculator Condensed Format

Project Description: Radio Station Road Sidepath

County: Charles County

MDE Tracking Number:

Job #:
Contract #:
Date: 5/5/2021
Designed by: LT
Reviewed by: PL

Clear Input Cells

Determine Development Classification for the Reconstruction Activities:

STEP 1 Site / Drainage Area Data

STEP 2 Impervious Area Requiring Treatment (IART)

STEP 3 Required ESD Volume for Treating Redevelopment ($ESD_{V\ RE\text{-}DEV'L}$)

STEP 4 ESD Volume Reduction from Decreasing Impervious Area ($ESD_{V\ reducedAi}$) (for Redevelopment Classification when ΔAi<0)

STEP 5 Required ESD Volume for treating New Development ($ESD_{V\ NEW}$) for POI

STEP 6 ESD Volume for the Shifted Impervious Area ($ESD_{V\ SHIFT}$) in/out of POI

STEP 7 Req'd ESDv from Loss of Existing SWM ($ESD_{V\ Loss}$)

STEP 8 Required ESD Volume for the POI ($ESD_{V\ POI}$)

STEP 9 Required Recharge Volume (Re_V)

	Report to ESD Summary Sheet															Col. 1	Col. 2		Col. 3		Col. 4a		Col. 4b		Col. 5a			Col. 5b		Col. 6	Col. 7	Col. 8		Col. 10
	Report to WQSS»		Col. D			Col. B	Col. C	Col. E	Col. F			Col. G				should match Col. I	should match Col. J	should match Col. K															
POI	SWM Study Area	Existing Impervious Surface Area	Percent Existing Imperviousness	Development Classification for Re-construc-tion	**Existing** Condition Drainage Area	**Proposed** Condition Drainage Area	**Existing** Imp. Area within LOD	**Proposed** Imp. Area within LOD	Area for which WQ is Not Req'd (i.e. 3.3.A Waiver)	Loss of Existing Water Quality (Area)	Loss of Existing ESD_v/ WQ_v (Volume)	Loss of Existing Recharge (Volume)	Re-constructed Imp. Area Already Treated (Area)	Ex. Imp. Area outside of LOD Shifted in/out of POI	qualify for a Cp_V Waiver under Section 3.3.B of the Guide-lines?	**IART** from **Redevelopment:** For Re-dev'l Classification, $IART_{RE\text{-}DEV'L}$ = 50% of (A_{EI} - A_{MI} - A_{RECI}) For New Dev'l Classification, $IART_{RE\text{-}DEV'L}$ = 0	**IART** from **New Development:** For Re-dev'l Classification, $IART_{NEW}$ = ΔAi = A_{PI} - A_{EI} For New Dev'l Classification, $IART_{NEW}$ = A_{PI} - A_{MI} - A_{RECI}	**Total IART:** IART = $IART_{RE\text{-}DEV'L}$ + $IART_{NEW}$ + A_{LI}	P_E	R_V	$ESD_{V\ RE\text{-}DEV'L}$	Applied to Project: P_E	Applied to Project: R_V	Applied to Project: $ESD_{V\ reducedAi}$	Applied to POI: P_E	Applied to POI: R_V	Applied to POI: $ESD_{V\ reducedAi}$	$ESD_{V\ NEW}$ for 3.3.B Waiver: P_E	$ESD_{V\ NEW}$ for 3.3.B Waiver: R_V	$ESD_{V\ NEW}$ for 3.3.B Waiver: $ESD_{V\ NEW}$	$ESD_{V\ NEW}$ for No Waiver or No Impervious Reduction (i.e. ΔAi >=0): Soil Group				Weighted P_E	R_V	$ESD_{V\ NEW}$	P_E	R_V	$ESD_{V\ SHIFT}$	ESDV Loss	$ESD_{V\ POI}$	1-Year Management Requirement	Soil Specific Recharge Factor (S): Soil Group				Weighted S	Recharge Volume ($Re_{V\ NEW}$) for New Development	Loss of Existing Recharge Volume (Rev Loss)	Total Required Recharge Volume (Rev)
	A_S	A_{EXI}	%I		A_E	A_P	A_{EI}	A_{PI}	A_{MI}	A_{LI}	$ESD_{V\ Loss}$	$Re_{V\ Loss}$	A_{RECI}	A_{SHIFT}	Cp_{VW}	$IART_{RE\text{-}DEV'L}$	$IART_{NEW}$	IART																								
	acres	acres	%I = A_{EXI}/A_S		acres	acres	acres	acres	acres	acres	cubic feet	cubic feet	acres	acres		acres	acres	acres	in.		cubic feet	in.		cubic feet	in.		cubic feet	in.		cubic feet	ac.	ac.	ac.	ac.						ac.	ac.	ac.	ac.	in.	cubic feet	cubic feet	cubic feet
POI 1	2.00	0.13	6.5%	New Dev'l	1415.00	1415.00	0.13	1.50	0.00	0.00	0.0	0.0	0.00	0.00	NO	0.00	1.50	1.50	N/A	N/A	0	N/A	N/A	0	N/A	N/A	0	N/A	N/A	0	###	###	###	###	###	0.95	11,432	2.60	0.95	0	0	11,432	NO	###	###	###	###	###	724	0	724
POI 2	0.59	0.00	0.0%	New Dev'l	69.00	69.00	0.00	0.48	0.00	0.00	0.0	0.0	0.00	0.00	NO	0.00	0.48	0.48	N/A	N/A	0	N/A	N/A	0	N/A	N/A	0	N/A	N/A	0	###	###	###	###	###	0.95	3,642	2.60	0.95	0	0	3,642	NO	###	###	###	###	###	215	0	215

Project:		Designed By:	LT
County:		Checked By:	PL
Watershed:		Approved By:	
SHA Project Number:		Date:	5/21/2021
PRD Project Number:			
Design Phase:		**POI:**	**1**
		Facility No:	**BS 1**
		Location:	

Bioswale Design Calculations

Step 1: Bioswale Dimensions

Input Cell

Contributing Rainfall Target (P_E) =	1	in.	= Target Pe for the Contributing Area
HSG A =		sf.	= HSG A within Contributing Area
HSG B =		sf.	= HSG B within Contributing Area
HSG C =	45000	sf.	= HSG C within Contributing Area
HSG D =	0	sf.	= HSG D within Contributing Area
Contributing Area (A) =	45000	sf.	= Maximum Contributing Drainage Area: 1 ac.
Contributing Impervious Area (A_I) =	6000	sf.	
Bioswale Length (L) =	600	ft.	= 4 cells x Check Dam Height / Bioswale Slope = 4 x 0.75' / 0.02 = 150'
Bioswale Bottom Width (W) =		ft.	
Bioswale Surface Area (A_f) =	0.00	sf.	= Surface Area must be ≥ 2% of the contributing Area ----> 0%
Side Slope (S_S) =	0.25	ft/ft	= 4:1 maximum side slopes
Bioswale Slope (S_L) =	0.040	ft/ft	= 4% maximum longitudinal slope
Facility Underdrain Diameter (d) =	6	in.	

Step 2: Storage Requirements

Percent Impervious Area ($\%_{IMP}$) =	13.3	% → use	15%
Volumetric Runoff Coefficient (R_v) =	0.170		= 0.5 + 0.009 * ($\%_{IMP}$)
A_f/A_i =	0.0	% → use	2%
ESD_v to be Captured by Bioswale (V_{TBC}) =	638	cf.	= (P_E * A * R_v) / 12
Percent Storage Required Above Surface ($V_{\%-R}$) =	50%	of ESD_v	= Surface Storage tables based on P_E, $\%_{IMP}$, and A_f/A_i

Step 3: Partial Storage Calculations

Check Dam Height (CD_H) =	0.75	ft.	
Check Dam Spacing (CD_S) =	50.00	ft. (min.)	= CD_H / S_L, If less than 50 ft. a minimum of 50 ft is used.
Number of facilities (F) =	4.00		= L / CD_S
Surface Storage Per Facility (V_F) =	14.06	cf.	= (2 * (CD_H^3 / S_S * S_L) + 3 * (CD_H^2 * W / S_L)) / 6
Total Surface Storage Provided (V_T) =	168.75	cf.	= V_F * F + ((L - CD_S * F) * V_F / CD_S)
Recharge Volume Provided (Rev) =	240.00	cf.	Rev=0.5*8*0.4*L 6" stone below underdrain DS Invert @ 0% slope for Rev
Percent Volume Provided Above Surface ($V_{\%-P}$) =	26%	of ESD_v	= V_T / V_{TBC}
Partial Storage Bypass Volume =	153.12	cf.	= (V_{TBC} * $V_{\%-R}$) - (minimum($V_{\%-R}$ or $V_{\%-P}$) * V_{TBC})

Because the proposed facility does not provide enough surface storage to treat the target Pe, iterations will need to be done to determine the reduced Pe treated.

			Percent Storage	
From	P_E	ESD_v	Required	Actual
	in.	cf.	%	%
Table	0.50	319	45	53
Iteration	0.550	351	46.0	48.5
Table	0.60	383	47	44

The PE treated is based on providing a surface storage volume that is a certain percent of the ESDv, but the ESDv changes depending on the PE. Therefore, determing the PE treated is an iterative process. The table shown demonstrates this process.

Through iterations the achieved Pe for this Bioswale is 0.55 in. and the ESDv attained by the facility is 351 cf.

Step 4: Impervious Area Requiring Treatment (IART) Calculation

Contributing Impervious Area	P_E treated	Impervious Area Treated
ac.	in.	ac.
0.14	0.55	0.08

Because the proposed facility is providing a Pe less than 1 in. only a portion of the contributing Impervious Area equal to the ratio of the treated Pe to a Pe of 1 in., 0.08 ac., is considered treated.

Note: The tables used for determining the amount of surface storage above the media have been provided by MDE to be used with State Highway Administration (SHA) Bioretention Soil Mix (BSM). The tables can only be used with SHA BSM with an infiltration rate of 1 in/hr. The tables are not valid for media with an infiltration rate different than 1 in/hr.

Project:		Designed By:	LT
County:		Checked By:	PL
Watershed:		Approved By:	
SHA Project Number:		Date:	5/21/2021
PRD Project Number:			
Design Phase:		**POI:**	**1**
		Facility No:	**BS 2**
		Location:	

Bioswale Design Calculations

Step 1: Bioswale Dimensions

Input Cell

Contributing Rainfall Target (P_E) =	1.6	in.	= Target Pe for the Contributing Area
HSG A =		sf.	= HSG A within Contributing Area
HSG B =		sf.	= HSG B within Contributing Area
HSG C =	12000	sf.	= HSG C within Contributing Area
HSG D =	0	sf.	= HSG D within Contributing Area
Contributing Area (A) =	12000	sf.	= Maximum Contributing Drainage Area: 1 ac.
Contributing Impervious Area (A_I) =	3500	sf.	
Bioswale Length (L) =	330	ft.	= 4 cells x Check Dam Height / Bioswale Slope = 4 x 0.75' / 0.02 = 150'
Bioswale Bottom Width (W) =	8	ft.	
Bioswale Surface Area (A_f) =	2640.00	sf.	= Surface Area must be ≥ 2% of the contributing Area ----> 22%
Side Slope (S_S) =	0.25	ft/ft	= 4:1 maximum side slopes
Bioswale Slope (S_L) =	0.040	ft/ft	= 4% maximum longitudinal slope
Facility Underdrain Diameter (d) =	6	in.	

Step 2: Storage Requirements

Percent Impervious Area ($\%_{IMP}$) =	29.2	% → use	30%
Volumetric Runoff Coefficient (R_v) =	0.313		= 0.5 + 0.009 * ($\%_{IMP}$)
A_f/A_i =	75.4	% → use	75%
ESD_v to be Captured by Bioswale (V_{TBC}) =	500	cf.	= (P_E * A * R_v) / 12
Percent Storage Required Above Surface ($V_{\%-R}$) =	24%	of ESD_v	= Surface Storage tables based on P_E, $\%_{IMP}$, and A_f/A_i

Step 3: Partial Storage Calculations

Check Dam Height (CD_H) =	0.75	ft.	
Check Dam Spacing (CD_S) =	50.00	ft. (min.)	= CD_H / S_L, If less than 50 ft. a minimum of 50 ft is used.
Number of facilities (F) =	4.00		= L / CD_S
Surface Storage Per Facility (V_F) =	70.31	cf.	= (2 * (CD_H^3 / S_S * S_L) + 3 * (CD_H^2 * W / S_L)) / 6
Total Surface Storage Provided (V_T) =	464.06	cf.	= V_F * F + ((L - CD_S * F) * V_F / CD_S)
Recharge Volume Provided (Rev) =	240.00	cf.	Rev=0.5*8*0.4*L 6" stone below underdrain DS Invert @ 0% slope for Rev
Percent Volume Provided Above Surface ($V_{\%-P}$) =	93%	of ESD_v	= V_T / V_{TBC}
Partial Storage Bypass Volume =	0.00	cf.	= (V_{TBC} * $V_{\%-R}$) - (minimum($V_{\%-R}$ or $V_{\%-P}$) * V_{TBC})

Because the proposed facility is providing more than enough surface storage, iterations will need to be done to determine the larger Pe treated.

			Percent Storage	
From	P_E	ESD_v	Required	Actual
	in.	cf.	%	%
Table	2.60	813	28	57
Iteration	2.600	813	28.0	57.1
Table	2.60	813	28	57

The PE treated is based on providing a surface storage volume that is a certain percent of the ESDv, but the ESDv changes depending on the PE. Therefore, determing the PE treated is an iterative process. The table shown demonstrates this process.

Through iterations the achieved Pe for this Bioswale is 2.6 in. and the ESDv attained by the facility is 813 cf.

Step 4: Impervious Area Requiring Treatment (IART) Calculation

Contributing Impervious Area	P_E treated	Impervious Area Treated
ac.	in.	ac.
0.08	2.60	0.08

Because the proposed facility is providing a Pe greater than 1 in. 100% of the contributing impervious area, 0.08 ac., is considered treated.

Note: The tables used for determining the amount of surface storage above the media have been provided by MDE to be used with State Highway Administration (SHA) Bioretention Soil Mix (BSM). The tables can only be used with SHA BSM with an infiltration rate of 1 in/hr. The tables are not valid for media with an infiltration rate different than 1 in/hr.

Project:		Designed By:	LT
County:		Checked By:	PL
Watershed:		Approved By:	
SHA Project Number:		Date:	5/21/2021
PRD Project Number:			
Design Phase:		**POI:**	**1**
		Facility No:	**BS 3**
		Location:	

Bioswale Design Calculations

Step 1: Bioswale Dimensions

Input Cell

Contributing Rainfall Target (P_E) =	1.8	in.	= Target Pe for the Contributing Area
HSG A =		sf.	= HSG A within Contributing Area
HSG B =		sf.	= HSG B within Contributing Area
HSG C =	55000	sf.	= HSG C within Contributing Area
HSG D =	0	sf.	= HSG D within Contributing Area
Contributing Area (A) =	55000	sf.	= Maximum Contributing Drainage Area: 1 ac.
Contributing Impervious Area (A_I) =	20000	sf.	
Bioswale Length (L) =	2300	ft.	= 4 cells x Check Dam Height / Bioswale Slope = 4 x 0.75' / 0.02 = 150'
Bioswale Bottom Width (W) =	8	ft.	
Bioswale Surface Area (A_f) =	18400.00	sf.	= Surface Area must be ≥ 2% of the contributing Area ----> 33%
Side Slope (S_S) =	0.25	ft/ft	= 4:1 maximum side slopes
Bioswale Slope (S_L) =	0.040	ft/ft	= 4% maximum longitudinal slope
Facility Underdrain Diameter (d) =	6	in.	

Step 2: Storage Requirements

Percent Impervious Area ($\%_{IMP}$) =	36.4	% → use	40%
Volumetric Runoff Coefficient (R_v) =	0.377		= 0.5 + 0.009 * ($\%_{IMP}$)
A_f/A_i =	92.0	% → use	90%
ESD_v to be Captured by Bioswale (V_{TBC}) =	3113	cf.	= (P_E * A * R_v) / 12
Percent Storage Required Above Surface ($V_{\%-R}$) =	27%	of ESD_v	= Surface Storage tables based on P_E, $\%_{IMP}$, and A_f/A_i

Step 3: Partial Storage Calculations

Check Dam Height (CD_H) =	0.75	ft.	
Check Dam Spacing (CD_S) =	50.00	ft. (min.)	= CD_H / S_L, If less than 50 ft. a minimum of 50 ft is used.
Number of facilities (F) =	4.00		= L / CD_S
Surface Storage Per Facility (V_F) =	70.31	cf.	= (2 * (CD_H^3 / S_S * S_L) + 3 * (CD_H^2 * W / S_L)) / 6
Total Surface Storage Provided (V_T) =	3234.38	cf.	= V_F * F + ((L - CD_S * F) * V_F / CD_S)
Recharge Volume Provided (Rev) =	240.00	cf.	Rev=0.5*8*0.4*L 6" stone below underdrain DS Invert @ 0% slope for Rev
Percent Volume Provided Above Surface ($V_{\%-P}$) =	104%	of ESD_v	= V_T / V_{TBC}
Partial Storage Bypass Volume =	0.00	cf.	= (V_{TBC} * $V_{\%-R}$) - (minimum($V_{\%-R}$ or $V_{\%-P}$) * V_{TBC})

Because the proposed facility is providing more than enough surface storage, iterations will need to be done to determine the larger Pe treated.

			Percent Storage	
From	P_E	ESD_v	Required	Actual
	in.	cf.	%	%
Table	2.60	4496	29	72
Iteration	2.600	4496	29.0	71.9
Table	2.60	4496	29	72

The PE treated is based on providing a surface storage volume that is a certain percent of the ESDv, but the ESDv changes depending on the PE. Therefore, determing the PE treated is an iterative process. The table shown demonstrates this process.

Through iterations the achieved Pe for this Bioswale is 2.6 in. and the ESDv attained by the facility is 4496 cf.

Step 4: Impervious Area Requiring Treatment (IART) Calculation

Contributing Impervious Area	P_E treated	Impervious Area Treated
ac.	in.	ac.
0.46	2.60	0.46

Because the proposed facility is providing a Pe greater than 1 in. 100% of the contributing impervious area, 0.46 ac., is considered treated.

Note: The tables used for determining the amount of surface storage above the media have been provided by MDE to be used with State Highway Administration (SHA) Bioretention Soil Mix (BSM). The tables can only be used with SHA BSM with an infiltration rate of 1 in/hr. The tables are not valid for media with an infiltration rate different than 1 in/hr.

Project:		Designed By:	LT
County:		Checked By:	PL
Watershed:		Approved By:	
SHA Project Number:		Date:	5/21/2021
PRD Project Number:			
Design Phase:		**POI:**	**1**
		Facility No:	**BS 4**
		Location:	

Bioswale Design Calculations

Step 1: Bioswale Dimensions

Input Cell

Contributing Rainfall Target (P_E) =	1.8	in.	= Target Pe for the Contributing Area
HSG A =		sf.	= HSG A within Contributing Area
HSG B =		sf.	= HSG B within Contributing Area
HSG C =	33000	sf.	= HSG C within Contributing Area
HSG D =	0	sf.	= HSG D within Contributing Area
Contributing Area (A) =	33000	sf.	= Maximum Contributing Drainage Area: 1 ac.
Contributing Impervious Area (A_I) =	12000	sf.	
Bioswale Length (L) =	1300	ft.	= 4 cells x Check Dam Height / Bioswale Slope = 4 x 0.75' / 0.02 = 150'
Bioswale Bottom Width (W) =	8	ft.	
Bioswale Surface Area (A_f) =	10400.00	sf.	= Surface Area must be ≥ 2% of the contributing Area ----> 32%
Side Slope (S_S) =	0.25	ft/ft	= 4:1 maximum side slopes
Bioswale Slope (S_L) =	0.040	ft/ft	= 4% maximum longitudinal slope
Facility Underdrain Diameter (d) =	6	in.	

Step 2: Storage Requirements

Percent Impervious Area ($\%_{IMP}$) =	36.4	% → use	40%
Volumetric Runoff Coefficient (R_v) =	0.377		= 0.5 + 0.009 * ($\%_{IMP}$)
A_f/A_i =	86.7	% → use	85%
ESD_v to be Captured by Bioswale (V_{TBC}) =	1868	cf.	= (P_E * A * R_v) / 12
Percent Storage Required Above Surface ($V_{\%-R}$) =	27%	of ESD_v	= Surface Storage tables based on P_E, $\%_{IMP}$, and A_f/A_i

Step 3: Partial Storage Calculations

Check Dam Height (CD_H) =	0.75	ft.	
Check Dam Spacing (CD_S) =	50.00	ft. (min.)	= CD_H / S_L, If less than 50 ft. a minimum of 50 ft is used.
Number of facilities (F) =	4.00		= L / CD_S
Surface Storage Per Facility (V_F) =	70.31	cf.	= (2 * (CD_H^3 / S_S * S_L) + 3 * (CD_H^2 * W / S_L)) / 6
Total Surface Storage Provided (V_T) =	1828.13	cf.	= V_F * F + ((L - CD_S * F) * V_F / CD_S)
Recharge Volume Provided (Rev) =	240.00	cf.	Rev=0.5*8*0.4*L 6" stone below underdrain DS Invert @ 0% slope for Rev
Percent Volume Provided Above Surface ($V_{\%-P}$) =	98%	of ESD_v	= V_T / V_{TBC}
Partial Storage Bypass Volume =	0.00	cf.	= (V_{TBC} * $V_{\%-R}$) - (minimum($V_{\%-R}$ or $V_{\%-P}$) * V_{TBC})

Because the proposed facility is providing more than enough surface storage, iterations will need to be done to determine the larger Pe treated.

			Percent Storage	
From	P_E	ESD_v	Required	Actual
	in.	cf.	%	%
Table	2.60	2698	29	68
Iteration	2.600	2698	29.0	67.8
Table	2.60	2698	29	68

The PE treated is based on providing a surface storage volume that is a certain percent of the ESDv, but the ESDv changes depending on the PE. Therefore, determing the PE treated is an iterative process. The table shown demonstrates this process.

Through iterations the achieved Pe for this Bioswale is 2.6 in. and the ESDv attained by the facility is 2698 cf.

Step 4: Impervious Area Requiring Treatment (IART) Calculation

Contributing Impervious Area	P_E treated	Impervious Area Treated
ac.	in.	ac.
0.28	2.60	0.28

Because the proposed facility is providing a Pe greater than 1 in. 100% of the contributing impervious area, 0.28 ac., is considered treated.

Note: The tables used for determining the amount of surface storage above the media have been provided by MDE to be used with State Highway Administration (SHA) Bioretention Soil Mix (BSM). The tables can only be used with SHA BSM with an infiltration rate of 1 in/hr. The tables are not valid for media with an infiltration rate different than 1 in/hr.

Project:		Designed By:	LT
County:		Checked By:	PL
Watershed:		Approved By:	
SHA Project Number:		Date:	5/21/2021
PRD Project Number:			
Design Phase:		**POI:**	**2**
		Facility No:	**BS 5**
		Location:	

Bioswale Design Calculations

Step 1: Bioswale Dimensions

Input Cell

Contributing Rainfall Target (P_E) =	1.6	in.	= Target Pe for the Contributing Area
HSG A =		sf.	= HSG A within Contributing Area
HSG B =		sf.	= HSG B within Contributing Area
HSG C =	14000	sf.	= HSG C within Contributing Area
HSG D =	0	sf.	= HSG D within Contributing Area
Contributing Area (A) =	14000	sf.	= Maximum Contributing Drainage Area: 1 ac.
Contributing Impervious Area (A_I) =	4000	sf.	
Bioswale Length (L) =	380	ft.	= 4 cells x Check Dam Height / Bioswale Slope = 4 x 0.75' / 0.02 = 150'
Bioswale Bottom Width (W) =	8	ft.	
Bioswale Surface Area (A_f) =	3040.00	sf.	= Surface Area must be ≥ 2% of the contributing Area ----> 22%
Side Slope (S_S) =	0.25	ft/ft	= 4:1 maximum side slopes
Bioswale Slope (S_L) =	0.040	ft/ft	= 4% maximum longitudinal slope
Facility Underdrain Diameter (d) =	6	in.	

Step 2: Storage Requirements

Percent Impervious Area ($\%_{IMP}$) =	28.6	% → use	30%
Volumetric Runoff Coefficient (R_v) =	0.307		= 0.5 + 0.009 * ($\%_{IMP}$)
A_f/A_i =	76.0	% → use	75%
ESD_v to be Captured by Bioswale (V_{TBC}) =	573	cf.	= (P_E * A * R_v) / 12
Percent Storage Required Above Surface ($V_{\%-R}$) =	24%	of ESD_v	= Surface Storage tables based on P_E, $\%_{IMP}$, and A_f/A_i

Step 3: Partial Storage Calculations

Check Dam Height (CD_H) =	0.75	ft.	
Check Dam Spacing (CD_S) =	50.00	ft. (min.)	= CD_H / S_L, If less than 50 ft. a minimum of 50 ft is used.
Number of facilities (F) =	4.00		= L / CD_S
Surface Storage Per Facility (V_F) =	70.31	cf.	= (2 * (CD_H^3 / S_S * S_L) + 3 * (CD_H^2 * W / S_L)) / 6
Total Surface Storage Provided (V_T) =	534.38	cf.	= V_F * F + ((L - CD_S * F) * V_F / CD_S)
Recharge Volume Provided (Rev) =	240.00	cf.	Rev=0.5*8*0.4*L 6" stone below underdrain DS Invert @ 0% slope for Rev
Percent Volume Provided Above Surface ($V_{\%-P}$) =	93%	of ESD_v	= V_T / V_{TBC}
Partial Storage Bypass Volume =	0.00	cf.	= (V_{TBC} * $V_{\%-R}$) - (minimum($V_{\%-R}$ or $V_{\%-P}$) * V_{TBC})

Because the proposed facility is providing more than enough surface storage, iterations will need to be done to determine the larger Pe treated.

			Percent Storage	
From	P_E	ESD_v	Required	Actual
	in.	cf.	%	%
Table	2.60	932	28	57
Iteration	2.600	932	28.0	57.4
Table	2.60	932	28	57

The PE treated is based on providing a surface storage volume that is a certain percent of the ESDv, but the ESDv changes depending on the PE. Therefore, determing the PE treated is an iterative process. The table shown demonstrates this process.

Through iterations the achieved Pe for this Bioswale is 2.6 in. and the ESDv attained by the facility is 932 cf.

Step 4: Impervious Area Requiring Treatment (IART) Calculation

Contributing Impervious Area	P_E treated	Impervious Area Treated
ac.	in.	ac.
0.09	2.60	0.09

Because the proposed facility is providing a Pe greater than 1 in. 100% of the contributing impervious area, 0.09 ac., is considered treated.

Note: The tables used for determining the amount of surface storage above the media have been provided by MDE to be used with State Highway Administration (SHA) Bioretention Soil Mix (BSM). The tables can only be used with SHA BSM with an infiltration rate of 1 in/hr. The tables are not valid for media with an infiltration rate different than 1 in/hr.

Project:		Designed By:	LT
County:		Checked By:	PL
Watershed:		Approved By:	
SHA Project Number:		Date:	5/21/2021
PRD Project Number:			
Design Phase:		**POI:**	**2**
		Facility No:	**BS 6**
		Location:	

Bioswale Design Calculations

Step 1: Bioswale Dimensions

Input Cell

Contributing Rainfall Target (P_E) =	1.6	in.	= Target Pe for the Contributing Area
HSG A =		sf.	= HSG A within Contributing Area
HSG B =		sf.	= HSG B within Contributing Area
HSG C =	26000	sf.	= HSG C within Contributing Area
HSG D =	0	sf.	= HSG D within Contributing Area
Contributing Area (A) =	26000	sf.	= Maximum Contributing Drainage Area: 1 ac.
Contributing Impervious Area (A_I) =	8500	sf.	
Bioswale Length (L) =	830	ft.	= 4 cells x Check Dam Height / Bioswale Slope = 4 x 0.75' / 0.02 = 150'
Bioswale Bottom Width (W) =	8	ft.	
Bioswale Surface Area (A_f) =	6640.00	sf.	= Surface Area must be ≥ 2% of the contributing Area ----> 26%
Side Slope (S_S) =	0.25	ft/ft	= 4:1 maximum side slopes
Bioswale Slope (S_L) =	0.040	ft/ft	= 4% maximum longitudinal slope
Facility Underdrain Diameter (d) =	6	in.	

Step 2: Storage Requirements

Percent Impervious Area ($\%_{IMP}$) =	32.7	% → use	35%
Volumetric Runoff Coefficient (R_v) =	0.344		= 0.5 + 0.009 * ($\%_{IMP}$)
A_f/A_i =	78.1	% → use	75%
ESD_v to be Captured by Bioswale (V_{TBC}) =	1193	cf.	= (P_E * A * R_v) / 12
Percent Storage Required Above Surface ($V_{\%-R}$) =	25%	of ESD_v	= Surface Storage tables based on P_E, $\%_{IMP}$, and A_f/A_i

Step 3: Partial Storage Calculations

Check Dam Height (CD_H) =	0.75	ft.	
Check Dam Spacing (CD_S) =	50.00	ft. (min.)	= CD_H / S_L, If less than 50 ft. a minimum of 50 ft is used.
Number of facilities (F) =	4.00		= L / CD_S
Surface Storage Per Facility (V_F) =	70.31	cf.	= (2 * (CD_H^3 / S_S * S_L) + 3 * (CD_H^2 * W / S_L)) / 6
Total Surface Storage Provided (V_T) =	1167.19	cf.	= V_F * F + ((L - CD_S * F) * V_F / CD_S)
Recharge Volume Provided (Rev) =	240.00	cf.	Rev=0.5*8*0.4*L 6" stone below underdrain DS Invert @ 0% slope for Rev
Percent Volume Provided Above Surface ($V_{\%-P}$) =	98%	of ESD_v	= V_T / V_{TBC}
Partial Storage Bypass Volume =	0.00	cf.	= (V_{TBC} * $V_{\%-R}$) - (minimum($V_{\%-R}$ or $V_{\%-P}$) * V_{TBC})

Because the proposed facility is providing more than enough surface storage, iterations will need to be done to determine the larger Pe treated.

			Percent Storage	
From	P_E	ESD_v	Required	Actual
	in.	cf.	%	%
Table	2.60	1939	28	60
Iteration	2.600	1939	28.0	60.2
Table	2.60	1939	28	60

The PE treated is based on providing a surface storage volume that is a certain percent of the ESDv, but the ESDv changes depending on the PE. Therefore, determing the PE treated is an iterative process. The table shown demonstrates this process.

Through iterations the achieved Pe for this Bioswale is 2.6 in. and the ESDv attained by the facility is 1939 cf.

Step 4: Impervious Area Requiring Treatment (IART) Calculation

Contributing Impervious Area	P_E treated	Impervious Area Treated
ac.	in.	ac.
0.20	2.60	0.20

Because the proposed facility is providing a Pe greater than 1 in. 100% of the contributing impervious area, 0.2 ac., is considered treated.

Note: The tables used for determining the amount of surface storage above the media have been provided by MDE to be used with State Highway Administration (SHA) Bioretention Soil Mix (BSM). The tables can only be used with SHA BSM with an infiltration rate of 1 in/hr. The tables are not valid for media with an infiltration rate different than 1 in/hr.

Project:		Designed By:	LT
County:		Checked By:	PL
Watershed:		Approved By:	
SHA Project Number:		Date:	5/21/2021
PRD Project Number:			
Design Phase:		**POI:**	**2**
		Facility No:	**BS 7**
		Location:	

Bioswale Design Calculations

Step 1: Bioswale Dimensions

Input Cell

Contributing Rainfall Target (P_E) =	1.6	in.	= Target Pe for the Contributing Area
HSG A =		sf.	= HSG A within Contributing Area
HSG B =		sf.	= HSG B within Contributing Area
HSG C =	20000	sf.	= HSG C within Contributing Area
HSG D =	0	sf.	= HSG D within Contributing Area
Contributing Area (A) =	20000	sf.	= Maximum Contributing Drainage Area: 1 ac.
Contributing Impervious Area (A_I) =	6000	sf.	
Bioswale Length (L) =	590	ft.	= 4 cells x Check Dam Height / Bioswale Slope = 4 x 0.75' / 0.02 = 150'
Bioswale Bottom Width (W) =	8	ft.	
Bioswale Surface Area (A_f) =	4720.00	sf.	= Surface Area must be ≥ 2% of the contributing Area ----> 24%
Side Slope (S_S) =	0.25	ft/ft	= 4:1 maximum side slopes
Bioswale Slope (S_L) =	0.040	ft/ft	= 4% maximum longitudinal slope
Facility Underdrain Diameter (d) =	6	in.	

Step 2: Storage Requirements

Percent Impervious Area ($\%_{IMP}$) =	30.0	% → use	30%
Volumetric Runoff Coefficient (R_v) =	0.320		= 0.5 + 0.009 * ($\%_{IMP}$)
A_f/A_i =	78.7	% → use	75%
ESD_v to be Captured by Bioswale (V_{TBC}) =	853	cf.	= (P_E * A * R_v) / 12
Percent Storage Required Above Surface ($V_{\%-R}$) =	24%	of ESD_v	= Surface Storage tables based on P_E, $\%_{IMP}$, and A_f/A_i

Step 3: Partial Storage Calculations

Check Dam Height (CD_H) =	0.75	ft.	
Check Dam Spacing (CD_S) =	50.00	ft. (min.)	= CD_H / S_L, If less than 50 ft. a minimum of 50 ft is used.
Number of facilities (F) =	4.00		= L / CD_S
Surface Storage Per Facility (V_F) =	70.31	cf.	= (2 * (CD_H^3 / S_S * S_L) + 3 * (CD_H^2 * W / S_L)) / 6
Total Surface Storage Provided (V_T) =	829.69	cf.	= V_F * F + ((L - CD_S * F) * V_F / CD_S)
Recharge Volume Provided (Rev) =	240.00	cf.	Rev=0.5*8*0.4*L 6" stone below underdrain DS Invert @ 0% slope for Rev
Percent Volume Provided Above Surface ($V_{\%-P}$) =	97%	of ESD_v	= V_T / V_{TBC}
Partial Storage Bypass Volume =	0.00	cf.	= (V_{TBC} * $V_{\%-R}$) - (minimum($V_{\%-R}$ or $V_{\%-P}$) * V_{TBC})

Because the proposed facility is providing more than enough surface storage, iterations will need to be done to determine the larger Pe treated.

			Percent Storage	
From	P_E	ESD_v	Required	Actual
	in.	cf.	%	%
Table	2.60	1387	28	60
Iteration	2.600	1387	28.0	59.8
Table	2.60	1387	28	60

The PE treated is based on providing a surface storage volume that is a certain percent of the ESDv, but the ESDv changes depending on the PE. Therefore, determing the PE treated is an iterative process. The table shown demonstrates this process.

Through iterations the achieved Pe for this Bioswale is 2.6 in. and the ESDv attained by the facility is 1387 cf.

Step 4: Impervious Area Requiring Treatment (IART) Calculation

Contributing Impervious Area	P_E treated	Impervious Area Treated
ac.	in.	ac.
0.14	2.60	0.14

Because the proposed facility is providing a Pe greater than 1 in. 100% of the contributing impervious area, 0.14 ac., is considered treated.

Note: ***The tables used for determining the amount of surface storage above the media have been provided by MDE to be used with State Highway Administration (SHA) Bioretention Soil Mix (BSM). The tables can only be used with SHA BSM with an infiltration rate of 1 in/hr. The tables are not valid for media with an infiltration rate different than 1 in/hr.***

Project:		Designed By:	LT
County:		Checked By:	FL
Watershed:		Approved By:	
SHA Project Number:		Date:	
PRD Project Number:			
Design Phase:		**POI:**	**1**
		Facility No:	**MB 1**
		Location:	

Micro-Bioretention Design Calculations

Step 1: Micro-Bioretention Dimensions

Input Cell

Contributing Rainfall Target (P_E) =	2	in.	= Target Pe for the Contributing Area
HSG A =		sf.	= HSG A within Contributing Area
HSG B =		sf.	= HSG B within Contributing Area
HSG C =	20000	sf.	= HSG C within Contributing Area
HSG D =		sf.	= HSG D within Contributing Area
Contributing Area (A) =	20000	sf.	= Maximum Contributing Drainage Area: 1 ac.
Contributing Impervious Area (A_i) =	12000	sf.	
Bioswale Bottom Width (W) =	8	ft.	
Microbioretention Surface Area (A_f) =	1000	sf.	= Surface Area must be ≥ 2% of the contributing Area ----> 5%
Side Slope (S_S) =	0.25	ft/ft	= 4:1 maximum side slopes
Facility Underdrain Diameter (d) =		in.	

Step 2: Storage Requirements

Percent Impervious Area ($\%_{IMP}$) =	60.0	% → use	60%
Volumetric Runoff Coefficient (R_v) =	0.590		= 0.5 + 0.009 * ($\%_{IMP}$)
A_f/A_i =	8.3	% → use	5%

ESD_v to be Captured by Biorentention (V_{TBC}) =	1967	cf.	= (P_E * A * R_v) / 12
Percent Storage Required Above Surface ($V_{\%-R}$) =	55%	of ESD_v	= Surface Storage tables based on P_E, $\%_{IMP}$, and A_f/A_i

Step 3: Partial Storage Calculations

* Total Surface Storage Provided (V_T) =	1665.00	cf.	= V_F * F + ((L - CD_S * F) * V_F / CD_S)
Recharge Volume Provided (Rev) =	200.00	cf.	Rev=Bottom surface* 6" * 0.4 6" stone below underdrain 0% slope for Rev
Percent Volume Provided Above Surface ($V_{\%-P}$) =	84.6	of ESD_v	= V_T / V_{TBC}
Partial Storage Bypass Volume =	0.00	cf.	= (V_{TBC} * $V_{\%-R}$) - (minimum($V_{\%-R}$ or $V_{\%-P}$) * V_{TBC})

Because the proposed facility is providing more than enough surface storage, iterations will need to be done to determine the larger Pe treated.

			Percent Storage	
From	P_E	ESD_v	Required	Actual
	in.	cf.	%	%
Table	2.60	2557	55	65
Iteration	2.600	2557	55.0	65.1
Table	2.60	2557	55	65

The PE treated is based on providing a surface storage volume that is a certain percent of the ESDv, but the ESDv changes depending on the PE. Therefore, determing the PE treated is an iterative process. The table shown demonstrates this process.

Through iterations the achieved Pe for this Bioswale is 2.6 in. and the ESDv attained by the facility is 2557 cf.

Step 4: Impervious Area Requiring Treatment (IART) Calculation

Contributing Impervious Area	P_E treated	Impervious Area Treated
ac.	in.	ac.
0.28	2.60	0.28

Because the proposed facility is providing a Pe greater than 1 in. 100% of the contributing impervious area, 0.28 ac., is considered treated.

Note: The tables used for determining the amount of surface storage above the media have been provided by MDE to be used with State Highway Administration (SHA) Bioretention Soil Mix (BSM). The tables can only be used with SHA BSM with an infiltration rate of 1 in/hr. The tables are not valid for media with an infiltration rate different than 1 in/hr.

Project:		Designed By:	LT
County:		Checked By:	PL
Watershed:		Approved By:	
SHA Project Number:		Date:	
PRD Project Number:			
Design Phase:		**POI:**	**1**
		Facility No:	**MB 2**
		Location:	

Micro-Bioretention Design Calculations

Step 1: Micro-Bioretention Dimensions

Input Cell

Contributing Rainfall Target (P_E) =	1	in.	= Target Pe for the Contributing Area
HSG A =		sf.	= HSG A within Contributing Area
HSG B =		sf.	= HSG B within Contributing Area
HSG C =		sf.	= HSG C within Contributing Area
HSG D =	10000	sf.	= HSG D within Contributing Area
Contributing Area (A) =	10000	sf.	= Maximum Contributing Drainage Area: 1 ac.
Contributing Impervious Area (A_i) =	2000	sf.	
Bioswale Bottom Width (W) =	20	ft.	
Microbioretention Surface Area (A_f) =	500	sf.	= Surface Area must be ≥ 2% of the contributing Area ----> 5%
Side Slope (S_S) =	0.25	ft/ft	= 4:1 maximum side slopes
Facility Underdrain Diameter (d) =	6	in.	

Step 2: Storage Requirements

Percent Impervious Area ($\%_{IMP}$) =	20.0	% → use	20%
Volumetric Runoff Coefficient (R_v) =	0.230		= 0.5 + 0.009 * ($\%_{IMP}$)
A_f/A_i =	25.0	% → use	25%

ESD_v to be Captured by Biorentention (V_{TBC}) =	192	cf.	= (P_E * A * R_v) / 12
Percent Storage Required Above Surface ($V_{\%-R}$) =	26%	of ESD_v	= Surface Storage tables based on P_E, $\%_{IMP}$, and A_f/A_i

Step 3: Partial Storage Calculations

* Total Surface Storage Provided (V_T) =	1665.00	cf.	= V_F * F + ((L - CD_S * F) * V_F / CD_S)
Recharge Volume Provided (Rev) =	100.00	cf.	Rev=Bottom surface* 6" * 0.4 6" stone below underdrain 0% slope for Rev
Percent Volume Provided Above Surface ($V_{\%-P}$) =	867.2	of ESD_v	= V_T / V_{TBC}
Partial Storage Bypass Volume =	0.00	cf.	= (V_{TBC} * $V_{\%-R}$) - (minimum($V_{\%-R}$ or $V_{\%-P}$) * V_{TBC})

Because the proposed facility is providing more than enough surface storage, iterations will need to be done to determine the larger Pe treated.

			Percent Storage	
From	P_E	ESD_v	Required	Actual
	in.	cf.	%	%
Table	2.60	498	35	334
Iteration	2.600	498	35.0	334.1
Table	2.60	498	35	334

The PE treated is based on providing a surface storage volume that is a certain percent of the ESDv, but the ESDv changes depending on the PE. Therefore, determing the PE treated is an iterative process. The table shown demonstrates this process.

Through iterations the achieved Pe for this Bioswale is 2.6 in. and the ESDv attained by the facility is 498 cf.

Step 4: Impervious Area Requiring Treatment (IART) Calculation

Contributing Impervious Area	P_E treated	Impervious Area Treated
ac.	in.	ac.
0.05	2.60	0.05

Because the proposed facility is providing a Pe greater than 1 in. 100% of the contributing impervious area, 0.05 ac., is considered treated.

Note: The tables used for determining the amount of surface storage above the media have been provided by MDE to be used with State Highway Administration (SHA) Bioretention Soil Mix (BSM). The tables can only be used with SHA BSM with an infiltration rate of 1 in/hr. The tables are not valid for media with an infiltration rate different than 1 in/hr.

Project:		Designed By:	LT
County:		Checked By:	PL
Watershed:		Approved By:	
SHA Project Number:		Date:	
PRD Project Number:			
Design Phase:		**POI:**	**1**
		Facility No:	**MB 3**
		Location:	

Micro-Bioretention Design Calculations

Step 1: Micro-Bioretention Dimensions

Input Cell

Contributing Rainfall Target (P_E) =	2	in.	= Target Pe for the Contributing Area
HSG A =	0	sf.	= HSG A within Contributing Area
HSG B =		sf.	= HSG B within Contributing Area
HSG C =	5000	sf.	= HSG C within Contributing Area
HSG D =		sf.	= HSG D within Contributing Area
Contributing Area (A) =	5000	sf.	= Maximum Contributing Drainage Area: 1 ac.
Contributing Impervious Area (A_i) =	2500	sf.	
Bioswale Bottom Width (W) =	5	ft.	
Microbioretention Surface Area (A_f) =	250	sf.	= Surface Area must be ≥ 2% of the contributing Area ----> 5%
Side Slope (S_S) =	0.25	ft/ft	= 4:1 maximum side slopes
Facility Underdrain Diameter (d) =		in.	

Step 2: Storage Requirements

Percent Impervious Area ($\%_{IMP}$) =	50.0	% → use	50%
Volumetric Runoff Coefficient (R_v) =	0.500		= 0.5 + 0.009 * ($\%_{IMP}$)
A_f/A_i =	10.0	% → use	10%

ESD_v to be Captured by Biorentention (V_{TBC}) =	375	cf.	= (P_E * A * R_v) / 12
Percent Storage Required Above Surface ($V_{\%-R}$) =	48%	of ESD_v	= Surface Storage tables based on P_E, $\%_{IMP}$, and A_f/A_i

Step 3: Partial Storage Calculations

* Total Surface Storage Provided (V_T) =	1665.00	cf.	= V_F * F + ((L - CD_S * F) * V_F / CD_S)
Recharge Volume Provided (Rev) =	50.00	cf.	Rev=Bottom surface* 6" * 0.4 6" stone below underdrain 0% slope for Rev
Percent Volume Provided Above Surface ($V_{\%-P}$) =	444.0	of ESD_v	= V_T / V_{TBC}
Partial Storage Bypass Volume =	0.00	cf.	= (V_{TBC} * $V_{\%-R}$) - (minimum($V_{\%-R}$ or $V_{\%-P}$) * V_{TBC})

Because the proposed facility is providing more than enough surface storage, iterations will need to be done to determine the larger Pe treated.

			Percent Storage	
From	P_E	ESD_v	Required	Actual
	in.	cf.	%	%
Table	2.60	542	49	307
Iteration	2.600	542	49.0	307.4
Table	2.60	542	49	307

The PE treated is based on providing a surface storage volume that is a certain percent of the ESDv, but the ESDv changes depending on the PE. Therefore, determing the PE treated is an iterative process. The table shown demonstrates this process.

Through iterations the achieved Pe for this Bioswale is 2.6 in. and the ESDv attained by the facility is 542 cf.

Step 4: Impervious Area Requiring Treatment (IART) Calculation

Contributing Impervious Area	P_E treated	Impervious Area Treated
ac.	in.	ac.
0.06	2.60	0.06

Because the proposed facility is providing a Pe greater than 1 in. 100% of the contributing impervious area, 0.06 ac., is considered treated.

Note: The tables used for determining the amount of surface storage above the media have been provided by MDE to be used with State Highway Administration (SHA) Bioretention Soil Mix (BSM). The tables can only be used with SHA BSM with an infiltration rate of 1 in/hr. The tables are not valid for media with an infiltration rate different than 1 in/hr.

Project:		Designed By:	LT
County:		Checked By:	PL
Watershed:		Approved By:	
SHA Project Number:		Date:	
PRD Project Number:			
Design Phase:		**POI:**	**1**
		Facility No:	**MB 4**
		Location:	

Micro-Bioretention Design Calculations

Step 1: Micro-Bioretention Dimensions

Input Cell

Contributing Rainfall Target (P_E) =	2	in.	= Target Pe for the Contributing Area
HSG A =	0	sf.	= HSG A within Contributing Area
HSG B =		sf.	= HSG B within Contributing Area
HSG C =	20000	sf.	= HSG C within Contributing Area
HSG D =		sf.	= HSG D within Contributing Area
Contributing Area (A) =	20000	sf.	= Maximum Contributing Drainage Area: 1 ac.
Contributing Impervious Area (A_i) =	6500	sf.	
Bioswale Bottom Width (W) =	5	ft.	
Microbioretention Surface Area (A_f) =	400	sf.	= Surface Area must be ≥ 2% of the contributing Area ----> 2%
Side Slope (S_S) =	0.25	ft/ft	= 4:1 maximum side slopes
Facility Underdrain Diameter (d) =		in.	

Step 2: Storage Requirements

Percent Impervious Area ($\%_{IMP}$) =	32.5	% → use	35%
Volumetric Runoff Coefficient (R_v) =	0.343		= 0.5 + 0.009 * ($\%_{IMP}$)
A_f/A_i =	6.2	% → use	5%

ESD_v to be Captured by Biorentention (V_{TBC}) =	913	cf.	= (P_E * A * R_v) / 12
Percent Storage Required Above Surface ($V_{\%-R}$) =	51%	of ESD_v	= Surface Storage tables based on P_E, $\%_{IMP}$, and A_f/A_i

Step 3: Partial Storage Calculations

* Total Surface Storage Provided (V_T) =	1665.00	cf.	= V_F * F + ((L - CD_S * F) * V_F / CD_S)
Recharge Volume Provided (Rev) =	80.00	cf.	Rev=Bottom surface* 6" * 0.4 6" stone below underdrain 0% slope for Rev
Percent Volume Provided Above Surface ($V_{\%-P}$) =	182.4	of ESD_v	= V_T / V_{TBC}
Partial Storage Bypass Volume =	0.00	cf.	= (V_{TBC} * $V_{\%-R}$) - (minimum($V_{\%-R}$ or $V_{\%-P}$) * V_{TBC})

Because the proposed facility is providing more than enough surface storage, iterations will need to be done to determine the larger Pe treated.

			Percent Storage	
From	P_E	ESD_v	Required	Actual
	in.	cf.	%	%
Table	2.60	1484	52	112
Iteration	2.600	1484	52.0	112.2
Table	2.60	1484	52	112

The PE treated is based on providing a surface storage volume that is a certain percent of the ESDv, but the ESDv changes depending on the PE. Therefore, determing the PE treated is an iterative process. The table shown demonstrates this process.

Through iterations the achieved Pe for this Bioswale is 2.6 in. and the ESDv attained by the facility is 1484 cf.

Step 4: Impervious Area Requiring Treatment (IART) Calculation

Contributing Impervious Area	P_E treated	Impervious Area Treated
ac.	in.	ac.
0.15	2.60	0.15

Because the proposed facility is providing a Pe greater than 1 in. 100% of the contributing impervious area, 0.15 ac., is considered treated.

Note: The tables used for determining the amount of surface storage above the media have been provided by MDE to be used with State Highway Administration (SHA) Bioretention Soil Mix (BSM). The tables can only be used with SHA BSM with an infiltration rate of 1 in/hr. The tables are not valid for media with an infiltration rate different than 1 in/hr.