Calculation for Bioswale's Storage Capacity

Project Name:_____
Date Submitted:_____
Property Address:_____
MSD Reviewer:_____
WM No._____
Development/Property Name:_____
GMP Number:_____
Design Firm:_____
Design Engineer:_____Telephone:_____Email:_____
KY PE No.:_____

Step A. Site Planning Recommendation

Define goals and primary function of bioswale based on the Bioswales Step by Step Design Procedures beginning on page 18.5.1-9 as well as Table 18.5.1-A. Refer to these sections as needed throughout the remainder of this calculation sheet.

Step B. Determine the Required Water Quality Volume Rain Event, RE_{WQV} in inches (Refer to Chapter 18.3; a minimum depth of 0.6 inches must be used):

_____ inches

Step C. Calculate the Required Water Quality Volume (WQ_V Required) of water to be removed by the Bioswale

1. A = Contributing drainage area to bioswale: _____ ft^2
2. RE_{WQV} = Required WQ_V Rain Event in inches: _____ inches
3. I = Impervious cover of the contribution drainage area in percent: _____ %
   a. $R_V^* = 0.05 + 0.009\ (I) =$ _____
4. WQ_V Required* = $(A/12)(RE_{WQV})(R_V) =$ _____ ft^3

Step D. Calculate the Provided Water Quality Volume (WQ_V Provided), or storage capacity of Bioswale

1. PD=Volume of Pretreatment Device (See Table 18.5.1-A for design of pretreatment device) _____ ft^3
2. W = Width of bioswale _____ ft
3. L = Length of bioswale _____ ft
4. A = Area of bioswale = W * L: _____ ft^2
5. φ = porosity of media (% void): 40 %
6. M = depth of media _____ ft
7. P = ponding depth of water _____ ft
8. WQ_V Provided = $(A)[\varphi(M) + P]+PD$ _____ ft^3

Step F. Determine the Managed Water Quality Volume (MWQ_V)

1. Determine the GMP Management Capacity of the bioswale in percent (Refer to Table 18.3-C for percent): _____ %
2. $MWQ_V = (1/100)$(GMP Management Capacity in percent)(WQ_V Provided) = _____ ft^3
3. Is all of the WQ_V Required managed or treated (i.e. is MWQ_V greater than or equal to WQ_V Required)? _____

   If No, adjust WQ_V Provided parameters to allow for greater storage capacity and/or proceed to Step G (if using GMP with less runoff reduction capacity).
   If Yes, proceed to step I.

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Step G. Calculate the Required Remaining Water Quality Volume (RWQ_V)

1. Required $RWQ_V = 2(WQ_V \text{ Required} - MWQ_V) =$ _____ ft^3

Step H. Check velocities for water quality storm

Based on the average bioswale cross-section and slope, check flow velocities and water surface elevations for the WQ_V Rain Event. Verify that the velocity for the WQ_V Rain Event is within 1 fps to promote sediment drop out and filtration as well as reduce erosion potential.

1. Check Flow Velocities _____ ft/s
2. WQ_V Rain Event Velocities _____ ft/s
3. Is the check flow velocity with in 1 fps of the WQ_V rain event velocity? _____

Step I. Select Alternate GMPs to Treat RWQ_V. Examples may include:

Additional Calculations and Explanation

□ Green Wet Basin
□ Green Dry Basin
□ Catch Basin Inserts
□ Proprietary Water Quality Units
□ Other

1. How much additional WQ_V is removed by the Alternate GMPs? _____ ft^3
2. Does the Alternate GMP remove all the Required RWQV? _____
3. If Yes, proceed to step J.
   If No, alter existing GMPs or add new ones to provide adequate storage.

Step J. Complete O&M documentation.

Additional Calculations and Explanation (Required if design deviates from calculation sheet):

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