Calculation for Rain Garden'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 rain garden based on the Rain Garden Step by Step Design Procedures beginning on page 18.5.2-8 as well as Table 18.5.2-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 Rain Gardens

1. A = Contributing drainage area to rain garden: _____ 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. Size Pretreatment device to hold 10%-15% of the Water Quality Volume (Optional)

1. Percentage of Water Quality Volume (WQ_V) to design pretreatment: P _____ %
2. Size of pretreatment device (PD): $(P)(WQ_V)=$ _____ ft^3

Step E. Determine minimum surface area of rain garden

1. Refer to table 18.5.2-A
2. WQ_V=required water quality volume: _____ ft^3
3. h=average height of water above the amended/in situ soils during WQ_V rain event _____ ft
4. d=depth of any amended soils _____ ft
5. P=porosity of any amended soils (% void): 40 %
6. A=Surface area of the ponding area of the rain garden=$(WQ_V)/[(d)(P)+h]$ _____ ft^2

Step F. Calculate the Provided Water Quality Volume (WQ_V Provided), or storage capacity of Rain Gardens

1. PD=Volume of Pretreatment Device (See Table 18.5.2-A for design of pretreatment device) _____ ft^3
2. A = Area of rain garden: _____ ft^2
3. φ = porosity of media (% void): 40 %
4. M = depth of media _____ ft
5. P = ponding depth of water _____ ft

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6. WQ_V Provided = (A)[φ(M) + P] + PD _____ ft^3

Step G. Compare the minimum calculated surface area of the rain garden to the input area of the rain garden

1. Is the area in step F.2 greater than the minimum surface area calculated in step E.6? _____

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

1. Determine the GMP Management Capacity of the rain garden in percent (Refer to Table 18.3-C for percent). Please attach model printout or other documentation to verify retention times as required by Table 18.3-C. _____ %
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 I (if using GMP with less runoff reduction capacity).

   If Yes, proceed to step K.

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

1. Required RWQ_V = 2(WQ_V Required - MWQ_V) = _____ ft^3

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

Check all that apply. Include additional calculation sheets as necessary.

□ 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 K.
   If No, alter existing GMPs or add new ones to provide adequate storage.

Step K. Complete O&M documentation.

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

_____
_____
_____
_____