Calculation for Rain Garden's Storage Capacity

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 18.5.2I8 as well as Table 18.5.2IA. 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):

Step C. Calculate the Required Water Quality Volume (WQ_{Required}) of water to be removed by Rain Gardens

1. A = Contributing drainage area to rain garden: \( \text{ft}^2 \)
2. RE_{WQV} = Required WQ_{V} Rain Event in inches: \( \text{inches} \)
3. I = Impervious cover of the contribution drainage area in percent: \( \% \)
   a. \( R_V = 0.05 + 0.009 \times I = \)
4. WQ_{V} Required = \( \frac{A}{12} \times (R_V \times RE_{WQV}) = \text{ft}^3 \)

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): \( P \times (WQ_{V})= \text{ft}^3 \)

Step E. Determine minimum surface area of rain garden

1. Refer to table 18.5.2-A
2. WQ_{V}=required water quality volume: \( \text{ft}^3 \)
3. h=average height of water above the amended/in situ soils during WQ_{V} rain event \( \text{ft} \)
4. d=depth of any amended soils \( \text{ft} \)
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] \( \text{ft}^2 \)

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) \( \text{ft}^3 \)
2. A = Area of rain garden: \( \text{ft}^2 \)
3. \( \varphi \) = porosity of media (% void): 40 %
4. M = depth of media \( \text{ft} \)
5. P = ponding depth of water \( \text{ft} \)
Calculation for Rain Garden's Storage Capacity

6. WQV Provided = (A)\[\phi(M) + P\] + 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 (MWQV)

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. MWQV = (1/100)(GMP Management Capacity in percent)(WQV Provided) =

ft$^3$

3. Is all of the WQV Required managed or treated (i.e. is MWQV greater than or equal to WQV Required)?

If No, adjust WQV 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 (RWQV)

1. Required RWQV = 2(WQV Required - MWQV) =

ft$^3$

Step J. Select Alternate GMPs to Treat RWQV. 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 WQV 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):

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