

Bioretention Exercise - Solution

Task 1 Solution

Step 1: Determine percent impervious area:

$$I = \frac{0.16 \text{ acres} \times 100\%}{0.20 \text{ acres}} = 80\%$$

Step 2: Determine volumetric runoff coefficient:

$$R_v = 0.05 + (0.009)(80) = 0.77$$

Step 3: Determine water quality volume:

$$WQ_v = \frac{(1 \text{ in})(0.77)(0.20 \text{ acre})}{12 \text{ in/ft}} = 0.0128 \text{ acre-ft} = 557.5 \text{ ft}^3$$

Step 4: Determine the area:

$$A = \frac{(557.5)(2.5)}{(0.5)(2)(2.5 + 0.5)} = 465 \text{ ft}^2$$

Task 2 Solution

Step 1: Determine percent impervious area:

$$I = \frac{0.16 \text{ acres} \times 100\%}{0.20 \text{ acres}} = 80\%$$

Step 2: Determine volumetric runoff coefficient:

$$R_v = 0.05 + (0.009)(80) = 0.77$$

Step 3: Determine water quality volume:

$$WQ_v = \frac{(1 \text{ in})(0.77)(0.20 \text{ acre})}{12 \text{ in/ft}} = 0.0128 \text{ acre-ft} = 557.5 \text{ ft}^3$$

Step 4: Determine the area:

$$A = \frac{(557.5)(3.5)}{(0.5)(2)(3.5 + 0.5)} = 488 \text{ ft}^2$$

Task 3 Solution

Step 1: Determine percent impervious area:

$$I = \frac{0.16 \text{ acres} \times 100\%}{0.20 \text{ acres}} = 80\%$$

Step 2: Determine volumetric runoff coefficient:

$$R_v = 0.05 + (0.009)(80) = 0.77$$

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Step 3: Determine water quality volume:

$$WQ_V = \frac{(1 \text{ in})(0.77)(0.20 \text{ acre})}{12 \text{ in/ft}} = 0.0128 \text{ acre-ft} = 557.5 \text{ ft}^3$$

Step 4: Determine the area:

$$A = \frac{(557.5)(4.0)}{(0.5)(2)(4.0 + 0.5)} = 496 \text{ ft}^2$$

Task 4 Solution

Step 1: Determine percent impervious area:

$$I = \frac{0.16 \text{ acres} \times 100\%}{0.20 \text{ acres}} = 80\%$$

Step 2: Determine volumetric runoff coefficient:

$$R_V = 0.05 + (0.009)(80) = 0.77$$

Step 3: Determine water quality volume:

$$WQ_V = \frac{(1 \text{ in})(0.77)(0.20 \text{ acre})}{12 \text{ in/ft}} = 0.0128 \text{ acre-ft} = 557.5 \text{ ft}^3$$

Step 4: Determine the area:

$$A = \frac{(557.5)(2.5)}{(0.5)(2)(2.5 + 0.25)} = 507 \text{ ft}^2$$

Task 5 Solution

Step 1: Determine percent impervious area:

$$I = \frac{0.16 \text{ acres} \times 100\%}{0.20 \text{ acres}} = 80\%$$

Step 2: Determine volumetric runoff coefficient:

$$R_V = 0.05 + (0.009)(80) = 0.77$$

Step 3: Determine water quality volume:

$$WQ_V = \frac{(1 \text{ in})(0.77)(0.20 \text{ acre})}{12 \text{ in/ft}} = 0.0128 \text{ acre-ft} = 557.5 \text{ ft}^3$$

Step 4: Determine the area:

$$A = \frac{(557.5)(2.5)}{(0.5)(2)(2.5 + 0.75)} = 429 \text{ ft}^2$$

Task 6 Solution

Step 1: Determine percent impervious area:

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$$I = \frac{0.16 \text{ acres} \times 100\%}{0.20 \text{ acres}} = 80\%$$

Step 2: Determine volumetric runoff coefficient:

$$R_v = 0.05 + (0.009)(80) = 0.77$$

Step 3: Determine water quality volume:

$$WQ_v = \frac{(1 \text{ in})(0.77)(0.20 \text{ acre})}{12 \text{ in/ft}} = 0.0128 \text{ acre} \cdot \text{ft} = 557.5 \text{ ft}^3$$

Step 4: Determine the area:

$$A = \frac{(557.5)(2.5)}{(0.5)(2)(2.5 + 1.0)} = 398 \text{ ft}^2$$