

# **APPENDIX B EXAMPLE OF CALCULATING STORMWATER FLOW USING THE RATIONAL METHOD**

**PWSA BASIC INFORMATION FOR CALCULATION OF STORMWATER  
FLOW USING THE RATIONAL METHOD**

The rational method for calculating the quantity of stormwater for the PWSA Water and Sewer Use Application is defined by the following equation:

$$Q = CIA$$

where Q = maximum rate of runoff, cubic feet per second (cfs)  
 C = coefficient of runoff based on type and character of surface  
 I = average rainfall intensity, inches per hour (use 5.8 in/hr for the 25-year storm)  
 A = drainage area, acre

**COEFFICIENT OF RUNOFF**

| Type of Surface   | C Value |
|---|---------|
| Improved Surface (concrete, asphalt, brick)               | 0.95    |
| Improved Surface (stone, gravel, or slag-surface treated) | 0.80    |
| Building  | 0.95    |
| Improved Surface (gravel, stone, slag)                    | 0.60    |
| Unimproved Surface (grass and landscaped areas)           | 0.40    |

EXAMPLE

*Assume a lot of 1 acre.*

*Proposed building has area of 0.3 acre – AREA 1*

*Proposed asphalt parking lot and concrete sidewalk has area of 0.2 acre – AREA 2*

*Proposed landscaped area of 0.5 acre – AREA 3*

*Calculate stormwater flow for PWSA Water and Sewer Use Application using rational method.*

| AREA NO.                     | C VALUE | FORMULA                | AMOUNT OF STORMWATER<br>(cfs) |
|------------------------------|---------|------------------------|-------------------------------|
| 1                            | 0.95    | $Q = (0.95)(5.8)(0.3)$ | 1.653                         |
| 2                            | 0.95    | $Q = (0.95)(5.8)(0.2)$ | 1.102                         |
| 3                            | 0.40    | $Q = (0.40)(5.8)(0.5)$ | 1.160                         |
| <b>TOTAL STORMWATER FLOW</b> |         |                        | <b>3.915</b>                  |

PWSA reserves the right to require stormwater calculations sealed by a Pennsylvania registered professional engineer.

If a stormwater management report is required for the project by other agencies, it must be prepared and sealed by a Pennsylvania registered professional engineer.

10 X 30 DRIVEWAY  
300 SF GRAVEL

20 X 30 GARAGE  
600 SF ROOF

REMAINDER 2500 SF  
UNIMPROVED

5 X 20 WALK  
100 SF PAVED

30 X 50 HOUSE  
1500 SF ROOF

**RATIONAL EQUATION Q-CIA**

PAVED AREA: C = 0.95

ROOF AREA: C = 0.95

GRAVEL AREA: C = 0.60

UNIMPROVED: C = 0.30

25 YEAR STORM = 5.8"

1 ACRE = 43560 SF

HOUSE ROOF = 1500 SF

GARAGE ROOF = 600 SF

PAVED WALK = 100 SF

**ROOF & PAVING**

$0.95 \times 5.8" \times 2200 \text{ SF} / 43560 = 0.28 \text{ CFS}$

GRAVEL DRIVE = 300 SF

UNIMPROVED = 2500 SF

**GRAVEL AND UNIMPROVED**

$0.60 \times 5.8" \times 2800 \text{ SF} / 43560 = 0.22 \text{ CFS}$

TOTAL AREA = 5000 SF = 0.115 AC

TOTAL RUNOFF = 0.50 CFS