The minimum First Flush treatment discharge design flow rate is calculated as follows:

$$Q_{FF} = CIA$$

where:

Q_{FF} = minimum First Flush discharge in cfs
C = runoff coefficient (set at 1.00)
A = area of project site, in acres
T_C = time of concentration (minutes) – minimum of 10 minutes
I = 0.5 inches/hour rainfall excess intensity divided by time of concentration, calculated according to the following formula:

$$I = \frac{0.5 \text{in/hr} \times 60 \text{min/hr}}{T_C}$$

Example: Calculate the volume for a stormwater storage basin that must be constructed to capture the first flush from a commercial site with 100 acres of developed area. Also calculate the discharge that must be treated if the storage option is not selected. Assume the time of concentration is 20 minutes.

$$V_{FF} = \frac{1.0 \times 0.5 \text{in/hr} \times 100 \text{ac}}{12 \text{in/ft}}$$

$$V_{FF} = 4.17 \text{ac} - \text{ft}$$

$$Q_{FF} = \frac{1.0 \times 0.5 \text{in/hr} \times 60 \text{min/hr} \times 100 \text{ac}}{20 \text{min}}$$

$$Q_{FF} = 150 \text{cfs}$$