

Lesson 20: NRCS Runoff Method

Rainfall Excess Prediction Using the NRCS Runoff Method

Given

- Incremental rainfall hyetograph P
- Hydrologic soil group C (AMC II)
- Watershed area $A = 1 \text{ mi}^2$
 - $2/3 \text{ mi}^2$ residential (1/4 acre lots) $CN(II) = ?$
 - $1/3 \text{ mi}^2$ open spaces (good conditions) $CN(II) = ?$

Find

- Incremental rainfall excess (P_e)
- Effective storm duration (t_r)
- Depth (r_d) and volume (V_d) of direct runoff

Area (mi ²)	Hydrologic Soil Group	CN (AMC-II)	S (in)	I_a (in)
1	C	80	2.5	0.5

Time (hour)	P (in)	----- Accumulated -----		----- Cumulative -----			
		P (in)	P_e (in)	P_e (in)	$(I_a + F_a)$ (in)	I_a (in)	F_a (in)
0		0.0	0.0		0.000	0.000	0.000
	1.0			0.083			
2		1.0	0.083		0.917	0.500	0.417
	2.0			1.167			
4		3.0	1.250		1.750	0.500	1.250
	4.0			3.444			
6		7.0	4.694		2.306	0.500	1.806
	1.0			0.931			
8		8.0	5.625		2.375	0.500	1.875

Composite CN:

$$CN = (2/3)(83) + (1/3)(74) = 80$$

$$S = \frac{1000}{CN} - 10 = \frac{1000}{80} - 10 = 2.5 \text{ inches}$$

$$I_a = 0.2S = 0.2(2.5) = 0.5 \text{ inches}$$

Effective duration (t_r):

$$t_r = 8 \text{ hours (from hour 2 through 6)}$$

Depth of direct runoff (r_d)

$$r_d = \sum P_e = 5.625 \text{ inches}$$

Volume of direct runoff (V_d)

$$V_d = r_d A$$

$$= (5.625 \text{ in})(1 \text{ mi}^2)(640 \text{ ac}/\text{mi}^2) / (12 \text{ in}/\text{ft})$$

$$= 300 \text{ ac} \cdot \text{ft}$$

