M-NCPPC APPROVAL STAMP

Worksheet 2: Runoff curve number and runoff

Project	Mountain Vale Solar	By		Date	
Location	17700 Barnesville Road, Barnesville MD	Checked		Date	

Check one: ☑ Present ☐ Developed

1. Runoff curve number

Soil name and hydrologic group (appendix A)	Cover description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN 1/ Table 2-2	Figure 2-3	Figure 2-4	Area ☐ acres ☐ mi² ☐ %	Product of CN x area
Occoquan Loam (B)	43.68 Ac (Forest CN 55) 1.45 Ac (Open Space CN 61) 116.65 Ac (Straight Row Crop CN 78) 2.78 Ac (Impervious CN 98)	✓			164.56 ac 0.25 mi² 1.7% Imp	11,861.99
Linganore-Hyattstown silt loams (C)	4.86 Ac (Forest CN 70) 5.20 Ac (Open Space 74) 9.52 Ac (Straight Row Crop 85) 0.83 Ac (Impervious CN 98)	✓			20.41 Ac 0.03 mi^2 4.1% Imp	1,615.54
Brinklow-Blocktown channery silt loams (C)	52.07 Ac (Forest CN 70) 9.07 Ac (Open Space CN 74) 95.49 Ac (Straight Row Crop CN 85) 2.50 Ac (Impervious CN 98)	✓			159.13 Ac 0.25 mi^2 1.6 % Imp	12,677.73
Hyattstown channery silt loam (D)	3.09 Ac (Forest CN 77) 0 Ac (Open Space CN 80) 4.83 Ac (Straight Row Crop CN 89) 0 Ac (Impervious CN 98)	✓			7.92 Ac 0.01 mi^2 0 % Imp	667.8
Glenville silt loam (D)	7.33 Ac (Forest CN 77) 0 Ac (Open Space CN 80) 37.92 Ac (Straight Row Crop CN 89) 0.03 Ac (Impervious CN 98)	✓			45.28 Ac 0.07 mi^2 0.06 % Imp	3,942.23
Blocktown channery silt loam (D)	12.38 Ac (Forest CN 77) 0 Ac (Open Space CN 80) 4.78 Ac (Straight Row Crop CN 89) 0.46 Ac (Impervious CN 98)	✓			17.62 Ac 0.03 mi^2 3.2 % Imp	1,423.76
Baile silt loam (D)	28.82 Ac (Forest CN 77) 0 Ac (Open Space CN 80) 0.94 Ac (Straight Row Crop CN 89) 0.04 Ac (Impervious CN 98)	✓			29.8 Ac 0.05 mi^2 0.13 % Imp	2,306.72
Hatboro Silt loam (D)	0.11 Ac (Forest CN 77) 0 Ac (Open Space CN 80) 0 Ac (Straight Row Crop CN 89) 0 Ac (Impervious CN 98)	✓			0.11 Ac 0.0002 mi^2 0 % Imp	8.47
				Totals ➡	444.83 Ac 0.69 mi^2 10.79% Imp	34,504.24

1/ Use only one CN source per line

$$\text{CN (weighted)} = \frac{\text{total product}}{\text{total area}} = \frac{34{,}504.24}{444.83} = 77.57 \quad ; \quad \text{Use CN} \Rightarrow 78$$

2. Runoff

		Storm #1	Storm #2	Storm #3
Frequency	yr	10	25	50
Rainfall, P (24-hour)	in	4.66	5.83	6.85
Runoff, Q	in	2.43	3.43	4.34

(Use P and CN with table 2-1, figure 2-1, or equations 2-3 and 2-4)

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Worksheet 3: Time of Concentration (T_c) or travel time (T_t)

Project		By		Date	
Location		Checked		Date	

Check one: ☑ Present ☐ Developed

Check one: ☑ T_c ☐ T_t through subarea

Notes: Space for as many as two segments per flow type can be used for each worksheet. Include a map, schematic, or description of flow segments.

Sheet flow (Applicable to Tc only)

Segment ID		
1. Surface description (table 3-1)	Woods-dense underbrush	
2. Manning's roughness coefficient, n (table 3-1)	0.80	
3. Flow length, L (total L ↑ 300 ft) ft	100	
4. Two-year 24-hour rainfall, P_2 in	3.05	
5. Land slope, s ft/ft	0.06	
6. $T_t = \frac{0.007\,(nL)^{0.8}}{P_2^{0.5}\, s^{0.4}}$ Compute T_t hr	0.41 +	= 0.41

Shallow concentrated flow

Segment ID		
7. Surface description (paved or unpaved)	Unpaved	
8. Flow length, L ft	1354.88	
9. Watercourse slope, s ft/ft	0.04	
10. Average velocity, V (figure 3-1) ft/s	3.21	
11. $T_t = \frac{L}{3600\,V}$ Compute T_t hr	0.12 +	= 0.12

Channel flow

Segment ID		
12. Cross sectional flow area, a ft²		
13. Wetted perimeter, p_w ft	99.3	
14. Hydraulic radius, $r = \frac{a}{p_w}$ Compute r ft	9	
15 Channel slope, s ft/ft	0.014	
16. Manning's roughness coefficient, n	0.035	
17. $V = \frac{1.49\, r^{2/3}\, s^{1/2}}{n}$ Compute V ft/s	4.16	
18. Flow length, L ft	4036.69	
19. $T_t = \frac{L}{3600\,V}$ Compute T_t hr	0.27 +	= 0.27
20. Watershed or subarea T_c or T_t (add T_t in steps 6, 11, and 19) Hr		0.8

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Worksheet 4: Graphical Peak Discharge method

Project		By		Date	
Location		Checked		Date	

Check one: ☑ Present ☐ Developed

1. Data

Drainage area A_m = 0.695 mi² (acres/640)

Runoff curve number CN = 78 (From worksheet 2)

Time of concentration T_c = 0.8 hr (From worksheet 3)

Rainfall distribution = II (I, IA, II III)

Pond and swamp areas sprea throughout watershed = 0.25 percent of A_m (1.11 acres or mi² covered)

		Storm #1	Storm #2	Storm #3
2. Frequency	yr	10	25	50
3. Rainfall, P (24-hour)	in	4.66	5.83	6.85
4. Initial abstraction, I_a (Use CN with table 4-1)	in	0.564	0.564	0.564
5. Compute I_a / P		0.121	0.097	0.082
6. Unit peak discharge, q_u (Use T_c and I_a / P with exhibit 4– _____)	csm/in	400	450	490
7. Runoff, Q (From worksheet 2) Figure 2-6	in	2.43	3.43	4.34
8. Pond and swamp adjustment factor, F_p (Use percent pond and swamp area with table 4-2. Factor is 1.0 for zero percent pond ans swamp area.)		0.97	0.97	0.97
9. Peak discharge, q_p	ft³/s	655.27	1040.55	1433.65

(Where $q_p = q_u A_m Q F_p$)

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Worksheet 5a: Basic watershed data

Project		Location		By	Date
Check one: ☑ Present ☐ Developed		Frequency (yr)		Checked	Date

Subarea name	Drainage area A_m (mi²)	Time of concentration T_c (hr)	Travel time through subarea T_t (hr)	Downstream subarea names	Travel time summation to outlet ΣT_t (hr)	24-hr rainfall P (in)	Runoff curve number CN	Runoff Q (in)	$A_m Q$ (mi²—in)	Initial abstraction I_a (in)	I_a/P
10-YR	0.695	0.8	0.8		0.8	4.66	78	2.43	1.69	0.564	0.121
25-YR	0.695	0.8	0.8		0.8	5.83	78	3.43	2.38	0.564	0.097
50-YR	0.695	0.8	0.8		0.8	6.85	78	4.34	3.02	0.564	0.082
		From worksheet 3					From worksheet 2			From table 5-1	

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Worksheet 5b: Basic watershed data

Project		Location		By	Date
Check one: ☐ Present ☐ Developed		Frequency (yr)		Checked	Date

Subarea name	Basic watershed data used 1/: Subarea T_c (hr)	ΣT_t to outlet (hr)	I_a / P	$A_m Q$ (mi²—in)	Select and enter hydrograph times in hours from exhibit 5-II 2/	Discharges at selected hydrograph times 3/ (cfs)
Composite hydrograph at outlet						

1/ Worksheet 5a. Rounded as needed for use with exhibit 5.
2/ Enter rainfall distribution type used.
3/ Hydrograph discharge for selected times is $A_m Q$ multiplied by tabular discharge from appropriate exhibit 5.

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Exhibit 17 (f)
OZAH Case No: CU 25-07

Bowman

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PRESENT RUNOFF CURVE NUMBER & RUNOFF
MOUNTAIN VALE COMMUNITY SOLAR
17700 BARNESVILLE ROAD, BARNESVILLE MD
WSSC GRID #230NW17, 230NW18, 231NW18, 230NW17 & 230NW18
TAX MAP: CV62, GRID: 0000, PARCEL: P020
MONTGOMERY COUNTY, MARYLAND
ELECTION DISTRICT 11

PLAN #295856

STATE OF MARYLAND — EDWARD M. PAPAZIAN — No. 60083 — REGISTERED PROFESSIONAL ENGINEER

05/06/2025

PLAN STATUS	
05/06/25	CONDITIONAL USE SITE PLAN

DATE	DESCRIPTION	
EP DESIGN	EG DRAWN	EP CHKD
SCALE	H: N/A V: N/A	
JOB No. 140362-01-001		
DATE : MAY, 2025		
FILE No. 140362-D-CP-001-DDM		
SHEET 13 OF 19		

Cad file name : V:\140362 - Barnesville Road Solar Photovoltaic Sys\140362-01-001 (ENG) - Barnesville Road Solar Photovoltaic\Engineering\Engineering Plans\Conditional Use Plan\140362-D-CP-001-DDM.dwg