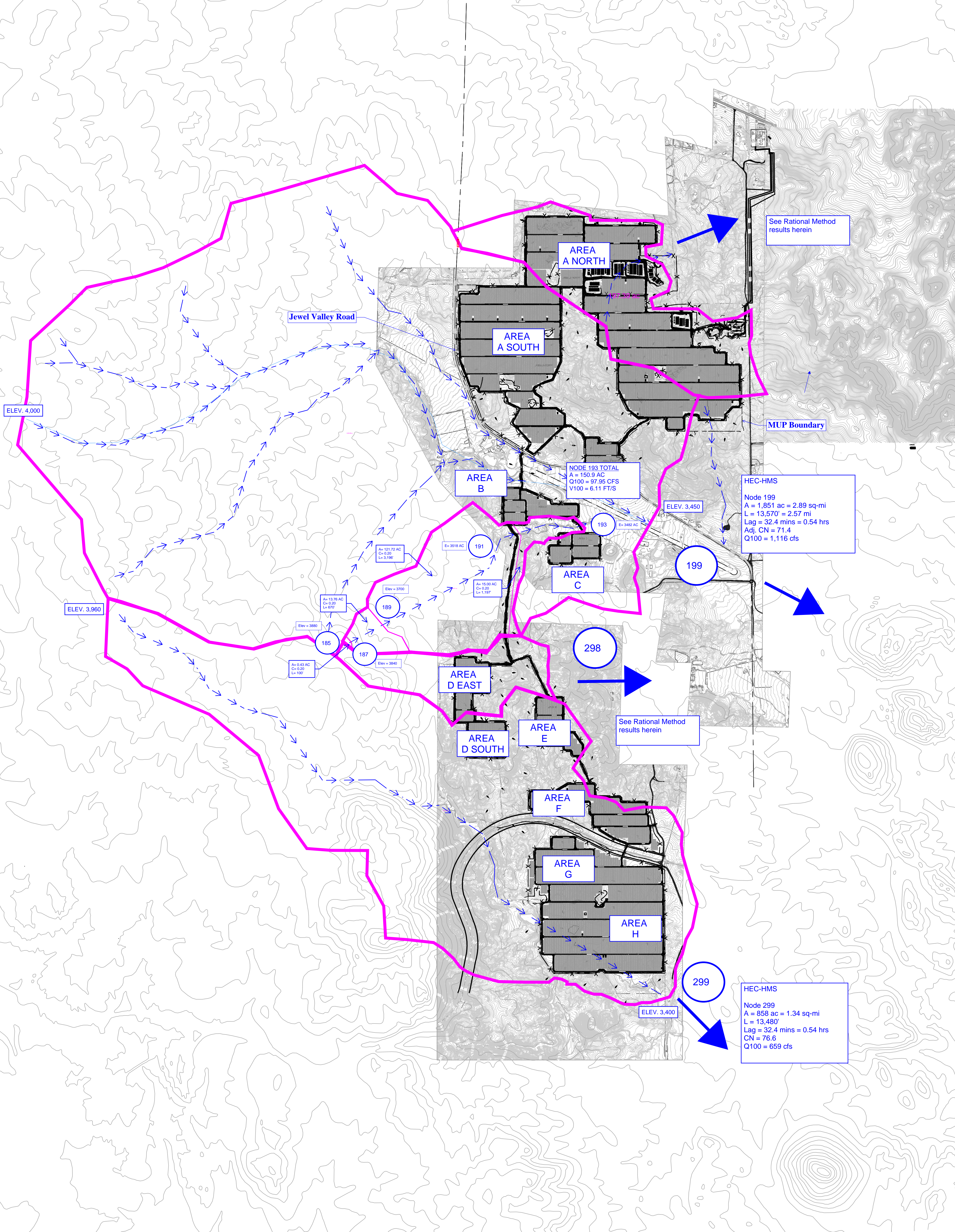
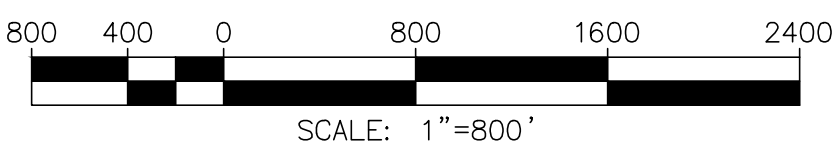


Appendix E – Off-Site Hydrology

*Off-Site Hydrologic Work Map
HEC-HMS 100yr Hydrology Calculations*

3/13/2024 6:53 PM

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Project: I856I4_Area_A_B
Simulation Run: Run 1
Simulation Start: 31 December 2021, 24:00
Simulation End: 1 January 2022, 24:00

HMS Version: 4.9
Executed: 07 July 2023, 19:55

Global Parameter Summary - Subbasin

Area (MI ²)	
Element Name	Area (MI ²)
Off - Site A - B (Node 199)	2.89

Loss Rate: SCS		
Element Name	Percent Impervious Area	Curve Number
Off - Site A - B (Node 199)	0	71.4

Transform: SCS		
Element Name	Lag	Unitgraph Type
Off - Site A - B (Node 199)	32.4	Standard

Global Results Summary

Hydrologic Element	Drainage Area (MI ²)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
Off - Site A - B (Node 199)	2.89	1116.26	01Jan2022, 10:30	2.11

Subbasin: Off-Site A-B (Node 199)

Area (MI²) : 2.89

Loss Rate: SCS

Percent Impervious Area	0
Curve Number	71.4

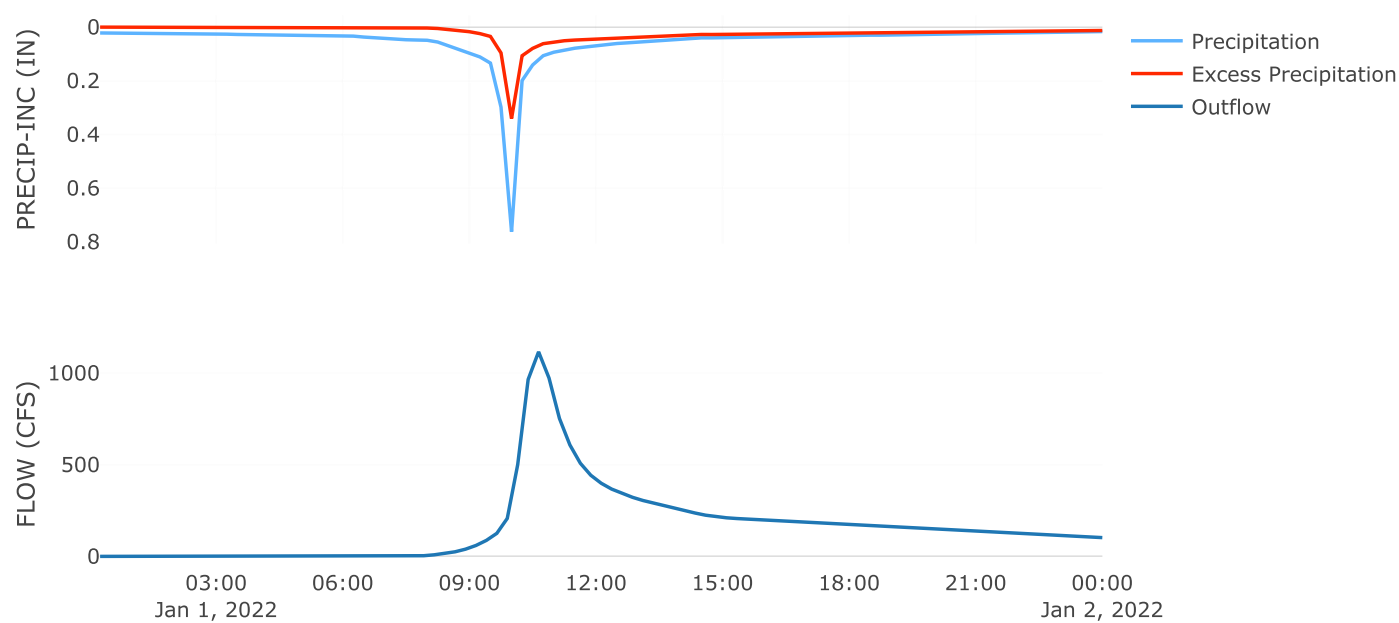
Transform: SCS

Lag	32.4
Unitgraph Type	Standard

Results: Off-Site A-B (Node 199)

Peak Discharge (CFS)	1116.26
Time of Peak Discharge	01 Jan 2022, 10:30
Volume (IN)	2.11
Precipitation Volume (AC - FT)	770.67
Loss Volume (AC - FT)	439.45
Excess Volume (AC - FT)	331.22
Direct Runoff Volume (AC - FT)	325.19
Baseflow Volume (AC - FT)	0

Precipitation and Outflow



Project: I856I4_Areas_G_H**Simulation Run:** Run I**Simulation Start:** 31 December 2021, 24:00**Simulation End:** 1 January 2022, 24:00**HMS Version:** 4.9**Executed:** 07 July 2023, 20:03

Global Parameter Summary - Subbasin

Area (MI ²)	
Element Name	Area (MI ²)
Off - Site G H	1.34

Loss Rate: SCS		
Element Name	Percent Impervious Area	Curve Number
Off - Site G H	0	76.6

Transform: SCS		
Element Name	Lag	Unitgraph Type
Off - Site G H	32.4	Standard

Global Results Summary

Hydrologic Element	Drainage Area (MI ²)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
Off - Site G H	1.34	658.71	01Jan2022, 10:30	2.55

Subbasin: Off-Site G H

Area (MI²) : 1.34

Loss Rate: SCS

Percent Impervious Area	0
Curve Number	76.6

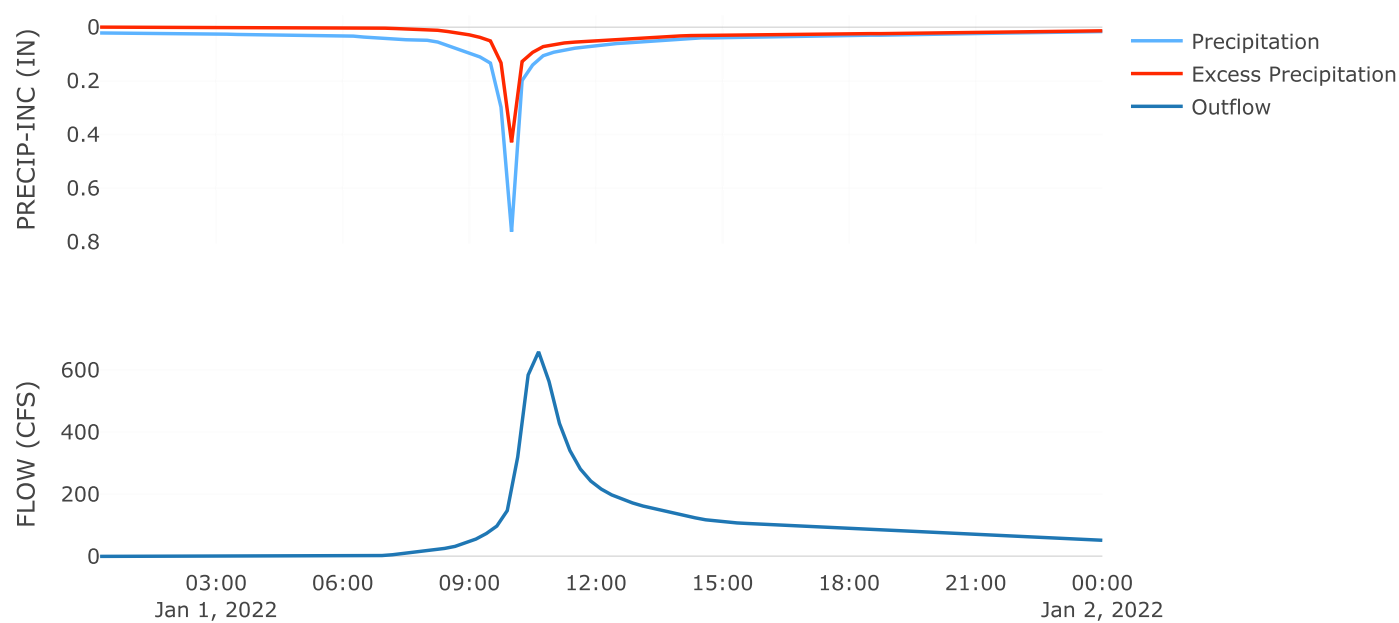
Transform: SCS

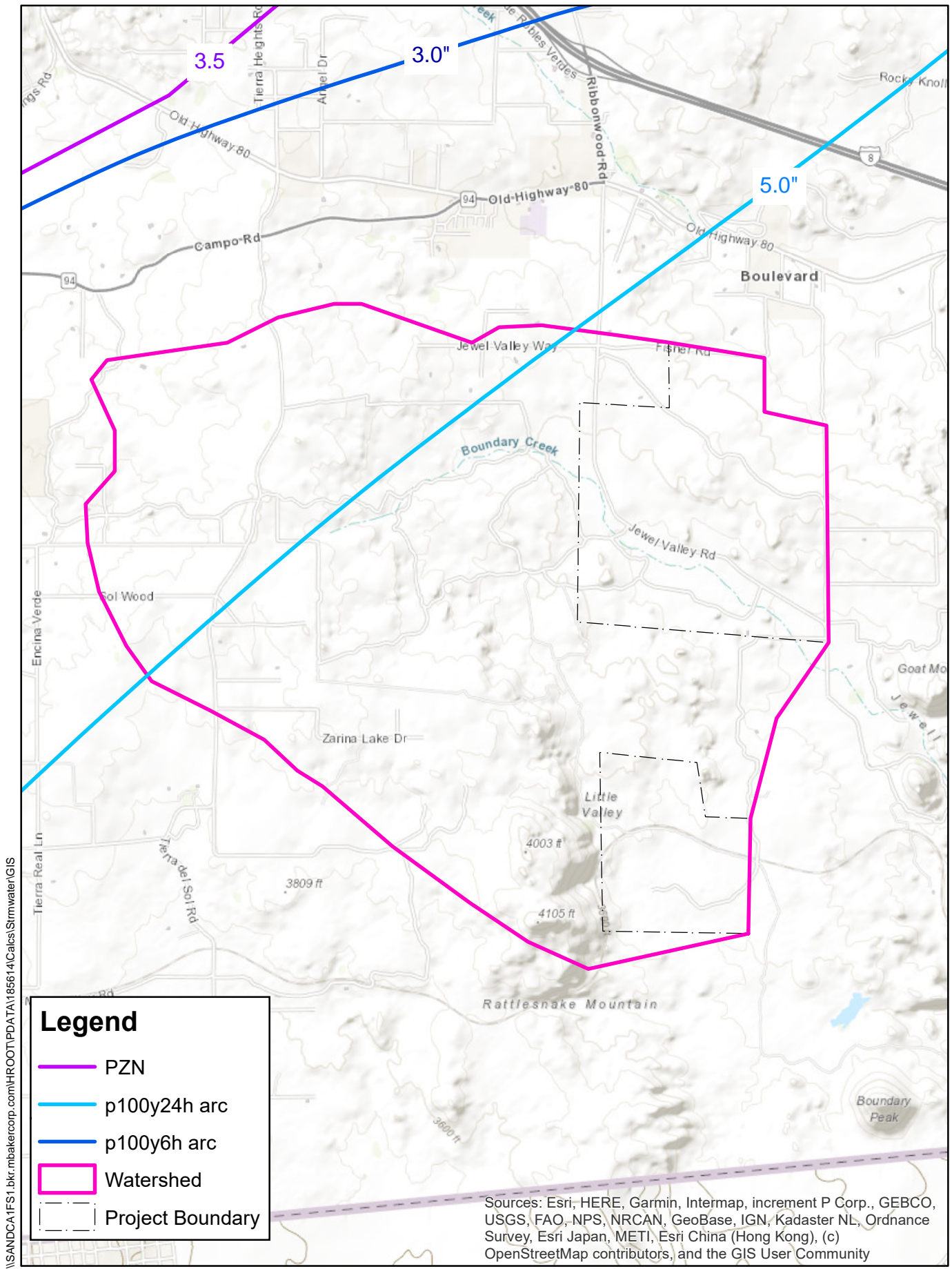
Lag	32.4
Unitgraph Type	Standard

Results: Off-Site G H

Peak Discharge (CFS)	658.71
Time of Peak Discharge	01Jan2022, 10:30
Volume (IN)	2.55
Precipitation Volume (AC - FT)	357.33
Loss Volume (AC - FT)	172.39
Excess Volume (AC - FT)	184.95
Direct Runoff Volume (AC - FT)	181.89
Baseflow Volume (AC - FT)	0

Precipitation and Outflow

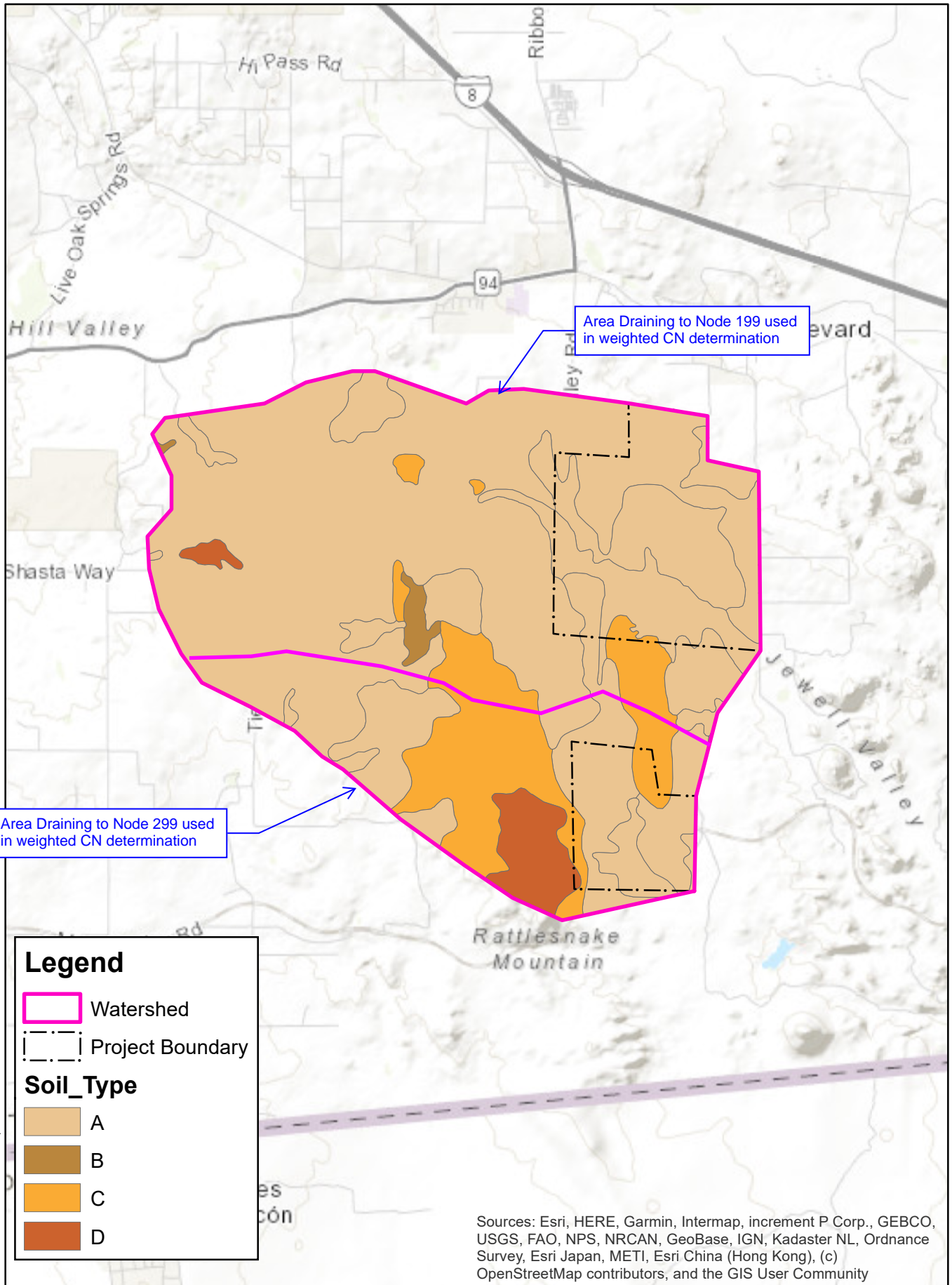




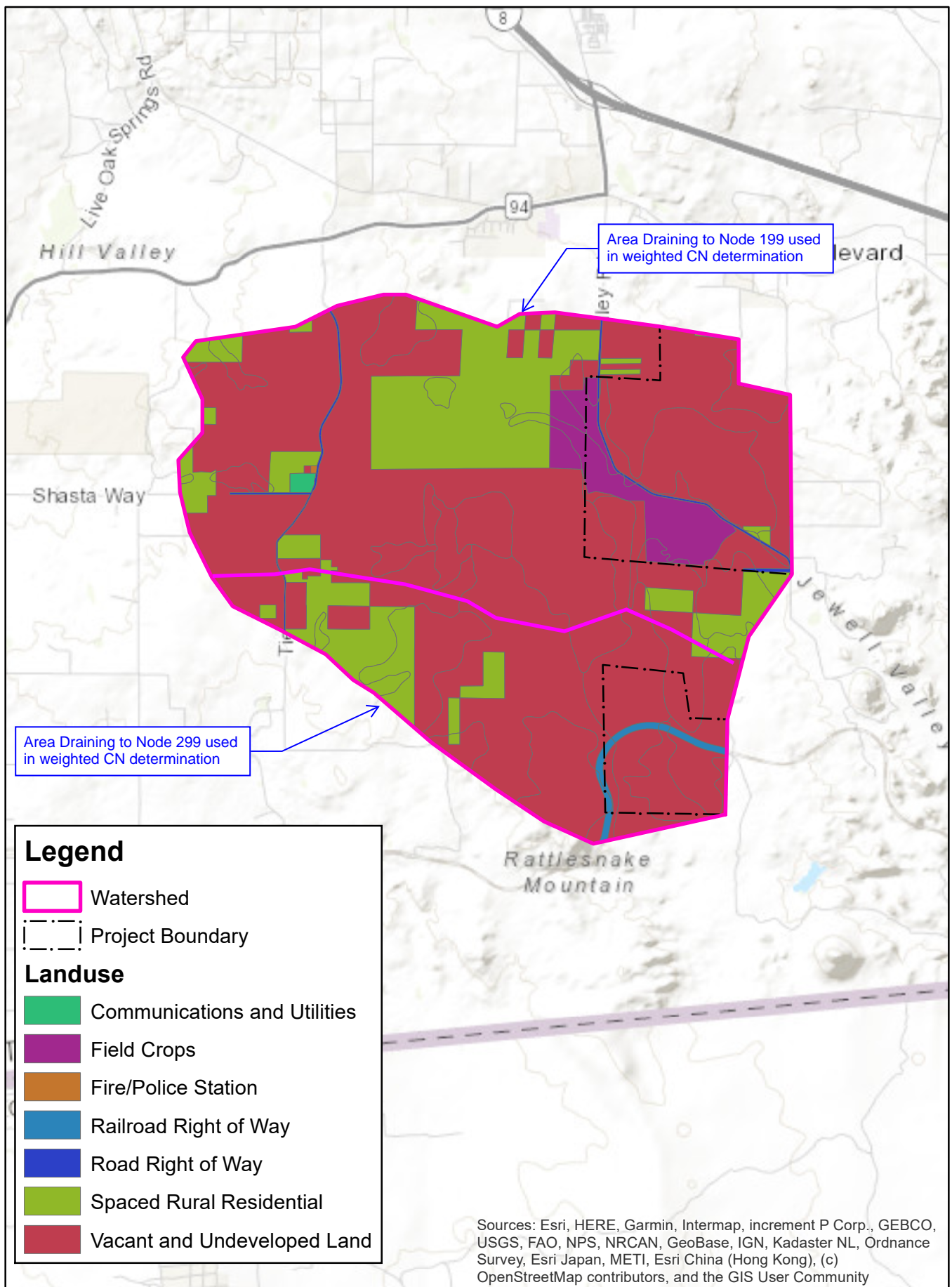
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- Legend**
- PZN
 - p100y24h arc
 - p100y6h arc
 - Watershed
 - Project Boundary

Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community



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Starlight Solar - Adjusted Curve Number - North Area (Node 199)

Land Use	Cover Description	Soil Type	CN (Table 4-2 SDCHM)	Area (acres)	CN*Area
SANDAG	Table 4-2 SDCHM	Soil Survey	PZN = 2.0	-	-
Communications and Utilities	Streets and Roads (Gravel)	A	76	8.751	665.08
Field Crops	Row Crops (Straight Row, Good)	A	67	0.193	12.93
Field Crops	Row Crops (Straight Row, Good)	A	67	39.512	2647.30
Field Crops	Row Crops (Straight Row, Good)	A	67	21.847	1463.75
Field Crops	Row Crops (Straight Row, Good)	A	67	0.065	4.36
Field Crops	Row Crops (Straight Row, Good)	A	67	126.142	8451.51
Field Crops	Row Crops (Straight Row, Good)	A	67	0.006	0.40
Field Crops	Row Crops (Straight Row, Good)	C	85	9.369	796.37
Fire/Police Station	Urban District (Commercial)	A	89	0.839	74.67
Road Right of Way	Streets and Roads	A	98	0.855	83.79
Road Right of Way	Streets and Roads	A	98	19.777	1938.15
Road Right of Way	Streets and Roads	A	98	3.686	361.23
Road Right of Way	Streets and Roads	A	98	8.275	810.95
Road Right of Way	Streets and Roads	D	46	0.006	0.28
Spaced Rural Residential	Residential (2 acres)	A	46	42.041	1933.89
Spaced Rural Residential	Residential (2 acres)	A	46	5.918	272.23
Spaced Rural Residential	Residential (2 acres)	A	46	4.197	193.06
Spaced Rural Residential	Residential (2 acres)	A	46	125.277	5762.74
Spaced Rural Residential	Residential (2 acres)	A	46	19.07	877.22
Spaced Rural Residential	Residential (2 acres)	A	46	2.645	121.67
Spaced Rural Residential	Residential (2 acres)	A	46	25.523	1174.06
Spaced Rural Residential	Residential (2 acres)	A	46	27.782	1277.97
Spaced Rural Residential	Residential (2 acres)	A	46	4.444	204.42
Spaced Rural Residential	Residential (2 acres)	A	46	3.899	179.35
Spaced Rural Residential	Residential (2 acres)	A	46	4.215	193.89
Spaced Rural Residential	Residential (2 acres)	A	46	3.599	165.55
Spaced Rural Residential	Residential (2 acres)	A	46	0.111	5.11
Spaced Rural Residential	Residential (2 acres)	A	46	17.68	813.28
Spaced Rural Residential	Residential (2 acres)	A	46	4.556	209.58
Spaced Rural Residential	Residential (2 acres)	A	46	420.804	19356.98
Spaced Rural Residential	Residential (2 acres)	A	46	7.107	326.92
Spaced Rural Residential	Residential (2 acres)	A	46	2.659	122.31
Spaced Rural Residential	Residential (2 acres)	A	46	1.609	74.01
Spaced Rural Residential	Residential (2 acres)	A	46	1.881	86.53
Spaced Rural Residential	Residential (2 acres)	A	46	24.416	1123.14
Spaced Rural Residential	Residential (2 acres)	A	46	0.813	37.40
Spaced Rural Residential	Residential (2 acres)	A	46	6.637	305.30
Spaced Rural Residential	Residential (2 acres)	A	46	1.784	82.06
Spaced Rural Residential	Residential (2 acres)	A	46	5.888	270.85
Spaced Rural Residential	Residential (2 acres)	A	46	0.188	8.65
Spaced Rural Residential	Residential (2 acres)	A	46	3.363	154.70
Spaced Rural Residential	Residential (2 acres)	C	77	18.939	1458.30
Spaced Rural Residential	Residential (2 acres)	C	77	9.233	710.94
Spaced Rural Residential	Residential (2 acres)	C	77	12.856	989.91
Spaced Rural Residential	Residential (2 acres)	C	77	3.063	235.85
Spaced Rural Residential	Residential (2 acres)	D	82	0.751	61.58
Spaced Rural Residential	Residential (2 acres)	D	82	0.791	64.86
Vacant and Undeveloped Land	Open Brush (Poor)	A	62	58.402	3620.92
Vacant and Undeveloped Land	Open Brush (Poor)	A	62	22.974	1424.39
Vacant and Undeveloped Land	Open Brush (Poor)	A	62	43.394	2690.43
Vacant and Undeveloped Land	Open Brush (Poor)	A	62	53.294	3304.23
Vacant and Undeveloped Land	Open Brush (Poor)	A	62	39.895	2473.49
Vacant and Undeveloped Land	Open Brush (Poor)	A	62	18.519	1148.18
Vacant and Undeveloped Land	Open Brush (Poor)	A	62	18.376	1139.31
Vacant and Undeveloped Land	Open Brush (Poor)	A	62	0.933	57.85

Vacant and Undeveloped Land	Open Brush (Poor)	A	62	8.175	506.85
Vacant and Undeveloped Land	Open Brush (Poor)	A	62	7.441	461.34
Vacant and Undeveloped Land	Open Brush (Poor)	A	62	8.432	522.78
Vacant and Undeveloped Land	Open Brush (Poor)	A	62	4.893	303.37
Vacant and Undeveloped Land	Open Brush (Poor)	A	62	486.955	30191.21
Vacant and Undeveloped Land	Open Brush (Poor)	A	62	793.782	49214.48
Vacant and Undeveloped Land	Open Brush (Poor)	A	62	306.845	19024.39
Vacant and Undeveloped Land	Open Brush (Poor)	A	62	12.612	781.94
Vacant and Undeveloped Land	Open Brush (Poor)	A	62	10.767	667.55
Vacant and Undeveloped Land	Open Brush (Poor)	A	62	9.859	611.26
Vacant and Undeveloped Land	Open Brush (Poor)	A	62	210.091	13025.64
Vacant and Undeveloped Land	Open Brush (Poor)	A	62	51.997	3223.81
Vacant and Undeveloped Land	Open Brush (Poor)	A	62	8.682	538.28
Vacant and Undeveloped Land	Open Brush (Poor)	A	62	188.498	11686.88
Vacant and Undeveloped Land	Open Brush (Poor)	A	62	0.405	25.11
Vacant and Undeveloped Land	Open Brush (Poor)	A	62	53.73	3331.26
Vacant and Undeveloped Land	Open Brush (Poor)	B	76	35.487	2697.01
Vacant and Undeveloped Land	Open Brush (Poor)	B	76	2.522	191.67
Vacant and Undeveloped Land	Open Brush (Poor)	C	84	111.093	9331.81
Vacant and Undeveloped Land	Open Brush (Poor)	C	84	12.741	1070.24
Vacant and Undeveloped Land	Open Brush (Poor)	C	84	384.002	32256.17
Vacant and Undeveloped Land	Open Brush (Poor)	D	88	17.722	1559.54

	Sum	4,035.6	253,246.5
	Average CN for PZN = 2.0		63
	Project Watershed PZN		3.5
Per Table 4-6, "Greater than or equal to a 35-year return period":	Adjusted PZN		2.5
	Per Table 4-10: Adjusted CN		71.4

PZN	CN	
2	63	Calculated above
2.5	?	*
3	80	Table 4-10 (County Hydrology Manual)
2.5 =	71.37671537	*

Startlight Solar - Adjusted Curve Number - South Area (Node 299)					
Land Use	Cover Description	Soil Type	CN (Table 4-2 SDCHM)	Area (acres)	CN*Area
SANDAG	Table 4-2 SDCHM	Soil Survey	PZN = 2.0	-	-
Railroad Right of Way	Streets and Roads (Gravel)	A	76	6.235	473.86
Railroad Right of Way	Streets and Roads (Gravel)	A	76	8.064	612.86
Railroad Right of Way	Streets and Roads (Gravel)	A	76	1.352	102.75
Railroad Right of Way	Streets and Roads (Gravel)	C	89	11.187	995.64
Railroad Right of Way	Streets and Roads (Gravel)	D	91	3.405	309.86
Spaced Rural Residential	Residential (2 acres)	A	46	2.329	107.13
Spaced Rural Residential	Residential (2 acres)	A	46	53.977	2482.94
Spaced Rural Residential	Residential (2 acres)	C	77	7.939	611.30
Spaced Rural Residential	Residential (2 acres)	C	77	24.732	1904.36
Vacant and Undeveloped Land	Open Brush (Poor)	A	62	64.553	4002.29
Vacant and Undeveloped Land	Open Brush (Poor)	A	62	117.419	7279.98
Vacant and Undeveloped Land	Open Brush (Poor)	A	62	52.891	3279.24
Vacant and Undeveloped Land	Open Brush (Poor)	A	62	67.422	4180.16
Vacant and Undeveloped Land	Open Brush (Poor)	A	62	0.402	24.92
Vacant and Undeveloped Land	Open Brush (Poor)	C	84	12.268	1030.51
Vacant and Undeveloped Land	Open Brush (Poor)	D	88	139.493	12275.38

Sum	573.7	39,673.2
Average CN for PZN = 2.0		69
Project Watershed PZN		3.5
Per Table 4-6, "Greater than or equal to a 35-year return period": Adjusted PZN		2.5
Per Table 4-10: Adjusted CN		76.6

PZN	CN	
2	69	Calculated above
2.5	?	*
3	84	Table 4-10 (County Hydrology Manual)
2.5 =	76.57854282	*

WATERSHED LAG: REFERENCES

T_c = Concentration Time (Hours)

From San Diego County Hydrology Manual, Figure 3-4 (page 3-16)

$$T_c = \left(\frac{11.9 * L^3}{\Delta E} \right)^{0.385}$$

Where:

L = Watercourse distance (miles)

ΔE = Change in elevation along effective slope line (feet)

Watershed Lag: T_p = Time to Peak (Minutes)

From San Diego County Hydrology Manual, Eq. 4-22 (page 4-36)

$$T_p = 0.67 * T_c$$

TI = Corps Lag for San Diego Unit Hydrology Program

$$\text{Corps } T_1 = 0.8 T_c$$

Node 199

T_c = Concentration Time (Hours)

L = 13,570 feet
2.57 miles

ΔE = 550 feet

T_c = 0.68 hours
40.80 minutes

TI = Corps Lag for San Diego Unit Hydrology Program

T_c =	0.68 hours
TI =	0.54 hours

Node 299

T_c = Concentration Time (Hours)

L = 13,480 feet
2.55 miles

ΔE = 560 feet

T_c = 0.67 hours
40.21 minutes

TI = Corps Lag for San Diego Unit Hydrology Program

T_c =	0.67 hours
TI =	0.54 hours