Westwood

12701 Whitewater Drive, Suite 300
Minnetonka, MN 55343

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MEMORANDUM

Date: May 18, 2026

Re: Welter Road Stormwater Management Approach
File R0078301.00

Introduction

The Welter Road ("the project") is proposed within a 43.1 acre property boundary and will encompass approximately 11.9 acres. The project is located approximately 44 miles west of the city of Chicago in Kane County, Illinois, with the nearest town being Elburn. Elburn is located 3 miles southeast of the project area. The site's current use is agricultural row crops.

The area below the proposed solar panels is assumed to be pervious due to the area between and beneath the panels being vegetated. The proposed use of the site will be a solar facility consisting of 11.1 acres of meadow grasses, 0.5 acres of gravel access road, and 0.3 acres of the new impervious surface including the equipment pad and asphalt entrance.

Site Description

The project site is located on moderately sloped terrain with slopes ranging from 2%-6%. Onsite drainage is split into two drainage areas, both of which eventually drain to an unnamed stream to the west. According to SSURGO soils data, the site consists primarily of Hydrologic Soil Group (HSG) C and D. Existing landcover on site is agricultural row crop.

Post-Construction Stormwater Requirements and Recommendations

Post-Construction Stormwater requirements can be found in the Kane County Stormwater Management Ordinance, https://www.kanecountyil.gov/FDER/Documents/waterOrdinances/adoptedOrdinance.pdf. See Table 2 below for a summary of the stormwater management requirements for the project. Beyond the Kane County requirements, the client requested that solar panels be treated as partially impervious surfaces. Accordingly, the Minnesota Pollution Control Agency (MPCA) calculator for solar panel imperviousness has been included as a design requirement.

TABLE 2: STORMWATER MANAGEMENT REQUIREMENTS

Agency	Location of Requirements	New Impervious Area	Requirement
Kane County	Kane County Stormwater Management Ordinance (Rev. 06/01/2019)	5,000 sq.ft. – 24,999 sq.ft.	Provide volume reduction and water quality treatment of one-inch of rainfall over the impervious area
MPCA	Requested by client	Disconnected impervious surface (solar panels)	Treat remaining water quality volume after applying BMP volume credit for disconnected impervious surfaces

A desktop review did not reveal any post-construction water quantity control requirements for Kane county. Westwood standard practices are summarized in Table 3 below.

TABLE 3: STORMWATER MANAGEMENT RECOMMENDATIONS

Source	Water Quantity Recommendation
Westwood Standard	Post Construction Runoff Rates < Pre Construction Runoff Rates (2-, 10-, 100-year 24-hour storms)

Methodology

Existing and proposed conditions are modeled in HydroCAD software. HydroCAD is a widely accepted hydrologic and hydraulic modeling package based on National Engineering Handbook (NEH) Part 630. It models stormwater runoff discharge rates and velocities from ponds, culverts, outlet control structures, and stream reaches.

Curve Number Methodology, based on NEH Part 630 Chapter 9, was used in the modeling for predicting direct runoff. Curve numbers were assigned by reviewing the soil and landcover for each drainage area.

TABLE 3: CURVE NUMBERS

Landcover	Curve Number	Existing Area (ac)	Proposed Area (ac)
Row Crops (HSG B)	78	0.40	0.00
Row Crops (HSG C)	85	6.90	0.00
Row Crops (HSG D)	89	4.60	0.00
Meadow Grass (HSG B)	58	0.00	0.25
Meadow Grass (HSG C)	71	0.00	6.35
Meadow Grass (HSG D)	78	0.00	4.50
Gravel Road (HSG B)*	96	0.00	0.15
Gravel Road (HSG C)*	96	0.00	0.25
Gravel Road (HSG D)*	96	0.00	0.10
Impervious	98	0.00	0.30
Total		11.90	11.90

*Gravel road will utilize CA-7 material and is not considered impervious.

Times of concentration were calculated for each drainage area in HydroCAD using methods described in Chapter 15 of NEH Part 630.

Precipitation and distribution data used for the analysis was gathered from the Illinois State Water Survey (ISWS) Bulletin 75 with Huff 3rd Quartile temporal distribution. See Table 4 and Appendix A for the precipitation values used.

TABLE 4: ISWS BULLETIN 75 RAINFALL

Storm Event	2-year, 24-hour	10-year, 24-hour	100-year, 24-hour
Rainfall (in)	3.34	5.15	8.57

Proposed Stormwater Management Design

Pre-Post

Stormwater quantity calculations for the site were prepared using HydroCAD. The proposed site meets the rate control recommendations of Westwood. Table 5 shows a summary of the runoff rates for the recommended storm events at each site discharge locations. Calculations are included in Appendices B & C.

TABLE 5: RUNOFF RATE SUMMARY

Location	2-year Runoff (cfs)		10-year Runoff (cfs)		100-year Runoff (cfs)	
	Existing	Proposed	Existing	Proposed	Existing	Proposed
1	3.38	2.28	5.88	4.62	10.54	9.28

Water Quality

Treatment of the stormwater quality volume for the site will be provided through filter strip BMPs by the conversion from row crop to meadow grass land cover across the site. The filter strips BMP treats and reduces the runoff volume from the one-inch rainfall event over the impervious area. The gravel road is not considered impervious since it will utilize CA-7 material. Table 6 shows the required and provided treatment volume for drainage areas 1 and 2. The required volume was calculated using the MPCA spreadsheet to determine the required volume for the solar array. The provided treatment volume was calculated by taking the difference between the proposed runoff volume and the existing runoff volume for each drainage area containing proposed impervious area for the 1-inch rainfall event. Calculations can be found in Appendix D.

TABLE 6: WATER QUALITY TREATMENT SUMMARY

Drainage Area	Required Treatment Volume (ac ft)	Provided Treatment Volume (ac ft)
1	0.11	0.12
2	0.02	0.04
Total	0.13	0.16

Conclusion

The proposed site was designed to meet the water quality requirements of the Kane County Stormwater Management Ordinance and the client, and water quantity recommendations of

Westwood Professional Services. The proposed site consists of meadow grass in order to maintain existing drainage patterns, reduce runoff rates, and provide required treatment volumes. Minimal grading on site maintains existing drainage areas throughout the site. The proposed vegetative cover below the array reduces runoff rates for the final conditions.

Exhibits

Exhibit 1: Existing Drainage Map
Exhibit 2: Proposed Drainage Map

Appendices

Appendix A: Illinois State Water Survey (ISWS) Bulletin 75 Excerpt
Appendix B: Existing HydroCAD Results
Appendix C: Proposed HydroCAD Results
Appendix D: Water Quality Calculations

Exhibits

LEGEND:

	PROJECT BOUNDARY
900	EX. INDEX CONTOUR
	EX. INTERVAL CONTOUR
	FEMA FLOOD ZONE
	EX. ONSITE DRAINAGE AREA BOUNDARY
	EX. TIME OF CONCENTRATION LINE
	DISCHARGE LOCATION
1	DRAINAGE AREA LABEL
1ER	DISCHARGE AREA LABEL

Westwood

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Westwood Professional Services, Inc.

PREPARED FOR:

SUNVEST SOLAR LLC®
330 W. State Street Suite 1
Geneva, IL 60134

REVISIONS:

#	DATE	COMMENT	BY	CHK	APR

0' 120' 240' 360'

Welter Road Solar

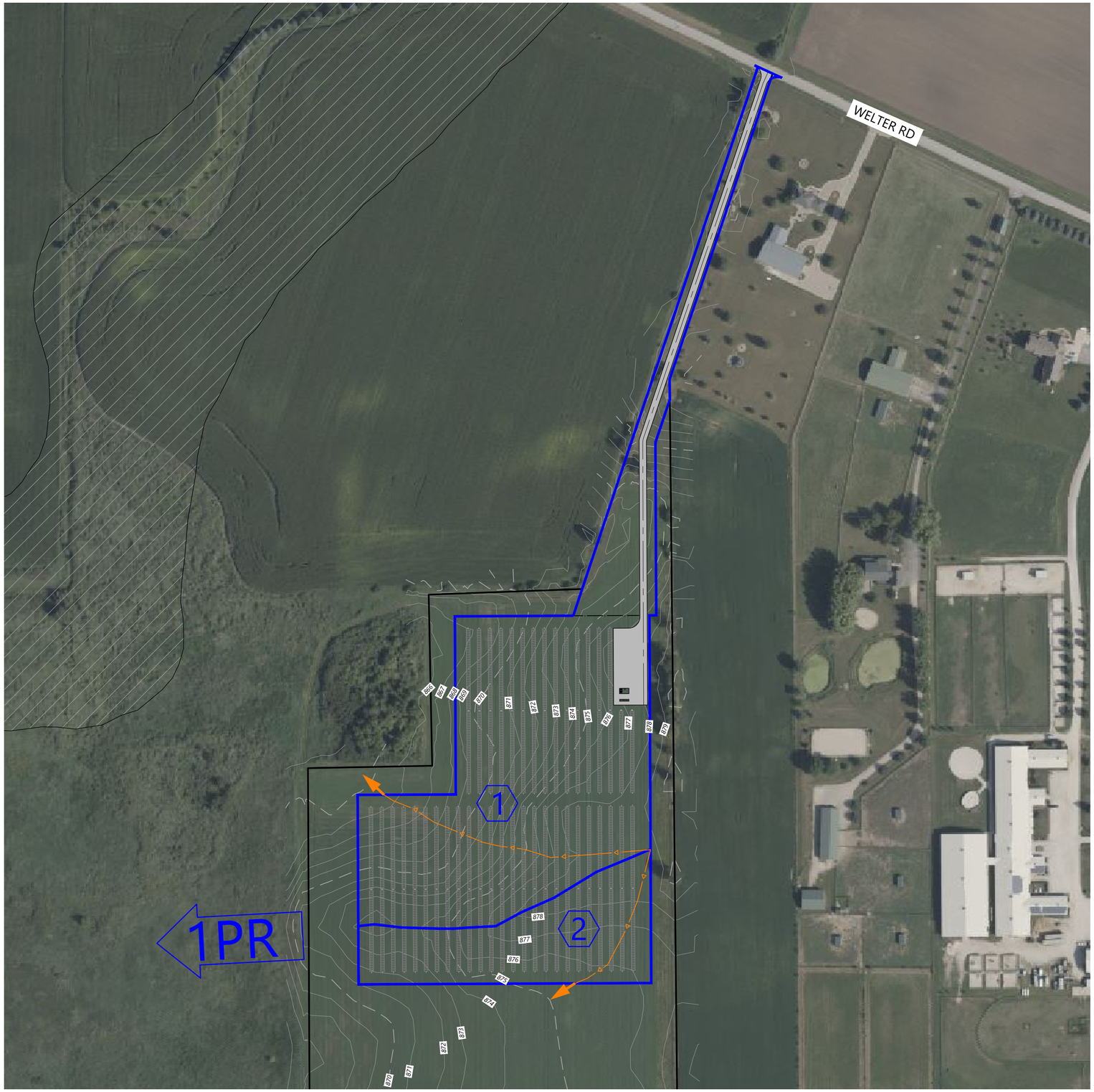
Kane County, Illinois

Existing Drainage Map

DATE: 5/15/2026

REV:

SHEET: 1



LEGEND:

- PROJECT BOUNDARY
- 900 EX. INDEX CONTOUR
- EX. INTERVAL CONTOUR
- FEMA FLOOD ZONE
- PROPOSED SOLAR ARRAY
- PROPOSED ACCESS ROAD
- x PROPOSED SECURITY FENCE
- PROPOSED ELECTRICAL EQUIPMENT
- PROPOSED ONSITE DRAINAGE AREA BOUNDARY
- PROPOSED TIME OF CONCENTRATION LINE
- DISCHARGE LOCATION
- 1 DRAINAGE AREA LABEL
- 1PR DISCHARGE AREA LABEL

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REVISIONS:

#	DATE	COMMENT	BY	CHK	APR

0' 120' 240' 360'

Welter Road Solar

Kane County, Illinois

Proposed Drainage Map

DATE: 5/15/2026
REV:
SHEET: 2

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Appendix A

Illinois State Water Survey (ISWS) Bulletin 75 Excerpt

ISWS Bulletin 75

Precipitation Frequency Study for Illinois

James R. Angel and Momcilo Markus

Contributing Authors:

Kexuan Ariel Wang, Brian M. Kerschner, and Shailendra Singh

Illinois State Water Survey
University of Illinois at Urbana-Champaign

March 2020

ILLINOIS
Illinois State Water Survey
PRAIRIE RESEARCH INSTITUTE

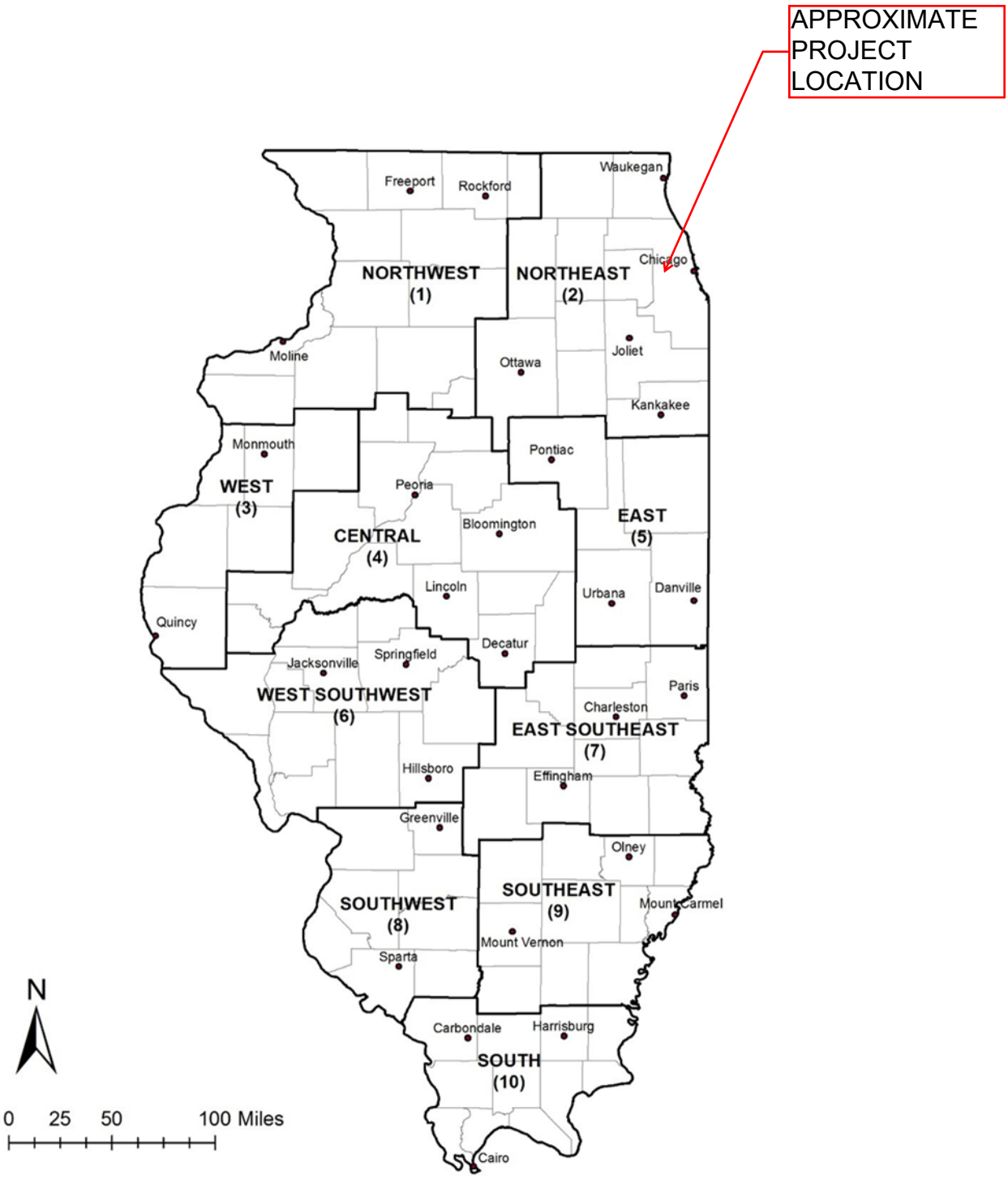


Figure 2. Climatic sections used in developing Illinois frequency estimates

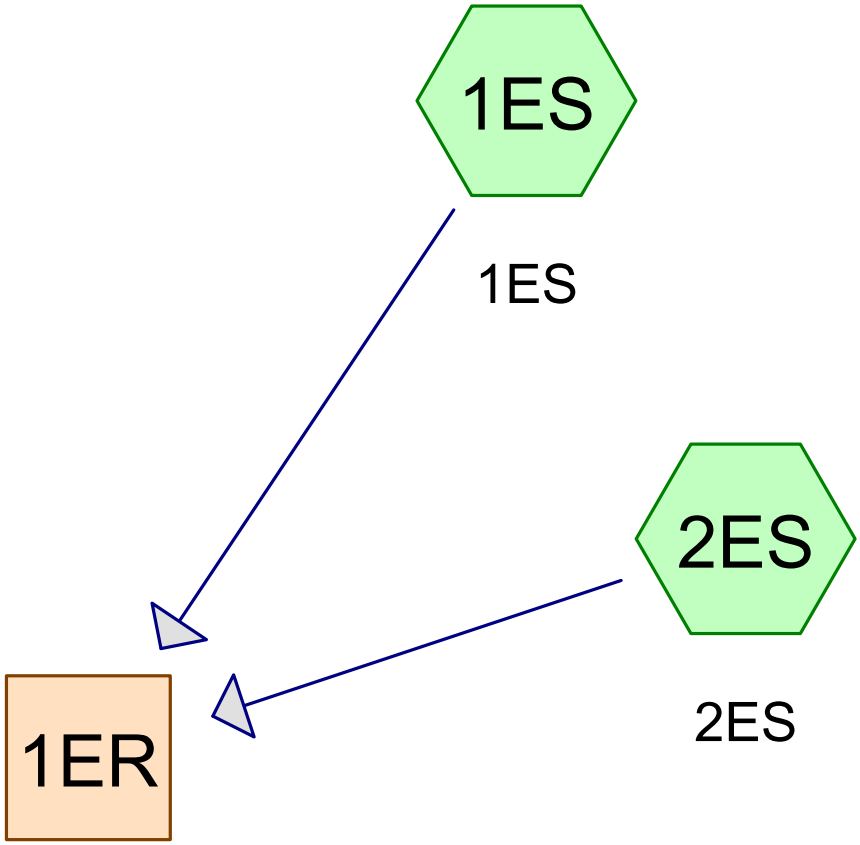
Table 7. Rainfall (inches) for Given Recurrence Interval for Section 2 (Northeast)

Storm Duration	2-month	3-month	4-month	6-month	9-month	1-year	2-year	5-year	10-year	25-year	50-year	100-year	500-year
5 minutes	0.19	0.22	0.24	0.27	0.31	0.33	0.40	0.52	0.62	0.77	0.90	1.03	1.35
10 minutes	0.33	0.38	0.41	0.47	0.53	0.58	0.70	0.90	1.08	1.35	1.58	1.80	2.36
15 minutes	0.42	0.49	0.53	0.61	0.69	0.75	0.90	1.16	1.39	1.74	2.03	2.32	3.04
30 minutes	0.58	0.66	0.73	0.83	0.94	1.03	1.24	1.59	1.91	2.39	2.78	3.17	4.16
1 hour	0.74	0.84	0.93	1.05	1.20	1.30	1.57	2.02	2.42	3.03	3.53	4.03	5.28
2 hours	0.91	1.04	1.14	1.30	1.48	1.61	1.94	2.49	2.99	3.74	4.35	4.97	6.52
3 hours	1.00	1.15	1.26	1.44	1.63	1.77	2.14	2.75	3.30	4.13	4.80	5.49	7.20
6 hours	1.18	1.35	1.48	1.68	1.91	2.08	2.51	3.23	3.86	4.84	5.63	6.43	8.43
12 hours	1.37	1.56	1.71	1.95	2.21	2.41	2.91	3.74	4.48	5.61	6.53	7.46	9.78
18 hours	1.48	1.69	1.85	2.11	2.39	2.61	3.14	4.04	4.84	6.06	7.05	8.06	10.57
24 hours	1.57	1.80	1.97	2.24	2.55	2.77	3.34	4.30	5.15	6.45	7.50	8.57	11.24
48 hours	1.72	1.97	2.16	2.46	2.79	3.04	3.66	4.71	5.62	6.99	8.13	9.28	12.10
72 hours	1.87	2.14	2.34	2.67	3.03	3.30	3.97	5.08	6.05	7.49	8.64	9.85	12.81
120 hours	2.08	2.38	2.61	2.97	3.37	3.67	4.42	5.63	6.68	8.16	9.39	10.66	13.81
240 hours	2.63	3.01	3.30	3.76	4.27	4.65	5.60	7.09	8.25	9.90	11.26	12.65	16.00

Appendix B

Existing HydroCAD Results

EXISTING



Subcat Reach Pond Link

Routing Diagram for 2026-05-11_WelterRoad_PrePost
Prepared by Westwood Professional Services, Printed 5/14/2026

Rainfall Events Listing (selected events)

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	2-yr	Huff 0-10sm	3Q	Scale	24.00	1	3.34	2
2	10-yr	Huff 0-10sm	3Q	Scale	24.00	1	5.15	2
3	100-yr	Huff 0-10sm	3Q	Scale	24.00	1	8.57	2

Area Listing (selected nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.400	78	Row Crops, HSG B (1ES)
6.900	85	Row Crops, HSG C (1ES, 2ES)
4.600	89	Row Crops, HSG D (1ES, 2ES)
11.900	**86**	**TOTAL AREA**

Soil Listing (selected nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
0.400	HSG B	1ES
6.900	HSG C	1ES, 2ES
4.600	HSG D	1ES, 2ES
0.000	Other	
11.900		**TOTAL AREA**

Time span=0.00-48.00 hrs, dt=0.05 hrs, 961 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1ES: 1ES Runoff Area=9.300 ac 0.00% Impervious Runoff Depth=1.96"
Flow Length=619' Tc=18.3 min CN=86 Runoff=2.64 cfs 1.517 af

Subcatchment 2ES: 2ES Runoff Area=2.600 ac 0.00% Impervious Runoff Depth=1.96"
Flow Length=356' Tc=17.3 min CN=86 Runoff=0.74 cfs 0.424 af

Reach 1ER: Inflow=3.38 cfs 1.941 af
Outflow=3.38 cfs 1.941 af

Total Runoff Area = 11.900 ac Runoff Volume = 1.941 af Average Runoff Depth = 1.96"
100.00% Pervious = 11.900 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment 1ES: 1ES

Runoff = 2.64 cfs @ 15.83 hrs, Volume= 1.517 af, Depth= 1.96"
Routed to Reach 1ER :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Huff 0-10sm 3Q scaled to 24.00 hrs 2-yr Rainfall=3.34"

	Area (ac)	CN	Description
*	0.400	78	Row Crops, HSG B
*	5.100	85	Row Crops, HSG C
*	3.800	89	Row Crops, HSG D
	9.300	86	Weighted Average
	9.300		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.9	100	0.0050	0.11		**Sheet Flow,** n= 0.130 P2= 3.34"
3.4	519	0.0250	2.55		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
18.3	619	Total			

Summary for Subcatchment 2ES: 2ES

Runoff = 0.74 cfs @ 15.81 hrs, Volume= 0.424 af, Depth= 1.96"
Routed to Reach 1ER :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Huff 0-10sm 3Q scaled to 24.00 hrs 2-yr Rainfall=3.34"

	Area (ac)	CN	Description
*	1.800	85	Row Crops, HSG C
*	0.800	89	Row Crops, HSG D
	2.600	86	Weighted Average
	2.600		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.9	100	0.0050	0.11		**Sheet Flow,** n= 0.130 P2= 3.34"
2.4	256	0.0120	1.76		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
17.3	356	Total			

Summary for Reach 1ER:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 11.900 ac, 0.00% Impervious, Inflow Depth = 1.96" for 2-yr event
Inflow = 3.38 cfs @ 15.82 hrs, Volume= 1.941 af
Outflow = 3.38 cfs @ 15.82 hrs, Volume= 1.941 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Time span=0.00-48.00 hrs, dt=0.05 hrs, 961 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1ES: 1ES Runoff Area=9.300 ac 0.00% Impervious Runoff Depth=3.61"
Flow Length=619' Tc=18.3 min CN=86 Runoff=4.59 cfs 2.796 af

Subcatchment 2ES: 2ES Runoff Area=2.600 ac 0.00% Impervious Runoff Depth=3.61"
Flow Length=356' Tc=17.3 min CN=86 Runoff=1.28 cfs 0.782 af

Reach 1ER: Inflow=5.88 cfs 3.577 af
Outflow=5.88 cfs 3.577 af

Total Runoff Area = 11.900 ac Runoff Volume = 3.577 af Average Runoff Depth = 3.61"
100.00% Pervious = 11.900 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment 1ES: 1ES

Runoff = 4.59 cfs @ 15.80 hrs, Volume= 2.796 af, Depth= 3.61"
Routed to Reach 1ER :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Huff 0-10sm 3Q scaled to 24.00 hrs 10-yr Rainfall=5.15"

	Area (ac)	CN	Description
*	0.400	78	Row Crops, HSG B
*	5.100	85	Row Crops, HSG C
*	3.800	89	Row Crops, HSG D
	9.300	86	Weighted Average
	9.300		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.9	100	0.0050	0.11		**Sheet Flow,** n= 0.130 P2= 3.34"
3.4	519	0.0250	2.55		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
18.3	619	Total			

Summary for Subcatchment 2ES: 2ES

Runoff = 1.28 cfs @ 15.79 hrs, Volume= 0.782 af, Depth= 3.61"
Routed to Reach 1ER :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Huff 0-10sm 3Q scaled to 24.00 hrs 10-yr Rainfall=5.15"

	Area (ac)	CN	Description
*	1.800	85	Row Crops, HSG C
*	0.800	89	Row Crops, HSG D
	2.600	86	Weighted Average
	2.600		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.9	100	0.0050	0.11		**Sheet Flow,** n= 0.130 P2= 3.34"
2.4	256	0.0120	1.76		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
17.3	356	Total			

Summary for Reach 1ER:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 11.900 ac, 0.00% Impervious, Inflow Depth = 3.61" for 10-yr event
Inflow = 5.88 cfs @ 15.80 hrs, Volume= 3.577 af
Outflow = 5.88 cfs @ 15.80 hrs, Volume= 3.577 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Time span=0.00-48.00 hrs, dt=0.05 hrs, 961 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1ES: 1ES Runoff Area=9.300 ac 0.00% Impervious Runoff Depth=6.88"
Flow Length=619' Tc=18.3 min CN=86 Runoff=8.24 cfs 5.336 af

Subcatchment 2ES: 2ES Runoff Area=2.600 ac 0.00% Impervious Runoff Depth=6.88"
Flow Length=356' Tc=17.3 min CN=86 Runoff=2.31 cfs 1.492 af

Reach 1ER: Inflow=10.54 cfs 6.828 af
Outflow=10.54 cfs 6.828 af

Total Runoff Area = 11.900 ac Runoff Volume = 6.828 af Average Runoff Depth = 6.88"
100.00% Pervious = 11.900 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment 1ES: 1ES

Runoff = 8.24 cfs @ 15.79 hrs, Volume= 5.336 af, Depth= 6.88"
Routed to Reach 1ER :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Huff 0-10sm 3Q scaled to 24.00 hrs 100-yr Rainfall=8.57"

	Area (ac)	CN	Description
*	0.400	78	Row Crops, HSG B
*	5.100	85	Row Crops, HSG C
*	3.800	89	Row Crops, HSG D
	9.300	86	Weighted Average
	9.300		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.9	100	0.0050	0.11		**Sheet Flow,** n= 0.130 P2= 3.34"
3.4	519	0.0250	2.55		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
18.3	619	Total			

Summary for Subcatchment 2ES: 2ES

Runoff = 2.31 cfs @ 15.78 hrs, Volume= 1.492 af, Depth= 6.88"
Routed to Reach 1ER :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Huff 0-10sm 3Q scaled to 24.00 hrs 100-yr Rainfall=8.57"

	Area (ac)	CN	Description
*	1.800	85	Row Crops, HSG C
*	0.800	89	Row Crops, HSG D
	2.600	86	Weighted Average
	2.600		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.9	100	0.0050	0.11		**Sheet Flow,** n= 0.130 P2= 3.34"
2.4	256	0.0120	1.76		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
17.3	356	Total			

Summary for Reach 1ER:

[40] Hint: Not Described (Outflow=Inflow)

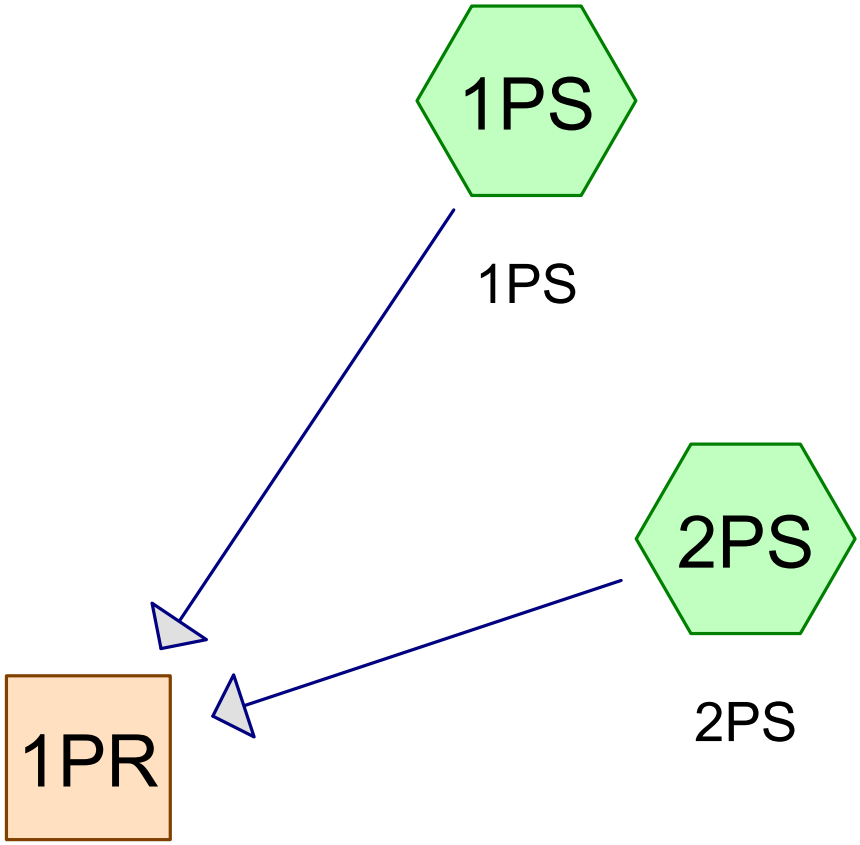
Inflow Area = 11.900 ac, 0.00% Impervious, Inflow Depth = 6.88" for 100-yr event
Inflow = 10.54 cfs @ 15.79 hrs, Volume= 6.828 af
Outflow = 10.54 cfs @ 15.79 hrs, Volume= 6.828 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Appendix C

Proposed HydroCAD Results

PROPOSED



Subcat Reach Pond Link

Routing Diagram for 2026-05-11_WelterRoad_PrePost
Prepared by Westwood Professional Services, Printed 5/14/2026

Rainfall Events Listing (selected events)

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	2-yr	Huff 0-10sm	3Q	Scale	24.00	1	3.34	2
2	10-yr	Huff 0-10sm	3Q	Scale	24.00	1	5.15	2
3	100-yr	Huff 0-10sm	3Q	Scale	24.00	1	8.57	2

Area Listing (selected nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.150	96	Gravel Road, HSG B (1PS)
0.250	96	Gravel Road, HSG C (1PS)
0.100	96	Gravel Road, HSG D (1PS)
0.300	98	Impervious (1PS)
0.250	58	Meadow Grass, HSG B (1PS)
6.350	71	Meadow Grass, HSG C (1PS, 2PS)
4.500	78	Meadow Grass, HSG D (1PS, 2PS)
11.900	**75**	**TOTAL AREA**

Soil Listing (selected nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
0.400	HSG B	1PS
6.600	HSG C	1PS, 2PS
4.600	HSG D	1PS, 2PS
0.300	Other	1PS
11.900		**TOTAL AREA**

Time span=0.00-48.00 hrs, dt=0.05 hrs, 961 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1PS: 1PS Runoff Area=9.300 ac 3.23% Impervious Runoff Depth=1.25"
Flow Length=619' Tc=27.7 min CN=76 Runoff=1.83 cfs 0.969 af

Subcatchment 2PS: 2PS Runoff Area=2.600 ac 0.00% Impervious Runoff Depth=1.07"
Flow Length=356' Tc=26.7 min CN=73 Runoff=0.45 cfs 0.233 af

Reach 1PR: Inflow=2.28 cfs 1.202 af
Outflow=2.28 cfs 1.202 af

Total Runoff Area = 11.900 ac Runoff Volume = 1.202 af Average Runoff Depth = 1.21"
97.48% Pervious = 11.600 ac 2.52% Impervious = 0.300 ac

Summary for Subcatchment 1PS: 1PS

Runoff = 1.83 cfs @ 16.03 hrs, Volume= 0.969 af, Depth= 1.25"
Routed to Reach 1PR :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Huff 0-10sm 3Q scaled to 24.00 hrs 2-yr Rainfall=3.34"

	Area (ac)	CN	Description
*	0.150	96	Gravel Road, HSG B
*	0.250	96	Gravel Road, HSG C
*	0.100	96	Gravel Road, HSG D
*	0.300	98	Impervious
*	0.250	58	Meadow Grass, HSG B
*	4.550	71	Meadow Grass, HSG C
*	3.700	78	Meadow Grass, HSG D
	9.300	76	Weighted Average
	9.000		96.77% Pervious Area
	0.300		3.23% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
24.3	100	0.0050	0.07		**Sheet Flow,** n= 0.240 P2= 3.34"
3.4	519	0.0250	2.55		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
27.7	619	Total			

Summary for Subcatchment 2PS: 2PS

Runoff = 0.45 cfs @ 16.05 hrs, Volume= 0.233 af, Depth= 1.07"
Routed to Reach 1PR :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Huff 0-10sm 3Q scaled to 24.00 hrs 2-yr Rainfall=3.34"

	Area (ac)	CN	Description
*	1.800	71	Meadow Grass, HSG C
*	0.800	78	Meadow Grass, HSG D
	2.600	73	Weighted Average
	2.600		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
24.3	100	0.0050	0.07		**Sheet Flow,** n= 0.240 P2= 3.34"
2.4	256	0.0120	1.76		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
26.7	356	Total			

Summary for Reach 1PR:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 11.900 ac, 2.52% Impervious, Inflow Depth = 1.21" for 2-yr event
Inflow = 2.28 cfs @ 16.04 hrs, Volume= 1.202 af
Outflow = 2.28 cfs @ 16.04 hrs, Volume= 1.202 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Time span=0.00-48.00 hrs, dt=0.05 hrs, 961 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1PS: 1PS Runoff Area=9.300 ac 3.23% Impervious Runoff Depth=2.66"
Flow Length=619' Tc=27.7 min CN=76 Runoff=3.67 cfs 2.061 af

Subcatchment 2PS: 2PS Runoff Area=2.600 ac 0.00% Impervious Runoff Depth=2.40"
Flow Length=356' Tc=26.7 min CN=73 Runoff=0.95 cfs 0.520 af

Reach 1PR: Inflow=4.62 cfs 2.581 af
Outflow=4.62 cfs 2.581 af

Total Runoff Area = 11.900 ac Runoff Volume = 2.581 af Average Runoff Depth = 2.60"
97.48% Pervious = 11.600 ac 2.52% Impervious = 0.300 ac

Summary for Subcatchment 1PS: 1PS

Runoff = 3.67 cfs @ 15.96 hrs, Volume= 2.061 af, Depth= 2.66"
Routed to Reach 1PR :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Huff 0-10sm 3Q scaled to 24.00 hrs 10-yr Rainfall=5.15"

	Area (ac)	CN	Description
*	0.150	96	Gravel Road, HSG B
*	0.250	96	Gravel Road, HSG C
*	0.100	96	Gravel Road, HSG D
*	0.300	98	Impervious
*	0.250	58	Meadow Grass, HSG B
*	4.550	71	Meadow Grass, HSG C
*	3.700	78	Meadow Grass, HSG D
	9.300	76	Weighted Average
	9.000		96.77% Pervious Area
	0.300		3.23% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
24.3	100	0.0050	0.07		**Sheet Flow,** n= 0.240 P2= 3.34"
3.4	519	0.0250	2.55		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
27.7	619	Total			

Summary for Subcatchment 2PS: 2PS

Runoff = 0.95 cfs @ 15.97 hrs, Volume= 0.520 af, Depth= 2.40"
Routed to Reach 1PR :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Huff 0-10sm 3Q scaled to 24.00 hrs 10-yr Rainfall=5.15"

	Area (ac)	CN	Description
*	1.800	71	Meadow Grass, HSG C
*	0.800	78	Meadow Grass, HSG D
	2.600	73	Weighted Average
	2.600		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
24.3	100	0.0050	0.07		**Sheet Flow,** n= 0.240 P2= 3.34"
2.4	256	0.0120	1.76		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
26.7	356	Total			

Summary for Reach 1PR:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 11.900 ac, 2.52% Impervious, Inflow Depth = 2.60" for 10-yr event
Inflow = 4.62 cfs @ 15.97 hrs, Volume= 2.581 af
Outflow = 4.62 cfs @ 15.97 hrs, Volume= 2.581 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Time span=0.00-48.00 hrs, dt=0.05 hrs, 961 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1PS: 1PS Runoff Area=9.300 ac 3.23% Impervious Runoff Depth=5.68"
Flow Length=619' Tc=27.7 min CN=76 Runoff=7.32 cfs 4.401 af

Subcatchment 2PS: 2PS Runoff Area=2.600 ac 0.00% Impervious Runoff Depth=5.32"
Flow Length=356' Tc=26.7 min CN=73 Runoff=1.96 cfs 1.152 af

Reach 1PR: Inflow=9.28 cfs 5.554 af
Outflow=9.28 cfs 5.554 af

Total Runoff Area = 11.900 ac Runoff Volume = 5.554 af Average Runoff Depth = 5.60"
97.48% Pervious = 11.600 ac 2.52% Impervious = 0.300 ac

Summary for Subcatchment 1PS: 1PS

Runoff = 7.32 cfs @ 15.92 hrs, Volume= 4.401 af, Depth= 5.68"
Routed to Reach 1PR :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Huff 0-10sm 3Q scaled to 24.00 hrs 100-yr Rainfall=8.57"

	Area (ac)	CN	Description
*	0.150	96	Gravel Road, HSG B
*	0.250	96	Gravel Road, HSG C
*	0.100	96	Gravel Road, HSG D
*	0.300	98	Impervious
*	0.250	58	Meadow Grass, HSG B
*	4.550	71	Meadow Grass, HSG C
*	3.700	78	Meadow Grass, HSG D
	9.300	76	Weighted Average
	9.000		96.77% Pervious Area
	0.300		3.23% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
24.3	100	0.0050	0.07		**Sheet Flow,** n= 0.240 P2= 3.34"
3.4	519	0.0250	2.55		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
27.7	619	Total			

Summary for Subcatchment 2PS: 2PS

Runoff = 1.96 cfs @ 15.92 hrs, Volume= 1.152 af, Depth= 5.32"
Routed to Reach 1PR :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Huff 0-10sm 3Q scaled to 24.00 hrs 100-yr Rainfall=8.57"

	Area (ac)	CN	Description
*	1.800	71	Meadow Grass, HSG C
*	0.800	78	Meadow Grass, HSG D
	2.600	73	Weighted Average
	2.600		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
24.3	100	0.0050	0.07		**Sheet Flow,** n= 0.240 P2= 3.34"
2.4	256	0.0120	1.76		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
26.7	356	Total			

Summary for Reach 1PR:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 11.900 ac, 2.52% Impervious, Inflow Depth = 5.60" for 100-yr event
Inflow = 9.28 cfs @ 15.92 hrs, Volume= 5.554 af
Outflow = 9.28 cfs @ 15.92 hrs, Volume= 5.554 af, Atten= 0%, Lag= 0.0 min

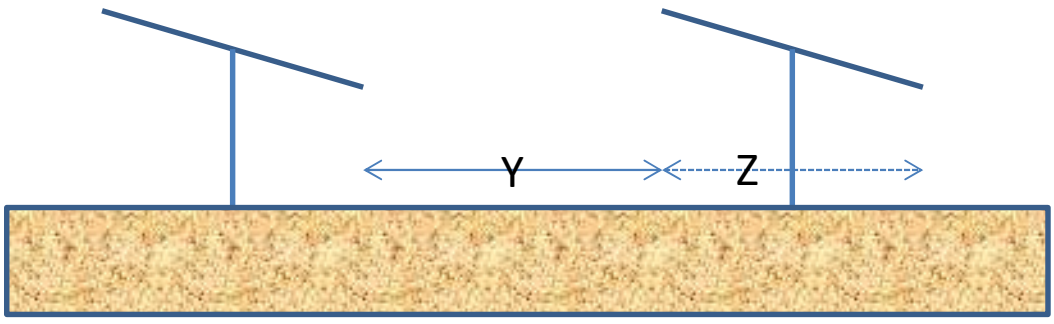
Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Appendix D

Water Quality Calculations

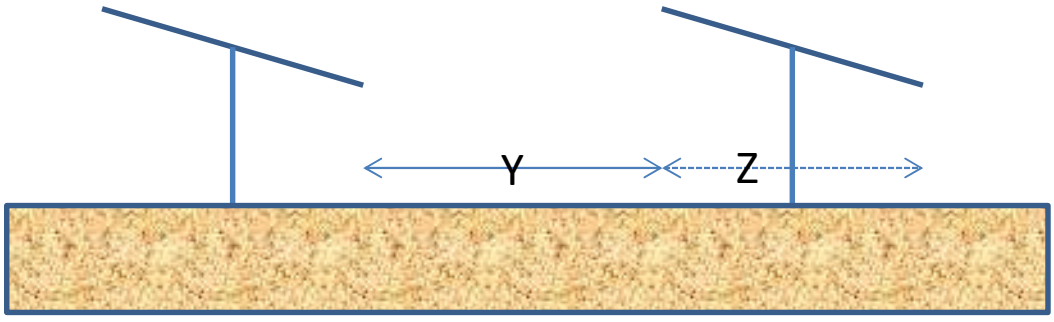
Drainage Area 1

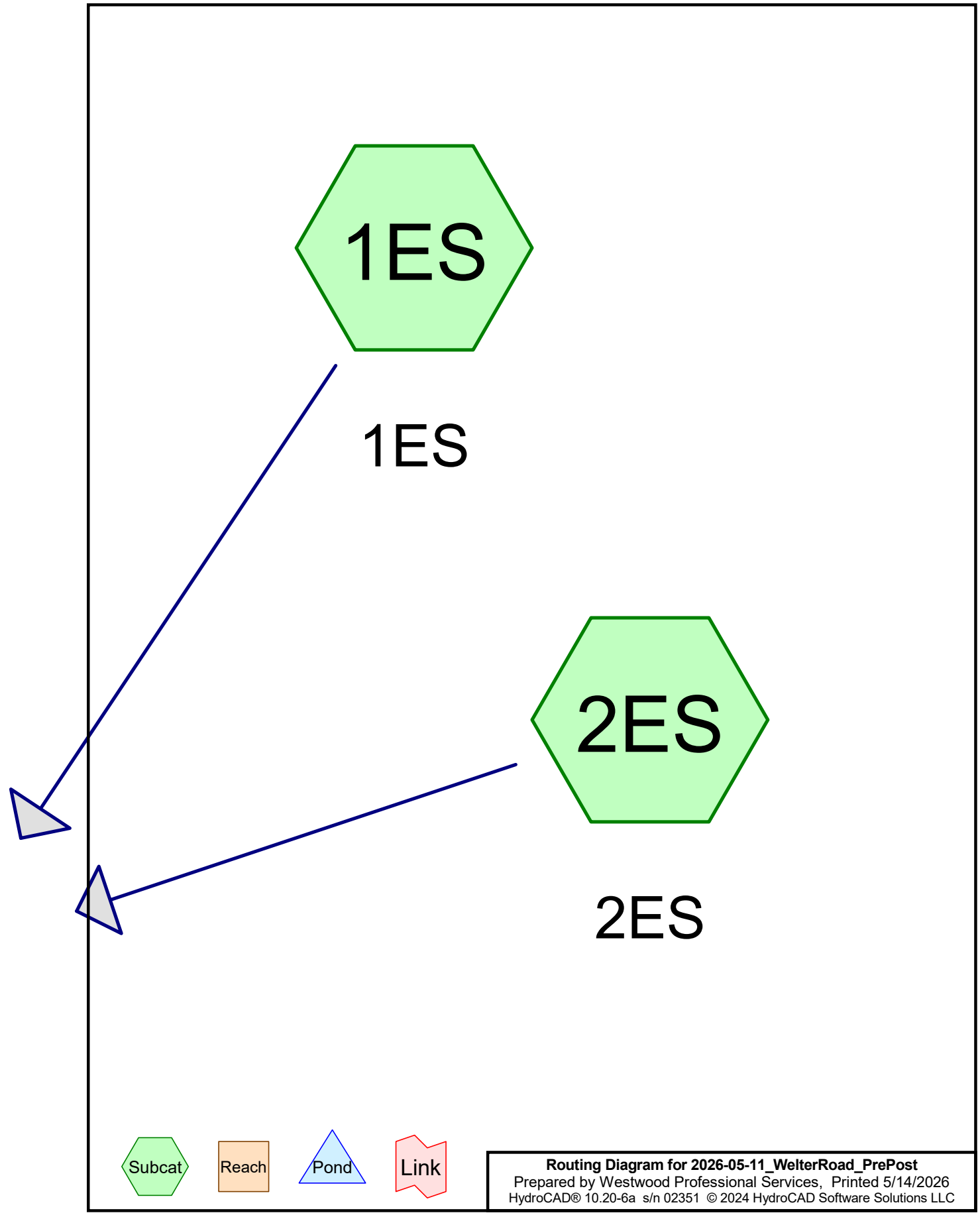
This spreadsheet makes calculations for an individual solar panel.		
Enter values in blue cells		
Soil	D	
I/P ratio	0.351	
Term	**Value**	**Units**
Pervious area	248292.00	square feet
Impervious area (area of solar panel)	87120.00	square feet
Runoff depth from pervious areas	7.20	inches
Redirected runoff depth from solar panel (called average annual runoff depth)	8.40	inches
Runoff depth from solar panel	22.50	inches
Performance goal	1.00	inches
SUMMARY		
Pre-disconnection		
Runoff from impervious	163350	ft3
Runoff from pervious	148975	ft3
Total runoff	312325	ft3
Post-disconnection		
Total runoff	234788	ft3
Total runoff reduced	77537	ft3
Runoff from pervious	148975	ft3
Runoff from impervious	85813	ft3
Adjusted impervious	45767.040	square feet
Performance Goal Summary		
Performance goal	**7260.00**	ft3
BMP volume credit ($BMP_{volume\ credit}$)	**3446.08**	ft3
% of performance goal achieved	**47.5**	%
Remaining water quality volume to be treated (per panel)	**3813.92**	ft3
Pervious area = (Y + Z) * W; where W is the width of the solar panel and Z is the average horizontal distance		
Impervious area = Z * W; where W is the width of the solar panel and Z is the average horizontal distance of		



Drainage Area 2

This spreadsheet makes calculations for an individual solar panel.		
Enter values in blue cells		
Soil	C	
I/P ratio	0.333	
Term	**Value**	**Units**
Pervious area	84942.00	square feet
Impervious area (area of solar panel)	28314.00	square feet
Runoff depth from pervious areas	6.10	inches
Redirected runoff depth from solar panel (called average annual runoff depth)	7.06	inches
Runoff depth from solar panel	22.50	inches
Performance goal	1.00	inches
SUMMARY		
Pre-disconnection		
Runoff from impervious	53089	ft3
Runoff from pervious	43179	ft3
Total runoff	96268	ft3
Post-disconnection		
Total runoff	66632	ft3
Total runoff reduced	29635	ft3
Runoff from pervious	43179	ft3
Runoff from impervious	23453	ft3
Adjusted impervious	12508.496	square feet
Performance Goal Summary		
Performance goal	**2359.50**	ft3
BMP volume credit ($BMP_{volume\ credit}$)	**1317.13**	ft3
% of performance goal achieved	**55.8**	%
Remaining water quality volume to be treated (per panel)	**1042.37**	ft3
Pervious area = (Y + Z) * W; where W is the width of the solar panel and Z is the average horizontal distance		
Impervious area = Z * W; where W is the width of the solar panel and Z is the average horizontal distance of		





Routing Diagram for 2026-05-11_WelterRoad_PrePost
Prepared by Westwood Professional Services, Printed 5/14/2026

Rainfall Events Listing (selected events)

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	1in	Huff 0-10sm	3Q	Scale	24.00	1	1.00	2

Area Listing (selected nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.400	78	Row Crops, HSG B (1ES)
6.900	85	Row Crops, HSG C (1ES, 2ES)
4.600	89	Row Crops, HSG D (1ES, 2ES)
11.900	**86**	**TOTAL AREA**

Soil Listing (selected nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
0.400	HSG B	1ES
6.900	HSG C	1ES, 2ES
4.600	HSG D	1ES, 2ES
0.000	Other	
11.900		**TOTAL AREA**

Time span=0.00-48.00 hrs, dt=0.05 hrs, 961 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1ES: 1ES Runoff Area=9.300 ac 0.00% Impervious Runoff Depth=0.20"
Flow Length=619' Tc=18.3 min CN=86 Runoff=0.31 cfs 0.153 af

Subcatchment 2ES: 2ES Runoff Area=2.600 ac 0.00% Impervious Runoff Depth=0.20"
Flow Length=356' Tc=17.3 min CN=86 Runoff=0.09 cfs 0.043 af

Total Runoff Area = 11.900 ac Runoff Volume = 0.196 af Average Runoff Depth = 0.20"
100.00% Pervious = 11.900 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment 1ES: 1ES

Runoff = 0.31 cfs @ 16.05 hrs, Volume= 0.153 af, Depth= 0.20"
Routed to Reach 1ER :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Huff 0-10sm 3Q scaled to 24.00 hrs 1in Rainfall=1.00"

	Area (ac)	CN	Description
*	0.400	78	Row Crops, HSG B
*	5.100	85	Row Crops, HSG C
*	3.800	89	Row Crops, HSG D
	9.300	86	Weighted Average
	9.300		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.9	100	0.0050	0.11		**Sheet Flow,** n= 0.130 P2= 3.34"
3.4	519	0.0250	2.55		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
18.3	619	Total			

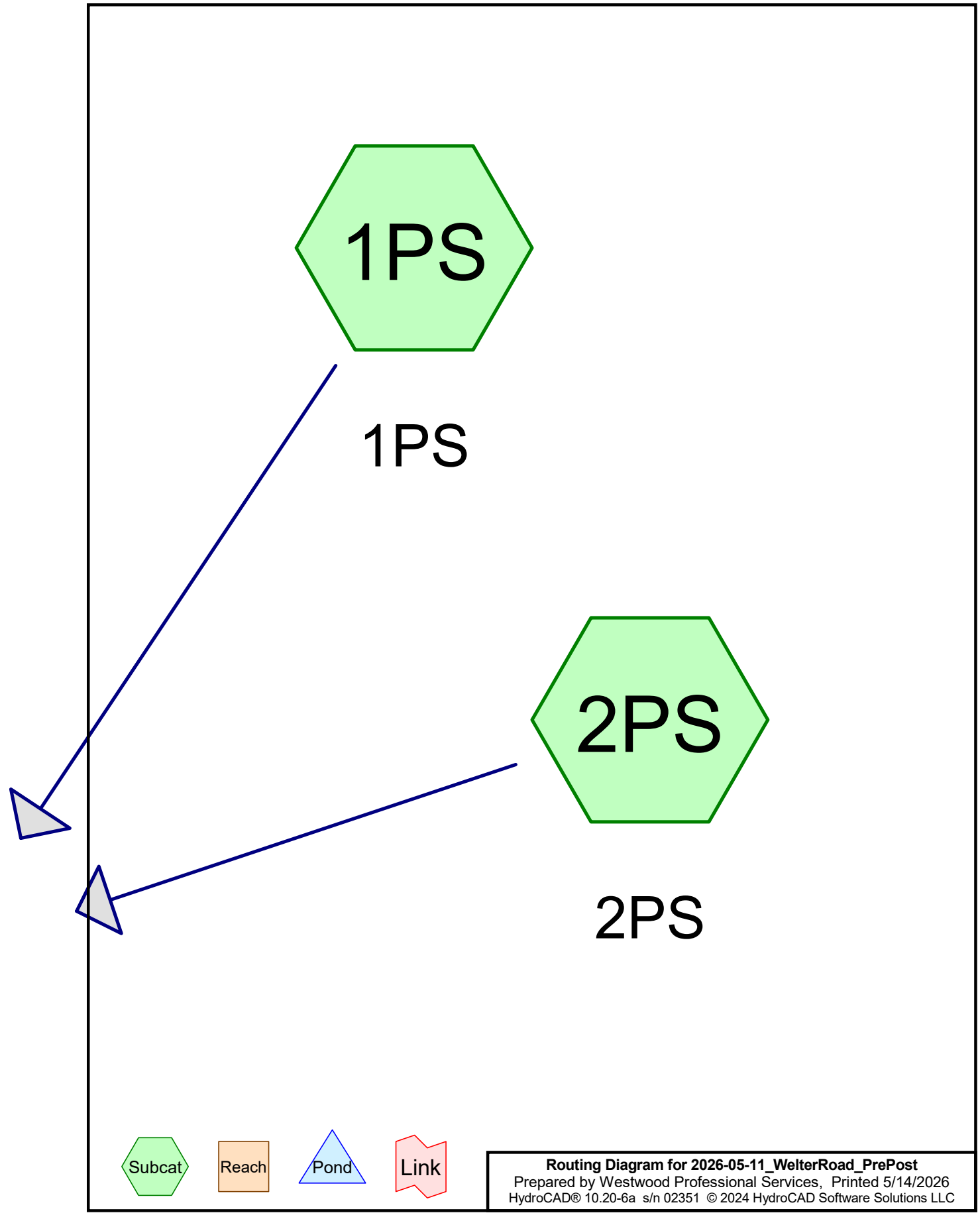
Summary for Subcatchment 2ES: 2ES

Runoff = 0.09 cfs @ 16.02 hrs, Volume= 0.043 af, Depth= 0.20"
Routed to Reach 1ER :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Huff 0-10sm 3Q scaled to 24.00 hrs 1in Rainfall=1.00"

	Area (ac)	CN	Description
*	1.800	85	Row Crops, HSG C
*	0.800	89	Row Crops, HSG D
	2.600	86	Weighted Average
	2.600		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.9	100	0.0050	0.11		**Sheet Flow,** n= 0.130 P2= 3.34"
2.4	256	0.0120	1.76		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
17.3	356	Total			



Routing Diagram for 2026-05-11_WelterRoad_PrePost
Prepared by Westwood Professional Services, Printed 5/14/2026
HydroCAD® 10.20-6a s/n 02351 © 2024 HydroCAD Software Solutions LLC

Rainfall Events Listing (selected events)

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	1in	Huff 0-10sm	3Q	Scale	24.00	1	1.00	2

Area Listing (selected nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.150	96	Gravel Road, HSG B (1PS)
0.250	96	Gravel Road, HSG C (1PS)
0.100	96	Gravel Road, HSG D (1PS)
0.300	98	Impervious (1PS)
0.250	58	Meadow Grass, HSG B (1PS)
6.350	71	Meadow Grass, HSG C (1PS, 2PS)
4.500	78	Meadow Grass, HSG D (1PS, 2PS)
11.900	**75**	**TOTAL AREA**

Soil Listing (selected nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
0.400	HSG B	1PS
6.600	HSG C	1PS, 2PS
4.600	HSG D	1PS, 2PS
0.300	Other	1PS
11.900		**TOTAL AREA**

Time span=0.00-48.00 hrs, dt=0.05 hrs, 961 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1PS: 1PS Runoff Area=9.300 ac 3.23% Impervious Runoff Depth=0.04"
Flow Length=619' Tc=27.7 min CN=76 Runoff=0.06 cfs 0.030 af

Subcatchment 2PS: 2PS Runoff Area=2.600 ac 0.00% Impervious Runoff Depth=0.02"
Flow Length=356' Tc=26.7 min CN=73 Runoff=0.01 cfs 0.004 af

Total Runoff Area = 11.900 ac Runoff Volume = 0.034 af Average Runoff Depth = 0.03"
97.48% Pervious = 11.600 ac 2.52% Impervious = 0.300 ac

Summary for Subcatchment 1PS: 1PS

Runoff = 0.06 cfs @ 17.89 hrs, Volume= 0.030 af, Depth= 0.04"
Routed to Reach 1PR :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Huff 0-10sm 3Q scaled to 24.00 hrs 1in Rainfall=1.00"

	Area (ac)	CN	Description
*	0.150	96	Gravel Road, HSG B
*	0.250	96	Gravel Road, HSG C
*	0.100	96	Gravel Road, HSG D
*	0.300	98	Impervious
*	0.250	58	Meadow Grass, HSG B
*	4.550	71	Meadow Grass, HSG C
*	3.700	78	Meadow Grass, HSG D
	9.300	76	Weighted Average
	9.000		96.77% Pervious Area
	0.300		3.23% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
24.3	100	0.0050	0.07		**Sheet Flow,** n= 0.240 P2= 3.34"
3.4	519	0.0250	2.55		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
27.7	619	Total			

Summary for Subcatchment 2PS: 2PS

Runoff = 0.01 cfs @ 24.09 hrs, Volume= 0.004 af, Depth= 0.02"
Routed to Reach 1PR :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Huff 0-10sm 3Q scaled to 24.00 hrs 1in Rainfall=1.00"

	Area (ac)	CN	Description
*	1.800	71	Meadow Grass, HSG C
*	0.800	78	Meadow Grass, HSG D
	2.600	73	Weighted Average
	2.600		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
24.3	100	0.0050	0.07		**Sheet Flow,** n= 0.240 P2= 3.34"
2.4	256	0.0120	1.76		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
26.7	356	Total			