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APPENDIX 4.10-A: HYDROLOGY AND HYDRAULICS ANALYSIS

Hydrology & Hydraulics Report

Corby Energy Center, LLC

Corby Energy Storage
Project No. 163851

Revision B
10/28/2024

Hydrology & Hydraulics Report

prepared for

Corby Energy Center, LLC
Corby Energy Storage
Solano County, California

Project No. 163851

Revision B
10/28/2024

prepared by

Burns & McDonnell Western Enterprises, Inc.
Brea, California

INDEX AND CERTIFICATION

Corby Energy Center, LLC
Hydrology & Hydraulics Report
Project No. 163851

Report Index

Certifications

I hereby certify, as a Professional Engineer in the state of California, that the information in this document was assembled under my direct supervisory control. This report is not intended or represented to be suitable for reuse by Corby Energy Center, LLC or others without specific verification or adaptation by the Engineer.

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1.0 SITE CONDITIONS

1.1 Site Description

Corby Energy Center, LLC (CEC) proposes to install the new Corby Battery Energy Storage System (Project). The project site is bordered by Kilkenny Road to the north, Byrnes Road to the east, and agricultural land to the south and west edge of the site near the city of Vacaville, Solano County, California. See Figure 1-1 for project general vicinity map. The property encompasses 40 acres. The area of the property CEC is proposing to disturb during construction is approximately 19 acres. CEC will add two new points of access off Byrnes Road as a part of this project.

The property is mostly agricultural land. The Project will result in the creation of approximately 14 acres of impervious surfaces on the project site. 2.5 acres of that impervious area is derived from the battery cabinets, their foundations, and the foundations for the substation equipment with an additional 11.7 acres coming from the internal access roadway system and yard surfacing. The existing site drainage generally flows from west to east into the ditch along Byrnes Road.

As detailed herein, the stormwater management design will meet or exceed all applicable Solano County and California stormwater standards.

1.2 Project Description

The project is planned to be a 300 MW battery storage facility with a capacity of 1200 MWh. In addition to batteries, the development will include inverters, transformers, access roads, and a project substation (by others).

1.3 FEMA Flood Hazard

The Project is located in the Lower Sacramento Watershed. Based on the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM) Panel Number 06095C0168E (effective May 2009) encompasses the project area within Solano County, California. The project area is classified as a FEMA “Zone X” floodplain, which is identified as “Areas determined to be outside the 0.2% annual chance floodplain.” The FIRM Panel is included in Appendix F.

1.4 Soils

Existing site soil information was taken from the USDA Natural Resources Conservation Service (NRCS). The NRCS Web Soil Survey classifies the types of soils found within the watershed according to hydrologic soils group: A, B, C, or D. The soil type on the project site and adjacent areas was determined to be mostly lean clay. Hydrologic soil groups B & D were specified for the watersheds

encompassing the project site, indicating that soils have moderate to high runoff potential when saturated. The NRCS Web Soil Survey is included in Appendix E.

Figure 1-1: General Vicinity Map

2.0 HYDROLOGY AND HYDRAULICS

2.1 Offsite Drainage

The existing site and surrounding watersheds consist of agricultural fields. These fields are very flat and gradually slope at approximately 0.5%-1.0% to the southeast. There are dirt farm roads running north and south, evenly spaced at 900' intervals, that divide the existing property into smaller fields. These farm roads are slightly elevated to help prevent irrigation water from leaving the field and ultimately divert flows to the south. Offsite runoff approaches the Project from the west. The majority of this runoff is diverted to the south by the existing farm roads. Any offsite flow that overtops the farm roads and approaches the Project will be intercepted by perimeter diversion ditches and routed around the Project to stormwater ponds located at historic discharge points.

2.2 Onsite Drainage

The project site will be graded so that slopes are generally less than 2% across battery storage yard and 1% across the substation. The Project will be divided into four drainage areas as shown in Appendix B. Onsite runoff will sheet flow to the north and south where they will enter the proposed diversion ditches and be routed to the stormwater ponds where they will be stored.

2.3 Rainfall Data

Rainfall depths for Solano County, CA were obtained from the National Oceanic and Atmospheric Administration. The SCS rainfall distribution for this project is Type I. See Table 2.1 and Appendix G for rainfall data.

Table 2.1 Design Storm Frequency-Depth

Return Frequency (yr)	24 Hour Depth (in)
2	2.88
10	4.37
25	5.28
100	6.67

2.4 Runoff Data

HydroCAD 10.20-2 software was utilized to model the stormwater runoff at the site. The SCS TR-55 methodology was used for this model to calculate the pre and post developed runoff rates for storage design. Tables 2.2, 2.3 & 2.4 provide detailed information regarding curve numbers, land coverages and times of concentration for the project.

Table 2.2 Standard Runoff Curve Numbers

Land Type	Curve Number
Gravel	96
Grass (B)	61
Grass (D)	80
Impervious	98
Row Crops (B)	78
Row Crops (D)	89
Water Surface	98

Table 2.3 Land Coverages

Land Coverage	Pre-Developed Area (ac)	Pre-Developed Curve Number (CN)	Post-Developed Area (ac)	Post-Developed Curve Number (CN)
Gravel	0	96	11.7	96
Grass (B)	0	61	0.58	61
Grass (D)	0	80	2.44	80
Impervious	0	98	2.48	98
Row Crops (B)	4.21	78	0.70	78
Row Crops (D)	19.96	89	4.51	89
Water	0	98	2.22	98
Total Area	24.2		24.7	
Weighted CN		87		92

Table 2.4 Times of Concentrations

Drainage Area*	Pre-Developed Time of Concentration (hrs)	Post-Developed Time of Concentration (hrs)
1	0.618	0.128
2	N/A	0.167
3	N/A	0.192
4	N/A	0.102
OS1	N/A	0.742
OS2	N/A	0.100
OS3	N/A	0.100
OS4	N/A	0.100

*Drainage areas do not match between pre- and post-construction.

2.5 Stormwater Management System

Stormwater Best Management Practices (BMPs) will be implemented on site to control the quality and quantity of the stormwater discharge from the site in order to mitigate impervious cover impacts.

Drainage ditches will be used along the perimeter of the site to intercept onsite and offsite flows. The flat bottom ditches will be 8-foot wide and approximately 1 foot deep. The ditches will flow into the proposed wet ponds. The ditches have been designed to contain the flows from a 100-year, 24-hour storm.

Two wet ponds are proposed to be used at the Site to mitigate the effects of higher runoff rates from the development of the Site. The rectangular basins will be excavated earth and vegetated with a grass bottom and side slopes. The wet ponds have been designed to contain the volume from a 10-year, 24-hour storm and controls flows for up to and including the 100-year, 24-hour storm.

The HydroCAD program was used to determine the incremental and cumulative storage of the two basins. The 10-yr, 24-hr volume will be provided between the bottom of the basin and bottom of spillway weir. The results are summarized in Table 2.5. See Appendix H for Basin Volume Calculations.

Table 2.5: Pond Capacity Summary

	Pond Volume Required (cu ft)	**Pond Volume Provided (cu ft)**
	10-Year, 24-Hour	
Northern Pond (Pond 1)	111,163	144,306
Southern Pond (Pond 2)	119,270	179,236

The northern pond will have a bottom elevation of 72’ and top elevation of 76’. The southern pond will have a bottom elevation of 71’ and top elevation of 75’. The ponds will utilize a spillway weir to manage the flows exiting the basin. The spillway weirs have been designed for the 100-yr, 24-hrthe from storms greater than the 10-year, 24-hour storm. The weir will be 6 inches deep and 12-foot wide. The ponds will ultimately outfall to the ditch along Byrnes Road similar to pre-construction conditions.

The wet ponds have been designed to infiltrate within 72 hours with the help of drywells. See Appendix H for the drywell calculations.

The proposed wet ponds have been designed to reduce the runoff leaving the site such that post-construction flow rates will not exceed the pre-construction flows. The Project is designed to mimic existing drainage patterns to the extent practicable.

2.6

2.6 Results

As summarized in Section 2.3, two wet ponds are proposed to mitigate the impacts of stormwater runoff from changes in drainage patterns that would result from the construction of the new energy storage development. The SCS Type I storm distribution was used to calculate stormwater flow rates. Flow rate calculations and level pool routing calculations were completed using HydroCAD. See Appendix B for HydroCAD calculations.

Tables 2.6 below summarizes the stormwater flow conditions for the area. The tables show the results for the post-construction flows without stormwater measures (SWM) and with stormwater measures (i.e. ponds and spillways). This illustrates the impact of the ponds and their spillways.

Table 2.6a Site Flow Results

	Return Frequency					
Drainage Area*	2-Year, 24-Hour			10-Year, 24-Hour		
	Pre-Developed Flow (cfs)	Post-Developed Flow without SWM (cfs)	Post-Developed Flow with SWM (cfs)	Pre-Developed Flow (cfs)	Post-Developed Flow without SWM (cfs)	Post-Developed Flow with SWM (cfs)
1	15.91	8.90	0.00	29.80	14.70	0.00
2	N/A	5.94		N/A	9.66	
3	N/A	10.51	0.00	N/A	16.81	0.00
4	N/A	5.49		N/A	8.63	
OS1	N/A	1.82	N/A	N/A	3.35	N/A
OS2	N/A	0.40	N/A	N/A	0.82	N/A
OS3	N/A	1.28	N/A	N/A	2.37	N/A
OS4	N/A	2.49	N/A	N/A	5.02	N/A
TOTAL	15.9	5.99		29.8	11.56	

*Drainage Areas do not match between pre- and post-construction.

Table 2.6b Site Flow Results

	Return Frequency					
Drainage Area*	25-Year, 24-Hour			100-Year, 24-Hour		
	Pre-Developed Flow (cfs)	Post-Developed Flow without SWM (cfs)	Post-Developed Flow with SWM (cfs)	Pre-Developed Flow (cfs)	Post-Developed Flow without SWM (cfs)	Post-Developed Flow with SWM (cfs)
1	38.50	18.22	0.37	51.83	23.54	1.63
2	N/A	11.91		N/A	15.31	
3	N/A	20.62	0.39	N/A	26.40	1.70
4	N/A	10.54		N/A	13.43	
OS1	N/A	4.30	N/A	N/A	5.74	N/A
OS2	N/A	1.10	N/A	N/A	1.52	N/A
OS3	N/A	3.04	N/A	N/A	4.08	N/A
OS4	N/A	6.64	N/A	N/A	9.16	N/A
TOTAL	38.5	15.8		51.8	23.8	

*Drainage Areas do not match between pre- and post-construction.

3.0 BEST MANAGEMENT PRACTICES

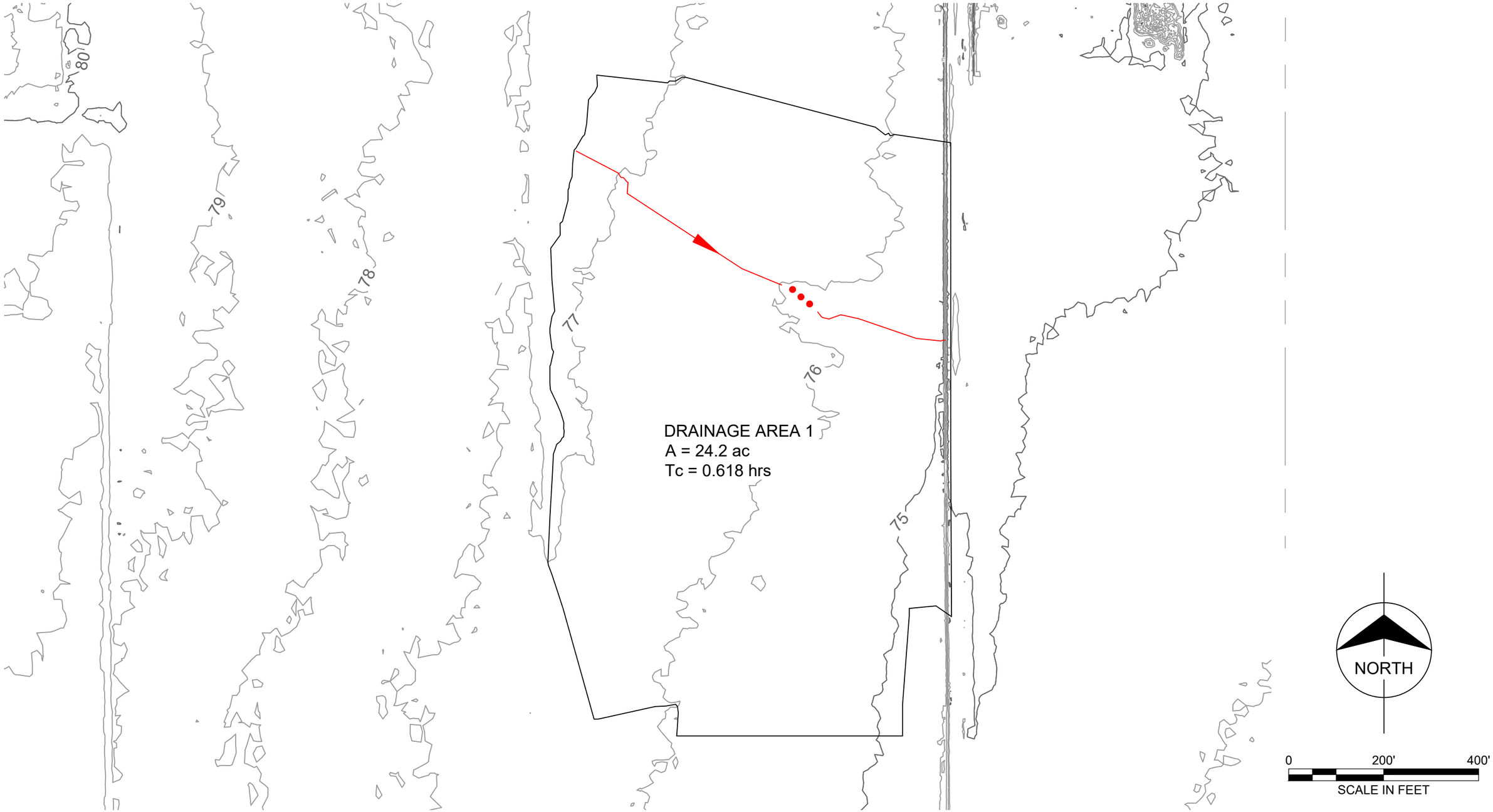
3.1 Stormwater Management

Stormwater management focused on the inclusion of temporary and permanent BMPs to manage runoff through the project site. Methods of controlling stormwater runoff and mitigating erosion were an integral part of the site layout and grading plan and were developed by the project engineer. Permanent methods include site-wide gravel stabilization, vegetated drainage ditches, preservation of existing drainage patterns, and two wet ponds. Temporary methods include use of silt fence and stabilized construction entrances.

4.0 CONCLUSIONS

The Corby Battery Storage Project is a 300 MW/1,200 MWhr project. Offsite runoff approaches the Project from the west and will be routed around the site via vegetated drainage ditches. Onsite flows will sheet flow across the site and be directed to two wet retention ponds located near the historic outfall locations for the site. The retention ponds were designed in accordance with Solano County and State of California requirements to accommodate the increase in stormwater runoff. The retention ponds are sized to retain the 10yr-24hr storm volume, attenuate peak discharges from the 2yr-24hr, 10yr-24hr, and control flows for up to and including the 100yr-24hr storm without overtopping.

APPENDIX A – PRE-CONSTRUCTION DRAINAGE EXHIBIT



BURNS McDONNELL

date 10/18/2024

designed D. ROSENBLUM

CORBY BESS

PRE-CONSTRUCTION
DRAINAGE EXHIBIT

project 163851

contract -

SK - C-1000

APPENDIX B – POST-CONSTRUCTION DRAINAGE EXHIBIT

DRAINAGE AREA OS1
A = 2.91 ac
Tc = 0.742 hrs

DRAINAGE AREA 1
A = 5.27 ac
Tc = 0.128 hrs

DRAINAGE AREA OS2
A = 0.40 ac
Tc = 0.100 hrs

DRAINAGE AREA 2
A = 3.59 ac
Tc = 0.167 hrs

DRAINAGE AREA OS4
A = 2.36 ac
Tc = 0.100 hrs

DRAINAGE AREA 4
A = 2.81 ac
Tc = 0.102 hrs

DRAINAGE AREA OS3
A = 0.97 ac
Tc = 0.100 hrs

DRAINAGE AREA 3
A = 6.37 ac
Tc = 0.192 hrs

NORTH

0 200' 400'
SCALE IN FEET

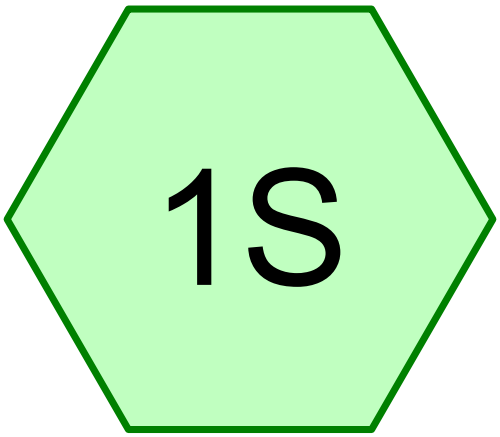
BURNS McDONNELL

date 10/18/2024
designed D. ROSENBLUM

CORBY BESS
POST-CONSTRUCTION
DRAINAGE EXHIBIT

project 163851
contract -
SK - C-2000

APPENDIX C – PRE-CONSTRUCTION HYDROCAD REPORT



Corby Site

Subcat Reach Pond Link

Routing Diagram for 163851 Pre-Construction
Prepared by Burns & McDonnell, Printed 10/15/2024

Rainfall Events Listing (selected events)

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	2yr, 24hr	Type I 24-hr		Default	24.00	1	2.88	2
2	10yr, 24hr	Type I 24-hr		Default	24.00	1	4.37	2
3	25yr, 24hr	Type I 24-hr		Default	24.00	1	5.28	2
4	100yr, 24hr	Type I 24-hr		Default	24.00	1	6.67	2

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
4.209	78	Row crops, straight row, Good, HSG B (1S)
19.958	89	Row crops, straight row, Good, HSG D (1S)
24.167	**87**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
4.209	HSG B	1S
0.000	HSG C	
19.958	HSG D	1S
0.000	Other	
24.167		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	4.209	0.000	19.958	0.000	24.167	Row crops, straight row, Good	1S
0.000	**4.209**	**0.000**	**19.958**	**0.000**	**24.167**	**TOTAL AREA**	

Time span=0.00-36.00 hrs, dt=0.05 hrs, 721 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 1S: Corby Site Runoff Area=24.167 ac 0.00% Impervious Runoff Depth=1.63"
Flow Length=817' Tc=37.1 min CN=87 Runoff=15.91 cfs 3.292 af

Total Runoff Area = 24.167 ac Runoff Volume = 3.292 af Average Runoff Depth = 1.63"
100.00% Pervious = 24.167 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment 1S: Corby Site

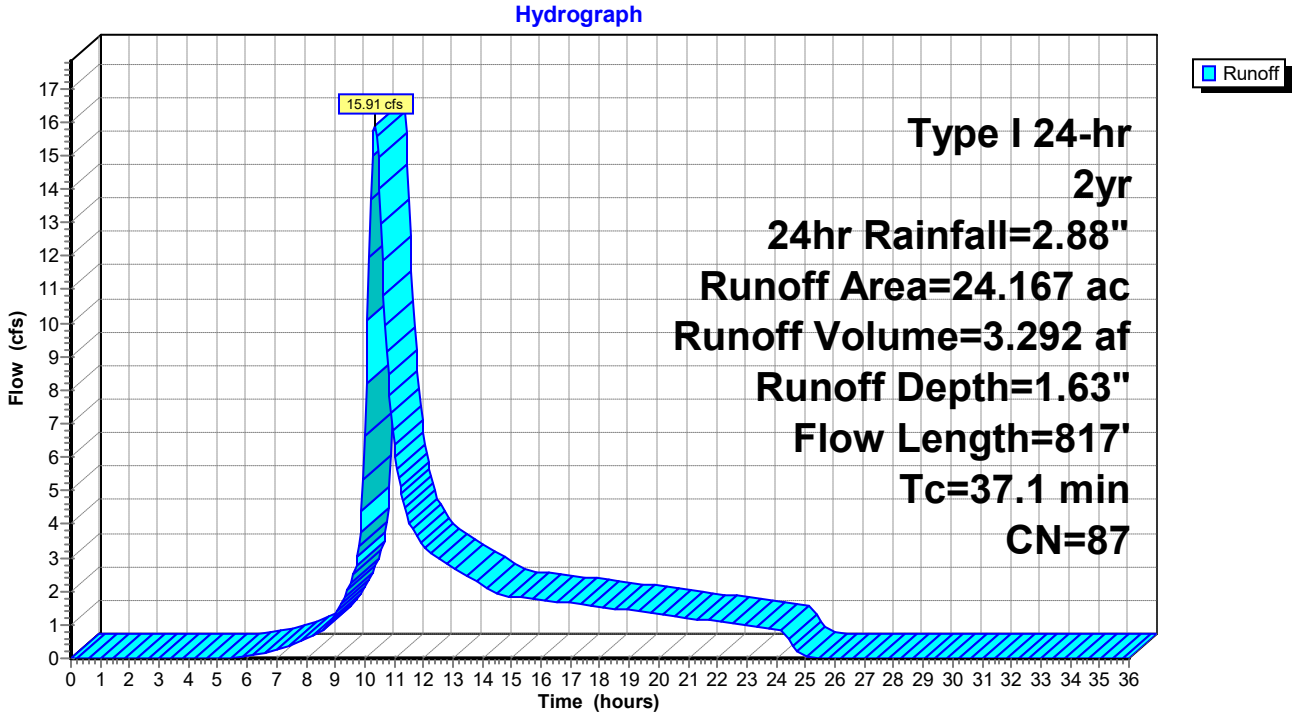
Runoff = 15.91 cfs @ 10.34 hrs, Volume= 3.292 af, Depth= 1.63"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type I 24-hr 2yr, 24hr Rainfall=2.88"

Area (ac)	CN	Description
4.209	78	Row crops, straight row, Good, HSG B
19.958	89	Row crops, straight row, Good, HSG D
24.167	87	Weighted Average
24.167		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
23.7	100	0.0004	0.07		**Sheet Flow,** Cultivated: Residue<=20% n= 0.060 P2= 2.88"
13.4	717	0.0098	0.89		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
37.1	817	Total			

Subcatchment 1S: Corby Site



Time span=0.00-36.00 hrs, dt=0.05 hrs, 721 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 1S: Corby Site Runoff Area=24.167 ac 0.00% Impervious Runoff Depth=2.98"
Flow Length=817' Tc=37.1 min CN=87 Runoff=29.80 cfs 5.998 af

Total Runoff Area = 24.167 ac Runoff Volume = 5.998 af Average Runoff Depth = 2.98"
100.00% Pervious = 24.167 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment 1S: Corby Site

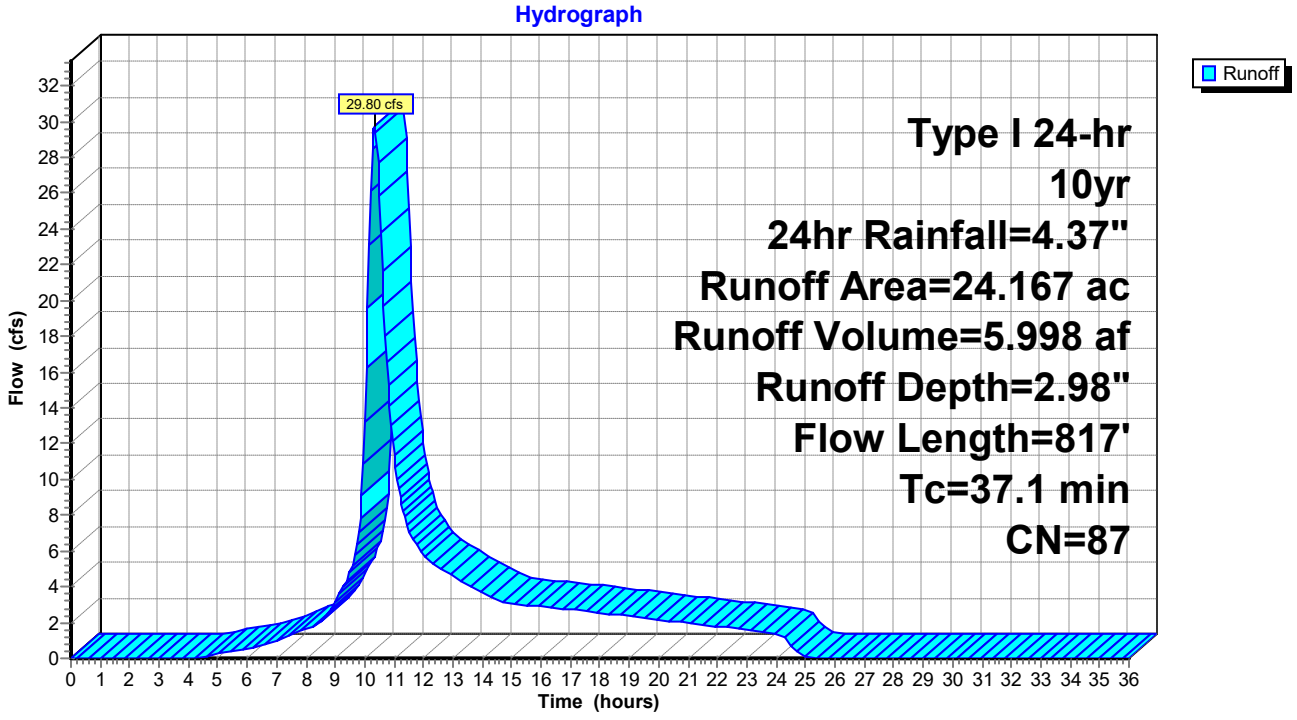
Runoff = 29.80 cfs @ 10.33 hrs, Volume= 5.998 af, Depth= 2.98"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type I 24-hr 10yr, 24hr Rainfall=4.37"

Area (ac)	CN	Description
4.209	78	Row crops, straight row, Good, HSG B
19.958	89	Row crops, straight row, Good, HSG D
24.167	87	Weighted Average
24.167		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
23.7	100	0.0004	0.07		**Sheet Flow,** Cultivated: Residue<=20% n= 0.060 P2= 2.88"
13.4	717	0.0098	0.89		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
37.1	817	Total			

Subcatchment 1S: Corby Site



Time span=0.00-36.00 hrs, dt=0.05 hrs, 721 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 1S: Corby Site Runoff Area=24.167 ac 0.00% Impervious Runoff Depth=3.83"
Flow Length=817' Tc=37.1 min CN=87 Runoff=38.50 cfs 7.717 af

Total Runoff Area = 24.167 ac Runoff Volume = 7.717 af Average Runoff Depth = 3.83"
100.00% Pervious = 24.167 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment 1S: Corby Site

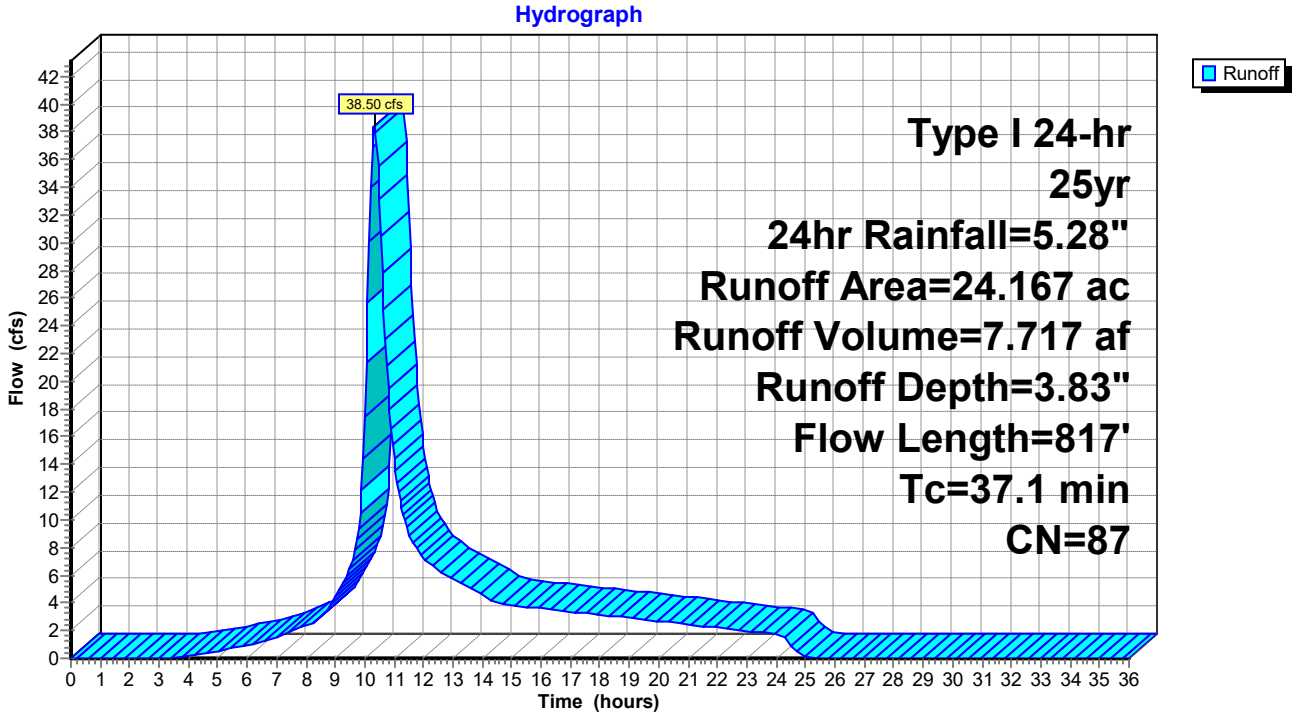
Runoff = 38.50 cfs @ 10.33 hrs, Volume= 7.717 af, Depth= 3.83"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type I 24-hr 25yr, 24hr Rainfall=5.28"

Area (ac)	CN	Description
4.209	78	Row crops, straight row, Good, HSG B
19.958	89	Row crops, straight row, Good, HSG D
24.167	87	Weighted Average
24.167		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
23.7	100	0.0004	0.07		**Sheet Flow,** Cultivated: Residue<=20% n= 0.060 P2= 2.88"
13.4	717	0.0098	0.89		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
37.1	817	Total			

Subcatchment 1S: Corby Site



Time span=0.00-36.00 hrs, dt=0.05 hrs, 721 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 1S: Corby Site Runoff Area=24.167 ac 0.00% Impervious Runoff Depth=5.16"
Flow Length=817' Tc=37.1 min CN=87 Runoff=51.83 cfs 10.393 af

Total Runoff Area = 24.167 ac Runoff Volume = 10.393 af Average Runoff Depth = 5.16"
100.00% Pervious = 24.167 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment 1S: Corby Site

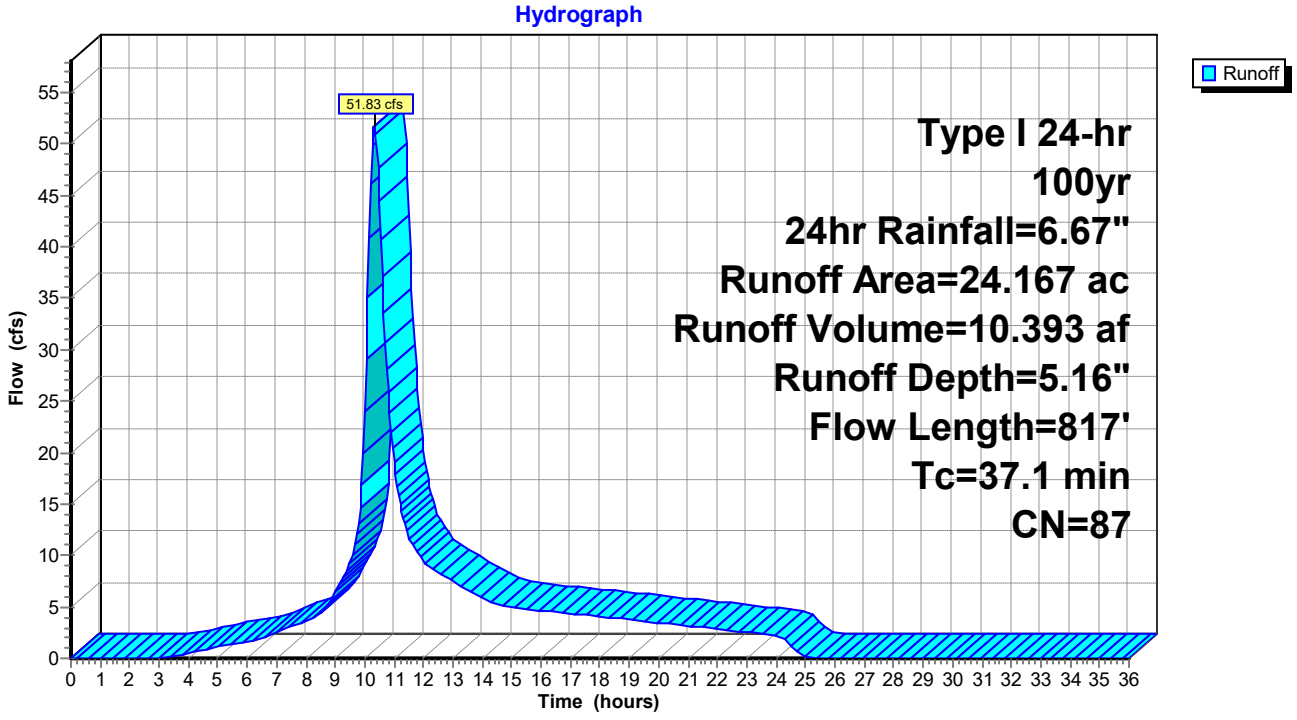
Runoff = 51.83 cfs @ 10.33 hrs, Volume= 10.393 af, Depth= 5.16"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type I 24-hr 100yr, 24hr Rainfall=6.67"

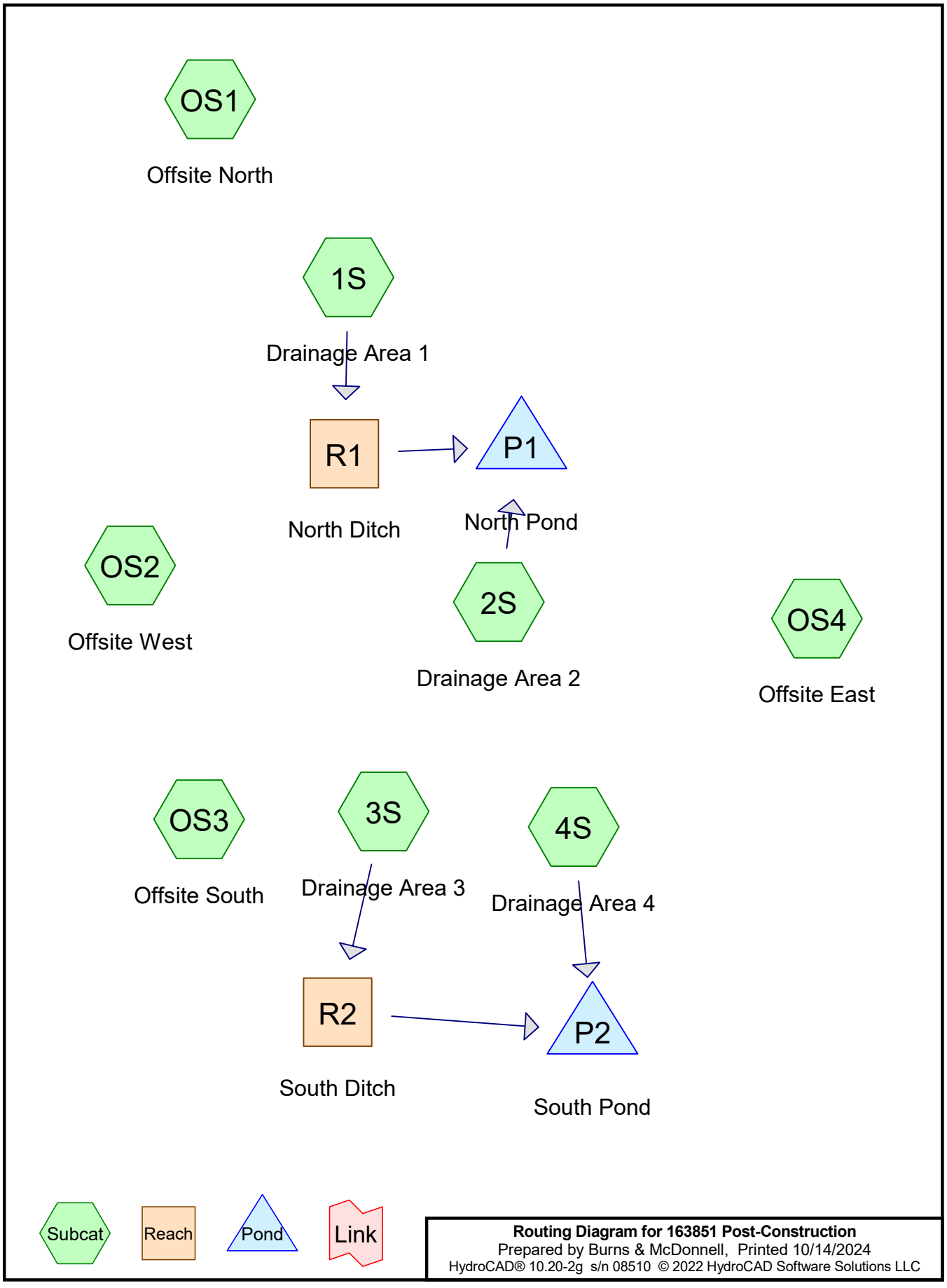
Area (ac)	CN	Description
4.209	78	Row crops, straight row, Good, HSG B
19.958	89	Row crops, straight row, Good, HSG D
24.167	87	Weighted Average
24.167		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
23.7	100	0.0004	0.07		**Sheet Flow,** Cultivated: Residue<=20% n= 0.060 P2= 2.88"
13.4	717	0.0098	0.89		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
37.1	817	Total			

Subcatchment 1S: Corby Site



APPENDIX D – POST-CONSTRUCTION HYDROCAD REPORT



Routing Diagram for 163851 Post-Construction
Prepared by Burns & McDonnell, Printed 10/14/2024

Rainfall Events Listing (selected events)

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	2yr, 24hr	Type I 24-hr		Default	24.00	1	2.88	2
2	10yr, 24hr	Type I 24-hr		Default	24.00	1	4.37	2
3	25yr, 24hr	Type I 24-hr		Default	24.00	1	5.28	2
4	100yr, 24hr	Type I 24-hr		Default	24.00	1	6.67	2

Area Listing (selected nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.584	61	>75% Grass cover, Good, HSG B (1S, OS1, OS2, OS4)
2.437	80	>75% Grass cover, Good, HSG D (1S, 2S, 3S, 4S, OS1, OS2, OS3, OS4)
5.866	96	Gravel surface (1S, 2S, OS4)
1.169	96	Gravel surface, HSG C (4S)
4.706	96	Gravel surface, HSG D (3S)
2.484	98	Impervious (1S, 2S, 3S, 4S, OS1)
0.703	78	Row crops, straight row, Good, HSG B (OS1, OS2, OS4)
4.513	89	Row crops, straight row, Good, HSG D (OS1, OS2, OS3, OS4)
2.218	98	Water Surface, HSG D (2S, 4S)
24.681	**92**	**TOTAL AREA**

Soil Listing (selected nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
1.287	HSG B	1S, OS1, OS2, OS4
1.169	HSG C	4S
13.875	HSG D	1S, 2S, 3S, 4S, OS1, OS2, OS3, OS4
8.350	Other	1S, 2S, 3S, 4S, OS1, OS4
24.681		**TOTAL AREA**

Ground Covers (selected nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.584	0.000	2.437	0.000	3.022	>75% Grass cover, Good	1S, 2S, 3S, 4S, OS 1, OS 2, OS 3, OS 4
0.000	0.000	1.169	4.706	5.866	11.741	Gravel surface	1S, 2S, 3S, 4S, OS 4
0.000	0.000	0.000	0.000	2.484	2.484	Impervious	1S, 2S, 3S, 4S, OS 1
0.000	0.703	0.000	4.513	0.000	5.216	Row crops, straight row, Good	OS 1, OS 2, OS 3, OS 4
0.000	0.000	0.000	2.218	0.000	2.218	Water Surface	2S, 4S
0.000	**1.287**	**1.169**	**13.875**	**8.350**	**24.681**	**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 1S: Drainage Area 1 Runoff Area=229,565 sf 10.31% Impervious Runoff Depth=2.14"
Flow Length=378' Tc=7.7 min CN=93 Runoff=8.90 cfs 0.940 af

Subcatchment 2S: Drainage Area 2 Runoff Area=156,165 sf 40.41% Impervious Runoff Depth=2.23"
Flow Length=111' Tc=10.0 min CN=94 Runoff=5.94 cfs 0.667 af

Subcatchment 3S: Drainage Area 3 Runoff Area=277,408 sf 18.98% Impervious Runoff Depth=2.33"
Flow Length=883' Tc=11.5 min CN=95 Runoff=10.51 cfs 1.238 af

Subcatchment 4S: Drainage Area 4 Runoff Area=122,534 sf 52.57% Impervious Runoff Depth=2.43"
Flow Length=369' Tc=6.1 min CN=96 Runoff=5.49 cfs 0.571 af

Subcatchment OS1: Offsite North Runoff Area=126,813 sf 0.79% Impervious Runoff Depth=1.71"
Flow Length=896' Tc=44.5 min CN=88 Runoff=1.82 cfs 0.415 af

Subcatchment OS2: Offsite West Runoff Area=17,527 sf 0.00% Impervious Runoff Depth=1.29"
Tc=6.0 min CN=82 Runoff=0.40 cfs 0.043 af

Subcatchment OS3: Offsite South Runoff Area=42,158 sf 0.00% Impervious Runoff Depth=1.63"
Tc=6.0 min CN=87 Runoff=1.28 cfs 0.132 af

Subcatchment OS4: Offsite East Runoff Area=102,943 sf 0.00% Impervious Runoff Depth=1.35"
Tc=6.0 min CN=83 Runoff=2.49 cfs 0.266 af

Reach R1: North Ditch Avg. Flow Depth=0.39' Max Vel=1.79 fps Inflow=8.90 cfs 0.940 af
n=0.022 L=1,382.0' S=0.0030 '/' Capacity=33.98 cfs Outflow=6.27 cfs 0.940 af

Reach R2: South Ditch Avg. Flow Depth=0.45' Max Vel=1.97 fps Inflow=10.51 cfs 1.238 af
n=0.022 L=1,238.6' S=0.0030 '/' Capacity=34.15 cfs Outflow=8.21 cfs 1.238 af

Pond P1: North Pond Peak Elev=73.80' Storage=70,004 cf Inflow=7.99 cfs 1.607 af
Outflow=0.00 cfs 0.000 af

Pond P2: South Pond Peak Elev=72.89' Storage=78,771 cf Inflow=9.36 cfs 1.808 af
Outflow=0.00 cfs 0.000 af

Total Runoff Area = 24.681 ac Runoff Volume = 4.272 af Average Runoff Depth = 2.08"
80.95% Pervious = 19.979 ac 19.05% Impervious = 4.702 ac

Summary for Subcatchment 1S: Drainage Area 1

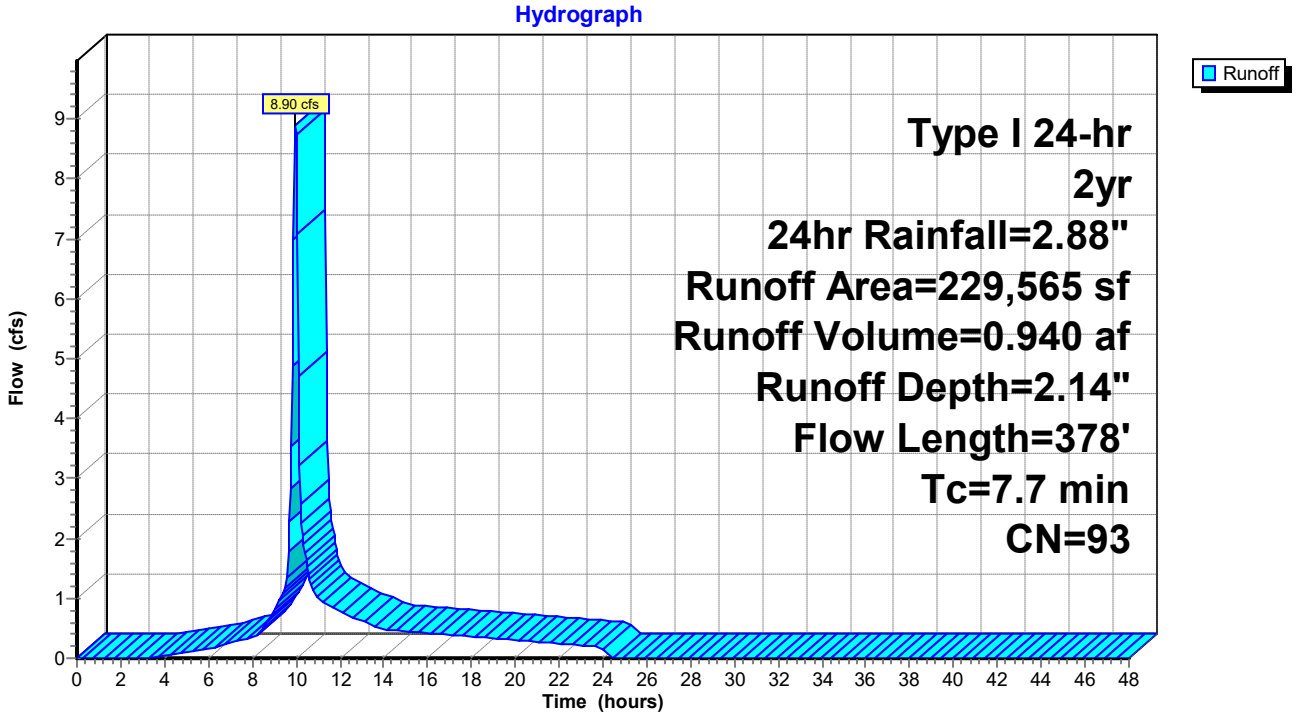
Runoff = 8.90 cfs @ 9.98 hrs, Volume= 0.940 af, Depth= 2.14"
Routed to Reach R1 : North Ditch

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type I 24-hr 2yr, 24hr Rainfall=2.88"

	Area (sf)	CN	Description
*	178,025	96	Gravel surface
	15,486	61	>75% Grass cover, Good, HSG B
	12,395	80	>75% Grass cover, Good, HSG D
*	23,659	98	Impervious
	229,565	93	Weighted Average
	205,906		89.69% Pervious Area
	23,659		10.31% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.2	100	0.0051	0.76		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.88"
5.5	278	0.0145	0.84		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
7.7	378	Total			

Subcatchment 1S: Drainage Area 1



Summary for Subcatchment 2S: Drainage Area 2

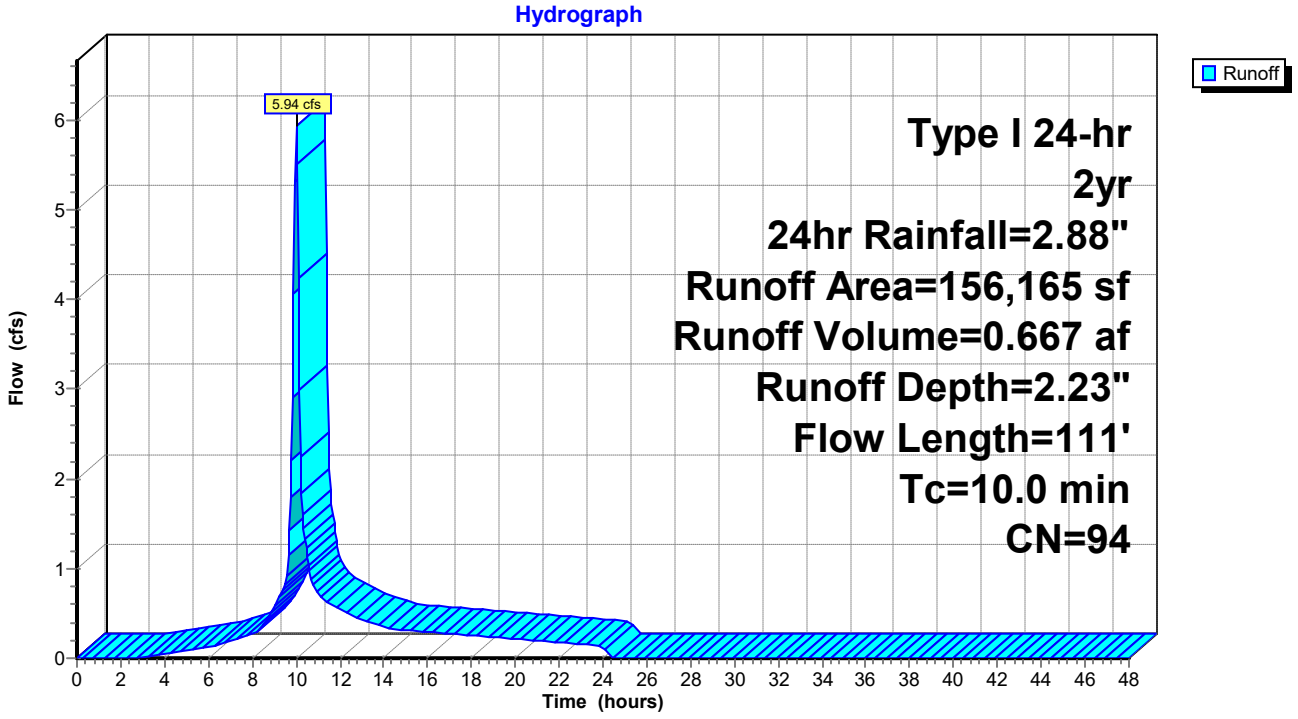
Runoff = 5.94 cfs @ 10.00 hrs, Volume= 0.667 af, Depth= 2.23"
Routed to Pond P1 : North Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type I 24-hr 2yr, 24hr Rainfall=2.88"

	Area (sf)	CN	Description
	46,901	98	Water Surface, HSG D
*	70,484	96	Gravel surface
	22,582	80	>75% Grass cover, Good, HSG D
*	16,198	98	Impervious
	156,165	94	Weighted Average
	93,066		59.59% Pervious Area
	63,099		40.41% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.9	33	0.0137	0.11		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.88"
5.1	78	0.0712	0.26		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.88"
10.0	111	Total			

Subcatchment 2S: Drainage Area 2



Summary for Subcatchment 3S: Drainage Area 3

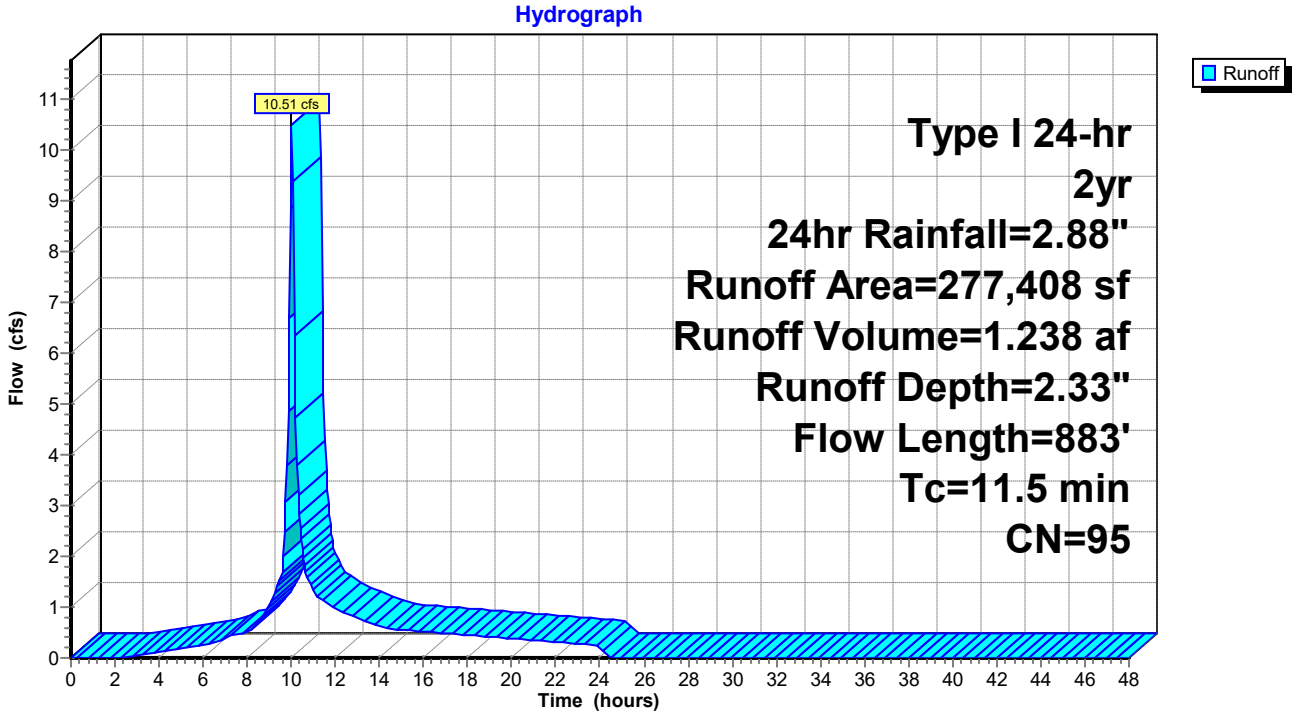
Runoff = 10.51 cfs @ 10.02 hrs, Volume= 1.238 af, Depth= 2.33"
Routed to Reach R2 : South Ditch

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type I 24-hr 2yr, 24hr Rainfall=2.88"

	Area (sf)	CN	Description
	205,009	96	Gravel surface, HSG D
	19,737	80	>75% Grass cover, Good, HSG D
*	52,662	98	Impervious
	277,408	95	Weighted Average
	224,746		81.02% Pervious Area
	52,662		18.98% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.2	100	0.0050	0.75		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.88"
9.3	783	0.0076	1.40		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
11.5	883	Total			

Subcatchment 3S: Drainage Area 3



Summary for Subcatchment 4S: Drainage Area 4

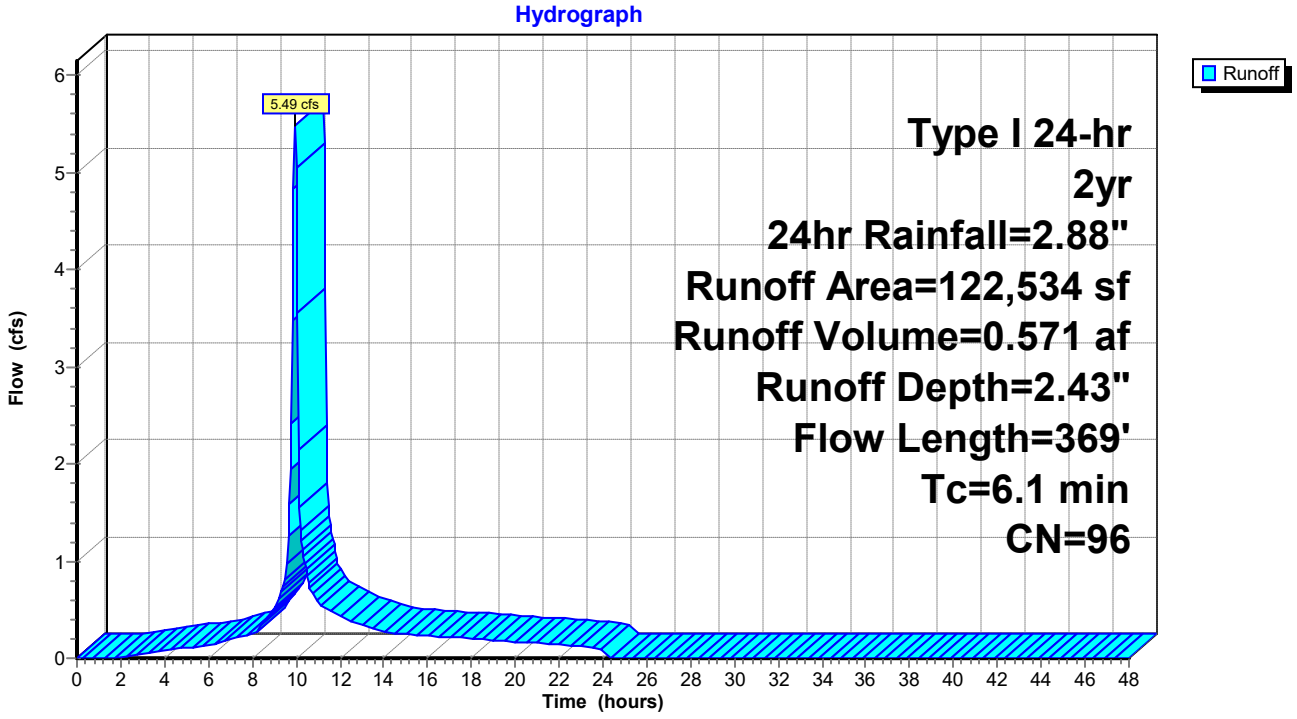
Runoff = 5.49 cfs @ 9.96 hrs, Volume= 0.571 af, Depth= 2.43"
Routed to Pond P2 : South Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type I 24-hr 2yr, 24hr Rainfall=2.88"

	Area (sf)	CN	Description
	50,930	96	Gravel surface, HSG C
	49,729	98	Water Surface, HSG D
*	14,690	98	Impervious
	7,185	80	>75% Grass cover, Good, HSG D
	122,534	96	Weighted Average
	58,115		47.43% Pervious Area
	64,419		52.57% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.2	100	0.0050	0.75		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.88"
3.9	269	0.0051	1.15		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
6.1	369	Total			

Subcatchment 4S: Drainage Area 4



Summary for Subcatchment OS1: Offsite North

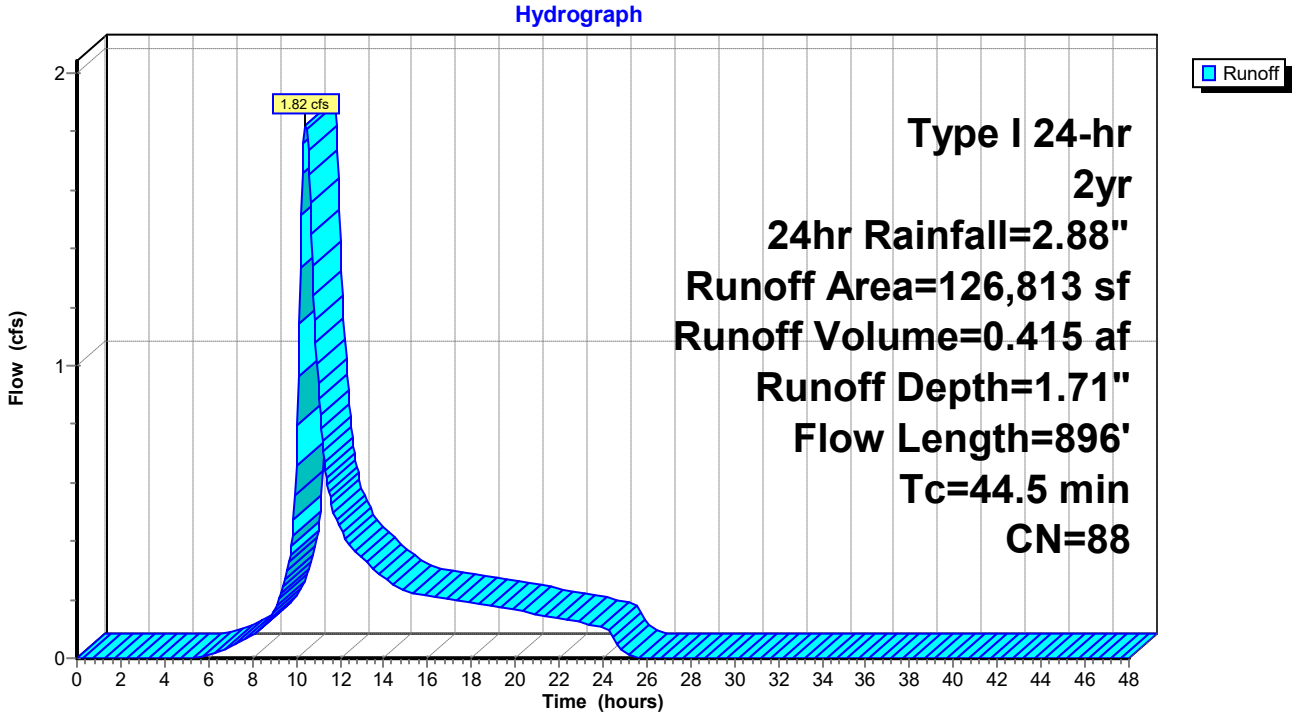
Runoff = 1.82 cfs @ 10.44 hrs, Volume= 0.415 af, Depth= 1.71"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type I 24-hr 2yr, 24hr Rainfall=2.88"

	Area (sf)	CN	Description
	4,873	78	Row crops, straight row, Good, HSG B
	108,569	89	Row crops, straight row, Good, HSG D
	969	61	>75% Grass cover, Good, HSG B
	11,402	80	>75% Grass cover, Good, HSG D
*	1,000	98	Impervious
	126,813	88	Weighted Average
	125,813		99.21% Pervious Area
	1,000		0.79% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
23.7	100	0.0004	0.07		**Sheet Flow,** Cultivated: Residue<=20% n= 0.060 P2= 2.88"
20.8	796	0.0050	0.64		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
44.5	896	Total			

Subcatchment OS1: Offsite North



Summary for Subcatchment OS2: Offsite West

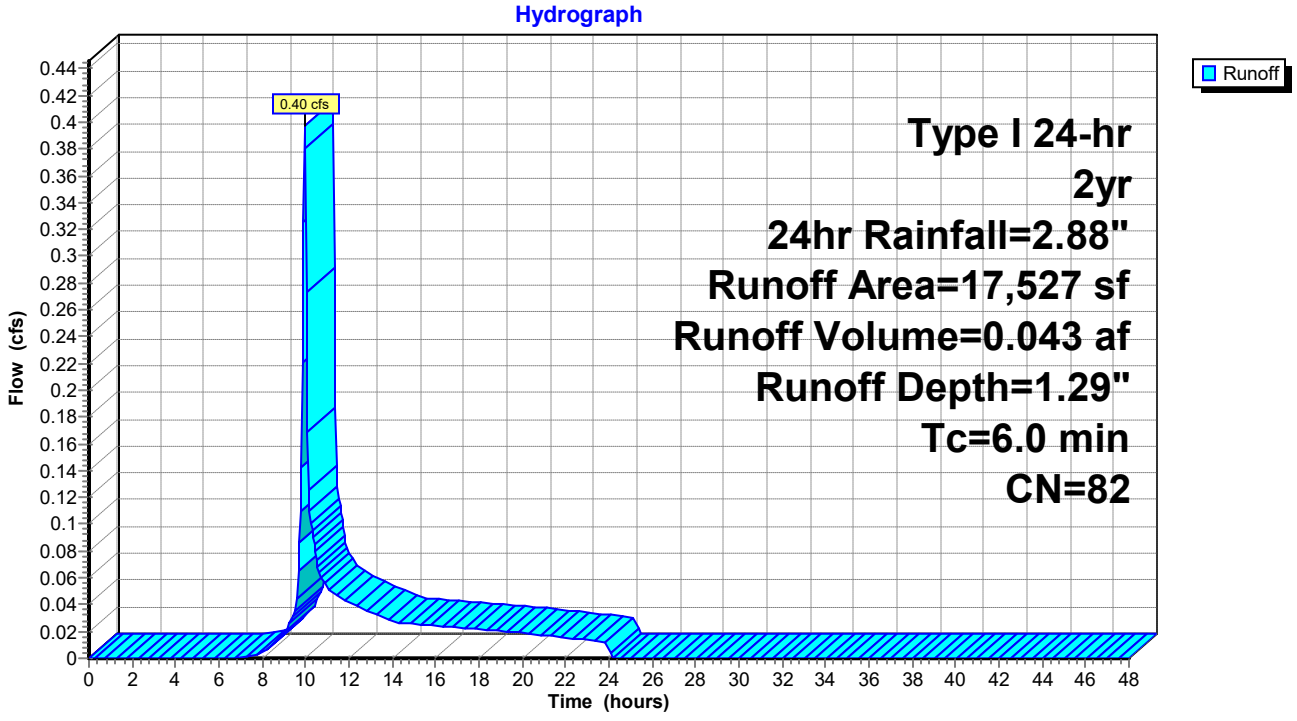
Runoff = 0.40 cfs @ 9.97 hrs, Volume= 0.043 af, Depth= 1.29"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type I 24-hr 2yr, 24hr Rainfall=2.88"

Area (sf)	CN	Description
1,048	61	>75% Grass cover, Good, HSG B
6,609	78	Row crops, straight row, Good, HSG B
1,911	80	>75% Grass cover, Good, HSG D
7,959	89	Row crops, straight row, Good, HSG D
17,527	82	Weighted Average
17,527		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Direct Entry**

Subcatchment OS2: Offsite West



Summary for Subcatchment OS3: Offsite South

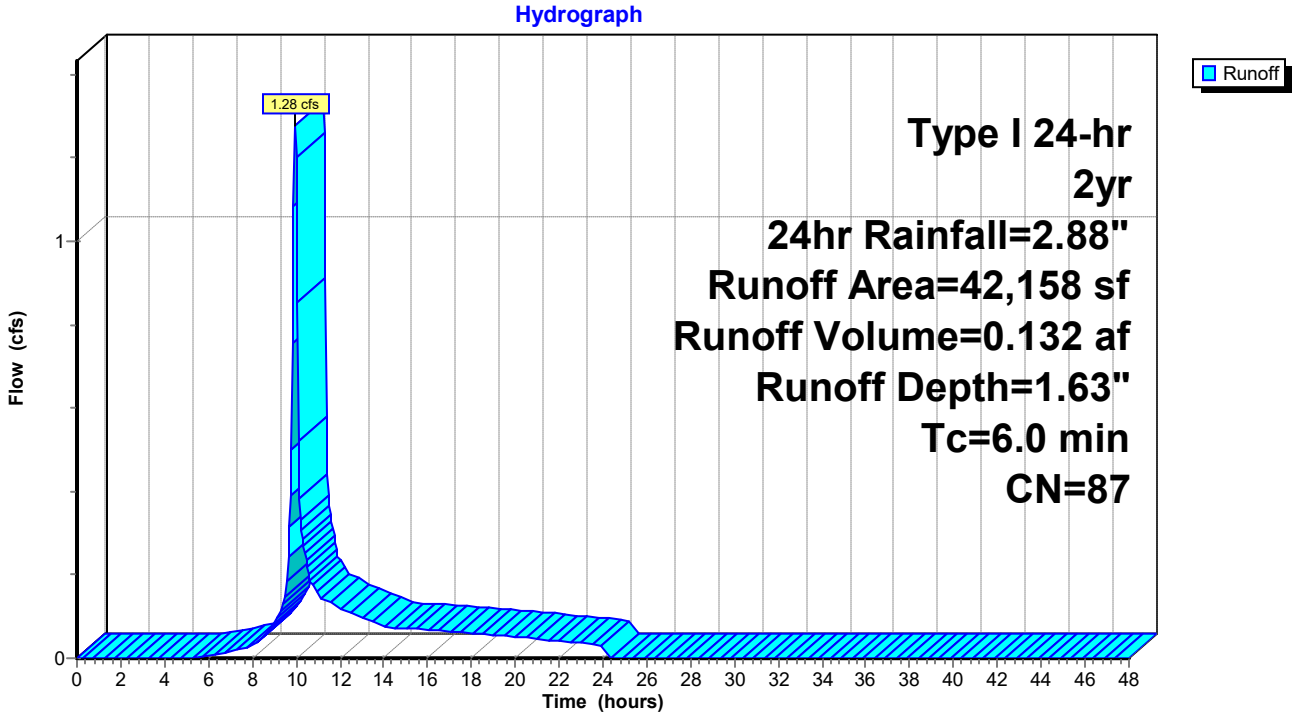
Runoff = 1.28 cfs @ 9.96 hrs, Volume= 0.132 af, Depth= 1.63"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type I 24-hr 2yr, 24hr Rainfall=2.88"

Area (sf)	CN	Description
33,415	89	Row crops, straight row, Good, HSG D
8,743	80	>75% Grass cover, Good, HSG D
42,158	87	Weighted Average
42,158		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Direct Entry**

Subcatchment OS3: Offsite South



Summary for Subcatchment OS4: Offsite East

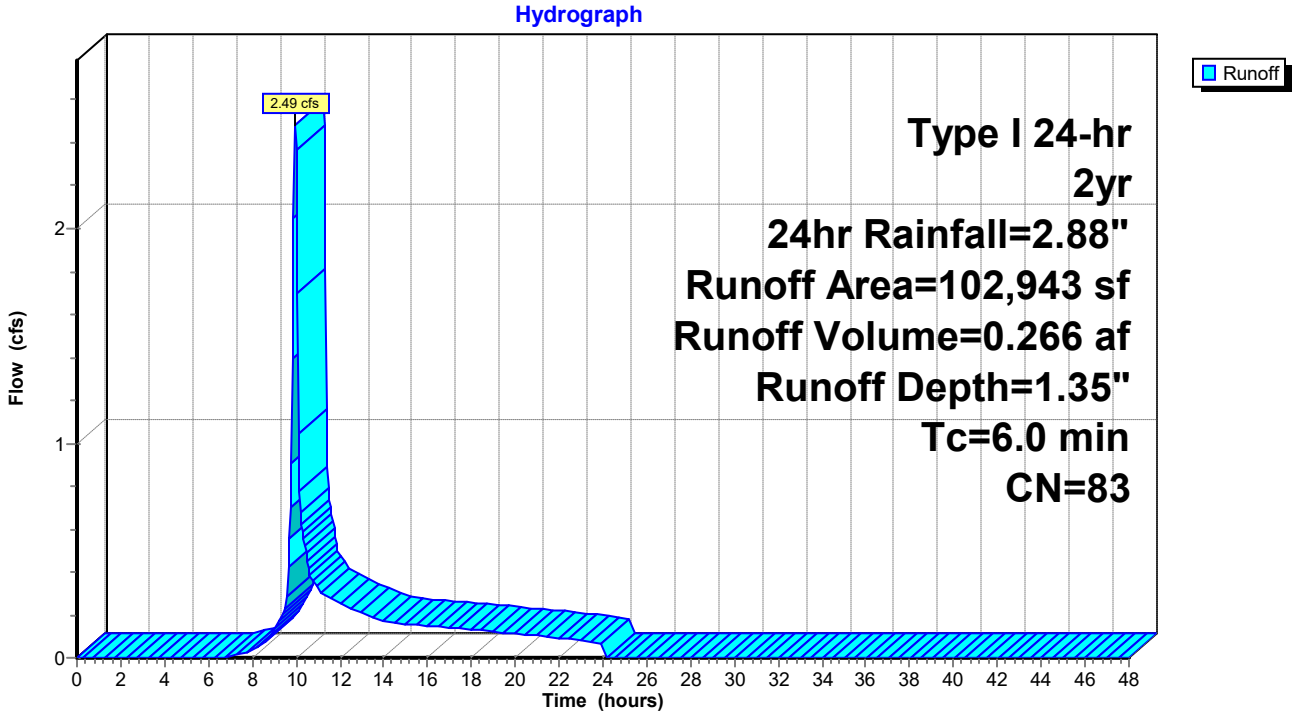
Runoff = 2.49 cfs @ 9.97 hrs, Volume= 0.266 af, Depth= 1.35"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type I 24-hr 2yr, 24hr Rainfall=2.88"

	Area (sf)	CN	Description
*	7,003	96	Gravel surface
	22,215	80	>75% Grass cover, Good, HSG D
	7,951	61	>75% Grass cover, Good, HSG B
	46,629	89	Row crops, straight row, Good, HSG D
	19,145	78	Row crops, straight row, Good, HSG B
	102,943	83	Weighted Average
	102,943		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Direct Entry**

Subcatchment OS4: Offsite East



Summary for Reach R1: North Ditch

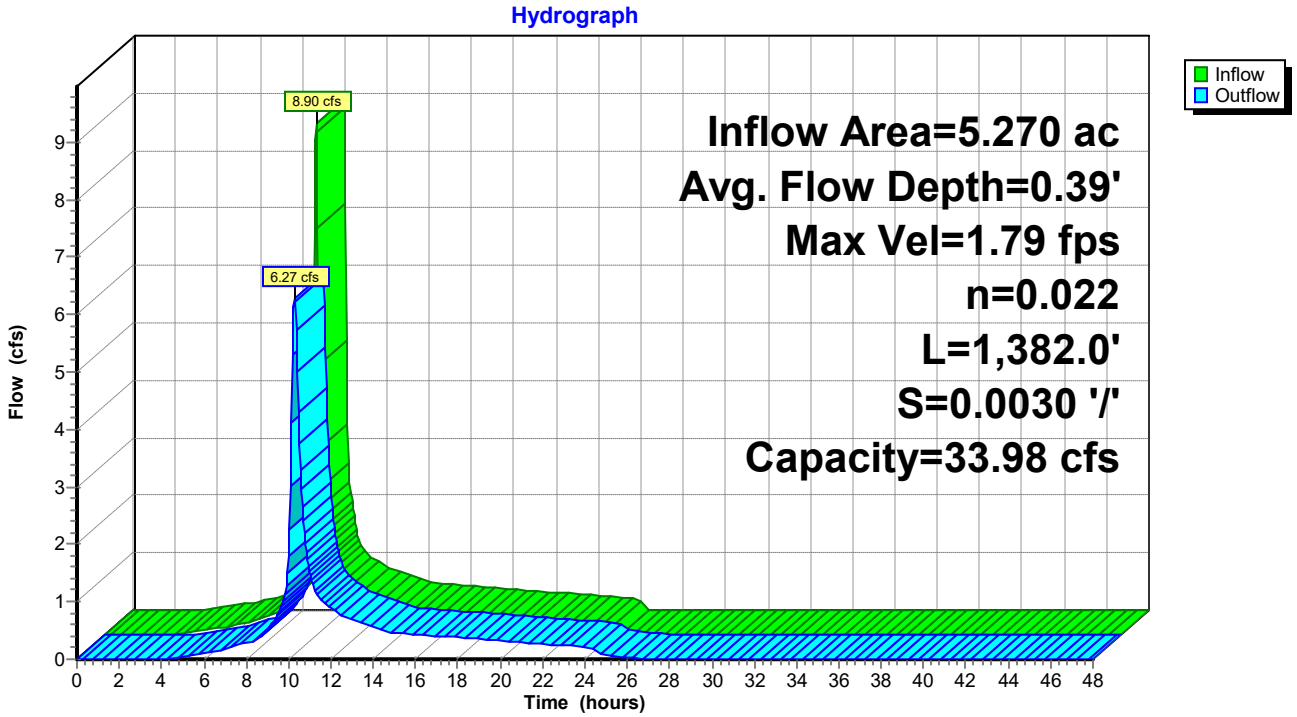
Inflow Area = 5.270 ac, 10.31% Impervious, Inflow Depth = 2.14" for 2yr, 24hr event
Inflow = 8.90 cfs @ 9.98 hrs, Volume= 0.940 af
Outflow = 6.27 cfs @ 10.28 hrs, Volume= 0.940 af, Atten= 30%, Lag= 18.3 min
Routed to Pond P1 : North Pond

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.79 fps, Min. Travel Time= 12.9 min
Avg. Velocity = 0.43 fps, Avg. Travel Time= 53.5 min

Peak Storage= 4,909 cf @ 10.07 hrs
Average Depth at Peak Storage= 0.39' , Surface Width= 10.33'
Bank-Full Depth= 1.00' Flow Area= 11.0 sf, Capacity= 33.98 cfs

8.00' x 1.00' deep channel, n= 0.022 Earth, clean & straight
Side Slope Z-value= 3.0 '/' Top Width= 14.00'
Length= 1,382.0' Slope= 0.0030 '/'
Inlet Invert= 78.13', Outlet Invert= 74.02'

‡



Summary for Reach R2: South Ditch

Inflow Area = 6.368 ac, 18.98% Impervious, Inflow Depth = 2.33" for 2yr, 24hr event
Inflow = 10.51 cfs @ 10.02 hrs, Volume= 1.238 af
Outflow = 8.21 cfs @ 10.28 hrs, Volume= 1.238 af, Atten= 22%, Lag= 15.7 min
Routed to Pond P2 : South Pond

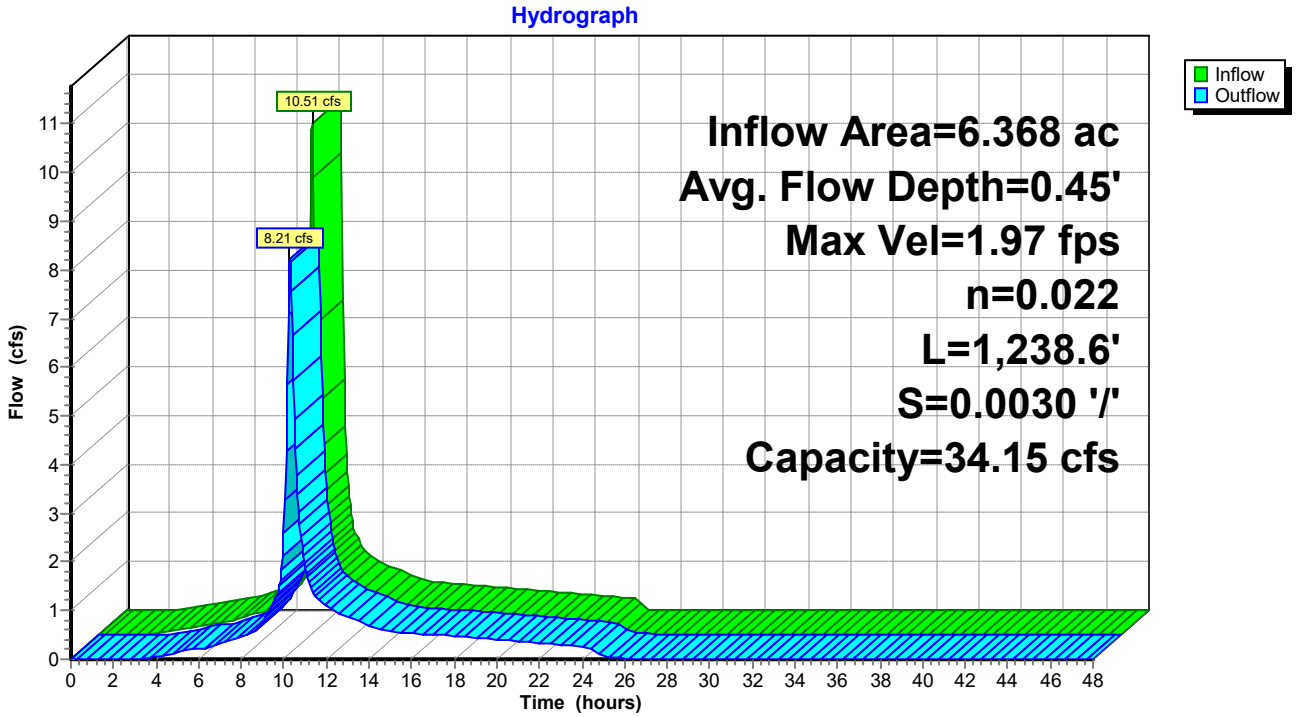
Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.97 fps, Min. Travel Time= 10.5 min
Avg. Velocity = 0.48 fps, Avg. Travel Time= 42.6 min

Peak Storage= 5,234 cf @ 10.11 hrs
Average Depth at Peak Storage= 0.45' , Surface Width= 10.71'
Bank-Full Depth= 1.00' Flow Area= 11.0 sf, Capacity= 34.15 cfs

8.00' x 1.00' deep channel, n= 0.022
Side Slope Z-value= 3.0 '/' Top Width= 14.00'
Length= 1,238.6' Slope= 0.0030 '/'
Inlet Invert= 78.13', Outlet Invert= 74.41'

‡

Reach R2: South Ditch



Summary for Pond P1: North Pond

Inflow Area = 8.855 ac, 22.49% Impervious, Inflow Depth = 2.18" for 2yr, 24hr event
Inflow = 7.99 cfs @ 10.26 hrs, Volume= 1.607 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 73.80' @ 48.00 hrs Surf.Area= 41,168 sf Storage= 70,004 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no outflow)

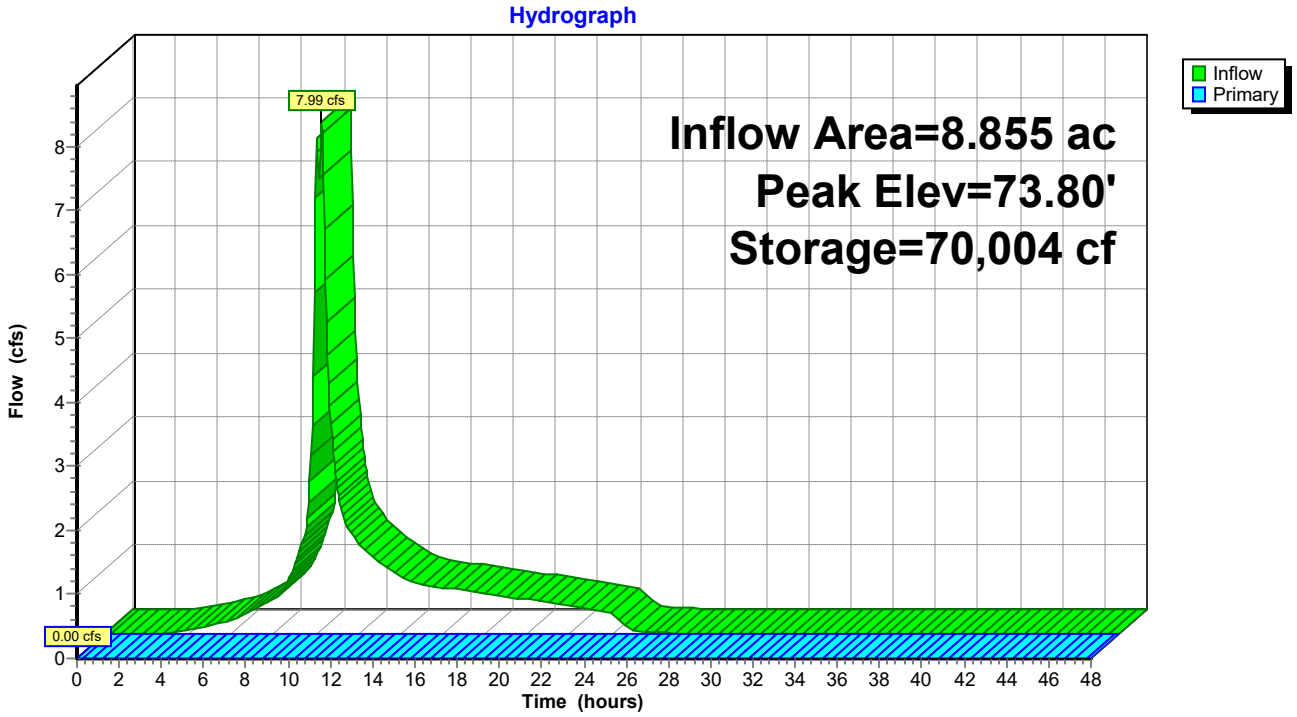
Volume	Invert	Avail.Storage	Storage Description
#1	72.00'	168,730 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
72.00	36,732	0	0
73.00	39,167	37,950	37,950
74.00	41,674	40,421	78,370
75.00	44,253	42,964	121,334
76.00	50,539	47,396	168,730

Device	Routing	Invert	Outlet Devices
#1	Primary	75.50'	**Custom Weir/Orifice, Cv= 2.62 (C= 3.28)** Head (feet) 0.00 0.50 Width (feet) 12.00 15.00

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=72.00' (Free Discharge)
↑—**1=Custom Weir/Orifice** (Controls 0.00 cfs)

Pond P1: North Pond



Summary for Pond P2: South Pond

Inflow Area = 9.181 ac, 29.27% Impervious, Inflow Depth = 2.36" for 2yr, 24hr event
Inflow = 9.36 cfs @ 10.28 hrs, Volume= 1.808 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 72.89' @ 48.00 hrs Surf.Area= 44,118 sf Storage= 78,771 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no outflow)

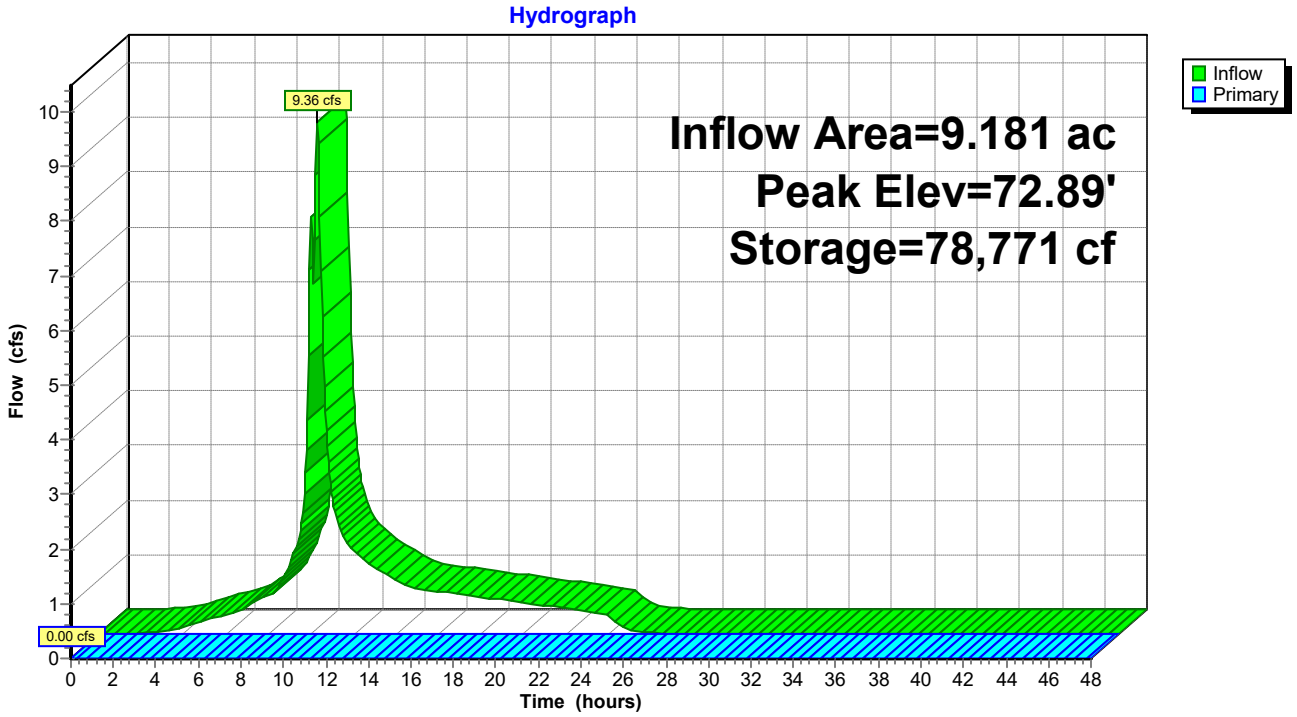
Volume	Invert	Avail.Storage	Storage Description
#1	71.00'	179,236 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
71.00	39,358	0	0
72.00	41,846	40,602	40,602
73.00	44,405	43,126	83,728
74.00	47,033	45,719	129,447
75.00	52,545	49,789	179,236

Device	Routing	Invert	Outlet Devices
#1	Primary	74.50'	**Custom Weir/Orifice, Cv= 2.62 (C= 3.28)** Head (feet) 0.00 0.50 Width (feet) 12.00 15.00

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=71.00' (Free Discharge)
↑—**1=Custom Weir/Orifice** (Controls 0.00 cfs)

Pond P2: South Pond



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 1S: Drainage Area 1 Runoff Area=229,565 sf 10.31% Impervious Runoff Depth=3.58"
Flow Length=378' Tc=7.7 min CN=93 Runoff=14.70 cfs 1.573 af

Subcatchment 2S: Drainage Area 2 Runoff Area=156,165 sf 40.41% Impervious Runoff Depth=3.69"
Flow Length=111' Tc=10.0 min CN=94 Runoff=9.66 cfs 1.102 af

Subcatchment 3S: Drainage Area 3 Runoff Area=277,408 sf 18.98% Impervious Runoff Depth=3.80"
Flow Length=883' Tc=11.5 min CN=95 Runoff=16.81 cfs 2.015 af

Subcatchment 4S: Drainage Area 4 Runoff Area=122,534 sf 52.57% Impervious Runoff Depth=3.91"
Flow Length=369' Tc=6.1 min CN=96 Runoff=8.63 cfs 0.916 af

Subcatchment OS1: Offsite North Runoff Area=126,813 sf 0.79% Impervious Runoff Depth=3.07"
Flow Length=896' Tc=44.5 min CN=88 Runoff=3.35 cfs 0.746 af

Subcatchment OS2: Offsite West Runoff Area=17,527 sf 0.00% Impervious Runoff Depth=2.52"
Tc=6.0 min CN=82 Runoff=0.82 cfs 0.085 af

Subcatchment OS3: Offsite South Runoff Area=42,158 sf 0.00% Impervious Runoff Depth=2.98"
Tc=6.0 min CN=87 Runoff=2.37 cfs 0.240 af

Subcatchment OS4: Offsite East Runoff Area=102,943 sf 0.00% Impervious Runoff Depth=2.61"
Tc=6.0 min CN=83 Runoff=5.02 cfs 0.514 af

Reach R1: North Ditch Avg. Flow Depth=0.54' Max Vel=2.17 fps Inflow=14.70 cfs 1.573 af
n=0.022 L=1,382.0' S=0.0030 '/' Capacity=33.98 cfs Outflow=11.00 cfs 1.573 af

Reach R2: South Ditch Avg. Flow Depth=0.61' Max Vel=2.34 fps Inflow=16.81 cfs 2.015 af
n=0.022 L=1,238.6' S=0.0030 '/' Capacity=34.15 cfs Outflow=13.86 cfs 2.015 af

Pond P1: North Pond Peak Elev=74.89' Storage=116,489 cf Inflow=14.29 cfs 2.674 af
Outflow=0.00 cfs 0.000 af

Pond P2: South Pond Peak Elev=73.96' Storage=127,653 cf Inflow=15.76 cfs 2.931 af
Outflow=0.00 cfs 0.000 af

Total Runoff Area = 24.681 ac Runoff Volume = 7.189 af Average Runoff Depth = 3.50"
80.95% Pervious = 19.979 ac 19.05% Impervious = 4.702 ac

Summary for Subcatchment 1S: Drainage Area 1

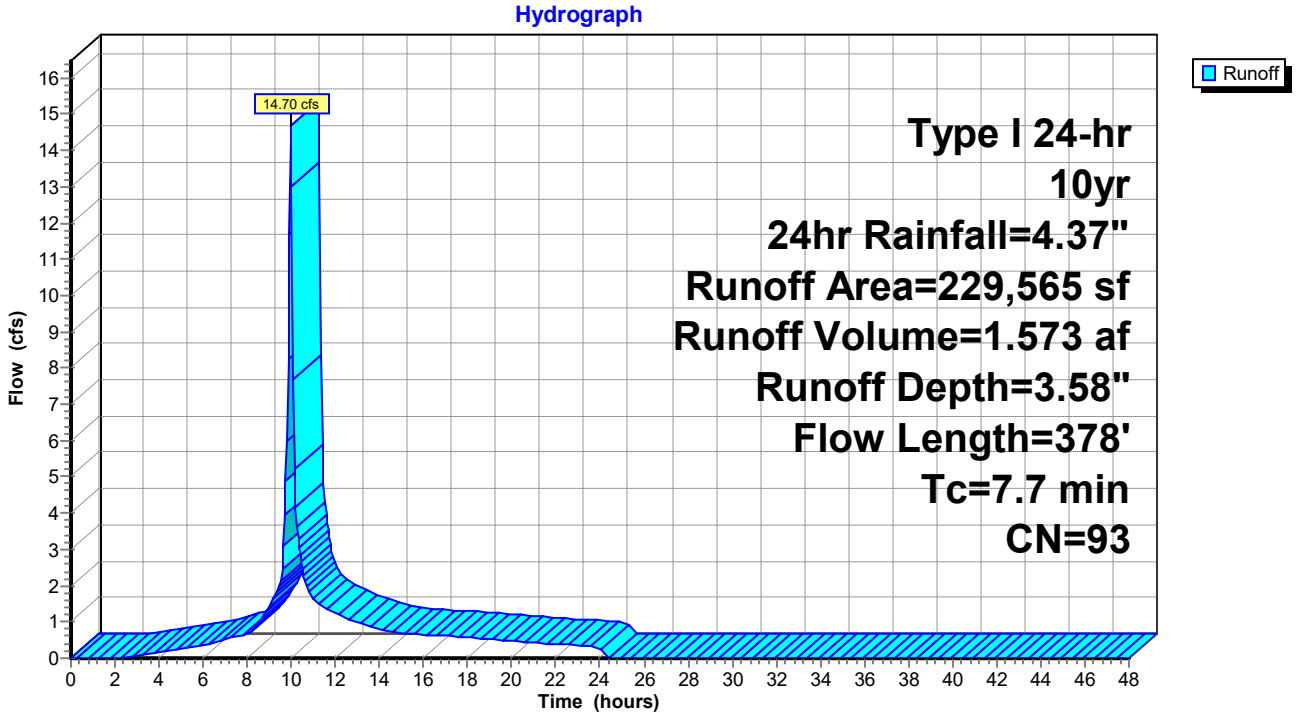
Runoff = 14.70 cfs @ 9.98 hrs, Volume= 1.573 af, Depth= 3.58"
Routed to Reach R1 : North Ditch

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type I 24-hr 10yr, 24hr Rainfall=4.37"

	Area (sf)	CN	Description
*	178,025	96	Gravel surface
	15,486	61	>75% Grass cover, Good, HSG B
	12,395	80	>75% Grass cover, Good, HSG D
*	23,659	98	Impervious
	229,565	93	Weighted Average
	205,906		89.69% Pervious Area
	23,659		10.31% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.2	100	0.0051	0.76		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.88"
5.5	278	0.0145	0.84		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
7.7	378	Total			

Subcatchment 1S: Drainage Area 1



Summary for Subcatchment 2S: Drainage Area 2

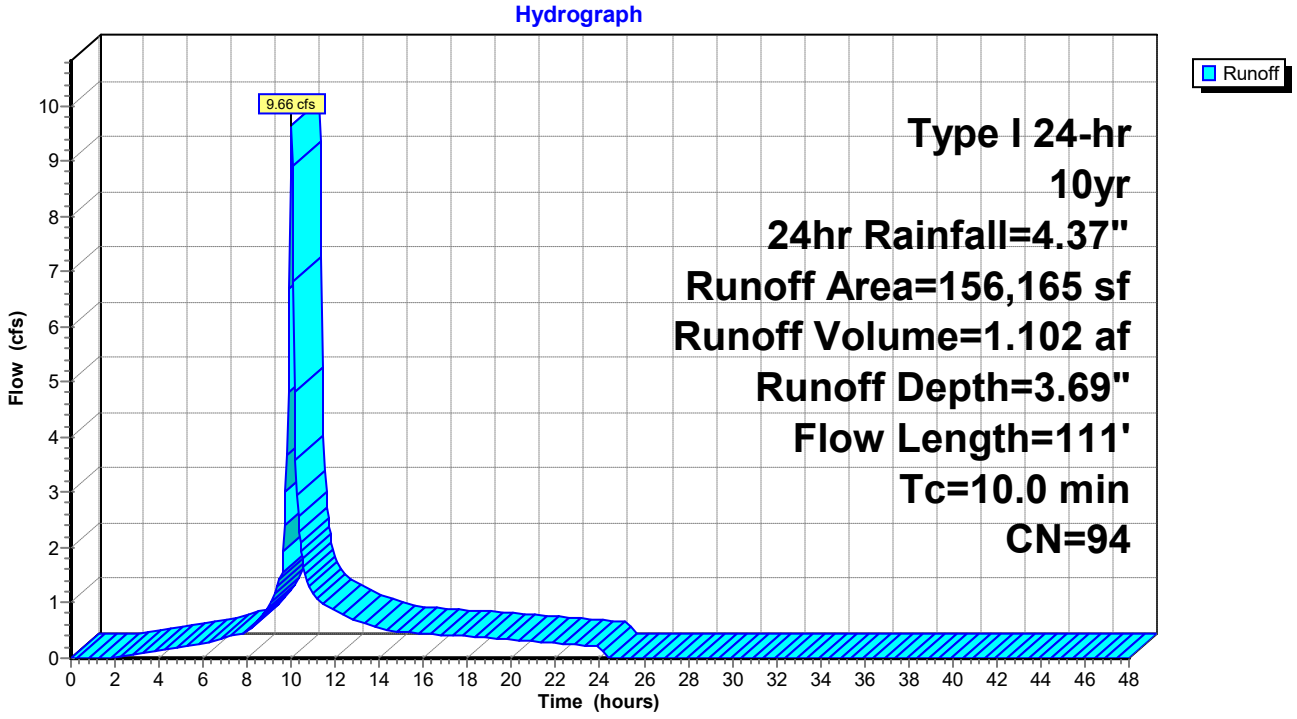
Runoff = 9.66 cfs @ 10.00 hrs, Volume= 1.102 af, Depth= 3.69"
Routed to Pond P1 : North Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type I 24-hr 10yr, 24hr Rainfall=4.37"

	Area (sf)	CN	Description
	46,901	98	Water Surface, HSG D
*	70,484	96	Gravel surface
	22,582	80	>75% Grass cover, Good, HSG D
*	16,198	98	Impervious
	156,165	94	Weighted Average
	93,066		59.59% Pervious Area
	63,099		40.41% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.9	33	0.0137	0.11		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.88"
5.1	78	0.0712	0.26		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.88"
10.0	111	Total			

Subcatchment 2S: Drainage Area 2



Summary for Subcatchment 3S: Drainage Area 3

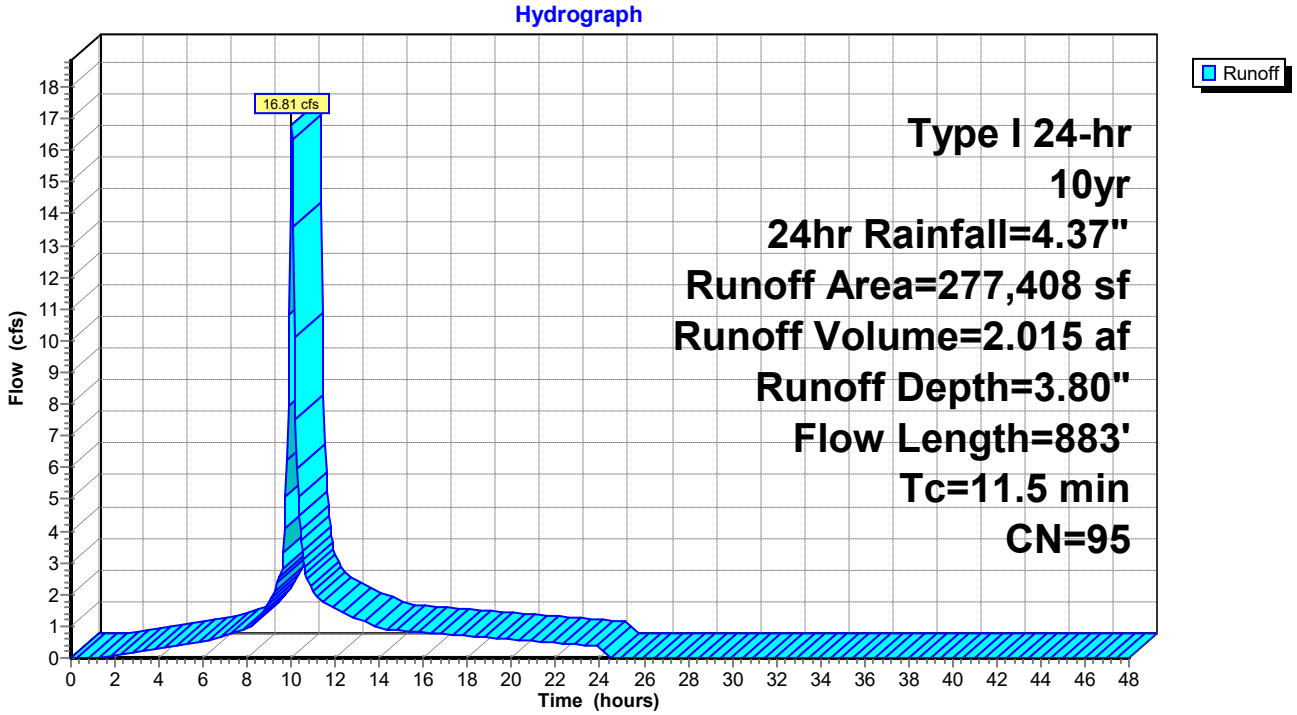
Runoff = 16.81 cfs @ 10.02 hrs, Volume= 2.015 af, Depth= 3.80"
Routed to Reach R2 : South Ditch

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type I 24-hr 10yr, 24hr Rainfall=4.37"

	Area (sf)	CN	Description
	205,009	96	Gravel surface, HSG D
	19,737	80	>75% Grass cover, Good, HSG D
*	52,662	98	Impervious
	277,408	95	Weighted Average
	224,746		81.02% Pervious Area
	52,662		18.98% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.2	100	0.0050	0.75		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.88"
9.3	783	0.0076	1.40		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
11.5	883	Total			

Subcatchment 3S: Drainage Area 3



Summary for Subcatchment 4S: Drainage Area 4

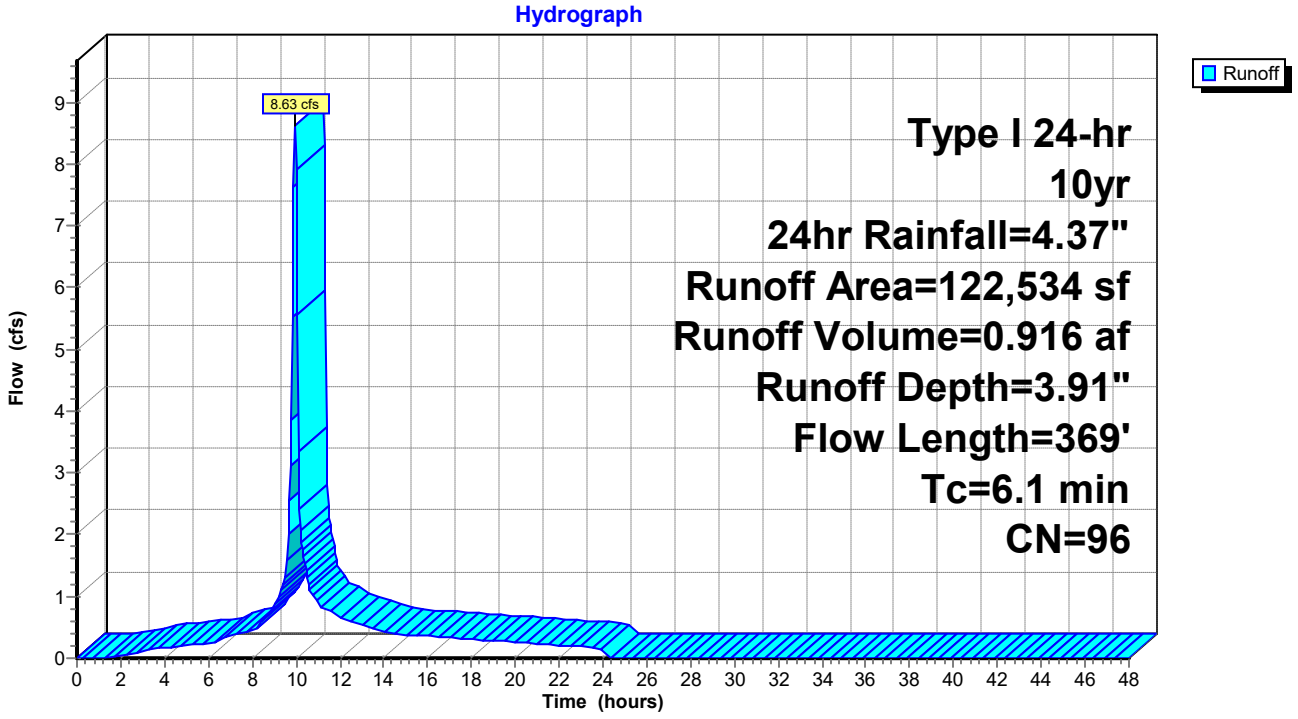
Runoff = 8.63 cfs @ 9.95 hrs, Volume= 0.916 af, Depth= 3.91"
Routed to Pond P2 : South Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type I 24-hr 10yr, 24hr Rainfall=4.37"

	Area (sf)	CN	Description
	50,930	96	Gravel surface, HSG C
	49,729	98	Water Surface, HSG D
*	14,690	98	Impervious
	7,185	80	>75% Grass cover, Good, HSG D
	122,534	96	Weighted Average
	58,115		47.43% Pervious Area
	64,419		52.57% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.2	100	0.0050	0.75		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.88"
3.9	269	0.0051	1.15		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
6.1	369	Total			

Subcatchment 4S: Drainage Area 4



Summary for Subcatchment OS1: Offsite North

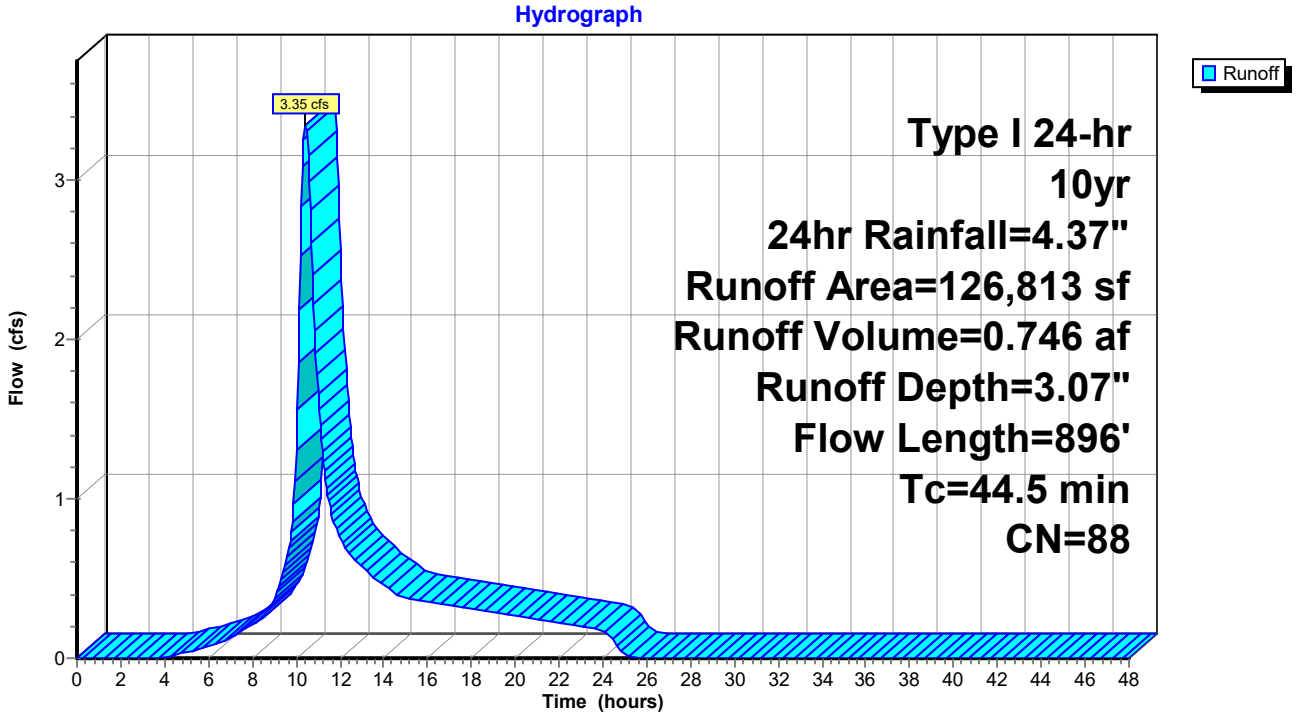
Runoff = 3.35 cfs @ 10.43 hrs, Volume= 0.746 af, Depth= 3.07"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type I 24-hr 10yr, 24hr Rainfall=4.37"

	Area (sf)	CN	Description
	4,873	78	Row crops, straight row, Good, HSG B
	108,569	89	Row crops, straight row, Good, HSG D
	969	61	>75% Grass cover, Good, HSG B
	11,402	80	>75% Grass cover, Good, HSG D
*	1,000	98	Impervious
	126,813	88	Weighted Average
	125,813		99.21% Pervious Area
	1,000		0.79% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
23.7	100	0.0004	0.07		**Sheet Flow,** Cultivated: Residue<=20% n= 0.060 P2= 2.88"
20.8	796	0.0050	0.64		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
44.5	896	Total			

Subcatchment OS1: Offsite North



Summary for Subcatchment OS2: Offsite West

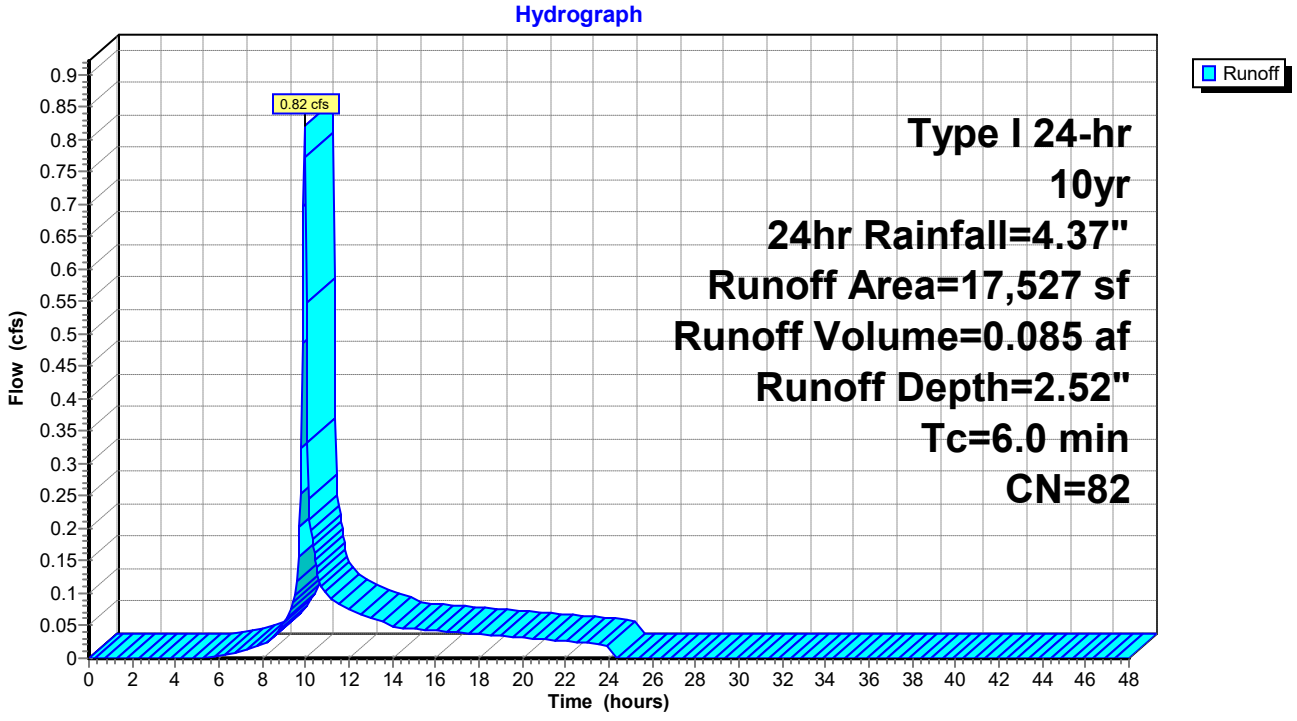
Runoff = 0.82 cfs @ 9.96 hrs, Volume= 0.085 af, Depth= 2.52"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type I 24-hr 10yr, 24hr Rainfall=4.37"

Area (sf)	CN	Description
1,048	61	>75% Grass cover, Good, HSG B
6,609	78	Row crops, straight row, Good, HSG B
1,911	80	>75% Grass cover, Good, HSG D
7,959	89	Row crops, straight row, Good, HSG D
17,527	82	Weighted Average
17,527		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Direct Entry**

Subcatchment OS2: Offsite West



Summary for Subcatchment OS3: Offsite South

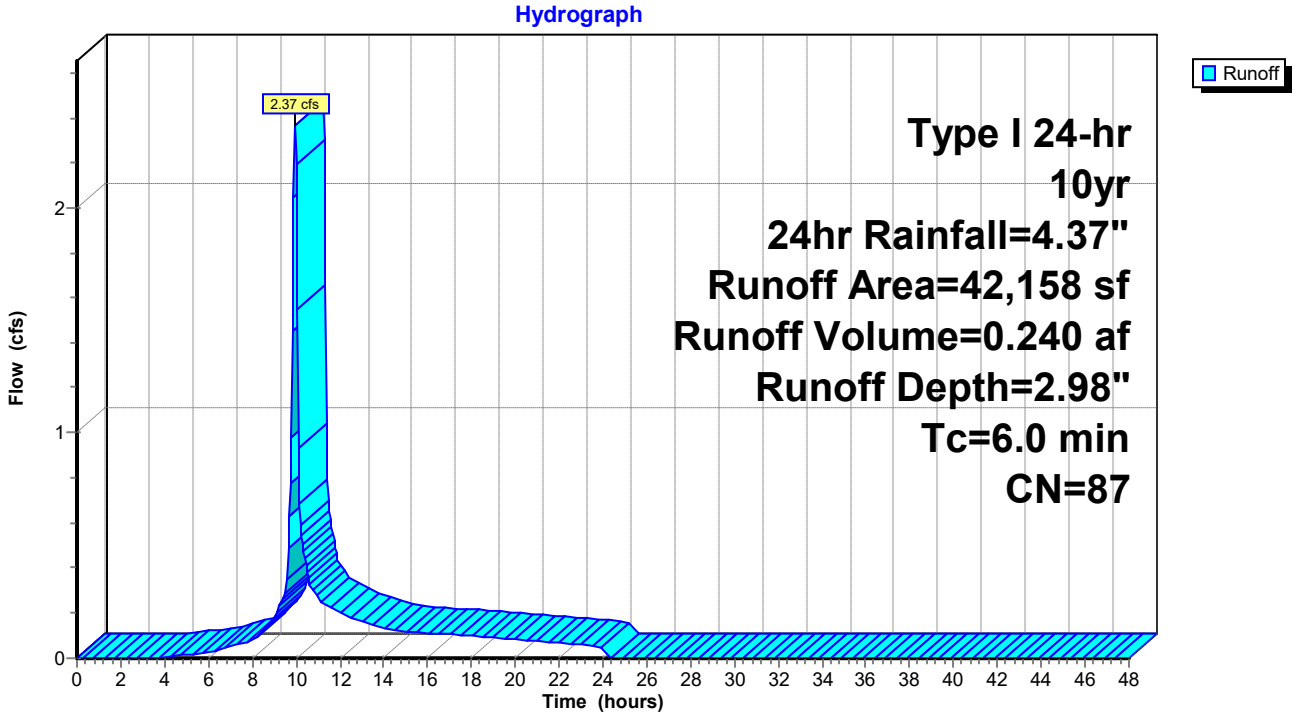
Runoff = 2.37 cfs @ 9.96 hrs, Volume= 0.240 af, Depth= 2.98"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type I 24-hr 10yr, 24hr Rainfall=4.37"

Area (sf)	CN	Description
33,415	89	Row crops, straight row, Good, HSG D
8,743	80	>75% Grass cover, Good, HSG D
42,158	87	Weighted Average
42,158		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Direct Entry**

Subcatchment OS3: Offsite South



Summary for Subcatchment OS4: Offsite East

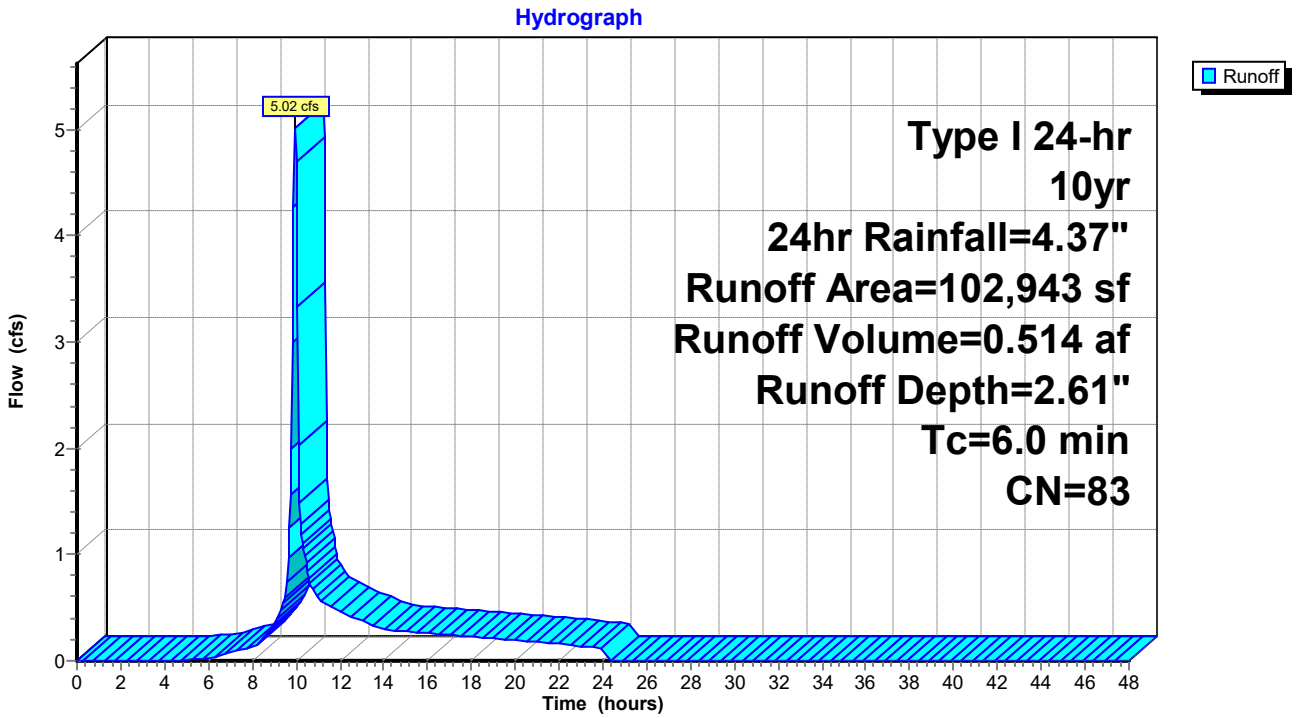
Runoff = 5.02 cfs @ 9.96 hrs, Volume= 0.514 af, Depth= 2.61"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type I 24-hr 10yr, 24hr Rainfall=4.37"

	Area (sf)	CN	Description
*	7,003	96	Gravel surface
	22,215	80	>75% Grass cover, Good, HSG D
	7,951	61	>75% Grass cover, Good, HSG B
	46,629	89	Row crops, straight row, Good, HSG D
	19,145	78	Row crops, straight row, Good, HSG B
	102,943	83	Weighted Average
	102,943		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Direct Entry**

Subcatchment OS4: Offsite East



Summary for Reach R1: North Ditch

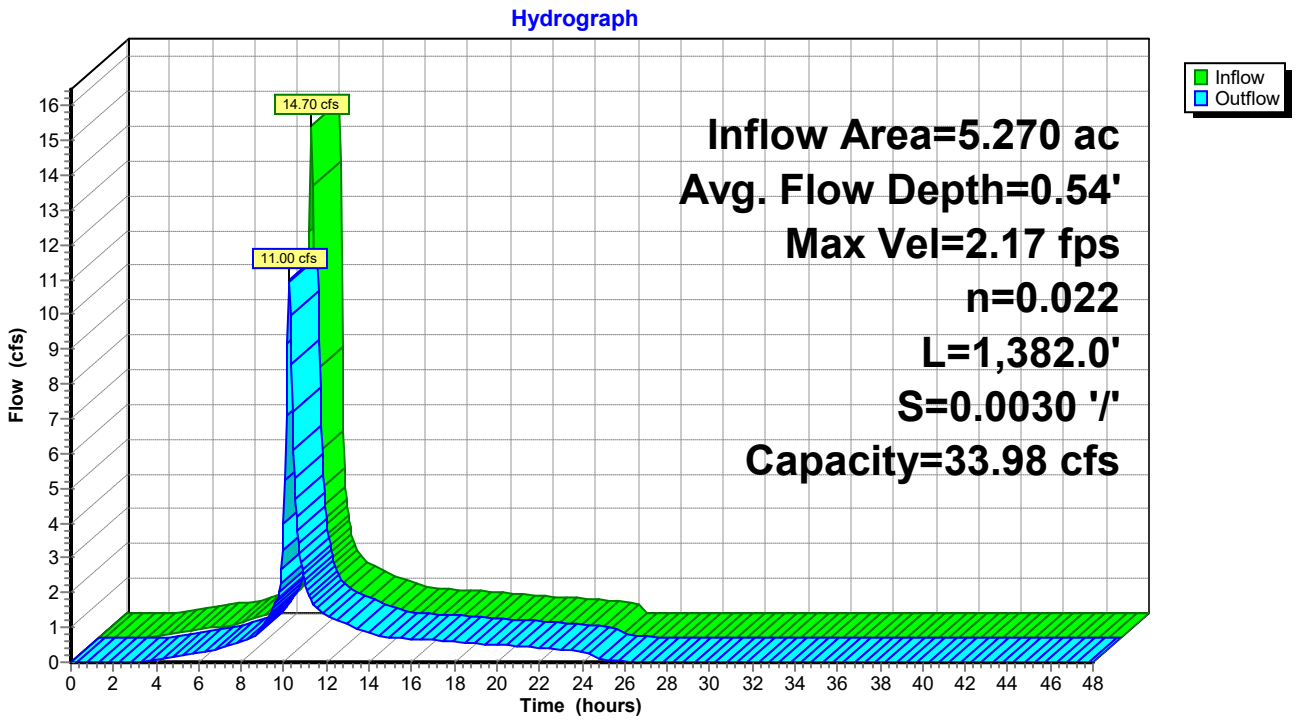
Inflow Area = 5.270 ac, 10.31% Impervious, Inflow Depth = 3.58" for 10yr, 24hr event
Inflow = 14.70 cfs @ 9.98 hrs, Volume= 1.573 af
Outflow = 11.00 cfs @ 10.24 hrs, Volume= 1.573 af, Atten= 25%, Lag= 15.5 min
Routed to Pond P1 : North Pond

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.17 fps, Min. Travel Time= 10.6 min
Avg. Velocity = 0.51 fps, Avg. Travel Time= 45.6 min

Peak Storage= 7,136 cf @ 10.06 hrs
Average Depth at Peak Storage= 0.54' , Surface Width= 11.22'
Bank-Full Depth= 1.00' Flow Area= 11.0 sf, Capacity= 33.98 cfs

8.00' x 1.00' deep channel, n= 0.022 Earth, clean & straight
Side Slope Z-value= 3.0 '/' Top Width= 14.00'
Length= 1,382.0' Slope= 0.0030 '/'
Inlet Invert= 78.13', Outlet Invert= 74.02'

‡



Summary for Reach R2: South Ditch

Inflow Area = 6.368 ac, 18.98% Impervious, Inflow Depth = 3.80" for 10yr, 24hr event
Inflow = 16.81 cfs @ 10.02 hrs, Volume= 2.015 af
Outflow = 13.86 cfs @ 10.25 hrs, Volume= 2.015 af, Atten= 18%, Lag= 13.5 min
Routed to Pond P2 : South Pond

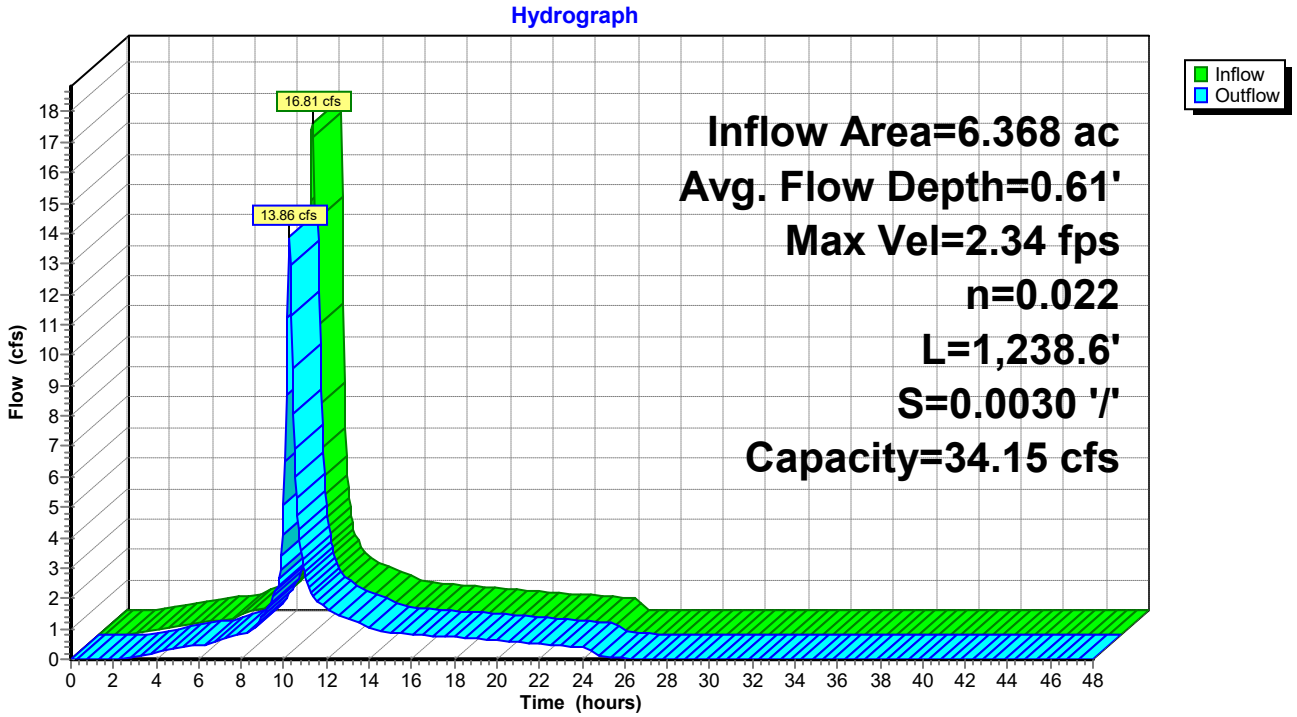
Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.34 fps, Min. Travel Time= 8.8 min
Avg. Velocity = 0.57 fps, Avg. Travel Time= 36.4 min

Peak Storage= 7,363 cf @ 10.10 hrs
Average Depth at Peak Storage= 0.61' , Surface Width= 11.63'
Bank-Full Depth= 1.00' Flow Area= 11.0 sf, Capacity= 34.15 cfs

8.00' x 1.00' deep channel, n= 0.022
Side Slope Z-value= 3.0 '/' Top Width= 14.00'
Length= 1,238.6' Slope= 0.0030 '/'
Inlet Invert= 78.13', Outlet Invert= 74.41'

‡

Reach R2: South Ditch



Summary for Pond P1: North Pond

[62] Hint: Exceeded Reach R1 OUTLET depth by 0.87' @ 47.95 hrs

Inflow Area = 8.855 ac, 22.49% Impervious, Inflow Depth = 3.62" for 10yr, 24hr event
Inflow = 14.29 cfs @ 10.20 hrs, Volume= 2.674 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 74.89' @ 48.00 hrs Surf.Area= 43,970 sf Storage= 116,489 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no outflow)

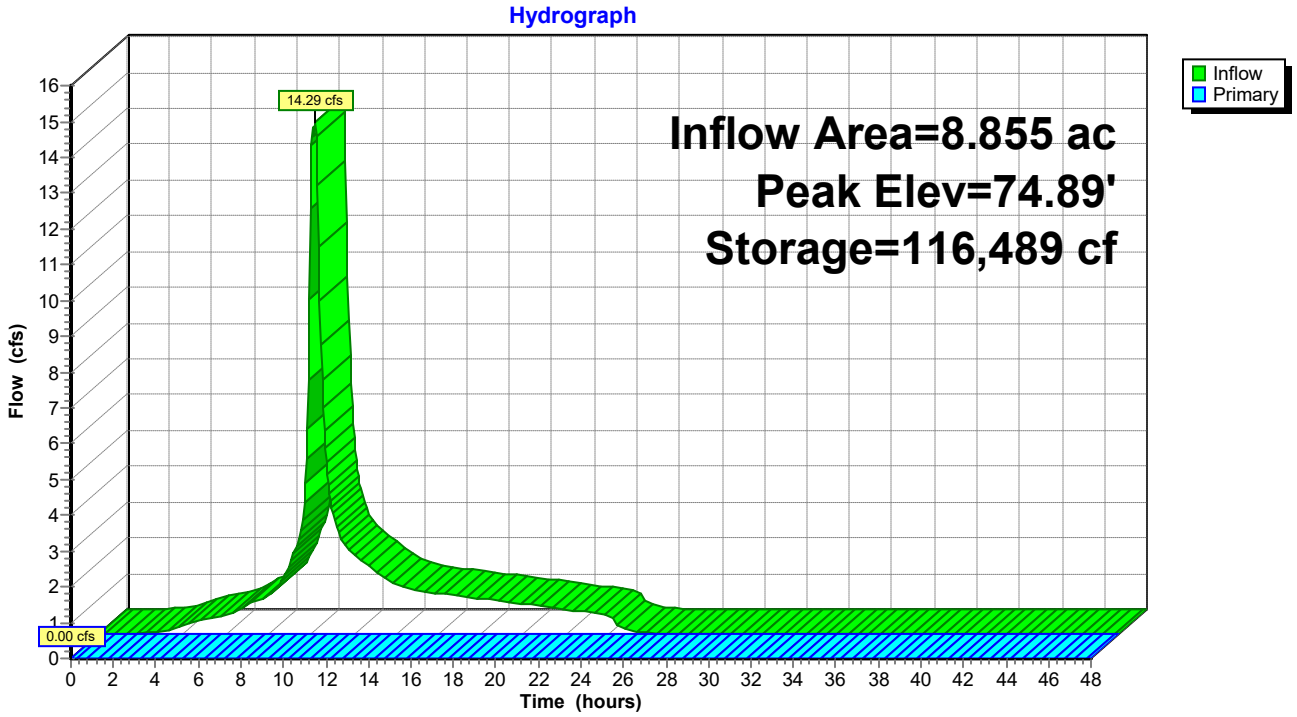
Volume	Invert	Avail.Storage	Storage Description
#1	72.00'	168,730 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
72.00	36,732	0	0
73.00	39,167	37,950	37,950
74.00	41,674	40,421	78,370
75.00	44,253	42,964	121,334
76.00	50,539	47,396	168,730

Device	Routing	Invert	Outlet Devices
#1	Primary	75.50'	**Custom Weir/Orifice, Cv= 2.62 (C= 3.28)** Head (feet) 0.00 0.50 Width (feet) 12.00 15.00

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=72.00' (Free Discharge)
↑—**1=Custom Weir/Orifice** (Controls 0.00 cfs)

Pond P1: North Pond



Summary for Pond P2: South Pond

Inflow Area = 9.181 ac, 29.27% Impervious, Inflow Depth = 3.83" for 10yr, 24hr event
Inflow = 15.76 cfs @ 10.24 hrs, Volume= 2.931 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 73.96' @ 48.00 hrs Surf.Area= 46,933 sf Storage= 127,653 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no outflow)

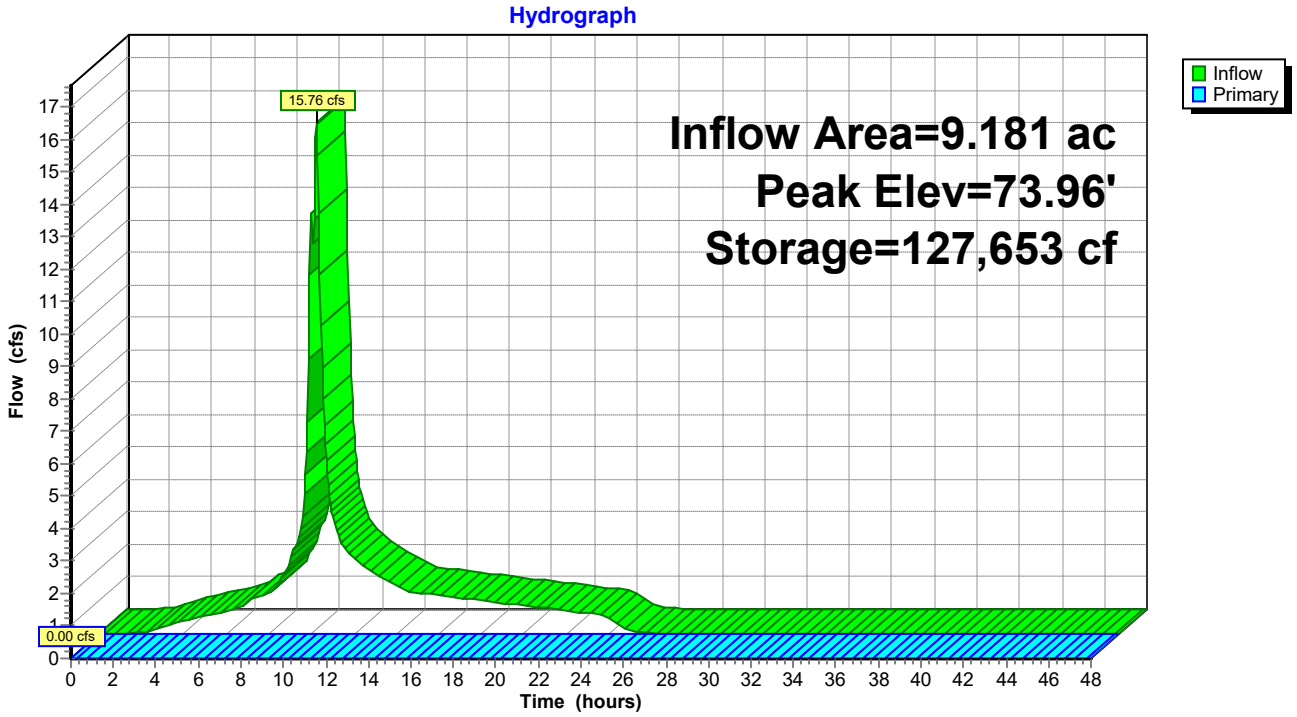
Volume	Invert	Avail.Storage	Storage Description
#1	71.00'	179,236 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
71.00	39,358	0	0
72.00	41,846	40,602	40,602
73.00	44,405	43,126	83,728
74.00	47,033	45,719	129,447
75.00	52,545	49,789	179,236

Device	Routing	Invert	Outlet Devices
#1	Primary	74.50'	**Custom Weir/Orifice, Cv= 2.62 (C= 3.28)** Head (feet) 0.00 0.50 Width (feet) 12.00 15.00

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=71.00' (Free Discharge)
↑—**1=Custom Weir/Orifice** (Controls 0.00 cfs)

Pond P2: South Pond



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 1S: Drainage Area 1 Runoff Area=229,565 sf 10.31% Impervious Runoff Depth=4.47"
Flow Length=378' Tc=7.7 min CN=93 Runoff=18.22 cfs 1.964 af

Subcatchment 2S: Drainage Area 2 Runoff Area=156,165 sf 40.41% Impervious Runoff Depth=4.58"
Flow Length=111' Tc=10.0 min CN=94 Runoff=11.91 cfs 1.370 af

Subcatchment 3S: Drainage Area 3 Runoff Area=277,408 sf 18.98% Impervious Runoff Depth=4.70"
Flow Length=883' Tc=11.5 min CN=95 Runoff=20.62 cfs 2.493 af

Subcatchment 4S: Drainage Area 4 Runoff Area=122,534 sf 52.57% Impervious Runoff Depth=4.81"
Flow Length=369' Tc=6.1 min CN=96 Runoff=10.54 cfs 1.128 af

Subcatchment OS1: Offsite North Runoff Area=126,813 sf 0.79% Impervious Runoff Depth=3.94"
Flow Length=896' Tc=44.5 min CN=88 Runoff=4.30 cfs 0.955 af

Subcatchment OS2: Offsite West Runoff Area=17,527 sf 0.00% Impervious Runoff Depth=3.33"
Tc=6.0 min CN=82 Runoff=1.10 cfs 0.112 af

Subcatchment OS3: Offsite South Runoff Area=42,158 sf 0.00% Impervious Runoff Depth=3.83"
Tc=6.0 min CN=87 Runoff=3.04 cfs 0.309 af

Subcatchment OS4: Offsite East Runoff Area=102,943 sf 0.00% Impervious Runoff Depth=3.43"
Tc=6.0 min CN=83 Runoff=6.64 cfs 0.675 af

Reach R1: North Ditch Avg. Flow Depth=0.61' Max Vel=2.35 fps Inflow=18.22 cfs 1.964 af
n=0.022 L=1,382.0' S=0.0030 '/' Capacity=33.98 cfs Outflow=14.01 cfs 1.964 af

Reach R2: South Ditch Avg. Flow Depth=0.69' Max Vel=2.51 fps Inflow=20.62 cfs 2.493 af
n=0.022 L=1,238.6' S=0.0030 '/' Capacity=34.15 cfs Outflow=17.11 cfs 2.493 af

Pond P1: North Pond Peak Elev=75.51' Storage=144,775 cf Inflow=18.37 cfs 3.334 af
Outflow=0.06 cfs 0.023 af

Pond P2: South Pond Peak Elev=74.54' Storage=155,823 cf Inflow=19.47 cfs 3.620 af
Outflow=0.39 cfs 0.093 af

Total Runoff Area = 24.681 ac Runoff Volume = 9.005 af Average Runoff Depth = 4.38"
80.95% Pervious = 19.979 ac 19.05% Impervious = 4.702 ac

Summary for Subcatchment 1S: Drainage Area 1

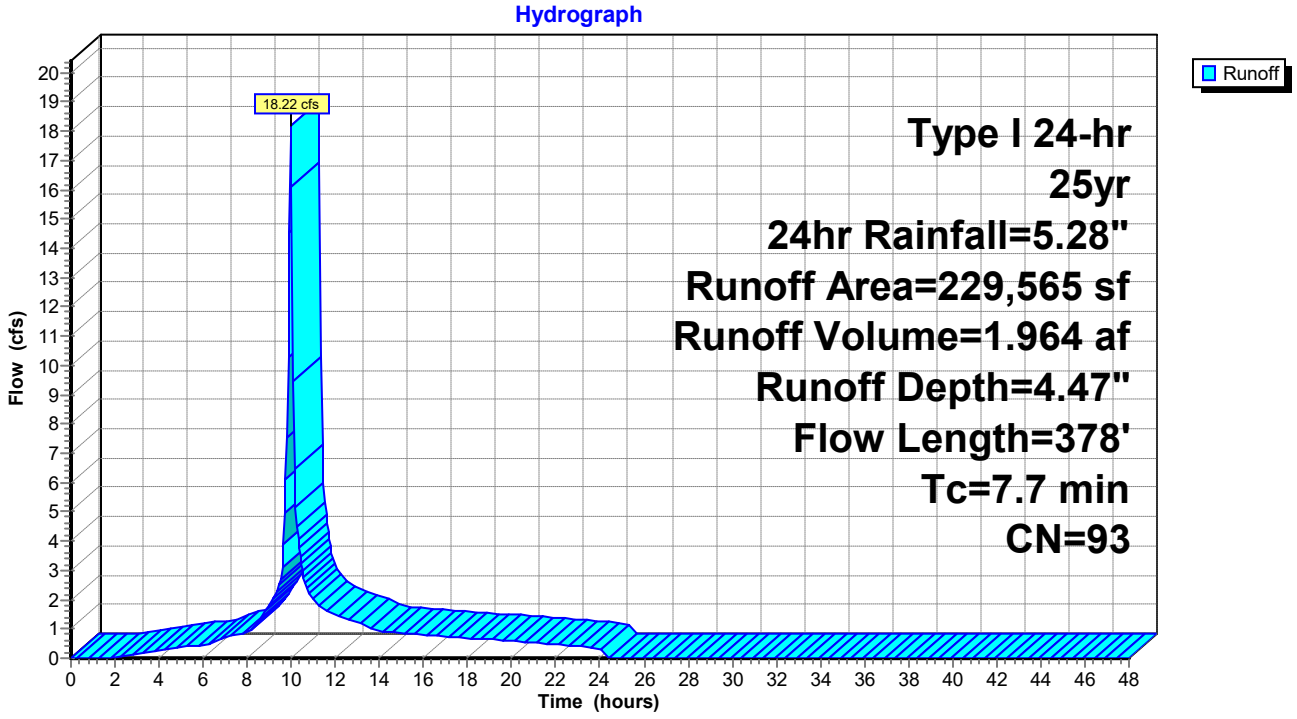
Runoff = 18.22 cfs @ 9.98 hrs, Volume= 1.964 af, Depth= 4.47"
Routed to Reach R1 : North Ditch

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type I 24-hr 25yr, 24hr Rainfall=5.28"

	Area (sf)	CN	Description
*	178,025	96	Gravel surface
	15,486	61	>75% Grass cover, Good, HSG B
	12,395	80	>75% Grass cover, Good, HSG D
*	23,659	98	Impervious
	229,565	93	Weighted Average
	205,906		89.69% Pervious Area
	23,659		10.31% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.2	100	0.0051	0.76		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.88"
5.5	278	0.0145	0.84		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
7.7	378	Total			

Subcatchment 1S: Drainage Area 1



Summary for Subcatchment 2S: Drainage Area 2

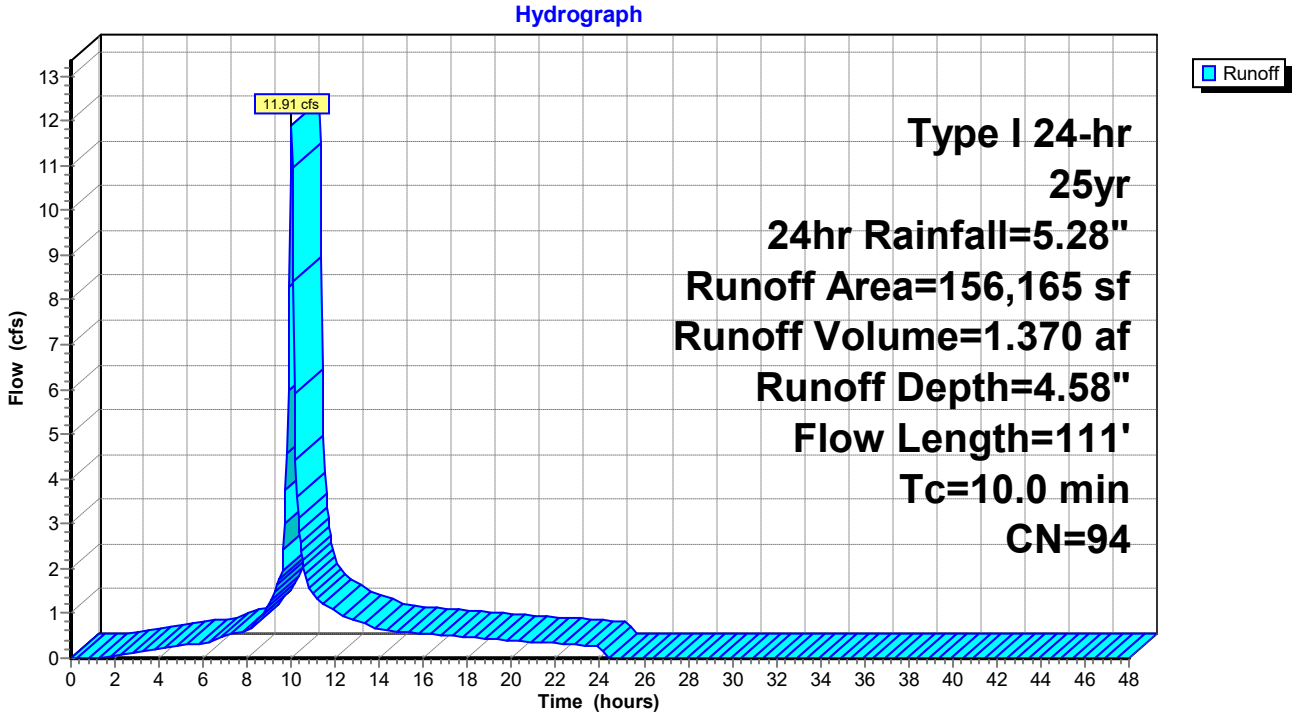
Runoff = 11.91 cfs @ 10.00 hrs, Volume= 1.370 af, Depth= 4.58"
Routed to Pond P1 : North Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type I 24-hr 25yr, 24hr Rainfall=5.28"

	Area (sf)	CN	Description
	46,901	98	Water Surface, HSG D
*	70,484	96	Gravel surface
	22,582	80	>75% Grass cover, Good, HSG D
*	16,198	98	Impervious
	156,165	94	Weighted Average
	93,066		59.59% Pervious Area
	63,099		40.41% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.9	33	0.0137	0.11		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.88"
5.1	78	0.0712	0.26		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.88"
10.0	111	Total			

Subcatchment 2S: Drainage Area 2



Summary for Subcatchment 3S: Drainage Area 3

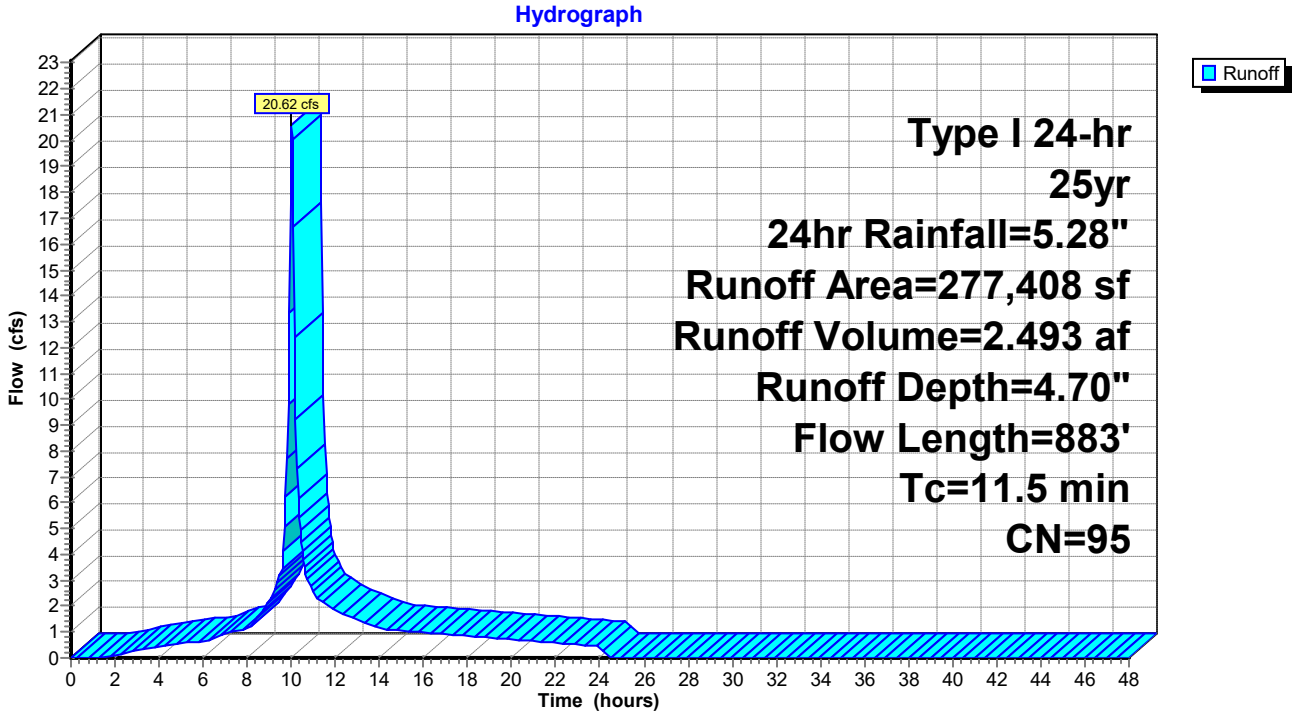
Runoff = 20.62 cfs @ 10.02 hrs, Volume= 2.493 af, Depth= 4.70"
Routed to Reach R2 : South Ditch

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type I 24-hr 25yr, 24hr Rainfall=5.28"

	Area (sf)	CN	Description
	205,009	96	Gravel surface, HSG D
	19,737	80	>75% Grass cover, Good, HSG D
*	52,662	98	Impervious
	277,408	95	Weighted Average
	224,746		81.02% Pervious Area
	52,662		18.98% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.2	100	0.0050	0.75		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.88"
9.3	783	0.0076	1.40		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
11.5	883	Total			

Subcatchment 3S: Drainage Area 3



Summary for Subcatchment 4S: Drainage Area 4

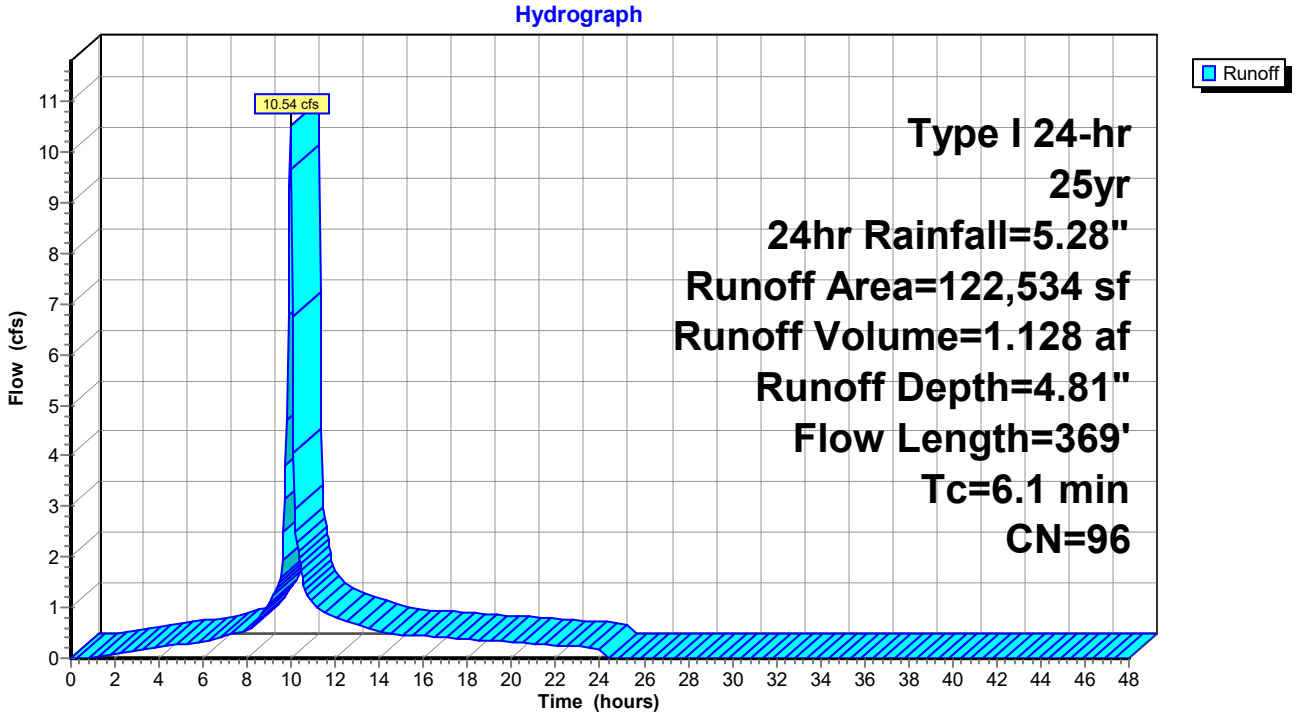
Runoff = 10.54 cfs @ 9.95 hrs, Volume= 1.128 af, Depth= 4.81"
Routed to Pond P2 : South Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type I 24-hr 25yr, 24hr Rainfall=5.28"

	Area (sf)	CN	Description
	50,930	96	Gravel surface, HSG C
	49,729	98	Water Surface, HSG D
*	14,690	98	Impervious
	7,185	80	>75% Grass cover, Good, HSG D
	122,534	96	Weighted Average
	58,115		47.43% Pervious Area
	64,419		52.57% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.2	100	0.0050	0.75		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.88"
3.9	269	0.0051	1.15		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
6.1	369	Total			

Subcatchment 4S: Drainage Area 4



Summary for Subcatchment OS1: Offsite North

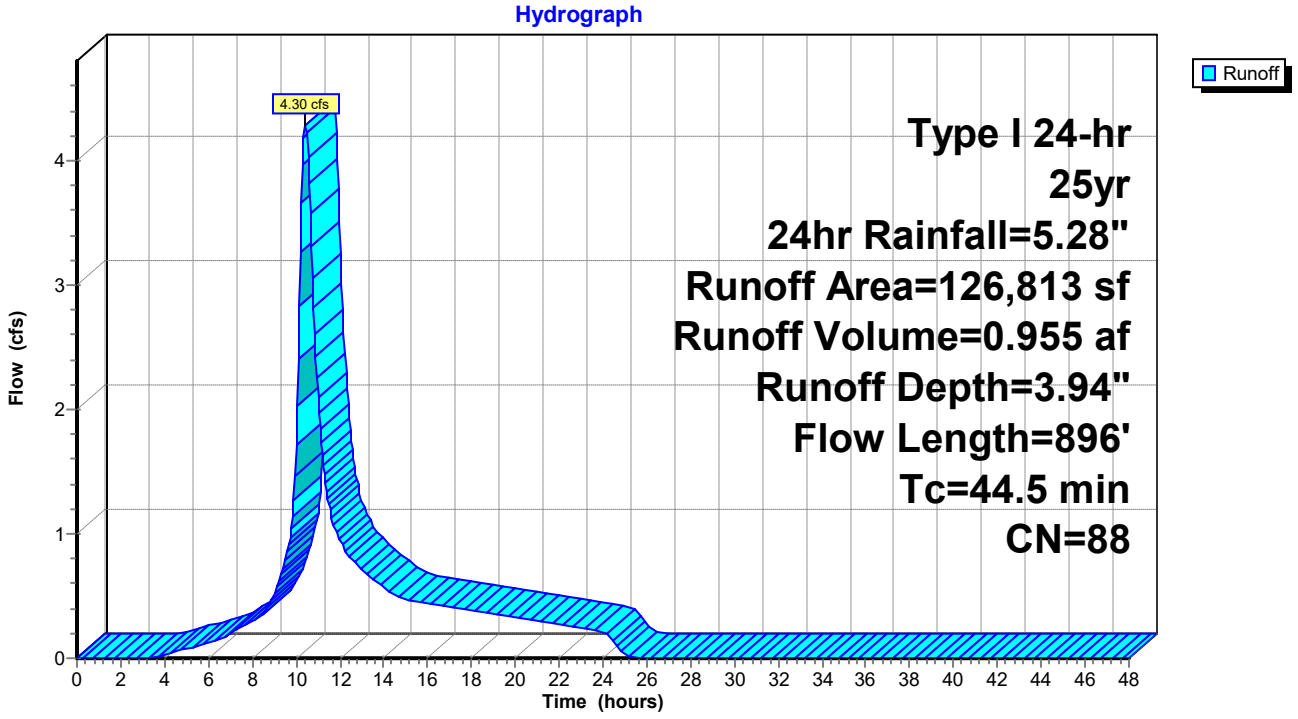
Runoff = 4.30 cfs @ 10.42 hrs, Volume= 0.955 af, Depth= 3.94"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type I 24-hr 25yr, 24hr Rainfall=5.28"

	Area (sf)	CN	Description
	4,873	78	Row crops, straight row, Good, HSG B
	108,569	89	Row crops, straight row, Good, HSG D
	969	61	>75% Grass cover, Good, HSG B
	11,402	80	>75% Grass cover, Good, HSG D
*	1,000	98	Impervious
	126,813	88	Weighted Average
	125,813		99.21% Pervious Area
	1,000		0.79% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
23.7	100	0.0004	0.07		**Sheet Flow,** Cultivated: Residue<=20% n= 0.060 P2= 2.88"
20.8	796	0.0050	0.64		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
44.5	896	Total			

Subcatchment OS1: Offsite North



Summary for Subcatchment OS2: Offsite West

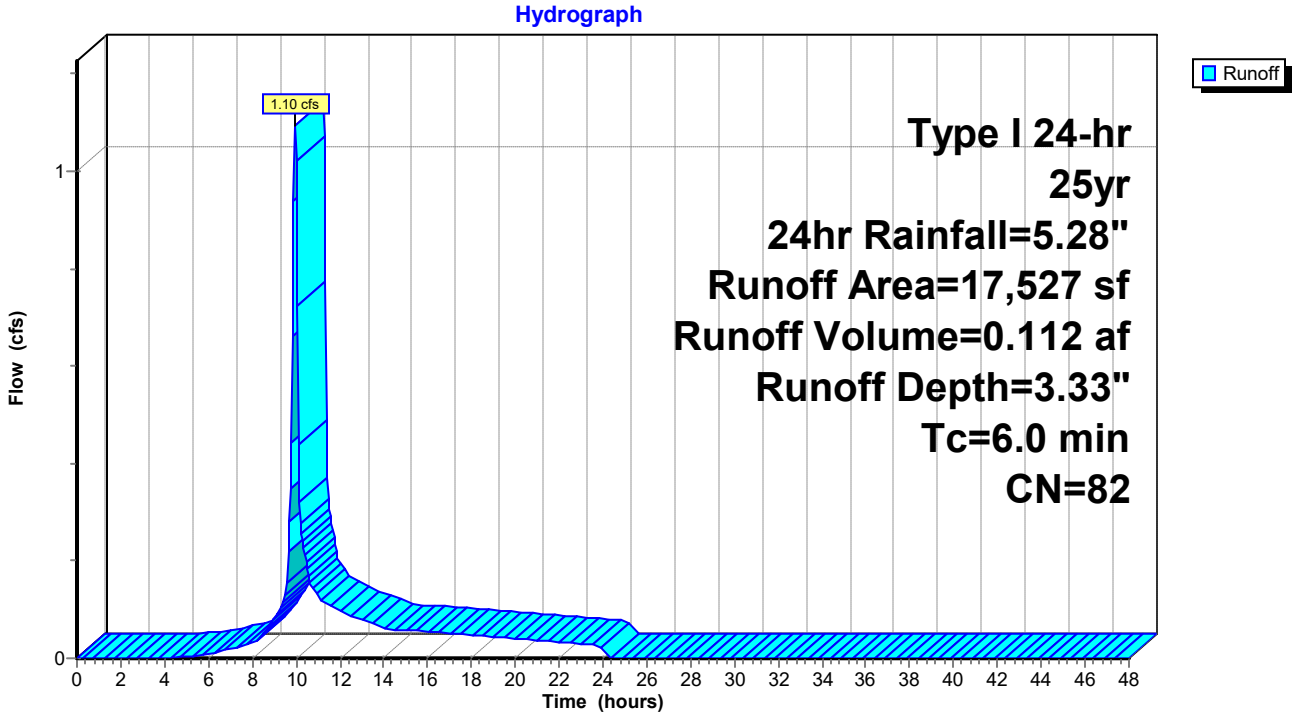
Runoff = 1.10 cfs @ 9.96 hrs, Volume= 0.112 af, Depth= 3.33"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type I 24-hr 25yr, 24hr Rainfall=5.28"

Area (sf)	CN	Description
1,048	61	>75% Grass cover, Good, HSG B
6,609	78	Row crops, straight row, Good, HSG B
1,911	80	>75% Grass cover, Good, HSG D
7,959	89	Row crops, straight row, Good, HSG D
17,527	82	Weighted Average
17,527		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Direct Entry**

Subcatchment OS2: Offsite West



Summary for Subcatchment OS3: Offsite South

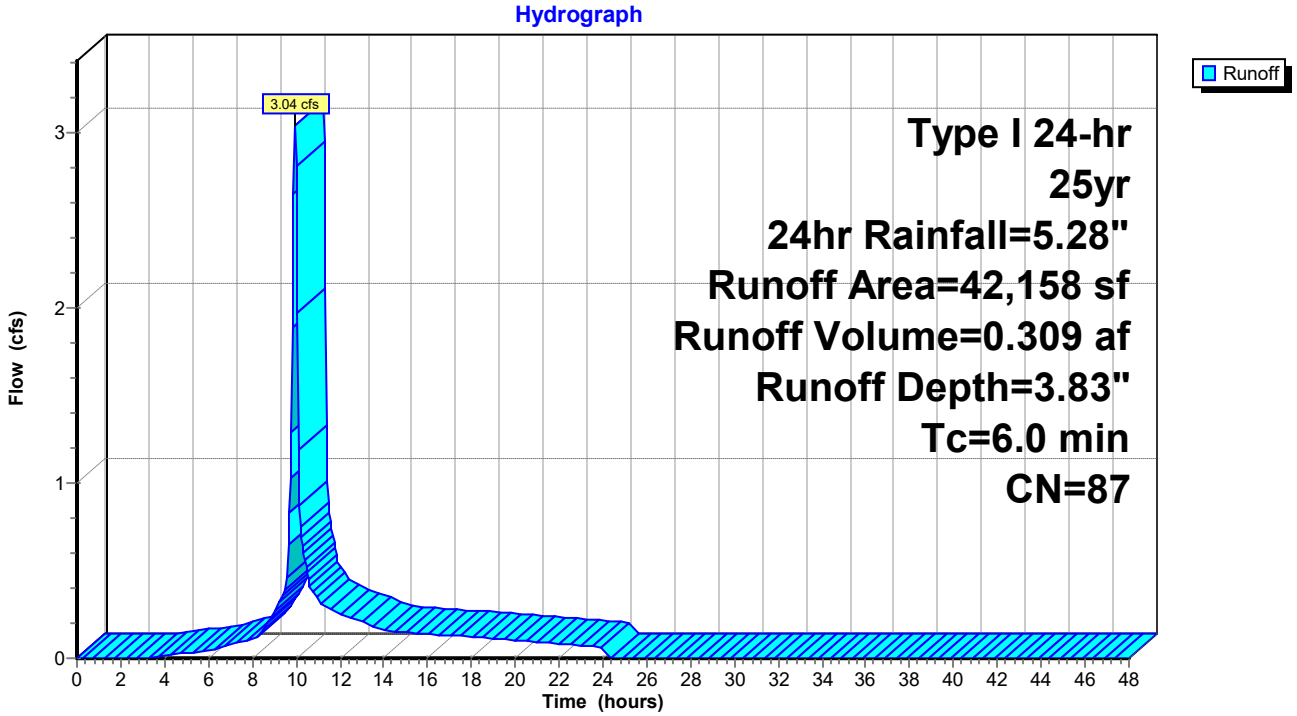
Runoff = 3.04 cfs @ 9.96 hrs, Volume= 0.309 af, Depth= 3.83"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type I 24-hr 25yr, 24hr Rainfall=5.28"

Area (sf)	CN	Description
33,415	89	Row crops, straight row, Good, HSG D
8,743	80	>75% Grass cover, Good, HSG D
42,158	87	Weighted Average
42,158		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Direct Entry**

Subcatchment OS3: Offsite South



Summary for Subcatchment OS4: Offsite East

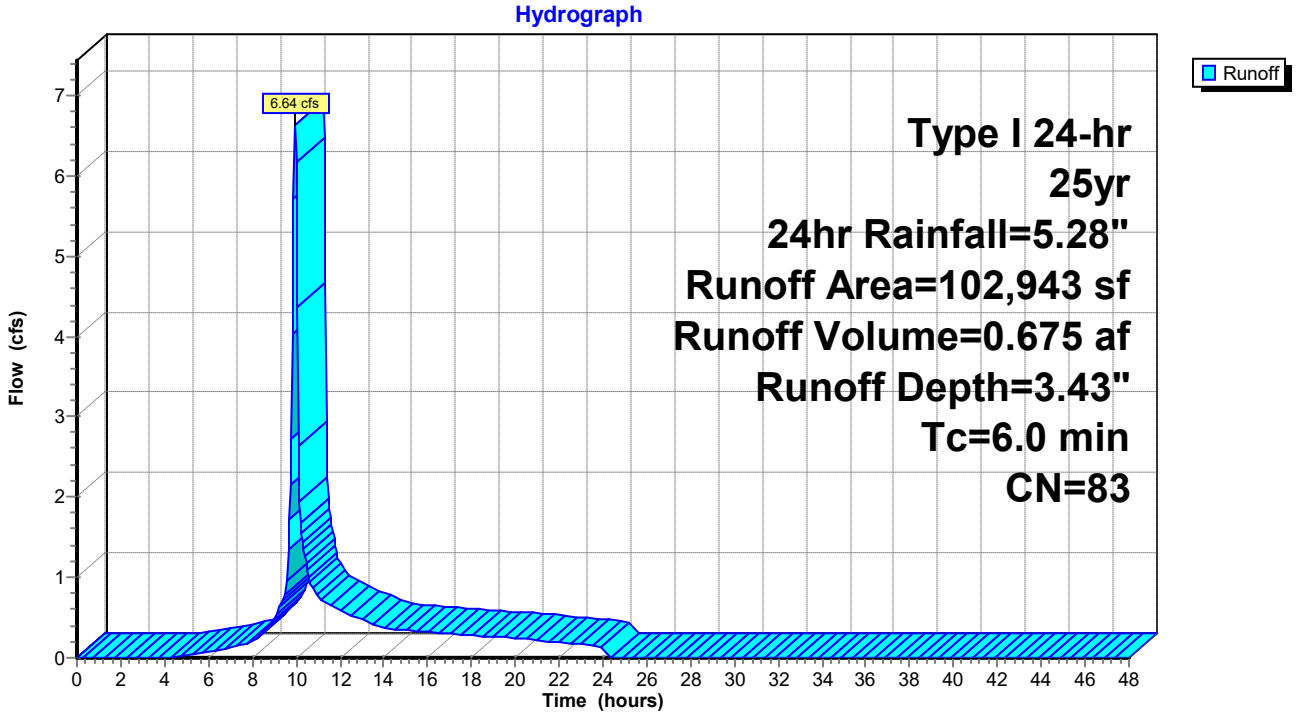
Runoff = 6.64 cfs @ 9.96 hrs, Volume= 0.675 af, Depth= 3.43"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type I 24-hr 25yr, 24hr Rainfall=5.28"

	Area (sf)	CN	Description
*	7,003	96	Gravel surface
	22,215	80	>75% Grass cover, Good, HSG D
	7,951	61	>75% Grass cover, Good, HSG B
	46,629	89	Row crops, straight row, Good, HSG D
	19,145	78	Row crops, straight row, Good, HSG B
	102,943	83	Weighted Average
	102,943		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Direct Entry**

Subcatchment OS4: Offsite East



Summary for Reach R1: North Ditch

Inflow Area = 5.270 ac, 10.31% Impervious, Inflow Depth = 4.47" for 25yr, 24hr event
Inflow = 18.22 cfs @ 9.98 hrs, Volume= 1.964 af
Outflow = 14.01 cfs @ 10.22 hrs, Volume= 1.964 af, Atten= 23%, Lag= 14.3 min
Routed to Pond P1 : North Pond

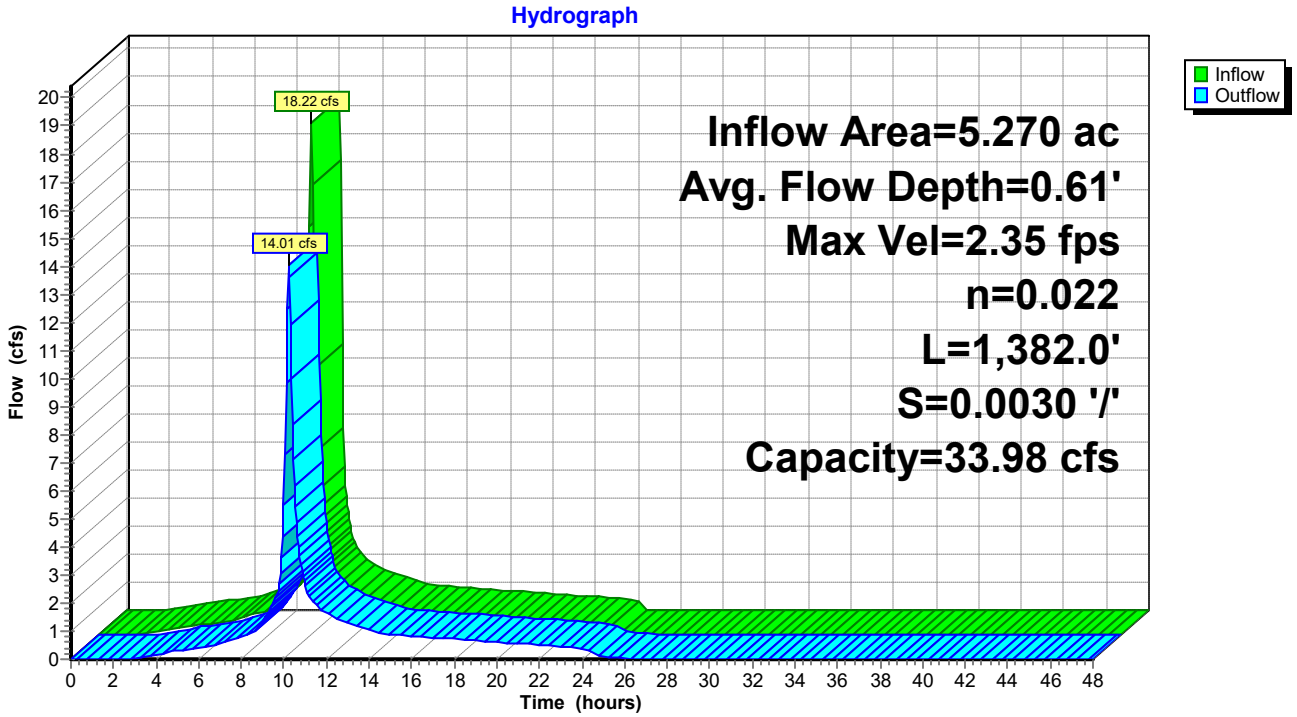
Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.35 fps, Min. Travel Time= 9.8 min
Avg. Velocity = 0.54 fps, Avg. Travel Time= 42.4 min

Peak Storage= 8,365 cf @ 10.05 hrs
Average Depth at Peak Storage= 0.61' , Surface Width= 11.69'
Bank-Full Depth= 1.00' Flow Area= 11.0 sf, Capacity= 33.98 cfs

8.00' x 1.00' deep channel, n= 0.022 Earth, clean & straight
Side Slope Z-value= 3.0 '/' Top Width= 14.00'
Length= 1,382.0' Slope= 0.0030 '/'
Inlet Invert= 78.13', Outlet Invert= 74.02'

‡

Reach R1: North Ditch



Summary for Reach R2: South Ditch

Inflow Area = 6.368 ac, 18.98% Impervious, Inflow Depth = 4.70" for 25yr, 24hr event
Inflow = 20.62 cfs @ 10.02 hrs, Volume= 2.493 af
Outflow = 17.11 cfs @ 10.23 hrs, Volume= 2.493 af, Atten= 17%, Lag= 12.7 min
Routed to Pond P2 : South Pond

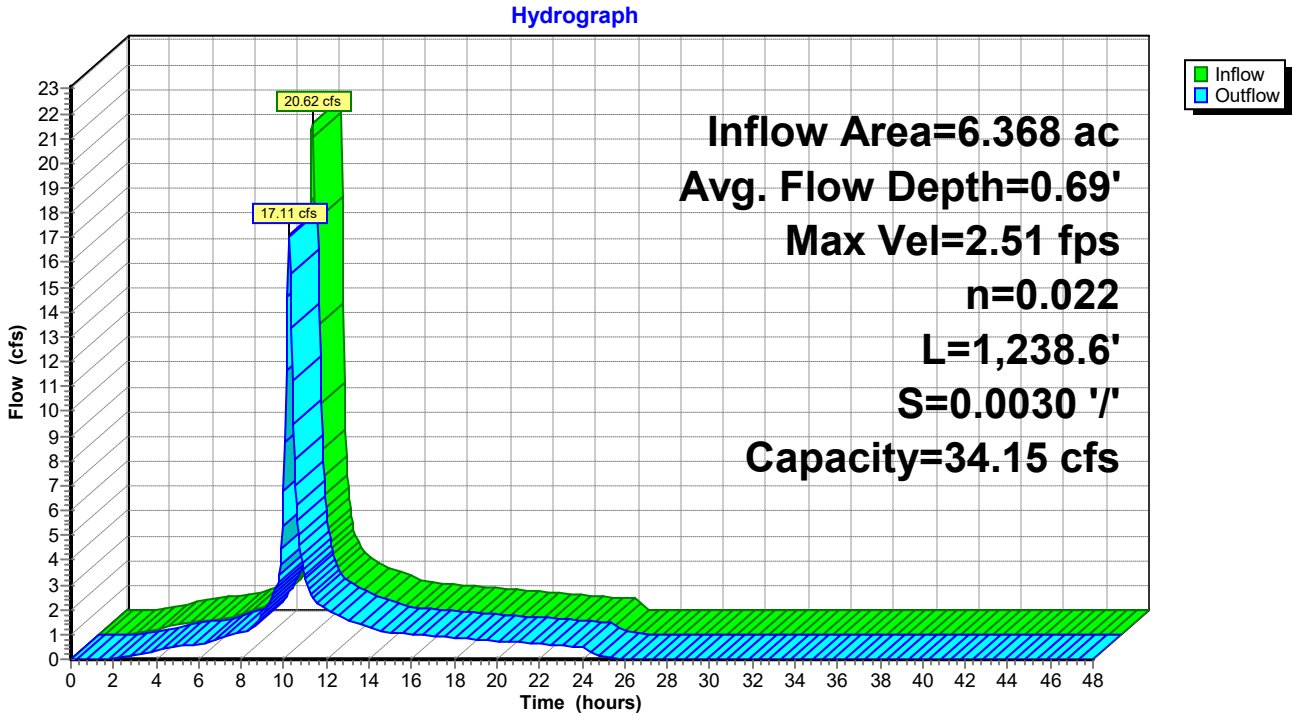
Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.51 fps, Min. Travel Time= 8.2 min
Avg. Velocity = 0.61 fps, Avg. Travel Time= 33.9 min

Peak Storage= 8,541 cf @ 10.09 hrs
Average Depth at Peak Storage= 0.69' , Surface Width= 12.11'
Bank-Full Depth= 1.00' Flow Area= 11.0 sf, Capacity= 34.15 cfs

8.00' x 1.00' deep channel, n= 0.022
Side Slope Z-value= 3.0 '/' Top Width= 14.00'
Length= 1,238.6' Slope= 0.0030 '/'
Inlet Invert= 78.13', Outlet Invert= 74.41'

‡

Reach R2: South Ditch



Summary for Pond P1: North Pond

[62] Hint: Exceeded Reach R1 OUTLET depth by 1.48' @ 29.80 hrs

Inflow Area = 8.855 ac, 22.49% Impervious, Inflow Depth = 4.52" for 25yr, 24hr event
Inflow = 18.37 cfs @ 10.16 hrs, Volume= 3.334 af
Outflow = 0.06 cfs @ 25.27 hrs, Volume= 0.023 af, Atten= 100%, Lag= 906.2 min
Primary = 0.06 cfs @ 25.27 hrs, Volume= 0.023 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 75.51' @ 25.27 hrs Surf.Area= 47,466 sf Storage= 144,775 cf

Plug-Flow detention time= 1,471.2 min calculated for 0.023 af (1% of inflow)
Center-of-Mass det. time= 909.0 min (1,656.8 - 747.8)

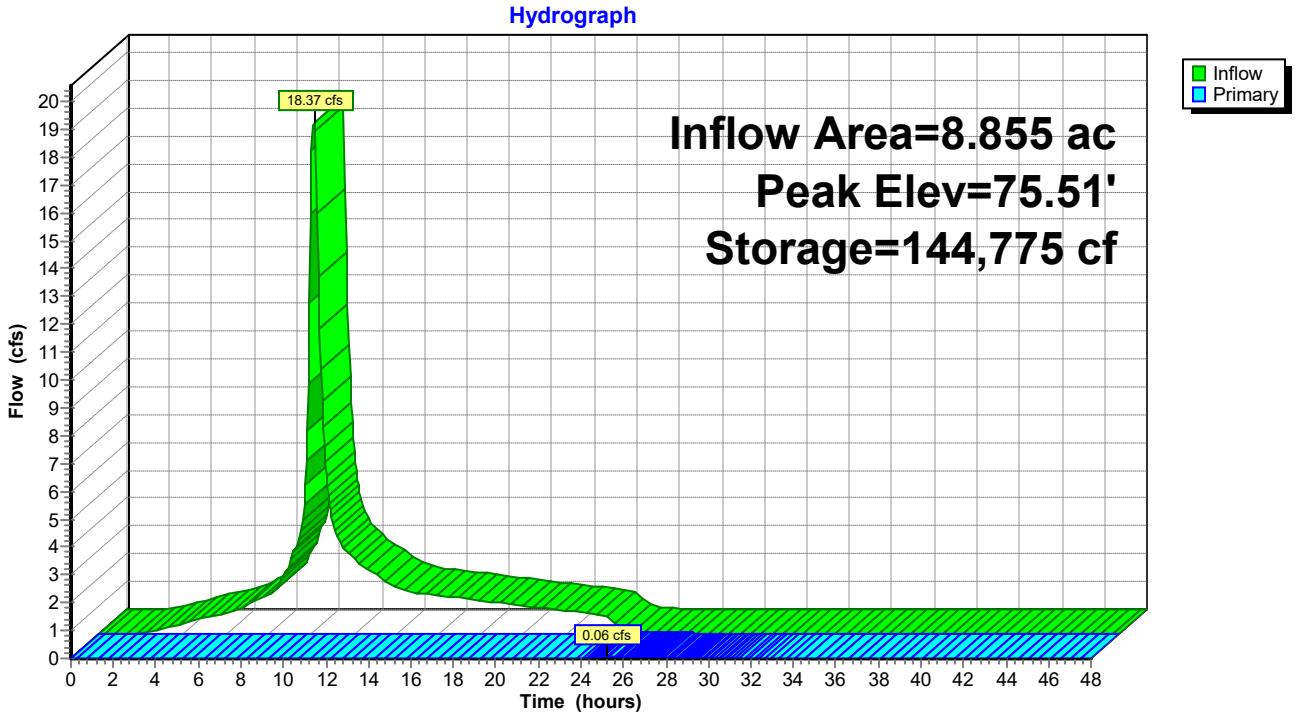
Volume	Invert	Avail.Storage	Storage Description
#1	72.00'	168,730 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
72.00	36,732	0	0
73.00	39,167	37,950	37,950
74.00	41,674	40,421	78,370
75.00	44,253	42,964	121,334
76.00	50,539	47,396	168,730

Device	Routing	Invert	Outlet Devices
#1	Primary	75.50'	**Custom Weir/Orifice, Cv= 2.62 (C= 3.28)** Head (feet) 0.00 0.50 Width (feet) 12.00 15.00

Primary OutFlow Max=0.05 cfs @ 25.27 hrs HW=75.51' (Free Discharge)
↑—**1=Custom Weir/Orifice** (Weir Controls 0.05 cfs @ 0.35 fps)

Pond P1: North Pond



Summary for Pond P2: South Pond

[62] Hint: Exceeded Reach R2 OUTLET depth by 0.10' @ 25.60 hrs

Inflow Area = 9.181 ac, 29.27% Impervious, Inflow Depth = 4.73" for 25yr, 24hr event
Inflow = 19.47 cfs @ 10.23 hrs, Volume= 3.620 af
Outflow = 0.39 cfs @ 24.35 hrs, Volume= 0.093 af, Atten= 98%, Lag= 847.4 min
Primary = 0.39 cfs @ 24.35 hrs, Volume= 0.093 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 74.54' @ 24.35 hrs Surf.Area= 50,029 sf Storage= 155,823 cf

Plug-Flow detention time= 1,338.4 min calculated for 0.093 af (3% of inflow)
Center-of-Mass det. time= 818.5 min (1,554.5 - 736.0)

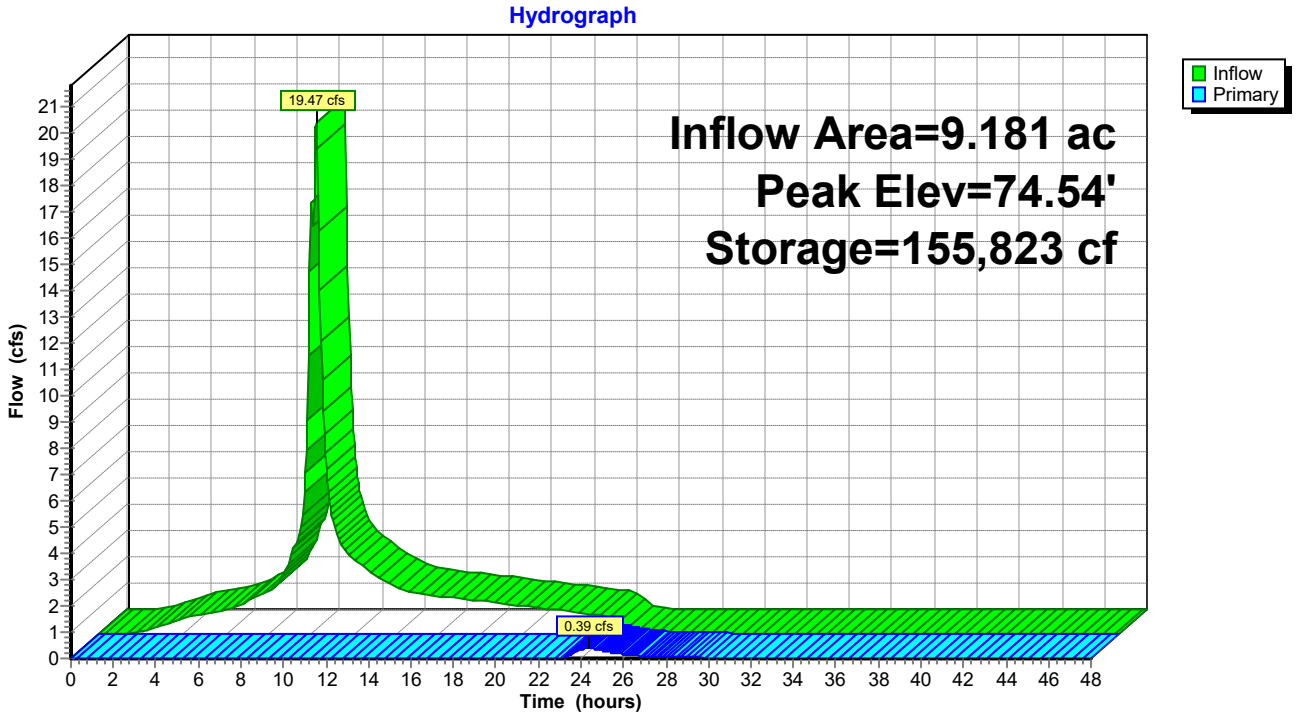
Volume	Invert	Avail.Storage	Storage Description
#1	71.00'	179,236 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
71.00	39,358	0	0
72.00	41,846	40,602	40,602
73.00	44,405	43,126	83,728
74.00	47,033	45,719	129,447
75.00	52,545	49,789	179,236

Device	Routing	Invert	Outlet Devices
#1	Primary	74.50'	**Custom Weir/Orifice, Cv= 2.62 (C= 3.28)** Head (feet) 0.00 0.50 Width (feet) 12.00 15.00

Primary OutFlow Max=0.36 cfs @ 24.35 hrs HW=74.54' (Free Discharge)
↑—**1=Custom Weir/Orifice** (Weir Controls 0.36 cfs @ 0.68 fps)

Pond P2: South Pond



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 1S: Drainage Area 1 Runoff Area=229,565 sf 10.31% Impervious Runoff Depth=5.84"
Flow Length=378' Tc=7.7 min CN=93 Runoff=23.54 cfs 2.567 af

Subcatchment 2S: Drainage Area 2 Runoff Area=156,165 sf 40.41% Impervious Runoff Depth=5.96"
Flow Length=111' Tc=10.0 min CN=94 Runoff=15.31 cfs 1.781 af

Subcatchment 3S: Drainage Area 3 Runoff Area=277,408 sf 18.98% Impervious Runoff Depth=6.08"
Flow Length=883' Tc=11.5 min CN=95 Runoff=26.40 cfs 3.225 af

Subcatchment 4S: Drainage Area 4 Runoff Area=122,534 sf 52.57% Impervious Runoff Depth=6.19"
Flow Length=369' Tc=6.1 min CN=96 Runoff=13.43 cfs 1.452 af

Subcatchment OS1: Offsite North Runoff Area=126,813 sf 0.79% Impervious Runoff Depth=5.27"
Flow Length=896' Tc=44.5 min CN=88 Runoff=5.74 cfs 1.279 af

Subcatchment OS2: Offsite West Runoff Area=17,527 sf 0.00% Impervious Runoff Depth=4.61"
Tc=6.0 min CN=82 Runoff=1.52 cfs 0.154 af

Subcatchment OS3: Offsite South Runoff Area=42,158 sf 0.00% Impervious Runoff Depth=5.16"
Tc=6.0 min CN=87 Runoff=4.08 cfs 0.416 af

Subcatchment OS4: Offsite East Runoff Area=102,943 sf 0.00% Impervious Runoff Depth=4.72"
Tc=6.0 min CN=83 Runoff=9.16 cfs 0.929 af

Reach R1: North Ditch Avg. Flow Depth=0.72' Max Vel=2.57 fps Inflow=23.54 cfs 2.567 af
n=0.022 L=1,382.0' S=0.0030 '/' Capacity=33.98 cfs Outflow=18.80 cfs 2.567 af

Reach R2: South Ditch Avg. Flow Depth=0.79' Max Vel=2.73 fps Inflow=26.40 cfs 3.225 af
n=0.022 L=1,238.6' S=0.0030 '/' Capacity=34.15 cfs Outflow=22.22 cfs 3.225 af

Pond P1: North Pond Peak Elev=75.61' Storage=149,731 cf Inflow=25.24 cfs 4.348 af
Outflow=1.58 cfs 1.036 af

Pond P2: South Pond Peak Elev=74.62' Storage=159,675 cf Inflow=25.30 cfs 4.677 af
Outflow=1.70 cfs 1.150 af

Total Runoff Area = 24.681 ac Runoff Volume = 11.804 af Average Runoff Depth = 5.74"
80.95% Pervious = 19.979 ac 19.05% Impervious = 4.702 ac

Summary for Subcatchment 1S: Drainage Area 1

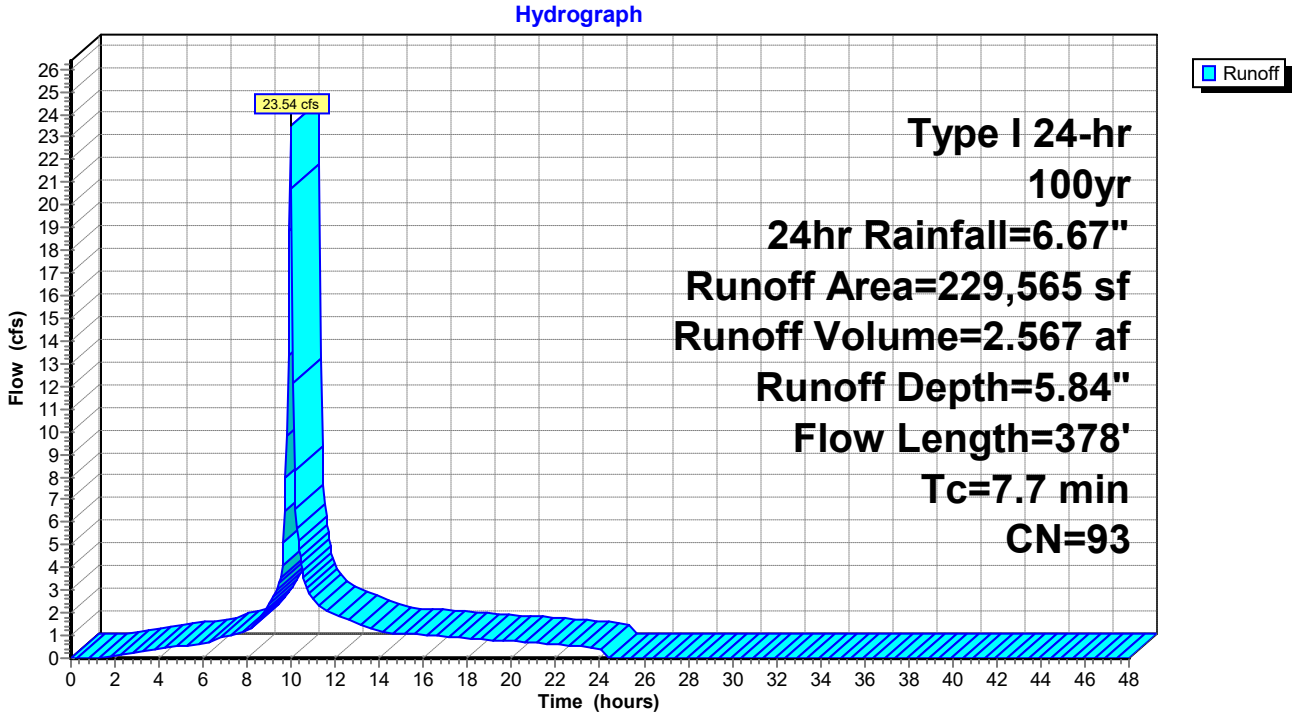
Runoff = 23.54 cfs @ 9.98 hrs, Volume= 2.567 af, Depth= 5.84"
Routed to Reach R1 : North Ditch

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type I 24-hr 100yr, 24hr Rainfall=6.67"

	Area (sf)	CN	Description
*	178,025	96	Gravel surface
	15,486	61	>75% Grass cover, Good, HSG B
	12,395	80	>75% Grass cover, Good, HSG D
*	23,659	98	Impervious
	229,565	93	Weighted Average
	205,906		89.69% Pervious Area
	23,659		10.31% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.2	100	0.0051	0.76		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.88"
5.5	278	0.0145	0.84		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
7.7	378	Total			

Subcatchment 1S: Drainage Area 1



Summary for Subcatchment 2S: Drainage Area 2

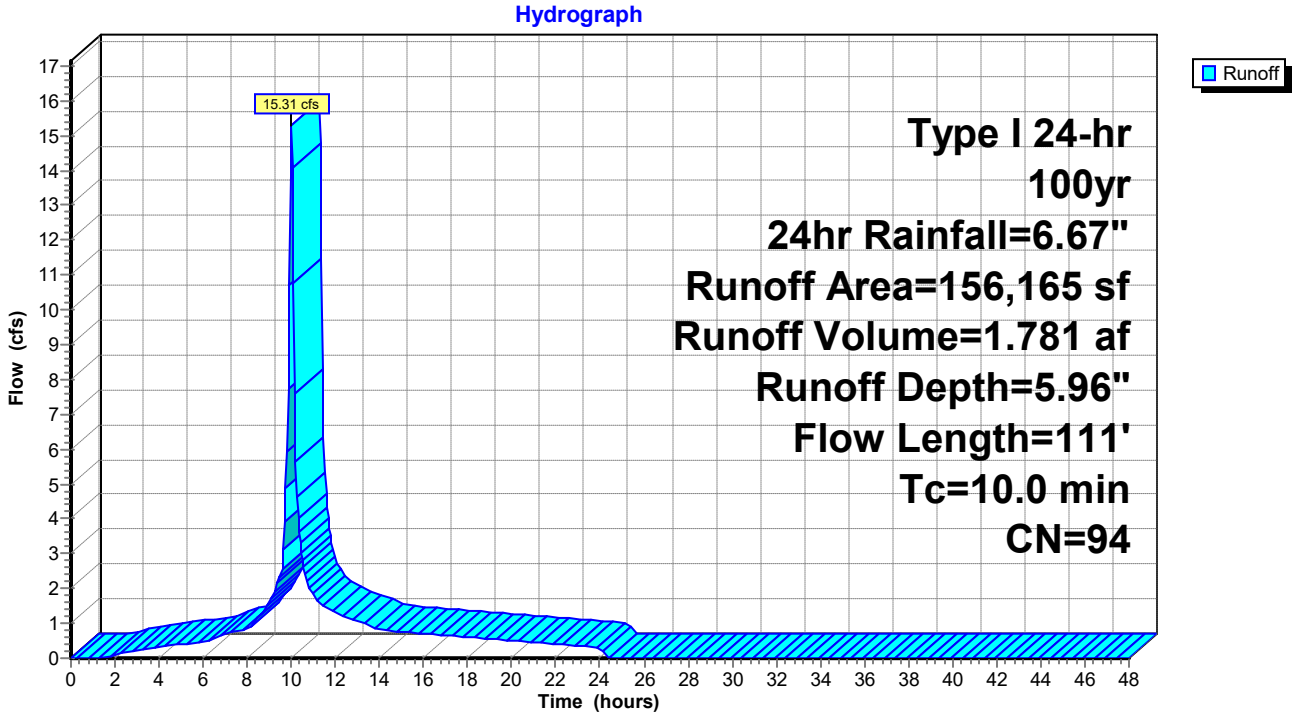
Runoff = 15.31 cfs @ 10.00 hrs, Volume= 1.781 af, Depth= 5.96"
Routed to Pond P1 : North Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type I 24-hr 100yr, 24hr Rainfall=6.67"

	Area (sf)	CN	Description
	46,901	98	Water Surface, HSG D
*	70,484	96	Gravel surface
	22,582	80	>75% Grass cover, Good, HSG D
*	16,198	98	Impervious
	156,165	94	Weighted Average
	93,066		59.59% Pervious Area
	63,099		40.41% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.9	33	0.0137	0.11		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.88"
5.1	78	0.0712	0.26		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.88"
10.0	111	Total			

Subcatchment 2S: Drainage Area 2



Summary for Subcatchment 3S: Drainage Area 3

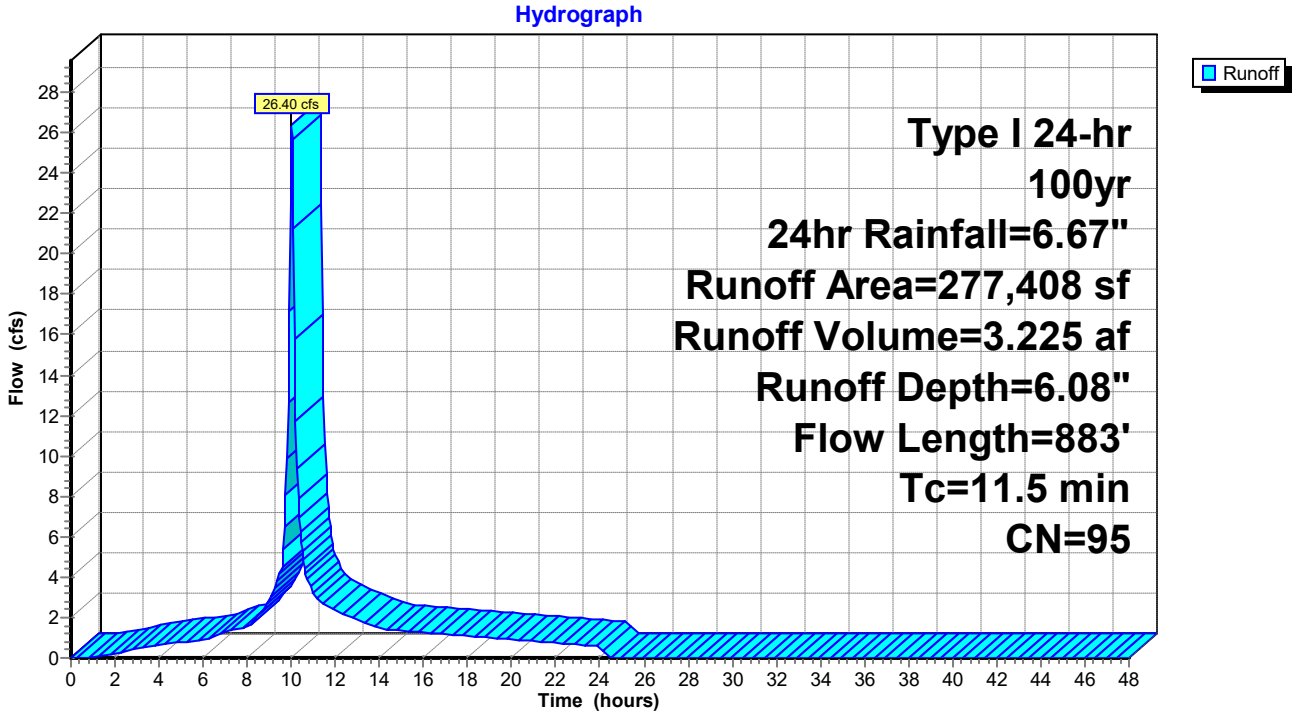
Runoff = 26.40 cfs @ 10.02 hrs, Volume= 3.225 af, Depth= 6.08"
Routed to Reach R2 : South Ditch

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type I 24-hr 100yr, 24hr Rainfall=6.67"

	Area (sf)	CN	Description
	205,009	96	Gravel surface, HSG D
	19,737	80	>75% Grass cover, Good, HSG D
*	52,662	98	Impervious
	277,408	95	Weighted Average
	224,746		81.02% Pervious Area
	52,662		18.98% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.2	100	0.0050	0.75		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.88"
9.3	783	0.0076	1.40		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
11.5	883	Total			

Subcatchment 3S: Drainage Area 3



Summary for Subcatchment 4S: Drainage Area 4

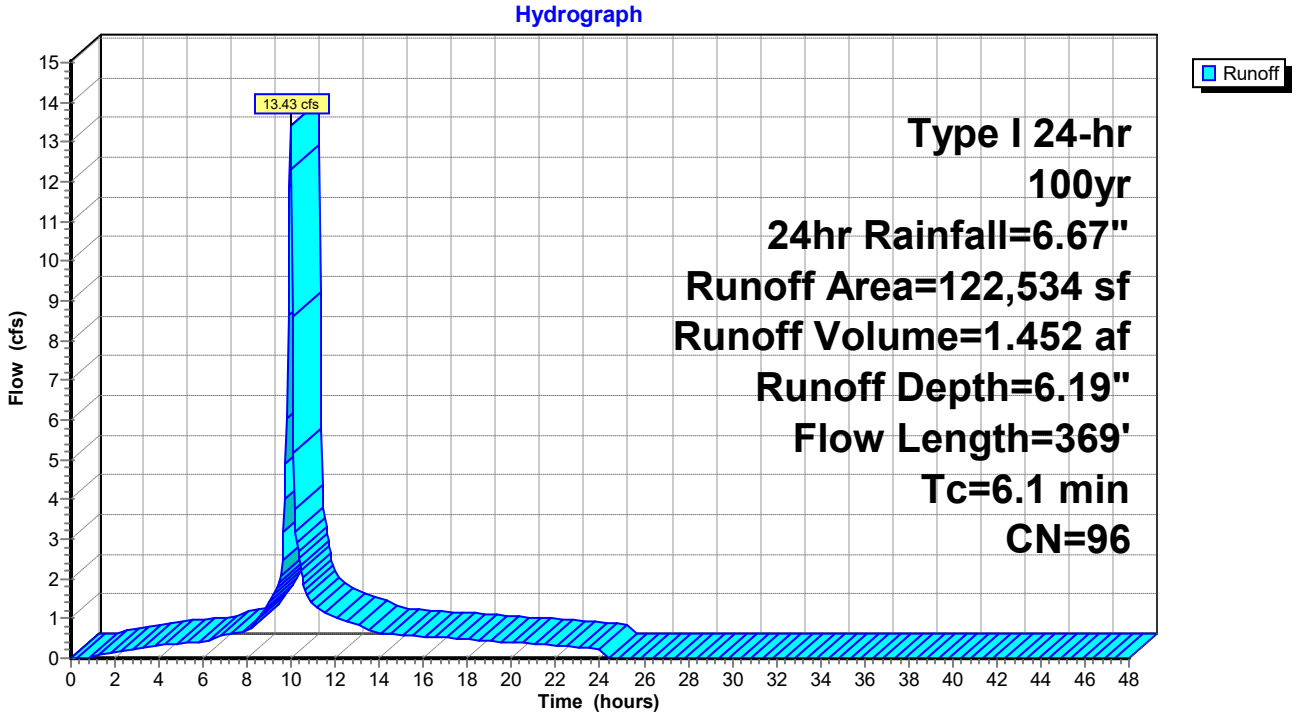
Runoff = 13.43 cfs @ 9.95 hrs, Volume= 1.452 af, Depth= 6.19"
Routed to Pond P2 : South Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type I 24-hr 100yr, 24hr Rainfall=6.67"

	Area (sf)	CN	Description
	50,930	96	Gravel surface, HSG C
	49,729	98	Water Surface, HSG D
*	14,690	98	Impervious
	7,185	80	>75% Grass cover, Good, HSG D
	122,534	96	Weighted Average
	58,115		47.43% Pervious Area
	64,419		52.57% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.2	100	0.0050	0.75		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.88"
3.9	269	0.0051	1.15		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
6.1	369	Total			

Subcatchment 4S: Drainage Area 4



Summary for Subcatchment OS1: Offsite North

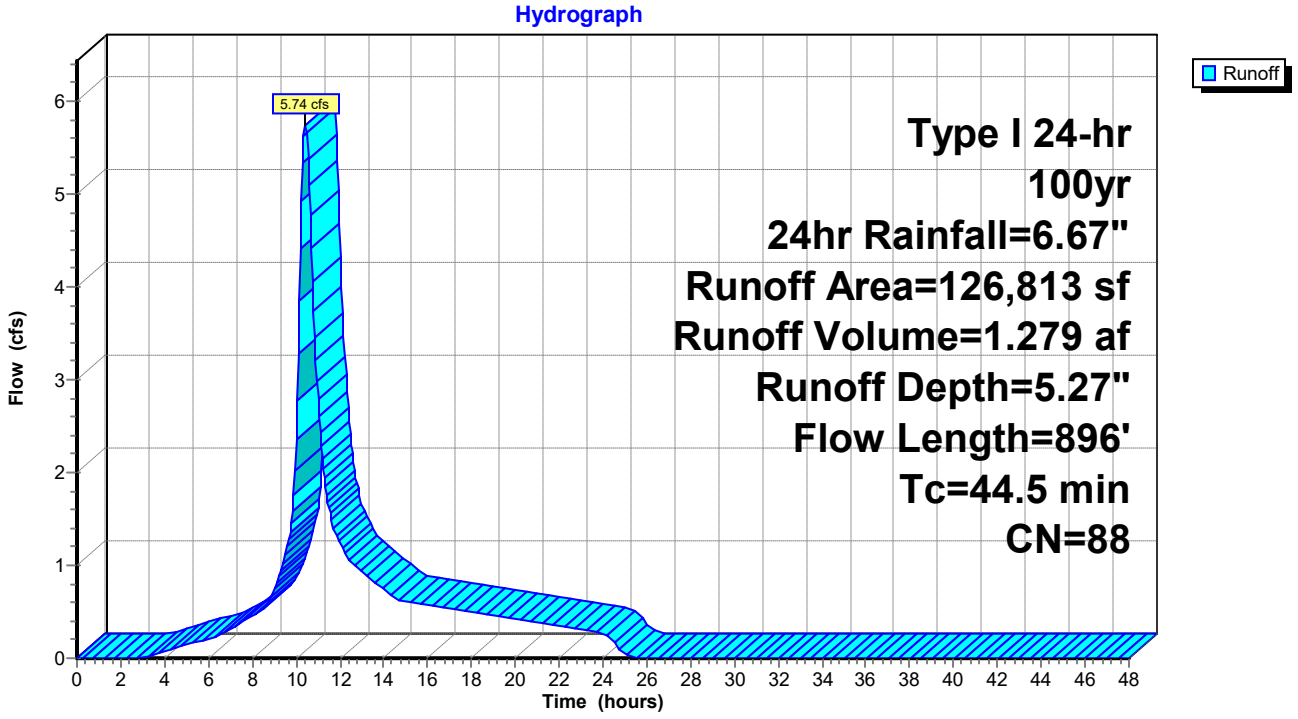
Runoff = 5.74 cfs @ 10.42 hrs, Volume= 1.279 af, Depth= 5.27"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type I 24-hr 100yr, 24hr Rainfall=6.67"

	Area (sf)	CN	Description
	4,873	78	Row crops, straight row, Good, HSG B
	108,569	89	Row crops, straight row, Good, HSG D
	969	61	>75% Grass cover, Good, HSG B
	11,402	80	>75% Grass cover, Good, HSG D
*	1,000	98	Impervious
	126,813	88	Weighted Average
	125,813		99.21% Pervious Area
	1,000		0.79% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
23.7	100	0.0004	0.07		**Sheet Flow,** Cultivated: Residue<=20% n= 0.060 P2= 2.88"
20.8	796	0.0050	0.64		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
44.5	896	Total			

Subcatchment OS1: Offsite North



Summary for Subcatchment OS2: Offsite West

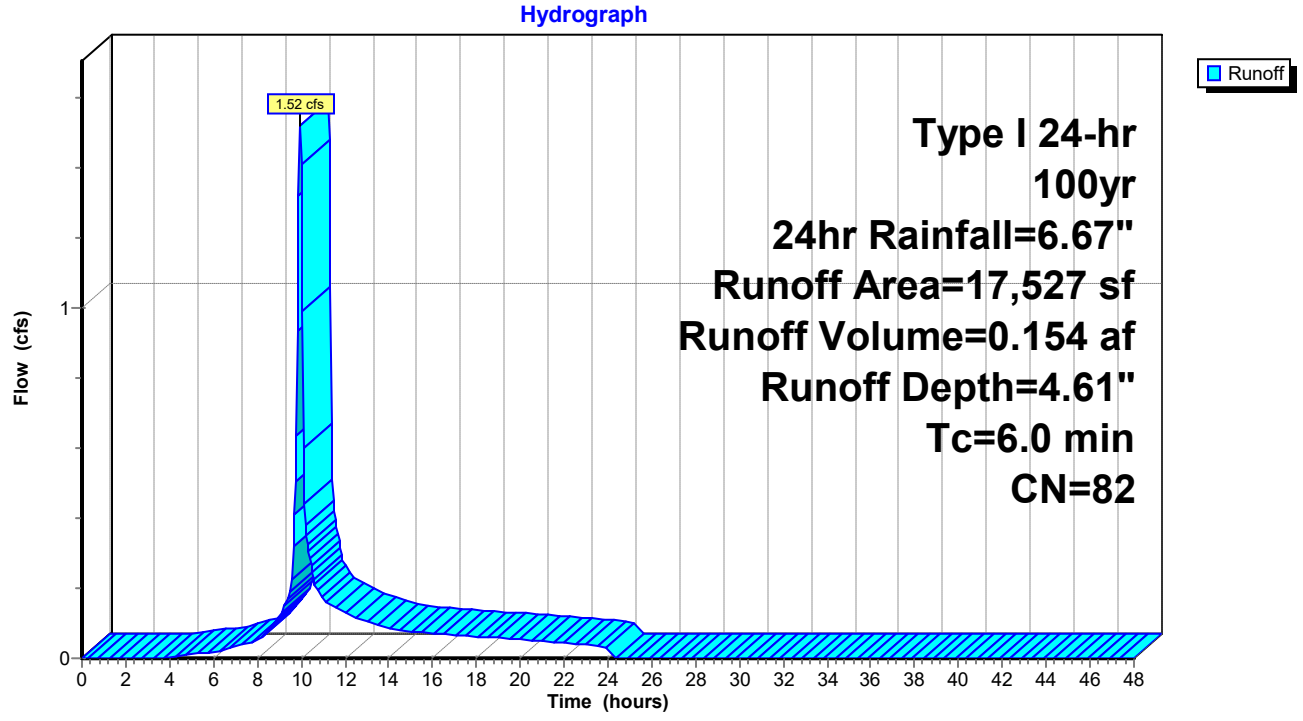
Runoff = 1.52 cfs @ 9.96 hrs, Volume= 0.154 af, Depth= 4.61"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type I 24-hr 100yr, 24hr Rainfall=6.67"

Area (sf)	CN	Description
1,048	61	>75% Grass cover, Good, HSG B
6,609	78	Row crops, straight row, Good, HSG B
1,911	80	>75% Grass cover, Good, HSG D
7,959	89	Row crops, straight row, Good, HSG D
17,527	82	Weighted Average
17,527		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Direct Entry**

Subcatchment OS2: Offsite West



Summary for Subcatchment OS3: Offsite South

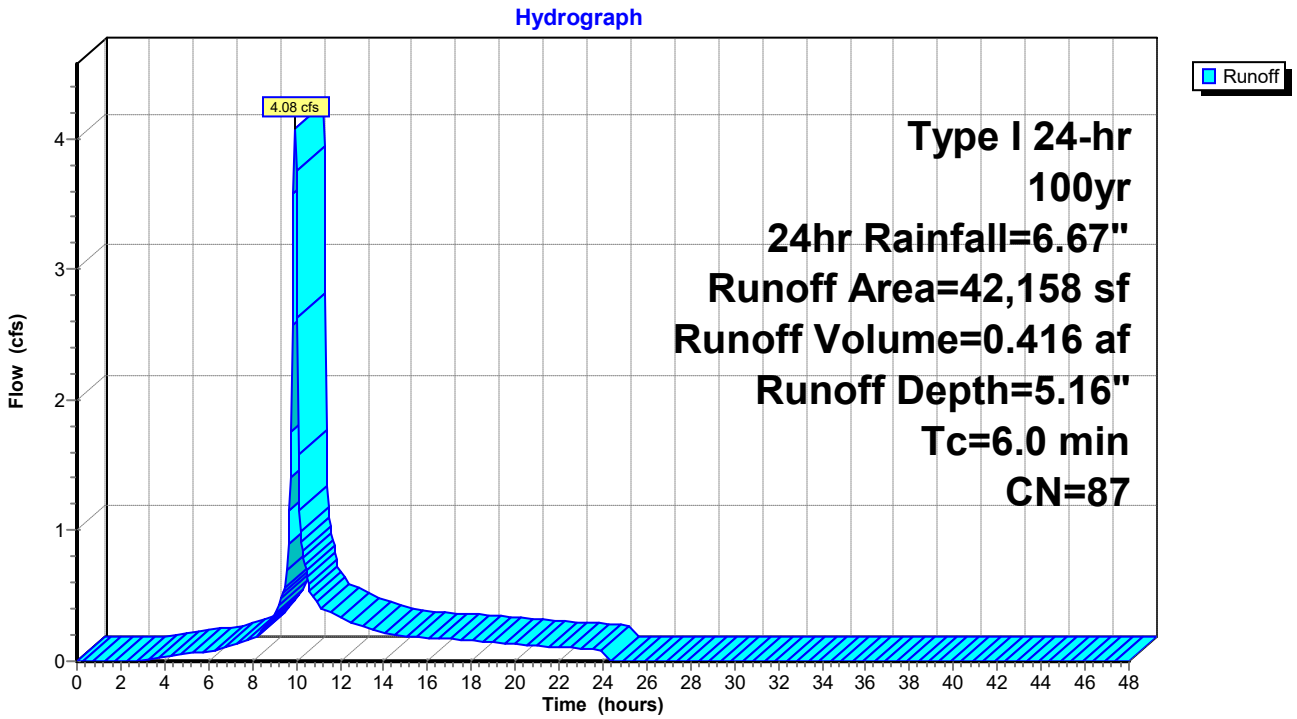
Runoff = 4.08 cfs @ 9.96 hrs, Volume= 0.416 af, Depth= 5.16"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type I 24-hr 100yr, 24hr Rainfall=6.67"

Area (sf)	CN	Description
33,415	89	Row crops, straight row, Good, HSG D
8,743	80	>75% Grass cover, Good, HSG D
42,158	87	Weighted Average
42,158		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Direct Entry**

Subcatchment OS3: Offsite South



Summary for Subcatchment OS4: Offsite East

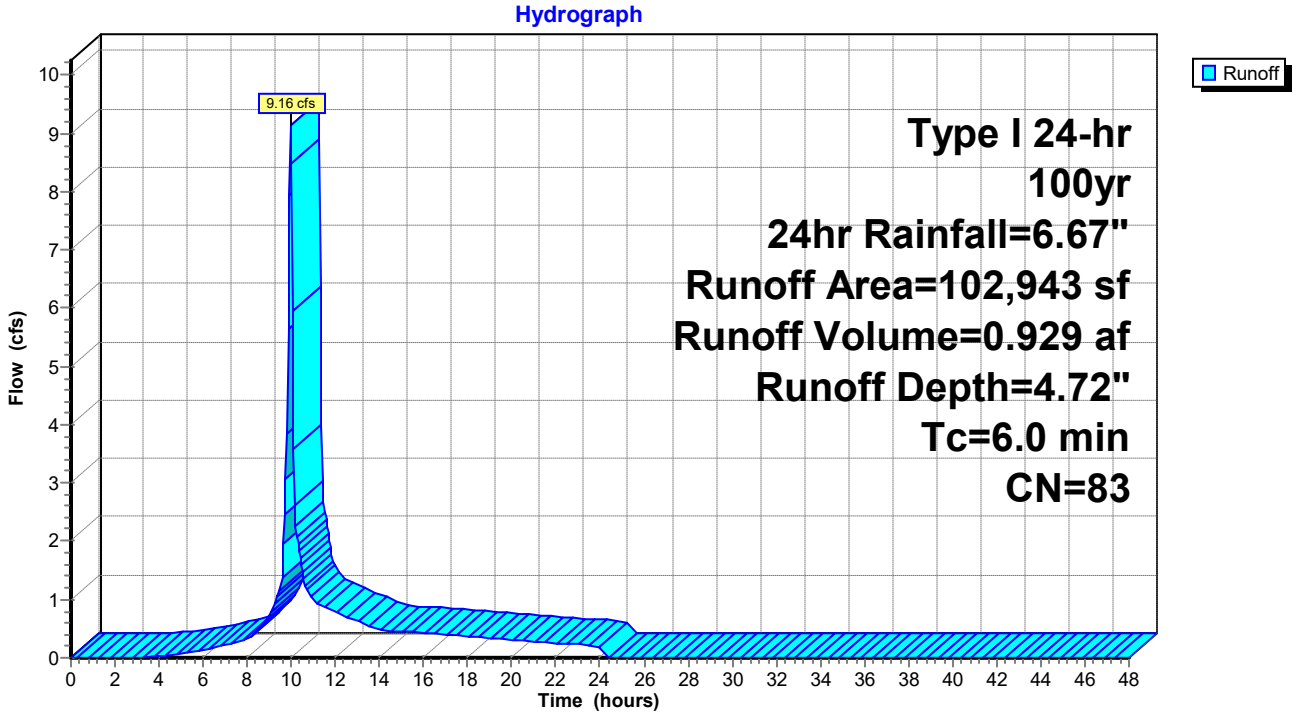
Runoff = 9.16 cfs @ 9.96 hrs, Volume= 0.929 af, Depth= 4.72"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type I 24-hr 100yr, 24hr Rainfall=6.67"

	Area (sf)	CN	Description
*	7,003	96	Gravel surface
	22,215	80	>75% Grass cover, Good, HSG D
	7,951	61	>75% Grass cover, Good, HSG B
	46,629	89	Row crops, straight row, Good, HSG D
	19,145	78	Row crops, straight row, Good, HSG B
	102,943	83	Weighted Average
	102,943		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Direct Entry**

Subcatchment OS4: Offsite East



Summary for Reach R1: North Ditch

Inflow Area = 5.270 ac, 10.31% Impervious, Inflow Depth = 5.84" for 100yr, 24hr event
Inflow = 23.54 cfs @ 9.98 hrs, Volume= 2.567 af
Outflow = 18.80 cfs @ 10.20 hrs, Volume= 2.567 af, Atten= 20%, Lag= 13.3 min
Routed to Pond P1 : North Pond

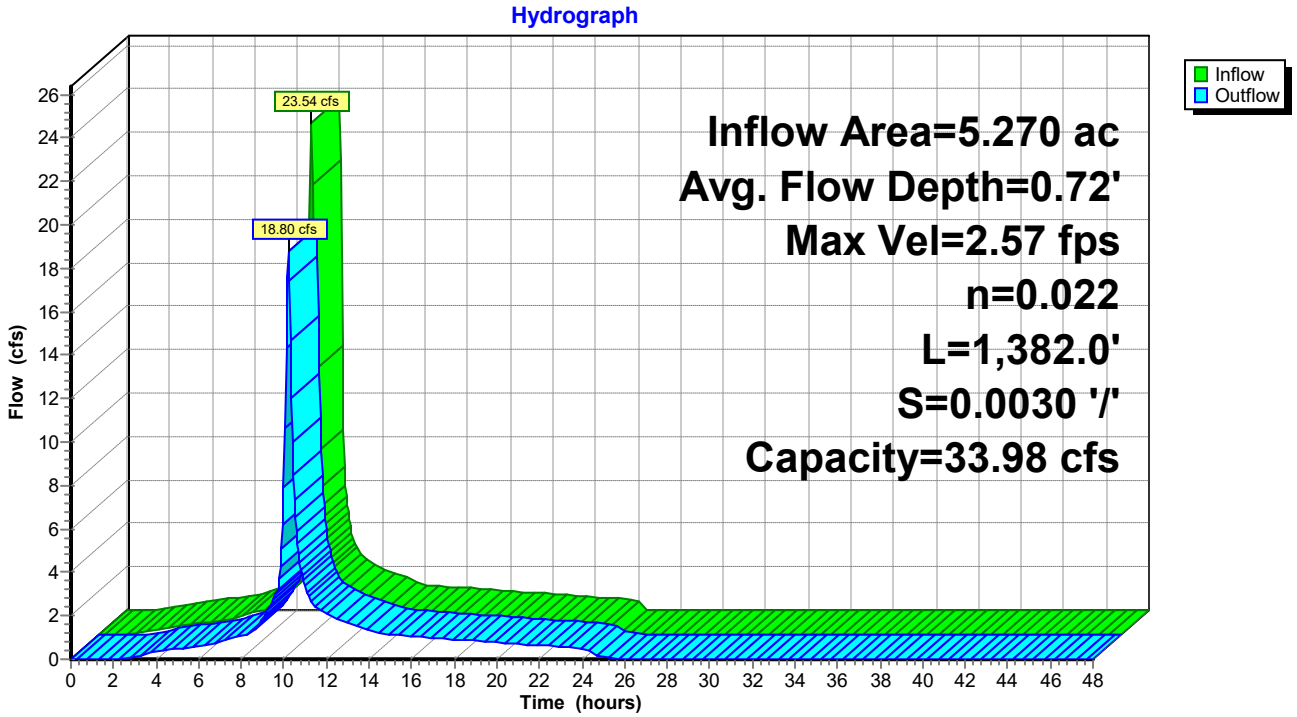
Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.57 fps, Min. Travel Time= 9.0 min
Avg. Velocity = 0.59 fps, Avg. Travel Time= 38.9 min

Peak Storage= 10,115 cf @ 10.05 hrs
Average Depth at Peak Storage= 0.72' , Surface Width= 12.32'
Bank-Full Depth= 1.00' Flow Area= 11.0 sf, Capacity= 33.98 cfs

8.00' x 1.00' deep channel, n= 0.022 Earth, clean & straight
Side Slope Z-value= 3.0 '/' Top Width= 14.00'
Length= 1,382.0' Slope= 0.0030 '/'
Inlet Invert= 78.13', Outlet Invert= 74.02'

‡

Reach R1: North Ditch



Summary for Reach R2: South Ditch

Inflow Area = 6.368 ac, 18.98% Impervious, Inflow Depth = 6.08" for 100yr, 24hr event
Inflow = 26.40 cfs @ 10.02 hrs, Volume= 3.225 af
Outflow = 22.22 cfs @ 10.22 hrs, Volume= 3.225 af, Atten= 16%, Lag= 11.8 min
Routed to Pond P2 : South Pond

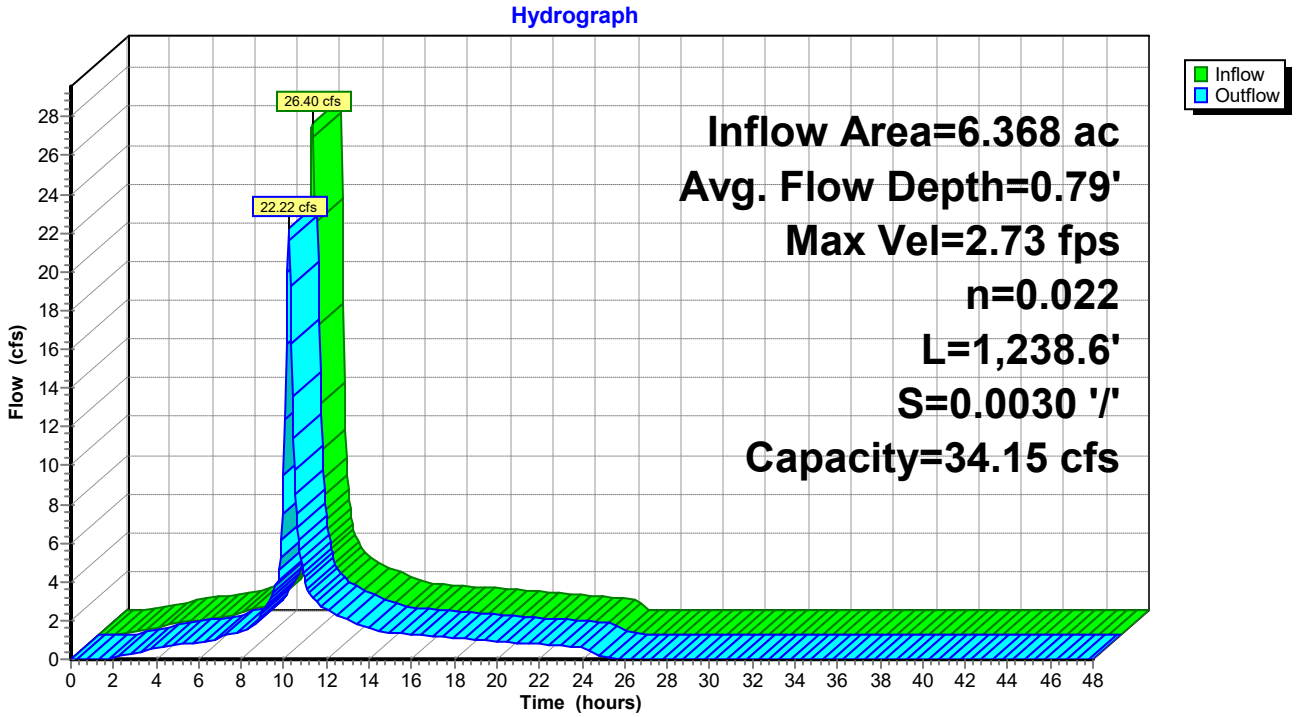
Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.73 fps, Min. Travel Time= 7.6 min
Avg. Velocity = 0.67 fps, Avg. Travel Time= 31.0 min

Peak Storage= 10,223 cf @ 10.09 hrs
Average Depth at Peak Storage= 0.79' , Surface Width= 12.77'
Bank-Full Depth= 1.00' Flow Area= 11.0 sf, Capacity= 34.15 cfs

8.00' x 1.00' deep channel, n= 0.022
Side Slope Z-value= 3.0 '/' Top Width= 14.00'
Length= 1,238.6' Slope= 0.0030 '/'
Inlet Invert= 78.13', Outlet Invert= 74.41'

‡

Reach R2: South Ditch



Summary for Pond P1: North Pond

[62] Hint: Exceeded Reach R1 OUTLET depth by 1.50' @ 24.90 hrs

Inflow Area = 8.855 ac, 22.49% Impervious, Inflow Depth = 5.89" for 100yr, 24hr event
Inflow = 25.24 cfs @ 10.13 hrs, Volume= 4.348 af
Outflow = 1.58 cfs @ 17.42 hrs, Volume= 1.036 af, Atten= 94%, Lag= 437.7 min
Primary = 1.58 cfs @ 17.42 hrs, Volume= 1.036 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 75.61' @ 17.42 hrs Surf.Area= 48,118 sf Storage= 149,731 cf

Plug-Flow detention time= 748.9 min calculated for 1.036 af (24% of inflow)
Center-of-Mass det. time= 475.3 min (1,213.3 - 737.9)

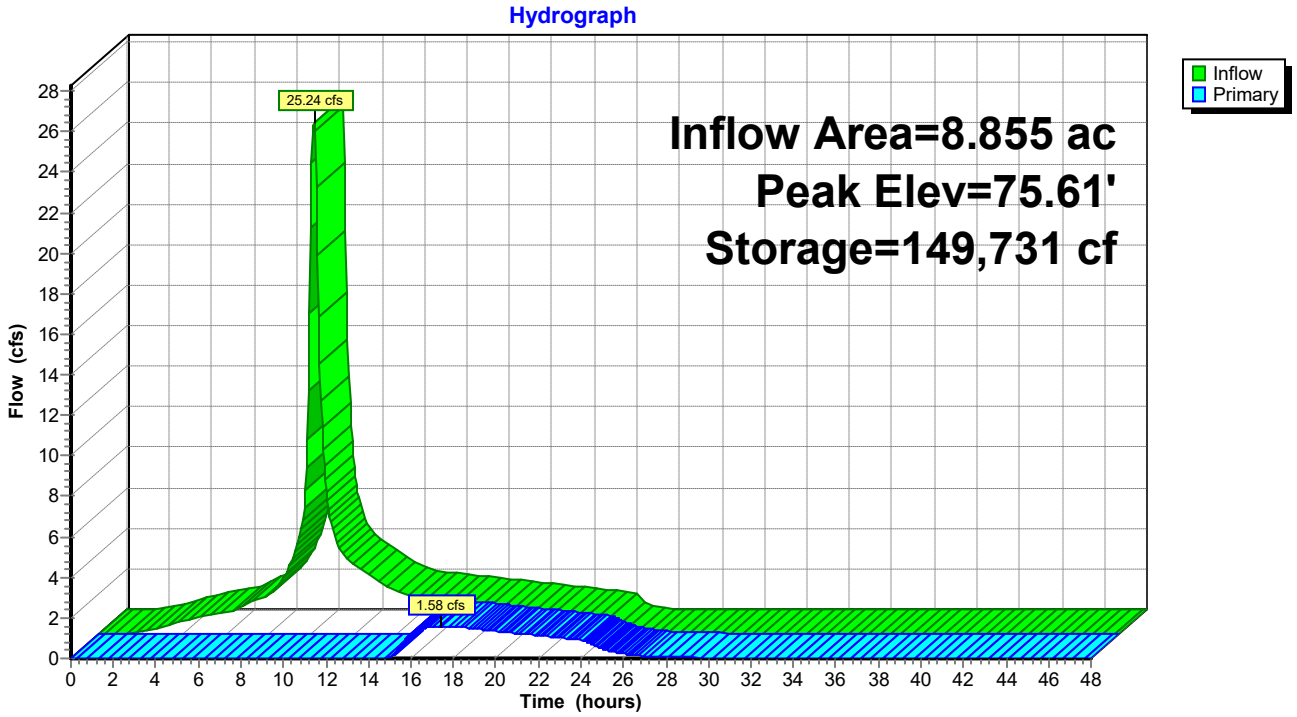
Volume	Invert	Avail.Storage	Storage Description
#1	72.00'	168,730 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
72.00	36,732	0	0
73.00	39,167	37,950	37,950
74.00	41,674	40,421	78,370
75.00	44,253	42,964	121,334
76.00	50,539	47,396	168,730

Device	Routing	Invert	Outlet Devices
#1	Primary	75.50'	**Custom Weir/Orifice, Cv= 2.62 (C= 3.28)** Head (feet) 0.00 0.50 Width (feet) 12.00 15.00

Primary OutFlow Max=1.56 cfs @ 17.42 hrs HW=75.61' (Free Discharge)
↑—**1=Custom Weir/Orifice** (Weir Controls 1.56 cfs @ 1.10 fps)

Pond P1: North Pond



Summary for Pond P2: South Pond

[62] Hint: Exceeded Reach R2 OUTLET depth by 0.12' @ 25.00 hrs

Inflow Area = 9.181 ac, 29.27% Impervious, Inflow Depth = 6.11" for 100yr, 24hr event
Inflow = 25.30 cfs @ 10.21 hrs, Volume= 4.677 af
Outflow = 1.70 cfs @ 17.07 hrs, Volume= 1.150 af, Atten= 93%, Lag= 411.6 min
Primary = 1.70 cfs @ 17.07 hrs, Volume= 1.150 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 74.62' @ 17.07 hrs Surf.Area= 50,451 sf Storage= 159,675 cf

Plug-Flow detention time= 752.2 min calculated for 1.149 af (25% of inflow)
Center-of-Mass det. time= 471.8 min (1,199.5 - 727.7)

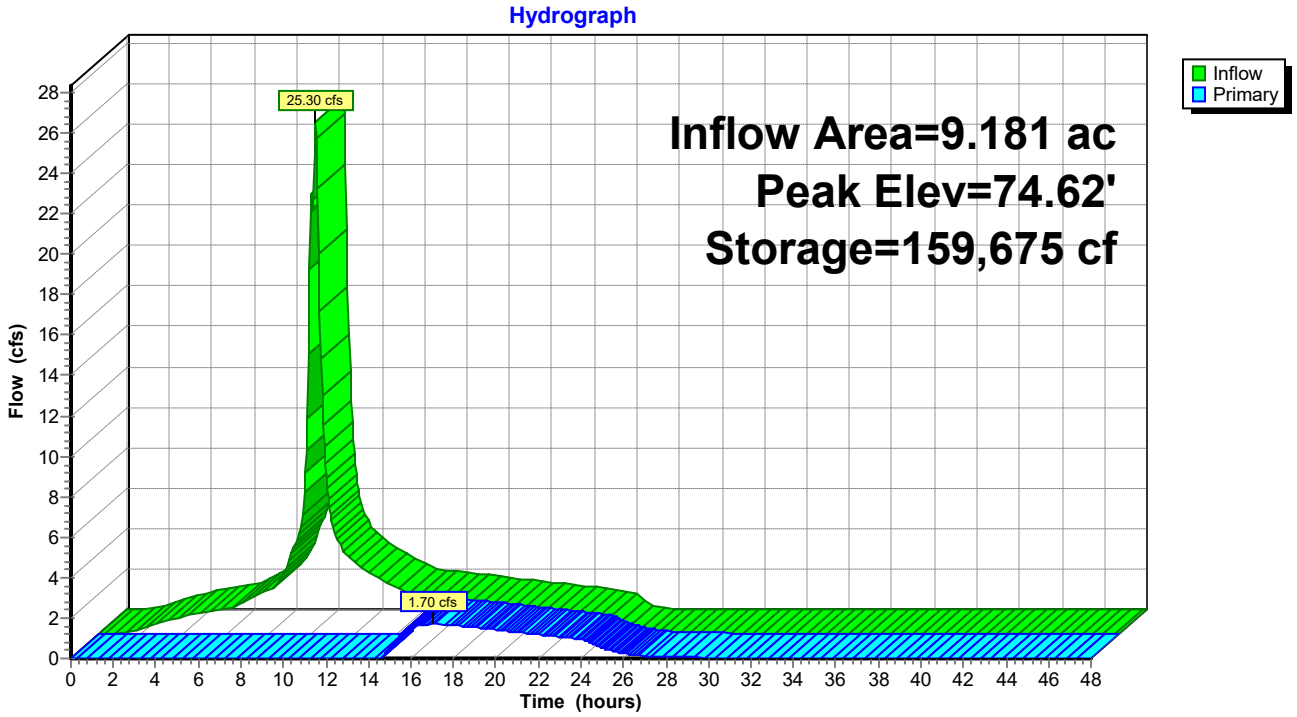
Volume	Invert	Avail.Storage	Storage Description
#1	71.00'	179,236 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
71.00	39,358	0	0
72.00	41,846	40,602	40,602
73.00	44,405	43,126	83,728
74.00	47,033	45,719	129,447
75.00	52,545	49,789	179,236

Device	Routing	Invert	Outlet Devices
#1	Primary	74.50'	**Custom Weir/Orifice, Cv= 2.62 (C= 3.28)** Head (feet) 0.00 0.50 Width (feet) 12.00 15.00

Primary OutFlow Max=1.68 cfs @ 17.07 hrs HW=74.62' (Free Discharge)
↑—**1=Custom Weir/Orifice** (Weir Controls 1.68 cfs @ 1.13 fps)

Pond P2: South Pond



APPENDIX E – NRCS WEB SOIL SURVEY

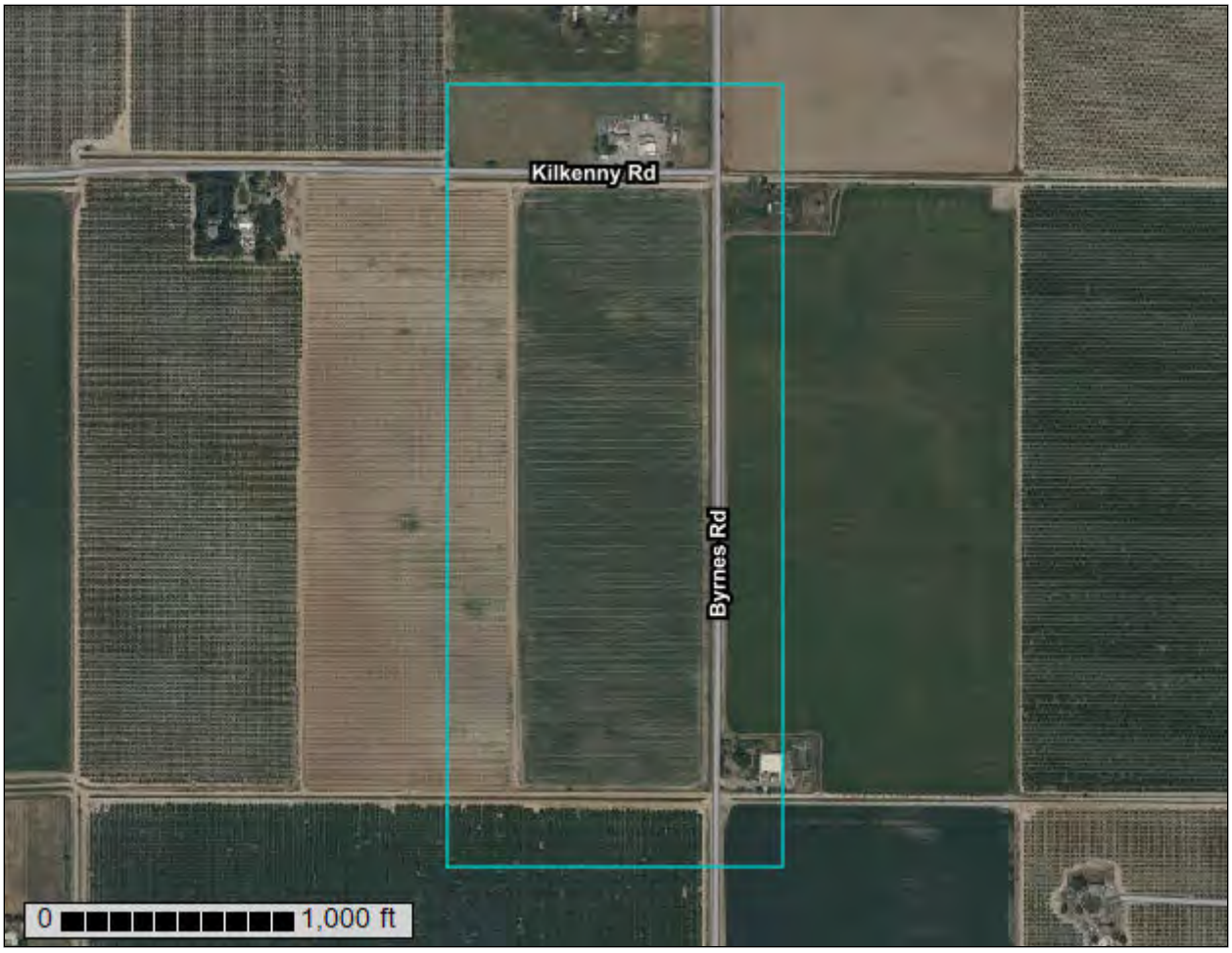
United States Department of Agriculture

NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Solano County, California



August 15, 2024

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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Contents

How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

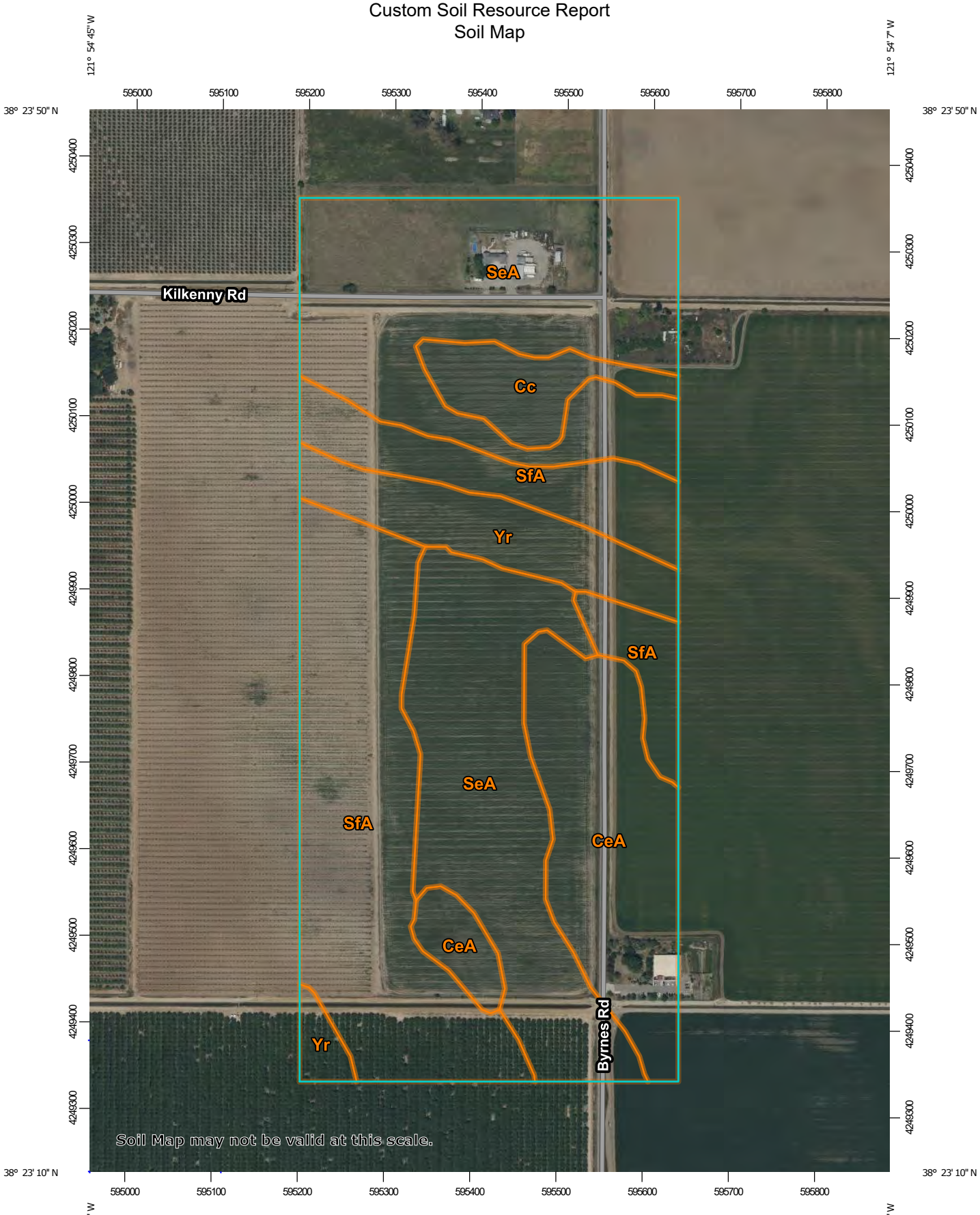
After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map



Map Scale: 1:5,980 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 50 100 200 300

Feet: 0 250 500 1000 1500

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 10N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Solano County, California
Survey Area Data: Version 18, Sep 11, 2023

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Apr 23, 2022—Apr 24, 2022

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
Cc	Capay clay, 0 percent slopes, MLRA 17	4.7	4.2%
CeA	Clear Lake clay, 0 to 2 percent slopes, MLRA 17	17.4	15.6%
SeA	San Ysidro sandy loam, 0 to 2 percent slopes	46.4	41.7%
SfA	San Ysidro sandy loam, thick surface , 0 to 2 percent slopes	33.9	30.5%
Yr	Yolo loam, clay substratum	8.9	8.0%
Totals for Area of Interest		**111.2**	**100.0%**

Soil Information for All Uses

Soil Properties and Qualities

The Soil Properties and Qualities section includes various soil properties and qualities displayed as thematic maps with a summary table for the soil map units in the selected area of interest. A single value or rating for each map unit is generated by aggregating the interpretive ratings of individual map unit components. This aggregation process is defined for each property or quality.

Soil Qualities and Features

Soil qualities are behavior and performance attributes that are not directly measured, but are inferred from observations of dynamic conditions and from soil properties. Example soil qualities include natural drainage, and frost action. Soil features are attributes that are not directly part of the soil. Example soil features include slope and depth to restrictive layer. These features can greatly impact the use and management of the soil.

Hydrologic Soil Group

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Map Scale: 1:5,980 if printed on A portrait (8.5" x 11") sheet.

N

Meters
0 50 100 200 300

Feet
0 250 500 1000 1500

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 10N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils

Soil Rating Polygons
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Lines
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Points
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

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Soil Survey Area: Solano County, California
Survey Area Data: Version 18, Sep 11, 2023

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Apr 23, 2022—Apr 24, 2022

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Table—Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
Cc	Capay clay, 0 percent slopes, MLRA 17	C	4.7	4.2%
CeA	Clear Lake clay, 0 to 2 percent slopes, MLRA 17	C/D	17.4	15.6%
SeA	San Ysidro sandy loam, 0 to 2 percent slopes	D	46.4	41.7%
SfA	San Ysidro sandy loam, thick surface , 0 to 2 percent slopes	D	33.9	30.5%
Yr	Yolo loam, clay substratum	B	8.9	8.0%
Totals for Area of Interest			**111.2**	**100.0%**

Rating Options—Hydrologic Soil Group

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

References

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APPENDIX F – FEMA FIRM PANEL

NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The **community map repository** should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations** (BFEs) and/or **floodways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Coastal Base Flood Elevations shown on this map apply only landward of 0.0' North American Vertical Datum of 1988 (NAVD 88). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations tables in the Flood Insurance Study report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations tables should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study report for information on flood control structures for this jurisdiction.

The **projection** used in the preparation of this map was Universal Transverse Mercator (UTM) zone 10N. The **horizontal datum** was NAD 83, GRS80 spheroid. Differences in datum, spheroid, projection or UTM zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Flood elevations on this map are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same **vertical datum**. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at http://www.ngs.noaa.gov or contact the National Geodetic Survey at the following address:

NGS Information Services
NOAA, N/NGS12
National Geodetic Survey
SSMC-3, #9202
1315 East-West Highway
Silver Spring, Maryland 20910-3282
(301) 713-3242

To obtain current elevation, description, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at **(301) 713-3242**, or visit its website at http://www.ngs.noaa.gov.

Base map information shown on this FIRM was provided in digital format by the USDA National Agriculture Imagery Program (NAIP). This information was photogrammetrically compiled at a scale of 1:24 000 from aerial photography dated 2005.

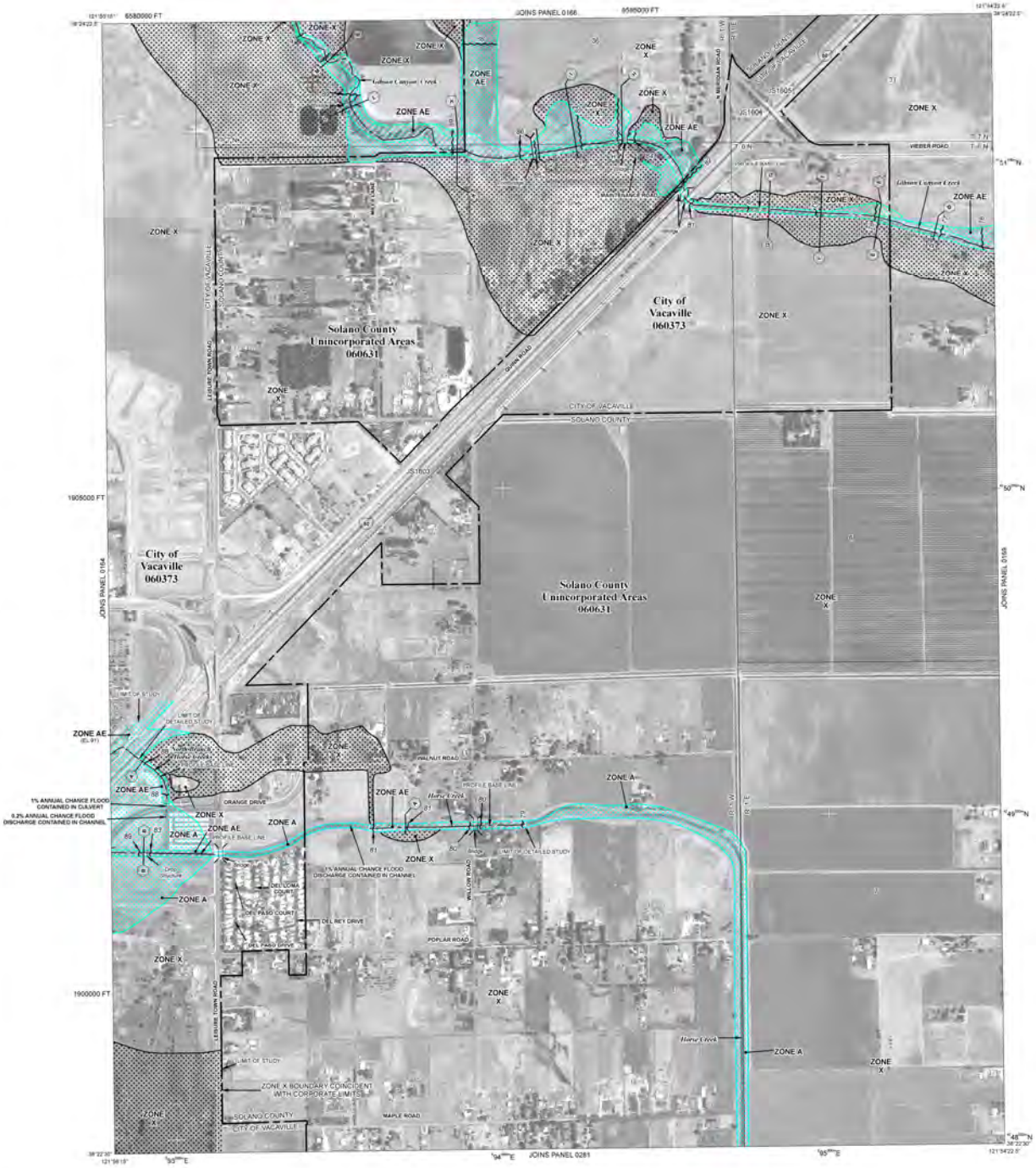
This map reflects more detailed and up-to-date **stream channel configurations** than those shown on the previous FIRM for this jurisdiction. The floodplains and floodways that were transferred from the previous FIRM may have been adjusted to conform to these new stream channel configurations. As a result, the Flood Profiles and Floodway Data tables in the Flood Insurance Study Report (which contains authoritative hydraulic data) may reflect stream channel distances that differ from what is shown on this map.

Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

Please refer to the separately printed **Map Index** for an overview map of the county showing the layout of map panels; community map repository addresses; and a Listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which each community is located.

Contact the **FEMA Map Service Center** at 1-800-358-9616 for information on available products associated with this FIRM. Available products may include previously issued Letters of Map Change, a Flood Insurance Study report, and/or digital versions of this map. The FEMA Map Service Center may also be reached by Fax at 1-800-358-9620 and its website at http://msc.fema.gov.

If you have **questions about this map** or questions concerning the National Flood Insurance Program in general, please call **1-877-FEMA MAP** (1-877-336-2627) or visit the FEMA website at http://www.fema.gov.



LEGEND

SPECIAL FLOOD HAZARD AREAS SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, A0, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

- ZONE A — No Base Flood Elevations determined.
- ZONE AE — Base Flood Elevations determined.
- ZONE AH — Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
- ZONE AO — Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
- ZONE AH — Special Flood Hazard Area formerly protected from the 1% annual chance flood by a Flood control system that was subsequently decertified. Zone A0 indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
- ZONE A99 — Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
- ZONE V — Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
- ZONE VE — Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

- ZONE X — Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

- ZONE X — Areas determined to be outside the 0.2% annual chance floodplain.
- ZONE D — Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

- 1% annual chance floodplain boundary
- 0.2% annual chance floodplain boundary
- Floodway boundary
- Zone D boundary
- CBRS and OPA boundary
- Boundary dividing Special Flood Hazard Area Zones and boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.
- 513 — Base Flood Elevation line and value; elevation in feet*
- (EL 987) — Base Flood Elevation value where uniform within zone; elevation in feet*

* Referenced to the North American Vertical Datum of 1988

- A — A — Cross section line
- B — B — Transect line
- 87°07'45", 32°22'30" — Geographic coordinates referenced to the North American Datum of 1983 (NAD 83), Western Hemisphere
- 4376mN — 1000-meter Universal Transverse Mercator grid values, zone 10N
- 600000 FT — 5000-foot grid ticks: California State Plane coordinate system, zone II (FIPSZONE 0402), Lambert Conformal Conic projection
- DX5510 x — Bench mark (see explanation in Notes to Users section of this FIRM panel)
- M1.5 — River Mile

MAP REPOSITORY
Refer to listing of Map Repositories on Map Index

EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP
May 4, 2009

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your Insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

MAP SCALE 1" = 500'
250 0 500 1000 FEET
150 0 150 300 METERS

NFIP NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0168E

FIRM

FLOOD INSURANCE RATE MAP

SOLANO COUNTY, CALIFORNIA AND INCORPORATED AREAS

PANEL 168 OF 730

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS

COMMUNITY	NUMBER	PANEL	SUFFIX
SOLANO COUNTY	060631	0168	E
VACAVILLE, CITY OF	060373	0168	E

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
06095C0168E

EFFECTIVE DATE
MAY 4, 2009

Federal Emergency Management Agency

APPENDIX G – NOAA ATLAS 14 DATA

NOAA Atlas 14, Volume 6, Version 2
Location name: Vacaville, California, USA*
Latitude: 38.3927°, Longitude: -121.9078°
Elevation: 76 ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Sarah Dietz, Sarah Heim, Lillian Hiner, Kazungu Maitaria, Deborah Martin, Sandra Pavlovic, Ishani Roy, Carl Trypaluk, Dale Unruh, Fenglin Yan, Michael Yekta, Tan Zhao, Geoffrey Bonnin, Daniel Brewer, Li-Chuan Chen, Tye Parzybok, John Yarchoan

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.133 (0.118-0.150)	0.160 (0.142-0.181)	0.196 (0.174-0.222)	0.225 (0.198-0.258)	0.266 (0.225-0.317)	0.297 (0.245-0.363)	0.330 (0.265-0.415)	0.364 (0.283-0.472)	0.410 (0.304-0.559)	0.447 (0.319-0.634)
10-min	0.190 (0.170-0.215)	0.229 (0.204-0.259)	0.280 (0.249-0.319)	0.323 (0.284-0.370)	0.381 (0.322-0.454)	0.426 (0.352-0.521)	0.473 (0.379-0.595)	0.521 (0.405-0.677)	0.588 (0.436-0.801)	0.641 (0.457-0.908)
15-min	0.230 (0.205-0.260)	0.277 (0.247-0.314)	0.339 (0.301-0.385)	0.390 (0.343-0.448)	0.460 (0.390-0.550)	0.515 (0.425-0.630)	0.572 (0.459-0.719)	0.630 (0.490-0.819)	0.711 (0.527-0.969)	0.775 (0.552-1.10)
30-min	0.322 (0.288-0.365)	0.388 (0.346-0.440)	0.476 (0.422-0.541)	0.547 (0.481-0.628)	0.646 (0.547-0.771)	0.723 (0.597-0.884)	0.802 (0.644-1.01)	0.884 (0.687-1.15)	0.998 (0.740-1.36)	1.09 (0.775-1.54)
60-min	0.452 (0.403-0.512)	0.544 (0.485-0.617)	0.667 (0.592-0.758)	0.767 (0.675-0.881)	0.905 (0.766-1.08)	1.01 (0.837-1.24)	1.12 (0.902-1.41)	1.24 (0.964-1.61)	1.40 (1.04-1.91)	1.52 (1.09-2.16)
2-hr	0.668 (0.596-0.757)	0.813 (0.724-0.921)	0.998 (0.887-1.14)	1.15 (1.01-1.32)	1.34 (1.14-1.60)	1.50 (1.23-1.83)	1.64 (1.32-2.07)	1.80 (1.40-2.34)	2.00 (1.49-2.73)	2.16 (1.54-3.06)
3-hr	0.853 (0.761-0.966)	1.04 (0.930-1.18)	1.28 (1.14-1.46)	1.48 (1.30-1.70)	1.73 (1.46-2.06)	1.92 (1.59-2.35)	2.11 (1.69-2.66)	2.30 (1.79-2.99)	2.56 (1.90-3.48)	2.75 (1.96-3.90)
6-hr	1.24 (1.10-1.40)	1.53 (1.36-1.73)	1.90 (1.69-2.16)	2.19 (1.93-2.51)	2.57 (2.18-3.07)	2.85 (2.36-3.49)	3.13 (2.52-3.94)	3.42 (2.65-4.44)	3.78 (2.80-5.16)	4.06 (2.89-5.76)
12-hr	1.65 (1.48-1.87)	2.09 (1.86-2.37)	2.64 (2.35-3.00)	3.09 (2.72-3.54)	3.68 (3.11-4.39)	4.12 (3.40-5.04)	4.56 (3.66-5.74)	5.01 (3.89-6.51)	5.60 (4.15-7.63)	6.05 (4.31-8.58)
24-hr	2.24 (2.02-2.54)	2.88 (2.59-3.26)	3.70 (3.33-4.20)	4.37 (3.90-5.00)	5.28 (4.59-6.20)	5.97 (5.10-7.13)	6.67 (5.58-8.13)	7.39 (6.04-9.22)	8.36 (6.60-10.8)	9.10 (6.98-12.1)
2-day	2.90 (2.61-3.28)	3.69 (3.33-4.18)	4.72 (4.25-5.36)	5.56 (4.96-6.35)	6.67 (5.80-7.83)	7.52 (6.42-8.98)	8.37 (7.00-10.2)	9.24 (7.55-11.5)	10.4 (8.21-13.4)	11.3 (8.66-15.0)
3-day	3.35 (3.02-3.79)	4.25 (3.83-4.82)	5.41 (4.86-6.14)	6.34 (5.66-7.24)	7.58 (6.58-8.90)	8.51 (7.27-10.2)	9.45 (7.91-11.5)	10.4 (8.50-13.0)	11.7 (9.20-15.1)	12.6 (9.68-16.8)
4-day	3.72 (3.35-4.20)	4.71 (4.24-5.33)	5.98 (5.38-6.79)	7.00 (6.25-8.00)	8.34 (7.25-9.80)	9.35 (7.98-11.2)	10.3 (8.66-12.6)	11.4 (9.29-14.2)	12.7 (10.0-16.4)	13.7 (10.5-18.2)
7-day	4.58 (4.13-5.18)	5.83 (5.26-6.60)	7.41 (6.66-8.41)	8.64 (7.72-9.88)	10.2 (8.91-12.0)	11.4 (9.76-13.7)	12.6 (10.5-15.3)	13.7 (11.2-17.1)	15.2 (12.0-19.6)	16.3 (12.5-21.7)
10-day	5.14 (4.64-5.82)	6.59 (5.94-7.47)	8.39 (7.54-9.52)	9.78 (8.73-11.2)	11.6 (10.0-13.6)	12.8 (11.0-15.3)	14.1 (11.8-17.2)	15.3 (12.5-19.1)	16.9 (13.3-21.8)	18.0 (13.8-24.0)
20-day	6.57 (5.92-7.43)	8.52 (7.68-9.65)	10.9 (9.77-12.3)	12.6 (11.3-14.4)	14.9 (12.9-17.4)	16.4 (14.0-19.6)	17.9 (15.0-21.8)	19.3 (15.8-24.1)	21.1 (16.6-27.2)	22.3 (17.1-29.7)
30-day	7.80 (7.03-8.82)	10.2 (9.15-11.5)	13.0 (11.6-14.7)	15.0 (13.4-17.2)	17.6 (15.3-20.7)	19.4 (16.5-23.1)	21.0 (17.6-25.6)	22.6 (18.5-28.2)	24.5 (19.3-31.7)	25.8 (19.8-34.4)
45-day	9.47 (8.54-10.7)	12.3 (11.1-14.0)	15.7 (14.1-17.8)	18.1 (16.2-20.7)	21.1 (18.3-24.8)	23.1 (19.7-27.6)	25.0 (20.9-30.5)	26.7 (21.8-33.3)	28.8 (22.8-37.2)	30.3 (23.2-40.3)
60-day	11.3 (10.2-12.8)	14.6 (13.2-16.6)	18.5 (16.6-21.0)	21.3 (19.0-24.4)	24.7 (21.4-29.0)	27.0 (23.0-32.2)	29.0 (24.3-35.4)	31.0 (25.3-38.6)	33.2 (26.3-43.0)	34.8 (26.7-46.3)

[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

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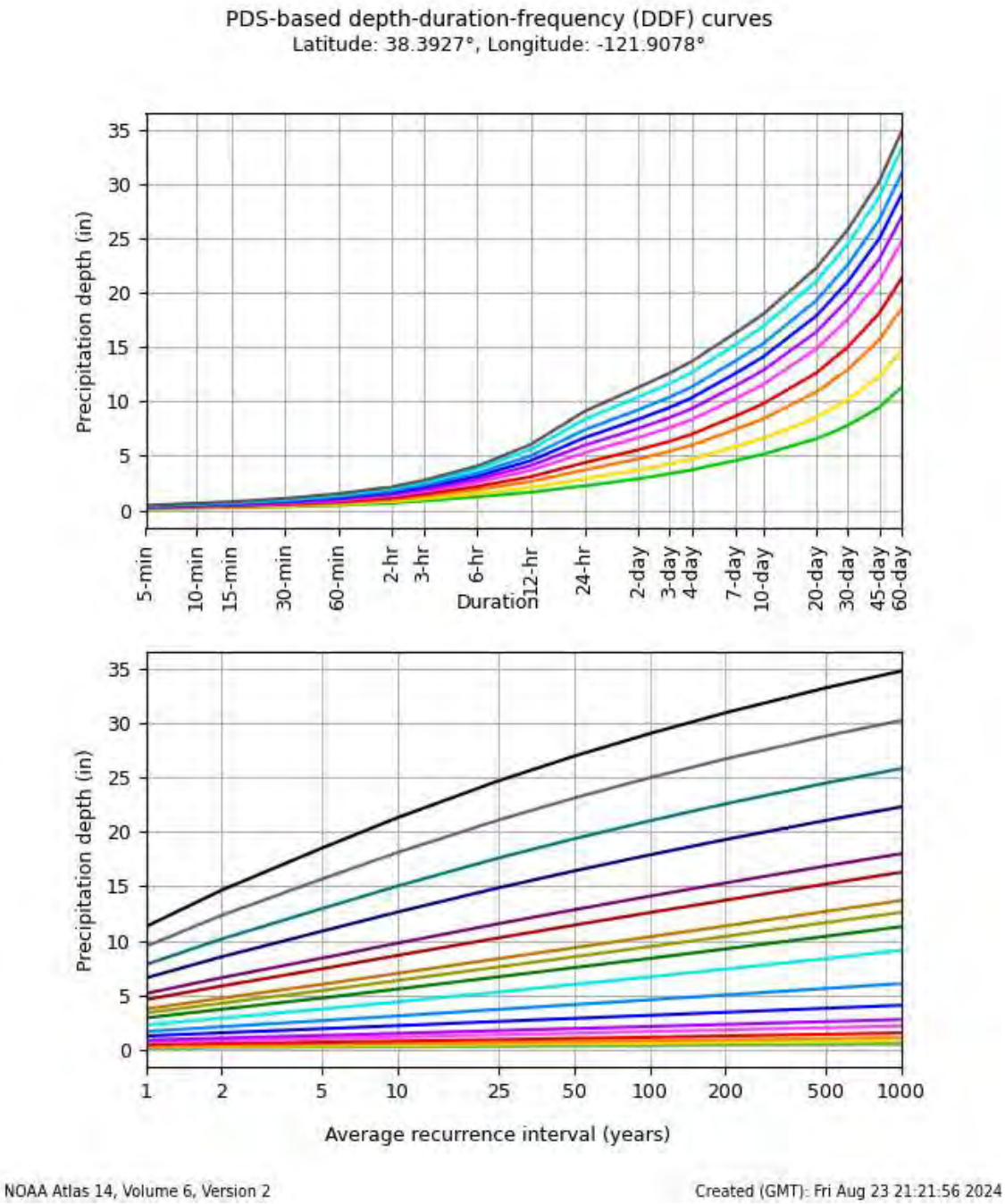
PF graphical



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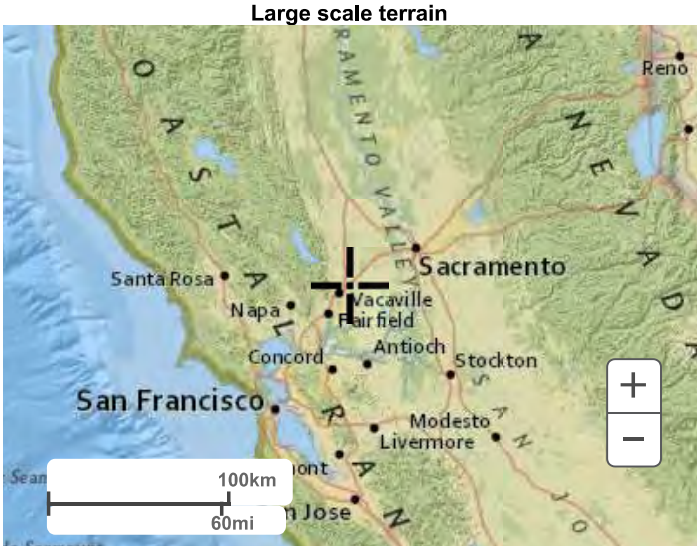
Maps & aerials

Small scale terrain

Large scale terrain



Large scale map

Large scale aerial

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US Department of Commerce
National Oceanic and Atmospheric Administration
National Weather Service
National Water Center
1325 East West Highway
Silver Spring, MD 20910
Questions?: HDSC.Questions@noaa.gov

Disclaimer

APPENDIX H – BASIN VOLUME/DRYWELL CALCULATIONS

Corby Energy Storage

Weighted Runoff Coefficients

Sub-basin ID	Total Sub-basin Area	Land Use Category	100-yr Base C Value	Area A	Area A x Base C-Value	Sum of A x Base C-value	Composite C-Values 100-year
1	5.271	Foundations	0.95	0.543	0.516	4.433	0.84
		Gravel	0.88	4.087	3.597		
		Open Space	0.5	0.641	0.321		
2	3.585	Foundations	0.95	0.372	0.353	2.575	0.72
		Gravel	0.88	1.618	1.424		
		Open Space	0.5	1.595	0.798		

Preliminary 10-Year, 24-Hour Wet Pond Volume Calculations

Sub-basin ID	Total Sub-basin Area (acres)	Runoff Coefficient	Precipitation (inches)	Volume Required (cu ft)	Volume Required (ac-ft)
1	5.27	0.84	4.37	70320	1.614
2	3.59	0.72	4.37	40843	0.938
TOTAL	8.86			111,163	2.552

Volume Provided					
Wet Pond ID	Depth (ft)	Area Bottom (ac)	Area Top (ac)	Total Vp (cu ft)	Total Vp (ac-ft)
P1	4	0.84	1.16	144306	3.313
TOTAL				144,306	3.313

Drywell Calculations					
Wet Pond ID	Volume Required (ac ft)	Volume Required (cu ft)	Flowrate Required to Drain Basin Within 72 Hours (cfs)	De-Rated Disposal Rate (cfs)	Number of Drywells Required
P1	2.552	111163	0.43	0.1	4

Corby Energy Storage

Weighted Runoff Coefficients

Sub-basin ID	Total Sub-basin Area	Land Use Category	100-yr Base C Value	Area A	Area A x Base C-Value	Sum of A x Base C-value	Composite C-Values 100-year
3	6.368	Foundations	0.95	1.209	1.149	5.516	0.87
		Gravel	0.88	4.706	4.141		
		Open Space	0.5	0.453	0.227		
4	2.813	Foundations	0.95	0.337	0.320	2.002	0.71
		Gravel	0.88	1.169	1.029		
		Open Space	0.5	1.307	0.654		

Preliminary 10-Year, 24-Hour Wet Pond Volume Calculations

Sub-basin ID	Total Sub-basin Area (acres)	Runoff Coefficient	Precipitation (inches)	Volume Required (cu ft)	Volume Required (ac-ft)
3	6.37	0.87	4.37	87506	2.009
4	2.81	0.71	4.37	31764	0.729
TOTAL	9.18			119270	2.738

Volume Provided					
Wet Pond ID	Depth (ft)	Area Bottom (ac)	Area Top (ac)	Total Vp (cu ft)	Total Vp (ac-ft)
P2	4	0.90	1.21	179236	4.115
TOTAL				179236	4.115

Drywell Calculations					
Wet Pond ID	Volume Required (ac ft)	Volume Required (cu ft)	Flowrate Required to Drain Basin Within 72 Hours (cfs)	De-Rated Disposal Rate (cfs)	Number of Drywells Required
P2	2.738	119270	0.46	0.1	5

BURNS McDONNELL

CREATE AMAZING.

Burns & McDonnell Engineering Company, Inc.
9400 Ward Parkway
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APPENDIX 4.10-B: GROUNDWATER SUPPLY FEASIBILITY STUDY

DRAFT GROUNDWATER SUPPLY FEASIBILITY STUDY

Corby Battery Energy Storage System Project

Kilkenny Road at Byrnes Road, Solano County, California

October 31, 2024

Reference: 117-0526409

Prepared for

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Acronyms and Abbreviations

3D	three dimensional
Applicant	North Bay Interconnect, LLC and Corby Energy Storage, LLC
BESS	battery energy storage system
bgs	below ground surface
CEC	California Energy Commission
CVHM	Central Valley Hydrologic Model
DWR	California Department of Water Resources
gpm	gallon per minute
GSP	Groundwater Sustainability Plan
HP	horsepower
NextEra	NextEra Energy Environmental Services
NPDES	National Pollutant Discharge Elimination System
Project	Corby Battery Energy Storage System Project
PVC	polyvinyl chloride
Site	an approximately 40.3-acre property located in the southwestern quadrant of the intersection of Kilkenny and Byrnes Roads
Tetra Tech	Tetra Tech, Inc.
USGS	U.S. Geological Survey

1.0 INTRODUCTION

North Bay Interconnect, LLC and Corby Energy Storage, LLC (Applicant[1]) plans to construct the Corby Battery Energy Storage System Project (Project) on a rural parcel just northeast of City of Vacaville in Solano County, California (the Site). The Site is an approximately 40.3-acre property located in the southwestern quadrant of the intersection of Kilkenny and Byrnes Roads. The subject property is an unirrigated crop field at the time of this study. The Site and surrounding properties are shown in Figure 1.

The Applicant is submitting a license application through the California Energy Commission's (CEC) Opt-in Application process for approval to construct and operate qualifying renewable energy facilities. CEC filing requirements include specific water supply and water quality information as outlined in Appendix B, *Information Requirements for an Application for Certification (AFC) or Small Power Plant Exemption (SPPE).*[2] If the local water supplier, Solano Irrigation District, is unable to meet the Project water supply needs, the Applicant may develop an onsite groundwater well to serve the construction and temporary landscape irrigation water needs. Up to 30 acre-feet of water may be needed during the construction phase and, following construction, approximately 2 acre-feet of water during the first year following landscape installation and scaled back by 20 to 30 percent each year for complete shutoff of irrigation by year 3 through 5. The primary purpose of construction water is for onsite dust control and soil consolidation during construction and/or grading activities.

The Applicant contracted Tetra Tech Inc. (Tetra Tech) to conduct a desktop study to determine the feasibility of constructing a groundwater well onsite for the purposes of soil compaction and dust control during site construction and temporary landscape irrigation (non-potable) water needs for a duration of approximately 5 years from the start of site construction.

1.1 Study Objectives

The objectives of this study are: 1) determine whether constructing a groundwater well onsite is feasible, achievable, affordable, and can meet the water demand for the specified Project duration; and 2) provide information pertaining to groundwater supply well to support CEC's Opt-in Application review.

1.2 Study Methodology and Data Sources

The methodology and data sources for this study include the following:

- Collecting and reviewing available hydrogeological and environmental data and information from various sources including U.S. Geologic Surveys (USGS) publications; California Department of Water Resources (DWR) well completion reports and groundwater databases; basin plans from local water agencies; State of California Geotracker and Envirostor

[1] North Bay Interconnect, LLC and Corby Energy Storage, LLC are both wholly-owned subsidiaries of NextEra Energy Resources. North Bay Interconnect, LLC will own and operate the interconnection facilities for the Project; and Corby Energy Storage, LLC will own and operate the battery energy storage system components of the Project.

[2] Cal. Code Regs., tit. 20, div. 2, ch. 5, appendix B

environmental databases; and a Phase I environmental site assessment report for the Site prepared by NextEra Energy Environmental Services (NextEra);

- Preliminary assessment of the groundwater supply including groundwater source aquifers, expected water quality, potential sources of groundwater contamination, and expected well depth and pumping capacity;
- Developing a local groundwater flow model using a regional USGS groundwater model to predict the magnitude of water level drawdown in existing nearby wells and the potential mobilization of any groundwater contamination that maybe caused by pumping from a new groundwater well onsite;
- Reviewing the state and local regulatory and permitting requirements pertaining to water wells; and
- Developing a preliminary cost estimate and schedule for water well construction based on similar project experience.

1.3 Report Organization

This report is organized into the following sections:

- **Section 1 – Introduction:** provides the Project background and objectives of this report.
- **Section 2 – Groundwater Source Assessment:** provides a discussion on geology, hydrogeology, available groundwater aquifers, expected well production capacity, and expected water quality for the proposed well.
- **Section 3 – Well Permitting and Construction:** provides an outline of the activities associated with well permitting and construction.
- **Section 4 – Conclusion and Recommendations:** provides a conclusion on whether constructing a groundwater well onsite is feasible, achievable, affordable, and whether the well can meet the water demand for the specified project duration and recommendations.
- **Section 5 – Limitations:** provides a description of the study limitations.
- **Section 6 – References:** provides a list of references cited in this study.

2.0 GROUNDWATER SOURCE ASSESSMENT

The Site is located within Solano Subbasin of the Sacramento Valley Groundwater Basin. The Solano Subbasin has been the focus of several comprehensive geologic, hydrogeologic and hydrologic studies undertaken by the DWR, the Solano County, the USGS, and the Solano Subbasin Groundwater Sustainability Agency Collaborative. Tetra Tech has utilized published literature and datasets from these and other sources including the Solano Subbasin Groundwater Sustainability Plan (GSP; LSCE Team 2021) and geologic and water quality data from the GeoTracker and Envirostor databases for this feasibility study. A regional-scale USGS central valley regional groundwater model (Faunt 2009) was also used as a base to develop a local-scale groundwater model to assess the potential impacts of groundwater pumping at the Site.

2.1 Geology and Hydrogeology

The Solano Subbasin topography is relatively flat, with ground surface elevation varying from 120 feet in the northwest corner to sea level in the south. The subbasin boundaries are defined by Putah Creek on the north, the Sacramento River on the east (from Sacramento to Walnut Grove), the North Mokelumne River on the southeast (from Walnut Grove to the San Joaquin River), and the San Joaquin River on the south (from the North Mokelumne River to the Sacramento River).

The primary water-bearing formations within the Solano Subbasin are sedimentary continental deposits of Late Tertiary (Pliocene) to Quaternary (Recent) age. Fresh water-bearing units include Quaternary Alluvium and the older Tehama Formation (DWR 2003). The units pinch out near the Coast Range on the west and thicken to nearly 3,000 feet near the eastern margin of the subbasin. Saline water-bearing sedimentary units underlie the Tehama Formation (DWR 2003).

The shallowest fresh water-bearing unit of the subbasin is referred to as Quaternary Alluvium, which consists of loose to moderately compacted silt, silty clay, sand, and gravel deposited in alluvial fans, and supply shallow agricultural and domestic wells. Thickness of the unit ranges from 60 to 130 feet. (DWR 2003). Permeability of the Quaternary Alluvium is highly variable. Wells penetrating sand and gravel lenses of the unit produce between 300 and 1,000 gallons per minute (gpm), while the wells completed in the finer-grained portions of the Quaternary Alluvium produce between 50 and 150 gpm (DWR, 2003). Beneath the Site, the Quaternary Alluvium is estimated to be approximately 100 feet thick (Thomasson et al. 1960) with thin coarse-grained water-bearing layers that rarely produce more than 50 gpm based on well test results reported on DWR well completion reports (Attachment A).

Underlying the Quaternary Alluvium deposits is the Tehama Formation, which represents a significant groundwater resource in the Solano Subbasin. It consists of moderately compacted silt, clay, and silty fine sand enclosing lenses of sand and gravel, silt and gravel, and cemented conglomerate (DWR 2003). Permeability of the Tehama Formation is variable depending on the depth and location. The Tehama Formation is divided into the Upper Tehama zone, the Middle Tehama zone, and the Basal Tehama zone. The Upper Tehama zone extends to a depth of approximately 700 feet beneath the project area and many shallow water wells are completed in the Upper Tehama and produced up to 460 gpm, according to the well pumping information obtained from well completion reports in DWR database. The underlying Middle Tehama Formation is estimated to extend from approximately 700 feet to more than 1,000 feet deep beneath the Site, and is generally fine-grained with only relatively thin sandy intervals of limited lateral extent that does not serve as a major water producer in the Solano Subbasin. The depths of the formation boundaries are estimated based on projection of geologic cross-sections (Thomasson et al. 1960; LSCE Team 2024). The Basal Tehama Formation is generally encountered at great depth and under confined conditions within the Solano Subbasin, except for along parts of the western Solano Subbasin boundary where it is steeply dipping and outcrops at the surface. The Basal Tehama zone is mainly used for public water supply wells, where the aquifer is present (LSCE Team 2024).

The anticipated groundwater flow directions in the Solano Subbasin within the Alluvial Aquifer and Upper Tehama Formation tend to be from west/northwest to east/southeast (LSCE Team 2024) generally towards the Sacramento River. In the deeper confined Basal Tehama Formation, there are

fewer groundwater-level data, but groundwater gradients indicate flow is generally to the southwest towards the City of Vacaville, where most of the groundwater pumping from the Basal Tehama zone is occurring (LSCE Team 2024).

Overall long-term trends in groundwater levels are stable in the Subbasin with some declining levels evident in localized areas of the Subbasin, most notably in the northwestern part of the Subbasin (LSCE Team 2021). Groundwater levels exhibit declines during drought periods and recovery during and after wet periods with seasonal fluctuations observed throughout the Subbasin as a result of the cyclic annual trends in groundwater pumping for urban and agricultural uses during the irrigation season. The Subbasin has experienced a prolonged drier-than-average period since about 1999; this is evident in many hydrographs, although many wells exhibit recovery from recent wetter years in 2017 and 2019 (LSCE Team 2021). In the vicinity of the Site, historically the groundwater level has ranged from 7 to 35 feet below ground surface (bgs) in wells completed in the Alluvial Aquifer and Upper Tehama Formation, based on well information obtained from the DWR well completion reports.

2.2 Groundwater Flow Model

The CEC Application filing requirements for water resources development (Appendix B, (g) (14), (E), (ii)) require the Applicant to utilize a groundwater model to estimate the drawdown (pumping interference) on neighboring wells within 0.5 mile of the proposed pumping well, any effect on the migration of groundwater contaminants, and the likelihood of any change in existing physical or chemical conditions of groundwater. To meet this Application filing requirement, Tetra Tech geologists and hydrogeologists developed a local-scale groundwater model using a USGS regional-scale groundwater model as a base.

The USGS regional-scale hydrologic model, the Central Valley Hydrologic Model (CVHM), was developed to predict water supply scenarios and addressing issues related to water competition. The CVHM is an extensive, detailed three-dimensional (3D) computer model (MODFLOW 2000 finite-difference groundwater flow model) of the hydrologic system of the Central Valley, which simultaneously accounts for changing water supply and demand across the landscape, and simulates surface water and groundwater flow across the entire Central Valley (Faunt 2009). The CVHM encompasses the alluvial deposits of the entire Central Valley extending from the Cascade Ranges on the north to the Tehachapi Mountains on the south and bounded on the east by the Sierra Nevada and on the west by the Coast Ranges. The aquifer in the CVHM is divided spatially into 20,000 model cells of 1 square mile each and vertically into 10 layers ranging in thickness from 50 to 750 feet.

The USGS groundwater flow model lacks the data density to provide sufficient details necessary to meet the objectives of this groundwater study. As such, Tetra Tech created a local-scale numerical groundwater model using the USGS groundwater flow model as a base. The local-scale numerical groundwater model development and simulations performed included the following:

- Refining the model grid cell size from 1 mile to less than 70 feet using the USGS's telescopic mesh refinement method (Leake and Claar 1999).

- Refining the upper six vertical layers of the USGS CVHM groundwater model representing the shallow and upper deep systems to 500 feet depth to 11 layers in the local-scale groundwater model.
- Calculating hydraulic conductivities using soil description and well pumping data from DWR well completion reports and Geotracker database for wells located in the vicinity of the project site. The hydraulic conductivity values for each well location were plotted and contoured across the model domain by kriging method to represent local heterogeneity using Surfer contouring software.
- Running groundwater flow simulations in the model to predict the pumping drawdowns at the proposed well and at the nearby wells. The results of groundwater model simulation of the pumping drawdowns at the proposed well and at the possible locations of nearby wells within a 0.5-mile radius of the Site are provided in Section 2.4, Expected Groundwater Production.
- Running the USGS particle tracking code MODPATH in conjunction with MODFLOW to determine the zone of influence and travel time to evaluate potential impact to any existing groundwater contamination over time in the study area. The effect of the proposed pumping well on the migration of groundwater contaminants, and the likelihood of any change in existing physical or chemical conditions of groundwater are provided in Section 2.5, Expected Groundwater Quality.

Model documentation of the local-scale groundwater model development including calculations and input data are provided in Attachment B.

2.3 Groundwater Wells in the Vicinity

Water well information from the DWR well completion reports database and Solano County Department of Resource Management well search database was reviewed. Several water wells in the vicinity were identified. Copies of the well completion reports of nearby water wells are provided in Attachment A. Water Code section 13752 was amended in June 2015 to allow public access to water well completion reports. Geologic information and well pumping data from the well completion reports were used to calculate aquifer parameters for groundwater model data input and estimating potential production of the Site water well. A list of nearby water wells and the reported well construction details are provided in Table 1 below. Three wells were identified at or within 0.5 mile from the closest Project property boundary line. The location of the nearby water supply wells is shown in Figure 2.

Table 1. Nearby Wells – Construction Details

Well ID	Perforated Interval, Top/Bottom (ft bgs)	Casing Diameter (in.)	Location	Distance/Direction from Site	Well Type
WCR1975-000680	40-50, 80-100	5	NW corner of Kilkenny and Byrnes Rd	200 ft N of site	Domestic
WCR2002-008372	40-100, 112-120	5	SE corner of Kilkenny and Byrnes Rd	200 ft E of site	Domestic
WCR1989-003080	220-240	5	S of Kilkenny on Byrnes Rd	0.5 mi S of site	Domestic
WCR2017-007926	280-290	6.5	5500 Weber Rd	0.6 mi NE of site	Domestic
WCR1950-000659	78-570	12	1500 ft N of Kilkenny/Hwy 80	1 mi W of site	Industrial
WCR2018-012113	200-210, 230-250	6.5	6712 Willow Rd	1 mi SW of site	Domestic
WCR1966-000117	40-100	6	Box 795 Walnut Rd	1 mi SW of site	Domestic
WCR1965-000300	20-100	6	2 mi N of Elmira on Byrnes Rd	1 mi S of site	Domestic
WCR2015-007329	51-271	8	5608 Weber Rd	0.8 mi NE of site	Irrigation - Agriculture
WCR2015-011088	70-250	6	5612 Weber Rd	1 mi NE of site	Irrigation - Agriculture
WCR1962-000517	20-40, 60-100	6	Mills Ln/Hwy 80	1 mi W of site	Domestic
WCR2023-011624	140-190	-	5144 Maple Rd	1.4 mi SW of site	Domestic
WCR2023-010980	80-100, 140-170	6.6	5149 Maple Rd	1.4 mi SW of site	Domestic
WCR1999-005829	70-90, 110-140	5	5738 Weber Rd	1.4 mi ENE of site	Domestic
WCR2003-004887	70-80, 100-110	6	Fox Rd at Weber Rd	1.5 mi NE of site	Domestic

Data source: Solano County and DWR well completion reports
Distance are approximate. Measured from the property line closest to well site.
bgs = below ground surface; ft = feet; mi = mile

2.4 Expected Groundwater Production

This section provides a discussion on the expected well production capacity of a Site water well. Well pumping data from water wells located in the vicinity of the Site are provided in Table 2 below.

Table 2. Nearby Wells – Pumping Data

Well ID	Perforated Interval Top/Bottom (ft bgs)	Static Water Level (ft bgs)	Pumping Drawdown (ft)	Test Pumping Rate (gpm)	Calculated Specific Capacity (gpm/ft)	Calculated Transmissivity (gpd/ft)
WCR1975-000680	40-50, 80-100	-	-	-	-	-
WCR2002-008372	40-100, 112-120	-	-	-	-	-
WCR1989-003080	220-240	15*	15	-	-	-
WCR2017-007926	280-290	18	-	50	-	-
WCR1950-000659	78-570	35	200	460	2.3	4600
WCR2018-012113	200-210, 230-250	30	-	45	-	-
WCR1966-000117	40-100	17	50	30	0.6	1200
WCR1965-000300	20-100	20	15	30	2.0	4000
WCR2015-007329	51-271	10	250	200	0.8	1600
WCR2015-011088	70-250	10	230	150	0.7	1304
WCR1962-000517	20-40, 60-100	15*	25	8	0.3	640

Well ID	Perforated Interval Top/Bottom (ft bgs)	Static Water Level (ft bgs)	Pumping Drawdown (ft)	Test Pumping Rate (gpm)	Calculated Specific Capacity (gpm/ft)	Calculated Transmissivity (gpd/ft)
WCR2023-011624	140-190	14	-	40	-	-
WCR2023-010980	80-100, 140-170	28	-	30	-	-
WCR1999-005829	70-90, 110-140	-	-	-	-	-
WCR2003-004887	70-80, 100-110	7	60	60	1	2000

Data source: DWR well completion reports
* = Estimated based on nearby well data
- = no information
ft bgs = feet below ground surface
gpm = gallon per minute
gpd/ft = gallons per day per foot
Estimate of Transmissivity from Specific Capacity
Q/Sw = Specific capacity
Transmissivity (T) = 2000 (Q/Sw), Confined aquifer
Q = pumping rate = 1500 (Q/Sw), Unconfined aquifer
Sw = drawdown after 1 day
Driscoll, F.G. (1986), Groundwater and Wells, Johnson Screens.
T = transmissivity (gal/day/ft)

Groundwater supply at the Site is expected to be derived mainly from the alluvial sand and gravel water-bearing units of Quaternary Alluvium and Upper Tehama Formation, which are estimated to extend to approximately 700 feet bgs beneath the subject site, according to a geologic cross-section interpretation (LSCE Team 2021). Wells completed to less than 100 feet bgs in this area typically yield less than 30 gpm. Some deeper wells that extend into the Upper Tehama Formation aquifers that are 200 to 570 feet deep have produced from 200 to 460 gpm, as evidenced by the nearby wells WCR1950-000659, WCR2015-007329, and WCR2015-011088 (Attachment A).

Based on the above well information, conceptually a water well onsite completed to approximately 300 to 500 feet bgs is expected to produce at least 100 gpm, which would easily meet the Project water demand of 30 acre-feet over the construction period. During the active grading period, water use will be highest, at up to approximately 20 to 40 gpm. Allowing for occasional peak water flow usage and the possibility of encountering lower than expected aquifer transmissivities, a design pumping rate of 60 gpm has been assumed for this Project. A 60 gpm water well has the capacity to deliver a sufficient amount of water over the construction period and would also meet higher usage rates during site preparation and grading activities.

The expected pumping water level drawdown in a hypothetical pumping well onsite was estimated using the well data obtained from DWR well completion reports for nearby wells, and for comparison, by running a flow simulation on the local-scale numerical groundwater model developed by Tetra Tech. The pumping drawdown scenario, the two methods of estimations, and a comparison of the results are summarized in Table 3 below.

Table 3. Estimated Groundwater Drawdown in Site Pumping Well

Site Pumping Well Screen Interval (ft bgs)	Pumping Rate (gpm)	Drawdown Approximation Based on Pumping Data from Nearby Wells			Drawdown from Groundwater Model Simulation (ft)	Comparison (Relative Percent Difference)
		Specific Capacity of Nearby 250-570 Ft Depth Wells (gpm/ft)		Calculated Drawdown (ft)		
		Range	Average			
100 - 300	60	0.7-2.3	1.5	40	34.3	15%

ft bgs = feet below ground surface; gpm = gallon per minute

The pumping scenario consisted of a 300-foot-deep well located near the center west side of the subject property pumping at a rate of 60 gpm. The approximation of drawdown in the pumping well using well data from nearby wells of similar depth indicated a drawdown of 40 feet. The results of groundwater model pumping simulation indicated a drawdown of 34.3 feet, which is considered a good match, given the limited amount of available data.

The expected pumping water level at the Site well is 55 feet bgs at a pumping rate of 60 gpm, assuming a drawdown of 40 feet and an estimated average static water level of 15 feet. Based on these assumptions, a suitable well pump would be a 4-inch-diameter, 5 horsepower (HP) electrical submersible pump.

2.5 Expected Groundwater Quality

This section provides a discussion on the expected quality of groundwater produced from a potential Site water well.

Available regulatory environmental databases were reviewed to assess the potential for contaminated sites to impact the groundwater at the Site. The results of the review are summarized below.

- Geotracker Environmental Database, State Water Resources Control Board
  - The closest release site listed is a closed cleanup program site located approximately 0.9 mile southwest of the Site. This site was also identified in NextEra's Phase 1 ESA report. The contaminants of concern were paint and petroleum hydrocarbons from past vehicle repair at the site. Impacted soils were removed in 2013 as part of the remedial action and closure was granted in 2018. Based on the distance from the subject property, inferred regional groundwater flow direction (away from the subject property), and regulatory status (closed), it is unlikely that this site has impacted the environmental conditions of the subject property (NextEra 2024).
  - KMEP Fox Road Petroleum Pipeline Release site at 6645 Fox Road in Dixon, California, is located approximately 1.5 miles southeast of the Site. Soil and groundwater were contaminated by petroleum hydrocarbons from a pipeline release in 1993. Site cleanup is ongoing. Given the downgradient location and distance from the Site, this site is not expected to impact the groundwater quality at the Site.
- Envirostor Environmental Database, Department of Toxic Substances Control
  - No release sites were identified within 2.5 miles of the Site.

- Water Data Library, DWR
  - Water quality data records exist for four wells located within 1.5 miles of the Site (one well near Kilkenny Road and Byrnes Road, two wells adjacent to Highway 80 near Kilkenny Road, and a well located on Fox Road at Weber Road). The water quality data reports contain only general chemistry data (major minerals, pH and conductivity) from the 1970s to 1990s, which appear to be at background levels.

Table 4 below presents a summary of recent groundwater quality data from a monitoring well, DeMellow MW, screened from 85 to 95 feet bgs in Quaternary Alluvium and is located approximately 1.5 miles north of the Site.

Table 4. Summary of Expected Water Quality

Analyte	Units	Drinking Water Quality Criteria	Average Concentration (2015 – Present) DeMello MW MidwayRd/Hwy80
Arsenic	µg/L	10	<2.5
Boron	mg/L	1.0 (NL)	NA
Chloride	mg/L	250 (Secondary MCL)	<50
Chromium+6	µg/L	10	<5
Nitrate	µg/L	10	<2.5
Total dissolved solids	mg/L	1,000 (Secondary MCL)	<250

Data Source: LSCE Team 2024
µg/L = microgram per liter; MCL = maximum contaminant level; mg/L = milligram per liter; NL = notification level

The DeMellow MW groundwater quality data are considered most representative of the expected groundwater conditions at the Site, based on the proximity of the well location and the well screen interval.

A review of available groundwater quality data from various data sources indicated no evidence of the presence of groundwater contamination in the vicinity of the Site. Furthermore, it should be noted that the proposed use of the groundwater at the Site is non-potable, which the drinking water quality criteria do not apply to.

2.6 Potential Impact of Proposed Well on Groundwater resources

This section provides an evaluation of potential impact of the proposed Site pumping well may have on surrounding water wells, groundwater quality, and groundwater aquifers.

2.6.1 Potential Impact on Surrounding Water Wells

A pumping well in close proximity of another well will likely cause interference groundwater level drawdown if the wells are pumping from the same source aquifer. The potential effect of a Site pumping well on surrounding water wells was evaluated by running a pumping simulation on the local-scale numerical groundwater model developed by Tetra Tech. The pumping simulation scenario and results are summarized in Table 5 below and Figure 3.

Table 5. Groundwater Model Simulated Pumping Water Level Drawdown

Hypothetical Onsite Pumping Well			Resulting Drawdown at Wells Within 0.5 Miles of the Site (ft)	
Well Screen Interval (ft bgs)	Pumping Rate (gpm)	Drawdown (ft)	Closest well approx. 200 feet north of the Site (WCR1975-000680)	All other wells within 0.5 mile of the Site
100 - 300	60	34.3	2.4	1.1 - 2.3

ft bgs = feet below ground surface; gpm = gallon per minute

The pumping simulation consisted of assuming a 300-foot-deep well located near the center west side of the subject property pumping at a rate of 60 gpm. The results of the pumping simulation (Figure 3) indicate that the greatest drawdown at wells within 0.5 mile of the Site would be 2.4 feet at the well located on the adjacent property to the north. All other wells within the 0.5-mile radius of the Site had less drawdown. If a 500-foot-deep pumping well was used in the simulation, the drawdown in the pumping well and the nearby wells would be even less because water from additional deeper aquifers will likely be available to draw groundwater. As shown in Table 1, wells in the vicinity are 100 feet deep or greater. The depth to groundwater in this area is approximately 15 feet, indicating a water column length of 85 feet available for pumping. The 2.4-foot loss of groundwater level represents approximately 3 percent loss of groundwater level, which is insignificant and not likely to cause water well issues. It should be noted that 2.4 feet of drawdown is not unusual for rural residential property owners to expect neighbors will likely have water wells.

Existing well pumping data and groundwater model pumping simulations indicated that the estimated interference drawdown at nearby wells is insignificant and would not likely cause issues for water wells located within 0.5 mile of the Site. Although the groundwater level drawdown at neighboring wells is unlikely to be an issue, as a precaution, the well site geologist can conduct aquifer zone testing during drilling and evaluate well screen placements. Screening below 100 feet bgs in the deeper aquifer zones would reduce the potential for drawdown impact to neighboring wells.

2.6.2 Potential Impact on Groundwater Quality

As indicated in Section 2.5, Expected Groundwater Quality, no evidence of groundwater contamination was identified in the vicinity of the Site. Thus, there is no groundwater contamination that could possibly be mobilized by pumping from the Site.

As an additional evaluation, numerical groundwater model particle tracking was utilized to estimate the time for a potential groundwater contamination from a potential source area to mobilize to a sensitive receptor, assumed to be a possible water well located on a residential property on Kilkenny Road, west of the Site.

The results of particle tracking simulation is shown in Figure 4. As shown in the figure, the 100-year particle tracks do not extend out to any developed areas near Highway 80. This indicates that even if there was a groundwater contamination at the developed areas near or west of Highway 80, the groundwater contamination will not reach the receptor well in 100 years.

Based on the results of groundwater quality data review and groundwater model particle tracking simulation, the risk of groundwater pumping from the Site negatively impacting the groundwater

quality is low because there is no known groundwater contamination in the groundwater source area, and any contamination, if present, would not be drawn to the groundwater pathway towards the Site because groundwater from this area is outside of the 100-year zone of influence.

2.6.3 Potential Impact on Groundwater Aquifers

The average annual volume of groundwater extraction in the Solano Subbasin is estimated to be approximately 180,000 acre-feet per year, and the groundwater storage in the Subbasin has been stable to increasing based on the observed groundwater levels and model-simulated water budget results (LSCE Team 2021).

The sustainable yield for the Subbasin is estimated to be 190,000 acre-feet per year, which is equal to the volume of groundwater extracted annually in the Subbasin, and approximately equal to the annual volume of replenishment occurring within the Subbasin, in addition to other water budget inflows (LSCE Team 2021). Sustainable yield is defined as the rate at which groundwater can be pumped without compromising the quality or quantity of the water, or causing unacceptable environmental or economic consequences. The groundwater monitoring results indicate that groundwater levels are not declining in the Subbasin, and they are not expected to decline in the future. As such, there is no danger of declining groundwater supply in the Subbasin in the foreseeable future, according to the GSP.

Given that no groundwater supply shortage is anticipated anytime during the next 50 years, and that 30 acre-feet project groundwater supply needs over the construction period are miniscule in comparison, representing less than 0.02 percent of the annual average groundwater extraction from the Subbasin, the potential impact on groundwater aquifers is negligible.

3.0 WELL PERMITTING AND CONSTRUCTION

This section provides a preliminary outline of activities associated with permitting and constructing a water well on the Site.

3.1 Well Siting

To construct a water well, typically an area 100 feet by 100 feet at minimum is necessary for drilling rig and equipment setup. Additionally, the Solano County Department of Resource Management requires the well to be located certain distances from the features listed in Table 6 below to protect groundwater from contamination.

Table 6. Solano County Department of Resource Management Setback Requirements for Non-Public Supply Water Wells

Feature	Minimum Distance Guideline (feet)
Property line, stream, ditch, drainage course	25
Sewer line	50
Septic tank, disposal field, deep trench, animal enclosure, hazardous materials tanks	100

The Site is undeveloped vacant land and it is assumed that the well can be placed at a location where it is accessible by drilling rig and equipment and that meets the setback requirements.

3.2 Well Construction Permit

The Solano County Department of Resource Management requires the acquisition of a well construction permit prior to well drilling, pursuant to the California Well Standards (Bulletins 74-81 and 74-90) and Solano County Code, Chapter 13.10. The well permit application requires specific information on the well design including well location, planned completion depth, seals, and screened intervals. The County requires an identification of possible contaminating sources within 100 feet of the water supply well and minimum setback distances (Table 6).

None of the potential contaminating sources have been identified on the subject property (NextEra 2024), and there are no known encumbrances that prohibit meeting the minimum setback distances requirements at this time. The well drilling permit application form should be completed by the Project geologist as it requires technical information. The permit application fee is $779.00 (as of October 2024), and the expected processing time is 5 to 10 business days.

3.3 NPDES Discharge Permit

Waste groundwater will be produced during the well construction, development, and testing activities, which will require disposal. A preliminary estimated volume is approximately 20,000 to 50,000 gallons of groundwater. It is assumed that sufficient land area is available at the Site to spread the water on the ground for percolation or irrigation without allowing any runoff to drainage ditches, and if so, a National Pollutant Discharge Elimination System (NPDES) permit would not be required. If discharges to drainage ditches or bodies of surface water is necessary, a Notice of Intent submitted to the Central Valley Regional Water Quality Control Board for issuance of a general NPDES permit, which will be required prior to discharges.

3.4 Drilling Waste Management

During drilling and well construction, soil cuttings, drilling mud, and groundwater will be generated. Solid wastes and muddy water will be contained in roll-off bins and transported to an appropriate landfill for disposal.

3.5 Preliminary Estimate of Well Construction Cost

A preliminary estimated contractor's cost to drill, construct, and develop a 300- to 500-foot-deep, 60 gpm water well at the Site may range from approximately $200,000 to $300,000, assuming a typical non-potable water well with PVC well casing. Estimated cost to equip the well including an electric 5-HP submersible well pump may range from $20,000 to $30,000 for an assumed basic outdoor installation with a simple valve and a hose connection at the wellhead. These costs do not include bringing electrical power to the Site, water storage tanks, piping, or any contingency.

3.6 Well Pump Power Consumption Estimate

The power consumption of a submersible pump depends on several factors, including the efficiency of the pump motor and the condition it is used. The actual power consumption of a specific submersible pump may vary depending on actual working conditions. A preliminary estimate of the power consumption of a typical 5 HP submersible well pump is provided in Table 7 below.

Table 7. Well Pump Power Consumption Estimate

Design Pumping Rate (gpm)	Well Pump (HP)	Rated Electrical Energy Use (1 HP=0.746 kW/h)	Efficiency (typical 70%)	Electrical Energy Use (kW/h) With Efficiency Loss
60	5	3.73	70%	5.3

gpm – gallon per minute; HP – horsepower; kW/h –kilowatt hour

3.7 Preliminary Well Construction Schedule

The estimated duration of well drilling and construction is outlined below.

- Prepare preliminary well design, work plan, and technical specifications for contractor bidding: 4 weeks
- Review and approval by Applicant: 1 week
- Finalize design documents: 1 week
- Well drilling contractor bidding and procurement: 3 weeks
- Well construction permit: 2 weeks (concurrent with contractor bidding)
- Well drilling contractor mobilization: 1 week
- Well drilling and construction: 2 weeks
- Well development and testing: 2 weeks
- Well pump and equipment procurement and installation: 5 weeks

The estimated total duration from well design to equipping is approximately 4 to 5 months. The actual schedule will depend on contractor availability and may be modified to fit the Project needs.

4.0 CONCLUSION AND RECOMMENDATIONS

Tetra Tech completed a groundwater supply feasibility study to support the Applicant's construction water supply options and the CEC review for the construction of the Project on a rural property near Vacaville, California. Up to 30 acre-feet of water may be needed during the construction phase and, following construction, approximately 2.0 acre-feet of water will be required for landscape irrigation during the first year following installation and scaled back by 20 to 30 percent each year for complete shutoff of irrigation by year 3 through 5.

The purposes of the study were to 1) determine whether constructing a groundwater well onsite is feasible, achievable, affordable, and whether the well can meet the water demand for the specified project duration; and 2) obtain information to support the CEC Opt-in Application.

This study included collecting and reviewing available hydrogeological and environmental data, reports, and information from various public sources, and developing a local-scale numerical

groundwater model from a regional-scale USGS groundwater model to simulate and analyze groundwater dynamics under varying conditions to support the data needs for this groundwater supply feasibility study and CEC water resources permitting.

Conclusions derived from the results of this study and recommendations are provided below.

- The primary water-bearing formations within the Solano Subbasin beneath the Site include the Quaternary Alluvium and the Upper Tehama Formation. Based on the DWR well completion reports for water wells completed in the study area, water wells completed to less than 100 feet bgs in this area typically yield less than 30 gpm. Some deeper wells that extend into the Upper Tehama Formation aquifers that are 200 to 570 feet deep have produced from 200 to 460 gpm. As such, conceptually a water well onsite completed to approximately 300 to 500 feet bgs is expected to produce at least 100 gpm, which would easily meet the Project water demand of 30 acre-feet over the construction period, including up to approximately 20 to 40 gpm during site grading. Allowing for occasional peak water flow usage and the possibility of encountering lower than expected aquifer transmissivities, a design pumping rate of 60 gpm has been assumed for this project. A 60 gpm water well has the capacity to deliver a sufficient amount of water over the entire construction period, including higher usage rates during site preparation and grading activities.
- The estimated pumping water level drawdown in a hypothetical water well at the Site pumping at 60 gpm may range from approximately 34 to 40 feet bgs based on two estimation methods: a flow simulation on the local-scale numerical groundwater model developed by Tetra Tech and specific capacity for existing water well data, respectively. Based on these assumptions, a suitable well pump would be a 4-inch-diameter, 5-HP electrical submersible pump. The well pump specifications may vary depending on the actual findings during well testing, and based on the well test results a matching pump should be specified.
- The groundwater model pumping simulation of a 300-foot-deep well located near the center west side of the subject property pumping at a rate of 60 gpm indicated that the estimated interference drawdown at the closest nearby well would be 2.4 feet. All other possible wells within the 0.5-mile radius of the Site had less drawdown. The depth to groundwater in this area is approximately 15 feet, indicating a water column length of 85 feet available for pumping. The 2.4 feet loss of groundwater level represents approximately 3 percent loss of groundwater level, which is insignificant and not likely to cause water well issues. It should be noted that 2.4 feet of drawdown is not unusual for rural residential property owners to expect, as the neighbors will likely have water wells. Although the groundwater level drawdown at neighboring wells is unlikely to be an issue, as a precaution, the well site geologist should conduct aquifer zone testing during drilling and evaluate well screen placements. Screening below 100 feet bgs in the deeper aquifer zones would reduce the potential for drawdown impact to neighboring wells.
- The proposed use of the groundwater at the Site is non-potable, which the drinking water quality criteria do not apply. A review of available groundwater quality data from various data sources indicated no evidence of the presence of groundwater contamination in the vicinity of

the Site. Thus, there is no groundwater contamination that could possibly be mobilized by pumping from the Site.

- As an additional evaluation, numerical groundwater model particle tracking was utilized to estimate the time for a potential groundwater contamination from a potential source area to mobilize to a sensitive receptor. The results of particle tracking simulation indicated that the risk of groundwater pumping from the Site negatively impacting the groundwater quality is low because there is no known groundwater contamination in the groundwater source area, and any contamination, if present, would not be drawn to the groundwater pathway towards the Site because groundwater from this area is outside of the 100-year zone of influence.
- The average annual volume of groundwater extraction in the Solano Subbasin is reported to be approximately 180,000 acre-feet per year, and the groundwater storage in the Subbasin has been stable to increasing based on the observed groundwater levels and model simulated water budget results, and they are not expected to decline in the future. As such, there is no danger of declining groundwater supply in the Subbasin in the foreseeable future, according to the GSP. Given that no groundwater supply shortage is anticipated anytime during the next 50 years, and that the 30 acre-feet per year Project groundwater supply needs are miniscule in comparison, representing less than 0.02 percent of the annual average groundwater extraction from the Subbasin, the potential impact on groundwater aquifers is negligeable.
- To construct a water well, typically an area 100 feet by 100 feet at minimum is necessary for drilling rig and equipment set up. The Site is undeveloped vacant land and it is assumed that the well can be placed at a location where it is accessible by drilling rig and equipment and that meets the setback requirements.
- The Solano County Department of Resource Management requires the acquisition of a well construction permit prior to well drilling. The well permit application requires specific information on the well design including well location, planned completion depth, seals, and screened intervals. The county requires an identification of possible contaminating sources within 100 feet of the water supply well and minimum setback distances. None of the potential contaminating sources have been identified on the subject property, and there are no known encumbrances that prohibit meeting the minimum setback distances requirements at this time. The well drilling permit application form should be completed by the project geologist as it requires technical information.
- Waste groundwater will be produced during the well construction, development, and testing activities, which will require disposal. It is assumed that sufficient land area is available at the Site to spread the water on the ground for percolation or irrigation without allowing any runoff to drainage ditches, and if so, an NPDES permit would not be required, according to the Central Valley Regional Water Quality Control Board.
- During drilling and well construction, soil cuttings, drilling mud, and groundwater will be generated. Solid wastes and muddy water can be contained in roll-off bins and transported to an appropriate landfill for disposal.
- A preliminary estimated contractor's cost to drill, construct, and develop a 300- to 500-foot deep, 60 gpm water well at the Site may range from approximately $200,000 to $300,000,

assuming a typical non-potable water well with PVC well casing. Estimated cost to equip the well including an electric 5-HP submersible well pump may range from $20,000 to $30,000 for an assumed basic outdoor installation with a simple valve and a hose connection at the wellhead. These costs do not include bringing electrical power to the Site, water storage tanks, piping, or any contingency. These costs are preliminary and are not intended to be used for construction budget. A qualified water well hydrogeologist should be retained to design the well, prepare detailed scope of work and technical specifications for competitive contractor bidding, and provide well construction oversight.

- Preliminary estimated duration for well permitting and well design, contractor bidding, construction, and equipping is approximately 4 to 5 months. The actual schedule will depend on contractor availability and may be modified to fit the project needs.
- Based on the study findings, constructing a groundwater well as described in this study at the Site is feasible, achievable, affordable (a low capacity well), and can meet the specified water demand for the specified project duration. The study findings are based on a desktop study and computer modeling, which should be verified for accuracy by field testing. Information provided in this report is not intended to be used for construction.

5.0 LIMITATIONS

This report was prepared by Tetra Tech for the sole use by NextEra for the purpose of evaluating groundwater supply at the site known as the Corby Battery Energy Storage System Project, located in Solano County, California. This report was prepared based partially on information from outside sources and other information which is in the public domain. Tetra Tech makes no warranty as to the accuracy or completeness of information or statements made by others that are contained in this report, nor are any other warranties or guarantees, express or implied, included or intended in this report with respect to information from outside sources or conclusions or recommendations substantially based on information from outside sources. This report has been prepared in accordance with the current generally accepted practices and standards consistent with the level of care and skill exercised under similar circumstances by other professional consultants or firms performing the same or similar services. Since the information forming the basis for this report are subject to professional interpretation, differing conclusions could be reached. Tetra Tech does not assume responsibility for any damages or costs arising from parties relying on information contained in this report. This report represents the professional judgment of Tetra Tech; however, compliance with submitted recommendations or suggestions does not assure elimination of requirements or the fulfillment of NextEra's obligations under local, state, or federal laws, or any modifications or changes to such laws.

None of the work performed hereunder shall constitute or be represented as a legal opinion of any kind or nature but shall be a representation of findings of fact from records examined.

6.0 REFERENCES

Driscoll, F.G. 1986. Groundwater and Wells. Johnson Screens. January 1, 1986.

DWR (California Department of Water Resources). 2003. California's Groundwater, Bulletin 118. Sacramento River Hydrologic Region, Sacramento Valley Groundwater Basin, Solano Subbasin. Updated February 2004.

Faunt, C.C. (ed.). 2009. Groundwater Availability of the Central Valley Aquifer. U.S. Geological Survey Professional Paper 1766. 225 p. Available online at: https://pubs.usgs.gov/pp/1766/

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LSCE Team (Luhdorff & Scalmanini Consulting Engineers, Kennedy/Jenks Consultants, Inc., Davids Engineering, Inc., ERA Economics, and West Yost Associates). 2021. Solano Subbasin Groundwater Sustainability Plan. November 30, 2021. Approved by California Department of Water Resources on January 18, 2024.

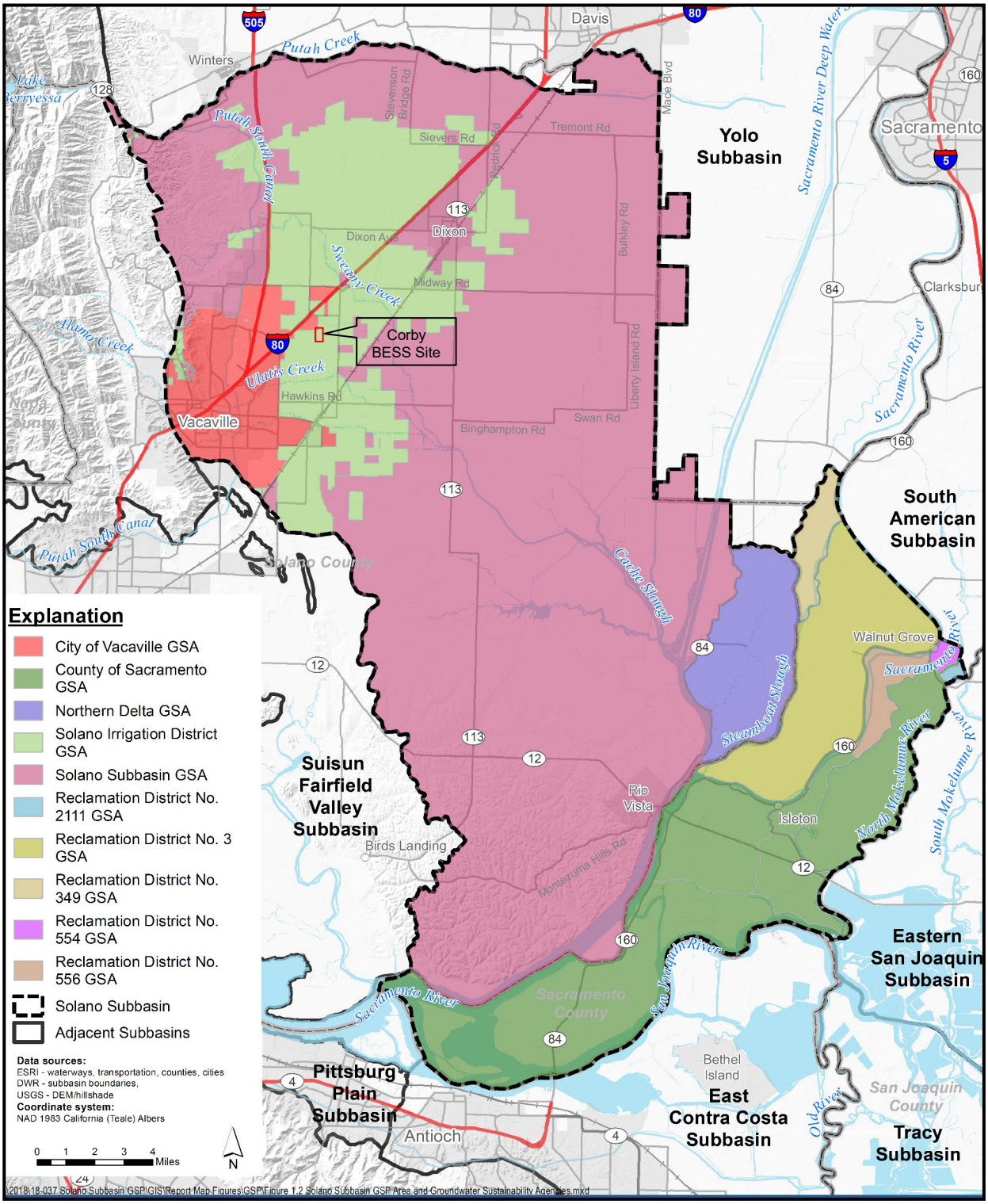
LSCE Team. 2024. Solano County and Solano Subbasin Groundwater Sustainability. Annual Report – Water Year 2023. March 2024.

NextEra (NextEra Energy Environmental Services). 2024. Phase I Environmental Site Assessment, Corby Battery Energy Storage System Project, Vacaville, Solano County, California. July 10, 2024.

Thomasson Jr., H.G., F.H. Olmsted, and E.F. LeRoux. 1960. Geology, Water Resources and Usable Ground-water Storage Capacity of Part of Solano County, California. U.S. Geological Survey Water Supply Paper 1464, Plate 9: Geologic sections C-C' and F-F', Solano County, California.

U.S. Geologic Surveys (USGS). [no date]. Central Valley Hydrologic Model: Numerical Model Data Set Files. Available online at: https://ca.water.usgs.gov/projects/central-valley/cvhm-numerical-model.html (downloaded September 2024).

FIGURES



TITLE:

Corby BESS Site Location

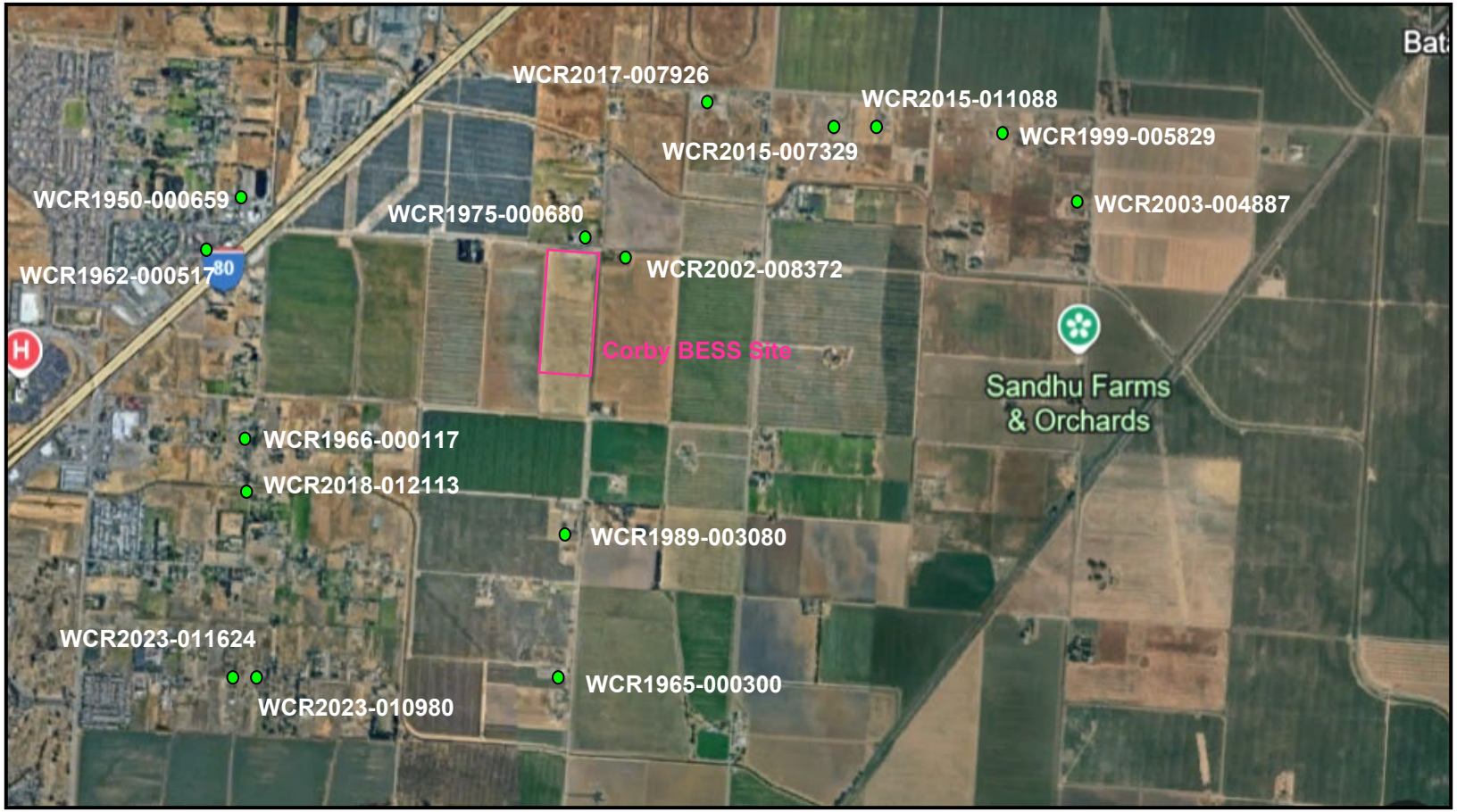
LOCATION:

Solano County, California

TETRA TECH

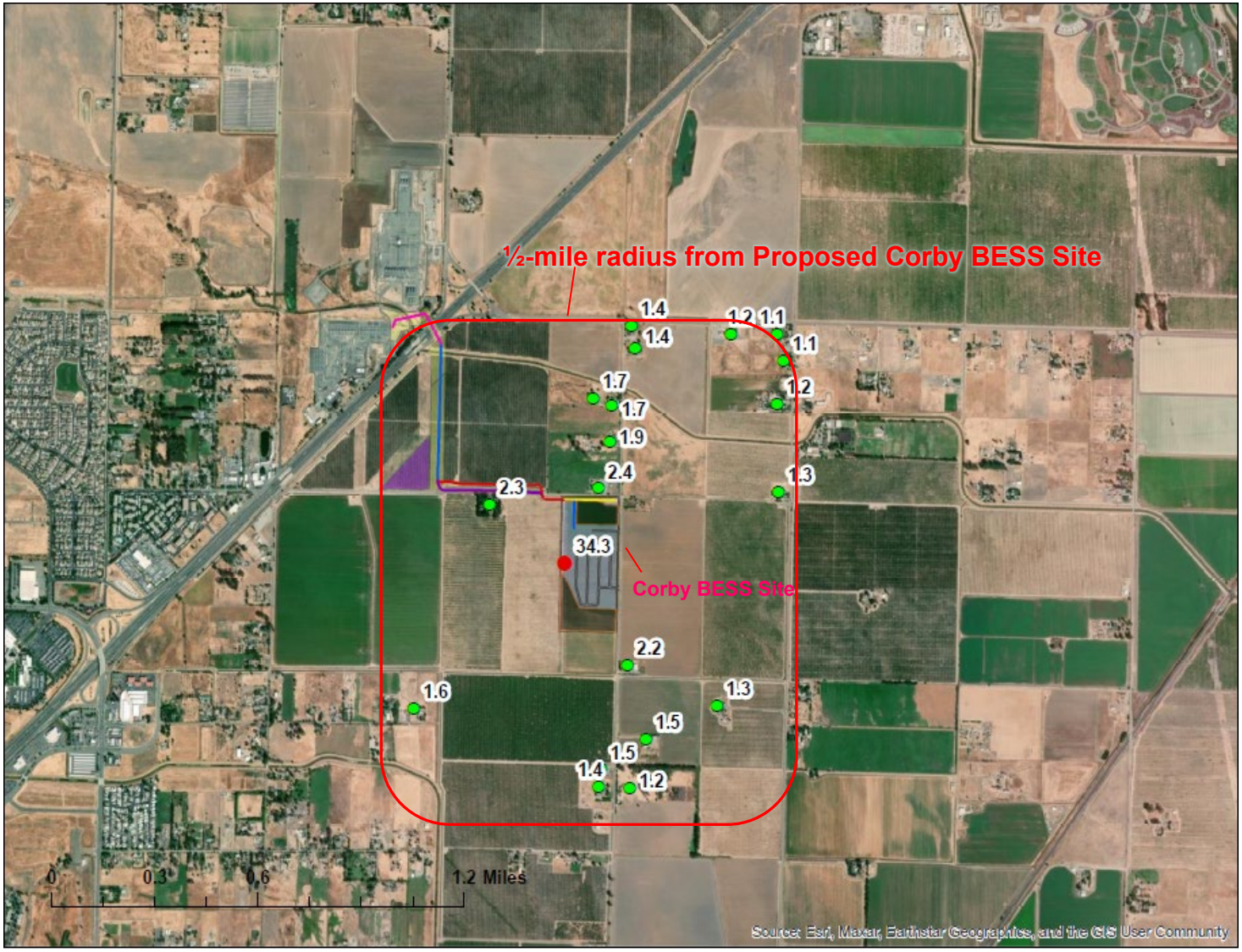
CHECKED:	DL
DRAFTED:	
PROJ.:	
DATE:	09/22/2024

Figure: 1



Water Well (from DWR Well Completion Reports Database). Presence, absence, or status of each well has not been verified.

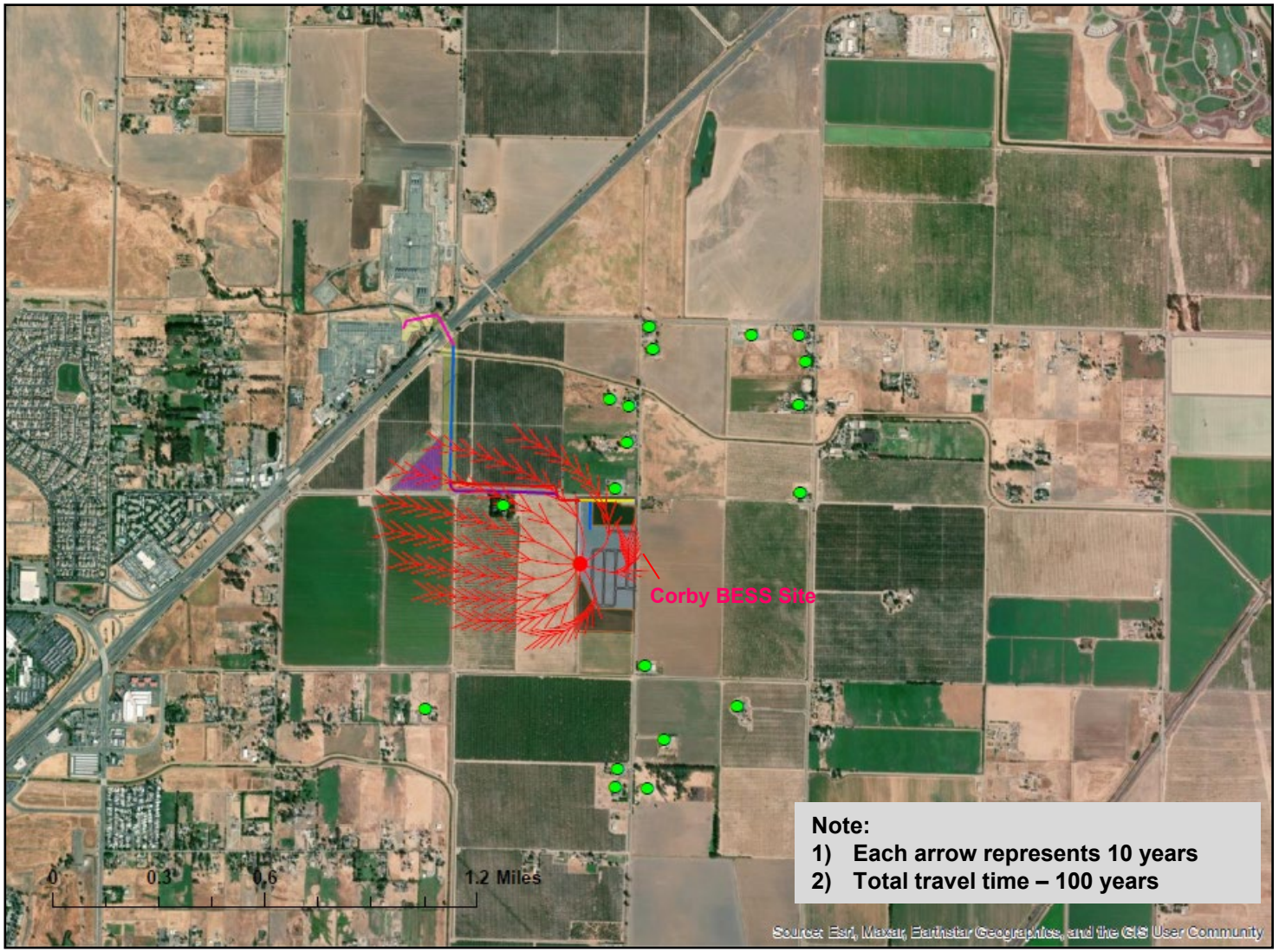
TITLE:	Water Well Locations
LOCATION:	Solano County, CA
TETRA TECH	CK BY: / DRAFTED BY: / PROJ: / DATE:
FIGURE:	2



Groundwater flow model simulated groundwater level drawdown in possible well locations within ½-mile of a proposed 300-foot deep well at Corby BESS site pumping at 60 gpm.

- Pumping Well
- Possible Water Well (assumed based on the presence of building)
- 2.2 Estimated water level drawdown in well (feet) caused by pumping at the Pumping Well

TITLE:	Groundwater Model Well Drawdown Simulation
LOCATION:	Solano County, CA
TETRA TECH	CK BY: / DRAFTED BY: / PROJ: / DATE:
FIGURE:	3



Groundwater flow model simulated pumping zone of influence from a 300-foot deep well at Corby BESS site pumping at 60 gpm.

- Pumping Well
- Possible Water Well (assumed based on the presence of building) within ½-mile of Corby BESS
- Particle Track: one arrow represents distance traveled in 10 years

TITLE:	Groundwater Pumping Zone of Influence Simulation
LOCATION:	Solano County, CA
TETRA TECH	CK BY: / DRAFTED BY: / PROJ: / DATE:
FIGURE:	4

ATTACHMENT A: WELL COMPLETION REPORTS

State of California

Well Completion Report

Form DWR 188 Auto-Completed 12/25/2023

WCR2023-011624

Owner's Well Number | Date Work Began: 09/27/2023 | Date Work Ended: 10/04/2023

Local Permit Agency: Solano County Department of Resource Management - Environmental Health

Secondary Permit Agency | Permit Number: W2023-0123 | Permit Date: 08/29/2023

Well Owner (must remain confidential pursuant to Water Code 13752)

Name: XXXXXXXXXXXXXXXXXXXX

Mailing Address: XXXXXXXXXXXXXXXXXXXX

XXXXXXXXXXXXXXXXXXXX

City: XXXXXXXXXXXXXXXXXXXX | State: XX | Zip: XXXXX

Planned Use and Activity

Activity: New Well

Planned Use: Water Supply Domestic

Well Location

Address: 5144 Maple Rd.

City: Vacaville | Zip: 95687 | County: Solano

Latitude: 38 Deg. 22 Min. 31.8719 Sec. N | Longitude: -121 Deg. 55 Min. 30.252 Sec. W

Dec. Lat.: 38.37552 | Dec. Long.: -121.92507

Vertical Datum | Horizontal Datum: WGS84

Location Accuracy | Location Determination Method

APN: 01342701000

Township: 06 N

Range: 01 W

Section: 12

Baseline Meridian: Mount Diablo

Ground Surface Elevation

Elevation Accuracy

Elevation Determination Method

Borehole Information

Orientation: Vertical | Specify

Drilling Method: Direct Rotary | Drilling Fluid: Bentonite

Total Depth of Boring: 200 Feet

Total Depth of Completed Well: 190 Feet

Water Level and Yield of Completed Well

Depth to first water: 140 (Feet below surface)

Depth to Static Water Level: 14 (Feet) | Date Measured: 10/04/2023

Estimated Yield*: 40 (GPM) | Test Type: Air Lift

Test Length: 6 (Hours) | Total Drawdown: (feet)

*May not be representative of a well's long term yield.

Geologic Log - Free Form

Depth from Surface Feet to Feet		Description
0	40	Brown Clay
40	100	Sandy Brown Clay
100	200	Grey Blue Sandy Clay

Casings

Casing #	Depth from Surface Feet to Feet		Casing Type	Material	Casings Specificatons	Wall Thickness (inches)	Outside Diameter (inches)	Screen Type	Slot Size if any (inches)	Description
1	0	140	Blank	PVC	OD: 6.625 in. | SDR: 17 | Thickness: 0.390 in.	0.39	6.625			
2	140	190	Screen	PVC	OD: 6.625 in. | SDR: 17 | Thickness: 0.390 in.	0.39	6.625	Milled Slots	0.032	

Annular Material

Depth from Surface Feet to Feet		Fill	Fill Type Details	Filter Pack Size	Description
0	5	Cement	Other Cement		cement
5	20	Bentonite	Other Bentonite		3/8 chips
20	120	Filter Pack	Other Gravel Pack		1/4x1/8 BE
120	200	Filter Pack	Other Gravel Pack		SRI#8

Other Observations:

Borehole Specifications

Depth from Surface Feet to Feet		Borehole Diameter (inches)
0	140	12
140	200	12

Certification Statement

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief

Name: PARKS WATER RESOURCES
Person, Firm or Corporation

P O BOX 494 (Address) | ZAMORA (City) | CA (State) | 95698 (Zip)

Signed: *electronic signature received* (C-57 Licensed Water Well Contractor) | 10/23/2023 (Date Signed) | 972963 (C-57 License Number)

DWR Use Only

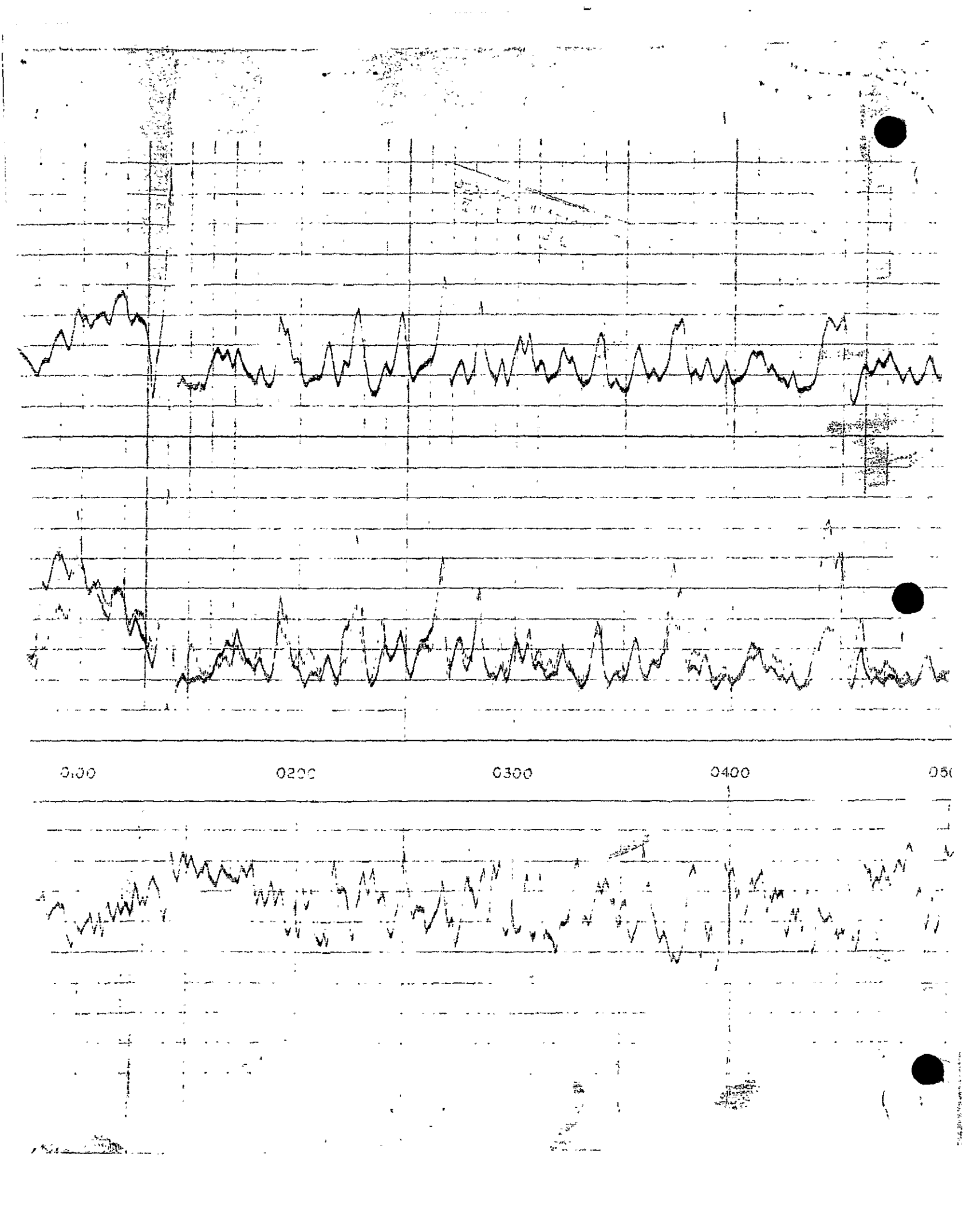
CSG #	State Well Number	Site Code	Local Well Number

N — Latitude Deg/Min/Sec

W — Longitude Deg/Min/Sec

TRS:

APN:


0100
0200
0300
0400

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STATE OF CALIFORNIA
DEPARTMENT OF PUBLIC WORKS

DIVISION OF WATER RESOURCES

SHEET 48-375

Do Not Fill In
State Well No. 6N/1W - 18A4
Other Well No. /
Region 5

WATER WELL DRILLERS REPORT

(Sections 7076, 7077, 7078, Water Code)

188

(1) **Driller:**
Name D. C. Crew
Address Route 1, Box 320
Vacaville, Calif.
License No. ____ Classification ____

Owne
Name
Addre

(2) **Proposed use or uses** *(check)*:
Domestic ☐ Municipal ☐
Irrigation ☐ Industrial ☒
Domestic and Irrigation ☐ Test well ☐
Other ____

(3) **Equipment used** *(check)*:
Rotary ☒
Cable ☐
Dug well ☐
Other ____

(4) **Type of work** *(check)*:
New well ☒ Reconditioning of well ☐
Deepening existing well ☐

(5) **Well log:**
Total depth of well 600 ft.

Give details of formations penetrated, such as silt, peat, muck, sand, gravel, clay, shale, sandstone, hardpan, rock. Include size of gravel (diameter) and sand (fine, medium, coarse), color of material, structure (loose, packed, cemented, soft, hard, brittle).

Depth From Ground Surface					
0	ft. to	2	ft.	Soil
2	" "	9	"	Clay-Yellow
9	" "	11	"	Sand
11	" "	44	"	Sandy Clay - Yellow
44	" "	50	"	Sand & Gravel - Loose
50	" "	73	"	Sandy Clay -Yellow
73	" "	86	"	Blue Clay - Soft
86	" "	90	"	Sand & Gravel - Loose
90	" "	95	"	Yellow Clay - Hard
95	" "	102	"	Gravel - Loose
102	" "	138	"	Blue Clay - Soft
138	" "	143	"	Clay - Gravel
143	" "	146	"	Gravel - Loose
146	" "	213	"	Yellow Clay
213	" "	222	"	Gravel
222	" "	228	"	Yellow Clay
228	" "	237	"	Sand & Gravel - Loose
237	" "	250	"	Yellow Clay
250	" "	253	"	Rock & Gravel
253	" "	308	"	Yellow Clay
308	" "	312	"	Gravel
312	" "	372	"	Yellow Clay
372	" "	375	"	Gravel
375	" "	385	"	Clay & Gravel - Hard
385	" "	411	"	Yellow Clay

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If additional space is required, continue on DWR Form No. 246—Supplement, and attach to respective report copies.

(6) **Casing left in well:**

LENGTH FT.	DIAMETER INCHES	SINGLE, DOUBLE, WELDED, OTHER	LBS. PER FOOT OR GAGE OF CASING	SEATING BELOW GROUND SURFACE, FT.
570	12	Welded	3/16 gage	570
			Plotted and Coded As Well 6N/1W-18A4	

Type and size of shoe or well ring ____ Welded joints—☒ Yes ☐ No

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48-375
SUPPLEMENTAL SHEET

WATER WELL DRILLERS REPORT

(Sections 7076, 7077, 7078, Water Code)

188

Do Not Fill In
State Well No. 6K/11E-1 B4
Other Well No.
Region 5

(5) Well log (continued):
Total depth of well 600 ft.

Give details of formations penetrated, such as silt, peat, muck, sand, gravel, clay, shale, sandstone, hardpan, rock. Include size of gravel (diameter) and sand (fine, medium, coarse), color of material, structure (loose, packed, cemented, soft, hard, brittle).

Depth From Ground Surface				
411	ft. to	422	ft.	Gravel - Loose
42[illegible]		41[illegible]		[illegible]ay - Hard
41				Loose
4[illegible]				ay
4[illegible]				Clay
483	" "	502	"	Gravel
502	" "	517	"	Yellow Clay
517	" "	522	"	Gravel - Loose
522	" "	551	"	Yellow Clay
551	" "	562	"	Gravel - Loose
562	" "	580	"	Clay - Hard
580	" "	600	"	Yellow Clay

COPIED
Sec. [illegible] 70[illegible]
Water Code

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48-375
SHEET 2

WATER WELL DRILLERS REPORT

(Sections 7076, 7077, 7078, Water Code)

188

Do Not Fill In
State Well No. 6N/1W-1B-5
Other Well No.
Region 5

(7) Perforations:

Type of perforator used Slotted

Perforated	78	ft. to	180	ft.	Hole size	3/16		No. of holes	1½ x 2½ Centers		
"	216	" "	270	"	"	"		"	"	"	
"	306	" "	324	"	"	"		"	"	"	
"	370	" "	388	"	"	"		"	"	"	
"	404	" "	422	"	"	"		"	"	"	
"	434	" "	452	"	"	"		"	"	"	
"	470	" "	524	"	"	"		"	"	"	
"	552	" "	570	"	"	"		"	"	"	
"		" "		"	"	"		"	"	"	
"		" "		"	"	"		"	"	"	

(8) Water levels:

Depth at which water first encountered 44 ft.
Depth to water before perforating ft.
Depth to water after perforating ft.
Note any change in water level while drilling

(9) Well pumping test:

Date of test 7/15 By whom E.E. Luhdorff
Depth to water when test started 35 ft.
G.P.M. at beginning of test 460
Drawdown from standing level 200 ft.
G.P.M. at completion of test 460
Drawdown at completion of test 200 ft.
Length of time tested 44 Hrs.
Temperature of water
Was gas present in water? ☐ Yes ☒ No

(10) General:

Was well gravel packed? yes Size of rock 1/4 x 3/4 Thickness of pack 6 in.
Was a surface sanitary seal provided?
Were any strata sealed against pollution? ☐ Yes ☒ No If yes, attach detailed description.
Strata sealed
Was analysis made of water? ☐ Yes ☐ No If yes, attach copy.
Was electric log made of well? ☒ Yes ☐ No If yes, attach copy.
If well abandoned, was it plugged and sealed?
Method of plugging and sealing

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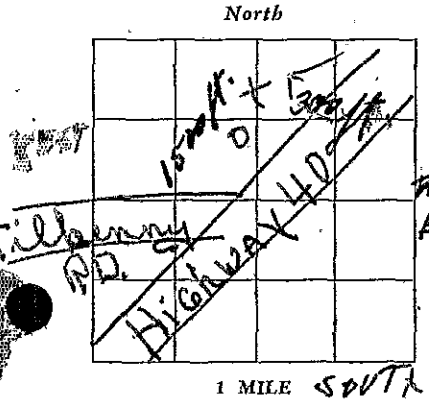
SUPPLEMENTAL
Sec. 7076.1, Water Code

(11) Location:



Section No. 1
Township Elmira 6N
Range 1W
Base & Meridian MD
Show location of well in Section, thus (X)
Distances to section lines from well, N or S 1000 ft. and E or W 1050 ft.
Show location of nearest known well, thus (O)
Distance to nearest known well 200 ft.

(12) Time of work:

Work started date 6/27 Completed date 7/8
Date of this report 7/10/50

WELL DRILLER'S STATEMENT:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

[SIGNED] (Well Driller)
By E. E. Luhdorff
License No. WB-1977 Classification C-57
Dated 7/10/50, 1950

06N01W01F

WATER WELL DRILLERS REPORT

(Sections 7076, 7077, 7078, Water Code)

STATE OF CALIFORNIA

1365

LOCATION NOT CHECKED

Do Not Fill In

No 76521

State Well No.

Other Well No. 6n/1w-1F

ORIGINAL

File Original, Duplicate and Triplicate with the REGIONAL WATER POLLUTION CONTROL BOARD No. 2 (Insert appropriate number)

(1) OWNER

Name

Address

(2) LOCATION OF WELL:

County Solano Owner's number, if any—

R. F. D. or Street No. County Rd. 621 A, Box 439

See Diagram, Item 11.

(3) TYPE OF WORK (*check*):

New well ☒ Deepening ☐ Reconditioning ☐ Abandon ☐

If abandonment, describe material and procedure in Item 11.

(4) PROPOSED USE (*check*):

Domestic ☒ Industrial ☐ Municipal ☐

Irrigation ☐ Test Well ☐ Other ☐

(5) EQUIPMENT:

Rotary ☒

Cable ☐

Dug Well ☐

(6) CASING INSTALLED:

SINGLE ☒ DOUBLE ☐

From ft.	to ft.	Diam.	Gage or Wall
0	100	6"	12

Type and size of shoe or well ring

Describe joint Butt Welded

If gravel packed

Diameter of Bore	from ft.	to ft.
None		

Size of gravel:

(7) PERFORATIONS:

Type of perforator used Acetylelene

Size of perforations 6 in., length, by 1/4 in.

From ft.	to ft.	Perf. per row	Rows per ft.
20	40	20	3
60	100	20	3

(8) CONSTRUCTION: To be provided by Owner.

Was a surface sanitary seal provided? ☐ Yes ☐ No To what depth ft.

Were any strata sealed against pollution? ☐ Yes ☒ No If yes, note depth of strata

From ft. to ft.

Method of Sealing

(9) WATER LEVELS:

Depth at which water was first found 75 ft.

Static level before perforating 70 ft.

Static level after perforating 70 ft.

(10) WELL TESTS: Tested by Bailing.

Was a pump test made? ☐ Yes ☐ No If yes, by whom?

Yield: 8 gal./min. with 25 ft. draw down after 20 hrs.

Temperature of water Was a chemical analysis made? ☐ Yes ☒ No

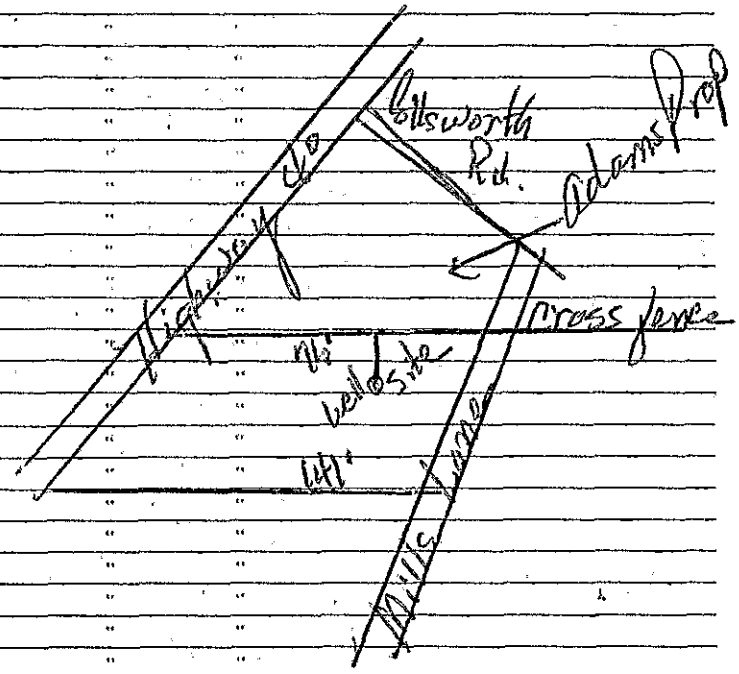
Was electric log made of well? ☐ Yes ☒ No

(11) WELL LOG:

Total depth 105 ft. Depth of completed well 100 ft.

Formation: *Describe by color, character, size of material, and structure.*

ft. to	ft.	
0	2	Top Soil
2	12	Clay
12	90	Sand & Clay
90	105	Blue Shale



CONFIDENTIAL Section 7076.1, Water Code

FOR OFFICIAL USE ONLY

Work started 6 Sept. 19 62 Completed 6 Sept. 19 62

WELL DRILLER'S STATEMENT:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

NAME Doshier-Gregson Well Drilling Service

(Person, firm, or corporation) (*Typed or printed*)

Address 1554 Green Island Rd.

Vallejo, California

[SIGNED] J. W. Doshier

Well Driller

License No. 208135 Dated 10 Sept., 19 62

57025 6-57 50M QUIN △ SPO

DWR 188 (REV. 3-54)

ORIGINAL
File Original, Duplicate and Triplicate with the REGIONAL WATER POLLUTION CONTROL BOARD No. 2
(Insert appropriate number)

WATER WELL DRILLERS REPORT
(Sections 7076, 7077, 7078, Water Code) 1576
THE RESOURCES AGENCY OF CALIFORNIA

Do Not Fill In
No 120838
State Well No. _____
Other Well No. 6/16

(2) LOCATION OF WELL:
County Solano Owner's number, if any—
R. F. D. or Street No. L. L. Bommersbach
2 miles North of Elmira on Byrnes Rd. (No #)

(3) TYPE OF WORK (check):
New well ☒ Deepening ☐ Reconditioning ☐ Abandon ☐
If abandonment, describe material and procedure in Item 11.

(4) PROPOSED USE (check):
Domestic ☒ Industrial ☐ Municipal ☐
Irrigation ☐ Test Well ☐ Other ☐

(5) EQUIPMENT:
Rotary ☒
Cable ☐
Dug Well ☐

(6) CASING INSTALLED:
SINGLE ☒ DOUBLE ☐

From ft.	to ft.	Diam.	Gage or Wall
0	100	6"	12

If gravel packed

Diameter of Bore	from ft.	to ft.
None		

Type and size of shoe or well ring
Size of gravel:
Describe joint Butt Weld

(7) PERFORATIONS:
Type of perforator used Aceytelene
Size of perforations 6 in., length, by 1/4 in.

From ft.	to ft.	Perf. per row	Rows per ft.
20	100	20	3

(8) CONSTRUCTION: By Owner
Was a surface sanitary seal provided? ☐ Yes ☐ No To what depth ft.
Were any strata sealed against pollution? ☐ Yes ☒ No If yes, note depth of strata

From ft.	to ft.

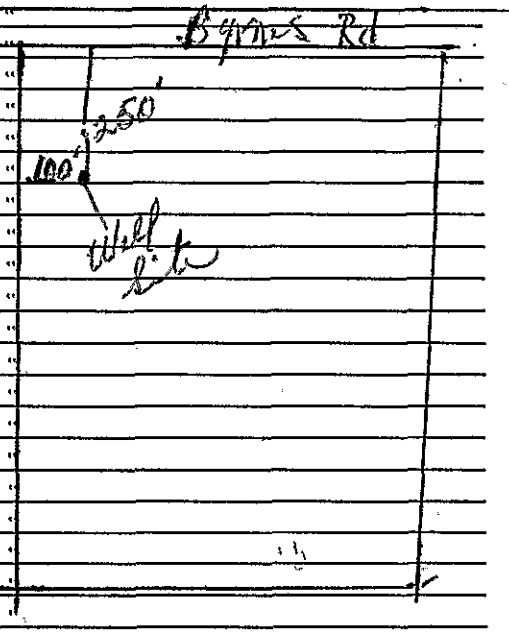
Method of Sealing

(9) WATER LEVELS:
Depth at which water was first found 46 ft.
Standing level before perforating 20 ft.
Standing level after perforating 20 ft.

(10) WELL TESTS: Tested by Bailing. Drillers
Was a pump test made? ☐ Yes ☐ No If yes, by whom?
Yield: 30 gal./min. with 15 ft. draw down after 2 hrs.
Temperature of water Was a chemical analysis made? ☐ Yes ☒ No
Was electric log made of well? ☐ Yes ☒ No

(11) WELL LOG:
Total depth 100 ft. Depth of completed well 100 ft.
Formation: *Describe by color, character, size of material, and structure.*

ft. to	ft.	
0	4	Fill
4	11	Red Clay
11	13	Sand
13	26	Red Clay
26	29	Sand
29	46	Red Clay
46	51	Sand
51	84	Red Clay
84	96	Red Clay
96	100	Blue Clay



FOR OFFICIAL USE ONLY

Work started Sept. 16 1965. Completed Sept. 17 1965

WELL DRILLER'S STATEMENT:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.
NAME Doshier-Gregson Well Drilling Service
(Person, firm, or corporation) *(Typed or printed)*
Address 1554 Green Island Rd.
Vallejo, Calif.
[SIGNED] _____ *Well Driller*
License No. 208135 Dated Sept. 20, 1965

87649 5-63 25M QUIN ⓘ △ SPO DWR 188 (REV. 3-54)

ORIGINAL
File Original, Duplicate and Triplicate with the REGIONAL WATER POLLUTION CONTROL BOARD No. 2
(Insert appropriate number)

WATER WELL DRILLERS REPORT
(Sections 7076, 7077, 7078, Water Code)

THE RESOURCES AGENCY OF CALIFORNIA

Do Not Fill In
No. 117739

State Well No. /
Other Well No. 6/1W-12

(1) OWNER:

(2) LOCATION OF WELL:

County Solano Owner's number, if any—

R. F. D. or Street No. Route 2, Box 795
Walnut Rd. (no #)

(3) TYPE OF WORK (check):

New well ☒ Deepening ☐ Reconditioning ☐ Abandon ☐

If abandonment, describe material and procedure in Item 11.

(4) PROPOSED USE (check):

Domestic ☒ Industrial ☐ Municipal ☐
Irrigation ☐ Test Well ☐ Other ☐

(5) EQUIPMENT:

Rotary ☒
Cable ☐
Dug Well ☐

(6) CASING INSTALLED:

SINGLE ☒ DOUBLE ☐

From ft.	to ft.	Diam.	Gage or Wall
0	100	6"	12

Type and size of shoe or well ring

Describe joint Butt Weld

If gravel packed

Diameter of Bore	from ft.	to ft.
8"		
None		

Size of gravel:

(7) PERFORATIONS:

Type of perforator used Aceytlene

Size of perforations 6" in., length, by 1/4 in.

From ft.	to ft.	Perf. per row	Rows per ft.
40	100	20	3

(8) CONSTRUCTION: By Owner

Was a surface sanitary seal provided? ☐ Yes ☐ No To what depth ft.

Were any strata sealed against pollution? ☐ Yes ☒ No If yes, note depth of strata

From ft.	to ft.

Method of Sealing

(9) WATER LEVELS:

Depth at which water was first found 28, 50 & 53 ft.

Standing level before perforating 17 ft.

Standing level after perforating 17 ft.

(10) WELL TESTS: Tested by bailing!

Was a pump test made? ☐ Yes ☐ No If yes, by whom? Drillers

Yield: 30 gal./min. with 50 ft. draw down after 2 hrs.

Temperature of water Was a chemical analysis made? ☐ Yes ☒ No

Was electric log made of well? ☐ Yes ☒ No

(11) WELL LOG:

Total depth 105 ft. Depth of completed well 100 ft.

Formation: *Describe by color, character, size of material, and structure.*

ft. to	ft.	
0	2	Brown Soil
2	10	Brown Clay
10	58	Sandy Clay
58	70	Lt. Brown Clay
70	92	Gray Clay
92	105	Lt. Brown Clay

CONFIDENTIAL LOG
Water Code Sec. 7080

FOR OFFICIAL USE ONLY

Work started August 20 1966. Completed August 21 1966

WELL DRILLER'S STATEMENT:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

NAME Doshier-Gregson Well Drilling Serv. (Person, firm, or corporation) (Typed or printed)

Address 5365 Napa-Vallejo Highway

Vallejo, Calif.

[SIGNED] (Well Driller)

License No. 208135 Dated Sept. 15, 1966

CONFIDENTIAL LOG

ORIGINAL
File with DWR

CONFIDENTIAL LOG
Water Code Sec. 13752

STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES

WATER WELL DRILLERS REPORT

CONFIDENTIAL LOG
Water Code Sec. 13752

Do Not Fill In

No 150685

State Well No. 6N/1E-6F2

Other Well No. 6N/1E-6F

(2) LOCATION OF WELL:

County Solano — Owner's number, if any

Township, Range, and Section T.6N R.1E Sec. 6

Distance from cities, roads, railroads, etc.

(3) TYPE OF WORK *(check)*:

New Well ☒ Deepening ☐ Reconditioning ☐ Destroying ☐

If destruction, describe material and procedure in Item 11.

(4) PROPOSED USE *(check)*:

Domestic ☒ Industrial ☐ Municipal ☐
Irrigation ☐ Test Well ☐ Other ☐

(5) EQUIPMENT:

Rotary ☒
Cable ☐
Other ☐

(6) CASING INSTALLED:

STEEL: SINGLE ☐ DOUBLE ☐ OTHER: Plastic

If gravel packed

From ft.	To ft.	Diam.	Gage or Wall	Diameter of Bore	From ft.	To ft.
0	102	5"	3/16	9"	0	100

Size of shoe or well ring: Plug

Size of gravel: ¼ X ½"

Describe joint Collars - Glue

(7) PERFORATIONS OR SCREEN:

Type of perforation or name of screen Slot

From ft.	To ft.	Perf. per row	Rows per ft.	Size in. x in.
40	50	10	1	1/8 X 6"
80	100			

(8) CONSTRUCTION:

Was a surface sanitary seal provided? Yes ☒ No ☐ To what depth 20 ft.

Were any strata sealed against pollution? Yes ☐ No ☐ If yes, note depth of strata

From ft. to ft.

From ft. to ft.

Method of sealing Cement Grout

(9) WATER LEVELS:

Depth at which water was first found, if known ft.

Standing level before perforating, if known ft.

Standing level after perforating and developing ft.

(10) WELL TESTS:

Was pump test made? Yes ☐ No ☒ If yes, by whom?

Yield: gal./min. with ft. drawdown after hrs.

Temperature of water Was a chemical analysis made? Yes ☐ No ☒

Was electric log made of well? Yes ☐ No ☒ If yes, attach copy

(11) WELL LOG:

Total depth 100 ft. Depth of completed well 100 ft.

Formation: *Describe by color, character, size of material, and structure*

	ft. to	ft.
Soil	0	2
Clay	2	14
Gravel	14	19
Clay	19	45
Sand	45	48
Clay	48	82
Sand & Gravel	82	87
Blue Clay	87	100

Work started 12-26- 1975 , Completed 12-27 1975

WELL DRILLER'S STATEMENT:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

NAME (Person, firm, or corporation) *(Typed or printed)* VACA DRILLING CO.

Address 4452 CHERRY GLEN RD.
VACAVILLE, CALIF. 95688

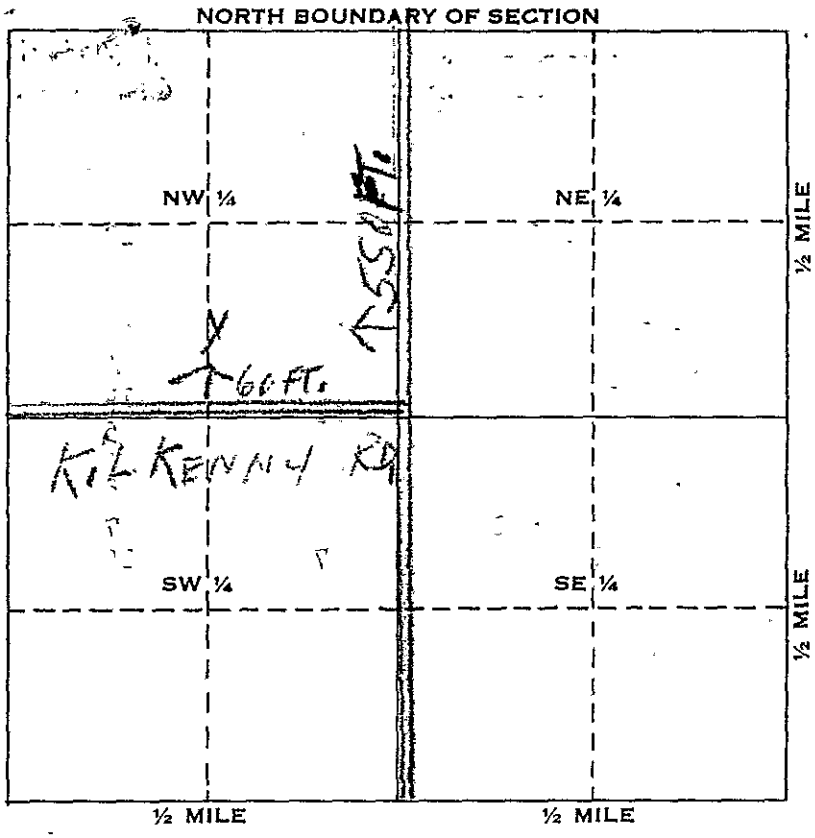
[SIGNED] *(Well Driller)*

License No. 98441 Dated 1-12, 1976

SKETCH LOCATION OF WELL ON REVERSE SIDE

WELL LOCATION SKETCH

150685

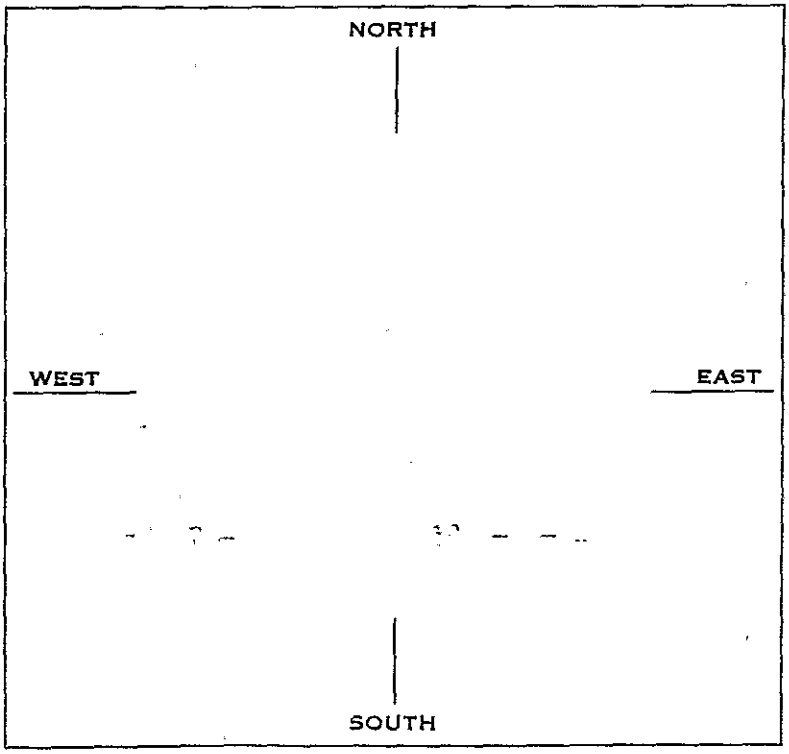


Township T. 6 N. N/S

Range R. 1 E. E/W

Section No. -6-

A. Location of well in sectionized areas.
Sketch roads, railroads, streams, or other features as necessary.



B. Location of well in areas not sectionized.
Sketch roads, railroads, streams, or other features as necessary.
Indicate distances.

ORIGINAL
File with DWR

STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES

WATER WELL DRILLERS REPORT

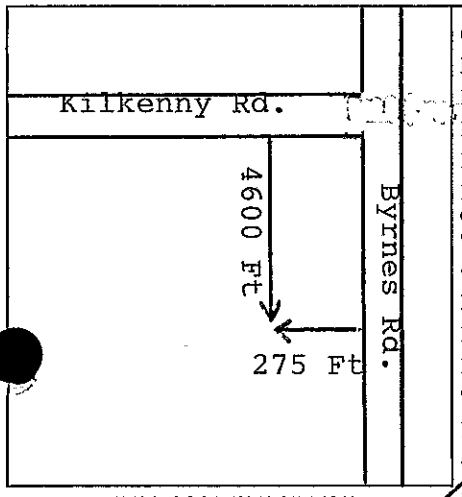
Do not fill in
No. 274183

Notice of Intent No. 244996
Local Permit No. or Date _____ Vaca or Elmira

State Well No. _____
Other Well No. 06N01E07F

(2) LOCATION OF WELL (See instructions):

County Solano Owner's Well Number _____
Well address if different from above _____
Township 6N Range 1E Section 7
Distance from cities, roads, railroads, fences, etc.
275 ft. west of Byrnes Rd.
4600 ft. south of Kilkenny Rd.



WELL LOCATION SKETCH

(3) TYPE OF WORK:

New Well ☒ Deepening ☐
Reconstruction ☐
Reconditioning ☐
Horizontal Well ☐
Destruction ☐ (Describe destruction materials and procedures in Item 12)

(4) PROPOSED USE:

Domestic ☒
Irrigation ☐
Industrial ☐
Test Well ☐
Municipal ☐
Other ☐
(Describe)

(5) EQUIPMENT:

Rotary ☒ Reverse ☐
Cable ☐ Air ☐
Other ☐ Bucket ☐

(6) GRAVEL PACK:

Yes ☒ No ☐ Size ¼ X ½ "
Diameter of bore 9"
Packed from 20 to 240 ft.

(7) CASING INSTALLED:

Steel ☐ Plastic ☒ Concrete ☐

From ft.	To ft.	Dia. in.	Gage or Wall
0	241	5	PVC ¼"

(8) PERFORATIONS:

Type of perforation or size of screen

From ft.	To ft.	Slot size
220	240	.032

(9) WELL SEAL:

Was surface sanitary seal provided? Yes ☒ No ☐ If yes, to depth 20 ft.
Were strata sealed against pollution? Yes ☐ No ☒ Interval _____ ft.
Method of sealing Cement grout

(10) WATER LEVELS:

Depth of first water, if known _____ ft.
Standing level after well completion _____ ft.

(11) WELL TESTS:

well test made? Yes ☐ No ☒ If yes, by whom? _____
e of test Pump ☐ Bailer ☐ Air lift ☐
Depth to water at start of test _____ ft. At end of test _____ ft.
Discharge _____ gal/min after _____ hours Water temperature _____
Chemical analysis made? Yes ☐ No ☒ If yes, by whom? _____
Was electric log made Yes ☐ No ☒ If yes, attach copy to this report

(12) WELL LOG:

Total depth 240 ft. Completed depth 240 ft.

from ft.	to ft.	Formation (Describe by color, character, size or material)
0	2	soil
2	57	clay
57	60	sandy
60	90	clay
90	220	blue clay
220	230	sand
230	240	brown clay

APN 141-070-10
141-070-05

Work started 2-2 19 89 Completed 2-3 19 89

WELL DRILLER'S STATEMENT:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

Signed _____ (Well Driller)
NAME Vaca Drilling Co. (Person, firm, or corporation) (Typed or printed)
Address P.O. Box 759
City Vacaville, CA ZIP 95696
License No. 532679 Date of this report 2-6-89

DWR 188 (REV. 12-86) IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM 86 96355

ORIGINAL
File with DWR

Page 1 of 1

STATE OF CALIFORNIA
WELL COMPLETION REPORT
Refer to Instruction Pamphlet

No. 822163

DWR USE ONLY — DO NOT FILL IN
STATE WELL NO./STATION NO. 06N01E05S
LATITUDE / LONGITUDE
APN/TRS/OTHER

Owner's Well No. B 05336
Date Work Began 07/13/99, Ended 07/14/99
Local Permit Agency Solano County Environmental Mgt.
Permit No. W-99-29 Permit Date 07/12/99

GEOLOGIC LOG

ORIENTATION (✓) X VERTICAL ___ HORIZONTAL ___ ANGLE ___ (SPECIFY)
DRILLING METHOD Rotary FLUID Mud

DEPTH FROM SURFACE Ft	to Ft.	DESCRIPTION *Describe material, grain size, color, etc.*
0	2	Soil
2	30	Clay
30	38	Sand & Fine Gravel
38	75	Clay
75	89	Sand & Fine Gravel
89	116	Clay
116	125	Sand & Sandy Clay
125	130	Brown Clay
130	140	Blue Clay
		325 Ft. South of Weber Rd.
		1450 Ft. West of Fox Rd.

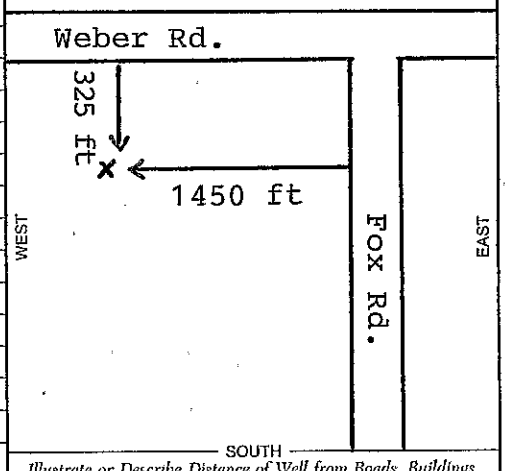
TOTAL DEPTH OF BORING 140 (Feet)
TOTAL DEPTH OF COMPLETED WELL 140 (Feet)

WELL OWNER

WELL LOCATION

Address 5738 Weber Rd.
City Vacaville
County Solano
APN Book 141 Page 020 Parcel 120
Township 6N Range 1E Section 5
Latitude ___ DEG. ___ MIN. ___ SEC. NORTH
Longitude ___ DEG. ___ MIN. ___ SEC. WEST

LOCATION SKETCH



Illustrate or Describe Distance of Well from Roads, Buildings, Fences, Rivers, etc. and attach a map. Use additional paper if necessary. PLEASE BE ACCURATE & COMPLETE.

ACTIVITY (✓)

X NEW WELL
MODIFICATION/REPAIR
___ Deepen
___ Other (Specify)
___ DESTROY *(Describe Procedures and Materials Under "GEOLOGIC LOG")*

PLANNED USES (✓)

WATER SUPPLY
X Domestic ___ Public
___ Irrigation ___ Industrial
MONITORING ___
TEST WELL ___
CATHODIC PROTECTION ___
HEAT EXCHANGE ___
DIRECT PUSH ___
INJECTION ___
VAPOR EXTRACTION ___
SPARGING ___
REMEDIATION ___
OTHER (SPECIFY) ___

WATER LEVEL & YIELD OF COMPLETED WELL

DEPTH TO FIRST WATER ___ (Ft.) BELOW SURFACE
DEPTH OF STATIC WATER LEVEL ___ (Ft.) & DATE MEASURED ___
ESTIMATED YIELD * ___ (GPM) & TEST TYPE ___
TEST LENGTH ___ (Hrs.) TOTAL DRAWDOWN ___ (Ft.)
** May not be representative of a well's long-term yield.*

CASING (S)

DEPTH FROM SURFACE Ft.	to Ft.	BORE-HOLE DIA. (Inches)	TYPE (✓) BLANK	SCREEN	CON-DUCTOR	F.L. PIPE	MATERIAL / GRADE	INTERNAL DIAMETER (Inches)	GAUGE OR WALL THICKNESS	SLOT SIZE IF ANY (inches)
0	70	10"	X				F-480	5"	1/4"	
70	90	10"		X			F-480	5"	1/4"	.032
90	110	10"	X				F-480	5"	1/4"	
110	140	10"		X			F-480	5"	1/4"	.032

ANNULAR MATERIAL

DEPTH FROM SURFACE Ft.	to Ft.	TYPE CEMENT (✓)	BENTONITE (✓)	FILL (✓)	FILTER PACK (TYPE/SIZE)
0	50	X			Pumped-in
50	140				Birdseye Gravel

ATTACHMENTS (✓)

___ Geologic Log
___ Well Construction Diagram
___ Geophysical Log(s)
___ Soil/Water Chemical Analyses
___ Other ___

ATTACH ADDITIONAL INFORMATION, IF IT EXISTS.

CERTIFICATION STATEMENT

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief.

NAME VACA DRILLING CO./ Del Crew Jr.
(PERSON, FIRM, OR CORPORATION) (TYPED OR PRINTED)

ADDRESS P. O. Box 759 CITY Vacaville STATE CA ZIP 95696

Signed Delbert Crew Jr. (WELL DRILLER/AUTHORIZED REPRESENTATIVE) DATE SIGNED 7-22-99 C-57 LICENSE NUMBER 532679

DWR 188 REV. 11-97

IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

VP

ORIGINAL
File with DWR

Page 1 of 1

STATE OF CALIFORNIA
WELL COMPLETION REPORT
Refer to Instruction Pamphlet

No. 818236

DWR USE ONLY — DO NOT FILL IN
06N 01E 06
STATE WELL NO./STATION NO
LATITUDE LONGITUDE
APN/TRS/OTHER

Owner's Well No. B 05247
Date Work Began 05/14/02 Ended 05/15/02
Local Permit Agency Solano County Environmental Mgt.
Permit No. W-02-13 Permit Date 05/02/02

GEOLOGIC LOG

ORIENTATION (✓) X VERTICAL ___ HORIZONTAL ___ ANGLE ___ (SPECIFY)
DRILLING METHOD Rotary FLUID Mud

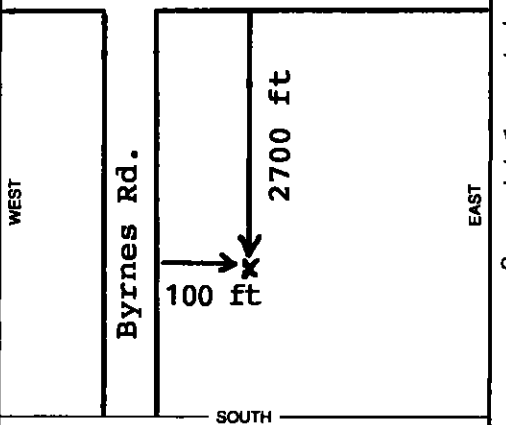
DEPTH FROM SURFACE Ft	to Ft.	DESCRIPTION *Describe material, grain size, color, etc.*
0	3	Soil
3	7	Clay
7	11	Sand
11	19	Clay
19	24	Sand
24	45	Clay
45	51	Sand
51	75	Clay
75	79	Sand & Fine Gravel
79	96	Clay
96	101	Sand
101	120	Blue Clay & Sandy Blue Clay

TOTAL DEPTH OF BORING 120 (Feet)
TOTAL DEPTH OF COMPLETED WELL 120 (Feet)

WELL LOCATION

Address 100 Ft. East of Byrnes Rd.
City 2700 Ft. South of Weber Rd.
County Solano
APN Book 0141 Page 030 Parcel 030
Township 6N Range 1E Section 6
Latitude ___ DEG. ___ MIN. ___ SEC. NORTH Longitude ___ DEG. ___ MIN. ___ SEC. WEST

LOCATION SKETCH



Illustrate or Describe Distance of Well from Roads, Buildings, Fences, Rivers, etc. and attach a map. Use additional paper if necessary. ***PLEASE BE ACCURATE & COMPLETE.***

ACTIVITY (✓)

X NEW WELL
MODIFICATION/REPAIR
___ Deepen
___ Other (Specify)
___ DESTROY *(Describe Procedures and Materials Under "GEOLOGIC LOG")*

PLANNED USES (✓)

WATER SUPPLY
X Domestic ___ Public
___ Irrigation ___ Industrial
MONITORING ___
TEST WELL ___
CATHODIC PROTECTION ___
HEAT EXCHANGE ___
DIRECT PUSH ___
INJECTION ___
VAPOR EXTRACTION ___
SPARGING ___
REMEDIATION ___
OTHER (SPECIFY) ___

WATER LEVEL & YIELD OF COMPLETED WELL

DEPTH TO FIRST WATER ___ (Ft.) BELOW SURFACE
DEPTH OF STATIC WATER LEVEL ___ (Ft.) & DATE MEASURED ___
ESTIMATED YIELD * ___ (GPM) & TEST TYPE ___
TEST LENGTH ___ (Hrs.) TOTAL DRAWDOWN ___ (Ft.)
** May not be representative of a well's long-term yield.*

CASING (S)

DEPTH FROM SURFACE Ft.	to Ft.	BORE-HOLE DIA. (Inches)	TYPE (✓) BLANK	SCREEN	CONDUCTOR	FILL PIPE	MATERIAL / GRADE	INTERNAL DIAMETER (Inches)	GAUGE OR WALL THICKNESS	SLOT SIZE IF ANY (Inches)
0	40	10"	X				F-480	5"	1/4"	
40	100	10"		X			F-480	5"	1/4"	.032
100	112	10"	X				F-480	5"	1/4"	
112	120	10"		X			F-480	5"	1/4"	.032

ANNULAR MATERIAL

DEPTH FROM SURFACE Ft.	to Ft.	TYPE CEMENT (✓)	BENTONITE (✓)	FILL (✓)	FILTER PACK (TYPE/SIZE)
0	35		X		
35	120				Birdseye Gravel

ATTACHMENTS (✓)

___ Geologic Log
___ Well Construction Diagram
___ Geophysical Log(s)
___ Soil/Water Chemical Analyses
___ Other ___

ATTACH ADDITIONAL INFORMATION, IF IT EXISTS.

CERTIFICATION STATEMENT

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief.

NAME VACA DRILLING CO./ Del Crew Jr.
(PERSON, FIRM, OR CORPORATION) (TYPED OR PRINTED)

ADDRESS P.O. Box 7591 CITY Vacaville STATE CA ZIP 95696

Signed Delbert Crew Jr. 5-16-02
WELL DRILLER/AUTHORIZED REPRESENTATIVE DATE SIGNED

C-57 LICENSE NUMBER 532679

DWR 188 REV 11-97

IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

ORIGINAL
File with DWR

Page ___ of ___

Owner's Well No. ___

Date Work Began 6/23/03 Ended 6/26/03

Local Permit Agency Solano County Dept. of Env. Mgmnt.

Permit No. W-03-19 Permit Date ___

STATE OF CALIFORNIA
WELL COMPLETION REPORT
Refer to Instruction Pamphlet

No. 798562

DWR USE ONLY — DO NOT FILL IN
06N01E08
STATE WELL NO./STATION NO.
LATITUDE LONGITUDE
APN/TRS/OTHER

GEOLOGIC LOG

ORIENTATION (✓) X VERTICAL ___ HORIZONTAL ___ ANGLE ___ (SPECIFY)
DRILLING METHOD Rotary FLUID Mud

DEPTH FROM SURFACE Ft. to Ft.	DESCRIPTION *Describe material, grain size, color, etc.*
0 21	Clay
21 23	Sand
23 46	Clay
46 48	Sand
48 63	Clay
63 65	Gravel
65 70	Clay
70 75	Sand and small gravel
75 100	Clay
100 109	Clay and Gravel Streaks
109 133	Clay
133 140	Soft Fractured clay
140 145	Clay
145 155	Blue Clay
155 160	Soft blue clay
160 177	Blue clay
177 185	Soft blue clay
185 196	Sand and gravel
196 197	Clay
197 199	Fractured sandstone
199 210	Blue Clay

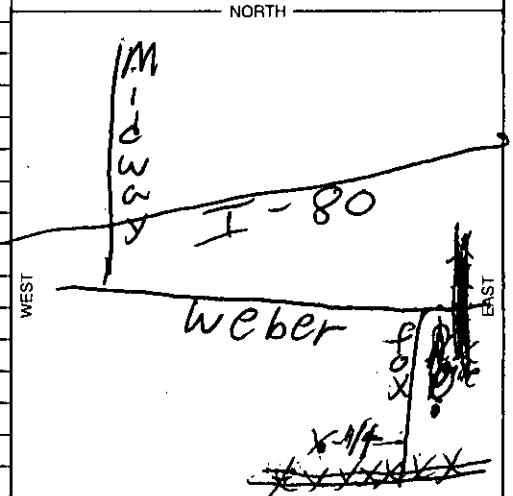
TOTAL DEPTH OF BORING 210 (Feet)
TOTAL DEPTH OF COMPLETED WELL 110 (Feet)

WELL OWNER

WELL LOCATION

Address Fox Road
City Vacaville
County Solano
APN Book 141 Page 090 Parcel 240
Township ___ Range ___ Section ___
Latitude ___ DEG. ___ MIN. ___ SEC. NORTH
Longitude ___ DEG. ___ MIN. ___ SEC. WEST

LOCATION SKETCH



Illustrate or Describe Distance of Well from Roads, Buildings, Fences, Rivers, etc. and attach a map. Use additional paper if necessary. PLEASE BE ACCURATE & COMPLETE.

ACTIVITY (✓)
X NEW WELL
MODIFICATION/REPAIR
___ Deepen
___ Other (Specify)
___ DESTROY *(Describe Procedures and Materials Under "GEOLOGIC LOG")*

PLANNED USES (✓)
WATER SUPPLY
X Domestic ___ Public
___ Irrigation ___ Industrial
___ MONITORING
___ TEST WELL
___ CATHODIC PROTECTION
___ HEAT EXCHANGE
___ DIRECT PUSH
___ INJECTION
___ VAPOR EXTRACTION
___ SPARGING
___ REMEDIATION
___ OTHER (SPECIFY)

WATER LEVEL & YIELD OF COMPLETED WELL

DEPTH TO FIRST WATER 7 (Ft.) BELOW SURFACE
DEPTH OF STATIC WATER LEVEL 7 (Ft.) & DATE MEASURED June-30-03
ESTIMATED YIELD 60 (GPM) & TEST TYPE Air
TEST LENGTH 4 (Hrs.) TOTAL DRAWDOWN 60 (Ft.)
** May not be representative of a well's long-term yield.*

CASING (S)

DEPTH FROM SURFACE Ft. to Ft.	BORE-HOLE DIA. (Inches)	TYPE (✓) BLANK	SCREEN	CON-DUCTOR	FILL PIPE	MATERIAL / GRADE	INTERNAL DIAMETER (Inches)	GAUGE OR WALL THICKNESS	SLOT SIZE IF ANY (Inches)
0 70	10	x				pvc	6	cl-200	
70 80	10		x			pvc	6	cl-200	.032
80 100	10	x				pvc	6	cl-200	
100 110	10		x			pvc	6	cl-200	.032

ANNULAR MATERIAL

DEPTH FROM SURFACE Ft. to Ft.	TYPE CEMENT (✓)	BENTONITE (✓)	FILL (✓)	FILTER PACK (TYPE/SIZE)
0 30		x		3/8" chip
30 55			x	gravel
55 65		x		3/8" chip
65 110			x	med. aquarium sand

ATTACHMENTS (✓)

___ Geologic Log
___ Well Construction Diagram
___ Geophysical Log(s)
___ Soil/Water Chemical Analyses
___ Other ___

ATTACH ADDITIONAL INFORMATION, IF IT EXISTS.

CERTIFICATION STATEMENT

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief.

NAME Sullivan Drilling
(PERSON, FIRM, OR CORPORATION) (TYPED OR PRINTED)

P.O. Box 1448 Corning CA 96021
ADDRESS CITY STATE ZIP

Signed Charlie Sullivan July-26-03
WELL DRILLER/AUTHORIZED REPRESENTATIVE DATE SIGNED

C-57 LICENSE NUMBER 656564

DWR 188 REV. 11-97

IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

*The free Adobe Reader may be used to view and complete this form. However, software must be purchased to complete, save, and reuse a saved form.

File Original with DWR R: 11/16/15

Page _____ of _____

Owner's Well Number _____

Date Work Began 10/06/2015 Date Work Ended 10/13/2015

Local Permit Agency Solano County

Permit Number W2015-0083 Permit Date 5/14/15

State of California

Well Completion Report

Refer to Instruction Pamphlet

No. e0287756

DWR Use Only – Do Not Fill In

State Well Number/Site Number: 06N01E05

Latitude: 38 23 58 N Longitude: 121 53 35 W

APN/TRS/Other

Geologic Log

Orientation ◉ Vertical ○ Horizontal ○ Angle Specify _____

Drilling Method Direct Rotary Drilling Fluid Polymer mud

Depth from Surface Feet	to Feet	Description Describe material, grain size, color, etc
0	60	Brown Clay
60	70	Gravel
70	105	Light Brown Clay
105	205	Blue, Green Clay
205	230	Gravel
230	275	Green Sandy Clay
		Perforation Layout: P = perforation, B = blank
		0 to 53 feet Blank
		p
		B
		P 110 ft
		B
		P
		B 150 ft 200 GPM
		P 260 ft 200 + GPM
		B 210 ft.
		P
		B
		P 271 ft.

Total Depth of Boring 275 Feet

Total Depth of Completed Well 271 Feet

Well Location

Address 5608 Weber Road

City Vacaville County Solano

Latitude ____ Deg. ____ Min. ____ Sec. N Longitude ____ Deg. ____ Min. ____ Sec W

Datum _____ Dec. Lat. _____ Dec. Long. _____

APN Book 0141 Page 020 Parcel 040

Township _____ Range _____ Section _____

Location Sketch

(Sketch must be drawn by hand after form is printed.)

North / West / East / South

Illustrate or describe distance of well from roads, buildings, fences, rivers, etc. and attach a map. Use additional paper if necessary. **Please be accurate and complete.**

Activity

◉ New Well
○ Modification/Repair
○ Deepen
○ Other _____
○ Destroy
Describe procedures and materials under "GEOLOGIC LOG"

Planned Uses

◉ Water Supply
☐ Domestic ☐ Public
☑ Irrigation ☐ Industrial
○ Cathodic Protection
○ Dewatering
○ Heat Exchange
○ Injection
○ Monitoring
○ Remediation
○ Sparging
○ Test Well
○ Vapor Extraction
○ Other _____

Water Level and Yield of Completed Well

Depth to first water 60 (Feet below surface)

Depth to Static Water Level 10 (Feet) Date Measured 10/13/2015

Estimated Yield * 200 (GPM) Test Type Air Lift

Test Length 5.0 (Hours) Total Drawdown 250 (Feet)

*May not be representative of a well's long term yield.

Casings

Depth from Surface Feet	to Feet	Borehole Diameter (Inches)	Type	Material	Wall Thickness (Inches)	Outside Diameter (Inches)	Screen Type	Slot Size if Any (Inches)
0	51	12.5	Blank	PVC Sch. 40	R21	8		
51	271	12.5	Screen	PVC Sch. 40	R21	8	Milled Slots	0.032

Annular Material

Depth from Surface Feet	to Feet	Fill	Description
0	27	Cement	cement/vol clay pe
27	271	Filter Pack	Birds Eye Well pk

Attachments

☐ Geologic Log
☐ Well Construction Diagram
☐ Geophysical Log(s)
☐ Soil/Water Chemical Analyses
☐ Other _____

Attach additional information, if it exists.

Certification Statement

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief

Name Pulliam Well Exploration Inc
Person, Firm or Corporation

4371 Cantelow Road Vacaville CA 95688
Address City State Zip

Signed _____ 10/20/2015 808-508
C-57 Licensed Water Well Contractor Date Signed C-57 License Number

DWR 188 REV 1/2006

IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

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File Original with DWR 1 11/1/15

Page _____ of _____

Owner's Well Number _____

Date Work Began 05/26/2015 Date Work Ended 5/29/2015

Local Permit Agency Solano County

Permit Number W2015-0077 Permit Date 4/28/15

State of California

Well Completion Report

Refer to Instruction Pamphlet

No. e0269842

DWR Use Only – Do Not Fill In

State Well Number/Site Number: 06N01E05

Latitude: 38 43 59 N Longitude: 121 53 25 W

APN/TRS/Other

Geologic Log

Orientation ◉ Vertical ○ Horizontal ○ Angle Specify _____

Drilling Method Direct Rotary Drilling Fluid Bentonite mud

Depth from Surface Feet	to Feet	Description Describe material, grain size, color, etc
0	35	Brown Clay
35	45	Brown Clay with Gravel
45	65	Gravel
65	125	Brown Clay
125	250	Green Sandy Clay
		Perforation lay out
		P = perforation
		B = blank
		0 to 70 ft. Blank
		P 90 ft.
		B
		P
		B
		P
		B 190 ft.
		P
		B
		P 250 ft.

Total Depth of Boring 250 Feet

Total Depth of Completed Well 250 Feet

Well Location

Address 5612 Weber Road

City Vacaville County Solano

Latitude ___ ___ ___ N Longitude ___ ___ ___ W (Deg. Min. Sec.)

Datum _____ Dec. Lat. _____ Dec. Long. _____

APN Book 0141 Page 020 Parcel 050

Township _____ Range _____ Section _____

Location Sketch

(Sketch must be drawn by hand after form is printed.)

North / West / East / South

Illustrate or describe distance of well from roads, buildings, fences, rivers, etc. and attach a map. Use additional paper if necessary. **Please be accurate and complete.**

Activity

◉ New Well
○ Modification/Repair
○ Deepen
○ Other _____
○ Destroy
Describe procedures and materials under "GEOLOGIC LOG"

Planned Uses

◉ Water Supply
☐ Domestic ☐ Public
☑ Irrigation ☐ Industrial
○ Cathodic Protection
○ Dewatering
○ Heat Exchange
○ Injection
○ Monitoring
○ Remediation
○ Sparging
○ Test Well
○ Vapor Extraction
○ Other _____

Water Level and Yield of Completed Well

Depth to first water 10 (Feet below surface)

Depth to Static Water Level 10 (Feet) Date Measured 05/29/2015

Estimated Yield * 150 (GPM) Test Type Air Lift

Test Length 4.0 (Hours) Total Drawdown 230 (Feet)

*May not be representative of a well's long term yield.

Casings

Depth from Surface Feet	to Feet	Borehole Diameter (Inches)	Type	Material	Wall Thickness (Inches)	Outside Diameter (Inches)	Screen Type	Slot Size if Any (Inches)
0	23	11	Blank	PVC Sch. 40	R21	6		
23	70	10	Blank	PVC Sch. 40	R21	6		
70	250	10	Screen	PVC Sch. 40	R21	6	Milled Slots	0.032

Annular Material

Depth from Surface Feet	to Feet	Fill	Description
0	23	Cement	cement & Val Clay
23	250	Filter Pack	Birds Eye Well Pk.

Attachments

☐ Geologic Log
☐ Well Construction Diagram
☐ Geophysical Log(s)
☐ Soil/Water Chemical Analyses
☐ Other _____

Attach additional information, if it exists.

Certification Statement

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief

Name Pulliam Wel Exploration Inc (Person, Firm or Corporation)

4371 Cantelow Road (Address) Vacaville (City) CA (State) 95688 (Zip)

Signed _____ (C-57 Licensed Water Well Contractor) 6/04/2015 (Date Signed) _____ (C-57 License Number)

DWR 188 REV. 1/2006

IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

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File Original with DWR

State of California

Well Completion Report

Refer to Instruction Pamphlet

No. e0343644

Page 1 of 1

Owner's Well Number Domestic1

Date Work Began 05/18/2017 Date Work Ended 5/25/2017

Local Permit Agency Solano Department of Environmental Health

Permit Number W2017-0086 Permit Date 5/12/17

DWR Use Only – Do Not Fill In

State Well Number/Site Number: 06N01E06

Latitude: 38°24'06"N Longitude: 121°54'19"W

APN/TRS/Other:

Geologic Log

Orientation ◉ Vertical ○ Horizontal ○ Angle Specify

Drilling Method Direct Rotary Drilling Fluid Bentonite mud

Depth from Surface Feet	to Feet	Description Describe material, grain size, color, etc
0	35	Golden Brown Clay
35	40	Sand/Gravel
40	60	Brown Clay
60	90	Sticky Brown Clay
90	108	Gray Clay
108	163	Blue Clay
163	176	Fine Sand
176	210	Blue Clay
210	218	Sand
218	220	Blue Clay
220	230	Coarse Black Sand
230	245	Sticky Blue Clay
245	255	Gravel
255	280	Brown Clay
280	290	Gravel
290	310	Brown Clay
310	400	Brown Clay

Total Depth of Boring 400 Feet

Total Depth of Completed Well 290 Feet

Well Location

Address 5500 Weber Rd

City Vacaville County Solano

Latitude 38 Deg. 402 Min. 49 Sec. N Longitude 121 Deg. 900 Min. 432 Sec. W

Datum Dec. Lat. Dec. Long.

APN Book 0141 Page 010 Parcel 120

Township Range Section

Location Sketch

(Sketch must be drawn by hand after form is printed.)

North / West / East / South

Illustrate or describe distance of well from roads, buildings, fences, rivers, etc. and attach a map. Use additional paper if necessary. **Please be accurate and complete.**

Activity

◉ New Well
○ Modification/Repair
○ Deepen
○ Other
○ Destroy
Describe procedures and materials under "GEOLOGIC LOG"

Planned Uses

◉ Water Supply
☑ Domestic ☐ Public
☐ Irrigation ☐ Industrial
○ Cathodic Protection
○ Dewatering
○ Heat Exchange
○ Injection
○ Monitoring
○ Remediation
○ Sparging
○ Test Well
○ Vapor Extraction
○ Other

Water Level and Yield of Completed Well

Depth to first water 80 (Feet below surface)

Depth to Static Water Level 18 (Feet) Date Measured 05/25/2017

Estimated Yield * 50 (GPM) Test Type Air Lift

Test Length 4.0 (Hours) Total Drawdown (Feet)

*May not be representative of a well's long term yield.

Casings

Depth from Surface Feet	to Feet	Borehole Diameter (Inches)	Type	Material	Wall Thickness (Inches)	Outside Diameter (Inches)	Screen Type	Slot Size if Any (Inches)
0	240	12	Blank	SDR21PVC	.25	6.5		
240	260	12	Screen	SDR21PVC	.25	6.5	Milled Slots	0.032
260	280	12	Blank	SDR21PVC	.25	6.5		
280	290	12	Screen	SDR21PVC	.25	6.5	Milled Slots	0.032

Annular Material

Depth from Surface Feet	to Feet	Fill	Description
0	51	Cement	10.3 Slurry
51	180	Filter Pack	1/8 x 1/4 BE
180	300	Filter Pack	SRI#8 Filter Pack
300	400	Filter Pack	1/3 x 1/4 BE

Attachments

☐ Geologic Log
☐ Well Construction Diagram
☐ Geophysical Log(s)
☐ Soil/Water Chemical Analyses
☐ Other

Attach additional information, if it exists.

Certification Statement

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief

Name Parks Water Resources (Person, Firm or Corporation)

P O Box 494 (Address) Zamora (City) CA (State) 95698 (Zip)

Signed (C-57 Licensed Water Well Contractor) Date Signed

C-57 License Number 972963

DWR 188 REV. 1/2006

IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

*The free Adobe Reader may be used to view and complete this form. However, software must be purchased to complete, save, and reuse a saved form.

File Original with DWR

State of California

Well Completion Report

Refer to Instruction Pamphlet

Page 1 of 1

Owner's Well Number Domestic1

No. e0370149

Date Work Began 03/26/2018 Date Work Ended 3/30/2018

Local Permit Agency Solano Environmental Health Services

Permit Number W2018-0042 Permit Date 3/20/18

DWR Use Only – Do Not Fill In

State Well Number/Site Number

N W

Latitude Longitude

APN/TRS/Other

Geologic Log

Orientation ◉ Vertical ○ Horizontal ○ Angle Specify

Drilling Method Direct Rotary Drilling Fluid Bentonite mud

Depth from Surface Feet	to Feet	Description Describe material, grain size, color, etc
0	30	Reddish Brown Clay
30	35	Sand
35	54	Golden Brown Clay
54	65	Sandy Clay
65	74	Fine Gravel/Sand
74	90	Bold Brown Clay
90	130	Sand and Gravel Cemented
130	140	Golden Brown Clay
140	172	Sticky Brown Clay
172	205	Silty Brown Clay
200	210	Gravel
210	226	Brown Clay
226	230	Brown Clay
230	250	cemented Sand Fine Gravel
250	260	Brown Clay

Total Depth of Boring 260 Feet

Total Depth of Completed Well 250 Feet

Well Owner

N

M

C

Well Location

Address 6712 Willow Rd

City Vacaville County Solano

Latitude 38 Deg. 383 Min. 648 Sec. N Longitude 121 Deg. 923 Min. 730 Sec. W

Datum Dec. Lat. Dec. Long.

APN Book 0133 Page 170 Parcel 100

Township Range Section

Location Sketch

(Sketch must be drawn by hand after form is printed.)

North

West East

South

Illustrate or describe distance of well from roads, buildings, fences, rivers, etc. and attach a map. Use additional paper if necessary. Please be accurate and complete.

Activity

◉ New Well

○ Modification/Repair

○ Deepen

○ Other

○ Destroy

Describe procedures and materials under "GEOLOGIC LOG"

Planned Uses

◉ Water Supply

☑ Domestic ☐ Public

☐ Irrigation ☐ Industrial

○ Cathodic Protection

○ Dewatering

○ Heat Exchange

○ Injection

○ Monitoring

○ Remediation

○ Sparging

○ Test Well

○ Vapor Extraction

○ Other

Water Level and Yield of Completed Well

Depth to first water 35 (Feet below surface)

Depth to Static Water Level 30 (Feet) Date Measured 03/30/2018

Estimated Yield * 45 (GPM) Test Type Air Lift

Test Length 4.0 (Hours) Total Drawdown (Feet)

*May not be representative of a well's long term yield.

Casings

Depth from Surface Feet	to Feet	Borehole Diameter (Inches)	Type	Material	Wall Thickness (Inches)	Outside Diameter (Inches)	Screen Type	Slot Size if Any (Inches)
0	200	12	Blank	SDR21PVC	.25	6.5		
200	210	12	Screen	SDR21PVC	.25	6.5	Milled Slots	0.032
210	230	12	Blank	SDR21PVC	.25	6.5		
230	250	12	Screen	SDR21PVC	.25	6.5	Milled Slots	0.032

Annular Material

Depth from Surface Feet	to Feet	Fill	Description
0	5	Cement	Cement
5	20	Bentonite	3/8 Chips
20	250	Filter Pack	SRI#8 Filter Pack
250	260	Fill	Native Soil

Attachments

☐ Geologic Log

☐ Well Construction Diagram

☐ Geophysical Log(s)

☐ Soil/Water Chemical Analyses

☐ Other

Attach additional information, if it exists.

Certification Statement

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief

Name Parks Water Resources (Person, Firm or Corporation)

P.O. Box 494 (Address) Zamora (City) CA (State) 95698 (Zip)

Signed (C-57 Licensed Water Well Contractor) 4/2/2018 (Date Signed) 972963 (C-57 License Number)

DWR 188 REV. 1/2006

IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

State of California

Well Completion Report

Form DWR 188 Auto-Completed 12/11/2023

WCR2023-010980

Owner's Well Number | Date Work Began: 09/21/2023 | Date Work Ended: 09/26/2023

Local Permit Agency: Solano County Department of Resource Management - Environmental Health

Secondary Permit Agency | Permit Number: W2022-0197 | Permit Date: 09/28/2022

Well Owner (must remain confidential pursuant to Water Code 13752)

Name: XXXXXXXXXXXXXXXXXXX

Mailing Address: XXXXXXXXXXXXXXXXXXX

XXXXXXXXXXXXXXXXXXX

City: XXXXXXXXXXXXXXXXXXX | State: XX | Zip: XXXXX

Planned Use and Activity

Activity: New Well

Planned Use: Water Supply Domestic

Well Location

Address: 5149 Maple Rd.

City: Vacaville | Zip: 95687 | County: Solano

Latitude: 38 Deg. 22 Min. 35.256 Sec. N | Longitude: -121 Deg. 55 Min. 27.1379 Sec. W

Dec. Lat.: 38.37646 | Dec. Long.: -121.924205

Vertical Datum | Horizontal Datum: WGS84

Location Accuracy | Location Determination Method

APN: 0134260190

Township: 06 N

Range: 01 W

Section: 12

Baseline Meridian: Mount Diablo

Ground Surface Elevation

Elevation Accuracy

Elevation Determination Method

Borehole Information

Orientation: Vertical | Specify

Drilling Method: Direct Rotary | Drilling Fluid: Bentonite

Total Depth of Boring: 200 Feet

Total Depth of Completed Well: 170 Feet

Water Level and Yield of Completed Well

Depth to first water: 80 (Feet below surface)

Depth to Static Water Level: 28 (Feet) | Date Measured: 09/26/2023

Estimated Yield*: 30 (GPM) | Test Type: Air Lift

Test Length: 7 (Hours) | Total Drawdown: (feet)

*May not be representative of a well's long term yield.

Geologic Log - Free Form

Depth from Surface Feet to Feet		Description
0	45	Brown Clay
45	90	Brown Sandy Clay
90	160	Sandy Grey Clay
160	170	Sand Stone Grey/Sandy
170	190	Grey Clay
190	200	Brown Clay

Casings

Casing #	Depth from Surface Feet to Feet		Casing Type	Material	Casings Specificatons	Wall Thickness (inches)	Outside Diameter (inches)	Screen Type	Slot Size if any (inches)	Description
1	0	80	Blank	PVC	OD: 6.625 in. | SDR: 17 | Thickness: 0.390 in.	0.39	6.625			
2	80	100	Screen	PVC	OD: 6.625 in. | SDR: 17 | Thickness: 0.390 in.	0.39	6.625	Milled Slots	0.032	
3	100	140	Blank	PVC	OD: 6.625 in. | SDR: 17 | Thickness: 0.390 in.	0.39	6.625			
4	140	170	Screen	PVC	OD: 6.625 in. | SDR: 17 | Thickness: 0.390 in.	0.39	6.625	Milled Slots	0.032	

Annular Material

Depth from Surface Feet to Feet		Fill	Fill Type Details	Filter Pack Size	Description
0	5	Cement	Other Cement		cement
5	20	Bentonite	Other Bentonite		3/8 chips
20	200	Filter Pack	Other Gravel Pack		SRI#8

Other Observations:

Borehole Specifications

Depth from Surface Feet to Feet		Borehole Diameter (inches)
0	80	12
80	100	12
100	140	12
140	200	12

Certification Statement

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief

Name: PARKS WATER RESOURCES
Person, Firm or Corporation

P O BOX 494 (Address) | ZAMORA (City) | CA (State) | 95698 (Zip)

Signed: *electronic signature received* (C-57 Licensed Water Well Contractor) | 10/06/2023 (Date Signed) | 972963 (C-57 License Number)

DWR Use Only

CSG #	State Well Number	Site Code	Local Well Number

N — Latitude Deg/Min/Sec

W — Longitude Deg/Min/Sec

TRS:

APN:

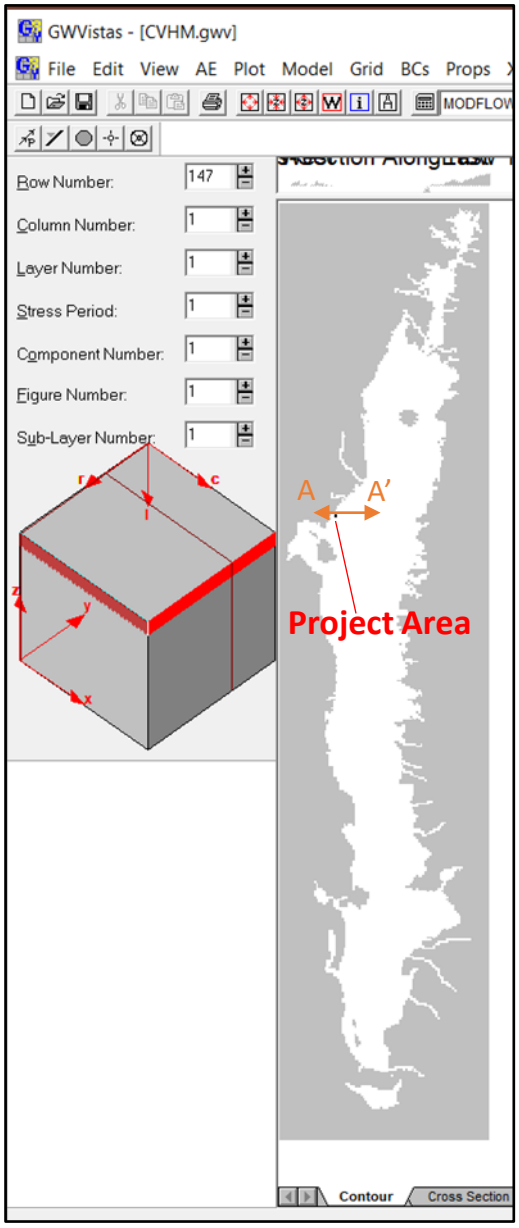
ATTACHMENT B: GROUNDWATER MODEL DEVELOPMENT DOCUMENTATION

Sub-Regional Groundwater Model Development
Corby BESS, Solano County, CA

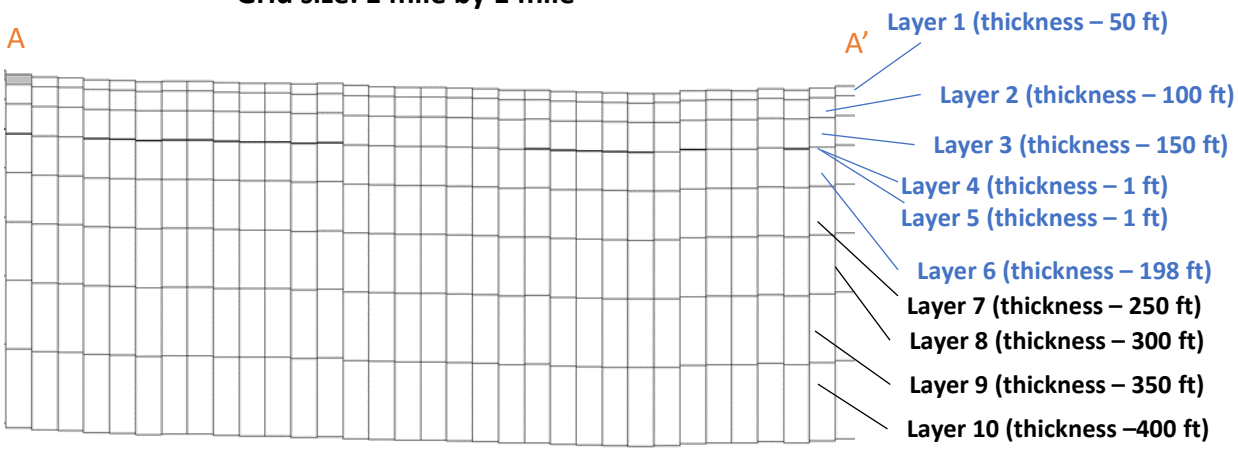
- U.S. Geological Survey (USGS) Central Valley Hydrologic Model (CVHM) regional groundwater model, a three-dimensional (3D) computer model (MODFLOW 2000 finite-difference groundwater flow model), was used as a base to construct a sub-regional groundwater model for the subject area.
- The USGS groundwater model has grid cells that are 1 mile by 1 mile, which does not provide sufficient details necessary for the groundwater study.
- Tetra Tech created a sub-regional groundwater model for the study area using USGS's telescopic mesh refinement (TMR) method (Reference: Procedures and computer programs for telescopic mesh refinement using MODFLOW (usgs.gov)).
- The upper six model layers of the USGS CVHM model that represent the shallow and upper deep systems (top 500 feet) were retained in the sub-regional groundwater model and refined to 11 layers.
- Hydraulic conductivities used in the sub-regional model were based on the well boring logs (Reference: DWR and Geotracker database), and the effective hydraulic conductivity calculated for each well boring location was then interpolated between the well borings and estimated across the model domain by kriging method using Surfer software.
- Flow simulations were conducted to predict the pumping drawdowns at the proposed well and at the nearby wells.
- USGS particle tracking code MODPATH was used with MODFLOW to evaluated the zone of influence and travel time for the proposed pumping well.

USGS Regional Model

USGS Central Valley Hydrologic Model

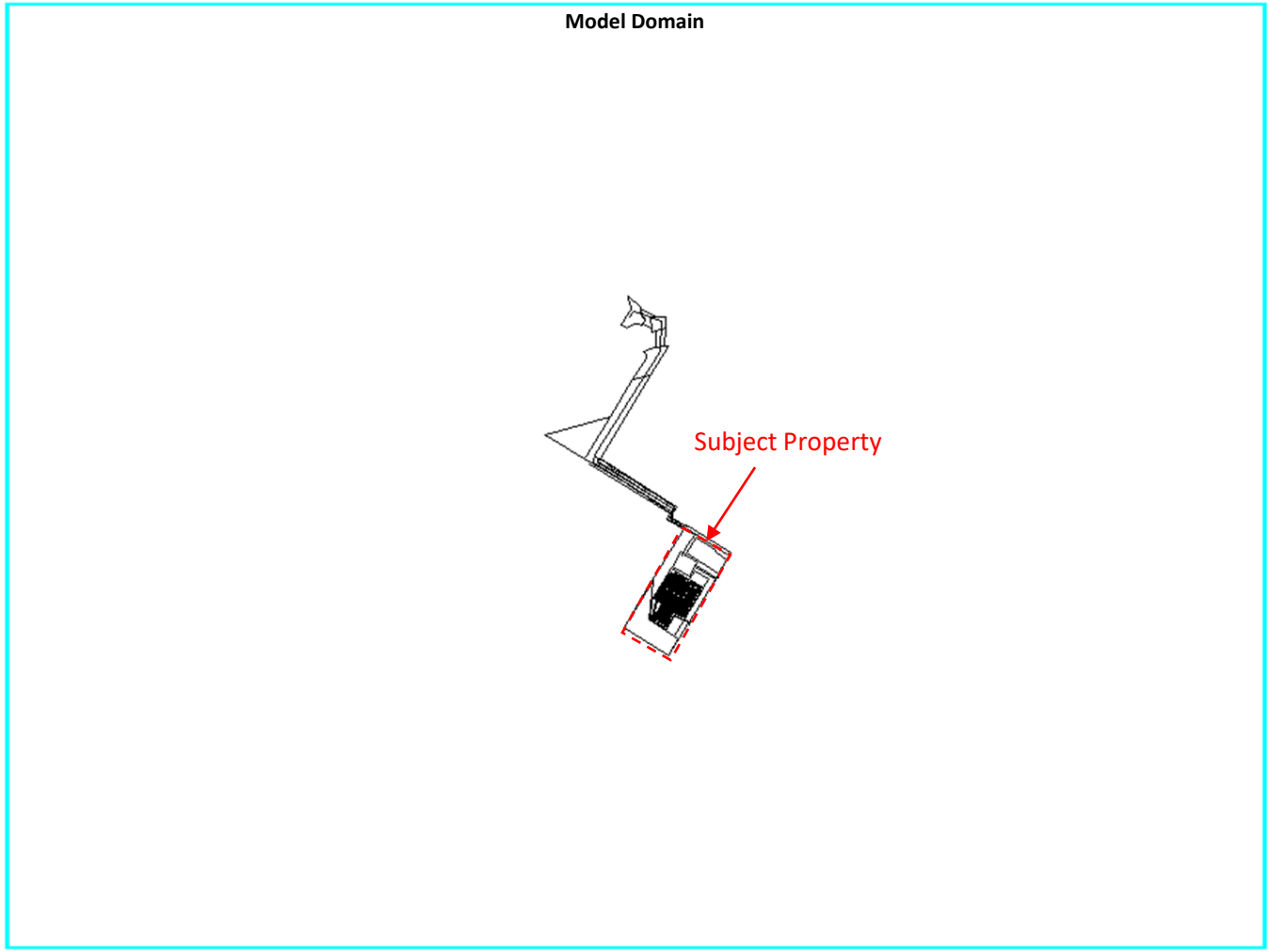


Grid size: 1 mile by 1 mile

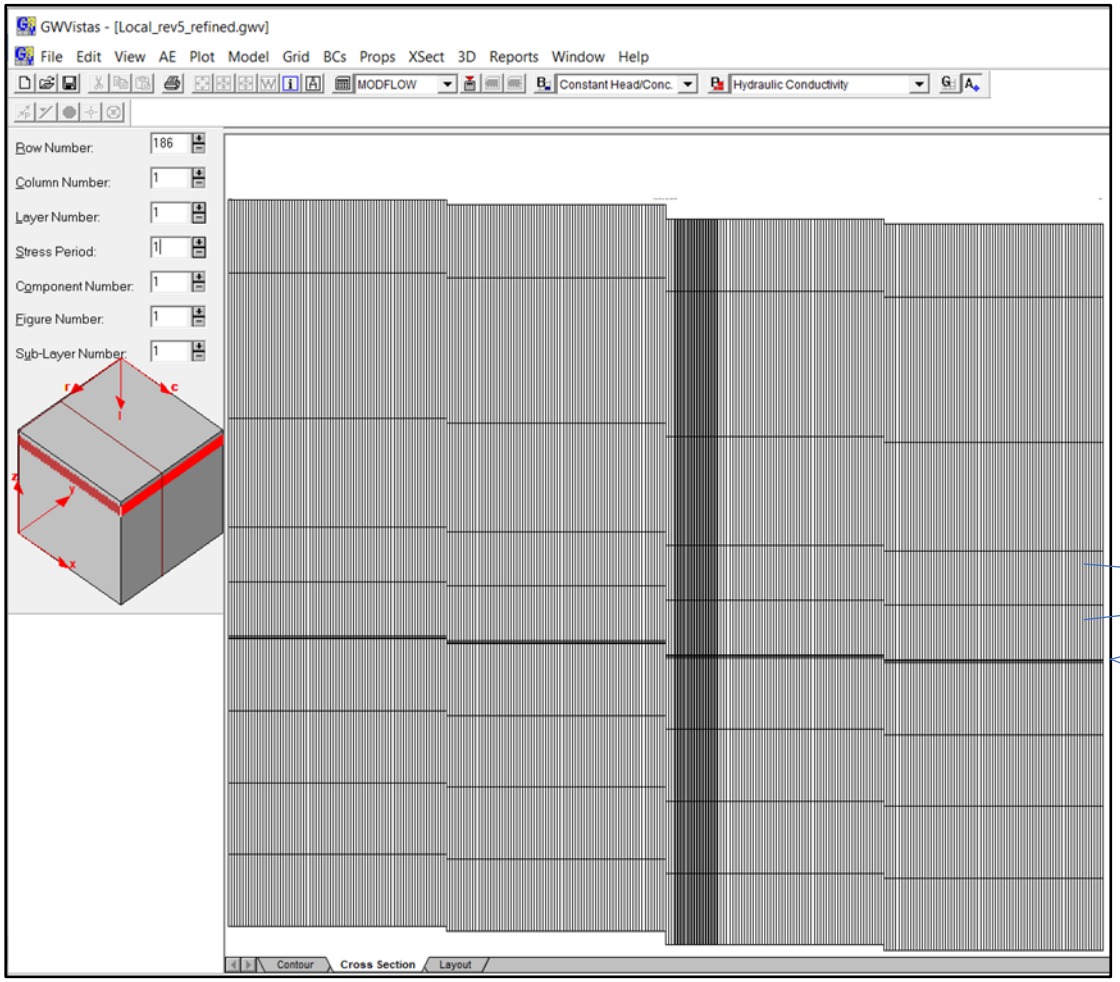


The upper 6 layers with a total thickness of 500 ft were retained and refined in the sub-regional model.

Sub-Regional Groundwater Model Domain
Corby BESS, Solano County, CA



Sub-Regional Groundwater Model Development
Corby BESS, Solano County, CA



The sub-regional model grid spacing varies from 26 feet in the area of interest to 70 feet at the outer regions.

Layer 1 (thickness – 50 ft) – Layer 1 of USGS regional Model

Layer 2 (thickness – 100 ft) – Layer 2 of USGS regional Model

Layer 3 (thickness – 75 ft)

Layer 4 (thickness – 37.5 ft)

Layer 5 (thickness – 37.5 ft)

– Layer 3 of USGS regional Model

Layer 6 (thickness – 1 ft) – Layer 4 of USGS regional Model

Layer 7 (thickness – 1 ft) – Layer 5 of USGS regional Model

Layer 8 (thickness – 49.5 ft)

Layer 9 (thickness – 49.5 ft)

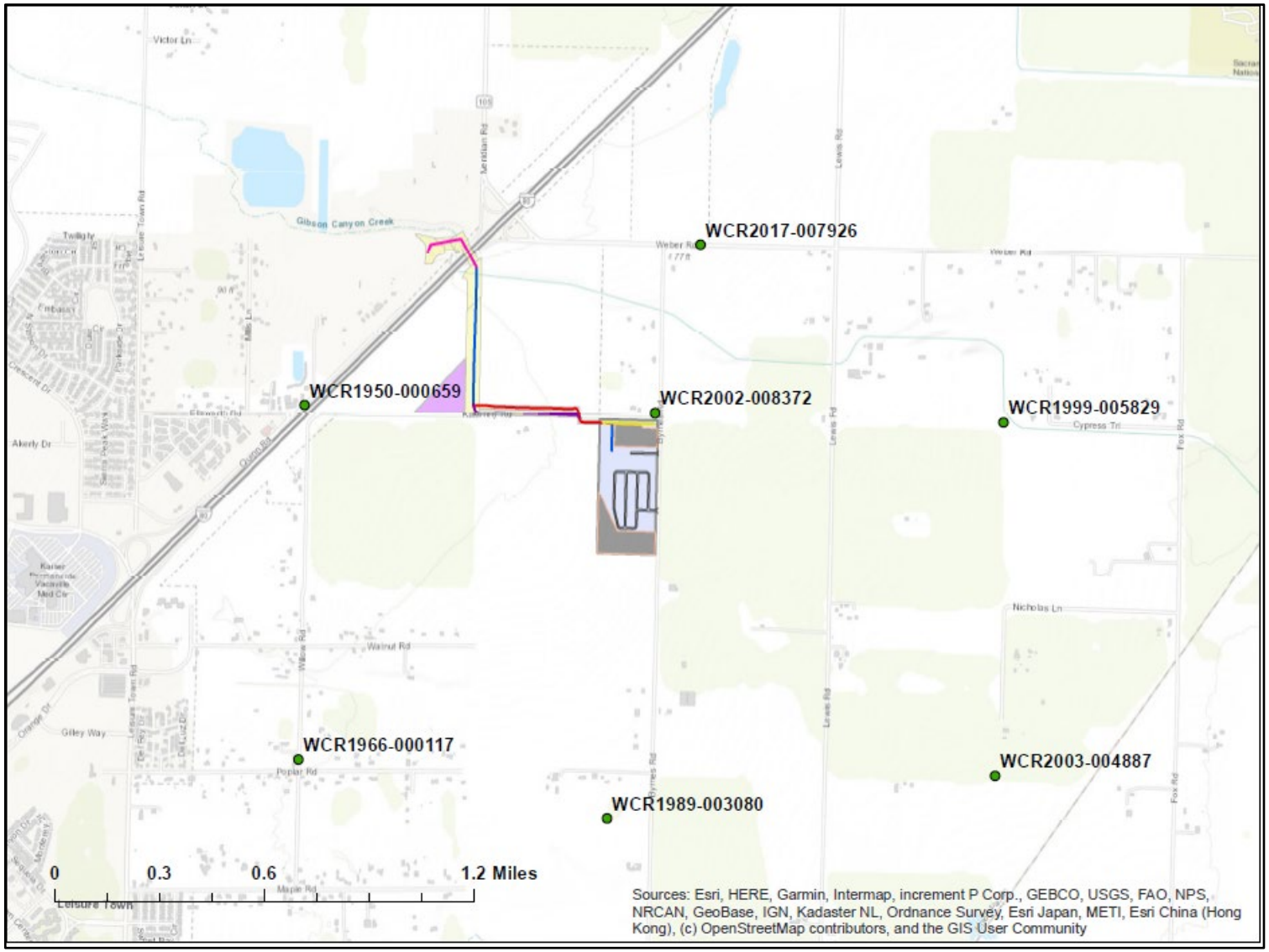
Layer 10 (thickness – 49.5 ft)

Layer 11 (thickness – 49.5 ft)

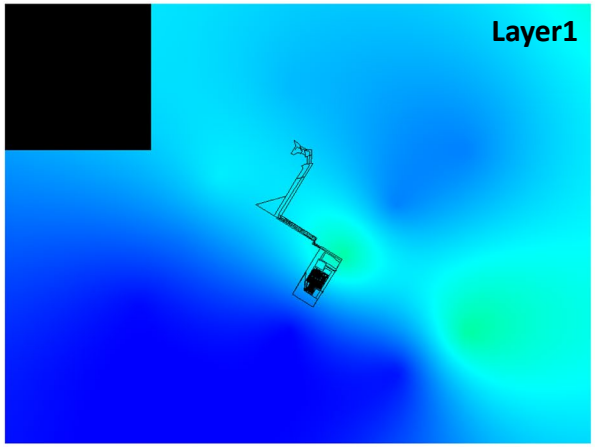
– Layer 6 of USGS regional Model

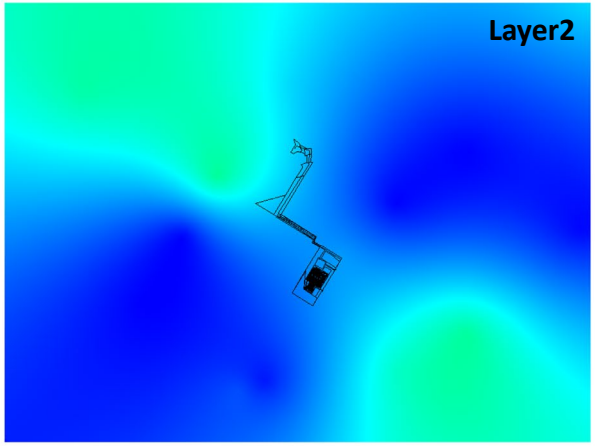
Location of nearby existing wells that have sufficient data to calculate hydraulic conductivities

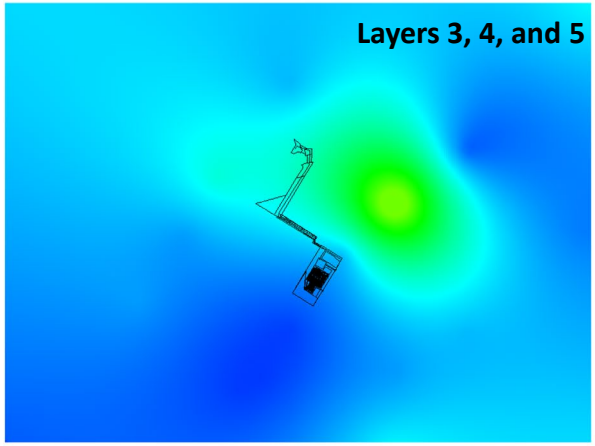
Data source: DWR water well database

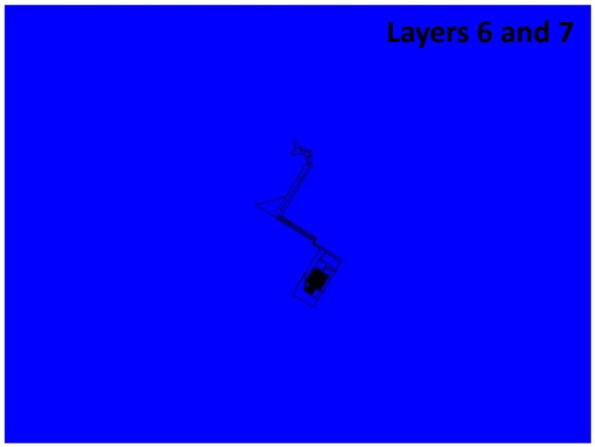


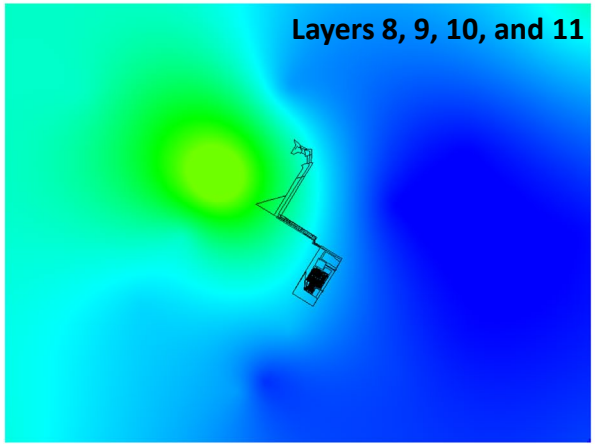
Sub-Regional Groundwater Flow Model – Horizontal Hydraulic Conductivities











Note:
1) Vertical hydraulic conductivity was assumed to be 0.1 of the horizontal hydraulic conductivity

WCR Number	Legacy Log Numl	Start Depth (feet	End Depth (feet	Thickness	Type	K (ft/day)	K*Thickness
WCR2017-007926	E0343644	0	35	35	Golden Brown Cl	8.95715E-05	3.14E-03
		35	40	5	Sand/Gravel	50.37618388	2.52E+02
		40	60	20	Brown Clay	8.95715E-05	1.79E-03
		60	90	30	Sticky Brown Clay	8.95715E-05	2.69E-03
		90	108	18	Gray Clay	8.95715E-05	1.61E-03
		108	163	55	Blue Clay	8.95715E-05	4.93E-03
		220	230	10	Coarse Black San	28.32861	2.83E+02
		230	245	15	Sticky Blue Clay	8.95715E-05	1.34E-03
		245	255	10	Gravel	89.58293055	8.96E+02
		255	280	25	Brown Clay	8.95715E-05	2.24E-03
		280	290	10	Gravel	89.58293055	8.96E+02
		290	310	20	Brown Clay	8.95715E-05	1.79E-03
		310	400	90	Brown Clay	8.95715E-05	8.06E-03
WCR1950-000659	48-375	0	2	2	Soil		
		2	9	7	Clay	8.95715E-05	6.27E-04
		9	11	2	Sand	28.32861	5.67E+01
		11	44	33	Sany Clay	0.28328805	9.35E+00
		44	50	6	Sand&Gravel	50.37618388	3.02E+02
		50	73	23	Sany Clay	0.28328805	6.52E+00
		73	86	13	Clay	8.95715E-05	1.16E-03
		86	90	4	Sand&Gravel	50.37618388	2.02E+02
		90	95	5	Clay	8.95715E-05	4.48E-04
		95	102	7	Gravel	89.58293055	6.27E+02
		102	138	36	Clay	8.95715E-05	3.22E-03
		138	143	5	Clay	8.95715E-05	4.48E-04
		143	146	3	Gravel	89.58293055	2.69E+02
		146	213	67	Clay	8.95715E-05	6.00E-03
		213	222	9	Gravel	89.58293055	8.06E+02
		222	228	6	Clay	8.95715E-05	5.37E-04
		228	237	9	Sand&Gravel	50.37618388	4.53E+02
		237	250	13	Clay	8.95715E-05	1.16E-03
		250	253	3	Gravel	89.58293055	2.69E+02
		253	308	55	Clay	8.95715E-05	4.93E-03
		308	312	4	Gravel	89.58293055	3.58E+02
		312	372	60	Clay	8.95715E-05	5.37E-03
		372	375	3	Gravel	89.58293055	2.69E+02
		375	385	10	Clay&Gravel	0.089577205	8.96E-01
		385	411	26	Clay	8.95715E-05	2.33E-03
		411	422	11	Gravel	89.58293055	9.85E+02
		422	434	12	Clay	8.95715E-05	1.07E-03
		434	452	18	Gravel	89.58293055	1.61E+03
		452	470	18	Clay	8.95715E-05	1.61E-03
		470	483	13	Clay	8.95715E-05	1.16E-03
		483	502	19	Gravel	89.58293055	1.70E+03
		502	517	15	Clay	8.95715E-05	1.34E-03
		517	522	5	Gravel	89.58293055	4.48E+02
		522	551	29	Clay	8.95715E-05	2.60E-03
		551	562	11	Gravel	89.58293055	9.85E+02
		562	580	18	Clay	8.95715E-05	1.61E-03
		580	600	20	Clay	8.95715E-05	1.79E-03
WCR2002-008372	818236	0	3	3	Soil		
		3	7	4	Sand	28.32861	1.13E+02
		7	11	4	Sand	28.32861	1.13E+02
		11	19	8	Clay	8.95715E-05	7.17E-04
		19	24	5	Sand	28.32861	1.42E+02
		24	45	21	Clay	8.95715E-05	1.88E-03
		45	51	6	Sand	28.32861	1.70E+02
		51	75	24	Clay	8.95715E-05	2.15E-03
		75	79	4	Sand&Gravel	50.37618388	2.02E+02
		79	96	17	Clay	8.95715E-05	1.52E-03
		96	101	5	Sand	28.32861	1.42E+02
		101	120	19	Clay	8.95715E-05	1.70E-03

WCR Number	Legacy Log Numl	Start Depth (feet	End Depth (feet	Thickness	Type	K (ft/day)	K*Thickness
WCR1999-005829	822163	0	2	2	Soil		
		2	30	28	Clay	8.95715E-05	2.51E-03
		30	38	8	Sand&Gravel	50.37618388	4.03E+02
		38	75	37	Clay	8.95715E-05	3.31E-03
		75	89	14	Sand&Gravel	50.37618388	7.05E+02
		89	116	27	Clay	8.95715E-05	2.42E-03
		116	125	9	Sand&Gravel	50.37618388	4.53E+02
		125	130	5	Clay	8.95715E-05	4.48E-04
		130	140	10	Clay	8.95715E-05	8.96E-04
WCR1989-003080	274183	0	2	2	Soil		
		2	57	55	Clay	8.95715E-05	4.93E-03
		57	60	3	Sandy	28.32861	8.50E+01
		60	90	30	Clay	8.95715E-05	2.69E-03
		90	220	130	Clay	8.95715E-05	1.16E-02
		220	230	10	sand	28.32861	2.83E+02
		230	240	10	Clay	8.95715E-05	8.96E-04
WCR1966-000117	117739	0	2	2	Soil		
		2	10	8	Clay	8.95715E-05	7.17E-04
		10	58	48	Sandy Clay	0.28328805	1.36E+01
		58	70	12	Clay	8.95715E-05	1.07E-03
		70	92	22	Clay	8.95715E-05	1.97E-03
		92	105	13	Clay	8.95715E-05	1.16E-03
WCR2003-004887	798562	0	21	21	Clay	8.95715E-05	1.88E-03
		21	23	2	sand	28.32861	5.67E+01
		23	46	23	Clay	8.95715E-05	2.06E-03
		46	48	2	sand	28.32861	5.67E+01
		48	63	15	Clay	8.95715E-05	1.34E-03
		63	65	2	Gravel	89.58293055	1.79E+02
		65	70	5	Clay	8.95715E-05	4.48E-04
		70	75	5	Sand&Gravel	50.37618388	2.52E+02
		75	100	25	Clay	8.95715E-05	2.24E-03
		100	109	9	Clay&Gravel	50.37618388	4.53E+02
		109	133	24	Clay	8.95715E-05	2.15E-03
		133	140	7	Fractured clay	8.95715E-05	6.27E-04
		140	145	5	Clay	8.95715E-05	4.48E-04
		145	155	10	Clay	8.95715E-05	8.96E-04
		155	160	5	Clay	8.95715E-05	4.48E-04
		160	177	17	Clay	8.95715E-05	1.52E-03
		177	185	8	Clay	8.95715E-05	7.17E-04
		185	196	11	Sand&Gravel	50.37618388	5.54E+02
		196	197	1	Clay	8.95715E-05	8.96E-05
		197	199	2	Fractured sandst	8.95715E-05	1.79E-04
		199	210	11	Clay	8.95715E-05	9.85E-04

Table 3.7 - Applied Hydrogeology - C.W. Fetter					Average K (ft/day)	Geometric Mean of K (ft/day)
Lithology	Low		High			
	cm/s	ft/day	cm/s	ft/day		
Clay	1.00E-08	2.83E-06	0.00001	0.002835	0.001418915	0.00008957
Silt	0.00001	0.002833	0.001	0.283286	0.1430595	0.0283293
Silty Sands	0.0001	0.028329	0.01	2.832861	1.430595	0.28328805
Sands	0.01	2.832861	1	283.2861	143.0594805	28.32861
Gravel	0.1	28.32861	1	283.2861	155.807355	89.58293055

Well	Latitude	Longitude	Kh_Layer1 (ft/day)	Kh_Layer2 (ft/day)	Kh_Layer3 (ft/day)	Kh_Layer4 (ft/day)	Kh_Layer5 (ft/day)	Kh_Layer6 (ft/day)
WCR2017-007926	38.40245	-121.90392	4.20E+00	8.96E-05	2.31E+01	8.96E-05	8.96E-05	8.96E-05
WCR1950-000659	38.39557	-121.92482	7.67E+00	1.15E+01	9.43E+00	8.96E-05	8.96E-05	2.54E+01
WCR2002-008372	38.39553	-121.90615	1.12E+01	4.97E+00				
WCR1999-005829	38.39543	-121.88759	1.12E+01	1.14E+01				
WCR1989-003080	38.37890745	-121.9082913	8.96E-05	2.58E+00	1.89E+00			
WCR1966-000117	38.38107	-121.92477	2.43E-01	8.96E-05				
WCR2003-004887	38.38097	-121.88767	2.36E+00	9.12E+00	8.53E+00			
Geomean			**7.99E-01**	**2.76E-01**	**7.69E+00**	**8.96E-05**	**8.96E-05**	**4.77E-02**

To integrate the boring interval hydraulic conductivity values into the groundwater model, the transmissivity for each lithologic interval was calculated. Transmissivity for a hydrogeologic unit is defined as the thickness of the unit multiplied by the hydraulic conductivity of the unit. For each boring, the transmissivity was calculated by multiplying the assigned hydraulic conductivity by the thickness of the corresponding interval in the boring for each model layer. The effective hydraulic conductivity was calculated by summing the transmissivity in the model layer and dividing it by the total thickness of the model layer using Equation No. 1.

$$K_e = \frac{\sum K_i d_i}{\sum d_i} \qquad (1)$$

where:

K_e = effective hydraulic conductivity (feet/day)

K_i = assigned hydraulic conductivity for boring interval *I* (feet/day)

d_i = thickness of boring interval *I* (feet)

$\sum K_i d_i$ = transmissivity for the model layer (feet^2/day)

$\sum d_i$ = model layer thickness (feet)

For each model layer, the effective hydraulic conductivity (calculated per boring) was then interpolated between borings and estimated across the model domain via kriging in Surfer.
The kriged hydraulic conductivity values, which represent the horizontal hydraulic conductivity for each model layer, were interpolated onto the local numerical groundwater flow model grid cells.