
STORMWATER REPORT

Mulnite II Solar

Mulnite Farms

East Windsor, Connecticut

PREPARED FOR

Greenskies Clean Energy LLC
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PREPARED BY



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Project Summary

Project Description

The Petitioner, Greenskies Clean Energy, LLC, is proposing to construct a 5 MW solar farm on undeveloped farmland along with all associated utilities, access paths, fencing, and landscaping to support this use (the Project). When the Project reaches the end of its life cycle, the improvements constructed as part of this petition will be removed and the land will be restored in accordance with the decommissioning plan prepared by others under separate cover.

Site Description

The Project Site will be comprised of two parcels. The parcel to the north is on approximately ± 24.8 acres west of Rockville Road and the parcel to the south is on approximately ± 26.2 acres east of Miller Road, (Map, Block, Lot: 038-68-030 and 028-68-023) in East Windsor, Connecticut (see Figure 1). The development site parcel to the north is bounded by active farm field on all sides. The parcels to the north, west, and east are zoned R-3 (Single Family Residential) and the parcel to the south is zoned A-1 (Agricultural/ Residential). The development site parcel to the south is surrounded by farm fields to the north and residential uses to the south, west, and east. The parcels to the north, south, east, and west are zoned A-1 (Agricultural/ Residential). The development site parcel to the north is within the R-3 zone (Single Family Residential) and the development site parcel to the south is within the A-1 (Agricultural/Residential).

The project area under existing conditions is active farmland. There is one delineated on-site wetland system on the development site. The wetland is located in the southeast corner of the southern parcel. However, no portions of the development area discharge runoff to this wetland. Under existing conditions, runoff from the project in the northern parcel flows northeast along a farm road and in the southern parcel runoff from the project generally flows southwest off the property. There are five sub-watersheds that make up the full development area: one path collects and follows along a farm road eventually discharging across residential property to a culvert that crosses Rockville Road to Windsorville Pond, two areas collect and discharge stormwater runoff towards residential property to the west,



another path collects and flows into a stream flowing parallel to the southern property line, and the final path flows across farm fields off the property towards residential properties in the northeast direction.

According to available soil mapping¹, the on-site soils are not expected to have restrictive layers up to 8 feet in depth. Soil profiles across the development area are anticipated to be extremely homogenous silt loams underlain with sand, displaying Hydraulic Soil Group "B". See Appendix B for NRCS Web Soil Survey output. It is proposed to perform on-site geotechnical investigations following the current on-site farming harvest.

According to available CTDEEP Groundwater Classification maps, groundwater at the site is GA (see Appendix A). The CTDEEP Aquifer Protection Areas Mapping website does not show the site as being within an Aquifer Protection Area.

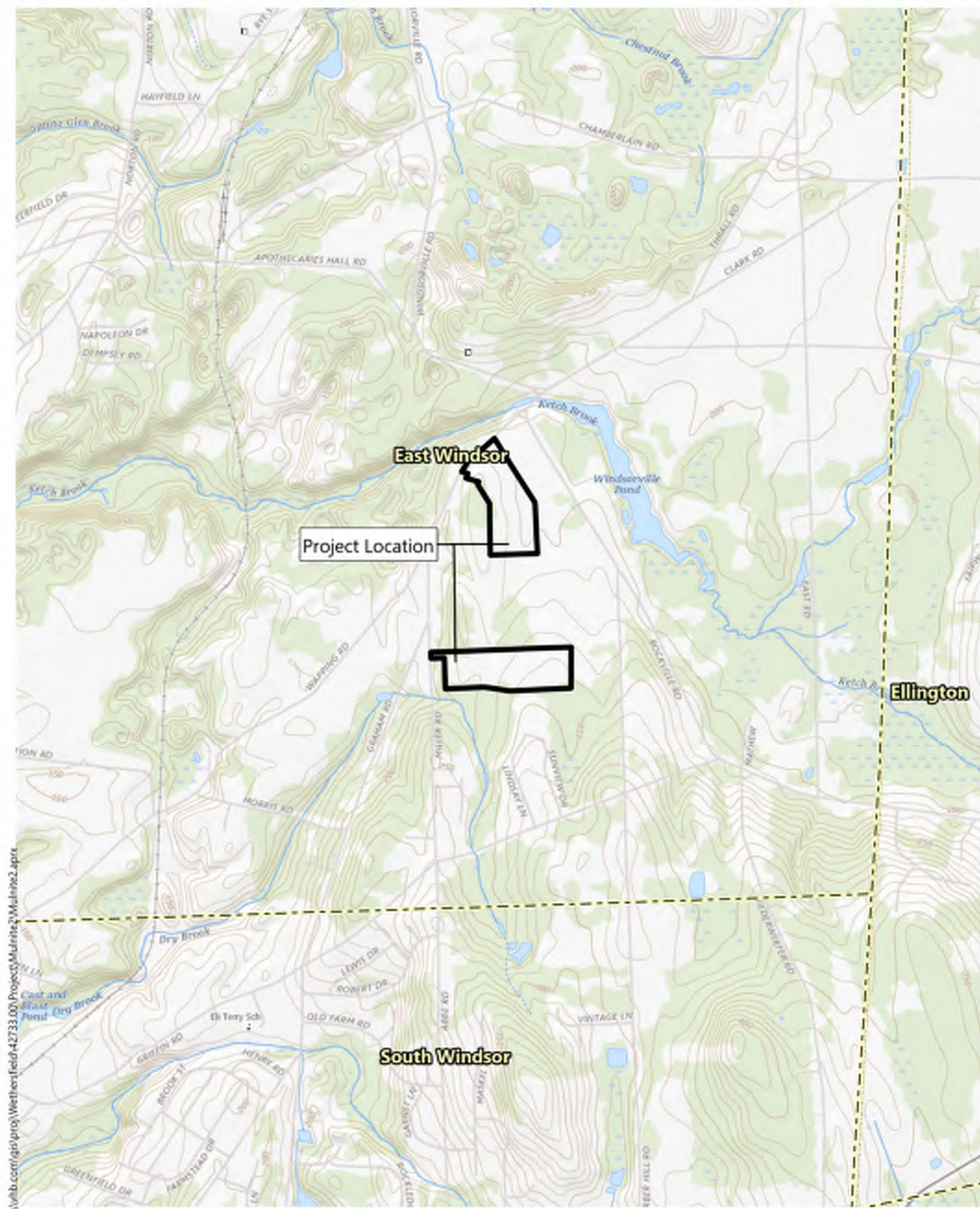
Methodology

The Project was designed to incorporate measures provided in the Connecticut Stormwater Quality Manual (CTDEEP 2004) as well as the CTDEEP Stormwater General Permit effective December 31, 2020. The conclusion of this analysis is that the proposed improvements will not increase the post-development peak runoff rates in comparison to existing pre-development rates at any of the critical design points analyzed and the quality of stormwater runoff leaving the Site will be treated prior to discharge from the Site. It is also proposed to meet State stream channel protection requirements for frequent rainfall events.

¹ <https://websoilsurvey.sc.egov.usda.gov/App/WebSoilSurvey.aspx>



Figure 1: Site Location Map



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Mulnite 2 Solar | East Windsor, Connecticut

USGS Map

Source: VHB, CTDEEP, ESRI

Existing Drainage Conditions

Summary

Under existing conditions, runoff from the project in the northern parcel flows northeast and in the southern parcel runoff from the project generally flows southwest off the property. There are five sub-watersheds that make up the full development areas: one path collects and follows along a farm road eventually discharging across residential property to a culvert that crosses Rockville Road to Windsorville Pond, two areas collect and discharge stormwater runoff towards residential property to the west, another path collects and flows into a stream flowing parallel to the southern property line, and the final path flows across farm fields off the property towards residential properties in the northeast direction.

The Site is generally at its highest elevation in the central southern portion of the Project and slopes down into the west and east sides of the site. The entirety of the Project area is comprised of farmland. Terrain slopes in the Project area range from 0% to approximately 5% with no slopes exceeding 15% existing slope.

Hydrologic Information

For the existing conditions hydrologic analysis, the Site has been divided into five (5) drainage areas, which have been identified as areas at the Project limits where flow begins to concentrate naturally before exiting the development areas. Table 1 provides a summary of the existing conditions hydrologic data. Figure 2 illustrates the existing drainage patterns on the Site. All portions of the Project site and tributary offsite areas have been considered in the hydrologic analysis discharging to the Design Points. All existing areas to be developed have been modelled as row crops with exception of the existing farm roads.

Drainage Area 1 - This ±4.9-acre area is located in the southern portion of the northern parcel. Stormwater in this area flows untreated generally in the east direction to the edge of the farm field. The stormwater then travels north along the farm road eventually discharging across a residential property to a culvert that crosses Rockville Road.



Drainage Area 2 – This ±1.3 acre area is located at the northwestern portion of the Site in the southern parcel. Stormwater in this area flows untreated generally west of the site over farm fields and ultimately towards residential property.

Drainage Area 3 – This ±2.0 acre area is located at the southwestern portion of the Site in the southern parcel. Stormwater in this area flows untreated generally west of the site over farm fields and ultimately towards residential property.

Drainage Area 4 – This ±20.1-acre area is located at the central portion of the Site in the southern parcel. Stormwater in this area flows untreated generally towards the Eversource easement area. The stormwater then flows south under the Eversource easement to an existing stream that flows west, parallel with the southern property line.

Drainage Area 5 – This ±1.9-acre area is located at the eastern portion of the Site in the southern parcel. Stormwater in this area flows untreated generally to the north/northeast to the corner of the property and then towards residential property.

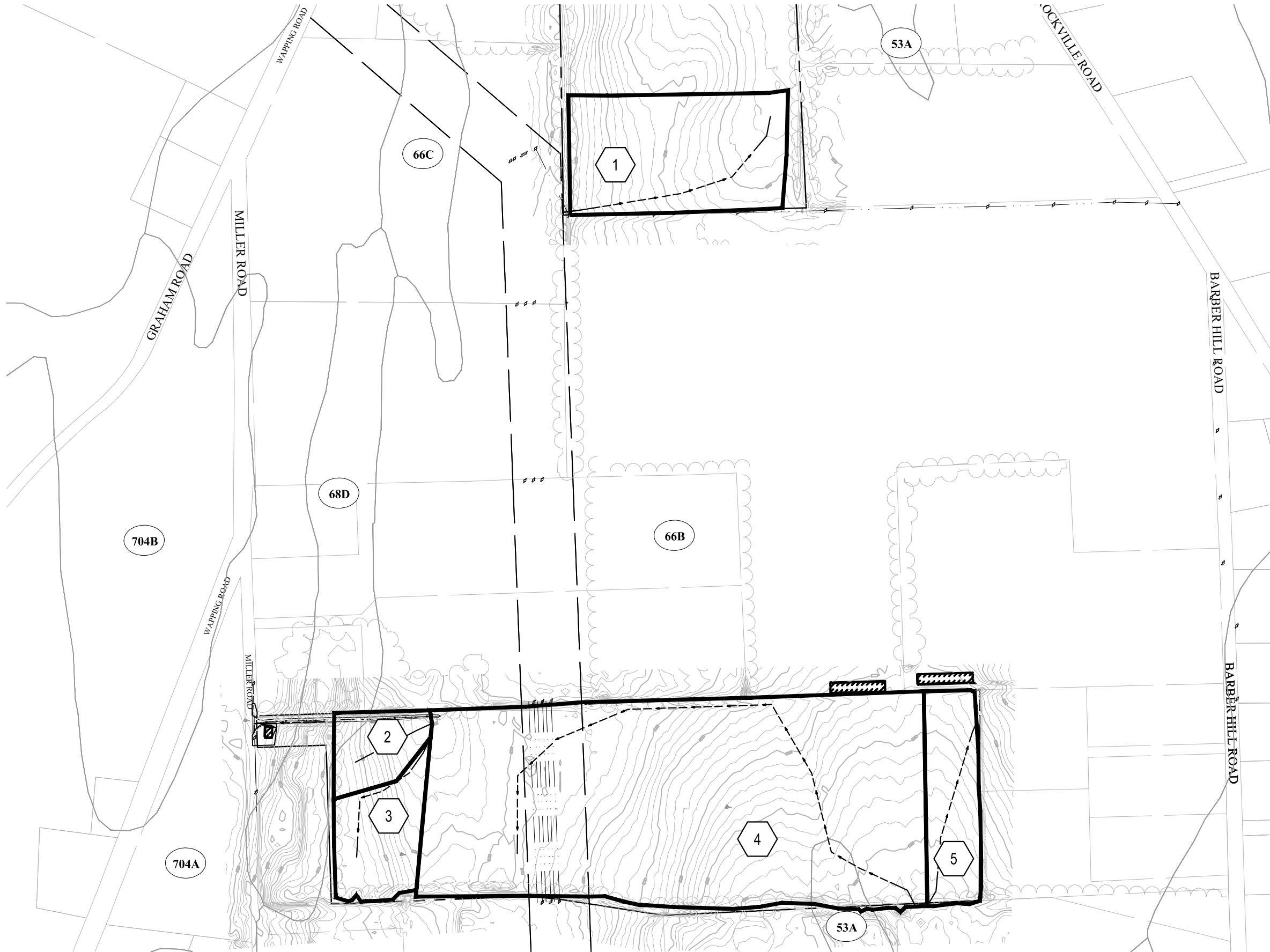
Table 1 summarizes the key hydrologic parameters for each drainage area used in the existing conditions analysis.

Table 1 Existing Conditions Hydrologic Data

<i>Drainage Area</i>	<i>Discharge Location</i>	<i>Area (acres)</i>	<i>Curve Number</i>	<i>Time of Concentration (min)</i>
1	Farm Road to North	4.9	77	13.5
2	Miller Road residence	1.3	77	7.5
3	Miller Road residence	2.0	78	9.3
4	Southern Stream	20.1	79	34.9
5	Barber Hill Road residence	1.9	79	14.1



Figure 2: Existing Drainage Areas







Legend







SYMBOLS

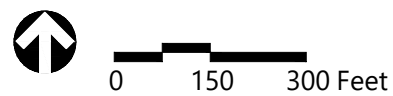
-  DRAINAGE AREA DESIGNATION
-  DRAINAGE POND

LINETYPES

-  DRAINAGE AREA BOUNDARY
-  TIME OF CONCENTRATION FLOW LINE
-  SOIL TYPE BOUNDARY
-  WETLAND BOUNDARY

SCS SOIL CLASSIFICATIONS

-  WAPPING VERY FINE SANDY LOAM, 0 TO 3 PERCENT SLOPES
-  NARRAGANSETT SILT LOAM, 2 TO 8 PERCENT SLOPES
-  NARRAGANSETT SILT LOAM, 8 TO 15 PERCENT SLOPES
-  NARRAGANSETT SILT LOAM, 15 TO 25 PERCENT SLOPES, EXTREMELY STONY
-  ENFIELD SILT LOAM, 0 TO 3 PERCENT SLOPES
-  ENFIELD SILT LOAM, 3 TO 8 PERCENT SLOPES



Proposed Drainage Conditions

Summary

The Site has been designed to maintain existing topography and mimic existing drainage patterns to the maximum extents feasible. In the majority of the on-Site areas, the Project proposes to install permanent turf-forming grasses to help stabilize the topsoil from erosion, sequester nutrients and pollutants, and lower runoff rates from the facility to the surrounding discharge points. Mature vegetation has been preserved to the maximum extents practicable and no tree clearing is proposed. As a result, the Project will have minimal impact to surrounding ecologically sensitive areas.

The only impervious surfaces proposed to be constructed are access roads and small concrete pads for utility equipment. Once operational, vehicular access to the Project will be limited to infrequent maintenance visits. The vegetated buffers and proposed stormwater basins will provide water quality treatment in all portions of the Site.

Hydrologic Information

Natural drainage patterns will be maintained throughout the Site so that the proposed hydrologic conditions will closely match existing conditions. The proposed conditions analysis utilizes the same five (5) drainage areas from existing conditions. In accordance with CTDEEP Stormwater General Permit effective December 31, 2020, a reduction in Hydrologic Soil Group of half a step has been considered in the proposed conditions hydrologic model for developed portions of the site.

Drainage Area 1 - This ±4.9-acre area is located in the southern portion of the northern parcel. Stormwater in this area flows generally in the east direction to Stormwater Basin 1. After being treated by this basin, the stormwater then travels north along the farm road eventually discharging across a residential property to a culvert that crosses Rockville Road.



Drainage Area 2 – This ±1.3 acre area is located at the northwestern portion of the Site in the southern parcel. Stormwater in this area flows generally west of the site under the proposed panel array to Stormwater Basin 2. After being treated by this basin, stormwater runoff ultimately discharges towards residential property.

Drainage Area 3 – This ±2.0 acre area is located at the northwestern portion of the Site in the southern parcel. Stormwater in this area flows generally west of the site under the proposed panel array to Stormwater Basin 3. After being treated by this basin, stormwater runoff ultimately discharges towards residential property.

Drainage Area 4 – This ±20.1-acre area is located at the central portion of the Site in the southern parcel. Stormwater in this area flows generally towards the Eversource easement area and is collected by Stormwater Basin 4. After being treated by this basin, the stormwater is discharged to the existing stream on the southern property line.

Drainage Area 5 – This ±1.9-acre area is located at the eastern portion of the Site in the southern parcel. Stormwater in this area flows untreated generally to the north/northeast to the corner of the property and then towards residential property. It is not proposed to install any solar infrastructure or other development in this watershed and it will only be planted.

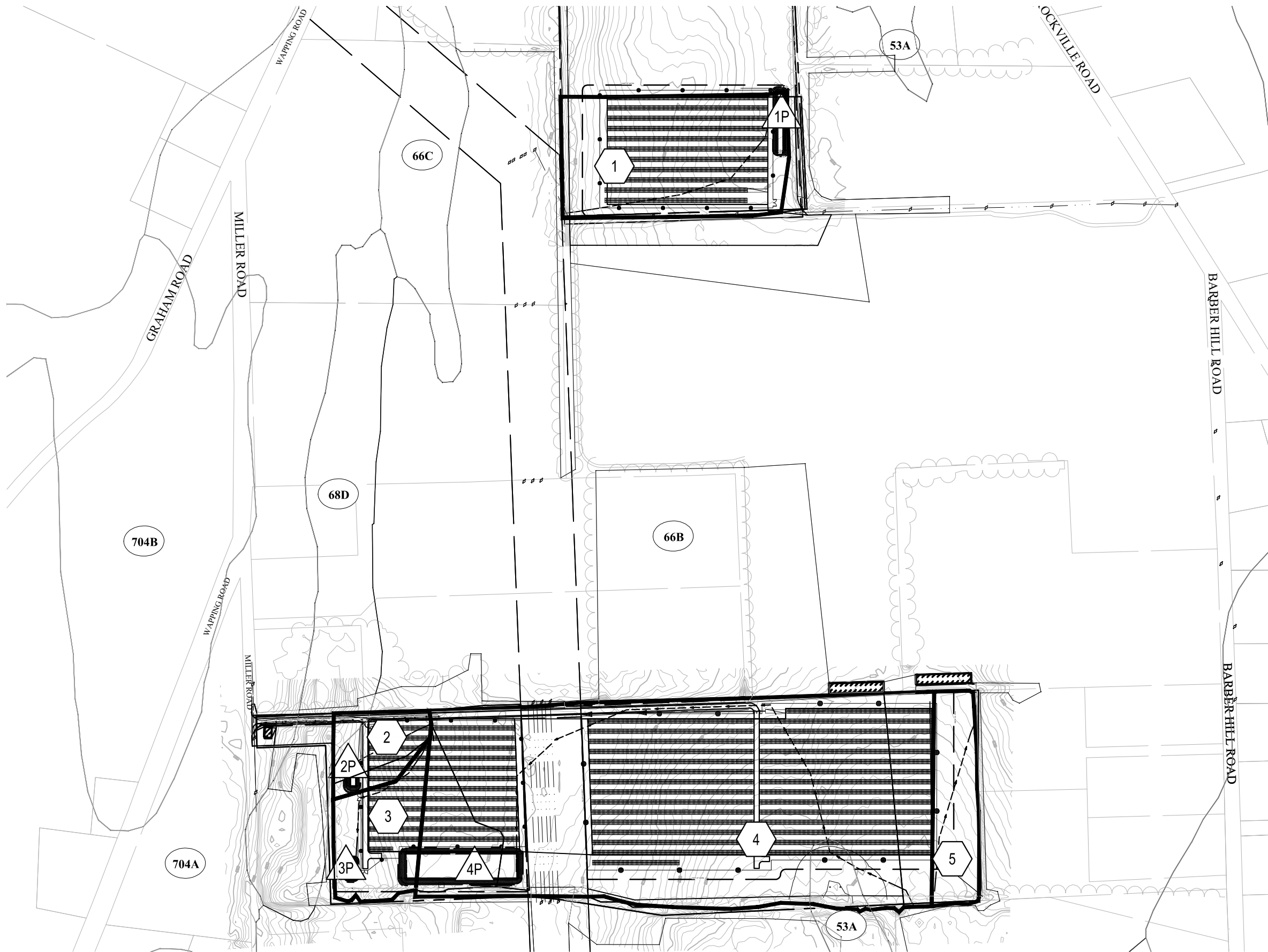
Table 2 summarizes the key hydrologic parameters for each drainage area used in the proposed conditions analysis.

Table 2 Proposed Conditions Hydrologic Data

<i>Drainage Area</i>	<i>Discharge Location</i>	<i>Area (acres)</i>	<i>Curve Number</i>	<i>Time of Concentration (min)</i>
1	Farm Road to North	4.9	75	13.5
2	Miller Road residence	1.3	76	7.5
3	Miller Road residence	2.0	74	9.3
4	Southern Stream	20.1	75	34.9
5	Barber Hill Road residence	1.9	70	14.1



Figure 3: Proposed Drainage Areas



Legend

SYMBOLS



DRAINAGE AREA DESIGNATION

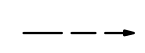


DRAINAGE POND

LINETYPES



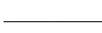
DRAINAGE AREA BOUNDARY



TIME OF CONCENTRATION FLOW LINE



SOIL TYPE BOUNDARY



WETLAND BOUNDARY

SCS SOIL CLASSIFICATIONS



WAPPING VERY FINE SANDY LOAM, 0 TO 3 PERCENT SLOPES



NARRAGANSETT SILT LOAM, 2 TO 8 PERCENT SLOPES



NARRAGANSETT SILT LOAM, 8 TO 15 PERCENT SLOPES



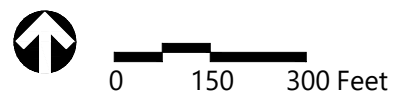
NARRAGANSETT SILT LOAM, 15 TO 25 PERCENT SLOPES, EXTREMELY STONY



ENFIELD SILT LOAM, 0 TO 3 PERCENT SLOPES



ENFIELD SILT LOAM, 3 TO 8 PERCENT SLOPES



Hydrologic Analysis

Hydrologic Analysis

The rainfall-runoff was evaluated for the 2-, 25-, 50-, and 100-year storm recurrence. Rainfall volumes used for this analysis were based on the National Weather Service NOAA Hydrometeorological Design Studies Center, Type III, 24—hour storm event for the Site. Rainfall depths were 3.16, 6.15, 6.99, 7.92 inches respectively. Runoff coefficients for the pre- and post- development conditions provided in the tables below were determined using NRCS Technical Release 55 (TR-55) methodology as provided in the HydroCAD reports found in Appendix D.

In accordance with the guidance of CTDEEP Stormwater General Permit effective December 31, 2020, the proposed conditions have been modelled with a loss of one-half class of Hydrologic Soil Group to conservatively estimate the effects of compaction during construction. The results of the pre- and post-development hydrologic models indicate that peak runoff rates from the Site will be reduced at all discharge points for all design storms with the implementation of the proposed permanent stormwater basins. It is proposed to perform field geotechnical investigations in the vicinity of each proposed basin location once the active farming has been harvested for the season. No more than one-half of the lowest field-tested infiltration rate for each infiltration basin will be used in the hydrologic model, in accordance with 2004 CTDEEP Stormwater Quality Manual. At this time the current design does not reflect infiltration rates.



Table 3 presents a summary of the existing and proposed conditions peak discharge rates where stormwater basins are proposed.

Table 3 Peak Discharge Rates (cfs*)

<u>Watershed</u>	<u>2-year</u>	<u>25-year</u>	<u>50-year</u>	<u>100-year</u>
1				
Existing	5.46	16.70	20.04	23.76
Proposed	0.27	9.27	14.91	20.68
2				
Existing	1.71	5.22	6.26	7.41
Proposed	0.12	4.69	5.71	6.83
3				
Existing	2.35	7.39	8.90	10.58
Proposed	0.06	6.00	8.12	9.73
4				
Existing	15.92	47.29	56.61	66.96
Proposed	0.00	10.04	21.83	36.23
5				
Existing	2.14	6.36	7.60	8.98
Proposed	1.19	4.85	6.02	7.34

* Expressed in cubic feet per second

Floodplain Information / Analysis

The entire portion of the Site is within the Federal Emergency Management Agency (FEMA) mapped "Area of Minimal Flood Hazard" as shown on the FEMA Flood Insurance Rate Map No. 09003C0245F, dated September 26, 2008 (included in Appendix A).

Water Quality Volume

Water Quality Volume (WQV) is based upon the first inch of rainfall, or a 1-inch rainfall event, over the acreage of proposed impervious surfaces for the development. Neither the solar panels nor the concrete equipment pads will be subject to vehicular access nor will they produce any pollutants to stormwater runoff. The crushed stone access paths will be trafficked infrequently and the grassy meadows downstream of the paths will provide residence time of stormwater runoff to remove the small amount of sediment from runoff.



Water quality computations have been performed assuming that the existing and proposed access roads serving the facility are the only impervious areas which require treatment. These water quality volumes are addressed in the design of the proposed permanent stormwater basins. Computations can be found in Appendix D.

Water Quality Flow

Water Quality Flow (WQF) is a rate of stormwater runoff based upon the first inch of rainfall, or a 1-inch rainfall event. This regulation is generally followed for “flow-through” treatment devices. As the proposed development does not incorporate any “flow-through” water quality treatment devices, WQF is not applicable to this project.

Stream Channel Protection

Stream channel protection is provided at the discharge point of each permanent stormwater basin, in accordance with the guidance in 2004 CTDEEP Stormwater Quality Manual. The 2-year, 24-hour post-development peak flow rate is mitigated to 50% or less of the 2-year, 24-hour pre-development peak flow for each watershed containing development.



Appendix A:

FEMA Flood Insurance Rate Map

NOAA Rainfall Depth Estimates

CTDEEP Groundwater Classification Map

Aquifer Protection Area Mapping



FEMA Flood Insurance Rate Map

National Flood Hazard Layer FIRMMette



72°32'35"W 41°53'8"N



Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS		Without Base Flood Elevation (BFE) <i>Zone A, V, A99</i>
		With BFE or Depth <i>Zone AE, AO, AH, VE, AR</i>
		Regulatory Floodway
OTHER AREAS OF FLOOD HAZARD		0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile <i>Zone X</i>
		Future Conditions 1% Annual Chance Flood Hazard <i>Zone X</i>
		Area with Reduced Flood Risk due to Levee. See Notes. <i>Zone X</i>
		Area with Flood Risk due to Levee <i>Zone D</i>
OTHER AREAS		NO SCREEN Area of Minimal Flood Hazard <i>Zone X</i>
		Effective LOMRs
GENERAL STRUCTURES		Area of Undetermined Flood Hazard <i>Zone D</i>
		Channel, Culvert, or Storm Sewer
		Levee, Dike, or Floodwall
OTHER FEATURES		20.2 Cross Sections with 1% Annual Chance
		17.5 Water Surface Elevation
		Coastal Transect
		Base Flood Elevation Line (BFE)
		Limit of Study
MAP PANELS		Jurisdiction Boundary
		Coastal Transect Baseline
		Profile Baseline
		Hydrographic Feature
		Digital Data Available
		No Digital Data Available
		Unmapped
		The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.



This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on **4/12/2021 at 11:02 AM** and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.



72°31'58"W 41°52'41"N



NOAA Rainfall Depth Estimates



NOAA Atlas 14, Volume 10, Version 3
Location name: Broad Brook, Connecticut, USA*
Latitude: 41.8776°, Longitude: -72.5417°
Elevation: 205.7 ft**
* source: ESRI Maps
** source: USGS



POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Sandra Pavlovic, Michael St. Laurent, Carl Trypaluk, Dale Unruh, Orlan Wilhite

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	0.336 (0.258-0.438)	0.407 (0.312-0.531)	0.523 (0.399-0.684)	0.619 (0.470-0.815)	0.751 (0.554-1.03)	0.851 (0.616-1.20)	0.955 (0.674-1.39)	1.07 (0.719-1.60)	1.24 (0.803-1.92)	1.38 (0.873-2.17)
10-min	0.476 (0.365-0.621)	0.577 (0.441-0.752)	0.741 (0.565-0.970)	0.877 (0.666-1.15)	1.06 (0.785-1.46)	1.21 (0.873-1.69)	1.35 (0.954-1.97)	1.52 (1.02-2.27)	1.76 (1.14-2.71)	1.96 (1.24-3.08)
15-min	0.560 (0.429-0.730)	0.678 (0.519-0.885)	0.871 (0.665-1.14)	1.03 (0.783-1.36)	1.25 (0.923-1.72)	1.42 (1.03-1.99)	1.59 (1.12-2.32)	1.79 (1.20-2.66)	2.07 (1.34-3.19)	2.30 (1.46-3.62)
30-min	0.755 (0.578-0.984)	0.916 (0.701-1.20)	1.18 (0.900-1.54)	1.40 (1.06-1.84)	1.70 (1.25-2.34)	1.93 (1.39-2.71)	2.16 (1.53-3.16)	2.43 (1.63-3.62)	2.82 (1.82-4.34)	3.13 (1.98-4.93)
60-min	0.949 (0.727-1.24)	1.15 (0.883-1.51)	1.49 (1.14-1.95)	1.77 (1.34-2.33)	2.15 (1.58-2.96)	2.44 (1.76-3.42)	2.74 (1.93-3.99)	3.08 (2.06-4.58)	3.56 (2.30-5.50)	3.96 (2.51-6.23)
2-hr	1.22 (0.942-1.59)	1.48 (1.14-1.92)	1.89 (1.45-2.47)	2.24 (1.71-2.93)	2.71 (2.02-3.72)	3.07 (2.24-4.31)	3.45 (2.46-5.04)	3.90 (2.62-5.78)	4.57 (2.97-7.01)	5.14 (3.26-8.04)
3-hr	1.41 (1.09-1.82)	1.70 (1.31-2.20)	2.18 (1.67-2.83)	2.57 (1.97-3.36)	3.12 (2.32-4.27)	3.52 (2.58-4.93)	3.96 (2.84-5.78)	4.49 (3.02-6.63)	5.30 (3.44-8.10)	6.00 (3.81-9.35)
6-hr	1.77 (1.37-2.27)	2.14 (1.66-2.76)	2.76 (2.13-3.56)	3.27 (2.51-4.25)	3.97 (2.98-5.42)	4.49 (3.31-6.27)	5.05 (3.65-7.37)	5.76 (3.89-8.46)	6.85 (4.47-10.4)	7.81 (4.98-12.1)
12-hr	2.17 (1.70-2.78)	2.66 (2.08-3.41)	3.46 (2.69-4.45)	4.13 (3.19-5.33)	5.04 (3.80-6.84)	5.71 (4.23-7.95)	6.45 (4.68-9.37)	7.37 (5.00-10.8)	8.82 (5.77-13.3)	10.1 (6.45-15.5)
24-hr	2.54 (1.99-3.23)	3.16 (2.47-4.02)	4.16 (3.25-5.32)	5.00 (3.88-6.42)	6.15 (4.66-8.32)	6.99 (5.21-9.70)	7.92 (5.80-11.5)	9.11 (6.20-13.2)	11.0 (7.21-16.5)	12.7 (8.13-19.4)
2-day	2.85 (2.25-3.61)	3.59 (2.83-4.55)	4.80 (3.77-6.10)	5.80 (4.53-7.41)	7.18 (5.48-9.69)	8.18 (6.15-11.3)	9.30 (6.87-13.5)	10.8 (7.36-15.6)	13.2 (8.67-19.7)	15.3 (9.88-23.3)
3-day	3.11 (2.46-3.92)	3.92 (3.10-4.94)	5.24 (4.13-6.64)	6.34 (4.97-8.07)	7.85 (6.01-10.6)	8.94 (6.75-12.4)	10.2 (7.55-14.8)	11.8 (8.07-17.0)	14.5 (9.55-21.6)	16.9 (10.9-25.6)
4-day	3.34 (2.65-4.21)	4.20 (3.33-5.30)	5.61 (4.43-7.10)	6.78 (5.33-8.62)	8.40 (6.44-11.3)	9.56 (7.23-13.2)	10.9 (8.08-15.7)	12.6 (8.64-18.1)	15.5 (10.2-23.0)	18.0 (11.6-27.2)
7-day	3.99 (3.18-5.00)	4.96 (3.95-6.22)	6.55 (5.20-8.25)	7.88 (6.21-9.96)	9.69 (7.46-12.9)	11.0 (8.34-15.1)	12.5 (9.29-17.9)	14.4 (9.91-20.6)	17.6 (11.6-25.9)	20.4 (13.2-30.6)
10-day	4.63 (3.70-5.79)	5.67 (4.52-7.09)	7.36 (5.85-9.23)	8.76 (6.93-11.0)	10.7 (8.23-14.2)	12.1 (9.16-16.5)	13.7 (10.1-19.4)	15.7 (10.8-22.3)	18.9 (12.5-27.7)	21.7 (14.1-32.5)
20-day	6.67 (5.36-8.28)	7.77 (6.23-9.66)	9.56 (7.65-11.9)	11.1 (8.79-13.9)	13.1 (10.1-17.2)	14.6 (11.1-19.6)	16.3 (12.0-22.6)	18.2 (12.6-25.7)	21.2 (14.1-30.9)	23.7 (15.4-35.2)
30-day	8.40 (6.77-10.4)	9.53 (7.67-11.8)	11.4 (9.11-14.1)	12.9 (10.3-16.1)	15.0 (11.6-19.5)	16.6 (12.5-21.9)	18.2 (13.3-25.0)	20.1 (13.9-28.1)	22.7 (15.2-32.9)	24.8 (16.2-36.7)
45-day	10.6 (8.55-13.1)	11.7 (9.47-14.5)	13.6 (11.0-16.9)	15.2 (12.2-18.9)	17.3 (13.4-22.4)	19.0 (14.3-24.9)	20.7 (15.1-27.9)	22.4 (15.6-31.2)	24.6 (16.5-35.5)	26.3 (17.2-38.8)
60-day	12.4 (10.1-15.3)	13.6 (11.0-16.8)	15.5 (12.5-19.2)	17.2 (13.8-21.3)	19.4 (15.0-24.8)	21.1 (15.9-27.5)	22.8 (16.6-30.5)	24.4 (17.1-33.9)	26.3 (17.7-37.9)	27.7 (18.1-40.7)

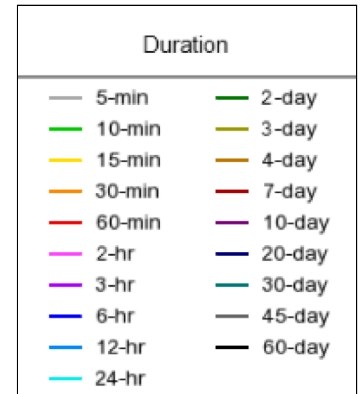
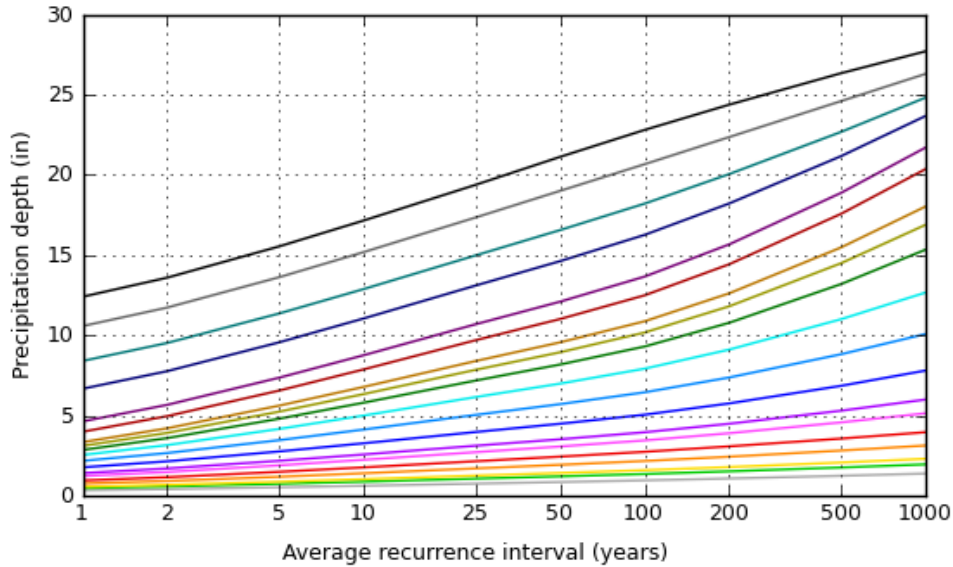
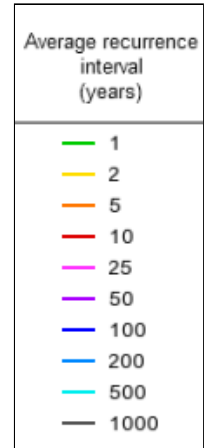
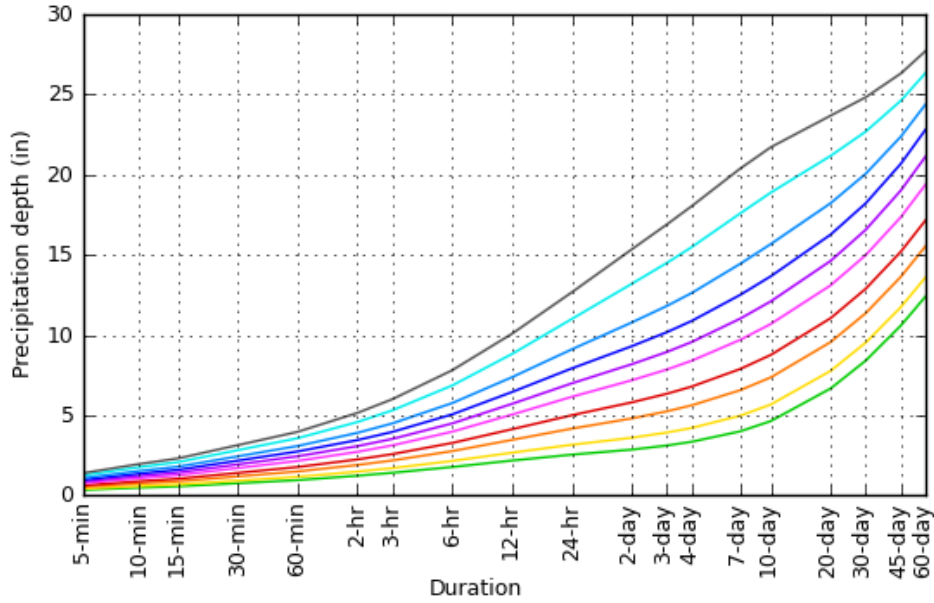
¹ Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS). Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average 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

PDS-based depth-duration-frequency (DDF) curves

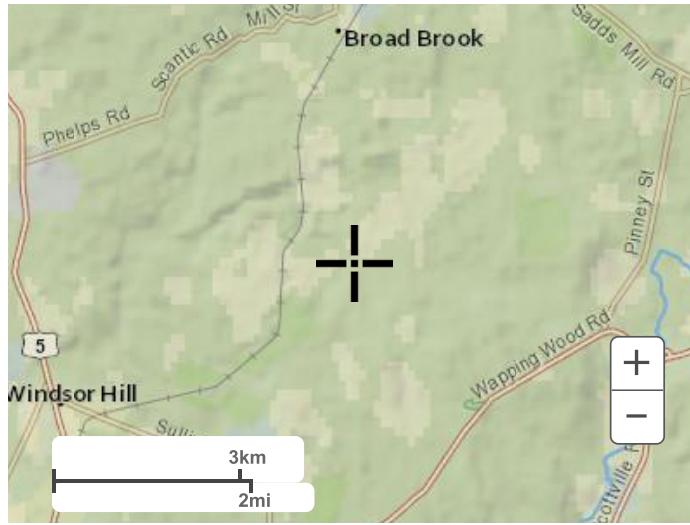
Latitude: 41.8776°, Longitude: -72.5417°



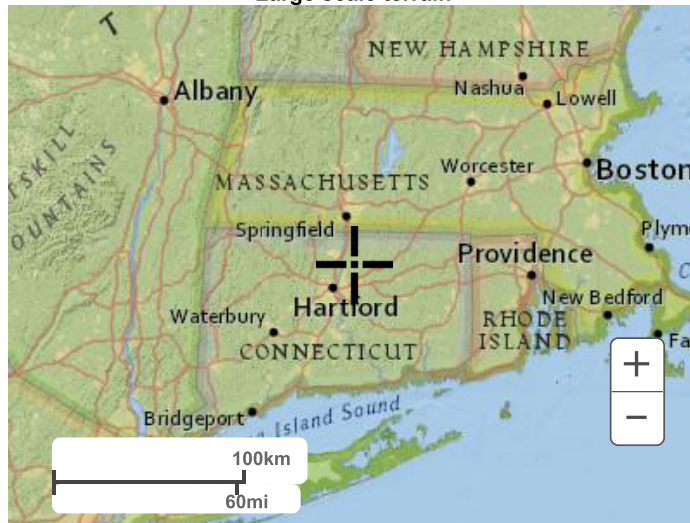
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Maps & aerials

Small scale terrain



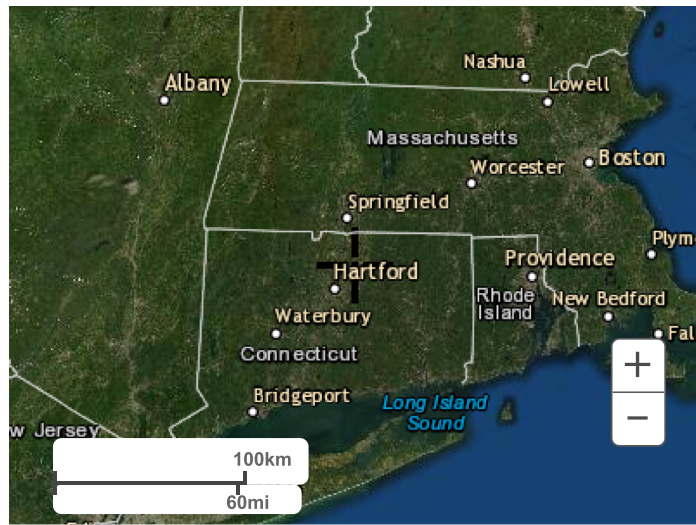
Large scale terrain



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](#)



CTDEEP Groundwater Classification Map

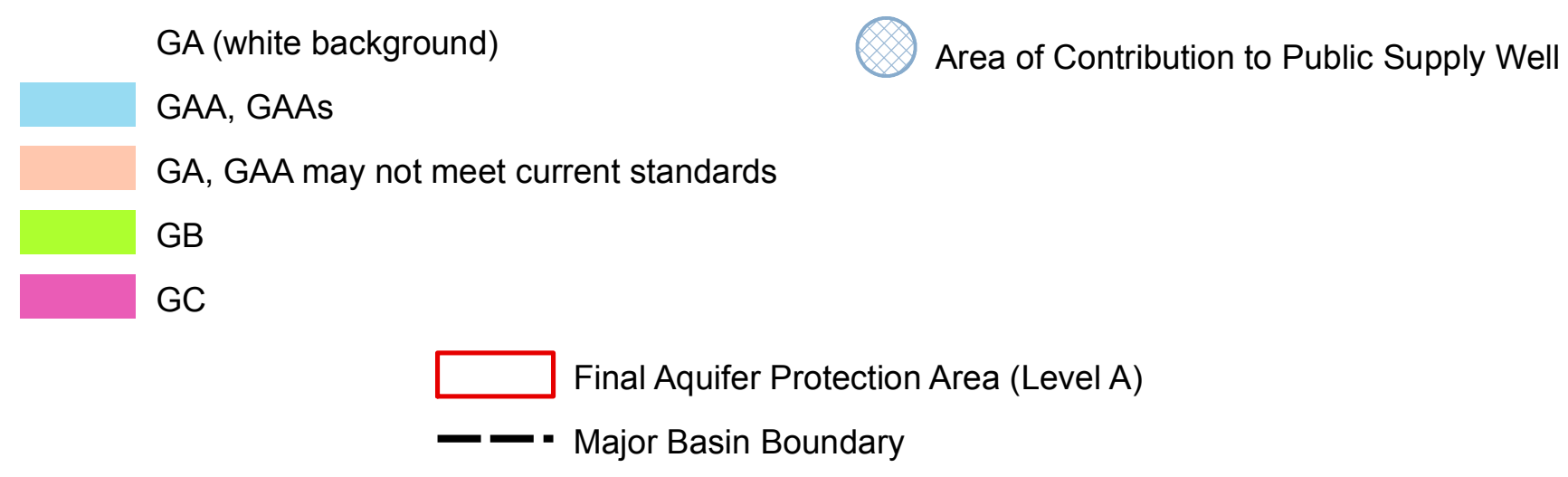
WATER QUALITY CLASSIFICATIONS EAST WINDSOR, CT

SURFACE WATER QUALITY CLASSES



NOTES:
Surface Water Classifications beginning with S refer to Coastal and Marine Surface Water. B* is a subset of Class B where no direct wastewater discharges are allowed other than those consistent with Class AA, A, and SA surface waters.

GROUND WATER QUALITY CLASSES



EXPLANATION

WATER QUALITY CLASSIFICATIONS (WQC) MAPS are one of the elements of the Water Quality Standards (WQS) for the State of Connecticut. The WQS are a part of Connecticut's clean water program and are essential for protecting and improving water quality. The WQS follow the principles of Connecticut's Clean Water Act which is in Chapter 446k of the Connecticut General Statutes. The WQS provide policy guidance in many areas, for example decisions on acceptable discharges to water resources, siting of landfills, remediation or prioritization of municipal sewerage system projects. The first two elements of the WQS are the Standards, which set an overall policy for management of water quality, and the Criteria, which are descriptive and numerical standards that describe the allowable parameters and goals for various water quality classifications. A discussion of these two elements is found in the Water Quality Standards document available on the CT DEEP website. The third element is the Classifications and the Water Quality Classification Maps which show the Classification assigned to each surface and groundwater resource throughout the State. The WQS are adopted using a public participation process. The WQC maps are also adopted using a public participation process but go through hearings separately from the Standards and Criteria hearings. Revision and adoption of the WQC data occurs in accordance with the public participation procedures contained in Section 22a-426 of the Connecticut General Statutes. Ground WQC is subject to Connecticut regulation and changes must be reviewed and adopted. All changes to the Surface WQC require an adoption process which is subject to federal review and approval in addition to CT regulation. The adoption dates for the WQC by major drainage basin are: Housatonic River, Hudson River and Southwest Coastal Basins - March 1999; Connecticut River and South Central Coastal Basins - February 1993; Thames River, Pawcatuck River and Southeast Coastal Basins - December 1986. Surface Water Classifications do not change after the adoption date until the next major revision. Ground Water Classifications may change after the adoption date under specific circumstances. The map may have more than one WQC adoption date because a town may be in more than one major drainage basin.

SURFACE WATERS in Connecticut are divided into freshwater classified as AA, A, B or B* and saline waters classified as SA or SB. Class AA designated uses are existing or proposed drinking water supplies; habitat for fish and other aquatic life and wildlife; recreation; and water supply for industry and agriculture. Class A designated uses are habitat for fish and other aquatic life and wildlife; potential drinking water supplies; recreation; navigation; and water supply for industry and agriculture. Class SA designated uses are habitat for marine fish, other aquatic life and wildlife; shellfish harvesting for direct human consumption; recreation; industrial water supply, and navigation. Class B designated uses are habitat for fish and aquatic life and wildlife; recreation; navigation and industrial and agricultural water supply. Class B* applicable to Candlewood Lake, is a subset of Class B and is identical in all ways to the designated uses, criteria and standards for Class B waters except for the restriction on direct discharges. Class SB designated uses are habitat for marine fish and aquatic life and wildlife; commercial shellfish harvesting; recreation; industrial water supply; and navigation.

Surface waters which are not specifically classified shall be considered as Class A or Class AA. Surface waters in GA ground water areas are assumed Class A or Class SA unless otherwise indicated. Surface waters in GAA ground water areas are assumed Class AA unless otherwise indicated.

On the WQC map a surface water quality goal of A is represented by blue colored water bodies. Surface water quality goal of AA is represented by purple colored water bodies. Surface water quality goal of B is represented by gold colored water bodies.

GROUND WATERS in Connecticut are classified as GAA, GA, GB and GC. Class GAA designated uses are existing or potential public supply of water suitable for drinking without treatment and baseflow for hydraulically-connected surface water bodies. The Class GAAs is a subclass of GAA for ground water that is tributary to a public water supply reservoir. The area of contribution to a public water supply well is represented by a 500-foot radius around the well and is assumed to be Class GAA unless otherwise classified. Class GA designated uses are existing private and potential public or private supplies of water suitable for drinking without treatment and baseflow for hydraulically-connected surface water bodies. All ground waters not specifically classified are considered as Class GA. Class GB designated uses are industrial process water and cooling waters and baseflow for hydraulically-connected water bodies and is presumed not suitable for human consumption without treatment. Class GC designated uses are assimilation of discharges authorized by the Commissioner pursuant to Section 22a-430 of the General Statutes.

On the WQC map GA is represented by white colored land areas. Class GAA and class GAAs are represented by blue colored land areas. The area of contribution to a public water supply well is shown by a blue cross-hatch overprint. A notation of GAA followed by a state abbreviation indicates a watershed that contributes to the public water supply for a state other than Connecticut. Class GA or Class GAA areas that currently may not be meeting the GA or GAA standards are represented on the WQC maps by tan colored land areas. Class GB is represented by green colored land areas. Class GC is represented by magenta colored land areas.

FINAL AQUIFER PROTECTION AREAS (Level A) are included on the WQC maps for informational purposes. These areas are anticipated to be reclassified as A during the next major basin updates, subject to public participation. The Aquifer Protection Program helps protect Connecticut's public drinking water resources by delineating aquifer protection areas (also called wellhead protection areas) for public supply wells and establishing land use regulations within these areas. These areas represent the land area contributing ground water to active public water supply wells or well fields that serve more than 1000 people and are set in sand and gravel aquifers (stratified drift deposits).

DATA SOURCES

WATER QUALITY CLASSIFICATIONS DATA - Water quality classifications shown on this map are based on information from the following digital spatial datasets that are typically shown together - Ground Water Quality Classifications Poly, Surface Water Quality Classifications Line, and Surface Water Quality Classifications Poly. The map legend above reflects the content of these three data sources. These WQC data were initially compiled on 1:24,000-scale 7.5 minute USGS topographic quadrangle maps and later digitized at 1:24,000 scale. For example, the Surface Water Quality Classifications Line and Surface Water Quality Classifications Poly digital data assigns surface water quality classifications to water bodies such as rivers, streams, reservoirs, lakes, ponds and covers found in 1:24,000-scale hydrography data available from CT DEEP. The hydrography data does not include all the waterbodies in Connecticut. The Ground Water Quality Classifications Poly data assigns ground water quality classifications, at 1:24,000 scale, to the remaining land areas in Connecticut.

the individual water companies owning the well fields and submitted to the CT DEEP for approval. Preliminary mapping provides a general estimate of the area contributing ground water to the well field. Final mapping is based on extensive site-specific detailed modeling of the ground water flow system. CT DEEP may adjust Final area boundaries to be consistent with 1:24,000 scale topography and base map data where appropriate during the approval process.

MAJOR DRAINAGE BASIN DATA - Major drainage basins shown on this map are from Major Basin Line data developed by CT DEEP and intended to be used at 1:24,000 scale.

BASE MAP DATA - Based on data originally from 1:24,000-scale USGS 7.5 minute topographic quadrangle maps published between 1969 and 1992. It includes political boundaries, railroads, airports, hydrography, geographic names and geographic places. Streets and street names are from Tele Atlas' copyrighted data. Base map information is neither current nor complete.

RELATED INFORMATION
This map is intended to be printed at its original dimensions in order to maintain the 1:24,000 scale (1 inch = 2000 feet).
WATER QUALITY STANDARDS - Go to the CT DEEP website for a summary and the full text of the "Water Quality Standards" and for other information on water quality.
AQUIFER PROTECTION AREAS - Go to the CT DEEP website for more information.

ADOPTED DATES

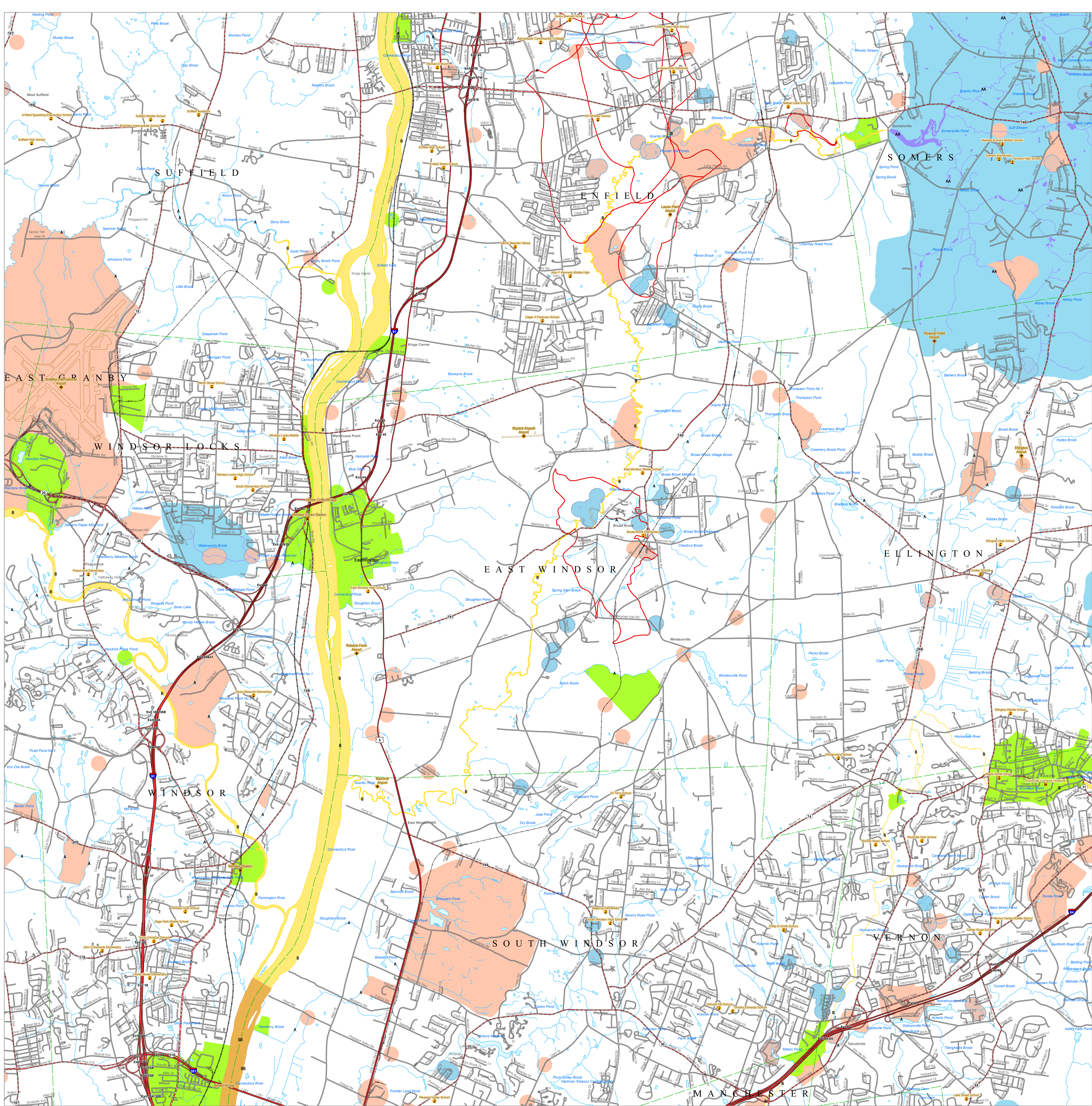
- Water Quality Standards
February 25, 2011
- Thames River, Pawcatuck River and Southeast Coastal Basins - December 1986
- Connecticut River and South Central Coastal Basins - February 1993
- Housatonic River, Hudson River and Southwest Coastal Basins - March 1999

- MAJOR BASINS
- 1 Pawcatuck
- 2 Southeast Coast
- 3 Thames
- 4 Connecticut
- 5 South Central Coast
- 6 Housatonic
- 7 Southwest Coast
- 8 Hudson

Date Plane Coordinate System of 1983, Zone 2028
Lambert Conformal Conic Projection
North American Datum of 1983

SCALE 1:24,000 (1 inch = 2000 feet) when map is printed at original size

Map created by CT DEEP
October 2018
Map is not colorfast
Protect from light and moisture









Aquifer Protection Area Mapping

AQUIFER PROTECTION AREAS

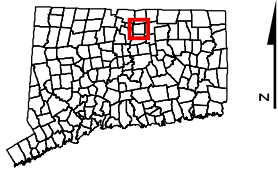
East Windsor, CT

August 26, 2019

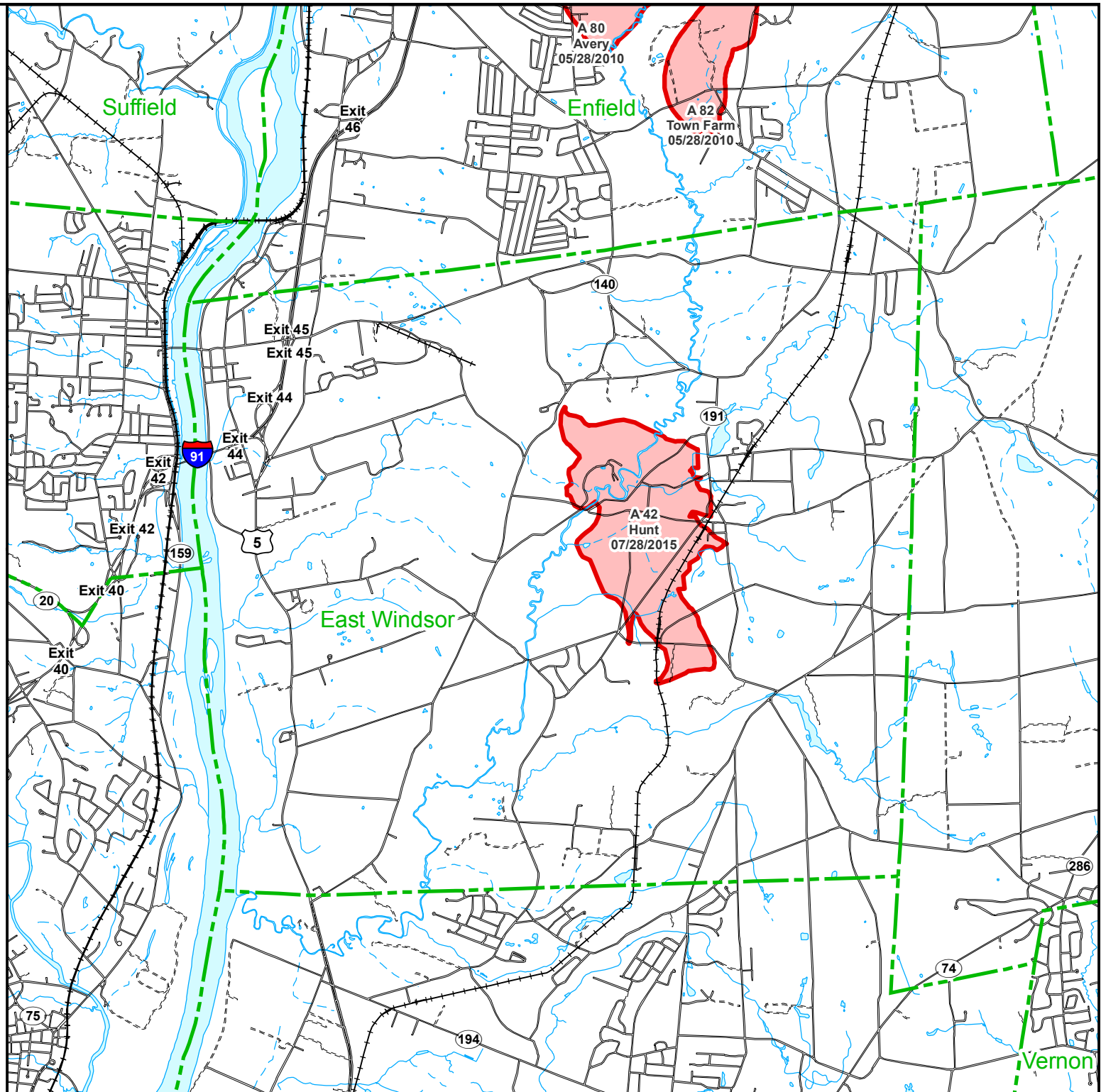
-  Level A APA (Final Adopted)
-  Level A APA (Final)
-  Level B APA (Preliminary)
-  Town Boundary

NOTE: The Aquifer Protection Areas were delineated through Connecticut's Level A and Level B Mapping Processes. Aquifer Protection Areas are delineated for active public water supply wells in stratified drift that serve more than 1000 people, in accordance with Sections 22a-354c and 22a-354z of the Connecticut General Statutes. Level B Mapping delineates a preliminary aquifer protection area, providing an estimate of the land area from which the well draws its water. Level A Mapping delineates the final Aquifer Protection Area, which becomes the regulatory boundary for land use controls designed to protect the well from contamination. As Level A Mapping is completed for each well field and approved by DEEP, it replaces the Level B Mapping. Final Adopted Level A Areas are those where towns have land use regulations for them. Massachusetts and Rhode Island Wellhead Protection Areas may be shown for informational purposes.

QUESTIONS:
 Bureau of Water Protection and Land Reuse
 Planning and Standards Division
 Phone: (860) 424-3020
www.ct.gov/deep/aquiferprotection



STATE OF CONNECTICUT
 DEPARTMENT OF
 ENERGY & ENVIRONMENTAL PROTECTION
 79 Elm Street
 Hartford, CT 06106-5127





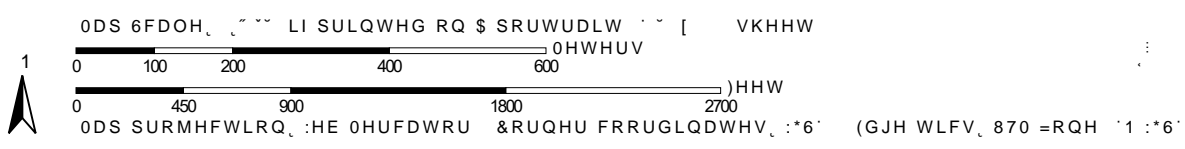
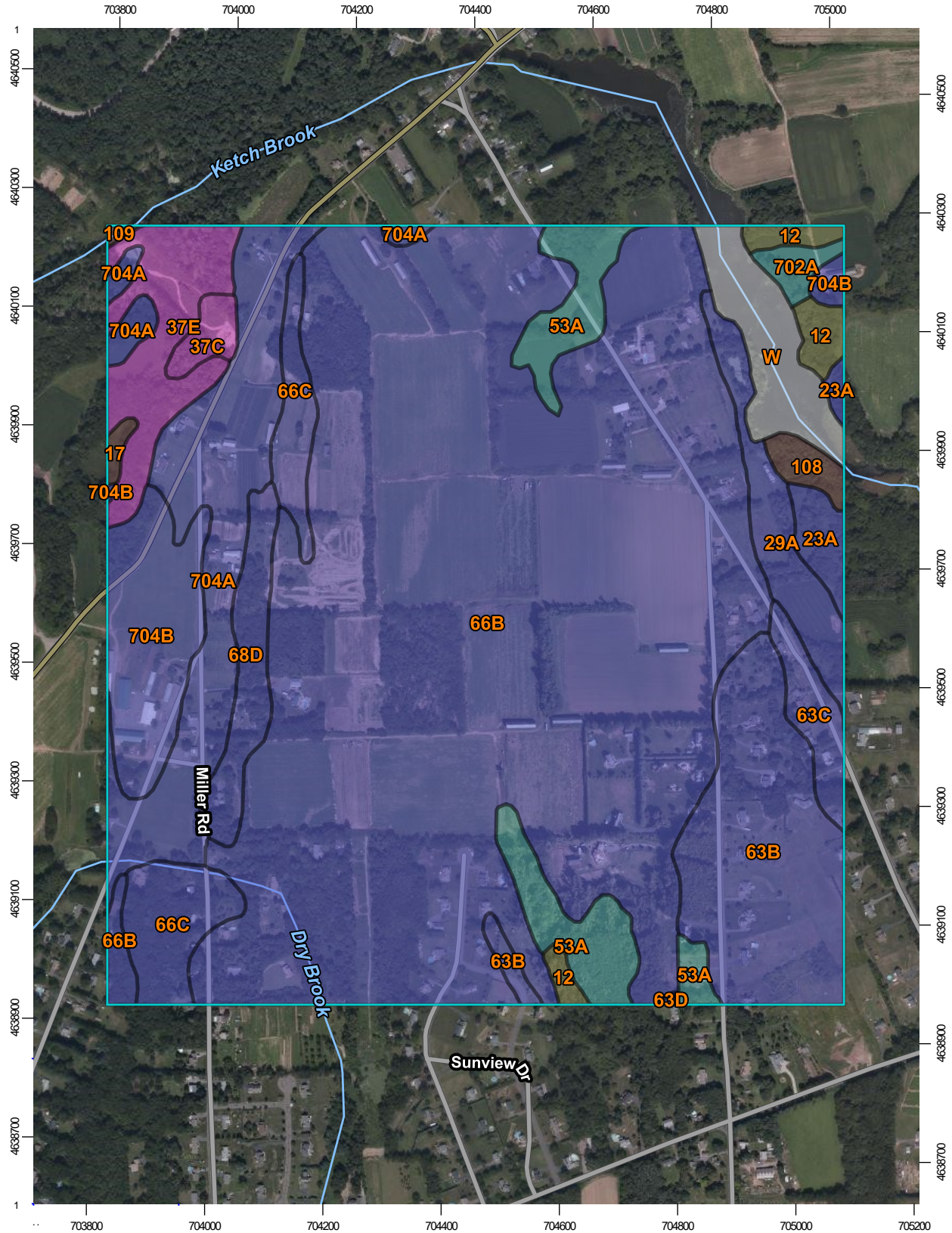
Appendix B:

NRCS Soil Survey Information



































NRCS Soil Survey Information

Hydrologic Soil Group—State of Connecticut



0 \$ 3 / (* (1 ')

0 \$ 3 , 1) 2 5 0 \$ 7 , 2 1

\$ U H D R I , Q W H U H V W \$ 2 ,	 C
 Area of Interest (AOI)	 C/D
6 R L O V	 D
6 R L O 5 D W L Q J 3 R O \ J R Q V	 Not rated or not available
 A	: D W H U) H D W X U H V
 A/D	 Streams and Canals
 B	7 U D Q V S R U W D W L R Q
 B/D	 Rails
 C	 Interstate Highways
 C/D	 US Routes
 D	 Major Roads
 Not rated or not available	 Local Roads
6 R L O 5 D W L Q J / L Q H V	% D F N J U R X Q G
 A	 Aerial Photography
 A/D	
 B	
 B/D	
 C	
 C/D	
 D	
 Not rated or not available	
6 R L O 5 D W L Q J 3 R L Q W V	
 A	
 A/D	
 B	
 B/D	

The soil surveys that comprise your AOI were mapped at 1:12,000.

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: State of Connecticut
 Survey Area Data: Version 20, Jun 9, 2020

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

Date(s) aerial images were photographed: Aug 24, 2019—Oct 24, 2019

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.

+ \ G U R O R J L F 6 R L O * U R X S

0 D S X Q L W V \ P E R O D S X Q L W Q D P H 5 D W L Q J	\$ F U H V L Q \$ 2 , 3 H U F H Q W R I \$ 2 ,			
12	Raypol silt loam	C/D	4.6	1.1%
17	Timakwa and Natchaug soils, 0 to 2 percent slopes	B/D	0.7	0.2%
23A	Sudbury sandy loam, 0 to 5 percent slopes	B	3.8	0.9%
29A	Agawam fine sandy loam, 0 to 3 percent slopes	B	9.6	2.4%
37C	Manchester gravelly sandy loam, 3 to 15 percent slopes	A	2.5	0.6%
37E	Manchester gravelly sandy loam, 15 to 45 percent slopes	A	13.8	3.4%
53A	Wapping very fine sandy loam, 0 to 3 percent slopes	C	15.4	3.8%
63B	Cheshire fine sandy loam, 3 to 8 percent slopes	B	32.0	7.9%
63C	Cheshire fine sandy loam, 8 to 15 percent slopes	B	5.1	1.3%
63D	Cheshire fine sandy loam, 15 to 25 percent slopes	B	0.1	0.0%
66B	Narragansett silt loam, 2 to 8 percent slopes	B	231.6	57.1%
66C	Narragansett silt loam, 8 to 15 percent slopes	B	13.6	3.3%
68D	Narragansett silt loam, 15 to 25 percent slopes, extremely stony	B	8.3	2.0%
108	Saco silt loam	B/D	2.3	0.6%
109	Fluvaquents-Udifulvents complex, frequently flooded	B/D	0.3	0.1%
702A	Tisbury silt loam, 0 to 3 percent slopes	C	2.1	0.5%
704A	Enfield silt loam, 0 to 3 percent slopes	B	32.6	8.0%
704B	Enfield silt loam, 3 to 8 percent slopes	B	17.1	4.2%

0 DS XQLW V	PER	0 DS XQLW Q	DPH 5DWLQJ	\$FUHV LQ \$2,	3HUFHQW RI \$2,
W	Water			10.3	2.5%
7RWDOV IRU \$UHD RI ,QWHUHVW					

'HVFULSWLRQ

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.

5DWLQJ 2SWLRQV

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher



Appendix C:

Erosion and Sedimentation Control Checklist Long Term Stormwater Operation and Maintenance Measures



Erosion and Sedimentation Control Checklist

Mulnrite Farms Solar – East Windsor, CT – Rockville Road

Best Management Practices – Maintenance/ Evaluation Checklist

Construction Practices

Best Management Practice	Inspection Frequency	Date Inspected	Inspector	Minimum Maintenance and Key Items to Check	Cleaning/Repair Needed <input type="checkbox"/> yes <input type="checkbox"/> no (List Items)	Date of Cleaning/Repair	Performed by
Silt Fencing	Once per week or after a 0.5" or greater storm event						
Compost Filter Sock	Once per week or after a 0.5" or greater storm event						
Straw Wattles	Once per week or after a 0.5" or greater storm event						
Stabilized Construction Exit	Once per week or after a 0.5" or greater storm event						
Temporary Sediment Trap/Basin & Diversion Swales	Once per week or after a 0.5" or greater storm event						
Vegetated Slope Stabilization	Once per week or after a 0.5" or greater storm event						
Energy Dissipators	Once per week or after a 0.5" or greater storm event						

Stormwater Control Manager _____



Long Term Stormwater Operation and Maintenance Measures

Mulnite Farms Solar – East Windsor, CT – Rockville Road

Best Management Practices – Maintenance/ Evaluation Checklist

Long Term Practices

Best Management Practice	Inspection Frequency	Date Inspected	Inspector	Minimum Maintenance and Key Items to Check	Cleaning/Repair Needed <input type="checkbox"/> yes <input type="checkbox"/> no (List Items)	Date of Cleaning/Repair	Performed by
Trash/Litter	Routinely pick up and remove litter from entire property as required.						
Vegetated Areas	Inspect bi-annually. Replant bare areas upon identification.						
Energy Dissipators	Inspect monthly for the first 3 months and after any rain event exceeding 0.5". Inspect 2x per year thereafter.						
Diversion Swales	Inspect monthly for the first 3 months and after any rain event exceeding 0.5". Inspect 2x per year thereafter.						
Infiltration Basin	Inspect monthly for the first 3 months and after any rain event exceeding 0.5". Inspect 2x per year thereafter.						

Stormwater Control Manager _____



Project Information

Site

Project Name: Mulnite II Solar

Address or Locus: Mulnite Farms

City, State & Zip: East Windsor, CT 06016

Developer

Client Name: Greenskies Clean Energy, LLC

Client Address: 127 Washington Ave, West Bldg, Lower Level

Client City, State & Zip: North Haven, CT 06473

Client Telephone No.: (860) 398-5408

Client Cell Phone: _____

Client E-Mail: _____

Site Supervisor

Site Manager Name: To be determined

Site Manager Address: _____

Site Manager City, State & Zip: _____

Site Manager Telephone No.: _____

Site Manager Cell Phone: _____

Site Manager E-Mail: _____



Appendix D:

Diversion Swale & Sediment Trap/Basin Sizing

Water Quality Computations

HydroCAD: Existing Conditions

HydroCAD: Proposed Conditions



Diversion Swale & Sediment Trap/Basin Sizing

Swale Sizing

Swale 1
0 sf
0.00 ac

Swale has almost zero tributary area, so proposed to use minimum-size swale.

Swale Sizing
 Swale 2
 20,900 sf
 0.48 ac

Reference DOT Drainage Manual 2000

Swale Slope, S =	0.010 ft / ft	
Manning's n for bare soil / ECB, n =	0.025	
Q25 (disturbed soil) =	2.34 cfs	
Bottom width, w =	1 ft	
Side slopes, X:1 =	3	
Estimated flow depth, d =	0.51 ft	
$Q = (1/n) * A * R^{(2/3)} * S^{(1/2)}$ $A * R^{(2/3)} = Q / (1/n) / S^{(1/2)} =$	0.59 (target for variable depth)	
$A = (w * d) + 2 * (0.5d * Xd) =$	1.29 sf	
$P = w + 2 * (\text{sqrt}(d^2 + (Xd)^2)) =$	4.23 ft	
$R = A / P =$	0.31 ft	
$A * R^{(2/3)} =$	0.59 (must be close to target)	
$y =$	62.4 pcf	
$\tau_d = y * d * S =$	0.32 psf	< 1.55 psf for ECB - OK
Velocity, $V = Q / A =$	1.81 fps	< 5.00 fps for ECB - OK

Swale Sizing
 Swale 3
 30,400 sf
 0.70 ac

Reference DOT Drainage Manual 2000

Swale Slope, S =	0.007 ft / ft	
Manning's n for bare soil / ECB, n =	0.025	
Q25 (disturbed soil & forest) =	3.2 cfs	
Bottom width, w =	1 ft	
Side slopes, X:1 =	3	
Estimated flow depth, d =	0.64 ft	
$Q = (1/n) * A * R^{(2/3)} * S^{(1/2)}$ $A * R^{(2/3)} = Q / (1/n) / S^{(1/2)} =$	0.96 (target for variable depth)	
$A = (w * d) + 2 * (0.5d * Xd) =$	1.87 sf	
$P = w + 2 * (\text{sqrt}(d^2 + (Xd)^2)) =$	5.05 ft	
$R = A / P =$	0.37 ft	
$A * R^{(2/3)} =$	0.96 (must be close to target)	
y =	62.4 pcf	
$\tau_d = y * d * S =$	0.28 psf	< 1.55 psf for ECB - OK
Velocity, $V = Q / A =$	1.71 fps	< 5.00 fps for ECB - OK

Swale Sizing
 Swale 4
 370,300 sf
 8.50 ac

Reference DOT Drainage Manual 2000

Swale Slope, S =	0.020 ft / ft	
Manning's n for bare soil / ECB, n =	0.025	
Q25 (disturbed soil & forest) =	23.43 cfs	
Bottom width, w =	3.5 ft	
Side slopes, X:1 =	3	
Estimated flow depth, d =	0.92 ft	
$Q = (1/n) * A * R^{(2/3)} * S^{(1/2)}$		
$A * R^{(2/3)} = Q / (1/n) / S^{(1/2)}$	4.14 (target for variable depth)	
$A = (w * d) + 2 * (0.5d * Xd) =$	5.76 sf	
$P = w + 2 * (\text{sqrt}(d^2 + (Xd)^2)) =$	9.32 ft	
$R = A / P =$	0.62 ft	
$A * R^{(2/3)} =$	4.18 (must be close to target)	
y =	62.4 pcf	
$\tau_d = y * d * S =$	1.15 psf	< 1.55 psf for ECB - OK
Velocity, $V = Q / A =$	4.07 fps	< 5.00 fps for ECB - OK

Sediment Trap Sizing
GCE Mulnite Farms 2 Solar
July 2021

*(134 cy / acre)**

TST #	Tributary Acreage, ac	Volume Required Below Top of Spillway, cf	Volume Provided in Permanent Basin Below Top of Spillway, cf
1	4.9	17,728	24,642
2	1.3	4,623	6,494
3	2.0	7,192	8,714

* Per 2002 Connecticut Guidelines for Soil Erosion and Sediment Control

SEDIMENT BASIN SIZING

SB 4

DA, drainage area =

sf
20.14 ac
0.031 sq mi.

Construction Duration:
(DA) (A) = 20.14 ac * 50 tons =

6 months
1007 tons / year
504 tons for life of basin

Delivery Ratio DR (from Figure SB-12) for sandy loam =

60%

Density of sediment (from Figure SB-2) for sandy loam =

85 pcf

Trap Efficiency TE =

80%

V sediment storage = (DA)(A)(DR)(TE)(2,000) / Density =

5,692 cf

10-year, 24-hour rainfall, P =

5 in.

Vr (half fallow & half compacted grass, from Hydrographs) =

2.68 watershed inches

Q10 = Qi (half fallow & half compacted grass, from Hydrographs) =

35.92 cfs

Qi / DA =

1.78

Qo / Qi (from Figure SB-13) =

0.095

Qo =

3.41 cfs

Release rate = Qo * 640 / DA =

108.4 csm

Vs (from Figure DB-6) =

1.5 watershed inches

Vs = Vs * DA / 12 * 43,560 =

109,662 cf

Minimum volume required below crest of emergency spillway =

115,355 cf

Minimum volume provided below crest of emergency spillway =

125,600 cf



Water Quality Computations

Water Quality Volume Calculations

Project: Mulnite II Solar By: JDW Date: 7/9/21
 Location: Mulnite Farms, East Windsor, CT Checked: SJK Date: 7/9/21

Basin Name	1	2	3	4	
Rainfall, P	1.0 in.	1.0 in.	1.0 in.	1.0 in.	a
Area, A	4.92 ac	1.28 ac	1.99 ac	20.14 ac	b
Impervious Cover Area	0.12 ac	0.17 ac	0.09 ac	1.16 ac	c
% Impervious, I	2 %	13 %	5 %	6 %	
Volumetric Runoff Coeff., R	0.072	0.170	0.091	0.102	d
Water Quality Volume, WQV	0.030 ac-ft	0.018 ac-ft	0.015 ac-ft	0.171 ac-ft	e
	1,285 cf	788 cf	655 cf	7,445 cf	

Water Quality Volume Provided	0.456 ac-ft	0.075 ac-ft	0.146 ac-ft	2.883 ac-ft
	19,848 cf	3,249 cf	6,348 cf	125,600 cf

a First one inch of rainfall; 2004 Connecticut Stormwater Quality Manual

b Area tributary to the stormwater management basin

c Impervious cover area tributary to the stormwater management basin

d $R=0.05+0.009*I$; Section 7.4.1 from 2004 Connecticut Stormwater Quality Manual

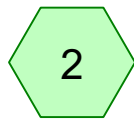
e $WQV=P*R*A/12$; Section 7.4.1 from 2004 Connecticut Stormwater Quality Manual



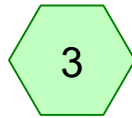
HydroCAD Analysis: Existing Conditions



Subcat 1



Subcat 2



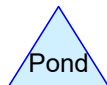
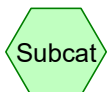
Subcat 3



Subcat 4



Subcat 5



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Rainfall Events Listing

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	2 year	Type III 24-hr		Default	24.00	1	3.16	2
2	25 year	Type III 24-hr		Default	24.00	1	6.15	2
3	50 year	Type III 24-hr		Default	24.00	1	6.99	2
4	100 year	Type III 24-hr		Default	24.00	1	7.92	2

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Page 3

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
1.260	98	Farm roads (1, 2, 4, 5)
28.270	78	Row crops, straight row, Good, HSG B (1, 2, 3, 4, 5)
0.650	60	Woods, Fair, HSG B (2, 3, 4)
30.180	78	TOTAL AREA

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Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
28.920	HSG B	1, 2, 3, 4, 5
0.000	HSG C	
0.000	HSG D	
1.260	Other	1, 2, 4, 5
30.180		TOTAL AREA

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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	0.000	0.000	0.000	1.260	1.260	Farm roads	1, 2, 4, 5
0.000	28.270	0.000	0.000	0.000	28.270	Row crops, straight row, Good	1, 2, 3, 4, 5
0.000	0.650	0.000	0.000	0.000	0.650	Woods, Fair	2, 3, 4
0.000	28.920	0.000	0.000	1.260	30.180	TOTAL AREA	



2-Year Storm Event – Existing

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Type III 24-hr 2 year Rainfall=3.16"

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Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1: Subcat 1 Runoff Area=4.920 ac 2.44% Impervious Runoff Depth>1.14"
Flow Length=600' Slope=0.0250 '/' Tc=13.5 min CN=78 Runoff=5.46 cfs 0.468 af

Subcatchment2: Subcat 2 Runoff Area=1.280 ac 7.81% Impervious Runoff Depth>1.14"
Flow Length=250' Tc=7.5 min CN=78 Runoff=1.71 cfs 0.122 af

Subcatchment3: Subcat 3 Runoff Area=1.990 ac 0.00% Impervious Runoff Depth>1.08"
Flow Length=450' Tc=9.3 min CN=77 Runoff=2.35 cfs 0.180 af

Subcatchment4: Subcat 4 Runoff Area=20.140 ac 4.92% Impervious Runoff Depth>1.19"
Flow Length=1,700' Tc=34.9 min CN=79 Runoff=15.92 cfs 1.997 af

Subcatchment5: Subcat 5 Runoff Area=1.850 ac 2.70% Impervious Runoff Depth>1.20"
Flow Length=550' Slope=0.0200 '/' Tc=14.1 min CN=79 Runoff=2.14 cfs 0.185 af

Total Runoff Area = 30.180 ac Runoff Volume = 2.952 af Average Runoff Depth = 1.17"
95.83% Pervious = 28.920 ac 4.17% Impervious = 1.260 ac

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Type III 24-hr 2 year Rainfall=3.16"

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Summary for Subcatchment 1: Subcat 1

Runoff = 5.46 cfs @ 12.20 hrs, Volume= 0.468 af, Depth> 1.14"

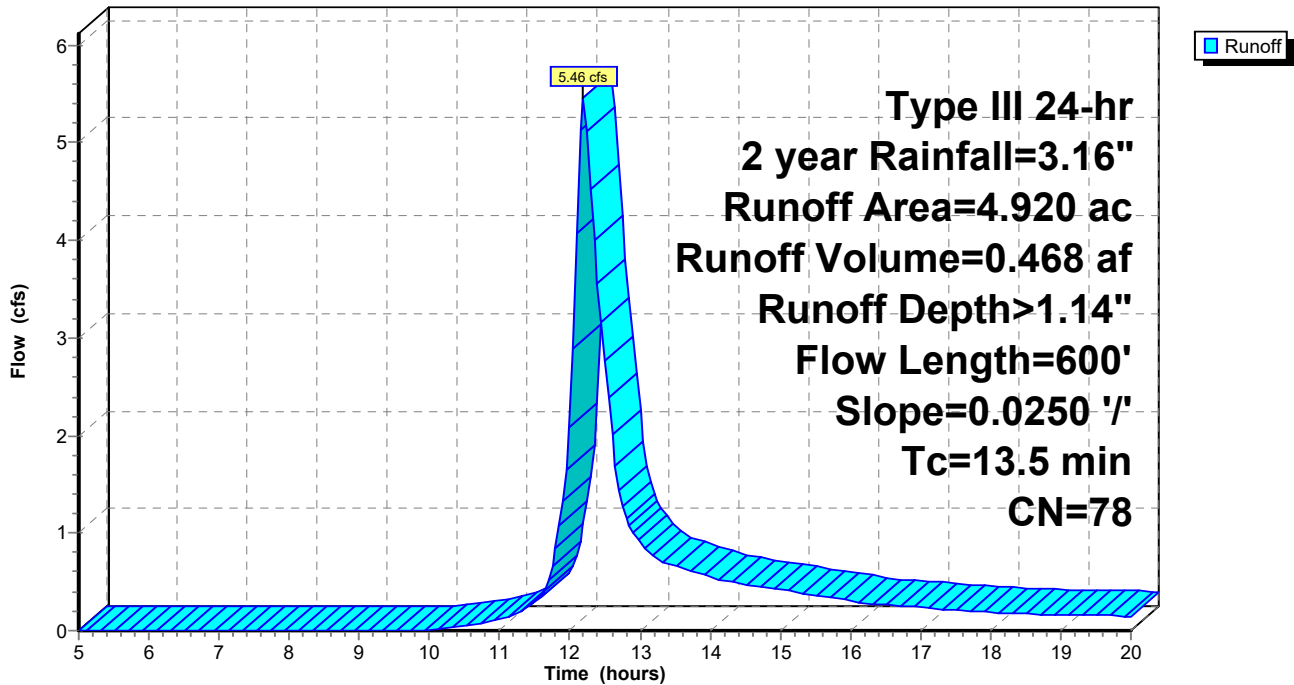
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 year Rainfall=3.16"

Area (ac)	CN	Description
4.800	78	Row crops, straight row, Good, HSG B
* 0.120	98	Farm roads
4.920	78	Weighted Average
4.800		97.56% Pervious Area
0.120		2.44% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.2	50	0.0250	0.16		Sheet Flow, Grass: Short n= 0.150 P2= 3.16"
8.3	550	0.0250	1.11		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
13.5	600	Total			

Subcatchment 1: Subcat 1

Hydrograph



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Type III 24-hr 2 year Rainfall=3.16"

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Summary for Subcatchment 2: Subcat 2

Runoff = 1.71 cfs @ 12.11 hrs, Volume= 0.122 af, Depth> 1.14"

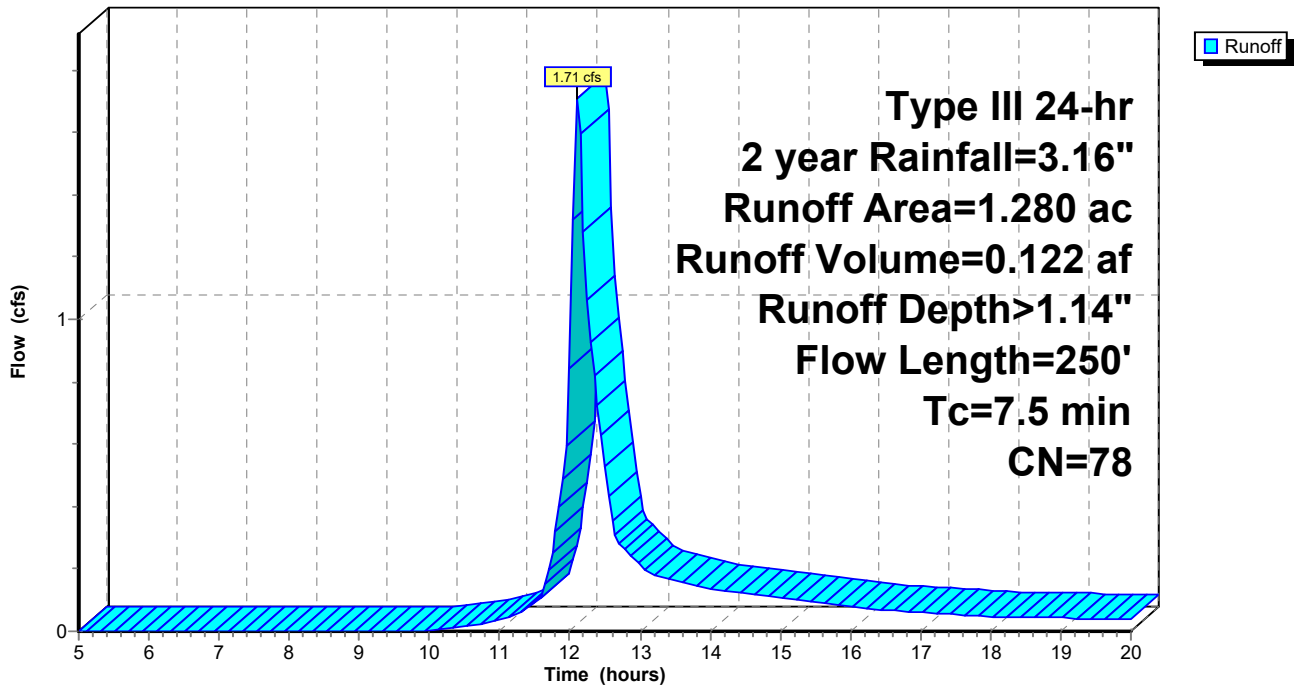
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 year Rainfall=3.16"

Area (ac)	CN	Description
1.080	78	Row crops, straight row, Good, HSG B
0.100	60	Woods, Fair, HSG B
* 0.100	98	Farm roads
1.280	78	Weighted Average
1.180		92.19% Pervious Area
0.100		7.81% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.7	50	0.0200	0.15		Sheet Flow, Grass: Short n= 0.150 P2= 3.16"
1.8	200	0.0700	1.85		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
7.5	250	Total			

Subcatchment 2: Subcat 2

Hydrograph



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Type III 24-hr 2 year Rainfall=3.16"

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Summary for Subcatchment 3: Subcat 3

Runoff = 2.35 cfs @ 12.14 hrs, Volume= 0.180 af, Depth> 1.08"

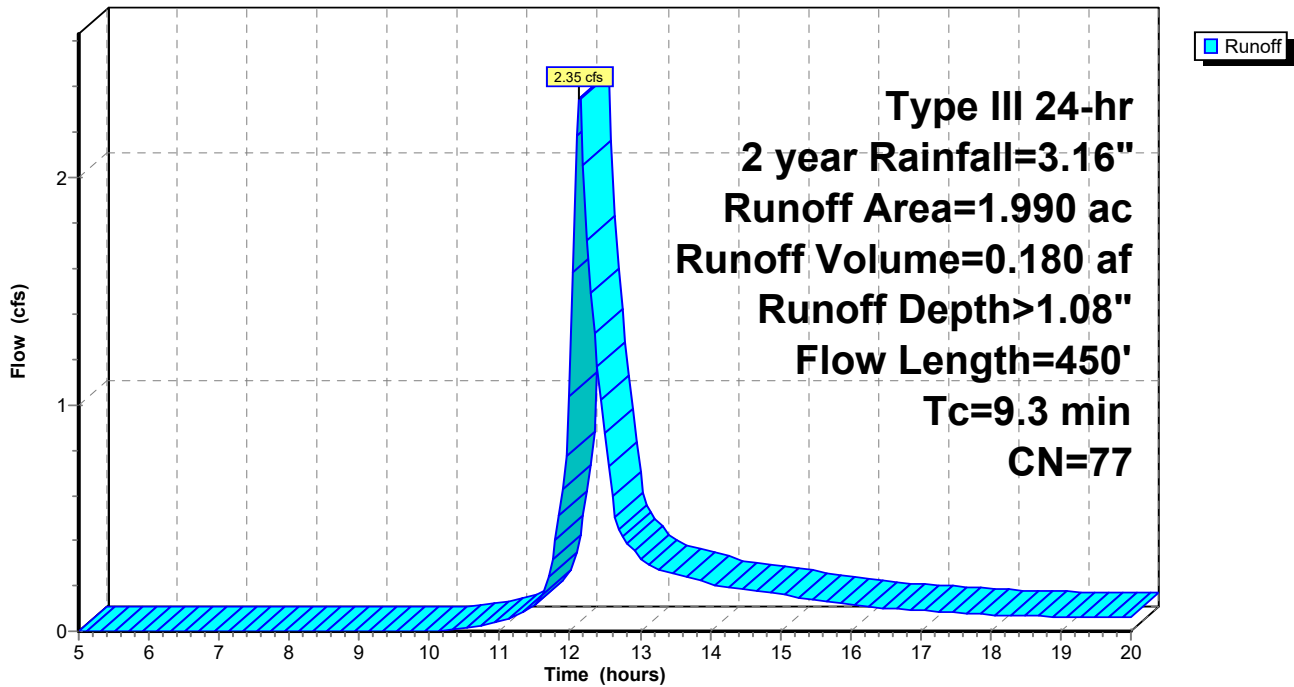
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 year Rainfall=3.16"

Area (ac)	CN	Description
1.890	78	Row crops, straight row, Good, HSG B
0.100	60	Woods, Fair, HSG B
1.990	77	Weighted Average
1.990		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.7	50	0.0200	0.15		Sheet Flow, Grass: Short n= 0.150 P2= 3.16"
3.6	400	0.0700	1.85		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
9.3	450	Total			

Subcatchment 3: Subcat 3

Hydrograph



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Type III 24-hr 2 year Rainfall=3.16"

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Summary for Subcatchment 4: Subcat 4

Runoff = 15.92 cfs @ 12.51 hrs, Volume= 1.997 af, Depth> 1.19"

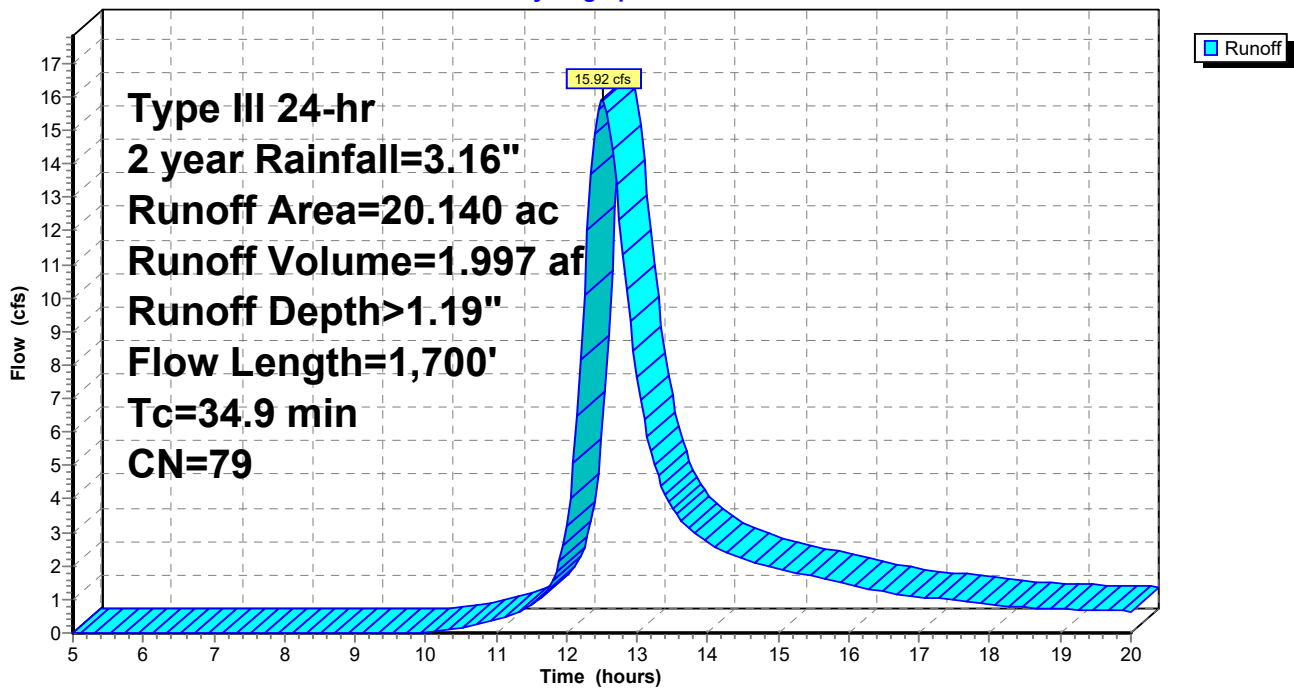
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 year Rainfall=3.16"

Area (ac)	CN	Description
18.700	78	Row crops, straight row, Good, HSG B
0.450	60	Woods, Fair, HSG B
* 0.990	98	Farm roads
20.140	79	Weighted Average
19.150		95.08% Pervious Area
0.990		4.92% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.7	50	0.0200	0.15		Sheet Flow, Grass: Short n= 0.150 P2= 3.16"
17.3	1,150	0.0250	1.11		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
11.9	500	0.0100	0.70		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
34.9	1,700	Total			

Subcatchment 4: Subcat 4

Hydrograph



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Type III 24-hr 2 year Rainfall=3.16"

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Summary for Subcatchment 5: Subcat 5

Runoff = 2.14 cfs @ 12.21 hrs, Volume= 0.185 af, Depth> 1.20"

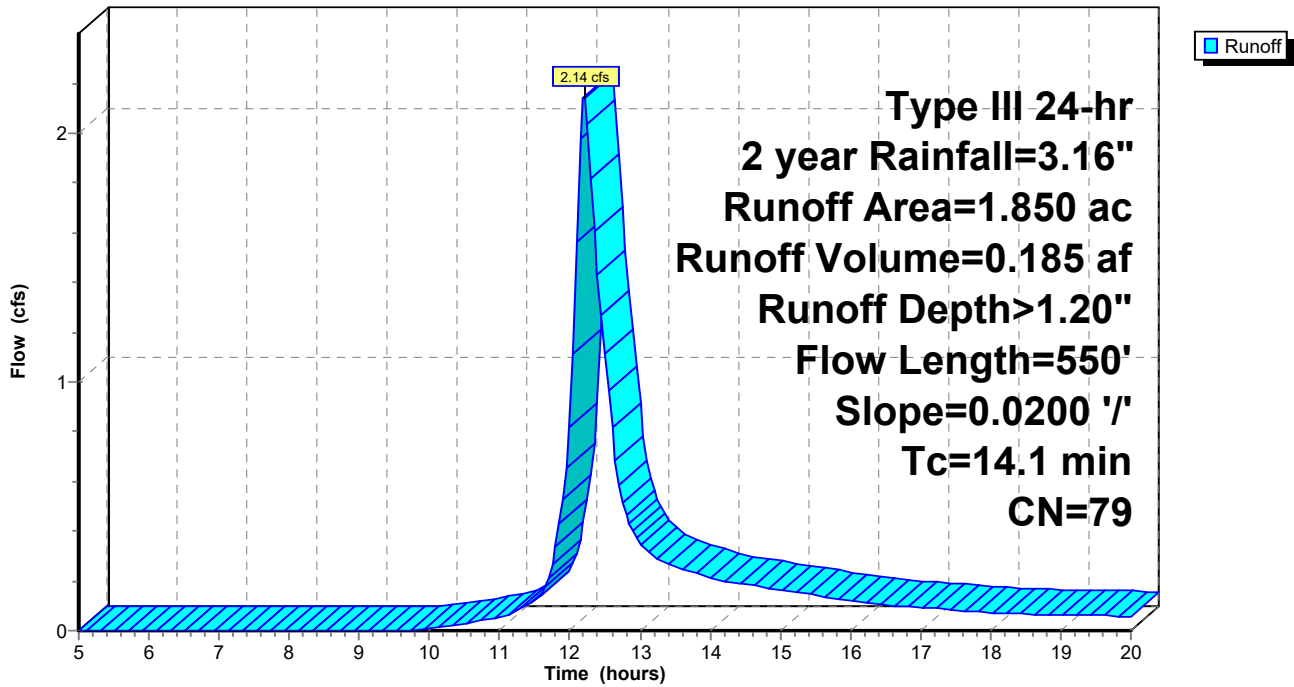
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 year Rainfall=3.16"

Area (ac)	CN	Description
1.800	78	Row crops, straight row, Good, HSG B
* 0.050	98	Farm roads
1.850	79	Weighted Average
1.800		97.30% Pervious Area
0.050		2.70% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.7	50	0.0200	0.15		Sheet Flow, Grass: Short n= 0.150 P2= 3.16"
8.4	500	0.0200	0.99		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
14.1	550	Total			

Subcatchment 5: Subcat 5

Hydrograph





25-Year Storm Event – Existing

42733.00 - Existing Conditions2

Type III 24-hr 25 year Rainfall=6.15"

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Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1: Subcat 1 Runoff Area=4.920 ac 2.44% Impervious Runoff Depth>3.46"
Flow Length=600' Slope=0.0250 '/' Tc=13.5 min CN=78 Runoff=16.70 cfs 1.421 af

Subcatchment2: Subcat 2 Runoff Area=1.280 ac 7.81% Impervious Runoff Depth>3.47"
Flow Length=250' Tc=7.5 min CN=78 Runoff=5.22 cfs 0.370 af

Subcatchment3: Subcat 3 Runoff Area=1.990 ac 0.00% Impervious Runoff Depth>3.37"
Flow Length=450' Tc=9.3 min CN=77 Runoff=7.39 cfs 0.559 af

Subcatchment4: Subcat 4 Runoff Area=20.140 ac 4.92% Impervious Runoff Depth>3.54"
Flow Length=1,700' Tc=34.9 min CN=79 Runoff=47.29 cfs 5.941 af

Subcatchment5: Subcat 5 Runoff Area=1.850 ac 2.70% Impervious Runoff Depth>3.56"
Flow Length=550' Slope=0.0200 '/' Tc=14.1 min CN=79 Runoff=6.36 cfs 0.549 af

Total Runoff Area = 30.180 ac Runoff Volume = 8.840 af Average Runoff Depth = 3.51"
95.83% Pervious = 28.920 ac 4.17% Impervious = 1.260 ac

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Type III 24-hr 25 year Rainfall=6.15"

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Summary for Subcatchment 1: Subcat 1

Runoff = 16.70 cfs @ 12.19 hrs, Volume= 1.421 af, Depth> 3.46"

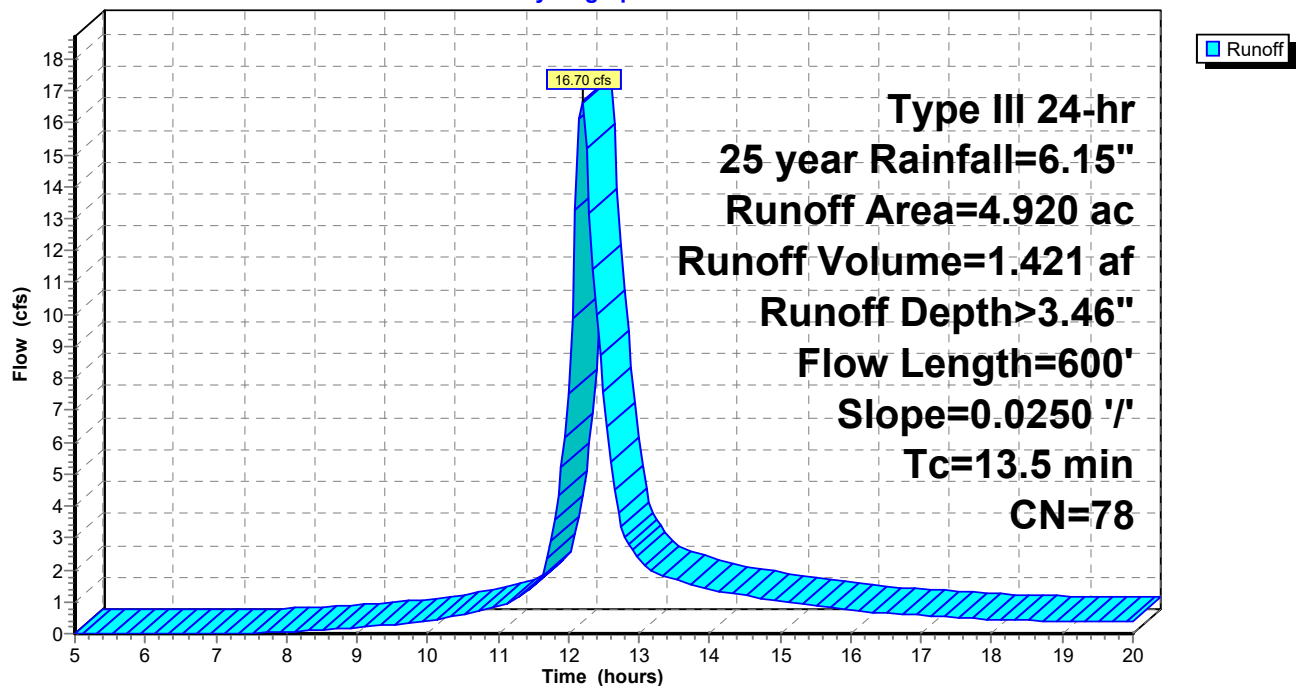
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 year Rainfall=6.15"

Area (ac)	CN	Description
4.800	78	Row crops, straight row, Good, HSG B
* 0.120	98	Farm roads
4.920	78	Weighted Average
4.800		97.56% Pervious Area
0.120		2.44% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.2	50	0.0250	0.16		Sheet Flow, Grass: Short n= 0.150 P2= 3.16"
8.3	550	0.0250	1.11		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
13.5	600	Total			

Subcatchment 1: Subcat 1

Hydrograph



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Type III 24-hr 25 year Rainfall=6.15"

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Summary for Subcatchment 2: Subcat 2

Runoff = 5.22 cfs @ 12.11 hrs, Volume= 0.370 af, Depth> 3.47"

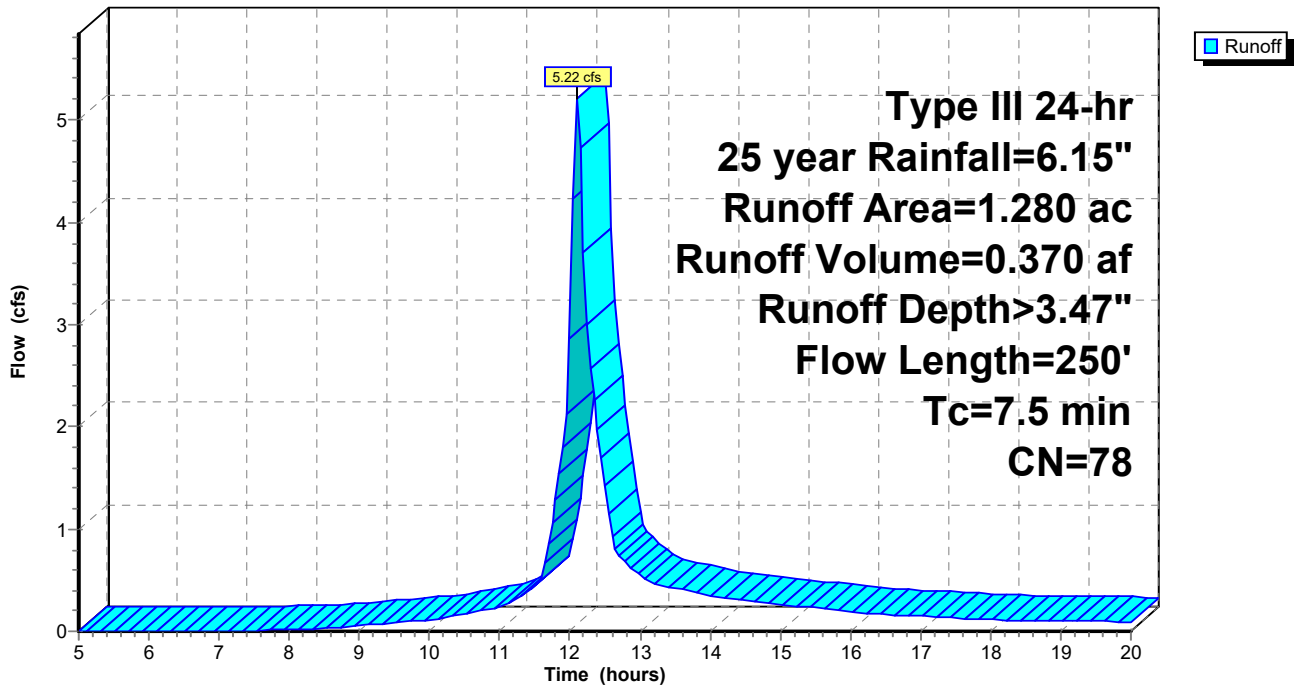
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 year Rainfall=6.15"

Area (ac)	CN	Description
1.080	78	Row crops, straight row, Good, HSG B
0.100	60	Woods, Fair, HSG B
* 0.100	98	Farm roads
1.280	78	Weighted Average
1.180		92.19% Pervious Area
0.100		7.81% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.7	50	0.0200	0.15		Sheet Flow, Grass: Short n= 0.150 P2= 3.16"
1.8	200	0.0700	1.85		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
7.5	250	Total			

Subcatchment 2: Subcat 2

Hydrograph



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Type III 24-hr 25 year Rainfall=6.15"

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Summary for Subcatchment 3: Subcat 3

Runoff = 7.39 cfs @ 12.13 hrs, Volume= 0.559 af, Depth> 3.37"

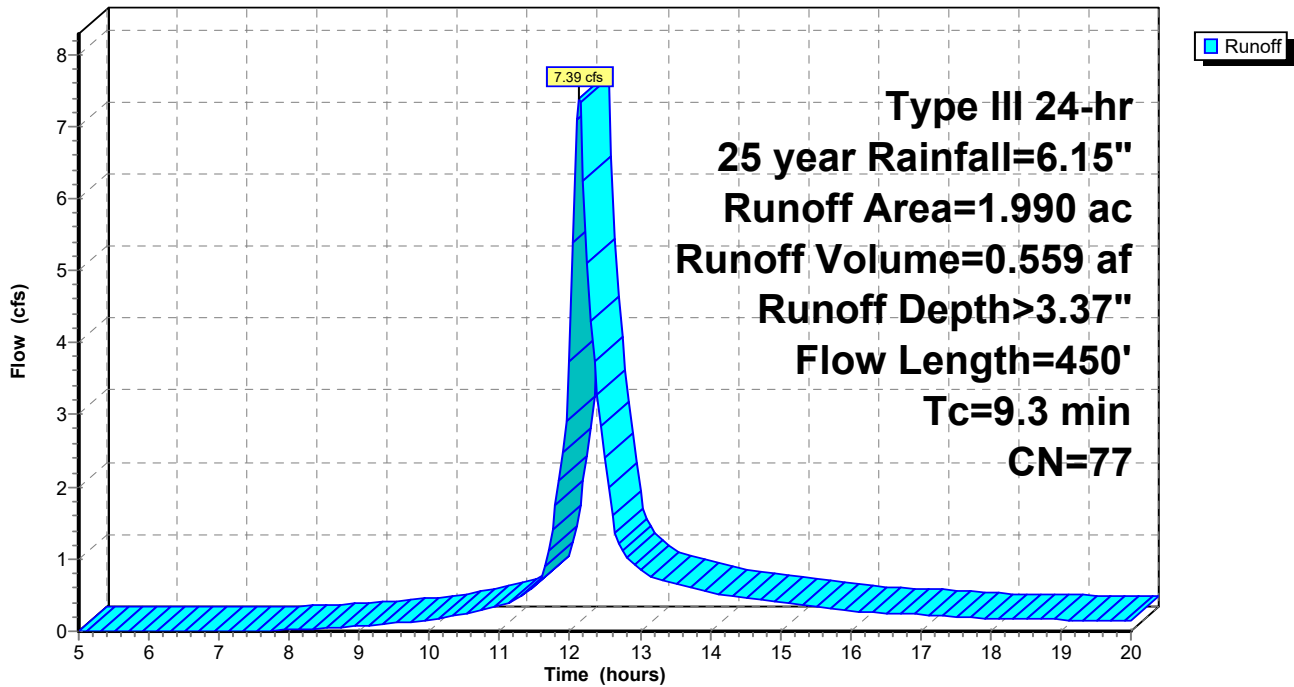
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 year Rainfall=6.15"

Area (ac)	CN	Description
1.890	78	Row crops, straight row, Good, HSG B
0.100	60	Woods, Fair, HSG B
1.990	77	Weighted Average
1.990		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.7	50	0.0200	0.15		Sheet Flow, Grass: Short n= 0.150 P2= 3.16"
3.6	400	0.0700	1.85		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
9.3	450	Total			

Subcatchment 3: Subcat 3

Hydrograph



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Type III 24-hr 25 year Rainfall=6.15"

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Summary for Subcatchment 4: Subcat 4

Runoff = 47.29 cfs @ 12.48 hrs, Volume= 5.941 af, Depth> 3.54"

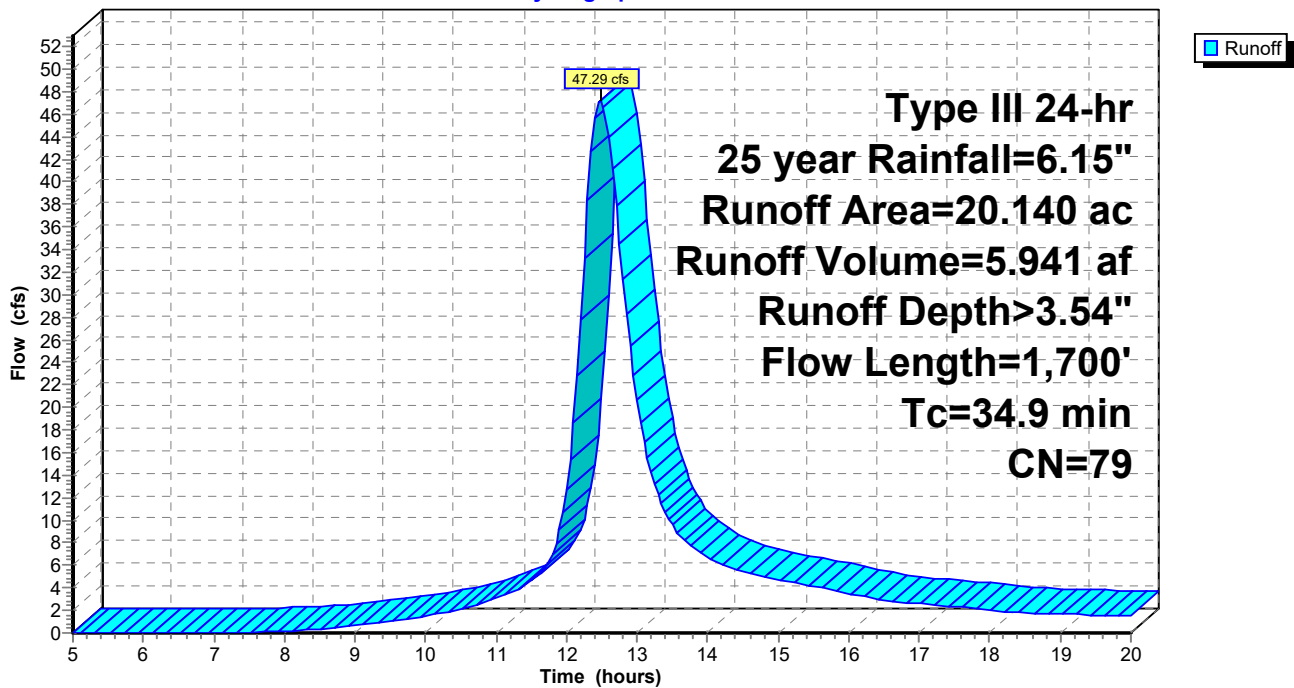
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 year Rainfall=6.15"

Area (ac)	CN	Description
18.700	78	Row crops, straight row, Good, HSG B
0.450	60	Woods, Fair, HSG B
* 0.990	98	Farm roads
20.140	79	Weighted Average
19.150		95.08% Pervious Area
0.990		4.92% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.7	50	0.0200	0.15		Sheet Flow, Grass: Short n= 0.150 P2= 3.16"
17.3	1,150	0.0250	1.11		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
11.9	500	0.0100	0.70		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
34.9	1,700	Total			

Subcatchment 4: Subcat 4

Hydrograph



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Type III 24-hr 25 year Rainfall=6.15"

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Summary for Subcatchment 5: Subcat 5

Runoff = 6.36 cfs @ 12.20 hrs, Volume= 0.549 af, Depth> 3.56"

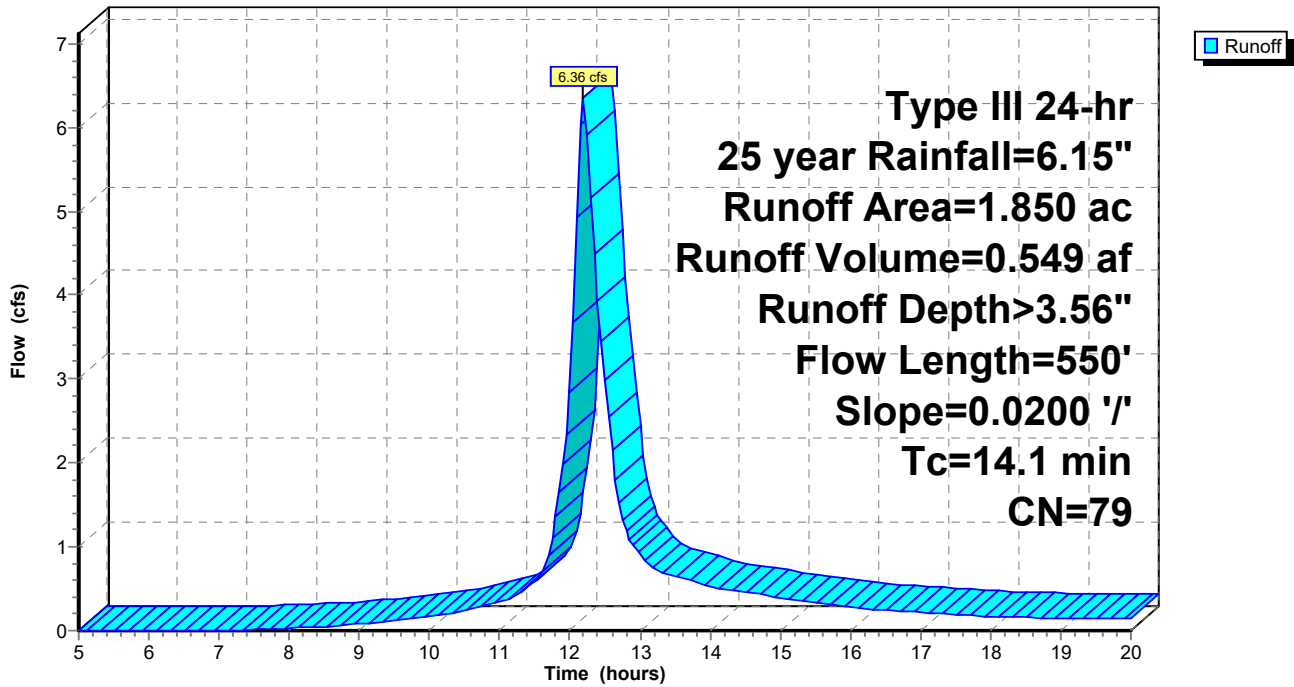
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 year Rainfall=6.15"

Area (ac)	CN	Description
1.800	78	Row crops, straight row, Good, HSG B
* 0.050	98	Farm roads
1.850	79	Weighted Average
1.800		97.30% Pervious Area
0.050		2.70% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.7	50	0.0200	0.15		Sheet Flow, Grass: Short n= 0.150 P2= 3.16"
8.4	500	0.0200	0.99		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
14.1	550	Total			

Subcatchment 5: Subcat 5

Hydrograph





50-Year Storm Event- Existing

42733.00 - Existing Conditions2

Type III 24-hr 50 year Rainfall=6.99"

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Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1: Subcat 1 Runoff Area=4.920 ac 2.44% Impervious Runoff Depth>4.18"
Flow Length=600' Slope=0.0250 '/' Tc=13.5 min CN=78 Runoff=20.04 cfs 1.713 af

Subcatchment2: Subcat 2 Runoff Area=1.280 ac 7.81% Impervious Runoff Depth>4.19"
Flow Length=250' Tc=7.5 min CN=78 Runoff=6.26 cfs 0.447 af

Subcatchment3: Subcat 3 Runoff Area=1.990 ac 0.00% Impervious Runoff Depth>4.08"
Flow Length=450' Tc=9.3 min CN=77 Runoff=8.90 cfs 0.676 af

Subcatchment4: Subcat 4 Runoff Area=20.140 ac 4.92% Impervious Runoff Depth>4.26"
Flow Length=1,700' Tc=34.9 min CN=79 Runoff=56.61 cfs 7.145 af

Subcatchment5: Subcat 5 Runoff Area=1.850 ac 2.70% Impervious Runoff Depth>4.28"
Flow Length=550' Slope=0.0200 '/' Tc=14.1 min CN=79 Runoff=7.60 cfs 0.661 af

Total Runoff Area = 30.180 ac Runoff Volume = 10.641 af Average Runoff Depth = 4.23"
95.83% Pervious = 28.920 ac 4.17% Impervious = 1.260 ac

42733.00 - Existing Conditions2

Type III 24-hr 50 year Rainfall=6.99"

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Summary for Subcatchment 1: Subcat 1

Runoff = 20.04 cfs @ 12.19 hrs, Volume= 1.713 af, Depth> 4.18"

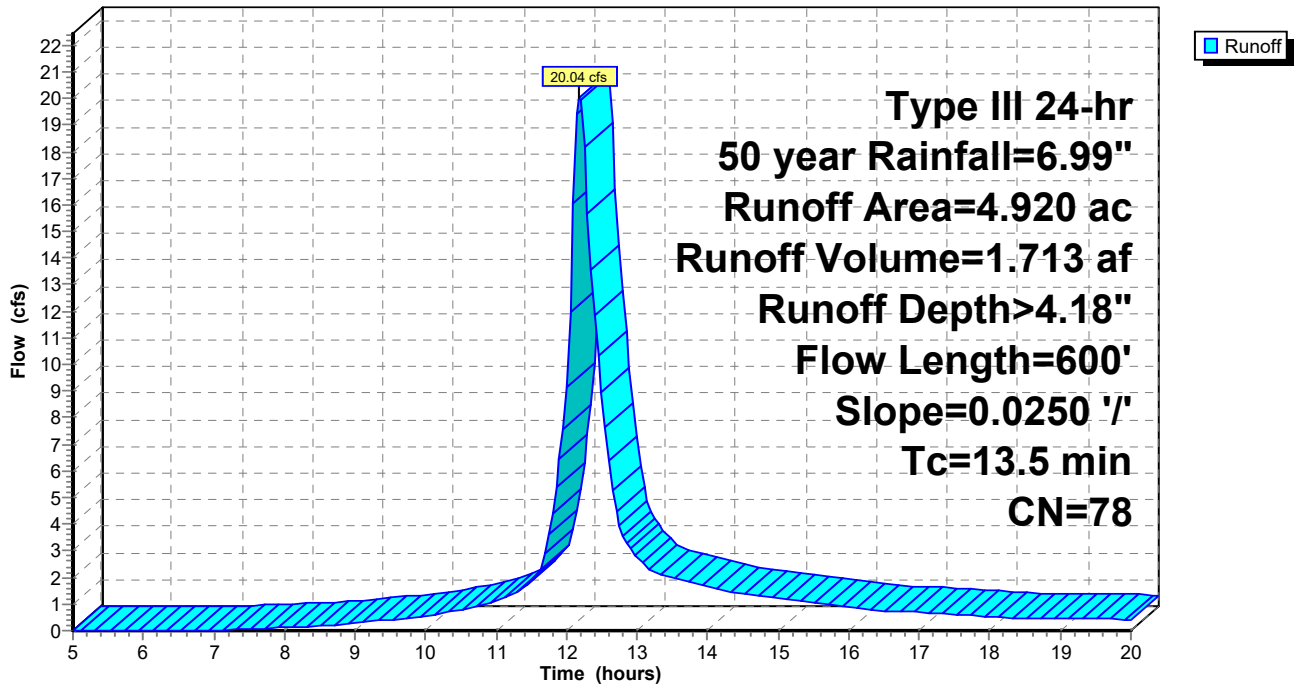
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 50 year Rainfall=6.99"

Area (ac)	CN	Description
4.800	78	Row crops, straight row, Good, HSG B
* 0.120	98	Farm roads
4.920	78	Weighted Average
4.800		97.56% Pervious Area
0.120		2.44% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.2	50	0.0250	0.16		Sheet Flow, Grass: Short n= 0.150 P2= 3.16"
8.3	550	0.0250	1.11		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
13.5	600	Total			

Subcatchment 1: Subcat 1

Hydrograph



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Type III 24-hr 50 year Rainfall=6.99"

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Summary for Subcatchment 2: Subcat 2

Runoff = 6.26 cfs @ 12.11 hrs, Volume= 0.447 af, Depth> 4.19"

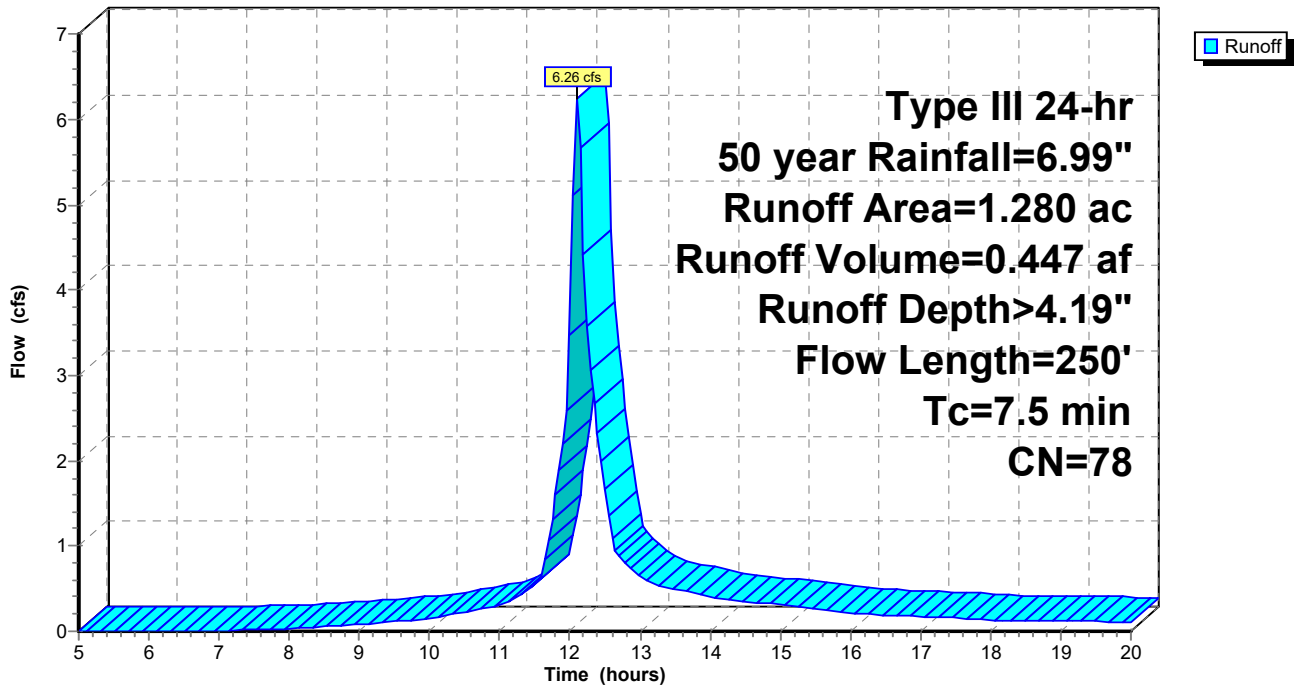
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 50 year Rainfall=6.99"

Area (ac)	CN	Description
1.080	78	Row crops, straight row, Good, HSG B
0.100	60	Woods, Fair, HSG B
* 0.100	98	Farm roads
1.280	78	Weighted Average
1.180		92.19% Pervious Area
0.100		7.81% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.7	50	0.0200	0.15		Sheet Flow, Grass: Short n= 0.150 P2= 3.16"
1.8	200	0.0700	1.85		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
7.5	250	Total			

Subcatchment 2: Subcat 2

Hydrograph



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Type III 24-hr 50 year Rainfall=6.99"

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Summary for Subcatchment 3: Subcat 3

Runoff = 8.90 cfs @ 12.13 hrs, Volume= 0.676 af, Depth> 4.08"

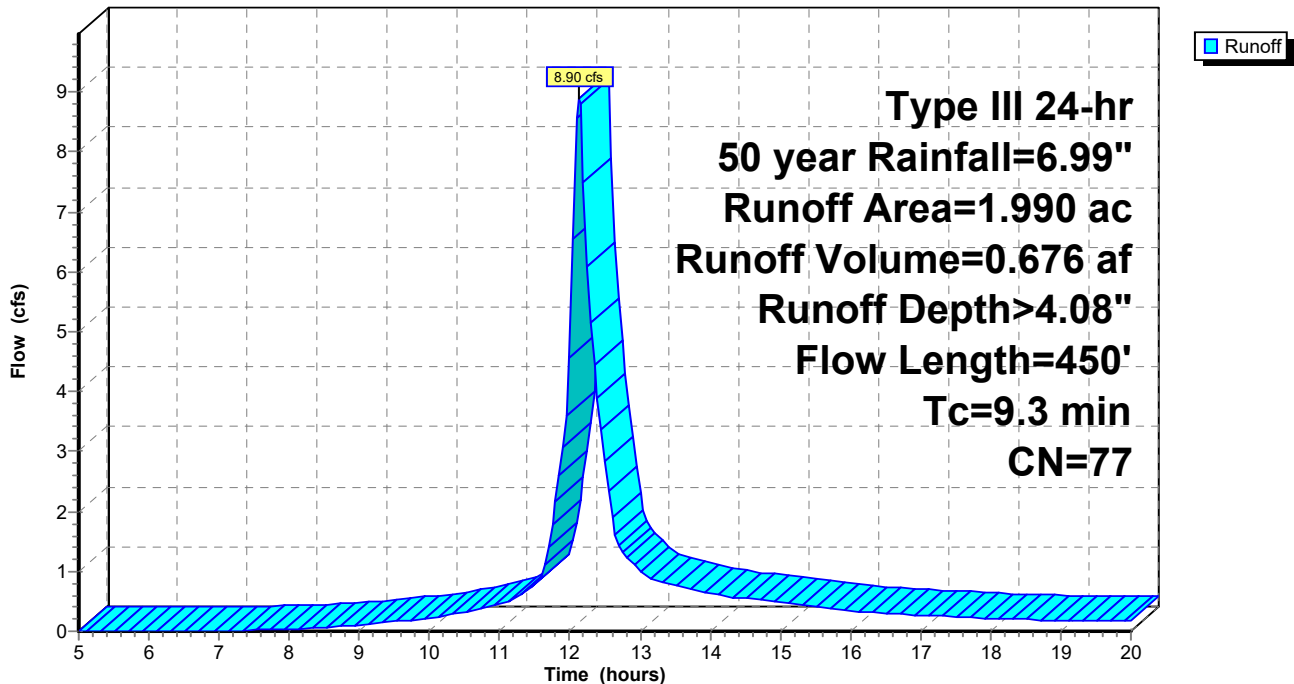
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 50 year Rainfall=6.99"

Area (ac)	CN	Description
1.890	78	Row crops, straight row, Good, HSG B
0.100	60	Woods, Fair, HSG B
1.990	77	Weighted Average
1.990		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.7	50	0.0200	0.15		Sheet Flow, Grass: Short n= 0.150 P2= 3.16"
3.6	400	0.0700	1.85		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
9.3	450	Total			

Subcatchment 3: Subcat 3

Hydrograph



42733.00 - Existing Conditions2

Type III 24-hr 50 year Rainfall=6.99"

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Summary for Subcatchment 4: Subcat 4

Runoff = 56.61 cfs @ 12.47 hrs, Volume= 7.145 af, Depth> 4.26"

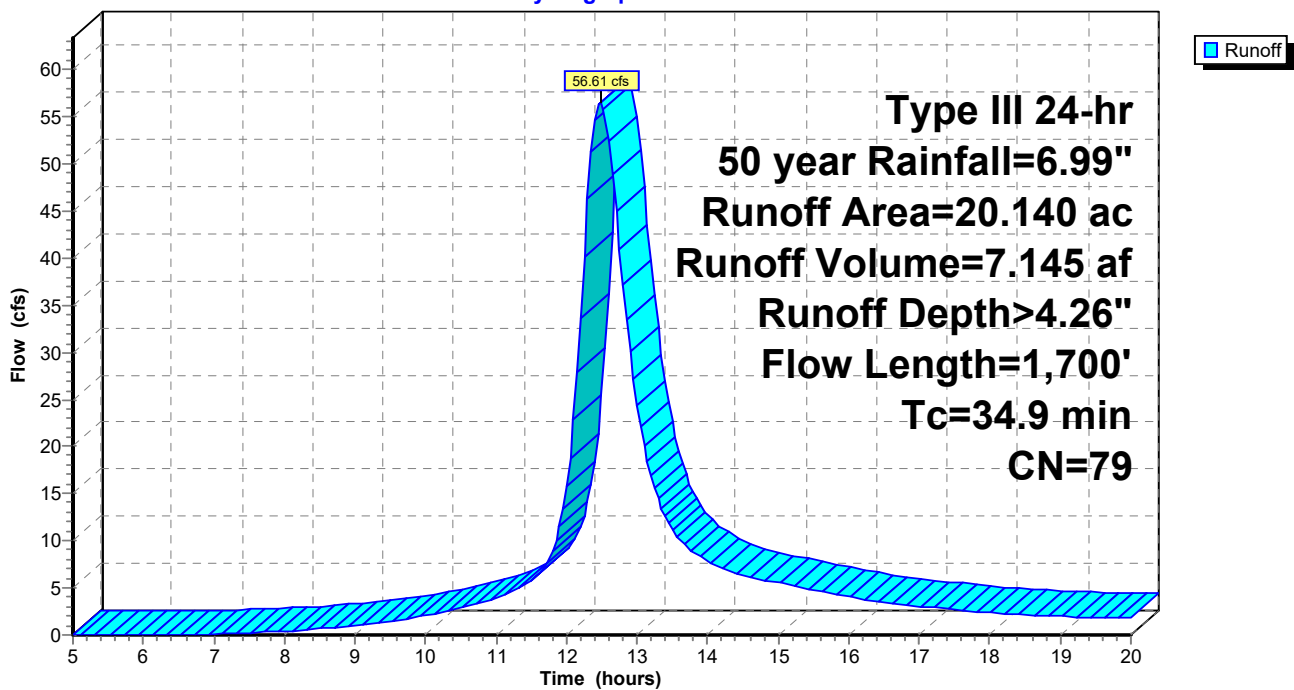
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 50 year Rainfall=6.99"

Area (ac)	CN	Description
18.700	78	Row crops, straight row, Good, HSG B
0.450	60	Woods, Fair, HSG B
* 0.990	98	Farm roads
20.140	79	Weighted Average
19.150		95.08% Pervious Area
0.990		4.92% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.7	50	0.0200	0.15		Sheet Flow, Grass: Short n= 0.150 P2= 3.16"
17.3	1,150	0.0250	1.11		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
11.9	500	0.0100	0.70		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
34.9	1,700	Total			

Subcatchment 4: Subcat 4

Hydrograph



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Type III 24-hr 50 year Rainfall=6.99"

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Summary for Subcatchment 5: Subcat 5

Runoff = 7.60 cfs @ 12.19 hrs, Volume= 0.661 af, Depth> 4.28"

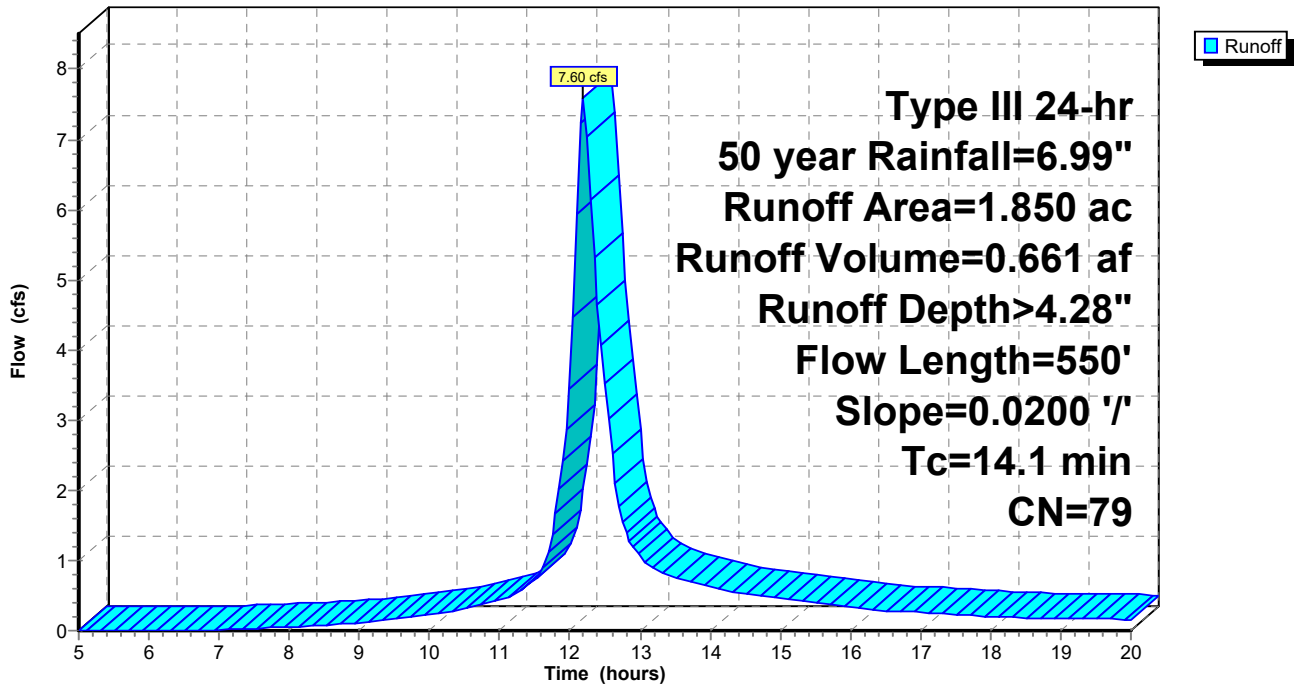
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 50 year Rainfall=6.99"

Area (ac)	CN	Description
1.800	78	Row crops, straight row, Good, HSG B
* 0.050	98	Farm roads
1.850	79	Weighted Average
1.800		97.30% Pervious Area
0.050		2.70% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.7	50	0.0200	0.15		Sheet Flow, Grass: Short n= 0.150 P2= 3.16"
8.4	500	0.0200	0.99		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
14.1	550	Total			

Subcatchment 5: Subcat 5

Hydrograph





100-Year Storm Event – Existing

42733.00 - Existing Conditions2

Type III 24-hr 100 year Rainfall=7.92"

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Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1: Subcat 1 Runoff Area=4.920 ac 2.44% Impervious Runoff Depth>4.99"
Flow Length=600' Slope=0.0250 '/' Tc=13.5 min CN=78 Runoff=23.76 cfs 2.044 af

Subcatchment2: Subcat 2 Runoff Area=1.280 ac 7.81% Impervious Runoff Depth>4.99"
Flow Length=250' Tc=7.5 min CN=78 Runoff=7.41 cfs 0.533 af

Subcatchment3: Subcat 3 Runoff Area=1.990 ac 0.00% Impervious Runoff Depth>4.88"
Flow Length=450' Tc=9.3 min CN=77 Runoff=10.58 cfs 0.809 af

Subcatchment4: Subcat 4 Runoff Area=20.140 ac 4.92% Impervious Runoff Depth>5.07"
Flow Length=1,700' Tc=34.9 min CN=79 Runoff=66.96 cfs 8.504 af

Subcatchment5: Subcat 5 Runoff Area=1.850 ac 2.70% Impervious Runoff Depth>5.10"
Flow Length=550' Slope=0.0200 '/' Tc=14.1 min CN=79 Runoff=8.98 cfs 0.786 af

Total Runoff Area = 30.180 ac Runoff Volume = 12.676 af Average Runoff Depth = 5.04"
95.83% Pervious = 28.920 ac 4.17% Impervious = 1.260 ac

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Type III 24-hr 100 year Rainfall=7.92"

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Summary for Subcatchment 1: Subcat 1

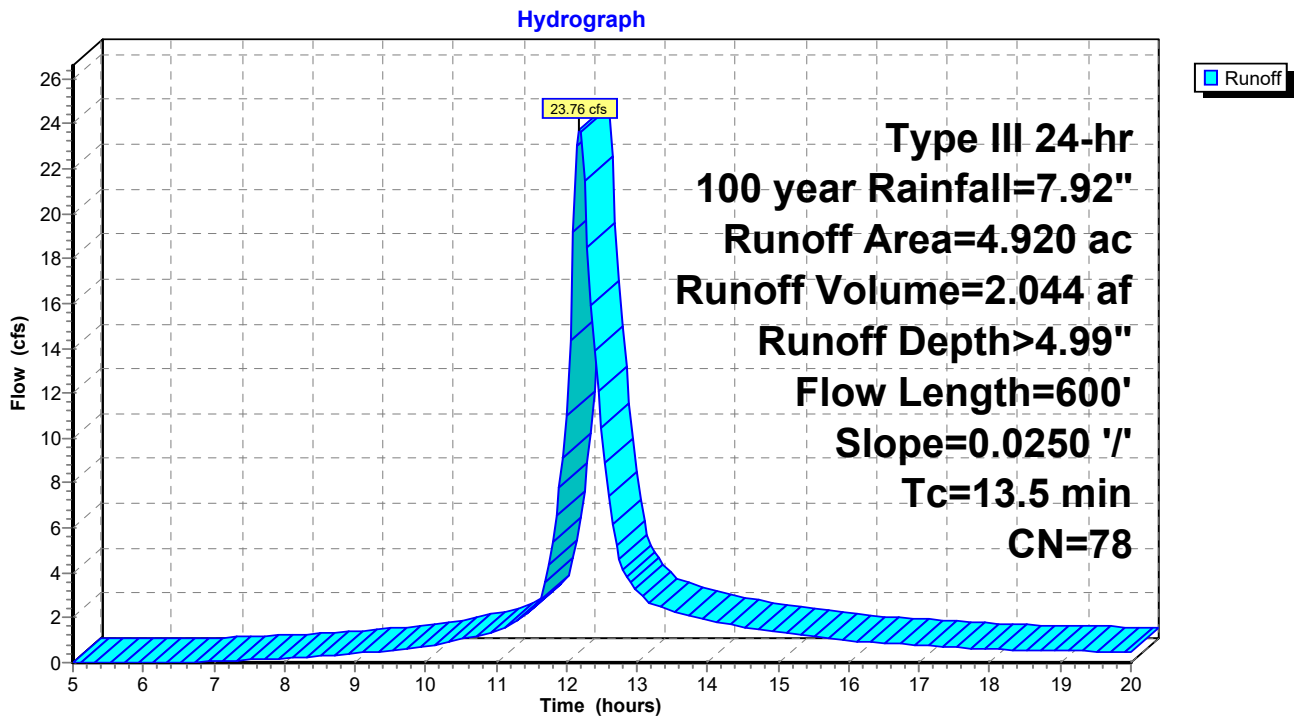
Runoff = 23.76 cfs @ 12.19 hrs, Volume= 2.044 af, Depth> 4.99"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 year Rainfall=7.92"

Area (ac)	CN	Description
4.800	78	Row crops, straight row, Good, HSG B
* 0.120	98	Farm roads
4.920	78	Weighted Average
4.800		97.56% Pervious Area
0.120		2.44% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.2	50	0.0250	0.16		Sheet Flow, Grass: Short n= 0.150 P2= 3.16"
8.3	550	0.0250	1.11		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
13.5	600	Total			

Subcatchment 1: Subcat 1



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Type III 24-hr 100 year Rainfall=7.92"

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Summary for Subcatchment 2: Subcat 2

Runoff = 7.41 cfs @ 12.11 hrs, Volume= 0.533 af, Depth> 4.99"

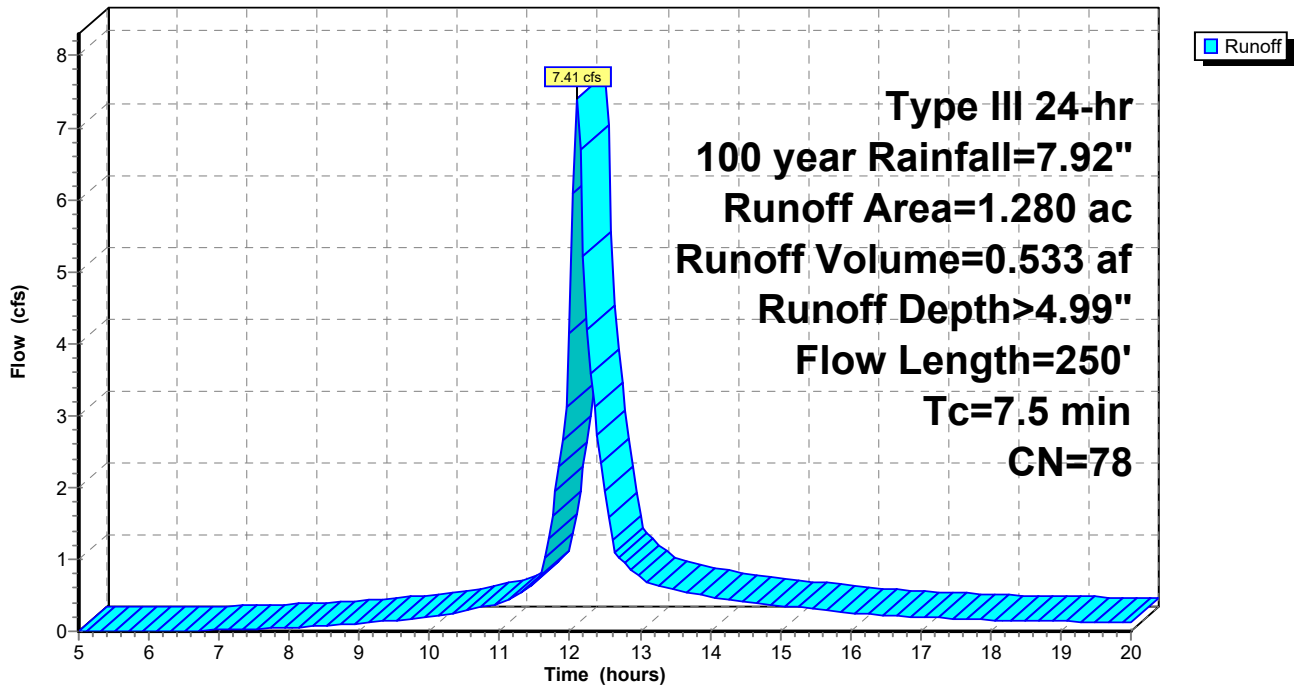
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 year Rainfall=7.92"

Area (ac)	CN	Description
1.080	78	Row crops, straight row, Good, HSG B
0.100	60	Woods, Fair, HSG B
* 0.100	98	Farm roads
1.280	78	Weighted Average
1.180		92.19% Pervious Area
0.100		7.81% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.7	50	0.0200	0.15		Sheet Flow, Grass: Short n= 0.150 P2= 3.16"
1.8	200	0.0700	1.85		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
7.5	250	Total			

Subcatchment 2: Subcat 2

Hydrograph



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Type III 24-hr 100 year Rainfall=7.92"

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Summary for Subcatchment 3: Subcat 3

Runoff = 10.58 cfs @ 12.13 hrs, Volume= 0.809 af, Depth> 4.88"

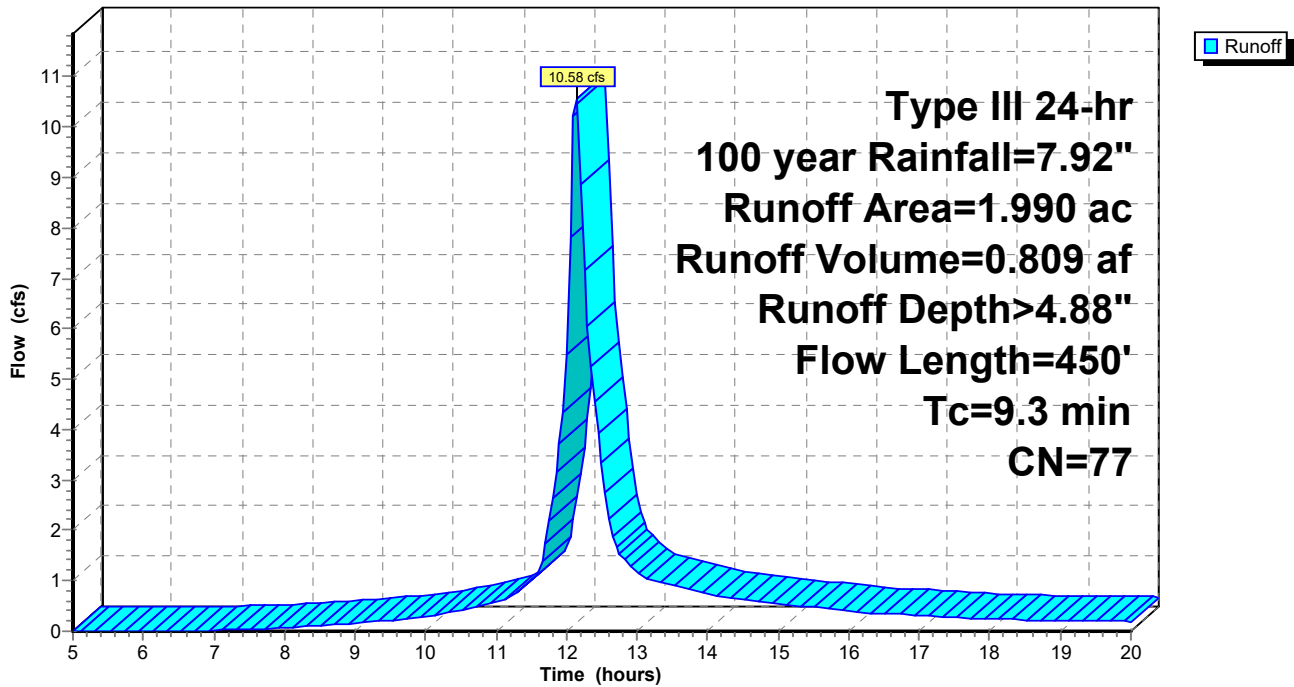
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 year Rainfall=7.92"

Area (ac)	CN	Description
1.890	78	Row crops, straight row, Good, HSG B
0.100	60	Woods, Fair, HSG B
1.990	77	Weighted Average
1.990		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.7	50	0.0200	0.15		Sheet Flow, Grass: Short n= 0.150 P2= 3.16"
3.6	400	0.0700	1.85		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
9.3	450	Total			

Subcatchment 3: Subcat 3

Hydrograph



42733.00 - Existing Conditions2

Type III 24-hr 100 year Rainfall=7.92"

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Summary for Subcatchment 4: Subcat 4

Runoff = 66.96 cfs @ 12.47 hrs, Volume= 8.504 af, Depth> 5.07"

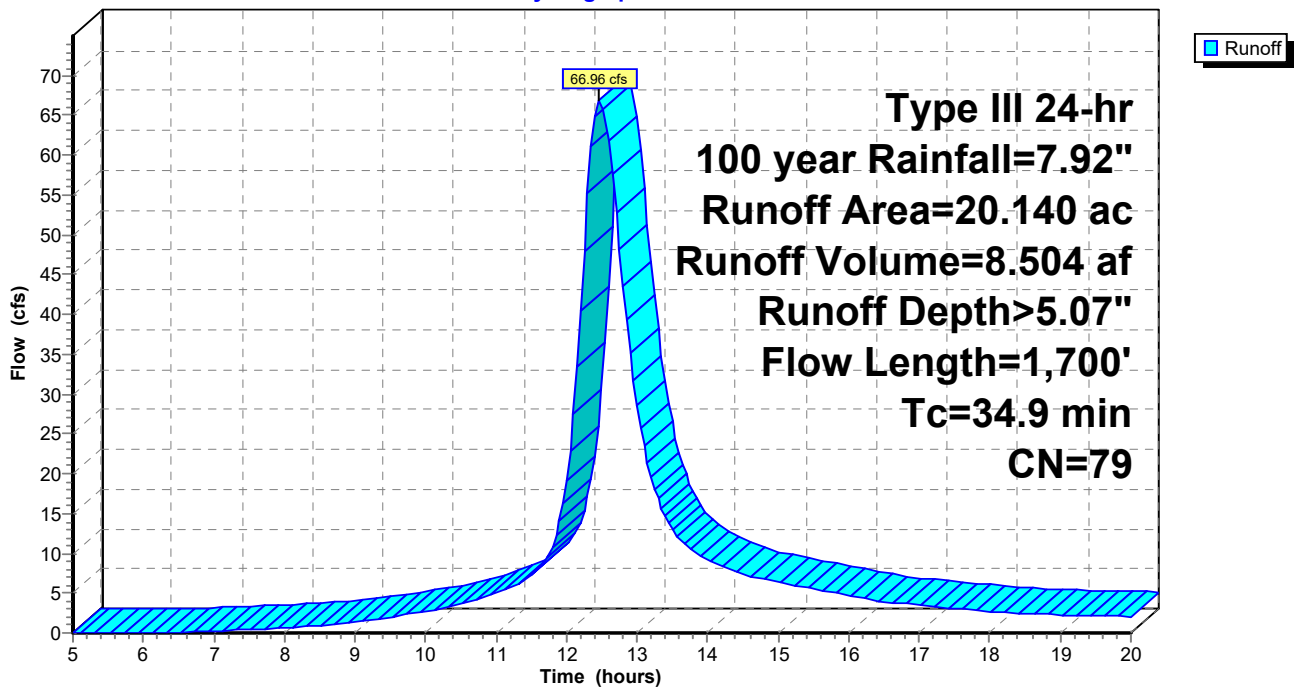
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 year Rainfall=7.92"

Area (ac)	CN	Description
18.700	78	Row crops, straight row, Good, HSG B
0.450	60	Woods, Fair, HSG B
* 0.990	98	Farm roads
20.140	79	Weighted Average
19.150		95.08% Pervious Area
0.990		4.92% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.7	50	0.0200	0.15		Sheet Flow, Grass: Short n= 0.150 P2= 3.16"
17.3	1,150	0.0250	1.11		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
11.9	500	0.0100	0.70		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
34.9	1,700	Total			

Subcatchment 4: Subcat 4

Hydrograph



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Type III 24-hr 100 year Rainfall=7.92"

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Summary for Subcatchment 5: Subcat 5

Runoff = 8.98 cfs @ 12.19 hrs, Volume= 0.786 af, Depth> 5.10"

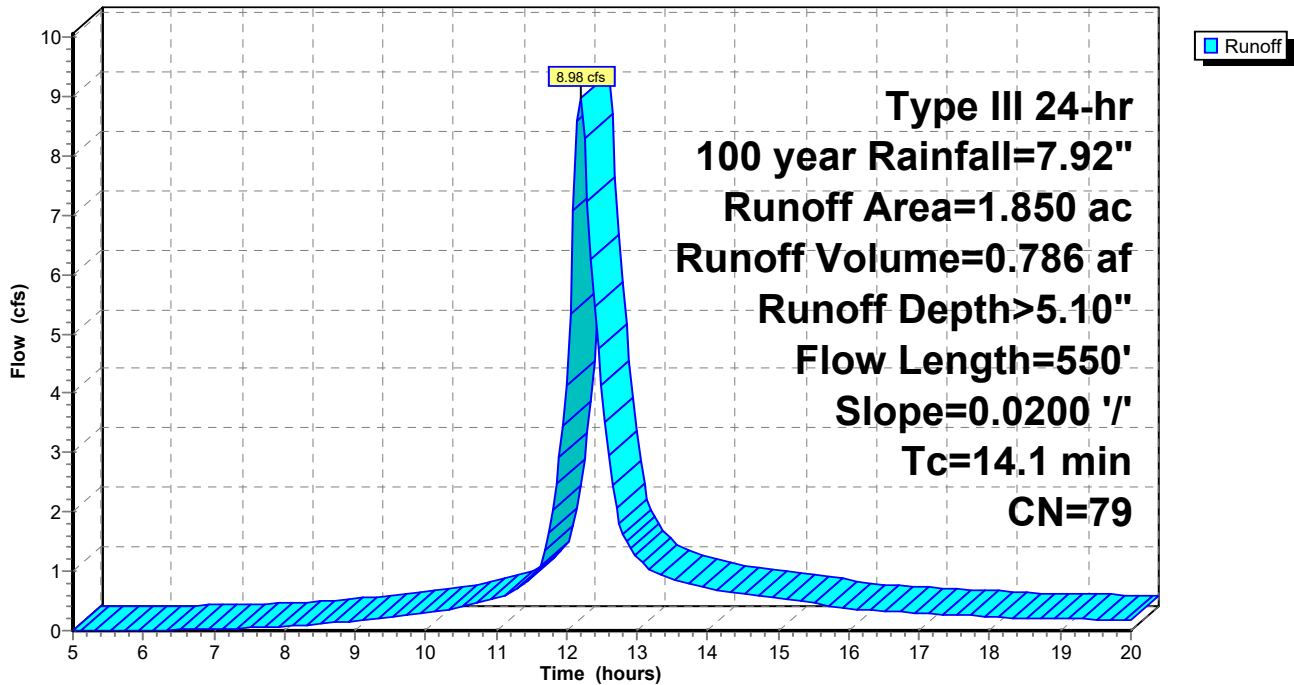
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 year Rainfall=7.92"

Area (ac)	CN	Description
1.800	78	Row crops, straight row, Good, HSG B
* 0.050	98	Farm roads
1.850	79	Weighted Average
1.800		97.30% Pervious Area
0.050		2.70% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.7	50	0.0200	0.15		Sheet Flow, Grass: Short n= 0.150 P2= 3.16"
8.4	500	0.0200	0.99		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
14.1	550	Total			

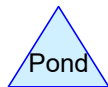
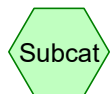
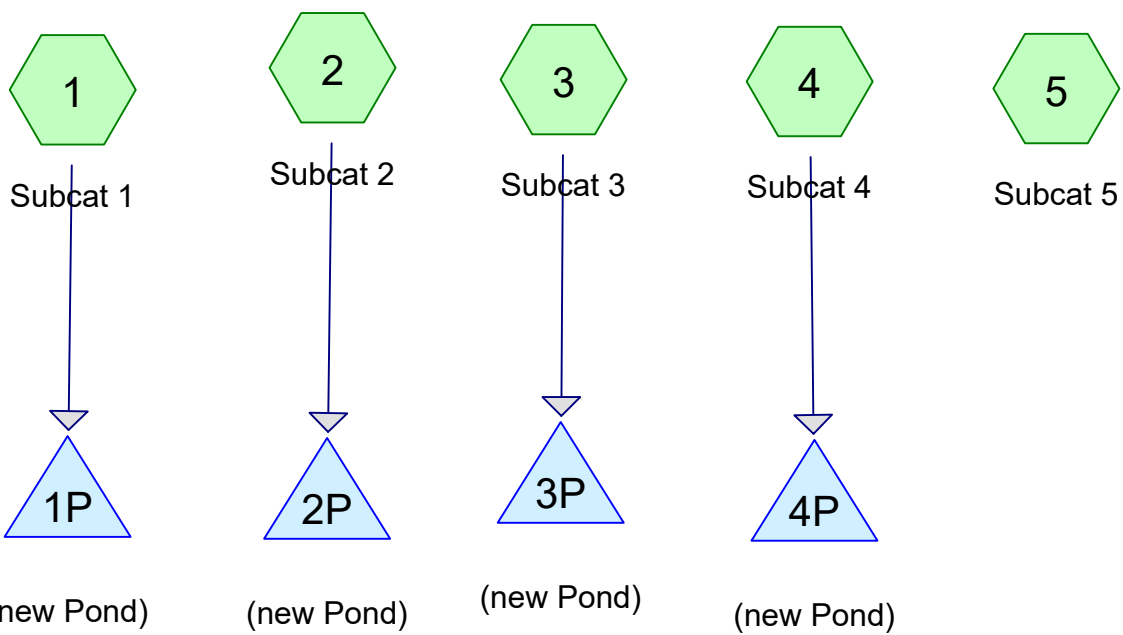
Subcatchment 5: Subcat 5

Hydrograph





HydroCAD Analysis: Proposed Conditions



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Rainfall Events Listing

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	2 year	Type III 24-hr		Default	24.00	1	3.16	2
2	25 year	Type III 24-hr		Default	24.00	1	6.15	2
3	50 year	Type III 24-hr		Default	24.00	1	6.99	2
4	100 year	Type III 24-hr		Default	24.00	1	7.92	2

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Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
1.800	69	50-75% Grass cover, Fair, HSG B (5)
26.140	74	50-75% Grass cover, Fair, HSG B-C (1, 2, 3, 4)
1.260	98	Farm roads (1, 2, 4, 5)
0.070	98	Proposed gravel road (2)
0.260	98	Proposed gravel roads (3, 4)
0.650	60	Woods, Fair, HSG B (2, 3, 4)
30.180	75	TOTAL AREA

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Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
28.590	HSG B	1, 2, 3, 4, 5
0.000	HSG C	
0.000	HSG D	
1.590	Other	1, 2, 3, 4, 5
30.180		TOTAL AREA

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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	27.940	0.000	0.000	0.000	27.940	50-75% Grass cover, Fair	1, 2, 3, 4, 5
0.000	0.000	0.000	0.000	1.260	1.260	Farm roads	1, 2, 4, 5
0.000	0.000	0.000	0.000	0.070	0.070	Proposed gravel road	2
0.000	0.000	0.000	0.000	0.260	0.260	Proposed gravel roads	3, 4
0.000	0.650	0.000	0.000	0.000	0.650	Woods, Fair	2, 3, 4
0.000	28.590	0.000	0.000	1.590	30.180	TOTAL AREA	



2-Year Storm Event – Proposed

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Type III 24-hr 2 year Rainfall=3.16"

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Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1: Subcat 1 Runoff Area=4.920 ac 2.44% Impervious Runoff Depth>0.97"
Flow Length=600' Slope=0.0250 '/' Tc=13.5 min CN=75 Runoff=4.57 cfs 0.398 af

Subcatchment2: Subcat 2 Runoff Area=1.280 ac 13.28% Impervious Runoff Depth>1.03"
Flow Length=250' Tc=7.5 min CN=76 Runoff=1.52 cfs 0.110 af

Subcatchment3: Subcat 3 Runoff Area=1.990 ac 4.52% Impervious Runoff Depth>0.92"
Flow Length=450' Tc=9.3 min CN=74 Runoff=1.96 cfs 0.153 af

Subcatchment4: Subcat 4 Runoff Area=20.140 ac 5.76% Impervious Runoff Depth>0.96"
Flow Length=1,700' Tc=34.9 min CN=75 Runoff=12.62 cfs 1.615 af

Subcatchment5: Subcat 5 Runoff Area=1.850 ac 2.70% Impervious Runoff Depth>0.72"
Flow Length=550' Slope=0.0200 '/' Tc=14.1 min CN=70 Runoff=1.19 cfs 0.111 af

Pond 1P: (new Pond) Peak Elev=195.61' Storage=10,675 cf Inflow=4.57 cfs 0.398 af
Discarded=0.27 cfs 0.181 af Primary=0.00 cfs 0.000 af Outflow=0.27 cfs 0.181 af

Pond 2P: (new Pond) Peak Elev=212.03' Storage=3,304 cf Inflow=1.52 cfs 0.110 af
Outflow=0.12 cfs 0.035 af

Pond 3P: (new Pond) Peak Elev=211.01' Storage=6,379 cf Inflow=1.96 cfs 0.153 af
Outflow=0.06 cfs 0.006 af

Pond 4P: (new Pond) Peak Elev=216.24' Storage=70,294 cf Inflow=12.62 cfs 1.615 af
Outflow=0.00 cfs 0.000 af

Total Runoff Area = 30.180 ac Runoff Volume = 2.387 af Average Runoff Depth = 0.95"
94.73% Pervious = 28.590 ac 5.27% Impervious = 1.590 ac

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Type III 24-hr 2 year Rainfall=3.16"

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Summary for Subcatchment 1: Subcat 1

Runoff = 4.57 cfs @ 12.20 hrs, Volume= 0.398 af, Depth> 0.97"

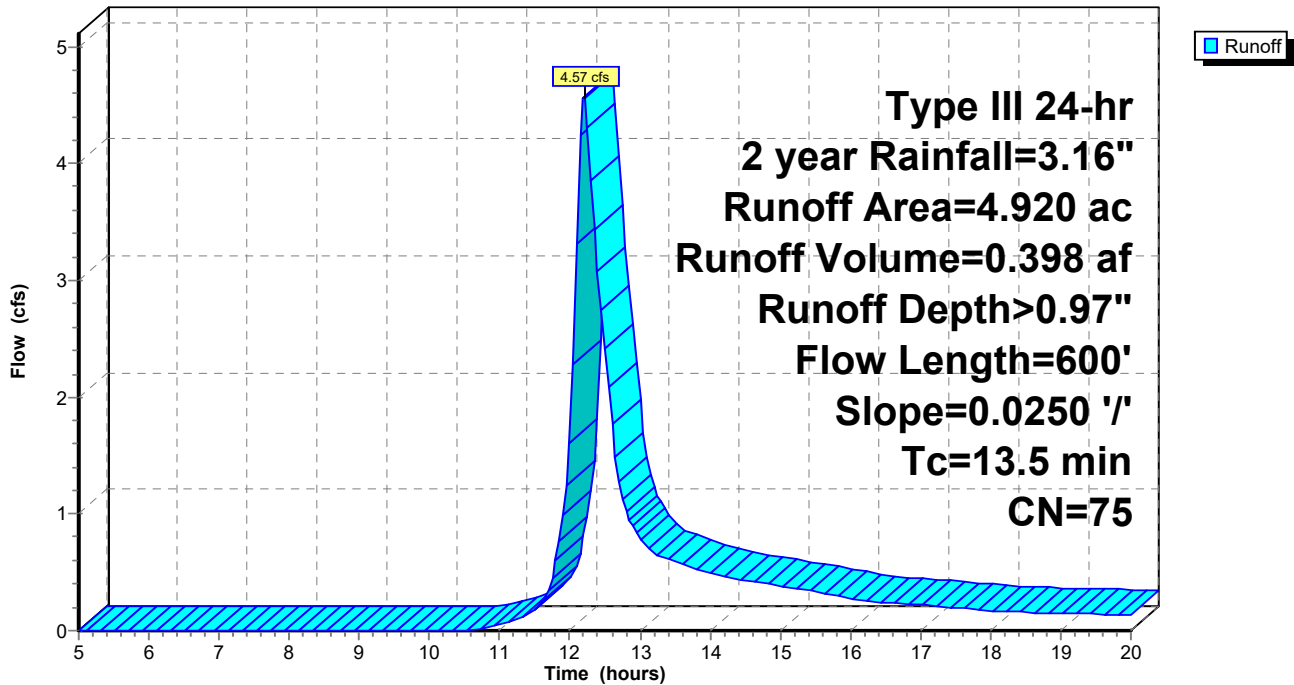
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 year Rainfall=3.16"

Area (ac)	CN	Description
* 4.800	74	50-75% Grass cover, Fair, HSG B-C
* 0.120	98	Farm roads
4.920	75	Weighted Average
4.800		97.56% Pervious Area
0.120		2.44% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.2	50	0.0250	0.16		Sheet Flow, Grass: Short n= 0.150 P2= 3.16"
8.3	550	0.0250	1.11		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
13.5	600	Total			

Subcatchment 1: Subcat 1

Hydrograph



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Type III 24-hr 2 year Rainfall=3.16"

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Summary for Subcatchment 2: Subcat 2

Runoff = 1.52 cfs @ 12.12 hrs, Volume= 0.110 af, Depth> 1.03"

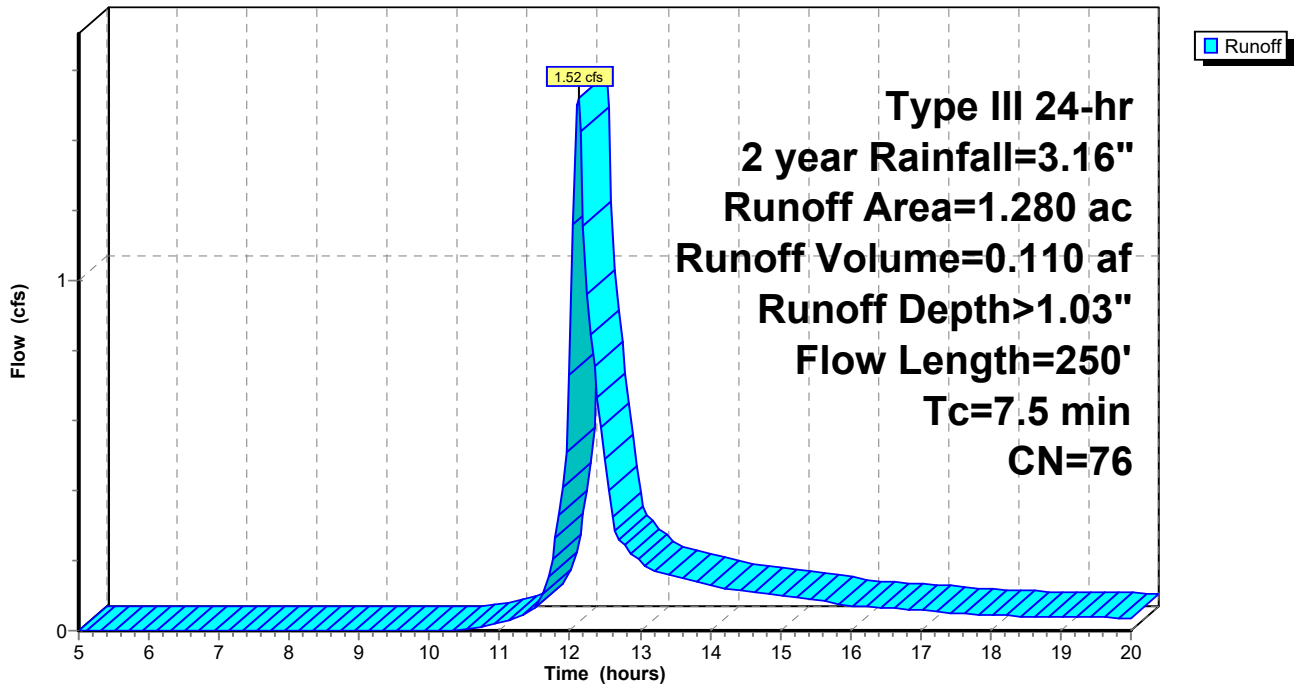
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 year Rainfall=3.16"

Area (ac)	CN	Description
* 1.010	74	50-75% Grass cover, Fair, HSG B-C
0.100	60	Woods, Fair, HSG B
* 0.100	98	Farm roads
* 0.070	98	Proposed gravel road
1.280	76	Weighted Average
1.110		86.72% Pervious Area
0.170		13.28% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.7	50	0.0200	0.15		Sheet Flow, Grass: Short n= 0.150 P2= 3.16"
1.8	200	0.0700	1.85		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
7.5	250	Total			

Subcatchment 2: Subcat 2

Hydrograph



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Type III 24-hr 2 year Rainfall=3.16"

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Summary for Subcatchment 3: Subcat 3

Runoff = 1.96 cfs @ 12.15 hrs, Volume= 0.153 af, Depth> 0.92"

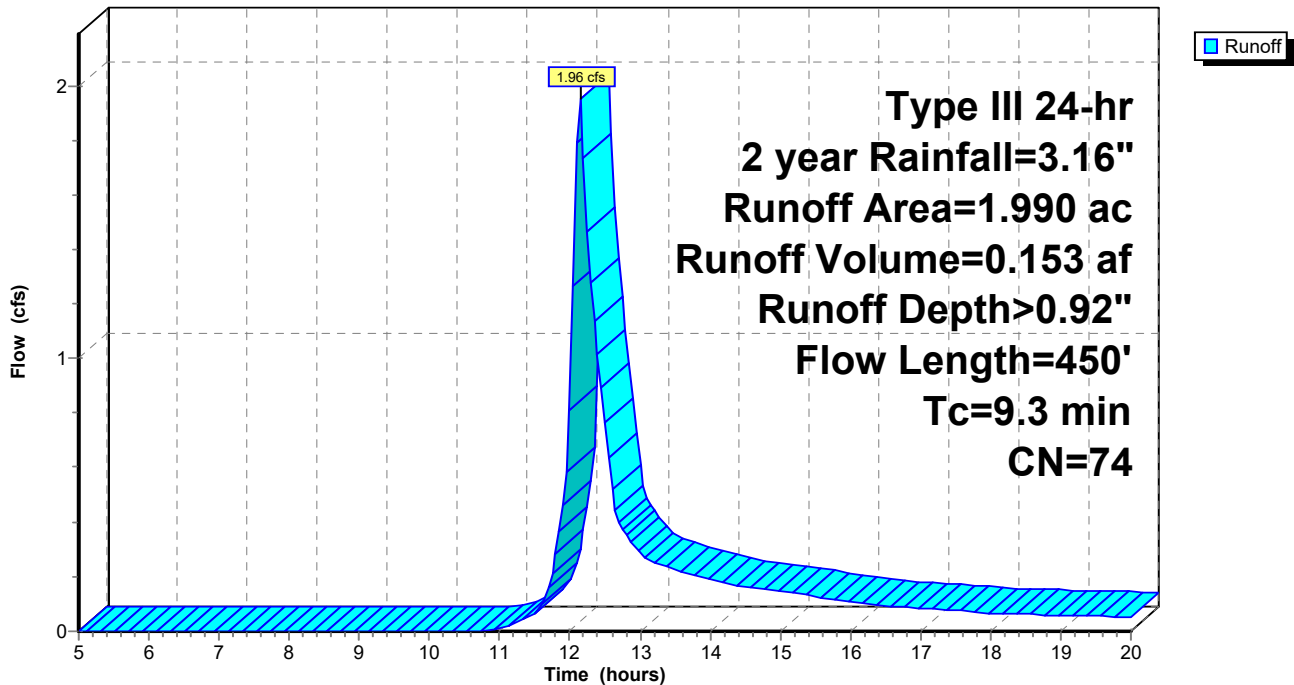
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 year Rainfall=3.16"

Area (ac)	CN	Description
* 1.800	74	50-75% Grass cover, Fair, HSG B-C
0.100	60	Woods, Fair, HSG B
* 0.090	98	Proposed gravel roads
1.990	74	Weighted Average
1.900		95.48% Pervious Area
0.090		4.52% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.7	50	0.0200	0.15		Sheet Flow, Grass: Short n= 0.150 P2= 3.16"
3.6	400	0.0700	1.85		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
9.3	450	Total			

Subcatchment 3: Subcat 3

Hydrograph



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Type III 24-hr 2 year Rainfall=3.16"

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Summary for Subcatchment 4: Subcat 4

Runoff = 12.62 cfs @ 12.52 hrs, Volume= 1.615 af, Depth> 0.96"

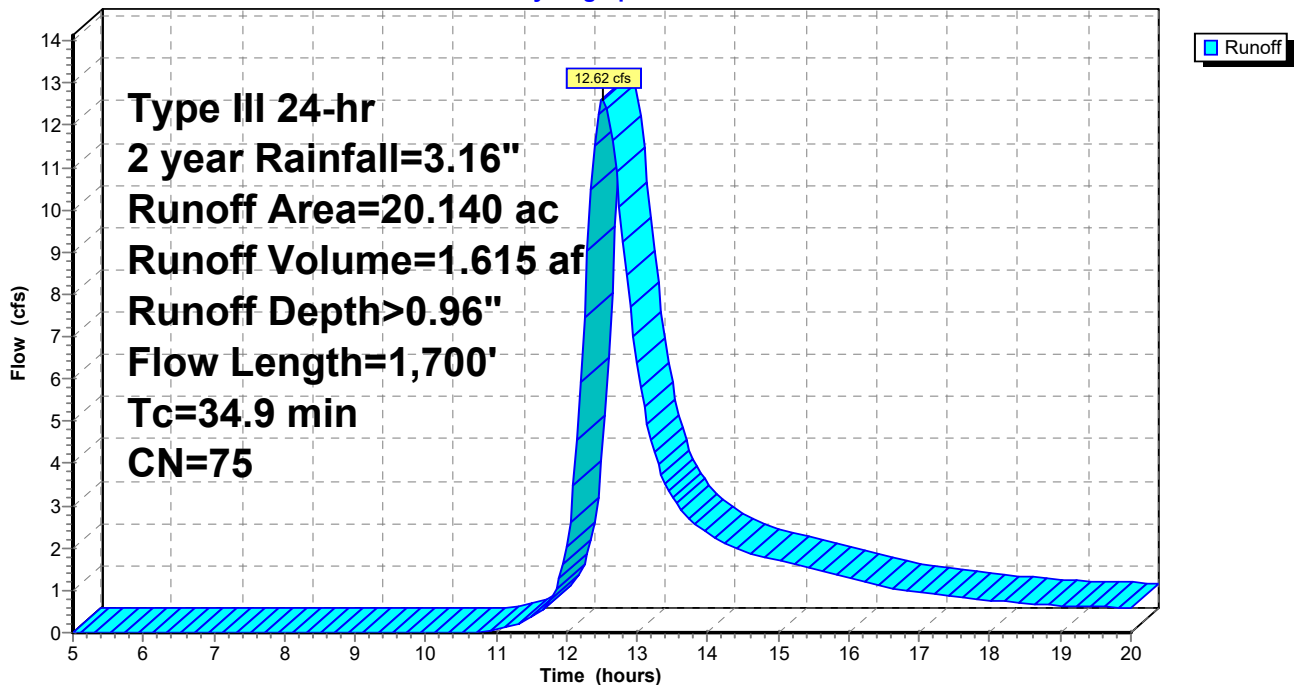
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 year Rainfall=3.16"

Area (ac)	CN	Description
* 18.530	74	50-75% Grass cover, Fair, HSG B-C
0.450	60	Woods, Fair, HSG B
* 0.990	98	Farm roads
* 0.170	98	Proposed gravel roads
20.140	75	Weighted Average
18.980		94.24% Pervious Area
1.160		5.76% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.7	50	0.0200	0.15		Sheet Flow, Grass: Short n= 0.150 P2= 3.16"
17.3	1,150	0.0250	1.11		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
11.9	500	0.0100	0.70		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
34.9	1,700	Total			

Subcatchment 4: Subcat 4

Hydrograph



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Type III 24-hr 2 year Rainfall=3.16"

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Summary for Subcatchment 5: Subcat 5

Runoff = 1.19 cfs @ 12.22 hrs, Volume= 0.111 af, Depth> 0.72"

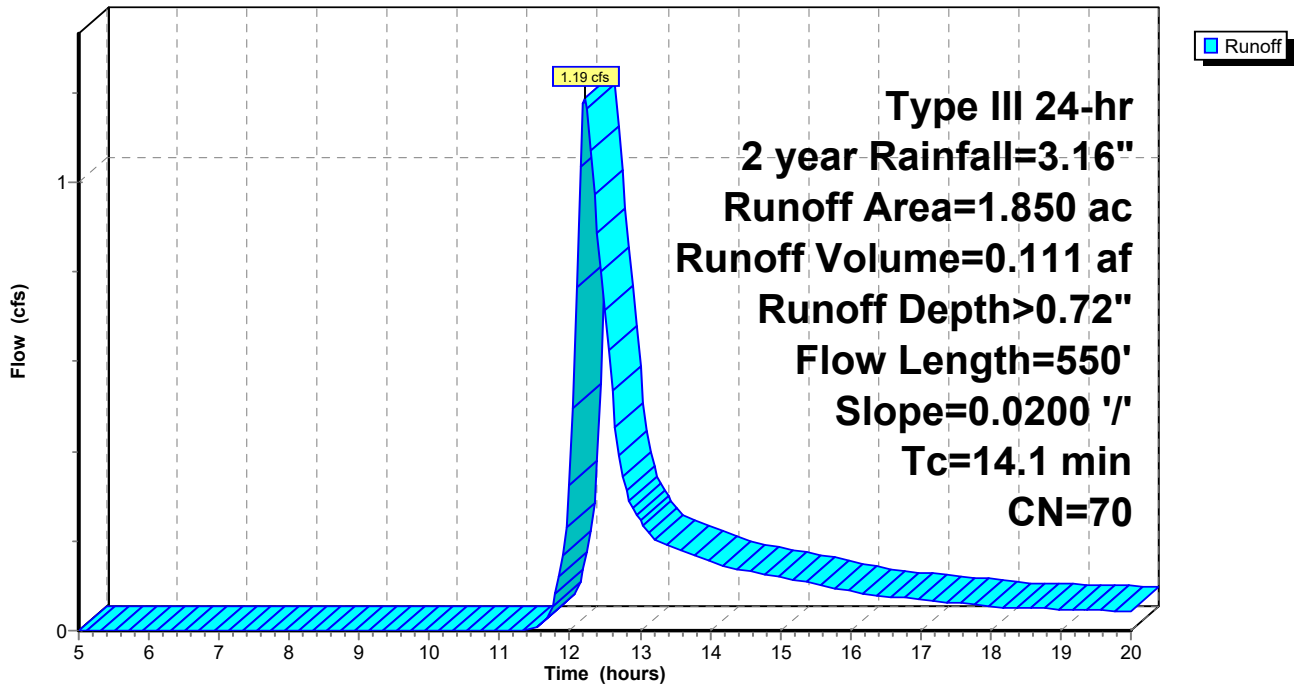
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 year Rainfall=3.16"

Area (ac)	CN	Description
1.800	69	50-75% Grass cover, Fair, HSG B
* 0.050	98	Farm roads
1.850	70	Weighted Average
1.800		97.30% Pervious Area
0.050		2.70% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.7	50	0.0200	0.15		Sheet Flow, Grass: Short n= 0.150 P2= 3.16"
8.4	500	0.0200	0.99		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
14.1	550	Total			

Subcatchment 5: Subcat 5

Hydrograph



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Type III 24-hr 2 year Rainfall=3.16"

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Summary for Pond 1P: (new Pond)

Inflow Area = 4.920 ac, 2.44% Impervious, Inflow Depth > 0.97" for 2 year event
 Inflow = 4.57 cfs @ 12.20 hrs, Volume= 0.398 af
 Outflow = 0.27 cfs @ 16.04 hrs, Volume= 0.181 af, Atten= 94%, Lag= 230.1 min
 Discarded = 0.27 cfs @ 16.04 hrs, Volume= 0.181 af
 Primary = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 195.61' @ 16.04 hrs Surf.Area= 5,698 sf Storage= 10,675 cf

Plug-Flow detention time= 224.1 min calculated for 0.181 af (45% of inflow)
 Center-of-Mass det. time= 133.1 min (955.3 - 822.2)

Volume	Invert	Avail.Storage	Storage Description
#1	193.00'	24,642 cf	15.00'W x 170.00'L x 4.60'H Prismatic Z=3.0

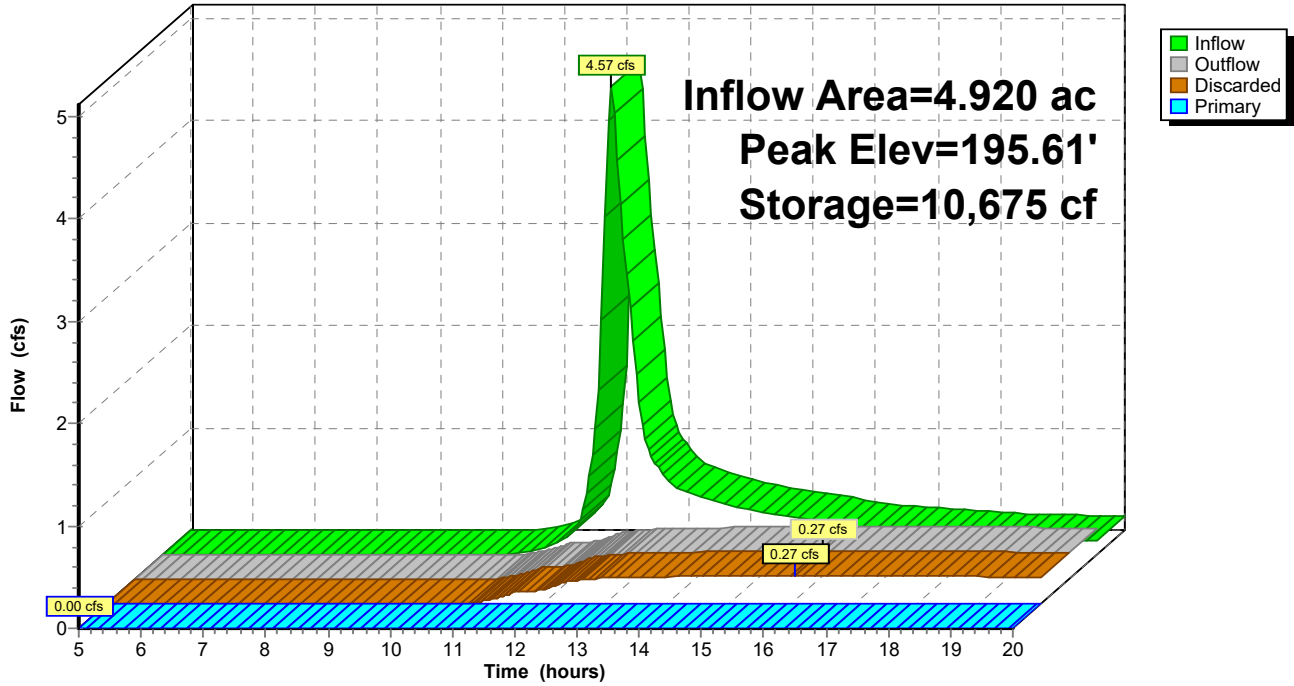
Device	Routing	Invert	Outlet Devices
#1	Primary	197.00'	20.0' long x 5.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88
#2	Discarded	193.00'	2.000 in/hr Exfiltration over Wetted area Conductivity to Groundwater Elevation = 10.00'

Discarded OutFlow Max=0.27 cfs @ 16.04 hrs HW=195.61' (Free Discharge)
 ↳2=Exfiltration (Controls 0.27 cfs)

Primary OutFlow Max=0.00 cfs @ 5.00 hrs HW=193.00' (Free Discharge)
 ↳1=Broad-Crested Rectangular Weir(Controls 0.00 cfs)

Pond 1P: (new Pond)

Hydrograph



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Type III 24-hr 2 year Rainfall=3.16"

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Summary for Pond 2P: (new Pond)

Inflow Area = 1.280 ac, 13.28% Impervious, Inflow Depth > 1.03" for 2 year event
 Inflow = 1.52 cfs @ 12.12 hrs, Volume= 0.110 af
 Outflow = 0.12 cfs @ 14.15 hrs, Volume= 0.035 af, Atten= 92%, Lag= 121.9 min
 Primary = 0.12 cfs @ 14.15 hrs, Volume= 0.035 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 212.03' @ 14.15 hrs Surf.Area= 1,765 sf Storage= 3,304 cf

Plug-Flow detention time= 256.6 min calculated for 0.035 af (31% of inflow)
 Center-of-Mass det. time= 159.8 min (975.0 - 815.2)

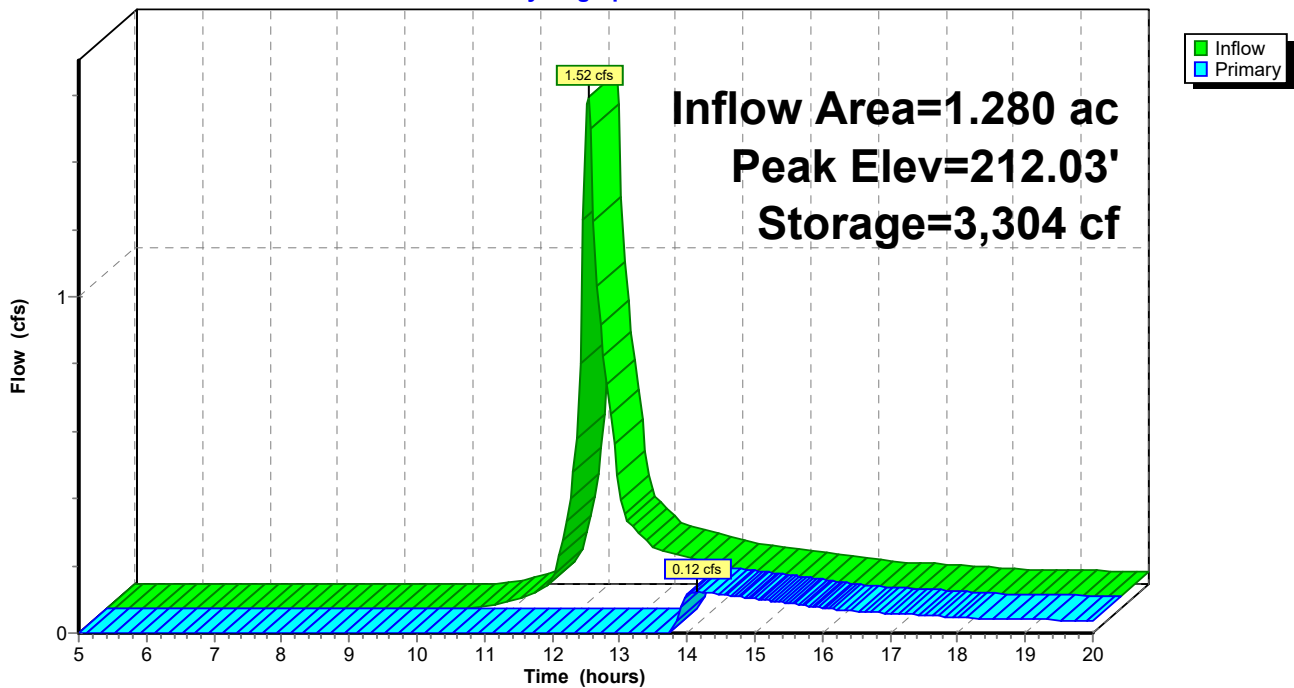
Volume	Invert	Avail.Storage	Storage Description
#1	209.00'	6,494 cf	15.00'W x 35.00'L x 4.50'H Prismatic Z=3.0

Device	Routing	Invert	Outlet Devices
#1	Primary	212.00'	8.0' long x 5.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=0.10 cfs @ 14.15 hrs HW=212.03' (Free Discharge)
 ←1=Broad-Crested Rectangular Weir (Weir Controls 0.10 cfs @ 0.42 fps)

Pond 2P: (new Pond)

Hydrograph



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Type III 24-hr 2 year Rainfall=3.16"

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Summary for Pond 3P: (new Pond)

Inflow Area = 1.990 ac, 4.52% Impervious, Inflow Depth > 0.92" for 2 year event
 Inflow = 1.96 cfs @ 12.15 hrs, Volume= 0.153 af
 Outflow = 0.06 cfs @ 19.21 hrs, Volume= 0.006 af, Atten= 97%, Lag= 423.9 min
 Primary = 0.06 cfs @ 19.21 hrs, Volume= 0.006 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 211.01' @ 19.21 hrs Surf.Area= 2,698 sf Storage= 6,379 cf

Plug-Flow detention time= 463.6 min calculated for 0.006 af (4% of inflow)
 Center-of-Mass det. time= 339.4 min (1,160.8 - 821.4)

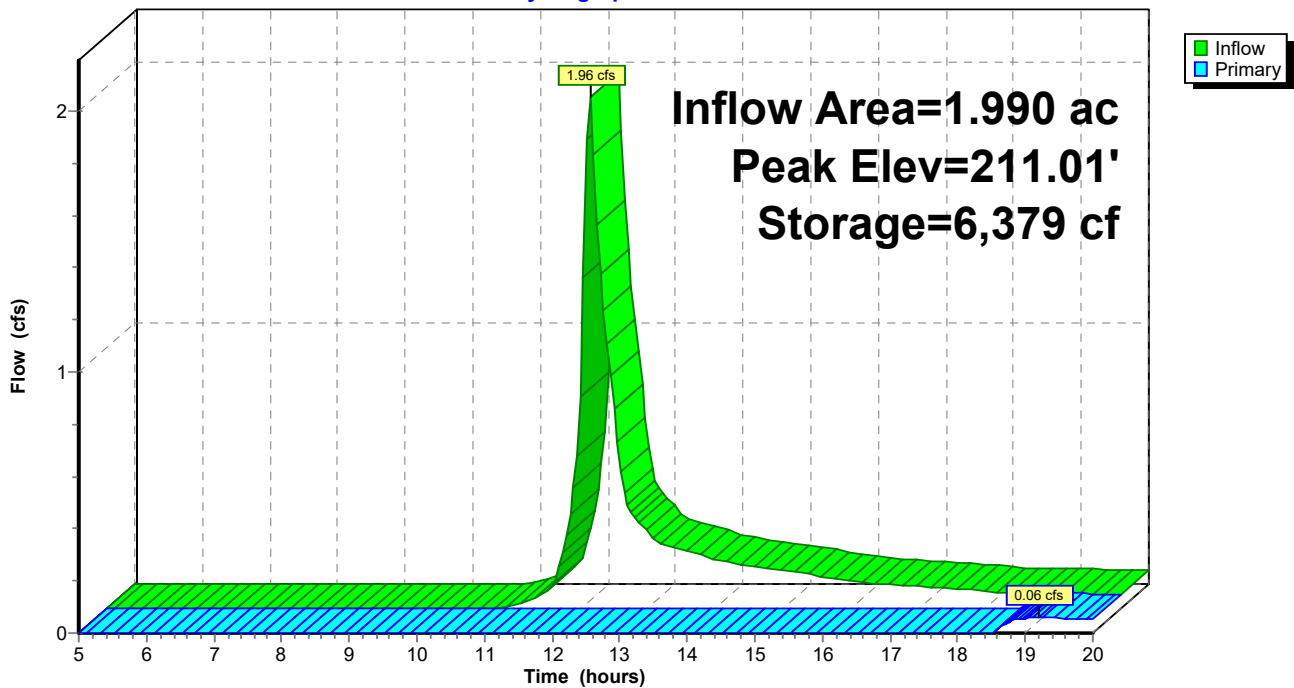
Volume	Invert	Avail.Storage	Storage Description
#1	207.00'	8,714 cf	15.00'W x 45.00'L x 4.80'H Prismatic Z=3.0

Device	Routing	Invert	Outlet Devices
#1	Primary	211.00'	12.0' long x 5.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=0.03 cfs @ 19.21 hrs HW=211.01' (Free Discharge)
 ←1=Broad-Crested Rectangular Weir (Weir Controls 0.03 cfs @ 0.25 fps)

Pond 3P: (new Pond)

Hydrograph



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Type III 24-hr 2 year Rainfall=3.16"

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Summary for Pond 4P: (new Pond)

Inflow Area = 20.140 ac, 5.76% Impervious, Inflow Depth > 0.96" for 2 year event
 Inflow = 12.62 cfs @ 12.52 hrs, Volume= 1.615 af
 Outflow = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min
 Primary = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 216.24' @ 20.00 hrs Surf.Area= 29,072 sf Storage= 70,294 cf

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

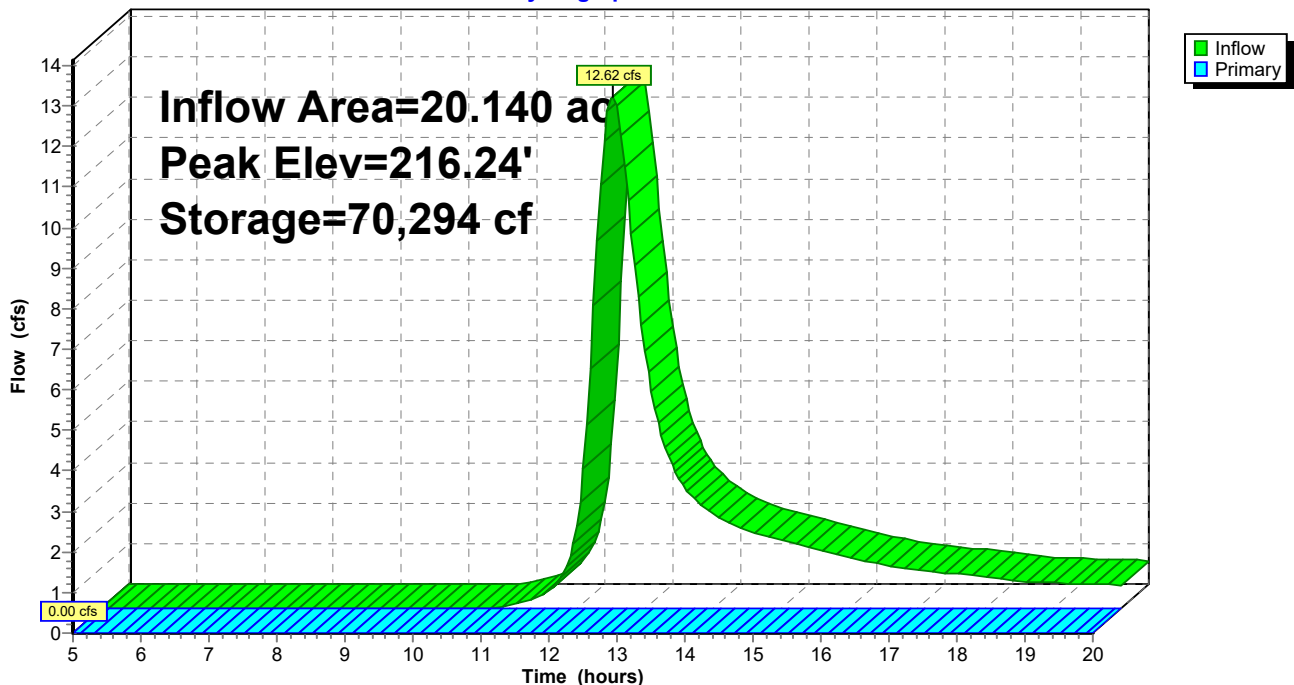
Volume	Invert	Avail.Storage	Storage Description
#1	213.50'	160,589 cf	70.00'W x 320.00'L x 5.50'H Prismatic Z=3.0

Device	Routing	Invert	Outlet Devices
#1	Primary	218.00'	16.0' long x 5.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=0.00 cfs @ 5.00 hrs HW=213.50' (Free Discharge)
 ←1=Broad-Crested Rectangular Weir(Controls 0.00 cfs)

Pond 4P: (new Pond)

Hydrograph





25-Year Storm Event- Proposed

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Type III 24-hr 25 year Rainfall=6.15"

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Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1: Subcat 1 Runoff Area=4.920 ac 2.44% Impervious Runoff Depth>3.17"
Flow Length=600' Slope=0.0250 '/' Tc=13.5 min CN=75 Runoff=15.36 cfs 1.301 af

Subcatchment2: Subcat 2 Runoff Area=1.280 ac 13.28% Impervious Runoff Depth>3.28"
Flow Length=250' Tc=7.5 min CN=76 Runoff=4.94 cfs 0.349 af

Subcatchment3: Subcat 3 Runoff Area=1.990 ac 4.52% Impervious Runoff Depth>3.08"
Flow Length=450' Tc=9.3 min CN=74 Runoff=6.79 cfs 0.511 af

Subcatchment4: Subcat 4 Runoff Area=20.140 ac 5.76% Impervious Runoff Depth>3.15"
Flow Length=1,700' Tc=34.9 min CN=75 Runoff=42.34 cfs 5.284 af

Subcatchment5: Subcat 5 Runoff Area=1.850 ac 2.70% Impervious Runoff Depth>2.70"
Flow Length=550' Slope=0.0200 '/' Tc=14.1 min CN=70 Runoff=4.85 cfs 0.417 af

Pond 1P: (new Pond) Peak Elev=197.32' Storage=22,352 cf Inflow=15.36 cfs 1.301 af
Discarded=0.39 cfs 0.283 af Primary=8.88 cfs 0.562 af Outflow=9.27 cfs 0.845 af

Pond 2P: (new Pond) Peak Elev=212.38' Storage=3,954 cf Inflow=4.94 cfs 0.349 af
Outflow=4.69 cfs 0.274 af

Pond 3P: (new Pond) Peak Elev=211.35' Storage=7,322 cf Inflow=6.79 cfs 0.511 af
Outflow=6.00 cfs 0.363 af

Pond 4P: (new Pond) Peak Elev=218.40' Storage=139,192 cf Inflow=42.34 cfs 5.284 af
Outflow=10.04 cfs 2.309 af

Total Runoff Area = 30.180 ac Runoff Volume = 7.862 af Average Runoff Depth = 3.13"
94.73% Pervious = 28.590 ac 5.27% Impervious = 1.590 ac

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Type III 24-hr 25 year Rainfall=6.15"

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Summary for Subcatchment 1: Subcat 1

Runoff = 15.36 cfs @ 12.19 hrs, Volume= 1.301 af, Depth> 3.17"

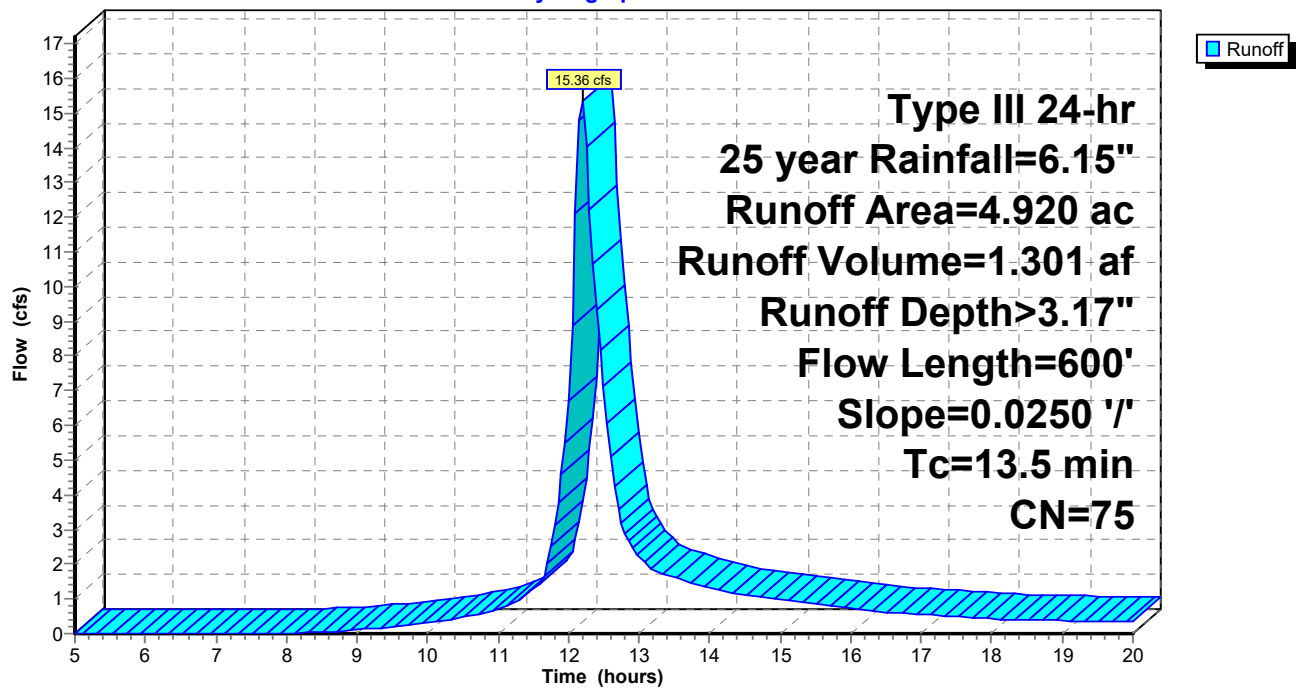
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 year Rainfall=6.15"

Area (ac)	CN	Description
* 4.800	74	50-75% Grass cover, Fair, HSG B-C
* 0.120	98	Farm roads
4.920	75	Weighted Average
4.800		97.56% Pervious Area
0.120		2.44% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.2	50	0.0250	0.16		Sheet Flow, Grass: Short n= 0.150 P2= 3.16"
8.3	550	0.0250	1.11		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
13.5	600	Total			

Subcatchment 1: Subcat 1

Hydrograph



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Type III 24-hr 25 year Rainfall=6.15"

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Summary for Subcatchment 2: Subcat 2

Runoff = 4.94 cfs @ 12.11 hrs, Volume= 0.349 af, Depth> 3.28"

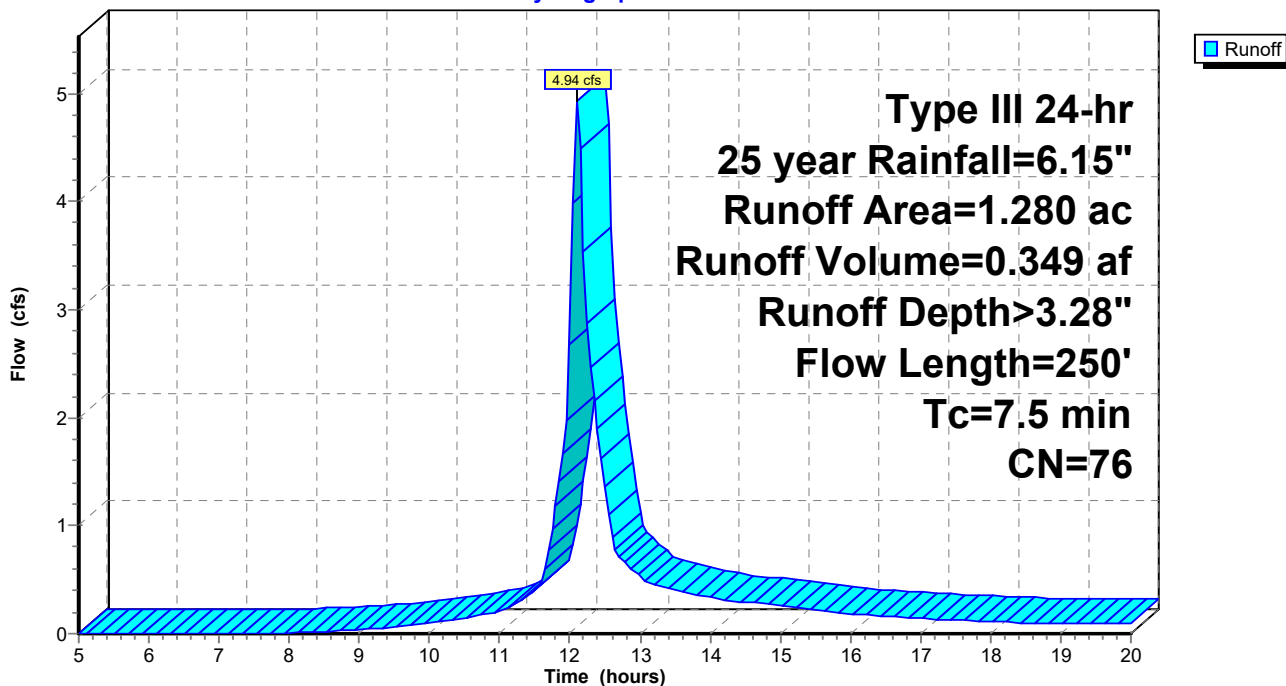
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 year Rainfall=6.15"

Area (ac)	CN	Description
* 1.010	74	50-75% Grass cover, Fair, HSG B-C
0.100	60	Woods, Fair, HSG B
* 0.100	98	Farm roads
* 0.070	98	Proposed gravel road
1.280	76	Weighted Average
1.110		86.72% Pervious Area
0.170		13.28% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.7	50	0.0200	0.15		Sheet Flow, Grass: Short n= 0.150 P2= 3.16"
1.8	200	0.0700	1.85		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
7.5	250	Total			

Subcatchment 2: Subcat 2

Hydrograph



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Type III 24-hr 25 year Rainfall=6.15"

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Summary for Subcatchment 3: Subcat 3

Runoff = 6.79 cfs @ 12.14 hrs, Volume= 0.511 af, Depth> 3.08"

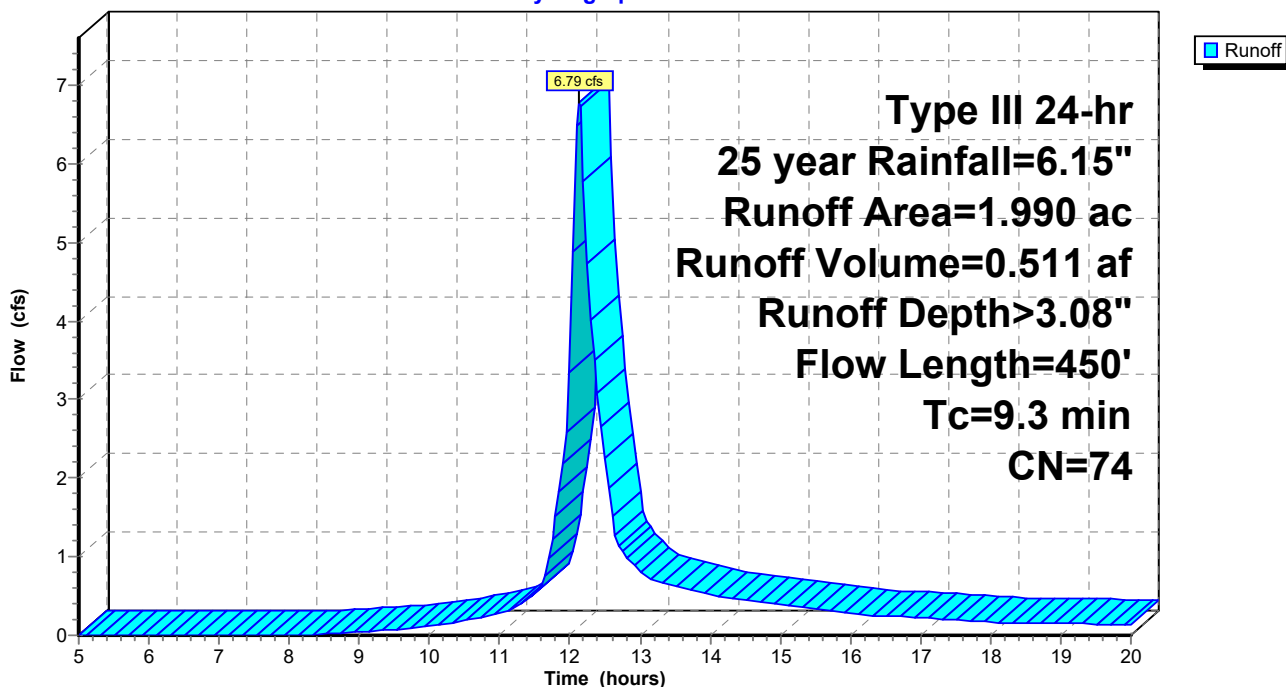
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 year Rainfall=6.15"

Area (ac)	CN	Description
* 1.800	74	50-75% Grass cover, Fair, HSG B-C
0.100	60	Woods, Fair, HSG B
* 0.090	98	Proposed gravel roads
1.990	74	Weighted Average
1.900		95.48% Pervious Area
0.090		4.52% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.7	50	0.0200	0.15		Sheet Flow, Grass: Short n= 0.150 P2= 3.16"
3.6	400	0.0700	1.85		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
9.3	450	Total			

Subcatchment 3: Subcat 3

Hydrograph



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Type III 24-hr 25 year Rainfall=6.15"

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Summary for Subcatchment 4: Subcat 4

Runoff = 42.34 cfs @ 12.49 hrs, Volume= 5.284 af, Depth> 3.15"

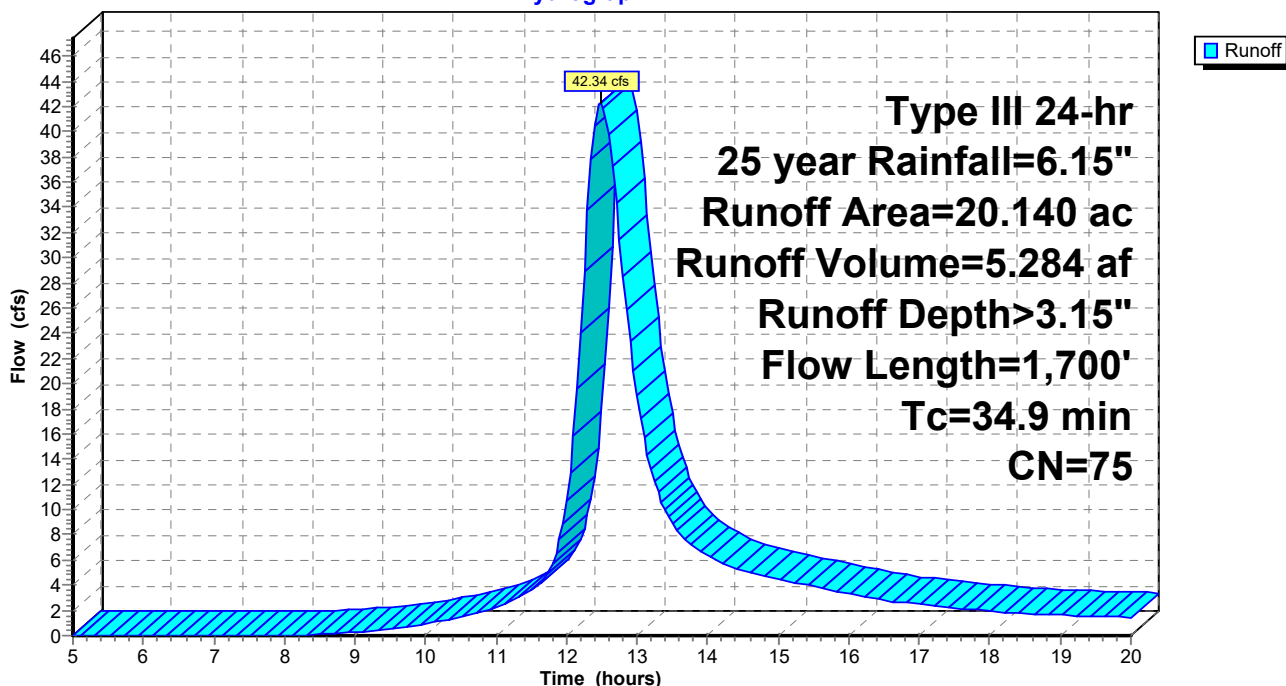
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 year Rainfall=6.15"

Area (ac)	CN	Description
* 18.530	74	50-75% Grass cover, Fair, HSG B-C
0.450	60	Woods, Fair, HSG B
* 0.990	98	Farm roads
* 0.170	98	Proposed gravel roads
20.140	75	Weighted Average
18.980		94.24% Pervious Area
1.160		5.76% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.7	50	0.0200	0.15		Sheet Flow, Grass: Short n= 0.150 P2= 3.16"
17.3	1,150	0.0250	1.11		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
11.9	500	0.0100	0.70		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
34.9	1,700	Total			

Subcatchment 4: Subcat 4

Hydrograph



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Type III 24-hr 25 year Rainfall=6.15"

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Summary for Subcatchment 5: Subcat 5

Runoff = 4.85 cfs @ 12.20 hrs, Volume= 0.417 af, Depth> 2.70"

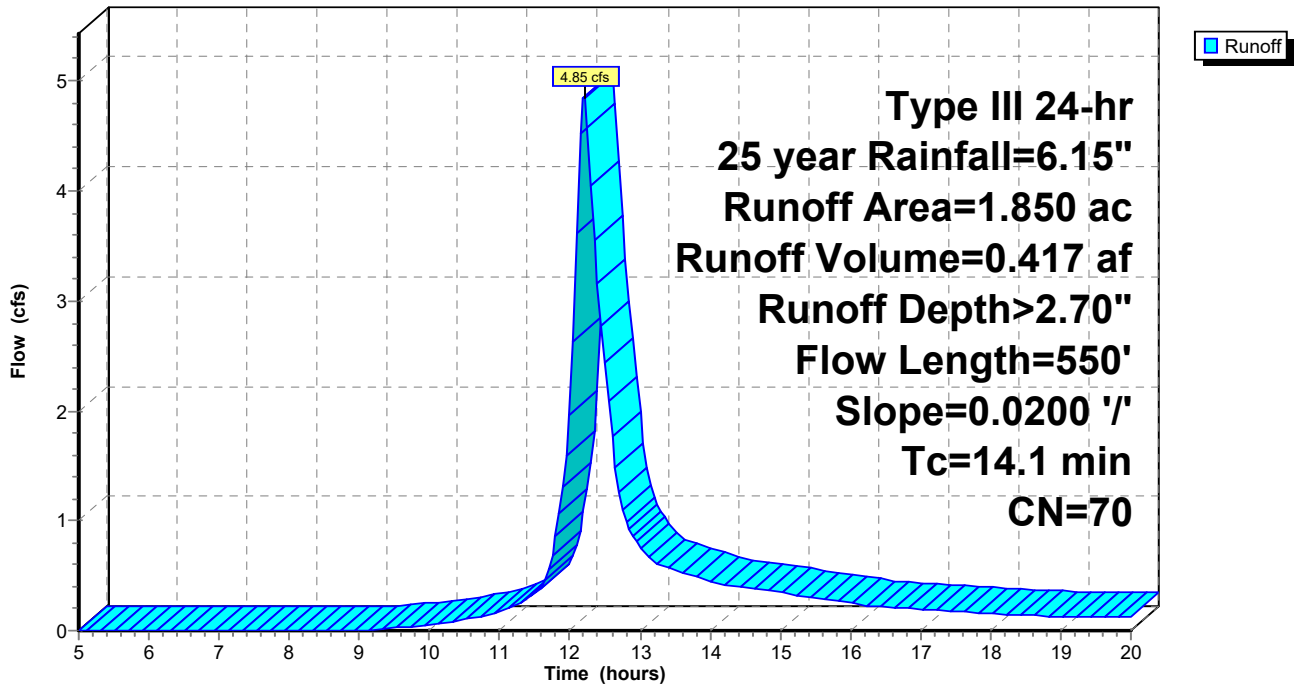
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 year Rainfall=6.15"

Area (ac)	CN	Description
1.800	69	50-75% Grass cover, Fair, HSG B
* 0.050	98	Farm roads
1.850	70	Weighted Average
1.800		97.30% Pervious Area
0.050		2.70% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.7	50	0.0200	0.15		Sheet Flow, Grass: Short n= 0.150 P2= 3.16"
8.4	500	0.0200	0.99		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
14.1	550	Total			

Subcatchment 5: Subcat 5

Hydrograph



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Type III 24-hr 25 year Rainfall=6.15"

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Summary for Pond 1P: (new Pond)

Inflow Area = 4.920 ac, 2.44% Impervious, Inflow Depth > 3.17" for 25 year event
 Inflow = 15.36 cfs @ 12.19 hrs, Volume= 1.301 af
 Outflow = 9.27 cfs @ 12.42 hrs, Volume= 0.845 af, Atten= 40%, Lag= 13.6 min
 Discarded = 0.39 cfs @ 12.42 hrs, Volume= 0.283 af
 Primary = 8.88 cfs @ 12.42 hrs, Volume= 0.562 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 197.32' @ 12.42 hrs Surf.Area= 8,019 sf Storage= 22,352 cf

Plug-Flow detention time= 122.3 min calculated for 0.845 af (65% of inflow)
 Center-of-Mass det. time= 50.9 min (846.7 - 795.8)

Volume	Invert	Avail.Storage	Storage Description
#1	193.00'	24,642 cf	15.00'W x 170.00'L x 4.60'H Prismatic Z=3.0

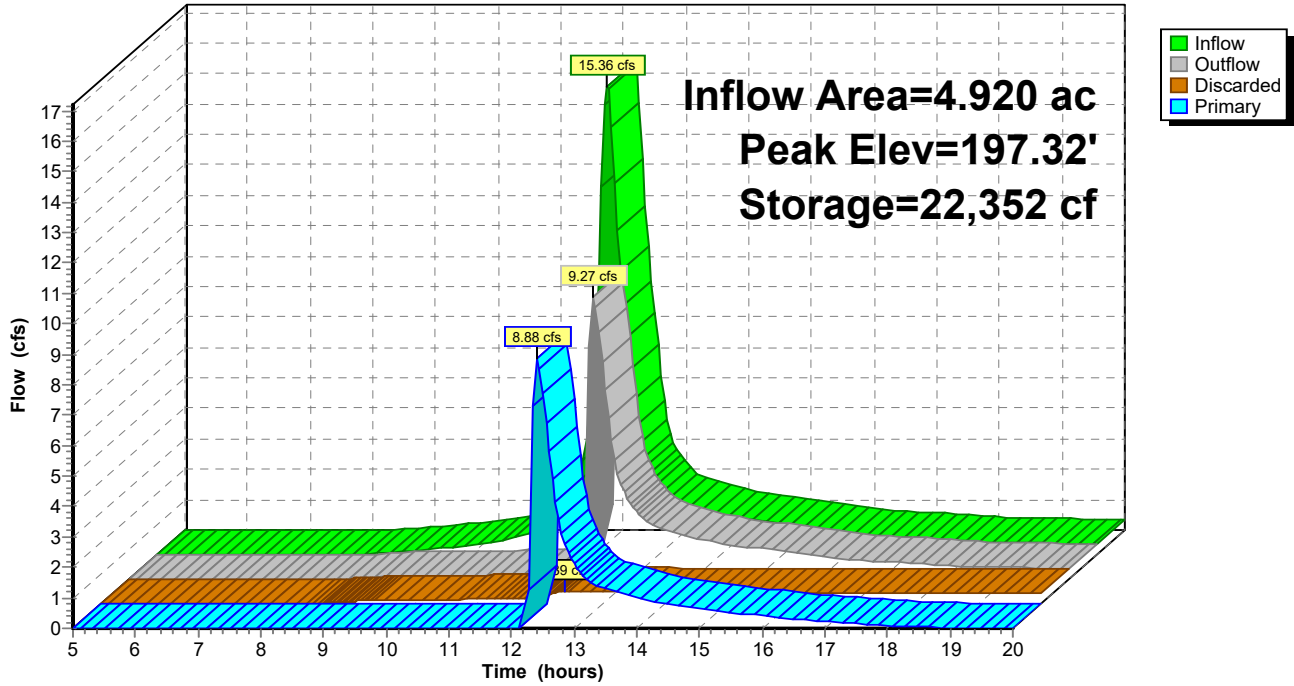
Device	Routing	Invert	Outlet Devices
#1	Primary	197.00'	20.0' long x 5.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88
#2	Discarded	193.00'	2.000 in/hr Exfiltration over Wetted area Conductivity to Groundwater Elevation = 10.00'

Discarded OutFlow Max=0.39 cfs @ 12.42 hrs HW=197.32' (Free Discharge)
 ↑2=Exfiltration (Controls 0.39 cfs)

Primary OutFlow Max=8.67 cfs @ 12.42 hrs HW=197.32' (Free Discharge)
 ↑1=Broad-Crested Rectangular Weir(Weir Controls 8.67 cfs @ 1.37 fps)

Pond 1P: (new Pond)

Hydrograph



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Type III 24-hr 25 year Rainfall=6.15"

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Summary for Pond 2P: (new Pond)

Inflow Area = 1.280 ac, 13.28% Impervious, Inflow Depth > 3.28" for 25 year event
 Inflow = 4.94 cfs @ 12.11 hrs, Volume= 0.349 af
 Outflow = 4.69 cfs @ 12.15 hrs, Volume= 0.274 af, Atten= 5%, Lag= 2.2 min
 Primary = 4.69 cfs @ 12.15 hrs, Volume= 0.274 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 212.38' @ 12.15 hrs Surf.Area= 1,951 sf Storage= 3,954 cf

Plug-Flow detention time= 89.1 min calculated for 0.274 af (78% of inflow)
 Center-of-Mass det. time= 33.6 min (822.8 - 789.1)

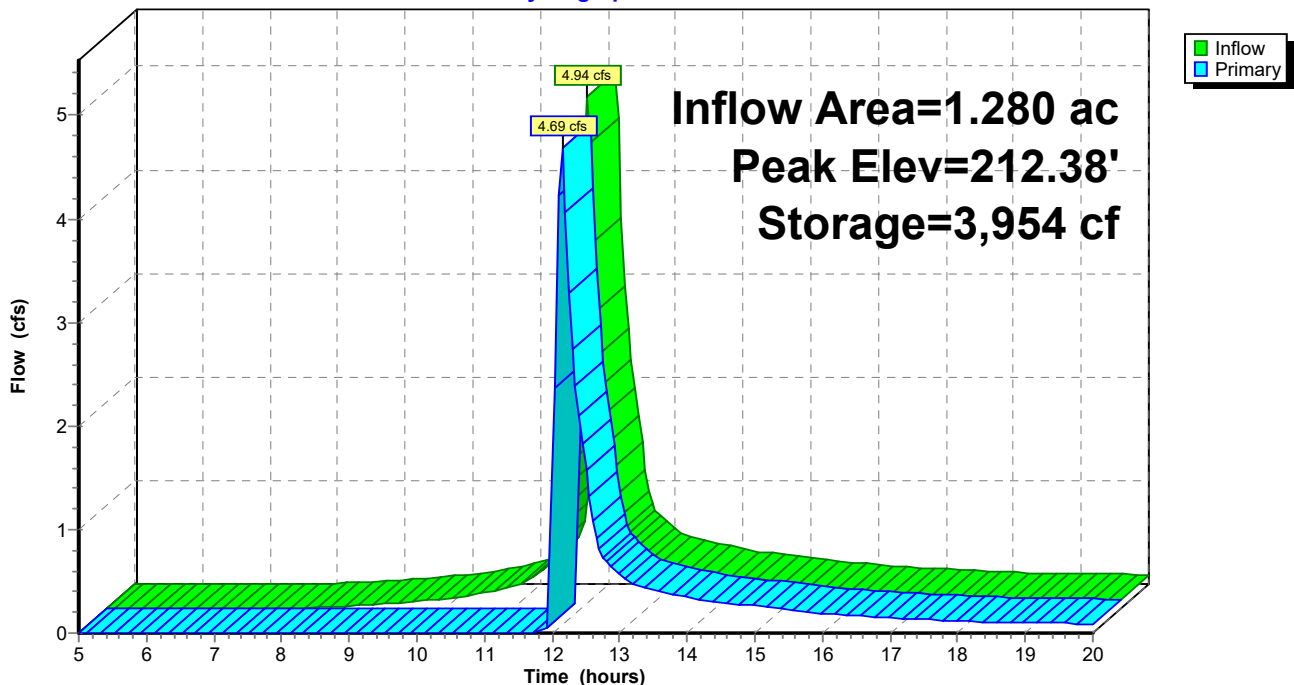
Volume	Invert	Avail.Storage	Storage Description
#1	209.00'	6,494 cf	15.00'W x 35.00'L x 4.50'H Prismatic Z=3.0

Device	Routing	Invert	Outlet Devices
#1	Primary	212.00'	8.0' long x 5.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=4.64 cfs @ 12.15 hrs HW=212.38' (Free Discharge)
 ←1=Broad-Crested Rectangular Weir (Weir Controls 4.64 cfs @ 1.53 fps)

Pond 2P: (new Pond)

Hydrograph



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Type III 24-hr 25 year Rainfall=6.15"

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Summary for Pond 3P: (new Pond)

Inflow Area = 1.990 ac, 4.52% Impervious, Inflow Depth > 3.08" for 25 year event
 Inflow = 6.79 cfs @ 12.14 hrs, Volume= 0.511 af
 Outflow = 6.00 cfs @ 12.22 hrs, Volume= 0.363 af, Atten= 12%, Lag= 4.9 min
 Primary = 6.00 cfs @ 12.22 hrs, Volume= 0.363 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 211.35' @ 12.22 hrs Surf.Area= 2,920 sf Storage= 7,322 cf

Plug-Flow detention time= 107.4 min calculated for 0.362 af (71% of inflow)
 Center-of-Mass det. time= 42.9 min (837.3 - 794.4)

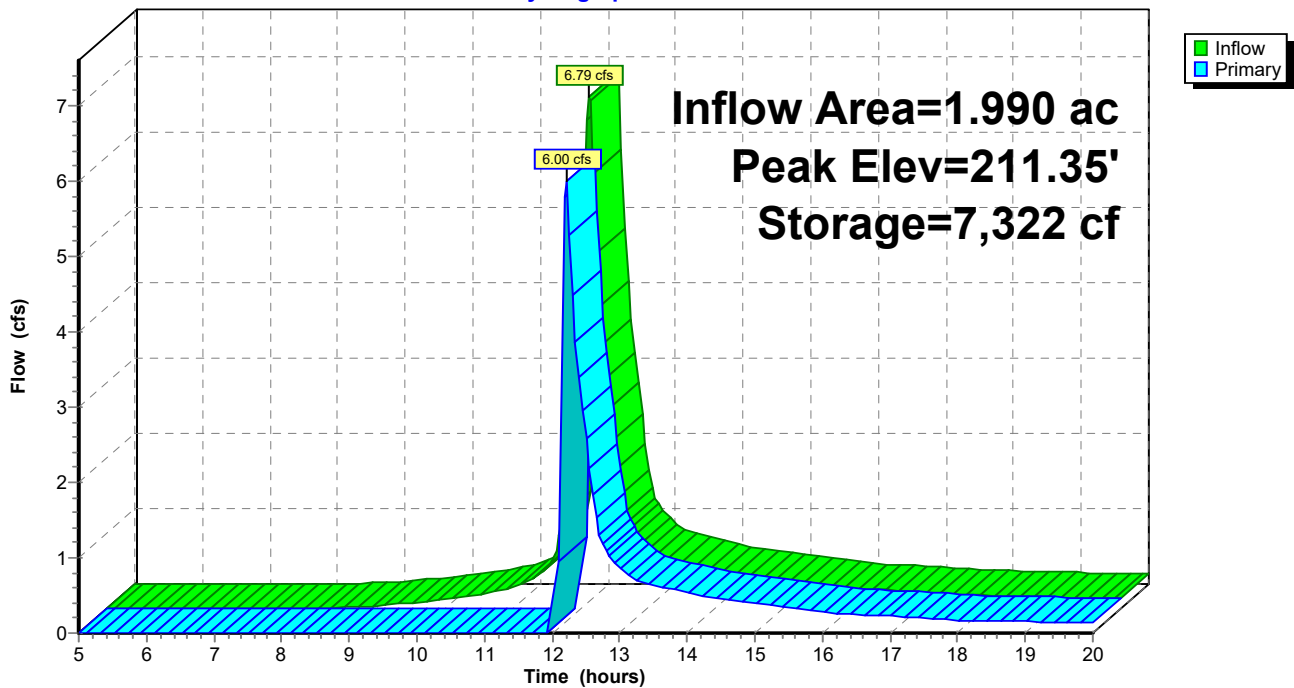
Volume	Invert	Avail.Storage	Storage Description
#1	207.00'	8,714 cf	15.00'W x 45.00'L x 4.80'H Prismatic Z=3.0

Device	Routing	Invert	Outlet Devices
#1	Primary	211.00'	12.0' long x 5.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=5.60 cfs @ 12.22 hrs HW=211.33' (Free Discharge)
 ←1=Broad-Crested Rectangular Weir (Weir Controls 5.60 cfs @ 1.41 fps)

Pond 3P: (new Pond)

Hydrograph



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Type III 24-hr 25 year Rainfall=6.15"

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Summary for Pond 4P: (new Pond)

Inflow Area = 20.140 ac, 5.76% Impervious, Inflow Depth > 3.15" for 25 year event
 Inflow = 42.34 cfs @ 12.49 hrs, Volume= 5.284 af
 Outflow = 10.04 cfs @ 13.40 hrs, Volume= 2.309 af, Atten= 76%, Lag= 54.8 min
 Primary = 10.04 cfs @ 13.40 hrs, Volume= 2.309 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 218.40' @ 13.40 hrs Surf.Area= 34,725 sf Storage= 139,192 cf

Plug-Flow detention time= 197.6 min calculated for 2.309 af (44% of inflow)
 Center-of-Mass det. time= 112.0 min (924.6 - 812.6)

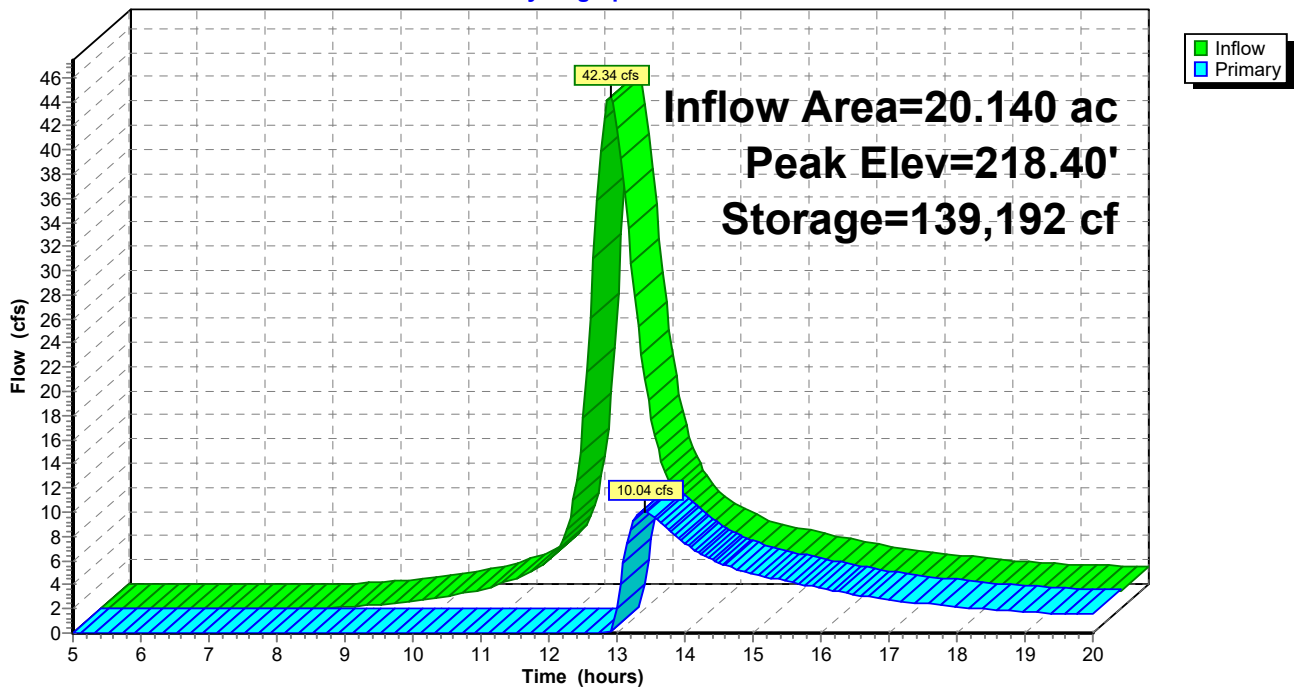
Volume	Invert	Avail.Storage	Storage Description
#1	213.50'	160,589 cf	70.00'W x 320.00'L x 5.50'H Prismatic Z=3.0

Device	Routing	Invert	Outlet Devices
#1	Primary	218.00'	16.0' long x 5.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=10.03 cfs @ 13.40 hrs HW=218.40' (Free Discharge)
 ←1=Broad-Crested Rectangular Weir(Weir Controls 10.03 cfs @ 1.58 fps)

Pond 4P: (new Pond)

Hydrograph





50-Year Storm Event- Proposed

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Type III 24-hr 50 year Rainfall=6.99"

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Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1: Subcat 1 Runoff Area=4.920 ac 2.44% Impervious Runoff Depth>3.86"
Flow Length=600' Slope=0.0250 '/' Tc=13.5 min CN=75 Runoff=18.64 cfs 1.584 af

Subcatchment2: Subcat 2 Runoff Area=1.280 ac 13.28% Impervious Runoff Depth>3.97"
Flow Length=250' Tc=7.5 min CN=76 Runoff=5.97 cfs 0.424 af

Subcatchment3: Subcat 3 Runoff Area=1.990 ac 4.52% Impervious Runoff Depth>3.76"
Flow Length=450' Tc=9.3 min CN=74 Runoff=8.26 cfs 0.624 af

Subcatchment4: Subcat 4 Runoff Area=20.140 ac 5.76% Impervious Runoff Depth>3.83"
Flow Length=1,700' Tc=34.9 min CN=75 Runoff=51.40 cfs 6.436 af

Subcatchment5: Subcat 5 Runoff Area=1.850 ac 2.70% Impervious Runoff Depth>3.35"
Flow Length=550' Slope=0.0200 '/' Tc=14.1 min CN=70 Runoff=6.02 cfs 0.516 af

Pond 1P: (new Pond) Peak Elev=197.43' Storage=23,267 cf Inflow=18.64 cfs 1.584 af
Discarded=0.40 cfs 0.293 af Primary=14.51 cfs 0.834 af Outflow=14.91 cfs 1.127 af

Pond 2P: (new Pond) Peak Elev=212.43' Storage=4,049 cf Inflow=5.97 cfs 0.424 af
Outflow=5.71 cfs 0.348 af

Pond 3P: (new Pond) Peak Elev=211.42' Storage=7,528 cf Inflow=8.26 cfs 0.624 af
Outflow=8.12 cfs 0.476 af

Pond 4P: (new Pond) Peak Elev=218.63' Storage=147,489 cf Inflow=51.40 cfs 6.436 af
Outflow=21.83 cfs 3.451 af

Total Runoff Area = 30.180 ac Runoff Volume = 9.584 af Average Runoff Depth = 3.81"
94.73% Pervious = 28.590 ac 5.27% Impervious = 1.590 ac

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Type III 24-hr 50 year Rainfall=6.99"

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Summary for Subcatchment 1: Subcat 1

Runoff = 18.64 cfs @ 12.19 hrs, Volume= 1.584 af, Depth> 3.86"

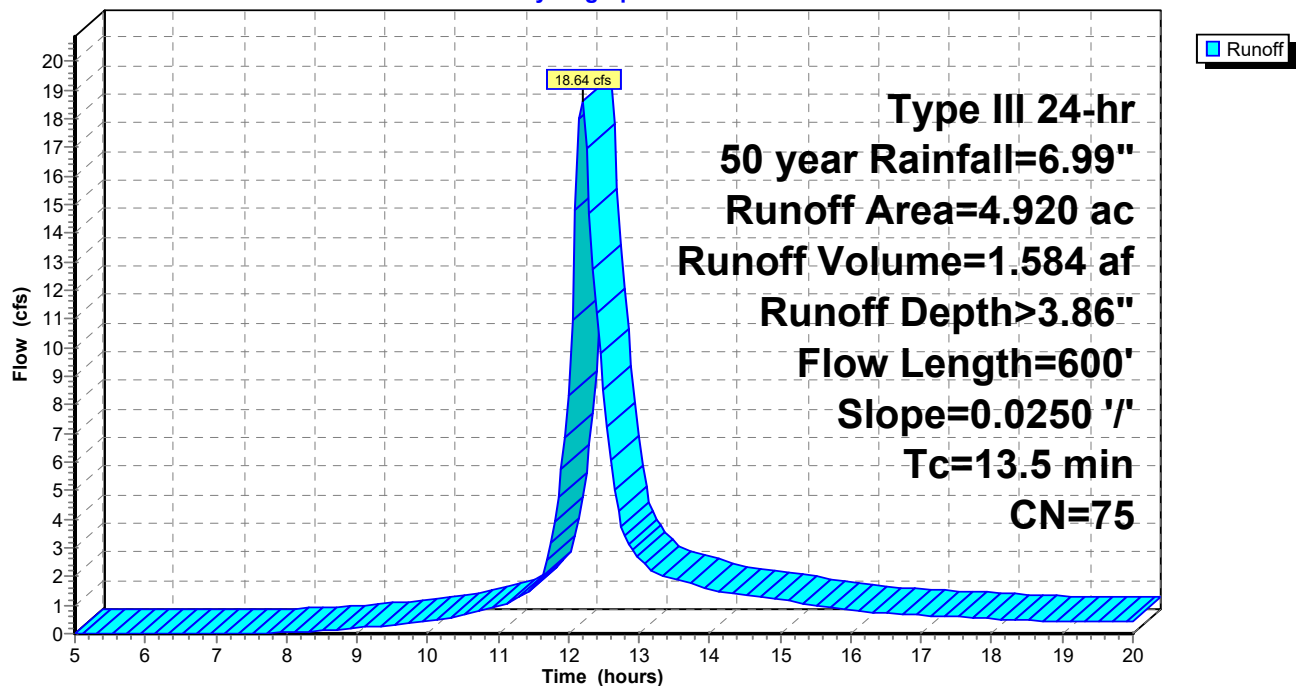
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 50 year Rainfall=6.99"

Area (ac)	CN	Description
* 4.800	74	50-75% Grass cover, Fair, HSG B-C
* 0.120	98	Farm roads
4.920	75	Weighted Average
4.800		97.56% Pervious Area
0.120		2.44% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.2	50	0.0250	0.16		Sheet Flow, Grass: Short n= 0.150 P2= 3.16"
8.3	550	0.0250	1.11		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
13.5	600	Total			

Subcatchment 1: Subcat 1

Hydrograph



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Summary for Subcatchment 2: Subcat 2

Runoff = 5.97 cfs @ 12.11 hrs, Volume= 0.424 af, Depth> 3.97"

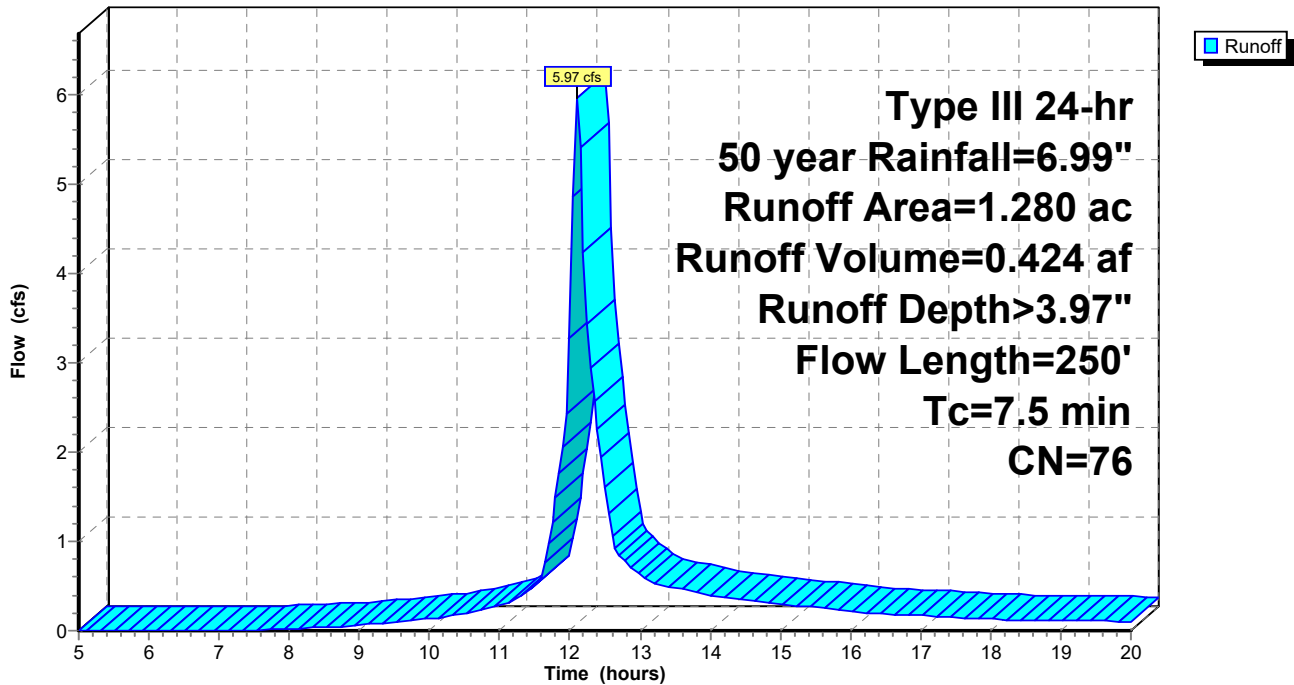
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 50 year Rainfall=6.99"

Area (ac)	CN	Description
* 1.010	74	50-75% Grass cover, Fair, HSG B-C
0.100	60	Woods, Fair, HSG B
* 0.100	98	Farm roads
* 0.070	98	Proposed gravel road
1.280	76	Weighted Average
1.110		86.72% Pervious Area
0.170		13.28% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.7	50	0.0200	0.15		Sheet Flow, Grass: Short n= 0.150 P2= 3.16"
1.8	200	0.0700	1.85		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
7.5	250	Total			

Subcatchment 2: Subcat 2

Hydrograph



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Summary for Subcatchment 3: Subcat 3

Runoff = 8.26 cfs @ 12.13 hrs, Volume= 0.624 af, Depth> 3.76"

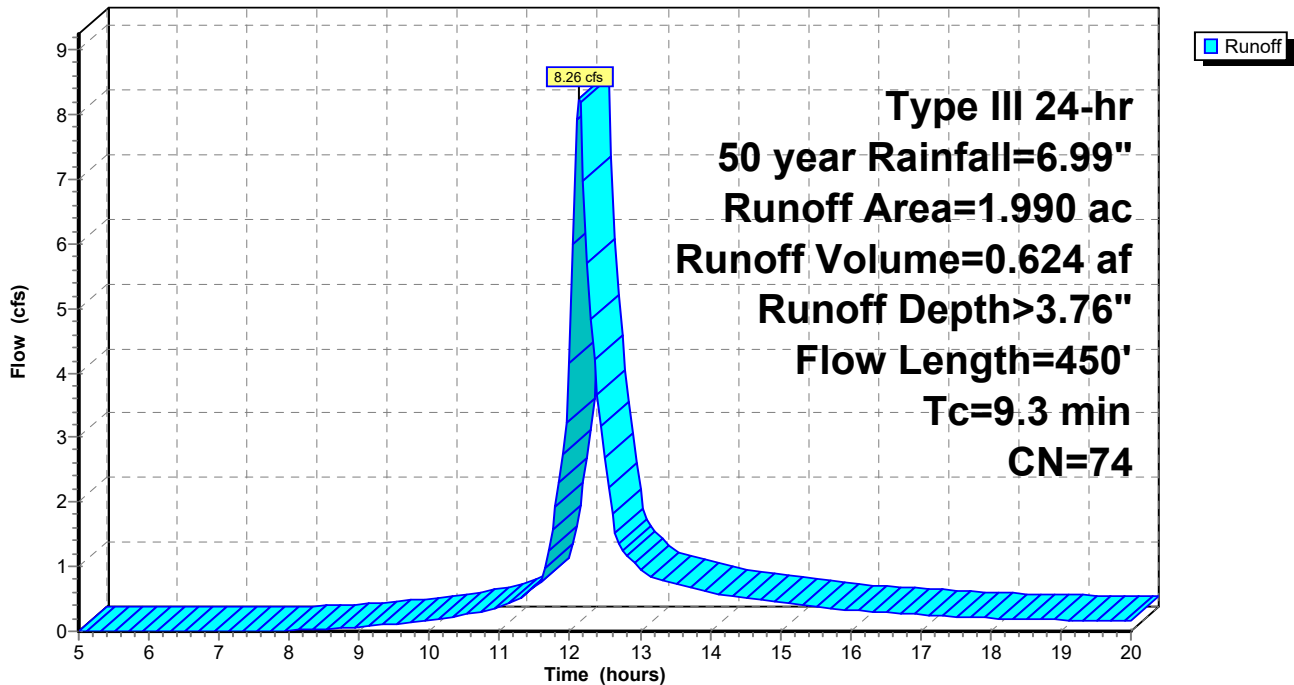
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 50 year Rainfall=6.99"

Area (ac)	CN	Description
* 1.800	74	50-75% Grass cover, Fair, HSG B-C
0.100	60	Woods, Fair, HSG B
* 0.090	98	Proposed gravel roads
1.990	74	Weighted Average
1.900		95.48% Pervious Area
0.090		4.52% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.7	50	0.0200	0.15		Sheet Flow, Grass: Short n= 0.150 P2= 3.16"
3.6	400	0.0700	1.85		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
9.3	450	Total			

Subcatchment 3: Subcat 3

Hydrograph



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Type III 24-hr 50 year Rainfall=6.99"

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Summary for Subcatchment 4: Subcat 4

Runoff = 51.40 cfs @ 12.48 hrs, Volume= 6.436 af, Depth> 3.83"

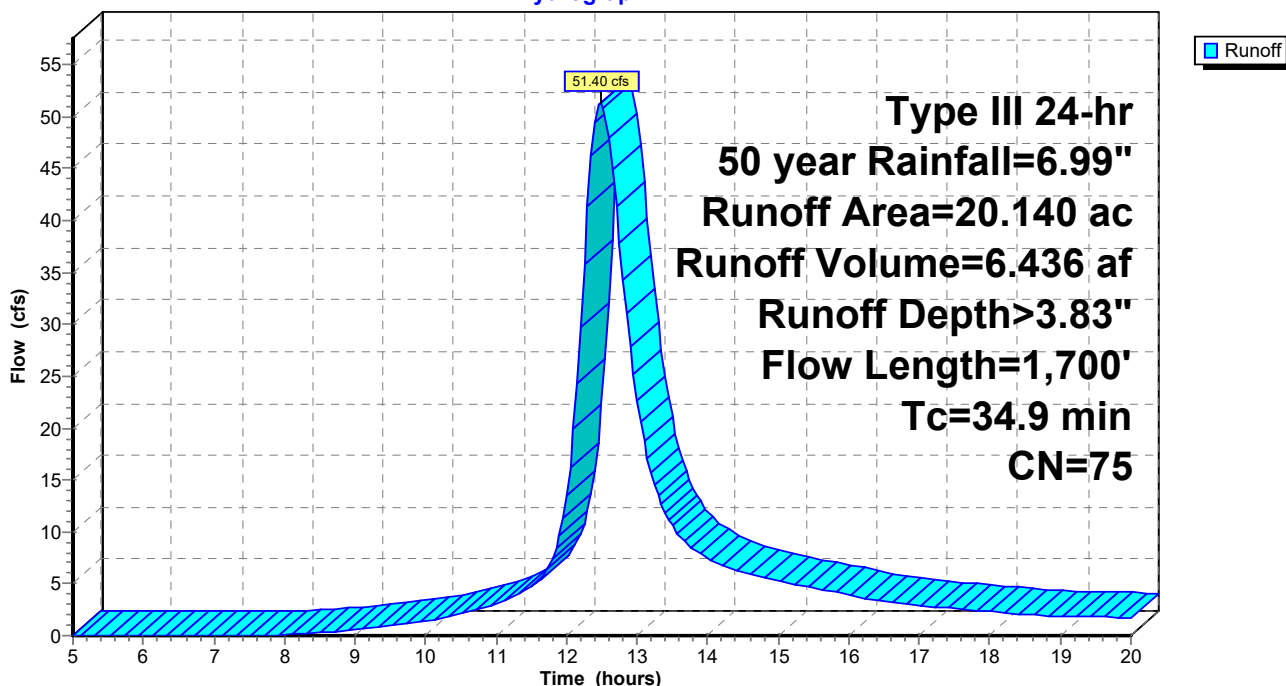
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 50 year Rainfall=6.99"

Area (ac)	CN	Description
* 18.530	74	50-75% Grass cover, Fair, HSG B-C
0.450	60	Woods, Fair, HSG B
* 0.990	98	Farm roads
* 0.170	98	Proposed gravel roads
20.140	75	Weighted Average
18.980		94.24% Pervious Area
1.160		5.76% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.7	50	0.0200	0.15		Sheet Flow, Grass: Short n= 0.150 P2= 3.16"
17.3	1,150	0.0250	1.11		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
11.9	500	0.0100	0.70		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
34.9	1,700	Total			

Subcatchment 4: Subcat 4

Hydrograph



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Summary for Subcatchment 5: Subcat 5

Runoff = 6.02 cfs @ 12.20 hrs, Volume= 0.516 af, Depth> 3.35"

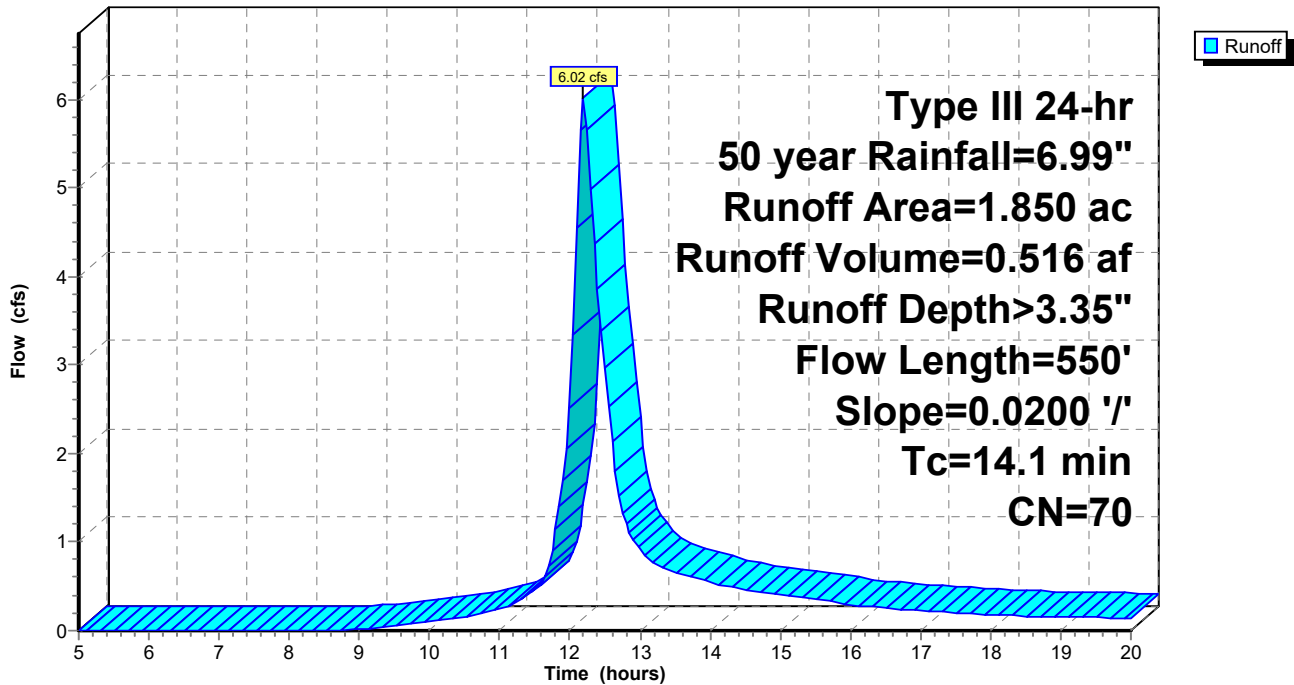
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 50 year Rainfall=6.99"

Area (ac)	CN	Description
1.800	69	50-75% Grass cover, Fair, HSG B
* 0.050	98	Farm roads
1.850	70	Weighted Average
1.800		97.30% Pervious Area
0.050		2.70% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.7	50	0.0200	0.15		Sheet Flow, Grass: Short n= 0.150 P2= 3.16"
8.4	500	0.0200	0.99		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
14.1	550	Total			

Subcatchment 5: Subcat 5

Hydrograph



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Type III 24-hr 50 year Rainfall=6.99"

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Summary for Pond 1P: (new Pond)

Inflow Area = 4.920 ac, 2.44% Impervious, Inflow Depth > 3.86" for 50 year event
 Inflow = 18.64 cfs @ 12.19 hrs, Volume= 1.584 af
 Outflow = 14.91 cfs @ 12.32 hrs, Volume= 1.127 af, Atten= 20%, Lag= 7.6 min
 Discarded = 0.40 cfs @ 12.32 hrs, Volume= 0.293 af
 Primary = 14.51 cfs @ 12.32 hrs, Volume= 0.834 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 197.43' @ 12.32 hrs Surf.Area= 8,180 sf Storage= 23,267 cf

Plug-Flow detention time= 106.2 min calculated for 1.127 af (71% of inflow)
 Center-of-Mass det. time= 41.4 min (832.7 - 791.3)

Volume	Invert	Avail.Storage	Storage Description
#1	193.00'	24,642 cf	15.00'W x 170.00'L x 4.60'H Prismatic Z=3.0

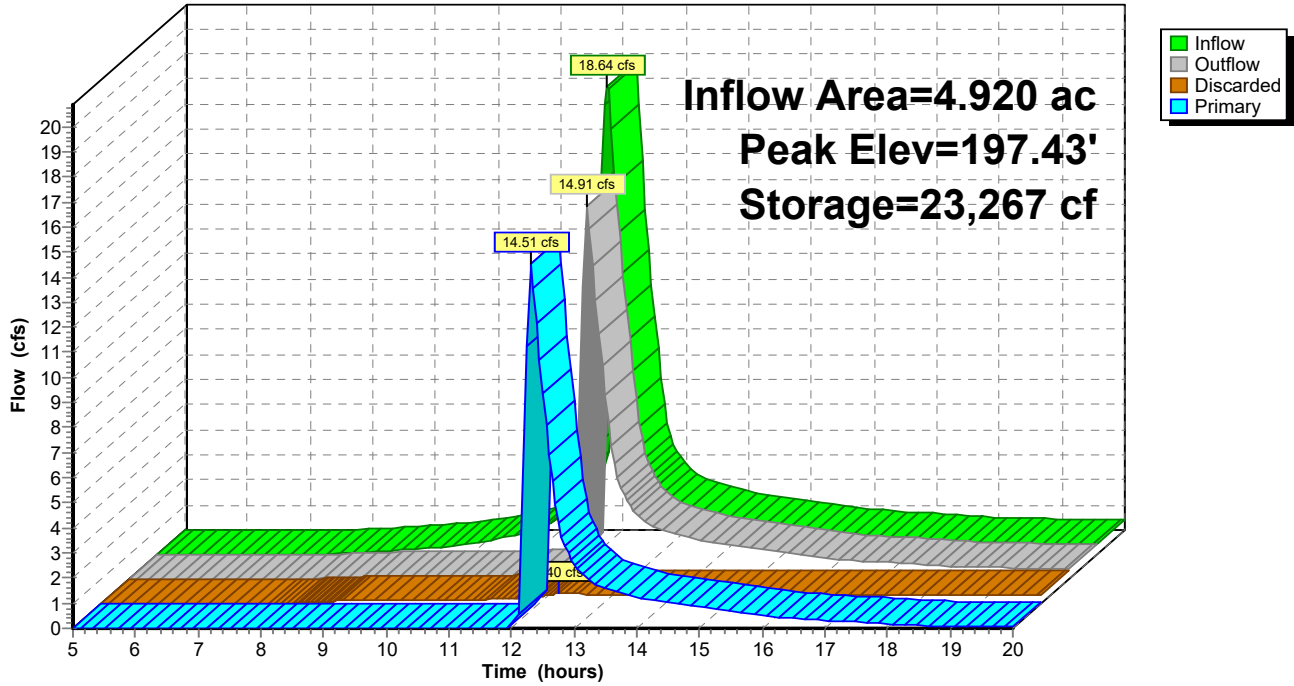
Device	Routing	Invert	Outlet Devices
#1	Primary	197.00'	20.0' long x 5.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88
#2	Discarded	193.00'	2.000 in/hr Exfiltration over Wetted area Conductivity to Groundwater Elevation = 10.00'

Discarded OutFlow Max=0.40 cfs @ 12.32 hrs HW=197.43' (Free Discharge)
 ↑2=Exfiltration (Controls 0.40 cfs)

Primary OutFlow Max=14.08 cfs @ 12.32 hrs HW=197.43' (Free Discharge)
 ↑1=Broad-Crested Rectangular Weir (Weir Controls 14.08 cfs @ 1.65 fps)

Pond 1P: (new Pond)

Hydrograph



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Type III 24-hr 50 year Rainfall=6.99"

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Summary for Pond 2P: (new Pond)

Inflow Area = 1.280 ac, 13.28% Impervious, Inflow Depth > 3.97" for 50 year event
 Inflow = 5.97 cfs @ 12.11 hrs, Volume= 0.424 af
 Outflow = 5.71 cfs @ 12.14 hrs, Volume= 0.348 af, Atten= 4%, Lag= 1.9 min
 Primary = 5.71 cfs @ 12.14 hrs, Volume= 0.348 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 212.43' @ 12.14 hrs Surf.Area= 1,977 sf Storage= 4,049 cf

Plug-Flow detention time= 78.1 min calculated for 0.347 af (82% of inflow)
 Center-of-Mass det. time= 30.0 min (814.6 - 784.7)

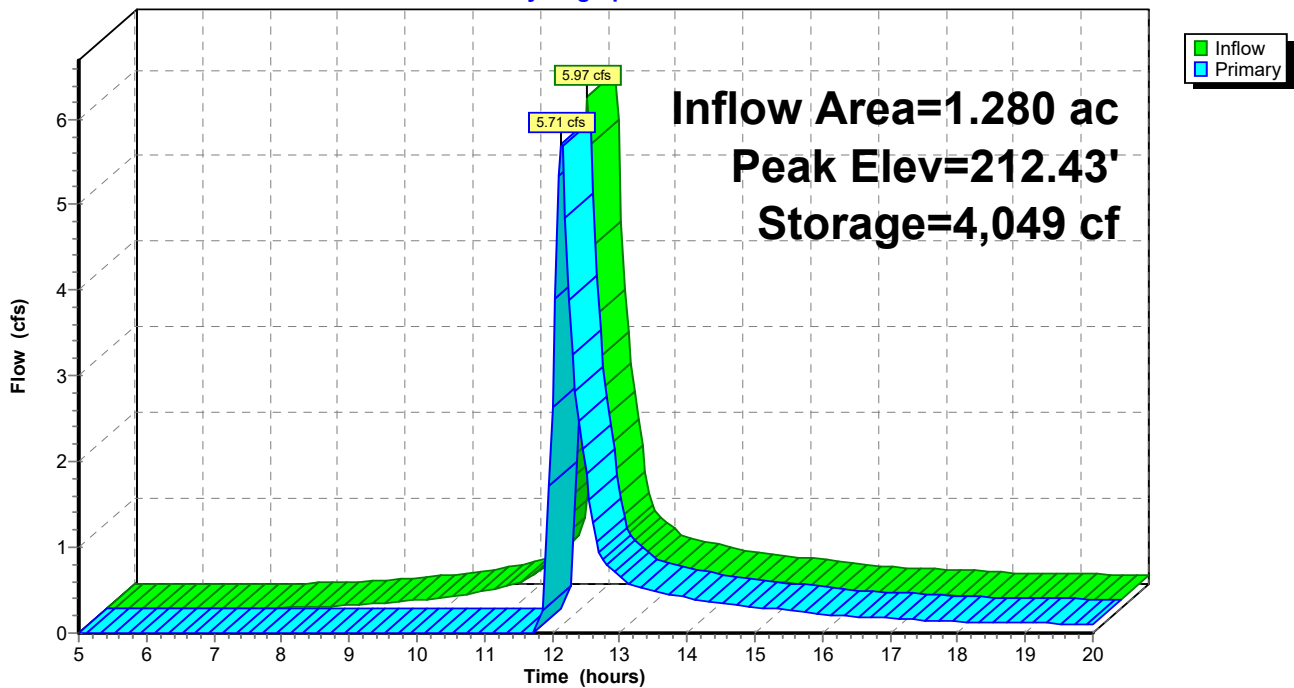
Volume	Invert	Avail.Storage	Storage Description
#1	209.00'	6,494 cf	15.00'W x 35.00'L x 4.50'H Prismatic Z=3.0

Device	Routing	Invert	Outlet Devices
#1	Primary	212.00'	8.0' long x 5.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=5.60 cfs @ 12.14 hrs HW=212.43' (Free Discharge)
 ←1=Broad-Crested Rectangular Weir (Weir Controls 5.60 cfs @ 1.65 fps)

Pond 2P: (new Pond)

Hydrograph



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Type III 24-hr 50 year Rainfall=6.99"

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Summary for Pond 3P: (new Pond)

Inflow Area = 1.990 ac, 4.52% Impervious, Inflow Depth > 3.76" for 50 year event
 Inflow = 8.26 cfs @ 12.13 hrs, Volume= 0.624 af
 Outflow = 8.12 cfs @ 12.17 hrs, Volume= 0.476 af, Atten= 2%, Lag= 2.1 min
 Primary = 8.12 cfs @ 12.17 hrs, Volume= 0.476 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 211.42' @ 12.17 hrs Surf.Area= 2,968 sf Storage= 7,528 cf

Plug-Flow detention time= 93.6 min calculated for 0.475 af (76% of inflow)
 Center-of-Mass det. time= 36.2 min (826.0 - 789.8)

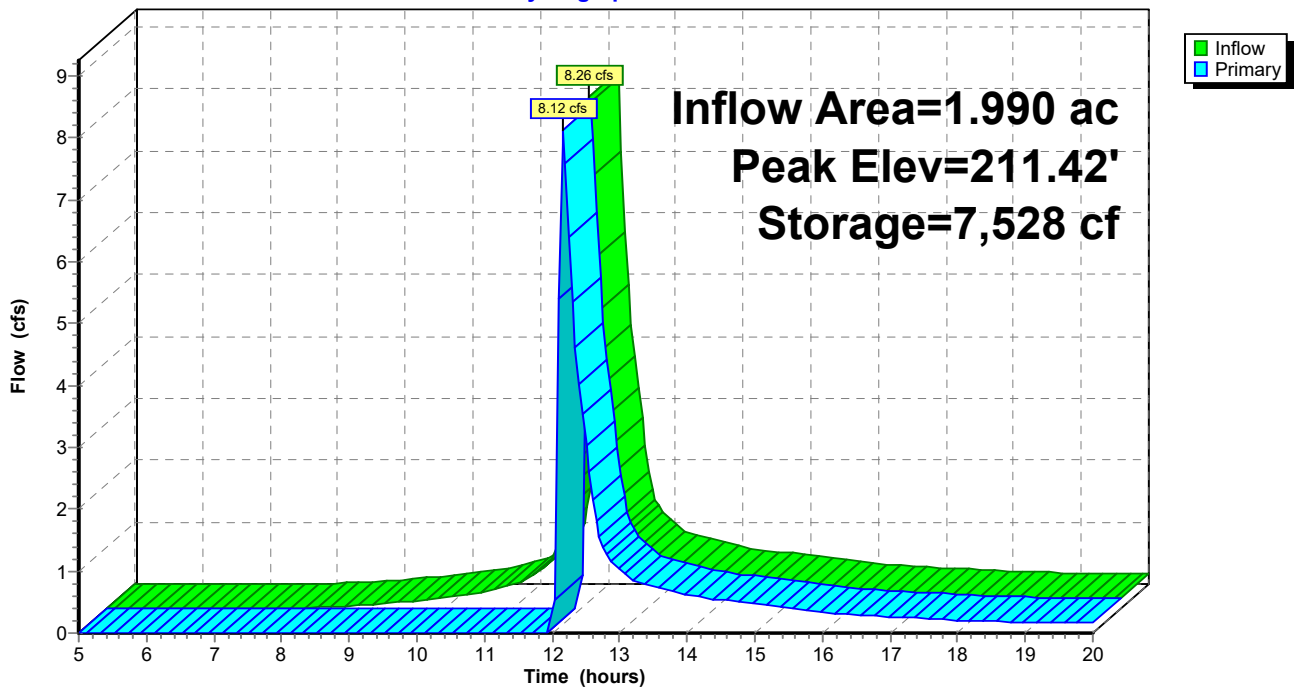
Volume	Invert	Avail.Storage	Storage Description
#1	207.00'	8,714 cf	15.00'W x 45.00'L x 4.80'H Prismatic Z=3.0

Device	Routing	Invert	Outlet Devices
#1	Primary	211.00'	12.0' long x 5.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=7.77 cfs @ 12.17 hrs HW=211.41' (Free Discharge)
 ←1=Broad-Crested Rectangular Weir (Weir Controls 7.77 cfs @ 1.60 fps)

Pond 3P: (new Pond)

Hydrograph



42733.00 - Proposed Conditions2

Type III 24-hr 50 year Rainfall=6.99"

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Summary for Pond 4P: (new Pond)

Inflow Area = 20.140 ac, 5.76% Impervious, Inflow Depth > 3.83" for 50 year event
 Inflow = 51.40 cfs @ 12.48 hrs, Volume= 6.436 af
 Outflow = 21.83 cfs @ 13.02 hrs, Volume= 3.451 af, Atten= 58%, Lag= 32.5 min
 Primary = 21.83 cfs @ 13.02 hrs, Volume= 3.451 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 218.63' @ 13.02 hrs Surf.Area= 35,364 sf Storage= 147,489 cf

Plug-Flow detention time= 163.5 min calculated for 3.451 af (54% of inflow)
 Center-of-Mass det. time= 85.6 min (893.8 - 808.2)

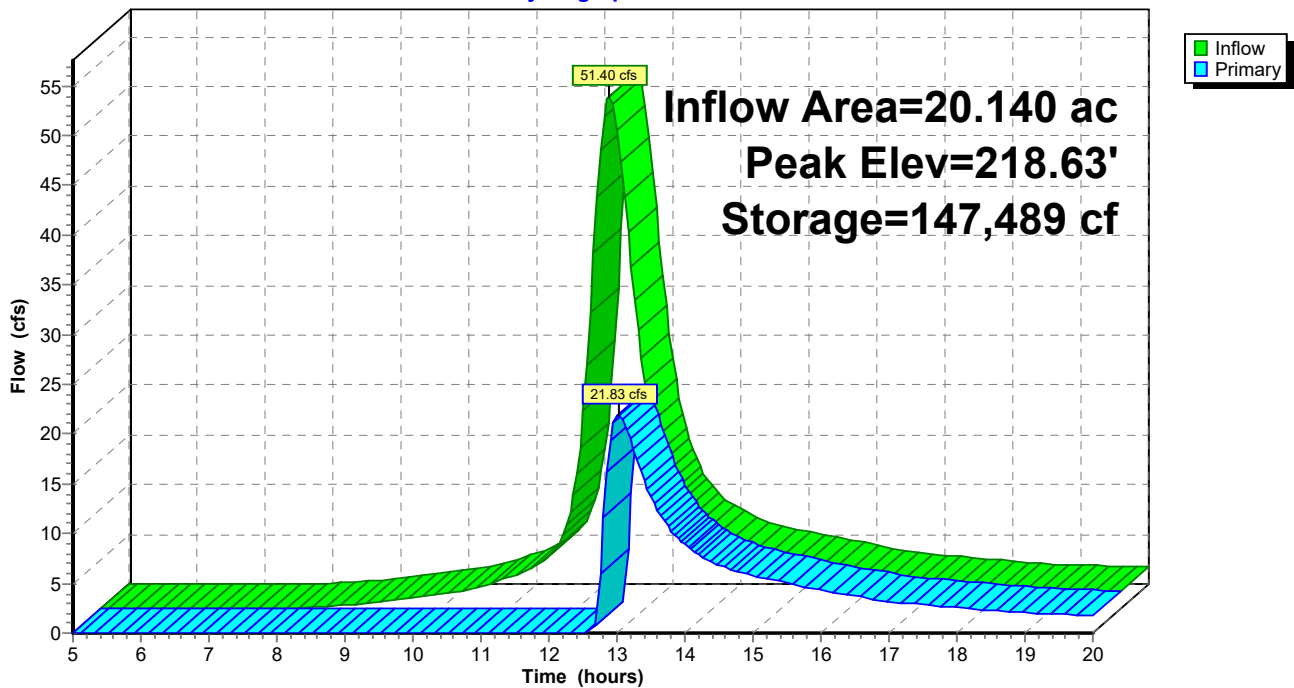
Volume	Invert	Avail.Storage	Storage Description
#1	213.50'	160,589 cf	70.00'W x 320.00'L x 5.50'H Prismatic Z=3.0

Device	Routing	Invert	Outlet Devices
#1	Primary	218.00'	16.0' long x 5.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=21.73 cfs @ 13.02 hrs HW=218.63' (Free Discharge)
 ←1=Broad-Crested Rectangular Weir (Weir Controls 21.73 cfs @ 2.15 fps)

Pond 4P: (new Pond)

Hydrograph





100-Year Storm Event – Proposed

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Type III 24-hr 100 year Rainfall=7.92"

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Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1: Subcat 1 Runoff Area=4.920 ac 2.44% Impervious Runoff Depth>4.65"
Flow Length=600' Slope=0.0250 '/' Tc=13.5 min CN=75 Runoff=22.32 cfs 1.905 af

Subcatchment2: Subcat 2 Runoff Area=1.280 ac 13.28% Impervious Runoff Depth>4.77"
Flow Length=250' Tc=7.5 min CN=76 Runoff=7.12 cfs 0.509 af

Subcatchment3: Subcat 3 Runoff Area=1.990 ac 4.52% Impervious Runoff Depth>4.54"
Flow Length=450' Tc=9.3 min CN=74 Runoff=9.92 cfs 0.753 af

Subcatchment4: Subcat 4 Runoff Area=20.140 ac 5.76% Impervious Runoff Depth>4.61"
Flow Length=1,700' Tc=34.9 min CN=75 Runoff=61.59 cfs 7.745 af

Subcatchment5: Subcat 5 Runoff Area=1.850 ac 2.70% Impervious Runoff Depth>4.09"
Flow Length=550' Slope=0.0200 '/' Tc=14.1 min CN=70 Runoff=7.34 cfs 0.630 af

Pond 1P: (new Pond) Peak Elev=197.53' Storage=24,051 cf Inflow=22.32 cfs 1.905 af
Discarded=0.41 cfs 0.304 af Primary=20.27 cfs 1.144 af Outflow=20.68 cfs 1.447 af

Pond 2P: (new Pond) Peak Elev=212.48' Storage=4,146 cf Inflow=7.12 cfs 0.509 af
Outflow=6.83 cfs 0.433 af

Pond 3P: (new Pond) Peak Elev=211.46' Storage=7,668 cf Inflow=9.92 cfs 0.753 af
Outflow=9.73 cfs 0.605 af

Pond 4P: (new Pond) Peak Elev=218.89' Storage=156,739 cf Inflow=61.59 cfs 7.745 af
Outflow=36.23 cfs 4.750 af

Total Runoff Area = 30.180 ac Runoff Volume = 11.542 af Average Runoff Depth = 4.59"
94.73% Pervious = 28.590 ac 5.27% Impervious = 1.590 ac

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Type III 24-hr 100 year Rainfall=7.92"

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Summary for Subcatchment 1: Subcat 1

Runoff = 22.32 cfs @ 12.19 hrs, Volume= 1.905 af, Depth> 4.65"

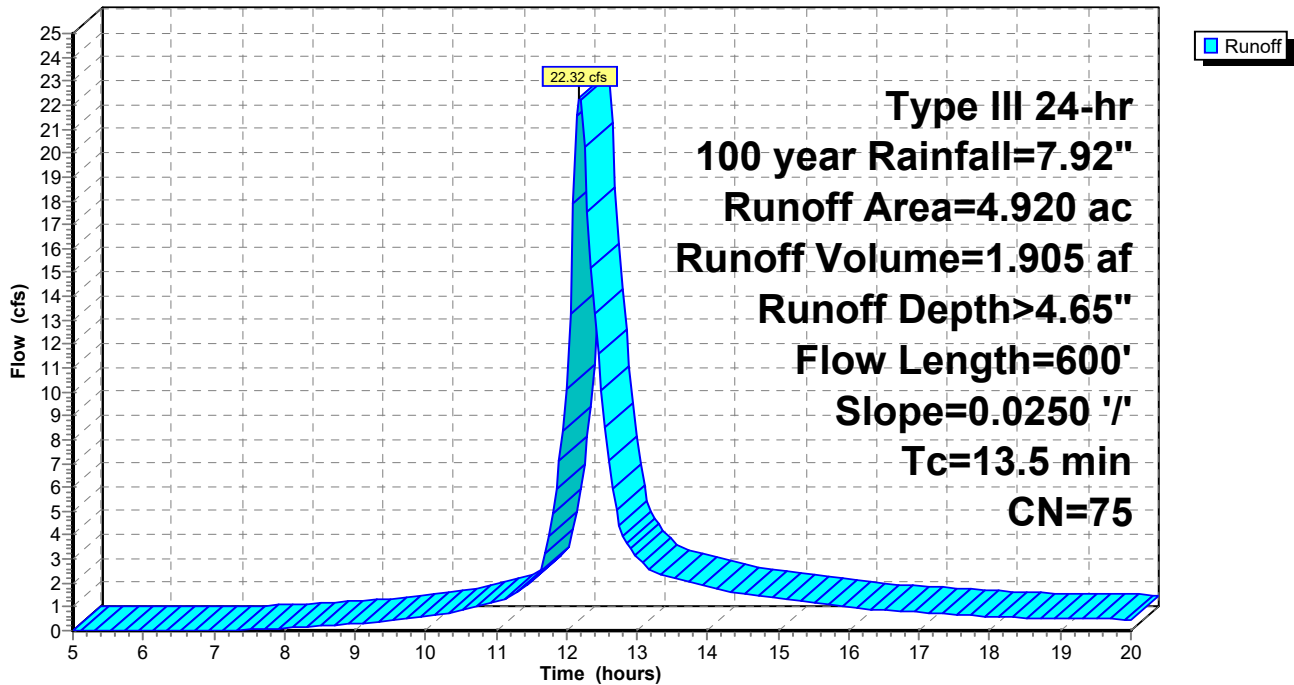
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 year Rainfall=7.92"

Area (ac)	CN	Description
* 4.800	74	50-75% Grass cover, Fair, HSG B-C
* 0.120	98	Farm roads
4.920	75	Weighted Average
4.800		97.56% Pervious Area
0.120		2.44% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.2	50	0.0250	0.16		Sheet Flow, Grass: Short n= 0.150 P2= 3.16"
8.3	550	0.0250	1.11		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
13.5	600	Total			

Subcatchment 1: Subcat 1

Hydrograph



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Type III 24-hr 100 year Rainfall=7.92"

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Summary for Subcatchment 2: Subcat 2

Runoff = 7.12 cfs @ 12.11 hrs, Volume= 0.509 af, Depth> 4.77"

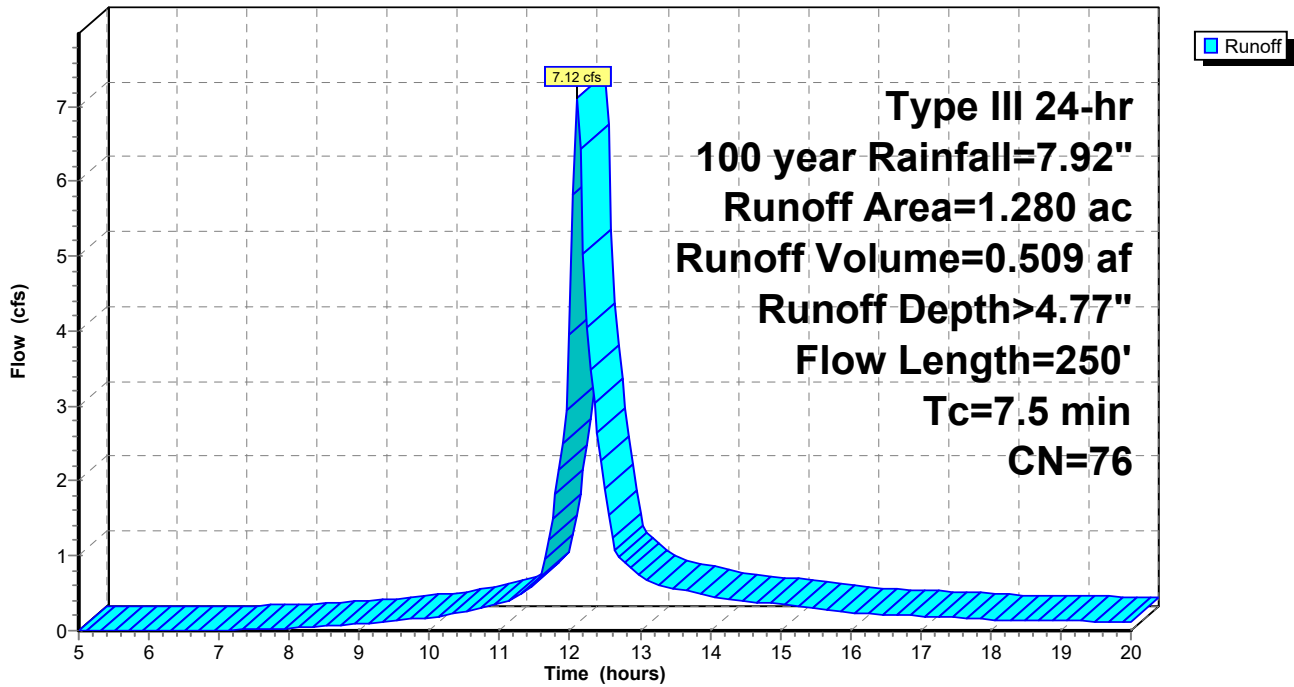
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 year Rainfall=7.92"

Area (ac)	CN	Description
* 1.010	74	50-75% Grass cover, Fair, HSG B-C
0.100	60	Woods, Fair, HSG B
* 0.100	98	Farm roads
* 0.070	98	Proposed gravel road
1.280	76	Weighted Average
1.110		86.72% Pervious Area
0.170		13.28% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.7	50	0.0200	0.15		Sheet Flow, Grass: Short n= 0.150 P2= 3.16"
1.8	200	0.0700	1.85		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
7.5	250	Total			

Subcatchment 2: Subcat 2

Hydrograph



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Type III 24-hr 100 year Rainfall=7.92"

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Summary for Subcatchment 3: Subcat 3

Runoff = 9.92 cfs @ 12.13 hrs, Volume= 0.753 af, Depth> 4.54"

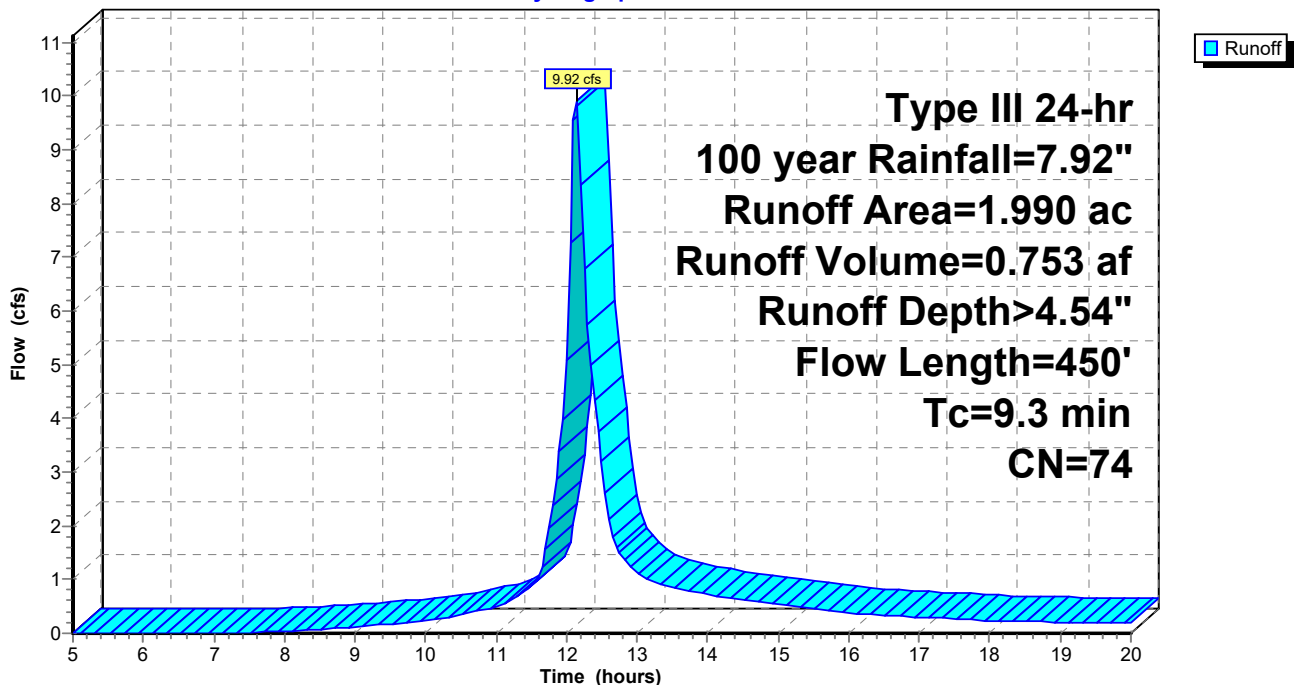
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 year Rainfall=7.92"

Area (ac)	CN	Description
* 1.800	74	50-75% Grass cover, Fair, HSG B-C
0.100	60	Woods, Fair, HSG B
* 0.090	98	Proposed gravel roads
1.990	74	Weighted Average
1.900		95.48% Pervious Area
0.090		4.52% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.7	50	0.0200	0.15		Sheet Flow, Grass: Short n= 0.150 P2= 3.16"
3.6	400	0.0700	1.85		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
9.3	450	Total			

Subcatchment 3: Subcat 3

Hydrograph



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Type III 24-hr 100 year Rainfall=7.92"

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Summary for Subcatchment 4: Subcat 4

Runoff = 61.59 cfs @ 12.48 hrs, Volume= 7.745 af, Depth> 4.61"

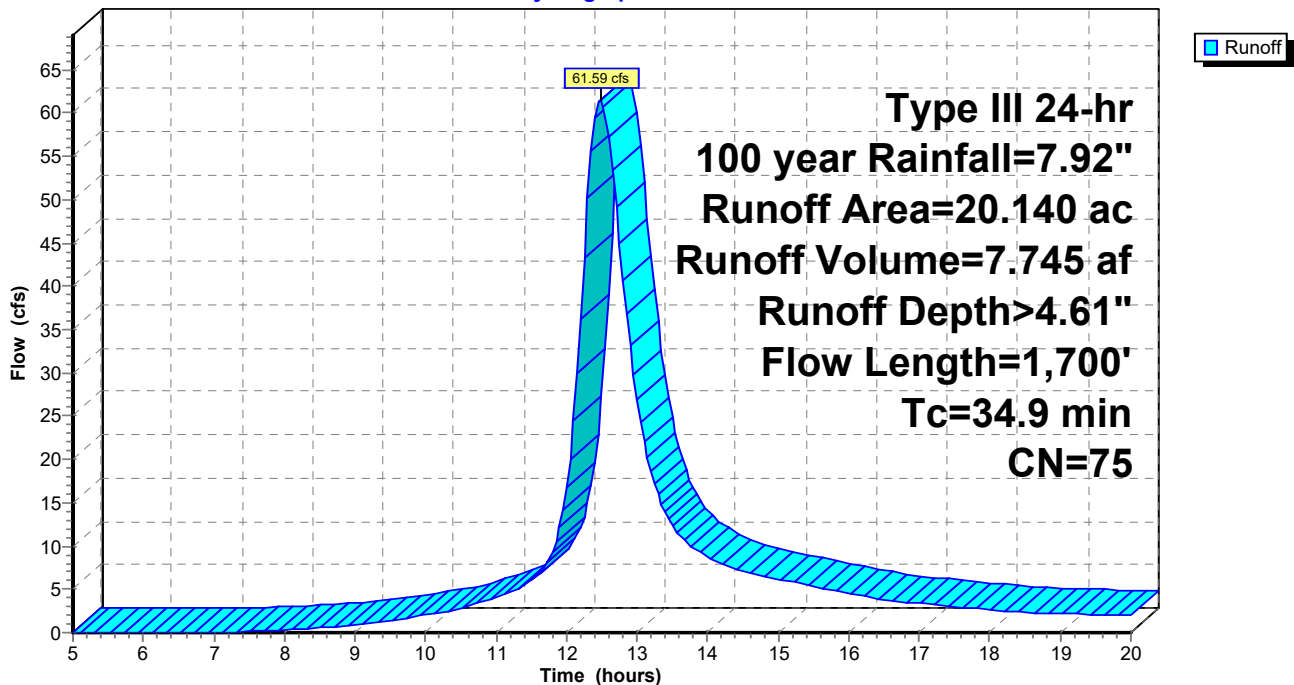
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 year Rainfall=7.92"

Area (ac)	CN	Description
* 18.530	74	50-75% Grass cover, Fair, HSG B-C
0.450	60	Woods, Fair, HSG B
* 0.990	98	Farm roads
* 0.170	98	Proposed gravel roads
20.140	75	Weighted Average
18.980		94.24% Pervious Area
1.160		5.76% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.7	50	0.0200	0.15		Sheet Flow, Grass: Short n= 0.150 P2= 3.16"
17.3	1,150	0.0250	1.11		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
11.9	500	0.0100	0.70		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
34.9	1,700	Total			

Subcatchment 4: Subcat 4

Hydrograph



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Type III 24-hr 100 year Rainfall=7.92"

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Summary for Subcatchment 5: Subcat 5

Runoff = 7.34 cfs @ 12.20 hrs, Volume= 0.630 af, Depth> 4.09"

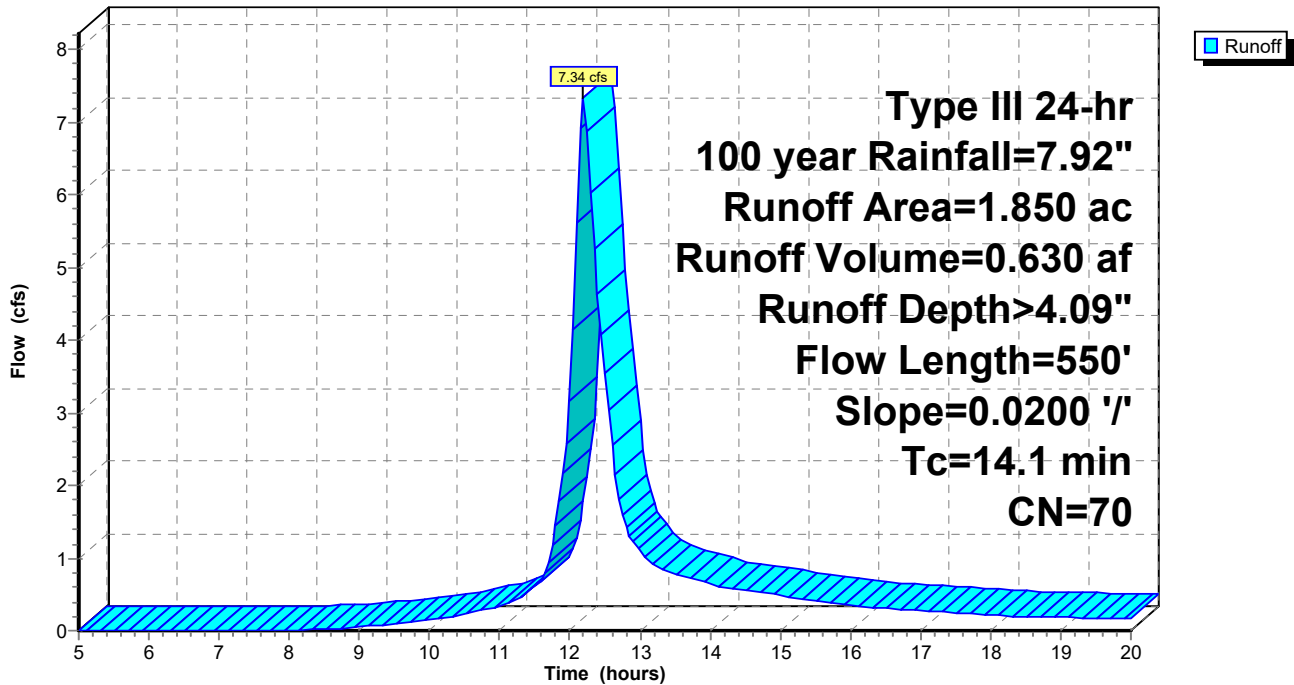
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 year Rainfall=7.92"

Area (ac)	CN	Description
1.800	69	50-75% Grass cover, Fair, HSG B
* 0.050	98	Farm roads
1.850	70	Weighted Average
1.800		97.30% Pervious Area
0.050		2.70% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.7	50	0.0200	0.15		Sheet Flow, Grass: Short n= 0.150 P2= 3.16"
8.4	500	0.0200	0.99		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
14.1	550	Total			

Subcatchment 5: Subcat 5

Hydrograph



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Type III 24-hr 100 year Rainfall=7.92"

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Summary for Pond 1P: (new Pond)

Inflow Area = 4.920 ac, 2.44% Impervious, Inflow Depth > 4.65" for 100 year event
 Inflow = 22.32 cfs @ 12.19 hrs, Volume= 1.905 af
 Outflow = 20.68 cfs @ 12.26 hrs, Volume= 1.447 af, Atten= 7%, Lag= 4.2 min
 Discarded = 0.41 cfs @ 12.26 hrs, Volume= 0.304 af
 Primary = 20.27 cfs @ 12.26 hrs, Volume= 1.144 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 197.53' @ 12.26 hrs Surf.Area= 8,316 sf Storage= 24,051 cf

Plug-Flow detention time= 94.0 min calculated for 1.447 af (76% of inflow)
 Center-of-Mass det. time= 35.5 min (822.5 - 787.0)

Volume	Invert	Avail.Storage	Storage Description
#1	193.00'	24,642 cf	15.00'W x 170.00'L x 4.60'H Prismatic Z=3.0

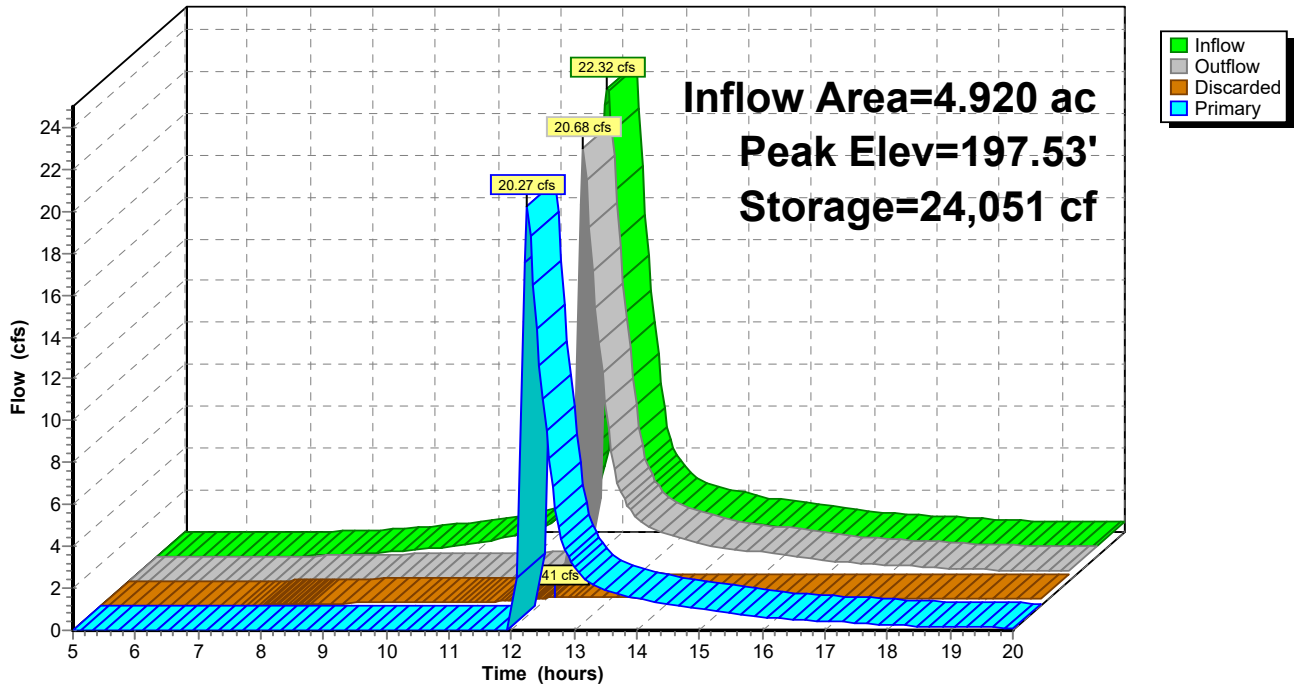
Device	Routing	Invert	Outlet Devices
#1	Primary	197.00'	20.0' long x 5.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88
#2	Discarded	193.00'	2.000 in/hr Exfiltration over Wetted area Conductivity to Groundwater Elevation = 10.00'

Discarded OutFlow Max=0.41 cfs @ 12.26 hrs HW=197.53' (Free Discharge)
 ↑2=Exfiltration (Controls 0.41 cfs)

Primary OutFlow Max=20.00 cfs @ 12.26 hrs HW=197.53' (Free Discharge)
 ↑1=Broad-Crested Rectangular Weir (Weir Controls 20.00 cfs @ 1.90 fps)

Pond 1P: (new Pond)

Hydrograph



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Type III 24-hr 100 year Rainfall=7.92"

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Summary for Pond 2P: (new Pond)

Inflow Area = 1.280 ac, 13.28% Impervious, Inflow Depth > 4.77" for 100 year event
 Inflow = 7.12 cfs @ 12.11 hrs, Volume= 0.509 af
 Outflow = 6.83 cfs @ 12.14 hrs, Volume= 0.433 af, Atten= 4%, Lag= 1.7 min
 Primary = 6.83 cfs @ 12.14 hrs, Volume= 0.433 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 212.48' @ 12.14 hrs Surf.Area= 2,004 sf Storage= 4,146 cf

Plug-Flow detention time= 70.9 min calculated for 0.433 af (85% of inflow)
 Center-of-Mass det. time= 27.6 min (808.0 - 780.4)

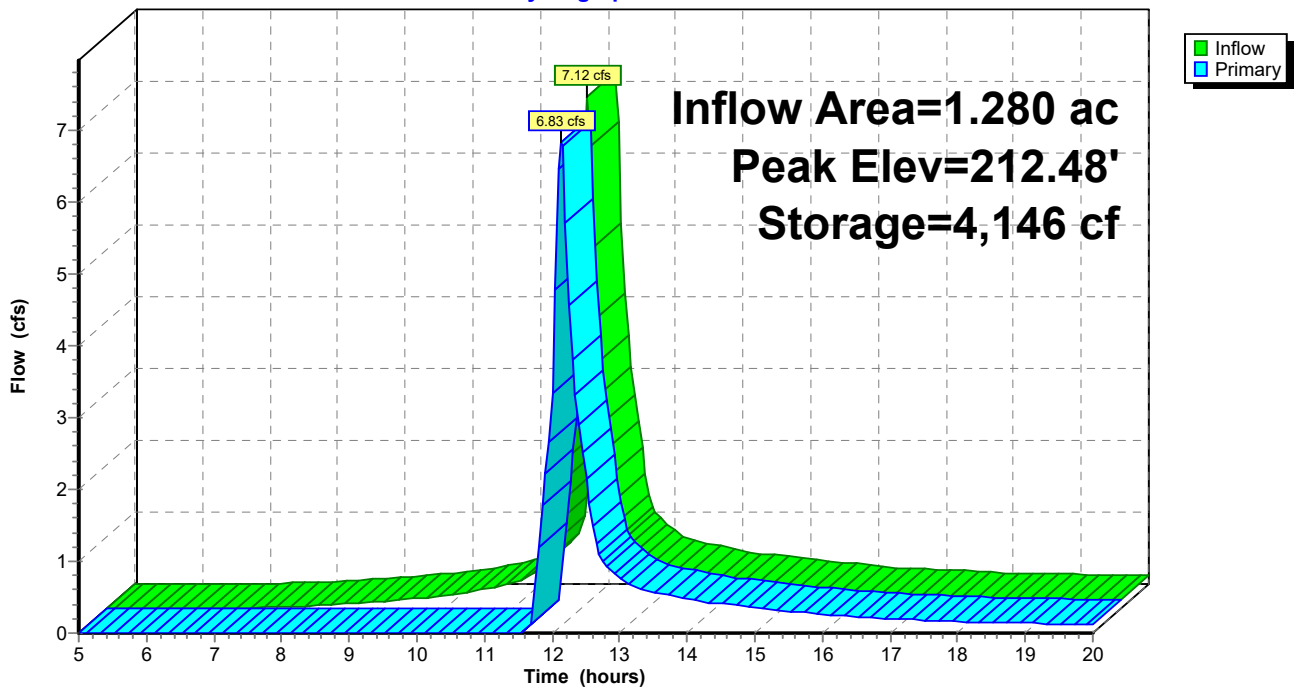
Volume	Invert	Avail.Storage	Storage Description
#1	209.00'	6,494 cf	15.00'W x 35.00'L x 4.50'H Prismatic Z=3.0

Device	Routing	Invert	Outlet Devices
#1	Primary	212.00'	8.0' long x 5.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=6.69 cfs @ 12.14 hrs HW=212.47' (Free Discharge)
 ←1=Broad-Crested Rectangular Weir (Weir Controls 6.69 cfs @ 1.77 fps)

Pond 2P: (new Pond)

Hydrograph



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Type III 24-hr 100 year Rainfall=7.92"

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Summary for Pond 3P: (new Pond)

Inflow Area = 1.990 ac, 4.52% Impervious, Inflow Depth > 4.54" for 100 year event
 Inflow = 9.92 cfs @ 12.13 hrs, Volume= 0.753 af
 Outflow = 9.73 cfs @ 12.16 hrs, Volume= 0.605 af, Atten= 2%, Lag= 1.6 min
 Primary = 9.73 cfs @ 12.16 hrs, Volume= 0.605 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 211.46' @ 12.16 hrs Surf.Area= 3,000 sf Storage= 7,668 cf

Plug-Flow detention time= 83.1 min calculated for 0.603 af (80% of inflow)
 Center-of-Mass det. time= 32.1 min (817.6 - 785.5)

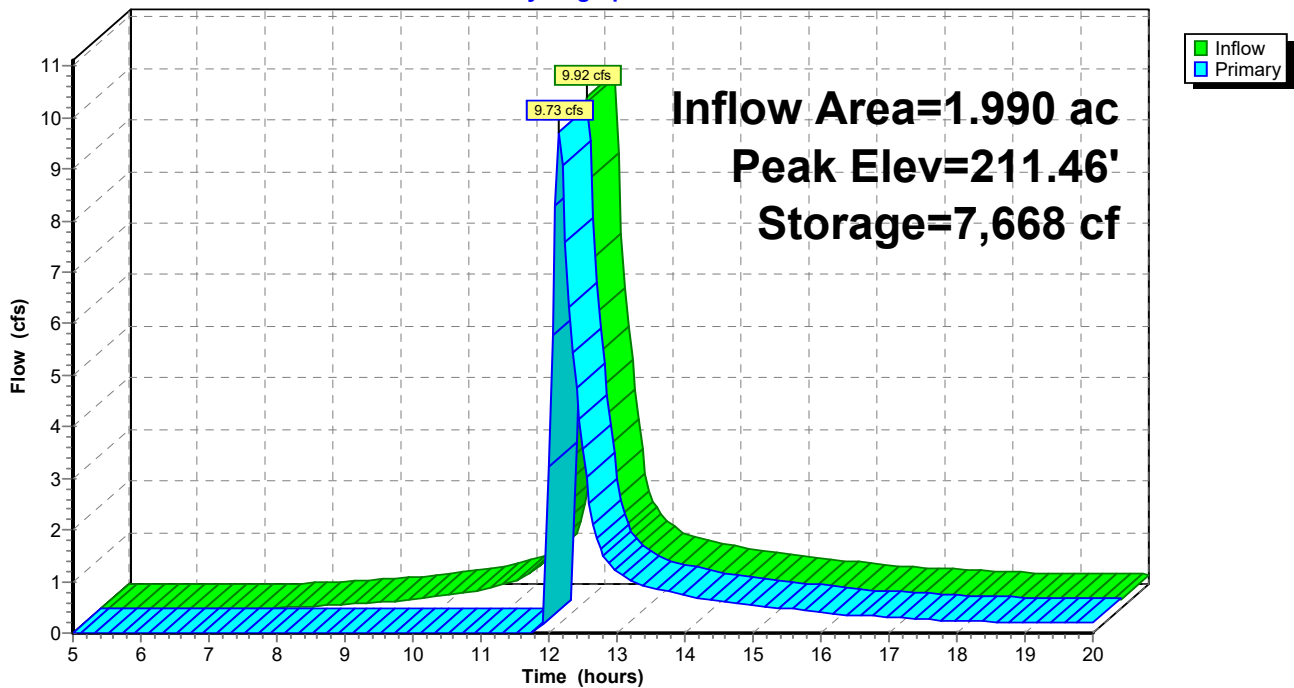
Volume	Invert	Avail.Storage	Storage Description
#1	207.00'	8,714 cf	15.00'W x 45.00'L x 4.80'H Prismatic Z=3.0

Device	Routing	Invert	Outlet Devices
#1	Primary	211.00'	12.0' long x 5.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=9.57 cfs @ 12.16 hrs HW=211.46' (Free Discharge)
 ←1=Broad-Crested Rectangular Weir (Weir Controls 9.57 cfs @ 1.74 fps)

Pond 3P: (new Pond)

Hydrograph



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Type III 24-hr 100 year Rainfall=7.92"

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Summary for Pond 4P: (new Pond)

Inflow Area = 20.140 ac, 5.76% Impervious, Inflow Depth > 4.61" for 100 year event
 Inflow = 61.59 cfs @ 12.48 hrs, Volume= 7.745 af
 Outflow = 36.23 cfs @ 12.86 hrs, Volume= 4.750 af, Atten= 41%, Lag= 23.0 min
 Primary = 36.23 cfs @ 12.86 hrs, Volume= 4.750 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 218.89' @ 12.86 hrs Surf.Area= 36,068 sf Storage= 156,739 cf

Plug-Flow detention time= 141.7 min calculated for 4.750 af (61% of inflow)
 Center-of-Mass det. time= 70.1 min (874.2 - 804.0)

Volume	Invert	Avail.Storage	Storage Description
#1	213.50'	160,589 cf	70.00'W x 320.00'L x 5.50'H Prismatic Z=3.0

Device	Routing	Invert	Outlet Devices
#1	Primary	218.00'	16.0' long x 5.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=36.12 cfs @ 12.86 hrs HW=218.89' (Free Discharge)
 ←1=Broad-Crested Rectangular Weir (Weir Controls 36.12 cfs @ 2.53 fps)

Pond 4P: (new Pond)

Hydrograph

