May
Engineering, LLC
Civil Engineering, Site Planning, and Consulting
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DRAINAGE REPORT

December 20, 2024

Property Located at:

LAKE SHORE POINT
HERITAGE RD
EAST LYME, CT

Prepared For:

PORTSIDE HOLDINGS, INC &
ENGLISH HARBOR CAPITAL PARTNERS, LLC
TENANTS IN COMMON

38 Granite Street
New London, CT 06320

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The stormwater management report is developed in support of a proposed plan for a three-lot subdivision located at Heritage Road, East Lyme, CT. The proposed development is submitted for plan review and approval. The 2023 Connecticut Stormwater Quality Manual standards have been considered and evaluated for a plan review to demonstrate that stormwater design and devices can be effectively implemented to achieve Water Quality Volumes and Required Retention Volumes.

SITE DESCRIPTION:

The site is a 4.27-acre parcel located on the northern end of Heritage Rd and along the southwest shoreline of Pattagansett Lake in the Town of East Lyme, CT. The existing parcel is an undeveloped wooded parcel that has mature deciduous trees and several small grassed areas. The parcel has average slopes ranging from 5% to 14%. There is an existing gravel driveway that provides access to the proposed three lots. The soil type is primarily a hydraulic soil group B consisting of *HINCKLEY - GRAVELLY LOAM*, *CHARLTON-CHATFIELD* and *HAVEN AND ENDFIELD* gravelly sandy loam. The soil types were evaluated for their permeability and have a moderate-to-high infiltration rate, referencing the USDA Natural Resource Conservation Service Soil Survey for this parcel.

The existing parcel contains no Directly Connected Impervious Areas (DCIA) that convey stormwater. All stormwater flows from the western side to the northeastern side of the parcel and then into Pattagansett Lake. The existing gravel driveway directs flows from the western side of the parcel, traveling northeast towards the property line. The existing gravel drive has a ditch on each side that facilitates stormwater channelization and infiltration. Existing conditions were verified after several large rainfalls in the spring and summer of 2024. After these rainfall events, onsite inspection noted very little soil migration of fines, or acute channelization that resulted in little evidence of soil erosion. This further demonstrates that the onsite soil has a high infiltration capacity and the soil conditions at the site are stable.

The proposed three-lot subdivision design will have approximately 0.56 ac of disturbance for the 4.27-ac parcel. The drainage area for the 4.27-ac parcel is contained in a 13.65-ac sub-catchment drainage area. HydroCad Stormwater modeling software using Soil Conservation Service (SCS/NRCS) methods was used to develop existing/undeveloped stormwater conditions, which were then compared to proposed/developed conditions. Water quality volumes (WQV), Required Retention volumes (RRV), Water Quality Flows (WQF) and pollutant reduction BMPs are evaluated and accomplished by the implementation of stormwater infiltration and retention devices to achieve the required 90% reduction in total suspended solids (TSS) and pollutant reduction. Stormwater from roof drains will be discharged to rain gardens designed to infiltrate storm water to reduce WQV and WQF. Permeable Interlocking Concrete Pavers (PICP) are incorporated in the driveway design to provide stormwater infiltration, storage and treatment to attenuate stormwater volumes and provide pollution reduction. Stormwater estimates have been modeled and estimated to ensure sufficient reduction of stormwater WQV.

DESIGN METHODOLOGY AND EVALUATION

The existing 4.27-ac site as proposed, consists of three parcels (*Lot #1- 1.19 ac; Lot #2-1.29 ac & Lot #3-1.79 ac*) of proposed developed areas which contains 9,300 sf (0.21 ac) permeable driveway and 6,810 sf (0.15 ac) of roof impervious areas, and 60,263 sf (1.4 ac) of grassed lawn area. The remaining 116,566 sf (2.67 ac) is undisturbed woodlands.

Storm water discharges from roofs are diverted to rain gardens sized to accommodate 730 cf (0.0167 ac-ft) of WQV removal. PICP as designed provide 22,000 gal (2940 cf) storage/ infiltration, combined with the rain garden volume for a total of 27,460 gal (3673 cf) or 0.084 acre-ft of WQV treatment / infiltration of stormwater. This stormwater treatment design methodology is in excess of the Required Retention Volume (RRV) for the

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site, which is calculated to be 0.069 acre-ft or 3005 cf (22,478 gal).

The Permeable Interlocking Concrete Pavers (PICP) provide Stormwater BMPs, specifically stormwater infiltration that is designed to retain stormwater and provide treatment and peak runoff attenuation. PICP provide dual functions, including retention (volume reduction), groundwater recharge, treatment, and stormwater quantity control.

PICP provide pollutant removal of:

- Sediments - High (includes sediment-bound pollutants)
- Phosphorus - Moderate
- Nitrogen - Moderate
- Bacteria - High

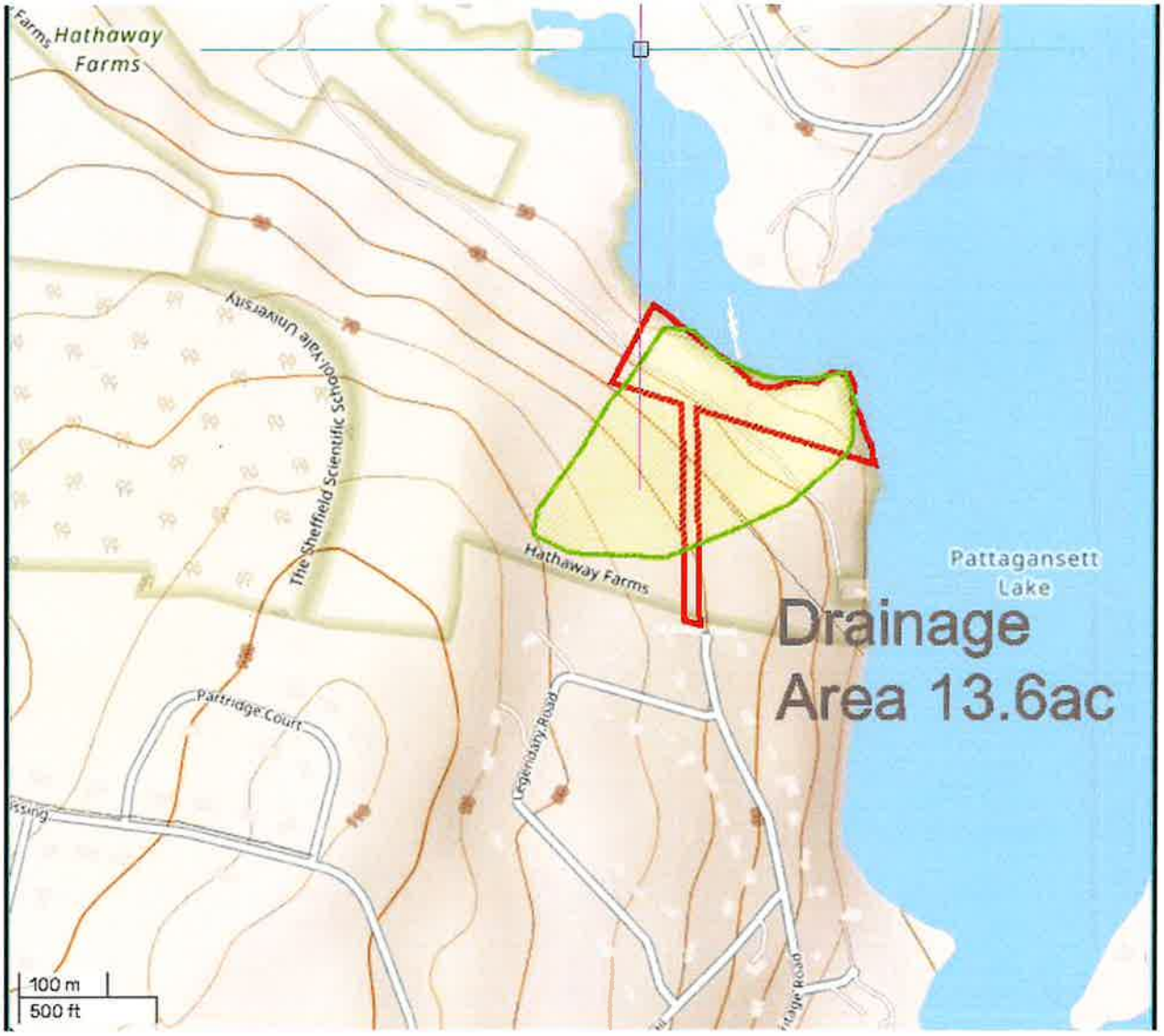
SUMMARIZED RESULTS FROM HYDROCAD FOR STORM EVENTS

Stormwater Runoff Amounts (cfs)

	2 year	10 year	25 year	50 year	100 year
Existing	3.5	10.25	15.54	19.34	24.69
Proposed	2.87	8.82	13.56	16.99	21.82
Change (cfs)	***0.63***	***1.43***	***1.98***	***2.35***	***2.87***
% reduction	**18%**	**13.9%**	**12.7%**	**12.2%**	**11.6%**

SUMMARY

The proposed subdivision plan as designed has incorporated stormwater BMPs and reduction practices to mitigate stormwater impacts. Water Quality Volumes and Required Retention Volumes are achieved and implemented with standard design practices that are within parameters of the existing site conditions using standard stormwater designs- Best Management Practices (2023 CT Stormwater Design Manual). The proposed Heritage Rd. Subdivision – Lake Shore Point has an overall stormwater reduction of 14% in peak runoff attenuation and exceed WQV requirements.


Hathaway Farms
Hathaway Farms
The Sheffield Scientific School Yale University
Hathaway Farms
Pattagansett Lake
Drainage Area 13.6ac
Partridge Court
Legendary Road
100 m
500 ft

Undeveloped

Subcat Reach Pond Link

Routing Diagram for Heritage Rd Subdivision Existing
Prepared by May Engineering, LLC, Printed 12/9/2024

Rainfall Events Listing (selected events)

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	3.40	2
2	10 year	Type III 24-hr		Default	24.00	1	4.80	2
3	25 year	Type III 24-hr		Default	24.00	1	5.70	2
4	50 year	Type III 24-hr		Default	24.00	1	6.30	2
5	100 year	Type III 24-hr		Default	24.00	1	7.10	2

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.330	85	Gravel roads, HSG B (2S)
13.320	60	Woods, Fair, HSG B (2S)
13.650	**61**	**TOTAL AREA**

Summary for Subcatchment 2S: Undeveloped

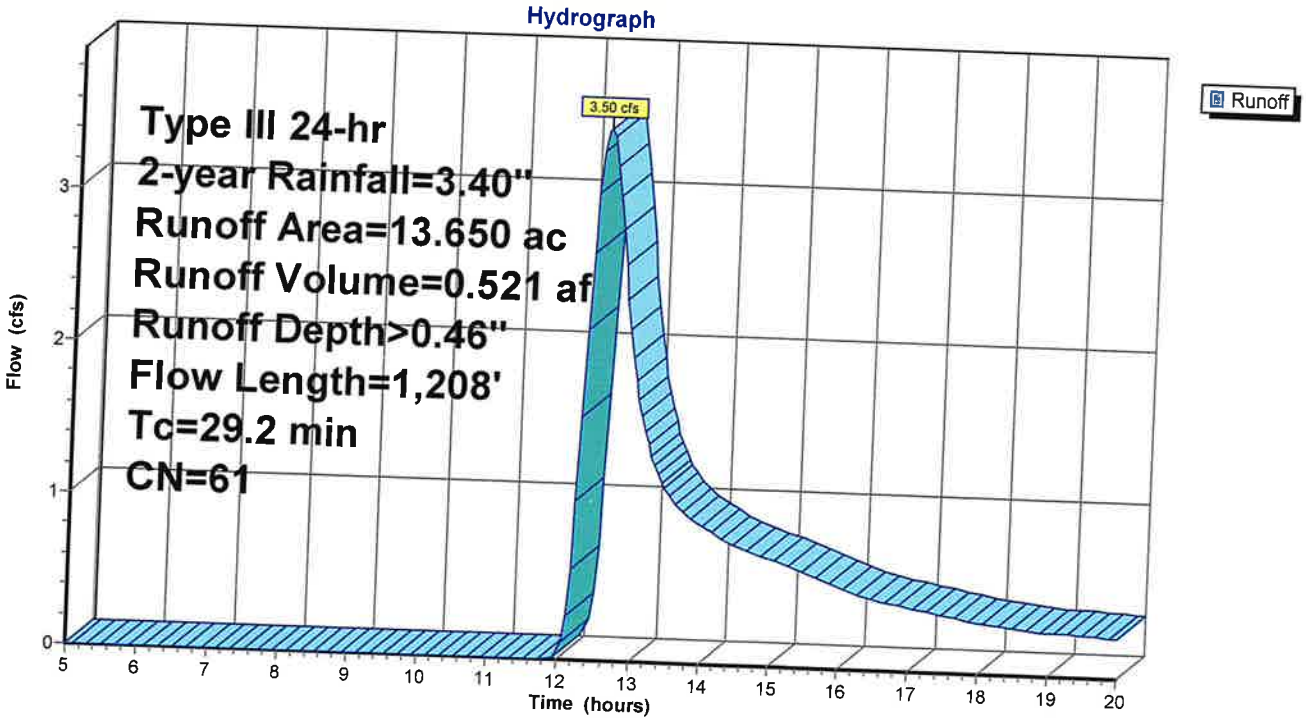
Runoff = 3.50 cfs @ 12.53 hrs, Volume= 0.521 af, Depth> 0.46"
Routed to nonexistent node 3P

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=3.40"

Area (ac)	CN	Description
* 13.320	60	Woods, Fair, HSG B
0.330	85	Gravel roads, HSG B
13.650	61	Weighted Average
13.650		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.3	40	0.0400	0.05		**Sheet Flow, sheet flow** Woods: Dense underbrush n= 0.800 P2= 3.35"
13.5	968	0.0570	1.19		**Shallow Concentrated Flow, shallow 1st leg 7%** Woodland Kv= 5.0 fps
2.4	200	0.0800	1.41		**Shallow Concentrated Flow, 2nd leg** Woodland Kv= 5.0 fps
29.2	1,208	Total			

Subcatchment 2S: Undeveloped



Summary for Subcatchment 2S: Undeveloped

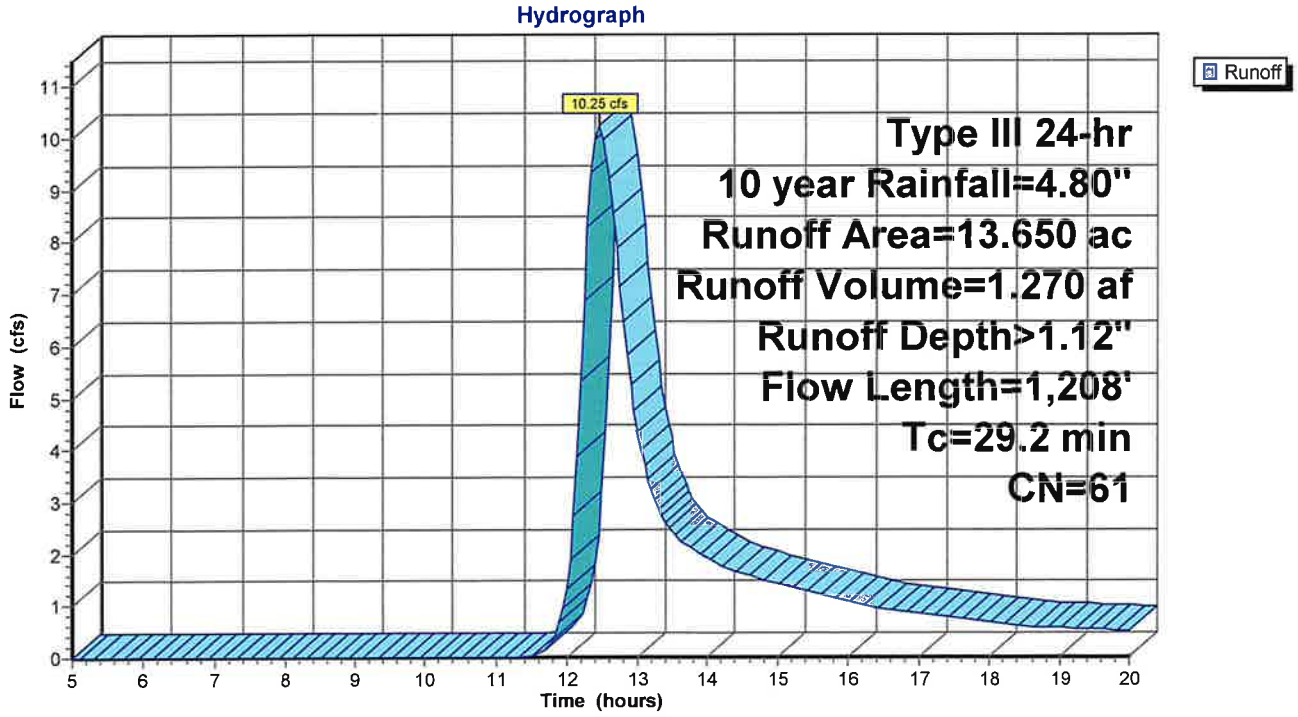
Runoff = 10.25 cfs @ 12.46 hrs, Volume= 1.270 af, Depth> 1.12"
Routed to nonexistent node 3P

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 10 year Rainfall=4.80"

	Area (ac)	CN	Description
*	13.320	60	Woods, Fair, HSG B
	0.330	85	Gravel roads, HSG B
	13.650	61	Weighted Average
	13.650		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.3	40	0.0400	0.05		**Sheet Flow, sheet flow** Woods: Dense underbrush n= 0.800 P2= 3.35"
13.5	968	0.0570	1.19		**Shallow Concentrated Flow, shallow 1st leg 7%** Woodland Kv= 5.0 fps
2.4	200	0.0800	1.41		**Shallow Concentrated Flow, 2nd leg** Woodland Kv= 5.0 fps
29.2	1,208	Total			

Subcatchment 2S: Undeveloped



Summary for Subcatchment 2S: Undeveloped

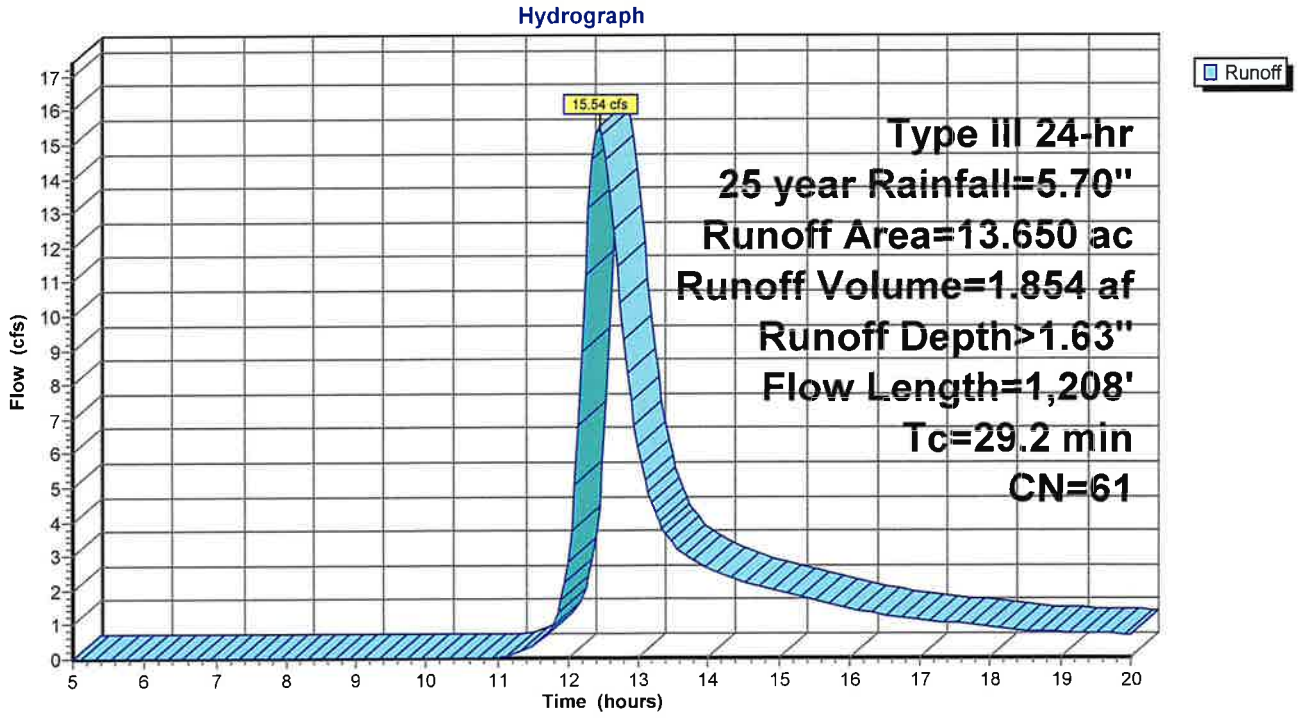
Runoff = 15.54 cfs @ 12.45 hrs, Volume= 1.854 af, Depth> 1.63"
Routed to nonexistent node 3P

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=5.70"

	Area (ac)	CN	Description
*	13.320	60	Woods, Fair, HSG B
	0.330	85	Gravel roads, HSG B
	13.650	61	Weighted Average
	13.650		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.3	40	0.0400	0.05		**Sheet Flow, sheet flow** Woods: Dense underbrush n= 0.800 P2= 3.35"
13.5	968	0.0570	1.19		**Shallow Concentrated Flow, shallow 1st leg 7%** Woodland Kv= 5.0 fps
2.4	200	0.0800	1.41		**Shallow Concentrated Flow, 2nd leg** Woodland Kv= 5.0 fps
29.2	1,208	Total			

Subcatchment 2S: Undeveloped



Summary for Subcatchment 2S: Undeveloped

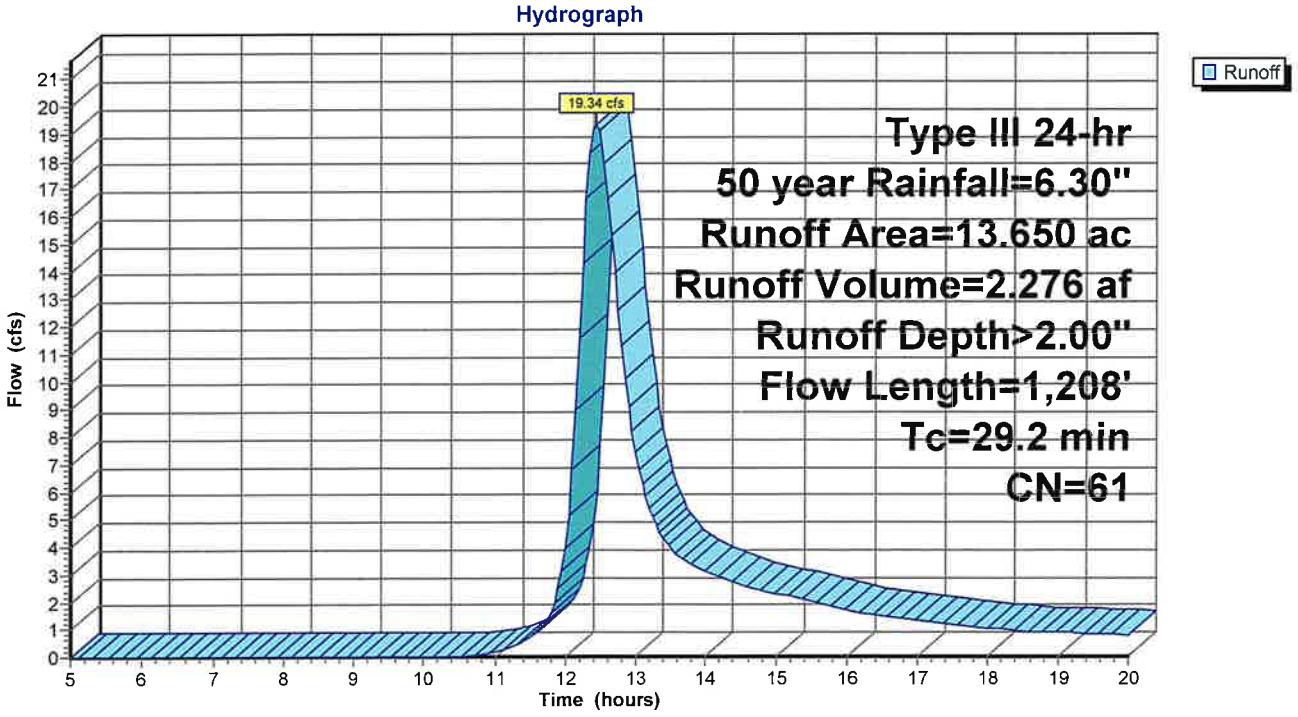
Runoff = 19.34 cfs @ 12.44 hrs, Volume= 2.276 af, Depth> 2.00"
Routed to nonexistent node 3P

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=6.30"

	Area (ac)	CN	Description
*	13.320	60	Woods, Fair, HSG B
	0.330	85	Gravel roads, HSG B
	13.650	61	Weighted Average
	13.650		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.3	40	0.0400	0.05		**Sheet Flow, sheet flow** Woods: Dense underbrush n= 0.800 P2= 3.35"
13.5	968	0.0570	1.19		**Shallow Concentrated Flow, shallow 1st leg 7%** Woodland Kv= 5.0 fps
2.4	200	0.0800	1.41		**Shallow Concentrated Flow, 2nd leg** Woodland Kv= 5.0 fps
29.2	1,208	Total			

Subcatchment 2S: Undeveloped



Summary for Subcatchment 2S: Undeveloped

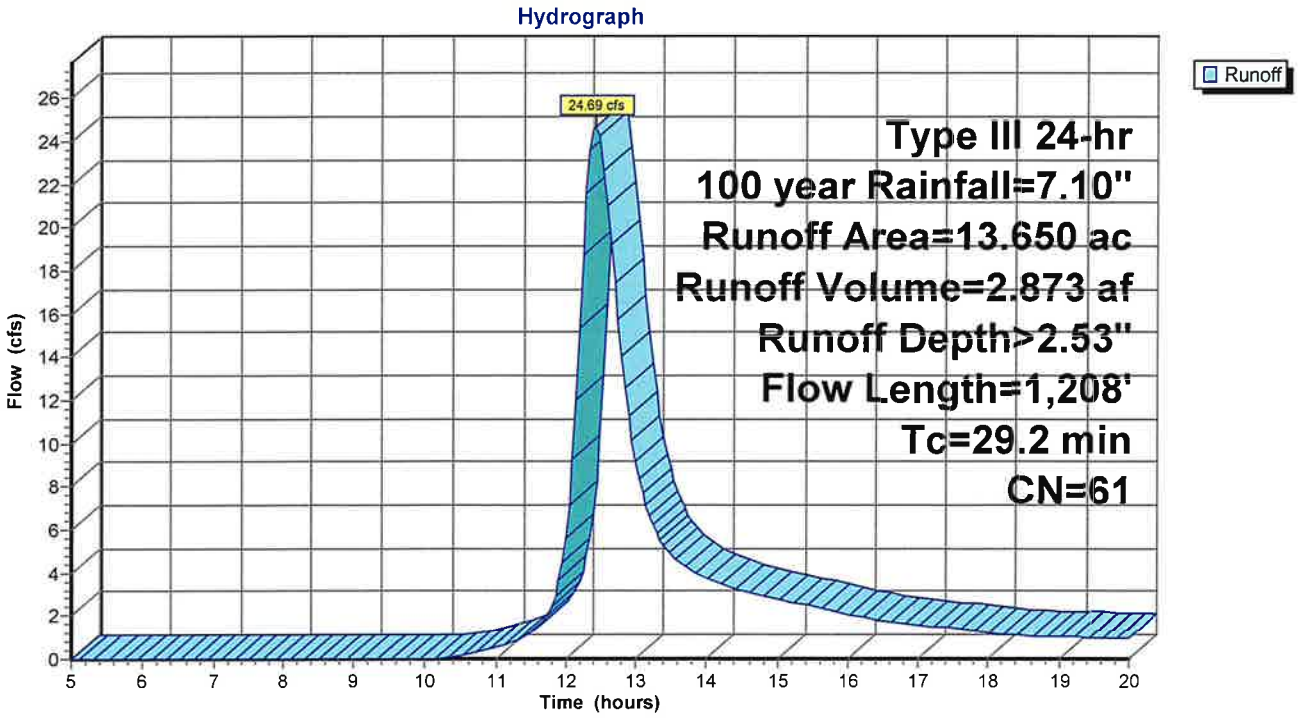
Runoff = 24.69 cfs @ 12.43 hrs, Volume= 2.873 af, Depth> 2.53"
Routed to nonexistent node 3P

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=7.10"

	Area (ac)	CN	Description
*	13.320	60	Woods, Fair, HSG B
	0.330	85	Gravel roads, HSG B
	13.650	61	Weighted Average
	13.650		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.3	40	0.0400	0.05		**Sheet Flow, sheet flow** Woods: Dense underbrush n= 0.800 P2= 3.35"
13.5	968	0.0570	1.19		**Shallow Concentrated Flow, shallow 1st leg 7%** Woodland Kv= 5.0 fps
2.4	200	0.0800	1.41		**Shallow Concentrated Flow, 2nd leg** Woodland Kv= 5.0 fps
29.2	1,208	Total			

Subcatchment 2S: Undeveloped



Developed

Subcat Reach Pond Link

Routing Diagram for Heritage Rd Subdivision Proposed
Prepared by May Engineering, LLC, Printed 12/20/2024

Rainfall Events Listing (selected events)

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	3.40	2
2	10 year	Type III 24-hr		Default	24.00	1	4.80	2
3	25 year	Type III 24-hr		Default	24.00	1	5.70	2
4	50 year	Type III 24-hr		Default	24.00	1	6.30	2
5	100 year	Type III 24-hr		Default	24.00	1	7.10	2

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.720	52	>75% Grass cover, Good, HSG B (3S)
0.330	82	Dirt roads, HSG B (3S)
0.180	32	Permeable Paved parking, HSG B (3S)
12.420	60	Woods, Good, HSG B (3S)
13.650	**60**	**TOTAL AREA**

Summary for Subcatchment 3S: Developed

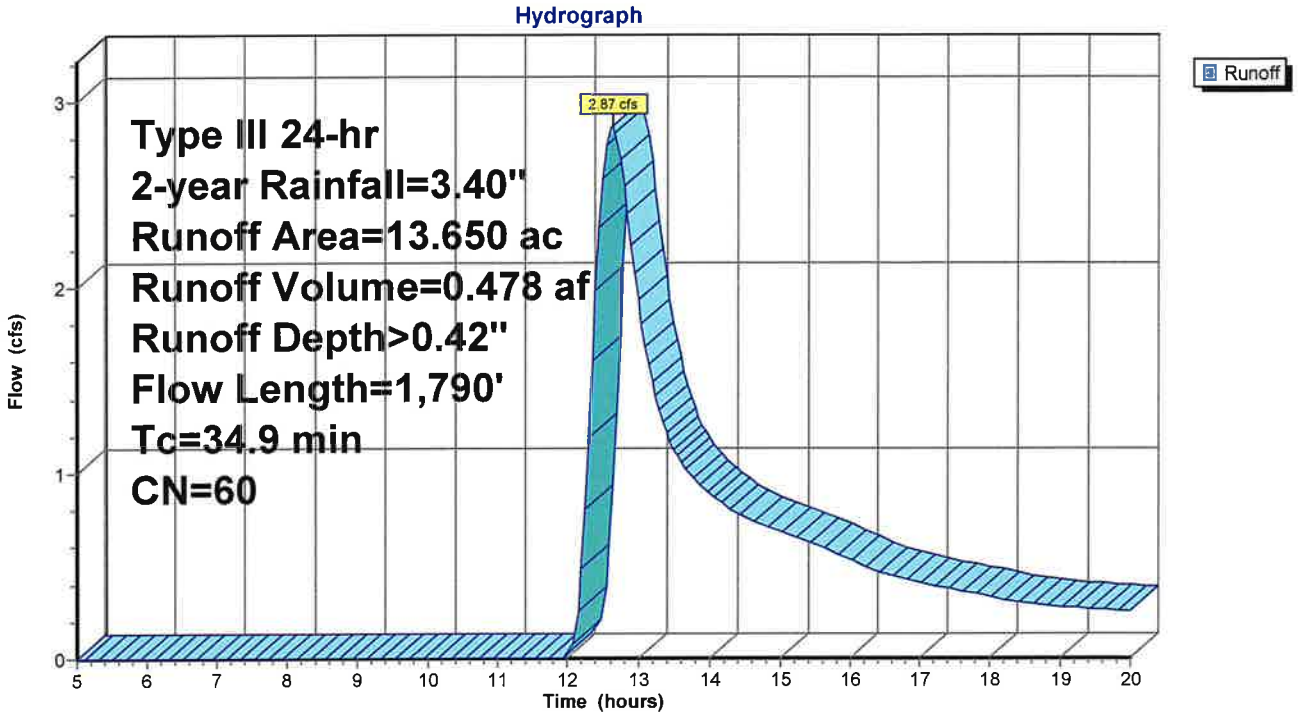
Runoff = 2.87 cfs @ 12.63 hrs, Volume= 0.478 af, Depth> 0.42"
Routed to nonexistent node 8P

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=3.40"

	Area (ac)	CN	Description
*	12.420	60	Woods, Good, HSG B
*	0.180	32	Permeable Paved parking, HSG B
*	0.720	52	>75% Grass cover, Good, HSG B
	0.330	82	Dirt roads, HSG B
	13.650	60	Weighted Average
	13.650		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.3	40	0.0400	0.05		**Sheet Flow, sheet flow** Woods: Dense underbrush n= 0.800 P2= 3.35"
15.2	1,100	0.0580	1.20		**Shallow Concentrated Flow, shallow 1st leg 7%** Woodland Kv= 5.0 fps
4.6	350	0.0650	1.27		**Shallow Concentrated Flow, 2nd leg** Woodland Kv= 5.0 fps
1.8	300		2.84		**Lake or Reservoir, Permeabile Paver 40% voild** Mean Depth= 0.25'
34.9	1,790	Total			

Subcatchment 3S: Developed



Summary for Subcatchment 3S: Developed

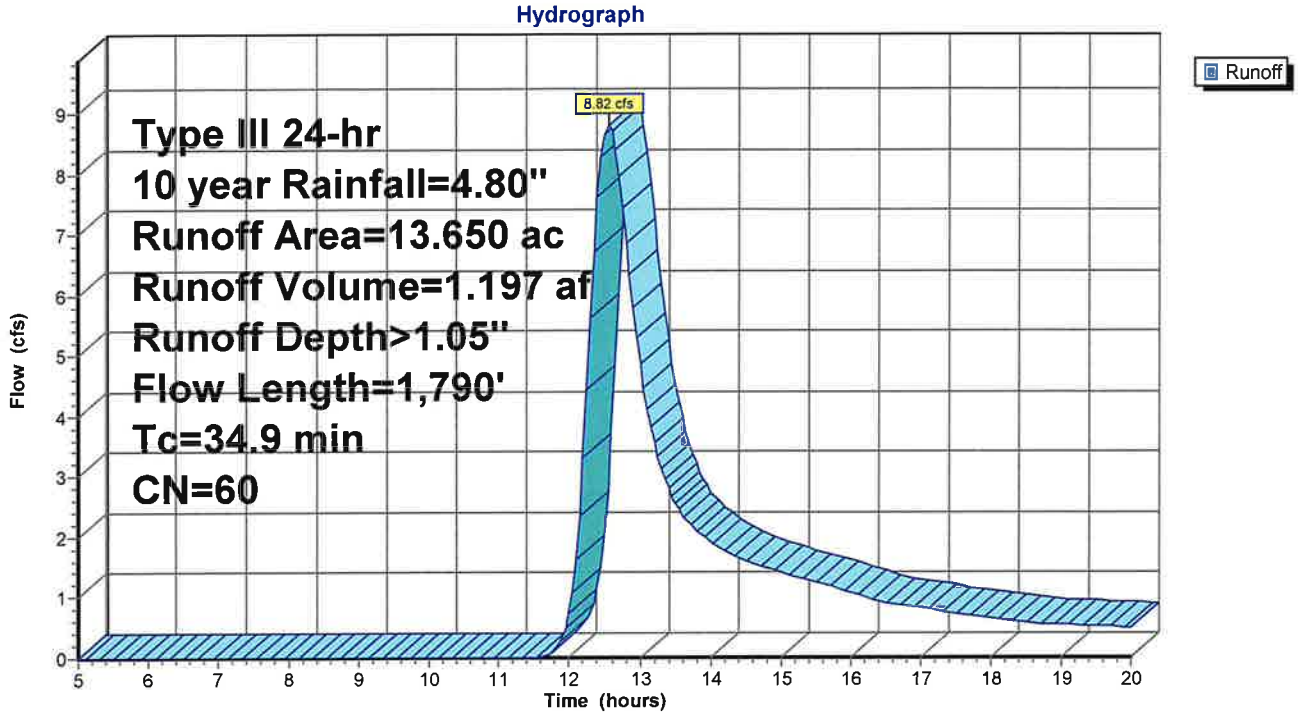
Runoff = 8.82 cfs @ 12.55 hrs, Volume= 1.197 af, Depth> 1.05"
Routed to nonexistent node 8P

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 10 year Rainfall=4.80"

	Area (ac)	CN	Description
*	12.420	60	Woods, Good, HSG B
*	0.180	32	Permeable Paved parking, HSG B
*	0.720	52	>75% Grass cover, Good, HSG B
	0.330	82	Dirt roads, HSG B
	13.650	60	Weighted Average
	13.650		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.3	40	0.0400	0.05		**Sheet Flow, sheet flow** Woods: Dense underbrush n= 0.800 P2= 3.35"
15.2	1,100	0.0580	1.20		**Shallow Concentrated Flow, shallow 1st leg 7%** Woodland Kv= 5.0 fps
4.6	350	0.0650	1.27		**Shallow Concentrated Flow, 2nd leg** Woodland Kv= 5.0 fps
1.8	300		2.84		**Lake or Reservoir, Permeabile Paver 40% voild** Mean Depth= 0.25'
34.9	1,790	Total			

Subcatchment 3S: Developed



Summary for Subcatchment 3S: Developed

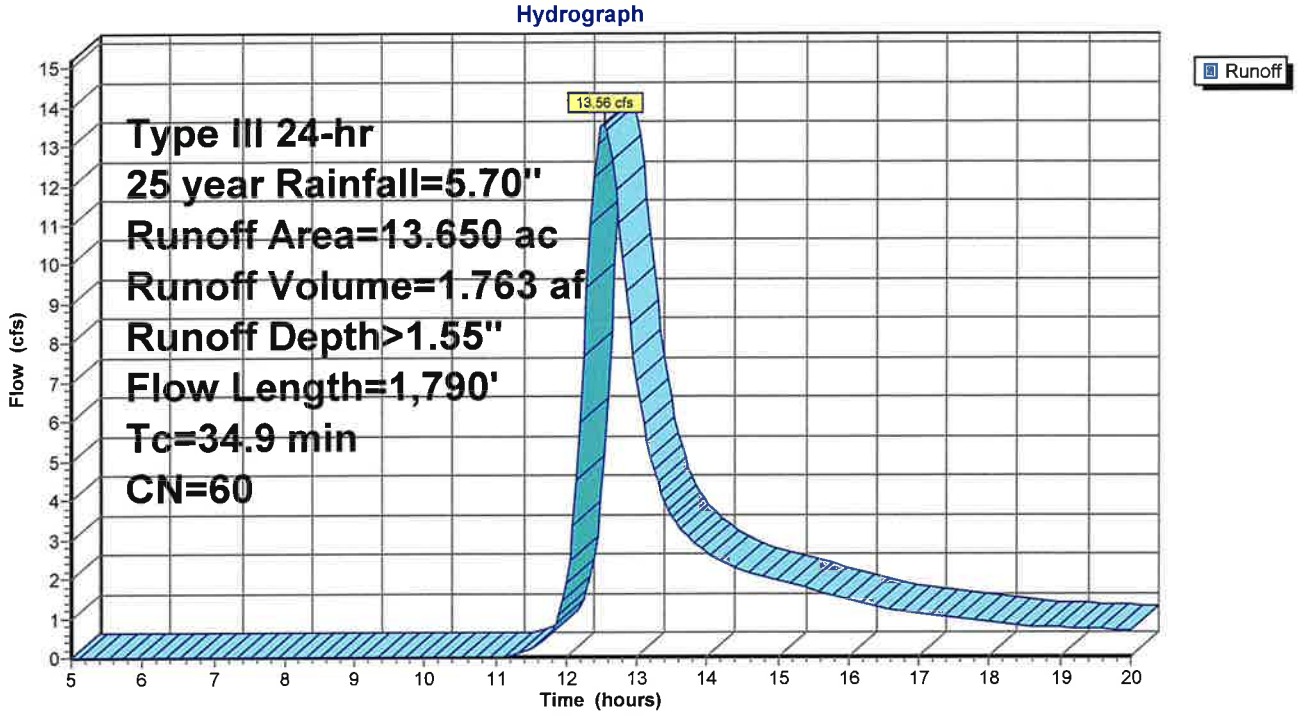
Runoff = 13.56 cfs @ 12.53 hrs, Volume= 1.763 af, Depth> 1.55"
Routed to nonexistent node 8P

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=5.70"

	Area (ac)	CN	Description
*	12.420	60	Woods, Good, HSG B
*	0.180	32	Permeable Paved parking, HSG B
*	0.720	52	>75% Grass cover, Good, HSG B
	0.330	82	Dirt roads, HSG B
	13.650	60	Weighted Average
	13.650		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.3	40	0.0400	0.05		**Sheet Flow, sheet flow** Woods: Dense underbrush n= 0.800 P2= 3.35"
15.2	1,100	0.0580	1.20		**Shallow Concentrated Flow, shallow 1st leg 7%** Woodland Kv= 5.0 fps
4.6	350	0.0650	1.27		**Shallow Concentrated Flow, 2nd leg** Woodland Kv= 5.0 fps
1.8	300		2.84		**Lake or Reservoir, Permeabile Paver 40% voild** Mean Depth= 0.25'
34.9	1,790	Total			

Subcatchment 3S: Developed



Summary for Subcatchment 3S: Developed

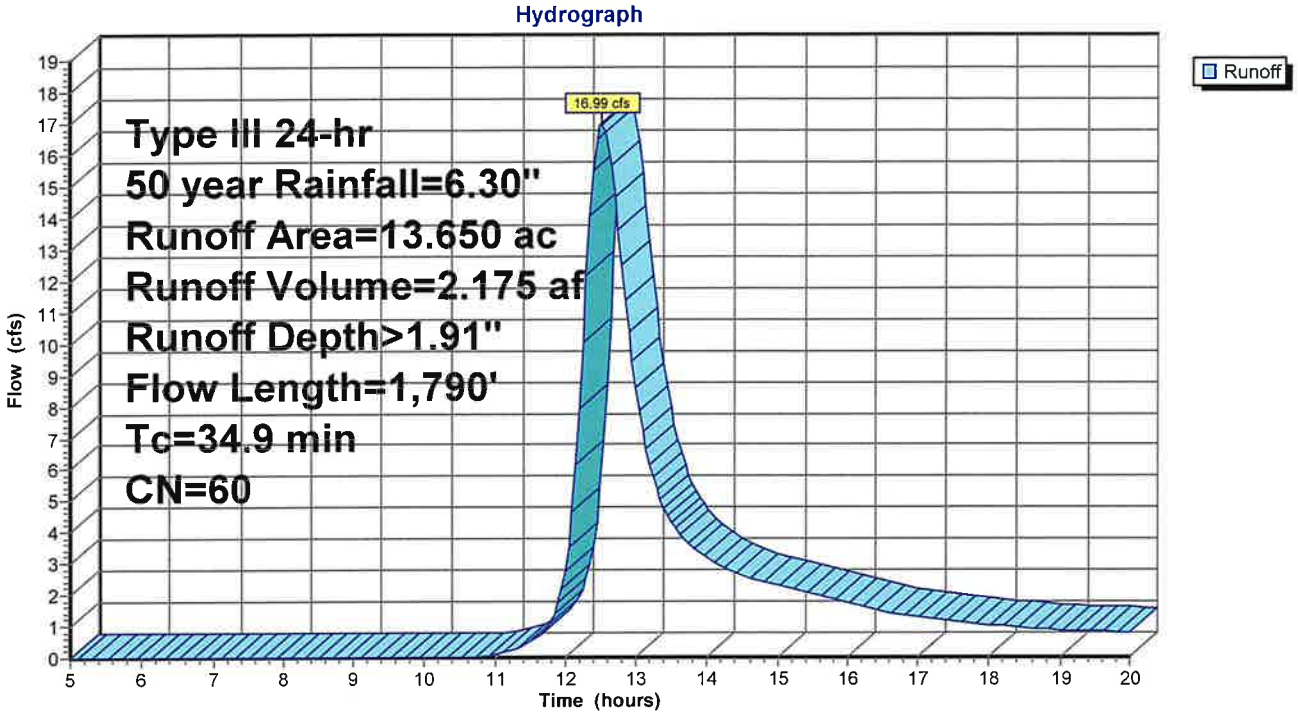
Runoff = 16.99 cfs @ 12.52 hrs, Volume= 2.175 af, Depth> 1.91"
Routed to nonexistent node 8P

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=6.30"

	Area (ac)	CN	Description
*	12.420	60	Woods, Good, HSG B
*	0.180	32	Permeable Paved parking, HSG B
*	0.720	52	>75% Grass cover, Good, HSG B
	0.330	82	Dirt roads, HSG B
	13.650	60	Weighted Average
	13.650		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.3	40	0.0400	0.05		**Sheet Flow, sheet flow** Woods: Dense underbrush n= 0.800 P2= 3.35"
15.2	1,100	0.0580	1.20		**Shallow Concentrated Flow, shallow 1st leg 7%** Woodland Kv= 5.0 fps
4.6	350	0.0650	1.27		**Shallow Concentrated Flow, 2nd leg** Woodland Kv= 5.0 fps
1.8	300		2.84		**Lake or Reservoir, Permeabile Paver 40% voild** Mean Depth= 0.25'
34.9	1,790	Total			

Subcatchment 3S: Developed



Summary for Subcatchment 3S: Developed

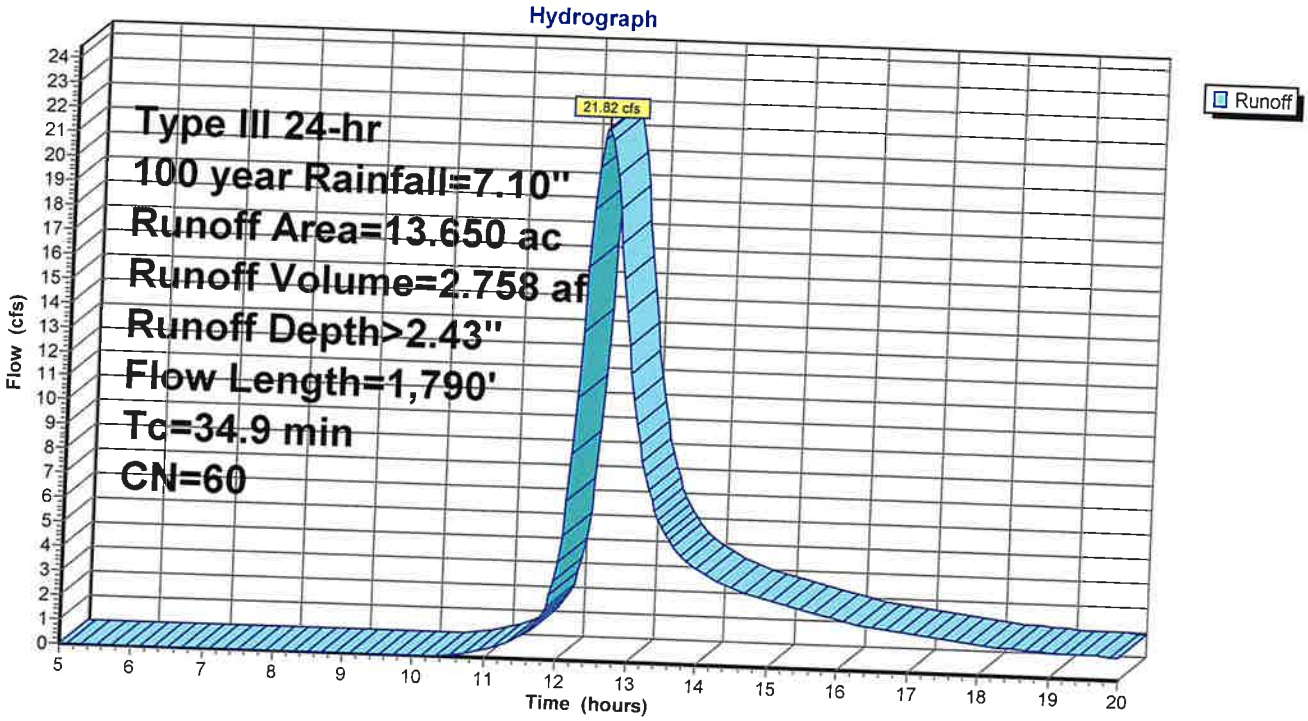
Runoff = 21.82 cfs @ 12.52 hrs, Volume= 2.758 af, Depth> 2.43"
Routed to nonexistent node 8P

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=7.10"

	Area (ac)	CN	Description
*	12.420	60	Woods, Good, HSG B
*	0.180	32	Permeable Paved parking, HSG B
*	0.720	52	>75% Grass cover, Good, HSG B
	0.330	82	Dirt roads, HSG B
	13.650	60	Weighted Average
	13.650		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.3	40	0.0400	0.05		**Sheet Flow, sheet flow** Woods: Dense underbrush n= 0.800 P2= 3.35"
15.2	1,100	0.0580	1.20		**Shallow Concentrated Flow, shallow 1st leg 7%** Woodland Kv= 5.0 fps
4.6	350	0.0650	1.27		**Shallow Concentrated Flow, 2nd leg** Woodland Kv= 5.0 fps
1.8	300		2.84		**Lake or Reservoir, Permeabile Paver 40% voild** Mean Depth= 0.25'
34.9	1,790	Total			

Subcatchment 3S: Developed



Search

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Basic Search

Enter keywords: east lyme ct

Advanced Search

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"east lyme ct": No match.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
38C	Hinckley loamy sand, 3 to 15 percent slopes	0.0	0.0%
38E	Hinckley loamy sand, 15 to 45 percent slopes	2.4	6.1%
62D	Canton and Charlton fine sandy loams, 15 to 35 percent slopes, extremely stony	9.7	24.6%
73E	Charlton-Chatfield complex, 15 to 45 percent slopes, very rocky	12.3	31.3%
703B	Haven silt loam, 3 to 8 percent slopes	8.1	20.5%
W	Water	6.9	17.4%

Soil Map

Scale (not to scale)

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

You have zoomed in beyond the scale at which the soil map for this area is intended to be used. Mapping of soils is done at a particular scale. The soil surveys that comprise your AC The design of map units and the level of detail shown in the resulting soil map are dependent on that map scale.

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