

TOWN OF NEW LONDON  
STORM WATER & EROSION  
CONTROL PLAN

September 2018

Prepared for  
**Marc Giguere & Michelle Gibbs**  
61 Lighthouse View Road  
New London, New Hampshire  
F&O Reference No. 20180190

Prepared by



**FUSS & O'NEILL**

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(802) 698-0370

## Overview:

The Giguere & Gibbs project is an earthwork and house construction project located on a residential site along Lighthouse View Road in New London that includes the demolition of the existing home to be re-built as a new home with attached garage. The site is located within the 250 foot shoreland protection overlay district of Lake Sunapee.

The driveway is proposed to be reduced and reconfigured to match the new garage entrance and there is also a new proposed onsite septic system. The site is relatively flat with gradual slopes in the proposed work areas. The proposed design and implementation of erosion controls and stormwater management features is intended to enhance the site and mitigate drainage and erosion issues. The site total drainage area or catchment area was analyzed and evaluated. It was determined that the roadway (Lighthouse View Road) acts as a cut off or diversion, preventing stormwater sourced upland from entering the site. Due to this fact the stormwater flow, based on the evaluated design storm events, was minimal for the 0.9 acre site. Fuss & O'Neill evaluated the existing site soils based on Natural Resources Conservation Service (NRCS) soil survey online data. The soils are identified as 77% Becket Fine Sandy Loam and 23% Skerry fine sandy loam both having a Saturated Hydraulic Conductivity (Ksat) of 10 micrometers per second (42 minutes per inch) and a hydrologic soil group rating of "C."

This published Ksat number was divided by two for design purposes following NH DES Alteration of Terrain (AoT) procedures for stormwater design to be more conservative in design.

Fuss & O'Neill created an existing conditions stormwater model and a proposed conditions model utilizing HydroCAD hydraulic modeling software. Rainfall amounts were determined using Cornell University published extreme precipitation estimates for New London. Due to the fact that the proposed design is a net reduction and does not increase impervious surfaces, the pre-development flow and volume was calculated as more than the post-development totals prior to even beginning the stormwater management design. All additional stormwater best management practices and retention/treatment areas would not technically be required per New London Zoning regulations but were designed to improve the existing condition of the site and promote water quality of the Lake based on engineering due diligence and environmentally conscience design goals.

Below is a list of more detailed information for each stormwater management and erosion control feature. Included at the end of this list is a schedule for inspection and maintenance to be performed by the landowner.

## Best Management Practices:

### Temporary Erosion Controls:

(Once seed has taken root and grass is established, temporary erosion controls may be removed. Prior to removal, check to make sure that erosion is not occurring at any place on site.)

- Silt Fence/Straw Wattles – Silt Fence and straw wattles should be installed downslope of intended soil disturbance but prior to any actual excavation, dredging, filling or stockpiling. Silt Fence is intended to prevent the migration of sediment off of the construction site and into undisturbed land, water or other protected areas.
- Temporary Seeding – Seed and mulch with hay any disturbed area that is to be left unworked for more than 30 days to stabilize the soil and prevent sediment migration.
- Erosion matting - should be installed in all proposed vegetated swales and exposed slopes over 4:1. Matting is intended to prevent the migration of sediment off of the construction site and into undisturbed land, water or other protected areas. Matting will biodegrade and allow for germination of grass seed.

#### Permanent Erosion Controls & Stormwater Management Best Management Practices (BMPs):

(These features will stay in place and should not be removed.)

- Grass Lined Swale – This feature is intended to create a protected swale that catches, slows and diverts stormwater away from where it can cause damage. After excavating the swale, line the swale with compacted loam, seed and erosion matting as specified on the construction plans.
- Stone Plunge Pool/Riprap Outlet Protection – This feature is intended to reduce the exit velocity of stormwater leaving culverts or drainage pipes. It will also act as a preliminary settling area for first flush rain events and smaller storm events.
- Stone Roof Dripedges – The dripedges are designed to promote infiltration and treatment of runoff from the impervious roof surfaces onsite. Stormwater is collected in the dripedges, stored, filtered, and treated stormwater eventually infiltrates into the surrounding soils or is conveyed through the foundation perimeter drains to stabilized outlet locations.
- Pervious Patio – The pervious patio area will act as storage and treatment for stormwater that directly falls on the patio area or is discharged from roof surface above and piped into the stone below the patio pavers via gutters.
- Bioretention Basin/Rain Garden – The majority of site stormwater is conveyed to bioretention basins planted with native vegetation capable of nutrient uptake and filtration. The fill media within the bioretention basins will allow for microbial growth and effective treatment of stormwater.

## Inspection & Maintenance:

### Temporary Erosion Controls:

- Silt Fence - Inspect weekly or after any major rain event for rips in or holes under Silt Fence. Repair promptly by patching or replacing ripped sections and plugging holes under the fence. If erosion spots are found under the silt fence, pile some backfill material in the area and attempt to divert the stormwater elsewhere until that spot is stabilized again. If sediment is found to be building up behind the silt fence, excavate the sediment down to a reasonable level and place in a protected stockpile area. After removal of the Silt Fence, regrade the disturbed soil to conform to the existing topography and vegetate with an appropriate material.
- Temporary Seeding – Inspect weekly or after any major rain event for erosion rills and sediment movement down slopes or in grassed swales. Repair by regrading, filling in any erosion rills or ditches and seeding and mulching. Heavier mulching may be necessary to prevent migration and erosion.

### Permanent Erosion Controls & Stormwater Management Best Management Practices (BMPs):

- Grass Lined Swale – Inspect after any major rain event for erosion or loss of vegetation. Repair promptly by patching or replacing topsoil and re-seeding swale. If erosion continues, place stone check dams along the swale or stake straw wattles in place along swale until vegetation has fully stabilized. If sediment is found to be building up within swales, clean the sediment out down to a vegetated level and re-stabilize.
- Stone Plunge Pool/Riprap Outlet Protection – Inspect after any major rain event for large sediment deposits or displaced stone. Clean out sediment and replace stones as required.
- Stone Roof Dripedges – Inspect the dripedges after any major rain event. The dripedges are designed to allow for routine maintenance. There is a 6" layer of stone above a layer of filter fabric which can be removed and replaced with clean new stone and clean fabric if signs of clogging or organics (leaves, grass clippings, bark mulch) and weed growth begins to develop within the dripedge stone.
- Pervious Patio – The pervious patio should be inspected annually and after major storm events. The patio shall be kept clean on leaves and debris. Do not pressure wash as water jet can drive residue into the bed and base below. Remove snow and used deicing sand or chemicals sparingly. Replenish stone within joints as needed and remove weeds or vegetation. Replace broken pavers as needed.
- Bioretention Basin/Rain Garden – Inspect bi-annually and after major storm events. Vegetation shall be healthy and thriving. Replace diseased or dead plants promptly to maintain a dense planting bed. Replace media and grass surface as needed if signs of

erosion are evident. If ponding is observed for longer than 72 hours the perforated underdrain within bioretention area shall be inspected and flushed if needed. Bioretention media may need to be replaced within 10 years if showing signs of degradation and poor absorption.

- Culverts, Headwalls & Underdrain – Inspect annually and after major storm events. Remove any debris or sediment that has collected in and/or around the ends of culverts. Visually check the structures for characteristics which may indicate deterioration. Underdrain lines shall be flushed if, upon inspection at cleanouts, that water is not visibly draining or there is a standing water level measured within the cleanout risers for longer than 72 hours. Hardware cloth screen may be installed on outlets if rodent nests are observed after flushing.

JOB#: 20180190  
 NAME: Giguere/Gibbs  
 TOWN: New London

**NEW LONDON STORMWATER CALCULATIONS**

INCREASE IN IMPERVIOUS AREA (sf): -6  
 VOLUME TO RECHARGE (Rev)(cf): -0.3

FEATURE		R.G. 1	Patio	D.E.	R.G. 2	TOTAL WQv	TOTAL AREA TO REMAIN UNTREATED
SUB WATERSHED AREA (sf):	AWS	9874	2460	4750	4075		12401   S.F.
%IMPERVIOUS:	%I	6%	45%	95%	61%		
Rv:	Rv	0.104	0.46	0.91	0.60		
WQv:	WQv	85.6	93.3	358.2	203.4	740.5	
PROPOSED RAIN GARDEN AREA (sf):	APRG	1471	992	683	481		
DEPTH OF SOIL FILTER (ft):	DSF	1	0	0	1		
DEPTH OF DRAINAGE LAYER (ft):	DDL	1	1.5	2	1		
DEPTH OF PONDING (ft):	DP	0.5	0	0.1	0.5		
POROSITY OF SOIL FILTER:	PSF	0.2	0.2	0.2	0.2		
POROSITY OF DRAINAGE LAYER:	PdL	0.4	0.4	0.4	0.4		
VOLUME OF SOIL FILTER (cf):	VSF	294.2	0	0	96.2		
VOLUME OF DRAINAGE LAYER (cf):	VdL	588.4	595.2	546.4	192.4		
VOLUME OF PONDING (cf):	VP	735.5	0	68.3	240.5		
CAPACITY OF RAIN GARDEN (cf):	VRG	1618.1	595.2	614.7	529.1	3357.1	
MIN. AREA REQ'D FOR INFILTRATION (sf):		67	121	335	160		
ACTUAL RAIN GARDEN AREA (sf):	AARG	<b>1471</b>	<b>992</b>	<b>683</b>	<b>481</b>		
CHECK		OK	OK	OK	OK		

link this into dwg:

<b>DRAINAGE FEATURE SCHEDULE:</b>	<b>R.G. 1</b>	<b>Patio</b>	<b>D.E.</b>	<b>R.G. 2</b>
DEPTH OF SOIL FILTER (ft)	1.0	0.0	0.0	1.0
DEPTH OF DRAINAGE LAYER (ft)	1.0	1.5	2.0	1.0
TOTAL SURFACE AREA (sf)	1471.0	992.0	683.0	481.0
CAPACITY OF RAIN GARDEN (cf)	1618.1	595.2	614.7	529.1
ESTIMATED WQv CAPACITY NEEDED (cf)	85.6	93.3	358.2	203.4

Hydrologic Soil Group—Merrimack and Belknap Counties, New Hampshire  
(61 Lighthouse View)



Map Scale: 1:582 if printed on A landscape (11" x 8.5") sheet.

0 5 10 20 30 Meters

0 25 50 100 150 Feet

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 18N WGS84



## MAP LEGEND

### Area of Interest (AOI)

 Area of Interest (AOI)

### Soils

#### Soil Rating Polygons

 A  
 A/D  
 B  
 B/D  
 C  
 C/D  
 D  
 Not rated or not available

#### Soil Rating Lines

 A  
 A/D  
 B  
 B/D  
 C  
 C/D  
 D  
 Not rated or not available

#### Soil Rating Points

 A  
 A/D  
 B  
 B/D

 C  
 C/D  
 D  
 Not rated or not available

### Water Features

 Streams and Canals

### Transportation

 Rails  
 Interstate Highways  
 US Routes  
 Major Roads  
 Local Roads

### Background

 Aerial Photography

## MAP INFORMATION

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

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

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

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

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

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

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

Soil Survey Area: Merrimack and Belknap Counties, New Hampshire  
 Survey Area Data: Version 23, Sep 7, 2018

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

Date(s) aerial images were photographed: Jul 11, 2014—Apr 13, 2016

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.

## Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
57C	Becket fine sandy loam, 8 to 15 percent slopes, very stony	C	0.7	77.4%
559C	Skerry fine sandy loam, 8 to 15 percent slopes, very stony	C/D	0.2	22.6%
<b>Totals for Area of Interest</b>			<b>0.9</b>	<b>100.0%</b>

### Description

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.

## Rating Options

*Aggregation Method:* Dominant Condition

*Component Percent Cutoff:* None Specified

*Tie-break Rule:* Higher

# Extreme Precipitation Tables

## Northeast Regional Climate Center

Data represents point estimates calculated from partial duration series. All precipitation amounts are displayed in inches.

<b>Smoothing</b>	Yes
<b>State</b>	New Hampshire
<b>Location</b>	
<b>Longitude</b>	72.039 degrees West
<b>Latitude</b>	43.392 degrees North
<b>Elevation</b>	0 feet
<b>Date/Time</b>	Fri, 28 Sep 2018 11:13:25 -0400

### Extreme Precipitation Estimates

	5min	10min	15min	30min	60min	120min		1hr	2hr	3hr	6hr	12hr	24hr	48hr		1day	2day	4day	7day	10day	
<b>1yr</b>	0.26	0.40	0.50	0.66	0.82	1.02	<b>1yr</b>	0.71	0.94	1.18	1.46	1.81	2.24	2.54	<b>1yr</b>	1.98	2.44	2.83	3.49	4.03	<b>1yr</b>
<b>2yr</b>	0.31	0.48	0.59	0.78	0.99	1.23	<b>2yr</b>	0.85	1.12	1.42	1.75	2.15	2.63	2.98	<b>2yr</b>	2.33	2.87	3.34	3.99	4.57	<b>2yr</b>
<b>5yr</b>	0.37	0.57	0.72	0.97	1.24	1.56	<b>5yr</b>	1.07	1.41	1.79	2.20	2.69	3.26	3.74	<b>5yr</b>	2.88	3.60	4.17	4.91	5.57	<b>5yr</b>
<b>10yr</b>	0.42	0.66	0.83	1.13	1.47	1.86	<b>10yr</b>	1.27	1.69	2.14	2.63	3.18	3.83	4.44	<b>10yr</b>	3.39	4.27	4.94	5.75	6.47	<b>10yr</b>
<b>25yr</b>	0.50	0.79	1.01	1.39	1.84	2.35	<b>25yr</b>	1.59	2.13	2.70	3.31	3.99	4.74	5.56	<b>25yr</b>	4.19	5.35	6.18	7.09	7.90	<b>25yr</b>
<b>50yr</b>	0.57	0.91	1.17	1.63	2.19	2.80	<b>50yr</b>	1.89	2.55	3.24	3.94	4.72	5.57	6.61	<b>50yr</b>	4.93	6.35	7.33	8.31	9.18	<b>50yr</b>
<b>100yr</b>	0.65	1.04	1.35	1.91	2.60	3.35	<b>100yr</b>	2.25	3.05	3.87	4.70	5.59	6.56	7.85	<b>100yr</b>	5.81	7.54	8.69	9.75	10.68	<b>100yr</b>
<b>200yr</b>	0.75	1.21	1.57	2.25	3.10	4.00	<b>200yr</b>	2.67	3.65	4.62	5.60	6.63	7.72	9.33	<b>200yr</b>	6.83	8.97	10.31	11.44	12.42	<b>200yr</b>
<b>500yr</b>	0.90	1.48	1.92	2.79	3.90	5.05	<b>500yr</b>	3.37	4.63	5.83	7.04	8.29	9.59	11.72	<b>500yr</b>	8.48	11.27	12.92	14.15	15.18	<b>500yr</b>

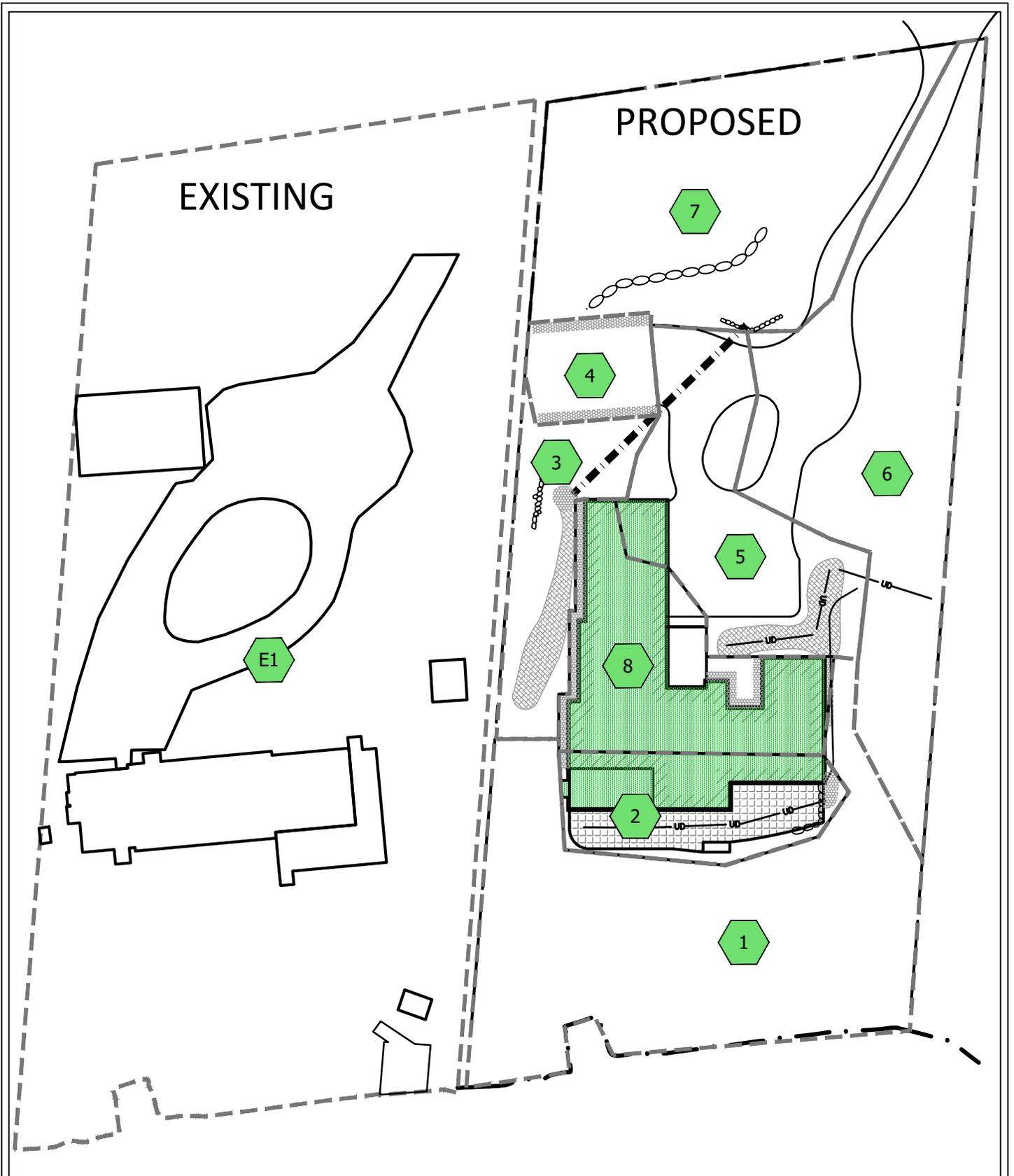
### Lower Confidence Limits

	5min	10min	15min	30min	60min	120min		1hr	2hr	3hr	6hr	12hr	24hr	48hr		1day	2day	4day	7day	10day	
<b>1yr</b>	0.20	0.31	0.38	0.51	0.63	0.79	<b>1yr</b>	0.54	0.77	0.94	1.26	1.64	1.93	2.28	<b>1yr</b>	1.71	2.19	2.51	3.05	3.34	<b>1yr</b>
<b>2yr</b>	0.30	0.46	0.57	0.77	0.95	1.12	<b>2yr</b>	0.82	1.09	1.29	1.67	2.14	2.55	2.88	<b>2yr</b>	2.26	2.77	3.23	3.86	4.43	<b>2yr</b>
<b>5yr</b>	0.34	0.52	0.65	0.89	1.14	1.33	<b>5yr</b>	0.98	1.30	1.51	1.96	2.46	3.03	3.41	<b>5yr</b>	2.68	3.28	3.80	4.51	5.10	<b>5yr</b>
<b>10yr</b>	0.37	0.58	0.71	1.00	1.29	1.48	<b>10yr</b>	1.11	1.45	1.70	2.19	2.72	3.43	3.88	<b>10yr</b>	3.04	3.73	4.28	5.04	5.67	<b>10yr</b>
<b>25yr</b>	0.42	0.64	0.79	1.13	1.48	1.68	<b>25yr</b>	1.28	1.65	1.99	2.53	3.12	4.06	4.58	<b>25yr</b>	3.59	4.41	5.00	5.81	6.50	<b>25yr</b>
<b>50yr</b>	0.44	0.67	0.83	1.20	1.61	1.84	<b>50yr</b>	1.39	1.80	2.24	2.82	3.44	4.62	5.20	<b>50yr</b>	4.09	5.00	5.62	6.40	7.19	<b>50yr</b>
<b>100yr</b>	0.46	0.69	0.87	1.25	1.72	2.00	<b>100yr</b>	1.48	1.96	2.52	3.20	3.82	5.27	5.89	<b>100yr</b>	4.66	5.66	6.29	7.03	7.93	<b>100yr</b>
<b>200yr</b>	0.47	0.71	0.90	1.30	1.81	2.17	<b>200yr</b>	1.57	2.12	2.83	3.58	4.24	6.04	6.65	<b>200yr</b>	5.34	6.39	7.02	7.70	8.73	<b>200yr</b>
<b>500yr</b>	0.49	0.73	0.94	1.37	1.95	2.37	<b>500yr</b>	1.68	2.32	3.31	4.17	4.86	7.24	7.84	<b>500yr</b>	6.41	7.54	8.07	8.60	9.85	<b>500yr</b>

### Upper Confidence Limits

	5min	10min	15min	30min	60min	120min		1hr	2hr	3hr	6hr	12hr	24hr	48hr		1day	2day	4day	7day	10day	
<b>1yr</b>	0.29	0.45	0.55	0.75	0.92	1.09	<b>1yr</b>	0.79	1.06	1.21	1.58	1.94	2.46	2.81	<b>1yr</b>	2.18	2.70	3.20	3.79	4.44	<b>1yr</b>
<b>2yr</b>	0.34	0.53	0.65	0.88	1.09	1.23	<b>2yr</b>	0.94	1.21	1.39	1.80	2.28	2.75	3.11	<b>2yr</b>	2.43	2.99	3.49	4.16	4.73	<b>2yr</b>
<b>5yr</b>	0.40	0.62	0.77	1.06	1.35	1.57	<b>5yr</b>	1.17	1.54	1.79	2.27	2.88	3.52	4.09	<b>5yr</b>	3.11	3.93	4.59	5.31	6.04	<b>5yr</b>
<b>10yr</b>	0.48	0.74	0.92	1.29	1.66	1.94	<b>10yr</b>	1.43	1.90	2.20	2.72	3.43	4.26	5.05	<b>10yr</b>	3.77	4.86	5.64	6.45	7.29	<b>10yr</b>
<b>25yr</b>	0.62	0.94	1.17	1.68	2.20	2.58	<b>25yr</b>	1.90	2.52	2.90	3.51	4.38	5.47	6.67	<b>25yr</b>	4.85	6.41	7.49	8.35	9.37	<b>25yr</b>
<b>50yr</b>	0.75	1.14	1.42	2.04	2.74	3.20	<b>50yr</b>	2.37	3.13	3.57	4.25	5.27	6.62	8.23	<b>50yr</b>	5.86	7.92	9.29	10.20	11.35	<b>50yr</b>
<b>100yr</b>	0.91	1.38	1.73	2.50	3.43	3.99	<b>100yr</b>	2.96	3.90	4.41	5.25	6.35	8.01	10.17	<b>100yr</b>	7.09	9.78	11.49	12.50	13.74	<b>100yr</b>
<b>200yr</b>	1.11	1.67	2.12	3.07	4.28	4.99	<b>200yr</b>	3.69	4.88	5.44	6.36	7.87	9.69	12.59	<b>200yr</b>	8.57	12.11	14.25	15.35	16.68	<b>200yr</b>
<b>500yr</b>	1.45	2.16	2.78	4.04	5.75	6.71	<b>500yr</b>	4.96	6.56	7.19	8.24	10.13	12.44	16.73	<b>500yr</b>	11.01	16.08	19.01	20.18	21.60	<b>500yr</b>





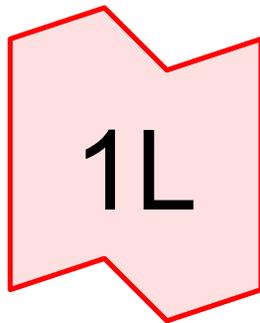
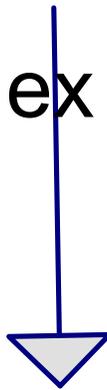
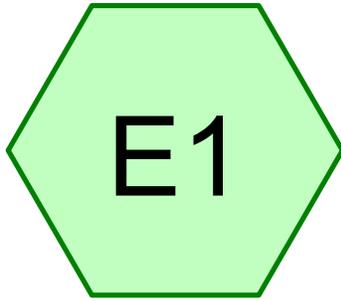
PROJECT #: 20180190  
 DATE: June 2018

DWG. NO.: DRN  
 SCALE: 1"=40'

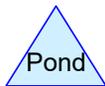
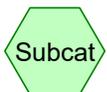
Drainage Areas MapS  
 61 Lighthouse View Road  
 New London, NH

**FUSS & O'NEILL**  
 205 BILLINGS FARM ROAD - SUITE 6B  
 WHITE RIVER JUNCTION, VT 05001  
 802.698.0370  
 www.eldengineers.com | www.fando.com

OWNER:  
 Giguere & Gibbs



LAKE



**Routing Diagram for Gibbs Stormwater**

Prepared by {enter your company name here}, Printed 9/28/2018  
HydroCAD® 10.00-21 s/n 01618 © 2018 HydroCAD Software Solutions LLC

**Gibbs Stormwater**

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**Area Listing (selected nodes)**

Area (acres)	CN	Description (subcatchment-numbers)
0.220	98	Roofs, HSG C (E1)
0.657	72	Woods/grass comb., Good, HSG C (E1)
<b>0.878</b>	<b>79</b>	<b>TOTAL AREA</b>

**Gibbs Stormwater**

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61 LIGHTHOUSE EXISTING  
Type III 24-hr 2yr Rainfall=2.63"

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**Summary for Subcatchment E1: ex**

Runoff = 0.68 cfs @ 12.23 hrs, Volume= 0.067 af, Depth> 0.92"

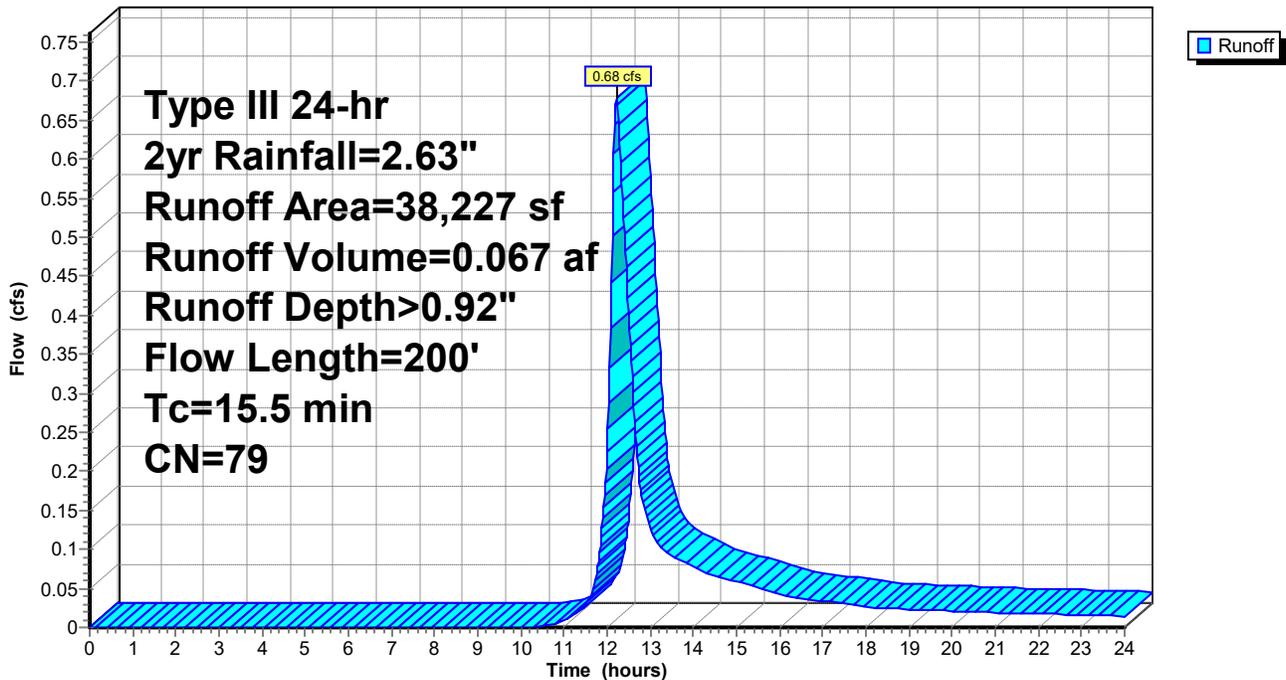
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.02 hrs  
Type III 24-hr 2yr Rainfall=2.63"

Area (sf)	CN	Description
28,639	72	Woods/grass comb., Good, HSG C
9,588	98	Roofs, HSG C
38,227	79	Weighted Average
28,639		74.92% Pervious Area
9,588		25.08% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.4	100	0.0700	0.12		<b>Sheet Flow, existing site</b>
					Woods: Light underbrush n= 0.400 P2= 2.63"
1.1	100	0.0500	1.57		<b>Shallow Concentrated Flow, lake front</b>
					Short Grass Pasture Kv= 7.0 fps
15.5	200	Total			

**Subcatchment E1: ex**

Hydrograph



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Type III 24-hr 2yr Rainfall=2.63"

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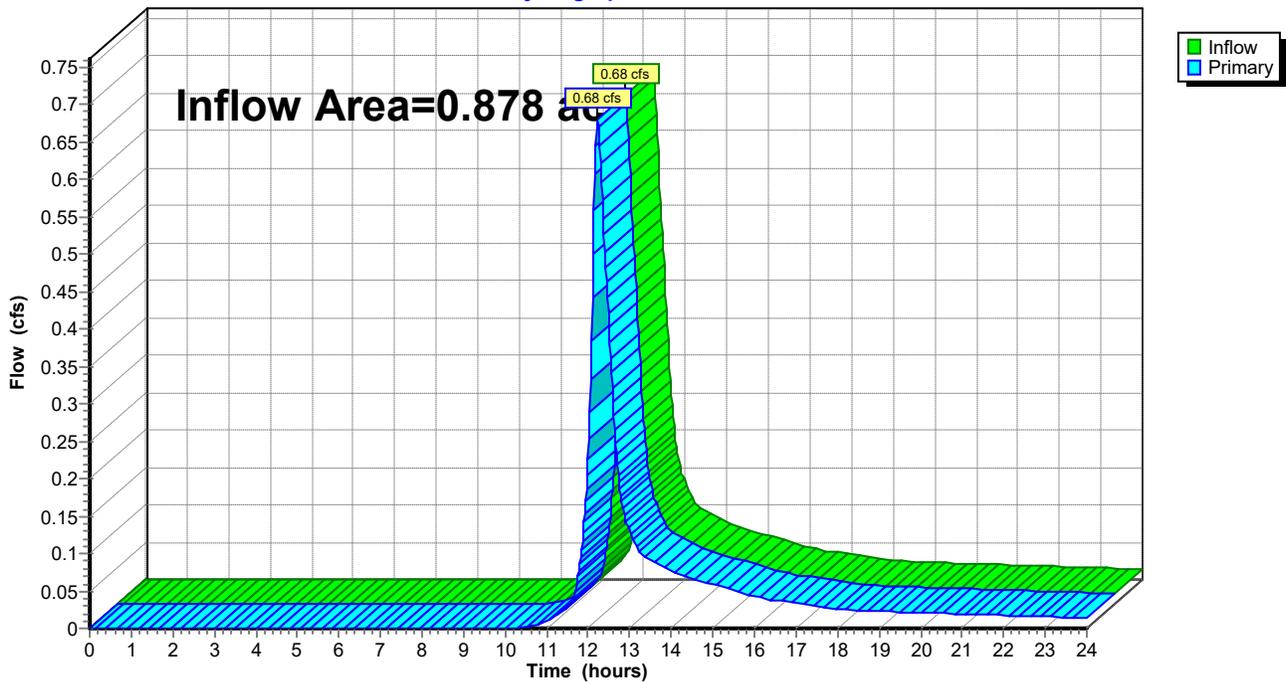
## Summary for Link 1L: LAKE

Inflow Area = 0.878 ac, 25.08% Impervious, Inflow Depth > 0.92" for 2yr event  
Inflow = 0.68 cfs @ 12.23 hrs, Volume= 0.067 af  
Primary = 0.68 cfs @ 12.23 hrs, Volume= 0.067 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.02 hrs

### Link 1L: LAKE

Hydrograph



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61 LIGHTHOUSE EXISTING  
Type III 24-hr 10 yr Rainfall=3.83"

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**Summary for Subcatchment E1: ex**

Runoff = 1.39 cfs @ 12.22 hrs, Volume= 0.133 af, Depth> 1.82"

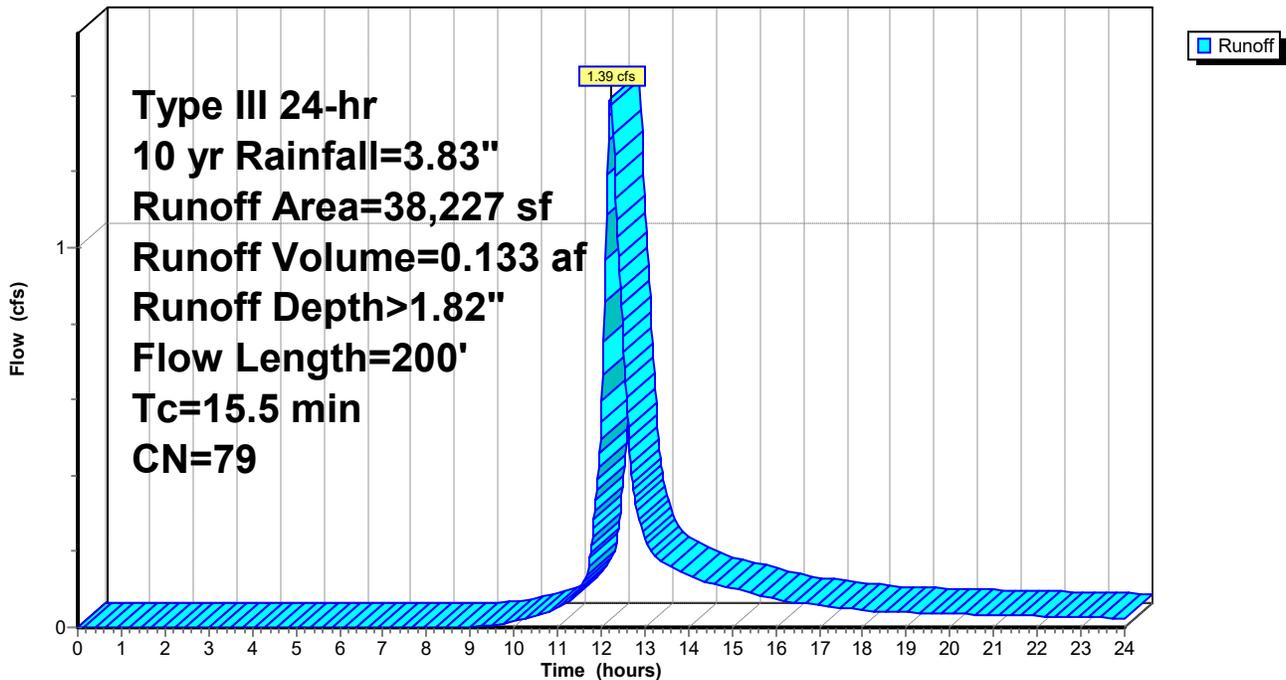
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.02 hrs  
Type III 24-hr 10 yr Rainfall=3.83"

Area (sf)	CN	Description
28,639	72	Woods/grass comb., Good, HSG C
9,588	98	Roofs, HSG C
38,227	79	Weighted Average
28,639		74.92% Pervious Area
9,588		25.08% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.4	100	0.0700	0.12		<b>Sheet Flow, existing site</b> Woods: Light underbrush n= 0.400 P2= 2.63"
1.1	100	0.0500	1.57		<b>Shallow Concentrated Flow, lake front</b> Short Grass Pasture Kv= 7.0 fps
15.5	200	Total			

**Subcatchment E1: ex**

Hydrograph



**Gibbs Stormwater**

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Type III 24-hr 10 yr Rainfall=3.83"

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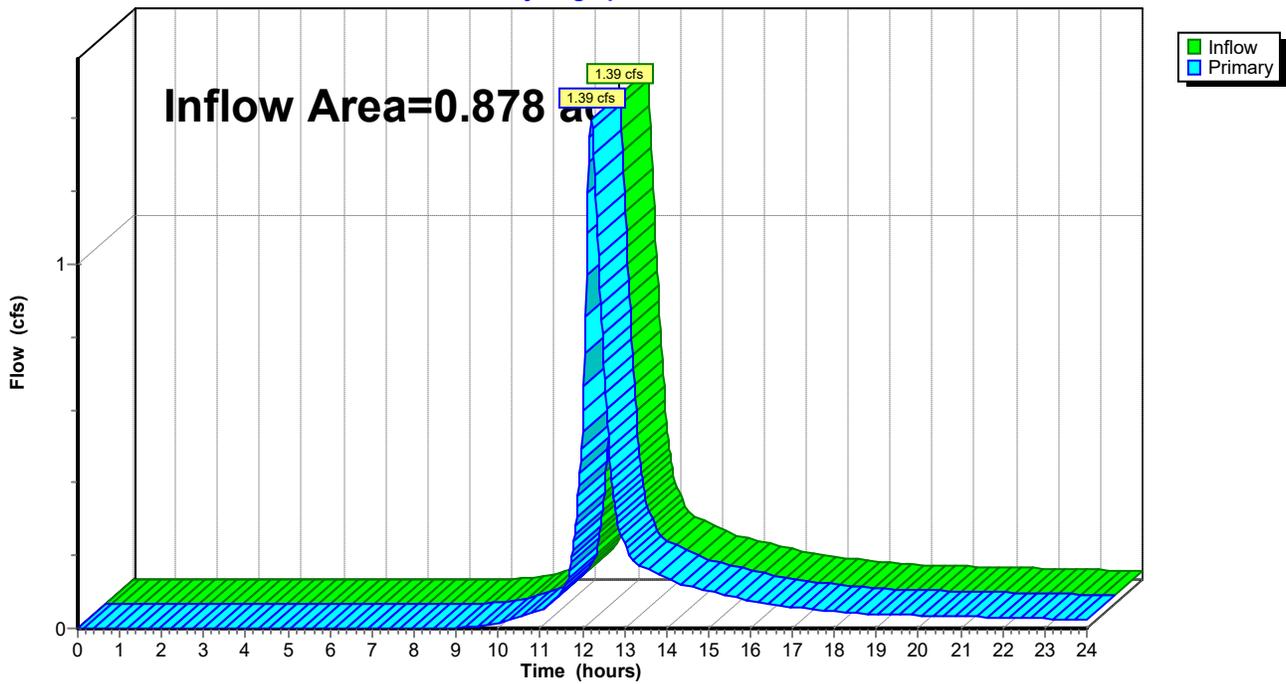
**Summary for Link 1L: LAKE**

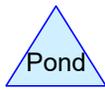
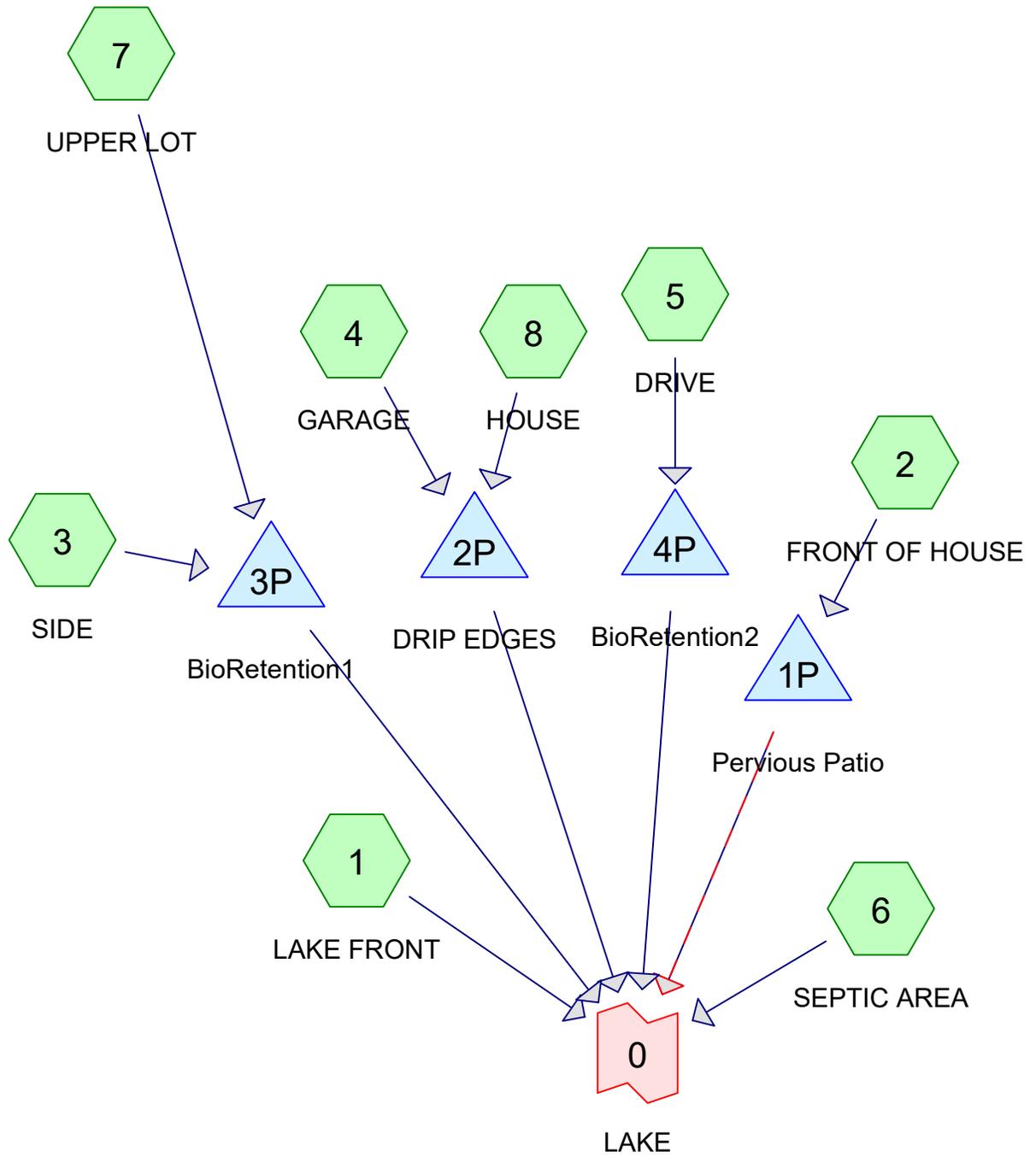
Inflow Area = 0.878 ac, 25.08% Impervious, Inflow Depth > 1.82" for 10 yr event  
Inflow = 1.39 cfs @ 12.22 hrs, Volume= 0.133 af  
Primary = 1.39 cfs @ 12.22 hrs, Volume= 0.133 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.02 hrs

**Link 1L: LAKE**

Hydrograph





**Routing Diagram for Gibbs Stormwater**  
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**Area Listing (selected nodes)**

Area (acres)	CN	Description (subcatchment-numbers)
0.036	74	>75% Grass cover, Good, HSG C (5)
0.057	98	DRIVE, HSG C (5)
0.135	98	Roofs, HSG C (2, 4, 8)
0.030	98	Water Surface, 0% imp, HSG C (2)
0.175	70	Woods, Good, HSG C (7)
0.444	72	Woods/grass comb., Good, HSG C (1, 3, 6)
<b>0.878</b>	<b>78</b>	<b>TOTAL AREA</b>

# Gibbs Stormwater

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61 LIGHTHOUSE VIEW PROPOSED

Type III 24-hr 2yr Rainfall=2.63"

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## Summary for Subcatchment 1: LAKE FRONT

[49] Hint:  $T_c < 2dt$  may require smaller  $dt$

Runoff = 0.15 cfs @ 12.03 hrs, Volume= 0.010 af, Depth > 0.60"

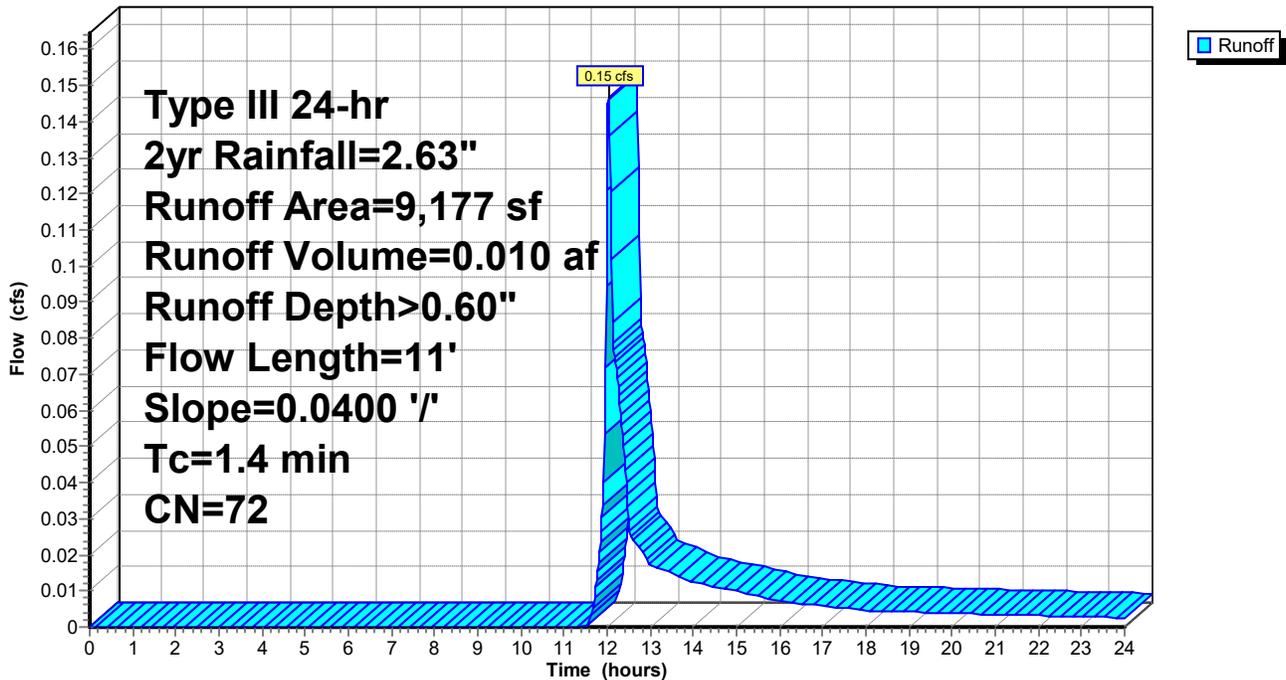
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs,  $dt= 0.02$  hrs  
Type III 24-hr 2yr Rainfall=2.63"

Area (sf)	CN	Description
9,177	72	Woods/grass comb., Good, HSG C
9,177		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.4	11	0.0400	0.13		Sheet Flow, Grass: Short n= 0.150 P2= 2.63"

## Subcatchment 1: LAKE FRONT

Hydrograph



**Gibbs Stormwater**

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**Summary for Subcatchment 2: FRONT OF HOUSE**

[49] Hint:  $T_c < 2dt$  may require smaller dt

Runoff = 0.17 cfs @ 12.00 hrs, Volume= 0.011 af, Depth> 2.40"

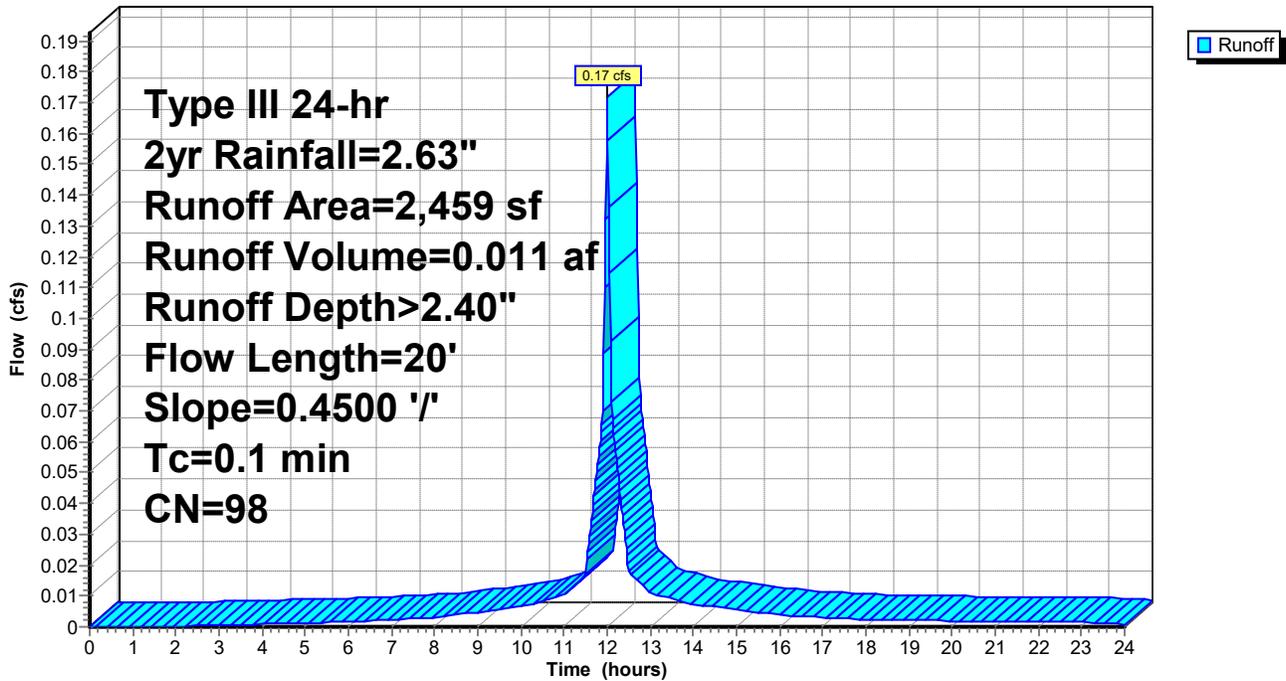
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.02 hrs  
Type III 24-hr 2yr Rainfall=2.63"

Area (sf)	CN	Description
1,137	98	Roofs, HSG C
1,322	98	Water Surface, 0% imp, HSG C
2,459	98	Weighted Average
1,322		53.76% Pervious Area
1,137		46.24% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.1	20	0.4500	3.14		<b>Sheet Flow,</b> Smooth surfaces n= 0.011 P2= 2.63"

**Subcatchment 2: FRONT OF HOUSE**

Hydrograph



**Gibbs Stormwater**

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Type III 24-hr 2yr Rainfall=2.63"

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**Summary for Subcatchment 3: SIDE**

Runoff = 0.03 cfs @ 12.13 hrs, Volume= 0.003 af, Depth> 0.60"

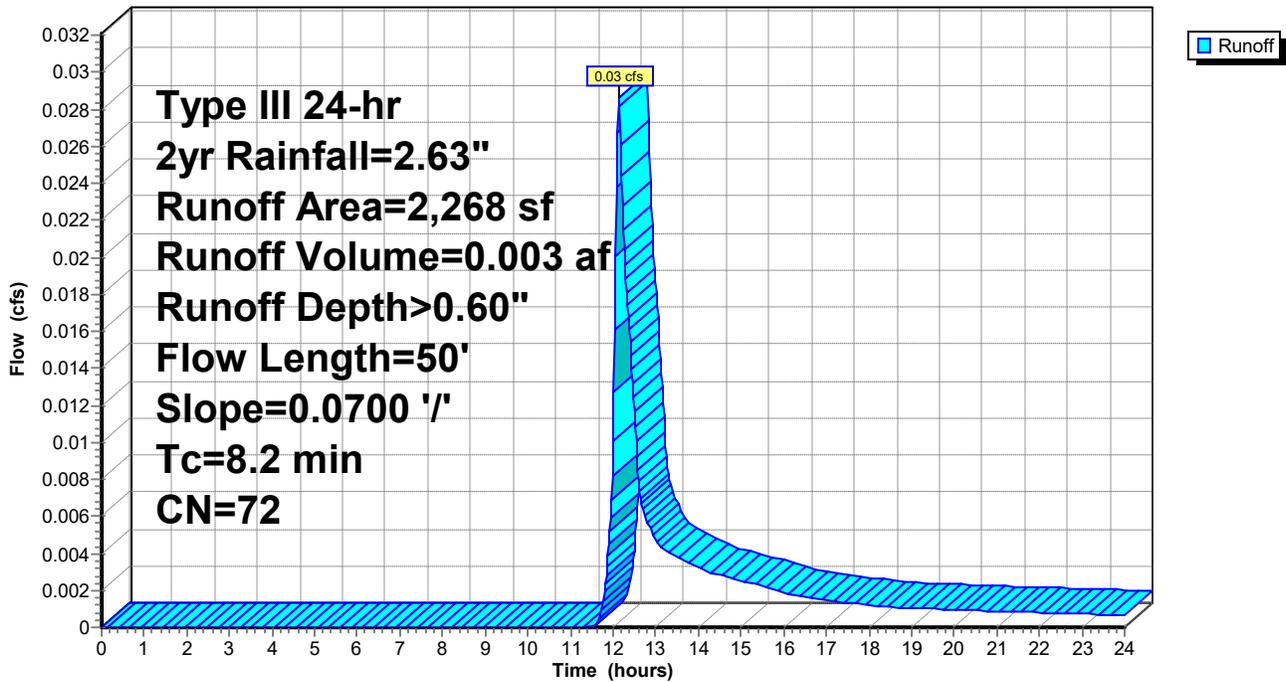
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.02 hrs  
Type III 24-hr 2yr Rainfall=2.63"

Area (sf)	CN	Description
2,268	72	Woods/grass comb., Good, HSG C
2,268		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.2	50	0.0700	0.10		<b>Sheet Flow, existing site</b> Woods: Light underbrush n= 0.400 P2= 2.63"

**Subcatchment 3: SIDE**

Hydrograph



**Gibbs Stormwater**

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**Summary for Subcatchment 4: GARAGE**

[49] Hint: Tc<2dt may require smaller dt

Runoff = 0.08 cfs @ 12.00 hrs, Volume= 0.005 af, Depth> 2.40"

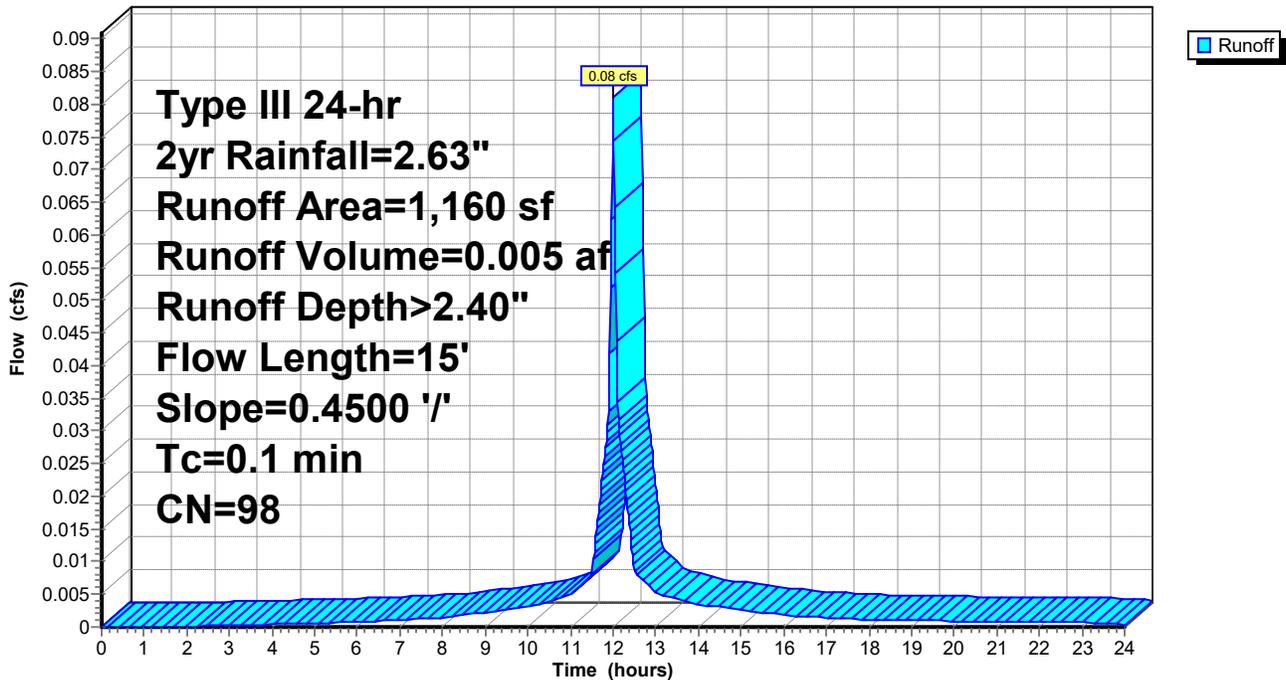
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.02 hrs  
Type III 24-hr 2yr Rainfall=2.63"

Area (sf)	CN	Description
1,160	98	Roofs, HSG C
1,160		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.1	15	0.4500	2.96		Sheet Flow, Smooth surfaces n= 0.011 P2= 2.63"

**Subcatchment 4: GARAGE**

Hydrograph



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Type III 24-hr 2yr Rainfall=2.63"

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**Summary for Subcatchment 5: DRIVE**

[49] Hint: Tc<2dt may require smaller dt

Runoff = 0.20 cfs @ 12.03 hrs, Volume= 0.012 af, Depth> 1.57"

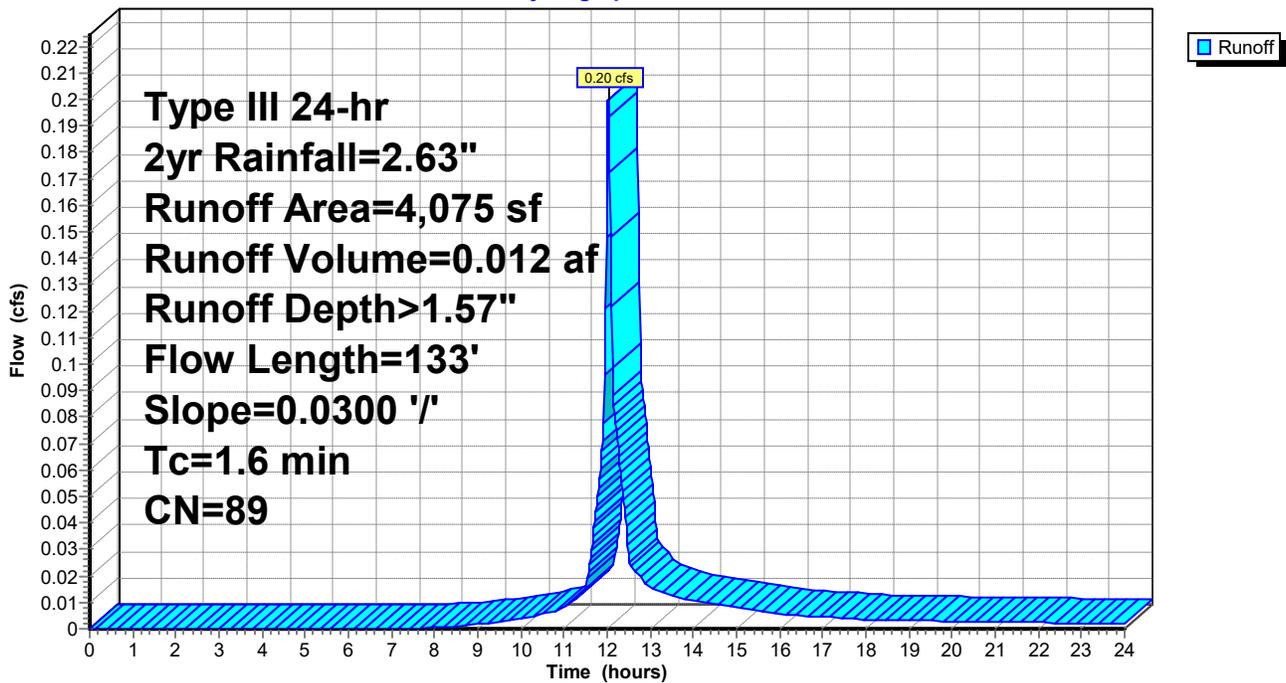
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.02 hrs  
Type III 24-hr 2yr Rainfall=2.63"

	Area (sf)	CN	Description
*	2,500	98	DRIVE, HSG C
	1,575	74	>75% Grass cover, Good, HSG C
	4,075	89	Weighted Average
	1,575		38.65% Pervious Area
	2,500		61.35% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.1	100	0.0300	1.47		<b>Sheet Flow,</b> Smooth surfaces n= 0.011 P2= 2.63"
0.5	33	0.0300	1.21		<b>Shallow Concentrated Flow,</b> Short Grass Pasture Kv= 7.0 fps
1.6	133	Total			

**Subcatchment 5: DRIVE**

Hydrograph



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**Summary for Subcatchment 6: SEPTIC AREA**

Runoff = 0.06 cfs @ 12.47 hrs, Volume= 0.009 af, Depth> 0.59"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.02 hrs  
Type III 24-hr 2yr Rainfall=2.63"

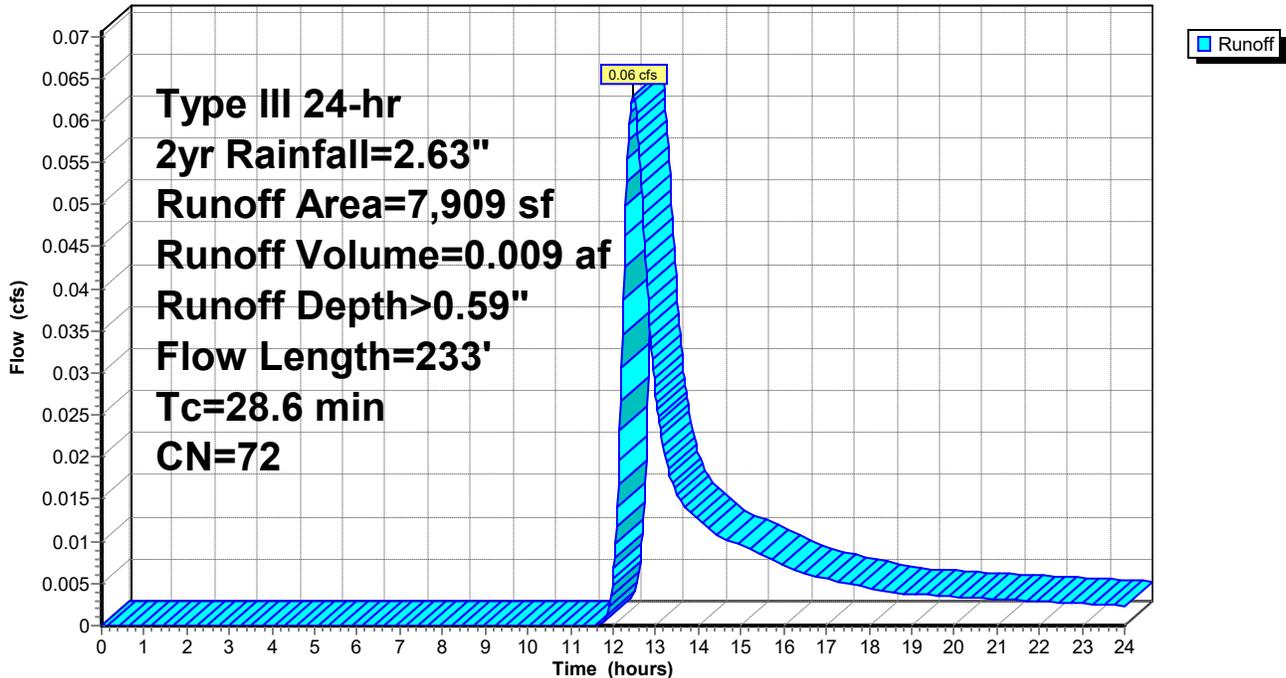
Area (sf)	CN	Description
7,909	72	Woods/grass comb., Good, HSG C
7,909		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
26.6	100	0.0600	0.06		<b>Sheet Flow,</b> Woods: Dense underbrush n= 0.800 P2= 2.63"
2.0	133	0.0500	1.12		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
28.6	233	Total			

**Subcatchment 6: SEPTIC AREA**

Hydrograph



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Type III 24-hr 2yr Rainfall=2.63"

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**Summary for Subcatchment 7: UPPER LOT**

Runoff = 0.05 cfs @ 12.40 hrs, Volume= 0.007 af, Depth> 0.51"

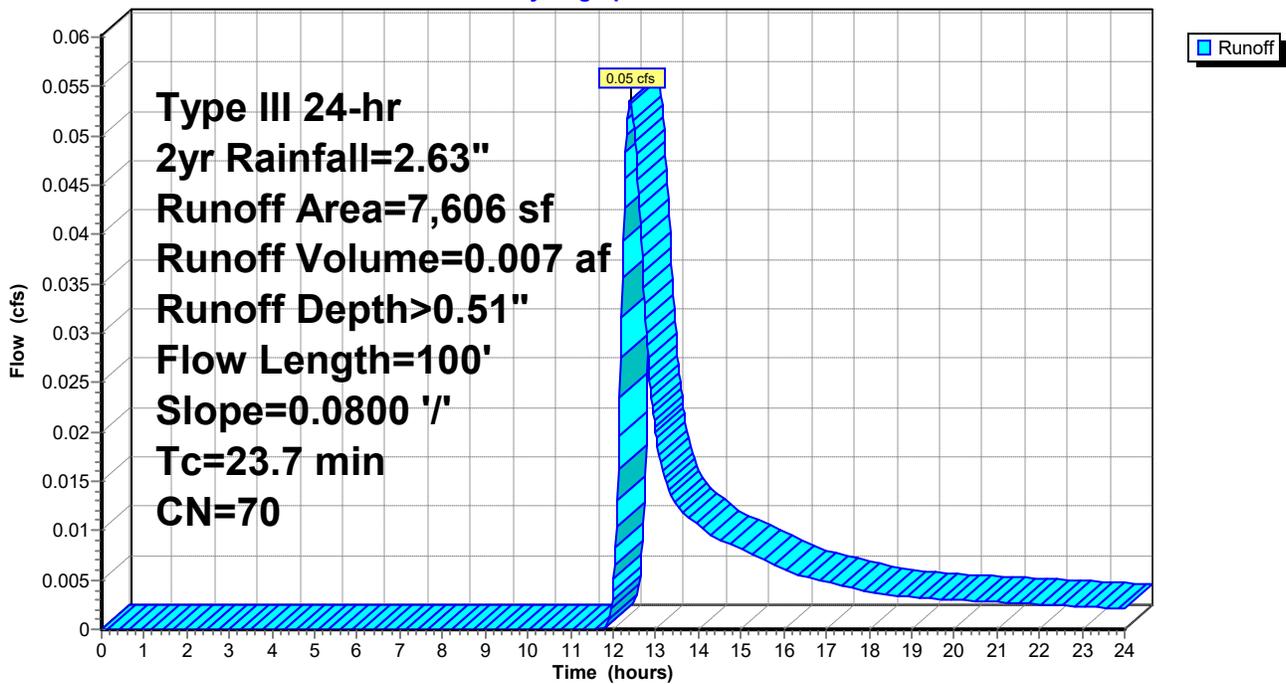
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.02 hrs  
Type III 24-hr 2yr Rainfall=2.63"

Area (sf)	CN	Description
7,606	70	Woods, Good, HSG C
7,606		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
23.7	100	0.0800	0.07		<b>Sheet Flow,</b> Woods: Dense underbrush n= 0.800 P2= 2.63"

**Subcatchment 7: UPPER LOT**

Hydrograph



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Type III 24-hr 2yr Rainfall=2.63"

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**Summary for Subcatchment 8: HOUSE**

[49] Hint: Tc<2dt may require smaller dt

Runoff = 0.25 cfs @ 12.00 hrs, Volume= 0.016 af, Depth> 2.40"

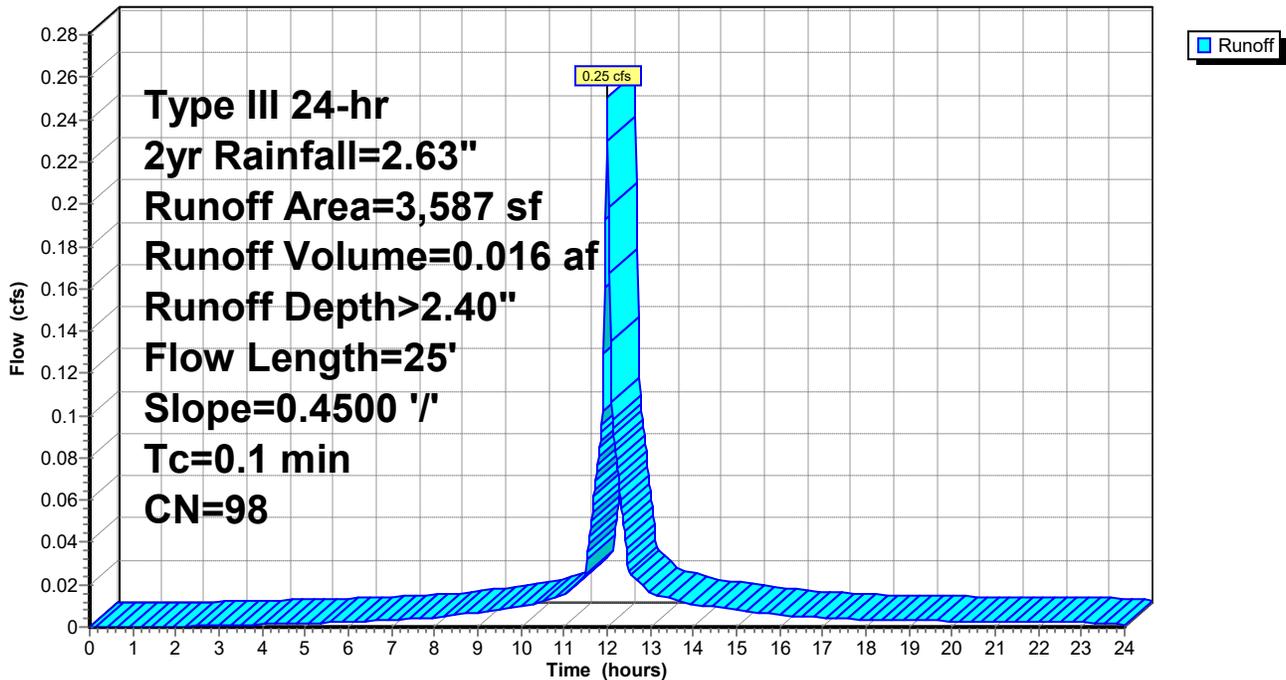
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.02 hrs  
Type III 24-hr 2yr Rainfall=2.63"

Area (sf)	CN	Description
3,587	98	Roofs, HSG C
3,587		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.1	25	0.4500	3.28		Sheet Flow, Smooth surfaces n= 0.011 P2= 2.63"

**Subcatchment 8: HOUSE**

Hydrograph



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**Summary for Pond 1P: Pervious Patio**

Inflow Area = 0.056 ac, 46.24% Impervious, Inflow Depth > 2.40" for 2yr event  
 Inflow = 0.17 cfs @ 12.00 hrs, Volume= 0.011 af  
 Outflow = 0.01 cfs @ 13.39 hrs, Volume= 0.011 af, Atten= 95%, Lag= 83.5 min  
 Discarded = 0.01 cfs @ 13.39 hrs, Volume= 0.011 af  
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af  
 Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.02 hrs  
 Peak Elev= 0.53' @ 13.39 hrs Surf.Area= 991 sf Storage= 209 cf

Plug-Flow detention time= 188.5 min calculated for 0.011 af (100% of inflow)  
 Center-of-Mass det. time= 186.6 min ( 941.9 - 755.2 )

Volume	Invert	Avail.Storage	Storage Description
#1	0.00'	595 cf	<b>Custom Stage Data (Prismatic)</b> Listed below (Recalc) 1,487 cf Overall x 40.0% Voids

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
0.00	991	0	0
1.00	991	991	991
1.50	991	496	1,487

Device	Routing	Invert	Outlet Devices
#1	Primary	1.00'	<b>4.0" Round Culvert</b> L= 4.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 1.00' / 0.90' S= 0.0250 '/ Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.09 sf
#2	Discarded	0.00'	<b>0.350 in/hr Exfiltration over Surface area</b> Conductivity to Groundwater Elevation = -3.00'
#3	Secondary	1.25'	<b>60.0' long x 1.0' breadth Broad-Crested Rectangular Weir</b> 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 Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31 3.30 3.31 3.32

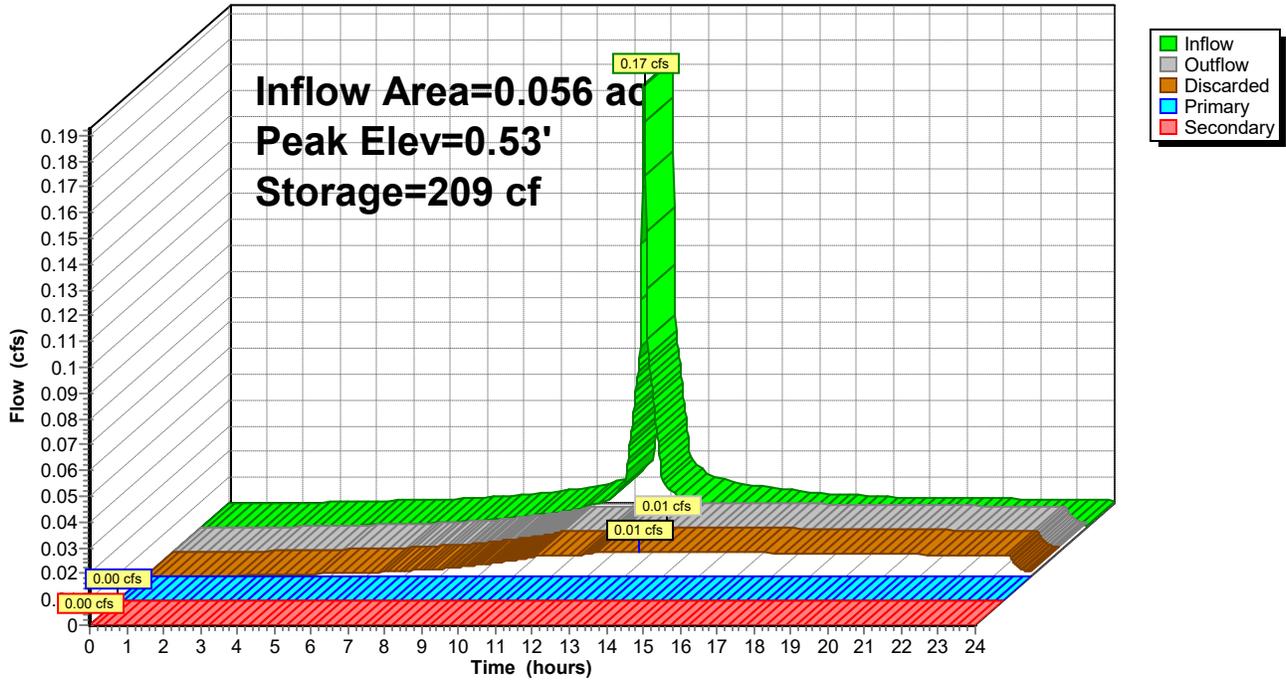
**Discarded OutFlow** Max=0.01 cfs @ 13.39 hrs HW=0.53' (Free Discharge)  
 ↑**2=Exfiltration** ( Controls 0.01 cfs)

**Primary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=0.00' (Free Discharge)  
 ↑**1=Culvert** ( Controls 0.00 cfs)

**Secondary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=0.00' (Free Discharge)  
 ↑**3=Broad-Crested Rectangular Weir** ( Controls 0.00 cfs)

Pond 1P: Pervious Patio

Hydrograph



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**Summary for Pond 2P: DRIP EDGES**

Inflow Area = 0.109 ac, 100.00% Impervious, Inflow Depth > 2.40" for 2yr event  
 Inflow = 0.33 cfs @ 12.00 hrs, Volume= 0.022 af  
 Outflow = 0.33 cfs @ 12.00 hrs, Volume= 0.022 af, Atten= 1%, Lag= 0.1 min  
 Discarded = 0.33 cfs @ 12.00 hrs, Volume= 0.022 af  
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.02 hrs  
 Peak Elev= 0.00' @ 12.00 hrs Surf.Area= 683.000 ac Storage= 0.000 af

Plug-Flow detention time= 0.1 min calculated for 0.022 af (100% of inflow)  
 Center-of-Mass det. time= 0.1 min ( 755.4 - 755.2 )

Volume	Invert	Avail.Storage	Storage Description
#1	0.00'	4.098 af	<b>Custom Stage Data (Prismatic)</b> Listed below (Recalc) 1,024.500 af Overall x 0.4% Voids

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
0.00	683.000	0.000	0.000
1.50	683.000	1,024.500	1,024.500

Device	Routing	Invert	Outlet Devices
#1	Primary	1.40'	<b>100.0' long x 5.0' breadth Broad-Crested Rectangular Weir</b> 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
#2	Discarded	0.00'	<b>0.350 in/hr Exfiltration over Surface area</b> Conductivity to Groundwater Elevation = -3.00'

**Discarded OutFlow** Max=241.04 cfs @ 12.00 hrs HW=0.00' (Free Discharge)  
 ↑2=Exfiltration ( Controls 241.04 cfs)

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

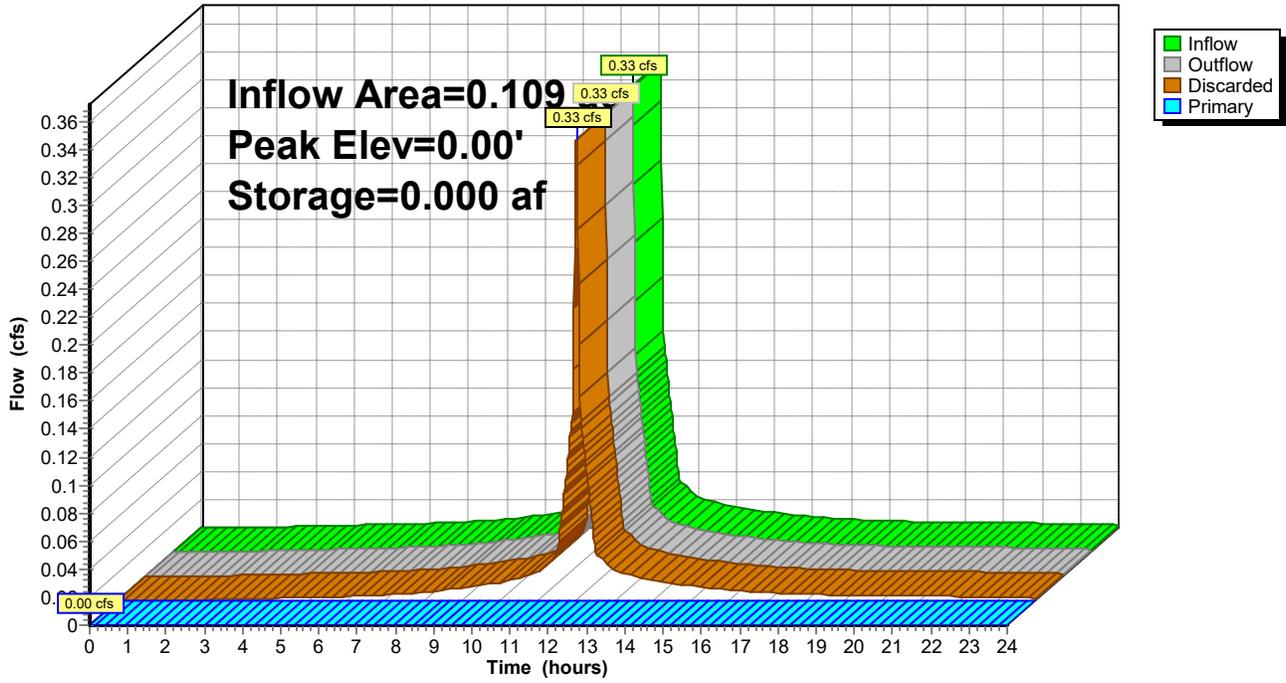
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**Pond 2P: DRIP EDGES**

Hydrograph



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**Summary for Pond 3P: BioRetention1**

Inflow Area = 0.227 ac, 0.00% Impervious, Inflow Depth > 0.53" for 2yr event  
 Inflow = 0.07 cfs @ 12.37 hrs, Volume= 0.010 af  
 Outflow = 0.07 cfs @ 12.36 hrs, Volume= 0.010 af, Atten= 0%, Lag= 0.0 min  
 Discarded = 0.02 cfs @ 12.36 hrs, Volume= 0.007 af  
 Primary = 0.05 cfs @ 12.36 hrs, Volume= 0.003 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.02 hrs / 2  
 Peak Elev= 0.91' @ 12.36 hrs Surf.Area= 1,471 sf Storage= 5 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)  
 Center-of-Mass det. time= 0.9 min ( 900.1 - 899.2 )

Volume	Invert	Avail.Storage	Storage Description
#1	0.00'	6 cf	<b>Custom Stage Data (Prismatic)</b> Listed below (Recalc) 1,471 cf Overall x 0.4% Voids

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
0.00	1,471	0	0
1.00	1,471	1,471	1,471

Device	Routing	Invert	Outlet Devices
#1	Primary	0.90'	<b>30.0' long x 5.0' breadth Broad-Crested Rectangular Weir</b> 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
#2	Discarded	0.00'	<b>0.350 in/hr Exfiltration over Surface area</b> Conductivity to Groundwater Elevation = -3.00'

**Discarded OutFlow** Max=0.02 cfs @ 12.36 hrs HW=0.91' (Free Discharge)  
 ↑**2=Exfiltration** ( Controls 0.02 cfs)

**Primary OutFlow** Max=0.05 cfs @ 12.36 hrs HW=0.91' (Free Discharge)  
 ↑**1=Broad-Crested Rectangular Weir** (Weir Controls 0.05 cfs @ 0.21 fps)

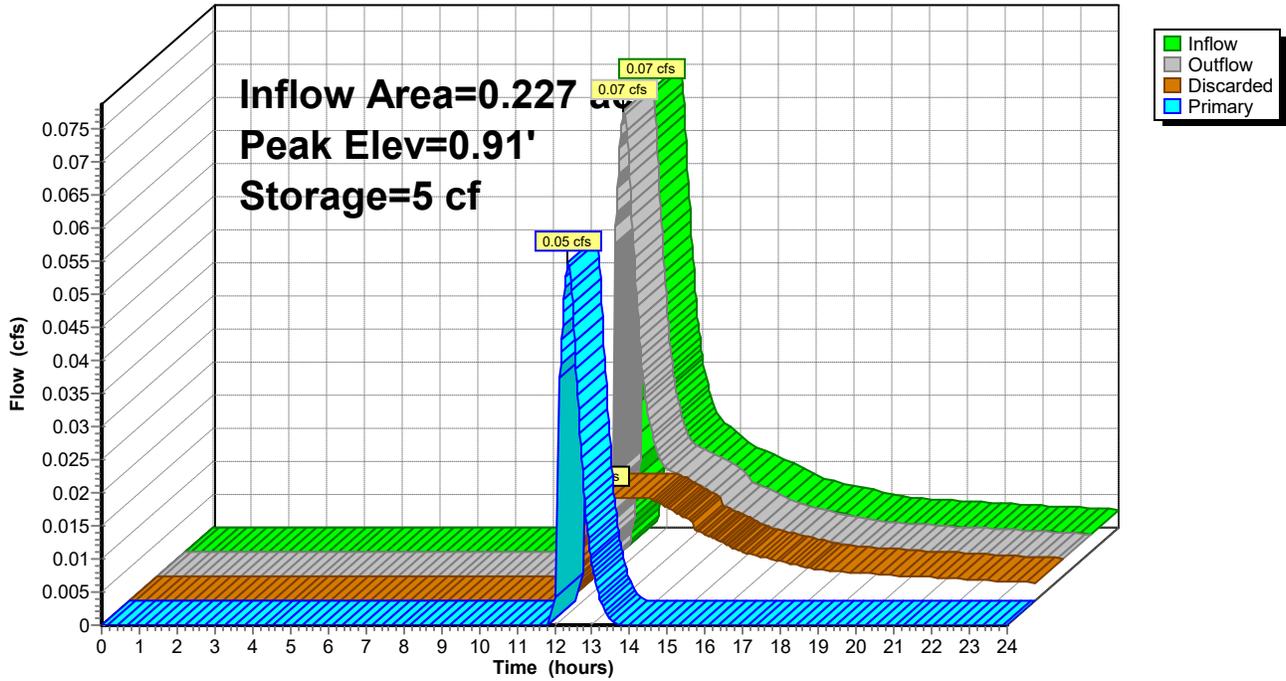
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## Pond 3P: BioRetention1

Hydrograph



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**Summary for Pond 4P: BioRetention2**

Inflow Area = 0.094 ac, 61.35% Impervious, Inflow Depth > 1.57" for 2yr event  
 Inflow = 0.20 cfs @ 12.03 hrs, Volume= 0.012 af  
 Outflow = 0.20 cfs @ 12.03 hrs, Volume= 0.012 af, Atten= 0%, Lag= 0.0 min  
 Discarded = 0.01 cfs @ 12.03 hrs, Volume= 0.005 af  
 Primary = 0.20 cfs @ 12.03 hrs, Volume= 0.007 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.02 hrs / 2  
 Peak Elev= 0.92' @ 12.03 hrs Surf.Area= 481 sf Storage= 2 cf

Plug-Flow detention time= 2.8 min calculated for 0.012 af (100% of inflow)  
 Center-of-Mass det. time= 1.7 min ( 816.6 - 814.9 )

Volume	Invert	Avail.Storage	Storage Description
#1	0.00'	2 cf	<b>Custom Stage Data (Prismatic)</b> Listed below (Recalc) 481 cf Overall x 0.4% Voids

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
0.00	481	0	0
1.00	481	481	481

Device	Routing	Invert	Outlet Devices
#1	Primary	0.90'	<b>25.0' long x 5.0' breadth Broad-Crested Rectangular Weir</b> 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
#2	Discarded	0.00'	<b>0.350 in/hr Exfiltration over Surface area</b> Conductivity to Groundwater Elevation = -3.00'

**Discarded OutFlow** Max=0.01 cfs @ 12.03 hrs HW=0.92' (Free Discharge)  
 ↑2=Exfiltration ( Controls 0.01 cfs)

**Primary OutFlow** Max=0.19 cfs @ 12.03 hrs HW=0.92' (Free Discharge)  
 ↑1=Broad-Crested Rectangular Weir (Weir Controls 0.19 cfs @ 0.35 fps)

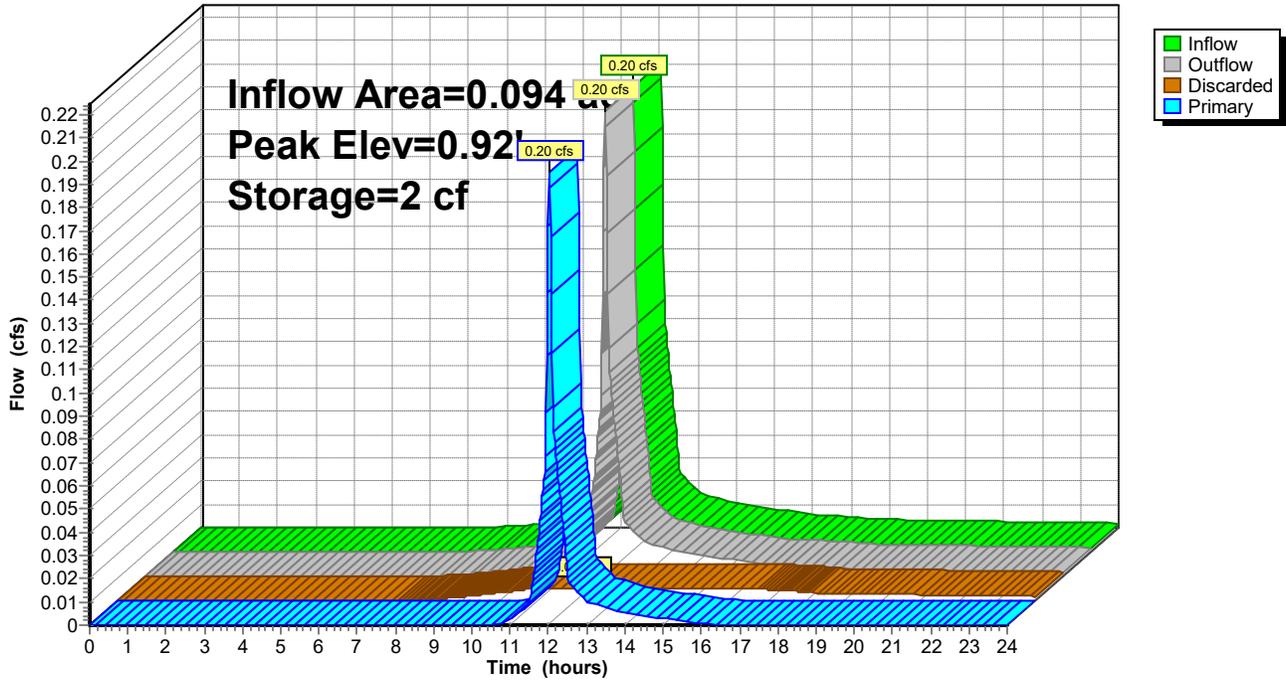
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**Pond 4P: BioRetention2**

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Type III 24-hr 2yr Rainfall=2.63"

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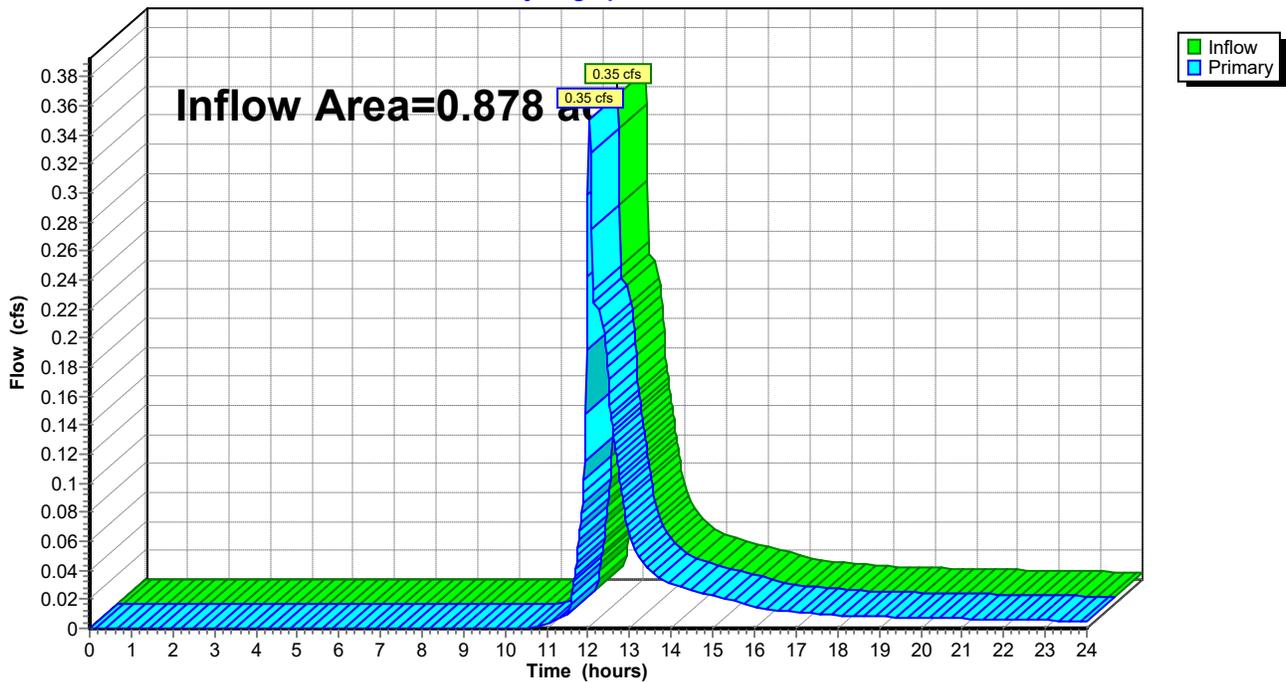
## Summary for Link 0: LAKE

Inflow Area = 0.878 ac, 21.92% Impervious, Inflow Depth > 0.40" for 2yr event  
Inflow = 0.35 cfs @ 12.03 hrs, Volume= 0.030 af  
Primary = 0.35 cfs @ 12.03 hrs, Volume= 0.030 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.02 hrs

### Link 0: LAKE

Hydrograph



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Type III 24-hr 10 yr Rainfall=3.83"

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## Summary for Subcatchment 1: LAKE FRONT

[49] Hint:  $T_c < 2dt$  may require smaller dt

Runoff = 0.37 cfs @ 12.03 hrs, Volume= 0.024 af, Depth> 1.34"

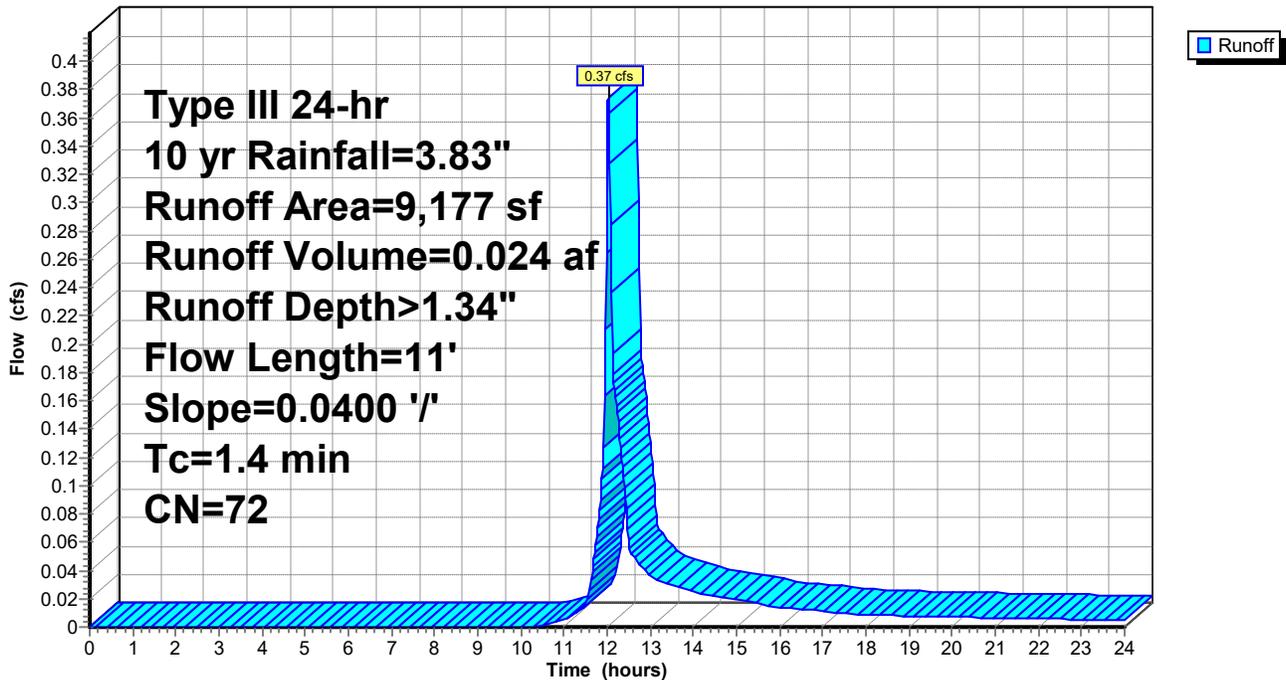
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.02 hrs  
Type III 24-hr 10 yr Rainfall=3.83"

Area (sf)	CN	Description
9,177	72	Woods/grass comb., Good, HSG C
9,177		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.4	11	0.0400	0.13		Sheet Flow, Grass: Short n= 0.150 P2= 2.63"

## Subcatchment 1: LAKE FRONT

Hydrograph



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**Summary for Subcatchment 2: FRONT OF HOUSE**

[49] Hint:  $T_c < 2dt$  may require smaller dt

Runoff = 0.25 cfs @ 12.00 hrs, Volume= 0.017 af, Depth> 3.60"

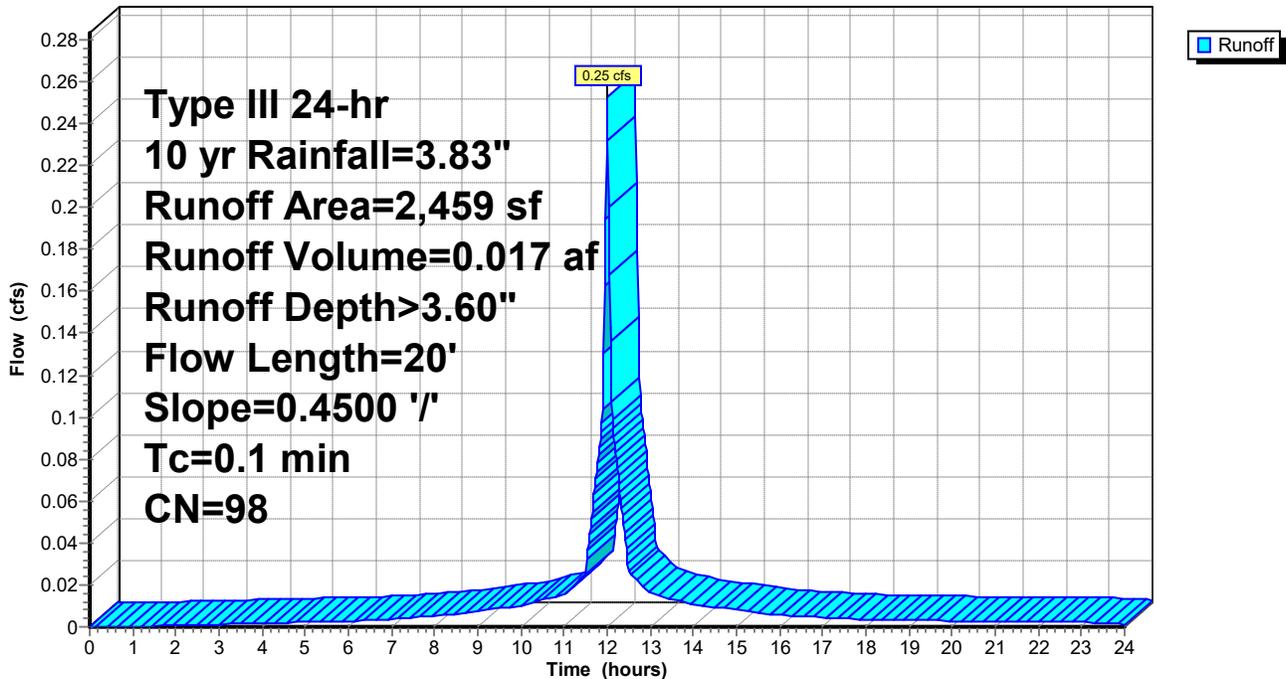
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.02 hrs  
Type III 24-hr 10 yr Rainfall=3.83"

Area (sf)	CN	Description
1,137	98	Roofs, HSG C
1,322	98	Water Surface, 0% imp, HSG C
2,459	98	Weighted Average
1,322		53.76% Pervious Area
1,137		46.24% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.1	20	0.4500	3.14		<b>Sheet Flow,</b> Smooth surfaces n= 0.011 P2= 2.63"

**Subcatchment 2: FRONT OF HOUSE**

Hydrograph



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## Summary for Subcatchment 3: SIDE

Runoff = 0.07 cfs @ 12.12 hrs, Volume= 0.006 af, Depth> 1.34"

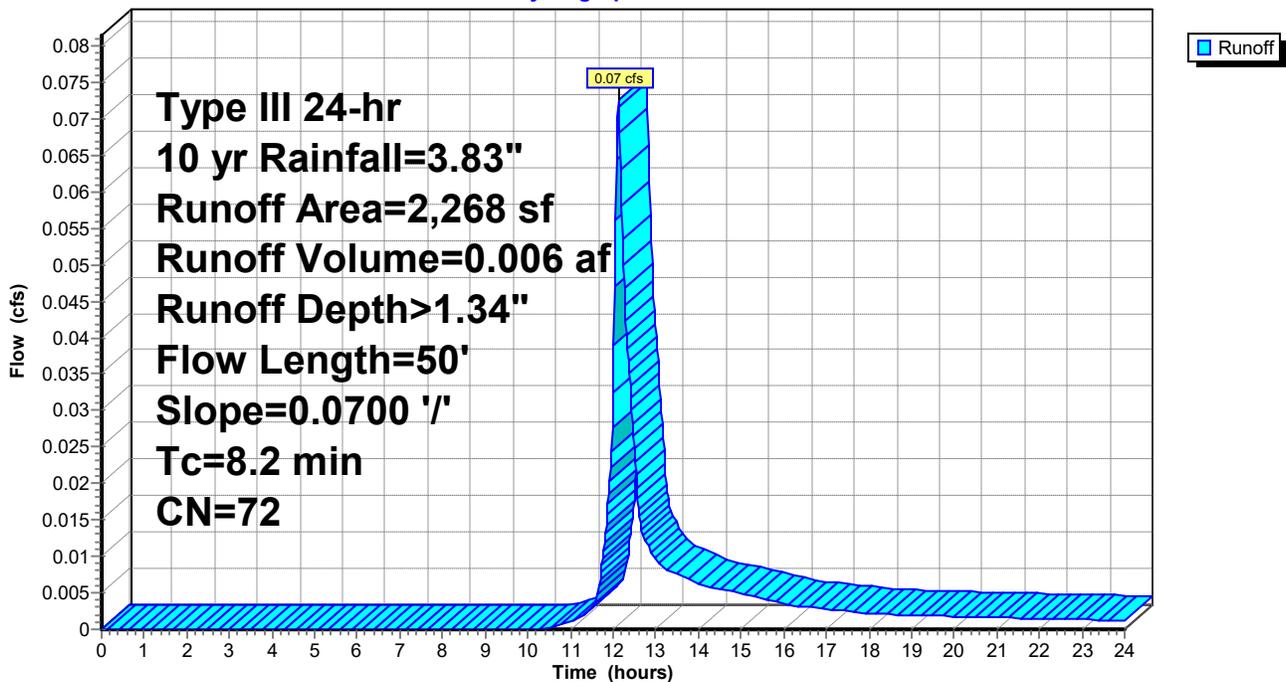
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.02 hrs  
Type III 24-hr 10 yr Rainfall=3.83"

Area (sf)	CN	Description
2,268	72	Woods/grass comb., Good, HSG C
2,268		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.2	50	0.0700	0.10		<b>Sheet Flow, existing site</b> Woods: Light underbrush n= 0.400 P2= 2.63"

## Subcatchment 3: SIDE

Hydrograph



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## Summary for Subcatchment 4: GARAGE

[49] Hint:  $T_c < 2dt$  may require smaller dt

Runoff = 0.12 cfs @ 12.00 hrs, Volume= 0.008 af, Depth> 3.60"

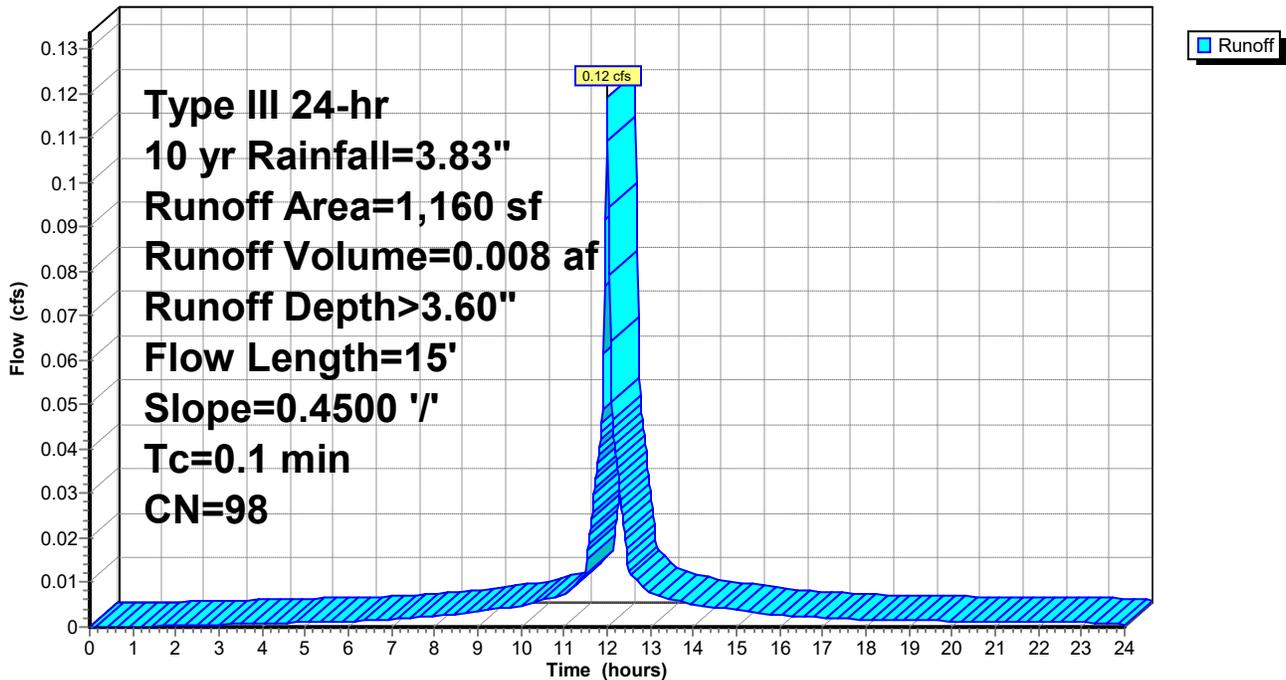
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.02 hrs  
Type III 24-hr 10 yr Rainfall=3.83"

Area (sf)	CN	Description
1,160	98	Roofs, HSG C
1,160		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.1	15	0.4500	2.96		Sheet Flow, Smooth surfaces n= 0.011 P2= 2.63"

## Subcatchment 4: GARAGE

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Type III 24-hr 10 yr Rainfall=3.83"

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**Summary for Subcatchment 5: DRIVE**

[49] Hint: Tc<2dt may require smaller dt

Runoff = 0.34 cfs @ 12.02 hrs, Volume= 0.021 af, Depth> 2.66"

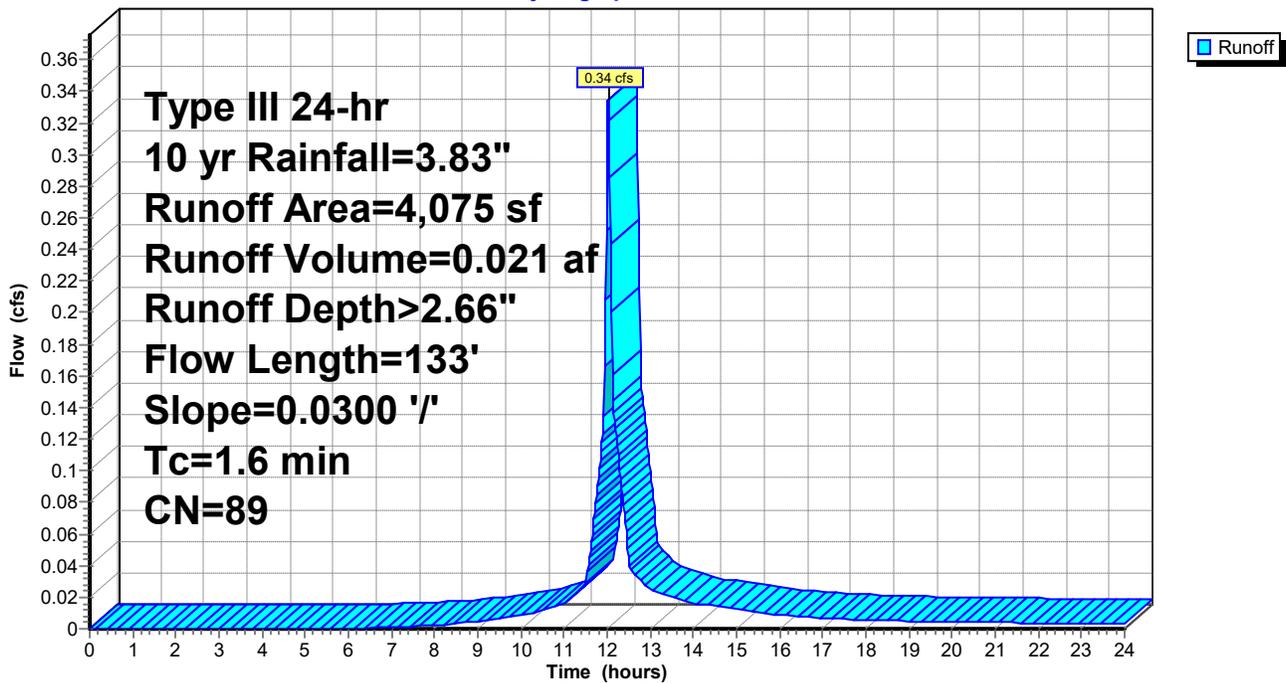
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.02 hrs  
Type III 24-hr 10 yr Rainfall=3.83"

	Area (sf)	CN	Description
*	2,500	98	DRIVE, HSG C
	1,575	74	>75% Grass cover, Good, HSG C
	4,075	89	Weighted Average
	1,575		38.65% Pervious Area
	2,500		61.35% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.1	100	0.0300	1.47		<b>Sheet Flow,</b> Smooth surfaces n= 0.011 P2= 2.63"
0.5	33	0.0300	1.21		<b>Shallow Concentrated Flow,</b> Short Grass Pasture Kv= 7.0 fps
1.6	133	Total			

**Subcatchment 5: DRIVE**

Hydrograph



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**Summary for Subcatchment 6: SEPTIC AREA**

Runoff = 0.16 cfs @ 12.43 hrs, Volume= 0.020 af, Depth> 1.33"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.02 hrs  
Type III 24-hr 10 yr Rainfall=3.83"

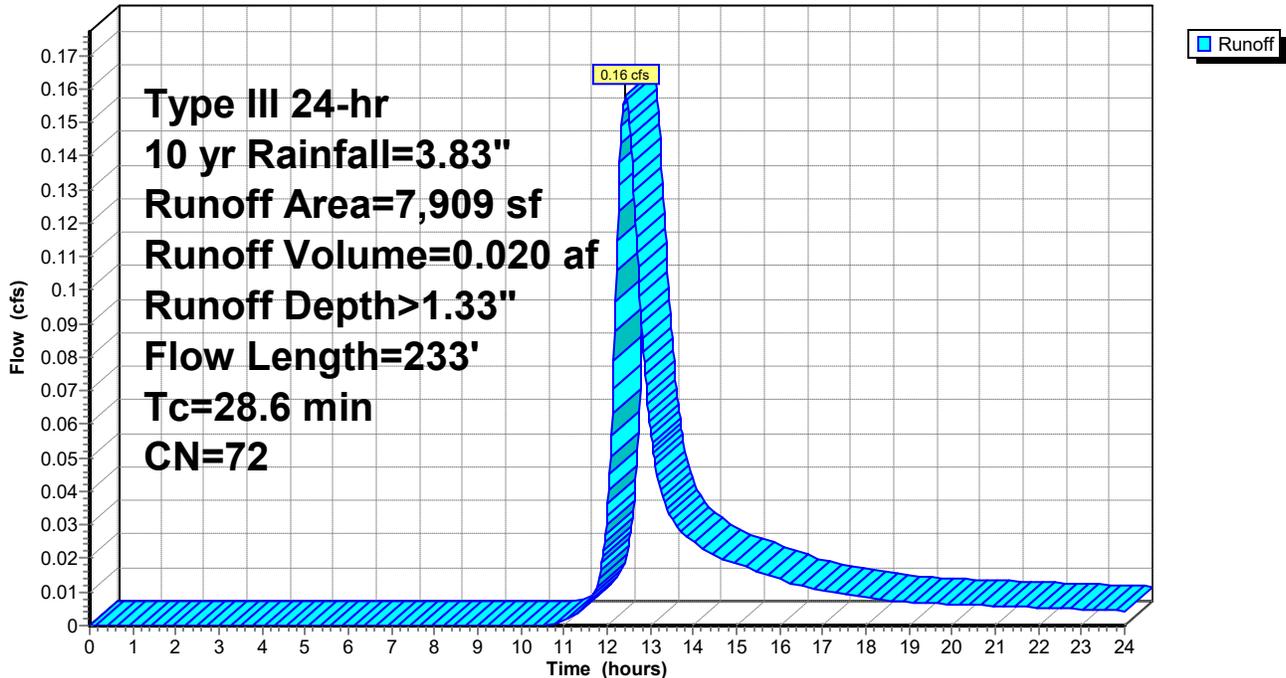
Area (sf)	CN	Description
7,909	72	Woods/grass comb., Good, HSG C
7,909		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
26.6	100	0.0600	0.06		<b>Sheet Flow,</b> Woods: Dense underbrush n= 0.800 P2= 2.63"
2.0	133	0.0500	1.12		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
28.6	233	Total			

**Subcatchment 6: SEPTIC AREA**

Hydrograph



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**Summary for Subcatchment 7: UPPER LOT**

Runoff = 0.15 cfs @ 12.36 hrs, Volume= 0.018 af, Depth> 1.21"

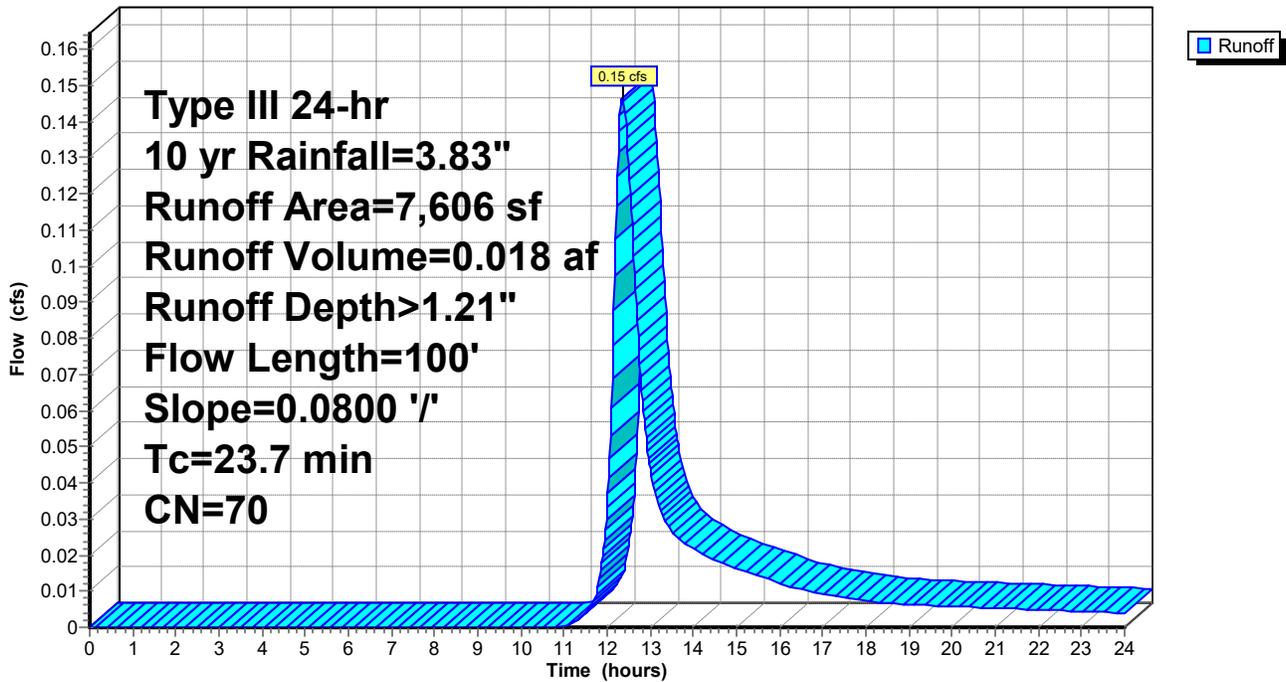
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.02 hrs  
Type III 24-hr 10 yr Rainfall=3.83"

Area (sf)	CN	Description
7,606	70	Woods, Good, HSG C
7,606		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
23.7	100	0.0800	0.07		<b>Sheet Flow,</b> Woods: Dense underbrush n= 0.800 P2= 2.63"

**Subcatchment 7: UPPER LOT**

Hydrograph



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**Summary for Subcatchment 8: HOUSE**

[49] Hint: Tc<2dt may require smaller dt

Runoff = 0.37 cfs @ 12.00 hrs, Volume= 0.025 af, Depth> 3.60"

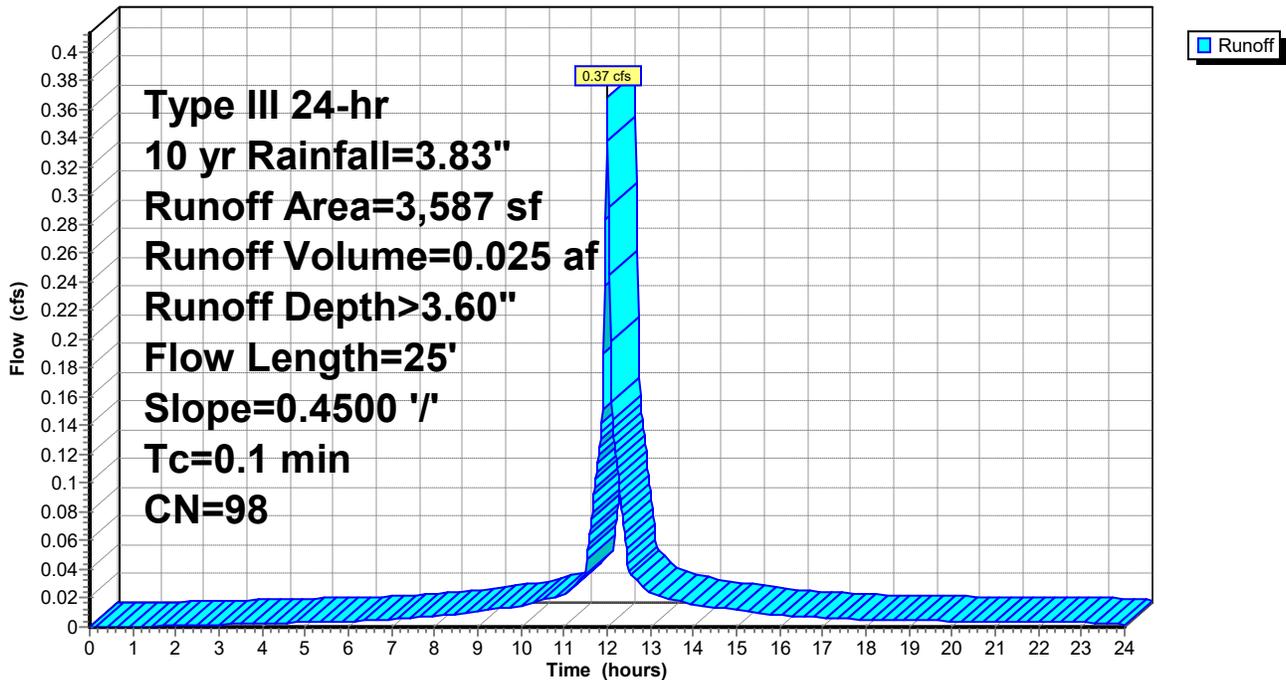
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.02 hrs  
Type III 24-hr 10 yr Rainfall=3.83"

Area (sf)	CN	Description
3,587	98	Roofs, HSG C
3,587		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.1	25	0.4500	3.28		Sheet Flow, Smooth surfaces n= 0.011 P2= 2.63"

**Subcatchment 8: HOUSE**

Hydrograph



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**Summary for Pond 1P: Pervious Patio**

Inflow Area = 0.056 ac, 46.24% Impervious, Inflow Depth > 3.60" for 10 yr event  
 Inflow = 0.25 cfs @ 12.00 hrs, Volume= 0.017 af  
 Outflow = 0.01 cfs @ 14.08 hrs, Volume= 0.013 af, Atten= 96%, Lag= 125.0 min  
 Discarded = 0.01 cfs @ 14.08 hrs, Volume= 0.013 af  
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af  
 Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.02 hrs  
 Peak Elev= 0.90' @ 14.08 hrs Surf.Area= 991 sf Storage= 356 cf

Plug-Flow detention time= 254.3 min calculated for 0.013 af (80% of inflow)  
 Center-of-Mass det. time= 177.3 min ( 924.6 - 747.3 )

Volume	Invert	Avail.Storage	Storage Description
#1	0.00'	595 cf	<b>Custom Stage Data (Prismatic)</b> Listed below (Recalc) 1,487 cf Overall x 40.0% Voids

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
0.00	991	0	0
1.00	991	991	991
1.50	991	496	1,487

Device	Routing	Invert	Outlet Devices
#1	Primary	1.00'	<b>4.0" Round Culvert</b> L= 4.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 1.00' / 0.90' S= 0.0250 '/ Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.09 sf
#2	Discarded	0.00'	<b>0.350 in/hr Exfiltration over Surface area</b> Conductivity to Groundwater Elevation = -3.00'
#3	Secondary	1.25'	<b>60.0' long x 1.0' breadth Broad-Crested Rectangular Weir</b> 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 Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31 3.30 3.31 3.32

**Discarded OutFlow** Max=0.01 cfs @ 14.08 hrs HW=0.90' (Free Discharge)  
 ↑**2=Exfiltration** ( Controls 0.01 cfs)

**Primary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=0.00' (Free Discharge)  
 ↑**1=Culvert** ( Controls 0.00 cfs)

**Secondary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=0.00' (Free Discharge)  
 ↑**3=Broad-Crested Rectangular Weir** ( Controls 0.00 cfs)

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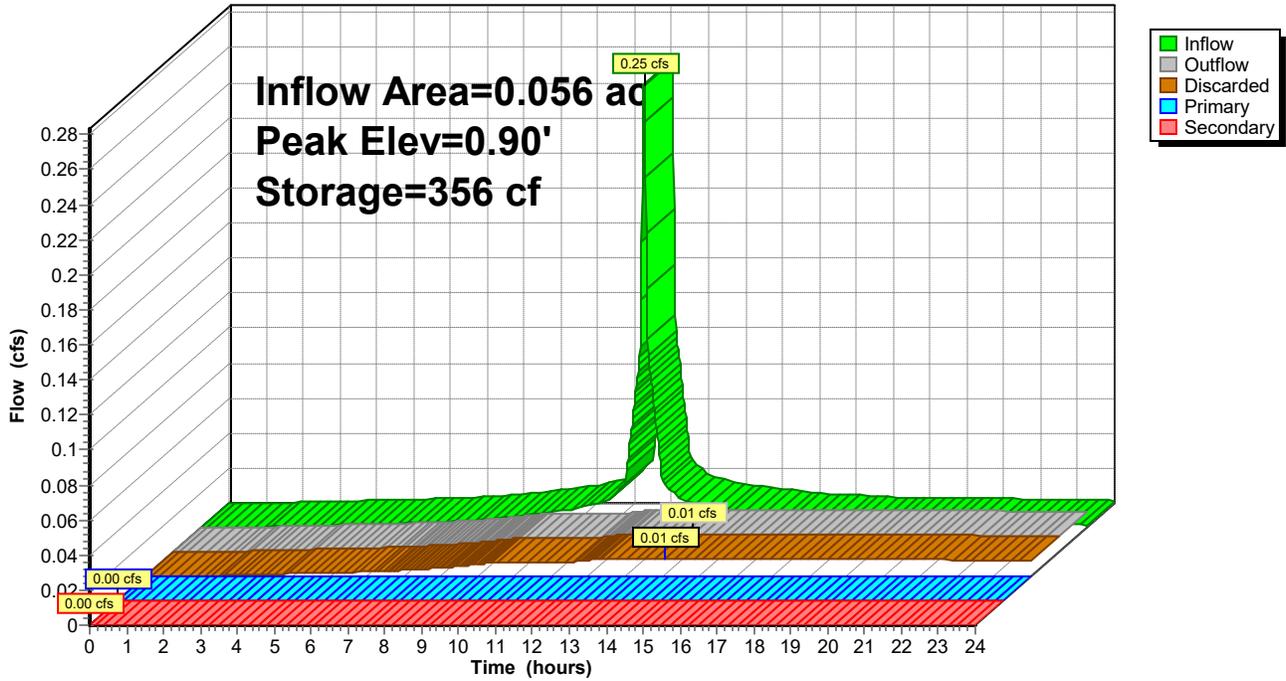
Type III 24-hr 10 yr Rainfall=3.83"

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## Pond 1P: Pervious Patio

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**Summary for Pond 2P: DRIP EDGES**

Inflow Area = 0.109 ac, 100.00% Impervious, Inflow Depth > 3.60" for 10 yr event  
 Inflow = 0.49 cfs @ 12.00 hrs, Volume= 0.033 af  
 Outflow = 0.48 cfs @ 12.00 hrs, Volume= 0.033 af, Atten= 1%, Lag= 0.1 min  
 Discarded = 0.48 cfs @ 12.00 hrs, Volume= 0.033 af  
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.02 hrs  
 Peak Elev= 0.00' @ 12.00 hrs Surf.Area= 683.000 ac Storage= 0.000 af

Plug-Flow detention time= 0.1 min calculated for 0.033 af (100% of inflow)  
 Center-of-Mass det. time= 0.1 min ( 747.4 - 747.3 )

Volume	Invert	Avail.Storage	Storage Description
#1	0.00'	4.098 af	<b>Custom Stage Data (Prismatic)</b> Listed below (Recalc) 1,024.500 af Overall x 0.4% Voids

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
0.00	683.000	0.000	0.000
1.50	683.000	1,024.500	1,024.500

Device	Routing	Invert	Outlet Devices
#1	Primary	1.40'	<b>100.0' long x 5.0' breadth Broad-Crested Rectangular Weir</b> 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
#2	Discarded	0.00'	<b>0.350 in/hr Exfiltration over Surface area</b> Conductivity to Groundwater Elevation = -3.00'

**Discarded OutFlow** Max=241.04 cfs @ 12.00 hrs HW=0.00' (Free Discharge)  
 ↑2=Exfiltration ( Controls 241.04 cfs)

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

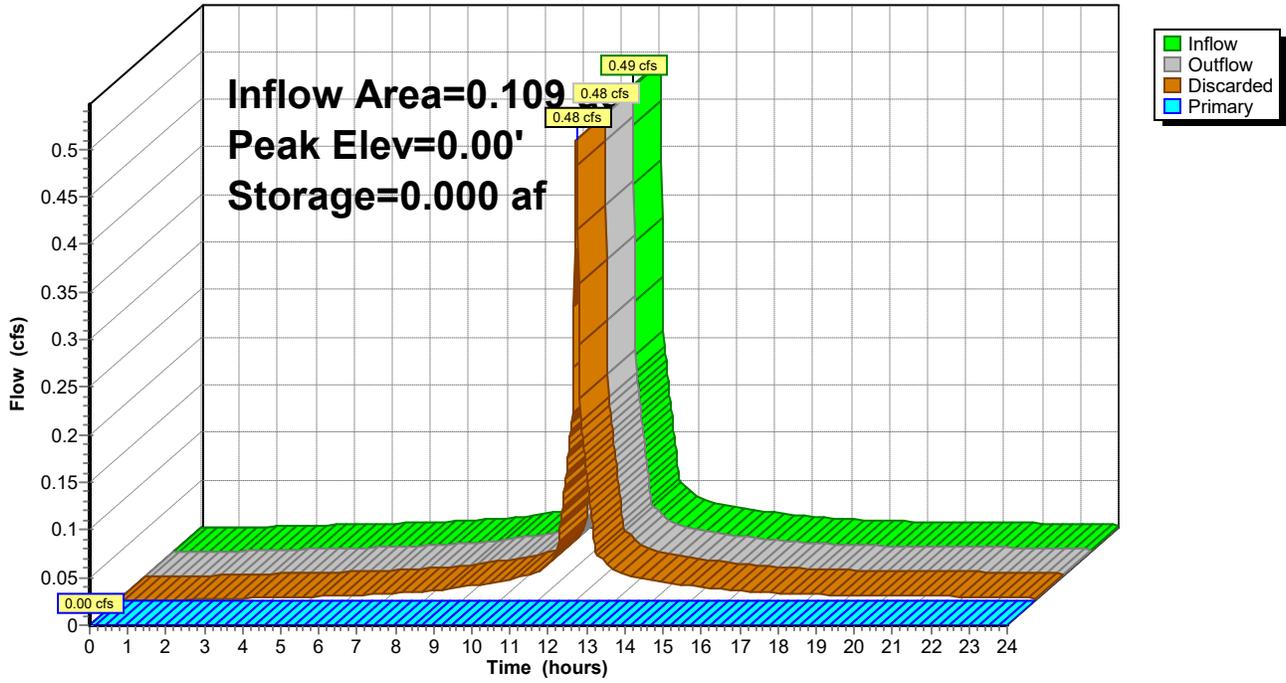
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**Pond 2P: DRIP EDGES**

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**Summary for Pond 3P: BioRetention1**

Inflow Area = 0.227 ac, 0.00% Impervious, Inflow Depth > 1.24" for 10 yr event  
 Inflow = 0.18 cfs @ 12.33 hrs, Volume= 0.023 af  
 Outflow = 0.18 cfs @ 12.33 hrs, Volume= 0.023 af, Atten= 0%, Lag= 0.1 min  
 Discarded = 0.02 cfs @ 12.33 hrs, Volume= 0.011 af  
 Primary = 0.17 cfs @ 12.33 hrs, Volume= 0.012 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.02 hrs / 2  
 Peak Elev= 0.92' @ 12.33 hrs Surf.Area= 1,471 sf Storage= 5 cf

Plug-Flow detention time= 4.9 min calculated for 0.023 af (99% of inflow)  
 Center-of-Mass det. time= 2.3 min ( 873.9 - 871.6 )

Volume	Invert	Avail.Storage	Storage Description
#1	0.00'	6 cf	<b>Custom Stage Data (Prismatic)</b> Listed below (Recalc) 1,471 cf Overall x 0.4% Voids

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
0.00	1,471	0	0
1.00	1,471	1,471	1,471

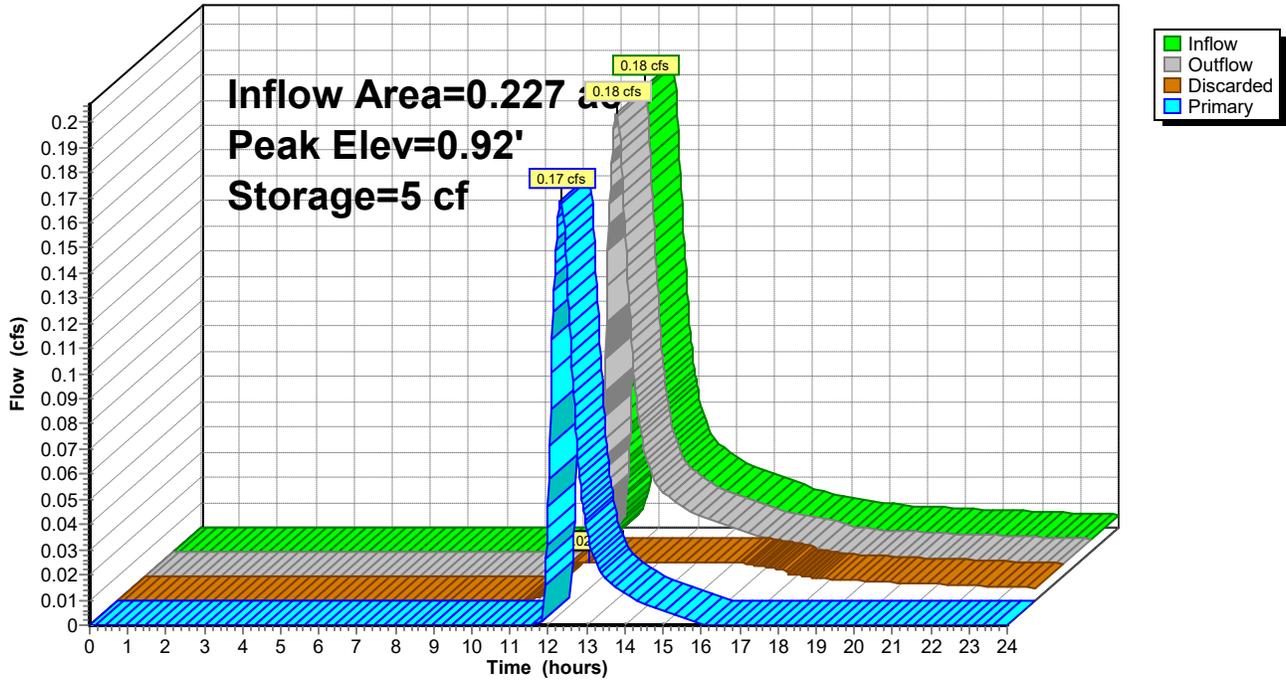
Device	Routing	Invert	Outlet Devices
#1	Primary	0.90'	<b>30.0' long x 5.0' breadth Broad-Crested Rectangular Weir</b> Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88
#2	Discarded	0.00'	<b>0.350 in/hr Exfiltration over Surface area</b> Conductivity to Groundwater Elevation = -3.00'

**Discarded OutFlow** Max=0.02 cfs @ 12.33 hrs HW=0.92' (Free Discharge)  
 ↑**2=Exfiltration** ( Controls 0.02 cfs)

**Primary OutFlow** Max=0.17 cfs @ 12.33 hrs HW=0.92' (Free Discharge)  
 ↑**1=Broad-Crested Rectangular Weir** (Weir Controls 0.17 cfs @ 0.31 fps)

Pond 3P: BioRetention1

Hydrograph



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**Summary for Pond 4P: BioRetention2**

Inflow Area = 0.094 ac, 61.35% Impervious, Inflow Depth > 2.66" for 10 yr event  
 Inflow = 0.34 cfs @ 12.02 hrs, Volume= 0.021 af  
 Outflow = 0.34 cfs @ 12.02 hrs, Volume= 0.021 af, Atten= 0%, Lag= 0.0 min  
 Discarded = 0.01 cfs @ 12.03 hrs, Volume= 0.006 af  
 Primary = 0.33 cfs @ 12.02 hrs, Volume= 0.015 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.02 hrs / 2  
 Peak Elev= 0.93' @ 12.03 hrs Surf.Area= 481 sf Storage= 2 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)  
 Center-of-Mass det. time= 1.1 min ( 801.0 - 799.9 )

Volume	Invert	Avail.Storage	Storage Description
#1	0.00'	2 cf	<b>Custom Stage Data (Prismatic)</b> Listed below (Recalc) 481 cf Overall x 0.4% Voids

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
0.00	481	0	0
1.00	481	481	481

Device	Routing	Invert	Outlet Devices
#1	Primary	0.90'	<b>25.0' long x 5.0' breadth Broad-Crested Rectangular Weir</b> 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
#2	Discarded	0.00'	<b>0.350 in/hr Exfiltration over Surface area</b> Conductivity to Groundwater Elevation = -3.00'

**Discarded OutFlow** Max=0.01 cfs @ 12.03 hrs HW=0.93' (Free Discharge)  
 ↑**2=Exfiltration** ( Controls 0.01 cfs)

**Primary OutFlow** Max=0.32 cfs @ 12.02 hrs HW=0.93' (Free Discharge)  
 ↑**1=Broad-Crested Rectangular Weir** (Weir Controls 0.32 cfs @ 0.41 fps)

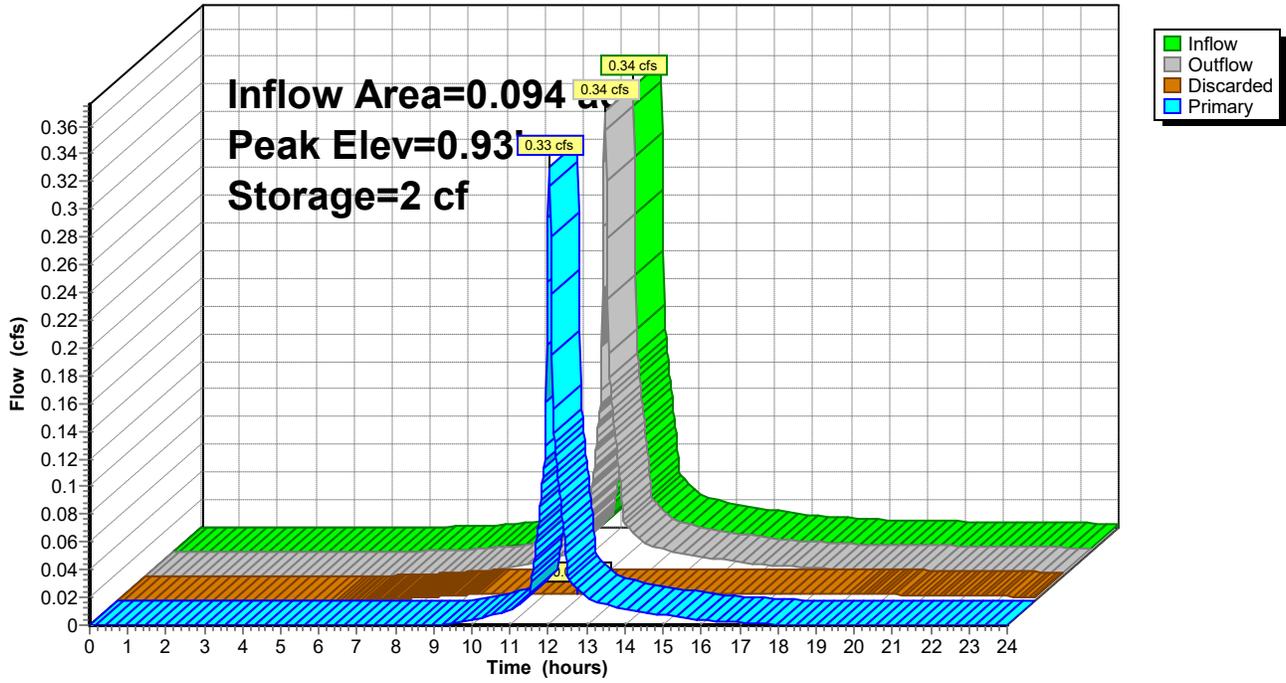
**Gibbs Stormwater**

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**Pond 4P: BioRetention2**

Hydrograph



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61 LIGHTHOUSE VIEW PROPOSED

Type III 24-hr 10 yr Rainfall=3.83"

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## Summary for Link 0: LAKE

Inflow Area = 0.878 ac, 21.92% Impervious, Inflow Depth > 0.96" for 10 yr event  
Inflow = 0.81 cfs @ 12.03 hrs, Volume= 0.070 af  
Primary = 0.81 cfs @ 12.03 hrs, Volume= 0.070 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.02 hrs

### Link 0: LAKE

Hydrograph

