

DRAINAGE SUMMARY

PROPOSED SINGLE-FAMILY DWELLING
113 GROVE STREET
NEWTON, MASSACHUSETTS



July 27, 2022

VERNE T. PORTER JR., PLS
LAND SURVEYORS – CIVIL ENGINEERS
354 ELLIOT STREET
NEWTON, MA 02464

DRAINAGE SUMMARY
PROPOSED SINGLE-FAMILY DWELLING
113 GROVE STREET
NEWTON, MASSACHUSETTS

The proposed project consists of the demolition of an existing single-family residential dwelling, subdivision of an existing lot and the construction of a new single-family dwelling including new driveway at 113 Grove St in Newton, MA, under the requirements of the City of Newton Stormwater Management and Erosion Control Rules & Regulations.

The on-site soils in the area are shown as “626B – Merrimac-Urban land complex, 0 to 8 percent slopes” soils on the NRCS Soils Survey map of the area, which are areas that fall within Hydrological Soil Groups of A & D. To confirm soil conditions, VTP performed four (4) test pits onsite on July 14, 2022 and found the parent material to be sand and gravel. For purposes of our design, VTP has used A soils with an infiltration rate of 8.27 in/hr in accordance with Table 2.3.3. 1982 Rawles Rates from the Massachusetts Stormwater Handbook.

Ground cover on the site is a dense residential grass area, building, and bituminous concrete walkways and driveway. The existing drainage on the site flows overland from the south to north towards the abutting property. Overall, the site will maintain the current flow pattern, however new collection systems for the proposed impervious areas have been provided to collect the runoff and attenuate offsite flows.

There are no wetlands or other Resource Areas within 100 feet of the lot. The proposed drainage controls are designed to capture & contain the runoff from the proposed impervious areas. This system will store the runoff from the new impervious area and allow the stored water to slowly infiltrate after the storm event and overflow offsite.

Under the proposed conditions, with the new building and driveways the rate of site runoff from the re-developed lot area will be less than the existing conditions for the 2, 10, 25 & 100-year storm events. The proposed controls have been designed to store this increase to maintain the pre and post runoff rates.

COMPLIANCE WITH STORMWATER STANDARDS

Untreated Stormwater (Standard 1)

The project is designed so that new stormwater conveyances (outfalls/discharges) do not discharge untreated stormwater into, or cause erosion to, existing wetlands.

Post-Development Peak Rates (Standard 2)

A hydrologic study was performed to determine the rate of runoff for the 100-year storm events under pre-development (existing) conditions. Unmitigated post-development rates were then computed in a similar manner. The study point where the peak rates were

compared were taken at one (1) location at the existing offsite flow area. From these analyses, it was determined that the proposed project and its stormwater management system would not increase the peak runoff rates above existing levels. It is the intent of the stormwater management system to minimize impacts to drainage patterns, and downstream property prior to its release from the site or discharge to wetlands.

The *United States Department of Agriculture (U.S.D.A)*. Soil Conservation Service (SCS) Technical Release 55 (TR-55), 1986, was used as the procedure for estimating runoff. A SCS TR-20-based computer program was used for estimating peak discharges. TR-55 is a generally accepted model for use on small sites that begin with a rainfall amount uniformly imposed on the watershed over a specified time distribution. Mass rainfall is converted to mass runoff by using a runoff curve number (CN). CN is based on soils, plant cover, impervious areas, interception, and surface storage. Runoff is then transformed into a hydrograph that depends on runoff travel time through segments of the watershed.

Development in a watershed changes the watershed's response to precipitation. The most common effects are reduced infiltration and decreased travel time, which can result in significantly higher peak rates of runoff. The volume of runoff is determined primarily by the amount of precipitation and by infiltration characteristics related to soil type, antecedent rainfall, type of vegetal cover, impervious surfaces, and surface retention. Travel time is determined primarily by slope, flow length, depth of flow, and roughness of flow surfaces. Peak rates of discharge are based on the relationship of the above parameters, as well as the total drainage area of the watershed, the location of the development in relation to the total drainage area, and the effect of any flood control works or other manmade storage. Peak rates of discharge are also influenced by the distribution of rainfall within a given storm event.

Stormwater management computations for the full-build were performed using a SCS-based *HYDROCAD* for existing and proposed conditions, curve numbers, time of concentrations and unit hydrograph computations.

Existing Conditions

Table 1. Shows the curve numbers, areas and times of concentration used to develop the pre-development hydrologic model of the site.

Table 1. – Existing Conditions					
Sub-Areas	Surface Cover	Curve Number (CN)	Area (SF)	Tc (Mins.)	Remarks
Area #1				6.0	
	Exist. Bldg.	98	566		Portion on Lot
	Exist. Imp.	98	1,763		Incl. Walks
	Lawn Areas	39	7,686		
		Total Area	10,015		
*CN based on Class A soils.					

Proposed Conditions

The proposed conditions will result in a new collection system that will collect the site run-off from the proposed dwellings and proposed driveways and direct it to underground leaching systems prior to overflowing off-site.

Table 2. Shows the curve numbers, areas and times of concentration used to develop the post-development hydrologic model of the site.

Table 2. – Proposed Conditions					
Sub-Areas	Surface Cover	Curve Number (CN)	Area (SF)	Tc (Mins.)	Remarks
Area #1				6.0	
	Lawn Area	39	6,440		
	Walks & Patios	98	270		
Area #2					
	Prop. Building	98	1,554		
	Prop. Driveways	98	1,751		
		Total Area	10,015		
*CN based on Class A soils.					

Peak Rate Summary

Table 3. Shows the peak runoff for the existing, as well as for the developed site at 100-year design storms.

Areas	Design Storm	Existing Runoff* (CFS)	Existing Volume* (Ac-Ft)	Proposed Runoff* (CFS)	Proposed Volume* (Ac-Ft)
Offsite Flow					
Existing	2-yr.	0.01	0.003	0.00	0.000
	10-yr.	0.14	0.013	0.01	0.002
	25-yr.	0.31	0.024	0.04	0.006
	100-yr.	0.79	0.054	0.24	0.023

Recharge to Groundwater (Standard 3)

The change in groundcover for the new development will change by increasing the impervious areas by approximately 1,246 sf. Groundwater infiltration will be achieved through the individual underground storage areas.

Required Recharge Volume for the entire site was calculated in accordance with the Massachusetts Stormwater Management Standards:

$R_v = F * \text{impervious area (in acres)}$
 $R_v = (0.60/12) * 0.082 = 0.004 \text{ Ac-ft.} = 178.75 \text{ CF}$

R_v = Required Recharge Volume;
 F = Target Depth Factor (0.60 in. for soils of Hydrologic Soil Group A);
 Impervious area = building, pavement on site in post development condition (0.082 Ac).

The proposed onsite leaching systems will store and infiltrate 178.75d cf in just the 2-year storm event.

Removal of TSS (Standard 4)

The proposed building will have clean runoff and the proposed driveway will flow through a drainmanhole with a 4' deep sump, and then infiltration to address TSS removal.

BMP ¹	Rate ¹	Load*	Removed (C*D)	Load (D-E)
Deep Sump and Hooded Catch Basin	0.25	1.00	0.25	0.75
Subsurface Infiltration Structure	0.80	0.75	0.60	0.15
Total TSS Removal =			85%	

Land Uses with Higher Potential Pollutant Loads (Standard 5)

The use proposed does not differ from the current use of the space and has no higher potential for pollution.

Critical Areas (Standard 6 – Water Quality Treatments)

This site does not lie within a critical area. One-half inch (1/2") of runoff is the standard for treatment relative to water quality, but as stated prior, the proposed use will not create pollutants in excess of what exists today.

Redevelopment (Standard 7)

Redevelopment projects are those that involve development, rehabilitation or expansion on previously developed sites provided the redevelopment results in no net increase in

impervious area. Furthermore, components of redevelopment project, which include development of previously undeveloped sites, do not fall under Standard 7. In addition, redevelopment of previously developed sites must meet the Stormwater Management Standards to the maximum extent practicable. However, if it is not practicable to meet all the Standards, new (retrofitted or expanded) stormwater management systems must be designed to improve existing conditions.

The project, as proposed, is a new building, replacing an existing building on a developed sited and we are increasing the impervious area, however it is minimal. VTP has considered this project a new development and we have met all of the applicable standards of the Massachusetts Stormwater Policy.

Erosion and Sedimentation Controls (Standard 8)

Erosion Control measures have been provided on the plans that accompany this application.

Operation and Maintenance Plan (Standard 9)

An Operation and Maintenance (O&M) Plan is provided as part of the application.

Prohibition of Illicit Discharges

The Owner and User of the facility, assures that there will not be illicit discharges to the nearby wetlands from the proposed facility.

Floodplain (310 CMR 10.57)

The project site does not fall with a floodplain district.

City of Newton Standards

In accordance with the City of Newton's Stormwater Management and Erosion Control Rules and Regulations, this project requires a Minor Stormwater Permit, as it is a residential development less than 4 units with land disturbance less than 0.5 acres.

Storage of Total Impervious area

The proposed project results in a post-development total impervious area of 3,575 SF. Per the City of Newton's Stormwater Management and Erosion Control Rules and Regulations, Section 5, Subsection B.1, this project is a teardown of an existing structure and therefore requires the applicant to retain 2" of runoff for the total of all impervious area.

$$\text{Volume} = (2''/12) * (3,575 \text{ sf}) = 595.83 \text{ CF}$$

As noted in the post-development HydroCAD report provided, the proposed BMP's offer a total storage volume of 0.021 acre-ft, which is equivalent to **914.76 CF** of available storage, which exceeds the required storage capacity of 595.83 CF

Total Phosphorus Removal

Existing Phosphorus Load

BMP Sub Area	Land Use Category	Cover Type	Area (Acres)	PLER (lb/acre/yr)*
1	Developed Land Pervious (HSG- A)	Impervious	0.053	1.96
2	Medium-Density Residential (MDR)	Pervious	0.176	0.03

*From Table 3-1 of appendix F.

$$\text{BMP}_{\text{Load}} = (0.053 \times 1.96) + (0.176 \times 0.03) = 0.11 \text{ lbs P/yr}$$

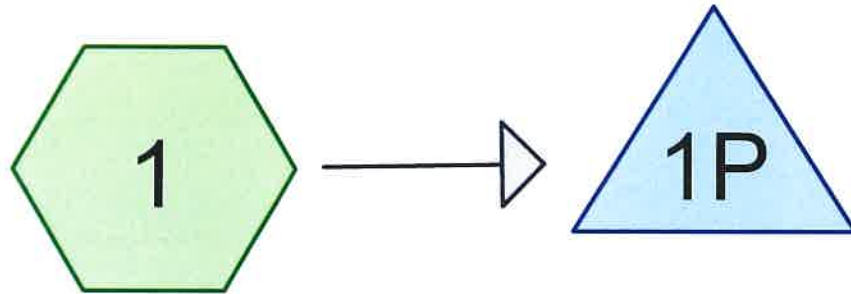
Proposed BMP's

Infiltration System #1

$$\text{BMP Volume}_{\text{ft}^3} \text{ (see HydroCAD)} = 0.021 \text{ acre-ft} = 914.76 \text{ ft}^3$$

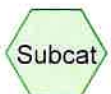
$$\begin{aligned} \text{BMP}_{\text{inches of runoff}} &= \text{BMP}_{\text{Volume}} (\text{ft}^3) / \text{IA} \times 12 \text{ in/ft} \times 1 \text{ acre} / 43,560 \text{ ft}^2 \\ &= 914.76 \text{ ft}^3 / 0.053 \text{ acre} \times 12 \text{ in/ft} \times 1 \text{ acre} / 43,560 \text{ ft}^2 \\ &= 4.75 \text{ in.} \end{aligned}$$

In accordance with BMP Curves for Soil Infiltration Rate: Infiltration Basin the BMP will have a 100% load reduction Efficiency for soils with an infiltration rate of 8.27 in/hr. and at least 2.0 inches of runoff.



Existing Site

Offsite



113 Grove St - Existing

Prepared by HP

Printed 7/27/2022

HydroCAD® 10.00-24 s/n 08768 © 2018 HydroCAD Software Solutions LLC

Page 2

Area Listing (selected nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.176	39	>75% Grass cover, Good, HSG A (1)
0.040	98	Exist. Impervious (1)
0.013	98	Existing Building (1)
0.230	53	TOTAL AREA

113 Grove St - Existing

Prepared by HP

HydroCAD® 10.00-24 s/n 08768 © 2018 HydroCAD Software Solutions LLC

113 Grove St - Existing
Type III 24-hr 2-Year Rainfall=3.16"

Printed 7/27/2022

Page 3

Summary for Subcatchment 1: Existing Site

Runoff = 0.01 cfs @ 12.39 hrs, Volume= 0.003 af, Depth> 0.15"

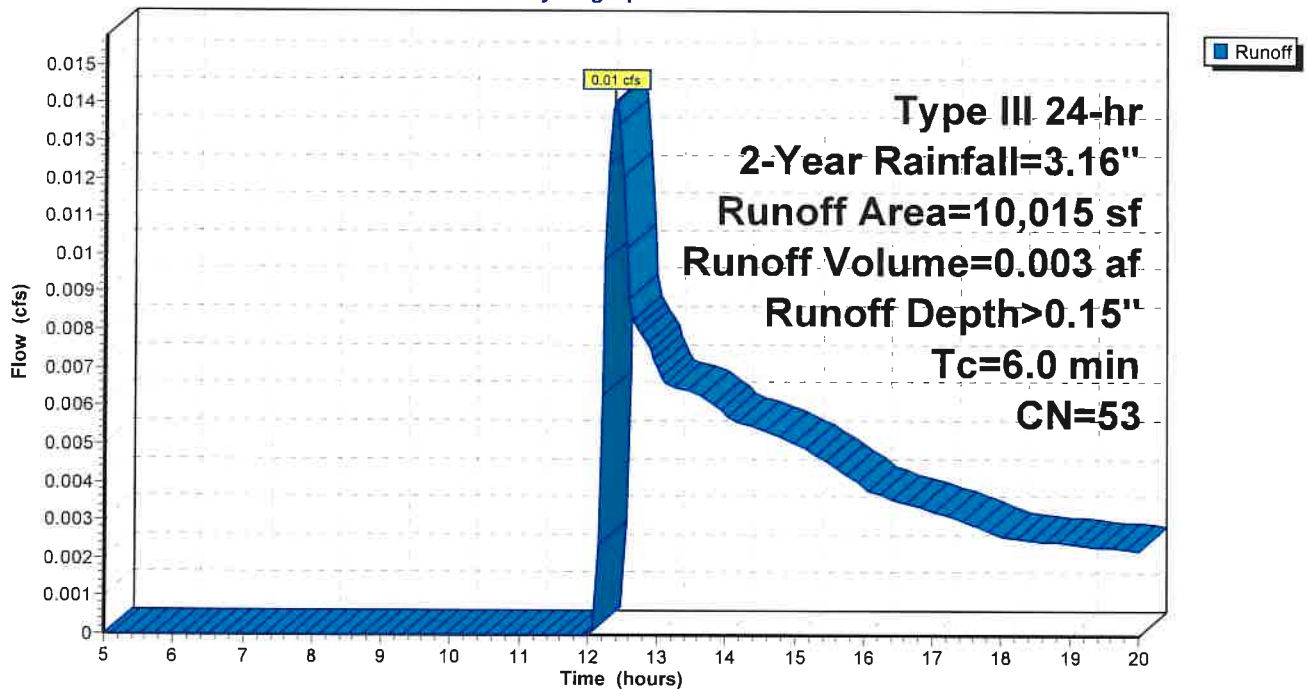
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.16"

Area (sf)	CN	Description
7,686	39	>75% Grass cover, Good, HSG A
* 1,763	98	Exist. Impervious
* 566	98	Existing Building
10,015	53	Weighted Average
7,686		76.74% Pervious Area
2,329		23.26% Impervious Area

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

Subcatchment 1: Existing Site

Hydrograph



113 Grove St - Existing

Prepared by HP

HydroCAD® 10.00-24 s/n 08768 © 2018 HydroCAD Software Solutions LLC

113 Grove St - Existing
Type III 24-hr 2-Year Rainfall=3.16"

Printed 7/27/2022

Page 4

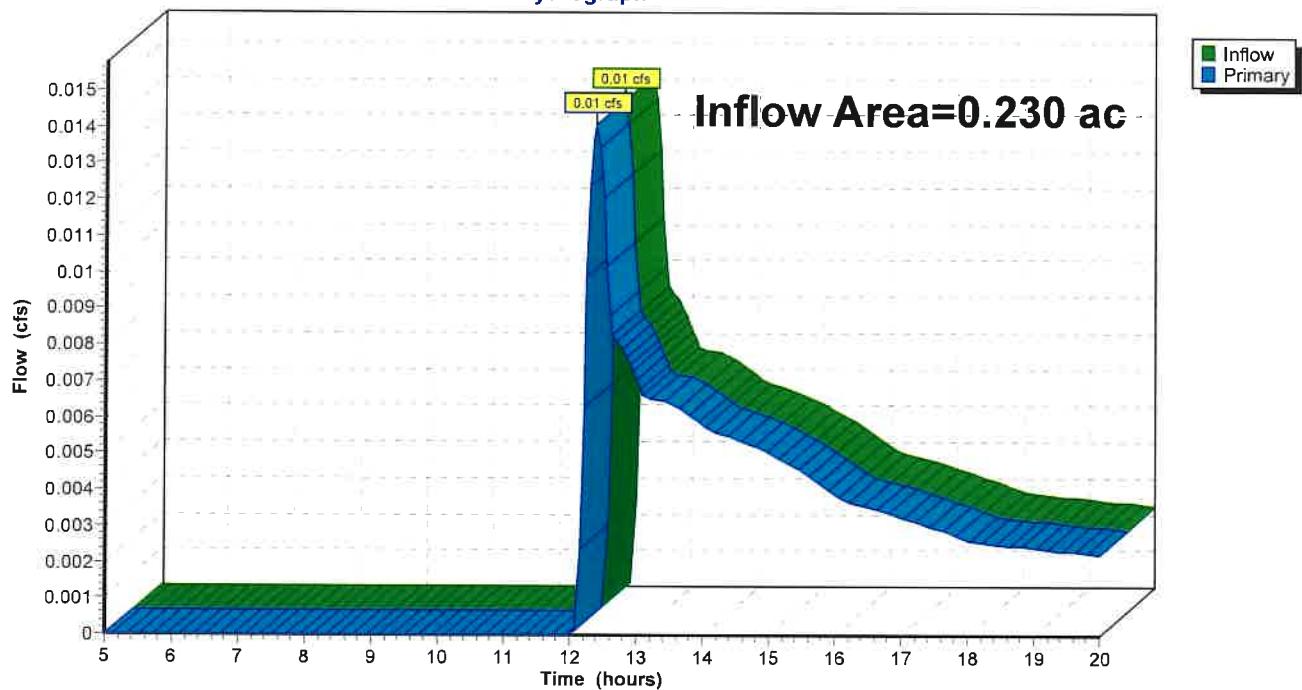
Summary for Pond 1P: Offsite

Inflow Area = 0.230 ac, 23.26% Impervious, Inflow Depth > 0.15" for 2-Year event
Inflow = 0.01 cfs @ 12.39 hrs, Volume= 0.003 af
Primary = 0.01 cfs @ 12.39 hrs, Volume= 0.003 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Pond 1P: Offsite

Hydrograph



113 Grove St - Existing

Prepared by HP

HydroCAD® 10.00-24 s/n 08768 © 2018 HydroCAD Software Solutions LLC

113 Grove St - Existing
Type III 24-hr 5-Year Rainfall=3.99"

Printed 7/27/2022

Page 5

Summary for Subcatchment 1: Existing Site

Runoff = 0.06 cfs @ 12.16 hrs, Volume= 0.007 af, Depth> 0.38"

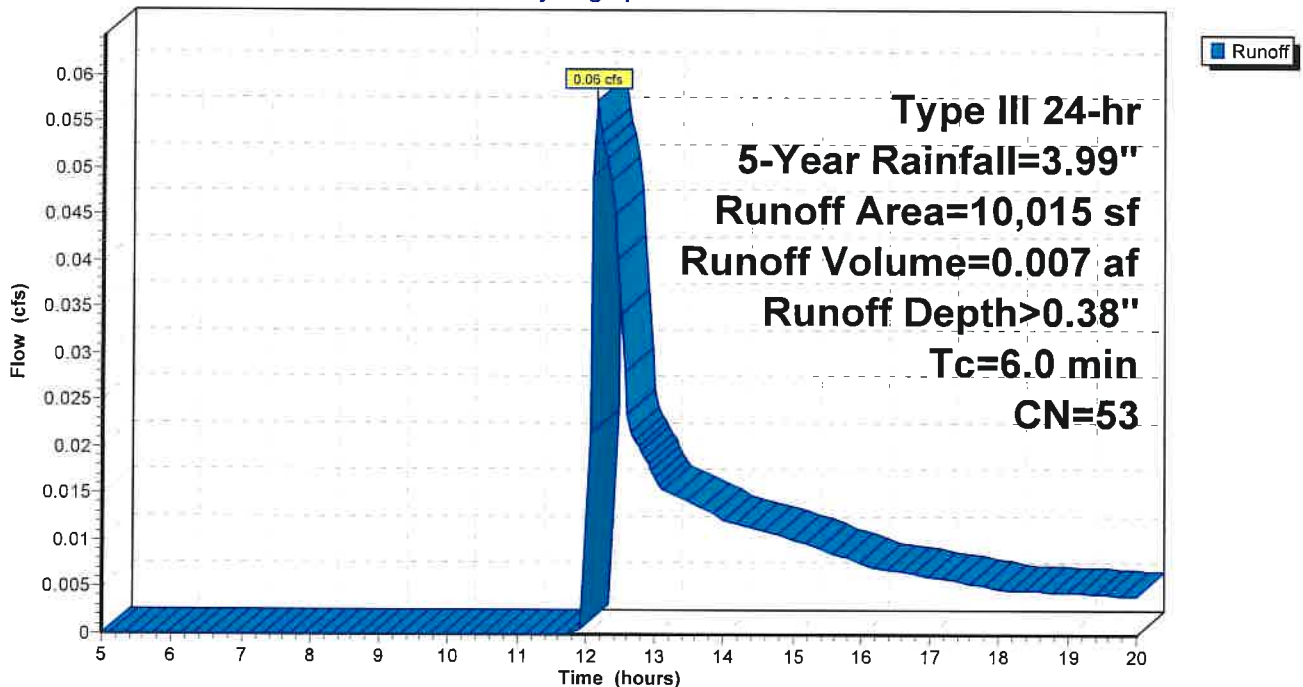
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 5-Year Rainfall=3.99"

Area (sf)	CN	Description
7,686	39	>75% Grass cover, Good, HSG A
* 1,763	98	Exist. Impervious
* 566	98	Existing Building
10,015	53	Weighted Average
7,686		76.74% Pervious Area
2,329		23.26% Impervious Area

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

Subcatchment 1: Existing Site

Hydrograph



113 Grove St - Existing

Prepared by HP

HydroCAD® 10.00-24 s/n 08768 © 2018 HydroCAD Software Solutions LLC

113 Grove St - Existing
Type III 24-hr 5-Year Rainfall=3.99"

Printed 7/27/2022

Page 6

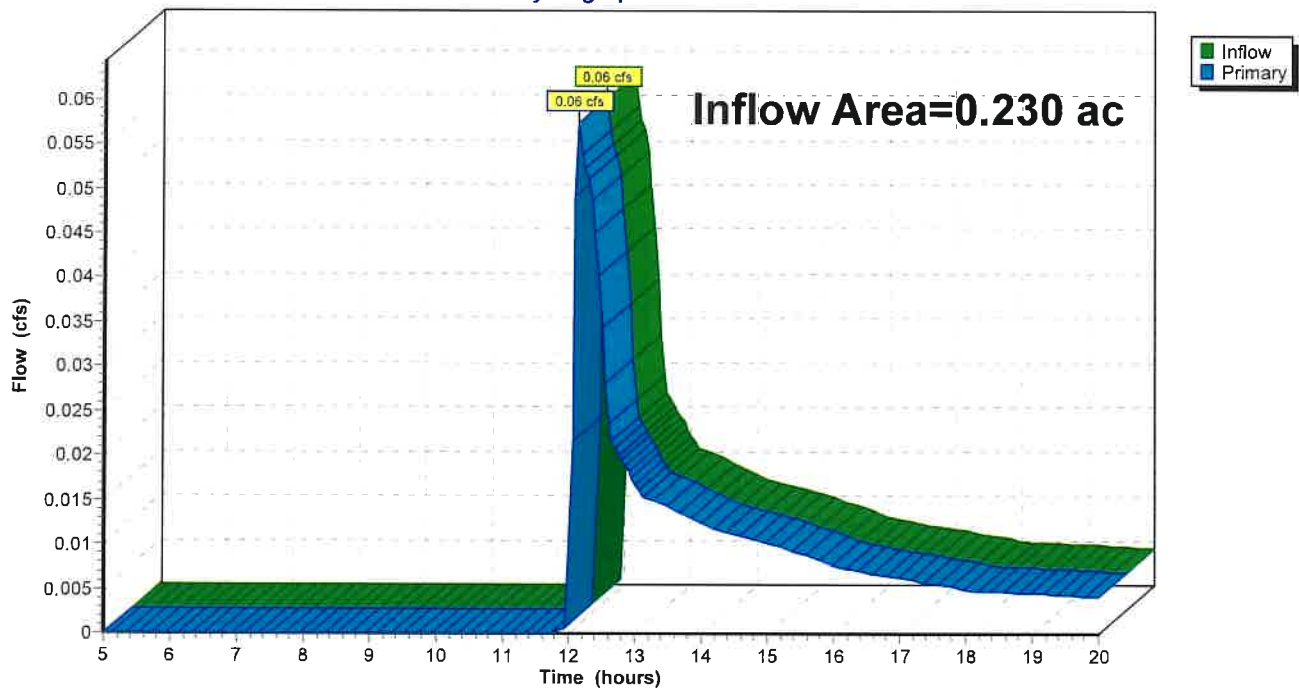
Summary for Pond 1P: Offsite

Inflow Area = 0.230 ac, 23.26% Impervious, Inflow Depth > 0.38" for 5-Year event
Inflow = 0.06 cfs @ 12.16 hrs, Volume= 0.007 af
Primary = 0.06 cfs @ 12.16 hrs, Volume= 0.007 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Pond 1P: Offsite

Hydrograph



113 Grove St - Existing

Prepared by HP

HydroCAD® 10.00-24 s/n 08768 © 2018 HydroCAD Software Solutions LLC

113 Grove St - Existing
Type III 24-hr 25-Year Rainfall=6.03"

Printed 7/27/2022

Page 7

Summary for Subcatchment 1: Existing Site

Runoff = 0.31 cfs @ 12.11 hrs, Volume= 0.024 af, Depth> 1.24"

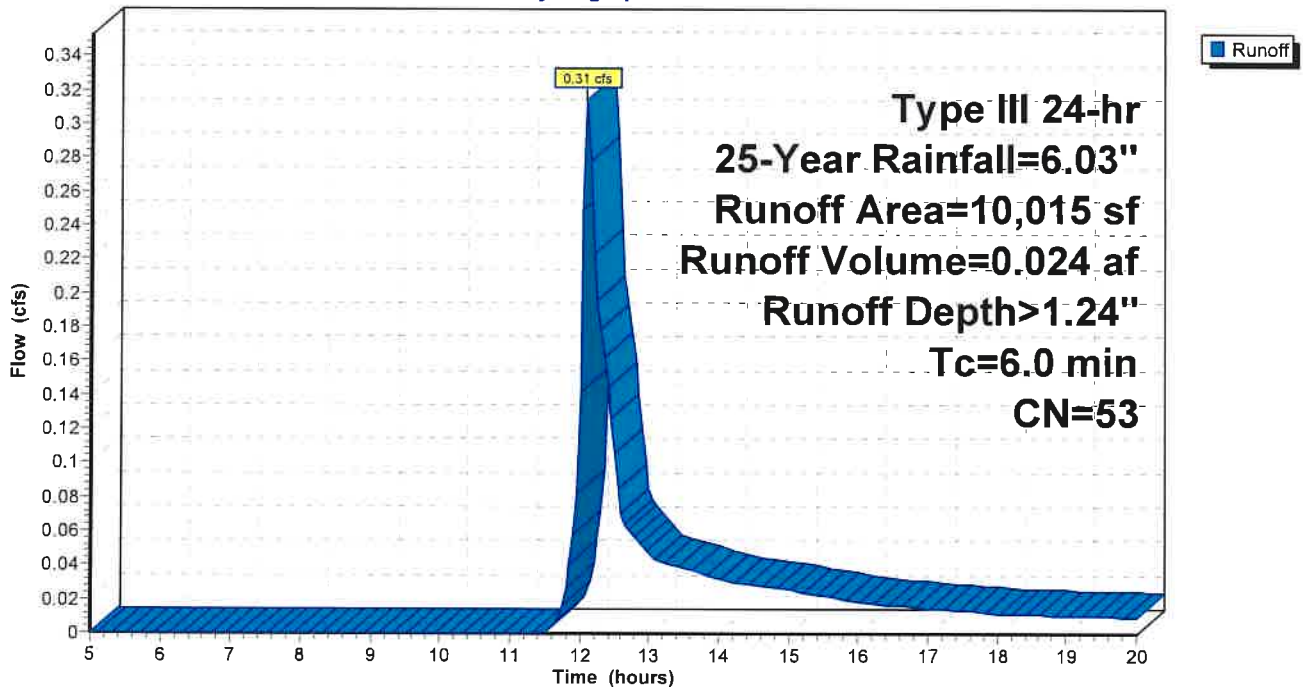
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=6.03"

Area (sf)	CN	Description
7,686	39	>75% Grass cover, Good, HSG A
* 1,763	98	Exist. Impervious
* 566	98	Existing Building
10,015	53	Weighted Average
7,686		76.74% Pervious Area
2,329		23.26% Impervious Area

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

Subcatchment 1: Existing Site

Hydrograph



113 Grove St - Existing

Prepared by HP

HydroCAD® 10.00-24 s/n 08768 © 2018 HydroCAD Software Solutions LLC

113 Grove St - Existing
Type III 24-hr 25-Year Rainfall=6.03"

Printed 7/27/2022

Page 8

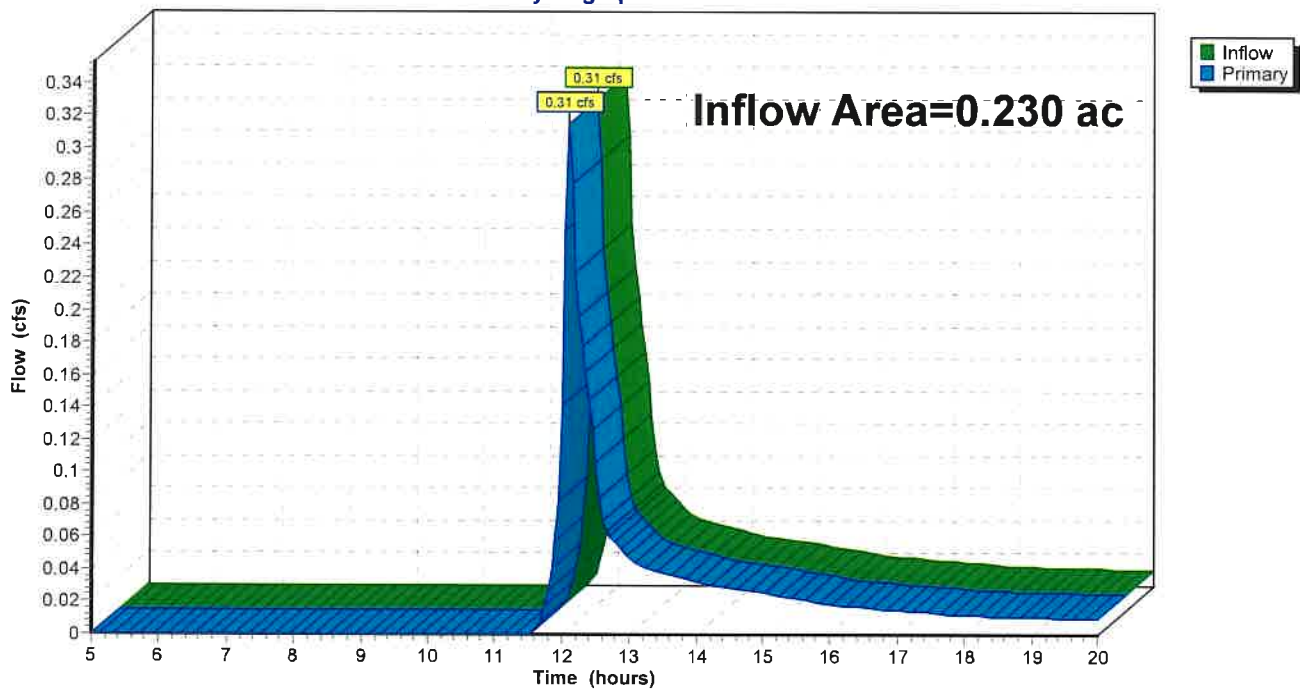
Summary for Pond 1P: Offsite

Inflow Area = 0.230 ac, 23.26% Impervious, Inflow Depth > 1.24" for 25-Year event
Inflow = 0.31 cfs @ 12.11 hrs, Volume= 0.024 af
Primary = 0.31 cfs @ 12.11 hrs, Volume= 0.024 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Pond 1P: Offsite

Hydrograph



113 Grove St - Existing

Prepared by HP

HydroCAD® 10.00-24 s/n 08768 © 2018 HydroCAD Software Solutions LLC

113 Grove St - Existing
Type III 24-hr Custom Rainfall=8.78"

Printed 7/27/2022

Page 9

Summary for Subcatchment 1: Existing Site

Runoff = 0.79 cfs @ 12.10 hrs, Volume= 0.054 af, Depth> 2.83"

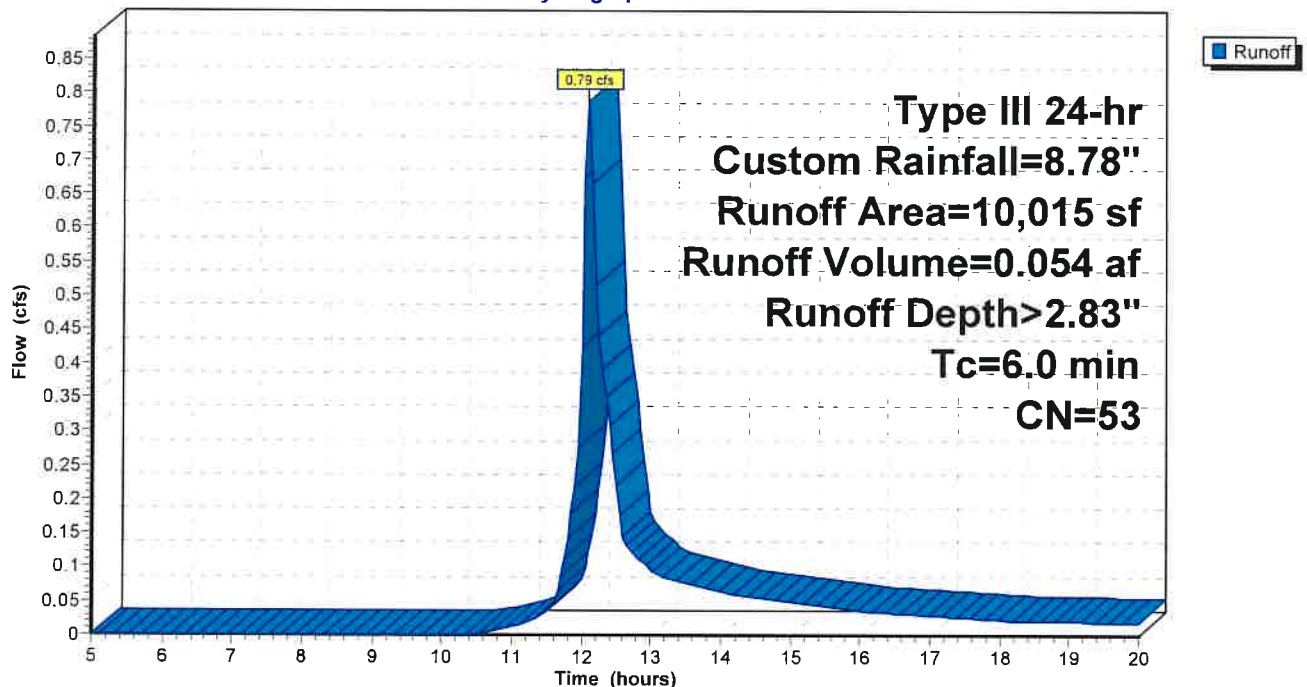
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr Custom Rainfall=8.78"

Area (sf)	CN	Description
7,686	39	>75% Grass cover, Good, HSG A
* 1,763	98	Exist. Impervious
* 566	98	Existing Building
10,015	53	Weighted Average
7,686		76.74% Pervious Area
2,329		23.26% Impervious Area

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

Subcatchment 1: Existing Site

Hydrograph



113 Grove St - Existing

Prepared by HP

HydroCAD® 10.00-24 s/n 08768 © 2018 HydroCAD Software Solutions LLC

113 Grove St - Existing
Type III 24-hr Custom Rainfall=8.78"

Printed 7/27/2022

Page 10

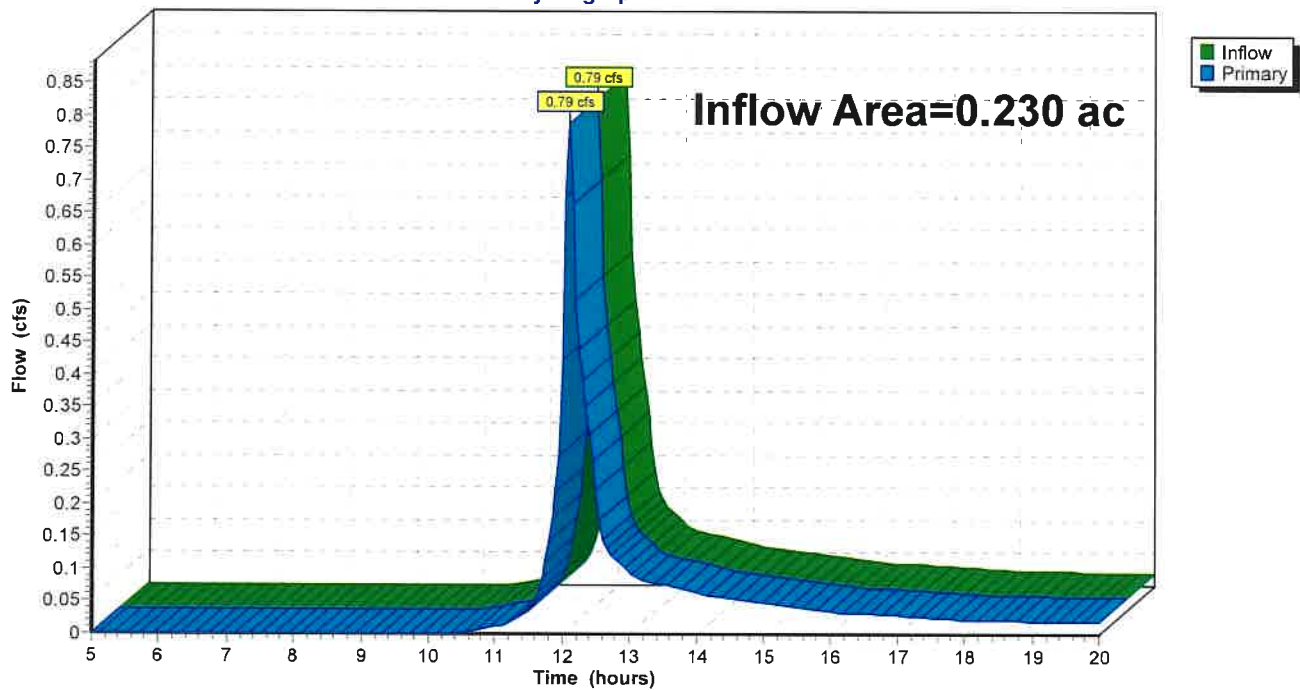
Summary for Pond 1P: Offsite

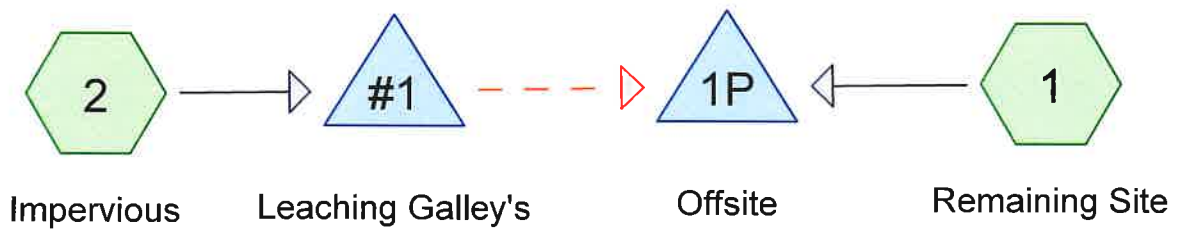
Inflow Area = 0.230 ac, 23.26% Impervious, Inflow Depth > 2.83" for Custom event
Inflow = 0.79 cfs @ 12.10 hrs, Volume= 0.054 af
Primary = 0.79 cfs @ 12.10 hrs, Volume= 0.054 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Pond 1P: Offsite

Hydrograph





113 Grove St - Proposed

Prepared by HP

Printed 7/27/2022

HydroCAD® 10.00-24 s/n 08768 © 2018 HydroCAD Software Solutions LLC

Page 2

Area Listing (selected nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.148	39	>75% Grass cover, Good, HSG A (1)
0.040	98	Prop. Building (2)
0.036	98	Prop. Driveway (2)
0.006	98	Prop. Patios (1)
0.230	60	TOTAL AREA

113 Grove St - Proposed

Prepared by HP

HydroCAD® 10.00-24 s/n 08768 © 2018 HydroCAD Software Solutions LLC

113 Grove St - Proposed
Type III 24-hr 2-Year Rainfall=3.16"

Printed 7/27/2022

Page 3

Summary for Subcatchment 1: Remaining Site

Runoff = 0.00 cfs @ 20.00 hrs, Volume= 0.000 af, Depth> 0.00"

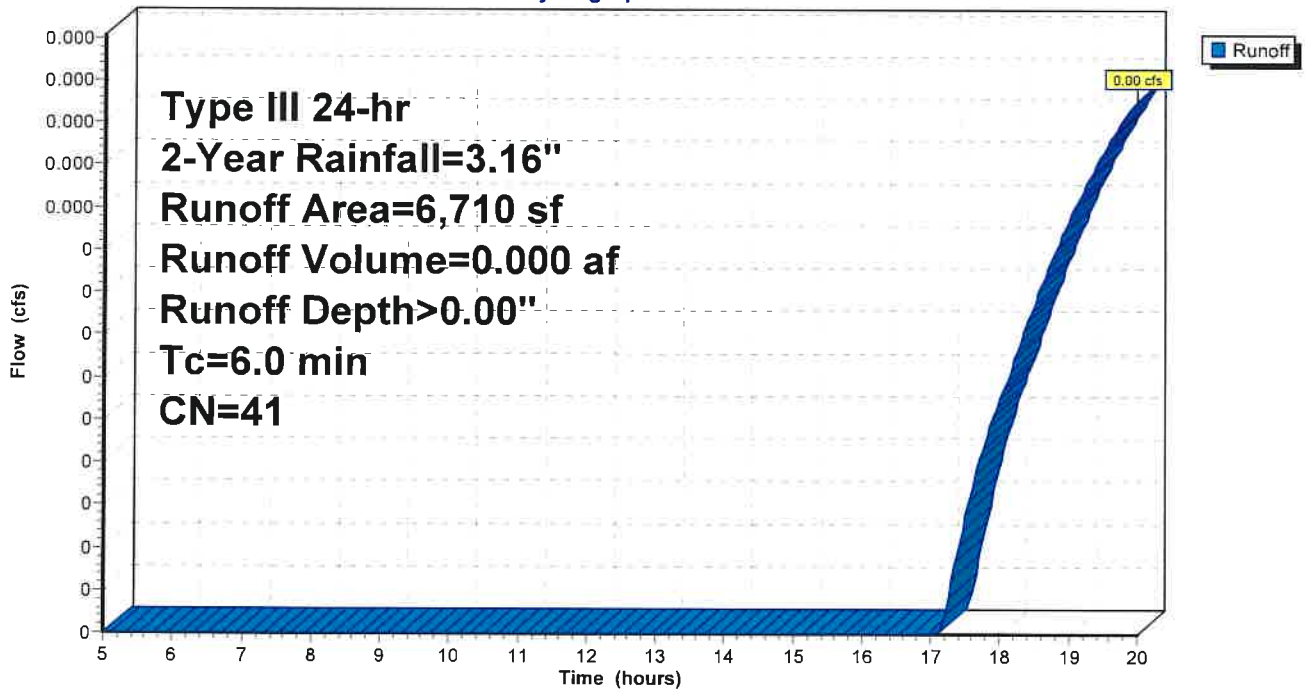
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.16"

Area (sf)	CN	Description
6,440	39	>75% Grass cover, Good, HSG A
* 270	98	Prop. Patios
6,710	41	Weighted Average
6,440		95.98% Pervious Area
270		4.02% Impervious Area

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

Subcatchment 1: Remaining Site

Hydrograph



113 Grove St - Proposed

Prepared by HP

HydroCAD® 10.00-24 s/n 08768 © 2018 HydroCAD Software Solutions LLC

113 Grove St - Proposed
Type III 24-hr 2-Year Rainfall=3.16"

Printed 7/27/2022

Page 4

Summary for Subcatchment 2: Impervious

Runoff = 0.23 cfs @ 12.09 hrs, Volume= 0.017 af, Depth> 2.74"

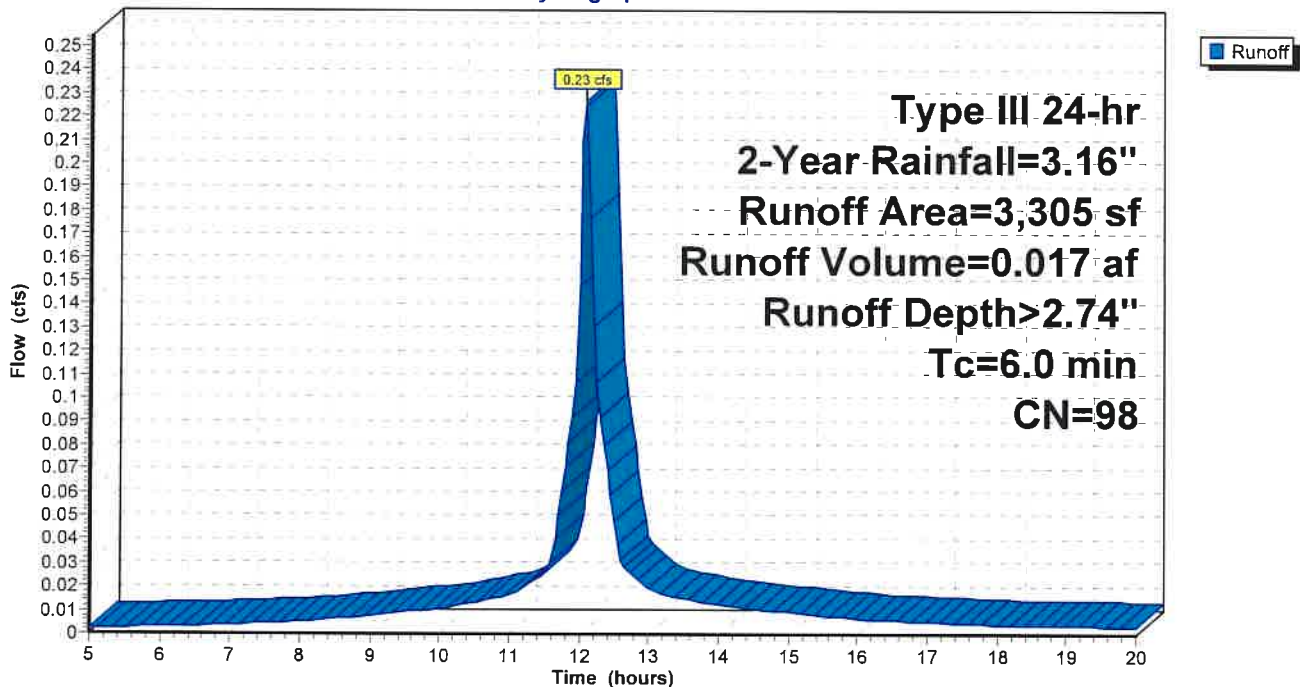
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.16"

	Area (sf)	CN	Description
*	1,554	98	Prop. Driveway
*	1,751	98	Prop. Building
	3,305	98	Weighted Average
	3,305		100.00% Impervious Area

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

Subcatchment 2: Impervious

Hydrograph



113 Grove St - Proposed

Prepared by HP

HydroCAD® 10.00-24 s/n 08768 © 2018 HydroCAD Software Solutions LLC

113 Grove St - Proposed
Type III 24-hr 2-Year Rainfall=3.16"

Printed 7/27/2022

Page 5

Summary for Pond #1: Leaching Galley's

Inflow Area = 0.076 ac, 100.00% Impervious, Inflow Depth > 2.74" for 2-Year event
 Inflow = 0.23 cfs @ 12.09 hrs, Volume= 0.017 af
 Outflow = 0.06 cfs @ 11.80 hrs, Volume= 0.017 af, Atten= 76%, Lag= 0.0 min
 Discarded = 0.06 cfs @ 11.80 hrs, Volume= 0.017 af
 Secondary = 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= 117.30' @ 12.47 hrs Surf.Area= 0.007 ac Storage= 0.004 af

Plug-Flow detention time= 15.8 min calculated for 0.017 af (100% of inflow)
 Center-of-Mass det. time= 15.4 min (754.1 - 738.7)

Volume	Invert	Avail.Storage	Storage Description
#1	116.25'	0.009 af	8.00'W x 36.00'L x 5.25'H Gravel 0.035 af Overall - 0.012 af Embedded = 0.022 af x 40.0% Voids
#2	116.75'	0.012 af	4.00'W x 4.00'L x 4.25'H Leaching Galleyx 8 Inside #1
		0.021 af	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	116.25'	8.270 in/hr Exfiltration over Surface area
#2	Secondary	120.00'	6.0" Vert. Orifice C= 0.600

Discarded OutFlow Max=0.06 cfs @ 11.80 hrs HW=116.32' (Free Discharge)
 ↳1=Exfiltration (Exfiltration Controls 0.06 cfs)

Secondary OutFlow Max=0.00 cfs @ 5.00 hrs HW=116.25' (Free Discharge)
 ↳2=Orifice (Controls 0.00 cfs)

113 Grove St - Proposed

Prepared by HP

HydroCAD® 10.00-24 s/n 08768 © 2018 HydroCAD Software Solutions LLC

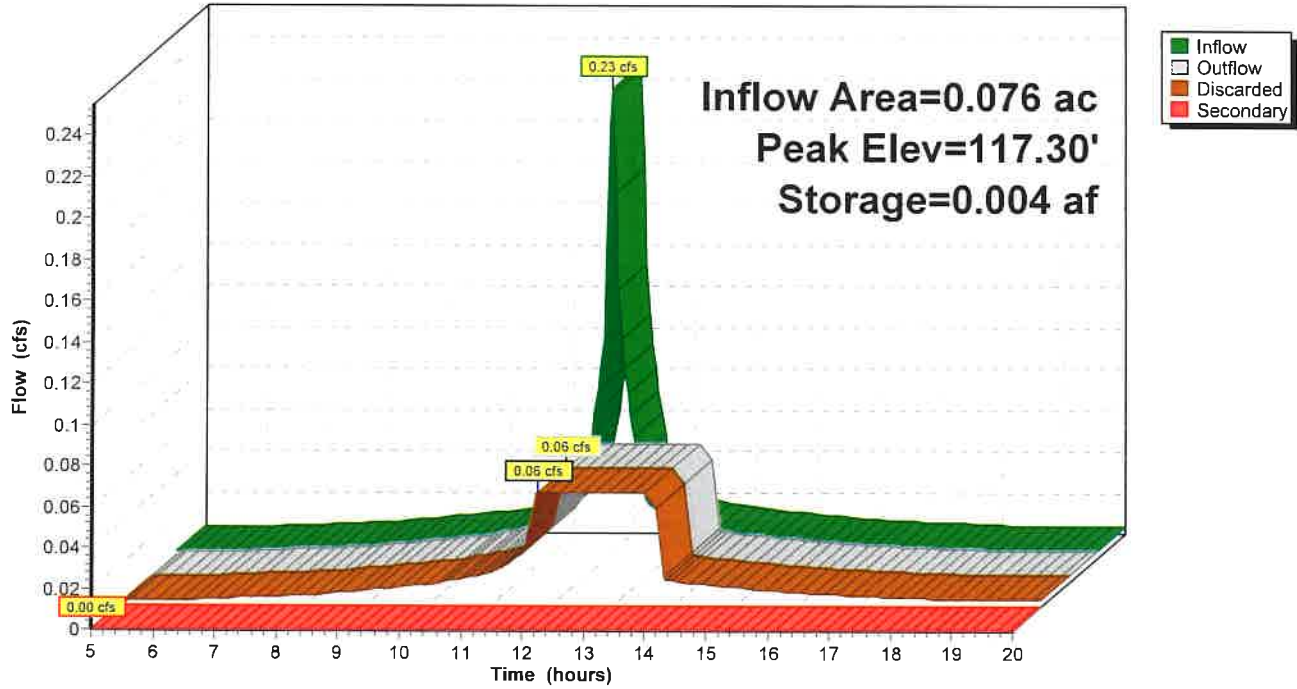
113 Grove St - Proposed
Type III 24-hr 2-Year Rainfall=3.16"

Printed 7/27/2022

Page 6

Pond #1: Leaching Galley's

Hydrograph



113 Grove St - Proposed

Prepared by HP

HydroCAD® 10.00-24 s/n 08768 © 2018 HydroCAD Software Solutions LLC

113 Grove St - Proposed
Type III 24-hr 2-Year Rainfall=3.16"

Printed 7/27/2022

Page 7

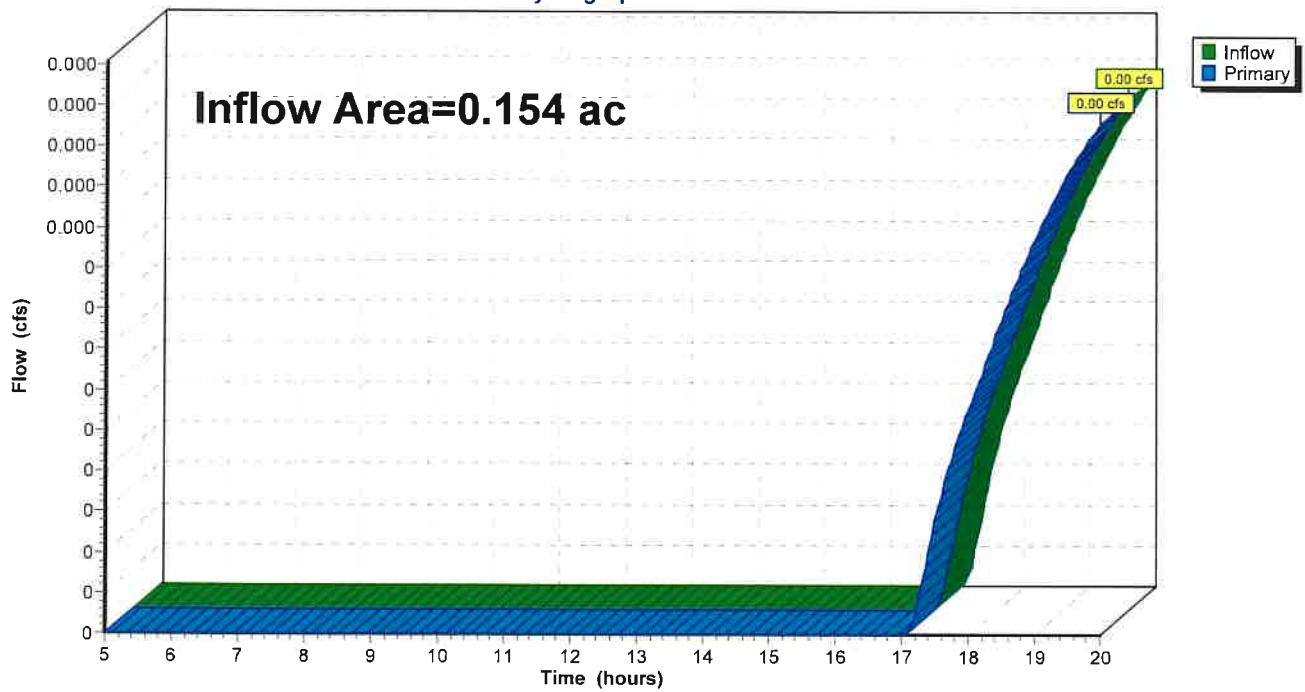
Summary for Pond 1P: Offsite

Inflow Area = 0.154 ac, 4.02% Impervious, Inflow Depth > 0.00" for 2-Year event
 Inflow = 0.00 cfs @ 20.00 hrs, Volume= 0.000 af
 Primary = 0.00 cfs @ 20.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Pond 1P: Offsite

Hydrograph



113 Grove St - Proposed

Prepared by HP

HydroCAD® 10.00-24 s/n 08768 © 2018 HydroCAD Software Solutions LLC

113 Grove St - Proposed
Type III 24-hr 10-Year Rainfall=4.77"

Printed 7/27/2022

Page 8

Summary for Subcatchment 1: Remaining Site

Runoff = 0.01 cfs @ 12.45 hrs, Volume= 0.002 af, Depth> 0.18"

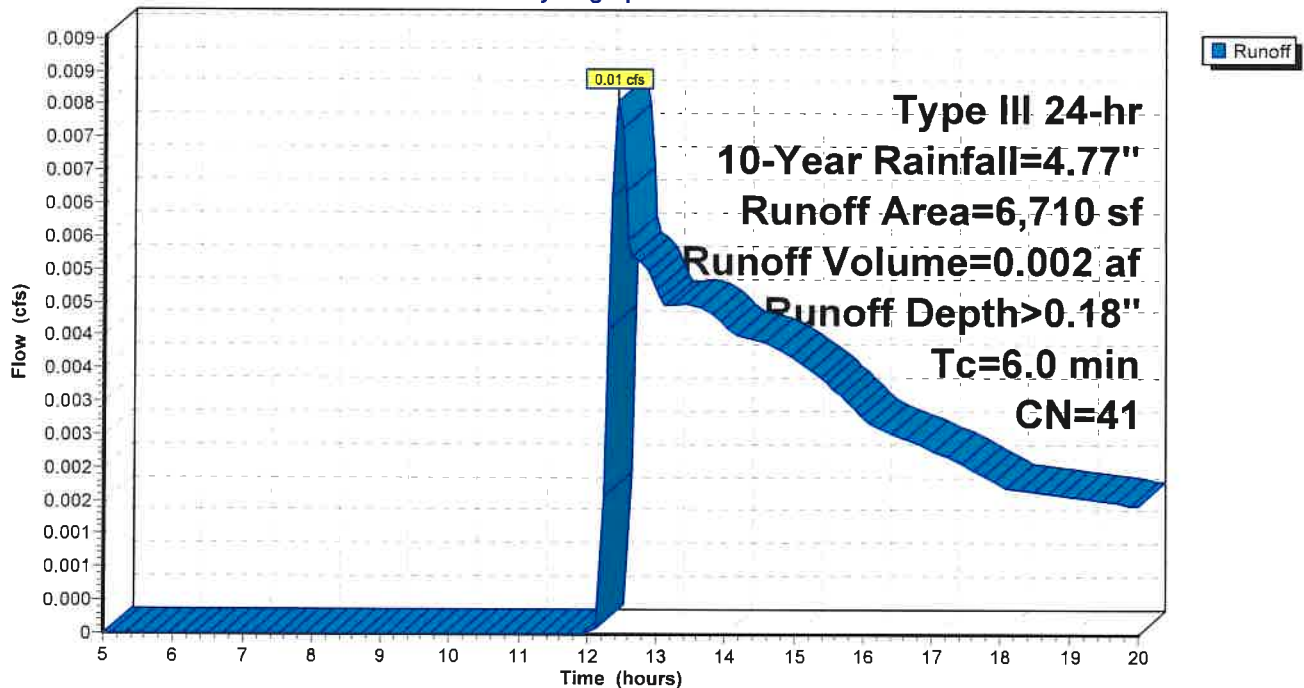
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.77"

Area (sf)	CN	Description
6,440	39	>75% Grass cover, Good, HSG A
* 270	98	Prop. Patios
6,710	41	Weighted Average
6,440		95.98% Pervious Area
270		4.02% Impervious Area

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

Subcatchment 1: Remaining Site

Hydrograph



113 Grove St - Proposed

Prepared by HP

HydroCAD® 10.00-24 s/n 08768 © 2018 HydroCAD Software Solutions LLC

113 Grove St - Proposed
Type III 24-hr 10-Year Rainfall=4.77"

Printed 7/27/2022

Page 9

Summary for Subcatchment 2: Impervious

Runoff = 0.35 cfs @ 12.09 hrs, Volume= 0.027 af, Depth> 4.21"

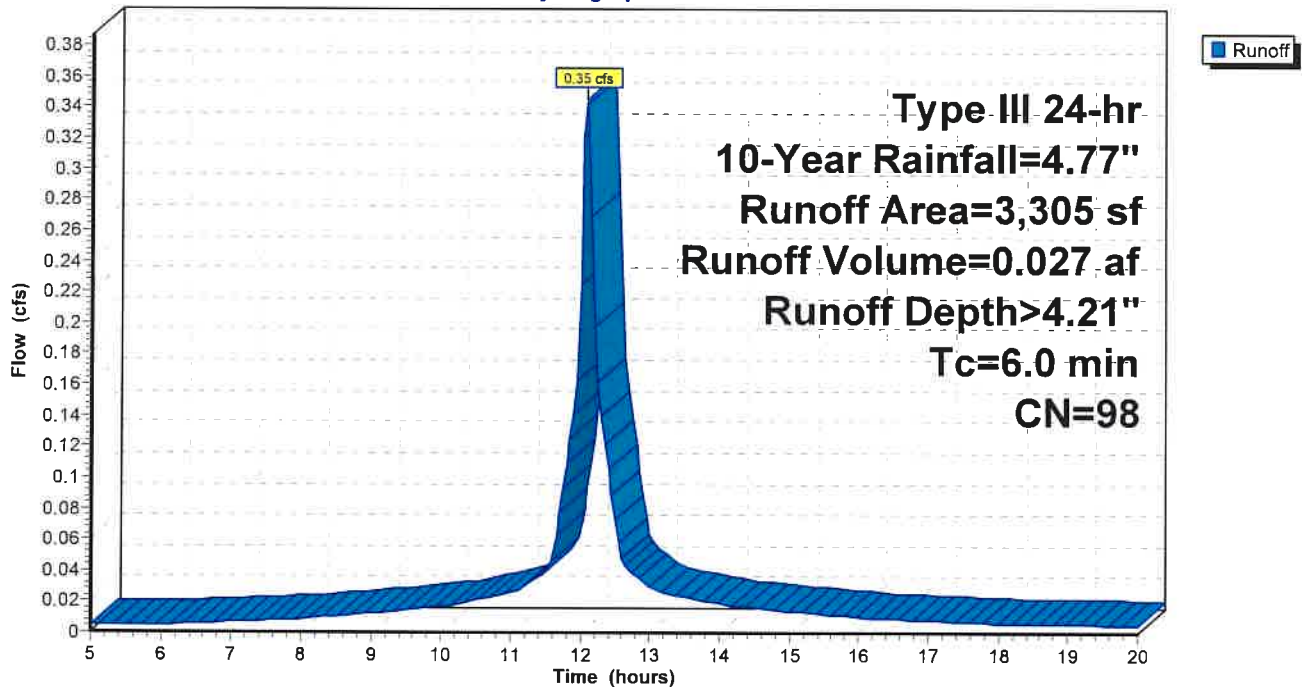
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.77"

	Area (sf)	CN	Description
*	1,554	98	Prop. Driveway
*	1,751	98	Prop. Building
	3,305	98	Weighted Average
	3,305		100.00% Impervious Area

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

Subcatchment 2: Impervious

Hydrograph



113 Grove St - Proposed

Prepared by HP

HydroCAD® 10.00-24 s/n 08768 © 2018 HydroCAD Software Solutions LLC

113 Grove St - Proposed

Type III 24-hr 10-Year Rainfall=4.77"

Printed 7/27/2022

Page 10

Summary for Pond #1: Leaching Galley's

Inflow Area = 0.076 ac, 100.00% Impervious, Inflow Depth > 4.21" for 10-Year event
Inflow = 0.35 cfs @ 12.09 hrs, Volume= 0.027 af
Outflow = 0.06 cfs @ 11.70 hrs, Volume= 0.027 af, Atten= 84%, Lag= 0.0 min
Discarded = 0.06 cfs @ 11.70 hrs, Volume= 0.027 af
Secondary = 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= 118.19' @ 12.56 hrs Surf.Area= 0.007 ac Storage= 0.008 af

Plug-Flow detention time= 36.2 min calculated for 0.027 af (100% of inflow)
Center-of-Mass det. time= 35.8 min (771.2 - 735.4)

Volume	Invert	Avail.Storage	Storage Description
#1	116.25'	0.009 af	8.00'W x 36.00'L x 5.25'H Gravel 0.035 af Overall - 0.012 af Embedded = 0.022 af x 40.0% Voids
#2	116.75'	0.012 af	4.00'W x 4.00'L x 4.25'H Leaching Galleyx 8 Inside #1
		0.021 af	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	116.25'	8.270 in/hr Exfiltration over Surface area
#2	Secondary	120.00'	6.0" Vert. Orifice C= 0.600

Discarded OutFlow Max=0.06 cfs @ 11.70 hrs HW=116.32' (Free Discharge)
↑1=Exfiltration (Exfiltration Controls 0.06 cfs)

Secondary OutFlow Max=0.00 cfs @ 5.00 hrs HW=116.25' (Free Discharge)
↑2=Orifice (Controls 0.00 cfs)

113 Grove St - Proposed

Prepared by HP

HydroCAD® 10.00-24 s/n 08768 © 2018 HydroCAD Software Solutions LLC

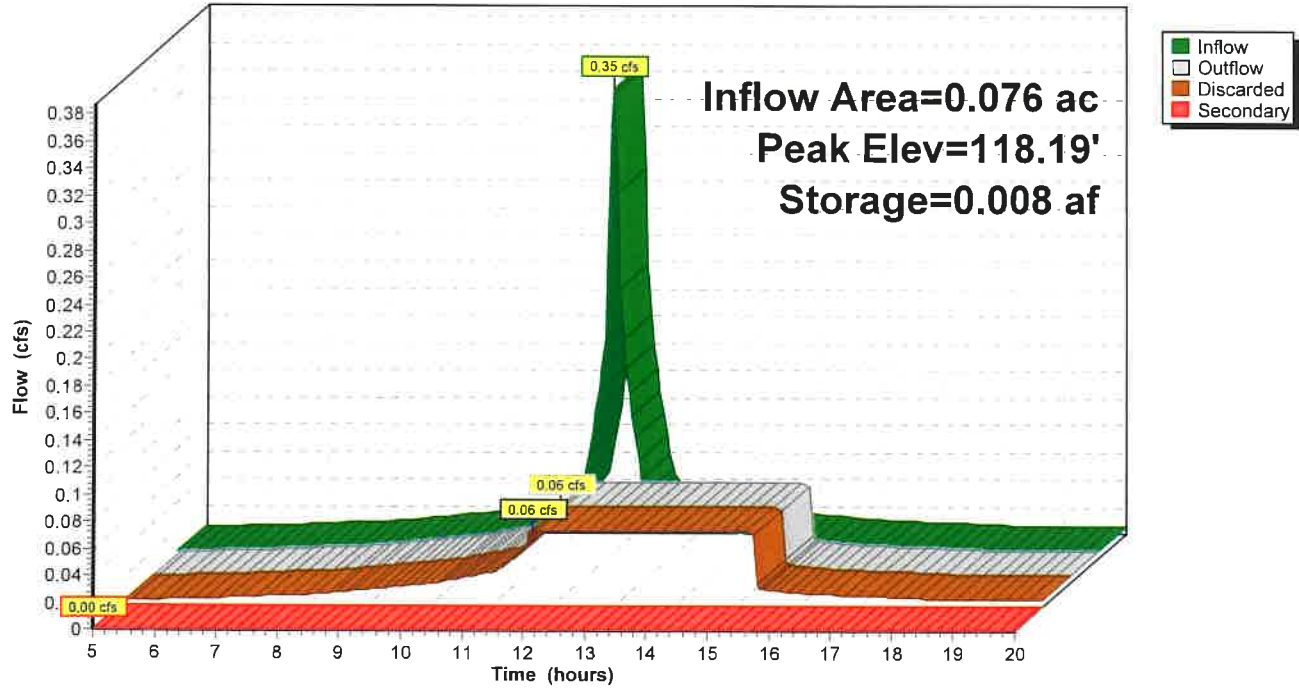
113 Grove St - Proposed
Type III 24-hr 10-Year Rainfall=4.77"

Printed 7/27/2022

Page 11

Pond #1: Leaching Galley's

Hydrograph



113 Grove St - Proposed

Prepared by HP

HydroCAD® 10.00-24 s/n 08768 © 2018 HydroCAD Software Solutions LLC

113 Grove St - Proposed
Type III 24-hr 10-Year Rainfall=4.77"

Printed 7/27/2022

Page 12

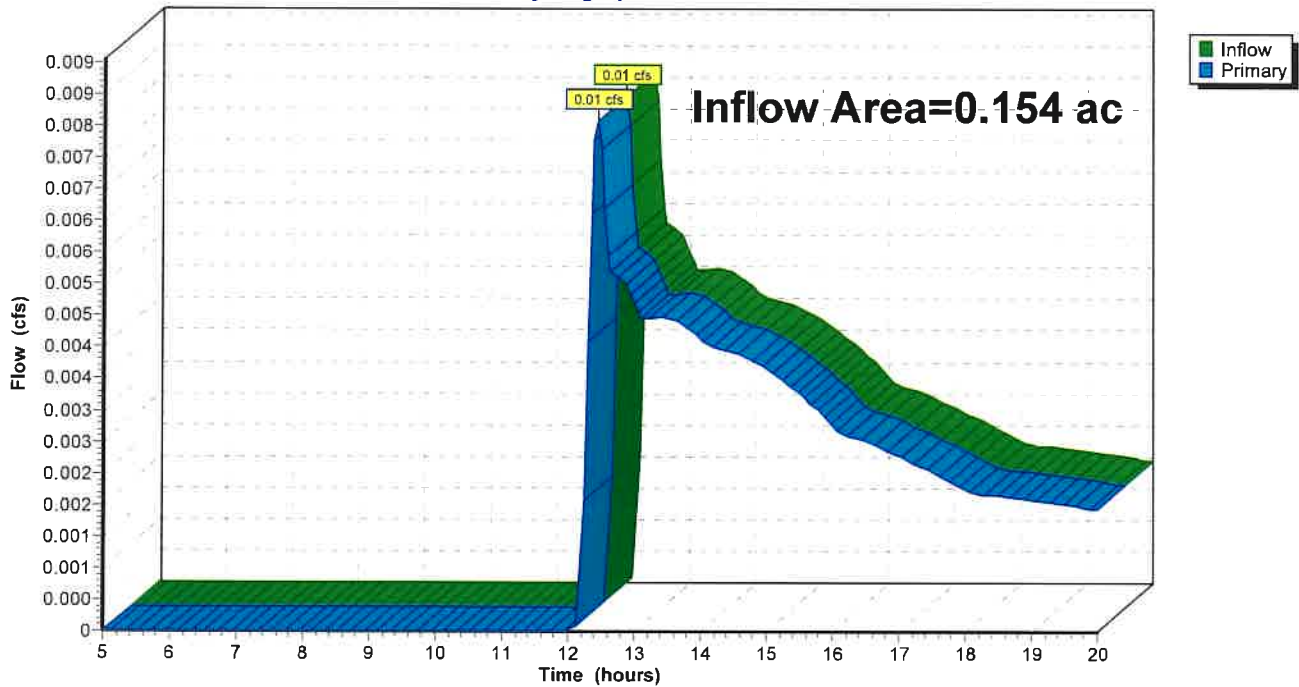
Summary for Pond 1P: Offsite

Inflow Area = 0.154 ac, 4.02% Impervious, Inflow Depth > 0.18" for 10-Year event
Inflow = 0.01 cfs @ 12.45 hrs, Volume= 0.002 af
Primary = 0.01 cfs @ 12.45 hrs, Volume= 0.002 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Pond 1P: Offsite

Hydrograph



113 Grove St - Proposed

Prepared by HP

HydroCAD® 10.00-24 s/n 08768 © 2018 HydroCAD Software Solutions LLC

113 Grove St - Proposed
Type III 24-hr 25-Year Rainfall=6.03"

Printed 7/27/2022

Page 13

Summary for Subcatchment 1: Remaining Site

Runoff = 0.04 cfs @ 12.29 hrs, Volume= 0.006 af, Depth> 0.48"

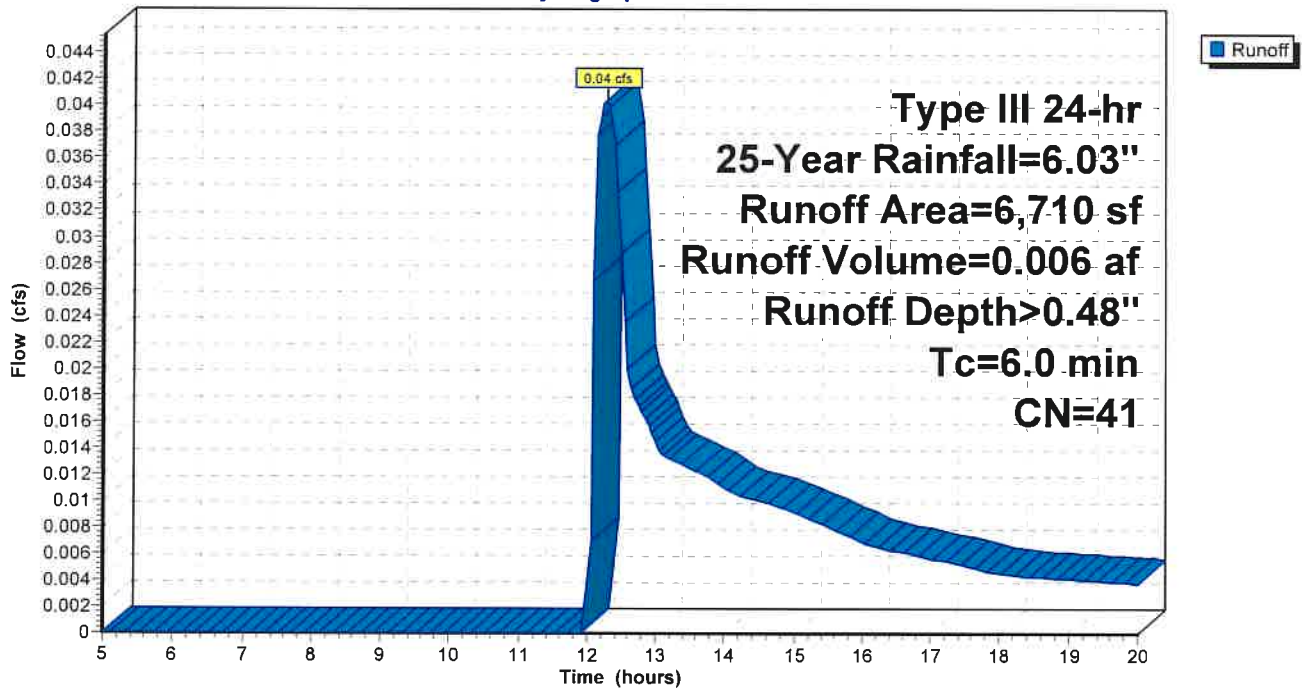
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=6.03"

Area (sf)	CN	Description
6,440	39	>75% Grass cover, Good, HSG A
* 270	98	Prop. Patios
6,710	41	Weighted Average
6,440		95.98% Pervious Area
270		4.02% Impervious Area

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

Subcatchment 1: Remaining Site

Hydrograph



113 Grove St - Proposed

Prepared by HP

HydroCAD® 10.00-24 s/n 08768 © 2018 HydroCAD Software Solutions LLC

113 Grove St - Proposed
Type III 24-hr 25-Year Rainfall=6.03"

Printed 7/27/2022

Page 14

Summary for Subcatchment 2: Impervious

Runoff = 0.44 cfs @ 12.09 hrs, Volume= 0.034 af, Depth> 5.36"

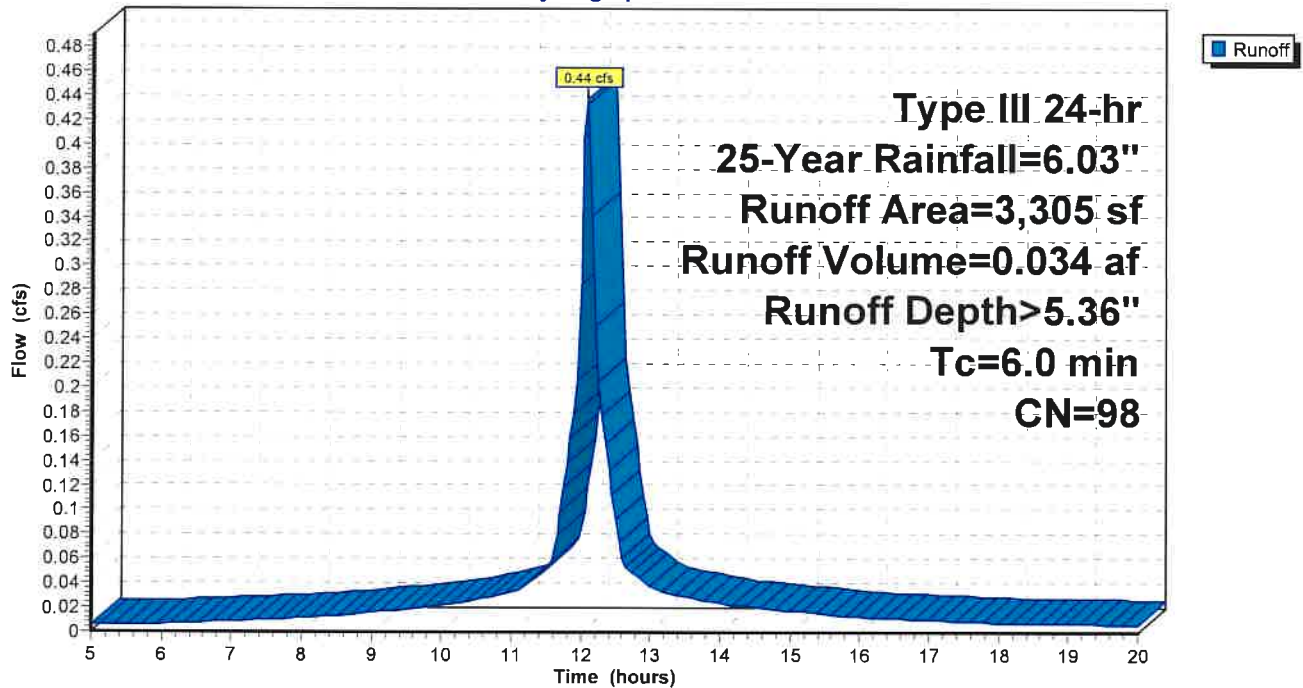
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=6.03"

	Area (sf)	CN	Description
*	1,554	98	Prop. Driveway
*	1,751	98	Prop. Building
	3,305	98	Weighted Average
	3,305		100.00% Impervious Area

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

Subcatchment 2: Impervious

Hydrograph



113 Grove St - Proposed

Prepared by HP

HydroCAD® 10.00-24 s/n 08768 © 2018 HydroCAD Software Solutions LLC

113 Grove St - Proposed

Type III 24-hr 25-Year Rainfall=6.03"

Printed 7/27/2022

Page 15

Summary for Pond #1: Leaching Galley's

Inflow Area = 0.076 ac, 100.00% Impervious, Inflow Depth > 5.36" for 25-Year event
 Inflow = 0.44 cfs @ 12.09 hrs, Volume= 0.034 af
 Outflow = 0.06 cfs @ 11.60 hrs, Volume= 0.034 af, Atten= 87%, Lag= 0.0 min
 Discarded = 0.06 cfs @ 11.60 hrs, Volume= 0.034 af
 Secondary = 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= 118.92' @ 12.64 hrs Surf.Area= 0.007 ac Storage= 0.011 af

Plug-Flow detention time= 56.3 min calculated for 0.034 af (100% of inflow)
 Center-of-Mass det. time= 55.8 min (789.9 - 734.1)

Volume	Invert	Avail.Storage	Storage Description
#1	116.25'	0.009 af	8.00'W x 36.00'L x 5.25'H Gravel 0.035 af Overall - 0.012 af Embedded = 0.022 af x 40.0% Voids
#2	116.75'	0.012 af	4.00'W x 4.00'L x 4.25'H Leaching Galleyx 8 Inside #1
		0.021 af	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	116.25'	8.270 in/hr Exfiltration over Surface area
#2	Secondary	120.00'	6.0" Vert. Orifice C= 0.600

Discarded OutFlow Max=0.06 cfs @ 11.60 hrs HW=116.31' (Free Discharge)
 ↳1=Exfiltration (Exfiltration Controls 0.06 cfs)

Secondary OutFlow Max=0.00 cfs @ 5.00 hrs HW=116.25' (Free Discharge)
 ↳2=Orifice (Controls 0.00 cfs)

113 Grove St - Proposed

Prepared by HP

HydroCAD® 10.00-24 s/n 08768 © 2018 HydroCAD Software Solutions LLC

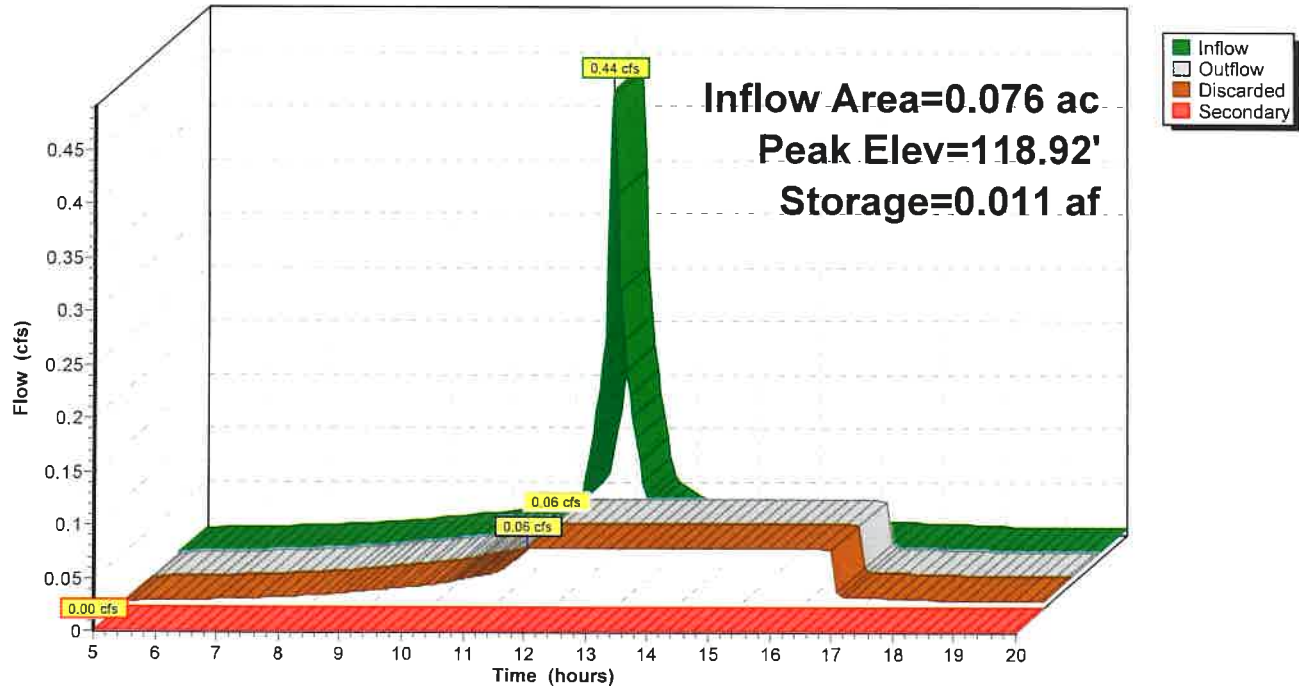
113 Grove St - Proposed
Type III 24-hr 25-Year Rainfall=6.03"

Printed 7/27/2022

Page 16

Pond #1: Leaching Galley's

Hydrograph



113 Grove St - Proposed

Prepared by HP

HydroCAD® 10.00-24 s/n 08768 © 2018 HydroCAD Software Solutions LLC

113 Grove St - Proposed
Type III 24-hr 25-Year Rainfall=6.03"

Printed 7/27/2022

Page 17

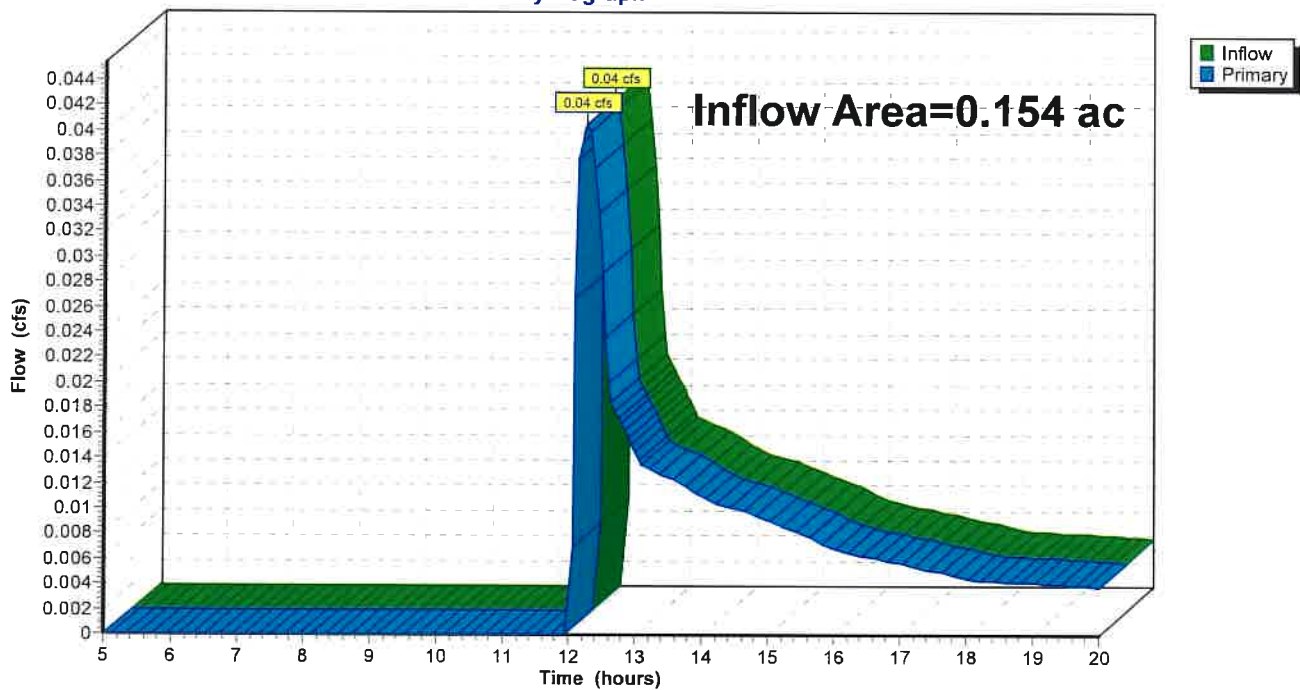
Summary for Pond 1P: Offsite

Inflow Area = 0.154 ac, 4.02% Impervious, Inflow Depth > 0.48" for 25-Year event
Inflow = 0.04 cfs @ 12.29 hrs, Volume= 0.006 af
Primary = 0.04 cfs @ 12.29 hrs, Volume= 0.006 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Pond 1P: Offsite

Hydrograph



113 Grove St - Proposed

Prepared by HP

HydroCAD® 10.00-24 s/n 08768 © 2018 HydroCAD Software Solutions LLC

113 Grove St - Proposed
Type III 24-hr Custom Rainfall=8.78"

Printed 7/27/2022

Page 18

Summary for Subcatchment 1: Remaining Site

Runoff = 0.24 cfs @ 12.11 hrs, Volume= 0.020 af, Depth> 1.53"

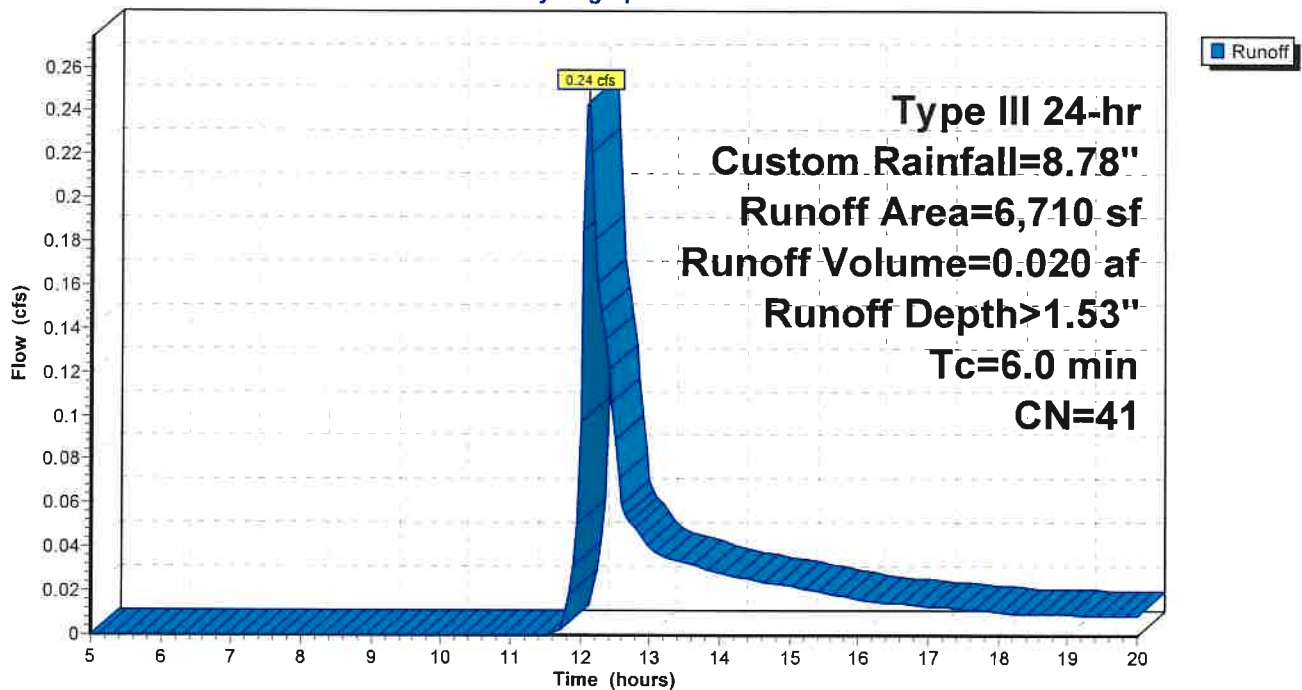
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr Custom Rainfall=8.78"

Area (sf)	CN	Description
6,440	39	>75% Grass cover, Good, HSG A
* 270	98	Prop. Patios
6,710	41	Weighted Average
6,440		95.98% Pervious Area
270		4.02% Impervious Area

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

Subcatchment 1: Remaining Site

Hydrograph



113 Grove St - Proposed

Prepared by HP

HydroCAD® 10.00-24 s/n 08768 © 2018 HydroCAD Software Solutions LLC

113 Grove St - Proposed
Type III 24-hr Custom Rainfall=8.78"

Printed 7/27/2022

Page 19

Summary for Subcatchment 2: Impervious

Runoff = 0.64 cfs @ 12.09 hrs, Volume= 0.050 af, Depth> 7.85"

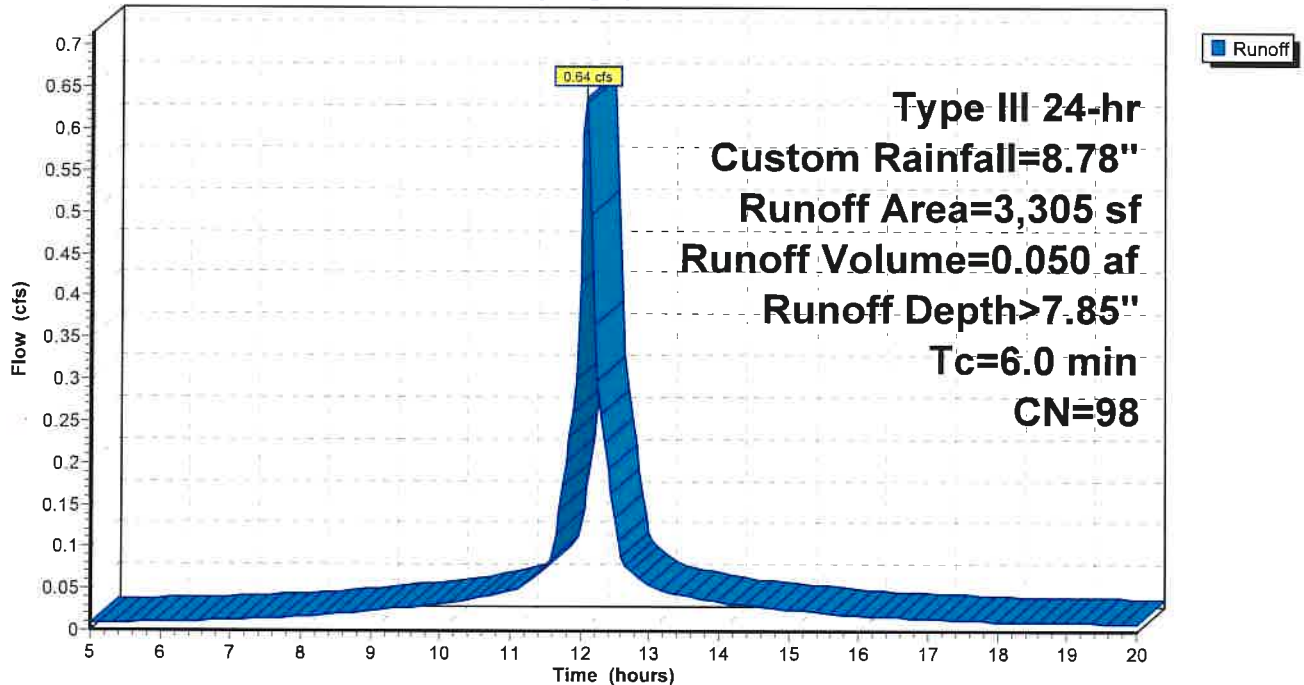
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr Custom Rainfall=8.78"

	Area (sf)	CN	Description
*	1,554	98	Prop. Driveway
*	1,751	98	Prop. Building
	3,305	98	Weighted Average
	3,305		100.00% Impervious Area

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

Subcatchment 2: Impervious

Hydrograph



113 Grove St - Proposed

Prepared by HP

HydroCAD® 10.00-24 s/n 08768 © 2018 HydroCAD Software Solutions LLC

113 Grove St - Proposed

Type III 24-hr Custom Rainfall=8.78"

Printed 7/27/2022

Page 20

Summary for Pond #1: Leaching Galley's

Inflow Area = 0.076 ac, 100.00% Impervious, Inflow Depth > 7.85" for Custom event
Inflow = 0.64 cfs @ 12.09 hrs, Volume= 0.050 af
Outflow = 0.18 cfs @ 12.44 hrs, Volume= 0.050 af, Atten= 72%, Lag= 21.2 min
Discarded = 0.06 cfs @ 11.25 hrs, Volume= 0.047 af
Secondary = 0.12 cfs @ 12.44 hrs, Volume= 0.003 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 120.21' @ 12.44 hrs Surf.Area= 0.007 ac Storage= 0.017 af

Plug-Flow detention time= 86.8 min calculated for 0.049 af (100% of inflow)
Center-of-Mass det. time= 86.1 min (818.9 - 732.8)

Volume	Invert	Avail.Storage	Storage Description
#1	116.25'	0.009 af	8.00'W x 36.00'L x 5.25'H Gravel 0.035 af Overall - 0.012 af Embedded = 0.022 af x 40.0% Voids
#2	116.75'	0.012 af	4.00'W x 4.00'L x 4.25'H Leaching Galleyx 8 Inside #1
		0.021 af	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	116.25'	8.270 in/hr Exfiltration over Surface area
#2	Secondary	120.00'	6.0" Vert. Orifice C= 0.600

Discarded OutFlow Max=0.06 cfs @ 11.25 hrs HW=116.30' (Free Discharge)
↑1=Exfiltration (Exfiltration Controls 0.06 cfs)

Secondary OutFlow Max=0.12 cfs @ 12.44 hrs HW=120.21' (Free Discharge)
↑2=Orifice (Orifice Controls 0.12 cfs @ 1.54 fps)

113 Grove St - Proposed

Prepared by HP

HydroCAD® 10.00-24 s/n 08768 © 2018 HydroCAD Software Solutions LLC

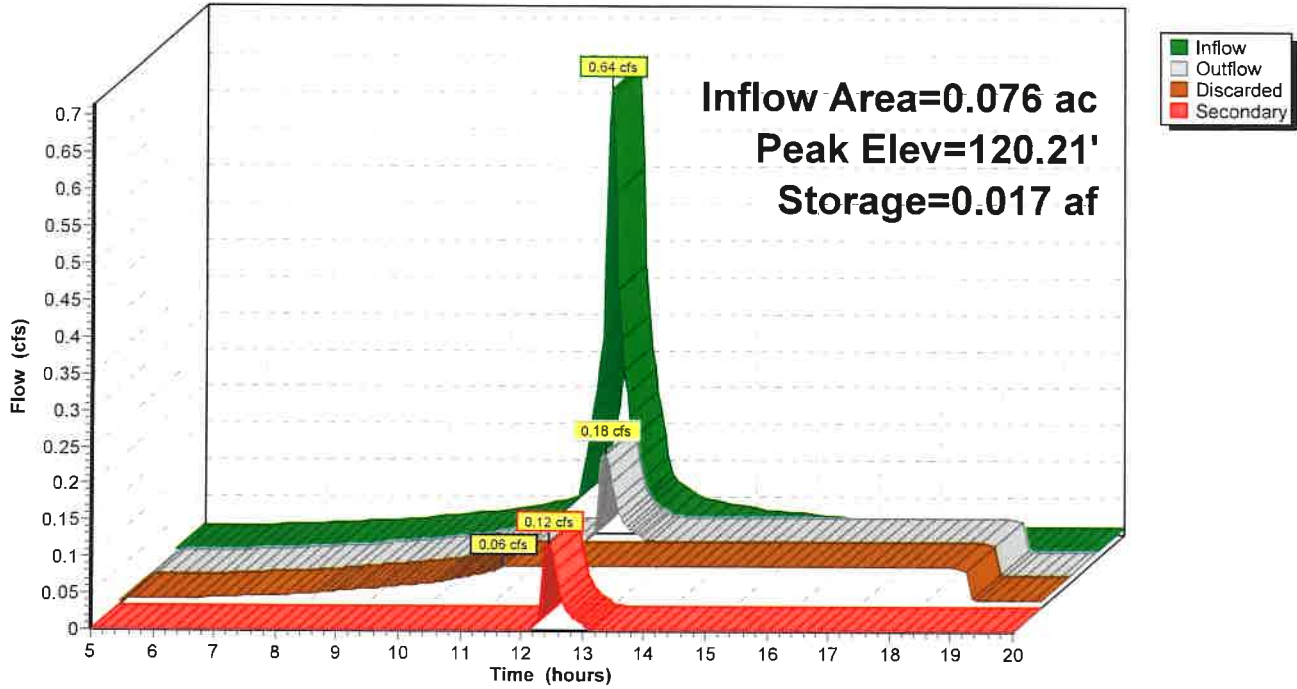
113 Grove St - Proposed
Type III 24-hr Custom Rainfall=8.78"

Printed 7/27/2022

Page 21

Pond #1: Leaching Galley's

Hydrograph



113 Grove St - Proposed

Prepared by HP

HydroCAD® 10.00-24 s/n 08768 © 2018 HydroCAD Software Solutions LLC

113 Grove St - Proposed
Type III 24-hr Custom Rainfall=8.78"

Printed 7/27/2022

Page 22

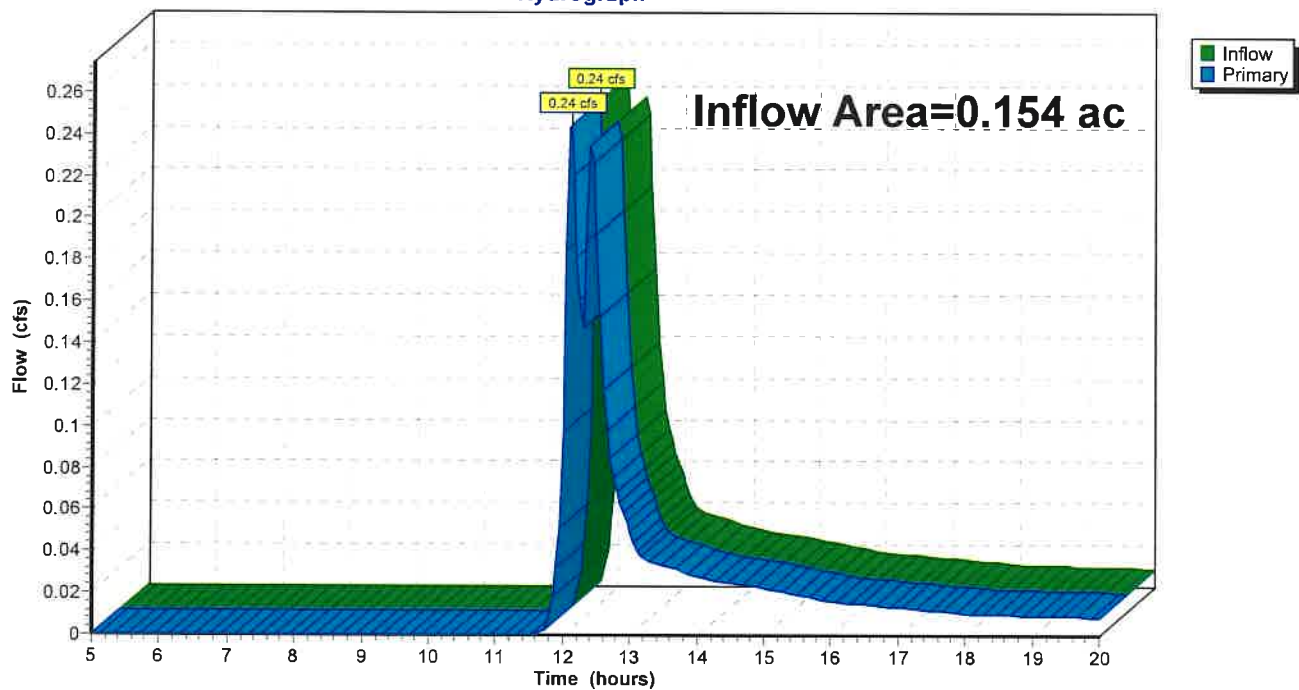
Summary for Pond 1P: Offsite

Inflow Area = 0.154 ac, 4.02% Impervious, Inflow Depth > 1.76" for Custom event
Inflow = 0.24 cfs @ 12.11 hrs, Volume= 0.023 af
Primary = 0.24 cfs @ 12.11 hrs, Volume= 0.023 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Pond 1P: Offsite

Hydrograph



OPERATION & MAINTENANCE PLAN

STORMWATER MANAGEMENT FACILITIES
PROPOSED SINGLE-FAMILY DWELLING
113 GROVE STREET
NEWTON, MASSACHUSETTS

July 27, 2022

VERNE T. PORTER JR., PLS
LAND SURVEYORS – CIVIL ENGINEERS
354 ELLIOT STREET
NEWTON, MA 02464

**OPERATION & MAINTENANCE PLAN
STORMWATER MANAGEMENT FACILITIES
PROPOSED SINGLE-FAMILY DWELLING
113 GROVE STREET
NEWTON, MA**

The proposed project includes stormwater runoff controls associated with the construction of a new single-family dwelling and driveways. The major components associated with maintenance needs are the proposed leaching gallies that will handle runoff from the proposed building and proposed driveway. These will need to be cleaned periodically as noted below. Cleaning of this structures shall be done by the property owner or by a specialty contractor with hydraulic cleaning ability. The following outlines the major maintenance issues associated with the project:

Leaching Galley/Cleaning:

The proposed leaching gallies should be inspected monthly during the first year, and then every third year following the 1-year inspection.

The leaching gallies are equipped with a frame and cover. After removal of the cover, a stadia rod should be used to measure the depth of sediment. If the depth of sediment is in excess of 3", then the sediment should be removed.

Drain Manhole Inspection/Cleaning:

Have all drain manholes cleaned out completely twice annually during April and October, if required.

Trench Drain Inspection/Cleaning:

Have all trench drains cleaned out completely twice annually during April and October, if required.

Street Sweeping

Have the driveway swept bi-annually in April and October.

MAINTENANCE RESPONSIBILITIES

The maintenance of the Drainage System is the responsibility of the Property Owners. The actual work can be accomplished by the Owner or can be subcontracted to a company that specializes in the cleaning of storm drainage facilities. Inspections should be performed by independent individual such as the design engineer or other experienced individual in the field.

Construction period pollution control

Erosion and sedimentation control measures will be implemented prior to and during construction activities to minimize impacts from land disturbance activities. Erosion and sedimentation control measures implemented on the site will include, at a minimum, dust control measures, the installation of silt fence barriers on the up-gradient side of resource areas, and catch basin inlet protection. Controls may also include temporary sedimentation basins and diversion swales and temporary seeding. The erosion and sedimentation controls will be inspected at the end of the day if precipitation is forecast, and after each rainfall event of 0.5 inches or more. Should construction occur during winter months, seasonally appropriate stabilization measure will be utilized.

Below is a summary of the minimum construction period pollution control requirements. These topics are presented as a means of demonstrating understanding of pollution control but are not meant to supplant preparation of the SWPPP. Please refer to the SWPPP for complete construction activity details.

a. Dust Control

Mitigation measures will be implemented to control fugitive dust during construction activities. Dust control measure may include seeding, wet suppression, application of soil stabilization agents, or other measures to control dust generated by construction activities. The Contractor shall confirm with state and local regulations to see if the use of calcium chloride for dust suppression is allowed.

b. Erosion Control Barriers

Prior to any ground disturbance, erosion control barriers will be installed at the limit of work at down-gradient positions on the site. The barriers will consist of silt fence and staked hay bales and will be entrenched in the soil to prevent underflow.

c. Catch Basin/Trench Drain Inlet Protection

All existing and newly installed catch basins or trench drains shall be protected during construction with a filter insert system. These sedimentation control measures will be regularly maintained until the drainage area tributary to the catch basin has been stabilized.

d. Temporary Sedimentation Basins and Diversion Swales

If necessary, temporary sedimentation basins will be constructed to prevent transport of fine-grained sediment into wetland resource areas and other off-site areas. These temporary basins will be located where appropriate, as determined by the contractor. Temporary diversion swales or berms may be used to convey runoff from construction areas to temporary or previously constructed basins.

e. Temporary Seeding

Temporary seeding will be used where vegetative cover is required for less than one year on disturbed soil areas. Such areas will be seeded if the soils will be exposed without construction activity for more than 30 days. Rapidly growing annual grasses, such as annual rye grass, oats, perennial rye grass or winter rye will be uniformly applied. Depending on the slope, the soil may be covered with a layer of straw mulch, an erosion control blanket, or a bonded fiber matrix.

f. Permanent Seeding

Upon completion of the final grading, any areas not covered by pavement, other forms of stabilization, including landscaping, will be seeded with rapidly growing annual rye grass/red fescue seed mix.

**STORMWATER MANAGEMENT REPORT
PROPOSED SINGLE-FAMILY DWELLING
113 GROVE STREET
NEWTON, MASSACHUSETTS**

INSPECTION REPORT:

Inspection Firm: _____

Inspectors Name: _____ Date: _____

Components Inspected: _____

Signed: _____

SYSTEM MAINTENANCE:

Maintenance Firm: _____ Date: _____

Leaching Gallies Inspected: Yes ___ No ___ Comments: _____

Leaching Gallies Cleaned: Yes ___ No ___ Comments: _____

Manhole Inspected: Yes ___ No ___ Comments: _____

Manhole Cleaned: Yes ___ No ___ Comments: _____

Trench Drain Inspected: Yes ___ No ___ Comments: _____

Trench Drain Cleaned: Yes ___ No ___ Comments: _____

Estimate of Material Removed: _____

Other Comments: _____

Signed: _____

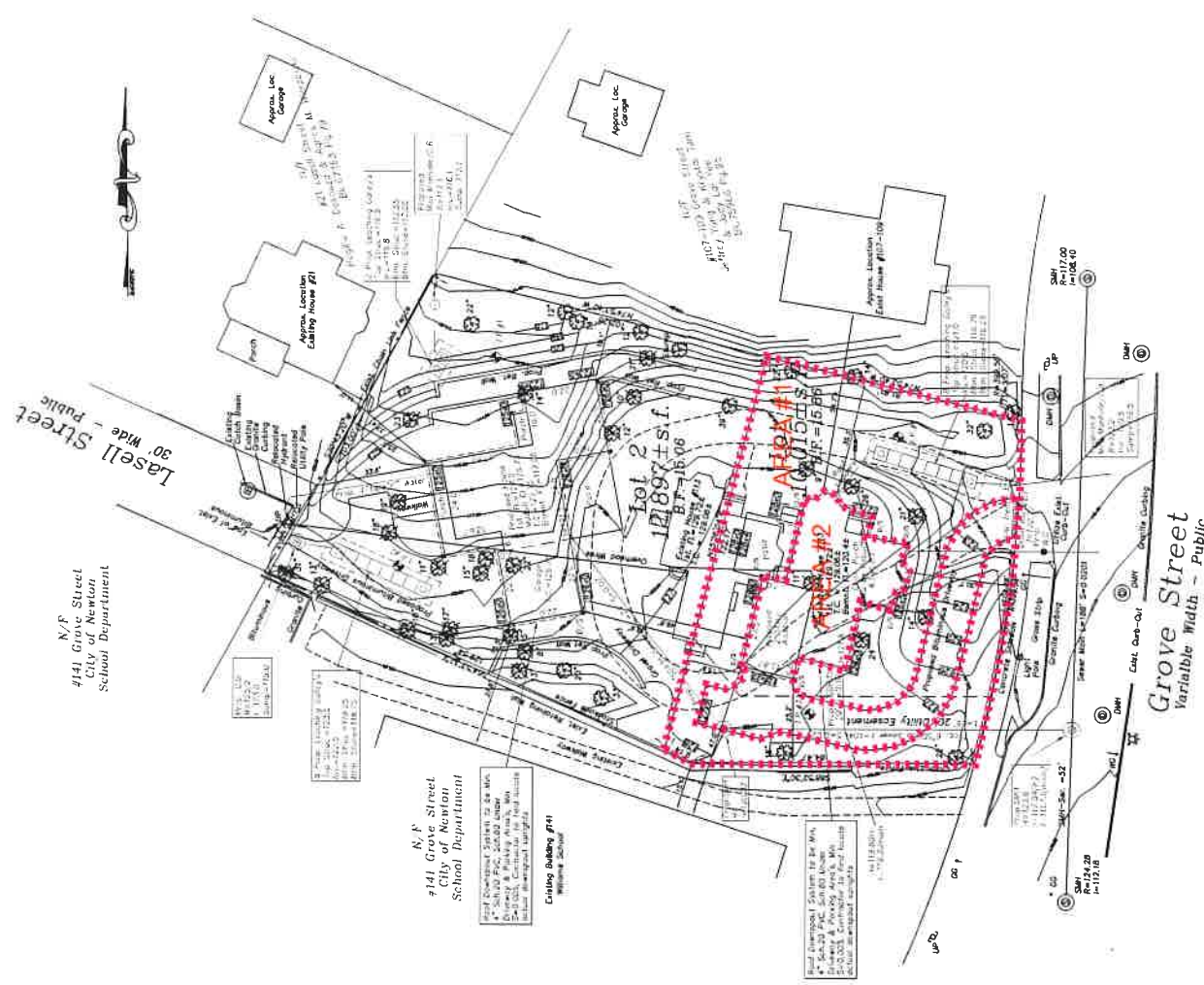


N/P
4141 Grove Street
City of Newton
School Department

N/P
7141 Grove Street
City of Newton
School Department

Existing Building #41
Williams School

~Pre Development Catchment Area Plan~	
113 Grove Street	
Newton, Massachusetts	
Scale: n.i.s.	July 27, 2022
VERNE T. PORTER, JR., PLS	
Land Surveyors - Civil Engineers	
354 Elliot Street, Newton, Ma. 02464	
DESIGNED BY	VP
CHECKED BY	VP
DRAWN BY	VP
Sheet 1 of 2	



N/F
4141 Grove Street
City of Newton
School Department

N/F
7141 Grove Street
City of Newton
School Department

7141 Grove Street
City of Newton
School Department
Crest Building #41
William School

113 Grove Street
Newton, Massachusetts
Scale: n.l.s., July 27, 2022
VERNE T. PORTER, JR., PLS
Land Surveyors - Civil Engineers
354 Elliot Street, Newton, Ma. 02464

~Post Development Catchment Area Plan~	
113 Grove Street	
Newton, Massachusetts	
Scale: n.l.s., July 27, 2022	
VERNE T. PORTER, JR., PLS	
Land Surveyors - Civil Engineers	
354 Elliot Street, Newton, Ma. 02464	
Job #11243	
Design By/VP	
Checked By/VP	
Drawn By/01B	
Sheet 2 of 2	

Middlesex County, Massachusetts

626B—Merrimac-Urban land complex, 0 to 8 percent slopes

Map Unit Setting

National map unit symbol: 2tyr9
Elevation: 0 to 820 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 250 days
Farmland classification: Not prime farmland

Map Unit Composition

Merrimac and similar soils: 45 percent
Urban land: 40 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Merrimac

Setting

Landform: Outwash plains, outwash terraces, moraines, eskers, kames
Landform position (two-dimensional): Backslope, footslope, summit, shoulder
Landform position (three-dimensional): Side slope, crest, riser, tread
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loamy glaciofluvial deposits derived from granite, schist, and gneiss over sandy and gravelly glaciofluvial deposits derived from granite, schist, and gneiss

Typical profile

Ap - 0 to 10 inches: fine sandy loam
Bw1 - 10 to 22 inches: fine sandy loam
Bw2 - 22 to 26 inches: stratified gravel to gravelly loamy sand
2C - 26 to 65 inches: stratified gravel to very gravelly sand

Properties and qualities

Slope: 0 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat excessively drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to very high (1.42 to 99.90 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 2 percent
Maximum salinity: Nonsaline (0.0 to 1.4 mmhos/cm)

Sodium adsorption ratio, maximum: 1.0
Available water supply, 0 to 60 inches: Low (about 4.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: A
Ecological site: F144AY022MA - Dry Outwash
Hydric soil rating: No

Description of Urban Land

Typical profile

M - 0 to 10 inches: cemented material

Properties and qualities

Slope: 0 to 8 percent
Depth to restrictive feature: 0 inches to manufactured layer
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)
Available water supply, 0 to 60 inches: Very low (about 0.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8
Hydrologic Soil Group: D
Hydric soil rating: Unranked

Minor Components

Hinckley

Percent of map unit: 5 percent
Landform: Deltas, kames, eskers, outwash plains
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Nose slope, crest, head slope, side slope, rise
Down-slope shape: Convex
Across-slope shape: Convex, linear
Hydric soil rating: No

Sudbury

Percent of map unit: 5 percent
Landform: Deltas, terraces, outwash plains
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Tread, dip
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: No

Windsor

Percent of map unit: 5 percent
Landform: Outwash terraces, dunes, outwash plains, deltas
Landform position (three-dimensional): Tread, riser
Down-slope shape: Linear, convex

Across-slope shape: Linear, convex
Hydric soil rating: No






































Data Source Information

Soil Survey Area: Middlesex County, Massachusetts
Survey Area Data: Version 21, Sep 2, 2021

Soil Map—Middlesex County, Massachusetts



MAP LEGEND

 Area of Interest (AOI)	 Spoil Area
 Soils	 Stony Spot
 Soil Map Unit Polygons	 Very Stony Spot
 Soil Map Unit Lines	 Wet Spot
 Soil Map Unit Points	 Other
Special Point Features	 Special Line Features
 Blowout	Water Features
 Borrow Pit	 Streams and Canals
 Clay Spot	Transportation
 Closed Depression	 Rails
 Gravel Pit	 Interstate Highways
 Gravelly Spot	 US Routes
 Landfill	 Major Roads
 Lava Flow	 Local Roads
 Marsh or swamp	Background
 Mine or Quarry	 Aerial Photography
 Miscellaneous Water	
 Perennial Water	
 Rock Outcrop	
 Saline Spot	
 Sandy Spot	
 Severely Eroded Spot	
 Sinkhole	
 Slide or Slip	
 Sodic Spot	

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:25,000.

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: Middlesex County, Massachusetts
 Survey Area Data: Version 21, Sep 2, 2021

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

Date(s) aerial images were photographed: Oct 4, 2020—Oct 19, 2020

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

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres In AOI	Percent of AOI
626B	Merrimac-Urban land complex, 0 to 8 percent slopes	0.3	100.0%
Totals for Area of Interest		0.3	100.0%

TEST PIT FIELD LOG

<p>PROJECT DESCRIPTION: <u>113 GROVE ST</u> LOCATION: <u>NEWTON</u></p> <p>TEST PIT NO.: <u>3</u> DATE: <u>7-14-22</u> WEATHER: <u>SUNNY 75°</u> GROUND EL: <u>128.0+/-</u> ENGINEER: <u>VERVE T PORTER</u></p>	<p>PERCOLATION RESULTS</p> <table style="width: 100%;"> <tr> <td>DEPTH:</td> <td>TIME:</td> <td rowspan="7">REMARKS:</td> </tr> <tr> <td>12"</td> <td></td> </tr> <tr> <td>11"</td> <td></td> </tr> <tr> <td>10"</td> <td></td> </tr> <tr> <td>9"</td> <td></td> </tr> <tr> <td>8"</td> <td></td> </tr> <tr> <td>7"</td> <td></td> </tr> <tr> <td>6"</td> <td></td> <td>AVERAGE RATE: <u>72 min/100H</u></td> </tr> </table>	DEPTH:	TIME:	REMARKS:	12"		11"		10"		9"		8"		7"		6"		AVERAGE RATE: <u>72 min/100H</u>
DEPTH:	TIME:	REMARKS:																	
12"																			
11"																			
10"																			
9"																			
8"																			
7"																			
6"		AVERAGE RATE: <u>72 min/100H</u>																	

DEPTH	SOIL DESCRIPTION	Excav. Effort	Boulder Count	Remarks No.
0'	12" SANDY loam 10YR 3/2			
1'				
2'				
3'	FINE TO MEDIUM SAND, GRAVEL & STONE			
4'	COBBLES 6" MINUS			
5'				
6'				
7'				
8'				
9'				
10'	EL = 118.0+/-			
11'	NO WATER: NO REVERSAL			
12'				
13'				
14'				

REMARKS:

TEST PIT PLAN	LEGEND	PROPORTIONS	ABBREVIATIONS	EXCAVATION EFFORT
	Boulder Count Size Range Classification 6"-18" -----A 18"-30" -----B	USED Trace (TR) - 0-10% Little (LI.) - 10-20% Some (SO) - 20-35%	F-fine M-medium C-coarse F/M-fine to med. F/C-fine to coar. V-very GR-gray	Easy E Moderate M Difficult D Groundwater GI

TEST PIT FIELD LOG

<p>PROJECT</p> <p>DESCRIPTION: <u>113 GROVE ST</u></p> <p>LOCATION: <u>NEWTON</u></p> <p>TEST PIT NO.: <u>4</u></p> <p>DATE: <u>7-14-22</u></p> <p>WEATHER: <u>SUNNY 75°</u></p> <p>GROUND EL: <u>124.5+/-</u></p> <p>ENGINEER: <u>VERNE T. POSTER JR</u></p>	<p>PERCOLATION RESULTS</p> <p>DEPTH: TIME:</p> <p>12" _____</p> <p>11" _____</p> <p>10" _____</p> <p>9" _____</p> <p>8" _____</p> <p>7" _____</p> <p>6" _____</p> <p>REMARKS: _____</p> <p>AVERAGE RATE: <u>> 2 MIN/INCH</u></p>
--	---

DEPTH	SOIL DESCRIPTION	Excav. Effort	Bould. Count	Remarks No.
0'	12" GRAVEL DRIVEWAY BASE			
1'				
2'				
3'				
4'	FINE TO MEDIUM SAND, GRAVEL & STONE COBBLES 6" MINUS			
5'				
6'				
7'				
8'				
9'				
10'				
11'	<p>EL = 114.0 +/-</p> <p>NO WATER</p> <p>NO REFUSAL</p>			
12'				
13'				
14'				

REMARKS:

TEST PIT PLAN	LEGEND	PROPORTIONS	ABBREVIATIONS	EXCAVATION EFFORT
	<p>Boulder Count</p> <p>Size Range Classification</p> <p>6"-18" -----A</p> <p>18"-30" -----B</p>	<p>USED</p> <p>Trace (TR) - 0-10%</p> <p>Little (LI.) - 10-20%</p> <p>Some (SO) - 20-35%</p>	<p>F-fine</p> <p>M-medium</p> <p>C-coarse</p> <p>F/M-fine to med.</p> <p>F/C-fine to coar.</p> <p>V-very</p> <p>GR-gray</p>	<p>Easy E</p> <p>Moderate M</p> <p>Difficult D</p> <p>Groundwater GI</p>