DRAINAGE SUMMARY

PROPOSED MULTI-FAMILY DWELLING
50 HIGHLAND AVENUE
NEWTON, MASSACHUSETTS

September 20, 2021

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NEWTON, MA 02464

DRAINAGE SUMMARY
PROPOSED MULTI-FAMILY DWELLING
266 HIGHLAND AVENUE
NEWTON, MASSACHUSETTS

The proposed project consists of the renovation to an existing single-family dwelling including conversion to a multi-family dwelling, construction of a of a new multi-family dwelling in the rear of the property at 50 Highland Avenue in Newton, MA, under the requirements of the City of Newton.

The on-site soils in the area are shown as "602 – Urban Land" soils on the NRCS Soils Survey map of the area, which are areas that do not fall within any Hydrological Soil Groups. To confirm on-site soils, test pits were performed by VTP and soils were confirmed as coarse sand and gravel with an infiltration rate of less than 2 min/in. For purposes of our design, we have assumed an A soil with an infiltration rate of 8.27 in./hr.

Ground cover on the site is a dense residential grass area, dwelling, garage and bituminous concrete walkways and driveway. The existing drainage on the site flows overland from the rear of the property towards Highland Ave. Overall, the site will maintain the current flow pattern, however new collection systems for the addition, new dwelling and driveways will be collected and leaching galley's will be added to attenuate peak 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 additions, dwellings and driveways. 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 addition, dwelling and driveway, the rate of site runoff from the re-developed lot area will be greater than the existing conditions for the 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				5.0	
	Exist Bldg.	98	2,079		Incls. Garage
	Exist. Drive	98	3,351		Incls. walks
	Lawn Areas	49	17,308		
		Total Area	22,738		
*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 building 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				5.0	
	Lawn Area	49	12,757		
Area #2					
	Proposed Driveway	98	5,055		
	Front Unit	98	2,603		Incls. Addition
Area #3				5.0	
	Rear Unit	98	2,323		Incls. Front porch
		Total Area	22,738		
*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	100-yr.	2.47	0.163	1.34	0.079

Recharge to Groundwater (Standard 3)

The change in groundcover for the new development will change by increasing the impervious areas by approximately 4,551 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:

Rv = F * impervious area (in acres)
Rv = (0.60/12) * 0.229 = 0.011 Ac-ft. = 499.05

Rv = 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 (0.229Ac).

The proposed onsite leaching systems will store and infiltrate over 499.05 cf in just the 2-year storm event.

Removal of TSS (Standard 4)

The proposed buildings will have clean runoff and the proposed driveways will flow through a drain manhole with a 4' deep sump to address TSS removal.

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 addition and new unit, on an existing developed site. VTP has considered this project a re-development and we have met all of the applicable standards of the Massachusetts Stormwater Policy to the maximum extent possible.

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)

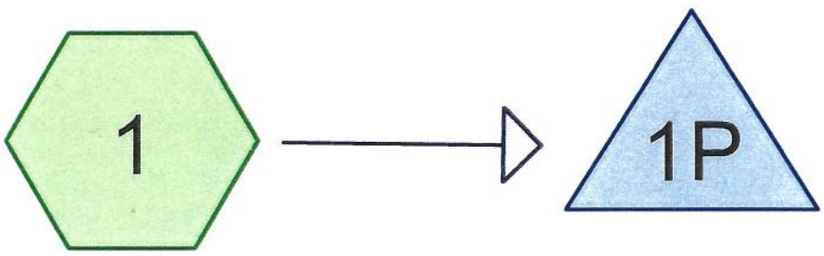
An Operation and Maintenance (O&M) Plan is provided as part of the application.

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.



Existing Site

Highland Ave

Subcat Reach Pond Link

Routing Diagram for Highland Ave - Existing
Prepared by HP, Printed 9/18/2021
HydroCAD® 10.00-24 s/n 08768 © 2018 HydroCAD Software Solutions LLC

Area Listing (selected nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.397	49	50-75% Grass cover, Fair, HSG A (1)
0.077	98	Exist. Bit Conc Drives and Walks (1)
0.048	98	Existing House (incls. garage) (1)
0.522	**61**	**TOTAL AREA**

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

Subcatchment1: Existing Site Runoff Area=22,738 sf 23.88% Impervious Runoff Depth>3.75"
Tc=5.0 min CN=61 Runoff=2.47 cfs 0.163 af

Pond 1P: Highland Ave Inflow=2.47 cfs 0.163 af
Primary=2.47 cfs 0.163 af

Total Runoff Area = 0.522 ac Runoff Volume = 0.163 af Average Runoff Depth = 3.75"
76.12% Pervious = 0.397 ac 23.88% Impervious = 0.125 ac

Summary for Subcatchment 1: Existing Site

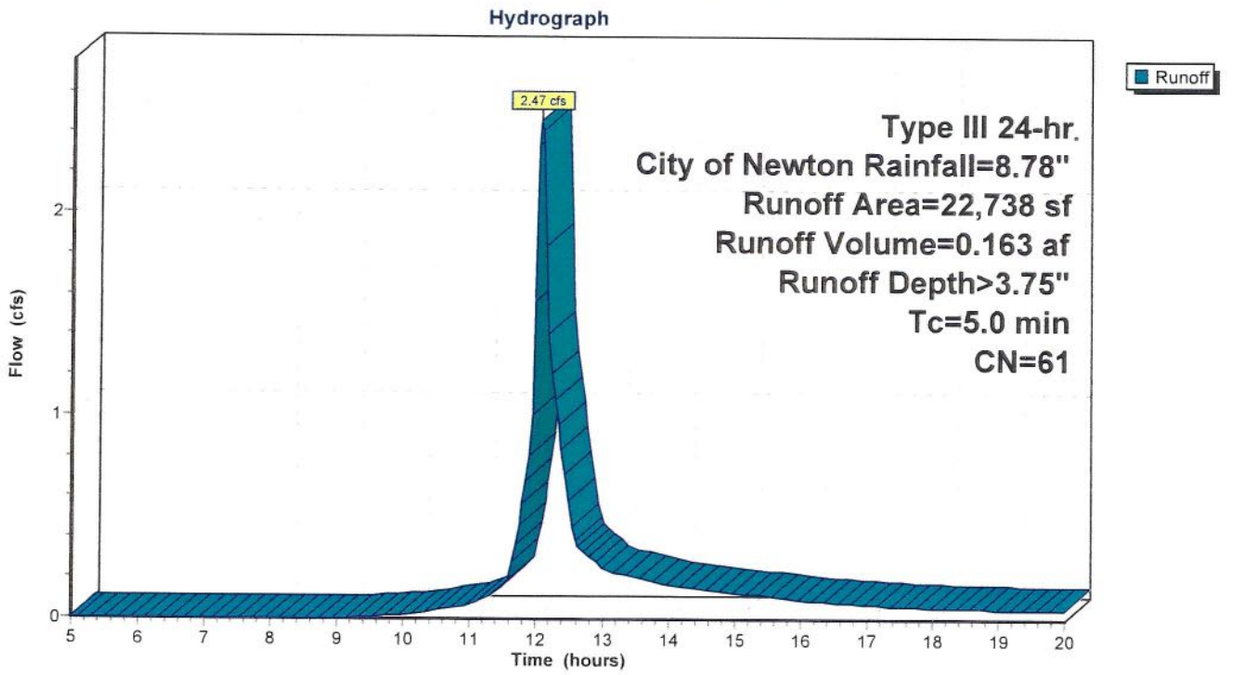
Runoff = 2.47 cfs @ 12.08 hrs, Volume= 0.163 af, Depth> 3.75"

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 City of Newton Rainfall=8.78"

	Area (sf)	CN	Description
	17,308	49	50-75% Grass cover, Fair, HSG A
*	3,351	98	Exist. Bit Conc Drives and Walks
*	2,079	98	Existing House (incls. garage)
	22,738	61	Weighted Average
	17,308		76.12% Pervious Area
	5,430		23.88% Impervious Area

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

Subcatchment 1: Existing Site

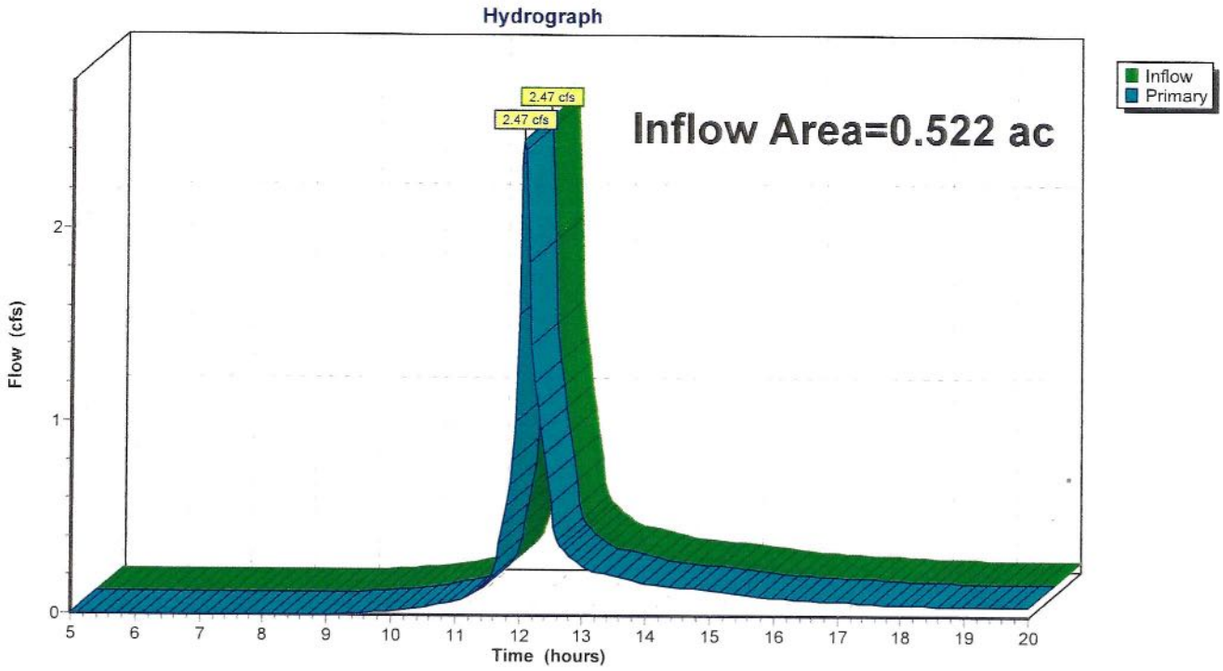


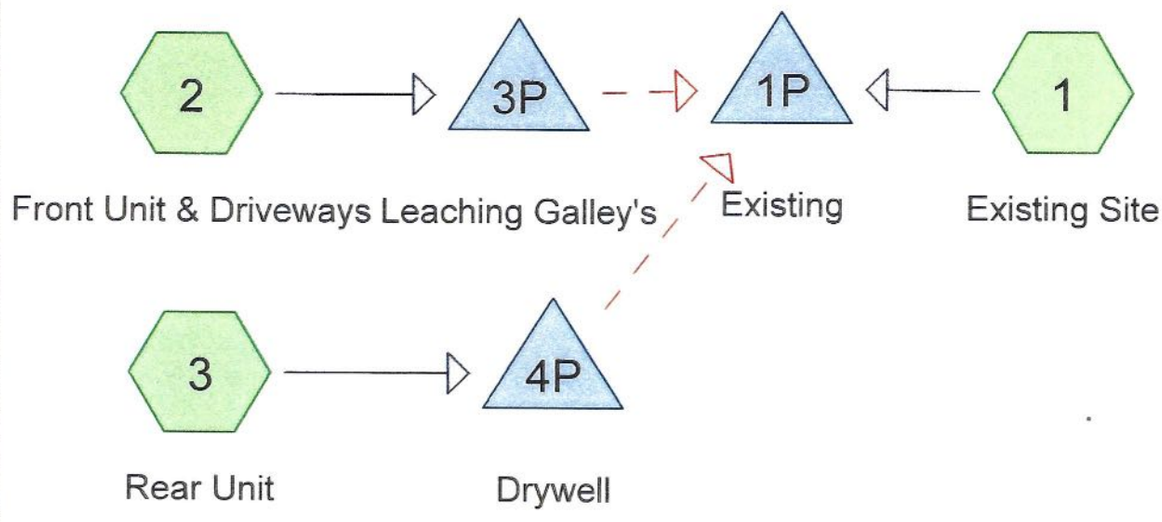
Summary for Pond 1P: Highland Ave

Inflow Area = 0.522 ac, 23.88% Impervious, Inflow Depth > 3.75" for City of Newton event
Inflow = 2.47 cfs @ 12.08 hrs, Volume= 0.163 af
Primary = 2.47 cfs @ 12.08 hrs, Volume= 0.163 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: Highland Ave





Subcat Reach Pond Link

Routing Diagram for Highland Ave - Proposed
Prepared by HP, Printed 9/19/2021

Area Listing (selected nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.293	49	50-75% Grass cover, Fair, HSG A (1)
0.116	98	Prop. Drive (2)
0.060	98	Prop. Front Unit (2)
0.053	98	Prop. Rear Unit (3)
0.522	**71**	**TOTAL AREA**

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

Subcatchment1: Existing Site Runoff Area=12,757 sf 0.00% Impervious Runoff Depth>2.38"
Tc=5.0 min CN=49 Runoff=0.84 cfs 0.058 af

Subcatchment2: Front Unit & Driveways Runoff Area=7,658 sf 100.00% Impervious Runoff Depth>7.85"
Tc=5.0 min CN=98 Runoff=1.53 cfs 0.115 af

Subcatchment3: Rear Unit Runoff Area=2,323 sf 100.00% Impervious Runoff Depth>7.85"
Tc=5.0 min CN=98 Runoff=0.46 cfs 0.035 af

Pond 1P: Existing Inflow=1.34 cfs 0.079 af
Primary=1.34 cfs 0.079 af

Pond 3P: Leaching Galley's Peak Elev=60.25' Storage=0.042 af Inflow=1.53 cfs 0.115 af
Discarded=0.09 cfs 0.092 af Secondary=0.33 cfs 0.010 af Outflow=0.42 cfs 0.103 af

Pond 4P: Drywell Peak Elev=62.32' Storage=0.009 af Inflow=0.46 cfs 0.035 af
Discarded=0.02 cfs 0.020 af Secondary=0.51 cfs 0.010 af Outflow=0.53 cfs 0.030 af

Total Runoff Area = 0.522 ac Runoff Volume = 0.208 af Average Runoff Depth = 4.78"
56.10% Pervious = 0.293 ac 43.90% Impervious = 0.229 ac

Summary for Subcatchment 1: Existing Site

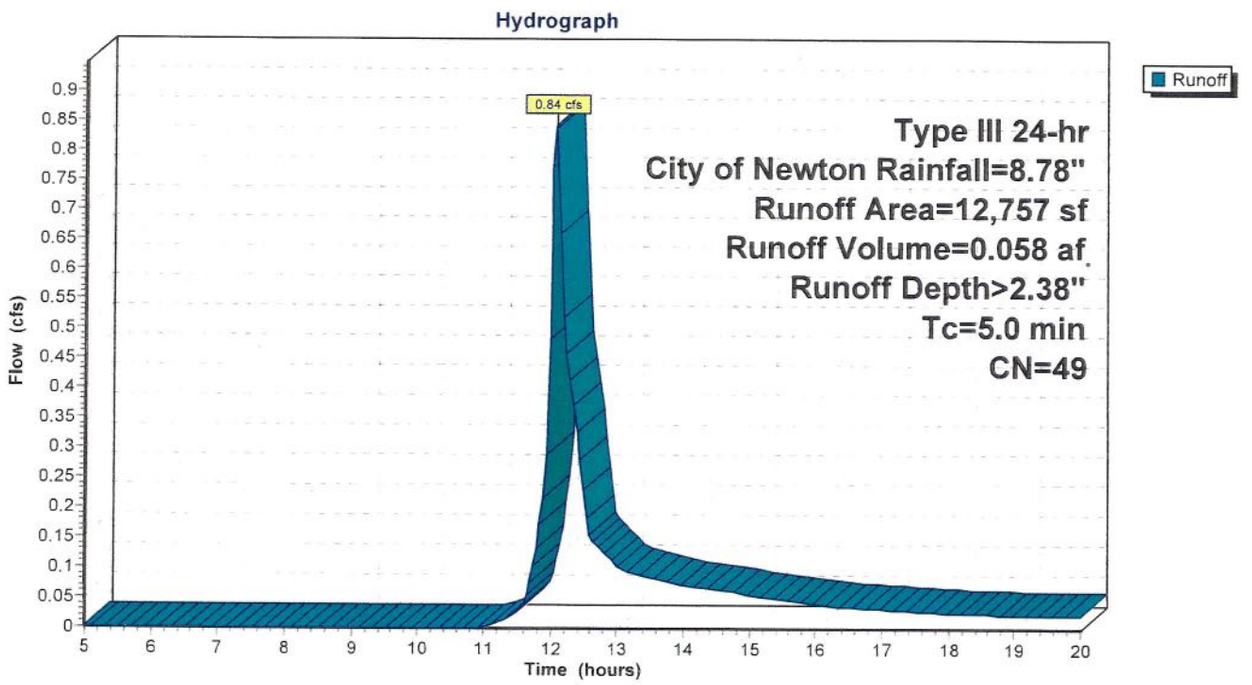
Runoff = 0.84 cfs @ 12.09 hrs, Volume= 0.058 af, Depth> 2.38"

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 City of Newton Rainfall=8.78"

Area (sf)	CN	Description
12,757	49	50-75% Grass cover, Fair, HSG A
12,757		100.00% Pervious Area

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

Subcatchment 1: Existing Site



Summary for Subcatchment 2: Front Unit & Driveways

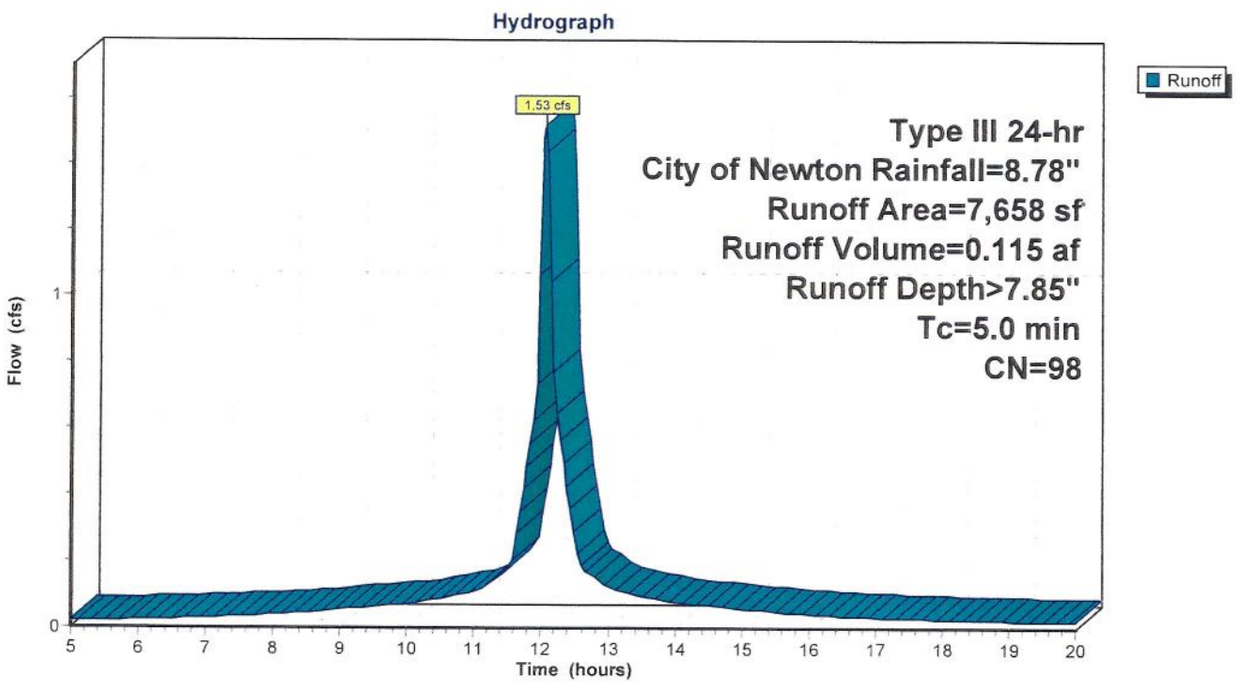
Runoff = 1.53 cfs @ 12.07 hrs, Volume= 0.115 af, Depth> 7.85"

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 City of Newton Rainfall=8.78"

	Area (sf)	CN	Description
*	2,603	98	Prop. Front Unit
*	5,055	98	Prop. Drive
	7,658	98	Weighted Average
	7,658		100.00% Impervious Area

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

Subcatchment 2: Front Unit & Driveways



Summary for Subcatchment 3: Rear Unit

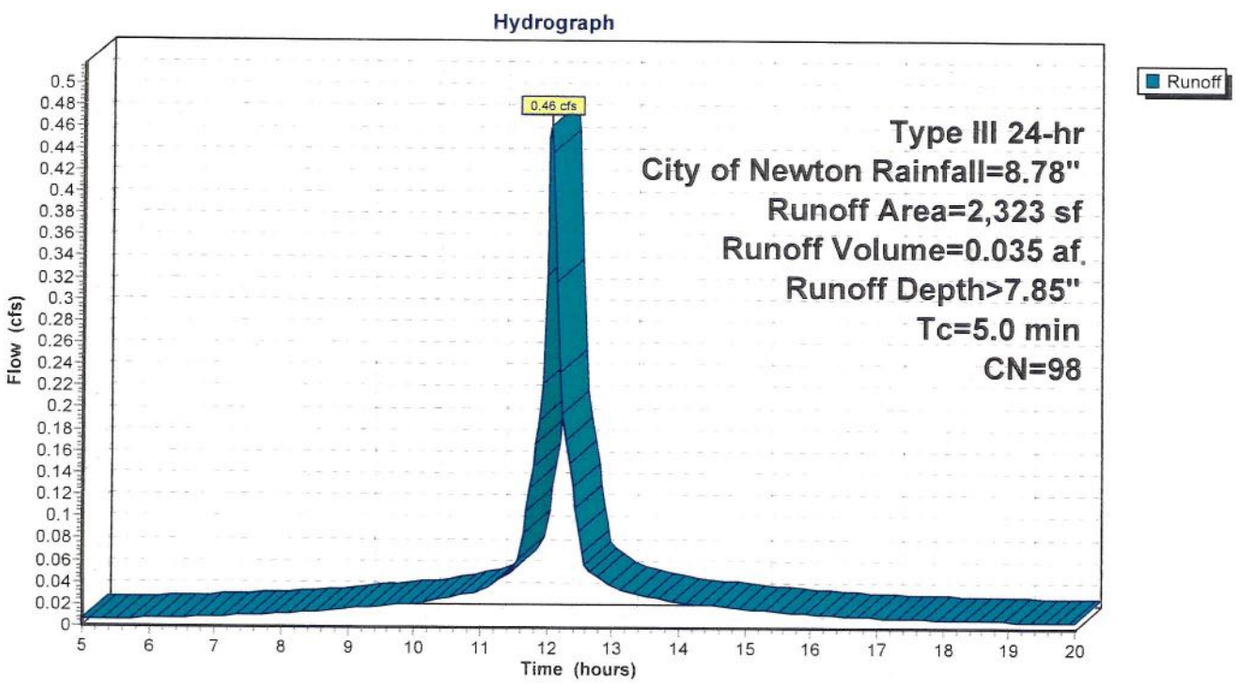
Runoff = 0.46 cfs @ 12.07 hrs, Volume= 0.035 af, Depth> 7.85"

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 City of Newton Rainfall=8.78"

	Area (sf)	CN	Description
*	2,323	98	Prop. Rear Unit
	2,323		100.00% Impervious Area

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

Subcatchment 3: Rear Unit

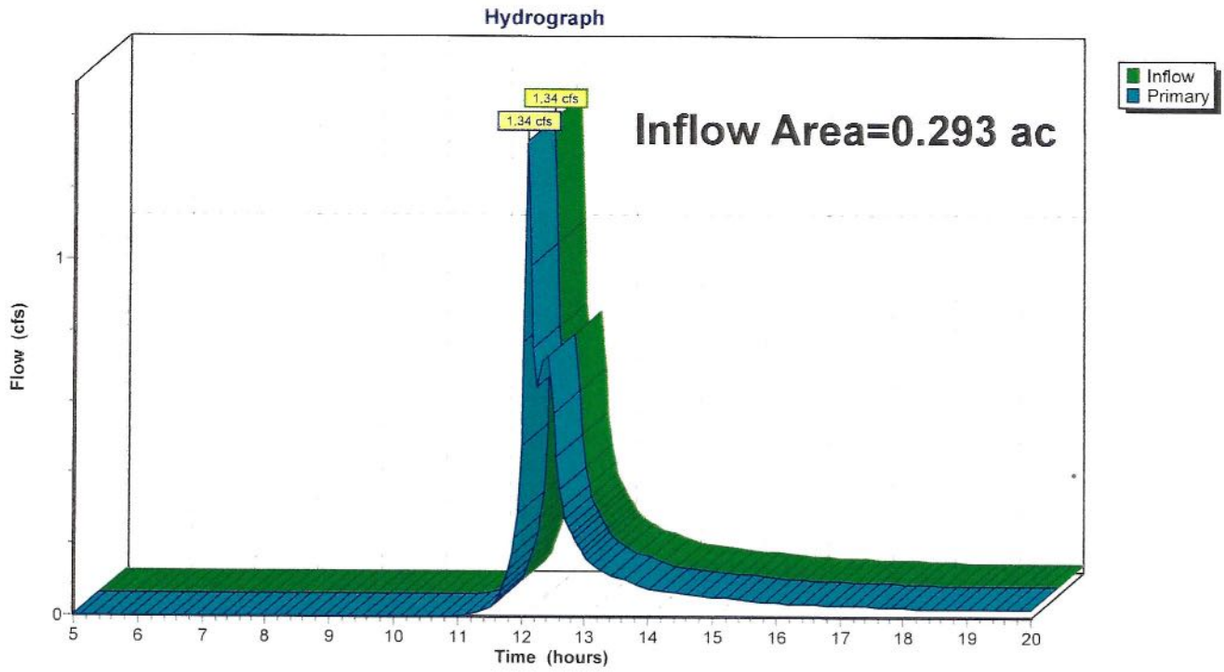


Summary for Pond 1P: Existing

Inflow Area = 0.293 ac, 0.00% Impervious, Inflow Depth > 3.23" for City of Newton event
Inflow = 1.34 cfs @ 12.11 hrs, Volume= 0.079 af
Primary = 1.34 cfs @ 12.11 hrs, Volume= 0.079 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: Existing



Summary for Pond 3P: Leaching Galley's

Inflow Area = 0.176 ac,100.00% Impervious, Inflow Depth > 7.85" for City of Newton event
Inflow = 1.53 cfs @ 12.07 hrs, Volume= 0.115 af
Outflow = 0.42 cfs @ 12.41 hrs, Volume= 0.103 af, Atten= 72%, Lag= 20.7 min
Discarded = 0.09 cfs @ 10.60 hrs, Volume= 0.092 af
Secondary = 0.33 cfs @ 12.41 hrs, Volume= 0.010 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 60.25' @ 12.41 hrs Surf.Area= 0.011 ac Storage= 0.042 af

Plug-Flow detention time= 127.9 min calculated for 0.103 af (89% of inflow)
Center-of-Mass det. time= 91.2 min (823.2 - 732.1)

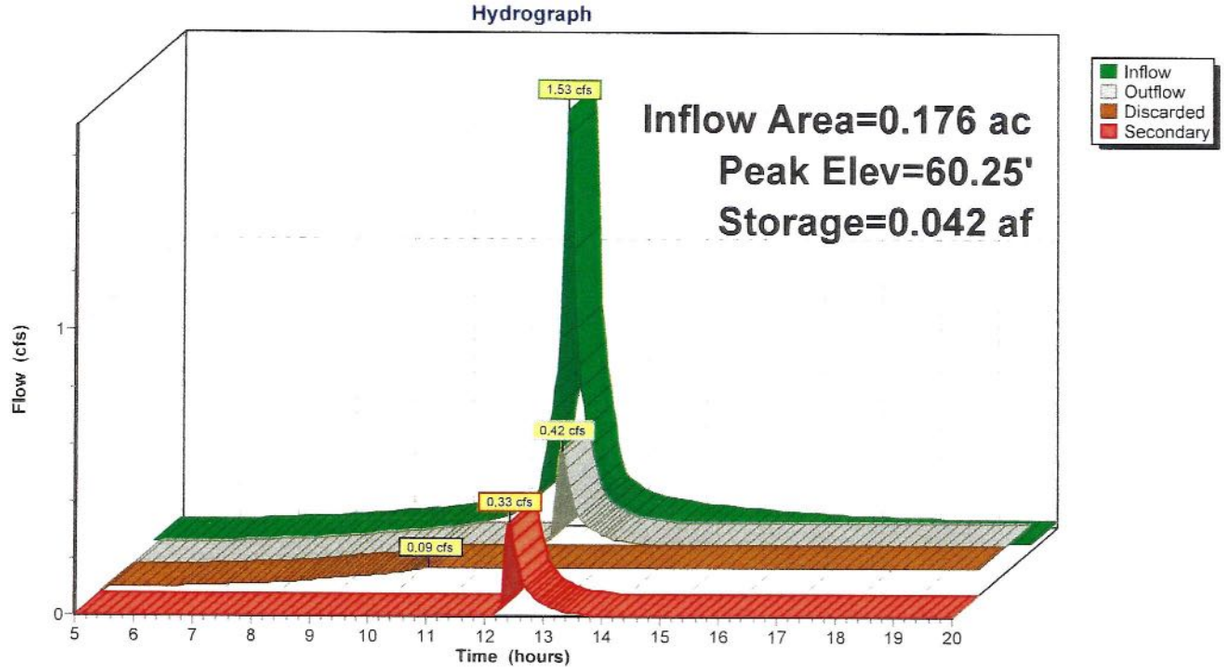
Volume	Invert	Avail.Storage	Storage Description
#1	53.70'	0.022 af	**22.00'W x 22.00'L x 7.17'H Gravel Area** 0.080 af Overall - 0.024 af Embedded = 0.056 af x 40.0% Voids
#2	54.20'	0.024 af	**7.00'D x 6.67'H 1500 Gal Drywell** x 4 Inside #1
		0.046 af	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	53.70'	**8.270 in/hr Exfiltration over Surface area**
#2	Secondary	59.87'	**6.0" Vert. Orifice/Grate** C= 0.600

Discarded OutFlow Max=0.09 cfs @ 10.60 hrs HW=53.77' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.09 cfs)

Secondary OutFlow Max=0.32 cfs @ 12.41 hrs HW=60.24' (Free Discharge)
↑—**2=Orifice/Grate** (Orifice Controls 0.32 cfs @ 2.07 fps)

Pond 3P: Leaching Galley's



Summary for Pond 4P: Drywell

Inflow Area = 0.053 ac,100.00% Impervious, Inflow Depth > 7.85" for City of Newton event
Inflow = 0.46 cfs @ 12.07 hrs, Volume= 0.035 af
Outflow = 0.53 cfs @ 12.11 hrs, Volume= 0.030 af, Atten= 0%, Lag= 2.5 min
Discarded = 0.02 cfs @ 9.30 hrs, Volume= 0.020 af
Secondary = 0.51 cfs @ 12.11 hrs, Volume= 0.010 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 62.32' @ 12.11 hrs Surf.Area= 0.002 ac Storage= 0.009 af

Plug-Flow detention time= 94.5 min calculated for 0.030 af (86% of inflow)
Center-of-Mass det. time= 51.1 min (783.2 - 732.1)

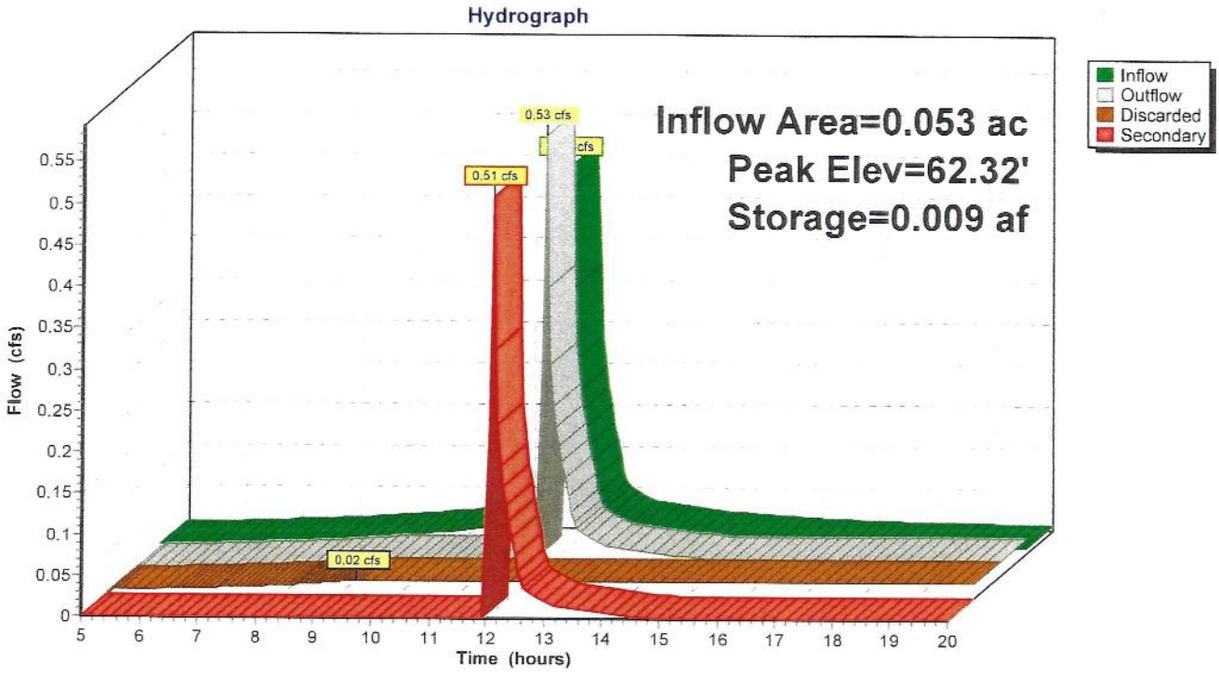
Volume	Invert	Avail.Storage	Storage Description
#1	55.60'	0.004 af	**11.00'D x 7.17'H Gravel** 0.016 af Overall - 0.006 af Embedded = 0.010 af x 40.0% Voids
#2	56.10'	0.006 af	**7.00'D x 6.67'H 1500 Gal Drywell** Inside #1
		0.010 af	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	55.60'	**8.270 in/hr Exfiltration over Surface area**
#2	Secondary	61.77'	**6.0" Vert. Orifice/Grate** C= 0.600

Discarded OutFlow Max=0.02 cfs @ 9.30 hrs HW=55.67' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.02 cfs)

Secondary OutFlow Max=0.46 cfs @ 12.11 hrs HW=62.25' (Free Discharge)
↑—**2=Orifice/Grate** (Orifice Controls 0.46 cfs @ 2.37 fps)

Pond 4P: Drywell



OPERATION & MAINTENANCE PLAN

STORMWATER MANAGEMENT FACILITIES
PROPOSED MULTI-FAMILY DWELLING
50 HIGHLAND AVE
NEWTON, MASSACHUSETTS

September 20, 2021

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

OPERATION & MAINTENANCE PLAN
STORMWATER MANAGEMENT FACILITIES
PROPOSED MULTI-FAMILY DWELLING
50 HIGHLAND AVE
NEWTON, MA

The proposed project includes stormwater runoff controls associated with the construction of a new addition, new multi-family dwelling and associated site amenities. The major components associated with maintenance needs are the proposed leaching galleys that will handle runoff from the existing driveway, garage and proposed addition. 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 galleys should be inspected monthly during the first year, and then every third year following the 1-year inspection.

The galley's 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.

Trench Drain Inspection/Cleaning:

Have all trench drains and drain manholes 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 Inlet Protection

All existing and newly installed catch basin 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 MULTI-FAMILY DWELLING
50 HIGHLAND AVE
NEWTON, MASSACHUSETTS

INSPECTION REPORT:

Inspection Firm: _____

Inspectors Name: _____ Date: _____

Components Inspected: _____

Signed: _____

SYSTEM MAINTENANCE:

Maintenance Firm: _____ Date: _____

Leaching Galleys Inspected: Yes____No__Comments:_____

_____

Leaching Galleys Cleaned: Yes____No__Comments:_____

Trench Drain Inspected: Yes____No__Comments:_____

_____

Trench Drain Cleaned: Yes____No__Comments:_____

Drain Manhole Inspected: Yes____No__Comments:_____

_____

Drain Manhole Cleaned: Yes____No__Comments:_____

Estimate of Material Removed: _____

Other Comments: _____

_____

_____

Signed: _____

Middlesex County, Massachusetts

602—Urban land

Map Unit Setting

National map unit symbol: 9950
Elevation: 0 to 3,000 feet
Mean annual precipitation: 32 to 50 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 110 to 200 days
Farmland classification: Not prime farmland

Map Unit Composition

Urban land: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Urban Land

Setting

Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Base slope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Excavated and filled land

Minor Components

Rock outcrop

Percent of map unit: 5 percent
Landform: Ledges
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Head slope
Down-slope shape: Concave
Across-slope shape: Concave

Udorthents, wet substratum

Percent of map unit: 5 percent
Hydric soil rating: No

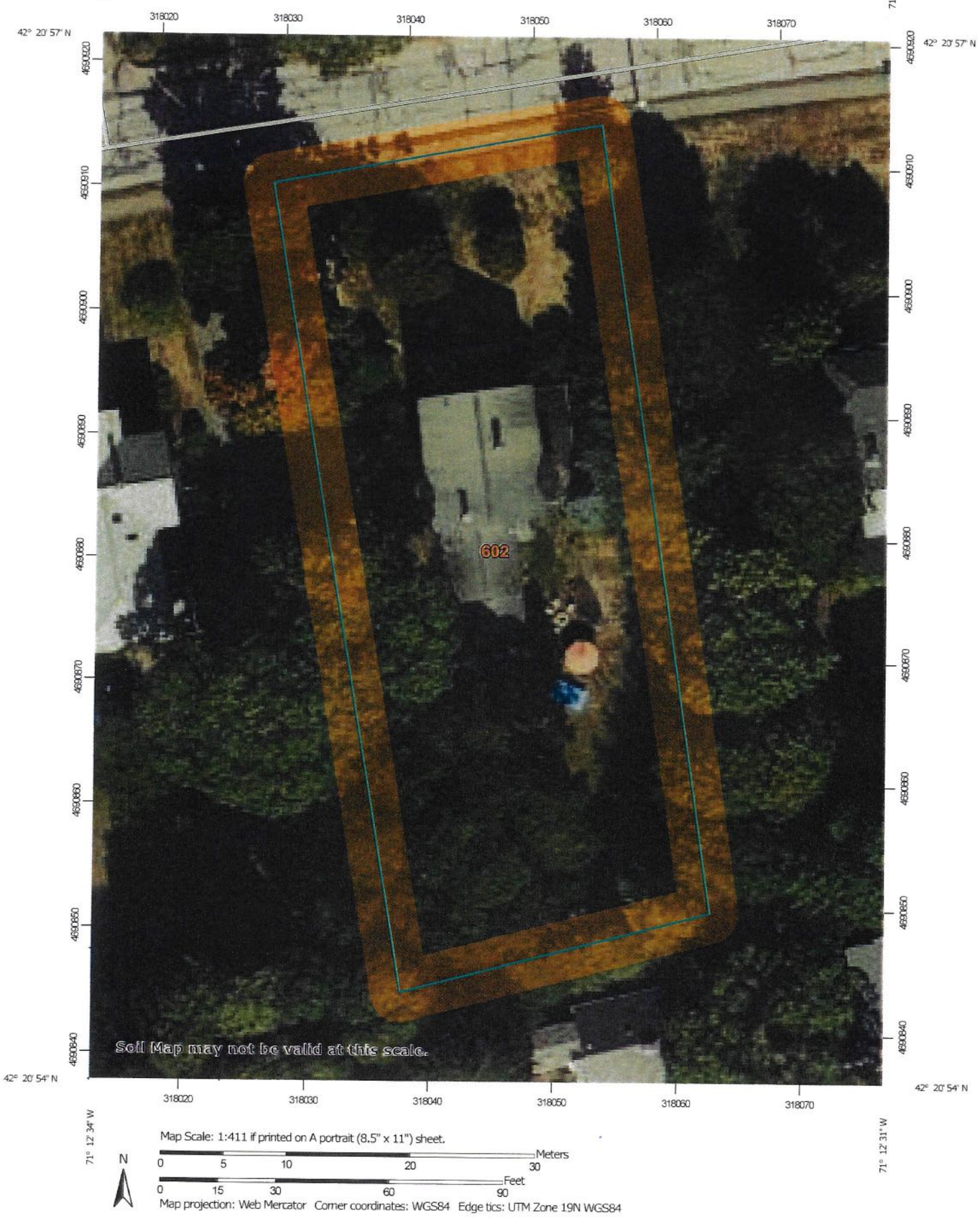
Udorthents, loamy

Percent of map unit: 5 percent
Hydric soil rating: No

Data Source Information

Soil Survey Area: Middlesex County, Massachusetts
Survey Area Data: Version 20, Jun 9, 2020

Soil Map—Middlesex County, Massachusetts



Map Scale: 1:411 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 5 10 20 30

Feet: 0 15 30 60 90

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 19N WGS84

MAP LEGEND

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

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

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

Water Features
- Streams and Canals

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

Background
- Aerial Photography

MAP INFORMATION

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

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 20, Jun 9, 2020

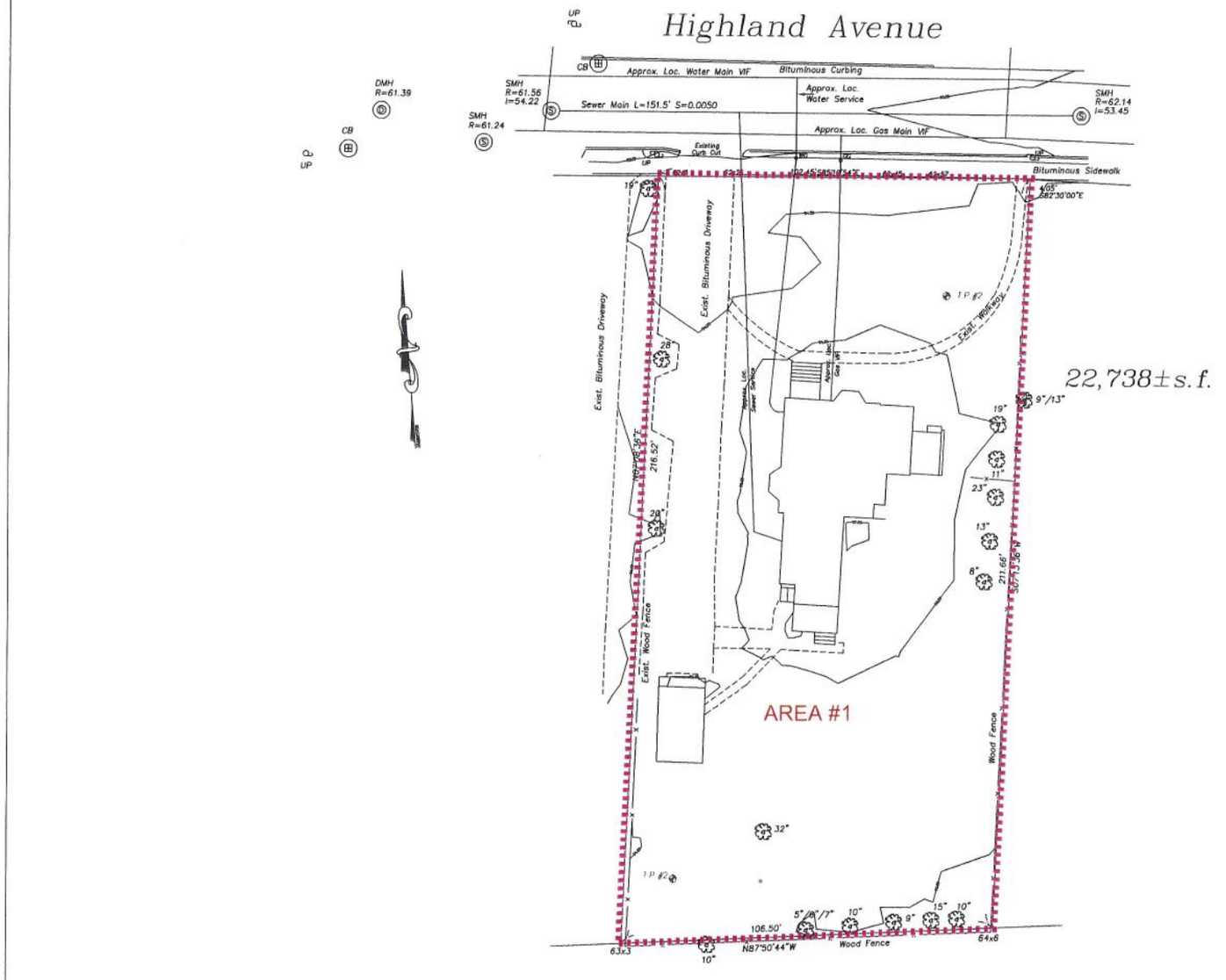
Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Sep 25, 2020—Oct 4, 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
602	Urban land	0.4	100.0%
Totals for Area of Interest		**0.4**	**100.0%**



~Predevelopment Catchment Area Plan~

50 Highland Avenue

Newton, Massachusetts

Scale: n.t.s. September 18, 2021

VERNE T. PORTER Jr, PLS

Land Surveyors – Civil Engineers

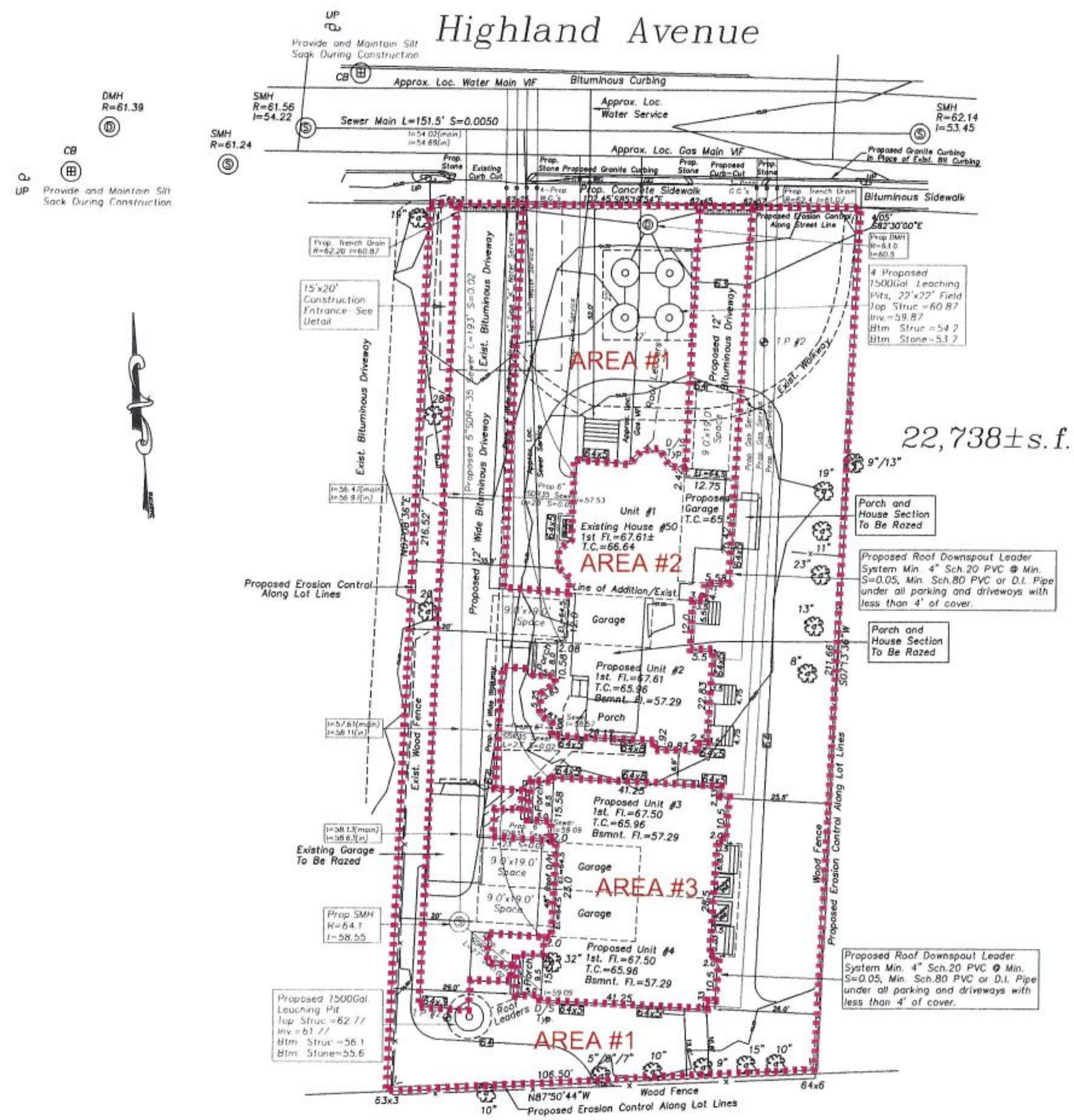
354 Elliot Street, Newton, Ma. 02464

Design By:GNB

Checked By:VTP

Drawn By:GNB

Sheet 1 of 2



~Post Development Catchment Area Plan~

50 Highland Avenue

Newton, Massachusetts

Scale: n.t.s. September 18, 2021

VERNE T. PORTER Jr, PLS

Land Surveyors – Civil Engineers

354 Elliot Street, Newton, Ma. 02464

Design By:GNB

Checked By:VTP

Drawn By:GNB

Sheet 2 of 2

TEST PIT FIELD LOG

PROJECT

DESCRIPTION: 50 HIGHLAND AVE
LOCATION: NEWTON

TEST PIT NO.: 1
DATE: 9-16-21
WEATHER: CLOUDY 75°
GROUND EL: 103.2 +/-
ENGINEER: VERNE T PORTER

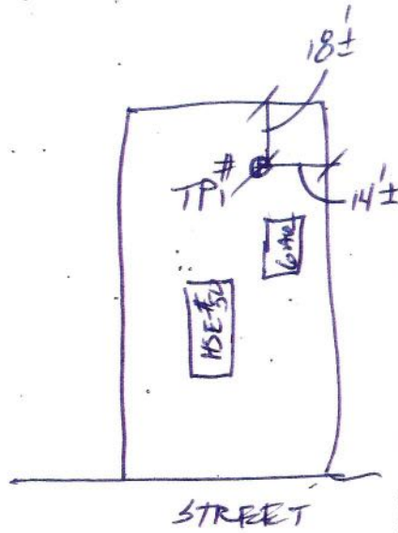
PERCOLATION RESULTS

DEPTH:	TIME:
12"	
11"	
10"	
9"	
8"	
7"	
6"	

REMARKS:

AVERAGE RATE: > 2 mW/WcH

DEPTH	SOIL DESCRIPTION	Excav. Effort	Boulder Count	Remar No.
0'	SANDY LOAM 10YR 3/3			
1'	~~LOAMY~~ SAND 10YR 5/8			
2'				
3'				
4'	MEDIUM TO COARSE SAND & GRAVEL			
5'	COBBLE 6" MINUS			
6'				
7'				
8'				
9'				
10'				
11'	NO REFUSAL			
12'	NO WATER			
13'				
14'				



REMARKS:

TEST PIT PLAN

LEGEND

Boulder Count
Size Range Classification
6"-18" --------A
18"-30" --------B

PROPORTIONS USED

Trace (TR)- 0 -10%
Little(LI.)-10-20%
Some (SO) -20-35%

ABBREVIATIONS

F-fine
M-medium
C-coarse
F/M-fine to med.
F/C-fine to coar.
V-very
GR-gray

EXCAVATION EFFORT

Easy	E
Moderate	M
Difficult	D
Groundwater	GI

TEST PIT FIELD LOG

PROJECT

DESCRIPTION: 50 HIGHLAND AVE
LOCATION: NEWTON

TEST PIT NO.: 2
DATE: 9-16-21
WEATHER: CLOUDY 75°
GROUND EL: 63.6 +/-
ENGINEER: VERNE T PORTER JR

PERCOLATION RESULTS

DEPTH:	TIME:
12"	
11"	
10"	
9"	
8"	
7"	
6"	

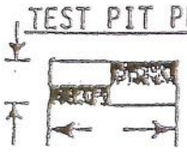
REMARKS:

AVERAGE RATE:

DEPTH	SOIL DESCRIPTION	Excav. Effort	Boulder Count	Remar No.
0'				
1'	24" SANDY LOAM			
2'	12" ~~LOAMY~~ SANDY SAND			
3'				
4'				
5'	COARSE SAND & GRAVEL			
6'	COBBLES 6" MINUS			
7'				
8'				
9'				
10'				
11'				
12'	NO REFUSAL			
13'	NO WATER			
14'	WET @ BOTTOM			

REMARKS:

TEST PIT PLAN



LEGEND

Boulder Count
Size Range Classification
6"-18" --------A
18"-30" --------B

PROPORTIONS USED

Trace (TR)- 0 -10%
Little(LI.)-10-20%
Some (SO) -20-35%

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F-fine
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Easy	E
Moderate	M
Difficult	D
Groundwater	GI