

**Drainage Analysis
For
44 DAVIS ROAD
MILLBURY, MA**

**Prepared for & Owned by
JOSEPH B HALL
272 MAIN STREET UNIT 2B
ACTON, MA**

03/23/2022

**Prepared by
ALPHA OMEGA ENGINEERING, INC.
25 Highland View Drive
Sutton, MA 01590**

Roumany A. Wasef, P.E.

EXISTING CONDITIONS:

The site is located off Davis Road. Presently, ground cover is wooded. The existing site work area has one drainage catchment area. Area A slopes 9% +/- easterly towards the street. The predominant soil on site from soil maps is Paxton fine sandy loam. However field observations and soil testing show the soil as Sand and Loamy Sand, hydrologic soil type B.

DEVELOPED CONDITIONS:

Development of the site will result in the creation of a single family home along with the associated grading. The increase of storm water run-off will be sent to an underground detention/infiltration system to attenuate increased run-off rates as a result of development. The detention/infiltration system is designed for capture the runoff from sub-catchment area A2

ANALYSIS:

The goal of the stormwater management system proposed is to ensure that there is no increase in peak run-off rates downstream of the site. This goal is achieved using the proposed detention/infiltration system that has been carefully sized to attenuate flow rates for the 100 year storm event.

CALCULATIONS:

The storm modeling and routings were performed using HydroCAD version 9.1.

SUMMARY:

A) Runoff Rate - cfs

<i>Area</i>	<i>2 Year</i>		<i>10 Year</i>		<i>25 Year</i>		<i>100 Year</i>	
	<i>Pre</i>	<i>Post</i>	<i>Pre</i>	<i>Post</i>	<i>Pre</i>	<i>Post</i>	<i>Pre</i>	<i>Post</i>
A	0.08	0.12	0.52	.57	1.02	0.97	2.20	1.90

Table 1

A) Runoff Volume - af

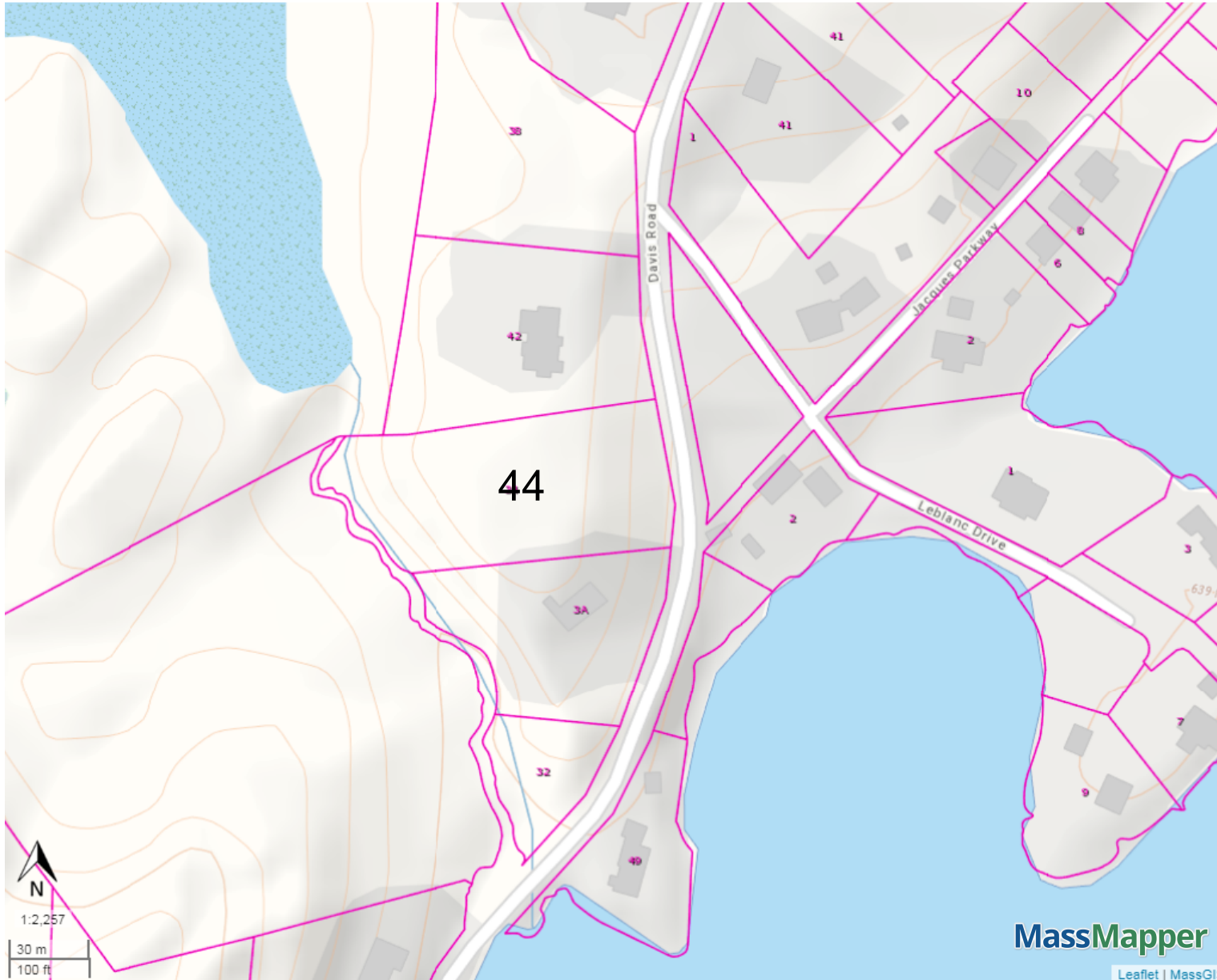
<i>Area</i>	<i>2 Year</i>		<i>10 Year</i>		<i>25 Year</i>		<i>100 Year</i>	
	<i>Pre</i>	<i>Post</i>	<i>Pre</i>	<i>Post</i>	<i>Pre</i>	<i>Post</i>	<i>Pre</i>	<i>Post</i>
A	.014	.017	.055	.053	.094	.085	.190	.162

Table 2

CONCLUSIONS:

From this analysis we conclude that no significant net increase in peak run-off rates will occur as a result of the development of this site. The total net peak run-off rate from this site will be slightly reduced as a result of the development.

44 Davis Rd, MILLBURY MA



- NHESP Certified Vernal Pools
*
- Potential Vernal Pools
○
- BioMap2 Core Habitat Species of Conservation Concern
■
- BioMap2 Core Habitat Vernal Pool Core
■
- BioMap2 Core Habitat
■
- Aquifers by Yield
■ High Yield
■ Medium Yield
- Zone Is
■
- Zone IIs
■
- Zone B
—
- Zone A
■
- IWPAs
■
- BioMap2 Core Habitat Wetlands
■
- Property Tax Parcels

NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The community map repository should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations (BFEs)** and/or **floodways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) Report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS Report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Coastal Base Flood Elevations shown on this map apply only landward of 0' North American Vertical Datum of 1988 (NAVD 88). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations table in the Flood Insurance Study Report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations table should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study Report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study Report for information on flood control structures for this jurisdiction.

The **projection** used in the preparation of this map was Massachusetts State Plane Mainland Zone (FIPS zone 2001). The **horizontal datum** was NAD 83, GRS 1980 spheroid. Differences in datum, spheroid, projection or UTM zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Flood elevations on this map are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same **vertical datum**. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at <http://www.ngs.noaa.gov> or contact the National Geodetic Survey at the following address:

NGS Information Services
NOAA, N/NGS12
National Geodetic Survey
SSMC-3, #9202
1315 East-West Highway
Silver Spring, Maryland 20910-3282
(301) 713-3242

To obtain current elevation, description, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at (301) 713-3242, or visit its website at <http://www.ngs.noaa.gov>.

Base map information shown on this FIRM was derived from digital orthophotography. Base map files were provided in digital format by Massachusetts Geographic Information Systems (MassGIS). Ortho imagery was produced at a scale of 1:5,000. Aerial photography is dated April 2005.

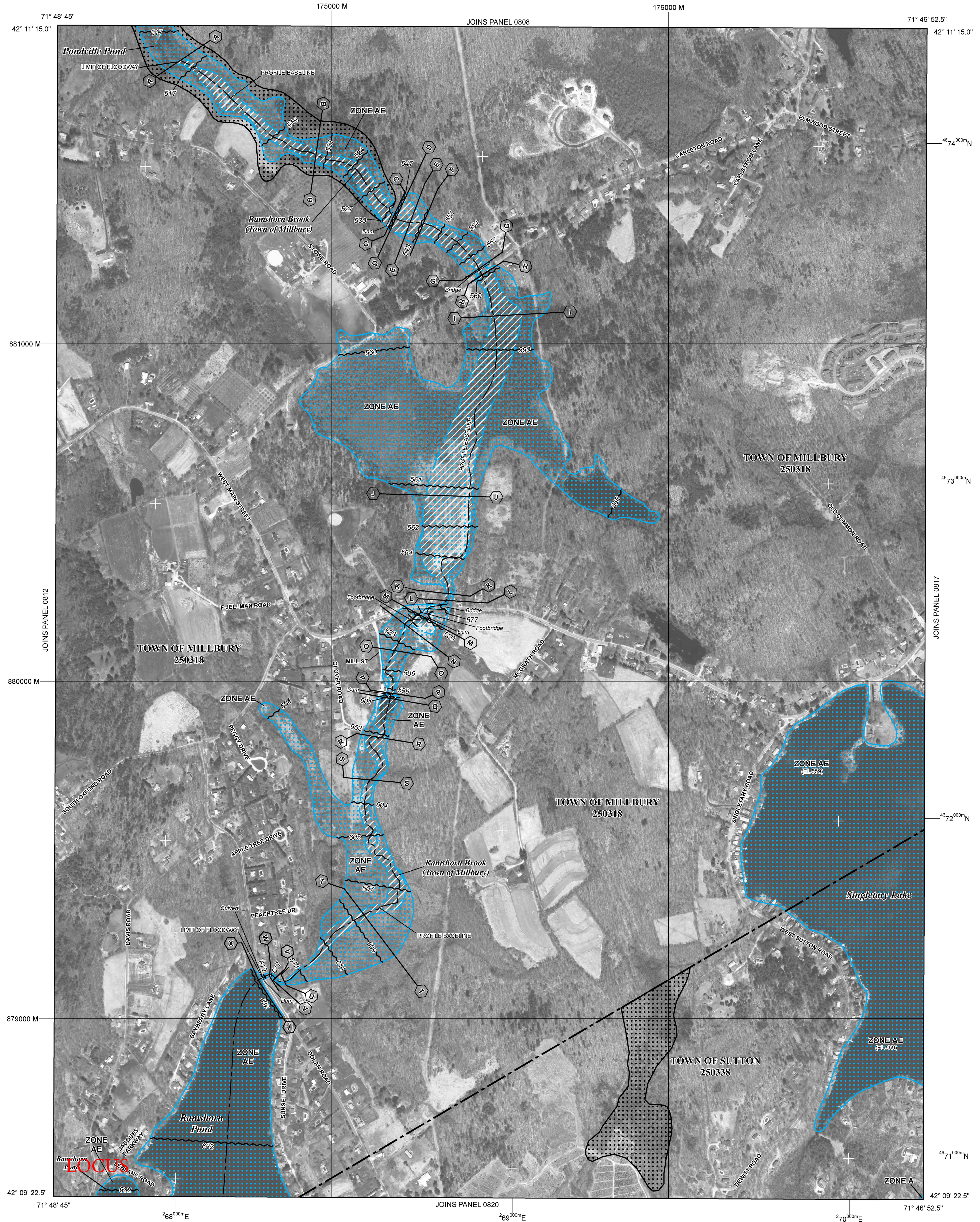
The **profile baselines** depicted on this map represent the hydraulic modeling baselines that match the flood profiles in the FIS report. As a result of improved topographic data, the **profile baseline**, in some cases, may deviate significantly from the channel centerline or appear outside the SFHA.

Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

Please refer to the separately printed **Map Index** for an overview map of the county showing the layout of map panels; community map repository addresses; and a Listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which each community is located.

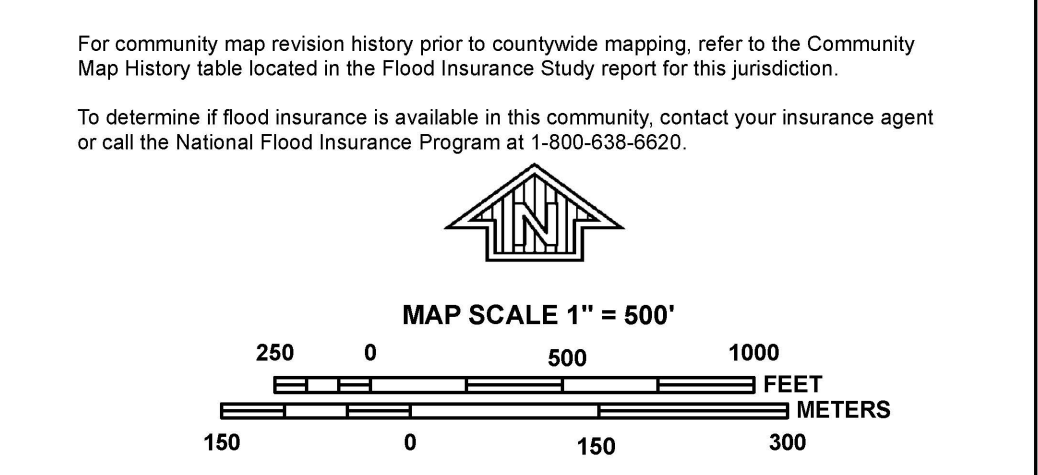
For information on available products associated with this FIRM visit the **Map Service Center (MSC)** website at <http://msc.fema.gov>. Available products may include previously issued Letters of Map Change, a Flood Insurance Study Report, and/or digital versions of this map. Many of these products can be ordered or obtained directly from the MSC website.

If you have **questions about this map**, how to order products, or the National Flood Insurance Program in general, please call the **FEMA Map Information eXchange (FMIX)** at 1-877-FEMA-MAP (1-877-336-2627) or visit the FEMA website at <http://www.fema.gov/business/nfp>.



LEGEND

- SPECIAL FLOOD HAZARD AREAS (SFHAs) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD. The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.
- ZONE A** No Base Flood Elevations determined.
- ZONE AE** Base Flood Elevations determined.
- ZONE AH** Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
- ZONE AO** Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
- ZONE AR** Special Flood Hazard Areas formerly protected from the 1% annual chance flood by a flood control system that was subsequently identified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
- ZONE A99** Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
- ZONE V** Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
- ZONE VE** Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.
- FLOODWAY AREAS IN ZONE AE. The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.
- OTHER FLOOD AREAS
- ZONE X** Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.
- OTHER AREAS**
- ZONE X** Areas determined to be outside the 0.2% annual chance floodplain.
- ZONE D** Areas in which flood hazards are undetermined, but possible.
- COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS
- OTHERWISE PROTECTED AREAS (OPAs)
- CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.
- 1% Annual Chance Floodplain Boundary
- 0.2% Annual Chance Floodplain Boundary
- Floodway boundary
- Zone D boundary
- CBRS and OPA boundary
- Boundary dividing Special Flood Hazard Area Zones and boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths, or flood velocities.
- Base Flood Elevation line and value; elevation in feet* (EL 987)
- Base Flood Elevation value where uniform within zone; elevation in feet*
- *Referenced to the North American Vertical Datum of 1988
- Cross section line
- Transect line
- Culvert
- Bridge
- Geographic coordinates referenced to the North American Datum of 1983 (NAD 83) Western Hemisphere
- 1000-meter ticks; Massachusetts State Plane Mainland Zone (FIPS Zone 2001), Lambert Conformal Conic projection
- 1000-meter Universal Transverse Mercator grid values, zone 19N
- Bench mark (see explanation in Notes to Users section of this FIRM panel)
- River Mile
- MAP REPOSITORIES. Refer to Map Repositories list on Map Index
- EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP July 4, 2011
- EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL



PANEL 0816E

FIRM
FLOOD INSURANCE RATE MAP
WORCESTER COUNTY,
MASSACHUSETTS
(ALL JURISDICTIONS)

PANEL 816 OF 1075
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
MILLBURY TOWN OF	250318	0816	E
SUTTON TOWN OF	250338	0816	E

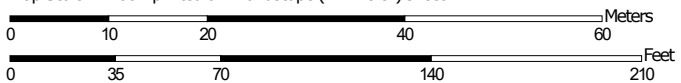
Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
25027C0816E
EFFECTIVE DATE
JULY 4, 2011
Federal Emergency Management Agency

Soil Map—Worcester County, Massachusetts, Southern Part



Map Scale: 1:766 if printed on A landscape (11" x 8.5") sheet.




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: Worcester County, Massachusetts, Southern Part
 Survey Area Data: Version 14, Sep 3, 2021

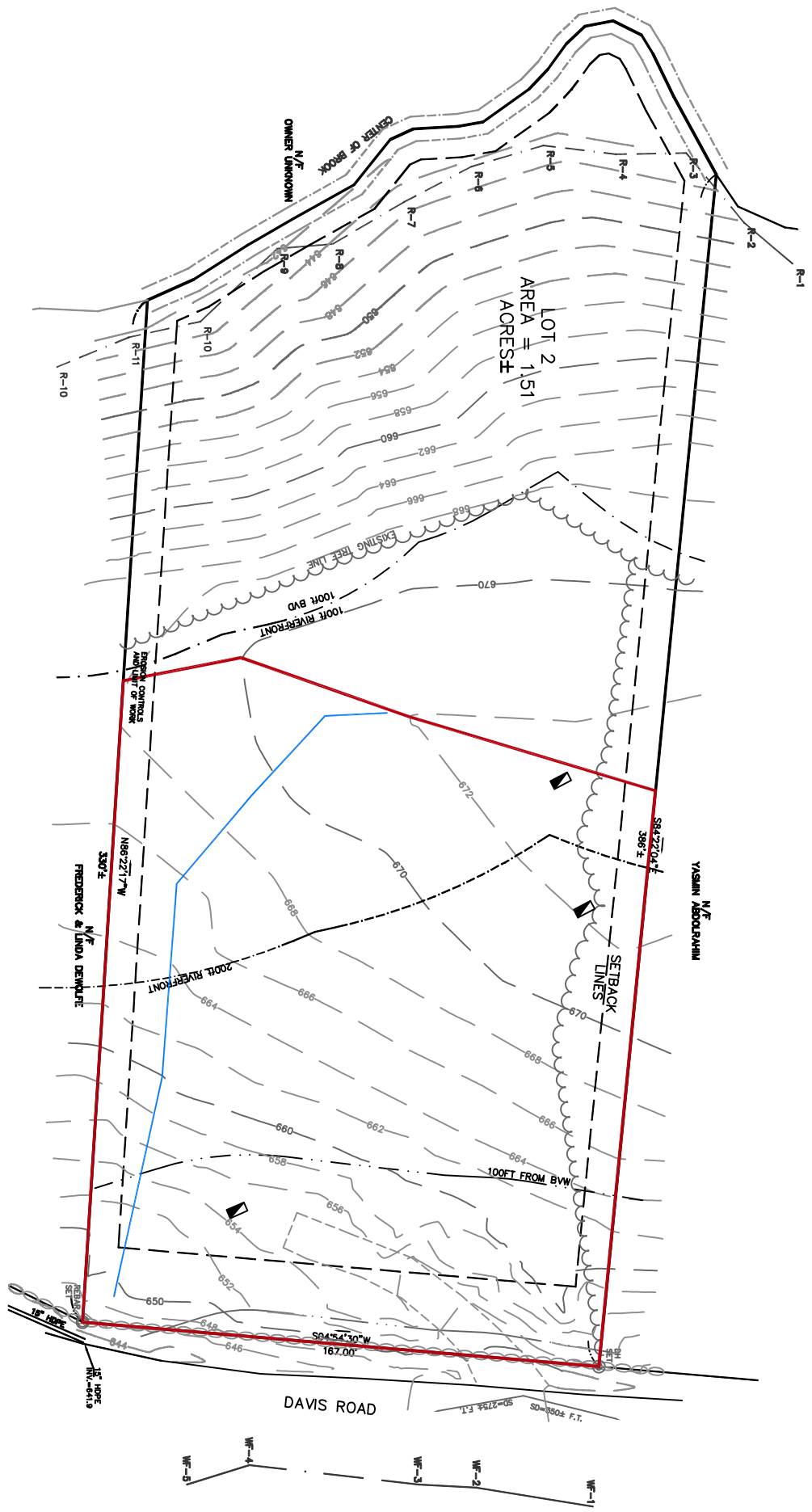
Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Sep 16, 2020—Oct 1, 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.

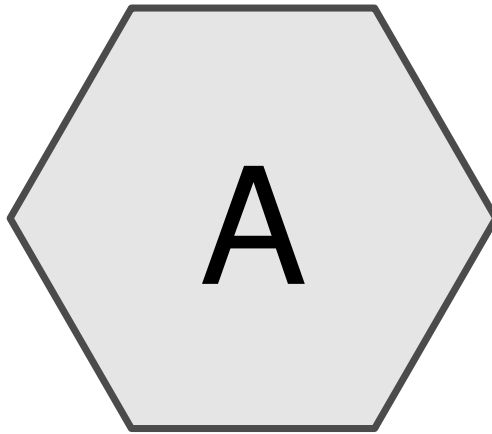
Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
73A	Whitman fine sandy loam, 0 to 3 percent slopes, extremely stony	0.2	11.0%
305B	Paxton fine sandy loam, 3 to 8 percent slopes	1.3	89.0%
Totals for Area of Interest		1.4	100.0%

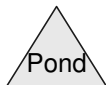
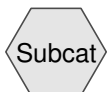


EXISTING CONDITION PLAN

SCALE: 1"=50'



AREA A



21-0576 Pre

Prepared by Burke Engineering

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Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.797	55	Woods, Good, HSG B (A)
0.797		TOTAL AREA

Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points

Runoff by SCS TR-20 method, UH=SCS

Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment A: AREA A

Runoff Area=34,723 sf 0.00% Impervious Runoff Depth>0.21"
Flow Length=175' Tc=13.7 min CN=55 Runoff=0.08 cfs 0.014 af

Total Runoff Area = 0.797 ac Runoff Volume = 0.014 af Average Runoff Depth = 0.21"
100.00% Pervious = 0.797 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment A: AREA A

Runoff = 0.08 cfs @ 12.45 hrs, Volume= 0.014 af, Depth> 0.21"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Type III 24-hr 2 Year Storm Rainfall=3.20"

Area (sf)	CN	Description
34,723	55	Woods, Good, HSG B
34,723		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.3	50	0.0200	0.07		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.20"
1.4	125	0.0900	1.50		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
13.7	175	Total			

Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points

Runoff by SCS TR-20 method, UH=SCS

Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment A: AREA A

Runoff Area=34,723 sf 0.00% Impervious Runoff Depth>0.82"
Flow Length=175' Tc=13.7 min CN=55 Runoff=0.52 cfs 0.055 af

Total Runoff Area = 0.797 ac Runoff Volume = 0.055 af Average Runoff Depth = 0.82"
100.00% Pervious = 0.797 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment A: AREA A

Runoff = 0.52 cfs @ 12.23 hrs, Volume= 0.055 af, Depth> 0.82"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Type III 24-hr 10 Year Storm Rainfall=4.90"

Area (sf)	CN	Description
34,723	55	Woods, Good, HSG B
34,723		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.3	50	0.0200	0.07		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.20"
1.4	125	0.0900	1.50		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
13.7	175	Total			

Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points

Runoff by SCS TR-20 method, UH=SCS

Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment A: AREA A

Runoff Area=34,723 sf 0.00% Impervious Runoff Depth>1.42"
Flow Length=175' Tc=13.7 min CN=55 Runoff=1.02 cfs 0.094 af

Total Runoff Area = 0.797 ac Runoff Volume = 0.094 af Average Runoff Depth = 1.42"
100.00% Pervious = 0.797 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment A: AREA A

Runoff = 1.02 cfs @ 12.21 hrs, Volume= 0.094 af, Depth> 1.42"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Type III 24-hr 25 Year Storm Rainfall=6.10"

Area (sf)	CN	Description
34,723	55	Woods, Good, HSG B
34,723		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.3	50	0.0200	0.07		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.20"
1.4	125	0.0900	1.50		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
13.7	175	Total			

Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points

Runoff by SCS TR-20 method, UH=SCS

Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment A: AREA A

Runoff Area=34,723 sf 0.00% Impervious Runoff Depth>2.86"
Flow Length=175' Tc=13.7 min CN=55 Runoff=2.20 cfs 0.190 af

Total Runoff Area = 0.797 ac Runoff Volume = 0.190 af Average Runoff Depth = 2.86"
100.00% Pervious = 0.797 ac 0.00% Impervious = 0.000 ac

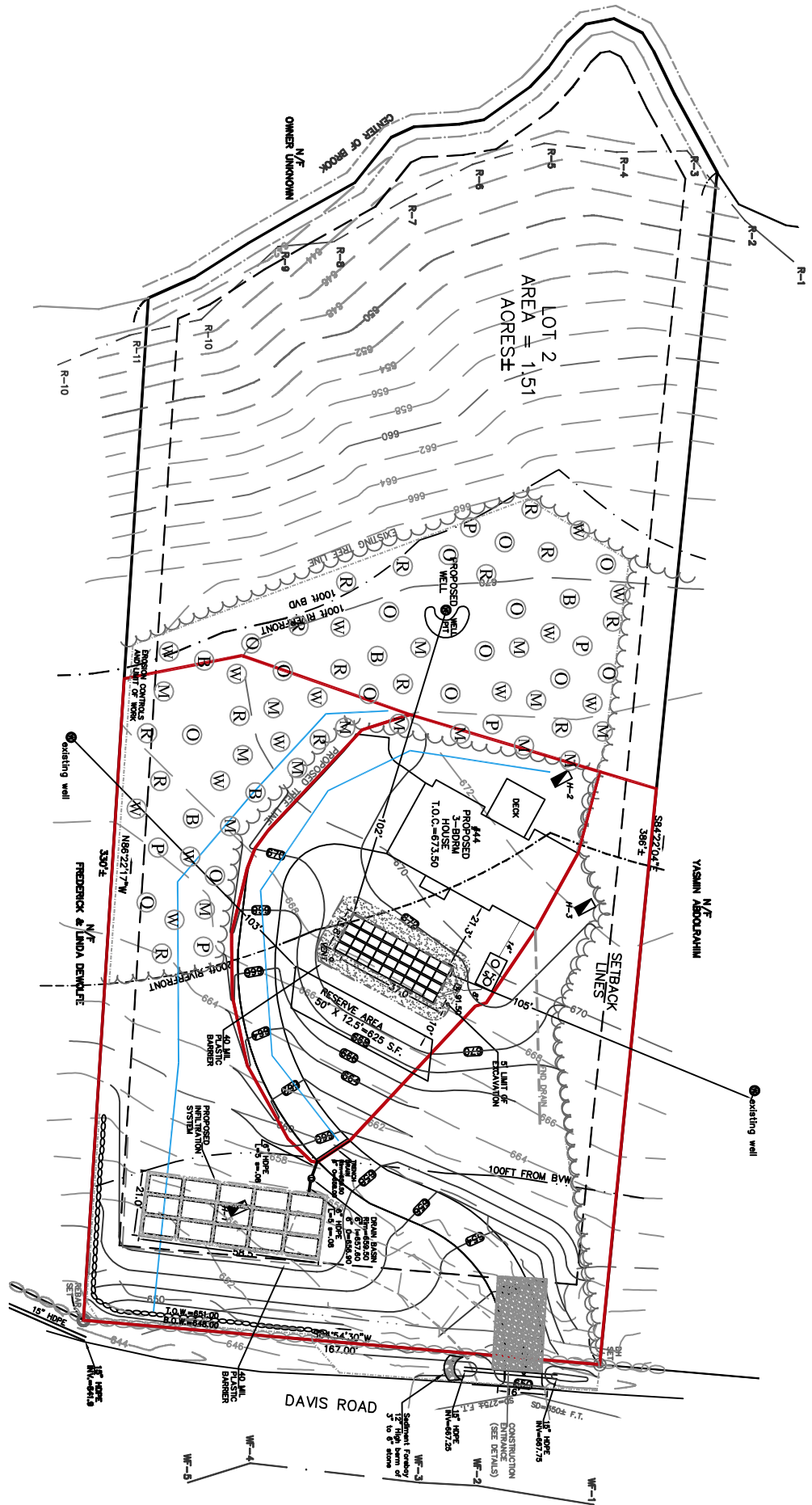
Summary for Subcatchment A: AREA A

Runoff = 2.20 cfs @ 12.20 hrs, Volume= 0.190 af, Depth> 2.86"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Type III 24-hr 100 Year Storm Rainfall=8.50"

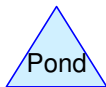
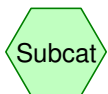
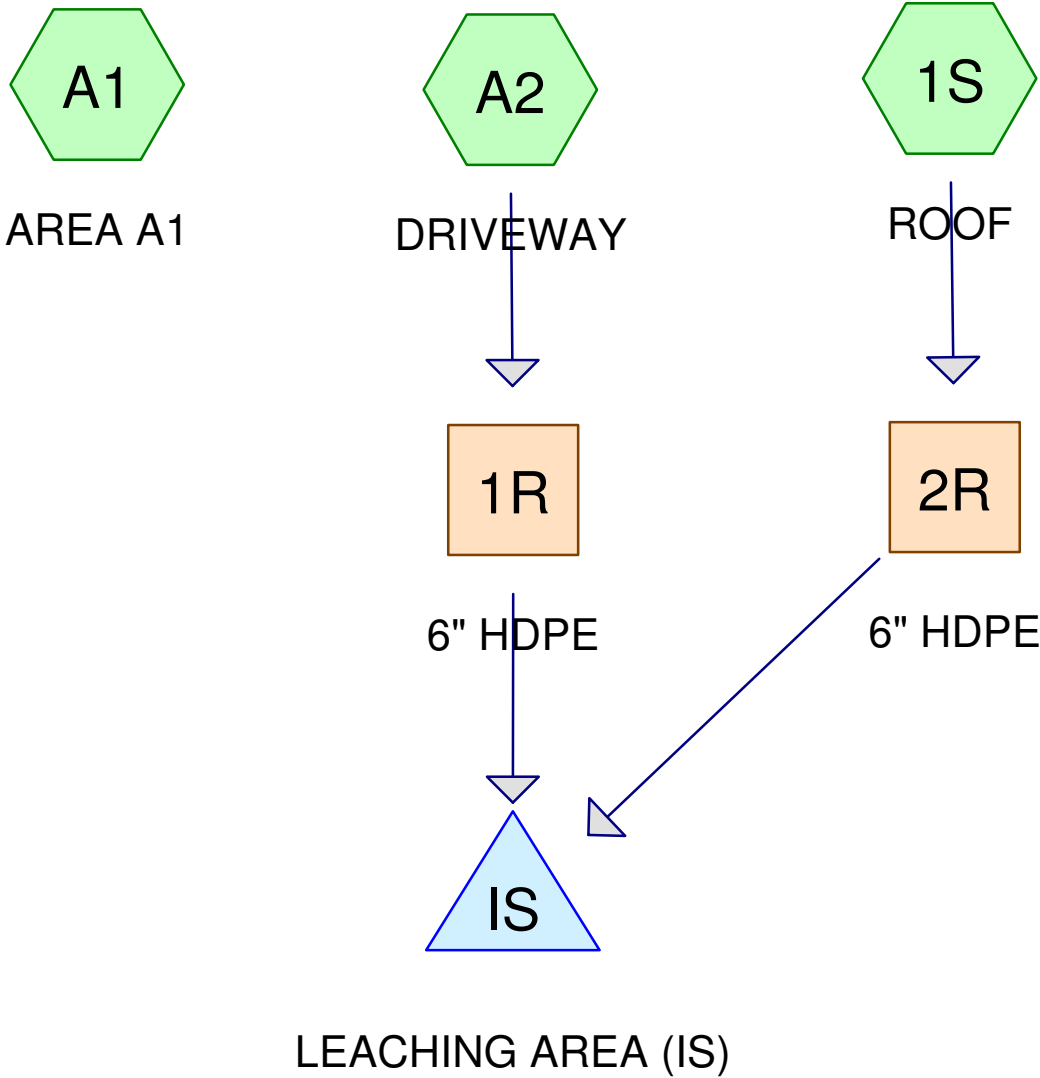
Area (sf)	CN	Description
34,723	55	Woods, Good, HSG B
34,723		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.3	50	0.0200	0.07		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.20"
1.4	125	0.0900	1.50		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
13.7	175	Total			



PROPOSED PLAN

SCALE: 1" = 50'



21-0576 Post-REV

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.196	55	Woods, Good, HSG B (A1)
0.484	61	>75% Grass cover, Good, HSG B (A1, A2)
0.023	98	Paved parking, HSG B (A1)
0.034	98	Roofs, HSG B (1S)
0.060	98	Unconnected pavement, HSG B (A2)
0.797		TOTAL AREA

21-0576 Post-REV

Prepared by {enter your company name here}

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Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
0.797	HSG B	1S, A1, A2
0.000	HSG C	
0.000	HSG D	
0.000	Other	
0.797		TOTAL AREA

21-0576 Post-REV

Prepared by {enter your company name here}

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Pipe Listing (all nodes)

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Diam/Width (inches)	Height (inches)	Fill (inches)
1	1R	81.30	80.50	10.0	0.0800	0.012	6.0	0.0	0.0
2	2R	668.60	656.60	150.0	0.0800	0.012	6.0	0.0	0.0

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

Subcatchment 1S: ROOF Runoff Area=1,480 sf 100.00% Impervious Runoff Depth>7.60"
Tc=5.0 min CN=98 Runoff=0.29 cfs 0.022 af

Subcatchment A1: AREA A1 Runoff Area=24,736 sf 4.04% Impervious Runoff Depth>3.42"
Flow Length=220' Tc=13.7 min CN=60 Runoff=1.90 cfs 0.162 af

Subcatchment A2: DRIVEWAY Runoff Area=8,507 sf 30.50% Impervious Runoff Depth>4.80"
Flow Length=200' Tc=7.8 min CN=72 Runoff=1.09 cfs 0.078 af

Reach 1R: 6" HDPE Avg. Flow Depth=0.29' Max Vel=9.25 fps Inflow=1.09 cfs 0.078 af
6.0" Round Pipe n=0.012 L=10.0' S=0.0800 '/' Capacity=1.72 cfs Outflow=1.09 cfs 0.078 af

Reach 2R: 6" HDPE Avg. Flow Depth=0.14' Max Vel=6.42 fps Inflow=0.29 cfs 0.022 af
6.0" Round Pipe n=0.012 L=150.0' S=0.0800 '/' Capacity=1.72 cfs Outflow=0.28 cfs 0.021 af

Pond IS: LEACHING AREA (IS) Peak Elev=80.17' Storage=2,804 cf Inflow=1.36 cfs 0.100 af
Discarded=0.06 cfs 0.045 af Primary=0.00 cfs 0.000 af Outflow=0.06 cfs 0.045 af

Total Runoff Area = 0.797 ac Runoff Volume = 0.261 af Average Runoff Depth = 3.94"
85.38% Pervious = 0.681 ac 14.62% Impervious = 0.117 ac

Summary for Subcatchment 1S: ROOF

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

Runoff = 0.29 cfs @ 12.07 hrs, Volume= 0.022 af, Depth > 7.60"

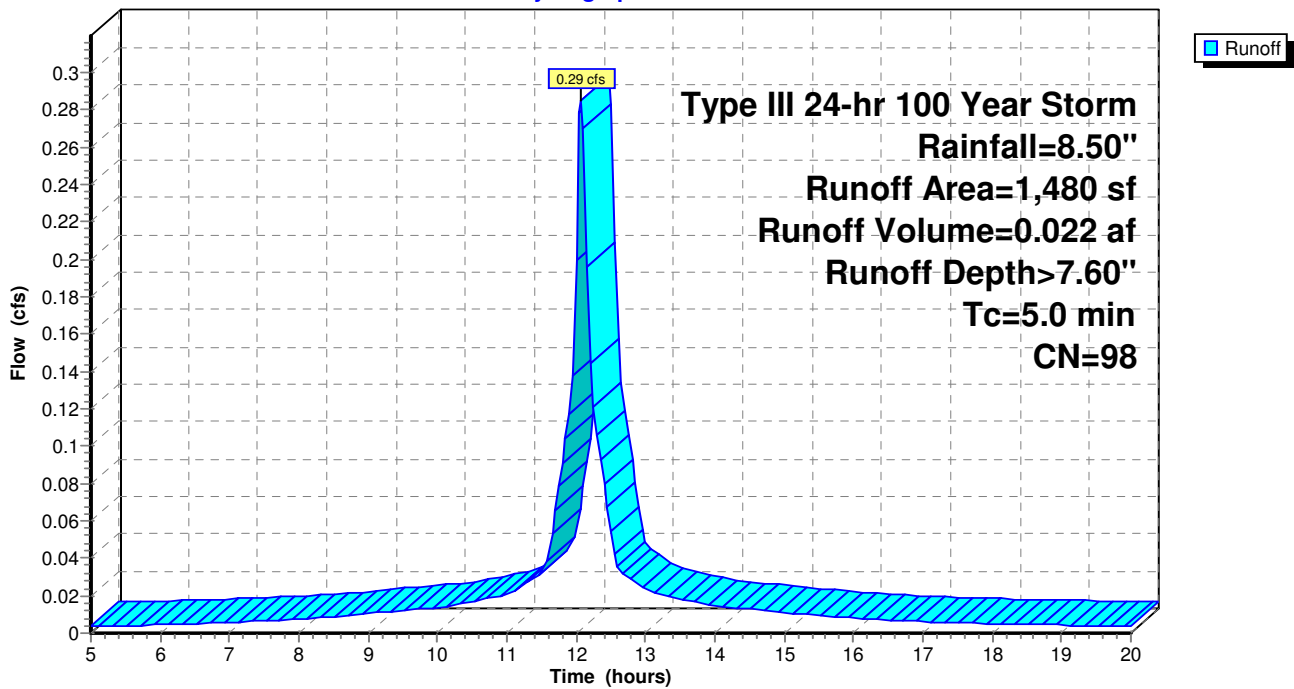
Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, $dt=0.05$ hrs
 Type III 24-hr 100 Year Storm Rainfall=8.50"

Area (sf)	CN	Description
1,480	98	Roofs, HSG B
1,480		100.00% Impervious Area

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

Subcatchment 1S: ROOF

Hydrograph



Summary for Subcatchment A1: AREA A1

Runoff = 1.90 cfs @ 12.20 hrs, Volume= 0.162 af, Depth> 3.42"

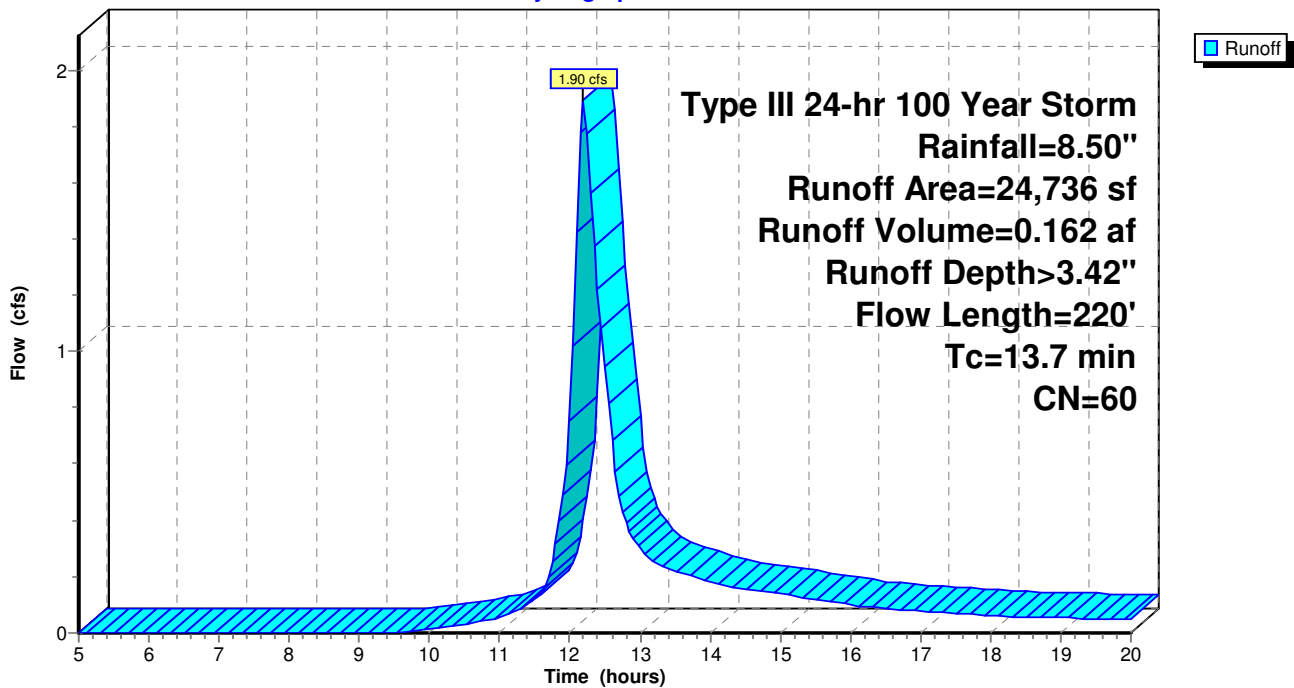
Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Type III 24-hr 100 Year Storm Rainfall=8.50"

Area (sf)	CN	Description
8,556	55	Woods, Good, HSG B
15,180	61	>75% Grass cover, Good, HSG B
1,000	98	Paved parking, HSG B
24,736	60	Weighted Average
23,736		95.96% Pervious Area
1,000		4.04% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.3	50	0.0200	0.07		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.20"
0.8	70	0.0900	1.50		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
0.6	100	0.1700	2.89		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
13.7	220	Total			

Subcatchment A1: AREA A1

Hydrograph



Summary for Subcatchment A2: DRIVEWAY

Runoff = 1.09 cfs @ 12.11 hrs, Volume= 0.078 af, Depth> 4.80"

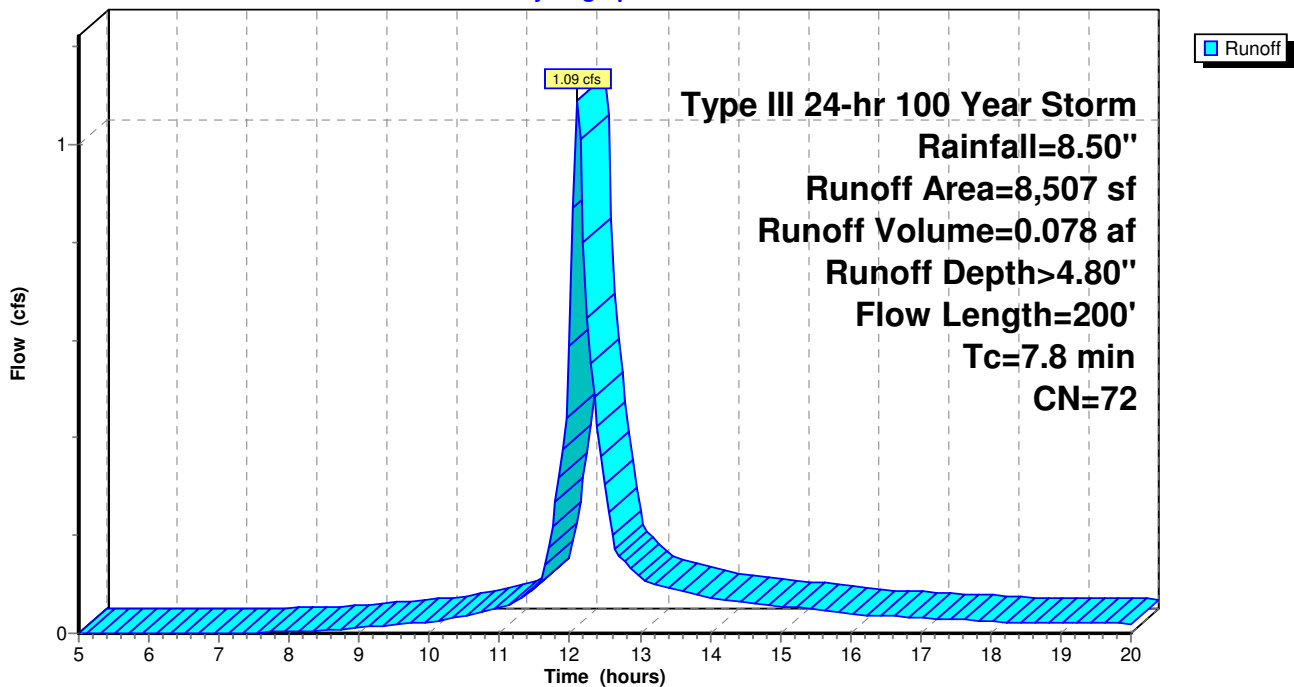
Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Type III 24-hr 100 Year Storm Rainfall=8.50"

Area (sf)	CN	Description
2,595	98	Unconnected pavement, HSG B
5,912	61	>75% Grass cover, Good, HSG B
8,507	72	Weighted Average
5,912		69.50% Pervious Area
2,595		30.50% Impervious Area
2,595		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.4	50	0.0100	0.11		Sheet Flow, Grass: Short n= 0.150 P2= 3.20"
0.4	150	0.0800	5.74		Shallow Concentrated Flow, Paved Kv= 20.3 fps
7.8	200	Total			

Subcatchment A2: DRIVEWAY

Hydrograph



Summary for Reach 1R: 6" HDPE

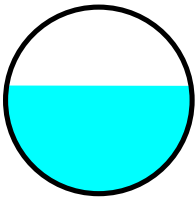
[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area = 0.195 ac, 30.50% Impervious, Inflow Depth > 4.80" for 100 Year Storm event
 Inflow = 1.09 cfs @ 12.11 hrs, Volume= 0.078 af
 Outflow = 1.09 cfs @ 12.11 hrs, Volume= 0.078 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Max. Velocity= 9.25 fps, Min. Travel Time= 0.0 min
 Avg. Velocity = 3.65 fps, Avg. Travel Time= 0.0 min

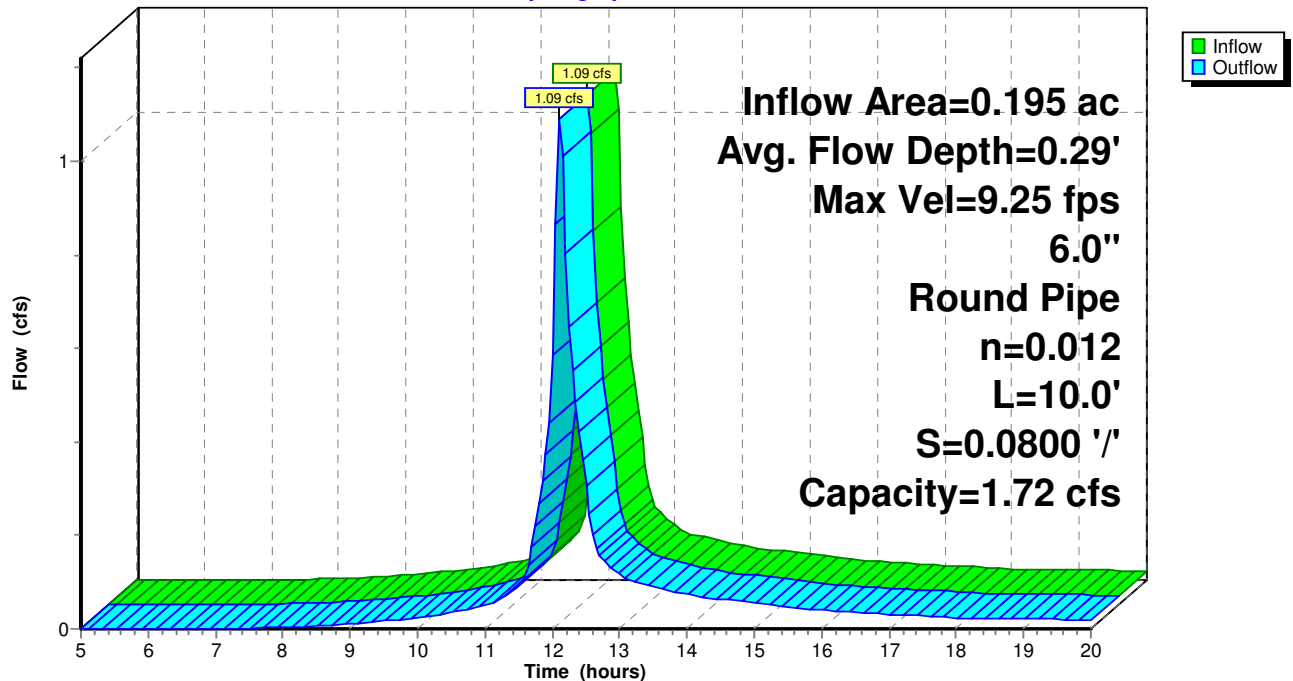
Peak Storage= 1 cf @ 12.11 hrs
 Average Depth at Peak Storage= 0.29'
 Bank-Full Depth= 0.50', Capacity at Bank-Full= 1.72 cfs

6.0" Round Pipe
 n= 0.012
 Length= 10.0' Slope= 0.0800 '/'
 Inlet Invert= 81.30', Outlet Invert= 80.50'



Reach 1R: 6" HDPE

Hydrograph



Summary for Reach 2R: 6" HDPE

[52] Hint: Inlet/Outlet conditions not evaluated

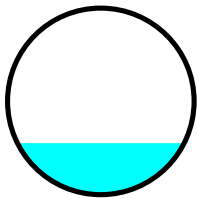
[82] Warning: Early inflow requires earlier time span

Inflow Area = 0.034 ac, 100.00% Impervious, Inflow Depth > 7.60" for 100 Year Storm event
 Inflow = 0.29 cfs @ 12.07 hrs, Volume= 0.022 af
 Outflow = 0.28 cfs @ 12.08 hrs, Volume= 0.021 af, Atten= 2%, Lag= 0.8 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Max. Velocity= 6.42 fps, Min. Travel Time= 0.4 min
 Avg. Velocity = 2.48 fps, Avg. Travel Time= 1.0 min

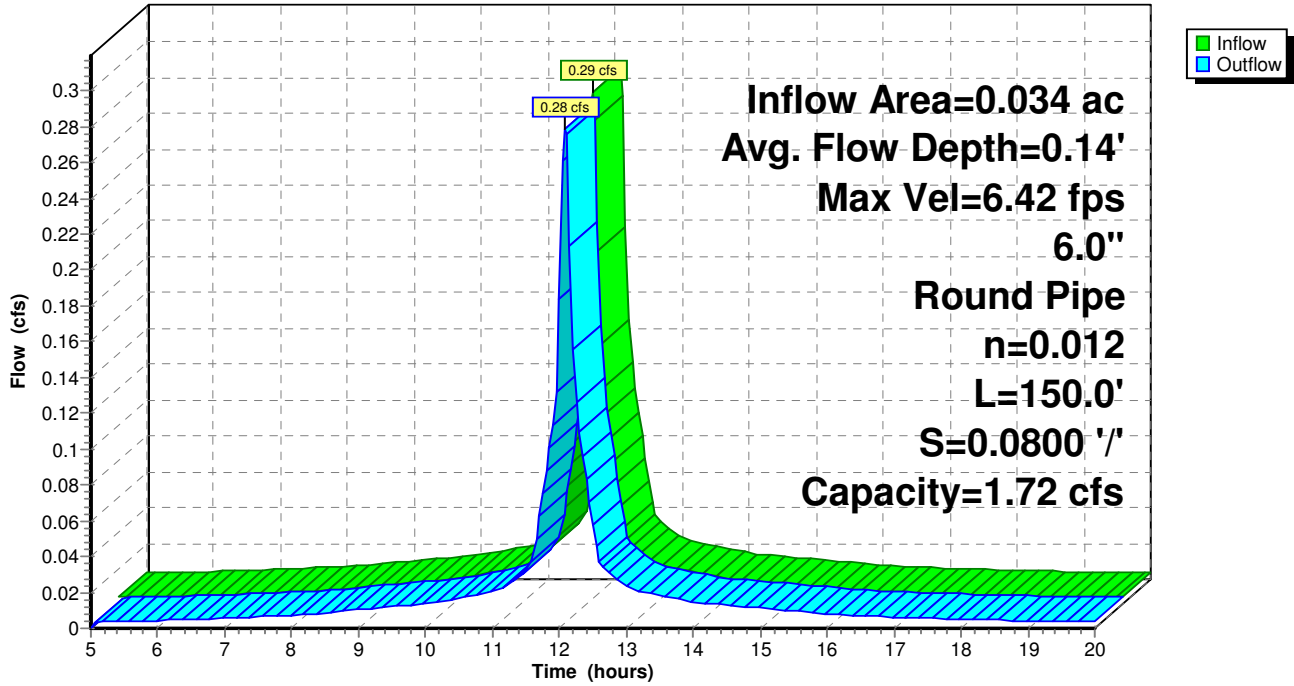
Peak Storage= 7 cf @ 12.08 hrs
 Average Depth at Peak Storage= 0.14'
 Bank-Full Depth= 0.50', Capacity at Bank-Full= 1.72 cfs

6.0" Round Pipe
 n= 0.012
 Length= 150.0' Slope= 0.0800 '/'
 Inlet Invert= 668.60', Outlet Invert= 656.60'



Reach 2R: 6" HDPE

Hydrograph



Summary for Pond IS: LEACHING AREA (IS)

Inflow Area = 0.229 ac, 40.80% Impervious, Inflow Depth > 5.22" for 100 Year Storm event
 Inflow = 1.36 cfs @ 12.11 hrs, Volume= 0.100 af
 Outflow = 0.06 cfs @ 15.30 hrs, Volume= 0.045 af, Atten= 95%, Lag= 191.9 min
 Discarded = 0.06 cfs @ 15.30 hrs, Volume= 0.045 af
 Primary = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 80.17' @ 15.30 hrs Surf.Area= 1,097 sf Storage= 2,804 cf

Plug-Flow detention time= 236.8 min calculated for 0.045 af (46% of inflow)
 Center-of-Mass det. time= 146.8 min (920.9 - 774.1)

Volume	Invert	Avail.Storage	Storage Description
#1	75.00'	3,163 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
75.00	0	0	0
76.00	178	89	89
77.00	335	257	346
78.50	737	804	1,150
79.50	1,096	917	2,066
80.50	1,098	1,097	3,163

Device	Routing	Invert	Outlet Devices
#1	Discarded	75.00'	2.410 in/hr Exfiltration over Surface area
#2	Primary	80.50'	6.0" Vert. Orifice/Grate C= 0.600

Discarded OutFlow Max=0.06 cfs @ 15.30 hrs HW=80.17' (Free Discharge)
 ↑1=Exfiltration (Exfiltration Controls 0.06 cfs)

Primary OutFlow Max=0.00 cfs @ 5.00 hrs HW=75.00' (Free Discharge)
 ↑2=Orifice/Grate (Controls 0.00 cfs)

Pond IS: LEACHING AREA (IS)

