DRAINAGE CALCULATIONS & STORMWATER MANAGEMENT PLAN

For:

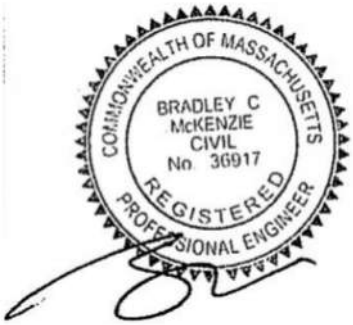
PROPOSED COMMERCIAL DEVELOPMENT
OFF SPRING STREET
CARVER, MASSACHUSETTS

Located:

LOT 2
RICKETTS POND BUSINESS PARK
SPRING STREET
CARVER, MASSACHUSETTS

Submitted to:
TOWN OF CARVER

Prepared For:
PETER SPRAGUE
44 FOX DEN ROAD
KINGSTON, MA 02364



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FEBRUARY 28, 2022
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Project Summary

The project will consist of the construction of multiple commercial buildings located off Spring Street in Carver, Massachusetts at Lot 1 & Lot 2 of the Ricketts Pond Business Park Definitive Subdivision. The two lots will be comprised of five commercial buildings with associated driveways, parking lots, closed drainage system, septic systems and utility connections. Stormwater from the site development will be directed to an infiltration basin that was designed to accommodate runoff from the Ricketts Pond Business Park Definitive Subdivision.

The existing and proposed site conditions for the approved subdivision are illustrated on the project site plans entitled "Definitive Subdivision Plans, Ricketts Pond Business Park, Spring Street, Carver Massachusetts", prepared by McKenzie Engineering Group, Inc. dated January 10, 2019 and revised April 3, 2019. The hydrologic calculations for the subdivision can be found in a report entitled "Drainage Calculations & Stormwater Management Plan" prepared by McKenzie Engineering Group, Inc. dated January 10, 2019 (January 2019 Report). The proposed site development for Lot 1 of the Ricketts Pond Business Park Definitive Subdivision is illustrated on the project site plans entitled "Site Development Plans, Ricketts Pond Business Park, Lot 1, Off Spring Street, Carver, Massachusetts", dated February 28, 2022 prepared by McKenzie Engineering Group, Inc. (Site Plans). The proposed site development for Lot 2 of the Ricketts Pond Business Park Definitive Subdivision is illustrated on the project site plans entitled "Site Development Plans, Ricketts Pond Business Park, Lot 2, Off Spring Street, Carver, Massachusetts", dated February 28, 2022 prepared by McKenzie Engineering Group, Inc. (Site Plans).

This report contains stormwater runoff calculations for the post-development 2, 10, 25 & 100-year storm conditions to confirm that the proposed stormwater infiltration basin originally designed for the subdivision can accommodate the entire 100-year runoff volume from the proposed commercial lot developments. All stormwater management facilities will be designed to mitigate peak rates of runoff, provide renovation of stormwater and fully meet the requirements of the DEP's Stormwater Management Regulations.

The existing watershed analyzed in this report is comprised of approximately 21.02 acres which includes the Carver portion of the subject parcel and offsite tributary areas to the northeast and southern portions of the site. The watershed consists of five (5) sub-catchment areas and four (4) Design Points. Refer to the Pre-Development Watershed Plan WS-1 in Appendix A for a delineation of drainage subcatchments for the pre-development design condition.

The SCS Technical Release 20 (TR-20) and Technical Release 55 (TR-55) method based program "HydroCAD" was employed to develop pre- and post-development peak flows. Drainage calculations were prepared for the pre-development condition for the 2, 10, 25 and 100-year, Type III storm events. Refer to Appendix A for computer results, soil characteristics, cover descriptions and times of concentrations for all subareas.

Post-Development Condition

The subject commercial developments are located at Lot 1 & Lot 2 of the Ricketts Pond Business Park Definitive Subdivision. Stormwater runoff from the proposed site development will be directed to the proposed stormwater infiltration basin designed for the subdivision (Infiltration Basin #1 & Infiltration Basin #2). The entire 100-year storm runoff volume from the proposed commercial lots will be contained within the infiltration basins so the project will not involve a connection to the municipal system located on Spring Street. A closed drainage system consisting of a series of catch basins and drainage manholes will direct stormwater runoff from both lots to the infiltration basin (2P) that will accept runoff from the western portion subdivision project, as specified in the "Drainage Calculations & Stormwater Management Plan" prepared for the Ricketts Pond Business Park Definitive Subdivision. A portion of the front yards of Lot 1 and Lot 2 will continue to sheet flow to Ricketts Pond Drive, where they will be captured by the closed

drainage system for the roadway and be conveyed to Infiltration Basin 1P, as originally designed in the January 2019 Report. The stormwater management system will be designed to fully comply with all standards of the Department of Environmental Protection's Stormwater Management Regulations. Compliance with all standards is documented in the "Drainage Calculations & Stormwater Management Plan" prepared for the Ricketts Pond Business Park Definitive Subdivision.

Refer to the Post-Development Watershed Plan WS-2 for a delineation of post-development drainage subareas. The Post-Development Condition Drainage Calculations section of the previously submitted Drainage Calculations and Stormwater Management Plan dated January 10, 2019, has been revised to indicate an updated impervious areas for Lot 1 & Lot 2. These revisions are based on the proposed Site Plans for each lot which involve a reduction of impervious area from the assumed impervious surface in the January 2019 Report. The reduction in impervious area decreases the 100-year flood elevation of Basin 1 (1P) from elevation 138.45 (NAVD88) to 138.01, and Basin 2 (2P) from elevation 138.84 (NAVD88) to 138.75. Both infiltration basins, Basins 1 & 2, are still compliant with the requirements for infiltration basins in the Massachusetts Stormwater Handbook as greater than one (1) foot of freeboard is maintained above the calculated 100-year flood elevation.

The revisions to the January 2019 Report accounts for the addition of 5,300 S.F. of impervious area proposed by the approved Form A Lot Site Plan located Off Spring Street, which outlets into Basin 1 (1P).

Stormwater Infiltration Basins

The proposed stormwater infiltration basins was designed to attenuate peak flows generated by all storm events to ensure that post-development peak flows generated by all storm events are less than pre-development flows at the design point and allow for recharge to groundwater. The proposed facilities were analyzed using the Soil Conservation Service (now Natural Resources Conservation Service) Technical Release 20 (TR-20) based computer program, "HydroCAD".

Stormwater Best Management Practices (BMP's)

The treatment stream for the will consist of deep sump hooded catch basins, sediment forebay and an infiltration basin to achieve the required removal of a least 80% of the total suspended solids (TSS) and mitigate the anticipated pollutant loading.

Erosion and Siltation Control

Compost filter tube erosion control barriers will be placed at the limit of work where indicated on the plans prior to the commencement of any construction activity. The integrity of the compost filter tube erosion control barrier will be maintained by periodic inspection and replacement as necessary. The compost filter tube erosion control barrier will remain in place until the first course of pavement has been placed and all side slopes have been loamed and seeded and vegetation has been established.

Compliance with Stormwater Management Standards

Standard 1 – No New Untreated Discharges

The site development is designed so that new stormwater conveyances do not discharge untreated pavement runoff into, or cause erosion to, wetlands.

Standard 2 – Peak Rate Attenuation

In the pre-development and post-development stormwater analysis, the watershed area analyzed was approximately 21.02 acres consisting of the subject parcels to be developed and offsite tributary areas. Refer to Existing Watershed Delineation Plan WS-1 for a delineation of drainage subareas for the pre-development design condition and refer to Post-Development

Watershed Delineation Plan WS-2 for a delineation of drainage subareas for the post-development design condition.

Drainage calculations were performed by employing SCS TR-20 methods for the 2, 10, 25, and 100-year Type III storm events. Refer to Appendix A and B for computer results. All drainage structures will be designed employing the Rational Method and the Mass. DPW Design Manual to accommodate peak flows generated by a minimum of a 25-year storm event or a 100-year storm event where applicable. The stormwater management systems were designed to accommodate peak flows generated by a 100-year storm event.

The peak rates of runoff are as follows:

Pre-Development vs. Post-Development Peak Rates of Runoff

Design Point	2 Year Storm **(3.35 Inches)**		10 Year Storm **(4.96 Inches)**		25 Year Storm **(6.21 Inches)**		100 Year Storm **(8.73 Inches)**	
	Exist. (CFS)	**Prop. (CFS)**	**Exist. (CFS)**	**Prop. (CFS)**	**Exist. (CFS)**	**Prop. (CFS)**	**Exist. (CFS)**	**Prop. (CFS)**
Design Point 1 (Ricketts Pond)	*0.06*	0.00	*1.31*	0.08	*3.06*	0.25	*7.03*	1.01
Design Point 2 (Spring Street/Southwest Property Line)	*0.00*	0.00	*0.00*	0.00	*0.03*	0.00	*0.13*	0.00
Design Point 3 (Route 44/West Property Line)	*0.00*	0.00	*0.00*	0.00	*0.02*	0.00	*0.11*	0.00
Design Point 4 (Northeast Property Line)	*0.00*	0.00	*0.00*	0.09	*0.00*	0.22	*0.01*	0.58

The peak volumes of runoff are as follows:

Pre-Development vs. Post-Development Volumes of Runoff

Design Point	2 Year Storm **(3.35 Inches)**		10 Year Storm **(4.96 Inches)**		25 Year Storm **(6.21 Inches)**		100 Year Storm **(8.73 Inches)**	
	Exist. (AC-FT)	**Prop. (AC-FT)**	**Exist. (AC-FT)**	**Prop. (AC-FT)**	**Exist. (AC-FT)**	**Prop. (AC-FT)**	**Exist. (AC-FT)**	**Prop. (AC-FT)**
Design Point 1 (Ricketts Pond)	*0.041*	0.000	*0.328*	0.049	*0.571*	0.113	*1.026*	0.250
Design Point 2 (Spring Street/Southwest Property Line)	*0.000*	0.000	*0.001*	0.000	*0.018*	0.000	*0.077*	0.000
Design Point 3 (Route 44/West Property Line)	*0.000*	0.000	*0.000*	0.000	*0.012*	0.000	*0.068*	0.000
Design Point 4 (Northeast Property Line)	*0.000*	0.002	*0.000*	0.018	*0.001*	0.032	*0.005*	0.058

A comparison of the pre-development and post-development peak rates and volumes of runoff indicates that the peak rates and volumes of runoff for the post-development condition will be equal or less than the pre- development condition for all storm events for Design Points 1, 2 & 3. Runoff directed at Design Point 4 will be captured and treated by infrastructure to be located on the Plympton Parcel to mitigate the increase in peak rates and volumes, as originally designed.

Standard 3 – Groundwater Recharge

Runoff will be infiltrated by an infiltration basin, which will the meet the Stormwater Guidelines for infiltration:

- Infiltration structures will be a minimum of two (2) feet above seasonal high groundwater.
- Utilize the "Simple Dynamic" method for sizing the storage volume, which takes into account the fact that stormwater is exfiltrating from the infiltration basin at the same time that the basin is filling.
- Hydraulic conductivity are based on soil data from the Geotechnical Report and values developed from Rawls, Brakensiek and Saxton, 1982, Estimation of Soil Water Properties, *Transactions of the American Society of Agricultural Engineers*, vol.25, no. 5.
- Refer to Appendix D for infiltration and drawdown calculations and Appendix E for soil data.

Groundwater Recharge Volume

Infiltration Basin	Soil Type	Target Depth Factor (F) (in)	Total Impervious Area (sf)	Required Recharge Volume (cf)[1]	Provided Recharge Volume (cf)[2]
1P	A	0.60	239,942	12,097	105,332
2P	A	0.60	117,751	5,937	41,455
				18,034	**146,787**

1. Required Recharge Volume = Target Depth Factor x Impervious Area / (d+Kt)
   (Refer to supplemental calculations in Appendix D)
2. Provided Recharge Volume = Volume Provided from Bottom of System to invert of overflow pipe.

Per Standard 3, if stormwater runoff from less than 100% of the site's impervious cover is directed to the BMP intended to infiltrate the Required Recharge Volume, then the storage capacity of the infiltration BMP needs to be increased so that the BMP can capture more of the runoff from the impervious surfaces located with the contributing drainage area. The impervious cover directed towards the stormwater management system 99.89%; therefore, a slight capture area adjustment was made. Refer to Appendix D for Capture Area Adjustment calculations.

The subsurface infiltration system and rain garden will provide both water quality treatment and recharge. Per Standard 4, Water Quality, the BMP must be sized to treat or hold the Target Volume, the larger of the Required Water Quality Volume and the Required Recharge Volume. The Required Water Quality Volume is based on the half-inch of runoff and the Required Recharge Volume is based on 0.60-inches (Soil Type A); therefore the Target Volume is the Required Recharge Volume of 18,034 cubic feet. Refer to Appendix D supplemental calculations.

The proposed infiltration basins have been designed to completely drain within 72 hours. The drawdown analysis is based on the required recharge volume exfiltrating at the Rawls Rates based on the soil textural analysis conducted at the proposed exfiltration location. Refer to Appendix D for calculations.

Standard 4 – Water Quality

The Long-Term Pollution Prevention Plan has been incorporated into the Post-Development Operation and Maintenance Plan. Refer to Appendix F for BMP Operation and Maintenance Plans.

The stormwater management system will be designed to be in full compliance with the Standards of the DEP Stormwater Management Policy. A treatment stream consisting of deep-sump catch basins with hooded outlets and sediment forebays will ensure that the 44% TSS removal (total suspended solids) is removed prior to discharge to the infiltration basins and to ensure that 80% TSS removal is accomplished. The proposed treatment stream will renovate the stormwater and improve the water quality by promoting the settlement of sediments and pollutants before runoff is released into the infiltration basins. Refer to Appendix D for TSS Removal Calculation Worksheets.

Sediment Forebay Sizing Requirements

Infiltration Basin	Contributing Impervious Area (ft^2)	Required Volume[1] (ft^3)	Provided Volume (ft^3)
F1 (Infil. Basin #2, West Forebay)	42,680	355	735
F2 (Infil. Basin #2, East Forebay)	38,407	626	647

1. Required Volume = Contributing Impervious Area (sq.ft.) x (1 ft./12 in.) x (0.1 in./acre)

Water Quality Treatment Volume

Design Point	Required WQ Volume (cf)	Proposed WQ Volume (cf)	
Pond 1P	9,998	105,332	Infil. basin w/ sediment forebay
Pond 2P	4,906	41,445	Infil. basin w/ sediment forebay
	14,904	146,787	

Standard 5 – Land Use with Higher Potential Pollutant Loads (LUHPPL)

The proposed project does not include land uses with higher potential pollutant loads. Not Applicable.

Standard 6 – Critical Areas

The proposed project does not discharge to any critical areas. Not Applicable.

Standard 7 - Redevelopments and Other Projects Subject to the Standards only to the

maximum extent practicable

The proposed project is not a redevelopment project. Not Applicable.

Standard 8 – Construction Period Pollution Prevention and Erosion and Sedimentation Control

The project will require a NPDES Construction General Permit but the Stormwater Pollution Prevention Plan (SWPPP) has not been submitted. The SWPPP will be submitted prior to any proposed construction. A Construction Phase BMP Operation and Maintenance Plan will be provided as a basis for the SWPPP during final design.

Standard 9 – Operation and Maintenance Plan

The Long-Term Operation and Maintenance Plan is provided in Appendix F.

Standard 10 – Prohibition of Illicit Discharges

No illicit discharges are anticipated on site. An Illicit Discharge Compliance Statement will be submitted prior to the discharge of any stormwater to the post-construction best management practices. Measures to prevent illicit discharges will be included in the Long-Term Pollution Prevention Plan.

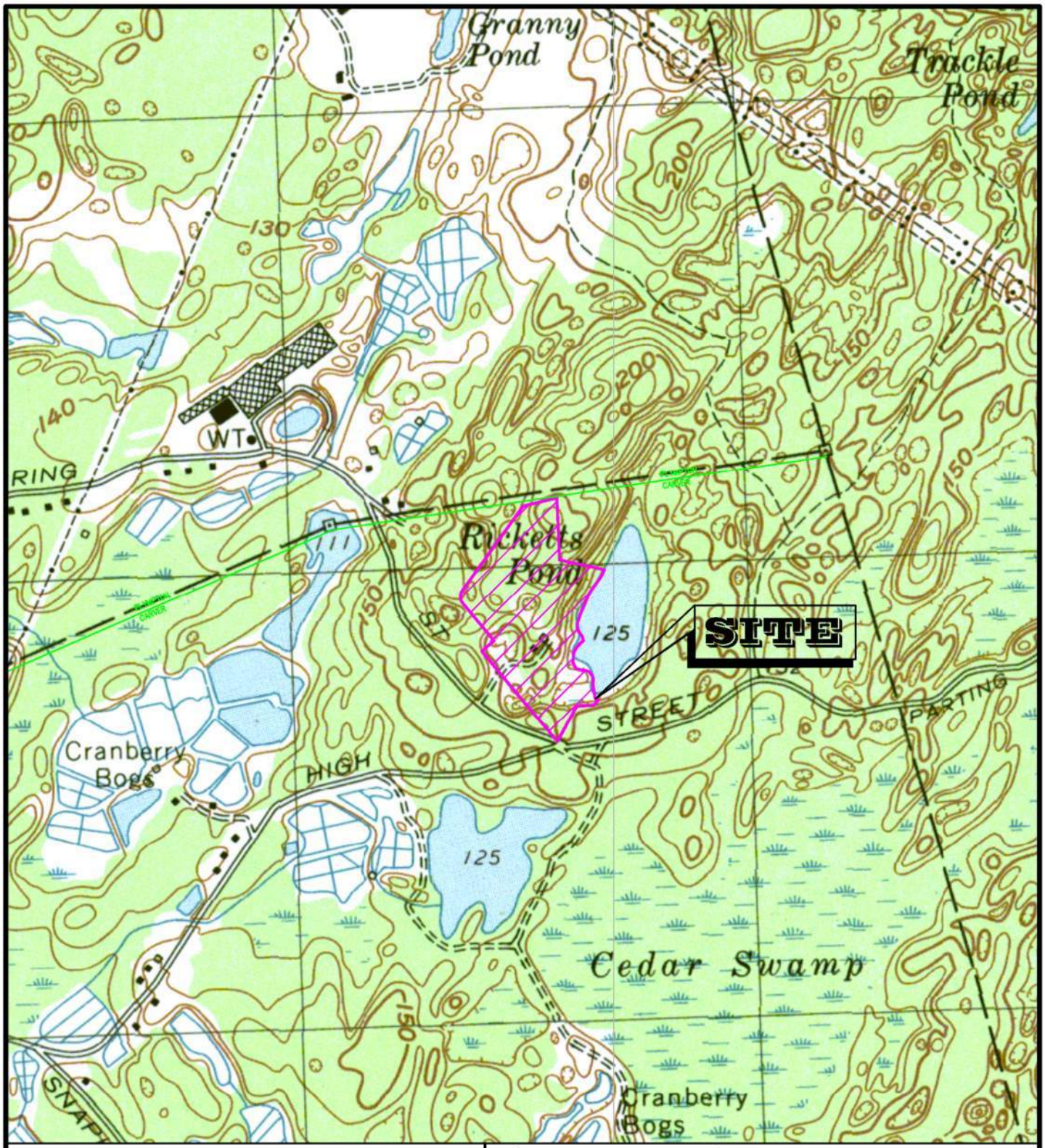

FIGURE - 1

0 1000' 2000' 2500'

U.S. GEOLOGICAL SURVEY
7.5 X 15 MINUTE SERIES

DATE: MARCH 7, 2018

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USGS LOCUS MAP

SPRING STREET
(ASSESSORS MAP 32, PARCELS 3, 5 & 6)
CARVER, MASSACHUSETTS

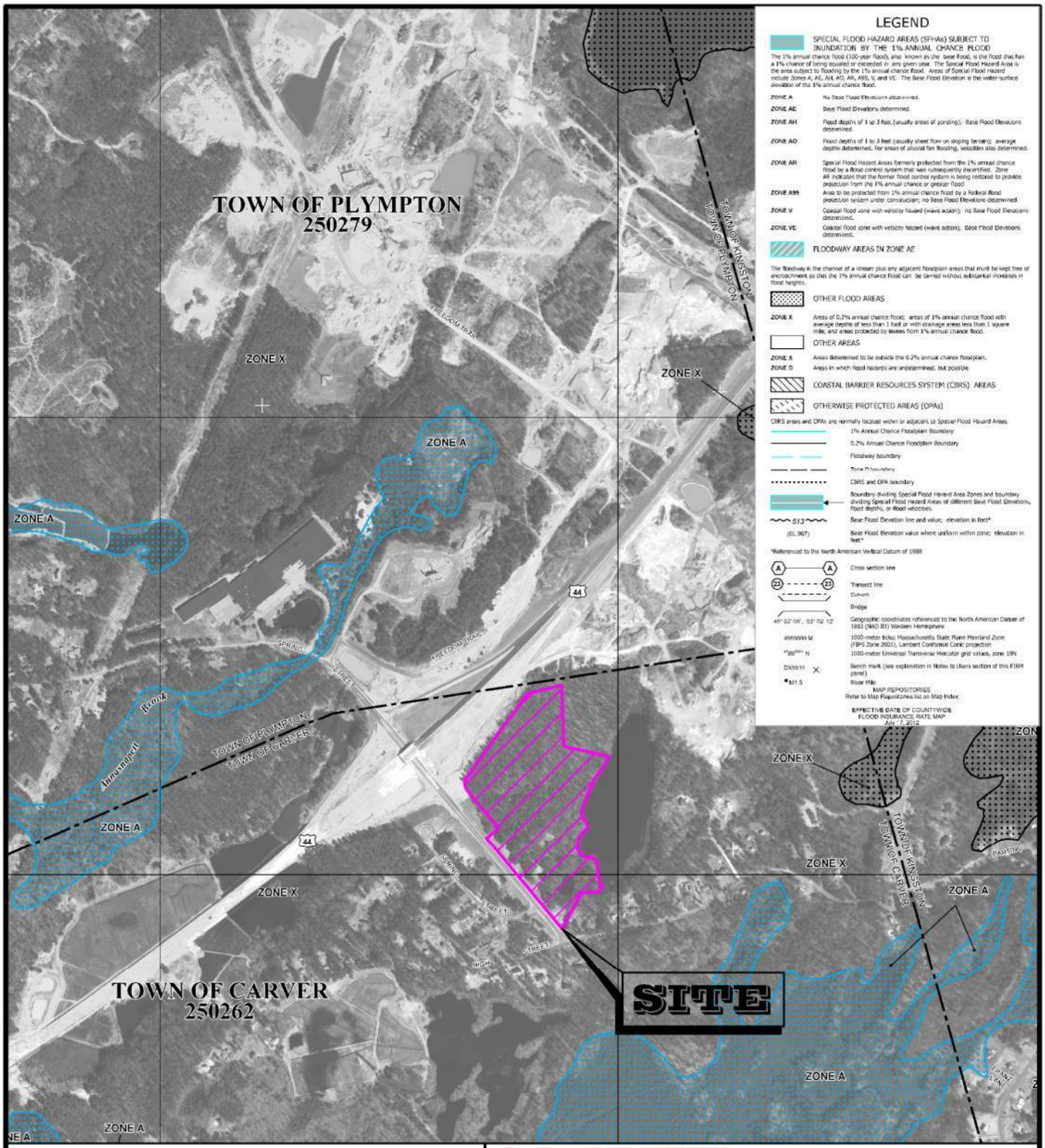

FIGURE - 2

0 1000' 2000' 2500'

COMMUNITY PANEL NO: 25023C0334J

EFFECTIVE DATE: JULY 17, 2012

DATE: MARCH 7, 2018

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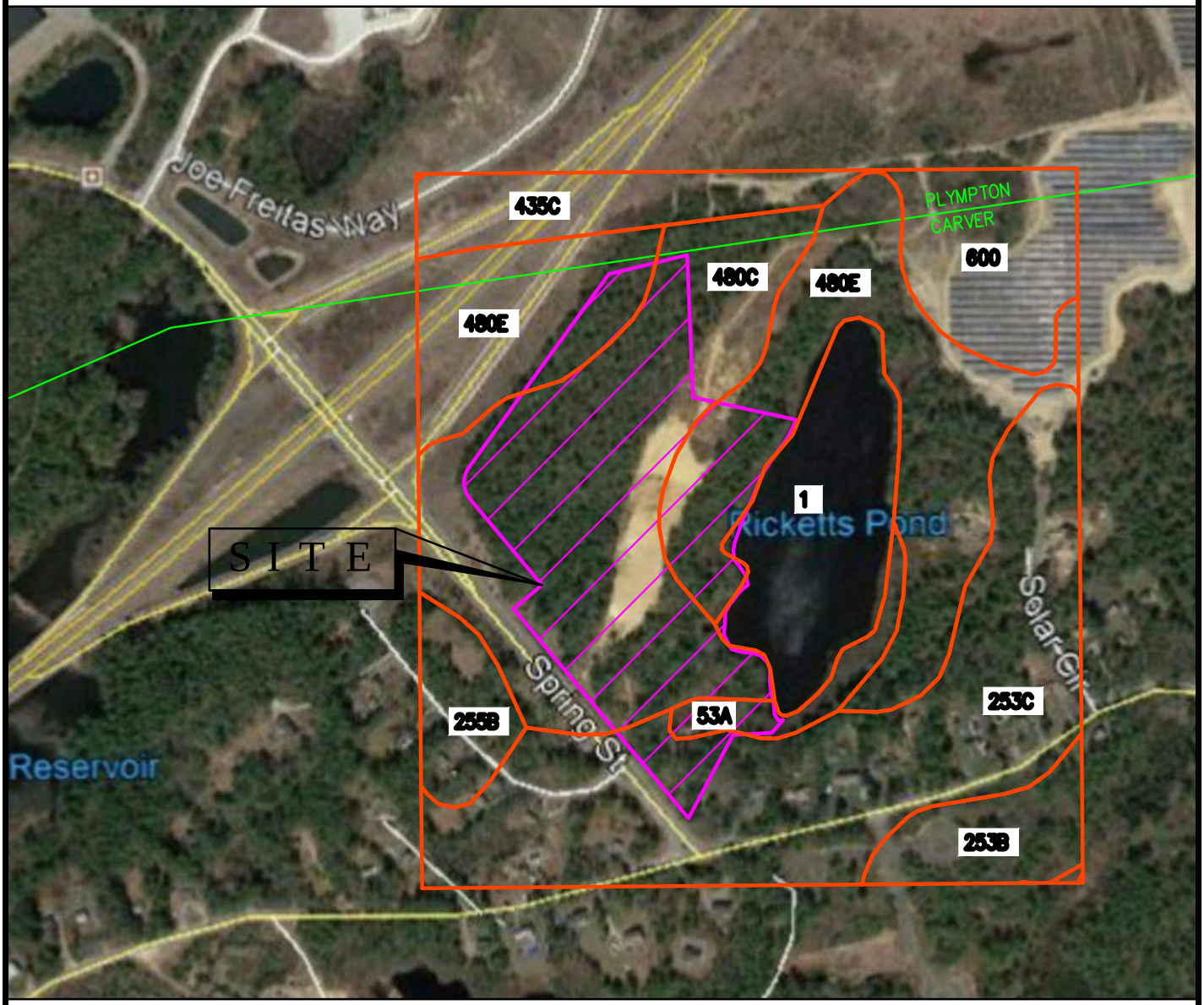
FEMA FLOOD MAP

SPRING STREET
(ASSESSORS MAP 32, PARCELS 3, 5 & 6)
CARVER, MASSACHUSETTS



SOIL KEY

SOIL CLASSIFICATION	DESCRIPTION	HYDROLOGIC SOIL GROUP
1	WATER	
53A	FREETOWN MUCK, PONDED, 0–1 PERCENT SLOPES	B/D
253C	HINCKLEY LOAMY SAND, 8–15 PERCENT SLOPES	A
480C	PLYMOUTH–CARVER COMPLEX, 8–15 PERCENT SLOPES	A
480E	PLYMOUTH–CARVER COMPLEX, 15–35 PERCENT SLOPES	A

FIGURE - 3

0 500' 1000' 1500'

NRCS SOIL SURVEY
PLYMOUTH COUNTY

DATE: MARCH 7, 2018

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NRCS SOILS MAP

SPRING STREET
(ASSESSORS MAP 32, PARCELS 3, 5 & 6)
CARVER, MASSACHUSETTS

FIGURE - 4

0 500' 1000' 1250'

2008 EDITION
NHESP

DATE: MARCH 7, 2018

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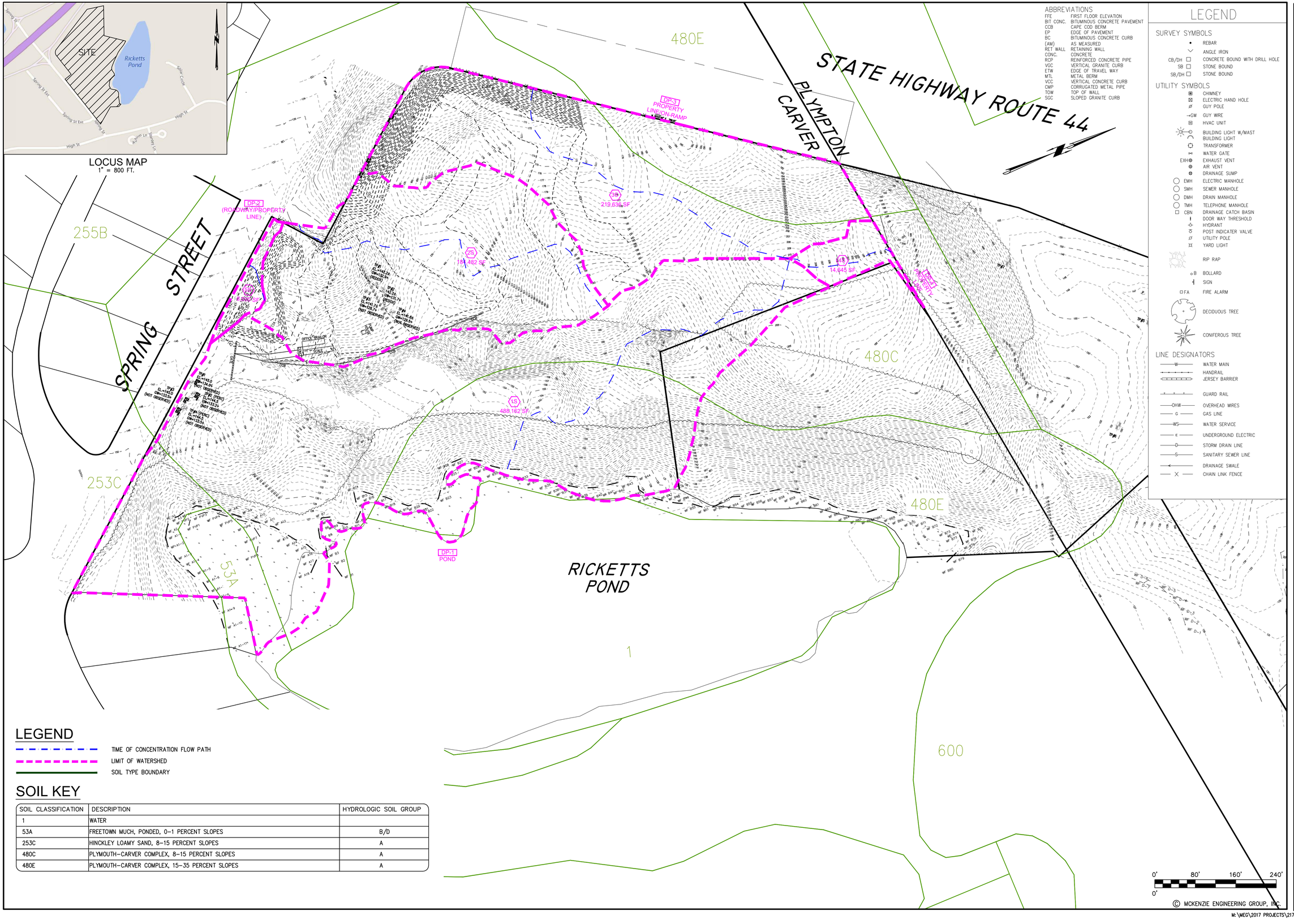
NATIONAL HERITAGE AND ENDANGERED SPECIES MAP

SPRING STREET
(ASSESSORS MAP 32, PARCELS 3, 5 & 6)
CARVER, MASSACHUSETTS

A P P E N D I X A

Pre-Development Condition



ABBREVIATIONS

FFE	FIRST FLOOR ELEVATION
BIT CONC.	BITUMINOUS CONCRETE PAVEMENT
CCB	CAPE COD BERM
EP	EDGE OF PAVEMENT
BC	BITUMINOUS CONCRETE CURB
(AM)	AS MEASURED
RET WALL	RETAINING WALL
CONC.	CONCRETE
RCP	REINFORCED CONCRETE PIPE
VGC	VERTICAL GRANITE CURB
ETW	EDGE OF TRAVEL WAY
MTL	METAL BERM
VCC	VERTICAL CONCRETE CURB
CMP	CORRUGATED METAL PIPE
TOW	TOP OF WALL
SGC	SLOPED GRANITE CURB

LEGEND

SURVEY SYMBOLS

- REBAR
- ANGLE IRON
- CB/DH — CONCRETE BOUND WITH DRILL HOLE
- SB — STONE BOUND
- SB/DH — STONE BOUND

UTILITY SYMBOLS

- CHIMNEY
- ELECTRIC HAND HOLE
- GUY POLE
- GW — GUY WIRE
- HVAC UNIT
- BUILDING LIGHT W/MAST
- BUILDING LIGHT
- TRANSFORMER
- WATER GATE
- EXH — EXHAUST VENT
- AIR VENT
- DRAINAGE SUMP
- EMH — ELECTRIC MANHOLE
- SMH — SEWER MANHOLE
- DMH — DRAIN MANHOLE
- TMH — TELEPHONE MANHOLE
- CBN — DRAINAGE CATCH BASIN
- DOOR WAY THRESHOLD
- HYDRANT
- POST INDICATER VALVE
- UTILITY POLE
- YARD LIGHT
- RIP RAP
- B — BOLLARD
- SIGN
- FA — FIRE ALARM
- DECIDUOUS TREE
- CONIFEROUS TREE

LINE DESIGNATORS

- W — WATER MAIN
- HANDRAIL
- JERSEY BARRIER
- GUARD RAIL
- OHW — OVERHEAD WIRES
- G — GAS LINE
- WS — WATER SERVICE
- E — UNDERGROUND ELECTRIC
- D — STORM DRAIN LINE
- S — SANITARY SEWER LINE
- DRAINAGE SWALE
- X — CHAIN LINK FENCE

LEGEND

- TIME OF CONCENTRATION FLOW PATH
- LIMIT OF WATERSHED
- SOIL TYPE BOUNDARY

SOIL KEY

SOIL CLASSIFICATION	DESCRIPTION	HYDROLOGIC SOIL GROUP
1	WATER	
53A	FREETOWN MUCK, PONDED, 0-1 PERCENT SLOPES	B/D
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480C	PLYMOUTH-CARVER COMPLEX, 8-15 PERCENT SLOPES	A
480E	PLYMOUTH-CARVER COMPLEX, 15-35 PERCENT SLOPES	A

REV	DATE	DESCRIPTION	BY	APP
1	4/3/2019	TOWN REVIEW	ESS	BCM

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RICKETTS POND BUSINESS PARK

(ASSESSORS MAP 32, LOTS 1, 3, 5-E, 5-AN, 6-EN, 6-DN, 6-CN, 6-BN, & 6-A)
SPRING STREET
CARVER, MASSACHUSETTS

PROFESSIONAL ENGINEER:

OWNER/APPLICANT:
RPBP, LLC
3 MARION DRIVE
CARVER, MA 02330

PERMIT PLAN SET

DRAWN BY:	ESS
DESIGNED BY:	ESS
CHECKED BY:	BCM
APPROVED BY:	BCM
DATE:	JANUARY 10, 2019
SCALE:	1"=80'
PROJECT NO.:	217-182

DWG. TITLE:
PRE-DEV. WATERSHED PLAN

DWG. NO:
WS-1

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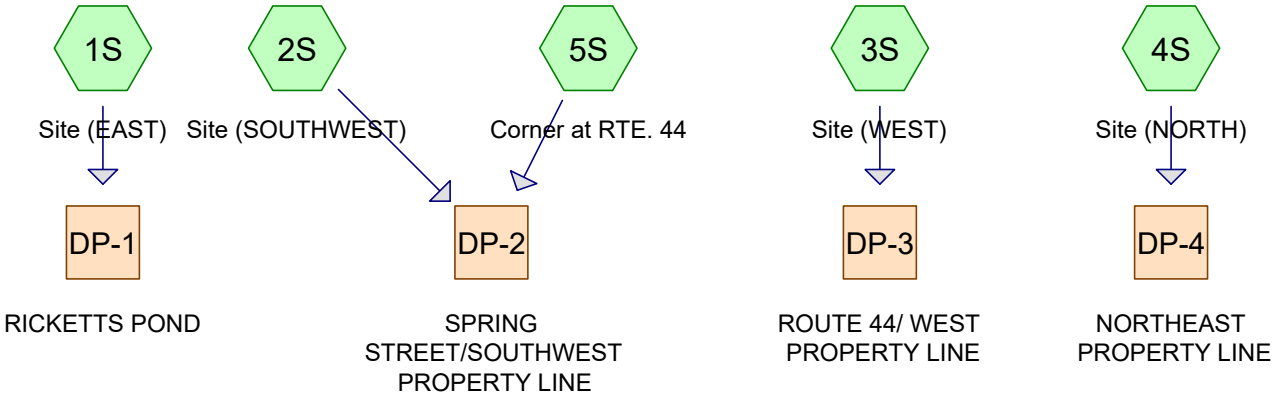


Subcat Reach Pond Link

Routing Diagram for 217-182 Pre Development
Prepared by McKenzie Engineering Group, Inc., Printed 5/31/2022

Rainfall Events Listing

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	2-Year	Type III 24-hr		Default	24.00	1	3.20	2
2	10-Year	Type III 24-hr		Default	24.00	1	4.70	2
3	25-Year	Type III 24-hr		Default	24.00	1	5.50	2
4	100-Year	Type III 24-hr		Default	24.00	1	6.70	2

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
2.953	77	Fallow, bare soil, HSG A, SAND (1S, 2S)
0.028	96	Gravel surface, HSG A (1S)
14.899	30	Woods, Good, HSG A (1S, 2S, 3S, 4S)
0.005	77	Woods, Good, HSG D (1S)
2.541	32	Woods/grass comb., Good, HSG A (1S, 2S, 5S)
0.589	79	Woods/grass comb., Good, HSG D (1S)
21.015	**38**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
20.421	HSG A	1S, 2S, 3S, 4S, 5S
0.000	HSG B	
0.000	HSG C	
0.594	HSG D	1S
0.000	Other	
21.015		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
2.953	0.000	0.000	0.000	0.000	2.953	Fallow, bare soil	1S, 2S
0.028	0.000	0.000	0.000	0.000	0.028	Gravel surface	1S
14.899	0.000	0.000	0.005	0.000	14.904	Woods, Good	1S, 2S, 3S, 4S
2.541	0.000	0.000	0.589	0.000	3.131	Woods/grass comb., Good	1S, 2S, 5S
20.421	**0.000**	**0.000**	**0.594**	**0.000**	**21.015**	**TOTAL AREA**	

Time span=5.00-48.00 hrs, dt=0.05 hrs, 861 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1S: Site (EAST) Runoff Area=488,162 sf 0.00% Impervious Runoff Depth=0.04"
Flow Length=1,757' Tc=20.3 min CN=45 Runoff=0.06 cfs 0.041 af

Subcatchment2S: Site (SOUTHWEST) Runoff Area=184,482 sf 0.00% Impervious Runoff Depth=0.00"
Flow Length=780' Tc=16.6 min CN=31 Runoff=0.00 cfs 0.000 af

Subcatchment3S: Site (WEST) Runoff Area=219,636 sf 0.00% Impervious Runoff Depth=0.00"
Flow Length=670' Tc=16.2 min CN=30 Runoff=0.00 cfs 0.000 af

Subcatchment4S: Site (NORTH) Runoff Area=14,645 sf 0.00% Impervious Runoff Depth=0.00"
Flow Length=246' Tc=22.3 min CN=30 Runoff=0.00 cfs 0.000 af

Subcatchment5S: Corner at RTE. 44 Runoff Area=8,500 sf 0.00% Impervious Runoff Depth=0.00"
Flow Length=78' Tc=18.4 min CN=32 Runoff=0.00 cfs 0.000 af

Reach DP-1: RICKETTS POND Inflow=0.06 cfs 0.041 af
Outflow=0.06 cfs 0.041 af

Reach DP-2: SPRING STREET/SOUTHWEST PROPERTY LINE Inflow=0.00 cfs 0.000 af
Outflow=0.00 cfs 0.000 af

Reach DP-3: ROUTE 44/ WEST PROPERTY LINE Inflow=0.00 cfs 0.000 af
Outflow=0.00 cfs 0.000 af

Reach DP-4: NORTHEAST PROPERTY LINE Inflow=0.00 cfs 0.000 af
Outflow=0.00 cfs 0.000 af

Total Runoff Area = 21.015 ac Runoff Volume = 0.041 af Average Runoff Depth = 0.02"
100.00% Pervious = 21.015 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment 1S: Site (EAST)

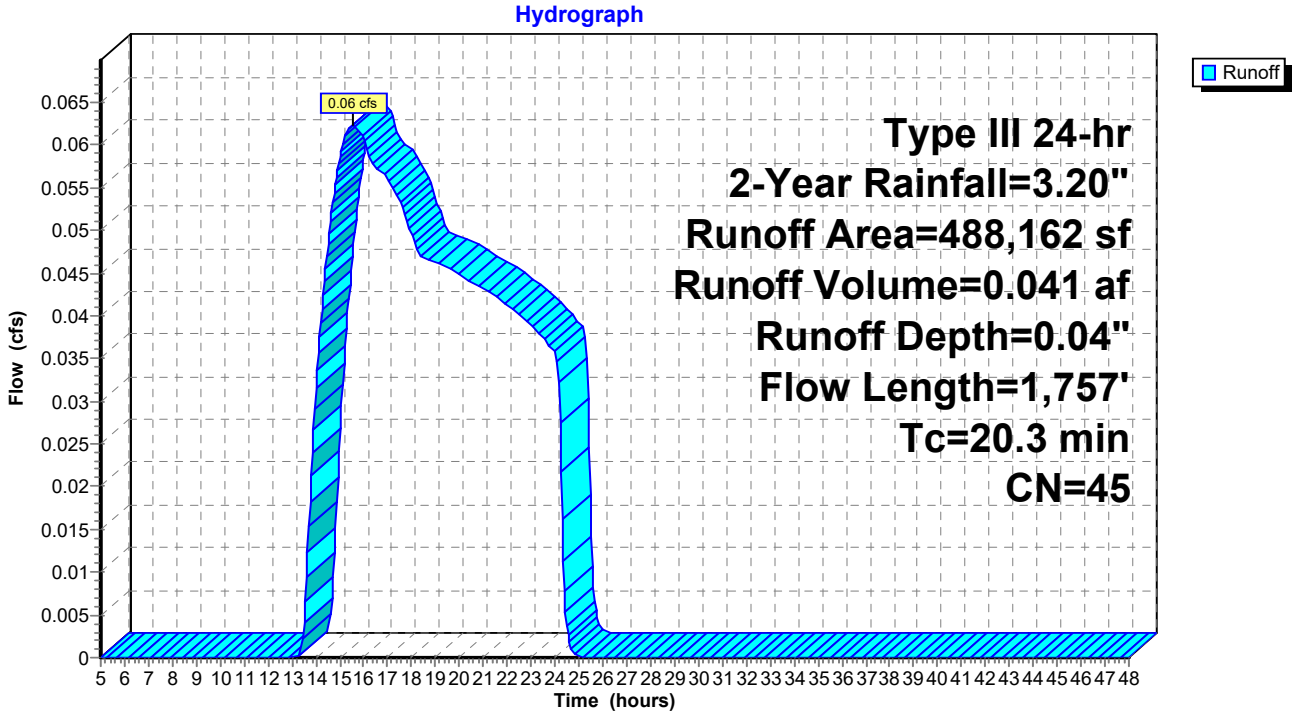
Runoff = 0.06 cfs @ 15.58 hrs, Volume= 0.041 af, Depth= 0.04"
Routed to Reach DP-1 : RICKETTS POND

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.20"

	Area (sf)	CN	Description
	239,646	30	Woods, Good, HSG A
	201	77	Woods, Good, HSG D
	96,161	32	Woods/grass comb., Good, HSG A
	25,665	79	Woods/grass comb., Good, HSG D
	1,227	96	Gravel surface, HSG A
*	125,262	77	Fallow, bare soil, HSG A, SAND
	488,162	45	Weighted Average
	488,162		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.9	50	0.0500	0.06		**Sheet Flow, SHEET** Woods: Dense underbrush n= 0.800 P2= 3.20"
5.4	1,707	0.1090	5.32		**Shallow Concentrated Flow, SHALLOW CONC. FLOW** Unpaved Kv= 16.1 fps
20.3	1,757	Total			

Subcatchment 1S: Site (EAST)



Summary for Subcatchment 2S: Site (SOUTHWEST)

[45] Hint: Runoff=Zero

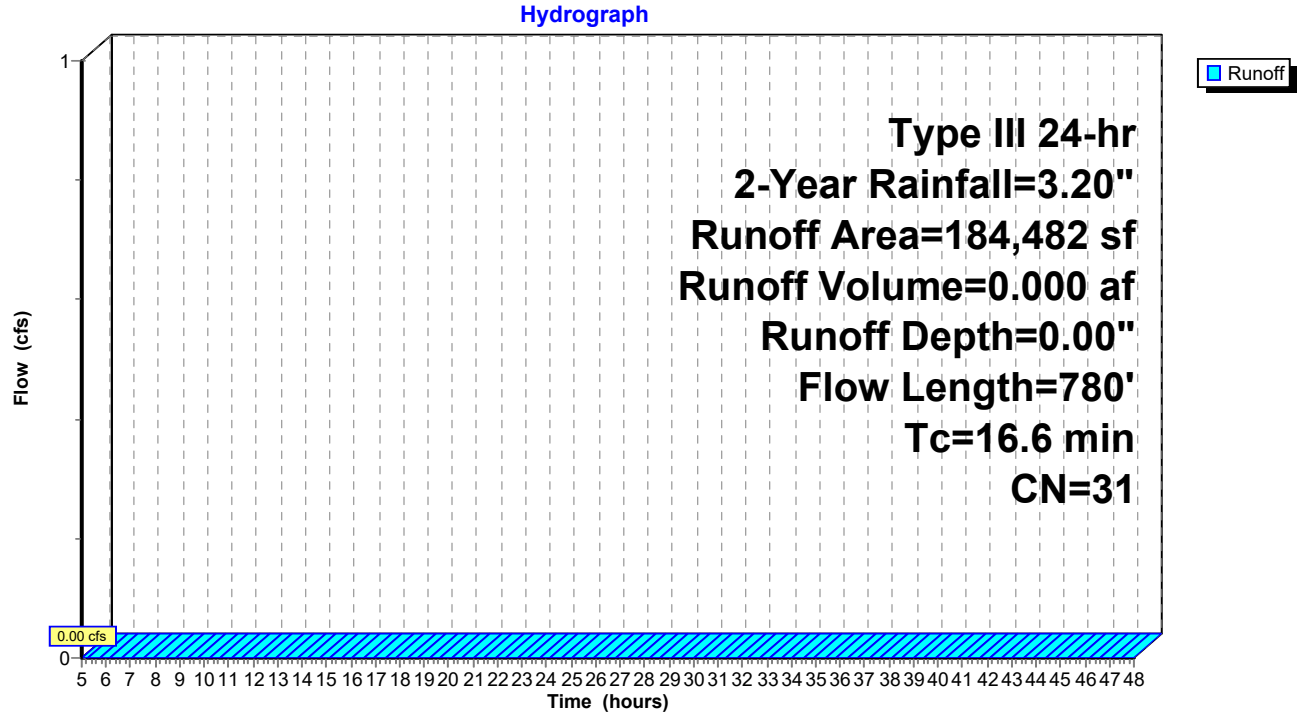
Runoff = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af, Depth= 0.00"
Routed to Reach DP-2 : SPRING STREET/SOUTHWEST PROPERTY LINE

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.20"

	Area (sf)	CN	Description
	175,086	30	Woods, Good, HSG A
	6,042	32	Woods/grass comb., Good, HSG A
*	3,354	77	Fallow, bare soil, HSG A, SAND
	184,482	31	Weighted Average
	184,482		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.8	50	0.0600	0.06		**Sheet Flow, SHEET** Woods: Dense underbrush n= 0.800 P2= 3.20"
2.8	730	0.0750	4.41		**Shallow Concentrated Flow, SHALLOW CONC. FLOW** Unpaved Kv= 16.1 fps
16.6	780	Total			

Subcatchment 2S: Site (SOUTHWEST)



Summary for Subcatchment 3S: Site (WEST)

[45] Hint: Runoff=Zero

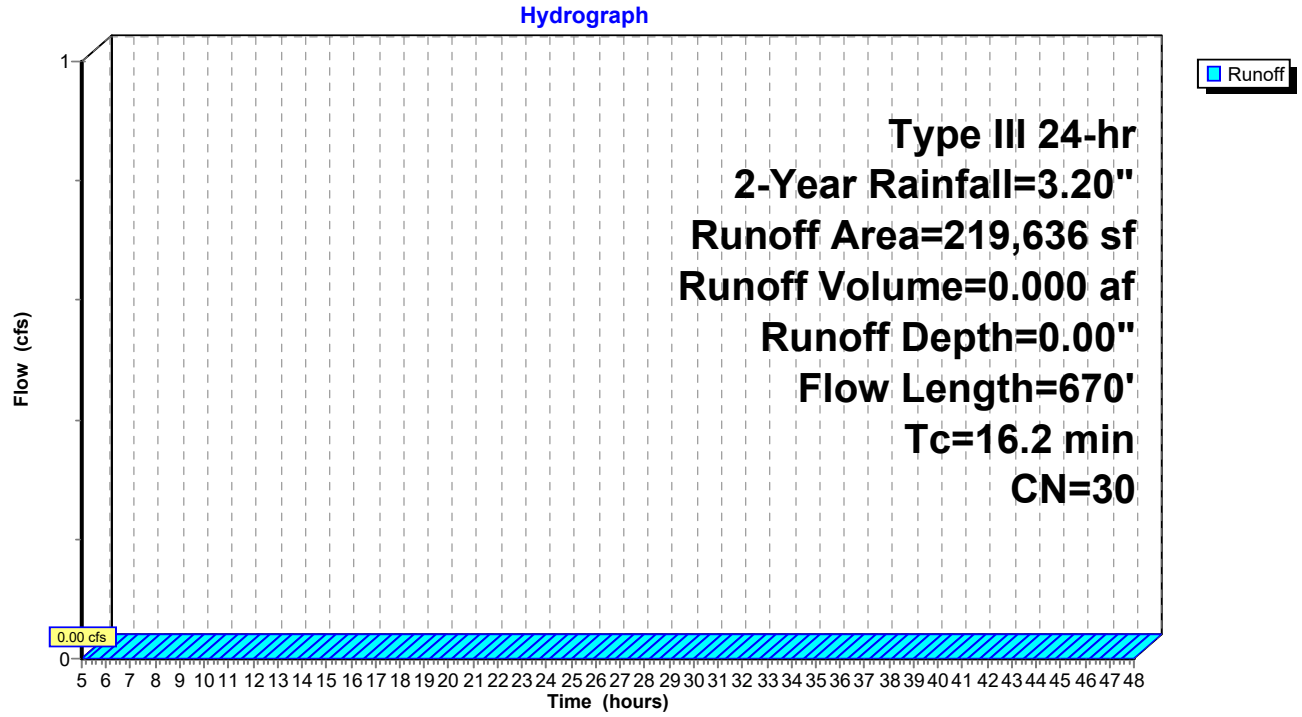
Runoff = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af, Depth= 0.00"
Routed to Reach DP-3 : ROUTE 44/ WEST PROPERTY LINE

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.20"

Area (sf)	CN	Description
219,636	30	Woods, Good, HSG A
219,636		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.8	50	0.0600	0.06		**Sheet Flow, SHEET** Woods: Dense underbrush n= 0.800 P2= 3.20"
2.4	620	0.0693	4.24		**Shallow Concentrated Flow, SHALLOW CONC. FLOW** Unpaved Kv= 16.1 fps
16.2	670	Total			

Subcatchment 3S: Site (WEST)



Summary for Subcatchment 4S: Site (NORTH)

[45] Hint: Runoff=Zero

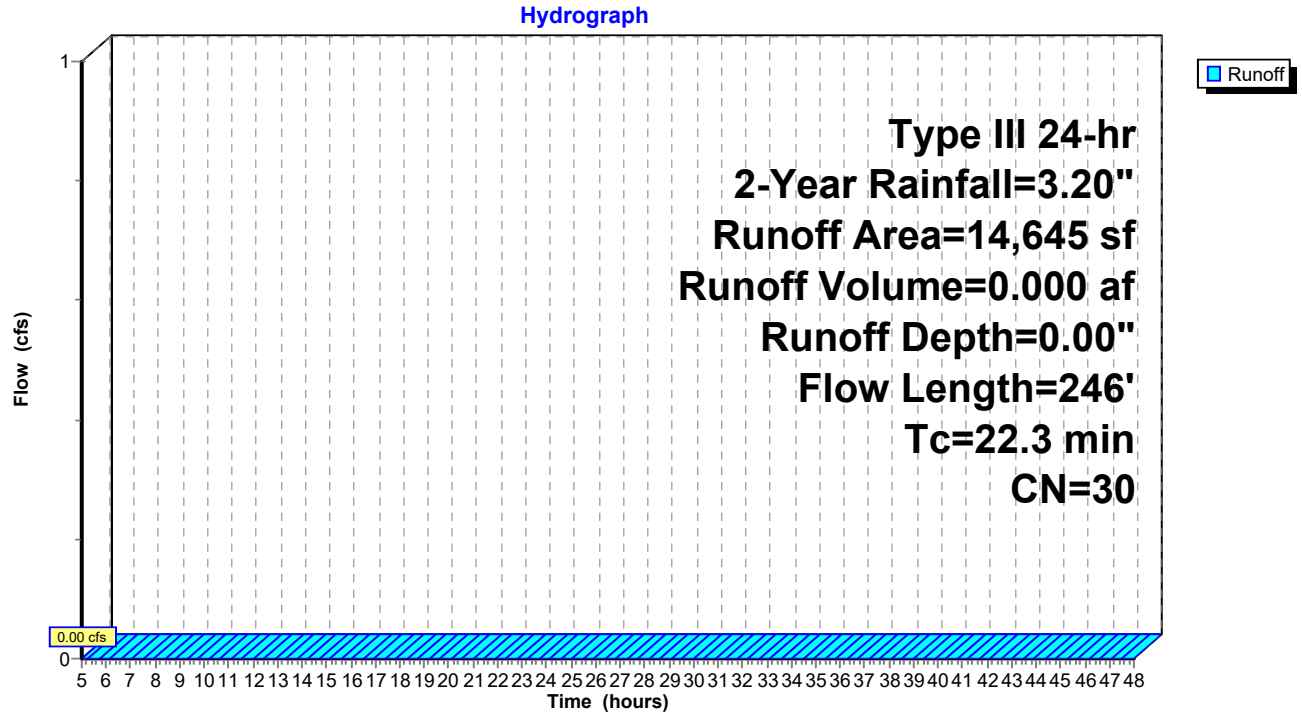
Runoff = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af, Depth= 0.00"
Routed to Reach DP-4 : NORTHEAST PROPERTY LINE

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.20"

Area (sf)	CN	Description
14,645	30	Woods, Good, HSG A
14,645		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
21.5	50	0.0200	0.04		**Sheet Flow, SHEET** Woods: Dense underbrush n= 0.800 P2= 3.20"
0.8	196	0.0715	4.31		**Shallow Concentrated Flow, SHALLOW CONC. FLOW** Unpaved Kv= 16.1 fps
22.3	246	Total			

Subcatchment 4S: Site (NORTH)



Summary for Subcatchment 5S: Corner at RTE. 44

[45] Hint: Runoff=Zero

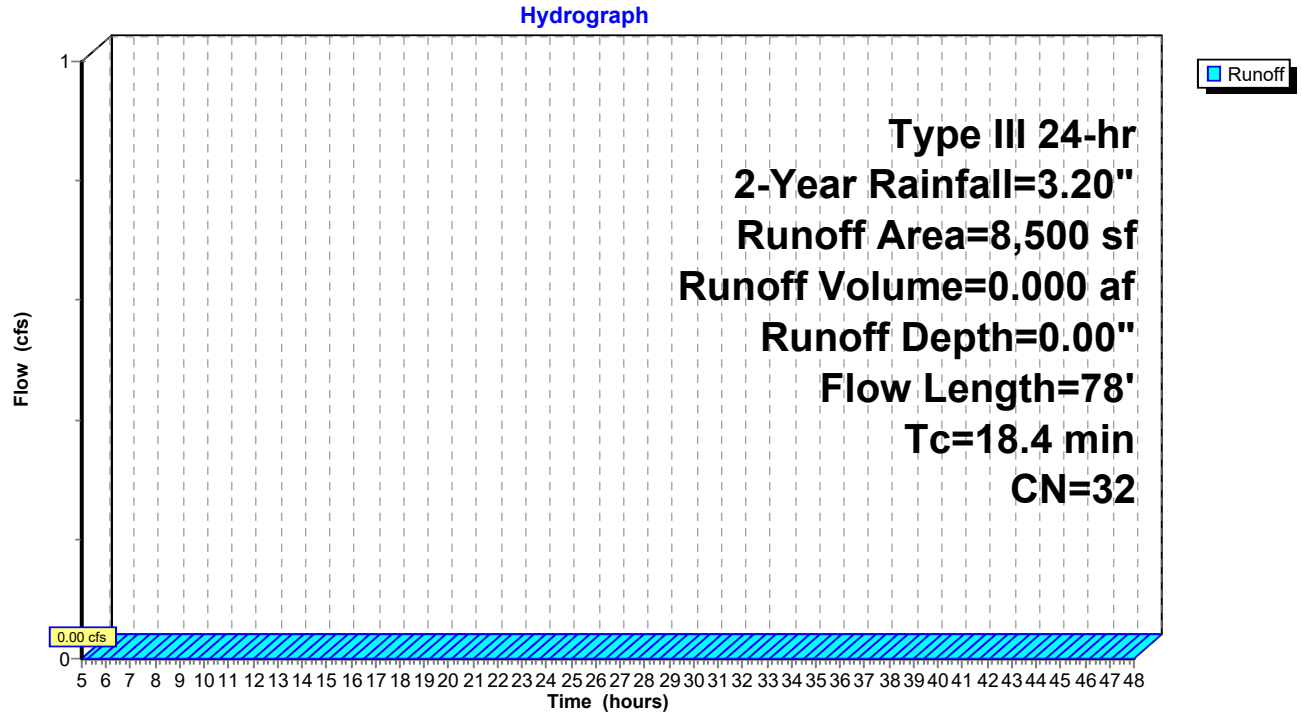
Runoff = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af, Depth= 0.00"
Routed to Reach DP-2 : SPRING STREET/SOUTHWEST PROPERTY LINE

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.20"

Area (sf)	CN	Description
8,500	32	Woods/grass comb., Good, HSG A
8,500		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.3	50	0.0300	0.05		**Sheet Flow, SHEET** Woods: Dense underbrush n= 0.800 P2= 3.20"
0.1	28	0.0953	4.97		**Shallow Concentrated Flow, SHALLOW CONC. FLOW** Unpaved Kv= 16.1 fps
18.4	78	Total			

Subcatchment 5S: Corner at RTE. 44



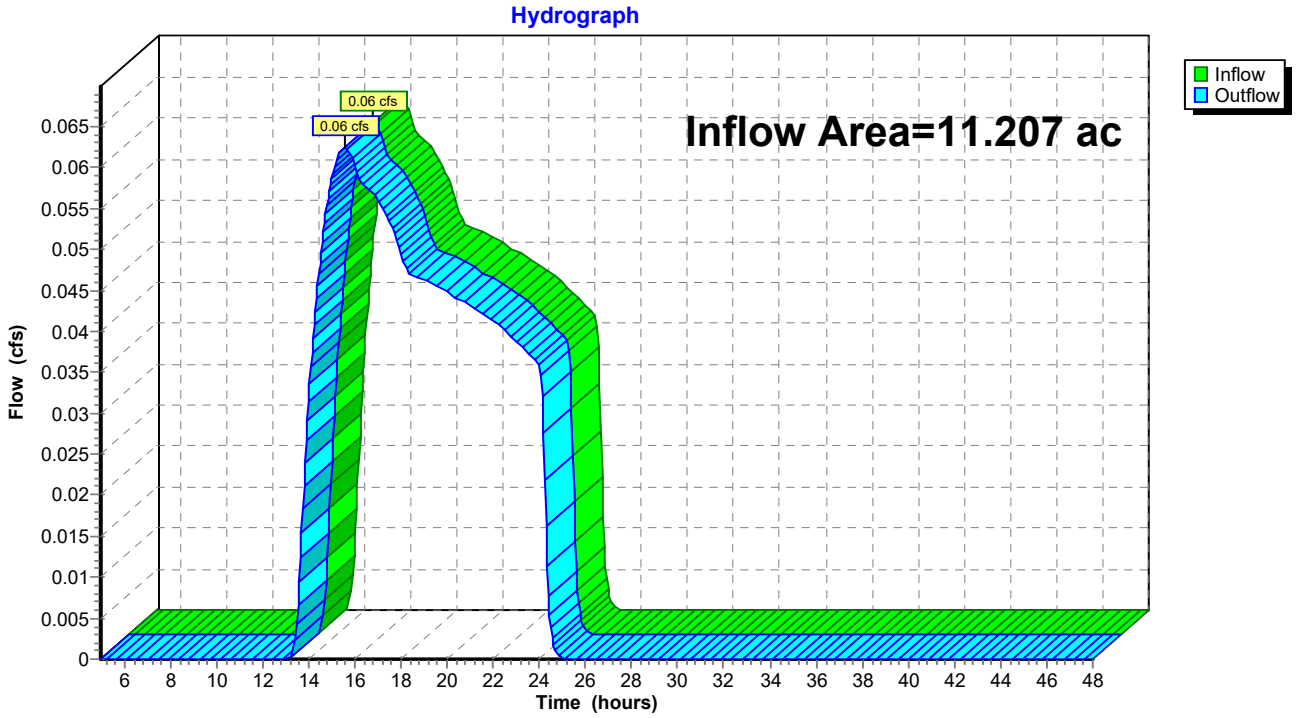
Summary for Reach DP-1: RICKETTS POND

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 11.207 ac, 0.00% Impervious, Inflow Depth = 0.04" for 2-Year event
Inflow = 0.06 cfs @ 15.58 hrs, Volume= 0.041 af
Outflow = 0.06 cfs @ 15.58 hrs, Volume= 0.041 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs

Reach DP-1: RICKETTS POND



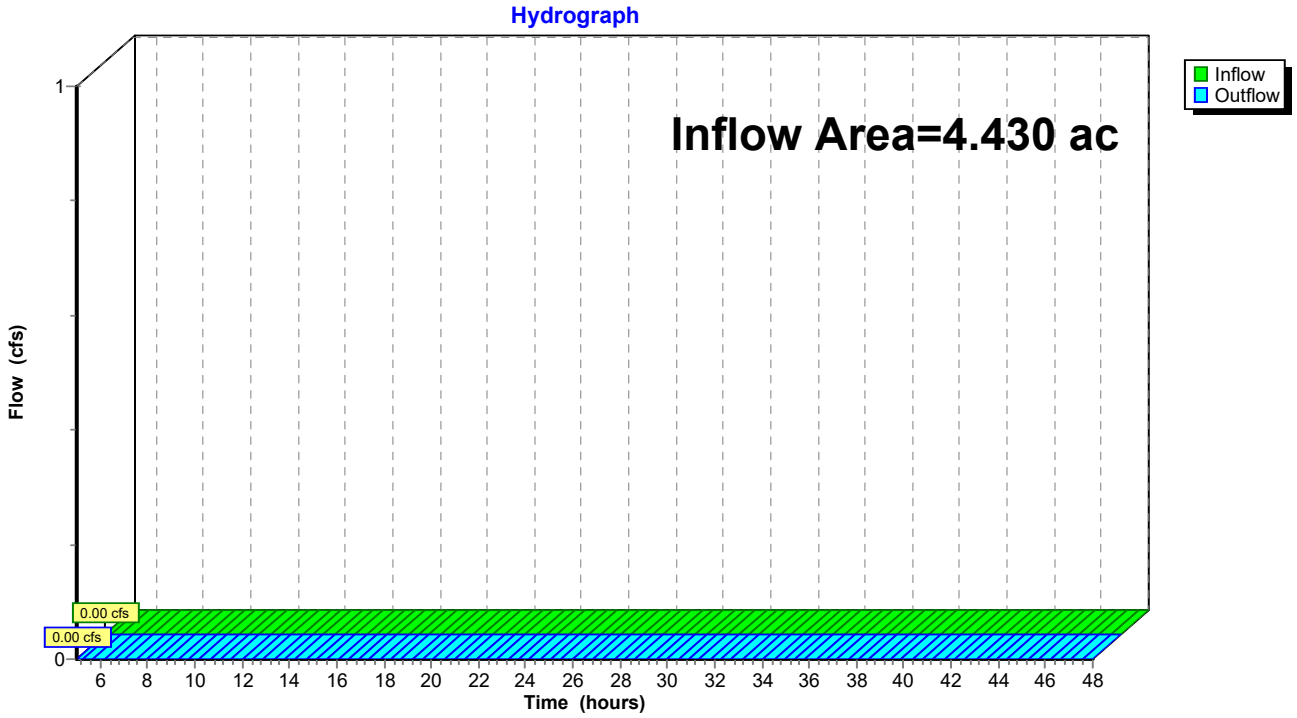
Summary for Reach DP-2: SPRING STREET/SOUTHWEST PROPERTY LINE

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 4.430 ac, 0.00% Impervious, Inflow Depth = 0.00" for 2-Year event
Inflow = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs

Reach DP-2: SPRING STREET/SOUTHWEST PROPERTY LINE



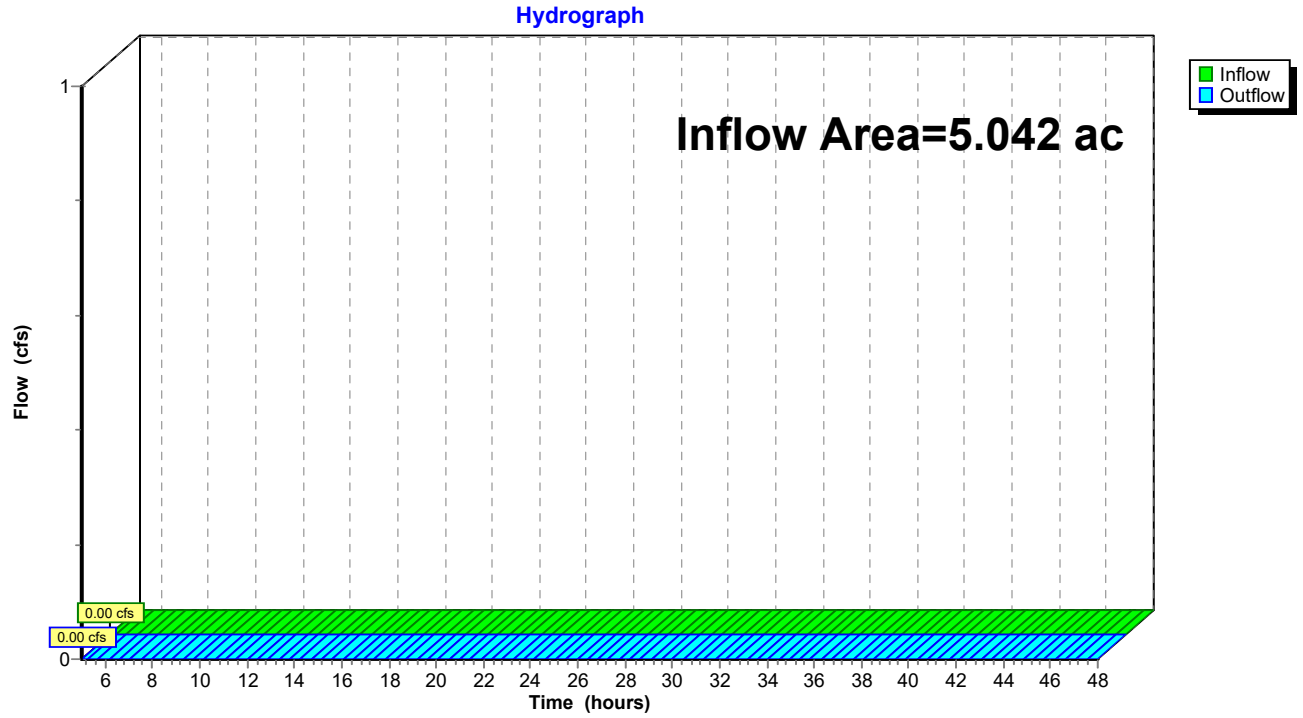
Summary for Reach DP-3: ROUTE 44/ WEST PROPERTY LINE

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 5.042 ac, 0.00% Impervious, Inflow Depth = 0.00" for 2-Year event
Inflow = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs

Reach DP-3: ROUTE 44/ WEST PROPERTY LINE



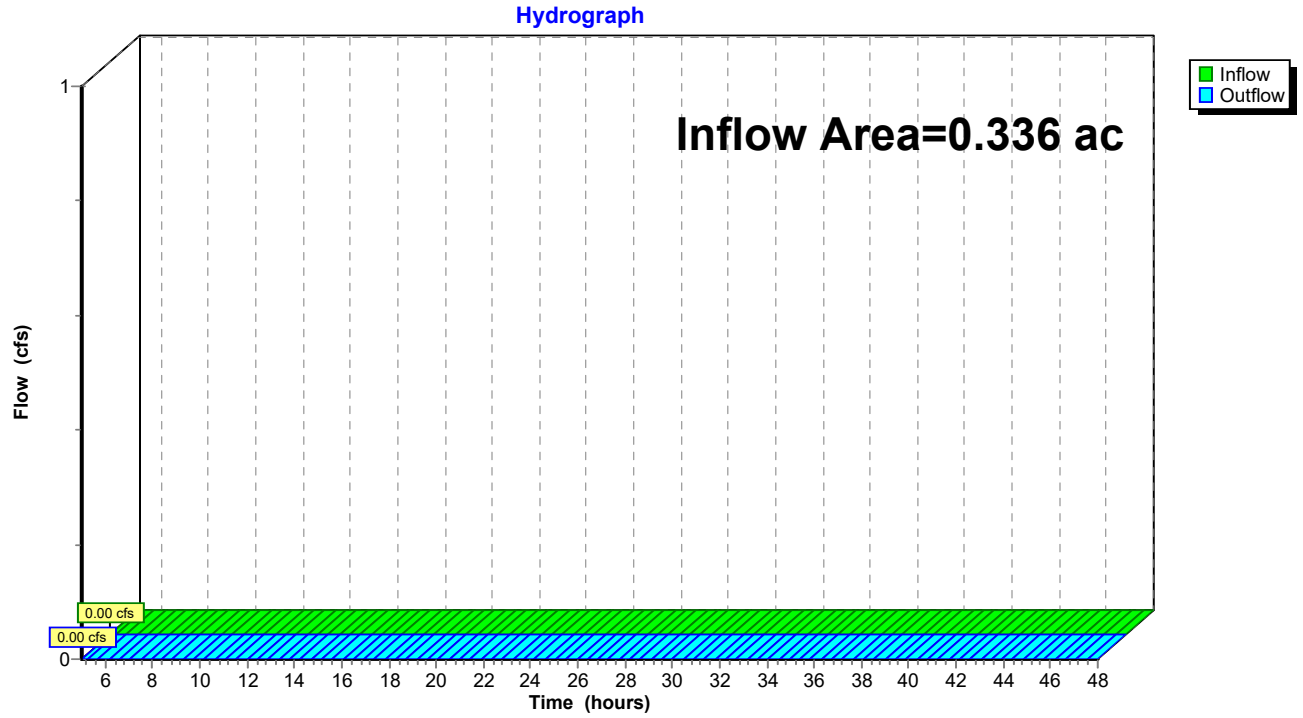
Summary for Reach DP-4: NORTHEAST PROPERTY LINE

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.336 ac, 0.00% Impervious, Inflow Depth = 0.00" for 2-Year event
Inflow = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs

Reach DP-4: NORTHEAST PROPERTY LINE



Time span=5.00-48.00 hrs, dt=0.05 hrs, 861 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1S: Site (EAST) Runoff Area=488,162 sf 0.00% Impervious Runoff Depth=0.35"
Flow Length=1,757' Tc=20.3 min CN=45 Runoff=1.31 cfs 0.328 af

Subcatchment2S: Site (SOUTHWEST) Runoff Area=184,482 sf 0.00% Impervious Runoff Depth=0.00"
Flow Length=780' Tc=16.6 min CN=31 Runoff=0.00 cfs 0.001 af

Subcatchment3S: Site (WEST) Runoff Area=219,636 sf 0.00% Impervious Runoff Depth=0.00"
Flow Length=670' Tc=16.2 min CN=30 Runoff=0.00 cfs 0.000 af

Subcatchment4S: Site (NORTH) Runoff Area=14,645 sf 0.00% Impervious Runoff Depth=0.00"
Flow Length=246' Tc=22.3 min CN=30 Runoff=0.00 cfs 0.000 af

Subcatchment5S: Corner at RTE. 44 Runoff Area=8,500 sf 0.00% Impervious Runoff Depth=0.01"
Flow Length=78' Tc=18.4 min CN=32 Runoff=0.00 cfs 0.000 af

Reach DP-1: RICKETTS POND Inflow=1.31 cfs 0.328 af
Outflow=1.31 cfs 0.328 af

Reach DP-2: SPRING STREET/SOUTHWEST PROPERTY LINE Inflow=0.00 cfs 0.001 af
Outflow=0.00 cfs 0.001 af

Reach DP-3: ROUTE 44/ WEST PROPERTY LINE Inflow=0.00 cfs 0.000 af
Outflow=0.00 cfs 0.000 af

Reach DP-4: NORTHEAST PROPERTY LINE Inflow=0.00 cfs 0.000 af
Outflow=0.00 cfs 0.000 af

Total Runoff Area = 21.015 ac Runoff Volume = 0.329 af Average Runoff Depth = 0.19"
100.00% Pervious = 21.015 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment 1S: Site (EAST)

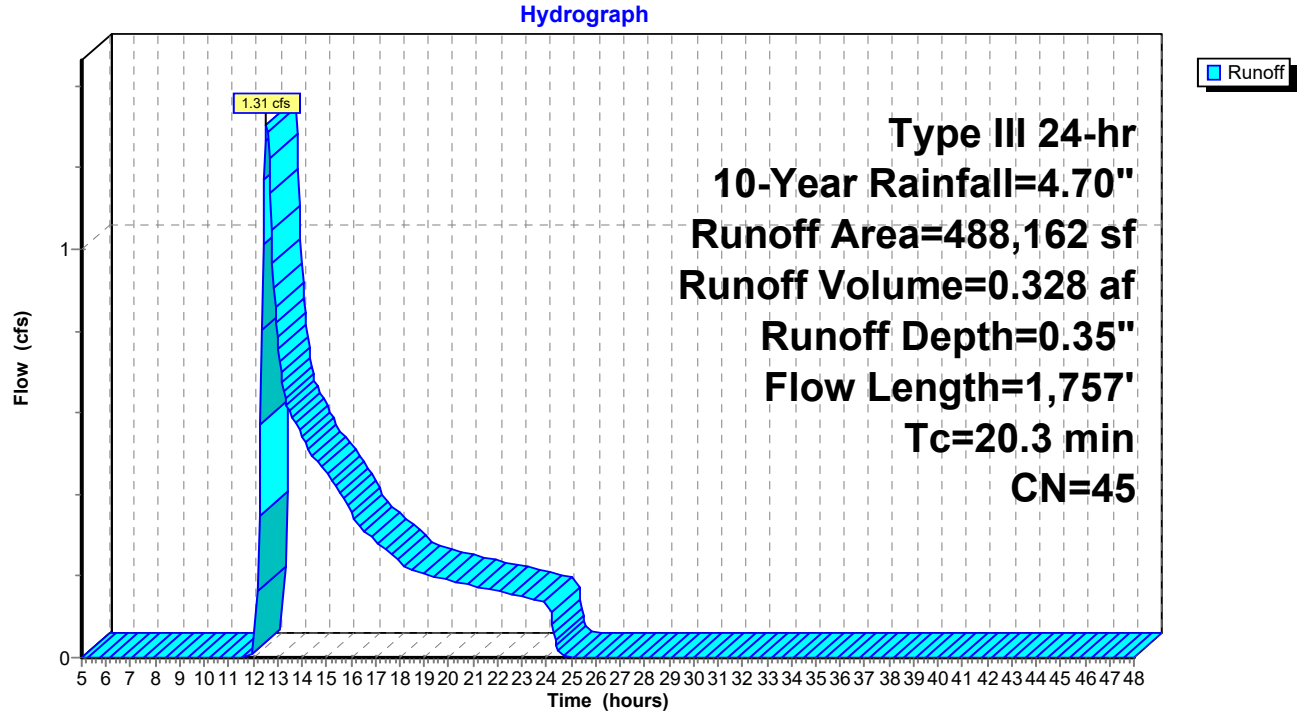
Runoff = 1.31 cfs @ 12.56 hrs, Volume= 0.328 af, Depth= 0.35"
Routed to Reach DP-1 : RICKETTS POND

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.70"

	Area (sf)	CN	Description
	239,646	30	Woods, Good, HSG A
	201	77	Woods, Good, HSG D
	96,161	32	Woods/grass comb., Good, HSG A
	25,665	79	Woods/grass comb., Good, HSG D
	1,227	96	Gravel surface, HSG A
*	125,262	77	Fallow, bare soil, HSG A, SAND
	488,162	45	Weighted Average
	488,162		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.9	50	0.0500	0.06		**Sheet Flow, SHEET** Woods: Dense underbrush n= 0.800 P2= 3.20"
5.4	1,707	0.1090	5.32		**Shallow Concentrated Flow, SHALLOW CONC. FLOW** Unpaved Kv= 16.1 fps
20.3	1,757	Total			

Subcatchment 1S: Site (EAST)



Summary for Subcatchment 2S: Site (SOUTHWEST)

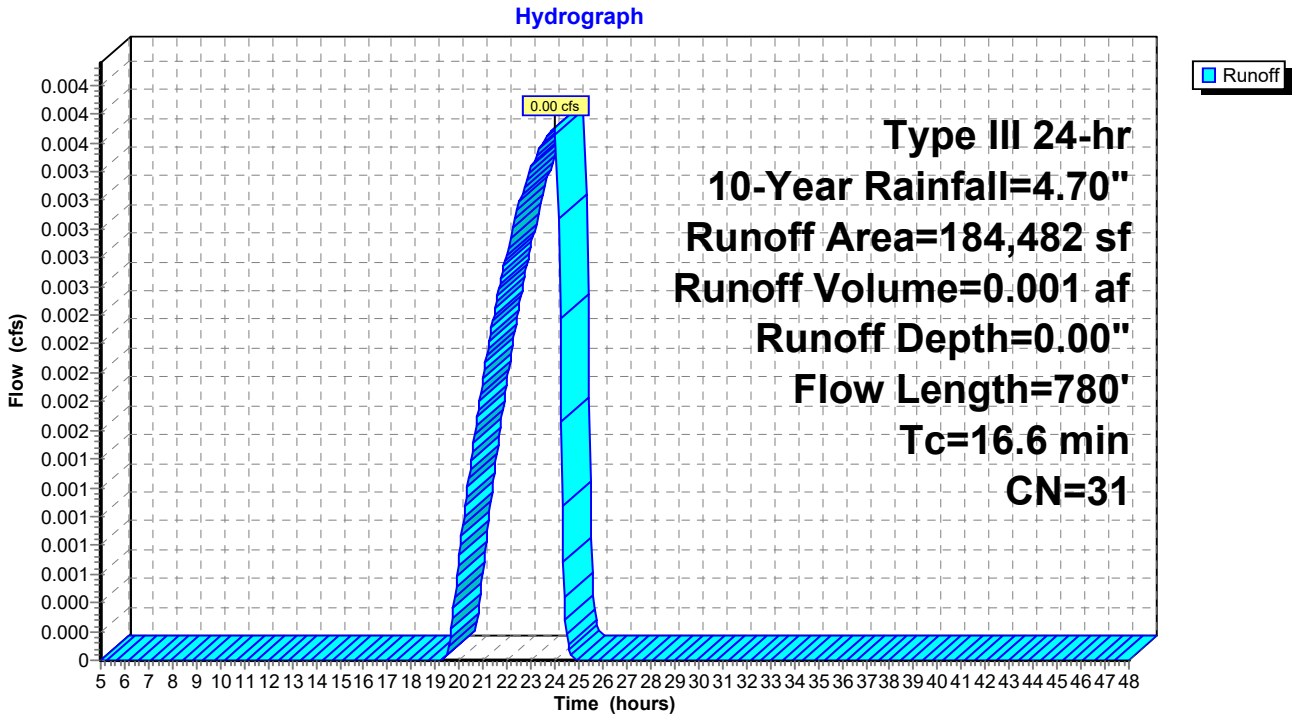
Runoff = 0.00 cfs @ 23.99 hrs, Volume= 0.001 af, Depth= 0.00"
Routed to Reach DP-2 : SPRING STREET/SOUTHWEST PROPERTY LINE

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.70"

	Area (sf)	CN	Description
	175,086	30	Woods, Good, HSG A
	6,042	32	Woods/grass comb., Good, HSG A
*	3,354	77	Fallow, bare soil, HSG A, SAND
	184,482	31	Weighted Average
	184,482		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.8	50	0.0600	0.06		**Sheet Flow, SHEET** Woods: Dense underbrush n= 0.800 P2= 3.20"
2.8	730	0.0750	4.41		**Shallow Concentrated Flow, SHALLOW CONC. FLOW** Unpaved Kv= 16.1 fps
16.6	780	Total			

Subcatchment 2S: Site (SOUTHWEST)



Summary for Subcatchment 3S: Site (WEST)

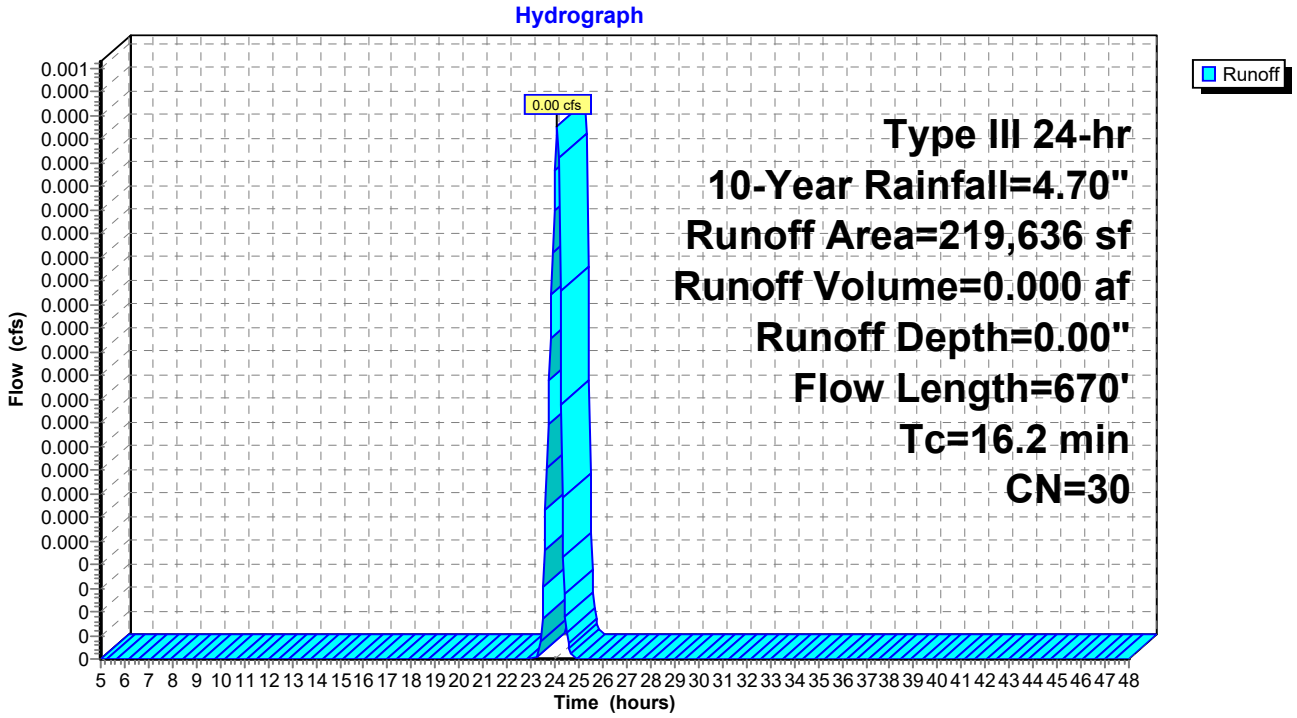
Runoff = 0.00 cfs @ 24.08 hrs, Volume= 0.000 af, Depth= 0.00"
Routed to Reach DP-3 : ROUTE 44/ WEST PROPERTY LINE

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.70"

Area (sf)	CN	Description
219,636	30	Woods, Good, HSG A
219,636		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.8	50	0.0600	0.06		**Sheet Flow, SHEET** Woods: Dense underbrush n= 0.800 P2= 3.20"
2.4	620	0.0693	4.24		**Shallow Concentrated Flow, SHALLOW CONC. FLOW** Unpaved Kv= 16.1 fps
16.2	670	Total			

Subcatchment 3S: Site (WEST)



Summary for Subcatchment 4S: Site (NORTH)

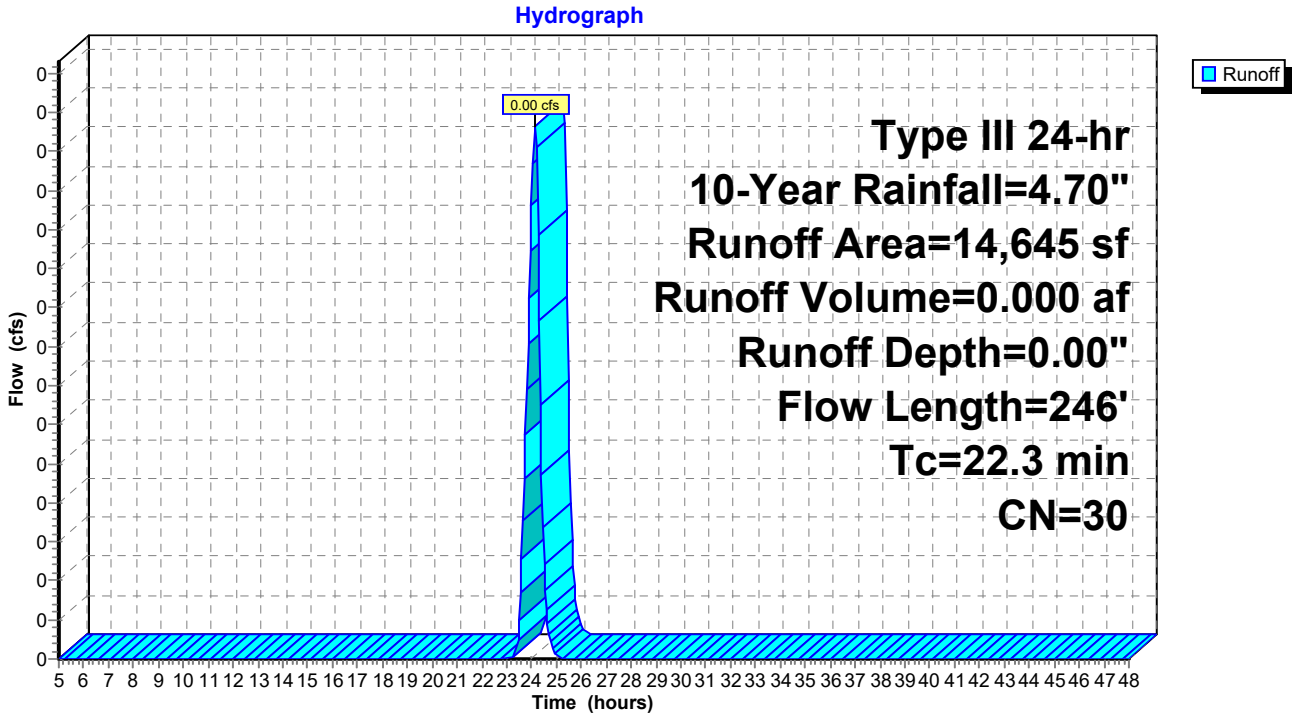
Runoff = 0.00 cfs @ 24.13 hrs, Volume= 0.000 af, Depth= 0.00"
Routed to Reach DP-4 : NORTHEAST PROPERTY LINE

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.70"

Area (sf)	CN	Description
14,645	30	Woods, Good, HSG A
14,645		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
21.5	50	0.0200	0.04		**Sheet Flow, SHEET** Woods: Dense underbrush n= 0.800 P2= 3.20"
0.8	196	0.0715	4.31		**Shallow Concentrated Flow, SHALLOW CONC. FLOW** Unpaved Kv= 16.1 fps
22.3	246	Total			

Subcatchment 4S: Site (NORTH)



Summary for Subcatchment 5S: Corner at RTE. 44

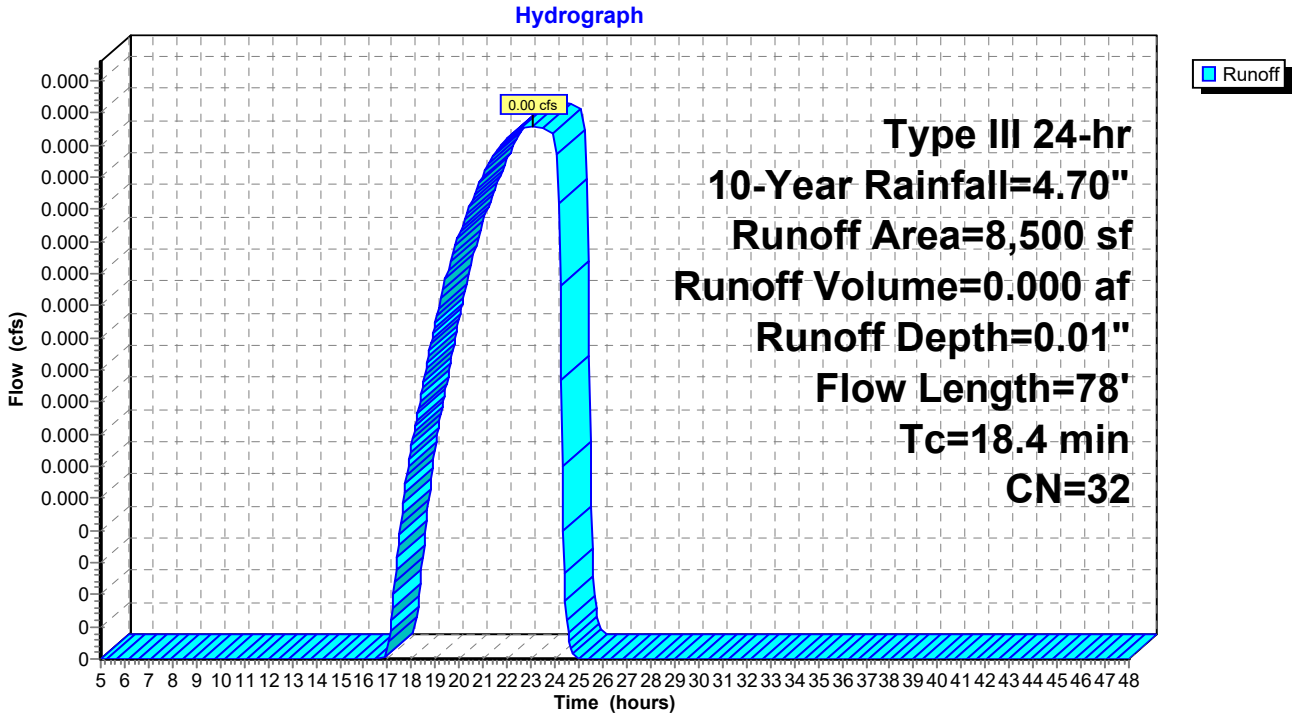
Runoff = 0.00 cfs @ 23.09 hrs, Volume= 0.000 af, Depth= 0.01"
Routed to Reach DP-2 : SPRING STREET/SOUTHWEST PROPERTY LINE

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.70"

Area (sf)	CN	Description
8,500	32	Woods/grass comb., Good, HSG A
8,500		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.3	50	0.0300	0.05		**Sheet Flow, SHEET** Woods: Dense underbrush n= 0.800 P2= 3.20"
0.1	28	0.0953	4.97		**Shallow Concentrated Flow, SHALLOW CONC. FLOW** Unpaved Kv= 16.1 fps
18.4	78	Total			

Subcatchment 5S: Corner at RTE. 44



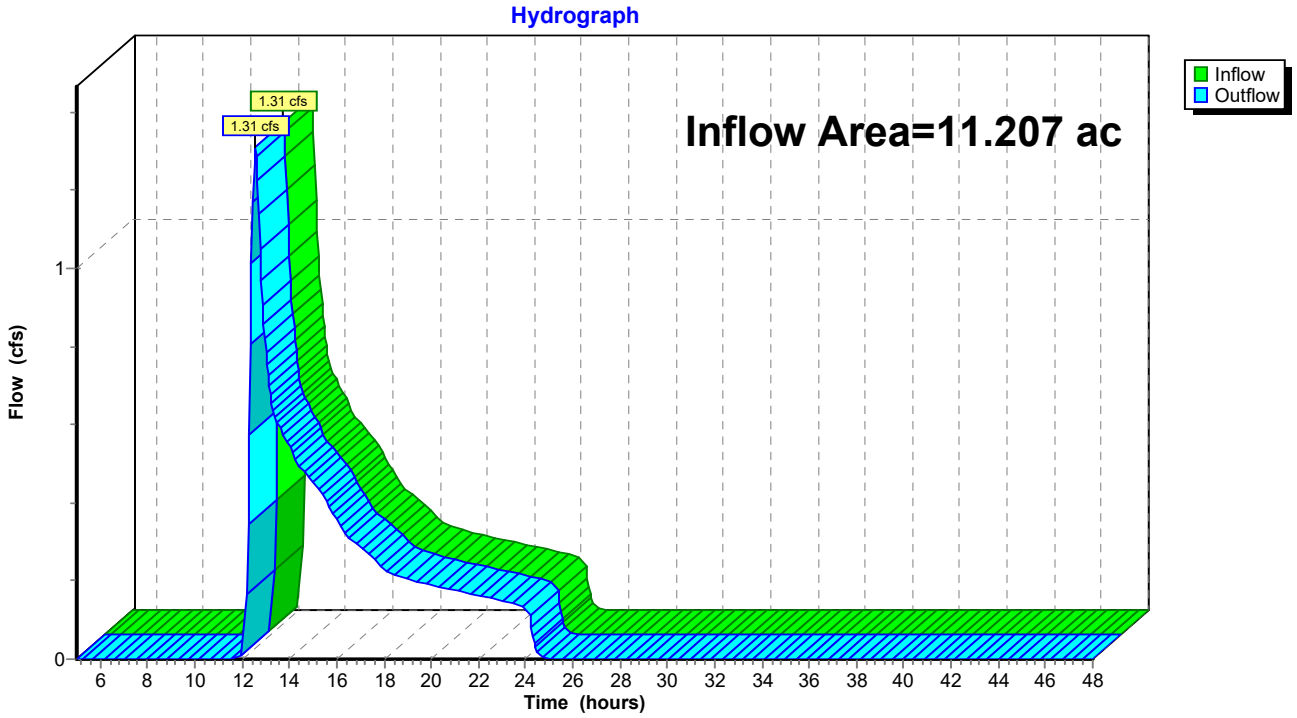
Summary for Reach DP-1: RICKETTS POND

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 11.207 ac, 0.00% Impervious, Inflow Depth = 0.35" for 10-Year event
Inflow = 1.31 cfs @ 12.56 hrs, Volume= 0.328 af
Outflow = 1.31 cfs @ 12.56 hrs, Volume= 0.328 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs

Reach DP-1: RICKETTS POND



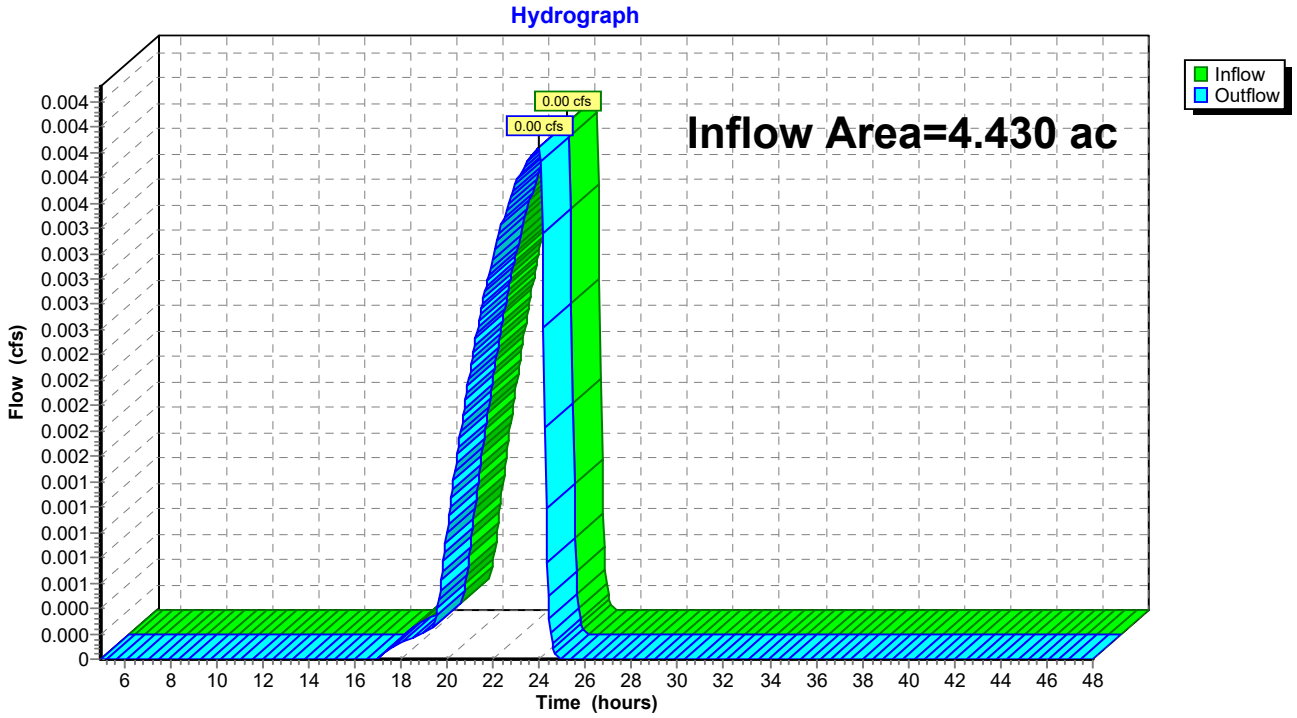
Summary for Reach DP-2: SPRING STREET/SOUTHWEST PROPERTY LINE

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 4.430 ac, 0.00% Impervious, Inflow Depth = 0.00" for 10-Year event
Inflow = 0.00 cfs @ 23.99 hrs, Volume= 0.001 af
Outflow = 0.00 cfs @ 23.99 hrs, Volume= 0.001 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs

Reach DP-2: SPRING STREET/SOUTHWEST PROPERTY LINE



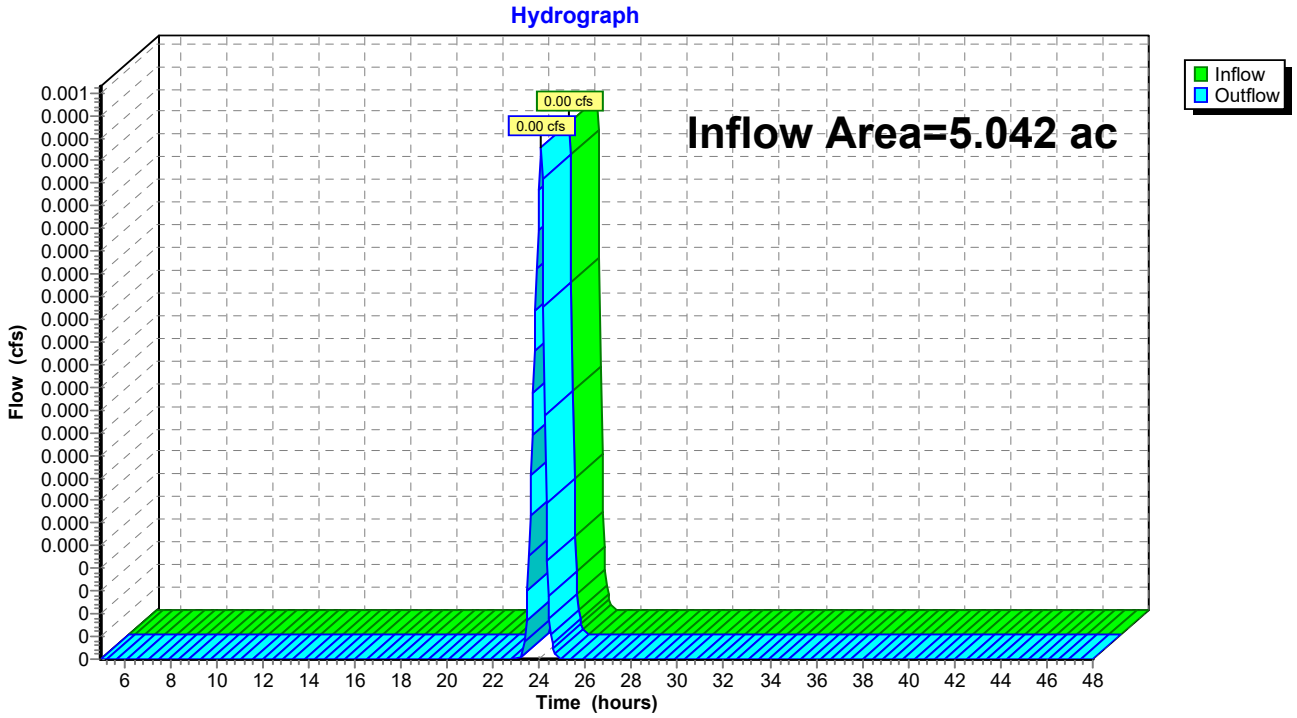
Summary for Reach DP-3: ROUTE 44/ WEST PROPERTY LINE

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 5.042 ac, 0.00% Impervious, Inflow Depth = 0.00" for 10-Year event
Inflow = 0.00 cfs @ 24.08 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 24.08 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs

Reach DP-3: ROUTE 44/ WEST PROPERTY LINE



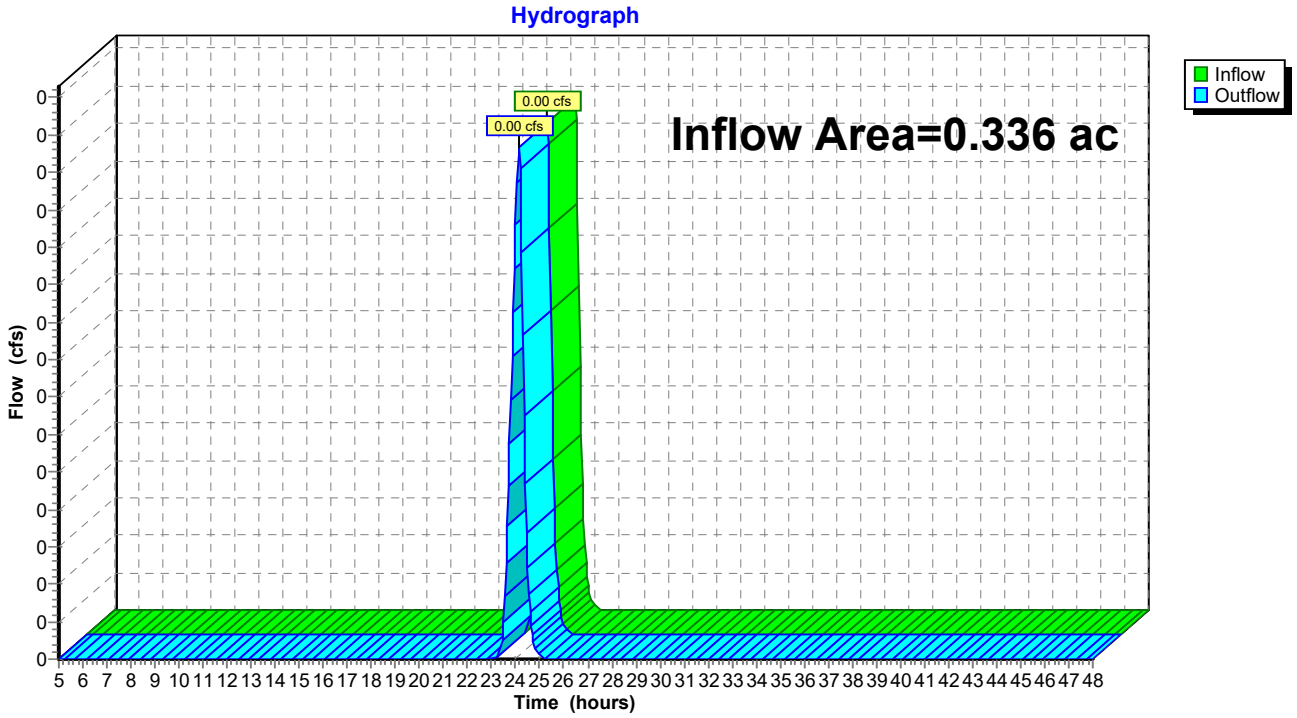
Summary for Reach DP-4: NORTHEAST PROPERTY LINE

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.336 ac, 0.00% Impervious, Inflow Depth = 0.00" for 10-Year event
Inflow = 0.00 cfs @ 24.13 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 24.13 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs

Reach DP-4: NORTHEAST PROPERTY LINE



Time span=5.00-48.00 hrs, dt=0.05 hrs, 861 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1S: Site (EAST) Runoff Area=488,162 sf 0.00% Impervious Runoff Depth=0.61"
Flow Length=1,757' Tc=20.3 min CN=45 Runoff=3.06 cfs 0.571 af

Subcatchment2S: Site (SOUTHWEST) Runoff Area=184,482 sf 0.00% Impervious Runoff Depth=0.05"
Flow Length=780' Tc=16.6 min CN=31 Runoff=0.02 cfs 0.017 af

Subcatchment3S: Site (WEST) Runoff Area=219,636 sf 0.00% Impervious Runoff Depth=0.03"
Flow Length=670' Tc=16.2 min CN=30 Runoff=0.02 cfs 0.012 af

Subcatchment4S: Site (NORTH) Runoff Area=14,645 sf 0.00% Impervious Runoff Depth=0.03"
Flow Length=246' Tc=22.3 min CN=30 Runoff=0.00 cfs 0.001 af

Subcatchment5S: Corner at RTE. 44 Runoff Area=8,500 sf 0.00% Impervious Runoff Depth=0.07"
Flow Length=78' Tc=18.4 min CN=32 Runoff=0.00 cfs 0.001 af

Reach DP-1: RICKETTS POND Inflow=3.06 cfs 0.571 af
Outflow=3.06 cfs 0.571 af

Reach DP-2: SPRING STREET/SOUTHWEST PROPERTY LINE Inflow=0.03 cfs 0.018 af
Outflow=0.03 cfs 0.018 af

Reach DP-3: ROUTE 44/ WEST PROPERTY LINE Inflow=0.02 cfs 0.012 af
Outflow=0.02 cfs 0.012 af

Reach DP-4: NORTHEAST PROPERTY LINE Inflow=0.00 cfs 0.001 af
Outflow=0.00 cfs 0.001 af

Total Runoff Area = 21.015 ac Runoff Volume = 0.601 af Average Runoff Depth = 0.34"
100.00% Pervious = 21.015 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment 1S: Site (EAST)

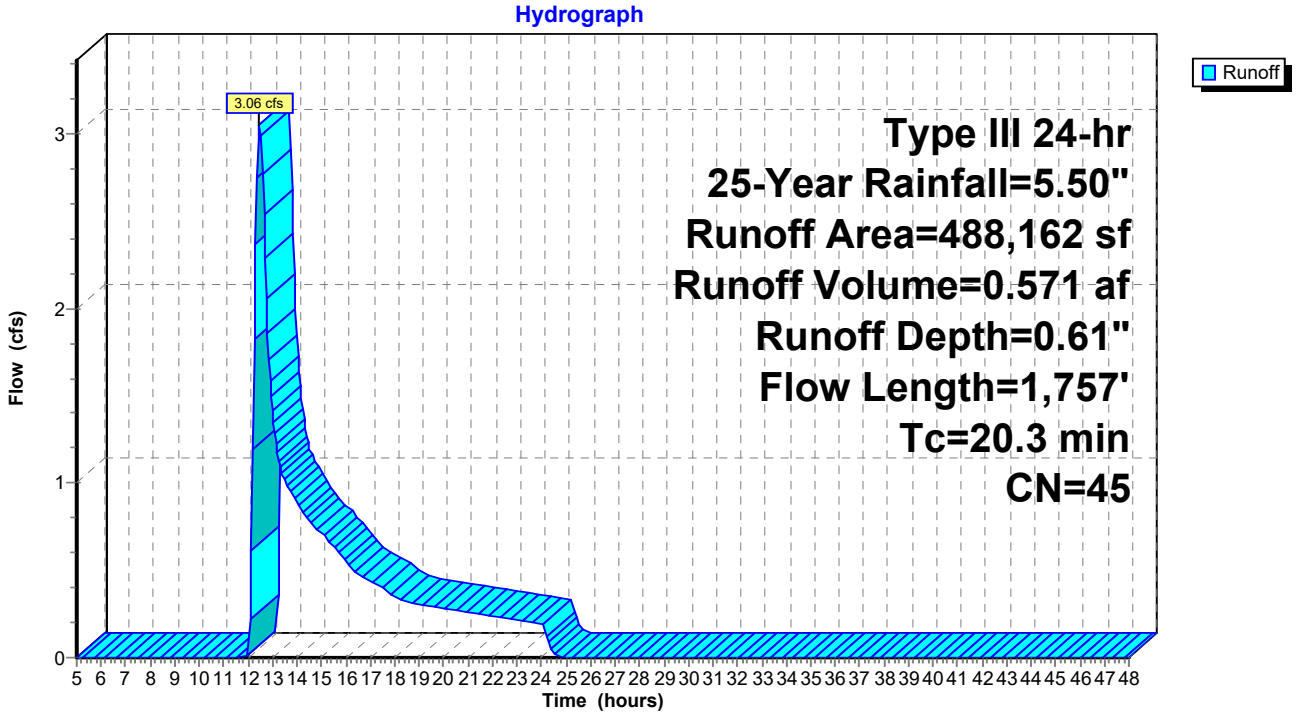
Runoff = 3.06 cfs @ 12.47 hrs, Volume= 0.571 af, Depth= 0.61"
Routed to Reach DP-1 : RICKETTS POND

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=5.50"

	Area (sf)	CN	Description
	239,646	30	Woods, Good, HSG A
	201	77	Woods, Good, HSG D
	96,161	32	Woods/grass comb., Good, HSG A
	25,665	79	Woods/grass comb., Good, HSG D
	1,227	96	Gravel surface, HSG A
*	125,262	77	Fallow, bare soil, HSG A, SAND
	488,162	45	Weighted Average
	488,162		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.9	50	0.0500	0.06		**Sheet Flow, SHEET** Woods: Dense underbrush n= 0.800 P2= 3.20"
5.4	1,707	0.1090	5.32		**Shallow Concentrated Flow, SHALLOW CONC. FLOW** Unpaved Kv= 16.1 fps
20.3	1,757	Total			

Subcatchment 1S: Site (EAST)



Summary for Subcatchment 2S: Site (SOUTHWEST)

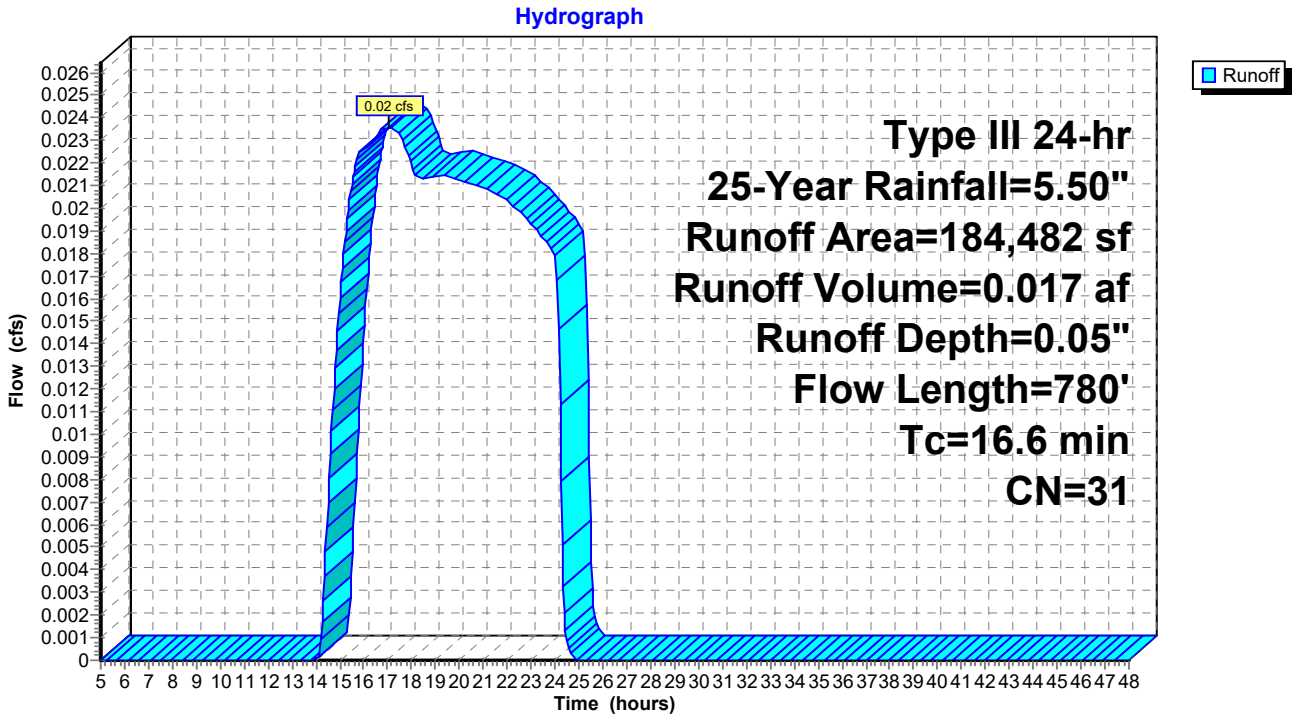
Runoff = 0.02 cfs @ 17.02 hrs, Volume= 0.017 af, Depth= 0.05"
Routed to Reach DP-2 : SPRING STREET/SOUTHWEST PROPERTY LINE

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=5.50"

	Area (sf)	CN	Description
	175,086	30	Woods, Good, HSG A
	6,042	32	Woods/grass comb., Good, HSG A
*	3,354	77	Fallow, bare soil, HSG A, SAND
	184,482	31	Weighted Average
	184,482		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.8	50	0.0600	0.06		**Sheet Flow, SHEET** Woods: Dense underbrush n= 0.800 P2= 3.20"
2.8	730	0.0750	4.41		**Shallow Concentrated Flow, SHALLOW CONC. FLOW** Unpaved Kv= 16.1 fps
16.6	780	Total			

Subcatchment 2S: Site (SOUTHWEST)



Summary for Subcatchment 3S: Site (WEST)

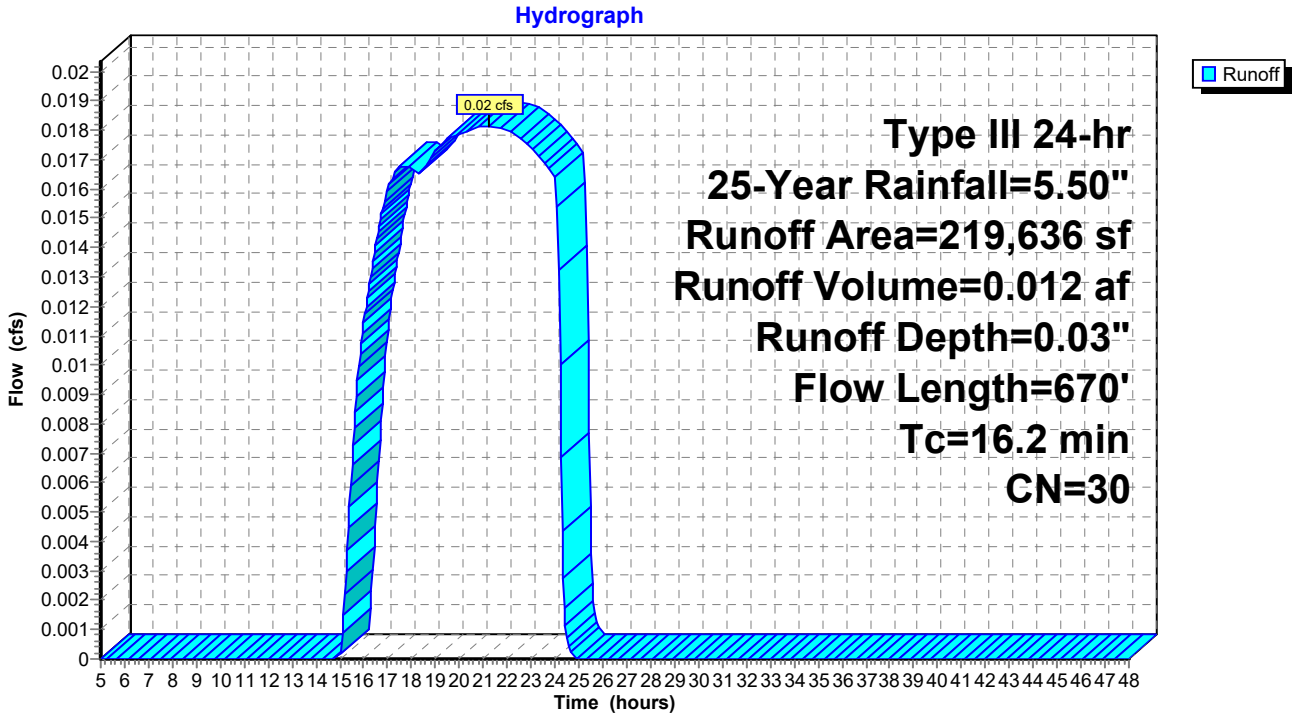
Runoff = 0.02 cfs @ 21.21 hrs, Volume= 0.012 af, Depth= 0.03"
Routed to Reach DP-3 : ROUTE 44/ WEST PROPERTY LINE

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=5.50"

Area (sf)	CN	Description
219,636	30	Woods, Good, HSG A
219,636		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.8	50	0.0600	0.06		**Sheet Flow, SHEET** Woods: Dense underbrush n= 0.800 P2= 3.20"
2.4	620	0.0693	4.24		**Shallow Concentrated Flow, SHALLOW CONC. FLOW** Unpaved Kv= 16.1 fps
16.2	670	Total			

Subcatchment 3S: Site (WEST)



Summary for Subcatchment 4S: Site (NORTH)

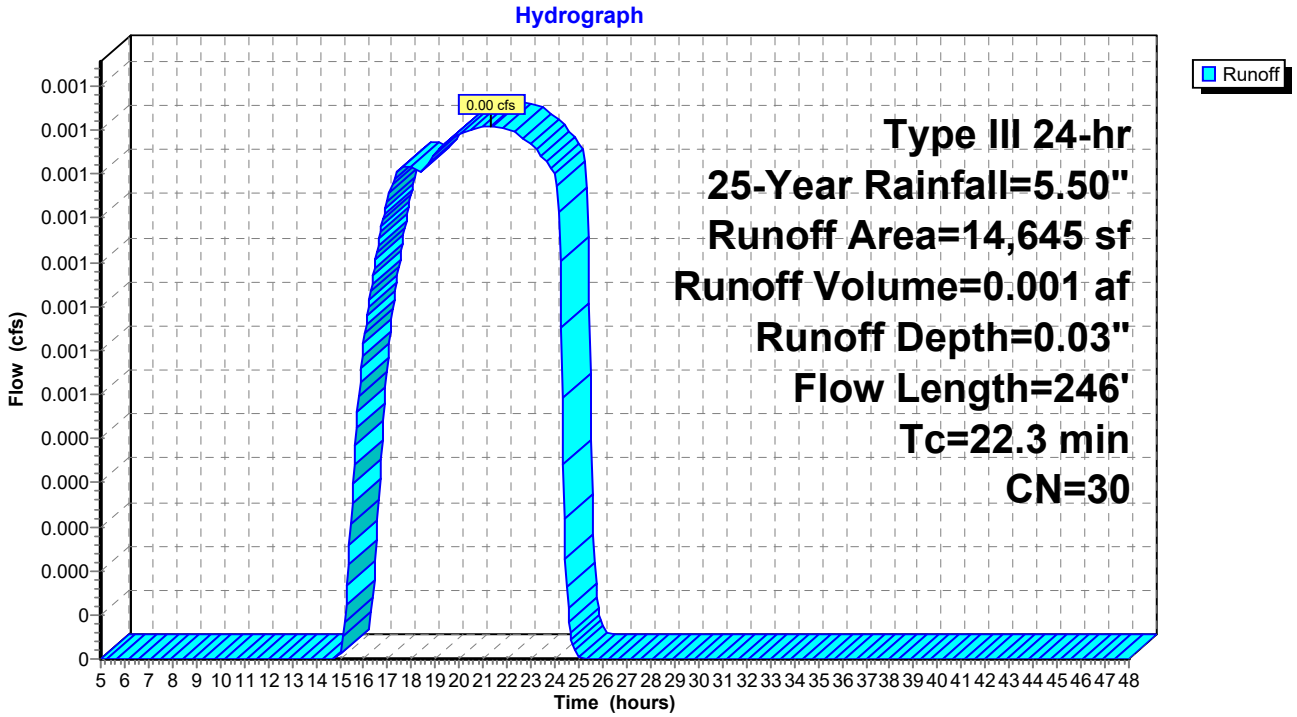
Runoff = 0.00 cfs @ 21.32 hrs, Volume= 0.001 af, Depth= 0.03"
Routed to Reach DP-4 : NORTHEAST PROPERTY LINE

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=5.50"

Area (sf)	CN	Description
14,645	30	Woods, Good, HSG A
14,645		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
21.5	50	0.0200	0.04		**Sheet Flow, SHEET** Woods: Dense underbrush n= 0.800 P2= 3.20"
0.8	196	0.0715	4.31		**Shallow Concentrated Flow, SHALLOW CONC. FLOW** Unpaved Kv= 16.1 fps
22.3	246	Total			

Subcatchment 4S: Site (NORTH)



Summary for Subcatchment 5S: Corner at RTE. 44

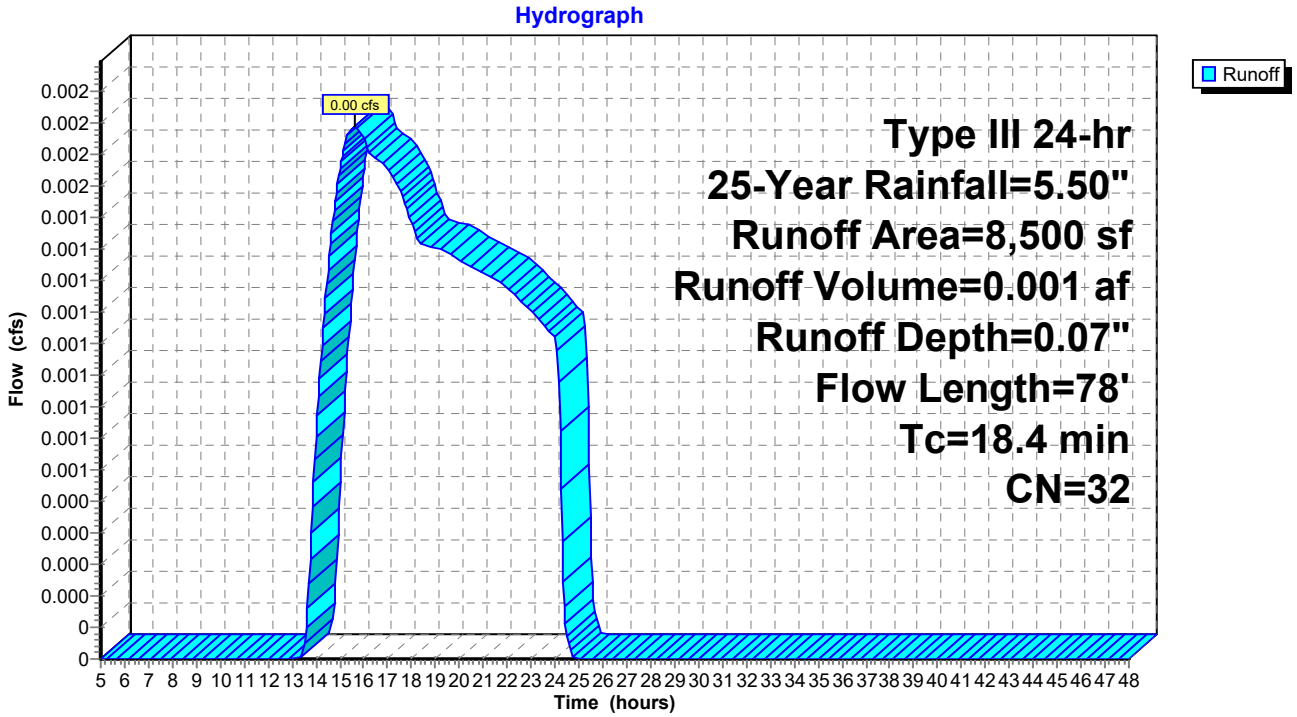
Runoff = 0.00 cfs @ 15.64 hrs, Volume= 0.001 af, Depth= 0.07"
Routed to Reach DP-2 : SPRING STREET/SOUTHWEST PROPERTY LINE

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=5.50"

Area (sf)	CN	Description
8,500	32	Woods/grass comb., Good, HSG A
8,500		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.3	50	0.0300	0.05		**Sheet Flow, SHEET** Woods: Dense underbrush n= 0.800 P2= 3.20"
0.1	28	0.0953	4.97		**Shallow Concentrated Flow, SHALLOW CONC. FLOW** Unpaved Kv= 16.1 fps
18.4	78	Total			

Subcatchment 5S: Corner at RTE. 44



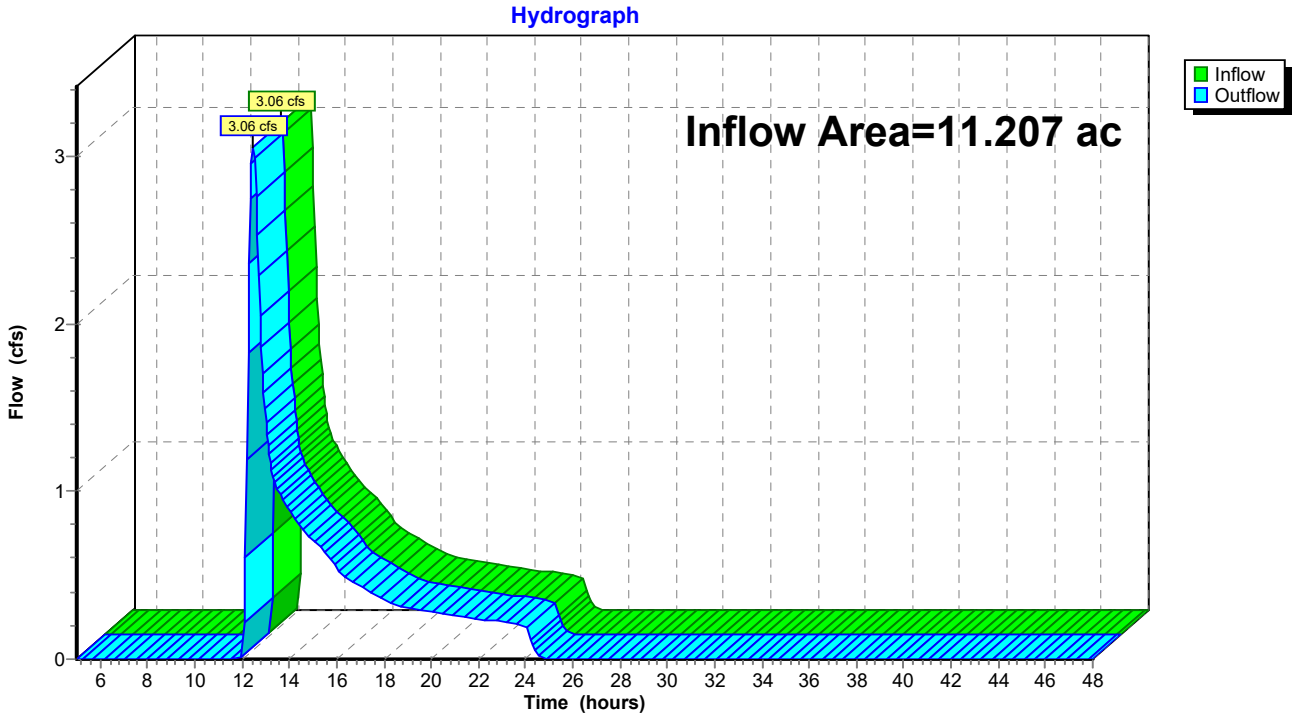
Summary for Reach DP-1: RICKETTS POND

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 11.207 ac, 0.00% Impervious, Inflow Depth = 0.61" for 25-Year event
Inflow = 3.06 cfs @ 12.47 hrs, Volume= 0.571 af
Outflow = 3.06 cfs @ 12.47 hrs, Volume= 0.571 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs

Reach DP-1: RICKETTS POND



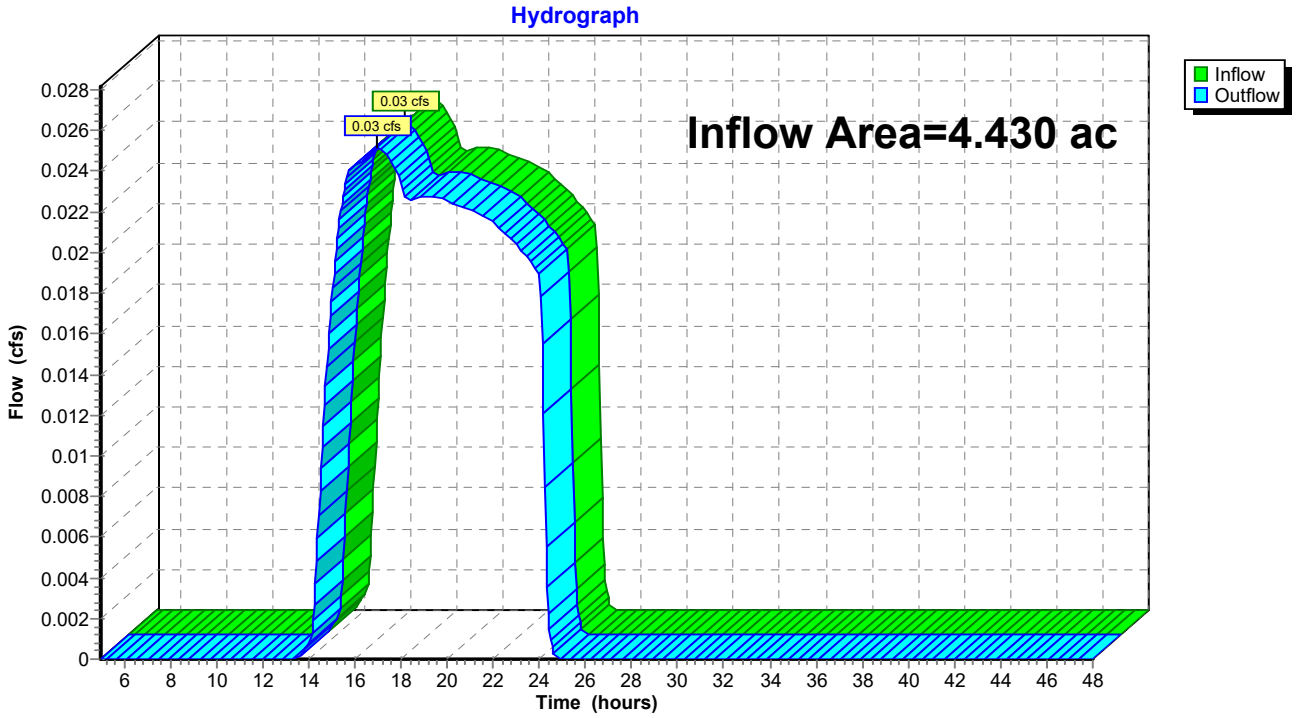
Summary for Reach DP-2: SPRING STREET/SOUTHWEST PROPERTY LINE

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 4.430 ac, 0.00% Impervious, Inflow Depth = 0.05" for 25-Year event
Inflow = 0.03 cfs @ 17.01 hrs, Volume= 0.018 af
Outflow = 0.03 cfs @ 17.01 hrs, Volume= 0.018 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs

Reach DP-2: SPRING STREET/SOUTHWEST PROPERTY LINE



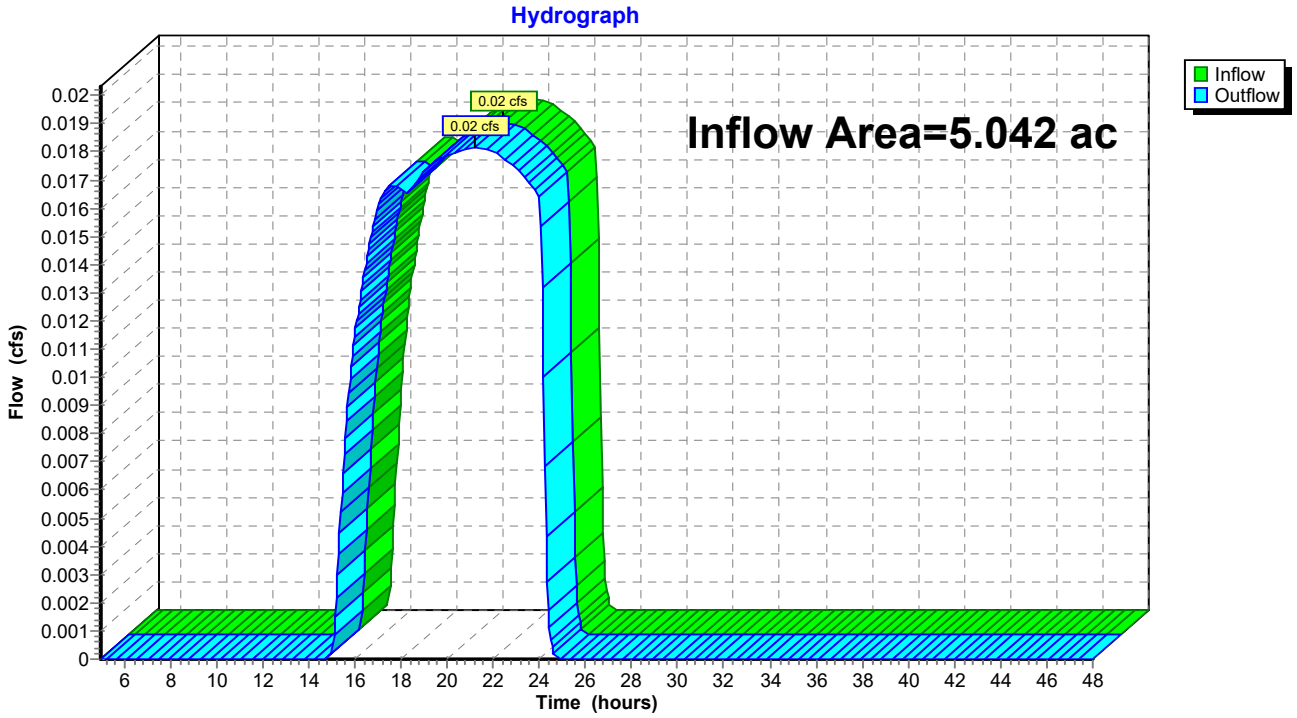
Summary for Reach DP-3: ROUTE 44/ WEST PROPERTY LINE

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 5.042 ac, 0.00% Impervious, Inflow Depth = 0.03" for 25-Year event
Inflow = 0.02 cfs @ 21.21 hrs, Volume= 0.012 af
Outflow = 0.02 cfs @ 21.21 hrs, Volume= 0.012 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs

Reach DP-3: ROUTE 44/ WEST PROPERTY LINE



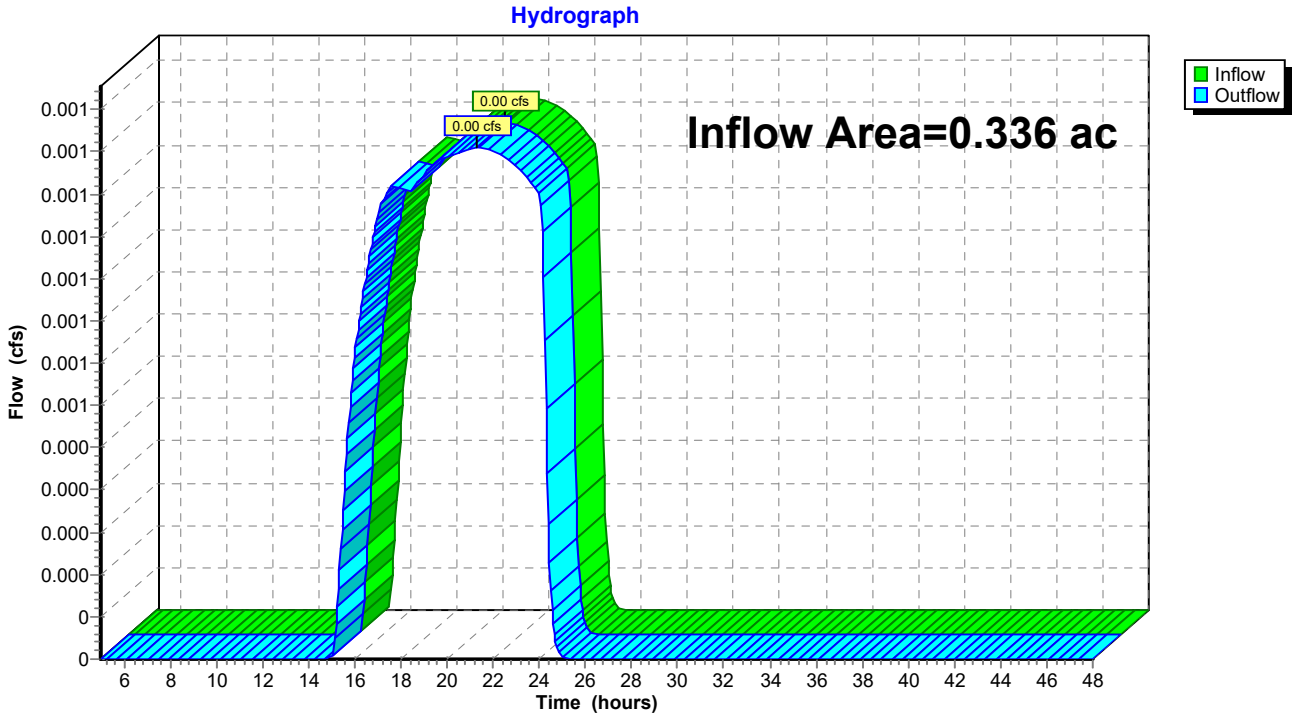
Summary for Reach DP-4: NORTHEAST PROPERTY LINE

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.336 ac, 0.00% Impervious, Inflow Depth = 0.03" for 25-Year event
Inflow = 0.00 cfs @ 21.32 hrs, Volume= 0.001 af
Outflow = 0.00 cfs @ 21.32 hrs, Volume= 0.001 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs

Reach DP-4: NORTHEAST PROPERTY LINE



Time span=5.00-48.00 hrs, dt=0.05 hrs, 861 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1S: Site (EAST) Runoff Area=488,162 sf 0.00% Impervious Runoff Depth=1.10"
Flow Length=1,757' Tc=20.3 min CN=45 Runoff=7.03 cfs 1.026 af

Subcatchment2S: Site (SOUTHWEST) Runoff Area=184,482 sf 0.00% Impervious Runoff Depth=0.21"
Flow Length=780' Tc=16.6 min CN=31 Runoff=0.12 cfs 0.073 af

Subcatchment3S: Site (WEST) Runoff Area=219,636 sf 0.00% Impervious Runoff Depth=0.16"
Flow Length=670' Tc=16.2 min CN=30 Runoff=0.11 cfs 0.068 af

Subcatchment4S: Site (NORTH) Runoff Area=14,645 sf 0.00% Impervious Runoff Depth=0.16"
Flow Length=246' Tc=22.3 min CN=30 Runoff=0.01 cfs 0.005 af

Subcatchment5S: Corner at RTE. 44 Runoff Area=8,500 sf 0.00% Impervious Runoff Depth=0.25"
Flow Length=78' Tc=18.4 min CN=32 Runoff=0.01 cfs 0.004 af

Reach DP-1: RICKETTS POND Inflow=7.03 cfs 1.026 af
Outflow=7.03 cfs 1.026 af

Reach DP-2: SPRING STREET/SOUTHWEST PROPERTY LINE Inflow=0.13 cfs 0.077 af
Outflow=0.13 cfs 0.077 af

Reach DP-3: ROUTE 44/ WEST PROPERTY LINE Inflow=0.11 cfs 0.068 af
Outflow=0.11 cfs 0.068 af

Reach DP-4: NORTHEAST PROPERTY LINE Inflow=0.01 cfs 0.005 af
Outflow=0.01 cfs 0.005 af

Total Runoff Area = 21.015 ac Runoff Volume = 1.176 af Average Runoff Depth = 0.67"
100.00% Pervious = 21.015 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment 1S: Site (EAST)

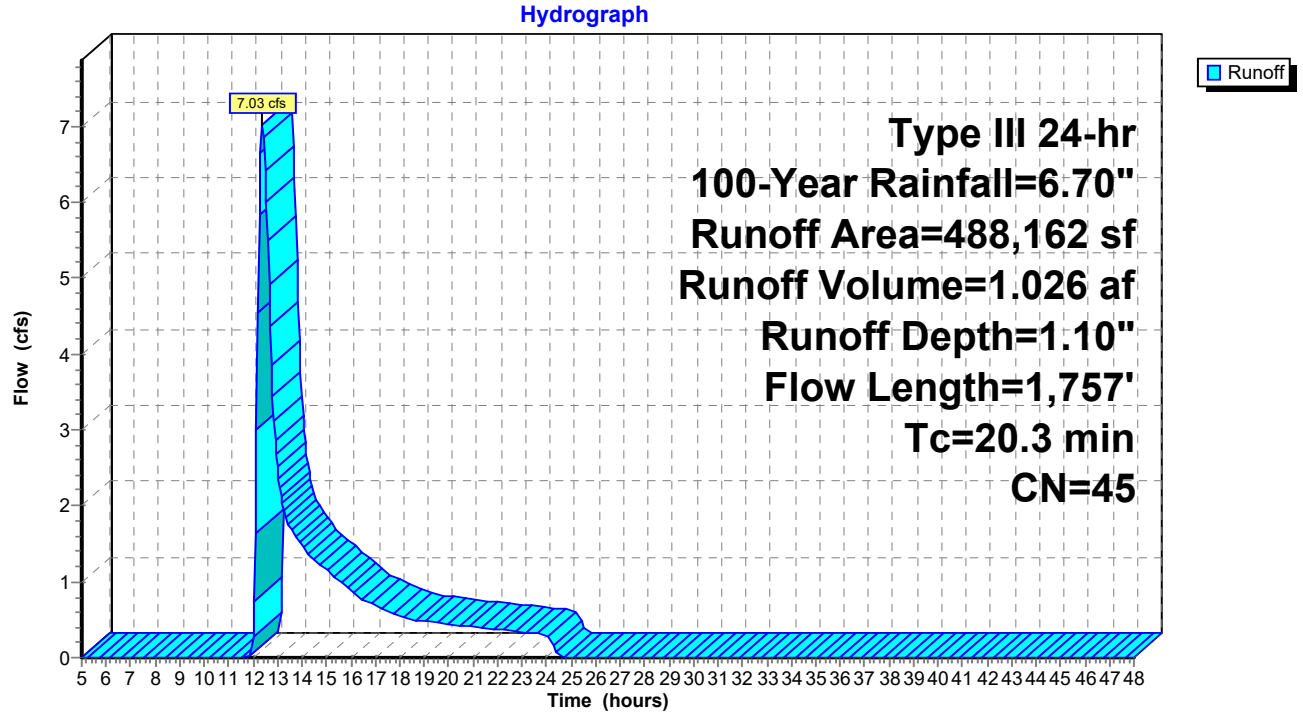
Runoff = 7.03 cfs @ 12.37 hrs, Volume= 1.026 af, Depth= 1.10"
Routed to Reach DP-1 : RICKETTS POND

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=6.70"

	Area (sf)	CN	Description
	239,646	30	Woods, Good, HSG A
	201	77	Woods, Good, HSG D
	96,161	32	Woods/grass comb., Good, HSG A
	25,665	79	Woods/grass comb., Good, HSG D
	1,227	96	Gravel surface, HSG A
*	125,262	77	Fallow, bare soil, HSG A, SAND
	488,162	45	Weighted Average
	488,162		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.9	50	0.0500	0.06		**Sheet Flow, SHEET** Woods: Dense underbrush n= 0.800 P2= 3.20"
5.4	1,707	0.1090	5.32		**Shallow Concentrated Flow, SHALLOW CONC. FLOW** Unpaved Kv= 16.1 fps
20.3	1,757	Total			

Subcatchment 1S: Site (EAST)



Summary for Subcatchment 2S: Site (SOUTHWEST)

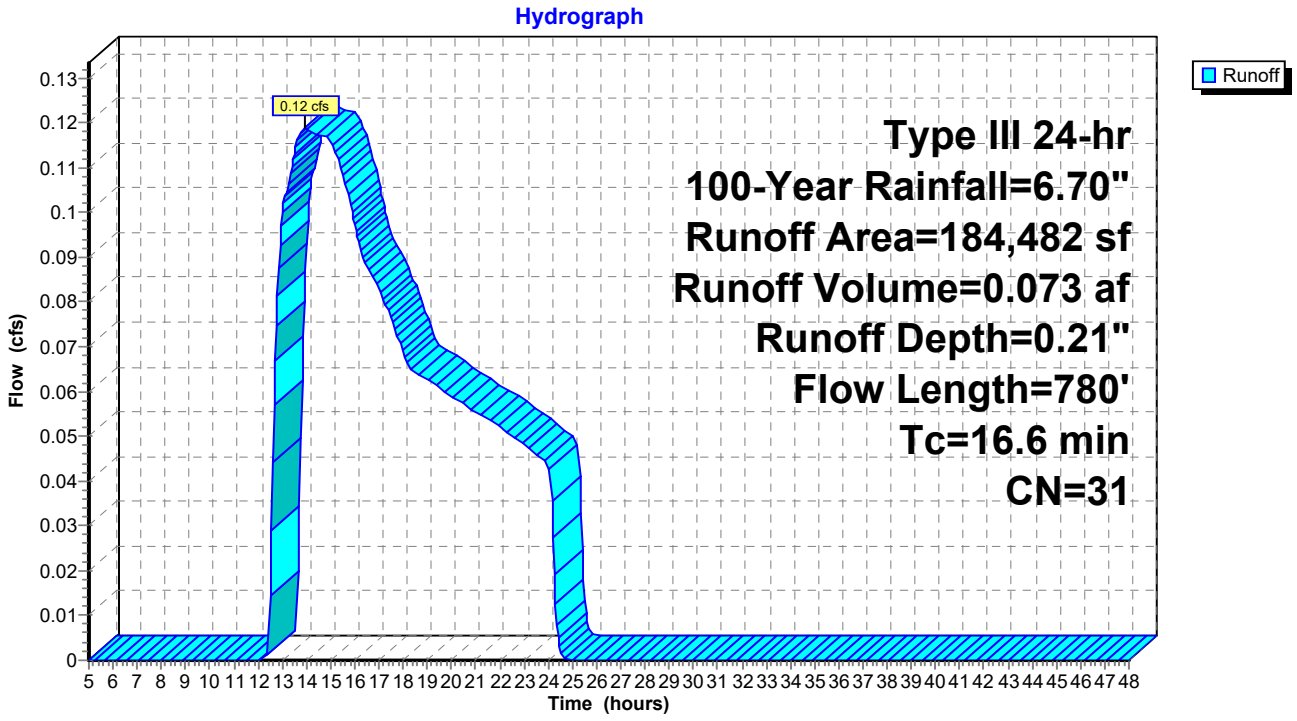
Runoff = 0.12 cfs @ 13.92 hrs, Volume= 0.073 af, Depth= 0.21"
Routed to Reach DP-2 : SPRING STREET/SOUTHWEST PROPERTY LINE

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=6.70"

	Area (sf)	CN	Description
	175,086	30	Woods, Good, HSG A
	6,042	32	Woods/grass comb., Good, HSG A
*	3,354	77	Fallow, bare soil, HSG A, SAND
	184,482	31	Weighted Average
	184,482		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.8	50	0.0600	0.06		**Sheet Flow, SHEET** Woods: Dense underbrush n= 0.800 P2= 3.20"
2.8	730	0.0750	4.41		**Shallow Concentrated Flow, SHALLOW CONC. FLOW** Unpaved Kv= 16.1 fps
16.6	780	Total			

Subcatchment 2S: Site (SOUTHWEST)



Summary for Subcatchment 3S: Site (WEST)

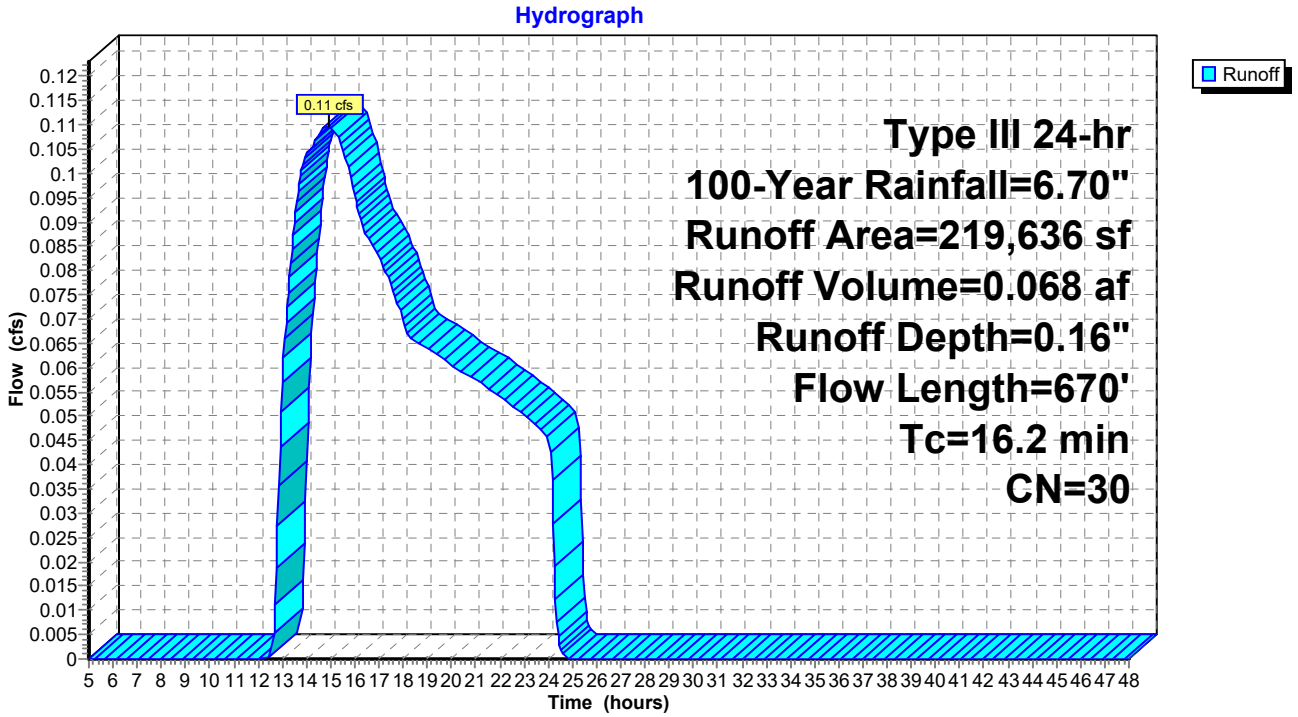
Runoff = 0.11 cfs @ 14.89 hrs, Volume= 0.068 af, Depth= 0.16"
Routed to Reach DP-3 : ROUTE 44/ WEST PROPERTY LINE

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=6.70"

Area (sf)	CN	Description
219,636	30	Woods, Good, HSG A
219,636		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.8	50	0.0600	0.06		**Sheet Flow, SHEET** Woods: Dense underbrush n= 0.800 P2= 3.20"
2.4	620	0.0693	4.24		**Shallow Concentrated Flow, SHALLOW CONC. FLOW** Unpaved Kv= 16.1 fps
16.2	670	Total			

Subcatchment 3S: Site (WEST)



Summary for Subcatchment 4S: Site (NORTH)

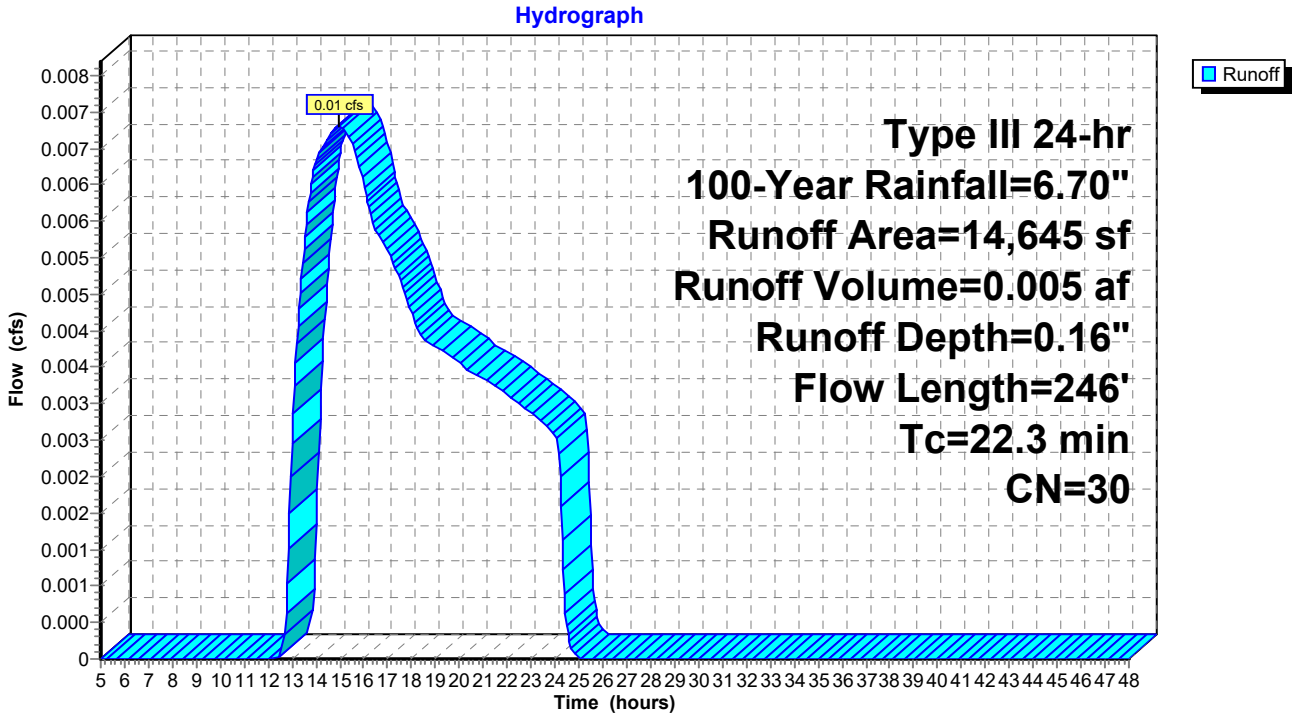
Runoff = 0.01 cfs @ 14.97 hrs, Volume= 0.005 af, Depth= 0.16"
Routed to Reach DP-4 : NORTHEAST PROPERTY LINE

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=6.70"

Area (sf)	CN	Description
14,645	30	Woods, Good, HSG A
14,645		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
21.5	50	0.0200	0.04		**Sheet Flow, SHEET** Woods: Dense underbrush n= 0.800 P2= 3.20"
0.8	196	0.0715	4.31		**Shallow Concentrated Flow, SHALLOW CONC. FLOW** Unpaved Kv= 16.1 fps
22.3	246	Total			

Subcatchment 4S: Site (NORTH)



Summary for Subcatchment 5S: Corner at RTE. 44

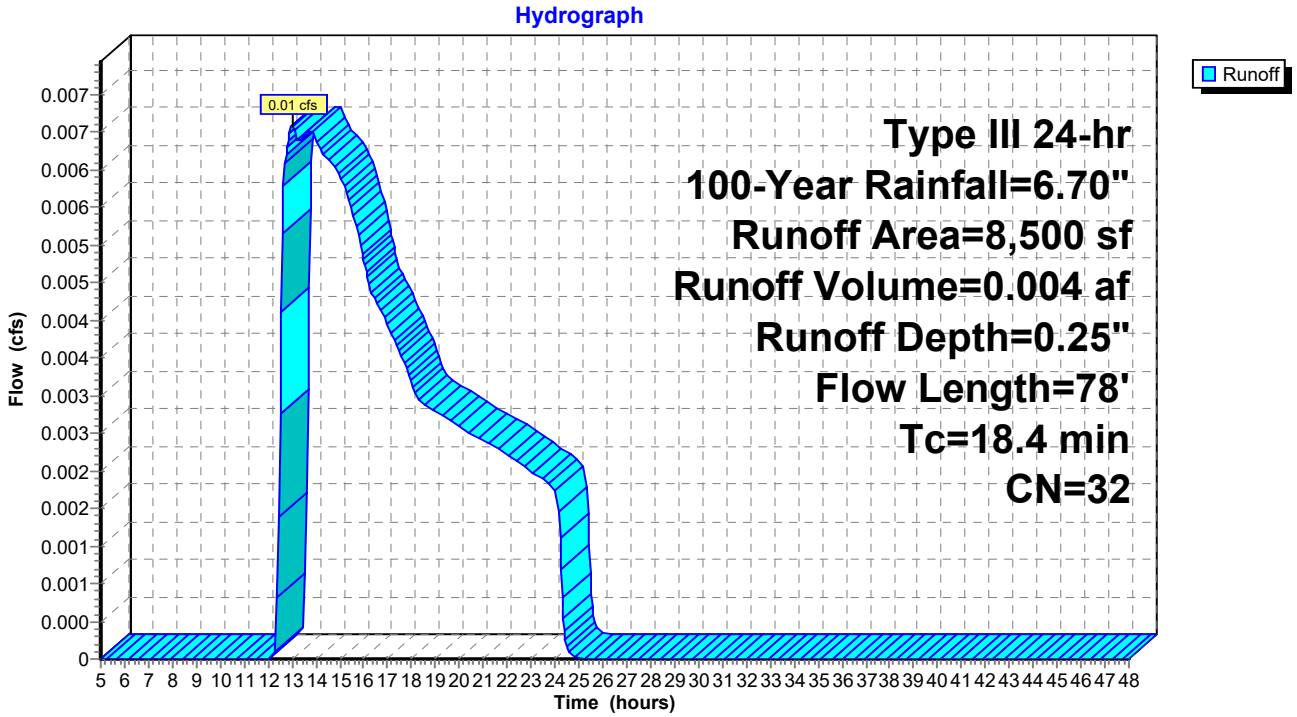
Runoff = 0.01 cfs @ 13.02 hrs, Volume= 0.004 af, Depth= 0.25"
Routed to Reach DP-2 : SPRING STREET/SOUTHWEST PROPERTY LINE

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=6.70"

Area (sf)	CN	Description
8,500	32	Woods/grass comb., Good, HSG A
8,500		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.3	50	0.0300	0.05		**Sheet Flow, SHEET** Woods: Dense underbrush n= 0.800 P2= 3.20"
0.1	28	0.0953	4.97		**Shallow Concentrated Flow, SHALLOW CONC. FLOW** Unpaved Kv= 16.1 fps
18.4	78	Total			

Subcatchment 5S: Corner at RTE. 44



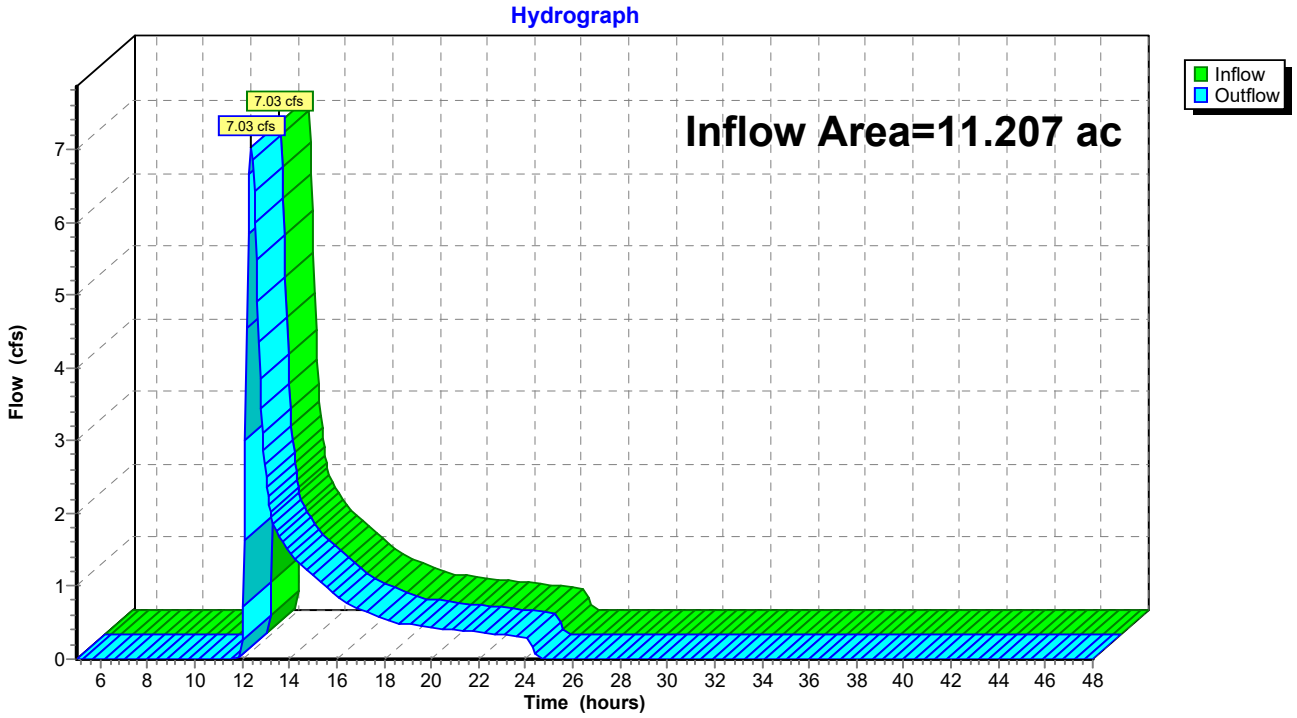
Summary for Reach DP-1: RICKETTS POND

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 11.207 ac, 0.00% Impervious, Inflow Depth = 1.10" for 100-Year event
Inflow = 7.03 cfs @ 12.37 hrs, Volume= 1.026 af
Outflow = 7.03 cfs @ 12.37 hrs, Volume= 1.026 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs

Reach DP-1: RICKETTS POND



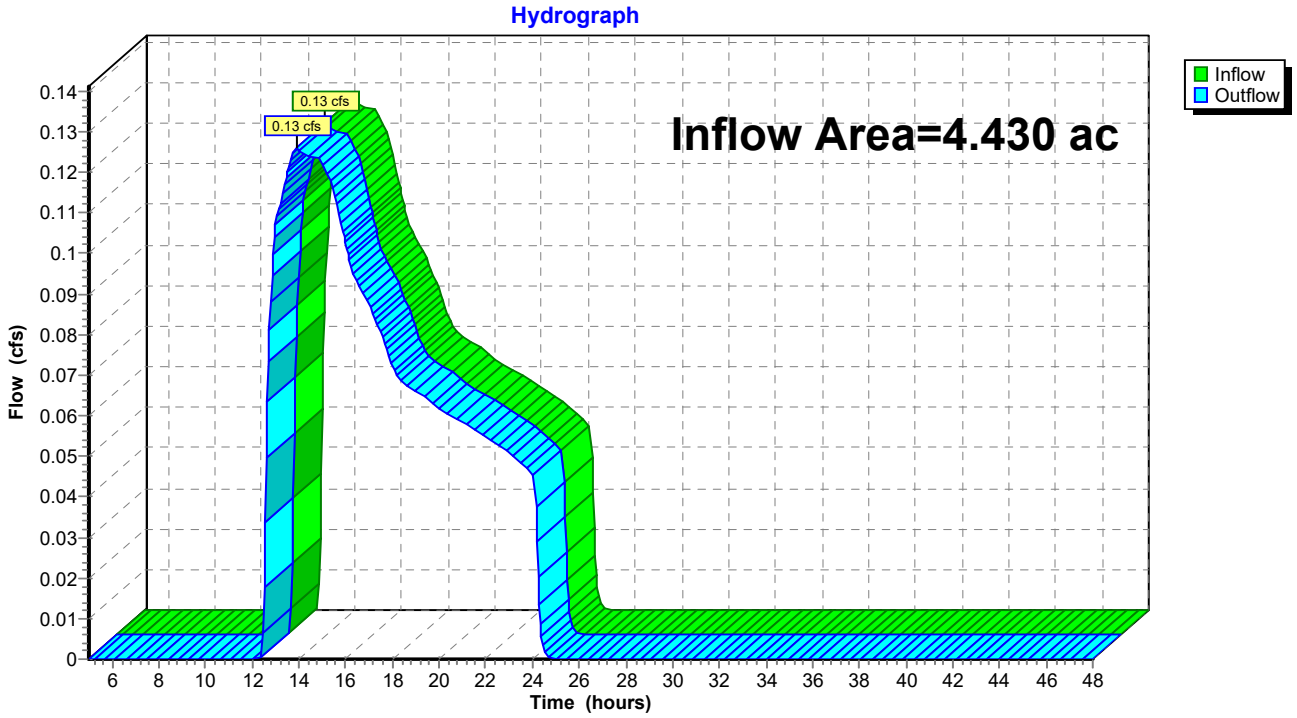
Summary for Reach DP-2: SPRING STREET/SOUTHWEST PROPERTY LINE

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 4.430 ac, 0.00% Impervious, Inflow Depth = 0.21" for 100-Year event
Inflow = 0.13 cfs @ 13.92 hrs, Volume= 0.077 af
Outflow = 0.13 cfs @ 13.92 hrs, Volume= 0.077 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs

Reach DP-2: SPRING STREET/SOUTHWEST PROPERTY LINE



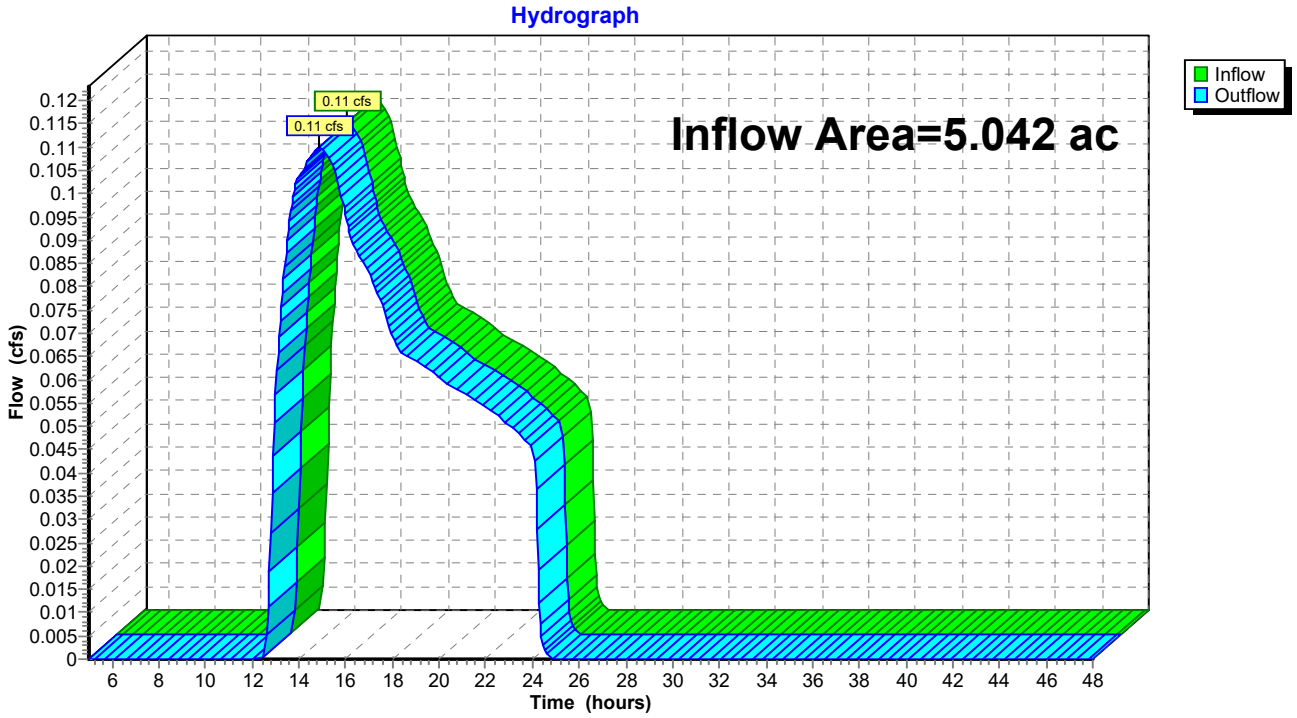
Summary for Reach DP-3: ROUTE 44/ WEST PROPERTY LINE

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 5.042 ac, 0.00% Impervious, Inflow Depth = 0.16" for 100-Year event
Inflow = 0.11 cfs @ 14.89 hrs, Volume= 0.068 af
Outflow = 0.11 cfs @ 14.89 hrs, Volume= 0.068 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs

Reach DP-3: ROUTE 44/ WEST PROPERTY LINE



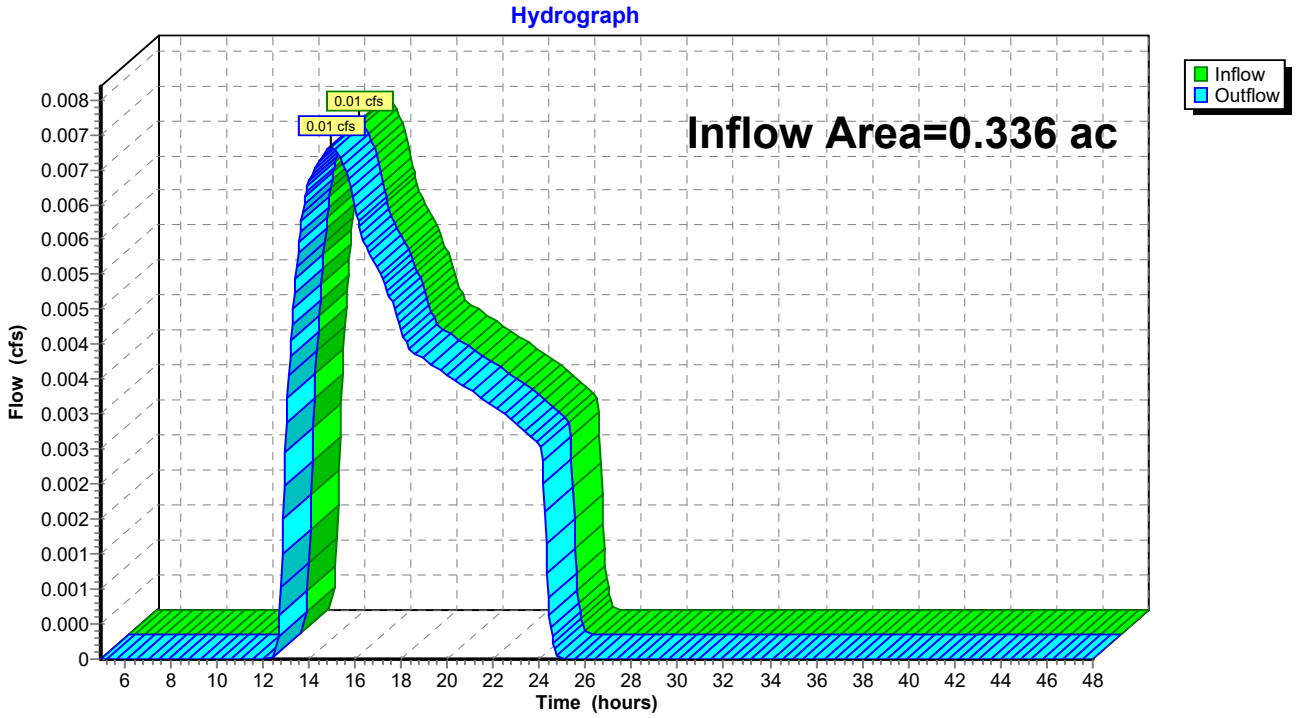
Summary for Reach DP-4: NORTHEAST PROPERTY LINE

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.336 ac, 0.00% Impervious, Inflow Depth = 0.16" for 100-Year event
Inflow = 0.01 cfs @ 14.97 hrs, Volume= 0.005 af
Outflow = 0.01 cfs @ 14.97 hrs, Volume= 0.005 af, Atten= 0%, Lag= 0.0 min

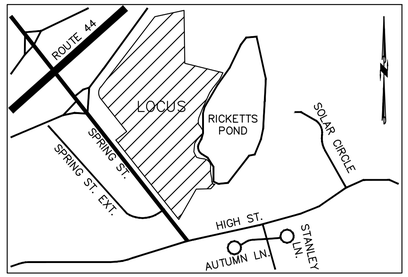
Routing by Stor-Ind+Trans method, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs

Reach DP-4: NORTHEAST PROPERTY LINE



A P P E N D I X B

Post-Development Condition



LOCUS MAP
1" = 800 FT.

STATE HIGHWAY ROUTE 44
(STATE HIGHWAY LAYOUT - 300' WIDE)

PLYMPTON CARVER

SPRING STREET

RICKETTS POND

ROAD A

DP-1 RICKETTS POND

DP-2 SPRING STREET

DP-3 ROUTE 44

DP-4 NORTHEAST PROPERTY LINE

1S 442,519 SF

2S 47,290 SF

3S 80,462 SF

4S 27,378 SF

5S 218,839 SF

1P BASIN 1

2P BASIN 2

PROP. OFFICE/WAREHOUSE BUILDING 7,000 S.F. SLAB EL=146.0

PROP. OFFICE/WAREHOUSE BUILDING #2 7,440 S.F. FFE=47.0

PROP. OFFICE/WAREHOUSE BUILDING 7,440 S.F. FFE=46.8

PROP. COMMERCIAL BUILDING 20,000 S.F. SLAB EL=145.0

PROP. OFFICE/WAREHOUSE BUILDING 7,000 S.F. SLAB EL=143.0 (NOT OBSERVED)

PROP. BUILDING NO. 2 (54' X 138') (SLAB EL=146.0)

PROP. BUILDING NO. 3 (54' X 138') (SLAB EL=146.0)

PROP. BUILDING NO. 1 (54' X 138') (SLAB EL=145.0)

PROP. COMMERCIAL BUILDING (SLAB EL=145.5) 7,452 S.F.

PROP. COMMERCIAL BUILDING (SLAB EL=142.0) 7,452 S.F.

255B

253C

53A

480E

480C

145.0x

LEGEND

- TIME OF CONCENTRATION FLOW PATH
- LIMIT OF WATERSHED
- SOIL TYPE BOUNDARY

SOIL KEY

SOIL CLASSIFICATION	DESCRIPTION	HYDROLOGIC SOIL GROUP
1	WATER	
53A	FREETOWN MUCK, PONDED, 0-1 PERCENT SLOPES	B/D
253C	HINCKLEY LOAMY SAND, 8-15 PERCENT SLOPES	A
480C	PLYMOUTH-CARVER COMPLEX, 8-15 PERCENT SLOPES	A
480E	PLYMOUTH-CARVER COMPLEX, 15-35 PERCENT SLOPES	A

REV	DATE	DESCRIPTION	BY
1	6/6/22	LOTS 1 & 2 REVISIONS	ESS BCM

MCKENZIE ENGINEERING GROUP
Assinippi Office Park
150 Longwater Drive, Suite 101
Norwell, MA 02061
P: 781.792.3900
F: 781.792.0333
www.mckeng.com

PROPOSED COMMERCIAL DEVELOPMENT
RICKETTS POND BUSINESS PARK

OFF SPRING STREET
CARVER, MASSACHUSETTS

PROFESSIONAL ENGINEER:

PERMIT PLAN SET

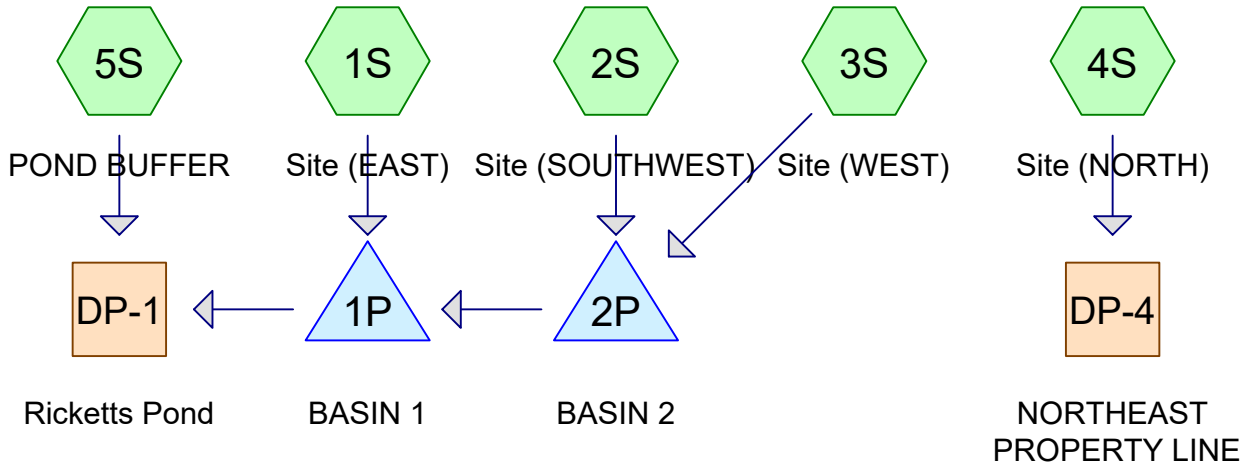
OWNER/APPLICANT:
RPBP, LLC
3 MARION DRIVE
CARVER, MA 02330

DRAWN BY:	ESS
DESIGNED BY:	ESS
CHECKED BY:	BCM
APPROVED BY:	BCM
DATE:	FEBRUARY 25, 2022
SCALE:	1"=60'
PROJECT NO.:	217-182

DWG. TITLE:
POST-DEV. WATERSHED PLAN

DWG. NO:
WS-2

M:\MEG\2017 PROJECTS\217-182 (SLT CARVER)\RESEARCH\SLT\INDIVIDUAL LOT DEVELOPMENT\217-182 COMPILED LOTS2.DWG



Subcat Reach Pond Link

Routing Diagram for 217-182 Post Development_COMPILED
Prepared by McKenzie Engineering Group, Inc., Printed 5/31/2022

Rainfall Events Listing

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	2-Year	Type III 24-hr		Default	24.00	1	3.20	2
2	10-Year	Type III 24-hr		Default	24.00	1	4.70	2
3	25-Year	Type III 24-hr		Default	24.00	1	5.50	2
4	100-Year	Type III 24-hr		Default	24.00	1	6.70	2

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
7.759	39	>75% Grass cover, Good, HSG A (1S, 2S, 3S, 4S)
6.103	98	Paved parking, HSG A (1S, 2S, 3S, 4S)
2.177	98	Roofs, HSG A (1S, 2S, 3S)
4.430	32	Woods/grass comb., Good, HSG A (5S)
0.594	79	Woods/grass comb., Good, HSG D (5S)
21.063	**62**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
20.468	HSG A	1S, 2S, 3S, 4S, 5S
0.000	HSG B	
0.000	HSG C	
0.594	HSG D	5S
0.000	Other	
21.063		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
7.759	0.000	0.000	0.000	0.000	7.759	>75% Grass cover, Good	1S, 2S, 3S, 4S
6.103	0.000	0.000	0.000	0.000	6.103	Paved parking	1S, 2S, 3S, 4S
2.177	0.000	0.000	0.000	0.000	2.177	Roofs	1S, 2S, 3S
4.430	0.000	0.000	0.594	0.000	5.024	Woods/grass comb., Good	5S
20.468	**0.000**	**0.000**	**0.594**	**0.000**	**21.063**	**TOTAL AREA**	

Pipe Listing (all nodes)

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Width (inches)	Diam/Height (inches)	Inside-Fill (inches)
1	2P	138.50	137.50	100.0	0.0100	0.013	0.0	15.0	0.0

Time span=5.00-48.00 hrs, dt=0.05 hrs, 861 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1S: Site (EAST) Runoff Area=443,519 sf 54.10% Impervious Runoff Depth=0.88"
Flow Length=636' Tc=8.2 min CN=71 Runoff=8.61 cfs 0.745 af

Subcatchment2S: Site (SOUTHWEST) Runoff Area=147,290 sf 50.97% Impervious Runoff Depth=0.78"
Flow Length=318' Tc=6.9 min CN=69 Runoff=2.59 cfs 0.220 af

Subcatchment3S: Site (WEST) Runoff Area=80,462 sf 53.04% Impervious Runoff Depth=0.83"
Tc=6.0 min CN=70 Runoff=1.58 cfs 0.127 af

Subcatchment4S: Site (NORTH) Runoff Area=27,376 sf 10.93% Impervious Runoff Depth=0.04"
Tc=6.0 min CN=45 Runoff=0.00 cfs 0.002 af

Subcatchment5S: POND BUFFER Runoff Area=218,839 sf 0.00% Impervious Runoff Depth=0.00"
Flow Length=375' Tc=29.2 min CN=38 Runoff=0.00 cfs 0.000 af

Reach DP-1: Ricketts Pond Inflow=0.00 cfs 0.000 af
Outflow=0.00 cfs 0.000 af

Reach DP-4: NORTHEAST PROPERTY LINE Inflow=0.00 cfs 0.002 af
Outflow=0.00 cfs 0.002 af

Pond 1P: BASIN 1 Peak Elev=134.70' Storage=12,135 cf Inflow=8.61 cfs 0.745 af
Discarded=0.94 cfs 0.745 af Primary=0.00 cfs 0.000 af Outflow=0.94 cfs 0.745 af

Pond 2P: BASIN 2 Peak Elev=135.21' Storage=7,182 cf Inflow=4.16 cfs 0.347 af
Discarded=0.27 cfs 0.347 af Primary=0.00 cfs 0.000 af Outflow=0.27 cfs 0.347 af

Total Runoff Area = 21.063 ac Runoff Volume = 1.094 af Average Runoff Depth = 0.62"
60.69% Pervious = 12.782 ac 39.31% Impervious = 8.280 ac

Summary for Subcatchment 1S: Site (EAST)

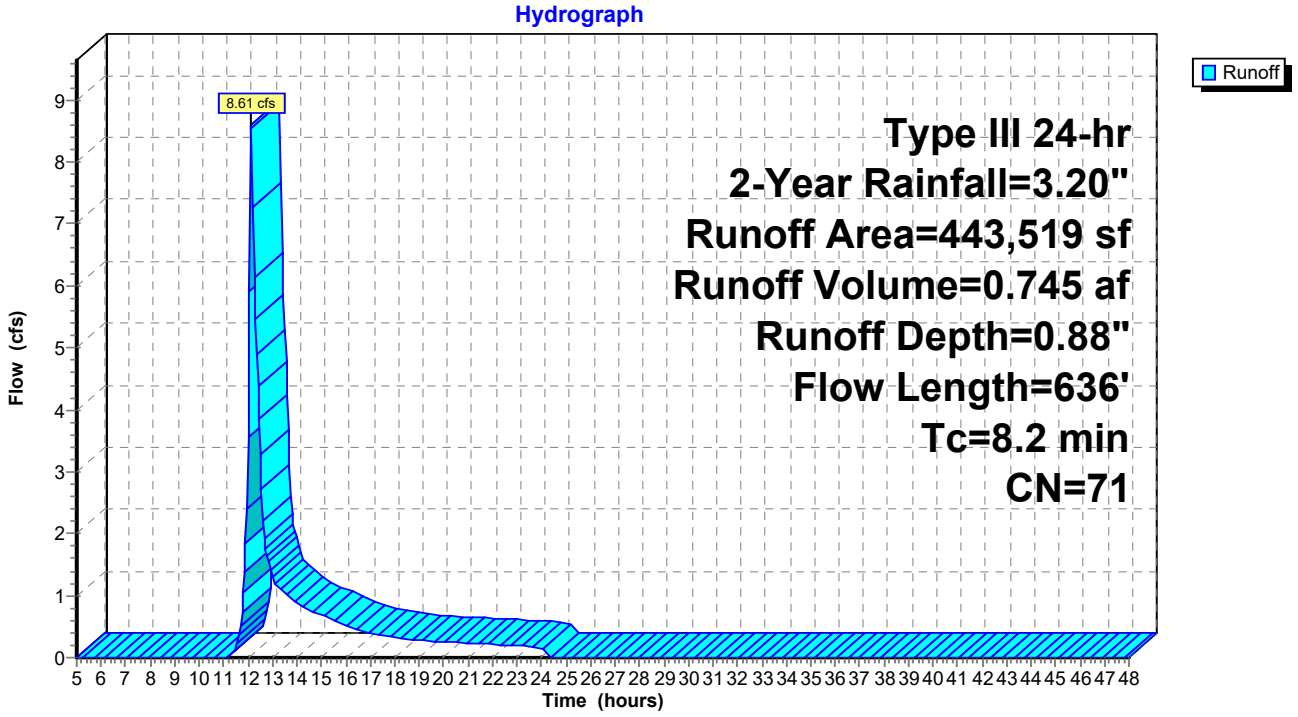
Runoff = 8.61 cfs @ 12.13 hrs, Volume= 0.745 af, Depth= 0.88"
Routed to Pond 1P : BASIN 1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.20"

Area (sf)	CN	Description
58,376	98	Roofs, HSG A
181,566	98	Paved parking, HSG A
203,577	39	>75% Grass cover, Good, HSG A
443,519	71	Weighted Average
203,577		45.90% Pervious Area
239,942		54.10% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.2	50	0.3000	0.20		**Sheet Flow, SHEET** Woods: Light underbrush n= 0.400 P2= 3.20"
1.6	305	0.0400	3.22		**Shallow Concentrated Flow, SHALLOW CONC. FLOW** Unpaved Kv= 16.1 fps
2.4	281	0.0090	1.93		**Shallow Concentrated Flow, SHALLOW CONC. FLOW2** Paved Kv= 20.3 fps
8.2	636	Total			

Subcatchment 1S: Site (EAST)



Summary for Subcatchment 2S: Site (SOUTHWEST)

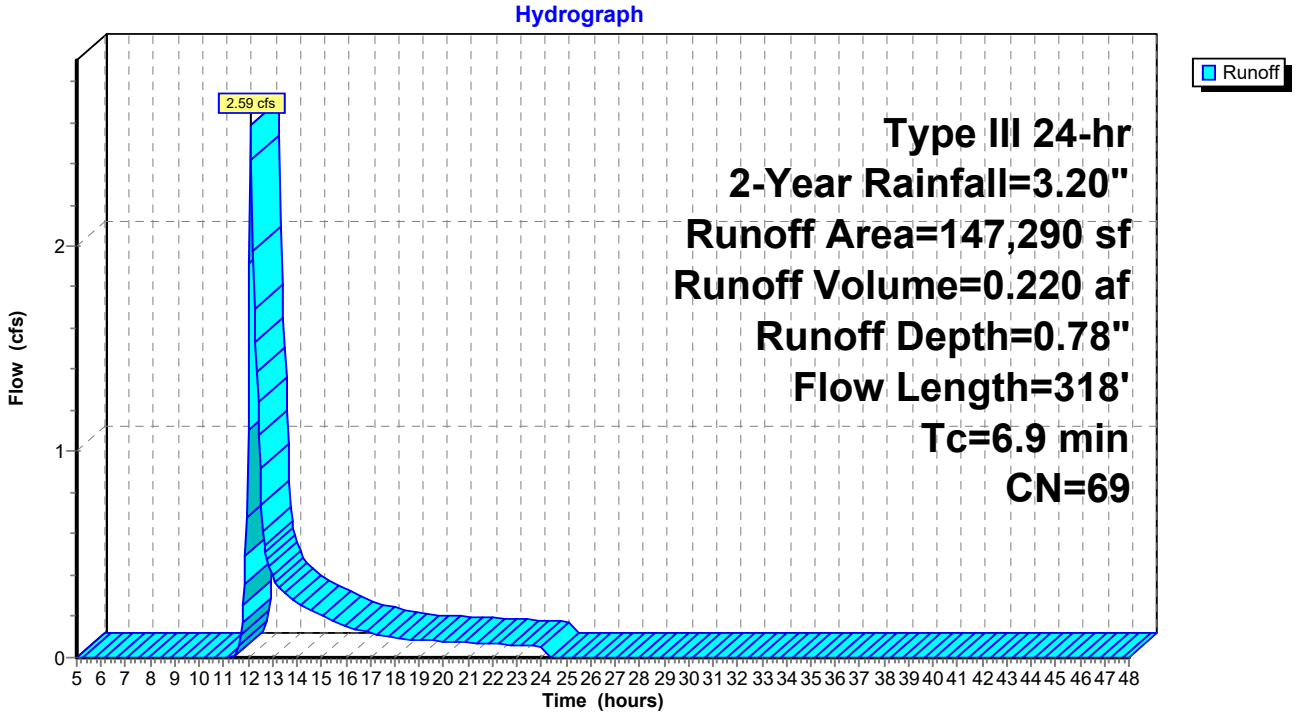
Runoff = 2.59 cfs @ 12.12 hrs, Volume= 0.220 af, Depth= 0.78"
Routed to Pond 2P : BASIN 2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.20"

Area (sf)	CN	Description
25,300	98	Roofs, HSG A
49,771	98	Paved parking, HSG A
72,219	39	>75% Grass cover, Good, HSG A
147,290	69	Weighted Average
72,219		49.03% Pervious Area
75,071		50.97% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.7	50	0.2200	0.18		**Sheet Flow, SHEET** Woods: Light underbrush n= 0.400 P2= 3.20"
0.6	98	0.0300	2.79		**Shallow Concentrated Flow, SHALLOW CONC. FLOW** Unpaved Kv= 16.1 fps
1.6	170	0.0080	1.82		**Shallow Concentrated Flow, SHALLOW CONC. FLOW2** Paved Kv= 20.3 fps
6.9	318	Total			

Subcatchment 2S: Site (SOUTHWEST)



Summary for Subcatchment 3S: Site (WEST)

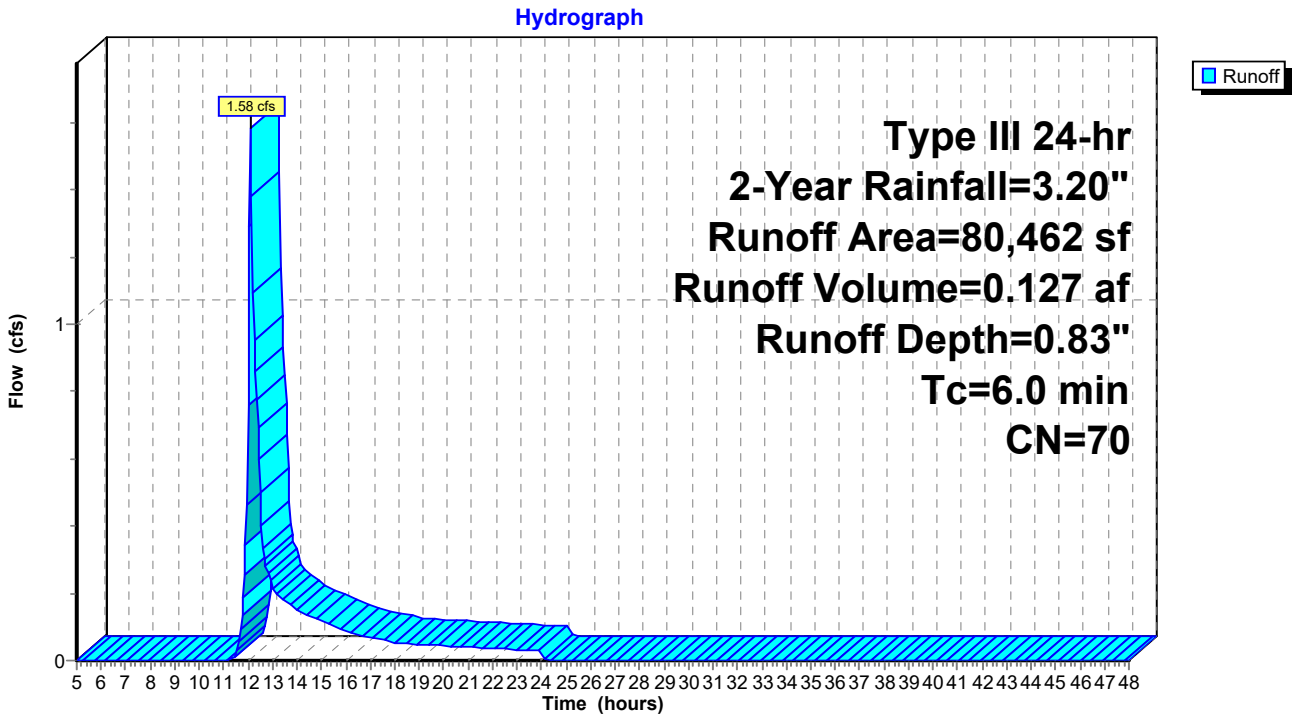
Runoff = 1.58 cfs @ 12.10 hrs, Volume= 0.127 af, Depth= 0.83"
Routed to Pond 2P : BASIN 2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.20"

Area (sf)	CN	Description
11,160	98	Roofs, HSG A
31,520	98	Paved parking, HSG A
37,782	39	>75% Grass cover, Good, HSG A
80,462	70	Weighted Average
37,782		46.96% Pervious Area
42,680		53.04% Impervious Area

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

Subcatchment 3S: Site (WEST)



Summary for Subcatchment 4S: Site (NORTH)

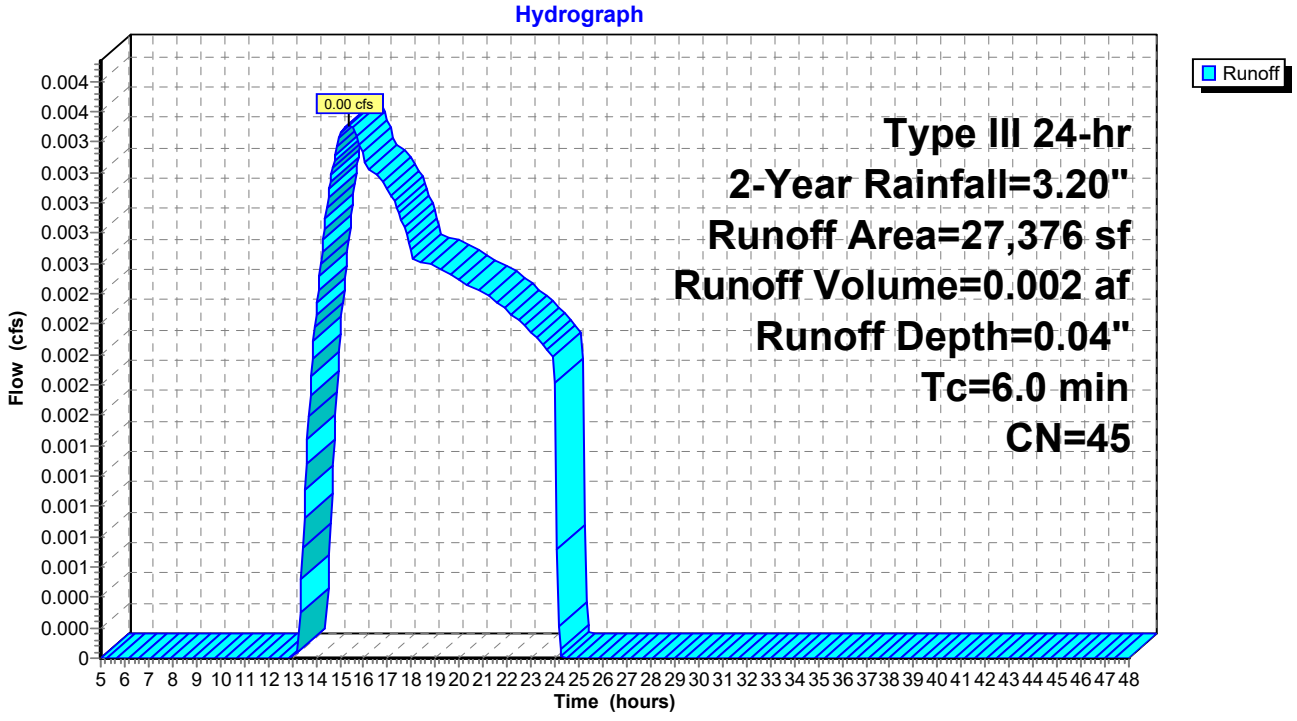
Runoff = 0.00 cfs @ 15.35 hrs, Volume= 0.002 af, Depth= 0.04"
Routed to Reach DP-4 : NORTHEAST PROPERTY LINE

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.20"

Area (sf)	CN	Description
2,991	98	Paved parking, HSG A
24,385	39	>75% Grass cover, Good, HSG A
27,376	45	Weighted Average
24,385		89.07% Pervious Area
2,991		10.93% Impervious Area

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

Subcatchment 4S: Site (NORTH)



Summary for Subcatchment 5S: POND BUFFER

[45] Hint: Runoff=Zero

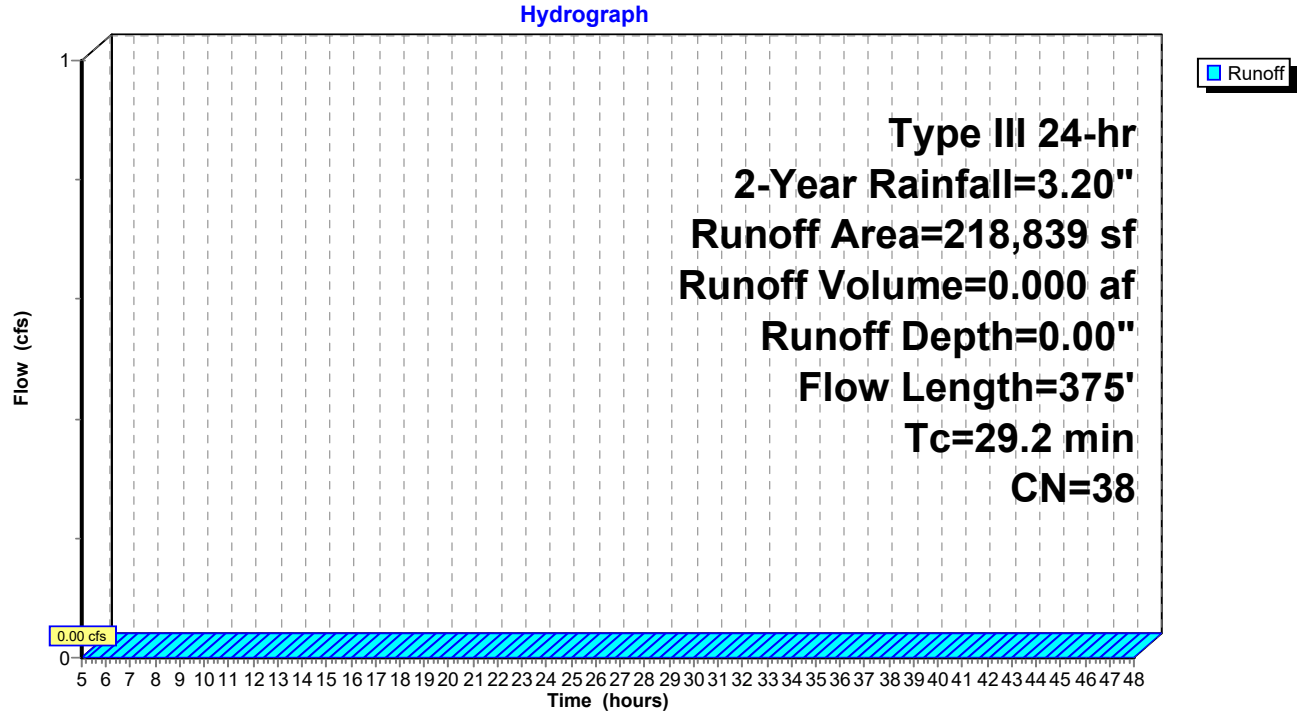
Runoff = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af, Depth= 0.00"
Routed to Reach DP-1 : Ricketts Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.20"

Area (sf)	CN	Description
25,887	79	Woods/grass comb., Good, HSG D
192,952	32	Woods/grass comb., Good, HSG A
218,839	38	Weighted Average
218,839		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
28.3	50	0.0100	0.03		**Sheet Flow, SHEET** Woods: Dense underbrush n= 0.800 P2= 3.20"
0.9	325	0.1300	5.80		**Shallow Concentrated Flow, SHALLOW CONC. FLOW** Unpaved Kv= 16.1 fps
29.2	375	Total			

Subcatchment 5S: POND BUFFER



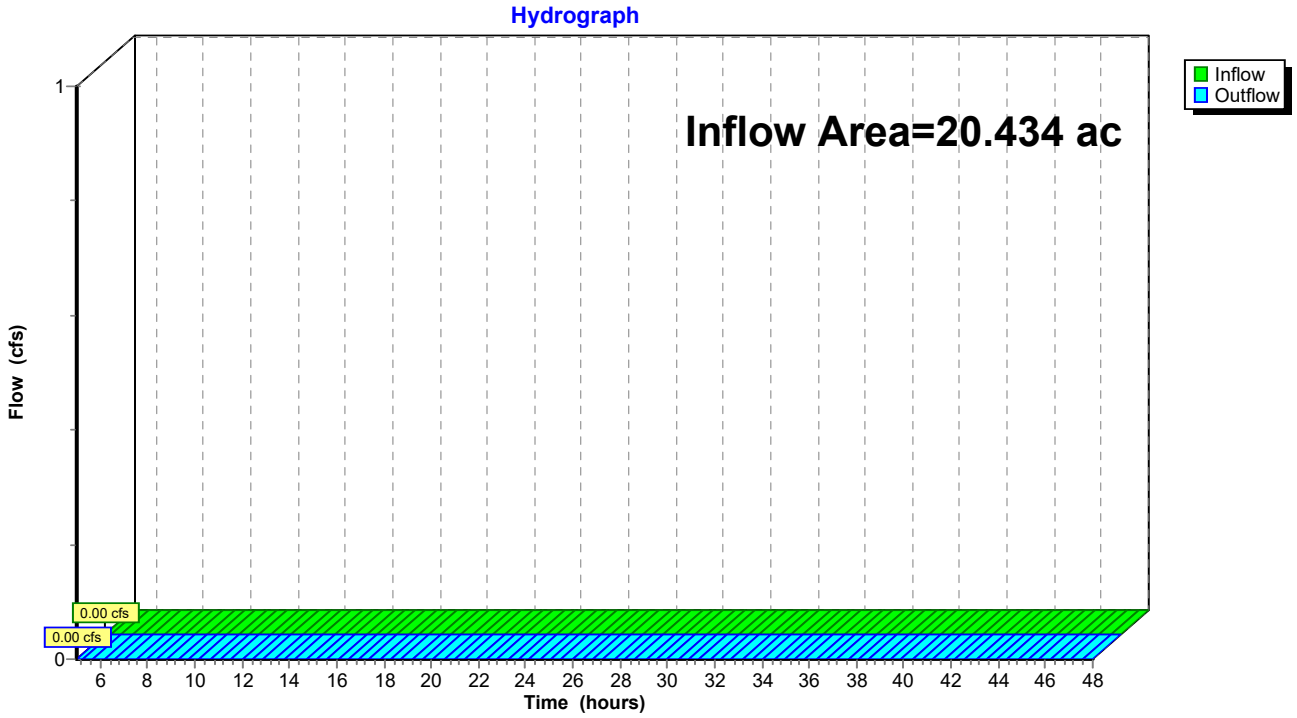
Summary for Reach DP-1: Ricketts Pond

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 20.434 ac, 40.19% Impervious, Inflow Depth = 0.00" for 2-Year event
Inflow = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs

Reach DP-1: Ricketts Pond



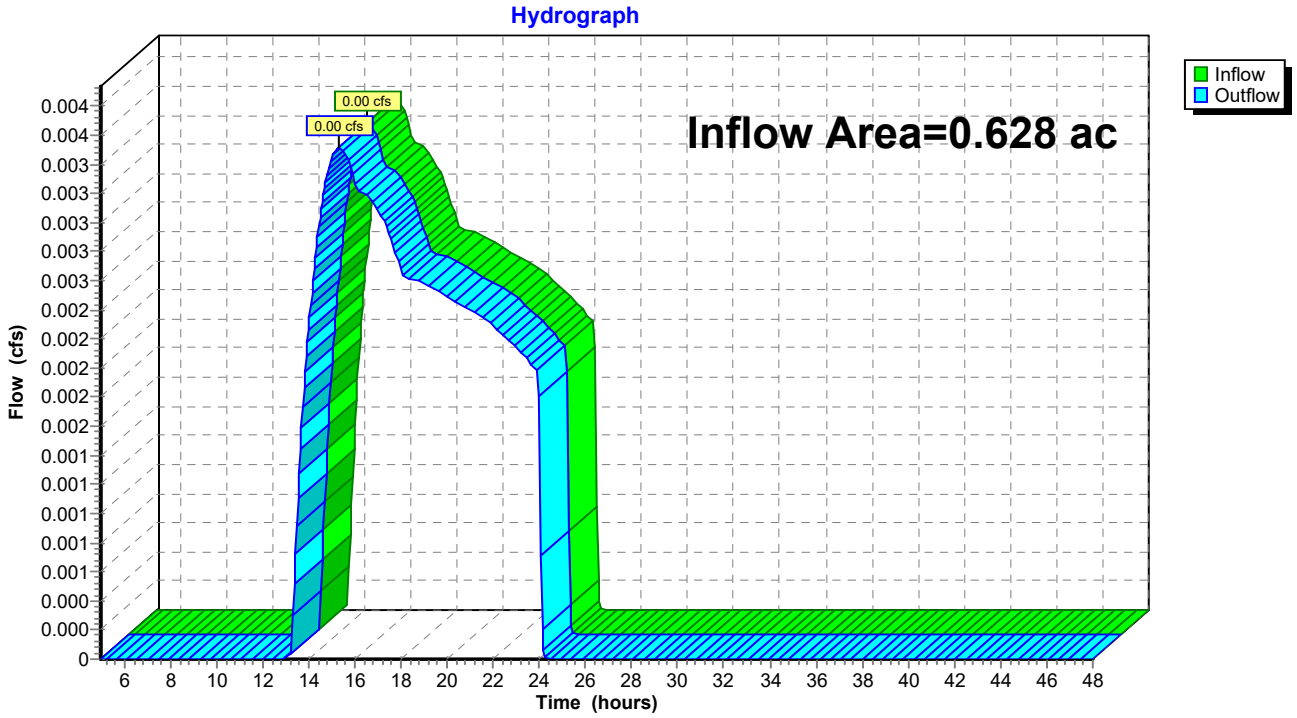
Summary for Reach DP-4: NORTHEAST PROPERTY LINE

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.628 ac, 10.93% Impervious, Inflow Depth = 0.04" for 2-Year event
Inflow = 0.00 cfs @ 15.35 hrs, Volume= 0.002 af
Outflow = 0.00 cfs @ 15.35 hrs, Volume= 0.002 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs

Reach DP-4: NORTHEAST PROPERTY LINE



Summary for Pond 1P: BASIN 1

Inflow Area = 15.410 ac, 53.29% Impervious, Inflow Depth = 0.58" for 2-Year event
Inflow = 8.61 cfs @ 12.13 hrs, Volume= 0.745 af
Outflow = 0.94 cfs @ 12.00 hrs, Volume= 0.745 af, Atten= 89%, Lag= 0.0 min
Discarded = 0.94 cfs @ 12.00 hrs, Volume= 0.745 af
Primary = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af
Routed to Reach DP-1 : Ricketts Pond

Routing by Stor-Ind method, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 134.70' @ 13.81 hrs Surf.Area= 17,829 sf Storage= 12,135 cf

Plug-Flow detention time= 129.7 min calculated for 0.745 af (100% of inflow)
Center-of-Mass det. time= 129.4 min (1,003.7 - 874.2)

Volume	Invert	Avail.Storage	Storage Description
#1	134.00'	146,199 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

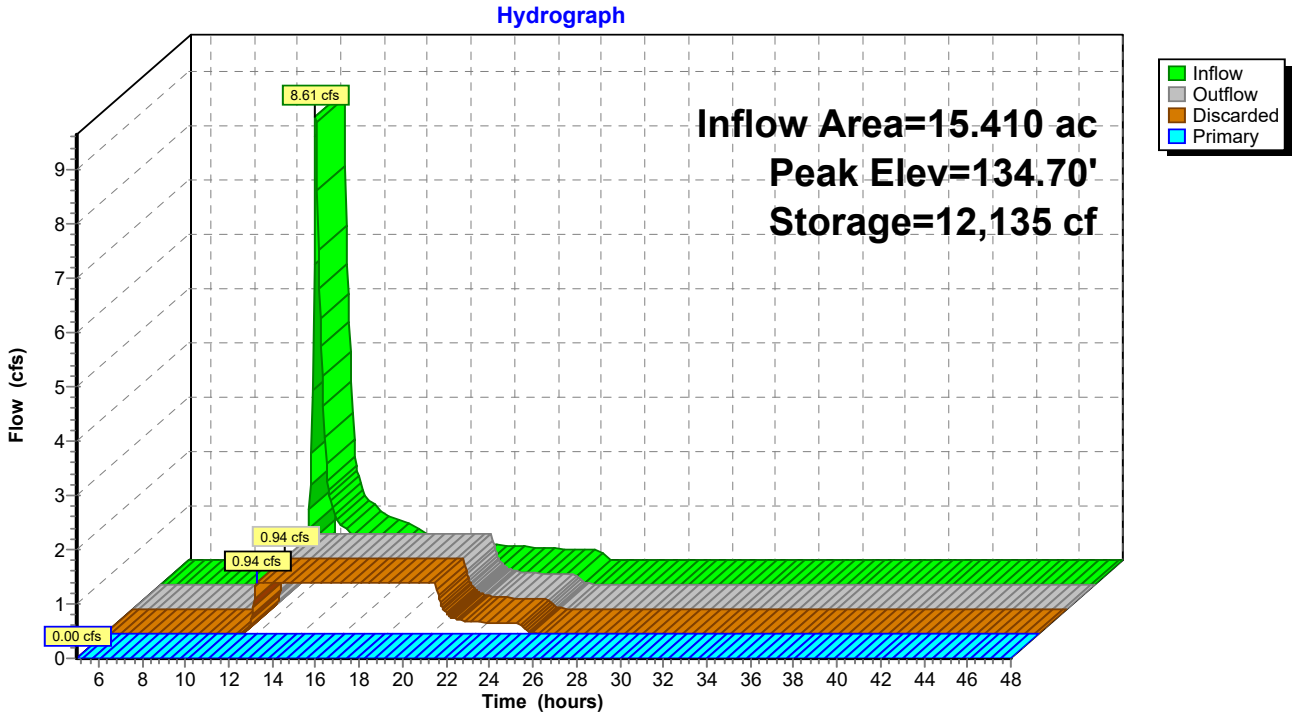
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
134.00	16,836	0	0
135.00	18,254	17,545	17,545
135.01	21,121	197	17,742
136.00	22,883	21,782	39,524
137.00	24,726	23,805	63,328
138.00	26,626	25,676	89,004
139.00	28,583	27,605	116,609
140.00	30,597	29,590	146,199

Device	Routing	Invert	Outlet Devices
#1	Discarded	134.00'	**0.94 cfs Exfiltration at all elevations**
#2	Primary	138.60'	**10.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Discarded OutFlow Max=0.94 cfs @ 12.00 hrs HW=134.08' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 0.94 cfs)

Primary OutFlow Max=0.00 cfs @ 5.00 hrs HW=134.00' (Free Discharge)
↑**2=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 1P: BASIN 1



Summary for Pond 2P: BASIN 2

Inflow Area = 5.228 ac, 51.70% Impervious, Inflow Depth = 0.80" for 2-Year event
Inflow = 4.16 cfs @ 12.11 hrs, Volume= 0.347 af
Outflow = 0.27 cfs @ 11.95 hrs, Volume= 0.347 af, Atten= 94%, Lag= 0.0 min
Discarded = 0.27 cfs @ 11.95 hrs, Volume= 0.347 af
Primary = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af
Routed to Pond 1P : BASIN 1

Routing by Stor-Ind method, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 135.21' @ 15.65 hrs Surf.Area= 7,817 sf Storage= 7,182 cf

Plug-Flow detention time= 295.4 min calculated for 0.347 af (100% of inflow)
Center-of-Mass det. time= 295.1 min (1,173.7 - 878.6)

Volume	Invert	Avail.Storage	Storage Description
#1	134.00'	63,393 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

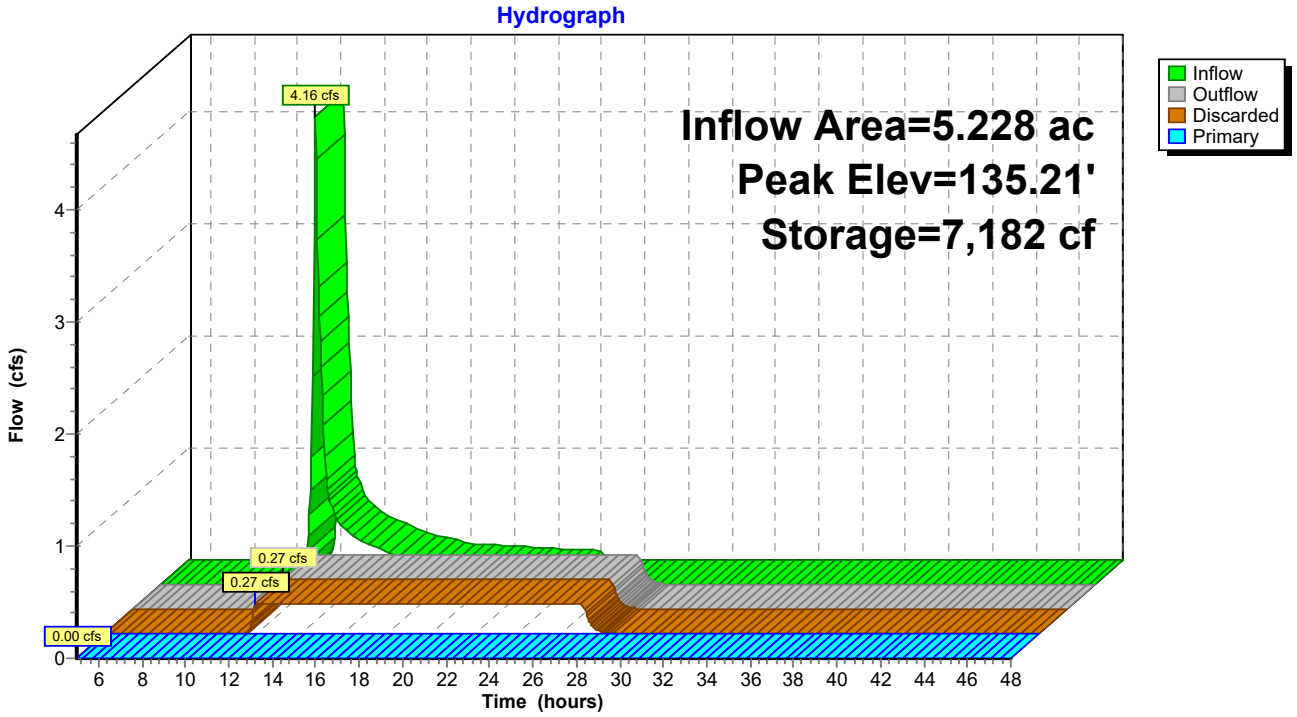
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
134.00	4,914	0	0
135.00	6,275	5,595	5,595
135.01	7,540	69	5,664
136.00	8,924	8,150	13,813
137.00	10,604	9,764	23,577
138.00	12,350	11,477	35,054
139.00	14,156	13,253	48,307
140.00	16,016	15,086	63,393

Device	Routing	Invert	Outlet Devices
#1	Discarded	134.00'	**0.27 cfs Exfiltration at all elevations**
#2	Primary	138.50'	**15.0" Round Culvert** L= 100.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 138.50' / 137.50' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf

Discarded OutFlow Max=0.27 cfs @ 11.95 hrs HW=134.09' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.27 cfs)

Primary OutFlow Max=0.00 cfs @ 5.00 hrs HW=134.00' (Free Discharge)
2=Culvert (Controls 0.00 cfs)

Pond 2P: BASIN 2



Time span=5.00-48.00 hrs, dt=0.05 hrs, 861 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1S: Site (EAST) Runoff Area=443,519 sf 54.10% Impervious Runoff Depth=1.89"
Flow Length=636' Tc=8.2 min CN=71 Runoff=20.21 cfs 1.606 af

Subcatchment2S: Site (SOUTHWEST) Runoff Area=147,290 sf 50.97% Impervious Runoff Depth=1.74"
Flow Length=318' Tc=6.9 min CN=69 Runoff=6.41 cfs 0.491 af

Subcatchment3S: Site (WEST) Runoff Area=80,462 sf 53.04% Impervious Runoff Depth=1.82"
Tc=6.0 min CN=70 Runoff=3.77 cfs 0.280 af

Subcatchment4S: Site (NORTH) Runoff Area=27,376 sf 10.93% Impervious Runoff Depth=0.35"
Tc=6.0 min CN=45 Runoff=0.09 cfs 0.018 af

Subcatchment5S: POND BUFFER Runoff Area=218,839 sf 0.00% Impervious Runoff Depth=0.12"
Flow Length=375' Tc=29.2 min CN=38 Runoff=0.08 cfs 0.049 af

Reach DP-1: Ricketts Pond Inflow=0.08 cfs 0.049 af
Outflow=0.08 cfs 0.049 af

Reach DP-4: NORTHEAST PROPERTY LINE Inflow=0.09 cfs 0.018 af
Outflow=0.09 cfs 0.018 af

Pond 1P: BASIN 1 Peak Elev=135.97' Storage=38,766 cf Inflow=20.21 cfs 1.606 af
Discarded=0.94 cfs 1.606 af Primary=0.00 cfs 0.000 af Outflow=0.94 cfs 1.606 af

Pond 2P: BASIN 2 Peak Elev=136.87' Storage=22,164 cf Inflow=10.17 cfs 0.771 af
Discarded=0.27 cfs 0.771 af Primary=0.00 cfs 0.000 af Outflow=0.27 cfs 0.771 af

Total Runoff Area = 21.063 ac Runoff Volume = 2.443 af Average Runoff Depth = 1.39"
60.69% Pervious = 12.782 ac 39.31% Impervious = 8.280 ac

Summary for Subcatchment 1S: Site (EAST)

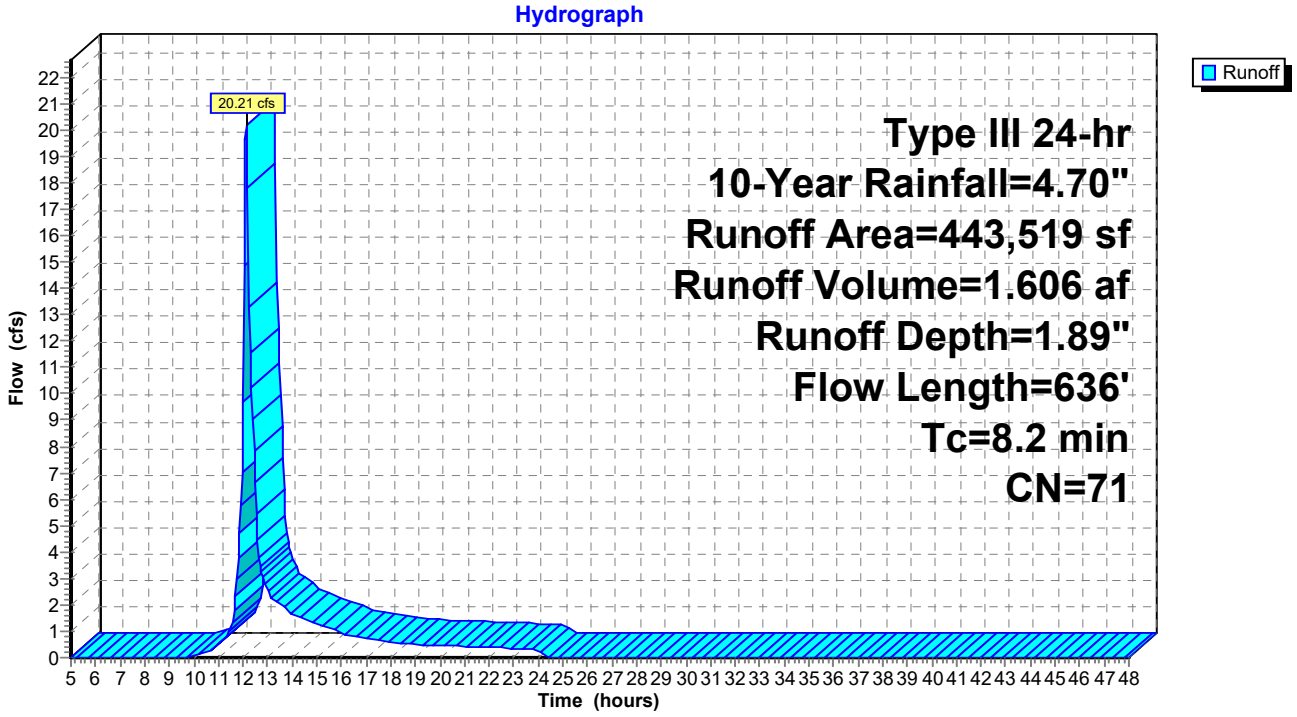
Runoff = 20.21 cfs @ 12.12 hrs, Volume= 1.606 af, Depth= 1.89"
Routed to Pond 1P : BASIN 1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.70"

Area (sf)	CN	Description
58,376	98	Roofs, HSG A
181,566	98	Paved parking, HSG A
203,577	39	>75% Grass cover, Good, HSG A
443,519	71	Weighted Average
203,577		45.90% Pervious Area
239,942		54.10% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.2	50	0.3000	0.20		**Sheet Flow, SHEET** Woods: Light underbrush n= 0.400 P2= 3.20"
1.6	305	0.0400	3.22		**Shallow Concentrated Flow, SHALLOW CONC. FLOW** Unpaved Kv= 16.1 fps
2.4	281	0.0090	1.93		**Shallow Concentrated Flow, SHALLOW CONC. FLOW2** Paved Kv= 20.3 fps
8.2	636	Total			

Subcatchment 1S: Site (EAST)



Summary for Subcatchment 2S: Site (SOUTHWEST)

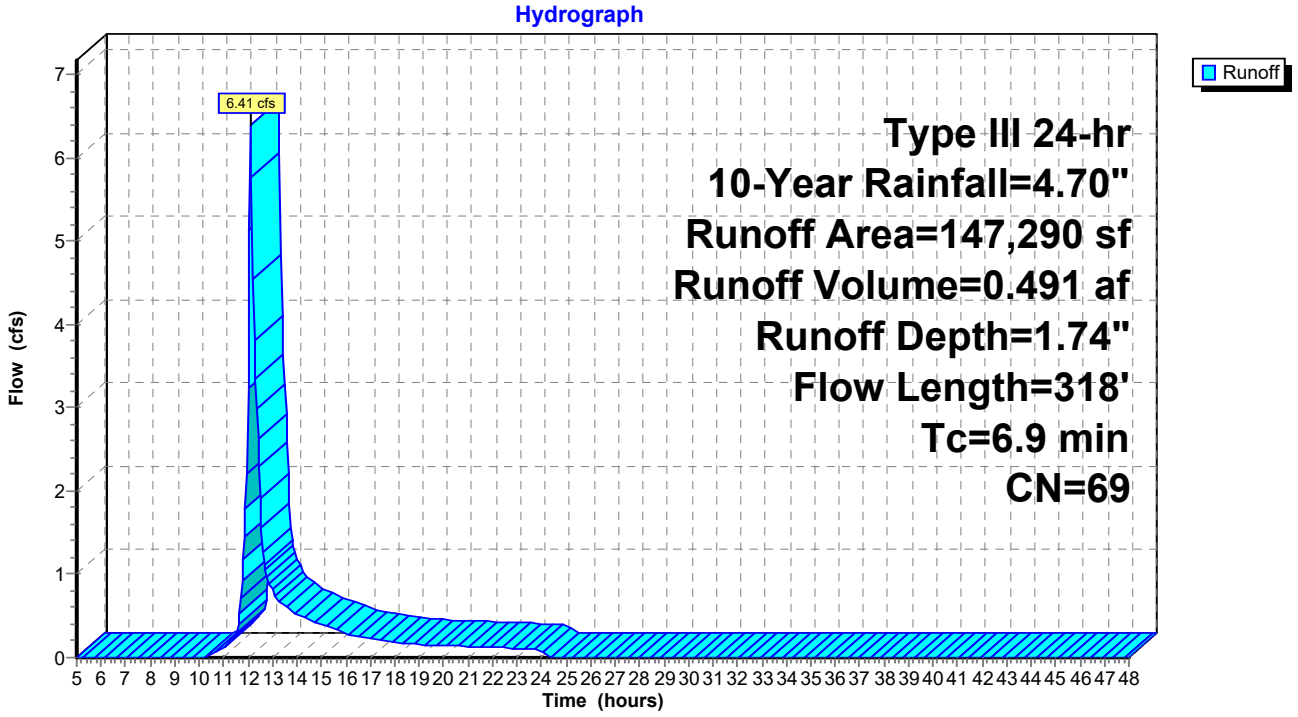
Runoff = 6.41 cfs @ 12.11 hrs, Volume= 0.491 af, Depth= 1.74"
Routed to Pond 2P : BASIN 2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.70"

Area (sf)	CN	Description
25,300	98	Roofs, HSG A
49,771	98	Paved parking, HSG A
72,219	39	>75% Grass cover, Good, HSG A
147,290	69	Weighted Average
72,219		49.03% Pervious Area
75,071		50.97% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.7	50	0.2200	0.18		**Sheet Flow, SHEET** Woods: Light underbrush n= 0.400 P2= 3.20"
0.6	98	0.0300	2.79		**Shallow Concentrated Flow, SHALLOW CONC. FLOW** Unpaved Kv= 16.1 fps
1.6	170	0.0080	1.82		**Shallow Concentrated Flow, SHALLOW CONC. FLOW2** Paved Kv= 20.3 fps
6.9	318	Total			

Subcatchment 2S: Site (SOUTHWEST)



Summary for Subcatchment 3S: Site (WEST)

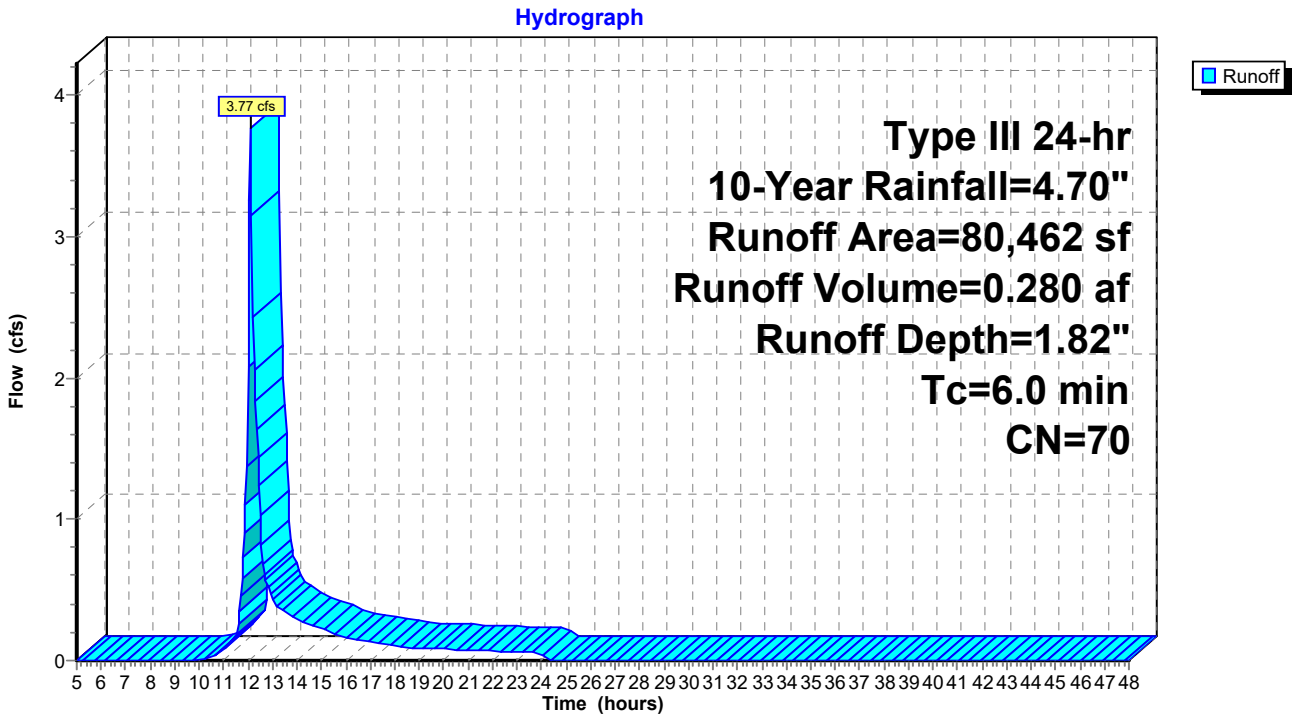
Runoff = 3.77 cfs @ 12.10 hrs, Volume= 0.280 af, Depth= 1.82"
Routed to Pond 2P : BASIN 2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.70"

Area (sf)	CN	Description
11,160	98	Roofs, HSG A
31,520	98	Paved parking, HSG A
37,782	39	>75% Grass cover, Good, HSG A
80,462	70	Weighted Average
37,782		46.96% Pervious Area
42,680		53.04% Impervious Area

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

Subcatchment 3S: Site (WEST)



Summary for Subcatchment 4S: Site (NORTH)

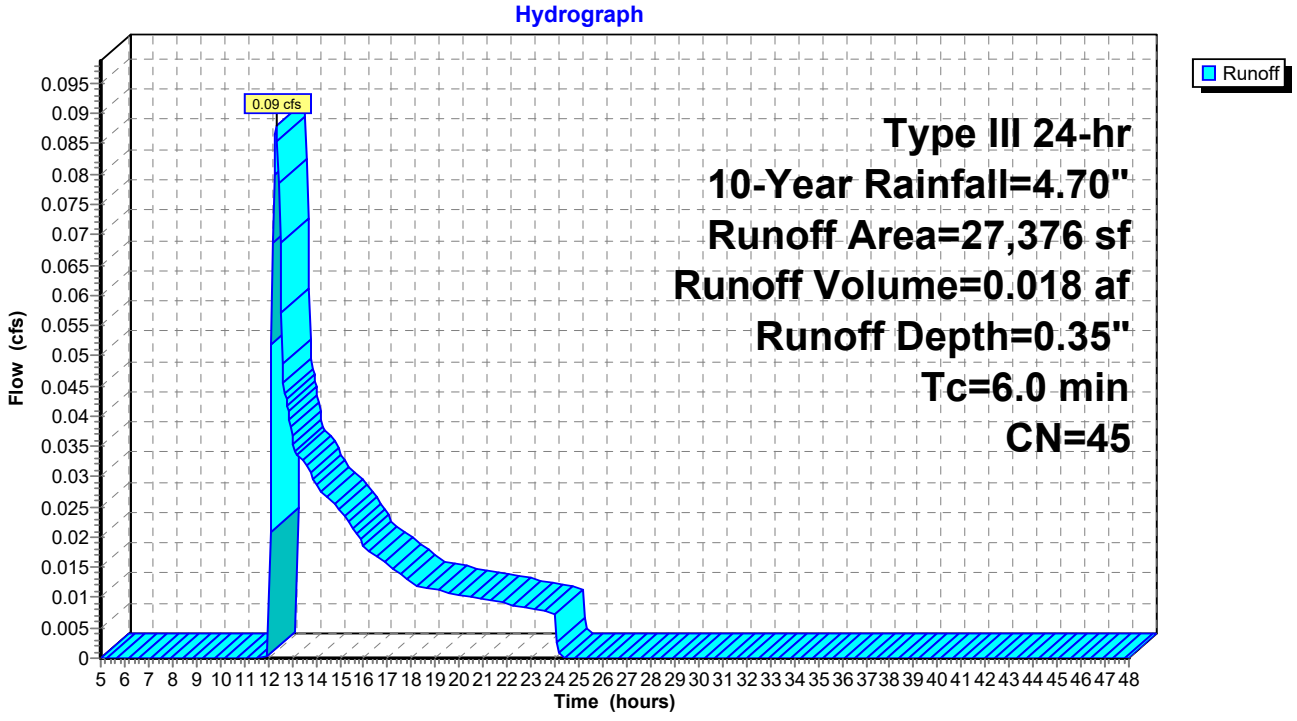
Runoff = 0.09 cfs @ 12.34 hrs, Volume= 0.018 af, Depth= 0.35"
Routed to Reach DP-4 : NORTHEAST PROPERTY LINE

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.70"

Area (sf)	CN	Description
2,991	98	Paved parking, HSG A
24,385	39	>75% Grass cover, Good, HSG A
27,376	45	Weighted Average
24,385		89.07% Pervious Area
2,991		10.93% Impervious Area

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

Subcatchment 4S: Site (NORTH)



Summary for Subcatchment 5S: POND BUFFER

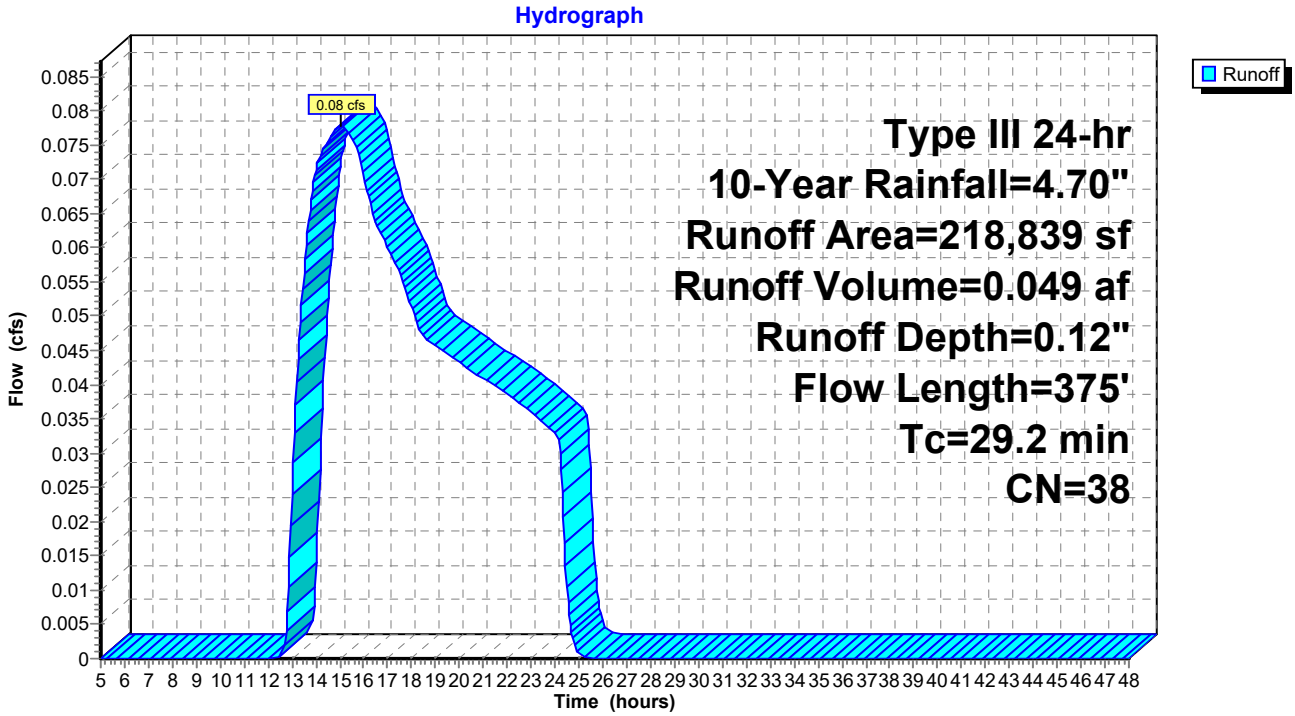
Runoff = 0.08 cfs @ 15.07 hrs, Volume= 0.049 af, Depth= 0.12"
Routed to Reach DP-1 : Ricketts Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.70"

Area (sf)	CN	Description
25,887	79	Woods/grass comb., Good, HSG D
192,952	32	Woods/grass comb., Good, HSG A
218,839	38	Weighted Average
218,839		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
28.3	50	0.0100	0.03		**Sheet Flow, SHEET** Woods: Dense underbrush n= 0.800 P2= 3.20"
0.9	325	0.1300	5.80		**Shallow Concentrated Flow, SHALLOW CONC. FLOW** Unpaved Kv= 16.1 fps
29.2	375	Total			

Subcatchment 5S: POND BUFFER



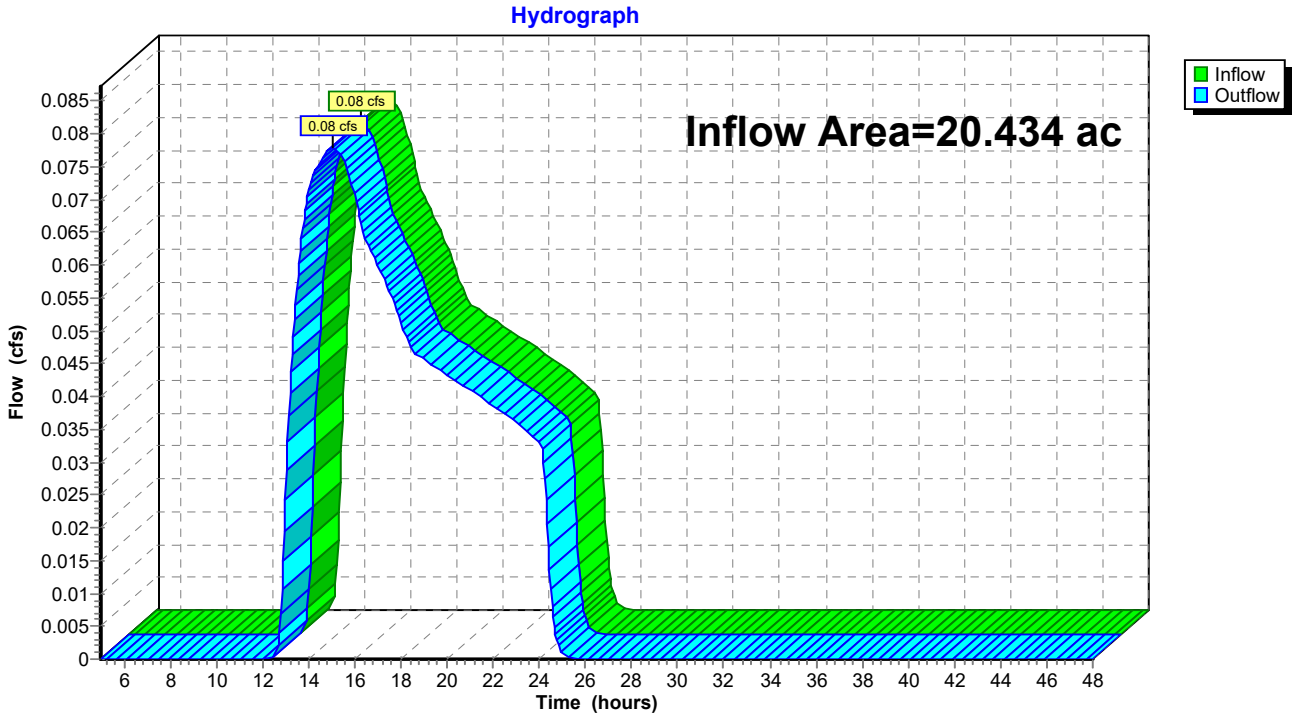
Summary for Reach DP-1: Ricketts Pond

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 20.434 ac, 40.19% Impervious, Inflow Depth = 0.03" for 10-Year event
Inflow = 0.08 cfs @ 15.07 hrs, Volume= 0.049 af
Outflow = 0.08 cfs @ 15.07 hrs, Volume= 0.049 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs

Reach DP-1: Ricketts Pond



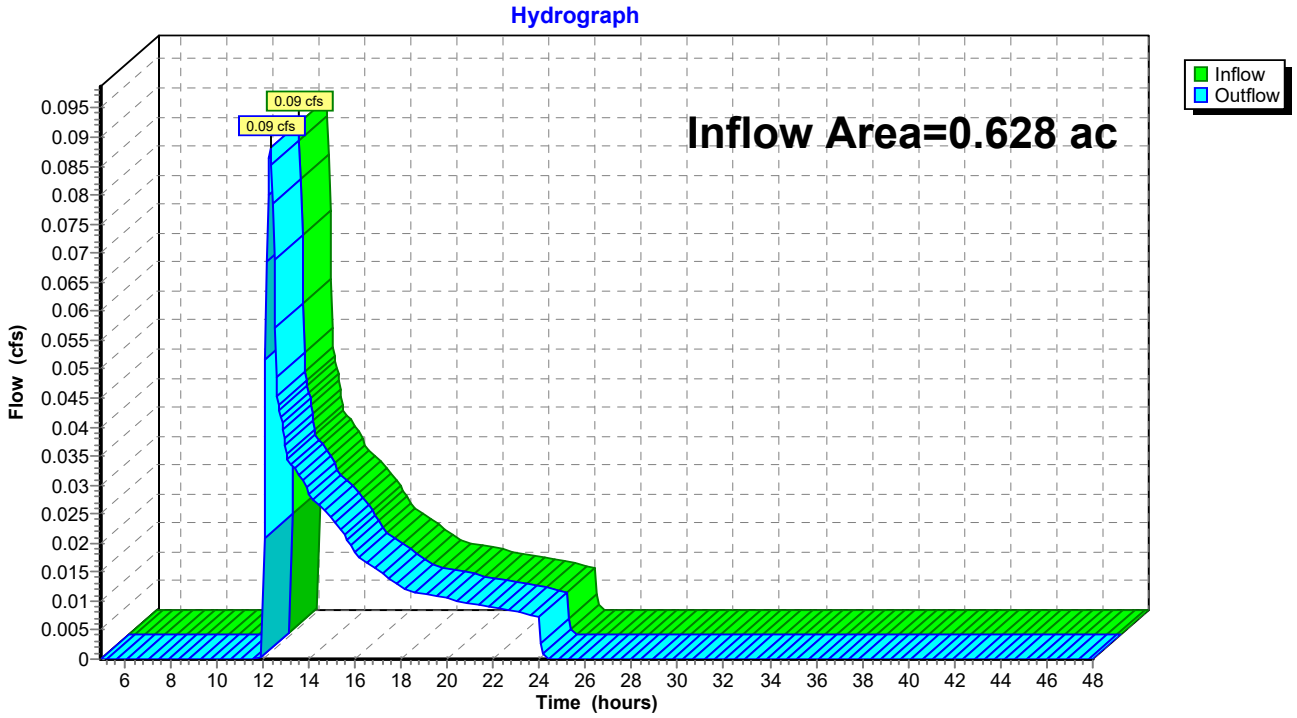
Summary for Reach DP-4: NORTHEAST PROPERTY LINE

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.628 ac, 10.93% Impervious, Inflow Depth = 0.35" for 10-Year event
Inflow = 0.09 cfs @ 12.34 hrs, Volume= 0.018 af
Outflow = 0.09 cfs @ 12.34 hrs, Volume= 0.018 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs

Reach DP-4: NORTHEAST PROPERTY LINE



Summary for Pond 1P: BASIN 1

Inflow Area = 15.410 ac, 53.29% Impervious, Inflow Depth = 1.25" for 10-Year event
Inflow = 20.21 cfs @ 12.12 hrs, Volume= 1.606 af
Outflow = 0.94 cfs @ 11.65 hrs, Volume= 1.606 af, Atten= 95%, Lag= 0.0 min
Discarded = 0.94 cfs @ 11.65 hrs, Volume= 1.606 af
Primary = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af
Routed to Reach DP-1 : Ricketts Pond

Routing by Stor-Ind method, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 135.97' @ 15.95 hrs Surf.Area= 22,824 sf Storage= 38,766 cf

Plug-Flow detention time= 436.1 min calculated for 1.604 af (100% of inflow)
Center-of-Mass det. time= 436.2 min (1,286.6 - 850.4)

Volume	Invert	Avail.Storage	Storage Description
#1	134.00'	146,199 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

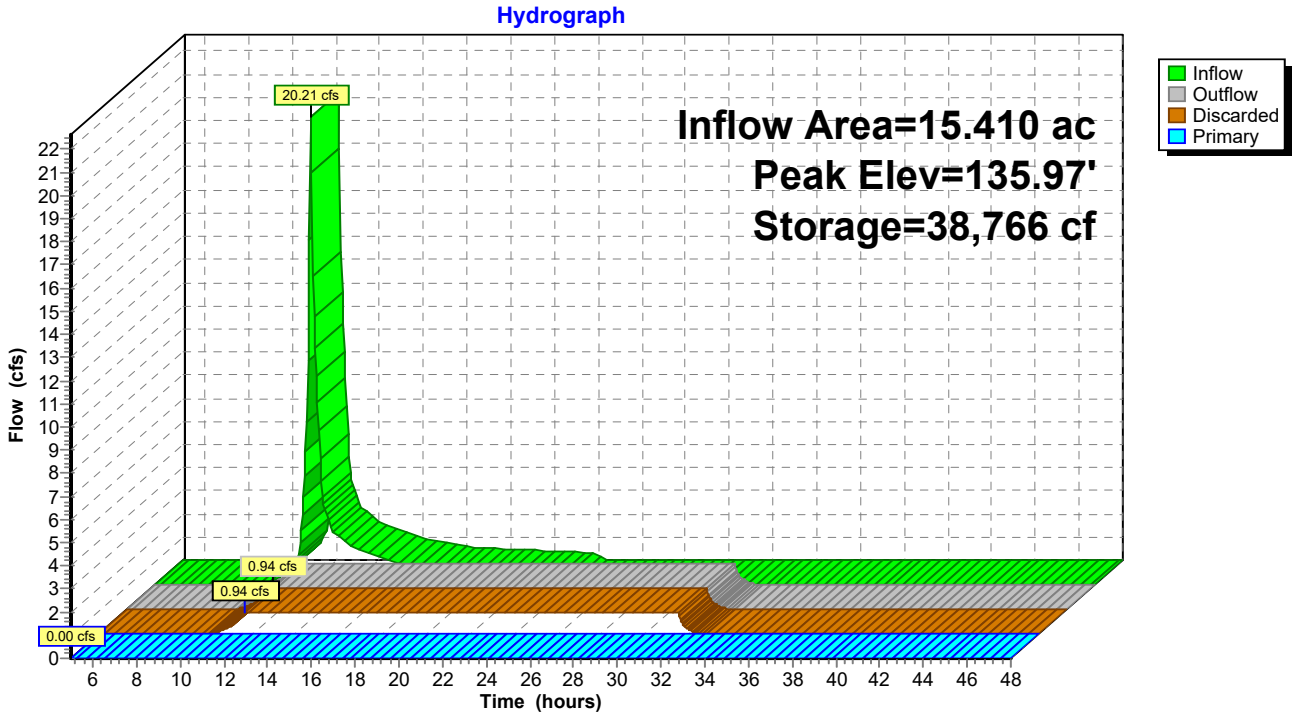
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
134.00	16,836	0	0
135.00	18,254	17,545	17,545
135.01	21,121	197	17,742
136.00	22,883	21,782	39,524
137.00	24,726	23,805	63,328
138.00	26,626	25,676	89,004
139.00	28,583	27,605	116,609
140.00	30,597	29,590	146,199

Device	Routing	Invert	Outlet Devices
#1	Discarded	134.00'	**0.94 cfs Exfiltration at all elevations**
#2	Primary	138.60'	**10.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Discarded OutFlow Max=0.94 cfs @ 11.65 hrs HW=134.06' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 0.94 cfs)

Primary OutFlow Max=0.00 cfs @ 5.00 hrs HW=134.00' (Free Discharge)
↑**2=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 1P: BASIN 1



Summary for Pond 2P: BASIN 2

Inflow Area = 5.228 ac, 51.70% Impervious, Inflow Depth = 1.77" for 10-Year event
Inflow = 10.17 cfs @ 12.10 hrs, Volume= 0.771 af
Outflow = 0.27 cfs @ 11.45 hrs, Volume= 0.771 af, Atten= 97%, Lag= 0.0 min
Discarded = 0.27 cfs @ 11.45 hrs, Volume= 0.771 af
Primary = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af
Routed to Pond 1P : BASIN 1

Routing by Stor-Ind method, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 136.87' @ 18.21 hrs Surf.Area= 10,378 sf Storage= 22,164 cf

Plug-Flow detention time= 842.4 min calculated for 0.771 af (100% of inflow)
Center-of-Mass det. time= 842.3 min (1,695.6 - 853.3)

Volume	Invert	Avail.Storage	Storage Description
#1	134.00'	63,393 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

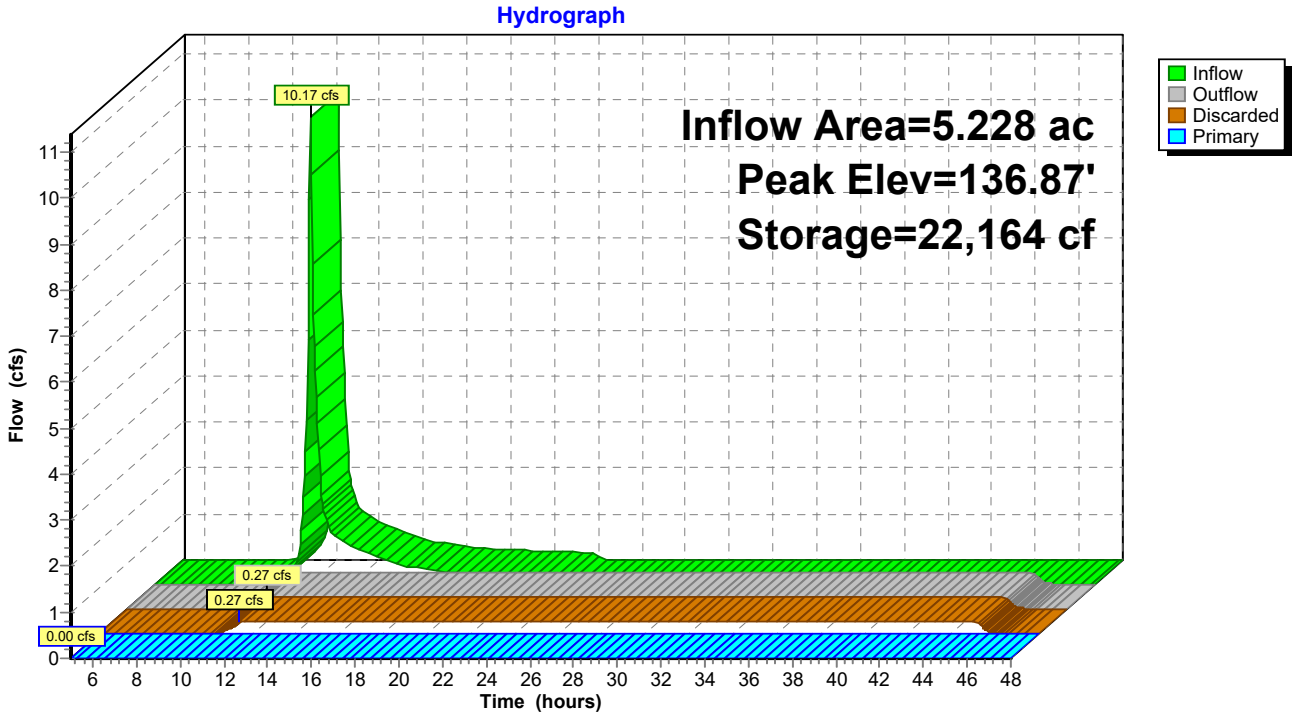
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
134.00	4,914	0	0
135.00	6,275	5,595	5,595
135.01	7,540	69	5,664
136.00	8,924	8,150	13,813
137.00	10,604	9,764	23,577
138.00	12,350	11,477	35,054
139.00	14,156	13,253	48,307
140.00	16,016	15,086	63,393

Device	Routing	Invert	Outlet Devices
#1	Discarded	134.00'	**0.27 cfs Exfiltration at all elevations**
#2	Primary	138.50'	**15.0" Round Culvert** L= 100.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 138.50' / 137.50' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf

Discarded OutFlow Max=0.27 cfs @ 11.45 hrs HW=134.06' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 0.27 cfs)

Primary OutFlow Max=0.00 cfs @ 5.00 hrs HW=134.00' (Free Discharge)
↑**2=Culvert** (Controls 0.00 cfs)

Pond 2P: BASIN 2



Time span=5.00-48.00 hrs, dt=0.05 hrs, 861 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1S: Site (EAST) Runoff Area=443,519 sf 54.10% Impervious Runoff Depth=2.50"
Flow Length=636' Tc=8.2 min CN=71 Runoff=27.07 cfs 2.122 af

Subcatchment2S: Site (SOUTHWEST) Runoff Area=147,290 sf 50.97% Impervious Runoff Depth=2.33"
Flow Length=318' Tc=6.9 min CN=69 Runoff=8.71 cfs 0.656 af

Subcatchment3S: Site (WEST) Runoff Area=80,462 sf 53.04% Impervious Runoff Depth=2.41"
Tc=6.0 min CN=70 Runoff=5.08 cfs 0.372 af

Subcatchment4S: Site (NORTH) Runoff Area=27,376 sf 10.93% Impervious Runoff Depth=0.61"
Tc=6.0 min CN=45 Runoff=0.22 cfs 0.032 af

Subcatchment5S: POND BUFFER Runoff Area=218,839 sf 0.00% Impervious Runoff Depth=0.27"
Flow Length=375' Tc=29.2 min CN=38 Runoff=0.25 cfs 0.113 af

Reach DP-1: Ricketts Pond Inflow=0.25 cfs 0.113 af
Outflow=0.25 cfs 0.113 af

Reach DP-4: NORTHEAST PROPERTY LINE Inflow=0.22 cfs 0.032 af
Outflow=0.22 cfs 0.032 af

Pond 1P: BASIN 1 Peak Elev=136.72' Storage=56,373 cf Inflow=27.07 cfs 2.122 af
Discarded=0.94 cfs 2.122 af Primary=0.00 cfs 0.000 af Outflow=0.94 cfs 2.122 af

Pond 2P: BASIN 2 Peak Elev=137.75' Storage=32,034 cf Inflow=13.77 cfs 1.028 af
Discarded=0.27 cfs 0.838 af Primary=0.00 cfs 0.000 af Outflow=0.27 cfs 0.838 af

Total Runoff Area = 21.063 ac Runoff Volume = 3.295 af Average Runoff Depth = 1.88"
60.69% Pervious = 12.782 ac 39.31% Impervious = 8.280 ac

Summary for Subcatchment 1S: Site (EAST)

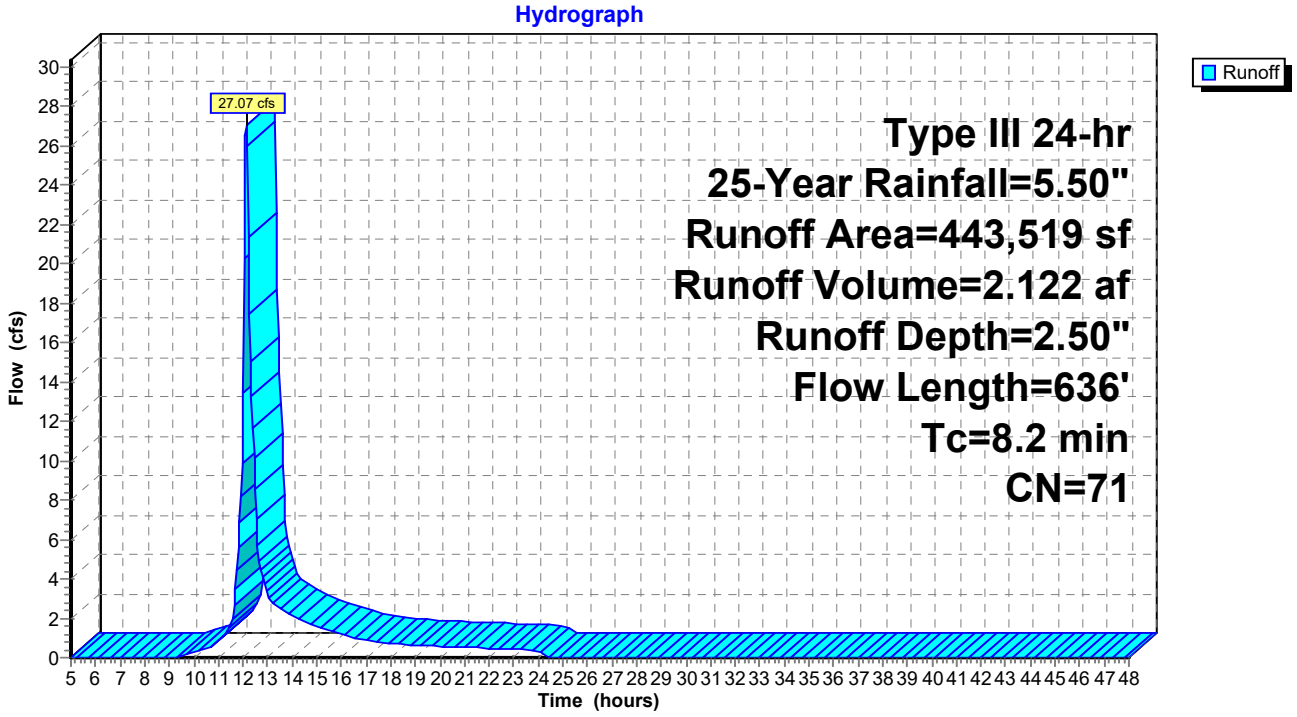
Runoff = 27.07 cfs @ 12.12 hrs, Volume= 2.122 af, Depth= 2.50"
Routed to Pond 1P : BASIN 1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=5.50"

Area (sf)	CN	Description
58,376	98	Roofs, HSG A
181,566	98	Paved parking, HSG A
203,577	39	>75% Grass cover, Good, HSG A
443,519	71	Weighted Average
203,577		45.90% Pervious Area
239,942		54.10% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.2	50	0.3000	0.20		**Sheet Flow, SHEET** Woods: Light underbrush n= 0.400 P2= 3.20"
1.6	305	0.0400	3.22		**Shallow Concentrated Flow, SHALLOW CONC. FLOW** Unpaved Kv= 16.1 fps
2.4	281	0.0090	1.93		**Shallow Concentrated Flow, SHALLOW CONC. FLOW2** Paved Kv= 20.3 fps
8.2	636	Total			

Subcatchment 1S: Site (EAST)



Summary for Subcatchment 2S: Site (SOUTHWEST)

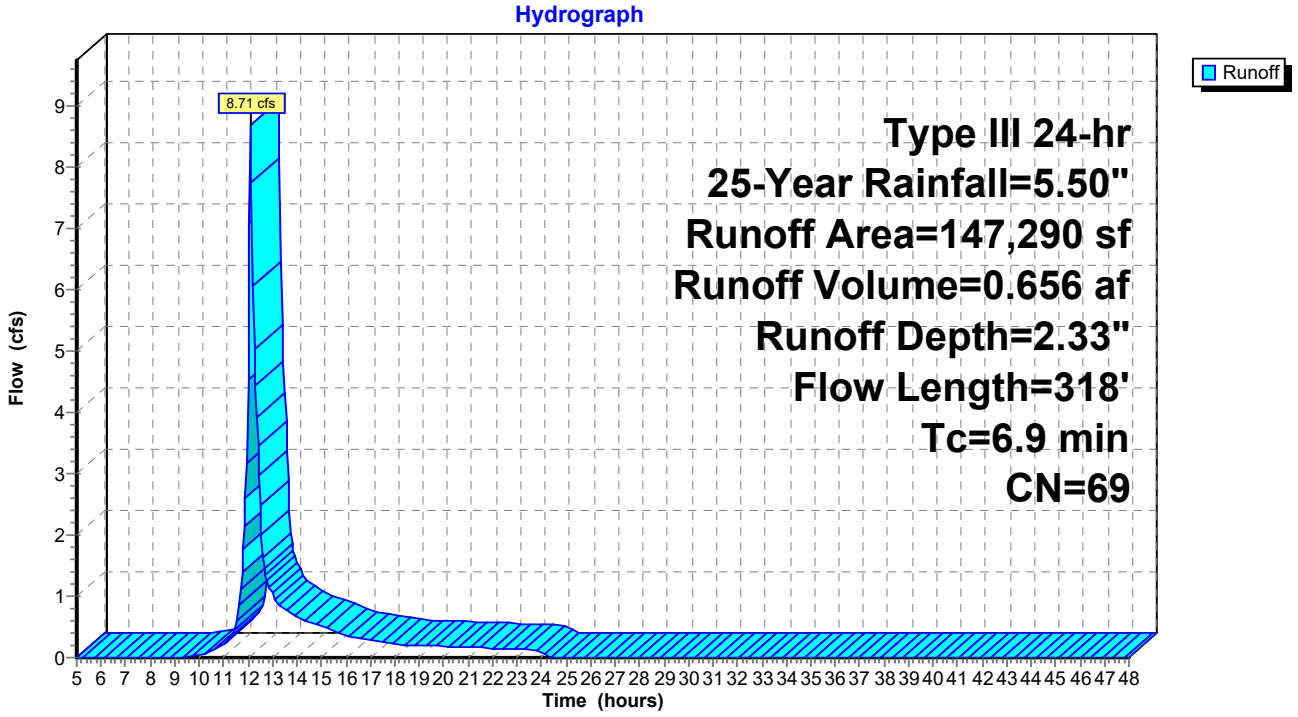
Runoff = 8.71 cfs @ 12.11 hrs, Volume= 0.656 af, Depth= 2.33"
Routed to Pond 2P : BASIN 2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=5.50"

Area (sf)	CN	Description
25,300	98	Roofs, HSG A
49,771	98	Paved parking, HSG A
72,219	39	>75% Grass cover, Good, HSG A
147,290	69	Weighted Average
72,219		49.03% Pervious Area
75,071		50.97% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.7	50	0.2200	0.18		**Sheet Flow, SHEET** Woods: Light underbrush n= 0.400 P2= 3.20"
0.6	98	0.0300	2.79		**Shallow Concentrated Flow, SHALLOW CONC. FLOW** Unpaved Kv= 16.1 fps
1.6	170	0.0080	1.82		**Shallow Concentrated Flow, SHALLOW CONC. FLOW2** Paved Kv= 20.3 fps
6.9	318	Total			

Subcatchment 2S: Site (SOUTHWEST)



Summary for Subcatchment 3S: Site (WEST)

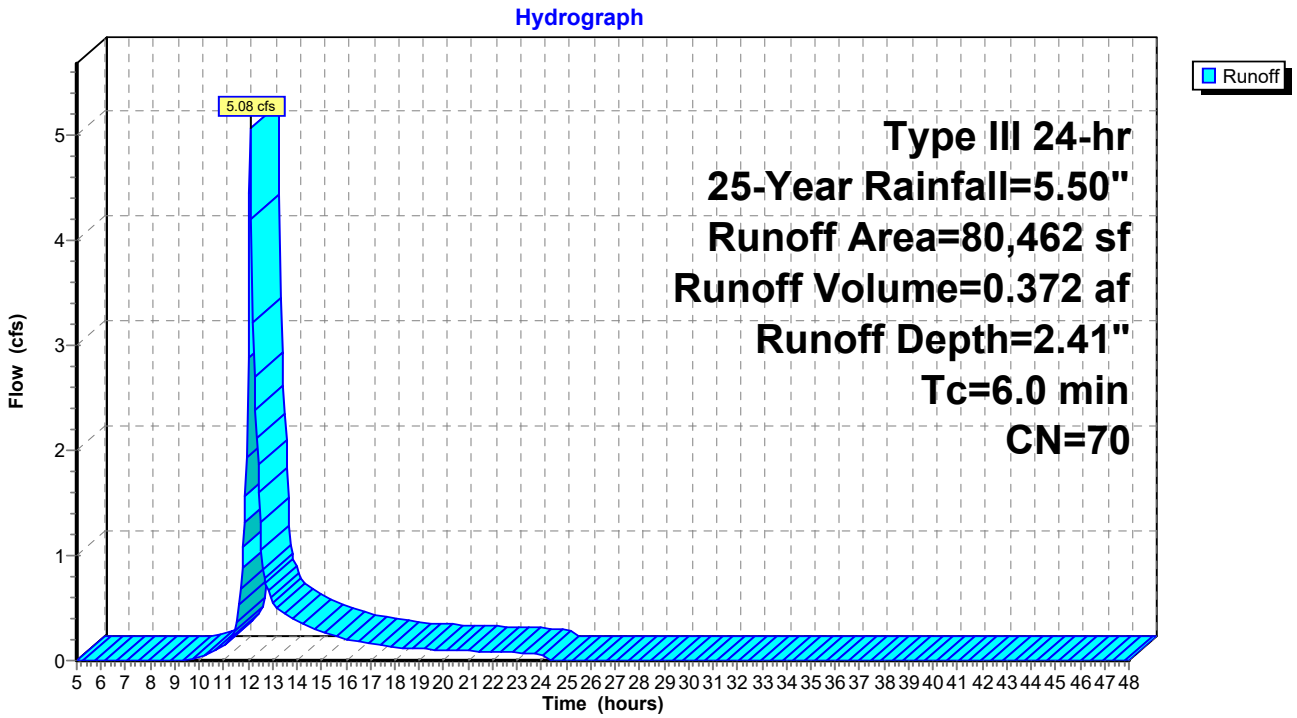
Runoff = 5.08 cfs @ 12.10 hrs, Volume= 0.372 af, Depth= 2.41"
Routed to Pond 2P : BASIN 2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=5.50"

Area (sf)	CN	Description
11,160	98	Roofs, HSG A
31,520	98	Paved parking, HSG A
37,782	39	>75% Grass cover, Good, HSG A
80,462	70	Weighted Average
37,782		46.96% Pervious Area
42,680		53.04% Impervious Area

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

Subcatchment 3S: Site (WEST)



Summary for Subcatchment 4S: Site (NORTH)

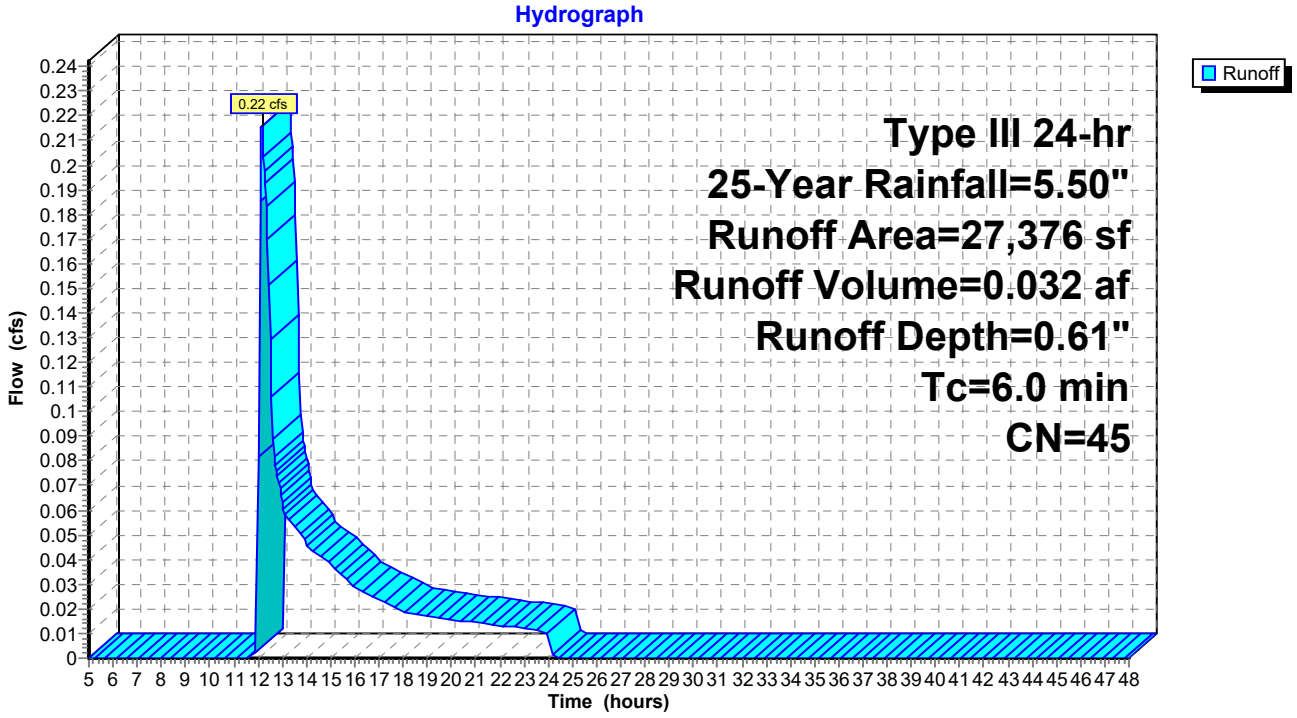
Runoff = 0.22 cfs @ 12.16 hrs, Volume= 0.032 af, Depth= 0.61"
Routed to Reach DP-4 : NORTHEAST PROPERTY LINE

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=5.50"

Area (sf)	CN	Description
2,991	98	Paved parking, HSG A
24,385	39	>75% Grass cover, Good, HSG A
27,376	45	Weighted Average
24,385		89.07% Pervious Area
2,991		10.93% Impervious Area

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

Subcatchment 4S: Site (NORTH)



Summary for Subcatchment 5S: POND BUFFER

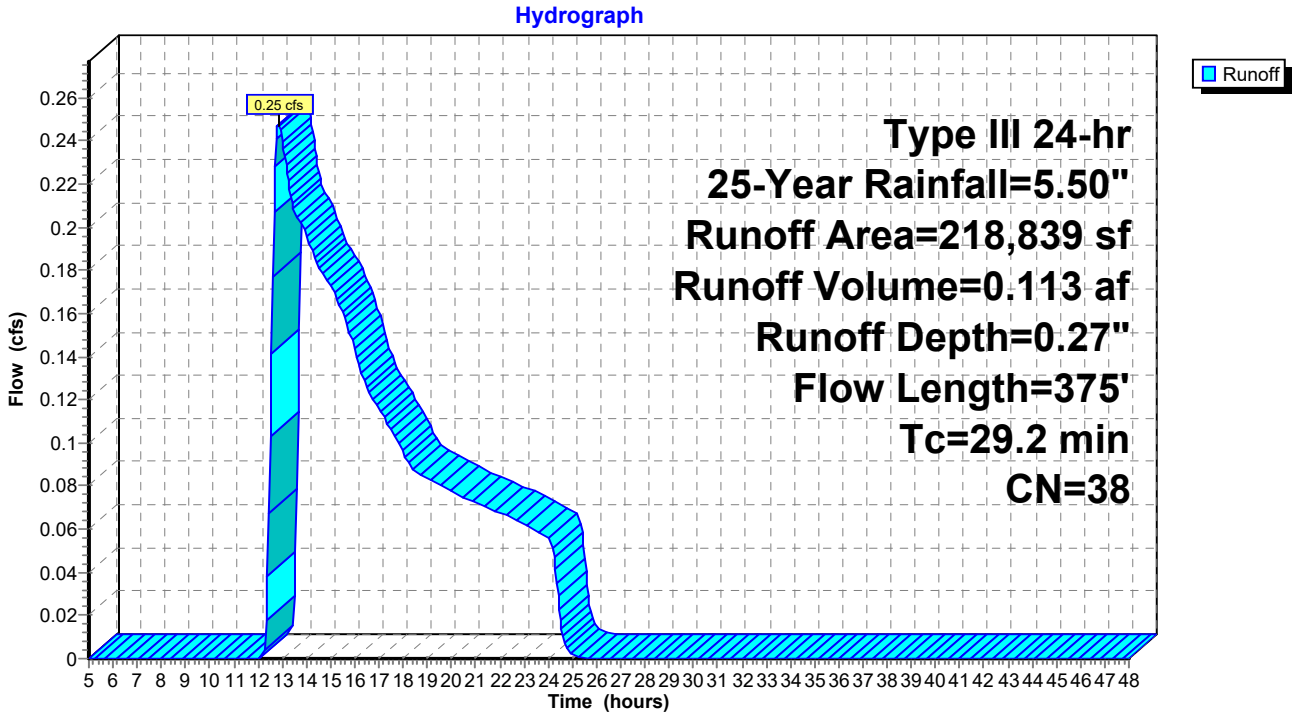
Runoff = 0.25 cfs @ 12.84 hrs, Volume= 0.113 af, Depth= 0.27"
Routed to Reach DP-1 : Ricketts Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=5.50"

Area (sf)	CN	Description
25,887	79	Woods/grass comb., Good, HSG D
192,952	32	Woods/grass comb., Good, HSG A
218,839	38	Weighted Average
218,839		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
28.3	50	0.0100	0.03		**Sheet Flow, SHEET** Woods: Dense underbrush n= 0.800 P2= 3.20"
0.9	325	0.1300	5.80		**Shallow Concentrated Flow, SHALLOW CONC. FLOW** Unpaved Kv= 16.1 fps
29.2	375	Total			

Subcatchment 5S: POND BUFFER



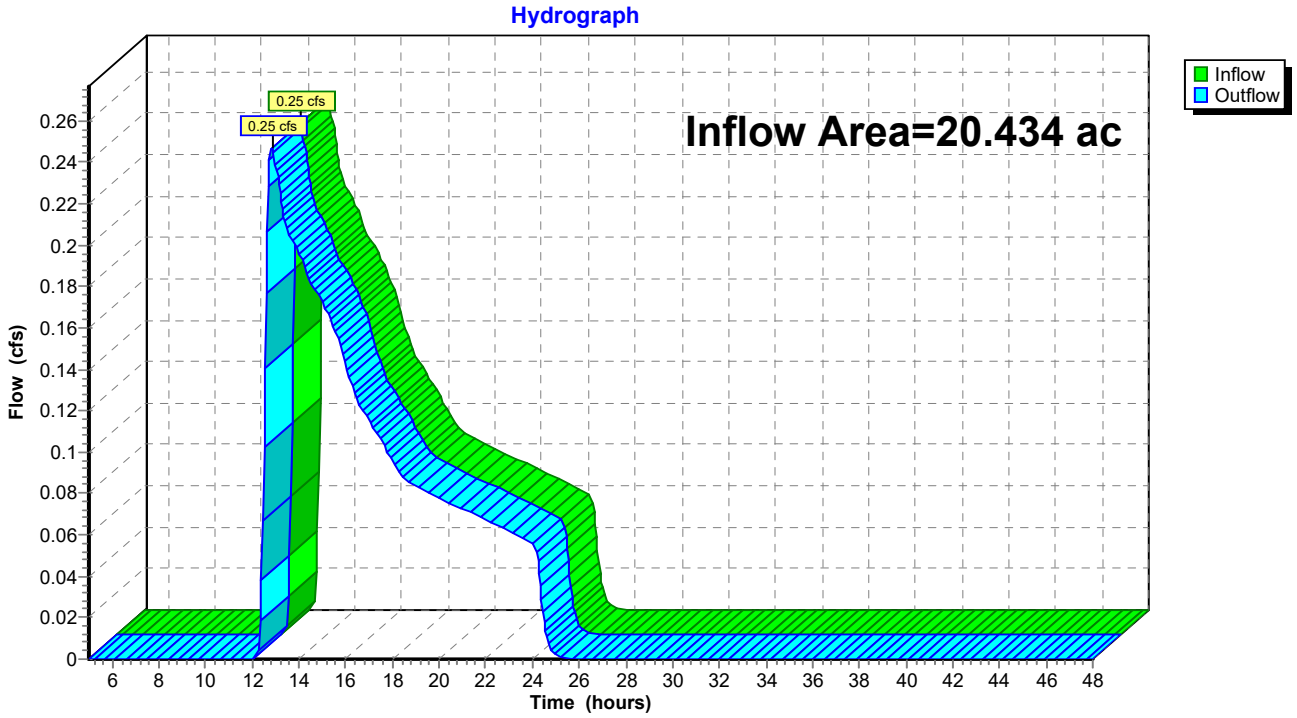
Summary for Reach DP-1: Ricketts Pond

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 20.434 ac, 40.19% Impervious, Inflow Depth = 0.07" for 25-Year event
Inflow = 0.25 cfs @ 12.84 hrs, Volume= 0.113 af
Outflow = 0.25 cfs @ 12.84 hrs, Volume= 0.113 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs

Reach DP-1: Ricketts Pond



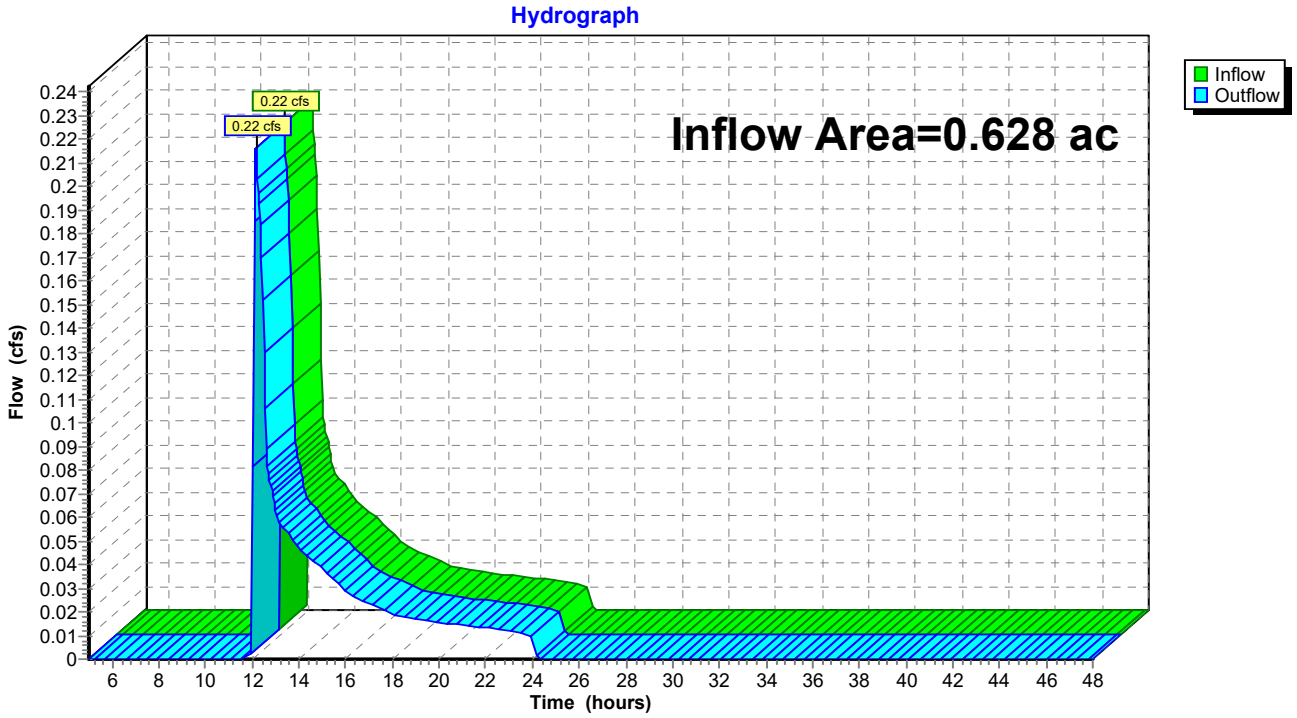
Summary for Reach DP-4: NORTHEAST PROPERTY LINE

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.628 ac, 10.93% Impervious, Inflow Depth = 0.61" for 25-Year event
Inflow = 0.22 cfs @ 12.16 hrs, Volume= 0.032 af
Outflow = 0.22 cfs @ 12.16 hrs, Volume= 0.032 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs

Reach DP-4: NORTHEAST PROPERTY LINE



Summary for Pond 1P: BASIN 1

Inflow Area = 15.410 ac, 53.29% Impervious, Inflow Depth = 1.65" for 25-Year event
Inflow = 27.07 cfs @ 12.12 hrs, Volume= 2.122 af
Outflow = 0.94 cfs @ 11.35 hrs, Volume= 2.122 af, Atten= 97%, Lag= 0.0 min
Discarded = 0.94 cfs @ 11.35 hrs, Volume= 2.122 af
Primary = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af
Routed to Reach DP-1 : Ricketts Pond

Routing by Stor-Ind method, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 136.72' @ 16.91 hrs Surf.Area= 24,202 sf Storage= 56,373 cf

Plug-Flow detention time= 616.2 min calculated for 2.122 af (100% of inflow)
Center-of-Mass det. time= 616.0 min (1,458.2 - 842.2)

Volume	Invert	Avail.Storage	Storage Description
#1	134.00'	146,199 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

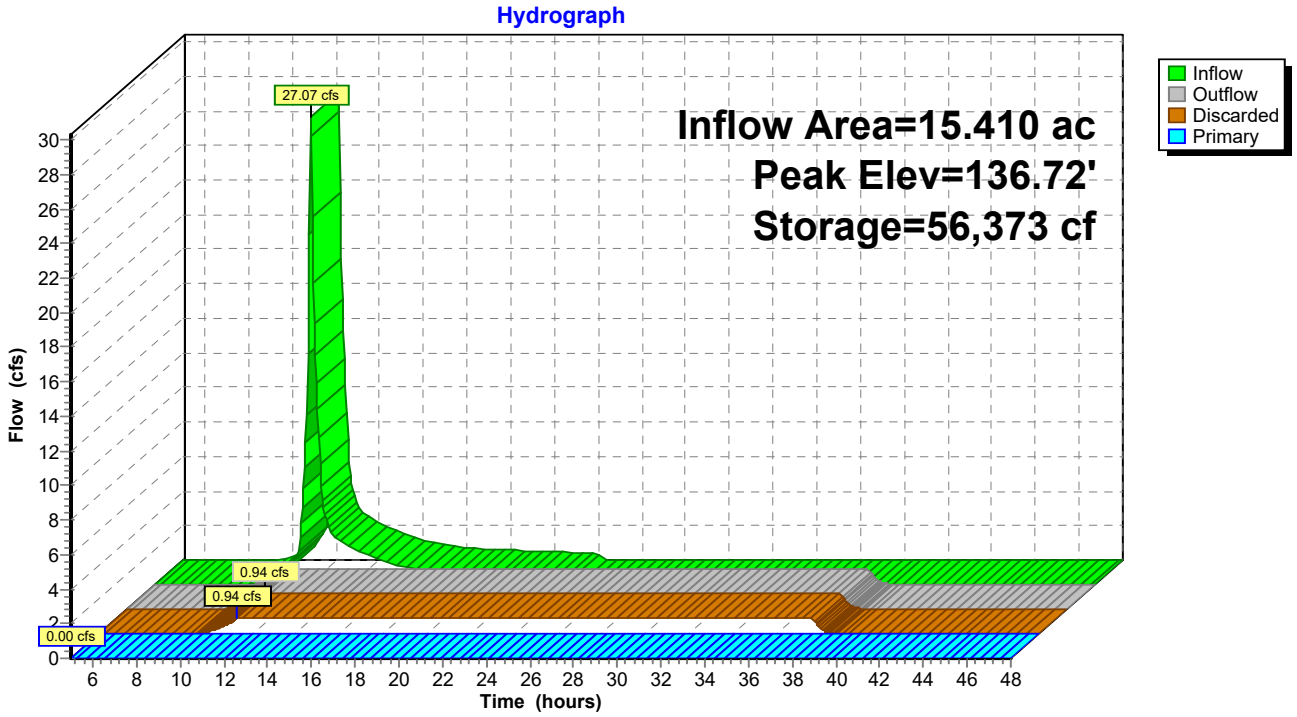
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
134.00	16,836	0	0
135.00	18,254	17,545	17,545
135.01	21,121	197	17,742
136.00	22,883	21,782	39,524
137.00	24,726	23,805	63,328
138.00	26,626	25,676	89,004
139.00	28,583	27,605	116,609
140.00	30,597	29,590	146,199

Device	Routing	Invert	Outlet Devices
#1	Discarded	134.00'	**0.94 cfs Exfiltration at all elevations**
#2	Primary	138.60'	**10.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Discarded OutFlow Max=0.94 cfs @ 11.35 hrs HW=134.06' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.94 cfs)

Primary OutFlow Max=0.00 cfs @ 5.00 hrs HW=134.00' (Free Discharge)
↑—**2=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 1P: BASIN 1



Summary for Pond 2P: BASIN 2

Inflow Area = 5.228 ac, 51.70% Impervious, Inflow Depth = 2.36" for 25-Year event
Inflow = 13.77 cfs @ 12.10 hrs, Volume= 1.028 af
Outflow = 0.27 cfs @ 11.05 hrs, Volume= 0.838 af, Atten= 98%, Lag= 0.0 min
Discarded = 0.27 cfs @ 11.05 hrs, Volume= 0.838 af
Primary = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af
Routed to Pond 1P : BASIN 1

Routing by Stor-Ind method, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 137.75' @ 20.62 hrs Surf.Area= 11,915 sf Storage= 32,034 cf

Plug-Flow detention time= 985.0 min calculated for 0.837 af (81% of inflow)
Center-of-Mass det. time= 910.2 min (1,754.9 - 844.7)

Volume	Invert	Avail.Storage	Storage Description
#1	134.00'	63,393 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

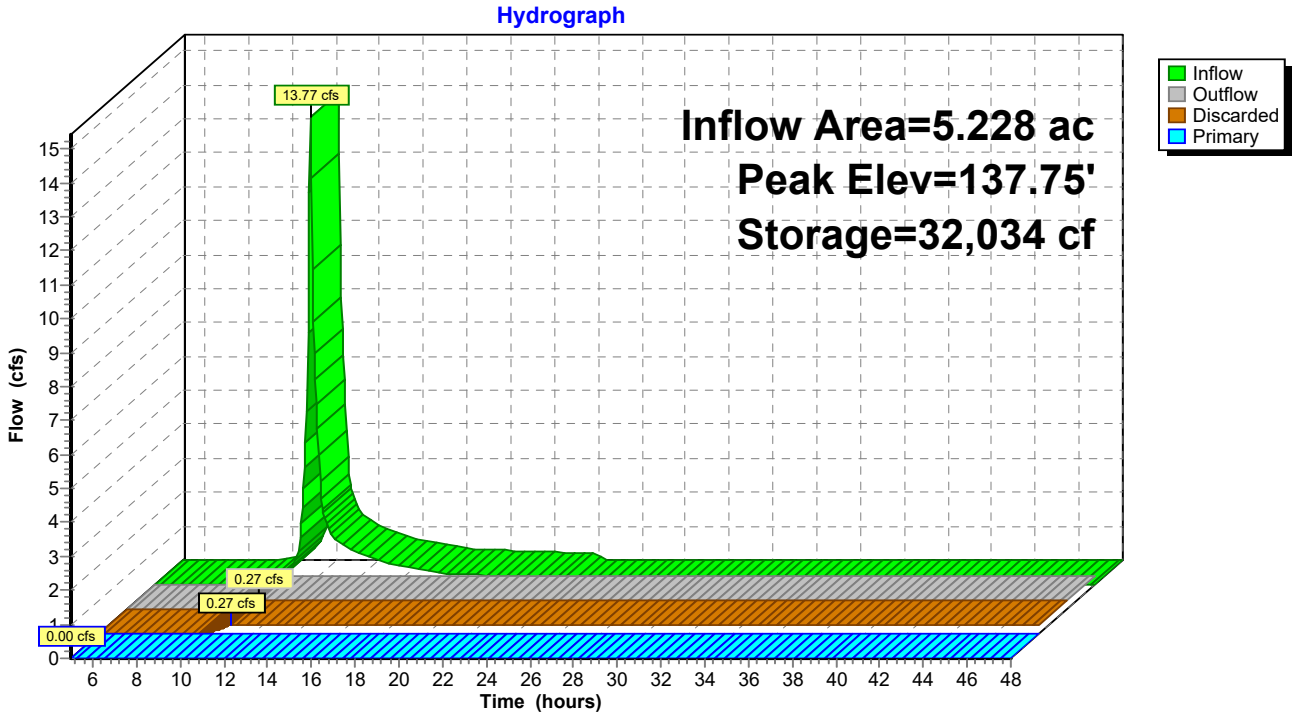
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
134.00	4,914	0	0
135.00	6,275	5,595	5,595
135.01	7,540	69	5,664
136.00	8,924	8,150	13,813
137.00	10,604	9,764	23,577
138.00	12,350	11,477	35,054
139.00	14,156	13,253	48,307
140.00	16,016	15,086	63,393

Device	Routing	Invert	Outlet Devices
#1	Discarded	134.00'	**0.27 cfs Exfiltration at all elevations**
#2	Primary	138.50'	**15.0" Round Culvert** L= 100.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 138.50' / 137.50' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf

Discarded OutFlow Max=0.27 cfs @ 11.05 hrs HW=134.06' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 0.27 cfs)

Primary OutFlow Max=0.00 cfs @ 5.00 hrs HW=134.00' (Free Discharge)
↑**2=Culvert** (Controls 0.00 cfs)

Pond 2P: BASIN 2



Time span=5.00-48.00 hrs, dt=0.05 hrs, 861 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1S: Site (EAST) Runoff Area=443,519 sf 54.10% Impervious Runoff Depth=3.47"
Flow Length=636' Tc=8.2 min CN=71 Runoff=37.87 cfs 2.946 af

Subcatchment2S: Site (SOUTHWEST) Runoff Area=147,290 sf 50.97% Impervious Runoff Depth=3.27"
Flow Length=318' Tc=6.9 min CN=69 Runoff=12.36 cfs 0.921 af

Subcatchment3S: Site (WEST) Runoff Area=80,462 sf 53.04% Impervious Runoff Depth=3.37"
Tc=6.0 min CN=70 Runoff=7.15 cfs 0.519 af

Subcatchment4S: Site (NORTH) Runoff Area=27,376 sf 10.93% Impervious Runoff Depth=1.10"
Tc=6.0 min CN=45 Runoff=0.58 cfs 0.058 af

Subcatchment5S: POND BUFFER Runoff Area=218,839 sf 0.00% Impervious Runoff Depth=0.60"
Flow Length=375' Tc=29.2 min CN=38 Runoff=1.01 cfs 0.250 af

Reach DP-1: Ricketts Pond Inflow=1.01 cfs 0.250 af
Outflow=1.01 cfs 0.250 af

Reach DP-4: NORTHEAST PROPERTY LINE Inflow=0.58 cfs 0.058 af
Outflow=0.58 cfs 0.058 af

Pond 1P: BASIN 1 Peak Elev=138.01' Storage=89,383 cf Inflow=37.87 cfs 3.083 af
Discarded=0.94 cfs 2.957 af Primary=0.00 cfs 0.000 af Outflow=0.94 cfs 2.957 af

Pond 2P: BASIN 2 Peak Elev=138.75' Storage=44,818 cf Inflow=19.48 cfs 1.440 af
Discarded=0.27 cfs 0.854 af Primary=0.30 cfs 0.137 af Outflow=0.57 cfs 0.991 af

Total Runoff Area = 21.063 ac Runoff Volume = 4.694 af Average Runoff Depth = 2.67"
60.69% Pervious = 12.782 ac 39.31% Impervious = 8.280 ac

Summary for Subcatchment 1S: Site (EAST)

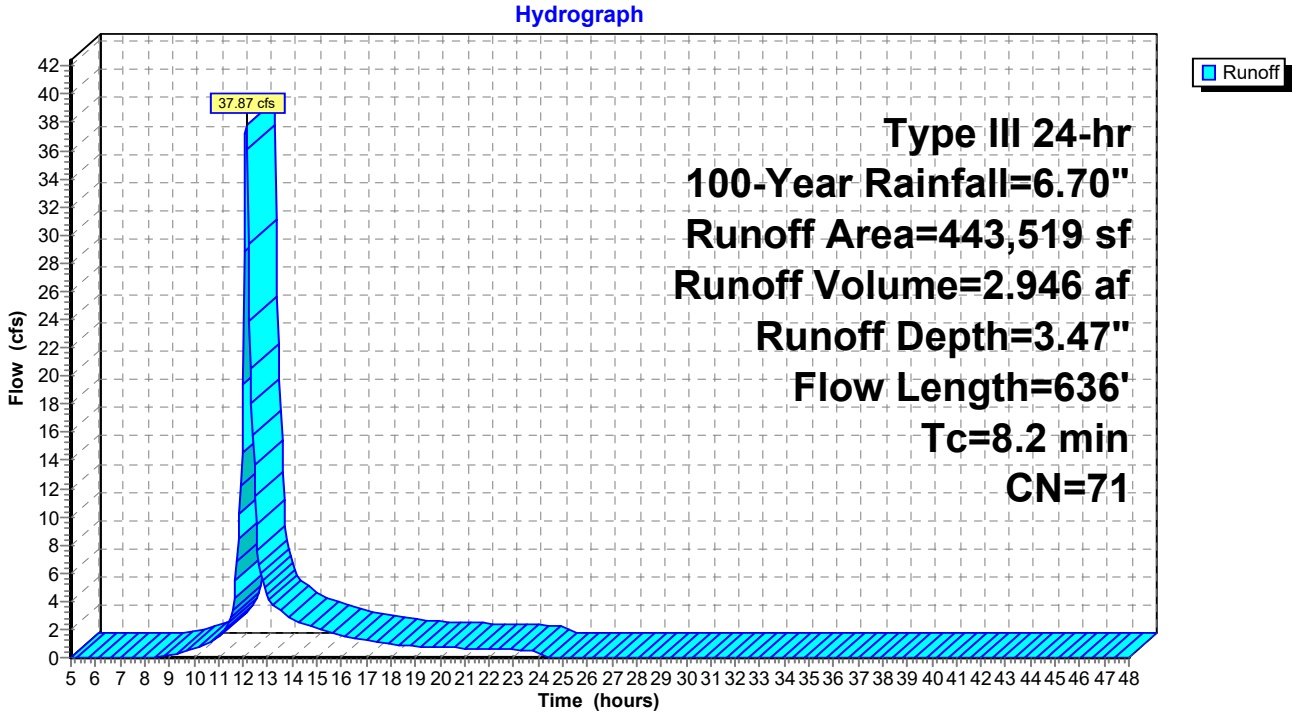
Runoff = 37.87 cfs @ 12.12 hrs, Volume= 2.946 af, Depth= 3.47"
Routed to Pond 1P : BASIN 1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=6.70"

Area (sf)	CN	Description
58,376	98	Roofs, HSG A
181,566	98	Paved parking, HSG A
203,577	39	>75% Grass cover, Good, HSG A
443,519	71	Weighted Average
203,577		45.90% Pervious Area
239,942		54.10% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.2	50	0.3000	0.20		**Sheet Flow, SHEET** Woods: Light underbrush n= 0.400 P2= 3.20"
1.6	305	0.0400	3.22		**Shallow Concentrated Flow, SHALLOW CONC. FLOW** Unpaved Kv= 16.1 fps
2.4	281	0.0090	1.93		**Shallow Concentrated Flow, SHALLOW CONC. FLOW2** Paved Kv= 20.3 fps
8.2	636	Total			

Subcatchment 1S: Site (EAST)



Summary for Subcatchment 2S: Site (SOUTHWEST)

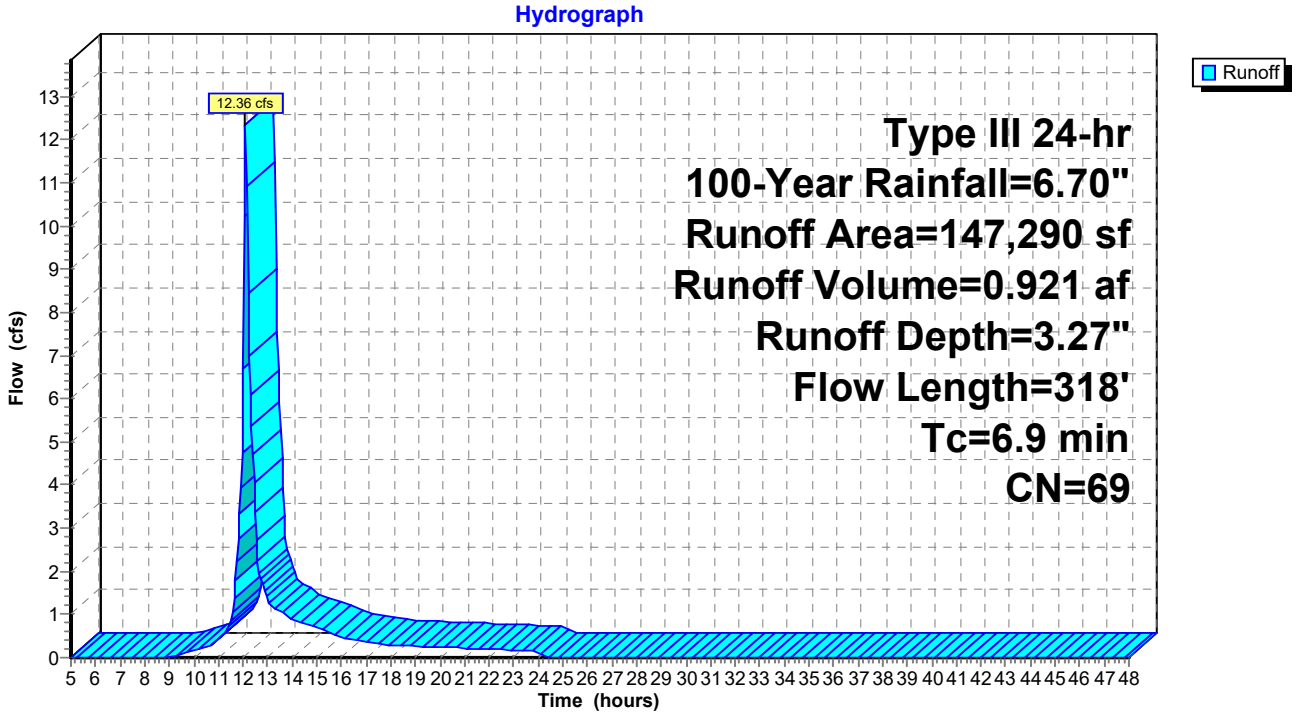
Runoff = 12.36 cfs @ 12.10 hrs, Volume= 0.921 af, Depth= 3.27"
Routed to Pond 2P : BASIN 2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=6.70"

Area (sf)	CN	Description
25,300	98	Roofs, HSG A
49,771	98	Paved parking, HSG A
72,219	39	>75% Grass cover, Good, HSG A
147,290	69	Weighted Average
72,219		49.03% Pervious Area
75,071		50.97% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.7	50	0.2200	0.18		**Sheet Flow, SHEET** Woods: Light underbrush n= 0.400 P2= 3.20"
0.6	98	0.0300	2.79		**Shallow Concentrated Flow, SHALLOW CONC. FLOW** Unpaved Kv= 16.1 fps
1.6	170	0.0080	1.82		**Shallow Concentrated Flow, SHALLOW CONC. FLOW2** Paved Kv= 20.3 fps
6.9	318	Total			

Subcatchment 2S: Site (SOUTHWEST)



Summary for Subcatchment 3S: Site (WEST)

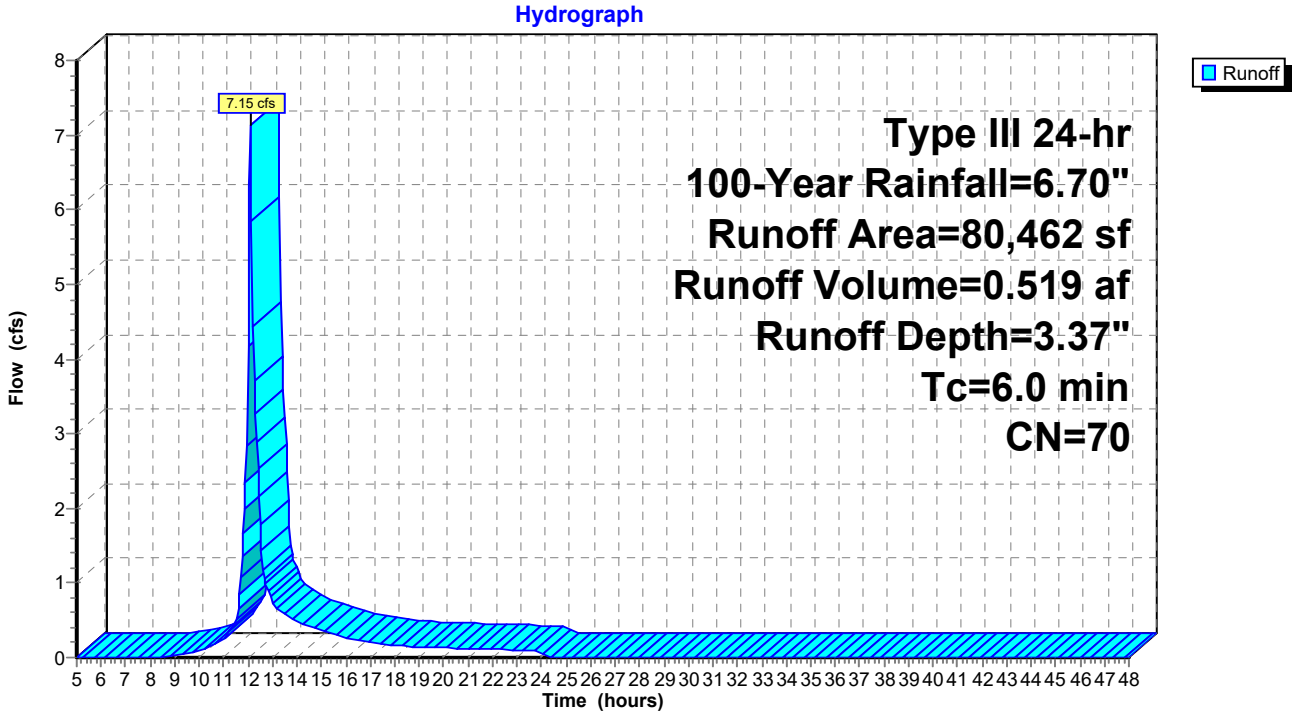
Runoff = 7.15 cfs @ 12.09 hrs, Volume= 0.519 af, Depth= 3.37"
Routed to Pond 2P : BASIN 2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=6.70"

Area (sf)	CN	Description
11,160	98	Roofs, HSG A
31,520	98	Paved parking, HSG A
37,782	39	>75% Grass cover, Good, HSG A
80,462	70	Weighted Average
37,782		46.96% Pervious Area
42,680		53.04% Impervious Area

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

Subcatchment 3S: Site (WEST)



Summary for Subcatchment 4S: Site (NORTH)

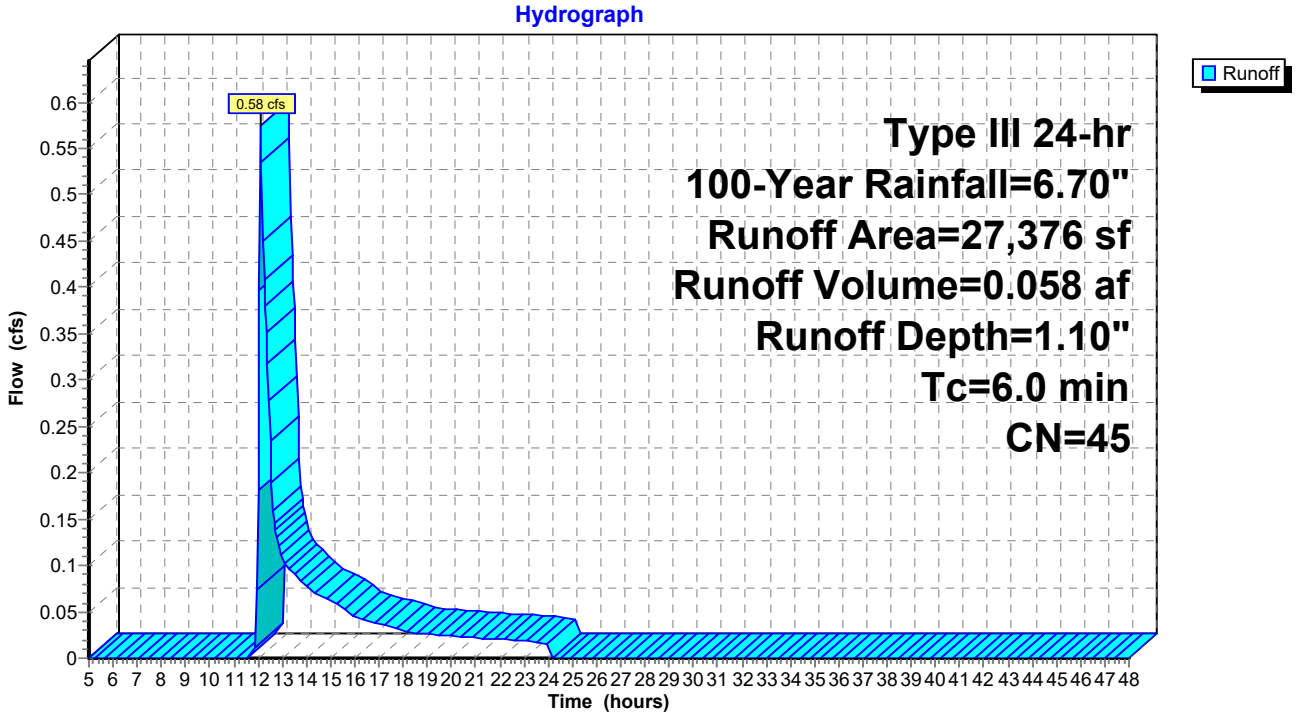
Runoff = 0.58 cfs @ 12.12 hrs, Volume= 0.058 af, Depth= 1.10"
Routed to Reach DP-4 : NORTHEAST PROPERTY LINE

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=6.70"

Area (sf)	CN	Description
2,991	98	Paved parking, HSG A
24,385	39	>75% Grass cover, Good, HSG A
27,376	45	Weighted Average
24,385		89.07% Pervious Area
2,991		10.93% Impervious Area

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

Subcatchment 4S: Site (NORTH)



Summary for Subcatchment 5S: POND BUFFER

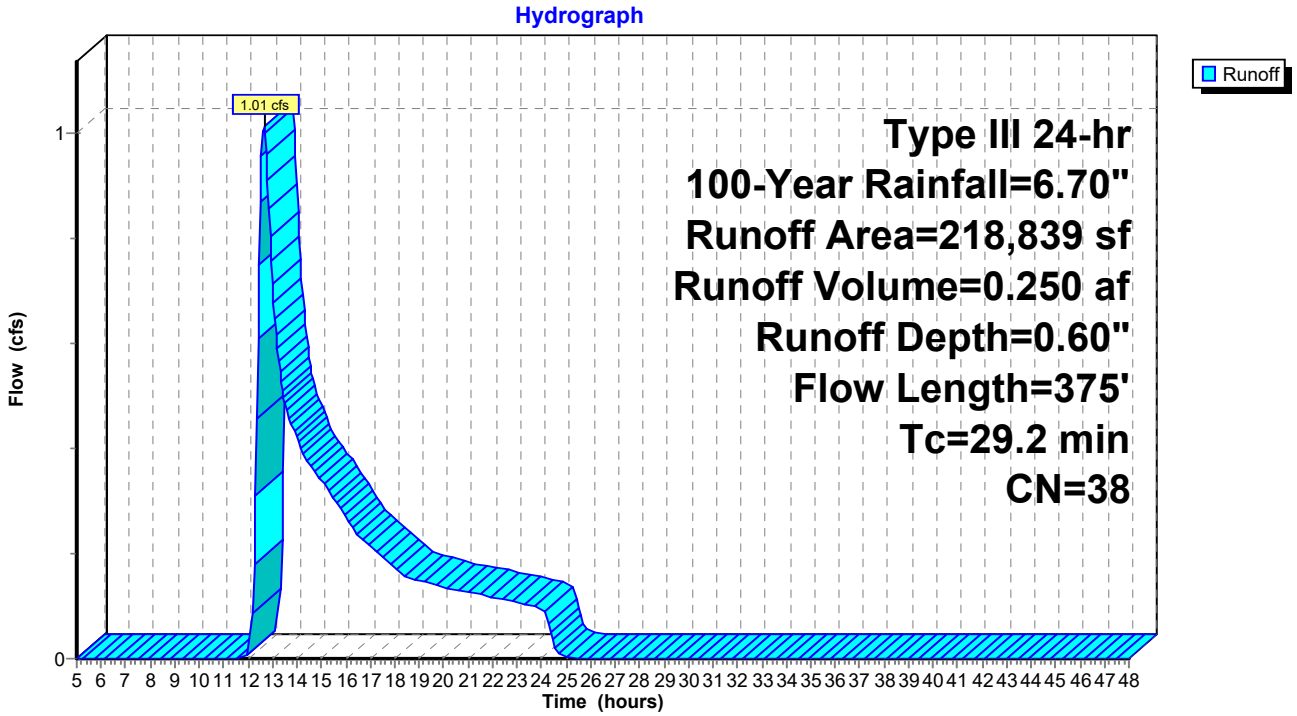
Runoff = 1.01 cfs @ 12.65 hrs, Volume= 0.250 af, Depth= 0.60"
Routed to Reach DP-1 : Ricketts Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=6.70"

Area (sf)	CN	Description
25,887	79	Woods/grass comb., Good, HSG D
192,952	32	Woods/grass comb., Good, HSG A
218,839	38	Weighted Average
218,839		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
28.3	50	0.0100	0.03		**Sheet Flow, SHEET** Woods: Dense underbrush n= 0.800 P2= 3.20"
0.9	325	0.1300	5.80		**Shallow Concentrated Flow, SHALLOW CONC. FLOW** Unpaved Kv= 16.1 fps
29.2	375	Total			

Subcatchment 5S: POND BUFFER



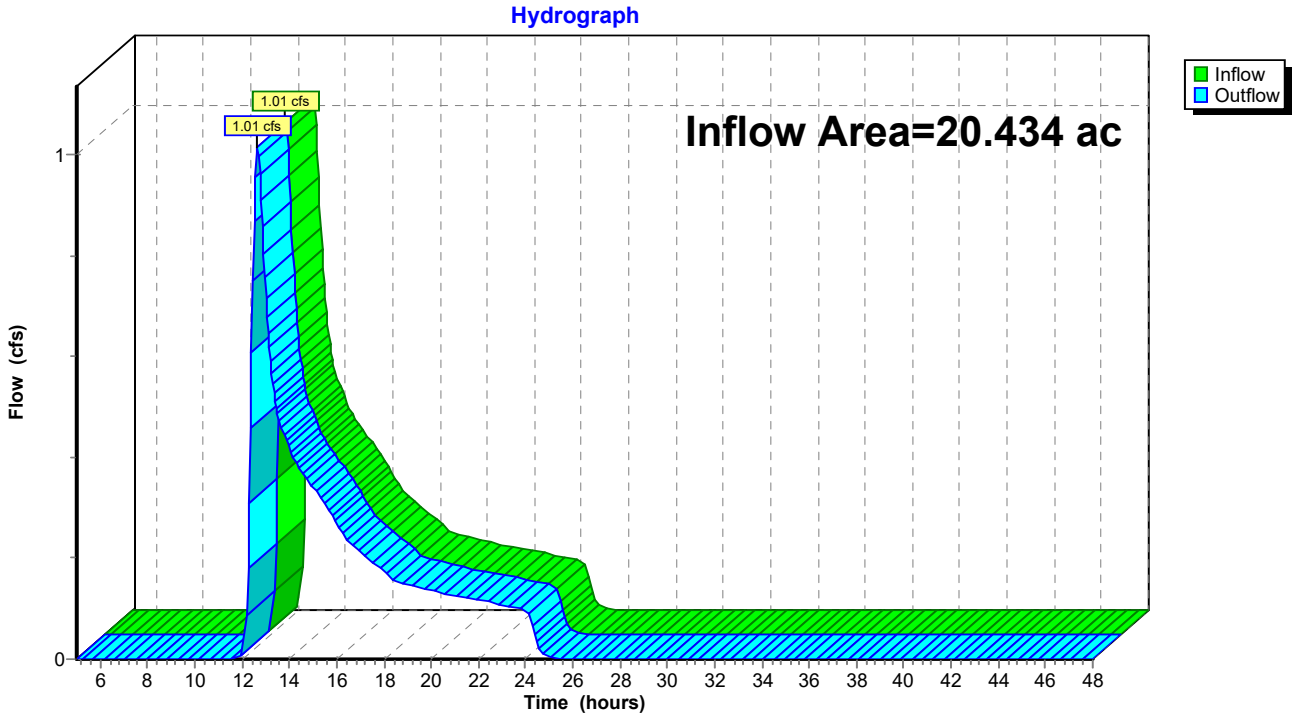
Summary for Reach DP-1: Ricketts Pond

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 20.434 ac, 40.19% Impervious, Inflow Depth = 0.15" for 100-Year event
Inflow = 1.01 cfs @ 12.65 hrs, Volume= 0.250 af
Outflow = 1.01 cfs @ 12.65 hrs, Volume= 0.250 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs

Reach DP-1: Ricketts Pond



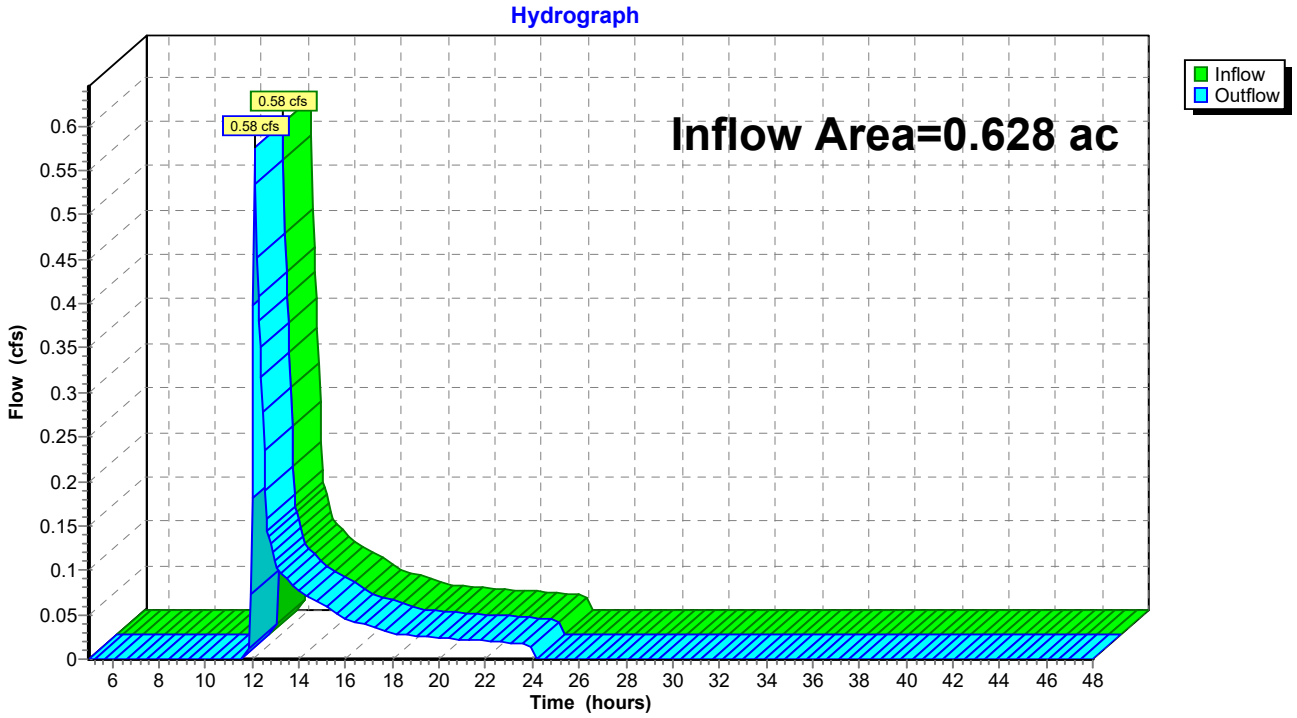
Summary for Reach DP-4: NORTHEAST PROPERTY LINE

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.628 ac, 10.93% Impervious, Inflow Depth = 1.10" for 100-Year event
Inflow = 0.58 cfs @ 12.12 hrs, Volume= 0.058 af
Outflow = 0.58 cfs @ 12.12 hrs, Volume= 0.058 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs

Reach DP-4: NORTHEAST PROPERTY LINE



Summary for Pond 1P: BASIN 1

[79] Warning: Submerged Pond 2P Primary device # 2 OUTLET by 0.51'

Inflow Area = 15.410 ac, 53.29% Impervious, Inflow Depth = 2.40" for 100-Year event
Inflow = 37.87 cfs @ 12.12 hrs, Volume= 3.083 af
Outflow = 0.94 cfs @ 10.80 hrs, Volume= 2.957 af, Atten= 98%, Lag= 0.0 min
Discarded = 0.94 cfs @ 10.80 hrs, Volume= 2.957 af
Primary = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af
Routed to Reach DP-1 : Ricketts Pond

Routing by Stor-Ind method, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 138.01' @ 19.92 hrs Surf.Area= 26,654 sf Storage= 89,383 cf

Plug-Flow detention time= 915.2 min calculated for 2.953 af (96% of inflow)
Center-of-Mass det. time= 893.3 min (1,739.4 - 846.1)

Volume	Invert	Avail.Storage	Storage Description
#1	134.00'	146,199 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

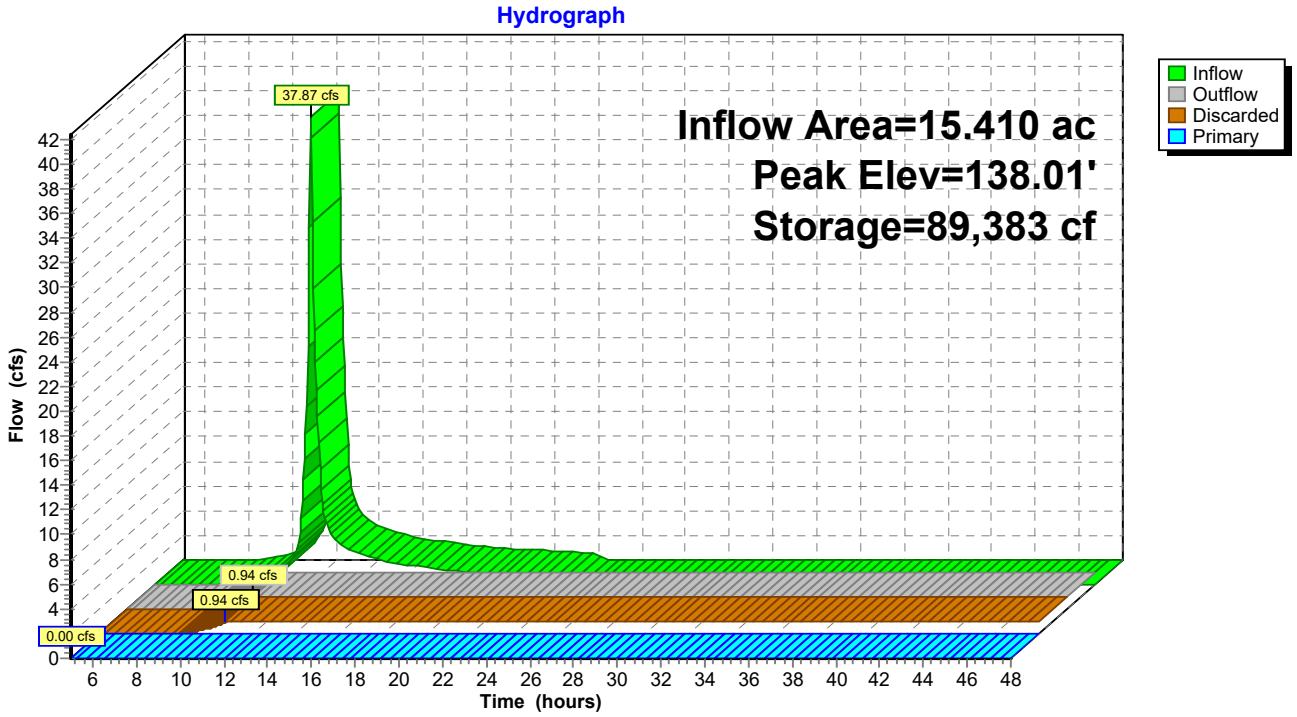
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
134.00	16,836	0	0
135.00	18,254	17,545	17,545
135.01	21,121	197	17,742
136.00	22,883	21,782	39,524
137.00	24,726	23,805	63,328
138.00	26,626	25,676	89,004
139.00	28,583	27,605	116,609
140.00	30,597	29,590	146,199

Device	Routing	Invert	Outlet Devices
#1	Discarded	134.00'	**0.94 cfs Exfiltration at all elevations**
#2	Primary	138.60'	**10.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Discarded OutFlow Max=0.94 cfs @ 10.80 hrs HW=134.06' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.94 cfs)

Primary OutFlow Max=0.00 cfs @ 5.00 hrs HW=134.00' (Free Discharge)
↑—**2=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 1P: BASIN 1



Summary for Pond 2P: BASIN 2

Inflow Area = 5.228 ac, 51.70% Impervious, Inflow Depth = 3.31" for 100-Year event
Inflow = 19.48 cfs @ 12.10 hrs, Volume= 1.440 af
Outflow = 0.57 cfs @ 17.23 hrs, Volume= 0.991 af, Atten= 97%, Lag= 307.7 min
Discarded = 0.27 cfs @ 10.40 hrs, Volume= 0.854 af
Primary = 0.30 cfs @ 17.23 hrs, Volume= 0.137 af
Routed to Pond 1P : BASIN 1

Routing by Stor-Ind method, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 138.75' @ 17.23 hrs Surf.Area= 13,704 sf Storage= 44,818 cf

Plug-Flow detention time= 914.6 min calculated for 0.989 af (69% of inflow)
Center-of-Mass det. time= 815.9 min (1,650.7 - 834.9)

Volume	Invert	Avail.Storage	Storage Description
#1	134.00'	63,393 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

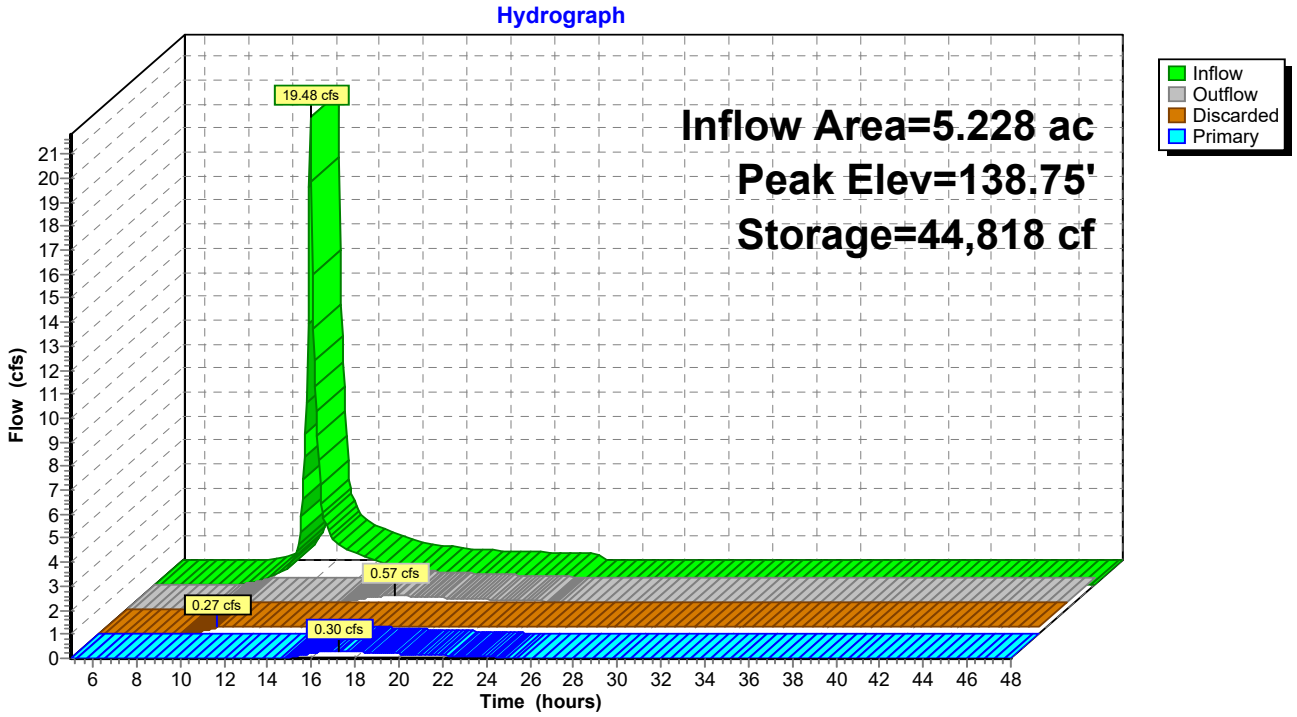
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
134.00	4,914	0	0
135.00	6,275	5,595	5,595
135.01	7,540	69	5,664
136.00	8,924	8,150	13,813
137.00	10,604	9,764	23,577
138.00	12,350	11,477	35,054
139.00	14,156	13,253	48,307
140.00	16,016	15,086	63,393

Device	Routing	Invert	Outlet Devices
#1	Discarded	134.00'	**0.27 cfs Exfiltration at all elevations**
#2	Primary	138.50'	**15.0" Round Culvert** L= 100.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 138.50' / 137.50' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf

Discarded OutFlow Max=0.27 cfs @ 10.40 hrs HW=134.06' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.27 cfs)

Primary OutFlow Max=0.30 cfs @ 17.23 hrs HW=138.75' (Free Discharge)
2=Culvert (Inlet Controls 0.30 cfs @ 1.70 fps)

Pond 2P: BASIN 2



A P P E N D I X C

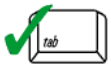
Checklist for Stormwater Report

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands Program

Checklist for Stormwater Report

A. Introduction

Important: When filling out forms on the computer, use only the tab key to move your cursor - do not use the return key.



A Stormwater Report must be submitted with the Notice of Intent permit application to document compliance with the Stormwater Management Standards. The following checklist is NOT a substitute for the Stormwater Report (which should provide more substantive and detailed information) but is offered here as a tool to help the applicant organize their Stormwater Management documentation for their Report and for the reviewer to assess this information in a consistent format. As noted in the Checklist, the Stormwater Report must contain the engineering computations and supporting information set forth in Volume 3 of the Massachusetts Stormwater Handbook. The Stormwater Report must be prepared and certified by a Registered Professional Engineer (RPE) licensed in the Commonwealth.

The Stormwater Report must include:

- The Stormwater Checklist completed and stamped by a Registered Professional Engineer (see page 2) that certifies that the Stormwater Report contains all required submittals.[1] This Checklist is to be used as the cover for the completed Stormwater Report.
- Applicant/Project Name
- Project Address
- Name of Firm and Registered Professional Engineer that prepared the Report
- Long-Term Pollution Prevention Plan required by Standards 4-6
- Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan required by Standard 8[2]
- Operation and Maintenance Plan required by Standard 9

In addition to all plans and supporting information, the Stormwater Report must include a brief narrative describing stormwater management practices, including environmentally sensitive site design and LID techniques, along with a diagram depicting runoff through the proposed BMP treatment train. Plans are required to show existing and proposed conditions, identify all wetland resource areas, NRCS soil types, critical areas, Land Uses with Higher Potential Pollutant Loads (LUHPPL), and any areas on the site where infiltration rate is greater than 2.4 inches per hour. The Plans shall identify the drainage areas for both existing and proposed conditions at a scale that enables verification of supporting calculations.

As noted in the Checklist, the Stormwater Management Report shall document compliance with each of the Stormwater Management Standards as provided in the Massachusetts Stormwater Handbook. The soils evaluation and calculations shall be done using the methodologies set forth in Volume 3 of the Massachusetts Stormwater Handbook.

To ensure that the Stormwater Report is complete, applicants are required to fill in the Stormwater Report Checklist by checking the box to indicate that the specified information has been included in the Stormwater Report. If any of the information specified in the checklist has not been submitted, the applicant must provide an explanation. The completed Stormwater Report Checklist and Certification must be submitted with the Stormwater Report.

[1] The Stormwater Report may also include the Illicit Discharge Compliance Statement required by Standard 10. If not included in the Stormwater Report, the Illicit Discharge Compliance Statement must be submitted prior to the discharge of stormwater runoff to the post-construction best management practices.

[2] For some complex projects, it may not be possible to include the Construction Period Erosion and Sedimentation Control Plan in the Stormwater Report. In that event, the issuing authority has the discretion to issue an Order of Conditions that approves the project and includes a condition requiring the proponent to submit the Construction Period Erosion and Sedimentation Control Plan before commencing any land disturbance activity on the site.

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands Program

Checklist for Stormwater Report

B. Stormwater Checklist and Certification

The following checklist is intended to serve as a guide for applicants as to the elements that ordinarily need to be addressed in a complete Stormwater Report. The checklist is also intended to provide conservation commissions and other reviewing authorities with a summary of the components necessary for a comprehensive Stormwater Report that addresses the ten Stormwater Standards.

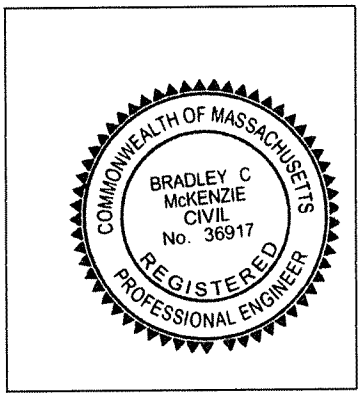
Note: Because stormwater requirements vary from project to project, it is possible that a complete Stormwater Report may not include information on some of the subjects specified in the Checklist. If it is determined that a specific item does not apply to the project under review, please note that the item is not applicable (N.A.) and provide the reasons for that determination.

A complete checklist must include the Certification set forth below signed by the Registered Professional Engineer who prepared the Stormwater Report.

Registered Professional Engineer's Certification

I have reviewed the Stormwater Report, including the soil evaluation, computations, Long-term Pollution Prevention Plan, the Construction Period Erosion and Sedimentation Control Plan (if included), the Long-term Post-Construction Operation and Maintenance Plan, the Illicit Discharge Compliance Statement (if included) and the plans showing the stormwater management system, and have determined that they have been prepared in accordance with the requirements of the Stormwater Management Standards as further elaborated by the Massachusetts Stormwater Handbook. I have also determined that the information presented in the Stormwater Checklist is accurate and that the information presented in the Stormwater Report accurately reflects conditions at the site as of the date of this permit application.

Registered Professional Engineer Block and Signature



6-7-22

Signature and Date

Checklist

Project Type: Is the application for new development, redevelopment, or a mix of new and redevelopment?

☒ New development

☐ Redevelopment

☐ Mix of New Development and Redevelopment

Checklist for Stormwater Report

Checklist (continued)

LID Measures: Stormwater Standards require LID measures to be considered. Document what environmentally sensitive design and LID Techniques were considered during the planning and design of the project:

☒ No disturbance to any Wetland Resource Areas

☐ Site Design Practices (e.g. clustered development, reduced frontage setbacks)

☐ Reduced Impervious Area (Redevelopment Only)

☒ Minimizing disturbance to existing trees and shrubs

☐ LID Site Design Credit Requested:

- ☐ Credit 1
- ☐ Credit 2
- ☐ Credit 3

☐ Use of "country drainage" versus curb and gutter conveyance and pipe

☐ Bioretention Cells (includes Rain Gardens)

☐ Constructed Stormwater Wetlands (includes Gravel Wetlands designs)

☐ Treebox Filter

☐ Water Quality Swale

☐ Grass Channel

☐ Green Roof

☒ Other (describe): Infiltration Basin

Standard 1: No New Untreated Discharges

☒ No new untreated discharges

☒ Outlets have been designed so there is no erosion or scour to wetlands and waters of the Commonwealth

☒ Supporting calculations specified in Volume 3 of the Massachusetts Stormwater Handbook included.

Checklist for Stormwater Report

Checklist (continued)

Standard 2: Peak Rate Attenuation

☐ Standard 2 waiver requested because the project is located in land subject to coastal storm flowage and stormwater discharge is to a wetland subject to coastal flooding.

☐ Evaluation provided to determine whether off-site flooding increases during the 100-year 24-hour storm.

☒ Calculations provided to show that post-development peak discharge rates do not exceed pre-development rates for the 2-year and 10-year 24-hour storms. If evaluation shows that off-site flooding increases during the 100-year 24-hour storm, calculations are also provided to show that post-development peak discharge rates do not exceed pre-development rates for the 100-year 24-hour storm.

Standard 3: Recharge

☒ Soil Analysis provided.

☒ Required Recharge Volume calculation provided.

☐ Required Recharge volume reduced through use of the LID site Design Credits.

☒ Sizing the infiltration, BMPs is based on the following method: Check the method used.

☐ Static ☒ Simple Dynamic ☐ Dynamic Field[1]

☒ Runoff from all impervious areas at the site discharging to the infiltration BMP.

☐ Runoff from all impervious areas at the site is *not* discharging to the infiltration BMP and calculations are provided showing that the drainage area contributing runoff to the infiltration BMPs is sufficient to generate the required recharge volume.

☒ Recharge BMPs have been sized to infiltrate the Required Recharge Volume.

☐ Recharge BMPs have been sized to infiltrate the Required Recharge Volume *only* to the maximum extent practicable for the following reason:

- ☐ Site is comprised solely of C and D soils and/or bedrock at the land surface
- ☐ M.G.L. c. 21E sites pursuant to 310 CMR 40.0000
- ☐ Solid Waste Landfill pursuant to 310 CMR 19.000
- ☐ Project is otherwise subject to Stormwater Management Standards only to the maximum extent practicable.

☒ Calculations showing that the infiltration BMPs will drain in 72 hours are provided.

☐ Property includes a M.G.L. c. 21E site or a solid waste landfill and a mounding analysis is included.

[1] 80% TSS removal is required prior to discharge to infiltration BMP if Dynamic Field method is used.

Checklist for Stormwater Report

Checklist (continued)

Standard 3: Recharge (continued)

☐ The infiltration BMP is used to attenuate peak flows during storms greater than or equal to the 10-year 24-hour storm and separation to seasonal high groundwater is less than 4 feet and a mounding analysis is provided.

☐ Documentation is provided showing that infiltration BMPs do not adversely impact nearby wetland resource areas.

Standard 4: Water Quality

The Long-Term Pollution Prevention Plan typically includes the following:

- Good housekeeping practices;
- Provisions for storing materials and waste products inside or under cover;
- Vehicle washing controls;
- Requirements for routine inspections and maintenance of stormwater BMPs;
- Spill prevention and response plans;
- Provisions for maintenance of lawns, gardens, and other landscaped areas;
- Requirements for storage and use of fertilizers, herbicides, and pesticides;
- Pet waste management provisions;
- Provisions for operation and management of septic systems;
- Provisions for solid waste management;
- Snow disposal and plowing plans relative to Wetland Resource Areas;
- Winter Road Salt and/or Sand Use and Storage restrictions;
- Street sweeping schedules;
- Provisions for prevention of illicit discharges to the stormwater management system;
- Documentation that Stormwater BMPs are designed to provide for shutdown and containment in the event of a spill or discharges to or near critical areas or from LUHPPL;
- Training for staff or personnel involved with implementing Long-Term Pollution Prevention Plan;
- List of Emergency contacts for implementing Long-Term Pollution Prevention Plan.

☐ A Long-Term Pollution Prevention Plan is attached to Stormwater Report and is included as an attachment to the Wetlands Notice of Intent.

☐ Treatment BMPs subject to the 44% TSS removal pretreatment requirement and the one inch rule for calculating the water quality volume are included, and discharge:

- ☐ is within the Zone II or Interim Wellhead Protection Area
- ☐ is near or to other critical areas
- ☐ is within soils with a rapid infiltration rate (greater than 2.4 inches per hour)
- ☐ involves runoff from land uses with higher potential pollutant loads.

☐ The Required Water Quality Volume is reduced through use of the LID site Design Credits.

☒ Calculations documenting that the treatment train meets the 80% TSS removal requirement and, if applicable, the 44% TSS removal pretreatment requirement, are provided.

Checklist for Stormwater Report

Checklist (continued)

Standard 4: Water Quality (continued)

☒ The BMP is sized (and calculations provided) based on:

- ☒ The ½" or 1" Water Quality Volume or
- ☐ The equivalent flow rate associated with the Water Quality Volume and documentation is provided showing that the BMP treats the required water quality volume.

☐ The applicant proposes to use proprietary BMPs, and documentation supporting use of proprietary BMP and proposed TSS removal rate is provided. This documentation may be in the form of the propriety BMP checklist found in Volume 2, Chapter 4 of the Massachusetts Stormwater Handbook and submitting copies of the TARP Report, STEP Report, and/or other third party studies verifying performance of the proprietary BMPs.

☐ A TMDL exists that indicates a need to reduce pollutants other than TSS and documentation showing that the BMPs selected are consistent with the TMDL is provided.

Standard 5: Land Uses With Higher Potential Pollutant Loads (LUHPPLs)

☐ The NPDES Multi-Sector General Permit covers the land use and the Stormwater Pollution Prevention Plan (SWPPP) has been included with the Stormwater Report.

☐ The NPDES Multi-Sector General Permit covers the land use and the SWPPP will be submitted ***prior to*** the discharge of stormwater to the post-construction stormwater BMPs.

☐ The NPDES Multi-Sector General Permit does ***not*** cover the land use.

☐ LUHPPLs are located at the site and industry specific source control and pollution prevention measures have been proposed to reduce or eliminate the exposure of LUHPPLs to rain, snow, snow melt and runoff, and been included in the long term Pollution Prevention Plan.

☐ All exposure has been eliminated.

☐ All exposure has ***not*** been eliminated and all BMPs selected are on MassDEP LUHPPL list.

☐ The LUHPPL has the potential to generate runoff with moderate to higher concentrations of oil and grease (e.g. all parking lots with >1000 vehicle trips per day) and the treatment train includes an oil grit separator, a filtering bioretention area, a sand filter or equivalent.

Standard 6: Critical Areas

☐ The discharge is near or to a critical area and the treatment train includes only BMPs that MassDEP has approved for stormwater discharges to or near that particular class of critical area.

☐ Critical areas and BMPs are identified in the Stormwater Report.

Checklist for Stormwater Report

Checklist (continued)

Standard 7: Redevelopments and Other Projects Subject to the Standards only to the maximum extent practicable

☐ The project is subject to the Stormwater Management Standards only to the maximum Extent Practicable as a:

- ☐ Limited Project
- ☐ Small Residential Projects: 5-9 single family houses or 5-9 units in a multi-family development provided there is no discharge that may potentially affect a critical area.
- ☐ Small Residential Projects: 2-4 single family houses or 2-4 units in a multi-family development with a discharge to a critical area
- ☐ Marina and/or boatyard provided the hull painting, service and maintenance areas are protected from exposure to rain, snow, snow melt and runoff
- ☐ Bike Path and/or Foot Path
- ☐ Redevelopment Project
- ☐ Redevelopment portion of mix of new and redevelopment.

☐ Certain standards are not fully met (Standard No. 1, 8, 9, and 10 must always be fully met) and an explanation of why these standards are not met is contained in the Stormwater Report.

☐ The project involves redevelopment and a description of all measures that have been taken to improve existing conditions is provided in the Stormwater Report. The redevelopment checklist found in Volume 2 Chapter 3 of the Massachusetts Stormwater Handbook may be used to document that the proposed stormwater management system (a) complies with Standards 2, 3 and the pretreatment and structural BMP requirements of Standards 4-6 to the maximum extent practicable and (b) improves existing conditions.

Standard 8: Construction Period Pollution Prevention and Erosion and Sedimentation Control

A Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan must include the following information:

- Narrative;
- Construction Period Operation and Maintenance Plan;
- Names of Persons or Entity Responsible for Plan Compliance;
- Construction Period Pollution Prevention Measures;
- Erosion and Sedimentation Control Plan Drawings;
- Detail drawings and specifications for erosion control BMPs, including sizing calculations;
- Vegetation Planning;
- Site Development Plan;
- Construction Sequencing Plan;
- Sequencing of Erosion and Sedimentation Controls;
- Operation and Maintenance of Erosion and Sedimentation Controls;
- Inspection Schedule;
- Maintenance Schedule;
- Inspection and Maintenance Log Form.

☒ A Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan containing the information set forth above has been included in the Stormwater Report.

Checklist for Stormwater Report

Checklist (continued)

Standard 8: Construction Period Pollution Prevention and Erosion and Sedimentation Control (continued)

☐ The project is highly complex and information is included in the Stormwater Report that explains why it is not possible to submit the Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan with the application. A Construction Period Pollution Prevention and Erosion and Sedimentation Control has ***not*** been included in the Stormwater Report but will be submitted ***before*** land disturbance begins.

☐ The project is ***not*** covered by a NPDES Construction General Permit.

☐ The project is covered by a NPDES Construction General Permit and a copy of the SWPPP is in the Stormwater Report.

☒ The project is covered by a NPDES Construction General Permit but no SWPPP been submitted. The SWPPP will be submitted BEFORE land disturbance begins.

Standard 9: Operation and Maintenance Plan

☒ The Post Construction Operation and Maintenance Plan is included in the Stormwater Report and includes the following information:

- ☒ Name of the stormwater management system owners;
- ☒ Party responsible for operation and maintenance;
- ☒ Schedule for implementation of routine and non-routine maintenance tasks;
- ☒ Plan showing the location of all stormwater BMPs maintenance access areas;
- ☒ Description and delineation of public safety features;
- ☐ Estimated operation and maintenance budget; and
- ☒ Operation and Maintenance Log Form.

☐ The responsible party is ***not*** the owner of the parcel where the BMP is located and the Stormwater Report includes the following submissions:

- ☐ A copy of the legal instrument (deed, homeowner's association, utility trust or other legal entity) that establishes the terms of and legal responsibility for the operation and maintenance of the project site stormwater BMPs;
- ☐ A plan and easement deed that allows site access for the legal entity to operate and maintain BMP functions.

Standard 10: Prohibition of Illicit Discharges

☒ The Long-Term Pollution Prevention Plan includes measures to prevent illicit discharges;

☒ An Illicit Discharge Compliance Statement is attached;

☐ NO Illicit Discharge Compliance Statement is attached but will be submitted ***prior to*** the discharge of any stormwater to post-construction BMPs.

A P P E N D I X D

Illicit Discharge Compliance Statement
Supplemental BMP Calculations

Illicit Discharge Compliance Statement

I, Bradley C. McKenzie, P.E., hereby notify the Carver Conservation Commission that I have not witnessed, nor am aware of any existing illicit discharges at the site known as Lot 2, Ricketts Pond Business Park (Off Spring Street) in Carver, Massachusetts. I also hereby certify that the development of said property as illustrated on the final plans entitled "Site Development Plan, Ricketts Pond Business Park, Lot 2, Off Spring Street Carver, Massachusetts," prepared by McKenzie Engineering Group. Inc. dated February 28, 2022 and as revised and approved by the Carver Conservation Commission and maintenance thereof in accordance with the "Construction Phase Operations and Maintenance Plan" and "Long-Term Operations and Maintenance Plan" prepared by McKenzie Engineering Group, Inc. dated June 6. 2022 and as revised and approved by the Carver Conservation Commission will not create any new illicit discharges. There is no warranty implied regarding future illicit discharges that may occur as a result of improper construction or maintenance of the stormwater management system or unforeseen accidents.

Name: Bradley C. McKenzie, P.E.

Company: McKenzie Engineering Group, Inc.

Title: President

Signature: 

Date: 6-7-22

MCKENZIE ENGINEERING GROUP

Assinippi Office Park
150 Longwater Drive, Suite 101
Norwell, MA 02061

Ricketts Pond Business Park
Spring Street
Carver, MA

5/25/2022

WATER QUALITY VOLUME ANALYSIS

POND	IMPERVIOUS AREA (SF) CN=98	PRECIPITATION (IN)	WATER QUALITY VOLUME REQUIRED (CF)	TREATMENT VOLUME PROVIDED (CF) UP TO INVERT ELEVATION	NET TREATMENT VOLUME PROVIDED (CF)
P-1	239,942	0.50	9,998	105,332	95,334
P-2	117,751	0.50	4,906	41,455	36,549
TOTAL	**357,693**		**14,904**	**146,787**	**131,883**

WATER QUALITY VOLUME ANALYSIS - PROPRIETARY STORMWATER TREATMENT UNITS (FIRST DEFENSE UNITS)*

	IMPERVIOUS AREA (SF) CN=98	PRECIPITATION (IN)	qu (Fig 4) Tc 6 min. (CSM/IN)	AREA (SM)	WATER QUALITY REQUIRED (CFS)
P-1	239,942	0.50	774	8.607E-03	3.331
P-2	117,751	0.50	774	4.224E-03	1.635

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Spring Street
Carver, MA

5/25/2022

REQUIRED RECHARGE VOLUME (CF) *"STATIC METHOD"*

WATERSHED #	IMPERVIOUS AREA (SF)	TARGET DEPTH FACTOR (F) A SOIL	IMPERVIOUS AREA (SF)	TARGET DEPTH FACTOR (F) B SOIL	IMPERVIOUS AREA (SF)	TARGET DEPTH FACTOR (F) C SOIL	IMPERVIOUS AREA (SF)	TARGET DEPTH FACTOR (F) D SOIL		REQUIRED RECHARGE VOLUME (CF)
1P	239,942	0.60		0.35		0.25		0.10		11,997
2P	117,751	0.60		0.35		0.25		0.10		5,888
		0.60		0.35		0.25		0.10		0
							TOTAL			**17,885**

CAPTURE ADJUSTMENT

WATERSHED #	TOTAL IMPERVIOUS AREA (SF)	TOTAL IMPERVIOUS COLLECTED	% DIRECTED TOWARDS INFILTRATION SYSTEM	STANDARD NO. 3 <100% - > 65% CAPTURED	CAPTURE ADJUSTMENT	ADJUSTED REQUIRED RECHARGE VOLUME (CF)
TOTAL SITE	360,684	357,693	99.17%	**CAPTURE ADJUSTMENT REQUIRED**	1.01	18,034

* Required Water Quality Volume based on 0.5 inches of runoff; Required Recharge Volume based on 0.60 inches; Target Volume is Adjusted Required Recharge Volume of 18,034CF.

PROVIDED RECHARGE VOLUME (CF)
BELOW LOWEST INVERT

	REQUIRED RECHARGE VOLUME (CF)	POND	STORAGE VOLUME PROVIDED (CF)	NET STORAGE VOLUME PROVIDED (CF)
	12,097	P-1	105,332	93,235
	5,937	P-2	41,455	35,518
TOTAL	**18,034**		**146,787**	**128,753**

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Assinippi Office Park
150 Longwater Drive, Suite 101
Norwell, MA 02061

Ricketts Pond Business Park
Spring Street
Carver, MA

5/25/2022

DRAWDOWN WITHIN 72 HOURS ANALYSIS

POND	RAWLS RATE (IN/HR)	STORAGE VOLUME PROVIDED (CF)	BOTTOM AREA (FT2)	DRAWDOWN (HR)
P-1	8.2700	105,332	16,836	9
P-2	8.2700	41,455	4,914	12

Storm Drainage Computations

Name: LOT 2 - SPRING STREET, CARVER

Client: RPBP, LLC

Proj. No.: **217-182**
Date: **1-Jun-22**
Computed by: **ESS**
Checked by: **BCM**

Design Parameters:
100 **Year Storm**
Boston, MA
k_e= **0.5**

DESCRIPTION	LOCATION		AREA	C	C x A	SUM	FLOW TIME (MIN)		i*	DESIGN					CAPACITY		PROFILE						
	FROM	TO	(AC.)			C x A	PIPE	CONC TIME		Q cfs	V fps	n	PIPE SIZE	SLOPE	Q full ft^3/s	V full ft/s	LENGTH ft	FALL ft	RIM	INV UPPER	INV LOWER	W.S.E. ft	Freeboard ft
	CB1	DMH1	0.340	0.82	0.28	0.28	0.02	6.0	7.0	2.0	3.9	0.013	12	0.0100	3.6	4.5	5	0.05	145.00	141.35	141.30	141.8	3.2
	CB2	DMH2	0.295	0.62	0.18	0.18	0.61	6.0	7.0	1.3	3.5	0.013	12	0.0102	3.6	4.6	128	1.30	145.00	142.50	141.20	143.2	1.8
	CB3	DMH2	0.370	0.57	0.21	0.21	0.15	6.0	7.0	1.5	5.3	0.013	12	0.0283	6.0	7.6	46	1.30	145.00	142.50	141.20	143.8	1.2
	DMH2	DMH3	---	---	---	0.39	0.36	6.6	6.8	2.7	4.6	0.013	12	0.0120	3.9	5.0	100	1.20	146.05	141.20	140.00	142.6	3.5
	DMH1	DMH3	---	---	---	0.62	0.69	6.0	7.0	4.3	4.3	0.013	18	0.0074	9.1	5.1	175	1.30	145.10	141.30	140.00	142.0	3.1
	CB4	DMH3	0.318	0.86	0.27	0.27	0.01	6.0	7.0	1.9	11.8	0.013	12	0.2600	18.2	23.1	5	1.30	145.00	141.30	140.00	139.6	5.4
	DMH3	FES	---	---	---	1.29	1.52	6.7	6.8	8.8	4.4	0.013	24	0.0050	16.0	5.1	400	2.00	145.10	140.00	138.00	141.5	3.6
	CB2B	DMH1	0.815	0.42	0.34	0.34	0.04	6.0	7.0	2.4	4.3	0.013	12	0.0110	3.7	4.8	10	0.11	144.31	140.61	140.50	141.0	3.3

Inlet Capacity

Name:	Ricketts Pond Business Park Carver, MA	Proj. No.:	**217-182**
		Date:	**6/1/2022**
Client:	RPBP, LLC	Computed by:	**ESS**
		Checked by:	**BCM**

CB #	Flow to CB (cfs)	Grate Type	Grate Area (sf)	Head (ft)	Head (in)	Grate Capacity (cfs)	Adequate Capacity (Y/N)
CB1	2.0	A	1.56	0.25	3.00	2.63	YES
CB2	1.3	A	1.56	0.25	3.00	2.63	YES
CB3	1.5	A	1.56	0.25	3.00	2.63	YES
CB4	1.9	A	1.56	0.25	3.00	2.63	YES
CB2B	2.4	B	3.13	0.25	3.00	5.27	YES

Notes:

1. CxA values from storm drainage calcs.
2. Grate Types:

Name	Type	Area (sf)
Lebaron LF 248-2	A	1.56
Lebaron LV 2448-2	B	3.13
Lebaron LG 24SG1	C	1.56
Lebaron LG 24SG18	D	1.73
Neenah R3405A	E	1.30
Neenah R3405B	F	1.50
Neenah R3405A-Double	G	2.60
Neenah R3405B-Double	H	3.00

4. The Orifice Equation was used to evaluate grate capacity:

   $Q = C \times A \times (2gh)1/2 \times f$

   where:

   Q = Grate Capacity
   C = Orifice Coefficient, 0.6
   A = Free Open Area of grate in square feet
   h = Head over grate in feet
   g = Gravity, ft/s^2, 32.2
   *f = Clogging Factor, 0.7
   *Assumes the catch basin is 30% clogged

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Assinippi Office Park
150 Longwater Drive, Suite 101
Norwell, MA 02061

Standard 4: Pretreatment: Infiltration Basin 1

NAME: Ricketts pond Business Park
Carver, MA
CLIENT: RPBP, LLC
COUNTY: Plymouth

Proj. No.: 217-182
Date: 10/3/2018
Revised:
Computed by: ESS
Checked by: BCM

TSS Removal Calculation Worksheet

B BMP[1]	C TSS Removal Rate[1]	D Starting TSS Load*	E Amount Removed (C*D)	F Remaining Load (D-E)
Deep Sump and Hooded Catch Basin	**0.25**	**1.00**	**0.25**	**0.75**
Sediment Forebay	**0.25**	**0.75**	**0.19**	**0.56**
	0.00	**0.56**	**0.00**	**0.56**
	0.00	**0.56**	**0.00**	**0.56**
	0.00	**0.56**	**0.00**	**0.56**

Total TSS Removal = **44%**

*Equals remaining load from previous BMP (E) which enters the BMP

Non-automated TSS Calculation Sheet
must be used if Proprietary BMP Proposed
1. From MassDEP Stormwater Handbook Vol. 1

MCKENZIE ENGINEERING GROUP

Assinippi Office Park
150 Longwater Drive, Suite 101
Norwell, MA 02061

Standard 4: Total Suspended Solids Calculation: Infiltration Basin 1 & 2

NAME: Ricketts pond Business Park
Carver, MA
CLIENT: RPBP, LLC
COUNTY: Plymouth

Proj. No.: 217-182
Date: 10/3/2018
Revised:
Computed by: ESS
Checked by: BCM

TSS Removal Calculation Worksheet

B BMP[1]	C TSS Removal Rate[1]	D Starting TSS Load*	E Amount Removed (C*D)	F Remaining Load (D-E)
Deep Sump and Hooded Catch Basin	**0.25**	**1.00**	**0.25**	**0.75**
Infiltration Basin	**0.80**	**0.75**	**0.60**	**0.15**
	0.00	**0.15**	**0.00**	**0.15**
	0.00	**0.15**	**0.00**	**0.15**
	0.00	**0.15**	**0.00**	**0.15**

Total TSS Removal = **85%**

*Equals remaining load from previous BMP (E) which enters the BMP

Non-automated TSS Calculation Sheet
must be used if Proprietary BMP Proposed
1. From MassDEP Stormwater Handbook Vol. 1

Mass. Dept. of Environmental Protection
Version 1, Automated: Mar. 4, 2008

A P P E N D I X E

Soil Testing Data

Commonwealth of Massachusetts
City/Town of

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

A. Facility Information

Mike Facchini
Owner Name

Form A Lot - Off Spring Street
Street Address

N/A
Map/Lot #

Carver
City

MA
State

02330
Zip Code

B. Site Information

1. (Check one) [X] New Construction [ ] Upgrade [ ] Repair

2. Soil Survey Available? [X] Yes [ ] No If yes: NRCS (Source) 480 C (Soil Map Unit)

Plymouth - Carver Complex
Soil Name

None
Soil Limitations

Meltout Till
Soil Parent material

Shoulder
Landform

3. Surficial Geological Report Available? [X] Yes [ ] No If yes: 2020 MassGIS (Year Published/Source) Sand/Gravel (Map Unit)

Sandy and gravelly supraglacial meltout till over sand and gravelly glaciofluvial deposits.
Description of Geologic Map Unit:

4. Flood Rate Insurance Map Within a regulatory floodway? [ ] Yes [X] No Zone x: 0.2%

5. Within a velocity zone? [ ] Yes [X] No

6. Within a Mapped Wetland Area? [X] Yes [X] No If yes, MassGIS Wetland Data Layer: Ricketts Pond at Rear of Site (Wetland Type)

7. Current Water Resource Conditions (USGS): 5/18/21 (Month/Day/ Year) Range: [ ] Above Normal [X] Normal [ ] Below Normal

8. Other references reviewed: MassGIS, Plymouth 22 well

Commonwealth of Massachusetts
City/Town of

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (*minimum of two holes required at every proposed primary and reserve disposal area)*

Deep Observation Hole Number: 1 (Hole #) | 5/20/2021 (Date) | 9:00AM (Time) | 70 Sunny (Weather) | 41.943° (Latitude) | -70.757° (Longitude:)

1. Land Use: Vacant Lot (e.g., woodland, agricultural field, vacant lot, etc.) | sand pit (Vegetation) | Cobbles (Surface Stones (e.g., cobbles, stones, boulders, etc.)) | 1-3% (Slope (%))

Description of Location: Left Front

2. Soil Parent Material: Outwash Till | Ground Moraine (Landform) | SH (Position on Landscape (SU, SH, BS, FS, TS))

3. Distances from: Open Water Body >100' feet | Drainage Way >100' feet | Wetlands >100' feet | Property Line 15' feet | Drinking Water Well >100' feet | Other _____ feet

4. Unsuitable Materials Present: ☐ Yes ☒ No If Yes: ☐ Disturbed Soil ☐ Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☐ Yes ☒ No If yes: n/a Depth Weeping from Pit | n/a Depth Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-8"	Fill	--	--	-	-	-	--	--	--	--	Sand over organics
8-24"	Bw	Sand	10YR 5/4	-	-	-	15	10	SG	Loose	Sand & Gravel
24-132"	C	Sand	10YR 6/4	-	-	-	10	5	SG	Loose	Sand & Gravel

Additional Notes: No weep, No mottle, Clean sand

Commonwealth of Massachusetts
City/Town of

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (*minimum of two holes required at every proposed primary and reserve disposal area)*

Deep Observation Hole Number: 2 (Hole #) | 5/20/2021 (Date) | 9:15AM (Time) | 70 Sunny (Weather) | 41.943° (Latitude) | -70.757° (Longitude:)

1. Land Use: Vacant Lot (e.g., woodland, agricultural field, vacant lot, etc.) | sand pit (Vegetation) | cobbles (Surface Stones (e.g., cobbles, stones, boulders, etc.)) | 1-3% (Slope (%))

Description of Location: Left Front

2. Soil Parent Material: Outwash Till | Ground Moraine (Landform) | SH (Position on Landscape (SU, SH, BS, FS, TS))

3. Distances from: Open Water Body >100' feet | Drainage Way >100' feet | Wetlands >100' feet
Property Line 30' feet | Drinking Water Well >100' feet | Other x feet

4. Unsuitable Materials Present: ☐ Yes ☒ No If Yes: ☐ Disturbed Soil ☐ Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☐ Yes ☒ No If yes: n/a Depth Weeping from Pit | n/a Depth Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA)	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-8"	Fill	--	--	-	-	-	--	--	--	--	Sand over organics
8-30"	Bw	Sand	10YR 5/4	-	-	-	15	10	SG	Loose	Sand & Gravel
30-136"	C	Sand	10YR 6/4	-	-	-	10	5	SG	Loose	Sand & Gravel

Additional Notes: No weep, No mottle, Clean sand, Perc at 54"

Commonwealth of Massachusetts
City/Town of

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

D. Determination of High Groundwater Elevation

1. Method Used:

	Obs. Hole # 1	Obs. Hole # 2
☐ Depth observed standing water in observation hole	_____ inches	_____ inches
☐ Depth weeping from side of observation hole	_____ inches	_____ inches
☐ Depth to soil redoximorphic features (mottles)	_____ inches	_____ inches
☒ Depth to adjusted seasonal high groundwater (S_h) (USGS methodology)	132 inches (Bot. of Hole)	136 inches (Bot. of Hole)

Index Well Number _____ Reading Date _____

$S_h = S_c – [S_r \times (OW_c – OW_{max})/OW_r]$

Obs. Hole/Well# _____ S_c 132/136" S_r _____ OW_c _____ OW_{max} _____ OW_r _____ S_h _____

2. Estimated Depth to High Groundwater: _____ inches

E. Depth of Pervious Material

1. Depth of Naturally Occurring Pervious Material

a. Does at least four feet of naturally occurring pervious material exist in all areas observed throughout the area proposed for the soil absorption system?

☒ Yes ☐ No

b. If yes, at what depth was it observed (exclude A and O Horizons)?	Upper boundary:	8" inches	Lower boundary:	136"+ inches
c. If no, at what depth was impervious material observed?	Upper boundary:	_____ inches	Lower boundary:	_____ inches

Commonwealth of Massachusetts
City/Town of

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

F. Certification

I certify that I am currently approved by the Department of Environmental Protection pursuant to 310 CMR 15.017 to conduct soil evaluations and that the above analysis has been performed by me consistent with the required training, expertise and experience described in 310 CMR 15.017. I further certify that the results of my soil evaluation, as indicated in the attached Soil Evaluation Form, are accurate and in accordance with 310 CMR 15.100 through 15.107.

Austin Chartier, PE	5/20/2021
Signature of Soil Evaluator	Date
Austin Chartier, PE SE#14167	6/30/2023
Typed or Printed Name of Soil Evaluator / License #	Expiration Date of License
Kevin Forgue	Carver Board of Health
Name of Approving Authority Witness	Approving Authority

Note: In accordance with 310 CMR 15.018(2) this form must be submitted to the approving authority within 60 days of the date of field testing, and to the designer and the property owner with Percolation Test Form 12.

Field Diagrams: Use this area for field diagrams:

Commonwealth of Massachusetts
City/Town of

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

A. Facility Information

Mike Facchini
Owner Name

Form A Lot - Off Spring Street
Street Address

N/A
Map/Lot #

Carver
City

MA
State

02330
Zip Code

B. Site Information

1. (Check one) [X] New Construction [ ] Upgrade [ ] Repair

2. Soil Survey Available? [X] Yes [ ] No If yes: NRCS (Source) 480 C (Soil Map Unit)

Plymouth - Carver Complex
Soil Name

None
Soil Limitations

Meltout Till
Soil Parent material

Shoulder
Landform

3. Surficial Geological Report Available? [X] Yes [ ] No If yes: 2020 MassGIS (Year Published/Source) Sand/Gravel (Map Unit)

Sandy and gravelly supraglacial meltout till over sand and gravelly glaciofluvial deposits.
Description of Geologic Map Unit:

4. Flood Rate Insurance Map Within a regulatory floodway? [ ] Yes [X] No Zone x: 0.2%

5. Within a velocity zone? [ ] Yes [X] No

6. Within a Mapped Wetland Area? [X] Yes [X] No If yes, MassGIS Wetland Data Layer: Ricketts Pond at Rear of Site (Wetland Type)

7. Current Water Resource Conditions (USGS): 5/18/21 (Month/Day/ Year) Range: [ ] Above Normal [X] Normal [ ] Below Normal

8. Other references reviewed: MassGIS, Plymouth 22 well

Commonwealth of Massachusetts
City/Town of

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (*minimum of two holes required at every proposed primary and reserve disposal area)*

Deep Observation Hole Number: 3 (Hole #) | 5/20/2021 (Date) | 9:30AM (Time) | 70 Sunny (Weather) | 41.943° (Latitude) | -70.757° (Longitude:)

1. Land Use: Vacant Lot (e.g., woodland, agricultural field, vacant lot, etc.) | sand pit (Vegetation) | Cobbles (Surface Stones (e.g., cobbles, stones, boulders, etc.)) | 1-3% (Slope (%))

Description of Location: Middle Front

2. Soil Parent Material: Outwash Till | Ground Moraine (Landform) | SH (Position on Landscape (SU, SH, BS, FS, TS))

3. Distances from: Open Water Body >100' feet | Drainage Way >100' feet | Wetlands >100' feet | Property Line 15' feet | Drinking Water Well >100' feet | Other _____ feet

4. Unsuitable Materials Present: ☐ Yes ☒ No If Yes: ☐ Disturbed Soil ☐ Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☐ Yes ☒ No If yes: n/a Depth Weeping from Pit | n/a Depth Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-12"	Fill	--	--	-	-	-	--	--	--	--	Sand over organics
12-28"	Bw	Sand	10YR 5/4	-	-	-	15	10	SG	Loose	Sand & Gravel
28-138"	C	Sand	10YR 6/4	-	-	-	10	5	SG	Loose	Sand & Gravel

Additional Notes: No weep, No mottle, Clean sand

Commonwealth of Massachusetts
City/Town of

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (*minimum of two holes required at every proposed primary and reserve disposal area)*

Deep Observation Hole Number: 4 (Hole #) | 5/20/2021 (Date) | 9:45AM (Time) | 70 Sunny (Weather) | 41.943° (Latitude) | -70.757° (Longitude:)

1. Land Use: Vacant Lot (e.g., woodland, agricultural field, vacant lot, etc.) | sand pit (Vegetation) | cobbles (Surface Stones (e.g., cobbles, stones, boulders, etc.)) | 1-3% (Slope (%))

Description of Location: MIddle Front

2. Soil Parent Material: Outwash Till | Ground Moraine (Landform) | SH (Position on Landscape (SU, SH, BS, FS, TS))

3. Distances from: Open Water Body >100' feet | Drainage Way >100' feet | Wetlands >100' feet
Property Line 30' feet | Drinking Water Well >100' feet | Other x feet

4. Unsuitable Materials Present: ☐ Yes ☒ No If Yes: ☐ Disturbed Soil ☐ Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☐ Yes ☒ No If yes: n/a Depth Weeping from Pit | n/a Depth Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA)	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-12"	Fill	--	--	-	-	-	--	--	--	--	Sand over organics
12-28"	Bw	Sand	10YR 5/4	-	-	-	15	10	SG	Loose	Sand & Gravel
28-132"	C	Sand	10YR 6/4	-	-	-	10	5	SG	Loose	Sand & Gravel

Additional Notes: No weep, No mottle, Clean sand, Perc at 40"

Commonwealth of Massachusetts
City/Town of

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

D. Determination of High Groundwater Elevation

1. Method Used:

	Obs. Hole # 3	Obs. Hole # 4
☐ Depth observed standing water in observation hole	_____ inches	_____ inches
☐ Depth weeping from side of observation hole	_____ inches	_____ inches
☐ Depth to soil redoximorphic features (mottles)	_____ inches	_____ inches
☒ Depth to adjusted seasonal high groundwater (S_h) (USGS methodology)	138 inches (Bot. of Hole)	132 inches (Bot. of Hole)

Index Well Number _____ Reading Date _____

$S_h = S_c – [S_r \times (OW_c – OW_{max})/OW_r]$

Obs. Hole/Well# _____ S_c 132/138" S_r _____ OW_c _____ OW_{max} _____ OW_r _____ S_h _____

2. Estimated Depth to High Groundwater: _____ inches

E. Depth of Pervious Material

1. Depth of Naturally Occurring Pervious Material

a. Does at least four feet of naturally occurring pervious material exist in all areas observed throughout the area proposed for the soil absorption system?

☒ Yes ☐ No

b. If yes, at what depth was it observed (exclude A and O Horizons)?	Upper boundary:	12" inches	Lower boundary:	138"+ inches
c. If no, at what depth was impervious material observed?	Upper boundary:	_____ inches	Lower boundary:	_____ inches

Commonwealth of Massachusetts
City/Town of

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

F. Certification

I certify that I am currently approved by the Department of Environmental Protection pursuant to 310 CMR 15.017 to conduct soil evaluations and that the above analysis has been performed by me consistent with the required training, expertise and experience described in 310 CMR 15.017. I further certify that the results of my soil evaluation, as indicated in the attached Soil Evaluation Form, are accurate and in accordance with 310 CMR 15.100 through 15.107.

Austin Chartier, PE	5/20/2021
Signature of Soil Evaluator	Date
Austin Chartier, PE SE#14167	6/30/2023
Typed or Printed Name of Soil Evaluator / License #	Expiration Date of License
Inspector - Kevin Forgue	Carver Board of Health
Name of Approving Authority Witness	Approving Authority

Note: In accordance with 310 CMR 15.018(2) this form must be submitted to the approving authority within 60 days of the date of field testing, and to the designer and the property owner with Percolation Test Form 12.

Field Diagrams: Use this area for field diagrams:

Commonwealth of Massachusetts
City/Town of Carver

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

A. Facility Information

RPBP, LLC
Owner Name

Lot 1 Ricketts Pond Drive
Street Address

Map 32 / Portion of Lots 1-1 & 1-2
Map/Lot #

Carver
City

MA
State

02330
Zip Code

B. Site Information

1. (Check one) ☒ New Construction ☐ Upgrade ☐ Repair

2. Soil Survey Available? ☒ Yes ☐ No If yes: Web Soil Survey (Source) 480C (Soil Map Unit)

Plymouth-Carver Complex
Soil Name

Slope
Soil Limitations

Ice contact outwash
Soil Parent material

Outwash plains
Landform

3. Surficial Geological Report Available? ☒ Yes ☐ No If yes: 2018 (Year Published/Source) Coarse deposits (Map Unit)

Gravel deposits, sand and gravel deposits and sand deposits
Description of Geologic Map Unit:

4. Flood Rate Insurance Map Within a regulatory floodway? ☐ Yes ☒ No

5. Within a velocity zone? ☐ Yes ☒ No

6. Within a Mapped Wetland Area? ☐ Yes ☒ No If yes, MassGIS Wetland Data Layer: (Wetland Type)

7. Current Water Resource Conditions (USGS): 04/06/2022 (Month/Day/ Year) Range: ☐ Above Normal ☒ Normal ☐ Below Normal

8. Other references reviewed:

Commonwealth of Massachusetts
City/Town of Carver

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (*minimum of two holes required at every proposed primary and reserve disposal area)*

Deep Observation Hole Number: TP-1 (Hole #) | 04/06/22 (Date) | 9:40 AM (Time) | Rain 45 degrees (Weather) | 41d 56'38.8" (Latitude) | 70d 46'1.4" (Longitude:)

1. Land Use: Gravel mining (e.g., woodland, agricultural field, vacant lot, etc.) | Fallow (Vegetation) | Few (Surface Stones (e.g., cobbles, stones, boulders, etc.)) | 3-5% (Slope (%))

Description of Location: _____

2. Soil Parent Material: Ice contact outwash | Outwash plain (Landform) | _____ (Position on Landscape (SU, SH, BS, FS, TS))

3. Distances from: Open Water Body >100 feet | Drainage Way >100 feet | Wetlands >100 feet | Property Line 130+/- feet | Drinking Water Well >100 feet | Other _____ feet

4. Unsuitable Materials Present: ☐ Yes ☒ No If Yes: ☐ Disturbed Soil ☐ Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☐ Yes ☒ No If yes: _____ Depth Weeping from Pit _____ Depth Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-8"	F	Fill									
8-112"	C1	Sand	2.5Y5/3			0	5%	<5%	Single grain	Loose	Fine - medium
112-150"	C2	Sandy loam/loamy sand	2.5Y5/3	112"		30%	5%	<5%	Slightly blocky	Friable	Fine

Commonwealth of Massachusetts
City/Town of Carver

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

Additional Notes:

C. On-Site Review (*minimum of two holes required at every proposed primary and reserve disposal area)*

Deep Observation Hole Number: TP-2 (Hole #) 04/06/22 (Date) 10:05 (Time) Rain 45 degrees (Weather) 41d 56'38.9" (Latitude) 70d 46'1.1" (Longitude:

1. Land Use: Gravel minimg (e.g., woodland, agricultural field, vacant lot, etc.) Fallow (Vegetation) Few (Surface Stones (e.g., cobbles, stones, boulders, etc.) 3-5% (Slope (%)

Description of Location:

2. Soil Parent Material: Ice contact outwash Outwash plain (Landform) (Position on Landscape (SU, SH, BS, FS, TS)

3. Distances from: Open Water Body >100 feet Drainage Way >100 feet Wetlands >100 feet
Property Line 140+/- feet Drinking Water Well >100 feet Other _____ feet

4. Unsuitable Materials Present: ☐ Yes ☒ No If Yes: ☐ Disturbed Soil ☐ Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☐ Yes ☐ No If yes: _____ Depth Weeping from Pit _____ Depth Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA)	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-10"	F	Fill									
10-126"	C1	Sand	2.5Y5/3			0	5%	<5%	Single grain	Loose	Fine - medium
126-146"	C2	Sandy loam loamy sand	2.5Y5/3	126"		30%	5%	<5%	Slightly blocky	Friable	Fine

Additional Notes:

D. Determination of High Groundwater Elevation

1. Method Used:	Obs. Hole #TP-1	Obs. Hole #TP-2
☐ Depth observed standing water in observation hole	_____ inches	_____ inches
☐ Depth weeping from side of observation hole	_____ inches	_____ inches
☒ Depth to soil redoximorphic features (mottles)	112 inches	126 inches
☐ Depth to adjusted seasonal high groundwater (S_h) (USGS methodology)	_____ inches	_____ inches

_____ Index Well Number

_____ Reading Date

$S_h = S_c – [S_r \times (OW_c – OW_{max})/OW_r]$

Obs. Hole/Well# _____ S_c _____ S_r _____ OW_c _____ OW_{max} _____ OW_r _____ S_h _____

2. Estimated Depth to High Groundwater: _____ inches

E. Depth of Pervious Material

1. Depth of Naturally Occurring Pervious Material

a. Does at least four feet of naturally occurring pervious material exist in all areas observed throughout the area proposed for the soil absorption system?

☒ Yes ☐ No

b. If yes, at what depth was it observed (exclude A and O Horizons)?	Upper boundary:	10 inches	Lower boundary:	126 inches
c. If no, at what depth was impervious material observed?	Upper boundary:	_____ inches	Lower boundary:	_____ inches

Commonwealth of Massachusetts
City/Town of Carver

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

F. Certification

I certify that I am currently approved by the Department of Environmental Protection pursuant to 310 CMR 15.017 to conduct soil evaluations and that the above analysis has been performed by me consistent with the required training, expertise and experience described in 310 CMR 15.017. I further certify that the results of my soil evaluation, as indicated in the attached Soil Evaluation Form, are accurate and in accordance with 310 CMR 15.100 through 15.107.

Signature of Soil Evaluator	April 6, 2022 Date
Alan W. Loomis / Soil evaluator #1405 Typed or Printed Name of Soil Evaluator / License #	June 30, 2022 Expiration Date of License
Kevin Forgue, Health Agent Name of Approving Authority Witness	Carver Board of Health Approving Authority

Note: In accordance with 310 CMR 15.018(2) this form must be submitted to the approving authority within 60 days of the date of field testing, and to the designer and the property owner with Percolation Test Form 12.

Field Diagrams: Use this area for field diagrams:

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

Commonwealth of Massachusetts
City/Town of Carver

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

A. Facility Information

RPBP, LLC
Owner Name

Lot 1 Ricketts Pond Drive
Street Address

Map 32 / Portion of Lots 1-1 & 1-2
Map/Lot #

Carver
City

MA
State

02330
Zip Code

B. Site Information

1. (Check one) ☒ New Construction ☐ Upgrade ☐ Repair

2. Soil Survey Available? ☒ Yes ☐ No If yes: Web Soil Survey (Source) 480C (Soil Map Unit)

Plymouth-Carver Complex
Soil Name

Slope
Soil Limitations

Ice contact outwash
Soil Parent material

Outwash plains
Landform

3. Surficial Geological Report Available? ☒ Yes ☐ No If yes: 2018 (Year Published/Source) Coarse deposits (Map Unit)

Gravel deposits, sand and gravel deposits and sand deposits
Description of Geologic Map Unit:

4. Flood Rate Insurance Map Within a regulatory floodway? ☐ Yes ☒ No

5. Within a velocity zone? ☐ Yes ☒ No

6. Within a Mapped Wetland Area? ☐ Yes ☒ No If yes, MassGIS Wetland Data Layer: Wetland Type

7. Current Water Resource Conditions (USGS): 04/06/2022 (Month/Day/ Year) Range: ☐ Above Normal ☒ Normal ☐ Below Normal

8. Other references reviewed:

Commonwealth of Massachusetts
City/Town of Carver

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (*minimum of two holes required at every proposed primary and reserve disposal area)*

Deep Observation Hole Number: TP-3 (Hole #) | 04/06/22 (Date) | 10:20 AM (Time) | Rain 45 degrees (Weather) | 41d 56'39.0" (Latitude) | 70d 46'0.4" (Longitude:)

1. Land Use: Gravel mining (e.g., woodland, agricultural field, vacant lot, etc.) | Fallow (Vegetation) | Few (Surface Stones (e.g., cobbles, stones, boulders, etc.)) | 3-5% (Slope (%))

Description of Location:

2. Soil Parent Material: Ice contact outwash | Outwash plain (Landform) | (Position on Landscape (SU, SH, BS, FS, TS))

3. Distances from: Open Water Body >100 feet | Drainage Way >100 feet | Wetlands >100 feet | Property Line 65+/- feet | Drinking Water Well >100 feet | Other _____ feet

4. Unsuitable Materials Present: ☐ Yes ☒ No If Yes: ☐ Disturbed Soil ☐ Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☐ Yes ☒ No If yes: _____ Depth Weeping from Pit _____ Depth Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-15"	F	Fill									
15-156"	C1	Sand	2.5Y5/3			0	5%	<5%	Single grain	Loose	Medium

Additional Notes:

Commonwealth of Massachusetts
City/Town of Carver

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (*minimum of two holes required at every proposed primary and reserve disposal area)*

Deep Observation Hole Number: TP-4 (Hole #) | 04/06/22 (Date) | 10:40di | Rain 45 degrees (Weather) | 41d 56'38.9" (Latitude) | 70d 46'1.1" (Longitude:)

1. Land Use: Gravel minimg (e.g., woodland, agricultural field, vacant lot, etc.) | Fallow (Vegetation) | Few (Surface Stones (e.g., cobbles, stones, boulders, etc.)) | 3-5% (Slope (%))

Description of Location:

2. Soil Parent Material: Ice contact outwash | Outwash plain (Landform) | (Position on Landscape (SU, SH, BS, FS, TS))

3. Distances from: Open Water Body >100 feet | Drainage Way >100 feet | Wetlands >100 feet
Property Line 80+/- feet | Drinking Water Well >100 feet | Other _____ feet

4. Unsuitable Materials Present: ☐ Yes ☒ No If Yes: ☐ Disturbed Soil ☐ Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☐ Yes ☐ No If yes: _____ Depth Weeping from Pit _____ Depth Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA)	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-12"	F	Fill									
12-148"	C1	Sand	2.5Y5/3			0	5%	<5%	Single grain	Loose	Medium

Additional Notes:

Commonwealth of Massachusetts
City/Town of Carver

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

D. Determination of High Groundwater Elevation

1. Method Used:	Obs. Hole #TP-3	Obs. Hole #TP-4
☒ Depth observed standing water in observation hole	156" inches	148" inches
☐ Depth weeping from side of observation hole	_____ inches	_____ inches
☐ Depth to soil redoximorphic features (mottles)	_____ inches	_____ inches
☐ Depth to adjusted seasonal high groundwater (S_h) (USGS methodology)	_____ inches	_____ inches

Index Well Number _____ Reading Date _____

$S_h = S_c – [S_r \times (OW_c – OW_{max})/OW_r]$

Obs. Hole/Well# _____ S_c _____ S_r _____ OW_c _____ OW_{max} _____ OW_r _____ S_h _____

2. Estimated Depth to High Groundwater: _____ inches

E. Depth of Pervious Material

1. Depth of Naturally Occurring Pervious Material

a. Does at least four feet of naturally occurring pervious material exist in all areas observed throughout the area proposed for the soil absorption system?

☒ Yes ☐ No

b. If yes, at what depth was it observed (exclude A and O Horizons)?	Upper boundary:	15 inches	Lower boundary:	156 inches
c. If no, at what depth was impervious material observed?	Upper boundary:	_____ inches	Lower boundary:	_____ inches

Commonwealth of Massachusetts
City/Town of Carver

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

F. Certification

I certify that I am currently approved by the Department of Environmental Protection pursuant to 310 CMR 15.017 to conduct soil evaluations and that the above analysis has been performed by me consistent with the required training, expertise and experience described in 310 CMR 15.017. I further certify that the results of my soil evaluation, as indicated in the attached Soil Evaluation Form, are accurate and in accordance with 310 CMR 15.100 through 15.107.

	April 6, 2022
Signature of Soil Evaluator	Date
Alan W. Loomis / Soil evaluator #1405	June 30, 2022
Typed or Printed Name of Soil Evaluator / License #	Expiration Date of License
Kevin Forgue, Health Agent	Carver Board of Health
Name of Approving Authority Witness	Approving Authority

Note: In accordance with 310 CMR 15.018(2) this form must be submitted to the approving authority within 60 days of the date of field testing, and to the designer and the property owner with Percolation Test Form 12.

Field Diagrams: Use this area for field diagrams:

A P P E N D I X F

Best Management Practices
Operation and Maintenance Plans

CONSTRUCTION PHASE POLLUTION PREVENTION AND EROSION AND SEDIMENTATION CONTROL PLAN (BEST MANAGEMENT PRACTICES OPERATION AND MAINTENANCE PLAN)

for

Definitive Plan Set
Ricketts Pond Business Park
Spring Street
Carver, Massachusetts

Submitted to:

Town of Carver

Prepared for:

RPBP, LLC
3 Marion Drive
Carver, Massachusetts 0233

Prepared by:

MCKENZIE ENGINEERING GROUP

Professional Civil Engineering • Project Management • Land Planning
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Construction Phase Best Management Practices (BMP's)

Erosion and Sedimentation will be controlled at the site by utilizing Structural Practices, Stabilization Practices, and Dust Control. These practices correspond with plans entitled "Definitive Subdivision Plans, Ricketts Pond Business Park, Spring Street, Carver, Massachusetts", issued October 1, 2018. and as revised hereinafter.

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Structural Practices:

1) **Compost Filter Tube Barrier Controls** – A compost filter tube barrier will be constructed along downward slopes at the limit of work in locations shown on the plans. This control will be installed prior to major soil disturbance on the site. The sediment silt sack barrier should be installed as shown on the Construction Detail Plan.

Compost Filter Tube Design/Installation Requirements *

a) Locate the compost filter tube where identified on the plans.

b) The compost filter tube line should be nearly level through most of its length to impound a broad, temporary pool. The last 10 to 20 feet at each end of the silt sack should be swung slightly uphill (approximately 0.5 feet in elevation) to provide storage capacity.

c) The compost filter tube shall be staked every 8 linear feet with 1-inch by 1-inch stakes.

d) Compost filter tubes should be removed when they have served their useful purpose, but not before the upslope area has been permanently stabilized through one growing season. Retained sediment must be removed and properly disposed of, or mulched and seeded.

Compost Filter Tube Inspection/Maintenance *

a) Compost filter tubes should be inspected immediately after each rainfall event of 1-inch or greater, and at least daily during prolonged rainfall. Inspect the depth of sediment, fabric tears, and to see that the fence posts are firmly in the ground. Repair or replace as necessary.

b) Remove sediment deposits promptly after storm events to provide adequate storage volume for the next rain and to reduce pressure on the fence. Sediment will be removed from behind the sediment fence when it becomes about ½ foot deep at the compost filter tube. Take care to avoid undermining fence during cleanout.

c) If the fabric tears, decomposes, or in any way becomes ineffective, replace it immediately.

d) Remove all compost filter tube materials after the contributing drainage area has been properly stabilized. Sediment deposits remaining after the fabric has been removed should be graded to conform with the existing topography and vegetated.

2) **Sediment Fence Controls** – A sediment fence will be constructed along the limit of work as needed to prevent the spreading of fine sediments from the site. This control will be installed prior to major soil disturbance on the site. The sediment fence should be installed as shown on the Erosion Control Detail Plan and be Amoco woven polypropylene 1198 or equivalent.

Sediment Fence Design/Installation Requirements *

e) Locate the fence upland of the hay bale barriers and where identified on the plans.

f) The fence line should be nearly level through most of its length to impound a broad, temporary pool. The last 10 to 20 feet at each end of the fence should

be swung slightly uphill (approximately 0.5 feet in elevation) to provide storage capacity.

g) Excavate a trench approximately 8 inches deep and 4 inches wide, or a V-trench; along the line of the fence, upslope side.

h) Fasten support wire fence (14 gauge with 6-inch mesh) securely to the upslope side of the fence posts with wire ties or staples. Wire should extend 6 inches into the trench.

i) Attach continuous length of fabric to upslope side of fence posts. Avoid joints, particularly at low points in the fence line. Where joints are necessary, fasten fabric securely to support posts and overlap to the next post.

j) Place the bottom one foot of fabric in the trench. Backfill with compacted earth or gravel.

k) Filter cloth shall be fastened securely to the woven wire fence with ties spaced every 24 inches at the top, mid-section, and bottom.

l) Sediment fences should be removed when they have served their useful purpose, but not before the upslope area has been permanently stabilized through one growing season and only following approval by the Engineering Department or their representative. Retained sediment must be removed and properly disposed of, or mulched and seeded.

Sediment Fence Inspection/Maintenance *

e) Silt fences should be inspected immediately after each rainfall event of 1-inch or greater, and at least daily during prolonged rainfall. Inspect the depth of sediment, fabric tears, if the fabric is securely attached to the fence posts, and to see that the fence posts are firmly in the ground. Repair or replace as necessary.

f) Remove sediment deposits promptly after storm events to provide adequate storage volume for the next rain and to reduce pressure on the fence. Sediment will be removed from behind the sediment fence when it becomes about ½ foot deep at the fence. Take care to avoid undermining fence during cleanout.

g) If the fabric tears, decomposes, or in any way becomes ineffective, replace it immediately.

h) Remove all fencing materials after the contributing drainage area has been properly stabilized. Sediment deposits remaining after the fabric has been removed should be graded to conform to the existing topography and vegetation.

3) **Stabilized Construction Entrance** – A stabilized construction entrance will be placed at the proposed entrance of the Site at Spring Street. The construction entrance will keep mud and sediment from being tracked off the construction site

onto Spring Street by vehicles leaving the site. The stabilized construction entrance will be installed immediately after the clear and grubbing of the roadway entrance and associated roadway fill to maintain access to the site are completed. The stormwater runoff from the entrance will be diverted to a temporary sedimentation basin. The stabilized construction entrance shall be constructed as shown on the Construction Detail Plans.

Construction Entrance Design/Construction Requirements *

a) Grade foundation for positive drainage towards the temporary sedimentation basin.

b) Stone for a stabilized construction entrance shall consist of 1 to 3-inch stone placed on a stable foundation.

c) Pad dimensions: The minimum length of the gravel pad should be 50 feet. The pad should extend the full width of the proposed roadway, or wide enough so that the largest construction vehicle will fit in the entrance with room to spare; whichever is greater.

d) A geotextile filter fabric shall be placed between the stone fill and the earth surface below the pad to reduce the migration of soil particles from the underlying soil into the stone and vice versa. The filter fabric should be Amoco woven polypropylene 1198 or equivalent.

e) Washing: If the site conditions are such that the majority of mud is not removed from the vehicle tires by the gravel pad, then the tires should be washed before the vehicle enters the street. The wash area shall be located at the stabilized construction entrance.

f) Water employed in the washing process shall be directed to the temporary sedimentation basin/dewatering area as shown on the plans prior to discharge. Sediment should be prevented from entering any watercourses.

Construction Entrance Inspection/Maintenance *

a) The entrance should be maintained in a condition that will prevent tracking or flowing of sediment onto Spring Street. This may require periodic topdressing with additional stone

b) The construction entrance and sediment disposal area shall be inspected weekly and after heavy rains or heavy use.

c) Mud and sediment tracked or washed onto public road shall be immediately removed by sweeping.

d) Once mud and soil particles clog the voids in the gravel and the effectiveness of the gravel pad is no longer satisfactory, the pad must be topdressed with new stone. Replacement of the entire pad may be necessary when the pad becomes completely clogged.

e) If washing facilities are used, the temporary sedimentation basin/dewatering area should be cleaned out as often as necessary to assure that adequate trapping efficiency and storage volume is available. Any water pumped from the temporary sedimentation basin shall be directed into a sediment dirt bag or equivalent inlet protection prior to discharge. Discharge should not be across the disturbed construction site but rather to undisturbed areas.

f) The pad shall be reshaped as needed for drainage and runoff control.

g) Broken road pavement on Spring Street shall be repaired immediately.

h) All temporary erosion and sediment control measures shall be removed within 30 days after final site stabilization is achieved or after the temporary practices are no longer needed and only following approval by the Public Works Department or their representative. Trapped sediment shall be removed or stabilized on site. Disturbed soil areas resulting from removal shall be permanently stabilized.

Stabilization Practices:

Stabilization measures shall be implemented as soon as practicable in portions of the site where construction activities have temporarily or permanently ceased, but in no case more than 14 days after the construction activity in that portion of the site has temporarily or permanently ceased, with the following exceptions.

- Where the initiation of stabilization measures by the 14th day after construction activity temporary or permanently cease is precluded by snow cover, stabilization measures shall be initiated as soon as practicable.

- Where construction activity will resume on a portion of the site within 21 days from when activities ceased, (e.g. the total time period that construction activity is temporarily ceased is less than 21 days) then stabilization measures do not have to be initiated on that portion of the site by the 14th day after construction activity temporarily ceased.

- The contractor shall provide erosion control measures around all soil stockpiles.

1) **Temporary Seeding** – Temporary seeding will allow a short-term vegetative cover on disturbed site areas that may be in danger of erosion. Temporary seeding will be done at stock piles and disturbed portions of the site where construction activity will temporarily cease for at least 21 days. The temporary seedings will stabilize cleared and unvegetated areas that will not be brought into final grade for several weeks or months.

   Temporary Seeding Planting Procedures *

   a) Planting should preferably be done between April 1st and June 30th, and September 1st through September 31st. If planting is done in the months of July and August, irrigation may be required. If planting is done between October 1st and March 31st, mulching should be applied immediately after planting. If

seeding is done during the summer months, irrigation of some sort will probably be necessary.

b) Before seeding, install structural practice controls. Utilize Amoco supergro or equivalent.

c) Select the appropriate seed species for temporary cover from the following table.

Species	Seeding Rate (lbs/1,000 sq.ft.)	Seeding Rate (lbs/acre)	Recommended Seeding Dates	Seed Cover required
Annual Ryegrass	1	40	April 1st to June 1st August 15th to Sept. 15th	¼ inch
Foxtail Millet	0.7	30	May 1st to June 30th	½ to ¾ inch
Oats	2	80	April 1st to July 1st August 15th to Sept. 15th	1 to 1-½ inch
Winter Rye	3	120	August 15th to Oct. 15th	1 to 1-½ inch

Apply the seed uniformly by hydroseeding, broadcasting, or by hand.

d) Use effective mulch, such as clean grain straw; tacked and/or tied with netting to protect seedbed and encourage plant growth.

Temporary Seeding Inspection/Maintenance *

a) Inspect within 6 weeks of planting to see if stands are adequate. Check for damage within 24 hours of the end to a heavy rainfall, defined as a 2-year storm event (i.e., 3.2 inches of rainfall within a twenty-four hour period). Stands should be uniform and dense. Reseed and mulch damaged and sparse areas immediately. Tack or tie down mulch as necessary.

b) Seeds should be supplied with adequate moisture. Furnish water as needed, especially in abnormally hot or dry weather. Water application rates should be controlled to prevent runoff.

2) **Geotextiles** - Geotextiles such as jute netting will be used in combination with other practices such as mulching to stabilize slopes. The following geotextile materials or equivalent are to be utilized for structural and nonstructural controls as shown in the following table.

Practice	Manufacturer	Product	Remarks
Sediment Fence	Amoco	Woven polypropylene 1198 or equivalent	0.425 mm opening
Construction Entrance	Amoco	Woven polypropylene 2002 or equivalent	0.300 mm opening
Outlet Protection	Amoco	Nonwoven polypropylene 4551 or equivalent	0.150 mm opening
Erosion Control (slope stability)	Amoco	Supergro or equivalent	Erosion control revegetation mix, open polypropylene fiber on

			degradable polypropylene net scrim

Amoco may be reached at (800) 445-7732

Geotextile Installation

a) Netting and matting require firm, continuous contact between the materials and the soil. If there is no contact, the material will not hold the soil and erosion will occur underneath the material.

Geotextile Inspection/Maintenance *

a) In the field, regular inspections should be made to check for cracks, tears, or breaches in the fabric. The appropriate repairs should be made.

3) **Mulching and Netting** – Mulching will provide immediate protection to exposed soils during the period of short construction delays, or over winter months through the application of plant residues, or other suitable materials, to exposed soil areas. In areas, which have been seeded either for temporary or permanent cover, mulching should immediately follow seeding. On steep slopes, mulch must be supplemented with netting. The preferred mulching material is straw. All netting shall be biodegradable or photodegradable.

Mulch (Hay or Straw) Materials and Installation

a) Straw has been found to be one of the most effective organic mulch materials. The specifications for straw are described below, but other material may be appropriate. The straw should be air-dried; free of undesirable seeds & coarse materials. The application rate per 1,000 sq.ft. is 90-100 lbs. (2-3 bales) and the application rate per acre is 2 tons (100-120 bales). The application should cover about 90% of the surface. The use of straw mulch is appropriate where mulch is maintained for more than three months. Straw mulch is subject to wind blowing unless anchored, is the most commonly used mulching material, and has the best microenvironment for germinating seeds.

Mulch Maintenance *

a) Inspect after rainstorms to check for movement of mulch or erosion. If washout, breakage, or erosion occurs, repair surface, reseed, remulch, and install new netting.

b) Straw or grass mulches that blow or wash away should be repaired promptly.

c) If plastic netting is used to anchor mulch, care should be taken during initial mowings to keep the mower height high. Otherwise, the netting can wrap up on the mower blade shafts. After a period of time, the netting degrades and becomes less of a problem.

d) Continue inspections until vegetation is well established.

4) **Land Grading** – Grading on fill slopes, cut slopes, and stockpile areas will be done with full siltation controls in place.

Land Grading Design/Installation Requirements

a) Areas to be graded should be cleared and grubbed of all timber, logs, brush, rubbish, and vegetated matter that will interfere with the grading operation. Topsoil should be stripped and stockpiled for use on critical disturbed areas for establishment of vegetation. Cut slopes to be topsoiled should be thoroughly scarified to a minimum depth of 3-inches prior to placement of topsoil.

b) Fill materials should be generally free of brush, rubbish, rocks, and stumps. Frozen materials or soft and easily compressible materials should not be used in fills intended to support buildings, parking lots, roads, conduits, or other structures.

c) Earth fill intended to support structural measures should be compacted to a minimum of 90 percent of Standard Proctor Test density with proper moisture control, or as otherwise specified by the engineer responsible for the design. Compaction of other fills should be to the density required to control sloughing, erosion or excessive moisture content. Maximum thickness of fill layers prior to compaction should not exceed 9 inches.

d) The uppermost one foot of fill slopes should be compacted to at least 85 percent of the maximum unit weight (based on the modified AASHTO compaction test). This is usually accomplished by running heavy equipment over the fill.

e) Fill should consist of material from borrow areas and excess cut will be stockpiled in areas shown on the Site Plans. All disturbed areas should be free draining, left with a neat and finished appearance, and should be protected from erosion.

f) Detention basins shall be excavated, graded and shaped to subgrade elevation and shall then be suitably protected with installation of erosion control measures to prevent sediment-laden runoff from washing into the basins. The basins shall also be protected from heavy equipment activity from this point forward. Prior to application of loam and seed to detention basin surfaces, the contractor shall remove any unsuitable soil such as silt or clay that may have been deposited during construction. The surface shall be scarified with a York rake or other small tractor mounted equipment. The loam and seed shall then be applied as required by this document.

Land Grading Stabilization Inspection/Maintenance *

a) All slopes should be checked periodically to see that vegetation is in good condition. Any rills or damage from erosion and animal burrowing should be repaired immediately to avoid further damage.

b) If seeps develop on the slopes, the area should be evaluated to determine if the seep will cause an unstable condition. Subsurface drains or a gravel mulch may be required to solve seep problems. However, no seeps are anticipated.

c) Areas requiring revegetation should be repaired immediately. Control undesirable vegetation such as weeds and woody growth to avoid bank stability problems in the future.

5) **Topsoiling *** – Topsoiling will help establish vegetation on all disturbed areas throughout the site during the seeding process. The soil texture of the topsoil to be used will be a sandy loam to a silt loam texture with 15% to 20% organic content.

Topsoiling Placement

a) Topsoil should not be placed while in a frozen or muddy condition, when the subgrade is excessively wet, or when conditions exist that may otherwise be detrimental to proper grading or proposed seeding.

b) Do not place topsoil on slopes steeper than 2.5:1, as it will tend to erode.

c) If topsoil and subsoil are not properly bonded, water will not infiltrate the soil profile evenly and it will be difficult to establish vegetation. The best method is to actually work the topsoil into the layer below for a depth of at least 6 inches.

6) **Permanent Seeding** – Permanent Seeding should be done immediately after the final design grades are achieved. Native species of plants should be used to establish perennial vegetative cover on disturbed areas. The revegetation should be done early enough in the fall so that a good cover is established before cold weather comes and growth stops until the spring. A good cover is defined as vegetation covering 75 percent or more of the ground surface.

Permanent Seeding Seedbed Preparation

a) In infertile or coarse-textured subsoil, it is best to stockpile topsoil and re-spread it over the finished slope at a minimum 2 to 6-inch depth and roll it to provide a firm seedbed. The topsoil must have a sandy loam to silt loam texture with 15% to 20% organic content. If construction fill operations have left soil exposed with a loose, rough, or irregular surface, smooth with blade and roll.

b) Loosen the soil to a depth of 3-5 inches with suitable agricultural or construction equipment.

c) Areas not to receive topsoil shall be treated to firm the seedbed after incorporation of the lime and fertilizer so that it is depressed no more than ½ - 1 inch when stepped on with a shoe. Areas to receive topsoil shall not be firmed until after topsoiling and lime and fertilizer is applied and incorporated, at which time it shall be treated to firm the seedbed as described above.

Permanent Seeding Grass Selection/Application

a) Select an appropriate cool or warm season grass based on site conditions and seeding date. Apply the seed uniformly by hydro-seeding, broadcasting, or by hand. Uniform seed distribution is essential. On steep slopes, hydroseeding may be the most effective seeding method. Surface roughening is particularly important when preparing slopes for hydroseeding.

b) Lime and fertilize. Organic fertilizer shall be utilized in areas within the 100 foot buffer zone to a wetland resource area.

c) Mulch the seedings with straw applied at the rate of ½ tons per acre. Anchor the mulch with erosion control netting or fabric on sloping areas. Amoco supergro or equivalent should be utilized.

Permanent Seeding Inspection/Maintenance *

a) Frequently inspect seeded areas for failure and make necessary repairs and reseed immediately. Conduct or follow-up survey after one year and replace failed plants where necessary.

b) If vegetative cover is inadequate to prevent rill erosion, overseed and fertilize in accordance with soil test results.

c) If a stand has less than 40% cover, reevaluate choice of plant materials and quantities of lime and fertilizer. Re-establish the stand following seedbed preparation and seeding recommendations, omitting lime and fertilizer in the absence of soil test results. If the season prevents resowing, mulch or jute netting is an effective temporary cover.

d) Seeded areas should be fertilized during the second growing season. Lime and fertilize thereafter at periodic intervals, as needed.

Fueling and Maintenance of Equipment and Vehicles:

1. Refueling/maintenance Rules – The site supervisor shall produce a written document received by all subcontractors and employees that delineates their responsibilities on site. This document shall include language that shall permit the maintenance of vehicles only in designated locations on the job site. In the event of mechanical failure of a vehicle, the vehicle shall be moved to the designated maintenance area on the site to perform maintenance. The site supervisor shall document receipt of these instructions by obtaining the signatures of subcontractors and individuals that may enter the site and the date in which they were notified of their responsibilities. Refueling for vehicles or equipment shall occur either within the designated washout area or shall utilize temporary drip protection measures at the location of fueling. The site supervisor or their representative shall be present at the time of any fueling procedure. The site supervisor shall have a fuel spill plan and measures on site to initiate containment and clean-up in the event a fuel spill occurs.

2. Installation Schedule: Prior to start of Work

3. Maintenance and Inspection: The site supervisor shall maintain a log of individuals receiving these instructions.

4. Specific Pollution Prevention Practices

   Pollution Prevention Practice # 1

   a. Description: Fueling operations shall take place in designated area(s) as shown on site maps. Provide temporary drip protection during fueling operations which take place outside of designated area(s). Materials necessary to address a spill shall be made readily available in a location known to the site supervisor or his/her designee.

   b. Installation: Fueling operation procedures shall be in effect throughout the project duration.

   c. Maintenance Requirements: All emergency response equipment listed in the Emergency Response Equipment Inventory shall be made readily available and kept in a designated location known to the site supervisor or his/her designee. All such materials shall be replenished as necessary to the listed amounts.

Dust Control:

Dust control will be utilized throughout the entire construction process of the site. For example, keeping disturbed surfaces moist during windy periods will be an effective control measure, especially for construction access roads. The use of dust control will prevent the movement of soil to offsite areas. However, care must be taken to not create runoff from excessive use of water to control dust. The following are methods of Dust Control that may be used on-site:

- Vegetative Cover – The most practical method for disturbed areas not subject to traffic.
- Calcium Chloride – Calcium chloride may be applied by mechanical spreader as loose, dry granules or flakes at a rate that keeps the surface moist but not so high as to cause water pollution or plant damage.
- Sprinkling – The site may be sprinkled until the surface is wet. Sprinkling will be effective for dust control on haul roads and other traffic routes.
- Stone – Stone will be used to stabilize construction roads; will also be effective for dust control.

The general contractor shall employ an on-site water vehicle for the control of dust as necessary.

Washing of Equipment and Vehicles

Vehicle Washing Rules - The site supervisor shall produce a written document received by all subcontractors and employees that delineates their responsibilities on site. The site supervisor shall document receipt of these instructions by obtaining the signatures of subcontractors and individuals that may enter the site and the date in which they were notified of their responsibilities. This document shall include language

that shall not permit vehicle washing on the job site. Concrete trucks shall be exempt from this rule. Concrete truck cleaning shall be confined within the work area and conducted in a manner to prevent water drainage beyond the specified area of work. Concrete truck washout shall be conducted in designated areas and shall not be discharged in areas which would allow wash water to leave the site or enter protected areas.

Maintenance Requirements

1. The site supervisor shall maintain a log of individuals receiving these instructions.

Storage, Handling, and Disposal of Construction Products, Materials, and Wastes

Building Products - Building products are not anticipated during this phase of construction.

Pesticides, Herbicides, Insecticides, Fertilizers, and Landscape Materials

The use of pesticides and herbicides is not currently anticipated for this site. Fertilizers and landscape materials will be used to stabilize slopes and other disturbed areas.

1. Store all fertilizers and landscape materials in designated locations. Store all weather sensitive materials in closed containers in accordance with manufacturer's recommendations.

Maintenance Requirements

1. The site supervisor shall regularly inspect the designated storage areas as well as any portions of the site under construction to ensure that all materials are properly stored. The site supervisor shall immediately address any issues and instruct personnel to secure and properly store all materials.

Diesel Fuel, Oil, Hydraulic Fluids, Other Petroleum Products, and Other Chemicals

Refueling and maintenance for vehicles or equipment shall occur either within the designated washout area or shall utilize temporary drip protection measures at the location of fueling. The site supervisor or their representative shall be present at the time of any fueling procedure. The site supervisor shall have a fuel spill plan and measures on site to initiate containment and clean-up in the event a fuel spill occurs.

Refueling and maintenance of equipment shall take place in designated areas whenever possible. Refueling or maintenance of equipment in locations other than those designated for such activity shall be performed under the supervision of the site supervisor or his/her designee and shall employ drip pans or other suitable means of preventing fuel, hydraulic fluid, etc. from spilling or being otherwise carried offsite or into protected areas.

Maintenance Requirements

1. All emergency response equipment listed in the Emergency Response Equipment Inventory shall be made readily available and kept in a designated location known to the site supervisor or his/her designee. All such materials shall be replenished as necessary to the listed amounts.

Hazardous or Toxic Waste

(Note: Examples include paints, solvents, petroleum-based products, wood preservatives, additives, curing compounds, acids.)

Hazardous or toxic waste associated with paints, solvents, petroleum-based products, wood preservatives, additives, curing compounds, acids shall be collected in approved containers and disposed of in accordance with municipal, state and federal regulations.

Hazardous or toxic waste shall be collected in approved containers and disposed of in accordance with municipal, state and federal regulations. Hazardous and toxic waste shall not be disposed of in solid waste containers intended for non-hazardous construction debris.

Maintenance Requirements

1. The site supervisor shall regularly inspect all portions of the project under construction and ensure that all hazardous or toxic materials are disposed of in accordance with the practices detailed above and shall immediately correct any improper disposal practices.

Construction and Domestic Waste

(Note: Examples include packaging materials, scrap construction materials, masonry products, timber, pipe and electrical cuttings, plastics, styrofoam, concrete, and other trash or building materials.)

Construction and domestic waste shall be disposed of in a trash receptacle (dumpster) which shall be removed and disposed of at an approved land fill.

Recyclable waste material shall be stored in an appropriate container or in a designated location on site until it can be removed.

1. Trash receptacles (dumpsters) and recyclable waste material containers shall be located as needed throughout the site.

Maintenance Requirements

1. The site supervisor shall inspect all trash receptacles and containers to confirm that construction and domestic waste is properly contained, and shall also ascertain that waste is being picked up in a timely manner to ensure that no receptacles are overflowing. Pick-up schedules shall be modified or the number of receptacles shall be increased as needed.

Sanitary Waste

During the construction process, portable toilets will be provided in an appropriate location during the construction process.

Maintenance Requirements

1. The site supervisor shall execute a contract with a vendor to supply and maintain portable toilets throughout the site for the project duration. The site supervisor shall determine if a sufficient number of toilets are present to meet staffing levels and shall ensure that the toilets are regularly and properly maintained.

Washing of Applicators and Containers used for Paint, Concrete or Other Materials

Concrete washout shall be restricted to designated areas. Paints, form release oils, curing compounds, etc. shall be recycled and/or disposed of utilizing appropriate containers in accordance with manufacturer's recommendations and EPA guidelines.

1. Install straw bale and plastic liner washout pit at the designated location on site. Concrete trucks shall wash out only at washout pit or other similar acceptable facility such as a portable roll-off washout pit.
2. Provide suitable containers for recycling or disposal for cleanup of paints, form release oils, curing compounds, etc.

Maintenance Requirements

1. The site supervisor shall inspect concrete washout pits (or other acceptable facility) to ensure that they are properly maintained. If necessary, wash water in a concrete washout pit shall be vacuumed off and the hardened concrete broken up and recycled. Wash water and broken up concrete shall be properly disposed of at a suitable facility. If necessary the wash out pit shall be repaired and relined with plastic prior to continued use.
2. Containers for waste paint, form release oil, curing compounds, etc. shall be sealed and removed from the site and properly disposed of at a suitable facility. Empty containers shall replace those being removed for disposal.

Fertilizers

Fertilizers shall be used only as necessary to establish vegetative stabilized slopes and disturbed areas. Apply at recommended rates. Use only slow release fertilizers to minimize discharge of nitrogen or phosphorous.

1. Store all fertilizers in designated locations. Store all weather sensitive materials in closed containers in accordance with manufacturer's recommendations.
2. To prevent accidental release of fertilizers, the site supervisor shall attempt to coordinate delivery of fertilizers to coincide with application and reduce the need to warehouse large quantities on-site.

Maintenance Requirements

1. Site supervisor shall make regular inspections to ensure that fertilizer is being applied at proper rates and that all perimeter controls are in place and properly maintained to control runoff which may contain fertilizer. Stored fertilizer shall be properly covered or enclosed in a designated location to prevent introduction into stormwater runoff.

Spill Prevention and Response

The site supervisor or their representative shall be present on the job site at all times during the course of work and shall be present during the delivery, removal of any liquid/chemical materials to or from the job site. They will also be present during any refueling practices. All subcontractors will be notified of their responsibilities in writing. In the event a spill occurs, the site supervisor shall be notified immediately.
The site supervisor shall have in place a spill prevention plan and resources to contain and clean up any potential spills in a timely manner. Refer to the following Spill Containment & Management Plan, including Spill Report, Emergency Response Equipment Inventory, and Emergency Notification and phone numbers.

Non-Stormwater Discharges:

The construction de-watering and all non-stormwater discharges will be directed into a sediment dirt bag (or equivalent inlet protection) or a sediment basin. Sediment material

removed shall be disposed of in accordance with all applicable local, state, and federal regulations.

The developer and site general contractor will comply with the E.P.A.'s Final General Permit for Construction De-watering Discharges, (N.P.D.E.S., Section 402 and 40 C.F.R. 122.26(b)(14)(x).

Inspection/Maintenance:

Operator personnel must inspect the construction site at least once every 14 calendar days and within 24 hours of a storm event of ½-inch or greater. The applicant shall be responsible to secure the services of a design professional or similar professional (inspector) on an on-going basis throughout all phases of the project. Refer to the Inspection/Maintenance Requirements presented earlier in the "Structural and Stabilization Practices." The inspector should review the erosion and sediment controls with respect to the following:

- Whether or not the measure was installed/performed correctly.
- Whether or not there has been damage to the measure since it was installed or performed.
- What should be done to correct any problems with the measure.

The inspector should complete the Stormwater Management Construction Phase BMP Inspection Schedule and Evaluation Checklist, as attached, for documenting the findings and should request the required maintenance or repair for the pollution prevention measures when the inspector finds that it is necessary for the measure to be effective. The inspector should notify the appropriate person to make the changes and submit copies of the form to the Carver Highway Department.

Project Location: Off Spring Street, Ricketts Pond Business Park, Carver, MA **Date:**
Stormwater Management – Construction Phase
Best Management Practices – Inspection Schedule and Evaluation Checklist

Construction Practices

Best Management Practice	Inspection Frequency	Date Inspected	Inspector	Minimum Maintenance and Key Items to Check	Cleaning/Repair Needed: (List Items)	Date of Cleaning/ Repair	Performed by
Silt Sock and Sediment Fence Controls	After heavy rainfall events (minimum weekly)			1. Sediment Fence Design/Installation Requirements 2. Sediment Fence Inspection/Maintenance	☐**yes** ☐**no**		
Stabilized Construction Entrance	After heavy rainfall events (minimum weekly)			1. Construction Entrance Design/ Construction Requirements 2. Construction Entrance Inspection/ Maintenance	☐**yes** ☐**no**		
Temporary Sedimentation Basins	After heavy rainfall events (minimum weekly)			1. Sediment Basin Inspection/ Maintenance	☐**yes** ☐**no**		
Temporary Seeding	After heavy rainfall events (minimum weekly)			1. Temporary Seeding Planting Procedures 2. Temporary Seeding Inspection/ Maintenance	☐**yes** ☐**no**		
Geotextiles	After heavy rainfall events (minimum weekly)			1. Geotextile Inspection/Maintenance	☐**yes** ☐**no**		
Mulching & Netting	After heavy rainfall events (minimum weekly)			1. Mulch Maintenance	☐**yes** ☐**no**		
Land Grading	After heavy rainfall events (minimum weekly)			1. Land Grading Stabilization Inspection/ Maintenance	☐**yes** ☐**no**		

Permanent Seeding	After heavy rainfall events (minimum weekly)			1. Permanent Seeding Inspection/ Maintenance	☐**yes** ☐**no**		
Dust Control	After heavy rainfall events (minimum weekly)				☐**yes** ☐**no**		
Soil Stockpiling	After heavy rainfall events (minimum weekly)				☐**yes** ☐**no**		

(1) Refer to the Massachusetts Stormwater Handbook issued January 2, 2008.

Notes (Include deviations from : Definitive Subdivision Decision and Special Conditions and Approved Plan):

Stormwater Control Manager _____

Spill Containment and Management Plan

June 1, 2022

Initial Notification

In the event of a spill, the facility manager will be notified immediately.

Facility Managers (name)

RPBP, LLC
Peter Opachinski
3 Marion Drive
Carver, MA 02330
Phone: (508) 866-9061

Facility Manager (phone)

Assessment - Initial Containment

The supervisor will assess the incident and initiate containment control measures with the appropriate spill containment equipment included in the spill kit kept on-site. The supervisor will first contact the Fire Department and then notify the Police Department, Department of Public Works, Board of Health and Conservation Commission. The fire department is ultimately responsible for matters of public health and safety and should be notified immediately.

Contact:	Phone Number:
Fire Department:	911
Police Department:	911
Department of Public Works:	(508) 866-3400 ext. 1030 .
Board of Health Phone:	(508) 866-3420 .
Conservation Commission Phone:	(508) 866-3482

Further Notification

Based on the assessment from the Fire Chief, additional notification to a cleanup contractor may be made. The Massachusetts Department of Environmental Protection (DEP) and the EPA may be notified depending upon the nature and severity of the spill. The Fire Chief will be responsible for determining the level of cleanup and notification required. The attached list of emergency phone numbers shall be posted in the facility office and readily accessible to all employees.

HAZARDOUS WASTE / OIL SPILL REPORT

Date____/_____/_____ Time_____ AM / PM

Exact location (Transformer #)_____

Type of equipment_____Make_____Size_____

S / N_____Weather Conditions_____

On or near water ☐ Yes If yes, name of body of water_____
☐ No

Type of chemical / oil spilled_____

Amount of chemical / oil spilled_____

Cause of spill_____

_____

_____

Measures taken to contain or clean up spill_____

_____

_____

Amount of chemical / oil recovered_____Method_____

Material collected as a result of clean up

_____drums containing_____

_____drums containing_____

_____drums containing_____

Location and method of debris disposal_____

_____

Name and address of any person, firm, or corporation suffering damages_____

_____

Procedures, method, and precautions instituted to prevent a similar occurrence from recurring____

_____

Spill reported to General Office by_____Time_____AM / PM

Spill reported to DEP / National Response Center by_____

DEP Date____/_____/_____ Time_____ AM / PM Inspector_____

NRC Date____/_____/_____ Time_____ AM / PM Inspector_____

Additional comments_____

_____

_____

EMERGENCY RESPONSE EQUIPMENT
INVENTORY

The following equipment and materials shall be maintained at all times and stored in a secure area for long-term emergency response need.

--	SORBENT PADS	1 BALE
--	SAND BAGS (empty)	5
--	SPEEDI-DRI ABSORBENT	2 – 40LB BAGS
--	12” INFLATABLE PIPE PLUG	1
--	SQUARE END SHOVELS	1
--	PRY BAR	1
--	CATCH BASIN COVER	1

EMERGENCY NOTIFICATION PHONE NUMBERS

1. FACILITY MANAGER
   NAME: Peter Opachinski BEEPER: _____
   PHONE: (508) 866-9061 CELL PHONE: _____

   ALTERNATE:
   NAME: _____ BEEPER: N/A
   PHONE: _____ CEL PHONE: N/A

2. FIRE DEPARTMENT
   EMERGENCY: 911
   BUSINESS: (508) 866-3440

   POLICE DEPARTMENT
   EMERGENCY: 911
   BUSINESS: (508) 866-2000

3. MASSACHUSETTS DEPARTMENT OF ENVIRONMENTAL PROTECTION
   EMERGENCY: (617) 556-1133
   SOUTHEAST REGION - LAKEVILLE OFFICE: (508) 946-2700

4. NATIONAL RESPONSE CENTER
   PHONE: (800) 424-8802

   ALTERNATE: U.S. ENVIRONMENTAL PROTECTION AGENCY
   EMERGENCY: (617) 223-7265
   BUSINESS: (617) 860-4300

POST-DEVELOPMENT BEST MANAGEMENT PRACTICE
OPERATION AND MAINTENANCE PLAN & LONG-TERM POLLUTION PREVENTION PLAN

for

Definitive Plan Set
Ricketts Pond Business Park
Spring Street
Carver, Massachusetts

Submitted to:

Town of Carver

Prepared for:

RPBP, LLC
3 Marion Drive
Carver, Massachusetts 0233

Prepared by:

MCKENZIE ENGINEERING GROUP

Professional Civil Engineering • Project Management • Land Planning
150 Longwater Drive, Suite 101, Norwell, Massachusetts 02061
Tel.: (781) 792-3900 Facsimile: (781) 792-0333
www.mckeng.com

June 1, 2022

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Post-Development Best Management Practice
Operation and Maintenance Plan &
Long-Term Pollution Prevention Plan

Post-Development Best Management Practices (BMPs) Operation and Maintenance Plan

Responsible Party/Property Owner/Developer contact information:

Property Owners: RPBP, LLC
Peter Opachinski
3 Marion Drive
Carver, MA 02330
Phone: (508) 866-9061

Developer Contact Information:
RPBP, LLC
Peter Opachinski
3 Marion Drive
Carver, MA 02330
Phone: (508) 866-9061

Town of Carver Contact Information:
North Carver District Water Commissioners
108 Main Street
Carver, MA 02330
Phone: (508) 866-3400

Carver Board of Health
108 Main Street
Carver, MA 02330
Phone: (508) 866-3420

Carver Conservation Commission
Brooke Monroe, Environmental Scientist
108 Main Street
Carver, MA 02330
Phone: (508) 866-3482

Carver Building Department
108 Main Street
Carver, MA 02330
Phone: (508) 866-3405

Carver Planning & Community Development 108 Main Street
Carver, MA 02330
Phone: (508) 866-3405

Best Management Practices (BMPs) of the Commonwealth of Massachusetts ~~Department of Environmental Protection's (DEP's) Stormwater Management Policy~~

(SMP) have been implemented and utilized for the project. The following information provided is to be used as a guideline for monitoring and maintaining the performance of the drainage facilities and to ensure that the quality of water runoff meets the standards set forth by the SMP. The structural Best Management Practices (BMPs) shall be inspected during rainfall conditions during the first year of operation to verify functionality.

BMPs included in the design consist of the use of:

- Deep sump catch basins with hooded outlets
- Sediment Forebay
- Infiltration Basin
- Outlet protection at stormwater management basins
- Roadway pavement maintenance
- Restrictions on the use of pesticides and herbicides within the 100-foot buffer zone

Operation:

Once the infiltration basins and closed drainage system have been constructed and the site has been permanently and the stormwater facilities are online, the operation of the stormwater management system will function as intended. Stormwater runoff is directed into the catch basins and closed drainage system to the sediment forebays, and lastly to the infiltration basins which includes an overflow outlet directed at Ricketts Pond. The stormwater management basins have been designed to attenuate peak flows for the 2-year through 100-year storm events.

Maintenance:

1. **Paved Areas** –Sweepers shall sweep paved areas periodically during dry weather to remove excess sediments and to reduce the amount of sediments that the drainage system shall have to remove from the runoff. The sweeping shall be conducted primarily between March 15th and November 15th. Special attention should be made to sweeping paved surfaces in March and April before spring rains wash residual sand into the drainage system.

   The frequency of sweeping shall be quarterly.

   Salt used for de-icing on the parking lot during winter months shall be limited as much as possible as this will reduce the need for removal and treatment. Sand containing the minimum amount of calcium chloride (or approved equivalent) needed for handling may be applied as part of the routine winter maintenance activities.

   Cost: The property owner should consult local sweeping contractors for detailed cost estimates.

2. **Catch Basins -** Catch basin grates shall be checked quarterly and following heavy rainfalls to verify that the inlet openings are not clogged by debris. Debris shall be removed from the grates and disposed of properly. Deep sump catch basins shall be inspected and cleaned bi-annually of all accumulated sediments. Catch basins with hoods shall be inspected annually to check oil build-up and outlet obstructions. Material shall be removed from catch basins and disposed of in accordance with all applicable regulations.

Cost: Estimated $50 - $100 per cleaning as needed. The property owner should consult local vacuum cleaning contractors for detailed cost estimates.

3. **Outlet Protection** - All outfall protection structures shall be inspected quarterly and following major storm events defined as a storm event exceeding one inch of rainfall within a twenty-four-hour period to check for signs for erosion. Any necessary repairs shall be performed promptly and cleaned to remove accumulated sediment as necessary. Material removed shall be disposed of in accordance with all applicable local, state, and federal regulations. Rip-Rap overflow structure shall be weeded and cleaned on a quarterly basis to ensure that water overflowing the spillway will not become obstructed by debris.

4. **Pesticides, Herbicides, and Fertilizers -** Pesticides and herbicides shall be used sparingly. Fertilizers should be restricted to the use of organic fertilizers only.

   All structural BMP's as identified on the site plans will be owned and maintained by the developer and shall run with the title of the property.

   Cost: Included in the routine landscaping maintenance schedule. The Owner should consult local landscaping contractors for details.

5. **Snow Removal -** Snow accumulations removed from road and parking areas should be placed in upland areas only, where sand and other debris will remain after snowmelt for later removal. Excess snow should be removed from the site and properly disposed of in an approved snow disposal facility. Care must be exercised not to deposit snow in the following areas: in the wetland, drainage depression, infiltration basin, bioswales, and where sand and debris can get into the watercourse.

   Cost: The owner should consult local snow removal contractors for a detailed cost estimate.

6. **Sediment Forebay Areas –** The sediment forebay areas shall be checked for sediment and debris accumulation on a monthly basis and cleaned quarterly. Additional inspections should be scheduled during the first few months to make sure that the vegetation becomes adequately established. Trash, leaves, branches, etc. shall be removed from facility. Silt, sand and sediment, if significant accumulation occurs, shall be removed by hand annually. Material removed from the areas shall be disposed of in accordance with all applicable local, state, and federal regulations. Where applicable by design, mow grassed areas 2 to 12 times per year as necessary. Any slope erosion within the facilities shall be stabilized and repaired as soon as practical.

   Do not store snow in the sediment forebay areas. Care must be taken during plowing operations to prevent snow from being plowed into the sediment forebay areas.

   Cost: Estimated $100 - $200 per cleaning as needed. The Owner should consult local landscape contractors for a detailed cost estimate.

7. **Infiltration Basins -** The infiltration basins, emergency spillway, inlets and vehicular access shall be checked for debris accumulation on a quarterly basis. Additional inspections should be scheduled during the first few months to make sure that the vegetation becomes adequately established in the infiltration basin

and that the facility is functioning as intended. Trash, leaves, branches, etc. shall be removed from facility. Silt, sand and sediment, if significant accumulation occurs, shall be removed by rubber-tired excavator annually. Material removed from the basin shall be disposed of in accordance with all applicable local, state, and federal regulations. The infiltration basins and vehicular access shall be kept free of woody vegetation by mowing at least twice per year. Reseeding, weed control, and invasive species removal may need to be performed periodically to maintain healthy vegetation and maintain the pollutant removal efficiency of the facilities. In the case that water remains in the infiltration facilities for greater than three (3) days after a storm event, an inspection is warranted and necessary maintenance or repairs to the outlet control structure or bottom of the basin may be necessary. Any slope erosion within the facility shall be stabilized and repaired as soon as practical.

The emergency spillway and embankment shall be inspected annually for structural integrity. The inspections shall be conducted by qualified personnel.

Cost: $500-$1000 per cleaning if excavator is necessary to remove sediment. The Owner should consult local landscape contractors for a detailed cost estimate.

Maintenance Responsibilities:

All post construction maintenance activities will be documented and kept on file. Annual inspection reports in the form of an Evaluation Checklist, see attached form, will be submitted to the Town of Carver. Inspections shall be performed by a licensed engineer or similar professional (inspector).

All structural BMPs as identified on the site plans located within the roadway layout, open parcels and drainage easements will be owned and maintained by the developer or property owners until such time that the roadway is accepted by the Town of Carver, then the Town of Carver will maintain the BMPs.

All post construction maintenance activities shall survive the Order of Conditions and shall run with the title of the property.

Long-Term Pollution Prevention Plan

Good Housekeeping:

To develop and implement an operation and maintenance program with the goal of preventing or reducing pollutant runoff by keeping potential pollutants from coming into contact with stormwater or being transported off site without treatment, the following efforts will be made:

- Property Management awareness and training on how to incorporate pollution prevention techniques into maintenance operations.
- Follow appropriate best management practices (BMPs) by proper maintenance and inspection procedures.
- Homeowner education outreach, including promoting recycling through the Town of Carver Transfer Station.

Storage and Disposal of Household Waste and Toxics:

This management measure involves educating the general public on the management considerations for hazardous materials. Failure to properly store hazardous materials dramatically increases the probability that they will end up in local waterways. Many people have hazardous chemicals stored throughout their homes, especially in garages and storage sheds. Practices such as covering hazardous materials or even storing them properly, can have dramatic impacts. Property owners are encouraged to support the household hazardous product collection events sponsored by the Town of Carver.

MADEP has prepared several materials for homeowners on how to properly use and dispose of household hazardous materials:

http://www.mass.gov/dep/recycle/reduce/househol.htm

For consumer questions on household hazardous waste call the following number:

DEP Household Hazardous Waste Hotline 800-343-3420

The following is a list of management considerations for hazardous materials as outlined by the EPA:

- Ensuring sufficient aisle space to provide access for inspections and to improve the ease of material transport;
- Storing materials well away from high-traffic areas to reduce the likelihood of accidents that might cause spills or damage to drums, bags, or containers.
- Stacking containers in accordance with the manufacturers' directions to avoid damaging the container or the product itself;
- Storing containers on pallets or equivalent structures. This facilitates inspection for leaks and prevents the containers from coming into contact with wet floors, which can cause corrosion. This consideration also reduces the incidence of damage by pests.

The following is a list of commonly used hazardous materials used in the household:

Batteries – automotive and rechargeable
nickel cadmium batteries
(no alkaline batteries)
Gasoline
Oil-based paints
Fluorescent light bulbs and lamps
Pool chemicals
Propane tanks
Lawn chemicals,
fertilizers and weed killers
Turpentine
Bug sprays
Antifreeze
Paint thinners, strippers, varnishes and
stains
Arts and crafts chemicals
Charcoal lighter fluid

Disinfectant
Drain clog dissolvers
Driveway sealer
Flea dips, sprays and collars
Houseplant insecticides
Metal polishes
Mothballs
Motor oil and filters
Muriatic acid (concrete cleaner)
Nail polishes and nail polish
removers
Oven cleaner
Household pest and rat poisons
Rug and upholstery cleaners
Shoe polish
Windshield wiper fluid

Vehicle Washing:

This management measure involves educating the general public on the water quality impacts of the outdoor washing of automobiles and how to avoid allowing polluted runoff to enter the storm drain system. Outdoor car washing has the potential to result in high loads of nutrients, metals, and hydrocarbons during dry weather conditions in many watersheds, as the detergent-rich water used to wash the grime off our cars flows down the street and into the storm drain. The following management practices will be encouraged:

- Washing cars on gravel, grass, or other permeable surfaces.
- Blocking off the storm drain during car washing and redirecting wash water onto grass or landscaping to provide filtration.
- Using hoses with nozzles that automatically turn off when left unattended.
- Using only biodegradable soaps.
- Minimize the amounts of soap and water used. Wash cars less frequently.
- Promote use of commercial car wash services.

Landscape Maintenance:

This management measure seeks to control the storm water impacts of landscaping and lawn care practices through education and outreach on methods that reduce nutrient loadings and the amount of storm water runoff generated from lawns. Nutrient loads generated by fertilizer use on suburban lawns can be significant, and recent research has shown that lawns produce more surface runoff than previously thought.

Using proper landscaping techniques can effectively increase the value of a property while benefiting the environment. These practices can benefit the environment by reducing water use; decreasing energy use (because less water pumping and treatment is required); minimizing runoff of storm and irrigation water that transports soils, fertilizers, and pesticides; and creating additional habitat for plants and wildlife. The following lawn and landscaping management practices will be encouraged:

- Mow lawns at the highest recommended height.
- Minimize lawn size and maintain existing native vegetation.
- Collect rainwater for landscaping/gardening needs (rain barrels and cisterns to capture roof runoff).
- Raise public awareness for promoting the water efficient maintenance practices by informing users of water efficient irrigation techniques and other innovative approaches to water conservation.
- Abide by water restrictions and other conservation measures implemented by the Town of Carver.
- Water only when necessary.
- Use automatic irrigation systems to reduce water use.

Integrated Pest Management (IPM):

This management measure seeks to limit the adverse impacts of insecticides and herbicides by providing information on alternative pest control techniques other than chemicals or explaining how to determine the correct dosages needed to manage pests.

The presence of pesticides in stormwater runoff has a direct impact on the health of aquatic organisms and can present a threat to humans through contamination of drinking water supplies. The pesticides of greatest concern are insecticides, such as diazinon and chloropyrifos, which even at very low levels can be harmful to aquatic life. The major source of pesticides to urban steams is home application of products designed to kill insects and weeds in the lawn and garden. The following IPM practices will be encouraged:

- Lawn care and landscaping management programs including appropriate pesticide use management as part of program.
- Raise public awareness by referring homeowners to "A Homeowner's Guide to Environmentally Sound Lawncare, Maintaining a Healthy Lawn the IPM Way", Massachusetts Department of Food and Agriculture, Pesticide Bureau or link **http://www.mass.gov/dep/water/resources/nonpoint.htm#megaman>**

Pet Waste Management:

Pet waste management involves using a combination of pet waste collection programs, pet awareness and education, to alert residents to the proper disposal techniques for pet droppings. The following management practices will be encouraged:

- Raise awareness of homeowners that are also pet owners that they are encouraged to pick up after their pets and dispose of the waste either in the trash, including on their own lawns and walking trails.
- Provide signage along walking trails.

Proper Management of Deicing Chemicals and Snow:

The following deicing chemicals and snow storage practices will be encouraged:

- Select effective snow disposal sites adjacent to or on pervious surfaces in upland areas away from water resources and wells. At these locations, the snow meltwater can filter in to the soil, leaving behind sand and debris, which can be removed in the springtime.
- No roadway deicing materials shall be stockpiled on site unless all storage areas are protected from exposure to rain, snow, snowmelt and runoff.
- Avoid dumping snow into any waterbody, including wetlands, cranberry bogs, detention/infiltration basins, and grassed swales/channels.
- Avoid disposing of snow on top of storm drain catch basins.

Project Location: Ricketts Pond Business Park, Spring Street, Carver, MA

Stormwater Management – Post Construction Phase

Best Management Practices – Inspection Schedule and Evaluation Checklist

Long Term Practices

Best Management Practice	Inspection Frequency (1)	Date Inspected	Inspector	Minimum Maintenance and Key Items to Check (1)	Cleaning/Repair Needed: ☐yes ☐no (List Items)	Date of Cleaning/ Repair	Performed by
Street Sweeping Maintenance	4-times annually - specifically in Spring and Fall			1. Sediment build-up 2. Trash and debris 3. Minor Spills (vehicular)			
Deep Sump and Hooded Catch basin	After heavy rainfall events (minimum quarterly)			1. Sediment level exceeds 8” 2. Trash and debris 3. Floatable oils or hydrocarbons 4. Grate or outlet blockages			
Drainage Depression Areas	(minimum monthly) (Cleaned quarterly)			1. Sediment and debris build-up 2. Standing water greater than 48 hours			
Sediment Forebay Areas	(cleaned quarterly) (minimum monthly)			1. Sediment and debris buildup 2. Standing water greater than 48 hours			
Outlet Protection	Quarterly			1. Sediment build-up 2. Trash and debris 3. Displacement of rip rap 4. Excess vegetation			
Infiltration Basins/Emergency Spillway/Inlets and Vehicular Access	After heavy rainfall events (minimum monthly, cleaned quarterly)			1. Sediment build-up 2. Standing water greater than 48 hours 3. Trash and debris			

(1) Refer to the Massachusetts Stormwater Management, Volume Two: Stormwater Technical Handbook (February 2008) for recommendations regarding frequency for inspection and maintenance of specific BMP’s.

Notes (Include deviations from: Con Com Order of Conditions, PB Approval, Construction Sequence and Approved Plan):

1.

Stormwater Control Manager _____ Stamp:

Spill Containment and Management Plan

June 1, 2022

Initial Notification

In the event of a spill, the facility manager will be notified immediately.

Facility Managers (name)

RPBP, LLC
Peter Opachinski
3 Marion Drive
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Amount of chemical / oil spilled_____

Cause of spill_____

_____

_____

Measures taken to contain or clean up spill_____

_____

_____

Amount of chemical / oil recovered_____Method_____

Material collected as a result of clean up

_____drums containing_____

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Location and method of debris disposal_____

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Name and address of any person, firm, or corporation suffering damages_____

_____

Procedures, method, and precautions instituted to prevent a similar occurrence from recurring____

_____

Spill reported to General Office by_____Time_____AM / PM

Spill reported to DEP / National Response Center by_____

DEP Date____/_____/_____ Time_____ AM / PM Inspector_____

NRC Date____/_____/_____ Time_____ AM / PM Inspector_____

Additional comments_____

_____

_____

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--	SQUARE END SHOVELS	1
--	PRY BAR	1
--	CATCH BASIN COVER	1

EMERGENCY NOTIFICATION PHONE NUMBERS

1. FACILITY MANAGER
   NAME: Peter Opachinski BEEPER: _____
   PHONE: (508) 866-9061 CELL PHONE: _____

   ALTERNATE:
   NAME: _____ BEEPER: N/A
   PHONE: _____ CEL PHONE: N/A

2. FIRE DEPARTMENT
   EMERGENCY: 911
   BUSINESS: (508) 866-3440

   POLICE DEPARTMENT
   EMERGENCY: 911
   BUSINESS: (508) 866-2000

3. MASSACHUSETTS DEPARTMENT OF ENVIRONMENTAL PROTECTION
   EMERGENCY: (617) 556-1133
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