MILLENNIUM ENGINEERING, INC.

Land Surveyors and Civil Engineers

STORMWATER MANAGEMENT REPORT

FOR THE

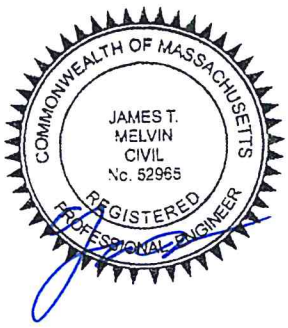
SITE PLAN

AT

66 ELM STREET
SALISBURY, MA

PREPARED FOR:

CARLYN CAPOLUPO
66 ELM STREET
SALISBURY, MA 01952



DATE: AUGUST 12, 2022
REVISED: SEPTEMBER 29, 2022
REVISED: OCTOBER 19, 2022

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Salisbury, MA 01952
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Exeter, NH 03833
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Table of Contents

Stormwater Management Report
66 Elm Street, Salisbury, MA

I. Introduction

Introduction

The subject parcel is described as Tax Map 1, Lot 8 on the Town of Salisbury, MA Assessor's Map. The project parcel is 1.62 acres in size. Elevations on the site range from 36.00' near the western property line to 29.00' at the northeast corner of the site. These elevations are based upon 1988 NAV datum.

The Site Plan at 66 Elm Street proposes to demolish the existing building that currently serves as a dog daycare and replace it with a larger building that will serve as the new dog daycare facility. The proposed stormwater management system for the project includes a catch basin, proprietary treatment unit, and a subsurface infiltration area. The water quality unit will remove suspended solids prior to discharging to the infiltration area. The infiltration area will provide stormwater recharge to the groundwater and mitigate peak runoff rates so the post-development runoff rates will be less than or equal to the pre-development rates.

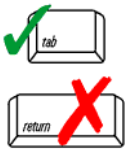
II. Stormwater Management Checklist

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

[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.

B. Stormwater Checklist and Certification

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

Checklist for Stormwater Report

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.

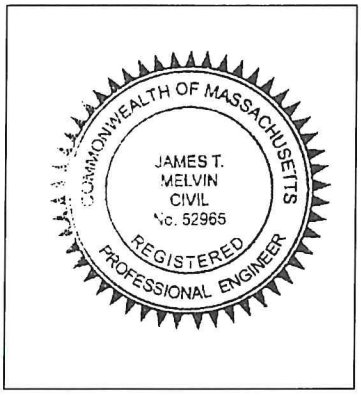
Note: Because stormwater requirements vary from project to project, it is possible that a complete Stormwater Report may not include information on some of the subjects specified in the Checklist. If it is determined that a specific item does not apply to the project under review, please note that the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



9/29/22

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 (continued)

Checklist for Stormwater Report

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): Contech treatment unit, subsurface infiltration system

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 (continued)

Checklist for Stormwater Report

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 (continued)

Checklist for Stormwater Report

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 (continued)

Checklist for Stormwater Report

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 (continued)

Checklist for Stormwater Report

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 (continued)

Checklist for Stormwater Report

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.

III. Hydrologic Analysis

Existing Site Characteristics

In general, the property is rectangular in shape and fronts Elm Street (Route 110). A wetland resource area is present along the northeast portion of the site. An existing dwelling and commercial building with associated parking and access drive, and utilities are located on-site. See the accompanying plan for a more detailed description of the existing site conditions and topography.

The lot consists of three soil groups: Deerfield Loam Fine Sand, 256A (Hydrologic Soil Group A); Amostown fine Sandy Loam, 258B (Hydrologic Soil Group C), and Ninigret fine Sandy Loam (Hydrologic Soil Group C). 4 test pits were performed onsite in May 2022. The test pits indicated sandy soils throughout the area of testing, indicative of A soils being present. See Appendix E for the NRCS soil map.

Proposed Site Features

The Applicant proposes to construct a new commercial building and re-design parking area. Access to the property will be via Elm Street (Rt 110). Sewer and water services are proposed to be connected to the Town of Salisbury's sewer main and water main located in the Elm Street Right of Way.

In order to address stormwater management regulations, a catch basin, water quality unit, an subsurface infiltration area are proposed to treat, store, and infiltrate runoff.

WATERSHED ANALYSIS AND METHODOLOGY

The stormwater runoff management system was analyzed using the storm events of the 2-year, 10-year and 100-year frequency. The analysis was performed using HydroCAD, version 10.00. Using USDA NRCS TR-20 and TR-55 methods of estimating runoff, the program uses the measured characteristics of the site and computes runoff produced by simulated rainfall events. The results are then used to design runoff control structures.

Existing drainage area boundaries were developed using an onsite topographic survey performed by Millennium Engineering, Inc. Proposed site development boundaries were developed from proposed grades and ground cover designed to minimize site storm water management structure requirements.

Hydrologic soil groups and curve numbers were estimated for existing and proposed developed conditions using available NRCS Soil Maps, current vegetation, and terrain.

DRAINAGE ANALYSIS

The purpose of the drainage analysis is two-fold. The first is to analyze and quantify the pre-development runoff flows through the site. The second purpose is to evaluate the impact of the proposed development on drainage patterns and flows, both within and outside the site, and to design a stormwater management system to adequately convey post-development runoff.

The design of the stormwater management system has the following goals:

1.) Minimize or eliminate erosion and sedimentation during construction as well as after development.

2.) To ensure that post-development flows do not have an adverse effect on downstream drainage structures and landowners.

3.) To design a stormwater and treatment system which will carry the surface runoff and satisfy goals one and two.

To determine the hydrological effect of the proposed development on the watershed, the existing conditions must first be analyzed.

WATERSHED DESCRIPTION: EXISTING CONDITIONS

Depending on the soil classification, type of ground cover present and the direction of the flow of runoff, the existing site is divided into watershed areas. Watershed area E1 consists of portions of the existing parking area, portions of the dwelling and lawn areas that flow overland direct to Elm Street. Area E2 consists of portions of the dwelling, portions of the commercial building, and lawn areas that flow overland to the BVW and abutting property to the east. Area E3 consists of the current dog play areas, lawn and woods that flow overland to the abutting property to the north. Area E4 consists of portions of the commercial building, parking area, and lawn that flow overland to the abutting property to the west. See the attached plans (Watersheds and HydroCad Data, sheet 1 of 2) for the watershed area boundaries and the pre-development time of concentration flow paths.

WATERSHED ANALYSIS: EXISTING CONDITIONS

The existing conditions were modeled using the tabular hydrograph method with a Type III synthetic storm distribution for the 2, 10 and 100-year storm recurrence intervals. Runoff hydrographs were produced to estimate existing peak discharge.

Flows for the three storm simulations are as follows:

Existing (Pre-development) Peak Runoff Rates (c.f.s.)

Subcatchment	Size	2 Yr	10 Yr	100 Yr
	(Acres)	Storm	Storm	Storm
E1	0.24	0.31	0.65	1.57
E2	1.04	0.03	0.68	3.52
E3	0.26	0.00	0.01	0.37
E4	0.07	0.00	0.05	0.24

The pre-development drainage calculations can be found in Appendix A.

WATERSHED DESCRIPTION: POST-DEVELOPMENT CONDITIONS

To determine the post development runoff, new watersheds, runoff curve numbers and times of concentration were generated reflecting the changes in the topography and surface cover. The post-development watersheds are shown on the attached plans (Watersheds and HydroCad Data, sheet 2 of 2). Watershed area P1 consists of portions of the existing dwelling, parking area, and lawn that flow overland direct to Elm Street. Areas P2A consists of portions of the existing dwelling, lawn areas and woods that flow overland to the BVW and abutting property to the east. Area P2B consists of the roof runoff from the proposed commercial building. The runoff is directed into a subsurface infiltration area. Area P2C consists of a portion of the existing dwelling, proposed parking area and lawn. The runoff is directed into a catch basin, into a water quality unit, and into the subsurface infiltration area. Area P3 consists of a portion of lawn and woods that flows overland to the abutting property to the north. Area P4 consists of lawn area that flows overland to the abutting property to the west.

WATERSHED ANALYSIS: POST-DEVELOPMENT CONDITIONS

The proposed developed conditions were modeled using the tabular hydrograph method with a Type III synthetic storm distribution for the 2, 10 and 100-year storm recurrence intervals. Runoff hydrographs were produced to estimate the post-development peak discharge.

Flows for the three storm simulations are as follows:

Post-Developed Peak Runoff Rates (c.f.s.)

Subcatchment	Size (Acres)	2 Yr Storm	10 Yr Storm	100 Yr Storm
Total P1	0.21	0.11	0.34	1.06
Total P2	1.19	0.01	0.42	3.13
Total P3	0.17	0.00	0.01	0.29
Total P4	0.04	0.00	0.00	0.06

The post-development drainage calculations can be found in Appendix B.

IV. Stormwater Recharge Calculations

Stormwater Recharge Calculations

Calculations were performed to ensure that the proposed project will comply with the groundwater recharge requirements of the Mass **DEP** Stormwater Management Standards. The required recharge volume was calculated as follows:

The Required Recharge Volume equals a depth of runoff corresponding to the soil type times the impervious areas located on site.

Rv = Fx Impervious area Where:

Rv = Required Recharge Volume, expressed in cubic feet

F = Target Depth Factor associated with each Hydrologic Soil

Group Impervious Area = pavement and rooftop area on site

For the proposed project:

Required Recharge volume, Rv (A soil) = F * impervious area
= 0.6 in * 11,387 s.f.
= 570 c.f.

Required Recharge volume, Rv (C soil) = F * impervious area
= 0.25 in * 1,002 s.f.
= 21 c.f.

Total Required Recharge Volume = 591 c.f.

Adjusted Required Recharge Volume

Since only a portion of the new impervious areas are to be directed into the infiltration BMP, it is necessary to calculate an Adjusted Required Recharge Volume:

1. The Required Recharge Volume = 591 cubic feet
2. The total proposed impervious area is 12,389 s.f.

3. The proposed impervious area draining to all infiltration areas is 9,560 s.f.
4. The ratio of total site impervious area to impervious are draining to the infiltration BMP is 12,389 / 9,560= 1.30
5. The Adjusted Required Recharge Volume = 1.30 x 591 cubic feet = 769 cubic feet.

Stormwater recharge will be accomplished on the site through the infiltration areas to be constructed.

Total Recharge provided = 849 c.f.

Drawdown Calculation

Exfiltrating Bio-retention Area

$$\text{Drawdown Time} = \frac{Rv}{(K)\,(\text{Bottom Area})}$$

Rv=Storage Volume= 849 c.f.
K=Saturated Hydraulic Conductivity=8.27 in./hr
Bottom Area=841 s.f.

$$\text{Drawdown Time} = \frac{849 \text{ c.f.}}{(8.27 \text{ in/hr})(1\text{ft}/12\text{in})(841 \text{ s.f.})}$$

Drawdown Time = 1.46 hours

V. TSS Removal Calculations

INSTRUCTIONS:

Non-automated: Mar. 4, 2008

1. Sheet is nonautomated. Print sheet and complete using hand calculations. Column A and B: See MassDEP Structural BMP Table
2. The calculations must be completed using the Column Headings specified in Chart and Not the Excel Column Headings
3. To complete Chart Column D, multiple Column B value within Row x Column C value within Row
4. To complete Chart Column E value, subtract Column D value within Row from Column C within Row
5. Total TSS Removal = Sum All Values in Column D

Location: Pretreatment for Inf. Area

TSS Removal Calculation Worksheet

A BMP[1]	B TSS Removal Rate[1]	C Starting TSS Load*	D Amount Removed (B*C)	E Remaining Load (C-D)
CDS Unit	0.96	1.00	0.96	0.04

Total TSS Removal = **96%**

Separate Form Needs to be Completed for Each Outlet or BMP Train

Project: M203703

Prepared By: JTM

Date: 9/27/2022

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

INSTRUCTIONS:
1. In BMP Column, click on Blue Cell to Activate Drop Down Menu
2. Select BMP from Drop Down Menu
3. After BMP is selected, TSS Removal and other Columns are automatically completed.

Version 1, Automated: Mar. 4, 2008

Location: Subsurface Infiltration Area

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)
Subsurface Infiltration Structure	**0.80**	**1.00**	**0.80**	**0.20**
	0.00	**0.20**	**0.00**	**0.20**
	0.00	**0.20**	**0.00**	**0.20**
	0.00	**0.20**	**0.00**	**0.20**
	0.00	**0.20**	**0.00**	**0.20**

Total TSS Removal = **80%**

Separate Form Needs to be Completed for Each Outlet or BMP Train

Project: M203703
Prepared By: JTM
Date: 8/11/2022

*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

CONTECH ENGINEERED SOLUTIONS

CDS TECHNOLOGIES

CDS ESTIMATED NET ANNUAL SOLIDS LOAD REDUCTION
BASED ON THE RATIONAL RAINFALL METHOD

66 ELM STREET
SALISBURY, MA

Area	0.08 ac	Unit Site Designation	WQU
Weighted C	0.9	Rainfall Station #	67
t_c	6 min		
CDS Model	1515-3	CDS Treatment Capacity	**1.0 cfs**

Rainfall Intensity[1] (in/hr)	Percent Rainfall Volume[1]	Cumulative Rainfall Volume	Total Flowrate (cfs)	Treated Flowrate (cfs)	Incremental Removal (%)
0.08	41.0%	41.0%	0.01	0.01	39.7
0.16	23.9%	64.9%	0.01	0.01	23.0
0.24	11.5%	76.5%	0.02	0.02	11.1
0.32	7.4%	83.9%	0.02	0.02	7.1
0.40	4.4%	88.3%	0.03	0.03	4.2
0.48	2.9%	91.2%	0.03	0.03	2.8
0.56	1.8%	93.0%	0.04	0.04	1.7
0.64	1.2%	94.2%	0.04	0.04	1.1
0.72	1.6%	95.8%	0.05	0.05	1.5
0.80	0.8%	96.6%	0.06	0.06	0.7
1.00	0.6%	97.1%	0.07	0.07	0.5
1.40	1.4%	98.6%	0.10	0.10	1.3
1.80	0.9%	99.5%	0.13	0.13	0.8
2.20	0.5%	100.0%	0.15	0.15	0.4
0.00	0.0%	100.0%	0.00	0.00	0.0
0.00	0.0%	100.0%	0.00	0.00	0.0
0.00	0.0%	100.0%	0.00	0.00	0.0
0.00	0.0%	100.0%	0.00	0.00	0.0
0.00	0.0%	100.0%	0.00	0.00	0.0
0.00	0.0%	100.0%	0.00	0.00	0.0
0.00	0.0%	100.0%	0.00	0.00	0.0
					96.1
				Removal Efficiency Adjustment[2] =	0.0%
				Predicted % Annual Rainfall Treated =	100.0%
				Predicted Net Annual Load Removal Efficiency =	**96.1%**

1 - Based on 7 years of data from NCDC station #3276, Groveland, Essex County, MA
2 - Reduction due to use of 60-minute data for a site that has a time of concentration less than 30-minutes.

VI. Water Quality Calculations

Water Quality Calculations

The Massachusetts DEP requires water quality calculations based on 1 inch of runoff for the total impervious area associated with the proposed development. The following calculation identifies the water quality volume required.

Infiltration Area 1

Total Impervious Area contributing to the subsurface infiltration area = 3,400 s.f.
3,400 s.f. * 1" / 12 (to convert to ft) = 284 c.f. of runoff to be treated for water quality.

Volume of the subsurface infiltration area below the lowest outlet = 849 c.f.

Project: 66 Elm Street
Location: Salisbury, MA
Prepared For: Millennium Engineering

Purpose: To calculate the water quality flow rate (WQF) over a given site area. In this situation the WQF is derived from the first 1" of runoff from the contributing impervious surface.

Reference: Massachusetts Dept. of Environmental Protection Wetlands Program / United States Department of Agriculture Natural Resources Conservation Service TR-55 Manual

Procedure: Determine unit peak discharge using Figure 1 or 2. Figure 2 is in tabular form so is preferred. Using the tc, read the unit peak discharge (qu) from Figure 1 or Table in Figure 2. qu is expressed in the following units: cfs/mi^2/watershed inches (csm/in).

Compute Q Rate using the following equation:

$$Q = (qu)\ (A)\ (WQV)$$

where:

Q = flow rate associated with first 1" of runoff
qu = the unit peak discharge, in csm/in.
A = impervious surface drainage area (in square miles)
WQV = water quality volume in watershed inches (1" in this case)

Structure Name	Impv. (acres)	A (miles^2)	t_c (min)	t_c (hr)	WQV (in)	qu (csm/in.)	Q (cfs)
WQU	0.08	0.0001219	6.0	0.100	1.00	774.00	0.09

VII. Soils Analysis

SOIL SUITABILITY ASSESSMENT REPORT

COMMONWEALTH OF MASSACHUSETTS

SALISBURY, MASSACHUSETTS

SOIL EVALUATION FOR ON-SITE DRAINAGE DESIGN

SITE INFORMATION 5/20/22

Street Address: 66 Elm Street Town: Salisbury State: Massachusetts Zip Code: 01952 County: Essex

Land Use: Commercial/ dog daycare Latitude: ~42° 50' 31.54" N Longitude: ~70° 52' 13.79" W

PUBLISHED SOIL DATA AND MAP UNIT DESCRIPTION

Physiographic Division: Appalachian Highlands Physio. Province: New England Physio. Section: Seaboard lowland section

Soil survey area: Essex County, Massachusetts, Northern Part Series name: 256A – Deerfield LS, 0-3% slopes

Order: Entisol Suborder: Psamments Family: Mixed, mesic, Typic Udipsamments

Soil moisture regime: Udic Soil temperature regime: Mesic Runoff class: Negligible Hydric soil rating: No

Soil hydric or upland: Upland Average depth to water table: ~ 15" - 37" Depth to restrictive feature: > 80"

Frequency of flooding: None Frequency of ponding: None Available water capacity: Moderate (~6.5")

Drainage Class: Moderately well drained Hydrologic Soil Group: A Ksat: Moderately high to very high (1.42 – 99.90 in/hr)

Ecological site: Moist sandy outwash

WETLAND AREA & USGS WELL MEASUREMENTS

National Wetland Inventory Map: NA Wetlands Conservancy Program: NA Bordering vegetative wetland: NA

Current Water Resource Condition (USGS): Well Site # 424841071004101- MA-HLW 23 Haverhill, MA.,

Well depth: 15.10 feet Land surface altitude: 100.00 feet above NGVD29 Latitude: ~42°48'41.8" N Longitude: ~71°00'41.7"

Most recent data value: 11.25' on 05/18/22 (depth to water level in feet below land surface) Range: Below normal

SURFICIAL GEOLOGY:

Geologic parent material: Loose, sandy, glaciofluvial outwash deposits Geomorphic component: Outwash plain

Slope aspect: Level to gently sloping Landform position (2D): Riser Landform position (3D): Tread

Slope gradient: ~00-02% Down slope shape: Linear Across slope shape: Linear Slope complexity: Simple

Bedrock outcropping in vicinity: None observed Glacial erratics in vicinity: None observed

Bedrock Geology: Newburyport complex: Gray, medium-grained Tonalite and Granodiorite

TP22-1 DEEP OBSERVATION HOLE

66 Elm Street, Salisbury, Massachusetts

Date: May 20, 2022 Weather: Overcast, 50°-55° F, East breeze, light mist.

Landscape: Upland Landform: Outwash plain Position on landscape: Tread/ flat

Slope aspect: Level Slope (%): 00 – 03 % Slope complexity: Simple Land Cover: Grass lawn

Property line: 10^{+} feet Drainage way: 50^{+} feet Drinking water well: 100^{+} feet Abutting septic system: 50^{+} feet

Wetlands: 10^{+} feet Public water supply reservoir: 400^{+} feet Tributary to reservoir: 200^{+} feet

SOIL PROFILE ▶ TP22-1

Depth below land surface (inches)	Soil Horizon/ Layer	Soil Texture (USDA/ NRCS)	Soil Color (Munsell)	Redoxomorphic Features/ ESHGWT	Consistence, grade, size, structure, grain size, soil moisture state, roots, horizon boundary, clasts, stratification, artifacts, restrictive features, etc.
00" → 13"	A_P	Sandy Loam	10YR 3/2 very dark grayish brown	none observed	Very friable; weak-grade fine-to-medium granular structure; somewhat cohesive; fine grained mineral content; damp matrix; non-sticky; non-plastic; many fine and few fine to medium roots; free of clasts; clear wavy boundary.
13" → 22"	B_w	Sandy Loam	10YR 4/4 dark yellowish brown	none observed	Very friable; weak-grade, fine, sub-angular blocky structure; somewhat cohesive; mixed medium to mostly fine-grained mineral content; damp matrix; non-sticky; non-plastic; approximately 05% sub-angular to sub-rounded gravel content of mixed lithology; few fine-to-medium roots; diffuse wavy boundary.
22" → 72"	$_2C$	Sand	2.5Y 5/3 light olive brown	54" (m,1-2,p) 10R 4/8 2.5Y 6/1	Loose; single grained/ structureless; weakly stratified; non-cohesive; mixed fine-to- medium grained mineral content; free of clasts; damp matrix; non-sticky; non-plastic; seasonal high-water table observed at 54"; apparent water observed at 70"; no bedrock refusal at test hole depth.

Depth to bedrock: > 72" Seasonal High Groundwater Table: 54" Apparent water: 70"

TP22-1 DEEP OBSERVATION HOLE

66 Elm Street, Salisbury, Massachusetts

DEPTH TO PHREATIC GROUNDWATER TABLE:

Apparent water seeping from pit face: 70" (below land surface) Depth to stabilized apparent water: 70" (below land surface)

Soil moisture state: Damp to wet

ESTIMATED SEASONAL HIGH GROUNDWATER TABLE:

Depth of Estimated Seasonal High Groundwater Table: 54" (below land surface)

Kind: Iron concentrations; noncemented iron masses coating sand grains

Location: In 2C matrix Shape: Irregular/ spherical

Hardness: Soft Boundary: Clear Abundance: Many Size: Fine and medium Contrast: Prominent

Concentration color: 10R 4/8 red Reduction color: 2.5Y 6/1 gray Moisture state: Damp to wet

DETERMINATION OF HIGH GROUNDWATER ELEVATION

Observed depth to redoximorphic features: 54" inches below grade

Observed water weeping from side of deep hole: 70" inches below grade

Observed depth to stabilized phreatic water: 70" inches below grade

DEPTH OF NATURALLY OCCURRING PERVIOUS MATERIAL: ► 4.92'

Depth of naturally occurring pervious material in TP22-1 Upper boundary: 13"
Lower boundary: 72"

Certification

I certify that I am currently approved by the Department of Environmental Protection pursuant to 310 CMR 15.017 to conduct 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 15.017.

Alexander F. Parker *License #1848*

Evaluator & license number Certification

June 1998

Date of Soil Evaluator Certification

05/20/22

Date of soil testing

TP22-2 DEEP OBSERVATION HOLE

66 Elm Street, Salisbury, Massachusetts

Date: May 20, 2022 Weather: Overcast, 50°-55° F, East breeze, light mist.

Landscape: Upland Landform: Outwash plain Position on landscape: Tread/ flat

Slope aspect: Level Slope (%): 00 – 03 % Slope complexity: Simple Land Cover: Grass lawn

Property line: 10^+ feet Drainage way: 50^+ feet Drinking water well: 100^+ feet Abutting septic system: 50^+ feet

Wetlands: 10^+ feet Public water supply reservoir: 400^+ feet Tributary to reservoir: 200^+ feet

SOIL PROFILE ▸ TP22-2

Depth below land surface (inches)	Soil Horizon/ Layer	Soil Texture (USDA/ NRCS)	Soil Color (Munsell)	Redoxomorphic Features/ ESHGWT	Consistence, grade, size, structure, grain size, soil moisture state, roots, horizon boundary, clasts, stratification, artifacts, restrictive features, etc.
00" → 13"	A_P	Sandy Loam	10YR 3/2 very dark grayish brown	none observed	Very friable; weak-grade fine-to-medium granular structure; somewhat cohesive; fine grained mineral content; damp matrix; non-sticky; non-plastic; many fine and few fine to medium roots; free of clasts; clear wavy boundary.
13" → 21"	B_w	Sandy Loam	10YR 4/4 dark yellowish brown	none observed	Very friable; weak-grade, fine, sub-angular blocky structure; somewhat cohesive; mixed medium to mostly fine-grained mineral content; damp matrix; non-sticky; non-plastic; approximately 05% sub-angular to sub-rounded gravel content of mixed lithology; few fine-to-medium roots; diffuse wavy boundary.
21" → 72"	$_2C$	Sand	2.5Y 5/3 light olive brown	46" (m,1-2,p) 10R 4/8 2.5Y 6/1	Loose; single grained/ structureless; weakly stratified; non-cohesive; mixed fine-to- medium grained mineral content; free of clasts; damp matrix; non-sticky; non-plastic; seasonal high-water table observed at 46"; apparent water observed at 53"; no bedrock refusal at test hole depth.

Depth to bedrock: > 72" Seasonal High Groundwater Table: 46" Apparent water: 53"

TP22-2 DEEP OBSERVATION HOLE

66 Elm Street, Salisbury, Massachusetts

DEPTH TO PHREATIC GROUNDWATER TABLE:

Apparent water seeping from pit face: 53" (below land surface) Depth to stabilized apparent water: ___ (below land surface)

Soil moisture state: Damp to wet

ESTIMATED SEASONAL HIGH GROUNDWATER TABLE:

Depth of Estimated Seasonal High Groundwater Table: 46" (below land surface)

Kind: Iron concentrations; noncemented iron masses coating sand grains

Location: In 2C matrix Shape: Irregular/ spherical

Hardness: Soft Boundary: Clear Abundance: Many Size: Fine and medium Contrast: Prominent

Concentration color: 10R 4/8 red Reduction color: 2.5Y 6/1 gray Moisture state: Damp to wet

DETERMINATION OF HIGH GROUNDWATER ELEVATION

Observed depth to redoximorphic features: 46" inches below grade

Observed water weeping from side of deep hole: 53" inches below grade

Observed depth to stabilized phreatic water: ___ inches below grade

DEPTH OF NATURALLY OCCURRING PERVIOUS MATERIAL: ► 4.92'

Depth of naturally occurring pervious material in TP22-2 Upper boundary: 13"
Lower boundary: 72"

Certification

I certify that I am currently approved by the Department of Environmental Protection pursuant to 310 CMR 15.017 to conduct 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 15.017.

Alexander F. Parker *License #1848*

Evaluator & license number Certification

June 1998

Date of Soil Evaluator Certification

05/20/22

Date of soil testing

TP22-3 DEEP OBSERVATION HOLE

66 Elm Street, Salisbury, Massachusetts

Date: May 20, 2022 Weather: Overcast, 50°-55° F, East breeze, light mist.

Landscape: Upland Landform: Outwash plain Position on landscape: Tread/ flat

Slope aspect: Level Slope (%): 00 – 03 % Slope complexity: Simple Land Cover: Grass lawn

Property line: 10^+ feet Drainage way: 50^+ feet Drinking water well: 100^+ feet Abutting septic system: 50^+ feet

Wetlands: 10^+ feet Public water supply reservoir: 400^+ feet Tributary to reservoir: 200^+ feet

SOIL PROFILE ▶ TP22-3

Depth below land surface (inches)	Soil Horizon/ Layer	Soil Texture (USDA/ NRCS)	Soil Color (Munsell)	Redoxomorphic Features/ ESHGWT	Consistence, grade, size, structure, grain size, soil moisture state, roots, horizon boundary, clasts, stratification, artifacts, restrictive features, etc.
00" → 10"	A_P	Sandy Loam	10YR 3/2 very dark grayish brown	none observed	Very friable; weak-grade fine-to-medium granular structure; somewhat cohesive; fine grained mineral content; damp matrix; non-sticky; non-plastic; many fine and few fine to medium roots; free of clasts; clear wavy boundary.
10" → 20"	B_w	Sandy Loam	10YR 4/4 dark yellowish brown	none observed	Very friable; weak-grade, fine, sub-angular blocky structure; somewhat cohesive; mixed medium to mostly fine-grained mineral content; damp matrix; non-sticky; non-plastic; approximately 05% sub-angular to sub-rounded gravel content of mixed lithology; few fine-to-medium roots; diffuse wavy boundary.
20" → 79"	$_2C$	Sand	2.5Y 5/3 light olive brown	49" (m,1-2,p) 10R 4/8 2.5Y 6/1	Loose; single grained/ structureless; weakly stratified; non-cohesive; mixed fine-to- medium grained mineral content; free of clasts; damp matrix; non-sticky; non-plastic; seasonal high-water table observed at 49"; apparent water observed at 69"; no bedrock refusal at test hole depth.

Depth to bedrock: > 72" Seasonal High Groundwater Table: 49" Apparent water: 69"

TP22-3 DEEP OBSERVATION HOLE

66 Elm Street, Salisbury, Massachusetts

DEPTH TO PHREATIC GROUNDWATER TABLE:

Apparent water seeping from pit face: 69" (below land surface) Depth to stabilized apparent water: ___ (below land surface)

Soil moisture state: Damp to wet

ESTIMATED SEASONAL HIGH GROUNDWATER TABLE:

Depth of Estimated Seasonal High Groundwater Table: 49" (below land surface)

Kind: Iron concentrations; noncemented iron masses coating sand grains

Location: In 2C matrix Shape: Irregular/ spherical

Hardness: Soft Boundary: Clear Abundance: Many Size: Fine and medium Contrast: Prominent

Concentration color: 10R 4/8 red Reduction color: 2.5Y 6/1 gray Moisture state: Damp to wet

DETERMINATION OF HIGH GROUNDWATER ELEVATION

Observed depth to redoximorphic features: 49" inches below grade

Observed water weeping from side of deep hole: 69" inches below grade

Observed depth to stabilized phreatic water: ___ inches below grade

DEPTH OF NATURALLY OCCURRING PERVIOUS MATERIAL: ► 5.75'

Depth of naturally occurring pervious material in TP22-3 Upper boundary: 10"
Lower boundary: 79"

Certification

I certify that I am currently approved by the Department of Environmental Protection pursuant to 310 CMR 15.017 to conduct 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 15.017.

Alexander F. Parker *License #1848*

Evaluator & license number Certification

June 1998

Date of Soil Evaluator Certification

05/20/22

Date of soil testing

TP22-4 DEEP OBSERVATION HOLE

66 Elm Street, Salisbury, Massachusetts

Date: May 20, 2022 Weather: Overcast, 50°-55° F, East breeze, light mist.

Landscape: Upland Landform: Outwash plain Position on landscape: Tread/ flat

Slope aspect: Level Slope (%): 00 – 03 % Slope complexity: Simple Land Cover: Grass lawn

Property line: 10^{+} feet Drainage way: 50^{+} feet Drinking water well: 100^{+} feet Abutting septic system: 50^{+} feet

Wetlands: 10^{+} feet Public water supply reservoir: 400^{+} feet Tributary to reservoir: 200^{+} feet

SOIL PROFILE ▶ TP22-4

Depth below land surface (inches)	Soil Horizon/ Layer	Soil Texture (USDA/ NRCS)	Soil Color (Munsell)	Redoxomorphic Features/ ESHGWT	Consistence, grade, size, structure, grain size, soil moisture state, roots, horizon boundary, clasts, stratification, artifacts, restrictive features, etc.
00" → 14"	A_P	Sandy Loam	10YR 3/2 very dark grayish brown	none observed	Very friable; weak-grade fine-to-medium granular structure; somewhat cohesive; fine grained mineral content; damp matrix; non-sticky; non-plastic; many fine and few fine to medium roots; free of clasts; clear wavy boundary.
14" → 24"	B_w	Sandy Loam	10YR 4/4 dark yellowish brown	none observed	Very friable; weak-grade, fine, sub-angular blocky structure; somewhat cohesive; mixed medium to mostly fine-grained mineral content; damp matrix; non-sticky; non-plastic; approximately 05% sub-angular to sub-rounded gravel content of mixed lithology; few fine-to-medium roots; diffuse wavy boundary.
24" → 81"	$_2C$	Sand	2.5Y 5/3 light olive brown	44" (m,1-2,p) 10R 4/8 2.5Y 6/1	Loose; single grained/ structureless; weakly stratified; non-cohesive; mixed fine-to- medium grained mineral content; free of clasts; damp matrix; non-sticky; non-plastic; seasonal high-water table observed at 44"; apparent water observed at 62"; no bedrock refusal at test hole depth.

Depth to bedrock: > 81" Seasonal High Groundwater Table: 44" Apparent water: 62"

TP22-4 DEEP OBSERVATION HOLE

66 Elm Street, Salisbury, Massachusetts

DEPTH TO PHREATIC GROUNDWATER TABLE:

Apparent water seeping from pit face: 62" (below land surface) Depth to stabilized apparent water: ___ (below land surface)

Soil moisture state: Damp to wet

ESTIMATED SEASONAL HIGH GROUNDWATER TABLE:

Depth of Estimated Seasonal High Groundwater Table: 44" (below land surface)

Kind: Iron concentrations; noncemented iron masses coating sand grains

Location: In 2C matrix Shape: Irregular/ spherical

Hardness: Soft Boundary: Clear Abundance: Many Size: Fine and medium Contrast: Prominent

Concentration color: 10R 4/8 red Reduction color: 2.5Y 6/1 gray Moisture state: Damp to wet

DETERMINATION OF HIGH GROUNDWATER ELEVATION

Observed depth to redoximorphic features: 44" inches below grade

Observed water weeping from side of deep hole: 62" inches below grade

Observed depth to stabilized phreatic water: ___ inches below grade

DEPTH OF NATURALLY OCCURRING PERVIOUS MATERIAL: ► 5.58'

Depth of naturally occurring pervious material in TP22-4 Upper boundary: 14"
Lower boundary: 81"

Certification

I certify that I am currently approved by the Department of Environmental Protection pursuant to 310 CMR 15.017 to conduct 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 15.017.

Alexander F. Parker *License #1848*

Evaluator & license number Certification

June 1998

Date of Soil Evaluator Certification

05/20/22

Date of soil testing

United States Department of Agriculture

NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Essex County, Massachusetts, Northern Part

August 10, 2022

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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Contents

How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map

Map Scale: 1:809 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 10 20 40 60

Feet: 0 35 70 140 210

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

MAP LEGEND

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

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

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

Water Features
- Streams and Canals

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

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:15,800.

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

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

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

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

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

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

Soil Survey Area: Essex County, Massachusetts, Northern Part
Survey Area Data: Version 17, Sep 2, 2021

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

Date(s) aerial images were photographed: May 22, 2020—Sep 25, 2020

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

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
256A	Deerfield loamy fine sand, 0 to 3 percent slopes	1.4	83.9%
258B	Amostown fine sandy loam, 3 to 8 percent slopes	0.1	5.6%
276B	Ninigret fine sandy loam, 3 to 8 percent slopes	0.2	10.5%
Totals for Area of Interest		**1.7**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or

landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Essex County, Massachusetts, Northern Part

256A—Deerfield loamy fine sand, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 2xfg8
Elevation: 0 to 1,100 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 145 to 240 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Deerfield and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Deerfield

Setting

Landform: Outwash terraces, outwash deltas, outwash plains, kame terraces
Landform position (three-dimensional): Tread
Down-slope shape: Concave, convex, linear
Across-slope shape: Convex, linear, concave
Parent material: Sandy outwash derived from granite, gneiss, and/or quartzite

Typical profile

Ap - 0 to 9 inches: loamy fine sand
Bw - 9 to 25 inches: loamy fine sand
BC - 25 to 33 inches: fine sand
Cg - 33 to 60 inches: sand

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to very high (1.42 to 99.90 in/hr)
Depth to water table: About 15 to 37 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Sodium adsorption ratio, maximum: 11.0
Available water supply, 0 to 60 inches: Moderate (about 6.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: A
Ecological site: F144AY027MA - Moist Sandy Outwash
Hydric soil rating: No

Minor Components

Windsor

Percent of map unit: 7 percent
Landform: Outwash terraces, kame terraces, outwash deltas, outwash plains
Landform position (three-dimensional): Tread
Down-slope shape: Concave, convex, linear
Across-slope shape: Convex, linear, concave
Hydric soil rating: No

Wareham

Percent of map unit: 5 percent
Landform: Drainageways, depressions
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Sudbury

Percent of map unit: 2 percent
Landform: Outwash plains, kame terraces, outwash deltas, outwash terraces
Landform position (three-dimensional): Tread
Down-slope shape: Concave, convex, linear
Across-slope shape: Convex, linear, concave
Hydric soil rating: No

Ninigret

Percent of map unit: 1 percent
Landform: Kame terraces, outwash plains, outwash terraces
Landform position (three-dimensional): Tread
Down-slope shape: Convex, linear
Across-slope shape: Convex, concave
Hydric soil rating: No

258B—Amostown fine sandy loam, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: vj2g
Elevation: 0 to 100 feet
Mean annual precipitation: 45 to 54 inches
Mean annual air temperature: 43 to 54 degrees F
Frost-free period: 145 to 240 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Amostown and similar soils: 70 percent
Minor components: 30 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Amostown

Setting

Landform: Lakebeds, deltas
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Rise
Down-slope shape: Linear
Across-slope shape: Concave
Parent material: Friable coarse-loamy glaciofluvial deposits derived from mica schist over hard coarse-loamy glaciolacustrine deposits

Typical profile

H1 - 0 to 11 inches: fine sandy loam
H2 - 11 to 38 inches: fine sandy loam
H3 - 38 to 60 inches: stratified very fine sand to silt loam

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.60 in/hr)
Depth to water table: About 12 to 30 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: High (about 9.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: C/D
Ecological site: F144AY027MA - Moist Sandy Outwash
Hydric soil rating: No

Minor Components

Pollux

Percent of map unit: 20 percent
Hydric soil rating: No

Walpole variant

Percent of map unit: 10 percent
Landform: Terraces
Hydric soil rating: Yes

276B—Ninigret fine sandy loam, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: 2tyr7
Elevation: 0 to 1,070 feet
Mean annual precipitation: 36 to 71 inches

Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 250 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Ninigret and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Ninigret

Setting

Landform: Drainageways, depressions, kame terraces, outwash plains, moraines, kames, outwash terraces
Landform position (two-dimensional): Backslope, shoulder, footslope, summit
Landform position (three-dimensional): Side slope, crest, tread, dip, rise
Down-slope shape: Concave, convex, linear
Across-slope shape: Concave, convex
Parent material: Coarse-loamy eolian deposits over sandy and gravelly glaciofluvial deposits derived from gneiss, granite, schist, and/or phyllite

Typical profile

Ap - 0 to 8 inches: fine sandy loam
Bw1 - 8 to 16 inches: fine sandy loam
Bw2 - 16 to 26 inches: fine sandy loam
2C - 26 to 65 inches: stratified loamy sand to loamy fine sand

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: 18 to 38 inches to strongly contrasting textural stratification
Drainage class: Moderately well drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high (0.14 to 14.17 in/hr)
Depth to water table: About 17 to 39 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water supply, 0 to 60 inches: Low (about 3.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: C
Ecological site: F144AY026CT - Moist Silty Outwash
Hydric soil rating: No

Minor Components

Agawam

Percent of map unit: 5 percent
Landform: Kame terraces, outwash plains, outwash terraces, moraines, kames
Landform position (two-dimensional): Backslope, shoulder, footslope, summit
Landform position (three-dimensional): Side slope, crest, riser, tread, rise
Down-slope shape: Convex
Across-slope shape: Convex

Hydric soil rating: No

Windsor

Percent of map unit: 5 percent
Landform: Outwash terraces, dunes, outwash plains, deltas
Landform position (three-dimensional): Tread, riser
Down-slope shape: Linear, convex
Across-slope shape: Linear, convex
Hydric soil rating: No

Sudbury

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

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VIII. Long Term Pollution Prevention and Operations and Maintenance Plan

This long-term Stormwater Management System Operations and Maintenance (O&M) Plan, filed with the Town of Salisbury, shall be implemented for the proposed development at 66 Elm Street to ensure that the stormwater management system functions as designed. The Owner holds the primary responsibility for overseeing and implementing the O&M Plan and assigning a Property Manager who will be responsible for the proper operation and maintenance of the stormwater structures. In case of transfer of property ownership, future property owners shall be notified of the presence of the stormwater management system and the requirements for proper implementation of the O&M Plan. Included in the manual is a Stormwater Management O&M Plan identifying the key components of the stormwater system and a log for tracking inspections and maintenance.

The stormwater management system protects and enhances the stormwater runoff water quality through the removal of sediment and pollutants, and source control significantly reduces the amount of pollutants entering the system. Preventive maintenance of the system will include a comprehensive source reduction program of regular vacuuming and litter removal, and prohibitions on the use of pesticides.

The purpose of the Stormwater Operations and Maintenance (O&M) plan is to ensure inspection of the system, removal of accumulated sediments, oils, and debris, and implementation of corrective action and record keeping activities.

The ongoing responsibility is the Owner, its successors and assigns. Adequate maintenance is defined in this document as good working condition.

Contact information is provided below:

Responsibility for Operations and Maintenance
Carlyn Capolupo
66 Elm Street
Salisbury, MA

Illicit Discharge Compliance Statement

I, _____, verify that all illicit discharges to the stormwater management system are prohibited and no illicit discharges exist on the site.

EROSION AND SEDIMENT CONTROL BMPs

Minimize Disturbed Area and Protect Natural Features and Soil

Topsoil

Topsoil stripped from the immediate construction area can be temporarily stockpiled on site providing that the perimeter of the stockpiles is properly staked with silt fence at the toe of slope. The stockpiles shall be in areas that will not interfere with construction and at least 15 feet away from areas of concentrated flows or pavement. The area shall be inspected weekly for erosion and immediately after storm events. Areas on or around the stockpile that have eroded shall be stabilized immediately with erosion controls.

Stabilize Soils

Temporary Stabilization

- All vegetated areas which do not exhibit a minimum of 85% vegetative growth by Oct. 15th, or which are disturbed after Oct. 15th, shall be stabilized by seeding and installing erosion control blankets on slopes greater than 3:1, and seeding and placing 3 to 4 tons of mulch per acre, secured with anchored netting, elsewhere. The placement of erosion control blankets or mulch and netting shall not occur over accumulated snow or on frozen ground and shall be completed in advance of thaw or spring melt events.
- All ditches or swales which do not exhibit a minimum of 85% vegetative growth by Oct. 15th, or which are disturbed after Oct. 15th, shall be stabilized with stone or erosion control blankets appropriate for the design flow conditions.
- After November 15th, incomplete road surfaces, where work has stopped for the winter season, shall be protected with a minimum of 3 inches of crushed gravel.

Protect Slopes

Geotextile erosion control blankets shall be used to provide stabilization for slopes exceeding 3:1. Prepare soil before installing erosion control blanket, including any necessary application of lime, fertilizer, and seed. Begin at the top of the slope by anchoring the blanket in a 6" deep x 6" wide trench with approximately 12" extended beyond the upslope portion of the trench. Anchor the blanket with a row of staples/stakes approximately 12" apart in the bottom of the trench. Backfill and compact the trench after stapling. Apply seed to compacted soil and fold remaining 12" portion of back over seed and compacted soil. Secure over compacted soil with a row of staples/stakes spaced approximately 12" apart across the width of the blanket. Roll erosion control blanket either down or horizontally across the slope. Blanket will unroll with appropriate side against the soil surface. All blankets must be securely fastened to soil surface by placing staples/stakes in appropriate locations as shown in the staple pattern guide. When using the dot system, staples/stakes should be placed through each of the colored dots corresponding to the appropriate staple pattern. The edges of parallel blankets must be stapled with approximately

2"-5" overlap. Consecutive blankets spliced down the slope must be placed end over end (shingle style) with an approximate 3" overlap. Staple through overlapped area, approximately 12" apart across entire blanket's width. In loose soil conditions, the use of staple or stake lengths greater than 6" may be necessary to properly anchor the blanket.

Establish Perimeter Controls and Sediment Barriers

Silt fence shall be installed along the edge of wetlands. The silt fence shall be installed before construction begins. Wooden posts shall be doubled and coupled at filter cloth seams. Filter cloth shall be fastened securely to support netting with ties spaced every 24" at top, midsection, and bottom. When two sections of filter cloth adjoin each other, they shall be overlapped by 6 inches, folded and stapled. Silt fence shall be removed upon completion of the project and stabilization of all soil.

Maintenance:
1. Silt fence shall be inspected immediately after each rainfall and at least daily during prolonged rainfall. Any repairs that are required shall be made immediately.
2. If the fabric on the silt fence shall decompose or become ineffective during the expected life of the fence, the fabric shall be replaced promptly.
3. Sediment deposits shall be inspected after every storm event. The deposits shall be removed when they reach approximately one-half the height of the barrier.
4. Sediment deposits that are removed or left in place after the fabric has been removed shall be graded to conform with the existing topography and vegetated.

Establish Stabilized Construction Entrance

A stabilized construction entrance shall be installed before construction begins on the site. The stone anti-tracking pad shall remain in place until the subgrade of pavement is installed.

1. Stone shall be 1-2" stone, reclaimed stone, or recycled concrete equivalent.
2. The length of the stabilized entrance shall not be less than 50'.
3. The thickness of the stone for the stabilized entrance shall not be less than 6".
4. Geotextile filter cloth shall be placed over the entire area prior to placing the stone.
5. All surface water that is flowing to or diverted toward the construction entrance shall be piped beneath the entrance. If piping is impractical, a berm with 5:1 slope that can be crossed by vehicles may be substituted for the pipe.
6. The entrance shall be maintained in a condition that will prevent tracking or flowing of sediment onto public rights-of-way. This may require periodic top-dressing with additional stone as conditions demand and repair and/or cleanout of any measures used to trap sediment. All sediment spilled, washed, or tracked onto public rights-of-way must be removed promptly.
7. Wheels shall be cleaned to remove mud prior to entrance onto public rights-of way. When washing is required, it shall be done on an area stabilized with stone which drains into an approved sediment trapping device.

Catch Basin Inlet Protection

Inlet protection devices intercept and/or filter sediment before it can be transported from a site into the storm drain system and discharged into a lake, river, stream, wetland, or other waterbody. These devices also keep sediment from filling or clogging storm drainpipes, ditches, and downgradient sediment traps or ponds. A siltsack or approved equal shall be used for catch basin inlet protection. It should be inspected weekly. When the restraint cord is no longer visible, siltsack is full and shall be emptied.

POST-CONSTRUCTION BMPs

Snow and Snow Melt Management

Proper management of snow and snow melt, snow removal and storage, use of deicing compounds, and other practices can minimize major runoff and pollutant loading impacts. Snow will be stored in areas adjacent to the edge of the roadway. Use of alternative deicing compounds, such as calcium chloride and calcium magnesium acetate, will be investigated for use. Professional services will be used for snow management.

Deep Sump/Hooded Catch Basins

Deep sump/hooded catch basins are incorporated in the proposed development's stormwater management plan as pre-treatment for the proposed drainage system. The sump provides for settlement of suspended solids and a hood is provided to remove floatables and trapped hydrocarbons. It is not anticipated that the access drive will become an area of high sediment loading. The sump should be inspected and cleaned at least four times per year; the more frequent the cleaning, the less likely sediment will be resuspended and subsequently discharged. Catch basin sediments and debris shall be disposed of at an approved DEP landfill. The owner shall be responsible for the catch basin cleaning operations.

Infiltration Chamber

Infiltration chambers are incorporated into the site design for infiltration. The chambers shall be inspected after every major storm event in the first 4 months after construction to ensure proper function. Inspection ports shall be utilized for access and assessment. After the four-month period, the chambers shall be inspected a minimum of twice per year. Any grit or sediment found within the chambers impacting infiltration shall be removed by manual or mechanical methods, such as a vacuum truck. The Owner will be responsible for proper maintenance of the subsurface systems.

CDS System

A CDS2015-4 is incorporated into the site design for treatment for the proposed underground infiltration system. At a minimum, the unit shall be inspected twice per year (spring and fall). The CDS unit should be vacuum cleaned when the level of sediment has reached 75% of capacity in the isolated sump. Sediments and debris shall be disposed of at an approved DEP landfill. The owner shall be responsible for the CDS cleaning operations.

Peastone Diaphragm

A stone diaphragm is proposed along the exterior fence of the dog play areas. The stone diaphragm shall be inspected twice per year (spring and fall). Any sediment and debris should be removed manually before the stone is adversely impacted. The oner will be responsible for proper maintenance of the stone trenches.

FINAL STABILIZATION

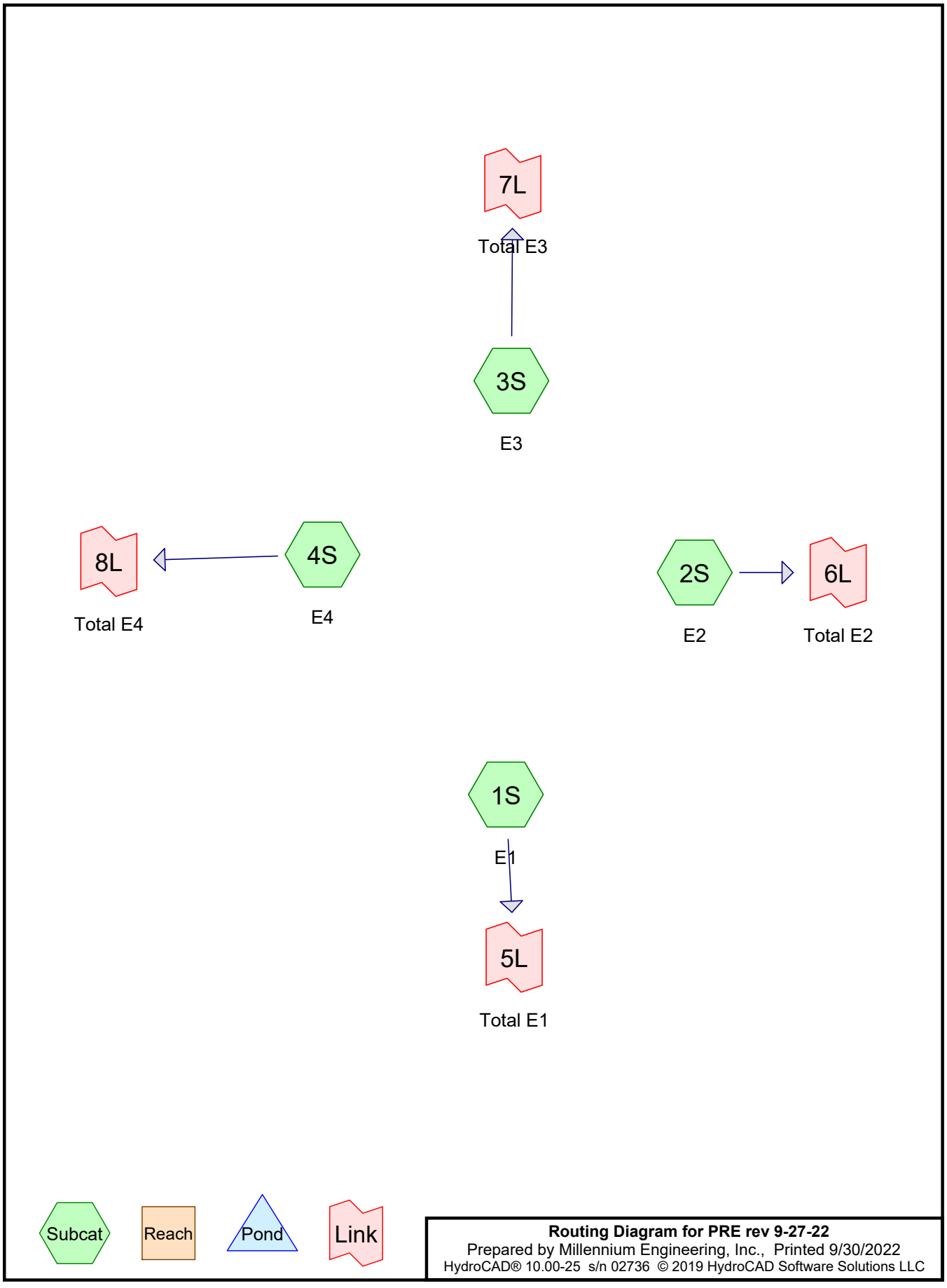
Permanent Seeding

Loam and hydroseed any disturbed surfaces after the final design grades have been achieved. A minimum of 6" of loam shall be installed. Seed mix shall be a maximum of 10% rye grass and a minimum of 90% permanent bluegrass and/or fescue. Lime shall be applied at a rate of 2 tons/acre.

Construction debris, trash and temporary BMPs (including silt fences, material storage areas, and inlet protection) will also be removed and any areas disturbed during removal will be seeded immediately.

IIX. **Appendix**

a. Existing Conditions HydroCAD Report



Routing Diagram for PRE rev 9-27-22
Prepared by Millennium Engineering, Inc., Printed 9/30/2022

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.357	68	<50% Grass cover, Poor, HSG A (2S, 3S)
0.767	39	>75% Grass cover, Good, HSG A (1S, 2S, 3S, 4S)
0.046	74	>75% Grass cover, Good, HSG C (1S, 2S)
0.095	98	Paved parking, HSG A (1S, 2S, 4S)
0.031	98	Paved parking, HSG C (1S)
0.068	98	Roofs, HSG A (1S, 2S, 4S)
0.143	30	Woods, Good, HSG A (2S, 3S)
0.101	70	Woods, Good, HSG C (2S, 3S)
1.606	**55**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
1.429	HSG A	1S, 2S, 3S, 4S
0.000	HSG B	
0.177	HSG C	1S, 2S, 3S
0.000	HSG D	
0.000	Other	
1.606		**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
0.357	0.000	0.000	0.000	0.000	0.357	<50% Grass cover, Poor	2S, 3S
0.767	0.000	0.046	0.000	0.000	0.812	>75% Grass cover, Good	1S, 2S, 3S, 4S
0.095	0.000	0.031	0.000	0.000	0.126	Paved parking	1S, 2S, 4S
0.068	0.000	0.000	0.000	0.000	0.068	Roofs	1S, 2S, 4S
0.143	0.000	0.101	0.000	0.000	0.243	Woods, Good	2S, 3S
1.429	**0.000**	**0.177**	**0.000**	**0.000**	**1.606**	**TOTAL AREA**	

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

Subcatchment 1S: E1 Runoff Area=10,628 sf 55.21% Impervious Runoff Depth>1.03"
Tc=6.0 min CN=77 Runoff=0.31 cfs 0.021 af

Subcatchment 2S: E2 Runoff Area=45,152 sf 3.87% Impervious Runoff Depth>0.14"
Tc=6.0 min CN=53 Runoff=0.03 cfs 0.012 af

Subcatchment 3S: E3 Runoff Area=11,265 sf 0.00% Impervious Runoff Depth>0.00"
Flow Length=96' Tc=9.5 min CN=42 Runoff=0.00 cfs 0.000 af

Subcatchment 4S: E4 Runoff Area=2,900 sf 27.86% Impervious Runoff Depth>0.18"
Tc=6.0 min CN=55 Runoff=0.00 cfs 0.001 af

Link 5L: Total E1 Inflow=0.31 cfs 0.021 af
Primary=0.31 cfs 0.021 af

Link 6L: Total E2 Inflow=0.03 cfs 0.012 af
Primary=0.03 cfs 0.012 af

Link 7L: Total E3 Inflow=0.00 cfs 0.000 af
Primary=0.00 cfs 0.000 af

Link 8L: Total E4 Inflow=0.00 cfs 0.001 af
Primary=0.00 cfs 0.001 af

Total Runoff Area = 1.606 ac Runoff Volume = 0.034 af Average Runoff Depth = 0.25"
87.95% Pervious = 1.412 ac 12.05% Impervious = 0.193 ac

Summary for Subcatchment 1S: E1

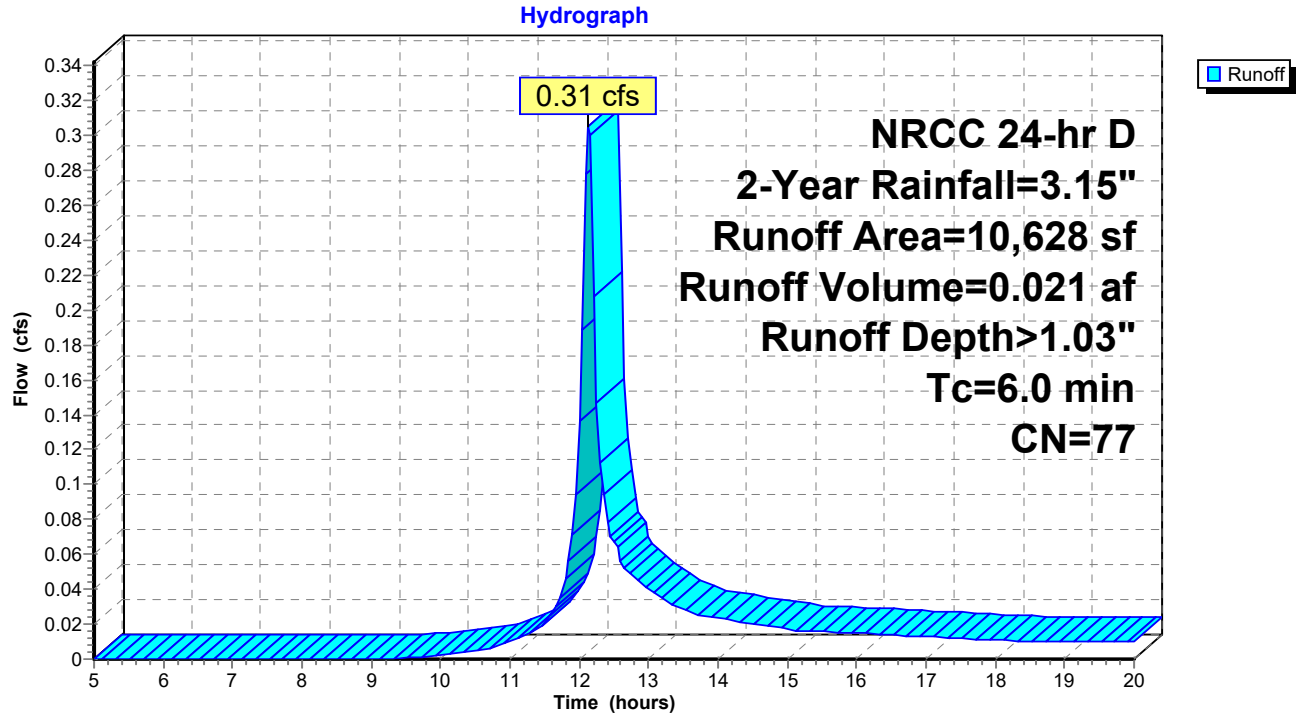
Runoff = 0.31 cfs @ 12.13 hrs, Volume= 0.021 af, Depth> 1.03"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 2-Year Rainfall=3.15"

Area (sf)	CN	Description
1,617	74	>75% Grass cover, Good, HSG C
1,351	98	Paved parking, HSG C
3,143	39	>75% Grass cover, Good, HSG A
3,734	98	Paved parking, HSG A
783	98	Roofs, HSG A
10,628	77	Weighted Average
4,760		44.79% Pervious Area
5,868		55.21% Impervious Area

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

Subcatchment 1S: E1



Summary for Subcatchment 2S: E2

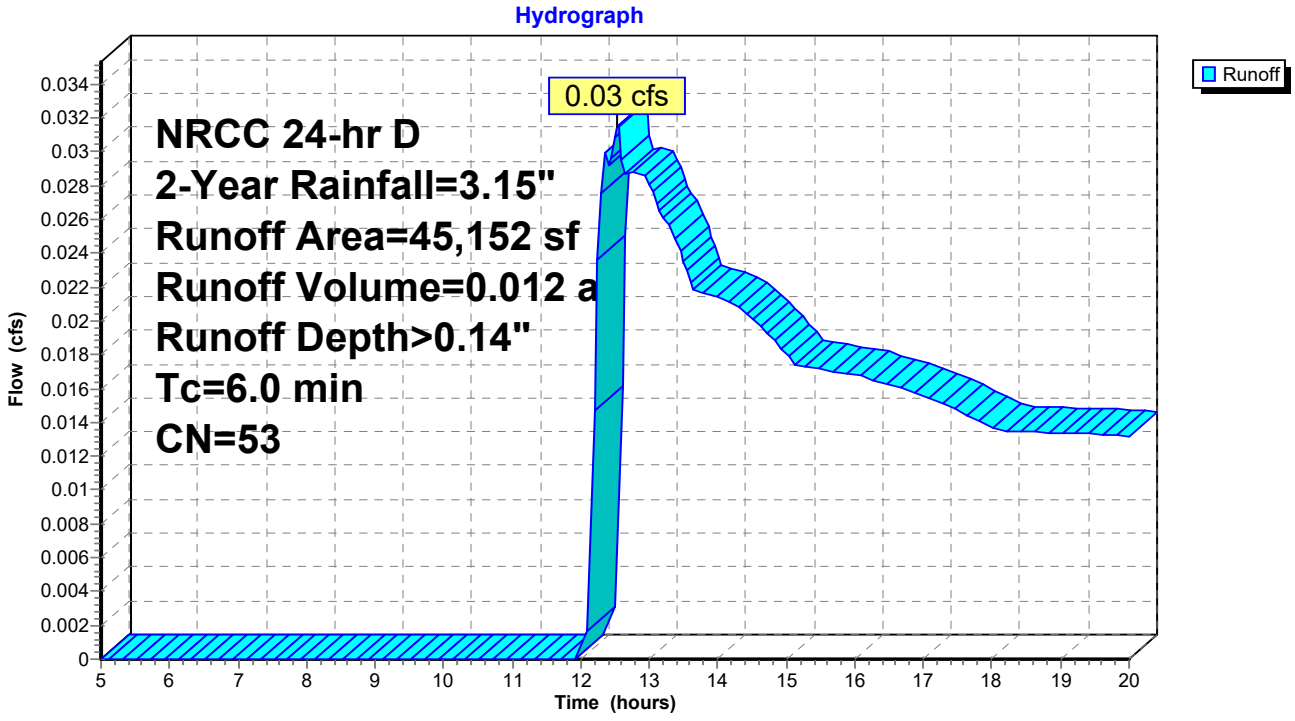
Runoff = 0.03 cfs @ 12.54 hrs, Volume= 0.012 af, Depth> 0.14"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 2-Year Rainfall=3.15"

Area (sf)	CN	Description
1,703	30	Woods, Good, HSG A
1,618	98	Roofs, HSG A
23,762	39	>75% Grass cover, Good, HSG A
366	74	>75% Grass cover, Good, HSG C
2,413	70	Woods, Good, HSG C
131	98	Paved parking, HSG A
15,159	68	<50% Grass cover, Poor, HSG A
45,152	53	Weighted Average
43,403		96.13% Pervious Area
1,749		3.87% Impervious Area

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

Subcatchment 2S: E2



Summary for Subcatchment 3S: E3

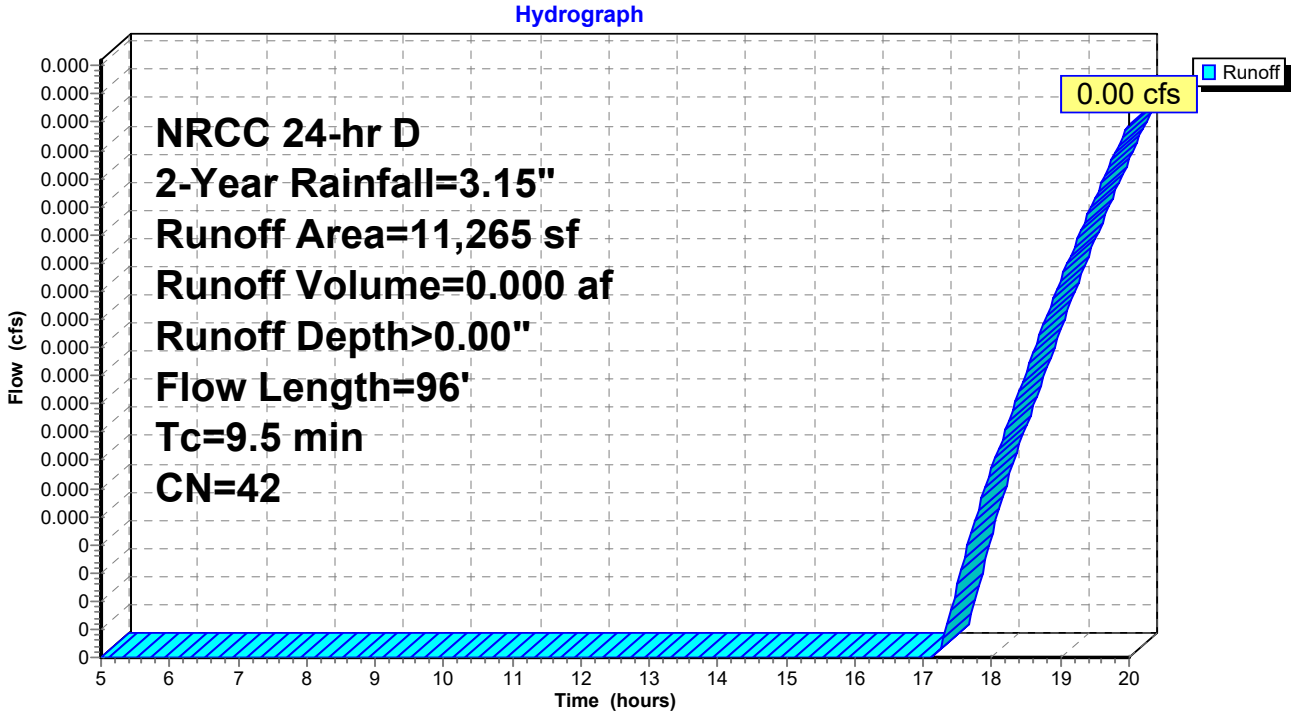
Runoff = 0.00 cfs @ 20.00 hrs, Volume= 0.000 af, Depth> 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 2-Year Rainfall=3.15"

Area (sf)	CN	Description
1,968	70	Woods, Good, HSG C
4,513	30	Woods, Good, HSG A
4,398	39	>75% Grass cover, Good, HSG A
386	68	<50% Grass cover, Poor, HSG A
11,265	42	Weighted Average
11,265		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.1	50	0.0450	0.09		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.10"
0.4	46	0.0170	2.10		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
9.5	96	Total			

Subcatchment 3S: E3



Summary for Subcatchment 4S: E4

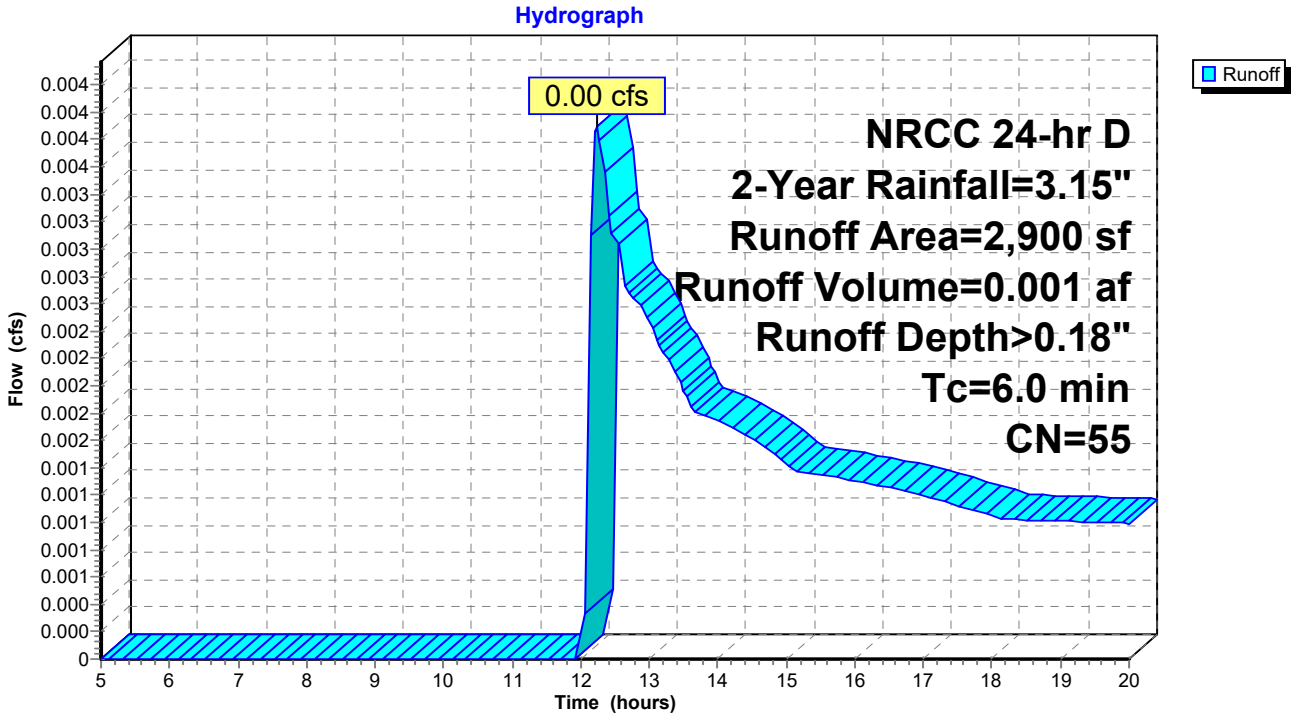
Runoff = 0.00 cfs @ 12.23 hrs, Volume= 0.001 af, Depth> 0.18"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 2-Year Rainfall=3.15"

Area (sf)	CN	Description
265	98	Paved parking, HSG A
2,092	39	>75% Grass cover, Good, HSG A
543	98	Roofs, HSG A
2,900	55	Weighted Average
2,092		72.14% Pervious Area
808		27.86% Impervious Area

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

Subcatchment 4S: E4

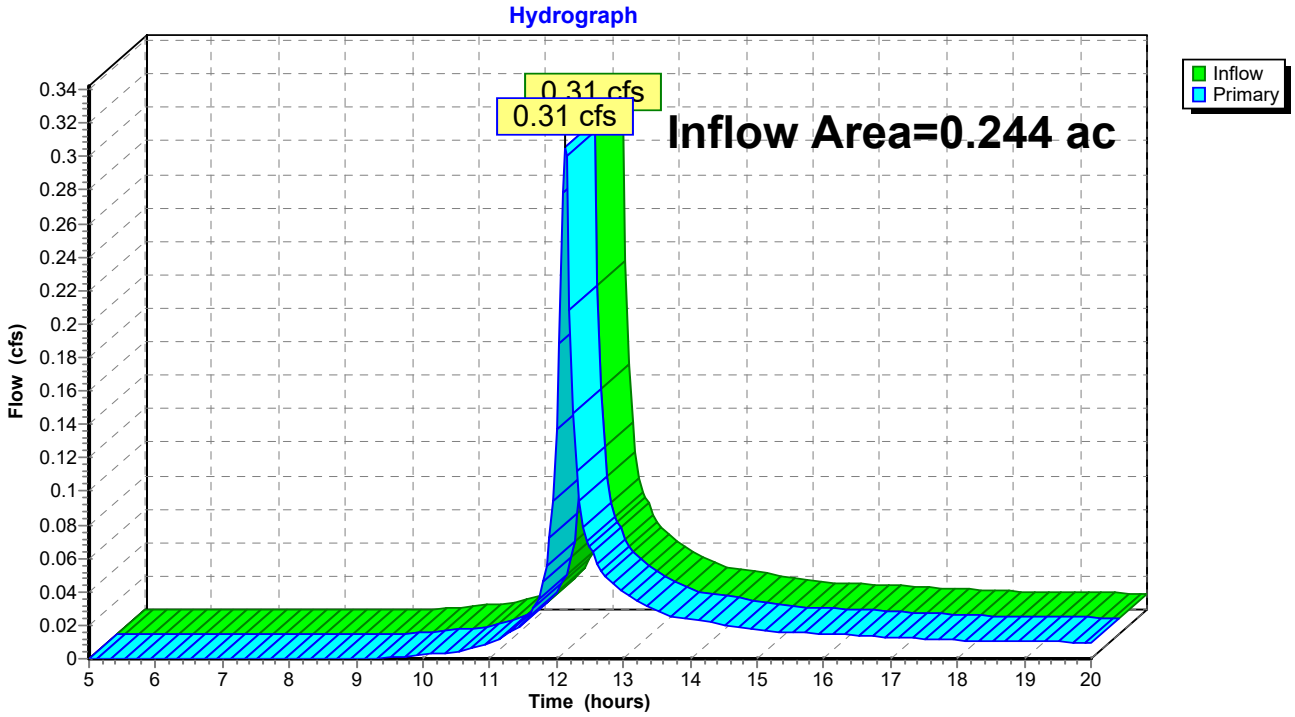


Summary for Link 5L: Total E1

Inflow Area = 0.244 ac, 55.21% Impervious, Inflow Depth > 1.03" for 2-Year event
Inflow = 0.31 cfs @ 12.13 hrs, Volume= 0.021 af
Primary = 0.31 cfs @ 12.13 hrs, Volume= 0.021 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link 5L: Total E1

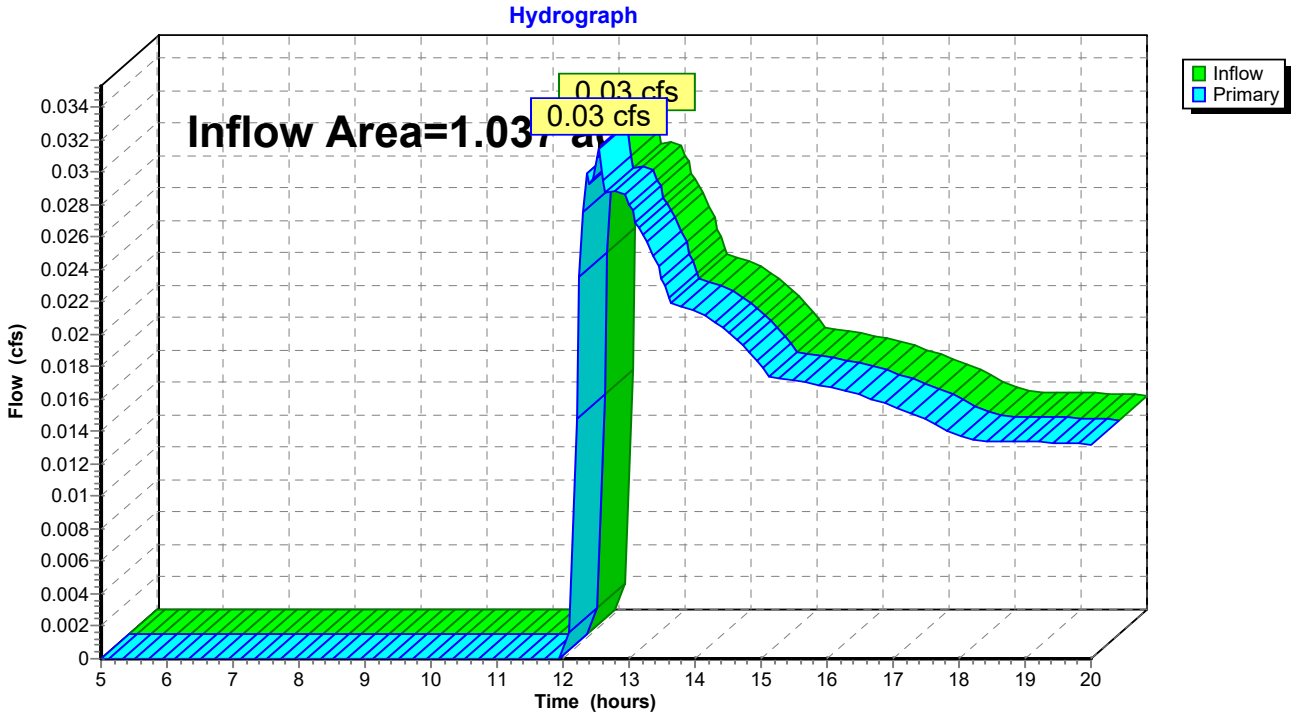


Summary for Link 6L: Total E2

Inflow Area = 1.037 ac, 3.87% Impervious, Inflow Depth > 0.14" for 2-Year event
Inflow = 0.03 cfs @ 12.54 hrs, Volume= 0.012 af
Primary = 0.03 cfs @ 12.54 hrs, Volume= 0.012 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link 6L: Total E2

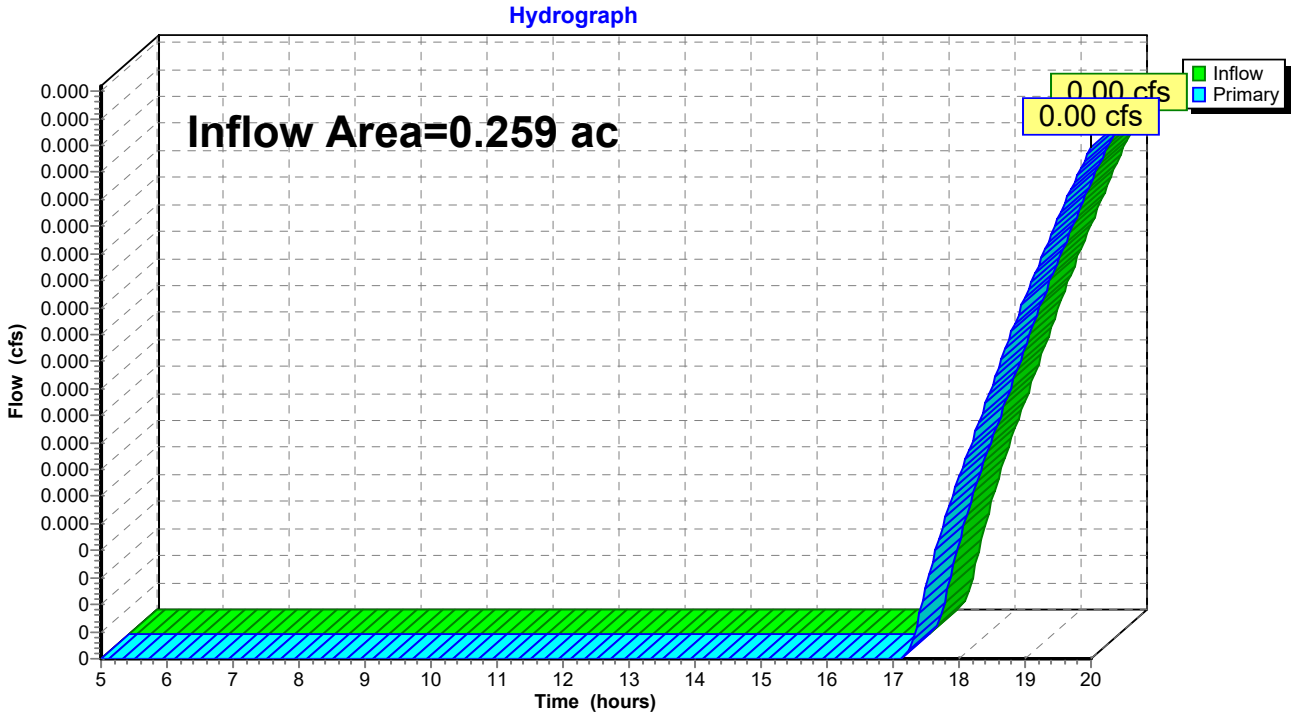


Summary for Link 7L: Total E3

Inflow Area = 0.259 ac, 0.00% Impervious, Inflow Depth > 0.00" for 2-Year event
Inflow = 0.00 cfs @ 20.00 hrs, Volume= 0.000 af
Primary = 0.00 cfs @ 20.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link 7L: Total E3

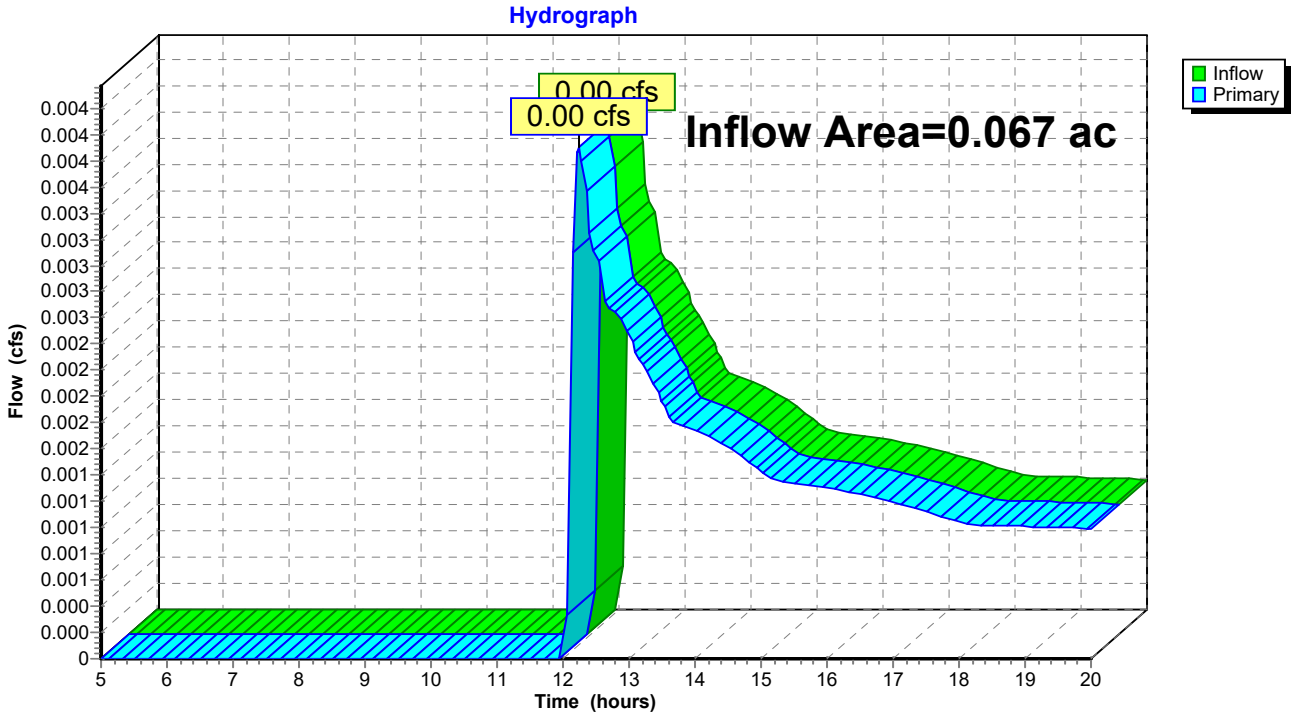


Summary for Link 8L: Total E4

Inflow Area = 0.067 ac, 27.86% Impervious, Inflow Depth > 0.18" for 2-Year event
Inflow = 0.00 cfs @ 12.23 hrs, Volume= 0.001 af
Primary = 0.00 cfs @ 12.23 hrs, Volume= 0.001 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link 8L: Total E4



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

Subcatchment 1S: E1 Runoff Area=10,628 sf 55.21% Impervious Runoff Depth>2.22"
Tc=6.0 min CN=77 Runoff=0.65 cfs 0.045 af

Subcatchment 2S: E2 Runoff Area=45,152 sf 3.87% Impervious Runoff Depth>0.65"
Tc=6.0 min CN=53 Runoff=0.68 cfs 0.056 af

Subcatchment 3S: E3 Runoff Area=11,265 sf 0.00% Impervious Runoff Depth>0.20"
Flow Length=96' Tc=9.5 min CN=42 Runoff=0.01 cfs 0.004 af

Subcatchment 4S: E4 Runoff Area=2,900 sf 27.86% Impervious Runoff Depth>0.75"
Tc=6.0 min CN=55 Runoff=0.05 cfs 0.004 af

Link 5L: Total E1 Inflow=0.65 cfs 0.045 af
Primary=0.65 cfs 0.045 af

Link 6L: Total E2 Inflow=0.68 cfs 0.056 af
Primary=0.68 cfs 0.056 af

Link 7L: Total E3 Inflow=0.01 cfs 0.004 af
Primary=0.01 cfs 0.004 af

Link 8L: Total E4 Inflow=0.05 cfs 0.004 af
Primary=0.05 cfs 0.004 af

Total Runoff Area = 1.606 ac Runoff Volume = 0.109 af Average Runoff Depth = 0.82"
87.95% Pervious = 1.412 ac 12.05% Impervious = 0.193 ac

Summary for Subcatchment 1S: E1

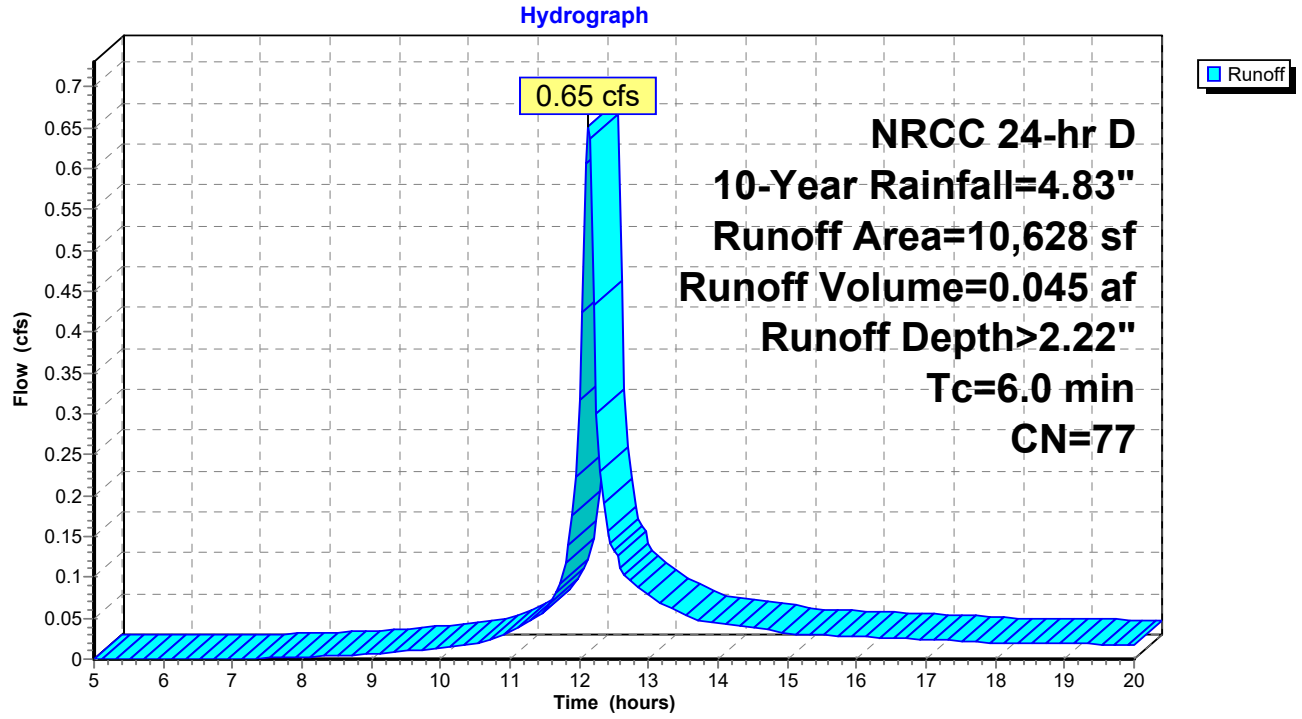
Runoff = 0.65 cfs @ 12.13 hrs, Volume= 0.045 af, Depth> 2.22"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 10-Year Rainfall=4.83"

Area (sf)	CN	Description
1,617	74	>75% Grass cover, Good, HSG C
1,351	98	Paved parking, HSG C
3,143	39	>75% Grass cover, Good, HSG A
3,734	98	Paved parking, HSG A
783	98	Roofs, HSG A
10,628	77	Weighted Average
4,760		44.79% Pervious Area
5,868		55.21% Impervious Area

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

Subcatchment 1S: E1



Summary for Subcatchment 2S: E2

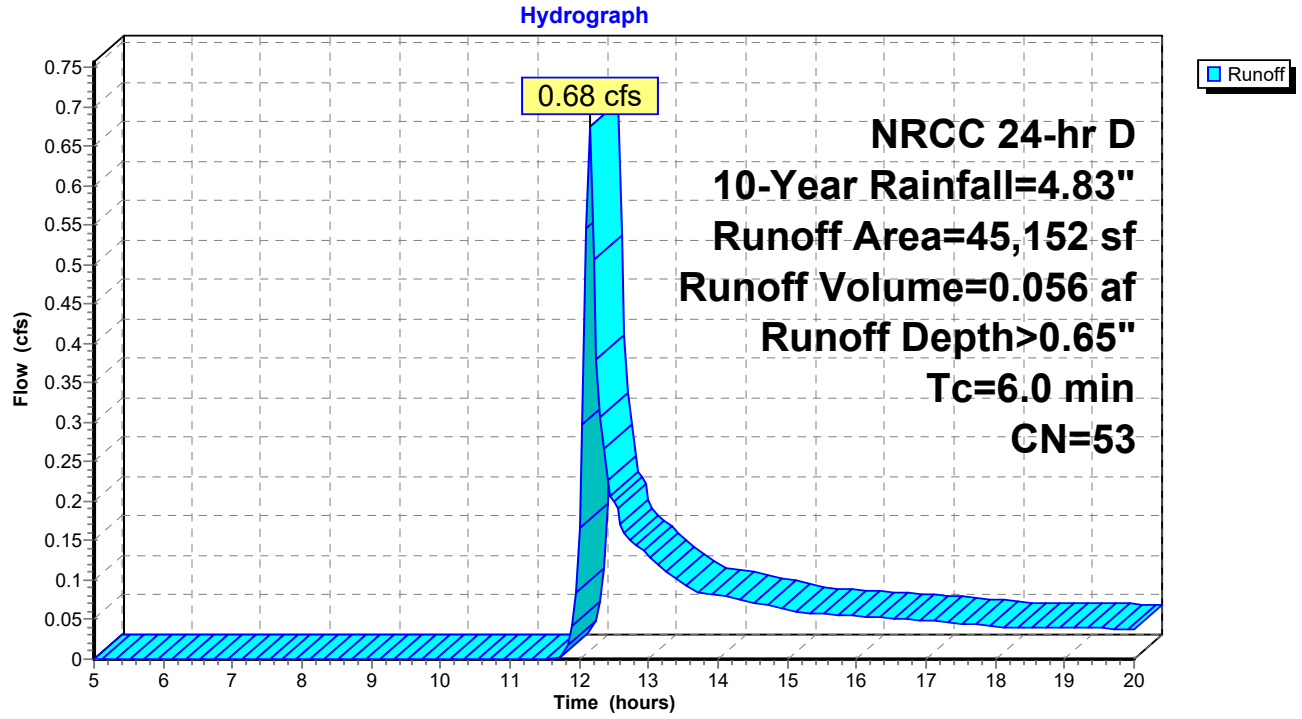
Runoff = 0.68 cfs @ 12.15 hrs, Volume= 0.056 af, Depth> 0.65"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 10-Year Rainfall=4.83"

Area (sf)	CN	Description
1,703	30	Woods, Good, HSG A
1,618	98	Roofs, HSG A
23,762	39	>75% Grass cover, Good, HSG A
366	74	>75% Grass cover, Good, HSG C
2,413	70	Woods, Good, HSG C
131	98	Paved parking, HSG A
15,159	68	<50% Grass cover, Poor, HSG A
45,152	53	Weighted Average
43,403		96.13% Pervious Area
1,749		3.87% Impervious Area

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

Subcatchment 2S: E2



Summary for Subcatchment 3S: E3

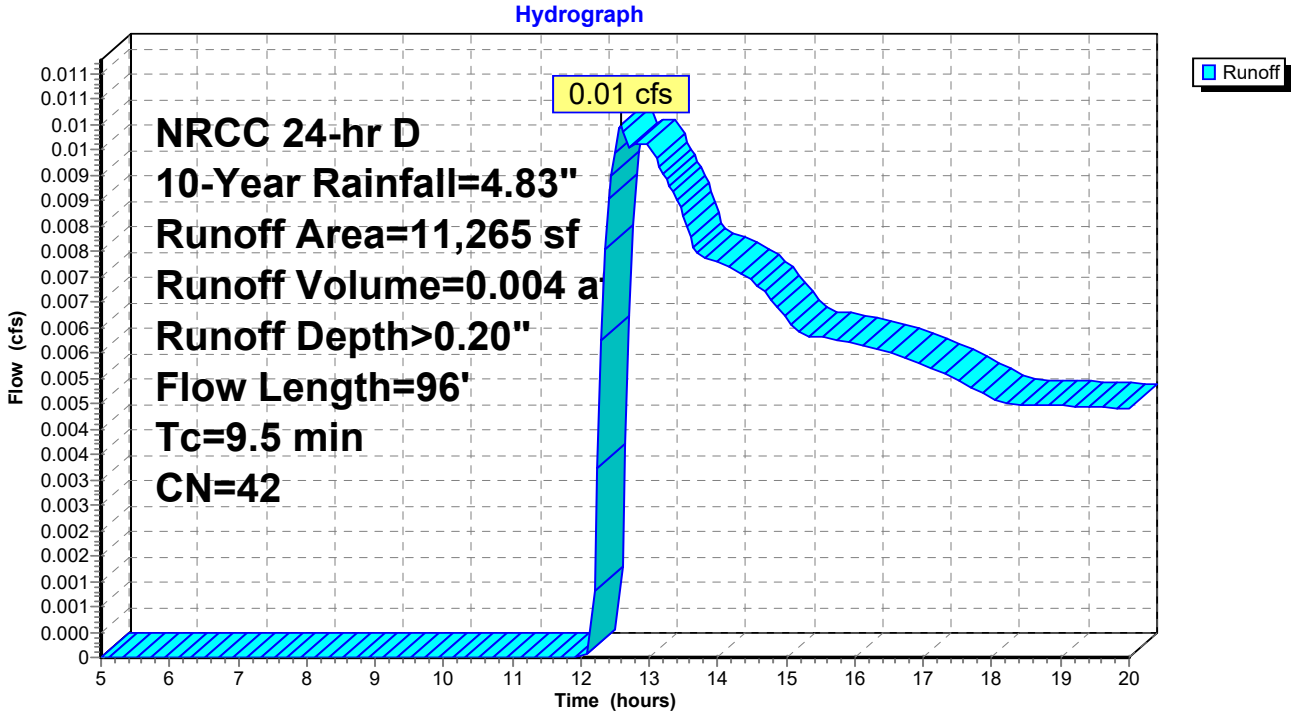
Runoff = 0.01 cfs @ 12.58 hrs, Volume= 0.004 af, Depth> 0.20"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 10-Year Rainfall=4.83"

Area (sf)	CN	Description
1,968	70	Woods, Good, HSG C
4,513	30	Woods, Good, HSG A
4,398	39	>75% Grass cover, Good, HSG A
386	68	<50% Grass cover, Poor, HSG A
11,265	42	Weighted Average
11,265		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.1	50	0.0450	0.09		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.10"
0.4	46	0.0170	2.10		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
9.5	96	Total			

Subcatchment 3S: E3



Summary for Subcatchment 4S: E4

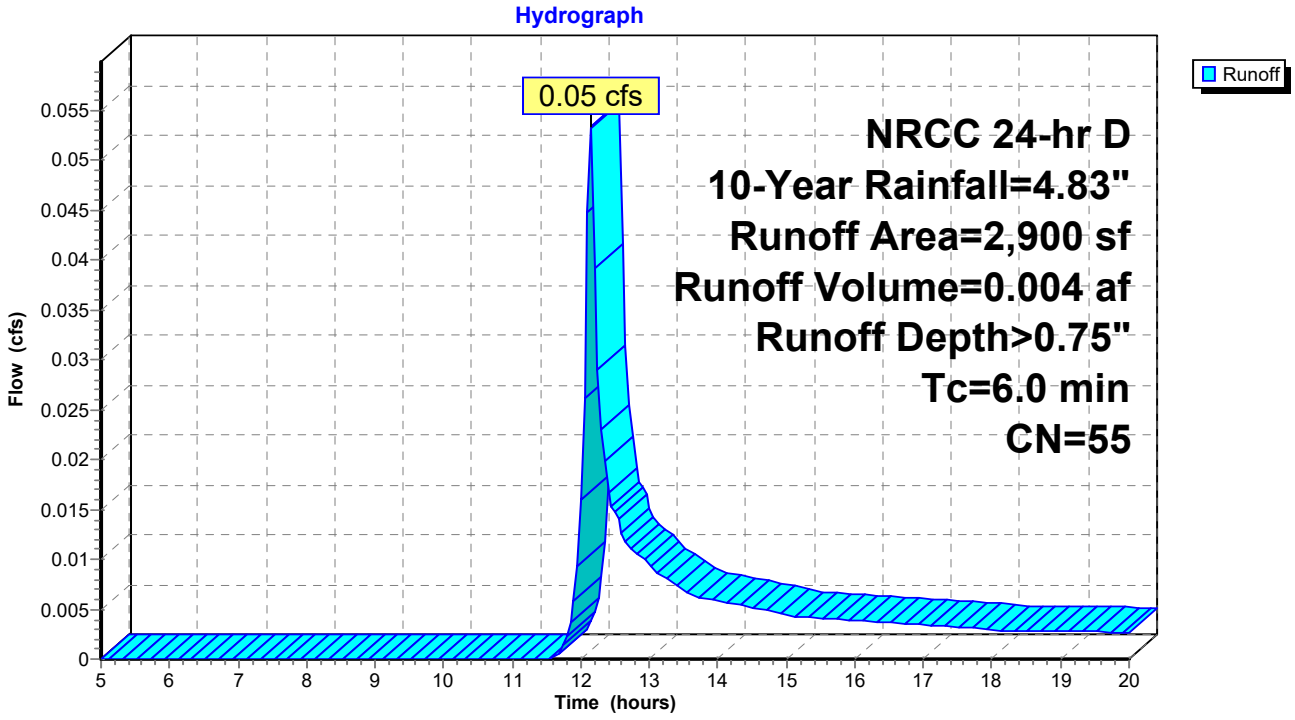
Runoff = 0.05 cfs @ 12.14 hrs, Volume= 0.004 af, Depth> 0.75"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 10-Year Rainfall=4.83"

Area (sf)	CN	Description
265	98	Paved parking, HSG A
2,092	39	>75% Grass cover, Good, HSG A
543	98	Roofs, HSG A
2,900	55	Weighted Average
2,092		72.14% Pervious Area
808		27.86% Impervious Area

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

Subcatchment 4S: E4

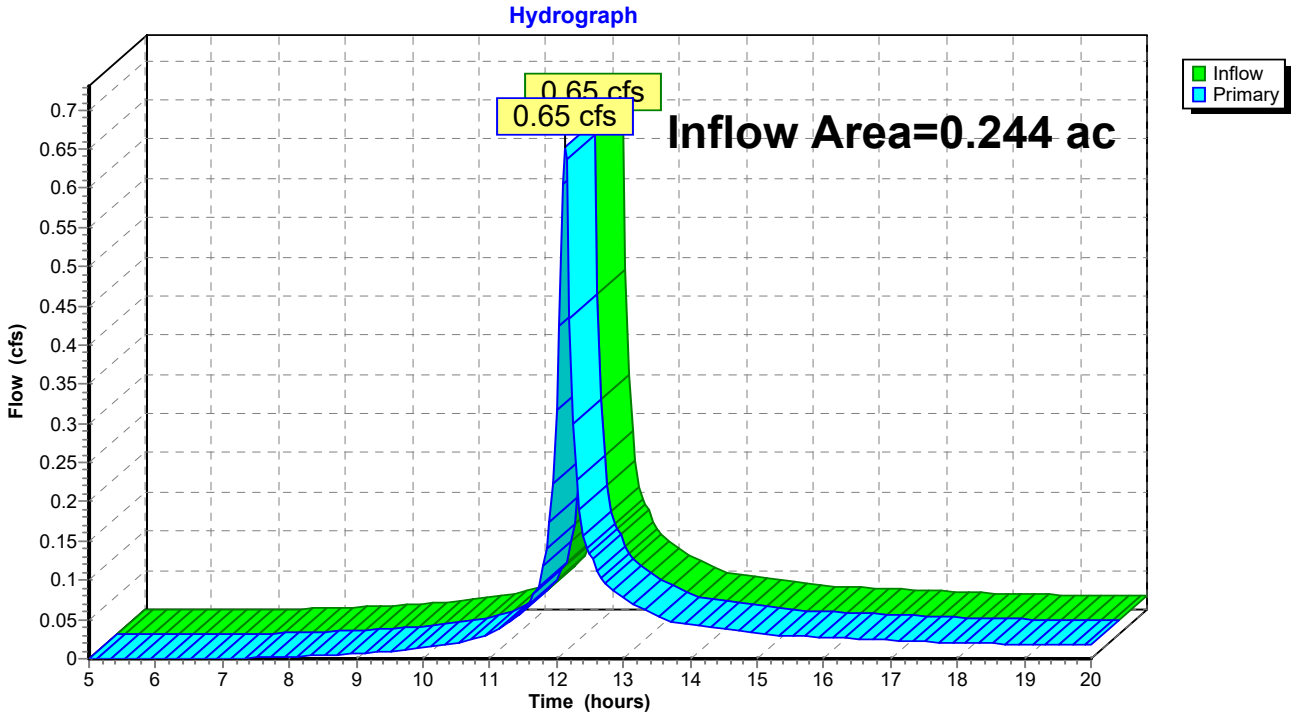


Summary for Link 5L: Total E1

Inflow Area = 0.244 ac, 55.21% Impervious, Inflow Depth > 2.22" for 10-Year event
Inflow = 0.65 cfs @ 12.13 hrs, Volume= 0.045 af
Primary = 0.65 cfs @ 12.13 hrs, Volume= 0.045 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link 5L: Total E1

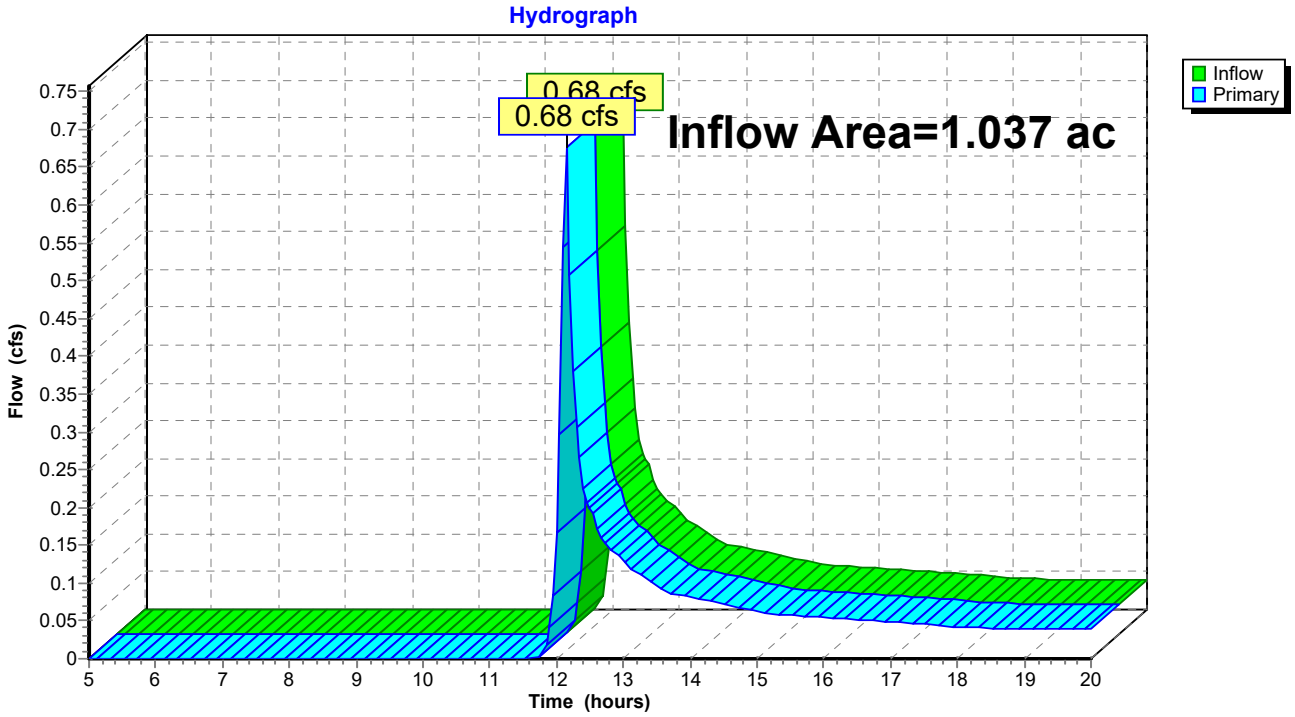


Summary for Link 6L: Total E2

Inflow Area = 1.037 ac, 3.87% Impervious, Inflow Depth > 0.65" for 10-Year event
Inflow = 0.68 cfs @ 12.15 hrs, Volume= 0.056 af
Primary = 0.68 cfs @ 12.15 hrs, Volume= 0.056 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link 6L: Total E2

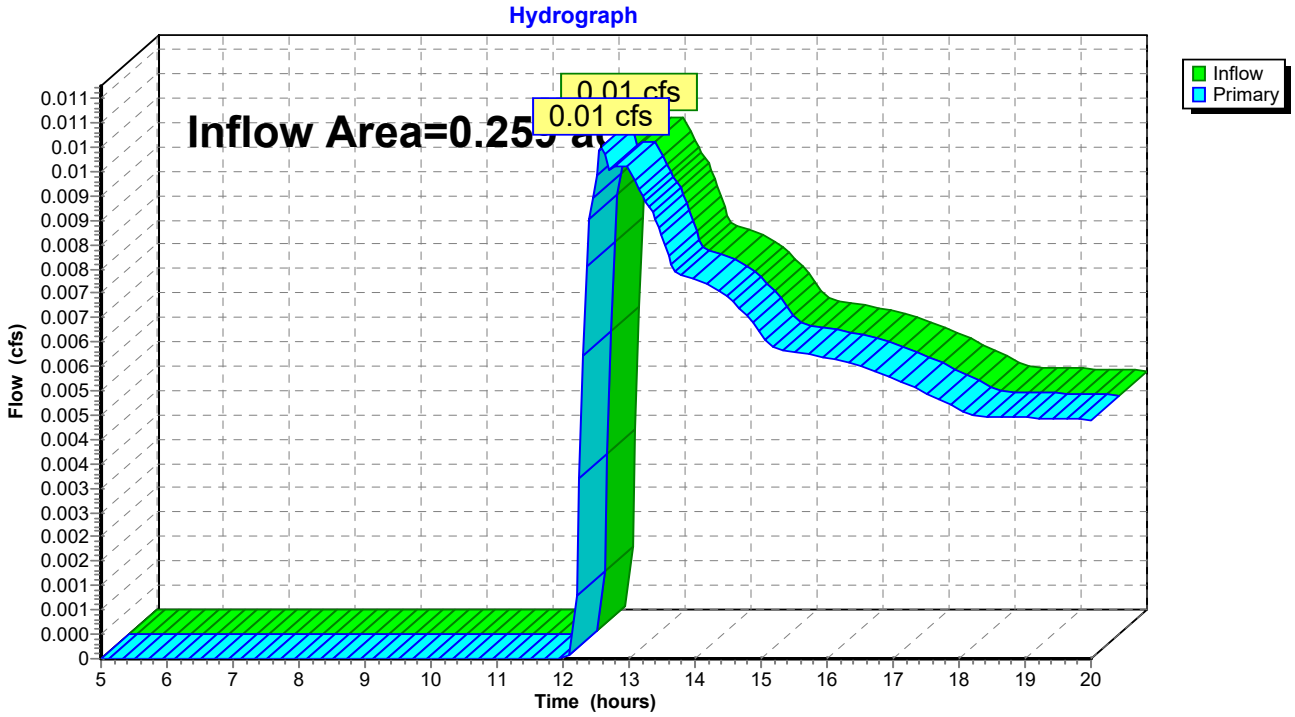


Summary for Link 7L: Total E3

Inflow Area = 0.259 ac, 0.00% Impervious, Inflow Depth > 0.20" for 10-Year event
Inflow = 0.01 cfs @ 12.58 hrs, Volume= 0.004 af
Primary = 0.01 cfs @ 12.58 hrs, Volume= 0.004 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link 7L: Total E3

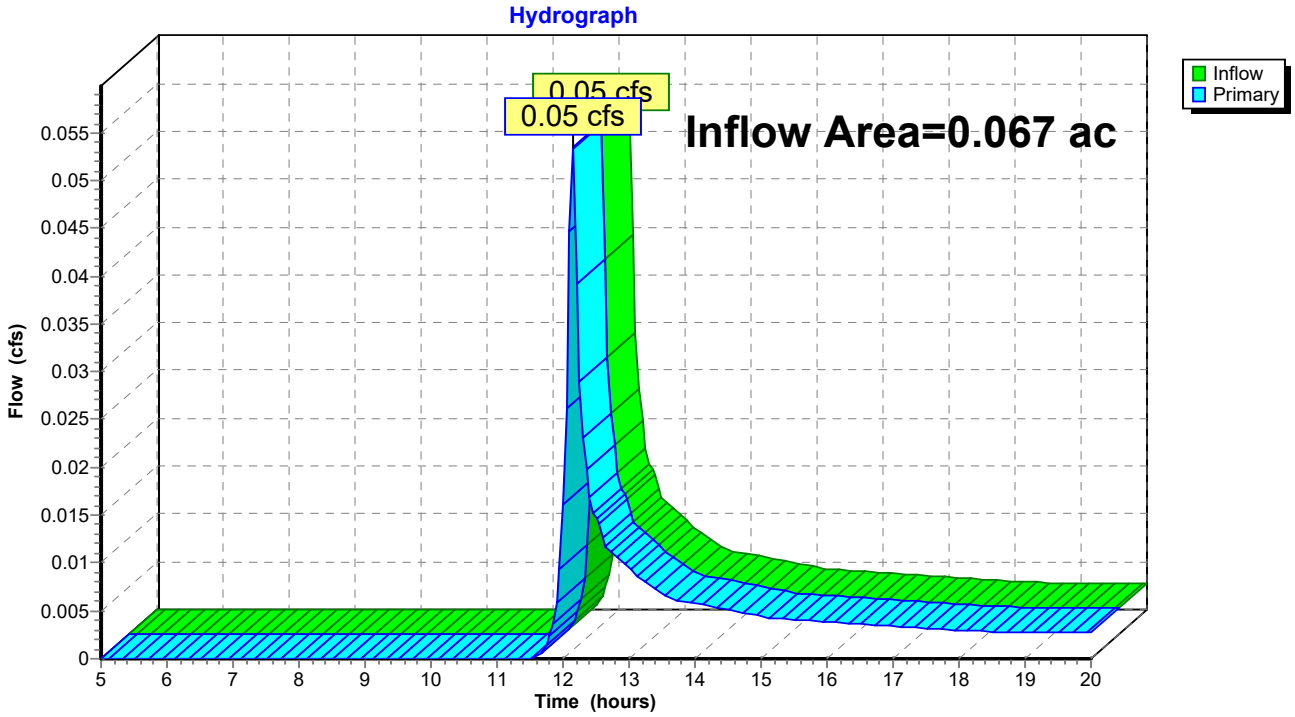


Summary for Link 8L: Total E4

Inflow Area = 0.067 ac, 27.86% Impervious, Inflow Depth > 0.75" for 10-Year event
Inflow = 0.05 cfs @ 12.14 hrs, Volume= 0.004 af
Primary = 0.05 cfs @ 12.14 hrs, Volume= 0.004 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link 8L: Total E4



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

Subcatchment 1S: E1 Runoff Area=10,628 sf 55.21% Impervious Runoff Depth>5.59"
Tc=6.0 min CN=77 Runoff=1.57 cfs 0.114 af

Subcatchment 2S: E2 Runoff Area=45,152 sf 3.87% Impervious Runoff Depth>2.80"
Tc=6.0 min CN=53 Runoff=3.52 cfs 0.242 af

Subcatchment 3S: E3 Runoff Area=11,265 sf 0.00% Impervious Runoff Depth>1.61"
Flow Length=96' Tc=9.5 min CN=42 Runoff=0.40 cfs 0.035 af

Subcatchment 4S: E4 Runoff Area=2,900 sf 27.86% Impervious Runoff Depth>3.03"
Tc=6.0 min CN=55 Runoff=0.24 cfs 0.017 af

Link 5L: Total E1 Inflow=1.57 cfs 0.114 af
Primary=1.57 cfs 0.114 af

Link 6L: Total E2 Inflow=3.52 cfs 0.242 af
Primary=3.52 cfs 0.242 af

Link 7L: Total E3 Inflow=0.40 cfs 0.035 af
Primary=0.40 cfs 0.035 af

Link 8L: Total E4 Inflow=0.24 cfs 0.017 af
Primary=0.24 cfs 0.017 af

Total Runoff Area = 1.606 ac Runoff Volume = 0.407 af Average Runoff Depth = 3.04"
87.95% Pervious = 1.412 ac 12.05% Impervious = 0.193 ac

Summary for Subcatchment 1S: E1

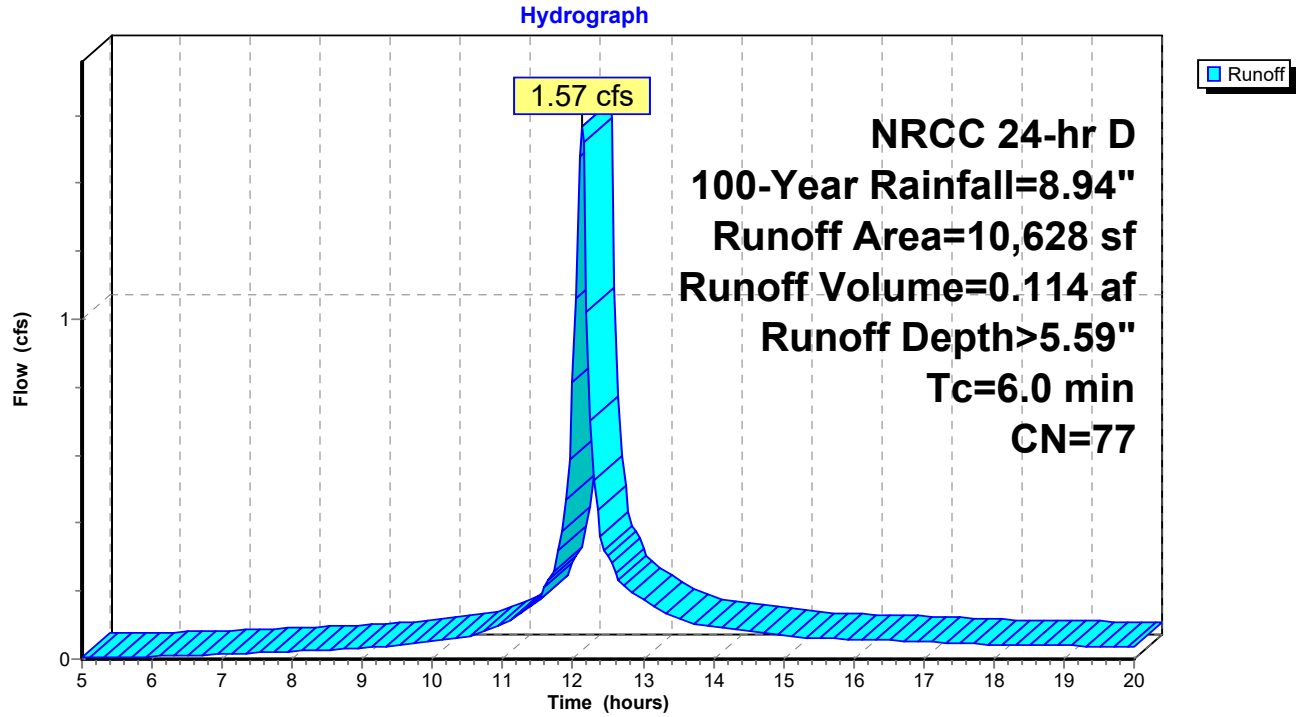
Runoff = 1.57 cfs @ 12.13 hrs, Volume= 0.114 af, Depth> 5.59"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 100-Year Rainfall=8.94"

Area (sf)	CN	Description
1,617	74	>75% Grass cover, Good, HSG C
1,351	98	Paved parking, HSG C
3,143	39	>75% Grass cover, Good, HSG A
3,734	98	Paved parking, HSG A
783	98	Roofs, HSG A
10,628	77	Weighted Average
4,760		44.79% Pervious Area
5,868		55.21% Impervious Area

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

Subcatchment 1S: E1



Summary for Subcatchment 2S: E2

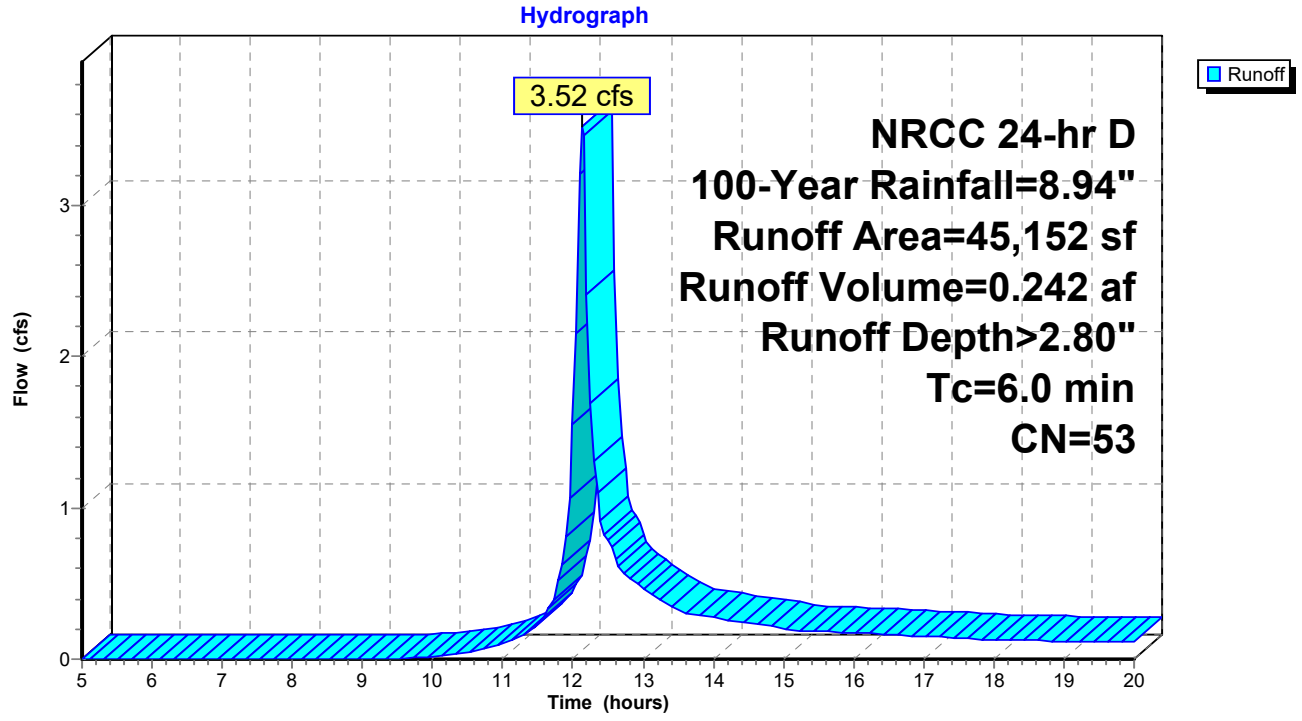
Runoff = 3.52 cfs @ 12.13 hrs, Volume= 0.242 af, Depth> 2.80"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 100-Year Rainfall=8.94"

Area (sf)	CN	Description
1,703	30	Woods, Good, HSG A
1,618	98	Roofs, HSG A
23,762	39	>75% Grass cover, Good, HSG A
366	74	>75% Grass cover, Good, HSG C
2,413	70	Woods, Good, HSG C
131	98	Paved parking, HSG A
15,159	68	<50% Grass cover, Poor, HSG A
45,152	53	Weighted Average
43,403		96.13% Pervious Area
1,749		3.87% Impervious Area

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

Subcatchment 2S: E2



Summary for Subcatchment 3S: E3

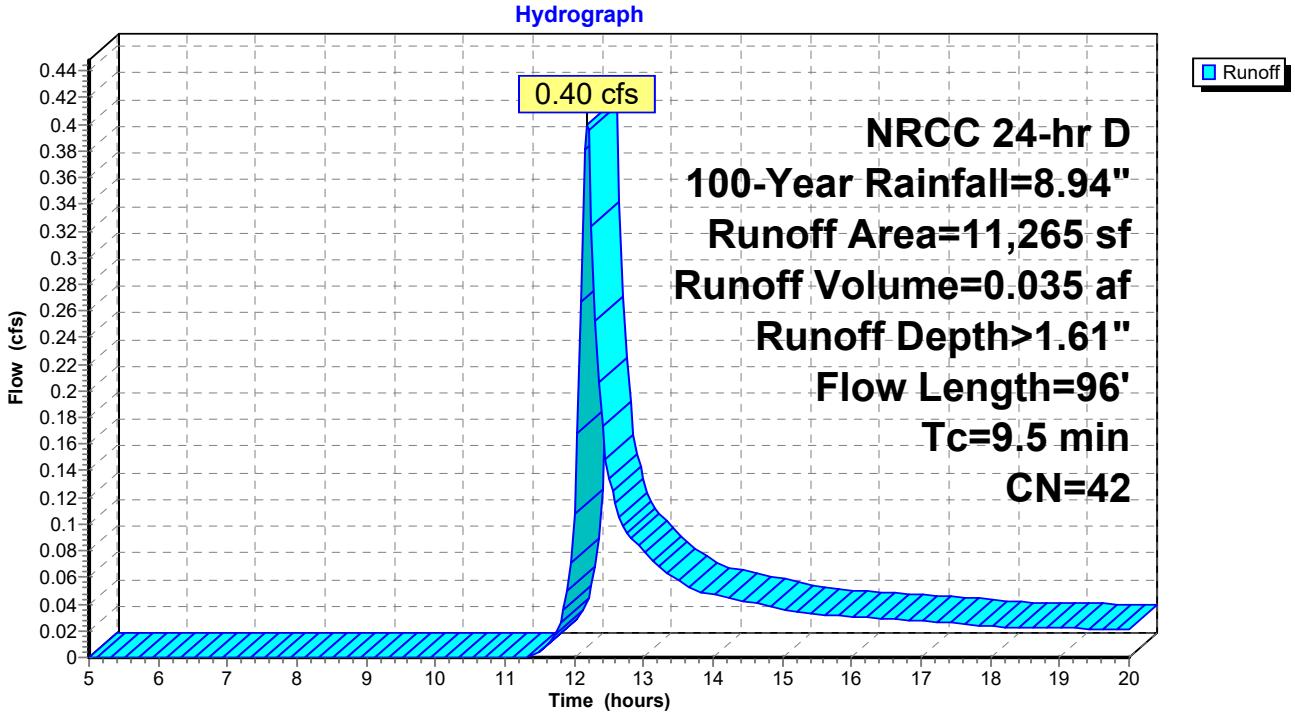
Runoff = 0.40 cfs @ 12.18 hrs, Volume= 0.035 af, Depth> 1.61"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 100-Year Rainfall=8.94"

Area (sf)	CN	Description
1,968	70	Woods, Good, HSG C
4,513	30	Woods, Good, HSG A
4,398	39	>75% Grass cover, Good, HSG A
386	68	<50% Grass cover, Poor, HSG A
11,265	42	Weighted Average
11,265		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.1	50	0.0450	0.09		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.10"
0.4	46	0.0170	2.10		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
9.5	96	Total			

Subcatchment 3S: E3



Summary for Subcatchment 4S: E4

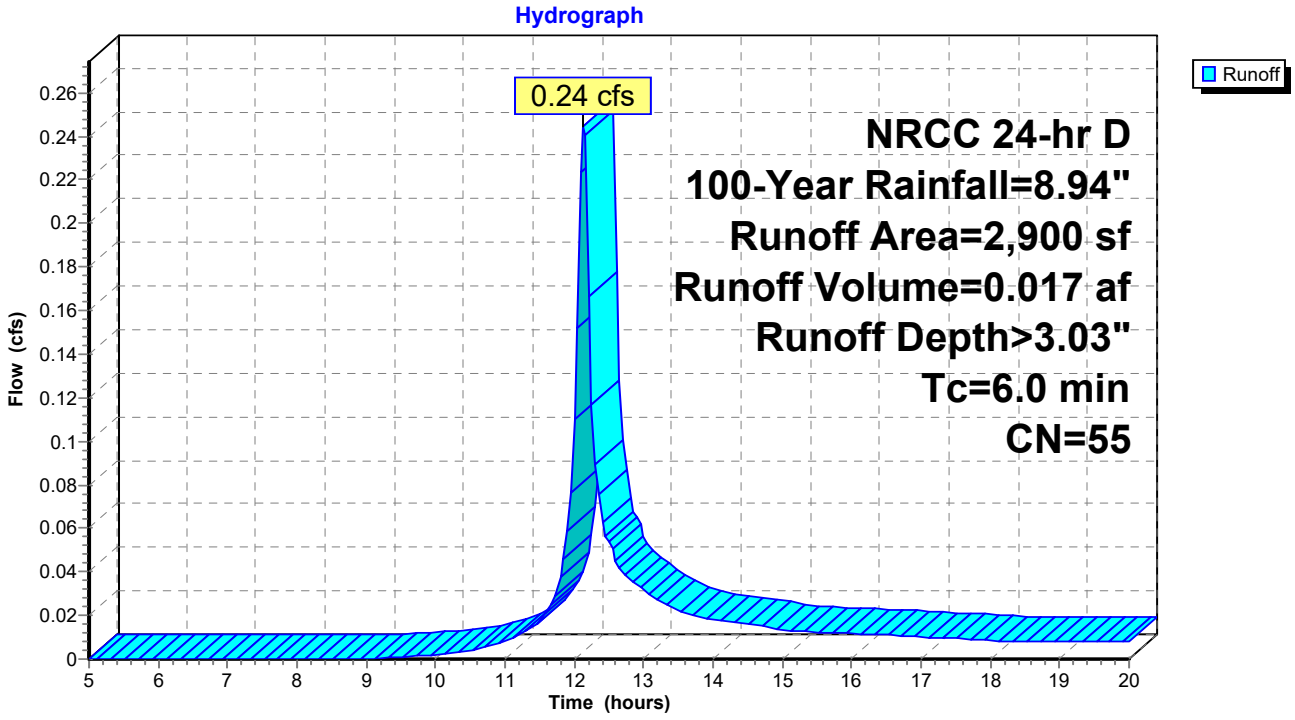
Runoff = 0.24 cfs @ 12.13 hrs, Volume= 0.017 af, Depth> 3.03"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 100-Year Rainfall=8.94"

Area (sf)	CN	Description
265	98	Paved parking, HSG A
2,092	39	>75% Grass cover, Good, HSG A
543	98	Roofs, HSG A
2,900	55	Weighted Average
2,092		72.14% Pervious Area
808		27.86% Impervious Area

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

Subcatchment 4S: E4

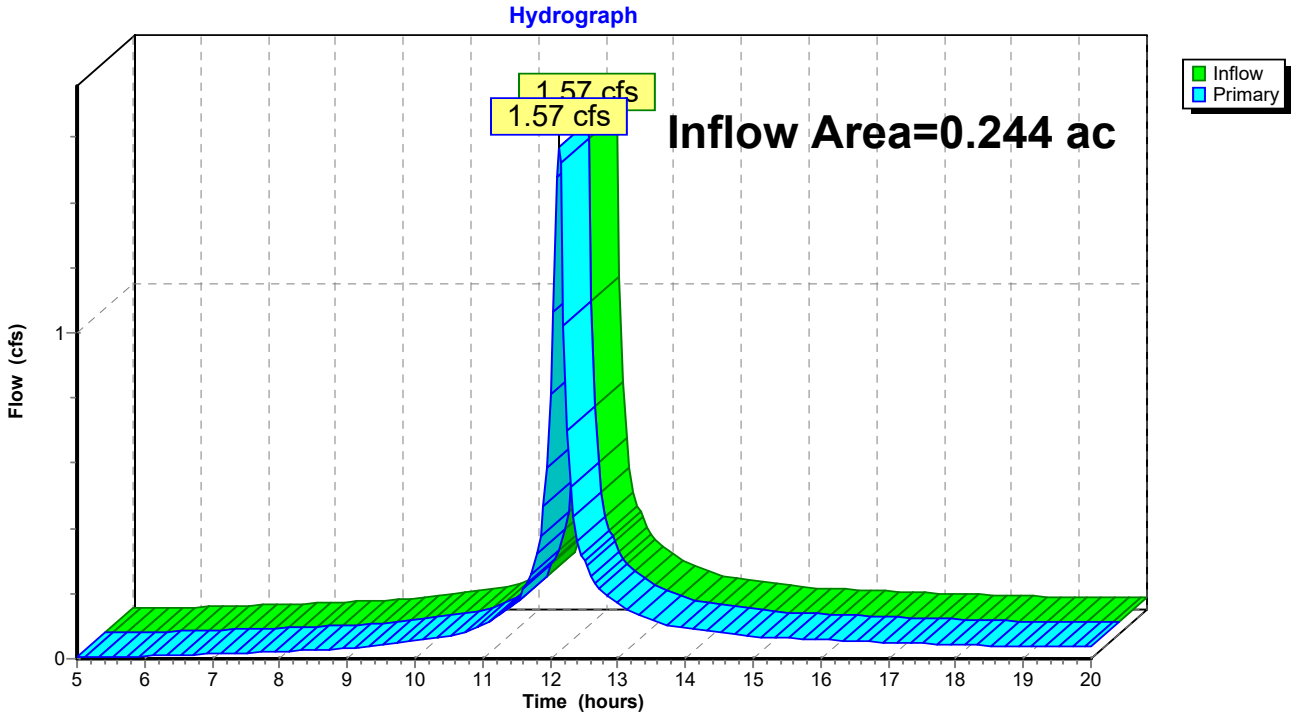


Summary for Link 5L: Total E1

Inflow Area = 0.244 ac, 55.21% Impervious, Inflow Depth > 5.59" for 100-Year event
Inflow = 1.57 cfs @ 12.13 hrs, Volume= 0.114 af
Primary = 1.57 cfs @ 12.13 hrs, Volume= 0.114 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link 5L: Total E1

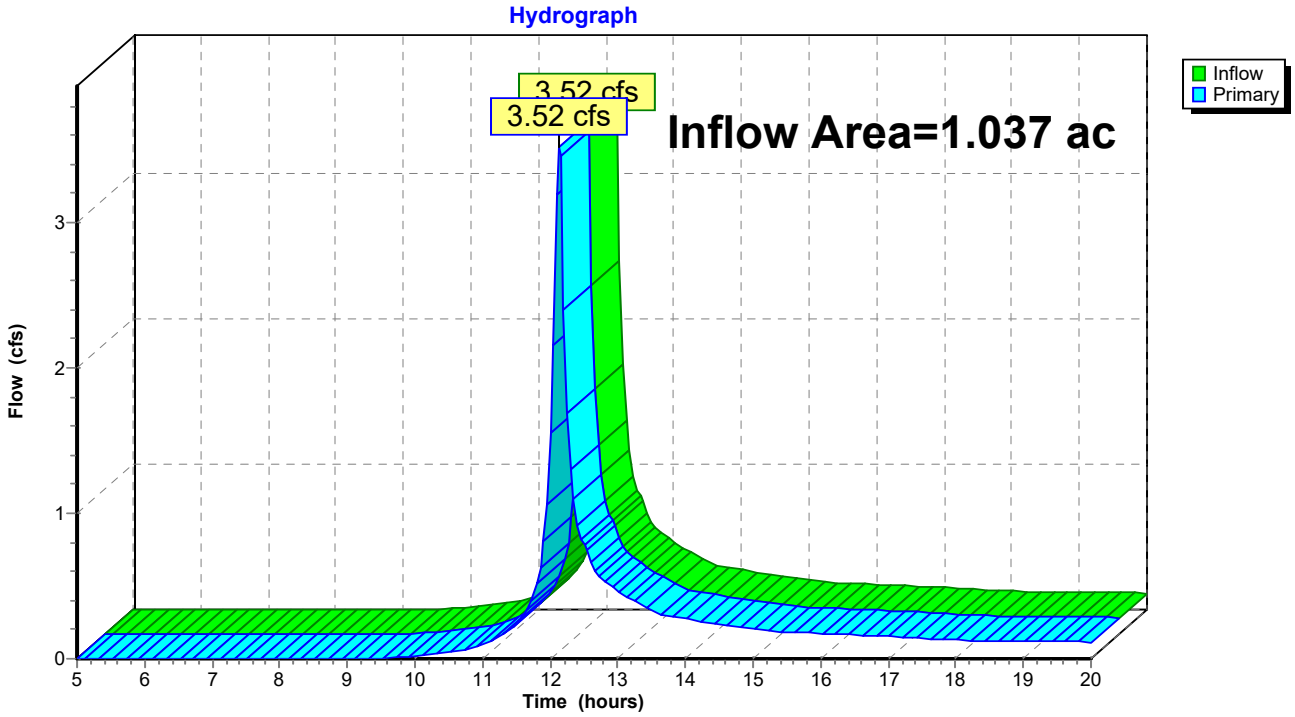


Summary for Link 6L: Total E2

Inflow Area = 1.037 ac, 3.87% Impervious, Inflow Depth > 2.80" for 100-Year event
Inflow = 3.52 cfs @ 12.13 hrs, Volume= 0.242 af
Primary = 3.52 cfs @ 12.13 hrs, Volume= 0.242 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link 6L: Total E2

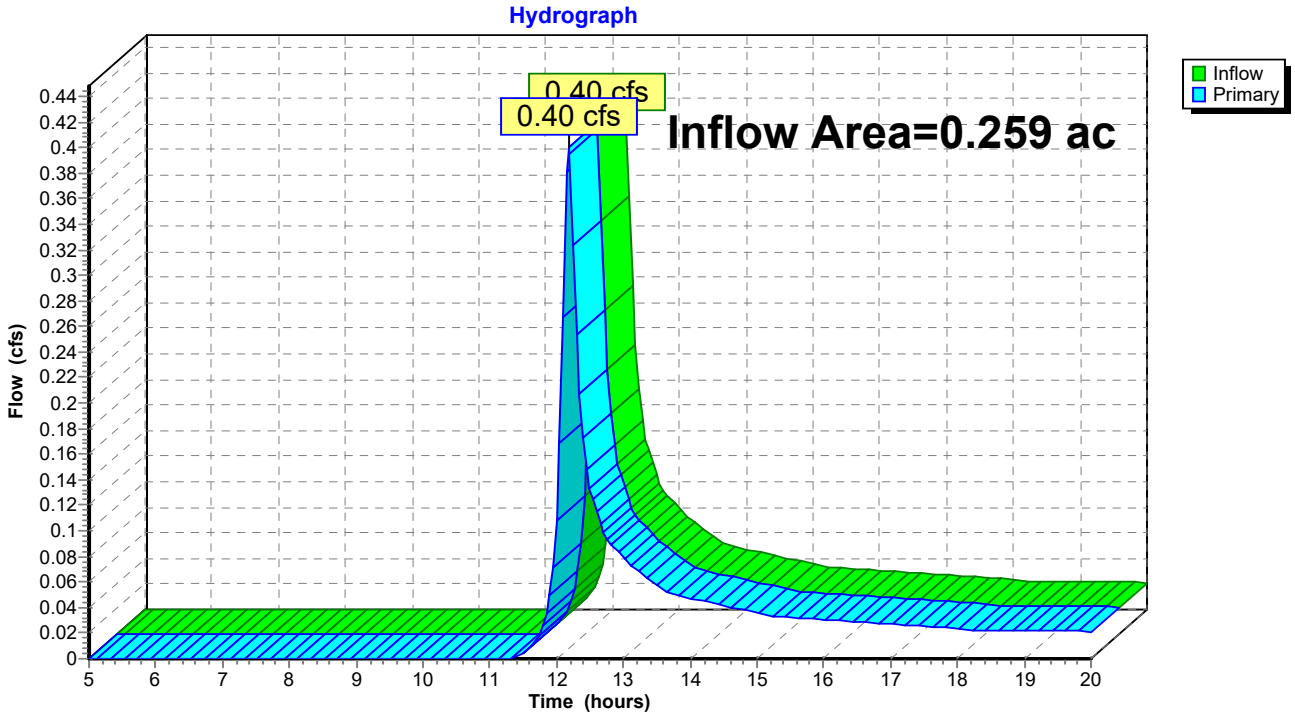


Summary for Link 7L: Total E3

Inflow Area = 0.259 ac, 0.00% Impervious, Inflow Depth > 1.61" for 100-Year event
Inflow = 0.40 cfs @ 12.18 hrs, Volume= 0.035 af
Primary = 0.40 cfs @ 12.18 hrs, Volume= 0.035 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link 7L: Total E3

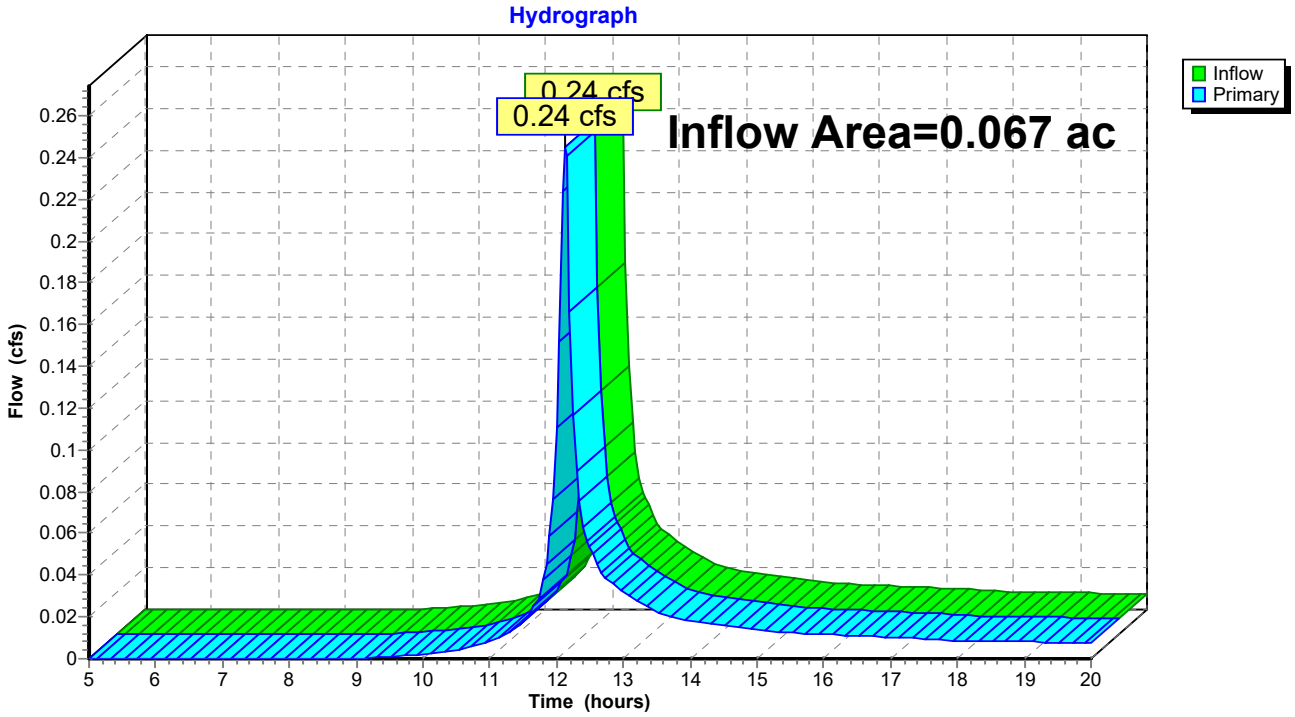


Summary for Link 8L: Total E4

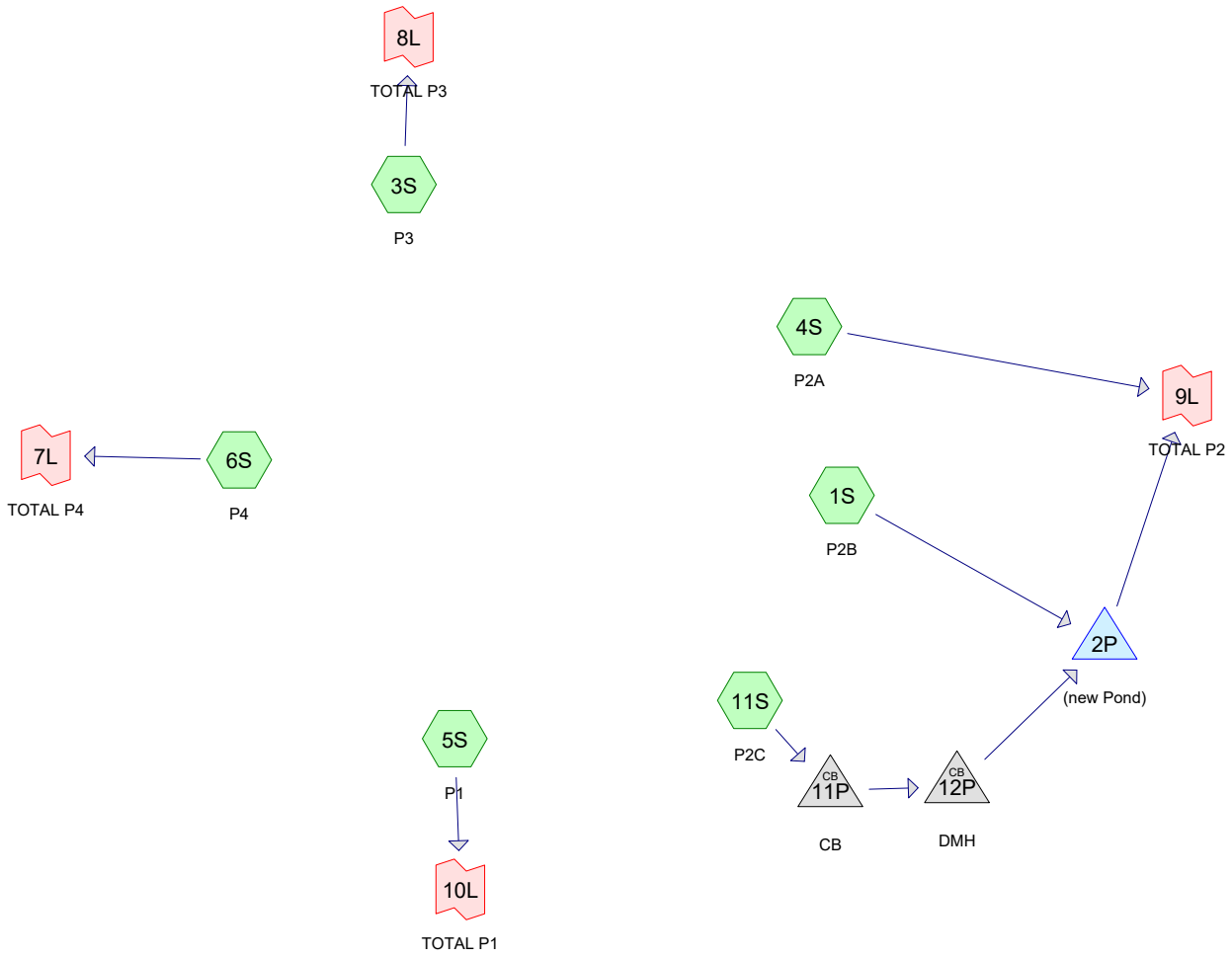
Inflow Area = 0.067 ac, 27.86% Impervious, Inflow Depth > 3.03" for 100-Year event
Inflow = 0.24 cfs @ 12.13 hrs, Volume= 0.017 af
Primary = 0.24 cfs @ 12.13 hrs, Volume= 0.017 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link 8L: Total E4



b. Proposed Conditions HydroCAD Report



Subcat Reach Pond Link

Routing Diagram for POSTrev 10-19-22

Prepared by Millennium Engineering, Inc., Printed 10/19/2022

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.272	68	<50% Grass cover, Poor, HSG A (4S)
0.765	39	>75% Grass cover, Good, HSG A (3S, 4S, 5S, 6S, 11S)
0.056	74	>75% Grass cover, Good, HSG C (4S, 5S)
0.123	98	Paved parking, HSG A (5S, 11S)
0.023	98	Paved parking, HSG C (5S)
0.177	98	Roofs, HSG A (1S, 4S, 11S)
0.128	30	Woods, Good, HSG A (3S, 4S)
0.100	70	Woods, Good, HSG C (3S, 4S)
1.644	**58**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
1.465	HSG A	1S, 3S, 4S, 5S, 6S, 11S
0.000	HSG B	
0.179	HSG C	3S, 4S, 5S
0.000	HSG D	
0.000	Other	
1.644		**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
0.272	0.000	0.000	0.000	0.000	0.272	<50% Grass cover, Poor	4S
0.765	0.000	0.056	0.000	0.000	0.822	>75% Grass cover, Good	3S, 4S, 5S, 6S, 11S
0.123	0.000	0.023	0.000	0.000	0.146	Paved parking	5S, 11S
0.177	0.000	0.000	0.000	0.000	0.177	Roofs	1S, 4S, 11S
0.128	0.000	0.100	0.000	0.000	0.228	Woods, Good	3S, 4S
1.465	**0.000**	**0.179**	**0.000**	**0.000**	**1.644**	**TOTAL AREA**	

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

Subcatchment 1S: P2B Runoff Area=6,160 sf 100.00% Impervious Runoff Depth>2.60"
Tc=6.0 min CN=98 Runoff=0.39 cfs 0.031 af

Subcatchment 3S: P3 Runoff Area=7,411 sf 0.00% Impervious Runoff Depth>0.01"
Flow Length=77' Tc=9.5 min CN=43 Runoff=0.00 cfs 0.000 af

Subcatchment 4S: P2A Runoff Area=42,137 sf 1.85% Impervious Runoff Depth>0.08"
Tc=6.0 min CN=50 Runoff=0.01 cfs 0.007 af

Subcatchment 5S: P1 Runoff Area=9,159 sf 30.48% Impervious Runoff Depth>0.48"
Tc=6.0 min CN=65 Runoff=0.11 cfs 0.008 af

Subcatchment 6S: P4 Runoff Area=1,826 sf 0.00% Impervious Runoff Depth=0.00"
Tc=6.0 min CN=39 Runoff=0.00 cfs 0.000 af

Subcatchment 11S: P2C Runoff Area=4,933 sf 88.34% Impervious Runoff Depth>2.02"
Tc=6.0 min CN=91 Runoff=0.26 cfs 0.019 af

Pond 2P: (new Pond) Peak Elev=30.92' Storage=0.007 af Inflow=0.65 cfs 0.050 af
Discarded=0.21 cfs 0.050 af Primary=0.00 cfs 0.000 af Outflow=0.21 cfs 0.050 af

Pond 11P: CB Peak Elev=31.80' Inflow=0.26 cfs 0.019 af
12.0" Round Culvert n=0.013 L=12.0' S=0.0083 '/' Outflow=0.26 cfs 0.019 af

Pond 12P: DMH Peak Elev=31.58' Inflow=0.26 cfs 0.019 af
12.0" Round Culvert n=0.013 L=80.0' S=0.0075 '/' Outflow=0.26 cfs 0.019 af

Link 7L: TOTAL P4 Inflow=0.00 cfs 0.000 af
Primary=0.00 cfs 0.000 af

Link 8L: TOTAL P3 Inflow=0.00 cfs 0.000 af
Primary=0.00 cfs 0.000 af

Link 9L: TOTAL P2 Inflow=0.01 cfs 0.007 af
Primary=0.01 cfs 0.007 af

Link 10L: TOTAL P1 Inflow=0.11 cfs 0.008 af
Primary=0.11 cfs 0.008 af

Total Runoff Area = 1.644 ac Runoff Volume = 0.065 af Average Runoff Depth = 0.47"
80.33% Pervious = 1.321 ac 19.67% Impervious = 0.323 ac

Summary for Subcatchment 1S: P2B

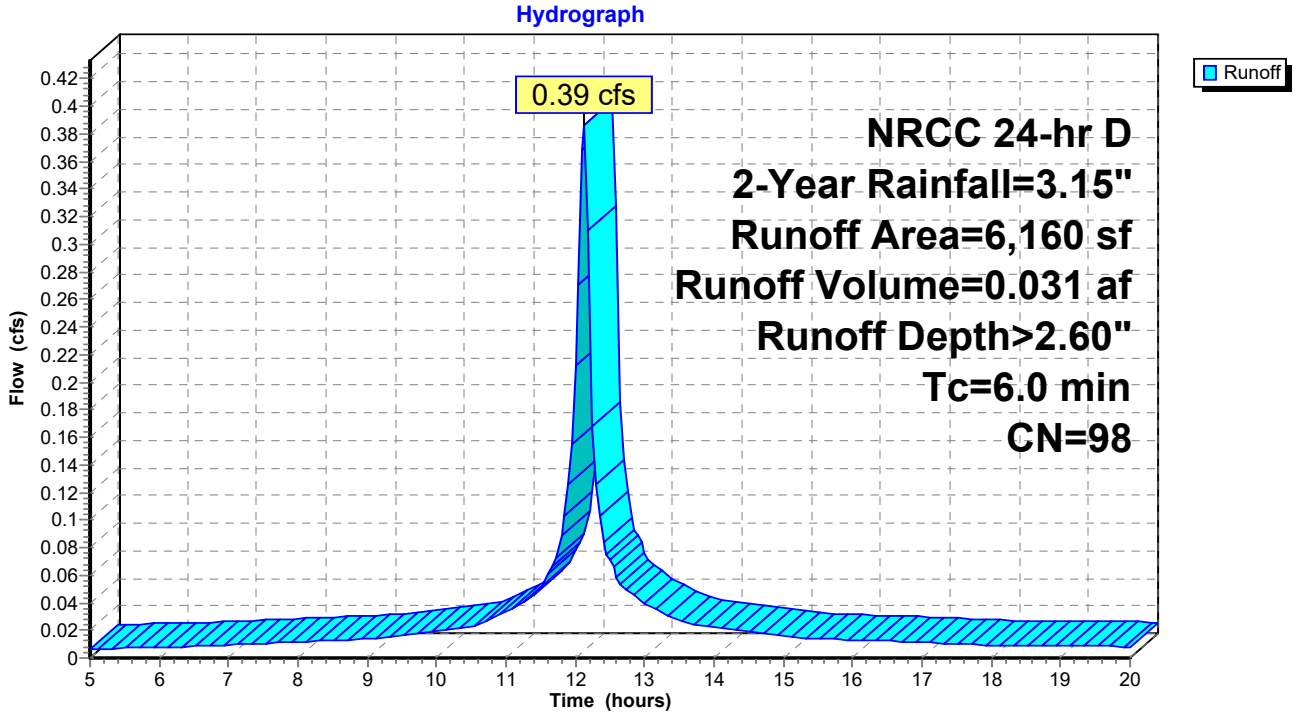
Runoff = 0.39 cfs @ 12.13 hrs, Volume= 0.031 af, Depth> 2.60"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 2-Year Rainfall=3.15"

Area (sf)	CN	Description
6,160	98	Roofs, HSG A
6,160		100.00% Impervious Area

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

Subcatchment 1S: P2B



Summary for Subcatchment 3S: P3

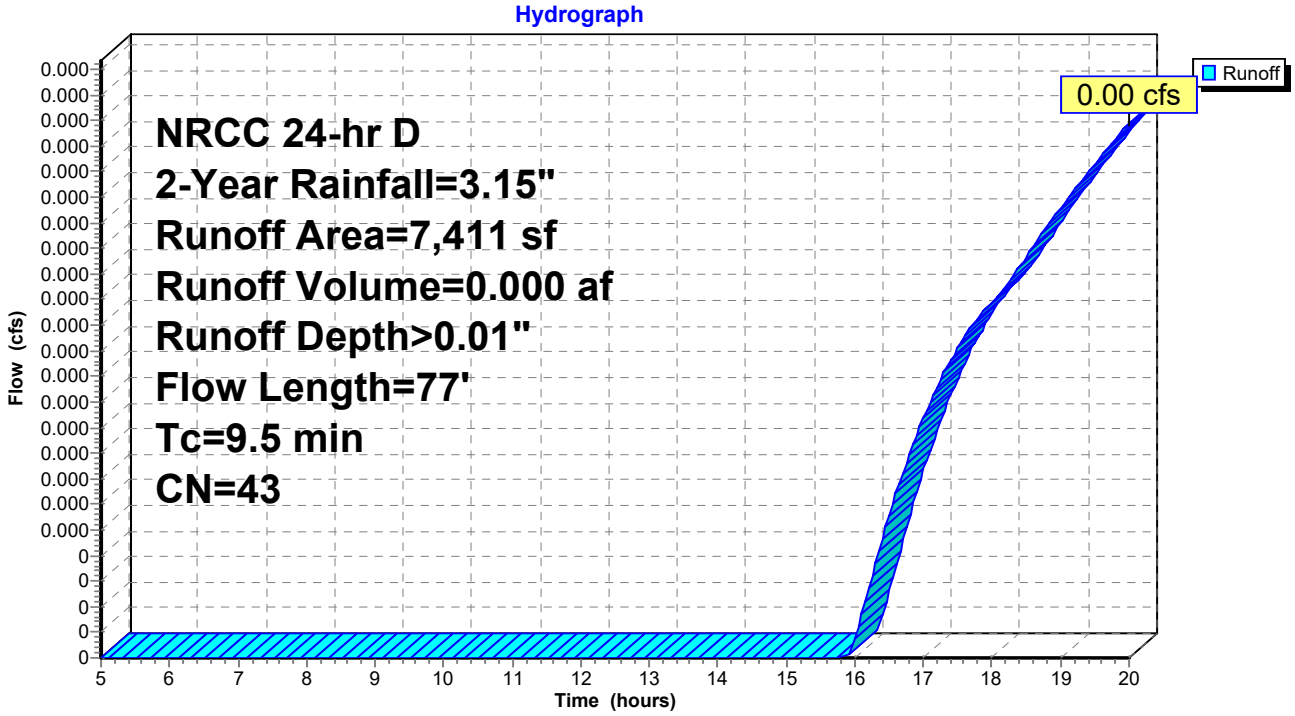
Runoff = 0.00 cfs @ 20.00 hrs, Volume= 0.000 af, Depth> 0.01"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 2-Year Rainfall=3.15"

Area (sf)	CN	Description
1,933	70	Woods, Good, HSG C
2,160	39	>75% Grass cover, Good, HSG A
3,318	30	Woods, Good, HSG A
7,411	43	Weighted Average
7,411		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.3	50	0.0420	0.09		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.10"
0.2	27	0.0220	2.39		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
9.5	77	Total			

Subcatchment 3S: P3



Summary for Subcatchment 4S: P2A

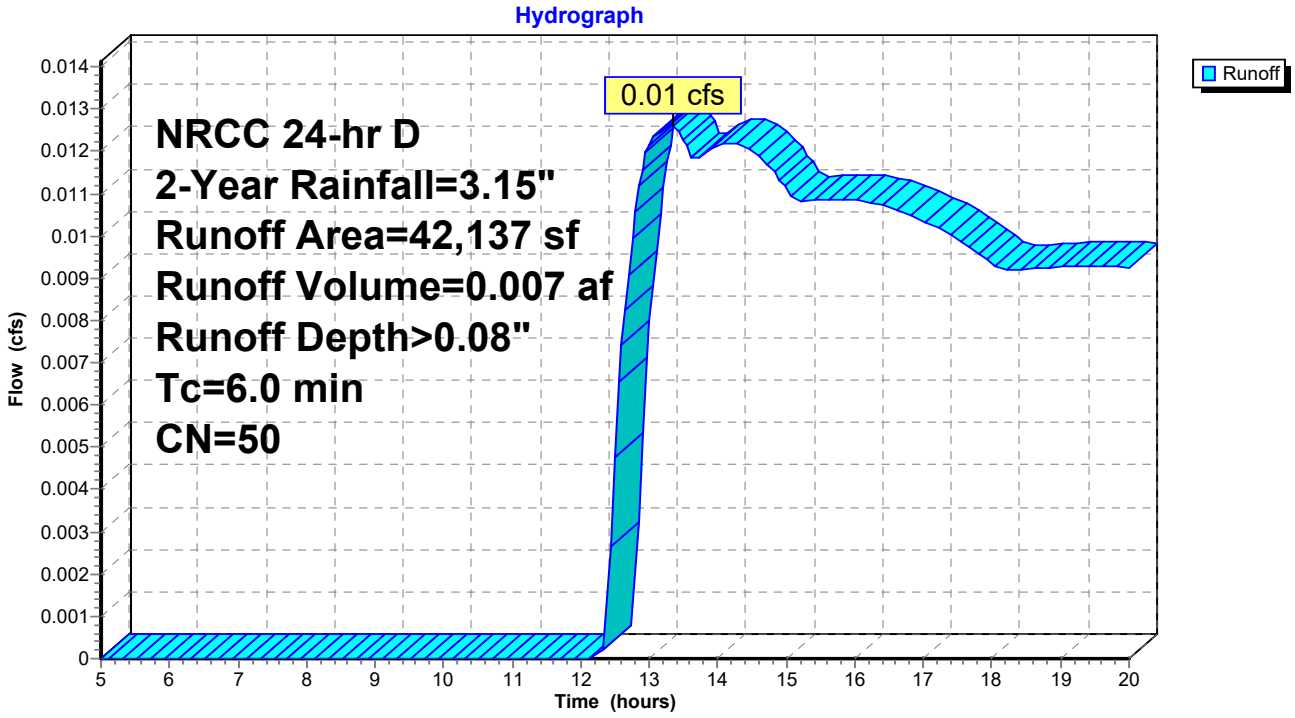
Runoff = 0.01 cfs @ 13.35 hrs, Volume= 0.007 af, Depth> 0.08"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 2-Year Rainfall=3.15"

Area (sf)	CN	Description
2,413	70	Woods, Good, HSG C
366	74	>75% Grass cover, Good, HSG C
2,247	30	Woods, Good, HSG A
781	98	Roofs, HSG A
24,492	39	>75% Grass cover, Good, HSG A
11,838	68	<50% Grass cover, Poor, HSG A
42,137	50	Weighted Average
41,356		98.15% Pervious Area
781		1.85% Impervious Area

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

Subcatchment 4S: P2A



Summary for Subcatchment 5S: P1

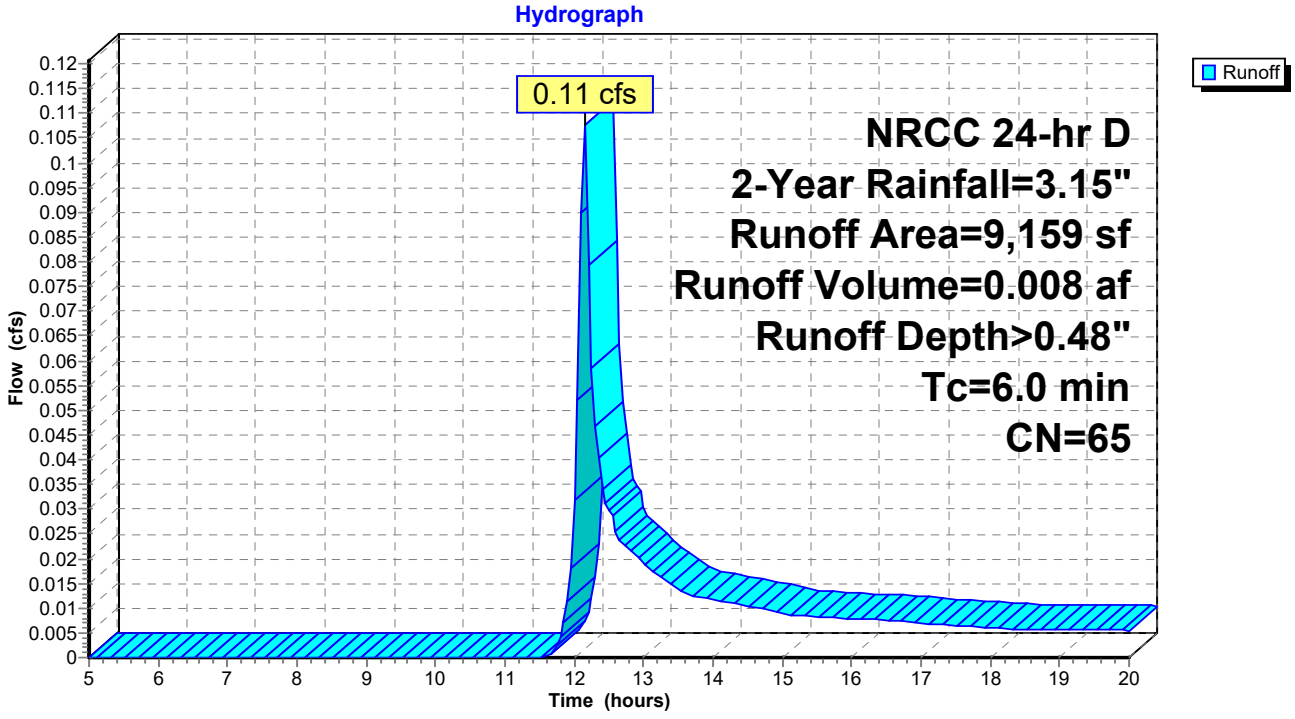
Runoff = 0.11 cfs @ 12.14 hrs, Volume= 0.008 af, Depth> 0.48"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 2-Year Rainfall=3.15"

Area (sf)	CN	Description
1,788	98	Paved parking, HSG A
4,277	39	>75% Grass cover, Good, HSG A
2,090	74	>75% Grass cover, Good, HSG C
1,004	98	Paved parking, HSG C
9,159	65	Weighted Average
6,367		69.52% Pervious Area
2,792		30.48% Impervious Area

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

Subcatchment 5S: P1



Summary for Subcatchment 6S: P4

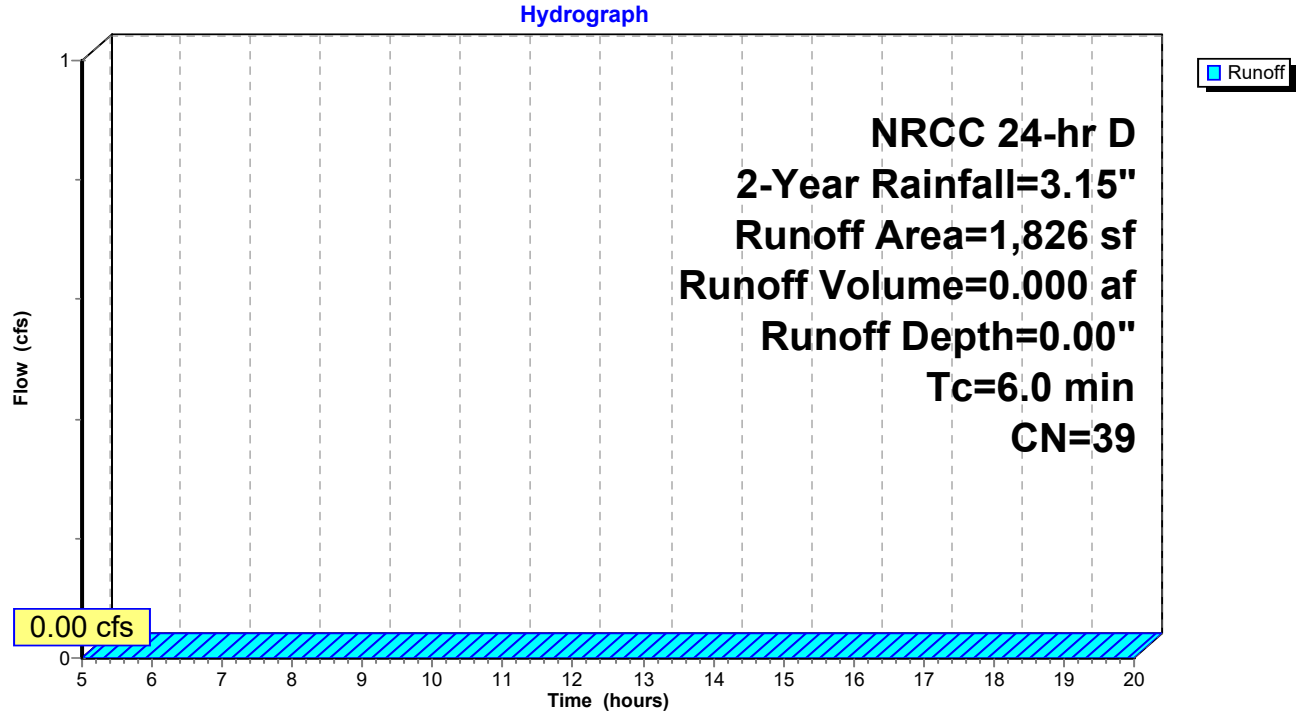
Runoff = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 2-Year Rainfall=3.15"

Area (sf)	CN	Description
1,826	39	>75% Grass cover, Good, HSG A
1,826		100.00% Pervious Area

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

Subcatchment 6S: P4



Summary for Subcatchment 11S: P2C

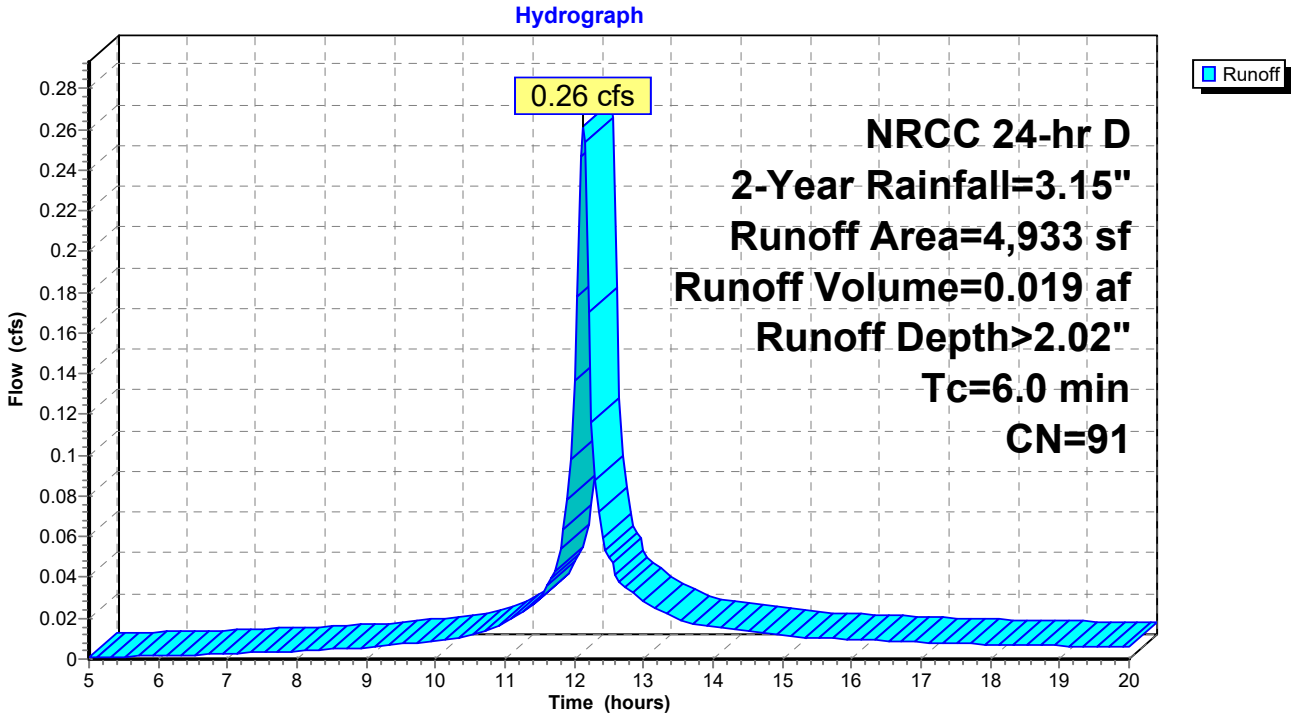
Runoff = 0.26 cfs @ 12.13 hrs, Volume= 0.019 af, Depth> 2.02"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 2-Year Rainfall=3.15"

Area (sf)	CN	Description
3,577	98	Paved parking, HSG A
575	39	>75% Grass cover, Good, HSG A
781	98	Roofs, HSG A
4,933	91	Weighted Average
575		11.66% Pervious Area
4,358		88.34% Impervious Area

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

Subcatchment 11S: P2C



Summary for Pond 2P: (new Pond)

Inflow Area = 0.255 ac, 94.82% Impervious, Inflow Depth > 2.34" for 2-Year event
Inflow = 0.65 cfs @ 12.13 hrs, Volume= 0.050 af
Outflow = 0.21 cfs @ 12.31 hrs, Volume= 0.050 af, Atten= 67%, Lag= 10.8 min
Discarded = 0.21 cfs @ 12.31 hrs, Volume= 0.050 af
Primary = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 30.92' @ 12.31 hrs Surf.Area= 0.019 ac Storage= 0.007 af

Plug-Flow detention time= 7.0 min calculated for 0.050 af (100% of inflow)
Center-of-Mass det. time= 6.7 min (758.9 - 752.3)

Volume	Invert	Avail.Storage	Storage Description
#1A	30.20'	0.018 af	**15.75'W x 53.46'L x 3.50'H Field A** 0.068 af Overall - 0.022 af Embedded = 0.046 af x 40.0% Voids
#2A	30.70'	0.022 af	**ADS_StormTech SC-740 +Cap** x 21 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap 21 Chambers in 3 Rows
		0.040 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	30.20'	**8.270 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 28.00'
#2	Primary	31.00'	**12.0" Round Culvert** L= 41.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 31.00' / 30.50' S= 0.0122 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#3	Device 2	33.00'	**4.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32
#4	Device 2	31.75'	**4.0" Vert. Orifice/Grate** C= 0.600

Discarded OutFlow Max=0.21 cfs @ 12.31 hrs HW=30.92' (Free Discharge)
└**1=Exfiltration** (Controls 0.21 cfs)

Primary OutFlow Max=0.00 cfs @ 5.00 hrs HW=30.20' (Free Discharge)
└**2=Culvert** (Controls 0.00 cfs)
  ├**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)
  └**4=Orifice/Grate** (Controls 0.00 cfs)

Pond 2P: (new Pond) - Chamber Wizard Field A

Chamber Model = ADS_StormTech SC-740 +Cap (ADS StormTech® SC-740 with cap length)
Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf
Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

51.0" Wide + 6.0" Spacing = 57.0" C-C Row Spacing

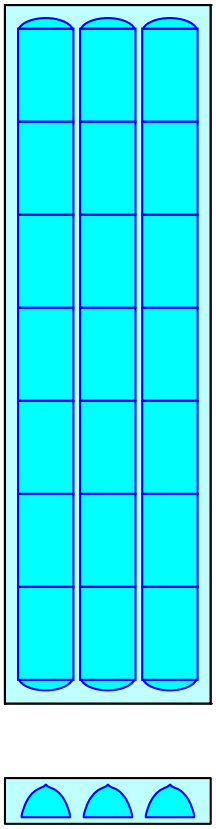
7 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 51.46' Row Length +12.0" End Stone x 2 = 53.46' Base Length
3 Rows x 51.0" Wide + 6.0" Spacing x 2 + 12.0" Side Stone x 2 = 15.75' Base Width
6.0" Base + 30.0" Chamber Height + 6.0" Cover = 3.50' Field Height

21 Chambers x 45.9 cf = 964.7 cf Chamber Storage

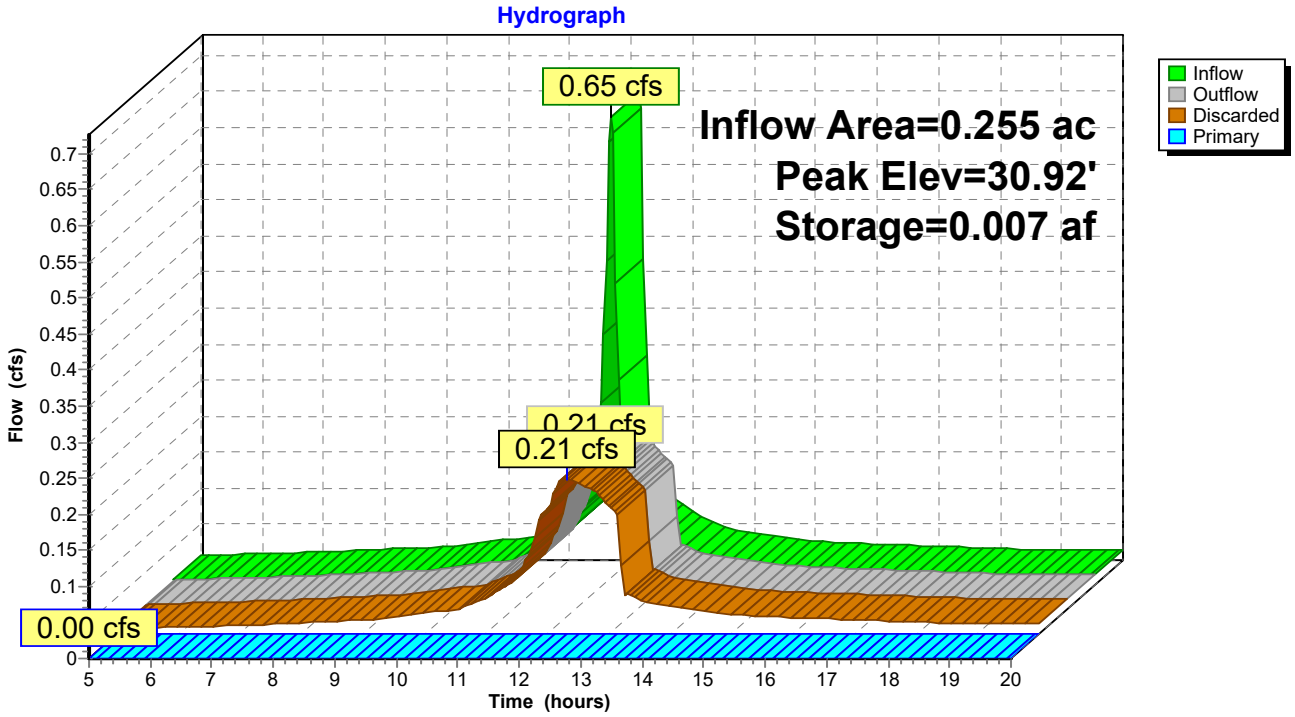
2,946.8 cf Field - 964.7 cf Chambers = 1,982.1 cf Stone x 40.0% Voids = 792.8 cf Stone Storage

Chamber Storage + Stone Storage = 1,757.6 cf = 0.040 af
Overall Storage Efficiency = 59.6%
Overall System Size = 53.46' x 15.75' x 3.50'

21 Chambers
109.1 cy Field
73.4 cy Stone



Pond 2P: (new Pond)



Stage-Area-Storage for Pond 2P: (new Pond)

Elevation (feet)	Surface (acres)	Storage (acre-feet)
30.20	**0.019**	0.000
30.25	0.019	0.000
30.30	0.019	0.001
30.35	0.019	0.001
30.40	0.019	0.002
30.45	0.019	0.002
30.50	0.019	0.002
30.55	0.019	0.003
30.60	0.019	0.003
30.65	0.019	0.003
30.70	0.019	0.004
30.75	0.019	0.005
30.80	0.019	0.005
30.85	0.019	0.006
30.90	0.019	0.007
30.95	0.019	0.008
31.00	0.019	0.008
31.05	0.019	0.009
31.10	0.019	0.010
31.15	0.019	0.011
31.20	0.019	0.011
31.25	0.019	0.012
31.30	0.019	0.013
31.35	0.019	0.014
31.40	0.019	0.014
31.45	0.019	0.015
31.50	0.019	0.016
31.55	0.019	0.017
31.60	0.019	0.017
31.65	0.019	0.018
31.70	0.019	0.019
31.75	0.019	0.020
31.80	0.019	0.020
31.85	0.019	0.021
31.90	0.019	0.022
31.95	0.019	0.022
32.00	0.019	0.023
32.05	0.019	0.024
32.10	0.019	0.024
32.15	0.019	0.025
32.20	0.019	0.026
32.25	0.019	0.026
32.30	0.019	0.027
32.35	0.019	0.028
32.40	0.019	0.028
32.45	0.019	0.029
32.50	0.019	0.029
32.55	0.019	0.030
32.60	0.019	0.031
32.65	0.019	0.031
32.70	0.019	0.032
32.75	0.019	0.032
32.80	0.019	0.033
32.85	0.019	0.033
32.90	0.019	0.034
32.95	0.019	0.034
33.00	0.019	0.035
33.05	0.019	0.035
33.10	0.019	0.036
33.15	0.019	0.036
33.20	0.019	0.036
33.25	0.019	0.037
33.30	0.019	0.037
33.35	0.019	0.038
33.40	0.019	0.038
33.45	0.019	0.038
33.50	0.019	0.039
33.55	0.019	0.039
33.60	0.019	0.040
33.65	0.019	0.040
33.70	0.019	**0.040**

Summary for Pond 11P: CB

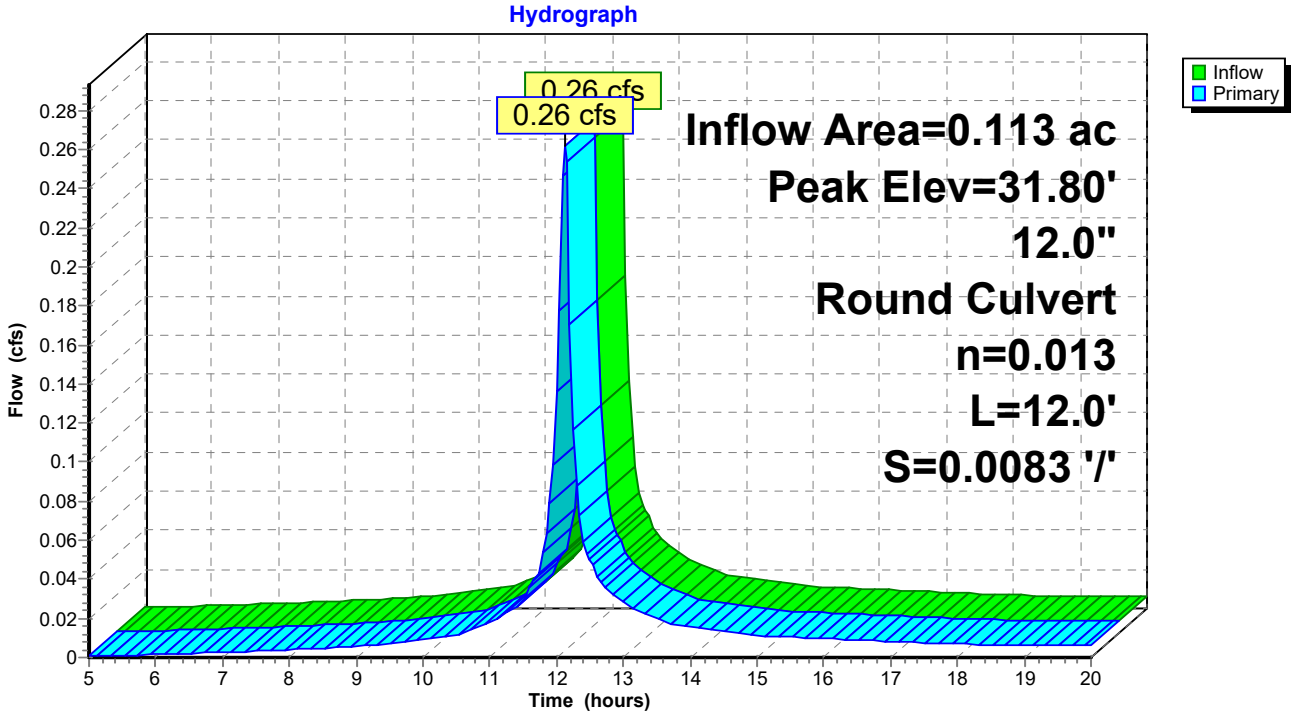
Inflow Area = 0.113 ac, 88.34% Impervious, Inflow Depth > 2.02" for 2-Year event
Inflow = 0.26 cfs @ 12.13 hrs, Volume= 0.019 af
Outflow = 0.26 cfs @ 12.13 hrs, Volume= 0.019 af, Atten= 0%, Lag= 0.0 min
Primary = 0.26 cfs @ 12.13 hrs, Volume= 0.019 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 31.80' @ 12.13 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	31.50'	**12.0" Round Culvert** L= 12.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 31.50' / 31.40' S= 0.0083 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.25 cfs @ 12.13 hrs HW=31.79' (Free Discharge)
1=Culvert (Barrel Controls 0.25 cfs @ 1.99 fps)

Pond 11P: CB



Stage-Area-Storage for Pond 11P: CB

Elevation (feet)	Storage (cubic-feet)	Elevation (feet)	Storage (cubic-feet)
31.50	**0**	32.03	0
31.51	0	32.04	0
31.52	0	32.05	0
31.53	0	32.06	0
31.54	0	32.07	0
31.55	0	32.08	0
31.56	0	32.09	0
31.57	0	32.10	0
31.58	0	32.11	0
31.59	0	32.12	0
31.60	0	32.13	0
31.61	0	32.14	0
31.62	0	32.15	0
31.63	0	32.16	0
31.64	0	32.17	0
31.65	0	32.18	0
31.66	0	32.19	0
31.67	0	32.20	0
31.68	0	32.21	0
31.69	0	32.22	0
31.70	0	32.23	0
31.71	0	32.24	0
31.72	0	32.25	0
31.73	0	32.26	0
31.74	0	32.27	0
31.75	0	32.28	0
31.76	0	32.29	0
31.77	0	32.30	0
31.78	0	32.31	0
31.79	0	32.32	0
31.80	0	32.33	0
31.81	0	32.34	0
31.82	0	32.35	0
31.83	0	32.36	0
31.84	0	32.37	0
31.85	0	32.38	0
31.86	0	32.39	0
31.87	0	32.40	0
31.88	0	32.41	0
31.89	0	32.42	0
31.90	0	32.43	0
31.91	0	32.44	0
31.92	0	32.45	0
31.93	0	32.46	0
31.94	0	32.47	0
31.95	0	32.48	0
31.96	0	32.49	0
31.97	0	32.50	0
31.98	0		
31.99	0		
32.00	0		
32.01	0		
32.02	0		

Summary for Pond 12P: DMH

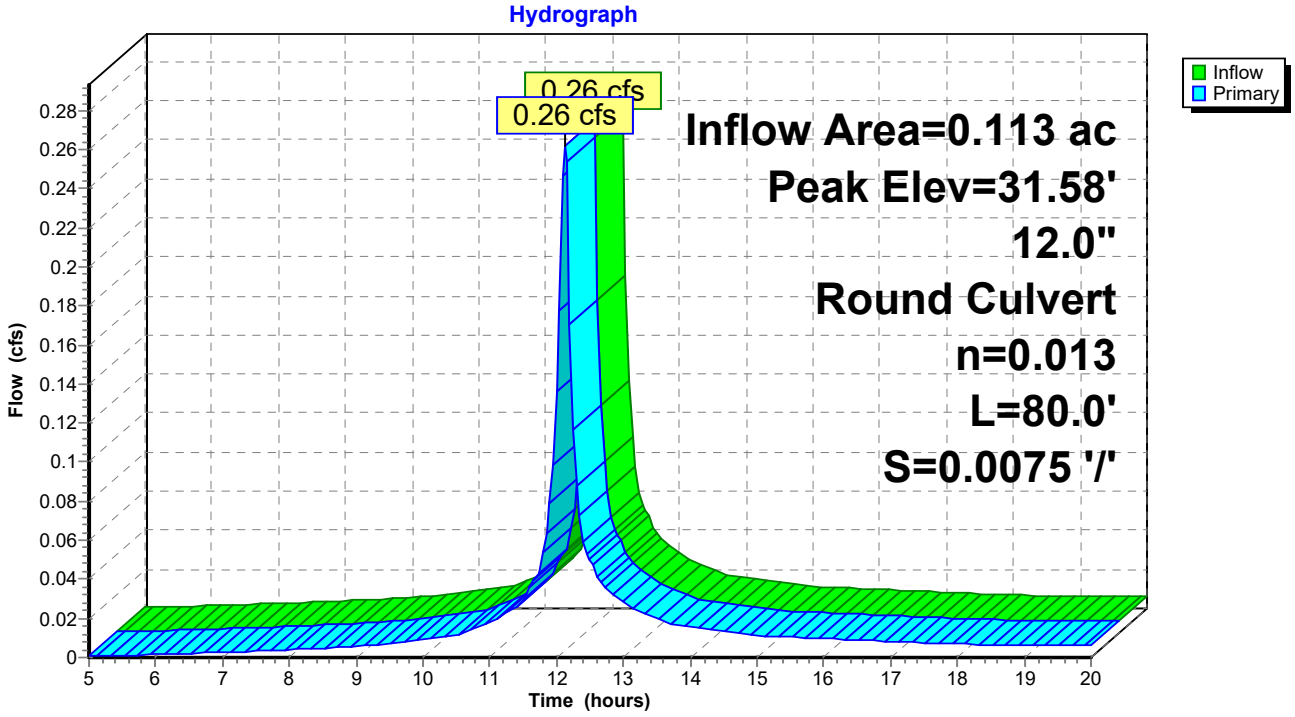
Inflow Area = 0.113 ac, 88.34% Impervious, Inflow Depth > 2.02" for 2-Year event
Inflow = 0.26 cfs @ 12.13 hrs, Volume= 0.019 af
Outflow = 0.26 cfs @ 12.13 hrs, Volume= 0.019 af, Atten= 0%, Lag= 0.0 min
Primary = 0.26 cfs @ 12.13 hrs, Volume= 0.019 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 31.58' @ 12.13 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	31.30'	**12.0" Round Culvert** L= 80.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 31.30' / 30.70' S= 0.0075 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.25 cfs @ 12.13 hrs HW=31.58' (Free Discharge)
1=Culvert (Inlet Controls 0.25 cfs @ 1.41 fps)

Pond 12P: DMH



Stage-Area-Storage for Pond 12P: DMH

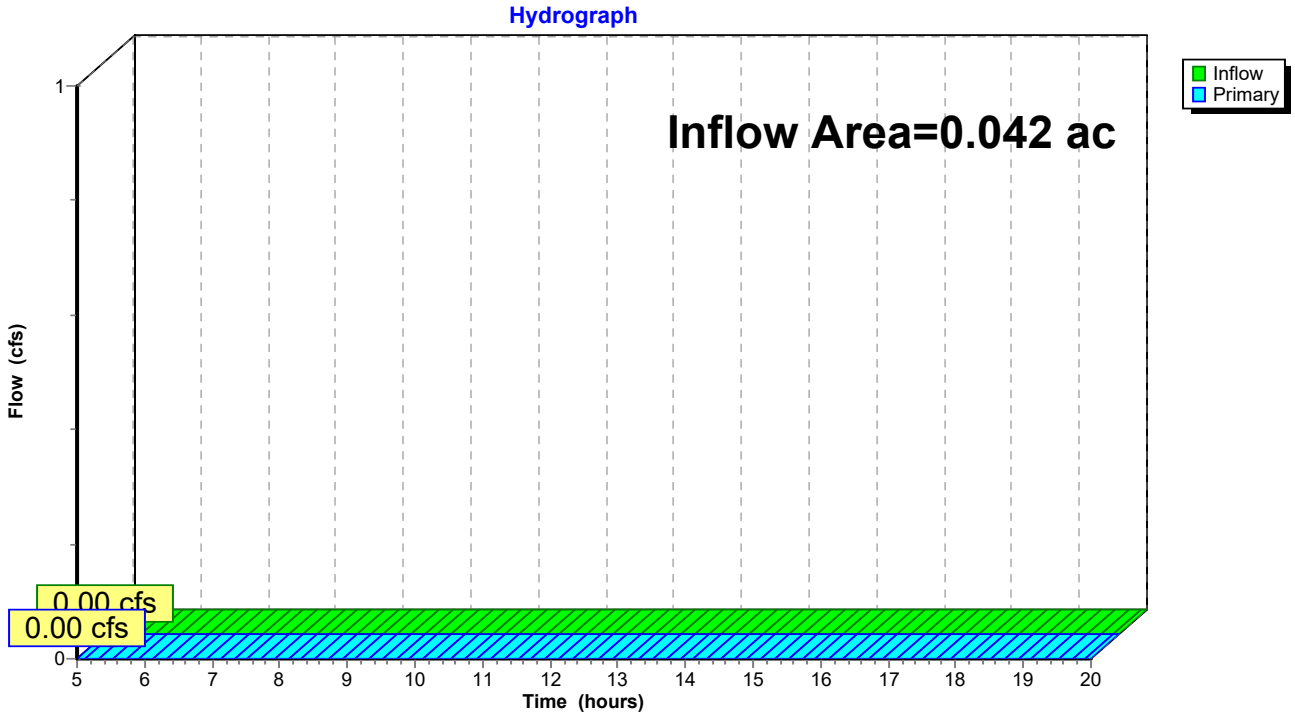
Elevation (feet)	Storage (cubic-feet)	Elevation (feet)	Storage (cubic-feet)
31.30	**0**	31.83	0
31.31	0	31.84	0
31.32	0	31.85	0
31.33	0	31.86	0
31.34	0	31.87	0
31.35	0	31.88	0
31.36	0	31.89	0
31.37	0	31.90	0
31.38	0	31.91	0
31.39	0	31.92	0
31.40	0	31.93	0
31.41	0	31.94	0
31.42	0	31.95	0
31.43	0	31.96	0
31.44	0	31.97	0
31.45	0	31.98	0
31.46	0	31.99	0
31.47	0	32.00	0
31.48	0	32.01	0
31.49	0	32.02	0
31.50	0	32.03	0
31.51	0	32.04	0
31.52	0	32.05	0
31.53	0	32.06	0
31.54	0	32.07	0
31.55	0	32.08	0
31.56	0	32.09	0
31.57	0	32.10	0
31.58	0	32.11	0
31.59	0	32.12	0
31.60	0	32.13	0
31.61	0	32.14	0
31.62	0	32.15	0
31.63	0	32.16	0
31.64	0	32.17	0
31.65	0	32.18	0
31.66	0	32.19	0
31.67	0	32.20	0
31.68	0	32.21	0
31.69	0	32.22	0
31.70	0	32.23	0
31.71	0	32.24	0
31.72	0	32.25	0
31.73	0	32.26	0
31.74	0	32.27	0
31.75	0	32.28	0
31.76	0	32.29	0
31.77	0	32.30	0
31.78	0		
31.79	0		
31.80	0		
31.81	0		
31.82	0		

Summary for Link 7L: TOTAL P4

Inflow Area = 0.042 ac, 0.00% Impervious, Inflow Depth = 0.00" for 2-Year event
Inflow = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af
Primary = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link 7L: TOTAL P4

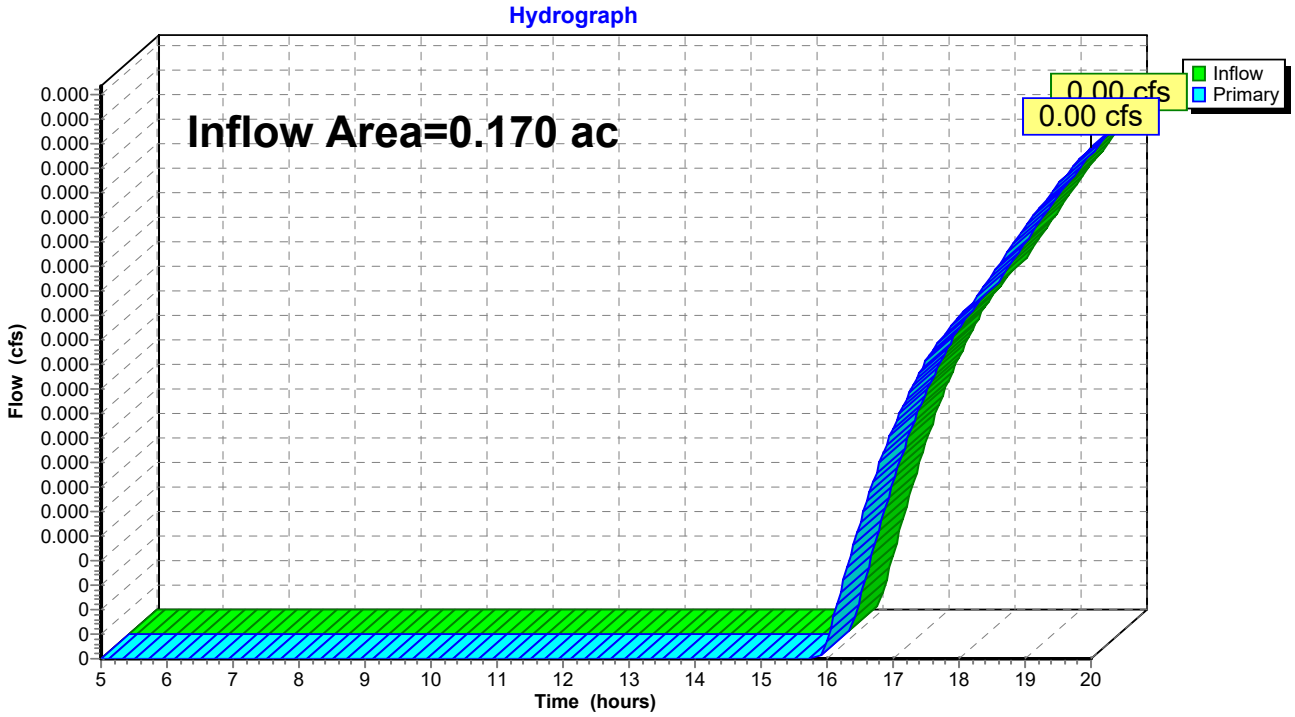


Summary for Link 8L: TOTAL P3

Inflow Area = 0.170 ac, 0.00% Impervious, Inflow Depth > 0.01" for 2-Year event
Inflow = 0.00 cfs @ 20.00 hrs, Volume= 0.000 af
Primary = 0.00 cfs @ 20.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link 8L: TOTAL P3

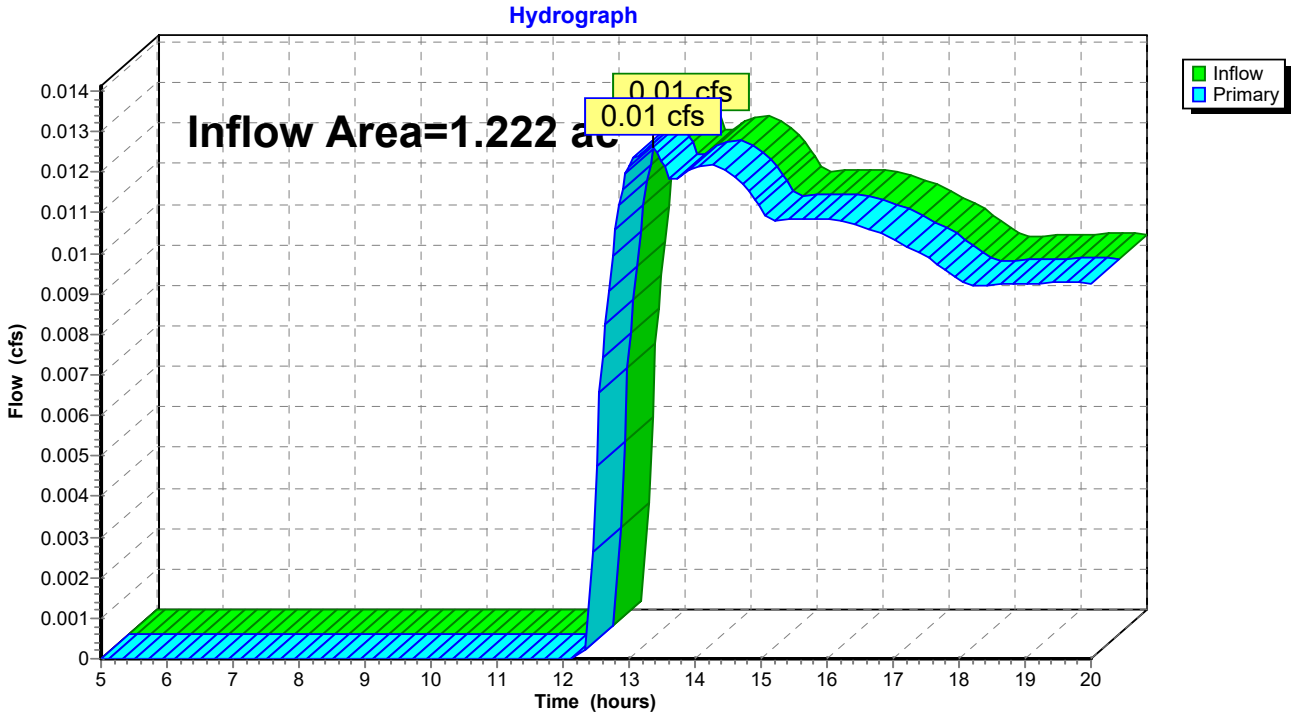


Summary for Link 9L: TOTAL P2

Inflow Area = 1.222 ac, 21.23% Impervious, Inflow Depth > 0.06" for 2-Year event
Inflow = 0.01 cfs @ 13.35 hrs, Volume= 0.007 af
Primary = 0.01 cfs @ 13.35 hrs, Volume= 0.007 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link 9L: TOTAL P2

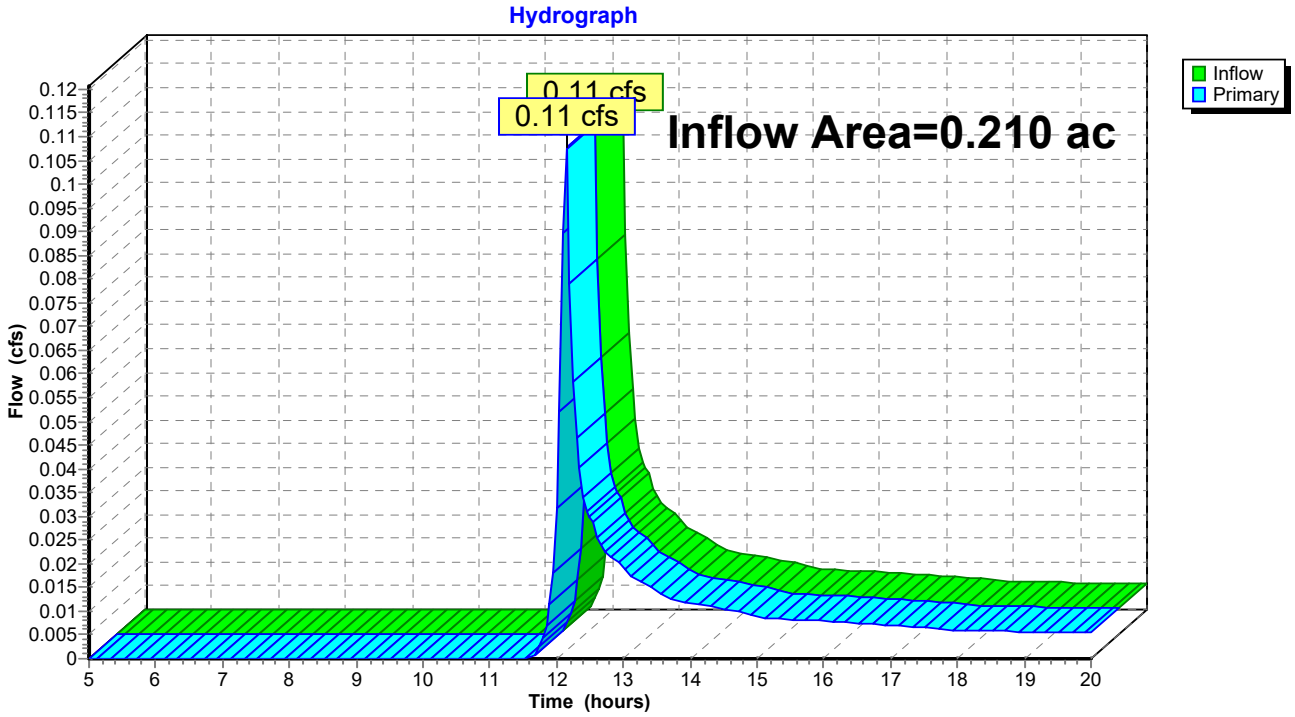


Summary for Link 10L: TOTAL P1

Inflow Area = 0.210 ac, 30.48% Impervious, Inflow Depth > 0.48" for 2-Year event
Inflow = 0.11 cfs @ 12.14 hrs, Volume= 0.008 af
Primary = 0.11 cfs @ 12.14 hrs, Volume= 0.008 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link 10L: TOTAL P1



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

Subcatchment 1S: P2B Runoff Area=6,160 sf 100.00% Impervious Runoff Depth>4.06"
Tc=6.0 min CN=98 Runoff=0.60 cfs 0.048 af

Subcatchment 3S: P3 Runoff Area=7,411 sf 0.00% Impervious Runoff Depth>0.23"
Flow Length=77' Tc=9.5 min CN=43 Runoff=0.01 cfs 0.003 af

Subcatchment 4S: P2A Runoff Area=42,137 sf 1.85% Impervious Runoff Depth>0.50"
Tc=6.0 min CN=50 Runoff=0.42 cfs 0.041 af

Subcatchment 5S: P1 Runoff Area=9,159 sf 30.48% Impervious Runoff Depth>1.34"
Tc=6.0 min CN=65 Runoff=0.34 cfs 0.023 af

Subcatchment 6S: P4 Runoff Area=1,826 sf 0.00% Impervious Runoff Depth>0.11"
Tc=6.0 min CN=39 Runoff=0.00 cfs 0.000 af

Subcatchment 11S: P2C Runoff Area=4,933 sf 88.34% Impervious Runoff Depth>3.48"
Tc=6.0 min CN=91 Runoff=0.44 cfs 0.033 af

Pond 2P: (new Pond) Peak Elev=31.49' Storage=0.016 af Inflow=1.04 cfs 0.081 af
Discarded=0.26 cfs 0.081 af Primary=0.00 cfs 0.000 af Outflow=0.26 cfs 0.081 af

Pond 11P: CB Peak Elev=31.90' Inflow=0.44 cfs 0.033 af
12.0" Round Culvert n=0.013 L=12.0' S=0.0083 '/' Outflow=0.44 cfs 0.033 af

Pond 12P: DMH Peak Elev=31.67' Inflow=0.44 cfs 0.033 af
12.0" Round Culvert n=0.013 L=80.0' S=0.0075 '/' Outflow=0.44 cfs 0.033 af

Link 7L: TOTAL P4 Inflow=0.00 cfs 0.000 af
Primary=0.00 cfs 0.000 af

Link 8L: TOTAL P3 Inflow=0.01 cfs 0.003 af
Primary=0.01 cfs 0.003 af

Link 9L: TOTAL P2 Inflow=0.42 cfs 0.041 af
Primary=0.42 cfs 0.041 af

Link 10L: TOTAL P1 Inflow=0.34 cfs 0.023 af
Primary=0.34 cfs 0.023 af

Total Runoff Area = 1.644 ac Runoff Volume = 0.148 af Average Runoff Depth = 1.08"
80.33% Pervious = 1.321 ac 19.67% Impervious = 0.323 ac

Summary for Subcatchment 1S: P2B

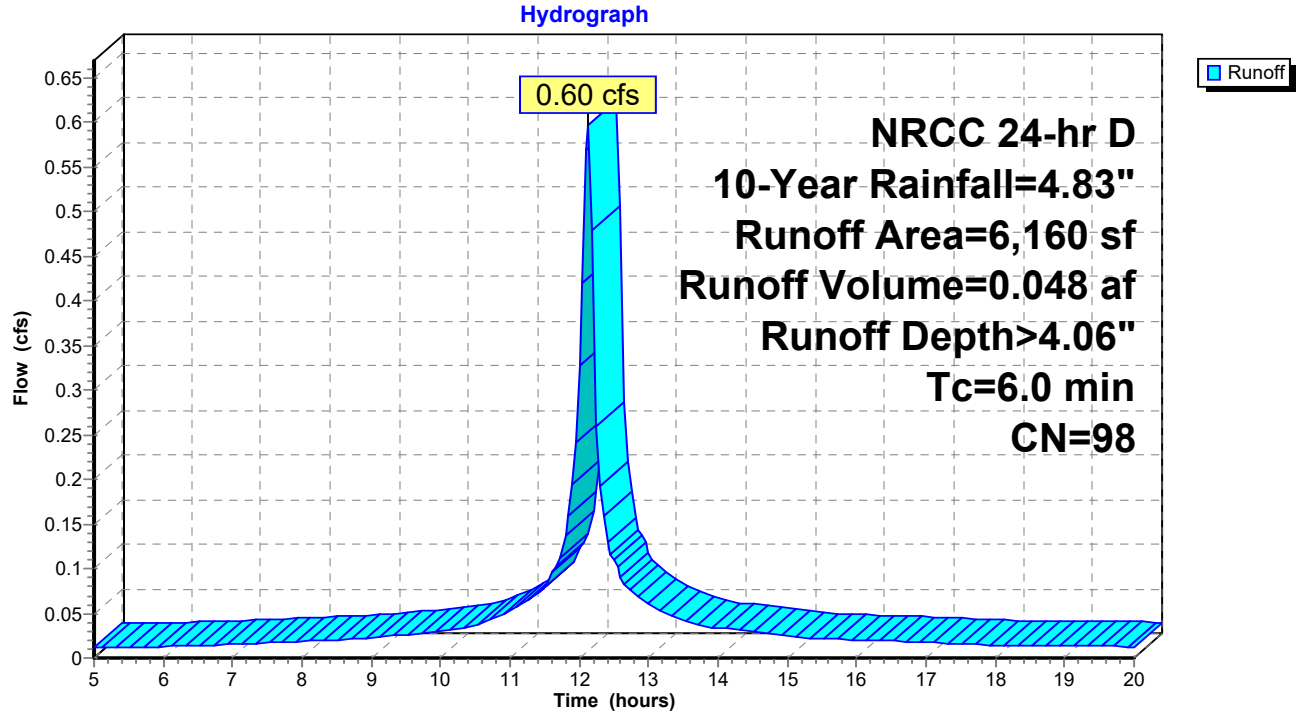
Runoff = 0.60 cfs @ 12.13 hrs, Volume= 0.048 af, Depth> 4.06"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 10-Year Rainfall=4.83"

Area (sf)	CN	Description
6,160	98	Roofs, HSG A
6,160		100.00% Impervious Area

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

Subcatchment 1S: P2B



Summary for Subcatchment 3S: P3

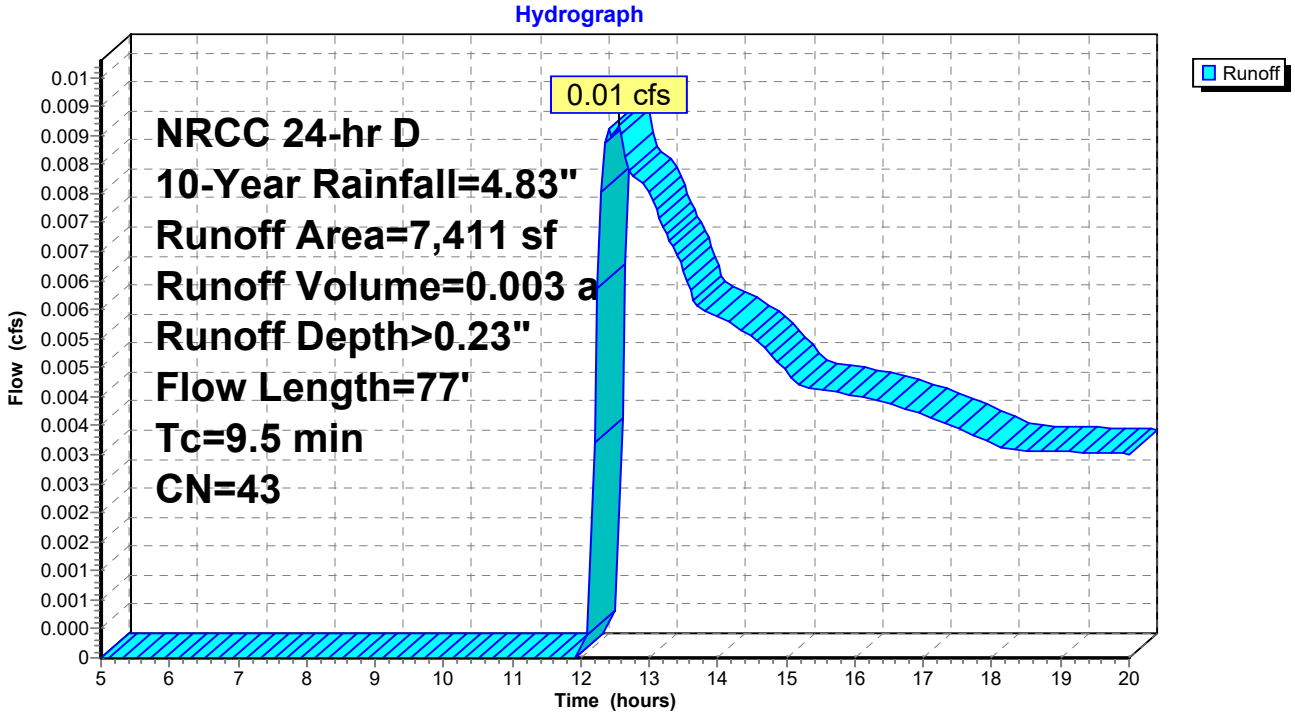
Runoff = 0.01 cfs @ 12.55 hrs, Volume= 0.003 af, Depth> 0.23"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 10-Year Rainfall=4.83"

Area (sf)	CN	Description
1,933	70	Woods, Good, HSG C
2,160	39	>75% Grass cover, Good, HSG A
3,318	30	Woods, Good, HSG A
7,411	43	Weighted Average
7,411		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.3	50	0.0420	0.09		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.10"
0.2	27	0.0220	2.39		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
9.5	77	Total			

Subcatchment 3S: P3



Summary for Subcatchment 4S: P2A

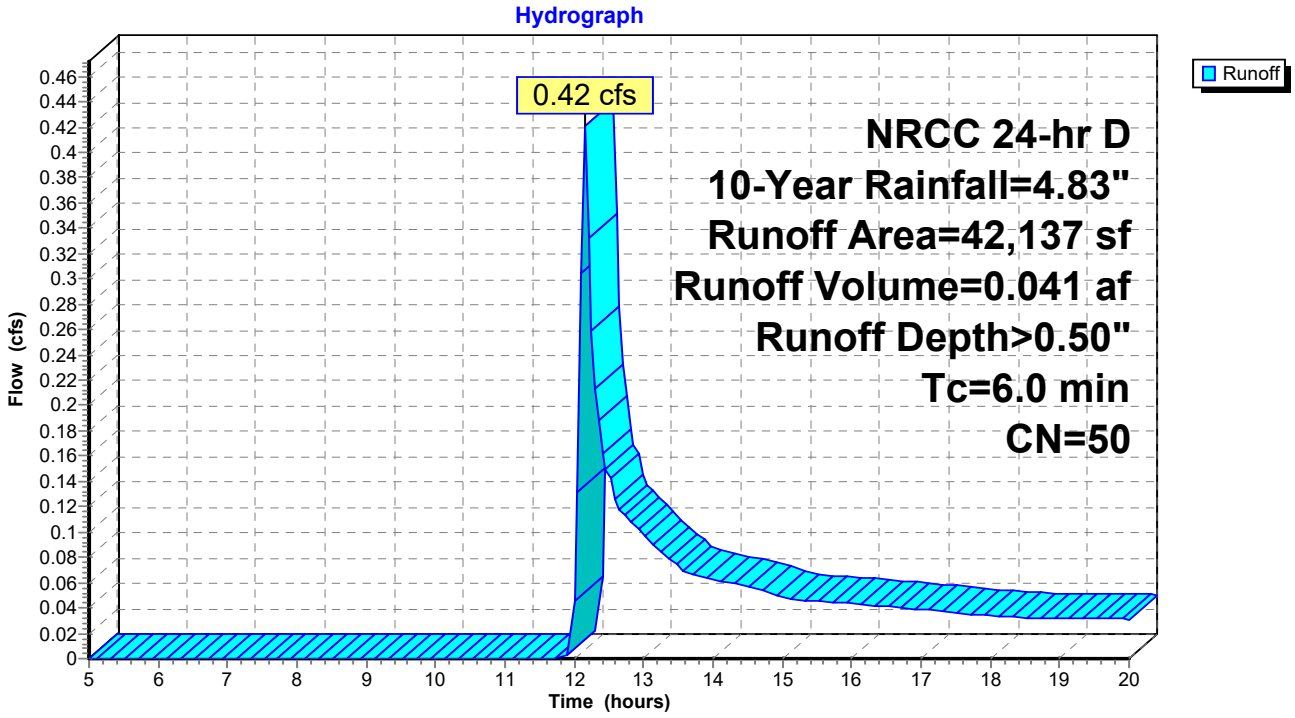
Runoff = 0.42 cfs @ 12.15 hrs, Volume= 0.041 af, Depth> 0.50"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 10-Year Rainfall=4.83"

Area (sf)	CN	Description
2,413	70	Woods, Good, HSG C
366	74	>75% Grass cover, Good, HSG C
2,247	30	Woods, Good, HSG A
781	98	Roofs, HSG A
24,492	39	>75% Grass cover, Good, HSG A
11,838	68	<50% Grass cover, Poor, HSG A
42,137	50	Weighted Average
41,356		98.15% Pervious Area
781		1.85% Impervious Area

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

Subcatchment 4S: P2A



Summary for Subcatchment 5S: P1

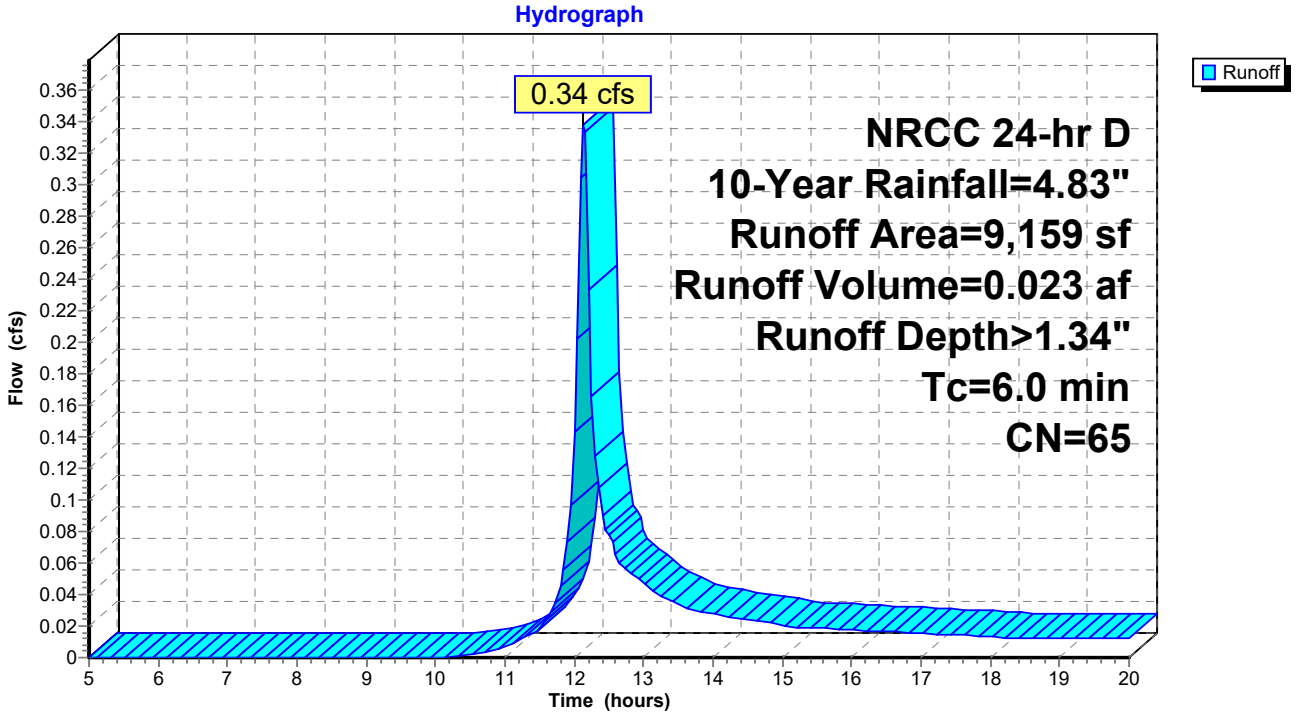
Runoff = 0.34 cfs @ 12.14 hrs, Volume= 0.023 af, Depth> 1.34"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 10-Year Rainfall=4.83"

Area (sf)	CN	Description
1,788	98	Paved parking, HSG A
4,277	39	>75% Grass cover, Good, HSG A
2,090	74	>75% Grass cover, Good, HSG C
1,004	98	Paved parking, HSG C
9,159	65	Weighted Average
6,367		69.52% Pervious Area
2,792		30.48% Impervious Area

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

Subcatchment 5S: P1



Summary for Subcatchment 6S: P4

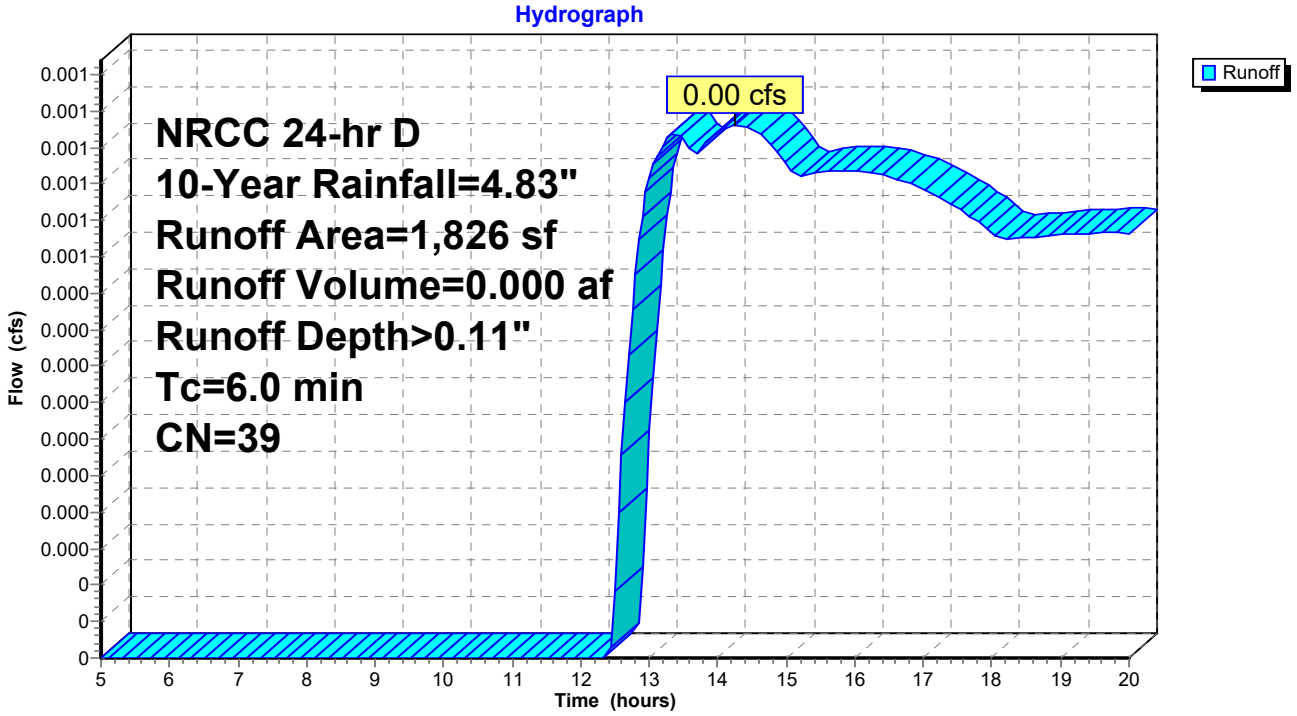
Runoff = 0.00 cfs @ 14.25 hrs, Volume= 0.000 af, Depth> 0.11"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 10-Year Rainfall=4.83"

Area (sf)	CN	Description
1,826	39	>75% Grass cover, Good, HSG A
1,826		100.00% Pervious Area

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

Subcatchment 6S: P4



Summary for Subcatchment 11S: P2C

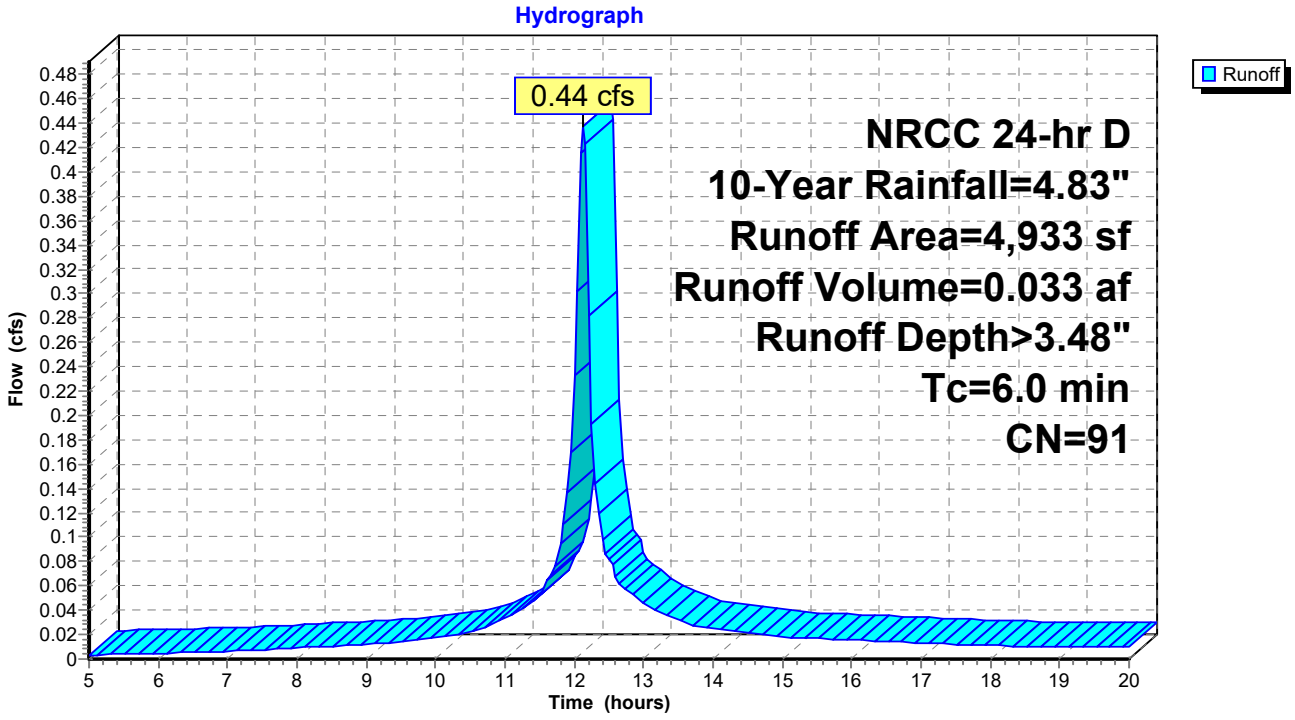
Runoff = 0.44 cfs @ 12.13 hrs, Volume= 0.033 af, Depth> 3.48"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 10-Year Rainfall=4.83"

Area (sf)	CN	Description
3,577	98	Paved parking, HSG A
575	39	>75% Grass cover, Good, HSG A
781	98	Roofs, HSG A
4,933	91	Weighted Average
575		11.66% Pervious Area
4,358		88.34% Impervious Area

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

Subcatchment 11S: P2C



Summary for Pond 2P: (new Pond)

Inflow Area = 0.255 ac, 94.82% Impervious, Inflow Depth > 3.80" for 10-Year event
Inflow = 1.04 cfs @ 12.13 hrs, Volume= 0.081 af
Outflow = 0.26 cfs @ 12.37 hrs, Volume= 0.081 af, Atten= 75%, Lag= 14.8 min
Discarded = 0.26 cfs @ 12.37 hrs, Volume= 0.081 af
Primary = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 31.49' @ 12.37 hrs Surf.Area= 0.019 ac Storage= 0.016 af

Plug-Flow detention time= 14.8 min calculated for 0.081 af (100% of inflow)
Center-of-Mass det. time= 14.4 min (760.4 - 745.9)

Volume	Invert	Avail.Storage	Storage Description
#1A	30.20'	0.018 af	**15.75'W x 53.46'L x 3.50'H Field A** 0.068 af Overall - 0.022 af Embedded = 0.046 af x 40.0% Voids
#2A	30.70'	0.022 af	**ADS_StormTech SC-740 +Cap** x 21 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap 21 Chambers in 3 Rows
		0.040 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	30.20'	**8.270 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 28.00'
#2	Primary	31.00'	**12.0" Round Culvert** L= 41.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 31.00' / 30.50' S= 0.0122 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#3	Device 2	33.00'	**4.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32
#4	Device 2	31.75'	**4.0" Vert. Orifice/Grate** C= 0.600

Discarded OutFlow Max=0.26 cfs @ 12.37 hrs HW=31.48' (Free Discharge)
└**1=Exfiltration** (Controls 0.26 cfs)

Primary OutFlow Max=0.00 cfs @ 5.00 hrs HW=30.20' (Free Discharge)
└**2=Culvert** (Controls 0.00 cfs)
  ├**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)
  └**4=Orifice/Grate** (Controls 0.00 cfs)

Pond 2P: (new Pond) - Chamber Wizard Field A

Chamber Model = ADS_StormTech SC-740 +Cap (ADS StormTech® SC-740 with cap length)
Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf
Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

51.0" Wide + 6.0" Spacing = 57.0" C-C Row Spacing

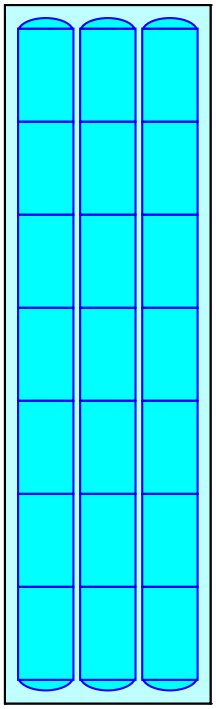
7 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 51.46' Row Length +12.0" End Stone x 2 = 53.46' Base Length
3 Rows x 51.0" Wide + 6.0" Spacing x 2 + 12.0" Side Stone x 2 = 15.75' Base Width
6.0" Base + 30.0" Chamber Height + 6.0" Cover = 3.50' Field Height

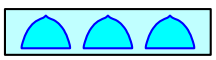
21 Chambers x 45.9 cf = 964.7 cf Chamber Storage

2,946.8 cf Field - 964.7 cf Chambers = 1,982.1 cf Stone x 40.0% Voids = 792.8 cf Stone Storage

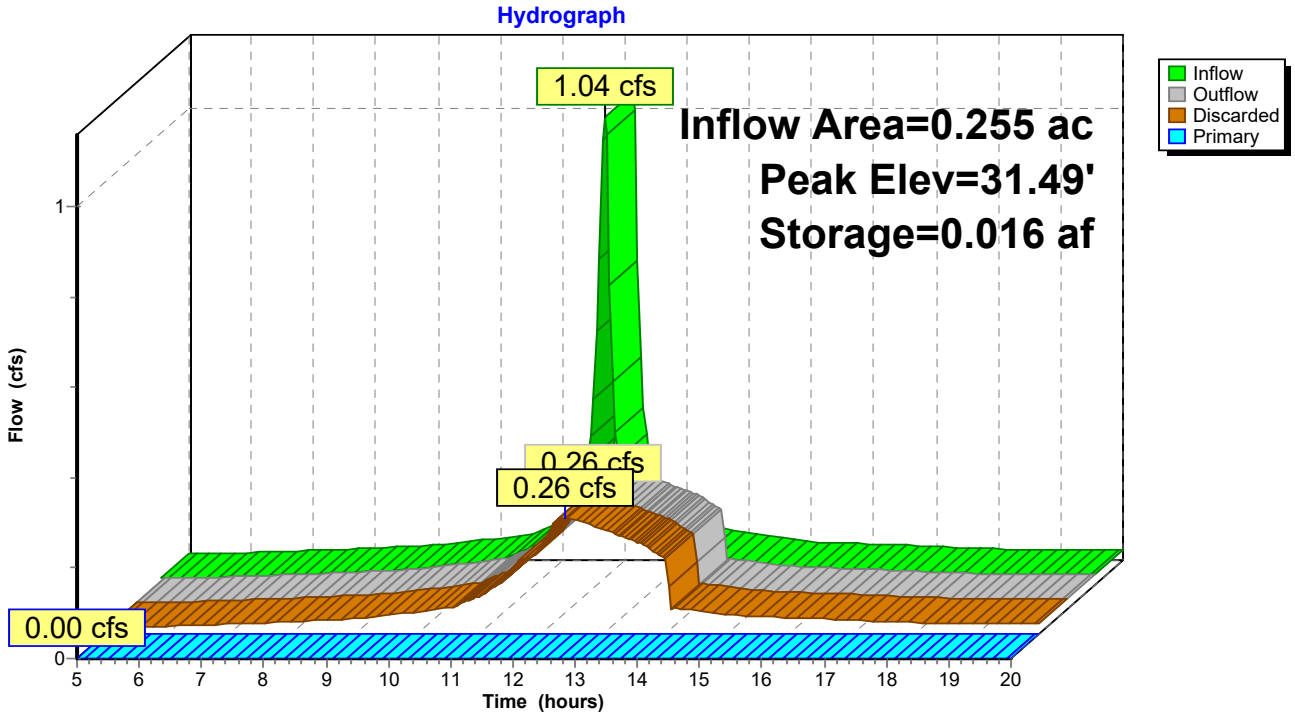
Chamber Storage + Stone Storage = 1,757.6 cf = 0.040 af
Overall Storage Efficiency = 59.6%
Overall System Size = 53.46' x 15.75' x 3.50'

21 Chambers
109.1 cy Field
73.4 cy Stone





Pond 2P: (new Pond)



Stage-Area-Storage for Pond 2P: (new Pond)

Elevation (feet)	Surface (acres)	Storage (acre-feet)
30.20	**0.019**	0.000
30.25	0.019	0.000
30.30	0.019	0.001
30.35	0.019	0.001
30.40	0.019	0.002
30.45	0.019	0.002
30.50	0.019	0.002
30.55	0.019	0.003
30.60	0.019	0.003
30.65	0.019	0.003
30.70	0.019	0.004
30.75	0.019	0.005
30.80	0.019	0.005
30.85	0.019	0.006
30.90	0.019	0.007
30.95	0.019	0.008
31.00	0.019	0.008
31.05	0.019	0.009
31.10	0.019	0.010
31.15	0.019	0.011
31.20	0.019	0.011
31.25	0.019	0.012
31.30	0.019	0.013
31.35	0.019	0.014
31.40	0.019	0.014
31.45	0.019	0.015
31.50	0.019	0.016
31.55	0.019	0.017
31.60	0.019	0.017
31.65	0.019	0.018
31.70	0.019	0.019
31.75	0.019	0.020
31.80	0.019	0.020
31.85	0.019	0.021
31.90	0.019	0.022
31.95	0.019	0.022
32.00	0.019	0.023
32.05	0.019	0.024
32.10	0.019	0.024
32.15	0.019	0.025
32.20	0.019	0.026
32.25	0.019	0.026
32.30	0.019	0.027
32.35	0.019	0.028
32.40	0.019	0.028
32.45	0.019	0.029
32.50	0.019	0.029
32.55	0.019	0.030
32.60	0.019	0.031
32.65	0.019	0.031
32.70	0.019	0.032
32.75	0.019	0.032
32.80	0.019	0.033
32.85	0.019	0.033
32.90	0.019	0.034
32.95	0.019	0.034
33.00	0.019	0.035
33.05	0.019	0.035
33.10	0.019	0.036
33.15	0.019	0.036
33.20	0.019	0.036
33.25	0.019	0.037
33.30	0.019	0.037
33.35	0.019	0.038
33.40	0.019	0.038
33.45	0.019	0.038
33.50	0.019	0.039
33.55	0.019	0.039
33.60	0.019	0.040
33.65	0.019	0.040
33.70	0.019	**0.040**

Summary for Pond 11P: CB

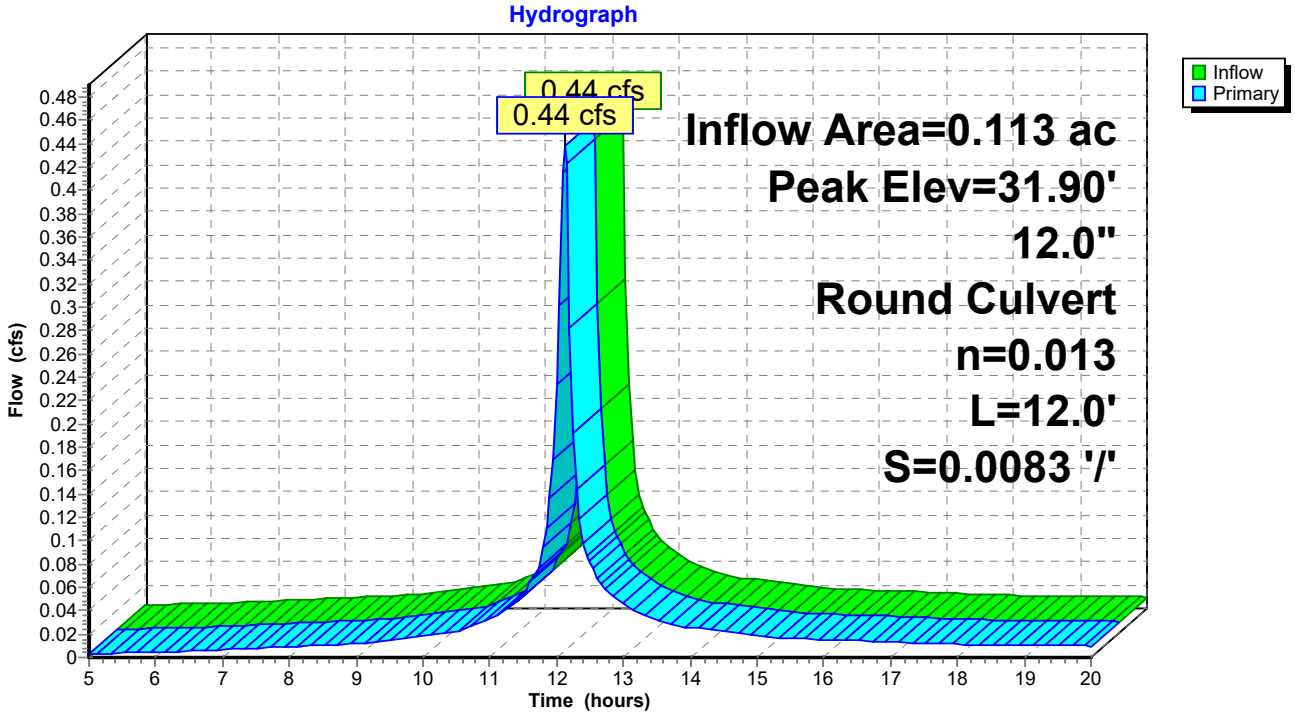
Inflow Area = 0.113 ac, 88.34% Impervious, Inflow Depth > 3.48" for 10-Year event
Inflow = 0.44 cfs @ 12.13 hrs, Volume= 0.033 af
Outflow = 0.44 cfs @ 12.13 hrs, Volume= 0.033 af, Atten= 0%, Lag= 0.0 min
Primary = 0.44 cfs @ 12.13 hrs, Volume= 0.033 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 31.90' @ 12.13 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	31.50'	**12.0" Round Culvert** L= 12.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 31.50' / 31.40' S= 0.0083 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.42 cfs @ 12.13 hrs HW=31.89' (Free Discharge)
1=Culvert (Barrel Controls 0.42 cfs @ 2.23 fps)

Pond 11P: CB



Stage-Area-Storage for Pond 11P: CB

Elevation (feet)	Storage (cubic-feet)	Elevation (feet)	Storage (cubic-feet)
31.50	**0**	32.03	0
31.51	0	32.04	0
31.52	0	32.05	0
31.53	0	32.06	0
31.54	0	32.07	0
31.55	0	32.08	0
31.56	0	32.09	0
31.57	0	32.10	0
31.58	0	32.11	0
31.59	0	32.12	0
31.60	0	32.13	0
31.61	0	32.14	0
31.62	0	32.15	0
31.63	0	32.16	0
31.64	0	32.17	0
31.65	0	32.18	0
31.66	0	32.19	0
31.67	0	32.20	0
31.68	0	32.21	0
31.69	0	32.22	0
31.70	0	32.23	0
31.71	0	32.24	0
31.72	0	32.25	0
31.73	0	32.26	0
31.74	0	32.27	0
31.75	0	32.28	0
31.76	0	32.29	0
31.77	0	32.30	0
31.78	0	32.31	0
31.79	0	32.32	0
31.80	0	32.33	0
31.81	0	32.34	0
31.82	0	32.35	0
31.83	0	32.36	0
31.84	0	32.37	0
31.85	0	32.38	0
31.86	0	32.39	0
31.87	0	32.40	0
31.88	0	32.41	0
31.89	0	32.42	0
31.90	0	32.43	0
31.91	0	32.44	0
31.92	0	32.45	0
31.93	0	32.46	0
31.94	0	32.47	0
31.95	0	32.48	0
31.96	0	32.49	0
31.97	0	32.50	0
31.98	0		
31.99	0		
32.00	0		
32.01	0		
32.02	0		

Summary for Pond 12P: DMH

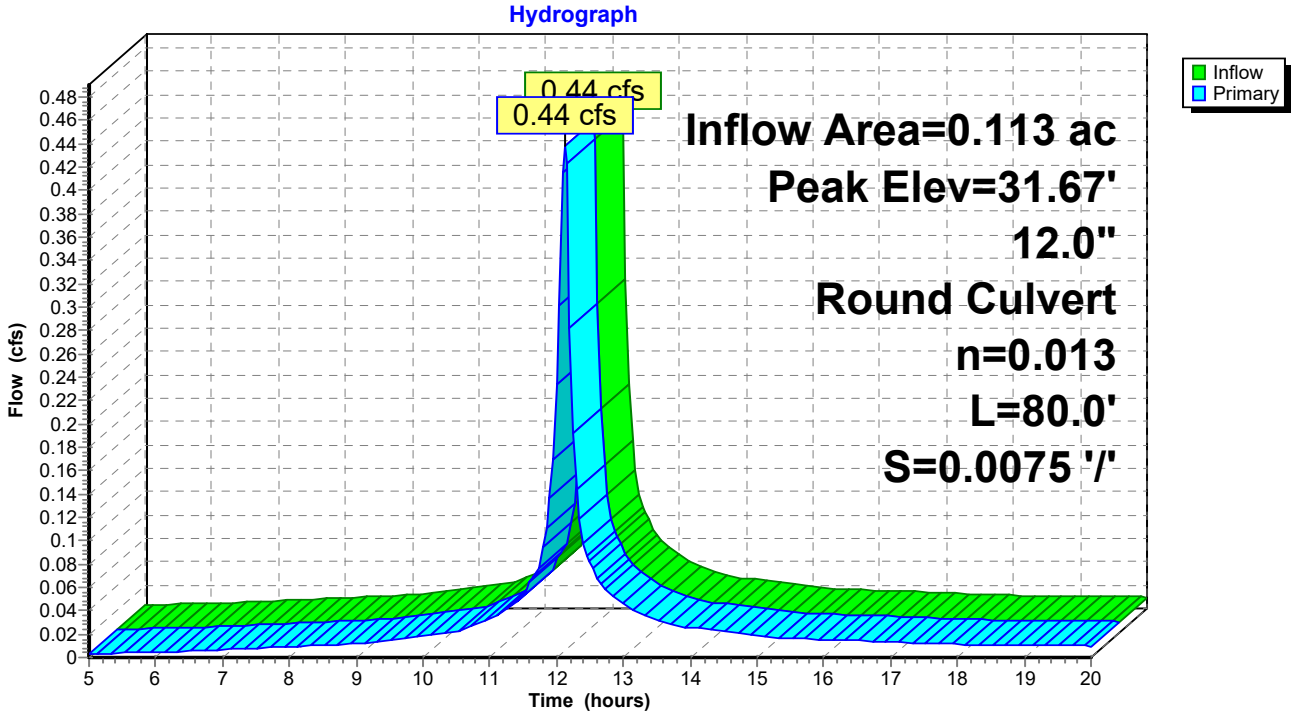
Inflow Area = 0.113 ac, 88.34% Impervious, Inflow Depth > 3.48" for 10-Year event
Inflow = 0.44 cfs @ 12.13 hrs, Volume= 0.033 af
Outflow = 0.44 cfs @ 12.13 hrs, Volume= 0.033 af, Atten= 0%, Lag= 0.0 min
Primary = 0.44 cfs @ 12.13 hrs, Volume= 0.033 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 31.67' @ 12.13 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	31.30'	**12.0" Round Culvert** L= 80.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 31.30' / 30.70' S= 0.0075 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.42 cfs @ 12.13 hrs HW=31.66' (Free Discharge)
1=Culvert (Inlet Controls 0.42 cfs @ 1.62 fps)

Pond 12P: DMH



Stage-Area-Storage for Pond 12P: DMH

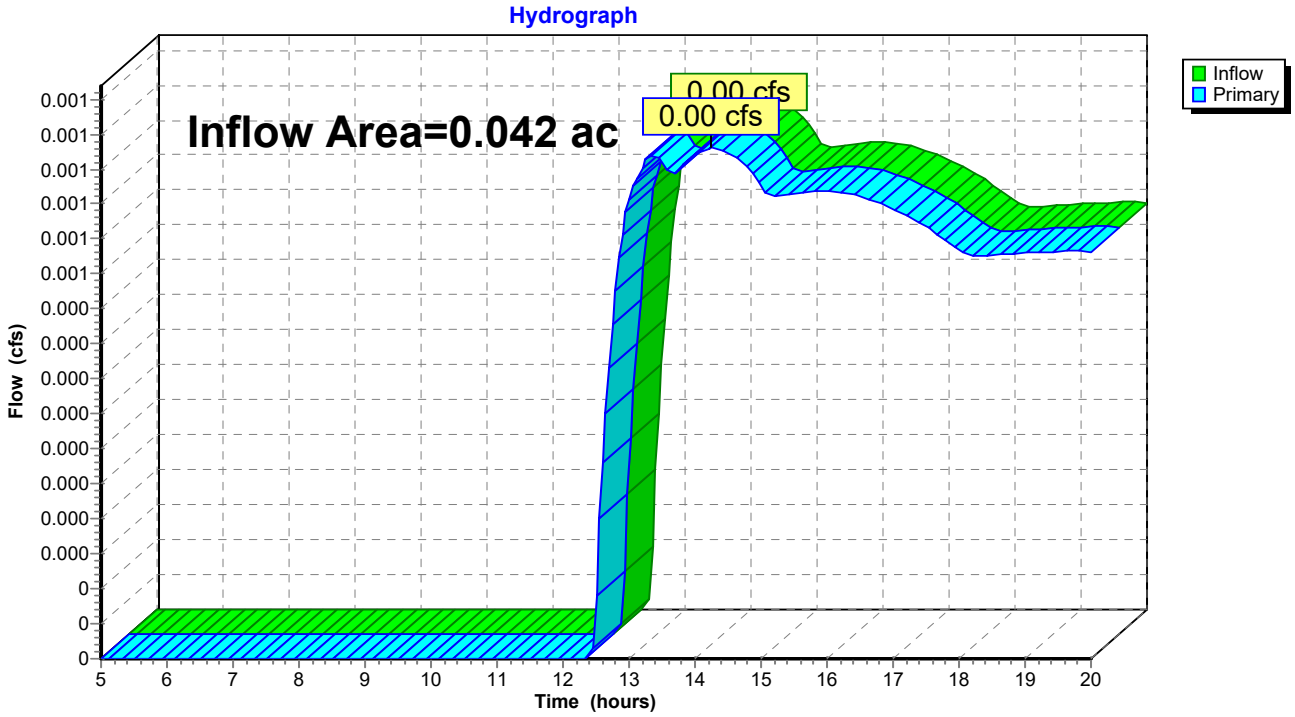
Elevation (feet)	Storage (cubic-feet)	Elevation (feet)	Storage (cubic-feet)
31.30	**0**	31.83	0
31.31	0	31.84	0
31.32	0	31.85	0
31.33	0	31.86	0
31.34	0	31.87	0
31.35	0	31.88	0
31.36	0	31.89	0
31.37	0	31.90	0
31.38	0	31.91	0
31.39	0	31.92	0
31.40	0	31.93	0
31.41	0	31.94	0
31.42	0	31.95	0
31.43	0	31.96	0
31.44	0	31.97	0
31.45	0	31.98	0
31.46	0	31.99	0
31.47	0	32.00	0
31.48	0	32.01	0
31.49	0	32.02	0
31.50	0	32.03	0
31.51	0	32.04	0
31.52	0	32.05	0
31.53	0	32.06	0
31.54	0	32.07	0
31.55	0	32.08	0
31.56	0	32.09	0
31.57	0	32.10	0
31.58	0	32.11	0
31.59	0	32.12	0
31.60	0	32.13	0
31.61	0	32.14	0
31.62	0	32.15	0
31.63	0	32.16	0
31.64	0	32.17	0
31.65	0	32.18	0
31.66	0	32.19	0
31.67	0	32.20	0
31.68	0	32.21	0
31.69	0	32.22	0
31.70	0	32.23	0
31.71	0	32.24	0
31.72	0	32.25	0
31.73	0	32.26	0
31.74	0	32.27	0
31.75	0	32.28	0
31.76	0	32.29	0
31.77	0	32.30	0
31.78	0		
31.79	0		
31.80	0		
31.81	0		
31.82	0		

Summary for Link 7L: TOTAL P4

Inflow Area = 0.042 ac, 0.00% Impervious, Inflow Depth > 0.11" for 10-Year event
Inflow = 0.00 cfs @ 14.25 hrs, Volume= 0.000 af
Primary = 0.00 cfs @ 14.25 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link 7L: TOTAL P4

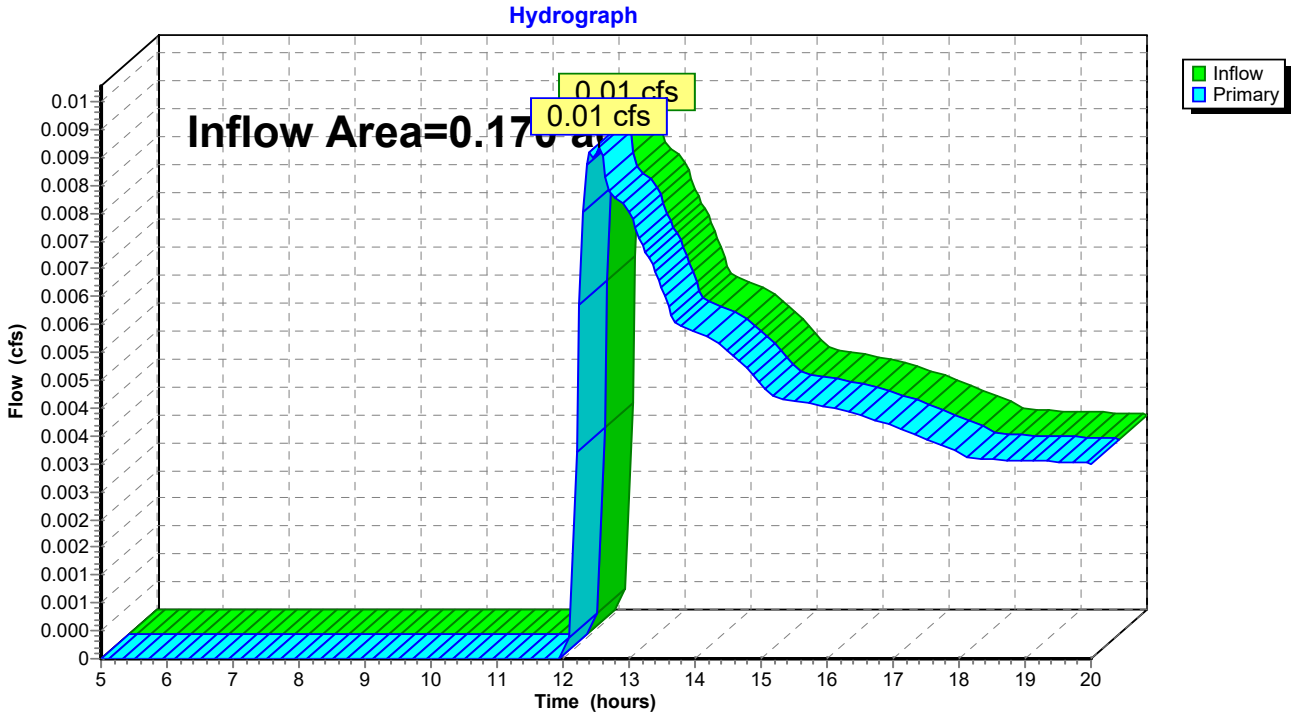


Summary for Link 8L: TOTAL P3

Inflow Area = 0.170 ac, 0.00% Impervious, Inflow Depth > 0.23" for 10-Year event
Inflow = 0.01 cfs @ 12.55 hrs, Volume= 0.003 af
Primary = 0.01 cfs @ 12.55 hrs, Volume= 0.003 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link 8L: TOTAL P3

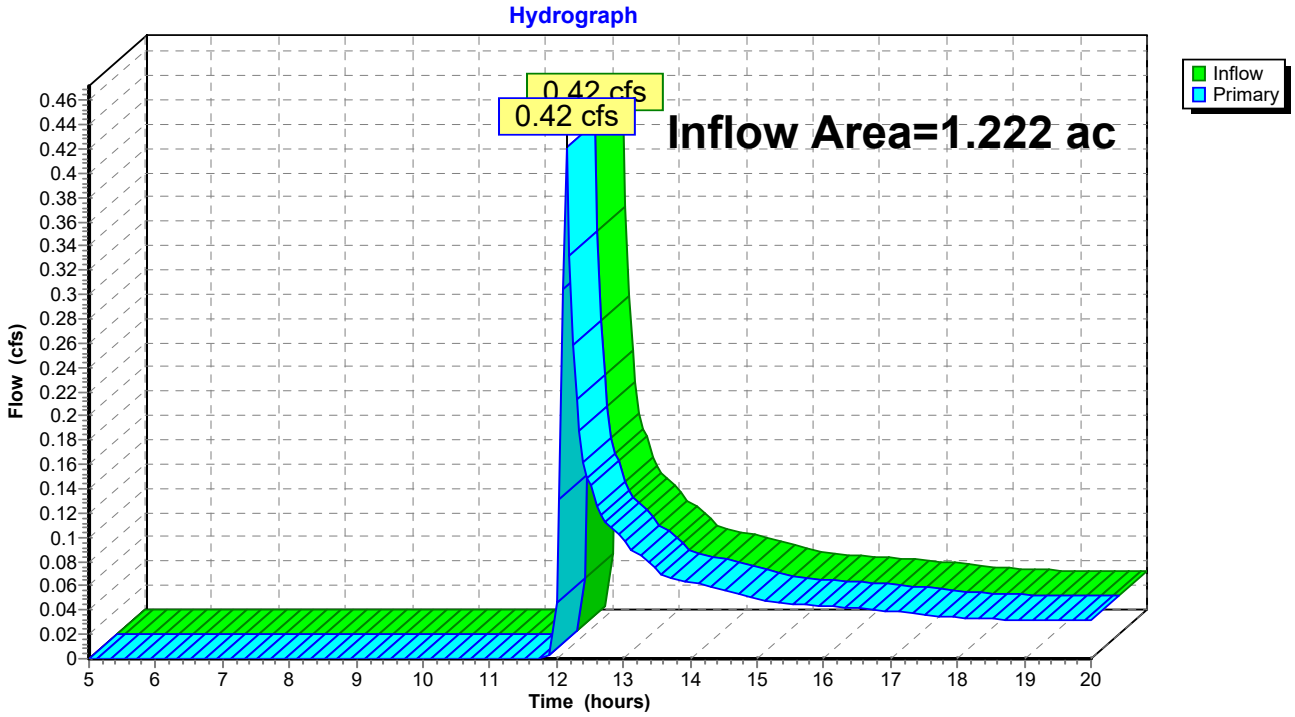


Summary for Link 9L: TOTAL P2

Inflow Area = 1.222 ac, 21.23% Impervious, Inflow Depth > 0.40" for 10-Year event
Inflow = 0.42 cfs @ 12.15 hrs, Volume= 0.041 af
Primary = 0.42 cfs @ 12.15 hrs, Volume= 0.041 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link 9L: TOTAL P2

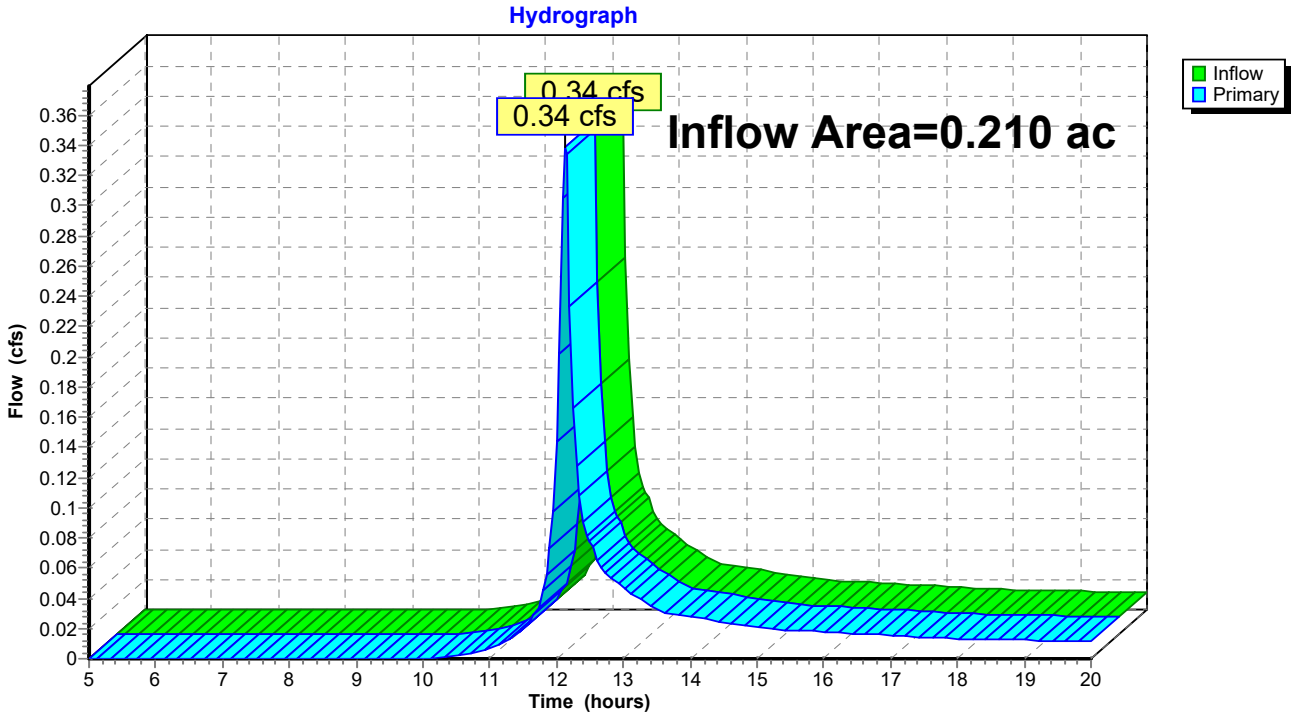


Summary for Link 10L: TOTAL P1

Inflow Area = 0.210 ac, 30.48% Impervious, Inflow Depth > 1.34" for 10-Year event
Inflow = 0.34 cfs @ 12.14 hrs, Volume= 0.023 af
Primary = 0.34 cfs @ 12.14 hrs, Volume= 0.023 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link 10L: TOTAL P1



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

Subcatchment 1S: P2B Runoff Area=6,160 sf 100.00% Impervious Runoff Depth>7.59"
Tc=6.0 min CN=98 Runoff=1.11 cfs 0.089 af

Subcatchment 3S: P3 Runoff Area=7,411 sf 0.00% Impervious Runoff Depth>1.71"
Flow Length=77' Tc=9.5 min CN=43 Runoff=0.29 cfs 0.024 af

Subcatchment 4S: P2A Runoff Area=42,137 sf 1.85% Impervious Runoff Depth>2.47"
Tc=6.0 min CN=50 Runoff=2.87 cfs 0.199 af

Subcatchment 5S: P1 Runoff Area=9,159 sf 30.48% Impervious Runoff Depth>4.18"
Tc=6.0 min CN=65 Runoff=1.06 cfs 0.073 af

Subcatchment 6S: P4 Runoff Area=1,826 sf 0.00% Impervious Runoff Depth>1.31"
Tc=6.0 min CN=39 Runoff=0.06 cfs 0.005 af

Subcatchment 11S: P2C Runoff Area=4,933 sf 88.34% Impervious Runoff Depth>7.09"
Tc=6.0 min CN=91 Runoff=0.86 cfs 0.067 af

Pond 2P: (new Pond) Peak Elev=32.85' Storage=0.033 af Inflow=1.97 cfs 0.156 af
Discarded=0.36 cfs 0.138 af Primary=0.41 cfs 0.018 af Outflow=0.76 cfs 0.156 af

Pond 11P: CB Peak Elev=32.08' Inflow=0.86 cfs 0.067 af
12.0" Round Culvert n=0.013 L=12.0' S=0.0083 '/' Outflow=0.86 cfs 0.067 af

Pond 12P: DMH Peak Elev=31.84' Inflow=0.86 cfs 0.067 af
12.0" Round Culvert n=0.013 L=80.0' S=0.0075 '/' Outflow=0.86 cfs 0.067 af

Link 7L: TOTAL P4 Inflow=0.06 cfs 0.005 af
Primary=0.06 cfs 0.005 af

Link 8L: TOTAL P3 Inflow=0.29 cfs 0.024 af
Primary=0.29 cfs 0.024 af

Link 9L: TOTAL P2 Inflow=3.13 cfs 0.217 af
Primary=3.13 cfs 0.217 af

Link 10L: TOTAL P1 Inflow=1.06 cfs 0.073 af
Primary=1.06 cfs 0.073 af

Total Runoff Area = 1.644 ac Runoff Volume = 0.457 af Average Runoff Depth = 3.34"
80.33% Pervious = 1.321 ac 19.67% Impervious = 0.323 ac

Summary for Subcatchment 1S: P2B

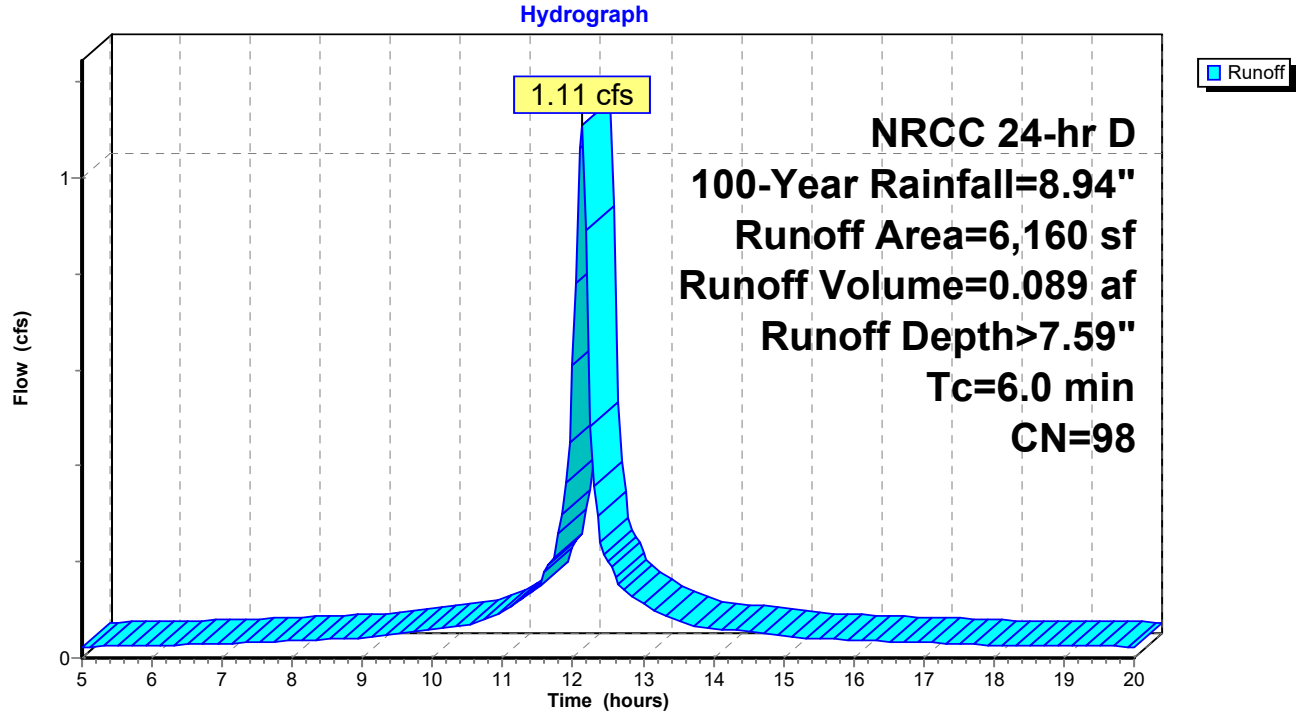
Runoff = 1.11 cfs @ 12.13 hrs, Volume= 0.089 af, Depth> 7.59"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 100-Year Rainfall=8.94"

Area (sf)	CN	Description
6,160	98	Roofs, HSG A
6,160		100.00% Impervious Area

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

Subcatchment 1S: P2B



Summary for Subcatchment 3S: P3

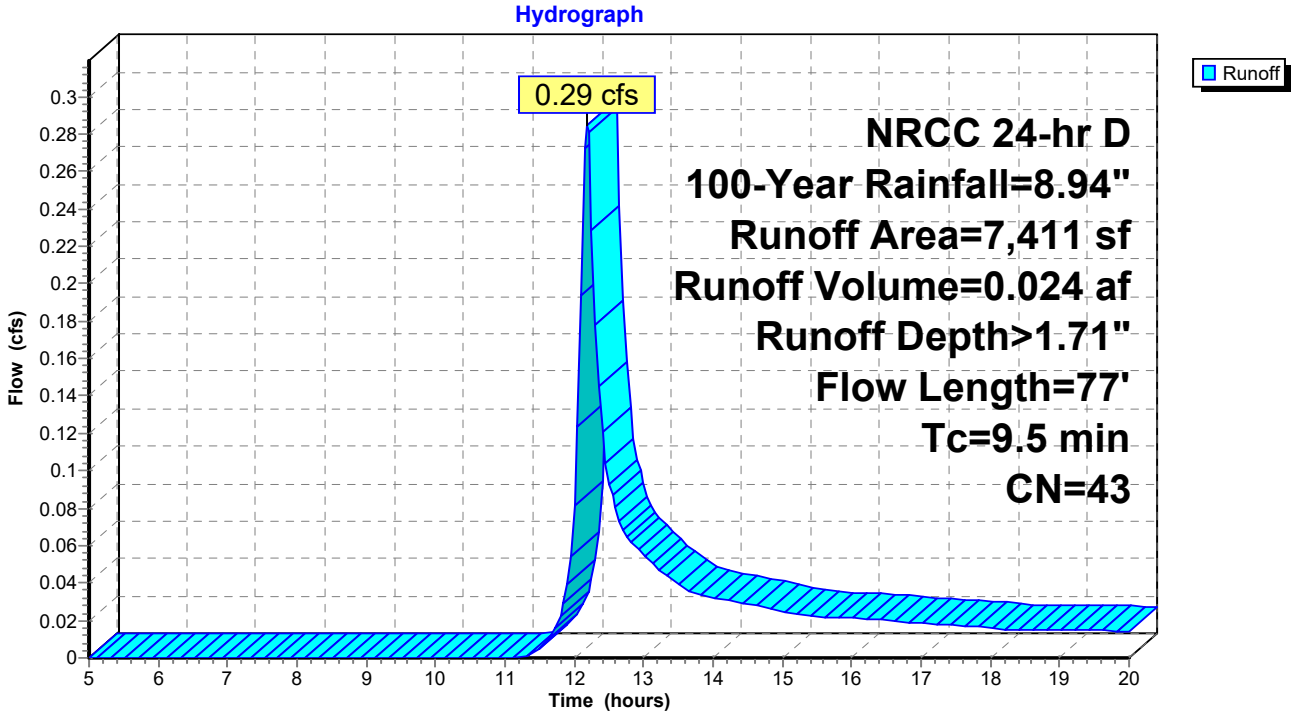
Runoff = 0.29 cfs @ 12.18 hrs, Volume= 0.024 af, Depth> 1.71"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 100-Year Rainfall=8.94"

Area (sf)	CN	Description
1,933	70	Woods, Good, HSG C
2,160	39	>75% Grass cover, Good, HSG A
3,318	30	Woods, Good, HSG A
7,411	43	Weighted Average
7,411		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.3	50	0.0420	0.09		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.10"
0.2	27	0.0220	2.39		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
9.5	77	Total			

Subcatchment 3S: P3



Summary for Subcatchment 4S: P2A

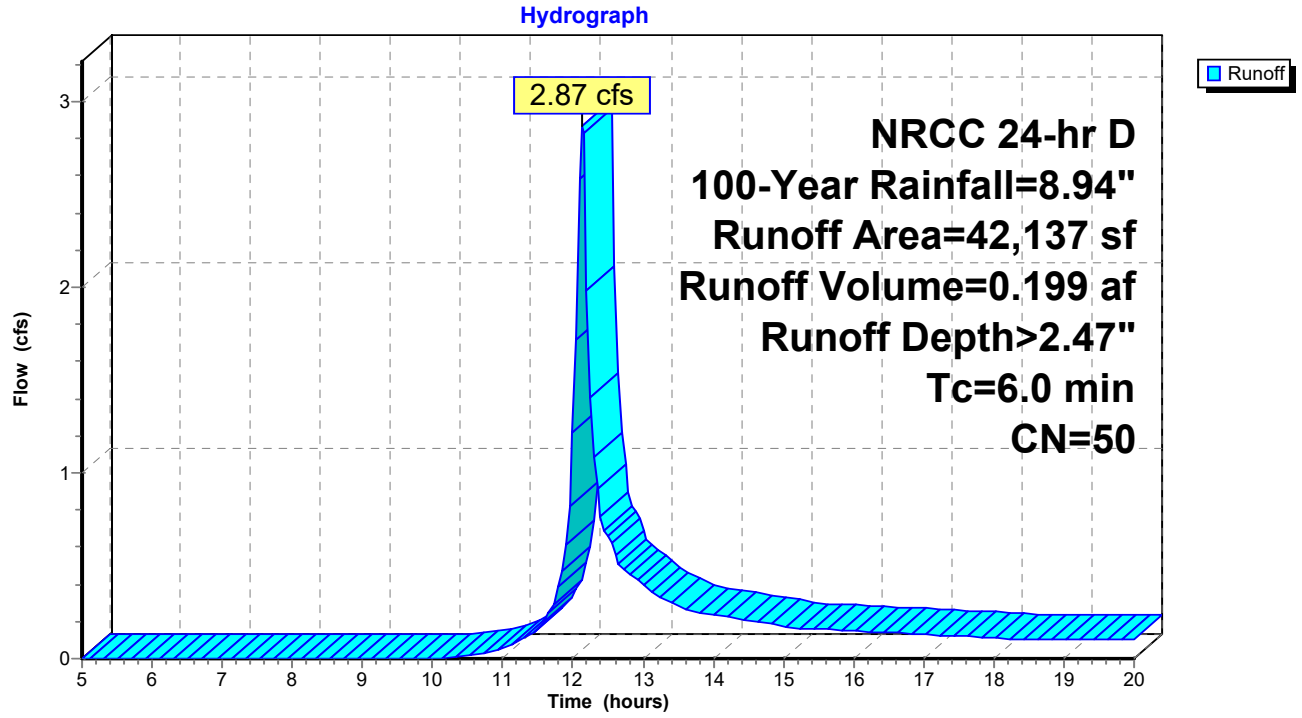
Runoff = 2.87 cfs @ 12.14 hrs, Volume= 0.199 af, Depth> 2.47"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 100-Year Rainfall=8.94"

Area (sf)	CN	Description
2,413	70	Woods, Good, HSG C
366	74	>75% Grass cover, Good, HSG C
2,247	30	Woods, Good, HSG A
781	98	Roofs, HSG A
24,492	39	>75% Grass cover, Good, HSG A
11,838	68	<50% Grass cover, Poor, HSG A
42,137	50	Weighted Average
41,356		98.15% Pervious Area
781		1.85% Impervious Area

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

Subcatchment 4S: P2A



Summary for Subcatchment 5S: P1

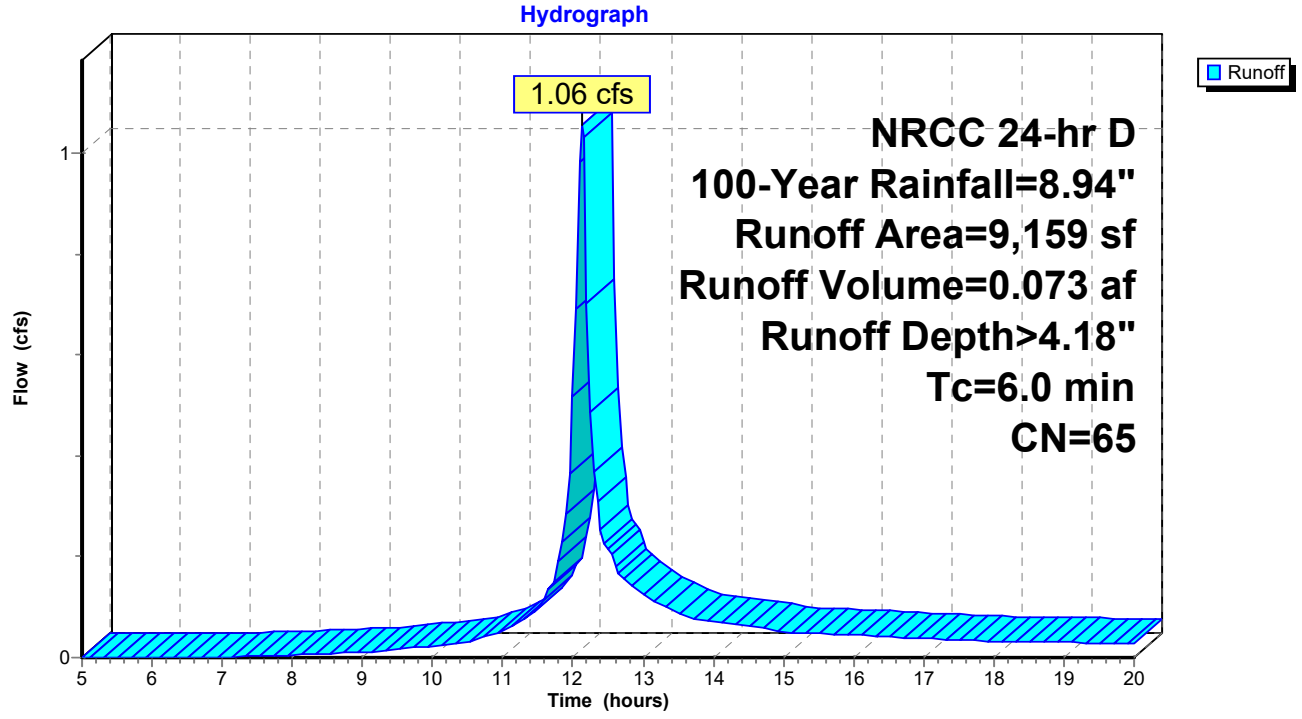
Runoff = 1.06 cfs @ 12.13 hrs, Volume= 0.073 af, Depth> 4.18"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 100-Year Rainfall=8.94"

Area (sf)	CN	Description
1,788	98	Paved parking, HSG A
4,277	39	>75% Grass cover, Good, HSG A
2,090	74	>75% Grass cover, Good, HSG C
1,004	98	Paved parking, HSG C
9,159	65	Weighted Average
6,367		69.52% Pervious Area
2,792		30.48% Impervious Area

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

Subcatchment 5S: P1



Summary for Subcatchment 6S: P4

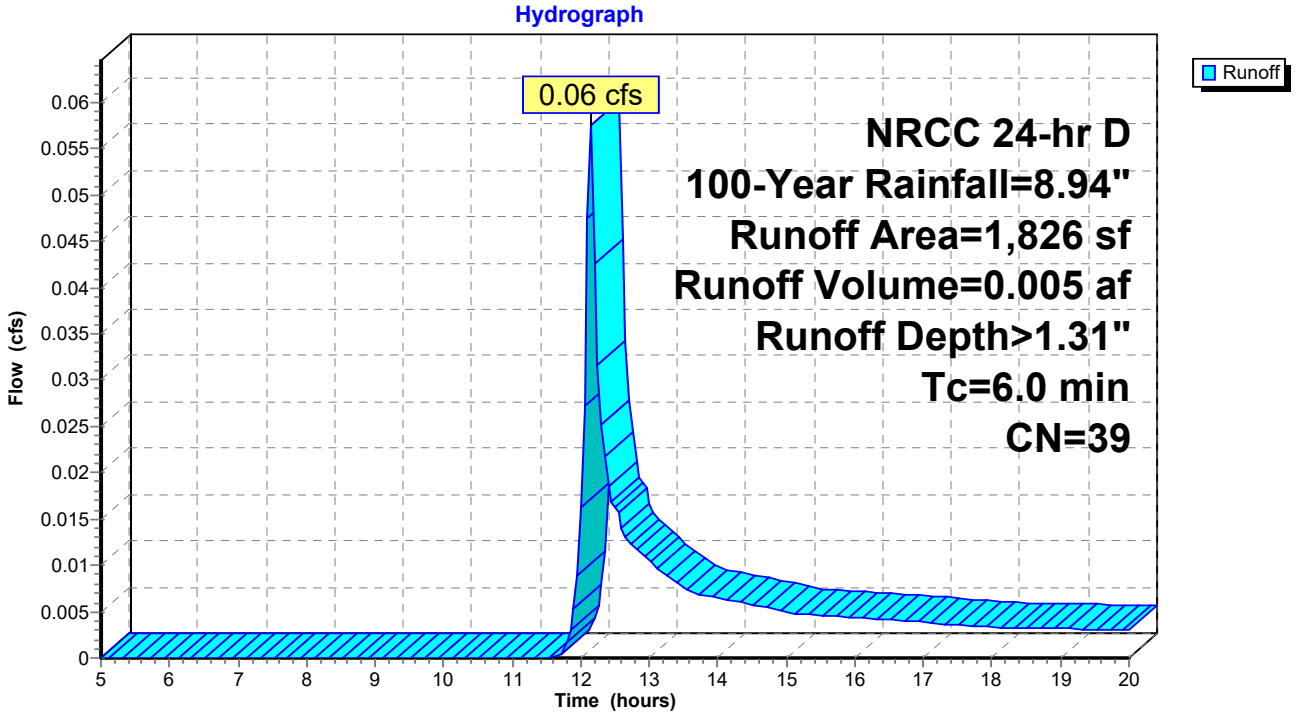
Runoff = 0.06 cfs @ 12.14 hrs, Volume= 0.005 af, Depth> 1.31"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 100-Year Rainfall=8.94"

Area (sf)	CN	Description
1,826	39	>75% Grass cover, Good, HSG A
1,826		100.00% Pervious Area

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

Subcatchment 6S: P4



Summary for Subcatchment 11S: P2C

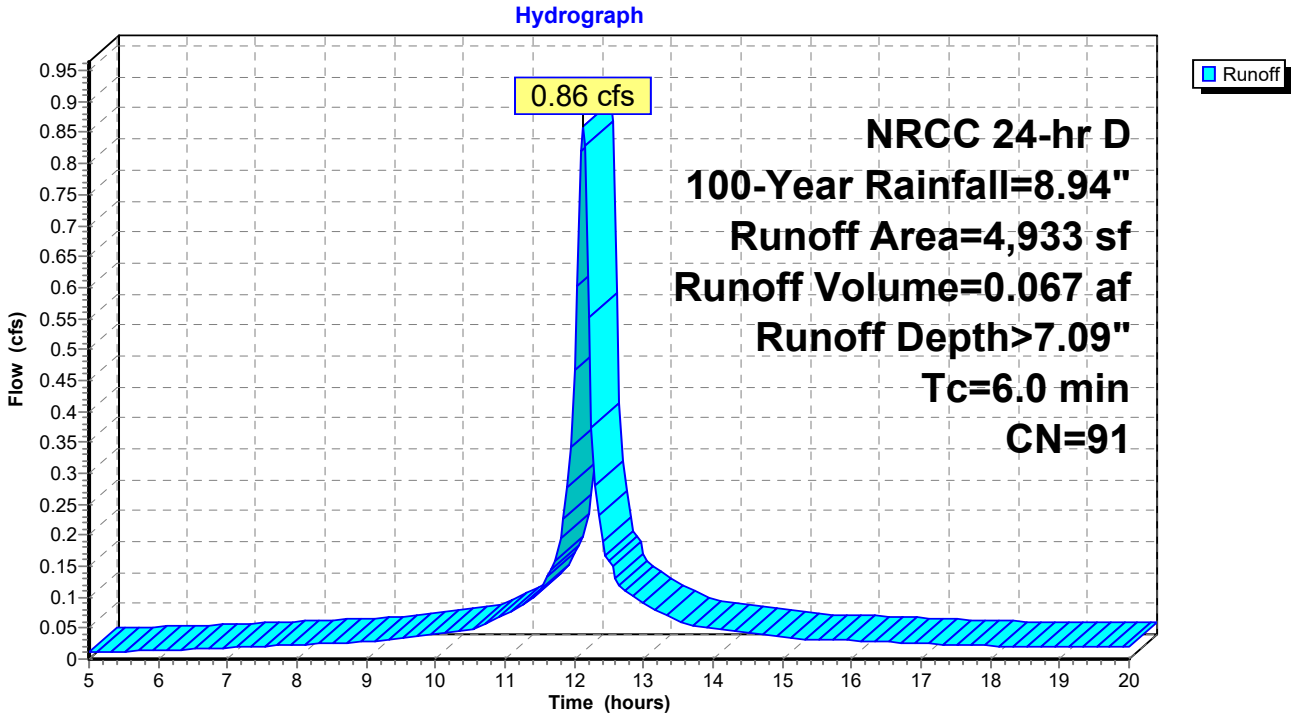
Runoff = 0.86 cfs @ 12.13 hrs, Volume= 0.067 af, Depth> 7.09"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 100-Year Rainfall=8.94"

Area (sf)	CN	Description
3,577	98	Paved parking, HSG A
575	39	>75% Grass cover, Good, HSG A
781	98	Roofs, HSG A
4,933	91	Weighted Average
575		11.66% Pervious Area
4,358		88.34% Impervious Area

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

Subcatchment 11S: P2C



Summary for Pond 2P: (new Pond)

Inflow Area = 0.255 ac, 94.82% Impervious, Inflow Depth > 7.37" for 100-Year event
Inflow = 1.97 cfs @ 12.13 hrs, Volume= 0.156 af
Outflow = 0.76 cfs @ 12.27 hrs, Volume= 0.156 af, Atten= 61%, Lag= 8.8 min
Discarded = 0.36 cfs @ 12.27 hrs, Volume= 0.138 af
Primary = 0.41 cfs @ 12.27 hrs, Volume= 0.018 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 32.85' @ 12.27 hrs Surf.Area= 0.019 ac Storage= 0.033 af

Plug-Flow detention time= 20.8 min calculated for 0.156 af (100% of inflow)
Center-of-Mass det. time= 20.4 min (760.1 - 739.8)

Volume	Invert	Avail.Storage	Storage Description
#1A	30.20'	0.018 af	**15.75'W x 53.46'L x 3.50'H Field A** 0.068 af Overall - 0.022 af Embedded = 0.046 af x 40.0% Voids
#2A	30.70'	0.022 af	**ADS_StormTech SC-740 +Cap** x 21 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap 21 Chambers in 3 Rows
		0.040 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	30.20'	**8.270 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 28.00'
#2	Primary	31.00'	**12.0" Round Culvert** L= 41.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 31.00' / 30.50' S= 0.0122 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#3	Device 2	33.00'	**4.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32
#4	Device 2	31.75'	**4.0" Vert. Orifice/Grate** C= 0.600

Discarded OutFlow Max=0.35 cfs @ 12.27 hrs HW=32.84' (Free Discharge)
└**1=Exfiltration** (Controls 0.35 cfs)

Primary OutFlow Max=0.40 cfs @ 12.27 hrs HW=32.84' (Free Discharge)
└**2=Culvert** (Passes 0.40 cfs of 3.45 cfs potential flow)
  ├**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)
  └**4=Orifice/Grate** (Orifice Controls 0.40 cfs @ 4.62 fps)

Pond 2P: (new Pond) - Chamber Wizard Field A

Chamber Model = ADS_StormTech SC-740 +Cap (ADS StormTech® SC-740 with cap length)
Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf
Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

51.0" Wide + 6.0" Spacing = 57.0" C-C Row Spacing

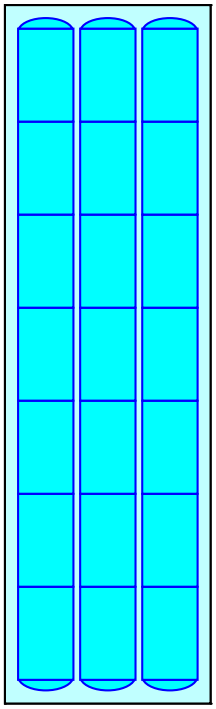
7 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 51.46' Row Length +12.0" End Stone x 2 = 53.46' Base Length
3 Rows x 51.0" Wide + 6.0" Spacing x 2 + 12.0" Side Stone x 2 = 15.75' Base Width
6.0" Base + 30.0" Chamber Height + 6.0" Cover = 3.50' Field Height

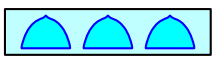
21 Chambers x 45.9 cf = 964.7 cf Chamber Storage

2,946.8 cf Field - 964.7 cf Chambers = 1,982.1 cf Stone x 40.0% Voids = 792.8 cf Stone Storage

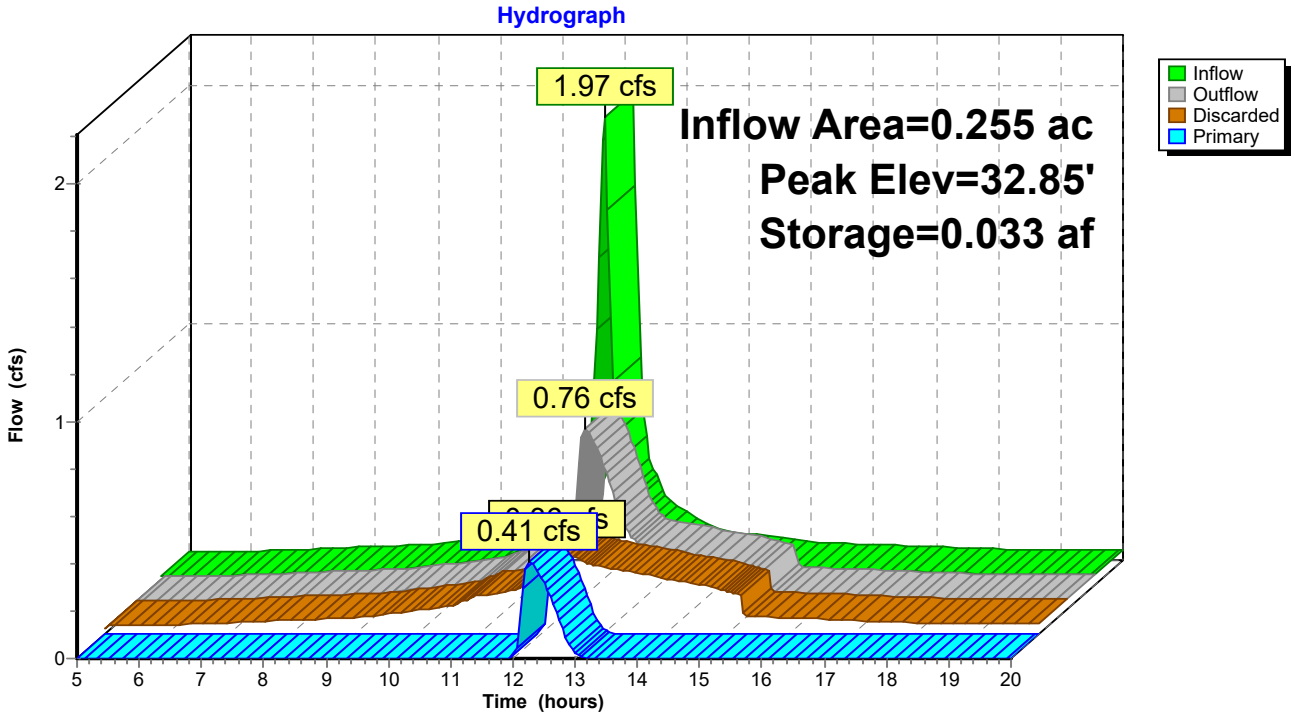
Chamber Storage + Stone Storage = 1,757.6 cf = 0.040 af
Overall Storage Efficiency = 59.6%
Overall System Size = 53.46' x 15.75' x 3.50'

21 Chambers
109.1 cy Field
73.4 cy Stone





Pond 2P: (new Pond)



Stage-Area-Storage for Pond 2P: (new Pond)

Elevation (feet)	Surface (acres)	Storage (acre-feet)
30.20	**0.019**	0.000
30.25	0.019	0.000
30.30	0.019	0.001
30.35	0.019	0.001
30.40	0.019	0.002
30.45	0.019	0.002
30.50	0.019	0.002
30.55	0.019	0.003
30.60	0.019	0.003
30.65	0.019	0.003
30.70	0.019	0.004
30.75	0.019	0.005
30.80	0.019	0.005
30.85	0.019	0.006
30.90	0.019	0.007
30.95	0.019	0.008
31.00	0.019	0.008
31.05	0.019	0.009
31.10	0.019	0.010
31.15	0.019	0.011
31.20	0.019	0.011
31.25	0.019	0.012
31.30	0.019	0.013
31.35	0.019	0.014
31.40	0.019	0.014
31.45	0.019	0.015
31.50	0.019	0.016
31.55	0.019	0.017
31.60	0.019	0.017
31.65	0.019	0.018
31.70	0.019	0.019
31.75	0.019	0.020
31.80	0.019	0.020
31.85	0.019	0.021
31.90	0.019	0.022
31.95	0.019	0.022
32.00	0.019	0.023
32.05	0.019	0.024
32.10	0.019	0.024
32.15	0.019	0.025
32.20	0.019	0.026
32.25	0.019	0.026
32.30	0.019	0.027
32.35	0.019	0.028
32.40	0.019	0.028
32.45	0.019	0.029
32.50	0.019	0.029
32.55	0.019	0.030
32.60	0.019	0.031
32.65	0.019	0.031
32.70	0.019	0.032
32.75	0.019	0.032
32.80	0.019	0.033
32.85	0.019	0.033
32.90	0.019	0.034
32.95	0.019	0.034
33.00	0.019	0.035
33.05	0.019	0.035
33.10	0.019	0.036
33.15	0.019	0.036
33.20	0.019	0.036
33.25	0.019	0.037
33.30	0.019	0.037
33.35	0.019	0.038
33.40	0.019	0.038
33.45	0.019	0.038
33.50	0.019	0.039
33.55	0.019	0.039
33.60	0.019	0.040
33.65	0.019	0.040
33.70	0.019	**0.040**

Summary for Pond 11P: CB

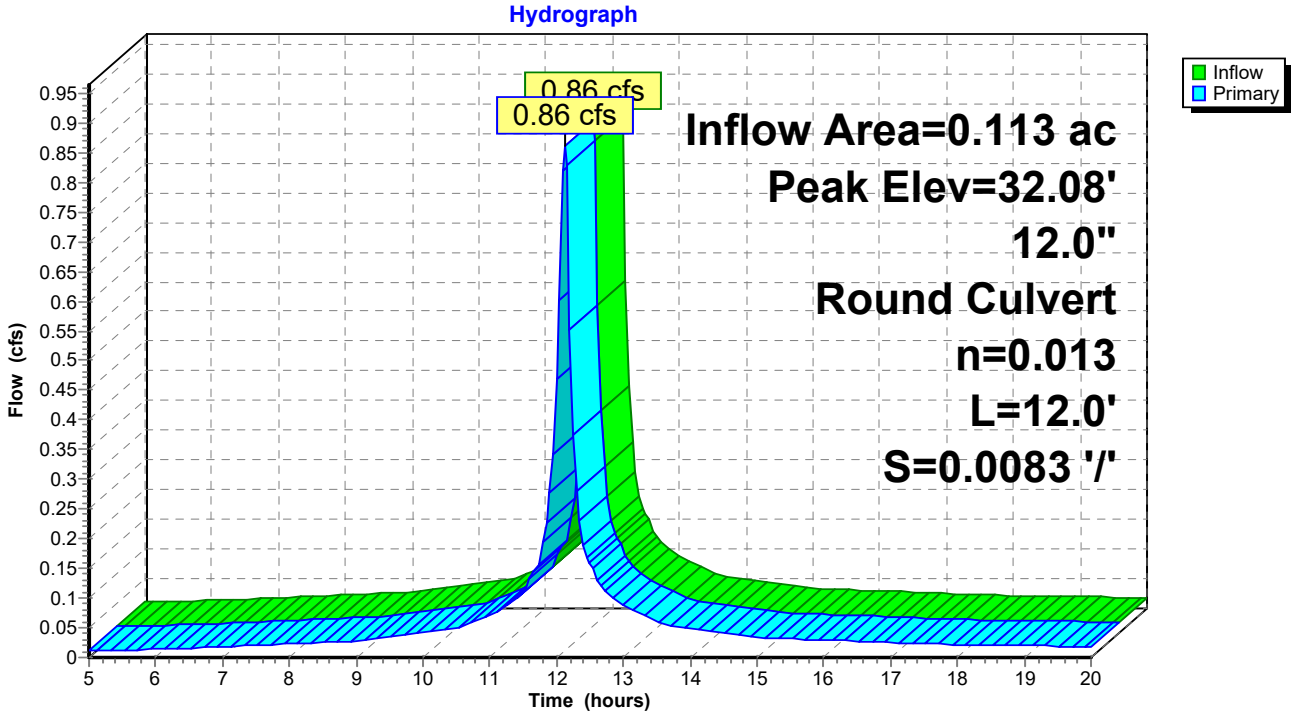
Inflow Area = 0.113 ac, 88.34% Impervious, Inflow Depth > 7.09" for 100-Year event
Inflow = 0.86 cfs @ 12.13 hrs, Volume= 0.067 af
Outflow = 0.86 cfs @ 12.13 hrs, Volume= 0.067 af, Atten= 0%, Lag= 0.0 min
Primary = 0.86 cfs @ 12.13 hrs, Volume= 0.067 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 32.08' @ 12.13 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	31.50'	**12.0" Round Culvert** L= 12.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 31.50' / 31.40' S= 0.0083 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.83 cfs @ 12.13 hrs HW=32.07' (Free Discharge)
1=Culvert (Barrel Controls 0.83 cfs @ 2.58 fps)

Pond 11P: CB



Stage-Area-Storage for Pond 11P: CB

Elevation (feet)	Storage (cubic-feet)	Elevation (feet)	Storage (cubic-feet)
31.50	**0**	32.03	0
31.51	0	32.04	0
31.52	0	32.05	0
31.53	0	32.06	0
31.54	0	32.07	0
31.55	0	32.08	0
31.56	0	32.09	0
31.57	0	32.10	0
31.58	0	32.11	0
31.59	0	32.12	0
31.60	0	32.13	0
31.61	0	32.14	0
31.62	0	32.15	0
31.63	0	32.16	0
31.64	0	32.17	0
31.65	0	32.18	0
31.66	0	32.19	0
31.67	0	32.20	0
31.68	0	32.21	0
31.69	0	32.22	0
31.70	0	32.23	0
31.71	0	32.24	0
31.72	0	32.25	0
31.73	0	32.26	0
31.74	0	32.27	0
31.75	0	32.28	0
31.76	0	32.29	0
31.77	0	32.30	0
31.78	0	32.31	0
31.79	0	32.32	0
31.80	0	32.33	0
31.81	0	32.34	0
31.82	0	32.35	0
31.83	0	32.36	0
31.84	0	32.37	0
31.85	0	32.38	0
31.86	0	32.39	0
31.87	0	32.40	0
31.88	0	32.41	0
31.89	0	32.42	0
31.90	0	32.43	0
31.91	0	32.44	0
31.92	0	32.45	0
31.93	0	32.46	0
31.94	0	32.47	0
31.95	0	32.48	0
31.96	0	32.49	0
31.97	0	32.50	0
31.98	0		
31.99	0		
32.00	0		
32.01	0		
32.02	0		

Summary for Pond 12P: DMH

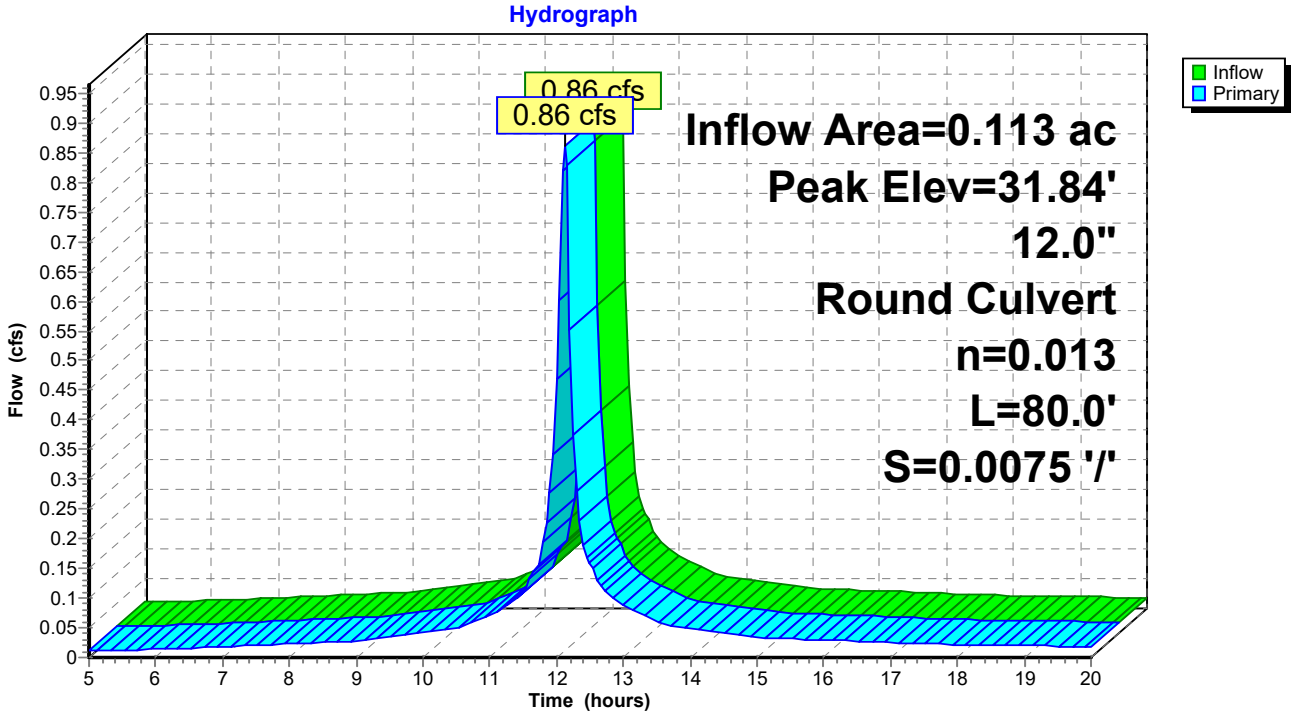
Inflow Area = 0.113 ac, 88.34% Impervious, Inflow Depth > 7.09" for 100-Year event
Inflow = 0.86 cfs @ 12.13 hrs, Volume= 0.067 af
Outflow = 0.86 cfs @ 12.13 hrs, Volume= 0.067 af, Atten= 0%, Lag= 0.0 min
Primary = 0.86 cfs @ 12.13 hrs, Volume= 0.067 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 31.84' @ 12.13 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	31.30'	**12.0" Round Culvert** L= 80.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 31.30' / 30.70' S= 0.0075 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.83 cfs @ 12.13 hrs HW=31.83' (Free Discharge)
1=Culvert (Inlet Controls 0.83 cfs @ 1.96 fps)

Pond 12P: DMH



Stage-Area-Storage for Pond 12P: DMH

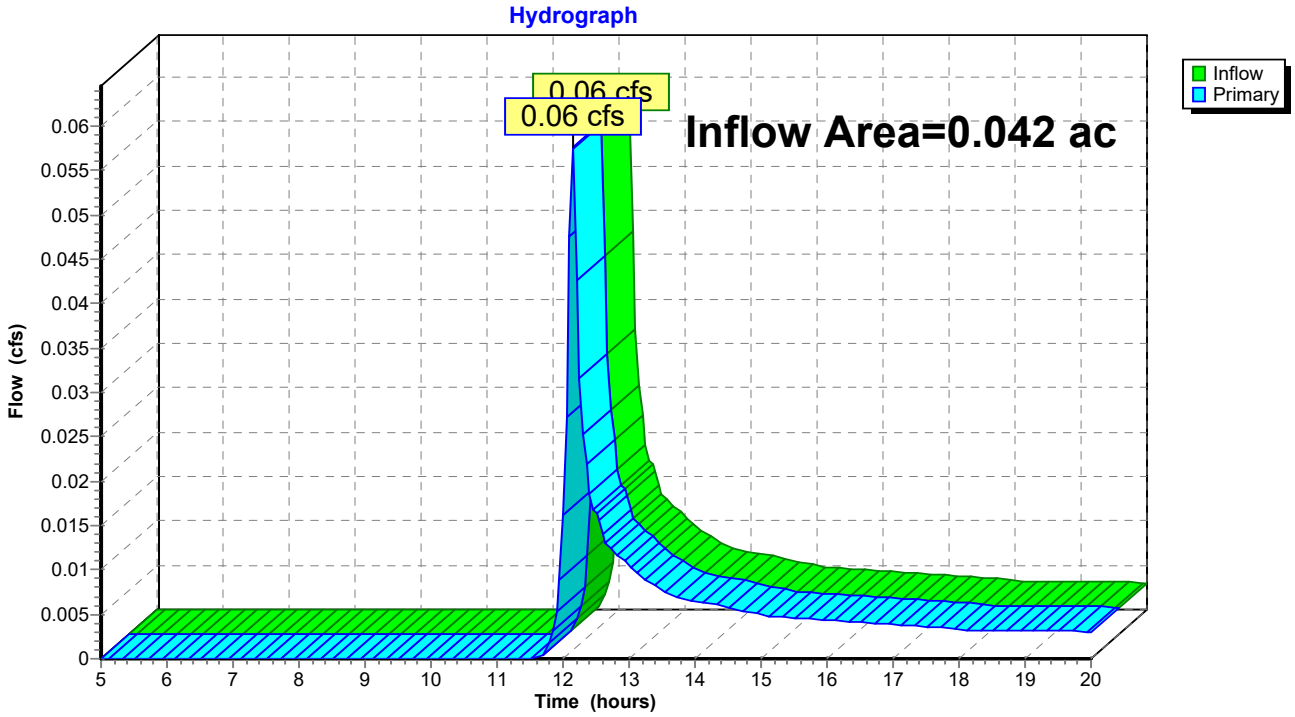
Elevation (feet)	Storage (cubic-feet)	Elevation (feet)	Storage (cubic-feet)
31.30	**0**	31.83	0
31.31	0	31.84	0
31.32	0	31.85	0
31.33	0	31.86	0
31.34	0	31.87	0
31.35	0	31.88	0
31.36	0	31.89	0
31.37	0	31.90	0
31.38	0	31.91	0
31.39	0	31.92	0
31.40	0	31.93	0
31.41	0	31.94	0
31.42	0	31.95	0
31.43	0	31.96	0
31.44	0	31.97	0
31.45	0	31.98	0
31.46	0	31.99	0
31.47	0	32.00	0
31.48	0	32.01	0
31.49	0	32.02	0
31.50	0	32.03	0
31.51	0	32.04	0
31.52	0	32.05	0
31.53	0	32.06	0
31.54	0	32.07	0
31.55	0	32.08	0
31.56	0	32.09	0
31.57	0	32.10	0
31.58	0	32.11	0
31.59	0	32.12	0
31.60	0	32.13	0
31.61	0	32.14	0
31.62	0	32.15	0
31.63	0	32.16	0
31.64	0	32.17	0
31.65	0	32.18	0
31.66	0	32.19	0
31.67	0	32.20	0
31.68	0	32.21	0
31.69	0	32.22	0
31.70	0	32.23	0
31.71	0	32.24	0
31.72	0	32.25	0
31.73	0	32.26	0
31.74	0	32.27	0
31.75	0	32.28	0
31.76	0	32.29	0
31.77	0	32.30	0
31.78	0		
31.79	0		
31.80	0		
31.81	0		
31.82	0		

Summary for Link 7L: TOTAL P4

Inflow Area = 0.042 ac, 0.00% Impervious, Inflow Depth > 1.31" for 100-Year event
Inflow = 0.06 cfs @ 12.14 hrs, Volume= 0.005 af
Primary = 0.06 cfs @ 12.14 hrs, Volume= 0.005 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link 7L: TOTAL P4

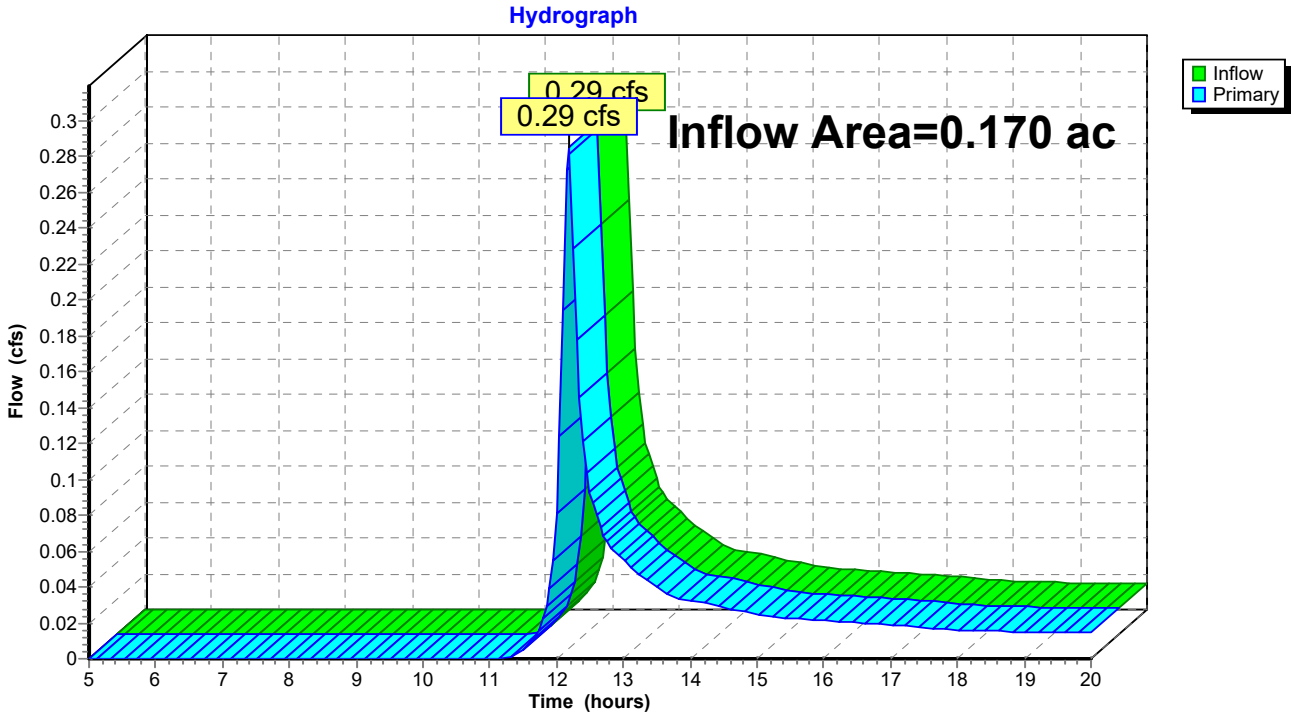


Summary for Link 8L: TOTAL P3

Inflow Area = 0.170 ac, 0.00% Impervious, Inflow Depth > 1.71" for 100-Year event
Inflow = 0.29 cfs @ 12.18 hrs, Volume= 0.024 af
Primary = 0.29 cfs @ 12.18 hrs, Volume= 0.024 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link 8L: TOTAL P3

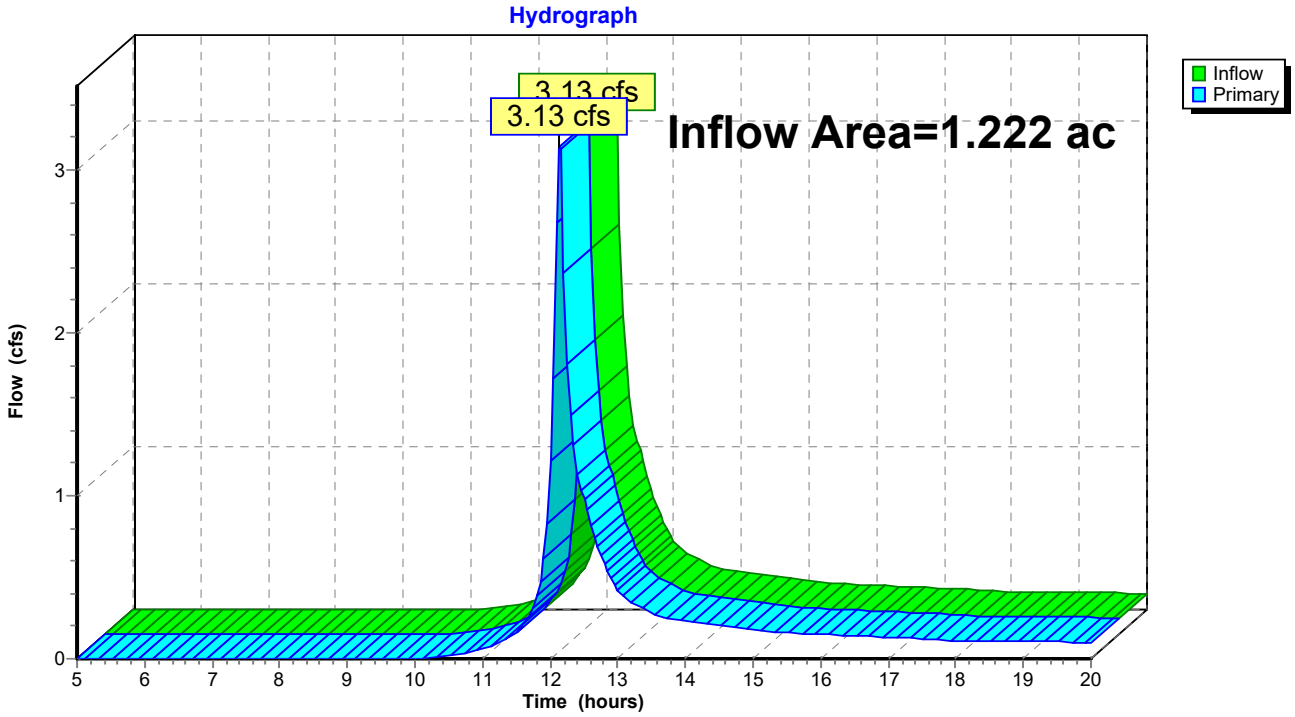


Summary for Link 9L: TOTAL P2

Inflow Area = 1.222 ac, 21.23% Impervious, Inflow Depth > 2.13" for 100-Year event
Inflow = 3.13 cfs @ 12.14 hrs, Volume= 0.217 af
Primary = 3.13 cfs @ 12.14 hrs, Volume= 0.217 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link 9L: TOTAL P2

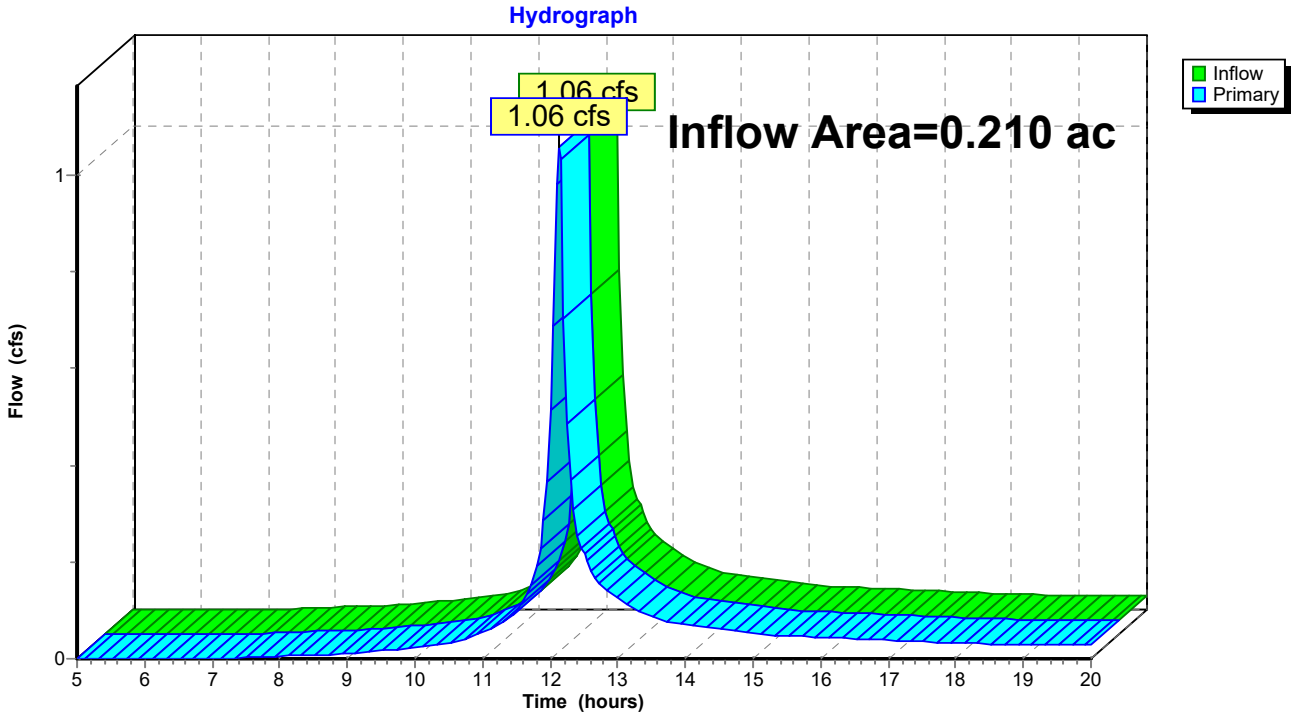


Summary for Link 10L: TOTAL P1

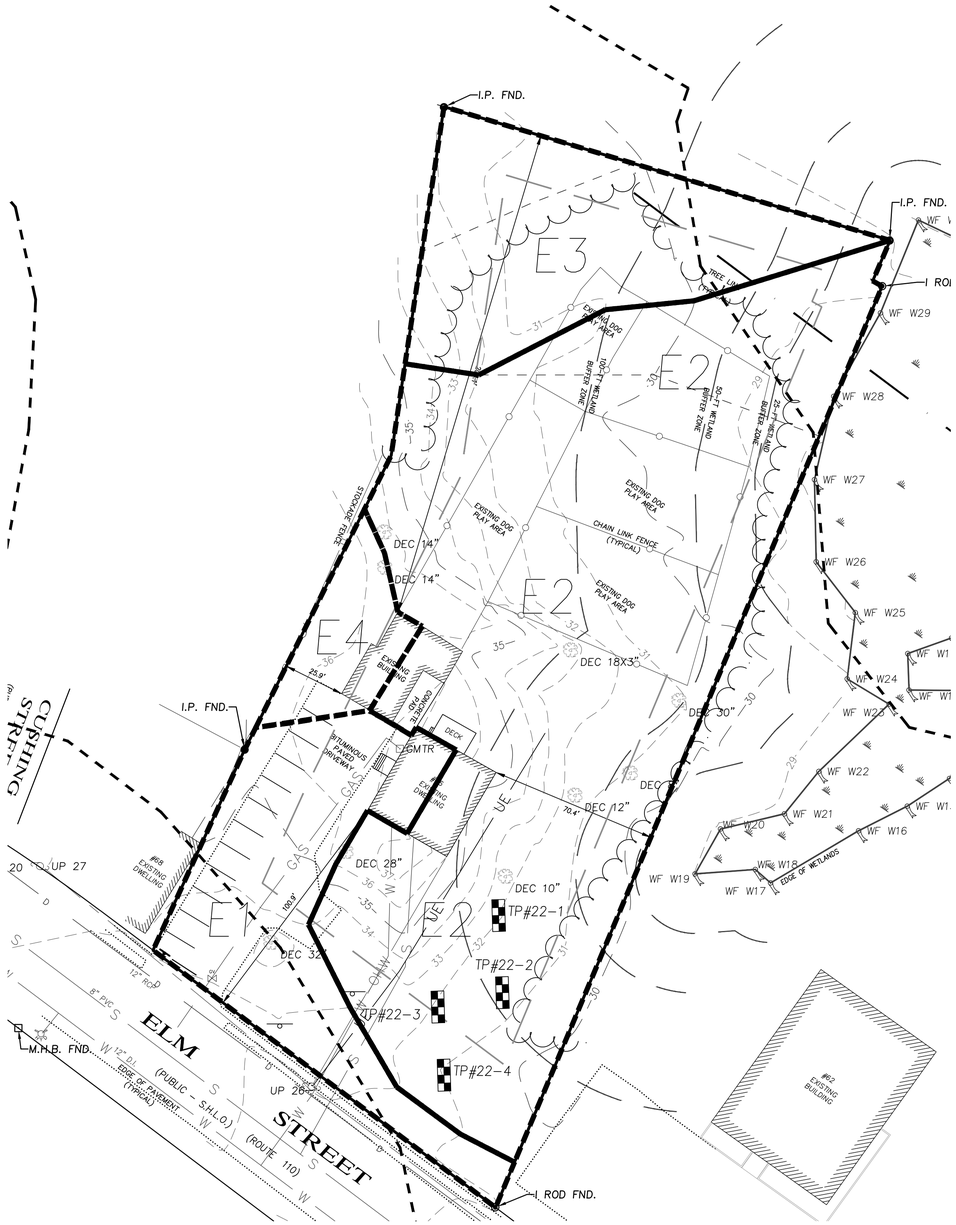
Inflow Area = 0.210 ac, 30.48% Impervious, Inflow Depth > 4.18" for 100-Year event
Inflow = 1.06 cfs @ 12.13 hrs, Volume= 0.073 af
Primary = 1.06 cfs @ 12.13 hrs, Volume= 0.073 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link 10L: TOTAL P1



c. Watershed Maps



GRAPHIC SCALE

30 0 15 30 60 120

(IN FEET)

1 inch = 30'

PREPARED FOR

CARLYN CAPOLUPO

66 ELM STREET

SALISBURY, MA 01952

NO.	DATE	DESCRIPTION	BY
1	9/28/22	RESPONSE TO PEER REVIEW	J.T.M.

MEI MILLENNIUM ENGINEERING, INC.

ENGINEERING AND LAND SURVEYING

62 ELM ST. SALISBURY, MA 01952 (978) 463-8980

13 HAMPTON RD. EXETER, NH 03833 (603) 778-0528

SCALE: 1"=30' | CALC. BY: J.T.M.

DATE: AUG. 8, 2022 | CHKD. BY: E.W.B.

PROJECT: M203703

SITE PLAN

IN

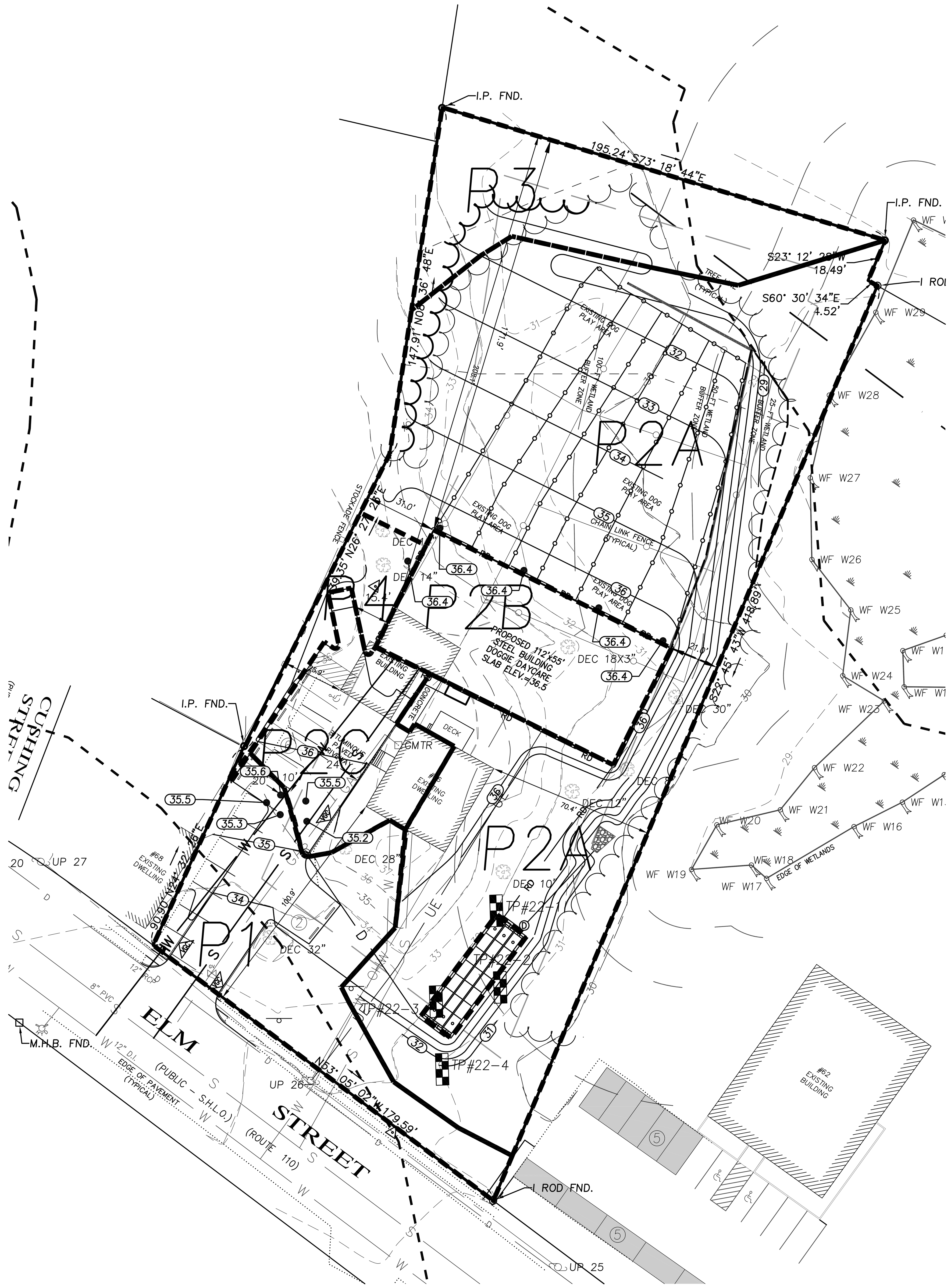
SALISBURY, MA

AT

66 ELM STREET

PRE-DEVELOPMENT WATERSHED PLAN

SHEET: 1 OF 2



GRAPHIC SCALE

30 0 15 30 60 120

(IN FEET)
1 inch = 30'

PREPARED FOR

CARLYN CAPOLUPO
66 ELM STREET
SALISBURY, MA 01952

NO.	DATE	DESCRIPTION	BY
2	10/19/22	RESPONSE TO PEER REVIEW	J.T.M.
1	9/28/22	RESPONSE TO PEER REVIEW	J.T.M.

MEI **MILLENNIUM ENGINEERING, INC.**
ENGINEERING AND LAND SURVEYING
62 ELM ST. SALISBURY, MA 01952 (978) 463-8980
13 HAMPTON RD. EXETER, NH 03833 (603) 778-0528

SCALE: 1"=30'	CALC. BY: J.T.M.	PROJECT: M203703
DATE: AUG. 8, 2022	CHKD. BY: E.W.B.	

SITE PLAN
IN
SALISBURY, MA
AT
66 ELM STREET

POST-DEVELOPMENT WATERSHED PLAN

SHEET: 2 OF 2