BEAR PEAK SOLAR, LLC

Ground-Mounted Solar Photovoltaic System Project
Sturbridge, MA
Wetland Bylaw Notice of Intent Application

Town of Sturbridge
Conservation Commission
August 2023

Prepared for:
Bear Peak Solar, LLC
2420 17th Street
Denver, CO 80202

BSC Project No. 50745.00

BSC GROUP

BSC GROUP
BUILD | SUPPORT | CONNECT

Engineers
Environmental Scientists
Software Developers
Landscape Architects
Planners
Surveyors

www.bscgroup.com

AUGUST 28, 2023

Attn: Edward Goodwin, Chairman
Sturbridge Conservation Commission
Center Office Building
301 Main Street
Sturbridge, MA 01566

**RE: Notice of Intent Sturbridge Wetlands Bylaw Section 3.50
Ground-Mounted Solar Photovoltaic System Project
Sturbridge, Massachusetts
Sturbridge PV LLC**

Dear Chairman Edward Goodwin and Members of the Sturbridge Conservation Commission:

BSC Group, Inc. (BSC) is filing this Notice of Intent (NOI) on behalf of Sturbridge PV, LLC for work associated with the installation of a ground-mounted solar photovoltaic (PV) system at 200 Route 15 in Sturbridge, Massachusetts. The Applicant is proposing to construct a 1,310 kW (DC) large-scale, ground-mounted PV system and 1,280 kW (DC) of battery storage. Additional site improvements include the installation of a gravel access road, perimeter fencing, utility service, and stormwater management facilities. This NOI is being submitted in accordance with the Town of Sturbridge's Wetlands Protection Bylaw (Chapter 286).

The proposed work is necessary to address the long-term reliability, safety, and resilience of the renewable energy utility service in Massachusetts. This NOI serves as a request for an Order of Conditions for the proposed activities within resource areas that are jurisdictional under the Sturbridge Wetlands Bylaw.

We respectfully request that this matter be heard at the next scheduled Conservation Commission hearing. Hard copies will be provided to the Conservation Commission. If you have any questions regarding the enclosed information, please contact me at (617-800-4164). Thank you for your consideration in this matter.

Sincerely,
BSC Group, Inc.

Adrienne D. Lennon
Senior Ecologist/Project Manager

cc: Brian Yergatian, BSC Group
Jessica Bardi, Robinson Cole, LLC

Table of Contents

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Notice of Intent Application Coversheet/Checklist

Date	August 28, 2023

Fill in all white cells completely

Parcel Address Assessors Map/Plat Book & Page	200 Route 15 (Haynes Street) 552-03748-200 58394 / 197	**Applicant** name Address Email Phone	Sturbridge PV LLC 2420 17th Street 3rd Floor Denver, CO 80202 chris.vorlicek@bearpeakpower.com 617-671-6366
Owner name Address Email Phone	30 Swift LLC 660 Main Street, Fiskdale, MA 01518 pmatt@kelleher-sadowsky.com 508-846-8800	**Representative** Address Email Phone	BSC Group, Inc. 349 Main Street - Route 28 W. Yarmouth, MA 02673 alennon@bscgroup.com 617-896-4491

Wetland type **Wetland type** **Wetland type**	200ft Buffer Zone 500ft Buffer Zone	**sf/cf affected** **sf/cf affected** **sf/cf affected**	+/-35,000sf +/-203,000sf	**Relevant Perf. Standards** **Relevant Perf. Standards** **Relevant Perf. Standards**	Sturbridge Wetlands Regulations ch365-1-10

Components of a Complete NOI Application

State Form: NOI Form 3	Included? ☐ Yes ☒ No
Engineered Plan	Included? ☒ Yes ☐ No
Proof of Mailing to DEP	Included? ☐ Yes ☒ No
Narrative	Included? ☒ Yes ☐ No
Proof that all relevant perf. standards are met	Included? ☒ Yes ☐ No
TOPO Map identifying locus with scale	Included? ☒ Yes ☐ No
FIRM Map identifying locus with scale	Included? ☐ Yes ☒ No
Natural Heritage Map with WH, PH, & VP data	Included? ☐ Yes ☒ No Included? ☐
Delineation lines (backup material)	Included? ☒ Yes ☐ No
Tax Form	Included? ☒ Yes ☐ No
Fees	
★ Fee Transmittal form	Included? ☒ Yes ☐ No
★ Filing Fee Worksheet	Included? ☒ Yes ☐ No
★ Town portion of state filing fee	Included? ☐ Yes ☒ No
★ Sturbridge local filing fee $ 1500	Included? ☒ Yes ☐ No
Abutter Information	
★ Certified abutters list (within 200')	Included? ☒ Yes ☐ No
★ Abutter notification form	Included? ☒ Yes ☐ No
★ Affidavit & proof -- bring to hearing	*Present them at the hearing*
Other Attachments, e.g.	
Confirmation of submission to NHESP	Included? ☐ Yes ☐ No ☒ Not Applicable
Planting Plan	Included? ☒ Yes ☐ No ☐ Not Applicable
Floodplain analysis	Included? ☐ Yes ☐ No ☒ Not Applicable
Stormwater analysis	Included? ☒ Yes ☐ No ☐ Not Applicable

Components of a Complete NOI Application

Conservation Commission Wetland Permit Process

NOI	Process
1	**Obtain a Certified list of all abutters within 200' of property lines from the Assessor's Office. (***may take 10 business days***)**
2	**Obtain a Tax Form Sign-Off by the Finance Department**
3	**Submit applications (see bullets below) by noon of the Tuesday deadline** (16 days before the desired hearing)**:** a. To Sturbridge Conservation Commission: 301 Main St., Sturbridge, MA 01566 • **This coversheet** (1 paper copy) • **Complete application** -- see the checklist on the other side of this page (2 paper copies and 1 pdf) ◦ *Plans must be stamped by an engineer if any component of the project requires engineering.* • **Checks** b. To Mass DEP Central Regional Office: 8 New Bond Street, Worcester, MA 01606 • **Complete application** -- see the checklist on the other side of this page (1 paper copy) • **Photocopy of the two state checks** • **Email a complete application to CERO_NOI@mass.gov** c. To DEP Lock Box: Box 4062, Boston MA 02211 • **Check** for state portion of the state fee • **Fee transmittal form**
4	*Upon receipt of a complete application, the Conservation Agent will* ***schedule a Public hearing/meeting****.*
5	Once you are provided the date and time of the hearing, **notify all abutters within 200' of the property line** using the Town's "**Notification to Abutters Form**" by **certified mail**, **certificate of mailing,** or **hand delivery with signatures 7 business days prior to the Hearing**. (Present proof of notification prior to the beginning of the public hearing.)
6	*The Conservation Agent will* ***place a legal ad in a local newspaper*** *and the* ***Applicant will be billed for the ad.***
7	**Stake the project.** 2 weeks in advance of the public hearing, stake all proposed structures, erosion control barriers, stormwater systems, etc. within Con Com jurisdiction. (See SWB Regulations)
8	*The Conservation Commission and/or Agent will perform a* ***site visit*** *before the public hearing to confirm existing conditions and proposed work. If you wish to be informed of the time of the visit, please contact the Con Com office.*
9	**Attend the public hearing/meeting.** The applicant or representative is required to **provide proof of abutter notification (including Affidavit of Service), proof of legal advertisement,** briefly **present the project**, and **answer any questions about possible impacts on wetlands.** At the end of the hearing, the Con Com will either: • **Issue an Order of Conditions** (OOC) approving or denying the project, **or** • **Approve a continuation** of the public hearing to allow time for additional information to be provided.
10	**Receive and read the decision and understand the conditions.** Contact the Con Com if you have any questions. Some conditions are temporary (such as maintaining erosion controls), and some are perpetual (such as maintaining restoration planting areas or limiting the use of fertilizers).
11	**Wait-out the 10-Day appeal period.** A decision of the Con Com can be appealed by MassDEP or by any abutter, applicant, or 10-citizen group within 10 business days of the decision.
12	**Record the Order** at the Registry of Deeds. Provide proof of recording to the Conservation office along with signed Certificates of Understanding.
13	**Install MassDEP file number sign and erosion controls**.
14	**Schedule and attend a pre-construction site visit.** Contact the Conservation office to schedule the site visit.
15	**Execute the project.** The project must be completed within 3 years, unless an extension of the permit is issued; extensions must be requested at least 30 days prior to the expiration of the permit.
16	**Request a Certificate of Compliance (COC).** Once the project is complete and all conditions have been satisfied, request a COC from the Conservation office by submitting at least: (1) DEP **Form 8a**, (2) a stamped **as-built plan**, and (3) a **letter from the engineer** stating that everything is in substantial compliance with the approved plans and OOC. The Con Com will perform a site visit to ensure compliance and will issue a COC if appropriate.
17	**Record the Certificate of Compliance (COC)** at the Registry of Deeds to remove the cloud from the title. **Provide proof of recording to the Conservation office**.

INCOMPLETE APPLICATIONS WILL NOT BE ACCEPTED.

Town of Sturbridge

Conservation Commission

Notice of Intent (NOI) Packet

Packet for filing of applications
under the Wetland Protection Act, MGL Ch. 131, sec 40,
and the Sturbridge Wetland Bylaw

Enclosed in this packet are the forms needed for submitting a Notice of Intent to the Town of Sturbridge Conservation Commission. It contains the following forms needing completion:

- **Notice of Intent Application Coversheet/Check List**
- **Mass DEP BRP WPA Form 3 - Notice of Intent Instructions and Supporting Materials**
- **Mass DEP BRP WPA Form 3 - Notice of Intent (formal form) 8pp (includes Mass DEP Wetland Fee Transmittal Form 2pp)**
- **Sturbridge Conservation Commission Affidavit of Service:**
  This document is your witness that abutters have been notified according to regulations.
- **Town of Sturbridge Notification to Abutters**
  Use this blank document to provide necessary information to abutters
- **Town of Sturbridge Proof of Paid Tax**
- **Abutter List Request**
- **Local Bylaw Filing Fee Sheet**

Please contact our office with any questions in regards to filing this application or process.

Sturbridge Conservation Commission

Notice of Intent

Sturbridge Wetland Bylaw Section 3.50

SCC File Number

A. General Information

1. Project Location:

200 Route 15 Haynes Street | Sturbridge | 01566
a. Street Address | b. City/Town | c. Zip Code

N/A | N/A
d. Assessors Map/Plat Number | e. Parcel /Lot Number

2. Applicant:

a. First Name | b. Last Name

Sturbridge PV LLC
c. Organization

2420 17th Street 3rd Floor
d. Street Address

Denver | CO | 80202
e. City/Town | f. State | g. Zip Code

617-671-6366 | | chris.vorlicek@bearpeakpower.com
h. Phone Number | i. Fax Number | j. Email Address

3. Property owner (required if different from applicant): ☐ Check if more than one owner

a. First Name | b. Last Name

30 Swift LLC
c. Organization

660 Main Street
d. Street Address

Fiskdale | MA | 01518
e. City/Town | f. State | g. Zip Code

508-846-8800 | | pmatt@kelleher-sadowsky.com
h. Phone Number | i. Fax Number | j. Email address

4. Representative (if any):

Adrienne | Lennon
a. First Name | b. Last Name

BSC Group, Inc.
c. Company

349 Main Street - Route 28
d. Street Address

W. Yarmouth | MA | 02673
e. | f. State | g. Zip Code

617-896-4491 | | alennon@bscgroup.com
h. Phone Number | i. Fax Number | j. Email address

5. Total Fee Paid (Attach with submittal from Filing Fee Worksheet):

$1500.00
Fee Paid

Sturbridge Conservation Commission

Notice of Intent

Sturbridge Wetland Bylaw Section 3.50

SCC File Number

6. General Project Description:

Installation of a ground-mounted solar photovoltaic (PV) system with gravel access road, perimeter fencing, utility service and stormwater management facilities.

7. Project Type Checklist:

1. ☐ Single Family Home
2. ☐ Residential Subdivision
3. ☐ Commercial/Industrial
4. ☐ Dock/Pier
5. ☐ Utilities
6. ☐ Coastal engineering Structure
7. ☐ Agriculture (e.g., cranberries, forestry)
8. ☐ Transportation
9. ☒ Other:

8. Property recorded at the Registry of Deeds for:

Worcester
a. County

b. Certificate # (if registered land)

58394
c. Book

197
d. Page Number

D. Signatures and Submittal Requirements

1. Attach a narrative and any supporting documentation describing how the project will protect the jurisdictional resource areas during construction and what Best Management Practices have been incorporated to ensure there will be no long-term impacts to the Resource Areas. Indicate distance to Resource Areas.
2. On a separate sheet, list the titles and dates for all plans and other materials submitted with this NOI.
3. If there is more than one property owner, please attach a list of these property owners not listed on this form.
4. Include the Town of Sturbridge Notice of Intent Application Checklist Signatures and Submittal Requirements
5. I hereby certify under the penalties of perjury that the foregoing Notice of Intent and accompanying plans, documents, and supporting data are true and complete to the best of my knowledge. The Commission will provide legal advertisement to the applicant and it is the applicants requirement to post in accordance to the applicable Sturbridge Bylaw and/or supporting regulations. I further certify under penalties of perjury that all abutters were notified of this application. Notice must be made by Certificate of Mailing or in writing by hand delivery or certified mail (return receipt requested) to all abutters within 200 feet of the property line of the project location.

1. Signature of Applicant

date

2. Signature of Property Owner (if different)

date

3. Signature of Representative (if any)

Adrienne D. Lennon August 28, 2023
date

Town of Sturbridge

Conservation Commission

STURBRIDGE CONSERVATION COMMISSION
AFFIDAVIT OF SERVICE

Under the Town of Sturbridge Wetland Bylaw, I 200 Route 15______________________, hereby certify under the pains and penalties of perjury that on (date) __________________________, I gave notification to abutters, in compliance with this Bylaw and Regulations, in connection with a Notice of Intent filed under this Bylaw. This Notice of Intent was filed with the Sturbridge Conservation Commission on (date) August 28, 2023_______ for the property located at

200 Route 15 Haynes Street____.

The form of the Notification and a list of abutters to whom it was given and their addresses are included in the application file.

________________________________ ____________
(Signature of applicant) (Date)

____
(Name of applicant-printed or typed)

WETLANDS FILING FEE CALCULATION WORSHEET

Application Type	Qty	Town Filing Fee	TOTAL
Notice of Intent (NOI):			
Residential – Single Family:			
Accessory (Deck, Shed, Pool Septic)		$150	
Shoreline Work		$150	
New Construction		$300	
Residential – Other:			
Subdivision/Multi-Unit		$750	
Commercial/Industrial:			
New	1	$1500	1500
Redevelopment		$1000	
Limited Project (as defined in SWB & WPA)		Equal to full WPA fee	
Alterations – located within Riverfront Area		Additional 50% of Fee	
Application filed after Enforcement Order		Double the Municipal fee	
Request for Amended Order of Conditions		50% of initial fee	
Request for Determination of Applicability (RDA:			
No Wetland Boundary Confirmation Residential:		$100	
No Wetland Boundary Confirmation All Other:		$200	
For Wetland Boundary Confirmation **File ANRAD or NOI**			
Abbreviated Notice of Resource Area Delineation (ANRAD):			
Residential – Single Family:		$100	
All Other:			
Base Review		$300	
Resource Area Boundary			

Certificate of Compliance (COC):			
Residential:			
Single Family	_____	$50	______________
Subdivision or Multi-Unit	_____	$150	______________
Commercial or Industrial:	_____	$150	______________
If Order of Conditions has Expired	_____	Add an additional $150	______________
OOC Extension Request	_____	$50	______________
Emergency Certification	______	$50	______________

(NOI may be required to be filed following issuance of Emergency Cert)

Local Bylaw Fee (includes Town Filing Fee) $ 1500

State Filing Fee (from DEP Wetland Transmittal Form) $ 0

Total Payable to "Town of STURBRIDGE" $ 1500

*Additional Consultant Fee may be required for reasons which may include:

- Significant amount of wetland impact;
- Extensive resource areas on a site;
- Lack of information supplied;
- Incomplete plans, reports, forms submitted;
- Supplemental information submitted.

Town of Sturbridge

Barbara A. Barry, Finance Director

Department/Board/Committee: Conservation Commission

Please verify outstanding tax/fee status for the following property owner:

Property Owner: 30 Swift LLC

Property Location: 200 Route 15 Haynes Street

☑ The license/permit may be released.

☐ The license/permit may not be released.

for [signature]
Finance Director

8/23/23
Date

Attachment A

Ground-Mounted Solar Photovoltaic System Project
Sturbridge, MA
Wetland Bylaw Notice of Intent Application

PROJECT NARRATIVE

1 INTRODUCTION

BSC Group, Inc. (BSC) is filing this Notice of Intent (NOI) on behalf of Sturbridge PV , LLC ("the Applicant") for work associated with the installation of a ground-mounted solar photovoltaic (PV) system at 200 Route 15 in Sturbridge, Massachusetts ("the Project"). The Applicant is proposing to construct a 1,310 kW (DC) large-scale, ground-mounted PV system and 1,280 kW (DC) of battery storage. Additional site improvements include the installation of a gravel access road, perimeter fencing, utility service, and stormwater management facilities. This NOI is being submitted in accordance with the Town of Sturbridge's Wetlands Protection Bylaw *(Chapter 286 Wetlands)* and implementing regulations *(Chapter 365 Wetlands Regulations)*. The work requires an Order of Conditions (OOC) pursuant to the same. No activities are proposed within the 100-foot Buffer Zone to a WPA jurisdictional resource area, however, DEP Stormwater Standards and areas under the jurisdiction of the Sturbridge Conservation Commission are within the scope of this NOI. The location of the proposed activities is shown on the USGS Site Locus Map in **Attachment B.**

1.1 Jurisdictional Activities

Activities that are the subject of this NOI exist within the 200-foot and 500-foot Buffer Zones to delineated Inland Bank/Bordering Vegetated Wetlands (BVW) at the northern and southern boundaries of the parcel. The jurisdictional work includes the installation of a 1,500±-foot long gravel drive along the northern and western portions of the parcel, a 7' high perimeter chain link fence encompassing 8.3± acres of Buffer Zone and upland field, utility poles, overhead electrical service, and stormwater management facilities. The stormwater management facilities include a gravity collection and conveyance system, two (2) subsurface infiltration systems within the 500-foot Buffer Zone, one (1) subsurface infiltration system within the 200-foot Buffer Zone, an infiltration basin and two (2) water quality units. In compliance with Article I of the Town of Sturbridge's Wetlands Regulations, the project proposes to maintain a continuous strip of undisturbed vegetative cover from the resource areas at be a minimum of 100 feet wide on the Northern boundary, and 200 feet wide on the southern boundary. Please refer to the enclosed Environmental Resources Map in **Attachment B**, and Site Photographs in **Attachment C**, for depictions of the work site.

The Applicant respectfully requests that the Sturbridge Conservation Commission issue an OOC pursuant to the Sturbridge Wetlands Bylaw for the jurisdictional activities associated with the proposed installation of a ground-mounted solar photovoltaic (PV) system and allow the proposed Project activities to proceed as described herein.

2 EXISTING CONDITIONS

The Project is located within the existing parcel known as 200 Route 15, Haynes Street (formerly known as Union Road). The total property area is 13.92 acres and consists mainly of undeveloped forested land. Existing grades on the property rise at a variable slope uphill from the frontage on Haynes Street at a benchmark grade of 678 feet to the high point in the southern portion of the parcel at 729.5 feet. The overall grade changes from this high point to the property boundaries reach up to 351.5 feet. The western and southern portions of the site see the steepest slopes, with a portion of the steep grade falling within the 500-foot Buffer Zone to BVW. The NRCS Soils Map for the Site in **Attachment B** indicates that the site is characterized by sandy loam (hydrologic soil groups C and D,) and test pits found sand with potential bedrock or ledge.

Land use immediately adjacent to the Project area is comprised of an existing solar field, and medium-density residential use, with areas of mixed forest.

2.1 Resource Area Summary

BSC conducted both a desktop analysis (using MassGIS data layers and publicly available data) and field investigations of the proposed Project area to identify wetland resource areas and assess permitting requirements pursuant to the WPA and Sturbridge Wetland Bylaw. Wetland Scientists from another firm delineated the BVWs on July 25, 2022, in accordance with the Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Northcentral and Northeast Region, ed. J.S. Wakely, R.W. Lichvar, and C. C. Noble. ERDC/EL TR-12-1. Vicksburg, MS: U.S. Army Engineer Research and Development Center (Version 2.0) and methodology described in the Massachusetts Department of Environmental Protection's (MassDEP) *Handbook on Delineating Bordering Vegetated Wetlands* (Published in March 1995). This resource area delineation report was provided to BSC and is included in **Attachment B** and incorporated in the Project Plans.

There are no resource areas on site, but there are Bordering Vegetated Wetlands on the adjacent properties to the north and south. There is no work proposed within their associated Buffer Zones. There are no Natural Heritage Endangered Species Program Priority Habitats, Wellhead Protection Areas, or FEMA Flood Zones on the site. Existing conditions, wetland resource areas, and buffer zones (in relation to the proposed activities), are shown on the Environmental Resources Map in **Attachment B**.

Representative photographs of site conditions are provided in **Attachment C.** The proposed activities are within 200-ft Buffer Zone to Inland Bank and BVW and 500-foot Buffer Zone to Inland Bank and BVW. The 500-foot Buffer Zone is identified due to the variable and steep slopes present on the site, which are greater than 8% in some cases. No impacts to resource areas are proposed, and no permanent impacts are proposed within any of the affected resource areas. The project requires the clearing of 9.44 acres of woodlands. All disturbed areas within the enclosed chain link fence will be loamed and seeded with a pollinator seed mixture.

3 PROJECT ACTIVITIES & ASSOCIATED IMPACTS

3.1 Project Need

The purpose of the Project is to address electrical safety and capacity concerns in Sturbridge and surrounding areas due to increased usage and development. High energy demand periods caused by increased precipitation and extreme temperatures are projected to rise with the impact of climate change over time. The installation of solar photovoltaic systems and battery storage in the region supports the social resilience of the community by helping to stabilize and support existing energy infrastructure.

The proposed development consists of the construction of a solar array over 8.3± acres of the property, with associated electrical equipment, gravel perimeter access road, landscape buffers, and stormwater management infrastructure. Little impervious area is proposed and consists mainly of the driveway apron at the entrance of the site and the pads for the electrical equipment. The installation of approximately half of the new solar field and the stormwater management systems are within the Town of Sturbridge's defined Buffer Zones and is subject to the Commission's review. All other activities occur in non-jurisdictional areas.

The Project has been designed to avoid adverse impacts to the greatest possible extent. Project impacts on the ground surface and topography aim to maintain slope and grade as much as possible. While no impacts to resource areas are anticipated from the development activities, this NOI is being filed under the Town of Sturbridge's Wetlands Bylaws which identify additional buffer zone protections. Details on the proposed activities are discussed further in the following sections. The work can begin as soon as the project is permitted.

3.2 Ground-Mounted Solar Installation

The proposed activities on the site include the installation of a 1500-foot gravel access road. To install the access road, the area vegetation will be cleared, surface terrain graded, and preliminary drainage systems will be installed to maintain a stable site. The roadway will be finished and compacted with crushed stone, geotextile fabric will be installed as needed to maintain separate and stable materials for the longevity of the road. The installation of the access road will be monitored closely during construction with erosion controls installed in advance of the work. The location of the proposed access driveway is the only available and feasible location to access the Project. This is because the Applicant and National Grid have an agreement that the Project will tie into National Grid's existing infrastructure along Kelly Road. The proposed location of the access driveway and proposed utility poles, which will serve as the Project's point of interconnection, is necessary for this to be feasible and for the Project to become operational.

The portion of the site to be developed as the solar field will then be cleared of trees, vegetation, shrubs, rocks, and other natural features to establish a level area suitable for the solar installation. Careful consideration is given to the environmental impacts of site clearing and a 7-foot tall perimeter fence and erosional control barriers will be installed prior to the commencement of the work to prevent and site migration into the 100-foot undisturbed vegetation barrier. Once the site is properly cleared, it will be loamed and seeded with a pollinator seed mixture.

The installation of the ground-mounted solar photovoltaic (PV) system includes the installation of the foundation mounting system and racking system to hold the array. The array will be a fixed-tilt position, thus simplifying the construction and minimizing the maintenance of the array. The solar panels will be connected in parallel and wired to the inverters. The inverters convert the direct current (DC) produced by the solar panels into alternating current (AC) used in the electrical grid. The entire solar array will be properly grounded to ensure safety and compliance with electrical regulations. The solar panels will be attached to the mounting system according to the manufacturer's instructions. Panels will be properly aligned and securely fastened. Once the installation is complete, a thorough inspection and testing of the system to ensure everything is functioning correctly and safely will be conducted. The Applicant will coordinate with the local utility to connect the solar array to the electrical grid. A monitoring system to track performance over time will be implemented according to the manufacturer's instructions.

The installation of the utility poles, overhead electrical service, and storage facilities will require the excavation of a hole of appropriate dimension to accommodate the pole, and the installation of concrete pads of appropriate dimensions to secure the battery storage facilities. The areas around all electrical service components will be backfilled, compacted, and stabilized as appropriate.

The installation of the Stormwater Management Systems will be the highest-impact activity of the project. To construct the gravity collection and conveyance system, the site will be excavated, and pipes will be laid to collect stormwater runoff from different areas of the site and deliver to the subsurface infiltration systems and infiltration basins. The proper alignment, slope and sizing of the collection system are shown in the Project Plans in **Attachment D.** The installation of subsurface infiltration systems and infiltration basins requires the excavation of existing soil to the grades shown on the Drainage and Grading Plan (Sheets 5&6 of 9). The basins will be finished with aggregate materials to facilitate water infiltration and planted with native vegetation to enhance pollutant removal. Water quality units will be installed to remove pollutants from the stormwater runoff before discharge, these units will be regularly maintained and cleaned to ensure they function effectively. The remainder of the site will be graded, stabilized, and seeded to direct stormwater flow toward the management facilities to prevent sediment runoff during and after construction.

4 ALTERNATIVES ANALYSIS

The existing site was identified as a primary location suitable for solar development in Massachusetts. The no-build option is not a feasible alternative, as the reliability concern of aging electric utility infrastructure is not met by this alternative. The other alternative would be to construct the array in a configuration that has a greater impact on the resource areas and the abutters to the parcel. The proposed design for the site removes all activities from the 100-foot Buffer Zone to the adjacent resource areas and out of the jurisdiction of the WPA and will manage and treat the stormwater at or above compliance with the Massachusetts Stormwater Handbook.

4.1 Practicable Alternatives

According to the Town of Sturbridge Wetlands Regulations Chapter 365-1.2(A.):
Applicants are required to demonstrate that there are no practicable alternatives to the proposed project with less adverse impact on the protected resource and interests. A "practicable alternative" is an available and feasible alternative which will accomplish the project's purpose, taking into account costs, logistics, the proposed use and the most current technology."

The Regulations go on to identify The Wetlands Regulations 365 Attachment 3 "*Sturbridge Conservation Commission Alternatives Analysis Scope of Requirements,"* as the correct guidance document to guide the practicable alternatives discussion. The Applicant understands that the discretionary authority of the Commission shall take precedence over any alternative analysis presented. The Project is designed such that it is entirely sited outside the resource areas and the 100-foot Buffer Zone. Therefore, the requirements for, "minimal disturbance," and, "no significant adverse impacts," have been met by the current design (Section 365-1.3 of the local wetlands regulations). Any other siting of the project pursuant to the reasonable use standards would require the design to expand in scope into the 200-foot Buffer Zone, specifically, the location of the access road frontage is such that the grading is minimized to the maximum extent practicable by locating the drive along the northwestern bound of the parcel, where the slope has to lowest approach. An alternative location for the access driveway outside the buffer zone is not viable, as it will put the Project in a position that is economically unjustifiable and unfeasible to proceed due to the location of the existing National Grid infrastructure.

The subsurface infiltration system that services this infrastructure is located to the south of the drive and entirely outside of the 200-foot buffer zone. The only available design alternative due to the existing access grades would install the subsurface infiltration system on the northern boundary and within the 200-foot buffer zone with the drive shifted to the south along the frontage, which is a greater impact to the resource area and not practicable.

In conclusion, the proposed installation is less impactful to wetland resources, involves less permitting, is less costly, and is a simpler engineering design. No significant adverse impacts on wetland resource areas or values protected by the WPA or the Town of Sturbridge Wetlands Bylaw are anticipated with this design.

5 CONFORMANCE WITH THE PERFORMANCE STANDARDS OF THE WPA, DEP STORMWATER STANDARDS AND THE TOWN OF STURBRIDGE WETLANDS BYLAW

The Project is not jurisdictional to the Massachusetts Wetlands Protection Act (*M.G.L. Ch.131, S.40*) (WPA) and implementing regulations (*310 CMR 10.00*). However, the MA DEP Stormwater Standards do apply to the new development. See the Checklist for Stormwater Report and Stormwater Report provided in **Attachment E.**

The Project has been designed to meet all applicable performance standards for each affected resource area defined in the Town of Sturbridge Wetlands Bylaw in accordance with the jurisdiction defined in Chapter 286-2. The Applicant will implement Best Management Practices (BMP) to ensure the adjacent resource areas are adequately protected, and impacts to the surrounding area are reduced, minimized, and restored to the maximum extent practicable. Project-specific BMPs are further discussed in *Section 6.0*. There will be no use of quick-release fertilizers within the 200-foot Buffer Zone.

6 PROPOSED AVOIDANCE AND MINIMIZATION MEASURES

The Applicant has established procedures that are to be followed by all employees and its contractors for accessing sites and performing construction and maintenance activities on ground-mounted solar photovoltaic (PV) systems. These procedures, ensure that Sturbridge PV, LLC projects are completed in accordance with all applicable environmental laws and regulations as well as company policies and compliance objectives.

6.1 Sediment and Erosion Controls

Erosion and sediment control measures will be installed prior to the commencement of work based on site conditions. These controls will function to mitigate work-related erosion and sedimentation and to serve as a physical boundary to delineate work areas to contain construction activities within approved locations. Proposed erosion and sediment control measures may include a turbidity curtain, straw wattles, weed-free bale barriers, fiber rolls, or similar treatment.

Erosion and sediment controls will be inspected on a regular basis and maintained in working order until all disturbed areas are stabilized. Please refer to **Attachment D** for erosion and sediment control details.

6.2 Construction Access

Construction access will be from the existing paved roadway of Hayes Road. The last crew to leave the site each day would be responsible for regularly sweeping the roadways, if and when sediment and/or rock have been tracked onto the street. No off-road vehicle or equipment access is anticipated for the Project.

6.3 Dewatering

Dewatering may be necessary during the construction of the stormwater management systems. If there is adequate vegetation in upland areas to function as a filter medium, the water generally will be discharged to the vegetated land surface. Where vegetation is absent or where slope prohibits, water will be pumped into a filter bag, or a dewatering basin consisting of a filter bag with straw bale or silt fence perimeter controls which will be located in approved areas outside wetland resource areas. The pump intake hose will not be allowed to set on the bottom of the excavation throughout dewatering. The basin and all accumulated sediment will be removed following dewatering operations and the area will be seeded and mulched with straw. The bag will be surrounded with additional sediment filtration such as fiber rolls, straw bales, or other appropriate containment.

6.4 Stormwater Management

There will be no change in grade or increase in impervious areas as a result of this Project. Therefore, additional stormwater management appurtenances will not be required.

6.5 Restoration

Disturbed areas will be stabilized, and the construction site will be returned to existing conditions to the maximum extent practicable. All construction materials, vehicles, and non-biodegradable sediment controls will be removed from the site upon completion of work.

7 CONCLUSION

Although portions of the Project will occur within jurisdictional wetland resource area buffer zones, the Project will:

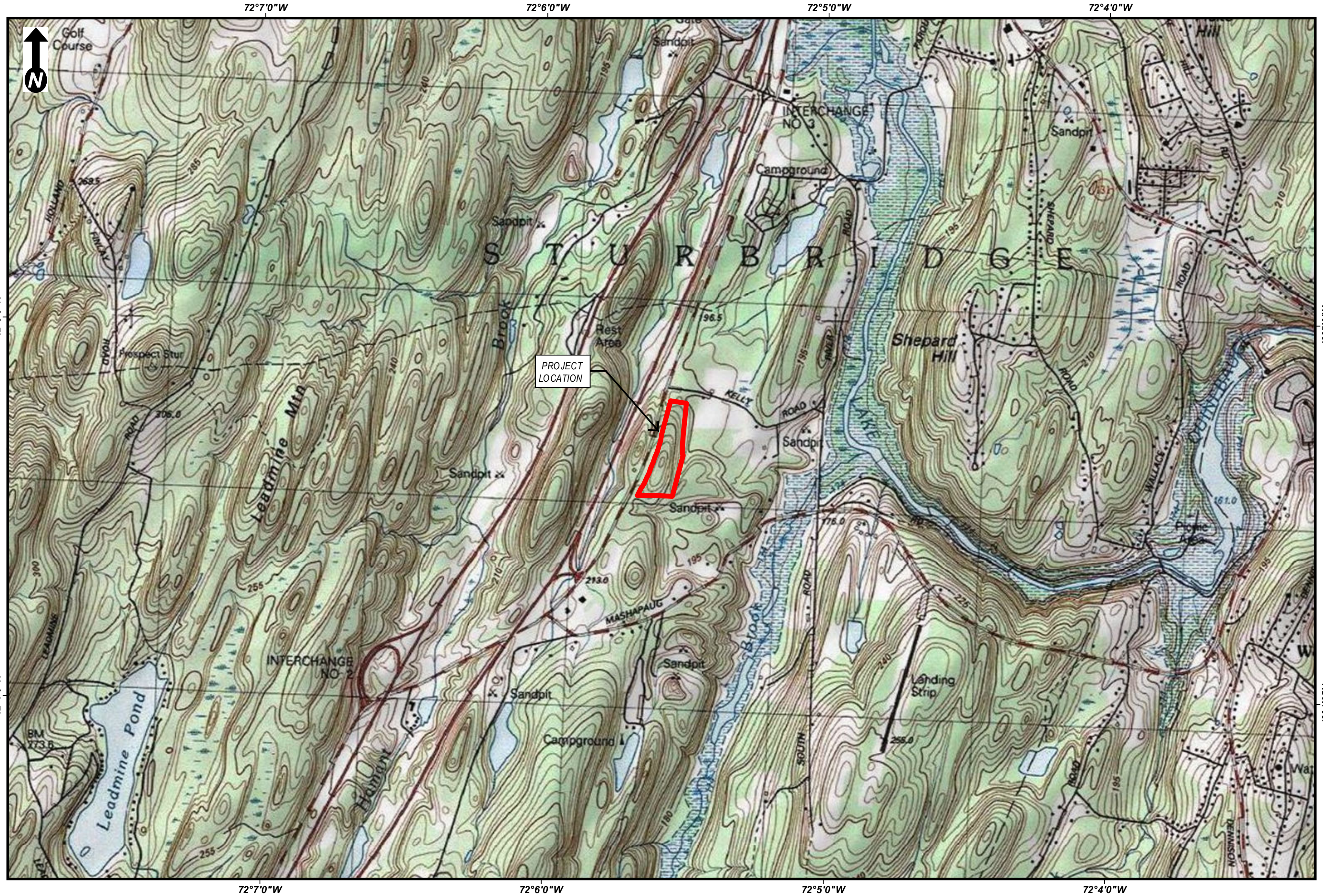
- Result in no impacts to Inland Bank or BVW, as all activities will be greater than 100 feet from the resource areas.
- Utilize appropriate BMPs to protect wetland resource areas from sedimentation and soil disturbance during Project activities; and,
- Is the only available, feasible means of making the Project viable at the property.

Therefore, the Applicant respectfully requests the Sturbridge Conservation Commission find this proposal adequately protective of the public interests identified in the WPA and Sturbridge Wetlands Protection Bylaw and issue an Order of Conditions for the proposed Project as currently designed.

Attachment B

Ground-Mounted Solar Photovoltaic System Project
Sturbridge, MA
Wetland Bylaw Notice of Intent Application

USGS SITE LOCUS MAP
ENVIRONMENTAL RESOURCE MAP
NRCS SOIL MAP
RESOURCE AREA DELINEATION REPORT



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1 inch = 2,000 feet
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Feet
(Page Size 8.5 x 11)

GROUND-MOUNTED PHOTOVOLTAIC SYSTEM
USGS Site Location Map
Sturbridge, MA

BSC GROUP

File Location: G:\GISPrj\5074500\Output\Maps\MXD\ReportMaps\BearPeakPower_ER_20230802.mxd
Date Saved: 8/3/2023 8:25:42 AM

DRAFT

Resource Areas Reviewed:
MADEP Tier Classified Oil and/or Hazardous Material Sites (21E); MADEP Oil and/or Hazardous Material Sites with Activity and Use Limitations; Certified Vernal Pools; Potential Vernal Pools; NHESP Priority Habitats; NHESP Estimated Habitats; NHESP Restricted Data; Wild & Scenic Rivers; NHD Hydrography; Census 2000 Streams; MADEP Hydrologic Connections; MADEP Wetlands; FEMA 100yr Floodplain; NRCS Hydric Soils; Public Water Supply; Zone II Wellhead Protection Area; Interim Wellhead Protection Area; Surface Water Protection Zone; Outstanding Resource Water; Areas of Critical Environmental Concern; Watershed Protection Act Zones; Ch. 91 Tidelands Jurisdiction; Article 97 Land; Landfills ([Not]Capped, [Un]Lined, [In]Active, Closed)

Index Map

Legend

- Proposed Photovoltaic System
- MADEP Hydrologic Connections
- 100ft Buffer to Wetlands & Streams
- 200ft Riverfront Area
- MADEP Wetlands*

N

1 inch = 150 feet
0 75 150
Feet

*Indicates Layers Set to Transparency

GROUND-MOUNTED PHOTOVOLTAIC SYSTEM

Environmental Resources Map

Sturbridge, MA

Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community

BSC GROUP

THIS DOCUMENT IS INTENDED FOR GENERAL PLANNING & INFORMATION PURPOSES ONLY. ALL MEASUREMENTS & LOCATIONS ARE APPROXIMATE.

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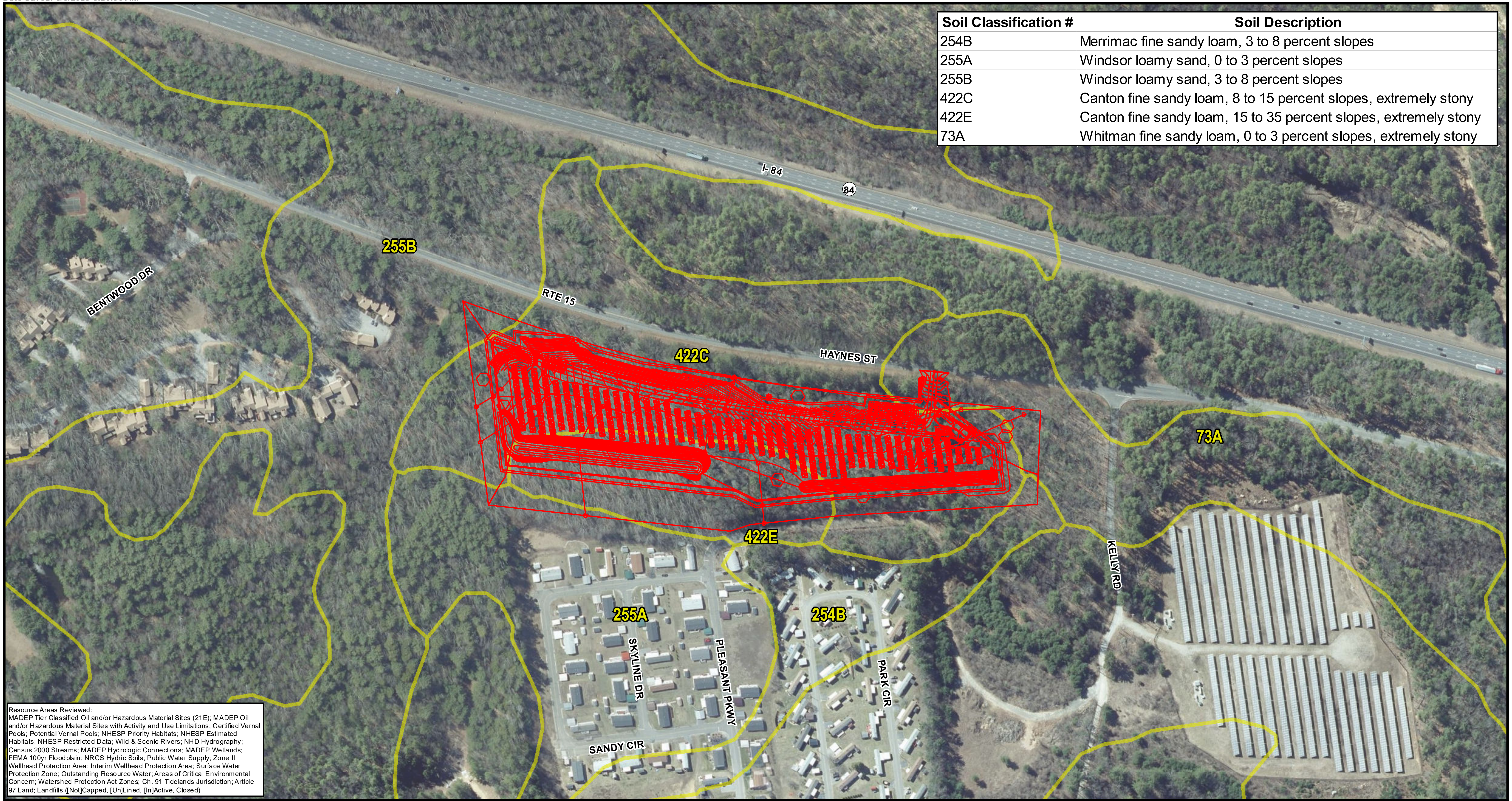
Date Saved: 8/3/2023 8:20:59 AM

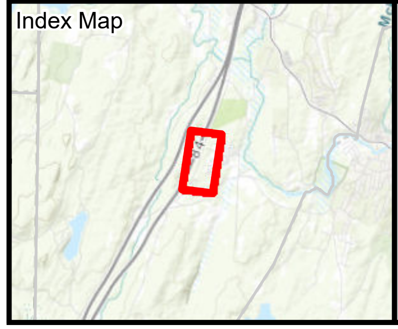
DRAFT

Soil Classification #	Soil Description
254B	Merrimac fine sandy loam, 3 to 8 percent slopes
255A	Windsor loamy sand, 0 to 3 percent slopes
255B	Windsor loamy sand, 3 to 8 percent slopes
422C	Canton fine sandy loam, 8 to 15 percent slopes, extremely stony
422E	Canton fine sandy loam, 15 to 35 percent slopes, extremely stony
73A	Whitman fine sandy loam, 0 to 3 percent slopes, extremely stony



Resource Areas Reviewed:
MADEP Tier Classified Oil and/or Hazardous Material Sites (21E); MADEP Oil and/or Hazardous Material Sites with Activity and Use Limitations; Certified Vernal Pools; Potential Vernal Pools; NHESP Priority Habitats; NHESP Estimated Habitats; NHESP Restricted Data; Wild & Scenic Rivers; NHD Hydrography; Census 2000 Streams; MADEP Hydrologic Connections; MADEP Wetlands; FEMA 100yr Floodplain; NRCS Hydric Soils; Public Water Supply; Zone II Wellhead Protection Area; Interim Wellhead Protection Area; Surface Water Protection Zone; Outstanding Resource Water; Areas of Critical Environmental Concern; Watershed Protection Act Zones; Ch. 91 Tidelands Jurisdiction; Article 97 Land; Landfills ([Not]Capped, [Un]Lined, [In]Active, Closed)

Index Map



Legend

Proposed Photovoltaic System

NCRS Soils

N

1 inch = 250 feet

0 125 250

Feet

**Indicates Layers Set to Transparency*

GROUND-MOUNTED PHOTOVOLTAIC SYSTEM

NCRS Soils Map

Sturbridge, MA

Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community

BSC GROUP

THIS DOCUMENT IS INTENDED FOR GENERAL PLANNING & INFORMATION PURPOSES ONLY. ALL MEASUREMENTS & LOCATIONS ARE APPROXIMATE.

June 2, 2023

Bear Peak Power
2420 17th Street Third Floor
Denver, CO 80202

Re: Wetland Border Report
200 Route 15 Sturbridge, MA

Introduction

On July 25, 2022, the wetland resources were delineated on land located on or near the above-listed site (refer to enclosed locus maps). The wetland border was flagged using the criteria in the most recent edition of MA Wetland Protection Act (WPA) and Regulations 310 CMR 10.00 et al and the Sturbridge wetland bylaw. Hydric soil indicators, vegetation changes, hydrological indicators, and topography were all considered for delineation purposes.

In the northern portion of the site, Bordering Vegetated Wetland (BVW) associated with an intermittent stream was flagged with wetland flag series GCA1-GCA60. In the southern portion of the site BVW was delineated with wetland flag series GCB1-11. These Wetland resources are protected under the MA Wetlands Protection Act and the local bylaw.

According to the Mass GIS data layers for NHESP, this site is not located within Estimated and/or Priority Habitat of Rare Wildlife. A portion of the site is not located in an ACEC or a regulated FEMA Flood Zone.

The titles of attached documents are as follows:

- DEP Bordering Vegetated Wetland (310 CMR 10.55) Delineation Field Data Form
- FEMA Flood Map
- NRCS Soil Map
- *Orthophoto View of Locus Site,* Goddard Consulting, LLC
- *USGS of Locus Site*, Goddard Consulting, LLC

Section 1. Regulatory Framework, Implications, and Delineation Methodology

1.1 Wetlands Protection Act (WPA)

Inland resource areas were delineated in accordance with relevant federal, state, and local regulations. As stated in 310 CMR (2)(a), "Bordering Vegetated Wetlands are freshwater wetlands which border on creeks, rivers, streams, ponds and lakes. The types of freshwater wetlands are wet meadows, marshes, swamps and bogs. Bordering Vegetated Wetlands are areas where the soils are saturated and/or inundated such that they support a predominance of wetland indicator plants. The ground and surface water regime and the vegetation community which occur in each type of freshwater wetland are specified in M.G.L. c 131 sec. 40."

The methodology used to delineate Bordering Vegetated Wetlands is detailed in: (1) the BVW Policy "BVW: Bordering Vegetated Wetlands Delineation Criteria and Methodology," issued March 1, 1995;

and (2) "Delineating Bordering Vegetated Wetlands Under the Massachusetts Wetlands Protection Act: A Handbook," produced by the Massachusetts Department of Environmental Protection, dated March 1995.

1.2 Bylaw

Federal, state, and local authorities regulate wetland jurisdiction. The local bylaws set forth additional definitions, regulations and performance standards necessary to protect the values and/or intent of the Bylaw, protect additional Resource Areas and wetland values, and specify standards and procedures stricter than those of the Wetlands Protection Act, M.G.L. Ch. 131, § 40 and implementing regulations at 310 CMR 10.00.

Section 2. Description of Regulated Inland Resource Area

- ☐ Bank
- ☐ Land Under Water Bodies and Waterways
- ☐ Riverfront Area
- ☐ Buffer Zone
- ☐ Vernal Pool (Certified and/or Potential)
- ☒ Bordering Vegetated Wetland (BVW)
- ☐ Land Subject to Flooding
- ☐ Isolated Vegetated Wetlands
- ☐ Estimated Habitats of Rare Wildlife
- ☐ Priority Habitats of Rare Species

The table below provides the Flag Numbers, Flag Type, and Wetland Types and Locations for the BVW resources delineated.

Resource	Regulatory Buffer zone	Flag Numbers	Flag Type	Wetland Types and Locations
BVW	100-ft (buffer zone not flagged in field)	GCA1-GCA60	Blue ribbon	Edge of the northern BVW
BVW	100-ft (buffer zone not flagged in field)	GCB1-GCB11	Blue ribbon	Edge of the southern BVW

2.1 Vegetation

The wetland is dominant in red maple, winterberry, blueberry, sensitive fern, cinnamon fern, jack in the pulpit, skunk cabbage, sphagnum moss. The adjacent upland area was dominate in cherry, black birch, white pine, Virginia creeper, Canada mayflower, and spinulose wood fern (see DEP Bordering Vegetated Wetland Delineation Field Data Forms).

2.3 Hydrology

Wetland hydrology includes drainage patterns in BVW, water-stained leaves, saturated soils, and hydric soils. The BVW is associate with an intermittent stream.

2.4 Soils

Consistent with the NRCS survey, soils identified on the property include Whitman fine sandy loam. More detailed information about soils is included in the attached NCRS soil map and data forms.

Section 3. Buffer Zone

Buffer Zone is defined in 310 CMR 10.04 as the “area of land extending 100 feet horizontally outward from the boundary of any area specified in 310 CMR 10.02(1)(a).” This land is jurisdictional under the MA Wetlands Protection Act and corresponding bylaws.

Section 4. FEMA Flood Zones

The MassGIS National Flood Hazard Layer provided by the Federal Emergency Management Agency (FEMA) depicts no jurisdictional flood zones on the property. BLSF is defined in 310 CMR 10.57 (2)(a)(1) as “an area with low, flat topography adjacent to and inundated by flood waters rising from creeks, rivers, streams, ponds or lakes. It extends from the banks of these waterways and water bodies; where a bordering vegetated wetland occurs, it extends from said wetlands.” This area is not located within a jurisdictional FEMA Flood Zone.

Section 5. Natural Heritage and Other Site-Specific Data

This site is not mapped for rare or endangered species habitat. It is not mapped for certified or potential vernal pools. It not is located in an Area of Critical of Environmental Concern.

Section 6. Findings

Based on hydric soil, vegetation and hydrological indicators the GCA and GCB Series was found to be the boundary of BVW, which is jurisdictional under the state and local bylaw with a jurisdictional 100-ft buffer zone. Any work performed within the resource area, buffer zone, flood zone, and/or Riverfront area needs a permit with the local conservation commission. Please contact Goddard Consulting if permit assistance is needed or requested.

Goddard Consulting, LLC.

Tom Schutz, WPIT.
Wetland Scientist.

DEP Bordering Vegetated Wetland (310 CMR 10.55) Delineation Field Data Form

Applicant: **Bear Peak Solar** Prepared by: **Goddard Consulting LLC** Project location: **200 Route 15 Sturbridge, MA** DEP File #: ____________

Check all that apply:

- [ ] Vegetation alone presumed adequate to delineate BVW boundary: fill out Section I only
- [x] Vegetation and other indicators of hydrology used to delineate BVW boundary: fill out Sections I and II
- [ ] Method other than dominance test used (attach additional information)

Section I. Vegetation Observation Plot Number: Transect Number: **Upgradient** Date of Delineation:

Sample Layer and Plant Species	Scientific name	% Cover	% Dominance	Dominant Plant (yes or no)	Wetland Indicator Category*
Tree Layer					
Black Cherry	*Prunus serotina*	20.5%	33.3%	Yes	FACU
Black Birch	*Betula lenta*	20.5%	33.3%	Yes	FACU
Eastern White Pine	*Pinus strobus*	20.5%	33.3%	Yes	FACU
Sapling Layer					
Eastern White Pine	*Pinus strobus*	10.5%	33.3%	Yes	FACU
Red Maple	*Acer rubrum*	10.5%	33.3%	Yes	FAC*
American Elm	*Ulmus americana*	10.5%	33.3%	Yes	FACW*
Shrub Layer					
Red Maple	*Acer rubrum*	20.5%	100.0%	Yes	FAC*
Climbing Woody Vine					
Ground Cover					
Virginia-Creeper	*Parthenocissus quinquefolia*	20.5%	49.4%	Yes	FACU
Canada Mayflower	*Maianthemum canadense*	10.5%	25.3%	Yes	FACU
Spinulose Wood Fern	*Dryopteris carthusiana*	10.5%	25.3%	Yes	FACW*

Remarks: * An asterisk after common plant name indicates stunted growth; ** indicates extremely stunted growth

Morphological Adaptations: 0 **Description:**

* An asterisk after indicator status denotes wetlands plants: plants listed in the Wetlands Protection Act (MGL c.131, s.40); plants in the genus Sphagnum; or plants listed as FAC, FACW, or OBL.

Vegetation conclusion:

Number of dominant wetland indicator plants: 4 **Number of dominant non-wetland indicator plants: 6**

Is the number of dominant wetland plants equal to or greater than the number of dominant non-wetland plants? no

If vegetation alone is presumes adequate to delineate the BVW boundary, submit this form with the Request for Determination of Applicability or Notice of Intent.

Section II. Indicators of Hydrology

Hydric Soil Interpretation

1. Soil Survey

Is there a published soil survey for this site? ☑ yes ☐ no

title/date: **Soil Survey of Worcester County, Southern Part - 1998**

map number: **73A**

soil type mapped: **Whitman Fine Sandy Loam**

hydric soil inclusions: ______

Are field observations consistent with soil survey? ☑ yes ☐ no

Remarks: ______

2. Soil Description

Horizon	Depth (inches)	Matrix Color	Mottles Color or Texture
A	0-3	10YR2/2	FSL
B	3-15	10TR5/6	FSL

Remarks: ______

3. Other: ______

Conclusion: Is soil hydric? ☐ yes ☑ no

Other Indicators of Hydrology: (check all that apply and describe)

☐ Site inundated: ______

☐ Depth to free water in observation hole: ______

☐ Depth to soil saturation in observation hole: ______

☐ Water marks: ______

☐ Drift Lines: ______

☐ Sediment deposits: ______

☐ Drainage patterns in BVW: ______

☐ Oxidized rhizoshperes: ______

☐ Water-stained leaves: ______

☐ Recorded data (stream, lake, or tidal gauge; aerial photo; other): ______

☐ Other: ______

Vegetation and Hydrology Conclusion for Upgradient of	yes	no
Number of wetland indicator plants >= number of non-wetland plants		**X**
Wetland hydrology present:		
hydric soils present		**X**
other indicators of hydrology present		**X**
Sample location is in a BVW		**X**

Submit this form with the Request for Determination of Applicability or Notice of Intent

DEP Bordering Vegetated Wetland (310 CMR 10.55) Delineation Field Data Form

Applicant: **Bear Peak Power** Prepared by: **Goddard Consulting LLC** Project location: **200 Route 15 Sturbridge, MA** DEP File #: ____________

Check all that apply:
- [ ] Vegetation alone presumed adequate to delineate BVW boundary: fill out Section I only
- [x] Vegetation and other indicators of hydrology used to delineate BVW boundary: fill out Sections I and II
- [ ] Method other than dominance test used (attach additional information)

Section I. Vegetation Observation Plot Number: **GCA45** Transect Number: **Downgradient** Date of Delineation:

Sample Layer and Plant Species	Scientific name	% Cover	% Dominance	Dominant Plant (yes or no)	Wetland Indicator Category*
Tree Layer					
Red Maple	*Acer rubrum*	38.0%	100.0%	Ywes	FAC*
Sapling Layer					
Red Maple	*Acer rubrum*	20.5%	100.0%	Yes	FAC*
Shrub Layer					
Winterberry	*Ilex verticillata*	20.5%	50.0%	Yes	FACW*
Highbush Blueberry	*Vaccinium corymbosum*	20.5%	50.0%	Yes	FACW*
Climbing Woody Vine					
Ground Cover					
Sensitive Fern	*Onoclea sensibilis*	10.5%	28.0%	Yes	FACW*
Cinnamon Fern	*Osmundastrum cinnamomeum*	10.5%	28.0%	Yes	FACW*
Jack-in-the-pulpit	*Arisaema triphyllum*	3.0%	8.0%	No	FAC*
Skunk Cabbage	*Symplocarpus foetidus*	10.5%	28.0%	Yes	OBL*
Sphagnum Moss	*Sphagnum L.*	3.0%	8.0%	No	OBL*

Remarks: * An asterisk after common plant name indicates stunted growth; ** indicates extremely stunted growth

Morphological Adaptations: 0 **Description:**

* An asterisk after indicator status denotes wetlands plants: plants listed in the Wetlands Protection Act (MGL c.131, s.40); plants in the genus Sphagnum; or plants listed as FAC, FACW, or OBL.

Vegetation conclusion:

Number of dominant wetland indicator plants: 6 **Number of dominant non-wetland indicator plants: 0**

Is the number of dominant wetland plants equal to or greater than the number of dominant non-wetland plants? yes

If vegetation alone is presumes adequate to delineate the BVW boundary, submit this form with the Request for Determination of Applicability or Notice of Intent.

Section II. Indicators of Hydrology

Hydric Soil Interpretation

1. Soil Survey

Is there a published soil survey for this site? ☑ yes ☐ no

title/date: **Soil Survey of Worcester County, Southern Part - 1998**

map number: **73A**

soil type mapped: **Whitman fine sandy loam**

hydric soil inclusions: ______

Are field observations consistent with soil survey? ☐ yes ☑ no

Remarks: ______

2. Soil Description

Horizon	Depth (inches)	Matrix Color	Mottles Color or Texture
O	0-18	10YR2/1	Muck

Remarks: ______

3. Other: ______

Conclusion: Is soil hydric? ☑ yes ☐ no

Other Indicators of Hydrology: (check all that apply and describe)

- ☐ Site inundated: ______
- ☐ Depth to free water in observation hole: ______
- ☐ Depth to soil saturation in observation hole: ______
- ☐ Water marks: ______
- ☐ Drift Lines: ______
- ☐ Sediment deposits: ______
- ☐ Drainage patterns in BVW: ______
- ☐ Oxidized rhizoshperes: ______
- ☑ Water-stained leaves: ______
- ☐ Recorded data (stream, lake, or tidal gauge; aerial photo; other): ______
- ☐ Other: ______

Vegetation and Hydrology Conclusion for Downgradient of	**yes**	**no**
Number of wetland indicator plants >= number of non-wetland plants	**X**	
Wetland hydrology present:		
hydric soils present	**X**	
other indicators of hydrology present	**X**	
Sample location is in a BVW	**X**	

Submit this form with the Request for Determination of Applicability or Notice of Intent

Map Scale: 1:5,420 if printed on A portrait (8.5" x 11") sheet.

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 18N WGS84

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Map Unit Polygons

Soil Map Unit Lines

Soil Map Unit Points

Special Point Features

Blowout

Borrow Pit

Clay Spot

Closed Depression

Gravel Pit

Gravelly Spot

Landfill

Lava Flow

Marsh or swamp

Mine or Quarry

Miscellaneous Water

Perennial Water

Rock Outcrop

Saline Spot

Sandy Spot

Severely Eroded Spot

Sinkhole

Slide or Slip

Sodic Spot

Spoil Area

Stony Spot

Very Stony Spot

Wet Spot

Other

Special Line Features

Water Features

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

Background

Aerial Photography

MAP INFORMATION

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

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

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

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

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

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

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

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

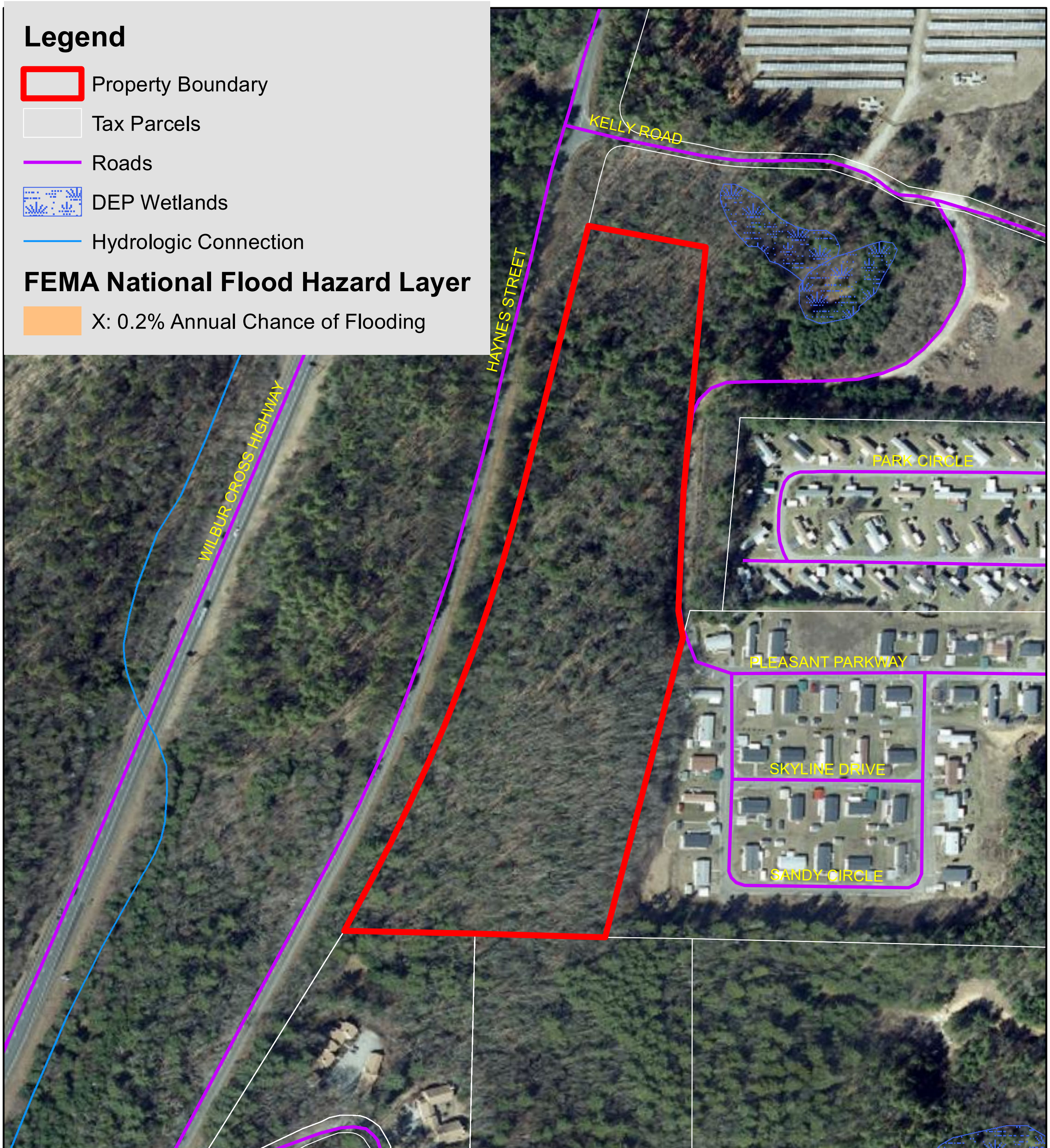
Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Oct 15, 2020—Oct 31, 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
3A	Scarboro and Walpole soils, 0 to 3 percent slopes	5.9	3.8%
73A	Whitman fine sandy loam, 0 to 3 percent slopes, extremely stony	8.9	5.8%
100C	Brookfield-Brimfield-Rock outcrop complex, 3 to 15 percent slopes	0.4	0.3%
102C	Chatfield-Hollis-Rock outcrop complex, 0 to 15 percent slopes	7.3	4.8%
102E	Chatfield-Hollis-Rock outcrop complex, 15 to 35 percent slopes	9.4	6.1%
245B	Hinckley loamy sand, 3 to 8 percent slopes	12.1	7.9%
254A	Merrimac fine sandy loam, 0 to 3 percent slopes	7.7	5.0%
254B	Merrimac fine sandy loam, 3 to 8 percent slopes	13.1	8.5%
254C	Merrimac fine sandy loam, 8 to 15 percent slopes	2.3	1.5%
255A	Windsor loamy sand, 0 to 3 percent slopes	13.1	8.6%
255B	Windsor loamy sand, 3 to 8 percent slopes	35.0	22.9%
255D	Windsor loamy sand, 15 to 25 percent slopes	0.0	0.0%
422B	Canton fine sandy loam, 0 to 8 percent slopes, extremely stony	6.8	4.5%
422C	Canton fine sandy loam, 8 to 15 percent slopes, extremely stony	18.7	12.2%
422E	Canton fine sandy loam, 15 to 35 percent slopes, extremely stony	4.6	3.0%
600	Pits, gravel	7.8	5.1%
Totals for Area of Interest		**153.0**	**100.0%**



Orthophoto of the Locus Site

200 Route 15 - Norfolk, MA

(Map: 552, Parcel: 3748, Lot: 200)

N

Date: 7/1/2022

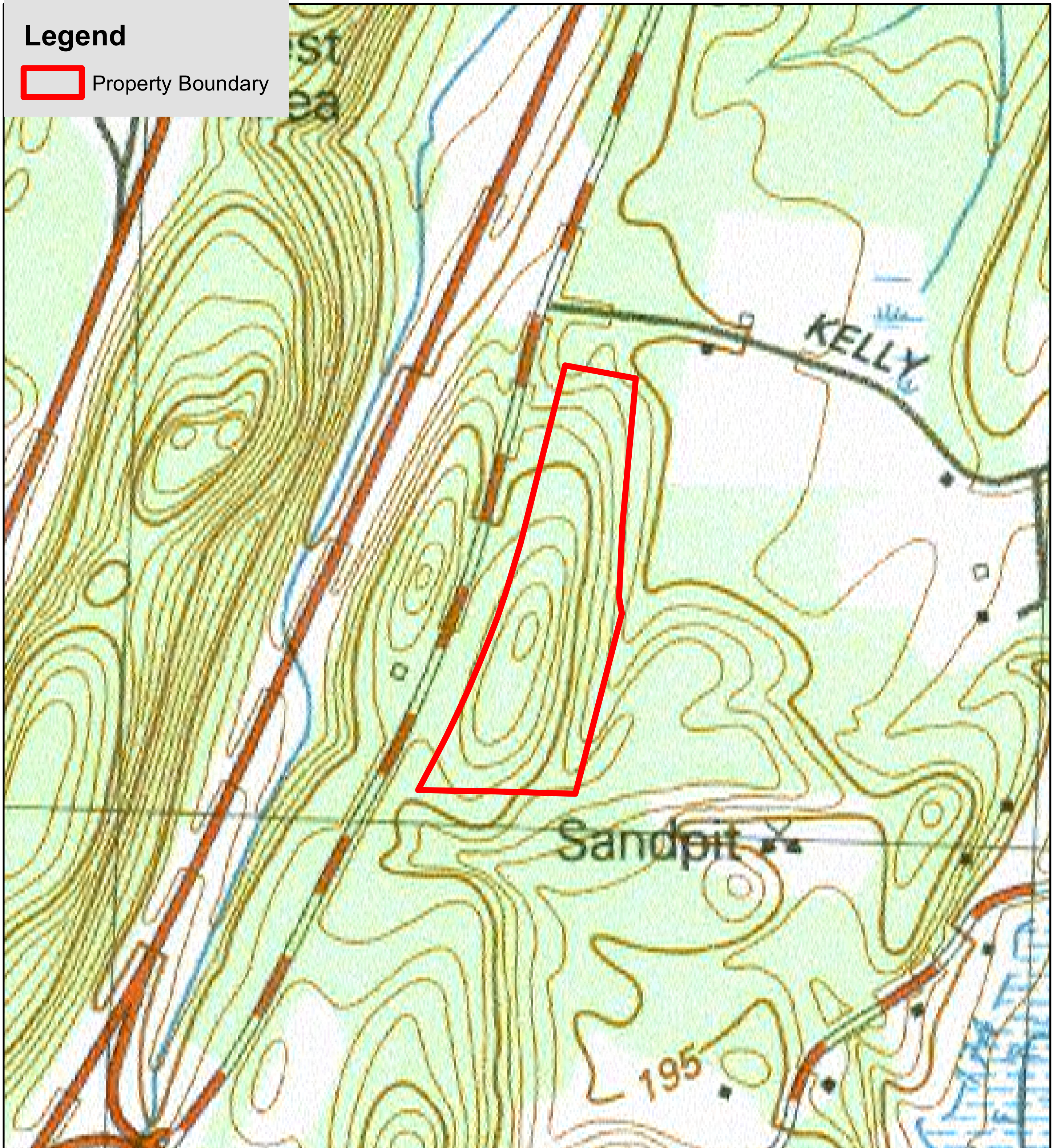
Feet

0 110 220 440

1 inch = 300 feet

GIS Data Source: "Office of Geographic Information (MassGIS), Commonwealth of Massachusetts, MassIT"

GODDARD CONSULTING LLC Strategic Wetland Permitting



USGS of the Locus Site

200 Route 15 - Norfolk, MA

(Map: 552, Parcel: 3748, Lot: 200)

N

Date: 7/1/2022

0 185 370 740 Feet

1 inch = 500 feet

GIS Data Source: "Office of Geographic Information (MassGIS), Commonwealth of Massachusetts, MassIT"

GODDARD CONSULTING LLC
Strategic Wetland Permitting

Attachment C

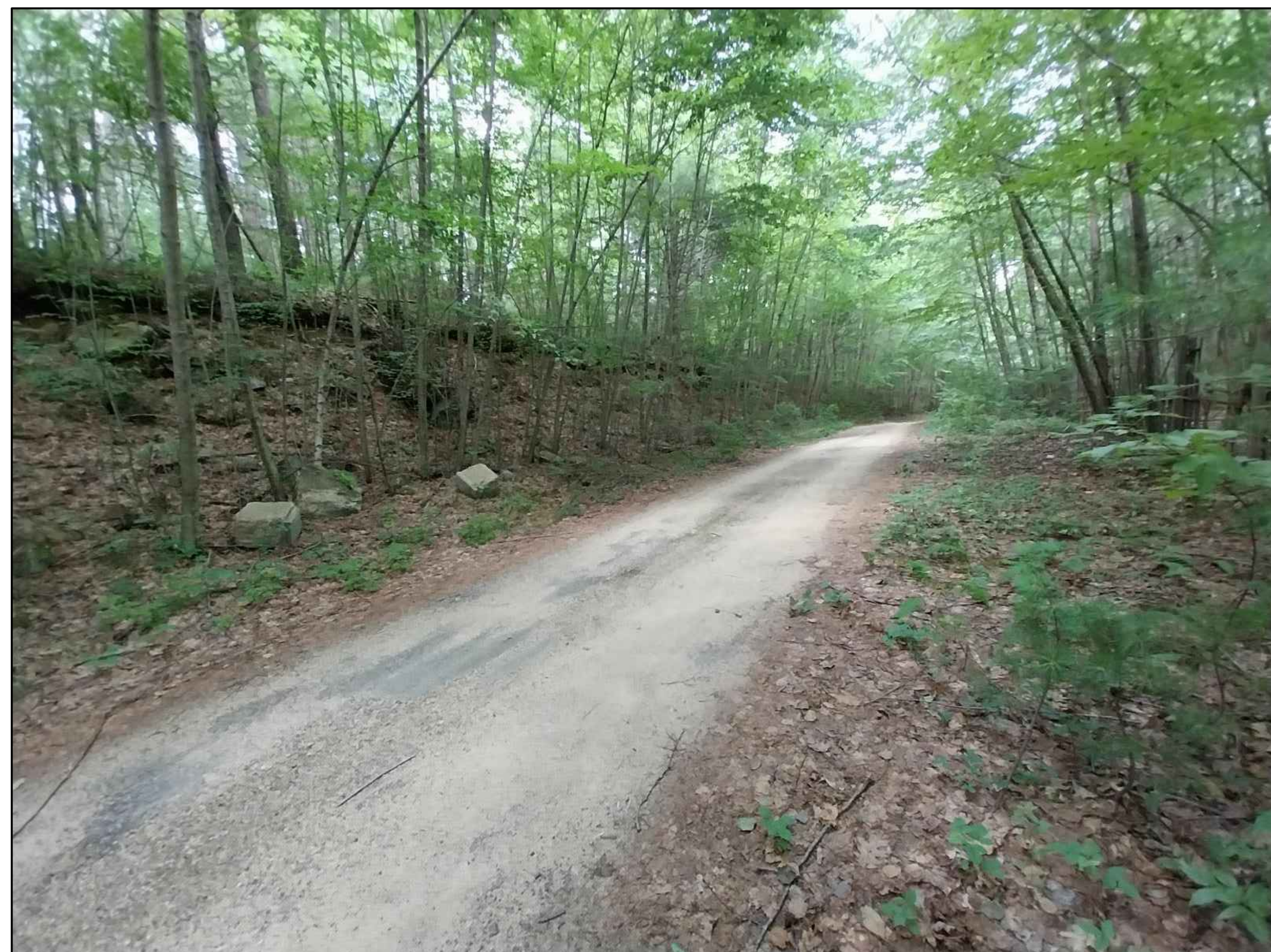
Ground-Mounted Solar Photovoltaic System Project
Sturbridge, MA
Wetland Bylaw Notice of Intent Application

SITE PHOTOGRAPHS
VISUAL SIMULATIONS

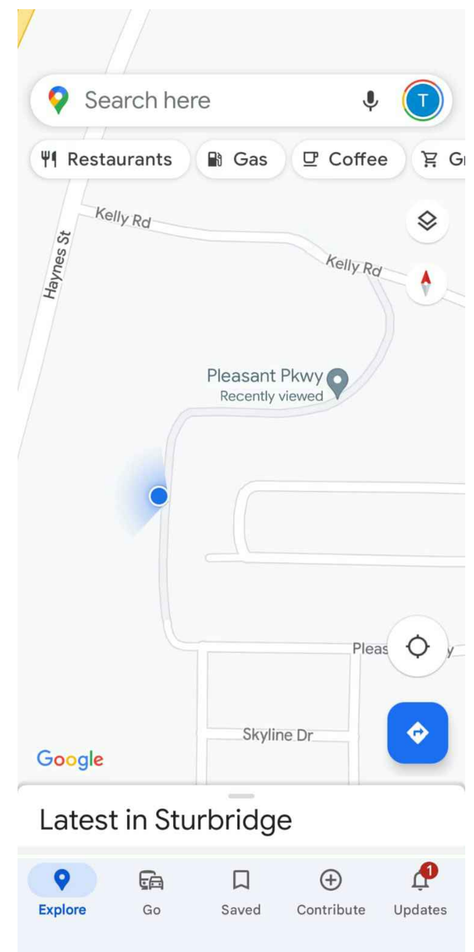
Photo #1: View of existing conditions for Project access road entrance on Haynes Street. Facing east.

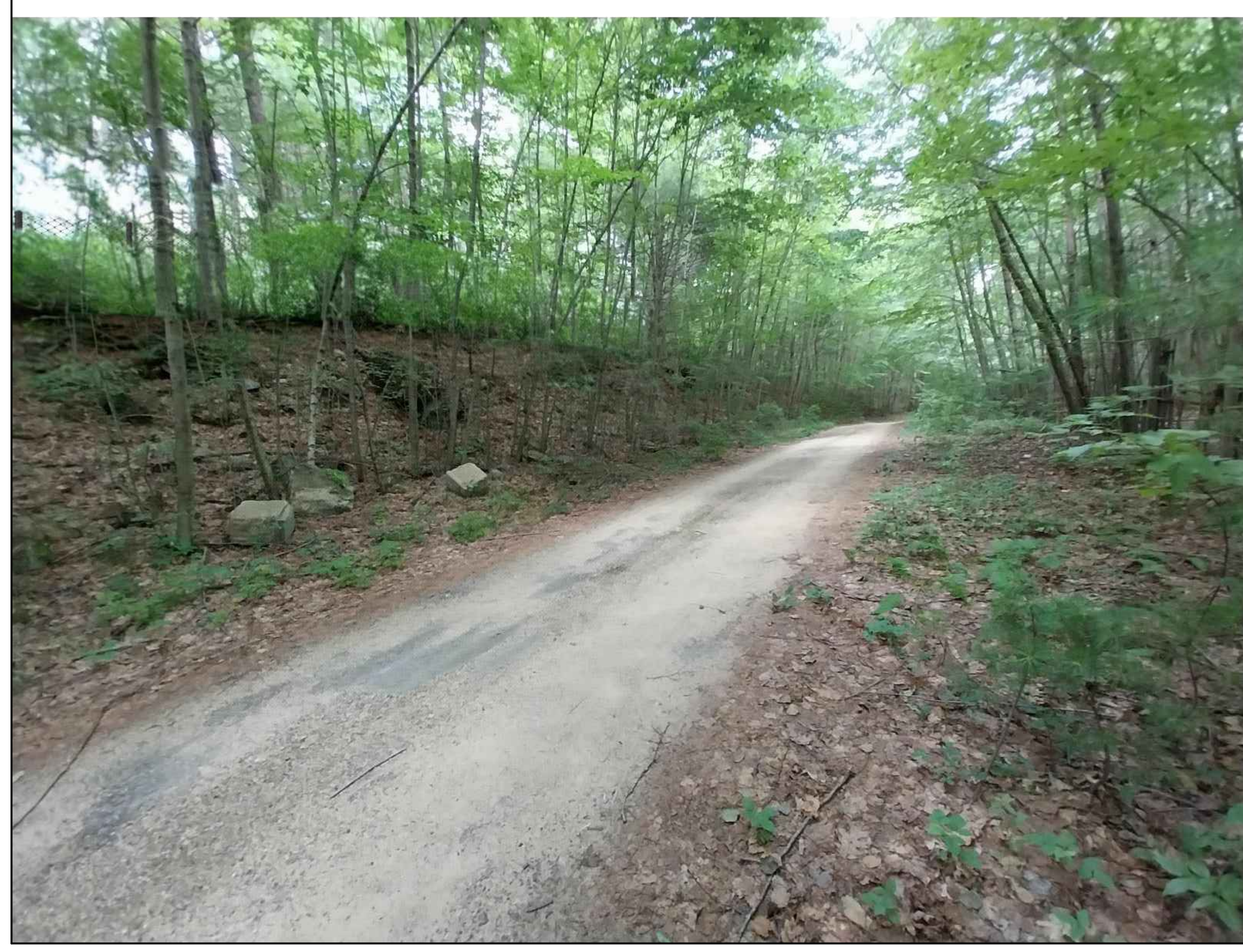
Photo #2: View of the existing access road off Kelly Road on the eastern boundary of the parcel. Facing south.

Photo #2: View of the existing access road near Pleasant Parkway on the eastern boundary of the parcel. Facing north.

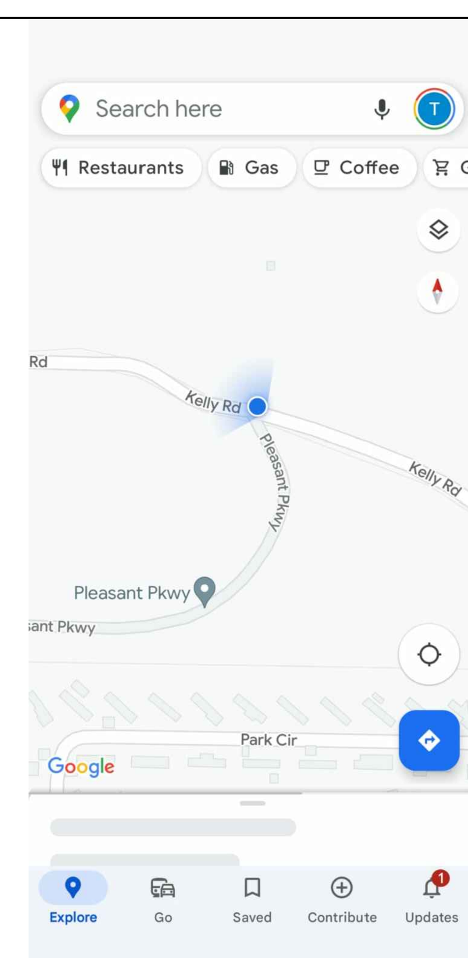


EX-view-Pleansant-pkw-near Sansy Cir

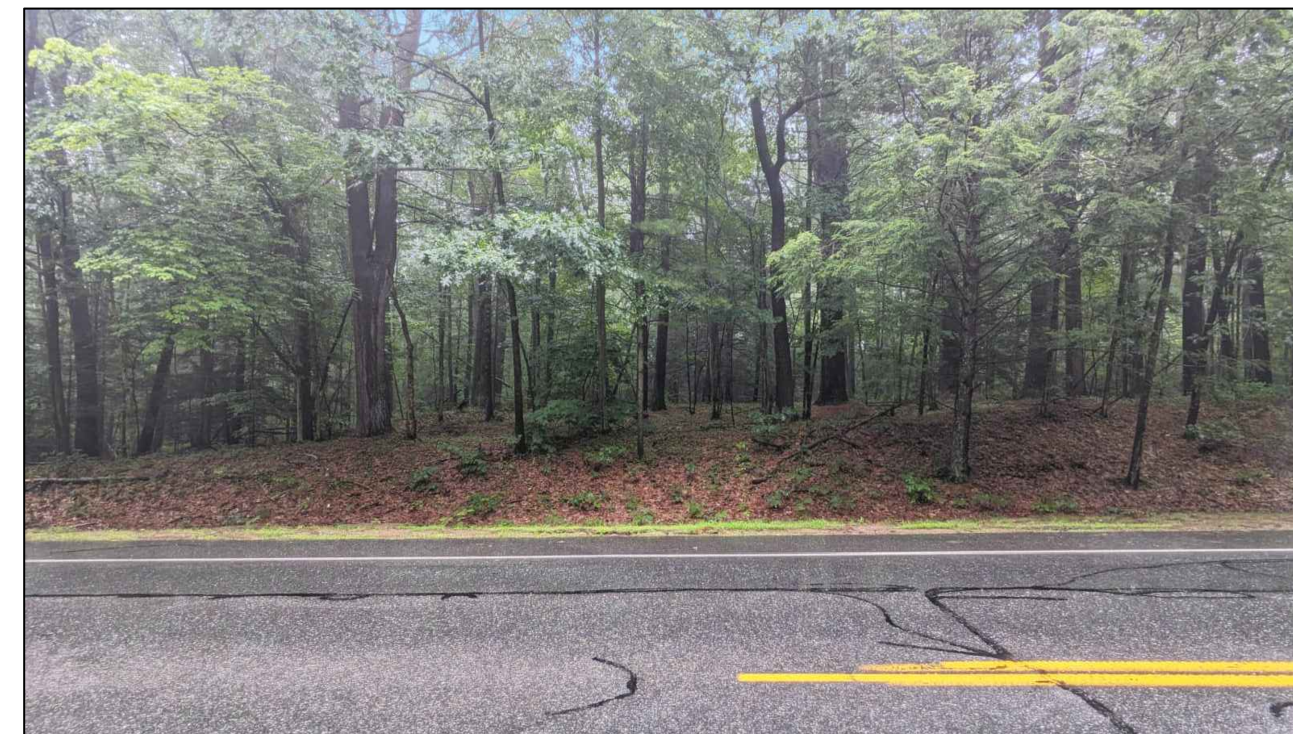




Prop-view-Pleansant-pkw-near Sansy Cir

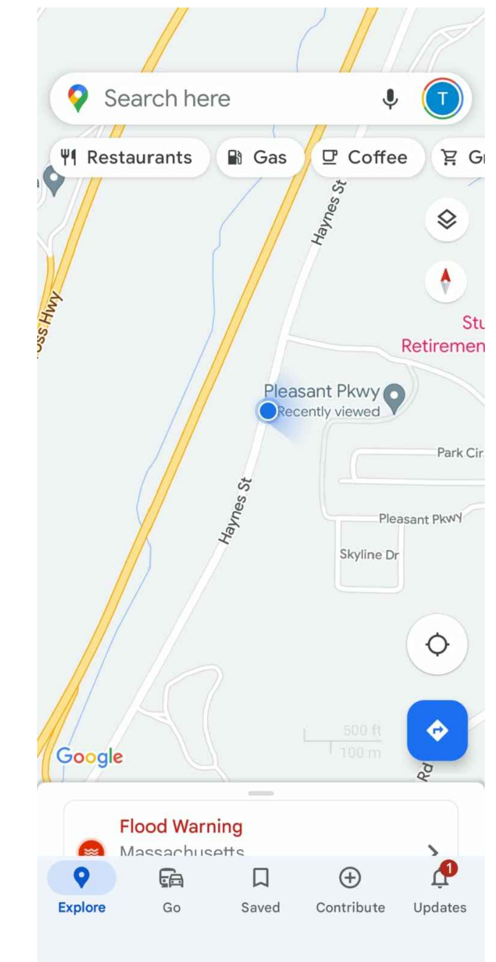


Ex. View / Kelly Rd



Ex Entry on Haynes St

Prop. Entry on Haynes St



Aerial View

GROUND-MOUNTED PHOTOVOLTAIC SYSTEM

VISUAL SIMS

Sturbridge, MA

SCALE: NONE

BSC GROUP
349 Main Street - Route 28
West Yarmouth, Massachusetts
02673
508 778 8919

DATE: August 1, 2023

FILE NAME: \5074500\C\D\5074500-SP

Attachment D

Ground-Mounted Solar Photovoltaic System Project
Sturbridge, MA
Wetland Bylaw Notice of Intent Application

PROJECT PLANS

GROUND-MOUNTED PHOTOVOLTAIC SYSTEM

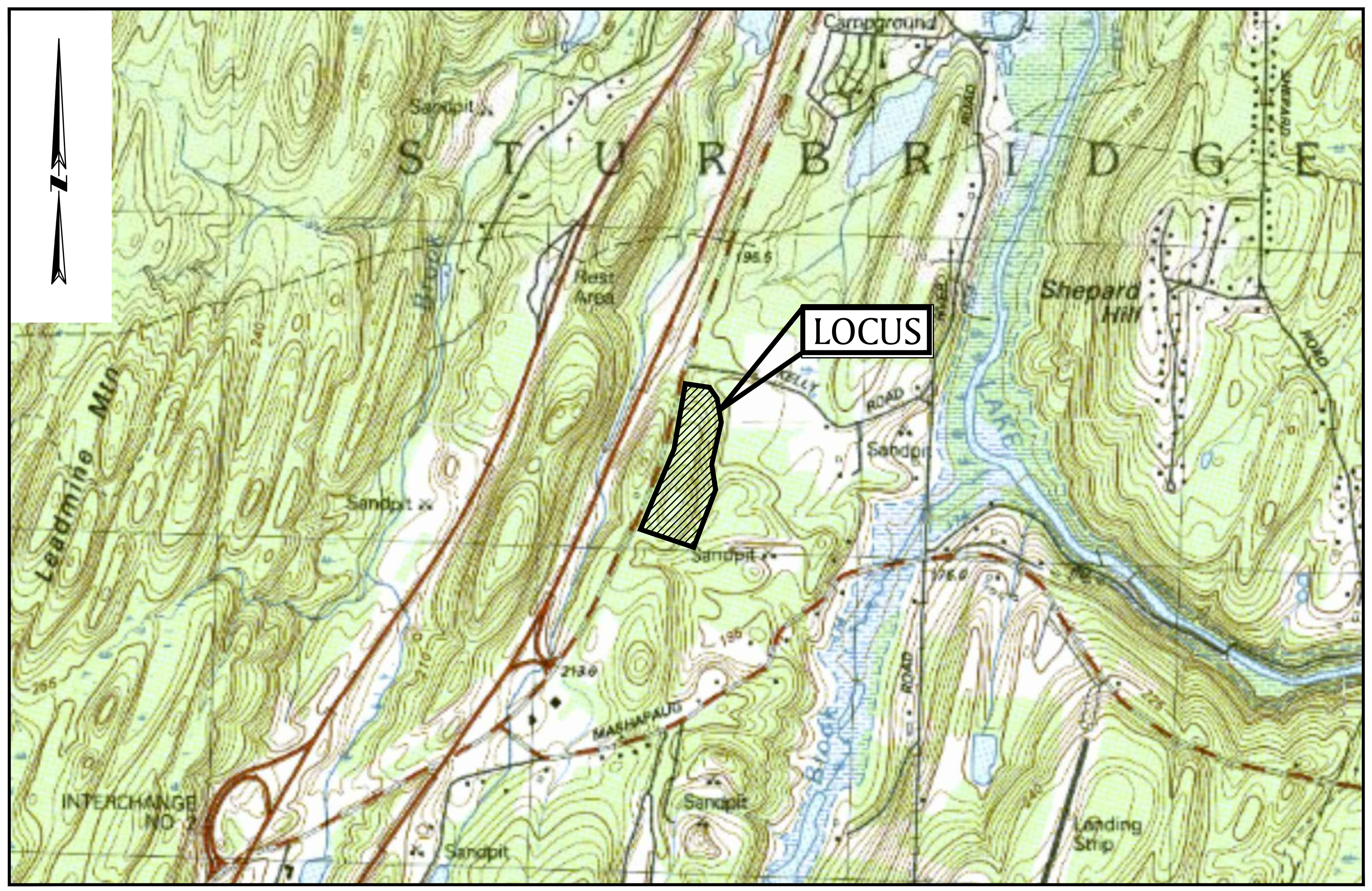
200 ROUTE 15
STURBRIDGE, MASSACHUSETTS

AUGUST 1, 2023

ZONING COMPLIANCE TABLE

CRITERIA: ARTICLE XIV – INTENSITY REGULATIONS (§300–14.2, SPECIAL USE)	REQUIRED	PROPOSED
MINIMUM LOT AREA	1 ACRE	13.92 ACRES
MINIMUM LOT FRONTAGE	200'	1,619.5'±
MINIMUM STREET SETBACK	50'	54.2'
MINIMUM SIDE/REAR YARD SETBACK	30'	192.3'
MAX. LOT COVERAGE (%)	30%	17%
MAXIMUM HEIGHT	35'	N/A

CRITERIA: ARTICLE X – SOLAR ENERGY FACILITIES (§300–10.1 – §300.10.12)	REQUIRED	PROPOSED
MINIMUM FRONT/SIDE/REAR YARD SETBACK	100'	100.6'
MINIMUM RESIDENTIAL LANDSCAPED BUFFER	200'	200.0'



LOCUS MAP

500 0 1,000 2,000 3,000 feet

SCALE: 1" = 1,000±

INDEX OF DRAWINGS

PREPARED FOR:

STURBRIDGE PV, LLC
2420 17TH STREET
DENVER, CO 80202

PREPARED BY:

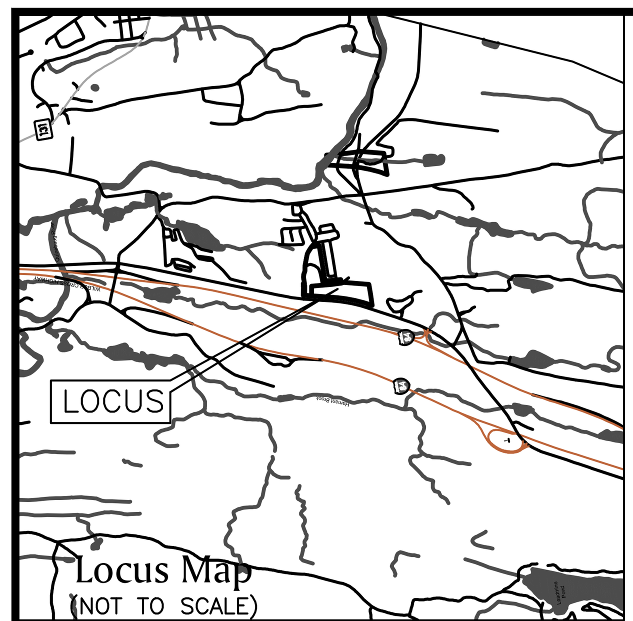
BSC GROUP
349 Main Street - Route 28
W. Yarmouth, Massachusetts
02673
508 778 8919

COMMONWEALTH OF MASSACHUSETTS BRIAN G. YERGATIAN CIVIL No. 46208 REGISTERED PROFESSIONAL ENGINEER

8/1/2023

ISSUED FOR PERMITTING
NOT FOR CONSTRUCTION

JOB NO: 5-0745.00



UTILITY NOTE

EXISTING UTILITIES, WHERE SHOWN HEREON, ARE APPROXIMATE. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROPERLY LOCATING AND COORDINATING ANY ON-SITE ACTIVITY WITH DIG-SAFE AND THE APPROPRIATE UTILITY COMPANY AND MAINTAINING EXISTING UTILITY SYSTEM SERVICE. DIG-SAFE SHALL BE NOTIFIED PER RHODE ISLAND GENERAL LAWS TITLE 39 CHAPTER 39-1.2, AT 1-888-344-7233. NO GUARANTEE IS IMPLIED OR INTENDED AS TO THE ACCURACY, LOCATION OR THAT ALL UTILITIES AND/OR SUBSURFACE STRUCTURES ARE SHOWN. THE CONTRACTOR SHALL VERIFY SIZE, LOCATION AND INVERTS OR UTILITIES AND STRUCTURES AS REQUIRED PRIOR TO THE START OF CONSTRUCTION.

LEGEND

BIT BITUMINOUS
CATCH BASIN
CHAIN LINK FENCE
CONC CONCRETE
DECIDUOUS TREE
DWP DETECTABLE WARNING PAD
DRAIN MANHOLE
DRILL HOLE
ELECTRIC MANHOLE
HYDRANT
IRON ROD FENCE
IR IRON ROD
LIGHT POLE
MANHOLE
PEDESTRIAN SIGNAL
SEWER MANHOLE
SIGN
SWL SINGLE WHITE LINE
TELEPHONE MANHOLE
TC/BC TOP CURB/BOTTOM CURB
TW/BW TOP WALL/BOTTOM WALL
TRAFFIC MASTARM
UTILITY POLE W/LIGHT & TRANSFORMER
VGC VERTICAL GRANITE CURB
WATER GATE
OVERHEAD WIRES
ONE FOOT CONTOUR
FIVE FOOT CONTOUR
UNDERGROUND DRAIN
UNDERGROUND ELECTRIC
UNDERGROUND GAS
UNDERGROUND SEWER
UNDERGROUND TELEPHONE
UNDERGROUND WATER

NAD 1983

OWNER:
30 SWIFT, LLC
SEE PLAN FOR ABUTTING PARCEL OWNER INFORMATION

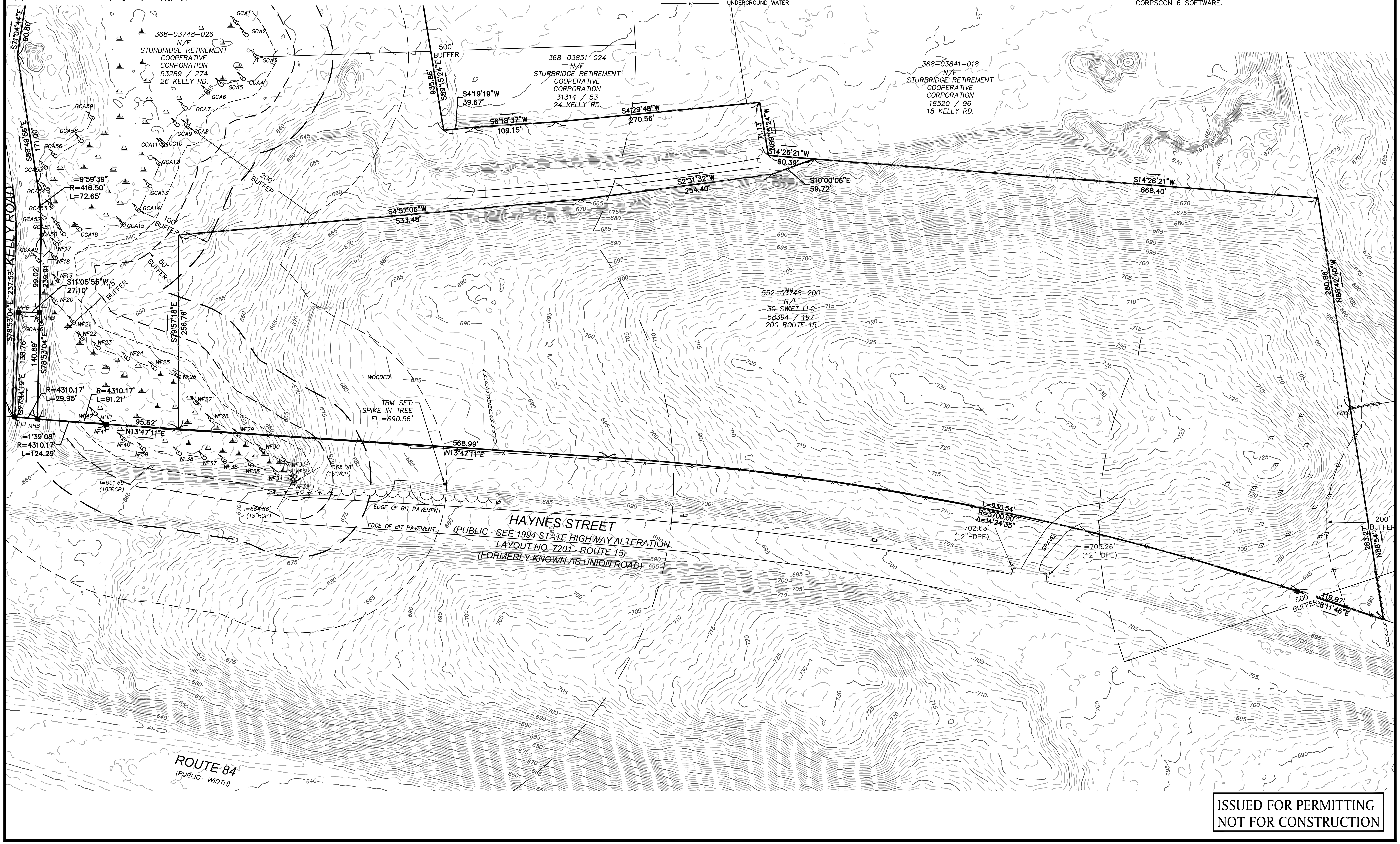
GENERAL NOTES:

1) THE EXISTING CONDITIONS SHOWN HEREON DEPICT THE SUBJECT SITE AS IT APPEARED DURING A FIELD SURVEY CONDUCTED BY BSC GROUP, INC. BETWEEN OCTOBER 11, 2022 AND NOVEMBER 18, 2022.

2) THE ABOVE MENTIONED FIELD SURVEY IS BASED ON NAD 1983 HORIZONTAL AND NAVD 1988 VERTICAL DATUM (TEMPORARY BENCH MARKS (TBM) SET) AS DERIVED FROM GPS OBSERVATIONS MADE AT THE TIME OF THE SURVEY.

*3) THE UTILITIES SHOWN ON THIS PLAN ARE TAKEN FROM LOCATIONS OF SURFACE STRUCTURES AND ALSO RECORD INFORMATION SUPPLIED BY UTILITY COMPANIES AND PB 90 PG 52-62.

4) WETLANDS FLAGS WF17-WF42 WERE FIELD LOCATED BY BSC GROUP AS PART OF AN ON-THE-GROUND SURVEY. WETLAND FLAGS GCA1-GCA16, GCA49-GCA59 AND GCB1-GCB11 ARE SHOWN FROM LATITUDE AND LONGITUDE VALUES PROVIDED BY GODDARD CONSULTING, LLC AND THE LATITUDE AND LONGITUDE VALUES PROVIDED WERE CONVERTED TO MASS STATE PLANE COORDINATE VALUES USING CORPSCON 6 SOFTWARE.



ISSUED FOR PERMITTING
NOT FOR CONSTRUCTION

CHRISTOPHER W. MCNARY #47396 — 08/03/2023
PROFESSIONAL LAND SURVEYOR — DATE

GROUND-MOUNTED PHOTOVOLTAIC SYSTEM

200 ROUTE 15
IN
STURBRIDGE MASSACHUSETTS
(WORCESTER COUNTY)

EXISTING CONDITIONS PLAN

APRIL 26, 2023

REVISIONS:

NO.	DATE	DESC.
1.	6/14/23	REV. WF FLAGS & BUFFERS

PREPARED FOR:
STURBRIDGE PV, LLC
2420 17TH STREET
DENVER, CO 80202

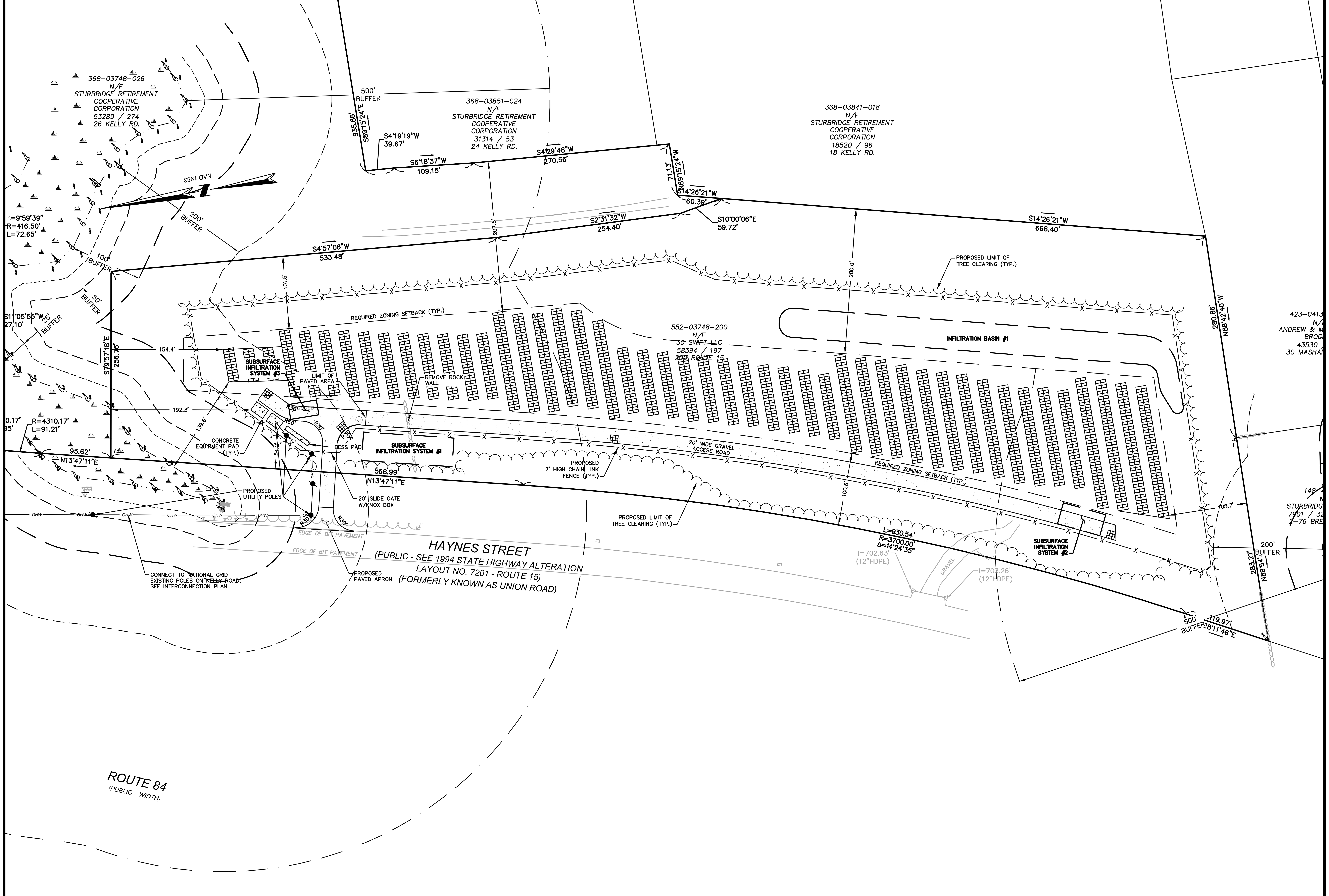
BSC GROUP
349 Main Street - Route 28
West Yarmouth, Massachusetts
02673
508 778 8919

SCALE: 1" = 60'

FILE: \5074500\S\D\5074500EC-2023.dwg
DWG.:5074500EC-2023
JOB. NO: 5-0745.00

GENERAL NOTES

1. THE AREA ENCLOSED BY CHAIN LINK FENCE IS 7.71± ACRES.
2. CONSTRUCTION OF THE PROPOSED SITE IMPROVEMENTS REQUIRES THE CLEARING OF 9.44± ACRES OF WOODLANDS.
3. ALL DISTURBED AREAS WITHIN THE CHAIN LINK FENCE, IF NOT OTHERWISE SPECIFIED, WILL BE LOAMED AND SEEDED WITH A POLLINATOR SEED MIXTURE.



BRIAN G. YERGATIAN PROFESSIONAL ENGINEER — DATE 8/1/23

GROUND-MOUNTED PHOTOVOLTAIC SYSTEM

200 ROUTE 15
IN
STURBRIDGE MASSACHUSETTS
(WORCESTER COUNTY)

LAYOUT & MATERIALS PLAN

AUGUST 1, 2023

REVISIONS:

NO.	DATE	DESC.

ISSUED FOR PERMITTING
NOT FOR CONSTRUCTION

PREPARED FOR:
STURBRIDGE PV, LLC
2420 17TH STREET
DENVER, CO 80202

BSC GROUP
349 Main Street - Route 28
West Yarmouth, Massachusetts 02673
508 778 8919

SCALE: 1" = 60'
0 30 60 120 FEET

FILE: PROJECTS-YAR\5074500\C\D\5074500-SP.dwg
DWG.: DWG
JOB. NO: 5-0745.00

EXAMINATION OF CONDITIONS:

1. THE CONTRACTOR SHALL BE RESPONSIBLE FOR JUDGING THE FULL EXTENT OF WORK REQUIREMENTS INVOLVED. THIS RESPONSIBILITY INCLUDES, BUT IS NOT LIMITED TO, THE FOLLOWING: TRANSPORTATION, PURCHASE, TEMPORARY STORAGE AND MAINTENANCE OF PLANTS; PLANT RE-HANDLING PRIOR TO FINAL INSTALLATION; REMOVAL AND OFF-SITE DISPOSAL OF EXISTING LOAM DETERMINED BY THE ENGINEER TO BE UNACCEPTABLE; PURCHASE, TRANSPORT, AND SUPPLY OF LOAM.
2. IMPORTED LOAM OFTEN CARRIES ANNUAL WEED SEED SUCH AS PERSICARIA, IT IS ADVANTAGEOUS TO ALLOW SOIL TO SETTLE AND WEED SEED TO GERMINATE AND BE MOWED PRIOR TO SITE SEEDING.
3. VERIFY ALL EXISTING UTILITY LINES PRIOR TO PLANTING AND REPORT ANY CONFLICTS TO THE OWNER OR HIS REPRESENTATIVE.

PLANTING NOTES

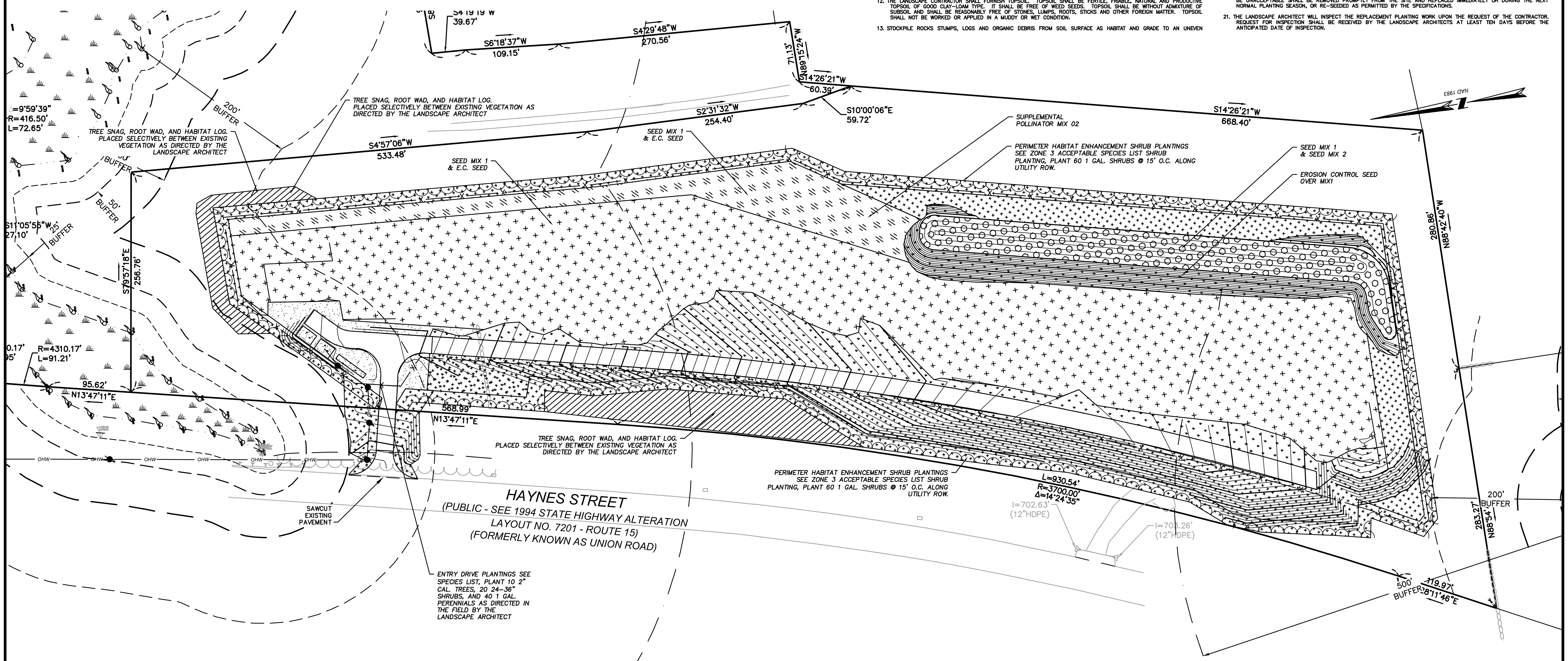
4. ALL PLANT MATERIAL SHALL CONFORM TO THE MINIMUM GUIDELINES ESTABLISHED BY THE AMERICAN STANDARD FOR NURSERY STOCK PUBLISHED BY THE AMERICAN ASSOCIATION OF NURSERYMEN, INC.
5. PLANT MATERIALS SHALL BEAR SAME RELATIONSHIP TO GRADE AS THEY BORE TO GRADE IN THE NURSERY.
6. ALL TREES NOTED FOR CLEARING AND SELECTIVE PRUNING AND THINNING SHALL BE EXECUTED UNDER THE SUPERVISION of A LICENSED ARBORIST.
7. THE CONTRACTOR SHALL CLEARLY MARK LIMITS OF CLEARING AND LIMITS OF SELECTIVE PRUNING AND THINNING, FOR REVIEW BY THE A/E PRIOR TO ANY CLEARING OPERATIONS. VEGETATION THAT IS NOT USED IN HABITAT FEATURES OR REMOVED AS TIMBER PRODUCTS SHALL BE CHIPPED ON SITE AND INCORPORATED INTO TOP SOIL.
8. THE CONTRACTOR SHALL TAKE ALL MEASURES NECESSARY TO PROTECT EXISTING VEGETATION THAT IS TAGGED BY THE A/E, "TO BE SAVED".
9. ALL TREES TO BE SAVED SHALL BE PROTECTED WITH MARKED BOUNDS AT A MINIMUM DISTANCE OF 6', OR AS DIRECTED BY THE LANDSCAPE ARCHITECT.
10. THE A/E RESERVES THE RIGHT TO ADJUST FINAL GRADES IN THE FIELD TO SAVE EXISTING VEGETATION.
11. LOAM AND SEED ALL DISTURBED AREAS UNLESS OTHERWISE INDICATED.
12. THE LANDSCAPE CONTRACTOR SHALL FURNISH TOPSOIL. TOPSOIL SHALL BE FERTILE, FRIABLE, NATURAL AND PRODUCTIVE TOPSOIL OF GOOD CLAY-LOAM TYPE. IT SHALL BE FREE OF WEED SEEDS. TOPSOIL SHALL BE WITHOUT ADMIXTURE OF SUBSOIL AND SHALL BE REASONABLY FREE OF STONES, LUMPS, ROOTS, STICKS AND OTHER FOREIGN MATTER. TOPSOIL SHALL NOT BE WORKED OR APPLIED IN A MUDDY OR WET CONDITION.
13. STOCKPILE ROCKS STUMPS, LOGS AND ORGANIC DEBRIS FROM SOIL SURFACE AS HABITAT AND GRADE TO AN UNEVEN SURFACE.
14. PROVIDE FERTILIZE OR OTHER SOIL AMENDMENTS AS DIRECTED BY THE LANDSCAPE ARCHITECT BASED UPON THE FINDINGS OF THE SOIL TEST REPORT. NO FERTILIZER OR OTHER NUTRIENT AMENDMENT SHALL BE APPLIED WITHOUT COMPLIANCE WITH 330 CMR 31.00–31.11 .

MAINTENANCE PERIOD: 90 DAYS

15. THE MAINTENANCE PERIOD SHALL BEGIN IMMEDIATELY AFTER EACH PLANT IS PLANTED AND SHALL CONTINUE FOR A MINIMUM OF 90 DAYS FOLLOWING THE COMPLETION OF ALL PLANTING INSTALLATIONS, OR UNTIL THE CONDITIONAL ACCEPTANCE OF ALL PLANTING WORK, WHICHEVER IS A LONGER PERIOD OF TIME.
16. AT THE END OF THE MAINTENANCE PERIOD, THE CONTRACTOR WILL REQUEST INSPECTION BY THE OWNERS REPRESENTATIVE AT LEAST 10 DAYS BEFORE THE ANTICIPATED DATE OF INSPECTION.
17. AT THE TIME OF INSPECTION, IF THE PLANT MATERIALS AND WORKMANSHIP ARE ACCEPTABLE TO THE LANDSCAPE ARCHITECTS, THEY SHALL ISSUE A WRITTEN CERTIFICATE OF CONDITIONAL ACCEPTANCE TO THE CONTRACTOR. THE DATE OF THE INSPECTION SHALL ESTABLISH THE END OF THE MAINTENANCE PERIOD AND THE COMMENCEMENT OF THE REQUIRED ONE-YEAR ESTABLISHMENT PERIOD FOR PLANTING WORK.
18. IF IN THE LANDSCAPE ARCHITECTS OPINION, PLANT MATERIALS AND/OR WORKMANSHIP IS DEFICIENT, ACCEPTANCE WILL NOT BE GRANTED, AND THE MAINTENANCE PERIOD FOR ALL THE PLANTS SHALL BE EXTENDED UNTIL PLANT REPLACEMENTS ARE MADE OR OTHER DEFICIENCIES ARE CORRECTED. ALL DEAD AND UNSATISFACTORY PLANTS WILL BE REMOVED PROMPTLY FROM THE PROJECT. REPLACEMENT PLANTS SHALL CONFORM IN ALL RESPECTS TO THE SPECIFICATIONS FOR THE ORIGINAL PLANTS AND SHALL BE PLANTED IN THE SAME MANNER.

ESTABLISHMENT PERIOD: ONE YEAR

19. THE PURPOSE OF THE ESTABLISHMENT PERIOD IS TO NURTURE PLANTS AND SEEDING THROUGH AT LEAST ONE FULL GROWING SEASON AND ONE FULL WINTER. ALL PLANTS SHALL BE INSPECTED BY THE ENGINEER ONE YEAR AFTER CONDITIONAL ACCEPTANCE AND SHALL BE ALIVE AND IN SATISFACTORY GROWTH AT THE END OF THAT TIME. THE CONTRACTOR IS RESPONSIBLE FOR ARRANGING INSPECTION EARLY ENOUGH IN THE SEASON TO ALLOW ADEQUATE TIME TO PROCURE AND INSTALL REPLACEMENT MATERIAL.
20. AT THE END OF THE ESTABLISHMENT PERIOD, EACH PLANT/ SEED TYPE SHALL SHOW HEALTHY GROWTH ON AT LEAST 75 PERCENT OF ITS TERMINAL STEMS, AS DETERMINED BY THE ENGINEER. DETERMINATION OF HEALTHY GROWTH SHALL INCLUDE, BUT IS NOT NECESSARILY LIMITED TO, VIABLE LEAVES (IN SEASON) AND TERMINAL BUDS, PLANTS FOUND TO BE UNACCEPTABLE SHALL BE REMOVED PROMPTLY FROM THE SITE AND REPLACED IMMEDIATELY OR DURING THE NEXT NORMAL PLANTING SEASON, OR RE-SEEDED AS PERMITTED BY THE SPECIFICATIONS.
21. THE LANDSCAPE ARCHITECT WILL INSPECT THE REPLACEMENT PLANTING WORK UPON THE REQUEST OF THE CONTRACTOR. REQUEST FOR INSPECTION SHALL BE RECEIVED BY THE LANDSCAPE ARCHITECTS AT LEAST TEN DAYS BEFORE THE ANTICIPATED DATE OF INSPECTION.



BASE SEED MIXES

POLLINATOR MIXES ARE BEST SPREAD BY BROADCASTING USING A CYCLONE FERTILIZER SPREADER PRIOR TO HYDROSEEDING OR HYDROMULCHING. BROADCASTING NATIVE WARM-SEASON GRASS AND FORB SEED ARE IRREGULAR AND REQUIRE THE USE OF A CARRIER TO ENSURE THE MIXTURE FLOWS CORRECTLY THROUGH THE SPREADER AND THE SEED IS DISTRIBUTED EVENLY ACROSS THE FIELD.

COVER CROP HYDROSEEDED OVER BASE SEED DURING ESTABLISHMENT

ALL SEEDED AREAS TO BEGIN WITH A COVER CROP SELECTED RELATIVE TO SEASON SEED AT 20 LBS/ACRE WITH A COVER CROP. FOR A COVER CROP USE JAPANESE MILLET (10 LBS/ACRE; 1 MAY TO 31 AUG), BARNYARD GRASS (10 LBS/ACRE; 1 MAY TO 31 AUG), OR GRAIN RYE (30 LBS/ACRE; 1 SEPT TO 30 APR).

LOW UPLAND POLLINATOR MIX 1 UNDER ARRAY UNDER 3' PART SHADE
1 LB/ 1000 FT.
ERNMX-612 OR EQUIVALENT
94.9% FESTUCA OVINA, (SHEEP FESCUE)
2.5% ASCLEPIAS TUBEROSA (BUTTERFLY MILKWEED)
2.0% CHAMAECRISTA FASCICULATA, PA ECOTYPE (PARTRIDGE PEA)
0.3% OENOTHERA FRUTICOSA VAR. FRUTICOSA (SUNDROPS)
0.3% SISYRINCHIUM ANGUSTIFOLIUM (NARROWLEAF BLUE EYED GRASS)

EROSION CONTROL SEED (OVER MIX 1 FOR STEEP SLOPES) UNDER 3'
2 LB/ 1000 FT.
70% LOLIUM PERENNE, TETRAPLOID (PERENNIAL RYEGRASS,TETRAPLOID)
30% AVENA SATIVA, (OATS)

POLLINATOR FRIENDLY TURF
4 LB/ 1000 FT.
ERNMX-186
LOW GRASS MIX WITH RED AND WHITE CLOVER

BASIN MIX 2 OUTSIDE ARRAY FULL SUN TRANSITIONAL MOISTURE
1 LB/ 1000 SF
ERNMX 610
37.0% SCHIZACHYRIUM SCOPARIUM,(LITTLE BLUESTEM,)
36.3% BOUTELOUA CURTIPENDULA, BUTTE (SIDEOATS GRAMA, BUTTE)
4.0% CHAMAECRISTA FASCICULATA, (PARTRIDGE PEA)
4.0% COREOPSIS LANCEOLATA (LANCELEAF COREOPSIS)
4.0% ECHINACEA PURPUREA (PURPLE CONEFLOWER)
3.3% RUDBECKIA HIRTA (BLACKEYED SUSAN)
2.3% HELIOPSIS HELIANTHOIDES, (OXEYE SUNFLOWER)
1.6% PENSTEMON DIGITALIS (TALL WHITE BEARDTONGUE)
1.5% ASCLEPIAS TUBEROSA (BUTTERFLY MILKWEED)
0.8% LIATRIS SPICATA (MARSH BLAZING STAR)
0.7% SENNA HEBECARPA, (WILD SENNA,)
0.6% ZIZIA AUREA (GOLDEN ALEXANDERS)
0.5% ASCLEPIAS INCARNATA, (SWAMP MILKWEED)
0.5% GEUM CANADENSE, (WHITE AVENS,)
0.5% MONARDA FISTULOSA, (WILD BERGAMOT)
0.5% PYCNANTHEMUM TENUIFOLIUM (NARROWLEAF MOUNTAINMINT)
0.4% ASTER LAEVIS, NY ECOTYPE (SMOOTH BLUE ASTER, NY ECOTYPE)
0.4% ASTER NOVAE-ANGLIAE, (NEW ENGLAND ASTER,)
0.3% BAPTISIA AUSTRALIS, SOUTHERN (BLUE FALSE INDIGO, SOUTHERN)
0.3% SISYRINCHIUM ANGUSTIFOLIUM (NARROWLEAF BLUE EYED GRASS)
0.2% OENOTHERA FRUTICOSA VAR. FRUTICOSA(SUNDROPS)
0.2% SOLIDAGO NEMORALIS, (GRAY GOLDENROD)
0.1% ASTER PRENANTHOIDES, (ZIGZAG ASTER)

POLLINATOR MIX 2 OUTSIDE ARRAY FULL SUN UNDER 4'
1 LB/ 1000 FT.
ERNMX-146 OR EQUIVALENT
26.4% LOLIUM PERENNE, TETRAPLOID (PERENNIAL RYEGRASS, TETRAPLOID)
21.0% DACTYLIS GLOMERATA, POTOMAC (ORCHARDGRASS, POTOMAC)
18.9% POA PRATENSIS, 'GINGER' (KENTUCKY BLUEGRASS, 'GINGER' (PASTURE TYPE)
12.0% BROMUS BIEBERSTEINII, 'FLEET' (MEADOW BROME, 'FLEET')
5.7% TRIFOLIUM HYBRIDUM (ALSIKE CLOVER)
5.0% FESTUCA ELATIOR X LOLIUM PERENNE, DUO (FESTULOLIUM, 'DUO')
4.8% TRIFOLIUM PRATENSE, MEDIUM, (RED CLOVER, MEDIUM)
2.0% LOTUS CORNICULATUS, 'LEO' (BIRD'S FOOT TREFOIL, 'LEO')
1.4% CHAMAECRISTA FASCICULATA, (PARTRIDGE PEA,)
1.0% LINUM PERENNE (PERENNIAL BLUE FLAX)
0.9% COREOPSIS LANCEOLATA (LANCELEAF COREOPSIS)
0.5% CHRYSANTHEMUM LEUCANTHEMUM (OXEYE DAISY)
0.4% SOLIDAGO NEMORALIS, (GRAY GOLDENROD)

SHADE PERIMETER POLLINATOR MIX
1 LB/ 1000 FT.
ERNMX-132-1
29.0% PANICUM CLANDESTINUM, TIOGA (DEERTONGUE, TIOGA)
20.0% LOLIUM MULTIFLORUM (ANNUAL RYEGRASS)
15.0% ELYMUS VIRGINICUS, MADISON-NY ECOTYPE (VIRGINIA WILDRYE,
15.0% PANICUM VIRGATUM, 'SHELTER' (SWITCHGRASS, 'SHELTER')
10.0% FESTUCA RUBRA (CREEPING RED FESCUE)
5.0% AGROSTIS PERENNANS, ALBANY PINE (AUTUMN BENTGRASS)
3.0% CAREX VULPINOIDEA, (FOX SEDGE)
3.0% CHAMAECRISTA FASCICULATA, (PARTRIDGE PEA)

LEGEND

- POLLINATOR MIX1
- EROSION CONTROL SEED OVER MIX1
- POLLINATOR MIX2
- NESTING FEATURE FOCUS AREA
- POLLINATOR FRIENDLY TURF SERVICE AREA
- SHADE PERIMETER POLLINATOR MIX
- LOW BASIN POLLINATOR MIX

NOTE:
PERIMETER HABITAT TREE AND SHRUB PLANTINGS TYPICAL PER POLLINATOR PROTECTION SPECIFICATIONS SEE SCHEMATIC PLANT LISTS AND SEED SPECIFICATIONS..

COMMONWEALTH OF MASSACHUSETTS
BRIAN G. YERGATIAN
CIVIL
No. 42205
REGISTERED
PROFESSIONAL ENGINEER

8/1/23

BRIAN G. YERGATIAN PROFESSIONAL ENGINEER | DATE

GROUND-MOUNTED PHOTOVOLTAIC SYSTEM

200 ROUTE 15
IN
STURBRIDGE
MASSACHUSETTS
(WORCESTER COUNTY)

PLANTING PLAN

AUGUST 1, 2023

REVISIONS:

NO.	DATE	DESC.

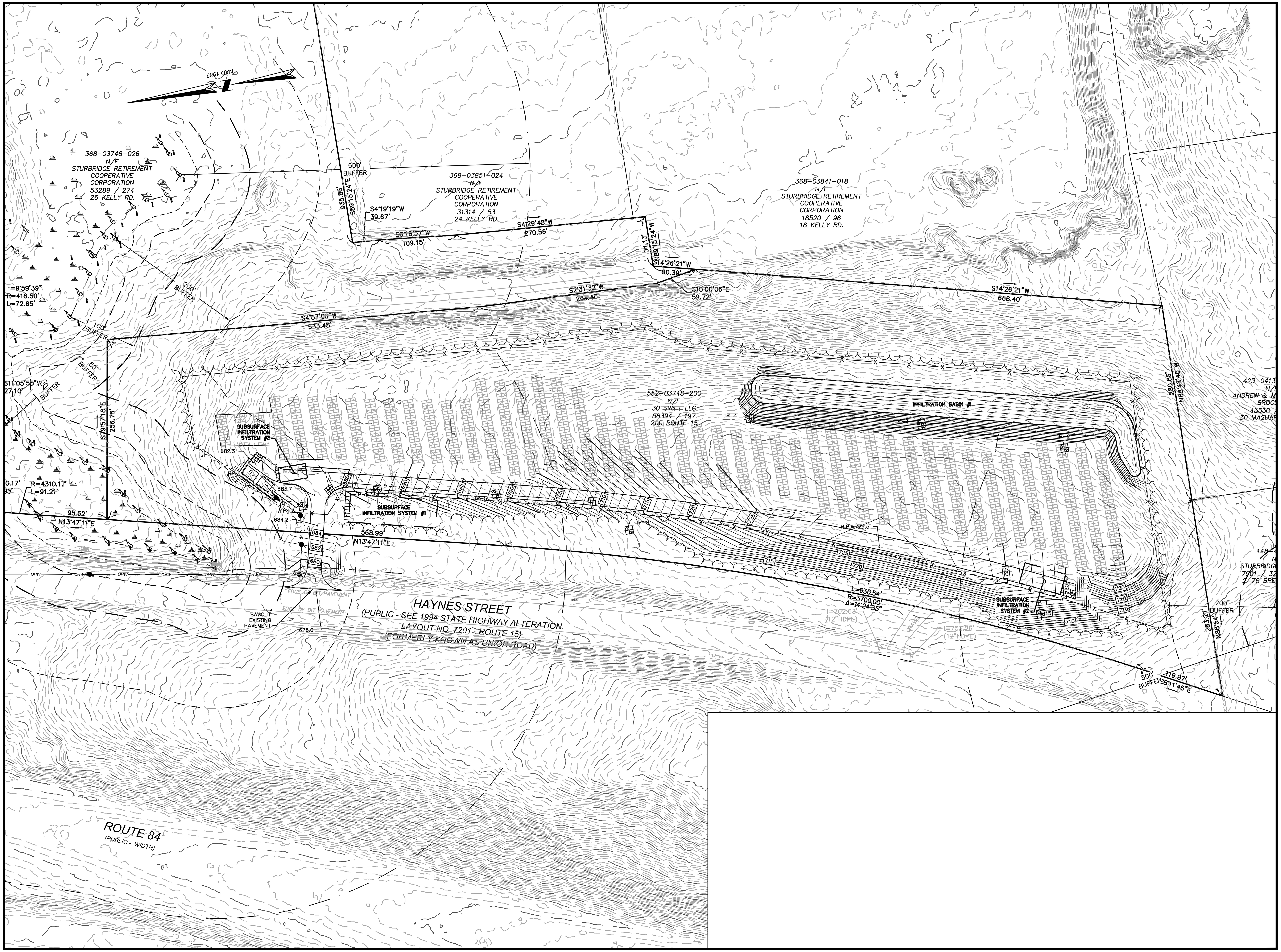
ISSUED FOR PERMITTING
NOT FOR CONSTRUCTION

PREPARED FOR:
STURBRIDGE PV, LLC
2420 17TH STREET
DENVER, CO 80202

BSC GROUP
349 Main Street - Route 28
West Yarmouth, Massachusetts
02673
508 778 8919

SCALE: 1" = 60'
0 30 60 120 FEET

FILE: PROJECTS-YAR\5074500\C\D\5074500-SP.dwg
DWG.: DWG
JOB. NO: 5-0745.00



BRIAN G. YERGATIAN
PROFESSIONAL ENGINEER

8/1/23

DATE

GROUND-MOUNTED PHOTOVOLTAIC SYSTEM

200 ROUTE 15

IN

STURBRIDGE
MASSACHUSETTS
(WORCESTER COUNTY)

GRADING PLAN

AUGUST 1, 2023

REVISIONS:

NO.	DATE	DESC.

ISSUED FOR PERMITTING
NOT FOR CONSTRUCTION

PREPARED FOR:
STURBRIDGE PV, LLC
2420 17TH STREET
DENVER, CO 80202

BSC GROUP
349 Main Street - Route 28
West Yarmouth, Massachusetts
02673
508 778 8919

SCALE: 1" = 60'

0 30 60 120 FEET

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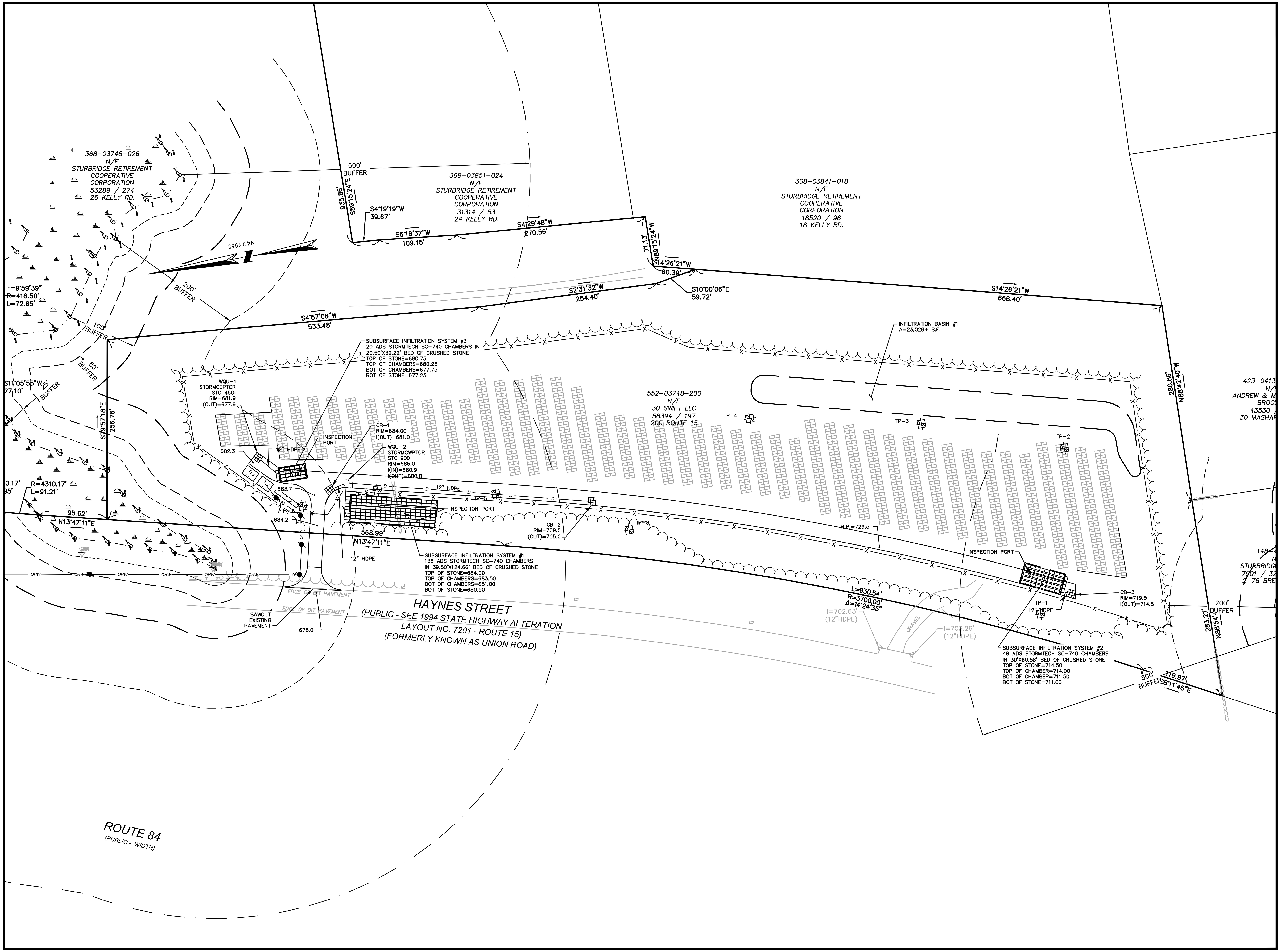


8/1/23

BRIAN G. YERGATIAN
PROFESSIONAL ENGINEER

DATE

GROUND-MOUNTED PHOTOVOLTAIC SYSTEM

200 ROUTE 15

IN

STURBRIDGE MASSACHUSETTS

(WORCESTER COUNTY)

DRAINAGE PLAN

AUGUST 1, 2023

REVISIONS:

NO.	DATE	DESC.

ISSUED FOR PERMITTING
NOT FOR CONSTRUCTION

PREPARED FOR:

STURBRIDGE PV, LLC
2420 17TH STREET
DENVER, CO 80202

BSC GROUP

349 Main Street - Route 28
West Yarmouth, Massachusetts
02673

508 778 8919

SCALE: 1" = 60'

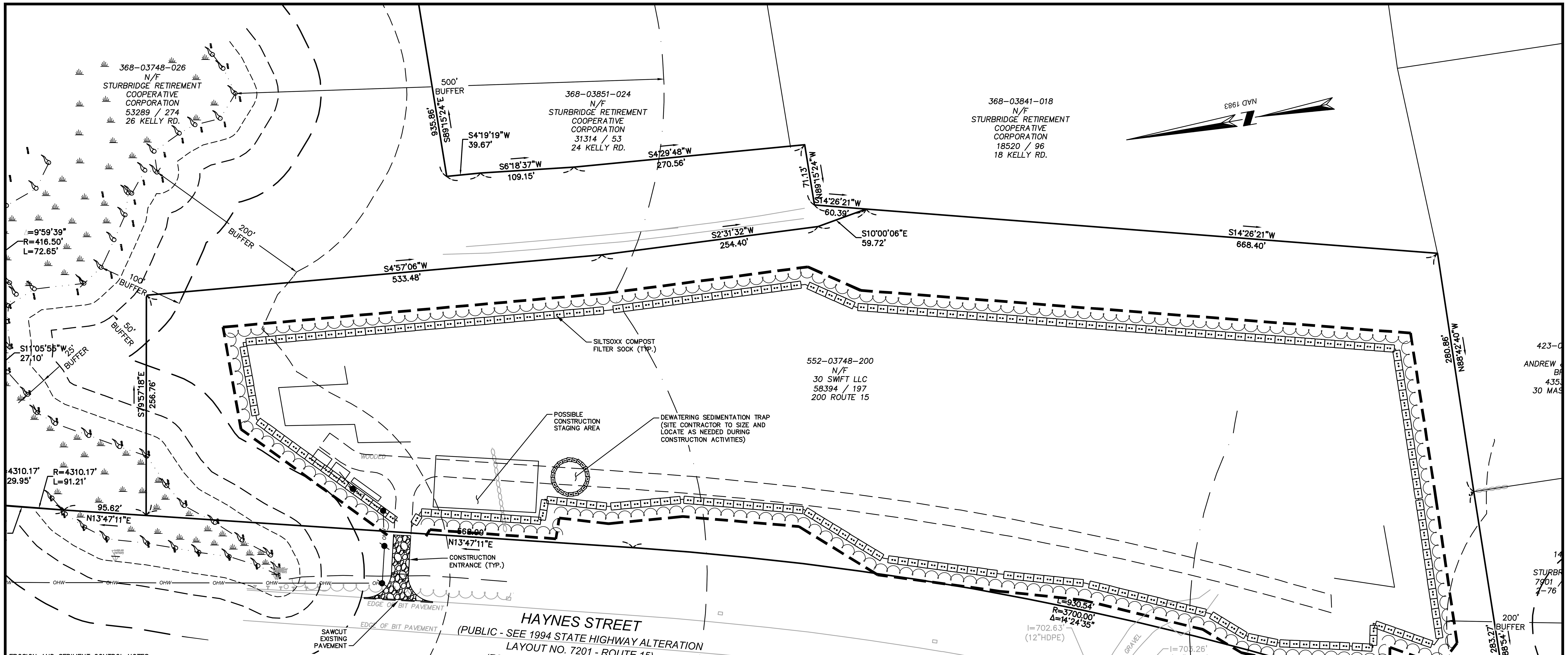
0 30 60 120 FEET

FILE: PROJECTS-YAR\5074500\C\D\5074500-SP.dwg

DWG.: DWG

JOB. NO: 5-0745.00

SHEET 6 OF 9

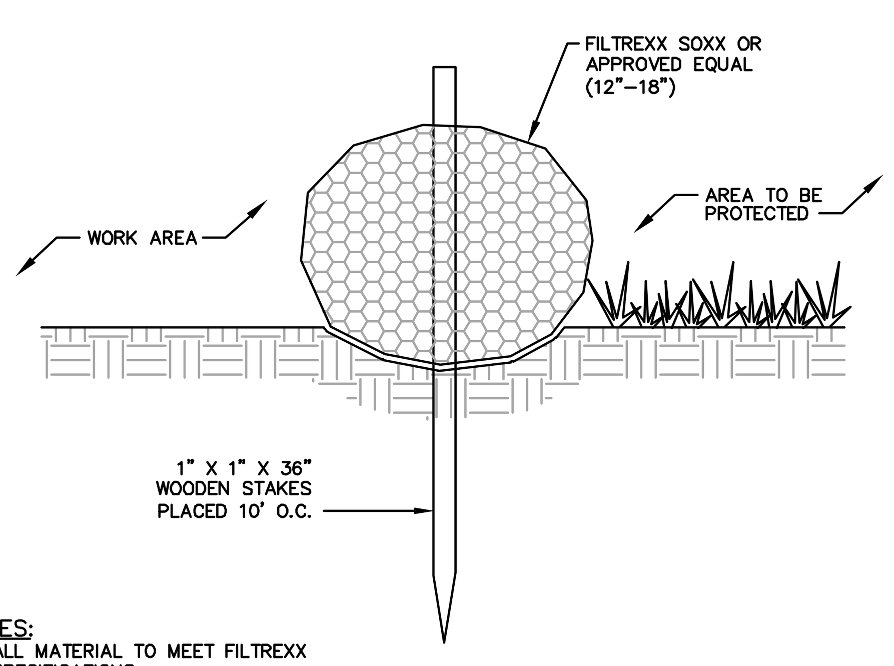


EROSION AND SEDIMENT CONTROL NOTES:

1. PRIOR TO ANY LAND DISTURBANCE ACTIVITIES COMMENCING ON THE SITE, THE DEVELOPER SHALL PHYSICALLY MARK LIMITS OF NO LAND DISTURBANCE ON THE SITE WITH TAPE, SIGNS, OR ORANGE CONSTRUCTION FENCE, SO THAT WORKERS CAN SEE THE AREAS TO BE PROTECTED. THE PHYSICAL MARKERS SHALL REMAIN IN PLACE UNTIL A CERTIFICATE OF COMPLETION HAS BEEN ISSUED.
2. APPROPRIATE EROSION AND SEDIMENT CONTROL MEASURES SHALL BE INSTALLED PRIOR TO SOIL DISTURBANCE. MEASURES SHALL BE TAKEN TO CONTROL EROSION WITHIN THE PROJECT AREA. SEDIMENT IN RUNOFF WATER SHALL BE TRAPPED AND RETAINED WITHIN THE PROJECT AREA. WETLAND AREAS AND SURFACE WATERS SHALL BE PROTECTED FROM SEDIMENT.
3. MINIMIZE TOTAL AREA OF DISTURBANCE AND PROTECT NATURAL FEATURES AND SOIL.
4. THE CONTRACTOR SHALL SEQUENCE ALL ACTIVITIES TO MINIMIZE SIMULTANEOUS AREAS OF DISTURBANCE. MASS CLEARING AND GRADING OF THE ENTIRE SITE SHALL BE AVOIDED.
5. MINIMIZE SOIL EROSION AND CONTROL SEDIMENTATION DURING CONSTRUCTION.
6. DIVERT UNCONTAMINATED WATER AROUND DISTURBED AREAS.
7. INSTALL AND MAINTAIN ALL EROSION AND SEDIMENT CONTROL MEASURES IN ACCORDANCE WITH THE MANUFACTURER'S SPECIFICATIONS AND GOOD ENGINEERING PRACTICES OR IN ACCORDANCE WITH THE 2017 EPA CONSTRUCTION GENERAL PERMIT.
8. PROTECT AND MANAGE ON AND OFF-SITE MATERIAL STORAGE AREAS (OVERBURDEN AND STOCKPILES OF DIRT, BORROW AREAS, OR OTHER AREAS USED SOLELY BY THE PERMITTED PROJECT ARE CONSIDERED A PART OF THE PROJECT).
9. COMPLY WITH APPLICABLE FEDERAL, STATE AND LOCAL LAWS AND REGULATIONS INCLUDING WASTE DISPOSAL, SANITARY OR SEWER REGULATIONS, AND AIR QUALITY REQUIREMENTS, INCLUDING DUST CONTROL.
10. SEDIMENT SHALL BE REMOVED ONCE THE VOLUME REACHES 1/4 TO 1/2 THE HEIGHT OF THE EROSION CONTROL DEVICE. SEDIMENT SHALL BE REMOVED FROM SILT FENCE PRIOR TO REACHING THE LOAD-BEARING CAPACITY OF THE SILT FENCE WHICH MAY BE LOWER THAN 1/4 TO 1/2 THE HEIGHT.
11. SEDIMENT FROM SEDIMENT TRAPS OR SEDIMENTATION PONDS SHALL BE REMOVED WHEN DESIGN CAPACITY HAS BEEN REDUCED BY 50 PERCENT.
12. BMPS TO BE USED FOR INFILTRATION AFTER CONSTRUCTION SHALL NOT BE USED AS BMPS DURING CONSTRUCTION UNLESS OTHERWISE APPROVED IN WRITING BY THE ENGINEER AND THE TOWN OF STURBRIDGE. MANY INFILTRATION TECHNOLOGIES ARE NOT DESIGNED TO HANDLE THE HIGH CONCENTRATIONS OF SEDIMENTS TYPICALLY FOUND IN CONSTRUCTION RUNOFF, AND THUS MUST BE PROTECTED FROM CONSTRUCTION RELATED SEDIMENT LOADINGS.
13. SOIL STOCKPILES MUST BE STABILIZED OR COVERED AT THE END OF EACH WORKDAY. STOCKPILE SIDE SLOPES SHALL NOT BE GREATER THAN 2:1. ALL STOCKPILES SHALL BE SURROUNDED BY SEDIMENT CONTROLS.
14. FOR ACTIVE CONSTRUCTION AREAS SUCH AS BORROW OR STOCKPILE AREAS, ROADWAY IMPROVEMENTS AND AREAS WITHIN 50 FEET OF A BUILDING UNDER CONSTRUCTION, A PERIMETER SEDIMENT CONTROL SYSTEM SHALL BE INSTALLED AND MAINTAINED TO CONTAIN SOIL.

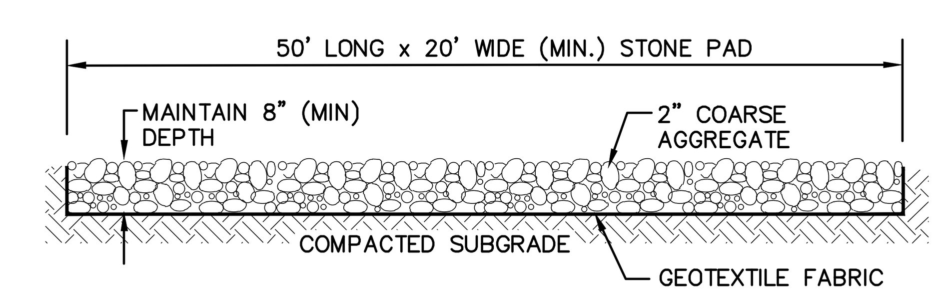
EROSION AND SEDIMENT CONTROL NOTES (CONT.):

15. A TRACKING PAD OR OTHER APPROVED STABILIZATION METHOD SHALL BE CONSTRUCTED AT ALL ENTRANCE/EXITS POINTS OF THE SITE TO REDUCE THE AMOUNT OF SOIL CARRIED ONTO ROADWAYS AND OFF THE SITE.
16. ON THE CUT SIDE OF ROADS, DITCHES SHALL BE STABILIZED IMMEDIATELY WITH ROCK RIP-RAP OR OTHER NON-ERODIBLE LINERS, OR WHERE APPROPRIATE, VEGETATIVE MEASURES SUCH AS HYDROSEEDING OR JUTE MATTING
17. PERMANENT SEEDING SHALL BE UNDERTAKEN IN THE SPRING FROM MARCH THROUGH MAY, AND IN LATE SUMMER AND EARLY FALL FROM AUGUST TO OCTOBER 15. DURING THE PEAK SUMMER MONTHS AND IN THE FALL AFTER OCTOBER 15, WHEN SEEDING IS FOUND TO BE IMPRACTICAL, APPROPRIATE TEMPORARY STABILIZATION SHALL BE APPLIED. PERMANENT SEEDING MAY BE UNDERTAKEN DURING THE SUMMER IF PLANS PROVIDE FOR ADEQUATE MULCHING AND WATERING.
18. ALL SLOPES STEEPER THAN 3:1 (H:V, 33.3%), AS WELL AS PERIMETER DIKES, SEDIMENT BASINS OR TRAPS, AND EMBANKMENTS MUST, UPON COMPLETION, BE IMMEDIATELY STABILIZED WITH SOD, SEED AND ANCHORED STRAW MULCH, OR OTHER APPROVED STABILIZATION MEASURES. AREAS OUTSIDE OF THE PERIMETER SEDIMENT CONTROL SYSTEM MUST NOT BE DISTURBED.
19. TEMPORARY SEDIMENT TRAPPING DEVICES MUST NOT BE REMOVED UNTIL PERMANENT STABILIZATION IS ESTABLISHED IN ALL CONTRIBUTORY DRAINAGE AREAS.
20. ALL TEMPORARY EROSION AND SEDIMENT CONTROL MEASURES SHALL BE REMOVED AFTER FINAL SITE STABILIZATION DISTURBED SOIL AREAS RESULTING FROM THE REMOVAL OF TEMPORARY MEASURES SHALL BE PERMANENTLY STABILIZED WITHIN 30 DAYS OF REMOVAL.
21. PROPERLY MANAGE ON-SITE CONSTRUCTION AND WASTE MATERIALS.
22. PREVENT OFF-SITE VEHICLE TRACKING OF SEDIMENTS,
23. DUST SHALL BE CONTROLLED AT THE SITE.
24. ALL PREVIOUSLY DISTURBED LAND SHALL BE STABILIZED BY APPROVED METHODS AFTER 14 DAYS IF LEFT UNDISTURBED, THIS INCLUDES STOCKPILES, CONSTRUCTION ENTRANCES, GRADED AREAS AND OTHER CONSTRUCTION ACTIVITY RELATED CLEARING,
25. IF WORK IS HALTED OVER WINTER MONTHS THE CONTRACTOR SHALL BE RESPONSIBLE FOR STABILIZING THE AREA THROUGH GROUND COVER PRACTICES.



NOTES:
1. ALL MATERIAL TO MEET FILTREXX SPECIFICATIONS.
2. FILTER MEDIA FILL TO MEET APPLICATION REQUIREMENTS.
3. COMPOST MATERIAL TO BE DISPERSED ON SITE, AS DETERMINED BY THE ENGINEER.

SILTSOXX COMPOST FILTER SOCK
SCALE: NONE



TEMPORARY CONSTRUCTION ENTRANCE
SCALE: NONE

LEGEND

STAKED STRAW WATTLES (LIMIT OF WORK)

LIMIT OF WORK

BRIAN G. YERGATIAN CIVIL No. 46206 — COMMONWEALTH OF MASSACHUSETTS — REGISTERED PROFESSIONAL ENGINEER

8/1/23

BRIAN G. YERGATIAN, PROFESSIONAL ENGINEER — DATE

GROUND-MOUNTED PHOTOVOLTAIC SYSTEM
200 ROUTE 15
IN
STURBRIDGE MASSACHUSETTS
(WORCESTER COUNTY)

EROSION & SEDIMENT CONTROL PLAN

AUGUST 1, 2023

REVISIONS:

NO.	DATE	DESC.

ISSUED FOR PERMITTING
NOT FOR CONSTRUCTION

PREPARED FOR:
STURBRIDGE PV, LLC
2420 17TH STREET
DENVER, CO 80202

BSC GROUP
349 Main Street - Route 28
West Yarmouth, Massachusetts
02673
508 778 8919

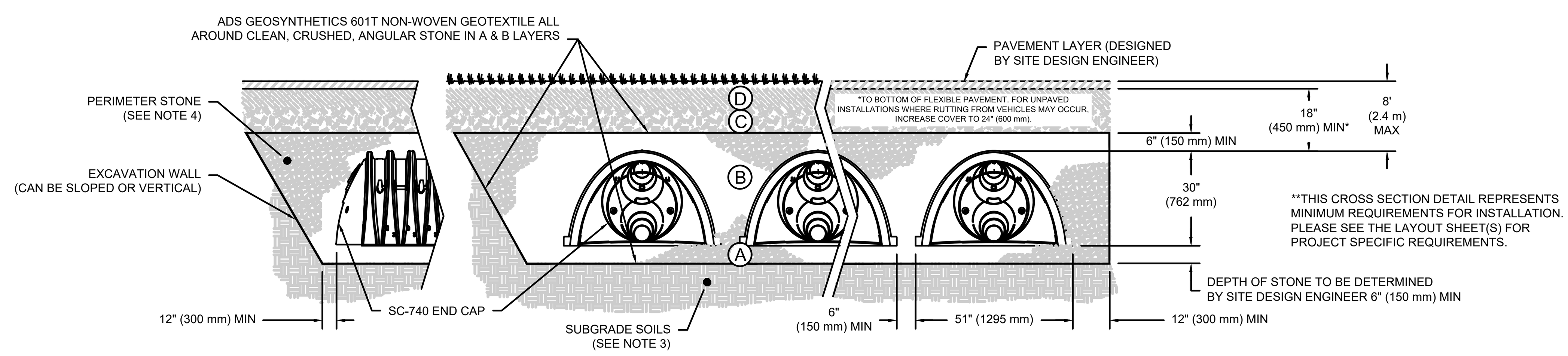
SCALE: 1" = 60'
0 30 60 120 FEET

FILE: PROJECTS-YAR\5074500\C\D\5074500-SP.dwg
DWG.: DWG
JOB. NO: 5-0745.00
SHEET 7 OF 9

ACCEPTABLE FILL MATERIALS: STORMTECH SC-740 CHAMBER SYSTEMS

MATERIAL LOCATION		DESCRIPTION	AASHTO MATERIAL CLASSIFICATIONS	COMPACTION / DENSITY REQUIREMENT
D	**FINAL FILL:** FILL MATERIAL FOR LAYER 'D' STARTS FROM THE TOP OF THE 'C' LAYER TO THE BOTTOM OF FLEXIBLE PAVEMENT OR UNPAVED FINISHED GRADE ABOVE. NOTE THAT PAVEMENT SUBBASE MAY BE PART OF THE 'D' LAYER.	ANY SOIL/ROCK MATERIALS, NATIVE SOILS, OR PER ENGINEER'S PLANS. CHECK PLANS FOR PAVEMENT SUBGRADE REQUIREMENTS.	N/A	PREPARE PER SITE DESIGN ENGINEER'S PLANS. PAVED INSTALLATIONS MAY HAVE STRINGENT MATERIAL AND PREPARATION REQUIREMENTS.
C	**INITIAL FILL:** FILL MATERIAL FOR LAYER 'C' STARTS FROM THE TOP OF THE EMBEDMENT STONE ('B' LAYER) TO 18" (450 mm) ABOVE THE TOP OF THE CHAMBER. NOTE THAT PAVEMENT SUBBASE MAY BE A PART OF THE 'C' LAYER.	GRANULAR WELL-GRADED SOIL/AGGREGATE MIXTURES, <35% FINES OR PROCESSED AGGREGATE. MOST PAVEMENT SUBBASE MATERIALS CAN BE USED IN LIEU OF THIS LAYER.	AASHTO M145[1] A-1, A-2-4, A-3 OR AASHTO M43[1] 3, 357, 4, 467, 5, 56, 57, 6, 67, 68, 7, 78, 8, 89, 9, 10	BEGIN COMPACTIONS AFTER 12" (300 mm) OF MATERIAL OVER THE CHAMBERS IS REACHED. COMPACT ADDITIONAL LAYERS IN 6" (150 mm) MAX LIFTS TO A MIN. 95% PROCTOR DENSITY FOR WELL GRADED MATERIAL AND 95% RELATIVE DENSITY FOR PROCESSED AGGREGATE MATERIALS. ROLLER GROSS VEHICLE WEIGHT NOT TO EXCEED 12,000 lbs (53 kN). DYNAMIC FORCE NOT TO EXCEED 20,000 lbs (89 kN).
B	**EMBEDMENT STONE:** FILL SURROUNDING THE CHAMBERS FROM THE FOUNDATION STONE ('A' LAYER) TO THE 'C' LAYER ABOVE.	CLEAN, CRUSHED, ANGULAR STONE	AASHTO M43[1] 3, 357, 4, 467, 5, 56, 57	NO COMPACTION REQUIRED.
A	**FOUNDATION STONE:** FILL BELOW CHAMBERS FROM THE SUBGRADE UP TO THE FOOT (BOTTOM) OF THE CHAMBER.	CLEAN, CRUSHED, ANGULAR STONE	AASHTO M43[1] 3, 357, 4, 467, 5, 56, 57	PLATE COMPACT OR ROLL TO ACHIEVE A FLAT SURFACE.[2,3]

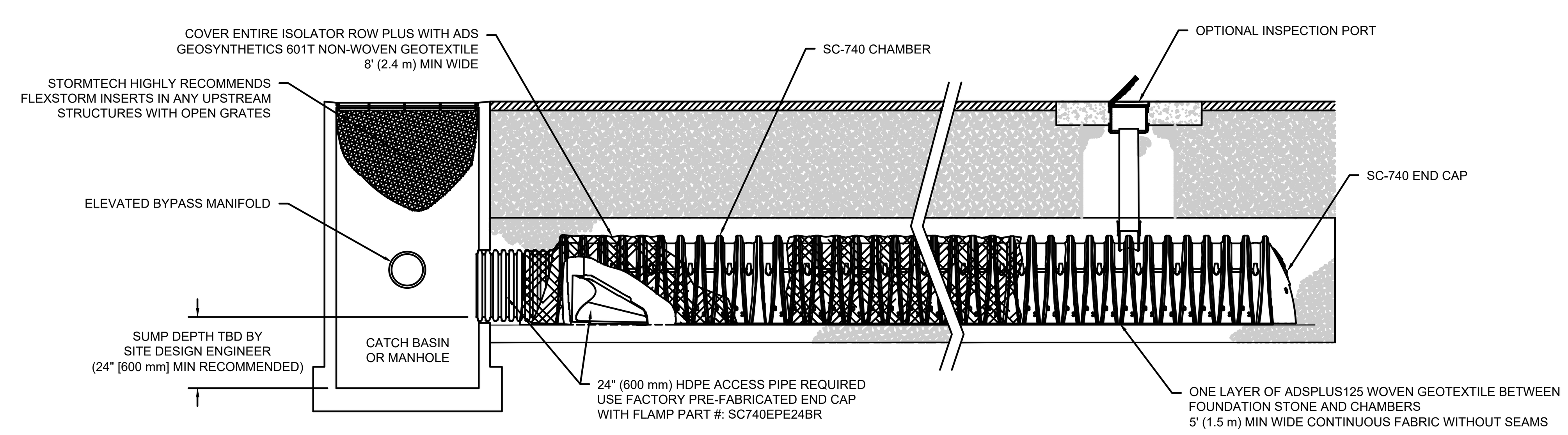
PLEASE NOTE:
1. THE LISTED AASHTO DESIGNATIONS ARE FOR GRADATIONS ONLY. THE STONE MUST ALSO BE CLEAN, CRUSHED, ANGULAR. FOR EXAMPLE, A SPECIFICATION FOR #4 STONE WOULD STATE: "CLEAN, CRUSHED, ANGULAR NO. 4 (AASHTO M43) STONE".
2. STORMTECH COMPACTION REQUIREMENTS ARE MET FOR 'A' LOCATION MATERIALS WHEN PLACED AND COMPACTED IN 6" (150 mm) (MAX) LIFTS USING TWO FULL COVERAGES WITH A VIBRATORY COMPACTOR.
3. WHERE INFILTRATION SURFACES MAY BE COMPROMISED BY COMPACTION, FOR STANDARD DESIGN LOAD CONDITIONS, A FLAT SURFACE MAY BE ACHIEVED BY RAKING OR DRAGGING WITHOUT COMPACTION EQUIPMENT. FOR SPECIAL LOAD DESIGNS, CONTACT STORMTECH FOR COMPACTION REQUIREMENTS.
4. ONCE LAYER 'C' IS PLACED, ANY SOIL/MATERIAL CAN BE PLACED IN LAYER 'D' UP TO THE FINISHED GRADE. MOST PAVEMENT SUBBASE SOILS CAN BE USED TO REPLACE THE MATERIAL REQUIREMENTS OF LAYER 'C' OR 'D' AT THE SITE DESIGN ENGINEER'S DISCRETION.



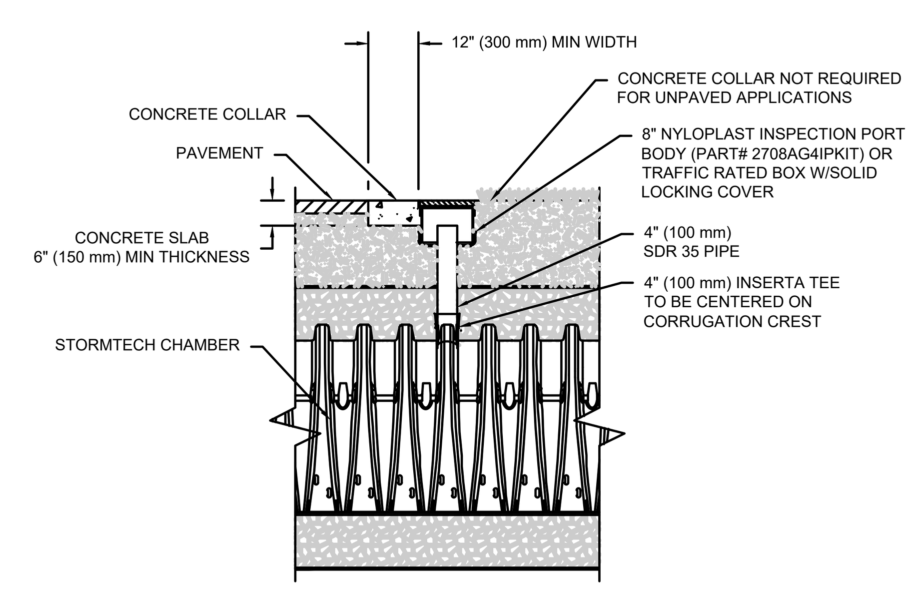
NOTES:

1. CHAMBERS SHALL MEET THE REQUIREMENTS OF ASTM F2418, "STANDARD SPECIFICATION FOR POLYPROPYLENE (PP) CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
2. SC-740 CHAMBERS SHALL BE DESIGNED IN ACCORDANCE WITH ASTM F2787 "STANDARD PRACTICE FOR STRUCTURAL DESIGN OF THERMOPLASTIC CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
3. THE SITE DESIGN ENGINEER IS RESPONSIBLE FOR ASSESSING THE BEARING RESISTANCE (ALLOWABLE BEARING CAPACITY) OF THE SUBGRADE SOILS AND THE DEPTH OF FOUNDATION STONE WITH CONSIDERATION FOR THE RANGE OF EXPECTED SOIL MOISTURE CONDITIONS.
4. PERIMETER STONE MUST BE EXTENDED HORIZONTALLY TO THE EXCAVATION WALL FOR BOTH VERTICAL AND SLOPED EXCAVATION WALLS.
5. REQUIREMENTS FOR HANDLING AND INSTALLATION:
   - TO MAINTAIN THE WIDTH OF CHAMBERS DURING SHIPPING AND HANDLING, CHAMBERS SHALL HAVE INTEGRAL, INTERLOCKING STACKING LUGS.
   - TO ENSURE A SECURE JOINT DURING INSTALLATION AND BACKFILL, THE HEIGHT OF THE CHAMBER JOINT SHALL NOT BE LESS THAN 2".
   - TO ENSURE THE INTEGRITY OF THE ARCH SHAPE DURING INSTALLATION, a) THE ARCH STIFFNESS CONSTANT AS DEFINED IN SECTION 6.2.8 OF ASTM F2418 SHALL BE GREATER THAN OR EQUAL TO 550 LBS/FT/%. AND b) TO RESIST CHAMBER DEFORMATION DURING INSTALLATION AT ELEVATED TEMPERATURES (ABOVE 73° F / 23° C), CHAMBERS SHALL BE PRODUCED FROM REFLECTIVE GOLD OR YELLOW COLORS.

1 SC-740 CROSS SECTION DETAIL



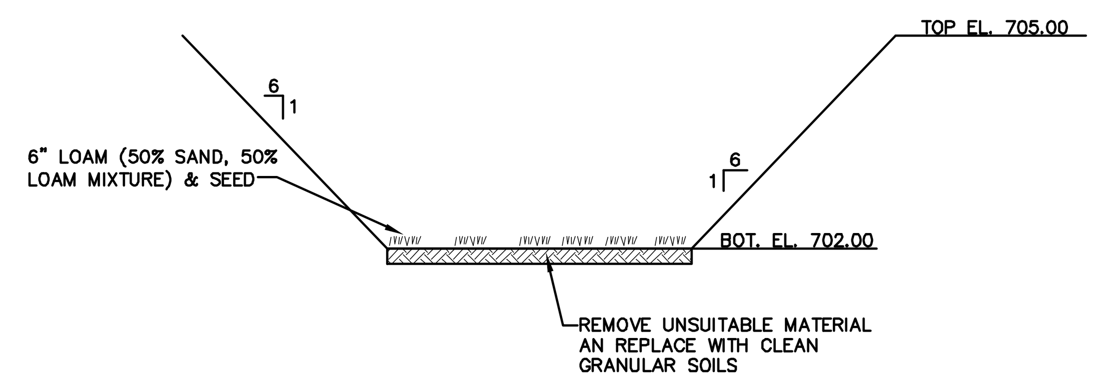
3 SC-740 ISOLATOR ROW PLUS DETAIL



NOTE:
INSPECTION PORTS MAY BE CONNECTED THROUGH ANY CHAMBER CORRUGATION CREST.

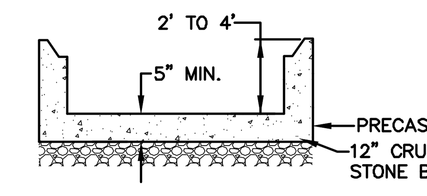
4 4" PVC INSPECTION PORT DETAIL (SC SERIES CHAMBER)

INFILTRATION BASIN #1

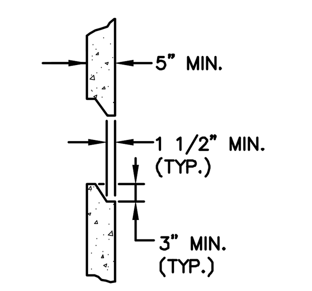


NOTES:
1. LIGHT EARTH MOVING EQUIPMENT IS TO BE USED DURING CONSTRUCTION TO REDUCE COMPACTION OF BASIN BOTTOM.
2. BASIN FLOOR IS TO BE DEEPLY TILLED AFTER FINAL GRADING.
3. PROPER EROSION SEDIMENT CONTROLS SHOULD BE UTILIZED DURING CONSTRUCTION TO PREVENT SEDIMENT AND/OR DEBRIS FROM ENTERING THE BASIN.
4. 75% OF RIP-RAP STONE SHALL BE 70 – 100 lbs.

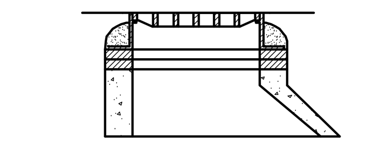
INFILTRATION BASIN CROSS-SECTION
SCALE: NONE



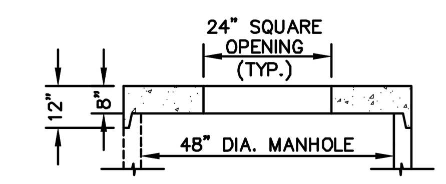
BASE DETAILS



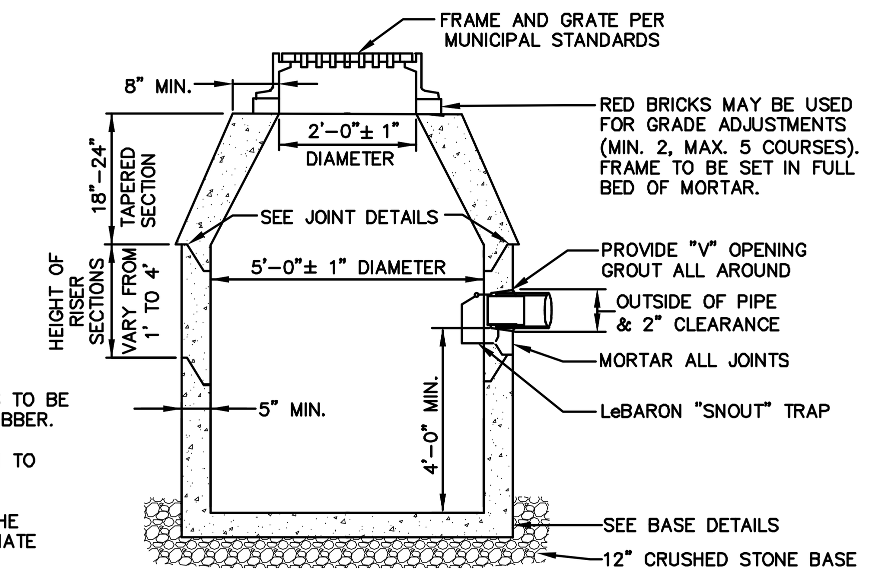
JOINT DETAILS



ALTERNATE ECCENTRIC CONE SECTION

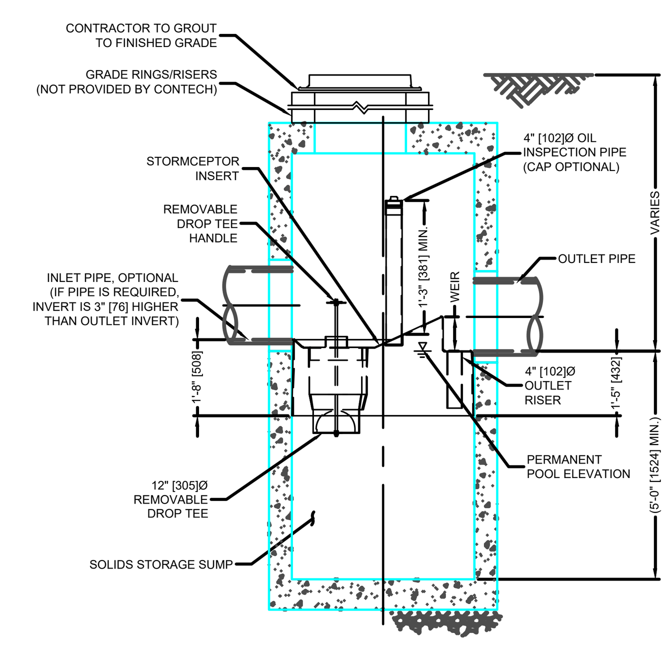


ALTERNATE TOP SLAB



NOTES:
1. ALL PRECAST JOINTS TO BE SEALED WITH BUTYL RUBBER.
2. DESIGN TO CONFORM TO H-20 LOADING.
3. CONTRACTOR HAS THE OPTION TO USE ALTERNATE TOP SLAB.

PRECAST CONCRETE CATCH BASIN
SCALE: NONE

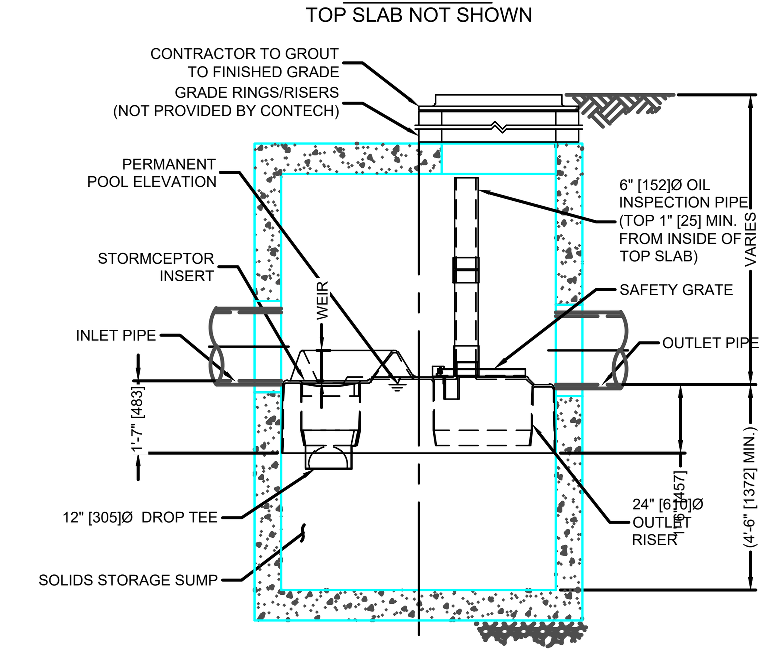


SECTION A-A

GENERAL NOTES
1. CONTECH TO PROVIDE ALL MATERIALS UNLESS NOTED OTHERWISE.
2. FOR SITE SPECIFIC DRAWINGS WITH DETAILED STRUCTURE DIMENSIONS AND WEIGHT, PLEASE CONTACT YOUR CONTECH ENGINEERED SOLUTIONS LLC REPRESENTATIVE. www.ContechES.com
3. STORMCEPTOR WATER QUALITY STRUCTURE SHALL BE IN ACCORDANCE WITH ALL DESIGN DATA AND INFORMATION CONTAINED IN THIS DRAWING. CONTRACTOR TO CONFIRM STRUCTURE MEETS REQUIREMENTS OF PROJECT.
4. STORMCEPTOR STRUCTURE SHALL MEET AASHTO HS20 LOAD RATING, ASSUMING EARTH COVER OF 0' - 2' [610], AND GROUNDWATER ELEVATION AT, OR BELOW, THE OUTLET PIPE INVERT ELEVATION. ENGINEER OF RECORD TO CONFIRM ACTUAL GROUNDWATER ELEVATION. CASTINGS SHALL MEET AASHTO M306 AND BE CAST WITH THE CONTECH LOGO.
5. STORMCEPTOR STRUCTURE SHALL BE PRECAST CONCRETE CONFORMING TO ASTM C478 AND AASHTO LOAD FACTOR DESIGN METHOD.
6. ALTERNATE UNITS ARE SHOWN IN MILLIMETERS [mm].

STORMCEPTOR STC 450i
SCALE: NONE

PLAN VIEW
TOP SLAB NOT SHOWN



SECTION A-A

GENERAL NOTES
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5. STORMCEPTOR STRUCTURE SHALL BE PRECAST CONCRETE CONFORMING TO ASTM C478 AND AASHTO LOAD FACTOR DESIGN METHOD.
6. ALTERNATE UNITS ARE SHOWN IN MILLIMETERS [mm].

STORMCEPTOR STC 900
SCALE: NONE

COMMONWEALTH OF MASSACHUSETTS BRIAN G. YERGATIAN CIVIL No. 46205 REGISTERED PROFESSIONAL ENGINEER

8/1/23

BRIAN G. YERGATIAN PROFESSIONAL ENGINEER — DATE

GROUND-MOUNTED PHOTOVOLTAIC SYSTEM

200 ROUTE 15
IN
STURBRIDGE MASSACHUSETTS
(WORCESTER COUNTY)

DETAIL SHEET

AUGUST 1, 2023

REVISIONS:

NO.	DATE	DESC.

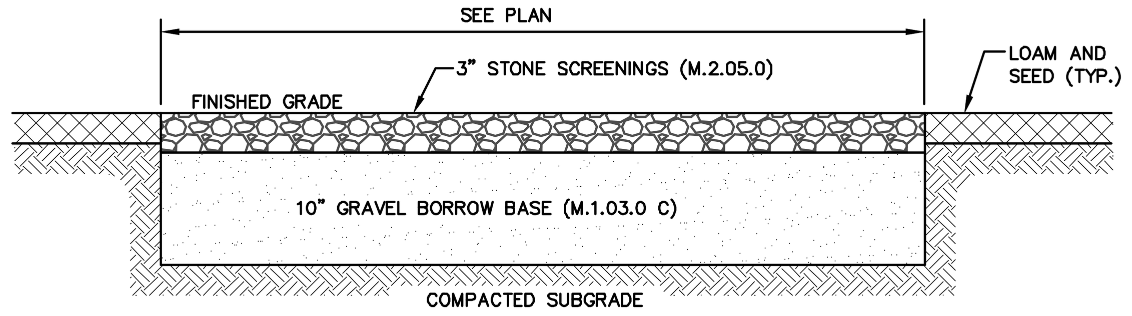
ISSUED FOR PERMITTING
NOT FOR CONSTRUCTION

PREPARED FOR:
STURBRIDGE PV, LLC
2420 17TH STREET
DENVER, CO 80202

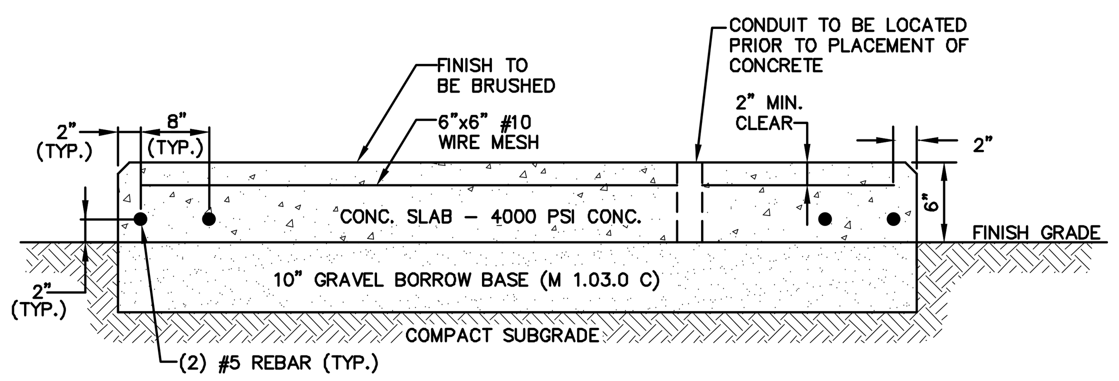
BSC GROUP
349 Main Street - Route 28
West Yarmouth, Massachusetts 02673
508 778 8919

SCALE: NOT TO SCALE
0 30 60 120 FEET

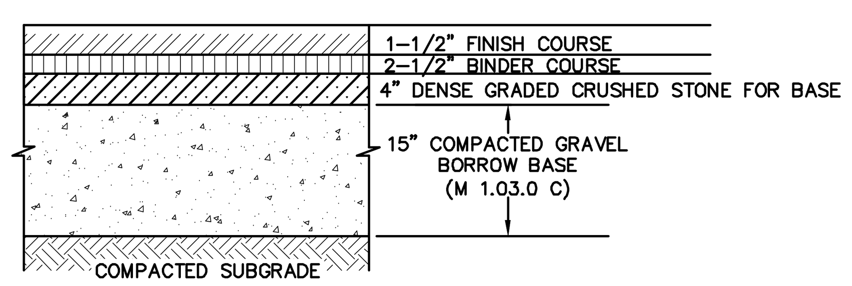
FILE: PROJECTS-YAR\5074500\C\D\5074500-SP.dwg
DWG.: DWG
JOB. NO: 5-0745.00
SHEET 8 OF 9



GRAVEL DRIVEWAY
SCALE: NONE



TRANSFORMER PAD
SCALE: NONE



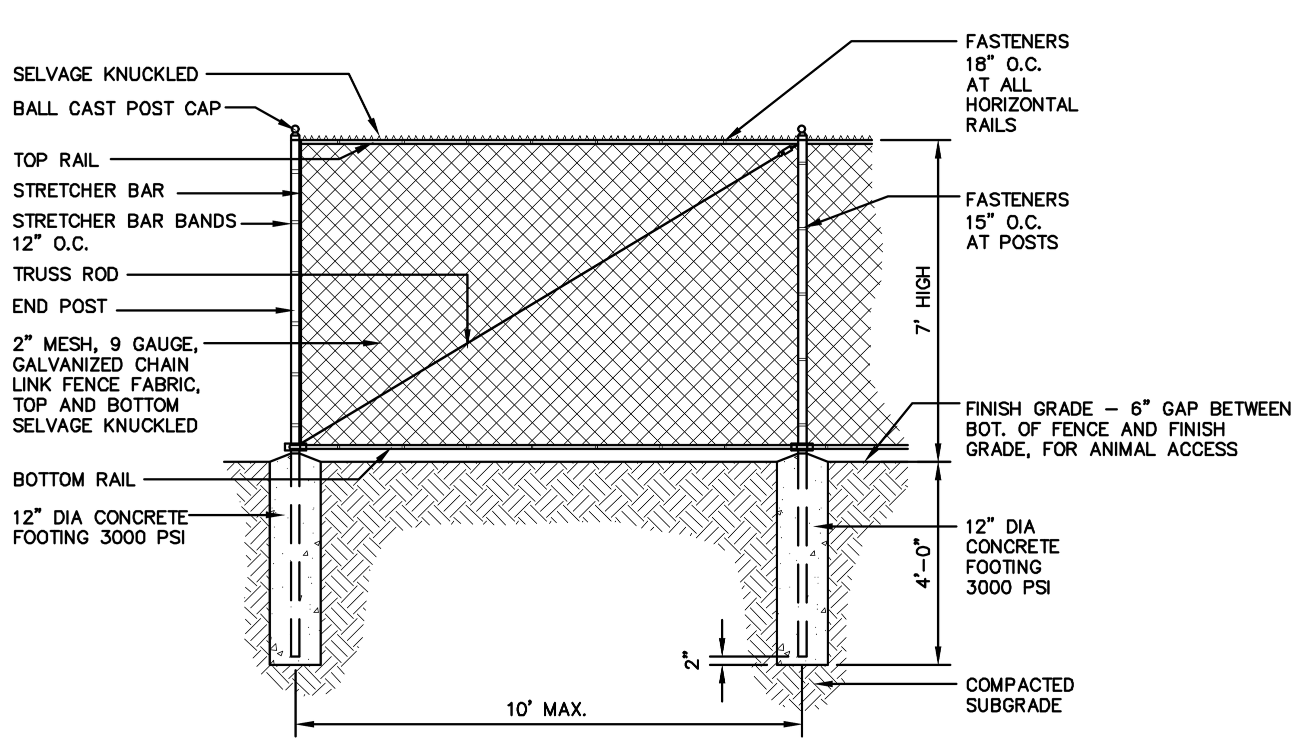
STANDARD DUTY FLEXIBLE PAVEMENT

NOTE:
PAVEMENT SECTIONS ARE SUBJECT TO CHANGE AND MAY BE BASED ON THE RESULTS OF GEOTECHNICAL INVESTIGATIONS

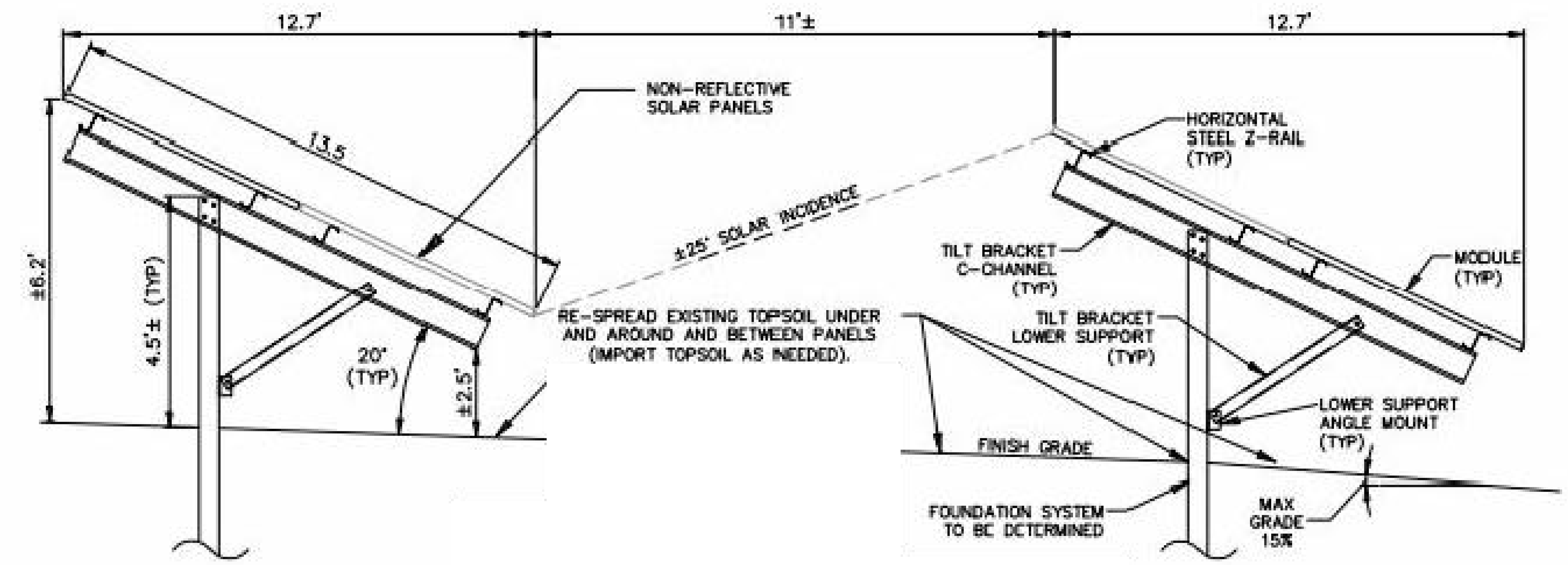
HOT MIX ASPHALT PAVEMENT SECTIONS
SCALE: NONE

CHAIN LINK FENCE FRAMEWORK SCHEDULE

FABRIC HEIGHT	6' OR LESS	6' – 10'	10' OR MORE
END, CORNER & PULL POST	2.375" O.D.	2.875" O.D.	4" O.D.
LINE POST	1.900" O.D.	2.375" O.D.	2.875" O.D.
TOP AND BOTTOM RAIL	1.660" O.D.	1.660" O.D.	1.660" O.D.
MIDDLE RAIL	NONE	1.660" O.D.	1.660" O.D.



CHAIN LINK FENCE
SCALE: NONE



SECTION VIEW – PANEL/RACK ASSEMBLY
SCALE: NONE

8/1/23

BRIAN G. YERGATIAN
PROFESSIONAL ENGINEER
DATE

GROUND-MOUNTED PHOTOVOLTAIC SYSTEM

200 ROUTE 15

IN

STURBRIDGE
MASSACHUSETTS
(WORCESTER COUNTY)

DETAIL SHEET II

AUGUST 1, 2023

REVISIONS:

NO.	DATE	DESC.

ISSUED FOR PERMITTING
NOT FOR CONSTRUCTION

PREPARED FOR:
STURBRIDGE PV, LLC
2420 17TH STREET
DENVER, CO 80202

BSC GROUP
349 Main Street - Route 28
West Yarmouth, Massachusetts
02673
508 778 8919

SCALE: NOT TO SCALE

FILE: PROJECTS-YAR\5074500\C\D\5074500-SP.dwg
DWG.: DWG
JOB. NO: 5-0745.00

Attachment E

Ground-Mounted Solar Photovoltaic System Project
Sturbridge, MA
Wetland Bylaw Notice of Intent Application

CHECKLIST FOR STORMWATER REPORT
STORMWATER REPORT

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

Checklist for Stormwater Report

A. Introduction

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

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

The Stormwater Report must include:

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

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

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

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

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

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

Checklist for Stormwater Report

B. Stormwater Checklist and Certification

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

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

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

Registered Professional Engineer's Certification

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

Registered Professional Engineer Block and Signature

4/7/2023

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)

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): ____________________

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)

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)

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)

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)

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)

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.

STORMWATER REPORT

GROUND-MOUNTED PHOTOVOLTAIC SYSTEM

200 ROUTE 15
STURBRIDGE, MA 01566

APRIL 2023

Owner/Applicant:

STURBRIDGE PV, LLC
2420 17TH STREET
DENVER, CO 80202

BSC Job Number: 5-0745.00

Prepared by:

BSC GROUP

349 Main Street
West Yarmouth, MA 02673

TABLE OF CONTENTS

SECTION 1.0

PROJECT INFORMATION

1.01 PROJECT DESCRIPTION

The project site is located at 200 Route 15 (Haynes Street) in Sturbridge, MA. The project consists of a total of 13.92± acres of undeveloped land.

The Applicant has proposed to create a paved site access driveway connecting off of Route 15. The access road will be secured by locked gate that can be accessed by Sturbridge Fire/Police Dept., as well as Bear Peak Power maintenance personnel, in order to perform routine maintenance on the solar array. The site is bordered by residential developments to the south and east, vacant lot to the north, and Route 15 and Route 84 to the West.

The applicant is seeking to redevelop the site to develop a large-scale, ground-mounted solar photovoltaic system. The development of the site will entail tree clearing, re-grading portions of the site, installation of equipment pads, electrical service infrastructure, access drive, and stormwater management facilities.

1.02 PRE-DEVELOPMENT CONDITIONS

The Pre-Development conditions include the existing site, 200 Route 15. The site has steep slopes ranging from 0% - 35%. For the Pre-Development conditions, the site has been broken down into four (4) subcatchment areas, draining off-site in each direction. There is a wetland resource area that has been identified on the property, in the northwest portion of the site.

NRCS Web Soil Survey has identified five primary soil classifications underlying the project site:

- 5.5% - Map Unit 73A – Whitman fine sandy loam, 0 to 3 percent slopes, extremely stony
- 0.7% - Map Unit 254B – Merrimac fine sandy loam, 3 to 8 percent slopes
- 0.2% - Map Unit 255A – Windsor loamy sand, 0 to 3 percent slopes
- 62.7% - Map Unit 422C – Canton fine sandy loam, 8 to 15 percent slopes, extremely stony
- 30.9% - Map Unit 422E – Canton fine sandy loam, 15 to 35 percent slopes, extremely stony

The Pre-Development HydroCAD model was developed with four (4) subcatchment areas, all flowing off-site. Subcatchment Areas 1S flows towards the wetland resource area in the northwest direction, Subcatchment Area 2S flows to the east off-site, Subcatchment Area 3S flows west towards Route 15, and Subcatchment Area 4S flows to the south off-site. The four summary nodes will be used in comparison between the peak off-site flows in the Post-Development design. Please refer to Section 6.01 for the Existing Watershed Plan and Section 6.02 for the Existing Hydrology Calculations (HydroCAD Printouts).

1.03 POST-DEVELOPMENT CONDITIONS

The proposed stormwater management system has been designed in a manner that will meet or exceed the provisions of the Massachusetts Department of Environmental Protection (MassDEP) Stormwater Management Standards for new construction. The design also complies fully with the Town of Sturbridge Zoning Bylaws.

The proposed stormwater management facilities on the site include three sub-surface infiltration systems consisting of ADS StormTech SC-740 chambers with end caps and one infiltration basin. These systems will work to collect and infiltrate stormwater from the proposed access driveway and portions of the photovoltaic system field. These infiltration systems have been modeled in the proposed HydroCAD model

(Section 6.04) as Ponds 5P through 8P. Summary nodes 1R, 2R, 3R, and 4R (off-site flow) have also been modeled to show a direct comparison between the peak runoff rates in the Pre- and Post- Development conditions. Please refer to Section 2.02 Stormwater Runoff Rates for a further detailed analysis of the peak runoff rates. The Proposed Watershed Plan can be seen in Section 6.03 and the proposed Hydrology Calculations (HydroCAD Printouts) can be seen in Section 6.04.

Specifics of the project's compliance with the MassDEP Stormwater Management Standards are discussed in detail in the following sections.

SECTION 2.0

DRAINAGE SUMMARY

2.01 Stormwater Standard 1 – New Stormwater Conveyances

Per MassDEP Stormwater Management Standard #1, no new outfalls may discharge untreated stormwater directly to or cause erosion in wetlands or waters of the Commonwealth. There are no known stormwater outfalls in this development and no new outfalls are proposed.

2.02 Stormwater Standard 2 – Stormwater Runoff Rates

Watershed modeling was performed using HydroCAD Stormwater Modeling Software version 10.0, a computer aided design program that combines SCS runoff methodology with standard hydraulic calculations. A model of the site's hydrology was developed for both pre- and post-development conditions to assess the effects of the proposed development on the resource areas to the northwest of the site.

The tables below compare the pre-development peak run-off rates and run-off volume to the post-development conditions for the 2-year, 10-year, 25-year, 50-year, and 100-year storm events. There are slight increases, however these are low, insignificant amounts and should be considered to be de minimus.

Peak Flow Discharge Rates

Node 1R – Off-site Flow (Wetland - Northwest)

Storm Event	Pre-Development Peak Discharge Rate (cfs)	Post-Development Peak Discharge Rate (cfs)	Change in Peak Discharge Rate (cfs)
2-Year	0.14	0.13	-0.01
10-Year	0.99	1.00	+0.01
25-Year	1.79	1.76	-0.03
50-Year	2.46	2.37	-0.09
100-Year	3.25	3.11	-0.14

Node 1R – Runoff Volume (Wetland - Northwest)

Storm Event	Pre-Development Runoff Volume (af)	Post-Development Runoff Volume (af)	Change in Runoff Volume (af)
2-Year	0.029	0.023	-0.006
10-Year	0.112	0.086	-0.026
25-Year	0.182	0.137	-0.045
50-Year	0.239	0.179	-0.060
100-Year	0.307	0.228	-0.079

Node 2R – Off-site Flow (East)

Storm Event	Pre-Development Peak Discharge Rate (cfs)	Post-Development Peak Discharge Rate (cfs)	Change in Peak Discharge Rate (cfs)
2-Year	0.78	0.82	+0.04
10-Year	6.21	5.99	-0.22
25-Year	11.25	10.29	-0.96
50-Year	15.39	13.79	-1.60
100-Year	20.31	17.92	-2.39

Node 2R – Runoff Volume (East)

Storm Event	Pre-Development Runoff Volume (af)	Post-Development Runoff Volume (af)	Change in Runoff Volume (af)
2-Year	0.156	0.142	-0.014
10-Year	0.602	0.501	-0.101
25-Year	0.973	0.792	-0.181
50-Year	1.279	1.029	-0.250
100-Year	1.643	1.310	-0.333

Node 3R – Off-site Flow (Route 15)

Storm Event	Pre-Development Peak Discharge Rate (cfs)	Post-Development Peak Discharge Rate (cfs)	Change in Peak Discharge Rate (cfs)
2-Year	0.44	0.52	+0.08
10-Year	3.32	2.85	-0.47
25-Year	6.03	4.71	-1.32
50-Year	8.26	6.20	-2.06
100-Year	10.90	7.95	-2.95

Node 3R – Runoff Volume (Route 15)

Storm Event	Pre-Development Runoff Volume (af)	Post-Development Runoff Volume (af)	Change in Runoff Volume (af)
2-Year	0.091	0.070	-0.021
10-Year	0.352	0.229	-0.123
25-Year	0.569	0.354	-0.215
50-Year	0.747	0.456	-0.291
100-Year	0.961	0.576	-0.385

Node 4R – Off-site Flow (South)

Storm Event	Pre-Development Peak Discharge Rate (cfs)	Post-Development Peak Discharge Rate (cfs)	Change in Peak Discharge Rate (cfs)
2-Year	0.12	0.14	+0.02
10-Year	0.95	1.00	+0.05
25-Year	1.71	1.71	-0.00
50-Year	2.34	2.30	-0.04
100-Year	3.09	2.98	-0.11

Node 4R – Runoff Volume (South)

Storm Event	Pre-Development Runoff Volume (af)	Post-Development Runoff Volume (af)	Change in Runoff Volume (af)
2-Year	0.023	0.024	+0.001
10-Year	0.091	0.083	-0.008
25-Year	0.146	0.132	-0.014
50-Year	0.192	0.171	-0.021
100-Year	0.247	0.218	-0.029

2.03 Stormwater Standard 3 – Groundwater Recharge

The ground water recharge is estimated based on the Massachusetts Stormwater Management Standard #3, as follows:

Rv = F x impervious area

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

Recharge Target Depth by Hydrologic Soil Group

NRCS HYDROLOGIC SOIL TYPE	APPROX. SOIL TEXTURE	TARGET DEPTH FACTOR (F)
A	sand	**0.60-inch**
B	loam	**0.35-inch**
C	silty loam	**0.25-inch**
D	clay	**0.10-inch**

The Natural Resources Conservation Service (NRCS) has classified the soils underlying the project site as a combination of soil groups 73A – Whitman fine sandy loam, 0 to 3 percent slopes, extremely stony (5.5%), 254B – Merrimac fine sandy loam. 3 to 8 percent slopes (0.7%), 255A – Windsor loamy sand. 0 to 3 percent slopes (0.2%), 422C – Canton fine sandy loam, 8 to 15 percent slopes, extremely stony (62.7%), and 422E

– Canton fine sandy loam, 15 to 35 percent slopes, extremely stony (30.9%).

A number of test pits have been conducted throughout the approximate locations of proposed drainage areas. As a result of that, the site has been modeled as Hydraulic Group A.

To determine the recharge volume provided in the recharge system, the *Static Method* was used as described in the DEP's Massachusetts Stormwater Handbook, Volume 3. A drawdown calculation was performed in accordance with the DEP's Massachusetts Stormwater Handbook, Volume 3, to verify that the proposed recharge systems would drain completely within 72-hours. This drawdown calculation along with calculations to determine the recharge required are provided in Section 7.0 of this report.

2.04 Stormwater Standard 4 – TSS Removal

The project stormwater management system will achieve a TSS removal greater than 80%. The proposed stormwater management system has been designed to provide treatment of runoff in order to reduce suspended solids prior to discharge off-site through the implementation of the following best management practices:

- Subsurface Structures – (80% TSS Removal with adequate pretreatment)
- Infiltration Basin – (80% TSS Removal with adequate pretreatment)
- Water Quality Units – (Pre-Treatment)

The water quality volume is defined as the runoff volume requiring TSS Removal for the site and is equal to 1-inch of runoff (0.5-inch for a rapid infiltration rate) over the total impervious area of the post-development site. The required water quality volume required for the project is calculated below based on the post-development impervious area:

$$WQV = 0.50\,\cancel{in}\,x\,\frac{1\,ft}{12\,\cancel{in}}x\;0.590\,ac\,x\,43{,}560\,ft^2 = \mathbf{1{,}071\,ft^3}$$

$\boxed{\therefore \textit{Water Quality Volume = 1,071cubic feet}}$

The infiltration systems have been sized to treat the required water quality volume and calculation are included in Section 7.0 of this Report.

A long-term pollution prevention plan complying with the requirements of Standard 4 is included in Section 5.0 of this Report.

2.05 Stormwater Standard 5 – Land Uses with Higher Potential Pollutant Loads

The Project is not a land use with higher potential pollutant loads, therefore this Standard does not apply.

2.06 Stormwater Standard 6 – Stormwater Discharges to a Critical Area

The project is not subject to Standard 6. There are no discharges to any Critical Area, as defined by the Massachusetts Stormwater Handbook.

2.07 Stormwater Standard 7 – Redevelopment Projects

This project is a new development, and as such, has been designed to fully comply with the MassDEP Stormwater Management Standards.

2.08 Stormwater Standard 8 – Sedimentation and Erosion Control Plan

Erosion and sedimentation controls are shown on the Project Site Plan set (page 6 of 7). Additionally, a Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan is included in Section 4.0 of this Report.

2.09 Stormwater Standard 9 – Long Term Operation and Maintenance Plan

A Long-Term Operation and Maintenance Plan is included in Section 5.0 of this Report.

2.10 Stormwater Standard 10 – Illicit Discharges

There are no known illicit discharges on the project site, and none are proposed. A signed, illicit discharge compliance statement will be submitted prior to the start of construction.

2.11 Conclusion

The Project has been designed to meet the applicable provisions of the Stormwater Management Standards. Site grading in concert with implementation of infiltration basin and subsurface drainage systems will serve to attenuate peak runoff rates, provide treatment to stormwater prior to discharge, and promote infiltration to groundwater. The project will not cause flooding to off-site and downgradient properties, will meet or exceed the requirements of the MassDEP Stormwater Management Standards and the Town of Sturbridge Zoning Bylaws.

SECTION 3.0

MASSACHUSETTS DEPARTMENT OF ENVIRONMENTAL PROTECTION CHECKLIST FOR STORMWATER REPORT

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

Checklist for Stormwater Report

A. Introduction

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

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

The Stormwater Report must include:

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

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

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

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

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

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

Checklist for Stormwater Report

B. Stormwater Checklist and Certification

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

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

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

Registered Professional Engineer's Certification

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

Registered Professional Engineer Block and Signature

COMMONWEALTH OF MASSACHUSETTS
BRIAN G. YERGATIAN
CIVIL
No. 46206
REGISTERED PROFESSIONAL ENGINEER

4/7/2023

Signature and Date

Checklist

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

☒ New development

☐ Redevelopment

☐ Mix of New Development and Redevelopment

Checklist for Stormwater Report

Checklist (continued)

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

- ☒ No disturbance to any Wetland Resource Areas
- ☐ Site Design Practices (e.g. clustered development, reduced frontage setbacks)
- ☐ Reduced Impervious Area (Redevelopment Only)
- ☒ Minimizing disturbance to existing trees and shrubs
- ☐ LID Site Design Credit Requested:
  - ☐ Credit 1
  - ☐ Credit 2
  - ☐ Credit 3
- ☐ Use of “country drainage” versus curb and gutter conveyance and pipe
- ☐ Bioretention Cells (includes Rain Gardens)
- ☐ Constructed Stormwater Wetlands (includes Gravel Wetlands designs)
- ☐ Treebox Filter
- ☐ Water Quality Swale
- ☐ Grass Channel
- ☐ Green Roof
- ☐ Other (describe): ______________________________

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)

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.

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

Checklist (continued)

Standard 3: Recharge (continued)

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

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

Standard 4: Water Quality

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

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

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

  ☐ is within the Zone II or Interim Wellhead Protection Area

  ☐ is near or to other critical areas

  ☐ is within soils with a rapid infiltration rate (greater than 2.4 inches per hour)

  ☐ involves runoff from land uses with higher potential pollutant loads.

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

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

Checklist (continued)

Standard 4: Water Quality (continued)

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

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

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

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

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

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

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

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

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

☐ All exposure has been eliminated.

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

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

Standard 6: Critical Areas

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

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

Checklist (continued)

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

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

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

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

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

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

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

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

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

Checklist (continued)

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

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

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

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

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

Standard 9: Operation and Maintenance Plan

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

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

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

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

Standard 10: Prohibition of Illicit Discharges

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

☐ An Illicit Discharge Compliance Statement is attached;

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

SECTION 4.0

CONSTRUCTION PERIOD POLLUTION PREVENTION AND EROSION AND SEDIMENTATION CONTROL PLAN

4.0 Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan

This Section specifies requirements and suggestions for implementation of a Stormwater Pollution Prevention Plan (SWPPP) for the proposed photovoltaic system located at 200 Route 15, Sturbridge, Massachusetts. The SWPPP shall be provided and maintained on-site by the Contractor(s) during all construction activities. The SWPPP shall be updated as required to reflect changes to construction activity.

The stormwater pollution prevention measures contained in the SWPPP shall be at least the minimum required by Local Regulations. The Contractor shall provide additional measures to prevent pollution from stormwater discharges in compliance with the National Pollution Discharge Elimination System (NPDES) Phase II permit requirements and all other local, state and federal requirements.

The SWPPP shall include provisions for, but not be limited to, the following:

1. Construction Trailers
2. Lay-down Areas
3. Equipment Storage Areas
4. Stockpile Areas
5. Disturbed Areas

The Contractor shall NOT begin construction without submitting evidence that a NPDES Notice of Intent (NOI) governing the discharge of stormwater from the construction site for the entire construction period has been filed **at least fourteen (14) days prior to construction**. It is the Contractor's responsibility to complete and file the NOI, unless otherwise determined by the project team.

The cost of any fines, construction delays and remedial actions resulting from the Contractor's failure to comply with all provisions of local regulations and Federal NPDES permit requirements shall be paid for by the Contractor at no additional cost to the Owner.

As a requirement of the EPA's NPDES permitting program, each Contractor and Subcontractor responsible for implementing and maintaining stormwater Best Management Practices shall execute a Contractor's Certification form.

Erosion and Sedimentation Control

The Contractor shall be solely responsible for erosion and sedimentation control at the site. The Contractor shall utilize a system of operations and all necessary erosion and sedimentation control measures, even if not specified herein or elsewhere, to minimize erosion damage at the site to prevent the migration of sediment into environmentally sensitive areas. Environmentally sensitive areas include all wetland resource areas within, and downstream of, the site, and those areas of the site that are not being altered.

Erosion and sedimentation control shall be in accordance with this Section, the design drawings, and the following:

- "National Pollutant Discharge Elimination System General Permit for Discharges from Construction Activities (EPA Construction General Permit February 16, 2017).
- Massachusetts Stormwater Management Policy Handbook issued by the Massachusetts Department of Environmental Protection, January 2008.
- Massachusetts Erosion and Sediment Control Guidelines for Urban and Suburban Areas, A Guide for Planners, Designers and Municipal Officials, March 1997.

The BMP's presented herein should be used as a guide for erosion and sedimentation control and are <u>not</u> intended to be considered specifications for construction. The most important BMP is maintaining a rapid construction process, resulting in prompt stabilization of surfaces, thereby reducing erosion potential. Given the primacy of rapid construction, these guidelines have been designed to allow construction to progress with essentially no hindrance by the erosion control methods prescribed. These guidelines have also been designed with sufficient flexibility to allow the Contractor to modify the suggested methods as required to suit seasonal, atmospheric, and site-specific physical constraints.

Another important BMP is the prevention of concentrated water flow. Sheet flow does not have the erosive potential of a concentrated rivulet. These guidelines recommend construction methods that allow localized erosion control and a system of construction, which inhibits the development of shallow concentrated flow. These BMP's shall be maintained throughout the construction process.

CONTACT INFORMATION AND RESPONSIBLE PARTIES

The following is a list of all project-associated parties:

Owner
Sturbridge PV, LLC
2420 17th Street
Denver, Colorado 80202

Contractor
To be determined

Environmental Consultant
BSC Group, Inc.
349 Route 28, Unit D
West Yarmouth, MA 02673

Contact: Brian G. Yergatian, P.E., LEED AP
Phone: (617) 896–4590
Email: byergatian@bscgroup.com

Qualified SWPPP Inspectors
To Be Determined

4.1 Procedural Conditions of the Construction General Permit (CGP)

The following list outlines the stormwater responsibilities for all construction operators working on the Project. The operators below agree through a cooperative agreement to abide by the following conditions throughout the duration of the construction project, effective the date of signature of the required SWPPP. These conditions apply to all operators on the project site.

The project is subject to EPA's NPDES General Permit through the CGP. The goal of this permit is to prevent the discharge of pollutants associated with construction activity from entering the existing and proposed storm drain system or surface waters.

All contractors/operators involved in clearing, grading and excavation construction activities must sign the appropriate certification statement required, which will remain with the SWPPP. The owner must also sign a certification, which is to remain with the SWPPP in accordance with the signatory requirements of the SWPPP.

Once the SWPPP is finalized, a signed copy, plus supporting documents, must be held at the project site during construction. A copy must remain available to EPA, State and Local agencies, and other interested parties during normal business hours.

The following items associated with this SWPPP must be posted in a prominent place at the construction site until final stabilization has been achieved:

- The completed/submitted NOI form
- Location where the public can view the SWPPP during normal business hours
- A copy of the signed/submitted NOI, permit number issued by the EPA and a copy of the current CGP.

Project specific SWPPP documents are not submitted to the US EPA unless the agency specifically requests a copy for review. SWPPP documents requested by a permitting authority, the permitee(s) will submit it in a timely manner.

EPA inspectors will be allowed free and unrestricted access to the project site and all related documentation and records kept under the conditions of the permit.

The permitee is expected to keep all BMP's and Stormwater controls operating correctly and maintained regularly.

Any additions to the project which will significantly change the anticipated discharges of pollutants, must be reported to the EPA. The EPA should also be notified in advance of any anticipated events of noncompliance. The permitee must also orally inform the EPA of any discharge, which may endanger health or the environment within 24 hours, with a written report following within 5 days.

In maintaining the SWPPP, all records and supporting documents will be compiled together in an orderly fashion. Inspection reports and amendments to the SWPPP must remain with the document. Federal regulations require permitee(s) to keep their Project Specific SWPPP and all reports and documents for at least three (3) years after the project is complete.

4.2 Project Description and Intended Construction Sequence

The proposed activities will include the following major components:

- Site grading.
- The construction of an access road.
- The construction of stormwater management facilities.
- Installation of photovoltaic system and landscape areas.

The installation of the photovoltaic system will disturb 9.83± acres.

Soil disturbing activities will include site demolition, clearing and grubbing, installing stabilized construction exits, installation of erosion and sedimentation controls, grading, stormwater management systems, utilities. Please refer to Table 1 for the projects anticipated construction timetable. A description of BMP's associated with project timetable and construction-phasing elements is provided in this Erosion and Sediment Control Plan.

Table 1 – Anticipated Construction Timetable

Construction Phasing Activity	Anticipated Timetable
Demolition, Grubbing and Stripping of Limits of Construction Phase	To be determined

Rough Site Grading and Site Utilities	To be determined
Utility Plan Construction	To be determined
Landscaping	To be determined

4.3 Potential Sources of Pollution

Any project site activities that have the potential to add pollutants to runoff are subject to the requirements of the SWPPP. Listed below are a description of potential sources of pollution from both sedimentation to Stormwater runoff, and pollutants from sources other than sedimentation.

Table 2 – Potential Sources of Sediment to Stormwater Runoff

Potential Source	Activities/Comments
Construction Site Entrance and Site Vehicles	Vehicles leaving the site can track soils onto public roadways. Site Vehicles can readily transport exposed soils throughout the site and off-site areas.
Grading Operations	Exposed soils have the potential for erosion and discharge of sediment to off-site areas.
Material Excavation, Relocation, and Stockpiling	Stockpiling of materials during excavation and relocation of soils can contribute to erosion and sedimentation. In addition, fugitive dust from stockpiled material, vehicle transport and site grading can be deposited in wetlands and waterway.
Landscaping Operations	Landscaping operations specifically associated with exposed soils can contribute to erosion and sedimentation. Hydro seeding, if not properly applied, can runoff to adjacent wetlands and waterways.

Table 3 – Potential Pollutants and Sources, other than Sediment to Stormwater Runoff

Potential Source	Activities/Comments
Staging Areas and Construction Vehicles	Vehicle refueling, minor equipment maintenance, sanitary facilities and hazardous waste storage
Materials Storage Area	General building materials, solvents, adhesives, paving materials, paints, aggregates, trash, etc.
Construction Activities	Construction, paving, curb/gutter installation, concrete pouring/mortar/stucco

4.4 Erosion and Sedimentation Control Best Management Practices

The project site is characterized by primarily pervious surface. All construction activities will implement Best Management Practices (BMP's) in order to minimize overall site disturbance and impacts to the sites natural features. Please refer to the following sections for a detailed description of site-specific BMP's. In addition, an Erosion and Sedimentation Control Plan is provided in the Site Plans.

4.5 Timetable and Construction Phasing

This section provides the Owner and Contractor with a suggested order of construction that shall minimize erosion and the transport of sediments. The individual objectives of the construction techniques described herein shall be considered an integral component of the project design intent of each project phase. The construction sequence is not intended to prescribe definitive construction methods and should not be interpreted as a construction specification document. However, the Contractor shall follow the general construction phase principles provided below:

- Protect and maintain existing vegetation wherever possible.
- Minimize the area of disturbance.
- To the extent possible, route unpolluted flows around disturbed areas.
- Install mitigation devices as early as possible.
- Minimize the time disturbed areas are left un-stabilized.
- Maintain siltation control devices in proper condition.
- The contractor should use the suggested sequence and techniques as a general guide and modify the suggested methods and procedures as required to best suit seasonal, atmospheric, and site-specific physical constraints for minimizing the environmental impact of construction.

Demolition, Grubbing and Stripping of Limits of Construction Phase

- Install Temporary Erosion Control (TEC) devices as required to prevent sediment transport into resource areas.
- Place a ring of silt socks and/or haybales around stockpiles.
- Stabilize all exposed surfaces that will not be under immediate construction.
- Store and/or dispose all pavement and building demolition debris as indicated in accordance with all applicable local, state, and federal regulations.

Driveway Area Sub-Base Construction

- Install temporary culverts and diversion ditches and additional TEC devices as required by individual construction area constraints to direct potential runoff toward detention areas designated for the current construction phase.
- Compact gravel as work progresses to control erosion potential.
- Apply water to control air suspension of dust.
- Avoid creating an erosive condition due to over-watering.
- Install piped utility systems as required as work progresses, keeping all inlets sealed until all downstream drainage system components are functional.

Binder Construction

- Fine grade gravel base and install processed gravel to the design grades.
- Compact pavement base as work progresses.
- Install pavement binder coat starting from the downhill end of the site and work toward the top.

Finish Paving

- Repair and stabilize damaged side slopes.
- Clean inverts of drainage structures.
- Install final top coat of pavement.

Final Clean-up

- Clean inverts of culverts and catch basins.
- Remove sediment and debris from rip-rap outlet areas.
- Remove TEC devices only after permanent vegetation and erosion control has been fully established.

4.6 Site Stabilization

Grubbing Stripping and Grading

- Erosion control devices shall be in place as shown on the design plans before grading commences.
- Stripping shall be done in a manner, which will not concentrate runoff. If precipitation is expected, earthen berms shall be constructed around the area being stripped, with a silt sock, silt fence or haybale dike situated in an arc at the low point of the berm.
- If intense precipitation is anticipated, silt socks, haybales, dikes and /or silt fences shall be used as required to prevent erosion and sediment transport. The materials required shall be stored on site at all time.
- If water is required for soil compaction, it shall be added in a uniform manner that does not allow excess water to flow off the area being compacted.
- Dust shall be held at a minimum by sprinkling exposed soil with an appropriate amount of water.

Maintenance of Disturbed Surfaces

- Runoff shall be diverted from disturbed side slopes in both cut and fill.
- Mulching may be used for temporary stabilization.
- Silt sock, haybale or silt fences shall be set where required to trap products of erosion and shall be maintained on a continuing basis during the construction process.

Loaming and Seeding

- Loam shall not be placed unless it is to be seeded directly thereafter.
- All disturbed areas shall have a minimum of 4” of loam placed before seeded and mulched.
- Consideration shall be given to hydro-mulching, especially on slopes in excess of 3 to 1.
- Loamed and seeded slopes shall be protected from washout by mulching or other acceptable slope protection until vegetation begins to grow.

Stormwater Collection System Installation

- The Stormwater drainage system shall be installed from the downstream end up and in a manner which will not allow runoff from disturbed areas to enter pipes.
- Excavation for the drainage system shall not be left open when rainfall is expected overnight. If left open under other circumstances, pipe ends shall be closed by a staked board or by an equivalent method.
- All catch basin openings shall be covered by a silt bag between the grate and the frame or protected from sediment by silt fence surrounding the catch basin grate.

Completion of Paved Areas

- During the placement of sub-base and pavement, the entrance to the Stormwater drainage systems shall be sealed when rain is expected. When these entrances are closed, consideration must be given to the direction of run-off and measures shall be undertaken to minimize erosion and to provide for the collection of sediment.
- In some situations, it may be necessary to keep catch basins open.
- Appropriate arrangements shall be made downstream to remove all sediment deposition.

Stabilization of Surfaces

- Stabilization of surfaces includes the placement of pavement, rip-rap, wood bark mulch and the establishment of vegetated surfaces.
- Upon completion of construction, all surfaces shall be stabilized even though it is apparent that future construction efforts will cause their disturbance.

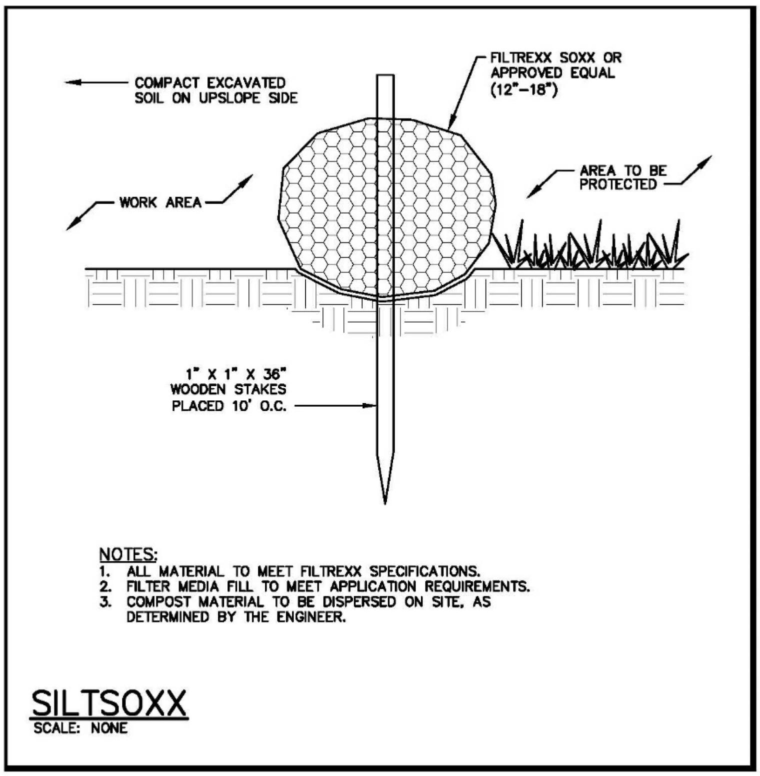
- Vegetated cover shall be established during the proper growing season and shall be enhanced by soil adjustment for proper pH, nutrients and moisture content.
- Surfaces that are disturbed by erosion processes or vandalism shall be stabilized as soon as possible.
- Areas where construction activities have permanently or temporarily ceased shall be stabilized within 14 days from the last construction activity, except when construction activity will resume within 21 days (e.g., the total time period that construction activity is temporarily ceased is less than 21 days).
- Hydro-mulching of grass surfaces is recommended, especially if seeding of the surfaces is required outside the normal growing season.
- Hay mulch is an effective method of temporarily stabilizing surfaces, but only if it is properly secured by branches, weighted snow fences or weighted chicken wire.

4.7 Temporary Structural Erosion Control Measures

Temporary erosion control measures serve to minimize construction-associated impacts to undisturbed areas. Please refer to the following sections for a description of temporary erosion control measures implemented as part of the project and this sample SWPPP.

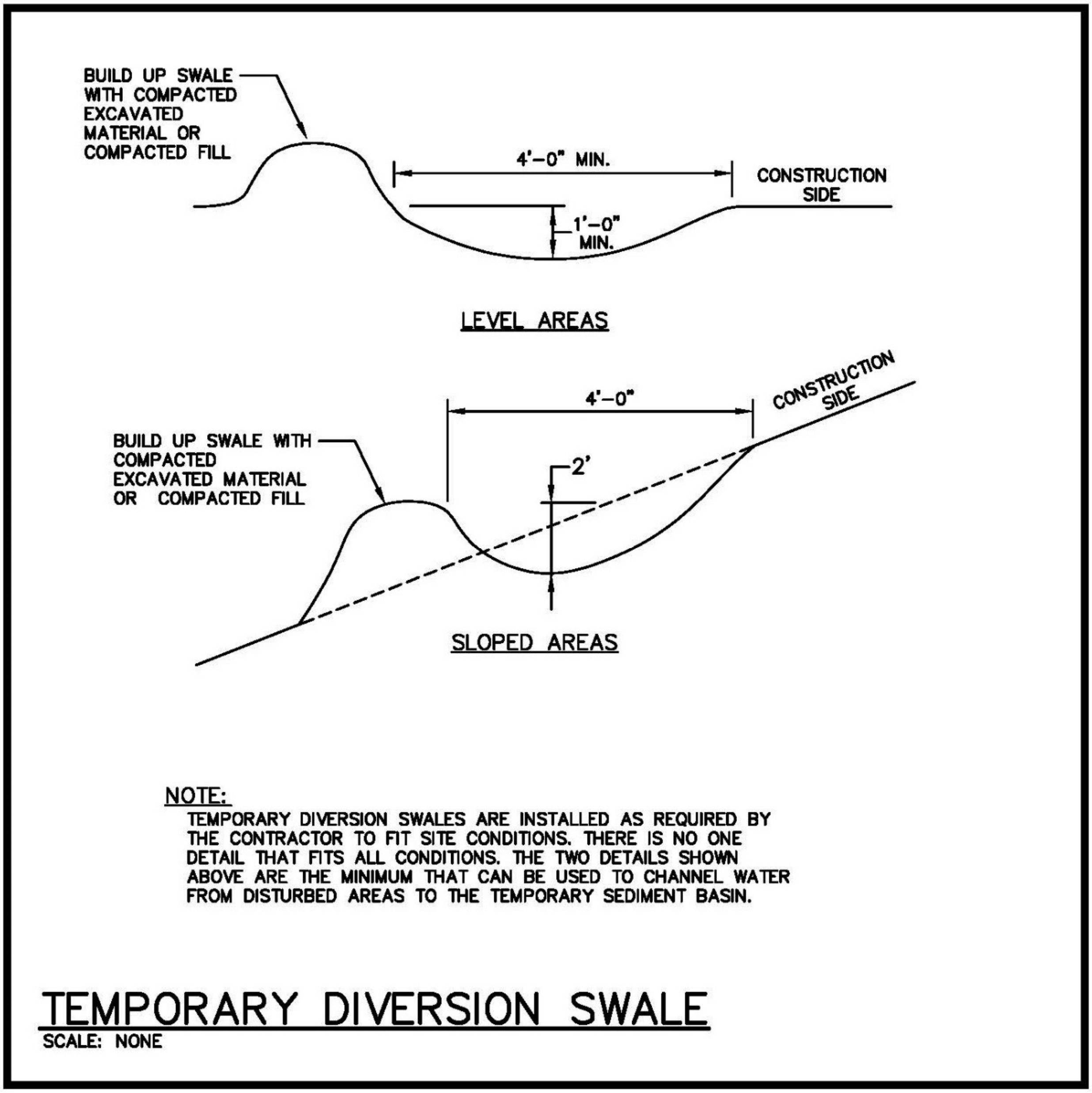
4.7.1 Staked Erosion Control Barrier

The siltation barriers will demarcate the limit of work, form a work envelope and provide additional assurance that construction equipment will not enter the undisturbed portions of the site. All barriers will remain in place until disturbed areas are stabilized.



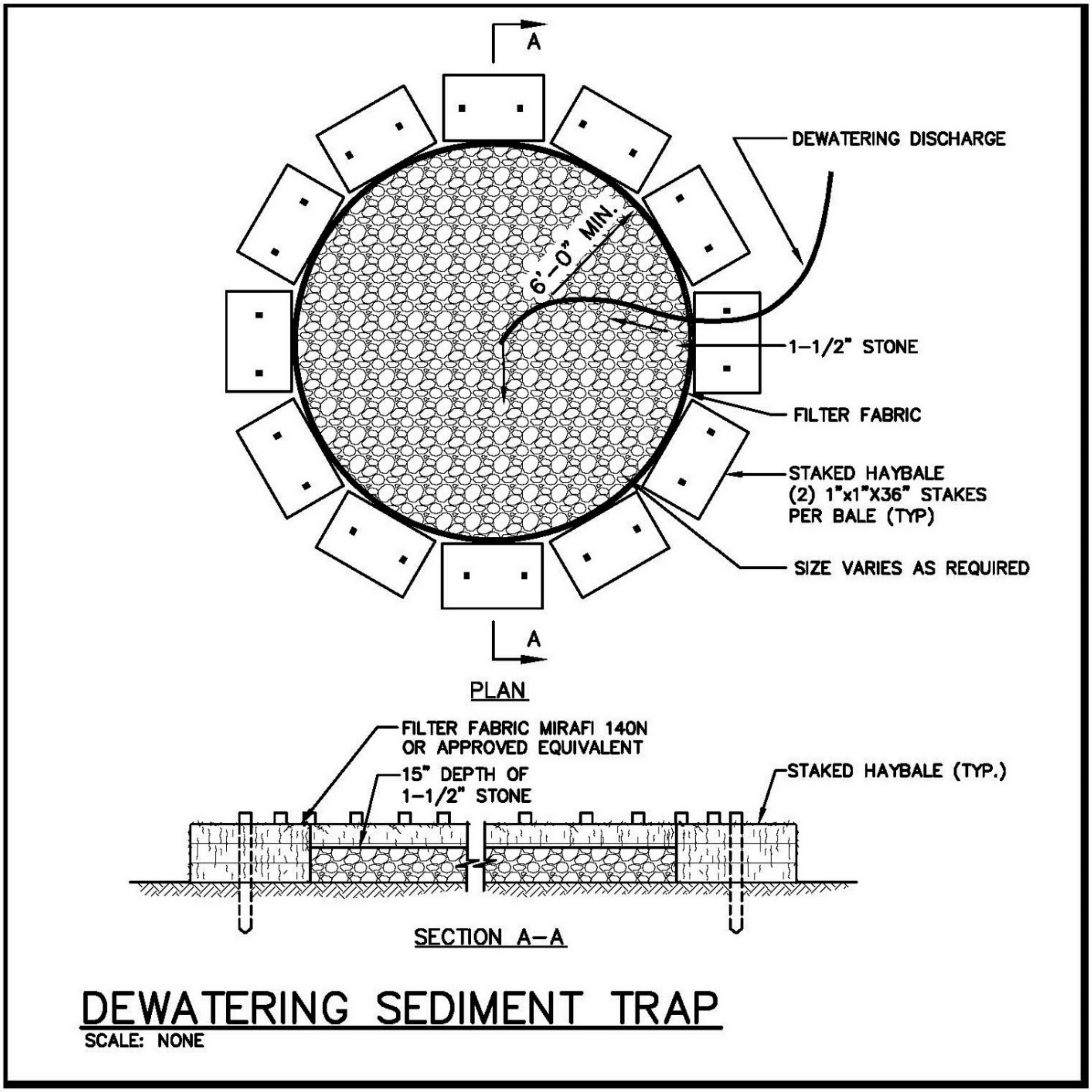
4.7.2 Temporary Stormwater Diversion Swale

A temporary diversion swale is an effective practice for temporarily diverting stormwater flows and to reduce stormwater runoff velocities during storm events. The swale channel can be installed before infrastructure construction begins at the site, or as needed throughout the construction process. The diversion swale should be routinely compacted or seeded to minimize the amount of exposed soil.



4.7.3 Dewatering Basins

Dewatering may be required during stormwater system, foundation construction and utility installation. Should the need for dewatering arise, groundwater will be pumped directly into a temporary settling basin, which will act as a sediment trap during construction. All temporary settling basins will be located within close proximity of daily work activities. Prior to discharge, all groundwater will be treated by means of the settling basin or acceptable substitute. Discharges from sediment basins will be free of visible floating, suspended and settleable solids that would impair the functions of a wetland or degrade the chemical composition of the wetland resource area receiving ground or surface water flows and will be to the combined system.



4.7.4 Material Stockpiling Locations

Piping and trench excavate associated with the subsurface utility work will be contained with a single row of silt socks and/or haybales.

4.8 Permanent Structural Erosion Control Measures

Permanent erosion control measures serve to minimize post-construction impacts to undisturbed areas. Please refer to the following sections for a description of permanent erosion control measures implemented as part of the project and this SWPPP.

4.9 Good Housekeeping Best Management Practices

4.9.1 Material Handling and Waste Management

Solid waste generation during the construction period will be primarily construction debris. The debris will include scrap lumber (used forming and shoring pallets and other shipping containers), waste packaging materials (plastic sheeting and cardboard), scrap cable and wire, roll-off containers (or dumpsters) and will be removed by a contract hauler to a properly licensed landfill. The roll-off containers will be covered with a properly secured tarp before the hauler exits the site. In addition to construction debris, the construction work force will generate some amount of household-type wastes (food packing, soft drink containers, and other paper). Trash containers for these wastes will be located around the site and will be emptied regularly to prevent wind-blown litter. This waste will also be removed by a contract hauler.

All hazardous waste material such as oil filters, petroleum products, paint and equipment maintenance fluids will be stored in structurally sound and sealed shipping containers in the hazardous-materials storage area and segregated from other non-waste materials. Secondary containment will be provided for all materials in the hazardous materials storage area and will consist of commercially available spill pallets. Additionally, all hazardous materials will be disposed of in accordance with federal, state and municipal regulations.

Two temporary sanitary facilities (portable toilets) will be provided at the site in the combined staging area. The toilets will be away from a concentrated flow path and traffic flow and will have collection pans underneath as secondary treatment. All sanitary waste will be collected from an approved party at a minimum of three times per week.

4.9.2 Building Material Staging Areas

Construction equipment and maintenance materials will be stored at the combined staging area and materials storage areas. Silt fence will be installed around the perimeter to designate the staging and materials storage area. A watertight shipping container will be used to store hand tools, small parts and other construction materials.

Non-hazardous building materials such as packaging material (wood, plastic and glass) and construction scrap material (brick, wood, steel, metal scraps, and pine cuttings) will be stored in a separate covered storage facility adjacent to other stored materials. All hazardous-waste materials such as oil filters, petroleum products, paint and equipment maintenance fluids will be stored in structurally sound and sealed containers under cover within the hazardous materials storage area.

Large items such as framing materials and stockpiled lumber will be stored in the open storage area. Such materials will be elevated on wood blocks to minimize contact with runoff.

The combined storage areas are expected to remain clean, well-organized and equipped with ample cleaning supplies as appropriate for the materials being stored. Perimeter controls such as containment structures, covers and liners will be repaired or replaced as necessary to maintain proper function.

4.9.3 Designated Washout Areas

Designated temporary, below-ground concrete washout areas will be constructed, as required, to minimize the pollution potential associated with concrete, paint, stucco, mixers etc. Signs will, if required, be posted marking the location of the washout area to ensure that concrete equipment operators use the proper facility. Concrete pours will not be conducted during or before an anticipated precipitation event. All excess concrete and concrete washout slurries from the concrete mixer trucks and chutes will be discharged to the washout area or hauled off-site for disposal.

4.9.4 Equipment/Vehicle Maintenance and Fueling Areas

Several types of vehicles and equipment will be used on-site throughout the project including graders, scrapers, excavators, loaders, paving equipment, rollers, trucks and trailers, backhoes and forklifts. All major equipment/vehicle fueling and maintenance will be performed off-site. A small, 20-gallon pickup bed fuel tank will be kept on-site in the combined staging area. When vehicle fueling must occur on-site, the fueling activity will occur in the staging area. Only minor equipment maintenance will occur on-site. All equipment fluids generated from maintenance activities will be disposed of into designated drums stored on spill pallets. Absorbent, spill-cleanup materials and spill kits will be available at the combined staging and materials storage area. Drip pans will be placed under all equipment receiving maintenance and vehicles and equipment parked overnight.

4.9.5 Equipment/Vehicle Wash down Area

All equipment and vehicle washing will be performed off-site.

4.9.6 Spill Prevention Plan

A spill containment kit will be kept on-site in the Contractor's trailer and/or the designated staging area throughout the duration of construction. Should there be an accidental release of petroleum product into a resource area, the appropriate agencies will be immediately notified.

4.9.7 Inspections

Maintenance of existing and proposed BMP's to address stormwater management facilities during construction is an on-going process. The purpose of the inspections is to observe all sources of stormwater or non-stormwater discharge as identified in the SWPPP as well as the status of the receiving waters and fulfill the requirements of the Order of Conditions. The following sections describe the appropriate inspection measures to adequately implement the project's SWPPP. A blank inspection form is provided at the end of this section. Completed inspection forms are to be maintained on site.

Inspection Personnel

The owner's appointed representative will be responsible for performing regular inspections of erosion controls and ordering repairs as necessary.

Inspection Frequency

Inspections will be performed by qualified personnel once every 7 days and within 24-hours after a storm event of greater than one-quarter inch, in accordance with the CGP. The inspections must be documented on the inspection form provided at the end of this section, and completed forms will be provided to the on-site supervisor and maintained at the Owner's office throughout the entire duration of construction.

Inspection Reporting

Each inspection report will summarize the scope of the inspection, name(s) and qualifications of personnel making the inspection, and major observations relating to the implementation of the SWPPP, including compliance and non-compliance items. Completed inspection reports will remain with the completed SWPPP on site.

4.9.8 Amendment Requirements

The final SWPPP is intended to be a working document that is utilized regularly on the construction site, and provides guidance to the Contractor. It must reflect changes made to the originally proposed plan and will be updated to include project specific activities and ensure that they are in compliance with the NPDES General Permit and state and local laws and regulations. It should be amended whenever there is a change in design, construction, operation or maintenance that affects discharge of pollutants. The following items should be addressed should an amendment to the SWPPP occur:

- Dates of certain construction activities such as major grading activities, clearing and initiation of and completion of stabilization measures should be recorded.
- Future amendments to the SWPPP will be recorded as required. As this SWPPP is amended, all amendments will be kept on site and made part of the SWPPP.
- Upon completion of site stabilization (completed as designed and/or 70% background vegetative cover), it can be documented and marked on the plans. Inspections are no longer required at this time.
- Inspections often identify areas not included in the original SWPPP, which will require the SWPPP to be amended. These updates should be made within seven days of being recognized by the inspector.

4.10 SWPPP Inspection and Maintenance Report

The following form is an example to be used for SWPPP Inspection Reporting.

Stormwater Construction Site Inspection and Maintenance Report

TO BE COMPLETED AT LEAST EVERY 7 DAYS AND WITHIN 24 HOURS OF A STORM EVENT OF AT LEAST 0.25 INCHES. AFTER SITE STABILIZATION, TO BE COMPLETED AT LEAST ONCE PER MONTH FOR THREE YEARS OR UNTIL A NOTICE OF TERMINATION IS FILED (IF APPLICABLE).

General Information			
Project Name	Photovoltaic System		
NPDES Tracking No. (if applicable)		**Location**	200 Route 15 Sturbridge, MA 01566
Date of Inspection		**Start/End Time**	
Inspector's Name(s)			
Inspector's Title(s)			
Inspector's Contact Information			
Inspector's Qualifications			
Describe present phase of construction			
Type of Inspection: ❑ Regular ❑ Pre-storm event ❑ During storm event ❑ Post-storm event			
Weather Information			
Has there been a storm event since the last inspection? ❑Yes ❑No **If yes, provide:** Storm Start Date & Time: Storm Duration (hrs): Approximate Amount of Precipitation (in):			
Weather at time of this inspection? ❑ Clear ❑Cloudy ❑ Rain ❑ Sleet ❑ Fog ❑ Snowing ❑ High Winds ❑ Other: Temperature:			
Have any discharges occurred since the last inspection? ❑Yes ❑No **If yes, describe:**			
Are there any discharges at the time of inspection? ❑Yes ❑No **If yes, describe:**			

Site-specific BMPs

- *Number the structural and non-structural BMPs identified in your SWPPP on your site map and list them below (add as many BMPs as necessary). Carry a copy of the numbered site map with you during your inspections. This list will ensure that you are inspecting all required BMPs at your site.*
- *Describe corrective actions initiated, date completed, and note the person that completed the work in the Corrective Action Log.*

	BMP	**BMP Installed?**	**BMP Maintenance Required?**	**Corrective Action Needed and Notes Action required by whom and when**
1	Catch Basin Protection	❑Yes ❑No	❑Yes ❑No	
2	Haybale & Silt Fencing	❑Yes ❑No	❑Yes ❑No	
3	Straw Wattles	❑Yes ❑No	❑Yes ❑No	
4	Construction Entrance	❑Yes ❑No	❑Yes ❑No	
5	Sediment Basins	❑Yes ❑No	❑Yes ❑No	
6	Dewatering Pit	❑Yes ❑No	❑Yes ❑No	

Overall Site Issues
Below are some general site issues that should be assessed during inspections. Customize this list as needed for conditions at your site.

	BMP/activity	Implemented?	Maintenance Required?	Corrective Action Needed and Notes Action required by whom and when
1	Are all slopes and disturbed areas not actively being worked properly stabilized?	❑Yes ❑No	❑Yes ❑No	
2	Are natural resource areas (e.g., streams, wetlands, mature trees, etc.) protected with barriers or similar BMPs?	❑Yes ❑No	❑Yes ❑No	
3	Are perimeter controls and sediment barriers adequately installed (keyed into substrate) and maintained?	❑Yes ❑No	❑Yes ❑No	
4	Are discharge points and receiving waters free of any sediment deposits?	❑Yes ❑No	❑Yes ❑No	
5	Are storm drain inlets properly protected?	❑Yes ❑No	❑Yes ❑No	
6	Is the construction exit preventing sediment from being tracked into the street?	❑Yes ❑No	❑Yes ❑No	
7	Is trash/litter from work areas collected and placed in covered dumpsters?	❑Yes ❑No	❑Yes ❑No	
8	Are washout facilities (e.g., paint, stucco, concrete) available, clearly marked, and maintained?	❑Yes ❑No	❑Yes ❑No	
9	Are vehicle and equipment fueling, cleaning, and maintenance areas free of spills, leaks, or any other deleterious material?	❑Yes ❑No	❑Yes ❑No	Vehicle Maintenance not allowed on site
10	Are materials that are potential stormwater	❑Yes ❑No	❑Yes ❑No	

	BMP/activity	Implemented?	Maintenance Required?	Corrective Action Needed and Notes Action required by whom and when
	contaminants stored inside or under cover?			
11	Are non-stormwater discharges (e.g., wash water, dewatering) properly controlled?	❑Yes ❑No	❑Yes ❑No	
12	(Other)	❑Yes ❑No	❑Yes ❑No	

Non-Compliance

Describe any incidents of non-compliance not described above:

CERTIFICATION STATEMENT

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

Print name and title: ____.
(Qualified Person Performing the Inspection)

Signature:________________________________ Date: ________________.

Print name and title: ____
(Contractor/Operator)

Signature:________________________________ Date:________________

SECTION 5.0

LONG-TERM POLLUTION PREVENTION & OPERATION AND MAINTENANCE PLAN

5.0 LONG-TERM POLLUTION PREVENTION & OPERATION AND MAINTENANCE PLAN

As required by Standard #4 of the Stormwater Management Policy, this Long-Term Pollution Prevention Plan has been developed for source control and pollution prevention at the site after construction.

MAINTENANCE RESPONSIBILITY

Ensuring that the provisions of the Long-Term Pollution Prevention Plan are followed will be the responsibility of The Applicant.

GOOD HOUSEKEEPING PRACTICES

The site to be kept clean of trash and debris at all times. Trash, junk, etc. is not to be left outside.

VEHICLE WASHING CONTROLS

The following BMP's, or equivalent measures, methods or practices are required if you are engaged in vehicle washing and/or steam cleaning:

> It is allowable to rinse down the body or a vehicle, including the bed of a truck, with just water without doing any wash water control BMP's.
>
> If you wash (with mild detergents) on an area that infiltrates water, such as gravel, grass, or loose soil, it is acceptable to let the wash water infiltrate as long as you only wash the body of vehicles.
>
> However, if you wash on a paved area and use detergents or other cleansers, or if you wash/rinse the engine compartment or the underside of vehicles, you must take the vehicles to a commercial vehicle wash.

REQUIREMENTS FOR ROUTINE INSPECTIONS AND MAINTENANCE OF STORMWATER BMPS

All stormwater BMPs are to be inspected and maintained as follows.

Siltsoxx, Silt Fence, and other temporary measures

The temporary erosion control measures will be installed up gradient of any area where any disturbance or alteration might otherwise allow for erosion or sedimentation. They will be regularly inspected to ensure that they are functioning adequately. Additional supplies of these temporary measures will be stockpiled on site for any immediate needs or routine replacement.

Subsurface Drainage System

Maintenance is required for the proper operation of the underground infiltration system. Infiltration systems are prone to failure due to clogging if the upstream water quality units are not maintained. The use of pretreatment BMPs will minimize failure and maintenance requirements.

After construction, the infiltration system shall be inspected after every major storm for the first few months to ensure proper stabilization and function. Water levels in the access ports shall be recorded over several days to check the drainage of the systems. It is recommended that a logbook be maintained showing the depth of water in the detention infiltration systems at each observation in order to determine the rate at which the system dewaters after runoff producing storm events. Once the performance characteristics of the detention/infiltration have been verified, the monitoring schedule can be reduced to an annual basis, unless the performance data suggests that a more frequent schedule is required.

Preventative maintenance on the infiltration system shall be performed at least twice a year, and sediment shall be removed from any and all pretreatment and collection structures. Sediment shall be removed when deposits approach within six inches of the invert heights of connecting pipes between unit rows or sumped inlet structures. Ponded water inside the system (as visible from the access ports) that remain after several days most likely indicates that the bottom of the system is clogged and will require cleaning or replacement.

The system is designed with a defined top portal area at the “down-flow” end of the chamber that can be cut out to accept up to a 10-inch diameter riser pipe. The 10-inch riser can be used as an observation well and as access for a vacuum truck tube for use in removing sediment. The “down flow” ends of the units have end walls that are closed on the bottom. The closed bottom functions like a coffer dam, with most of the sediment depositing prior to flowing into the next chamber, facilitating its removal through the riser pipe, which is positioned directly above this area.

Infiltration Basin

Infiltration basins are prone to clogging and failure, so it is imperative to develop and implement aggressive maintenance plans and schedules. Installing the required pretreatment BMPs will significantly reduce maintenance requirements for the basin.

The Operation and Maintenance Plan required by Standard 9 must include inspections and preventive maintenance at least twice a year, and after every time drainage discharges through the high outlet orifice. The Plan must require inspecting the pretreatment BMPs in accordance with the minimal requirements specified for those practices and after every major storm event. A major storm event is defined as a storm that is equal to or greater than the 2-year, 24-hour storm (generally 2.9 to 3.6 inches in a 24-hour period, depending in geographic location in Massachusetts).

Once the basin is in use, inspect it after every major storm for the first few months to ensure it is stabilized and functioning properly and if necessary, take corrective action. Note how long water remains standing in the basin after a storm; standing water within the basin 48 to 72 hours after a storm indicates that the infiltration capacity may have been overestimated. If the ponding is due to clogging, immediately address the reasons for clogging (such as upland sediment erosion, excessive compaction of soils, or low spots). Thereafter, inspect the infiltration basin at least twice per year. Important items to check during the inspection schedule: signs of differential settlement, cracking, erosion, leakage in the embankments, tree growth on the embankments, condition of riprap, sediment accumulation, and the health of the turf.

At least twice a year, mow the buffer area, side slopes, and basin bottom. Remove grass clippings and accumulated organic matter to prevent an impervious organic mat from forming. Remove trash and debris at the same time. Use deep tilling to break up clogged surfaces and revegetate immediately.

Remove sediment from the basin as necessary but wait until the floor of the basin is thoroughly dry. Use light equipment to remove the top layer to not compact the underlying soil. Deeply till the remaining clean pretreatment devices associated with basins at least twice a year, and ideally every other month.

Water Quality Unit, Catch Basins, and Drain Manholes

Regular maintenance is essential. Water quality units, catch basins, and drain manholes will only remain effective if they are cleaned out frequently. Inspect or clean out the unit at least four times per year and at the end of the foliage and snow-removal seasons. Sediments must also be removed four times a year or whenever the depth of the deposits is greater than or equal to one half of the depth from the bottom of the invert of the lowest pipe in the unit. Additional cleaning may be necessary.

Clamshell buckets or vacuum trucks are typical methods for removing sediment from the unit. Vacuuming is a much more time effective process. Also consider safety when cleaning the unit if the unit is in a roadway with active traffic.

PROVISIONS FOR MAINTENANCE OF LAWNS, GARDENS AND OTHER LANDSCAPE AREAS

Suggested Maintenance Operations

A. Trees and Shrubs

Disease and Pest Management - Prevention of disease or infestation is the first step of Pest Management. A plant that is in overall good health is far less susceptible to disease. Good general landscape maintenance can reduce problems from disease.

Inspections of plant materials for signs of disease or infestation are to be performed monthly by the Landscape Maintenance Contractor's Certified Arborist. This is a critical step for early diagnosis. Trees and Shrubs that have been diagnosed to have a plant disease or an infestation of insect pests are to be treated promptly with an appropriate material by a licensed applicator.

Watering - Trees and Shrubs will need supplemental watering to remain in vigorous health. All new plants need to be watered once a week in cool weather, twice a week during warm weather, and up to three times in a week during periods of extreme heat and drought. Trees and shrubs should be watered in such a manner as to totally saturate the soil in the root zone area. Over-watering or constant saturation of the soil must be avoided as this could lead to root rot and other disease problems. The use of a soil moisture meter can help you monitor the soil's water intake.

Plant Replacement - Unhealthy plants that may cause widespread infestation of other nearby plants shall be immediately removed from the site. Any vegetation removed from the site must be recorded and submitted with the daily maintenance log. The area shall be treated to prevent further infestation. The plant shall then be replaced with a healthy specimen of the same species and size. This work shall have a pre-established budget allowance for the year.

A spring inspection of all plant materials shall be performed to identify those plant materials that are not in vigorously healthy condition. Unhealthy plant materials shall be evaluated. If the problem is determined to be minor the plant material shall be given appropriate restorative care in accordance with this maintenance guideline until it is restored to a vigorously healthy condition. Unhealthy plant materials that do not respond to restorative care or are determined to be beyond saving shall be replaced with a healthy specimen of the same species and size. In the case of the necessity of replacing extremely large plant materials the Landscape Architect shall determine the size of the replacement plant.

Pruning - Proper pruning is the selective removal of branches without changing the plant's natural appearance, or habit of growth. All tree pruning is to be performed by a licensed Arborist. All branches that are dead, broken, scared or crossing should be removed. All cuts should be made at the collar and not cut flush with the base.

Pruning on the site shall be done for the following purposes;

- To maintain or reduce the size of a tree or shrub
- To remove dead, diseased or damaged branches
- To rejuvenate old shrubs and encourage new growth
- To stimulate future flower and fruit development
- To maximize the visibility of twig color
- To prevent damage and reduce hazards to people and properties

All shrubs are recommended to be pruned on an annual basis to prevent the shrub from becoming overgrown and eliminate the need for drastic pruning. There are several types of pruning for deciduous shrubs. Hand snips should be used to maintain a more natural look or hand shears can be used for a more formal appearance.

Winter Protection - All trees and shrubs are to be watered and mulched before the first frost. All stakes should be checked, and ties adjusted. Damaged branches should be pruned.

Broadleaf and Coniferous Evergreen plant materials are to be sprayed with an anti-desiccant product to prevent winter burn. The application shall be repeated during a suitable mid-winter thaw.

Shrubs located in areas likely to be piled with snow during snow removal (but not designated as Snow Storage Areas) shall be marked by six-foot high poles with bright green banner flags. Stockpiles of snow are not to be located in these areas due to potential damage to the plant materials from both the weight of the snow and the snow melting chemicals.

At the fall landscape maintenance conference parameters will be discussed between the Landscape Maintenance Contractor and the snow removal contractor to assure minimal damage and loss of landscape amenities during the winter season.

Seasonal Clean Up - A thorough spring cleanup is to be performed. This includes the removal and replacement of dead or unhealthy plant materials and the cleanup of plant debris and any general debris that has accumulated over the winter season. Mulch is to be lightly raked to clean debris from the surface without removing any mulch. Twigs and debris are to be removed from the planting beds throughout the growing season.

Mulching - Planting beds shall be mulched with a treated shredded hardwood mulch free from dirt, debris, and insects. A sample of this mulch shall be given to the Owner for approval prior to installation.

Maintain a 2-3" maximum depth and keep free of weeds either by hand weeding or by the use of a pre-emergent weed control such as Treflan or Serfian. Seasonal re-mulching shall occur as necessary in the spring and the fall to maintain this minimum depth. When new mulch is added to the planting bed it shall be spread to create a total depth of no more than three inches. Edges should be maintained in a cleanly edged fashion.

Mulch shall not be placed directly against the trunk of any tree or shrub.

B. Groundcover and Perennials

Disease and Pest Management – Pesticides and herbicides should be applied only as problems occur, with the proper chemical applied only by a trained professional or in the case of pesticide, a Certified Pesticide Applicator. Plants should be monitored weekly and treated accordingly.

Water – Groundcovers and Perennials will need supplemental watering in order to become established, healthy plants. All new plants need to be watered once a week in cool weather, twice a week during warm weather, and up to three times in a week during periods of extreme heat and drought. Until established, groundcovers and perennials should be watered in such a manner as to totally saturate the soil in the root zone area, to a depth of 6 inches. Once established, perennials shall continue to be watered as necessary to maintain them in a vigorous healthy condition. Over-watering or constant saturation of the soil must be avoided as this could lead to root rot and other disease problems. The use of a soil moisture meter can help you monitor the soil's water intake.

On-site water shall be furnished by the Owner. Hose and other watering equipment shall be furnished by the Landscape Maintenance Contractor.

Replacement – Any unhealthy plant/s that may cause widespread infestation of other nearby plants shall be immediately removed from the site. Any vegetation removed from the site must be recorded and submitted with the landscape maintenance log. The area shall be treated to prevent further infestation. The plant/s shall then be replaced with healthy specimen/s of the same species and size. Old Forge shall have a pre-established budget allowance for this type of replacement, each year.

Plant material that is damaged as a result of other landscape maintenance activities, such as mowing, shall be replaced with healthy specimens of the same species and size, at no additional cost to the owner.

Deadheading – Perennials shall be checked on a weekly basis and dead-headed once flowers have faded or as necessary based on plant type and duration of flower. Spent flowers can be pinched off with the thumb and forefinger. Continue to remove all faded flowers until Fall. All associated debris shall be removed from site daily.

Staking – Upright-growing perennials need support especially when in flower. Use of bamboo stakes, galvanized wire hoops or mesh may be necessary for their support. Supports should be put in place before they have become too difficult to handle. The supports should not be taller than the mature height of the perennial plant.

Division of Perennials – Two or three-year-old perennials are easily divided in the spring if more plants are needed. To divide, cut out the entire section of plant to be divided, including roots. The larger divisions (those with three or more shoots), can be set out immediately in their permanent location, where they can be expected to bloom the same season. Smaller divisions are best planted in an out-of-the-way planting bed until the following autumn or spring, when they can be moved to their permanent location.

Weeding – All planting beds should be kept weed-free. Weed either by hand or with a pre-emergent herbicide such as Treflen used according to manufacturers' specifications. Manual weeding is to be used in combination with the use of spot applications of herbicides. Both live and dead weeds are to be pulled and removed from the site.

All herbicide applications shall be documented in the Landscape Maintenance Log. The actual product label or the manufacturer's product specification sheet for the specific product shall also be included in the Log.

Only personnel with appropriate applicator licenses shall supervise and/or perform the application of pesticide products requiring a license.

Winterizing – Perennial gardens should be cleaned-up when growth ceases in the fall. Remove foliage of plants that normally die down to the ground. Divide and replant over-grown clumps.

C. Grass Areas (Meadow)

Mowing – Meadow grasses should be maintained at a maximum height of 12 inches. Maintaining grasses no higher than this is critical to prevent tall grass from casting shadows onto the solar panels, lowering their efficiency.

Mowing frequency – Typically, a solar field will need to be mowed once every month. Mowing frequency will vary with the growing season and should be set by the plant height and not a set date. Mowing frequency should be reduced during periods of stress.

When mowing any area, try to alternate mowing patterns. This tends to keep grass blades more erect and assures an even cut. A dull mower will cause color loss due to tearing of the turf plant, and since mowing will ultimately determine the appearance of any turf area there is an absolute necessity for a clean sharp cut.

Weed & Pest Control and Fertilizing- Not needed.

Weed Control – Not needed.

Pest Control – Not needed.

Lime – Not needed.

Lawn Maintenance Task Schedule

MARCH (Weather permitting)
- Clean up winter debris, sand, leaves, trash etc.
- Re-edge mulch beds, maintain at 2-3" maximum.
- Fertilize plants

APRIL
- Reseed or sod all areas needing attention.
- Start mowing when meadow grasses reach 12", mow to 6"

MAY
- Mow meadow grasses to height of 6"
- Check for disease and pest problems in both turf and plants.

JUNE

- Mow meadow grasses to height of 6”
- Check for disease and pest problems in both turf and plants, treat as necessary.

PROVISIONS FOR SOLID WASTE MANAGEMENT (SITE TRASH)

Trash will not be generated at this site and there will be no dumpsters or receptacles provided for solid waste.

SNOW DISPOSAL AND PLOWING PLANS

Snow plowing will be the responsibility of the owner. The purpose of the snow and snowmelt management plan is to provide guidelines regarding snow disposal site selection, site preparation and maintenance that are acceptable to the Department of Environmental Protection. For the areas that require snow removal, snow storage onsite will largely be accomplished by using pervious areas along the shoulder of the roadway and development as windrowed by plows.

- Avoid dumping of snow into any water body, including rivers, ponds, or wetlands. In addition to water quality impacts and flooding, snow disposed of in open water can cause navigational hazards when it freezes into ice blocks.
- Avoid disposing of snow on top of storm drain catch basins or in stormwater basins. Snow combined with sand and debris may block a storm drainage system, causing localized flooding. A high volume of sand, sediment, and litter released from melting snow also may be quickly transported through the system into surface water.

WINTER ROAD SALT AND/OR SAND USE AND STORAGE RESTRICTIONS

The owner will be responsible for sanding and salting the site. No storage on site.

STREET SWEEPING SCHEDULES

Not applicable.

This project has not included street sweeping as part of the TSS removal calculations. However, if sand accumulates on site from the adjacent roadway, a street sweeping may be required. This would likely occur after the spring snow melt.

Reuse and Disposal of Street Sweepings

Once removed from paved surfaces, the sweepings must be handled and disposed of properly. Mass DEP’s Bureau of Waste Prevention has issued a written policy regarding the reuse and disposal of street sweepings. These sweepings are regulated as a solid waste, and can be used in three ways:

- In one of the ways already approved by Mass DEP (e.g., daily cover in a landfill, additive to compost, fill in a public way)
- If approved under a Beneficial Use Determination
- Disposed in a landfill

TRAINING OF STAFF OR PERSONNEL INVOLVED WITH IMPLEMENTING LONG-TERM POLLUTION PREVENTION PLAN

The Long-Term Pollution Prevention Plan is to be implemented by property owner of the site. Trained and, if required, licensed Professionals are to be hired by the owner as applicable to implement the Long-Term Pollution Prevention Plan.

LIST OF EMERGENCY CONTACTS FOR IMPLEMENTING LONG-TERM POLLUTION PREVENTION PLAN

The applicant will be required to implement the Long-Term Pollution Prevention Plan and will create and maintain a list of emergency contacts.

POST CONSTRUCTION PHASE INSPECTION SCHEDULE AND EVALUATION CHECKLIST

Inspection Date	Inspector	BMP Inspected	Inspection Frequency Requirements	Comments	Recommendation	Follow-up Inspection Required (yes/no)
		Water Quality Unit, Catch Basin, & Drain Manhole	4 times a year			
		Subsurface Drainage Systems	2 times a year			
		Infiltration Basin	2 times a year			

1. Refer to the Massachusetts Stormwater Handbook Volume Two: Stormwater Technical Handbook (February 2008) for recommendations regarding frequency for inspections and maintenance of specific BMP's

2. Inspections to be conducted by a qualified professional such as an environmental scientist or civil engineer.

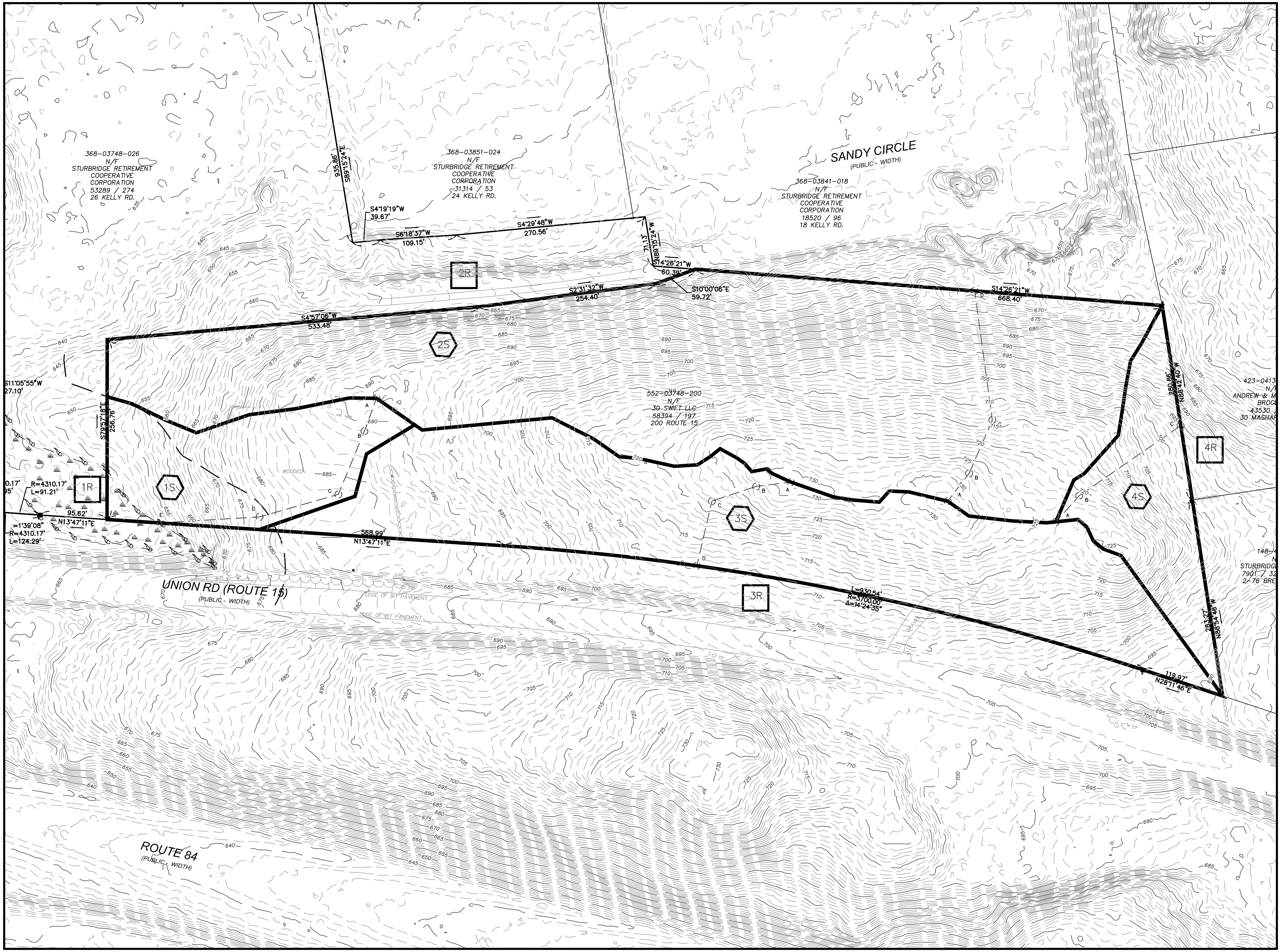
3. Limited or no use of sodium chloride salts, fertilizers or pesticides recommended.

4. Other Notes: (Include deviations from Conservation Commission Approvals, Planning Board Approvals and Approved Plans)

SECTION 6.0

HYDROLOGY CALCULATIONS

6.01 EXISTING WATERSHED PLAN



BRIAN G. YERGATIAN
PROFESSIONAL ENGINEER

DATE

GROUND-MOUNTED PHOTOVOLTAIC SYSTEM

200 ROUTE 15

IN

STURBRIDGE MASSACHUSETTS

(WORCESTER COUNTY)

PRE-DEVELOPMENT WATERSHED PLAN

APRIL 7, 2023

REVISIONS:

NO.	DATE	DESC.

PREPARED FOR:

BEAR PEAK POWER, LLC
2420 17TH STREET
DENVER, CO 80202

BSC GROUP

349 Main Street - Route 28
West Yarmouth, Massachusetts
02673

508 778 8919

SCALE: 1" = 60'

0 30 60 120 FEET

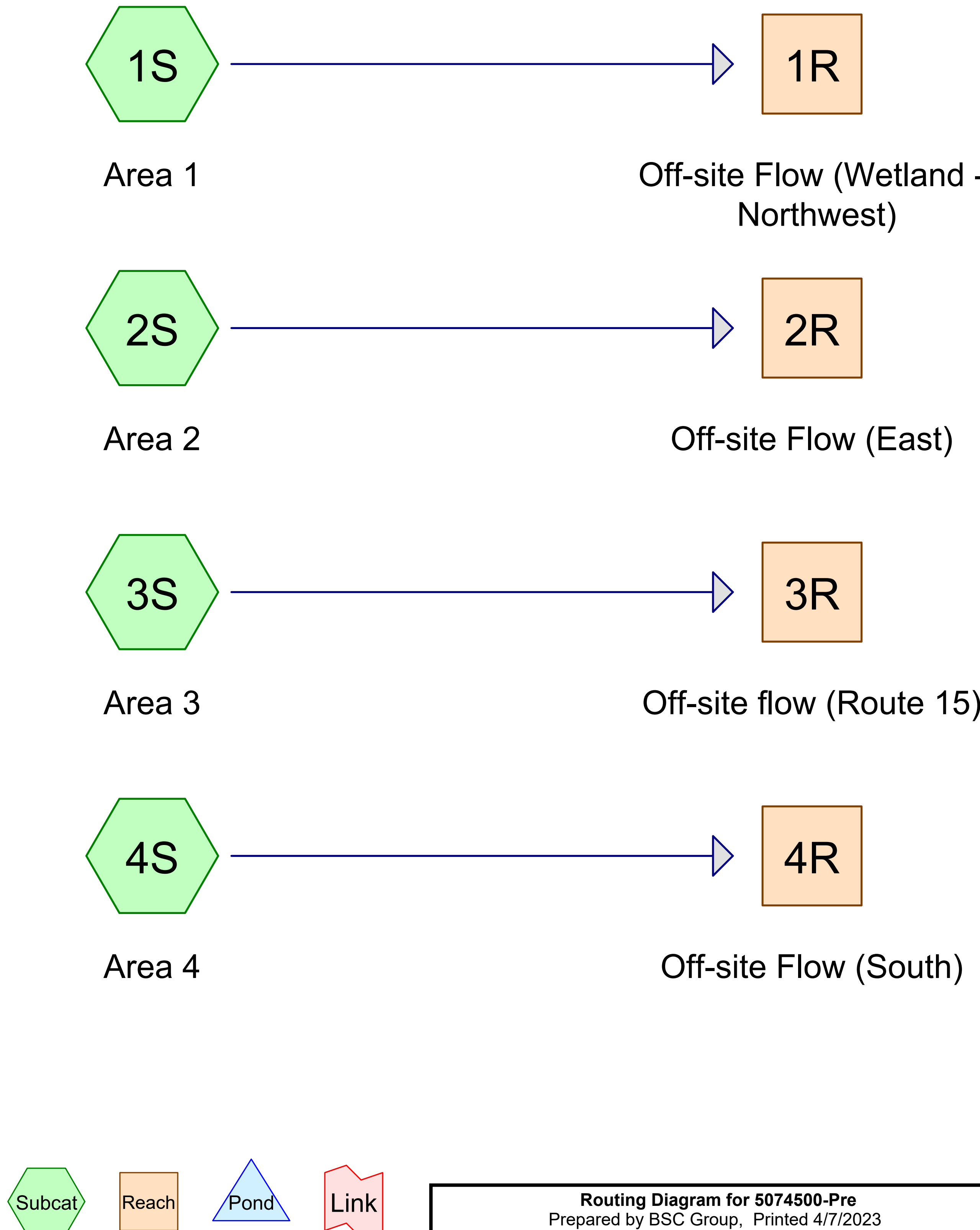
FILE: PROJECTS-YAR\5074500\C\D\5074500-SP.dwg

DWG.: DWG

JOB. NO: 5-0745.00

SHEET 1 OF 1

6.02 EXISTING HYDROLOGY CALCULATIONS (HYDROCAD™ PRINTOUTS)



Routing Diagram for 5074500-Pre
Prepared by BSC Group, Printed 4/7/2023
HydroCAD® 10.20-2g s/n 00904 © 2022 HydroCAD Software Solutions LLC

Rainfall Events Listing

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	2-year	Type III 24-hr		Default	24.00	1	3.23	2
2	10-year	Type III 24-hr		Default	24.00	1	5.04	2
3	25-year	Type III 24-hr		Default	24.00	1	6.17	2
4	50-year	Type III 24-hr		Default	24.00	1	7.00	2
5	100-year	Type III 24-hr		Default	24.00	1	7.92	2

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
13.919	55	Woods, Good, HSG B (1S, 2S, 3S, 4S)
13.919	**55**	**TOTAL AREA**

Time span=0.00-24.00 hrs, dt=0.01 hrs, 2401 points x 2
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment1S: Area 1 Runoff Area=58,975 sf 0.00% Impervious Runoff Depth>0.26"
Flow Length=407' Tc=13.5 min CN=55 Runoff=0.14 cfs 0.029 af

Subcatchment2S: Area 2 Runoff Area=315,386 sf 0.00% Impervious Runoff Depth>0.26"
Flow Length=318' Tc=8.5 min CN=55 Runoff=0.78 cfs 0.156 af

Subcatchment3S: Area 3 Runoff Area=184,498 sf 0.00% Impervious Runoff Depth>0.26"
Flow Length=212' Tc=11.1 min CN=55 Runoff=0.44 cfs 0.091 af

Subcatchment4S: Area 4 Runoff Area=47,465 sf 0.00% Impervious Runoff Depth>0.26"
Flow Length=226' Tc=8.2 min CN=55 Runoff=0.12 cfs 0.023 af

Reach 1R: Off-site Flow (Wetland - Northwest) Inflow=0.14 cfs 0.029 af
Outflow=0.14 cfs 0.029 af

Reach 2R: Off-site Flow (East) Inflow=0.78 cfs 0.156 af
Outflow=0.78 cfs 0.156 af

Reach 3R: Off-site flow (Route 15) Inflow=0.44 cfs 0.091 af
Outflow=0.44 cfs 0.091 af

Reach 4R: Off-site Flow (South) Inflow=0.12 cfs 0.023 af
Outflow=0.12 cfs 0.023 af

Total Runoff Area = 13.919 ac Runoff Volume = 0.300 af Average Runoff Depth = 0.26"
100.00% Pervious = 13.919 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment 1S: Area 1

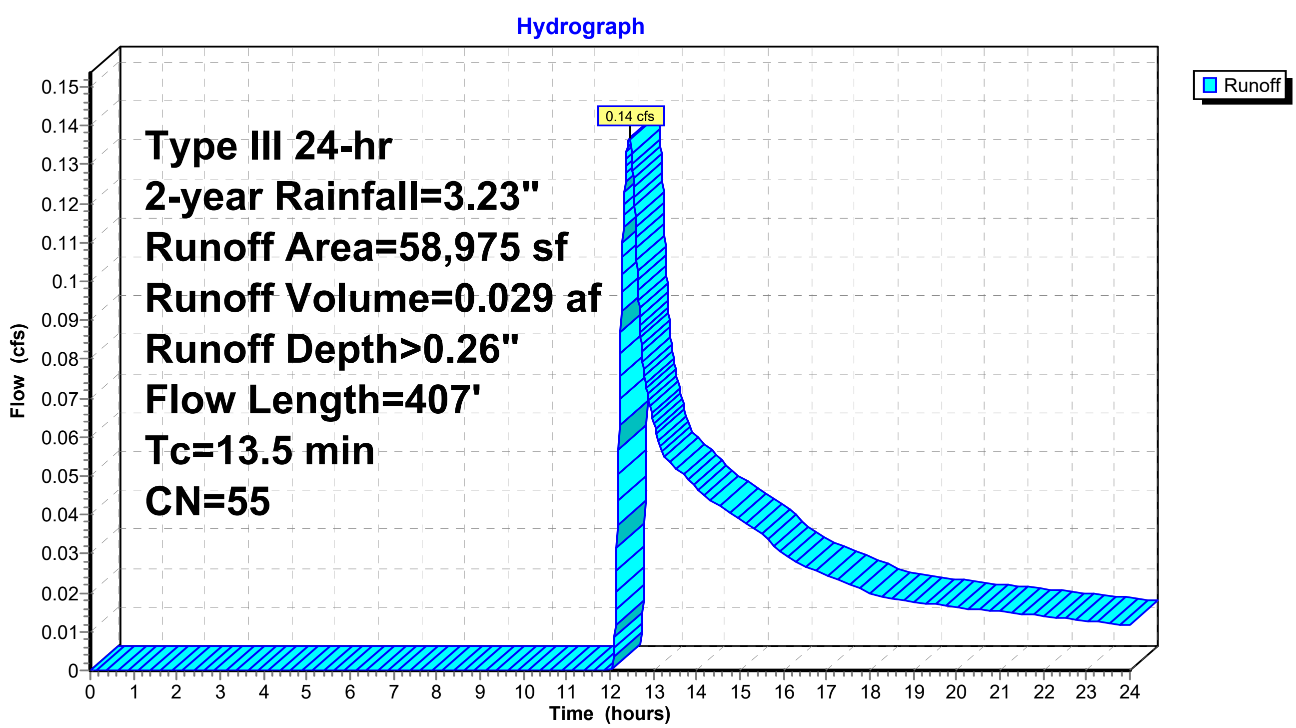
Runoff = 0.14 cfs @ 12.44 hrs, Volume= 0.029 af, Depth> 0.26"
Routed to Reach 1R : Off-site Flow (Wetland - Northwest)

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-year Rainfall=3.23"

Area (sf)	CN	Description
58,975	55	Woods, Good, HSG B
58,975		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.3	50	0.0400	0.09		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.20"
1.5	98	0.0450	1.06		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
1.6	117	0.0600	1.22		**Shallow Concentrated Flow, C-D** Woodland Kv= 5.0 fps
1.1	142	0.1700	2.06		**Shallow Concentrated Flow, D-E** Woodland Kv= 5.0 fps
13.5	407	Total			

Subcatchment 1S: Area 1



Summary for Subcatchment 2S: Area 2

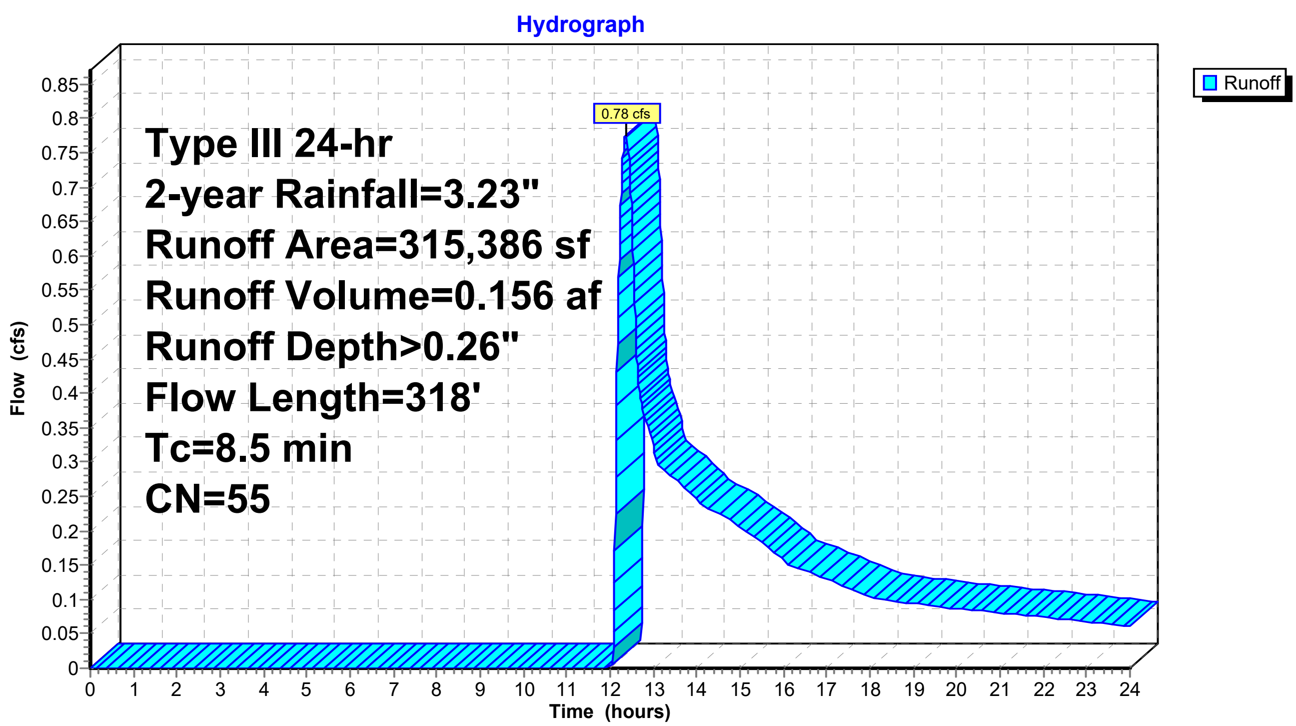
Runoff = 0.78 cfs @ 12.36 hrs, Volume= 0.156 af, Depth> 0.26"
Routed to Reach 2R : Off-site Flow (East)

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-year Rainfall=3.23"

Area (sf)	CN	Description
315,386	55	Woods, Good, HSG B
315,386		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.5	50	0.1000	0.13		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.20"
0.7	82	0.1700	2.06		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
1.3	186	0.2390	2.44		**Shallow Concentrated Flow, C-D** Woodland Kv= 5.0 fps
8.5	318	Total			

Subcatchment 2S: Area 2



Summary for Subcatchment 3S: Area 3

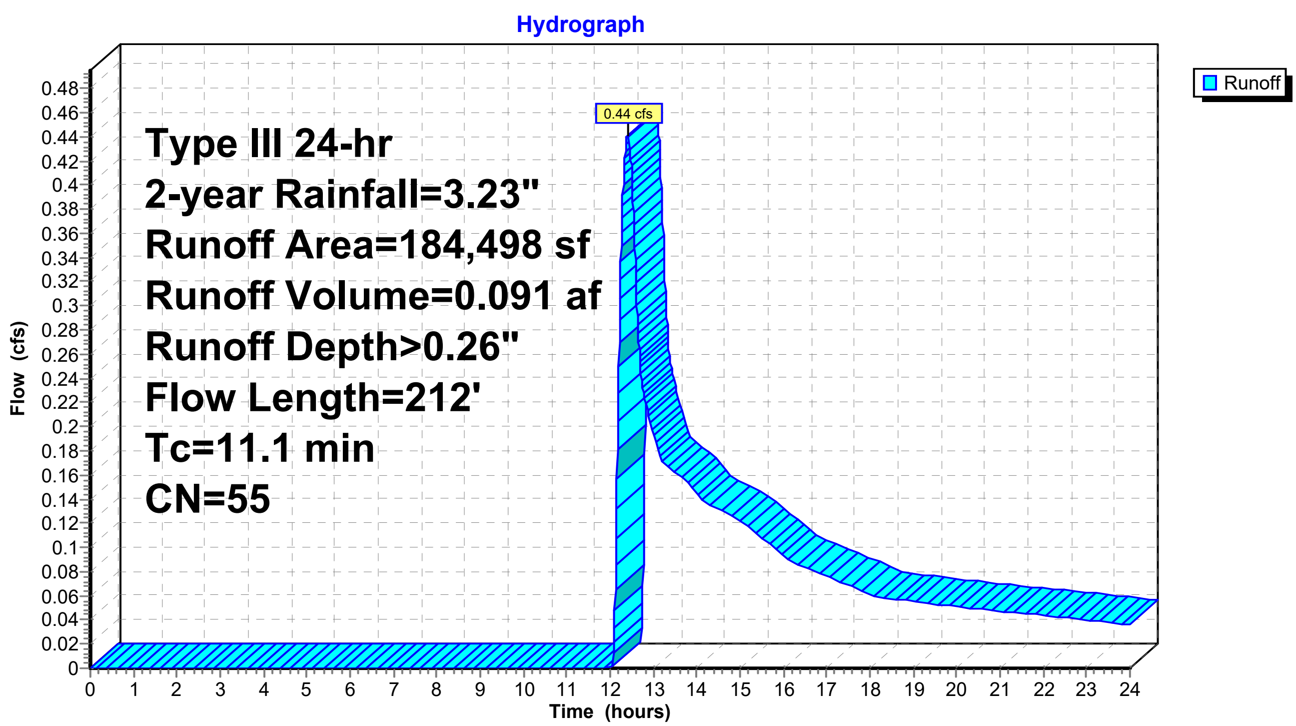
Runoff = 0.44 cfs @ 12.41 hrs, Volume= 0.091 af, Depth> 0.26"
Routed to Reach 3R : Off-site flow (Route 15)

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-year Rainfall=3.23"

Area (sf)	CN	Description
184,498	55	Woods, Good, HSG B
184,498		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.3	50	0.0400	0.09		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.20"
0.7	67	0.0900	1.50		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
1.1	95	0.0900	1.50		**Shallow Concentrated Flow, C-D** Woodland Kv= 5.0 fps
11.1	212	Total			

Subcatchment 3S: Area 3



Summary for Subcatchment 4S: Area 4

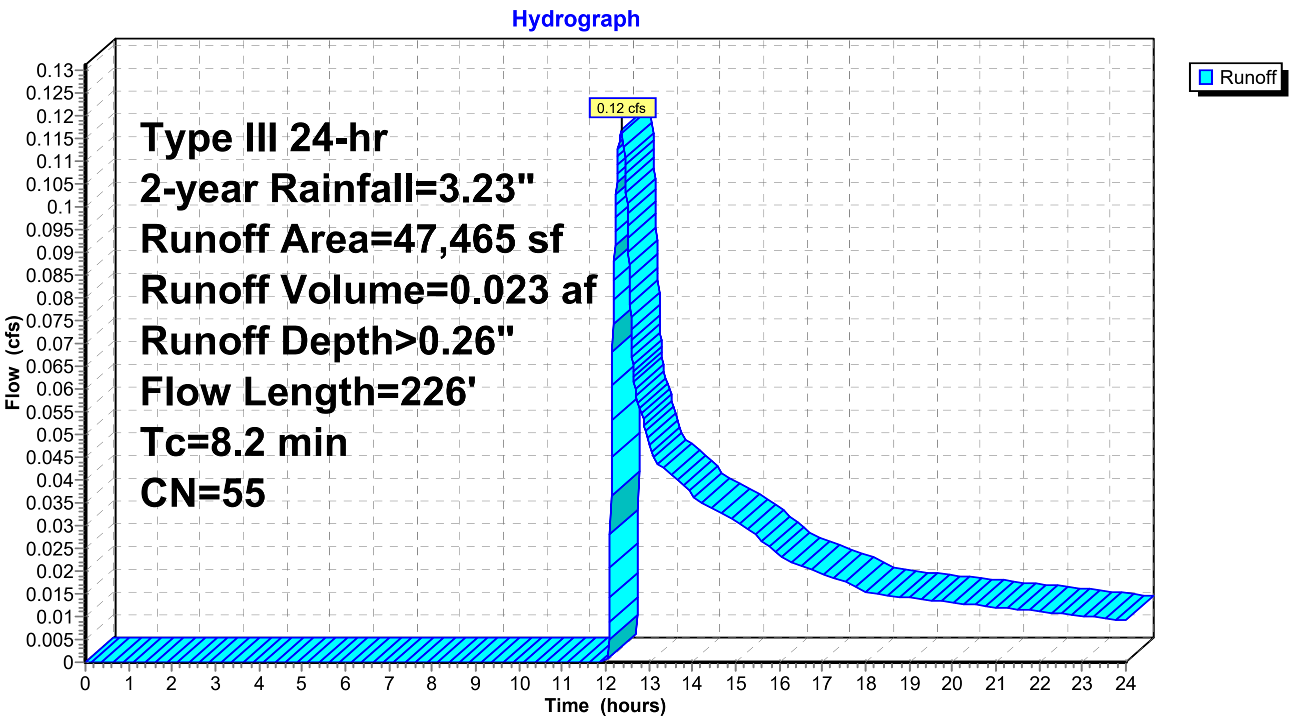
Runoff = 0.12 cfs @ 12.36 hrs, Volume= 0.023 af, Depth> 0.26"
Routed to Reach 4R : Off-site Flow (South)

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-year Rainfall=3.23"

Area (sf)	CN	Description
47,465	55	Woods, Good, HSG B
47,465		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.5	50	0.1000	0.13		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.20"
1.7	176	0.1200	1.73		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
8.2	226	Total			

Subcatchment 4S: Area 4



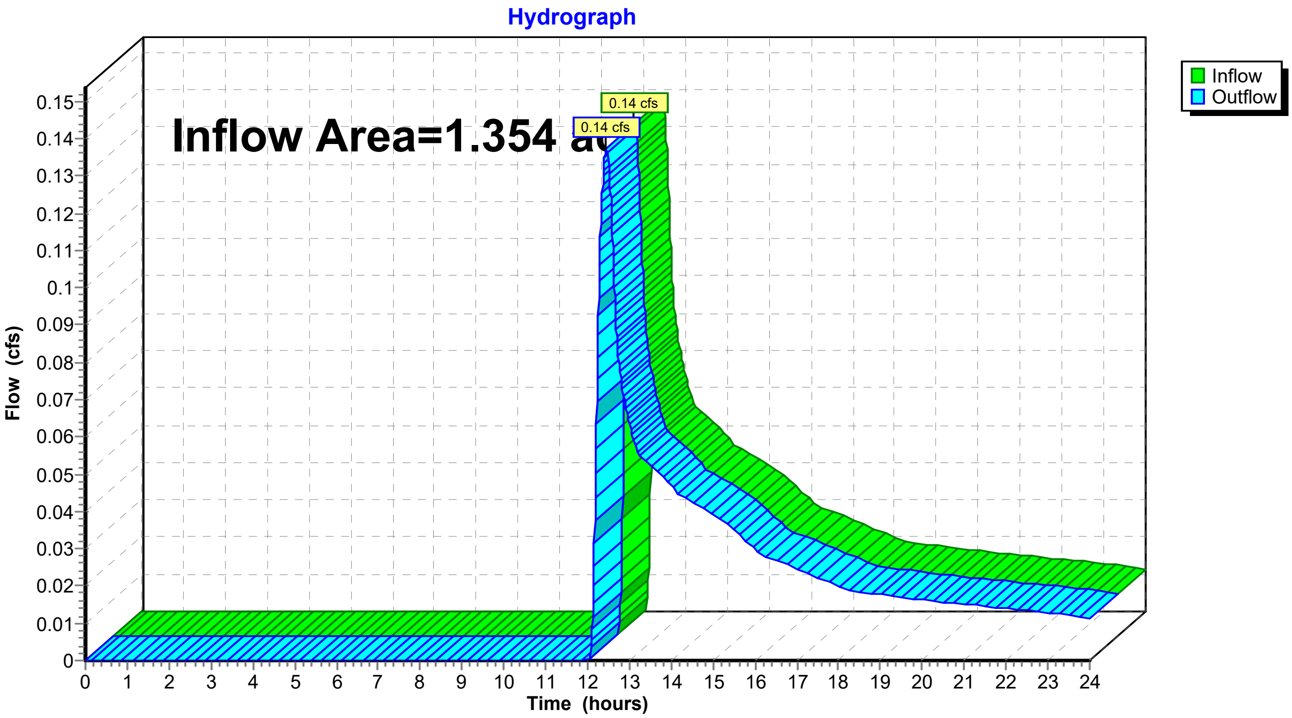
Summary for Reach 1R: Off-site Flow (Wetland - Northwest)

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

Inflow Area =	1.354 ac,	0.00% Impervious, Inflow Depth > 0.26"	for 2-year event
Inflow =	0.14 cfs @	12.44 hrs, Volume=	0.029 af
Outflow =	0.14 cfs @	12.44 hrs, Volume=	0.029 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 2

Reach 1R: Off-site Flow (Wetland - Northwest)



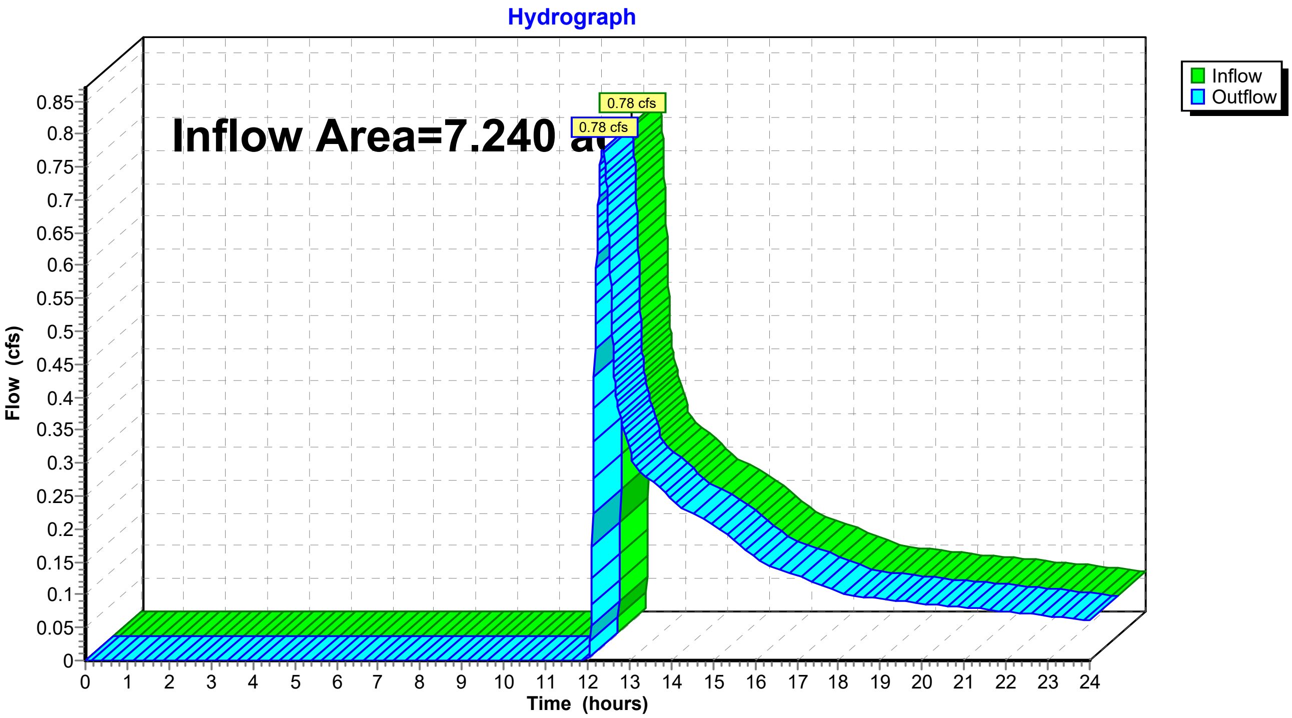
Summary for Reach 2R: Off-site Flow (East)

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

Inflow Area =	7.240 ac,	0.00% Impervious,	Inflow Depth > 0.26"	for 2-year event
Inflow =	0.78 cfs @	12.36 hrs, Volume=	0.156 af	
Outflow =	0.78 cfs @	12.36 hrs, Volume=	0.156 af,	Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 2

Reach 2R: Off-site Flow (East)



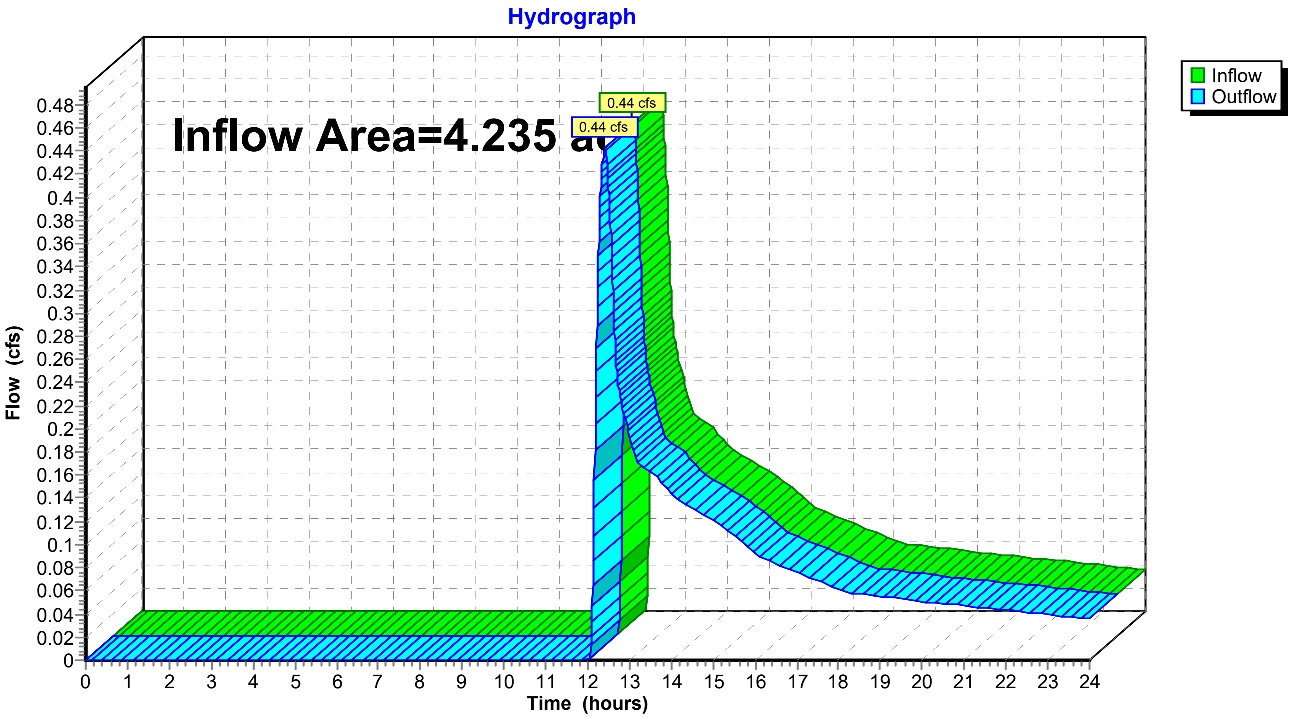
Summary for Reach 3R: Off-site flow (Route 15)

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

Inflow Area = 4.235 ac, 0.00% Impervious, Inflow Depth > 0.26" for 2-year event
Inflow = 0.44 cfs @ 12.41 hrs, Volume= 0.091 af
Outflow = 0.44 cfs @ 12.41 hrs, Volume= 0.091 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 2

Reach 3R: Off-site flow (Route 15)



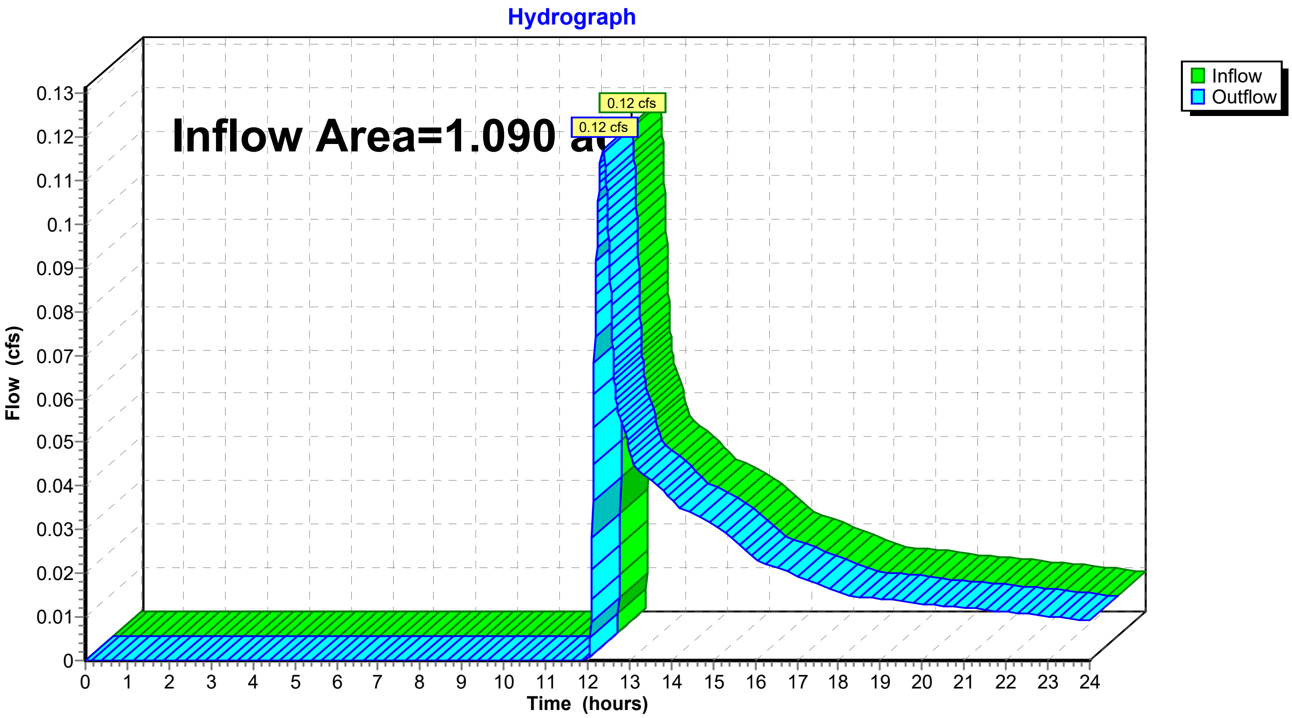
Summary for Reach 4R: Off-site Flow (South)

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

Inflow Area =	1.090 ac,	0.00% Impervious,	Inflow Depth > 0.26"	for 2-year event
Inflow =	0.12 cfs @	12.36 hrs, Volume=	0.023 af	
Outflow =	0.12 cfs @	12.36 hrs, Volume=	0.023 af, Atten= 0%, Lag= 0.0 min	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 2

Reach 4R: Off-site Flow (South)



Time span=0.00-24.00 hrs, dt=0.01 hrs, 2401 points x 2
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment1S: Area 1 Runoff Area=58,975 sf 0.00% Impervious Runoff Depth>1.00"
Flow Length=407' Tc=13.5 min CN=55 Runoff=0.99 cfs 0.112 af

Subcatchment2S: Area 2 Runoff Area=315,386 sf 0.00% Impervious Runoff Depth>1.00"
Flow Length=318' Tc=8.5 min CN=55 Runoff=6.21 cfs 0.602 af

Subcatchment3S: Area 3 Runoff Area=184,498 sf 0.00% Impervious Runoff Depth>1.00"
Flow Length=212' Tc=11.1 min CN=55 Runoff=3.32 cfs 0.352 af

Subcatchment4S: Area 4 Runoff Area=47,465 sf 0.00% Impervious Runoff Depth>1.00"
Flow Length=226' Tc=8.2 min CN=55 Runoff=0.95 cfs 0.091 af

Reach 1R: Off-site Flow (Wetland - Northwest) Inflow=0.99 cfs 0.112 af
Outflow=0.99 cfs 0.112 af

Reach 2R: Off-site Flow (East) Inflow=6.21 cfs 0.602 af
Outflow=6.21 cfs 0.602 af

Reach 3R: Off-site flow (Route 15) Inflow=3.32 cfs 0.352 af
Outflow=3.32 cfs 0.352 af

Reach 4R: Off-site Flow (South) Inflow=0.95 cfs 0.091 af
Outflow=0.95 cfs 0.091 af

Total Runoff Area = 13.919 ac Runoff Volume = 1.156 af Average Runoff Depth = 1.00"
100.00% Pervious = 13.919 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment 1S: Area 1

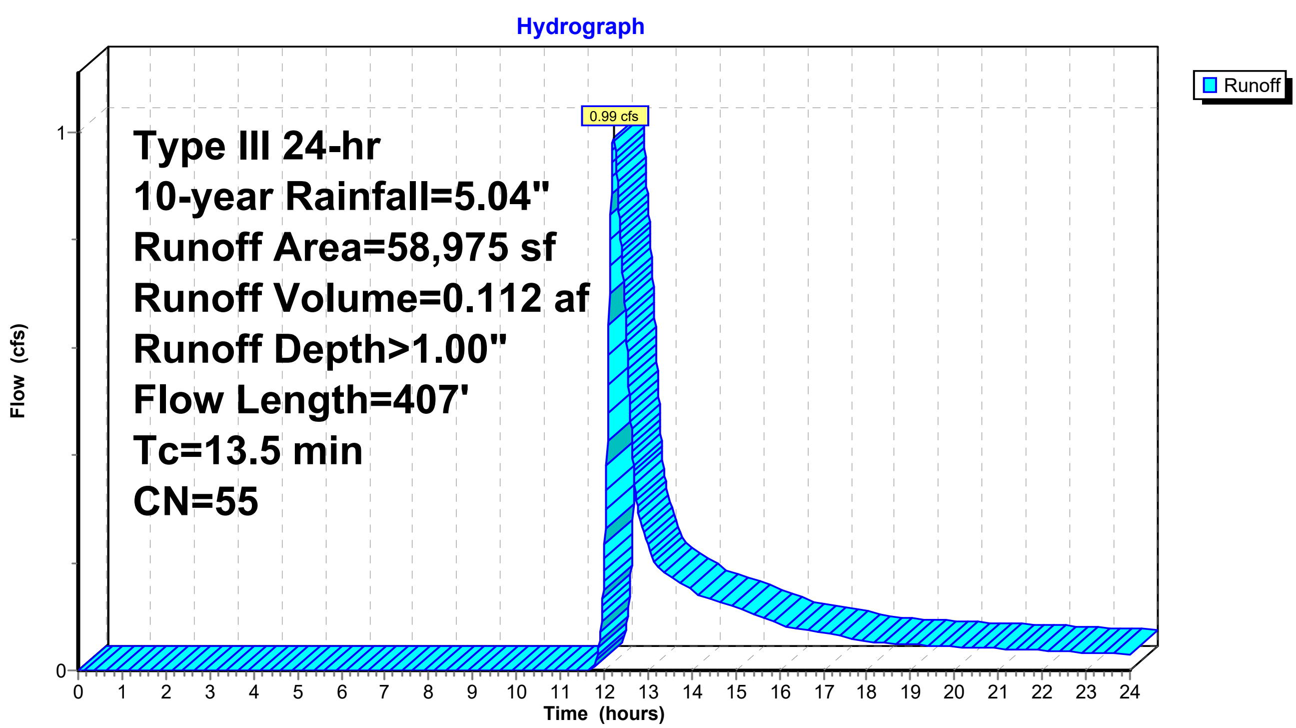
Runoff = 0.99 cfs @ 12.22 hrs, Volume= 0.112 af, Depth> 1.00"
Routed to Reach 1R : Off-site Flow (Wetland - Northwest)

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-year Rainfall=5.04"

Area (sf)	CN	Description
58,975	55	Woods, Good, HSG B
58,975		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.3	50	0.0400	0.09		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.20"
1.5	98	0.0450	1.06		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
1.6	117	0.0600	1.22		**Shallow Concentrated Flow, C-D** Woodland Kv= 5.0 fps
1.1	142	0.1700	2.06		**Shallow Concentrated Flow, D-E** Woodland Kv= 5.0 fps
13.5	407	Total			

Subcatchment 1S: Area 1



Summary for Subcatchment 2S: Area 2

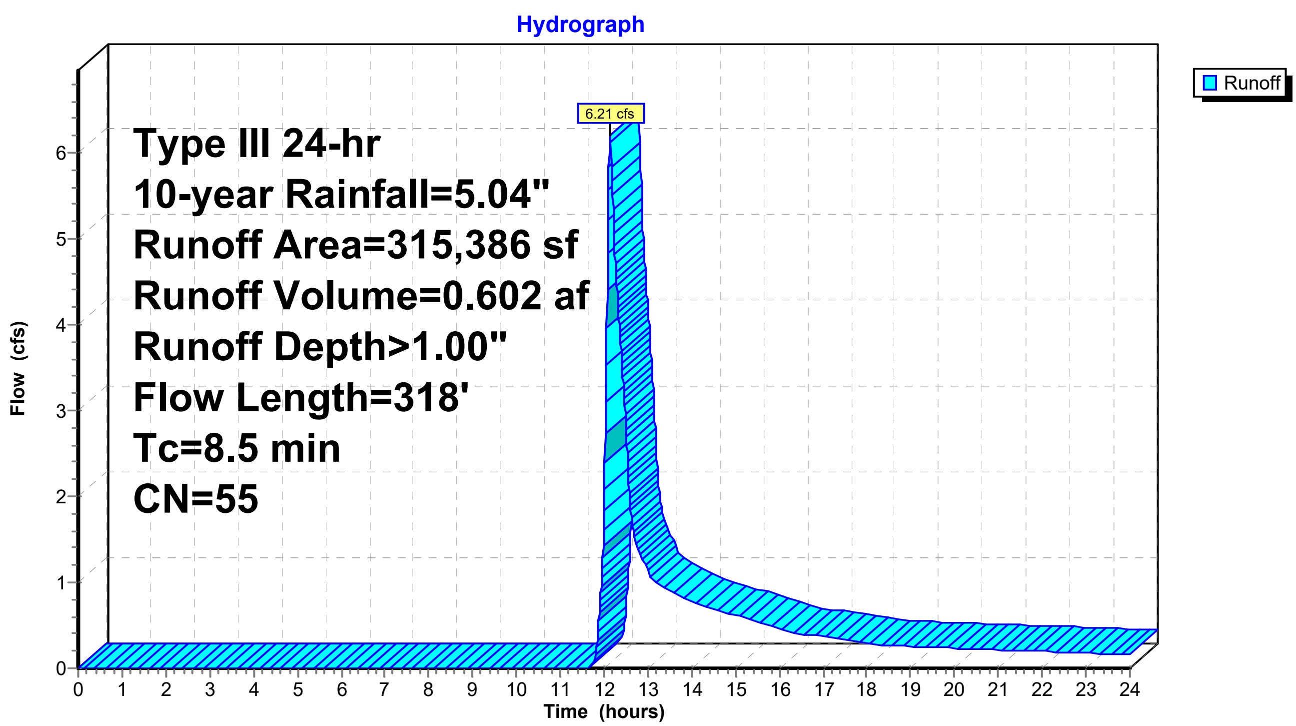
Runoff = 6.21 cfs @ 12.14 hrs, Volume= 0.602 af, Depth> 1.00"
Routed to Reach 2R : Off-site Flow (East)

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-year Rainfall=5.04"

Area (sf)	CN	Description
315,386	55	Woods, Good, HSG B
315,386		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.5	50	0.1000	0.13		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.20"
0.7	82	0.1700	2.06		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
1.3	186	0.2390	2.44		**Shallow Concentrated Flow, C-D** Woodland Kv= 5.0 fps
8.5	318	Total			

Subcatchment 2S: Area 2



Summary for Subcatchment 3S: Area 3

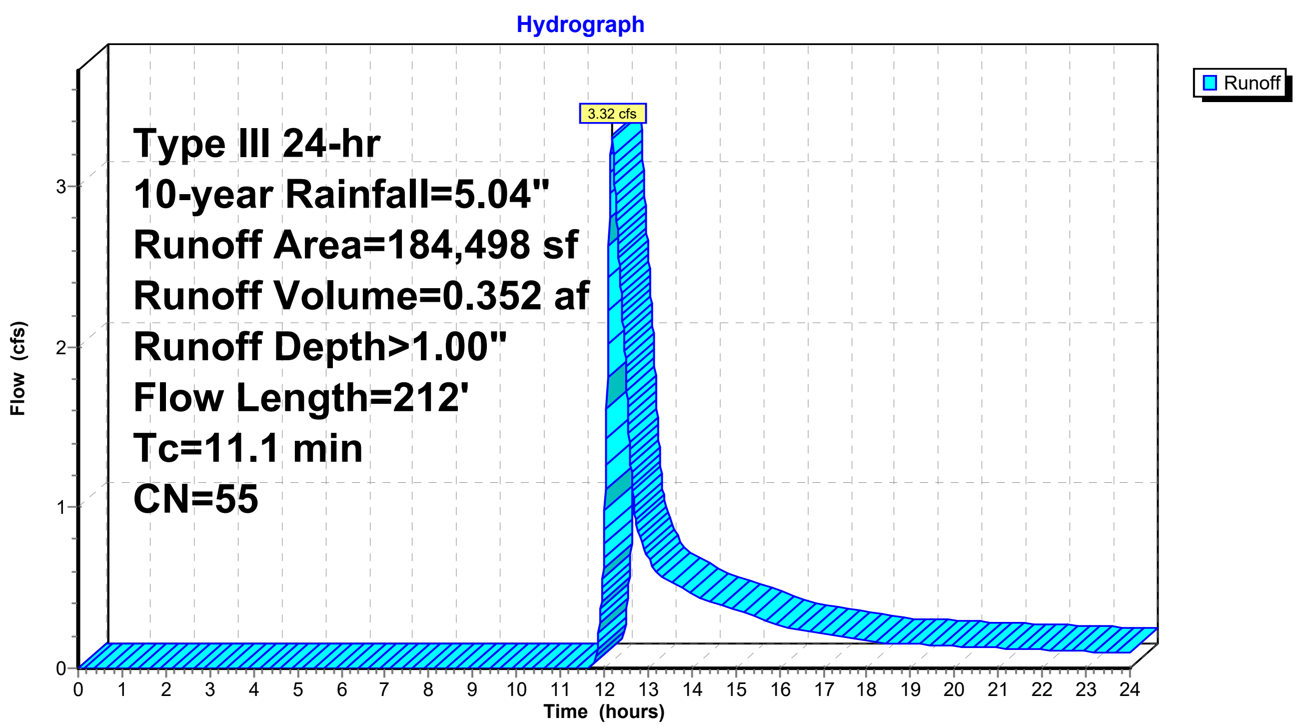
Runoff = 3.32 cfs @ 12.18 hrs, Volume= 0.352 af, Depth> 1.00"
Routed to Reach 3R : Off-site flow (Route 15)

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-year Rainfall=5.04"

Area (sf)	CN	Description
184,498	55	Woods, Good, HSG B
184,498		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.3	50	0.0400	0.09		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.20"
0.7	67	0.0900	1.50		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
1.1	95	0.0900	1.50		**Shallow Concentrated Flow, C-D** Woodland Kv= 5.0 fps
11.1	212	Total			

Subcatchment 3S: Area 3



Summary for Subcatchment 4S: Area 4

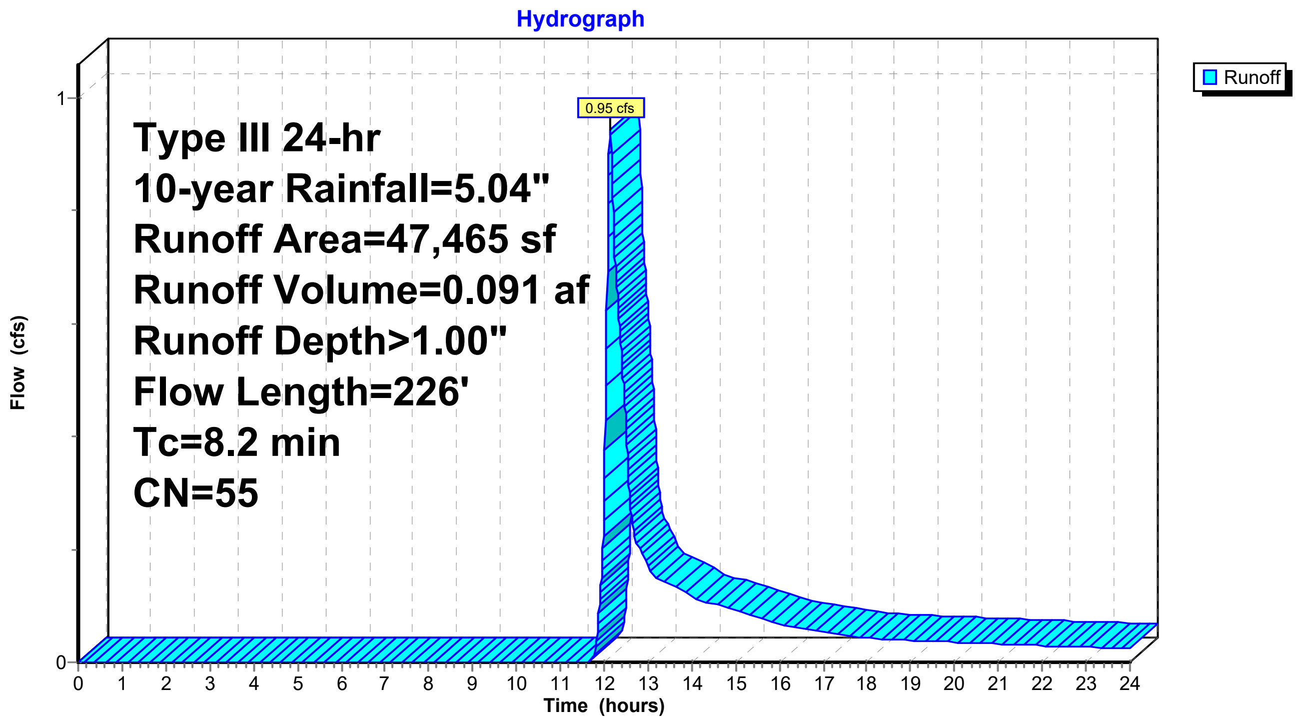
Runoff = 0.95 cfs @ 12.14 hrs, Volume= 0.091 af, Depth> 1.00"
Routed to Reach 4R : Off-site Flow (South)

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-year Rainfall=5.04"

Area (sf)	CN	Description
47,465	55	Woods, Good, HSG B
47,465		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.5	50	0.1000	0.13		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.20"
1.7	176	0.1200	1.73		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
8.2	226	Total			

Subcatchment 4S: Area 4



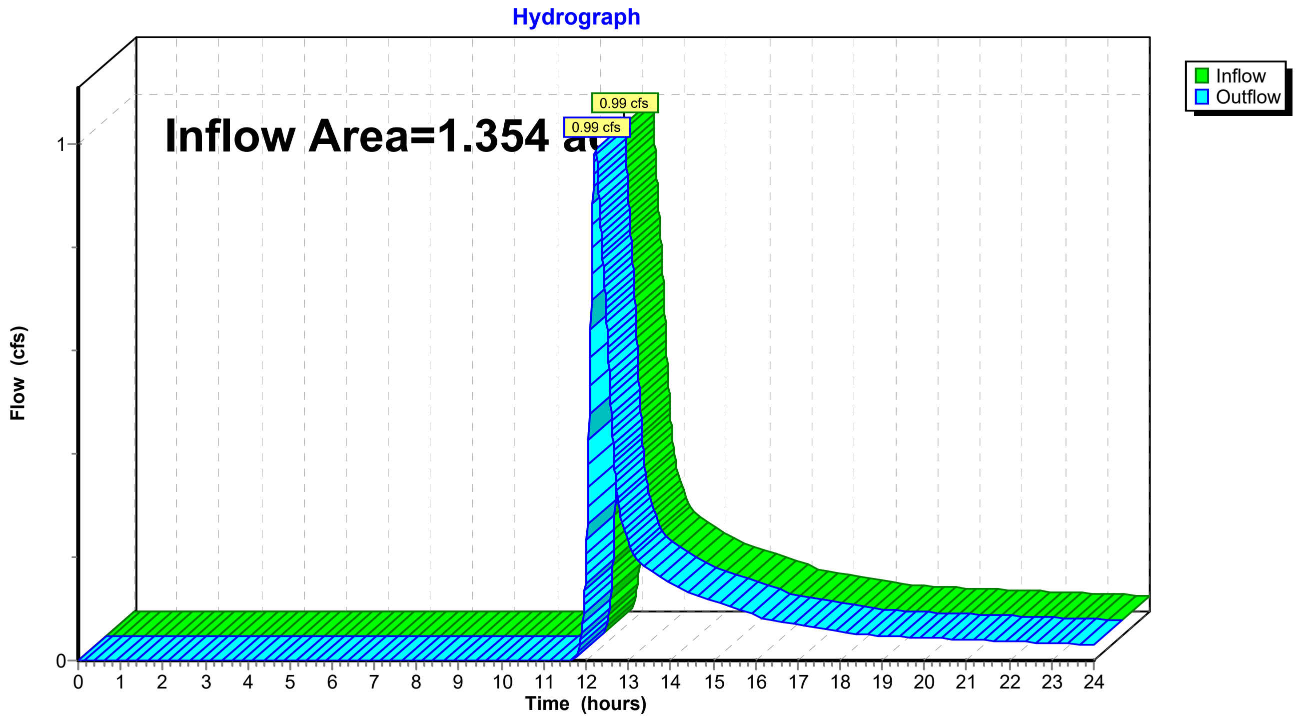
Summary for Reach 1R: Off-site Flow (Wetland - Northwest)

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

Inflow Area =	1.354 ac,	0.00% Impervious,	Inflow Depth > 1.00"	for 10-year event	
Inflow =	0.99 cfs @	12.22 hrs,	Volume=	0.112 af	
Outflow =	0.99 cfs @	12.22 hrs,	Volume=	0.112 af,	Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 2

Reach 1R: Off-site Flow (Wetland - Northwest)

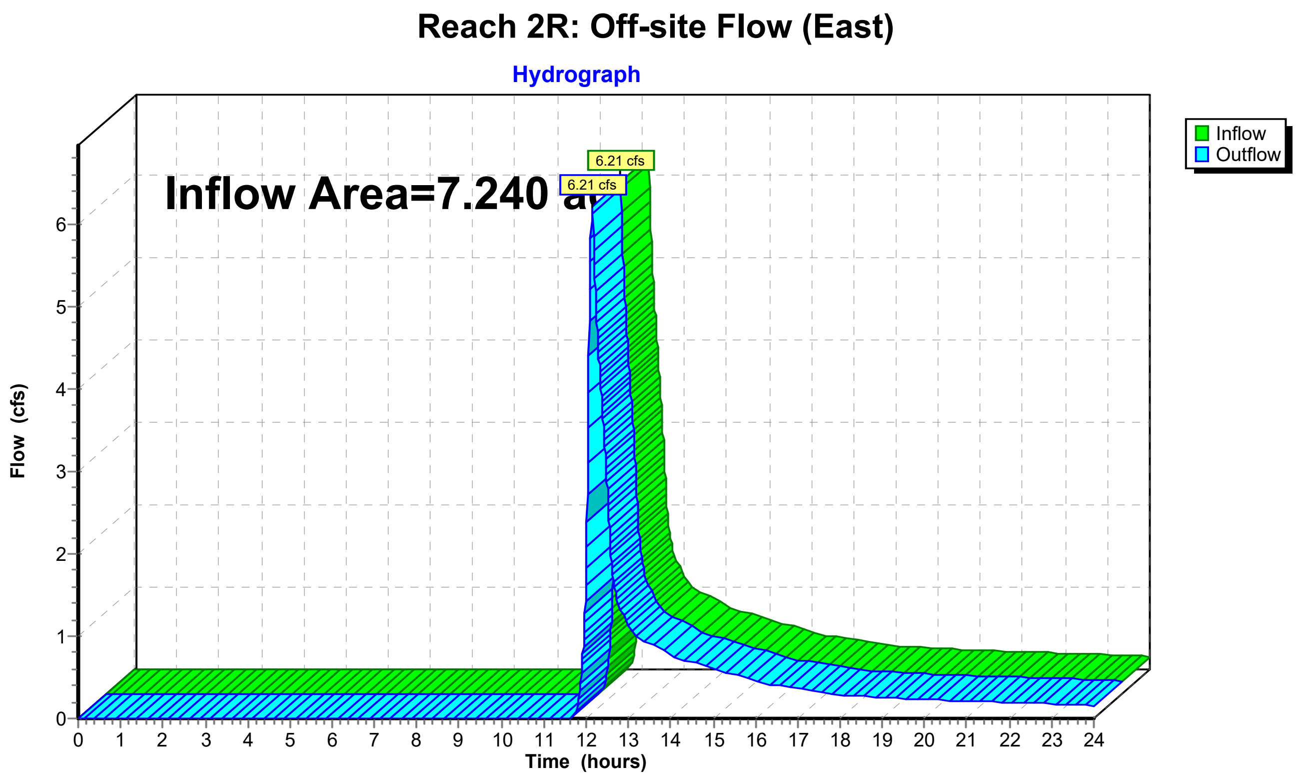


Summary for Reach 2R: Off-site Flow (East)

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

Inflow Area =	7.240 ac,	0.00% Impervious, Inflow Depth > 1.00"	for 10-year event	
Inflow =	6.21 cfs @	12.14 hrs, Volume=	0.602 af	
Outflow =	6.21 cfs @	12.14 hrs, Volume=	0.602 af,	Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 2



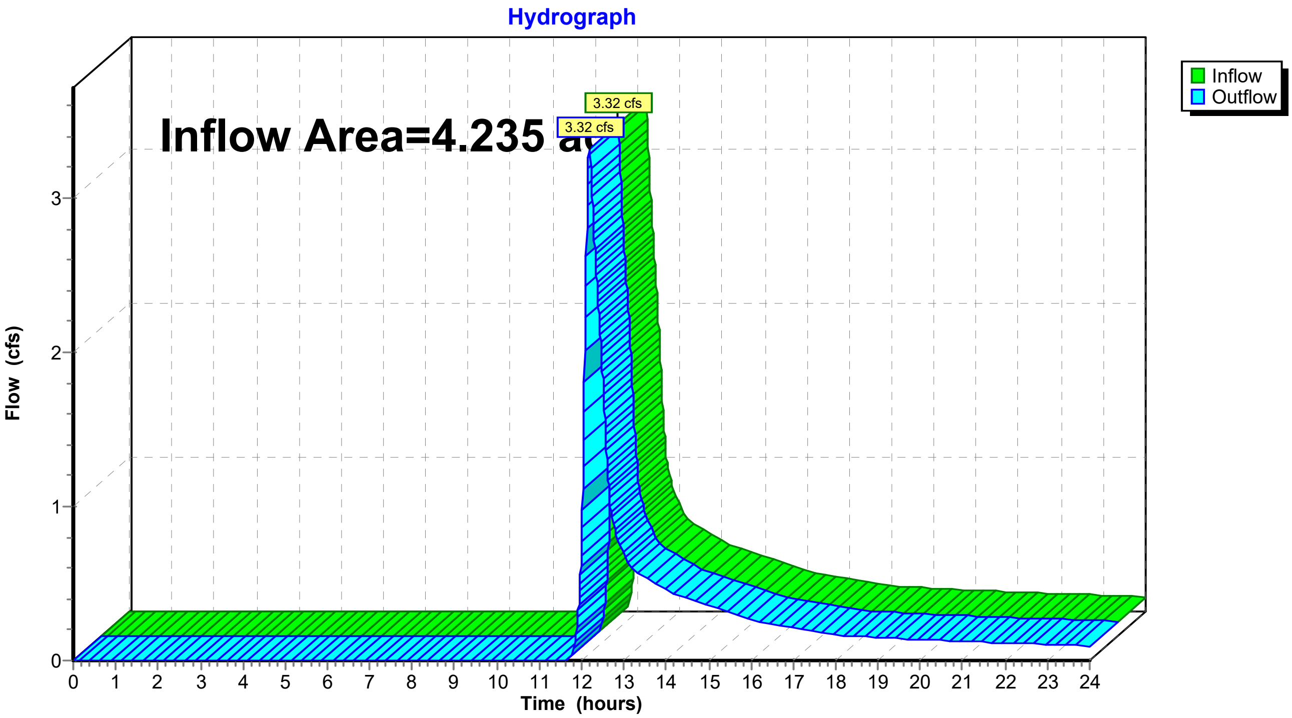
Summary for Reach 3R: Off-site flow (Route 15)

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

Inflow Area = 4.235 ac, 0.00% Impervious, Inflow Depth > 1.00" for 10-year event
Inflow = 3.32 cfs @ 12.18 hrs, Volume= 0.352 af
Outflow = 3.32 cfs @ 12.18 hrs, Volume= 0.352 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 2

Reach 3R: Off-site flow (Route 15)



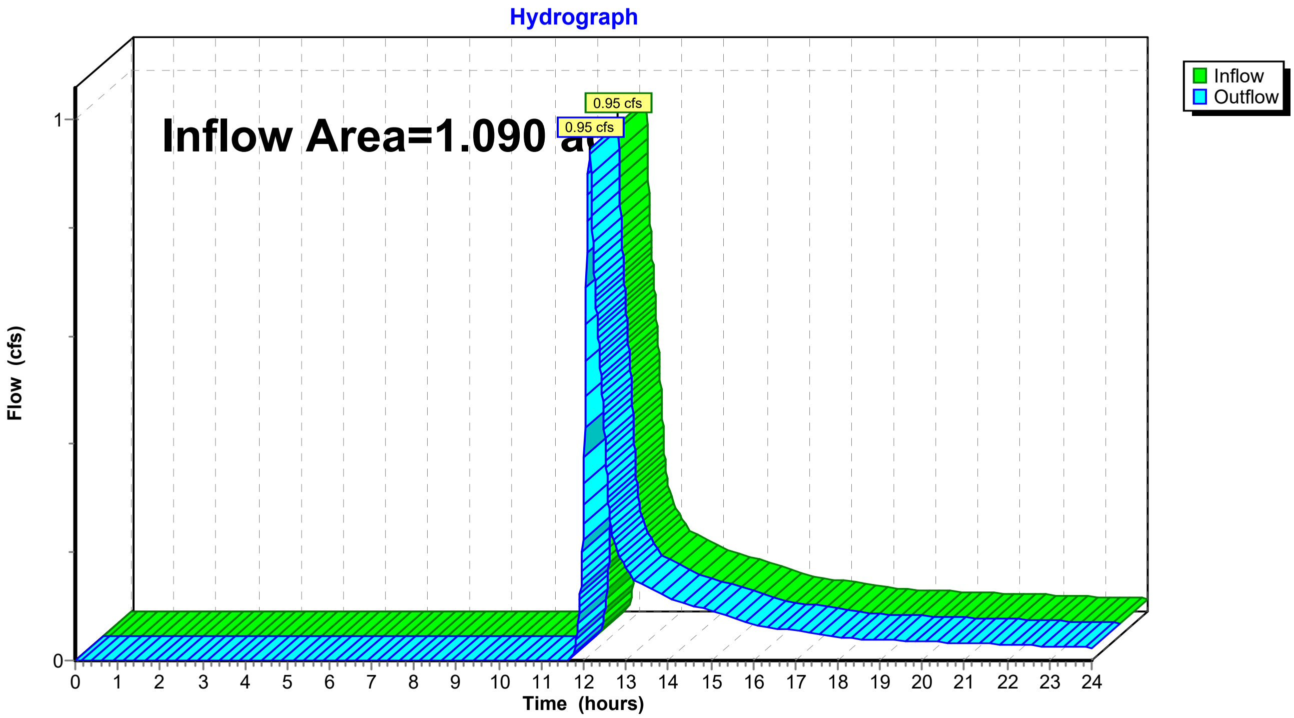
Summary for Reach 4R: Off-site Flow (South)

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

Inflow Area = 1.090 ac, 0.00% Impervious, Inflow Depth > 1.00" for 10-year event
Inflow = 0.95 cfs @ 12.14 hrs, Volume= 0.091 af
Outflow = 0.95 cfs @ 12.14 hrs, Volume= 0.091 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 2

Reach 4R: Off-site Flow (South)



Time span=0.00-24.00 hrs, dt=0.01 hrs, 2401 points x 2
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment1S: Area 1 Runoff Area=58,975 sf 0.00% Impervious Runoff Depth>1.61"
Flow Length=407' Tc=13.5 min CN=55 Runoff=1.79 cfs 0.182 af

Subcatchment2S: Area 2 Runoff Area=315,386 sf 0.00% Impervious Runoff Depth>1.61"
Flow Length=318' Tc=8.5 min CN=55 Runoff=11.25 cfs 0.973 af

Subcatchment3S: Area 3 Runoff Area=184,498 sf 0.00% Impervious Runoff Depth>1.61"
Flow Length=212' Tc=11.1 min CN=55 Runoff=6.03 cfs 0.569 af

Subcatchment4S: Area 4 Runoff Area=47,465 sf 0.00% Impervious Runoff Depth>1.61"
Flow Length=226' Tc=8.2 min CN=55 Runoff=1.71 cfs 0.146 af

Reach 1R: Off-site Flow (Wetland - Northwest) Inflow=1.79 cfs 0.182 af
Outflow=1.79 cfs 0.182 af

Reach 2R: Off-site Flow (East) Inflow=11.25 cfs 0.973 af
Outflow=11.25 cfs 0.973 af

Reach 3R: Off-site flow (Route 15) Inflow=6.03 cfs 0.569 af
Outflow=6.03 cfs 0.569 af

Reach 4R: Off-site Flow (South) Inflow=1.71 cfs 0.146 af
Outflow=1.71 cfs 0.146 af

Total Runoff Area = 13.919 ac Runoff Volume = 1.870 af Average Runoff Depth = 1.61"
100.00% Pervious = 13.919 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment 1S: Area 1

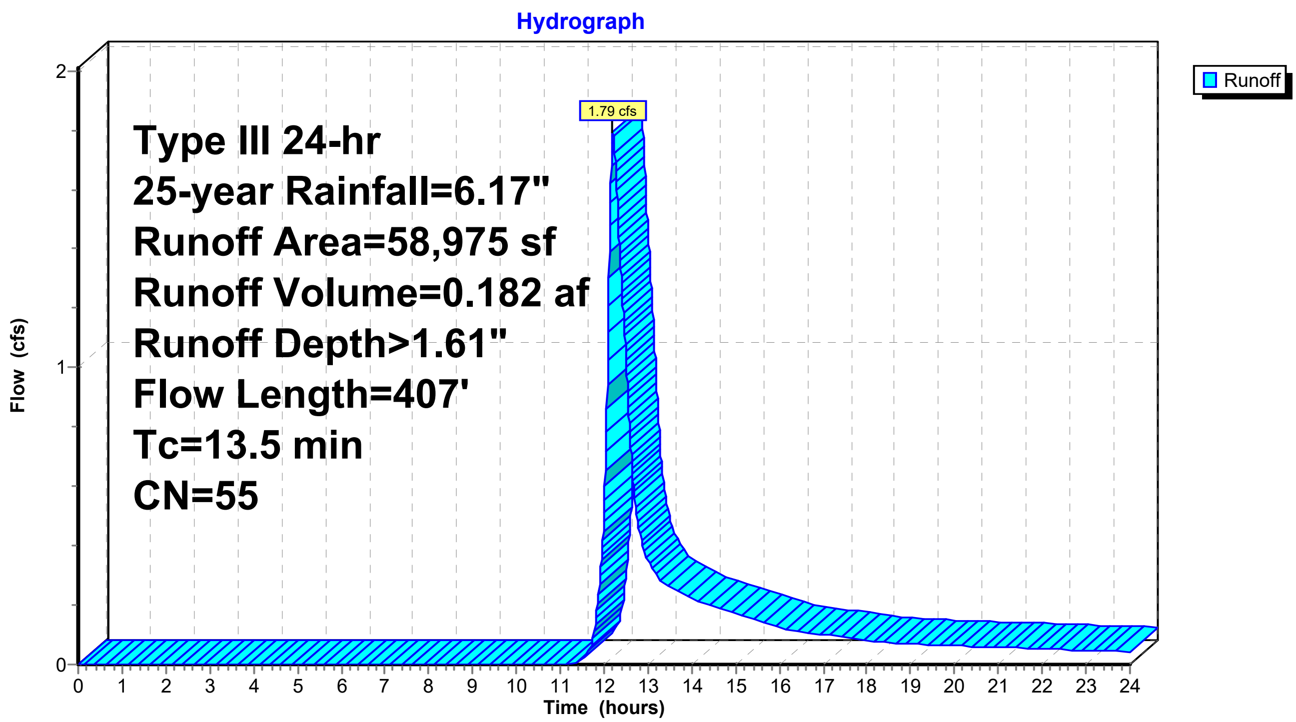
Runoff = 1.79 cfs @ 12.20 hrs, Volume= 0.182 af, Depth> 1.61"
Routed to Reach 1R : Off-site Flow (Wetland - Northwest)

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-year Rainfall=6.17"

Area (sf)	CN	Description
58,975	55	Woods, Good, HSG B
58,975		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.3	50	0.0400	0.09		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.20"
1.5	98	0.0450	1.06		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
1.6	117	0.0600	1.22		**Shallow Concentrated Flow, C-D** Woodland Kv= 5.0 fps
1.1	142	0.1700	2.06		**Shallow Concentrated Flow, D-E** Woodland Kv= 5.0 fps
13.5	407	Total			

Subcatchment 1S: Area 1



Summary for Subcatchment 2S: Area 2

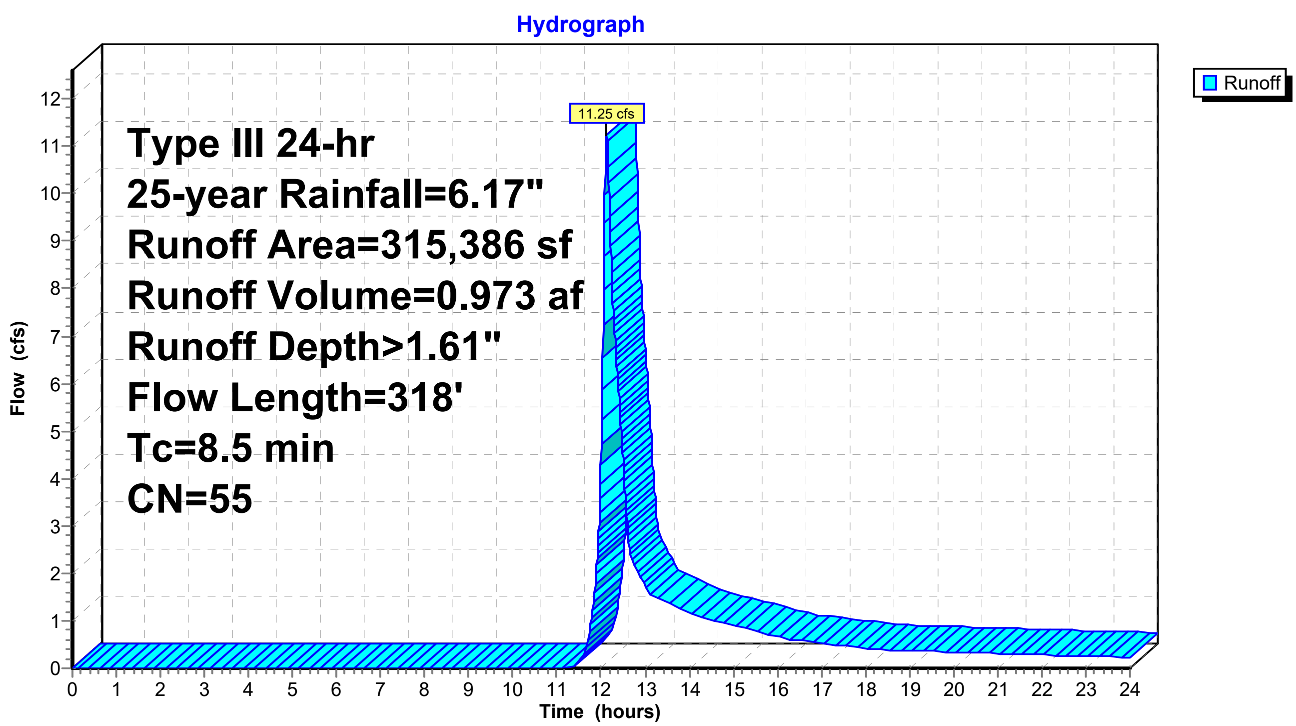
Runoff = 11.25 cfs @ 12.13 hrs, Volume= 0.973 af, Depth> 1.61"
Routed to Reach 2R : Off-site Flow (East)

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-year Rainfall=6.17"

Area (sf)	CN	Description
315,386	55	Woods, Good, HSG B
315,386		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.5	50	0.1000	0.13		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.20"
0.7	82	0.1700	2.06		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
1.3	186	0.2390	2.44		**Shallow Concentrated Flow, C-D** Woodland Kv= 5.0 fps
8.5	318	Total			

Subcatchment 2S: Area 2



Summary for Subcatchment 3S: Area 3

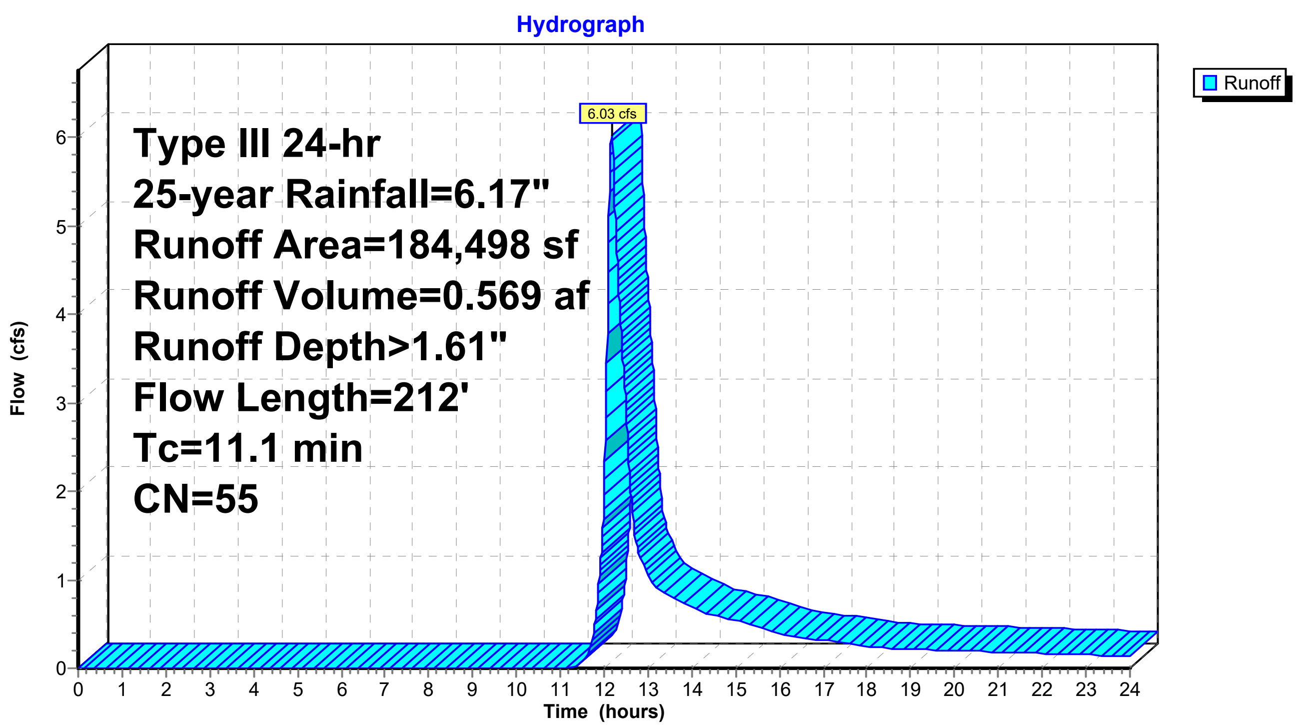
Runoff = 6.03 cfs @ 12.17 hrs, Volume= 0.569 af, Depth> 1.61"
Routed to Reach 3R : Off-site flow (Route 15)

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-year Rainfall=6.17"

Area (sf)	CN	Description
184,498	55	Woods, Good, HSG B
184,498		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.3	50	0.0400	0.09		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.20"
0.7	67	0.0900	1.50		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
1.1	95	0.0900	1.50		**Shallow Concentrated Flow, C-D** Woodland Kv= 5.0 fps
11.1	212	Total			

Subcatchment 3S: Area 3



Summary for Subcatchment 4S: Area 4

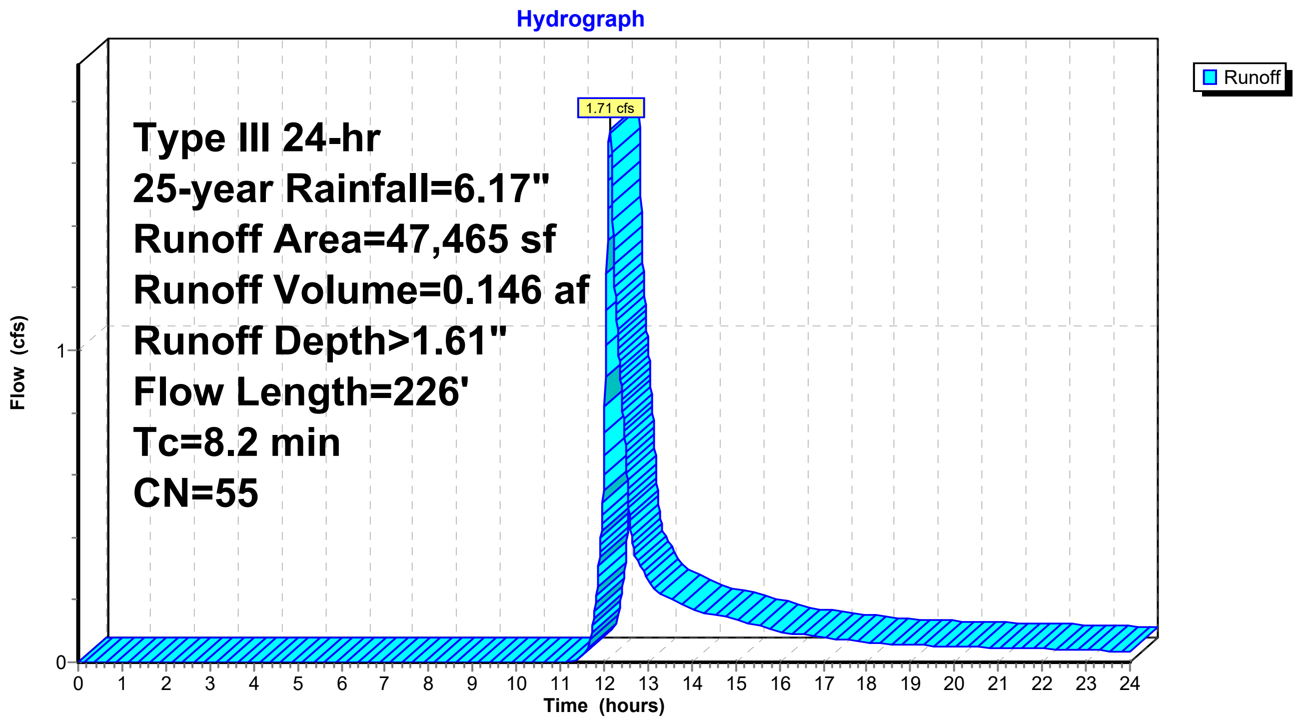
Runoff = 1.71 cfs @ 12.13 hrs, Volume= 0.146 af, Depth> 1.61"
Routed to Reach 4R : Off-site Flow (South)

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-year Rainfall=6.17"

Area (sf)	CN	Description
47,465	55	Woods, Good, HSG B
47,465		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.5	50	0.1000	0.13		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.20"
1.7	176	0.1200	1.73		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
8.2	226	Total			

Subcatchment 4S: Area 4



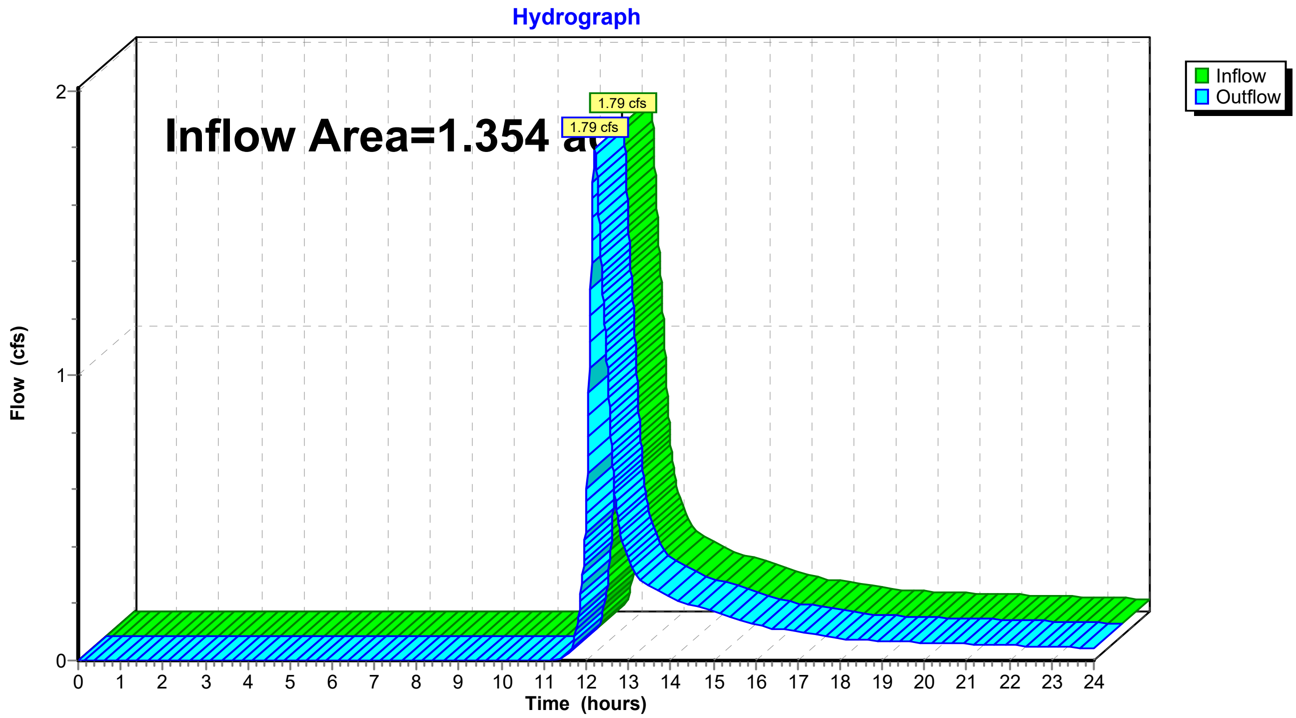
Summary for Reach 1R: Off-site Flow (Wetland - Northwest)

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

Inflow Area = 1.354 ac, 0.00% Impervious, Inflow Depth > 1.61" for 25-year event
Inflow = 1.79 cfs @ 12.20 hrs, Volume= 0.182 af
Outflow = 1.79 cfs @ 12.20 hrs, Volume= 0.182 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 2

Reach 1R: Off-site Flow (Wetland - Northwest)

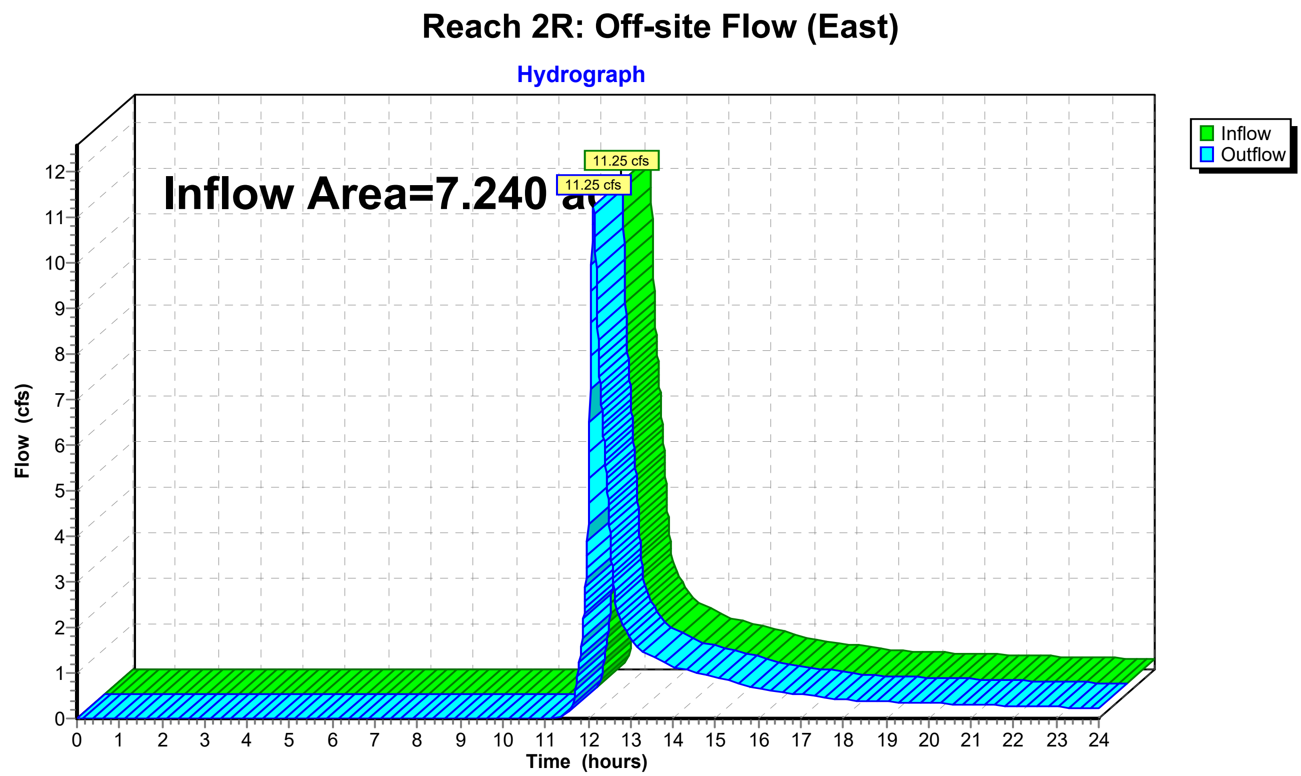


Summary for Reach 2R: Off-site Flow (East)

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

Inflow Area =	7.240 ac,	0.00% Impervious, Inflow Depth > 1.61"	for 25-year event
Inflow =	11.25 cfs @	12.13 hrs, Volume=	0.973 af
Outflow =	11.25 cfs @	12.13 hrs, Volume=	0.973 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 2



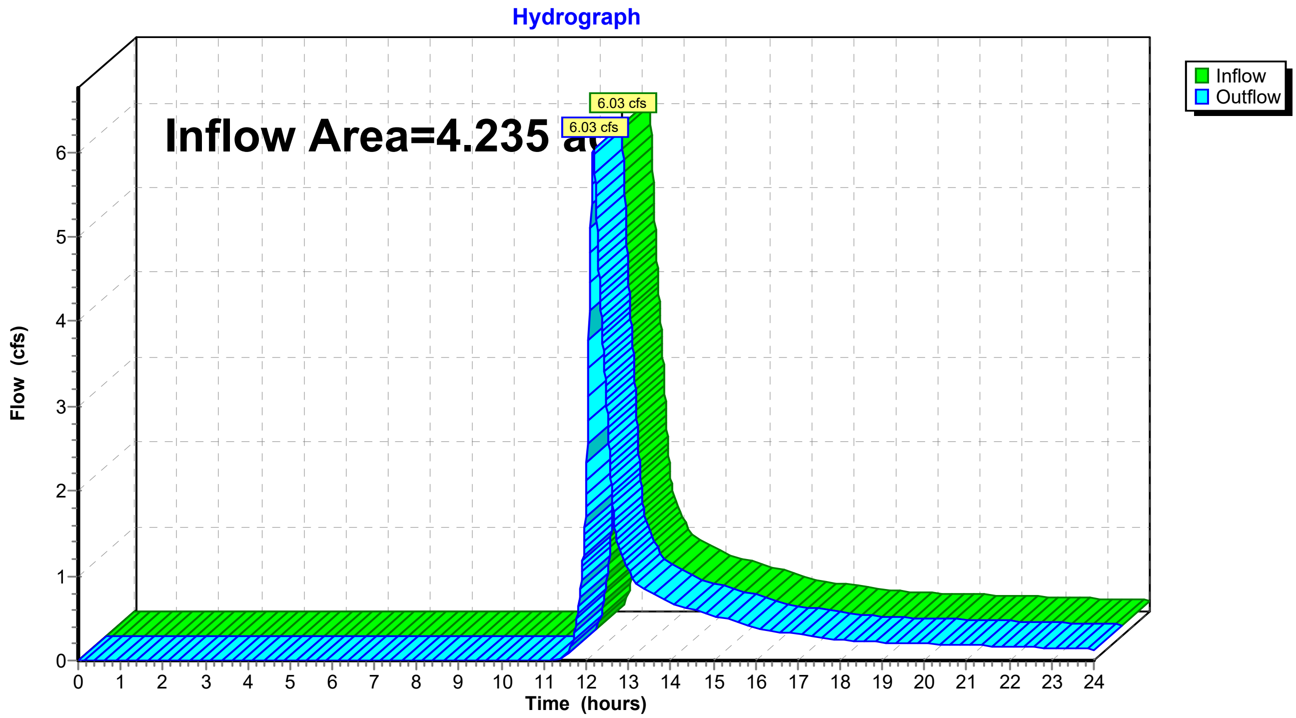
Summary for Reach 3R: Off-site flow (Route 15)

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

Inflow Area =	4.235 ac,	0.00% Impervious, Inflow Depth > 1.61"	for 25-year event
Inflow =	6.03 cfs @	12.17 hrs, Volume=	0.569 af
Outflow =	6.03 cfs @	12.17 hrs, Volume=	0.569 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 2

Reach 3R: Off-site flow (Route 15)



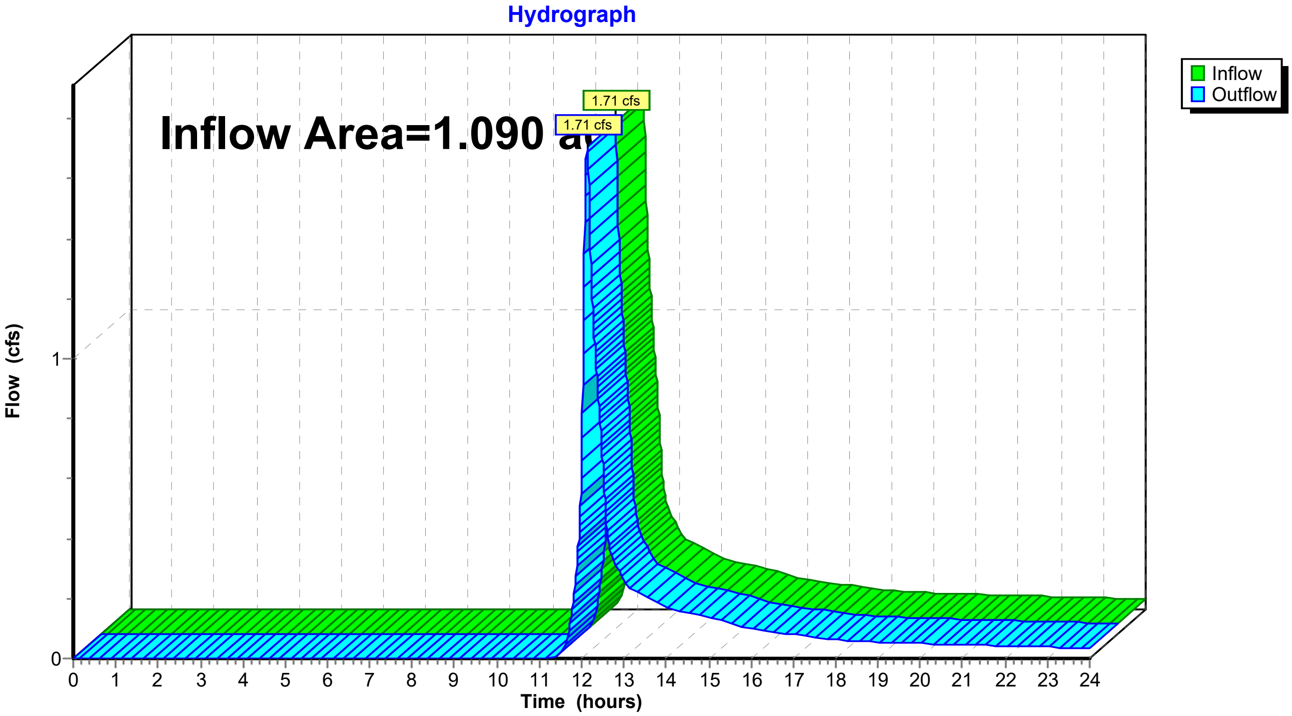
Summary for Reach 4R: Off-site Flow (South)

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

Inflow Area =	1.090 ac,	0.00% Impervious, Inflow Depth > 1.61"	for 25-year event	
Inflow =	1.71 cfs @	12.13 hrs, Volume=	0.146 af	
Outflow =	1.71 cfs @	12.13 hrs, Volume=	0.146 af,	Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 2

Reach 4R: Off-site Flow (South)



Time span=0.00-24.00 hrs, dt=0.01 hrs, 2401 points x 2
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment1S: Area 1 Runoff Area=58,975 sf 0.00% Impervious Runoff Depth>2.12"
Flow Length=407' Tc=13.5 min CN=55 Runoff=2.46 cfs 0.239 af

Subcatchment2S: Area 2 Runoff Area=315,386 sf 0.00% Impervious Runoff Depth>2.12"
Flow Length=318' Tc=8.5 min CN=55 Runoff=15.39 cfs 1.279 af

Subcatchment3S: Area 3 Runoff Area=184,498 sf 0.00% Impervious Runoff Depth>2.12"
Flow Length=212' Tc=11.1 min CN=55 Runoff=8.26 cfs 0.747 af

Subcatchment4S: Area 4 Runoff Area=47,465 sf 0.00% Impervious Runoff Depth>2.12"
Flow Length=226' Tc=8.2 min CN=55 Runoff=2.34 cfs 0.192 af

Reach 1R: Off-site Flow (Wetland - Northwest) Inflow=2.46 cfs 0.239 af
Outflow=2.46 cfs 0.239 af

Reach 2R: Off-site Flow (East) Inflow=15.39 cfs 1.279 af
Outflow=15.39 cfs 1.279 af

Reach 3R: Off-site flow (Route 15) Inflow=8.26 cfs 0.747 af
Outflow=8.26 cfs 0.747 af

Reach 4R: Off-site Flow (South) Inflow=2.34 cfs 0.192 af
Outflow=2.34 cfs 0.192 af

Total Runoff Area = 13.919 ac Runoff Volume = 2.457 af Average Runoff Depth = 2.12"
100.00% Pervious = 13.919 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment 1S: Area 1

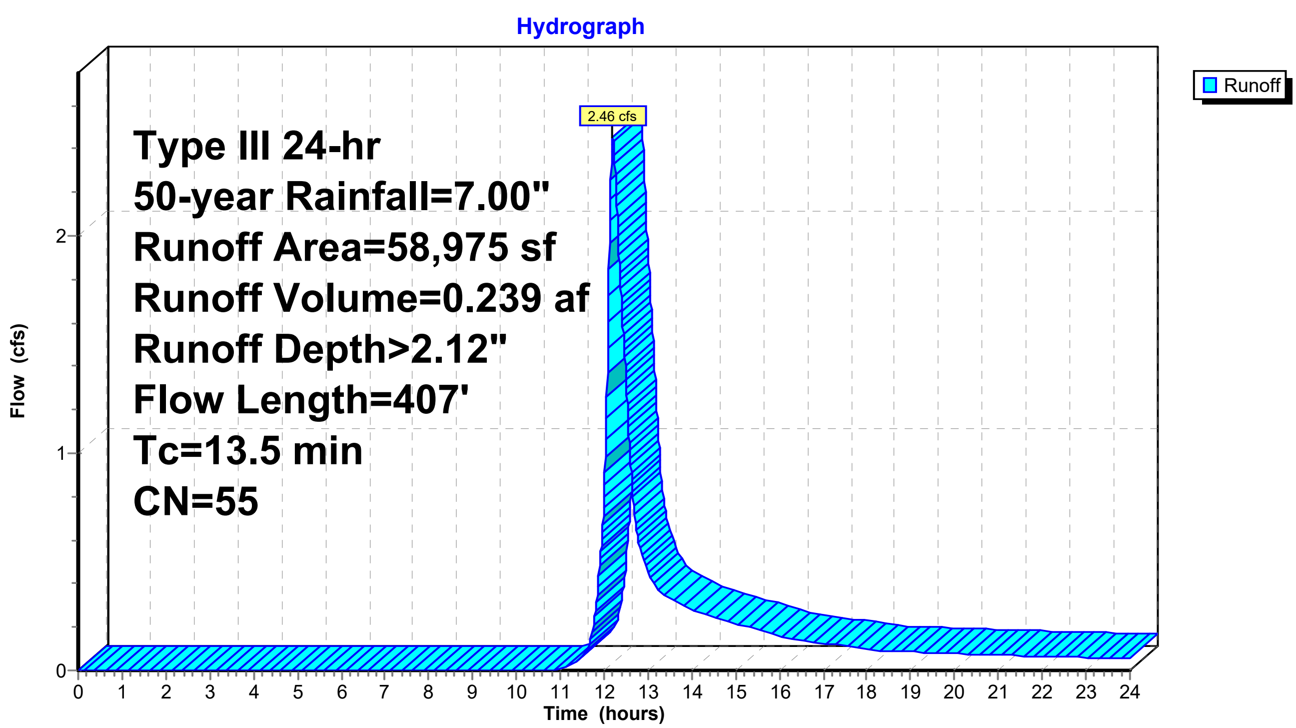
Runoff = 2.46 cfs @ 12.20 hrs, Volume= 0.239 af, Depth> 2.12"
Routed to Reach 1R : Off-site Flow (Wetland - Northwest)

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 50-year Rainfall=7.00"

Area (sf)	CN	Description
58,975	55	Woods, Good, HSG B
58,975		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.3	50	0.0400	0.09		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.20"
1.5	98	0.0450	1.06		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
1.6	117	0.0600	1.22		**Shallow Concentrated Flow, C-D** Woodland Kv= 5.0 fps
1.1	142	0.1700	2.06		**Shallow Concentrated Flow, D-E** Woodland Kv= 5.0 fps
13.5	407	Total			

Subcatchment 1S: Area 1



Summary for Subcatchment 2S: Area 2

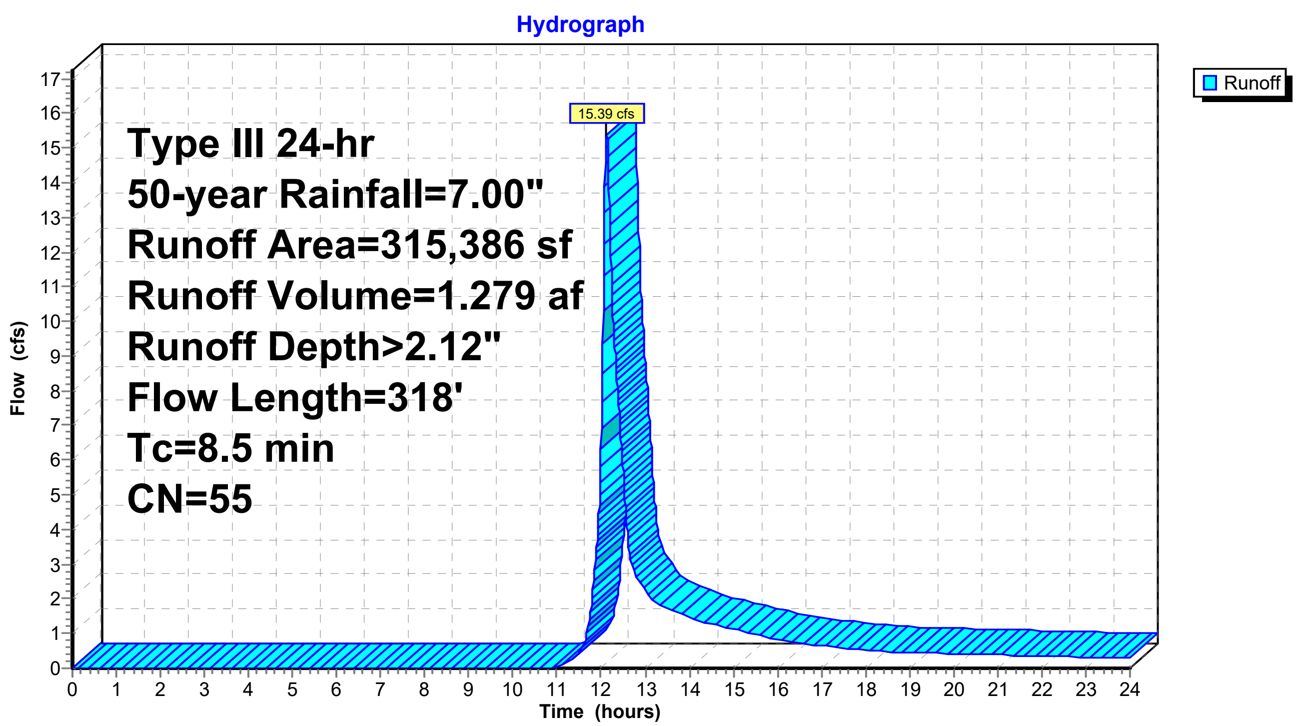
Runoff = 15.39 cfs @ 12.13 hrs, Volume= 1.279 af, Depth> 2.12"
Routed to Reach 2R : Off-site Flow (East)

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 50-year Rainfall=7.00"

Area (sf)	CN	Description
315,386	55	Woods, Good, HSG B
315,386		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.5	50	0.1000	0.13		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.20"
0.7	82	0.1700	2.06		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
1.3	186	0.2390	2.44		**Shallow Concentrated Flow, C-D** Woodland Kv= 5.0 fps
8.5	318	Total			

Subcatchment 2S: Area 2



Summary for Subcatchment 3S: Area 3

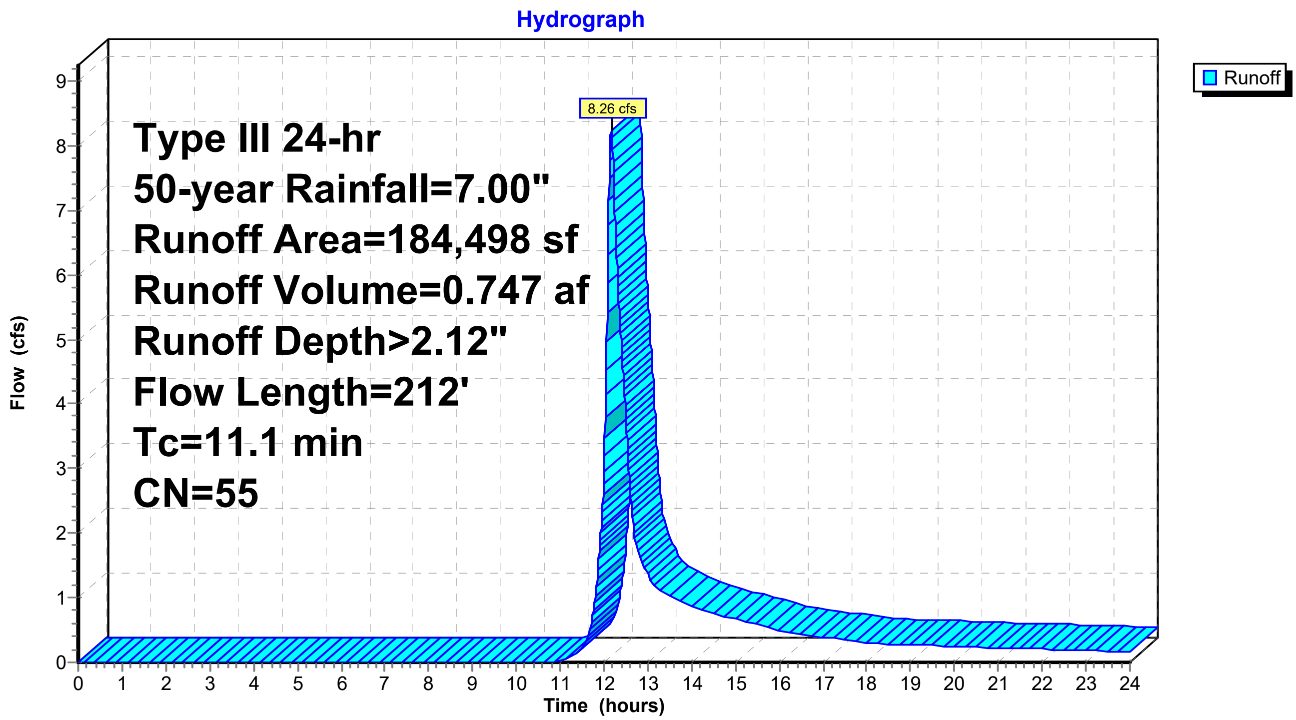
Runoff = 8.26 cfs @ 12.17 hrs, Volume= 0.747 af, Depth> 2.12"
Routed to Reach 3R : Off-site flow (Route 15)

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 50-year Rainfall=7.00"

Area (sf)	CN	Description
184,498	55	Woods, Good, HSG B
184,498		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.3	50	0.0400	0.09		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.20"
0.7	67	0.0900	1.50		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
1.1	95	0.0900	1.50		**Shallow Concentrated Flow, C-D** Woodland Kv= 5.0 fps
11.1	212	Total			

Subcatchment 3S: Area 3



Summary for Subcatchment 4S: Area 4

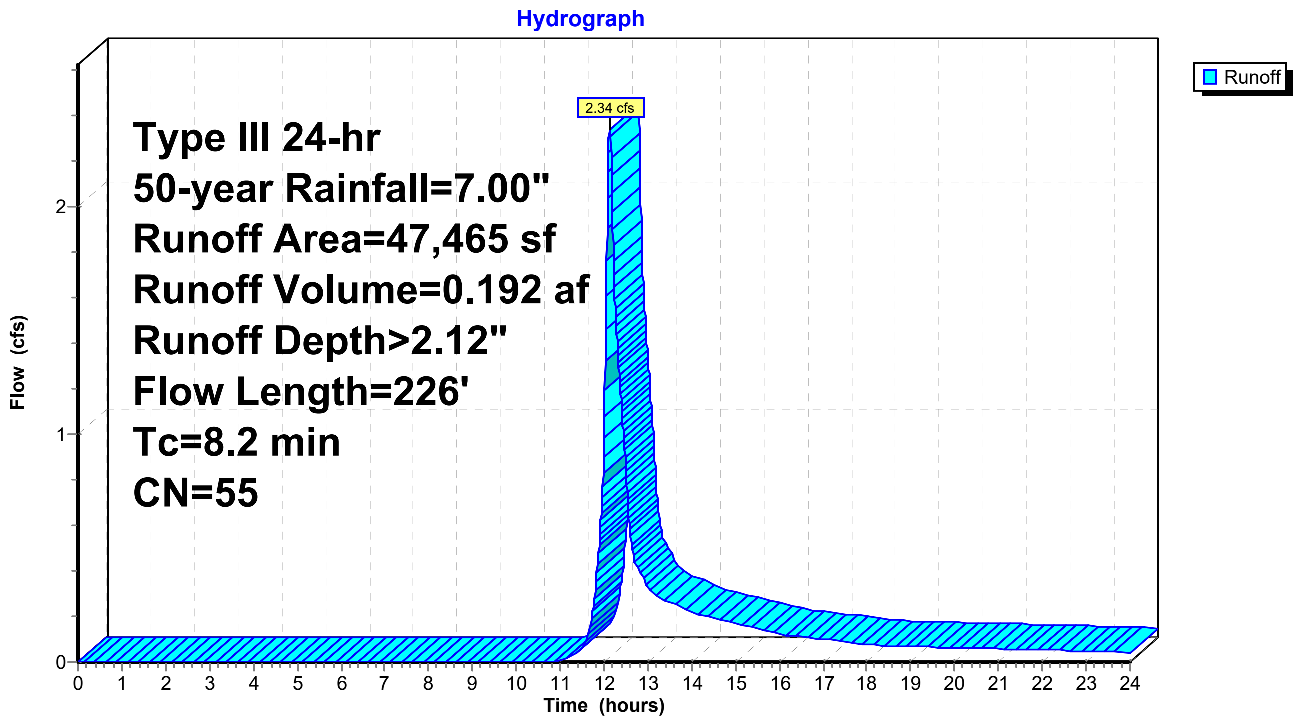
Runoff = 2.34 cfs @ 12.13 hrs, Volume= 0.192 af, Depth> 2.12"
Routed to Reach 4R : Off-site Flow (South)

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 50-year Rainfall=7.00"

Area (sf)	CN	Description
47,465	55	Woods, Good, HSG B
47,465		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.5	50	0.1000	0.13		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.20"
1.7	176	0.1200	1.73		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
8.2	226	Total			

Subcatchment 4S: Area 4



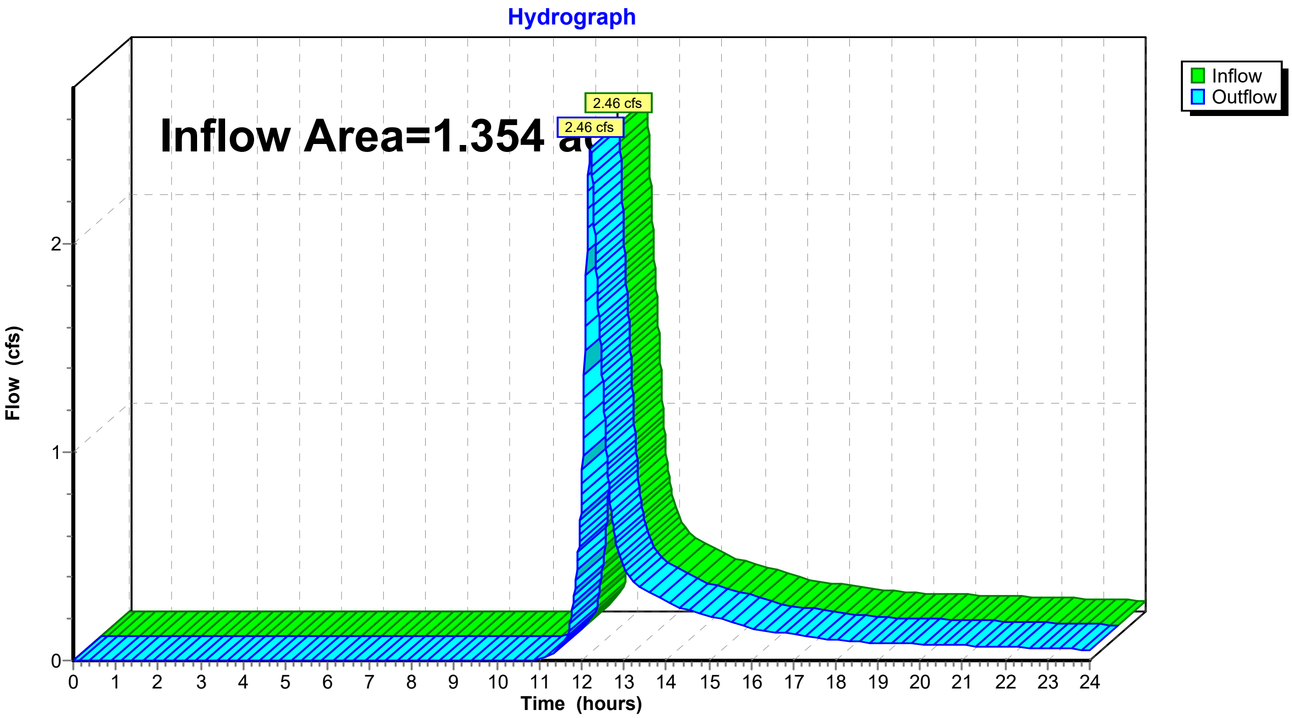
Summary for Reach 1R: Off-site Flow (Wetland - Northwest)

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

Inflow Area = 1.354 ac, 0.00% Impervious, Inflow Depth > 2.12" for 50-year event
Inflow = 2.46 cfs @ 12.20 hrs, Volume= 0.239 af
Outflow = 2.46 cfs @ 12.20 hrs, Volume= 0.239 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 2

Reach 1R: Off-site Flow (Wetland - Northwest)



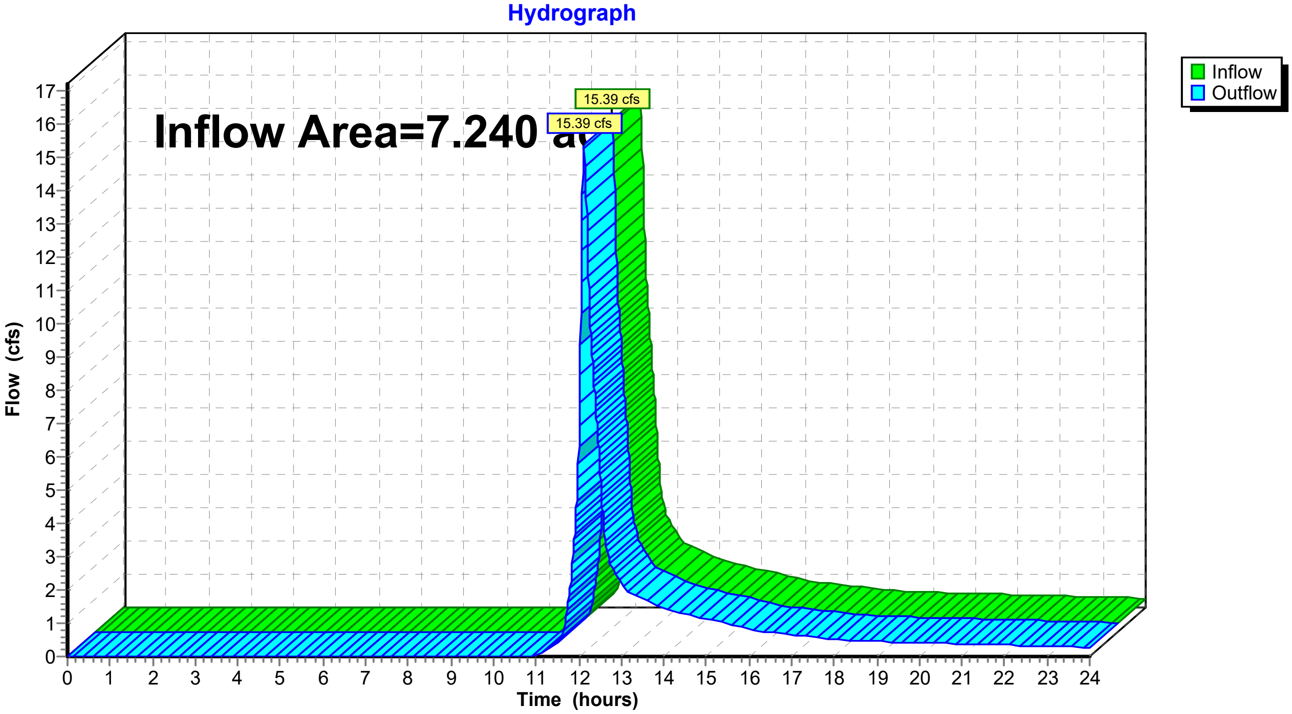
Summary for Reach 2R: Off-site Flow (East)

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

Inflow Area =	7.240 ac,	0.00% Impervious, Inflow Depth > 2.12"	for 50-year event
Inflow =	15.39 cfs @	12.13 hrs, Volume=	1.279 af
Outflow =	15.39 cfs @	12.13 hrs, Volume=	1.279 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 2

Reach 2R: Off-site Flow (East)



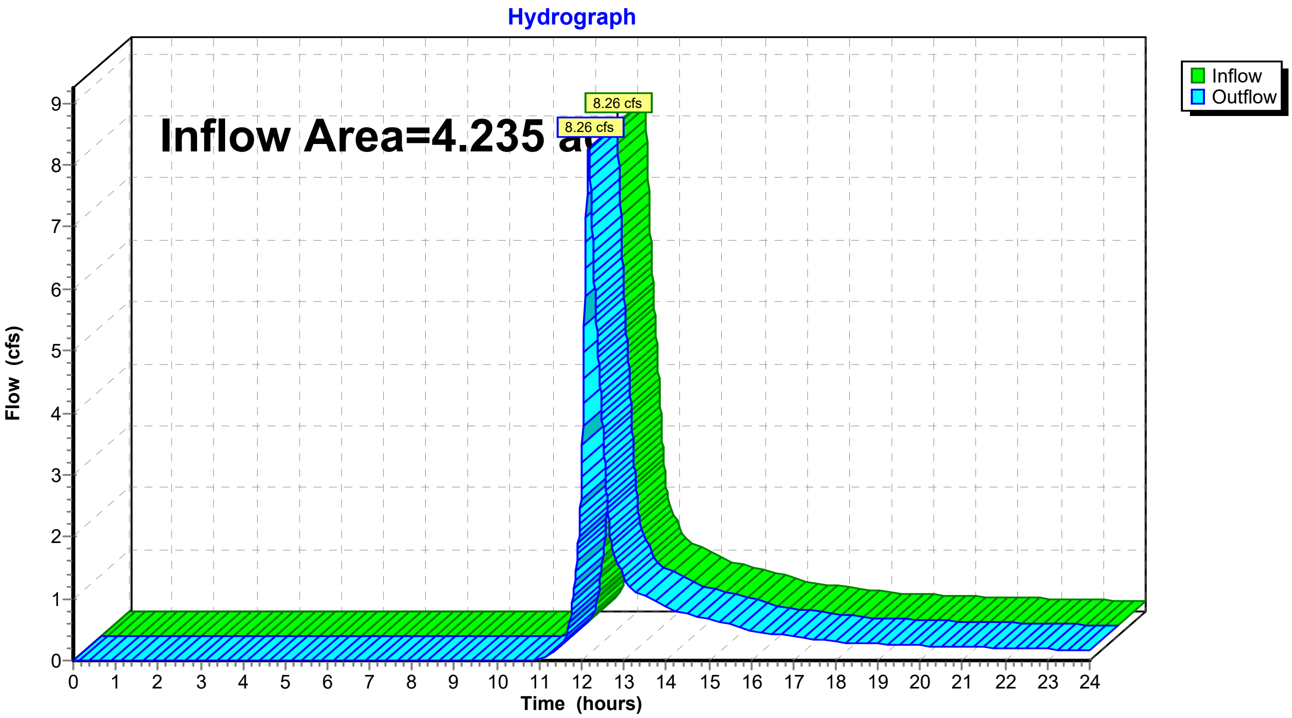
Summary for Reach 3R: Off-site flow (Route 15)

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

Inflow Area =	4.235 ac,	0.00% Impervious, Inflow Depth > 2.12"	for 50-year event
Inflow =	8.26 cfs @	12.17 hrs, Volume=	0.747 af
Outflow =	8.26 cfs @	12.17 hrs, Volume=	0.747 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 2

Reach 3R: Off-site flow (Route 15)



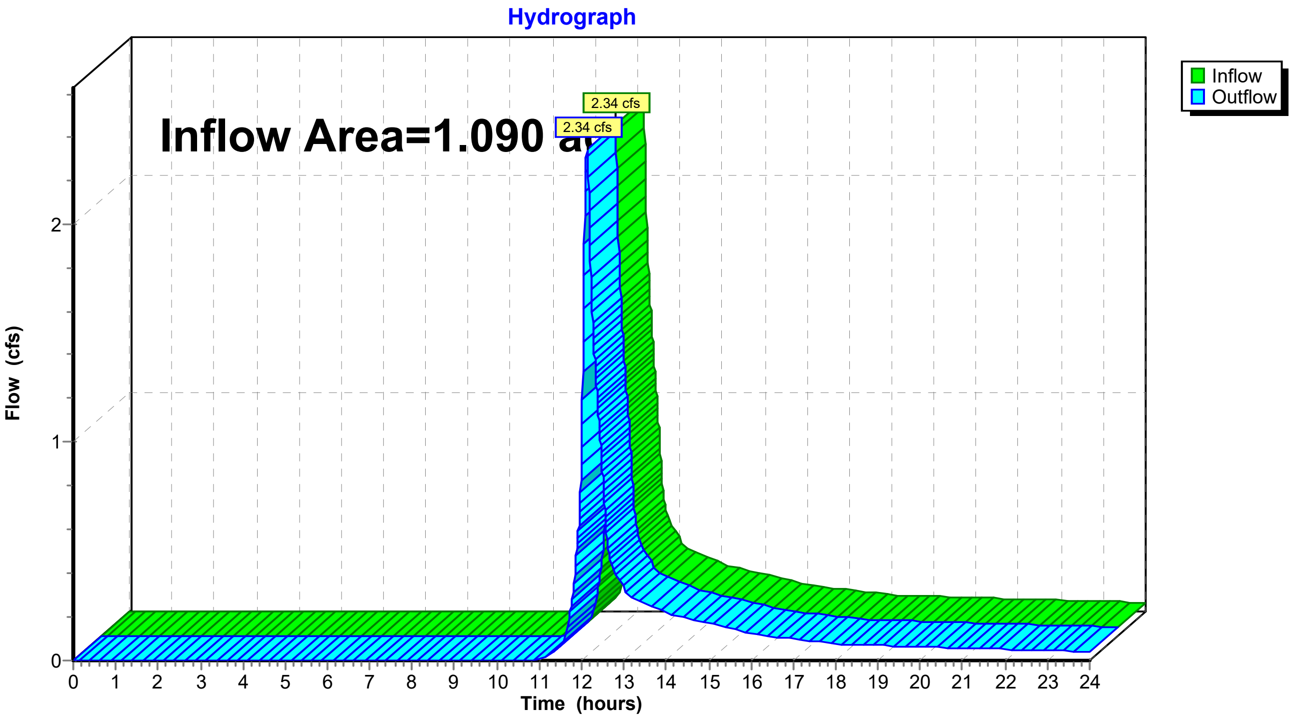
Summary for Reach 4R: Off-site Flow (South)

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

Inflow Area = 1.090 ac, 0.00% Impervious, Inflow Depth > 2.12" for 50-year event
Inflow = 2.34 cfs @ 12.13 hrs, Volume= 0.192 af
Outflow = 2.34 cfs @ 12.13 hrs, Volume= 0.192 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 2

Reach 4R: Off-site Flow (South)



Time span=0.00-24.00 hrs, dt=0.01 hrs, 2401 points x 2
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment1S: Area 1 Runoff Area=58,975 sf 0.00% Impervious Runoff Depth>2.72"
Flow Length=407' Tc=13.5 min CN=55 Runoff=3.25 cfs 0.307 af

Subcatchment2S: Area 2 Runoff Area=315,386 sf 0.00% Impervious Runoff Depth>2.72"
Flow Length=318' Tc=8.5 min CN=55 Runoff=20.31 cfs 1.643 af

Subcatchment3S: Area 3 Runoff Area=184,498 sf 0.00% Impervious Runoff Depth>2.72"
Flow Length=212' Tc=11.1 min CN=55 Runoff=10.90 cfs 0.961 af

Subcatchment4S: Area 4 Runoff Area=47,465 sf 0.00% Impervious Runoff Depth>2.72"
Flow Length=226' Tc=8.2 min CN=55 Runoff=3.09 cfs 0.247 af

Reach 1R: Off-site Flow (Wetland - Northwest) Inflow=3.25 cfs 0.307 af
Outflow=3.25 cfs 0.307 af

Reach 2R: Off-site Flow (East) Inflow=20.31 cfs 1.643 af
Outflow=20.31 cfs 1.643 af

Reach 3R: Off-site flow (Route 15) Inflow=10.90 cfs 0.961 af
Outflow=10.90 cfs 0.961 af

Reach 4R: Off-site Flow (South) Inflow=3.09 cfs 0.247 af
Outflow=3.09 cfs 0.247 af

Total Runoff Area = 13.919 ac Runoff Volume = 3.158 af Average Runoff Depth = 2.72"
100.00% Pervious = 13.919 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment 1S: Area 1

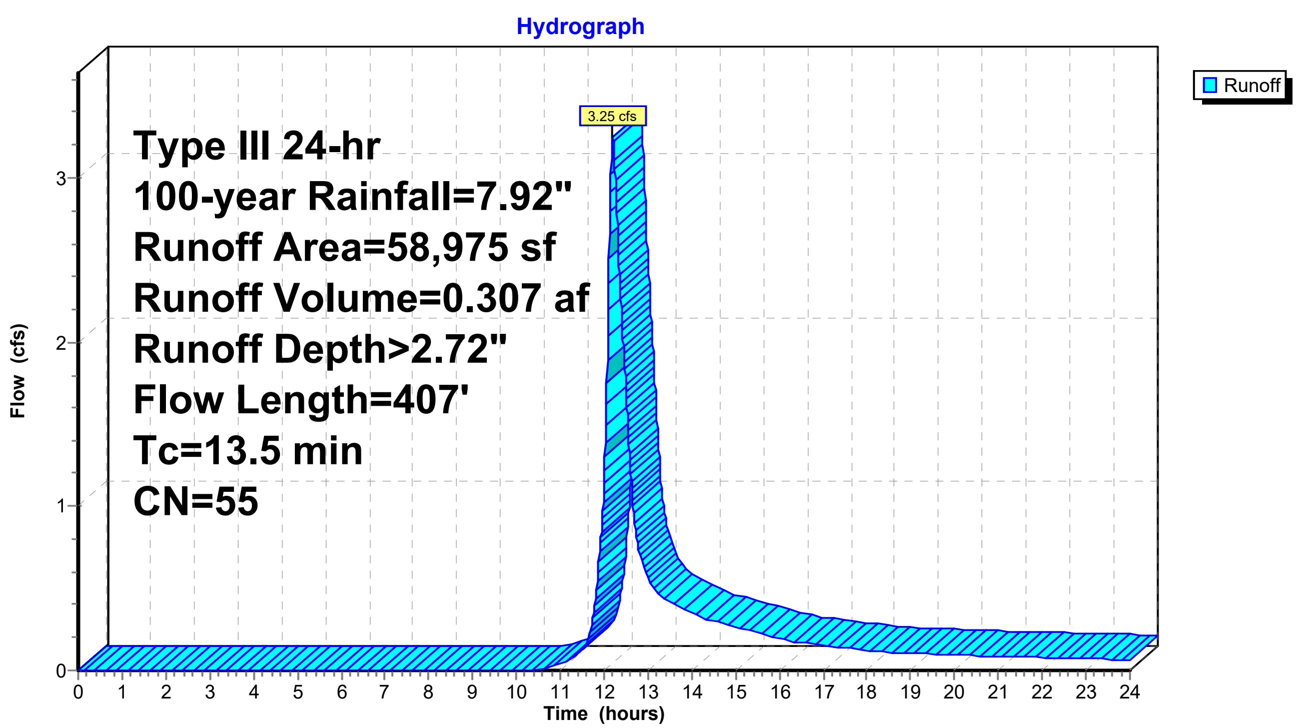
Runoff = 3.25 cfs @ 12.20 hrs, Volume= 0.307 af, Depth> 2.72"
Routed to Reach 1R : Off-site Flow (Wetland - Northwest)

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-year Rainfall=7.92"

Area (sf)	CN	Description
58,975	55	Woods, Good, HSG B
58,975		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.3	50	0.0400	0.09		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.20"
1.5	98	0.0450	1.06		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
1.6	117	0.0600	1.22		**Shallow Concentrated Flow, C-D** Woodland Kv= 5.0 fps
1.1	142	0.1700	2.06		**Shallow Concentrated Flow, D-E** Woodland Kv= 5.0 fps
13.5	407	Total			

Subcatchment 1S: Area 1



Summary for Subcatchment 2S: Area 2

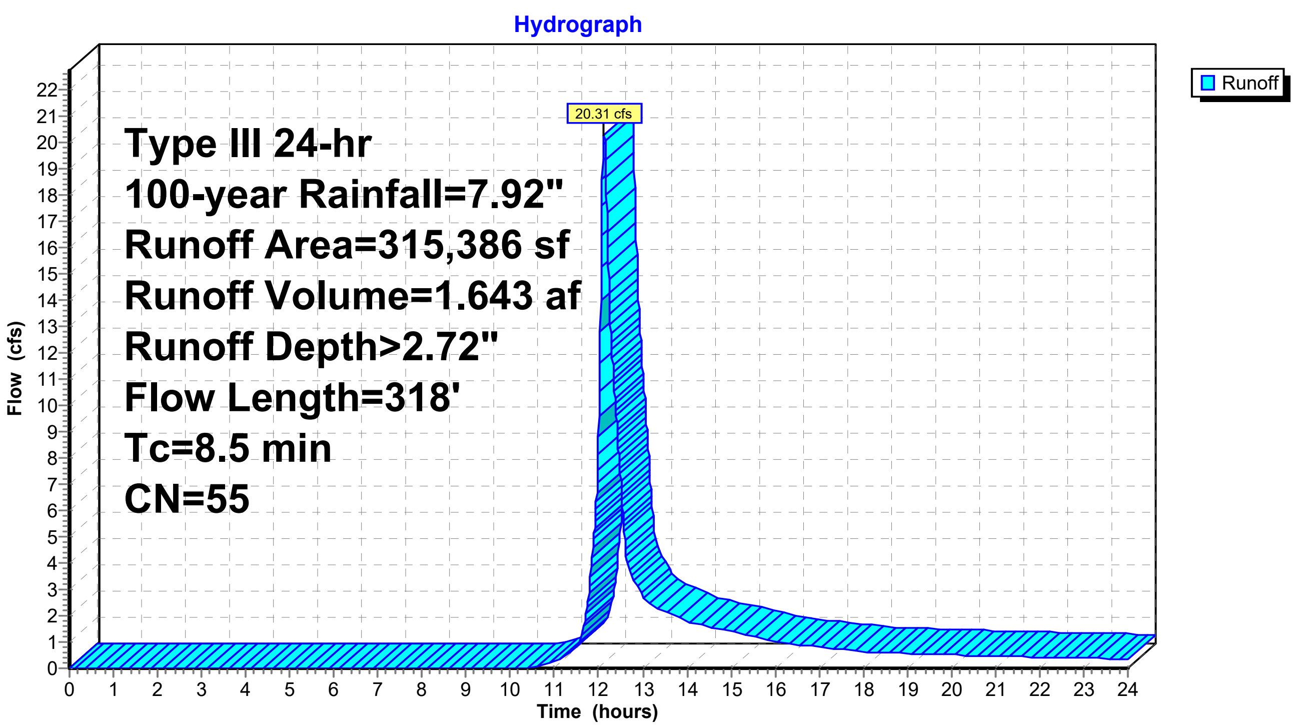
Runoff = 20.31 cfs @ 12.13 hrs, Volume= 1.643 af, Depth> 2.72"
Routed to Reach 2R : Off-site Flow (East)

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-year Rainfall=7.92"

Area (sf)	CN	Description
315,386	55	Woods, Good, HSG B
315,386		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.5	50	0.1000	0.13		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.20"
0.7	82	0.1700	2.06		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
1.3	186	0.2390	2.44		**Shallow Concentrated Flow, C-D** Woodland Kv= 5.0 fps
8.5	318	Total			

Subcatchment 2S: Area 2



Summary for Subcatchment 3S: Area 3

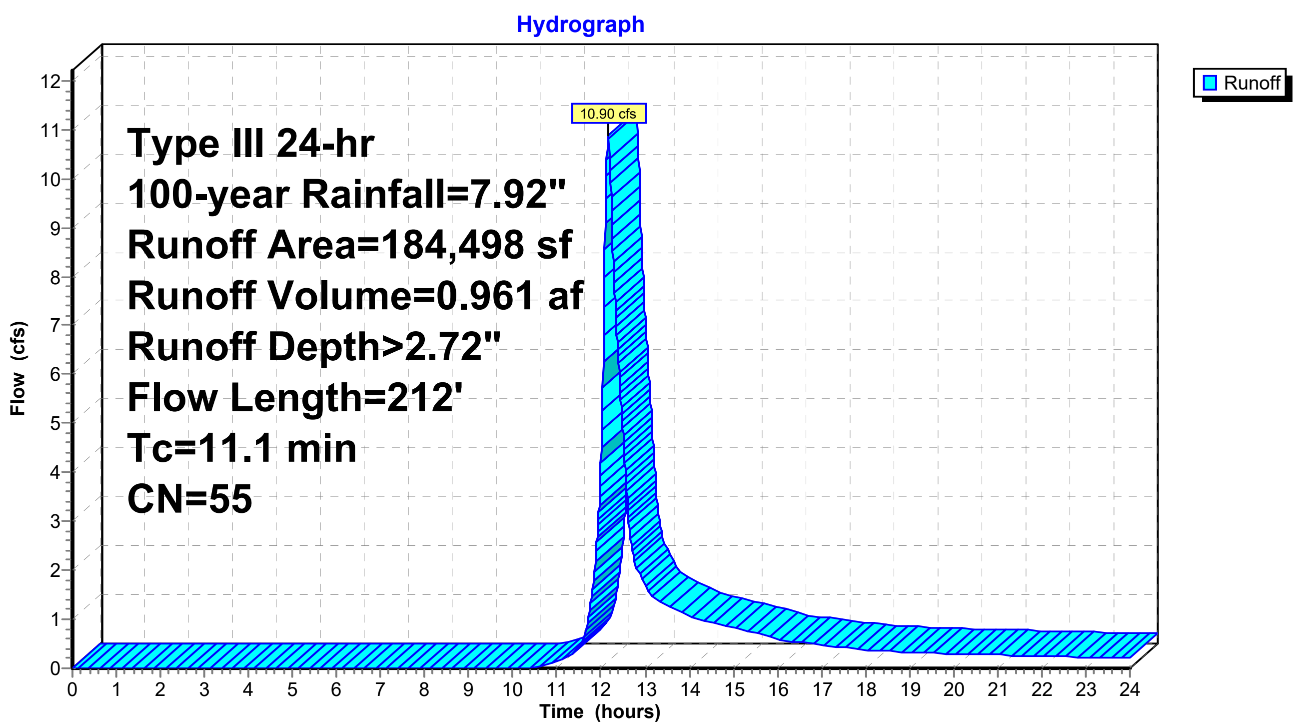
Runoff = 10.90 cfs @ 12.16 hrs, Volume= 0.961 af, Depth> 2.72"
Routed to Reach 3R : Off-site flow (Route 15)

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-year Rainfall=7.92"

Area (sf)	CN	Description
184,498	55	Woods, Good, HSG B
184,498		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.3	50	0.0400	0.09		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.20"
0.7	67	0.0900	1.50		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
1.1	95	0.0900	1.50		**Shallow Concentrated Flow, C-D** Woodland Kv= 5.0 fps
11.1	212	Total			

Subcatchment 3S: Area 3



Summary for Subcatchment 4S: Area 4

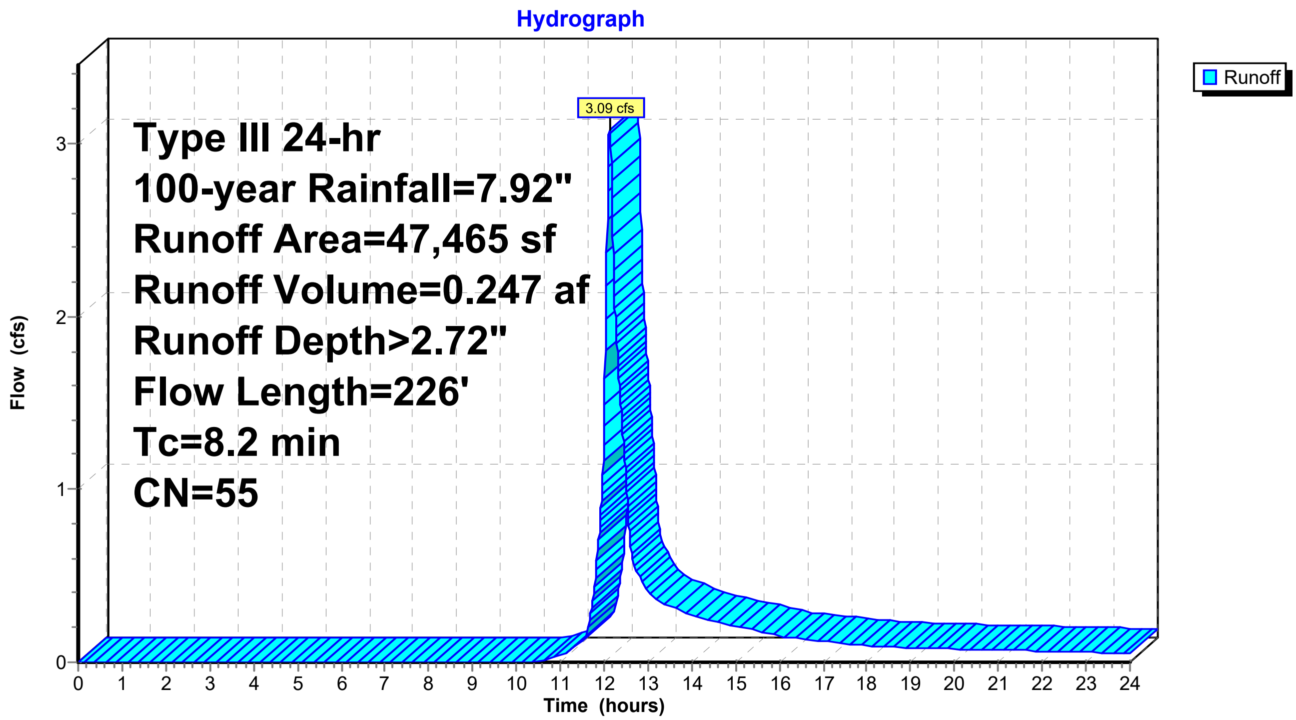
Runoff = 3.09 cfs @ 12.12 hrs, Volume= 0.247 af, Depth> 2.72"
Routed to Reach 4R : Off-site Flow (South)

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-year Rainfall=7.92"

Area (sf)	CN	Description
47,465	55	Woods, Good, HSG B
47,465		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.5	50	0.1000	0.13		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.20"
1.7	176	0.1200	1.73		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
8.2	226	Total			

Subcatchment 4S: Area 4



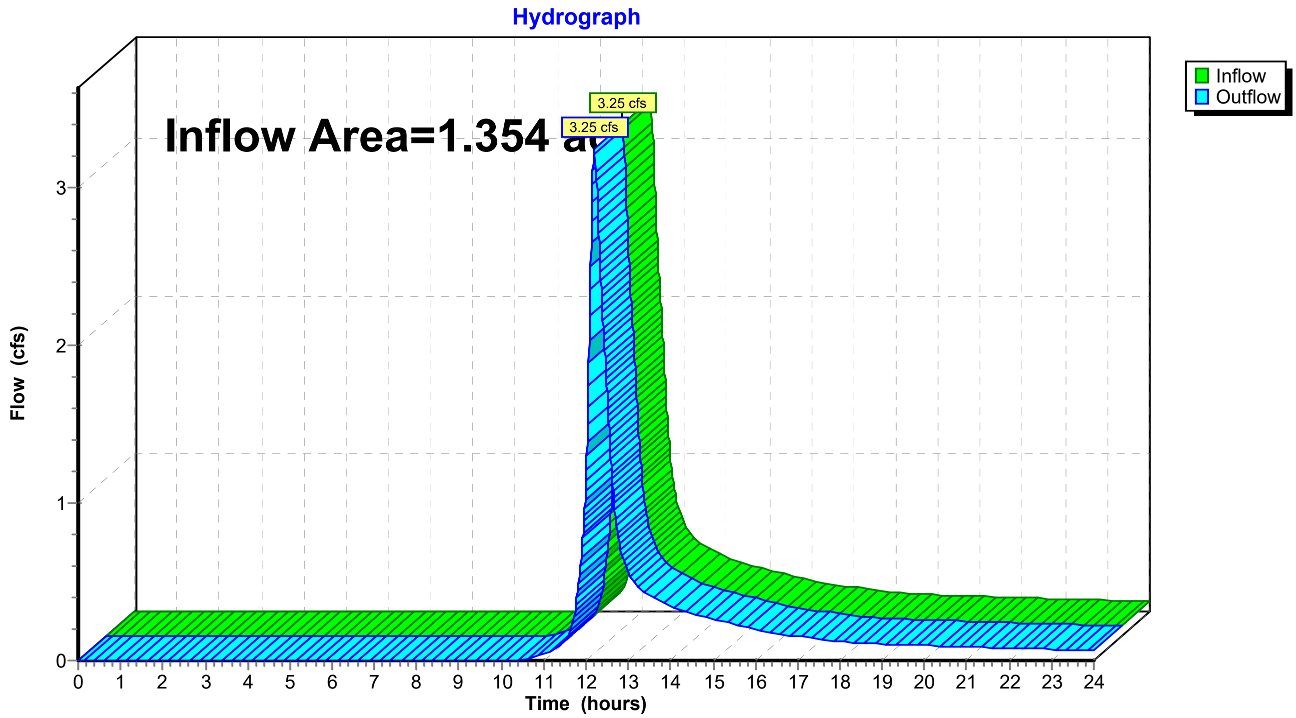
Summary for Reach 1R: Off-site Flow (Wetland - Northwest)

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

Inflow Area = 1.354 ac, 0.00% Impervious, Inflow Depth > 2.72" for 100-year event
Inflow = 3.25 cfs @ 12.20 hrs, Volume= 0.307 af
Outflow = 3.25 cfs @ 12.20 hrs, Volume= 0.307 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 2

Reach 1R: Off-site Flow (Wetland - Northwest)



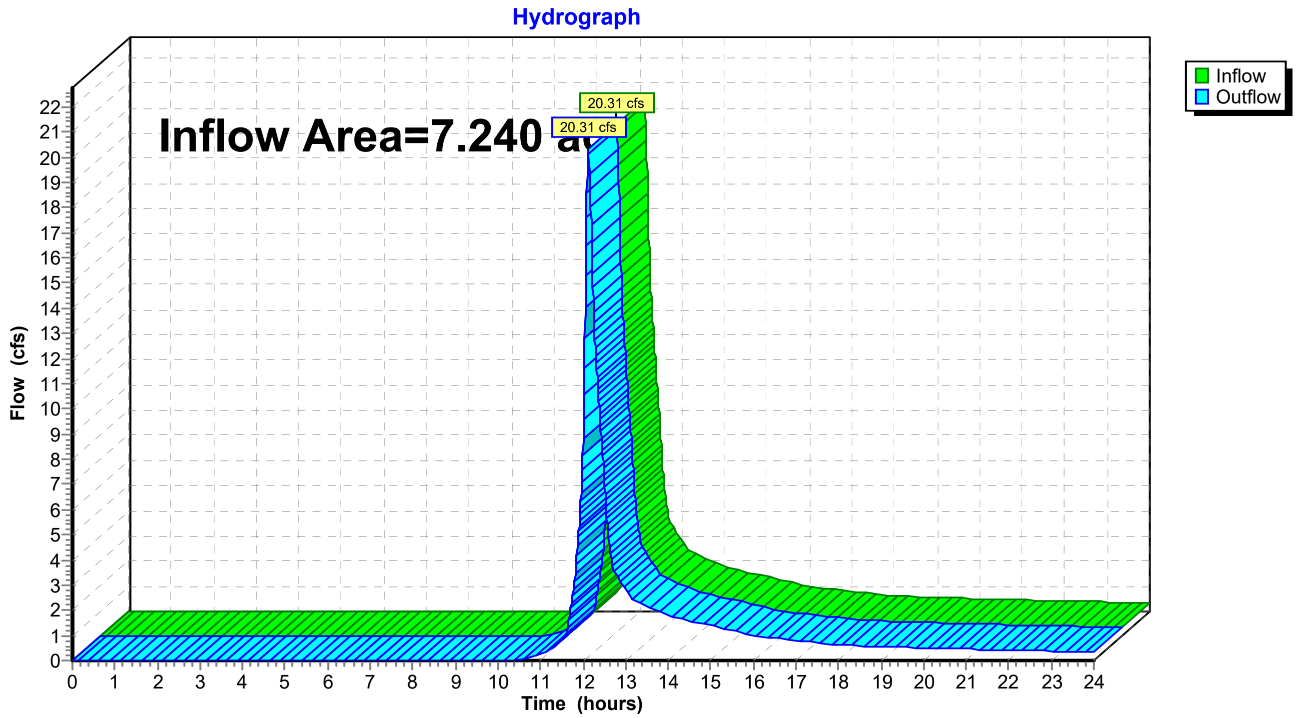
Summary for Reach 2R: Off-site Flow (East)

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

Inflow Area = 7.240 ac, 0.00% Impervious, Inflow Depth > 2.72" for 100-year event
Inflow = 20.31 cfs @ 12.13 hrs, Volume= 1.643 af
Outflow = 20.31 cfs @ 12.13 hrs, Volume= 1.643 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 2

Reach 2R: Off-site Flow (East)



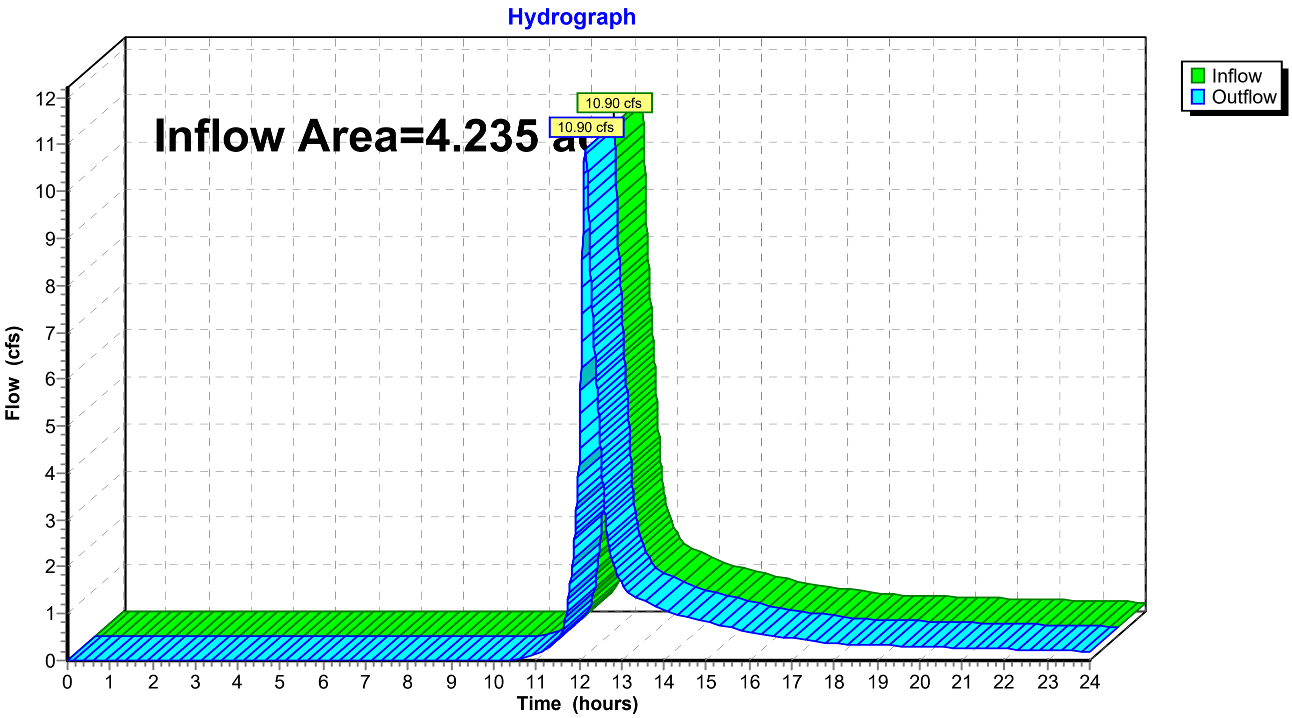
Summary for Reach 3R: Off-site flow (Route 15)

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

Inflow Area =	4.235 ac,	0.00% Impervious, Inflow Depth > 2.72"	for 100-year event	
Inflow =	10.90 cfs @	12.16 hrs, Volume=	0.961 af	
Outflow =	10.90 cfs @	12.16 hrs, Volume=	0.961 af,	Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 2

Reach 3R: Off-site flow (Route 15)

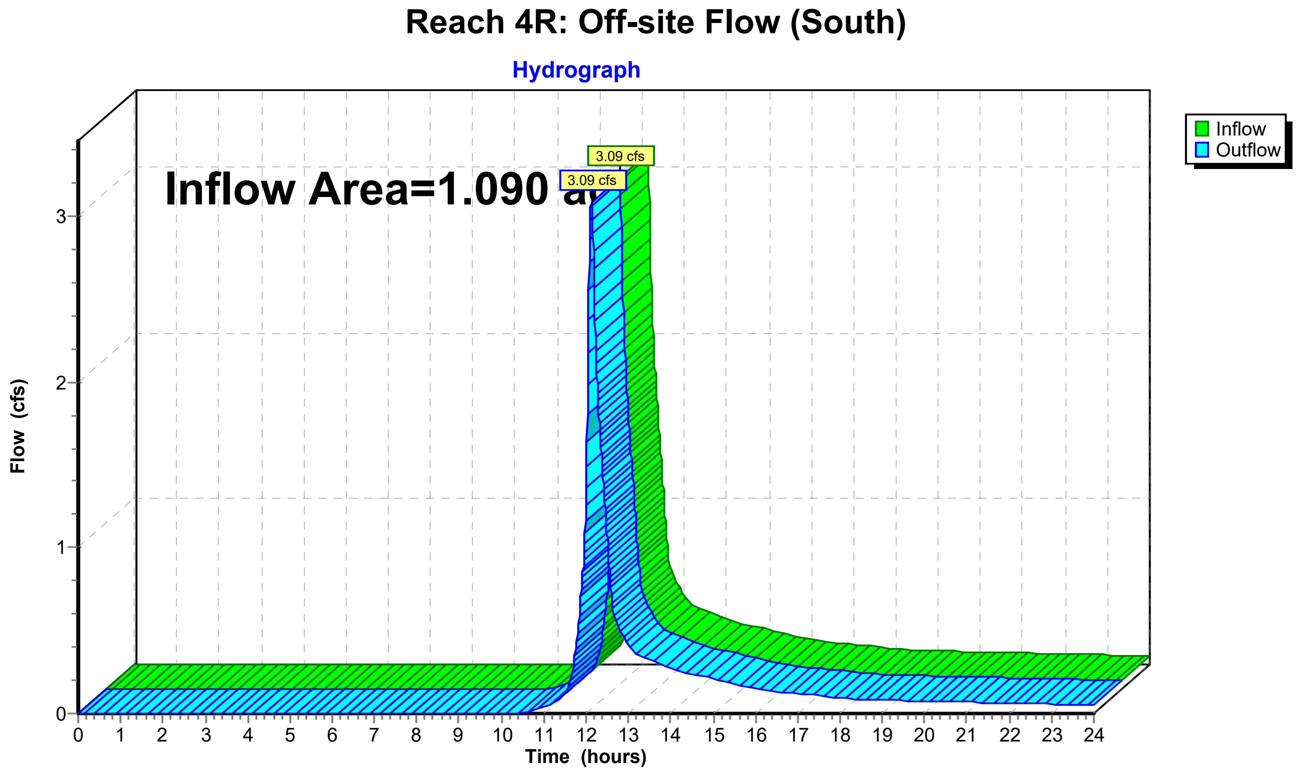


Summary for Reach 4R: Off-site Flow (South)

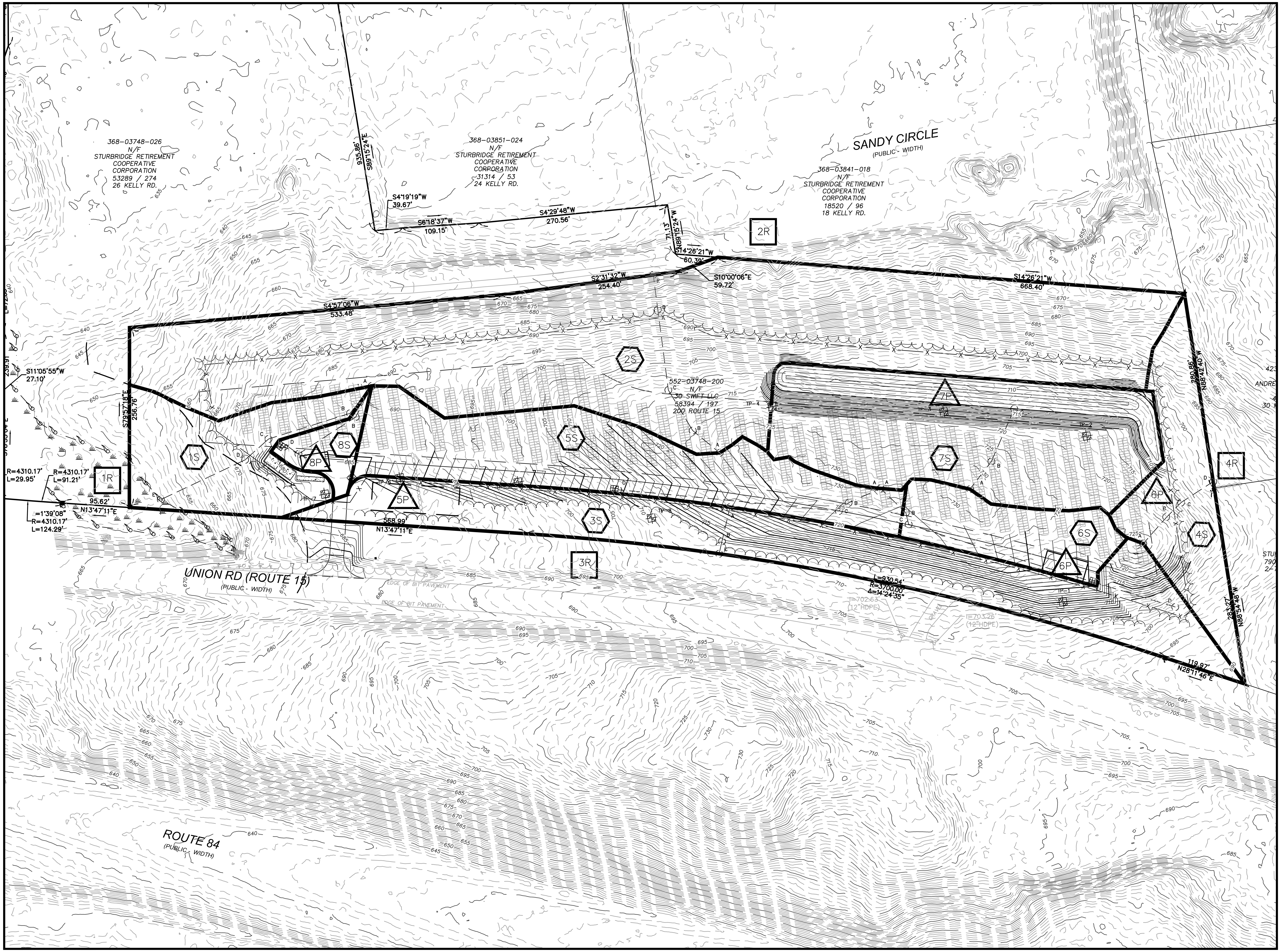
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 1.090 ac, 0.00% Impervious, Inflow Depth > 2.72" for 100-year event
Inflow = 3.09 cfs @ 12.12 hrs, Volume= 0.247 af
Outflow = 3.09 cfs @ 12.12 hrs, Volume= 0.247 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 2



6.03 PROPOSED WATERSHED PLAN



BRIAN G. YERGATIAN
PROFESSIONAL ENGINEER

DATE

GROUND-MOUNTED PHOTOVOLTAIC SYSTEM

200 ROUTE 15

IN

STURBRIDGE MASSACHUSETTS

(WORCESTER COUNTY)

POST-DEVELOPMENT WATERSHED PLAN

APRIL 7, 2023

REVISIONS:

NO.	DATE	DESC.

PREPARED FOR:

BEAR PEAK POWER, LLC
2420 17TH STREET
DENVER, CO 80202

BSC GROUP
349 Main Street - Route 28
West Yarmouth, Massachusetts
02673
508 778 8919

SCALE: 1" = 60'

0 30 60 120 FEET

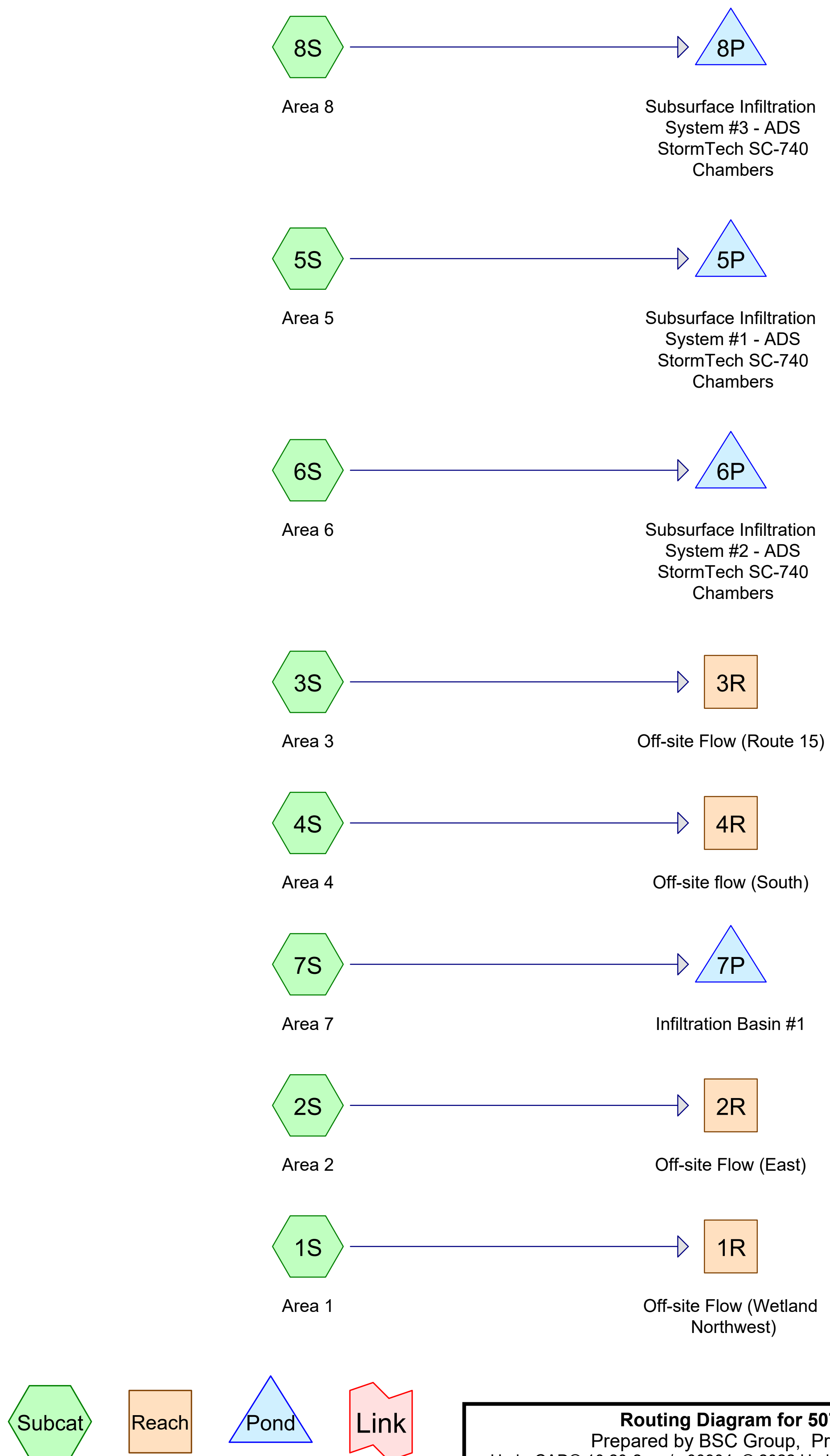
FILE: PROJECTS-YAR\5074500\C\D\5074500-SP.dwg

DWG.: DWG

JOB. NO: 5-0745.00

SHEET 1 OF 1

6.04 PROPOSED HYDROLOGY CALCULATIONS (HYDROCAD™ PRINTOUTS)



Routing Diagram for 5074500-Post
Prepared by BSC Group, Printed 4/7/2023

Rainfall Events Listing

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	2-year	Type III 24-hr		Default	24.00	1	3.23	2
2	10-year	Type III 24-hr		Default	24.00	1	5.04	2
3	25-year	Type III 24-hr		Default	24.00	1	6.17	2
4	50-year	Type III 24-hr		Default	24.00	1	7.00	2
5	100-year	Type III 24-hr		Default	24.00	1	7.92	2

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
1.667	61	>75% Grass cover, Good, HSG B (3S, 4S)
0.498	96	Gravel surface, HSG B (5S, 6S)
7.171	58	Meadow, non-grazed, HSG B (1S, 2S, 3S, 4S, 5S, 6S, 7S, 8S)
0.092	98	Paved parking, HSG B (3S, 8S)
4.488	55	Woods, Good, HSG B (1S, 2S, 3S, 4S)
13.916	**59**	**TOTAL AREA**

Time span=0.00-24.00 hrs, dt=0.01 hrs, 2401 points x 2
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment1S: Area 1 Runoff Area=42,152 sf 0.00% Impervious Runoff Depth>0.29"
Flow Length=350' Tc=6.0 min CN=56 Runoff=0.13 cfs 0.023 af

Subcatchment2S: Area 2 Runoff Area=232,817 sf 0.00% Impervious Runoff Depth>0.32"
Flow Length=283' Tc=6.0 min CN=57 Runoff=0.82 cfs 0.142 af

Subcatchment3S: Area 3 Runoff Area=95,234 sf 0.72% Impervious Runoff Depth>0.38"
Flow Length=68' Tc=6.0 min CN=59 Runoff=0.52 cfs 0.070 af

Subcatchment4S: Area 4 Runoff Area=38,773 sf 0.00% Impervious Runoff Depth>0.32"
Flow Length=132' Tc=6.0 min CN=57 Runoff=0.14 cfs 0.024 af

Subcatchment5S: Area 5 Runoff Area=72,521 sf 0.00% Impervious Runoff Depth>0.66"
Flow Length=385' Tc=6.0 min CN=66 Runoff=1.05 cfs 0.091 af

Subcatchment6S: Area 6 Runoff Area=26,937 sf 0.00% Impervious Runoff Depth>0.66"
Flow Length=465' Tc=6.0 min CN=66 Runoff=0.39 cfs 0.034 af

Subcatchment7S: Area 7 Runoff Area=89,330 sf 0.00% Impervious Runoff Depth>0.35"
Flow Length=133' Tc=6.0 min CN=58 Runoff=0.40 cfs 0.060 af

Subcatchment8S: Area 8 Runoff Area=8,417 sf 39.47% Impervious Runoff Depth>1.06"
Flow Length=170' Tc=6.0 min CN=74 Runoff=0.23 cfs 0.017 af

Reach 1R: Off-site Flow (Wetland Northwest) Inflow=0.13 cfs 0.023 af
Outflow=0.13 cfs 0.023 af

Reach 2R: Off-site Flow (East) Inflow=0.82 cfs 0.142 af
Outflow=0.82 cfs 0.142 af

Reach 3R: Off-site Flow (Route 15) Inflow=0.52 cfs 0.070 af
Outflow=0.52 cfs 0.070 af

Reach 4R: Off-site flow (South) Inflow=0.14 cfs 0.024 af
Outflow=0.14 cfs 0.024 af

Pond 5P: Subsurface Infiltration System #1 - Peak Elev=680.84' Storage=677 cf Inflow=1.05 cfs 0.091 af
Outflow=0.32 cfs 0.091 af

Pond 6P: Subsurface Infiltration System #2 - Peak Elev=711.35' Storage=255 cf Inflow=0.39 cfs 0.034 af
Outflow=0.12 cfs 0.034 af

Pond 7P: Infiltration Basin #1 Peak Elev=704.00' Storage=0 cf Inflow=0.40 cfs 0.060 af
Outflow=0.40 cfs 0.060 af

Pond 8P: Subsurface Infiltration System #3 - Peak Elev=677.76' Storage=165 cf Inflow=0.23 cfs 0.017 af
Outflow=0.06 cfs 0.017 af

Total Runoff Area = 13.916 ac Runoff Volume = 0.461 af Average Runoff Depth = 0.40"
99.34% Pervious = 13.824 ac 0.66% Impervious = 0.092 ac

Summary for Subcatchment 1S: Area 1

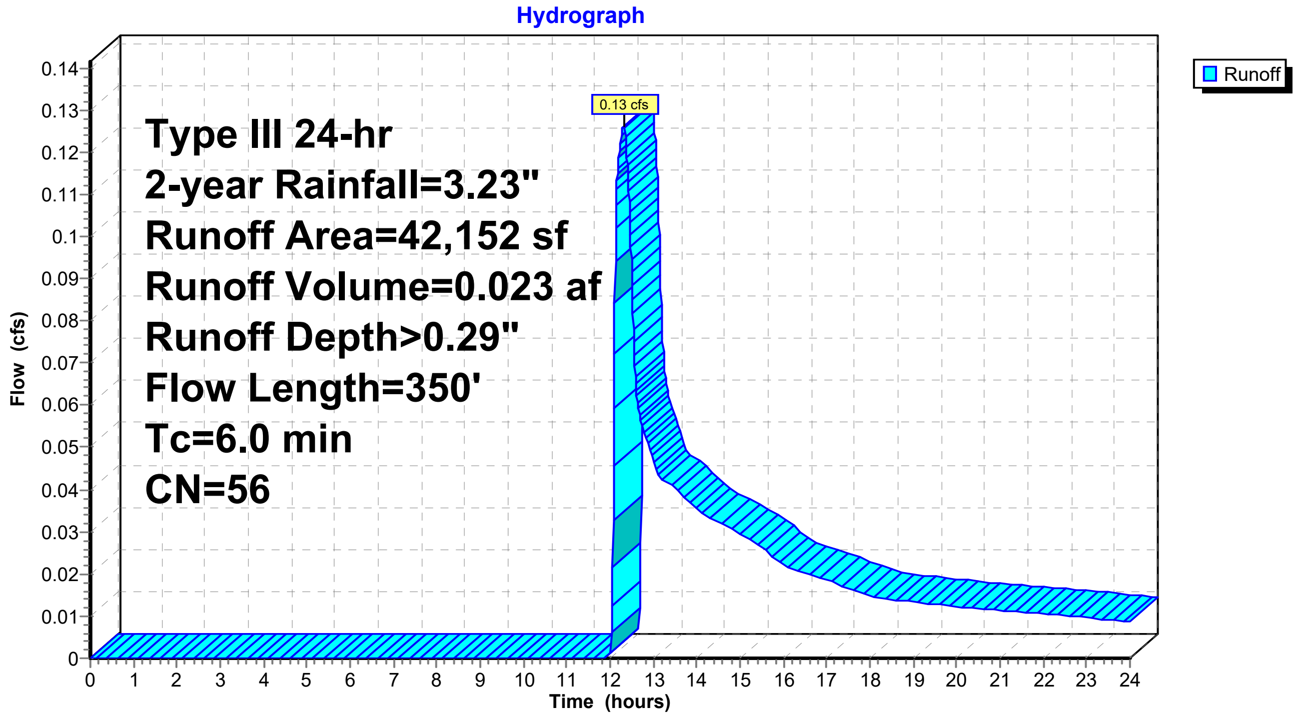
Runoff = 0.13 cfs @ 12.30 hrs, Volume= 0.023 af, Depth> 0.29"
Routed to Reach 1R : Off-site Flow (Wetland Northwest)

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-year Rainfall=3.23"

Area (sf)	CN	Description
15,269	58	Meadow, non-grazed, HSG B
26,883	55	Woods, Good, HSG B
42,152	56	Weighted Average
42,152		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.4	50	0.0700	0.24		**Sheet Flow, A-B**
					Grass: Short n= 0.150 P2= 3.20"
0.8	122	0.1420	2.64		**Shallow Concentrated Flow, B-C**
					Short Grass Pasture Kv= 7.0 fps
0.3	45	0.1420	2.64		**Shallow Concentrated Flow, C-D**
					Short Grass Pasture Kv= 7.0 fps
1.1	133	0.1500	1.94		**Shallow Concentrated Flow, D-E**
					Woodland Kv= 5.0 fps
0.4					**Direct Entry,**
6.0	350	Total			

Subcatchment 1S: Area 1



Summary for Subcatchment 2S: Area 2

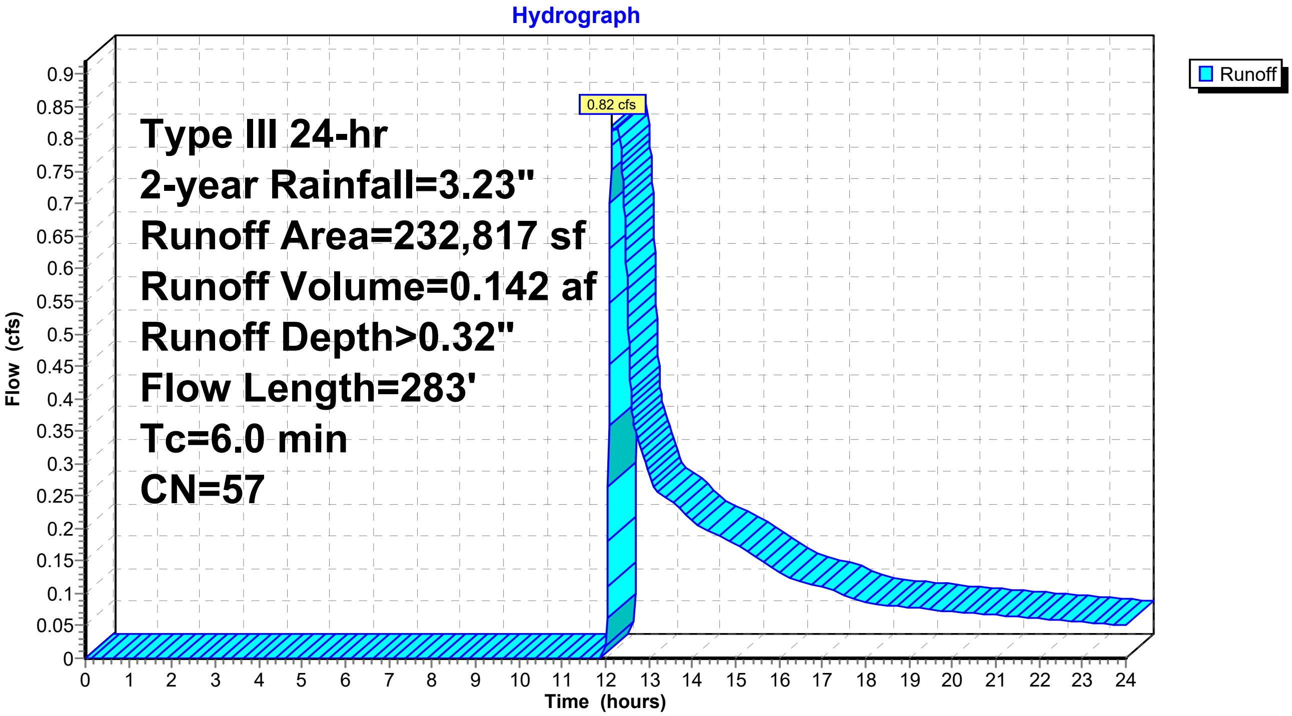
Runoff = 0.82 cfs @ 12.16 hrs, Volume= 0.142 af, Depth> 0.32"
Routed to Reach 2R : Off-site Flow (East)

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-year Rainfall=3.23"

Area (sf)	CN	Description
119,060	58	Meadow, non-grazed, HSG B
113,757	55	Woods, Good, HSG B
232,817	57	Weighted Average
232,817		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.1	50	0.0900	0.27		**Sheet Flow, A-B**
					Grass: Short n= 0.150 P2= 3.20"
0.5	67	0.0900	2.10		**Shallow Concentrated Flow, B-C**
					Short Grass Pasture Kv= 7.0 fps
0.5	116	0.2800	3.70		**Shallow Concentrated Flow, C-D**
					Short Grass Pasture Kv= 7.0 fps
0.3	50	0.4300	3.28		**Shallow Concentrated Flow, D-E**
					Woodland Kv= 5.0 fps
1.6					**Direct Entry,**
6.0	283	Total			

Subcatchment 2S: Area 2



Summary for Subcatchment 3S: Area 3

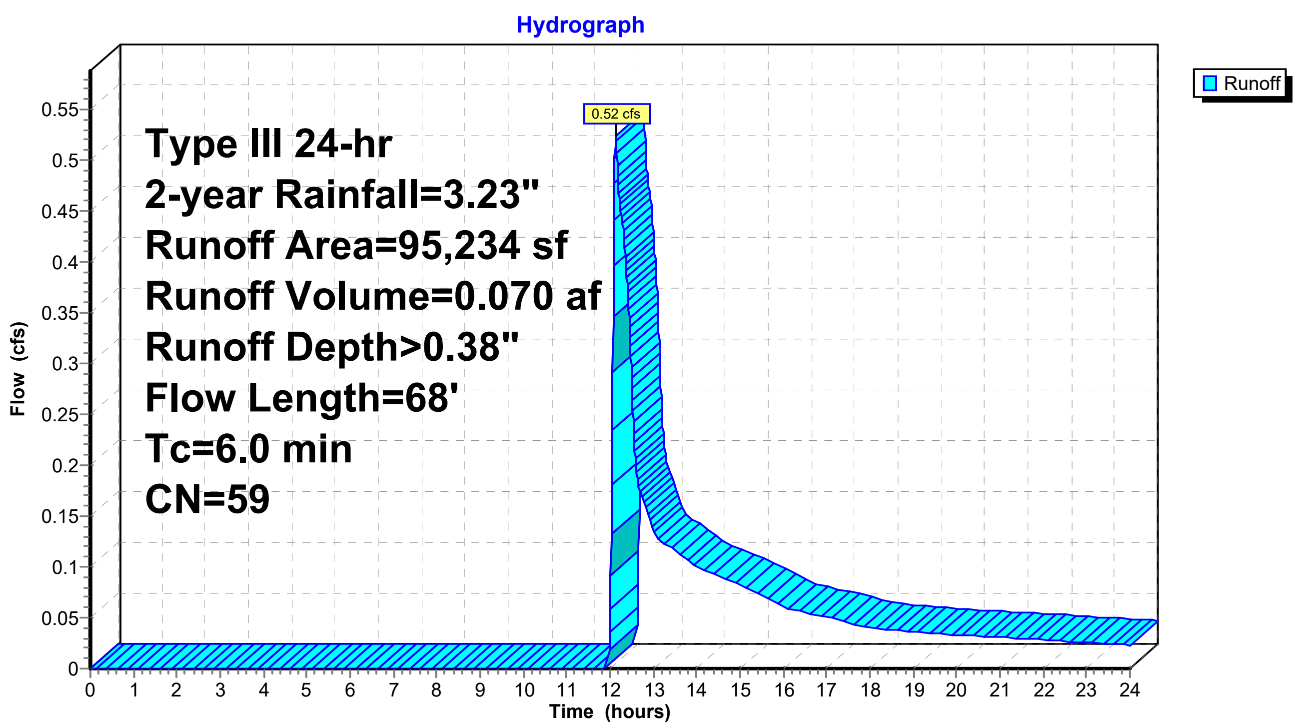
Runoff = 0.52 cfs @ 12.13 hrs, Volume= 0.070 af, Depth> 0.38"
Routed to Reach 3R : Off-site Flow (Route 15)

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-year Rainfall=3.23"

Area (sf)	CN	Description
30,543	55	Woods, Good, HSG B
682	98	Paved parking, HSG B
2,653	58	Meadow, non-grazed, HSG B
61,356	61	>75% Grass cover, Good, HSG B
95,234	59	Weighted Average
94,552		99.28% Pervious Area
682		0.72% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.8	50	0.1300	0.14		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.20"
0.2	18	0.1100	1.66		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
6.0	68	Total			

Subcatchment 3S: Area 3



Summary for Subcatchment 4S: Area 4

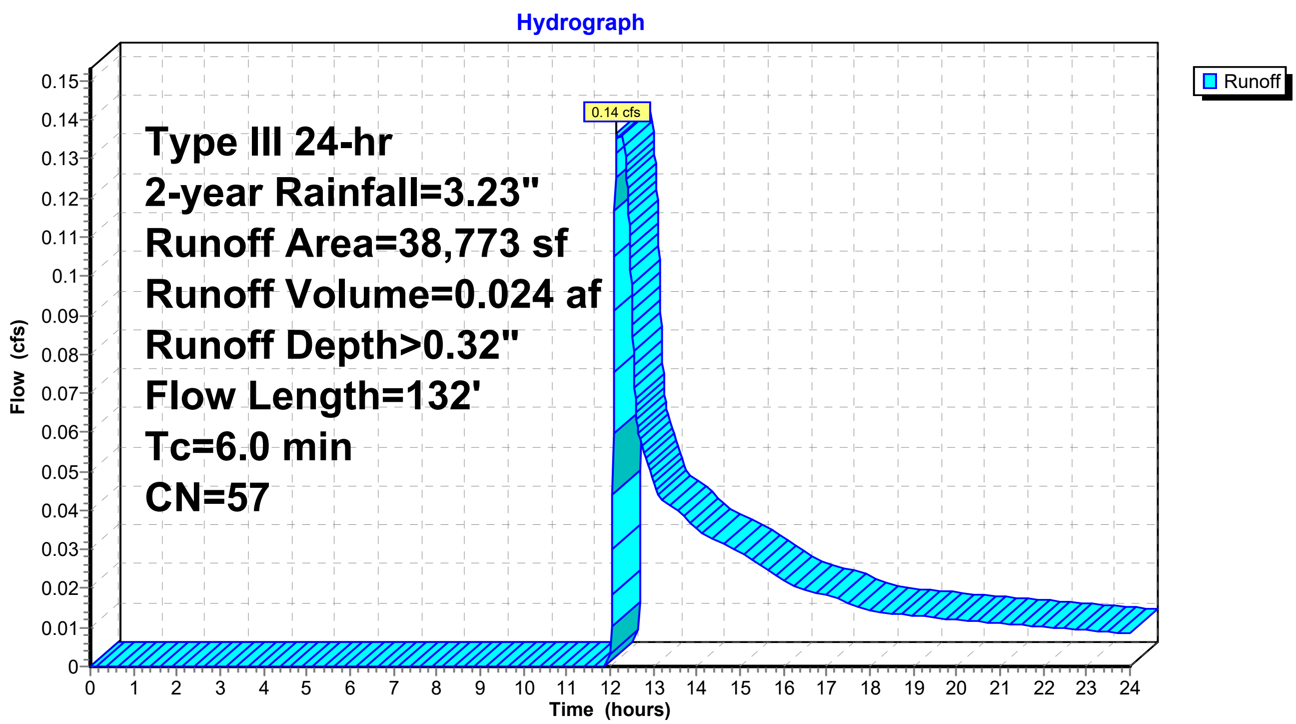
Runoff = 0.14 cfs @ 12.16 hrs, Volume= 0.024 af, Depth> 0.32"
Routed to Reach 4R : Off-site flow (South)

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-year Rainfall=3.23"

Area (sf)	CN	Description
3,172	58	Meadow, non-grazed, HSG B
24,335	55	Woods, Good, HSG B
11,266	61	>75% Grass cover, Good, HSG B
38,773	57	Weighted Average
38,773		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.7	50	0.1500	0.23		**Sheet Flow, A-B** Grass: Dense n= 0.240 P2= 3.20"
0.1	27	0.3100	3.90		**Shallow Concentrated Flow, B-C** Short Grass Pasture Kv= 7.0 fps
0.5	55	0.1500	1.94		**Shallow Concentrated Flow, C-D** Woodland Kv= 5.0 fps
1.7					**Direct Entry,**
6.0	132	Total			

Subcatchment 4S: Area 4



Summary for Subcatchment 5S: Area 5

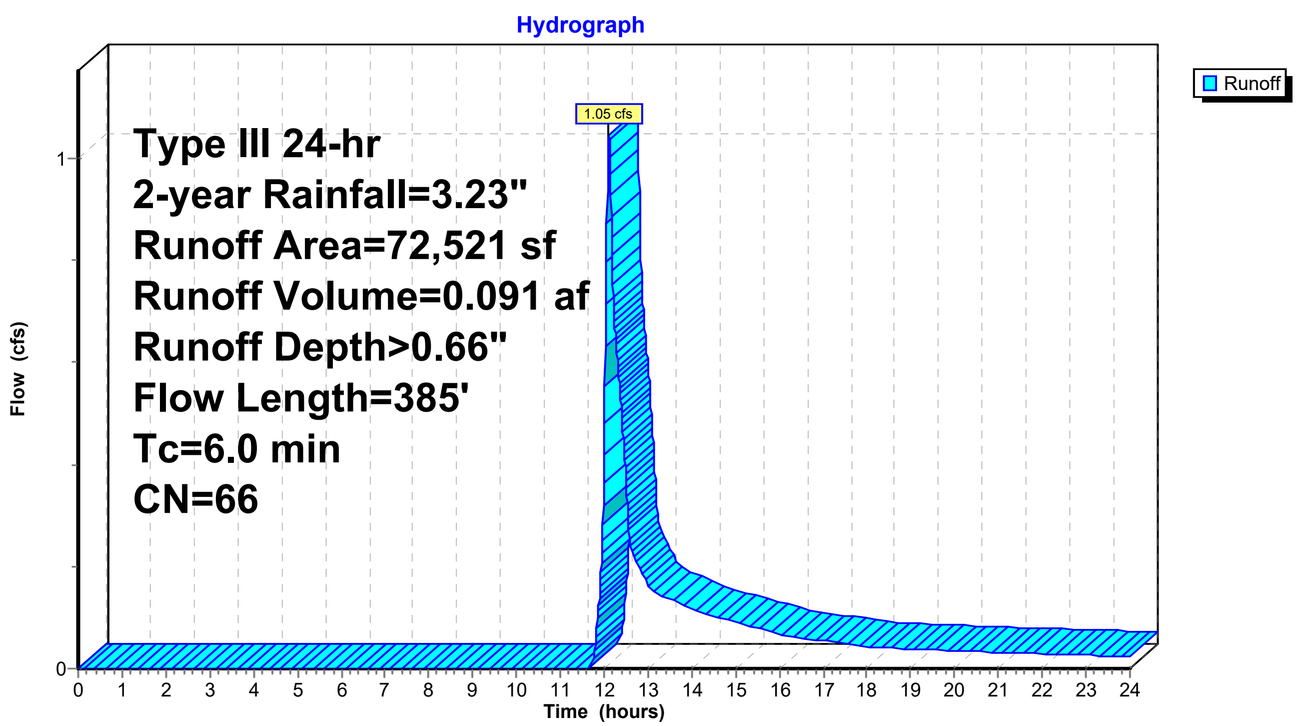
Runoff = 1.05 cfs @ 12.11 hrs, Volume= 0.091 af, Depth> 0.66"
Routed to Pond 5P : Subsurface Infiltration System #1 - ADS StormTech SC-740 Chambers

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-year Rainfall=3.23"

Area (sf)	CN	Description
56,669	58	Meadow, non-grazed, HSG B
15,852	96	Gravel surface, HSG B
72,521	66	Weighted Average
72,521		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.0	50	0.1000	0.28		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 3.20"
0.1	18	0.1100	2.32		**Shallow Concentrated Flow, B-C** Short Grass Pasture Kv= 7.0 fps
1.1	317	0.0600	4.97		**Shallow Concentrated Flow, C-D** Paved Kv= 20.3 fps
1.8					**Direct Entry,**
6.0	385	Total			

Subcatchment 5S: Area 5



Summary for Subcatchment 6S: Area 6

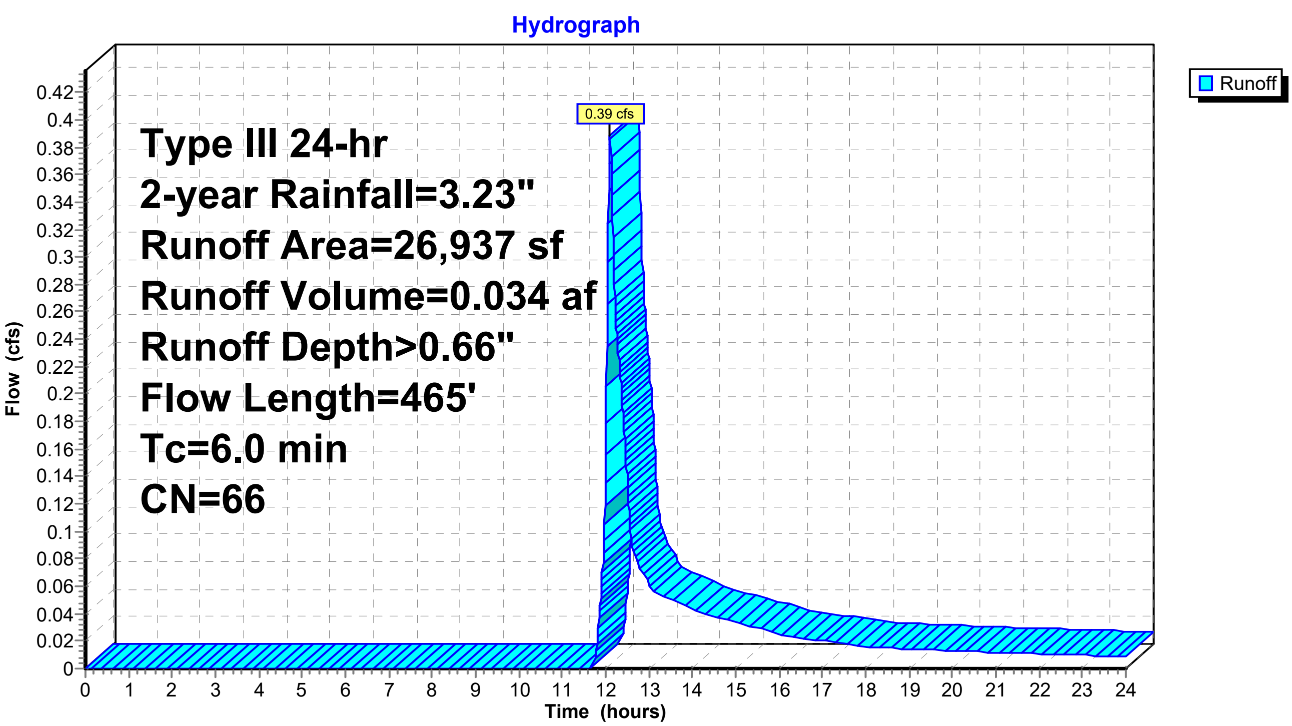
Runoff = 0.39 cfs @ 12.11 hrs, Volume= 0.034 af, Depth> 0.66"
Routed to Pond 6P : Subsurface Infiltration System #2 - ADS StormTech SC-740 Chambers

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-year Rainfall=3.23"

Area (sf)	CN	Description
21,116	58	Meadow, non-grazed, HSG B
5,821	96	Gravel surface, HSG B
26,937	66	Weighted Average
26,937		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.4	50	0.0700	0.24		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 3.20"
0.1	17	0.0800	1.98		**Shallow Concentrated Flow, B-C** Short Grass Pasture Kv= 7.0 fps
1.3	398	0.0600	4.97		**Shallow Concentrated Flow, C-D** Paved Kv= 20.3 fps
1.2					**Direct Entry,**
6.0	465	Total			

Subcatchment 6S: Area 6



Summary for Subcatchment 7S: Area 7

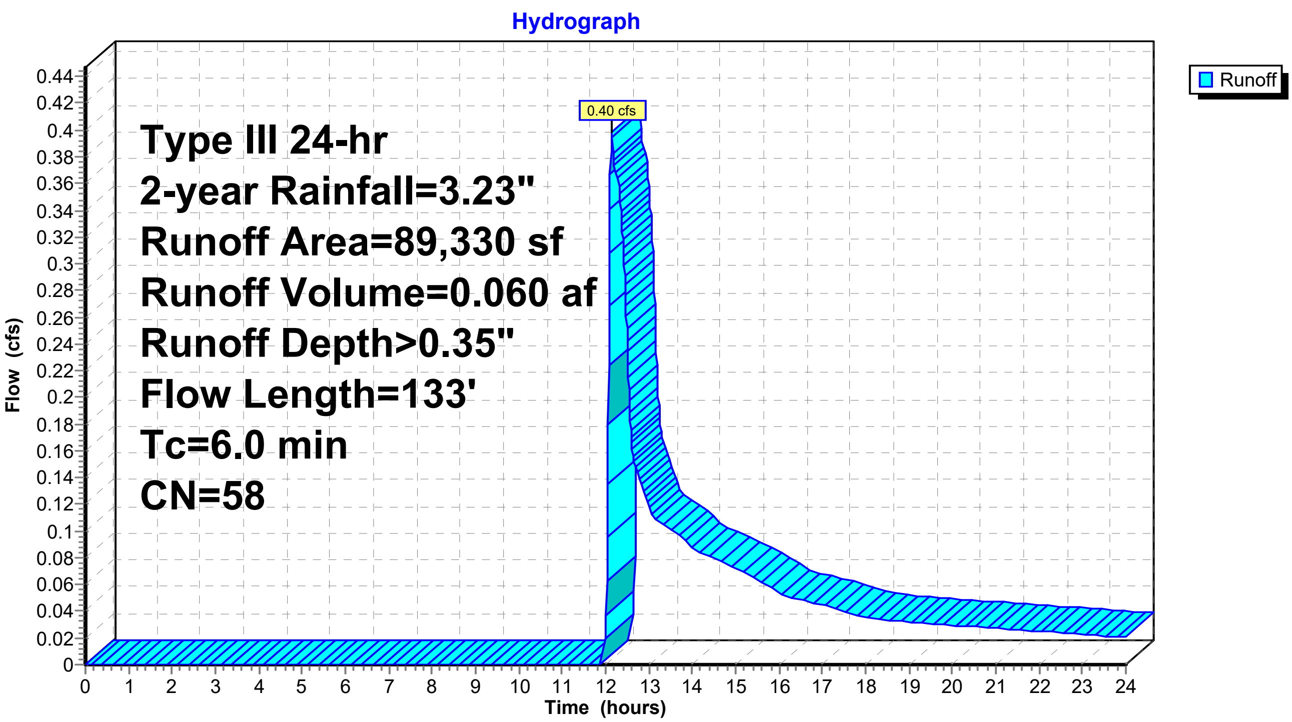
Runoff = 0.40 cfs @ 12.14 hrs, Volume= 0.060 af, Depth> 0.35"
Routed to Pond 7P : Infiltration Basin #1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-year Rainfall=3.23"

Area (sf)	CN	Description
89,330	58	Meadow, non-grazed, HSG B
89,330		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.0	50	0.1000	0.28		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 3.20"
0.5	83	0.1700	2.89		**Shallow Concentrated Flow, B-C** Short Grass Pasture Kv= 7.0 fps
2.5					**Direct Entry,**
6.0	133	Total			

Subcatchment 7S: Area 7



Summary for Subcatchment 8S: Area 8

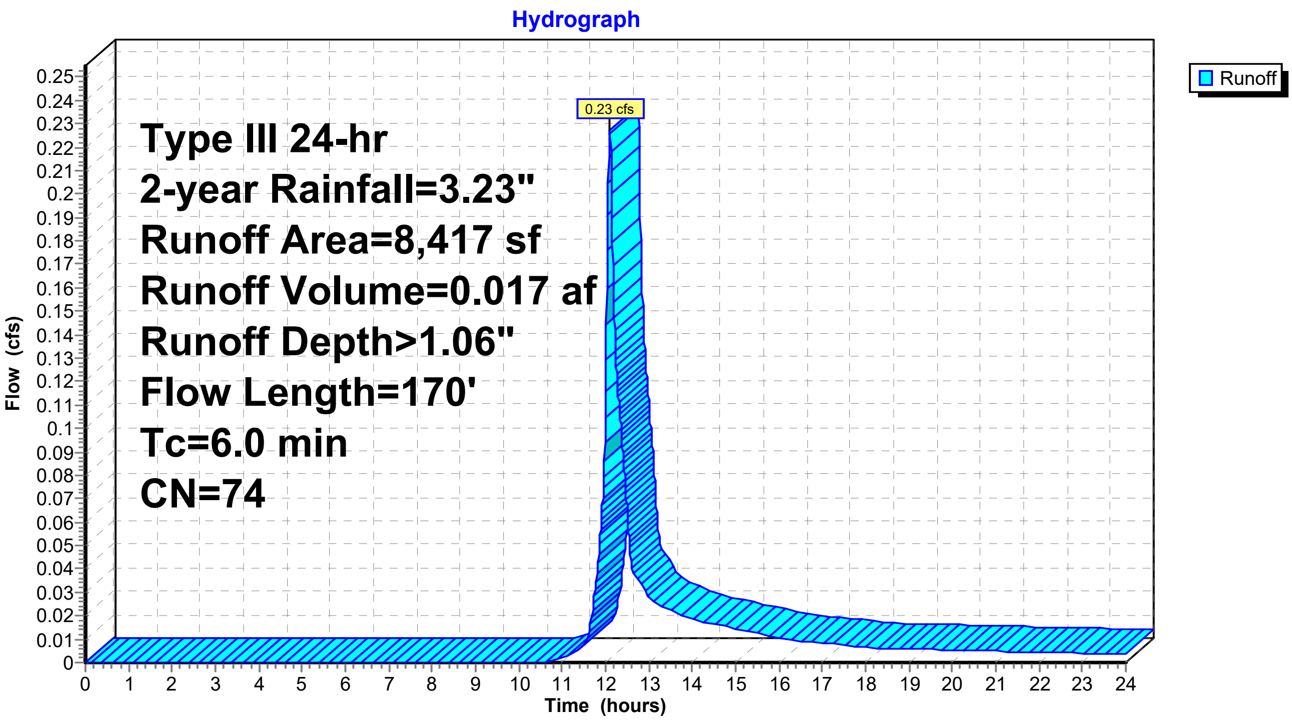
Runoff = 0.23 cfs @ 12.10 hrs, Volume= 0.017 af, Depth> 1.06"
Routed to Pond 8P : Subsurface Infiltration System #3 - ADS StormTech SC-740 Chambers

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-year Rainfall=3.23"

Area (sf)	CN	Description
5,095	58	Meadow, non-grazed, HSG B
3,322	98	Paved parking, HSG B
8,417	74	Weighted Average
5,095		60.53% Pervious Area
3,322		39.47% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.6	50	0.0600	0.23		**Sheet Flow, A-B**
					Grass: Short n= 0.150 P2= 3.20"
0.9	97	0.0600	1.71		**Shallow Concentrated Flow, B-C**
					Short Grass Pasture Kv= 7.0 fps
0.1	23	0.0200	2.87		**Shallow Concentrated Flow, C-D**
					Paved Kv= 20.3 fps
1.4					**Direct Entry,**
6.0	170	Total			

Subcatchment 8S: Area 8



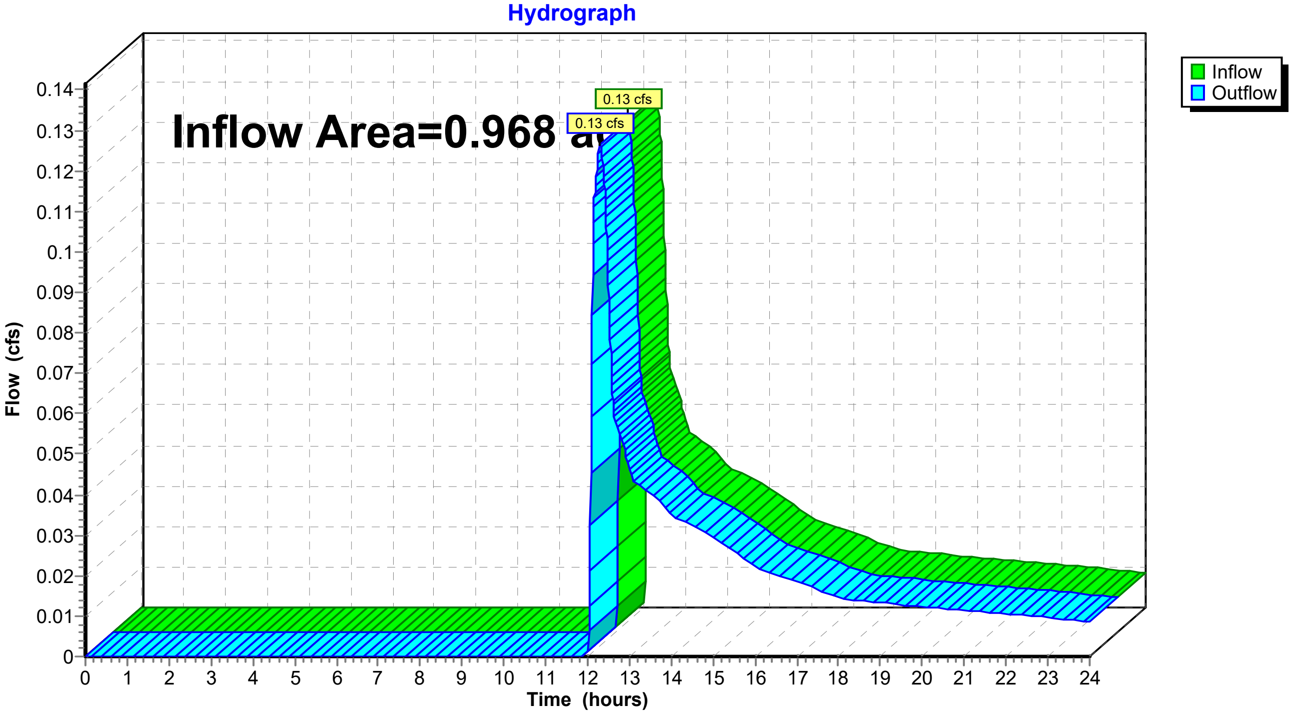
Summary for Reach 1R: Off-site Flow (Wetland Northwest)

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

Inflow Area =	0.968 ac,	0.00% Impervious,	Inflow Depth > 0.29"	for 2-year event
Inflow =	0.13 cfs @	12.30 hrs, Volume=	0.023 af	
Outflow =	0.13 cfs @	12.30 hrs, Volume=	0.023 af, Atten= 0%, Lag= 0.0 min	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 2

Reach 1R: Off-site Flow (Wetland Northwest)



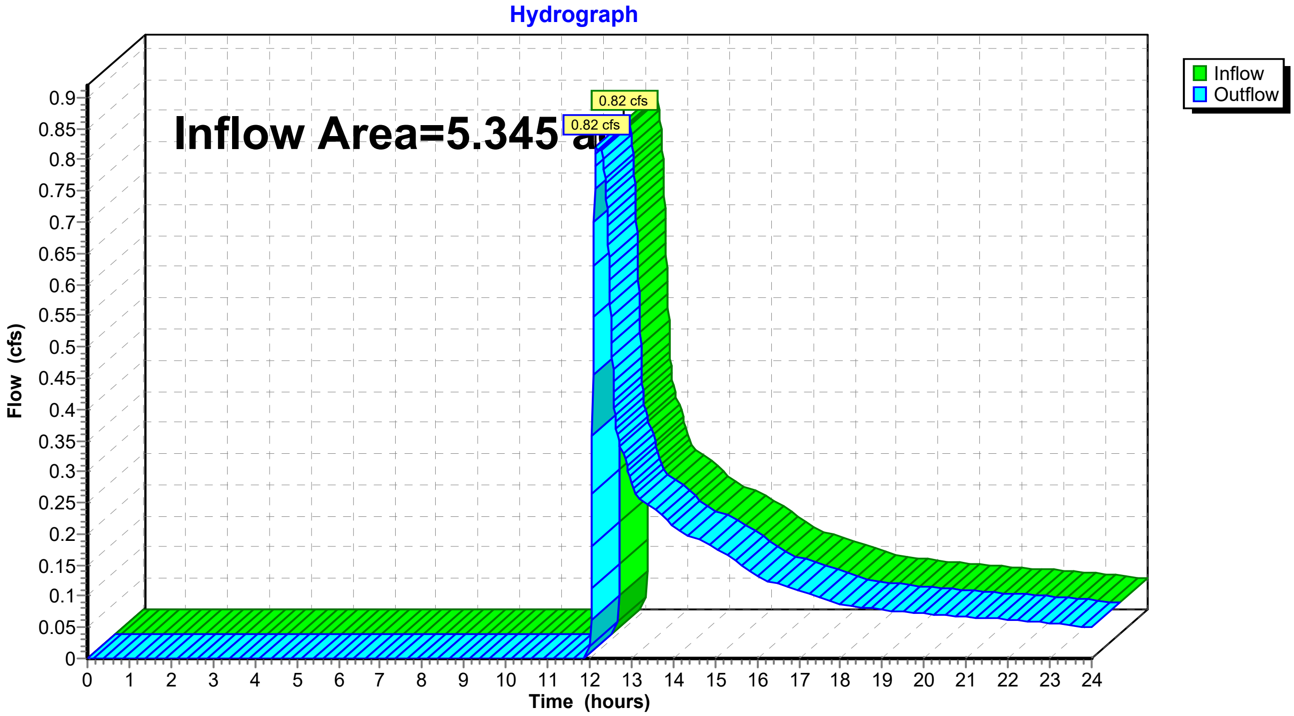
Summary for Reach 2R: Off-site Flow (East)

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

Inflow Area =	5.345 ac,	0.00% Impervious, Inflow Depth > 0.32"	for 2-year event
Inflow =	0.82 cfs @	12.16 hrs, Volume=	0.142 af
Outflow =	0.82 cfs @	12.16 hrs, Volume=	0.142 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 2

Reach 2R: Off-site Flow (East)



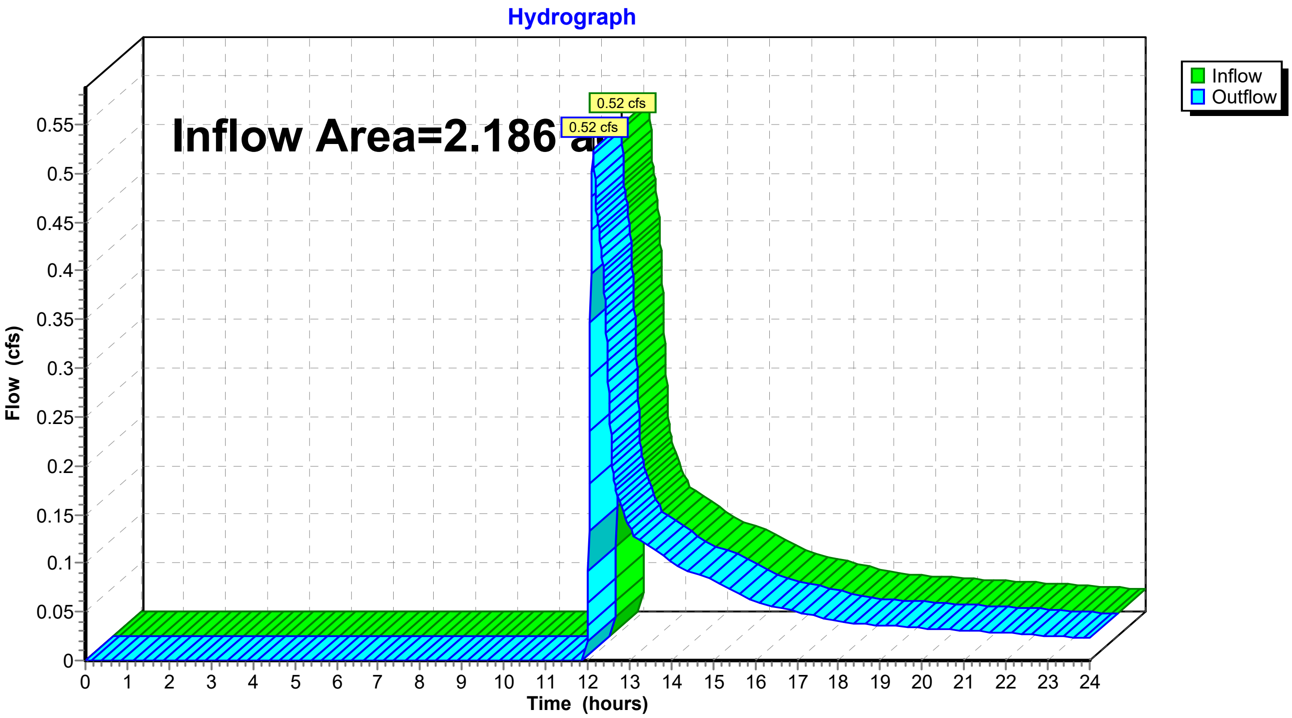
Summary for Reach 3R: Off-site Flow (Route 15)

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

Inflow Area =	2.186 ac,	0.72% Impervious, Inflow Depth > 0.38"	for 2-year event
Inflow =	0.52 cfs @	12.13 hrs, Volume=	0.070 af
Outflow =	0.52 cfs @	12.13 hrs, Volume=	0.070 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 2

Reach 3R: Off-site Flow (Route 15)



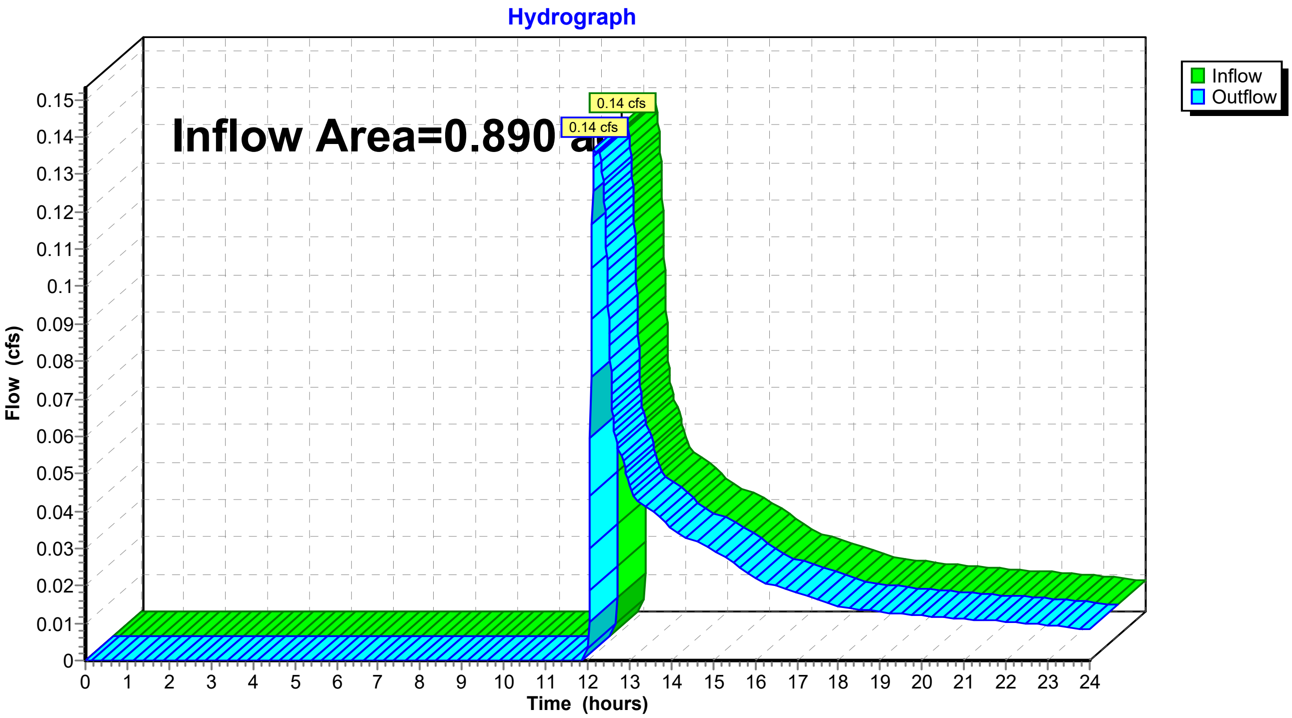
Summary for Reach 4R: Off-site flow (South)

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

Inflow Area =	0.890 ac,	0.00% Impervious, Inflow Depth > 0.32"	for 2-year event
Inflow =	0.14 cfs @	12.16 hrs, Volume=	0.024 af
Outflow =	0.14 cfs @	12.16 hrs, Volume=	0.024 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 2

Reach 4R: Off-site flow (South)



Summary for Pond 5P: Subsurface Infiltration System #1 - ADS StormTech SC-740 Chambers

[87] Warning: Oscillations may require smaller dt or Finer Routing (severity=502)

Inflow Area = 1.665 ac, 0.00% Impervious, Inflow Depth > 0.66" for 2-year event
Inflow = 1.05 cfs @ 12.11 hrs, Volume= 0.091 af
Outflow = 0.32 cfs @ 12.53 hrs, Volume= 0.091 af, Atten= 69%, Lag= 25.6 min
Discarded = 0.32 cfs @ 12.53 hrs, Volume= 0.091 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 680.84' @ 12.53 hrs Surf.Area= 4,924 sf Storage= 677 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 11.2 min (900.4 - 889.2)

Volume	Invert	Avail.Storage	Storage Description
#1A	680.50'	4,394 cf	**39.50'W x 124.66'L x 3.50'H Field A** 17,234 cf Overall - 6,248 cf Embedded = 10,986 cf x 40.0% Voids
#2A	681.00'	6,248 cf	**ADS_StormTech SC-740 +Cap** x 136 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 136 Chambers in 8 Rows
		10,642 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	680.50'	**2.410 in/hr Exfiltration over Horizontal area** Conductivity to Groundwater Elevation = 678.40'

Discarded OutFlow Max=0.32 cfs @ 12.53 hrs HW=680.84' (Free Discharge)
1=Exfiltration (Controls 0.32 cfs)

Pond 5P: Subsurface Infiltration System #1 - ADS StormTech SC-740 Chambers - Chamber Wizard Fiel

Chamber Model = ADS_StormTechSC-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

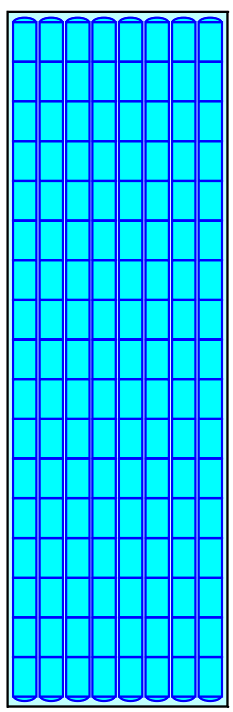
17 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 122.66' Row Length +12.0" End Stone x 2 = 124.66' Base Length
8 Rows x 51.0" Wide + 6.0" Spacing x 7 + 12.0" Side Stone x 2 = 39.50' Base Width
6.0" Stone Base + 30.0" Chamber Height + 6.0" Stone Cover = 3.50' Field Height

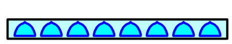
136 Chambers x 45.9 cf = 6,247.8 cf Chamber Storage

17,233.8 cf Field - 6,247.8 cf Chambers = 10,985.9 cf Stone x 40.0% Voids = 4,394.4 cf Stone Storage

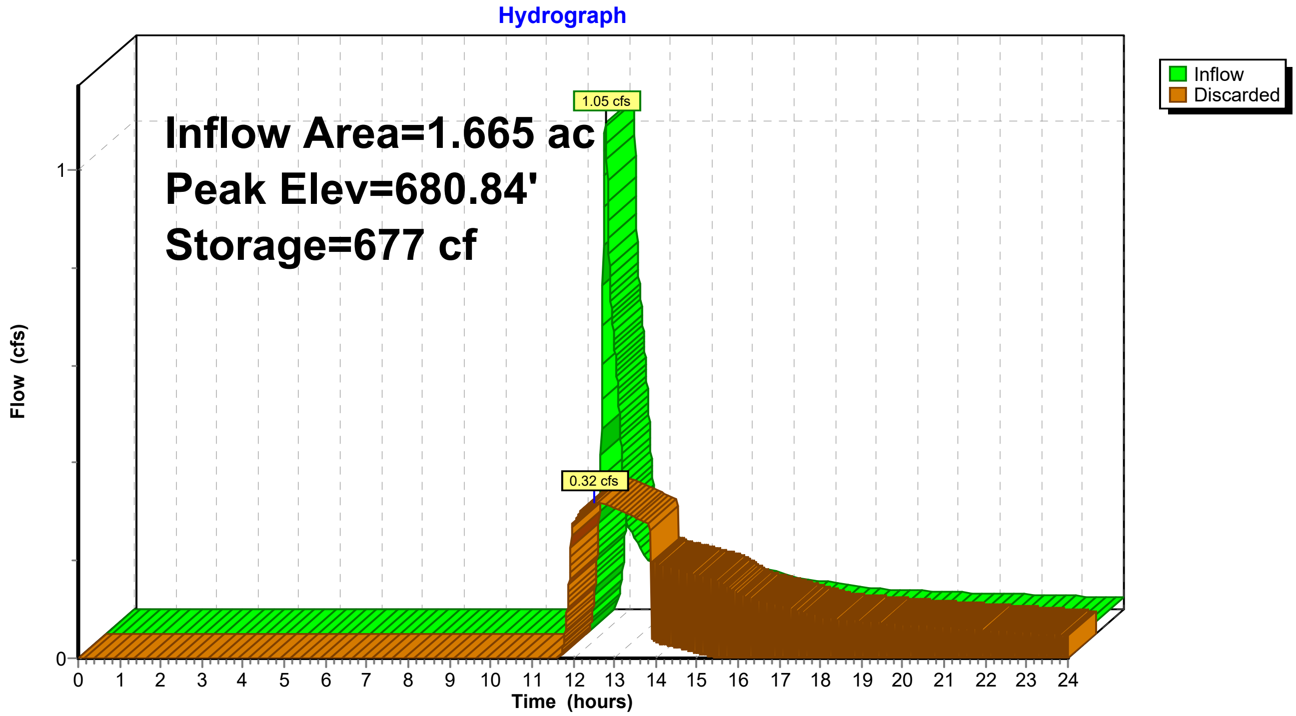
Chamber Storage + Stone Storage = 10,642.2 cf = 0.244 af
Overall Storage Efficiency = 61.8%
Overall System Size = 124.66' x 39.50' x 3.50'

136 Chambers
638.3 cy Field
406.9 cy Stone





Pond 5P: Subsurface Infiltration System #1 - ADS StormTech SC-740 Chambers



Summary for Pond 6P: Subsurface Infiltration System #2 - ADS StormTech SC-740 Chambers

[87] Warning: Oscillations may require smaller dt or Finer Routing (severity=499)

Inflow Area = 0.618 ac, 0.00% Impervious, Inflow Depth > 0.66" for 2-year event
Inflow = 0.39 cfs @ 12.11 hrs, Volume= 0.034 af
Outflow = 0.12 cfs @ 12.54 hrs, Volume= 0.034 af, Atten= 70%, Lag= 25.9 min
Discarded = 0.12 cfs @ 12.54 hrs, Volume= 0.034 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 711.35' @ 12.54 hrs Surf.Area= 1,817 sf Storage= 255 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 11.8 min (901.0 - 889.2)

Volume	Invert	Avail.Storage	Storage Description
#1A	711.00'	1,662 cf	**30.00'W x 60.58'L x 3.50'H Field A** 6,361 cf Overall - 2,205 cf Embedded = 4,155 cf x 40.0% Voids
#2A	711.50'	2,205 cf	**ADS_StormTech SC-740 +Cap** x 48 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 48 Chambers in 6 Rows
		3,867 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	711.00'	**2.410 in/hr Exfiltration over Horizontal area** Conductivity to Groundwater Elevation = 708.60'

Discarded OutFlow Max=0.12 cfs @ 12.54 hrs HW=711.35' (Free Discharge)
└─**1=Exfiltration** (Controls 0.12 cfs)

Pond 6P: Subsurface Infiltration System #2 - ADS StormTech SC-740 Chambers - Chamber Wizard Fiel

Chamber Model = ADS_StormTechSC-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

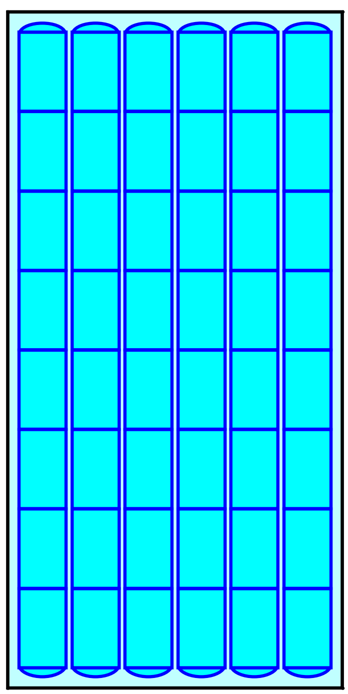
8 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 58.58' Row Length +12.0" End Stone x 2 = 60.58' Base Length
6 Rows x 51.0" Wide + 6.0" Spacing x 5 + 12.0" Side Stone x 2 = 30.00' Base Width
6.0" Stone Base + 30.0" Chamber Height + 6.0" Stone Cover = 3.50' Field Height

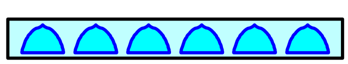
48 Chambers x 45.9 cf = 2,205.1 cf Chamber Storage

6,360.6 cf Field - 2,205.1 cf Chambers = 4,155.4 cf Stone x 40.0% Voids = 1,662.2 cf Stone Storage

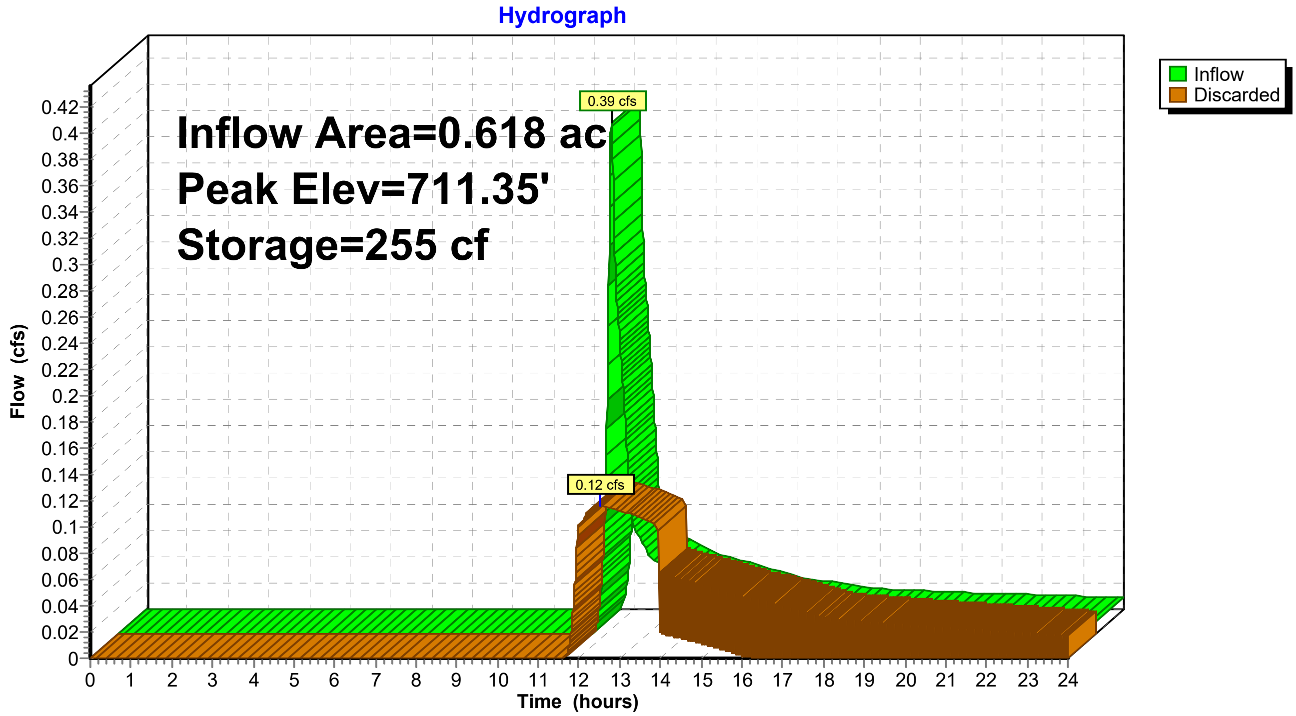
Chamber Storage + Stone Storage = 3,867.3 cf = 0.089 af
Overall Storage Efficiency = 60.8%
Overall System Size = 60.58' x 30.00' x 3.50'

48 Chambers
235.6 cy Field
153.9 cy Stone





Pond 6P: Subsurface Infiltration System #2 - ADS StormTech SC-740 Chambers



Summary for Pond 7P: Infiltration Basin #1

Inflow Area = 2.051 ac, 0.00% Impervious, Inflow Depth > 0.35" for 2-year event
Inflow = 0.40 cfs @ 12.14 hrs, Volume= 0.060 af
Outflow = 0.40 cfs @ 12.14 hrs, Volume= 0.060 af, Atten= 0%, Lag= 0.0 min
Discarded = 0.40 cfs @ 12.14 hrs, Volume= 0.060 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 704.00' @ 0.00 hrs Surf.Area= 15,599 sf Storage= 0 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 0.0 min (930.0 - 930.0)

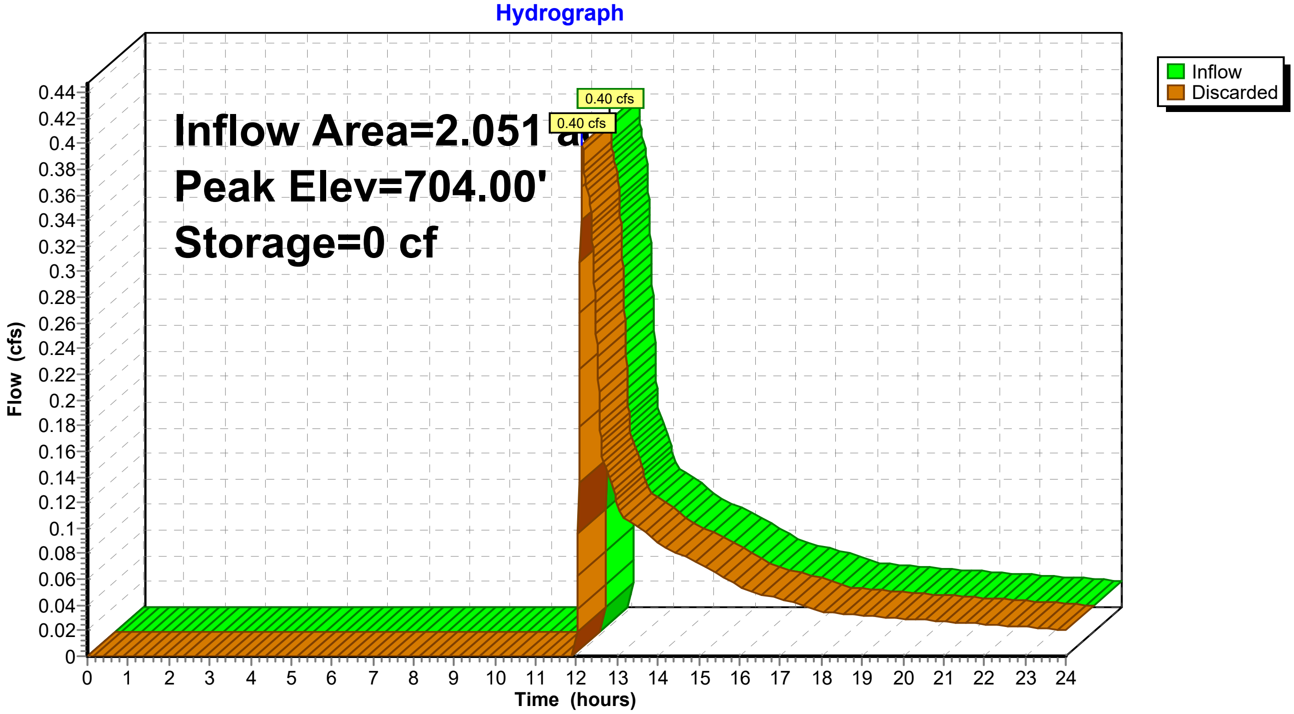
Volume	Invert	Avail.Storage	Storage Description
#1	704.00'	19,192 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
704.00	15,599	1,219.0	0	0	15,599
705.00	23,026	1,256.7	19,192	19,192	23,129

Device	Routing	Invert	Outlet Devices
#1	Discarded	704.00'	**2.410 in/hr Exfiltration over Horizontal area** Conductivity to Groundwater Elevation = 702.00'

Discarded OutFlow Max=0.00 cfs @ 12.14 hrs HW=704.00' (Free Discharge)
↑—**1=Exfiltration** (Passes 0.00 cfs of 0.87 cfs potential flow)

Pond 7P: Infiltration Basin #1



Summary for Pond 8P: Subsurface Infiltration System #3 - ADS StormTech SC-740 Chambers

[87] Warning: Oscillations may require smaller dt or Finer Routing (severity=481)

Inflow Area = 0.193 ac, 39.47% Impervious, Inflow Depth > 1.06" for 2-year event
Inflow = 0.23 cfs @ 12.10 hrs, Volume= 0.017 af
Outflow = 0.06 cfs @ 12.53 hrs, Volume= 0.017 af, Atten= 76%, Lag= 26.3 min
Discarded = 0.06 cfs @ 12.53 hrs, Volume= 0.017 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 677.76' @ 12.53 hrs Surf.Area= 804 sf Storage= 165 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 18.1 min (878.7 - 860.6)

Volume	Invert	Avail.Storage	Storage Description
#1A	677.25'	758 cf	**20.50'W x 39.22'L x 3.50'H Field A** 2,814 cf Overall - 919 cf Embedded = 1,895 cf x 40.0% Voids
#2A	677.75'	919 cf	**ADS_StormTech SC-740 +Cap** x 20 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 20 Chambers in 4 Rows
		1,677 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	677.25'	**2.410 in/hr Exfiltration over Horizontal area** Conductivity to Groundwater Elevation = 675.10'

Discarded OutFlow Max=0.06 cfs @ 12.53 hrs HW=677.76' (Free Discharge)
└─**1=Exfiltration** (Controls 0.06 cfs)

Pond 8P: Subsurface Infiltration System #3 - ADS StormTech SC-740 Chambers - Chamber Wizard Fiel

Chamber Model = ADS_StormTechSC-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

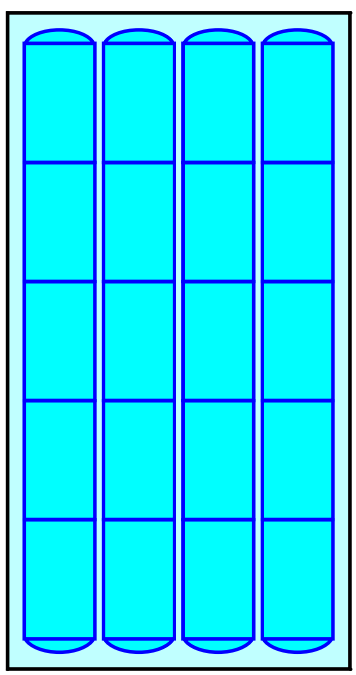
5 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 37.22' Row Length +12.0" End Stone x 2 = 39.22' Base Length
4 Rows x 51.0" Wide + 6.0" Spacing x 3 + 12.0" Side Stone x 2 = 20.50' Base Width
6.0" Stone Base + 30.0" Chamber Height + 6.0" Stone Cover = 3.50' Field Height

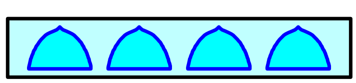
20 Chambers x 45.9 cf = 918.8 cf Chamber Storage

2,813.8 cf Field - 918.8 cf Chambers = 1,895.0 cf Stone x 40.0% Voids = 758.0 cf Stone Storage

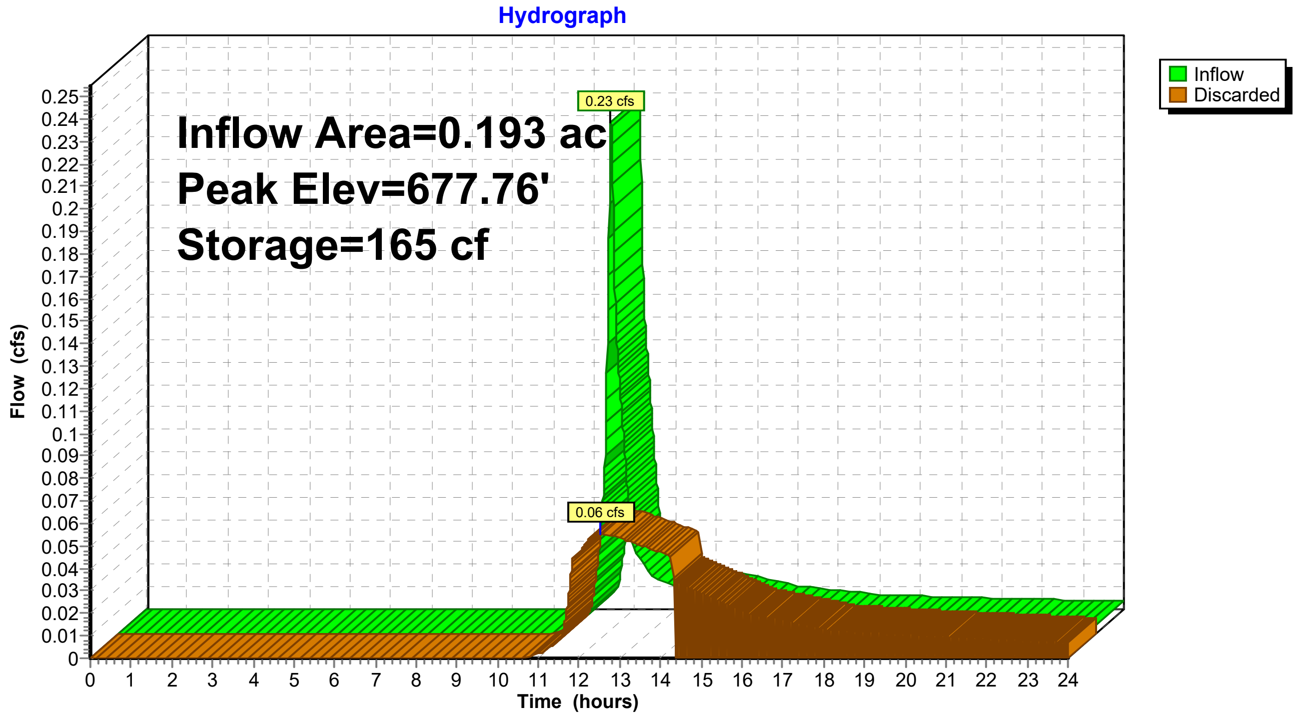
Chamber Storage + Stone Storage = 1,676.8 cf = 0.038 af
Overall Storage Efficiency = 59.6%
Overall System Size = 39.22' x 20.50' x 3.50'

20 Chambers
104.2 cy Field
70.2 cy Stone





Pond 8P: Subsurface Infiltration System #3 - ADS StormTech SC-740 Chambers



Time span=0.00-24.00 hrs, dt=0.01 hrs, 2401 points x 2
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment1S: Area 1 Runoff Area=42,152 sf 0.00% Impervious Runoff Depth>1.06"
Flow Length=350' Tc=6.0 min CN=56 Runoff=1.00 cfs 0.086 af

Subcatchment2S: Area 2 Runoff Area=232,817 sf 0.00% Impervious Runoff Depth>1.12"
Flow Length=283' Tc=6.0 min CN=57 Runoff=5.99 cfs 0.501 af

Subcatchment3S: Area 3 Runoff Area=95,234 sf 0.72% Impervious Runoff Depth>1.25"
Flow Length=68' Tc=6.0 min CN=59 Runoff=2.85 cfs 0.229 af

Subcatchment4S: Area 4 Runoff Area=38,773 sf 0.00% Impervious Runoff Depth>1.12"
Flow Length=132' Tc=6.0 min CN=57 Runoff=1.00 cfs 0.083 af

Subcatchment5S: Area 5 Runoff Area=72,521 sf 0.00% Impervious Runoff Depth>1.75"
Flow Length=385' Tc=6.0 min CN=66 Runoff=3.29 cfs 0.243 af

Subcatchment6S: Area 6 Runoff Area=26,937 sf 0.00% Impervious Runoff Depth>1.75"
Flow Length=465' Tc=6.0 min CN=66 Runoff=1.22 cfs 0.090 af

Subcatchment7S: Area 7 Runoff Area=89,330 sf 0.00% Impervious Runoff Depth>1.19"
Flow Length=133' Tc=6.0 min CN=58 Runoff=2.48 cfs 0.203 af

Subcatchment8S: Area 8 Runoff Area=8,417 sf 39.47% Impervious Runoff Depth>2.39"
Flow Length=170' Tc=6.0 min CN=74 Runoff=0.54 cfs 0.039 af

Reach 1R: Off-site Flow (Wetland Northwest) Inflow=1.00 cfs 0.086 af
Outflow=1.00 cfs 0.086 af

Reach 2R: Off-site Flow (East) Inflow=5.99 cfs 0.501 af
Outflow=5.99 cfs 0.501 af

Reach 3R: Off-site Flow (Route 15) Inflow=2.85 cfs 0.229 af
Outflow=2.85 cfs 0.229 af

Reach 4R: Off-site flow (South) Inflow=1.00 cfs 0.083 af
Outflow=1.00 cfs 0.083 af

Pond 5P: Subsurface Infiltration System #1 - Peak Elev=681.64' Storage=3,571 cf Inflow=3.29 cfs 0.243 af
Outflow=0.42 cfs 0.243 af

Pond 6P: Subsurface Infiltration System #2 - Peak Elev=712.17' Storage=1,347 cf Inflow=1.22 cfs 0.090 af
Outflow=0.15 cfs 0.090 af

Pond 7P: Infiltration Basin #1 Peak Elev=704.07' Storage=1,177 cf Inflow=2.48 cfs 0.203 af
Outflow=0.93 cfs 0.203 af

Pond 8P: Subsurface Infiltration System #3 - Peak Elev=678.42' Storage=582 cf Inflow=0.54 cfs 0.039 af
Outflow=0.07 cfs 0.039 af

Total Runoff Area = 13.916 ac Runoff Volume = 1.473 af Average Runoff Depth = 1.27"
99.34% Pervious = 13.824 ac 0.66% Impervious = 0.092 ac

Summary for Subcatchment 1S: Area 1

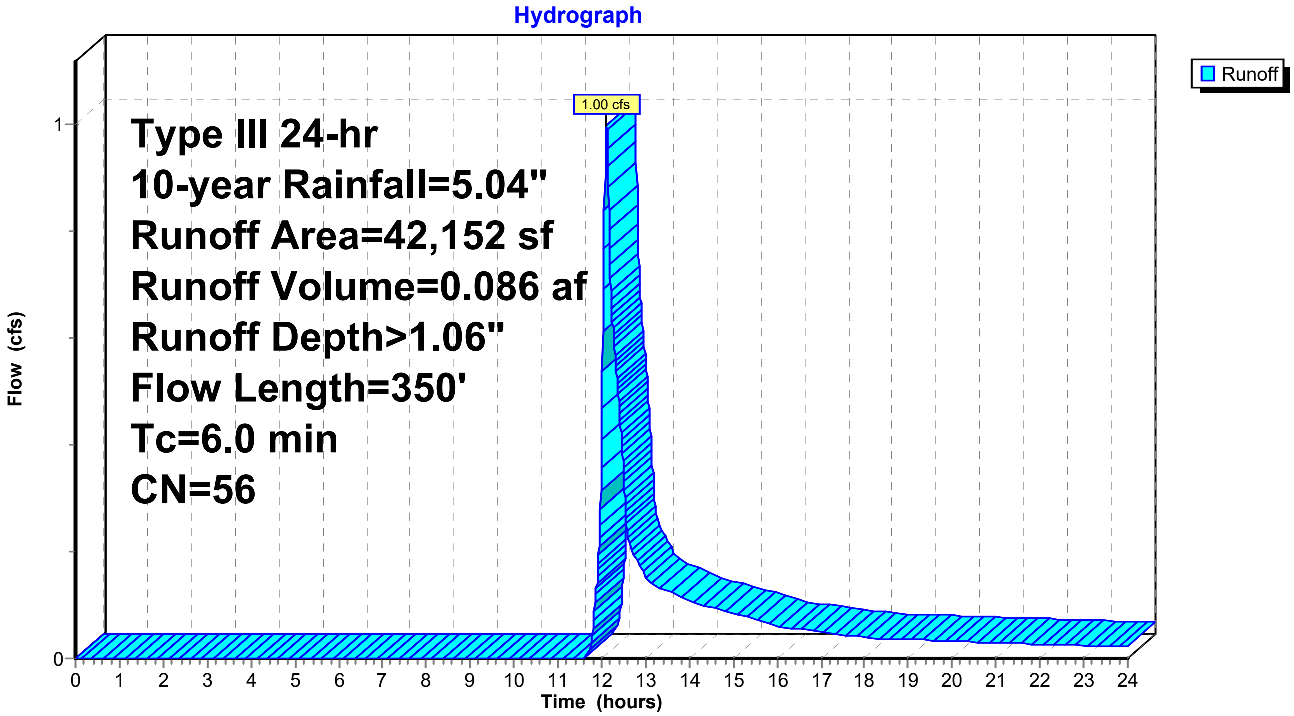
Runoff = 1.00 cfs @ 12.10 hrs, Volume= 0.086 af, Depth> 1.06"
Routed to Reach 1R : Off-site Flow (Wetland Northwest)

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-year Rainfall=5.04"

Area (sf)	CN	Description
15,269	58	Meadow, non-grazed, HSG B
26,883	55	Woods, Good, HSG B
42,152	56	Weighted Average
42,152		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.4	50	0.0700	0.24		**Sheet Flow, A-B**
					Grass: Short n= 0.150 P2= 3.20"
0.8	122	0.1420	2.64		**Shallow Concentrated Flow, B-C**
					Short Grass Pasture Kv= 7.0 fps
0.3	45	0.1420	2.64		**Shallow Concentrated Flow, C-D**
					Short Grass Pasture Kv= 7.0 fps
1.1	133	0.1500	1.94		**Shallow Concentrated Flow, D-E**
					Woodland Kv= 5.0 fps
0.4					**Direct Entry,**
6.0	350	Total			

Subcatchment 1S: Area 1



Summary for Subcatchment 2S: Area 2

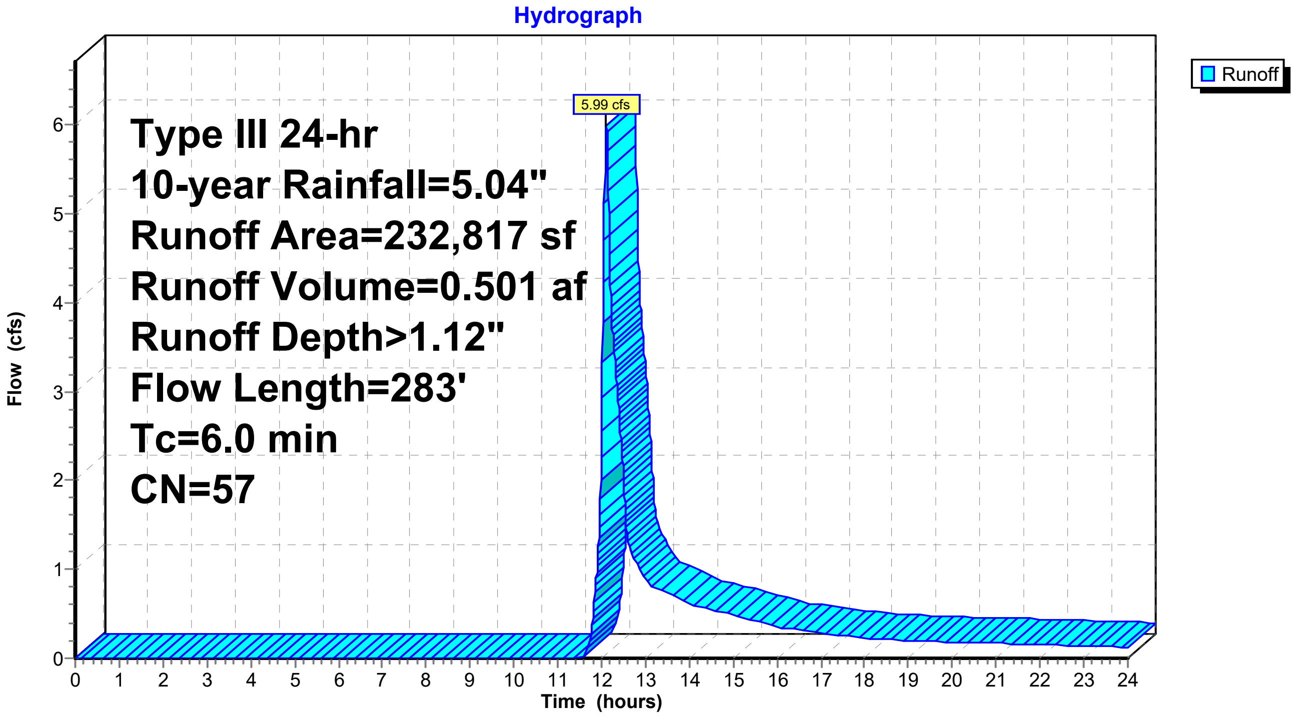
Runoff = 5.99 cfs @ 12.10 hrs, Volume= 0.501 af, Depth> 1.12"
Routed to Reach 2R : Off-site Flow (East)

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-year Rainfall=5.04"

Area (sf)	CN	Description
119,060	58	Meadow, non-grazed, HSG B
113,757	55	Woods, Good, HSG B
232,817	57	Weighted Average
232,817		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.1	50	0.0900	0.27		**Sheet Flow, A-B**
					Grass: Short n= 0.150 P2= 3.20"
0.5	67	0.0900	2.10		**Shallow Concentrated Flow, B-C**
					Short Grass Pasture Kv= 7.0 fps
0.5	116	0.2800	3.70		**Shallow Concentrated Flow, C-D**
					Short Grass Pasture Kv= 7.0 fps
0.3	50	0.4300	3.28		**Shallow Concentrated Flow, D-E**
					Woodland Kv= 5.0 fps
1.6					**Direct Entry,**
6.0	283	Total			

Subcatchment 2S: Area 2



Summary for Subcatchment 3S: Area 3

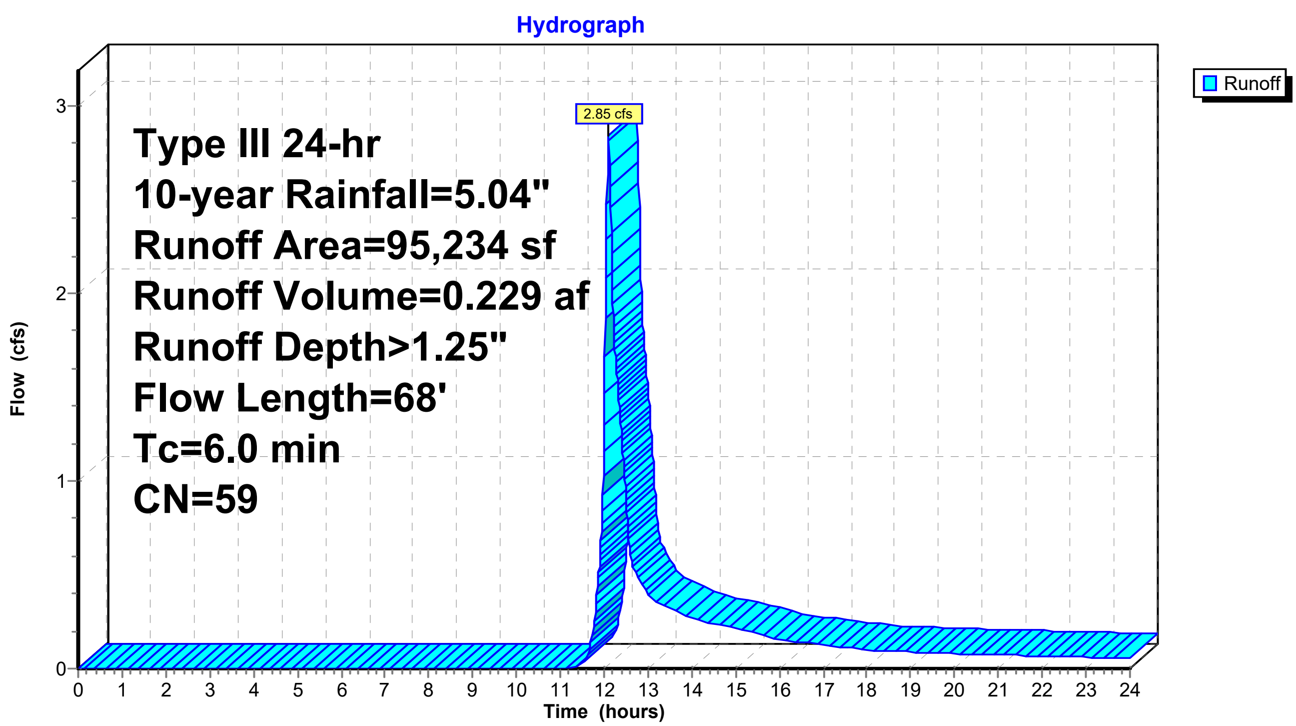
Runoff = 2.85 cfs @ 12.10 hrs, Volume= 0.229 af, Depth> 1.25"
Routed to Reach 3R : Off-site Flow (Route 15)

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-year Rainfall=5.04"

Area (sf)	CN	Description
30,543	55	Woods, Good, HSG B
682	98	Paved parking, HSG B
2,653	58	Meadow, non-grazed, HSG B
61,356	61	>75% Grass cover, Good, HSG B
95,234	59	Weighted Average
94,552		99.28% Pervious Area
682		0.72% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.8	50	0.1300	0.14		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.20"
0.2	18	0.1100	1.66		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
6.0	68	Total			

Subcatchment 3S: Area 3



Summary for Subcatchment 4S: Area 4

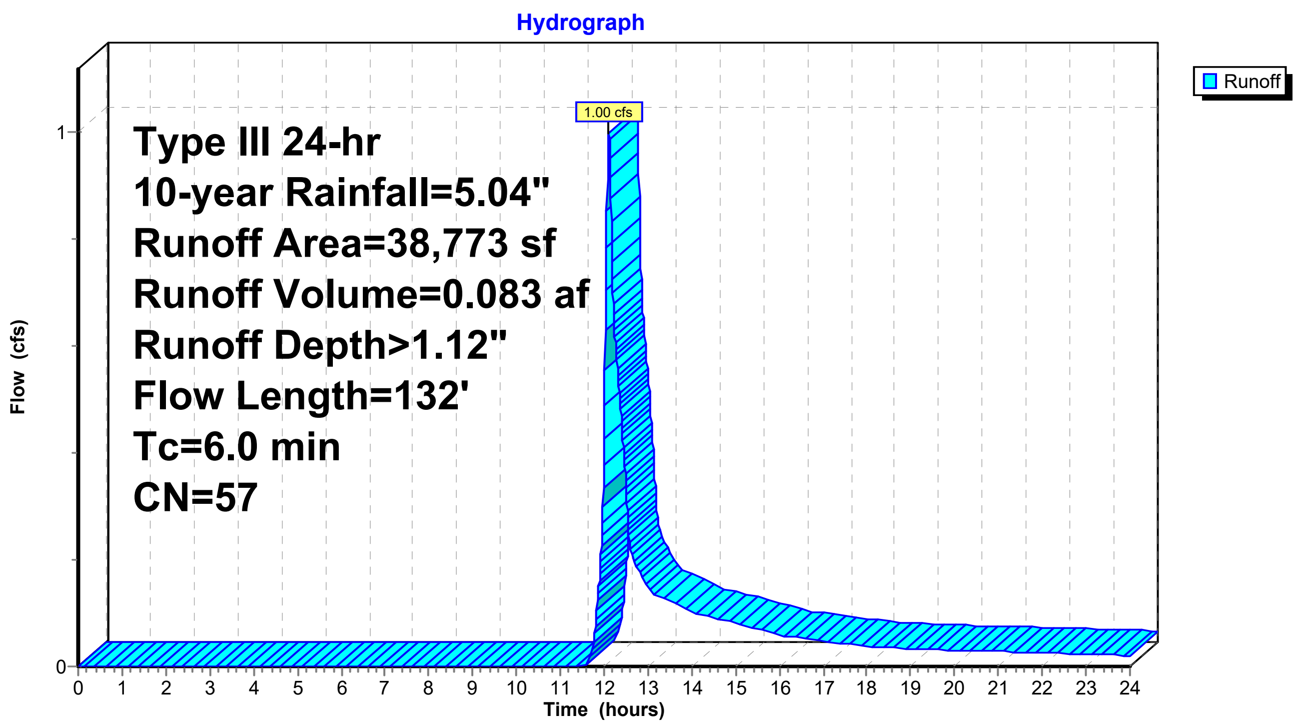
Runoff = 1.00 cfs @ 12.10 hrs, Volume= 0.083 af, Depth> 1.12"
Routed to Reach 4R : Off-site flow (South)

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-year Rainfall=5.04"

Area (sf)	CN	Description
3,172	58	Meadow, non-grazed, HSG B
24,335	55	Woods, Good, HSG B
11,266	61	>75% Grass cover, Good, HSG B
38,773	57	Weighted Average
38,773		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.7	50	0.1500	0.23		**Sheet Flow, A-B** Grass: Dense n= 0.240 P2= 3.20"
0.1	27	0.3100	3.90		**Shallow Concentrated Flow, B-C** Short Grass Pasture Kv= 7.0 fps
0.5	55	0.1500	1.94		**Shallow Concentrated Flow, C-D** Woodland Kv= 5.0 fps
1.7					**Direct Entry,**
6.0	132	Total			

Subcatchment 4S: Area 4



Summary for Subcatchment 5S: Area 5

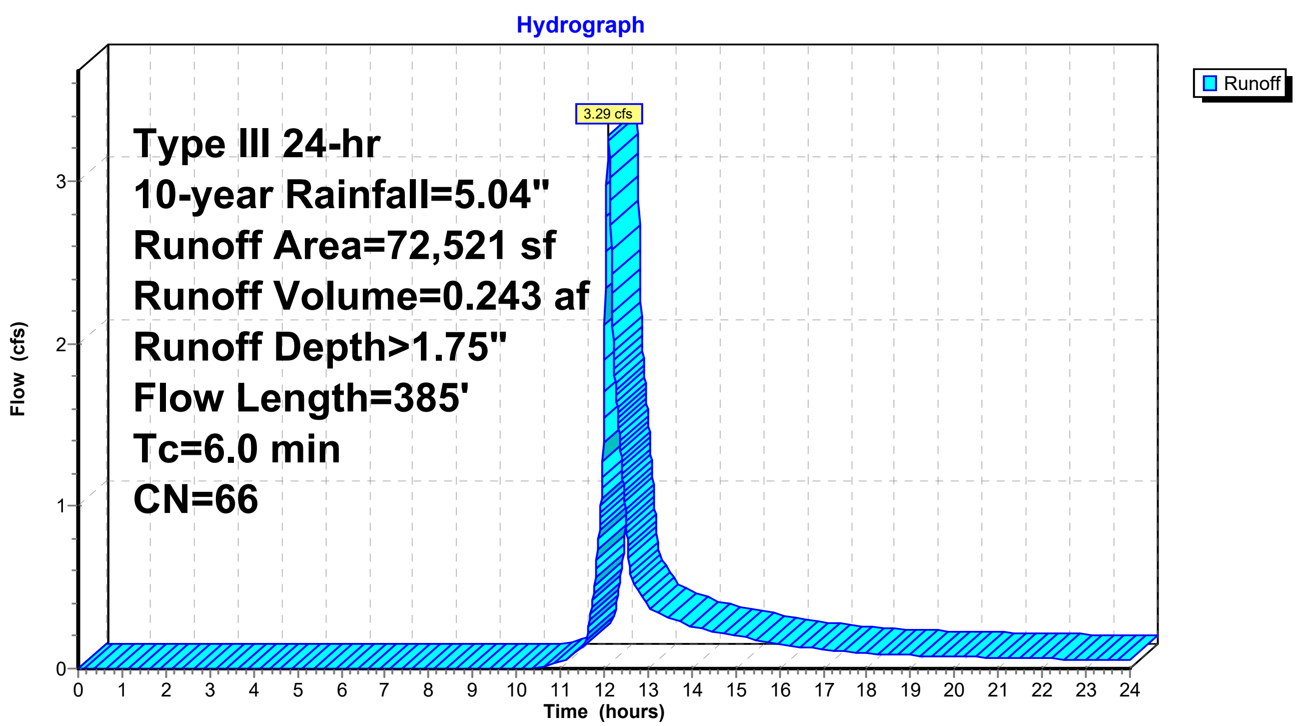
Runoff = 3.29 cfs @ 12.09 hrs, Volume= 0.243 af, Depth> 1.75"
Routed to Pond 5P : Subsurface Infiltration System #1 - ADS StormTech SC-740 Chambers

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-year Rainfall=5.04"

Area (sf)	CN	Description
56,669	58	Meadow, non-grazed, HSG B
15,852	96	Gravel surface, HSG B
72,521	66	Weighted Average
72,521		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.0	50	0.1000	0.28		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 3.20"
0.1	18	0.1100	2.32		**Shallow Concentrated Flow, B-C** Short Grass Pasture Kv= 7.0 fps
1.1	317	0.0600	4.97		**Shallow Concentrated Flow, C-D** Paved Kv= 20.3 fps
1.8					**Direct Entry,**
6.0	385	Total			

Subcatchment 5S: Area 5



Summary for Subcatchment 6S: Area 6

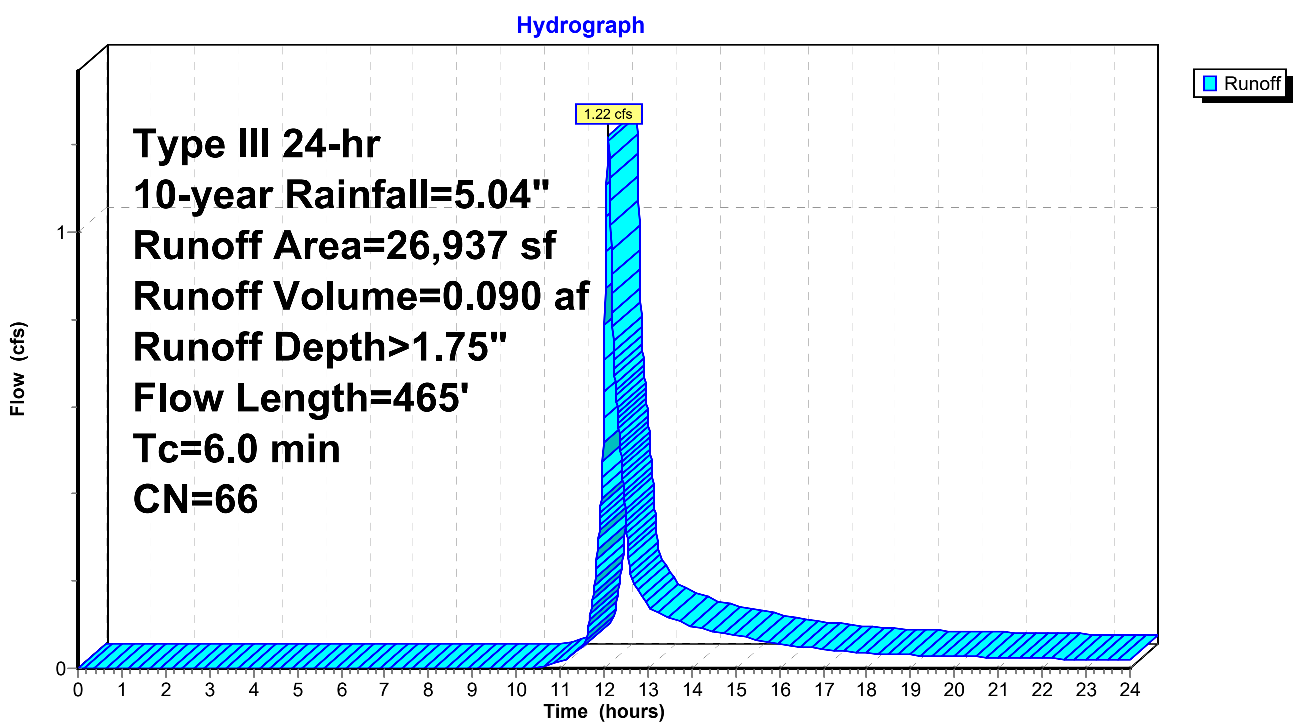
Runoff = 1.22 cfs @ 12.09 hrs, Volume= 0.090 af, Depth> 1.75"
Routed to Pond 6P : Subsurface Infiltration System #2 - ADS StormTech SC-740 Chambers

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-year Rainfall=5.04"

Area (sf)	CN	Description
21,116	58	Meadow, non-grazed, HSG B
5,821	96	Gravel surface, HSG B
26,937	66	Weighted Average
26,937		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.4	50	0.0700	0.24		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 3.20"
0.1	17	0.0800	1.98		**Shallow Concentrated Flow, B-C** Short Grass Pasture Kv= 7.0 fps
1.3	398	0.0600	4.97		**Shallow Concentrated Flow, C-D** Paved Kv= 20.3 fps
1.2					**Direct Entry,**
6.0	465	Total			

Subcatchment 6S: Area 6



Summary for Subcatchment 7S: Area 7

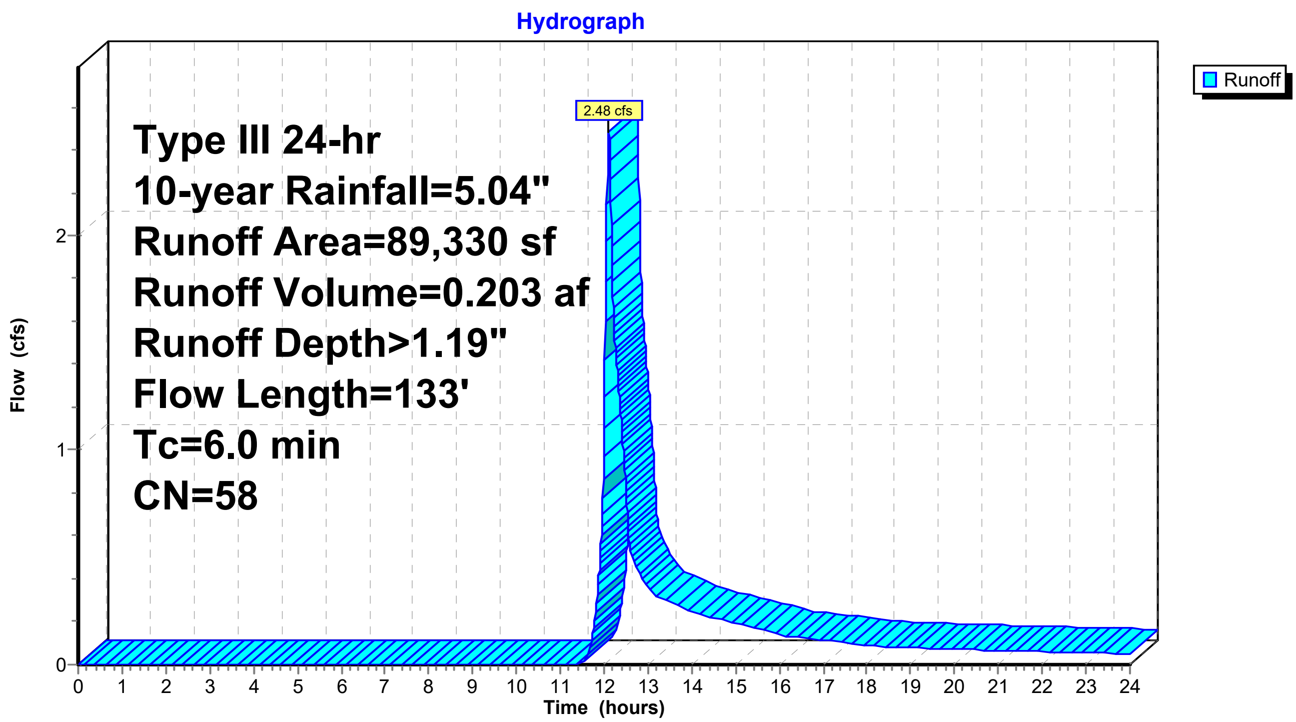
Runoff = 2.48 cfs @ 12.10 hrs, Volume= 0.203 af, Depth> 1.19"
Routed to Pond 7P : Infiltration Basin #1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-year Rainfall=5.04"

Area (sf)	CN	Description
89,330	58	Meadow, non-grazed, HSG B
89,330		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.0	50	0.1000	0.28		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 3.20"
0.5	83	0.1700	2.89		**Shallow Concentrated Flow, B-C** Short Grass Pasture Kv= 7.0 fps
2.5					**Direct Entry,**
6.0	133	Total			

Subcatchment 7S: Area 7



Summary for Subcatchment 8S: Area 8

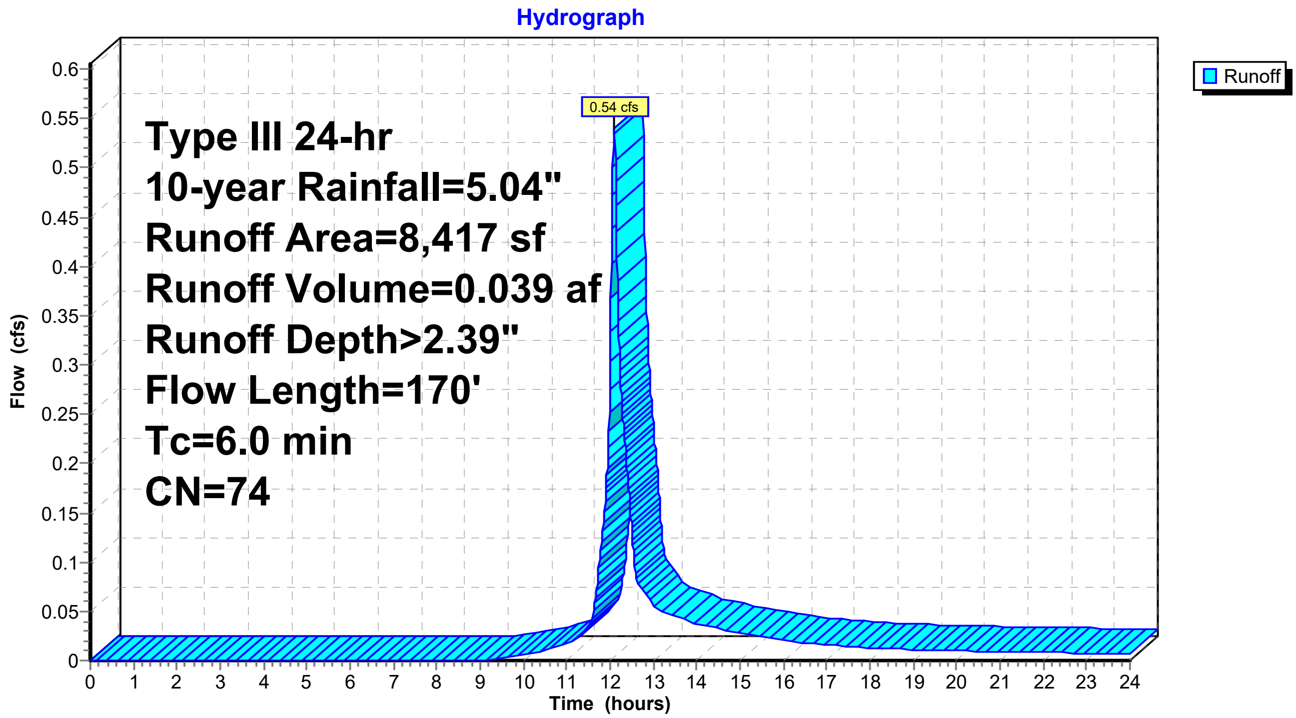
Runoff = 0.54 cfs @ 12.09 hrs, Volume= 0.039 af, Depth> 2.39"
Routed to Pond 8P : Subsurface Infiltration System #3 - ADS StormTech SC-740 Chambers

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-year Rainfall=5.04"

Area (sf)	CN	Description
5,095	58	Meadow, non-grazed, HSG B
3,322	98	Paved parking, HSG B
8,417	74	Weighted Average
5,095		60.53% Pervious Area
3,322		39.47% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.6	50	0.0600	0.23		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 3.20"
0.9	97	0.0600	1.71		**Shallow Concentrated Flow, B-C** Short Grass Pasture Kv= 7.0 fps
0.1	23	0.0200	2.87		**Shallow Concentrated Flow, C-D** Paved Kv= 20.3 fps
1.4					**Direct Entry,**
6.0	170	Total			

Subcatchment 8S: Area 8



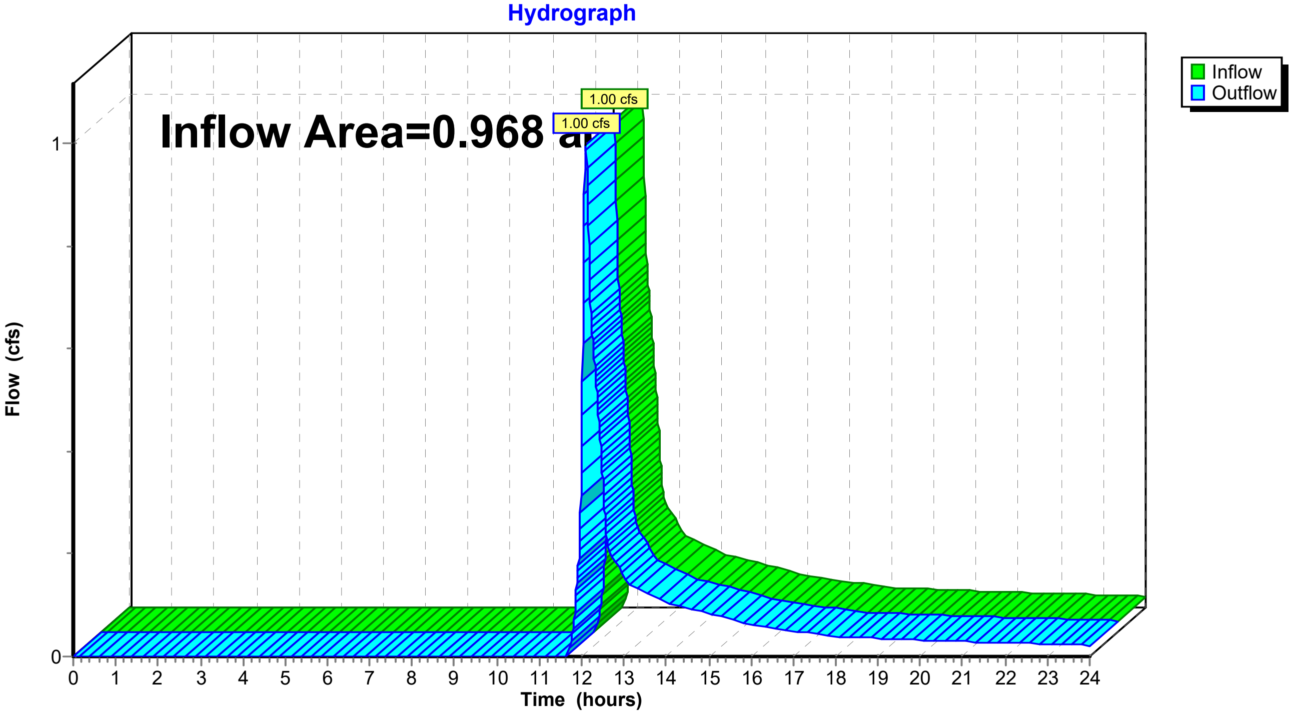
Summary for Reach 1R: Off-site Flow (Wetland Northwest)

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

Inflow Area =	0.968 ac,	0.00% Impervious, Inflow Depth > 1.06"	for 10-year event
Inflow =	1.00 cfs @	12.10 hrs, Volume=	0.086 af
Outflow =	1.00 cfs @	12.10 hrs, Volume=	0.086 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 2

Reach 1R: Off-site Flow (Wetland Northwest)



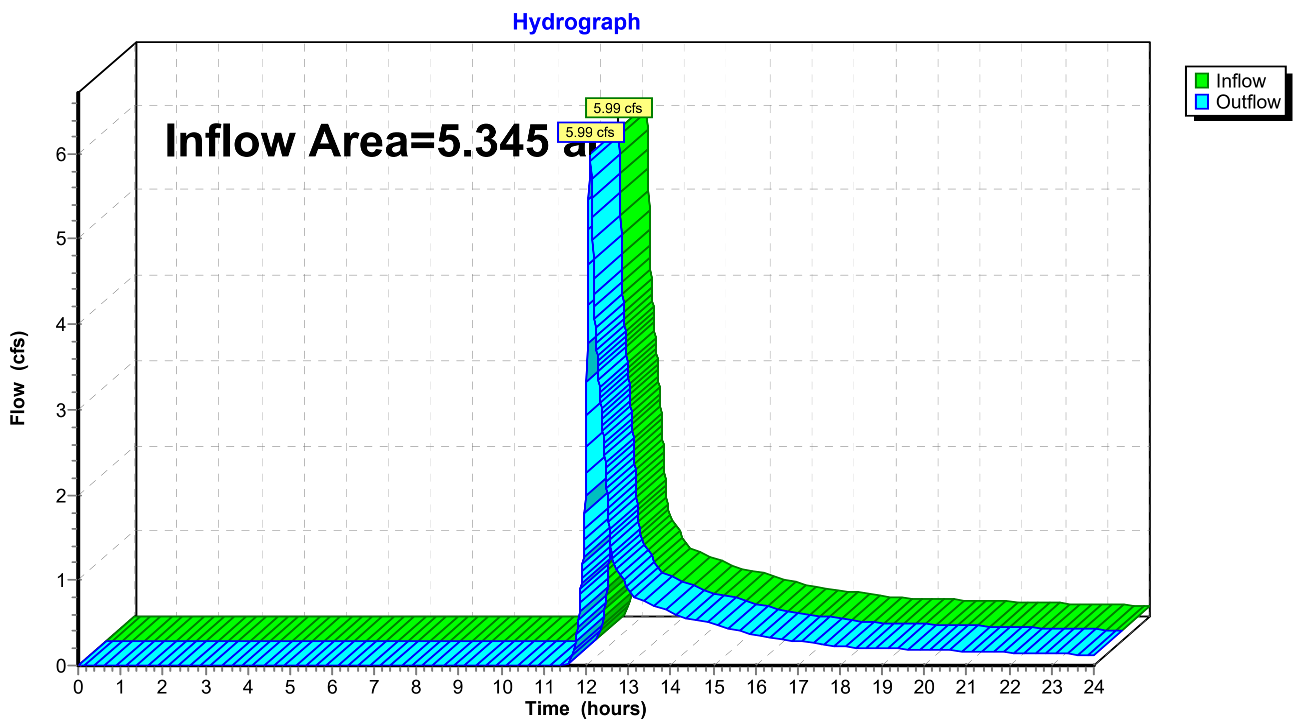
Summary for Reach 2R: Off-site Flow (East)

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

Inflow Area =	5.345 ac,	0.00% Impervious, Inflow Depth > 1.12" for 10-year event
Inflow =	5.99 cfs @	12.10 hrs, Volume= 0.501 af
Outflow =	5.99 cfs @	12.10 hrs, Volume= 0.501 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 2

Reach 2R: Off-site Flow (East)



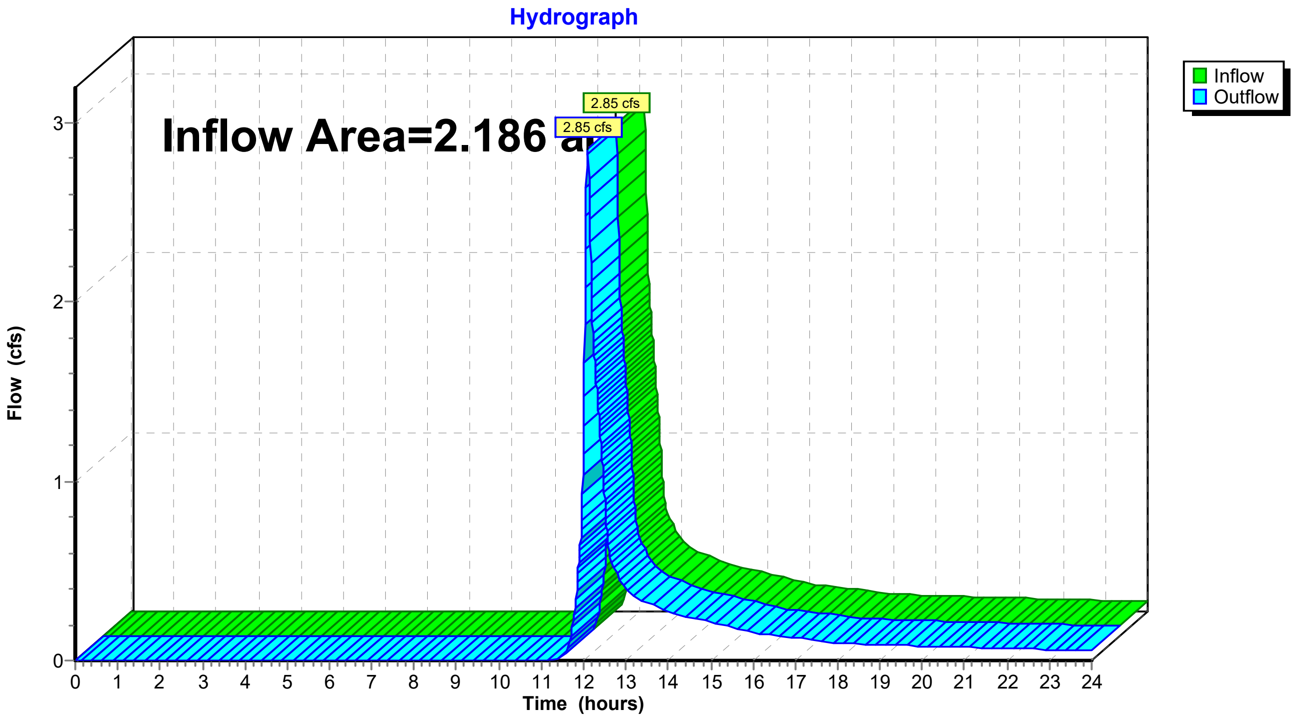
Summary for Reach 3R: Off-site Flow (Route 15)

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

Inflow Area =	2.186 ac,	0.72% Impervious, Inflow Depth > 1.25"	for 10-year event
Inflow =	2.85 cfs @	12.10 hrs, Volume=	0.229 af
Outflow =	2.85 cfs @	12.10 hrs, Volume=	0.229 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 2

Reach 3R: Off-site Flow (Route 15)



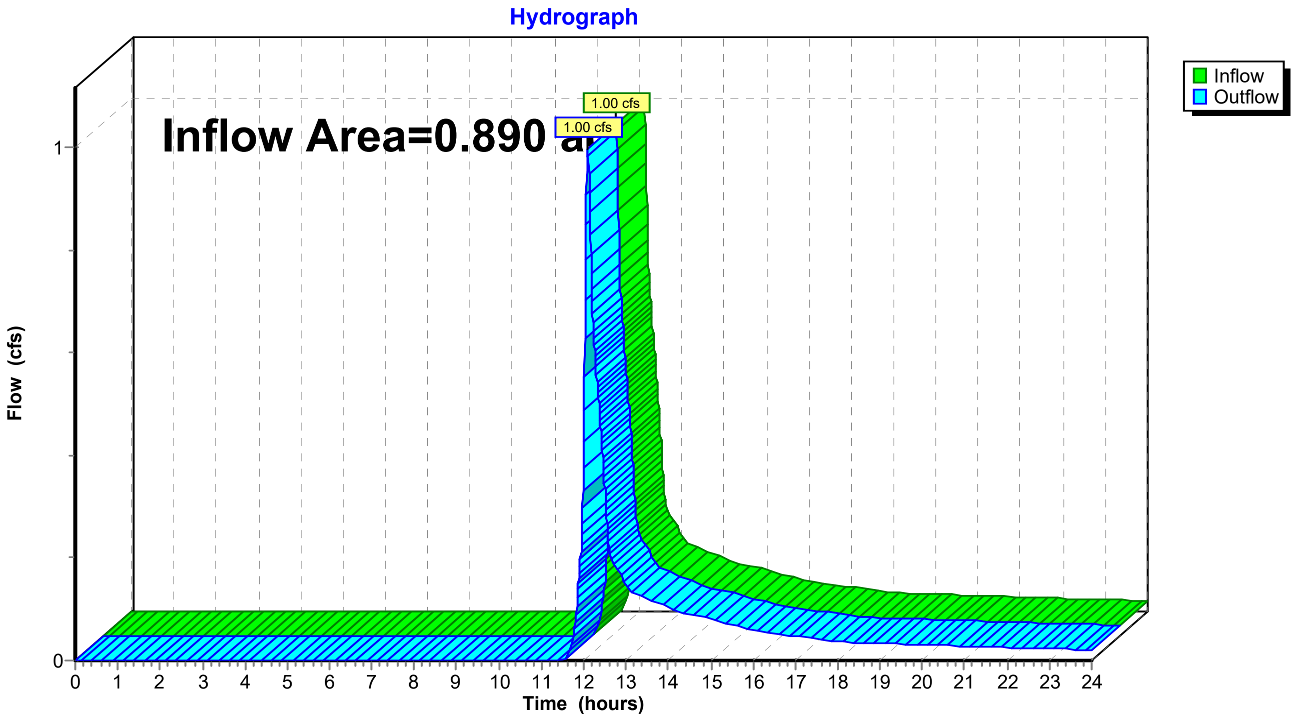
Summary for Reach 4R: Off-site flow (South)

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

Inflow Area =	0.890 ac,	0.00% Impervious, Inflow Depth > 1.12"	for 10-year event	
Inflow =	1.00 cfs @	12.10 hrs, Volume=	0.083 af	
Outflow =	1.00 cfs @	12.10 hrs, Volume=	0.083 af,	Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 2

Reach 4R: Off-site flow (South)



Summary for Pond 5P: Subsurface Infiltration System #1 - ADS StormTech SC-740 Chambers

[87] Warning: Oscillations may require smaller dt or Finer Routing (severity=278)

Inflow Area = 1.665 ac, 0.00% Impervious, Inflow Depth > 1.75" for 10-year event
Inflow = 3.29 cfs @ 12.09 hrs, Volume= 0.243 af
Outflow = 0.42 cfs @ 12.93 hrs, Volume= 0.243 af, Atten= 87%, Lag= 50.0 min
Discarded = 0.42 cfs @ 12.93 hrs, Volume= 0.243 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 681.64' @ 12.93 hrs Surf.Area= 4,924 sf Storage= 3,571 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 77.4 min (934.2 - 856.8)

Volume	Invert	Avail.Storage	Storage Description
#1A	680.50'	4,394 cf	**39.50'W x 124.66'L x 3.50'H Field A** 17,234 cf Overall - 6,248 cf Embedded = 10,986 cf x 40.0% Voids
#2A	681.00'	6,248 cf	**ADS_StormTech SC-740 +Cap** x 136 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 136 Chambers in 8 Rows
		10,642 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	680.50'	**2.410 in/hr Exfiltration over Horizontal area** Conductivity to Groundwater Elevation = 678.40'

Discarded OutFlow Max=0.42 cfs @ 12.93 hrs HW=681.64' (Free Discharge)
└**1=Exfiltration** (Controls 0.42 cfs)

Pond 5P: Subsurface Infiltration System #1 - ADS StormTech SC-740 Chambers - Chamber Wizard Fiel

Chamber Model = ADS_StormTechSC-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

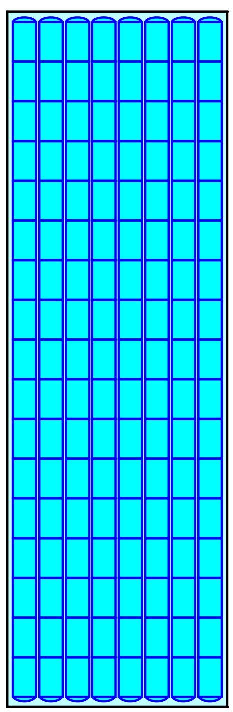
17 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 122.66' Row Length +12.0" End Stone x 2 = 124.66' Base Length
8 Rows x 51.0" Wide + 6.0" Spacing x 7 + 12.0" Side Stone x 2 = 39.50' Base Width
6.0" Stone Base + 30.0" Chamber Height + 6.0" Stone Cover = 3.50' Field Height

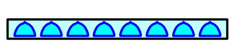
136 Chambers x 45.9 cf = 6,247.8 cf Chamber Storage

17,233.8 cf Field - 6,247.8 cf Chambers = 10,985.9 cf Stone x 40.0% Voids = 4,394.4 cf Stone Storage

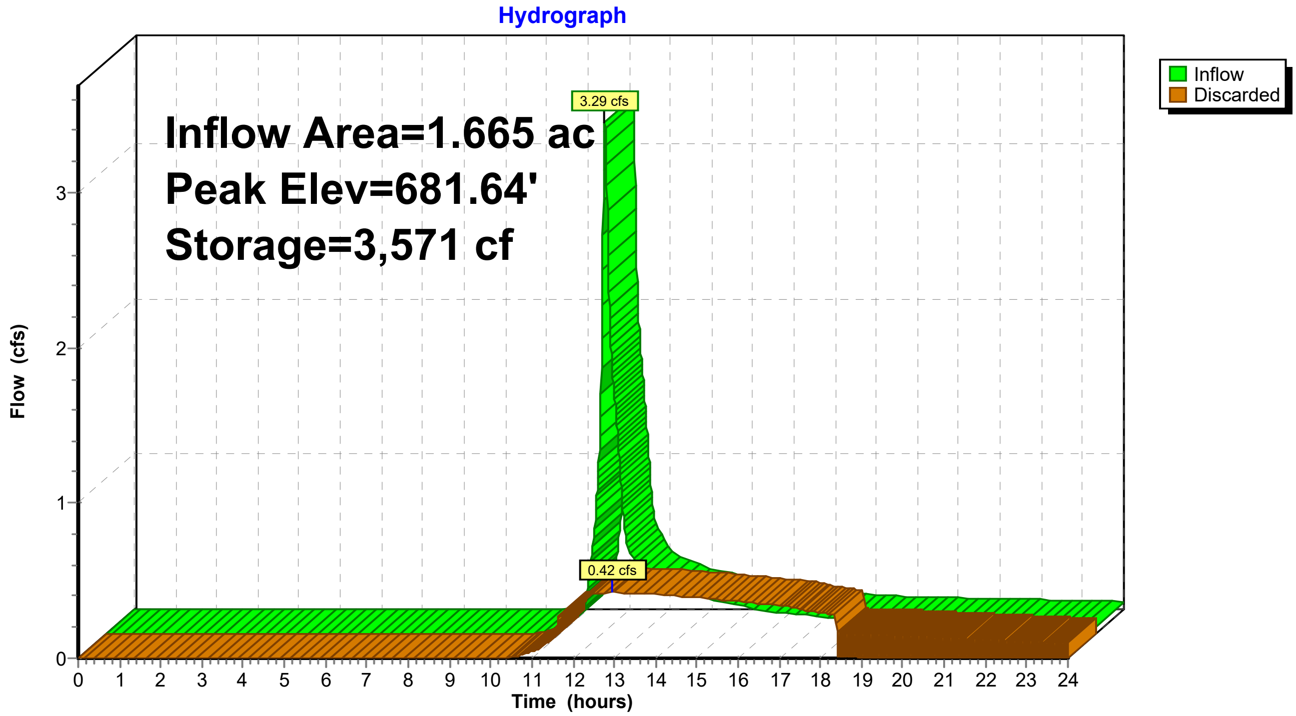
Chamber Storage + Stone Storage = 10,642.2 cf = 0.244 af
Overall Storage Efficiency = 61.8%
Overall System Size = 124.66' x 39.50' x 3.50'

136 Chambers
638.3 cy Field
406.9 cy Stone





Pond 5P: Subsurface Infiltration System #1 - ADS StormTech SC-740 Chambers



Summary for Pond 6P: Subsurface Infiltration System #2 - ADS StormTech SC-740 Chambers

[87] Warning: Oscillations may require smaller dt or Finer Routing (severity=264)

Inflow Area = 0.618 ac, 0.00% Impervious, Inflow Depth > 1.75" for 10-year event
Inflow = 1.22 cfs @ 12.09 hrs, Volume= 0.090 af
Outflow = 0.15 cfs @ 12.97 hrs, Volume= 0.090 af, Atten= 88%, Lag= 52.5 min
Discarded = 0.15 cfs @ 12.97 hrs, Volume= 0.090 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 712.17' @ 12.97 hrs Surf.Area= 1,817 sf Storage= 1,347 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 82.8 min (939.6 - 856.8)

Volume	Invert	Avail.Storage	Storage Description
#1A	711.00'	1,662 cf	**30.00'W x 60.58'L x 3.50'H Field A** 6,361 cf Overall - 2,205 cf Embedded = 4,155 cf x 40.0% Voids
#2A	711.50'	2,205 cf	**ADS_StormTech SC-740 +Cap** x 48 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 48 Chambers in 6 Rows
		3,867 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	711.00'	**2.410 in/hr Exfiltration over Horizontal area** Conductivity to Groundwater Elevation = 708.60'

Discarded OutFlow Max=0.15 cfs @ 12.97 hrs HW=712.17' (Free Discharge)
└—**1=Exfiltration** (Controls 0.15 cfs)

Pond 6P: Subsurface Infiltration System #2 - ADS StormTech SC-740 Chambers - Chamber Wizard Fiel

Chamber Model = ADS_StormTechSC-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

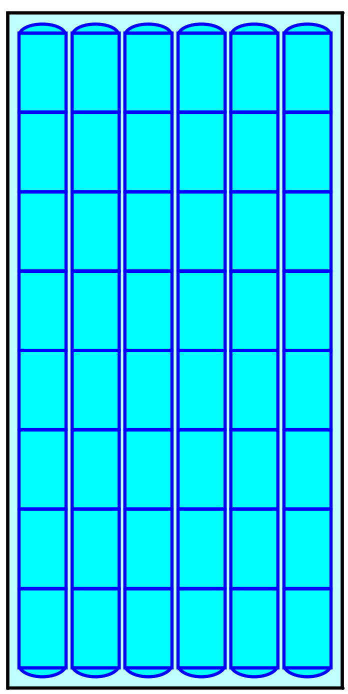
8 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 58.58' Row Length +12.0" End Stone x 2 = 60.58' Base Length
6 Rows x 51.0" Wide + 6.0" Spacing x 5 + 12.0" Side Stone x 2 = 30.00' Base Width
6.0" Stone Base + 30.0" Chamber Height + 6.0" Stone Cover = 3.50' Field Height

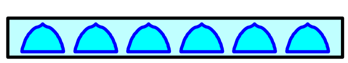
48 Chambers x 45.9 cf = 2,205.1 cf Chamber Storage

6,360.6 cf Field - 2,205.1 cf Chambers = 4,155.4 cf Stone x 40.0% Voids = 1,662.2 cf Stone Storage

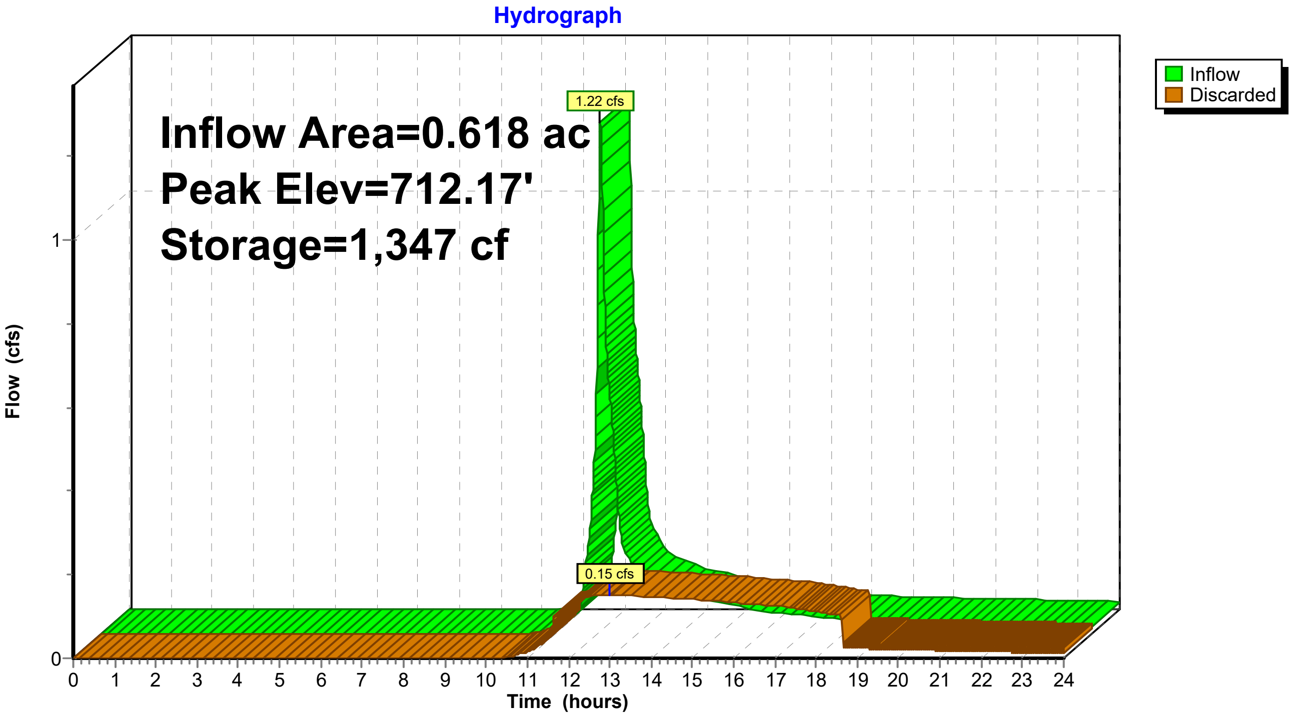
Chamber Storage + Stone Storage = 3,867.3 cf = 0.089 af
Overall Storage Efficiency = 60.8%
Overall System Size = 60.58' x 30.00' x 3.50'

48 Chambers
235.6 cy Field
153.9 cy Stone





Pond 6P: Subsurface Infiltration System #2 - ADS StormTech SC-740 Chambers



Summary for Pond 7P: Infiltration Basin #1

Inflow Area = 2.051 ac, 0.00% Impervious, Inflow Depth > 1.19" for 10-year event
Inflow = 2.48 cfs @ 12.10 hrs, Volume= 0.203 af
Outflow = 0.93 cfs @ 12.46 hrs, Volume= 0.203 af, Atten= 63%, Lag= 21.5 min
Discarded = 0.93 cfs @ 12.46 hrs, Volume= 0.203 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 704.07' @ 12.46 hrs Surf.Area= 16,101 sf Storage= 1,177 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 5.7 min (886.0 - 880.2)

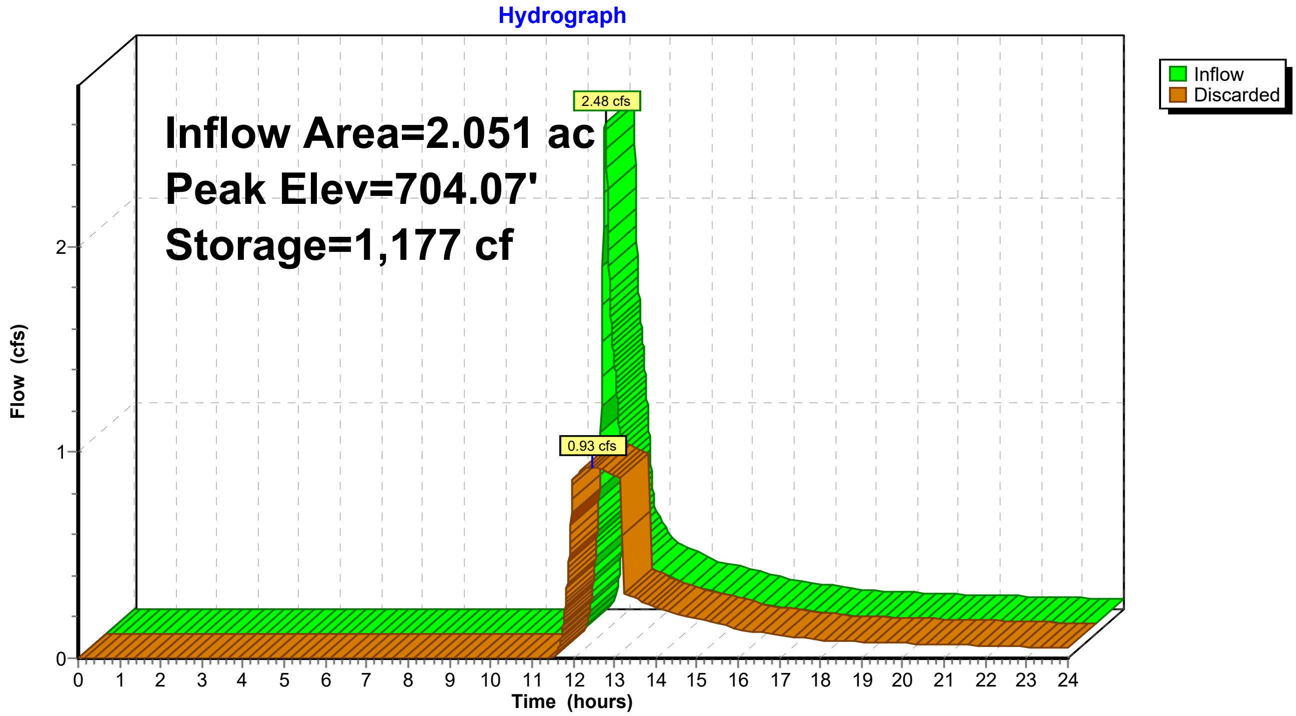
Volume	Invert	Avail.Storage	Storage Description
#1	704.00'	19,192 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
704.00	15,599	1,219.0	0	0	15,599
705.00	23,026	1,256.7	19,192	19,192	23,129

Device	Routing	Invert	Outlet Devices
#1	Discarded	704.00'	**2.410 in/hr Exfiltration over Horizontal area** Conductivity to Groundwater Elevation = 702.00'

Discarded OutFlow Max=0.93 cfs @ 12.46 hrs HW=704.07' (Free Discharge)
└─**1=Exfiltration** (Controls 0.93 cfs)

Pond 7P: Infiltration Basin #1



Summary for Pond 8P: Subsurface Infiltration System #3 - ADS StormTech SC-740 Chambers

[87] Warning: Oscillations may require smaller dt or Finer Routing (severity=300)

Inflow Area = 0.193 ac, 39.47% Impervious, Inflow Depth > 2.39" for 10-year event
Inflow = 0.54 cfs @ 12.09 hrs, Volume= 0.039 af
Outflow = 0.07 cfs @ 12.80 hrs, Volume= 0.039 af, Atten= 87%, Lag= 42.4 min
Discarded = 0.07 cfs @ 12.80 hrs, Volume= 0.039 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 678.42' @ 12.80 hrs Surf.Area= 804 sf Storage= 582 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 73.0 min (909.3 - 836.3)

Volume	Invert	Avail.Storage	Storage Description
#1A	677.25'	758 cf	**20.50'W x 39.22'L x 3.50'H Field A** 2,814 cf Overall - 919 cf Embedded = 1,895 cf x 40.0% Voids
#2A	677.75'	919 cf	**ADS_StormTech SC-740 +Cap** x 20 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 20 Chambers in 4 Rows
		1,677 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	677.25'	**2.410 in/hr Exfiltration over Horizontal area** Conductivity to Groundwater Elevation = 675.10'

Discarded OutFlow Max=0.07 cfs @ 12.80 hrs HW=678.42' (Free Discharge)
└─**1=Exfiltration** (Controls 0.07 cfs)

Pond 8P: Subsurface Infiltration System #3 - ADS StormTech SC-740 Chambers - Chamber Wizard Fiel

Chamber Model = ADS_StormTechSC-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

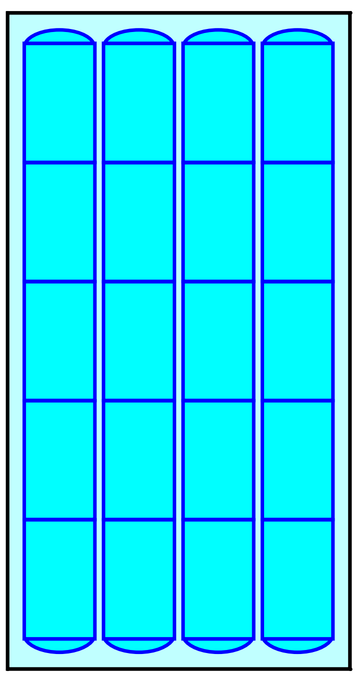
5 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 37.22' Row Length +12.0" End Stone x 2 = 39.22' Base Length
4 Rows x 51.0" Wide + 6.0" Spacing x 3 + 12.0" Side Stone x 2 = 20.50' Base Width
6.0" Stone Base + 30.0" Chamber Height + 6.0" Stone Cover = 3.50' Field Height

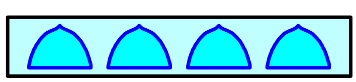
20 Chambers x 45.9 cf = 918.8 cf Chamber Storage

2,813.8 cf Field - 918.8 cf Chambers = 1,895.0 cf Stone x 40.0% Voids = 758.0 cf Stone Storage

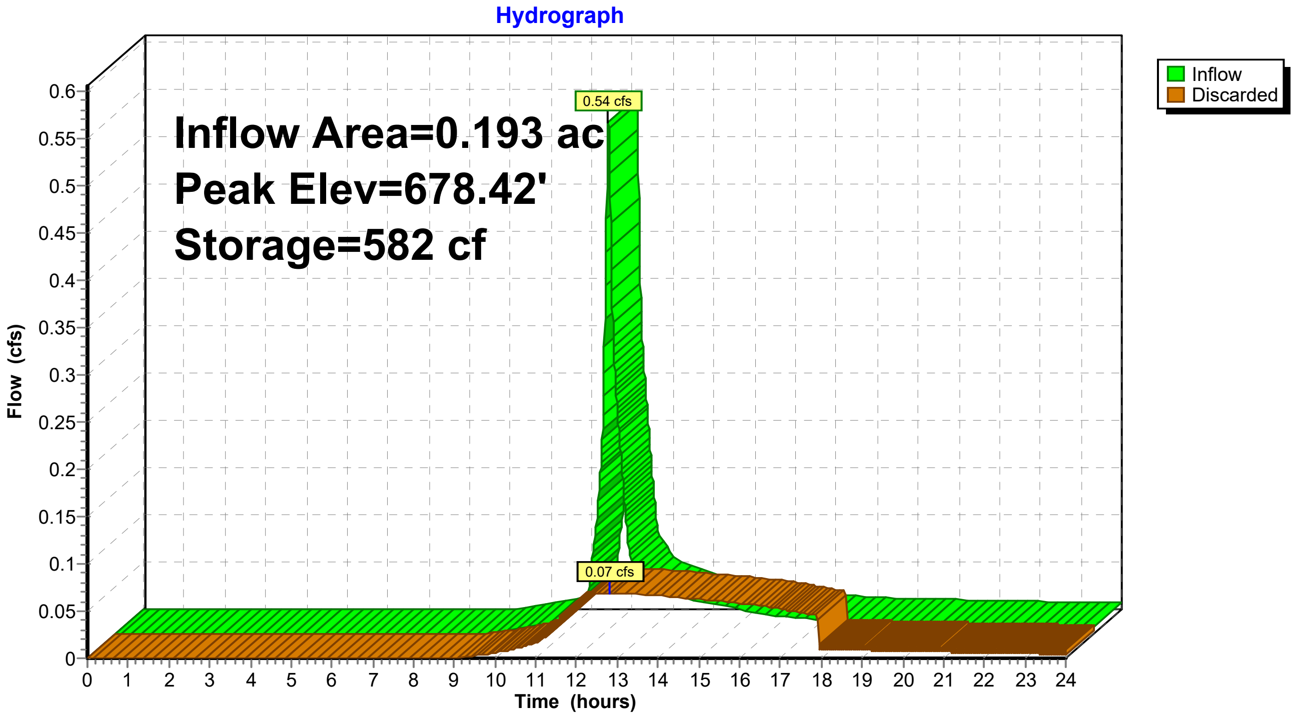
Chamber Storage + Stone Storage = 1,676.8 cf = 0.038 af
Overall Storage Efficiency = 59.6%
Overall System Size = 39.22' x 20.50' x 3.50'

20 Chambers
104.2 cy Field
70.2 cy Stone





Pond 8P: Subsurface Infiltration System #3 - ADS StormTech SC-740 Chambers



Time span=0.00-24.00 hrs, dt=0.01 hrs, 2401 points x 2
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment1S: Area 1 Runoff Area=42,152 sf 0.00% Impervious Runoff Depth>1.69"
Flow Length=350' Tc=6.0 min CN=56 Runoff=1.76 cfs 0.137 af

Subcatchment2S: Area 2 Runoff Area=232,817 sf 0.00% Impervious Runoff Depth>1.78"
Flow Length=283' Tc=6.0 min CN=57 Runoff=10.29 cfs 0.792 af

Subcatchment3S: Area 3 Runoff Area=95,234 sf 0.72% Impervious Runoff Depth>1.95"
Flow Length=68' Tc=6.0 min CN=59 Runoff=4.71 cfs 0.354 af

Subcatchment4S: Area 4 Runoff Area=38,773 sf 0.00% Impervious Runoff Depth>1.78"
Flow Length=132' Tc=6.0 min CN=57 Runoff=1.71 cfs 0.132 af

Subcatchment5S: Area 5 Runoff Area=72,521 sf 0.00% Impervious Runoff Depth>2.56"
Flow Length=385' Tc=6.0 min CN=66 Runoff=4.94 cfs 0.356 af

Subcatchment6S: Area 6 Runoff Area=26,937 sf 0.00% Impervious Runoff Depth>2.56"
Flow Length=465' Tc=6.0 min CN=66 Runoff=1.83 cfs 0.132 af

Subcatchment7S: Area 7 Runoff Area=89,330 sf 0.00% Impervious Runoff Depth>1.86"
Flow Length=133' Tc=6.0 min CN=58 Runoff=4.18 cfs 0.318 af

Subcatchment8S: Area 8 Runoff Area=8,417 sf 39.47% Impervious Runoff Depth>3.32"
Flow Length=170' Tc=6.0 min CN=74 Runoff=0.75 cfs 0.054 af

Reach 1R: Off-site Flow (Wetland Northwest) Inflow=1.76 cfs 0.137 af
Outflow=1.76 cfs 0.137 af

Reach 2R: Off-site Flow (East) Inflow=10.29 cfs 0.792 af
Outflow=10.29 cfs 0.792 af

Reach 3R: Off-site Flow (Route 15) Inflow=4.71 cfs 0.354 af
Outflow=4.71 cfs 0.354 af

Reach 4R: Off-site flow (South) Inflow=1.71 cfs 0.132 af
Outflow=1.71 cfs 0.132 af

Pond 5P: Subsurface Infiltration System #1 - Peak Elev=682.27' Storage=5,988 cf Inflow=4.94 cfs 0.356 af
Outflow=0.51 cfs 0.356 af

Pond 6P: Subsurface Infiltration System #2 - Peak Elev=712.84' Storage=2,260 cf Inflow=1.83 cfs 0.132 af
Outflow=0.18 cfs 0.132 af

Pond 7P: Infiltration Basin #1 Peak Elev=704.19' Storage=3,008 cf Inflow=4.18 cfs 0.318 af
Outflow=1.02 cfs 0.318 af

Pond 8P: Subsurface Infiltration System #3 - Peak Elev=678.95' Storage=897 cf Inflow=0.75 cfs 0.054 af
Outflow=0.08 cfs 0.054 af

Total Runoff Area = 13.916 ac Runoff Volume = 2.274 af Average Runoff Depth = 1.96"
99.34% Pervious = 13.824 ac 0.66% Impervious = 0.092 ac

Summary for Subcatchment 1S: Area 1

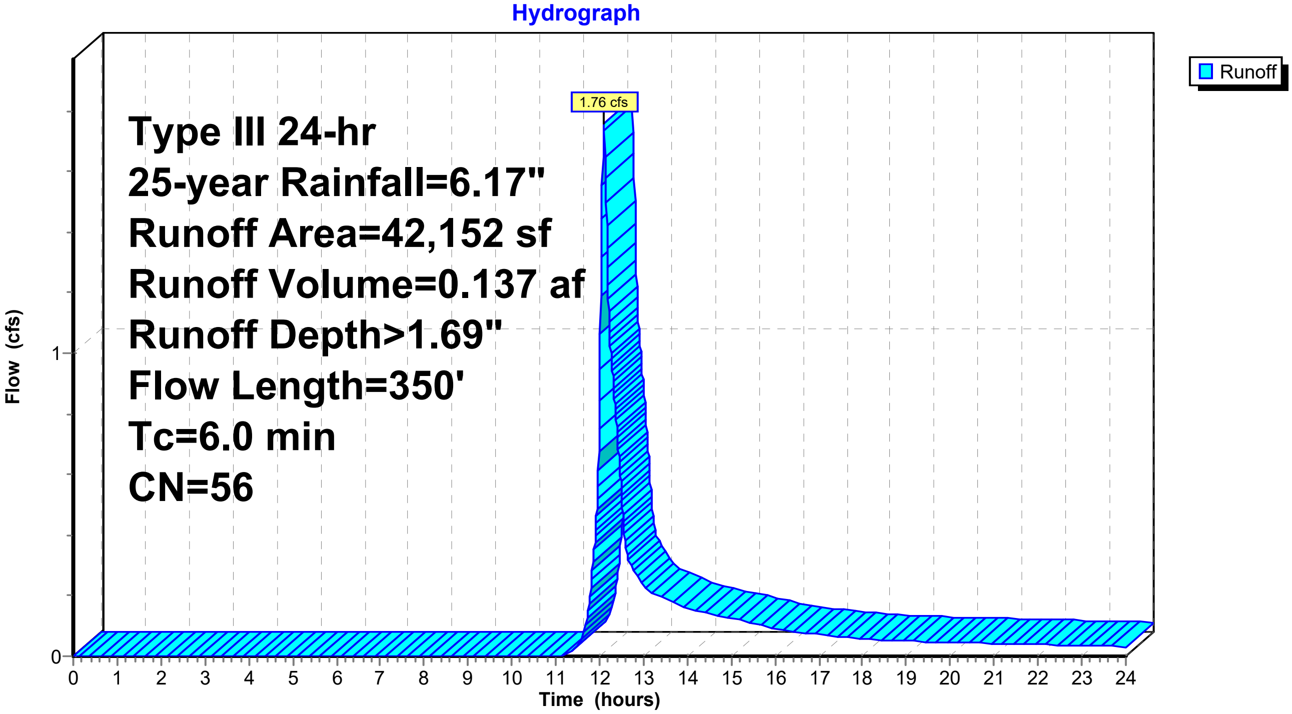
Runoff = 1.76 cfs @ 12.10 hrs, Volume= 0.137 af, Depth> 1.69"
Routed to Reach 1R : Off-site Flow (Wetland Northwest)

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-year Rainfall=6.17"

Area (sf)	CN	Description
15,269	58	Meadow, non-grazed, HSG B
26,883	55	Woods, Good, HSG B
42,152	56	Weighted Average
42,152		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.4	50	0.0700	0.24		**Sheet Flow, A-B**
					Grass: Short n= 0.150 P2= 3.20"
0.8	122	0.1420	2.64		**Shallow Concentrated Flow, B-C**
					Short Grass Pasture Kv= 7.0 fps
0.3	45	0.1420	2.64		**Shallow Concentrated Flow, C-D**
					Short Grass Pasture Kv= 7.0 fps
1.1	133	0.1500	1.94		**Shallow Concentrated Flow, D-E**
					Woodland Kv= 5.0 fps
0.4					**Direct Entry,**
6.0	350	Total			

Subcatchment 1S: Area 1



Summary for Subcatchment 2S: Area 2

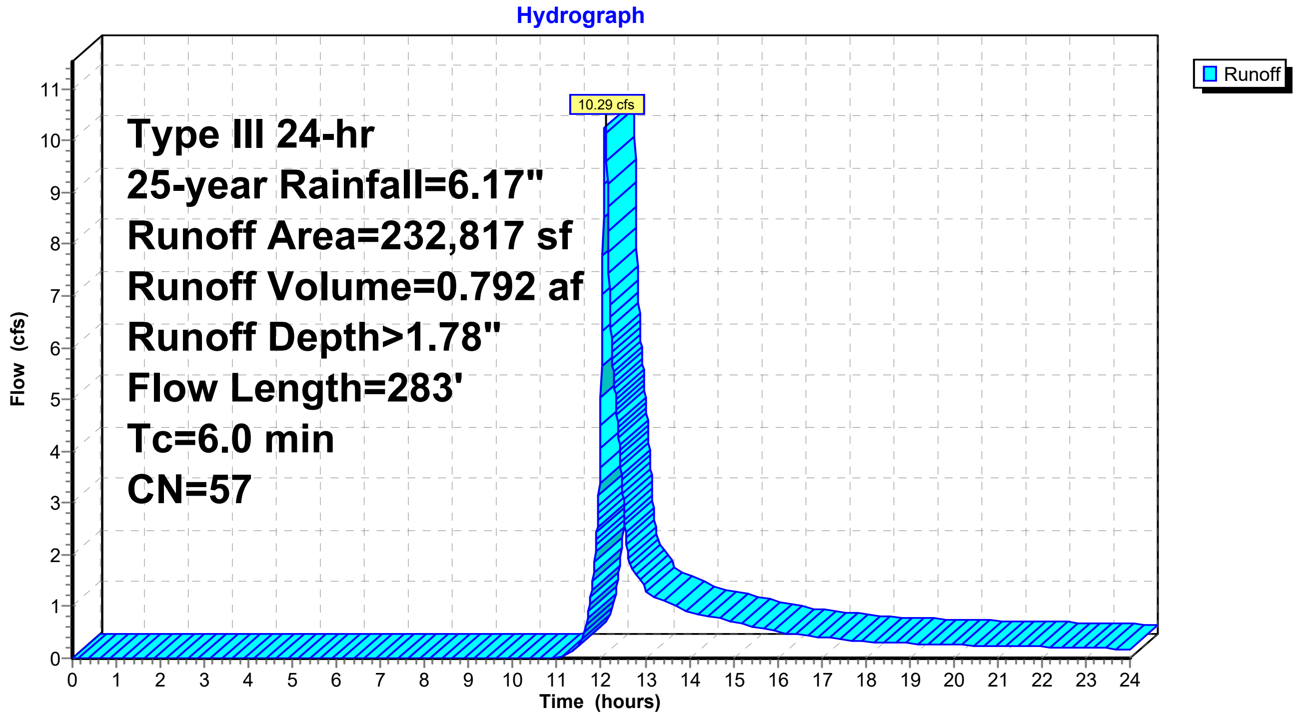
Runoff = 10.29 cfs @ 12.10 hrs, Volume= 0.792 af, Depth> 1.78"
Routed to Reach 2R : Off-site Flow (East)

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-year Rainfall=6.17"

Area (sf)	CN	Description
119,060	58	Meadow, non-grazed, HSG B
113,757	55	Woods, Good, HSG B
232,817	57	Weighted Average
232,817		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.1	50	0.0900	0.27		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 3.20"
0.5	67	0.0900	2.10		**Shallow Concentrated Flow, B-C** Short Grass Pasture Kv= 7.0 fps
0.5	116	0.2800	3.70		**Shallow Concentrated Flow, C-D** Short Grass Pasture Kv= 7.0 fps
0.3	50	0.4300	3.28		**Shallow Concentrated Flow, D-E** Woodland Kv= 5.0 fps
1.6					**Direct Entry,**
6.0	283	Total			

Subcatchment 2S: Area 2



Summary for Subcatchment 3S: Area 3

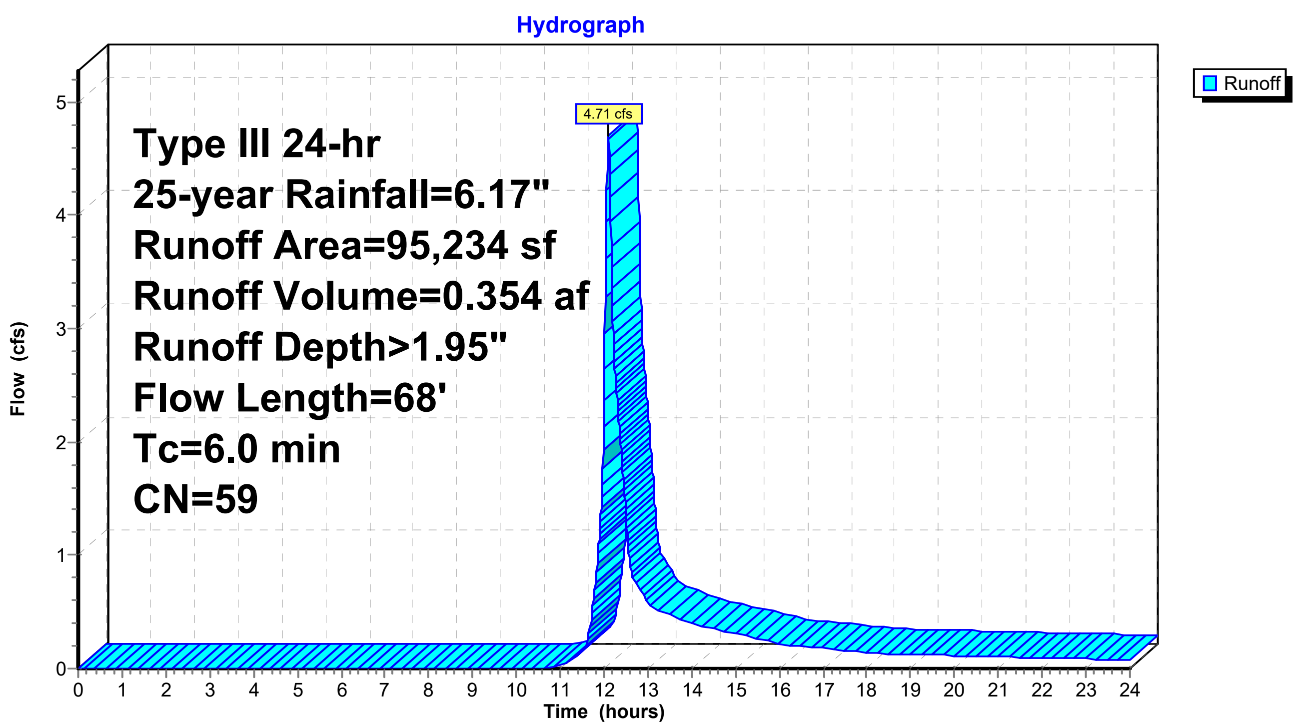
Runoff = 4.71 cfs @ 12.10 hrs, Volume= 0.354 af, Depth> 1.95"
Routed to Reach 3R : Off-site Flow (Route 15)

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-year Rainfall=6.17"

Area (sf)	CN	Description
30,543	55	Woods, Good, HSG B
682	98	Paved parking, HSG B
2,653	58	Meadow, non-grazed, HSG B
61,356	61	>75% Grass cover, Good, HSG B
95,234	59	Weighted Average
94,552		99.28% Pervious Area
682		0.72% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.8	50	0.1300	0.14		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.20"
0.2	18	0.1100	1.66		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
6.0	68	Total			

Subcatchment 3S: Area 3



Summary for Subcatchment 4S: Area 4

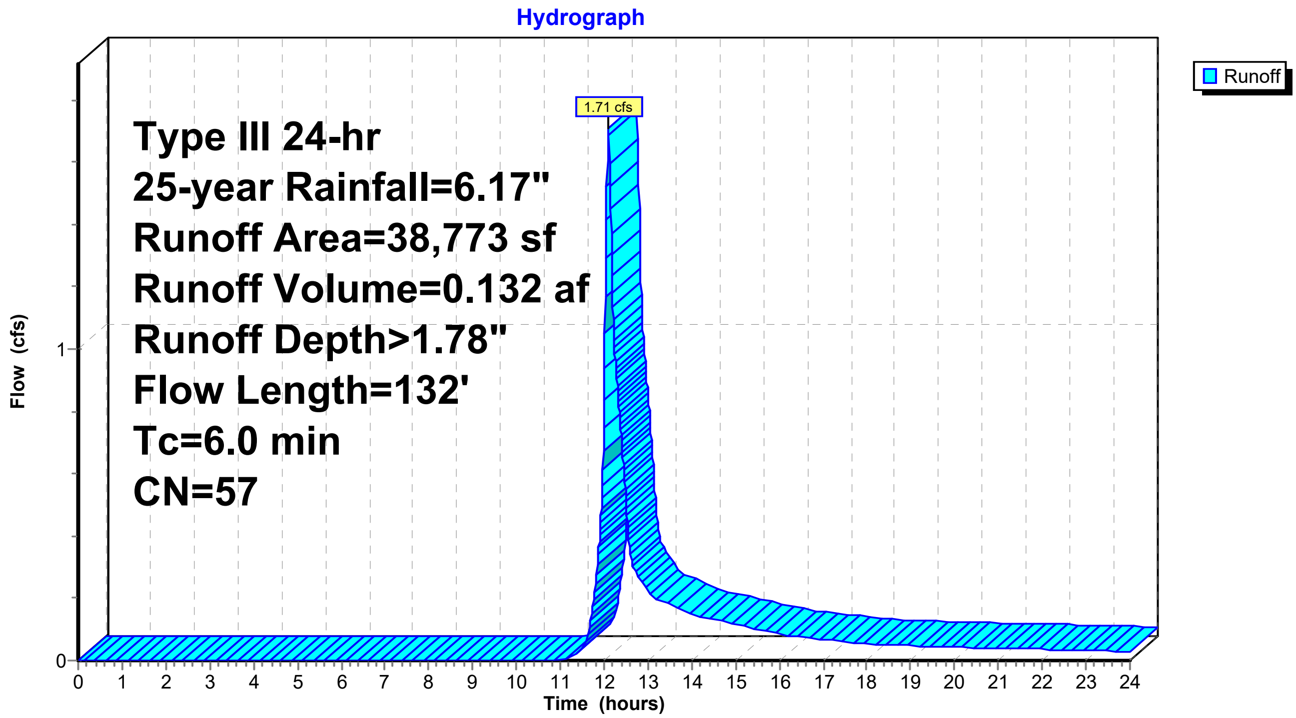
Runoff = 1.71 cfs @ 12.10 hrs, Volume= 0.132 af, Depth> 1.78"
Routed to Reach 4R : Off-site flow (South)

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-year Rainfall=6.17"

Area (sf)	CN	Description
3,172	58	Meadow, non-grazed, HSG B
24,335	55	Woods, Good, HSG B
11,266	61	>75% Grass cover, Good, HSG B
38,773	57	Weighted Average
38,773		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.7	50	0.1500	0.23		**Sheet Flow, A-B** Grass: Dense n= 0.240 P2= 3.20"
0.1	27	0.3100	3.90		**Shallow Concentrated Flow, B-C** Short Grass Pasture Kv= 7.0 fps
0.5	55	0.1500	1.94		**Shallow Concentrated Flow, C-D** Woodland Kv= 5.0 fps
1.7					**Direct Entry,**
6.0	132	Total			

Subcatchment 4S: Area 4



Summary for Subcatchment 5S: Area 5

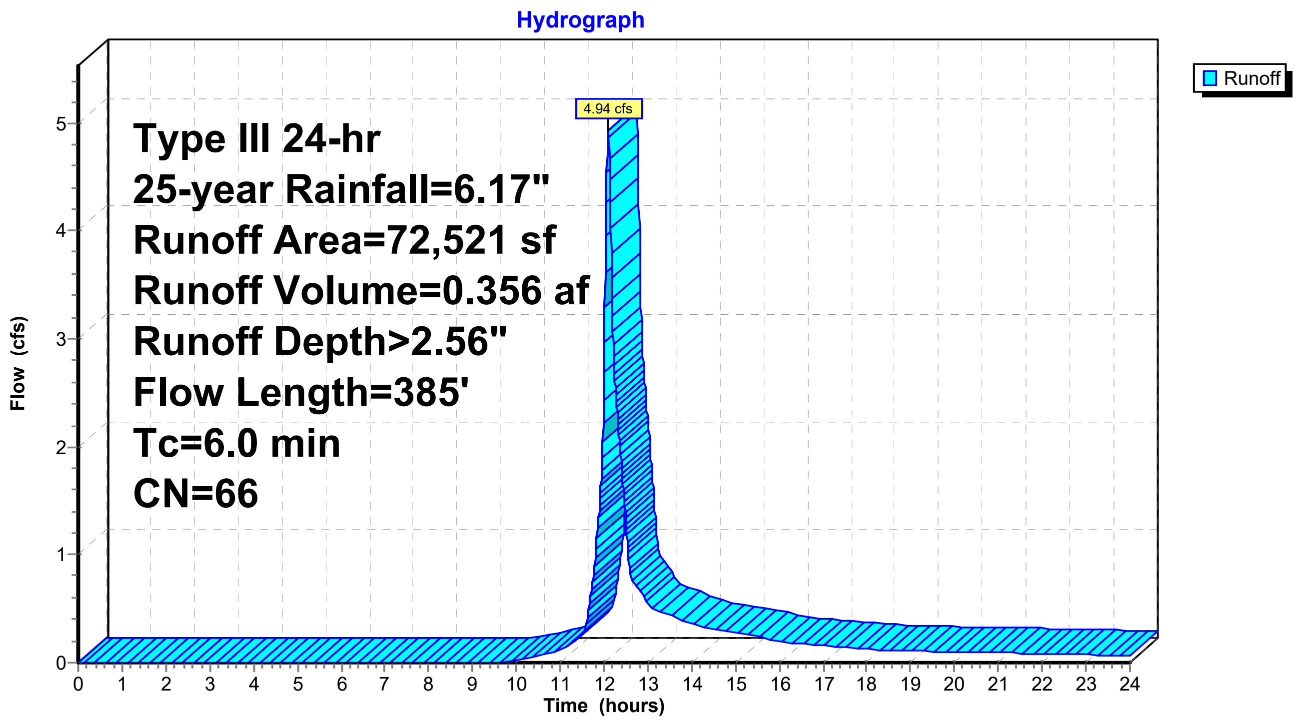
Runoff = 4.94 cfs @ 12.09 hrs, Volume= 0.356 af, Depth> 2.56"
Routed to Pond 5P : Subsurface Infiltration System #1 - ADS StormTech SC-740 Chambers

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-year Rainfall=6.17"

Area (sf)	CN	Description
56,669	58	Meadow, non-grazed, HSG B
15,852	96	Gravel surface, HSG B
72,521	66	Weighted Average
72,521		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.0	50	0.1000	0.28		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 3.20"
0.1	18	0.1100	2.32		**Shallow Concentrated Flow, B-C** Short Grass Pasture Kv= 7.0 fps
1.1	317	0.0600	4.97		**Shallow Concentrated Flow, C-D** Paved Kv= 20.3 fps
1.8					**Direct Entry,**
6.0	385	Total			

Subcatchment 5S: Area 5



Summary for Subcatchment 6S: Area 6

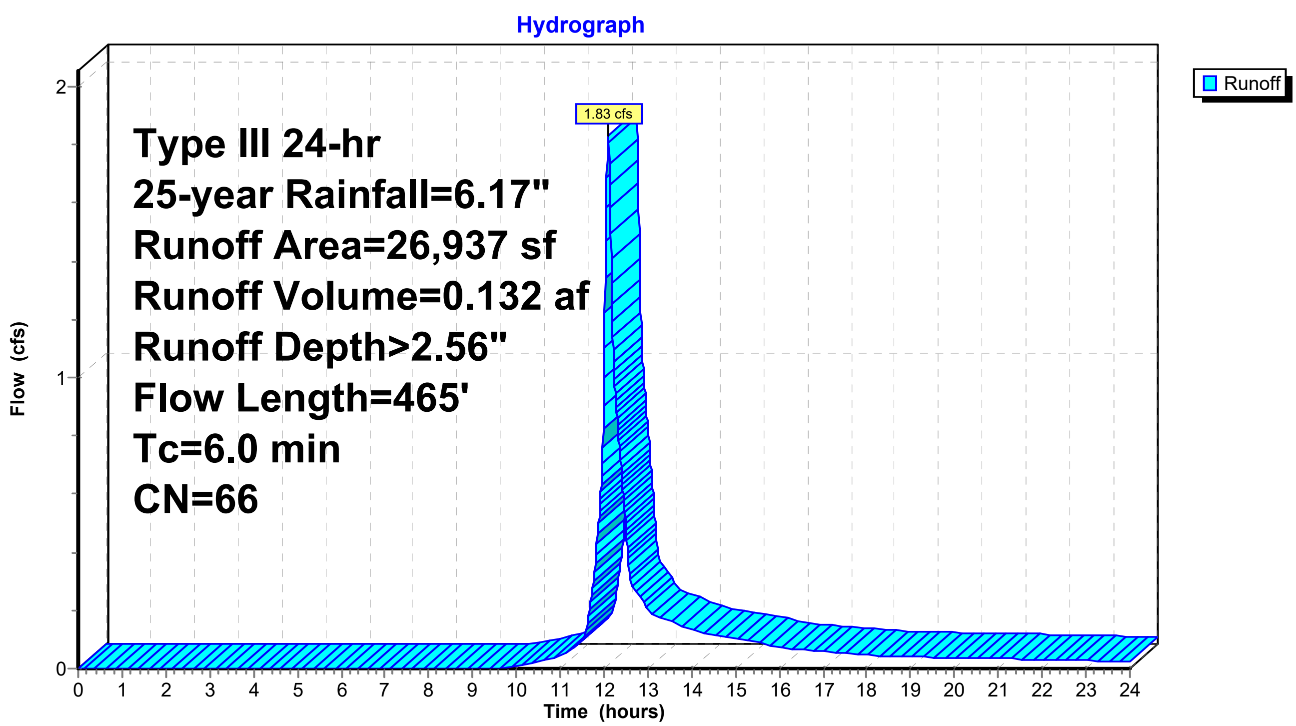
Runoff = 1.83 cfs @ 12.09 hrs, Volume= 0.132 af, Depth> 2.56"
Routed to Pond 6P : Subsurface Infiltration System #2 - ADS StormTech SC-740 Chambers

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-year Rainfall=6.17"

Area (sf)	CN	Description
21,116	58	Meadow, non-grazed, HSG B
5,821	96	Gravel surface, HSG B
26,937	66	Weighted Average
26,937		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.4	50	0.0700	0.24		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 3.20"
0.1	17	0.0800	1.98		**Shallow Concentrated Flow, B-C** Short Grass Pasture Kv= 7.0 fps
1.3	398	0.0600	4.97		**Shallow Concentrated Flow, C-D** Paved Kv= 20.3 fps
1.2					**Direct Entry,**
6.0	465	Total			

Subcatchment 6S: Area 6



Summary for Subcatchment 7S: Area 7

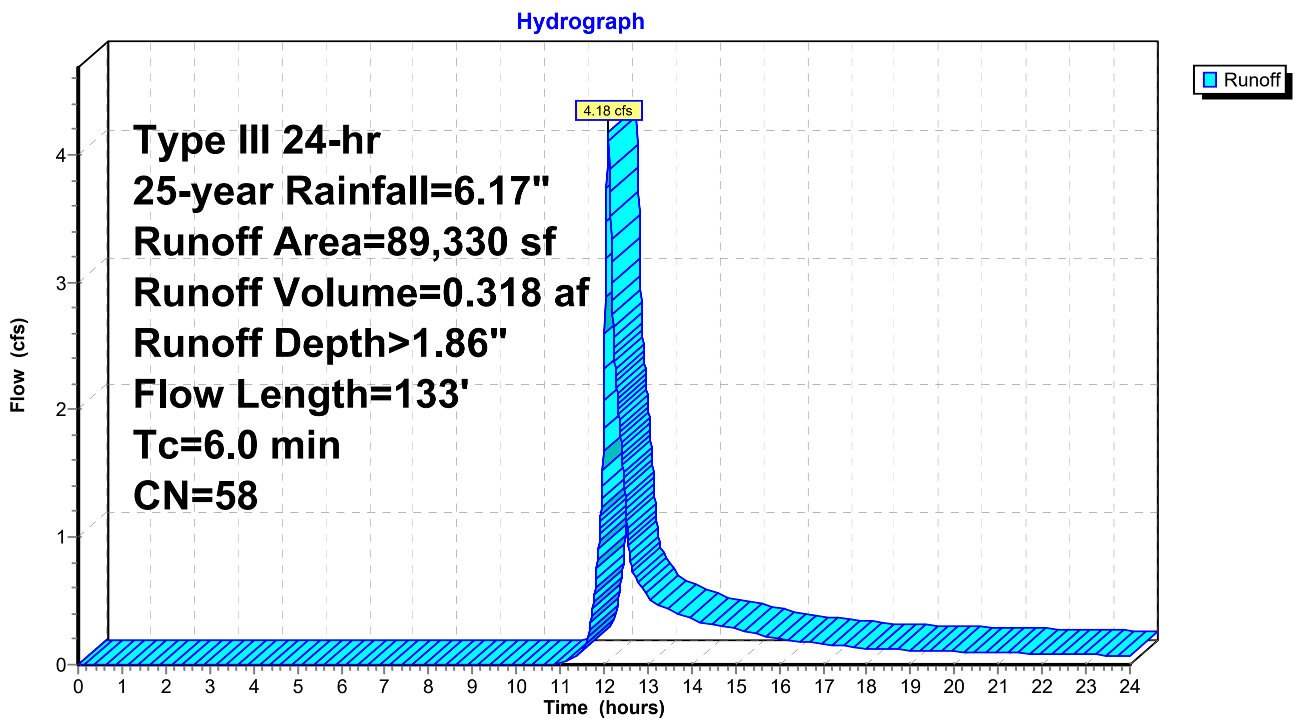
Runoff = 4.18 cfs @ 12.10 hrs, Volume= 0.318 af, Depth> 1.86"
Routed to Pond 7P : Infiltration Basin #1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-year Rainfall=6.17"

Area (sf)	CN	Description
89,330	58	Meadow, non-grazed, HSG B
89,330		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.0	50	0.1000	0.28		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 3.20"
0.5	83	0.1700	2.89		**Shallow Concentrated Flow, B-C** Short Grass Pasture Kv= 7.0 fps
2.5					**Direct Entry,**
6.0	133	Total			

Subcatchment 7S: Area 7



Summary for Subcatchment 8S: Area 8

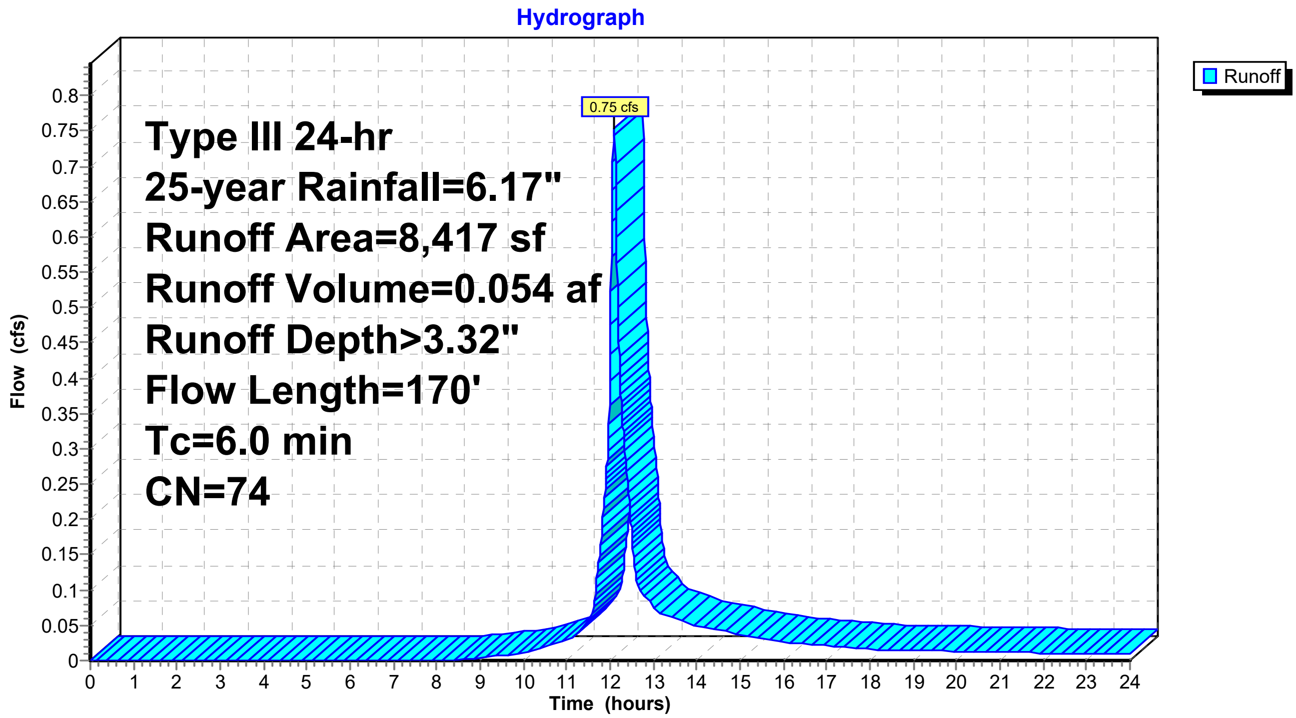
Runoff = 0.75 cfs @ 12.09 hrs, Volume= 0.054 af, Depth> 3.32"
Routed to Pond 8P : Subsurface Infiltration System #3 - ADS StormTech SC-740 Chambers

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-year Rainfall=6.17"

Area (sf)	CN	Description
5,095	58	Meadow, non-grazed, HSG B
3,322	98	Paved parking, HSG B
8,417	74	Weighted Average
5,095		60.53% Pervious Area
3,322		39.47% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.6	50	0.0600	0.23		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 3.20"
0.9	97	0.0600	1.71		**Shallow Concentrated Flow, B-C** Short Grass Pasture Kv= 7.0 fps
0.1	23	0.0200	2.87		**Shallow Concentrated Flow, C-D** Paved Kv= 20.3 fps
1.4					**Direct Entry,**
6.0	170	Total			

Subcatchment 8S: Area 8



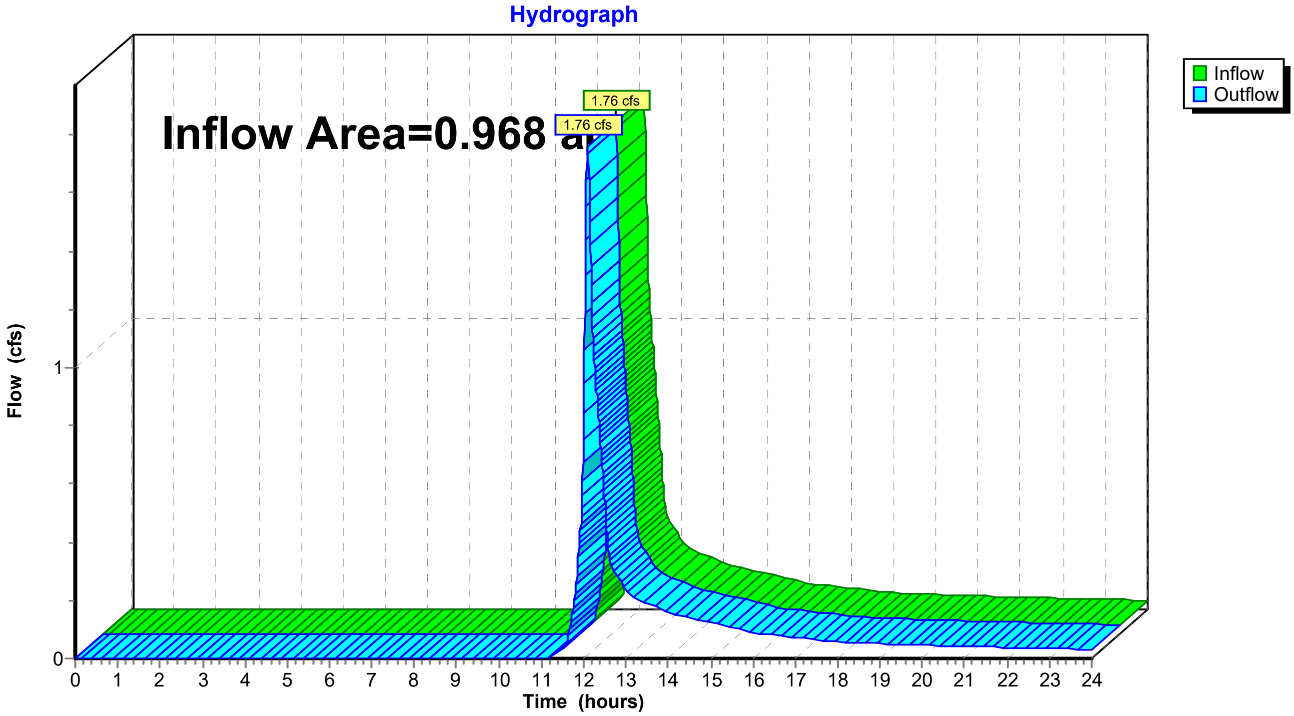
Summary for Reach 1R: Off-site Flow (Wetland Northwest)

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

Inflow Area = 0.968 ac, 0.00% Impervious, Inflow Depth > 1.69" for 25-year event
Inflow = 1.76 cfs @ 12.10 hrs, Volume= 0.137 af
Outflow = 1.76 cfs @ 12.10 hrs, Volume= 0.137 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 2

Reach 1R: Off-site Flow (Wetland Northwest)



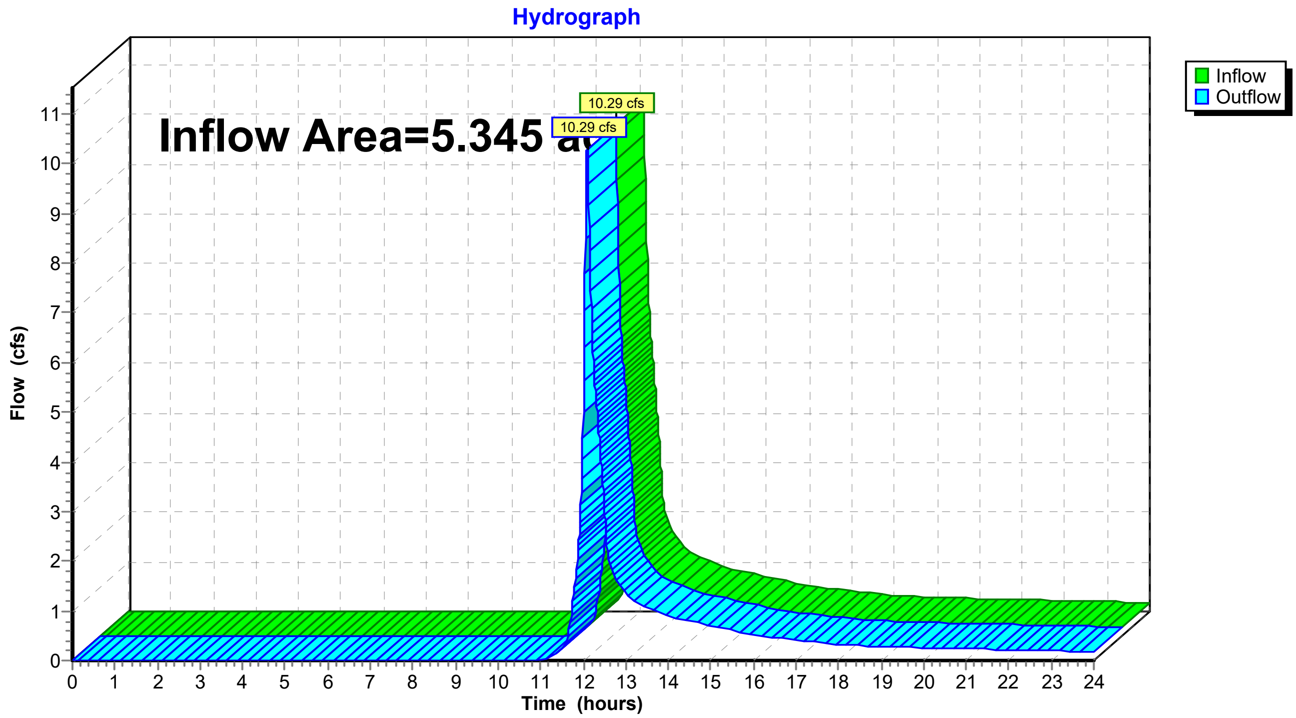
Summary for Reach 2R: Off-site Flow (East)

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

Inflow Area =	5.345 ac,	0.00% Impervious,	Inflow Depth > 1.78"	for 25-year event
Inflow =	10.29 cfs @	12.10 hrs, Volume=	0.792 af	
Outflow =	10.29 cfs @	12.10 hrs, Volume=	0.792 af, Atten= 0%, Lag= 0.0 min	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 2

Reach 2R: Off-site Flow (East)



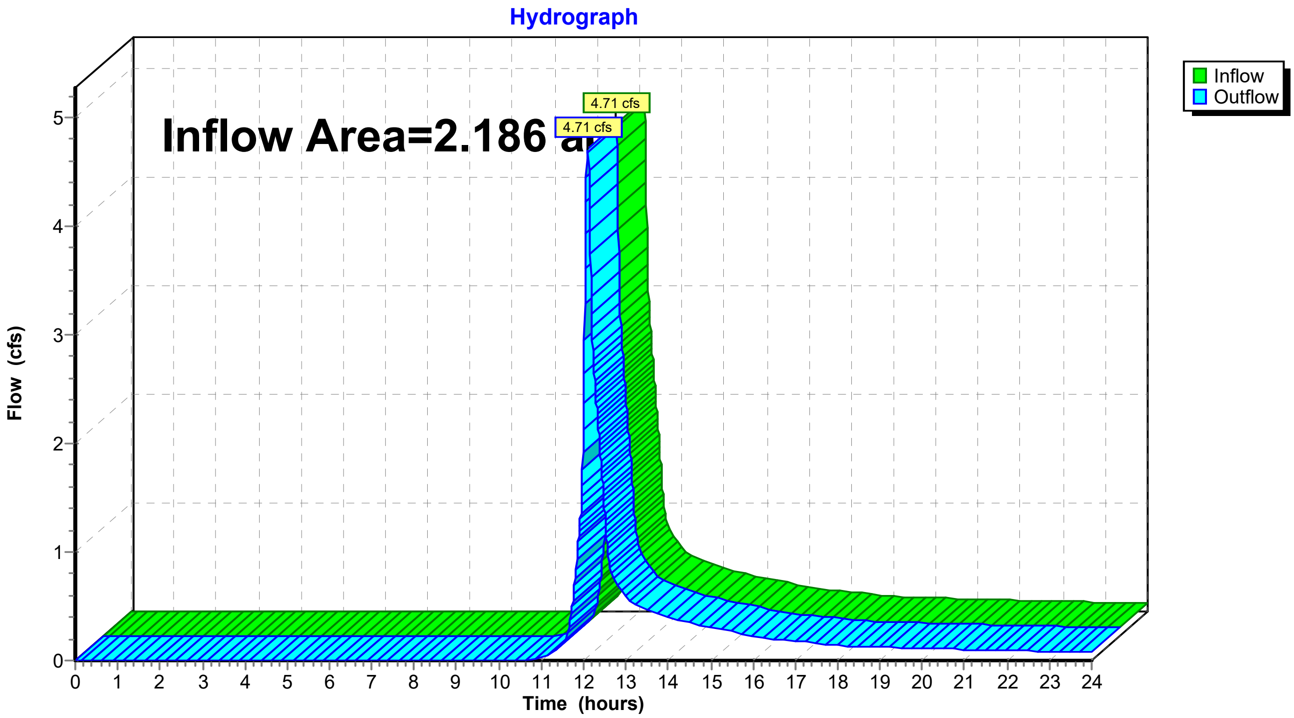
Summary for Reach 3R: Off-site Flow (Route 15)

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

Inflow Area = 2.186 ac, 0.72% Impervious, Inflow Depth > 1.95" for 25-year event
Inflow = 4.71 cfs @ 12.10 hrs, Volume= 0.354 af
Outflow = 4.71 cfs @ 12.10 hrs, Volume= 0.354 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 2

Reach 3R: Off-site Flow (Route 15)



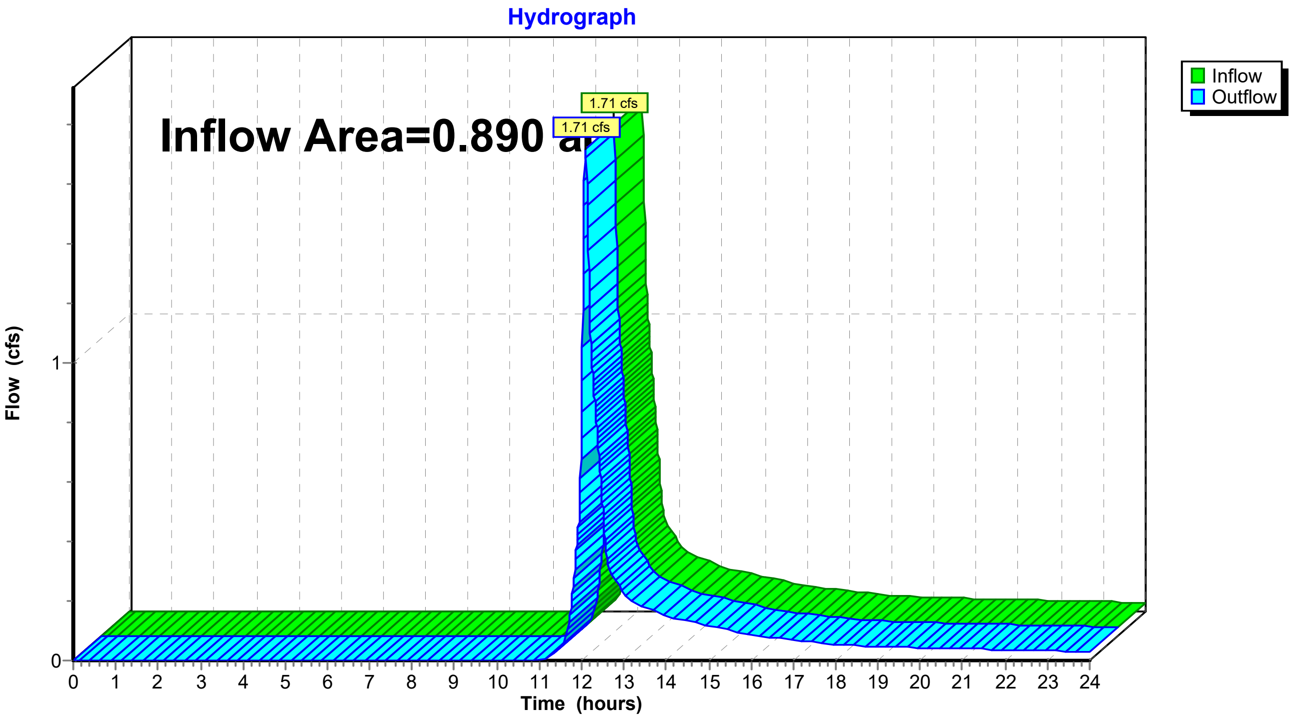
Summary for Reach 4R: Off-site flow (South)

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

Inflow Area = 0.890 ac, 0.00% Impervious, Inflow Depth > 1.78" for 25-year event
Inflow = 1.71 cfs @ 12.10 hrs, Volume= 0.132 af
Outflow = 1.71 cfs @ 12.10 hrs, Volume= 0.132 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 2

Reach 4R: Off-site flow (South)



Summary for Pond 5P: Subsurface Infiltration System #1 - ADS StormTech SC-740 Chambers

[87] Warning: Oscillations may require smaller dt or Finer Routing (severity=149)

Inflow Area =	1.665 ac,	0.00% Impervious, Inflow Depth > 2.56"	for 25-year event
Inflow =	4.94 cfs @	12.09 hrs, Volume=	0.356 af
Outflow =	0.51 cfs @	13.08 hrs, Volume=	0.356 af, Atten= 90%, Lag= 59.3 min
Discarded =	0.51 cfs @	13.08 hrs, Volume=	0.356 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 682.27' @ 13.08 hrs Surf.Area= 4,924 sf Storage= 5,988 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 121.6 min (967.0 - 845.4)

Volume	Invert	Avail.Storage	Storage Description
#1A	680.50'	4,394 cf	**39.50'W x 124.66'L x 3.50'H Field A** 17,234 cf Overall - 6,248 cf Embedded = 10,986 cf x 40.0% Voids
#2A	681.00'	6,248 cf	**ADS_StormTech SC-740 +Cap** x 136 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 136 Chambers in 8 Rows
		10,642 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	680.50'	**2.410 in/hr Exfiltration over Horizontal area** Conductivity to Groundwater Elevation = 678.40'

Discarded OutFlow Max=0.51 cfs @ 13.08 hrs HW=682.27' (Free Discharge)
└**1=Exfiltration** (Controls 0.51 cfs)

Pond 5P: Subsurface Infiltration System #1 - ADS StormTech SC-740 Chambers - Chamber Wizard Fiel

Chamber Model = ADS_StormTechSC-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

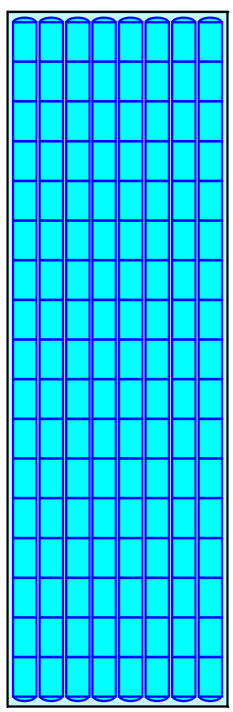
17 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 122.66' Row Length +12.0" End Stone x 2 = 124.66' Base Length
8 Rows x 51.0" Wide + 6.0" Spacing x 7 + 12.0" Side Stone x 2 = 39.50' Base Width
6.0" Stone Base + 30.0" Chamber Height + 6.0" Stone Cover = 3.50' Field Height

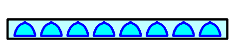
136 Chambers x 45.9 cf = 6,247.8 cf Chamber Storage

17,233.8 cf Field - 6,247.8 cf Chambers = 10,985.9 cf Stone x 40.0% Voids = 4,394.4 cf Stone Storage

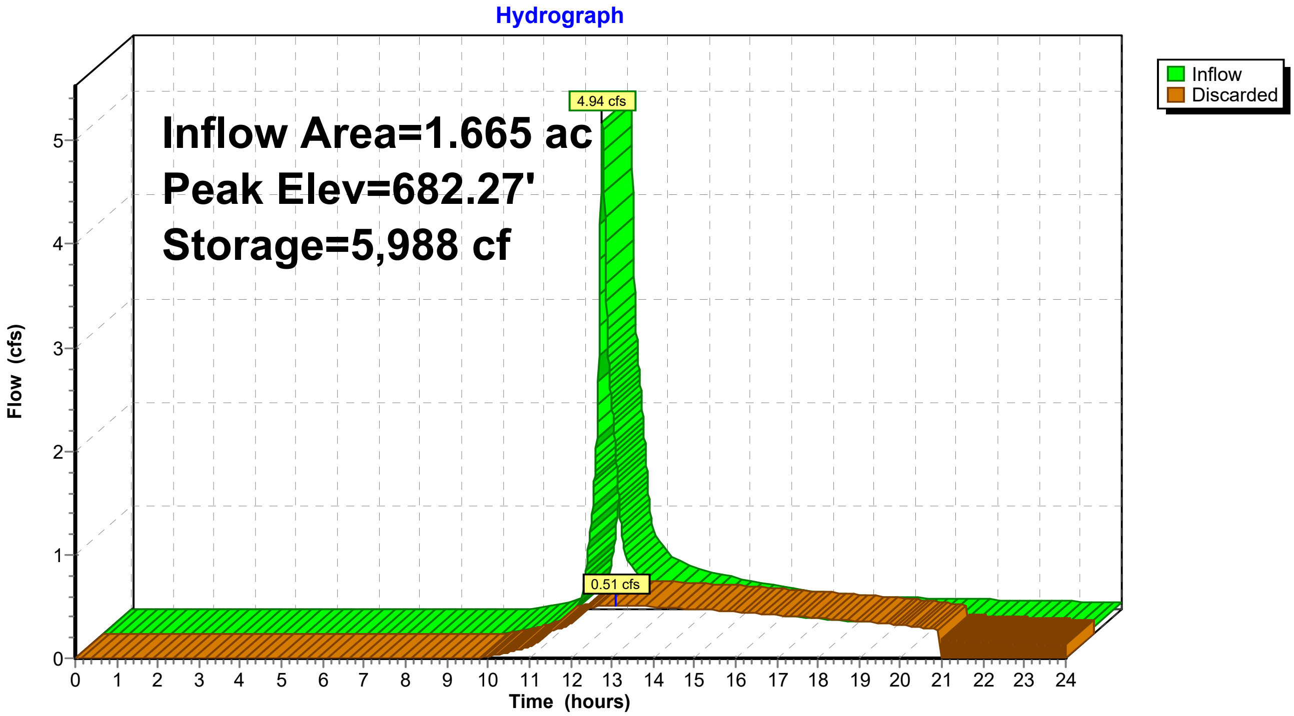
Chamber Storage + Stone Storage = 10,642.2 cf = 0.244 af
Overall Storage Efficiency = 61.8%
Overall System Size = 124.66' x 39.50' x 3.50'

136 Chambers
638.3 cy Field
406.9 cy Stone





Pond 5P: Subsurface Infiltration System #1 - ADS StormTech SC-740 Chambers



Summary for Pond 6P: Subsurface Infiltration System #2 - ADS StormTech SC-740 Chambers

[87] Warning: Oscillations may require smaller dt or Finer Routing (severity=127)

Inflow Area = 0.618 ac, 0.00% Impervious, Inflow Depth > 2.56" for 25-year event
Inflow = 1.83 cfs @ 12.09 hrs, Volume= 0.132 af
Outflow = 0.18 cfs @ 13.19 hrs, Volume= 0.132 af, Atten= 90%, Lag= 65.6 min
Discarded = 0.18 cfs @ 13.19 hrs, Volume= 0.132 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 712.84' @ 13.19 hrs Surf.Area= 1,817 sf Storage= 2,260 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 130.8 min (976.3 - 845.4)

Volume	Invert	Avail.Storage	Storage Description
#1A	711.00'	1,662 cf	**30.00'W x 60.58'L x 3.50'H Field A** 6,361 cf Overall - 2,205 cf Embedded = 4,155 cf x 40.0% Voids
#2A	711.50'	2,205 cf	**ADS_StormTech SC-740 +Cap** x 48 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 48 Chambers in 6 Rows
		3,867 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	711.00'	**2.410 in/hr Exfiltration over Horizontal area** Conductivity to Groundwater Elevation = 708.60'

Discarded OutFlow Max=0.18 cfs @ 13.19 hrs HW=712.84' (Free Discharge)
└—**1=Exfiltration** (Controls 0.18 cfs)

Pond 6P: Subsurface Infiltration System #2 - ADS StormTech SC-740 Chambers - Chamber Wizard Fiel

Chamber Model = ADS_StormTechSC-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

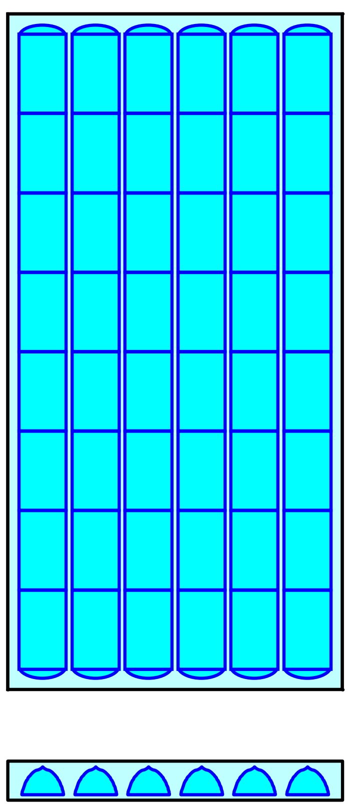
8 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 58.58' Row Length +12.0" End Stone x 2 = 60.58' Base Length
6 Rows x 51.0" Wide + 6.0" Spacing x 5 + 12.0" Side Stone x 2 = 30.00' Base Width
6.0" Stone Base + 30.0" Chamber Height + 6.0" Stone Cover = 3.50' Field Height

48 Chambers x 45.9 cf = 2,205.1 cf Chamber Storage

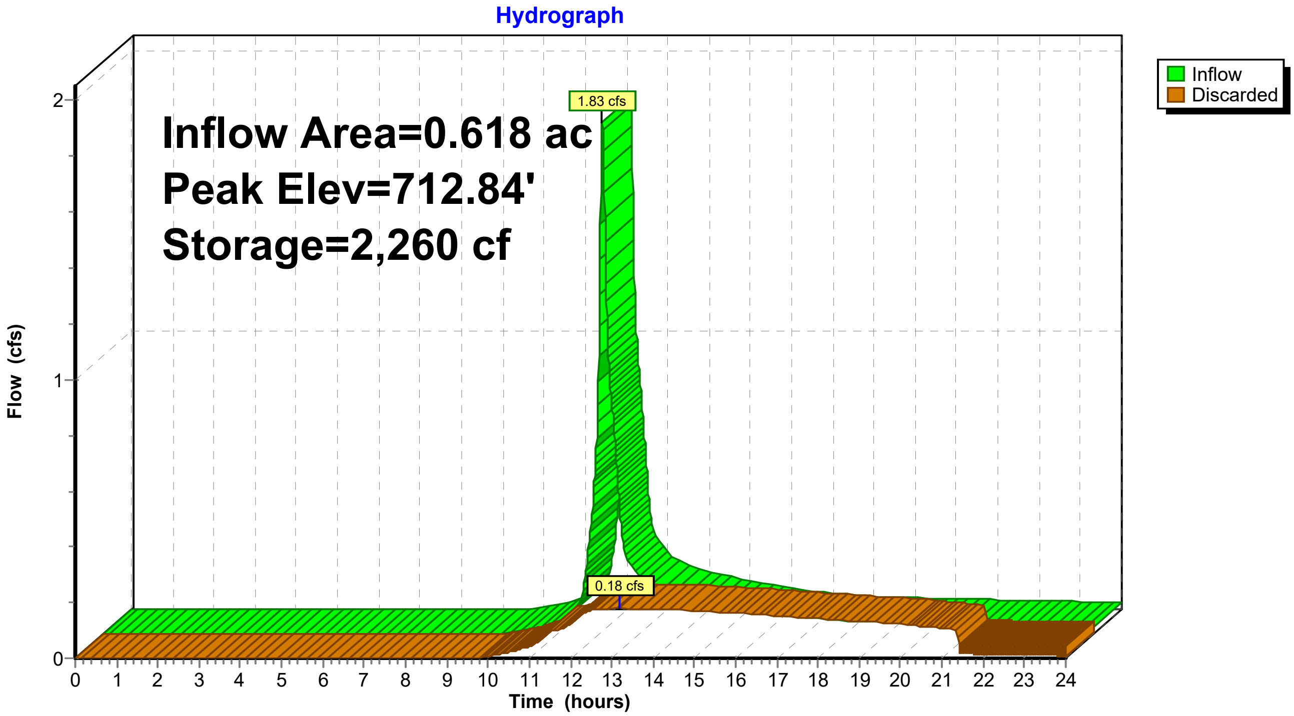
6,360.6 cf Field - 2,205.1 cf Chambers = 4,155.4 cf Stone x 40.0% Voids = 1,662.2 cf Stone Storage

Chamber Storage + Stone Storage = 3,867.3 cf = 0.089 af
Overall Storage Efficiency = 60.8%
Overall System Size = 60.58' x 30.00' x 3.50'

48 Chambers
235.6 cy Field
153.9 cy Stone



Pond 6P: Subsurface Infiltration System #2 - ADS StormTech SC-740 Chambers



Summary for Pond 7P: Infiltration Basin #1

[87] Warning: Oscillations may require smaller dt or Finer Routing (severity=482)

Inflow Area =	2.051 ac,	0.00% Impervious,	Inflow Depth > 1.86"	for 25-year event	
Inflow =	4.18 cfs @	12.10 hrs,	Volume=	0.318 af	
Outflow =	1.02 cfs @	12.54 hrs,	Volume=	0.318 af,	Atten= 75%, Lag= 26.5 min
Discarded =	1.02 cfs @	12.54 hrs,	Volume=	0.318 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 704.19' @ 12.54 hrs Surf.Area= 16,867 sf Storage= 3,008 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 17.6 min (883.0 - 865.5)

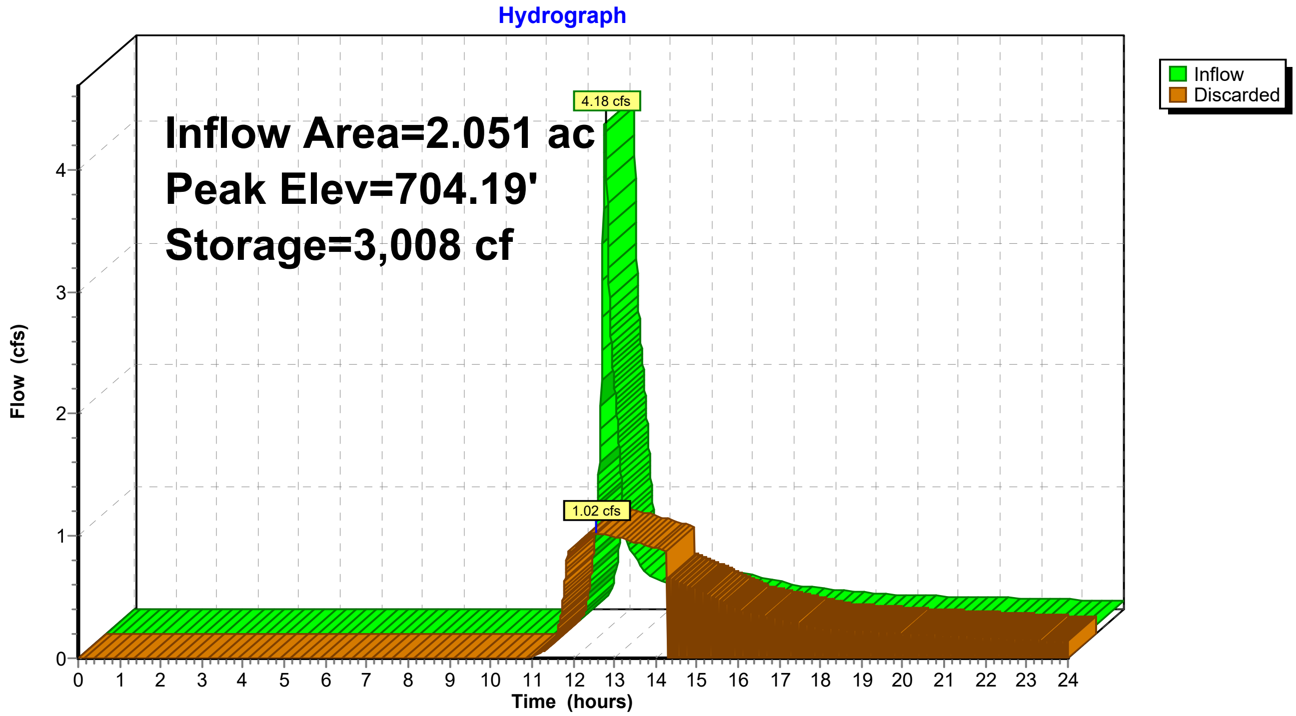
Volume	Invert	Avail.Storage	Storage Description
#1	704.00'	19,192 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
704.00	15,599	1,219.0	0	0	15,599
705.00	23,026	1,256.7	19,192	19,192	23,129

Device	Routing	Invert	Outlet Devices
#1	Discarded	704.00'	**2.410 in/hr Exfiltration over Horizontal area** Conductivity to Groundwater Elevation = 702.00'

Discarded OutFlow Max=1.02 cfs @ 12.54 hrs HW=704.19' (Free Discharge)
└─**1=Exfiltration** (Controls 1.02 cfs)

Pond 7P: Infiltration Basin #1



Summary for Pond 8P: Subsurface Infiltration System #3 - ADS StormTech SC-740 Chambers

[87] Warning: Oscillations may require smaller dt or Finer Routing (severity=200)

Inflow Area =	0.193 ac,	39.47% Impervious, Inflow Depth > 3.32"		for 25-year event
Inflow =	0.75 cfs @	12.09 hrs, Volume=	0.054 af	
Outflow =	0.08 cfs @	12.95 hrs, Volume=	0.054 af,	Atten= 89%, Lag= 51.4 min
Discarded =	0.08 cfs @	12.95 hrs, Volume=	0.054 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 678.95' @ 12.95 hrs Surf.Area= 804 sf Storage= 897 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 106.5 min (933.3 - 826.8)

Volume	Invert	Avail.Storage	Storage Description
#1A	677.25'	758 cf	**20.50'W x 39.22'L x 3.50'H Field A** 2,814 cf Overall - 919 cf Embedded = 1,895 cf x 40.0% Voids
#2A	677.75'	919 cf	**ADS_StormTech SC-740 +Cap** x 20 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 20 Chambers in 4 Rows
		1,677 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	677.25'	**2.410 in/hr Exfiltration over Horizontal area** Conductivity to Groundwater Elevation = 675.10'

Discarded OutFlow Max=0.08 cfs @ 12.95 hrs HW=678.95' (Free Discharge)
└**1=Exfiltration** (Controls 0.08 cfs)

Pond 8P: Subsurface Infiltration System #3 - ADS StormTech SC-740 Chambers - Chamber Wizard Fiel

Chamber Model = ADS_StormTechSC-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

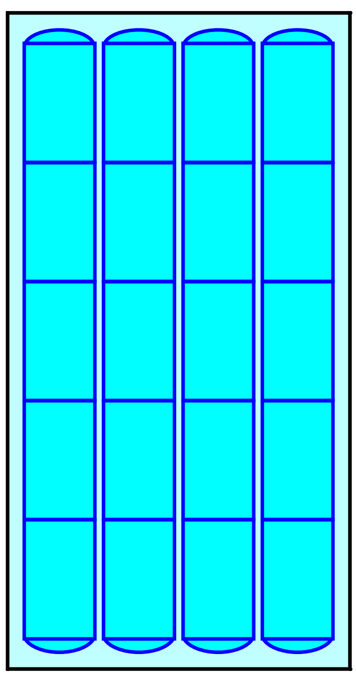
5 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 37.22' Row Length +12.0" End Stone x 2 = 39.22' Base Length
4 Rows x 51.0" Wide + 6.0" Spacing x 3 + 12.0" Side Stone x 2 = 20.50' Base Width
6.0" Stone Base + 30.0" Chamber Height + 6.0" Stone Cover = 3.50' Field Height

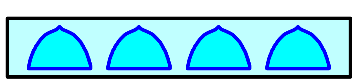
20 Chambers x 45.9 cf = 918.8 cf Chamber Storage

2,813.8 cf Field - 918.8 cf Chambers = 1,895.0 cf Stone x 40.0% Voids = 758.0 cf Stone Storage

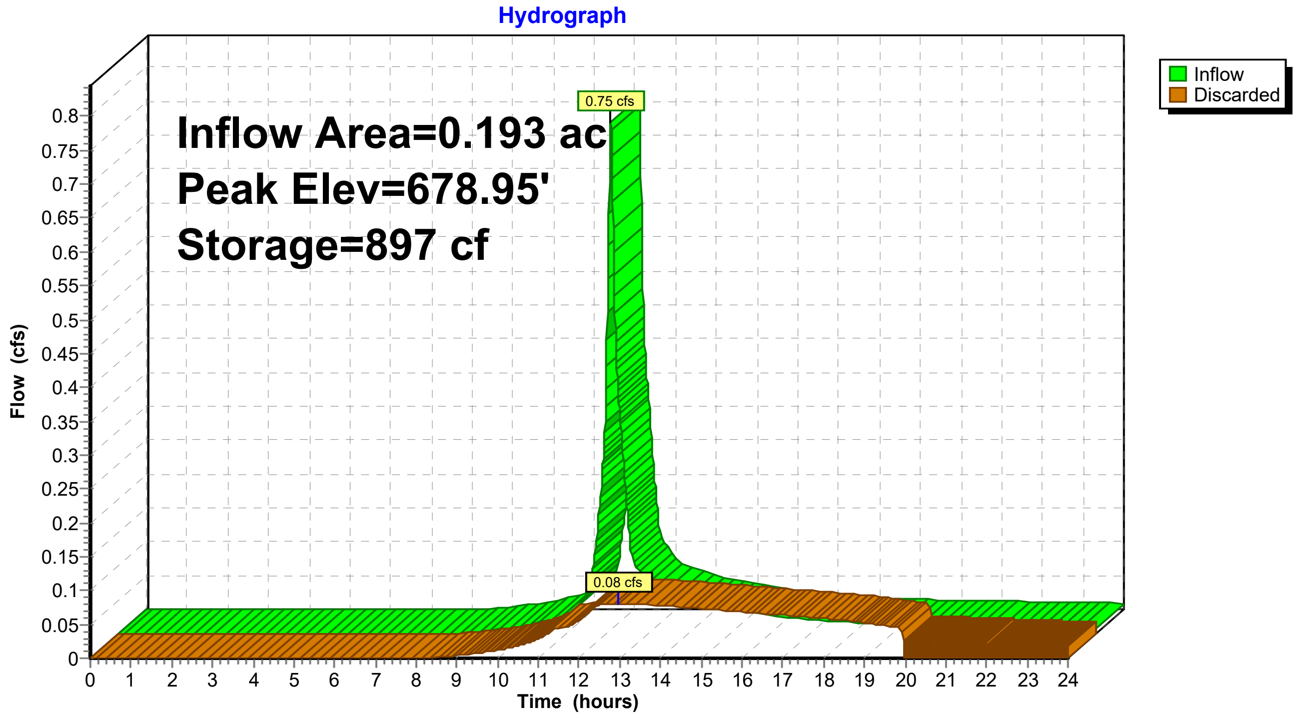
Chamber Storage + Stone Storage = 1,676.8 cf = 0.038 af
Overall Storage Efficiency = 59.6%
Overall System Size = 39.22' x 20.50' x 3.50'

20 Chambers
104.2 cy Field
70.2 cy Stone





Pond 8P: Subsurface Infiltration System #3 - ADS StormTech SC-740 Chambers



Time span=0.00-24.00 hrs, dt=0.01 hrs, 2401 points x 2
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment1S: Area 1 Runoff Area=42,152 sf 0.00% Impervious Runoff Depth>2.21"
Flow Length=350' Tc=6.0 min CN=56 Runoff=2.37 cfs 0.179 af

Subcatchment2S: Area 2 Runoff Area=232,817 sf 0.00% Impervious Runoff Depth>2.31"
Flow Length=283' Tc=6.0 min CN=57 Runoff=13.79 cfs 1.029 af

Subcatchment3S: Area 3 Runoff Area=95,234 sf 0.72% Impervious Runoff Depth>2.50"
Flow Length=68' Tc=6.0 min CN=59 Runoff=6.20 cfs 0.456 af

Subcatchment4S: Area 4 Runoff Area=38,773 sf 0.00% Impervious Runoff Depth>2.31"
Flow Length=132' Tc=6.0 min CN=57 Runoff=2.30 cfs 0.171 af

Subcatchment5S: Area 5 Runoff Area=72,521 sf 0.00% Impervious Runoff Depth>3.20"
Flow Length=385' Tc=6.0 min CN=66 Runoff=6.21 cfs 0.444 af

Subcatchment6S: Area 6 Runoff Area=26,937 sf 0.00% Impervious Runoff Depth>3.20"
Flow Length=465' Tc=6.0 min CN=66 Runoff=2.31 cfs 0.165 af

Subcatchment7S: Area 7 Runoff Area=89,330 sf 0.00% Impervious Runoff Depth>2.41"
Flow Length=133' Tc=6.0 min CN=58 Runoff=5.55 cfs 0.411 af

Subcatchment8S: Area 8 Runoff Area=8,417 sf 39.47% Impervious Runoff Depth>4.04"
Flow Length=170' Tc=6.0 min CN=74 Runoff=0.92 cfs 0.065 af

Reach 1R: Off-site Flow (Wetland Northwest) Inflow=2.37 cfs 0.179 af
Outflow=2.37 cfs 0.179 af

Reach 2R: Off-site Flow (East) Inflow=13.79 cfs 1.029 af
Outflow=13.79 cfs 1.029 af

Reach 3R: Off-site Flow (Route 15) Inflow=6.20 cfs 0.456 af
Outflow=6.20 cfs 0.456 af

Reach 4R: Off-site flow (South) Inflow=2.30 cfs 0.171 af
Outflow=2.30 cfs 0.171 af

Pond 5P: Subsurface Infiltration System #1 - Peak Elev=682.84' Storage=7,935 cf Inflow=6.21 cfs 0.444 af
Outflow=0.58 cfs 0.444 af

Pond 6P: Subsurface Infiltration System #2 - Peak Elev=713.45' Storage=2,999 cf Inflow=2.31 cfs 0.165 af
Outflow=0.20 cfs 0.165 af

Pond 7P: Infiltration Basin #1 Peak Elev=704.28' Storage=4,659 cf Inflow=5.55 cfs 0.411 af
Outflow=1.11 cfs 0.411 af

Pond 8P: Subsurface Infiltration System #3 - Peak Elev=679.40' Storage=1,146 cf Inflow=0.92 cfs 0.065 af
Outflow=0.09 cfs 0.065 af

Total Runoff Area = 13.916 ac Runoff Volume = 2.920 af Average Runoff Depth = 2.52"
99.34% Pervious = 13.824 ac 0.66% Impervious = 0.092 ac

Summary for Subcatchment 1S: Area 1

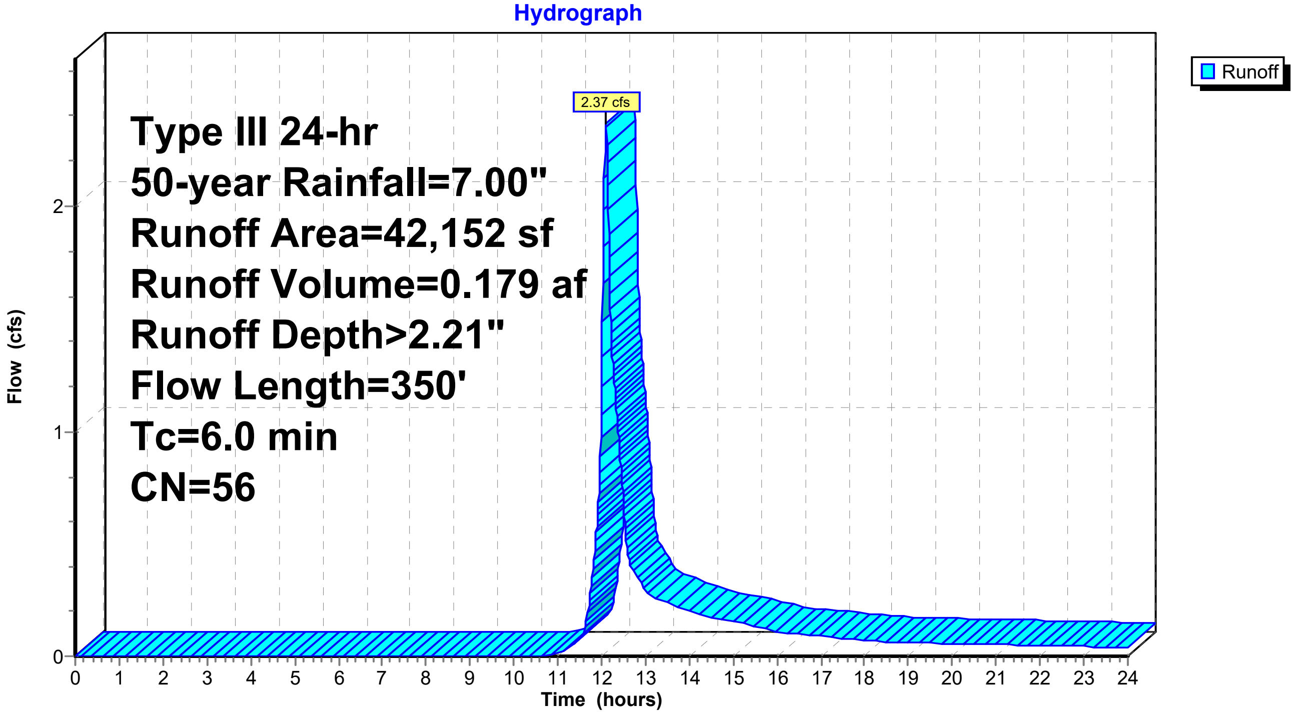
Runoff = 2.37 cfs @ 12.10 hrs, Volume= 0.179 af, Depth> 2.21"
Routed to Reach 1R : Off-site Flow (Wetland Northwest)

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 50-year Rainfall=7.00"

Area (sf)	CN	Description
15,269	58	Meadow, non-grazed, HSG B
26,883	55	Woods, Good, HSG B
42,152	56	Weighted Average
42,152		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.4	50	0.0700	0.24		**Sheet Flow, A-B**
					Grass: Short n= 0.150 P2= 3.20"
0.8	122	0.1420	2.64		**Shallow Concentrated Flow, B-C**
					Short Grass Pasture Kv= 7.0 fps
0.3	45	0.1420	2.64		**Shallow Concentrated Flow, C-D**
					Short Grass Pasture Kv= 7.0 fps
1.1	133	0.1500	1.94		**Shallow Concentrated Flow, D-E**
					Woodland Kv= 5.0 fps
0.4					**Direct Entry,**
6.0	350	Total			

Subcatchment 1S: Area 1



Summary for Subcatchment 2S: Area 2

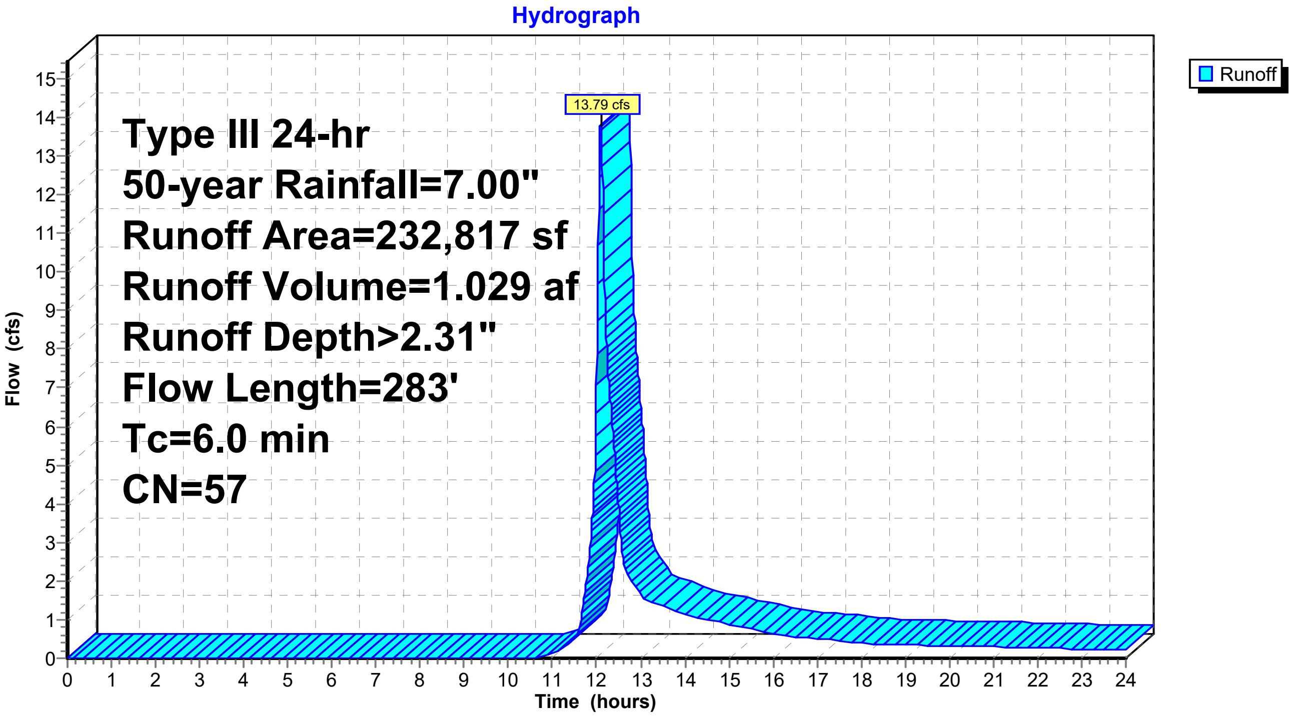
Runoff = 13.79 cfs @ 12.10 hrs, Volume= 1.029 af, Depth> 2.31"
Routed to Reach 2R : Off-site Flow (East)

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 50-year Rainfall=7.00"

Area (sf)	CN	Description
119,060	58	Meadow, non-grazed, HSG B
113,757	55	Woods, Good, HSG B
232,817	57	Weighted Average
232,817		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.1	50	0.0900	0.27		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 3.20"
0.5	67	0.0900	2.10		**Shallow Concentrated Flow, B-C** Short Grass Pasture Kv= 7.0 fps
0.5	116	0.2800	3.70		**Shallow Concentrated Flow, C-D** Short Grass Pasture Kv= 7.0 fps
0.3	50	0.4300	3.28		**Shallow Concentrated Flow, D-E** Woodland Kv= 5.0 fps
1.6					**Direct Entry,**
6.0	283	Total			

Subcatchment 2S: Area 2



Summary for Subcatchment 3S: Area 3

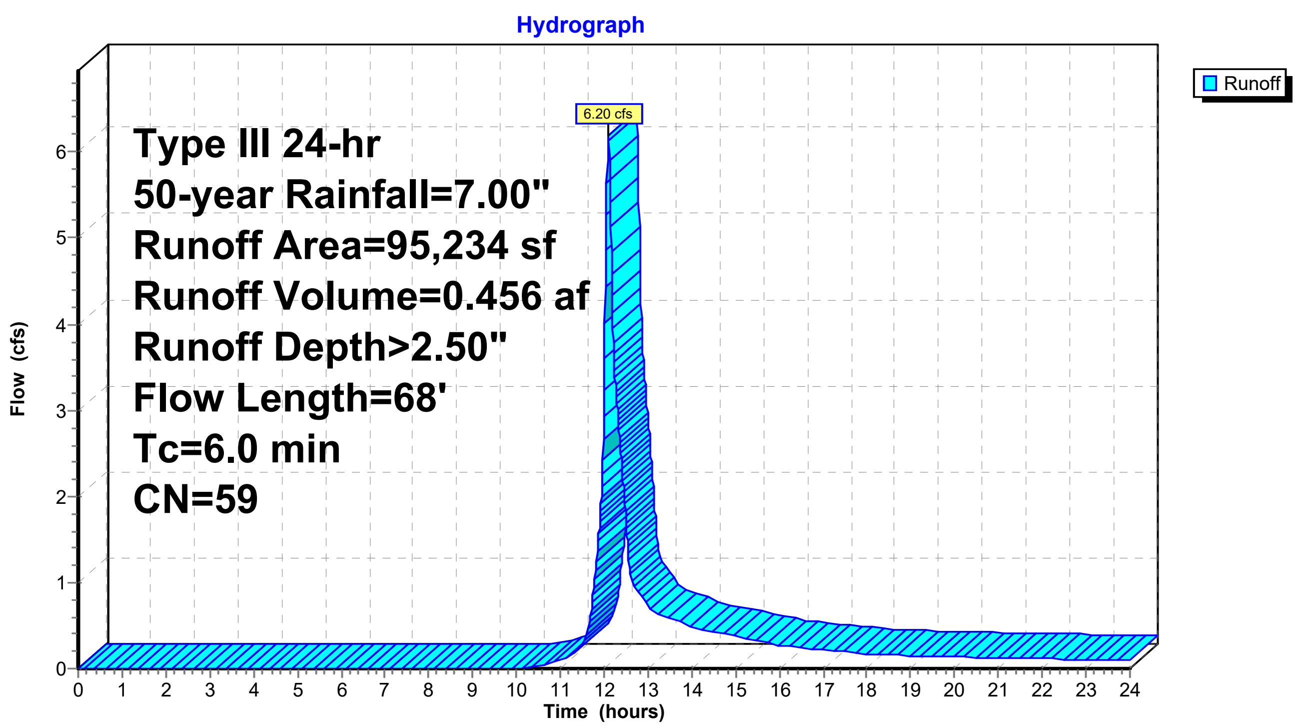
Runoff = 6.20 cfs @ 12.09 hrs, Volume= 0.456 af, Depth> 2.50"
Routed to Reach 3R : Off-site Flow (Route 15)

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 50-year Rainfall=7.00"

Area (sf)	CN	Description
30,543	55	Woods, Good, HSG B
682	98	Paved parking, HSG B
2,653	58	Meadow, non-grazed, HSG B
61,356	61	>75% Grass cover, Good, HSG B
95,234	59	Weighted Average
94,552		99.28% Pervious Area
682		0.72% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.8	50	0.1300	0.14		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.20"
0.2	18	0.1100	1.66		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
6.0	68	Total			

Subcatchment 3S: Area 3



Summary for Subcatchment 4S: Area 4

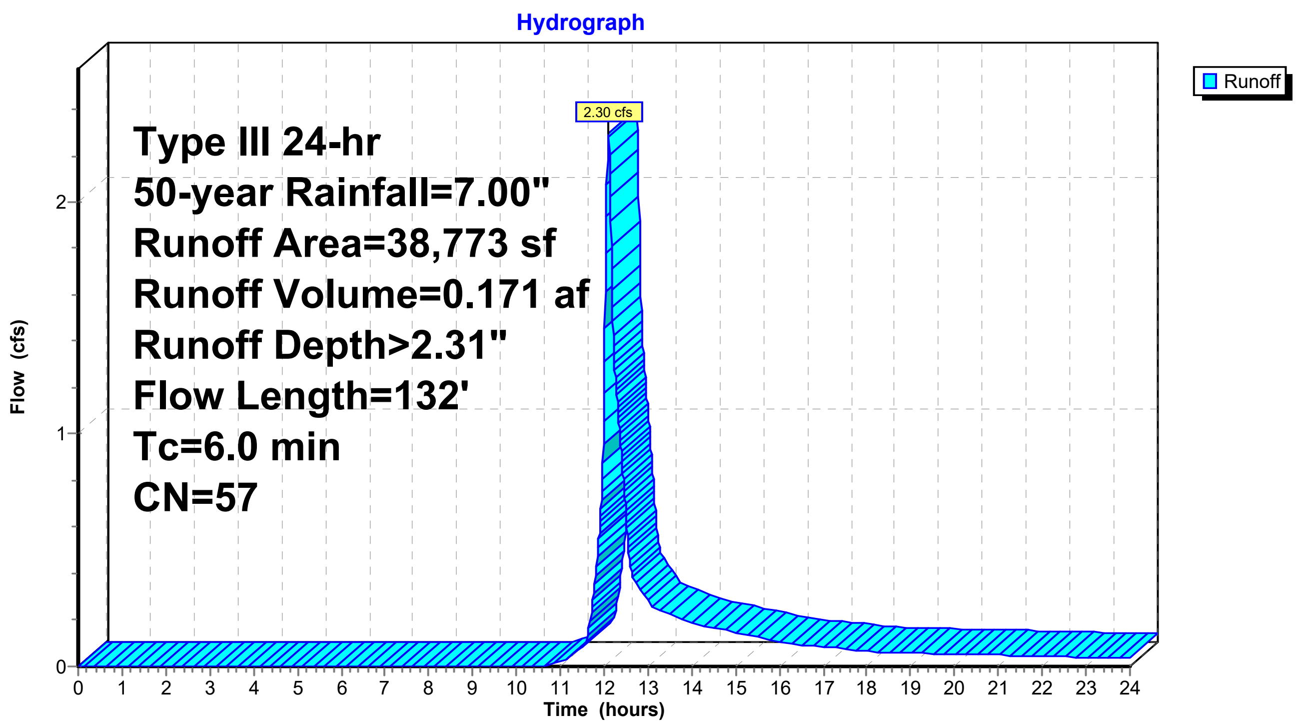
Runoff = 2.30 cfs @ 12.10 hrs, Volume= 0.171 af, Depth> 2.31"
Routed to Reach 4R : Off-site flow (South)

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 50-year Rainfall=7.00"

Area (sf)	CN	Description
3,172	58	Meadow, non-grazed, HSG B
24,335	55	Woods, Good, HSG B
11,266	61	>75% Grass cover, Good, HSG B
38,773	57	Weighted Average
38,773		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.7	50	0.1500	0.23		**Sheet Flow, A-B** Grass: Dense n= 0.240 P2= 3.20"
0.1	27	0.3100	3.90		**Shallow Concentrated Flow, B-C** Short Grass Pasture Kv= 7.0 fps
0.5	55	0.1500	1.94		**Shallow Concentrated Flow, C-D** Woodland Kv= 5.0 fps
1.7					**Direct Entry,**
6.0	132	Total			

Subcatchment 4S: Area 4



Summary for Subcatchment 5S: Area 5

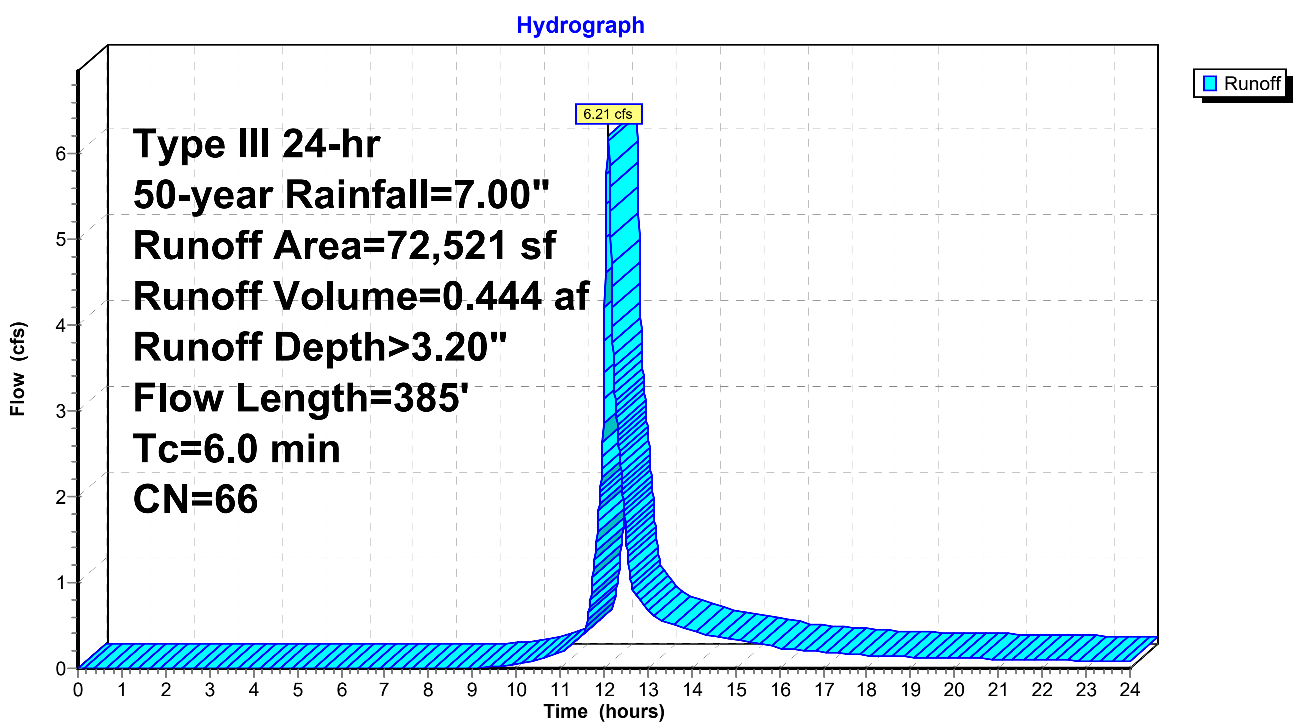
Runoff = 6.21 cfs @ 12.09 hrs, Volume= 0.444 af, Depth> 3.20"
Routed to Pond 5P : Subsurface Infiltration System #1 - ADS StormTech SC-740 Chambers

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 50-year Rainfall=7.00"

Area (sf)	CN	Description
56,669	58	Meadow, non-grazed, HSG B
15,852	96	Gravel surface, HSG B
72,521	66	Weighted Average
72,521		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.0	50	0.1000	0.28		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 3.20"
0.1	18	0.1100	2.32		**Shallow Concentrated Flow, B-C** Short Grass Pasture Kv= 7.0 fps
1.1	317	0.0600	4.97		**Shallow Concentrated Flow, C-D** Paved Kv= 20.3 fps
1.8					**Direct Entry,**
6.0	385	Total			

Subcatchment 5S: Area 5



Summary for Subcatchment 6S: Area 6

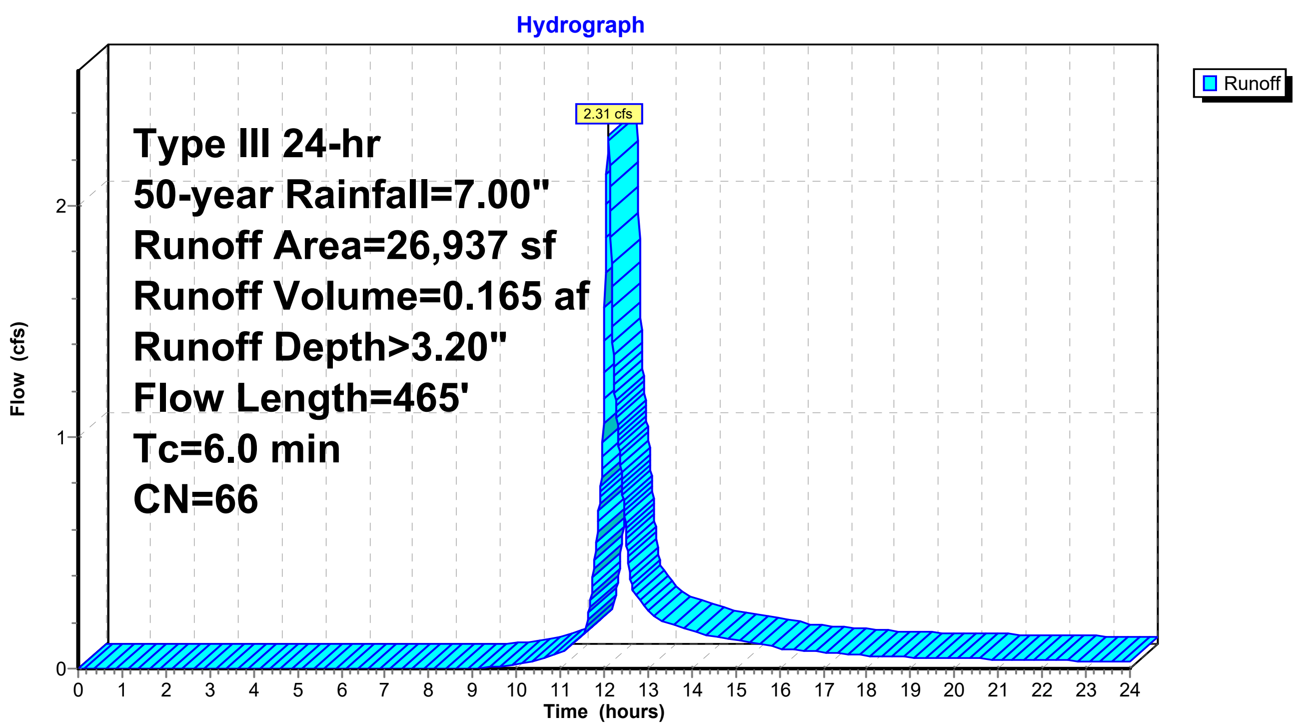
Runoff = 2.31 cfs @ 12.09 hrs, Volume= 0.165 af, Depth> 3.20"
Routed to Pond 6P : Subsurface Infiltration System #2 - ADS StormTech SC-740 Chambers

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 50-year Rainfall=7.00"

Area (sf)	CN	Description
21,116	58	Meadow, non-grazed, HSG B
5,821	96	Gravel surface, HSG B
26,937	66	Weighted Average
26,937		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.4	50	0.0700	0.24		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 3.20"
0.1	17	0.0800	1.98		**Shallow Concentrated Flow, B-C** Short Grass Pasture Kv= 7.0 fps
1.3	398	0.0600	4.97		**Shallow Concentrated Flow, C-D** Paved Kv= 20.3 fps
1.2					**Direct Entry,**
6.0	465	Total			

Subcatchment 6S: Area 6



Summary for Subcatchment 7S: Area 7

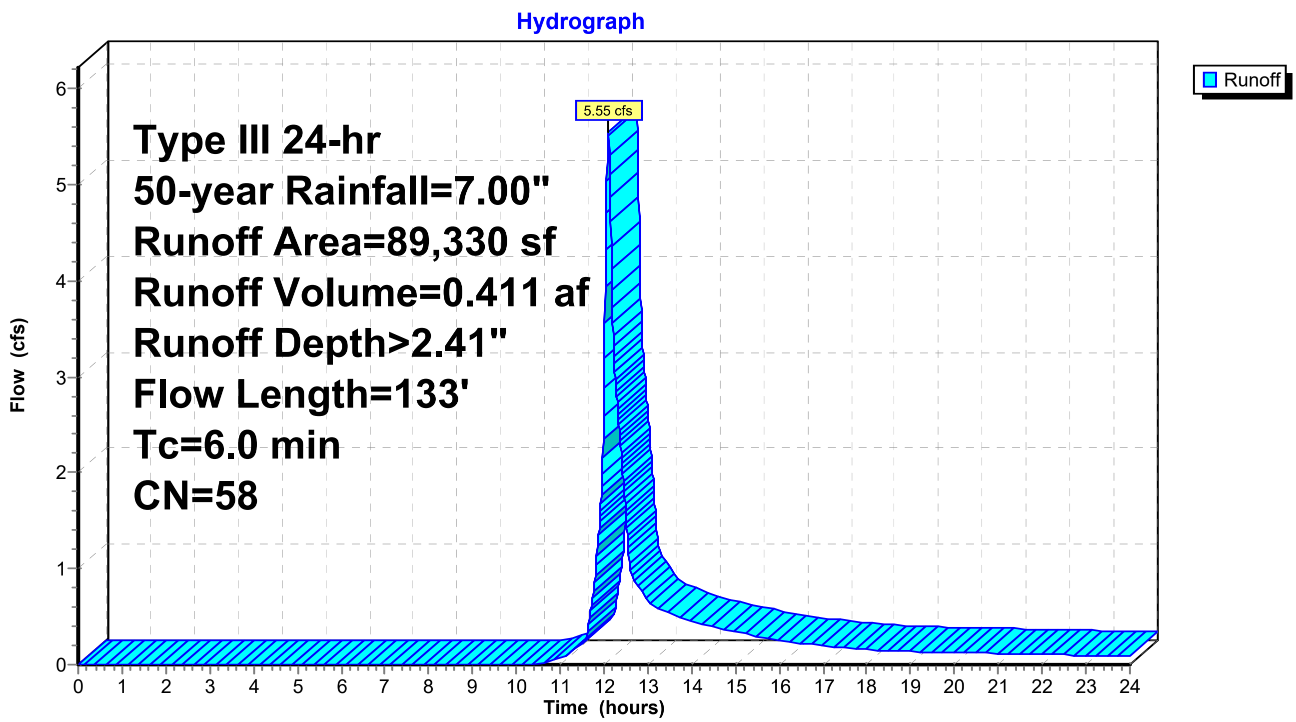
Runoff = 5.55 cfs @ 12.09 hrs, Volume= 0.411 af, Depth> 2.41"
Routed to Pond 7P : Infiltration Basin #1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 50-year Rainfall=7.00"

Area (sf)	CN	Description
89,330	58	Meadow, non-grazed, HSG B
89,330		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.0	50	0.1000	0.28		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 3.20"
0.5	83	0.1700	2.89		**Shallow Concentrated Flow, B-C** Short Grass Pasture Kv= 7.0 fps
2.5					**Direct Entry,**
6.0	133	Total			

Subcatchment 7S: Area 7



Summary for Subcatchment 8S: Area 8

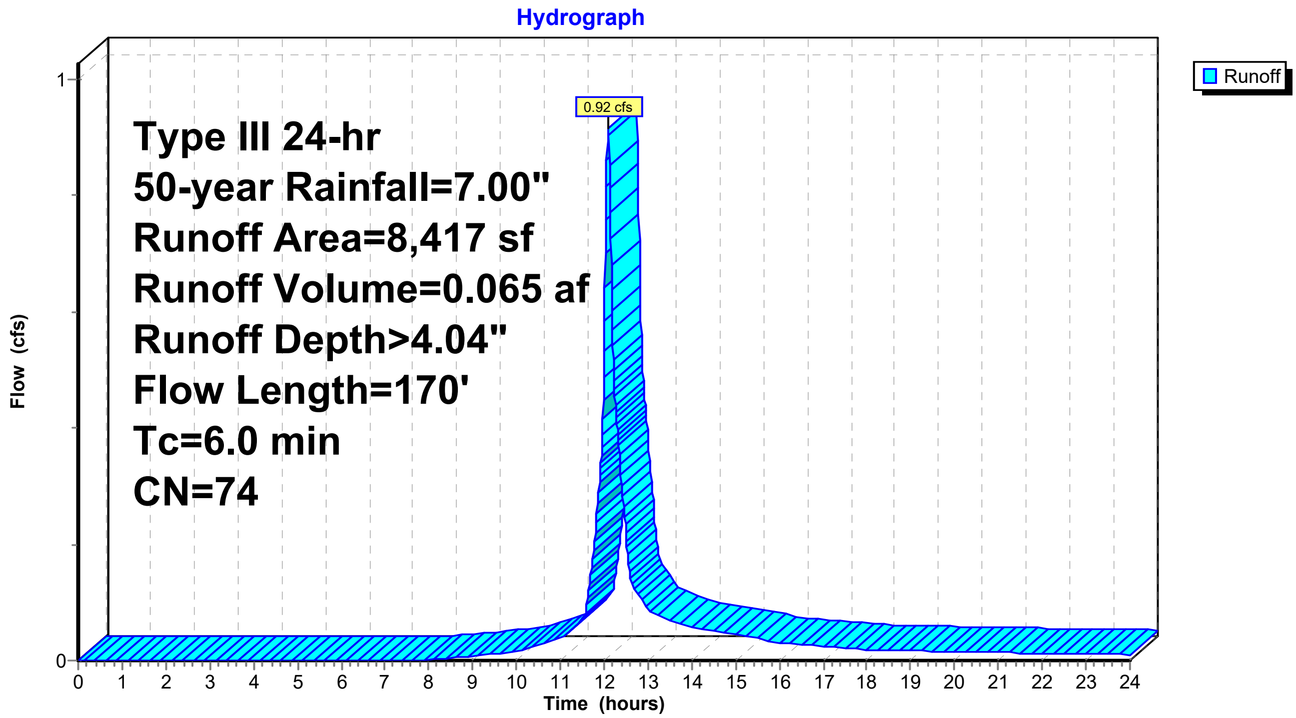
Runoff = 0.92 cfs @ 12.09 hrs, Volume= 0.065 af, Depth> 4.04"
Routed to Pond 8P : Subsurface Infiltration System #3 - ADS StormTech SC-740 Chambers

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 50-year Rainfall=7.00"

Area (sf)	CN	Description
5,095	58	Meadow, non-grazed, HSG B
3,322	98	Paved parking, HSG B
8,417	74	Weighted Average
5,095		60.53% Pervious Area
3,322		39.47% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.6	50	0.0600	0.23		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 3.20"
0.9	97	0.0600	1.71		**Shallow Concentrated Flow, B-C** Short Grass Pasture Kv= 7.0 fps
0.1	23	0.0200	2.87		**Shallow Concentrated Flow, C-D** Paved Kv= 20.3 fps
1.4					**Direct Entry,**
6.0	170	Total			

Subcatchment 8S: Area 8



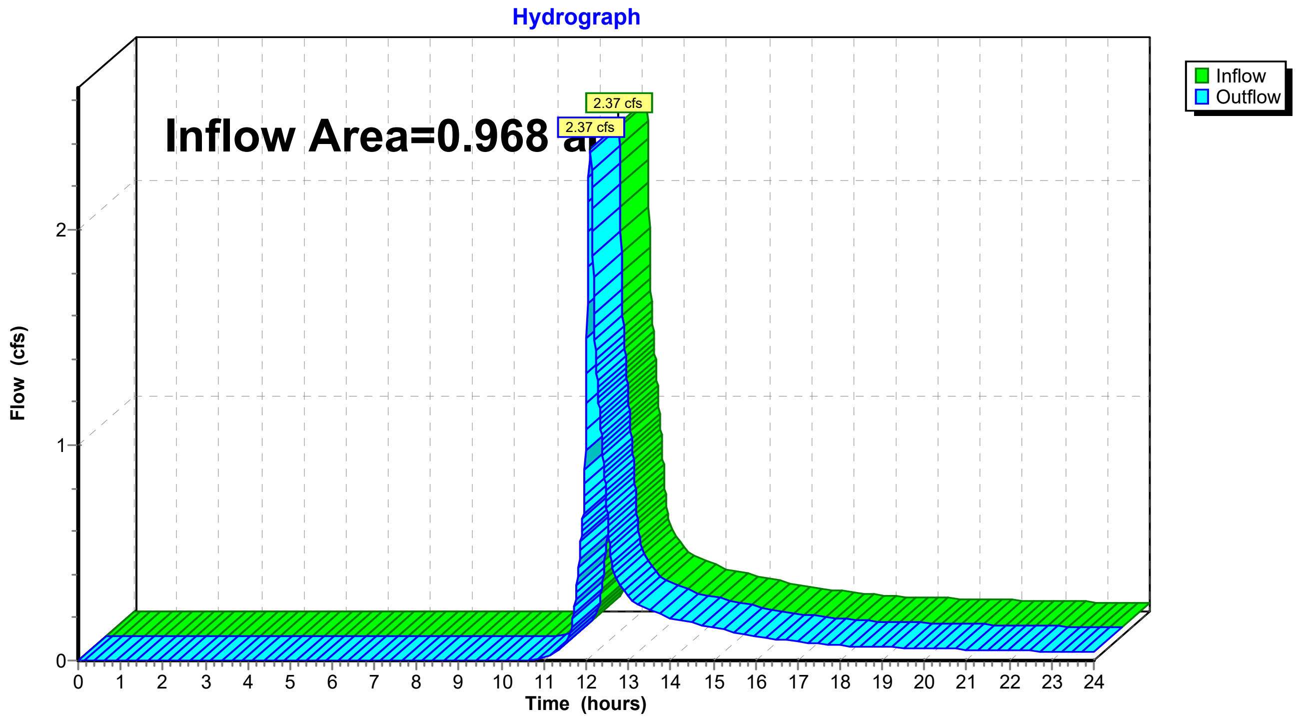
Summary for Reach 1R: Off-site Flow (Wetland Northwest)

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

Inflow Area =	0.968 ac,	0.00% Impervious, Inflow Depth > 2.21"		for 50-year event
Inflow =	2.37 cfs @	12.10 hrs, Volume=	0.179 af	
Outflow =	2.37 cfs @	12.10 hrs, Volume=	0.179 af,	Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 2

Reach 1R: Off-site Flow (Wetland Northwest)



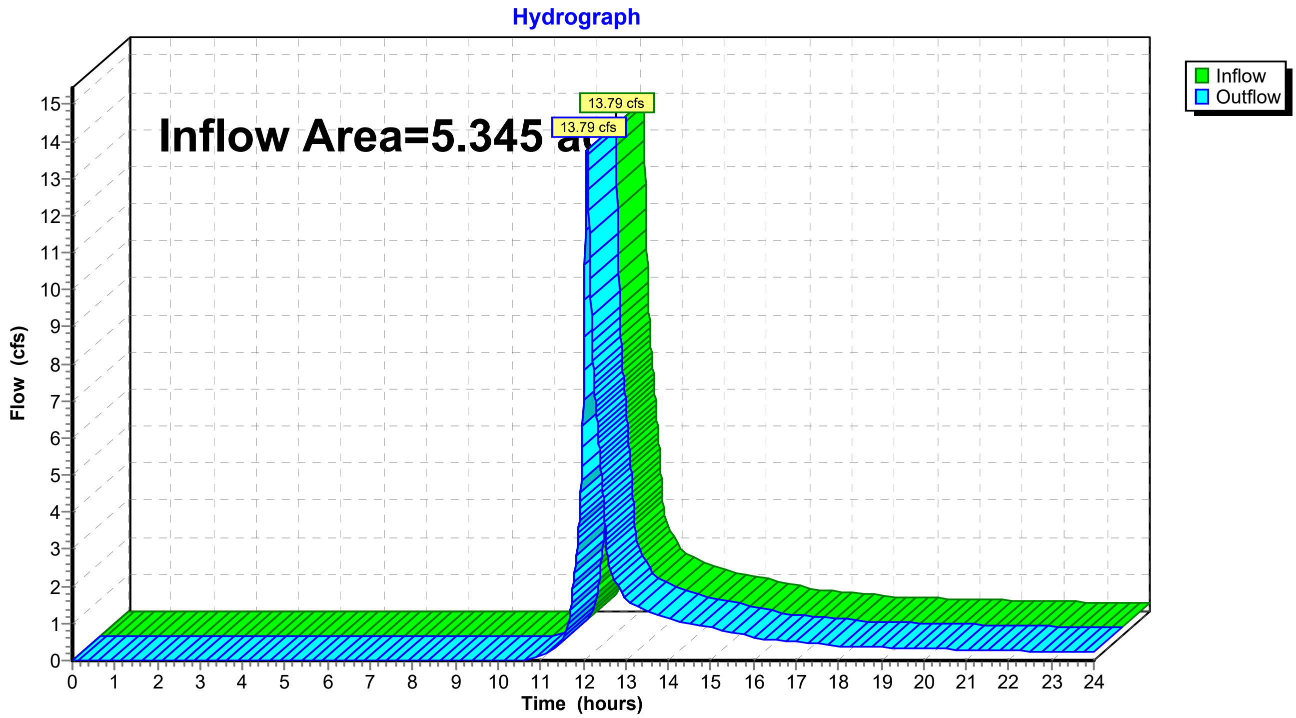
Summary for Reach 2R: Off-site Flow (East)

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

Inflow Area =	5.345 ac,	0.00% Impervious,	Inflow Depth > 2.31"	for 50-year event
Inflow =	13.79 cfs @	12.10 hrs, Volume=	1.029 af	
Outflow =	13.79 cfs @	12.10 hrs, Volume=	1.029 af, Atten= 0%, Lag= 0.0 min	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 2

Reach 2R: Off-site Flow (East)



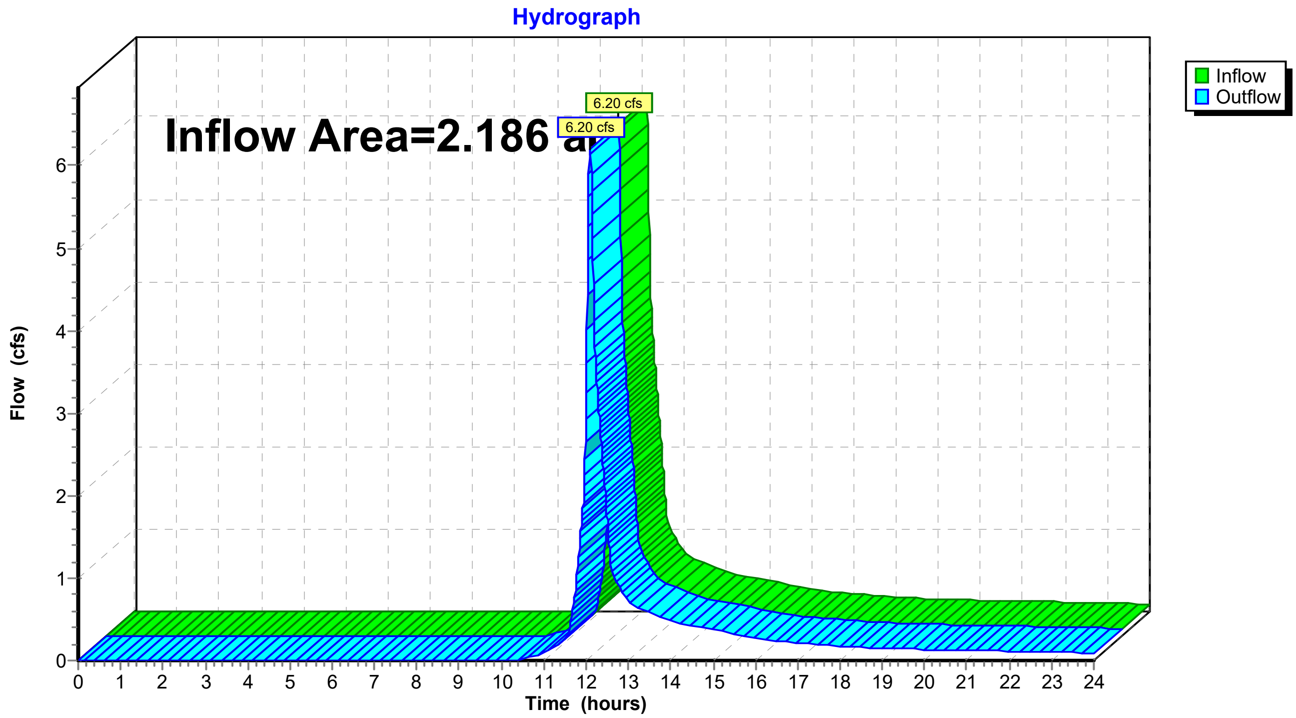
Summary for Reach 3R: Off-site Flow (Route 15)

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

Inflow Area = 2.186 ac, 0.72% Impervious, Inflow Depth > 2.50" for 50-year event
Inflow = 6.20 cfs @ 12.09 hrs, Volume= 0.456 af
Outflow = 6.20 cfs @ 12.09 hrs, Volume= 0.456 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 2

Reach 3R: Off-site Flow (Route 15)



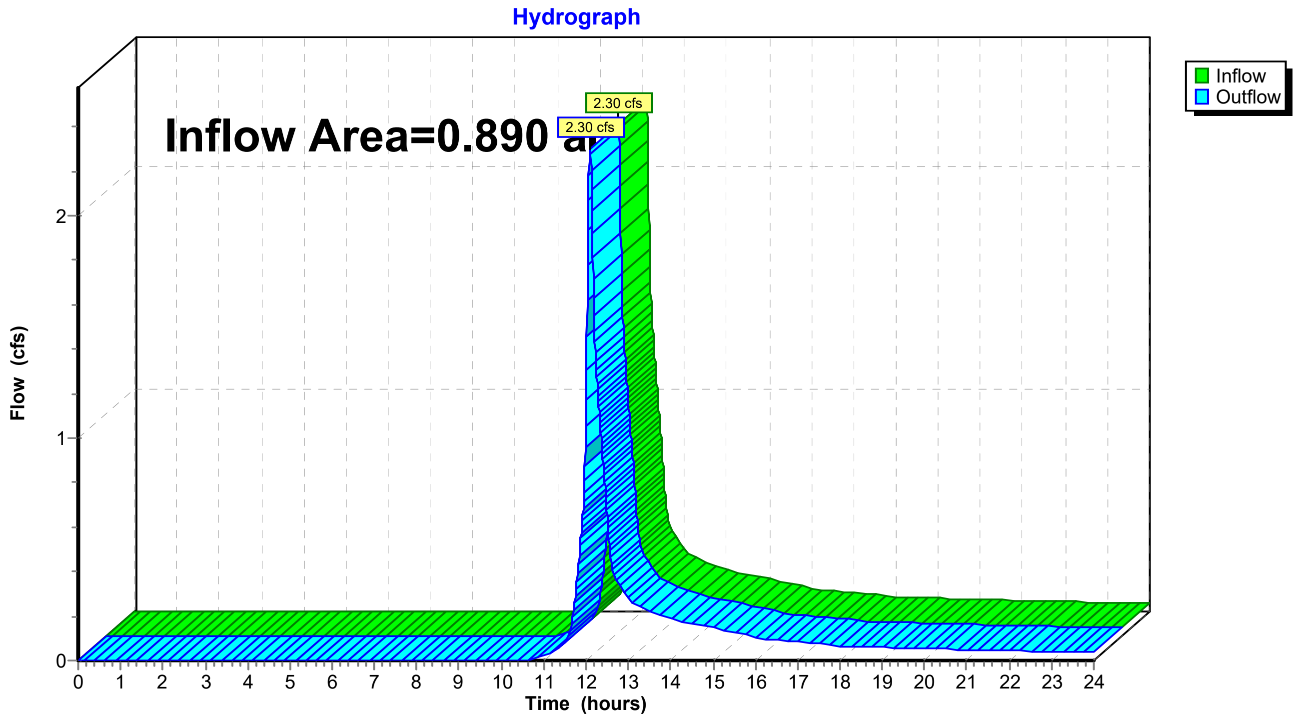
Summary for Reach 4R: Off-site flow (South)

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

Inflow Area =	0.890 ac,	0.00% Impervious, Inflow Depth > 2.31"	for 50-year event
Inflow =	2.30 cfs @	12.10 hrs, Volume=	0.171 af
Outflow =	2.30 cfs @	12.10 hrs, Volume=	0.171 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 2

Reach 4R: Off-site flow (South)



Summary for Pond 5P: Subsurface Infiltration System #1 - ADS StormTech SC-740 Chambers

[87] Warning: Oscillations may require smaller dt or Finer Routing (severity=65)

Inflow Area = 1.665 ac, 0.00% Impervious, Inflow Depth > 3.20" for 50-year event
Inflow = 6.21 cfs @ 12.09 hrs, Volume= 0.444 af
Outflow = 0.58 cfs @ 13.20 hrs, Volume= 0.444 af, Atten= 91%, Lag= 66.7 min
Discarded = 0.58 cfs @ 13.20 hrs, Volume= 0.444 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 682.84' @ 13.20 hrs Surf.Area= 4,924 sf Storage= 7,935 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 149.0 min (988.0 - 838.9)

Volume	Invert	Avail.Storage	Storage Description
#1A	680.50'	4,394 cf	**39.50'W x 124.66'L x 3.50'H Field A** 17,234 cf Overall - 6,248 cf Embedded = 10,986 cf x 40.0% Voids
#2A	681.00'	6,248 cf	**ADS_StormTech SC-740 +Cap** x 136 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 136 Chambers in 8 Rows
		10,642 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	680.50'	**2.410 in/hr Exfiltration over Horizontal area** Conductivity to Groundwater Elevation = 678.40'

Discarded OutFlow Max=0.58 cfs @ 13.20 hrs HW=682.84' (Free Discharge)
↑—**1=Exfiltration** (Controls 0.58 cfs)

Pond 5P: Subsurface Infiltration System #1 - ADS StormTech SC-740 Chambers - Chamber Wizard Fiel

Chamber Model = ADS_StormTechSC-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

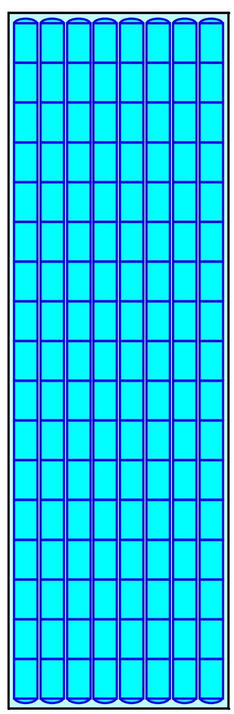
17 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 122.66' Row Length +12.0" End Stone x 2 = 124.66' Base Length
8 Rows x 51.0" Wide + 6.0" Spacing x 7 + 12.0" Side Stone x 2 = 39.50' Base Width
6.0" Stone Base + 30.0" Chamber Height + 6.0" Stone Cover = 3.50' Field Height

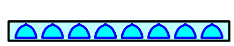
136 Chambers x 45.9 cf = 6,247.8 cf Chamber Storage

17,233.8 cf Field - 6,247.8 cf Chambers = 10,985.9 cf Stone x 40.0% Voids = 4,394.4 cf Stone Storage

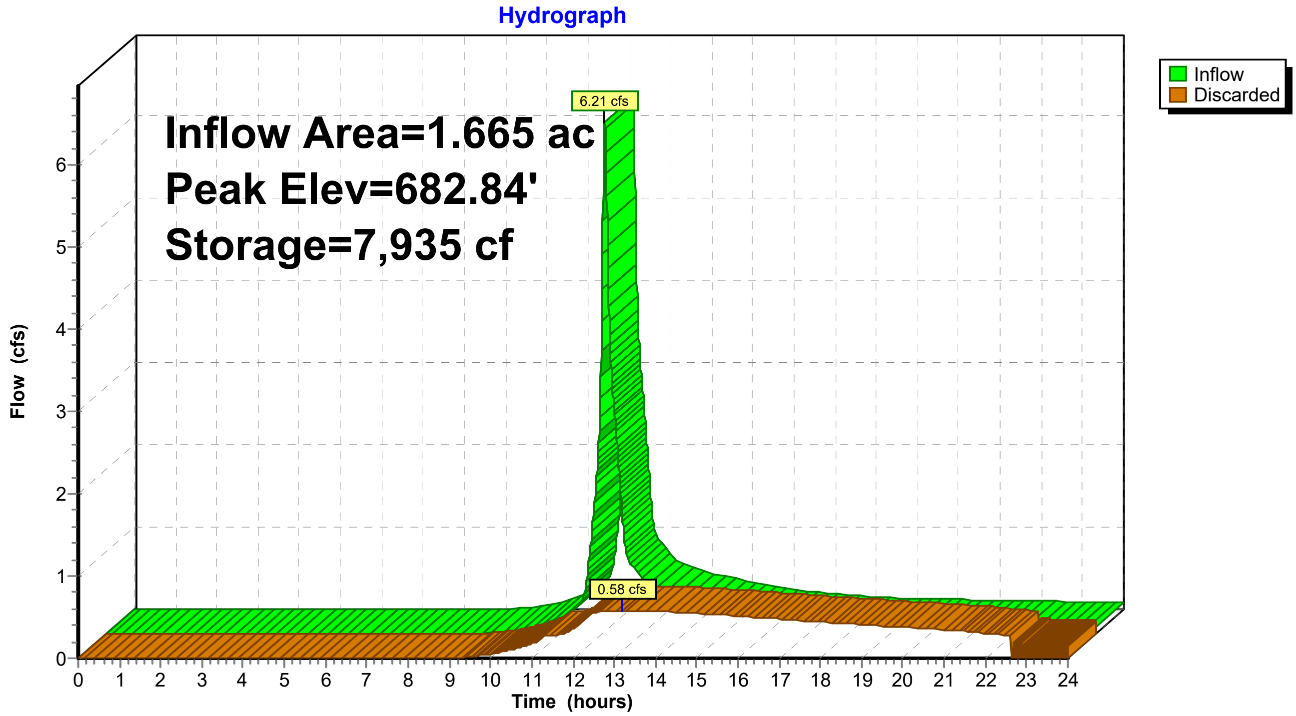
Chamber Storage + Stone Storage = 10,642.2 cf = 0.244 af
Overall Storage Efficiency = 61.8%
Overall System Size = 124.66' x 39.50' x 3.50'

136 Chambers
638.3 cy Field
406.9 cy Stone





Pond 5P: Subsurface Infiltration System #1 - ADS StormTech SC-740 Chambers



Summary for Pond 6P: Subsurface Infiltration System #2 - ADS StormTech SC-740 Chambers

[87] Warning: Oscillations may require smaller dt or Finer Routing (severity=37)

Inflow Area = 0.618 ac, 0.00% Impervious, Inflow Depth > 3.20" for 50-year event
Inflow = 2.31 cfs @ 12.09 hrs, Volume= 0.165 af
Outflow = 0.20 cfs @ 13.37 hrs, Volume= 0.165 af, Atten= 91%, Lag= 76.6 min
Discarded = 0.20 cfs @ 13.37 hrs, Volume= 0.165 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 713.45' @ 13.37 hrs Surf.Area= 1,817 sf Storage= 2,999 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 161.0 min (1,000.0 - 838.9)

Volume	Invert	Avail.Storage	Storage Description
#1A	711.00'	1,662 cf	**30.00'W x 60.58'L x 3.50'H Field A** 6,361 cf Overall - 2,205 cf Embedded = 4,155 cf x 40.0% Voids
#2A	711.50'	2,205 cf	**ADS_StormTech SC-740 +Cap** x 48 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 48 Chambers in 6 Rows
		3,867 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	711.00'	**2.410 in/hr Exfiltration over Horizontal area** Conductivity to Groundwater Elevation = 708.60'

Discarded OutFlow Max=0.20 cfs @ 13.37 hrs HW=713.45' (Free Discharge)
└─**1=Exfiltration** (Controls 0.20 cfs)

Pond 6P: Subsurface Infiltration System #2 - ADS StormTech SC-740 Chambers - Chamber Wizard Fiel

Chamber Model = ADS_StormTechSC-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

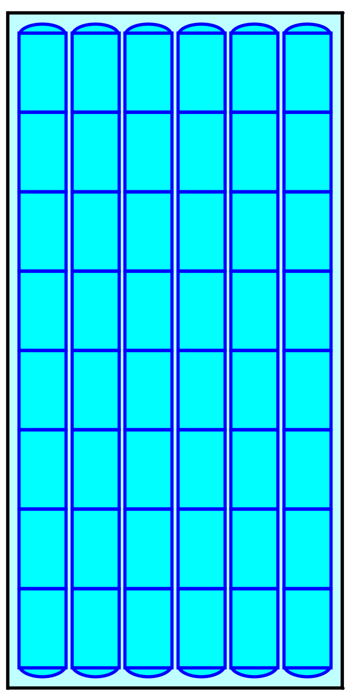
8 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 58.58' Row Length +12.0" End Stone x 2 = 60.58' Base Length
6 Rows x 51.0" Wide + 6.0" Spacing x 5 + 12.0" Side Stone x 2 = 30.00' Base Width
6.0" Stone Base + 30.0" Chamber Height + 6.0" Stone Cover = 3.50' Field Height

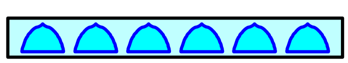
48 Chambers x 45.9 cf = 2,205.1 cf Chamber Storage

6,360.6 cf Field - 2,205.1 cf Chambers = 4,155.4 cf Stone x 40.0% Voids = 1,662.2 cf Stone Storage

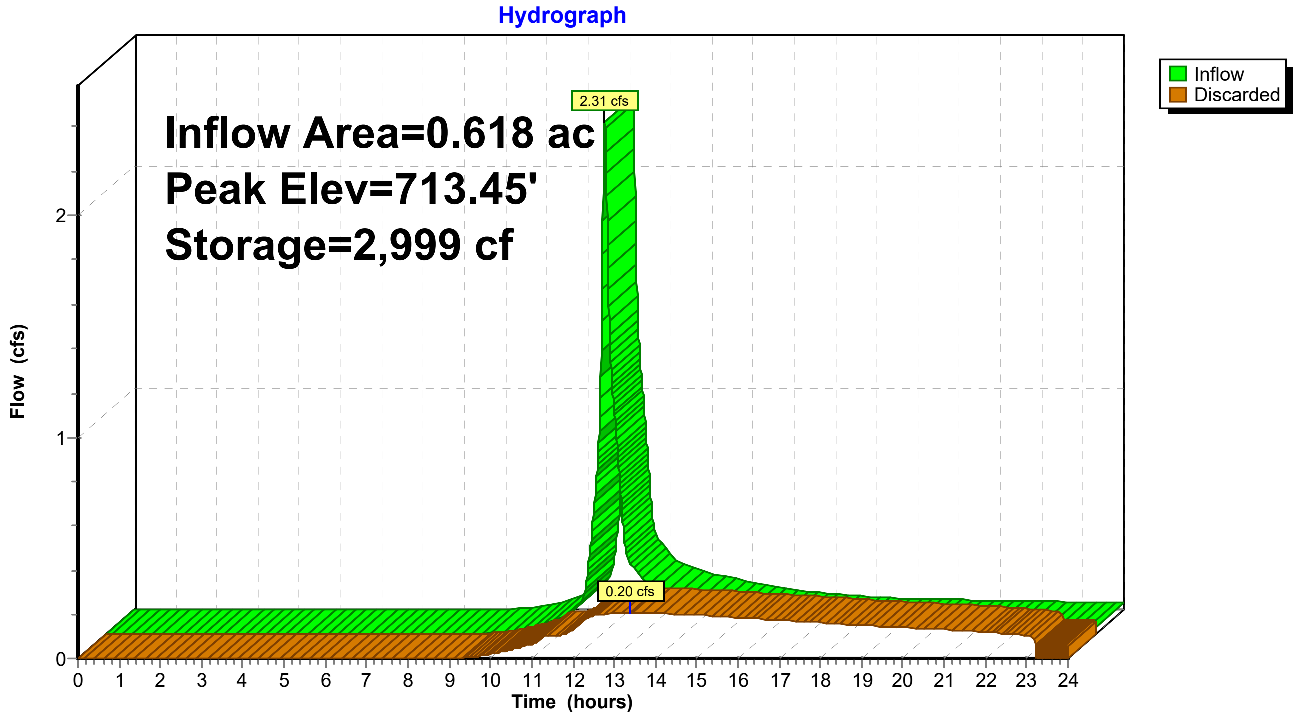
Chamber Storage + Stone Storage = 3,867.3 cf = 0.089 af
Overall Storage Efficiency = 60.8%
Overall System Size = 60.58' x 30.00' x 3.50'

48 Chambers
235.6 cy Field
153.9 cy Stone





Pond 6P: Subsurface Infiltration System #2 - ADS StormTech SC-740 Chambers



Summary for Pond 7P: Infiltration Basin #1

[87] Warning: Oscillations may require smaller dt or Finer Routing (severity=436)

Inflow Area = 2.051 ac, 0.00% Impervious, Inflow Depth > 2.41" for 50-year event
Inflow = 5.55 cfs @ 12.09 hrs, Volume= 0.411 af
Outflow = 1.11 cfs @ 12.57 hrs, Volume= 0.411 af, Atten= 80%, Lag= 28.7 min
Discarded = 1.11 cfs @ 12.57 hrs, Volume= 0.411 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 704.28' @ 12.57 hrs Surf.Area= 17,543 sf Storage= 4,659 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 29.2 min (886.7 - 857.5)

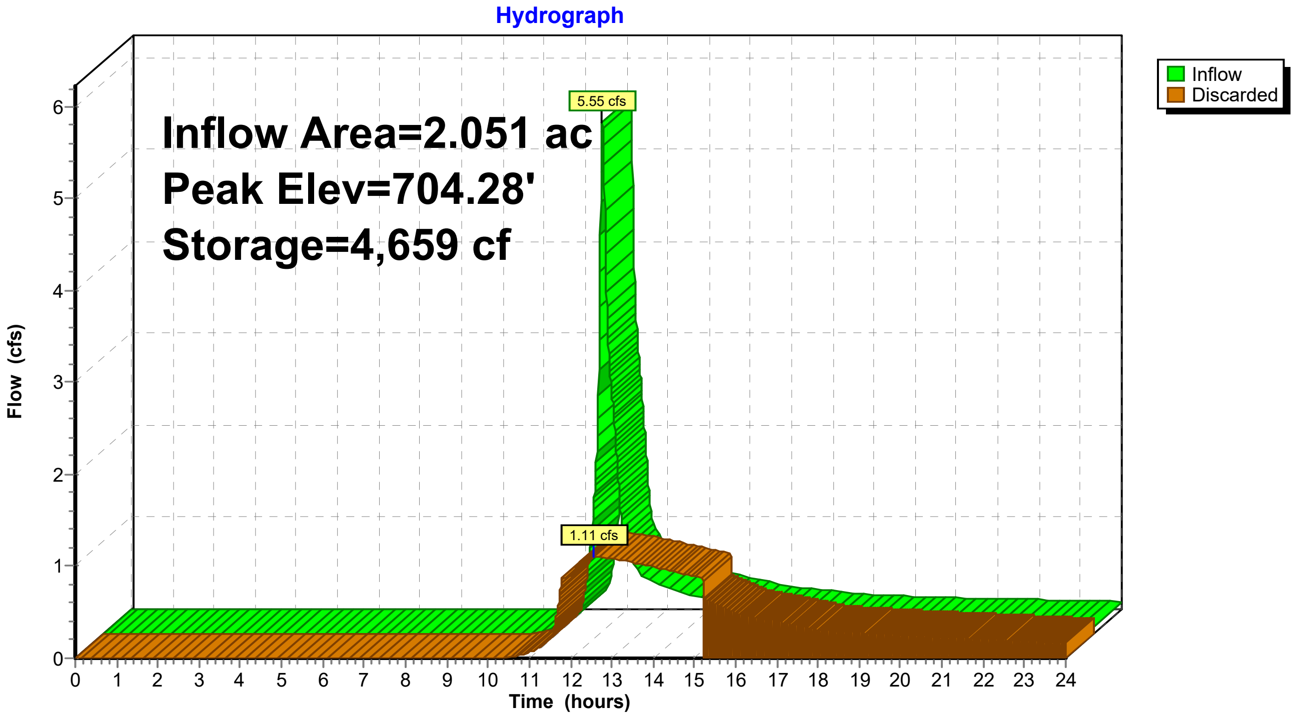
Volume	Invert	Avail.Storage	Storage Description
#1	704.00'	19,192 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
704.00	15,599	1,219.0	0	0	15,599
705.00	23,026	1,256.7	19,192	19,192	23,129

Device	Routing	Invert	Outlet Devices
#1	Discarded	704.00'	**2.410 in/hr Exfiltration over Horizontal area** Conductivity to Groundwater Elevation = 702.00'

Discarded OutFlow Max=1.11 cfs @ 12.57 hrs HW=704.28' (Free Discharge)
└─**1=Exfiltration** (Controls 1.11 cfs)

Pond 7P: Infiltration Basin #1



Summary for Pond 8P: Subsurface Infiltration System #3 - ADS StormTech SC-740 Chambers

[87] Warning: Oscillations may require smaller dt or Finer Routing (severity=133)

Inflow Area = 0.193 ac, 39.47% Impervious, Inflow Depth > 4.04" for 50-year event
Inflow = 0.92 cfs @ 12.09 hrs, Volume= 0.065 af
Outflow = 0.09 cfs @ 13.00 hrs, Volume= 0.065 af, Atten= 90%, Lag= 54.8 min
Discarded = 0.09 cfs @ 13.00 hrs, Volume= 0.065 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 679.40' @ 13.00 hrs Surf.Area= 804 sf Storage= 1,146 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 128.2 min (949.5 - 821.2)

Volume	Invert	Avail.Storage	Storage Description
#1A	677.25'	758 cf	**20.50'W x 39.22'L x 3.50'H Field A** 2,814 cf Overall - 919 cf Embedded = 1,895 cf x 40.0% Voids
#2A	677.75'	919 cf	**ADS_StormTech SC-740 +Cap** x 20 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 20 Chambers in 4 Rows
		1,677 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	677.25'	**2.410 in/hr Exfiltration over Horizontal area** Conductivity to Groundwater Elevation = 675.10'

Discarded OutFlow Max=0.09 cfs @ 13.00 hrs HW=679.40' (Free Discharge)
1=Exfiltration (Controls 0.09 cfs)

Pond 8P: Subsurface Infiltration System #3 - ADS StormTech SC-740 Chambers - Chamber Wizard Fiel

Chamber Model = ADS_StormTechSC-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

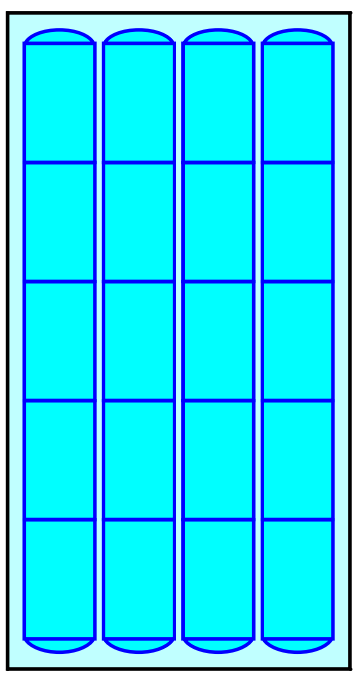
5 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 37.22' Row Length +12.0" End Stone x 2 = 39.22' Base Length
4 Rows x 51.0" Wide + 6.0" Spacing x 3 + 12.0" Side Stone x 2 = 20.50' Base Width
6.0" Stone Base + 30.0" Chamber Height + 6.0" Stone Cover = 3.50' Field Height

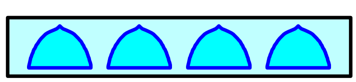
20 Chambers x 45.9 cf = 918.8 cf Chamber Storage

2,813.8 cf Field - 918.8 cf Chambers = 1,895.0 cf Stone x 40.0% Voids = 758.0 cf Stone Storage

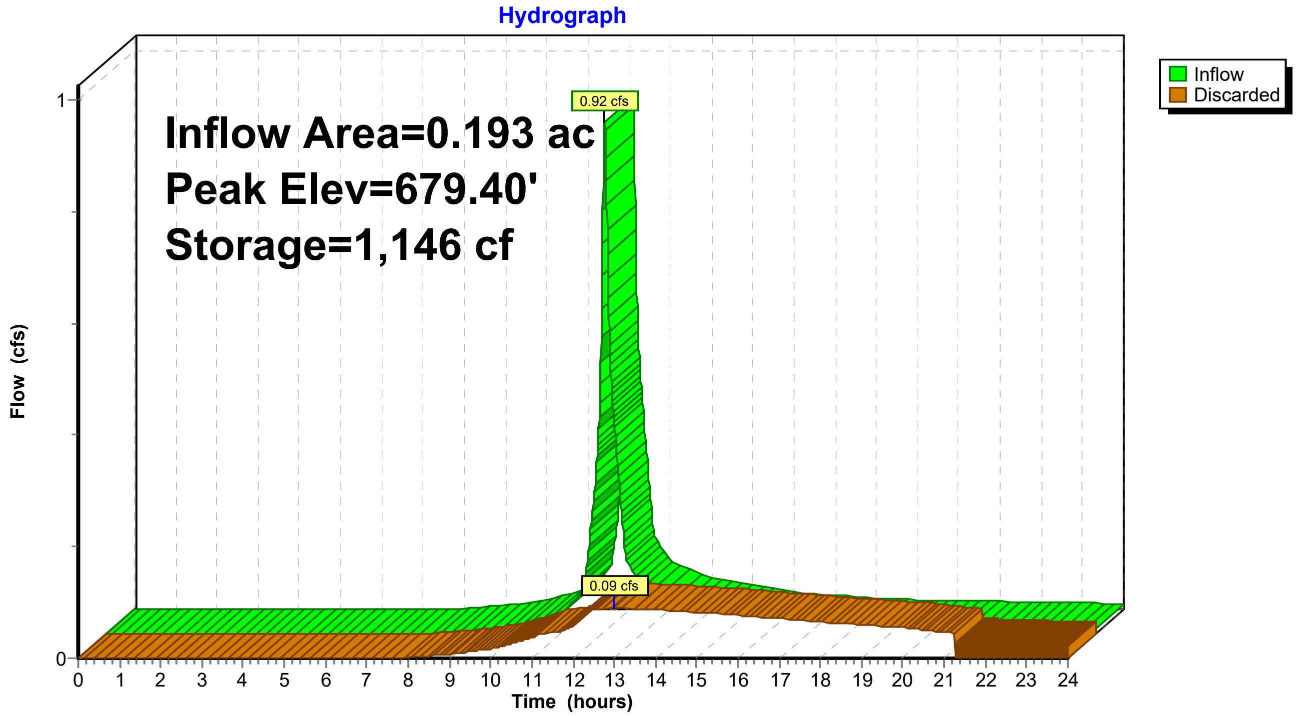
Chamber Storage + Stone Storage = 1,676.8 cf = 0.038 af
Overall Storage Efficiency = 59.6%
Overall System Size = 39.22' x 20.50' x 3.50'

20 Chambers
104.2 cy Field
70.2 cy Stone





Pond 8P: Subsurface Infiltration System #3 - ADS StormTech SC-740 Chambers



Time span=0.00-24.00 hrs, dt=0.01 hrs, 2401 points x 2
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment1S: Area 1 Runoff Area=42,152 sf 0.00% Impervious Runoff Depth>2.83"
Flow Length=350' Tc=6.0 min CN=56 Runoff=3.11 cfs 0.228 af

Subcatchment2S: Area 2 Runoff Area=232,817 sf 0.00% Impervious Runoff Depth>2.94"
Flow Length=283' Tc=6.0 min CN=57 Runoff=17.92 cfs 1.310 af

Subcatchment3S: Area 3 Runoff Area=95,234 sf 0.72% Impervious Runoff Depth>3.16"
Flow Length=68' Tc=6.0 min CN=59 Runoff=7.95 cfs 0.576 af

Subcatchment4S: Area 4 Runoff Area=38,773 sf 0.00% Impervious Runoff Depth>2.94"
Flow Length=132' Tc=6.0 min CN=57 Runoff=2.98 cfs 0.218 af

Subcatchment5S: Area 5 Runoff Area=72,521 sf 0.00% Impervious Runoff Depth>3.94"
Flow Length=385' Tc=6.0 min CN=66 Runoff=7.68 cfs 0.546 af

Subcatchment6S: Area 6 Runoff Area=26,937 sf 0.00% Impervious Runoff Depth>3.94"
Flow Length=465' Tc=6.0 min CN=66 Runoff=2.85 cfs 0.203 af

Subcatchment7S: Area 7 Runoff Area=89,330 sf 0.00% Impervious Runoff Depth>3.05"
Flow Length=133' Tc=6.0 min CN=58 Runoff=7.17 cfs 0.521 af

Subcatchment8S: Area 8 Runoff Area=8,417 sf 39.47% Impervious Runoff Depth>4.85"
Flow Length=170' Tc=6.0 min CN=74 Runoff=1.10 cfs 0.078 af

Reach 1R: Off-site Flow (Wetland Northwest) Inflow=3.11 cfs 0.228 af
Outflow=3.11 cfs 0.228 af

Reach 2R: Off-site Flow (East) Inflow=17.92 cfs 1.310 af
Outflow=17.92 cfs 1.310 af

Reach 3R: Off-site Flow (Route 15) Inflow=7.95 cfs 0.576 af
Outflow=7.95 cfs 0.576 af

Reach 4R: Off-site flow (South) Inflow=2.98 cfs 0.218 af
Outflow=2.98 cfs 0.218 af

Pond 5P: Subsurface Infiltration System #1 Peak Elev=683.75' Storage=10,155 cf Inflow=7.68 cfs 0.546 af
Outflow=0.70 cfs 0.543 af

Pond 6P: Subsurface Infiltration System #2 - Peak Elev=714.45' Storage=3,833 cf Inflow=2.85 cfs 0.203 af
Outflow=0.25 cfs 0.198 af

Pond 7P: Infiltration Basin #1 Peak Elev=704.40' Storage=6,712 cf Inflow=7.17 cfs 0.521 af
Outflow=1.21 cfs 0.521 af

Pond 8P: Subsurface Infiltration System #3 - Peak Elev=680.00' Storage=1,431 cf Inflow=1.10 cfs 0.078 af
Outflow=0.10 cfs 0.078 af

Total Runoff Area = 13.916 ac Runoff Volume = 3.681 af Average Runoff Depth = 3.17"
99.34% Pervious = 13.824 ac 0.66% Impervious = 0.092 ac

Summary for Subcatchment 1S: Area 1

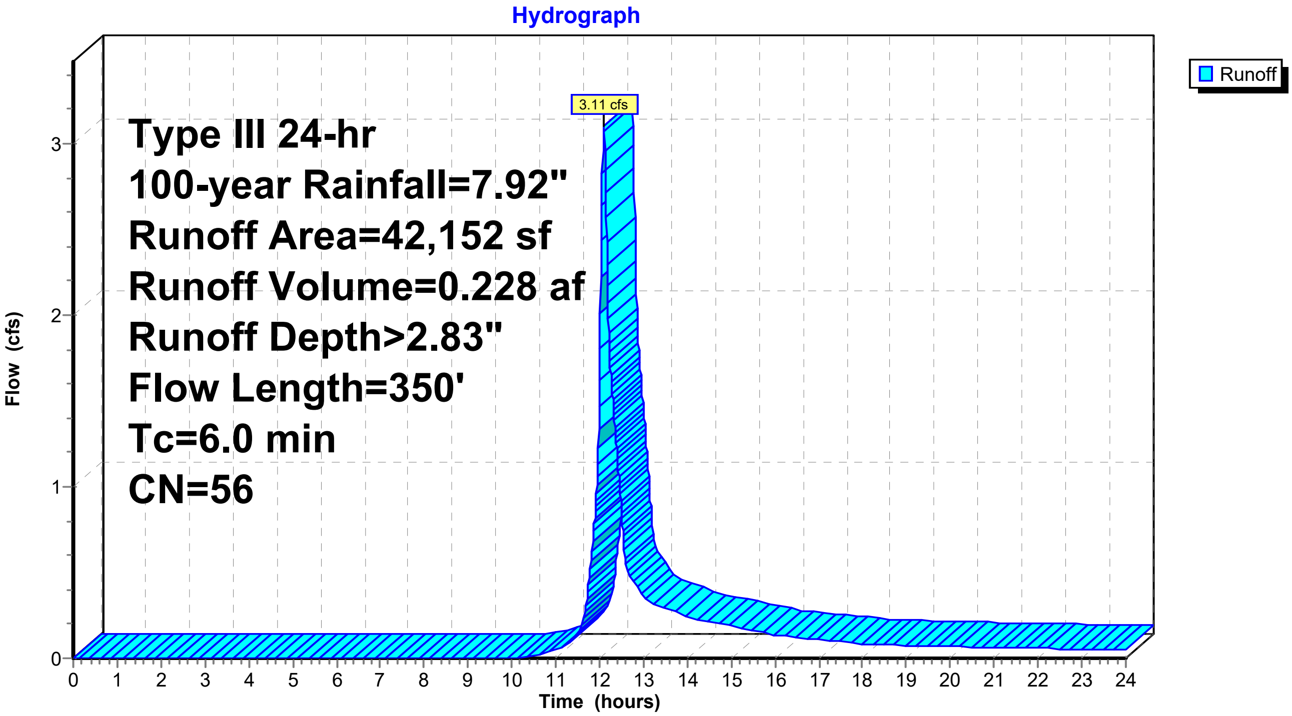
Runoff = 3.11 cfs @ 12.09 hrs, Volume= 0.228 af, Depth> 2.83"
Routed to Reach 1R : Off-site Flow (Wetland Northwest)

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-year Rainfall=7.92"

Area (sf)	CN	Description
15,269	58	Meadow, non-grazed, HSG B
26,883	55	Woods, Good, HSG B
42,152	56	Weighted Average
42,152		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.4	50	0.0700	0.24		**Sheet Flow, A-B**
					Grass: Short n= 0.150 P2= 3.20"
0.8	122	0.1420	2.64		**Shallow Concentrated Flow, B-C**
					Short Grass Pasture Kv= 7.0 fps
0.3	45	0.1420	2.64		**Shallow Concentrated Flow, C-D**
					Short Grass Pasture Kv= 7.0 fps
1.1	133	0.1500	1.94		**Shallow Concentrated Flow, D-E**
					Woodland Kv= 5.0 fps
0.4					**Direct Entry,**
6.0	350	Total			

Subcatchment 1S: Area 1



Summary for Subcatchment 2S: Area 2

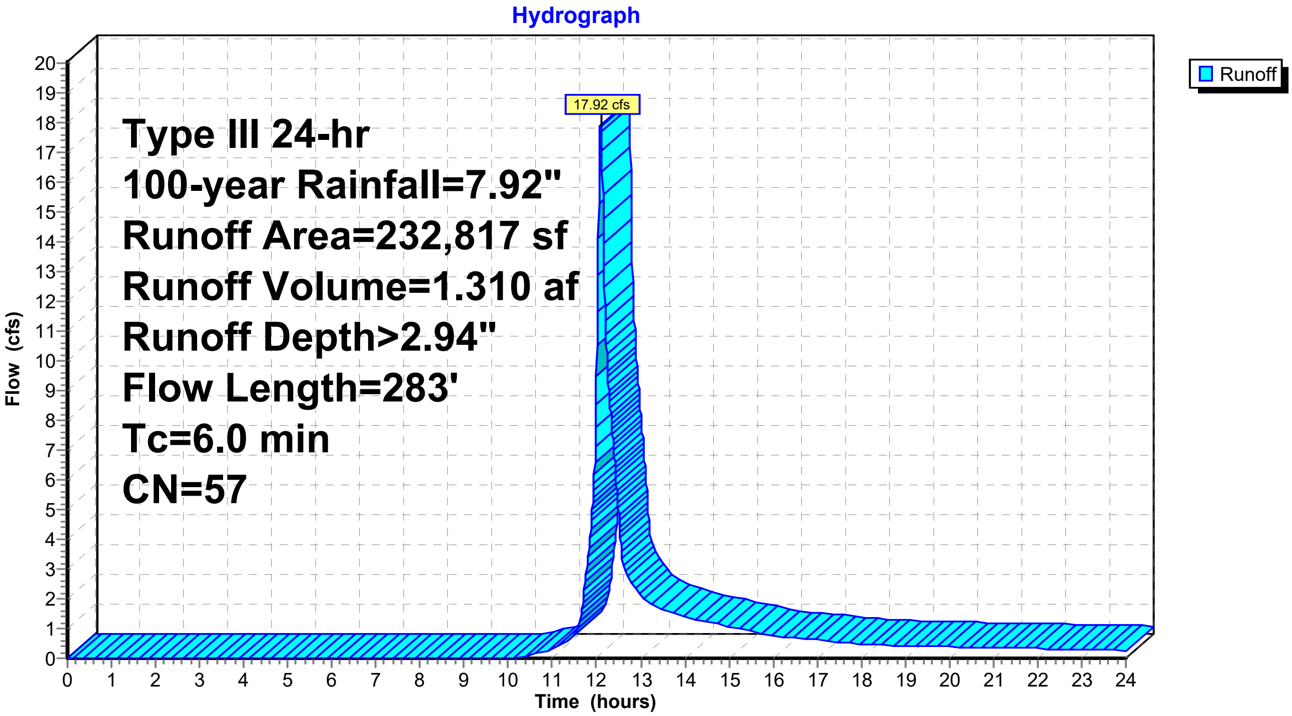
Runoff = 17.92 cfs @ 12.09 hrs, Volume= 1.310 af, Depth> 2.94"
Routed to Reach 2R : Off-site Flow (East)

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-year Rainfall=7.92"

Area (sf)	CN	Description
119,060	58	Meadow, non-grazed, HSG B
113,757	55	Woods, Good, HSG B
232,817	57	Weighted Average
232,817		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.1	50	0.0900	0.27		**Sheet Flow, A-B**
					Grass: Short n= 0.150 P2= 3.20"
0.5	67	0.0900	2.10		**Shallow Concentrated Flow, B-C**
					Short Grass Pasture Kv= 7.0 fps
0.5	116	0.2800	3.70		**Shallow Concentrated Flow, C-D**
					Short Grass Pasture Kv= 7.0 fps
0.3	50	0.4300	3.28		**Shallow Concentrated Flow, D-E**
					Woodland Kv= 5.0 fps
1.6					**Direct Entry,**
6.0	283	Total			

Subcatchment 2S: Area 2



Summary for Subcatchment 3S: Area 3

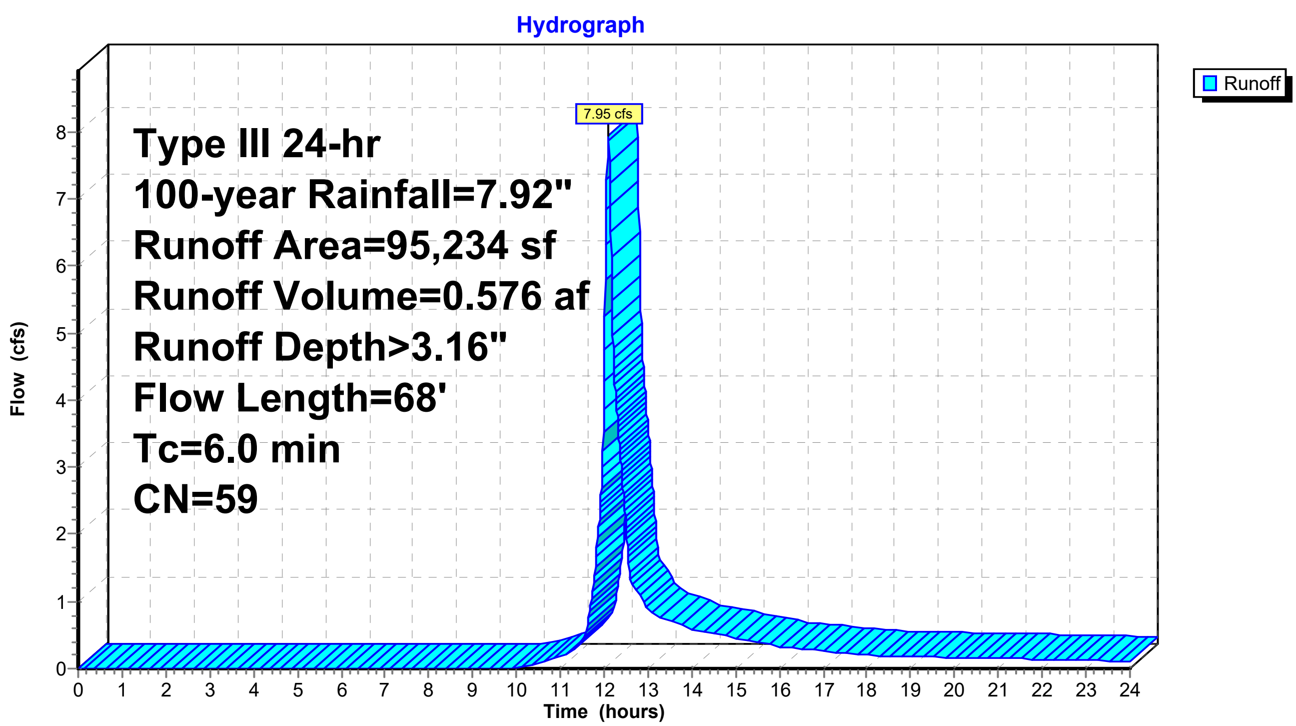
Runoff = 7.95 cfs @ 12.09 hrs, Volume= 0.576 af, Depth> 3.16"
Routed to Reach 3R : Off-site Flow (Route 15)

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-year Rainfall=7.92"

Area (sf)	CN	Description
30,543	55	Woods, Good, HSG B
682	98	Paved parking, HSG B
2,653	58	Meadow, non-grazed, HSG B
61,356	61	>75% Grass cover, Good, HSG B
95,234	59	Weighted Average
94,552		99.28% Pervious Area
682		0.72% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.8	50	0.1300	0.14		**Sheet Flow, A-B**
					Woods: Light underbrush n= 0.400 P2= 3.20"
0.2	18	0.1100	1.66		**Shallow Concentrated Flow, B-C**
					Woodland Kv= 5.0 fps
6.0	68	Total			

Subcatchment 3S: Area 3



Summary for Subcatchment 4S: Area 4

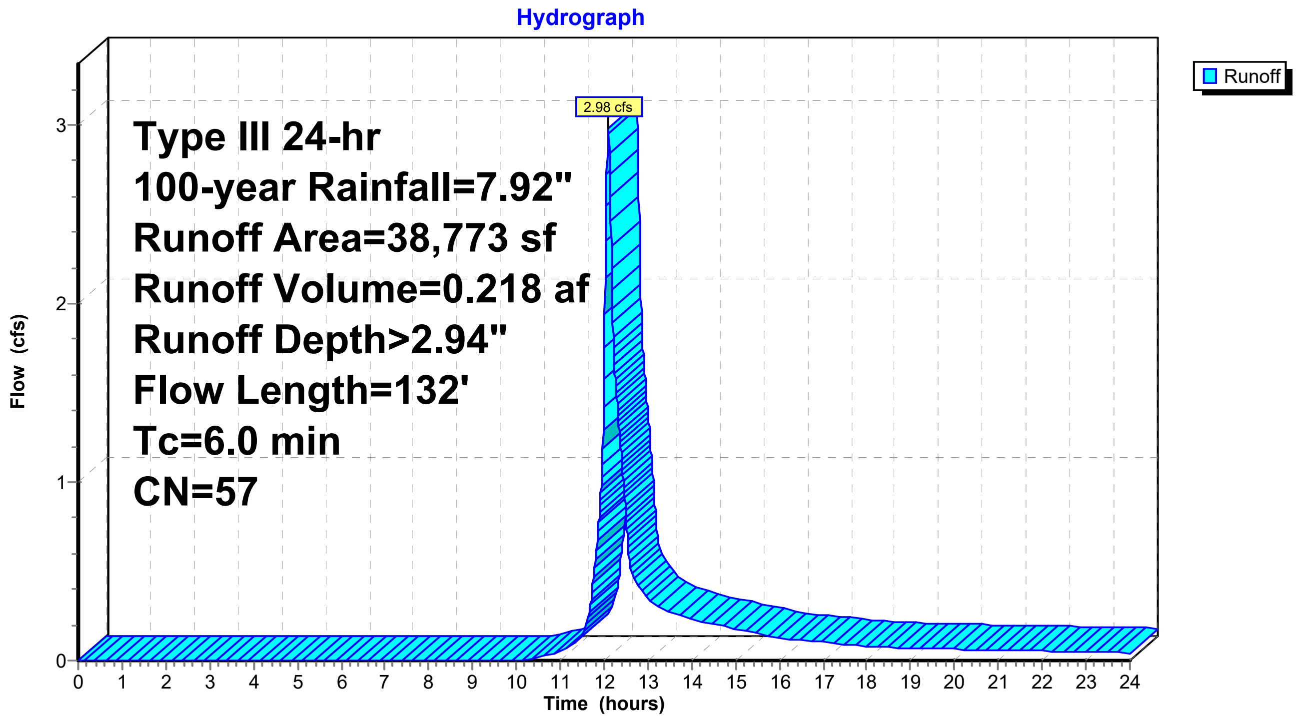
Runoff = 2.98 cfs @ 12.09 hrs, Volume= 0.218 af, Depth> 2.94"
Routed to Reach 4R : Off-site flow (South)

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-year Rainfall=7.92"

Area (sf)	CN	Description
3,172	58	Meadow, non-grazed, HSG B
24,335	55	Woods, Good, HSG B
11,266	61	>75% Grass cover, Good, HSG B
38,773	57	Weighted Average
38,773		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.7	50	0.1500	0.23		**Sheet Flow, A-B** Grass: Dense n= 0.240 P2= 3.20"
0.1	27	0.3100	3.90		**Shallow Concentrated Flow, B-C** Short Grass Pasture Kv= 7.0 fps
0.5	55	0.1500	1.94		**Shallow Concentrated Flow, C-D** Woodland Kv= 5.0 fps
1.7					**Direct Entry,**
6.0	132	Total			

Subcatchment 4S: Area 4



Summary for Subcatchment 5S: Area 5

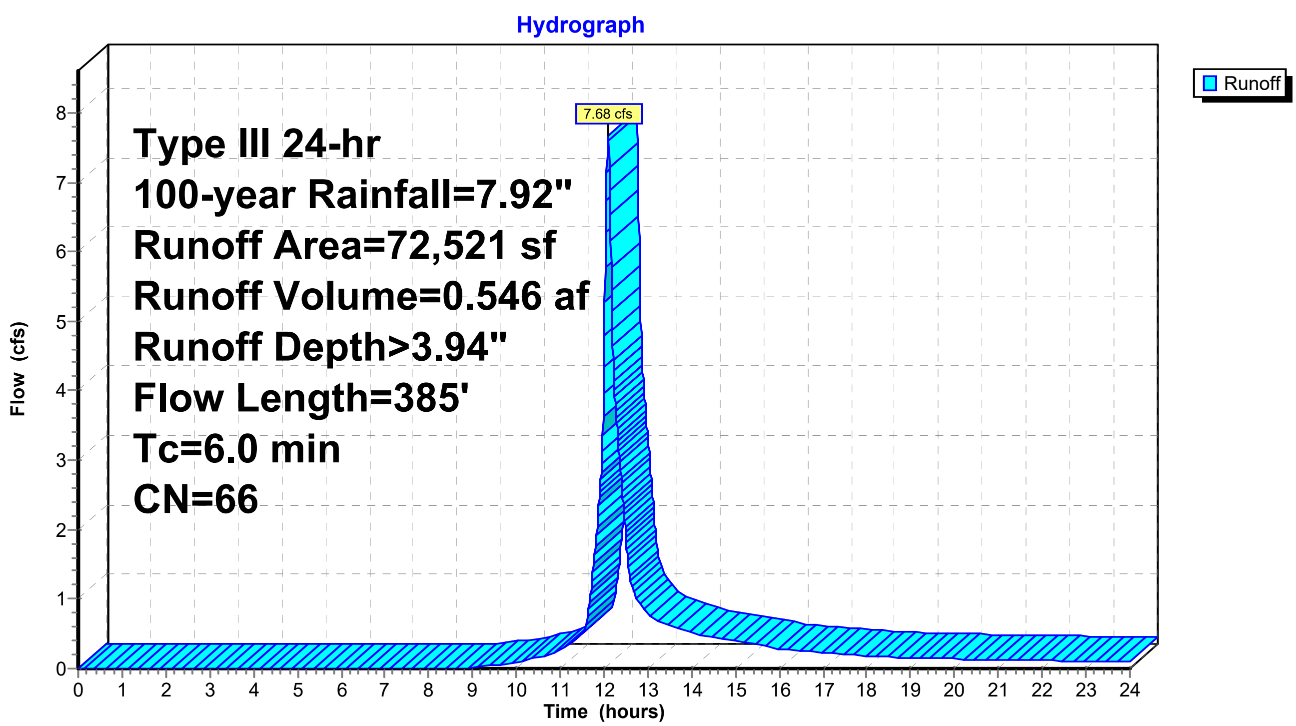
Runoff = 7.68 cfs @ 12.09 hrs, Volume= 0.546 af, Depth> 3.94"
Routed to Pond 5P : Subsurface Infiltration System #1 - ADS StormTech SC-740 Chambers

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-year Rainfall=7.92"

Area (sf)	CN	Description
56,669	58	Meadow, non-grazed, HSG B
15,852	96	Gravel surface, HSG B
72,521	66	Weighted Average
72,521		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.0	50	0.1000	0.28		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 3.20"
0.1	18	0.1100	2.32		**Shallow Concentrated Flow, B-C** Short Grass Pasture Kv= 7.0 fps
1.1	317	0.0600	4.97		**Shallow Concentrated Flow, C-D** Paved Kv= 20.3 fps
1.8					**Direct Entry,**
6.0	385	Total			

Subcatchment 5S: Area 5



Summary for Subcatchment 6S: Area 6

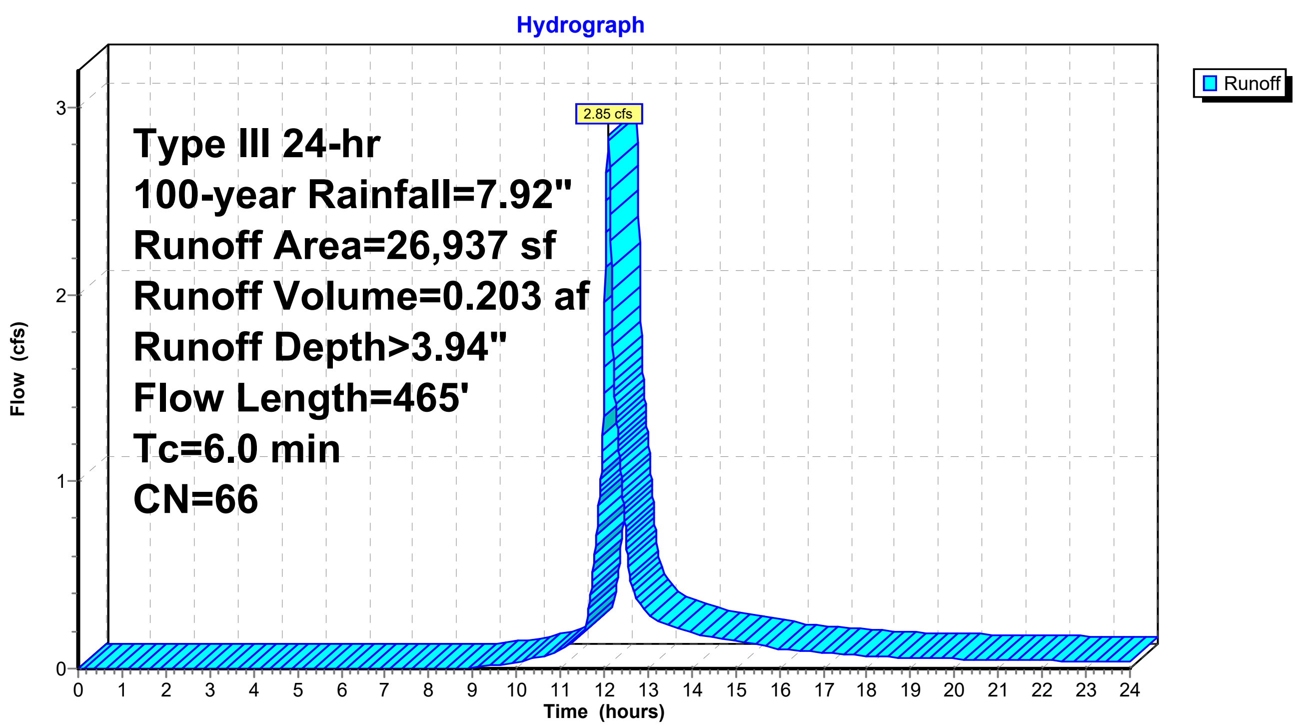
Runoff = 2.85 cfs @ 12.09 hrs, Volume= 0.203 af, Depth> 3.94"
Routed to Pond 6P : Subsurface Infiltration System #2 - ADS StormTech SC-740 Chambers

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-year Rainfall=7.92"

Area (sf)	CN	Description
21,116	58	Meadow, non-grazed, HSG B
5,821	96	Gravel surface, HSG B
26,937	66	Weighted Average
26,937		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.4	50	0.0700	0.24		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 3.20"
0.1	17	0.0800	1.98		**Shallow Concentrated Flow, B-C** Short Grass Pasture Kv= 7.0 fps
1.3	398	0.0600	4.97		**Shallow Concentrated Flow, C-D** Paved Kv= 20.3 fps
1.2					**Direct Entry,**
6.0	465	Total			

Subcatchment 6S: Area 6



Summary for Subcatchment 7S: Area 7

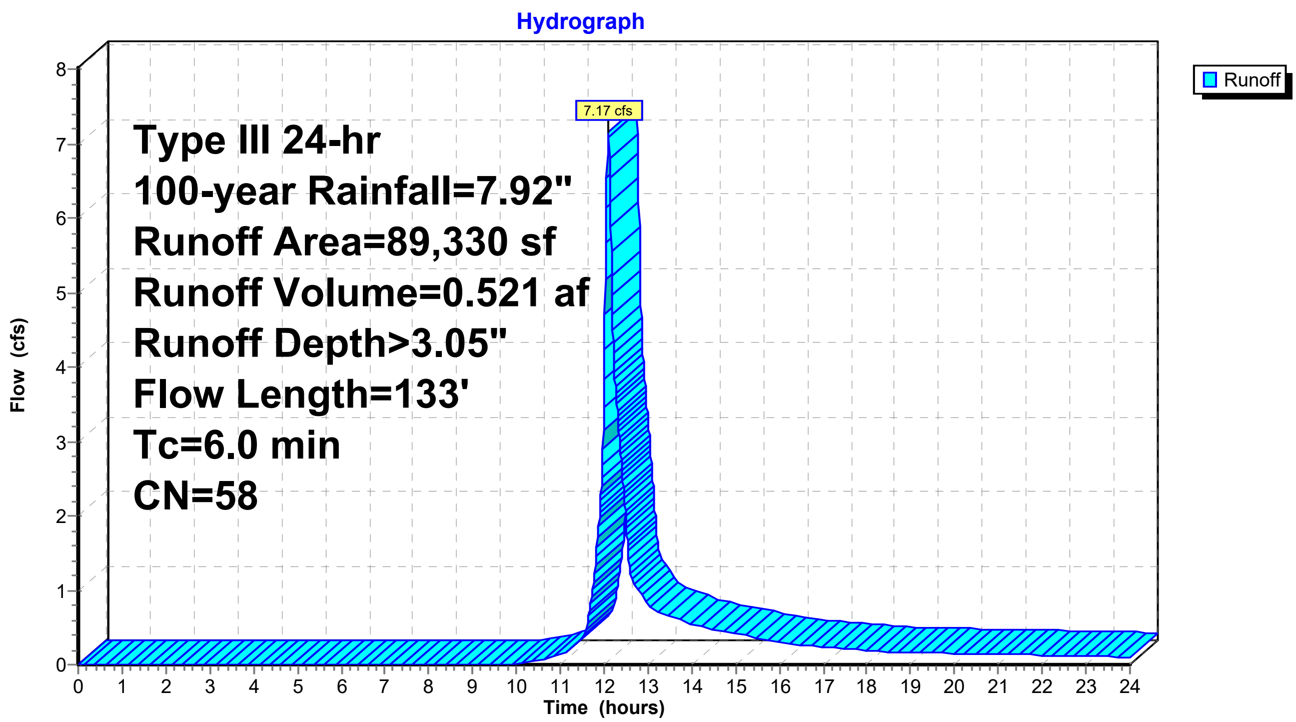
Runoff = 7.17 cfs @ 12.09 hrs, Volume= 0.521 af, Depth> 3.05"
Routed to Pond 7P : Infiltration Basin #1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-year Rainfall=7.92"

Area (sf)	CN	Description
89,330	58	Meadow, non-grazed, HSG B
89,330		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.0	50	0.1000	0.28		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 3.20"
0.5	83	0.1700	2.89		**Shallow Concentrated Flow, B-C** Short Grass Pasture Kv= 7.0 fps
2.5					**Direct Entry,**
6.0	133	Total			

Subcatchment 7S: Area 7



Summary for Subcatchment 8S: Area 8

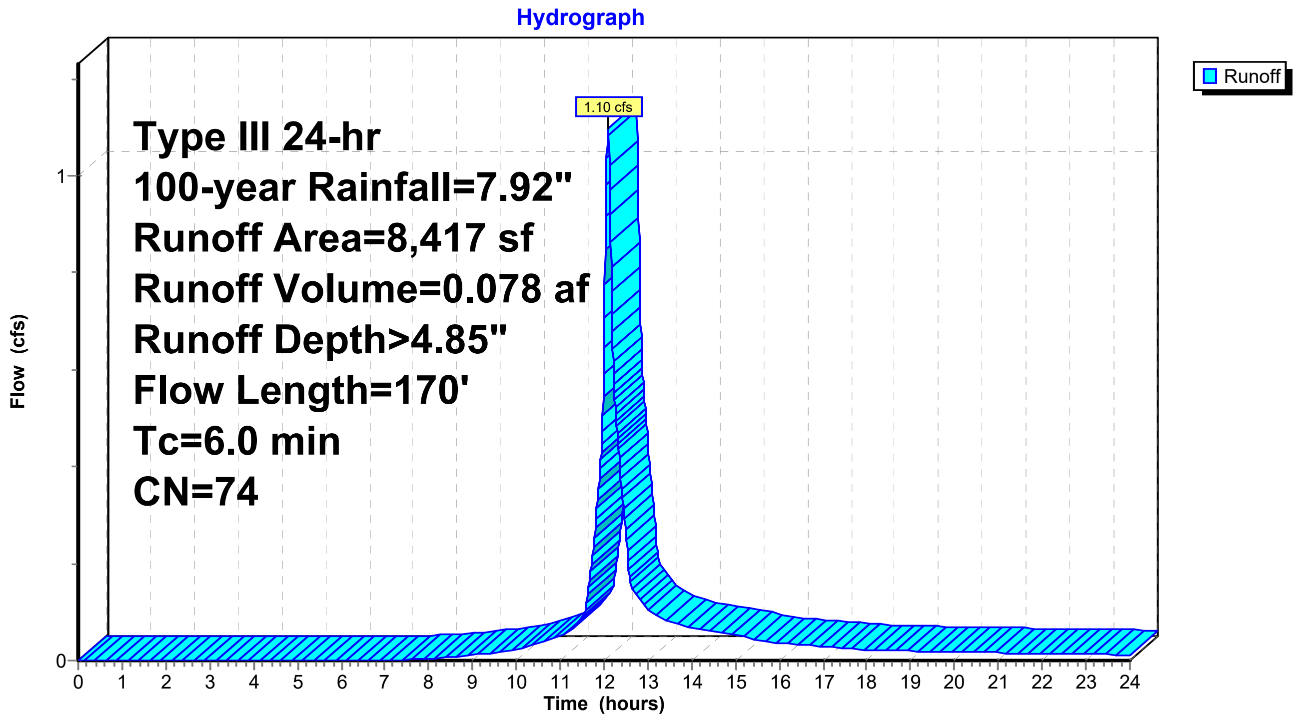
Runoff = 1.10 cfs @ 12.09 hrs, Volume= 0.078 af, Depth> 4.85"
Routed to Pond 8P : Subsurface Infiltration System #3 - ADS StormTech SC-740 Chambers

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-year Rainfall=7.92"

Area (sf)	CN	Description
5,095	58	Meadow, non-grazed, HSG B
3,322	98	Paved parking, HSG B
8,417	74	Weighted Average
5,095		60.53% Pervious Area
3,322		39.47% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.6	50	0.0600	0.23		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 3.20"
0.9	97	0.0600	1.71		**Shallow Concentrated Flow, B-C** Short Grass Pasture Kv= 7.0 fps
0.1	23	0.0200	2.87		**Shallow Concentrated Flow, C-D** Paved Kv= 20.3 fps
1.4					**Direct Entry,**
6.0	170	Total			

Subcatchment 8S: Area 8



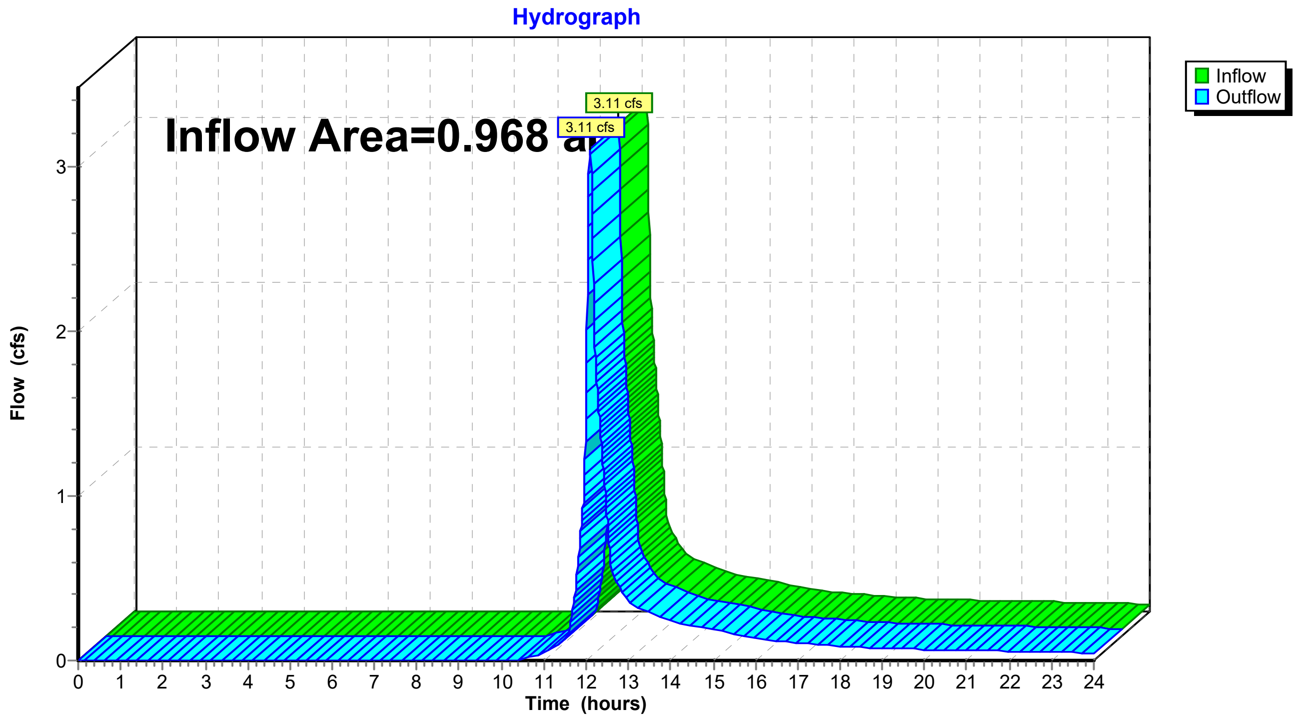
Summary for Reach 1R: Off-site Flow (Wetland Northwest)

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

Inflow Area =	0.968 ac,	0.00% Impervious, Inflow Depth > 2.83"	for 100-year event
Inflow =	3.11 cfs @	12.09 hrs, Volume=	0.228 af
Outflow =	3.11 cfs @	12.09 hrs, Volume=	0.228 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 2

Reach 1R: Off-site Flow (Wetland Northwest)



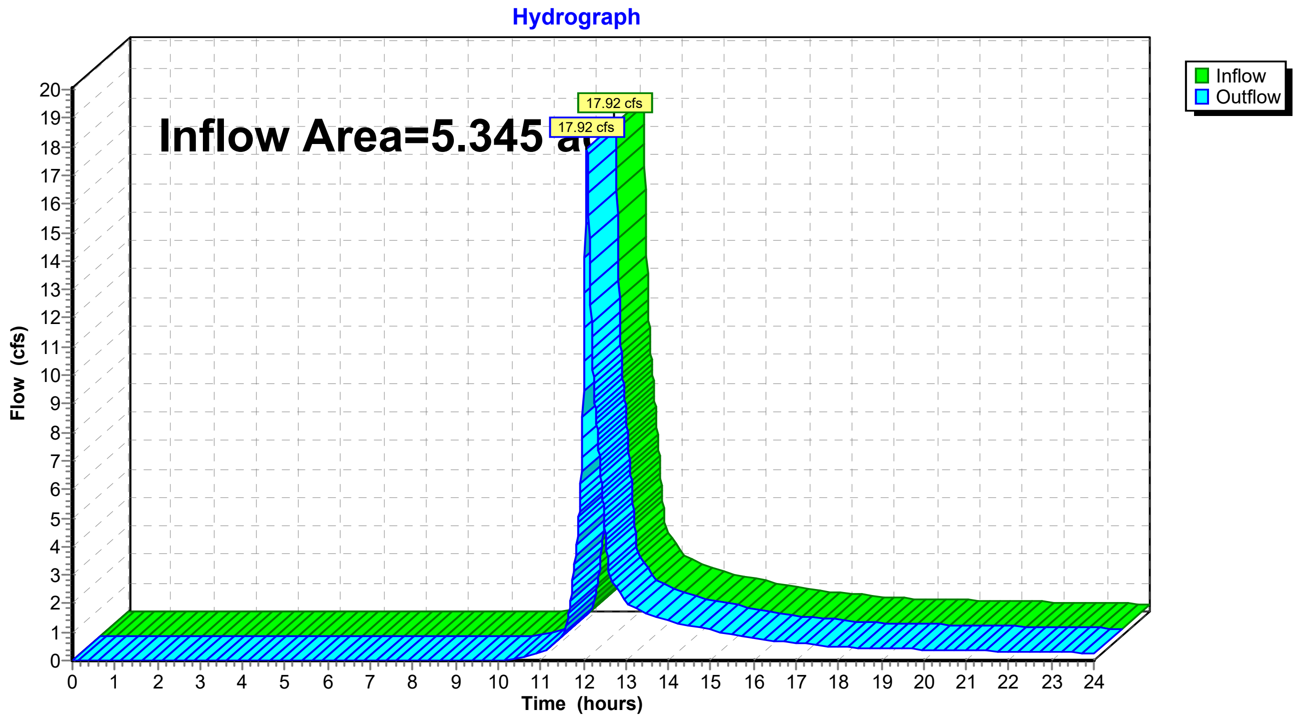
Summary for Reach 2R: Off-site Flow (East)

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

Inflow Area = 5.345 ac, 0.00% Impervious, Inflow Depth > 2.94" for 100-year event
Inflow = 17.92 cfs @ 12.09 hrs, Volume= 1.310 af
Outflow = 17.92 cfs @ 12.09 hrs, Volume= 1.310 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 2

Reach 2R: Off-site Flow (East)



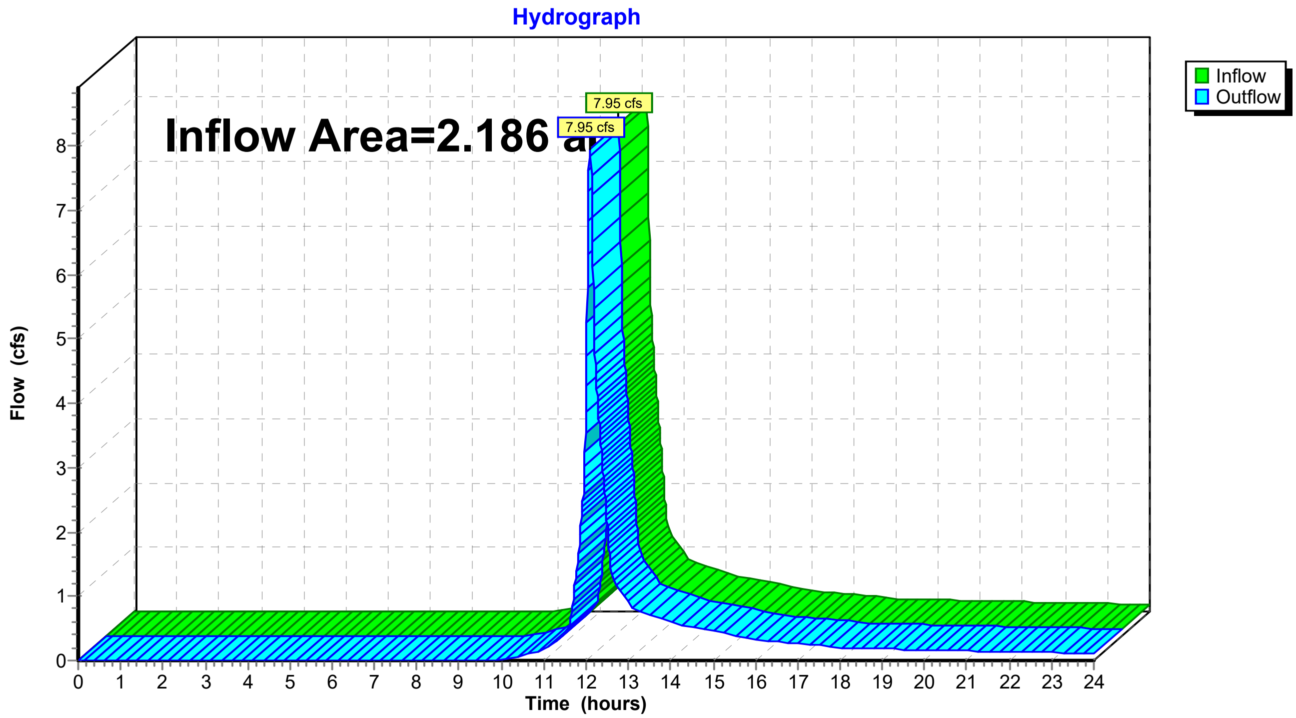
Summary for Reach 3R: Off-site Flow (Route 15)

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

Inflow Area =	2.186 ac,	0.72% Impervious, Inflow Depth > 3.16"	for 100-year event
Inflow =	7.95 cfs @	12.09 hrs, Volume=	0.576 af
Outflow =	7.95 cfs @	12.09 hrs, Volume=	0.576 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 2

Reach 3R: Off-site Flow (Route 15)



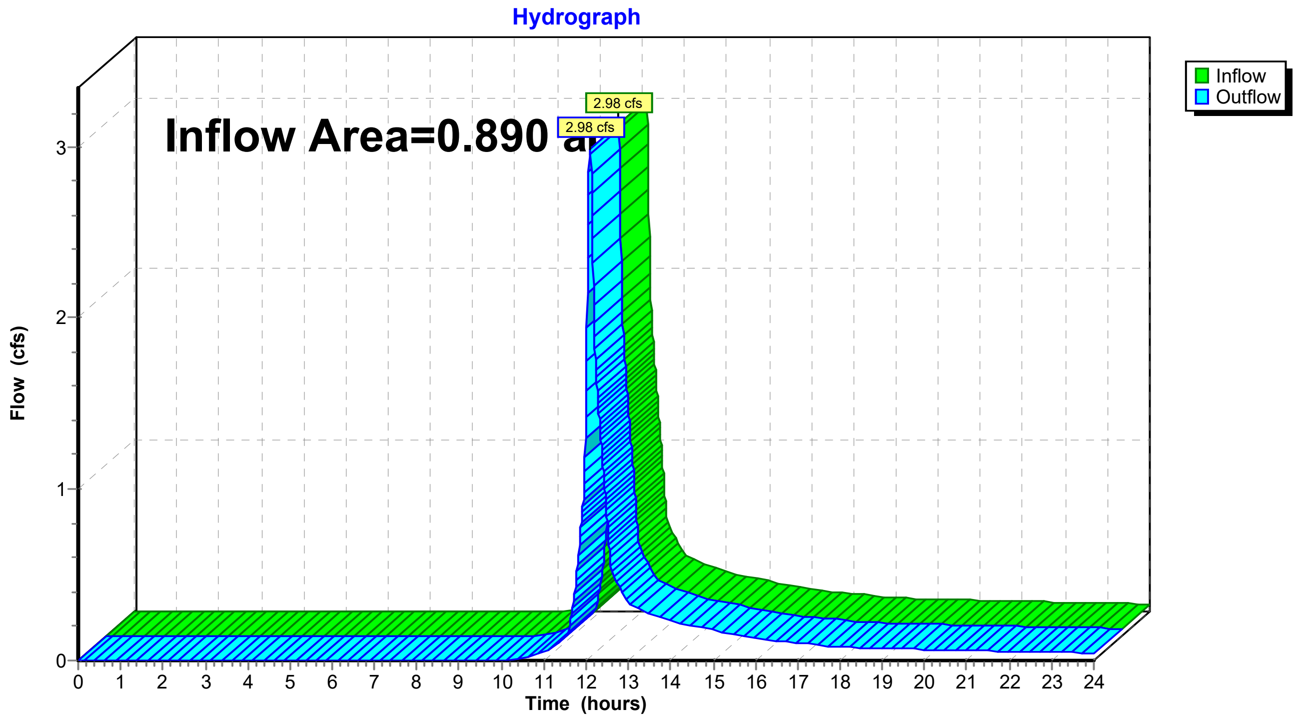
Summary for Reach 4R: Off-site flow (South)

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

Inflow Area =	0.890 ac,	0.00% Impervious, Inflow Depth > 2.94"	for 100-year event
Inflow =	2.98 cfs @	12.09 hrs, Volume=	0.218 af
Outflow =	2.98 cfs @	12.09 hrs, Volume=	0.218 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 2

Reach 4R: Off-site flow (South)



Summary for Pond 5P: Subsurface Infiltration System #1 - ADS StormTech SC-740 Chambers

Inflow Area = 1.665 ac, 0.00% Impervious, Inflow Depth > 3.94" for 100-year event
Inflow = 7.68 cfs @ 12.09 hrs, Volume= 0.546 af
Outflow = 0.70 cfs @ 13.18 hrs, Volume= 0.543 af, Atten= 91%, Lag= 65.2 min
Discarded = 0.70 cfs @ 13.18 hrs, Volume= 0.543 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 683.75' @ 13.18 hrs Surf.Area= 4,924 sf Storage= 10,155 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 168.7 min (1,001.6 - 832.9)

Volume	Invert	Avail.Storage	Storage Description
#1A	680.50'	4,394 cf	**39.50'W x 124.66'L x 3.50'H Field A** 17,234 cf Overall - 6,248 cf Embedded = 10,986 cf x 40.0% Voids
#2A	681.00'	6,248 cf	**ADS_StormTech SC-740 +Cap** x 136 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 136 Chambers in 8 Rows
		10,642 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	680.50'	**2.410 in/hr Exfiltration over Horizontal area** Conductivity to Groundwater Elevation = 678.40'

Discarded OutFlow Max=0.70 cfs @ 13.18 hrs HW=683.75' (Free Discharge)
└─**1=Exfiltration** (Controls 0.70 cfs)

Pond 5P: Subsurface Infiltration System #1 - ADS StormTech SC-740 Chambers - Chamber Wizard Fiel

Chamber Model = ADS_StormTechSC-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

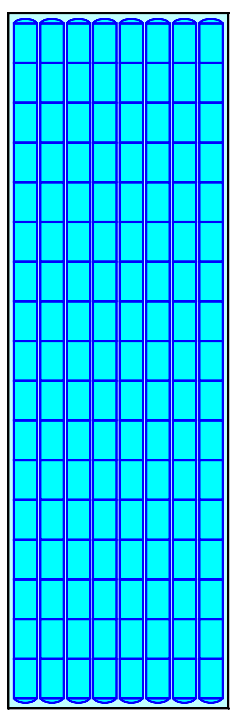
17 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 122.66' Row Length +12.0" End Stone x 2 = 124.66' Base Length
8 Rows x 51.0" Wide + 6.0" Spacing x 7 + 12.0" Side Stone x 2 = 39.50' Base Width
6.0" Stone Base + 30.0" Chamber Height + 6.0" Stone Cover = 3.50' Field Height

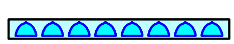
136 Chambers x 45.9 cf = 6,247.8 cf Chamber Storage

17,233.8 cf Field - 6,247.8 cf Chambers = 10,985.9 cf Stone x 40.0% Voids = 4,394.4 cf Stone Storage

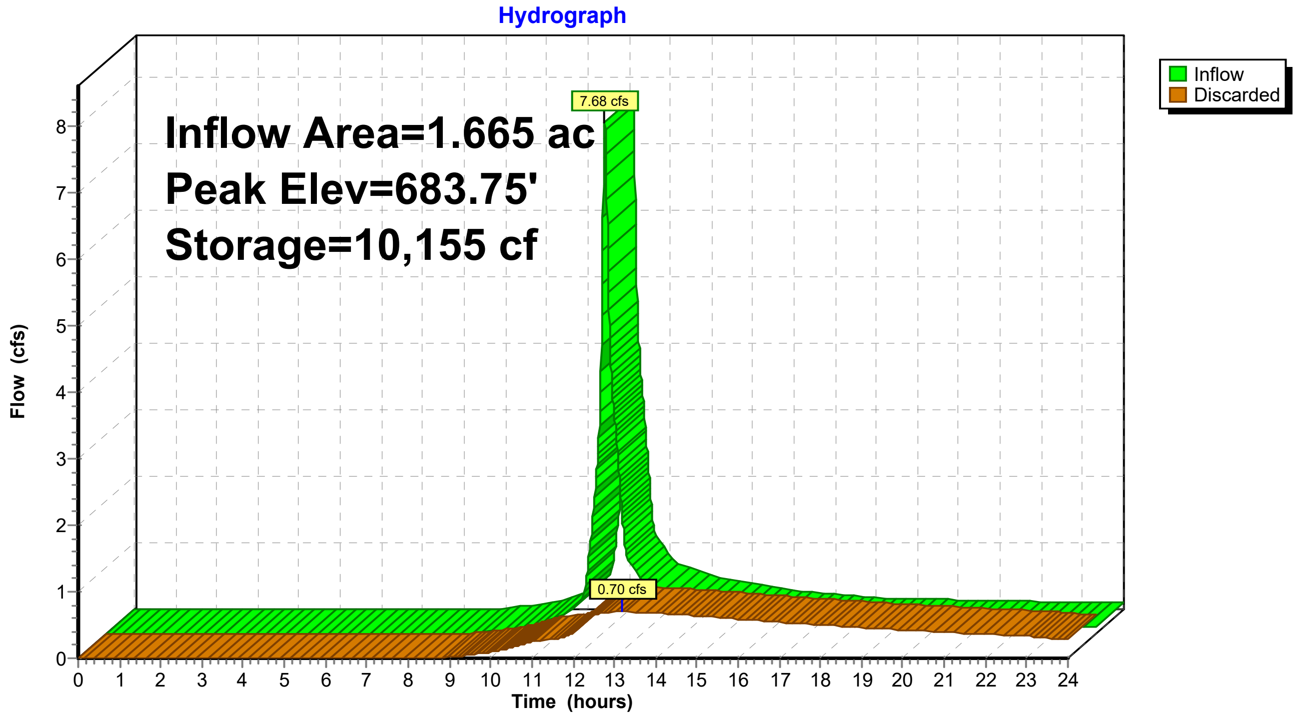
Chamber Storage + Stone Storage = 10,642.2 cf = 0.244 af
Overall Storage Efficiency = 61.8%
Overall System Size = 124.66' x 39.50' x 3.50'

136 Chambers
638.3 cy Field
406.9 cy Stone





Pond 5P: Subsurface Infiltration System #1 - ADS StormTech SC-740 Chambers



Summary for Pond 6P: Subsurface Infiltration System #2 - ADS StormTech SC-740 Chambers

Inflow Area = 0.618 ac, 0.00% Impervious, Inflow Depth > 3.94" for 100-year event
Inflow = 2.85 cfs @ 12.09 hrs, Volume= 0.203 af
Outflow = 0.25 cfs @ 13.33 hrs, Volume= 0.198 af, Atten= 91%, Lag= 74.6 min
Discarded = 0.25 cfs @ 13.33 hrs, Volume= 0.198 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 714.45' @ 13.33 hrs Surf.Area= 1,817 sf Storage= 3,833 cf

Plug-Flow detention time= 187.5 min calculated for 0.198 af (97% of inflow)
Center-of-Mass det. time= 173.0 min (1,006.0 - 832.9)

Volume	Invert	Avail.Storage	Storage Description
#1A	711.00'	1,662 cf	**30.00'W x 60.58'L x 3.50'H Field A** 6,361 cf Overall - 2,205 cf Embedded = 4,155 cf x 40.0% Voids
#2A	711.50'	2,205 cf	**ADS_StormTech SC-740 +Cap** x 48 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 48 Chambers in 6 Rows
		3,867 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	711.00'	**2.410 in/hr Exfiltration over Horizontal area** Conductivity to Groundwater Elevation = 708.60'

Discarded OutFlow Max=0.25 cfs @ 13.33 hrs HW=714.45' (Free Discharge)
└─**1=Exfiltration** (Controls 0.25 cfs)

Pond 6P: Subsurface Infiltration System #2 - ADS StormTech SC-740 Chambers - Chamber Wizard Fiel

Chamber Model = ADS_StormTechSC-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

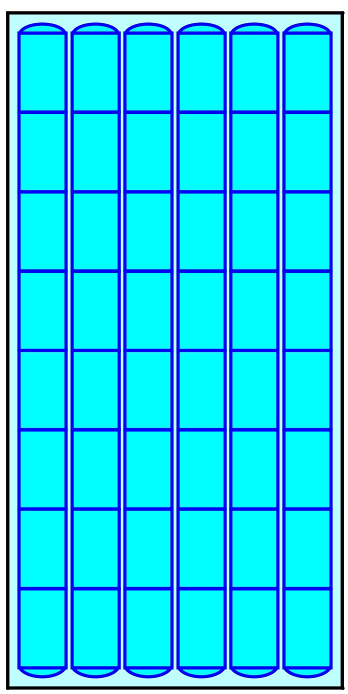
8 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 58.58' Row Length +12.0" End Stone x 2 = 60.58' Base Length
6 Rows x 51.0" Wide + 6.0" Spacing x 5 + 12.0" Side Stone x 2 = 30.00' Base Width
6.0" Stone Base + 30.0" Chamber Height + 6.0" Stone Cover = 3.50' Field Height

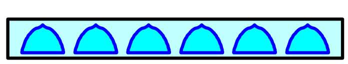
48 Chambers x 45.9 cf = 2,205.1 cf Chamber Storage

6,360.6 cf Field - 2,205.1 cf Chambers = 4,155.4 cf Stone x 40.0% Voids = 1,662.2 cf Stone Storage

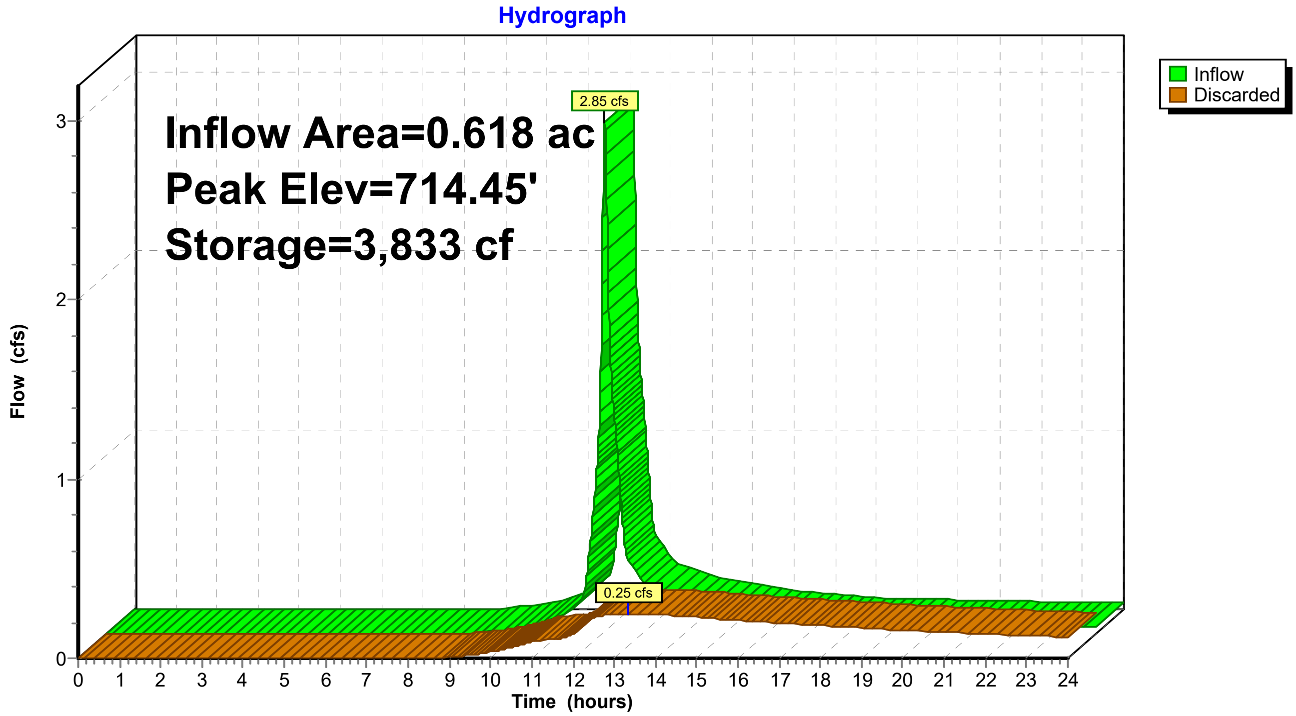
Chamber Storage + Stone Storage = 3,867.3 cf = 0.089 af
Overall Storage Efficiency = 60.8%
Overall System Size = 60.58' x 30.00' x 3.50'

48 Chambers
235.6 cy Field
153.9 cy Stone





Pond 6P: Subsurface Infiltration System #2 - ADS StormTech SC-740 Chambers



Summary for Pond 7P: Infiltration Basin #1

[87] Warning: Oscillations may require smaller dt or Finer Routing (severity=387)

Inflow Area =	2.051 ac,	0.00% Impervious, Inflow Depth > 3.05"	for 100-year event	
Inflow =	7.17 cfs @	12.09 hrs, Volume=	0.521 af	
Outflow =	1.21 cfs @	12.62 hrs, Volume=	0.521 af,	Atten= 83%, Lag= 31.3 min
Discarded =	1.21 cfs @	12.62 hrs, Volume=	0.521 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 704.40' @ 12.62 hrs Surf.Area= 18,365 sf Storage= 6,712 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 43.3 min (893.7 - 850.4)

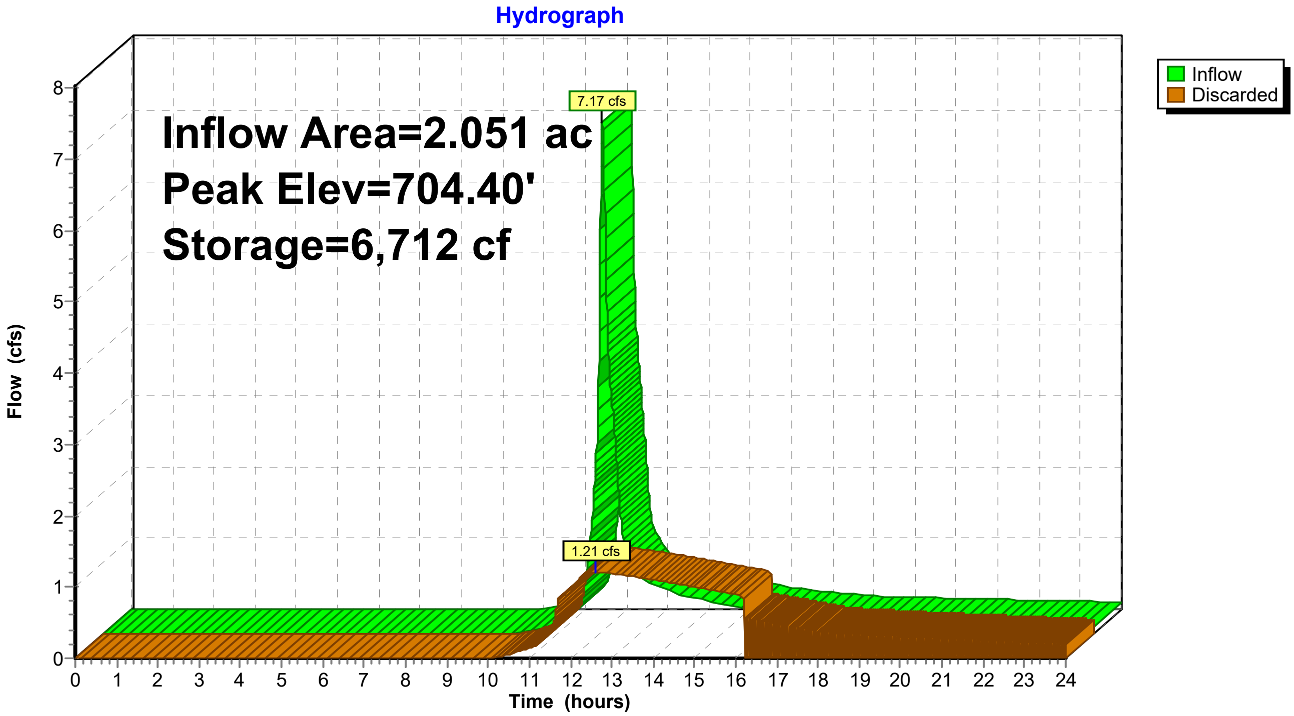
Volume	Invert	Avail.Storage	Storage Description
#1	704.00'	19,192 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
704.00	15,599	1,219.0	0	0	15,599
705.00	23,026	1,256.7	19,192	19,192	23,129

Device	Routing	Invert	Outlet Devices
#1	Discarded	704.00'	**2.410 in/hr Exfiltration over Horizontal area** Conductivity to Groundwater Elevation = 702.00'

Discarded OutFlow Max=1.21 cfs @ 12.62 hrs HW=704.40' (Free Discharge)
└─**1=Exfiltration** (Controls 1.21 cfs)

Pond 7P: Infiltration Basin #1



Summary for Pond 8P: Subsurface Infiltration System #3 - ADS StormTech SC-740 Chambers

[87] Warning: Oscillations may require smaller dt or Finer Routing (severity=67)

Inflow Area = 0.193 ac, 39.47% Impervious, Inflow Depth > 4.85" for 100-year event
Inflow = 1.10 cfs @ 12.09 hrs, Volume= 0.078 af
Outflow = 0.10 cfs @ 13.03 hrs, Volume= 0.078 af, Atten= 91%, Lag= 56.3 min
Discarded = 0.10 cfs @ 13.03 hrs, Volume= 0.078 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 680.00' @ 13.03 hrs Surf.Area= 804 sf Storage= 1,431 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 148.3 min (964.3 - 816.0)

Volume	Invert	Avail.Storage	Storage Description
#1A	677.25'	758 cf	**20.50'W x 39.22'L x 3.50'H Field A** 2,814 cf Overall - 919 cf Embedded = 1,895 cf x 40.0% Voids
#2A	677.75'	919 cf	**ADS_StormTech SC-740 +Cap** x 20 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 20 Chambers in 4 Rows
		1,677 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	677.25'	**2.410 in/hr Exfiltration over Horizontal area** Conductivity to Groundwater Elevation = 675.10'

Discarded OutFlow Max=0.10 cfs @ 13.03 hrs HW=680.00' (Free Discharge)
└**1=Exfiltration** (Controls 0.10 cfs)

Pond 8P: Subsurface Infiltration System #3 - ADS StormTech SC-740 Chambers - Chamber Wizard Fiel

Chamber Model = ADS_StormTechSC-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

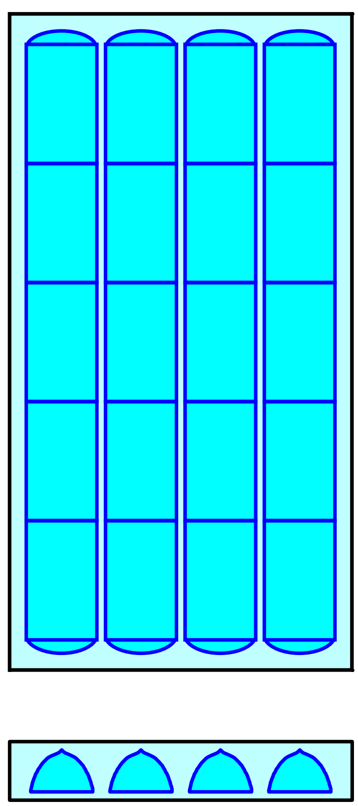
5 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 37.22' Row Length +12.0" End Stone x 2 = 39.22' Base Length
4 Rows x 51.0" Wide + 6.0" Spacing x 3 + 12.0" Side Stone x 2 = 20.50' Base Width
6.0" Stone Base + 30.0" Chamber Height + 6.0" Stone Cover = 3.50' Field Height

20 Chambers x 45.9 cf = 918.8 cf Chamber Storage

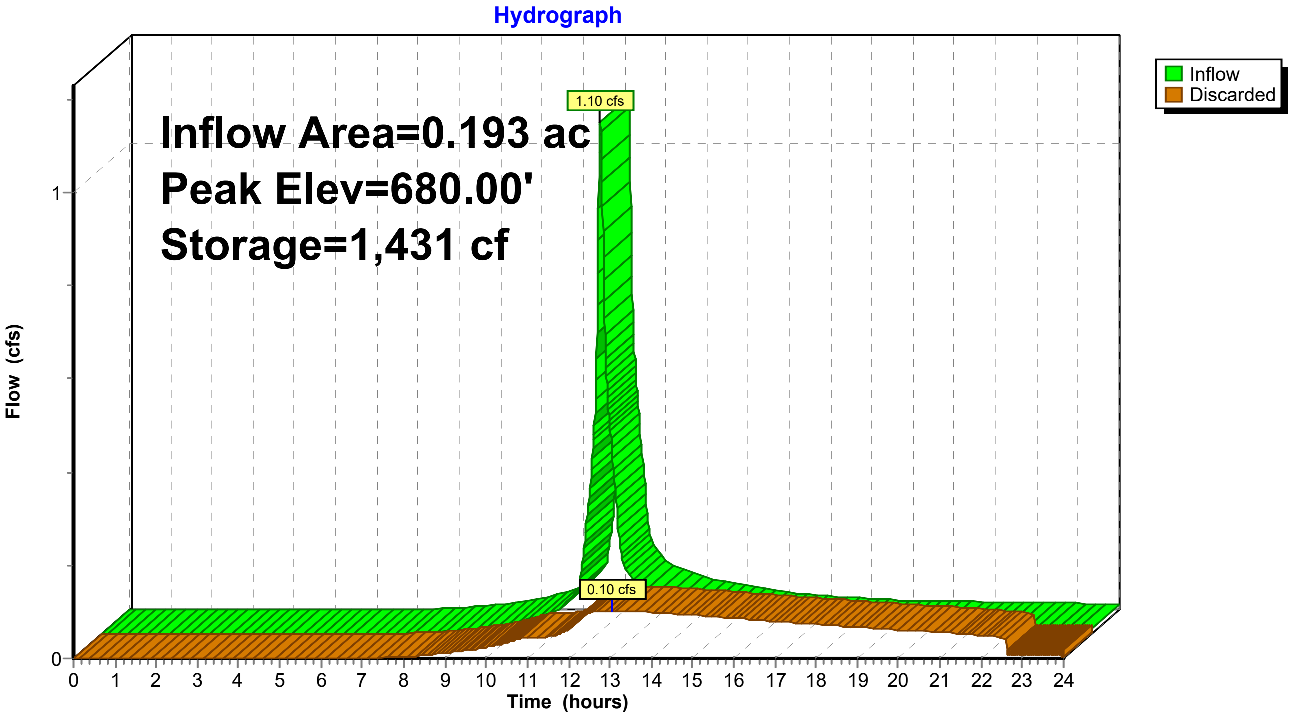
2,813.8 cf Field - 918.8 cf Chambers = 1,895.0 cf Stone x 40.0% Voids = 758.0 cf Stone Storage

Chamber Storage + Stone Storage = 1,676.8 cf = 0.038 af
Overall Storage Efficiency = 59.6%
Overall System Size = 39.22' x 20.50' x 3.50'

20 Chambers
104.2 cy Field
70.2 cy Stone



Pond 8P: Subsurface Infiltration System #3 - ADS StormTech SC-740 Chambers



SECTION 7.0

ADDITIONAL DRAINAGE CALCULATIONS

7.01 TSS REMOVAL CALCULATIONS

TSS Removal Calculation Worksheet

Location: 200 Route 15
Sturbridge, MA
Project: Ground-Mounted Photovoltaic System

BSC GROUP
Prepared By: T. MacDonald
Date: 4/7/2023

Subcatchment Area 3S
Total Impervious Area, Acres= 0.016

A	B		D	E
BMP	TSS Removal Rate	Starting TSS Load*	Amount Removed (BxC)	Remaining Load (C-D)
No Treatment	0.00	1.00	0.00	1.00

TSS Removal = 0.00

Subcatchment Area 5S, 6S, & 8S
Total Impervious Area, Acres= 0.574

A	B	C	D	E
BMP	TSS Removal Rate	Starting TSS Load*	Amount Removed (BxC)	Remaining Load (C-D)
Water Quality Unit	0.77	1.00	0.77	0.23
Infiltration Basin or Subsurface Sytem	0.80	0.23	0.184	0.05

TSS Removal = 0.95

WEIGHTED AVG. Total Site TSS Removal=	[(0.016*0.00)+(0.574*0.95)] / (0.016+0.574)

Total Site TSS Removal = 0.93

*Equals remaining load from previous BMP (E)

7.02 GROUNDWATER RECHARGE VOLUME CALCULATIONS

<u>Required Recharge Volume</u>

Rv = F x Impervious Area

Where:

Rv = Recharge Volume

F=Target Depth Factor associated with each Hydrologic Soil Group

(F=0.60-inch for Soil Type A)

Impervious Area = Proposed Pavement area on-site

$$Rv = \left(\frac{0.60\ in}{12\ in/ft}\right)(0.589\ ac)\left(43{,}560\frac{sf}{ac}\right) = 1{,}283\ cf$$

Rv = 1,283 cf (required recharge volume)

Storage Provided (Subsurface Infiltration Systems only):

- Infiltration System #1= 10,155 cubic feet provided
- Infiltration System #2= 3,833 cubic feet provided
- Infiltration System #3= 1,431 cubic feet provided
- Total = 15, 419 cubic feet provided
  Refer to the HydroCAD calculations for more information.

<u>Drawdown Time</u>

The following formula must be used to demonstrate that each proposed infiltration BMP will drain within 72 hours:

$$Time_{\ drawdown} = \frac{R_v}{(K)(Bottom\ Area)}$$

R_v = Storage Volume (Required Recharge Volume)
K = Saturated Hydraulic Conductivity For "Static" and "Simple Dynamic" Methods, use Rawls Rate
Bottom Area = Bottom Area of Recharge Structure

<u>Subsurface Infiltration System #1 (Pond 5P)</u>

$$Time_{\ drawdown} = \frac{829.1\ ft^3}{(2.410\ in/hr)(1\ ft/12\ in)(4{,}924\ ft^2)}$$

$$Time_{\ drawdown} = 0.07\ hours$$

<u>Subsurface Infiltration System #2 (Pond 6P)</u>

$$Time_{\ drawdown} = \frac{291\ ft^3}{(2.410\ in/hr)(1\ ft/12\ in)(1{,}817\ ft^2)}$$

$$Time_{\ drawdown} = 0.07\ hours$$

<u>Subsurface Infiltration System #3 (Pond 8P)</u>

$$Time_{\ drawdown} = \frac{166\ ft^3}{(2.410\ in/hr)(1\ ft/12\ in)(804\ ft^2)}$$

$$Time_{\ drawdown} = 0.09\ hours$$

7.03 WATER QUALITY VOLUME CALCULATIONS

Water Quality Volume Calculation

V_{WQ} = (D_{WQ}/12 inches/foot) * (A_{IMP} square feet)

V_{WQ} = Required Water Quality Volume (in cubic feet)
D_{WQ} = Water Quality Depth: **1.0-inch** used (1-inch for rapid infiltration rates, greater than 2.4 inches per hour & 0.5-inch for other areas)
A_{IMP} = Total Impervious Area (in acres) used for driveways, parking, etc.

Infiltration Systems

A_{IMP} = 0.590 ac

V_{WQ} = (1.0 inch/12 inches/foot) * (0.590 ac x 43,560 square feet/ac)

V_{WQ} = 2,142 cubic feet (required volume), provided volume = 15, 419 **cubic feet (refer to HydroCAD**

7.04 WATER QUALITY UNIT SIZING CALCULATION

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Detailed Stormceptor Sizing Report – WQU-1

Project Information & Location			
Project Name	200 Route 15	**Project Number**	49924
City	Sturbridge	**State/ Province**	Massachusetts
Country	United States of America	**Date**	4/7/2023
Designer Information		**EOR Information (optional)**	
Name	Todd MacDonald	**Name**	
Company	BSC Group	**Company**	
Phone #	617-896-4409	**Phone #**	
Email	TMacDonald@BSCGroup.com	**Email**	

Stormwater Treatment Recommendation

The recommended Stormceptor Model(s) which achieve or exceed the user defined water quality objective for each site within the project are listed in the below Sizing Summary table.

Site Name	WQU-1
Recommended Stormceptor Model	STC 450i
Target TSS Removal (%)	80.0
TSS Removal (%) Provided	92
PSD	Fine Distribution
Rainfall Station	EAST BRIMFIELD LAKE

The recommended Stormceptor model achieves the water quality objectives based on the selected inputs, historical rainfall records and selected particle size distribution.

Stormceptor Sizing Summary	
Stormceptor Model	**% TSS Removal Provided**
STC 450i	92
STC 900	96
STC 1200	96
STC 1800	96
STC 2400	97
STC 3600	97
STC 4800	98
STC 6000	98
STC 7200	99
STC 11000	99
STC 13000	99
STC 16000	99

Stormceptor

The Stormceptor oil and sediment separator is sized to treat stormwater runoff by removing pollutants through gravity separation and flotation. Stormceptor's patented design generates positive TSS removal for each rainfall event, including large storms. Significant levels of pollutants such as heavy metals, free oils and nutrients are prevented from entering natural water resources and the re-suspension of previously captured sediment (scour) does not occur.
Stormceptor provides a high level of TSS removal for small frequent storm events that represent the majority of annual rainfall volume and pollutant load. Positive treatment continues for large infrequent events, however, such events have little impact on the average annual TSS removal as they represent a small percentage of the total runoff volume and pollutant load.

Design Methodology

Stormceptor is sized using PCSWMM for Stormceptor, a continuous simulation model based on US EPA SWMM. The program calculates hydrology using local historical rainfall data and specified site parameters. With US EPA SWMM's precision, every Stormceptor unit is designed to achieve a defined water quality objective. The TSS removal data presented follows US EPA guidelines to reduce the average annual TSS load. The Stormceptor's unit process for TSS removal is settling. The settling model calculates TSS removal by analyzing:

- Site parameters
- Continuous historical rainfall data, including duration, distribution, peaks & inter-event dry periods
- Particle size distribution, and associated settling velocities (Stokes Law, corrected for drag)
- TSS load
- Detention time of the system

Hydrology Analysis

PCSWMM for Stormceptor calculates annual hydrology with the US EPA SWMM and local continuous historical rainfall data. Performance calculations of Stormceptor are based on the average annual removal of TSS for the selected site parameters. The Stormceptor is engineered to capture sediment particles by treating the required average annual runoff volume, ensuring positive removal efficiency is maintained during each rainfall event, and preventing negative removal efficiency (scour).
Smaller recurring storms account for the majority of rainfall events and average annual runoff volume, as observed in the historical rainfall data analyses presented in this section.

Rainfall Station

State/Province	Massachusetts	**Total Number of Rainfall Events**	5106
Rainfall Station Name	EAST BRIMFIELD LAKE	**Total Rainfall (in)**	1701.4
Station ID #	2107	**Average Annual Rainfall (in)**	37.8
Coordinates	42°7'0"N, 72°8'0"W	**Total Evaporation (in)**	110.5
Elevation (ft)	680	**Total Infiltration (in)**	437.1
Years of Rainfall Data	45	**Total Rainfall that is Runoff (in)**	1153.8

Notes

- Stormceptor performance estimates are based on simulations using PCSWMM for Stormceptor, which uses the EPA Rainfall and Runoff modules.
- Design estimates listed are only representative of specific project requirements based on total suspended solids (TSS) removal defined by the selected PSD, and based on stable site conditions only, after construction is completed.
- For submerged applications or sites specific to spill control, please contact your local Stormceptor representative for further design assistance.

Drainage Area	
Total Area (acres)	0.19
Imperviousness %	74.0

Water Quality Objective	
TSS Removal (%)	80.0
Runoff Volume Capture (%)	
Oil Spill Capture Volume (Gal)	
Peak Conveyed Flow Rate (CFS)	
Water Quality Flow Rate (CFS)	

Up Stream Storage	
Storage (ac-ft)	Discharge (cfs)
0.000	0.000

Up Stream Flow Diversion	
Max. Flow to Stormceptor (cfs)	

Design Details	
Stormceptor Inlet Invert Elev (ft)	
Stormceptor Outlet Invert Elev (ft)	677.90
Stormceptor Rim Elev (ft)	681.90
Normal Water Level Elevation (ft)	
Pipe Diameter (in)	12
Pipe Material	HDPE - plastic
Multiple Inlets (Y/N)	No
Grate Inlet (Y/N)	Yes

Particle Size Distribution (PSD)

Removing the smallest fraction of particulates from runoff ensures the majority of pollutants, such as metals, hydrocarbons and nutrients are captured. The table below identifies the Particle Size Distribution (PSD) that was selected to define TSS removal for the Stormceptor design.

Fine Distribution		
Particle Diameter (microns)	Distribution %	Specific Gravity
20.0	20.0	1.30
60.0	20.0	1.80
150.0	20.0	2.20
400.0	20.0	2.65
2000.0	20.0	2.65

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Site Name	WQU-1

Site Details

Drainage Area

Total Area (acres)	0.19
Imperviousness %	74.0

Surface Characteristics

Width (ft)	182.00
Slope %	2
Impervious Depression Storage (in)	0.02
Pervious Depression Storage (in)	0.2
Impervious Manning's n	0.015
Pervious Manning's n	0.25

Maintenance Frequency

Maintenance Frequency (months) >	12

Infiltration Parameters

Horton's equation is used to estimate infiltration

Max. Infiltration Rate (in/hr)	2.44
Min. Infiltration Rate (in/hr)	0.4
Decay Rate (1/sec)	0.00055
Regeneration Rate (1/sec)	0.01

Evaporation

Daily Evaporation Rate (in/day)	0.1

Dry Weather Flow

Dry Weather Flow (cfs)	0

Winter Months

Winter Infiltration	0

TSS Loading Parameters

TSS Loading Function	

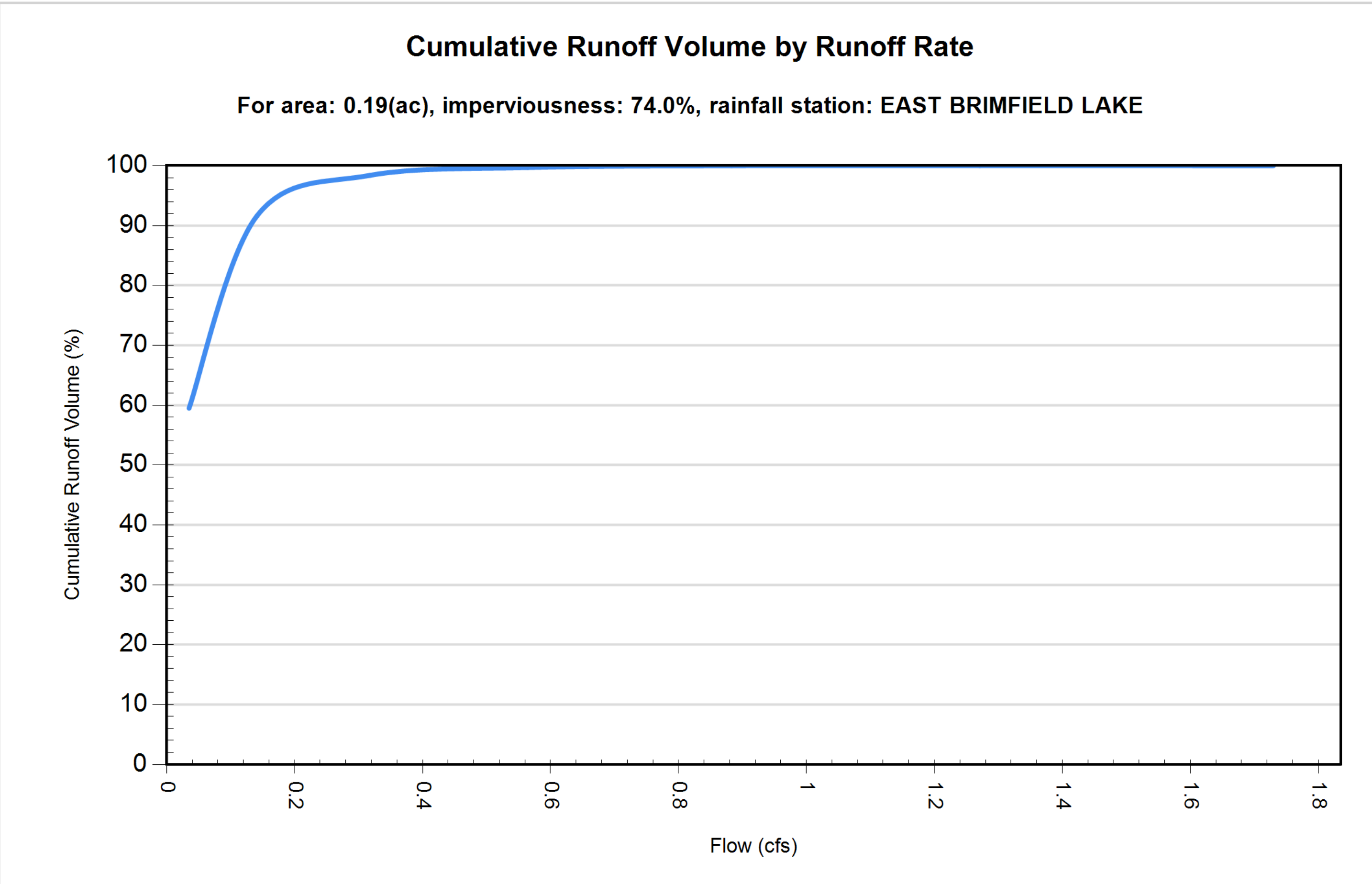
Buildup/Wash-off Parameters

Target Event Mean Conc. (EMC) mg/L	
Exponential Buildup Power	
Exponential Washoff Exponent	

TSS Availability Parameters

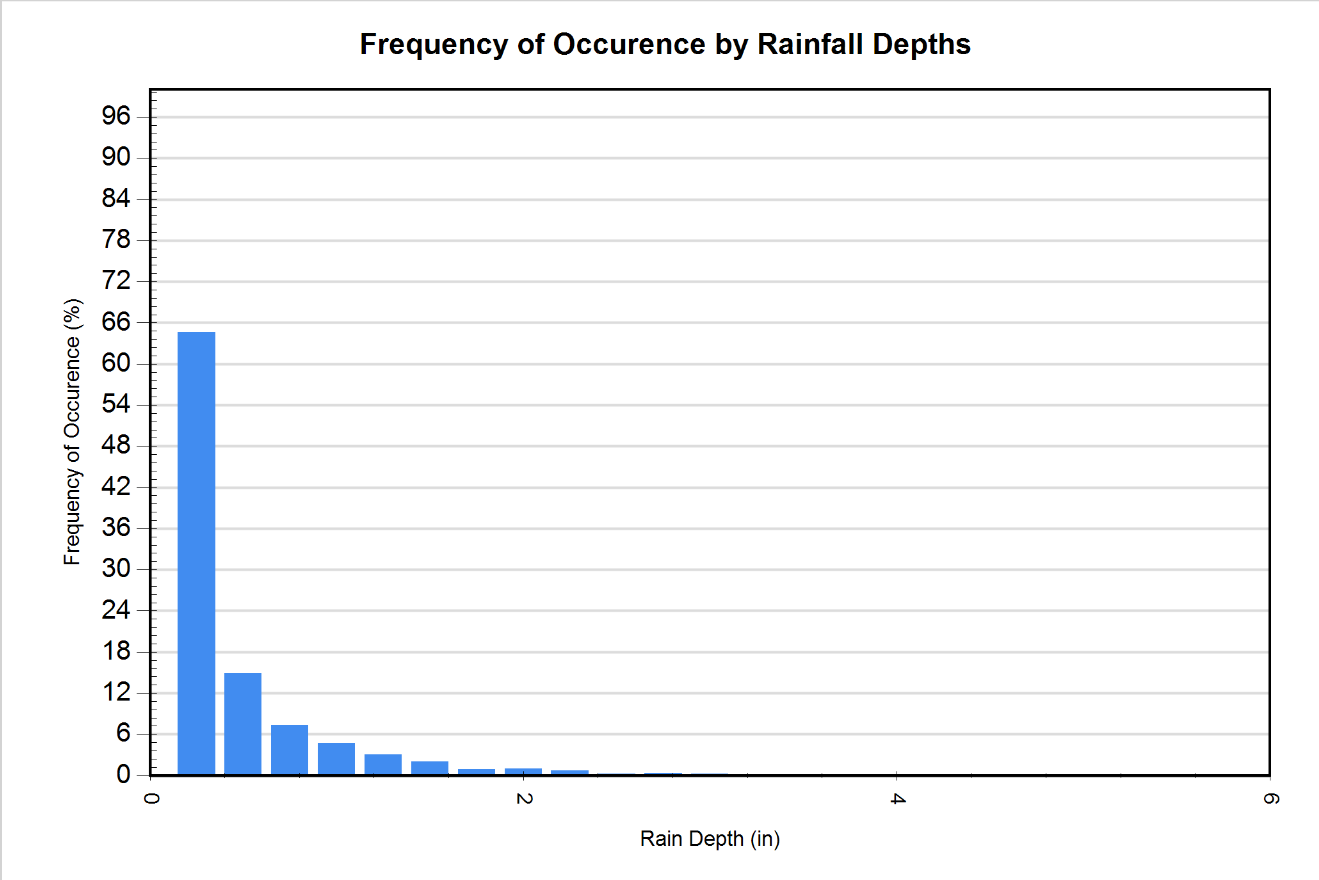
Availability Constant A	
Availability Factor B	
Availability Exponent C	
Min. Particle Size Affected by Availability (micron)	

Cumulative Runoff Volume by Runoff Rate			
Runoff Rate (cfs)	**Runoff Volume (ft³)**	**Volume Over (ft³)**	**Cumulative Runoff Volume (%)**
0.035	492371	334561	59.5
0.141	757683	69193	91.6
0.318	813259	13597	98.4
0.565	824417	2436	99.7
0.883	826653	200	100.0
1.271	826853	0	100.0
1.730	826853	0	100.0



Rainfall Event Analysis

Rainfall Depth (in)	No. of Events	Percentage of Total Events (%)	Total Volume (in)	Percentage of Annual Volume (%)
0.25	3297	64.6	282	16.6
0.50	761	14.9	281	16.5
0.75	371	7.3	229	13.5
1.00	241	4.7	211	12.4
1.25	154	3.0	172	10.1
1.50	102	2.0	139	8.2
1.75	45	0.9	73	4.3
2.00	50	1.0	93	5.5
2.25	34	0.7	72	4.2
2.50	12	0.2	29	1.7
2.75	14	0.3	36	2.1
3.00	12	0.2	35	2.0
3.25	5	0.1	16	0.9
3.50	1	0.0	3	0.2
3.75	1	0.0	4	0.2
4.00	2	0.0	8	0.5
4.25	1	0.0	4	0.2
4.50	0	0.0	0	0.0
4.75	1	0.0	5	0.3
5.00	1	0.0	5	0.3
5.25	1	0.0	5	0.3
5.50	0	0.0	0	0.0
5.75	0	0.0	0	0.0



For Stormceptor Specifications and Drawings Please Visit:
https://www.conteches.com/technical-guides/search?filter=1WBC0O5EYX

Detailed Stormceptor Sizing Report – WQU-2

Project Information & Location			
Project Name	200 Route 15	**Project Number**	49924
City	Sturbridge	**State/ Province**	Massachusetts
Country	United States of America	**Date**	4/7/2023
Designer Information		**EOR Information (optional)**	
Name	Todd MacDonald	**Name**	
Company	BSC Group	**Company**	
Phone #	617-896-4409	**Phone #**	
Email	TMacDonald@BSCGroup.com	**Email**	

Stormwater Treatment Recommendation

The recommended Stormceptor Model(s) which achieve or exceed the user defined water quality objective for each site within the project are listed in the below Sizing Summary table.

Site Name	WQU-2
Recommended Stormceptor Model	STC 900
Target TSS Removal (%)	80.0
TSS Removal (%) Provided	80
PSD	Fine Distribution
Rainfall Station	EAST BRIMFIELD LAKE

The recommended Stormceptor model achieves the water quality objectives based on the selected inputs, historical rainfall records and selected particle size distribution.

Stormceptor Sizing Summary	
Stormceptor Model	**% TSS Removal Provided**
STC 450i	71
STC 900	80
STC 1200	80
STC 1800	80
STC 2400	84
STC 3600	85
STC 4800	88
STC 6000	88
STC 7200	90
STC 11000	93
STC 13000	93
STC 16000	94

Stormceptor

The Stormceptor oil and sediment separator is sized to treat stormwater runoff by removing pollutants through gravity separation and flotation. Stormceptor's patented design generates positive TSS removal for each rainfall event, including large storms. Significant levels of pollutants such as heavy metals, free oils and nutrients are prevented from entering natural water resources and the re-suspension of previously captured sediment (scour) does not occur.

Stormceptor provides a high level of TSS removal for small frequent storm events that represent the majority of annual rainfall volume and pollutant load. Positive treatment continues for large infrequent events, however, such events have little impact on the average annual TSS removal as they represent a small percentage of the total runoff volume and pollutant load.

Design Methodology

Stormceptor is sized using PCSWMM for Stormceptor, a continuous simulation model based on US EPA SWMM. The program calculates hydrology using local historical rainfall data and specified site parameters. With US EPA SWMM's precision, every Stormceptor unit is designed to achieve a defined water quality objective. The TSS removal data presented follows US EPA guidelines to reduce the average annual TSS load. The Stormceptor's unit process for TSS removal is settling. The settling model calculates TSS removal by analyzing:

- Site parameters
- Continuous historical rainfall data, including duration, distribution, peaks & inter-event dry periods
- Particle size distribution, and associated settling velocities (Stokes Law, corrected for drag)
- TSS load
- Detention time of the system

Hydrology Analysis

PCSWMM for Stormceptor calculates annual hydrology with the US EPA SWMM and local continuous historical rainfall data. Performance calculations of Stormceptor are based on the average annual removal of TSS for the selected site parameters. The Stormceptor is engineered to capture sediment particles by treating the required average annual runoff volume, ensuring positive removal efficiency is maintained during each rainfall event, and preventing negative removal efficiency (scour).

Smaller recurring storms account for the majority of rainfall events and average annual runoff volume, as observed in the historical rainfall data analyses presented in this section.

Rainfall Station

State/Province	Massachusetts	**Total Number of Rainfall Events**	5106
Rainfall Station Name	EAST BRIMFIELD LAKE	**Total Rainfall (in)**	1701.4
Station ID #	2107	**Average Annual Rainfall (in)**	37.8
Coordinates	42°7'0"N, 72°8'0"W	**Total Evaporation (in)**	108.6
Elevation (ft)	680	**Total Infiltration (in)**	573.9
Years of Rainfall Data	45	**Total Rainfall that is Runoff (in)**	1018.9

Notes

- Stormceptor performance estimates are based on simulations using PCSWMM for Stormceptor, which uses the EPA Rainfall and Runoff modules.
- Design estimates listed are only representative of specific project requirements based on total suspended solids (TSS) removal defined by the selected PSD, and based on stable site conditions only, after construction is completed.
- For submerged applications or sites specific to spill control, please contact your local Stormceptor representative for further design assistance.

Drainage Area	
Total Area (acres)	2.28
Imperviousness %	66.0

Up Stream Storage	
Storage (ac-ft)	Discharge (cfs)
0.000	0.000

Water Quality Objective	
TSS Removal (%)	80.0
Runoff Volume Capture (%)	
Oil Spill Capture Volume (Gal)	
Peak Conveyed Flow Rate (CFS)	
Water Quality Flow Rate (CFS)	

Up Stream Flow Diversion	
Max. Flow to Stormceptor (cfs)	

Design Details	
Stormceptor Inlet Invert Elev (ft)	680.90
Stormceptor Outlet Invert Elev (ft)	680.80
Stormceptor Rim Elev (ft)	685.00
Normal Water Level Elevation (ft)	
Pipe Diameter (in)	12
Pipe Material	HDPE - plastic
Multiple Inlets (Y/N)	Yes
Grate Inlet (Y/N)	No

Particle Size Distribution (PSD)

Removing the smallest fraction of particulates from runoff ensures the majority of pollutants, such as metals, hydrocarbons and nutrients are captured. The table below identifies the Particle Size Distribution (PSD) that was selected to define TSS removal for the Stormceptor design.

Fine Distribution		
Particle Diameter (microns)	Distribution %	Specific Gravity
20.0	20.0	1.30
60.0	20.0	1.80
150.0	20.0	2.20
400.0	20.0	2.65
2000.0	20.0	2.65

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Site Name	WQU-2

Site Details

Drainage Area

Total Area (acres)	2.28
Imperviousness %	66.0

Surface Characteristics

Width (ft)	630.00
Slope %	2
Impervious Depression Storage (in)	0.02
Pervious Depression Storage (in)	0.2
Impervious Manning's n	0.015
Pervious Manning's n	0.25

Maintenance Frequency

Maintenance Frequency (months) >	12

Infiltration Parameters

Horton's equation is used to estimate infiltration

Max. Infiltration Rate (in/hr)	2.44
Min. Infiltration Rate (in/hr)	0.4
Decay Rate (1/sec)	0.00055
Regeneration Rate (1/sec)	0.01

Evaporation

Daily Evaporation Rate (in/day)	0.1

Dry Weather Flow

Dry Weather Flow (cfs)	0

Winter Months

Winter Infiltration	0

TSS Loading Parameters

TSS Loading Function	

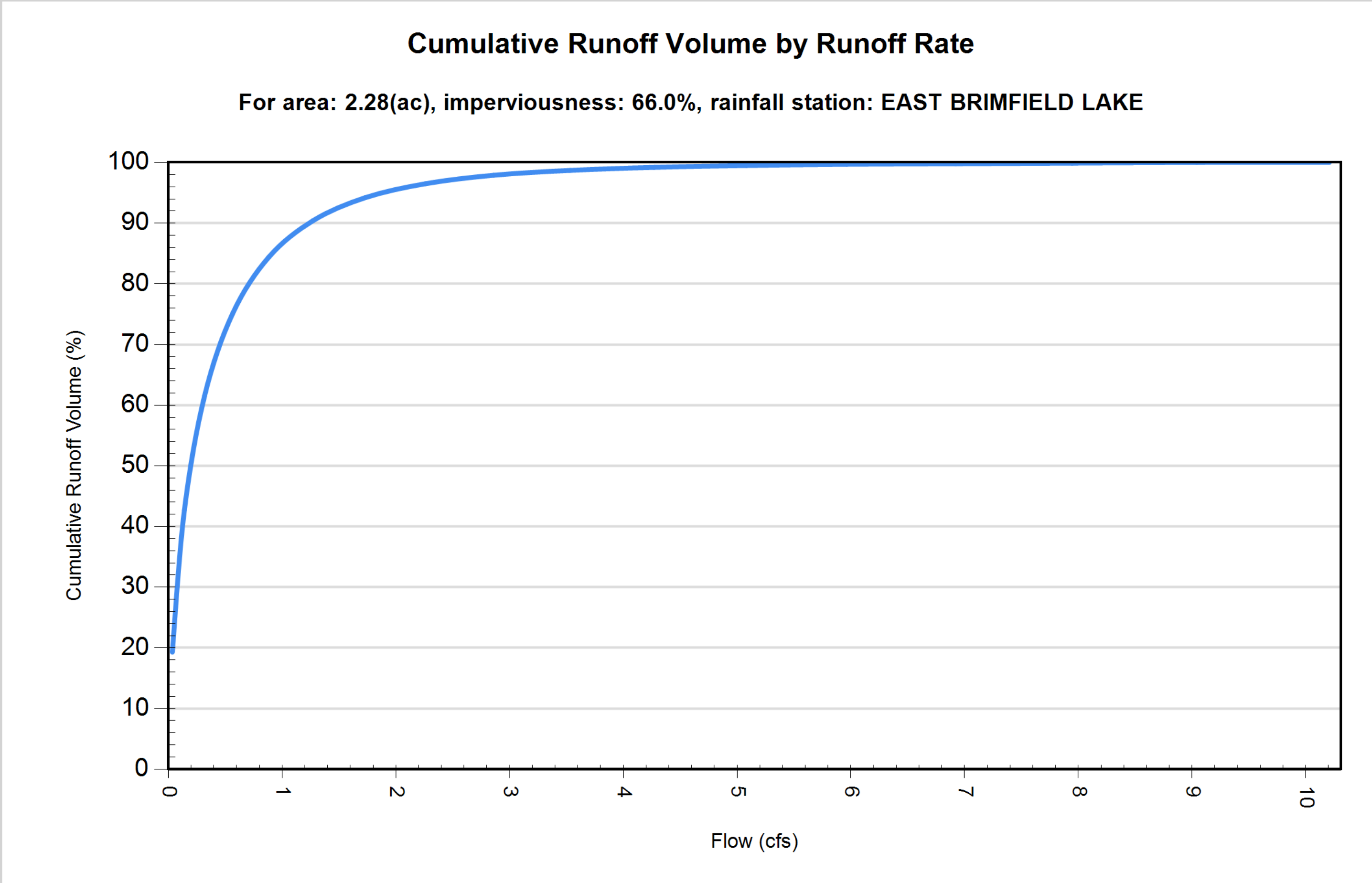
Buildup/Wash-off Parameters

Target Event Mean Conc. (EMC) mg/L	
Exponential Buildup Power	
Exponential Washoff Exponent	

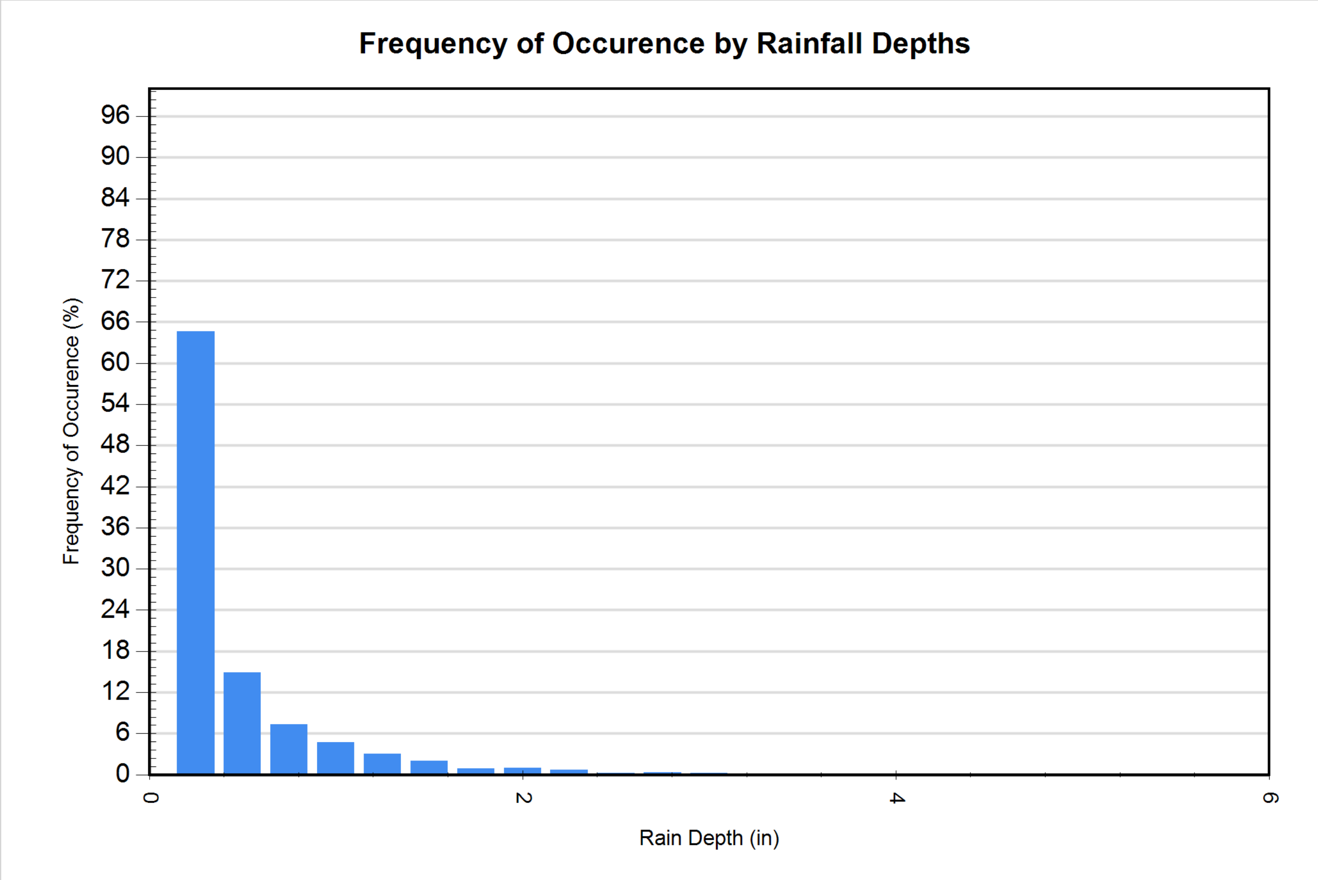
TSS Availability Parameters

Availability Constant A	
Availability Factor B	
Availability Exponent C	
Min. Particle Size Affected by Availability (micron)	

Cumulative Runoff Volume by Runoff Rate			
Runoff Rate (cfs)	**Runoff Volume (ft^3)**	**Volume Over (ft^3)**	**Cumulative Runoff Volume (%)**
0.035	1682368	7038536	19.3
0.141	3719489	5001259	42.7
0.318	5359979	3361551	61.5
0.565	6546873	2173475	75.1
0.883	7360766	1360044	84.4
1.271	7885678	834543	90.4
1.730	8213450	506949	94.2
2.260	8413486	306729	96.5
2.860	8533191	187063	97.9
3.531	8607187	113025	98.7
4.273	8653712	66528	99.2
5.085	8680811	39412	99.5
5.968	8696678	23550	99.7
6.922	8706922	13303	99.8
7.946	8713577	6649	99.9
9.041	8717302	2921	100.0
10.206	8719419	805	100.0


Cumulative Runoff Volume by Runoff Rate
For area: 2.28(ac), imperviousness: 66.0%, rainfall station: EAST BRIMFIELD LAKE
Cumulative Runoff Volume (%)
100
90
80
70
60
50
40
30
20
10
0
0
1
2
3
4
5
6
7
8
9
10
Flow (cfs)

Rainfall Event Analysis				
Rainfall Depth (in)	No. of Events	Percentage of Total Events (%)	Total Volume (in)	Percentage of Annual Volume (%)
0.25	3297	64.6	282	16.6
0.50	761	14.9	281	16.5
0.75	371	7.3	229	13.5
1.00	241	4.7	211	12.4
1.25	154	3.0	172	10.1
1.50	102	2.0	139	8.2
1.75	45	0.9	73	4.3
2.00	50	1.0	93	5.5
2.25	34	0.7	72	4.2
2.50	12	0.2	29	1.7
2.75	14	0.3	36	2.1
3.00	12	0.2	35	2.0
3.25	5	0.1	16	0.9
3.50	1	0.0	3	0.2
3.75	1	0.0	4	0.2
4.00	2	0.0	8	0.5
4.25	1	0.0	4	0.2
4.50	0	0.0	0	0.0
4.75	1	0.0	5	0.3
5.00	1	0.0	5	0.3
5.25	1	0.0	5	0.3
5.50	0	0.0	0	0.0
5.75	0	0.0	0	0.0



For Stormceptor Specifications and Drawings Please Visit:
https://www.conteches.com/technical-guides/search?filter=1WBC0O5EYX

7.05 GROUNDWATER MOUNDING ANALYSIS

This spreadsheet will calculate the height of a groundwater mound beneath a stormwater infiltration basin. More information can be found in the U.S. Geological Survey Scientific Investigations Report 2010-5102 "Simulation of groundwater mounding beneath hypothetical stormwater infiltration basins".

The user must specify infiltration rate (R), specific yield (Sy), horizontal hydraulic conductivity (Kh), basin dimensions (x, y), duration of infiltration period (t), and the initial thickness of the saturated zone (hi(0), height of the water table if the bottom of the aquifer is the datum). For a square basin the half width equals the half length (x = y). For a rectangular basin, if the user wants the water-table changes perpendicular to the long side, specify x as the short dimension and y as the long dimension. Conversely, if the user wants the values perpendicular to the short side, specify y as the short dimension, x as the long dimension. All distances are from the center of the basin. Users can change the distances from the center of the basin at which water-table aquifer thickness are calculated.
Cells highlighted in yellow are values that can be changed by the user. Cells highlighted in red are output values based on user-specified inputs. The user MUST click the blue "Re-Calculate Now" button each time ANY of the user-specified inputs are changed otherwise necessary iterations to converge on the correct solution will not be done and values shown will be incorrect. Use consistent units for all input values (for example, feet and days)

Input Values		use consistent units (e.g. feet & days **or** inches & hours)
4.8200	***R***	**Recharge (infiltration) rate (feet/day)**
0.200	**Sy**	**Specific yield, Sy (dimensionless, between 0 and 1)**
43.38	**K**	**Horizontal hydraulic conductivity, Kh (feet/day)***
20.000	**x**	**1/2 length of basin (x direction, in feet)**
255.000	**y**	**1/2 width of basin (y direction, in feet)**
0.080	**t**	**duration of infiltration period (days)**
2.000	**hi(0)**	**initial thickness of saturated zone (feet)**
3.904	**h(max)**	**maximum thickness of saturated zone (beneath center of basin at end of infiltration period)**
1.904	**Δh(max)**	**maximum groundwater mounding (beneath center of basin at end of infiltration period)**

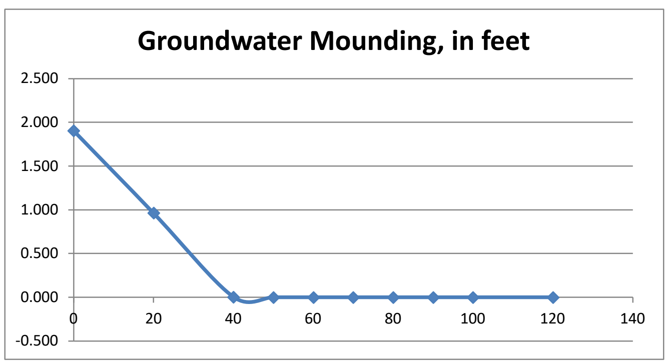
Conversion Table

inch/hour	**feet/day**
0.67	1.33
2.00	4.00
hours	**days**
36	1.50

In the report accompanying this spreadsheet (USGS SIR 2010-5102), vertical soil permeability (ft/d) is assumed to be one-tenth horizontal hydraulic conductivity (ft/d).

Ground-water Mounding, in feet	**Distance from center of basin in x direction, in feet**
1.904	**0**
0.964	**20**
0.004	**40**
0.001	**50**
0.001	**60**
0.001	**70**
0.001	**80**
0.001	**90**
0.001	**100**
0.001	**120**

Re-Calculate Now



Disclaimer

This spreadsheet solving the Hantush (1967) equation for ground-water mounding beneath an infiltration basin is made available to the general public as a convenience for those wishing to replicate values documented in the USGS Scientific Investigations Report 2010-5102 "Groundwater mounding beneath hypothetical stormwater infiltration basins" or to calculate values based on user-specified site conditions. Any changes made to the spreadsheet (other than values identified as user-specified) after transmission from the USGS could have unintended, undesirable consequences. These consequences could include, but may not be limited to: erroneous output, numerical instabilities, and violations of underlying assumptions that are inherent in results presented in the accompanying USGS published report. The USGS assumes no responsibility for the consequences of any changes made to the spreadsheet. If changes are made to the spreadsheet, the user is responsible for documenting the changes and justifying the results and conclusions.

This spreadsheet will calculate the height of a groundwater mound beneath a stormwater infiltration basin. More information can be found in the U.S. Geological Survey Scientific Investigations Report 2010-5102 "Simulation of groundwater mounding beneath hypothetical stormwater infiltration basins".

The user must specify infiltration rate (R), specific yield (Sy), horizontal hydraulic conductivity (Kh), basin dimensions (x, y), duration of infiltration period (t), and the initial thickness of the saturated zone (hi(0), height of the water table if the bottom of the aquifer is the datum). For a square basin the half width equals the half length (x = y). For a rectangular basin, if the user wants the water-table changes perpendicular to the long side, specify x as the short dimension and y as the long dimension. Conversely, if the user wants the values perpendicular to the short side, specify y as the short dimension, x as the long dimension. All distances are from the center of the basin. Users can change the distances from the center of the basin at which water-table aquifer thickness are calculated.
Cells highlighted in yellow are values that can be changed by the user. Cells highlighted in red are output values based on user-specified inputs. The user MUST click the blue "Re-Calculate Now" button each time ANY of the user-specified inputs are changed otherwise necessary iterations to converge on the correct solution will not be done and values shown will be incorrect. Use consistent units for all input values (for example, feet and days)

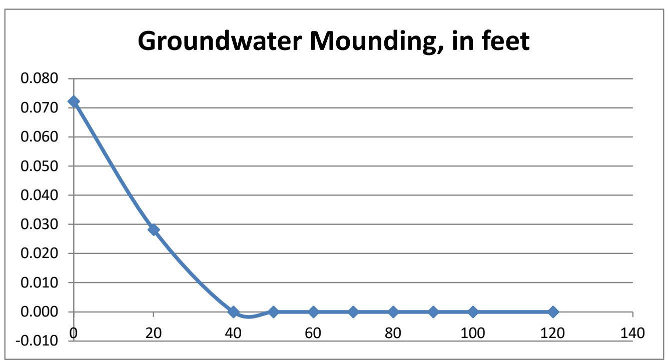
Input Values		use consistent units (e.g. feet & days **or** inches & hours)	**Conversion Table**	
			inch/hour	**feet/day**
4.8200	*R*	**Recharge (infiltration) rate (feet/day)**	0.67	1.33
0.200	Sy	**Specific yield, Sy (dimensionless, between 0 and 1)**		
43.38	K	**Horizontal hydraulic conductivity, Kh (feet/day)***	2.00	4.00
19.750	x	**1/2 length of basin (x direction, in feet)**		
62.330	y	**1/2 width of basin (y direction, in feet)**	**hours**	**days**
0.003	t	**duration of infiltration period (days)**	36	1.50
2.100	hi(0)	**initial thickness of saturated zone (feet)**		

In the report accompanying this spreadsheet (USGS SIR 2010-5102), vertical soil permeability (ft/d) is assumed to be one-tenth horizontal hydraulic conductivity (ft/d).

2.172	h(max)	**maximum thickness of saturated zone (beneath center of basin at end of infiltration period)**
0.072	Δh(max)	**maximum groundwater mounding (beneath center of basin at end of infiltration period)**

Ground-water Mounding, in feet	**Distance from center of basin in x direction, in feet**
0.072	0
0.028	20
0.000	40
0.000	50
0.000	60
0.000	70
0.000	80
0.000	90
0.000	100
0.000	120

Re-Calculate Now



Disclaimer

This spreadsheet solving the Hantush (1967) equation for ground-water mounding beneath an infiltration basin is made available to the general public as a convenience for those wishing to replicate values documented in the USGS Scientific Investigations Report 2010-5102 "Groundwater mounding beneath hypothetical stormwater infiltration basins" or to calculate values based on user-specified site conditions. Any changes made to the spreadsheet (other than values identified as user-specified) after transmission from the USGS could have unintended, undesirable consequences. These consequences could include, but may not be limited to: erroneous output, numerical instabilities, and violations of underlying assumptions that are inherent in results presented in the accompanying USGS published report. The USGS assumes no responsibility for the consequences of any changes made to the spreadsheet. If changes are made to the spreadsheet, the user is responsible for documenting the changes and justifying the results and conclusions.

This spreadsheet will calculate the height of a groundwater mound beneath a stormwater infiltration basin. More information can be found in the U.S. Geological Survey Scientific Investigations Report 2010-5102 "Simulation of groundwater mounding beneath hypothetical stormwater infiltration basins".

The user must specify infiltration rate (R), specific yield (Sy), horizontal hydraulic conductivity (Kh), basin dimensions (x, y), duration of infiltration period (t), and the initial thickness of the saturated zone (hi(0), height of the water table if the bottom of the aquifer is the datum). For a square basin the half width equals the half length (x = y). For a rectangular basin, if the user wants the water-table changes perpendicular to the long side, specify x as the short dimension and y as the long dimension. Conversely, if the user wants the values perpendicular to the short side, specify y as the short dimension, x as the long dimension. All distances are from the center of the basin.
Users can change the distances from the center of the basin at which water-table aquifer thickness are calculated.
Cells highlighted in yellow are values that can be changed by the user. Cells highlighted in red are output values based on user-specified inputs. The user MUST click the blue "Re-Calculate Now" button each time ANY of the user-specified inputs are changed otherwise necessary iterations to converge on the correct solution will not be done and values shown will be incorrect. Use consistent units for all input values (for example, feet and days)

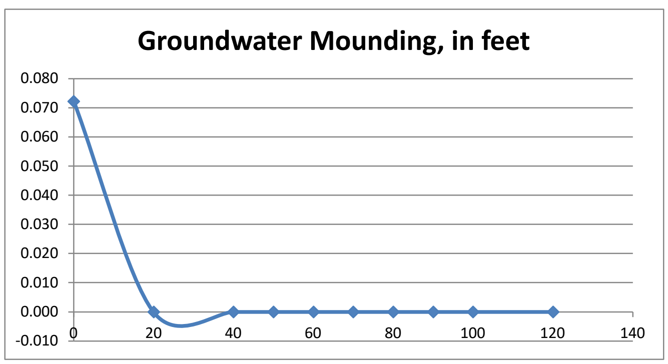
Input Values		use consistent units (e.g. feet & days **or** inches & hours)	Conversion Table	
			inch/hour	**feet/day**
4.8200	***R***	**Recharge (infiltration) rate (feet/day)**	0.67	1.33
0.200	**Sy**	**Specific yield, Sy (dimensionless, between 0 and 1)**		
43.38	**K**	**Horizontal hydraulic conductivity, Kh (feet/day)***	2.00	4.00
15.000	**x**	**1/2 length of basin (x direction, in feet)**		
30.290	**y**	**1/2 width of basin (y direction, in feet)**	**hours**	**days**
0.003	**t**	**duration of infiltration period (days)**	36	1.50
2.400	**hi(0)**	**initial thickness of saturated zone (feet)**		

In the report accompanying this spreadsheet (USGS SIR 2010-5102), vertical soil permeability (ft/d) is assumed to be one-tenth horizontal hydraulic conductivity (ft/d).

2.472	**h(max)**	**maximum thickness of saturated zone (beneath center of basin at end of infiltration period)**
0.072	**Δh(max)**	**maximum groundwater mounding (beneath center of basin at end of infiltration period)**

Ground-water Mounding, in feet	Distance from center of basin in x direction, in feet
0.072	0
0.000	20
0.000	40
0.000	50
0.000	60
0.000	70
0.000	80
0.000	90
0.000	100
0.000	120

Re-Calculate Now



Disclaimer

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This spreadsheet will calculate the height of a groundwater mound beneath a stormwater infiltration basin. More information can be found in the U.S. Geological Survey Scientific Investigations Report 2010-5102 "Simulation of groundwater mounding beneath hypothetical stormwater infiltration basins".

The user must specify infiltration rate (R), specific yield (Sy), horizontal hydraulic conductivity (Kh), basin dimensions (x, y), duration of infiltration period (t), and the initial thickness of the saturated zone (hi(0), height of the water table if the bottom of the aquifer is the datum). For a square basin the half width equals the half length (x = y). For a rectangular basin, if the user wants the water-table changes perpendicular to the long side, specify x as the short dimension and y as the long dimension. Conversely, if the user wants the values perpendicular to the short side, specify y as the short dimension, x as the long dimension. All distances are from the center of the basin.
Users can change the distances from the center of the basin at which water-table aquifer thickness are calculated.
Cells highlighted in yellow are values that can be changed by the user. Cells highlighted in red are output values based on user-specified inputs. The user MUST click the blue "Re-Calculate Now" button each time ANY of the user-specified inputs are changed otherwise necessary iterations to converge on the correct solution will not be done and values shown will be incorrect. Use consistent units for all input values (for example, feet and days)

Input Values		use consistent units (e.g. feet & days **or** inches & hours)
4.8200	***R***	**Recharge (infiltration) rate (feet/day)**
0.200	**Sy**	**Specific yield, Sy (dimensionless, between 0 and 1)**
43.38	**K**	**Horizontal hydraulic conductivity, Kh (feet/day)***
10.250	**x**	**1/2 length of basin (x direction, in feet)**
19.610	**y**	**1/2 width of basin (y direction, in feet)**
0.004	**t**	**duration of infiltration period (days)**
2.150	**hi(0)**	**initial thickness of saturated zone (feet)**

Conversion Table

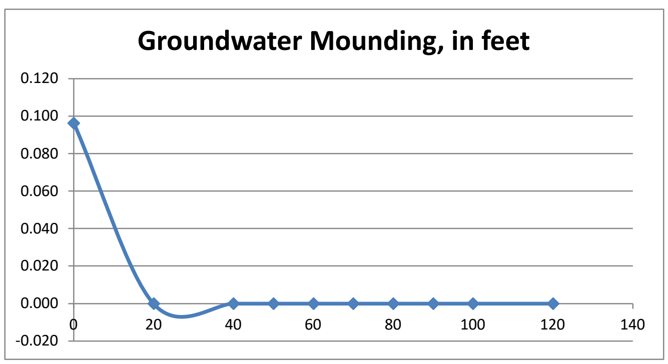
inch/hour	**feet/day**
0.67	1.33
2.00	4.00
hours	**days**
36	1.50

In the report accompanying this spreadsheet (USGS SIR 2010-5102), vertical soil permeability (ft/d) is assumed to be one-tenth horizontal hydraulic conductivity (ft/d).

2.246	**h(max)**	**maximum thickness of saturated zone (beneath center of basin at end of infiltration period)**
0.096	**Δh(max)**	**maximum groundwater mounding (beneath center of basin at end of infiltration period)**

Ground-water Mounding, in feet	**Distance from center of basin in x direction, in feet**
0.096	**0**
0.000	**20**
0.000	**40**
0.000	**50**
0.000	**60**
0.000	**70**
0.000	**80**
0.000	**90**
0.000	**100**
0.000	**120**

Re-Calculate Now

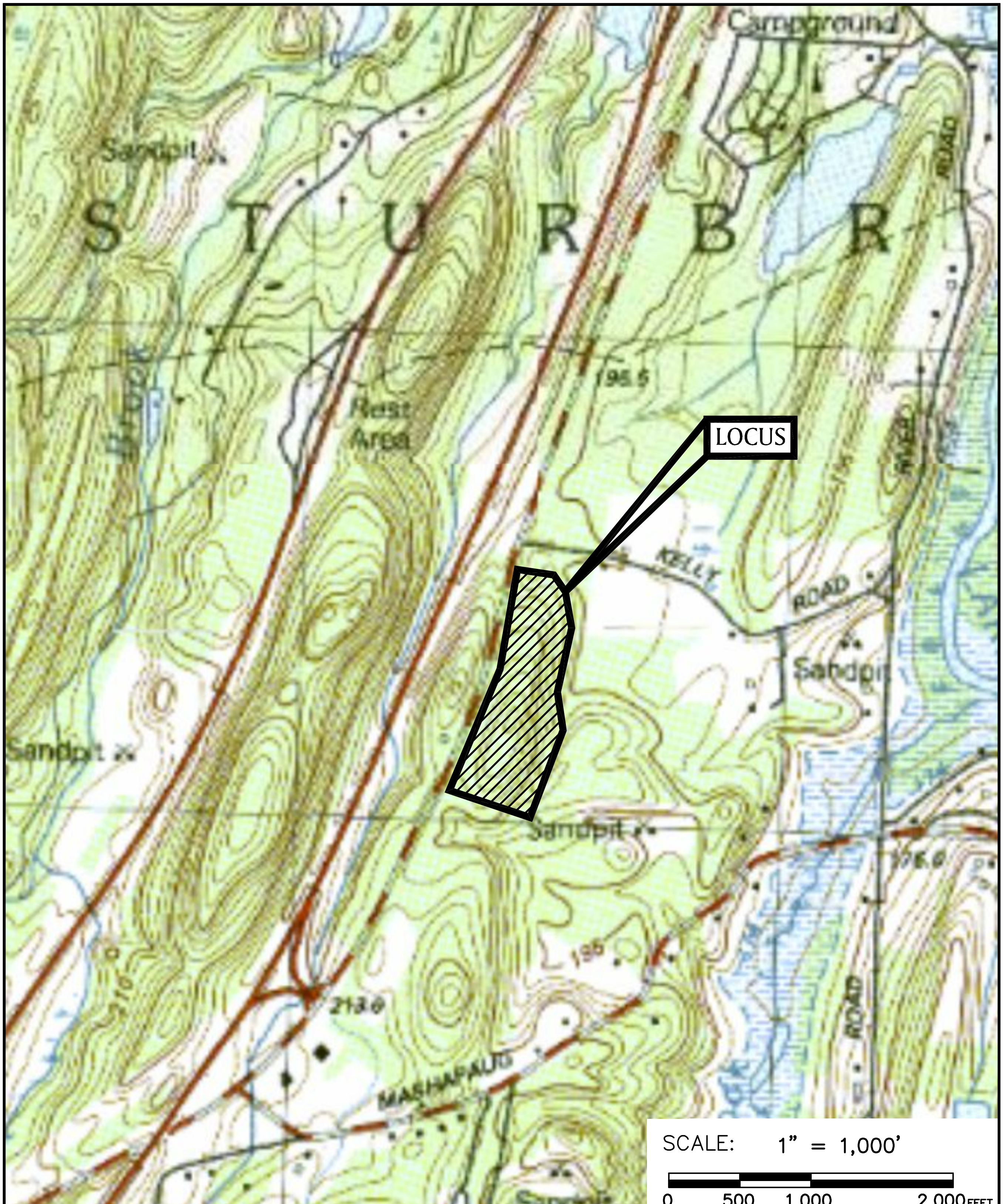


Disclaimer

This spreadsheet solving the Hantush (1967) equation for ground-water mounding beneath an infiltration basin is made available to the general public as a convenience for those wishing to replicate values documented in the USGS Scientific Investigations Report 2010-5102 "Groundwater mounding beneath hypothetical stormwater infiltration basins" or to calculate values based on user-specified site conditions. Any changes made to the spreadsheet (other than values identified as user-specified) after transmission from the USGS could have unintended, undesirable consequences. These consequences could include, but may not be limited to: erroneous output, numerical instabilities, and violations of underlying assumptions that are inherent in results presented in the accompanying USGS published report. The USGS assumes no responsibility for the consequences of any changes made to the spreadsheet. If changes are made to the spreadsheet, the user is responsible for documenting the changes and justifying the results and conclusions.

APPENDIX A

USGS LOCUS MAP



PREPARED FOR:

BEAR PEAK POWER
2420 17TH STREET
DENVER, CO 80202

USGS LOCUS MAP

Source:

GROUND-MOUNTED
PHOTOVOLTAIC SYSTEM
200 ROUTE 15,
STURBRIDGE, MA 01566

BSC GROUP
349 Main Street - Route 28
West Yarmouth, Massachusetts
02673
508 778 8919

Job No.:	5-0745.00	Date:	4/7/2023
Scale:	1"=1,000'	Revised:	
Dwg. No:		Figure:	

APPENDIX B

FEMA MAP

National Flood Hazard Layer FIRMette

FEMA

72°5'52"W 42°4'54"N

72°5'14"W 42°4'27"N

Feet 0 250 500 1,000 1,500 2,000

1:6,000

Basemap: USGS National Map: Orthoimagery: Data refreshed October, 2020

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee. See Notes. *Zone X*
- Area with Flood Risk due to Levee *Zone D*

OTHER AREAS
- NO SCREEN Area of Minimal Flood Hazard *Zone X*
- Effective LOMRs
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES
- B 20.2 17.5 Cross Sections with 1% Annual Chance Water Surface Elevation
- 8 Coastal Transect
- 513 Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

N

The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 4/7/2023 at 4:04 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

APPENDIX C

WEB SOIL SURVEY


72° 5' 43" W
72° 5' 25" W
740300
740360
740420
740480
740540
740600
740660
42° 4' 49" N
42° 4' 32" N
4662760
4662700
4662640
4662580
4662520
4662460
4662400
4662340
4662280
84
Route 15
15
Park Cir
73A
254B
422C
422E
255A
255A
Soil Map may not be valid at this scale.
Map Scale: 1:2,560 if printed on A portrait (8.5" x 11") sheet.
Meters
0 35 70 140 210
Feet
0 100 200 400 600
N
Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 18N WGS84

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Map Unit Polygons

Soil Map Unit Lines

Soil Map Unit Points

Special Point Features

Blowout

Borrow Pit

Clay Spot

Closed Depression

Gravel Pit

Gravelly Spot

Landfill

Lava Flow

Marsh or swamp

Mine or Quarry

Miscellaneous Water

Perennial Water

Rock Outcrop

Saline Spot

Sandy Spot

Severely Eroded Spot

Sinkhole

Slide or Slip

Sodic Spot

Spoil Area

Stony Spot

Very Stony Spot

Wet Spot

Other

Special Line Features

Water Features

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

Background

Aerial Photography

MAP INFORMATION

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

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

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

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

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

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

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

Soil Survey Area: Worcester County, Massachusetts, Southern Part
Survey Area Data: Version 15, Sep 9, 2022

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

Date(s) aerial images were photographed: Oct 15, 2020—Oct 31, 2020

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

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
73A	Whitman fine sandy loam, 0 to 3 percent slopes, extremely stony	0.6	5.5%
254B	Merrimac fine sandy loam, 3 to 8 percent slopes	0.1	0.7%
255A	Windsor loamy sand, 0 to 3 percent slopes	0.0	0.2%
422C	Canton fine sandy loam, 8 to 15 percent slopes, extremely stony	6.3	62.7%
422E	Canton fine sandy loam, 15 to 35 percent slopes, extremely stony	3.1	30.9%
Totals for Area of Interest		**10.0**	**100.0%**

APPENDIX D

MASSACHUSETTS FORM 11 TEST PIT LOGS

Commonwealth of Massachusetts
City/Town of

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

A. Facility Information

30 SWIFT LLC
Owner Name

200 Route 15
Street Address

552-/0 3748/- 220
Map/Lot #

Sturbridge
City

MA
State

01566
Zip Code

B. Site Information

1. (Check one) ☒ New Construction ☐ Upgrade

2. Soil Survey
   Web Soil Survey
   Source
   422C, 422E
   Soil Map Unit
   Canton fine sandy loam, 8-15 percent slopes, extremely stony
   Canton fine sandy loam, 15-35 percent slopes, extremely stony
   Soil Series
   Hill - Summit
   Landform
   Extremely stony
   Soil Limitations
   coarse-loamy over sandy melt-out till derived from gneiss, granite, and/or schist
   Soil Parent material

3. Surficial Geological Report
   2018 - Stone and DiGiacomo-Cohen
   Year Published/Source
   Thin till, some areas of shallow bedrock
   Map Unit
   Nonsorted, nostratified matrix of sand, some silt, and little clay containing scattered pebble, cobble, and boulder clasts
   Description of Geologic Map Unit:

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

5. Within a velocity zone? ☐ Yes ☒ No

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

7. Current Water Resource Conditions (USGS): March 2023
   Month/Day/ Year
   Range: ☒ Above Normal ☐ Normal ☐ Below Normal

8. Other references reviewed:
   (Zone II, IWPA, Zone A, EEA Data Portal, etc.)

Commonwealth of Massachusetts
City/Town of

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

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

Deep Observation Hole Number: TP-1 (Hole #) 3/21/23 (Date) 8AM (Time) Clear 45 F (Weather) ______ (Latitude) ______ (Longitude)

1. Land Use: Woodlands (e.g., woodland, agricultural field, vacant lot, etc.) — Trees (wide range) (Vegetation) — Surface stones & boulders present (Surface Stones (e.g., cobbles, stones, boulders, etc.)) — 0-8% (Slope (%))

Description of Location: Wooded area

2. Soil Parent Material: coarse-loamy over sandy melt-out till derived from gneiss, granite, and/or schist — Hill (Landform) — Summit (Position on Landscape (SU, SH, BS, FS, TS, Plain))

3. Distances from: Open Water Body >1,000 feet — Drainage Way N/A feet — Wetlands >800 feet
   Property Line 20 feet — Drinking Water Well N/A feet — Other ______ feet

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

5. Groundwater Observed: ☐ Yes ☒ No — If yes: ______ Depth to Weeping in Hole ______ Depth to Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-4	A / O	SL	10YR 2/1	-	Cnc : Dpl:	-	-	-	Granular	Friable	
4-18	B	LS	7.5YR 5/8	-	Cnc : Dpl:	-	3-5	0-3	Massive	Friable	
18-48	C	LS	10YR 5/4	-	Cnc : Dpl:	-	5-8	5-8	SG	Loose	Large stones present in C-layer
					Cnc : Dpl:						No GW Observed
					Cnc : Dpl:						
					Cnc : Dpl:						

Additional Notes:

Commonwealth of Massachusetts
City/Town of

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

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

Deep Observation Hole Number: TP-2 (Hole #) 3/21/23 (Date) 8:30AM (Time) Clear 45 F (Weather) ______ (Latitude) ______ (Longitude)

1. Land Use: Woodlands (e.g., woodland, agricultural field, vacant lot, etc.) Trees (wide range) (Vegetation) Surface stones & boulders present (Surface Stones (e.g., cobbles, stones, boulders, etc.)) 0-8% (Slope (%))

Description of Location: Wooded area

2. Soil Parent Material: coarse-loamy over sandy melt-out till derived from gneiss, granite, and/or schist Hill (Landform) Summit (Position on Landscape (SU, SH, BS, FS, TS, Plain))

3. Distances from: Open Water Body >1,000 feet Drainage Way N/A feet Wetlands >800 feet

Property Line 50 feet Drinking Water Well N/A feet Other ______ feet

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

5. Groundwater Observed: ☐ Yes ☒ No If yes: ______ Depth to Weeping in Hole ______ Depth Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA)	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-4	A / O	SL	10YR 2/1	-	Cnc : Dpl:	-	-	-	Granular	Friable	
4-20	B	LS	7.5YR 5/8	-	Cnc : Dpl:	-	3-5	0-3	Massive	Friable	
20-60	C	LS	10YR 5/4	-	Cnc : Dpl:	-	5-8	5-8	SG	Loose	Large stones present in C-layer
					Cnc : Dpl:						No GW Observed
					Cnc : Dpl:						
					Cnc : Dpl:						

Additional Notes:

Commonwealth of Massachusetts
City/Town of

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

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

Deep Observation Hole Number: TP-3 (Hole #) | 3/21/23 (Date) | 9:30AM (Time) | Clear 45 F (Weather) | ______ (Latitude) | ______ (Longitude)

1. Land Use: Woodlands (e.g., woodland, agricultural field, vacant lot, etc.) | Trees (wide range) (Vegetation) | Surface stones & boulders present (Surface Stones (e.g., cobbles, stones, boulders, etc.)) | 0-8% (Slope (%))

Description of Location: Wooded area

2. Soil Parent Material: coarse-loamy over sandy melt-out till derived from gneiss, granite, and/or schist | Hill (Landform) | Summit (Position on Landscape (SU, SH, BS, FS, TS, Plain))

3. Distances from: Open Water Body >1,000 feet | Drainage Way N/A feet | Wetlands >1,000 feet
Property Line 200 feet | Drinking Water Well N/A feet | Other ______ feet

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

5. Groundwater Observed: ☐ Yes ☒ No If yes: ______ Depth to Weeping in Hole ______ Depth to Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-4	A / O	SL	10YR 2/1	-	Cnc : Dpl:	-	-	-	Granular	Friable	
4-32	B	LS	7.5YR 4/6	-	Cnc : Dpl:	-	3-5	0-3	Massive	Friable	
32-84	C	LS	2.5Y 6/4	-	Cnc : Dpl:	-	10-15	5-8	SG	Loose	Very gravelly
					Cnc : Dpl:						Large stones present in C-layer
					Cnc : Dpl:						No GW Observed
					Cnc : Dpl:						

Additional Notes:

Commonwealth of Massachusetts
City/Town of

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

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

Deep Observation Hole Number: TP-4 (Hole #) 3/21/23 (Date) 10AM (Time) Clear 45 F (Weather) ____ (Latitude) ____ (Longitude)

1. Land Use: Woodlands (e.g., woodland, agricultural field, vacant lot, etc.) Trees (wide range) (Vegetation) Surface stones & boulders present (Surface Stones (e.g., cobbles, stones, boulders, etc.)) 0-8% (Slope (%))

   Description of Location: Wooded area

2. Soil Parent Material: coarse-loamy over sandy melt-out till derived from gneiss, granite, and/or schist Hill (Landform) Summit (Position on Landscape (SU, SH, BS, FS, TS, Plain))

3. Distances from: Open Water Body >1,000 feet Drainage Way N/A feet Wetlands >1,000 feet

   Property Line 200 feet Drinking Water Well N/A feet Other ____ feet

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

5. Groundwater Observed: ☐ Yes ☒ No If yes: ____ Depth to Weeping in Hole ____ Depth Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA)	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-4	A / O	SL	10YR 2/1	-	Cnc : Dpl:	-	-	-	Granular	Friable	
4-30	B	LS	7.5YR 4/6	-	Cnc : Dpl:	-	3-5	0-3	Massive	Friable	
30-84	C	LS	10YR 6/2	-	Cnc : Dpl:	-	5-8	5-8	SG	Loose	Large stones present in C-layer
					Cnc : Dpl:						No GW Observed
					Cnc : Dpl:						
					Cnc : Dpl:						

Additional Notes:

Commonwealth of Massachusetts
City/Town of

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

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

Deep Observation Hole Number: TP-5 (Hole #) | 3/21/23 (Date) | 11AM (Time) | Clear 45 F (Weather) | ______ (Latitude) | ______ (Longitude)

1. Land Use: Woodlands (e.g., woodland, agricultural field, vacant lot, etc.) | Trees (wide range) (Vegetation) | Surface stones & boulders present (Surface Stones (e.g., cobbles, stones, boulders, etc.)) | 0-8% (Slope (%))

Description of Location: Wooded area

2. Soil Parent Material: coarse-loamy over sandy melt-out till derived from gneiss, granite, and/or schist | Hill (Landform) | Summit (Position on Landscape (SU, SH, BS, FS, TS, Plain))

3. Distances from: Open Water Body >800 feet | Drainage Way N/A feet | Wetlands >600 feet
   Property Line 50 feet | Drinking Water Well N/A feet | Other ______ feet

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

5. Groundwater Observed: ☐ Yes ☒ No If yes: ______ Depth to Weeping in Hole ______ Depth to Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-4	A / O	SL	10YR 2/1	-	Cnc : Dpl:	-	-	-	Granular	Friable	
4-26	B	LS	7.5YR 5/8	-	Cnc : Dpl:	-	3-5	0-3	Massive	Friable	
26-56	C	LS	10YR 5/3	-	Cnc : Dpl:	-	5-8	5-8	SG	Loose	Large stones present in C-layer
					Cnc : Dpl:						No GW Observed
					Cnc : Dpl:						
					Cnc : Dpl:						

Additional Notes:

Commonwealth of Massachusetts
City/Town of

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

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

Deep Observation Hole Number: TP-6 (Hole #) 3/21/23 (Date) 11:30AM (Time) Clear 45 F (Weather) ____ (Latitude) ____ (Longitude)

1. Land Use: Woodlands (e.g., woodland, agricultural field, vacant lot, etc.) Trees (wide range) (Vegetation) Surface stones & boulders present (Surface Stones (e.g., cobbles, stones, boulders, etc.)) 0-8% (Slope (%))

   Description of Location: Wooded area

2. Soil Parent Material: coarse-loamy over sandy melt-out till derived from gneiss, granite, and/or schist Hill (Landform) Summit (Position on Landscape (SU, SH, BS, FS, TS, Plain))

3. Distances from: Open Water Body >1,000 feet Drainage Way N/A feet Wetlands >500 feet

   Property Line 50 feet Drinking Water Well N/A feet Other ____ feet

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

5. Groundwater Observed: ☐ Yes ☒ No If yes: ____ Depth to Weeping in Hole ____ Depth Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA)	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-4	A / O	SL	10YR 2/1	-	Cnc : Dpl:	-	-	-	Granular	Friable	
4-39	B	LS	7.5YR 5/8	-	Cnc : Dpl:	-	3-5	0-3	Massive	Friable	
39-92	C	LS	10YR 4/6	-	Cnc : Dpl:	-	5-8	5-8	SG	Loose	Large stones present in C-layer
					Cnc : Dpl:						No GW Observed
					Cnc : Dpl:						
					Cnc : Dpl:						

Additional Notes:

Commonwealth of Massachusetts
City/Town of

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

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

Deep Observation Hole Number: TP-7 (Hole #) | 3/21/23 (Date) | 1 PM (Time) | Clear 45 F (Weather) | ______ (Latitude) | ______ (Longitude)

1. Land Use: Woodlands (e.g., woodland, agricultural field, vacant lot, etc.) | Trees (wide range) (Vegetation) | Surface stones & boulders present (Surface Stones (e.g., cobbles, stones, boulders, etc.)) | 0-8% (Slope (%))

Description of Location: Wooded area

2. Soil Parent Material: coarse-loamy over sandy melt-out till derived from gneiss, granite, and/or schist | Hill (Landform) | Summit (Position on Landscape (SU, SH, BS, FS, TS, Plain))

3. Distances from: Open Water Body >500 feet | Drainage Way N/A feet | Wetlands >200 feet
Property Line 50 feet | Drinking Water Well N/A feet | Other ______ feet

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

5. Groundwater Observed: ☐ Yes ☒ No If yes: ______ Depth to Weeping in Hole ______ Depth to Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-4	A / O	SL	10YR 2/1	-	Cnc : Dpl:	-	-	-	Granular	Friable	
4-38	B	LS	7.5YR 4/6	-	Cnc : Dpl:	-	3-5	0-3	Massive	Friable	
38-96	C	LS	10YR 4/4	-	Cnc : Dpl:	-	5-8	5-8	SG	Loose	Large stones present in C-layer
					Cnc : Dpl:						No GW Observed
					Cnc : Dpl:						
					Cnc : Dpl:						

Additional Notes:

Commonwealth of Massachusetts
City/Town of

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

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

Deep Observation Hole Number: TP-8 (Hole #) 3/21/23 (Date) 1:30 PM (Time) Clear 45 F (Weather) ______ (Latitude) ______ (Longitude)

1. Land Use: Woodlands (e.g., woodland, agricultural field, vacant lot, etc.) Trees (wide range) (Vegetation) Surface stones & boulders present (Surface Stones (e.g., cobbles, stones, boulders, etc.)) 0-8% (Slope (%))

   Description of Location: Wooded area

2. Soil Parent Material: coarse-loamy over sandy melt-out till derived from gneiss, granite, and/or schist Hill (Landform) Summit (Position on Landscape (SU, SH, BS, FS, TS, Plain))

3. Distances from: Open Water Body >800 feet Drainage Way N/A feet Wetlands >800 feet

   Property Line 50 feet Drinking Water Well N/A feet Other ______ feet

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

5. Groundwater Observed: ☐ Yes ☒ No If yes: ______ Depth to Weeping in Hole ______ Depth Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA)	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-4	A / O	SL	10YR 2/1	-	Cnc : Dpl:	-	-	-	Granular	Friable	
4-32	B	LS	7.5YR 4/6	-	Cnc : Dpl:	-	3-5	0-3	Massive	Friable	
32-72	C	LS	10YR 6/4	-	Cnc : Dpl:	-	5-8	5-8	SG	Loose	Large stones present in C-layer
					Cnc : Dpl:						No GW Observed
					Cnc : Dpl:						
					Cnc : Dpl:						

Additional Notes:

Commonwealth of Massachusetts
City/Town of

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

D. Determination of High Groundwater Elevation

1. Method Used (Choose one): Obs. Hole # _____ Obs. Hole # _____

☐ Depth to soil redoximorphic features _____ inches _____ inches

☐ Depth to observed standing water in observation hole _____ inches _____ inches

☐ Depth to adjusted seasonal high groundwater (S_h) (USGS methodology) _____ inches _____ inches

No GW Observed, bot. of test hole used

_____________________ Index Well Number

_____________________ Reading Date

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

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

E. Depth of Pervious Material

1. Depth of Naturally Occurring Pervious Material

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

☒ Yes ☐ No

b. If yes, at what depth was it observed (exclude O, A, and E Horizons)? Upper boundary: _____ inches Lower boundary: _____ inches

c. If no, at what depth was impervious material observed? Upper boundary: _____ inches Lower boundary: _____ inches

Commonwealth of Massachusetts
City/Town of

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

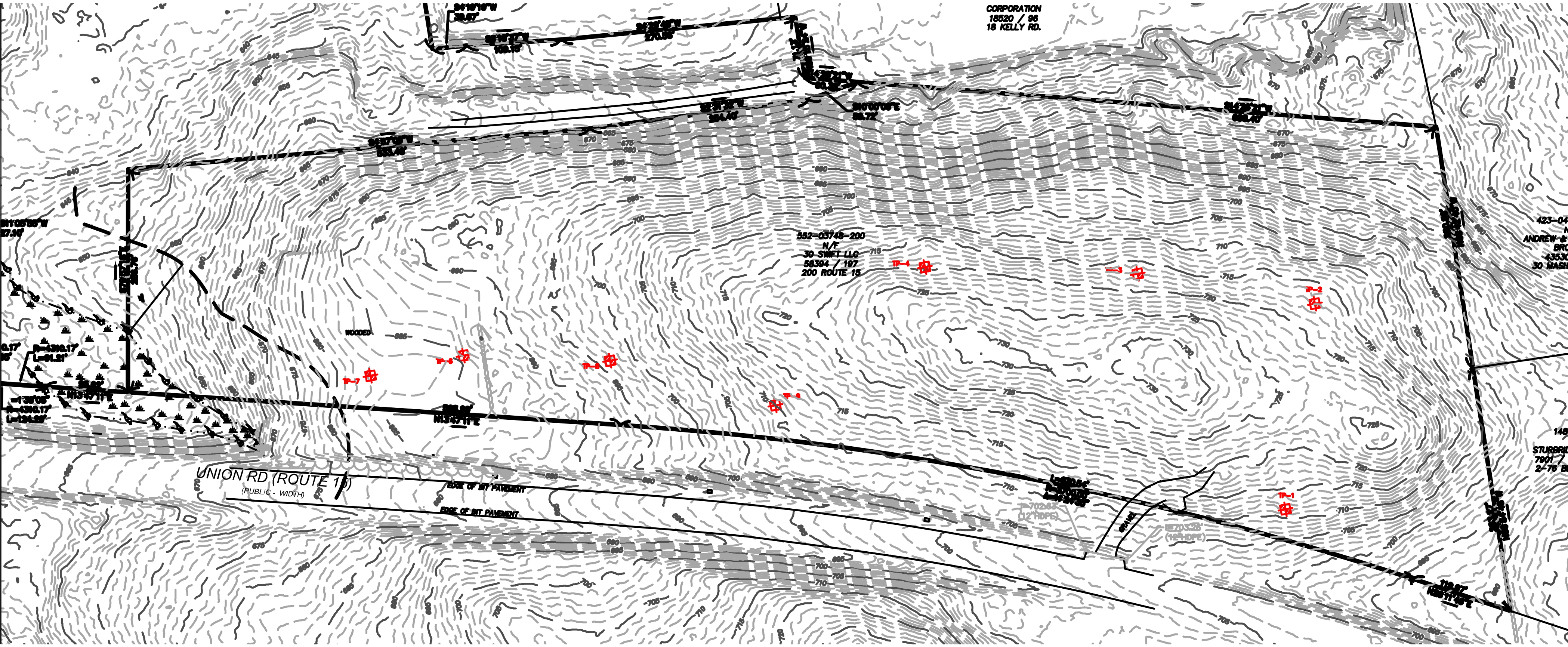
F. Certification

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

Todd MacDonald (signature)	4/10/2023
Signature of Soil Evaluator	Date 6/30/2023
Todd MacDonald, S.E. #14157	6/30/2023
Typed or Printed Name of Soil Evaluator / License #	Expiration Date of License
N/A	N/A
Name of Approving Authority Witness	Approving Authority

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

Field Diagrams: Use this area for field diagrams:


CORPORATION
18520 / 96
18 KELLY RD.
552-03748-200
N/F
30 SWIFT LLC
58394 / 197
200 ROUTE 15
WOODED
UNION RD (ROUTE 15)
(PUBLIC - WIDTH)
EDGE OF BIT PAVEMENT
EDGE OF BIT PAVEMENT

APPENDIX E

NOAA ATLAS 14, PRECIPITATION FREQUENCY ESTIMATES

NOAA Atlas 14, Volume 10, Version 3
Location name: Sturbridge, Massachusetts, USA*
Latitude: 42.0775°, Longitude: -72.0925°
Elevation: 711.71 ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Sandra Pavlovic, Michael St. Laurent, Carl Trypaluk, Dale Unruh, Orlan Wilhite

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches)[1]

Duration	Average recurrence interval (years)									
	1	**2**	**5**	**10**	**25**	**50**	**100**	**200**	**500**	**1000**
5-min	**0.338** (0.262-0.430)	**0.400** (0.309-0.509)	**0.501** (0.385-0.640)	**0.584** (0.448-0.751)	**0.698** (0.518-0.936)	**0.785** (0.570-1.08)	**0.874** (0.616-1.24)	**0.970** (0.653-1.42)	**1.10** (0.715-1.67)	**1.21** (0.764-1.87)
10-min	**0.479** (0.371-0.610)	**0.566** (0.438-0.721)	**0.708** (0.546-0.905)	**0.826** (0.633-1.06)	**0.988** (0.733-1.33)	**1.11** (0.808-1.52)	**1.24** (0.873-1.76)	**1.37** (0.924-2.01)	**1.56** (1.01-2.37)	**1.71** (1.08-2.65)
15-min	**0.564** (0.437-0.717)	**0.666** (0.515-0.848)	**0.833** (0.642-1.07)	**0.972** (0.745-1.25)	**1.16** (0.863-1.56)	**1.31** (0.951-1.79)	**1.46** (1.03-2.07)	**1.62** (1.09-2.37)	**1.84** (1.19-2.79)	**2.01** (1.27-3.12)
30-min	**0.765** (0.592-0.973)	**0.903** (0.699-1.15)	**1.13** (0.870-1.44)	**1.32** (1.01-1.69)	**1.58** (1.17-2.11)	**1.77** (1.29-2.43)	**1.98** (1.39-2.80)	**2.19** (1.48-3.21)	**2.49** (1.61-3.78)	**2.73** (1.73-4.23)
60-min	**0.965** (0.747-1.23)	**1.14** (0.882-1.45)	**1.43** (1.10-1.82)	**1.66** (1.27-2.14)	**1.99** (1.48-2.67)	**2.24** (1.63-3.07)	**2.49** (1.76-3.54)	**2.77** (1.86-4.05)	**3.14** (2.04-4.77)	**3.44** (2.18-5.34)
2-hr	**1.24** (0.965-1.57)	**1.45** (1.13-1.84)	**1.81** (1.40-2.29)	**2.10** (1.62-2.68)	**2.50** (1.87-3.34)	**2.80** (2.06-3.83)	**3.12** (2.23-4.44)	**3.49** (2.35-5.08)	**4.03** (2.62-6.09)	**4.48** (2.85-6.92)
3-hr	**1.42** (1.11-1.79)	**1.67** (1.31-2.11)	**2.08** (1.62-2.63)	**2.42** (1.87-3.08)	**2.88** (2.17-3.85)	**3.23** (2.38-4.42)	**3.60** (2.59-5.14)	**4.05** (2.74-5.88)	**4.73** (3.08-7.12)	**5.30** (3.37-8.16)
6-hr	**1.78** (1.40-2.23)	**2.12** (1.67-2.65)	**2.67** (2.09-3.36)	**3.13** (2.44-3.95)	**3.76** (2.85-5.00)	**4.22** (3.14-5.77)	**4.73** (3.44-6.76)	**5.36** (3.64-7.75)	**6.34** (4.14-9.51)	**7.20** (4.59-11.0)
12-hr	**2.19** (1.74-2.72)	**2.66** (2.11-3.31)	**3.42** (2.70-4.27)	**4.06** (3.18-5.09)	**4.93** (3.76-6.53)	**5.57** (4.17-7.58)	**6.28** (4.59-8.94)	**7.16** (4.87-10.3)	**8.54** (5.59-12.7)	**9.74** (6.23-14.8)
24-hr	**2.62** (2.09-3.23)	**3.23** (2.57-3.99)	**4.22** (3.35-5.23)	**5.04** (3.98-6.29)	**6.17** (4.73-8.13)	**7.00** (5.27-9.47)	**7.92** (5.82-11.2)	**9.06** (6.19-13.0)	**10.8** (7.12-16.1)	**12.4** (7.95-18.8)
2-day	**3.05** (2.45-3.74)	**3.77** (3.03-4.63)	**4.95** (3.96-6.10)	**5.93** (4.71-7.35)	**7.28** (5.62-9.54)	**8.27** (6.26-11.1)	**9.36** (6.92-13.2)	**10.7** (7.36-15.3)	**12.9** (8.47-19.0)	**14.7** (9.47-22.2)
3-day	**3.33** (2.69-4.07)	**4.12** (3.32-5.04)	**5.41** (4.34-6.63)	**6.48** (5.17-7.99)	**7.95** (6.15-10.4)	**9.03** (6.86-12.1)	**10.2** (7.57-14.4)	**11.7** (8.05-16.6)	**14.1** (9.28-20.7)	**16.1** (10.4-24.2)
4-day	**3.57** (2.89-4.35)	**4.41** (3.56-5.37)	**5.78** (4.65-7.07)	**6.92** (5.53-8.52)	**8.49** (6.59-11.1)	**9.64** (7.34-12.9)	**10.9** (8.10-15.3)	**12.5** (8.61-17.7)	**15.0** (9.93-22.0)	**17.2** (11.1-25.8)
7-day	**4.24** (3.45-5.13)	**5.18** (4.21-6.28)	**6.73** (5.45-8.19)	**8.01** (6.44-9.81)	**9.78** (7.63-12.7)	**11.1** (8.47-14.7)	**12.5** (9.33-17.5)	**14.3** (9.89-20.1)	**17.2** (11.4-25.1)	**19.6** (12.7-29.3)
10-day	**4.92** (4.01-5.93)	**5.92** (4.83-7.15)	**7.56** (6.14-9.17)	**8.92** (7.20-10.9)	**10.8** (8.44-13.9)	**12.2** (9.33-16.1)	**13.7** (10.2-19.0)	**15.6** (10.8-21.8)	**18.5** (12.3-27.0)	**21.1** (13.7-31.4)
20-day	**7.10** (5.83-8.50)	**8.16** (6.69-9.78)	**9.90** (8.09-11.9)	**11.3** (9.20-13.7)	**13.3** (10.4-16.9)	**14.8** (11.3-19.3)	**16.4** (12.1-22.2)	**18.2** (12.7-25.3)	**20.9** (14.0-30.2)	**23.1** (15.0-34.2)
30-day	**8.93** (7.36-10.7)	**10.0** (8.25-12.0)	**11.8** (9.67-14.1)	**13.3** (10.8-16.0)	**15.3** (12.0-19.3)	**16.8** (12.9-21.7)	**18.4** (13.6-24.6)	**20.1** (14.1-27.9)	**22.5** (15.1-32.4)	**24.3** (15.9-35.9)
45-day	**11.2** (9.26-13.3)	**12.3** (10.2-14.6)	**14.1** (11.6-16.9)	**15.7** (12.8-18.8)	**17.7** (14.0-22.2)	**19.4** (14.8-24.7)	**21.0** (15.4-27.7)	**22.5** (15.8-31.0)	**24.5** (16.5-35.2)	**26.0** (16.9-38.2)
60-day	**13.1** (10.8-15.5)	**14.2** (11.8-16.8)	**16.1** (13.3-19.2)	**17.7** (14.5-21.2)	**19.8** (15.6-24.7)	**21.6** (16.5-27.4)	**23.2** (17.0-30.4)	**24.6** (17.4-33.9)	**26.4** (17.8-37.7)	**27.5** (18.0-40.4)

[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

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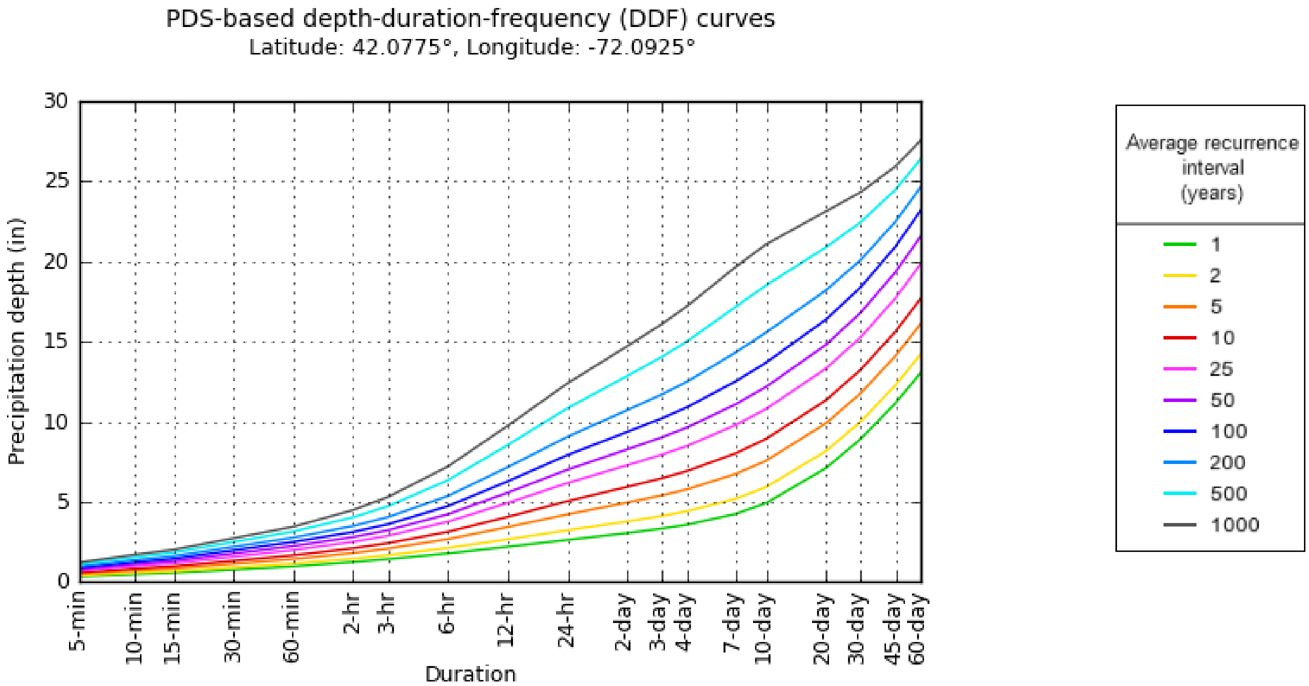
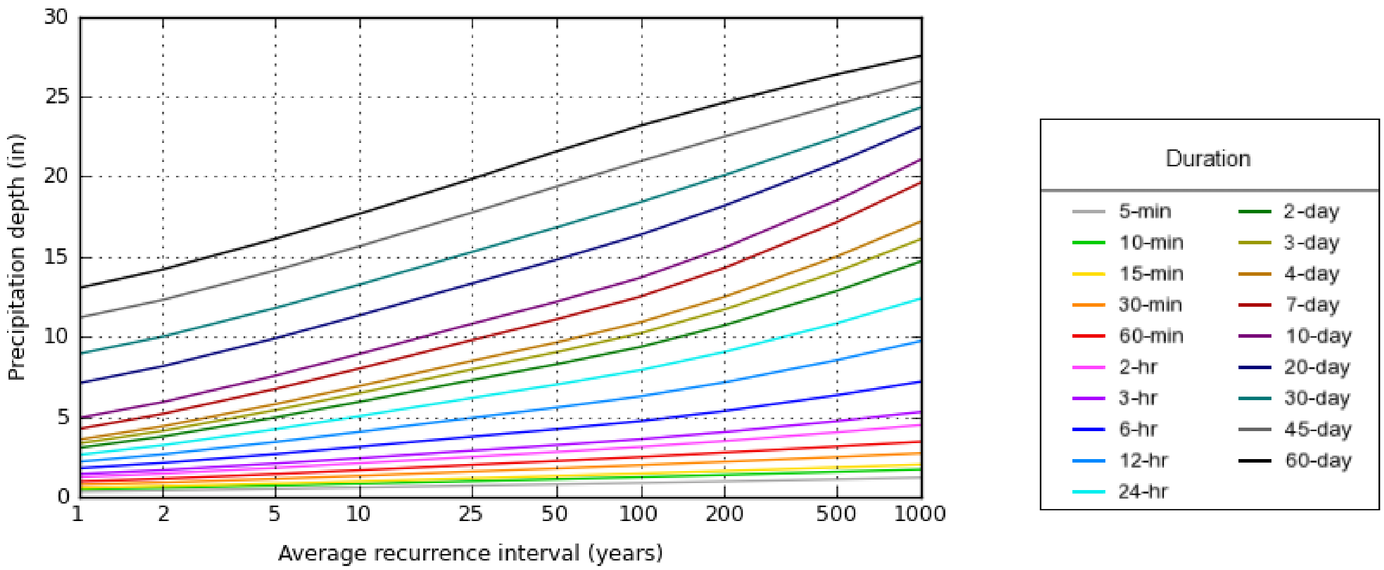
PF graphical





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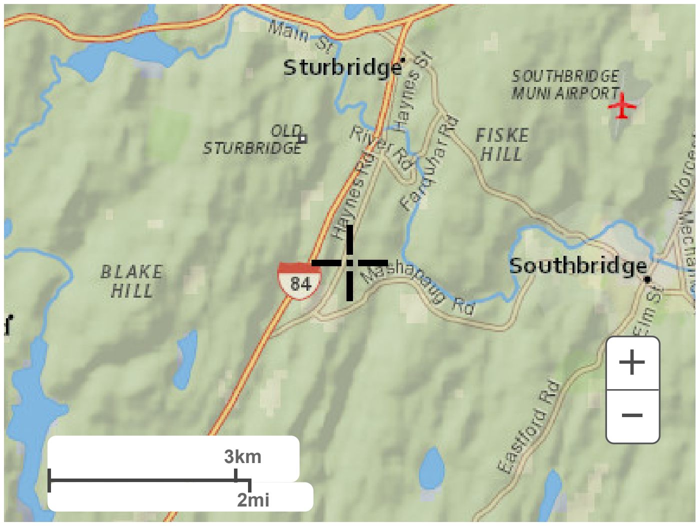
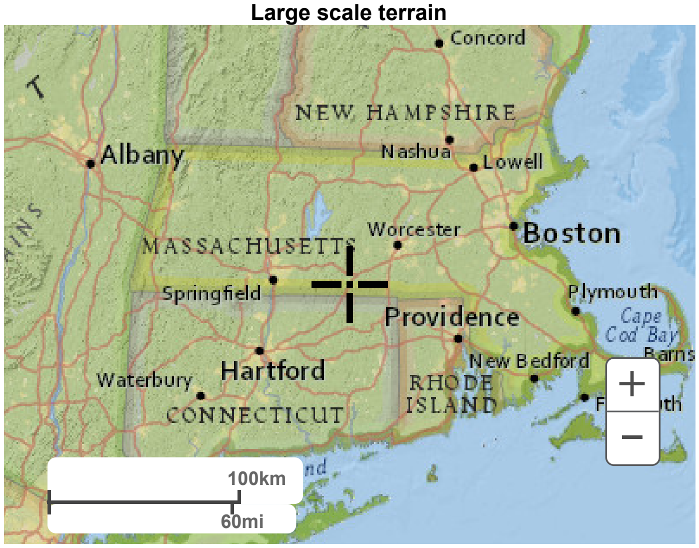
Maps & aerials

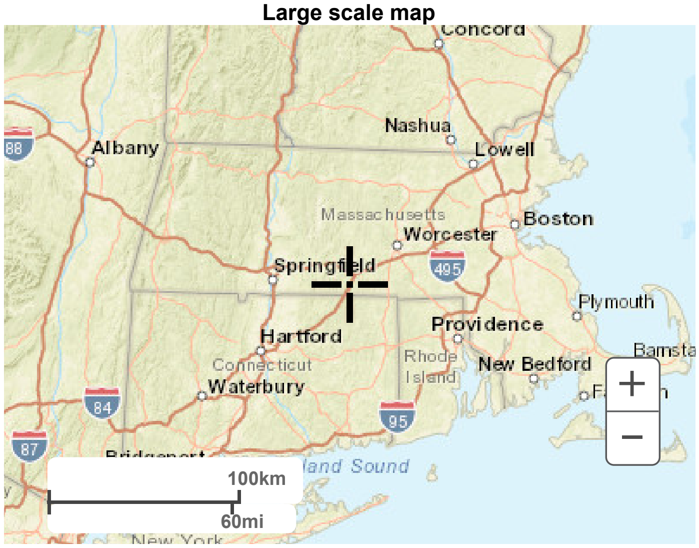
Small scale terrain



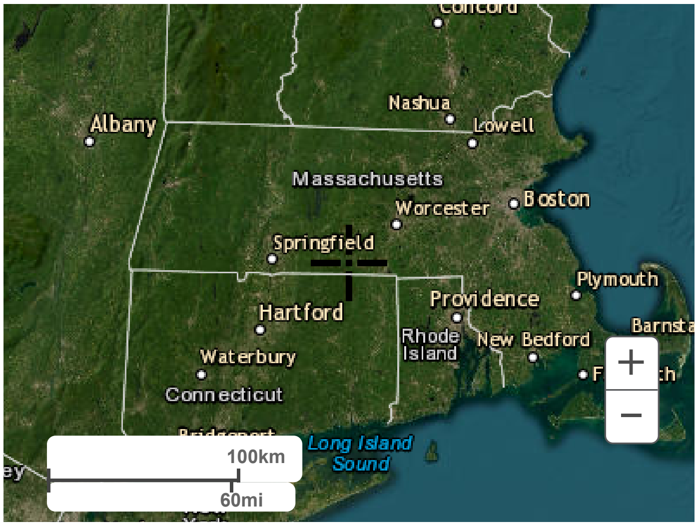
Large scale terrain



Large scale map



Large scale aerial



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[US Department of Commerce](#)
[National Oceanic and Atmospheric Administration](#)
[National Weather Service](#)
[National Water Center](#)
1325 East West Highway
Silver Spring, MD 20910
Questions?: HDSC.Questions@noaa.gov

[Disclaimer](#)

Attachment F

Ground-Mounted Solar Photovoltaic System Project
Sturbridge, MA
Wetland Bylaw Notice of Intent Application

CERTIFIED LIST OF ABUTTERS
ABUTTERS NOTIFICATION LETTER

Parcel ID	Owner	Owner Address	Owner City	State	Zip	Property Address
423-04211-036	BERRY JOAN R & GEORGE TRUSTEES	47 MASHAPAUG ROAD	STURBRIDGE	MA	01566	36 MASHAPAUG ROAD
423-04138-030	BROGDEN ANDREW & MARCELLE L	NARNIA PINEWOOD ROAD	SANDS BUCKINGHAMSHIRE	UK	00000	30 MASHAPAUG ROAD
148-04127-U66	LUCEY PAMELA ANNE	66 BENTWOOD DRIVE	STURBRIDGE	MA	01566	66 BENTWOOD DRIVE
368-03851-024	STURBRIDGE RETIREMENT	1 KELLY ROAD	STURBRIDGE	MA	01566	24 KELLY ROAD
368-03841-018	STURBRIDGE RETIREMENT	1 KELLY ROAD	STURBRIDGE	MA	01566	18 KELLY ROAD
368-03748-026	STURBRIDGE RETIREMENT	1 KELLY ROAD	STURBRIDGE	MA	01566	26 KELLY ROAD
148-04127-U10	BEAUREGARD LINDSEY M TR	10 BENTWOO DRIVE	STURBRIDGE	MA	01566	10 BENTWOOD DRIVE
148-04127-U14	LEMAIRE GLENN S & ANASTASIA C	14 BENTWOOD DRIVE	STURBRIDGE	MA	01566	14 BENTWOOD DRIVE
148-04127-U16	NORTHUP VIRGINIA	16 BENTWOOD DRIVE	STURBRIDGE	MA	01566	16 BENTWOO DRIVE
148-04127-U2	STEUER MICHAEL W SR & CHERYL A	2 BENTWOOD DRIVE	STURBRIDGE	MA	01566	2 BENTWOOD DRIVE
148-04127-U20	WALSH KATHLEEN	20 BENTWOOD DRIVE	STURBRIDGE	MA	01566	20 BENTWOOD DRIVE
148-04127-212	TRUSTESS OF THE STURBRIDGE CONDO TRUST	PO BOX 572	STURBRIDGE	MA	01566	212-1 BENTWOOD DRIVE
148-04117-212	TRUSTESS OF THE STURBRIDGE CONDO TRUST	PO BOX 572	STURBRIDGE	MA	01566	212-2 BENTWOOD DRIVE
148-04127-U22	WOOD KATHRYN	22 BENTWOOD DRIVE	STURBRIDGE	MA	01566	22 BENTWOOD DRIVE
148-04127-U24	STEBBINS WILLIAM J	24 BENTWOOD DRIVE	STURBRIDGE	MA	01566	24 BENTWOOD DRIVE
148-04127-U26	L'ECUYER KAREN	26 BENTWOOD DRIVE	STURBRIDGE	MA	01566	26 BENTWOOD DRIVE
148-04127-U28	FROST JEAN O	28 BENTWOOD DRIVE	STURBRIDGE	MA	01566	28 BENTWOOD DRIVE
148-04127-U30	MURPHY MARK J & BARBARA P	30 BENTWOOD DRIVE	STURBRIDGE	MA	01566	30 BENTWOOD DRIVE
148-04217-U32	DETARANDO ANTHONY M	32 BENTWOOD DRIVE	STURBRIDGE	MA	01566	32 BENTWOOD DRIVE
148-04127-U34	KRISPIEN GILSON & HELEN	34 BENTWOOD DRIVE	STURBRIDGE	MA	01566	34 BENTWOOD DRIVE
148-04127-U36	TREMBLAY MARIE CATHERINE	36 BENTWOOD DRIVE	STURBRIDGE	MA	01566	36 BENTWOOD DRIVE
148-04127-U38	BESSETTE GARY A & DIANE J	38 BENTWOOD DRIVE	STURBRIDGE	MA	01566	38 BENTWOOD DRIVE
148-04127-U4	BRIDGES JEFFREY K & KAREN L	4 BENTWOOD DRIVE	STURBRIDGE	MA	01566	4 BENTWOOD DRIVE
148-04127-U40	MUENZBERG ROBERT B JR & SUSAN D	40 BENTWOOD DRIVE	STURBRIDGE	MA	01566	40 BENTWOOD DRIVE
148-04127-U42	ALOIA PAUL A	42 BENTWOOD DRIVE	STURBRIDGE	MA	01566	42 BENTWOOD DRIVE
148-04127-U44	DESROSIER IRENE M	44 BENTWOOD DRIVE	STURBRIDGE	MA	01566	44 BENTWOOD DRIVE
148-04127-U46	POIRIER CINDY A TR	12 WEKE PEKE WAY	LEOMINSTER	MA	01453	46 BENTWOOD DRIVE
148-04127-U48	MANDEVILLE JEANNE L	48 BENTWOOD DRIVE	STURBRIDGE	MA	01566	48 BENTWOOD DRIVE
148-04127-U50	IDE G REED	50 BENTWOOD DRIVE	STURBRIDGE	MA	01566	50 BENTWOOD DRIVE
148-04127-U52	DARLING HANNAH M	52 BENTWOOD DRIVE	STURBRIDGE	MA	01566	52 BENTWOOD DRIVE
148-04127-U54	GARRETT SUE-LANE	54 BENTWOOD DRIVE	STURBRIDGE	MA	01566	54 BENTWOOD DRIVE
148-04127-U56	WADDICK JAMES H & ROSANNE	56 BENTWOOD DRIVE	STURBRIDGE	MA	01566	56 BENTWOOD DRIVE
148-04127-U58	LAFLAMME ROGER & CHERYL	58 BENTWOOD DRIVE	STURBRIDGE	MA	01566	58 BENTWOOD DRIVE
148-04127-U6	ANDERSON JOHN K TR	6 BENTWOOD DRIVE	STURBRIDGE	MA	01566	6 BENTWOOD DRIVE
148-04127-U66	LUCEY PAMELA ANNE	66 BENTWOOD DRIVE	STURBRIDGE	MA	01566	66 BENTWOOD DRIVE
148-04127-U68	LATINO ROBERT P & PATRICIA Y	68 BENTWOOD DRIVE	STURBRIDGE	MA	01566	68 BENTWOOD DRIVE
148-04127-U70	LANGO SUSAN M	70 BENTWOOD DRIVE	STURBRIDGE	MA	01566	70 BENTWOOD DRIVE

148-04127-U72	MURAWSKI LORRAINE	72 BENTWOOD DRIVE	STURBRIDGE	MA	01566	72 BENTWOOD DRIVE
148-04127-U74	SCIULLO ANNALISA & BATTLES BRANDYN	74 BENTWOOD DRIVE	STURBRIDGE	MA	01566	74 BENTWOOD DRIVE
148-04127-U76	TOMAS LISA	76 BENTWOOD DRIVE	STURBRIDGE	MA	01566	76 BENTWOOD DRIVE
148-04127-U8	MCGLONE JOHN M & RIVERA ELISA M	8 BENTWOOD DRIVE	STURBRIDGE	MA	01566	8 BENTWOOD DRIVE
		BOARD OF ASSESSORS				
	Above persons listed are record owners as they appear on the most recent applicable tax list.					
	Assessors are not responsible for errors or omissions. RE: M.G.L. - Chapter 40A, Section 11					
	Abutters List -	Conservation Commission - 200'				
	RE: 200 HAYNES STREET					
	Certified Copy					
	Assessor: Ann P. Murphy					
	Date: 8-4-2023					

Town of Sturbridge

Conservation Commission

Notification to Abutters

under the MA Wetlands Protection Act and the Town of Sturbridge Wetland Bylaw Regulations

In accordance with the second paragraph of Massachusetts General Laws, Chapter 131, § 40, as well as the Town of Sturbridge Wetland Bylaw, you are hereby notified of the following permit application for work within a wetland resource area and/or within the 200-foot buffer zone to a resource area:

A. The name of the applicant is: Sturbridge PV LLC

B. The address of the lot(s) where the activity is proposed is: 200 Route 15 (Haynes Street)

C. The nature of the activity proposed includes: Installation of a ground-mounted solar photovoltaic (PV) system.

D. The applicant has filed the following in accordance with the Wetlands Protection Act (MGL c. 131, § 40), and/or the Town of Sturbridge Wetland Bylaws.

- ☒ Notice of Intent seeking permission to conduct work within a wetland, water body or resource area
- ☐ Request for Determination seeking permission to conduct work within a buffer zone to a wetland, waterbody or resource area
- ☐ Abbreviated Notice of Resource Area Delineation seeking to confirm the wetland resource area boundaries.
- ☐ Request to amend an existing Order of Conditions for DEP File #300-_____

The Public Hearing for this application will be held in person and remotely via GoTo Meeting

at the Center Office Building, 301 Main Street, 2nd Floor

Date and Time of Hearing: ______________________________

Public Hearing can be accessed remotely:

- **From your computer using: ______________________________ or**
- **From your phone: +1 872 240 3212, followed by the access code ________________**

Please note that while an option for remote attendance and/or participation is being provided to the public, the meeting/hearing will not be suspended or terminated if technological problems interrupt the virtual broadcast, unless otherwise required by law. Members of the public with particular interest in any specific item on this agenda should make plans for in-person vs. virtual attendance accordingly. Please note that meetings can also be watched either online via the Town's on demand video broadcast or on cable television on channel 191, however, there is no public participation through these options.

PLEASE NOTE: Copies of the application and related materials including agendas and staff notes can be found here:

- https://www.sturbridge.gov/conservation-commission/pages/meeting-calendar-and-documents

You may contact the Sturbridge Conservation Commission Office (508) 347-2506 or the Department of Environmental Protection Central Regional Office at 508-792-7650 with questions in regards to the application process or the Wetlands Protection Act.