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January 26, 2016

VIA ELECTRONIC MAIL AND UPS OVERNIGHT

Mr. Robert Stein, Chairman
Connecticut Siting Council
Ten Franklin Square
New Britain, CT 06051

Re: Petition No. 1195 – SolarCity Corporation petition for a declaratory ruling that no Certificate of Environmental Compatibility and Public Need is required for the proposed construction and operation of a 4.05 Megawatt Community Shared Solar Photovoltaic Electric Generating facility located on municipally-owned property at 1240 Poquonnock Road, Groton, Connecticut -- Change In Use Permit Application

Dear Chairman Stein:

On behalf of SolarCity Corporation ("SolarCity"), enclosed, as an extreme bulk filing, is one hard copy and a disk of Groton Utilities' Water Company Change In Use Permit Application filed with the Connecticut Department of Public Health, and dated January 14, 2016. As required by the Connecticut Siting Council's January 11, 2015 Decision Letter, SolarCity will file a copy of the final Change In Use Permit and any associated site plan changes for Council review and approval prior to construction.

Please contact me at 860-509-6575 with any questions or if you need additional information.

Very truly yours,

BROWN RUDNICK LLP

By: _____
Philip M. Small
Counsel for SolarCity Corporation

PMS/jmb
Enclosures

62286823 v1-WorkSiteUS-031819/0001

STATE OF CONNECTICUT DEPARTMENT OF PUBLIC HEALTH
DRINKING WATER SECTION
www.ct.gov/dph/publicdrinkingwater

WATER COMPANY LAND PERMIT APPLICATION

This application must be submitted when a water company intends to sell, lease, transfer or assign Class I or II water company land or intends to change the use of Class I or II water company land per Connecticut General Statutes (CGS) Section 25-32. The following information should be supplied by the current administrative official of the water company. Refer to the Regulations of Connecticut State Agencies (RCSA) Sec. 25-37d-1 through 9 for information on the water company land application review process. Electronic submission of applications and attachments is permissible, provided that the applications include signatures.

Section A. Public Water System and Applicant Information

PWS Name: Groton Utilities

Project Name: Community Shared Solar - Poquonnock Road, Groton, CT

Project Address: 1240 Poquonnock Road, Groton, CT 06340

PWSID Number: CT0590011 PWS Type (select one): ☒ Community ☐ NTNC ☐ TNC

Town: Groton, CT DPH Project Number (if known):

Print Name of PWS Administrative Official: Ron Gaudet

Title: Director of Utilities

Address: Groton Utilities
295 Meridian Street
Groton, CT 06340

Phone Number: 860-446-4091

Fax Number: 860-446-0692

E-mail Address: gaudetr@yurservice.com

Name of Consultant (if applicable) Paul Platt

Company Name: SolarCity Corporation

Address: 1 Chapin Road, Suite 4
Pine Brook, NJ 07058

Phone Number: 914-606-2252

E-mail Address: pplatt@solarcity.com

Section B. Basis for Requesting Approval or Permit (select all that apply)

☐ Formal Enforcement Action (Administrative Order, Consent Order, Notice of Violation (Civil Penalty))
☐ Violation Identified in Sanitary Survey Report
☐ Project Identified in Approved Water Supply Plan
☐ Federal or State Grants or Loans ☐ DWSRF ☐ STEAP Funds ☐ STAG Funds
☐ Proactive (system improvements or enhancements)

☒ Other: Installation of solar energy system

Section C. Type of Approval or Permit Requested (select all that apply)

☐ Water Company Land Sale, Lease, Transfer or Assignment (Complete Sections D, E and G)

Check one of the following: Sale ☐ Lease ☐ Transfer ☐ Assignment ☐

☒ Water Company Owned Lands Change in Use (Complete Sections D, F and G)

Section D. Project Description

Provide a general summary of the proposed project, including the total acreage of each class of water company land to be disturbed or the total acreage of each class of water company land which will be subject to the sale, lease, transfer or assignment or change in use. Refer to CGS Sec. 25-37c for land classification definitions. You may attach additional sheets, if necessary.

See attached.

Section E. Supporting Information- Sale, Lease, Transfer or Assignment

Each of the following items should be labeled with the section and number (i.e. Section E – #4). If the item is not applicable, provide the number and indicate "N/A".

1. Provide a scaled site plan that shows all water company land to be sold, leased, transferred or assigned.
2. Indicate the proposed methods of protective restrictions and enforcement the applicant or other parties will impose on the parcel to be subject to the permit. (If restrictions do not apply uniformly throughout a parcel, attach a map that shows the restrictions that apply to each portion of the parcel.)
3. Provide a draft copy of the sale, lease, transfer or assignment agreement.
4. Provide copies of the notification letter sent to the chief elected and chief executive officials of the towns in which the proposed sale, lease, transfer or assignment will occur. Submit both sides of the certified mail green return receipt or United States Postal Service delivery confirmation.
5. Provide a copy of the "Capacity Evaluation for Water Company Purchase", completed by the entity to which the land will be sold, leased, transferred or assigned.
6. Provide copies of any deed restrictions or variances.
7. If the applicant is required to prepare a water supply plan pursuant to CGS Section 25-32d, indicate whether the proposed sale, lease, transfer or assignment is consistent with the current approved plan.
8. Provide the sale of a source notification letter required by CGS Section 25-33l and any subsequent correspondence, if applicable.
9. For the lease of Class I water company land associated with groundwater sources, provide copies of the sanitary easements indicating restrictions within the affected sanitary radius.

Section F. Supporting Information- Change in Use

Each of the following items should be labeled with the section and number (i.e. Section F – #4). If the item is not applicable, provide the number and indicate "N/A".

1. Provide a final scaled project site plan including existing conditions, horizontal and vertical extent of site disturbance including access and permanent and temporary land disturbance. Describe the nature and necessity of the impervious materials used at the site (i.e. pavement). Include any evaluation conducted to determine the impact of the impervious area on the recharge of the water supply sources.
2. Provide copies of the notification letter sent to the chief elected and chief executive officials of the towns in which the proposed project is located. Submit both sides of the certified mail green return receipt or United States Postal Service delivery confirmation.
3. Provide a brief outline of the project (i.e. site preparation, demolition, construction, stabilization); include a spill prevention and emergency response plan or drinking water quality management plan.
4. Indicate the proposed methods of protective restrictions and enforcement that the applicant or other parties will impose on the parcel to be subject to permit, and demonstrate that such change will not have a significant adverse impact upon the present and future purity and adequacy of the public drinking water supply. (If restrictions do not apply uniformly throughout parcel, attach a map which shows the restrictions which apply to each portion of the parcel.)
5. Indicate alternatives that were considered and why this option was chosen.
6. Describe the benefit to the water system as a result of the proposed change to the water company land.
7. Provide copies of any deed restrictions, variances or permits required by other regulatory agencies.
8. Provide a copy of the Revocable License Agreement, if applicable.
9. If any part of the sanitary radius of a groundwater source wellhead is owned by another entity, provide copies of the sanitary easements, if applicable.
10. If the applicant is required to prepare a water supply plan pursuant to CGS Section 25-32d, indicate whether the proposed change in use is consistent with the most current approved plan.
11. Describe the short and long term land improvements designed to protect the water source(s), such as primary or secondary stormwater treatment, addition of native vegetative buffers or other low impact development management practices.

Section G. Certification Statement

I certify to the best of my knowledge that the information provided in this application is complete and correct. I understand that the information I provide will be used by the Department of Public Health, Drinking Water Section to determine if a Permit for the Sale, Lease, Transfer or Assignment or Change in Use of Water Company Land can be granted.

Signature of PWS Administrative Official	Date 1/14/16
Ron Gaudet	Director of Utilities
Name of PWS Administrative Official (print or type)	Title

CT DPH Change of Use Permit Application – Additional Information

Section D. Project Description

The proposed project involves the installation of an approximately 4 megawatt, ground-mounted solar photovoltaic energy system located at 1240 Poquonnock Road in Groton, Connecticut. The municipally-owned Site consists of 290.5 acres, a portion of which is developed with the City's Water Treatment Plant infrastructure, the Poquonnock electrical substation and associated aerial transmission lines. SolarCity proposes to construct, own, operate and maintain the system under an existing Power Purchase Agreement (PPA) with the Connecticut Municipal Electric Energy Cooperative ("CMEEC"). The project will cover approximately 10.0 acres of Class I land and 3.5 acres of Class II land.

The Project will occupy approximately 13.5 acres of the Site ("Project Area"). The proposed solar arrays ("facility") will be comprised of approximately 13,000 Canadian Solar 315 watt modules, five (5) Solectria inverters, and four (4) Cooper transformers. The facility will use a post-driven mounting system to minimize impacts to the surrounding watershed. Individual panels would be placed at a fixed 20˚ tilt towards the south.

Section F. Supporting Information – Change in Use

Section F - #1. Please see Attachment 1 for the complete Site Plan Set. A stormwater analysis was conducted to determine if the proposed development would result in significant changes to existing flow patterns, water quality, or peak runoff rates. The design incorporates measures for limiting disturbed areas and minimizing increases in new impervious area. Proposed impervious areas are limited to the cross-sectional area of the steel support posts for the proposed racking system, and the four proposed electrical equipment pads. The existing gravel access drives will be utilized for access to the project area. Please see Attachment 2 for the detailed Stormwater Analysis and results.

Soils underlying the proposed project consist of Haven and Enfield soils located primarily on a gently sloped grass field. These soil series consist of very deep, well drained soils formed in loamy layers over sandy and gravelly outwash parent material. Permeability is moderate to high in the surface layer and subsoils and very high in the substratum. As a result, surface runoff is very low to medium. Field observations of the soil surface and hand-dug test pits are consistent with these characteristics; no surface flow patterns were observed on the soil surface, indicating the majority of precipitation infiltrates directly into the underlying soils.

The most effective pollutant removal processes pass the stormwater runoff through the soil filter-layer or bring it into direct contact with the soil and its microorganisms. Infiltrating stormwater into the soil or passing stormwater through the soil media is considered the most effective and successful approach to improving stormwater quality. Processes used to remove stormwater pollutants utilize physical, chemical, and biological mechanisms. These mechanisms are supported in both the underlying native soils and its grass surface at the project site. Specific removal mechanisms include chemical adsorption to soil particles and organic matter (removes most dissolved metals, soluble phosphorus and many organic compounds), microbial transformation and decomposition (removes organics and pathogens), plant uptake (removes nitrogen and phosphorus), and, sedimentation and filtration (removes: total suspended solids, soil-bound phosphorus, some soil-bound pathogens).

The proposed project will not alter existing flow patterns, result in concentrated flows, alter existing gentle slopes and will maintain the existing grass vegetation. In addition, the permeability characteristics of the soils underlying the project site will not be adversely affected by construction activities. Due to the minimal impervious area increase associated with the proposed post mounted solar arrays, there is a very limited impact on the post-development CN values. The peak flow rates are impacted more by the reduced times of concentrations and the limited clearing associated with the project than as a result in the minimal increases in impervious areas. To mitigate the potential effects of the change in surface conditions the following measures have been included in the system design:

- A water quality swale will be installed between DA #1S-B (Mounting Plane 1) and DA #2S-B (Mounting Plane 2) and the reservoir. The swale will collect the excess flow in small bio-filtration cells, reducing velocities and providing treatment of runoff. Runoff will be discharged through vegetated overflow channels constructed at low points located along the swale.

- A crushed stone check dam is proposed south of DA #4S (Mounting Plane 3) to dissipate the concentrated runoff flow and increase the travel times, resulting in an attenuation of peak runoff rates.

As presented above, the proposed low impact development of the system results in minimal effects on peak runoff rates. The underlying native soils and grass surface will continue to provide effective treatment to both stormwater runoff volumes and quality post development with little need for additional stormwater management. However, considering the importance of maintaining water quality to the nearby public water supply reservoir, a stormwater management system has been designed to provide additional treatment of runoff from the proposed project. The two proposed stormwater mitigation measures described above exceed the treatment requirements as described in the 2004 DEP Stormwater Quality Manual for the proposed development.

- The proposed bio-filtration cells in the water quality swale will provide the storage capacity to meet the requirements for both the water quality volume for pollutant reduction as well as groundwater recharge. Approximately 55 cubic feet of storage is provided per bio-filtration cell, for a total of approximately 495 cubic feet of retention in the water quality swale.

- The proposed crushed stone check dam will be embedded into the existing grade to provide the storage capacity to meet the requirements for both the water quality volume for pollutant reduction as well as groundwater recharge. In total, approximately 150 cubic feet of retention will be provided by the embedded crushed stone check dam.

As a result of the native soils and grass underlying in combination with the proposed water quality swale and bio-filtration cells, the proposed project will provide effective treatment of stormwater volume and quality that promotes recharge of the local groundwater that feeds the reservoir. Therefore, neither the operation of the solar facility nor stormwater runoff will adversely affect water quality of the underlying groundwater or nearby reservoir.

Section F - #2. Please see Attachment 3 for the Notification Letter and Return Receipt.

Section F - #3. Within the project area, the project involves clearing the site of mature trees and brush, minor grading to address grade changes due to land clearing and in order to construct the water quality swale and bio-filtration cells, installing the solar panel mounting system, construction of four concrete

pads for electrical equipment and re-establishment of vegetative cover in disturbed areas. Please see Sheet 9 of the Site Plan Set included as Attachment 1 for further details.

It is not anticipated that regular module cleaning will be required on this array due to the fixed tilt of the modules (20 degrees) and the average frequency of precipitation in Groton, CT. The combination of these two factors will normally be sufficient to keep the modules clean. In the event that modules do require manual cleaning, they will be surfaced washed with clean, fresh water with soft brush abrasion on problematic area only. No cleaning agents will be used.

Construction equipment will be required to access the Site during normal working hours (7:00am-7:00pm, seven days a week). After construction is complete and the unstaffed facility is operable, traffic at the Site will be minimal. The Site will be mowed and maintained in accordance with the approved Final Operation and Maintenance plan that will be completed prior to the cessation of construction activities. Maintenance of the electrical equipment will occur once per year. Any equipment that breaks down/malfunctions will be repaired on an as needed basis. Annual maintenance work will typically consist of two technicians for a day.

The Site's existing interior roadway systems will provide access to the solar field locations. The Project's primary access will originate off CT Route #117.

SolarCity is committed to implementing a wetland and public water supply protection plan that also includes a spill prevention and emergency response plan during construction to provide additional measures to avoid potential temporary wetland impacts and protect water quality of the adjoining public water supply reservoir. A proposed Wetland and Public Water Supply Protection Plan is included in Attachment 4.

Section F - #4. The Project will be designed to meet or exceed applicable industry, State, and local codes and standards and would not pose a safety concern or create undue hazard to the general public. The facility would not consume any raw materials, would not produce any by-products. Additionally, the facility will remain unstaffed during normal operating conditions. The individual modules of the facility will be secured behind the existing fence enclosures that currently surround the Site.

Overall, the Project will meet or exceed all health and safety requirements applicable to electric power generation. Each employee working on Site will:

- Receive required general and Site specific health and safety training;
- Comply with all health and safety controls as directed by local and state requirements;
- Understand and employ the Site health and safety plan while on the Site;
- Know the location of local emergency care facilities, travel times, ingress and egress routes; and
- Report all unsafe conditions to the construction manager.

Potential short term/temporary impacts associated with the Project's construction activities will be minimized by the proposed sedimentation and erosion controls, which would be designed, installed and maintained during construction activities in accordance with the 2002 *Connecticut Guidelines for Soil Erosion and Sediment Control* (see Attachment 1, Sheet 9). Long term secondary impacts to wetland resources possibly associated with the operation of this facility are minimized by the fact the development is unmanned, it minimizes the creation of impervious surfaces with the use of the existing gravel access drive with the majority of the surface surrounding the solar installation will remain native

grass/vegetation. Additionally, the proposed bio-filtration cells and the water quality swales will provide the storage capacity to meet the requirements for both the water quality volume for pollutant reduction as well as groundwater recharge. Based on a review of the Project plans, engineering documents, and the Stormwater Management Report, the stormwater generated by the proposed development will be properly handled and treated in accordance with the 2004 *Connecticut Stormwater Quality Manual*. As discussed in the response to Section F - #1, the proposed water quality swale and bio-filtration cells (in combination with the native soil and grass surface's inherent ability to provide stormwater treatment) will properly treat stormwater from the project and promote recharge into the underlying groundwater that feeds the reservoir. Due to implementation of these protective measures, the proposed Project will not result in an adverse impact to wetland resources or compromise the present and future purity and adequacy of the Groton public drinking water supply.

A Final Operations & Maintenance Plan will be developed in accordance with DPH and GU requirements prior to the completion of construction. The plan will be reviewed and approved by GU and will be in place prior to the final interconnection of the system.

Section F - #5.

Groton Utilities (GU) proactively supports renewable Photovoltaic Energy (PVE) installations in their distribution systems' with over 800 solar arrays already operating and supplying electricity to their customers.

GU's intent to install photovoltaic energy onto Groton Municipal properties started with the planning of a new Water Treatment Plant (WTP) site study. The initial evaluation (completed by Fay, Spofford & Thorndike) considered installing photovoltaic energy panels on the eleven (11) immediate roof tops and surrounding available land. Unfortunately, these aggregate areas proved marginal in energy production capacity.

Alternate sites were considered including the Town of Groton's capped landfill site, which unfortunately is not proximate to GU's or CMEEC's electrical distribution grid. GU also evaluated small, open areas located throughout GU's campus. Similar to the findings of the initial evaluation, the energy production capacity of solar systems on these areas proved marginal as a standalone system. With no other sites of sufficient acreage available, the City's adjacent open reservoir land offered the greatest opportunity. This site provided ample capacity to supply the entire WTP as well as surrounding utility facility requirements with solar energy. The location is also contiguous with the existing Poquonnock Electric Substation and adjacent to the WTP site. The property proved to be the superior solar farm location capable of producing and distributing ample photovoltaic energy to the treatment plant and surrounding area.

The selected project site is relatively flat and is located adjacent to a direct grid interconnection point making it an ideal site for a ground mount solar system. SolarCity completed an in-depth environmental assessment of the Site to ensure that the project would not adversely impact the site or surrounding environmental receptors. The assessment was included in the project petition submitted to the Connecticut Siting Council on October 8, 2015.

Understanding the environmental sensitivity of the Site, SolarCity has selected a racking system that will have limited disruption to the existing ground surface and will minimize any risk of future maintenance

for the racking system. The selection of a fixed-tilt (as opposed to a single- axis or double-axis tracking system) system contributes to the compact layout of the proposed array. The fixed-tilt array further requires little to no maintenance, and in particular, no lubricants or other chemicals to be introduced to the Site for maintenance and operation. The project will be located within the existing perimeter security fence that currently surrounds the Groton Reservoir system.

Section F - #6. This solar electrical system will add a renewable electrical energy supply to GU's WTP and work to meet the State of Connecticut's Renewable Portfolio Standards (RPS). The Connecticut RPS requires that electricity providers (Connecticut Electric Suppliers and Electric Distribution Company Wholesale Suppliers) obtain a minimum percentage of their retail load by using renewable energy.

The benefits to the water system as a result of the proposed solar facility that would replace traditional fossil-fueled electricity sources include:

- Reduction of greenhouse gas emissions such as carbon dioxide, nitrous oxide and sulfur dioxide;
- Reduction of particulate emissions; and,
- Reduction of water consumption.

GU will use a significant portion of the solar power generated from the adjacent ground mount array to satisfy the energy needs of the Treatment Plant and the operations building. GU will purchase the power to meet its WTP load requirements just as its customers do. Since the distribution system that the solar system will connect to is located directly next to the WTP and GU Operations Building, the GU complex will be powered by 100% solar energy when the adjacent system is online and generating energy.

In addition to powering the WTP, the completed facility will provide solar power to every GU customer without any premium charge. An estimated 80 percent of GU customers cannot own or lease solar systems because their roofs are physically unsuitable due to shading or because they do not control them (e.g., renters and people living in large apartment buildings). The facility will offer a way for every GU customer to have access to "green energy" without incurring a premium cost or having complex equipment installed on their roofs.

Section F - #7. Connecticut Siting Council approval is pending. The project petition was submitted to the Connecticut Siting Council on October 8, 2015. An approval with conditions was issued by the Siting Council on January 11, 2016. We will comply with the conditions of their approval. A copy of the complete petition submitted to the Siting Council can be accessed through the following link: http://www.ct.gov/csc/cwp/view.asp?A=895&Q=318776, Petition No. 1195. Additionally, SolarCity will apply for and comply with required City building and electrical permits.

Section F - #8. Not applicable.

Section F - #9. Not applicable.

Section F - #10. In Section VIII of the Water Supply Plan, Groton Utilities forecasts expected water use and supply requirements through (and well beyond) 2025. Based on the results of this analysis, Groton Utilities will maintain an adequate water supply throughout the lifetime of the solar project. In Section VI of the Water Supply Plan, projected water use is summarized as follows, "We [Groton Utilities] are, however, in agreement with the UConn Data Center in projecting a relatively flat to mildly increasing

growth rate, as with the population, in water use for the next decade. Based on this forecast, Groton Utilities continues to have excess water and treatment capacity available to serve any potential large users, be they local or regional." The installation of locally generated, clean solar energy will work to reduce greenhouse gases and dependency on fossil fuel energy plants.

The proposed solar development has employed the current Best Management Practices (BMPs) as part of the project design and development of the site-specific construction specifications. These BMP's include utilizing Low Impact Development (LID), the most recent storm water management practices, spill response and hazardous waste management, and water treatment and reservoir management. The proposed development is consistent with the core concept associated with Low Impact Development (LID) which states that "The goal of LID site planning is to maintain hydrologic function while allowing full development of the property." The facility will utilize creative site planning, innovative racking technology and a comprehensive stormwater design to mitigate any impacts to the existing Site hydrology. The project achieves several of the following common goals outlined by LID: minimize changes in surface water drainage patterns, avoid excessive site grading, promote infiltration of stormwater runoff, and reduce or mitigate increases in the volume of stormwater runoff as well as changes in magnitude, frequency, and duration of stormwater discharges to receiving waters. Additionally, the project is consistent with the following site design elements provided as defined by LID principals such as:

- Reduce paved areas to the extent possible.
- Avoid compaction of high permeability soils.
- Minimize the area dedicated for construction easements and stockpile areas.
- To the extent possible, plan site activities to limit the removal of trees and vegetation.
- Disconnect impervious areas. Provide curbless roads to allow sheet flow.
- Maintain existing topography to the extent possible. The intent is to maintain runoff travel distances, slopes, roughness, and channel shapes whenever possible.

After construction is complete, the project area will be mowed and inspected and continuously monitored in accordance with the approved and final O&M plan. The project will increase grid resiliency, provide a renewable energy source to power the GU WTP, while decreasing energy dependence on other sources. Additionally, through the CMEEC Community Shared Solar program, a portion of the energy delivered to Groton Utilities customers will be from this clean, green and local renewable energy source at no cost premium. Through strategic planning, all Groton Utilities customers will be provided with renewable energy, creating a regional benefit to the City of Groton and surrounding communities serviced by CMEEC.

Section F - #11. The project includes a series of perimeter water quality swales and bio-filtration cells installed between the limits of the proposed arrays and the reservoir to further mitigate any potential stormwater runoff impacts to the adjacent resource areas. The water quality swales and bio-filtration cells will be planted with native plant species consistent with those already present in vegetated habitats within and in the vicinity of the reservoir. Water quality swales improve water quality through a variety of mechanisms. Pollutants are removed through sedimentation, adsorption, nutrient uptake, and infiltration. The water quality volume is stored within a series of cells within the channel/swale, formed by permanent check dams. Proposed vegetation will also provide treatment of the stormwater runoff by additional filtration of the flow. Pretreatment of the runoff will be provided through the

vegetation and permeable soils beneath the solar arrays and a stone spreader immediately upgradient of the swales. Attachment 1 shows the location, cross-sections and planting detail associated with the proposed water quality swale and bio-filtration cells.

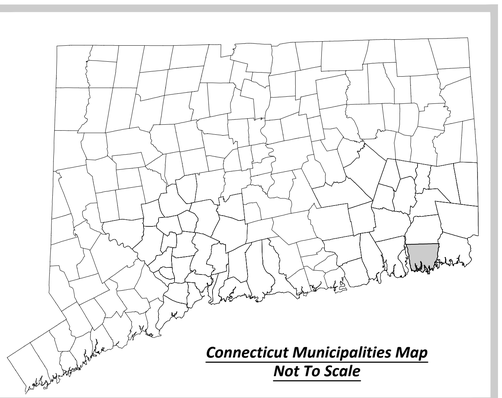
Please see Sheet 9 of the Site Plan Set, included as Attachment 1, for a description of low impact development management practices.

In addition, the project will include the replanting of ±4.2 acres of currently unforested areas on Groton Utilities property within the reservoir's watershed to mitigate for the loss of ±4.0 acres of forest removal proposed by the project. An evaluation of the number of trees being removed and areas to be replanted with native trees is provided in the Tree Count Investigation & Replanting Assessment report provided in Attachment 5.

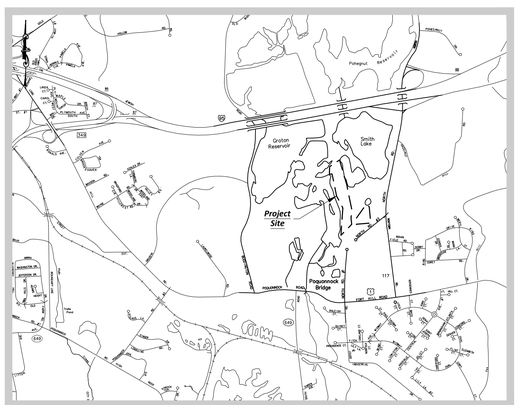
Attachment 1 – Site Development Plan

POQUONNOCK ROAD SOLAR PROJECT
DEVELOPMENT AND MANAGEMENT PLAN
SolarCity Corporation
1240 Poquonnock Road - Groton, Connecticut
October 2015

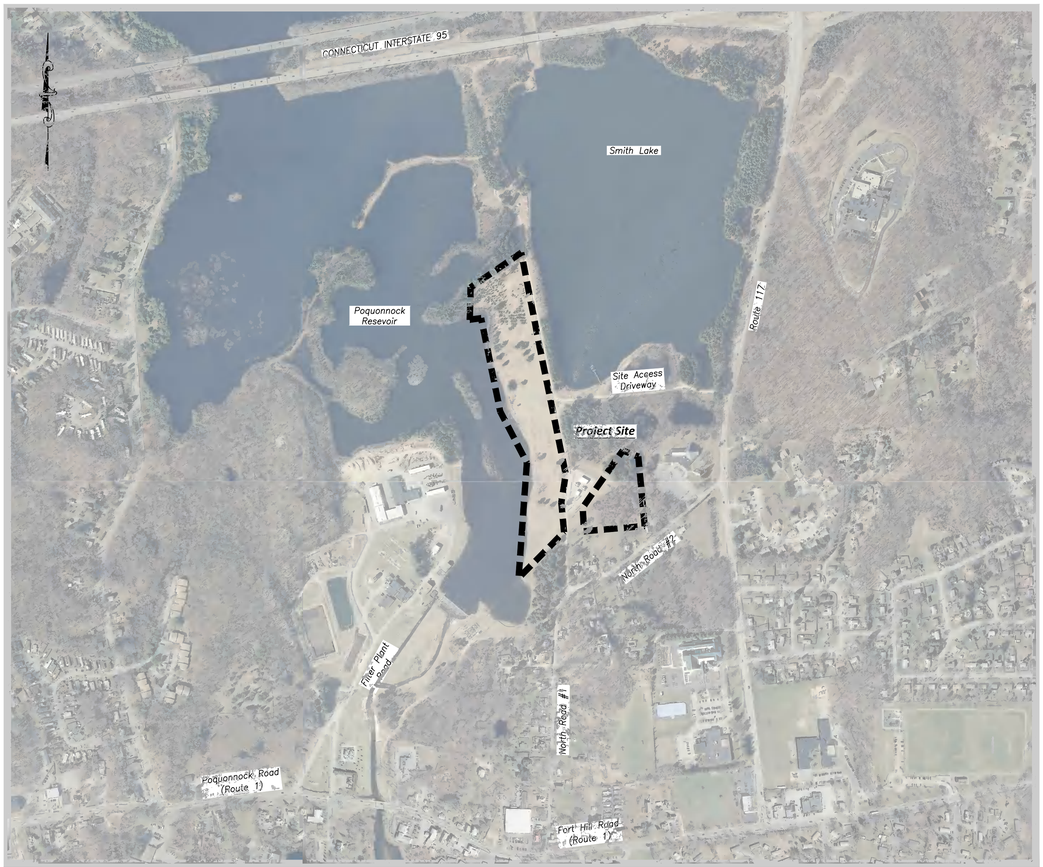
Revision "A" - Per Groton Utilities Comments



Connecticut Municipalities Map
Not To Scale



Site Location Map
Scale: 1"=2000'

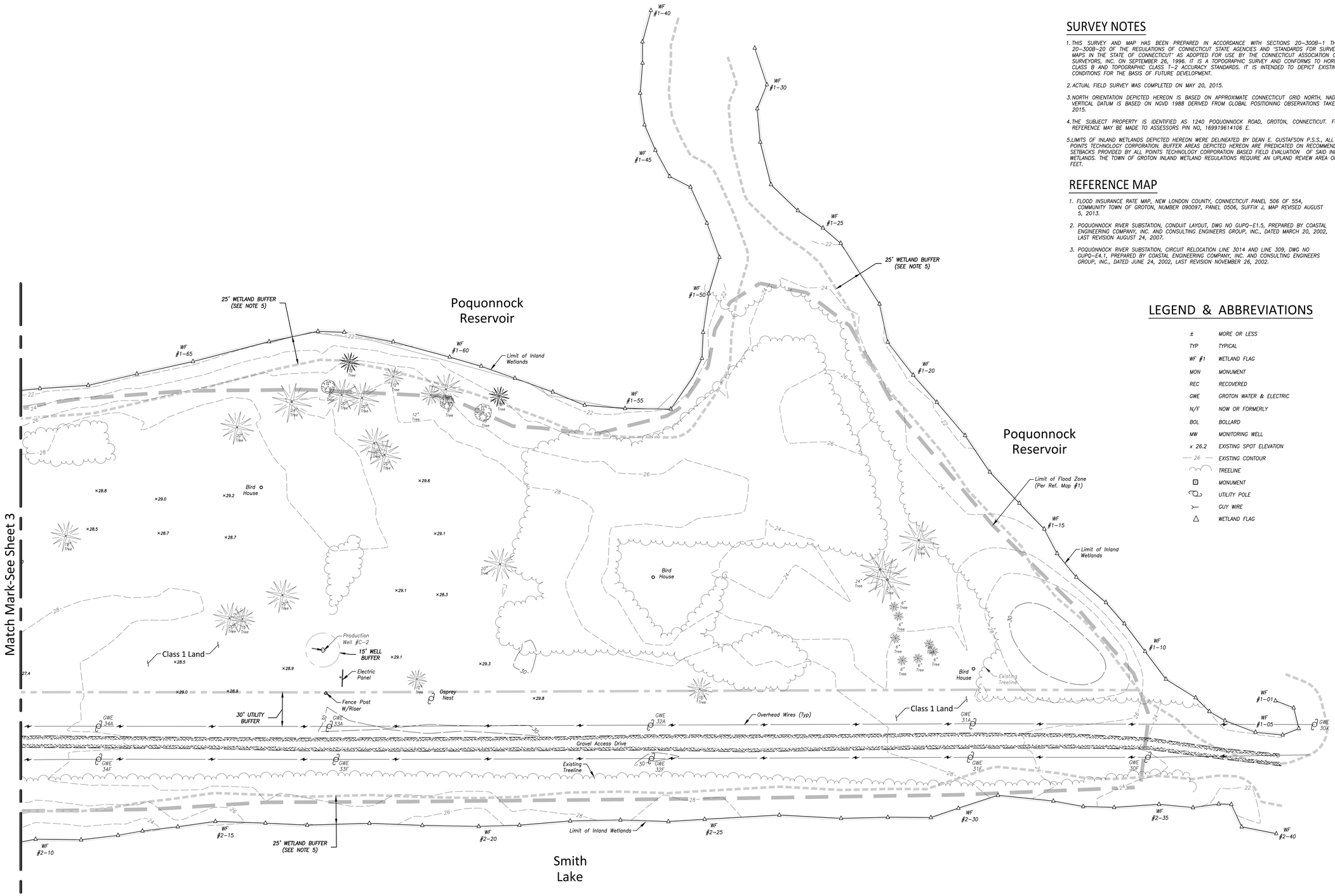


Site Location Aerial View
Not To Scale

Project Information	
Developed By:	***Electrical Engineer:***
Brightfields Development, LLC *40 Walnut Street, Suite 301* *Wellesley, MA 02481*	*SolarCity Corporation* *714 Brook Street* *Rocky Hill, CT 06067*
SolarCity Corporation *714 Brook Street* *Rocky Hill, CT 06067*	***Host:*** *City of Groton* *295 Meridian Street* *Groton, CT 06340*
Civil Engineer: *Boundaries LLC* *179 Pachaug River Drive* *Griswold, CT 06351*	***Utility:*** *Groton Utilities* *295 Meridian Street* *Groton, CT 06340*

Index To Drawings	
Sheet	*Sheet Title*
1	*Cover Sheet*
2-3	*Topographic Survey-Existing Conditions*
4	*Site Logistics Plan*
5-6	*Site Preparation and Demolition Plan*
7-8	*Site Development Plan Solar Modules and Infrastructure*
9	*Erosion & Sediment and Spill Prevention & Control Plan*
10	*Site Details*

FOR REVIEW ONLY



SURVEY NOTES

1. THIS SURVEY AND MAP HAS BEEN PREPARED IN ACCORDANCE WITH SECTIONS 20-300B-1 THROUGH 20-300B-20 OF THE REGULATIONS OF CONNECTICUT STATE AGENCIES AND "STANDARDS FOR SURVEYS AND MAPS IN THE STATE OF CONNECTICUT" AS ADOPTED FOR USE BY THE CONNECTICUT ASSOCIATION OF LAND SURVEYORS, INC. ON SEPTEMBER 26, 1996. IT IS A TOPOGRAPHIC SURVEY AND CONFORMS TO HORIZONTAL CLASS B AND TOPOGRAPHIC CLASS T-2 ACCURACY STANDARDS. IT IS INTENDED TO DEPICT EXISTING SITE CONDITIONS FOR THE BASIS OF FUTURE DEVELOPMENT.
2. ACTUAL FIELD SURVEY WAS COMPLETED ON MAY 20, 2015.
3. NORTH ORIENTATION DEPICTED HEREON IS BASED ON APPROXIMATE CONNECTICUT GRID NORTH, NAD 1983, VERTICAL DATUM IS BASED ON NGVD 1988 DERIVED FROM GLOBAL POSITIONING OBSERVATIONS TAKEN MAY 2015.
4. THE SUBJECT PROPERTY IS IDENTIFIED AS 1240 POQUONNOCK ROAD, GROTON, CONNECTICUT. FURTHER REFERENCE MAY BE MADE TO ASSESSORS PIN NO, 1699196141O6 E.
5. LIMITS OF INLAND WETLANDS DEPICTED HEREON WERE DELINEATED BY DEAN E. GUSTAFSON P.S.S., ALL POINTS TECHNOLOGY CORPORATION. BUFFER AREAS DEPICTED HEREON ARE PREDICATED ON RECOMMENDED SETBACKS PROVIDED BY ALL POINTS TECHNOLOGY CORPORATION BASED FIELD EVALUATION OF SAID INLAND WETLANDS. THE TOWN OF GROTON INLAND WETLAND REGULATIONS REQUIRE AN UPLAND REVIEW AREA OF 100 FEET.

REFERENCE MAP

1. FLOOD INSURANCE RATE MAP, NEW LONDON COUNTY, CONNECTICUT PANEL 506 OF 554, COMMUNITY TOWN OF GROTON, NUMBER 090097, PANEL 0506, SUFFIX J, MAP REVISED AUGUST 5, 2013.
2. POQUONNOCK RIVER SUBSTATION, CONDUIT LAYOUT, DWG NO GUPO-E1.5, PREPARED BY COASTAL ENGINEERING COMPANY, INC. AND CONSULTING ENGINEERS GROUP, INC., DATED MARCH 20, 2002, LAST REVISION AUGUST 24, 2007.
3. POQUONNOCK RIVER SUBSTATION, CIRCUIT RELOCATION LINE 3014 AND LINE 309, DWG NO GUPO-E4.1, PREPARED BY COASTAL ENGINEERING COMPANY, INC. AND CONSULTING ENGINEERS GROUP, INC., DATED JUNE 24, 2002, LAST REVISION NOVEMBER 26, 2002.

LEGEND & ABBREVIATIONS

±	MORE OR LESS
TYP	TYPICAL
WF #1	WETLAND FLAG
MON	MONUMENT
REC	RECOVERED
GWE	GROTON WATER & ELECTRIC
N/F	NOW OR FORMERLY
BOL	BOLLARD
MW	MONITORING WELL
× 26.2	EXISTING SPOT ELEVATION
26	EXISTING CONTOUR
	TREELINE
	MONUMENT
	UTILITY POLE
	GUY WIRE
	WETLAND FLAG

GRAPHIC SCALE

80 40 20 0 40

(IN FEET)
1 inch = 40 ft.

FOR REVIEW ONLY

"TO MY KNOWLEDGE AND BELIEF THIS MAP IS SUBSTANTIALLY CORRECT AS NOTED HEREON."

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www.solarcity.com

SolarCity Corporation
Proposed Solar Photovoltaic System
1240 Poquonnock Road
Groton, Connecticut
Topographic Survey-Existing Conditions

SCALE: 1"=40'
DATE: October 2015
JOB I.D. NO. 15-2347

Revisions

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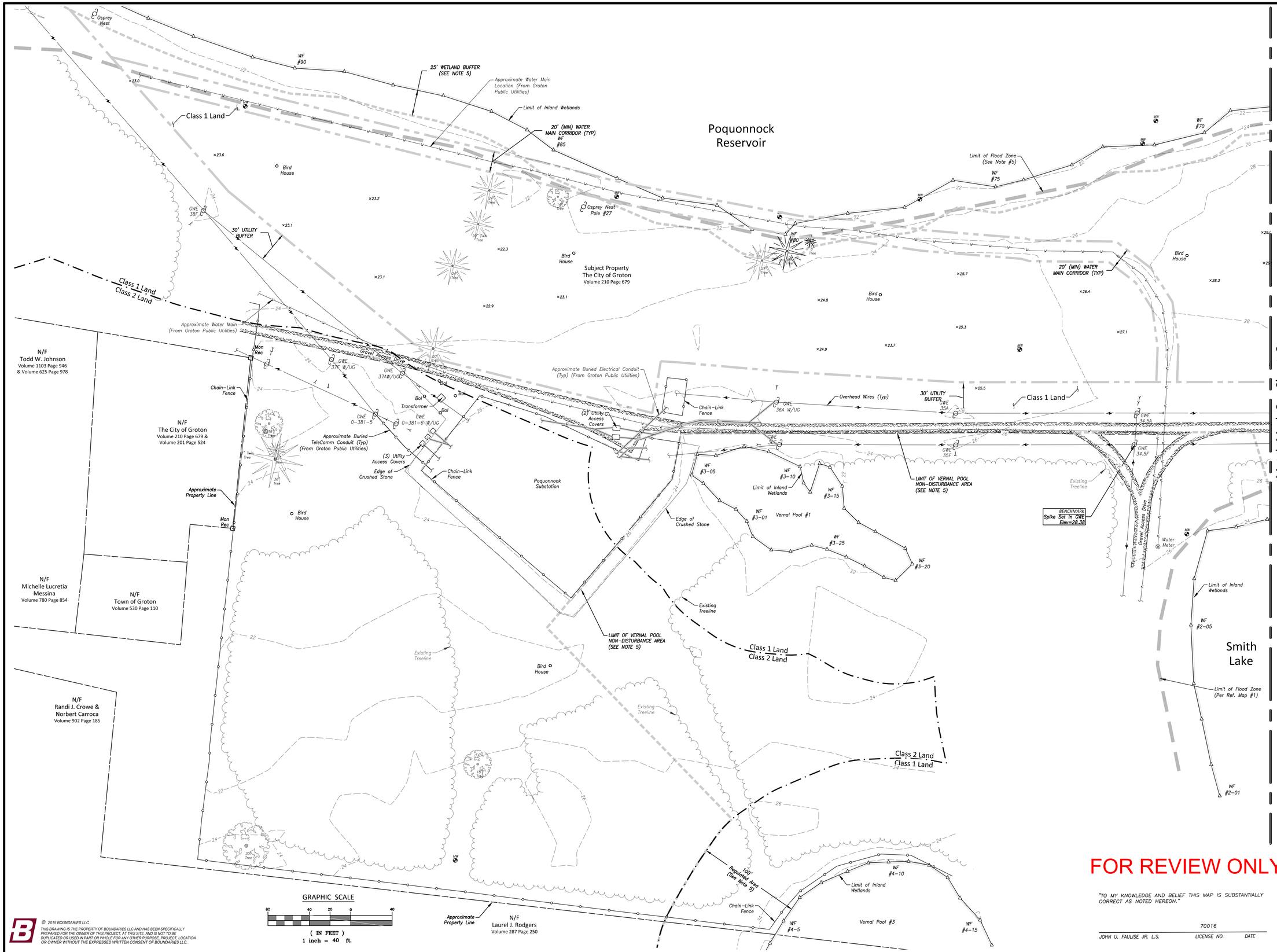
10



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GRAPHIC SCALE

200 100 50 0 100

(IN FEET)
1 inch = 100 ft.

POTENTIAL PHASE 2 SOLAR PV ARRAY

GRAPHIC SCALE

80 40 20 0 40

(IN FEET)
1 inch = 40 ft.

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Site Logistics Plan

SCALE: As Noted
DATE: October 2015
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PROPOSED LIMITS OF DISTURBANCE LINE (TYP.) ALONG THE PROPOSED 25' WETLAND BUFFER LINE.

DISTURBANCE LINE TO BE STAKED WITH A CONTINUOUS LINE OF SEDIMENT FENCE PRIOR TO CLEARING ACTIVITIES AND MAINTAINED FOR THE DURATION OF THE PROJECT. A CONTINUOUS LINE OF WOOD CHIP BERM SHALL BE PLACED ABOVE THE SEDIMENT FENCE IMMEDIATELY FOLLOWING CLEARING ACTIVITIES. (SEE DETAIL).

EXISTING TREE TO REMAIN AND BE PROTECTED THROUGHOUT CONSTRUCTION (TYP.)

PROVIDE VEGETATED SPILLWAY AT LOW POINT (SEE DETAIL)

25' WETLAND BUFFER (SEE NOTE 5)

EXISTING TREE AND REMAINING STUMP TO BE REMOVED (TYP.). DISTURBED AREA TO BE LOAMED, SEEDED AND MULCHED.

WATER QUALITY SWALE TO FOLLOW EXISTING GRADES. PROVIDE STONE CHECK DAM EVERY 6" DROP IN ELEVATION ALONG SWALE CENTERLINE (TYP OF 40 THIS SHEET)

Poquonnock Reservoir

WF #1-40

WF #1-30

WF #1-45

PROVIDE BIOFILTRATION CELL AT SPILLWAY (SEE TYPICAL PLANTING PLAN AND SCHEDULE)

PROVIDE VEGETATED SPILLWAY AT LOW POINT (SEE DETAIL)

PROVIDE 2,400 LF OF VEGETATED WATER QUALITY SWALE WITH PEA STONE LEVEL SPREADER BETWEEN RESERVOIR AND SOLAR ARRAYS (SEE DETAIL)

PROPOSED LIMITS OF TREE AND VEGETATION CLEARING. VEGETATED BUFFER TO REMAIN.

CROSS HATCHED PORTION DENOTES THE LIMITS OF PROPOSED CLEARING. CLEARING ACTIVITIES TO INCLUDE THE REMOVAL OF ALL BRUSH, TREES, AND STUMPS. AREA = 0.5± ACRES. CLEARED MATERIAL TO BE CHIPPED, STOCKPILED AND UTILIZED TO PROVIDE A WOOD CHIP BERM. ALL DISTURBED AREAS TO BE LOAMED, SEEDED AND MULCHED.

WF #1-25

25' WETLAND BUFFER (SEE NOTE 5)

PROVIDE BIOFILTRATION CELL AT SPILLWAY (SEE TYPICAL PLANTING PLAN AND SCHEDULE)

WF #1-50

PROVIDE VEGETATED SPILLWAY AT LOW POINT (SEE DETAIL)

CROSS HATCHED PORTION DENOTES THE LIMITS OF PROPOSED CLEARING. CLEARING ACTIVITIES TO INCLUDE THE REMOVAL OF ALL BRUSH, TREES, AND STUMPS. AREA = 1.2± ACRES. CLEARED MATERIAL TO BE CHIPPED, STOCKPILED AND UTILIZED TO PROVIDE A WOOD CHIP BERM. ALL DISTURBED AREAS TO BE LOAMED, SEEDED AND MULCHED.

PROVIDE VEGETATED SPILLWAY AT LOW POINT (SEE DETAIL)

WF #1-60

Limit of Inland Wetlands

WF #1-55

PROVIDE BIOFILTRATION CELL AT SPILLWAY (SEE TYPICAL PLANTING PLAN AND SCHEDULE)

PROVIDE BIOFILTRATION CELL AT SPILLWAY (SEE TYPICAL PLANTING PLAN AND SCHEDULE)

WF #1-65

PROPOSED LIMITS OF TREE AND VEGETATION CLEARING. 25' MIN. VEGETATED BUFFER TO REMAIN.

WF #1-20

PROVIDE BIOFILTRATION CELL AT SPILLWAY (SEE TYPICAL PLANTING PLAN AND SCHEDULE)

PROVIDE VEGETATED SPILLWAY AT LOW POINT (SEE DETAIL)

Poquonnock Reservoir

Limit of Flood Zone (Per Ref. Map #1)

WF #1-15

Limit of Inland Wetlands

WF #1-10

Match Mark-See Sheet 6

CROSS HATCHED PORTION DENOTES THE LIMITS OF PROPOSED CLEARING. CLEARING ACTIVITIES TO INCLUDE THE REMOVAL OF ALL BRUSH, TREES, AND STUMPS. AREA = 0.1± ACRES. CLEARED MATERIAL TO BE CHIPPED, STOCKPILED AND UTILIZED TO PROVIDE A WOOD CHIP BERM. ALL DISTURBED AREAS TO BE LOAMED, SEEDED AND MULCHED.

Bird House

BIRD HOUSE AND POLE TO BE RELOCATED TO AN APPROVED LOCATION (TYP.)

Bird House

Existing Treeline

Production Well #C-2

15' WELL BUFFER

Electric Panel

Class 1 Land

Fence Post W/Riser

Osprey Nest

30' UTILITY BUFFER

Overhead Wires (Typ)

Class 1 Land

Gravel Access Drive

WF #1-01

WF #1-05

GWE 30X

GWE 34A

GWE 33A

GWE 32A

GWE 31A

GWE 34F

GWE 33F

GWE 32F

GWE 31E

GWE 30F

WF #2-10

WF #2-15

WF #2-20

WF #2-25

WF #2-30

WF #2-35

WF #2-40

25' WETLAND BUFFER (SEE NOTE 5)

Limit of Inland Wetlands

Smith Lake

OSPREY NEST POLE #28 AND PLATFORM TO BE RELOCATED PRIOR TO CONSTRUCTION. SEE SHEET 6 FOR LOCATION.

PROPOSED LIMITS OF DISTURBANCE LINE (TYP.) ALONG THE PROPOSED 30' UTILITY BUFFER LINE.

DISTURBANCE LINE TO BE STAKED AND MAINTAINED WITH A CONTINUOUS LINE OF SEDIMENT FENCE PRIOR TO CLEARING AND TRENCHING ACTIVITIES (SEE DETAIL)

ALL EXISTING GRAVEL ACCESS DRIVES TO BE MAINTAINED FOR THE DURATION OF CONSTRUCTION. ADDITIONAL TRAPROCK MIX OR PROCESSED AGGREGATE AS SPECIFIED ON THE TRAFFIC BOUND GRAVEL SURFACE DETAIL TO BE APPLIED AS NEEDED TO MAINTAIN A STABLE TRAVEL SURFACE.

LEGEND & ABBREVIATIONS

±	MORE OR LESS
TYP	TYPICAL
WF #1	WETLAND FLAG
MON	MONUMENT
REC	RECOVERED
GWE	GROTON WATER & ELECTRIC
N/F	NOW OR FORMERLY
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× 26.2	EXISTING SPOT ELEVATION
26	EXISTING CONTOUR
	TREELINE
	MONUMENT
	UTILITY POLE
	GUY WIRE
	WETLAND FLAG

GRAPHIC SCALE

80 40 20 0 40

(IN FEET)

1 inch = 40 ft.

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Site Preparation and Demolition Plan

SCALE: 1"=40'

DATE: October 2015

JOB I.D. NO. 15-2347

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OSPREY NEST PLATFORM TO BE PROTECTED FOR THE DURATION OF CONSTRUCTION.

BIRD HOUSE AND POLE TO BE RELOCATED TO AN APPROVED LOCATION (TYP.)

PROPOSED LIMITS OF DISTURBANCE LINE (TYP.) ALONG THE PROPOSED 25' WETLAND BUFFER LINE.

DISTURBANCE LINE TO BE STAKED WITH A CONTINUOUS LINE OF SEDIMENT FENCE PRIOR TO CLEARING ACTIVITIES AND MAINTAINED FOR THE DURATION OF THE PROJECT. A CONTINUOUS LINE OF WOOD CHIP BERM SHALL BE PLACED AT THE SEDIMENT FENCE IMMEDIATELY FOLLOWING CLEARING ACTIVITIES. (SEE DETAIL).

25' WETLAND BUFFER (SEE NOTE 5)

Approximate Water Main Location (From Groton Public Utilities)

Limit of Inland Wetlands

20' (MIN) WATER MAIN CORRIDOR (TYP)

EXISTING TREE AND REMAINING STUMP TO BE REMOVED (TYP.). DISTURBED AREA TO BE LOAMED, SEEDED AND MULCHED.

OSPREY NEST POLE #27 AND PLATFORM TO BE RELOCATED PRIOR TO CONSTRUCTION. SEE THIS SHEET FOR LOCATION.

PROVIDE 2,400 LF OF VEGETATED WATER QUALITY SWALE WITH PEA STONE LEVEL SPREADER BETWEEN RESERVOIR AND SOLAR ARRAYS (SEE DETAIL)

EXISTING TREE TO REMAIN AND BE PROTECTED THROUGHOUT CONSTRUCTION (TYP.)

PROPOSED LOCATION FOR OSPREY NEST POLE #27 AND PLATFORM. RELOCATION TO BE COORDINATED WITH ENVIRONMENTAL MONITOR.

WATER QUALITY SWALE TO FOLLOW EXISTING GRADES. PROVIDE STONE CHECK DAM EVERY 6" DROP IN ELEVATION ALONG SWALE CENTERLINE (TYP OF 22 THIS SHEET)

PROVIDE VEGETATED SPILLWAY AT LOW POINT (SEE DETAIL)

PROVIDE BIOFILTRATION CELL AT SPILLWAY (SEE TYPICAL PLANTING PLAN AND SCHEDULE)

Poquonnock Reservoir

Limit of Flood Zone (See Note #5)

PROVIDE BIOFILTRATION CELL AT SPILLWAY (SEE TYPICAL PLANTING PLAN AND SCHEDULE)

PROPOSED LIMITS OF DISTURBANCE LINE (TYP.) ALONG THE PROPOSED 30' UTILITY BUFFER LINE.

DISTURBANCE LINE TO BE STAKED AND MAINTAINED WITH A CONTINUOUS LINE OF SEDIMENT FENCE IMMEDIATELY FOLLOWING CLEARING ACTIVITIES (SEE DETAIL)

30' UTILITY BUFFER

Class 1 Land

Class 2 Land

Approximate Water Main (From Groton Public Utilities)

Approximate Buried Electrical Conduit (Typ) (From Groton Public Utilities)

Overhead Wires (Typ)

Chain-Link Fence

(2) Utility Access Covers

Transformer

Approximate Buried TeleComm Conduit (Typ) (From Groton Public Utilities)

(3) Utility Access Covers

Edge of Crushed Stone

Poquonnock Substation

LIMIT OF VERNAL POOL NON-DISTURBANCE AREA (SEE NOTE 5)

Vernal Pool #1

Vernal Pool #3

PROPOSED LIMITS OF DISTURBANCE LINE (TYP.) ALONG THE PROPOSED 30' UTILITY BUFFER LINE.

DISTURBANCE LINE TO BE STAKED AND MAINTAINED WITH A CONTINUOUS LINE OF SEDIMENT FENCE PRIOR TO CLEARING AND TRENCHING ACTIVITIES (SEE DETAIL)

BENCHMARK
Spike Set in GWE
Elev=28.38

PROPOSED LOCATION FOR OSPREY NEST POLE #28 AND PLATFORM. RELOCATION TO BE COORDINATED WITH ENVIRONMENTAL MONITOR

ALL EXISTING GRAVEL ACCESS DRIVES TO BE MAINTAINED FOR THE DURATION OF CONSTRUCTION. ADDITIONAL TRAPROCK MIX OR PROCESSED AGGREGATE AS SPECIFIED ON THE TRAFFIC BOUND GRAVEL SURFACE DETAIL TO BE APPLIED AS NEEDED TO MAINTAIN A STABLE TRAVEL SURFACE.

Gravel Access Drive

Water Meter

Smith Lake

Limit of Flood Zone (Per Ref. Map #1)

PROVIDE 375 LF OF EMBEDDED CRUSHED STONE CHECK DAM (SEE DETAIL)

PROVIDE GREEN GIANT ARBORVITAE HEDGE ROW (8' SPACING) (SEE PLANTING DETAIL)

THOC2 58

PROPOSED LIMITS OF DISTURBANCE LINE. DISTURBANCE LINE TO BE STAKED AND MAINTAINED WITH A CONTINUOUS LINE OF SEDIMENT FENCE (1000'±) PRIOR TO CLEARING ACTIVITIES (SEE DETAIL)

CROSS HATCHED PORTION DENOTES THE LIMITS OF PROPOSED CLEARING. CLEARING ACTIVITIES TO INCLUDE THE REMOVAL OF ALL BRUSH, TREES, AND STUMPS. AREA = 1.4± ACRES. CLEARED MATERIAL TO BE CHIPPED, STOCKPILED AND UTILIZED TO PROVIDE A WOOD CHIP BERM. ALL DISTURBED AREAS TO BE LOAMED, SEEDED AND MULCHED.

PROVIDE CONTINUOUS LINE OF SEDIMENT FENCE (330'±) DOWNGRADIENT OF PROPOSED ELECTRICAL CONDUIT PRIOR TO TRENCH EXCAVATION (SEE DETAIL)

PROPOSED LIMITS OF DISTURBANCE LINE (TYP.) ALONG A PORTION OF THE PROPOSED VERNAL POOL NON- DISTURBANCE AREA.

DISTURBANCE LINE TO BE STAKED WITH A CONTINUOUS LINE OF SEDIMENT FENCE PRIOR TO CLEARING ACTIVITIES AND MAINTAINED FOR THE DURATION OF THE PROJECT. A CONTINUOUS LINE OF WOOD CHIP BERM SHALL BE PLACED AT THE SEDIMENT FENCE IMMEDIATELY FOLLOWING CLEARING ACTIVITIES. (SEE DETAIL). END AT SUBSTATION FENCE.

PROPOSED LIMITS OF TREE AND VEGETATION CLEARING. VEGETATED BUFFER TO REMAIN.

CROSS HATCHED PORTION DENOTES THE LIMITS OF PROPOSED CLEARING. CLEARING ACTIVITIES TO INCLUDE THE REMOVAL OF ALL BRUSH, TREES, AND STUMPS. AREA = 0.7± ACRES. CLEARED MATERIAL TO BE CHIPPED, STOCKPILED AND UTILIZED TO PROVIDE A WOOD CHIP BERM. ALL DISTURBED AREAS TO BE LOAMED, SEEDED AND MULCHED.

100' Regulated Area (See Note 5)

Chain-Link Fence

Approximate Property Line

Match Mark-See Sheet 5

FOR REVIEW ONLY

GRAPHIC SCALE

80 40 20 0 40

(IN FEET)
1 inch = 40 ft.

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Groton, Connecticut
Site Preparation and Demolition Plan

SCALE: 1"=40'

DATE: October 2015

JOB I.D. NO. 15-2347

Revisions

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SHEET NO.

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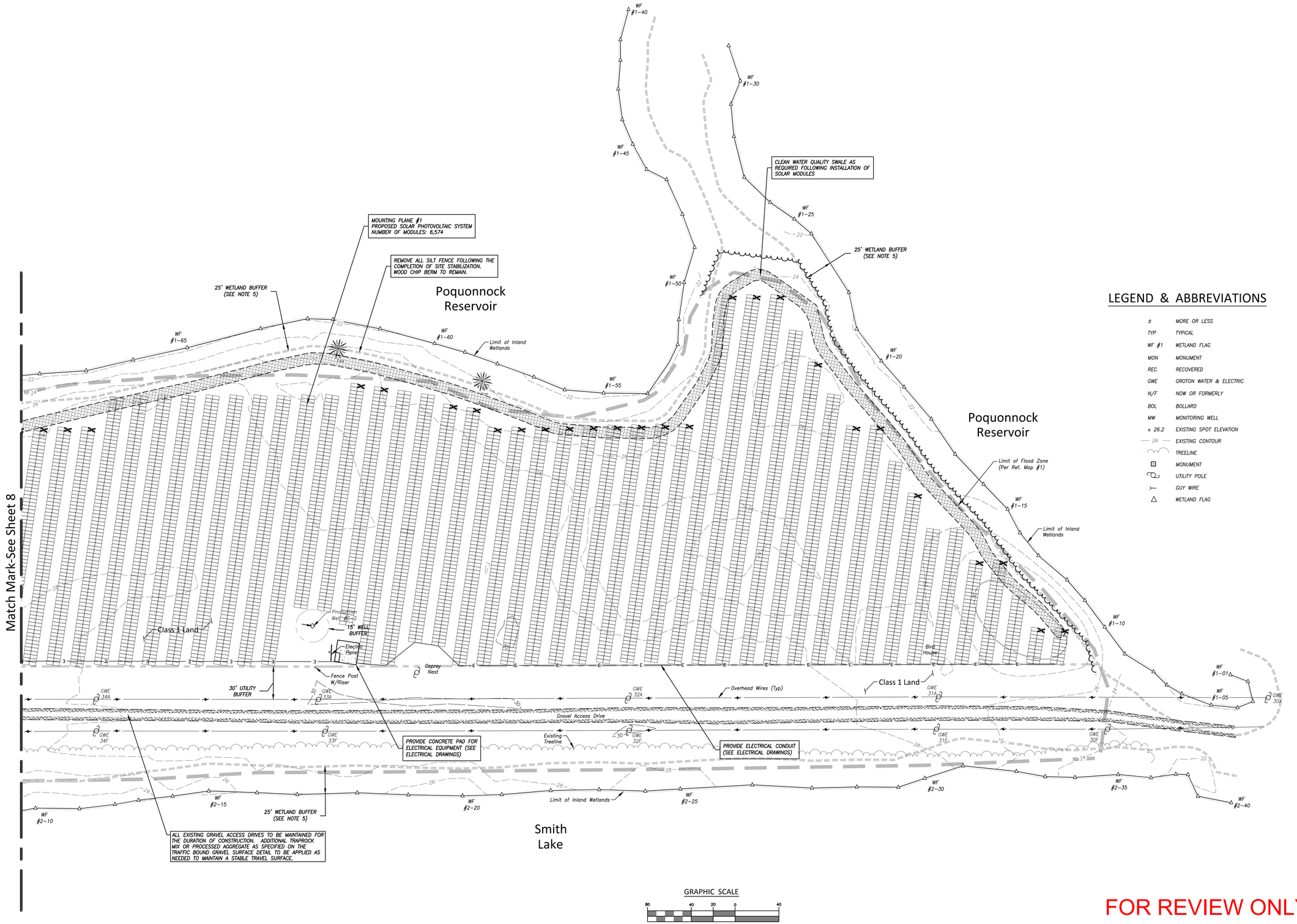

LEGEND & ABBREVIATIONS

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TYP	TYPICAL
WF #1	WETLAND FLAG
MON	MONUMENT
REC	RECOVERED
GWE	GROTON WATER & ELECTRIC
N/F	NOW OR FORMERLY
BOL	BOLLARD
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x 26.2	EXISTING SPOT ELEVATION
26	EXISTING CONTOUR
	TREELINE
	MONUMENT
	UTILITY POLE
	GUY WIRE
	WETLAND FLAG

GRAPHIC SCALE

80 40 20 0 40

(IN FEET)
1 inch = 40 ft.

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SCALE: 1"=40'
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Poquonnock Reservoir

Smith Lake

Match Mark-See Sheet 7

Osprey Nest

WF #90

25' WETLAND BUFFER (SEE NOTE 5)

Approximate Water Main Location (From Groton Public Utilities)

Limit of Inland Wetlands

20' (MIN) WATER MAIN CORRIDOR (TYP)

WF #85

MOUNTING PLANE #2
PROPOSED SOLAR PHOTOVOLTAIC SYSTEM
NUMBER OF MODULES: 2,926

REMOVE ALL SILT FENCE FOLLOWING THE COMPLETION OF SITE STABILIZATION. WOOD CHIP BERM TO REMAIN.

RELOCATED OSPREY NEST POLE #27

Limit of Flood Zone (See Note #5)

WF #75

WF #70

Class 1 Land

Osprey Nest Pole #27

GWE 38F

30' UTILITY BUFFER

WF #80

Tree

20' (MIN) WATER MAIN CORRIDOR (TYP)

Class 1 Land
Class 2 Land

Approximate Water Main (From Groton Public Utilities)

Approximate Buried Electrical Conduit (Typ) (From Groton Public Utilities)

Mon Rec

GWE 37F W/UG

GWE 37AW/UG

Gravel Access Drive

Bol

Transformer

Chain-Link Fence

GWE 0-381-5

GWE 0-381-6 W/UG

Approximate Buried TeleComm Conduit (Typ) (From Groton Public Utilities)

(3) Utility Access Covers

Edge of Crushed Stone

Approximate Property Line

PROTECT EXISTING UTILITIES DURING CONDUIT INSTALLATION (TYP)

Overhead Wires (Typ)

(2) Utility Access Covers

GWE 36A W/UG

30' UTILITY BUFFER

GWE 35A

Class 1 Land

GWE 34.5A

GWE 35F

GWE 34.5F

PROVIDE CONCRETE PAD FOR ELECTRICAL EQUIPMENT (SEE ELECTRICAL DRAWINGS)

Poquonnock Substation

MAINTAIN REQUIRED CLEARANCES FROM OVERHEAD UTILITIES DURING CONDUIT INSTALLATION (TYP)

WF #3-05

#3-10

Limit of Inland Wetlands

WF #3-15

LIMIT OF VERNAL POOL NON-DISTURBANCE AREA (SEE NOTE 5)

PROVIDE CONCRETE PAD FOR ELECTRICAL EQUIPMENT (SEE ELECTRICAL DRAWINGS)

PROPOSED POINT OF INTERCONNECTION (SEE ELECTRICAL DRAWINGS)

RELOCATED OSPREY NEST POLE #28

BENCHMARK
Spike Set in GWE
Elev=28.36

WF #3-01

Vernal Pool #1

WF #3-25

WF #3-20

Edge of Crushed Stone

PROVIDE ELECTRICAL CONDUIT (SEE ELECTRICAL DRAWINGS)

ALL EXISTING GRAVEL ACCESS DRIVES TO BE MAINTAINED FOR THE DURATION OF CONSTRUCTION. ADDITIONAL TRAPROCK MIX OR PROCESSED AGGREGATE AS SPECIFIED ON THE TRAFFIC BOUND GRAVEL SURFACE DETAIL TO BE APPLIED AS NEEDED TO MAINTAIN A STABLE TRAVEL SURFACE.

Water Meter

Gravel Access Drive

Limit of Inland Wetlands

WF #2-05

MAINTAIN PROPOSED GREEN GIANT ARBORVITAE HEDGEROW AS REQUIRED

Existing Treeline

LIMIT OF VERNAL POOL NON-DISTURBANCE AREA (SEE NOTE 5)

Class 1 Land
Class 2 Land

REPAIR CRUSHED STONE CHECK DAM AS REQUIRED FOLLOWING INSTALLATION OF SOLAR MODULES

PROVIDE CONCRETE PAD FOR ELECTRICAL EQUIPMENT (SEE ELECTRICAL DRAWINGS)

MOUNTING PLANE #3
PROPOSED SOLAR PHOTOVOLTAIC SYSTEM
NUMBER OF MODULES: 3,572

Class 2 Land
Class 1 Land

REMOVE ALL SILT FENCE FOLLOWING THE COMPLETION OF SITE STABILIZATION. WOOD CHIP BERM TO REMAIN.

100' Regulated Area (See Note 5)

WF #4-10

Limit of Inland Wetlands

Chain-Link Fence

WF #4-5

Vernal Pool #3

WF #4-15

WF #2-01

Limit of Flood Zone (Per Ref. Map #1)

Approximate Property Line

FOR REVIEW ONLY

GRAPHIC SCALE

80 40 20 0 40

(IN FEET)
1 inch = 40 ft.

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SCALE: 1"=40'

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Reference Is Made To:

1. Connecticut Guidelines For Soil Erosion and Sediment Control, MAY 2002.
2. Soil Survey Of New London County Connecticut, U.S.D.A. Soil Conservation Service.

Development Schedule:

Prior to the start of construction, the contractor is to schedule a mandatory preconstruction meeting on site to discuss issues as they relate to the proposed project. These issues will include but not be limited to:

1. Resource Protection.
2. Construction Vehicle Access and Parking.
3. Construction Methods and Scheduling.
4. Existing site utilities and mark-out coordination.
5. Material delivery and stockpiling.
6. Site Inspection procedures and As-Built drawings.

General Sequence of Construction:

1. Secure all necessary local, state, and federal permits. Register for all applicable state and federal permits as required.
2. Install anti-tracking pad at construction entrance and sediment fence in vicinity of proposed access drive.
3. Clear and remove all trees within the proposed clearing limits. Chip trees for use as sediment and erosion control berms (wood chip berms) for erosion control.
4. Install sediment and erosion control berms (wood chip berms) and sediment fence as shown down gradient of proposed development area prior to grubbing operations.
5. Grub stumps in cleared areas and restore disturbed areas by loaming, seeding and mulching. Stockpile excess topsoil for use in site restoration. Seed these stockpiles with ryegrass and surround with sediment fence or sediment and erosion control berm (wood chip berm). All stumps are to be ground or disposed of off-site at a location approved to accept stumps.
6. Install wetlands mitigation improvements and proposed solar array system. Install conduit, concrete utility pads and electrical equipment as required for harvesting power.
7. After all areas have been permanently stabilized, remove erosion control measures. Wood chip berms may be left in place.

Soil Disturbance Phasing:

The project results in an estimated total soil disturbance of approximately 4.04 acres as a result of the following activities:

1. Clearing, grubbing, and restoration of Mounting Planes 1 and 2 – 1.85 acres
2. Clearing, grubbing, and restoration of Mounting Plane 3 – 2.14 acres
3. Miscellaneous site improvements (landscaping, utilities, etc.) – 0.05 acres

Each of the soil disturbing activities referenced above will be completed and disturbed areas stabilized to insure that the total disturbed area on site does not exceed 5.0 acres at any given time.

Construction Notes:

1. The Contractor shall Call Before You Dig at 811 or 1-800-922-4455 at least 72 hours, Saturdays, Sundays, and holidays excluded, prior to excavation at any location. A copy of the Call Before You Dig project reference number(s) shall be given to the Owner prior to excavation.
2. Locations of existing pipes, conduits, utilities, foundations and other underground objects are not warranted to be correct and the Contractor shall have no claim on that account should they be other than that shown.
3. Stone walls, fences, curbs, etc. shall be removed and replaced as necessary to perform the work. Unless otherwise indicated, all such work shall be incidental to construction of the project.
4. All other areas disturbed by the Contractor beyond payment limits shall be restored at no additional cost to the Owner.
5. The wetland buffer line shall be staked out in the field prior to any clearing operations.
6. All work shall be done in accordance with OSHA requirements and the contractor is responsible for compliance with these requirements. In addition, it shall be the responsibility of the Contractor to provide any excavation safeguards, necessary barricades, flagmen, etc. for traffic control and site safety.
7. All erosion & sedimentation control measures shall be installed prior to the start of construction.
8. All fuel, oil, paint or other hazardous materials used during construction should be stored in a secondary container and removed to a locked indoor area with an impervious floor during non-work hours.

Erosion Control Operation & Maintenance:

The applicant shall be responsible for the installation and maintenance of erosion and sediment control measures throughout the project. No construction shall proceed until proper sedimentation and erosion control methods have been installed as the sequence of construction necessitates.

Every precaution shall be used during construction to prevent and minimize the degradation of the existing water quality from stormwater runoff during construction. All activities shall be in conformance to and consistent with all applicable water quality standards and management practices as set forth by local, state and federal agencies.

The applicant shall appoint an onsite agent who shall be personally responsible for implementing this erosion and sediment control plan and enforcing the prescribed safeguards during the excavation and operation period.

This responsibility includes the installation and maintenance of control measures throughout the project, informing all parties engaged on site of the requirements and objectives of the plan, notifying the proper agency and officials of any transfer of this responsibility.

All erosion and sediment control measures shall be repaired, cleaned and/or replaced as necessary throughout the project in order to maintain complete and integral erosion and sediment control protection. Once in place, all erosion and sediment control measures are to remain in place in proper condition and be continuously maintained until final site restoration has been completed. Following such permanent stabilization, the erosion and sediment control measures shall be dismantled, removed, and disposed of in an approved manner. Additional erosion and sediment control measures beyond those shown on the plans or prescribed herein shall be put in place, whenever necessary, to address field conditions and/or as ordered by the engineer.

Qualified personnel provided by the applicant shall inspect disturbed areas and the locations where vehicles enter and leave the site. These areas shall be inspected at least once every seven calendar days and within twenty-four hours of the end of a storm that is 0.5 inches or greater. Additional measures beyond those indicated and/or shown on this plan set or prescribed herein shall be put in place, whenever necessary, to address field conditions and/or as required by the engineer. Where sites have been temporarily or finally stabilized, such inspection shall be conducted at least once every month for three consecutive months.

No soil, fill or other materials shall be deposited in surrounding inland wetlands.

All temporary storage and/or stockpile areas shall be properly stabilized to prevent erosion and suitably contained to prevent turbid runoff.

Dumping of oil or other deleterious materials on the ground is forbidden. The applicant shall provide a means of catching, retaining and properly disposing of drained oil, removed oil filters, or other deleterious material from equipment used on site. Vehicle maintenance shall be completed off site. All oil spills shall be immediately reported to the department of energy and environmental protection/hazardous materials office. Failure to do so may result in the imposition of fines under the applicable Connecticut General Statutes.

During construction, the applicant shall be responsible for site inspection and maintenance to assure proper performance of erosion control measures. Inspection and maintenance shall include, at a minimum, the following:

- Inspect all sediment fence, wood chip berms and other erosion control measures. Repair or replace any damaged portion in order to insure its proper and effective operation. Remove accumulated sediment if required (greater than 4" depth).
- Inspect all stockpiles. Repair or replace any damaged portion of erosion control measures surrounding these areas in order to prevent sedimentation downgradient.
- Inspect grass restored areas. Revegetate any eroded or disturbed areas to provide permanent stabilization. Reseed and/or revegetate any areas that do not have a suitable stand of grass or any scoured areas to provide permanent stabilization.
- Inspect anti-tracking pad. Remove and dispose of pad and replace if pad is no longer functioning efficiently or accumulated sediment is to a depth of 2" below the stone surface.
- Inspect all wood chip berms. Remove accumulated sediment if required (blocking more than 3" depth of flow).
- Inspect downgradient areas of all solar arrays. Stabilize any eroded areas if found.

Erosion and Sediment Control Best Management Practices (BMP'S)

Minimize Disturbed Area and Protect Natural Features and Soil:

Topsoil:

Topsoil will be removed and stockpiled on site and utilized for final grading. Additional topsoil, if required will be supplied from an off-site source. Excess materials resulting from "cut slopes" in the areas of the proposed construction that are not intended for reuse will be immediately removed from the site. When soil is stockpiled, the slope of the stockpile will not exceed 2 horizontal to 1 vertical.

Installation Schedule: As noted, excavated topsoil will be stockpiled on site. Sediment fence will be placed around any stockpiles that are not immediately removed from the site to protect the existing drainage ditches and off site areas.

Maintenance and Inspection: The cut and fill areas will be inspected weekly for erosion. These areas will be stabilized immediately with erosion controls or graded to avoid possible disturbance to the existing drainage ditches or off site areas. See also maintenance and inspection procedures for silt fence.

Control Stormwater Flowing Onto and Through the Project:

Area for Silt to accumulate:

BMP/Installation Schedule: Before any grading operations begin, a wood chip filter berm or sediment fence will be installed adjacent to the areas under construction just outside the limits of disturbance. Other adjacent off site areas will always be protected by a sediment fence or another BMP until final stabilization is achieved.

Maintenance and Inspection: The graded areas and sediment fence will be inspected weekly to ensure that there are no structural failures and immediately after rain events.

Construction Specifications

Erosion and Sediment Control Berm (Wood Chip Filter Berm)

1. The material for wood chip filter berms will be acquired in conjunction with the removal and chipping of trees located within the project area.

Installation

Erect wood chip filter berm in a continuous fashion at the specified height and width.

Maintenance:

1. Sediment should be removed once it has accumulated to a depth of 4".
2. Berm should be repaired if it has been breached.
3. Berm can be left in place permanently and left to deteriorate.
4. All sediment accumulated at the berm should be removed and properly disposed of if the berm is to be removed.

Sediment Fence

1. The material for sediment fences should be a pervious sheet of synthetic fabric such as polypropylene, nylon, polyester, or polyethylene yarn.
2. The stakes used to anchor the filter fabric should be wood or metal. Wooden stakes should be at least 3 feet long and have a minimum diameter of 2 inches if a hardwood like oak is used. Stakes from soft woods like pine should be at least 4 inches in diameter.
3. Erect sediment fence in a continuous fashion from a single roll of fabric to eliminate gaps in the fence. If a continuous roll of fabric is not available, overlap the fabric from both directions only at stakes or posts. Overlap at least 6 inches. Excavate a trench to bury the bottom of the fabric fence at least 6 inches below the ground surface. This helps to prevent gaps from forming near the ground surface. Gaps would make the fencing useless as a sediment barrier.
4. The height of the fence posts should be 16 to 34 inches above the original ground surface. Space the posts no more than 10 feet apart.
5. The fence should be designed to withstand the runoff from a 10-year peak storm event. Once installed, it should remain in place until all areas upslope have been permanently stabilized by vegetation or other means.

Installation:

1. Dig a 6" deep trench on the uphill side of the fabric barrier and drive the post 1.5 feet into the ground.
2. Position the posts on the downhill side of the fabric barrier and drive the post 1.5 feet into the ground.
3. Lay the bottom 6" of the fabric barrier in the trench to prevent undermining and backfill.

Maintenance:

1. Sediment should be removed once it has accumulated to 4" depth.
2. Filter fabric should be replaced whenever it has deteriorated to such an extent that the effectiveness of the fabric is reduced (approximately six months).
3. Sediment fence should remain in place until disturbed areas have been permanently stabilized.
4. All sediment accumulated at the fence should be removed and properly disposed of before the fence is removed.

Inspection:

1. Inspect sediment fence before anticipated storm events (or series of storm events such as intermittent showers over one or more days) and within 24 hours after the end of a storm event of 0.5 inches or greater, and at least once every seven calendar days, at least 72 hours apart.
2. Where sites have been finally or temporarily stabilized, such inspections may be conducted once per month.

Straw Bale Barrier

Installation

1. Excavate trench 4" and place material upslope of trench.
2. Place bales in a single row in the trench, lengthwise, with ends of adjacent bales tightly abutting one another and the bindings oriented around the sides rather than along the tops and bottoms of the bales (to avoid premature rotting of the bindings).
3. Anchor each bale with at least 2 stakes, driving the first stake in each bale toward the previously laid bale to force the bales together. Stakes must be driven a minimum of 18 inches into the ground. Fill any gaps between the bales with straw to prevent water from escaping between the bales.
4. Backfill the bales with the excavated trench material to a minimum depth of 4 inches on the uphill side of the bales. Tamp by hand or machine and compact the soil. Loose straw scattered over the disturbed area immediately uphill from the hay bale barrier tends to increase barrier efficiency.

Maintenance

1. Inspect the straw bale barrier at least once a week and within 24 hours of the end of a storm with a rainfall amount of 0.5 inch or greater to determine maintenance needs. For dewatering operations, inspect frequently before, during, and after pumping operations. Remove the sediment deposits when sediment deposits reach approximately one half the height of the barrier.
2. Replace or repair the barrier within 24 hours of observed failure. Failure of the barrier has occurred when sediment fails to be retained by the barrier because:
   (a) the barrier has been overtopped, undercut or bypassed by runoff water,
   (b) the barrier has been moved out of position, or
   (c) the straw bales have deteriorated or been damaged.
3. When repetitive failures occur at the same location, review conditions and limitations for use and determine if additional controls are needed to reduce failure rate or replace straw bale barrier.
4. Maintain the straw bale barrier until the contributing area is stabilized. After the upslope areas have been permanently stabilized, pull the stakes out of the hay bales. Remove sediment.

Dust Control:

Dust from the site will be controlled by using a mobile pressure-type distributor truck that will apply potable water at rate of 300 gallons per acre and minimized as needed to avoid ponding.

Installation Schedule: Dust control will be implemented as needed once site grading has been initiated, and during windy conditions exceeding 20mph, while site grading is occurring. Spraying of potable water will be performed once per day during the months of March through May and no more than three times per day from June to September or whenever dryness of soil warrants it.

Maintenance Schedule: At least one mobile unit will be available at all times during construction to apply potable water. Each mobile unit shall be equipped with a positive shutoff valve to prevent over watering of disturbed areas.

Soil Stabilization:

Temporary Stabilization:

BMP Description: Hydromulching will be used on slopes where construction will cease for more than 14 days and over the winter months to stabilize erodible materials. Straw mulch and wood fiber will be mixed with a tackifier and applied uniformly by machine with an application rate of 2 tons (100-200 bales) per acre. The contractor will use crimping equipment to bind the mulch to the soil if the tackifier is not effective. Netting will be used on small areas with steep slopes. In areas where hydromulching is inaccessible, straw mulch will be applied by hand at the same application rate.

Temporary Seeding will be used on any area where construction activity is suspended for more than twenty-one days to stabilize erodible materials. Refer to the Erosion Control Plan for guidance on seeding mixtures, rates, and acceptable planting dates for temporary seeding.

Installation Schedule: Portions of the site where construction activities will temporarily cease for more than 14 days will be stabilized with mulch. Where construction activities will temporarily cease for more than 21 days it will be temporarily seeded. Winter stabilization will be provided between December 25 and March 30.

Maintenance and Inspection: Mulched areas will be inspected weekly to ensure that adequate coverage is provided. Repairs will be conducted as needed.

Seed Mixture For Temporary Seeding

	LBS./ACRE	LBS./1000 S.F.
Annual Ryegrass	40	1.0

See Figure TS-2 in the 2002 Guidelines for additional temporary seed mixes.

Final Stabilization:

Permanent seeding should be applied immediately after the final design grades are achieved at the site but no later than 14 days after construction activities have permanently ceased. After the entire site is stabilized, any sediment that has accumulated will be removed and hauled off site to a licensed landfill facility. Construction debris, trash, and temporary BMP's will also be removed and any areas disturbed during removal will be seeded immediately.

Seedbed Preparation:

1. Topsoil will be spread over final graded areas at a minimum depth of four inches. Topsoil shall inclusively mean a soil meeting one of the following soil textural classes established by the United States Department of Agriculture soil classification system based upon the proportion of sand, silt, and clay size particles after passing a 2 millimeter (mm) sieve and subjected to a particle size analysis:
   1.1. Loamy sand, including coarse, loamy fine, and loamy very fine sand, sandy loam, including coarse, fine and very fine sandy loam, loam, or silt loam with not more than 60% silt;
   1.2. Containing not less than 6% and not more than 20% organic matter as determined by loss-on-ignition of oven dried samples dried at 105 degrees centigrade;
   1.3. Possessing a ph range of 6.0-7.5, except if the vegetative practice being used specifically requires a lower ph, then ph may be adjusted accordingly;
   1.4. Having soluble salts not exceeding 500 ppm;
   1.5. And that is loose and friable and free from refuse, stumps, roots, brush, weeds, frozen particles, rocks, and stones over 1.25 inches in diameter, and any material that will prevent the formation of a suitable seedbed or prevent seed germination and plant growth.
2. Fertilizer will be applied to the seedbed as needed. Fertilizers will be commercial type of uniform composition, free-flowing and conforming to the applicable State and Federal laws. Choose native species that are adapted to local weather and soil conditions wherever possible to reduce water and fertilizer inputs and lower maintenance overall.
3. Topsoil will be loosened by raking, tilling or other suitable methods.

Final stabilization should be installed on portions of the site where construction activities have permanently ceased but no later than 14 days after construction ceases.

All seeded areas will be inspected weekly during construction activities for failure until a dense cover of vegetation has been established. If failure is noticed on the seeded area, the area will be reseeded, fertilized and mulched immediately. After construction is complete at the site permanent stabilization measures will be monitored until final stabilization is reached.

Seed Mixture For Upland Areas

	LBS./ACRE	LBS./1000 S.F.
Kentucky Bluegrass	20	0.45
Creeping Red Fescue	20	0.45
Perennial Ryegrass	5	0.10
	45	1.00

The recommended seeding dates are: April 1-June 15 and August 1-September 15

Spill Preventation and Control Plan:

1. Vehicle Maintenance: Vehicles and equipment will be maintained off-site. All vehicles and equipment including subcontractor vehicles will be checked for leaking oil and fluids upon entering the site. Vehicles leaking fluid will not be allowed on-site. Drip pans will be placed under all vehicles and equipment that are parked overnight. Parking shall be in the areas designated on the site logistics plan or as approved by the property owner.
2. Vehicle Fueling: Refueling of vehicles and equipment shall be conducted in the designated laydown area. The location within the laydown area shall be comprised of an impervious surface without access to any subsurface drainage structures.
3. Hazardous Material Storage: Hazardous materials including but not limited to fuel, oil and petroleum products and solvents will be stored in an approved covered storage unit and provided with secured secondary containment with an impervious floor in accordance with federal and municipal regulations.
4. Material safety data sheets, a material inventory, and emergency contact information will be maintained at the on-site project trailer.
5. Spill Kits: Spill kits will be stored within the material storage area,concrete washout areas, and designated fueling area.
6. Spills: All spills will be cleaned up immediately upon discovery. Spent absorbent materials and rags shall be placed in a sealed drum and will be hauled off-site immediately after the spill is cleaned up for disposal at the appropriate landfill. Spills or releases of hazardous chemicals or petroleum products shall be promptly reported to CTDEEP at 1-800-424-3338 and the National Response Center 1-800-424-8802.

   In accordance with Connecticut General Statues the contractor shall within 24 hours of verbal notificationcomplete a written "Report of Petroleum or Chemical Product Discharge, Spillage or Release" and mail it to: CTDEEP, Bureau of Waste Management, 79 Elm Street, Hartford, Ct, 06106-5127.

Installation Schedule: The spill prevention and control procedures will be implemented once construction begins on-site.

Spill Prevention and Control Best Management Practices (BMP'S) Description:

1. Material Handling and Waste Management:

Waste Materials:

All waste materials will be collected and disposed of into metal waste dumpsters in designated areas. Dumpsters will have a secure tight lid, be placed away from storm water drains and structures, and will meet all federal, state, county, and local regulations. Only trash and construction debris will be placed in the dumpsters. Construction materials will not be buried on site.

Maintenance and Inspection: The dumpsters will be inspected weekly and immediately after storm events. The dumpster will be emptied weekly or more frequently if needed, and taken to the appropriate landfill.

Hazardous Waste Materials:

BMP Description: All hazardous waste materials including oil filters, petroleum products, paint, and equipment maintenance fluids will be stored in structurally sound and sealed shipping containers in a designated area. Hazardous waste materials will be stored in appropriate and clearly marked containers and segregated from other non-waste materials. Secondary containment will be provided for all waste materials in a designated area and will consist of commercially available spill pallets. Additionally, all hazardous waste materials will be disposed of in accordance with federal, state, county, and local regulations. Hazardous waste materials will not be disposed of into the on-site dumpsters.

Maintenance and Inspection: The hazardous waste materials area will be inspected weekly and after storm events. The storage area will be kept clean, well organized and equipped with ample cleanup supplies as appropriate for the materials being stored. Material safety data sheets, material inventory, and emergency contact numbers will be maintained in the office trailer.

Sanitary Waste:

BMP Description: Portable toilets, located in the staging area, will be provided at the site throughout the construction phase. The toilets will be located away from concentrated drainage flow paths and will have collection pans underneath as secondary containment.

Maintenance and Inspection: Sanitary waste will be collected a minimum of once a week and shall be inspected weekly for evidence of leaking holding tanks.

Recycling:

BMP Description: Wood pallets, cardboard boxes, and other recyclable construction scraps will be disposed of in a designated dumpster for recycling. The dumpster will have a secure watertight lid, be placed away from stormwater conveyances and drains and meet all local and state solid-waste management regulations. Only solid recyclable construction scraps from the site will be deposited in the dumpster.

Maintenance and Inspection: The recycling dumpster will be inspected weekly. The recycling dumpster will be emptied when full and taken to an approved recycling center by the contractor. If recyclable construction wastes are exceeding the dumpster's capacity, the dumpsters will be emptied more frequently.

2. Designate Washout Areas:

Concrete Washout

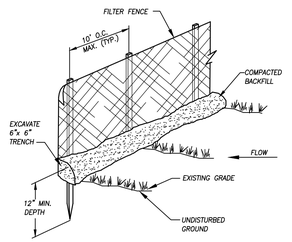
BMP Description: A designated temporary, above-grade concrete washout area will be constructed for concrete washout. The washout area will be lined with plastic sheeting at least 10 mils thick and free of holes or tears. Concrete pours will not be conducted during or before an anticipated storm event. Concrete mixer trucks and chutes will be washed in the designated washout area or concrete wastes will be properly disposed of off-site. When the temporary washout area is no longer needed for the construction project, the hardened concrete and materials used to construct the area will be removed and disposed of in accordance with all applicable local, State and Federal regulations, and the area will be stabilized.

Installation Schedule: The washout area will be constructed before concrete pours occur at the site.

3. Vehicle Fueling and Maintenance Practices:

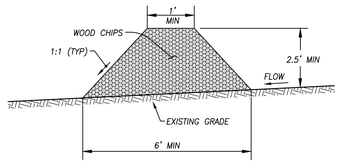
BMP Description: Several types of vehicles and equipment will be used on-site throughout the project, including graders, scrapers, excavators, loaders, rollers, trucks and trailers, backhoes, and forklifts. All major equipment/vehicle fueling will be performed in the staging area. This proposed activity is to be situated so that drainage facilities or water courses located in the area are not at risk from potential infiltration. 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 parked overnight. Fuel will be delivered to the site on an as needed basis by a fuel delivery service. Fueling of equipment will only occur in designated fueling areas. Vehicle maintenance including washing is prohibited on site.

Installation Schedule: BMPs implemented for fueling activities will begin at the start of the project.



SEDIMENT FENCE DETAIL

NOT TO SCALE



SEDIMENT AND EROSION CONTROL BERM

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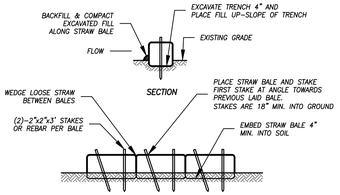

STRAW BALE BARRIER DETAIL

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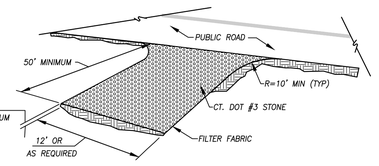

ANTI-TRACKING PAD

NOT TO SCALE

FOR REVIEW ONLY

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www.solarbrownfields.com

SolarCity
714 Brook Street
Rocky Hill, CT 06067
www.solarcity.com

SolarCity Corporation
Proposed Solar Photovoltaic System
1240 Poquonnock Road
Groton, Connecticut
Erosion & Sediment and Spill Prevention & Control Plan

SCALE: As Noted

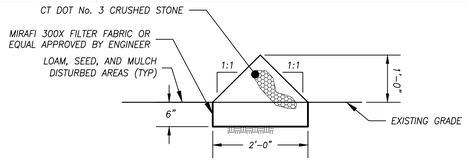
DATE: October 2015

JOB I.D. NO. 15-2347

Revisions

Rev. A - Per Groton Utilities Comments - 12/09/15

SHEET NO. 9 / 10



EMBEDDED STONE CHECK DAM

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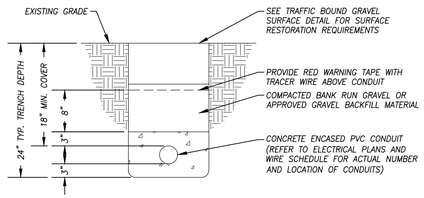

CONDUIT TRENCH THROUGH GRAVEL DRIVE DETAIL

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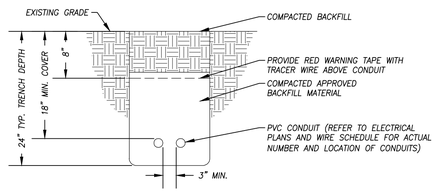

NON-TRAFFIC CONDUIT TRENCH DETAIL

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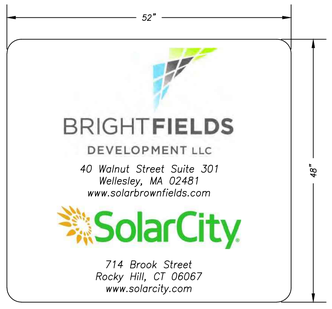
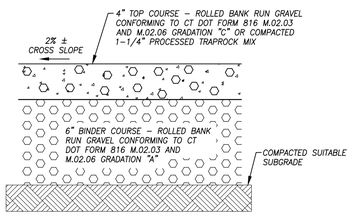


NOTE:
1. SIGNS MOUNTED ON GATES AT ALL ENTRANCES.
2. SIGNS TO BE RATED FOR OUTDOOR ENVIRONMENTS.

IDENTIFICATION SIGNAGE

NOT TO SCALE



TRAFFIC BOUND GRAVEL SURFACE DETAIL

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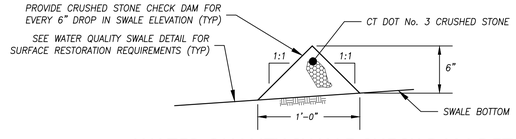

WATER QUALITY SWALE CHECK DAM DETAIL

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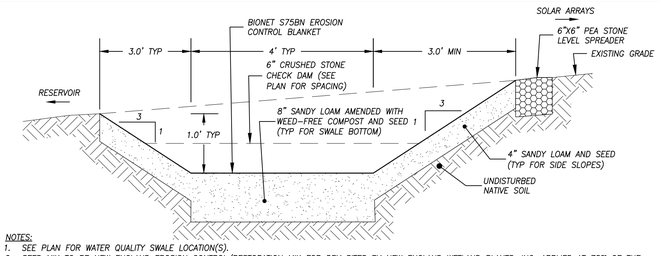
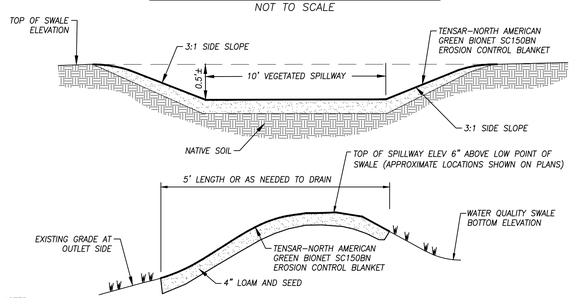


NOTES:
1. SEE PLAN FOR WATER QUALITY SWALE LOCATION(S).
2. SEED MIX TO BE NEW ENGLAND EROSION CONTROL/RESTORATION MIX FOR DRY SITES BY NEW ENGLAND WETLAND PLANTS, INC. APPLIED AT 75% OF THE MANUFACTURER'S RECOMMENDED APPLICATION RATE AND NEW ENGLAND CONSERVATION/WILDLIFE MIX BY NEW ENGLAND WETLAND PLANTS, INC. APPLIED AT 50% OF THE MANUFACTURER'S RECOMMENDED APPLICATION RATE.
3. STRIP TOPSOIL FROM WATER QUALITY SWALE AREA; AMEND WITH WEED-FREE COMPOST (30% TO 40% BY VOLUME) TO PROVIDE SOIL MEDIA FOR WATER QUALITY SWALE BASE; EXCAVATE FROM EXISTING GRADE; LOAM, SEED AND STABILIZE WITH TENSAR-NORTH AMERICAN GREEN BIONET S75BN EROSION CONTROL BLANKET.
4. EROSION CONTROL BLANKET TO BE INSTALLED IN ACCORDANCE WITH MANUFACTURER'S REQUIREMENTS.

WATER QUALITY SWALE DETAIL

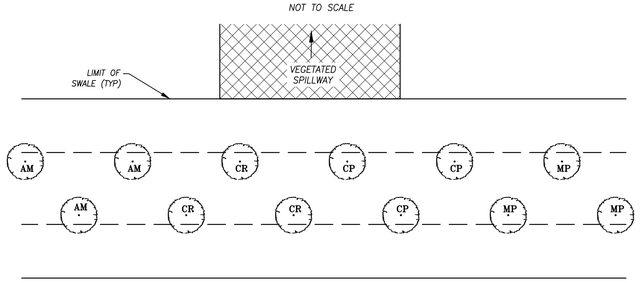
NOT TO SCALE



NOTES:
1. SEE PLAN FOR APPROXIMATE SPILLWAY LOCATION(S). FINAL LOCATIONS TO BE DETERMINED BASED ON ACTUAL LOW POINTS IN SWALE GRADING.
2. SEED MIX TO BE NEW ENGLAND EROSION CONTROL/RESTORATION MIX FOR DRY SITES BY NEW ENGLAND WETLAND PLANTS, INC. APPLIED AT 75% OF THE MANUFACTURER'S RECOMMENDED APPLICATION RATE AND NEW ENGLAND CONSERVATION/WILDLIFE MIX BY NEW ENGLAND WETLAND PLANTS, INC. APPLIED AT 50% OF THE MANUFACTURER'S RECOMMENDED APPLICATION RATE.
3. STRIP TOPSOIL FROM SPILLWAY AREA; EXCAVATE FROM EXISTING GRADE; LOAM, SEED AND STABILIZE WITH TENSAR-NORTH AMERICAN GREEN BIONET SC150BN EROSION CONTROL BLANKET.
4. EROSION CONTROL BLANKET TO BE INSTALLED IN ACCORDANCE WITH MANUFACTURER'S REQUIREMENTS.

VEGETATED SPILLWAY DETAIL

NOT TO SCALE



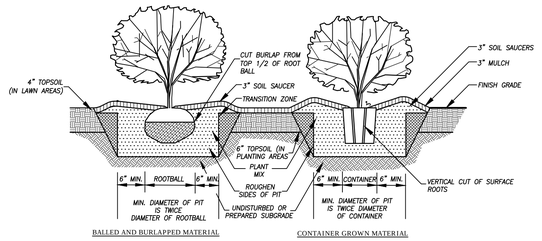
BIOFILTRATION CELL PLANTING SCHEDULE

SYMBOL	BOTANICAL NAME	COMMON NAME	SIZE	QUANTITY	SPACING
TREES AND SHRUBS					
AM	ARONIA MELANOCARPA	BLACK CHOKEBERRY	3'–4'	27	3–5 FT O.C.
CP	COMPTONIA PEREGRINA	SWEET FERN	3'–4'	27	3–5 FT O.C.
CR	CORNUS RACEMOSA	GRAY DOGWOOD	3'–4'	27	3–5 FT O.C.
MP	MORELLA (MYRICA) PENSYLVANICA	BAYBERRY	3'–4'	27	3–5 FT O.C.

NOTES:
1. WATER QUALITY SWALE TO BE UNDERSOWN WITH A NATIVE SEED MIX TO BE NEW ENGLAND EROSION CONTROL/RESTORATION MIX FOR DRY SITES APPLIED AT 75% OF THE MANUFACTURER'S RECOMMENDED APPLICATION RATE AND NEW ENGLAND CONSERVATION/WILDLIFE MIX APPLIED AT 50% OF THE MANUFACTURER'S RECOMMENDED APPLICATION RATE (SUPPLIED BY NEW ENGLAND WETLAND PLANTS, INC. (413-548-8000), OR APPROVED EQUIVALENT).
2. SHRUBS SHALL BE PROVIDED IN #2 CONTAINERS.

BIOFILTRATION CELL TYPICAL PLANTING DETAIL

NOT TO SCALE

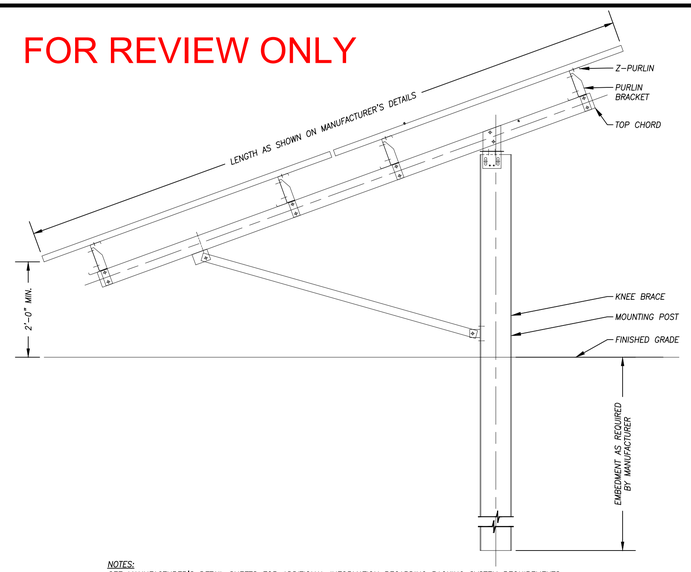


NOTES:
1. SET CROWN OF ROOTBALL 2" ABOVE FINISH GRADE.
2. FOR CONTAINER GROWN STOCK USE FINGERS OR A SHARP KNIFE TO LOOSEN ROOTS OUT OF THE OUTER LAYER OF POTTING SOIL; THEN CUT OR PULL APART ANY ROOTS CIRCLING THE PERIMETER OF THE CONTAINER.
3. AT PLANTING THOROUGHLY SOAK THE ROOT MASS AND ADJACENT SOIL. REPEAT SEVERAL TIMES DURING THE FIRST MONTH AND THROUGHOUT THE FOLLOWING TWO SUMMERS.

SHRUB PLANTING DETAIL

NOT TO SCALE

FOR REVIEW ONLY

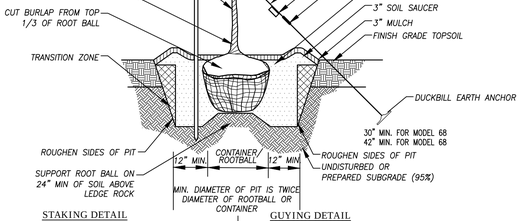


NOTES:
SEE MANUFACTURER'S DETAIL SHEETS FOR ADDITIONAL INFORMATION REGARDING RACKING SYSTEM REQUIREMENTS AND INSTALLATION PROCEDURES. RACKING SYSTEM TO BE INSTALLED IN ACCORDANCE WITH MANUFACTURER'S REQUIREMENTS.

TYPICAL POST MOUNTED RACKING SYSTEM DETAIL

NOT TO SCALE

NOTES:
1. SET TREE PLUMB PRIOR TO STAKING OR GUYING.
2. THIS DETAILS ILLUSTRATES THE MINIMUM REQUIRED STAKING OR GUYING SYSTEM. PROVIDE ADDITIONAL STAKES OR GUYS IF REQUIRED DUE TO FIELD CONDITIONS OR SIZE OF TREE.
3. SET CROWN OF ROOT BALL 3" ABOVE FINISHED GRADE.



STAKING DETAIL
FOR USE WITH:
A. DECIDUOUS TREES UNDER 3" CALIPER.
B. DECIDUOUS TREES 3"–4 1/2" CALIPER WHEN PLANTED WITHIN 10' OF PEDESTRIAN WAYS.
C. EVERGREEN TREES UNDER 8' IN HEIGHT.
D. EVERGREEN TREES 8'–16' IN HEIGHT WHEN PLANTED WITHIN 10' OF PEDESTRIAN WAYS.

GUYING DETAIL
FOR USE WITH:
A. DECIDUOUS TREES 3"–4 1/2" CALIPER WHEN PLANTED GREATER THAN 10' OUTSIDE OF PEDESTRIAN WAYS.
B. DECIDUOUS TREE OVER 4 1/2" CALIPER.
C. EVERGREEN TREES 8'–16' IN HEIGHT WHEN PLANTED GREATER THAN 10' OUTSIDE OF PEDESTRIAN WAYS.
D. EVERGREEN TREES OVER 16' IN HEIGHT.

TREE PLANTING DETAIL

NOT TO SCALE

LANDSCAPE SCHEDULE

SYMBOL	BOTANICAL NAME	COMMON NAME	SIZE	QUANTITY	COMMENT
TREES AND SHRUBS					
THOC2	Thuja Standishii x Plicata	"Green Giant" Arborvitae	4'–5' Height	58	C.G.

PLANTING SPECIFICATIONS:

1. All materials and construction methods shall conform to the requirements of the Connecticut Association of Landscape Contractors Specification. All plants shall be nursery grown and conform to the latest edition of ANSI Z60.1, AMERICAN STANDARD FOR NURSERY STOCK and also the minimum guidelines established for nursery stock published by the American Association of Nurserymen, Inc.
2. No substitution of plant materials will be allowed without the prior written consent of the Project Owner. Where a plant size range is provided at least 50% of the plants shall be of the larger size.
3. All lawn and planting area soil preparation shall be fertilized and amended according to recommendations of a soil analysis provided by an approved soil testing laboratory.
4. All exterior ground areas disturbed by construction and not covered by buildings, structures, paving, continuous planting beds or other site improvements shall be graded, topsoiled to a minimum depth of 4" and grass seeded. Provide lawn development in all areas of selective clearing as directed.
5. All plant pits must be free draining. Break up the bottom of the hole by fork if necessary to ensure plant has proper drainage.
6. Set all plants in center of plant pits, plumb and straight and as detailed on the drawing. All plant material shall bear the same relationship to finished grade as to original planting grade prior to digging. Trees shall be planted with the junction of roots and stem level with finished grade.
7. Handle balled and burlapped plants from the ball only. Once positioned in the hole, remove the top 1/3 of the burlap from the root ball without disturbing the roots.
8. Face each plant to give the best appearance. Final location of plant material should be approved by the Project Owner in the field.
9. Fill plant pits 2/3 their depth with prepared planting mixture, water thoroughly and allow to settle. Complete back-filling, water thoroughly to eliminate any voids and air pockets. Provide additional back-fill as necessary to conform to required elevation and as detailed.
10. Form saucer and install mulch over entire plant pit and saucer area as detailed.
11. All tree staking or guying shall be completed immediately after planting, but in no instance more than 24 hours after planting. See staking/guying detail. At the completion of the maintenance period remove all stakes, flags, guys, tree wrap, and anchors.
12. Mulch all new shrub beds and plant pits to achieve a 3" depth after settlement. Mulch all ground cover beds to achieve a 2" depth after settlement. Mulch for saucers and planting areas to be a double shredded bark mulch.
13. All plants shall be guaranteed for a period of one full year after inspection and acceptance by the Owner's representative, and shall have at least 80% healthy growth at the end of the guarantee period.
14. Landscape planting materials as proposed by this plan are Connecticut native and/or non-invasive species. This landscape plan has been designed to incorporate species which are prolific in USDA plant hardiness zone 6b and which require minimal energy input for upkeep and maintenance. References utilized for Connecticut native and non-invasive species selection include the Connecticut Botanical Society, the Connecticut agricultural experiment station, the U.S. Department of Transportation Federal Highway Administration, 2004 Connecticut Stormwater Quality Manual, New England Wetland Plants, Inc., and other sources.

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714 Brook Street
Rocky Hill, CT 06067
www.solarcity.com

SolarCity Corporation
Proposed Solar Photovoltaic System
1240 Poquonnock Road
Groton, Connecticut
Site Details

SCALE: As Noted
DATE: October 2015
JOB I.D. NO. 15-2347

Revisions
Rev. A - Per Groton Utilities Comments - 12/09/15

SHEET NO.
10
10

Attachment 2 – Stormwater Management Report

John U. Faulise Jr. L.S.
James McNally, Jr., L.S.

David C. McKay, P.E.
Demian A. Sorrentino AICP, C.S.S.

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STORMWATER MANAGEMENT REPORT

PREPARED FOR:

SOLARCITY CORPORATION
DEVELOPMENT AND MANAGEMENT PLAN
GROTON RESERVOIR SOLAR PROJECT
1240 POQUONNOCK ROAD

GROTON, CONNECTICUT

OCTOBER 2015
(UPDATED DECEMBER 3, 2015)

PREPARED BY:

BOUNDARIES LLC

PROJECT I.D. NO. 15-2347

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Introduction

On behalf of SolarCity Corporation, Boundaries LLC has prepared the following stormwater management report for the proposed solar photovoltaic development to be located at 1240 Poquonnock Road in Groton, Connecticut. The proposed development consists of an approximately 4.1 MW DC solar photovoltaic development on open space adjacent to the Groton reservoir (three locations/mounting planes). This stormwater management report has been prepared to determine the potential for the proposed development to impact existing stormwater runoff patterns and flow rates. The proposed development makes use of low impact development techniques in order to limit the impacts to stormwater flow patterns and flow rates.

The new construction includes solar panels mounted on pole driven racking and electrical equipment installed on concrete pads. The mounting posts for the solar arrays will be pole driven approximately 8-feet into the ground. The existing gravel roadways and perimeter security fence will be utilized for this project thus minimizing land disturbance and construction impacts. The proposed project areas are shown on the Location Map included as Figure 1.

The primary purpose of this stormwater management report is to demonstrate how the proposed solar arrays may affect the existing runoff flow patterns. The proposed solar panel system is raised above grade by approximately 2-feet at its leading edge (lowest end). With the exception of selected areas to be cleared, and the installation of the pole driven supports and equipment pads, the proposed project area surfaces and terrain remain essentially unchanged. These low impact techniques will result in minimal impact on the runoff flow and flow patterns.

According to the Natural Resources Conservation Service (NRCS) Web Soil Survey the soils on the reservoir site are classified Haven and Enfield soils, 0 to 3% slopes. Haven and Enfield soils are classified as Hydrologic Soil Group B. The Soils Report is provided in Appendix A.

Existing and post-development conditions hydrographs were estimated using the hydrologic modeling program HydroCAD. The methodology selected was NRCS TR-20. Times of concentration were estimated using multiple segment flow paths as described in the NRCS TR-55 manual. The Type III 24-hour storm was analyzed under antecedent moisture condition two. HydroCAD modeling results are presented in Appendix B.

The regulated inland wetlands resource areas in the vicinity of the project were determined by Matthew Gustafson of All-Points Technology, a certified soil scientist. The wetland areas are primarily adjacent to the Groton Reservoir on the western side of the site and Smith Lake on the eastern side of the site. Two vernal pools were also identified in the wooded area east of Mounting Plane 2 and north of Mounting Plane 3. Buffer areas (defined by All-Points Technology) will be maintained between the proposed project areas and the wetland resource areas to minimize impacts to the regulated resources. For additional information regarding the locations of the regulated wetland resources within the project areas, please see Sheets 2 and 3 of the Proposed Site Development Plans included in Appendix C.

Existing Conditions

The proposed project area consists of approximately 13.5 acres of the 290.5-acre parcel that contains the Groton reservoir, water treatment plant, the existing Poquonnock Road electrical substation, transmission lines, and various parcels of open space. The property is zoned RS-20. The open space on the property consists of wooded areas and open fields mowed periodically by the Groton Utilities

Department. The property is adjacent to residential properties to the south and west, by Interstate 95 to the north, and by CT Route 117 and a church to the east. Existing conditions of the property are shown below.

Aerial Photograph of Project Area

During storm events, excess runoff flows overland from the Mounting Planes 1 and 2 to the Groton reservoir, or flows overland along the existing gravel road to the wooded areas to the east of the proposed solar arrays. Runoff from Mounting Plane 3 primarily flows overland to the adjacent properties owned by the City and Town of Groton to the south. A small portion of Mounting Plane 3 also flows overland to a wooded property to the east. Existing conditions sub-watersheds are shown on Figure 2. Existing conditions sub-watersheds were delineated using recent topographic survey data. Land uses were estimated based on site inspections, aerial photography and survey data.

Runoff Curve Numbers (CN) used for the existing conditions analysis are as follows: 61 (>75% grass cover) for the grassed areas in Hydrologic Soil Group B, 60 (woods with fair ground cover) for the wooded areas in Hydrologic Soil Group B, and 85 (gravel roads) for existing unpaved access drives and gravel/stone areas associated with the existing electrical utilities and substation.

The existing conditions sub-watersheds are described further below:

Drainage Area #1S (DA #1S)

This 5.1± acre drainage area encompasses the northern portion of Mounting Plane 1. The drainage area is comprised of dense grass and wooded areas. The weighted CN of the drainage area is 60. This area drains generally northwesterly via overland flow through the open field to the wooded area along the border of the Groton Reservoir. The drainage area is bounded by the reservoir to the north and west and the existing gravel access road and Smith Lake to the east.

Drainage Area #2S (DA #2S)

This 5.4± acre drainage area encompasses the southwestern portion of Mounting Plane 1 and the central and southern portions of Mounting Plane 2. The drainage area is comprised of dense grass with some isolated trees and a portion of the existing gravel access drive and electrical substation. The weighted CN of the drainage area is 62. This area drains generally westerly via overland flow through the open field to the reservoir. The drainage area is bounded by the reservoir to the west and the existing gravel access drive to the east.

Drainage Area #3S (DA #3S)

This 4.0± acre drainage area encompasses the southern portion of Mounting Plane 1and the northern portion of Mounting Plane 2. The drainage area is comprised of dense grass and a portion of the existing gravel access drive and electrical substation. The weighted CN of the drainage area is 64. This area drains generally southeasterly via overland flow along the existing transmission lines before entering the wooded area to the east.

Drainage Area #4S (DA #4S)

This 4.3± acre drainage area encompasses the majority of Mounting Plane 3. The drainage area is comprised of woods, some dense grass areas, and a portion of the existing gravel access drive and electrical substation. The weighted CN of the drainage area is 62. This area drains generally southerly via overland flow through the wooded areas before flowing off-site to the undeveloped properties to the south owned by the City and Town of Groton.

Drainage Area #5S (DA #5S)

This 0.4± acre drainage area encompasses the eastern portion of Mounting Plane 3. The drainage area is comprised of woods and some maintained grass areas. The weighted CN of the drainage area is 60. This area drains generally easterly via overland flow to the adjacent wooded property.

Existing conditions peak runoff rates were analyzed at the downgradient limits of the proposed development areas. The existing conditions peak runoff rates will be compared to the post-development peak runoff rates to determine the effect of the proposed development on existing stormwater runoff patterns. Existing conditions peak flow rates are summarized below in Tables 1 through 2. Detailed modeling results are included in Appendix B.

Table 1
Peak Runoff Rates – Mounting Planes 1 and 2 Existing Conditions

Storm Event	DA #1S (CFS)	DA #2S (CFS)	DA #3S (CFS)
2-Year	1.2	1.7	1.2
5-Year	2.8	3.5	2.3
10-Year	4.2	5.2	3.3
25-Year	5.8	7.0	4.4
50-Year	7.3	8.7	5.4
100-Year	9.4	11.0	6.8

Table 2
Peak Runoff Rates – Mounting Plane 3 Existing Conditions

Storm Event	DA #4S (CFS)	DA #5S (CFS)
2-Year	0.8	0.1
5-Year	1.7	0.2
10-Year	2.5	0.3
25-Year	3.4	0.4
50-Year	4.2	0.5
100-Year	5.3	0.7

Proposed Conditions

The proposed improvements to the site include the installation of solar panels mounted on steel posts driven into the ground and electrical equipment mounted on concrete pads. Additionally, approximately 3.9 acres of wooded areas will be cleared and seeded with grass to accommodate the solar arrays.

Installation of the solar arrays will consist of clearing the select wooded areas located within the project limits, seeding and mulching the disturbed areas, mowing the dense grass inside the proposed development areas, installing proposed metal racking posts, installing and anchoring the solar array panels to the racking system, and installing the necessary electrical equipment for harvesting power.

The stormwater analysis was conducted to determine if the proposed development would result in significant changes to existing flow patterns, water quality, or peak runoff rates. The design

incorporates measures for limiting disturbed areas and minimizing increases in new impervious area. Proposed impervious areas are limited to the steel posts for the proposed racking system, and the proposed electrical equipment pads. The existing gravel access drives will be utilized for access to the project area.

The W8X10 steel posts each cover 2.96 square inches (0.02 square feet) and they are spaced approximately 16 feet along each row of solar arrays. The proposed concrete equipment pads are approximately 20 feet by 20 feet and cover approximately 400 square feet each. The changes in impervious areas and CN values for each drainage area as a result of the proposed development are presented below in Table 3 – Impervious Area Summary. The increases in CN values are primarily due to the clearing required to install the proposed solar arrays.

Table 3
Impervious Area Summary

Drainage Area	Proposed Racking System (SF)	Proposed Concrete Pads (SF)	Total Proposed Impervious Area (SF)	Total Watershed Area (SF)	CN (Pre)	CN (Post)
DA #1S-A	0	0	0	0	60	57
DA #1S-B	8	0	8	221,024	60	61
DA #2S-A	0	0	0	0	62	61
DA #2S-B	4	800	804	235,573	62	62
DA #3S	4	800	804	174,284	64	64
MP-1/2 Total	**16**	**1,600**	**1,616**	**630,881**	**62**	**62**
DA #4S	7	400	407	187,084	62	63
DA #5S	1	0	1	18,251	60	61
MP-3 Total	**8**	**400**	**408**	**205,335**	**62**	**63**

Proposed conditions sub-watersheds are shown on Figure 3. Proposed conditions sub-watersheds were delineated using topographic survey data. Land uses were estimated based on site inspections and by using the proposed site development plan.

Runoff Curve Numbers (CN) used for the proposed conditions analysis are as follows: 61 (>75% grass cover) for the grassed areas (solar array areas) in Hydrologic Soil Group B, 60 (woods with fair ground cover) for wooded areas in Hydrologic Soil Group B, 85 (gravel roads) for existing unpaved access drives and gravel/stone areas associated with the existing electrical utilities and substation, and 98 (impervious) for solar array posts and concrete equipment pads.

The proposed improvements to the existing conditions sub-watersheds are described further below:

Drainage Area #1S-A (DA #1S-A)

DA #1S-A consists of the approximately 1.3 acres of undisturbed land between the reservoir and the proposed water quality swale. This area is partially wooded and has a dense grass cover in non-wooded areas. The weighted CN of the drainage area is 57. The drainage area is bounded by the reservoir to the north and west and the proposed water quality swale to the south and east. The existing runoff flow paths will not be affected by the proposed development as there is no proposed grading of the area.

Drainage Area #1S-B (DA #1S-B)

Approximately 1.8 acres of the existing wooded area (2.6 acres in total) will be cleared, seeded with grass, and mulched prior to construction. The remaining area will be mowed prior to construction. The proposed improvements to this drainage area include the installation of approximately 372 posts (8 square feet) for the proposed racking system. The posts are spaced at approximately 16 feet along the proposed solar arrays and will support the solar modules. The weighted CN of the drainage area is 61. This area drains generally northwesterly via overland flow through the open field to the proposed water quality swale at the limit of the solar arrays. There is a decrease in the time of concentration travel time in comparison to existing conditions due to the clearing required for installation of the solar modules in this area. The result of the shorter travel time is an increase in peak runoff rates. In order to attenuate the peak runoff rates and provide treatment of the stormwater runoff the water quality swale will collect runoff in bio-filtration cells at the low points. The bio-filtration cells will overflow to the reservoir through vegetated swales during inundated conditions. The drainage area is bounded by the water quality swale to the north and west and the existing gravel access road and Smith Lake to the east. The existing runoff flow paths will not be affected by the proposed development as there is no proposed grading of the site, other than the construction of the water quality swale. The proposed water quality swale/bio-filtration cells will result in the reduction in peak runoff rates.

Drainage Area #2S-A (DA #2S-A)

DA #2S-A consists of the approximately 1.0 acres of undisturbed land between the reservoir and the proposed water quality swale. The area consists of a dense grass cover. The weighted CN of the drainage area is 61. The drainage area is bounded by the reservoir to the west and the proposed water quality swale to the east. The existing runoff flow paths will not be affected by the proposed development as there is no proposed grading of the area.

Drainage Area #2S-B (DA #2S-B)

In Drainage Area #2S-B, individual trees will be cleared and the minor disturbed areas will be seeded and mulched prior to construction. The grassed area will be mowed prior to construction. The proposed improvements to this drainage area include the installation of approximately 167 posts (4 square feet) for the proposed racking system. The posts are spaced at approximately 16 feet along the proposed solar arrays and will support the solar modules. Two 20 foot by 20 foot concrete equipment pads will also be constructed in this area. The weighted CN of the drainage area is 62. This area drains generally westerly via overland flow through the open field to the water quality swale. The drainage area is bounded by the water quality swale to the west and the existing gravel access drive to the east. In order to provide treatment of the stormwater runoff the water quality swale will collect runoff in bio-filtration cells at the low points. The bio-filtration cells will overflow to the reservoir through vegetated swales during inundated conditions. The existing runoff flow paths will not be affected by the proposed development given there is no proposed grading of the site, other than the construction of the proposed water quality swale.

Drainage Area #3S (DA #3S)

In Drainage Area #3S, individual trees will be cleared and the minor disturbed areas will be seeded and mulched prior to construction. The grassed area will be mowed prior to construction. The proposed improvements to this drainage area include the installation of approximately 211 posts (4 square feet) for the proposed racking system. The posts are spaced at approximately 16 feet along the proposed solar arrays and will support the solar modules. Two 20 foot by 20 foot concrete

equipment pads will also be constructed in this area. The weighted CN of the drainage area is 64. This area drains generally southeasterly via overland flow along the existing transmission lines before entering the existing wooded area to the east. The existing runoff flow paths will not be affected by the proposed development given there is no proposed grading of the site.

Drainage Area #4S (DA #4S)

Approximately 1.9 acres of the existing wooded area (2.2 acres in total) will be cleared, seeded with grass, and mulched prior to construction. The remaining area will be mowed prior to construction. The proposed improvements to this drainage area include the installation of approximately 331 posts (7 square feet) for the proposed racking system. The posts are spaced at approximately 16 feet along the proposed solar arrays and will support the solar modules and wiring. One 20 foot by 20 foot concrete equipment pad will also be constructed in this area. The weighted CN of the drainage area is 63. This area drains generally southerly via overland flow through the proposed solar array areas before flowing off-site to the undeveloped properties to the south owned by the City and Town of Groton. There is a decrease in the time of concentration travel time in comparison to existing conditions due to the clearing required for installation of the solar modules in this area. The result of the shorter travel time is an increase in peak runoff rates. In order to dissipate the concentrated flow of runoff and reduce the flow velocities, a crushed stone check dam/berm will be constructed along the downgradient edge of the solar array area in the areas to be cleared. The check dam results in a longer time of concentration travel time and reduces the peak runoff rates from the cleared areas. The existing runoff flow paths will not be affected by the proposed development as there is no proposed grading of the site. The proposed stone check dam will result in the reduction in peak runoff rates.

Drainage Area #5S (DA #5S)

The approximately 0.2 acres of woods in the area will be cleared, seeded with grass, and mulched prior to construction. The remaining area will be mowed prior to construction. The proposed improvements to this drainage area include the installation of approximately 36 posts (1 square foot) for the proposed racking system. The posts are spaced at approximately 16 feet along the proposed solar arrays and will support the solar modules. The weighted CN of the drainage area is 61. This area drains generally easterly via overland flow to the adjacent wooded property. The existing runoff flow paths will not be affected by the proposed development as there is no proposed grading of the site.

Proposed conditions peak flow rates were analyzed at the down-gradient limit of the proposed development areas as there are no existing stormwater management systems in place on these sites and runoff flows overland. The change in peak runoff rates as a result of the proposed improvements are summarized below in Tables 4 and 5. Detailed modeling results are included in Appendix B.

Table 4
Peak Runoff Rates – Mounting Planes 1 and 2 Post-Development vs. Pre-Development

	DA #1S-A/B			DA #2S-A/B			DA #3S		
Storm Event	Post (CFS)	Pre (CFS)	Change (CFS)	Post (CFS)	Pre (CFS)	Change (CFS)	Post (CFS)	Pre (CFS)	Change (CFS)
2-Year	1.2	1.2	+0.0	1.6	1.7	-0.1	1.2	1.2	+0.0
5-Year	2.7	2.8	-0.1	3.3	3.5	-0.2	2.3	2.3	+0.0
10-Year	4.1	4.1	+0.0	4.8	5.2	-0.4	3.3	3.3	+0.0
25-Year	5.6	5.8	-0.2	6.5	7.0	-0.5	4.4	4.4	+0.0
50-Year	6.9	7.3	-0.4	8.1	8.7	-0.6	5.4	5.4	+0.0
100-Year	8.9	9.4	-0.5	10.3	11.0	-0.7	6.8	6.8	+0.0

Table 5
Peak Runoff Rates –Mounting Plane 3 Post-Development vs. Pre-Development

	DA #4S			DA #5S		
Storm Event	Post (CFS)	Pre (CFS)	Change (CFS)	Post (CFS)	Pre (CFS)	Change (CFS)
2-Year	0.8	0.8	+0.0	0.1	0.1	+0.0
5-Year	1.6	1.7	-0.1	0.2	0.2	+0.0
10-Year	2.4	2.5	-0.1	0.3	0.3	+0.0
25-Year	3.2	3.4	-0.2	0.5	0.4	+0.1
50-Year	4.0	4.2	-0.2	0.6	0.5	+0.1
100-Year	5.0	5.3	-0.3	0.7	0.7	+0.0

Due to the minimal impervious area increase associated with the proposed post mounted solar arrays there is a very limited impact on the post-development CN values. The peak flow rates are impacted more by the reduced times of concentrations and the limited clearing associated with the project than as a result in the minimal increases in impervious areas. To mitigate the effects of the change in surface conditions the following measures have been included in the proposal:

- A water quality swale is proposed between DA #1S-B (Mounting Plane 1) and DA #2S-B (Mounting Plane 2) and the reservoir. The swale will collect the runoff in small bio-filtration cells, reducing velocities and providing treatment of runoff. Runoff will be discharged through vegetated overflow channels constructed at low points along the swale.
- A crushed stone check dam is proposed south of DA #4S (Mounting Plane 3) to dissipate the concentrated runoff flow and increase the travel times, resulting in an attenuation of peak runoff rates.

As presented above, the proposed low impact development has extremely limited effects on peak runoff rates.

Runoff from DA #5S increases slightly as a result of the proposed development, as presented above in Table 5. Runoff from this drainage area currently flows overland to an adjacent wooded buffer along an existing parking lot. Due to the wooded cover in the area of off-site overland flow and the lack of an existing stormwater management system point discharge, and current conditions being maintained and essentially unchanged, it is believed that the minimal increases in peak flow rates should not negatively impact down gradient areas. Additionally, the decreases in peak runoff rates from DA #4S result in a net decrease in peak runoff rates from the Mounting Plane 3 development area when viewed as a whole.

The stormwater management system is also required to treat the runoff from the proposed impervious areas. The two proposed stormwater mitigation measures described above meet the treatment requirements as described in the 2004 DEP Stormwater Quality Manual. The required groundwater recharge volume and water quality volume is 397 cubic feet. The calculations of the treatment volumes are included in Appendix B.

- The proposed bio-filtration cells in the water quality swale will provide the storage capacity to meet the requirements for both the water quality volume for pollutant reduction as well as groundwater recharge. The volume calculations for the proposed bio-filtration cells are included in Appendix B. Approximately 55 cubic feet of storage is provided per bio-filtration cell, for a total of approximately 495 cubic feet of retention.
- The proposed crushed stone check dam will be embedded into the existing grade to provide the storage capacity to meet the requirements for both the water quality volume for pollutant reduction as well as groundwater recharge. The volume calculations for the proposed check dam is included in Appendix B. Approximately 150 cubic feet of retention is provided.

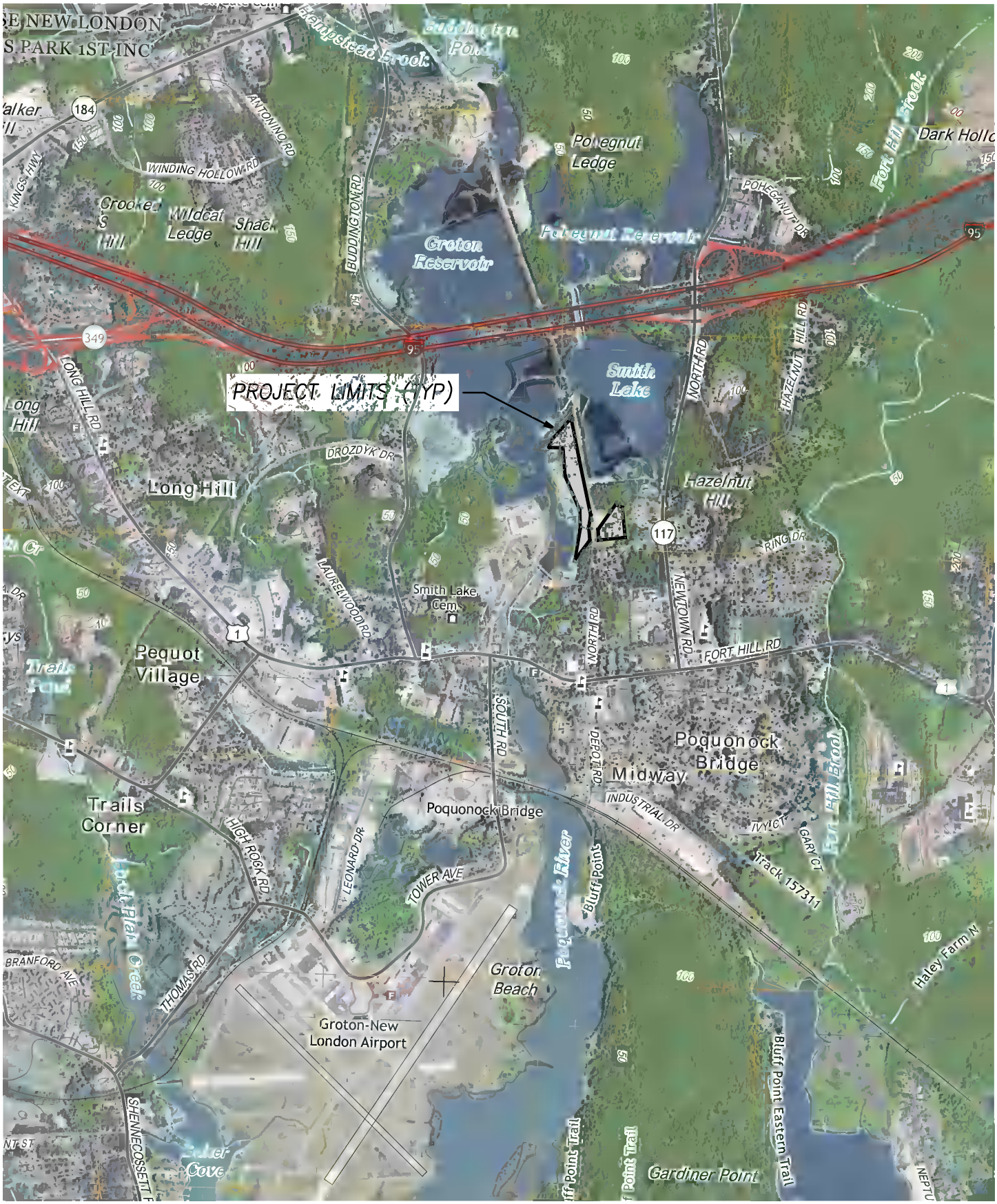
Because the total amount of runoff retained on-site (645 cubic feet) exceeds the required volume of 397 cubic feet the proposed stormwater treatment measures are sufficient to offset the minimal increases in impervious area associated with the project.

Summary

As discussed above the proposed development has been expressly designed to limit the impacts to existing stormwater runoff flow rates and patterns. The existing runoff flow paths will be maintained and while there are minor modeled increases in some peak runoff rates from the existing sites, we are confident that they should not have a negative impact on down gradient areas.

The proposed improvements are shown on plans titled “Poquonnock Road Solar Project, Development and Management Plan, Prepared for SolarCity Corporation, 1240 Poquonnock Road, Groton, Connecticut, September 2015, Job I.D. No. 15-2347, Cover Sheet through Sheet 10 of 10” prepared by Boundaries LLC.

Figures



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179 Pachaug River Drive, Griswold, CT 06351
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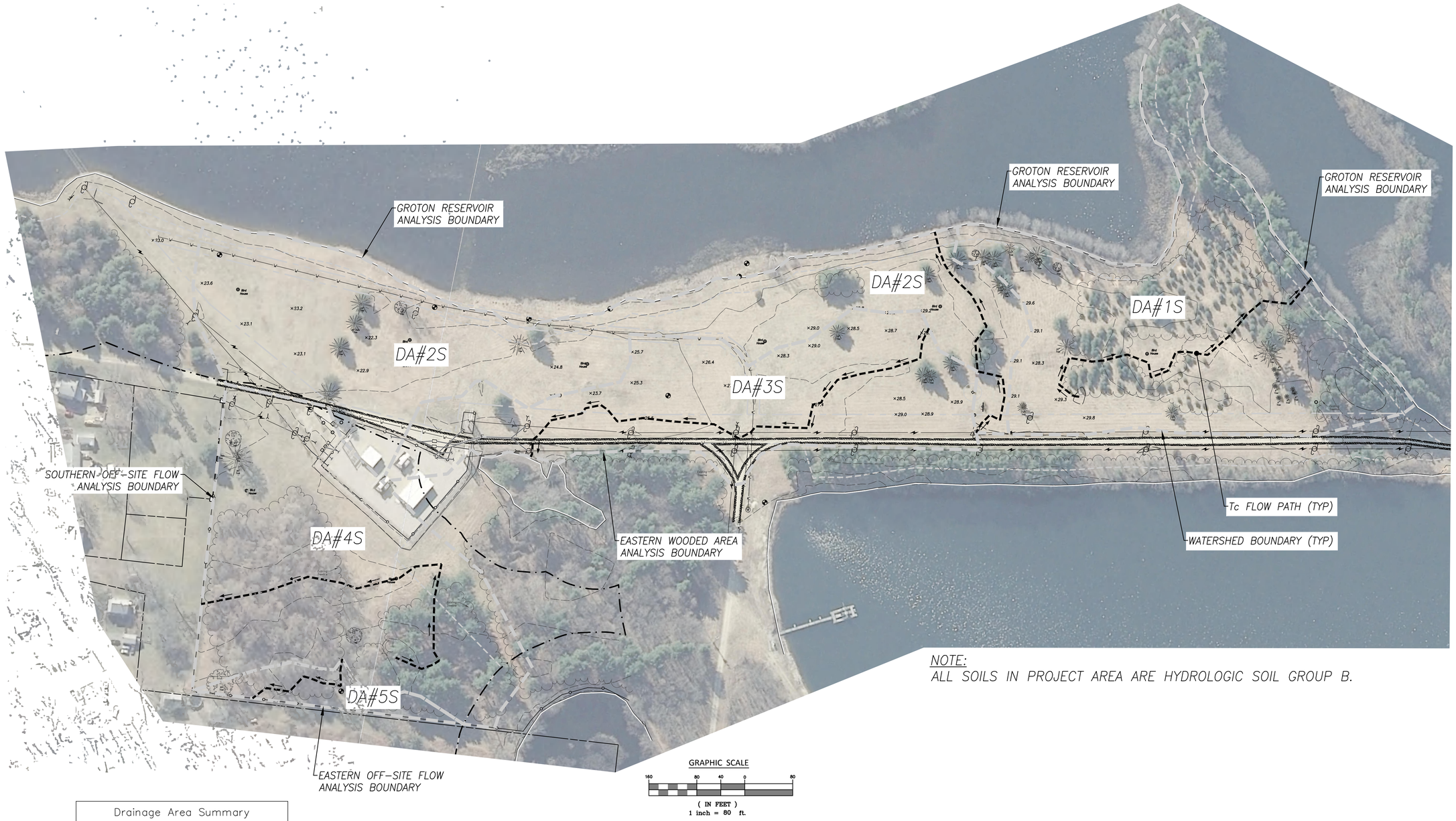
Location Map
(New London Quad)
SolarCity Corporation
1240 Poquonnock Road, Groton, CT

SCALE:	1"=2,000'
DATE:	September 2015
JOB NO.	15-2347
FIGURE	1



NOTE:
ALL SOILS IN PROJECT AREA ARE HYDROLOGIC SOIL GROUP B.

GRAPHIC SCALE
160 80 40 0 80
(IN FEET)
1 inch = 80 ft.

Drainage Area Summary			
NAME	AREA (Acres)	Weighted CN Value	Tc Time (Minutes)
DA #1S	5.07	60	25.2
DA #2S	5.41	62	24.6
DA #3S	4.00	64	42.6
AREA 1 TOTAL	14.48	62	--
DA #4S	4.30	62	64.9
DA #5S	0.42	60	34.7
AREA 2 TOTAL	4.72	62	--

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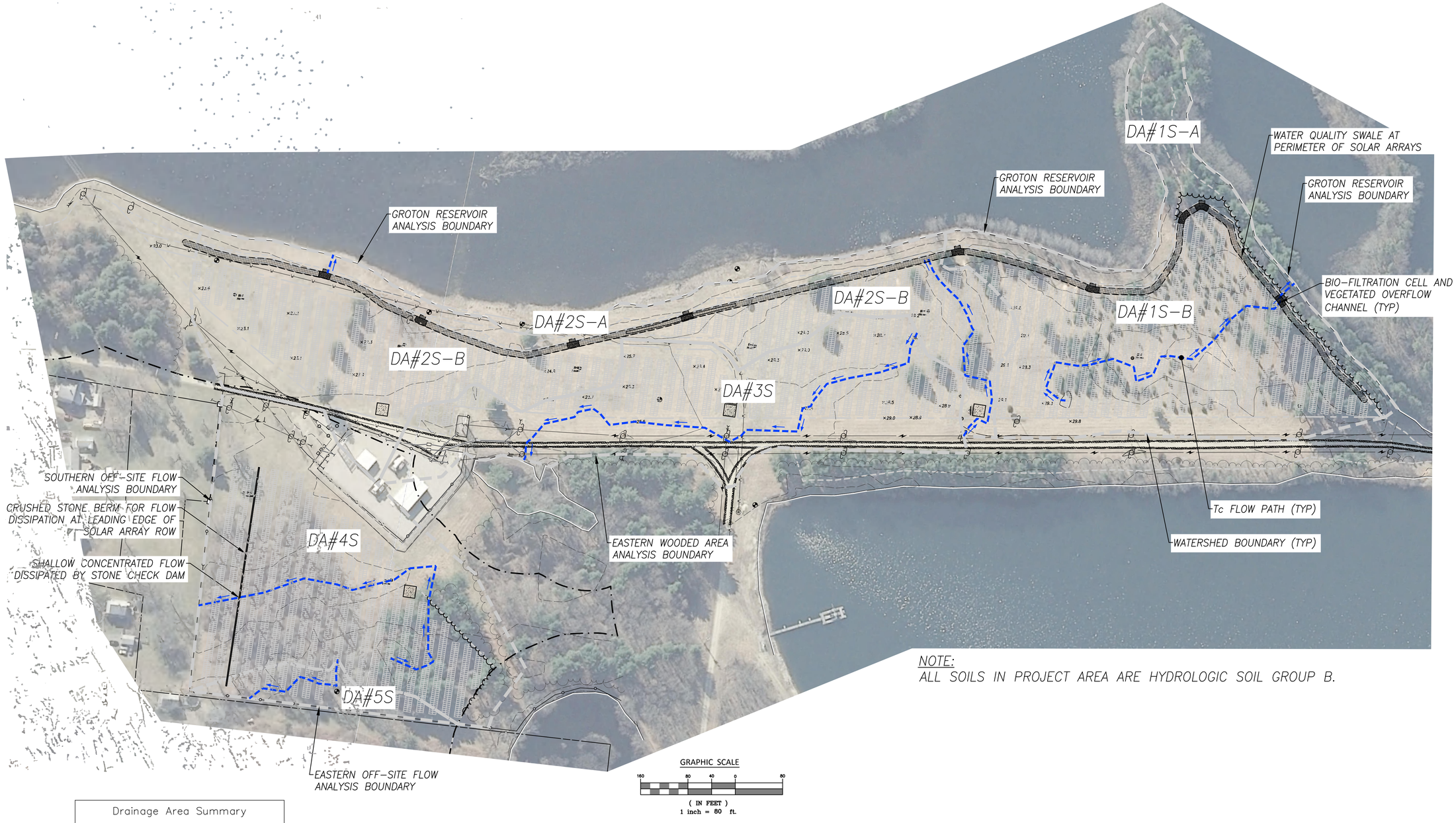
Figure 2
"Pre-Development Conditions Watershed Map"
SolarCity Corporation
1240 Poquonnock Road, Groton, Connecticut

SCALE: 1"=80'
DATE: September 2015
JOB I.D. NO. 15-2347
Revisions

SHEET NO.
1
2



NOTE:
ALL SOILS IN PROJECT AREA ARE HYDROLOGIC SOIL GROUP B.

Drainage Area Summary

NAME	AREA (Acres)	Weighted CN Value	Tc Time (Minutes)
DA #1S-A	1.30	57	4.6
DA #1S-B	3.77	61	24.8
DA #2S-A	1.00	61	4.2
DA #2S-B	4.41	62	24.8
DA #3S	4.00	64	42.6
AREA 1 TOTAL	14.48	62	--
DA #4S	4.30	63	75.0
DA #5S	0.42	61	30.4
AREA 2 TOTAL	4.72	63	--

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Figure 3
"Post-Development Conditions Watershed Map"
SolarCity Corporation
1240 Poquonnock Road, Groton, Connecticut

SCALE: 1"=80'
DATE: September 2015
JOB I.D. NO. 15-2347
Revisions

SHEET NO.
2
2

Appendix A
NRCS Web Soil Survey Soils Report

United States Department of Agriculture

NRCS

Natural Resources Conservation Service

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

Custom Soil Resource Report for State of Connecticut

August 12, 2015

Preface

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

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

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

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

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

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

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Contents

How Soil Surveys Are Made

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

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

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

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

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

individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

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

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

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

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

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

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

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

Custom Soil Resource Report
Soil Map

Map Scale: 1:4,310 if printed on A portrait (8.5" x 11") sheet.

N

Meters
0 50 100 200 300

Feet
0 200 400 800 1200

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 1:12,000.

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: http://websoilsurvey.nrcs.usda.gov
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: State of Connecticut
Survey Area Data: Version 13, Oct 28, 2014

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

Date(s) aerial images were photographed: Mar 28, 2011—May 12, 2011

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

State of Connecticut (CT600)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
32A	Haven and Enfield soils, 0 to 3 percent slopes	25.8	91.2%
306	Udorthents-Urban land complex	0.1	0.5%
W	Water	2.4	8.3%
Totals for Area of Interest		**28.3**	**100.0%**

Map Unit Descriptions

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

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

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

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If

intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

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

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

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

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

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

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

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

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

State of Connecticut

32A—Haven and Enfield soils, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 9lmr
Elevation: 0 to 1,200 feet
Mean annual precipitation: 43 to 54 inches
Mean annual air temperature: 45 to 55 degrees F
Frost-free period: 140 to 185 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Haven and similar soils: 60 percent
Enfield and similar soils: 25 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Haven

Setting

Landform: Outwash plains, terraces
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Coarse-loamy eolian deposits over sandy and gravelly glaciofluvial deposits derived from granite and/or schist and/or gneiss

Typical profile

Ap - 0 to 7 inches: silt loam
Bw1 - 7 to 14 inches: silt loam
Bw2 - 14 to 20 inches: silt loam
BC - 20 to 24 inches: fine sandy loam
2C - 24 to 60 inches: stratified very gravelly sand to gravelly fine sand

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Low (about 5.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 1
Hydrologic Soil Group: B

Description of Enfield

Setting

Landform: Outwash plains, terraces
Down-slope shape: Convex

Across-slope shape: Linear
Parent material: Coarse-silty eolian deposits over sandy and gravelly glaciofluvial deposits derived from granite and/or schist and/or gneiss

Typical profile

O - 0 to 3 inches: slightly decomposed plant material
O - 3 to 4 inches: moderately decomposed plant material
Ap - 4 to 12 inches: silt loam
Bw1 - 12 to 20 inches: silt loam
Bw2 - 20 to 26 inches: silt loam
Bw3 - 26 to 30 inches: silt loam
2C - 30 to 37 inches: stratified coarse sand to very gravelly loamy sand
3C - 37 to 65 inches: stratified very gravelly coarse sand to loamy sand

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Moderate (about 6.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 1
Hydrologic Soil Group: B

Minor Components

Agawam

Percent of map unit: 4 percent
Landform: Outwash plains, terraces
Down-slope shape: Linear
Across-slope shape: Linear

Branford

Percent of map unit: 3 percent
Landform: Outwash plains, terraces
Down-slope shape: Linear
Across-slope shape: Linear

Raypol

Percent of map unit: 2 percent
Landform: Depressions, drainageways
Down-slope shape: Concave
Across-slope shape: Concave

Ninigret

Percent of map unit: 2 percent
Landform: Outwash plains, terraces
Down-slope shape: Linear
Across-slope shape: Concave

Unnamed, gravelly surface
Percent of map unit: 2 percent

Tisbury
Percent of map unit: 2 percent
Landform: Outwash plains, terraces
Down-slope shape: Concave
Across-slope shape: Linear

306—Udorthents-Urban land complex

Map Unit Setting
National map unit symbol: 9lmg
Elevation: 0 to 2,000 feet
Mean annual precipitation: 43 to 56 inches
Mean annual air temperature: 45 to 55 degrees F
Frost-free period: 120 to 185 days
Farmland classification: Not prime farmland

Map Unit Composition
Udorthents and similar soils: 50 percent
Urban land: 35 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Udorthents

Setting
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Drift

Typical profile
A - 0 to 5 inches: loam
C1 - 5 to 21 inches: gravelly loam
C2 - 21 to 80 inches: very gravelly sandy loam

Properties and qualities
Slope: 0 to 25 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Very low to high (0.00 to 1.98 in/hr)
Depth to water table: About 54 to 72 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Moderate (about 6.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: B

Description of Urban Land

Typical profile

H - 0 to 6 inches: material

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8
Hydrologic Soil Group: D

Minor Components

Unnamed, undisturbed soils

Percent of map unit: 8 percent

Udorthents, wet substratum

Percent of map unit: 5 percent
Down-slope shape: Convex
Across-slope shape: Linear

Rock outcrop

Percent of map unit: 2 percent

W—Water

Map Unit Composition

Water: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Soil Information for All Uses

Soil Properties and Qualities

The Soil Properties and Qualities section includes various soil properties and qualities displayed as thematic maps with a summary table for the soil map units in the selected area of interest. A single value or rating for each map unit is generated by aggregating the interpretive ratings of individual map unit components. This aggregation process is defined for each property or quality.

Soil Qualities and Features

Soil qualities are behavior and performance attributes that are not directly measured, but are inferred from observations of dynamic conditions and from soil properties. Example soil qualities include natural drainage, and frost action. Soil features are attributes that are not directly part of the soil. Example soil features include slope and depth to restrictive layer. These features can greatly impact the use and management of the soil.

Hydrologic Soil Group

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

A

A/D

B

B/D

C

C/D

D

Not rated or not available

Soil Rating Lines

A

A/D

B

B/D

C

C/D

D

Not rated or not available

Soil Rating Points

A

A/D

B

B/D

C

C/D

D

Not rated or not available

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 1:12,000.

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: http://websoilsurvey.nrcs.usda.gov
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: State of Connecticut
Survey Area Data: Version 13, Oct 28, 2014

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

Date(s) aerial images were photographed: Mar 28, 2011—May 12, 2011

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.

Table—Hydrologic Soil Group

Hydrologic Soil Group— Summary by Map Unit — State of Connecticut (CT600)				
Map unit symbol	**Map unit name**	**Rating**	**Acres in AOI**	**Percent of AOI**
32A	Haven and Enfield soils, 0 to 3 percent slopes	B	25.8	91.2%
306	Udorthents-Urban land complex	B	0.1	0.5%
W	Water		2.4	8.3%
Totals for Area of Interest			**28.3**	**100.0%**

Rating Options—Hydrologic Soil Group

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

References

American Association of State Highway and Transportation Officials (AASHTO). 2004. Standard specifications for transportation materials and methods of sampling and testing. 24th edition.

American Society for Testing and Materials (ASTM). 2005. Standard classification of soils for engineering purposes. ASTM Standard D2487-00.

Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. Classification of wetlands and deep-water habitats of the United States. U.S. Fish and Wildlife Service FWS/OBS-79/31.

Federal Register. July 13, 1994. Changes in hydric soils of the United States.

Federal Register. September 18, 2002. Hydric soils of the United States.

Hurt, G.W., and L.M. Vasilas, editors. Version 6.0, 2006. Field indicators of hydric soils in the United States.

National Research Council. 1995. Wetlands: Characteristics and boundaries.

Soil Survey Division Staff. 1993. Soil survey manual. Soil Conservation Service. U.S. Department of Agriculture Handbook 18. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_054262

Soil Survey Staff. 1999. Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys. 2nd edition. Natural Resources Conservation Service, U.S. Department of Agriculture Handbook 436. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053577

Soil Survey Staff. 2010. Keys to soil taxonomy. 11th edition. U.S. Department of Agriculture, Natural Resources Conservation Service. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053580

Tiner, R.W., Jr. 1985. Wetlands of Delaware. U.S. Fish and Wildlife Service and Delaware Department of Natural Resources and Environmental Control, Wetlands Section.

United States Army Corps of Engineers, Environmental Laboratory. 1987. Corps of Engineers wetlands delineation manual. Waterways Experiment Station Technical Report Y-87-1.

United States Department of Agriculture, Natural Resources Conservation Service. National forestry manual. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/home/?cid=nrcs142p2_053374

United States Department of Agriculture, Natural Resources Conservation Service. National range and pasture handbook. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/landuse/rangepasture/?cid=stelprdb1043084

United States Department of Agriculture, Natural Resources Conservation Service. National soil survey handbook, title 430-VI. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/scientists/?cid=nrcs142p2_054242

United States Department of Agriculture, Natural Resources Conservation Service. 2006. Land resource regions and major land resource areas of the United States, the Caribbean, and the Pacific Basin. U.S. Department of Agriculture Handbook 296. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053624

United States Department of Agriculture, Soil Conservation Service. 1961. Land capability classification. U.S. Department of Agriculture Handbook 210. http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_052290.pdf

Appendix B
HydroCAD Modeling Results

Groundwater Recharge Volume

GRV = (D)(A)(I)/12

GRV = Groundwater Recharge Volume (acre-feet)

D = Depth of Runoff to be Recharged (inches)

A = Site Area (acres)

I = Post-Development Imperviousness (decimal)

D=	0.25	inches*	IA=	0.05	acres
A =	13.50	acres	I =	0.0034	

*(HSG B from Table 7-4, Stormwater Quality Manual)

GRV =	0.0010	acre-feet
=	**42.17**	**cubic feet**

Water Quality Volume

WQV = (1")(R)(A)/12

WQV = Water Quality Volume (acre-feet)

R = Runoff Co-Efficient = 0.005 + 0.009(I)

I = Impervious Area (%)

A = Site Area (acres)

IA=	0.05	acres	R =	0.01	
I =	0.34	%	A =	13.50	

WQV =	0.0091	acre-feet
=	**396.83**	**cubic feet**

Required Treatment Volume

Embedment of crushed stone check dam is sized to treat both the GRV and the WQV.

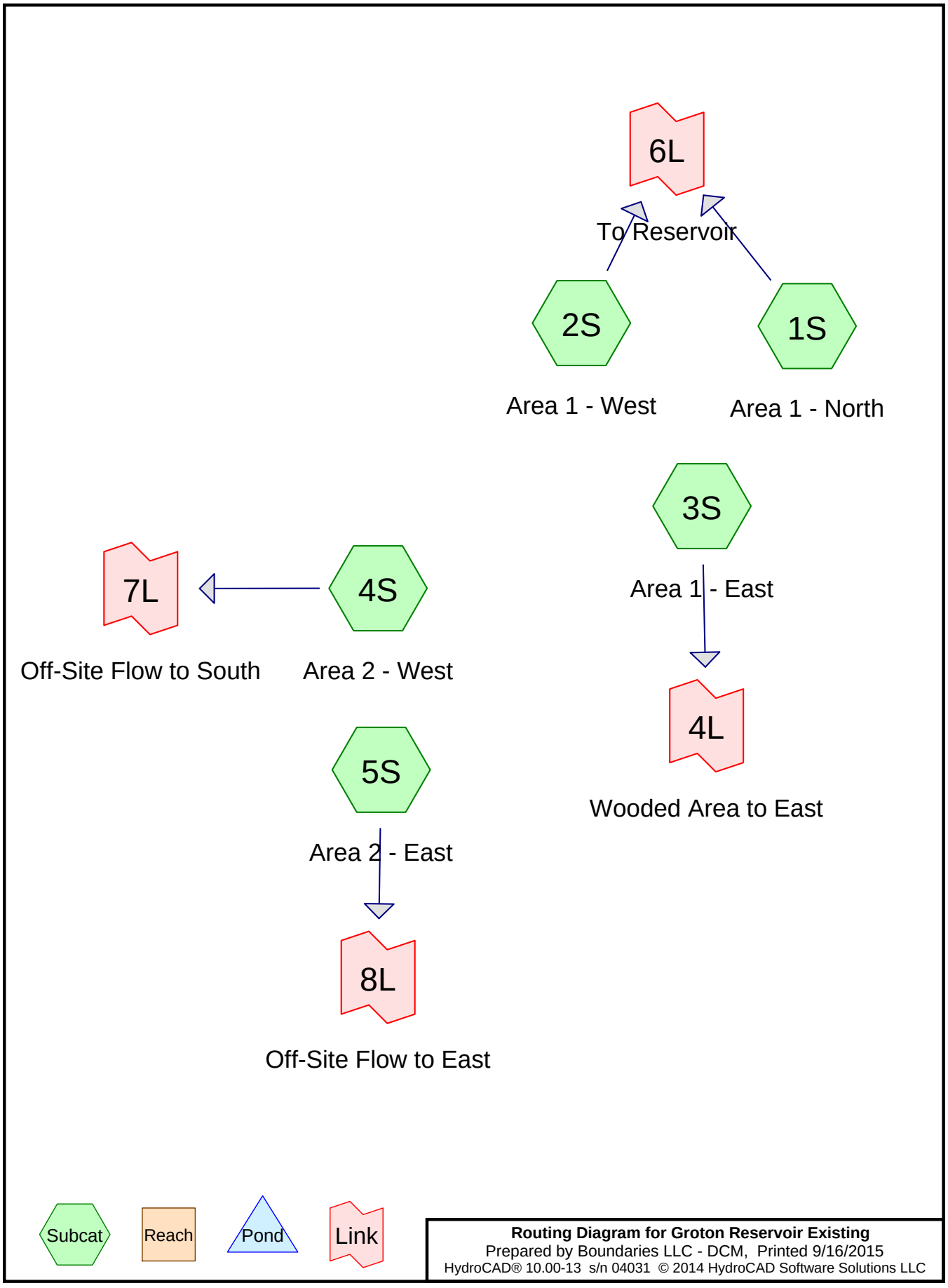
WQV requirements are reduced by the amount of GRV provided.

Required treatment volume = (WQV - GRV) + GRV

Volume Required	**396.83**	**cubic feet**
Length of Check Dam	**374.00**	**feet**
Width of Check Dam	**2.00**	**feet**
Embedment of Check Dam	**0.50**	**feet**
Porosity of Crushed Stone	**0.40**	
Volume Provided	**149.60**	**cubic feet**
Length of Biofiltration Cell	**20.00**	**feet**
Width of Biofiltration Cell	**4.00**	**feet**
Depth of Biofiltration Cell	**0.50**	**feet**
Side Slopes of Biofiltration Cell	**3H:1V**	
Volume of Biofiltration Cell	**55.00**	**cubic feet**
Number of Biofiltration Cells	**9.00**	
Volume Provided	**495**	**cubic feet**
Total Volume Provided	**644.60**	**cubic feet**

Because volume provided exceeds volume required the design meets the requirements of the Stormwater Quality Manual.

Existing Conditions Results



Routing Diagram for Groton Reservoir Existing
Prepared by Boundaries LLC - DCM, Printed 9/16/2015

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
13.174	61	>75% Grass cover, Good, HSG B (1S, 2S, 3S, 4S, 5S)
0.988	85	Gravel roads, HSG B (2S, 3S, 4S)
5.035	60	Woods, Fair, HSG B (1S, 2S, 4S, 5S)
19.197	**62**	**TOTAL AREA**

Soil Listing (all nodes)

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

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	13.174	0.000	0.000	0.000	13.174	>75% Grass cover, Good	1S, 2S, 3S, 4S, 5S
0.000	0.988	0.000	0.000	0.000	0.988	Gravel roads	2S, 3S, 4S
0.000	5.035	0.000	0.000	0.000	5.035	Woods, Fair	1S, 2S, 4S, 5S
0.000	**19.197**	**0.000**	**0.000**	**0.000**	**19.197**	**TOTAL AREA**	

Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1S: Area 1 - North Runoff Area=5.074 ac 0.00% Impervious Runoff Depth>0.48"
Flow Length=596' Tc=25.2 min CN=60 Runoff=1.2 cfs 0.205 af

Subcatchment 2S: Area 1 - West Runoff Area=5.408 ac 0.00% Impervious Runoff Depth>0.56"
Flow Length=437' Tc=24.6 min CN=62 Runoff=1.7 cfs 0.254 af

Subcatchment 3S: Area 1 - East Runoff Area=4.001 ac 0.00% Impervious Runoff Depth>0.65"
Flow Length=831' Tc=42.6 min CN=64 Runoff=1.2 cfs 0.215 af

Subcatchment 4S: Area 2 - West Runoff Area=4.295 ac 0.00% Impervious Runoff Depth>0.56"
Flow Length=662' Tc=64.9 min CN=62 Runoff=0.8 cfs 0.199 af

Subcatchment 5S: Area 2 - East Runoff Area=0.419 ac 0.00% Impervious Runoff Depth>0.48"
Flow Length=214' Tc=34.7 min CN=60 Runoff=0.1 cfs 0.017 af

Link 4L: Wooded Area to East Inflow=1.2 cfs 0.215 af
Primary=1.2 cfs 0.215 af

Link 6L: To Reservoir Inflow=2.9 cfs 0.459 af
Primary=2.9 cfs 0.459 af

Link 7L: Off-Site Flow to South Inflow=0.8 cfs 0.199 af
Primary=0.8 cfs 0.199 af

Link 8L: Off-Site Flow to East Inflow=0.1 cfs 0.017 af
Primary=0.1 cfs 0.017 af

Total Runoff Area = 19.197 ac Runoff Volume = 0.890 af Average Runoff Depth = 0.56"
100.00% Pervious = 19.197 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment 1S: Area 1 - North

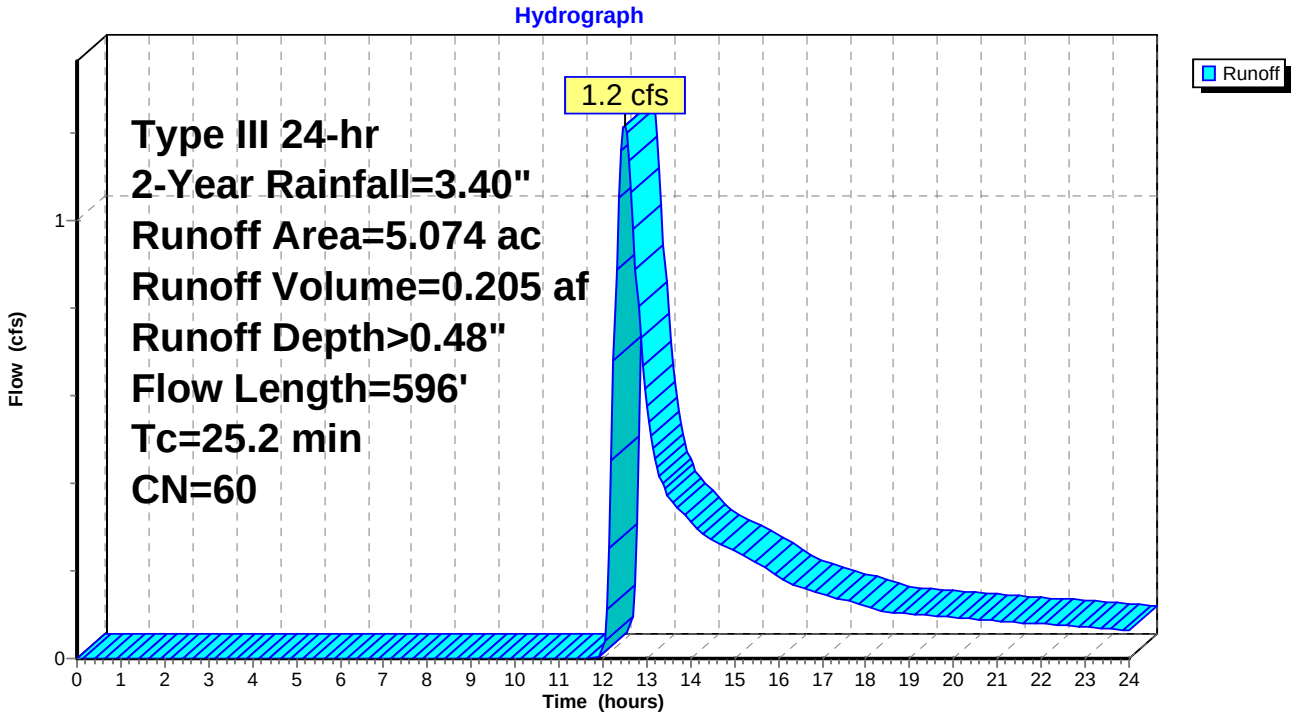
Runoff = 1.2 cfs @ 12.48 hrs, Volume= 0.205 af, Depth> 0.48"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.40"

Area (ac)	CN	Description
2.589	60	Woods, Fair, HSG B
2.485	61	>75% Grass cover, Good, HSG B
5.074	60	Weighted Average
5.074		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.5	100	0.0177	0.11		**Sheet Flow, Grass and Trees** Grass: Dense n= 0.240 P2= 3.40"
1.0	40	0.0085	0.65		**Shallow Concentrated Flow, Grass and Trees** Short Grass Pasture Kv= 7.0 fps
0.3	32	0.0625	1.75		**Shallow Concentrated Flow, Grass and Trees** Short Grass Pasture Kv= 7.0 fps
2.9	143	0.0140	0.83		**Shallow Concentrated Flow, Grass** Short Grass Pasture Kv= 7.0 fps
5.2	211	0.0095	0.68		**Shallow Concentrated Flow, Grass** Short Grass Pasture Kv= 7.0 fps
1.3	70	0.0323	0.90		**Shallow Concentrated Flow, Woods** Woodland Kv= 5.0 fps
25.2	596	Total			

Subcatchment 1S: Area 1 - North



Summary for Subcatchment 2S: Area 1 - West

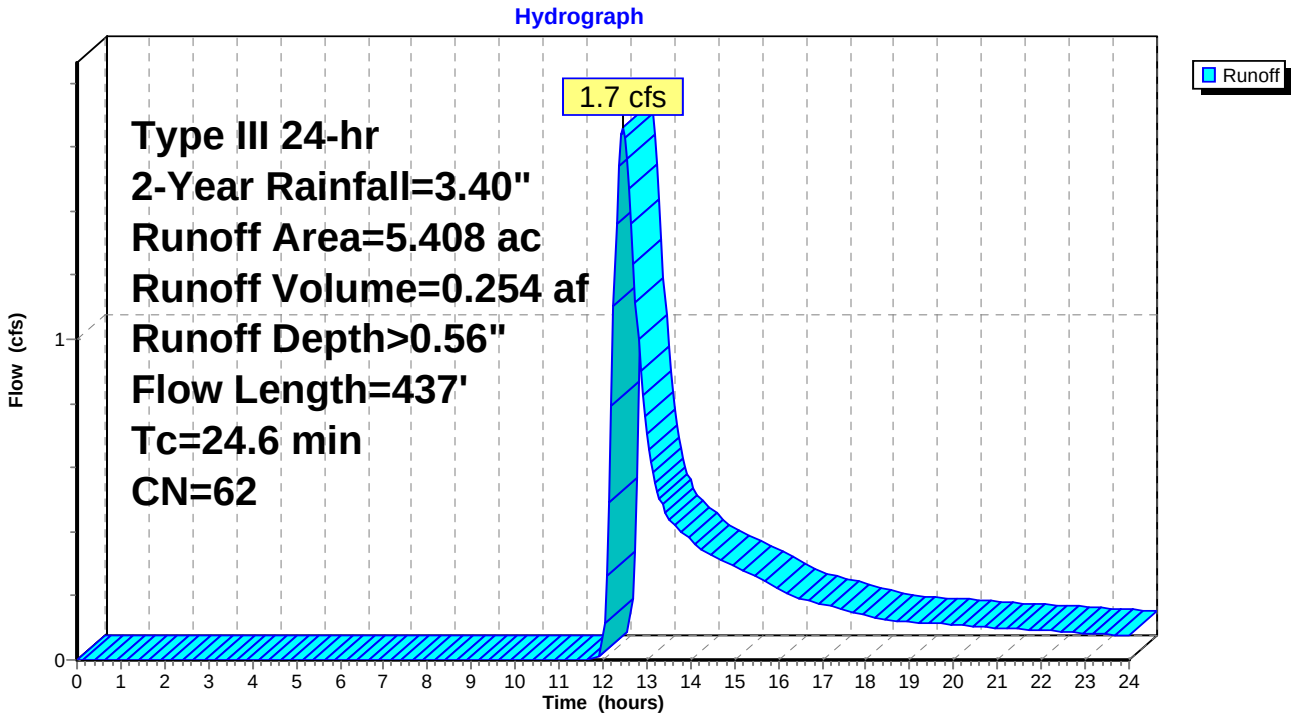
Runoff = 1.7 cfs @ 12.45 hrs, Volume= 0.254 af, Depth> 0.56"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.40"

Area (ac)	CN	Description
5.144	61	>75% Grass cover, Good, HSG B
0.068	60	Woods, Fair, HSG B
0.196	85	Gravel roads, HSG B
5.408	62	Weighted Average
5.408		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.0	100	0.0120	0.10		**Sheet Flow, Grass** Grass: Dense n= 0.240 P2= 3.40"
7.5	312	0.0099	0.70		**Shallow Concentrated Flow, Grass** Short Grass Pasture Kv= 7.0 fps
0.1	25	0.1581	2.78		**Shallow Concentrated Flow, Grass** Short Grass Pasture Kv= 7.0 fps
24.6	437	Total			

Subcatchment 2S: Area 1 - West



Summary for Subcatchment 3S: Area 1 - East

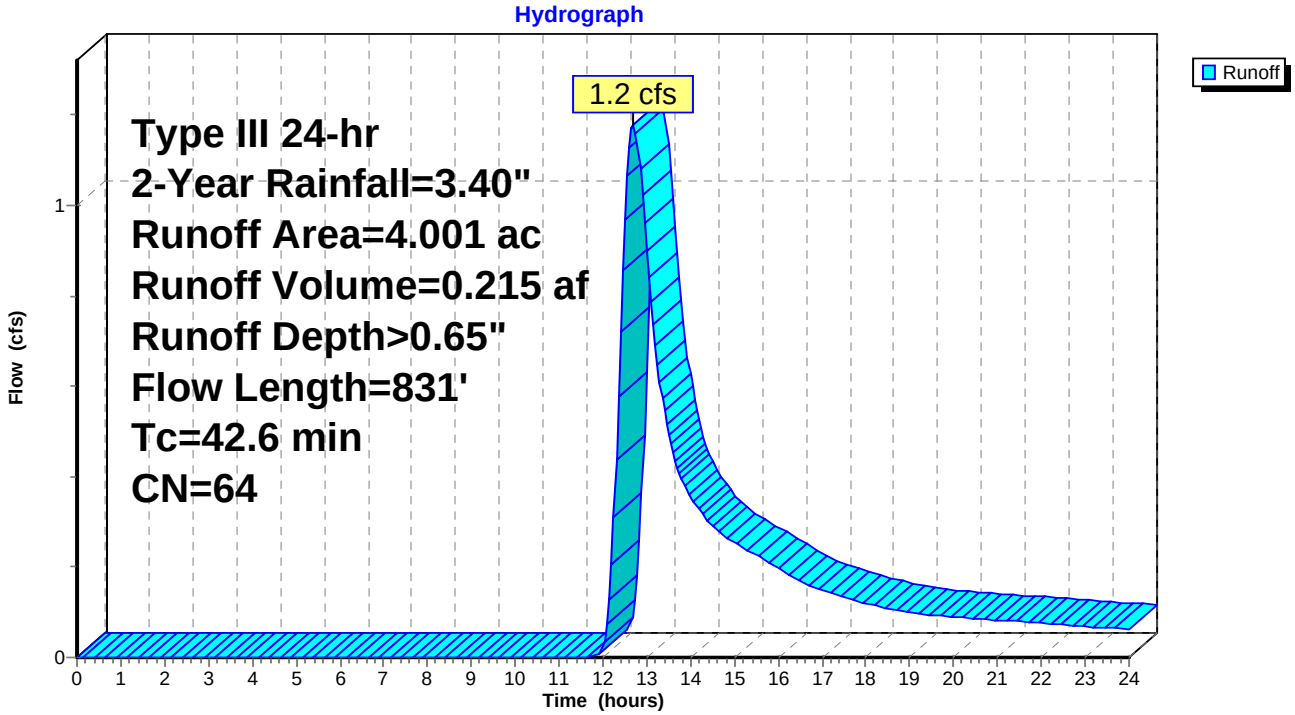
Runoff = 1.2 cfs @ 12.70 hrs, Volume= 0.215 af, Depth> 0.65"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.40"

Area (ac)	CN	Description
0.450	85	Gravel roads, HSG B
3.551	61	>75% Grass cover, Good, HSG B
4.001	64	Weighted Average
4.001		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
19.1	100	0.0090	0.09		**Sheet Flow, Grass** Grass: Dense n= 0.240 P2= 3.40"
7.1	174	0.0034	0.41		**Shallow Concentrated Flow, Grass** Short Grass Pasture Kv= 7.0 fps
16.3	526	0.0059	0.54		**Shallow Concentrated Flow, Grass** Short Grass Pasture Kv= 7.0 fps
0.1	31	0.0742	4.39		**Shallow Concentrated Flow, Grass/Gravel** Unpaved Kv= 16.1 fps
42.6	831	Total			

Subcatchment 3S: Area 1 - East



Summary for Subcatchment 4S: Area 2 - West

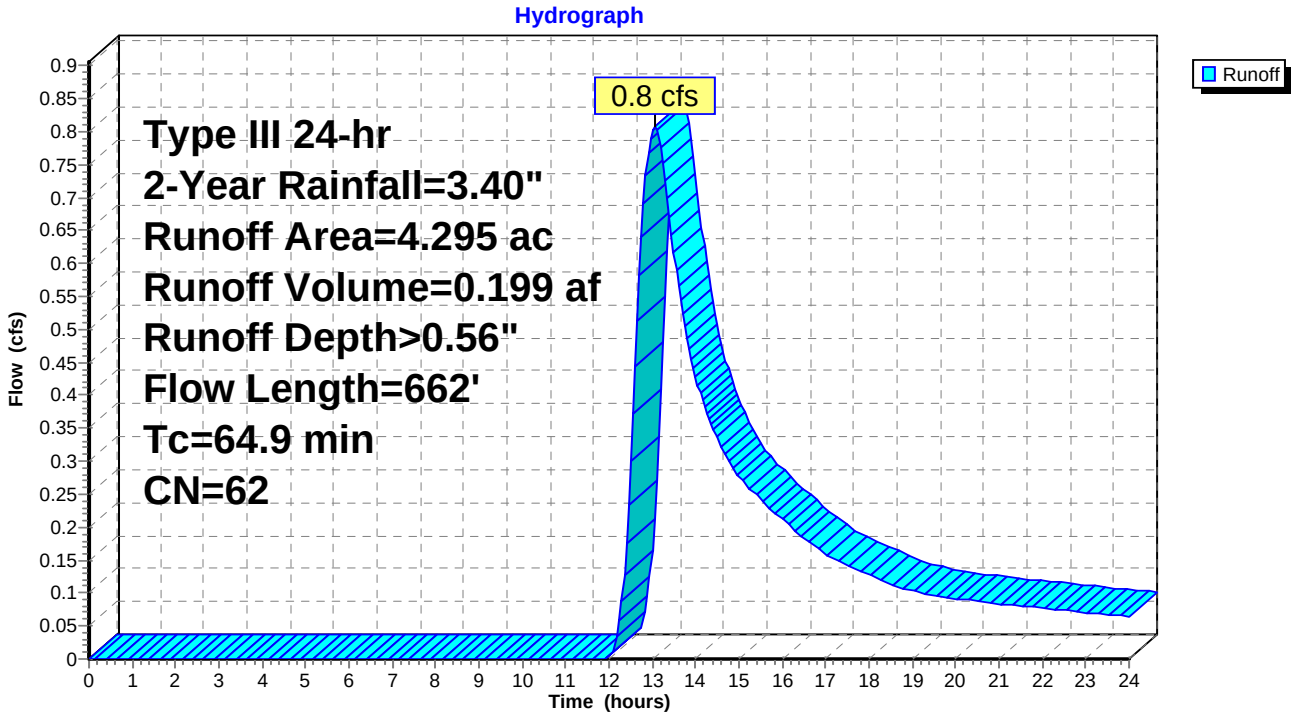
Runoff = 0.8 cfs @ 13.05 hrs, Volume= 0.199 af, Depth> 0.56"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.40"

Area (ac)	CN	Description
2.163	60	Woods, Fair, HSG B
1.790	61	>75% Grass cover, Good, HSG B
0.342	85	Gravel roads, HSG B
4.295	62	Weighted Average
4.295		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
30.1	100	0.0080	0.06		**Sheet Flow, Woods** Woods: Light underbrush n= 0.400 P2= 3.40"
1.9	86	0.0233	0.76		**Shallow Concentrated Flow, Woods** Woodland Kv= 5.0 fps
7.5	235	0.0055	0.52		**Shallow Concentrated Flow, Grass** Short Grass Pasture Kv= 7.0 fps
25.4	241	0.0010	0.16		**Shallow Concentrated Flow, Woods** Woodland Kv= 5.0 fps
64.9	662	Total			

Subcatchment 4S: Area 2 - West



Summary for Subcatchment 5S: Area 2 - East

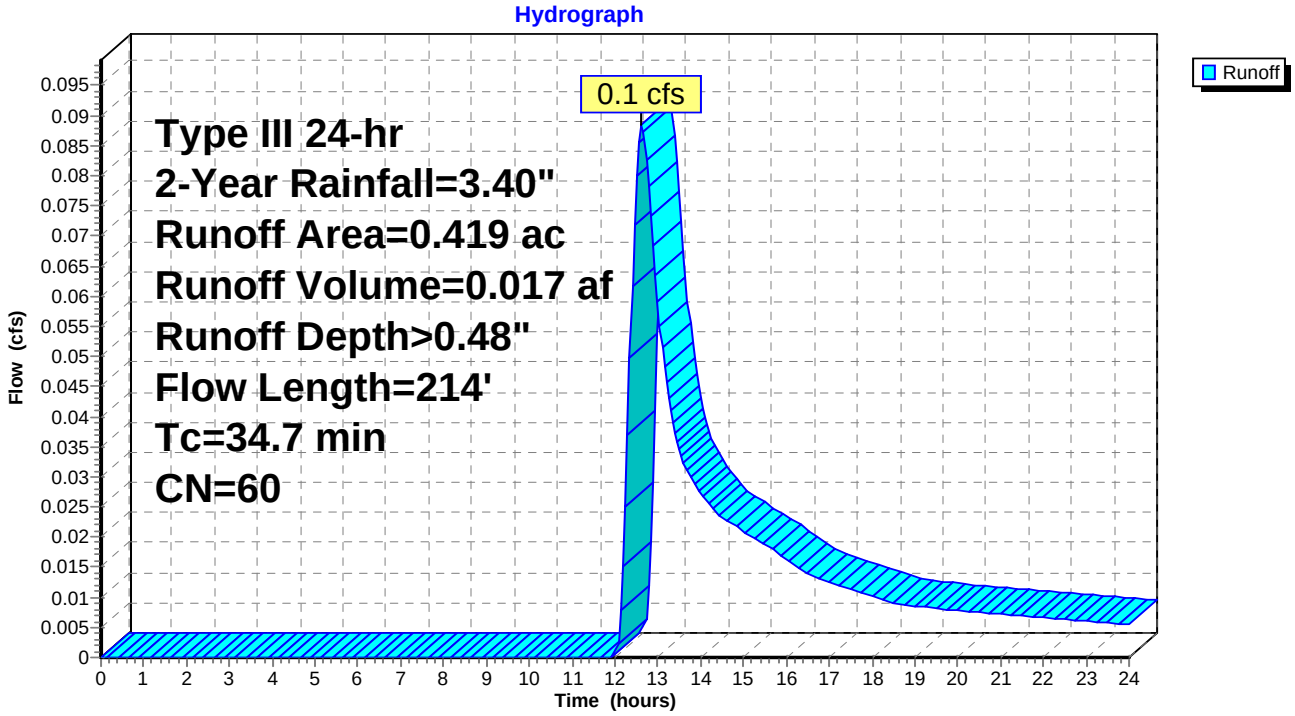
Runoff = 0.1 cfs @ 12.62 hrs, Volume= 0.017 af, Depth> 0.48"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.40"

Area (ac)	CN	Description
0.215	60	Woods, Fair, HSG B
0.204	61	>75% Grass cover, Good, HSG B
0.419	60	Weighted Average
0.419		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.2	58	0.0034	0.05		**Sheet Flow, Grass** Grass: Dense n= 0.240 P2= 3.40"
12.8	42	0.0119	0.05		**Sheet Flow, Woods** Woods: Light underbrush n= 0.400 P2= 3.40"
2.8	86	0.0105	0.51		**Shallow Concentrated Flow, Woods** Woodland Kv= 5.0 fps
0.9	28	0.0050	0.49		**Shallow Concentrated Flow, Grass** Short Grass Pasture Kv= 7.0 fps
34.7	214	Total			

Subcatchment 5S: Area 2 - East

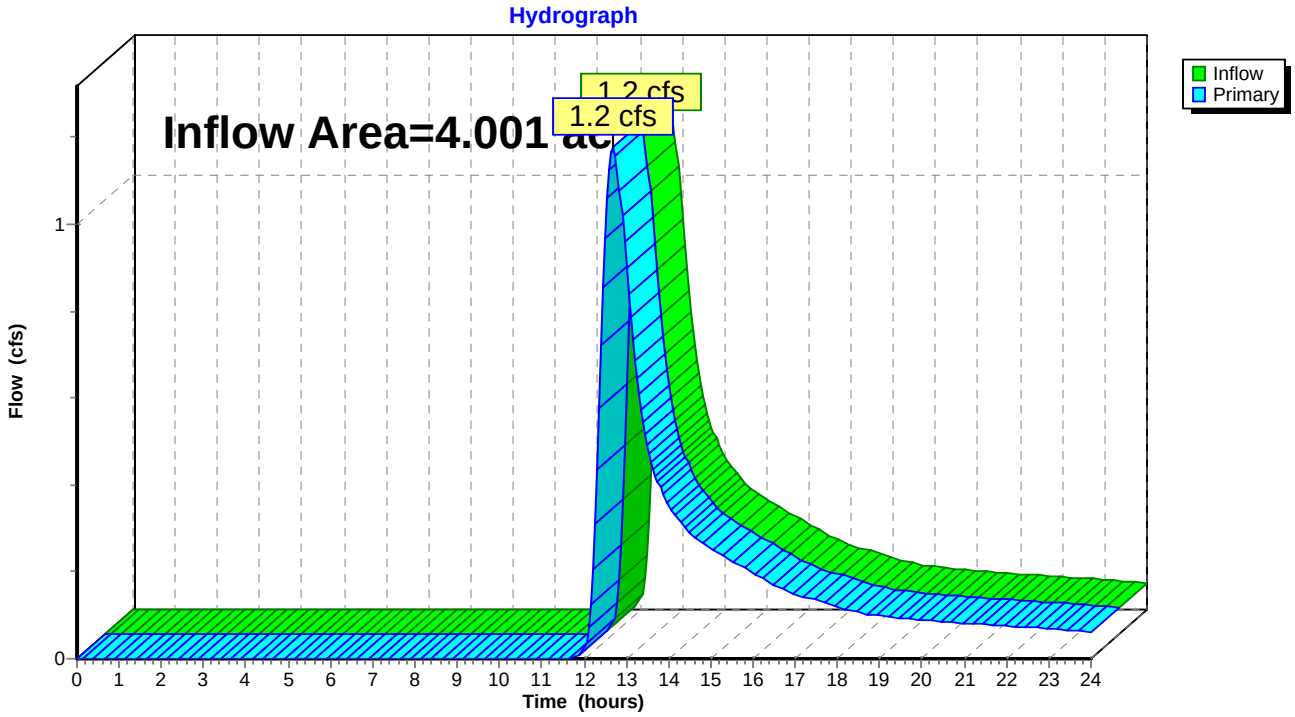


Summary for Link 4L: Wooded Area to East

Inflow Area = 4.001 ac, 0.00% Impervious, Inflow Depth > 0.65" for 2-Year event
Inflow = 1.2 cfs @ 12.70 hrs, Volume= 0.215 af
Primary = 1.2 cfs @ 12.70 hrs, Volume= 0.215 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link 4L: Wooded Area to East

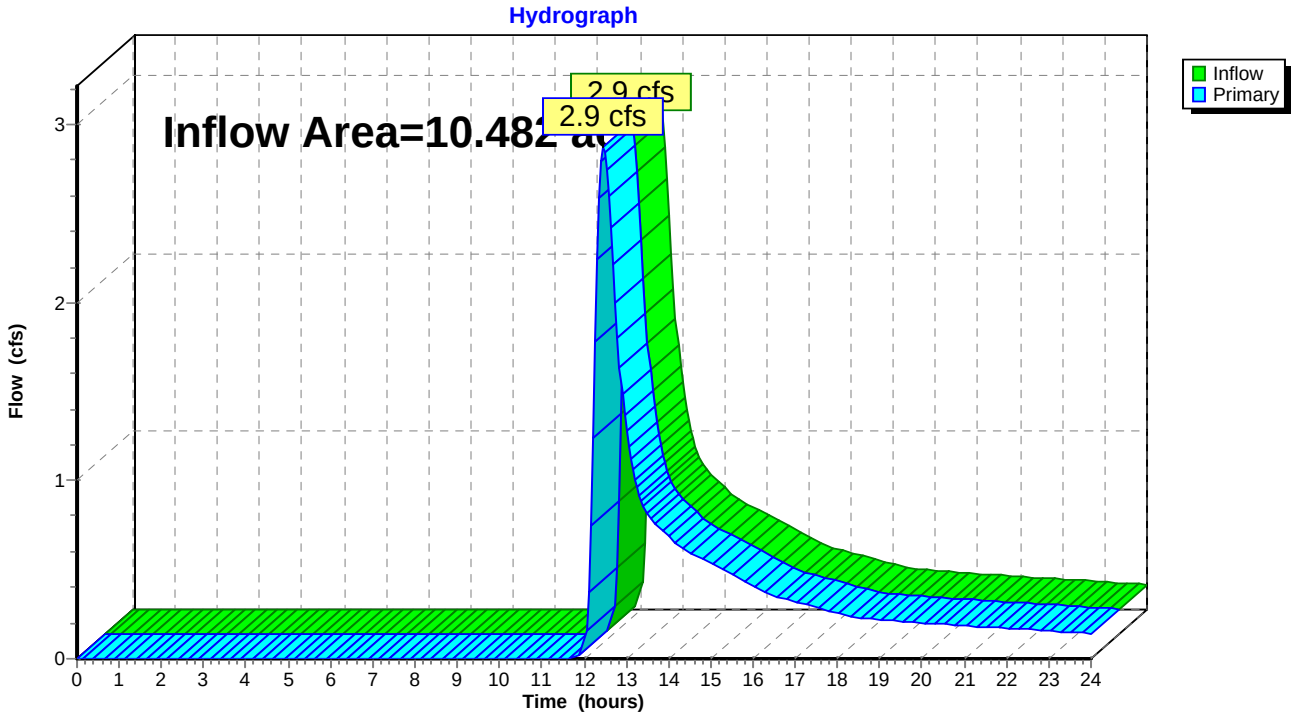


Summary for Link 6L: To Reservoir

Inflow Area = 10.482 ac, 0.00% Impervious, Inflow Depth > 0.53" for 2-Year event
Inflow = 2.9 cfs @ 12.46 hrs, Volume= 0.459 af
Primary = 2.9 cfs @ 12.46 hrs, Volume= 0.459 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link 6L: To Reservoir

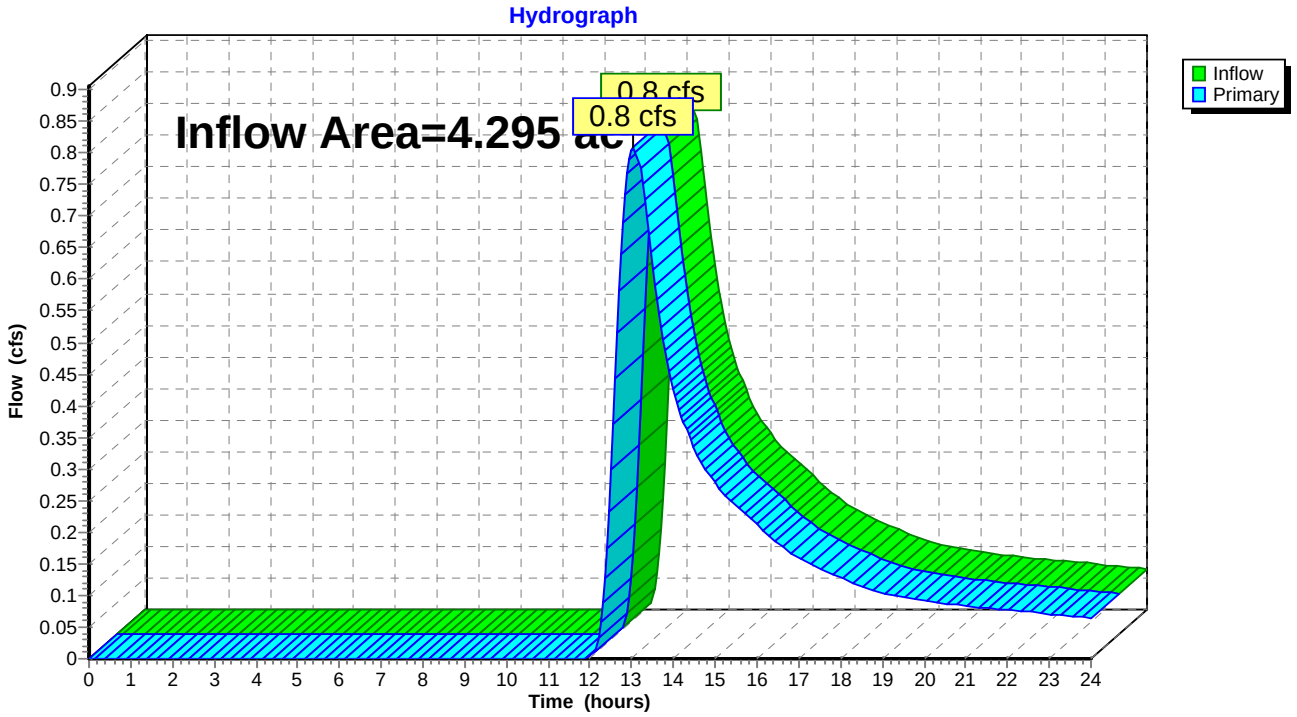


Summary for Link 7L: Off-Site Flow to South

Inflow Area = 4.295 ac, 0.00% Impervious, Inflow Depth > 0.56" for 2-Year event
Inflow = 0.8 cfs @ 13.05 hrs, Volume= 0.199 af
Primary = 0.8 cfs @ 13.05 hrs, Volume= 0.199 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link 7L: Off-Site Flow to South

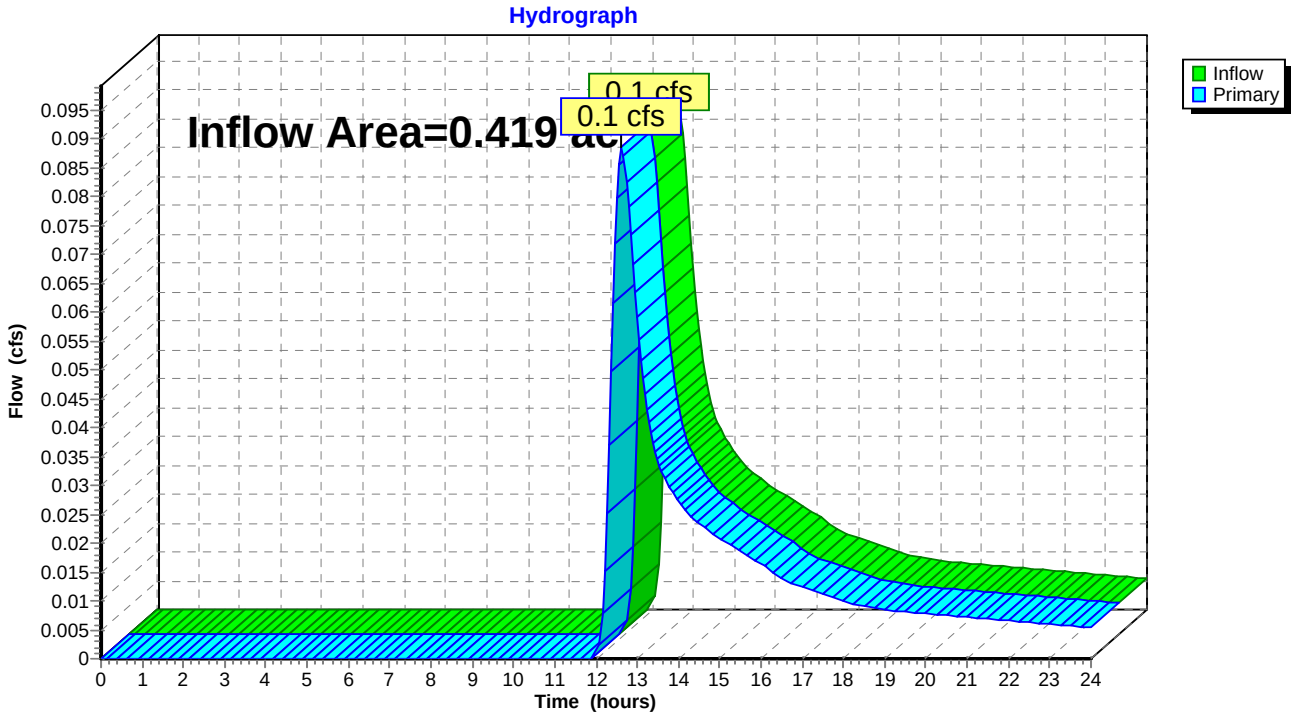


Summary for Link 8L: Off-Site Flow to East

Inflow Area = 0.419 ac, 0.00% Impervious, Inflow Depth > 0.48" for 2-Year event
Inflow = 0.1 cfs @ 12.62 hrs, Volume= 0.017 af
Primary = 0.1 cfs @ 12.62 hrs, Volume= 0.017 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link 8L: Off-Site Flow to East



Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1S: Area 1 - North Runoff Area=5.074 ac 0.00% Impervious Runoff Depth>0.91"
Flow Length=596' Tc=25.2 min CN=60 Runoff=2.8 cfs 0.383 af

Subcatchment 2S: Area 1 - West Runoff Area=5.408 ac 0.00% Impervious Runoff Depth>1.02"
Flow Length=437' Tc=24.6 min CN=62 Runoff=3.5 cfs 0.459 af

Subcatchment 3S: Area 1 - East Runoff Area=4.001 ac 0.00% Impervious Runoff Depth>1.13"
Flow Length=831' Tc=42.6 min CN=64 Runoff=2.3 cfs 0.377 af

Subcatchment 4S: Area 2 - West Runoff Area=4.295 ac 0.00% Impervious Runoff Depth>1.01"
Flow Length=662' Tc=64.9 min CN=62 Runoff=1.7 cfs 0.360 af

Subcatchment 5S: Area 2 - East Runoff Area=0.419 ac 0.00% Impervious Runoff Depth>0.90"
Flow Length=214' Tc=34.7 min CN=60 Runoff=0.2 cfs 0.032 af

Link 4L: Wooded Area to East Inflow=2.3 cfs 0.377 af
Primary=2.3 cfs 0.377 af

Link 6L: To Reservoir Inflow=6.2 cfs 0.843 af
Primary=6.2 cfs 0.843 af

Link 7L: Off-Site Flow to South Inflow=1.7 cfs 0.360 af
Primary=1.7 cfs 0.360 af

Link 8L: Off-Site Flow to East Inflow=0.2 cfs 0.032 af
Primary=0.2 cfs 0.032 af

Total Runoff Area = 19.197 ac Runoff Volume = 1.611 af Average Runoff Depth = 1.01"
100.00% Pervious = 19.197 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment 1S: Area 1 - North

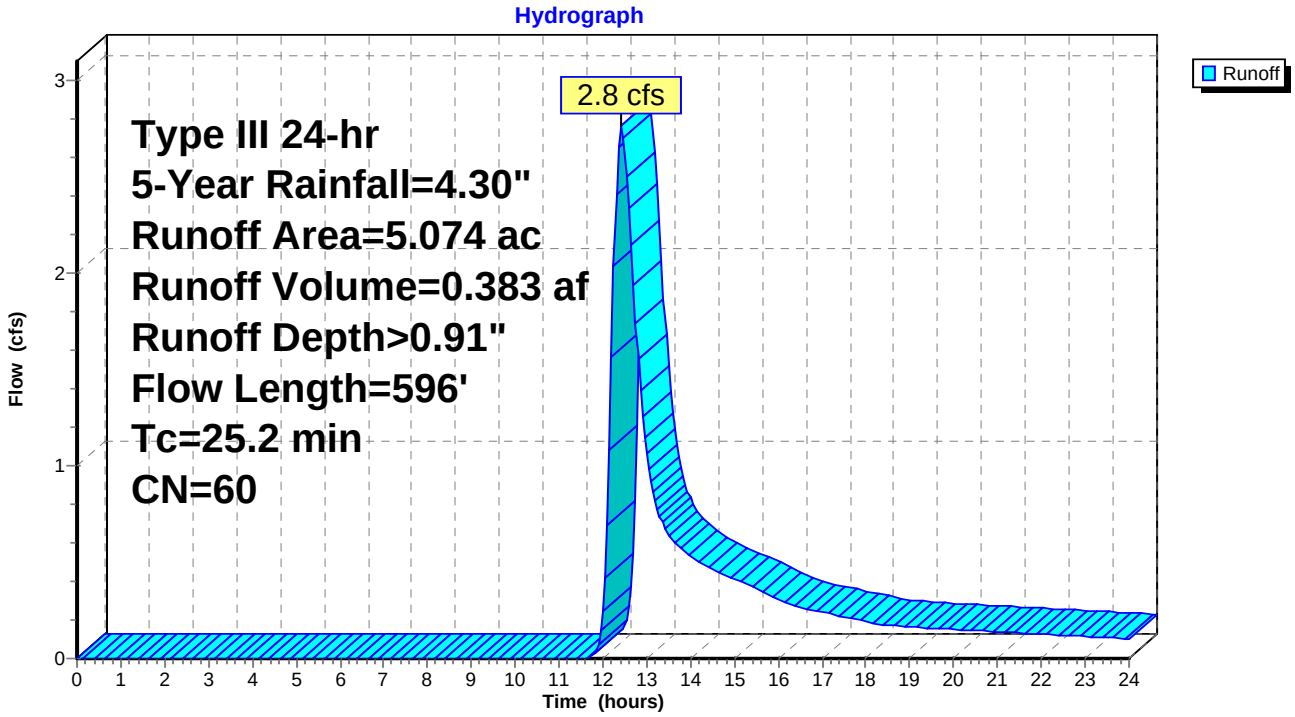
Runoff = 2.8 cfs @ 12.42 hrs, Volume= 0.383 af, Depth> 0.91"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 5-Year Rainfall=4.30"

Area (ac)	CN	Description
2.589	60	Woods, Fair, HSG B
2.485	61	>75% Grass cover, Good, HSG B
5.074	60	Weighted Average
5.074		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.5	100	0.0177	0.11		**Sheet Flow, Grass and Trees** Grass: Dense n= 0.240 P2= 3.40"
1.0	40	0.0085	0.65		**Shallow Concentrated Flow, Grass and Trees** Short Grass Pasture Kv= 7.0 fps
0.3	32	0.0625	1.75		**Shallow Concentrated Flow, Grass and Trees** Short Grass Pasture Kv= 7.0 fps
2.9	143	0.0140	0.83		**Shallow Concentrated Flow, Grass** Short Grass Pasture Kv= 7.0 fps
5.2	211	0.0095	0.68		**Shallow Concentrated Flow, Grass** Short Grass Pasture Kv= 7.0 fps
1.3	70	0.0323	0.90		**Shallow Concentrated Flow, Woods** Woodland Kv= 5.0 fps
25.2	596	Total			

Subcatchment 1S: Area 1 - North



Summary for Subcatchment 2S: Area 1 - West

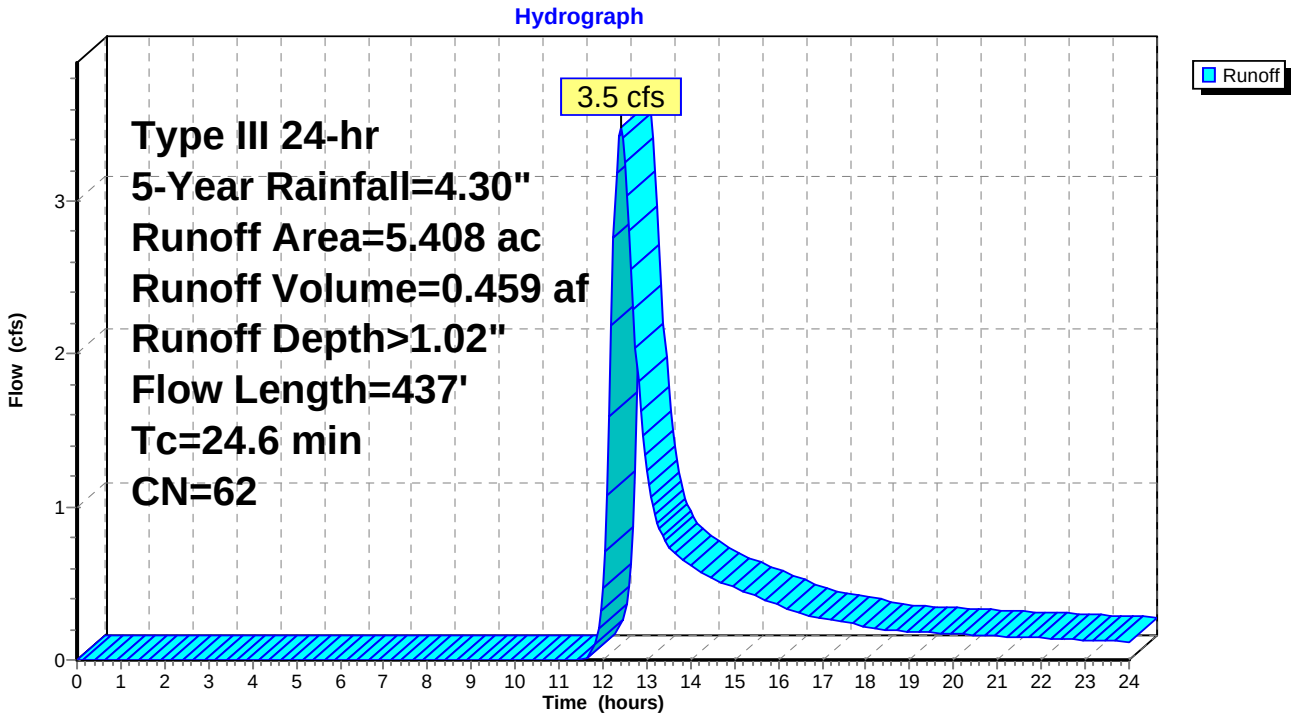
Runoff = 3.5 cfs @ 12.40 hrs, Volume= 0.459 af, Depth> 1.02"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 5-Year Rainfall=4.30"

Area (ac)	CN	Description
5.144	61	>75% Grass cover, Good, HSG B
0.068	60	Woods, Fair, HSG B
0.196	85	Gravel roads, HSG B
5.408	62	Weighted Average
5.408		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.0	100	0.0120	0.10		**Sheet Flow, Grass** Grass: Dense n= 0.240 P2= 3.40"
7.5	312	0.0099	0.70		**Shallow Concentrated Flow, Grass** Short Grass Pasture Kv= 7.0 fps
0.1	25	0.1581	2.78		**Shallow Concentrated Flow, Grass** Short Grass Pasture Kv= 7.0 fps
24.6	437	Total			

Subcatchment 2S: Area 1 - West



Summary for Subcatchment 3S: Area 1 - East

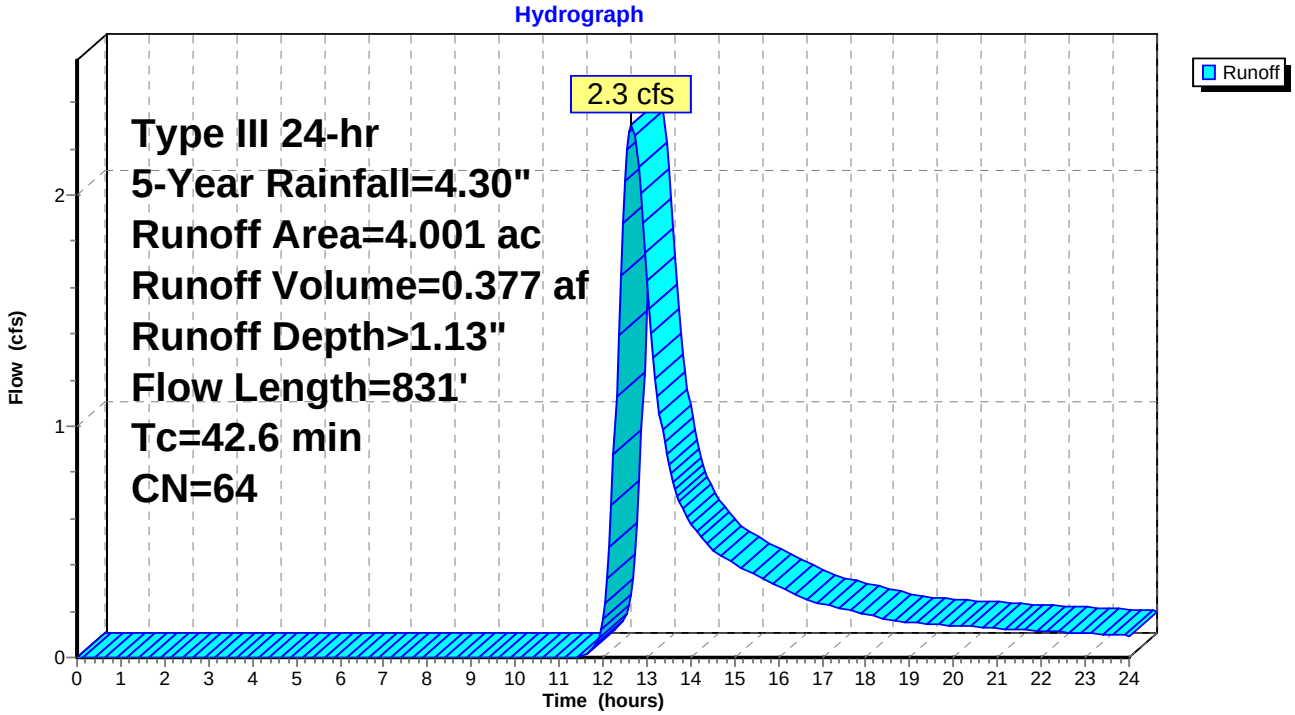
Runoff = 2.3 cfs @ 12.66 hrs, Volume= 0.377 af, Depth> 1.13"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 5-Year Rainfall=4.30"

Area (ac)	CN	Description
0.450	85	Gravel roads, HSG B
3.551	61	>75% Grass cover, Good, HSG B
4.001	64	Weighted Average
4.001		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
19.1	100	0.0090	0.09		**Sheet Flow, Grass** Grass: Dense n= 0.240 P2= 3.40"
7.1	174	0.0034	0.41		**Shallow Concentrated Flow, Grass** Short Grass Pasture Kv= 7.0 fps
16.3	526	0.0059	0.54		**Shallow Concentrated Flow, Grass** Short Grass Pasture Kv= 7.0 fps
0.1	31	0.0742	4.39		**Shallow Concentrated Flow, Grass/Gravel** Unpaved Kv= 16.1 fps
42.6	831	Total			

Subcatchment 3S: Area 1 - East



Summary for Subcatchment 4S: Area 2 - West

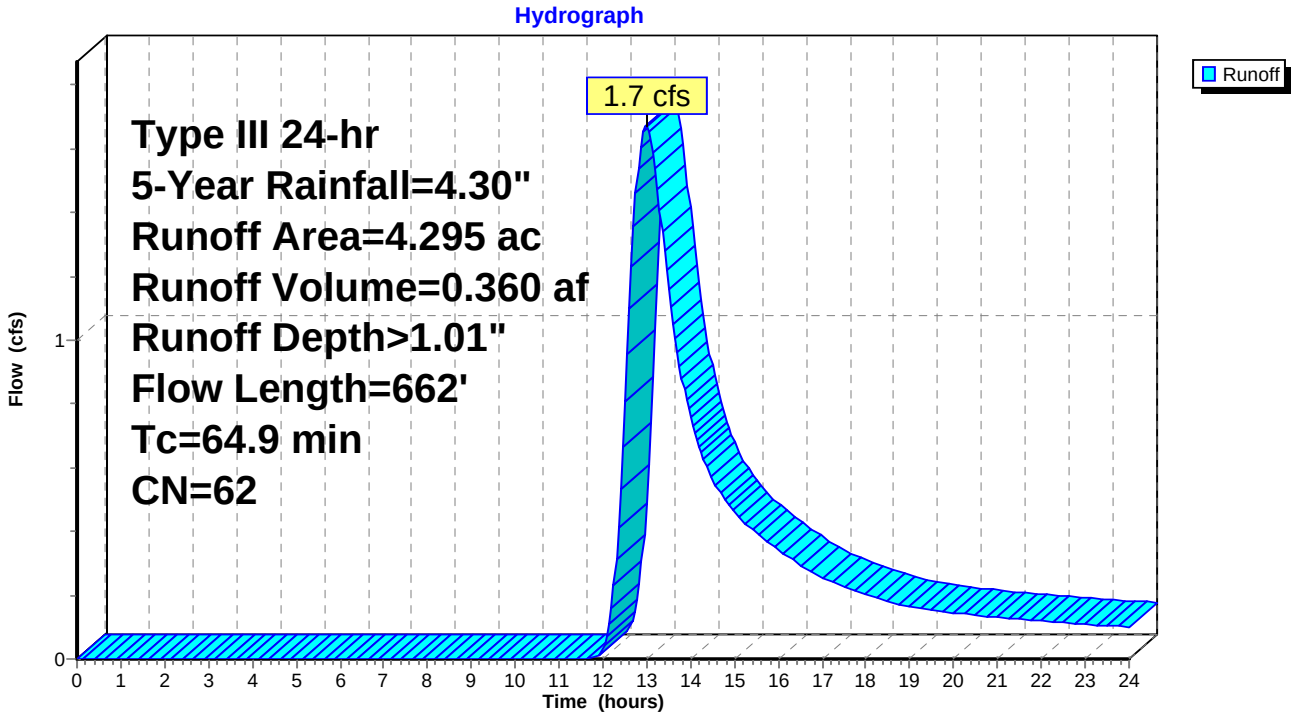
Runoff = 1.7 cfs @ 12.98 hrs, Volume= 0.360 af, Depth> 1.01"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 5-Year Rainfall=4.30"

Area (ac)	CN	Description
2.163	60	Woods, Fair, HSG B
1.790	61	>75% Grass cover, Good, HSG B
0.342	85	Gravel roads, HSG B
4.295	62	Weighted Average
4.295		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
30.1	100	0.0080	0.06		**Sheet Flow, Woods** Woods: Light underbrush n= 0.400 P2= 3.40"
1.9	86	0.0233	0.76		**Shallow Concentrated Flow, Woods** Woodland Kv= 5.0 fps
7.5	235	0.0055	0.52		**Shallow Concentrated Flow, Grass** Short Grass Pasture Kv= 7.0 fps
25.4	241	0.0010	0.16		**Shallow Concentrated Flow, Woods** Woodland Kv= 5.0 fps
64.9	662	Total			

Subcatchment 4S: Area 2 - West



Summary for Subcatchment 5S: Area 2 - East

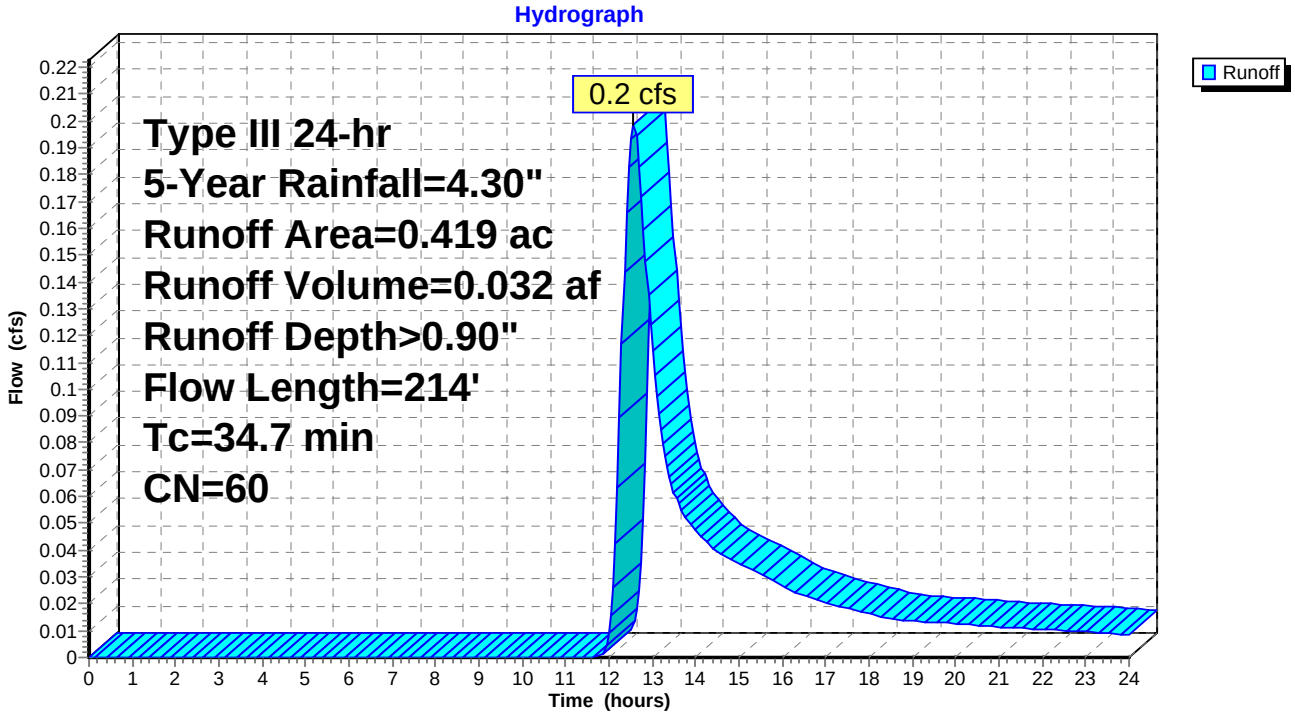
Runoff = 0.2 cfs @ 12.57 hrs, Volume= 0.032 af, Depth> 0.90"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 5-Year Rainfall=4.30"

Area (ac)	CN	Description
0.215	60	Woods, Fair, HSG B
0.204	61	>75% Grass cover, Good, HSG B
0.419	60	Weighted Average
0.419		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.2	58	0.0034	0.05		**Sheet Flow, Grass** Grass: Dense n= 0.240 P2= 3.40"
12.8	42	0.0119	0.05		**Sheet Flow, Woods** Woods: Light underbrush n= 0.400 P2= 3.40"
2.8	86	0.0105	0.51		**Shallow Concentrated Flow, Woods** Woodland Kv= 5.0 fps
0.9	28	0.0050	0.49		**Shallow Concentrated Flow, Grass** Short Grass Pasture Kv= 7.0 fps
34.7	214	Total			

Subcatchment 5S: Area 2 - East

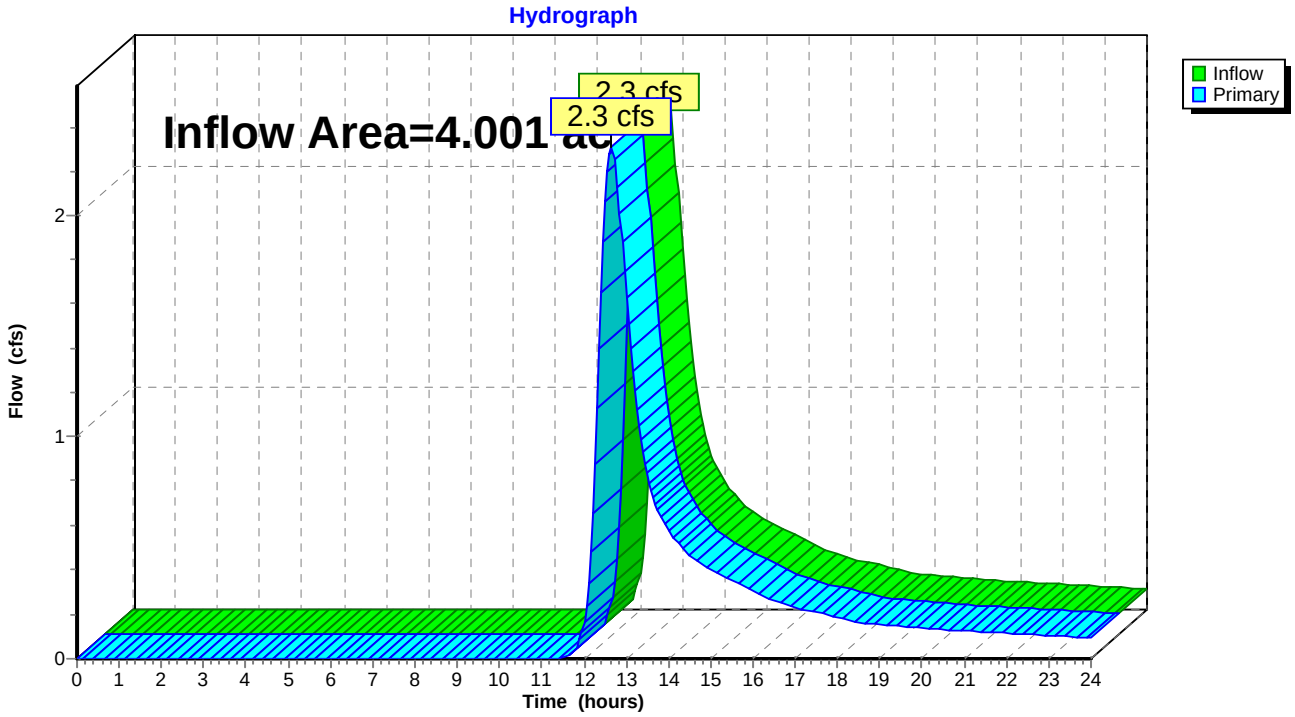


Summary for Link 4L: Wooded Area to East

Inflow Area = 4.001 ac, 0.00% Impervious, Inflow Depth > 1.13" for 5-Year event
Inflow = 2.3 cfs @ 12.66 hrs, Volume= 0.377 af
Primary = 2.3 cfs @ 12.66 hrs, Volume= 0.377 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link 4L: Wooded Area to East

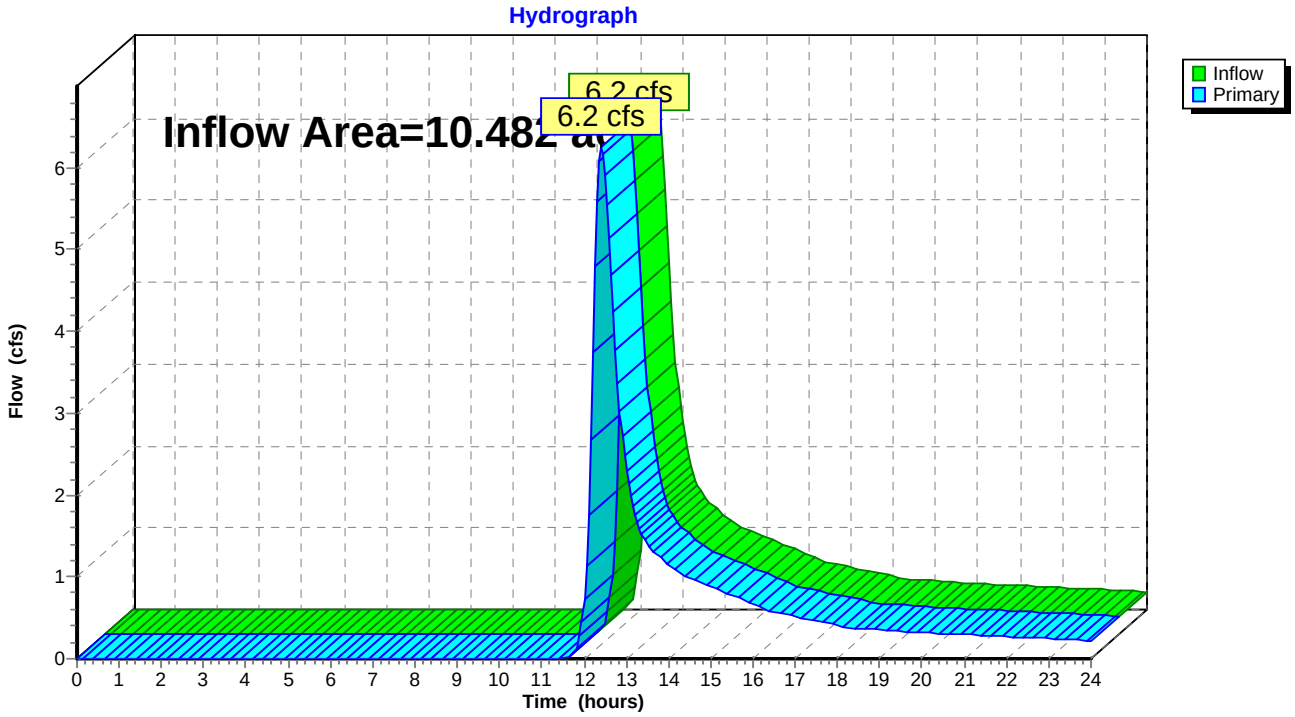


Summary for Link 6L: To Reservoir

Inflow Area = 10.482 ac, 0.00% Impervious, Inflow Depth > 0.96" for 5-Year event
Inflow = 6.2 cfs @ 12.41 hrs, Volume= 0.843 af
Primary = 6.2 cfs @ 12.41 hrs, Volume= 0.843 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link 6L: To Reservoir

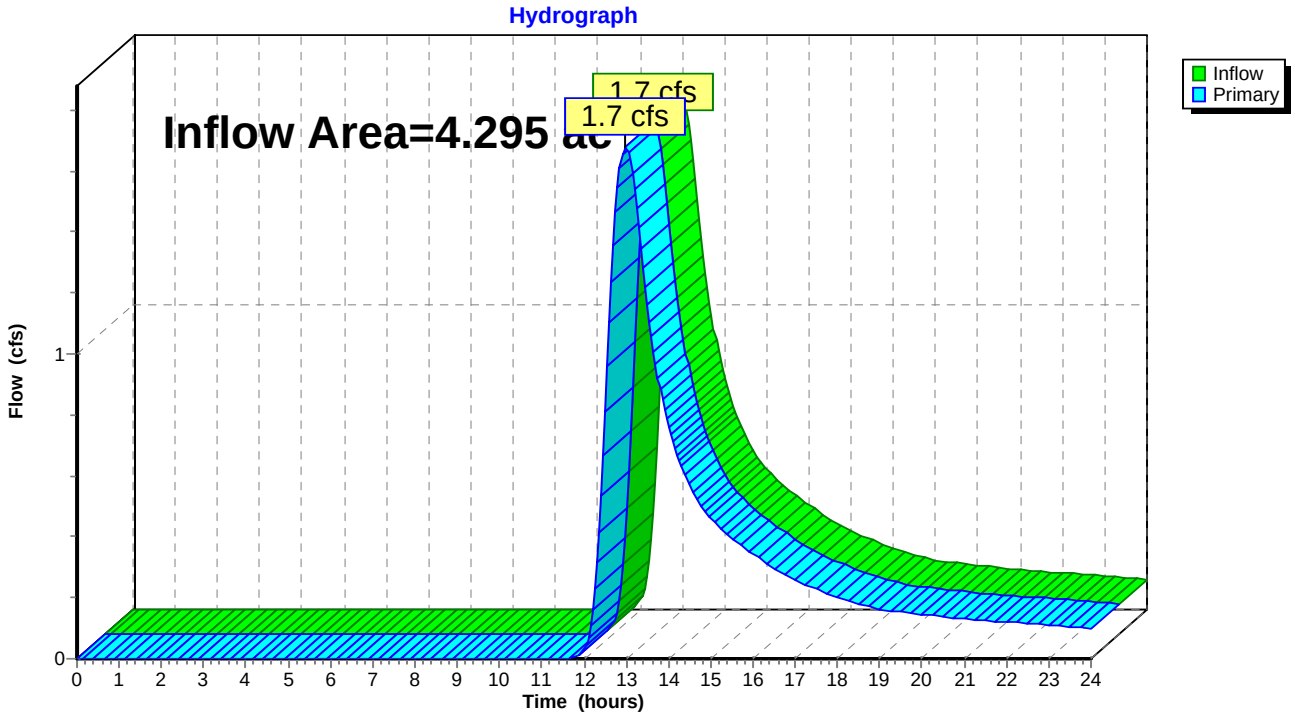


Summary for Link 7L: Off-Site Flow to South

Inflow Area = 4.295 ac, 0.00% Impervious, Inflow Depth > 1.01" for 5-Year event
Inflow = 1.7 cfs @ 12.98 hrs, Volume= 0.360 af
Primary = 1.7 cfs @ 12.98 hrs, Volume= 0.360 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link 7L: Off-Site Flow to South

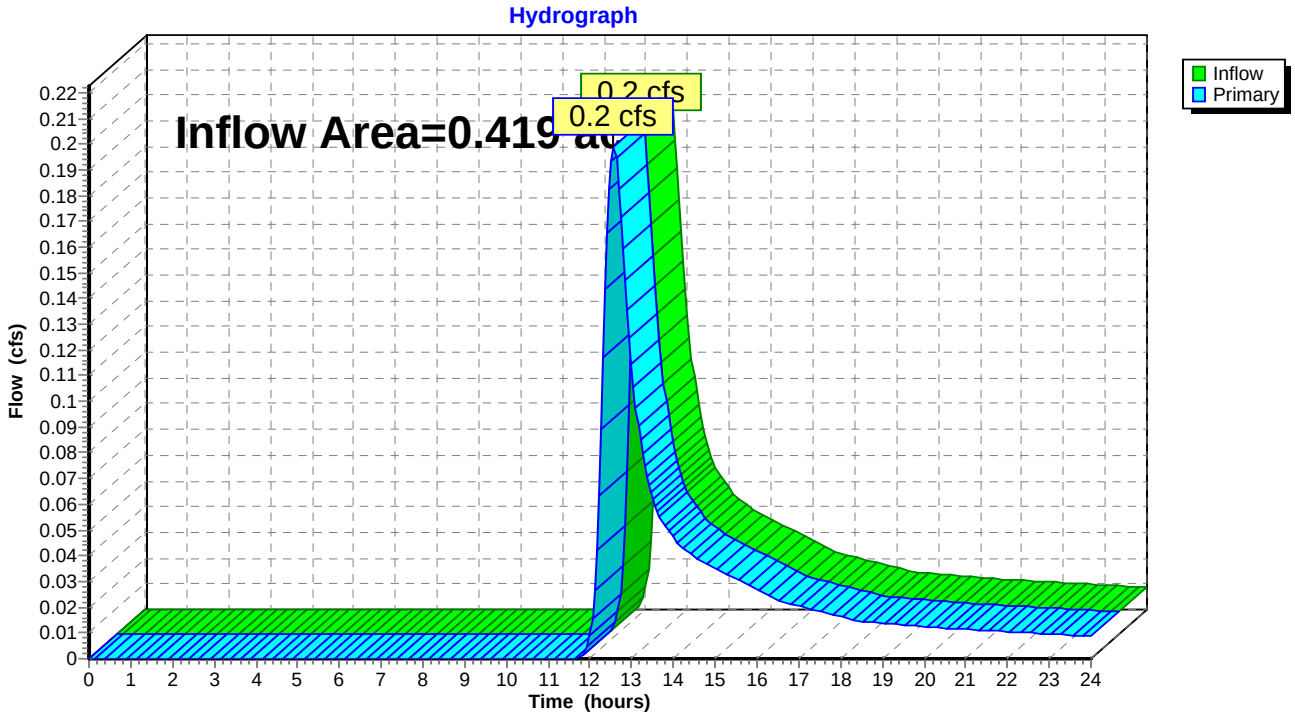


Summary for Link 8L: Off-Site Flow to East

Inflow Area = 0.419 ac, 0.00% Impervious, Inflow Depth > 0.90" for 5-Year event
Inflow = 0.2 cfs @ 12.57 hrs, Volume= 0.032 af
Primary = 0.2 cfs @ 12.57 hrs, Volume= 0.032 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link 8L: Off-Site Flow to East



Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1S: Area 1 - North Runoff Area=5.074 ac 0.00% Impervious Runoff Depth>1.29"
Flow Length=596' Tc=25.2 min CN=60 Runoff=4.2 cfs 0.546 af

Subcatchment 2S: Area 1 - West Runoff Area=5.408 ac 0.00% Impervious Runoff Depth>1.43"
Flow Length=437' Tc=24.6 min CN=62 Runoff=5.2 cfs 0.644 af

Subcatchment 3S: Area 1 - East Runoff Area=4.001 ac 0.00% Impervious Runoff Depth>1.56"
Flow Length=831' Tc=42.6 min CN=64 Runoff=3.3 cfs 0.521 af

Subcatchment 4S: Area 2 - West Runoff Area=4.295 ac 0.00% Impervious Runoff Depth>1.41"
Flow Length=662' Tc=64.9 min CN=62 Runoff=2.5 cfs 0.505 af

Subcatchment 5S: Area 2 - East Runoff Area=0.419 ac 0.00% Impervious Runoff Depth>1.29"
Flow Length=214' Tc=34.7 min CN=60 Runoff=0.3 cfs 0.045 af

Link 4L: Wooded Area to East Inflow=3.3 cfs 0.521 af
Primary=3.3 cfs 0.521 af

Link 6L: To Reservoir Inflow=9.4 cfs 1.190 af
Primary=9.4 cfs 1.190 af

Link 7L: Off-Site Flow to South Inflow=2.5 cfs 0.505 af
Primary=2.5 cfs 0.505 af

Link 8L: Off-Site Flow to East Inflow=0.3 cfs 0.045 af
Primary=0.3 cfs 0.045 af

Total Runoff Area = 19.197 ac Runoff Volume = 2.261 af Average Runoff Depth = 1.41"
100.00% Pervious = 19.197 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment 1S: Area 1 - North

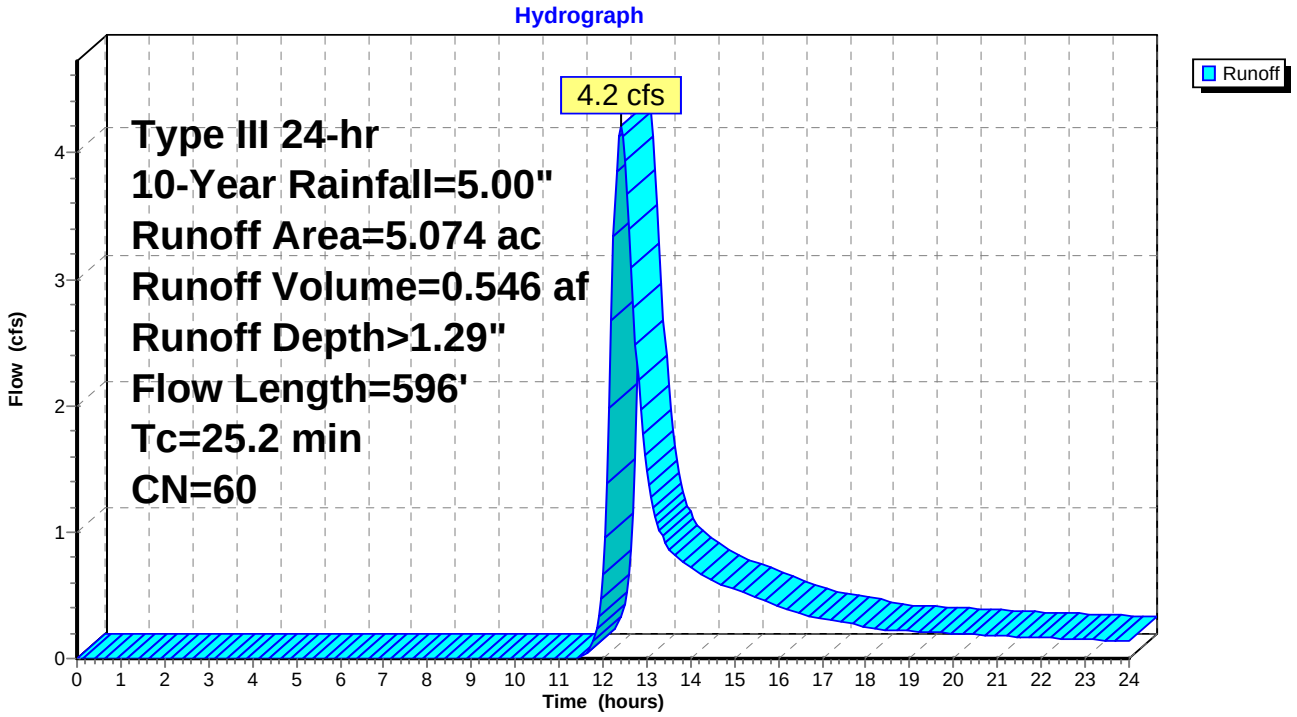
Runoff = 4.2 cfs @ 12.40 hrs, Volume= 0.546 af, Depth> 1.29"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=5.00"

Area (ac)	CN	Description
2.589	60	Woods, Fair, HSG B
2.485	61	>75% Grass cover, Good, HSG B
5.074	60	Weighted Average
5.074		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.5	100	0.0177	0.11		**Sheet Flow, Grass and Trees** Grass: Dense n= 0.240 P2= 3.40"
1.0	40	0.0085	0.65		**Shallow Concentrated Flow, Grass and Trees** Short Grass Pasture Kv= 7.0 fps
0.3	32	0.0625	1.75		**Shallow Concentrated Flow, Grass and Trees** Short Grass Pasture Kv= 7.0 fps
2.9	143	0.0140	0.83		**Shallow Concentrated Flow, Grass** Short Grass Pasture Kv= 7.0 fps
5.2	211	0.0095	0.68		**Shallow Concentrated Flow, Grass** Short Grass Pasture Kv= 7.0 fps
1.3	70	0.0323	0.90		**Shallow Concentrated Flow, Woods** Woodland Kv= 5.0 fps
25.2	596	Total			

Subcatchment 1S: Area 1 - North



Summary for Subcatchment 2S: Area 1 - West

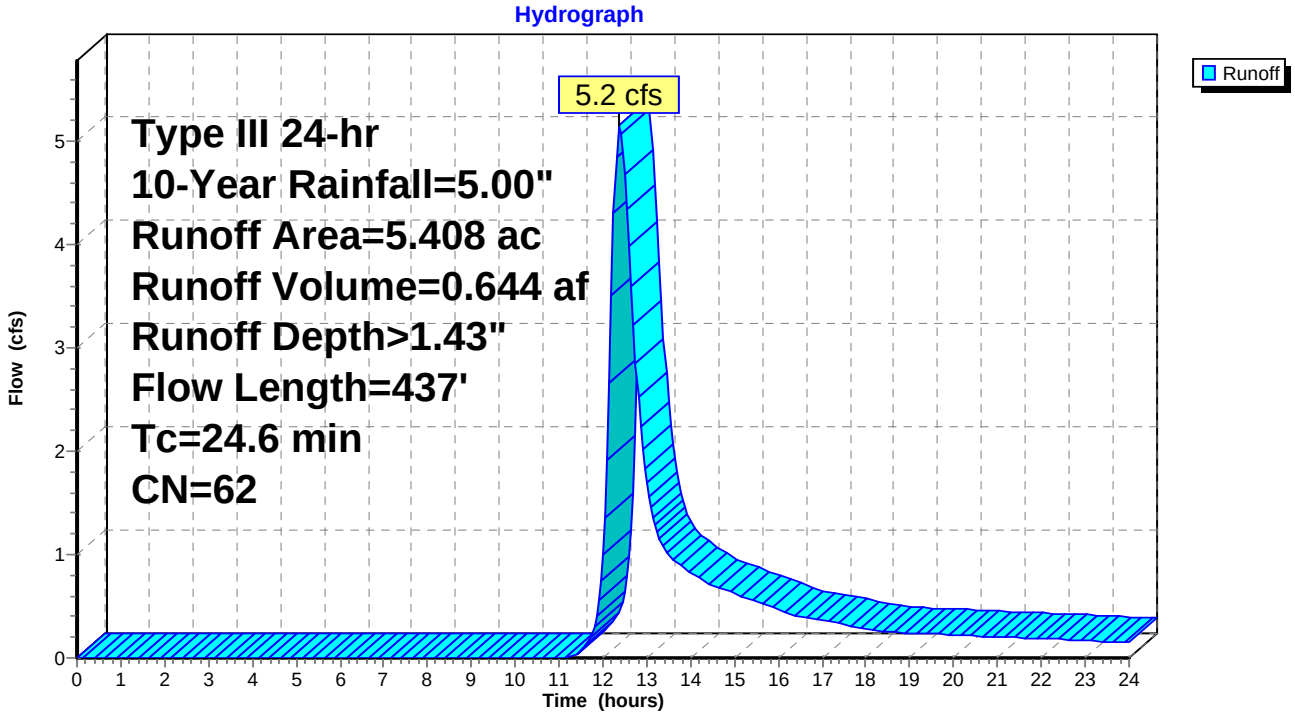
Runoff = 5.2 cfs @ 12.38 hrs, Volume= 0.644 af, Depth> 1.43"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=5.00"

Area (ac)	CN	Description
5.144	61	>75% Grass cover, Good, HSG B
0.068	60	Woods, Fair, HSG B
0.196	85	Gravel roads, HSG B
5.408	62	Weighted Average
5.408		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.0	100	0.0120	0.10		**Sheet Flow, Grass** Grass: Dense n= 0.240 P2= 3.40"
7.5	312	0.0099	0.70		**Shallow Concentrated Flow, Grass** Short Grass Pasture Kv= 7.0 fps
0.1	25	0.1581	2.78		**Shallow Concentrated Flow, Grass** Short Grass Pasture Kv= 7.0 fps
24.6	437	Total			

Subcatchment 2S: Area 1 - West



Summary for Subcatchment 3S: Area 1 - East

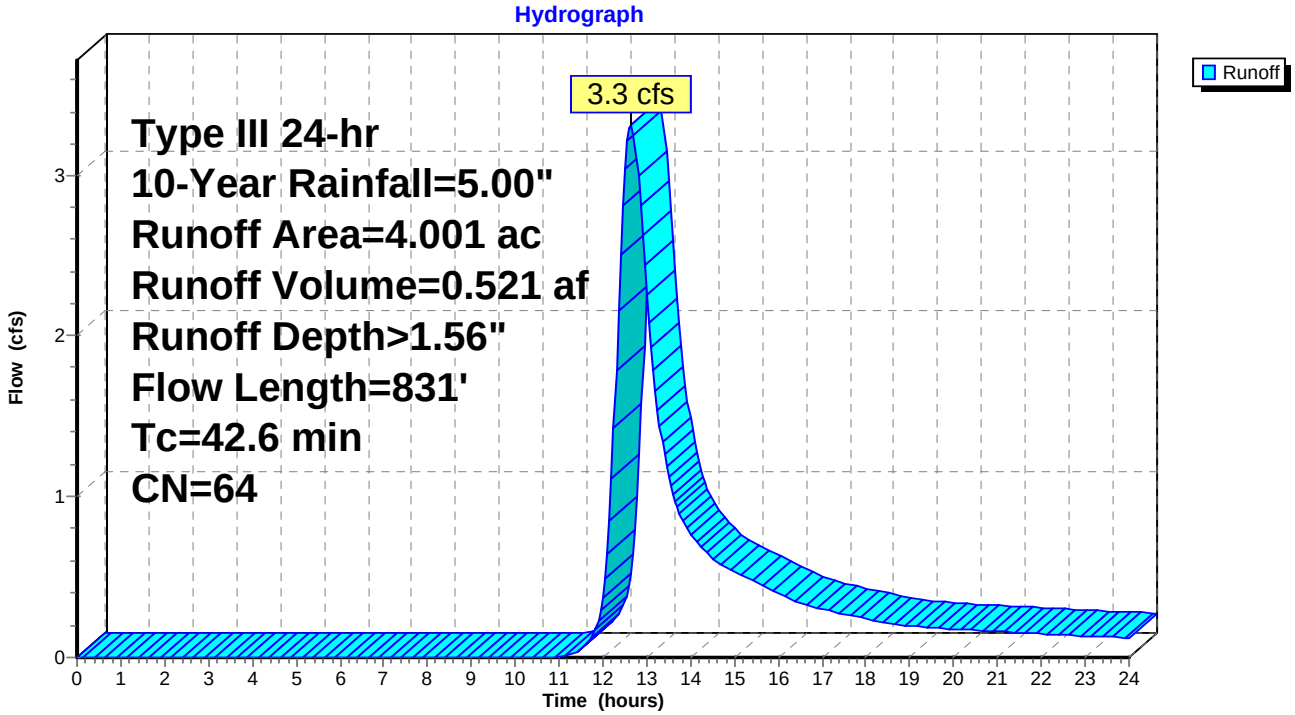
Runoff = 3.3 cfs @ 12.64 hrs, Volume= 0.521 af, Depth> 1.56"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=5.00"

Area (ac)	CN	Description
0.450	85	Gravel roads, HSG B
3.551	61	>75% Grass cover, Good, HSG B
4.001	64	Weighted Average
4.001		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
19.1	100	0.0090	0.09		**Sheet Flow, Grass** Grass: Dense n= 0.240 P2= 3.40"
7.1	174	0.0034	0.41		**Shallow Concentrated Flow, Grass** Short Grass Pasture Kv= 7.0 fps
16.3	526	0.0059	0.54		**Shallow Concentrated Flow, Grass** Short Grass Pasture Kv= 7.0 fps
0.1	31	0.0742	4.39		**Shallow Concentrated Flow, Grass/Gravel** Unpaved Kv= 16.1 fps
42.6	831	Total			

Subcatchment 3S: Area 1 - East



Summary for Subcatchment 4S: Area 2 - West

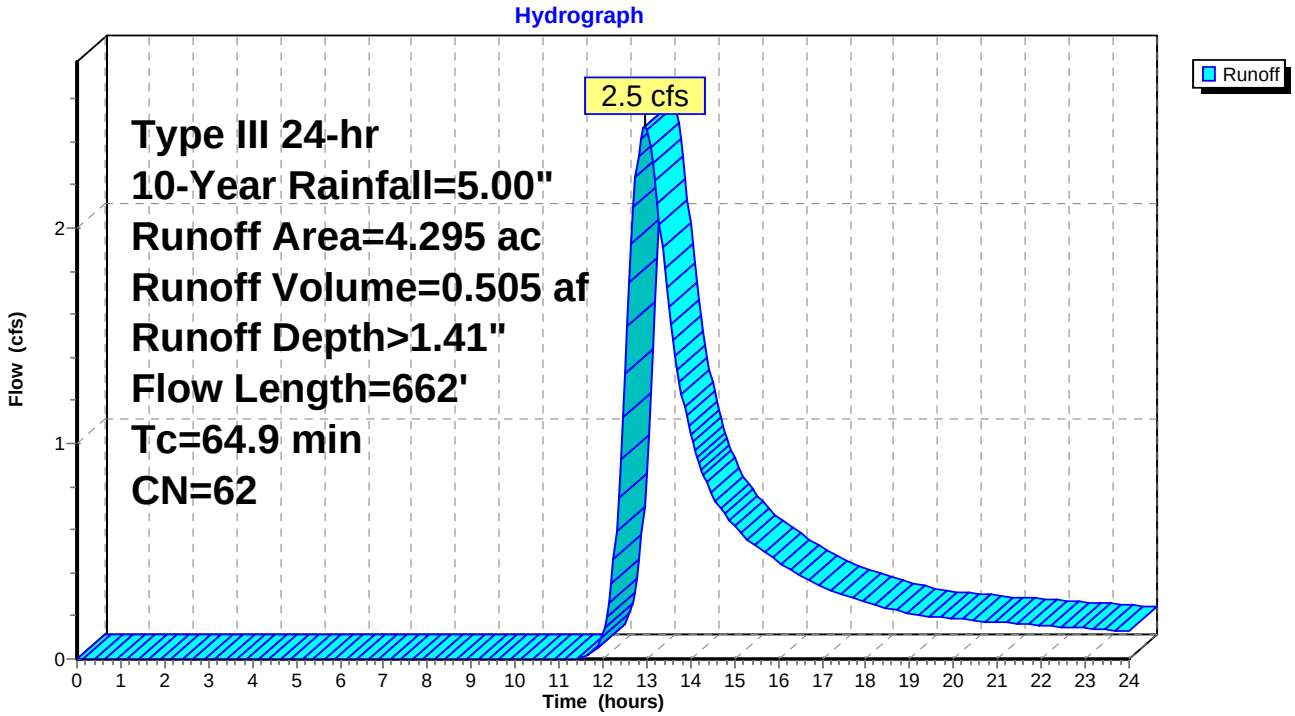
Runoff = 2.5 cfs @ 12.95 hrs, Volume= 0.505 af, Depth> 1.41"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=5.00"

Area (ac)	CN	Description
2.163	60	Woods, Fair, HSG B
1.790	61	>75% Grass cover, Good, HSG B
0.342	85	Gravel roads, HSG B
4.295	62	Weighted Average
4.295		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
30.1	100	0.0080	0.06		**Sheet Flow, Woods** Woods: Light underbrush n= 0.400 P2= 3.40"
1.9	86	0.0233	0.76		**Shallow Concentrated Flow, Woods** Woodland Kv= 5.0 fps
7.5	235	0.0055	0.52		**Shallow Concentrated Flow, Grass** Short Grass Pasture Kv= 7.0 fps
25.4	241	0.0010	0.16		**Shallow Concentrated Flow, Woods** Woodland Kv= 5.0 fps
64.9	662	Total			

Subcatchment 4S: Area 2 - West



Summary for Subcatchment 5S: Area 2 - East

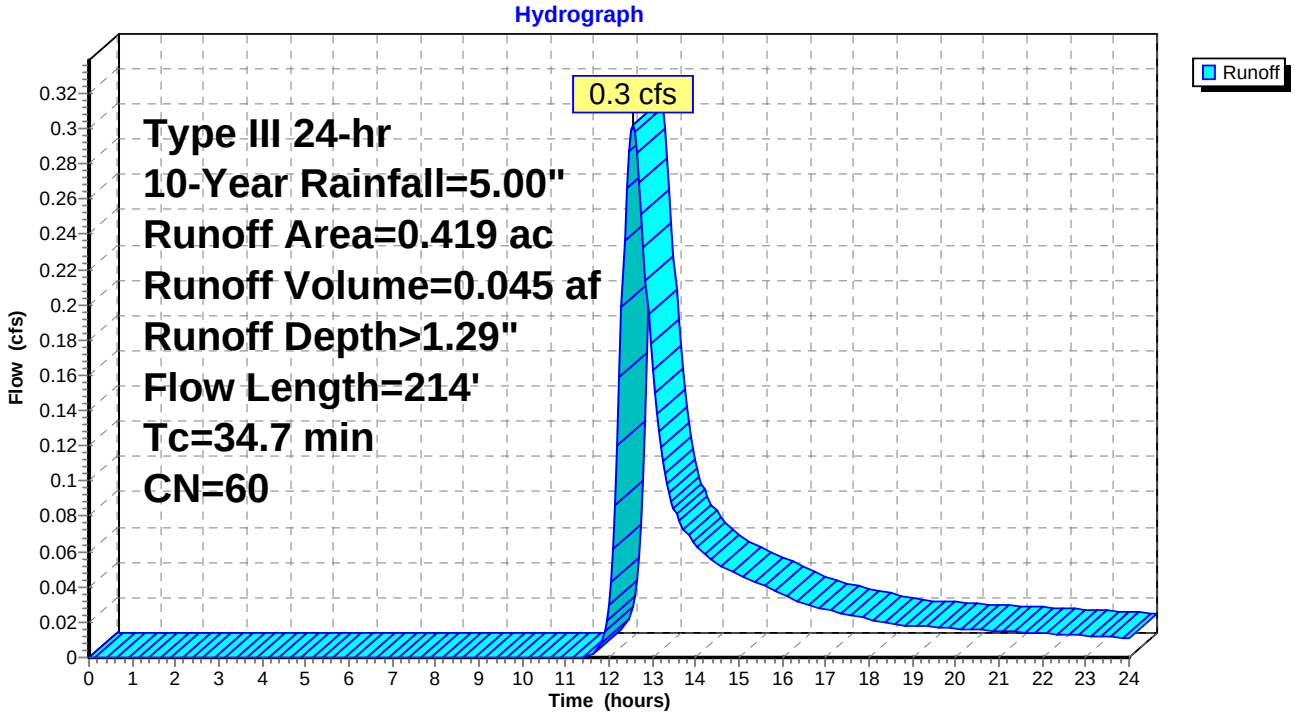
Runoff = 0.3 cfs @ 12.55 hrs, Volume= 0.045 af, Depth> 1.29"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=5.00"

Area (ac)	CN	Description
0.215	60	Woods, Fair, HSG B
0.204	61	>75% Grass cover, Good, HSG B
0.419	60	Weighted Average
0.419		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.2	58	0.0034	0.05		**Sheet Flow, Grass** Grass: Dense n= 0.240 P2= 3.40"
12.8	42	0.0119	0.05		**Sheet Flow, Woods** Woods: Light underbrush n= 0.400 P2= 3.40"
2.8	86	0.0105	0.51		**Shallow Concentrated Flow, Woods** Woodland Kv= 5.0 fps
0.9	28	0.0050	0.49		**Shallow Concentrated Flow, Grass** Short Grass Pasture Kv= 7.0 fps
34.7	214	Total			

Subcatchment 5S: Area 2 - East

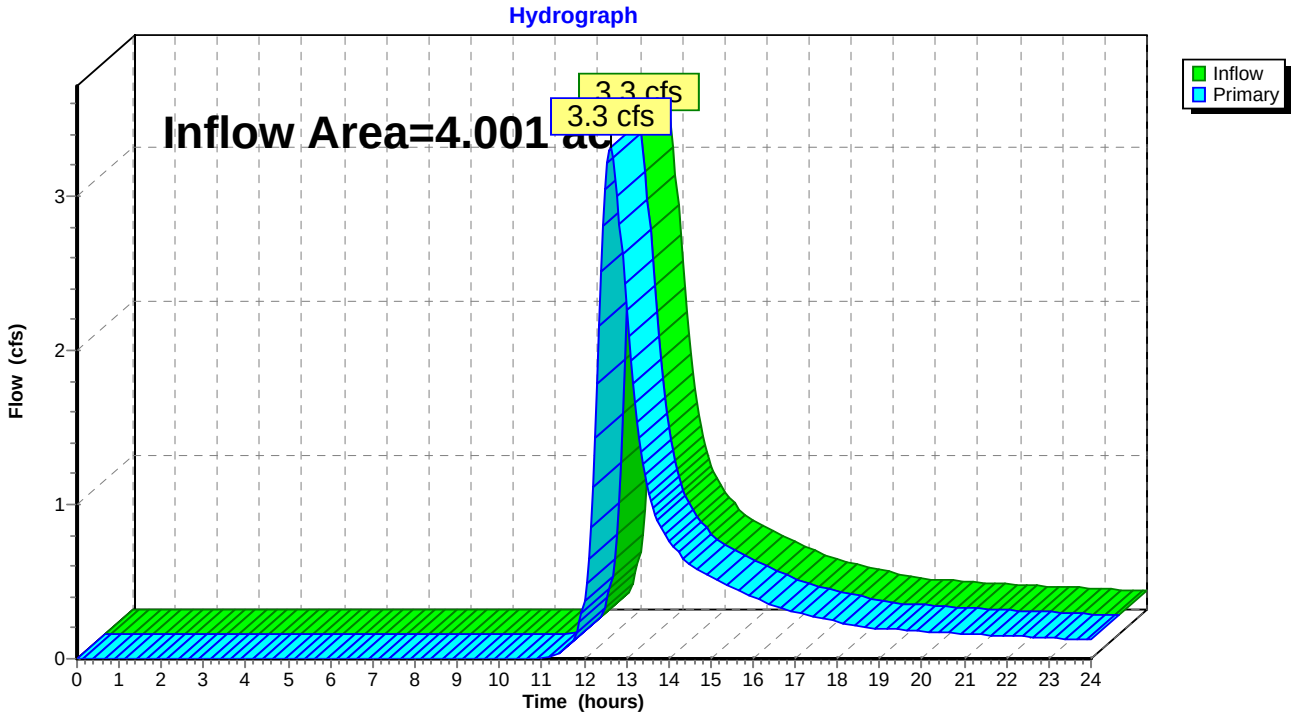


Summary for Link 4L: Wooded Area to East

Inflow Area = 4.001 ac, 0.00% Impervious, Inflow Depth > 1.56" for 10-Year event
Inflow = 3.3 cfs @ 12.64 hrs, Volume= 0.521 af
Primary = 3.3 cfs @ 12.64 hrs, Volume= 0.521 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link 4L: Wooded Area to East

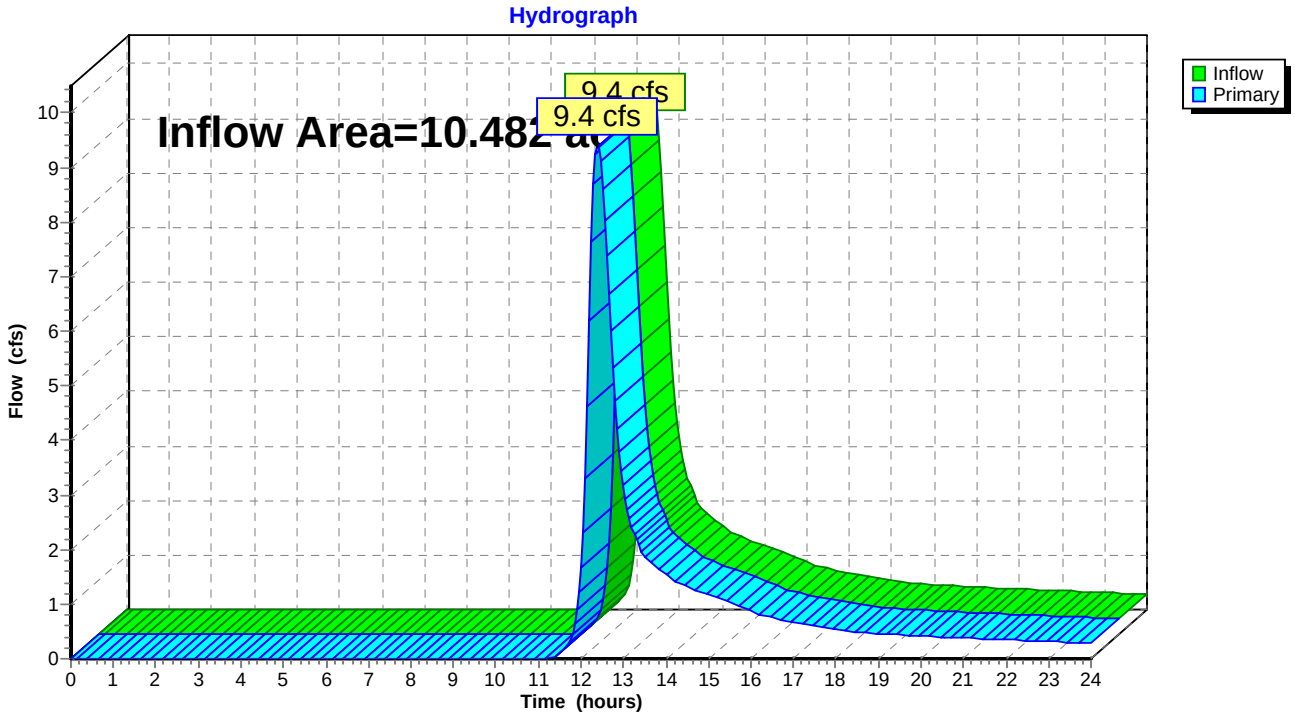


Summary for Link 6L: To Reservoir

Inflow Area = 10.482 ac, 0.00% Impervious, Inflow Depth > 1.36" for 10-Year event
Inflow = 9.4 cfs @ 12.39 hrs, Volume= 1.190 af
Primary = 9.4 cfs @ 12.39 hrs, Volume= 1.190 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link 6L: To Reservoir

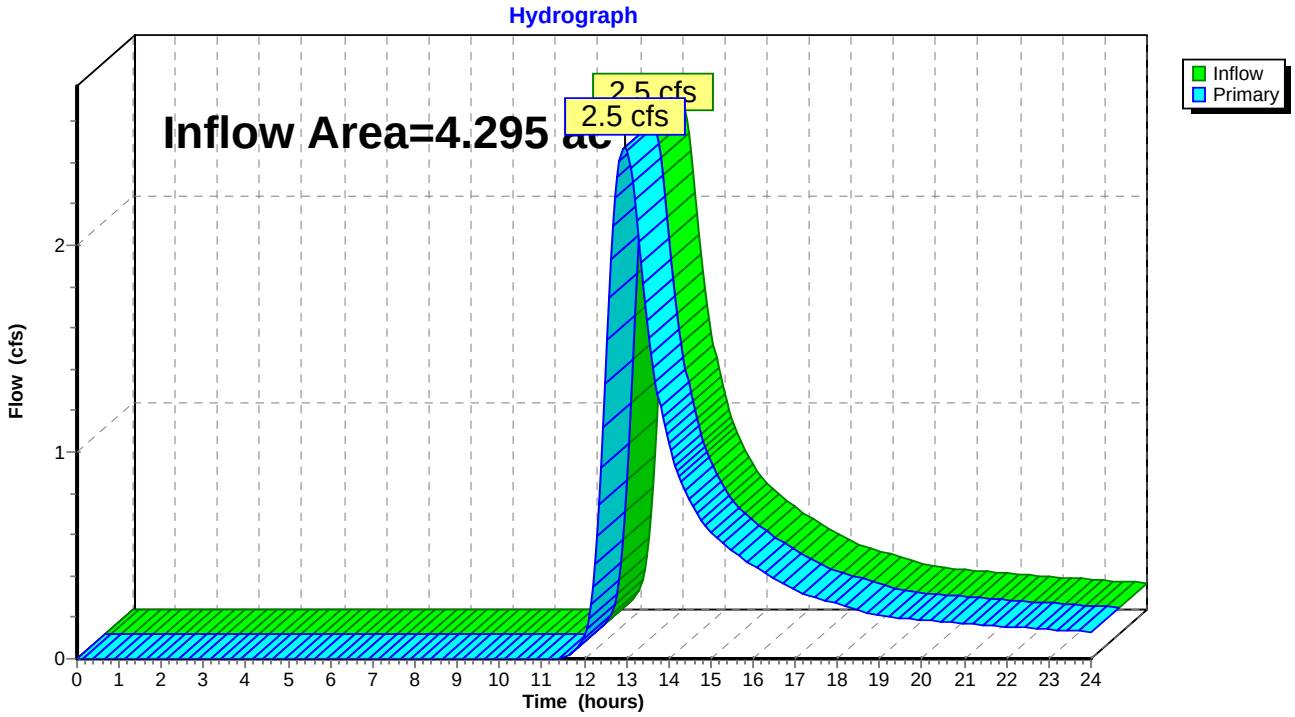


Summary for Link 7L: Off-Site Flow to South

Inflow Area = 4.295 ac, 0.00% Impervious, Inflow Depth > 1.41" for 10-Year event
Inflow = 2.5 cfs @ 12.95 hrs, Volume= 0.505 af
Primary = 2.5 cfs @ 12.95 hrs, Volume= 0.505 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link 7L: Off-Site Flow to South

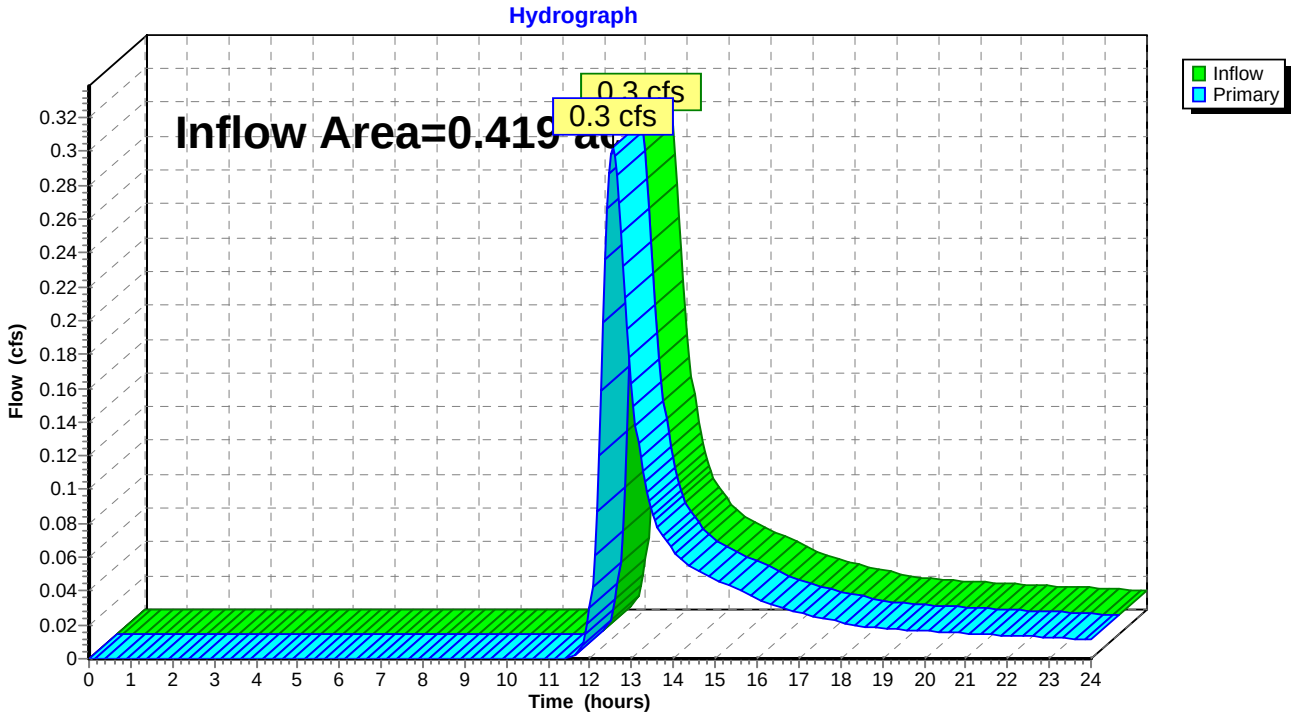


Summary for Link 8L: Off-Site Flow to East

Inflow Area = 0.419 ac, 0.00% Impervious, Inflow Depth > 1.29" for 10-Year event
Inflow = 0.3 cfs @ 12.55 hrs, Volume= 0.045 af
Primary = 0.3 cfs @ 12.55 hrs, Volume= 0.045 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link 8L: Off-Site Flow to East



Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1S: Area 1 - North Runoff Area=5.074 ac 0.00% Impervious Runoff Depth>1.72"
Flow Length=596' Tc=25.2 min CN=60 Runoff=5.8 cfs 0.726 af

Subcatchment 2S: Area 1 - West Runoff Area=5.408 ac 0.00% Impervious Runoff Depth>1.88"
Flow Length=437' Tc=24.6 min CN=62 Runoff=7.0 cfs 0.846 af

Subcatchment 3S: Area 1 - East Runoff Area=4.001 ac 0.00% Impervious Runoff Depth>2.03"
Flow Length=831' Tc=42.6 min CN=64 Runoff=4.4 cfs 0.677 af

Subcatchment 4S: Area 2 - West Runoff Area=4.295 ac 0.00% Impervious Runoff Depth>1.85"
Flow Length=662' Tc=64.9 min CN=62 Runoff=3.4 cfs 0.664 af

Subcatchment 5S: Area 2 - East Runoff Area=0.419 ac 0.00% Impervious Runoff Depth>1.71"
Flow Length=214' Tc=34.7 min CN=60 Runoff=0.4 cfs 0.060 af

Link 4L: Wooded Area to East Inflow=4.4 cfs 0.677 af
Primary=4.4 cfs 0.677 af

Link 6L: To Reservoir Inflow=12.8 cfs 1.571 af
Primary=12.8 cfs 1.571 af

Link 7L: Off-Site Flow to South Inflow=3.4 cfs 0.664 af
Primary=3.4 cfs 0.664 af

Link 8L: Off-Site Flow to East Inflow=0.4 cfs 0.060 af
Primary=0.4 cfs 0.060 af

Total Runoff Area = 19.197 ac Runoff Volume = 2.971 af Average Runoff Depth = 1.86"
100.00% Pervious = 19.197 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment 1S: Area 1 - North

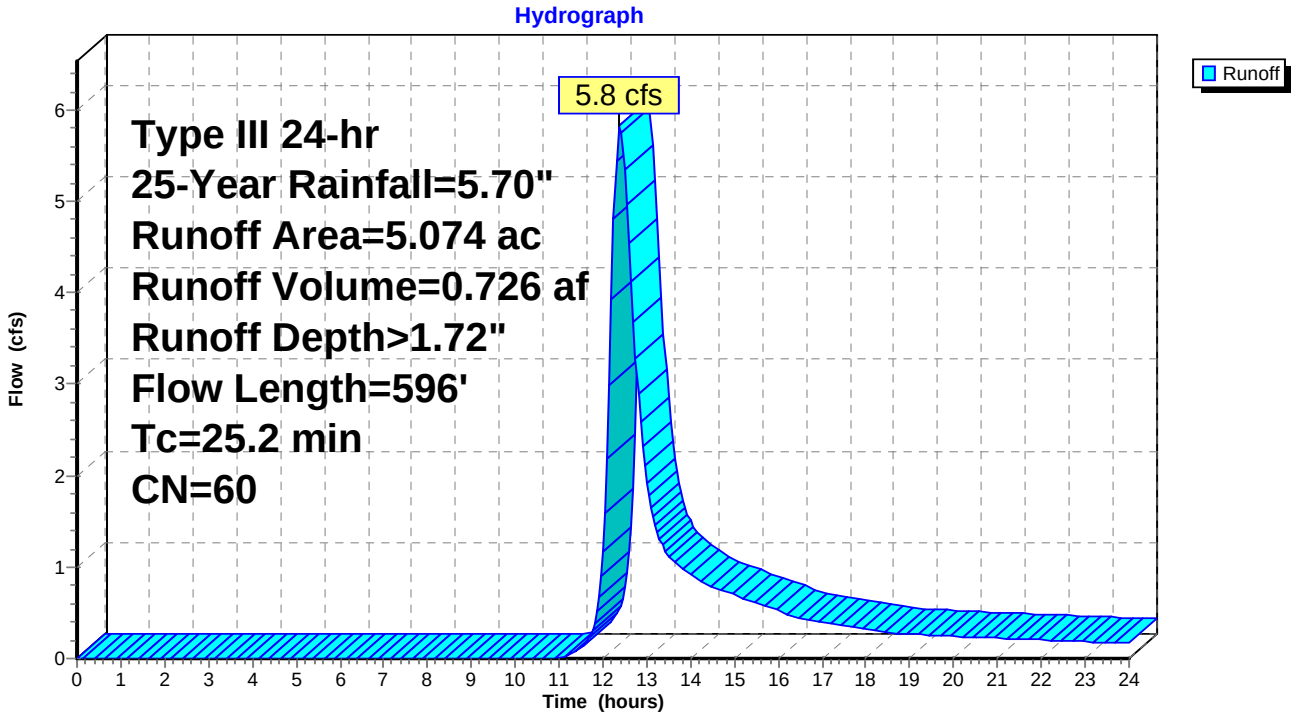
Runoff = 5.8 cfs @ 12.39 hrs, Volume= 0.726 af, Depth> 1.72"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=5.70"

Area (ac)	CN	Description
2.589	60	Woods, Fair, HSG B
2.485	61	>75% Grass cover, Good, HSG B
5.074	60	Weighted Average
5.074		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.5	100	0.0177	0.11		**Sheet Flow, Grass and Trees** Grass: Dense n= 0.240 P2= 3.40"
1.0	40	0.0085	0.65		**Shallow Concentrated Flow, Grass and Trees** Short Grass Pasture Kv= 7.0 fps
0.3	32	0.0625	1.75		**Shallow Concentrated Flow, Grass and Trees** Short Grass Pasture Kv= 7.0 fps
2.9	143	0.0140	0.83		**Shallow Concentrated Flow, Grass** Short Grass Pasture Kv= 7.0 fps
5.2	211	0.0095	0.68		**Shallow Concentrated Flow, Grass** Short Grass Pasture Kv= 7.0 fps
1.3	70	0.0323	0.90		**Shallow Concentrated Flow, Woods** Woodland Kv= 5.0 fps
25.2	596	Total			

Subcatchment 1S: Area 1 - North



Summary for Subcatchment 2S: Area 1 - West

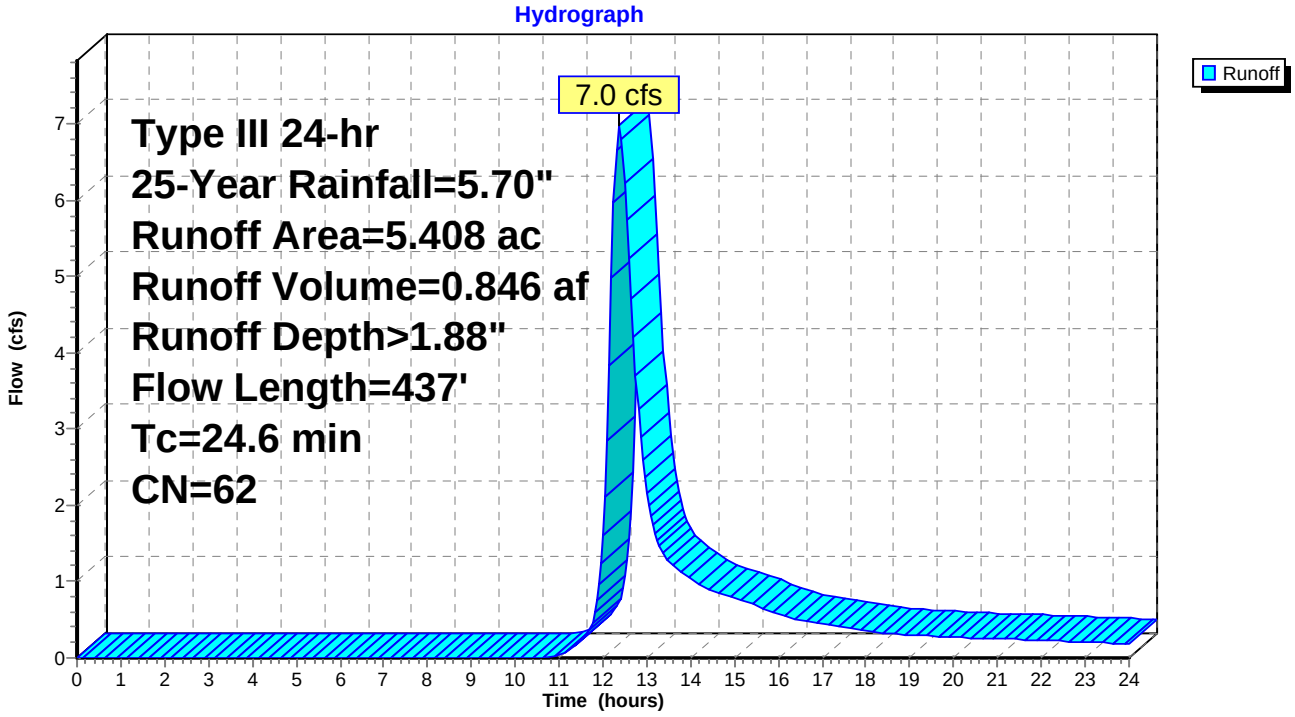
Runoff = 7.0 cfs @ 12.37 hrs, Volume= 0.846 af, Depth> 1.88"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=5.70"

Area (ac)	CN	Description
5.144	61	>75% Grass cover, Good, HSG B
0.068	60	Woods, Fair, HSG B
0.196	85	Gravel roads, HSG B
5.408	62	Weighted Average
5.408		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.0	100	0.0120	0.10		**Sheet Flow, Grass** Grass: Dense n= 0.240 P2= 3.40"
7.5	312	0.0099	0.70		**Shallow Concentrated Flow, Grass** Short Grass Pasture Kv= 7.0 fps
0.1	25	0.1581	2.78		**Shallow Concentrated Flow, Grass** Short Grass Pasture Kv= 7.0 fps
24.6	437	Total			

Subcatchment 2S: Area 1 - West



Summary for Subcatchment 3S: Area 1 - East

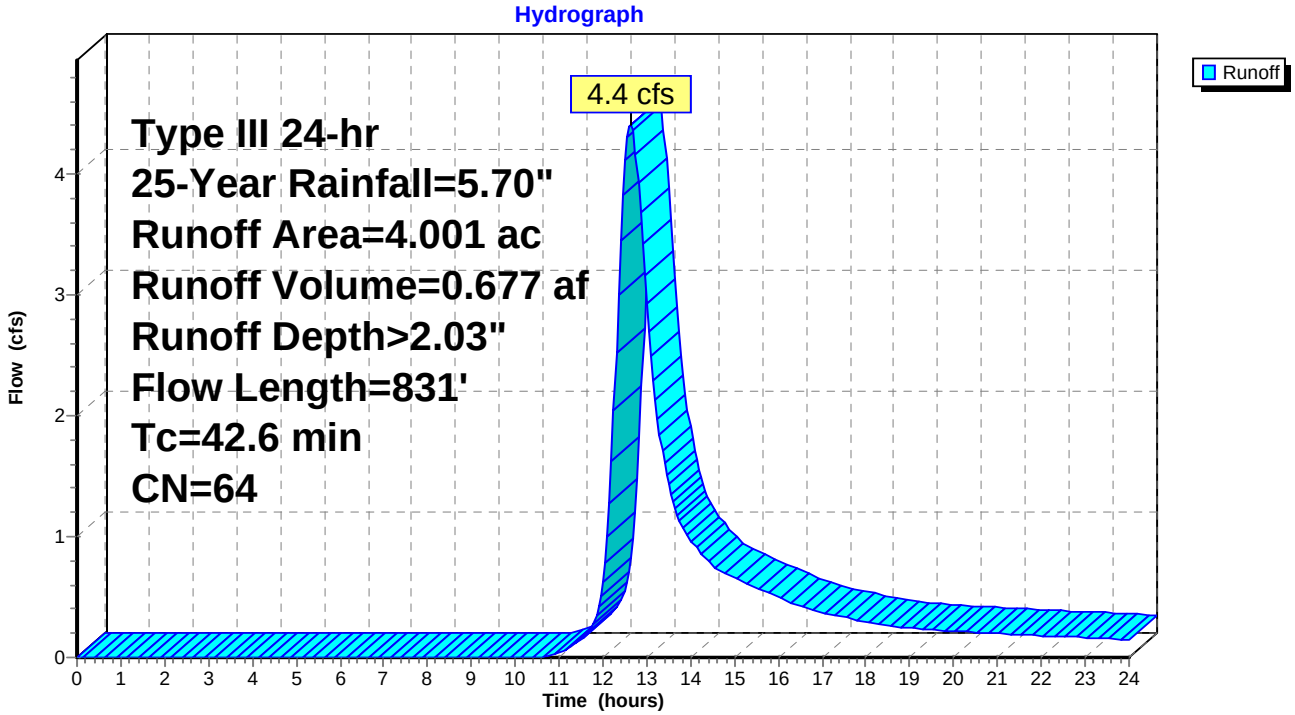
Runoff = 4.4 cfs @ 12.63 hrs, Volume= 0.677 af, Depth> 2.03"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=5.70"

Area (ac)	CN	Description
0.450	85	Gravel roads, HSG B
3.551	61	>75% Grass cover, Good, HSG B
4.001	64	Weighted Average
4.001		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
19.1	100	0.0090	0.09		**Sheet Flow, Grass** Grass: Dense n= 0.240 P2= 3.40"
7.1	174	0.0034	0.41		**Shallow Concentrated Flow, Grass** Short Grass Pasture Kv= 7.0 fps
16.3	526	0.0059	0.54		**Shallow Concentrated Flow, Grass** Short Grass Pasture Kv= 7.0 fps
0.1	31	0.0742	4.39		**Shallow Concentrated Flow, Grass/Gravel** Unpaved Kv= 16.1 fps
42.6	831	Total			

Subcatchment 3S: Area 1 - East



Summary for Subcatchment 4S: Area 2 - West

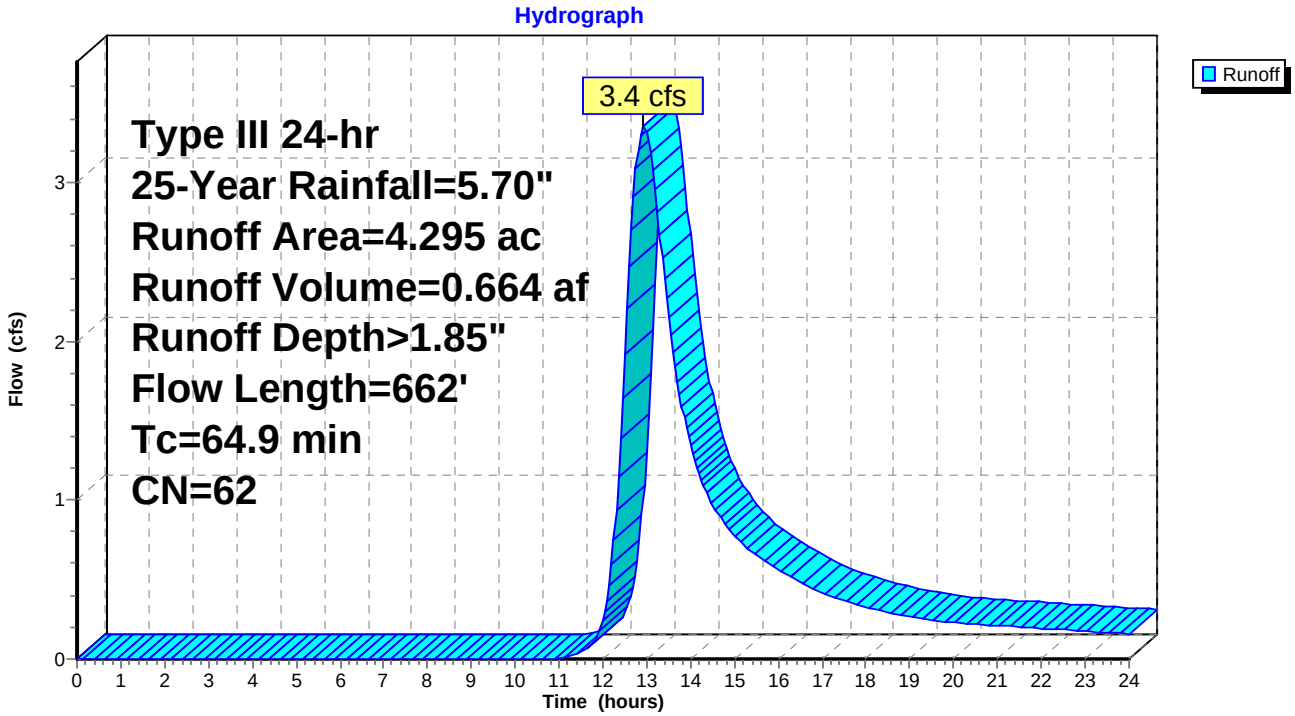
Runoff = 3.4 cfs @ 12.93 hrs, Volume= 0.664 af, Depth> 1.85"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=5.70"

Area (ac)	CN	Description
2.163	60	Woods, Fair, HSG B
1.790	61	>75% Grass cover, Good, HSG B
0.342	85	Gravel roads, HSG B
4.295	62	Weighted Average
4.295		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
30.1	100	0.0080	0.06		**Sheet Flow, Woods** Woods: Light underbrush n= 0.400 P2= 3.40"
1.9	86	0.0233	0.76		**Shallow Concentrated Flow, Woods** Woodland Kv= 5.0 fps
7.5	235	0.0055	0.52		**Shallow Concentrated Flow, Grass** Short Grass Pasture Kv= 7.0 fps
25.4	241	0.0010	0.16		**Shallow Concentrated Flow, Woods** Woodland Kv= 5.0 fps
64.9	662	Total			

Subcatchment 4S: Area 2 - West



Summary for Subcatchment 5S: Area 2 - East

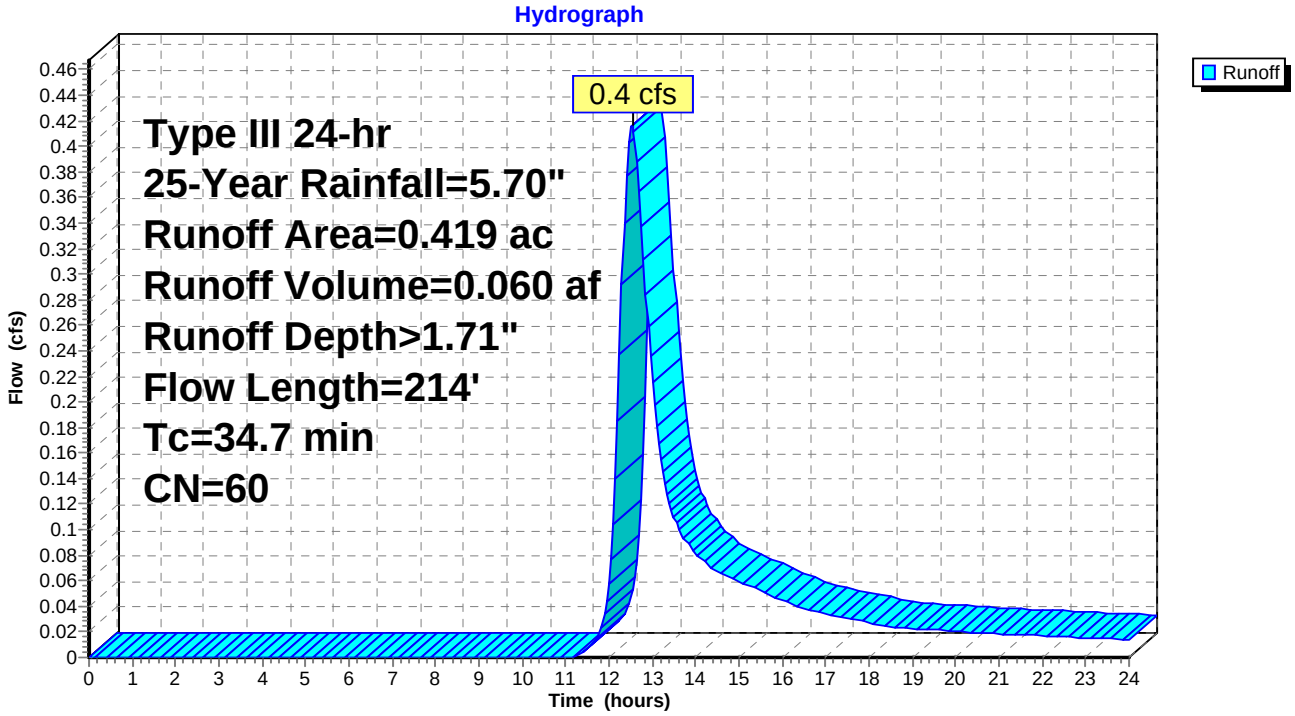
Runoff = 0.4 cfs @ 12.53 hrs, Volume= 0.060 af, Depth> 1.71"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=5.70"

Area (ac)	CN	Description
0.215	60	Woods, Fair, HSG B
0.204	61	>75% Grass cover, Good, HSG B
0.419	60	Weighted Average
0.419		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.2	58	0.0034	0.05		**Sheet Flow, Grass** Grass: Dense n= 0.240 P2= 3.40"
12.8	42	0.0119	0.05		**Sheet Flow, Woods** Woods: Light underbrush n= 0.400 P2= 3.40"
2.8	86	0.0105	0.51		**Shallow Concentrated Flow, Woods** Woodland Kv= 5.0 fps
0.9	28	0.0050	0.49		**Shallow Concentrated Flow, Grass** Short Grass Pasture Kv= 7.0 fps
34.7	214	Total			

Subcatchment 5S: Area 2 - East

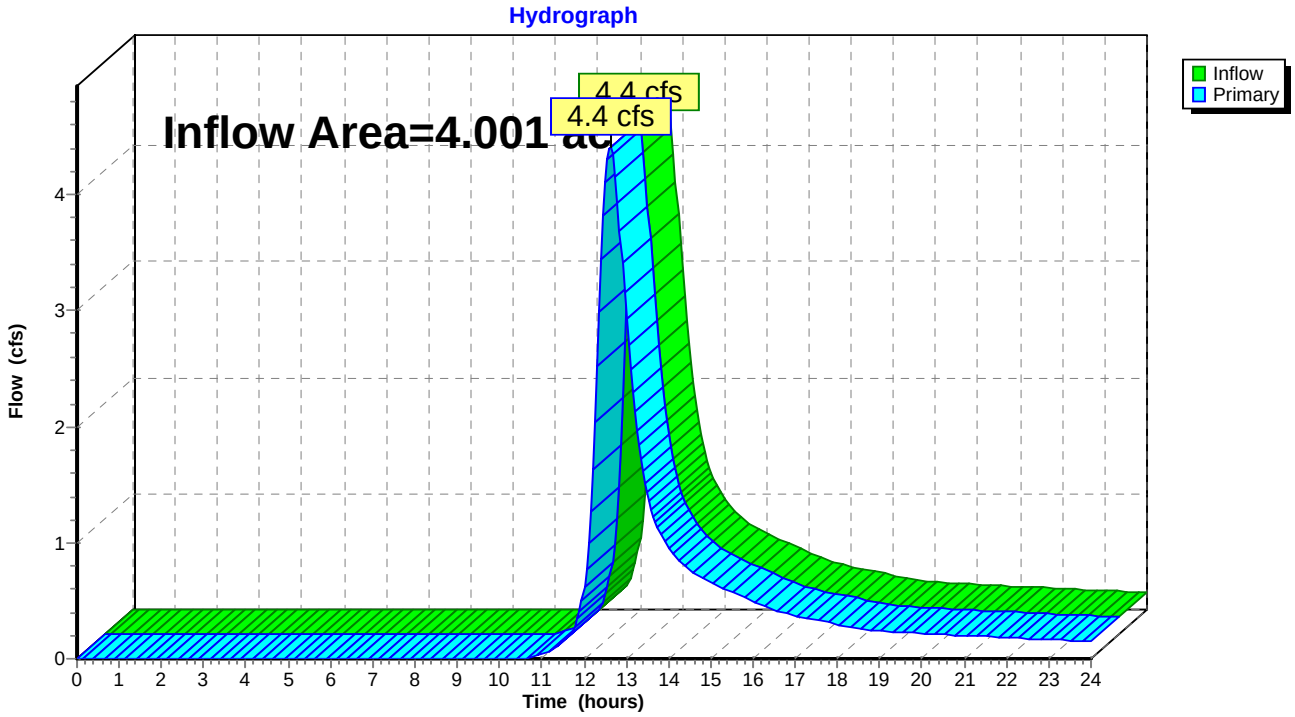


Summary for Link 4L: Wooded Area to East

Inflow Area = 4.001 ac, 0.00% Impervious, Inflow Depth > 2.03" for 25-Year event
Inflow = 4.4 cfs @ 12.63 hrs, Volume= 0.677 af
Primary = 4.4 cfs @ 12.63 hrs, Volume= 0.677 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link 4L: Wooded Area to East

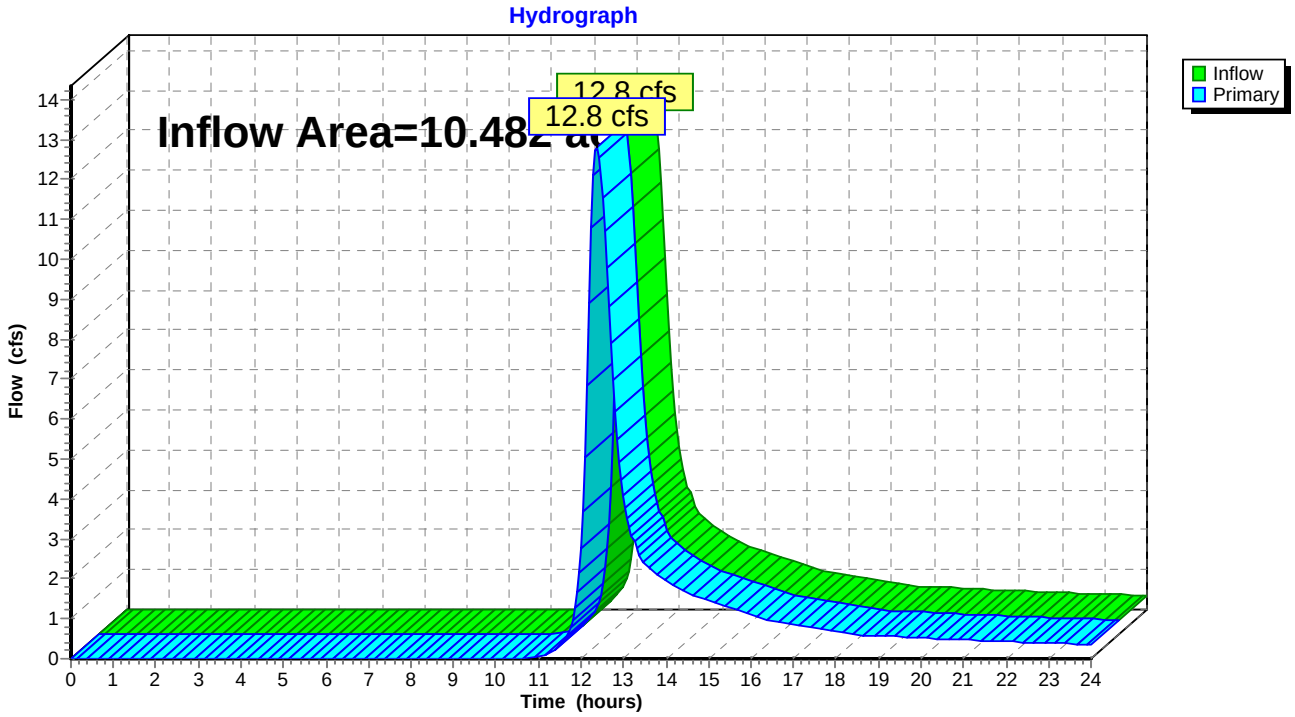


Summary for Link 6L: To Reservoir

Inflow Area = 10.482 ac, 0.00% Impervious, Inflow Depth > 1.80" for 25-Year event
Inflow = 12.8 cfs @ 12.38 hrs, Volume= 1.571 af
Primary = 12.8 cfs @ 12.38 hrs, Volume= 1.571 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link 6L: To Reservoir

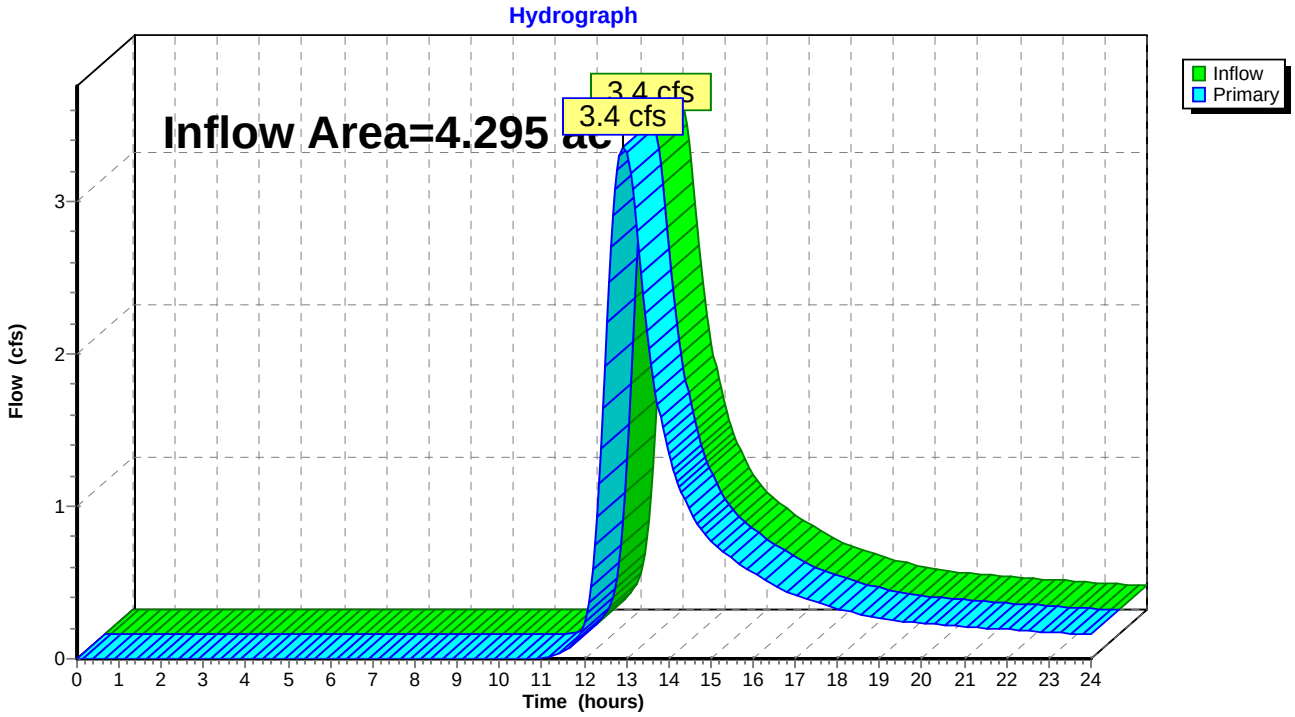


Summary for Link 7L: Off-Site Flow to South

Inflow Area = 4.295 ac, 0.00% Impervious, Inflow Depth > 1.85" for 25-Year event
Inflow = 3.4 cfs @ 12.93 hrs, Volume= 0.664 af
Primary = 3.4 cfs @ 12.93 hrs, Volume= 0.664 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link 7L: Off-Site Flow to South

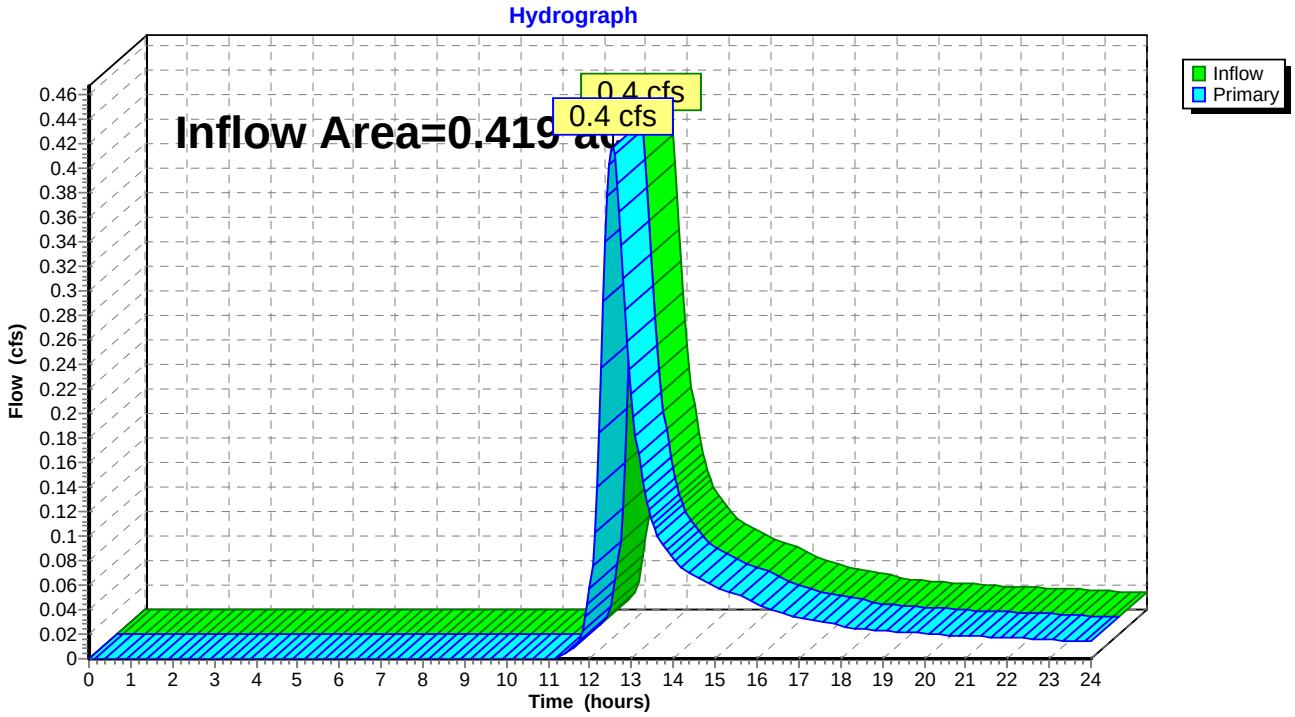


Summary for Link 8L: Off-Site Flow to East

Inflow Area = 0.419 ac, 0.00% Impervious, Inflow Depth > 1.71" for 25-Year event
Inflow = 0.4 cfs @ 12.53 hrs, Volume= 0.060 af
Primary = 0.4 cfs @ 12.53 hrs, Volume= 0.060 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link 8L: Off-Site Flow to East



Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1S: Area 1 - North Runoff Area=5.074 ac 0.00% Impervious Runoff Depth>2.11"
Flow Length=596' Tc=25.2 min CN=60 Runoff=7.3 cfs 0.891 af

Subcatchment 2S: Area 1 - West Runoff Area=5.408 ac 0.00% Impervious Runoff Depth>2.28"
Flow Length=437' Tc=24.6 min CN=62 Runoff=8.7 cfs 1.030 af

Subcatchment 3S: Area 1 - East Runoff Area=4.001 ac 0.00% Impervious Runoff Depth>2.45"
Flow Length=831' Tc=42.6 min CN=64 Runoff=5.4 cfs 0.818 af

Subcatchment 4S: Area 2 - West Runoff Area=4.295 ac 0.00% Impervious Runoff Depth>2.26"
Flow Length=662' Tc=64.9 min CN=62 Runoff=4.2 cfs 0.808 af

Subcatchment 5S: Area 2 - East Runoff Area=0.419 ac 0.00% Impervious Runoff Depth>2.10"
Flow Length=214' Tc=34.7 min CN=60 Runoff=0.5 cfs 0.073 af

Link 4L: Wooded Area to East Inflow=5.4 cfs 0.818 af
Primary=5.4 cfs 0.818 af

Link 6L: To Reservoir Inflow=16.0 cfs 1.920 af
Primary=16.0 cfs 1.920 af

Link 7L: Off-Site Flow to South Inflow=4.2 cfs 0.808 af
Primary=4.2 cfs 0.808 af

Link 8L: Off-Site Flow to East Inflow=0.5 cfs 0.073 af
Primary=0.5 cfs 0.073 af

Total Runoff Area = 19.197 ac Runoff Volume = 3.620 af Average Runoff Depth = 2.26"
100.00% Pervious = 19.197 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment 1S: Area 1 - North

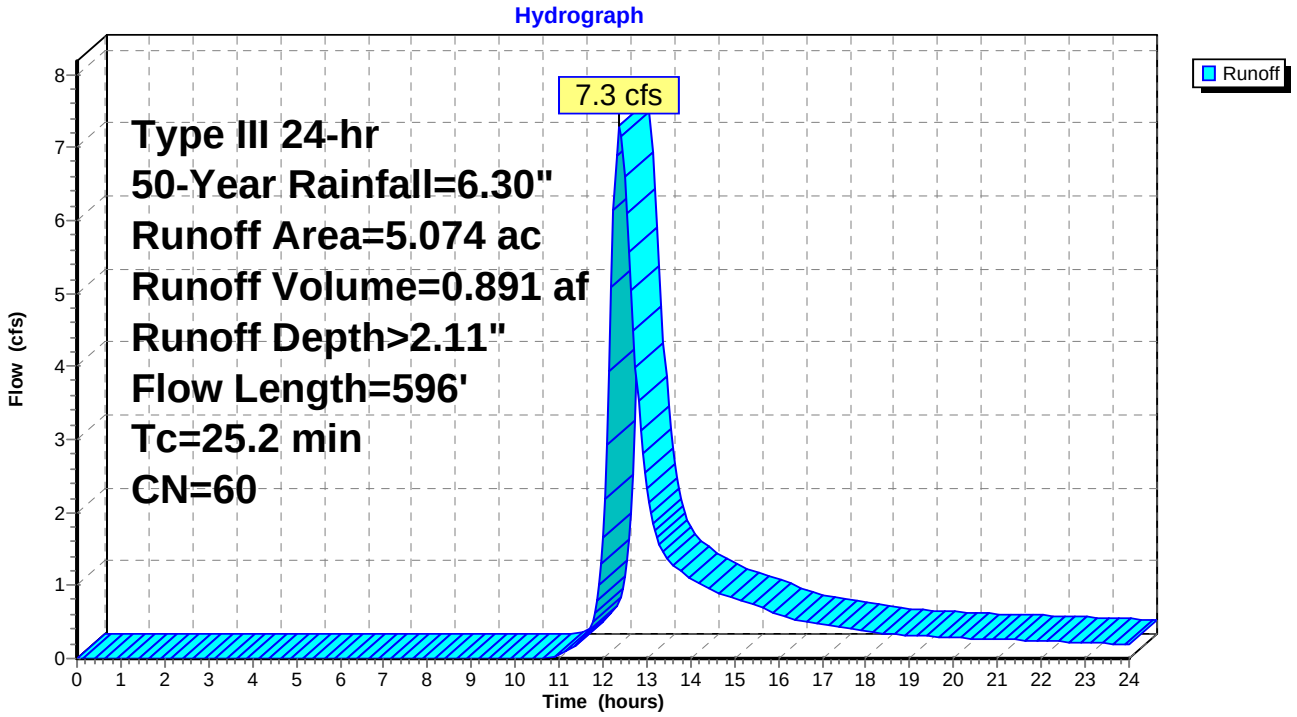
Runoff = 7.3 cfs @ 12.38 hrs, Volume= 0.891 af, Depth> 2.11"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 50-Year Rainfall=6.30"

Area (ac)	CN	Description
2.589	60	Woods, Fair, HSG B
2.485	61	>75% Grass cover, Good, HSG B
5.074	60	Weighted Average
5.074		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.5	100	0.0177	0.11		**Sheet Flow, Grass and Trees** Grass: Dense n= 0.240 P2= 3.40"
1.0	40	0.0085	0.65		**Shallow Concentrated Flow, Grass and Trees** Short Grass Pasture Kv= 7.0 fps
0.3	32	0.0625	1.75		**Shallow Concentrated Flow, Grass and Trees** Short Grass Pasture Kv= 7.0 fps
2.9	143	0.0140	0.83		**Shallow Concentrated Flow, Grass** Short Grass Pasture Kv= 7.0 fps
5.2	211	0.0095	0.68		**Shallow Concentrated Flow, Grass** Short Grass Pasture Kv= 7.0 fps
1.3	70	0.0323	0.90		**Shallow Concentrated Flow, Woods** Woodland Kv= 5.0 fps
25.2	596	Total			

Subcatchment 1S: Area 1 - North



Summary for Subcatchment 2S: Area 1 - West

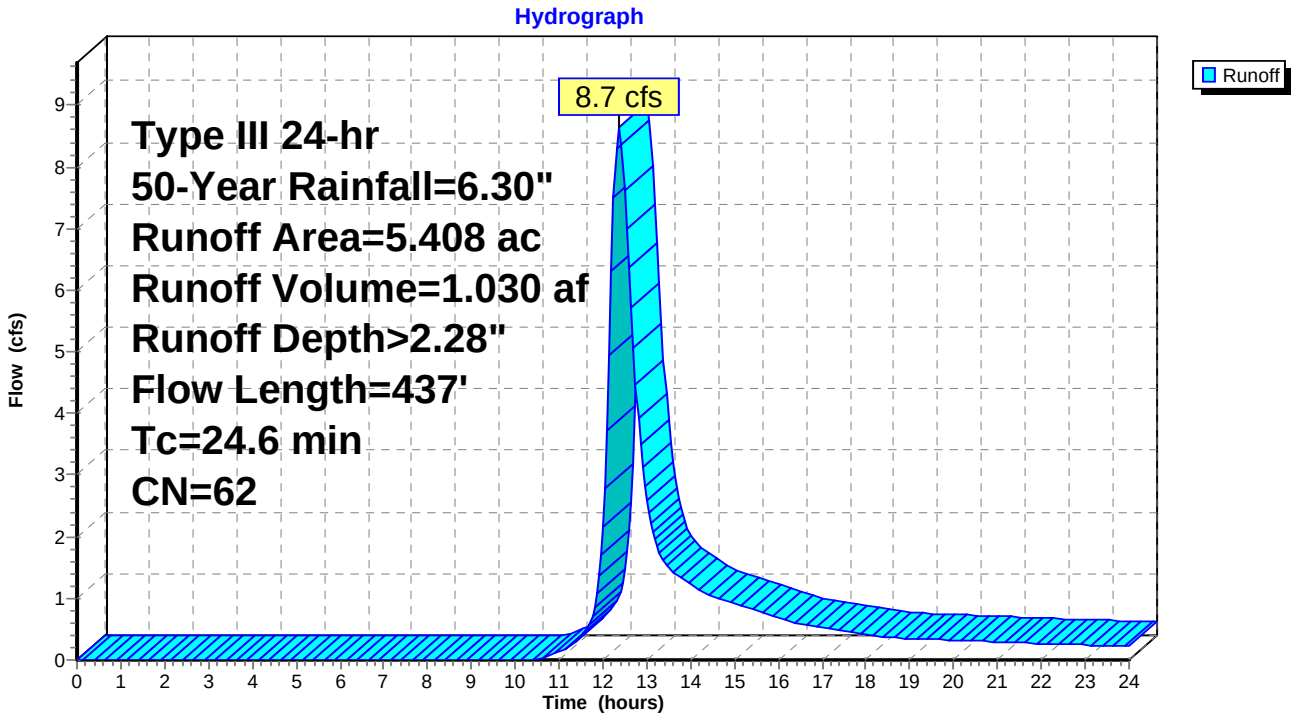
Runoff = 8.7 cfs @ 12.37 hrs, Volume= 1.030 af, Depth> 2.28"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 50-Year Rainfall=6.30"

Area (ac)	CN	Description
5.144	61	>75% Grass cover, Good, HSG B
0.068	60	Woods, Fair, HSG B
0.196	85	Gravel roads, HSG B
5.408	62	Weighted Average
5.408		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.0	100	0.0120	0.10		**Sheet Flow, Grass** Grass: Dense n= 0.240 P2= 3.40"
7.5	312	0.0099	0.70		**Shallow Concentrated Flow, Grass** Short Grass Pasture Kv= 7.0 fps
0.1	25	0.1581	2.78		**Shallow Concentrated Flow, Grass** Short Grass Pasture Kv= 7.0 fps
24.6	437	Total			

Subcatchment 2S: Area 1 - West



Summary for Subcatchment 3S: Area 1 - East

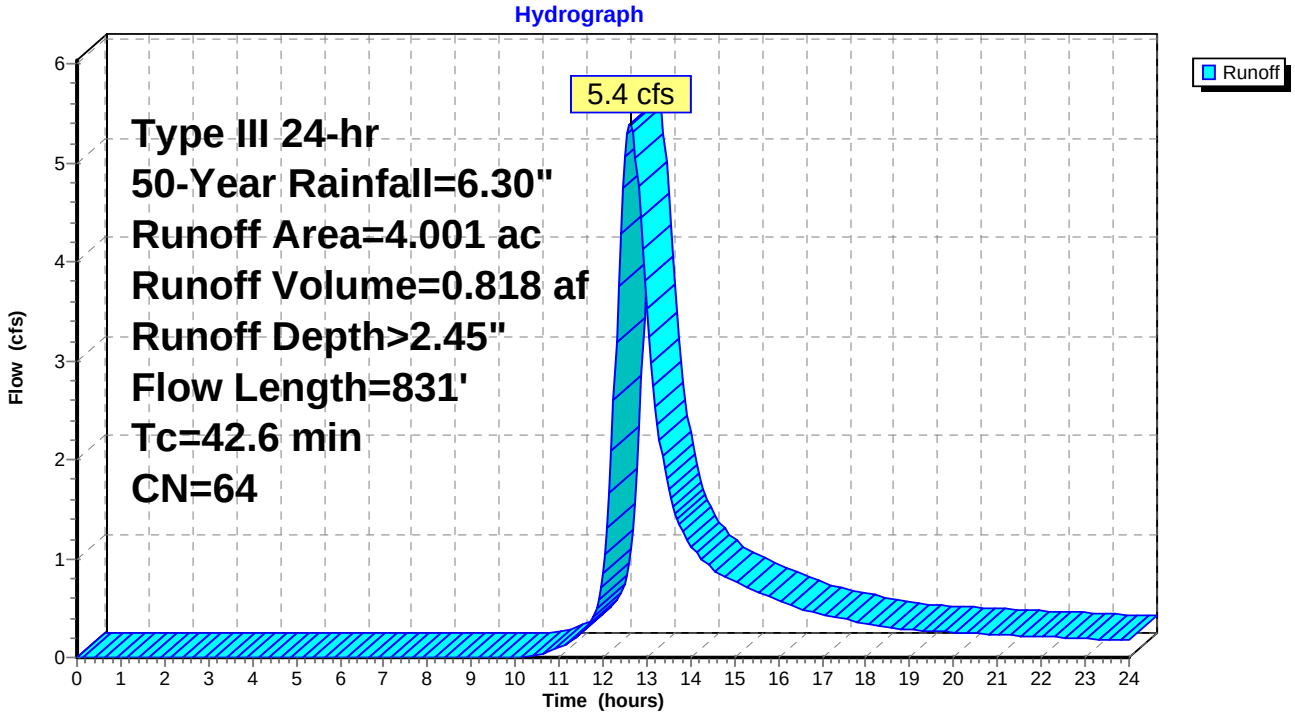
Runoff = 5.4 cfs @ 12.62 hrs, Volume= 0.818 af, Depth> 2.45"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 50-Year Rainfall=6.30"

Area (ac)	CN	Description
0.450	85	Gravel roads, HSG B
3.551	61	>75% Grass cover, Good, HSG B
4.001	64	Weighted Average
4.001		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
19.1	100	0.0090	0.09		**Sheet Flow, Grass** Grass: Dense n= 0.240 P2= 3.40"
7.1	174	0.0034	0.41		**Shallow Concentrated Flow, Grass** Short Grass Pasture Kv= 7.0 fps
16.3	526	0.0059	0.54		**Shallow Concentrated Flow, Grass** Short Grass Pasture Kv= 7.0 fps
0.1	31	0.0742	4.39		**Shallow Concentrated Flow, Grass/Gravel** Unpaved Kv= 16.1 fps
42.6	831	Total			

Subcatchment 3S: Area 1 - East



Summary for Subcatchment 4S: Area 2 - West

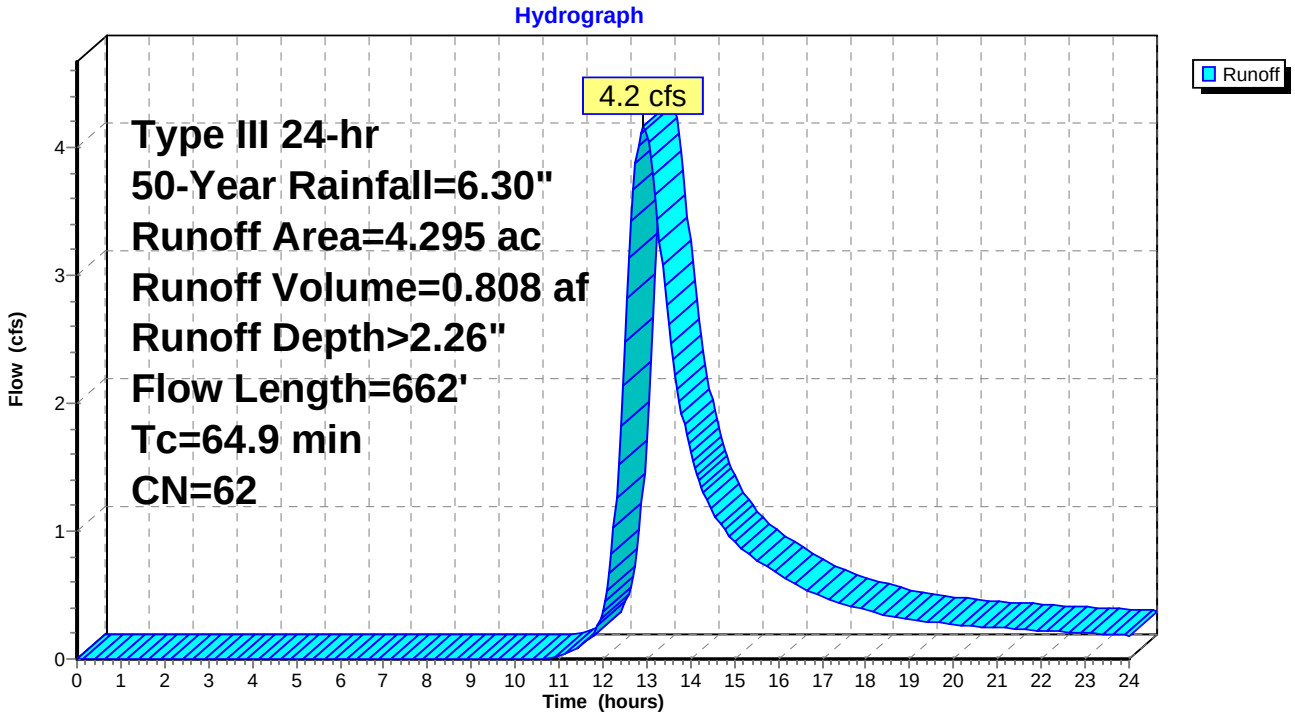
Runoff = 4.2 cfs @ 12.92 hrs, Volume= 0.808 af, Depth> 2.26"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 50-Year Rainfall=6.30"

Area (ac)	CN	Description
2.163	60	Woods, Fair, HSG B
1.790	61	>75% Grass cover, Good, HSG B
0.342	85	Gravel roads, HSG B
4.295	62	Weighted Average
4.295		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
30.1	100	0.0080	0.06		**Sheet Flow, Woods** Woods: Light underbrush n= 0.400 P2= 3.40"
1.9	86	0.0233	0.76		**Shallow Concentrated Flow, Woods** Woodland Kv= 5.0 fps
7.5	235	0.0055	0.52		**Shallow Concentrated Flow, Grass** Short Grass Pasture Kv= 7.0 fps
25.4	241	0.0010	0.16		**Shallow Concentrated Flow, Woods** Woodland Kv= 5.0 fps
64.9	662	Total			

Subcatchment 4S: Area 2 - West



Summary for Subcatchment 5S: Area 2 - East

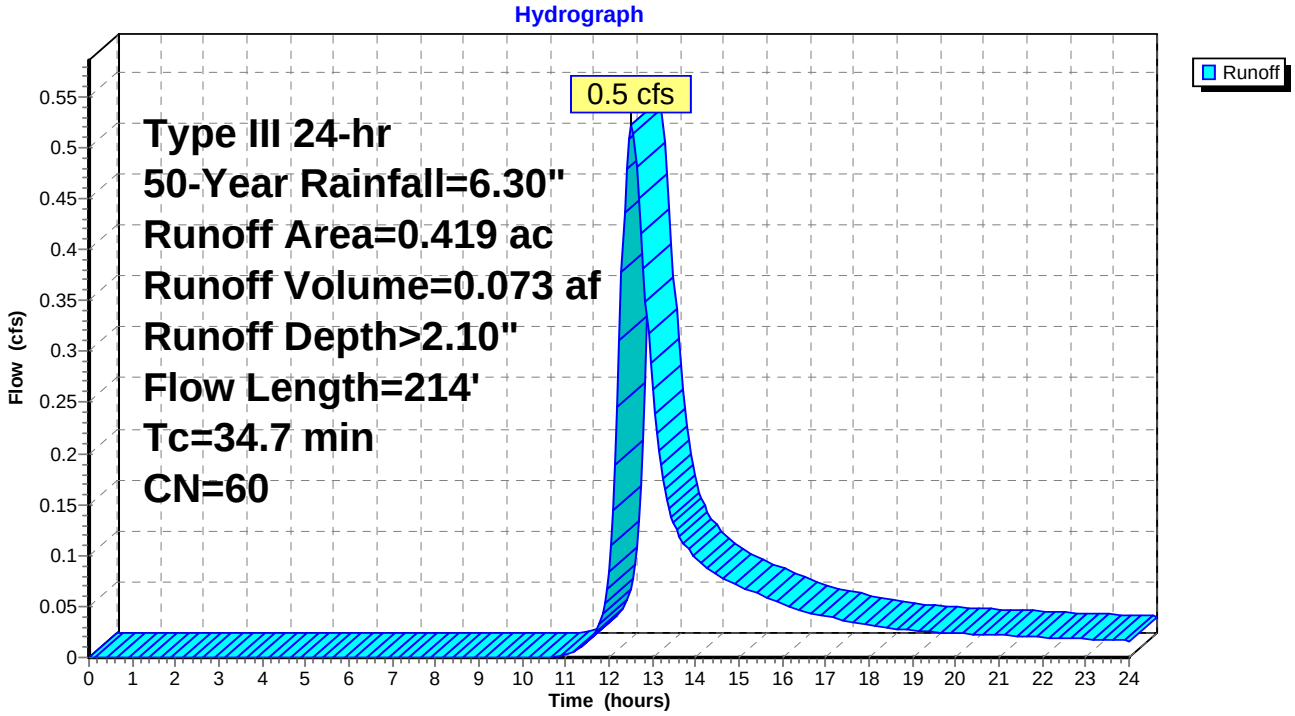
Runoff = 0.5 cfs @ 12.52 hrs, Volume= 0.073 af, Depth> 2.10"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 50-Year Rainfall=6.30"

Area (ac)	CN	Description
0.215	60	Woods, Fair, HSG B
0.204	61	>75% Grass cover, Good, HSG B
0.419	60	Weighted Average
0.419		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.2	58	0.0034	0.05		**Sheet Flow, Grass** Grass: Dense n= 0.240 P2= 3.40"
12.8	42	0.0119	0.05		**Sheet Flow, Woods** Woods: Light underbrush n= 0.400 P2= 3.40"
2.8	86	0.0105	0.51		**Shallow Concentrated Flow, Woods** Woodland Kv= 5.0 fps
0.9	28	0.0050	0.49		**Shallow Concentrated Flow, Grass** Short Grass Pasture Kv= 7.0 fps
34.7	214	Total			

Subcatchment 5S: Area 2 - East

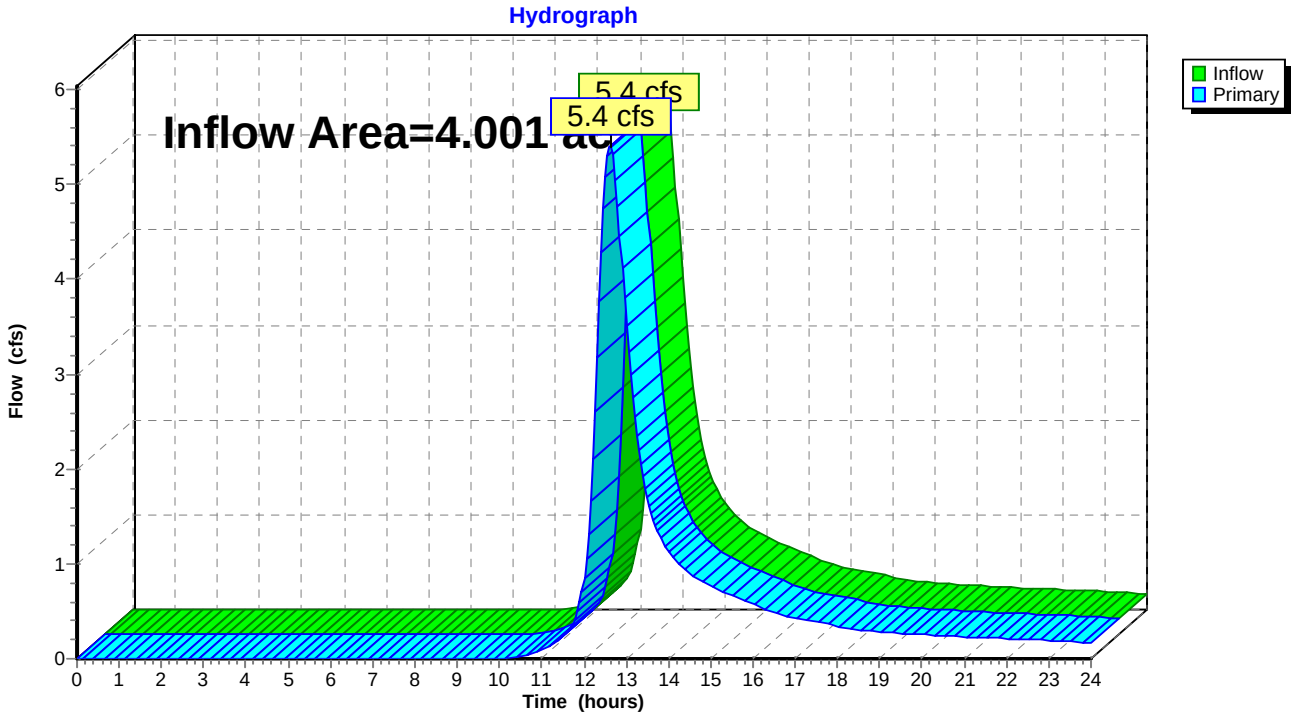


Summary for Link 4L: Wooded Area to East

Inflow Area = 4.001 ac, 0.00% Impervious, Inflow Depth > 2.45" for 50-Year event
Inflow = 5.4 cfs @ 12.62 hrs, Volume= 0.818 af
Primary = 5.4 cfs @ 12.62 hrs, Volume= 0.818 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link 4L: Wooded Area to East

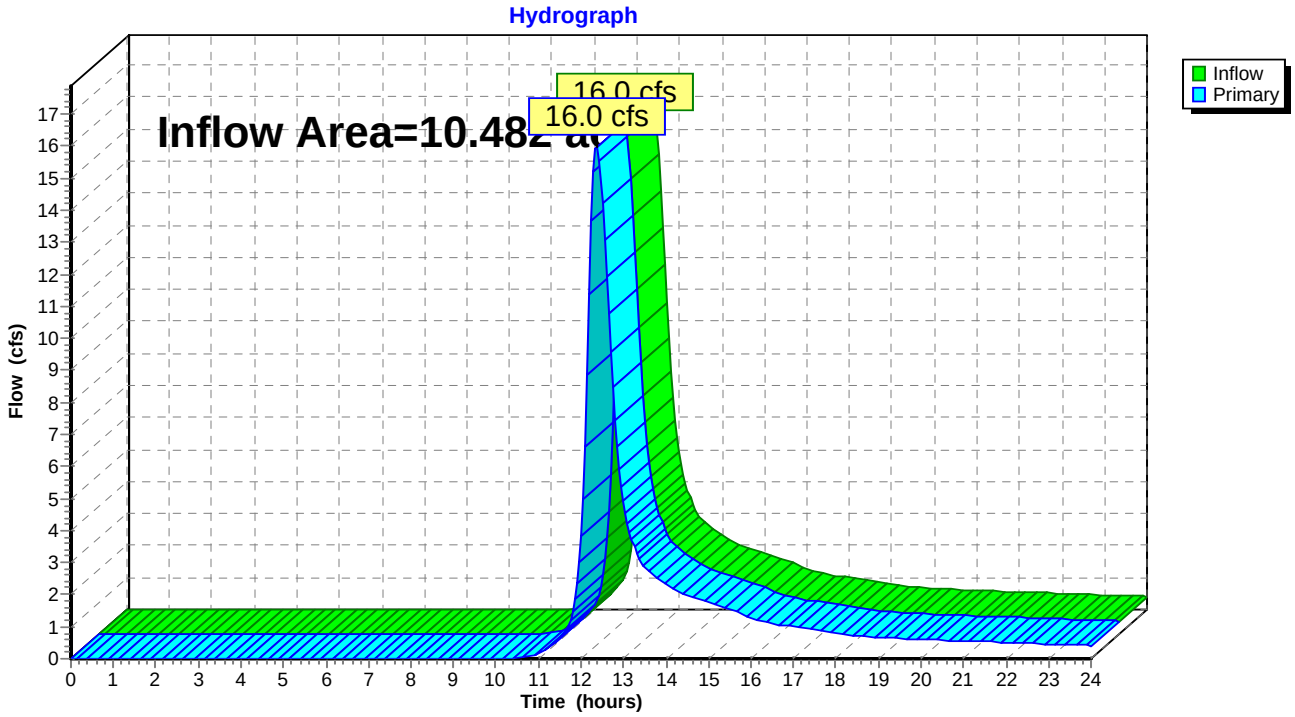


Summary for Link 6L: To Reservoir

Inflow Area = 10.482 ac, 0.00% Impervious, Inflow Depth > 2.20" for 50-Year event
Inflow = 16.0 cfs @ 12.37 hrs, Volume= 1.920 af
Primary = 16.0 cfs @ 12.37 hrs, Volume= 1.920 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link 6L: To Reservoir

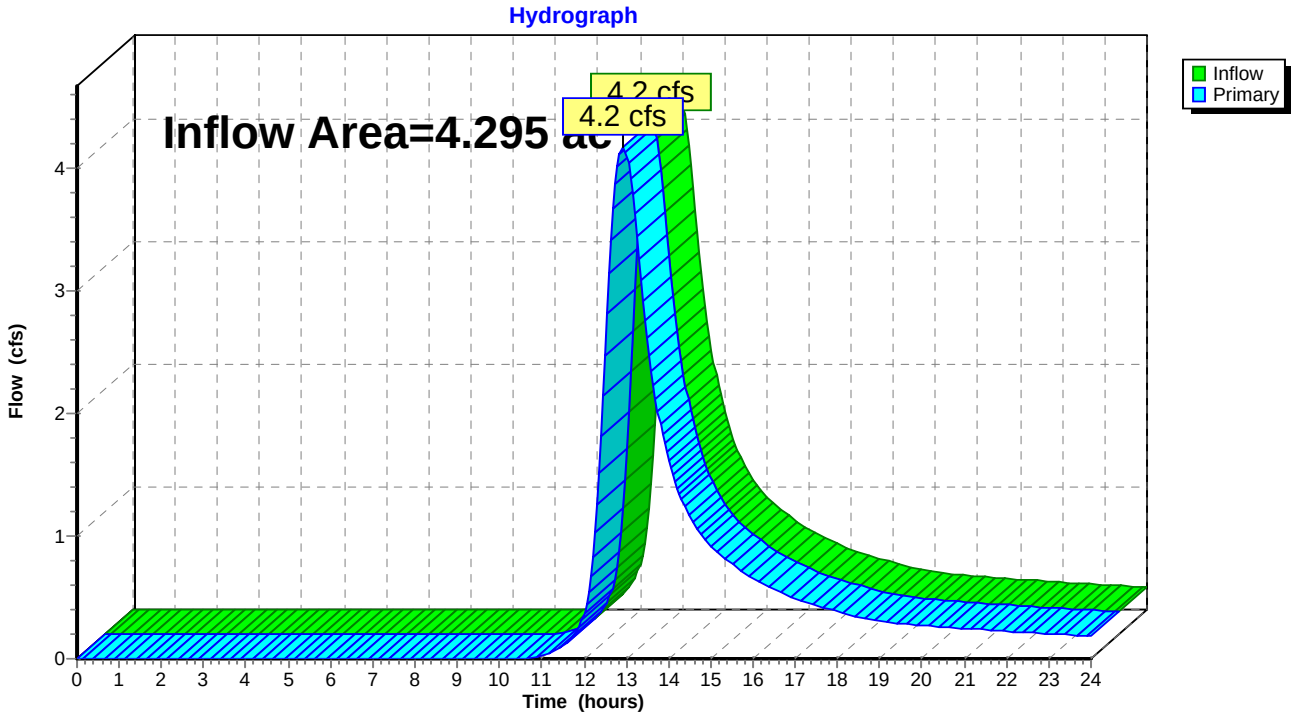


Summary for Link 7L: Off-Site Flow to South

Inflow Area = 4.295 ac, 0.00% Impervious, Inflow Depth > 2.26" for 50-Year event
Inflow = 4.2 cfs @ 12.92 hrs, Volume= 0.808 af
Primary = 4.2 cfs @ 12.92 hrs, Volume= 0.808 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link 7L: Off-Site Flow to South

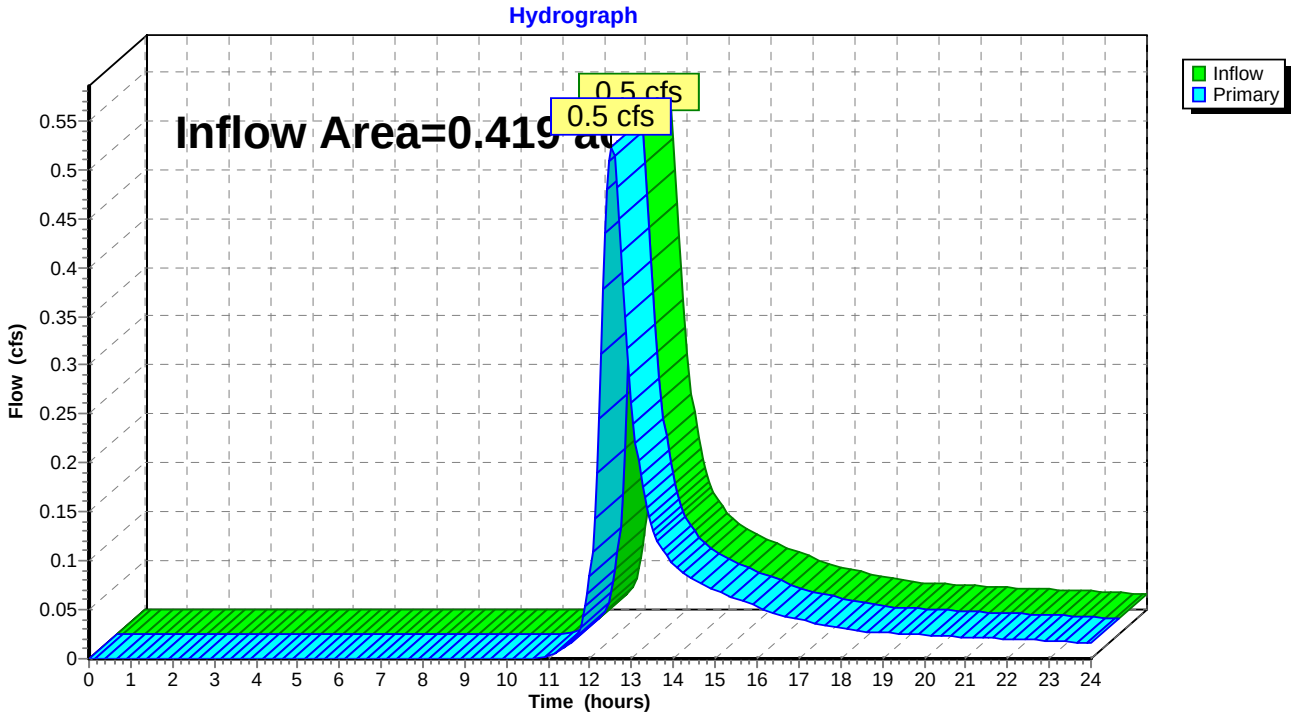


Summary for Link 8L: Off-Site Flow to East

Inflow Area = 0.419 ac, 0.00% Impervious, Inflow Depth > 2.10" for 50-Year event
Inflow = 0.5 cfs @ 12.52 hrs, Volume= 0.073 af
Primary = 0.5 cfs @ 12.52 hrs, Volume= 0.073 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link 8L: Off-Site Flow to East



Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1S: Area 1 - North Runoff Area=5.074 ac 0.00% Impervious Runoff Depth>2.66"
Flow Length=596' Tc=25.2 min CN=60 Runoff=9.4 cfs 1.124 af

Subcatchment 2S: Area 1 - West Runoff Area=5.408 ac 0.00% Impervious Runoff Depth>2.86"
Flow Length=437' Tc=24.6 min CN=62 Runoff=11.0 cfs 1.288 af

Subcatchment 3S: Area 1 - East Runoff Area=4.001 ac 0.00% Impervious Runoff Depth>3.05"
Flow Length=831' Tc=42.6 min CN=64 Runoff=6.8 cfs 1.016 af

Subcatchment 4S: Area 2 - West Runoff Area=4.295 ac 0.00% Impervious Runoff Depth>2.83"
Flow Length=662' Tc=64.9 min CN=62 Runoff=5.3 cfs 1.012 af

Subcatchment 5S: Area 2 - East Runoff Area=0.419 ac 0.00% Impervious Runoff Depth>2.65"
Flow Length=214' Tc=34.7 min CN=60 Runoff=0.7 cfs 0.093 af

Link 4L: Wooded Area to East Inflow=6.8 cfs 1.016 af
Primary=6.8 cfs 1.016 af

Link 6L: To Reservoir Inflow=20.4 cfs 2.412 af
Primary=20.4 cfs 2.412 af

Link 7L: Off-Site Flow to South Inflow=5.3 cfs 1.012 af
Primary=5.3 cfs 1.012 af

Link 8L: Off-Site Flow to East Inflow=0.7 cfs 0.093 af
Primary=0.7 cfs 0.093 af

Total Runoff Area = 19.197 ac Runoff Volume = 4.533 af Average Runoff Depth = 2.83"
100.00% Pervious = 19.197 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment 1S: Area 1 - North

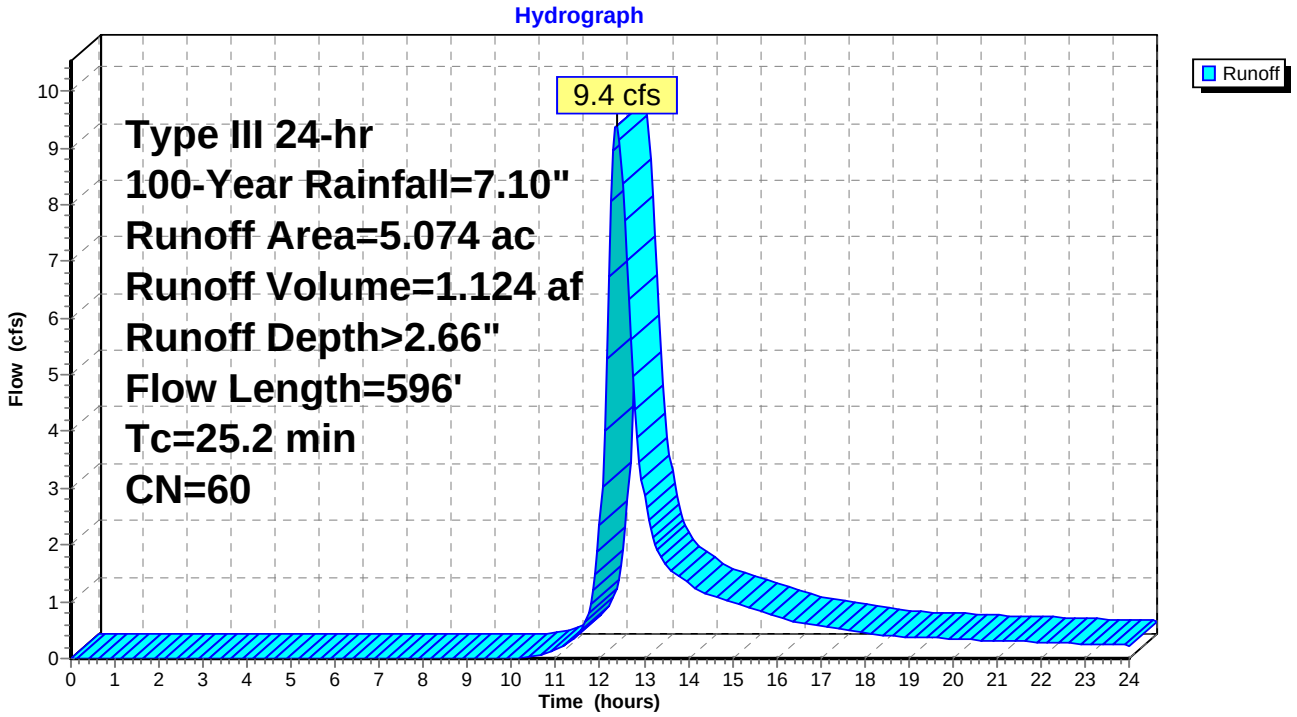
Runoff = 9.4 cfs @ 12.37 hrs, Volume= 1.124 af, Depth> 2.66"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=7.10"

Area (ac)	CN	Description
2.589	60	Woods, Fair, HSG B
2.485	61	>75% Grass cover, Good, HSG B
5.074	60	Weighted Average
5.074		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.5	100	0.0177	0.11		**Sheet Flow, Grass and Trees** Grass: Dense n= 0.240 P2= 3.40"
1.0	40	0.0085	0.65		**Shallow Concentrated Flow, Grass and Trees** Short Grass Pasture Kv= 7.0 fps
0.3	32	0.0625	1.75		**Shallow Concentrated Flow, Grass and Trees** Short Grass Pasture Kv= 7.0 fps
2.9	143	0.0140	0.83		**Shallow Concentrated Flow, Grass** Short Grass Pasture Kv= 7.0 fps
5.2	211	0.0095	0.68		**Shallow Concentrated Flow, Grass** Short Grass Pasture Kv= 7.0 fps
1.3	70	0.0323	0.90		**Shallow Concentrated Flow, Woods** Woodland Kv= 5.0 fps
25.2	596	Total			

Subcatchment 1S: Area 1 - North



Summary for Subcatchment 2S: Area 1 - West

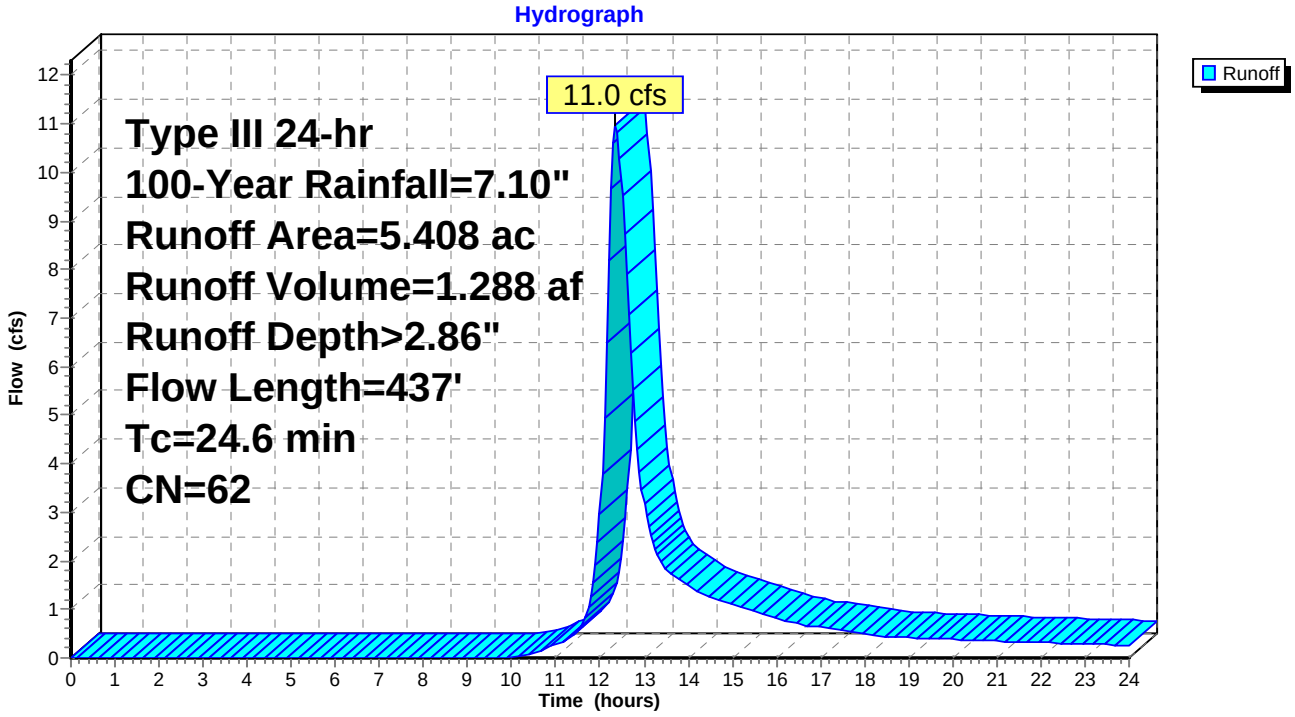
Runoff = 11.0 cfs @ 12.36 hrs, Volume= 1.288 af, Depth> 2.86"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=7.10"

Area (ac)	CN	Description
5.144	61	>75% Grass cover, Good, HSG B
0.068	60	Woods, Fair, HSG B
0.196	85	Gravel roads, HSG B
5.408	62	Weighted Average
5.408		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.0	100	0.0120	0.10		**Sheet Flow, Grass** Grass: Dense n= 0.240 P2= 3.40"
7.5	312	0.0099	0.70		**Shallow Concentrated Flow, Grass** Short Grass Pasture Kv= 7.0 fps
0.1	25	0.1581	2.78		**Shallow Concentrated Flow, Grass** Short Grass Pasture Kv= 7.0 fps
24.6	437	Total			

Subcatchment 2S: Area 1 - West



Summary for Subcatchment 3S: Area 1 - East

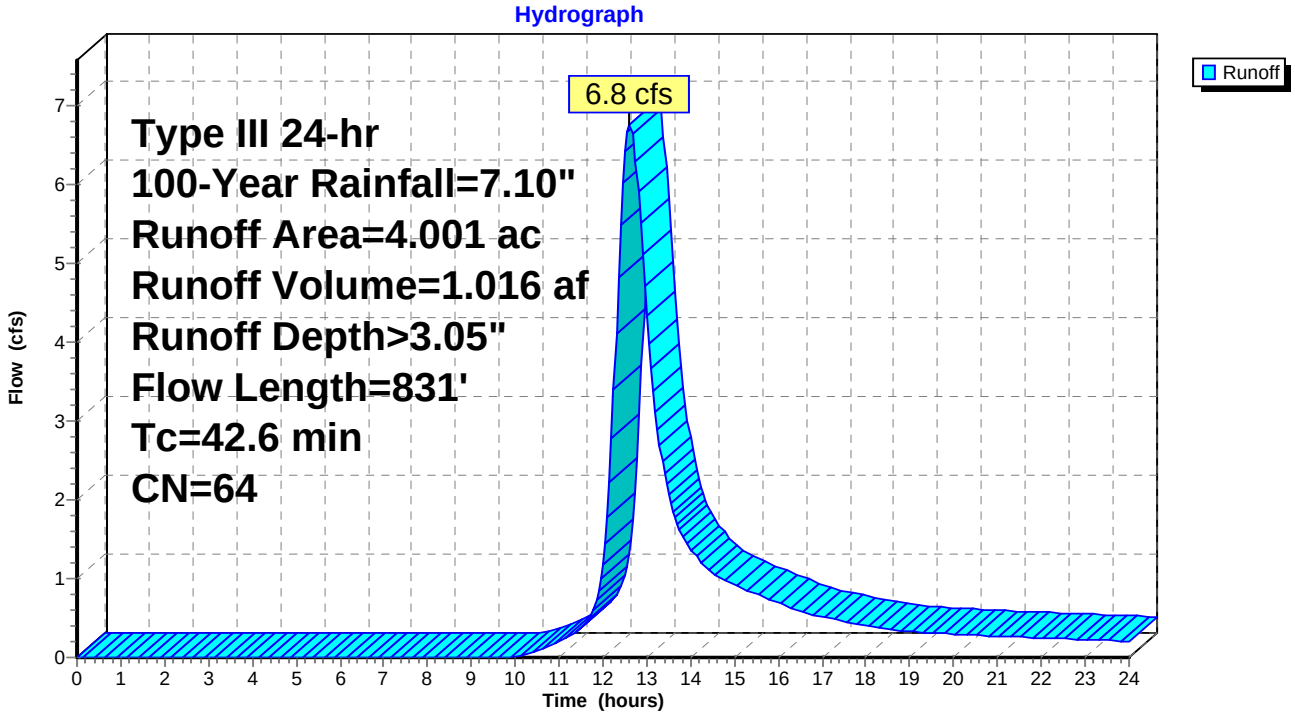
Runoff = 6.8 cfs @ 12.61 hrs, Volume= 1.016 af, Depth> 3.05"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=7.10"

Area (ac)	CN	Description
0.450	85	Gravel roads, HSG B
3.551	61	>75% Grass cover, Good, HSG B
4.001	64	Weighted Average
4.001		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
19.1	100	0.0090	0.09		**Sheet Flow, Grass** Grass: Dense n= 0.240 P2= 3.40"
7.1	174	0.0034	0.41		**Shallow Concentrated Flow, Grass** Short Grass Pasture Kv= 7.0 fps
16.3	526	0.0059	0.54		**Shallow Concentrated Flow, Grass** Short Grass Pasture Kv= 7.0 fps
0.1	31	0.0742	4.39		**Shallow Concentrated Flow, Grass/Gravel** Unpaved Kv= 16.1 fps
42.6	831	Total			

Subcatchment 3S: Area 1 - East



Summary for Subcatchment 4S: Area 2 - West

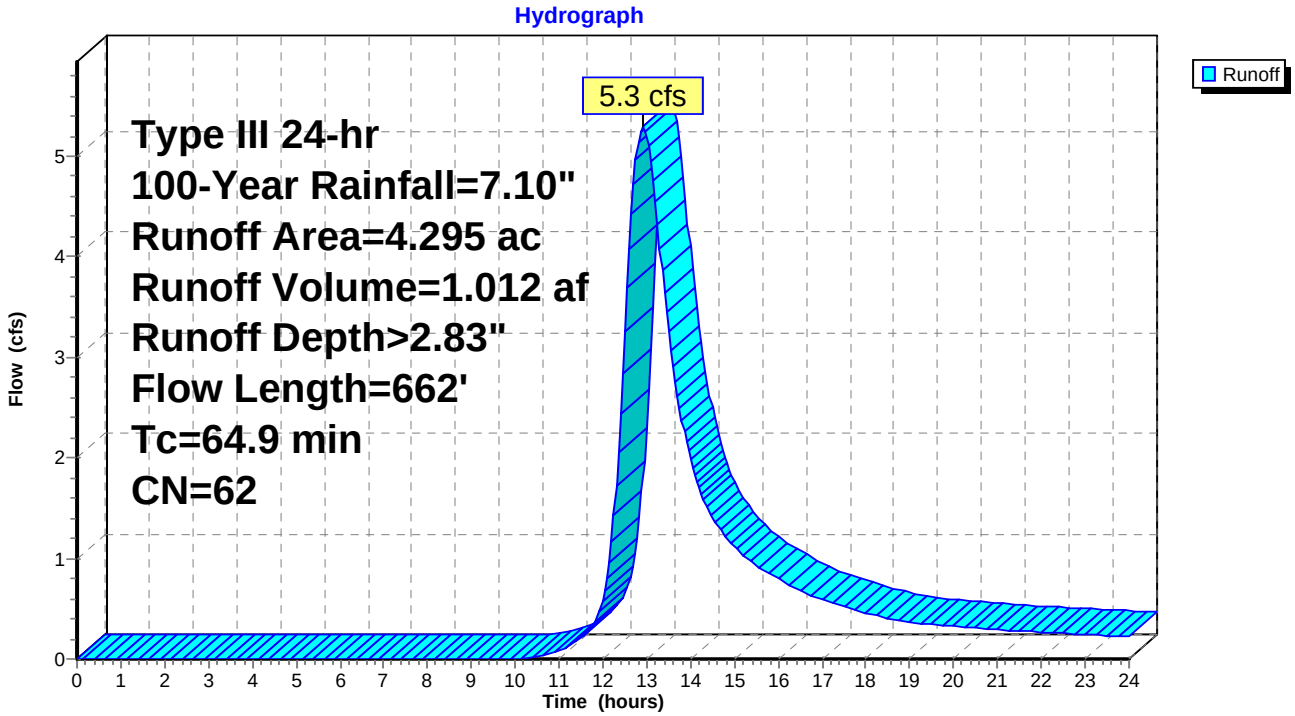
Runoff = 5.3 cfs @ 12.91 hrs, Volume= 1.012 af, Depth> 2.83"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=7.10"

Area (ac)	CN	Description
2.163	60	Woods, Fair, HSG B
1.790	61	>75% Grass cover, Good, HSG B
0.342	85	Gravel roads, HSG B
4.295	62	Weighted Average
4.295		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
30.1	100	0.0080	0.06		**Sheet Flow, Woods** Woods: Light underbrush n= 0.400 P2= 3.40"
1.9	86	0.0233	0.76		**Shallow Concentrated Flow, Woods** Woodland Kv= 5.0 fps
7.5	235	0.0055	0.52		**Shallow Concentrated Flow, Grass** Short Grass Pasture Kv= 7.0 fps
25.4	241	0.0010	0.16		**Shallow Concentrated Flow, Woods** Woodland Kv= 5.0 fps
64.9	662	Total			

Subcatchment 4S: Area 2 - West



Summary for Subcatchment 5S: Area 2 - East

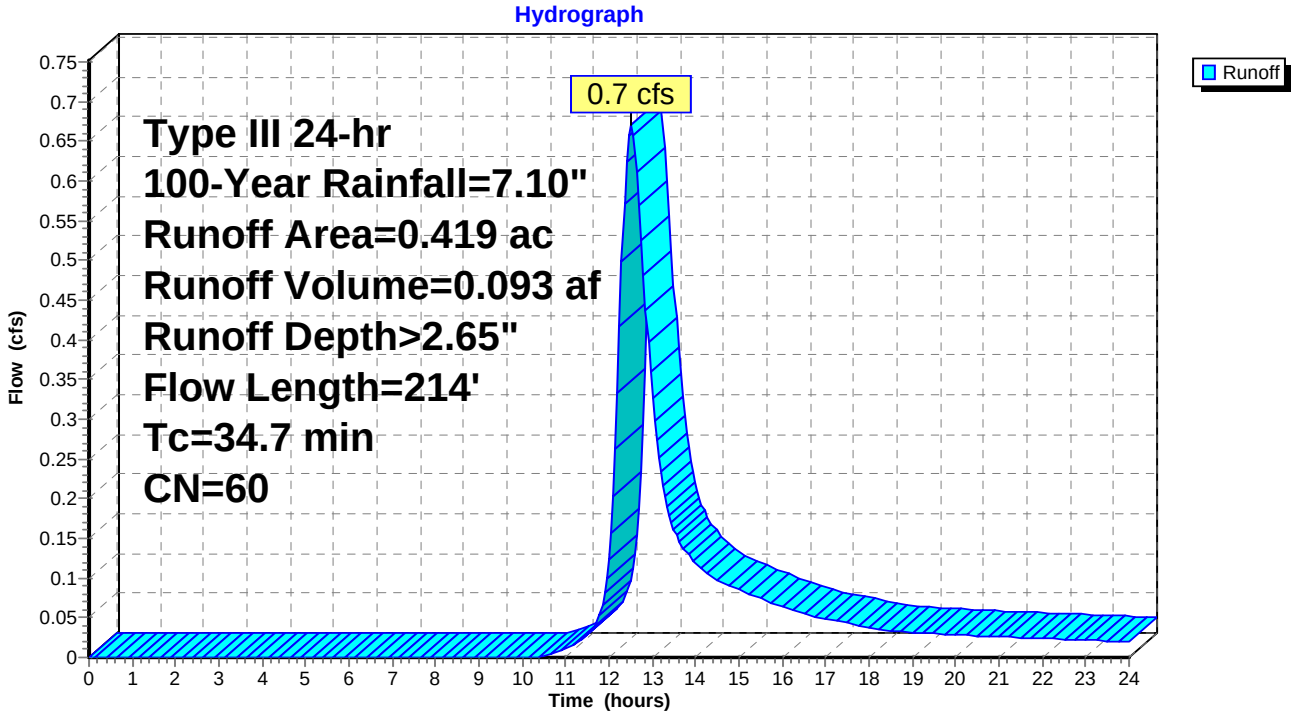
Runoff = 0.7 cfs @ 12.51 hrs, Volume= 0.093 af, Depth> 2.65"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=7.10"

Area (ac)	CN	Description
0.215	60	Woods, Fair, HSG B
0.204	61	>75% Grass cover, Good, HSG B
0.419	60	Weighted Average
0.419		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.2	58	0.0034	0.05		**Sheet Flow, Grass** Grass: Dense n= 0.240 P2= 3.40"
12.8	42	0.0119	0.05		**Sheet Flow, Woods** Woods: Light underbrush n= 0.400 P2= 3.40"
2.8	86	0.0105	0.51		**Shallow Concentrated Flow, Woods** Woodland Kv= 5.0 fps
0.9	28	0.0050	0.49		**Shallow Concentrated Flow, Grass** Short Grass Pasture Kv= 7.0 fps
34.7	214	Total			

Subcatchment 5S: Area 2 - East

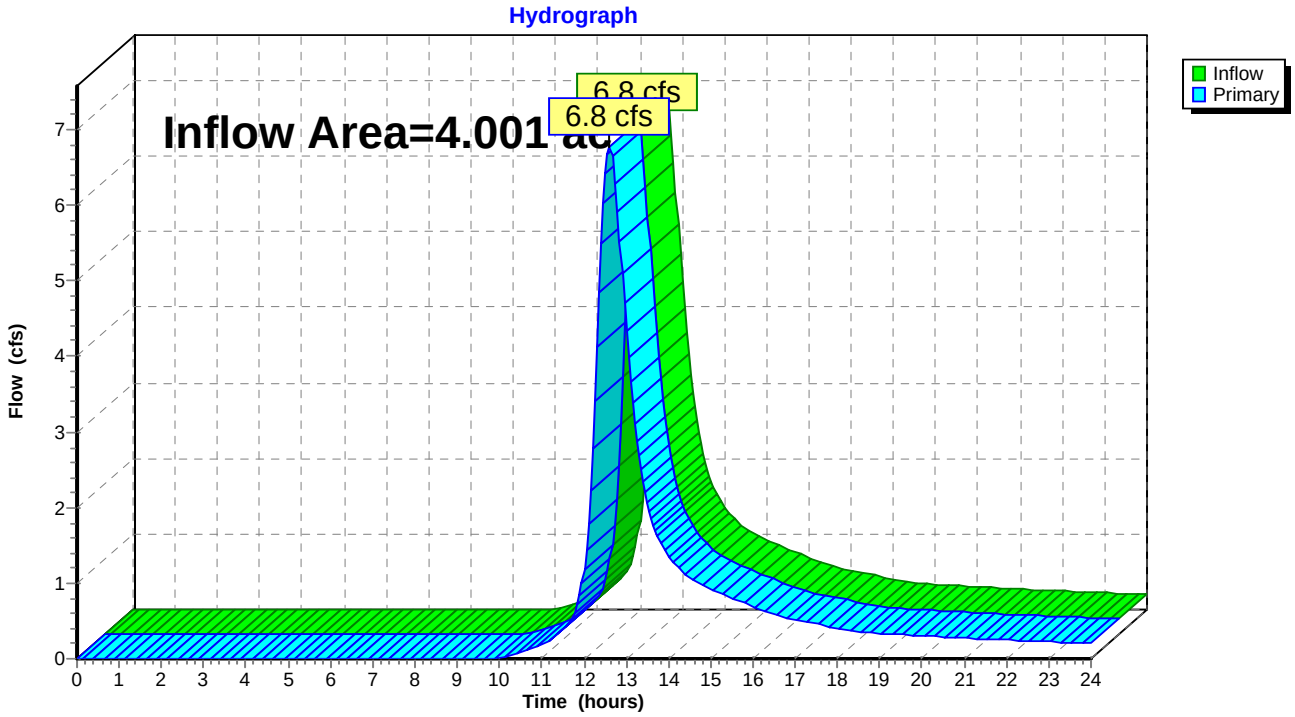


Summary for Link 4L: Wooded Area to East

Inflow Area = 4.001 ac, 0.00% Impervious, Inflow Depth > 3.05" for 100-Year event
Inflow = 6.8 cfs @ 12.61 hrs, Volume= 1.016 af
Primary = 6.8 cfs @ 12.61 hrs, Volume= 1.016 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link 4L: Wooded Area to East

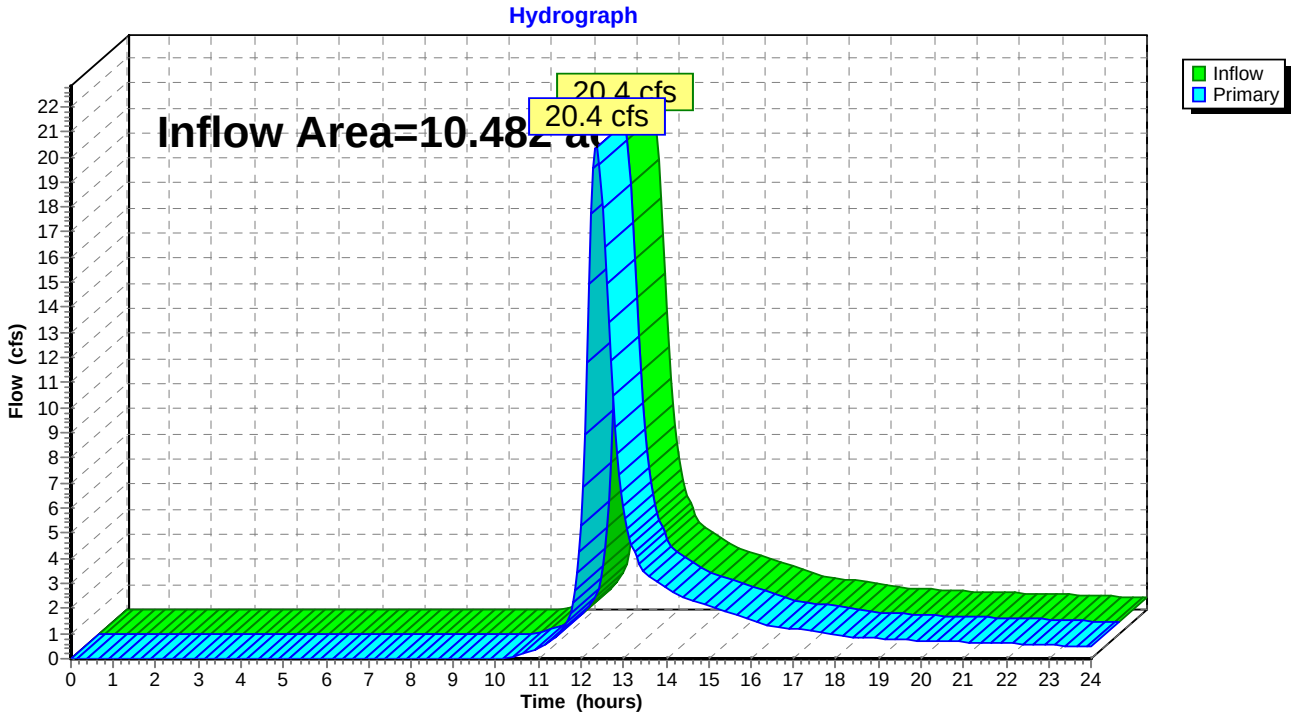


Summary for Link 6L: To Reservoir

Inflow Area = 10.482 ac, 0.00% Impervious, Inflow Depth > 2.76" for 100-Year event
Inflow = 20.4 cfs @ 12.37 hrs, Volume= 2.412 af
Primary = 20.4 cfs @ 12.37 hrs, Volume= 2.412 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link 6L: To Reservoir

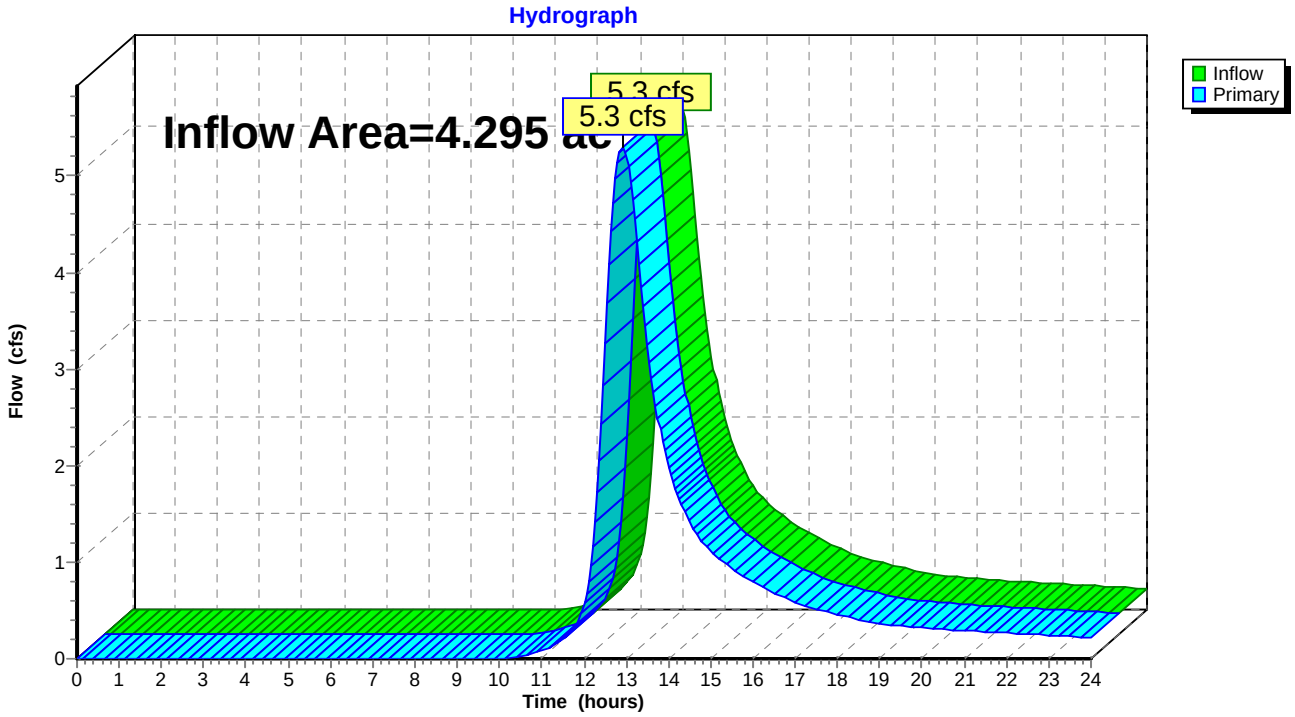


Summary for Link 7L: Off-Site Flow to South

Inflow Area = 4.295 ac, 0.00% Impervious, Inflow Depth > 2.83" for 100-Year event
Inflow = 5.3 cfs @ 12.91 hrs, Volume= 1.012 af
Primary = 5.3 cfs @ 12.91 hrs, Volume= 1.012 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link 7L: Off-Site Flow to South

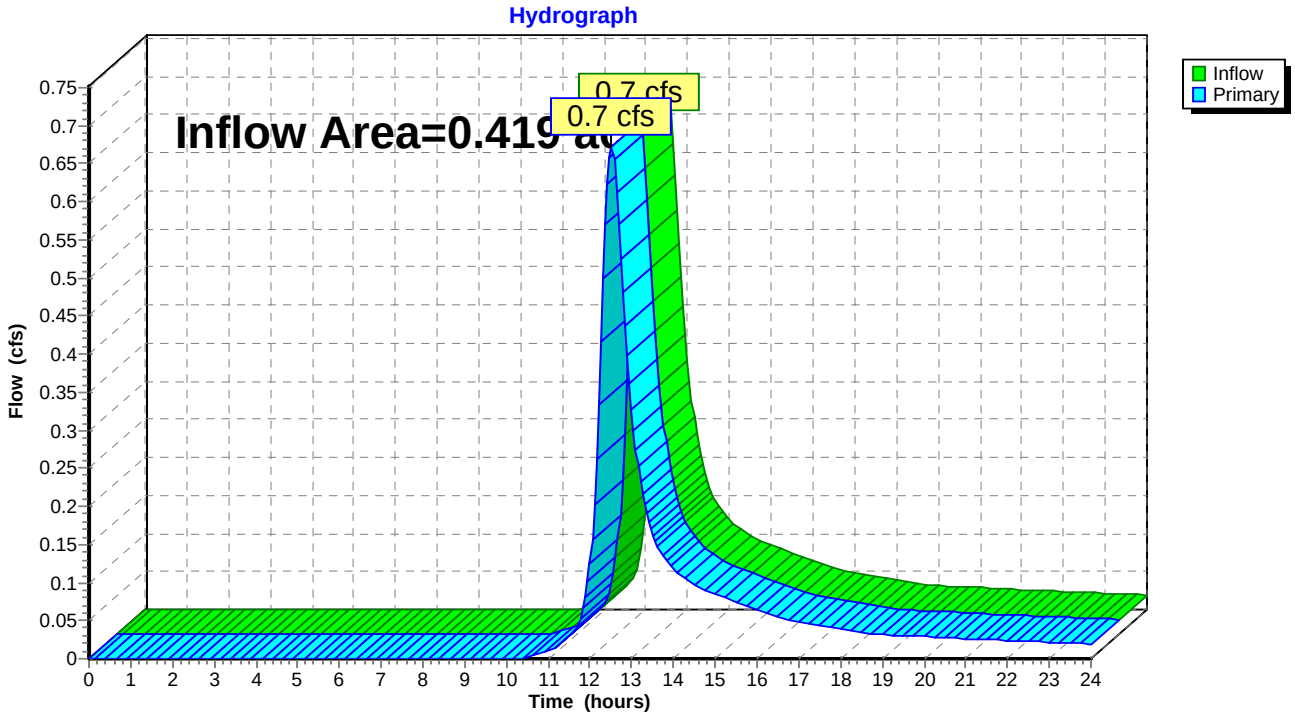


Summary for Link 8L: Off-Site Flow to East

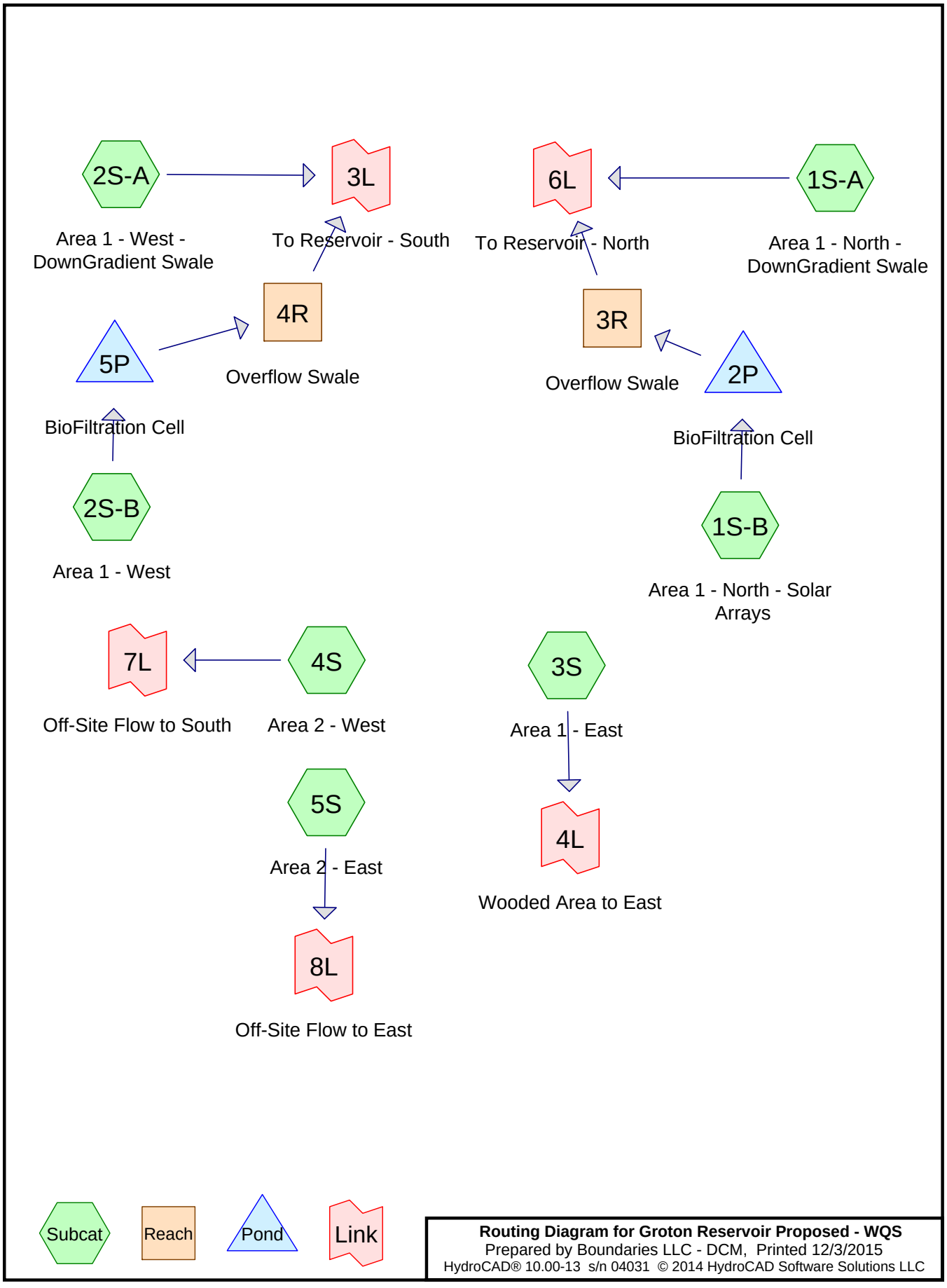
Inflow Area = 0.419 ac, 0.00% Impervious, Inflow Depth > 2.65" for 100-Year event
Inflow = 0.7 cfs @ 12.51 hrs, Volume= 0.093 af
Primary = 0.7 cfs @ 12.51 hrs, Volume= 0.093 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link 8L: Off-Site Flow to East



Proposed Conditions Results



Routing Diagram for Groton Reservoir Proposed - WQS
Prepared by Boundaries LLC - DCM, Printed 12/3/2015

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
1.450	61	>75% Grass cover, Good, HSG B (1S-A, 2S-A)
15.095	61	>75% Grass cover, Solar Array Area, HSG B (1S-B, 2S-B, 3S, 4S, 5S)
0.027	98	Concrete Equipment Pad, HSG B (2S-B, 4S)
0.018	98	Concrete Equipment Pads, HSG B (3S)
0.988	85	Gravel roads, HSG B (2S-B, 3S, 4S)
0.000	98	Solar Array Racking Posts, HSG B (3S, 4S, 5S)
0.768	60	Woods, Fair, HSG B (1S-B, 4S)
0.850	55	Woods, Good, HSG B (1S-A)
19.197	**62**	**TOTAL AREA**

Soil Listing (all nodes)

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

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchme Numbers
0.000	1.450	0.000	0.000	0.000	1.450	>75% Grass cover, Good	
0.000	15.095	0.000	0.000	0.000	15.095	>75% Grass cover, Solar Array Area	
0.000	0.027	0.000	0.000	0.000	0.027	Concrete Equipment Pad	
0.000	0.018	0.000	0.000	0.000	0.018	Concrete Equipment Pads	
0.000	0.988	0.000	0.000	0.000	0.988	Gravel roads	
0.000	0.000	0.000	0.000	0.000	0.000	Solar Array Racking Posts	
0.000	0.768	0.000	0.000	0.000	0.768	Woods, Fair	
0.000	0.850	0.000	0.000	0.000	0.850	Woods, Good	
0.000	**19.197**	**0.000**	**0.000**	**0.000**	**19.197**	**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

Subcatchment 1S-A: Area 1 - North - Runoff Area=1.300 ac 0.00% Impervious Runoff Depth>0.38"
Flow Length=30' Slope=0.0770 '/' Tc=6.0 min CN=57 Runoff=0.3 cfs 0.041 af

Subcatchment 1S-B: Area 1 - North - Solar Runoff Area=164,396 sf 0.00% Impervious Runoff Depth>0.52"
Flow Length=562' Tc=24.8 min CN=61 Runoff=1.0 cfs 0.165 af

Subcatchment 2S-A: Area 1 - West - Runoff Area=1.000 ac 0.00% Impervious Runoff Depth>0.53"
Flow Length=30' Slope=0.0350 '/' Tc=6.0 min CN=61 Runoff=0.4 cfs 0.044 af

Subcatchment 2S-B: Area 1 - West Runoff Area=192,013 sf 0.41% Impervious Runoff Depth>0.56"
Flow Length=412' Tc=24.8 min CN=62 Runoff=1.4 cfs 0.207 af

Subcatchment 3S: Area 1 - East Runoff Area=174,284 sf 0.46% Impervious Runoff Depth>0.65"
Flow Length=831' Tc=42.6 min CN=64 Runoff=1.2 cfs 0.215 af

Subcatchment 4S: Area 2 - West Runoff Area=187,084 sf 0.22% Impervious Runoff Depth>0.59"
Flow Length=664' Tc=75.0 min CN=63 Runoff=0.8 cfs 0.213 af

Subcatchment 5S: Area 2 - East Runoff Area=18,251 sf 0.01% Impervious Runoff Depth>0.52"
Flow Length=214' Tc=30.4 min CN=61 Runoff=0.1 cfs 0.018 af

Reach 3R: Overflow Swale Avg. Flow Depth=0.08' Max Vel=1.26 fps Inflow=1.0 cfs 0.163 af
n=0.035 L=30.0' S=0.0267 '/' Capacity=23.0 cfs Outflow=1.0 cfs 0.163 af

Reach 4R: Overflow Swale Avg. Flow Depth=0.06' Max Vel=2.08 fps Inflow=1.4 cfs 0.206 af
n=0.035 L=30.0' S=0.0973 '/' Capacity=43.9 cfs Outflow=1.4 cfs 0.206 af

Pond 2P: BioFiltration Cell Peak Elev=22.94' Storage=0.002 af Inflow=1.0 cfs 0.165 af
Outflow=1.0 cfs 0.163 af

Pond 5P: BioFiltration Cell Peak Elev=25.16' Storage=0.002 af Inflow=1.4 cfs 0.207 af
Outflow=1.4 cfs 0.206 af

Link 3L: To Reservoir - South Inflow=1.6 cfs 0.250 af
Primary=1.6 cfs 0.250 af

Link 4L: Wooded Area to East Inflow=1.2 cfs 0.215 af
Primary=1.2 cfs 0.215 af

Link 6L: To Reservoir - North Inflow=1.2 cfs 0.204 af
Primary=1.2 cfs 0.204 af

Link 7L: Off-Site Flow to South Inflow=0.8 cfs 0.213 af
Primary=0.8 cfs 0.213 af

Link 8L: Off-Site Flow to East Inflow=0.1 cfs 0.018 af
Primary=0.1 cfs 0.018 af

Total Runoff Area = 19.197 ac Runoff Volume = 0.903 af Average Runoff Depth = 0.56"
99.76% Pervious = 19.151 ac 0.24% Impervious = 0.046 ac

Summary for Subcatchment 1S-A: Area 1 - North - DownGradient Swale

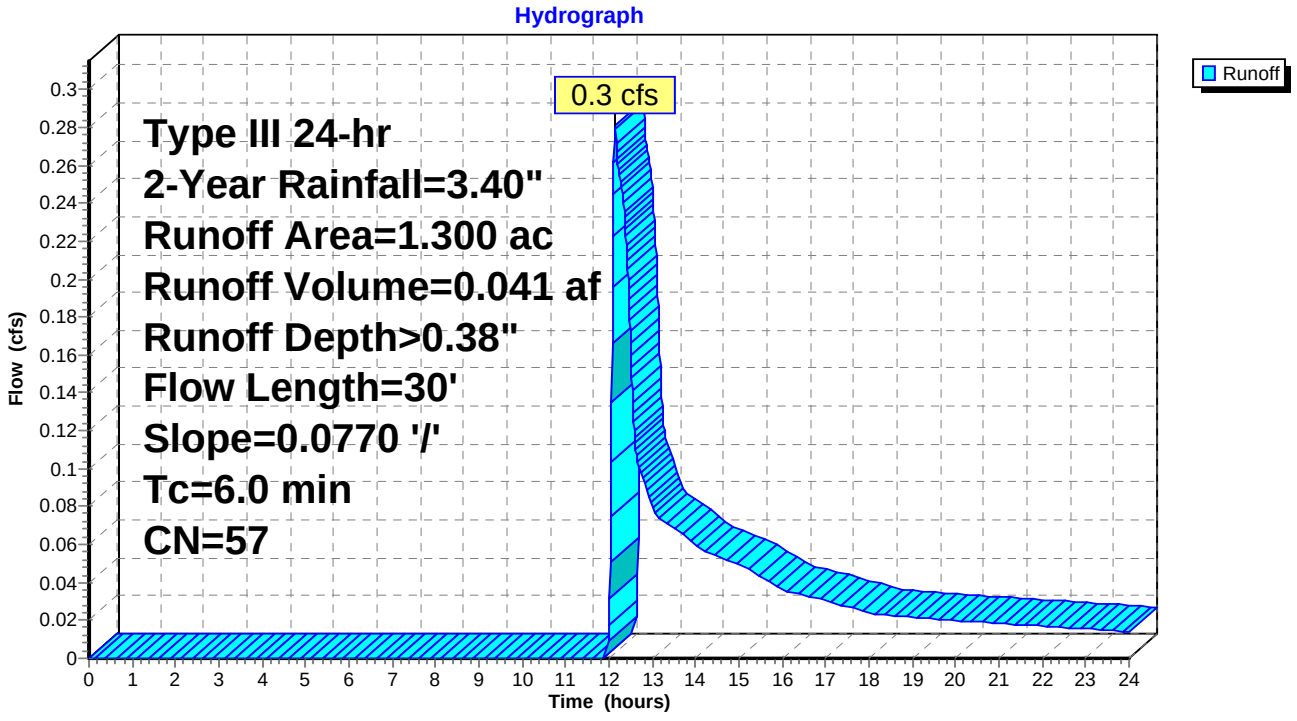
Runoff = 0.3 cfs @ 12.14 hrs, Volume= 0.041 af, Depth> 0.38"

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=3.40"

Area (ac)	CN	Description
0.850	55	Woods, Good, HSG B
0.450	61	>75% Grass cover, Good, HSG B
1.300	57	Weighted Average
1.300		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.6	30	0.0770	0.11		**Sheet Flow, Wooded Slope** Woods: Light underbrush n= 0.400 P2= 3.40"
4.6	30	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 1S-A: Area 1 - North - DownGradient Swale



Summary for Subcatchment 1S-B: Area 1 - North - Solar Arrays

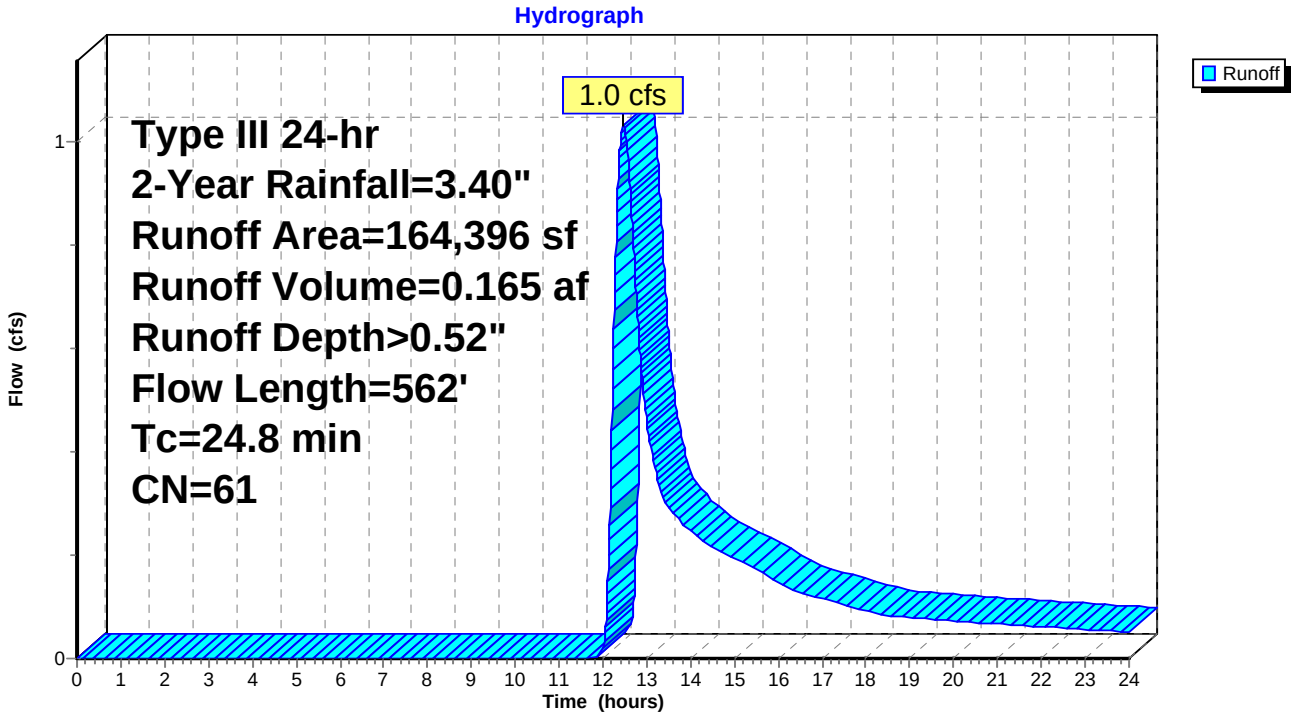
Runoff = 1.0 cfs @ 12.46 hrs, Volume= 0.165 af, Depth> 0.52"

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=3.40"

	Area (sf)	CN	Description
	23,392	60	Woods, Fair, HSG B
*	141,004	61	>75% Grass cover, Solar Array Area, HSG B
*	0	98	Solar Array Posts, HSG B
	164,396	61	Weighted Average
	164,396		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.5	100	0.0177	0.11		**Sheet Flow, Grass - Solar Array Area** Grass: Dense n= 0.240 P2= 3.40"
1.0	40	0.0085	0.65		**Shallow Concentrated Flow, Grass - Solar Array Area** Short Grass Pasture Kv= 7.0 fps
0.3	32	0.0625	1.75		**Shallow Concentrated Flow, Grass - Solar Array Area** Short Grass Pasture Kv= 7.0 fps
2.9	143	0.0140	0.83		**Shallow Concentrated Flow, Grass - Solar Array Area** Short Grass Pasture Kv= 7.0 fps
5.2	211	0.0095	0.68		**Shallow Concentrated Flow, Grass - Solar Array Area** Short Grass Pasture Kv= 7.0 fps
0.4	31	0.0323	1.26		**Shallow Concentrated Flow, Grass - Solar Array Area** Short Grass Pasture Kv= 7.0 fps
0.5	5	0.2000	0.17		**Sheet Flow, To swale (Flow disrupted by stone level spreader)** Grass: Dense n= 0.240 P2= 3.40"
24.8	562	Total			

Subcatchment 1S-B: Area 1 - North - Solar Arrays



Summary for Subcatchment 2S-A: Area 1 - West - DownGradient Swale

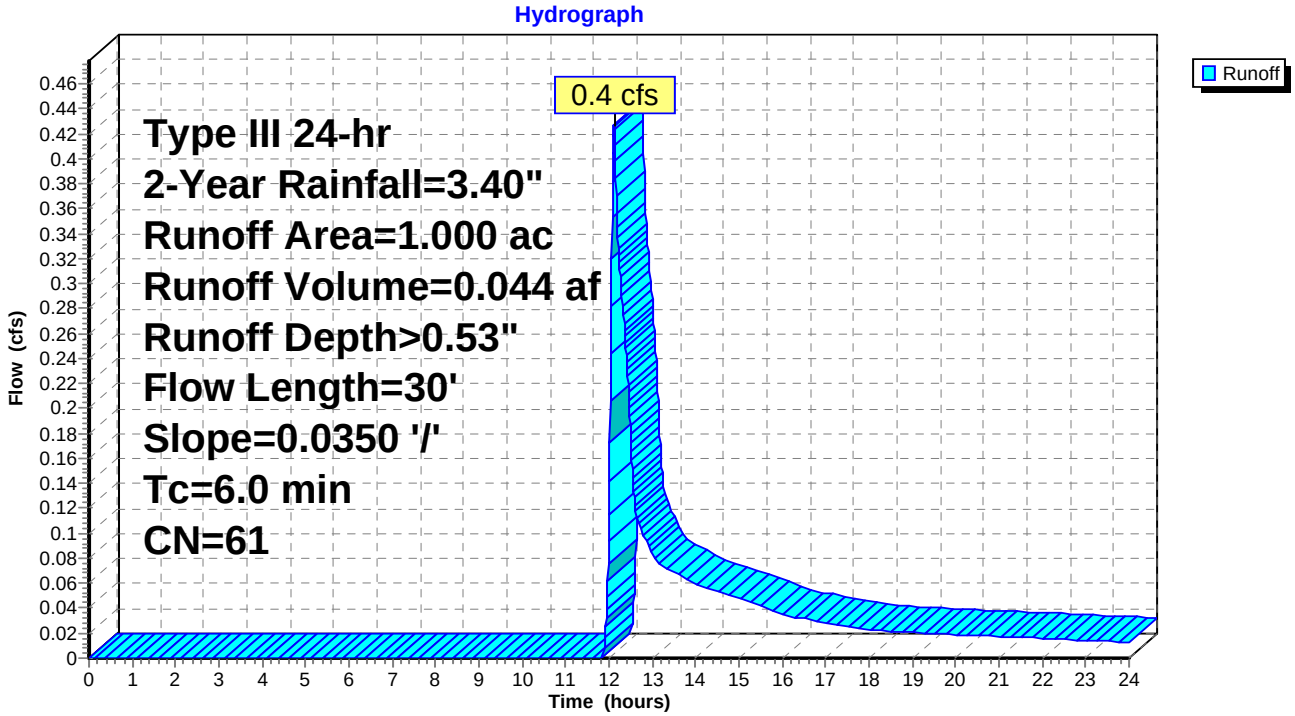
Runoff = 0.4 cfs @ 12.12 hrs, Volume= 0.044 af, Depth> 0.53"

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=3.40"

Area (ac)	CN	Description
1.000	61	>75% Grass cover, Good, HSG B
1.000		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.2	30	0.0350	0.12		**Sheet Flow, Grass Slope** Grass: Dense n= 0.240 P2= 3.40"
4.2	30	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 2S-A: Area 1 - West - DownGradient Swale



Summary for Subcatchment 2S-B: Area 1 - West

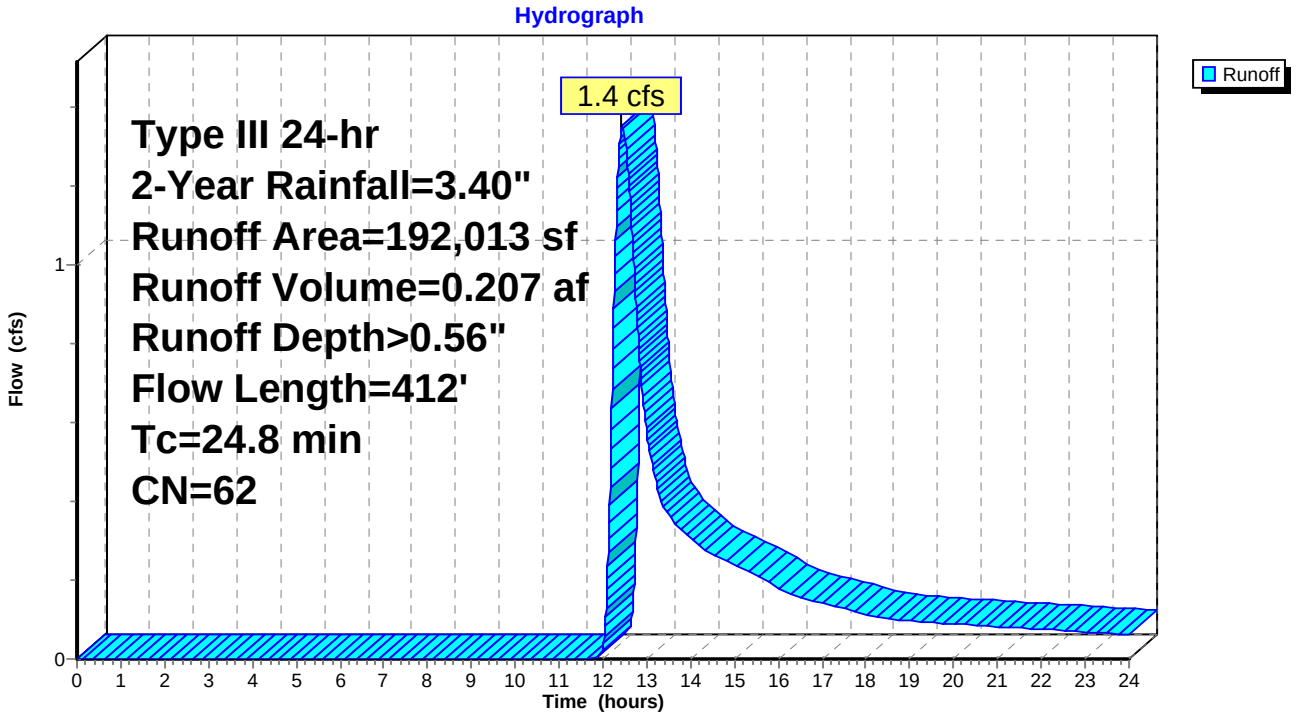
Runoff = 1.4 cfs @ 12.43 hrs, Volume= 0.207 af, Depth> 0.56"

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=3.40"

	Area (sf)	CN	Description
*	182,691	61	>75% Grass cover, Solar Array Area, HSG B
	8,538	85	Gravel roads, HSG B
*	0	98	Solar Array Racking Posts, HSG B
*	784	98	Concrete Equipment Pad, HSG B
	192,013	62	Weighted Average
	191,229		99.59% Pervious Area
	784		0.41% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.0	100	0.0120	0.10		**Sheet Flow, Grass - Solar Array Area** Grass: Dense n= 0.240 P2= 3.40"
7.3	307	0.0099	0.70		**Shallow Concentrated Flow, Grass - Solar Array Area** Short Grass Pasture Kv= 7.0 fps
0.5	5	0.2000	0.17		**Sheet Flow, Swale Slope (flow disrupted by stone level spreade** Grass: Dense n= 0.240 P2= 3.40"
24.8	412	Total			

Subcatchment 2S-B: Area 1 - West



Summary for Subcatchment 3S: Area 1 - East

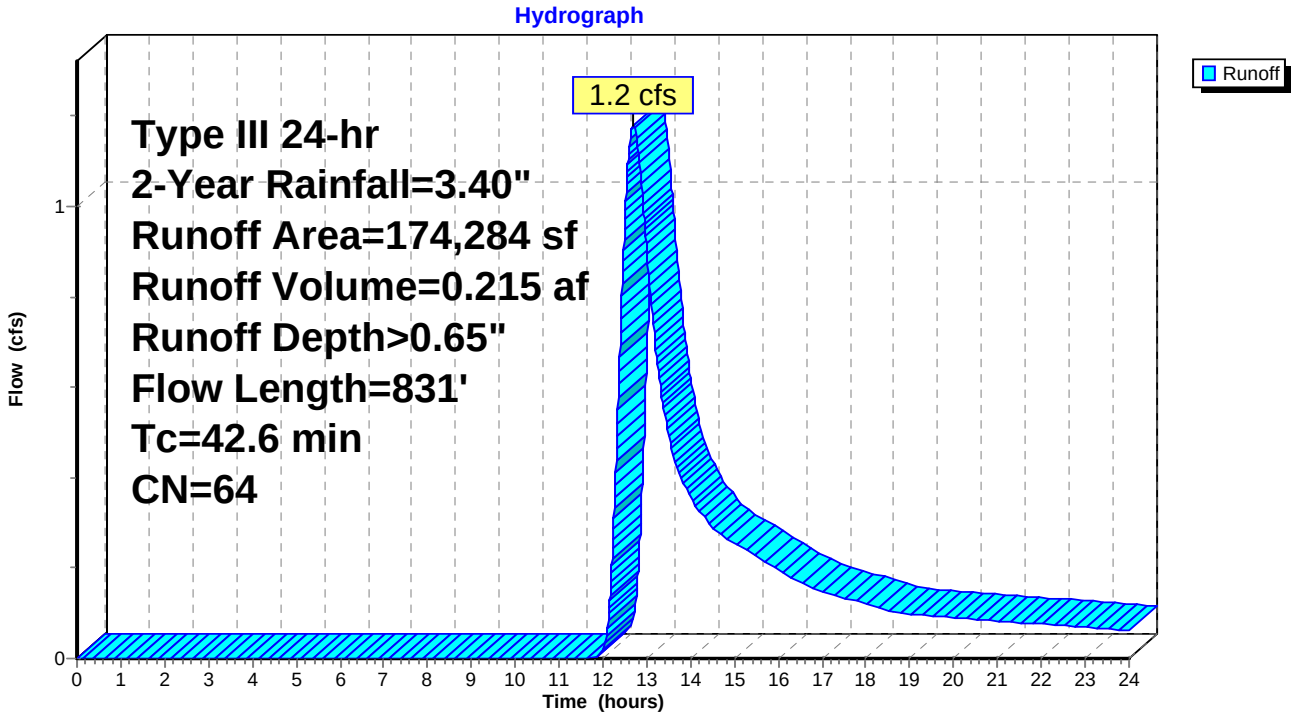
Runoff = 1.2 cfs @ 12.69 hrs, Volume= 0.215 af, Depth> 0.65"

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=3.40"

	Area (sf)	CN	Description
	19,602	85	Gravel roads, HSG B
*	153,878	61	>75% Grass cover, Solar Array Area, HSG B
*	4	98	Solar Array Racking Posts, HSG B
*	800	98	Concrete Equipment Pads, HSG B
	174,284	64	Weighted Average
	173,480		99.54% Pervious Area
	804		0.46% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
19.1	100	0.0090	0.09		**Sheet Flow, Grass - Solar Array Area** Grass: Dense n= 0.240 P2= 3.40"
7.1	174	0.0034	0.41		**Shallow Concentrated Flow, Grass - Solar Array Area** Short Grass Pasture Kv= 7.0 fps
16.3	526	0.0059	0.54		**Shallow Concentrated Flow, Grass** Short Grass Pasture Kv= 7.0 fps
0.1	31	0.0742	4.39		**Shallow Concentrated Flow, Grass/Gravel** Unpaved Kv= 16.1 fps
42.6	831	Total			

Subcatchment 3S: Area 1 - East



Summary for Subcatchment 4S: Area 2 - West

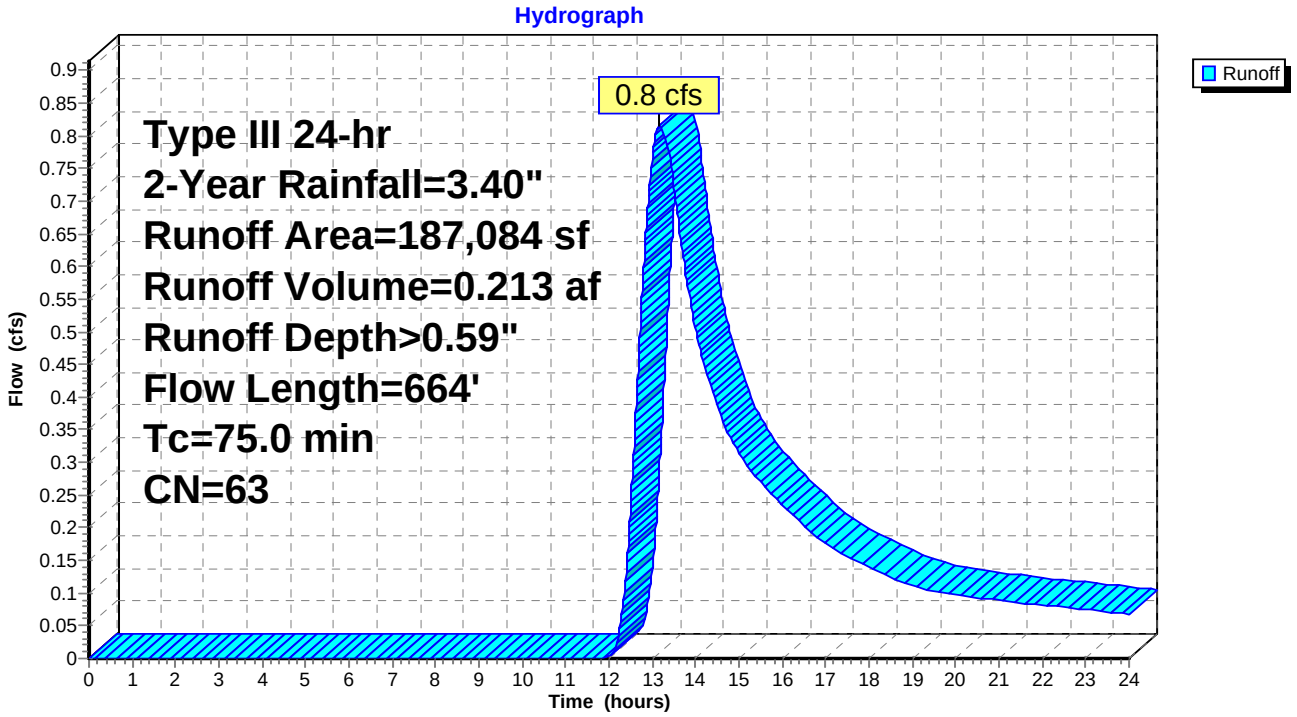
Runoff = 0.8 cfs @ 13.17 hrs, Volume= 0.213 af, Depth> 0.59"

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=3.40"

	Area (sf)	CN	Description
	10,060	60	Woods, Fair, HSG B
*	161,719	61	>75% Grass cover, Solar Array Area, HSG B
	14,898	85	Gravel roads, HSG B
*	7	98	Solar Array Racking Posts, HSG B
*	400	98	Concrete Equipment Pad, HSG B
	187,084	63	Weighted Average
	186,677		99.78% Pervious Area
	407		0.22% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
20.0	100	0.0080	0.08		**Sheet Flow, Grass - Solar Array Area** Grass: Dense n= 0.240 P2= 3.40"
1.3	86	0.0233	1.07		**Shallow Concentrated Flow, Grass - Solar Array Area** Short Grass Pasture Kv= 7.0 fps
7.5	235	0.0055	0.52		**Shallow Concentrated Flow, Grass - Solar Array Area** Short Grass Pasture Kv= 7.0 fps
13.3	177	0.0010	0.22		**Shallow Concentrated Flow, Grass - Solar Array Area** Short Grass Pasture Kv= 7.0 fps
32.9	66	0.0010	0.03		**Sheet Flow, Grass (Flow disrupted by stone check dam)** Grass: Dense n= 0.240 P2= 3.40"
75.0	664	Total			

Subcatchment 4S: Area 2 - West



Summary for Subcatchment 5S: Area 2 - East

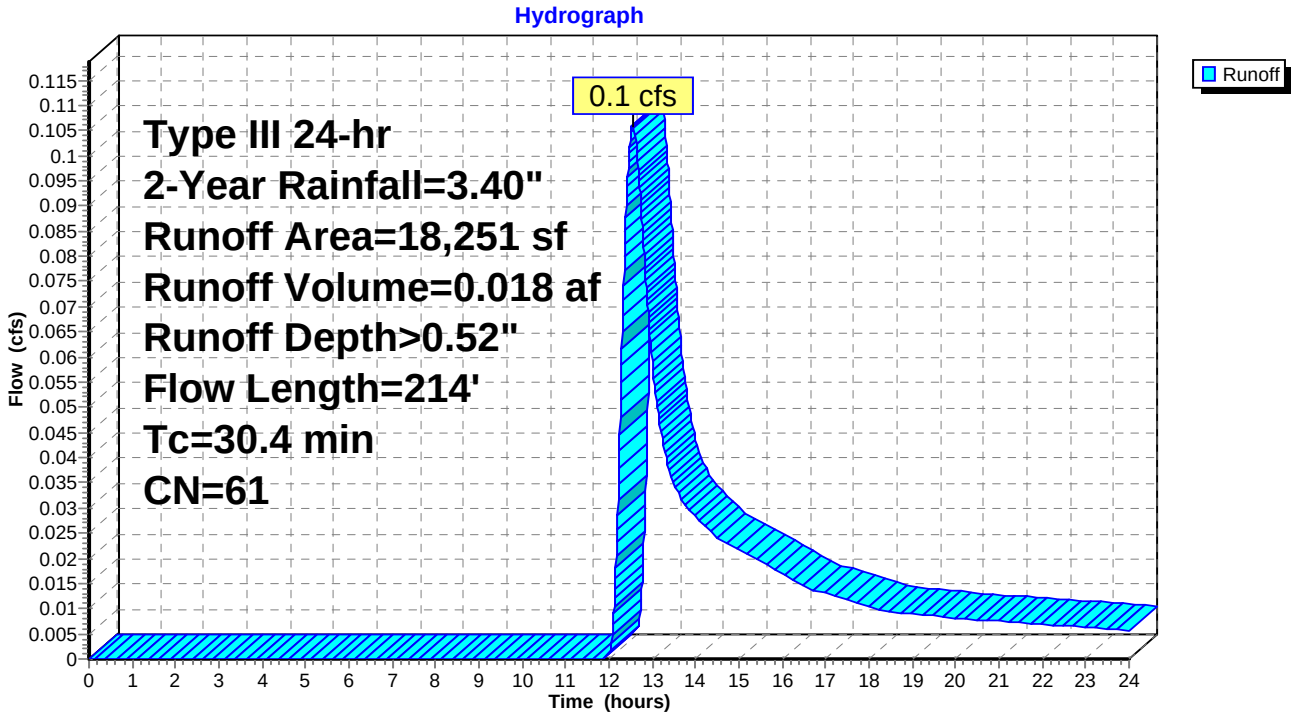
Runoff = 0.1 cfs @ 12.54 hrs, Volume= 0.018 af, Depth> 0.52"

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=3.40"

	Area (sf)	CN	Description
*	18,250	61	>75% Grass cover, Solar Array Area, HSG B
*	1	98	Solar Array Racking Posts, HSG B
	18,251	61	Weighted Average
	18,250		99.99% Pervious Area
	1		0.01% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.2	58	0.0034	0.05		**Sheet Flow, Grass - Solar Array Area** Grass: Dense n= 0.240 P2= 3.40"
8.5	42	0.0119	0.08		**Sheet Flow, Grass - Solar Array Area** Grass: Dense n= 0.240 P2= 3.40"
2.8	86	0.0105	0.51		**Shallow Concentrated Flow, Grass - Solar Array Area** Woodland Kv= 5.0 fps
0.9	28	0.0050	0.49		**Shallow Concentrated Flow, Grass** Short Grass Pasture Kv= 7.0 fps
30.4	214	Total			

Subcatchment 5S: Area 2 - East



Summary for Reach 3R: Overflow Swale

Inflow Area = 3.774 ac, 0.00% Impervious, Inflow Depth > 0.52" for 2-Year event
Inflow = 1.0 cfs @ 12.46 hrs, Volume= 0.163 af
Outflow = 1.0 cfs @ 12.47 hrs, Volume= 0.163 af, Atten= 0%, Lag= 0.3 min

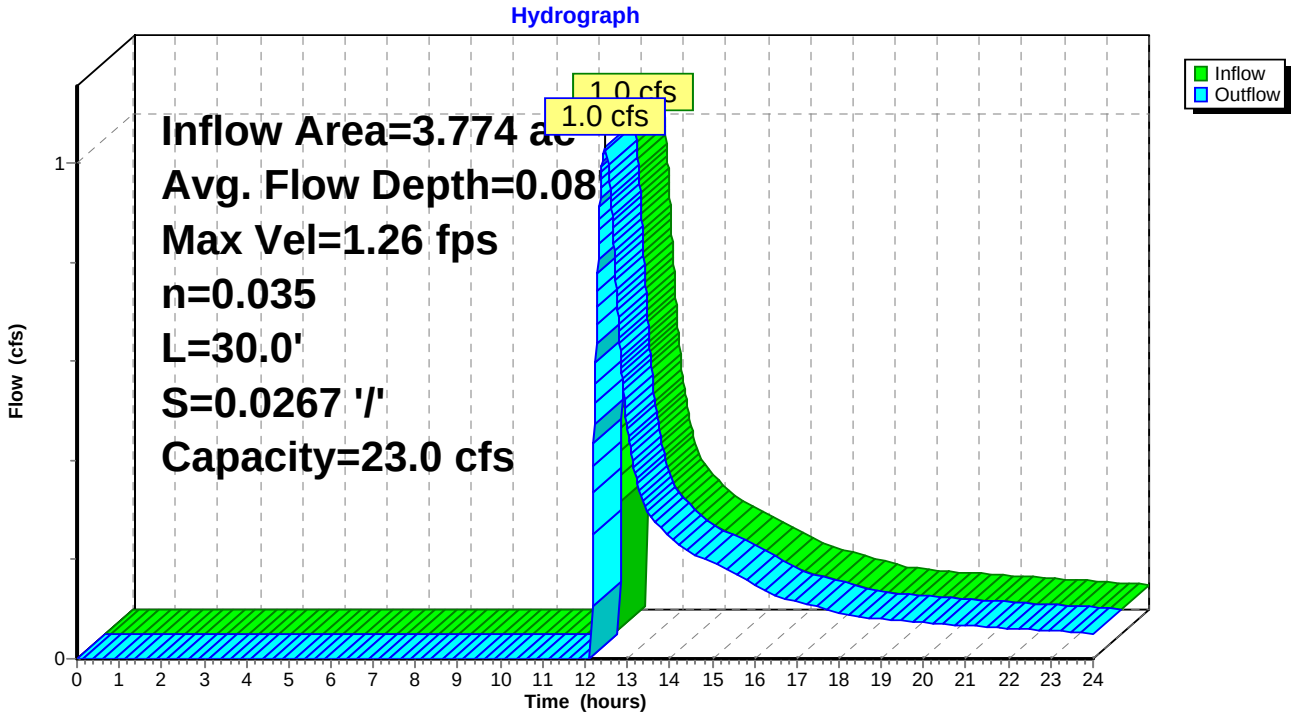
Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 2
Max. Velocity= 1.26 fps, Min. Travel Time= 0.4 min
Avg. Velocity = 0.57 fps, Avg. Travel Time= 0.9 min

Peak Storage= 24 cf @ 12.47 hrs
Average Depth at Peak Storage= 0.08'
Bank-Full Depth= 0.50' Flow Area= 5.8 sf, Capacity= 23.0 cfs

10.00' x 0.50' deep channel, n= 0.035 Earth, dense weeds
Side Slope Z-value= 3.0 '/' Top Width= 13.00'
Length= 30.0' Slope= 0.0267 '/'
Inlet Invert= 22.80', Outlet Invert= 22.00'

‡

Reach 3R: Overflow Swale



Summary for Reach 4R: Overflow Swale

Inflow Area = 4.408 ac, 0.41% Impervious, Inflow Depth > 0.56" for 2-Year event
Inflow = 1.4 cfs @ 12.44 hrs, Volume= 0.206 af
Outflow = 1.4 cfs @ 12.45 hrs, Volume= 0.206 af, Atten= 0%, Lag= 0.1 min

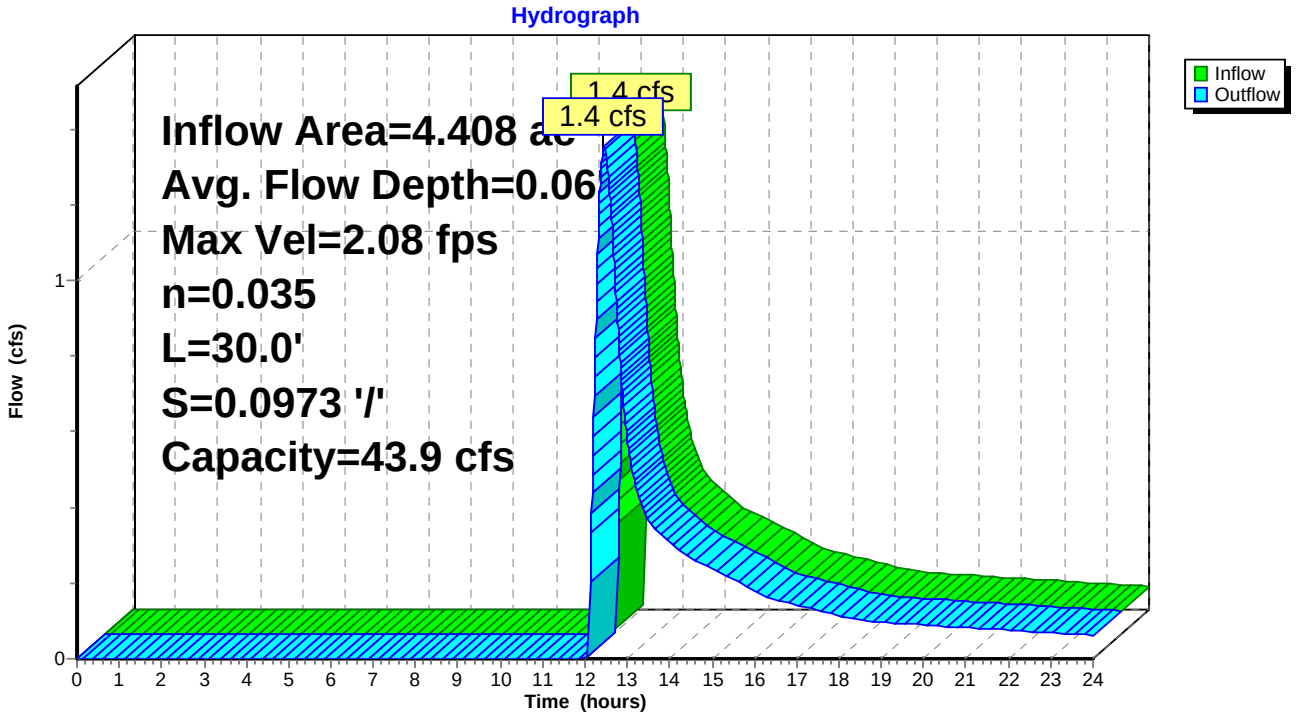
Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 2
Max. Velocity= 2.08 fps, Min. Travel Time= 0.2 min
Avg. Velocity = 0.91 fps, Avg. Travel Time= 0.5 min

Peak Storage= 19 cf @ 12.45 hrs
Average Depth at Peak Storage= 0.06'
Bank-Full Depth= 0.50' Flow Area= 5.8 sf, Capacity= 43.9 cfs

10.00' x 0.50' deep channel, n= 0.035 Earth, dense weeds
Side Slope Z-value= 3.0 '/' Top Width= 13.00'
Length= 30.0' Slope= 0.0973 '/'
Inlet Invert= 25.00', Outlet Invert= 22.08'

‡

Reach 4R: Overflow Swale



Summary for Pond 2P: BioFiltration Cell

Inflow Area = 3.774 ac, 0.00% Impervious, Inflow Depth > 0.52" for 2-Year event
Inflow = 1.0 cfs @ 12.46 hrs, Volume= 0.165 af
Outflow = 1.0 cfs @ 12.46 hrs, Volume= 0.163 af, Atten= 0%, Lag= 0.3 min
Primary = 1.0 cfs @ 12.46 hrs, Volume= 0.163 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 22.94' @ 12.46 hrs Surf.Area= 0.004 ac Storage= 0.002 af

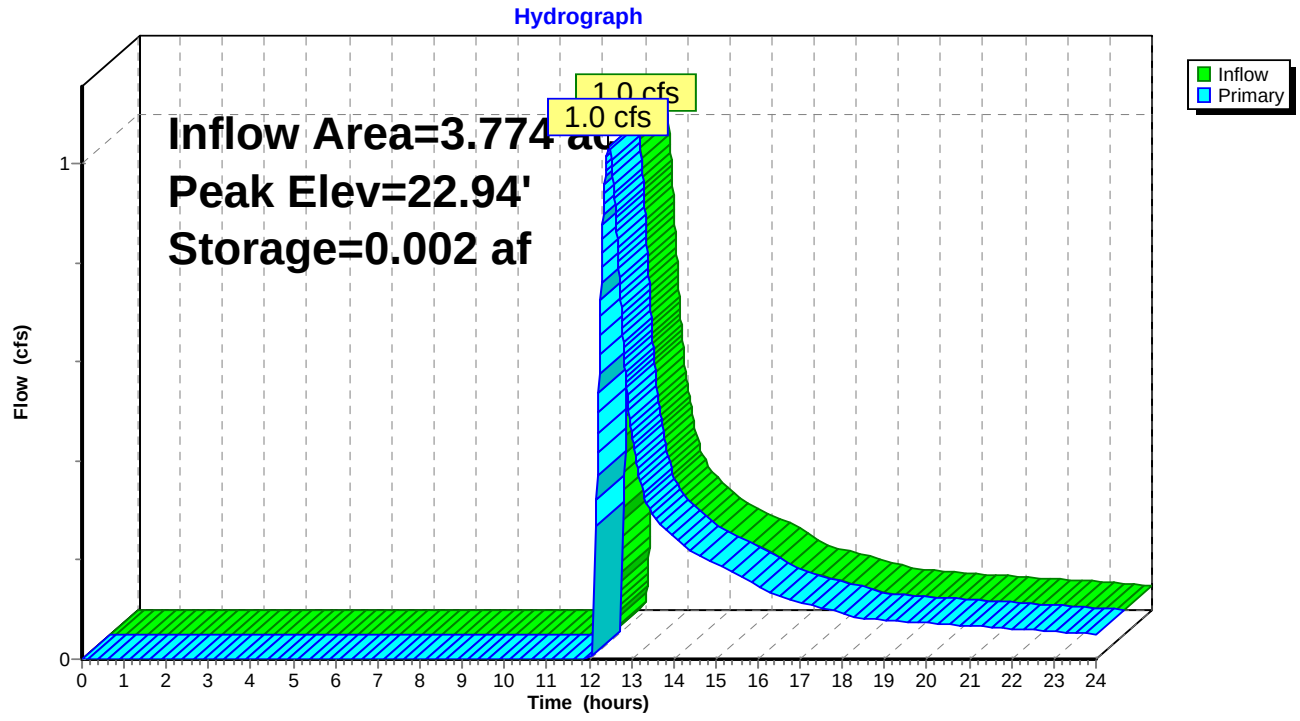
Plug-Flow detention time= 6.5 min calculated for 0.163 af (99% of inflow)
Center-of-Mass det. time= 2.0 min (921.8 - 919.8)

Volume	Invert	Avail.Storage	Storage Description
#1	22.30'	0.004 af	**4.00'W x 20.00'L x 1.00'H Filtration Cell Z=3.0**

Device	Routing	Invert	Outlet Devices
#1	Primary	22.80'	**10.0' long x 5.0' breadth Vegetated Swale** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=1.0 cfs @ 12.46 hrs HW=22.94' TW=22.88' (Dynamic Tailwater)
└─**1=Vegetated Swale** (Weir Controls 1.0 cfs @ 0.72 fps)

Pond 2P: BioFiltration Cell



Summary for Pond 5P: BioFiltration Cell

Inflow Area = 4.408 ac, 0.41% Impervious, Inflow Depth > 0.56" for 2-Year event
Inflow = 1.4 cfs @ 12.43 hrs, Volume= 0.207 af
Outflow = 1.4 cfs @ 12.44 hrs, Volume= 0.206 af, Atten= 0%, Lag= 0.8 min
Primary = 1.4 cfs @ 12.44 hrs, Volume= 0.206 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 25.16' @ 12.44 hrs Surf.Area= 0.004 ac Storage= 0.002 af

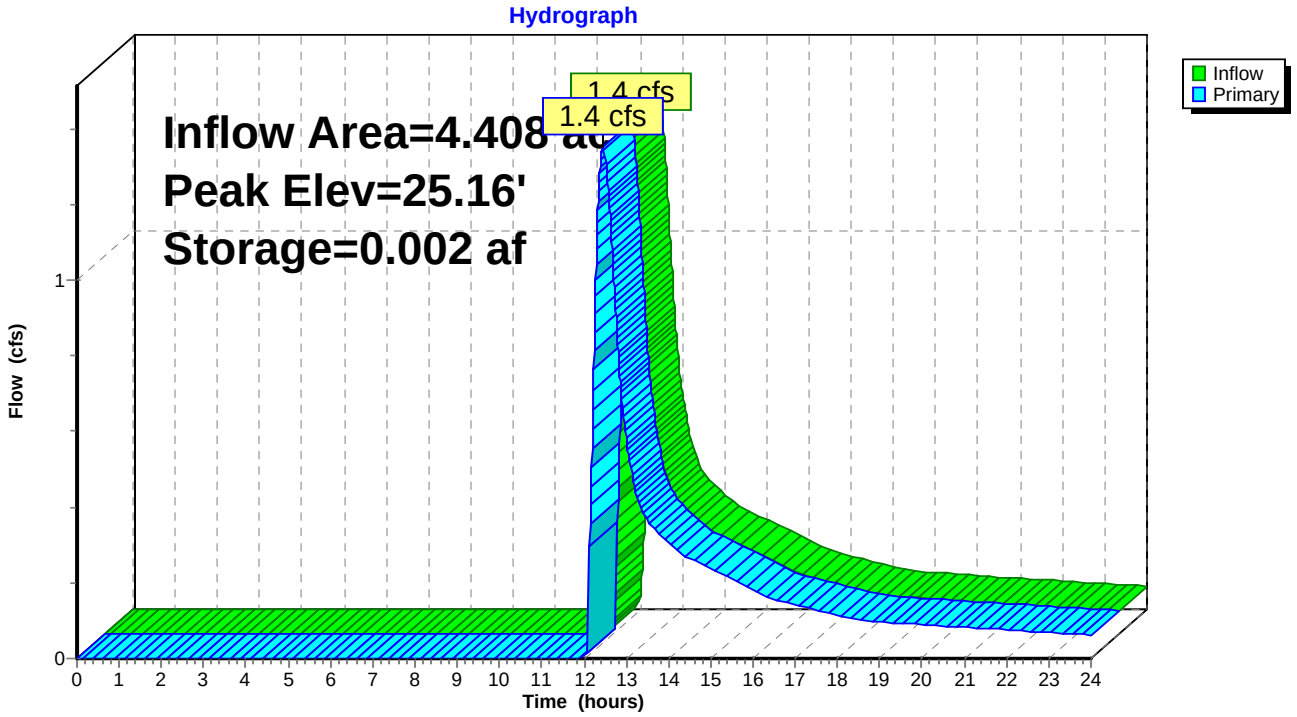
Plug-Flow detention time= 5.3 min calculated for 0.206 af (99% of inflow)
Center-of-Mass det. time= 1.6 min (916.8 - 915.1)

Volume	Invert	Avail.Storage	Storage Description
#1	24.50'	0.004 af	**4.00'W x 20.00'L x 1.10'H Filtration Cell Z=3.0**

Device	Routing	Invert	Outlet Devices
#1	Primary	25.00'	**10.0' long x 5.0' breadth Vegetated Swale** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88
#2	Primary	25.50'	**20.0' long x 5.0' breadth Swale Overtopping** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=1.4 cfs @ 12.44 hrs HW=25.16' TW=25.06' (Dynamic Tailwater)
└─**1=Vegetated Swale** (Weir Controls 1.4 cfs @ 0.84 fps)
└─**2=Swale Overtopping** (Controls 0.0 cfs)

Pond 5P: BioFiltration Cell

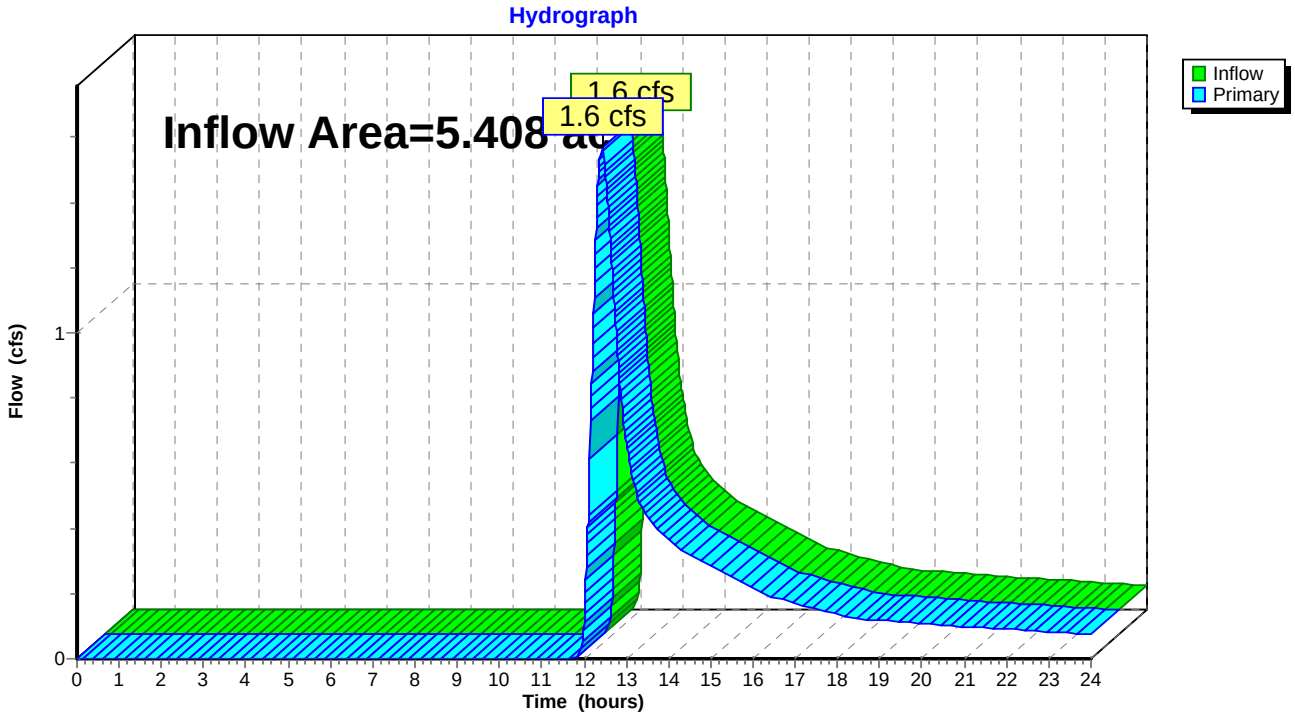


Summary for Link 3L: To Reservoir - South

Inflow Area = 5.408 ac, 0.33% Impervious, Inflow Depth > 0.55" for 2-Year event
Inflow = 1.6 cfs @ 12.43 hrs, Volume= 0.250 af
Primary = 1.6 cfs @ 12.43 hrs, Volume= 0.250 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Link 3L: To Reservoir - South

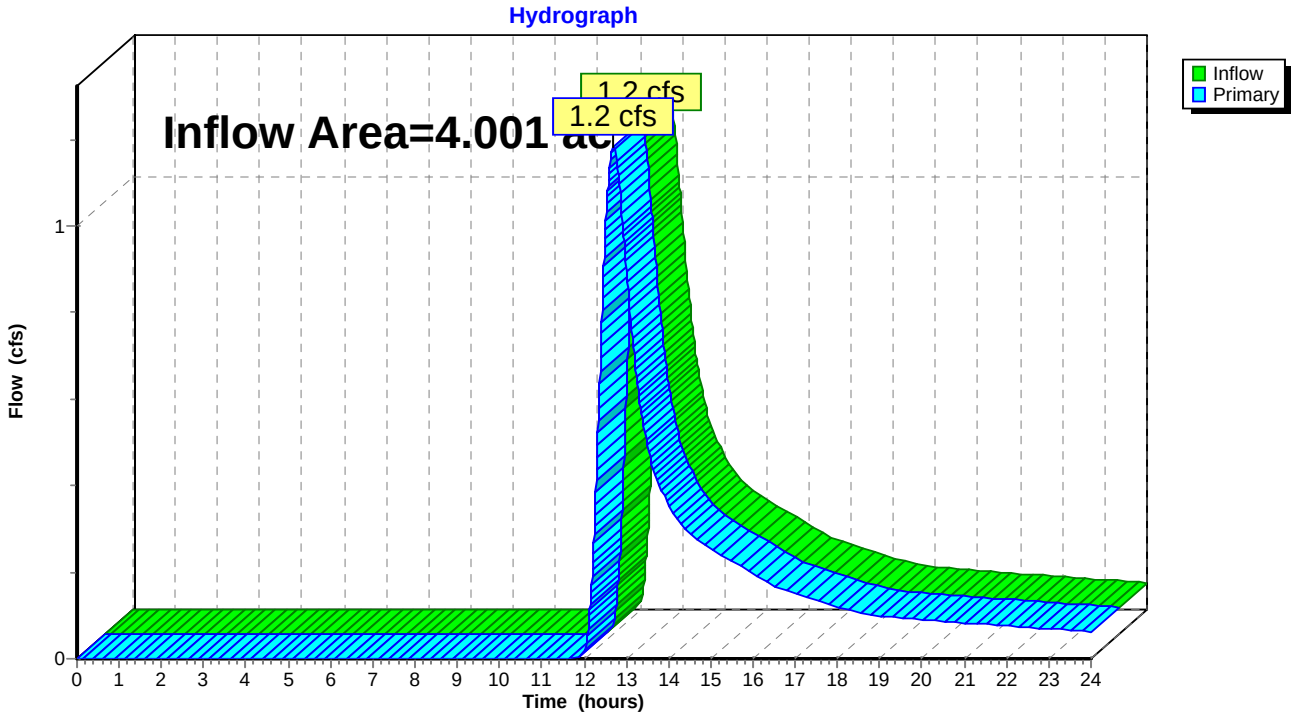


Summary for Link 4L: Wooded Area to East

Inflow Area = 4.001 ac, 0.46% Impervious, Inflow Depth > 0.65" for 2-Year event
Inflow = 1.2 cfs @ 12.69 hrs, Volume= 0.215 af
Primary = 1.2 cfs @ 12.69 hrs, Volume= 0.215 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Link 4L: Wooded Area to East

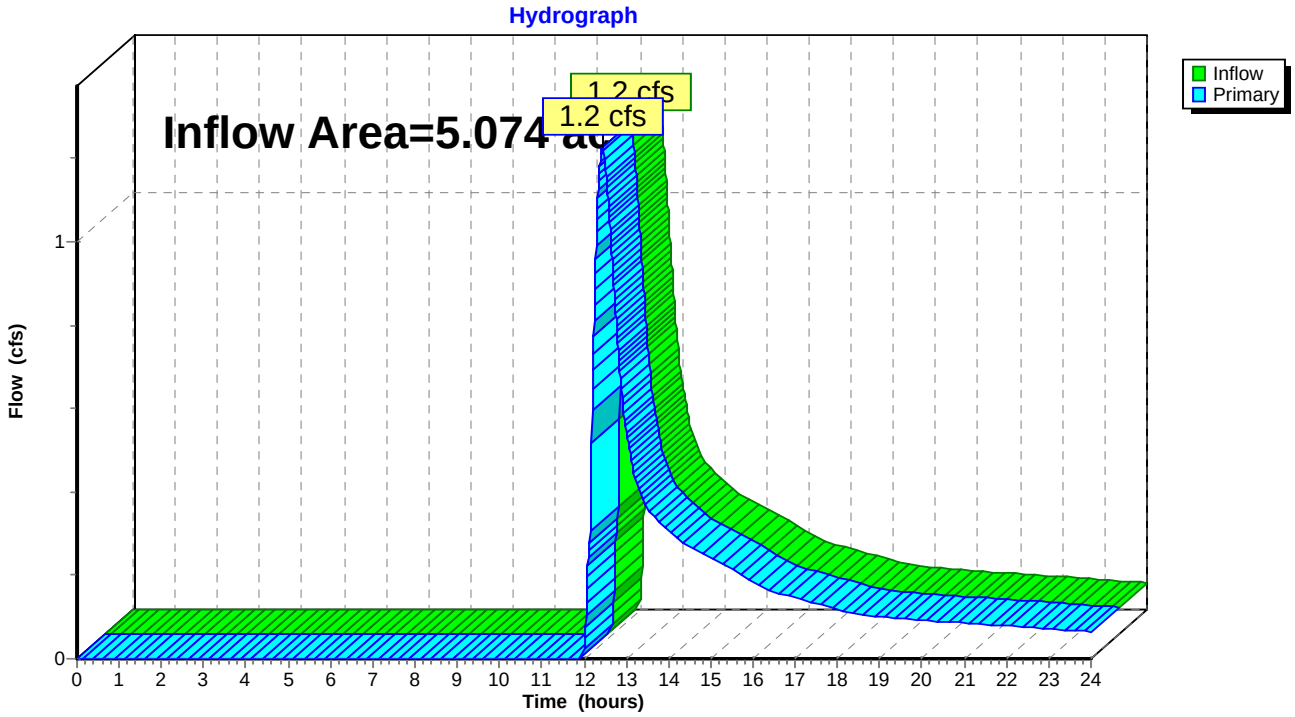


Summary for Link 6L: To Reservoir - North

Inflow Area = 5.074 ac, 0.00% Impervious, Inflow Depth > 0.48" for 2-Year event
Inflow = 1.2 cfs @ 12.44 hrs, Volume= 0.204 af
Primary = 1.2 cfs @ 12.44 hrs, Volume= 0.204 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Link 6L: To Reservoir - North

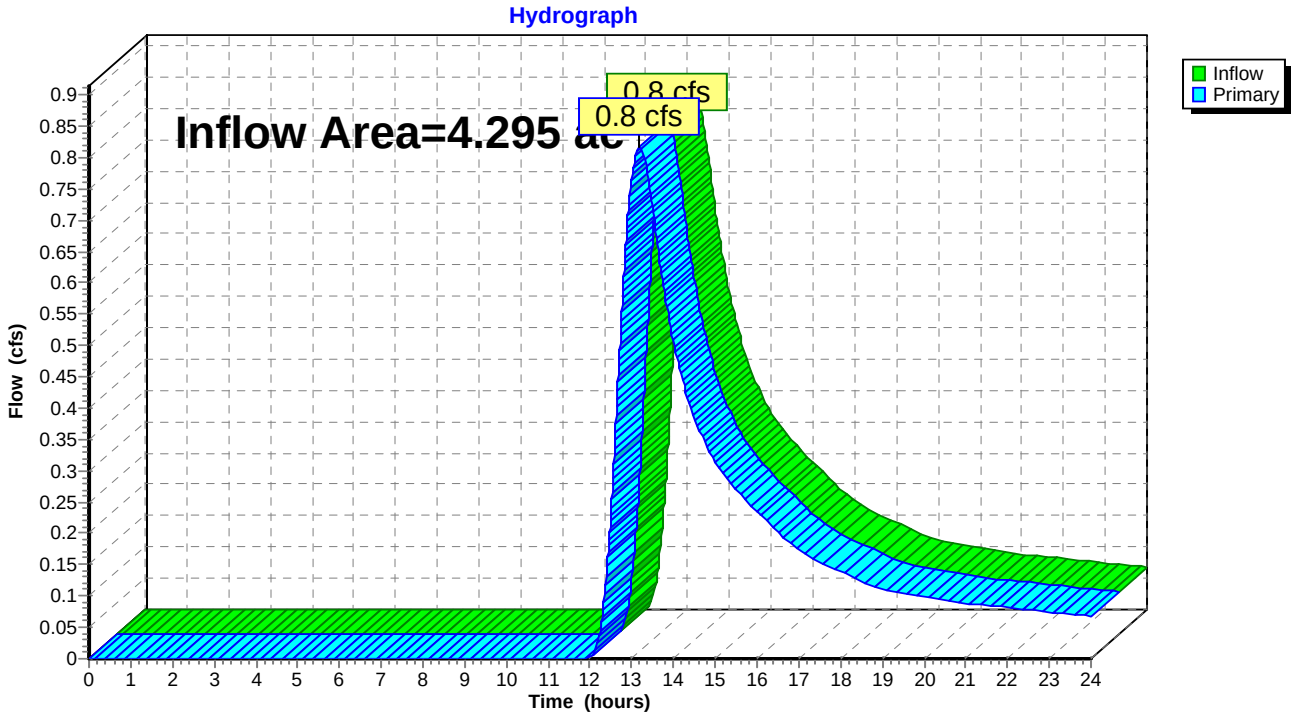


Summary for Link 7L: Off-Site Flow to South

Inflow Area = 4.295 ac, 0.22% Impervious, Inflow Depth > 0.59" for 2-Year event
Inflow = 0.8 cfs @ 13.17 hrs, Volume= 0.213 af
Primary = 0.8 cfs @ 13.17 hrs, Volume= 0.213 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Link 7L: Off-Site Flow to South

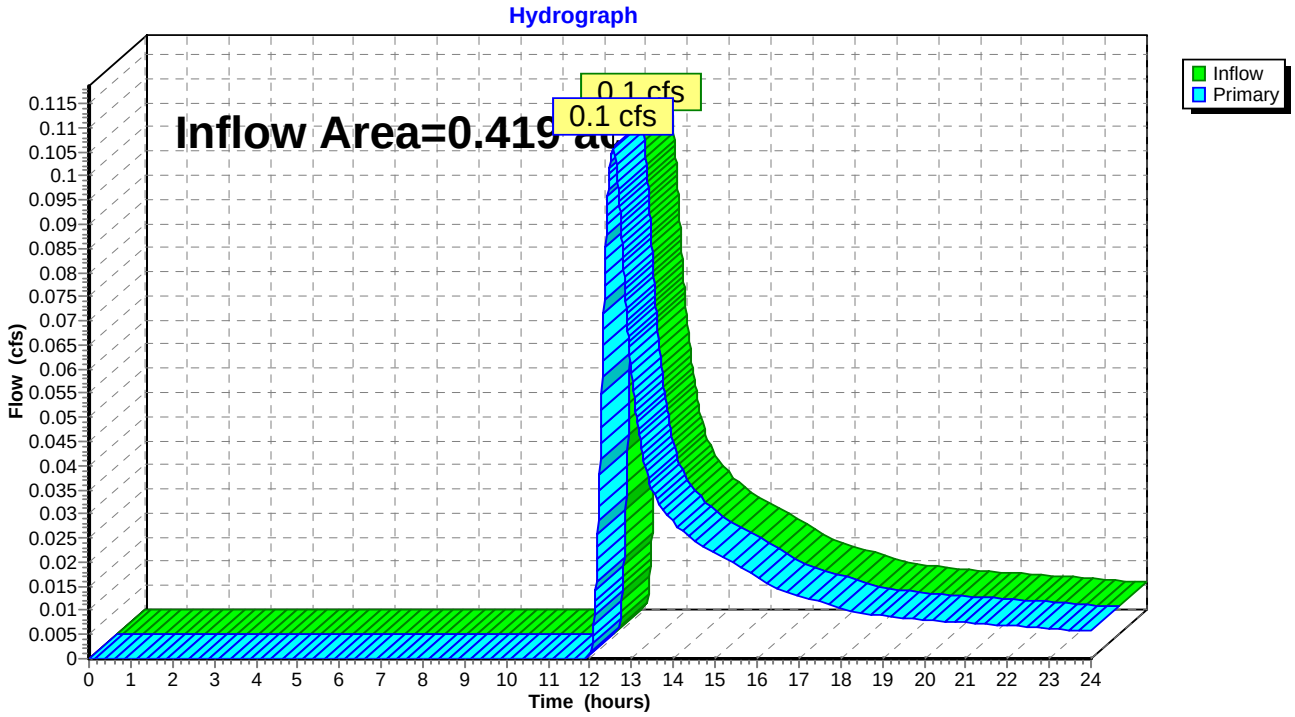


Summary for Link 8L: Off-Site Flow to East

Inflow Area = 0.419 ac, 0.01% Impervious, Inflow Depth > 0.52" for 2-Year event
Inflow = 0.1 cfs @ 12.54 hrs, Volume= 0.018 af
Primary = 0.1 cfs @ 12.54 hrs, Volume= 0.018 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Link 8L: Off-Site Flow to East



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

Subcatchment 1S-A: Area 1 - North - Runoff Area=1.300 ac 0.00% Impervious Runoff Depth>0.75"
Flow Length=30' Slope=0.0770 '/' Tc=6.0 min CN=57 Runoff=0.9 cfs 0.082 af

Subcatchment 1S-B: Area 1 - North - Solar Runoff Area=164,396 sf 0.00% Impervious Runoff Depth>0.96"
Flow Length=562' Tc=24.8 min CN=61 Runoff=2.2 cfs 0.303 af

Subcatchment 2S-A: Area 1 - West - Runoff Area=1.000 ac 0.00% Impervious Runoff Depth>0.97"
Flow Length=30' Slope=0.0350 '/' Tc=6.0 min CN=61 Runoff=1.0 cfs 0.081 af

Subcatchment 2S-B: Area 1 - West Runoff Area=192,013 sf 0.41% Impervious Runoff Depth>1.02"
Flow Length=412' Tc=24.8 min CN=62 Runoff=2.8 cfs 0.374 af

Subcatchment 3S: Area 1 - East Runoff Area=174,284 sf 0.46% Impervious Runoff Depth>1.13"
Flow Length=831' Tc=42.6 min CN=64 Runoff=2.3 cfs 0.377 af

Subcatchment 4S: Area 2 - West Runoff Area=187,084 sf 0.22% Impervious Runoff Depth>1.06"
Flow Length=664' Tc=75.0 min CN=63 Runoff=1.6 cfs 0.379 af

Subcatchment 5S: Area 2 - East Runoff Area=18,251 sf 0.01% Impervious Runoff Depth>0.96"
Flow Length=214' Tc=30.4 min CN=61 Runoff=0.2 cfs 0.034 af

Reach 3R: Overflow Swale Avg. Flow Depth=0.13' Max Vel=1.71 fps Inflow=2.2 cfs 0.301 af
n=0.035 L=30.0' S=0.0267 '/' Capacity=23.0 cfs Outflow=2.2 cfs 0.301 af

Reach 4R: Overflow Swale Avg. Flow Depth=0.10' Max Vel=2.78 fps Inflow=2.8 cfs 0.373 af
n=0.035 L=30.0' S=0.0973 '/' Capacity=43.9 cfs Outflow=2.8 cfs 0.373 af

Pond 2P: BioFiltration Cell Peak Elev=23.04' Storage=0.002 af Inflow=2.2 cfs 0.303 af
Outflow=2.2 cfs 0.301 af

Pond 5P: BioFiltration Cell Peak Elev=25.26' Storage=0.002 af Inflow=2.8 cfs 0.374 af
Outflow=2.8 cfs 0.373 af

Link 3L: To Reservoir - South Inflow=3.3 cfs 0.453 af
Primary=3.3 cfs 0.453 af

Link 4L: Wooded Area to East Inflow=2.3 cfs 0.377 af
Primary=2.3 cfs 0.377 af

Link 6L: To Reservoir - North Inflow=2.7 cfs 0.382 af
Primary=2.7 cfs 0.382 af

Link 7L: Off-Site Flow to South Inflow=1.6 cfs 0.379 af
Primary=1.6 cfs 0.379 af

Link 8L: Off-Site Flow to East Inflow=0.2 cfs 0.034 af
Primary=0.2 cfs 0.034 af

Total Runoff Area = 19.197 ac Runoff Volume = 1.629 af Average Runoff Depth = 1.02"
99.76% Pervious = 19.151 ac 0.24% Impervious = 0.046 ac

Summary for Subcatchment 1S-A: Area 1 - North - DownGradient Swale

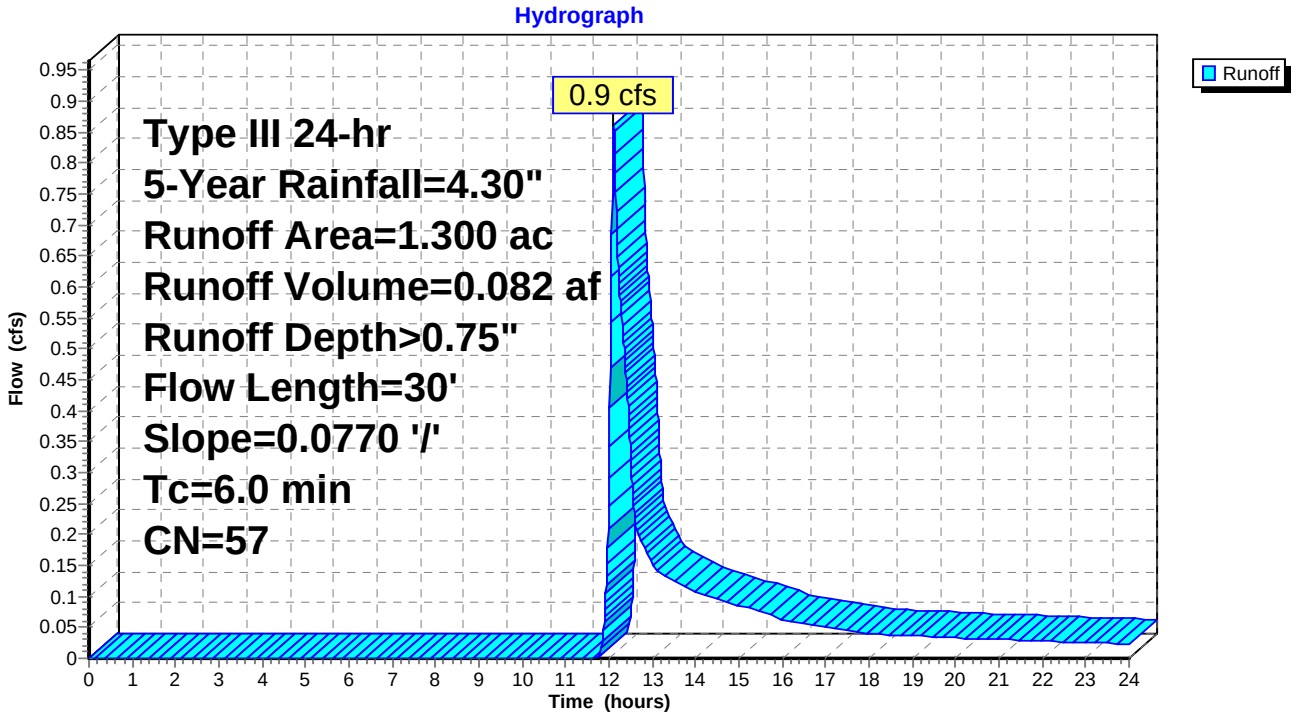
Runoff = 0.9 cfs @ 12.11 hrs, Volume= 0.082 af, Depth> 0.75"

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 5-Year Rainfall=4.30"

Area (ac)	CN	Description
0.850	55	Woods, Good, HSG B
0.450	61	>75% Grass cover, Good, HSG B
1.300	57	Weighted Average
1.300		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.6	30	0.0770	0.11		**Sheet Flow, Wooded Slope** Woods: Light underbrush n= 0.400 P2= 3.40"
4.6	30	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 1S-A: Area 1 - North - DownGradient Swale



Summary for Subcatchment 1S-B: Area 1 - North - Solar Arrays

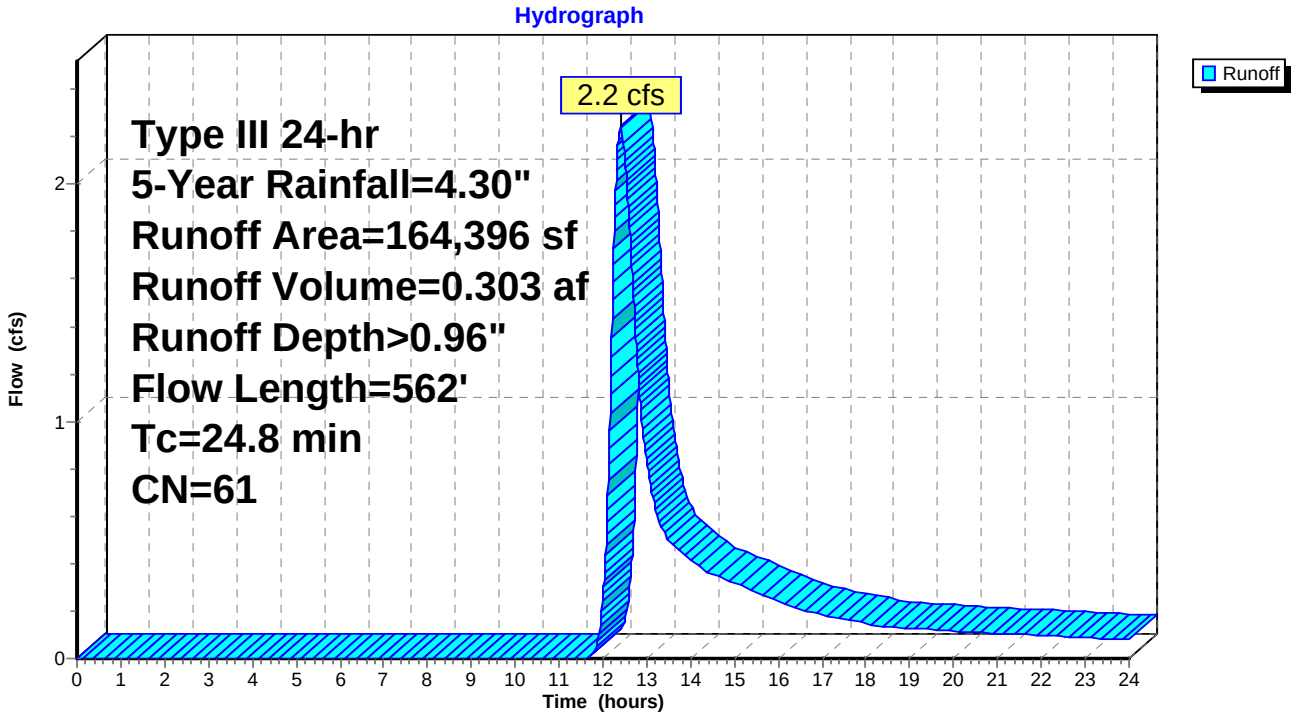
Runoff = 2.2 cfs @ 12.40 hrs, Volume= 0.303 af, Depth> 0.96"

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 5-Year Rainfall=4.30"

	Area (sf)	CN	Description
	23,392	60	Woods, Fair, HSG B
*	141,004	61	>75% Grass cover, Solar Array Area, HSG B
*	0	98	Solar Array Posts, HSG B
	164,396	61	Weighted Average
	164,396		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.5	100	0.0177	0.11		**Sheet Flow, Grass - Solar Array Area** Grass: Dense n= 0.240 P2= 3.40"
1.0	40	0.0085	0.65		**Shallow Concentrated Flow, Grass - Solar Array Area** Short Grass Pasture Kv= 7.0 fps
0.3	32	0.0625	1.75		**Shallow Concentrated Flow, Grass - Solar Array Area** Short Grass Pasture Kv= 7.0 fps
2.9	143	0.0140	0.83		**Shallow Concentrated Flow, Grass - Solar Array Area** Short Grass Pasture Kv= 7.0 fps
5.2	211	0.0095	0.68		**Shallow Concentrated Flow, Grass - Solar Array Area** Short Grass Pasture Kv= 7.0 fps
0.4	31	0.0323	1.26		**Shallow Concentrated Flow, Grass - Solar Array Area** Short Grass Pasture Kv= 7.0 fps
0.5	5	0.2000	0.17		**Sheet Flow, To swale (Flow disrupted by stone level spreader)** Grass: Dense n= 0.240 P2= 3.40"
24.8	562	Total			

Subcatchment 1S-B: Area 1 - North - Solar Arrays



Summary for Subcatchment 2S-A: Area 1 - West - DownGradient Swale

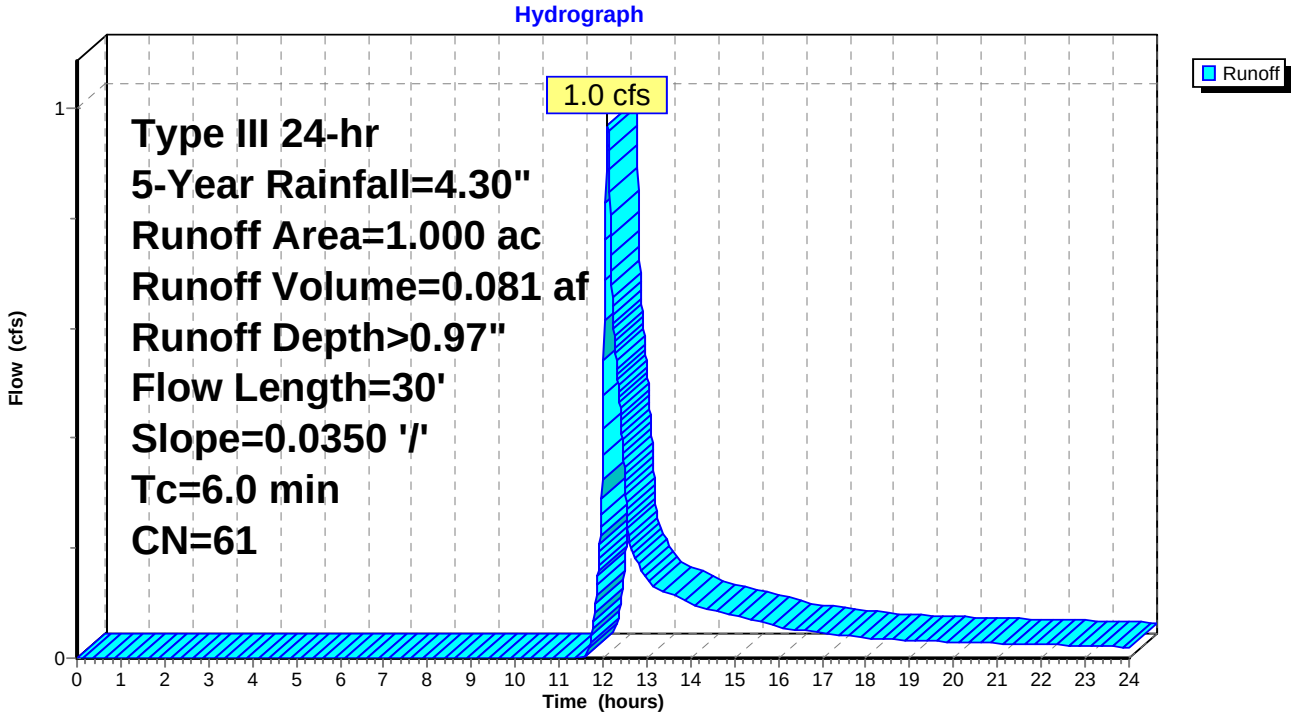
Runoff = 1.0 cfs @ 12.10 hrs, Volume= 0.081 af, Depth> 0.97"

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 5-Year Rainfall=4.30"

Area (ac)	CN	Description
1.000	61	>75% Grass cover, Good, HSG B
1.000		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.2	30	0.0350	0.12		**Sheet Flow, Grass Slope** Grass: Dense n= 0.240 P2= 3.40"
4.2	30	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 2S-A: Area 1 - West - DownGradient Swale



Summary for Subcatchment 2S-B: Area 1 - West

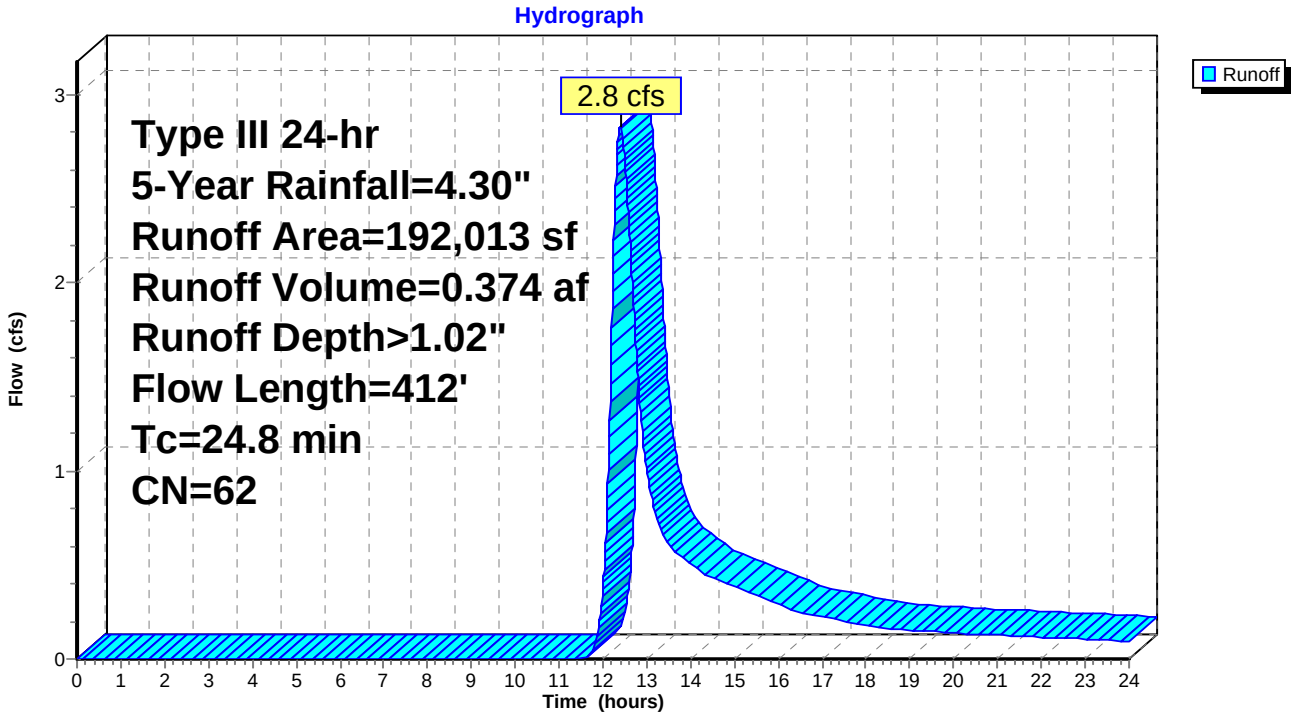
Runoff = 2.8 cfs @ 12.40 hrs, Volume= 0.374 af, Depth> 1.02"

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 5-Year Rainfall=4.30"

	Area (sf)	CN	Description
*	182,691	61	>75% Grass cover, Solar Array Area, HSG B
	8,538	85	Gravel roads, HSG B
*	0	98	Solar Array Racking Posts, HSG B
*	784	98	Concrete Equipment Pad, HSG B
	192,013	62	Weighted Average
	191,229		99.59% Pervious Area
	784		0.41% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.0	100	0.0120	0.10		**Sheet Flow, Grass - Solar Array Area** Grass: Dense n= 0.240 P2= 3.40"
7.3	307	0.0099	0.70		**Shallow Concentrated Flow, Grass - Solar Array Area** Short Grass Pasture Kv= 7.0 fps
0.5	5	0.2000	0.17		**Sheet Flow, Swale Slope (flow disrupted by stone level spreade** Grass: Dense n= 0.240 P2= 3.40"
24.8	412	Total			

Subcatchment 2S-B: Area 1 - West



Summary for Subcatchment 3S: Area 1 - East

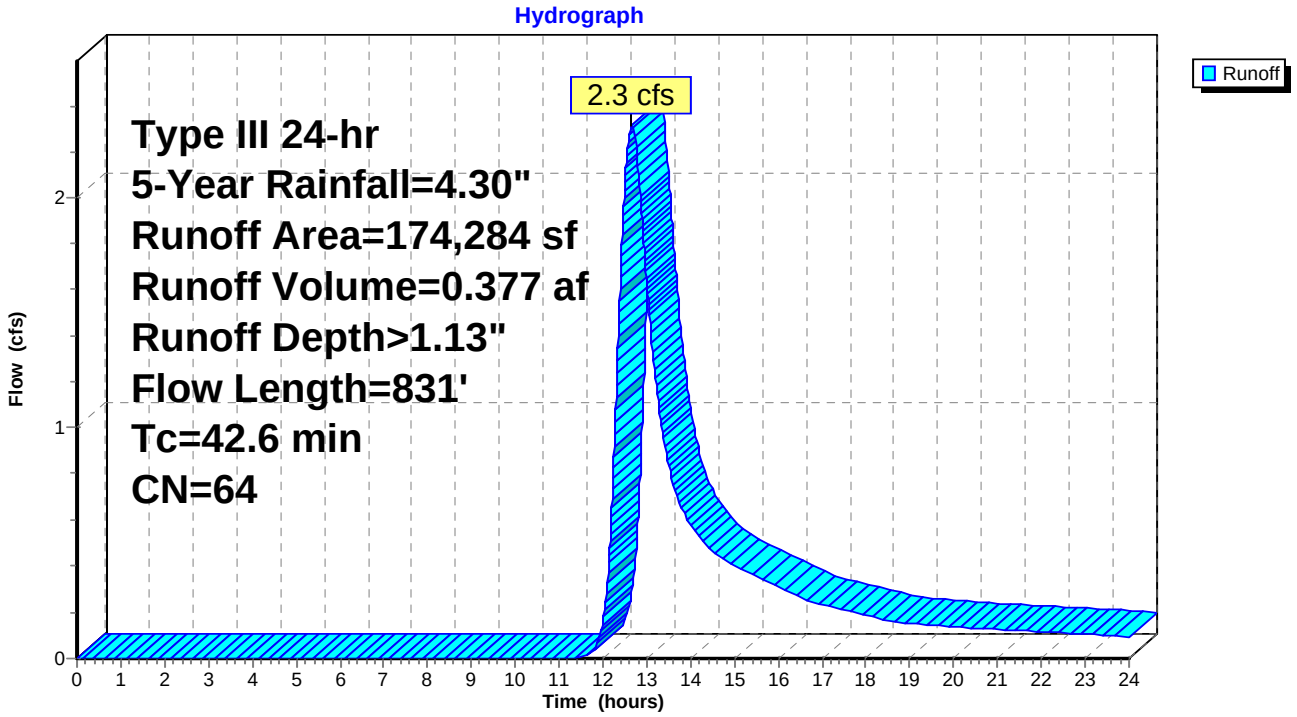
Runoff = 2.3 cfs @ 12.64 hrs, Volume= 0.377 af, Depth> 1.13"

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 5-Year Rainfall=4.30"

	Area (sf)	CN	Description
	19,602	85	Gravel roads, HSG B
*	153,878	61	>75% Grass cover, Solar Array Area, HSG B
*	4	98	Solar Array Racking Posts, HSG B
*	800	98	Concrete Equipment Pads, HSG B
	174,284	64	Weighted Average
	173,480		99.54% Pervious Area
	804		0.46% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
19.1	100	0.0090	0.09		**Sheet Flow, Grass - Solar Array Area** Grass: Dense n= 0.240 P2= 3.40"
7.1	174	0.0034	0.41		**Shallow Concentrated Flow, Grass - Solar Array Area** Short Grass Pasture Kv= 7.0 fps
16.3	526	0.0059	0.54		**Shallow Concentrated Flow, Grass** Short Grass Pasture Kv= 7.0 fps
0.1	31	0.0742	4.39		**Shallow Concentrated Flow, Grass/Gravel** Unpaved Kv= 16.1 fps
42.6	831	Total			

Subcatchment 3S: Area 1 - East



Summary for Subcatchment 4S: Area 2 - West

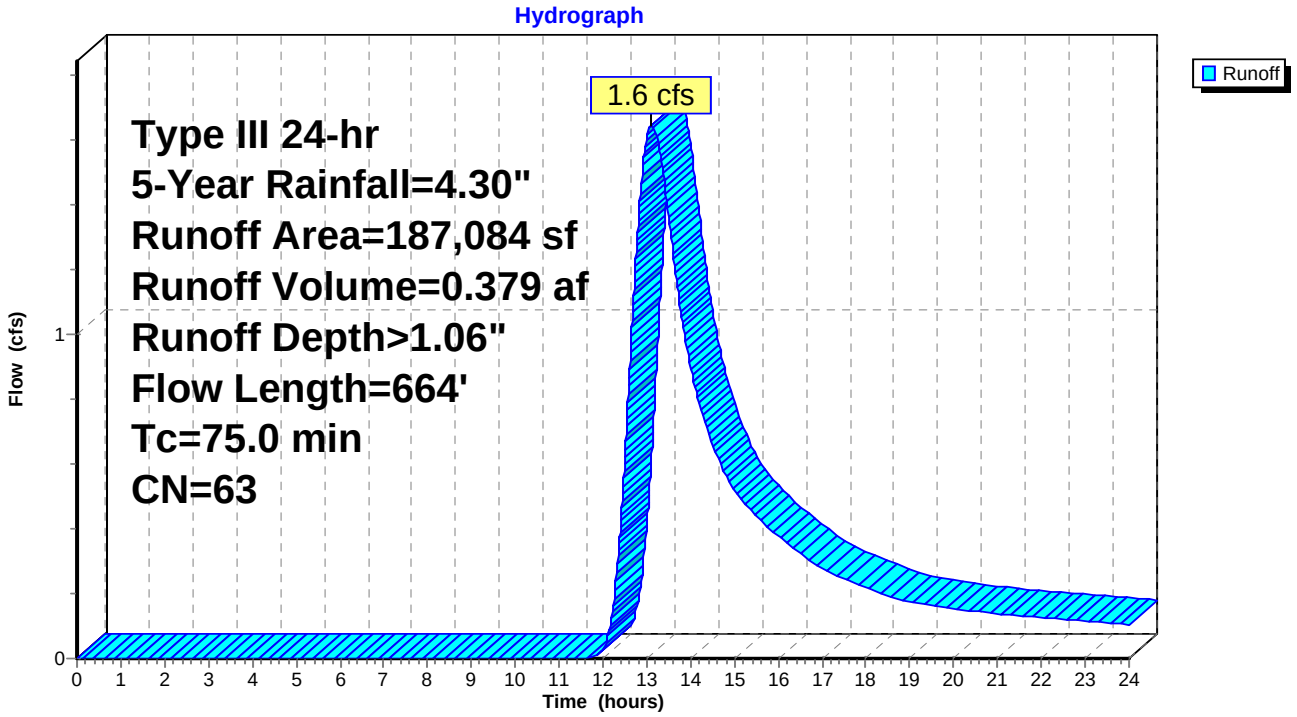
Runoff = 1.6 cfs @ 13.09 hrs, Volume= 0.379 af, Depth> 1.06"

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 5-Year Rainfall=4.30"

	Area (sf)	CN	Description
	10,060	60	Woods, Fair, HSG B
*	161,719	61	>75% Grass cover, Solar Array Area, HSG B
	14,898	85	Gravel roads, HSG B
*	7	98	Solar Array Racking Posts, HSG B
*	400	98	Concrete Equipment Pad, HSG B
	187,084	63	Weighted Average
	186,677		99.78% Pervious Area
	407		0.22% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
20.0	100	0.0080	0.08		**Sheet Flow, Grass - Solar Array Area** Grass: Dense n= 0.240 P2= 3.40"
1.3	86	0.0233	1.07		**Shallow Concentrated Flow, Grass - Solar Array Area** Short Grass Pasture Kv= 7.0 fps
7.5	235	0.0055	0.52		**Shallow Concentrated Flow, Grass - Solar Array Area** Short Grass Pasture Kv= 7.0 fps
13.3	177	0.0010	0.22		**Shallow Concentrated Flow, Grass - Solar Array Area** Short Grass Pasture Kv= 7.0 fps
32.9	66	0.0010	0.03		**Sheet Flow, Grass (Flow disrupted by stone check dam)** Grass: Dense n= 0.240 P2= 3.40"
75.0	664	Total			

Subcatchment 4S: Area 2 - West



Summary for Subcatchment 5S: Area 2 - East

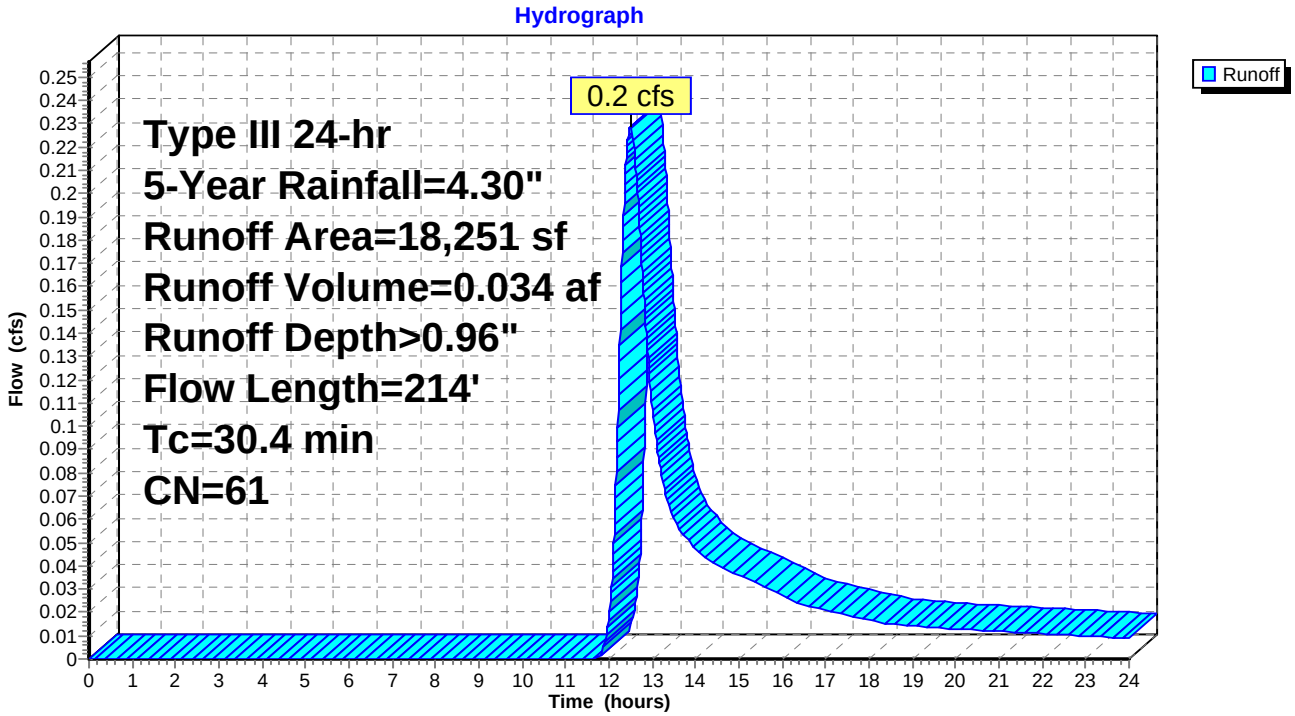
Runoff = 0.2 cfs @ 12.50 hrs, Volume= 0.034 af, Depth> 0.96"

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 5-Year Rainfall=4.30"

	Area (sf)	CN	Description
*	18,250	61	>75% Grass cover, Solar Array Area, HSG B
*	1	98	Solar Array Racking Posts, HSG B
	18,251	61	Weighted Average
	18,250		99.99% Pervious Area
	1		0.01% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.2	58	0.0034	0.05		**Sheet Flow, Grass - Solar Array Area** Grass: Dense n= 0.240 P2= 3.40"
8.5	42	0.0119	0.08		**Sheet Flow, Grass - Solar Array Area** Grass: Dense n= 0.240 P2= 3.40"
2.8	86	0.0105	0.51		**Shallow Concentrated Flow, Grass - Solar Array Area** Woodland Kv= 5.0 fps
0.9	28	0.0050	0.49		**Shallow Concentrated Flow, Grass** Short Grass Pasture Kv= 7.0 fps
30.4	214	Total			

Subcatchment 5S: Area 2 - East



Summary for Reach 3R: Overflow Swale

Inflow Area = 3.774 ac, 0.00% Impervious, Inflow Depth > 0.96" for 5-Year event
Inflow = 2.2 cfs @ 12.41 hrs, Volume= 0.301 af
Outflow = 2.2 cfs @ 12.41 hrs, Volume= 0.301 af, Atten= 0%, Lag= 0.2 min

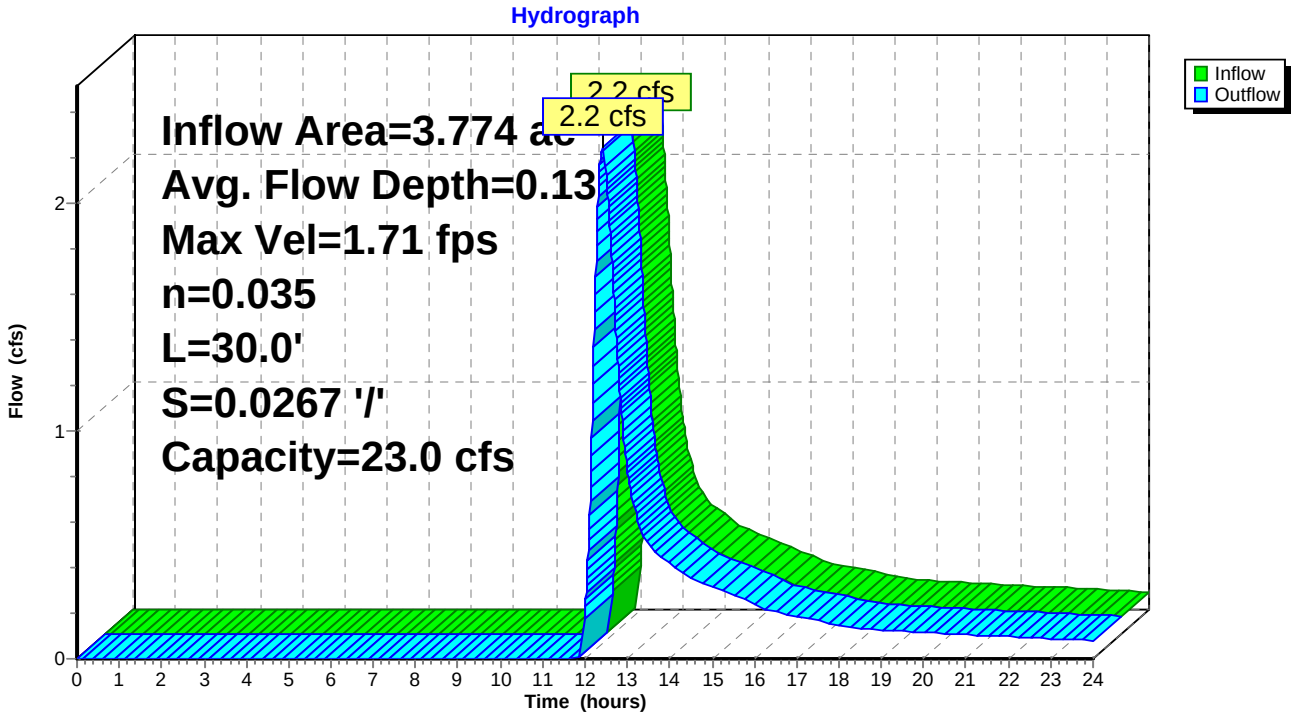
Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 2
Max. Velocity= 1.71 fps, Min. Travel Time= 0.3 min
Avg. Velocity = 0.70 fps, Avg. Travel Time= 0.7 min

Peak Storage= 40 cf @ 12.41 hrs
Average Depth at Peak Storage= 0.13'
Bank-Full Depth= 0.50' Flow Area= 5.8 sf, Capacity= 23.0 cfs

10.00' x 0.50' deep channel, n= 0.035 Earth, dense weeds
Side Slope Z-value= 3.0 '/' Top Width= 13.00'
Length= 30.0' Slope= 0.0267 '/'
Inlet Invert= 22.80', Outlet Invert= 22.00'

‡

Reach 3R: Overflow Swale



Summary for Reach 4R: Overflow Swale

Inflow Area = 4.408 ac, 0.41% Impervious, Inflow Depth > 1.01" for 5-Year event
Inflow = 2.8 cfs @ 12.40 hrs, Volume= 0.373 af
Outflow = 2.8 cfs @ 12.41 hrs, Volume= 0.373 af, Atten= 0%, Lag= 0.2 min

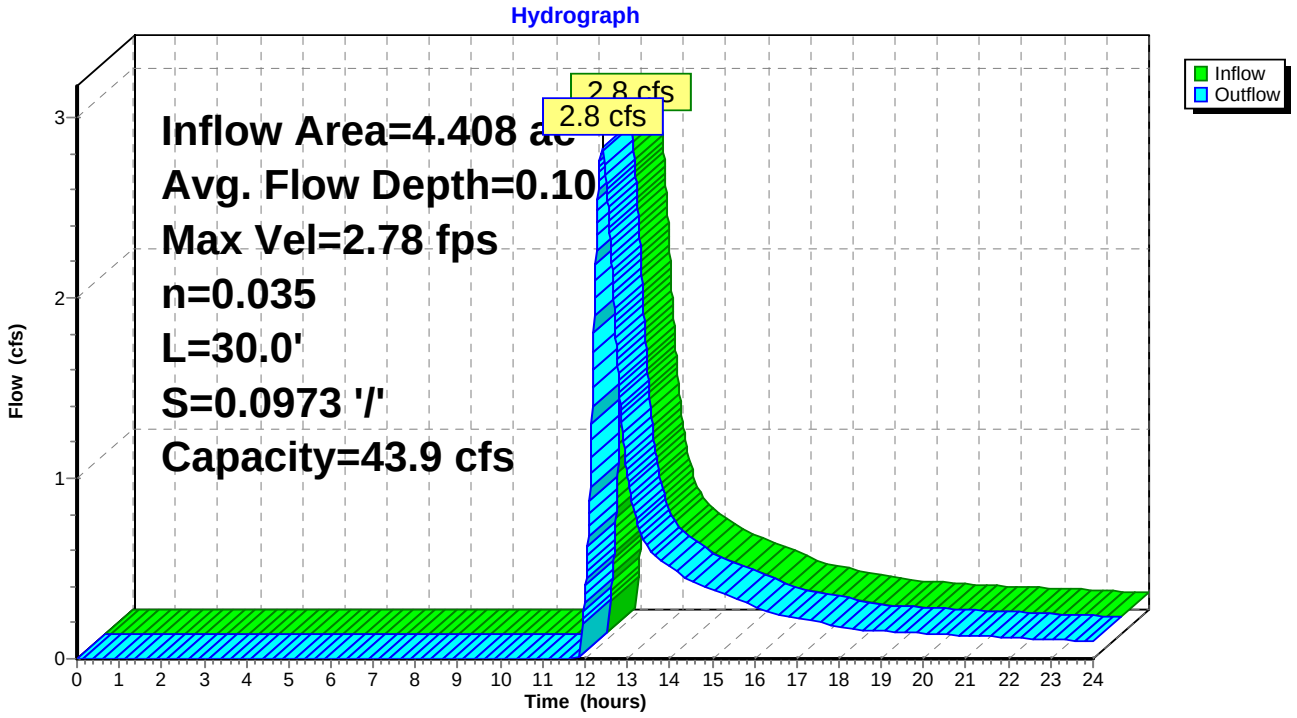
Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 2
Max. Velocity= 2.78 fps, Min. Travel Time= 0.2 min
Avg. Velocity = 1.12 fps, Avg. Travel Time= 0.4 min

Peak Storage= 31 cf @ 12.41 hrs
Average Depth at Peak Storage= 0.10'
Bank-Full Depth= 0.50' Flow Area= 5.8 sf, Capacity= 43.9 cfs

10.00' x 0.50' deep channel, n= 0.035 Earth, dense weeds
Side Slope Z-value= 3.0 '/' Top Width= 13.00'
Length= 30.0' Slope= 0.0973 '/'
Inlet Invert= 25.00', Outlet Invert= 22.08'

‡

Reach 4R: Overflow Swale



Summary for Pond 2P: BioFiltration Cell

Inflow Area = 3.774 ac, 0.00% Impervious, Inflow Depth > 0.96" for 5-Year event
Inflow = 2.2 cfs @ 12.40 hrs, Volume= 0.303 af
Outflow = 2.2 cfs @ 12.41 hrs, Volume= 0.301 af, Atten= 0%, Lag= 0.4 min
Primary = 2.2 cfs @ 12.41 hrs, Volume= 0.301 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 23.04' @ 12.41 hrs Surf.Area= 0.005 ac Storage= 0.002 af

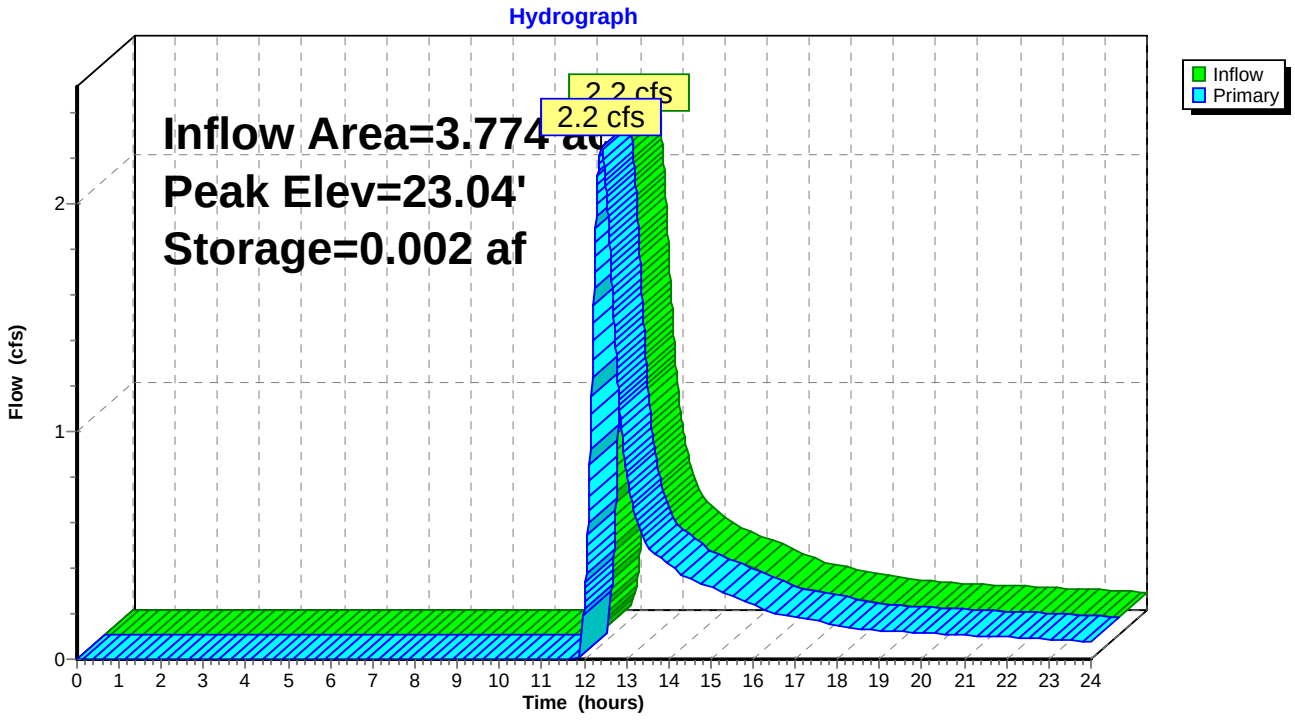
Plug-Flow detention time= 3.8 min calculated for 0.301 af (100% of inflow)
Center-of-Mass det. time= 1.2 min (898.3 - 897.1)

Volume	Invert	Avail.Storage	Storage Description
#1	22.30'	0.004 af	**4.00'W x 20.00'L x 1.00'H Filtration Cell Z=3.0**

Device	Routing	Invert	Outlet Devices
#1	Primary	22.80'	**10.0' long x 5.0' breadth Vegetated Swale** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=2.2 cfs @ 12.41 hrs HW=23.04' TW=22.93' (Dynamic Tailwater)
└─**1=Vegetated Swale** (Weir Controls 2.2 cfs @ 0.95 fps)

Pond 2P: BioFiltration Cell



Summary for Pond 5P: BioFiltration Cell

Inflow Area = 4.408 ac, 0.41% Impervious, Inflow Depth > 1.02" for 5-Year event
Inflow = 2.8 cfs @ 12.40 hrs, Volume= 0.374 af
Outflow = 2.8 cfs @ 12.40 hrs, Volume= 0.373 af, Atten= 0%, Lag= 0.2 min
Primary = 2.8 cfs @ 12.40 hrs, Volume= 0.373 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 25.26' @ 12.40 hrs Surf.Area= 0.005 ac Storage= 0.002 af

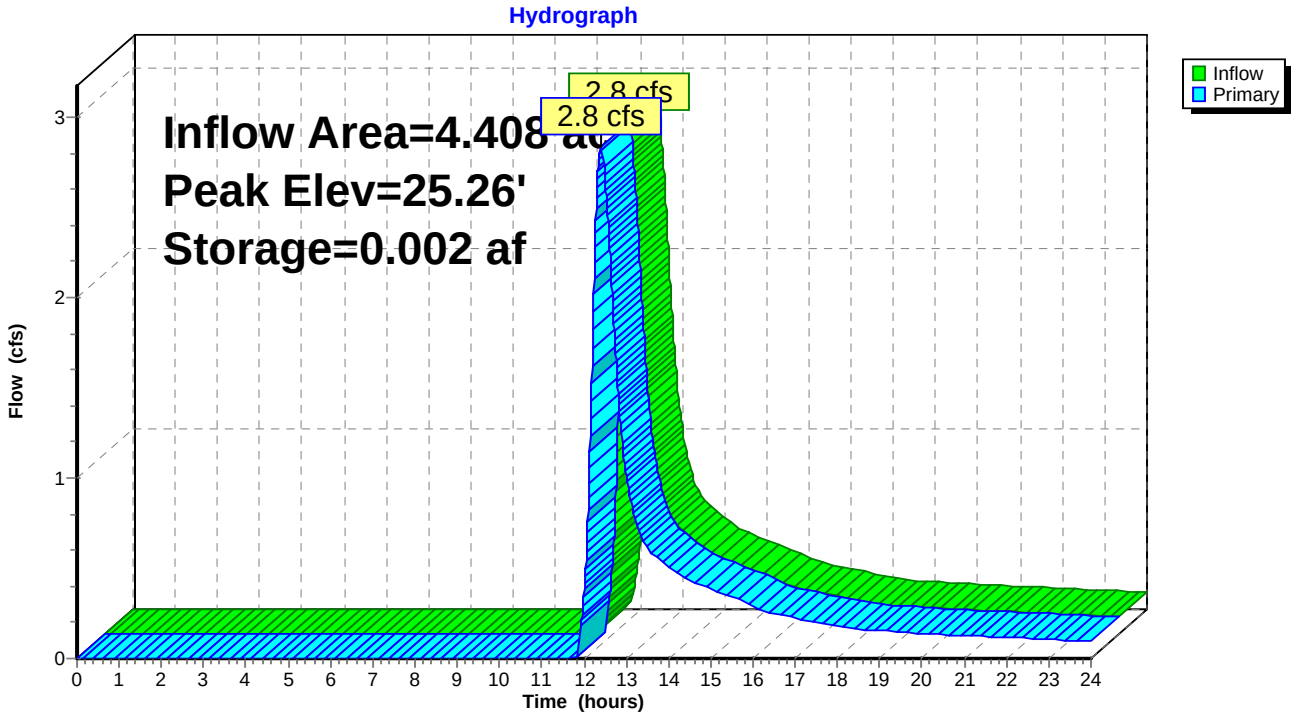
Plug-Flow detention time= 3.1 min calculated for 0.373 af (100% of inflow)
Center-of-Mass det. time= 1.0 min (894.7 - 893.7)

Volume	Invert	Avail.Storage	Storage Description
#1	24.50'	0.004 af	**4.00'W x 20.00'L x 1.10'H Filtration Cell Z=3.0**

Device	Routing	Invert	Outlet Devices
#1	Primary	25.00'	**10.0' long x 5.0' breadth Vegetated Swale** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88
#2	Primary	25.50'	**20.0' long x 5.0' breadth Swale Overtopping** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=2.8 cfs @ 12.40 hrs HW=25.26' TW=25.10' (Dynamic Tailwater)
└─**1=Vegetated Swale** (Weir Controls 2.8 cfs @ 1.09 fps)
└─**2=Swale Overtopping** (Controls 0.0 cfs)

Pond 5P: BioFiltration Cell

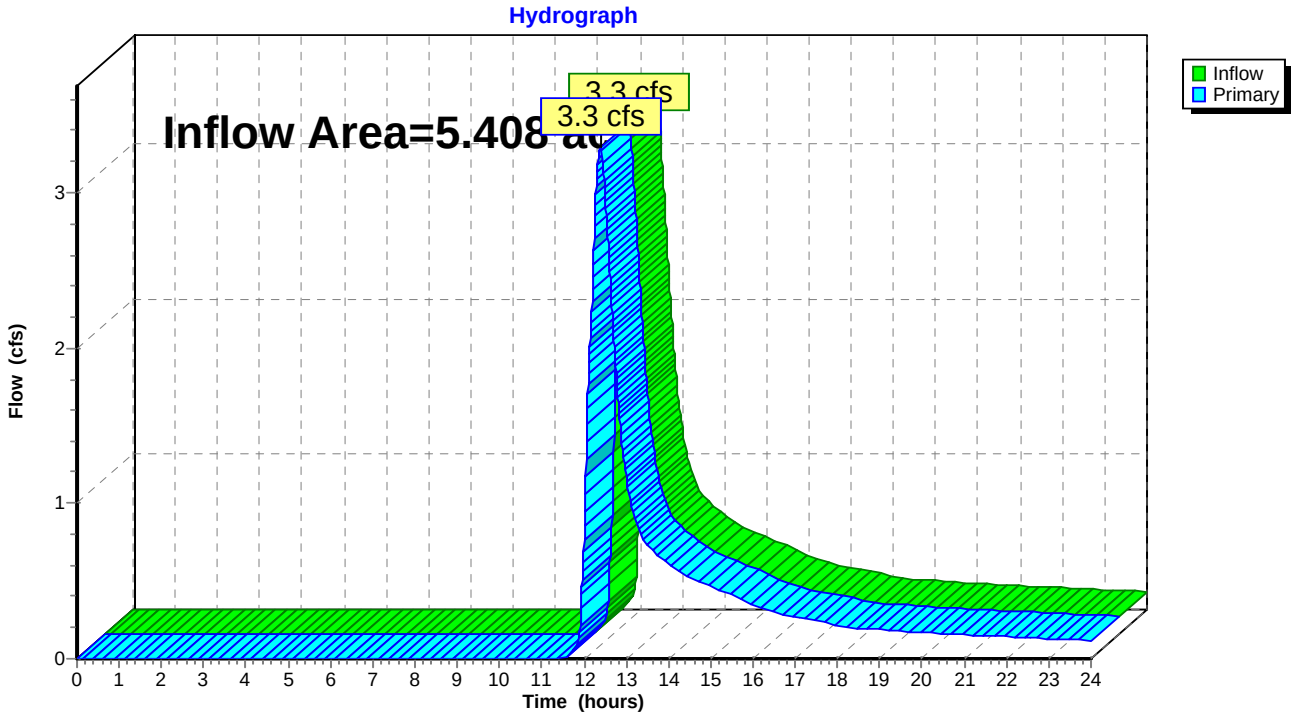


Summary for Link 3L: To Reservoir - South

Inflow Area = 5.408 ac, 0.33% Impervious, Inflow Depth > 1.01" for 5-Year event
Inflow = 3.3 cfs @ 12.38 hrs, Volume= 0.453 af
Primary = 3.3 cfs @ 12.38 hrs, Volume= 0.453 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Link 3L: To Reservoir - South

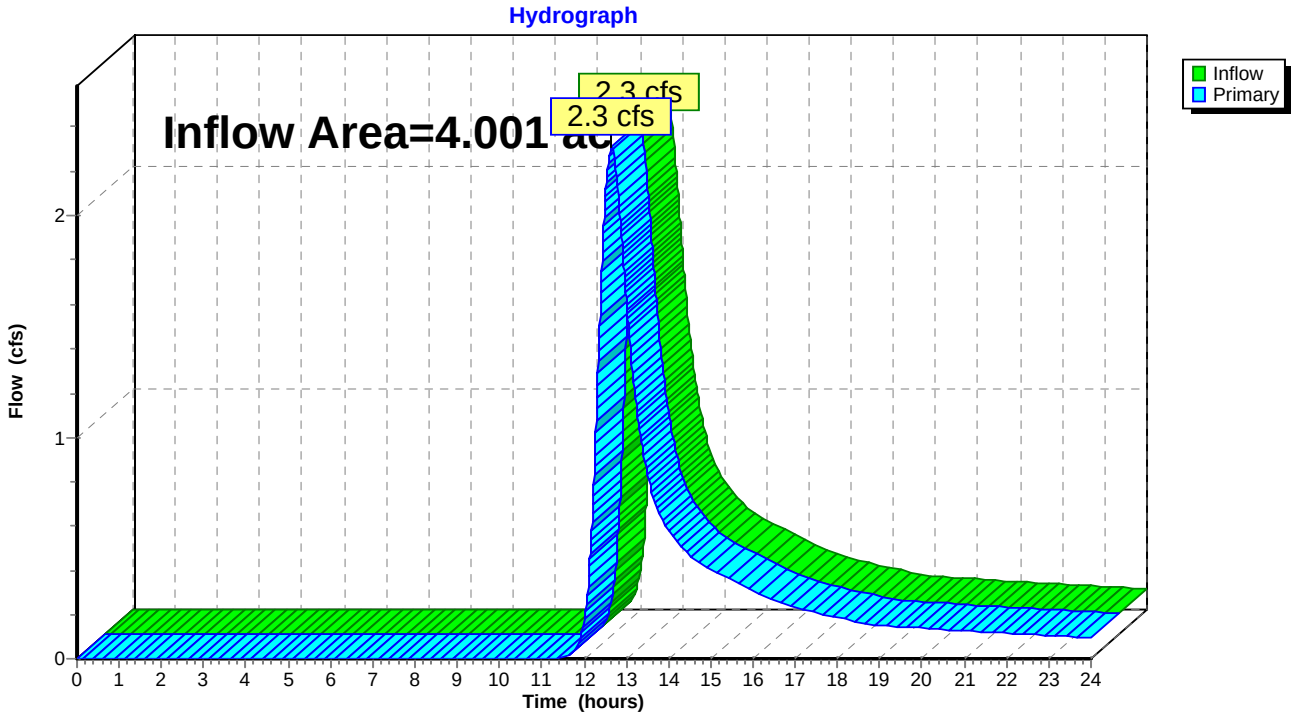


Summary for Link 4L: Wooded Area to East

Inflow Area = 4.001 ac, 0.46% Impervious, Inflow Depth > 1.13" for 5-Year event
Inflow = 2.3 cfs @ 12.64 hrs, Volume= 0.377 af
Primary = 2.3 cfs @ 12.64 hrs, Volume= 0.377 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Link 4L: Wooded Area to East

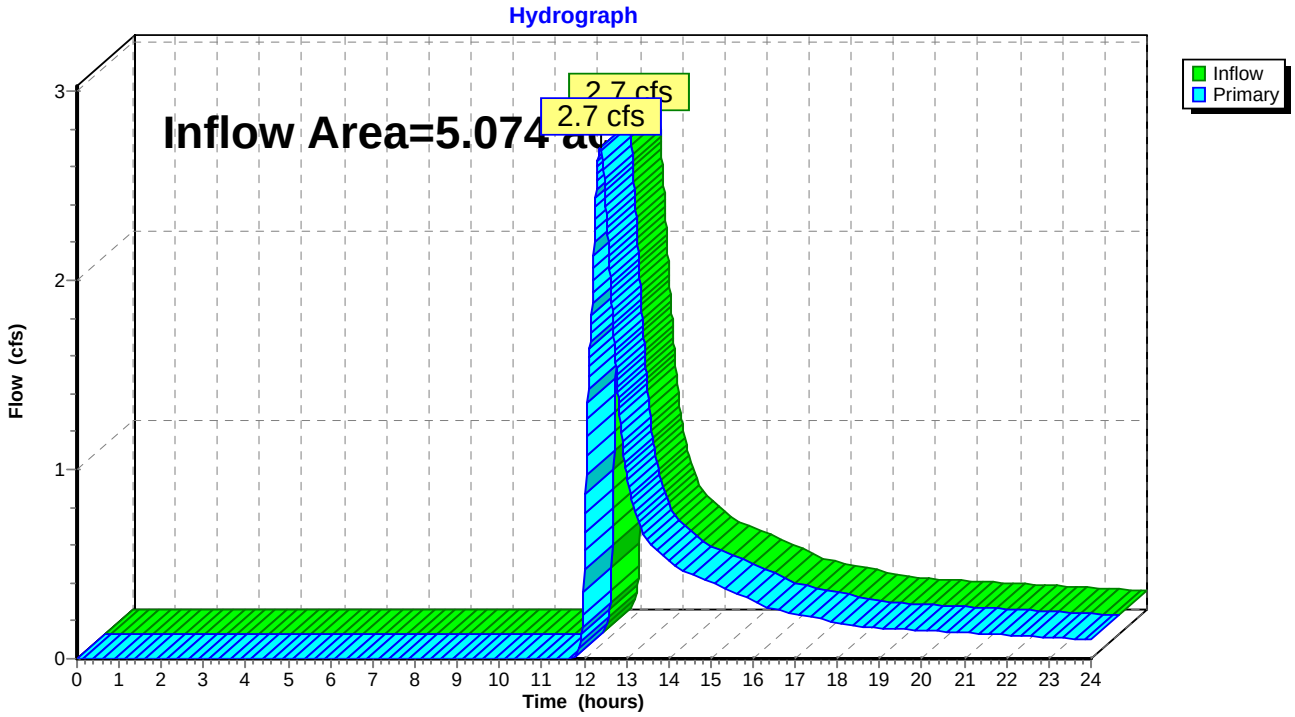


Summary for Link 6L: To Reservoir - North

Inflow Area = 5.074 ac, 0.00% Impervious, Inflow Depth > 0.90" for 5-Year event
Inflow = 2.7 cfs @ 12.38 hrs, Volume= 0.382 af
Primary = 2.7 cfs @ 12.38 hrs, Volume= 0.382 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Link 6L: To Reservoir - North

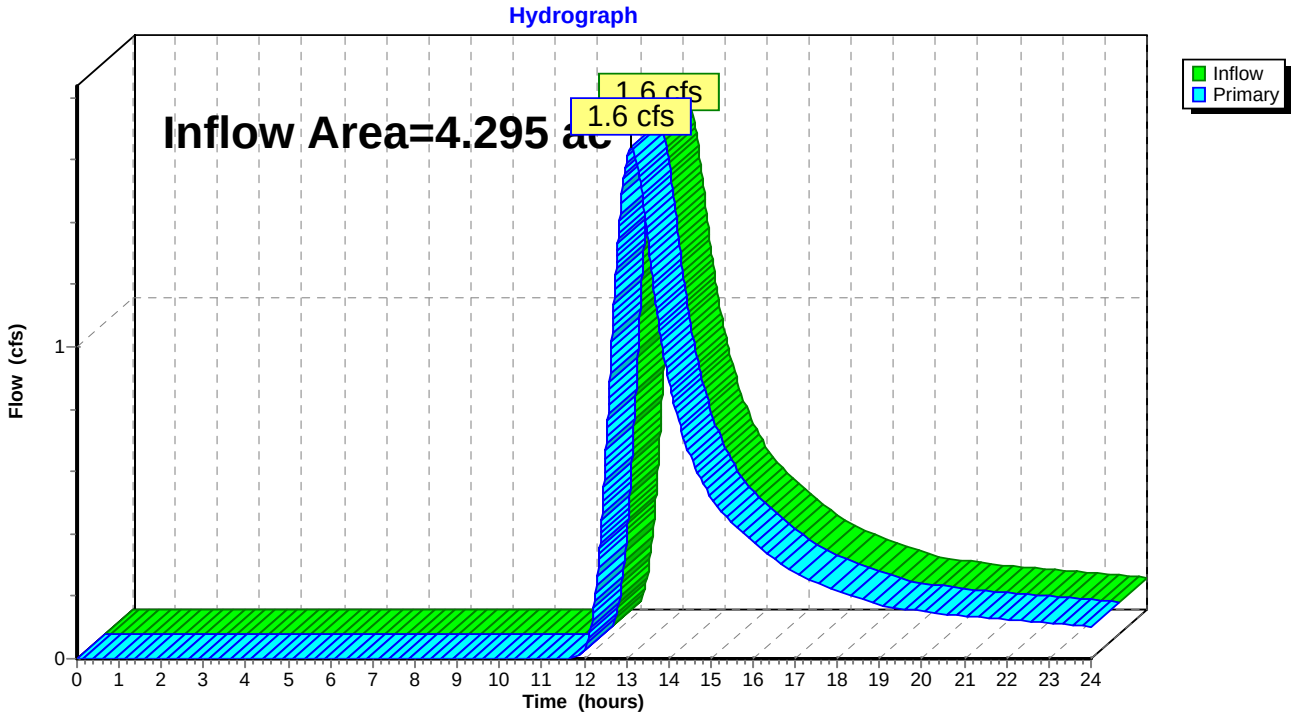


Summary for Link 7L: Off-Site Flow to South

Inflow Area = 4.295 ac, 0.22% Impervious, Inflow Depth > 1.06" for 5-Year event
Inflow = 1.6 cfs @ 13.09 hrs, Volume= 0.379 af
Primary = 1.6 cfs @ 13.09 hrs, Volume= 0.379 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Link 7L: Off-Site Flow to South

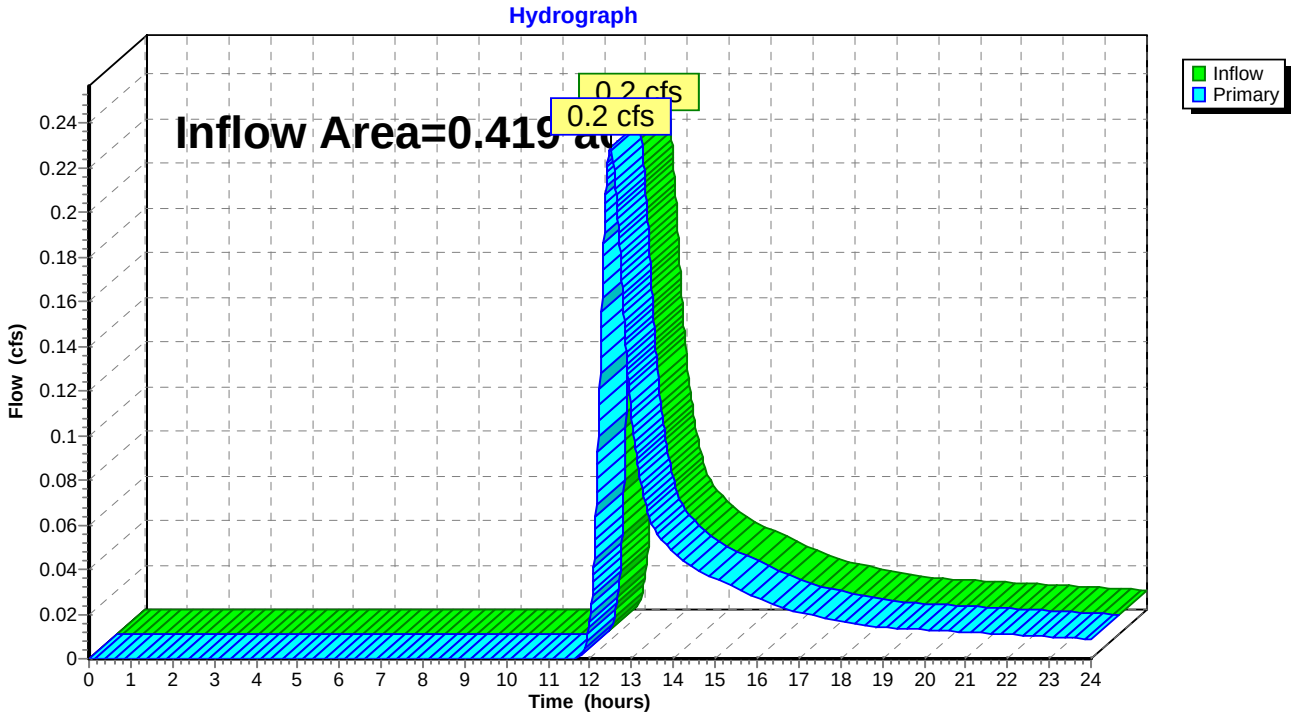


Summary for Link 8L: Off-Site Flow to East

Inflow Area = 0.419 ac, 0.01% Impervious, Inflow Depth > 0.96" for 5-Year event
Inflow = 0.2 cfs @ 12.50 hrs, Volume= 0.034 af
Primary = 0.2 cfs @ 12.50 hrs, Volume= 0.034 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Link 8L: Off-Site Flow to East



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

Subcatchment 1S-A: Area 1 - North - Runoff Area=1.300 ac 0.00% Impervious Runoff Depth>1.10"
Flow Length=30' Slope=0.0770 '/' Tc=6.0 min CN=57 Runoff=1.4 cfs 0.119 af

Subcatchment 1S-B: Area 1 - North - Solar Runoff Area=164,396 sf 0.00% Impervious Runoff Depth>1.36"
Flow Length=562' Tc=24.8 min CN=61 Runoff=3.4 cfs 0.427 af

Subcatchment 2S-A: Area 1 - West - Runoff Area=1.000 ac 0.00% Impervious Runoff Depth>1.37"
Flow Length=30' Slope=0.0350 '/' Tc=6.0 min CN=61 Runoff=1.5 cfs 0.114 af

Subcatchment 2S-B: Area 1 - West Runoff Area=192,013 sf 0.41% Impervious Runoff Depth>1.43"
Flow Length=412' Tc=24.8 min CN=62 Runoff=4.2 cfs 0.525 af

Subcatchment 3S: Area 1 - East Runoff Area=174,284 sf 0.46% Impervious Runoff Depth>1.56"
Flow Length=831' Tc=42.6 min CN=64 Runoff=3.3 cfs 0.521 af

Subcatchment 4S: Area 2 - West Runoff Area=187,084 sf 0.22% Impervious Runoff Depth>1.48"
Flow Length=664' Tc=75.0 min CN=63 Runoff=2.4 cfs 0.528 af

Subcatchment 5S: Area 2 - East Runoff Area=18,251 sf 0.01% Impervious Runoff Depth>1.36"
Flow Length=214' Tc=30.4 min CN=61 Runoff=0.3 cfs 0.047 af

Reach 3R: Overflow Swale Avg. Flow Depth=0.16' Max Vel=1.99 fps Inflow=3.4 cfs 0.426 af
n=0.035 L=30.0' S=0.0267 '/' Capacity=23.0 cfs Outflow=3.4 cfs 0.426 af

Reach 4R: Overflow Swale Avg. Flow Depth=0.13' Max Vel=3.23 fps Inflow=4.2 cfs 0.523 af
n=0.035 L=30.0' S=0.0973 '/' Capacity=43.9 cfs Outflow=4.2 cfs 0.523 af

Pond 2P: BioFiltration Cell Peak Elev=23.10' Storage=0.003 af Inflow=3.4 cfs 0.427 af
Outflow=3.4 cfs 0.426 af

Pond 5P: BioFiltration Cell Peak Elev=25.33' Storage=0.003 af Inflow=4.2 cfs 0.525 af
Outflow=4.2 cfs 0.523 af

Link 3L: To Reservoir - South Inflow=4.8 cfs 0.637 af
Primary=4.8 cfs 0.637 af

Link 4L: Wooded Area to East Inflow=3.3 cfs 0.521 af
Primary=3.3 cfs 0.521 af

Link 6L: To Reservoir - North Inflow=4.1 cfs 0.545 af
Primary=4.1 cfs 0.545 af

Link 7L: Off-Site Flow to South Inflow=2.4 cfs 0.528 af
Primary=2.4 cfs 0.528 af

Link 8L: Off-Site Flow to East Inflow=0.3 cfs 0.047 af
Primary=0.3 cfs 0.047 af

Total Runoff Area = 19.197 ac Runoff Volume = 2.281 af Average Runoff Depth = 1.43"
99.76% Pervious = 19.151 ac 0.24% Impervious = 0.046 ac

Summary for Subcatchment 1S-A: Area 1 - North - DownGradient Swale

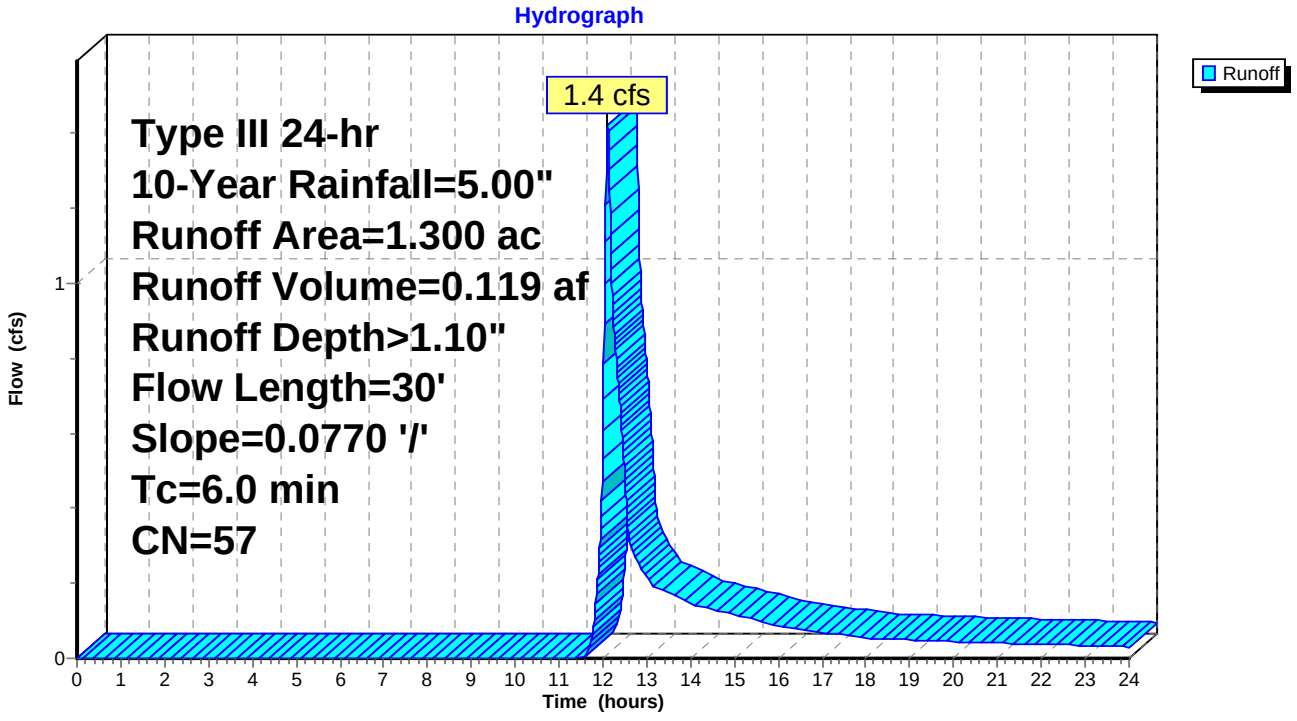
Runoff = 1.4 cfs @ 12.10 hrs, Volume= 0.119 af, Depth> 1.10"

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=5.00"

Area (ac)	CN	Description
0.850	55	Woods, Good, HSG B
0.450	61	>75% Grass cover, Good, HSG B
1.300	57	Weighted Average
1.300		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.6	30	0.0770	0.11		**Sheet Flow, Wooded Slope** Woods: Light underbrush n= 0.400 P2= 3.40"
4.6	30	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 1S-A: Area 1 - North - DownGradient Swale



Summary for Subcatchment 1S-B: Area 1 - North - Solar Arrays

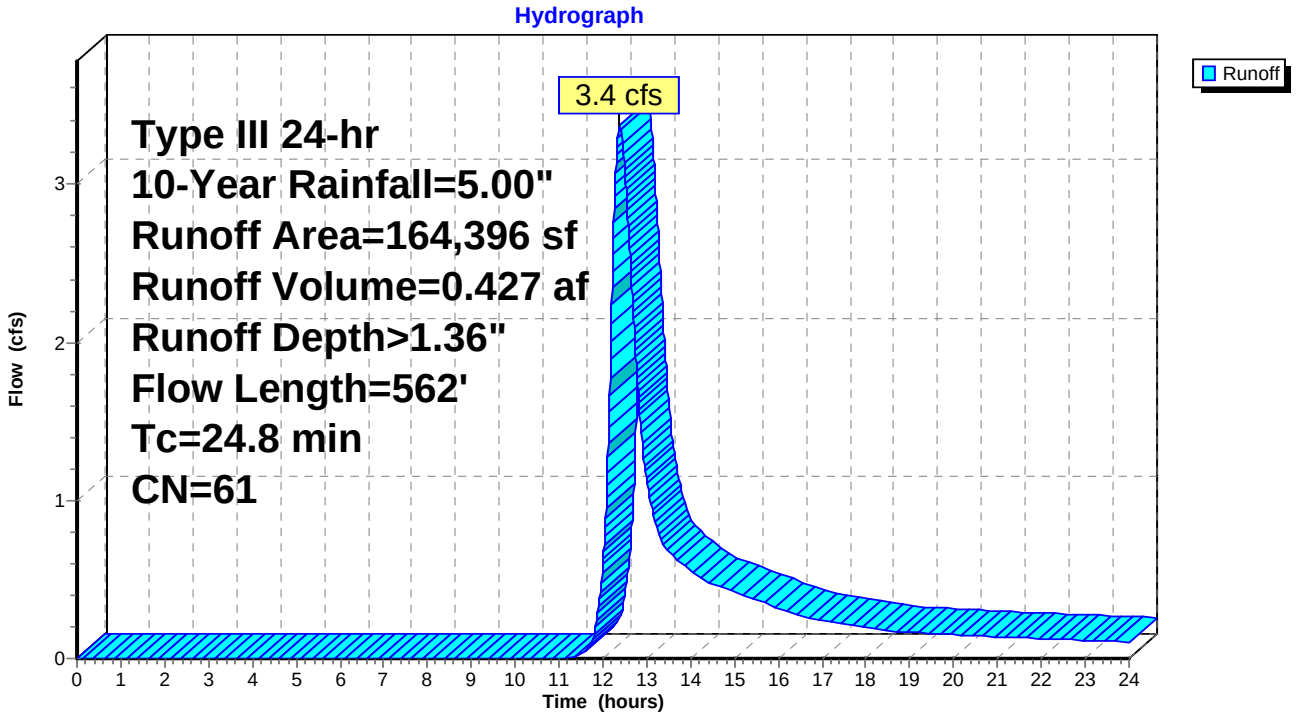
Runoff = 3.4 cfs @ 12.38 hrs, Volume= 0.427 af, Depth> 1.36"

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=5.00"

	Area (sf)	CN	Description
	23,392	60	Woods, Fair, HSG B
*	141,004	61	>75% Grass cover, Solar Array Area, HSG B
*	0	98	Solar Array Posts, HSG B
	164,396	61	Weighted Average
	164,396		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.5	100	0.0177	0.11		**Sheet Flow, Grass - Solar Array Area** Grass: Dense n= 0.240 P2= 3.40"
1.0	40	0.0085	0.65		**Shallow Concentrated Flow, Grass - Solar Array Area** Short Grass Pasture Kv= 7.0 fps
0.3	32	0.0625	1.75		**Shallow Concentrated Flow, Grass - Solar Array Area** Short Grass Pasture Kv= 7.0 fps
2.9	143	0.0140	0.83		**Shallow Concentrated Flow, Grass - Solar Array Area** Short Grass Pasture Kv= 7.0 fps
5.2	211	0.0095	0.68		**Shallow Concentrated Flow, Grass - Solar Array Area** Short Grass Pasture Kv= 7.0 fps
0.4	31	0.0323	1.26		**Shallow Concentrated Flow, Grass - Solar Array Area** Short Grass Pasture Kv= 7.0 fps
0.5	5	0.2000	0.17		**Sheet Flow, To swale (Flow disrupted by stone level spreader)** Grass: Dense n= 0.240 P2= 3.40"
24.8	562	Total			

Subcatchment 1S-B: Area 1 - North - Solar Arrays



Summary for Subcatchment 2S-A: Area 1 - West - DownGradient Swale

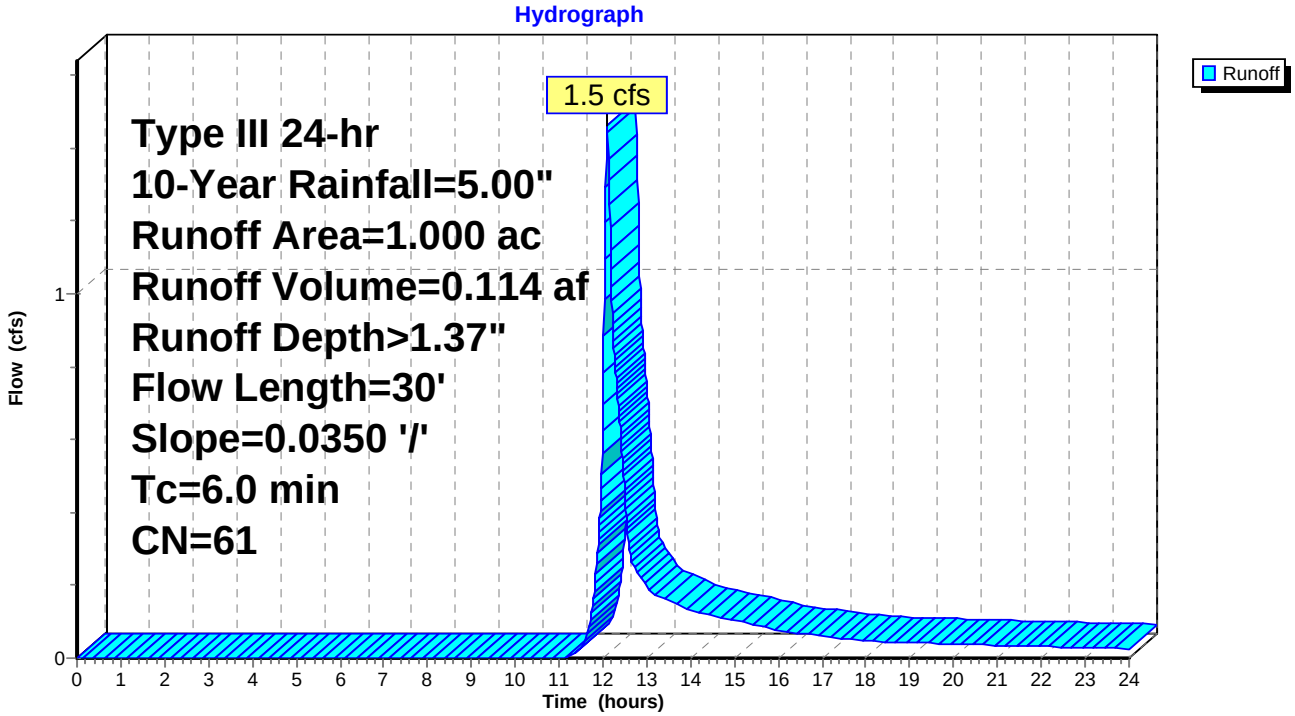
Runoff = 1.5 cfs @ 12.10 hrs, Volume= 0.114 af, Depth> 1.37"

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=5.00"

Area (ac)	CN	Description
1.000	61	>75% Grass cover, Good, HSG B
1.000		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.2	30	0.0350	0.12		**Sheet Flow, Grass Slope** Grass: Dense n= 0.240 P2= 3.40"
4.2	30	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 2S-A: Area 1 - West - DownGradient Swale



Summary for Subcatchment 2S-B: Area 1 - West

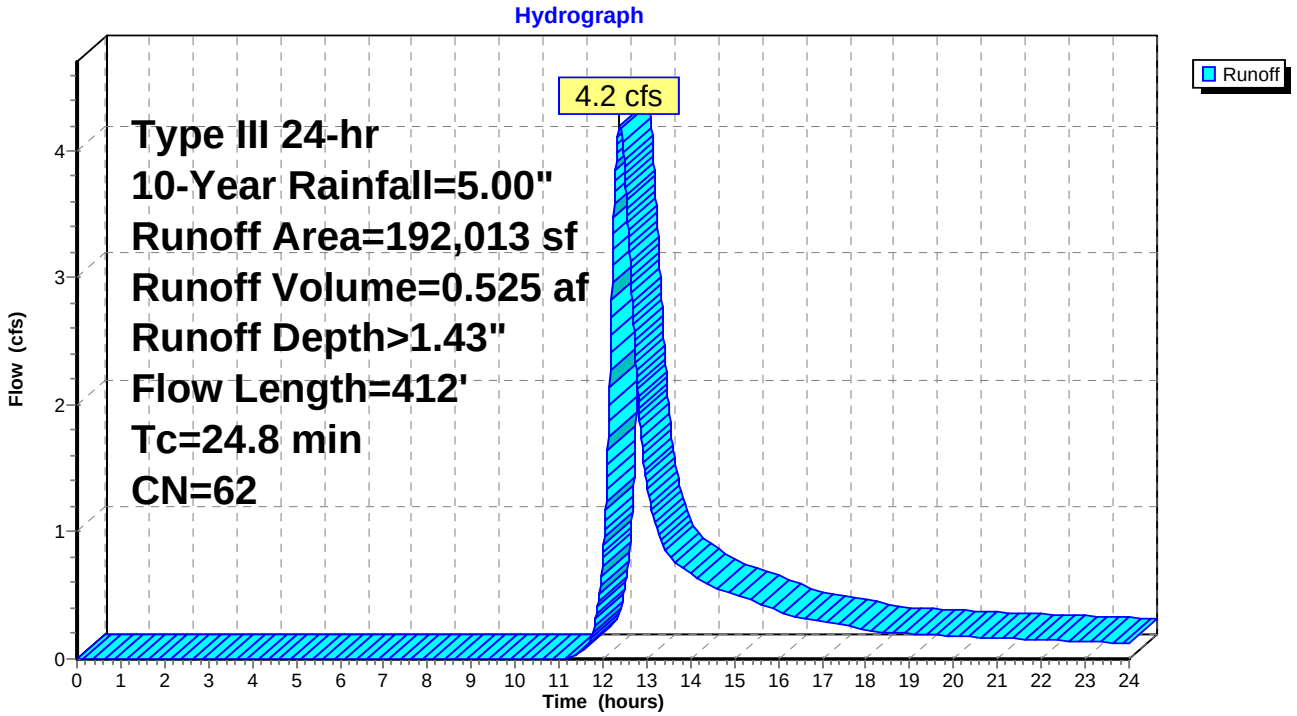
Runoff = 4.2 cfs @ 12.38 hrs, Volume= 0.525 af, Depth> 1.43"

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=5.00"

	Area (sf)	CN	Description
*	182,691	61	>75% Grass cover, Solar Array Area, HSG B
	8,538	85	Gravel roads, HSG B
*	0	98	Solar Array Racking Posts, HSG B
*	784	98	Concrete Equipment Pad, HSG B
	192,013	62	Weighted Average
	191,229		99.59% Pervious Area
	784		0.41% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.0	100	0.0120	0.10		**Sheet Flow, Grass - Solar Array Area** Grass: Dense n= 0.240 P2= 3.40"
7.3	307	0.0099	0.70		**Shallow Concentrated Flow, Grass - Solar Array Area** Short Grass Pasture Kv= 7.0 fps
0.5	5	0.2000	0.17		**Sheet Flow, Swale Slope (flow disrupted by stone level spreade** Grass: Dense n= 0.240 P2= 3.40"
24.8	412	Total			

Subcatchment 2S-B: Area 1 - West



Summary for Subcatchment 3S: Area 1 - East

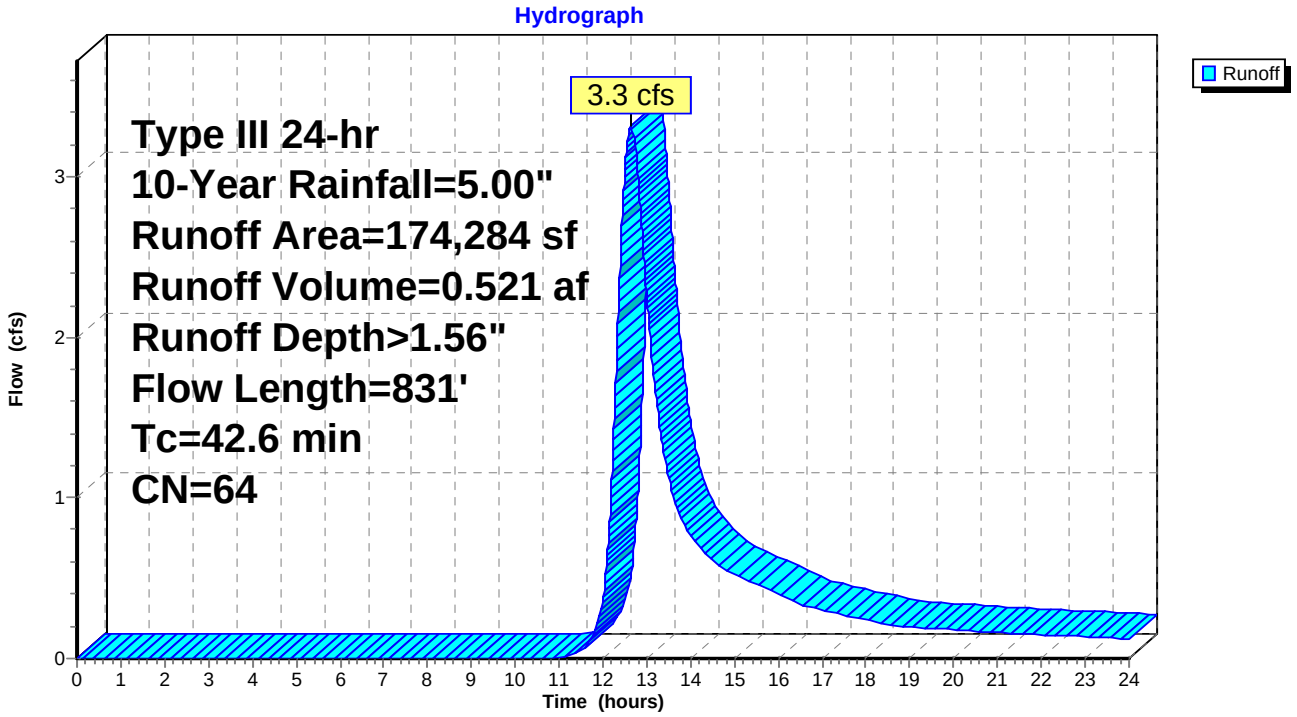
Runoff = 3.3 cfs @ 12.64 hrs, Volume= 0.521 af, Depth> 1.56"

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=5.00"

	Area (sf)	CN	Description
	19,602	85	Gravel roads, HSG B
*	153,878	61	>75% Grass cover, Solar Array Area, HSG B
*	4	98	Solar Array Racking Posts, HSG B
*	800	98	Concrete Equipment Pads, HSG B
	174,284	64	Weighted Average
	173,480		99.54% Pervious Area
	804		0.46% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
19.1	100	0.0090	0.09		**Sheet Flow, Grass - Solar Array Area** Grass: Dense n= 0.240 P2= 3.40"
7.1	174	0.0034	0.41		**Shallow Concentrated Flow, Grass - Solar Array Area** Short Grass Pasture Kv= 7.0 fps
16.3	526	0.0059	0.54		**Shallow Concentrated Flow, Grass** Short Grass Pasture Kv= 7.0 fps
0.1	31	0.0742	4.39		**Shallow Concentrated Flow, Grass/Gravel** Unpaved Kv= 16.1 fps
42.6	831	Total			

Subcatchment 3S: Area 1 - East



Summary for Subcatchment 4S: Area 2 - West

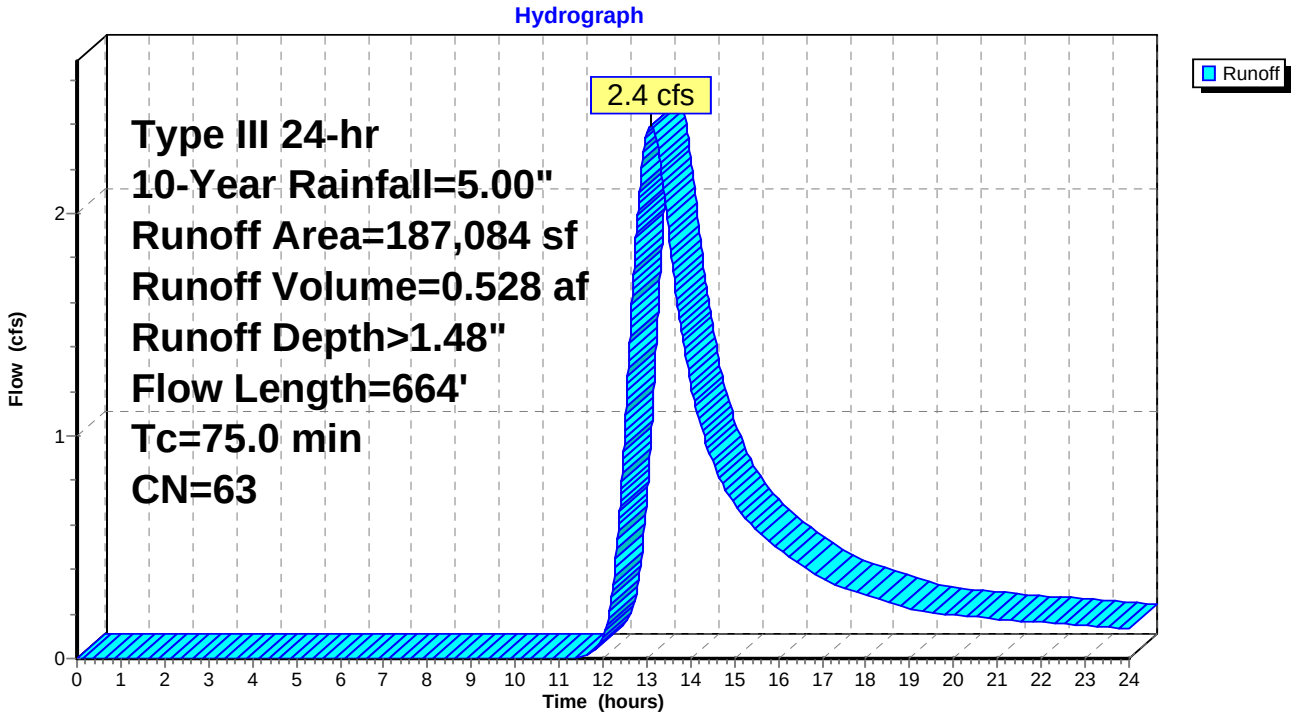
Runoff = 2.4 cfs @ 13.08 hrs, Volume= 0.528 af, Depth> 1.48"

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=5.00"

	Area (sf)	CN	Description
	10,060	60	Woods, Fair, HSG B
*	161,719	61	>75% Grass cover, Solar Array Area, HSG B
	14,898	85	Gravel roads, HSG B
*	7	98	Solar Array Racking Posts, HSG B
*	400	98	Concrete Equipment Pad, HSG B
	187,084	63	Weighted Average
	186,677		99.78% Pervious Area
	407		0.22% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
20.0	100	0.0080	0.08		**Sheet Flow, Grass - Solar Array Area** Grass: Dense n= 0.240 P2= 3.40"
1.3	86	0.0233	1.07		**Shallow Concentrated Flow, Grass - Solar Array Area** Short Grass Pasture Kv= 7.0 fps
7.5	235	0.0055	0.52		**Shallow Concentrated Flow, Grass - Solar Array Area** Short Grass Pasture Kv= 7.0 fps
13.3	177	0.0010	0.22		**Shallow Concentrated Flow, Grass - Solar Array Area** Short Grass Pasture Kv= 7.0 fps
32.9	66	0.0010	0.03		**Sheet Flow, Grass (Flow disrupted by stone check dam)** Grass: Dense n= 0.240 P2= 3.40"
75.0	664	Total			

Subcatchment 4S: Area 2 - West



Summary for Subcatchment 5S: Area 2 - East

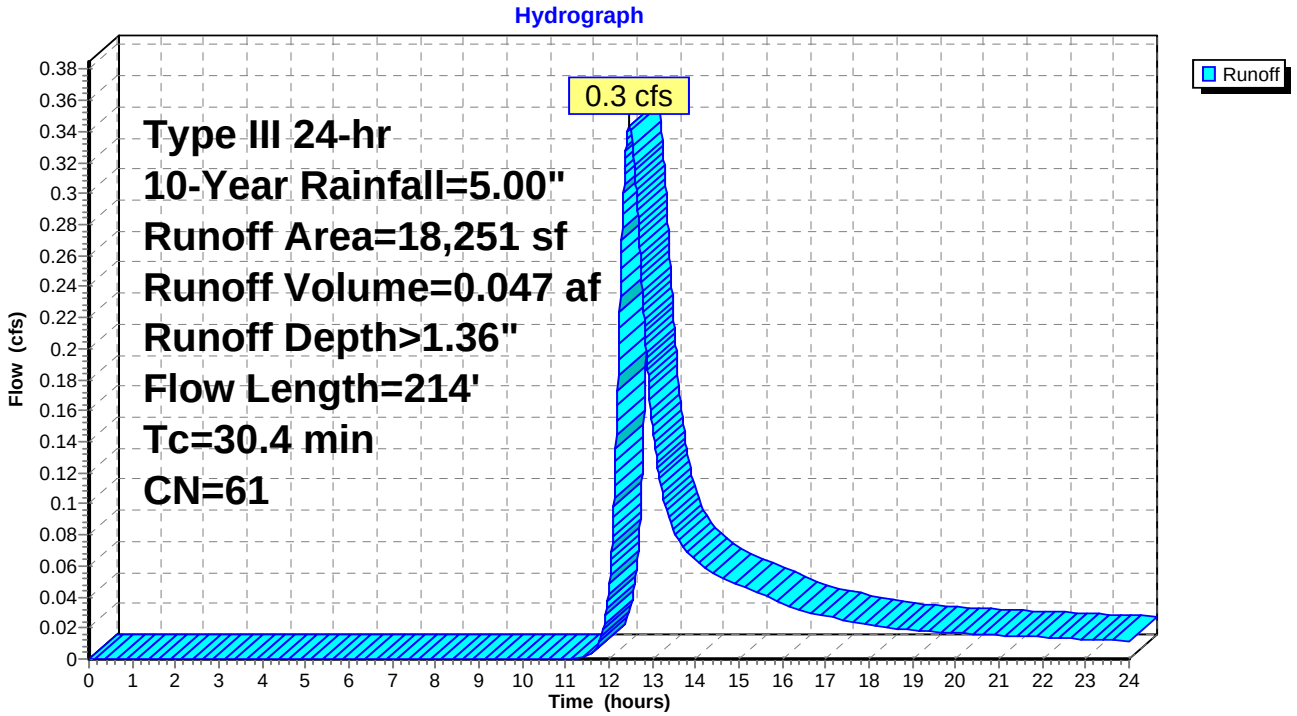
Runoff = 0.3 cfs @ 12.47 hrs, Volume= 0.047 af, Depth> 1.36"

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=5.00"

	Area (sf)	CN	Description
*	18,250	61	>75% Grass cover, Solar Array Area, HSG B
*	1	98	Solar Array Racking Posts, HSG B
	18,251	61	Weighted Average
	18,250		99.99% Pervious Area
	1		0.01% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.2	58	0.0034	0.05		**Sheet Flow, Grass - Solar Array Area** Grass: Dense n= 0.240 P2= 3.40"
8.5	42	0.0119	0.08		**Sheet Flow, Grass - Solar Array Area** Grass: Dense n= 0.240 P2= 3.40"
2.8	86	0.0105	0.51		**Shallow Concentrated Flow, Grass - Solar Array Area** Woodland Kv= 5.0 fps
0.9	28	0.0050	0.49		**Shallow Concentrated Flow, Grass** Short Grass Pasture Kv= 7.0 fps
30.4	214	Total			

Subcatchment 5S: Area 2 - East



Summary for Reach 3R: Overflow Swale

Inflow Area = 3.774 ac, 0.00% Impervious, Inflow Depth > 1.35" for 10-Year event
Inflow = 3.4 cfs @ 12.38 hrs, Volume= 0.426 af
Outflow = 3.4 cfs @ 12.39 hrs, Volume= 0.426 af, Atten= 0%, Lag= 0.3 min

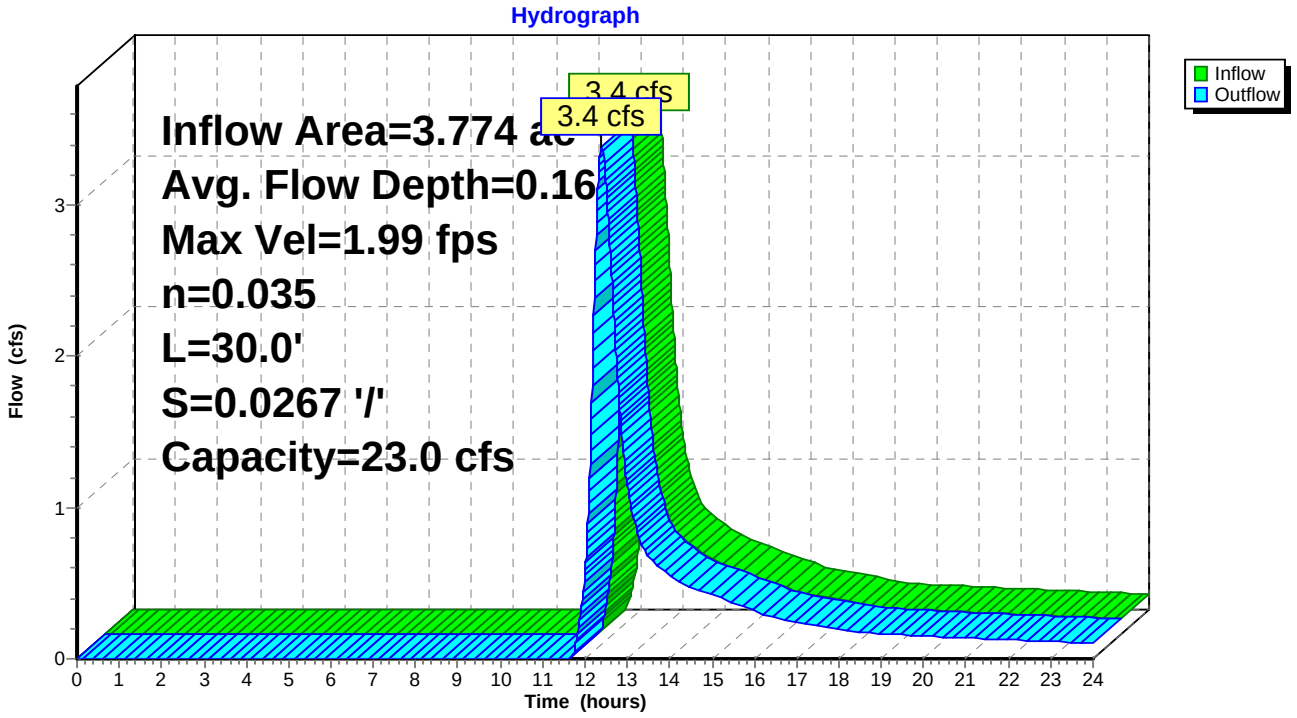
Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 2
Max. Velocity= 1.99 fps, Min. Travel Time= 0.3 min
Avg. Velocity = 0.78 fps, Avg. Travel Time= 0.6 min

Peak Storage= 51 cf @ 12.39 hrs
Average Depth at Peak Storage= 0.16'
Bank-Full Depth= 0.50' Flow Area= 5.8 sf, Capacity= 23.0 cfs

10.00' x 0.50' deep channel, n= 0.035 Earth, dense weeds
Side Slope Z-value= 3.0 '/' Top Width= 13.00'
Length= 30.0' Slope= 0.0267 '/'
Inlet Invert= 22.80', Outlet Invert= 22.00'

‡

Reach 3R: Overflow Swale



Summary for Reach 4R: Overflow Swale

Inflow Area = 4.408 ac, 0.41% Impervious, Inflow Depth > 1.42" for 10-Year event
Inflow = 4.2 cfs @ 12.38 hrs, Volume= 0.523 af
Outflow = 4.2 cfs @ 12.38 hrs, Volume= 0.523 af, Atten= 0%, Lag= 0.1 min

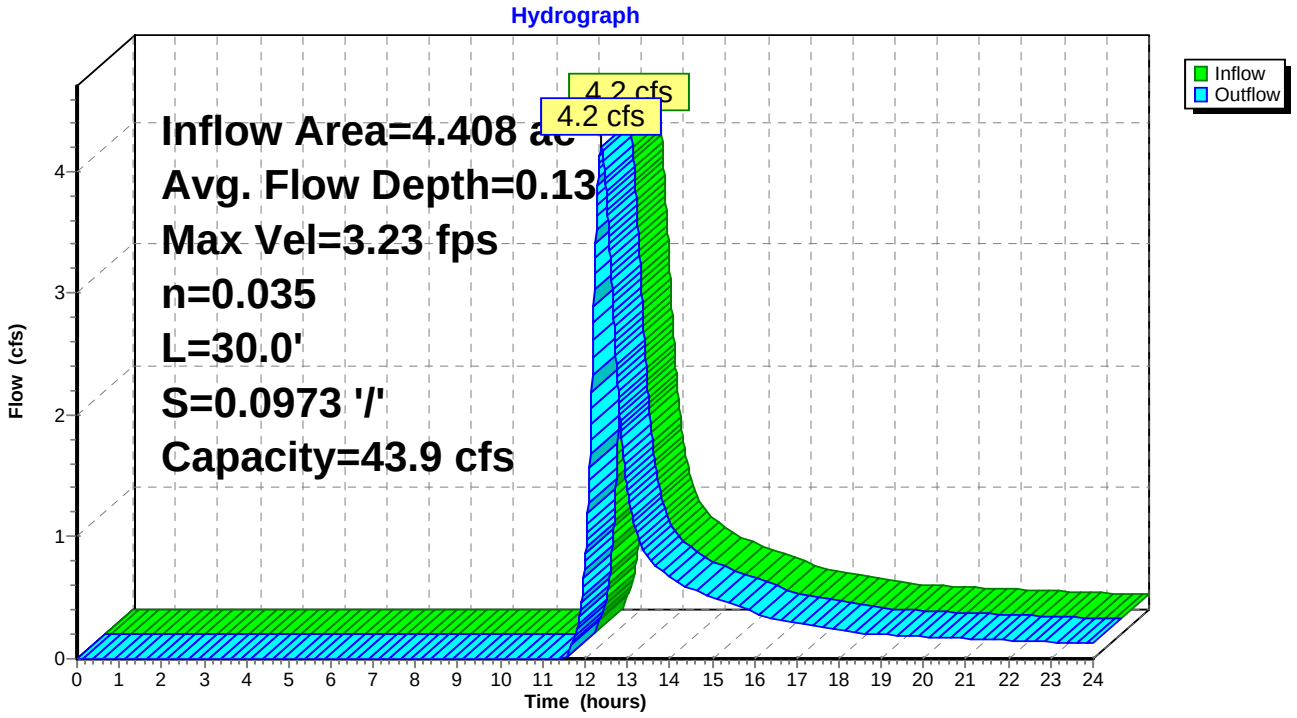
Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 2
Max. Velocity= 3.23 fps, Min. Travel Time= 0.2 min
Avg. Velocity = 1.25 fps, Avg. Travel Time= 0.4 min

Peak Storage= 39 cf @ 12.38 hrs
Average Depth at Peak Storage= 0.13'
Bank-Full Depth= 0.50' Flow Area= 5.8 sf, Capacity= 43.9 cfs

10.00' x 0.50' deep channel, n= 0.035 Earth, dense weeds
Side Slope Z-value= 3.0 '/' Top Width= 13.00'
Length= 30.0' Slope= 0.0973 '/'
Inlet Invert= 25.00', Outlet Invert= 22.08'

‡

Reach 4R: Overflow Swale



Summary for Pond 2P: BioFiltration Cell

Inflow Area = 3.774 ac, 0.00% Impervious, Inflow Depth > 1.36" for 10-Year event
Inflow = 3.4 cfs @ 12.38 hrs, Volume= 0.427 af
Outflow = 3.4 cfs @ 12.38 hrs, Volume= 0.426 af, Atten= 0%, Lag= 0.2 min
Primary = 3.4 cfs @ 12.38 hrs, Volume= 0.426 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 23.10' @ 12.38 hrs Surf.Area= 0.005 ac Storage= 0.003 af

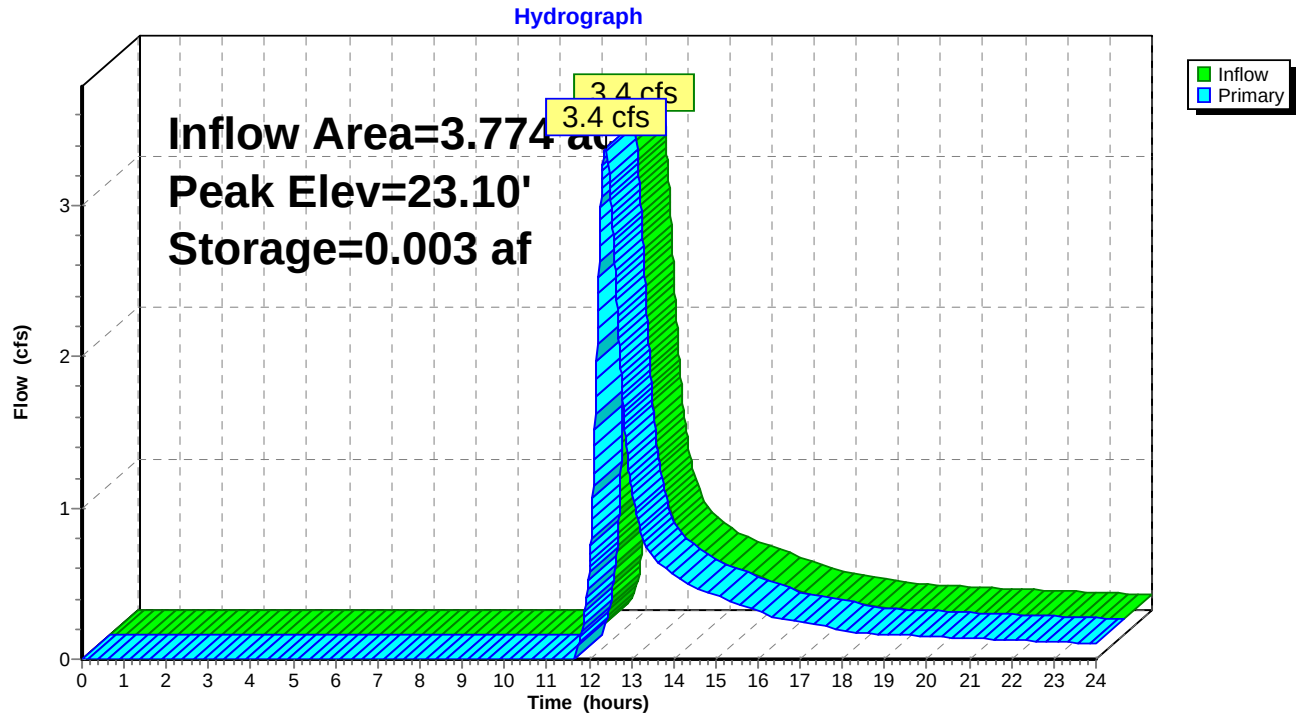
Plug-Flow detention time= 2.8 min calculated for 0.426 af (100% of inflow)
Center-of-Mass det. time= 0.9 min (886.6 - 885.6)

Volume	Invert	Avail.Storage	Storage Description
#1	22.30'	0.004 af	**4.00'W x 20.00'L x 1.00'H Filtration Cell Z=3.0**

Device	Routing	Invert	Outlet Devices
#1	Primary	22.80'	**10.0' long x 5.0' breadth Vegetated Swale** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=3.4 cfs @ 12.38 hrs HW=23.10' TW=22.96' (Dynamic Tailwater)
└─**1=Vegetated Swale** (Weir Controls 3.4 cfs @ 1.11 fps)

Pond 2P: BioFiltration Cell



Summary for Pond 5P: BioFiltration Cell

Inflow Area = 4.408 ac, 0.41% Impervious, Inflow Depth > 1.43" for 10-Year event
Inflow = 4.2 cfs @ 12.38 hrs, Volume= 0.525 af
Outflow = 4.2 cfs @ 12.38 hrs, Volume= 0.523 af, Atten= 0%, Lag= 0.2 min
Primary = 4.2 cfs @ 12.38 hrs, Volume= 0.523 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 25.33' @ 12.38 hrs Surf.Area= 0.005 ac Storage= 0.003 af

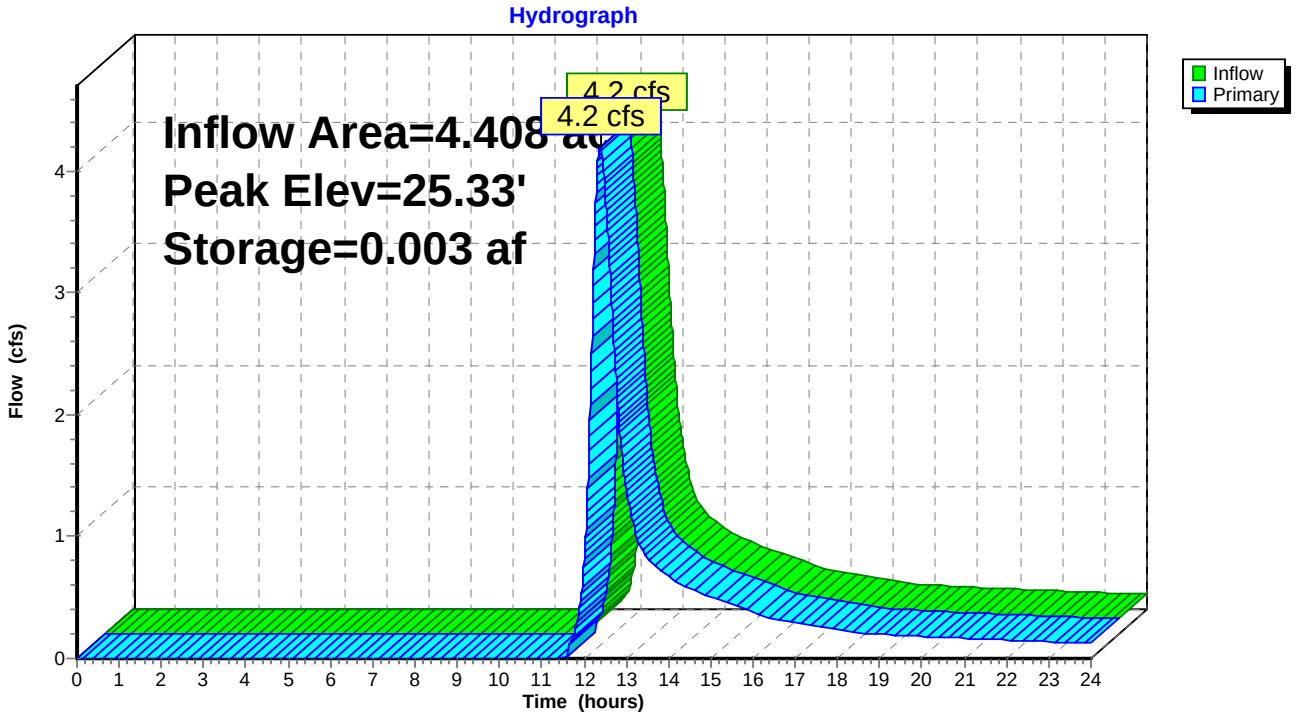
Plug-Flow detention time= 2.4 min calculated for 0.523 af (100% of inflow)
Center-of-Mass det. time= 0.8 min (883.5 - 882.7)

Volume	Invert	Avail.Storage	Storage Description
#1	24.50'	0.004 af	**4.00'W x 20.00'L x 1.10'H Filtration Cell Z=3.0**

Device	Routing	Invert	Outlet Devices
#1	Primary	25.00'	**10.0' long x 5.0' breadth Vegetated Swale** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88
#2	Primary	25.50'	**20.0' long x 5.0' breadth Swale Overtopping** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=4.2 cfs @ 12.38 hrs HW=25.33' TW=25.13' (Dynamic Tailwater)
└─**1=Vegetated Swale** (Weir Controls 4.2 cfs @ 1.27 fps)
└─**2=Swale Overtopping** (Controls 0.0 cfs)

Pond 5P: BioFiltration Cell

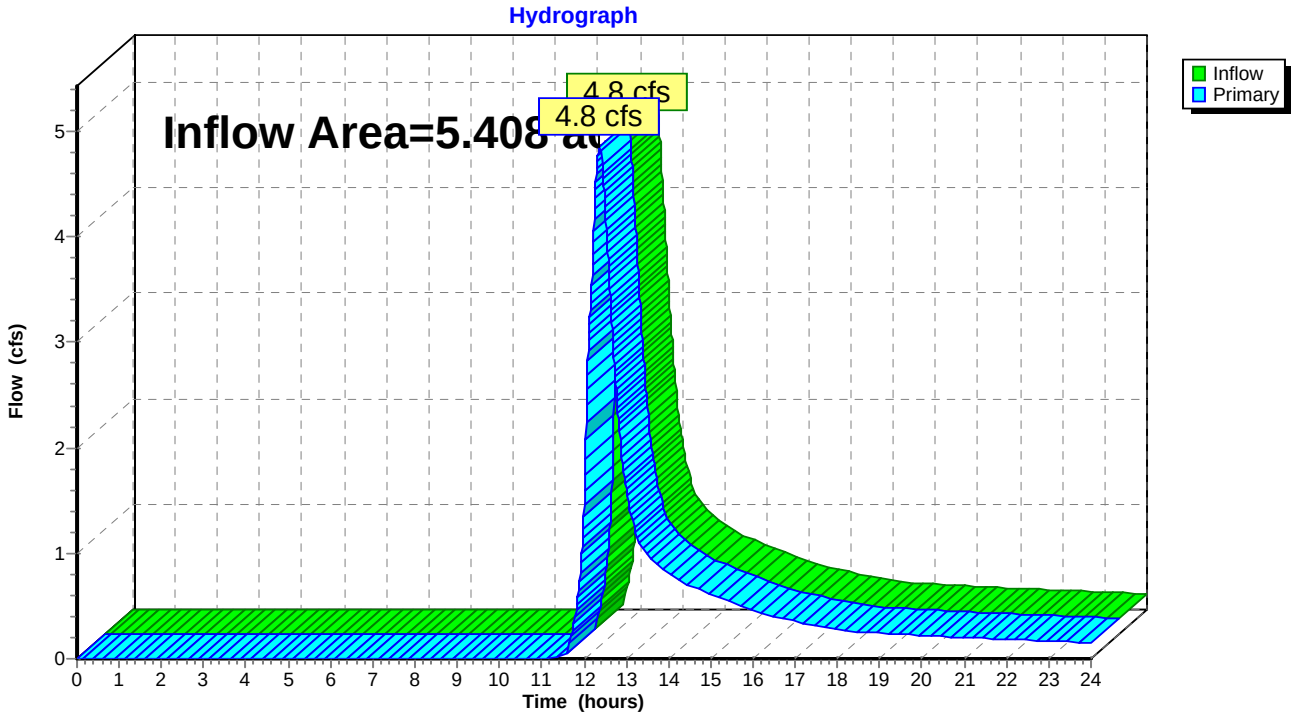


Summary for Link 3L: To Reservoir - South

Inflow Area = 5.408 ac, 0.33% Impervious, Inflow Depth > 1.41" for 10-Year event
Inflow = 4.8 cfs @ 12.37 hrs, Volume= 0.637 af
Primary = 4.8 cfs @ 12.37 hrs, Volume= 0.637 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Link 3L: To Reservoir - South

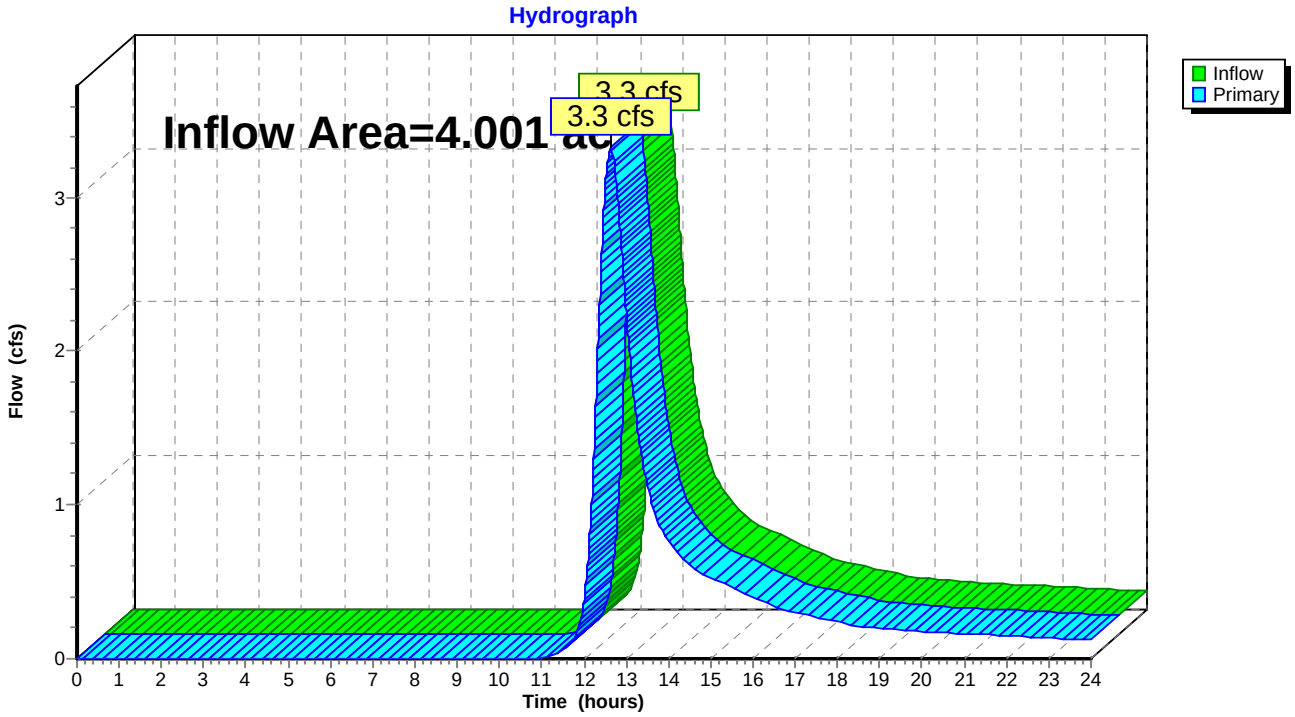


Summary for Link 4L: Wooded Area to East

Inflow Area = 4.001 ac, 0.46% Impervious, Inflow Depth > 1.56" for 10-Year event
Inflow = 3.3 cfs @ 12.64 hrs, Volume= 0.521 af
Primary = 3.3 cfs @ 12.64 hrs, Volume= 0.521 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Link 4L: Wooded Area to East

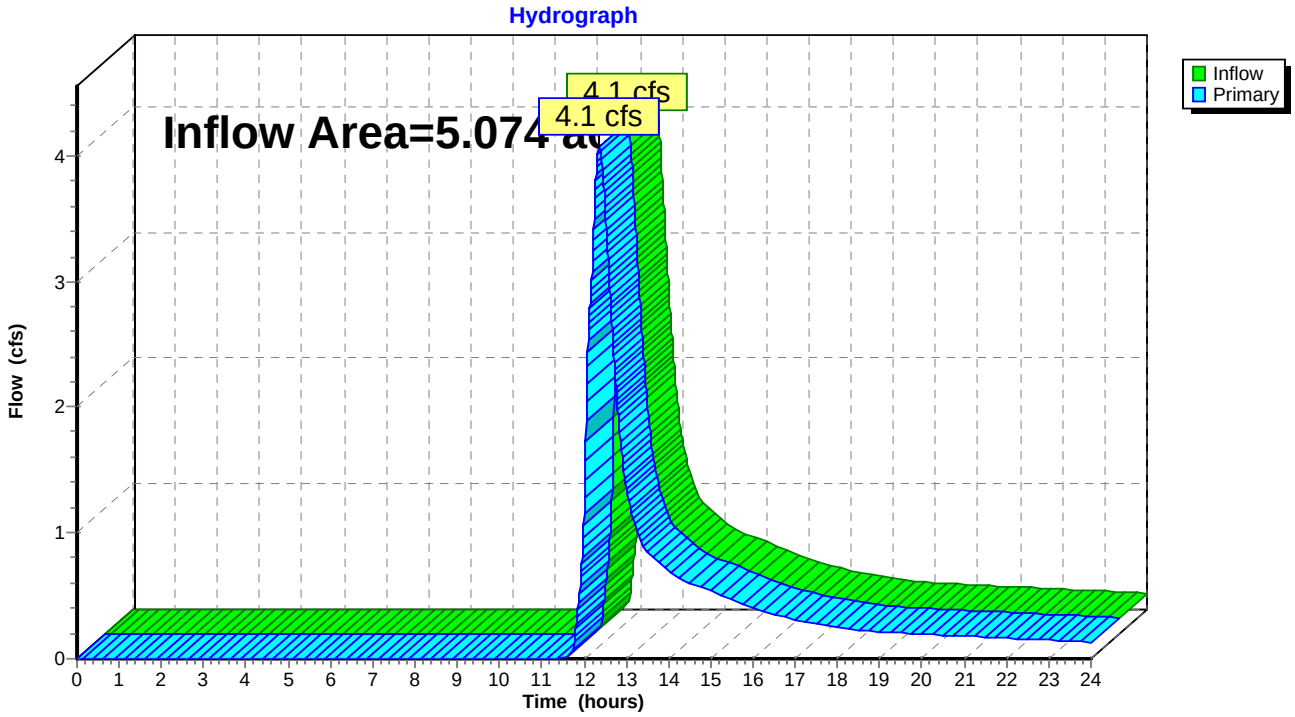


Summary for Link 6L: To Reservoir - North

Inflow Area = 5.074 ac, 0.00% Impervious, Inflow Depth > 1.29" for 10-Year event
Inflow = 4.1 cfs @ 12.37 hrs, Volume= 0.545 af
Primary = 4.1 cfs @ 12.37 hrs, Volume= 0.545 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Link 6L: To Reservoir - North

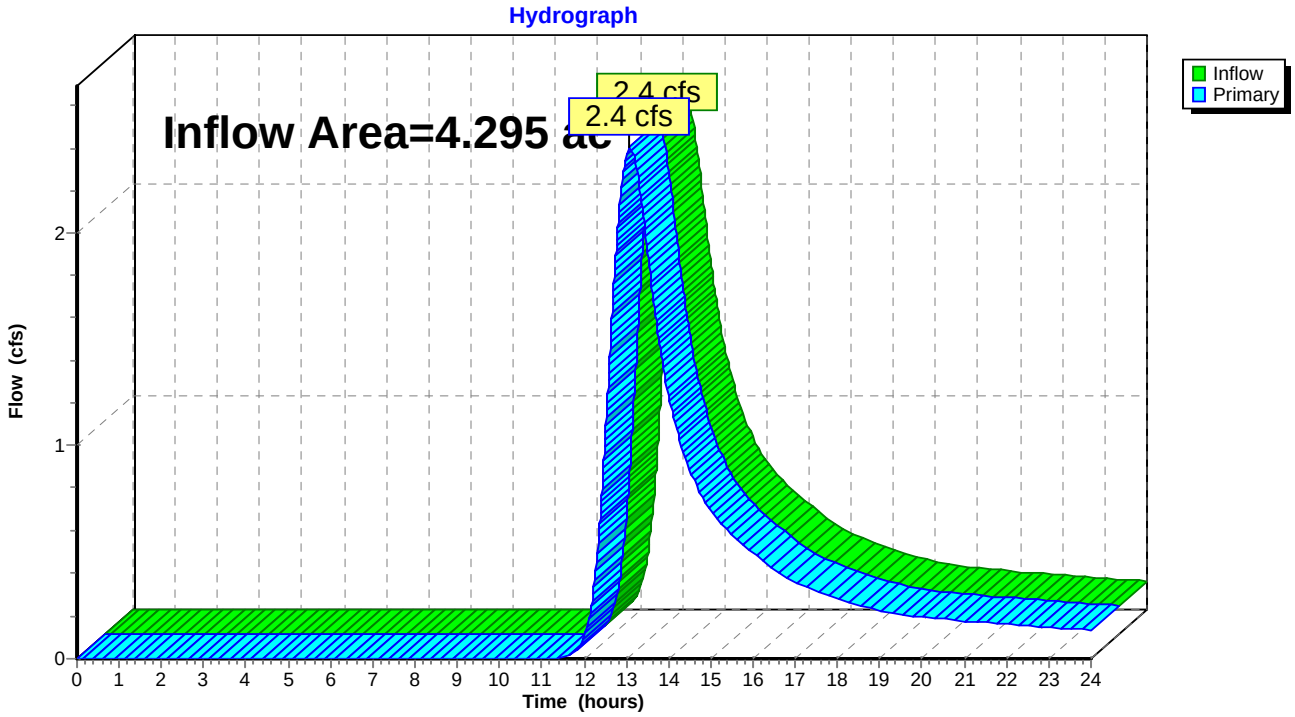


Summary for Link 7L: Off-Site Flow to South

Inflow Area = 4.295 ac, 0.22% Impervious, Inflow Depth > 1.48" for 10-Year event
Inflow = 2.4 cfs @ 13.08 hrs, Volume= 0.528 af
Primary = 2.4 cfs @ 13.08 hrs, Volume= 0.528 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Link 7L: Off-Site Flow to South

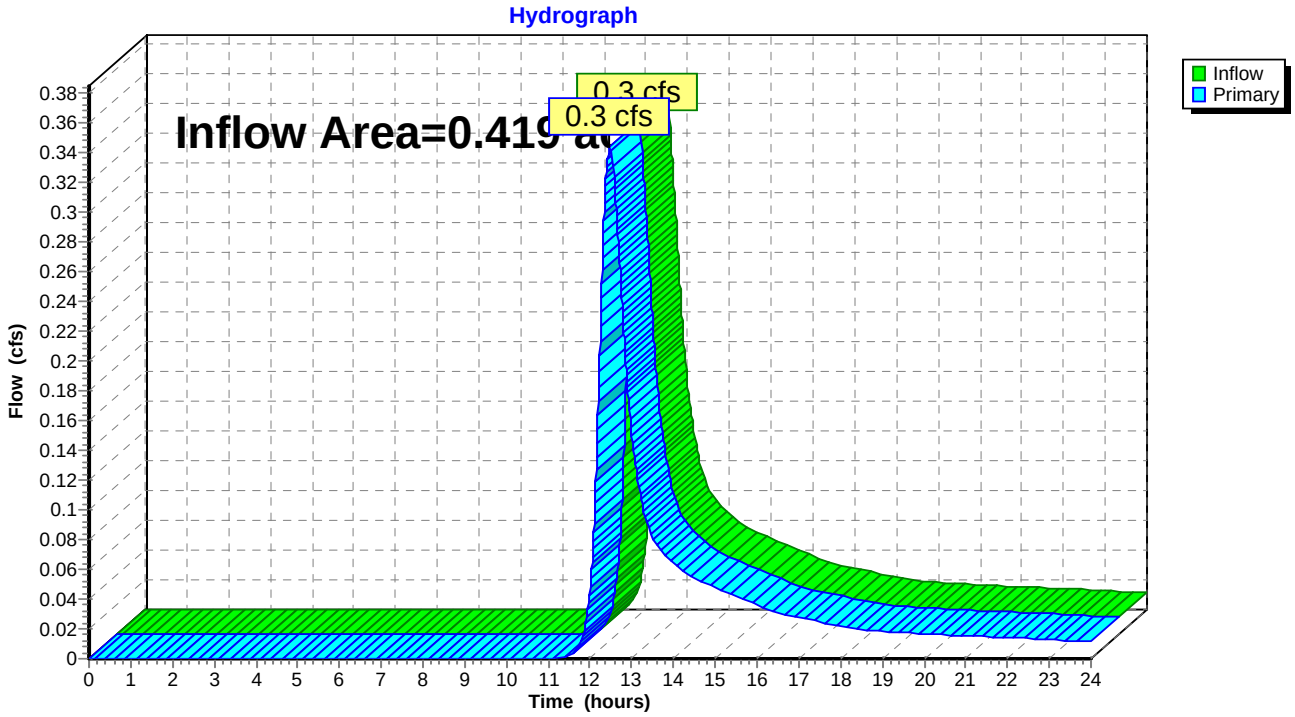


Summary for Link 8L: Off-Site Flow to East

Inflow Area = 0.419 ac, 0.01% Impervious, Inflow Depth > 1.36" for 10-Year event
Inflow = 0.3 cfs @ 12.47 hrs, Volume= 0.047 af
Primary = 0.3 cfs @ 12.47 hrs, Volume= 0.047 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Link 8L: Off-Site Flow to East



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

Subcatchment 1S-A: Area 1 - North - Runoff Area=1.300 ac 0.00% Impervious Runoff Depth>1.49"
Flow Length=30' Slope=0.0770 '/' Tc=6.0 min CN=57 Runoff=2.1 cfs 0.162 af

Subcatchment 1S-B: Area 1 - North - Solar Runoff Area=164,396 sf 0.00% Impervious Runoff Depth>1.80"
Flow Length=562' Tc=24.8 min CN=61 Runoff=4.6 cfs 0.565 af

Subcatchment 2S-A: Area 1 - West - Runoff Area=1.000 ac 0.00% Impervious Runoff Depth>1.80"
Flow Length=30' Slope=0.0350 '/' Tc=6.0 min CN=61 Runoff=2.0 cfs 0.150 af

Subcatchment 2S-B: Area 1 - West Runoff Area=192,013 sf 0.41% Impervious Runoff Depth>1.88"
Flow Length=412' Tc=24.8 min CN=62 Runoff=5.7 cfs 0.689 af

Subcatchment 3S: Area 1 - East Runoff Area=174,284 sf 0.46% Impervious Runoff Depth>2.03"
Flow Length=831' Tc=42.6 min CN=64 Runoff=4.4 cfs 0.676 af

Subcatchment 4S: Area 2 - West Runoff Area=187,084 sf 0.22% Impervious Runoff Depth>1.93"
Flow Length=664' Tc=75.0 min CN=63 Runoff=3.2 cfs 0.690 af

Subcatchment 5S: Area 2 - East Runoff Area=18,251 sf 0.01% Impervious Runoff Depth>1.79"
Flow Length=214' Tc=30.4 min CN=61 Runoff=0.5 cfs 0.063 af

Reach 3R: Overflow Swale Avg. Flow Depth=0.19' Max Vel=2.24 fps Inflow=4.6 cfs 0.563 af
n=0.035 L=30.0' S=0.0267 '/' Capacity=23.0 cfs Outflow=4.6 cfs 0.563 af

Reach 4R: Overflow Swale Avg. Flow Depth=0.15' Max Vel=3.63 fps Inflow=5.7 cfs 0.687 af
n=0.035 L=30.0' S=0.0973 '/' Capacity=43.9 cfs Outflow=5.7 cfs 0.687 af

Pond 2P: BioFiltration Cell Peak Elev=23.17' Storage=0.003 af Inflow=4.6 cfs 0.565 af
Outflow=4.6 cfs 0.563 af

Pond 5P: BioFiltration Cell Peak Elev=25.40' Storage=0.003 af Inflow=5.7 cfs 0.689 af
Outflow=5.7 cfs 0.687 af

Link 3L: To Reservoir - South Inflow=6.5 cfs 0.838 af
Primary=6.5 cfs 0.838 af

Link 4L: Wooded Area to East Inflow=4.4 cfs 0.676 af
Primary=4.4 cfs 0.676 af

Link 6L: To Reservoir - North Inflow=5.6 cfs 0.725 af
Primary=5.6 cfs 0.725 af

Link 7L: Off-Site Flow to South Inflow=3.2 cfs 0.690 af
Primary=3.2 cfs 0.690 af

Link 8L: Off-Site Flow to East Inflow=0.5 cfs 0.063 af
Primary=0.5 cfs 0.063 af

Total Runoff Area = 19.197 ac Runoff Volume = 2.995 af Average Runoff Depth = 1.87"
99.76% Pervious = 19.151 ac 0.24% Impervious = 0.046 ac

Summary for Subcatchment 1S-A: Area 1 - North - DownGradient Swale

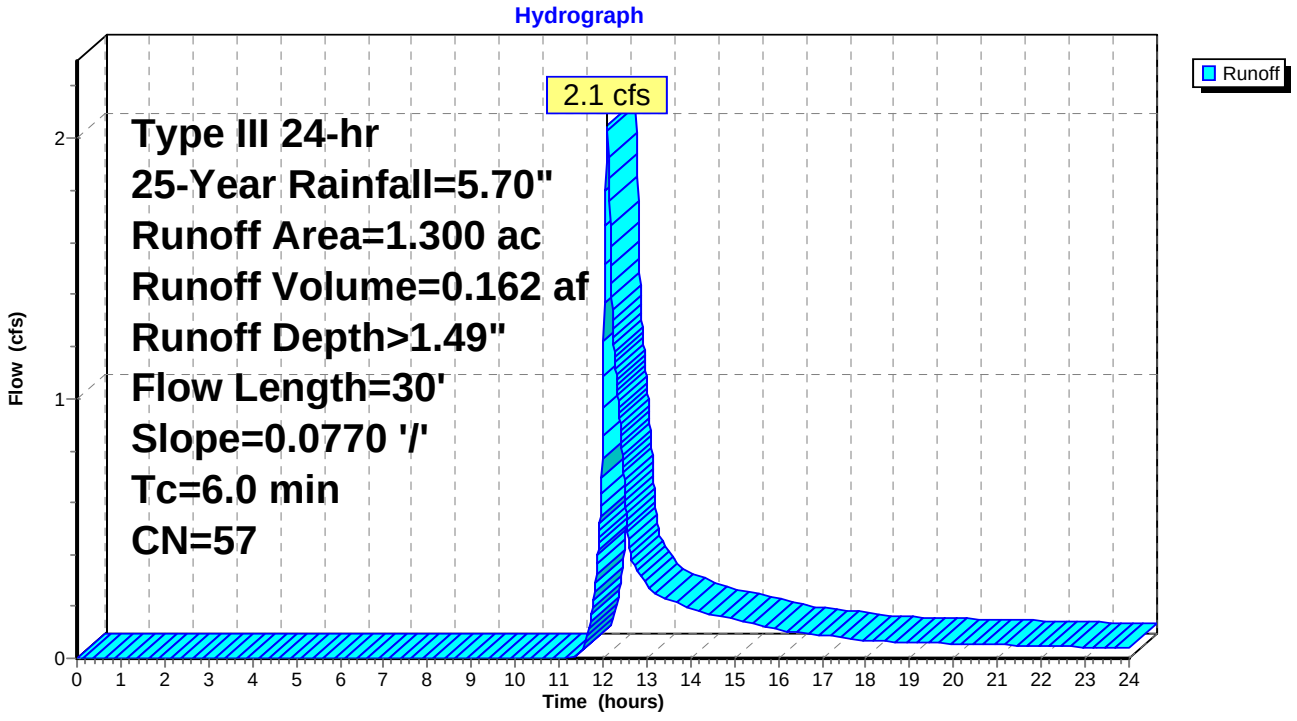
Runoff = 2.1 cfs @ 12.10 hrs, Volume= 0.162 af, Depth> 1.49"

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=5.70"

Area (ac)	CN	Description
0.850	55	Woods, Good, HSG B
0.450	61	>75% Grass cover, Good, HSG B
1.300	57	Weighted Average
1.300		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.6	30	0.0770	0.11		**Sheet Flow, Wooded Slope** Woods: Light underbrush n= 0.400 P2= 3.40"
4.6	30	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 1S-A: Area 1 - North - DownGradient Swale



Summary for Subcatchment 1S-B: Area 1 - North - Solar Arrays

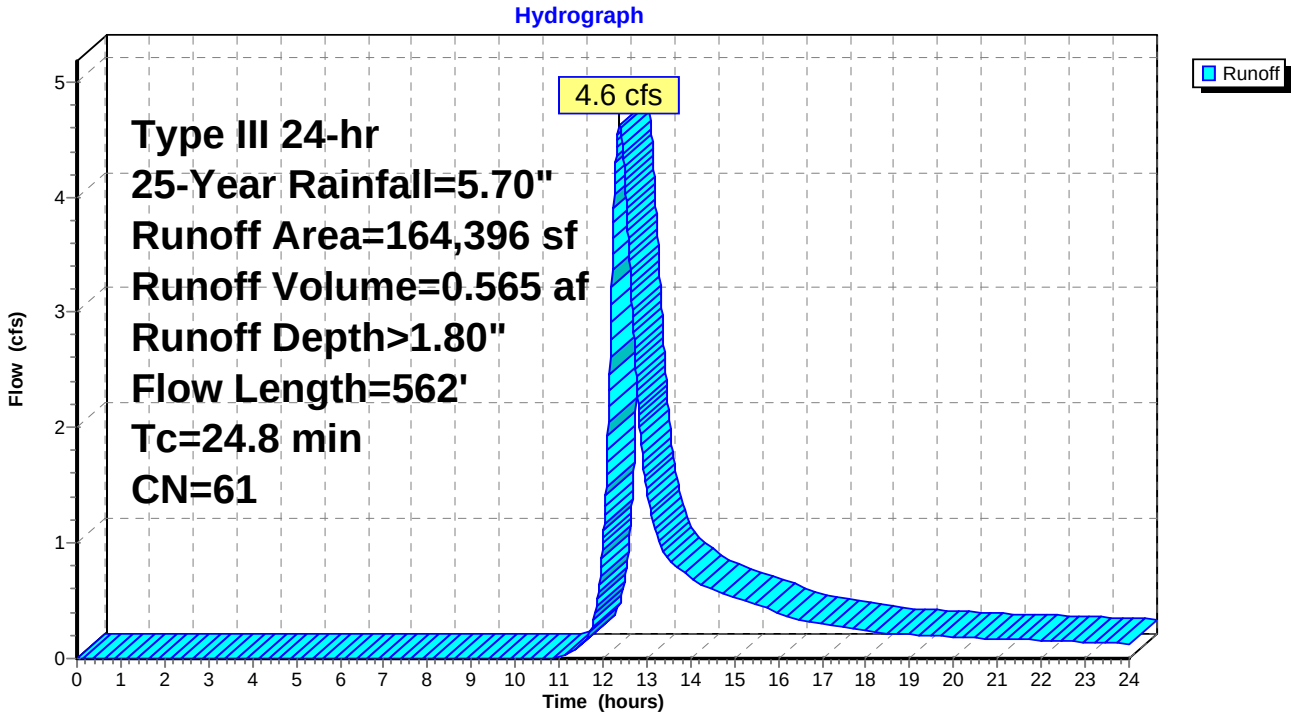
Runoff = 4.6 cfs @ 12.37 hrs, Volume= 0.565 af, Depth> 1.80"

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=5.70"

	Area (sf)	CN	Description
	23,392	60	Woods, Fair, HSG B
*	141,004	61	>75% Grass cover, Solar Array Area, HSG B
*	0	98	Solar Array Posts, HSG B
	164,396	61	Weighted Average
	164,396		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.5	100	0.0177	0.11		**Sheet Flow, Grass - Solar Array Area** Grass: Dense n= 0.240 P2= 3.40"
1.0	40	0.0085	0.65		**Shallow Concentrated Flow, Grass - Solar Array Area** Short Grass Pasture Kv= 7.0 fps
0.3	32	0.0625	1.75		**Shallow Concentrated Flow, Grass - Solar Array Area** Short Grass Pasture Kv= 7.0 fps
2.9	143	0.0140	0.83		**Shallow Concentrated Flow, Grass - Solar Array Area** Short Grass Pasture Kv= 7.0 fps
5.2	211	0.0095	0.68		**Shallow Concentrated Flow, Grass - Solar Array Area** Short Grass Pasture Kv= 7.0 fps
0.4	31	0.0323	1.26		**Shallow Concentrated Flow, Grass - Solar Array Area** Short Grass Pasture Kv= 7.0 fps
0.5	5	0.2000	0.17		**Sheet Flow, To swale (Flow disrupted by stone level spreader)** Grass: Dense n= 0.240 P2= 3.40"
24.8	562	Total			

Subcatchment 1S-B: Area 1 - North - Solar Arrays



Summary for Subcatchment 2S-A: Area 1 - West - DownGradient Swale

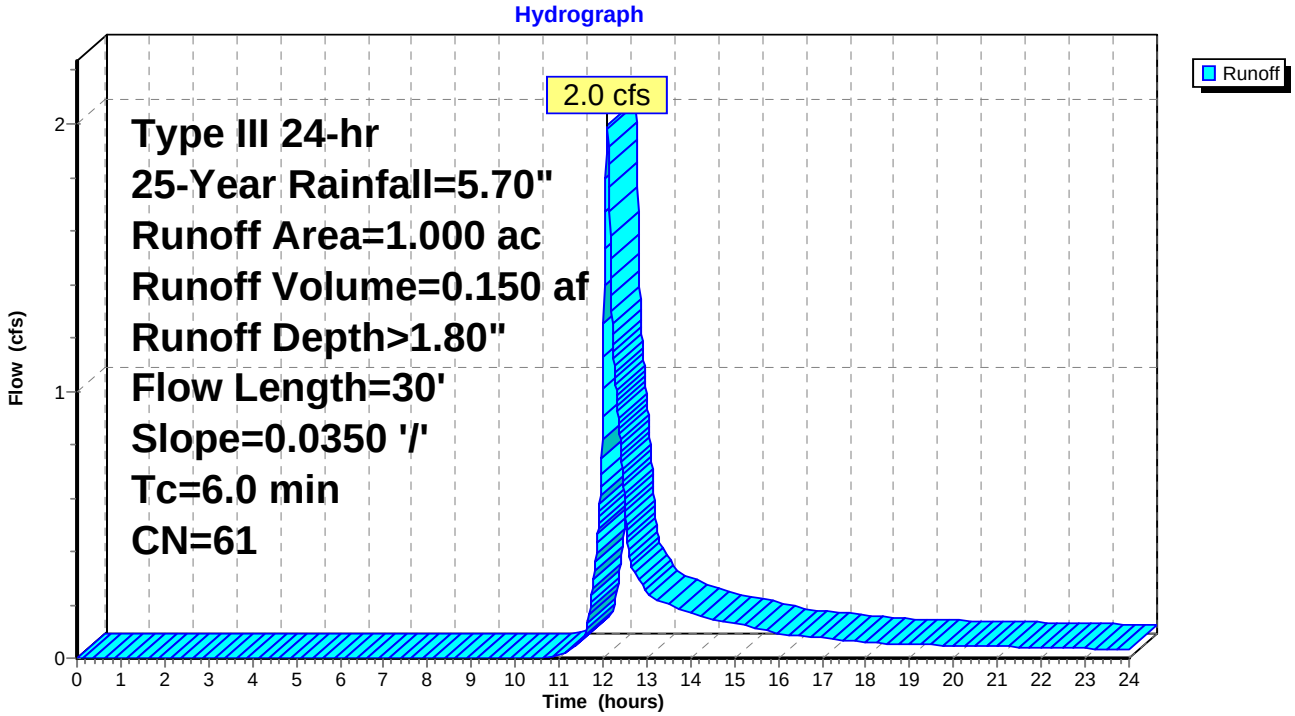
Runoff = 2.0 cfs @ 12.10 hrs, Volume= 0.150 af, Depth> 1.80"

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=5.70"

Area (ac)	CN	Description
1.000	61	>75% Grass cover, Good, HSG B
1.000		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.2	30	0.0350	0.12		**Sheet Flow, Grass Slope** Grass: Dense n= 0.240 P2= 3.40"
4.2	30	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 2S-A: Area 1 - West - DownGradient Swale



Summary for Subcatchment 2S-B: Area 1 - West

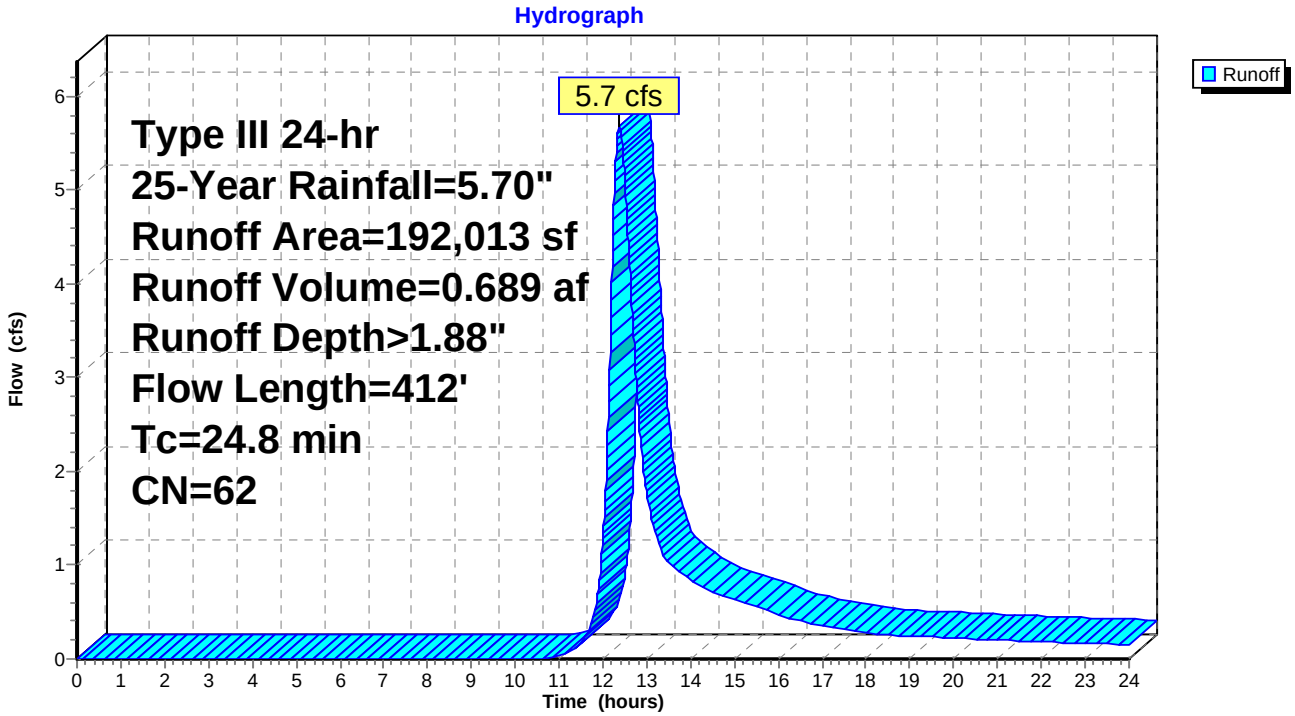
Runoff = 5.7 cfs @ 12.37 hrs, Volume= 0.689 af, Depth> 1.88"

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=5.70"

	Area (sf)	CN	Description
*	182,691	61	>75% Grass cover, Solar Array Area, HSG B
	8,538	85	Gravel roads, HSG B
*	0	98	Solar Array Racking Posts, HSG B
*	784	98	Concrete Equipment Pad, HSG B
	192,013	62	Weighted Average
	191,229		99.59% Pervious Area
	784		0.41% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.0	100	0.0120	0.10		**Sheet Flow, Grass - Solar Array Area** Grass: Dense n= 0.240 P2= 3.40"
7.3	307	0.0099	0.70		**Shallow Concentrated Flow, Grass - Solar Array Area** Short Grass Pasture Kv= 7.0 fps
0.5	5	0.2000	0.17		**Sheet Flow, Swale Slope (flow disrupted by stone level spreade** Grass: Dense n= 0.240 P2= 3.40"
24.8	412	Total			

Subcatchment 2S-B: Area 1 - West



Summary for Subcatchment 3S: Area 1 - East

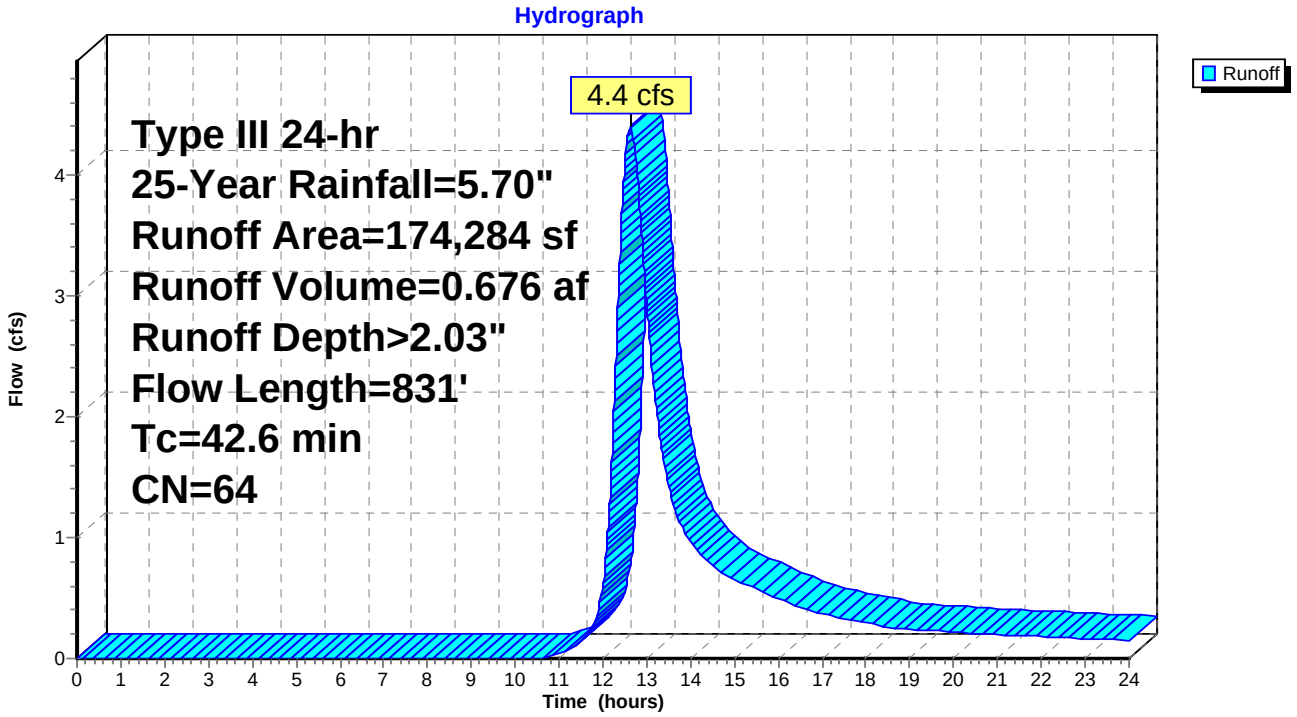
Runoff = 4.4 cfs @ 12.64 hrs, Volume= 0.676 af, Depth> 2.03"

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=5.70"

	Area (sf)	CN	Description
	19,602	85	Gravel roads, HSG B
*	153,878	61	>75% Grass cover, Solar Array Area, HSG B
*	4	98	Solar Array Racking Posts, HSG B
*	800	98	Concrete Equipment Pads, HSG B
	174,284	64	Weighted Average
	173,480		99.54% Pervious Area
	804		0.46% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
19.1	100	0.0090	0.09		**Sheet Flow, Grass - Solar Array Area** Grass: Dense n= 0.240 P2= 3.40"
7.1	174	0.0034	0.41		**Shallow Concentrated Flow, Grass - Solar Array Area** Short Grass Pasture Kv= 7.0 fps
16.3	526	0.0059	0.54		**Shallow Concentrated Flow, Grass** Short Grass Pasture Kv= 7.0 fps
0.1	31	0.0742	4.39		**Shallow Concentrated Flow, Grass/Gravel** Unpaved Kv= 16.1 fps
42.6	831	Total			

Subcatchment 3S: Area 1 - East



Summary for Subcatchment 4S: Area 2 - West

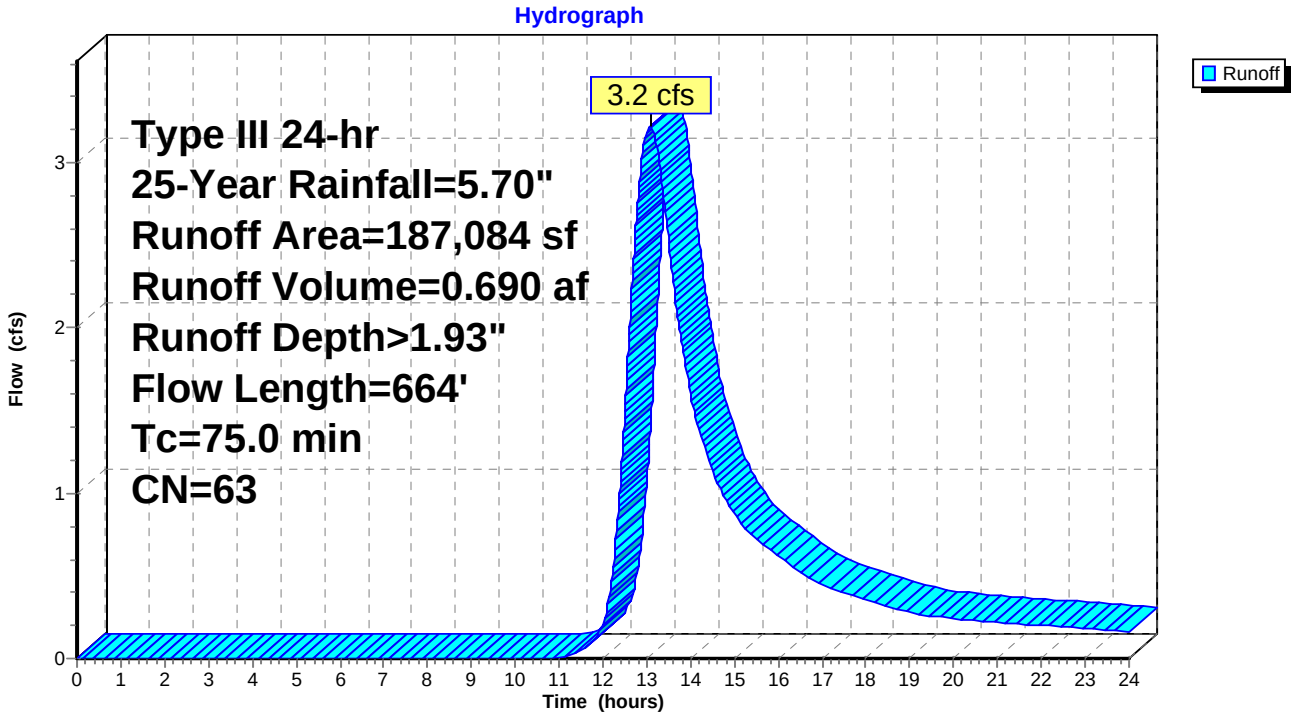
Runoff = 3.2 cfs @ 13.08 hrs, Volume= 0.690 af, Depth> 1.93"

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=5.70"

	Area (sf)	CN	Description
	10,060	60	Woods, Fair, HSG B
*	161,719	61	>75% Grass cover, Solar Array Area, HSG B
	14,898	85	Gravel roads, HSG B
*	7	98	Solar Array Racking Posts, HSG B
*	400	98	Concrete Equipment Pad, HSG B
	187,084	63	Weighted Average
	186,677		99.78% Pervious Area
	407		0.22% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
20.0	100	0.0080	0.08		**Sheet Flow, Grass - Solar Array Area** Grass: Dense n= 0.240 P2= 3.40"
1.3	86	0.0233	1.07		**Shallow Concentrated Flow, Grass - Solar Array Area** Short Grass Pasture Kv= 7.0 fps
7.5	235	0.0055	0.52		**Shallow Concentrated Flow, Grass - Solar Array Area** Short Grass Pasture Kv= 7.0 fps
13.3	177	0.0010	0.22		**Shallow Concentrated Flow, Grass - Solar Array Area** Short Grass Pasture Kv= 7.0 fps
32.9	66	0.0010	0.03		**Sheet Flow, Grass (Flow disrupted by stone check dam)** Grass: Dense n= 0.240 P2= 3.40"
75.0	664	Total			

Subcatchment 4S: Area 2 - West



Summary for Subcatchment 5S: Area 2 - East

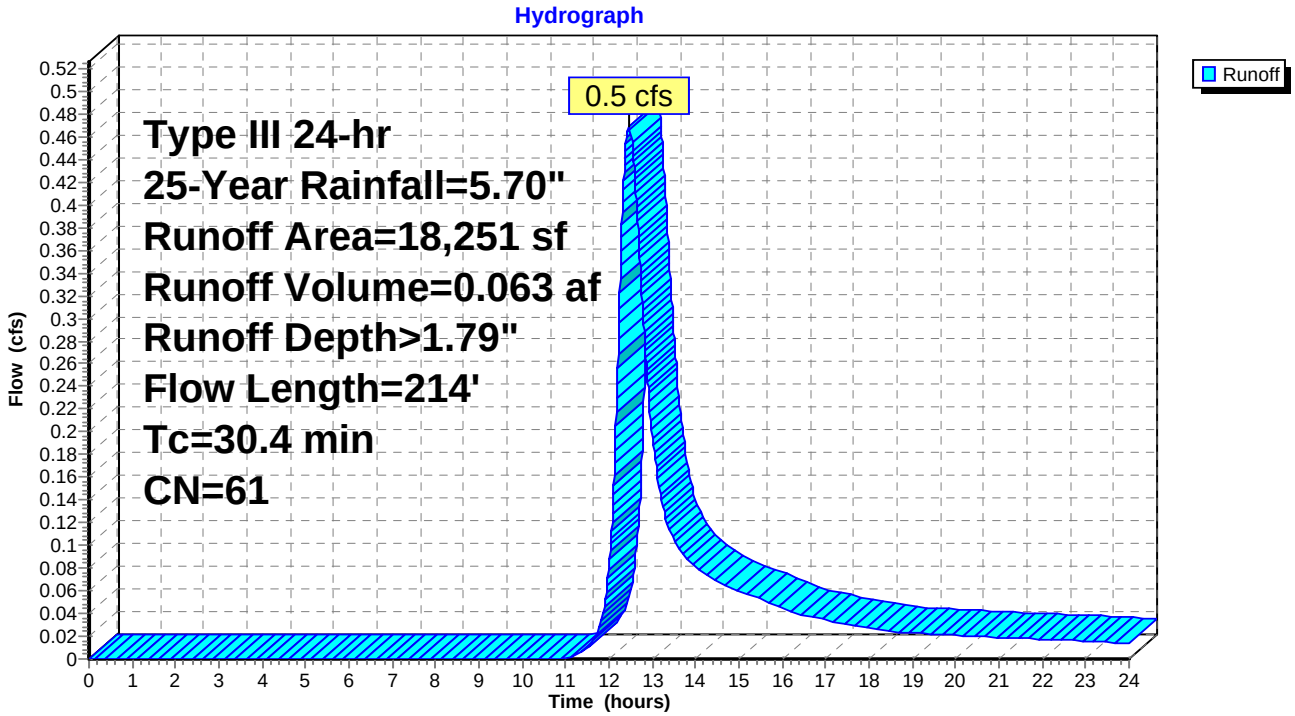
Runoff = 0.5 cfs @ 12.46 hrs, Volume= 0.063 af, Depth> 1.79"

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=5.70"

	Area (sf)	CN	Description
*	18,250	61	>75% Grass cover, Solar Array Area, HSG B
*	1	98	Solar Array Racking Posts, HSG B
	18,251	61	Weighted Average
	18,250		99.99% Pervious Area
	1		0.01% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.2	58	0.0034	0.05		**Sheet Flow, Grass - Solar Array Area** Grass: Dense n= 0.240 P2= 3.40"
8.5	42	0.0119	0.08		**Sheet Flow, Grass - Solar Array Area** Grass: Dense n= 0.240 P2= 3.40"
2.8	86	0.0105	0.51		**Shallow Concentrated Flow, Grass - Solar Array Area** Woodland Kv= 5.0 fps
0.9	28	0.0050	0.49		**Shallow Concentrated Flow, Grass** Short Grass Pasture Kv= 7.0 fps
30.4	214	Total			

Subcatchment 5S: Area 2 - East



Summary for Reach 3R: Overflow Swale

Inflow Area = 3.774 ac, 0.00% Impervious, Inflow Depth > 1.79" for 25-Year event
Inflow = 4.6 cfs @ 12.38 hrs, Volume= 0.563 af
Outflow = 4.6 cfs @ 12.38 hrs, Volume= 0.563 af, Atten= 0%, Lag= 0.1 min

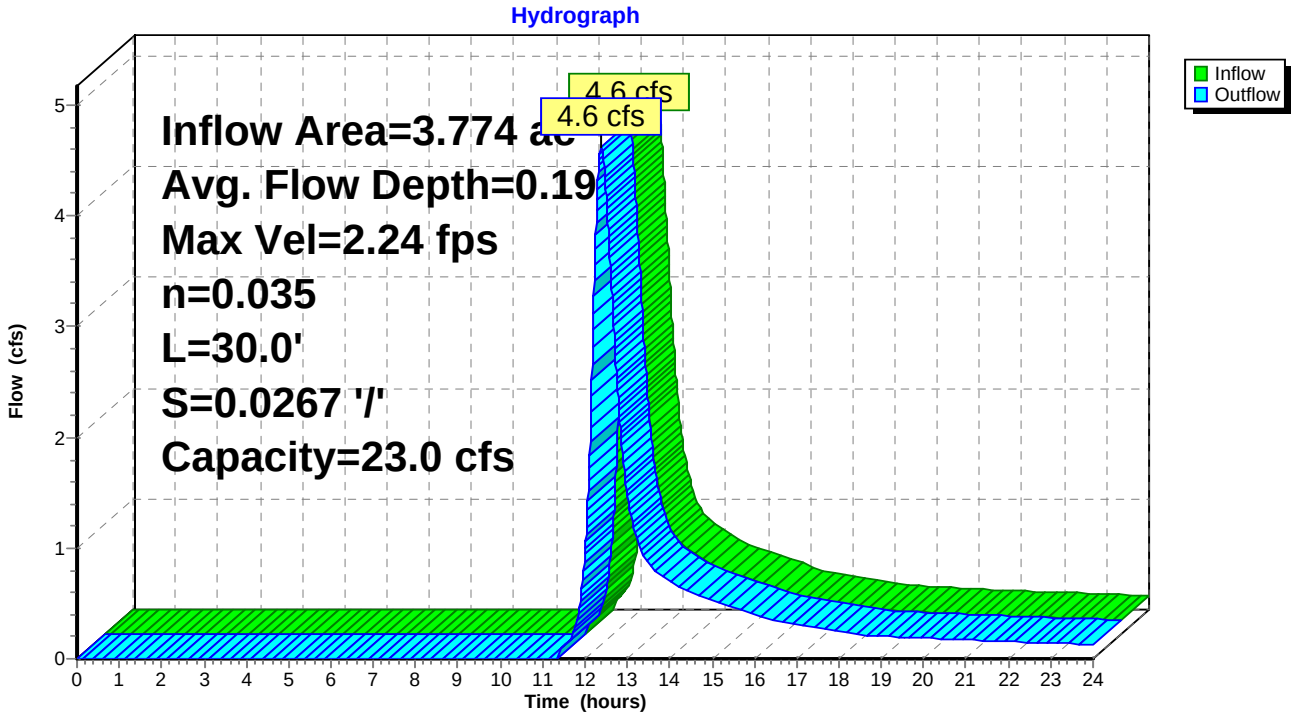
Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 2
Max. Velocity= 2.24 fps, Min. Travel Time= 0.2 min
Avg. Velocity = 0.85 fps, Avg. Travel Time= 0.6 min

Peak Storage= 62 cf @ 12.38 hrs
Average Depth at Peak Storage= 0.19'
Bank-Full Depth= 0.50' Flow Area= 5.8 sf, Capacity= 23.0 cfs

10.00' x 0.50' deep channel, n= 0.035 Earth, dense weeds
Side Slope Z-value= 3.0 '/' Top Width= 13.00'
Length= 30.0' Slope= 0.0267 '/'
Inlet Invert= 22.80', Outlet Invert= 22.00'

‡

Reach 3R: Overflow Swale



Summary for Reach 4R: Overflow Swale

Inflow Area = 4.408 ac, 0.41% Impervious, Inflow Depth > 1.87" for 25-Year event
Inflow = 5.7 cfs @ 12.38 hrs, Volume= 0.687 af
Outflow = 5.7 cfs @ 12.38 hrs, Volume= 0.687 af, Atten= 0%, Lag= 0.1 min

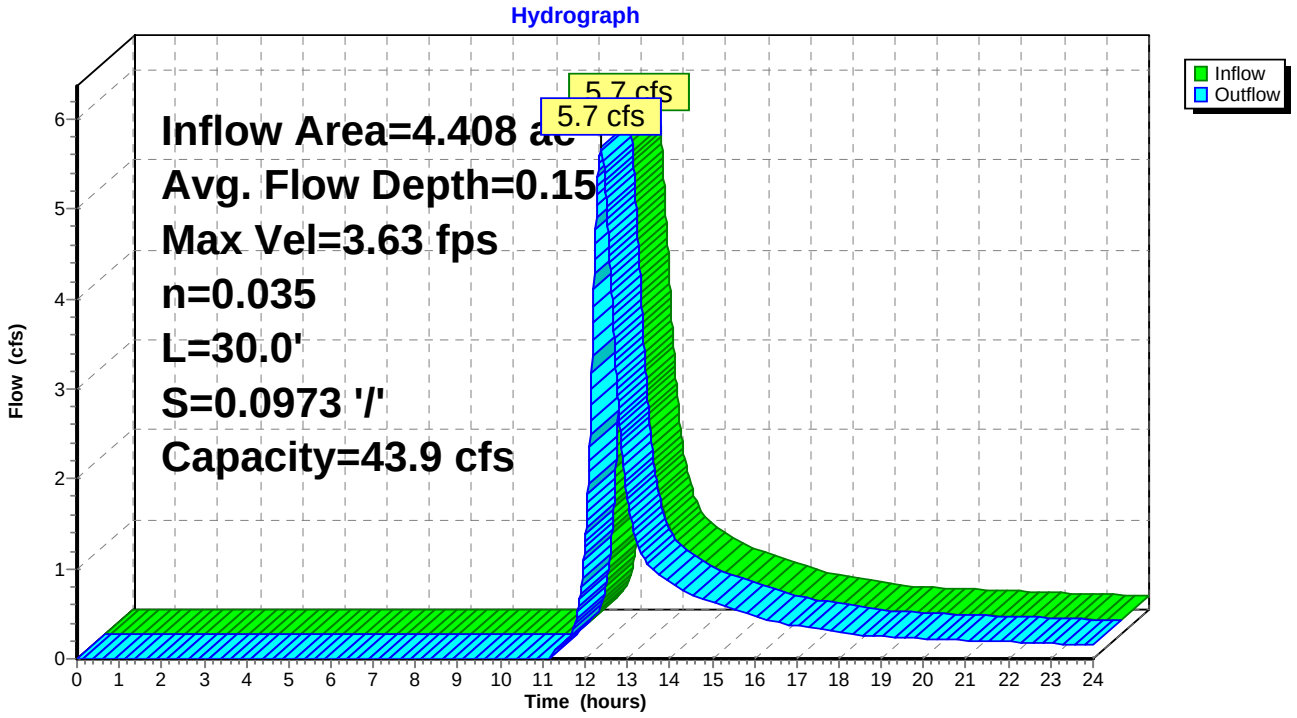
Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 2
Max. Velocity= 3.63 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 1.36 fps, Avg. Travel Time= 0.4 min

Peak Storage= 47 cf @ 12.38 hrs
Average Depth at Peak Storage= 0.15'
Bank-Full Depth= 0.50' Flow Area= 5.8 sf, Capacity= 43.9 cfs

10.00' x 0.50' deep channel, n= 0.035 Earth, dense weeds
Side Slope Z-value= 3.0 '/' Top Width= 13.00'
Length= 30.0' Slope= 0.0973 '/'
Inlet Invert= 25.00', Outlet Invert= 22.08'

‡

Reach 4R: Overflow Swale



Summary for Pond 2P: BioFiltration Cell

Inflow Area = 3.774 ac, 0.00% Impervious, Inflow Depth > 1.80" for 25-Year event
Inflow = 4.6 cfs @ 12.37 hrs, Volume= 0.565 af
Outflow = 4.6 cfs @ 12.38 hrs, Volume= 0.563 af, Atten= 0%, Lag= 0.3 min
Primary = 4.6 cfs @ 12.38 hrs, Volume= 0.563 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 23.17' @ 12.38 hrs Surf.Area= 0.005 ac Storage= 0.003 af

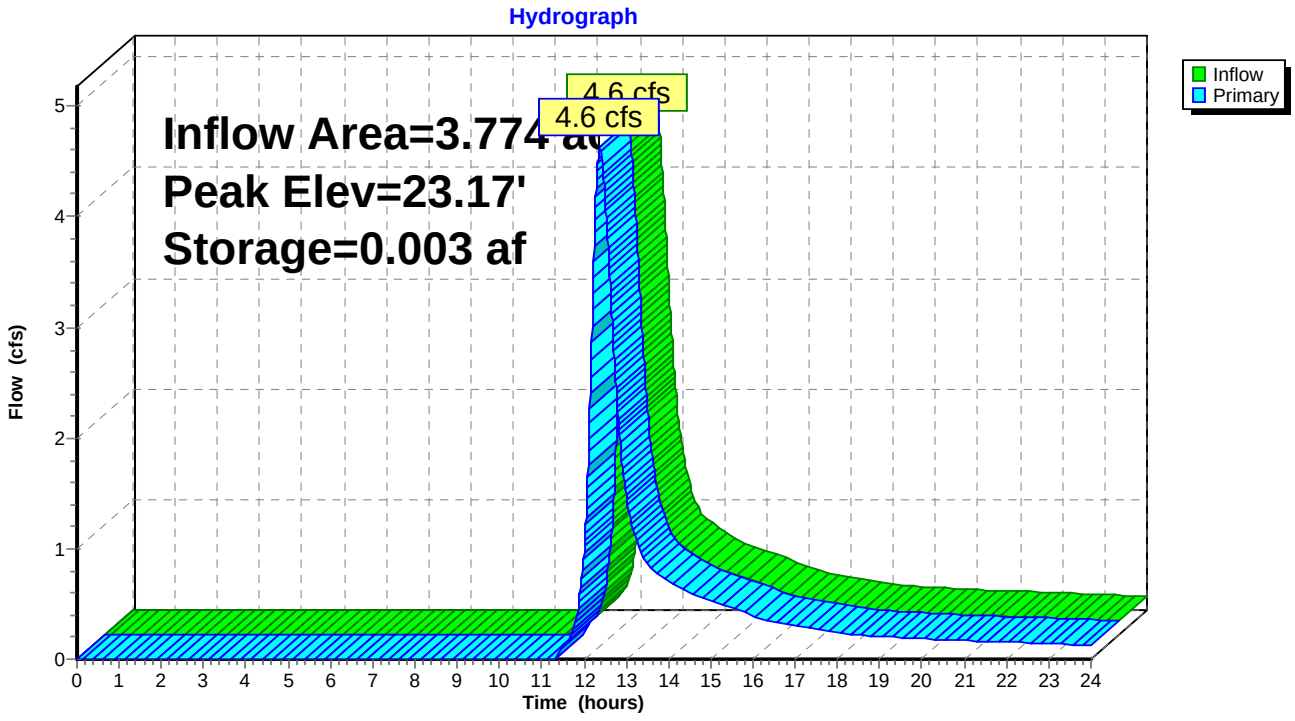
Plug-Flow detention time= 2.3 min calculated for 0.563 af (100% of inflow)
Center-of-Mass det. time= 0.8 min (877.7 - 876.9)

Volume	Invert	Avail.Storage	Storage Description
#1	22.30'	0.004 af	**4.00'W x 20.00'L x 1.00'H Filtration Cell Z=3.0**

Device	Routing	Invert	Outlet Devices
#1	Primary	22.80'	**10.0' long x 5.0' breadth Vegetated Swale** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=4.6 cfs @ 12.38 hrs HW=23.17' TW=22.99' (Dynamic Tailwater)
└─**1=Vegetated Swale** (Weir Controls 4.6 cfs @ 1.25 fps)

Pond 2P: BioFiltration Cell



Summary for Pond 5P: BioFiltration Cell

Inflow Area = 4.408 ac, 0.41% Impervious, Inflow Depth > 1.88" for 25-Year event
Inflow = 5.7 cfs @ 12.37 hrs, Volume= 0.689 af
Outflow = 5.7 cfs @ 12.38 hrs, Volume= 0.687 af, Atten= 0%, Lag= 0.2 min
Primary = 5.7 cfs @ 12.38 hrs, Volume= 0.687 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 25.40' @ 12.38 hrs Surf.Area= 0.005 ac Storage= 0.003 af

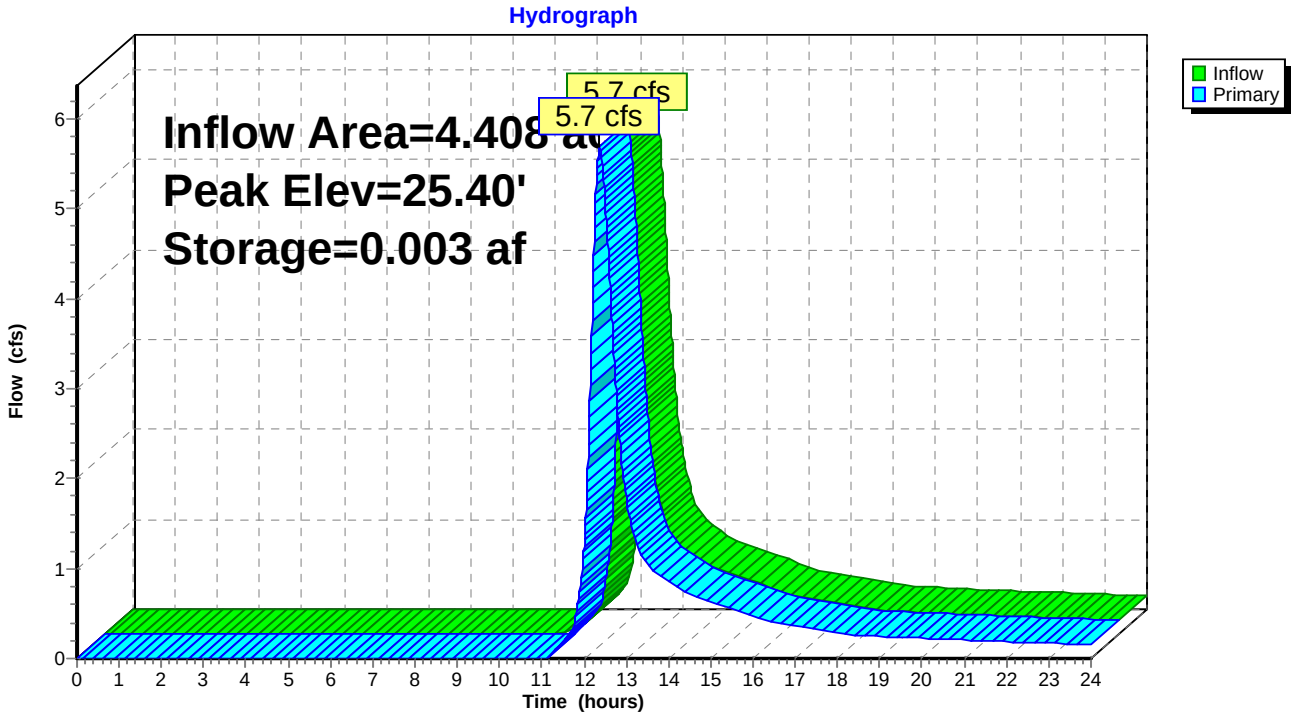
Plug-Flow detention time= 1.9 min calculated for 0.687 af (100% of inflow)
Center-of-Mass det. time= 0.7 min (875.0 - 874.3)

Volume	Invert	Avail.Storage	Storage Description
#1	24.50'	0.004 af	**4.00'W x 20.00'L x 1.10'H Filtration Cell Z=3.0**

Device	Routing	Invert	Outlet Devices
#1	Primary	25.00'	**10.0' long x 5.0' breadth Vegetated Swale** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88
#2	Primary	25.50'	**20.0' long x 5.0' breadth Swale Overtopping** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=5.7 cfs @ 12.38 hrs HW=25.40' TW=25.15' (Dynamic Tailwater)
└─**1=Vegetated Swale** (Weir Controls 5.7 cfs @ 1.43 fps)
└─**2=Swale Overtopping** (Controls 0.0 cfs)

Pond 5P: BioFiltration Cell

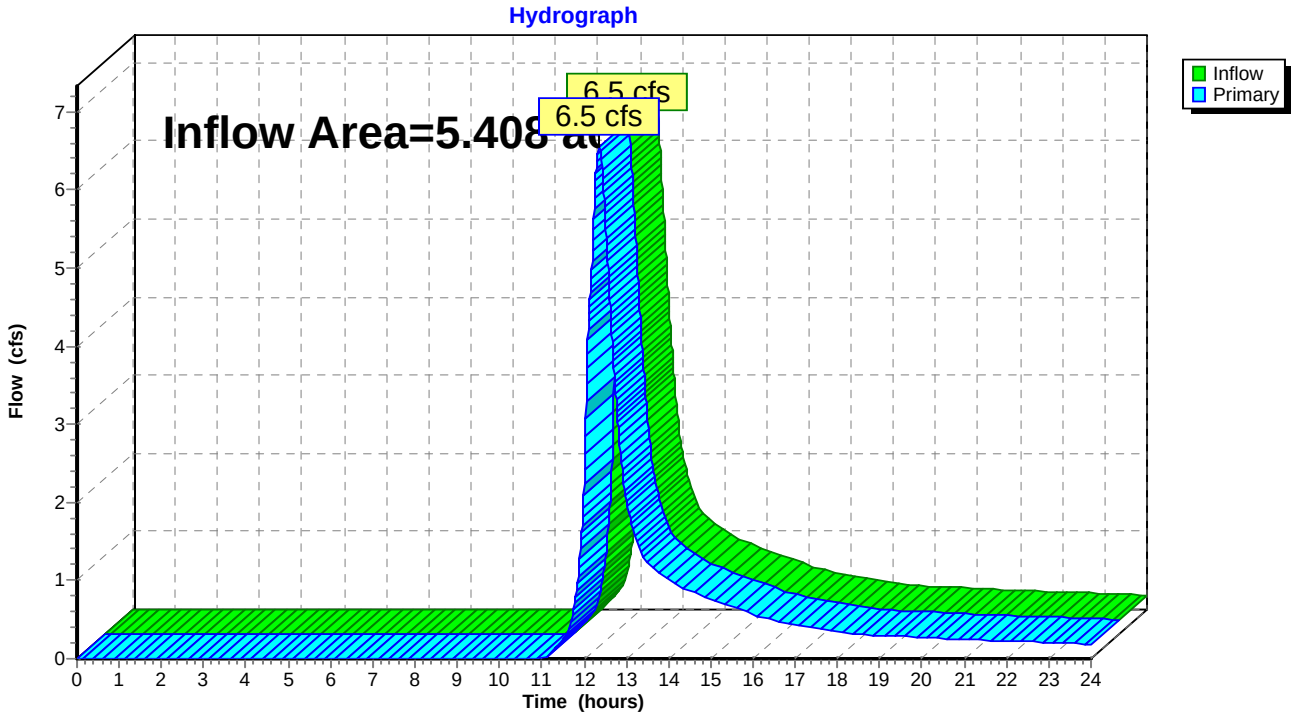


Summary for Link 3L: To Reservoir - South

Inflow Area = 5.408 ac, 0.33% Impervious, Inflow Depth > 1.86" for 25-Year event
Inflow = 6.5 cfs @ 12.36 hrs, Volume= 0.838 af
Primary = 6.5 cfs @ 12.36 hrs, Volume= 0.838 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Link 3L: To Reservoir - South

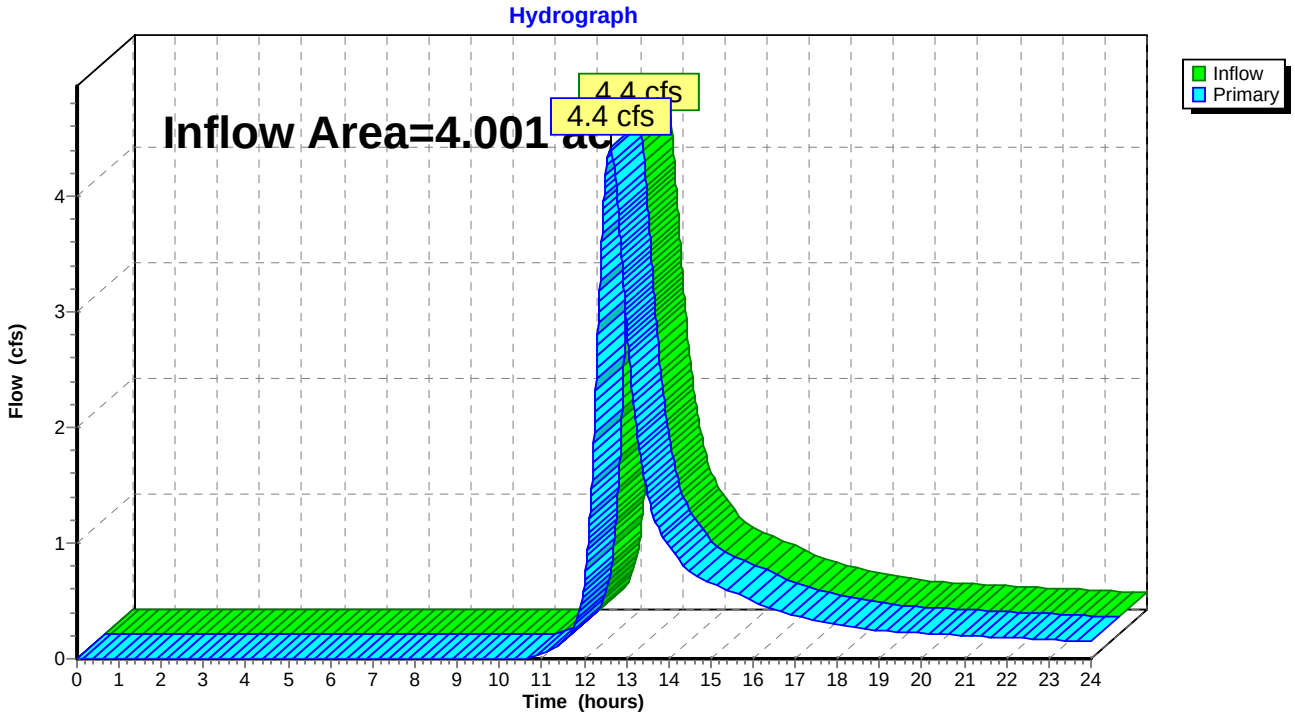


Summary for Link 4L: Wooded Area to East

Inflow Area = 4.001 ac, 0.46% Impervious, Inflow Depth > 2.03" for 25-Year event
Inflow = 4.4 cfs @ 12.64 hrs, Volume= 0.676 af
Primary = 4.4 cfs @ 12.64 hrs, Volume= 0.676 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Link 4L: Wooded Area to East

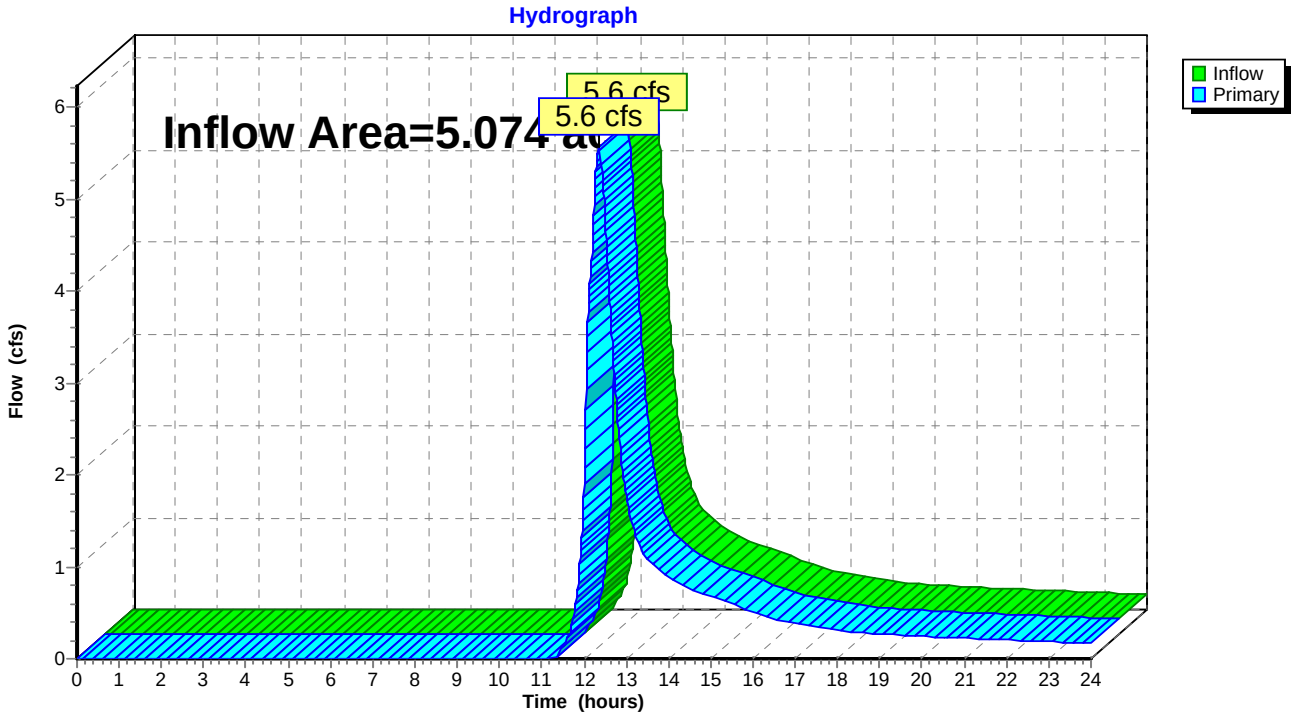


Summary for Link 6L: To Reservoir - North

Inflow Area = 5.074 ac, 0.00% Impervious, Inflow Depth > 1.71" for 25-Year event
Inflow = 5.6 cfs @ 12.36 hrs, Volume= 0.725 af
Primary = 5.6 cfs @ 12.36 hrs, Volume= 0.725 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Link 6L: To Reservoir - North

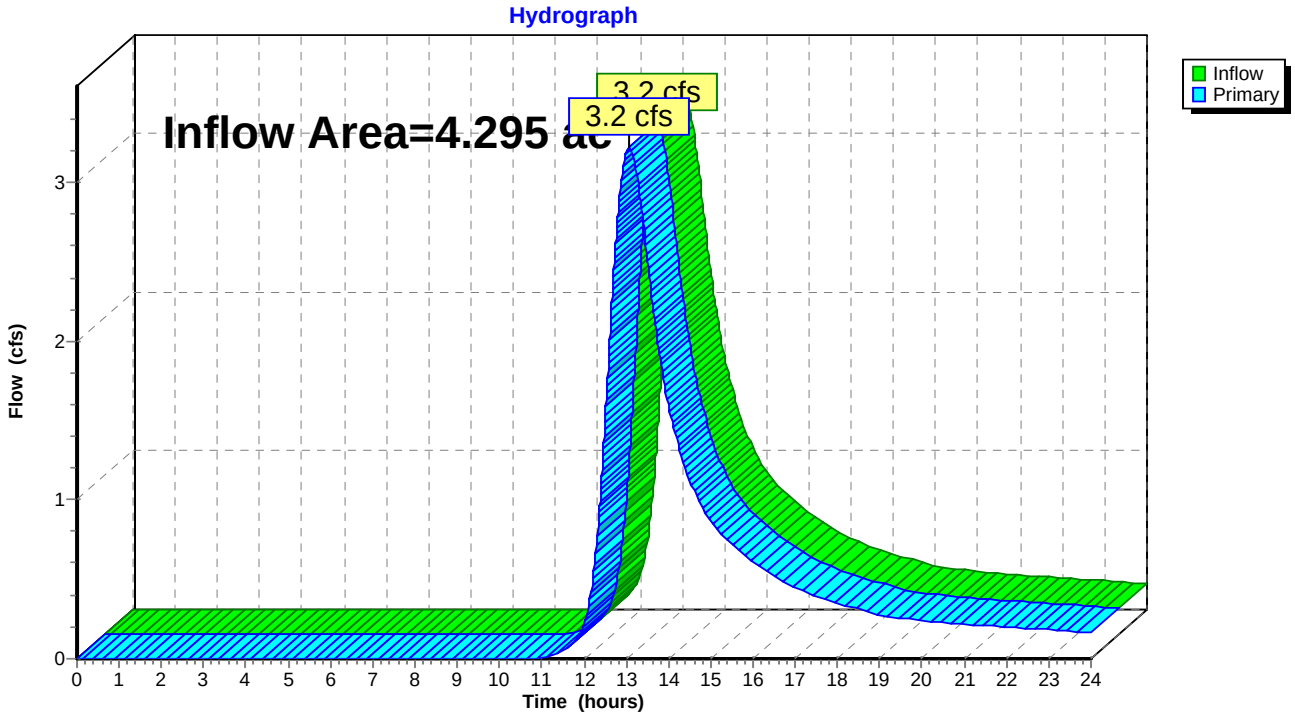


Summary for Link 7L: Off-Site Flow to South

Inflow Area = 4.295 ac, 0.22% Impervious, Inflow Depth > 1.93" for 25-Year event
Inflow = 3.2 cfs @ 13.08 hrs, Volume= 0.690 af
Primary = 3.2 cfs @ 13.08 hrs, Volume= 0.690 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Link 7L: Off-Site Flow to South

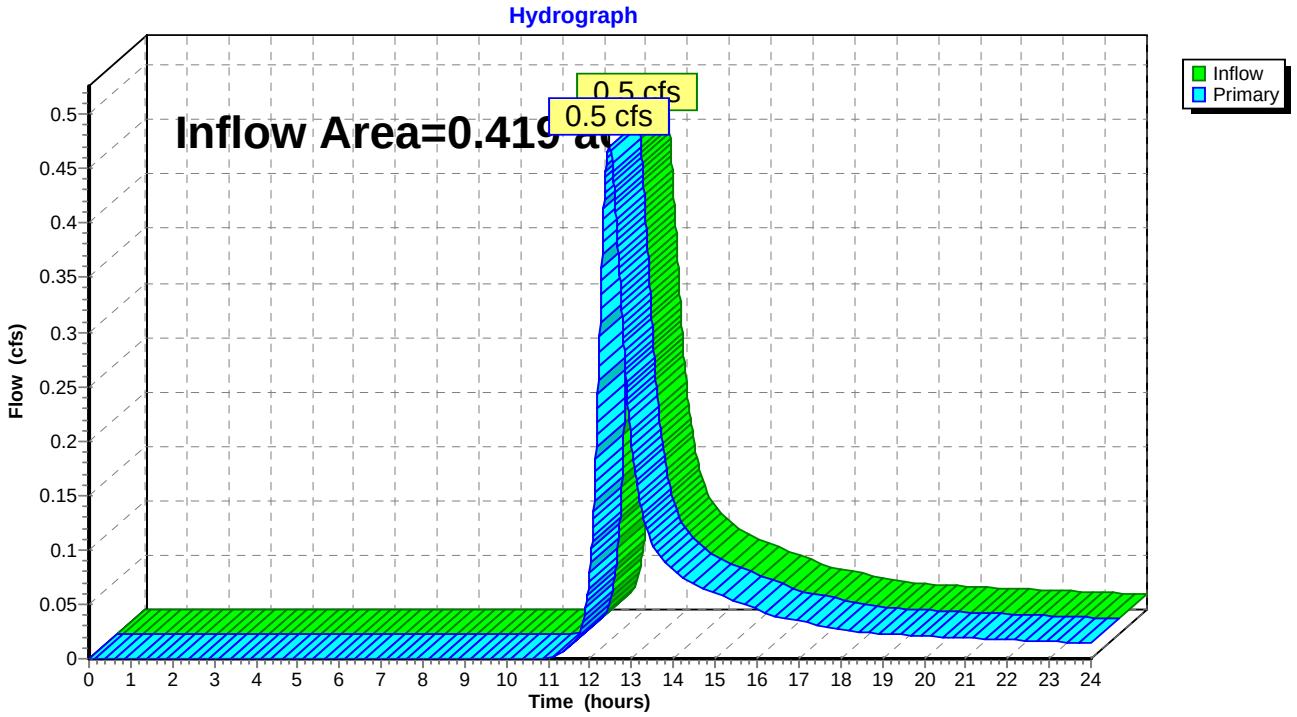


Summary for Link 8L: Off-Site Flow to East

Inflow Area = 0.419 ac, 0.01% Impervious, Inflow Depth > 1.79" for 25-Year event
Inflow = 0.5 cfs @ 12.46 hrs, Volume= 0.063 af
Primary = 0.5 cfs @ 12.46 hrs, Volume= 0.063 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Link 8L: Off-Site Flow to East



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

Subcatchment 1S-A: Area 1 - North - Runoff Area=1.300 ac 0.00% Impervious Runoff Depth>1.86"
Flow Length=30' Slope=0.0770 '/' Tc=6.0 min CN=57 Runoff=2.6 cfs 0.201 af

Subcatchment 1S-B: Area 1 - North - Solar Runoff Area=164,396 sf 0.00% Impervious Runoff Depth>2.19"
Flow Length=562' Tc=24.8 min CN=61 Runoff=5.8 cfs 0.690 af

Subcatchment 2S-A: Area 1 - West - Runoff Area=1.000 ac 0.00% Impervious Runoff Depth>2.21"
Flow Length=30' Slope=0.0350 '/' Tc=6.0 min CN=61 Runoff=2.5 cfs 0.184 af

Subcatchment 2S-B: Area 1 - West Runoff Area=192,013 sf 0.41% Impervious Runoff Depth>2.28"
Flow Length=412' Tc=24.8 min CN=62 Runoff=7.0 cfs 0.839 af

Subcatchment 3S: Area 1 - East Runoff Area=174,284 sf 0.46% Impervious Runoff Depth>2.45"
Flow Length=831' Tc=42.6 min CN=64 Runoff=5.4 cfs 0.818 af

Subcatchment 4S: Area 2 - West Runoff Area=187,084 sf 0.22% Impervious Runoff Depth>2.34"
Flow Length=664' Tc=75.0 min CN=63 Runoff=4.0 cfs 0.838 af

Subcatchment 5S: Area 2 - East Runoff Area=18,251 sf 0.01% Impervious Runoff Depth>2.19"
Flow Length=214' Tc=30.4 min CN=61 Runoff=0.6 cfs 0.077 af

Reach 3R: Overflow Swale Avg. Flow Depth=0.22' Max Vel=2.43 fps Inflow=5.8 cfs 0.689 af
n=0.035 L=30.0' S=0.0267 '/' Capacity=23.0 cfs Outflow=5.8 cfs 0.688 af

Reach 4R: Overflow Swale Avg. Flow Depth=0.17' Max Vel=3.93 fps Inflow=7.0 cfs 0.837 af
n=0.035 L=30.0' S=0.0973 '/' Capacity=43.9 cfs Outflow=7.0 cfs 0.837 af

Pond 2P: BioFiltration Cell Peak Elev=23.22' Storage=0.003 af Inflow=5.8 cfs 0.690 af
Outflow=5.8 cfs 0.689 af

Pond 5P: BioFiltration Cell Peak Elev=25.45' Storage=0.003 af Inflow=7.0 cfs 0.839 af
Outflow=7.0 cfs 0.837 af

Link 3L: To Reservoir - South Inflow=8.1 cfs 1.021 af
Primary=8.1 cfs 1.021 af

Link 4L: Wooded Area to East Inflow=5.4 cfs 0.818 af
Primary=5.4 cfs 0.818 af

Link 6L: To Reservoir - North Inflow=6.9 cfs 0.890 af
Primary=6.9 cfs 0.890 af

Link 7L: Off-Site Flow to South Inflow=4.0 cfs 0.838 af
Primary=4.0 cfs 0.838 af

Link 8L: Off-Site Flow to East Inflow=0.6 cfs 0.077 af
Primary=0.6 cfs 0.077 af

Total Runoff Area = 19.197 ac Runoff Volume = 3.646 af Average Runoff Depth = 2.28"
99.76% Pervious = 19.151 ac 0.24% Impervious = 0.046 ac

Summary for Subcatchment 1S-A: Area 1 - North - DownGradient Swale

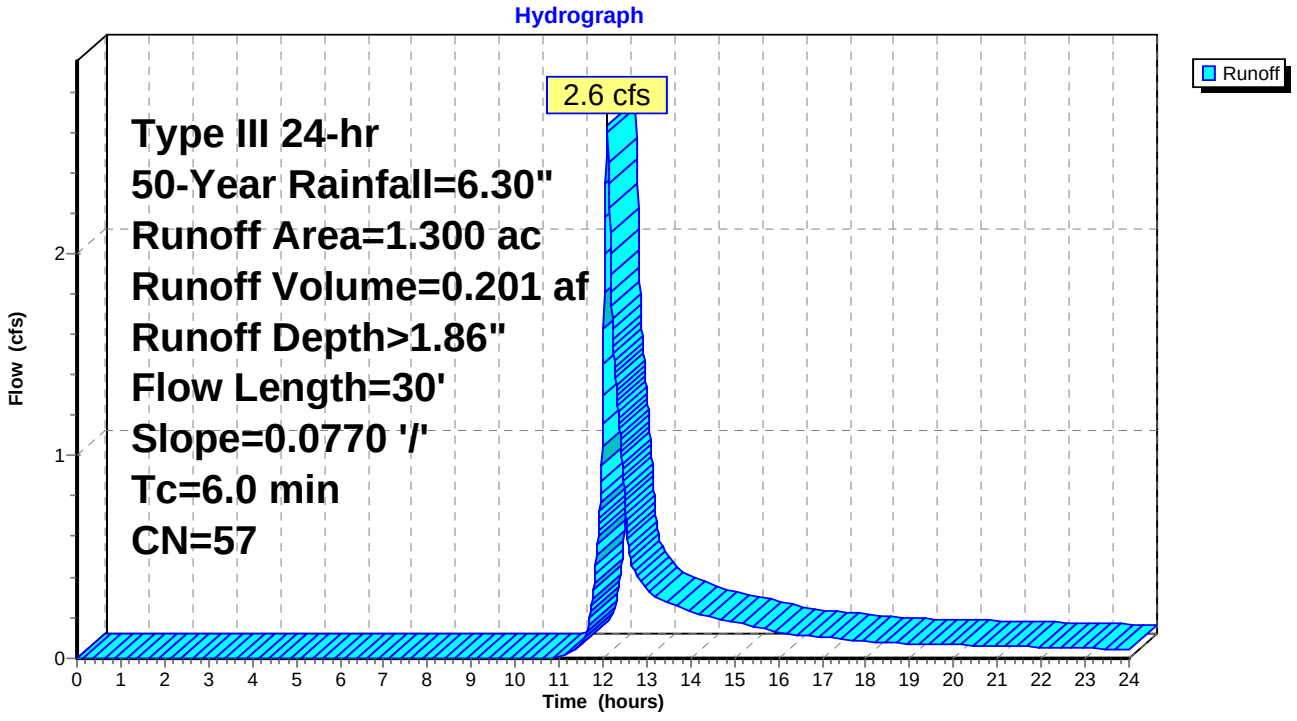
Runoff = 2.6 cfs @ 12.10 hrs, Volume= 0.201 af, Depth> 1.86"

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=6.30"

Area (ac)	CN	Description
0.850	55	Woods, Good, HSG B
0.450	61	>75% Grass cover, Good, HSG B
1.300	57	Weighted Average
1.300		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.6	30	0.0770	0.11		**Sheet Flow, Wooded Slope** Woods: Light underbrush n= 0.400 P2= 3.40"
4.6	30	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 1S-A: Area 1 - North - DownGradient Swale



Summary for Subcatchment 1S-B: Area 1 - North - Solar Arrays

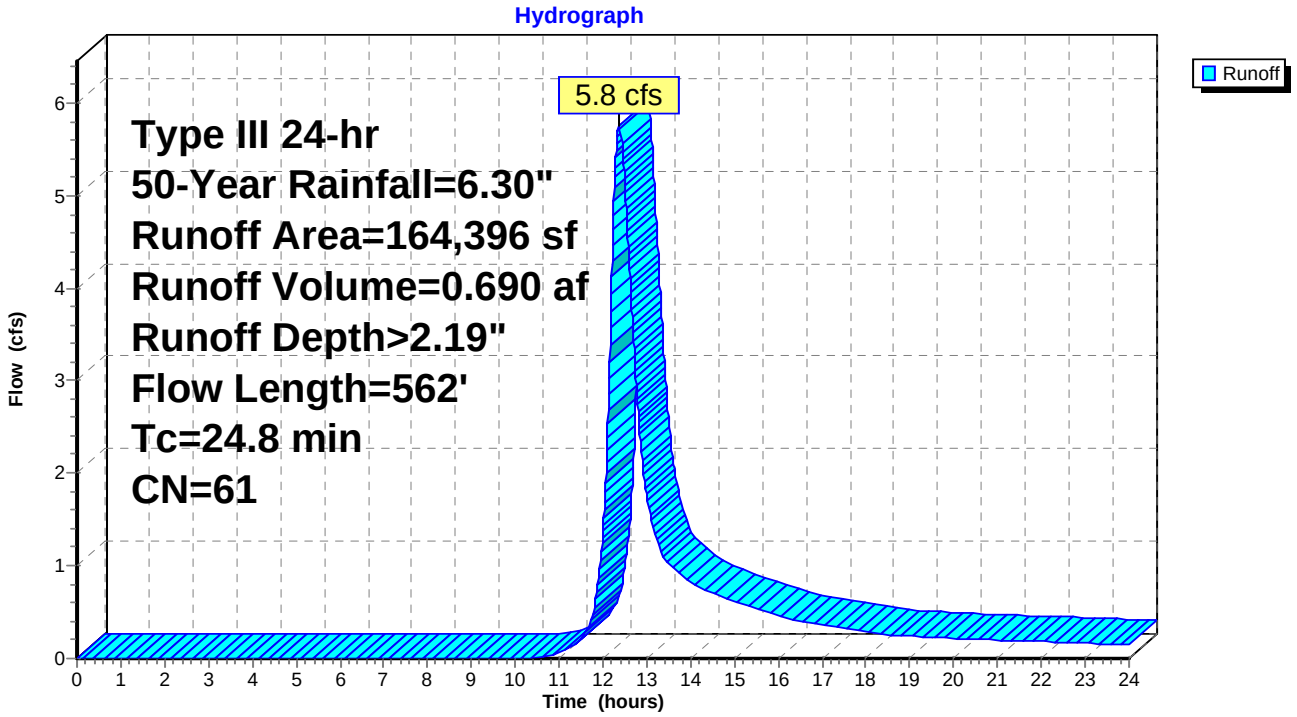
Runoff = 5.8 cfs @ 12.37 hrs, Volume= 0.690 af, Depth> 2.19"

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=6.30"

	Area (sf)	CN	Description
	23,392	60	Woods, Fair, HSG B
*	141,004	61	>75% Grass cover, Solar Array Area, HSG B
*	0	98	Solar Array Posts, HSG B
	164,396	61	Weighted Average
	164,396		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.5	100	0.0177	0.11		**Sheet Flow, Grass - Solar Array Area** Grass: Dense n= 0.240 P2= 3.40"
1.0	40	0.0085	0.65		**Shallow Concentrated Flow, Grass - Solar Array Area** Short Grass Pasture Kv= 7.0 fps
0.3	32	0.0625	1.75		**Shallow Concentrated Flow, Grass - Solar Array Area** Short Grass Pasture Kv= 7.0 fps
2.9	143	0.0140	0.83		**Shallow Concentrated Flow, Grass - Solar Array Area** Short Grass Pasture Kv= 7.0 fps
5.2	211	0.0095	0.68		**Shallow Concentrated Flow, Grass - Solar Array Area** Short Grass Pasture Kv= 7.0 fps
0.4	31	0.0323	1.26		**Shallow Concentrated Flow, Grass - Solar Array Area** Short Grass Pasture Kv= 7.0 fps
0.5	5	0.2000	0.17		**Sheet Flow, To swale (Flow disrupted by stone level spreader)** Grass: Dense n= 0.240 P2= 3.40"
24.8	562	Total			

Subcatchment 1S-B: Area 1 - North - Solar Arrays



Summary for Subcatchment 2S-A: Area 1 - West - DownGradient Swale

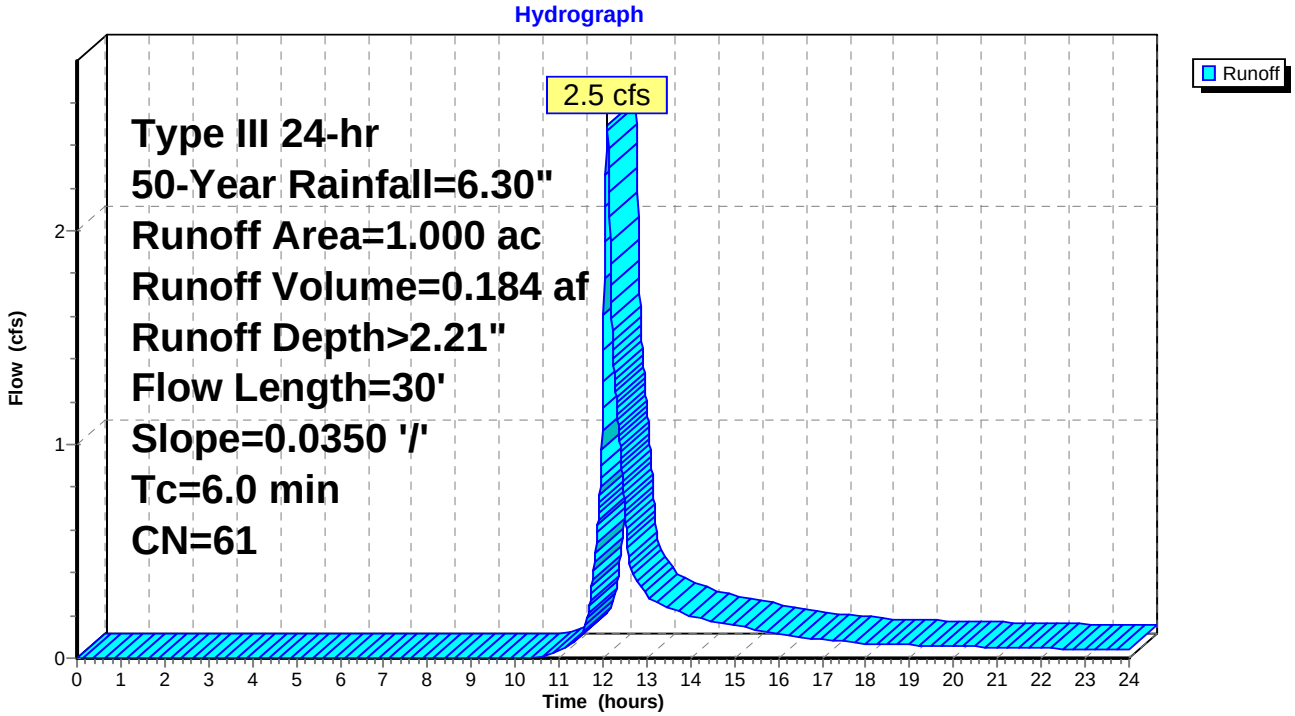
Runoff = 2.5 cfs @ 12.09 hrs, Volume= 0.184 af, Depth> 2.21"

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=6.30"

Area (ac)	CN	Description
1.000	61	>75% Grass cover, Good, HSG B
1.000		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.2	30	0.0350	0.12		**Sheet Flow, Grass Slope** Grass: Dense n= 0.240 P2= 3.40"
4.2	30	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 2S-A: Area 1 - West - DownGradient Swale



Summary for Subcatchment 2S-B: Area 1 - West

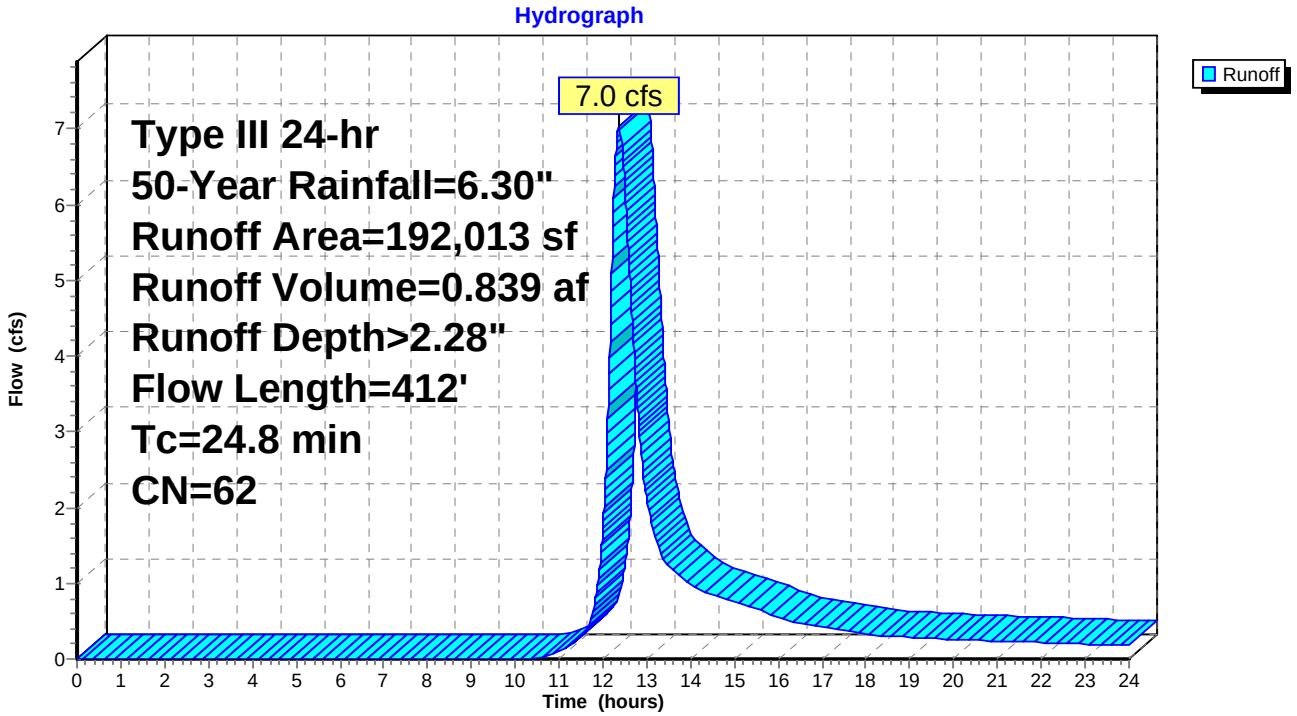
Runoff = 7.0 cfs @ 12.37 hrs, Volume= 0.839 af, Depth> 2.28"

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=6.30"

	Area (sf)	CN	Description
*	182,691	61	>75% Grass cover, Solar Array Area, HSG B
	8,538	85	Gravel roads, HSG B
*	0	98	Solar Array Racking Posts, HSG B
*	784	98	Concrete Equipment Pad, HSG B
	192,013	62	Weighted Average
	191,229		99.59% Pervious Area
	784		0.41% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.0	100	0.0120	0.10		**Sheet Flow, Grass - Solar Array Area** Grass: Dense n= 0.240 P2= 3.40"
7.3	307	0.0099	0.70		**Shallow Concentrated Flow, Grass - Solar Array Area** Short Grass Pasture Kv= 7.0 fps
0.5	5	0.2000	0.17		**Sheet Flow, Swale Slope (flow disrupted by stone level spreade** Grass: Dense n= 0.240 P2= 3.40"
24.8	412	Total			

Subcatchment 2S-B: Area 1 - West



Summary for Subcatchment 3S: Area 1 - East

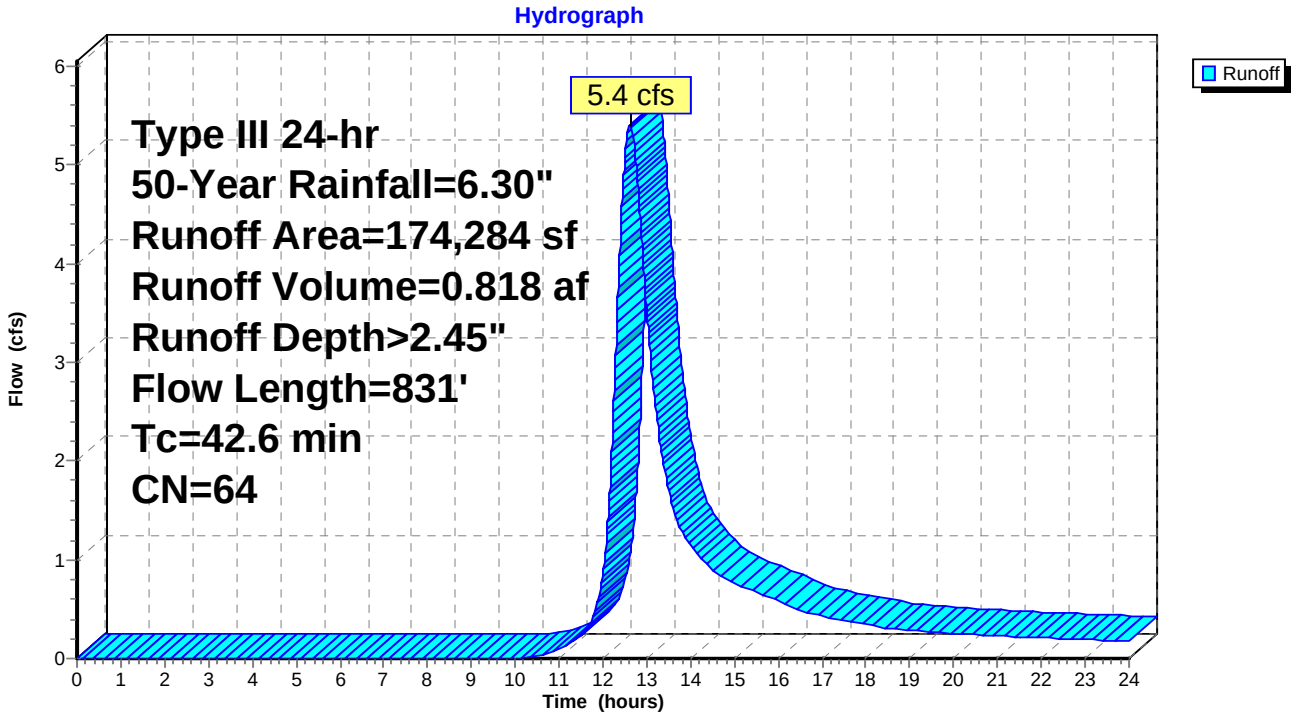
Runoff = 5.4 cfs @ 12.63 hrs, Volume= 0.818 af, Depth> 2.45"

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=6.30"

	Area (sf)	CN	Description
	19,602	85	Gravel roads, HSG B
*	153,878	61	>75% Grass cover, Solar Array Area, HSG B
*	4	98	Solar Array Racking Posts, HSG B
*	800	98	Concrete Equipment Pads, HSG B
	174,284	64	Weighted Average
	173,480		99.54% Pervious Area
	804		0.46% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
19.1	100	0.0090	0.09		**Sheet Flow, Grass - Solar Array Area** Grass: Dense n= 0.240 P2= 3.40"
7.1	174	0.0034	0.41		**Shallow Concentrated Flow, Grass - Solar Array Area** Short Grass Pasture Kv= 7.0 fps
16.3	526	0.0059	0.54		**Shallow Concentrated Flow, Grass** Short Grass Pasture Kv= 7.0 fps
0.1	31	0.0742	4.39		**Shallow Concentrated Flow, Grass/Gravel** Unpaved Kv= 16.1 fps
42.6	831	Total			

Subcatchment 3S: Area 1 - East



Summary for Subcatchment 4S: Area 2 - West

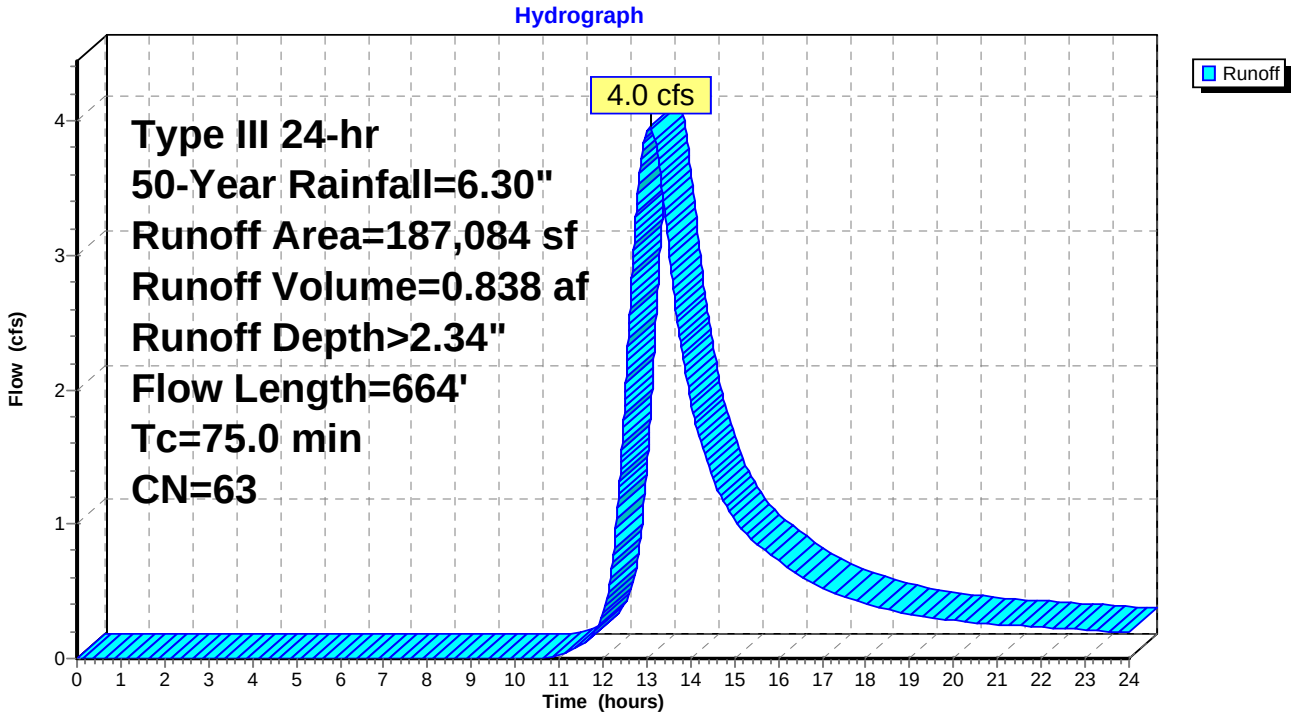
Runoff = 4.0 cfs @ 13.08 hrs, Volume= 0.838 af, Depth> 2.34"

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=6.30"

	Area (sf)	CN	Description
	10,060	60	Woods, Fair, HSG B
*	161,719	61	>75% Grass cover, Solar Array Area, HSG B
	14,898	85	Gravel roads, HSG B
*	7	98	Solar Array Racking Posts, HSG B
*	400	98	Concrete Equipment Pad, HSG B
	187,084	63	Weighted Average
	186,677		99.78% Pervious Area
	407		0.22% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
20.0	100	0.0080	0.08		**Sheet Flow, Grass - Solar Array Area** Grass: Dense n= 0.240 P2= 3.40"
1.3	86	0.0233	1.07		**Shallow Concentrated Flow, Grass - Solar Array Area** Short Grass Pasture Kv= 7.0 fps
7.5	235	0.0055	0.52		**Shallow Concentrated Flow, Grass - Solar Array Area** Short Grass Pasture Kv= 7.0 fps
13.3	177	0.0010	0.22		**Shallow Concentrated Flow, Grass - Solar Array Area** Short Grass Pasture Kv= 7.0 fps
32.9	66	0.0010	0.03		**Sheet Flow, Grass (Flow disrupted by stone check dam)** Grass: Dense n= 0.240 P2= 3.40"
75.0	664	Total			

Subcatchment 4S: Area 2 - West



Summary for Subcatchment 5S: Area 2 - East

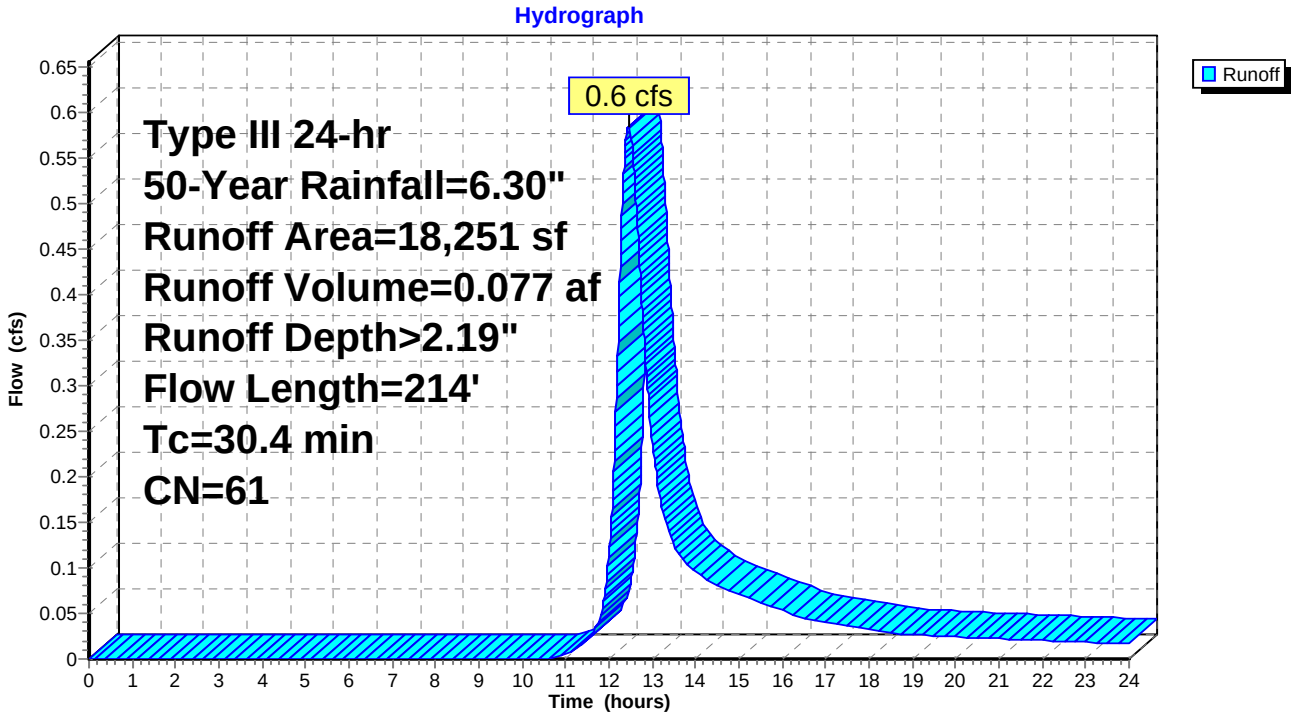
Runoff = 0.6 cfs @ 12.46 hrs, Volume= 0.077 af, Depth> 2.19"

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=6.30"

	Area (sf)	CN	Description
*	18,250	61	>75% Grass cover, Solar Array Area, HSG B
*	1	98	Solar Array Racking Posts, HSG B
	18,251	61	Weighted Average
	18,250		99.99% Pervious Area
	1		0.01% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.2	58	0.0034	0.05		**Sheet Flow, Grass - Solar Array Area** Grass: Dense n= 0.240 P2= 3.40"
8.5	42	0.0119	0.08		**Sheet Flow, Grass - Solar Array Area** Grass: Dense n= 0.240 P2= 3.40"
2.8	86	0.0105	0.51		**Shallow Concentrated Flow, Grass - Solar Array Area** Woodland Kv= 5.0 fps
0.9	28	0.0050	0.49		**Shallow Concentrated Flow, Grass** Short Grass Pasture Kv= 7.0 fps
30.4	214	Total			

Subcatchment 5S: Area 2 - East



Summary for Reach 3R: Overflow Swale

Inflow Area = 3.774 ac, 0.00% Impervious, Inflow Depth > 2.19" for 50-Year event
Inflow = 5.8 cfs @ 12.37 hrs, Volume= 0.689 af
Outflow = 5.8 cfs @ 12.38 hrs, Volume= 0.688 af, Atten= 0%, Lag= 0.2 min

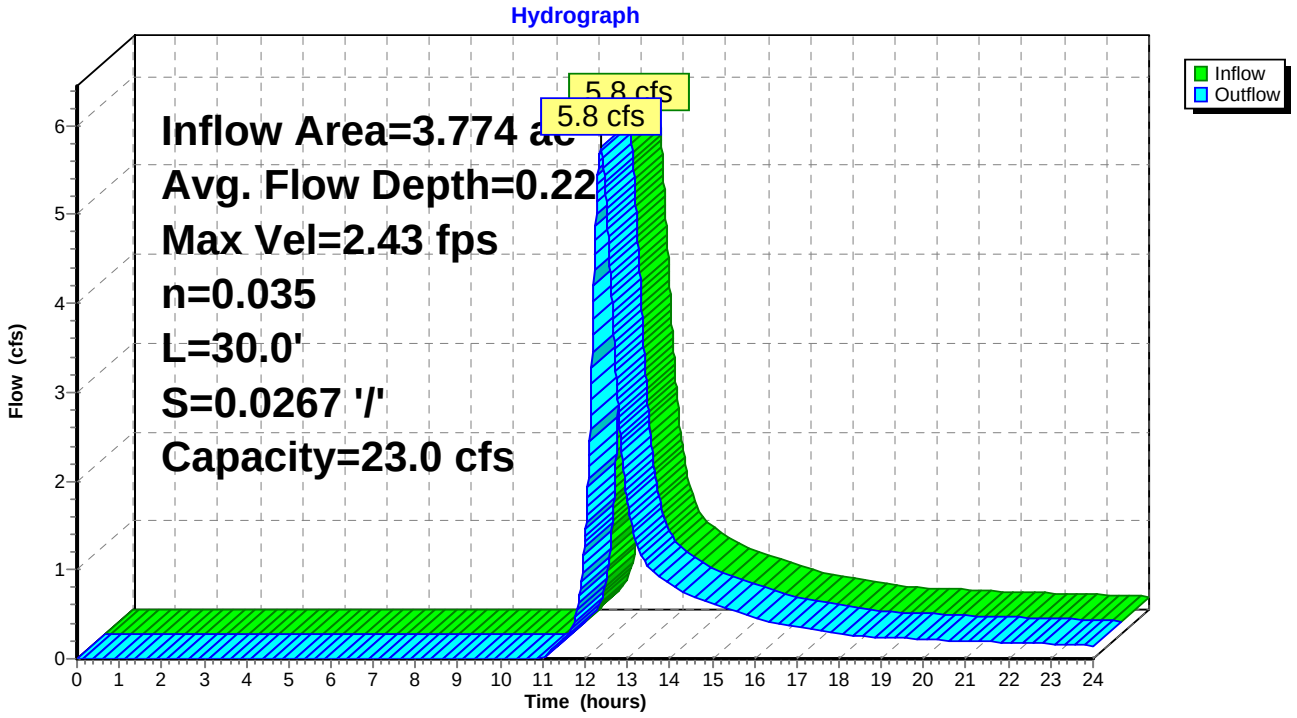
Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 2
Max. Velocity= 2.43 fps, Min. Travel Time= 0.2 min
Avg. Velocity = 0.91 fps, Avg. Travel Time= 0.6 min

Peak Storage= 71 cf @ 12.38 hrs
Average Depth at Peak Storage= 0.22'
Bank-Full Depth= 0.50' Flow Area= 5.8 sf, Capacity= 23.0 cfs

10.00' x 0.50' deep channel, n= 0.035 Earth, dense weeds
Side Slope Z-value= 3.0 '/' Top Width= 13.00'
Length= 30.0' Slope= 0.0267 '/'
Inlet Invert= 22.80', Outlet Invert= 22.00'

‡

Reach 3R: Overflow Swale



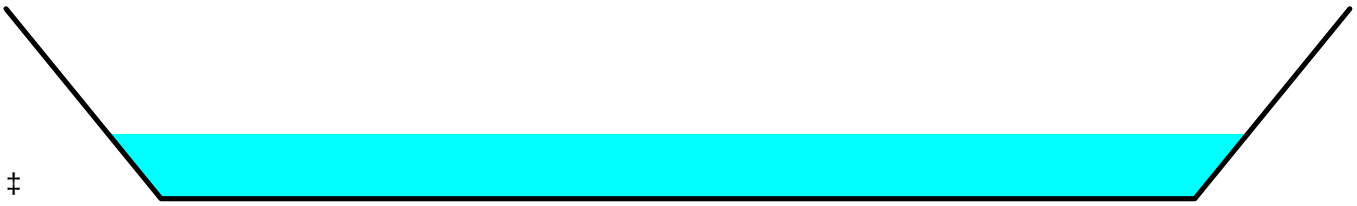
Summary for Reach 4R: Overflow Swale

Inflow Area = 4.408 ac, 0.41% Impervious, Inflow Depth > 2.28" for 50-Year event
Inflow = 7.0 cfs @ 12.37 hrs, Volume= 0.837 af
Outflow = 7.0 cfs @ 12.37 hrs, Volume= 0.837 af, Atten= 0%, Lag= 0.1 min

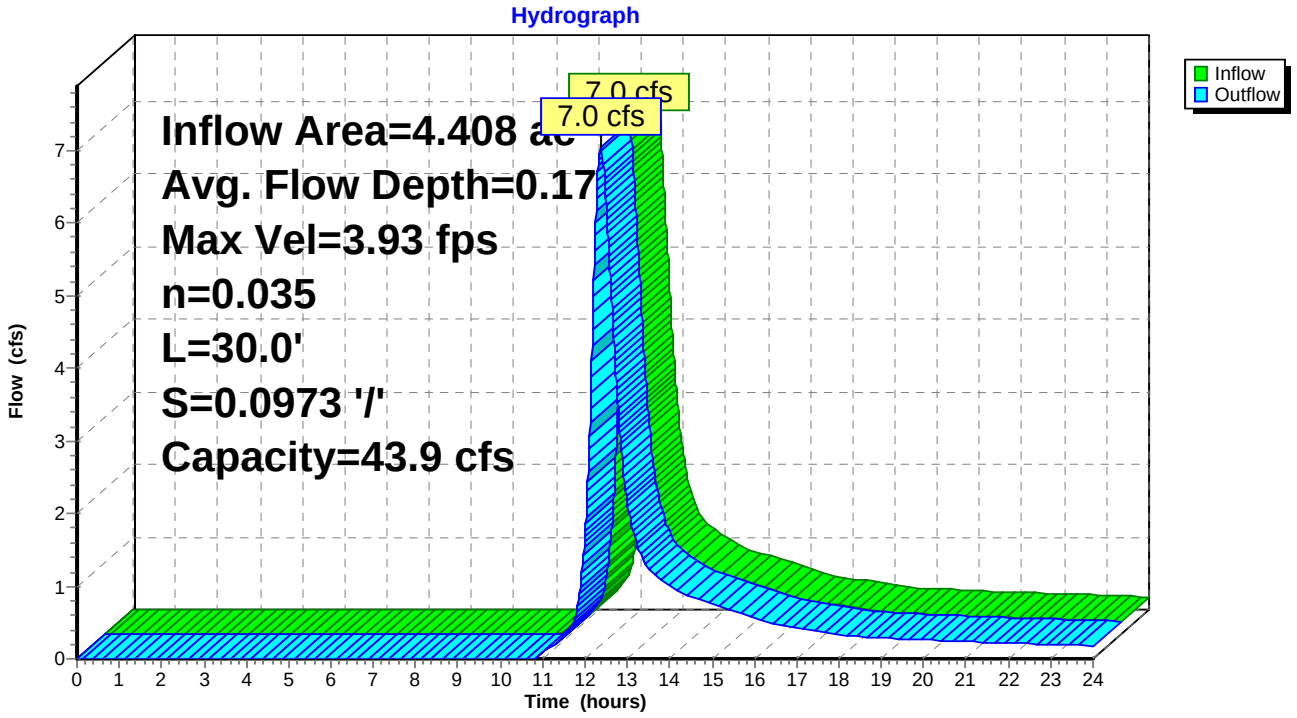
Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 2
Max. Velocity= 3.93 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 1.44 fps, Avg. Travel Time= 0.3 min

Peak Storage= 54 cf @ 12.37 hrs
Average Depth at Peak Storage= 0.17'
Bank-Full Depth= 0.50' Flow Area= 5.8 sf, Capacity= 43.9 cfs

10.00' x 0.50' deep channel, n= 0.035 Earth, dense weeds
Side Slope Z-value= 3.0 '/' Top Width= 13.00'
Length= 30.0' Slope= 0.0973 '/'
Inlet Invert= 25.00', Outlet Invert= 22.08'



Reach 4R: Overflow Swale



Summary for Pond 2P: BioFiltration Cell

Inflow Area = 3.774 ac, 0.00% Impervious, Inflow Depth > 2.19" for 50-Year event
Inflow = 5.8 cfs @ 12.37 hrs, Volume= 0.690 af
Outflow = 5.8 cfs @ 12.37 hrs, Volume= 0.689 af, Atten= 0%, Lag= 0.2 min
Primary = 5.8 cfs @ 12.37 hrs, Volume= 0.689 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 23.22' @ 12.37 hrs Surf.Area= 0.006 ac Storage= 0.003 af

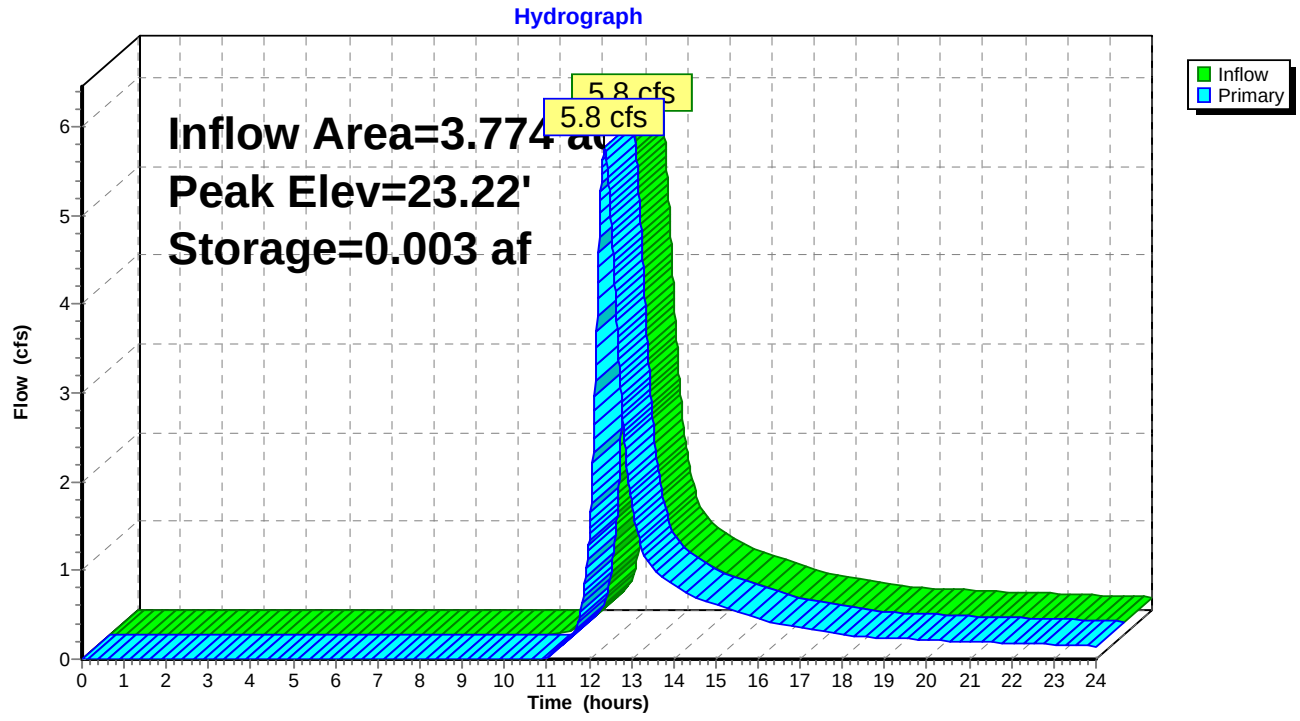
Plug-Flow detention time= 2.0 min calculated for 0.688 af (100% of inflow)
Center-of-Mass det. time= 0.7 min (871.6 - 870.9)

Volume	Invert	Avail.Storage	Storage Description
#1	22.30'	0.004 af	**4.00'W x 20.00'L x 1.00'H Filtration Cell Z=3.0**

Device	Routing	Invert	Outlet Devices
#1	Primary	22.80'	**10.0' long x 5.0' breadth Vegetated Swale** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=5.8 cfs @ 12.37 hrs HW=23.22' TW=23.02' (Dynamic Tailwater)
└**1=Vegetated Swale** (Weir Controls 5.8 cfs @ 1.36 fps)

Pond 2P: BioFiltration Cell



Summary for Pond 5P: BioFiltration Cell

Inflow Area = 4.408 ac, 0.41% Impervious, Inflow Depth > 2.28" for 50-Year event
Inflow = 7.0 cfs @ 12.37 hrs, Volume= 0.839 af
Outflow = 7.0 cfs @ 12.37 hrs, Volume= 0.837 af, Atten= 0%, Lag= 0.1 min
Primary = 7.0 cfs @ 12.37 hrs, Volume= 0.837 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 25.45' @ 12.37 hrs Surf.Area= 0.006 ac Storage= 0.003 af

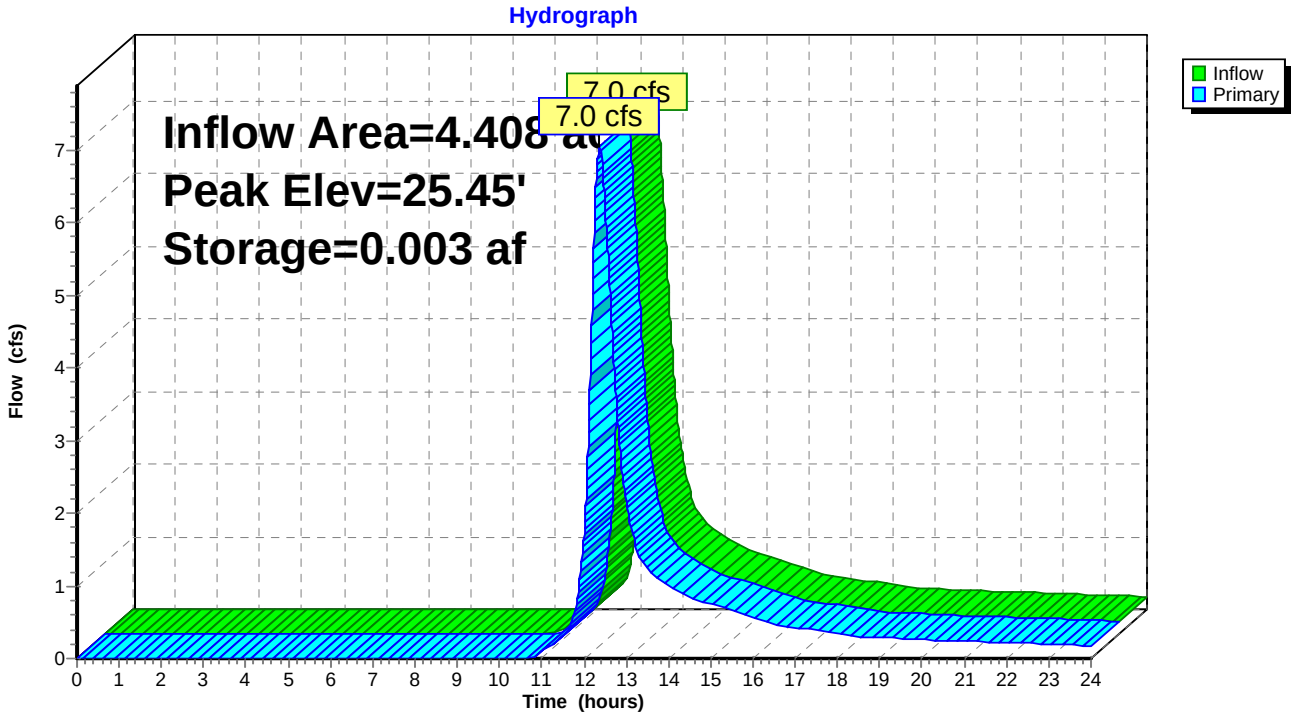
Plug-Flow detention time= 1.7 min calculated for 0.837 af (100% of inflow)
Center-of-Mass det. time= 0.6 min (869.1 - 868.5)

Volume	Invert	Avail.Storage	Storage Description
#1	24.50'	0.004 af	**4.00'W x 20.00'L x 1.10'H Filtration Cell Z=3.0**

Device	Routing	Invert	Outlet Devices
#1	Primary	25.00'	**10.0' long x 5.0' breadth Vegetated Swale** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88
#2	Primary	25.50'	**20.0' long x 5.0' breadth Swale Overtopping** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=7.0 cfs @ 12.37 hrs HW=25.45' TW=25.17' (Dynamic Tailwater)
└─**1=Vegetated Swale** (Weir Controls 7.0 cfs @ 1.55 fps)
└─**2=Swale Overtopping** (Controls 0.0 cfs)

Pond 5P: BioFiltration Cell

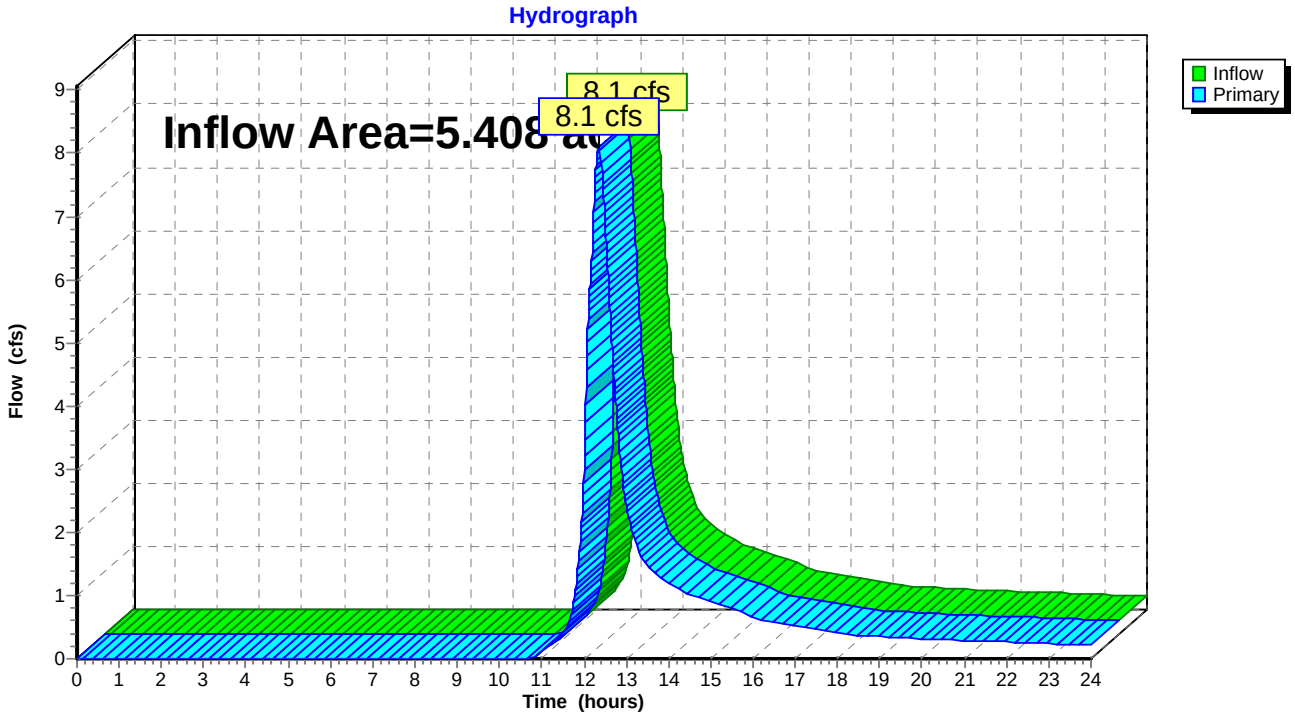


Summary for Link 3L: To Reservoir - South

Inflow Area = 5.408 ac, 0.33% Impervious, Inflow Depth > 2.27" for 50-Year event
Inflow = 8.1 cfs @ 12.35 hrs, Volume= 1.021 af
Primary = 8.1 cfs @ 12.35 hrs, Volume= 1.021 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Link 3L: To Reservoir - South

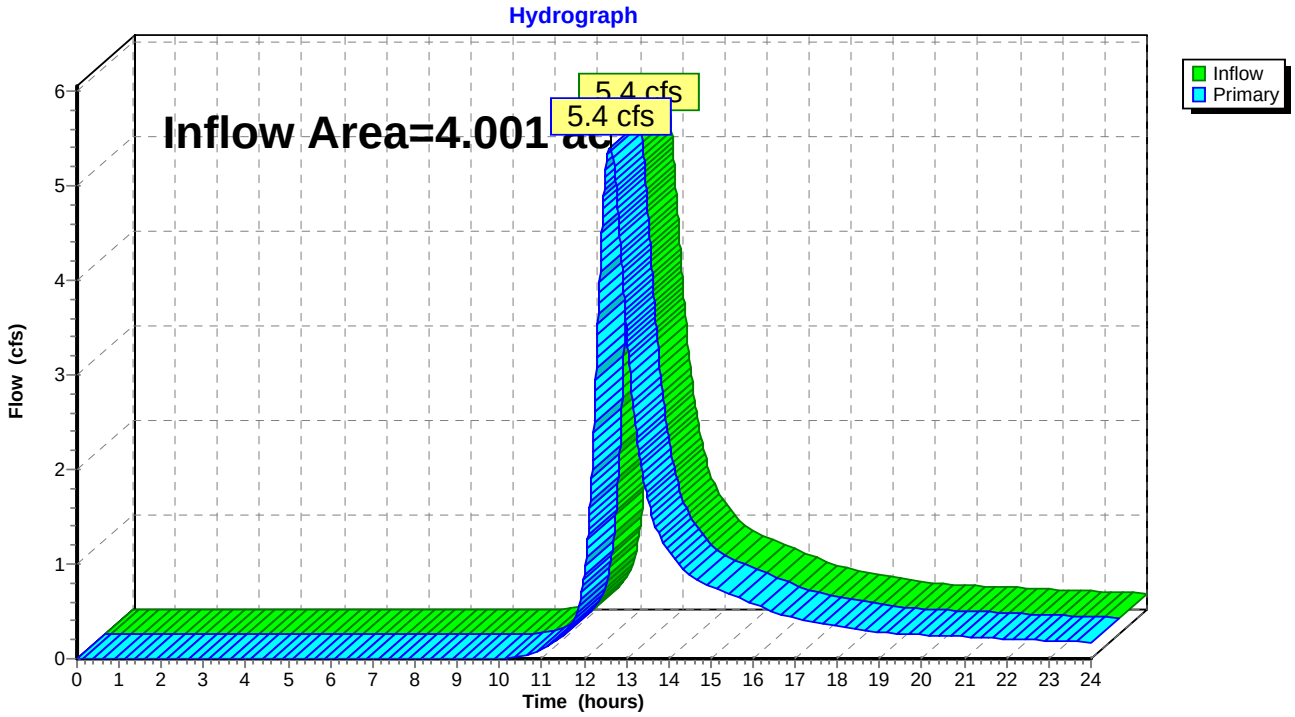


Summary for Link 4L: Wooded Area to East

Inflow Area = 4.001 ac, 0.46% Impervious, Inflow Depth > 2.45" for 50-Year event
Inflow = 5.4 cfs @ 12.63 hrs, Volume= 0.818 af
Primary = 5.4 cfs @ 12.63 hrs, Volume= 0.818 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Link 4L: Wooded Area to East

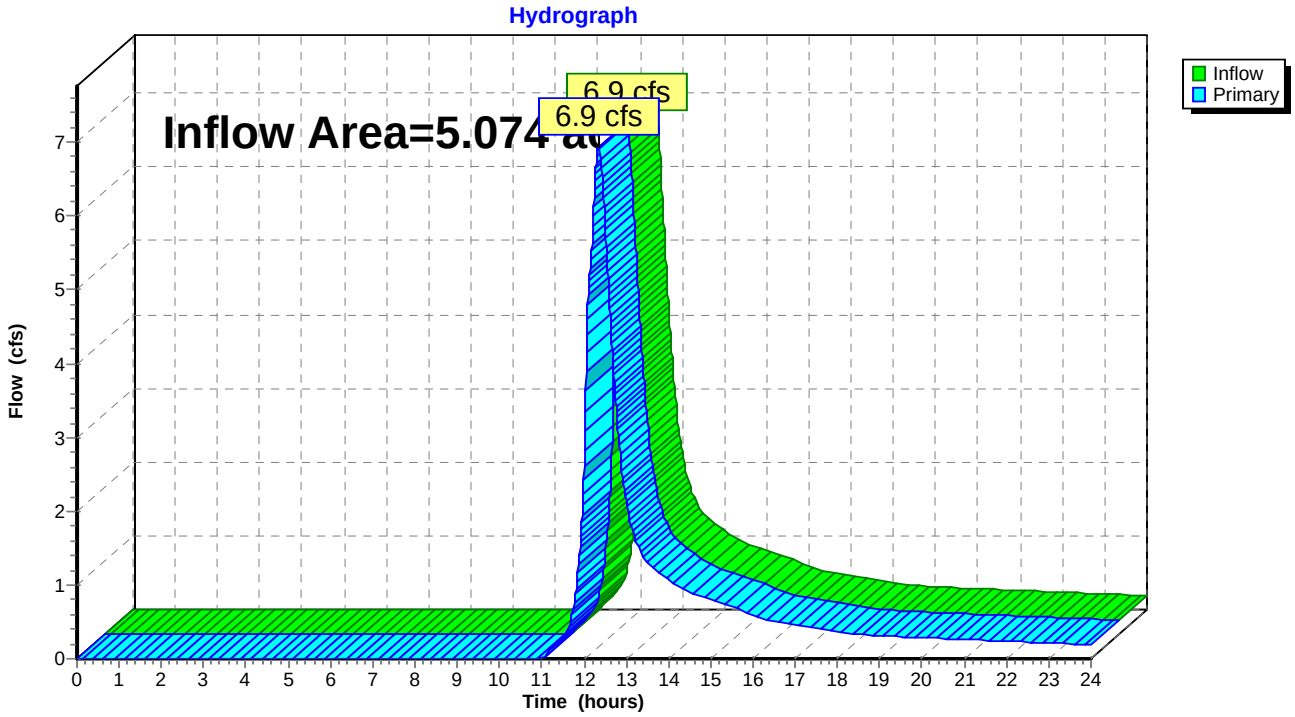


Summary for Link 6L: To Reservoir - North

Inflow Area = 5.074 ac, 0.00% Impervious, Inflow Depth > 2.10" for 50-Year event
Inflow = 6.9 cfs @ 12.35 hrs, Volume= 0.890 af
Primary = 6.9 cfs @ 12.35 hrs, Volume= 0.890 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Link 6L: To Reservoir - North

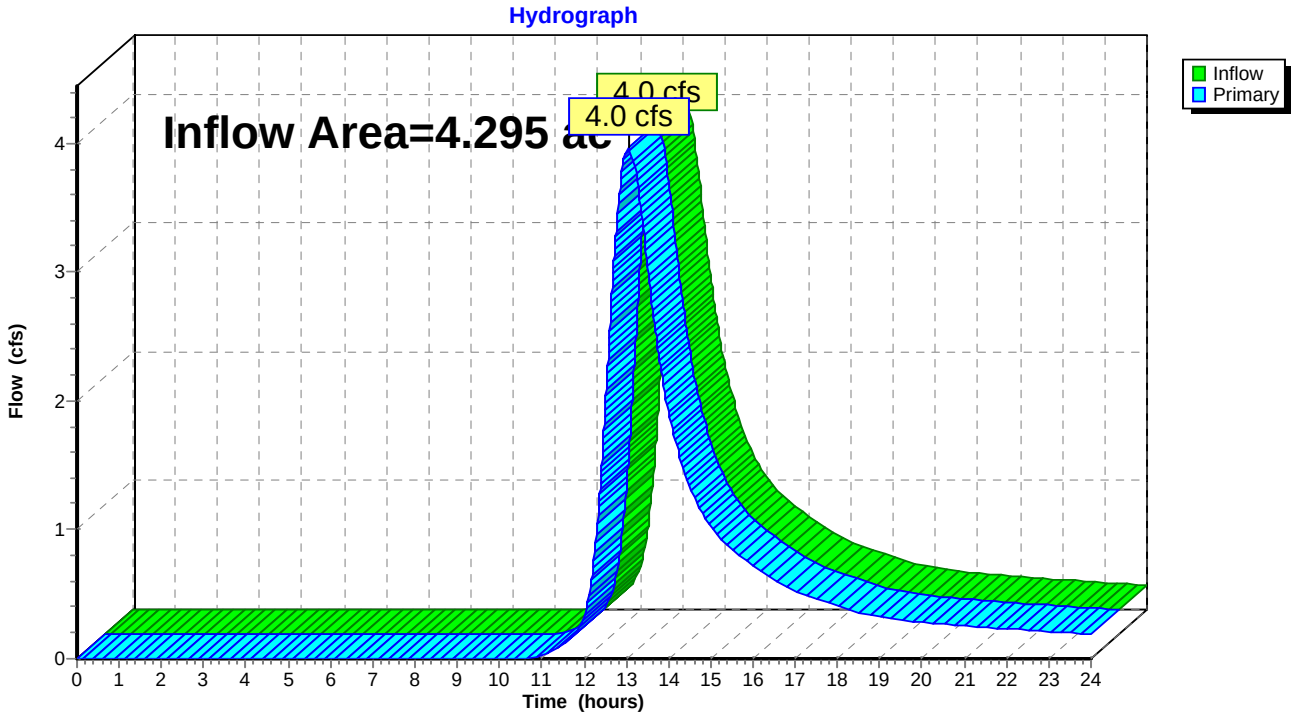


Summary for Link 7L: Off-Site Flow to South

Inflow Area = 4.295 ac, 0.22% Impervious, Inflow Depth > 2.34" for 50-Year event
Inflow = 4.0 cfs @ 13.08 hrs, Volume= 0.838 af
Primary = 4.0 cfs @ 13.08 hrs, Volume= 0.838 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Link 7L: Off-Site Flow to South

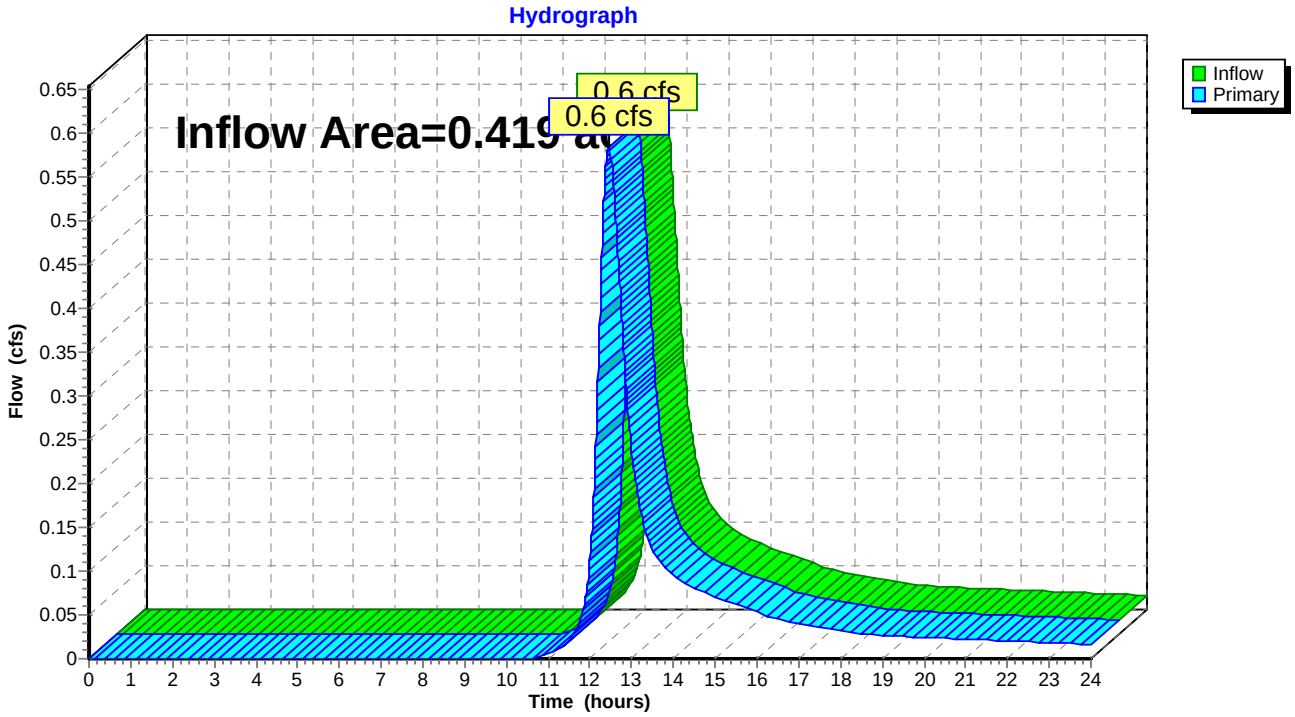


Summary for Link 8L: Off-Site Flow to East

Inflow Area = 0.419 ac, 0.01% Impervious, Inflow Depth > 2.19" for 50-Year event
Inflow = 0.6 cfs @ 12.46 hrs, Volume= 0.077 af
Primary = 0.6 cfs @ 12.46 hrs, Volume= 0.077 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Link 8L: Off-Site Flow to East



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

Subcatchment 1S-A: Area 1 - North - Runoff Area=1.300 ac 0.00% Impervious Runoff Depth>2.38"
Flow Length=30' Slope=0.0770 '/' Tc=6.0 min CN=57 Runoff=3.5 cfs 0.257 af

Subcatchment 1S-B: Area 1 - North - Solar Runoff Area=164,396 sf 0.00% Impervious Runoff Depth>2.76"
Flow Length=562' Tc=24.8 min CN=61 Runoff=7.4 cfs 0.867 af

Subcatchment 2S-A: Area 1 - West - Runoff Area=1.000 ac 0.00% Impervious Runoff Depth>2.77"
Flow Length=30' Slope=0.0350 '/' Tc=6.0 min CN=61 Runoff=3.2 cfs 0.231 af

Subcatchment 2S-B: Area 1 - West Runoff Area=192,013 sf 0.41% Impervious Runoff Depth>2.86"
Flow Length=412' Tc=24.8 min CN=62 Runoff=8.9 cfs 1.050 af

Subcatchment 3S: Area 1 - East Runoff Area=174,284 sf 0.46% Impervious Runoff Depth>3.05"
Flow Length=831' Tc=42.6 min CN=64 Runoff=6.8 cfs 1.016 af

Subcatchment 4S: Area 2 - West Runoff Area=187,084 sf 0.22% Impervious Runoff Depth>2.92"
Flow Length=664' Tc=75.0 min CN=63 Runoff=5.0 cfs 1.045 af

Subcatchment 5S: Area 2 - East Runoff Area=18,251 sf 0.01% Impervious Runoff Depth>2.75"
Flow Length=214' Tc=30.4 min CN=61 Runoff=0.7 cfs 0.096 af

Reach 3R: Overflow Swale Avg. Flow Depth=0.26' Max Vel=2.66 fps Inflow=7.4 cfs 0.866 af
n=0.035 L=30.0' S=0.0267 '/' Capacity=23.0 cfs Outflow=7.3 cfs 0.865 af

Reach 4R: Overflow Swale Avg. Flow Depth=0.20' Max Vel=4.30 fps Inflow=8.9 cfs 1.048 af
n=0.035 L=30.0' S=0.0973 '/' Capacity=43.9 cfs Outflow=8.9 cfs 1.048 af

Pond 2P: BioFiltration Cell Peak Elev=23.29' Storage=0.004 af Inflow=7.4 cfs 0.867 af
Outflow=7.4 cfs 0.866 af

Pond 5P: BioFiltration Cell Peak Elev=25.52' Storage=0.004 af Inflow=8.9 cfs 1.050 af
Outflow=8.9 cfs 1.048 af

Link 3L: To Reservoir - South Inflow=10.3 cfs 1.279 af
Primary=10.3 cfs 1.279 af

Link 4L: Wooded Area to East Inflow=6.8 cfs 1.016 af
Primary=6.8 cfs 1.016 af

Link 6L: To Reservoir - North Inflow=8.9 cfs 1.123 af
Primary=8.9 cfs 1.123 af

Link 7L: Off-Site Flow to South Inflow=5.0 cfs 1.045 af
Primary=5.0 cfs 1.045 af

Link 8L: Off-Site Flow to East Inflow=0.7 cfs 0.096 af
Primary=0.7 cfs 0.096 af

Total Runoff Area = 19.197 ac Runoff Volume = 4.561 af Average Runoff Depth = 2.85"
99.76% Pervious = 19.151 ac 0.24% Impervious = 0.046 ac

Summary for Subcatchment 1S-A: Area 1 - North - DownGradient Swale

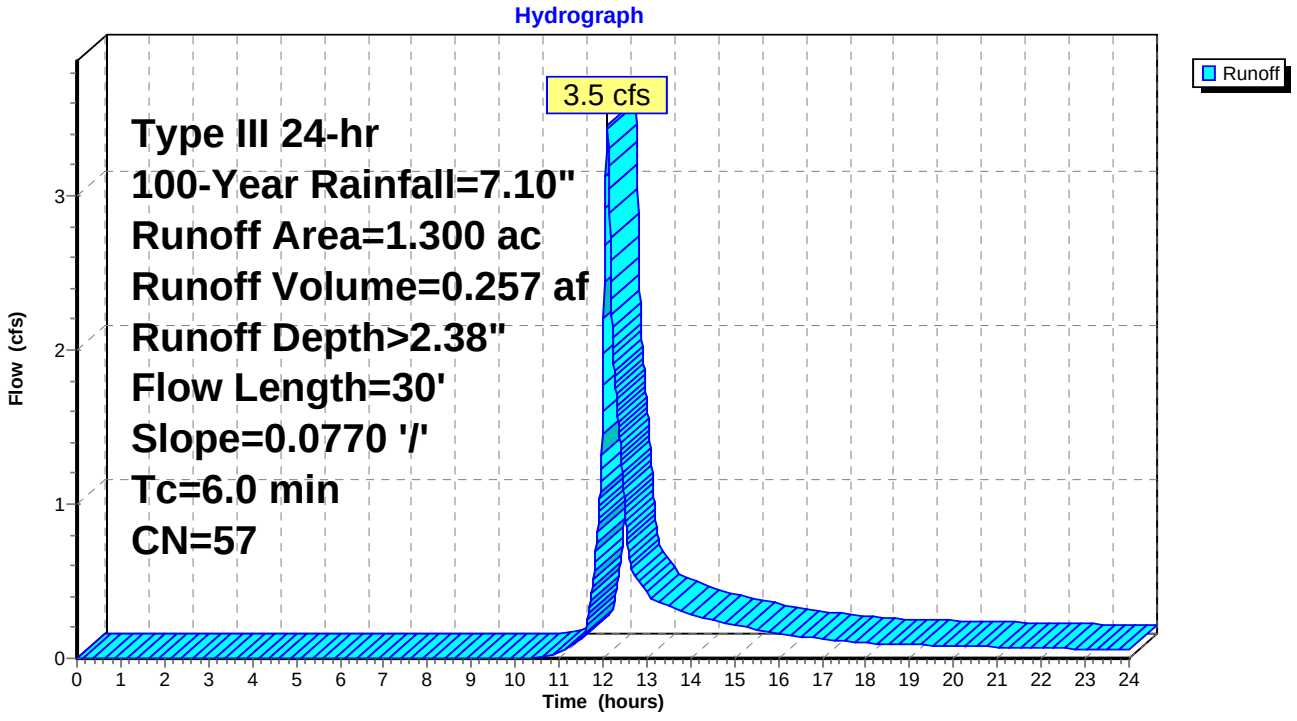
Runoff = 3.5 cfs @ 12.10 hrs, Volume= 0.257 af, Depth> 2.38"

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=7.10"

Area (ac)	CN	Description
0.850	55	Woods, Good, HSG B
0.450	61	>75% Grass cover, Good, HSG B
1.300	57	Weighted Average
1.300		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.6	30	0.0770	0.11		**Sheet Flow, Wooded Slope** Woods: Light underbrush n= 0.400 P2= 3.40"
4.6	30	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 1S-A: Area 1 - North - DownGradient Swale



Summary for Subcatchment 1S-B: Area 1 - North - Solar Arrays

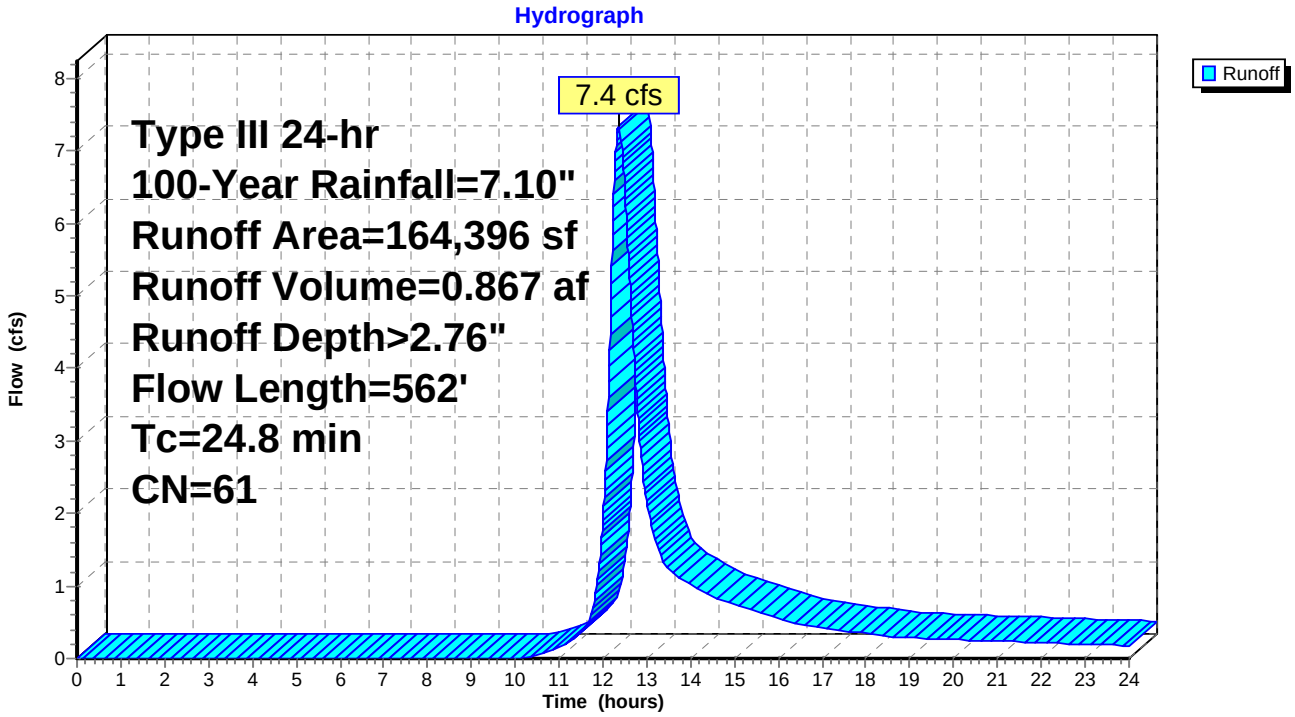
Runoff = 7.4 cfs @ 12.37 hrs, Volume= 0.867 af, Depth> 2.76"

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=7.10"

	Area (sf)	CN	Description
	23,392	60	Woods, Fair, HSG B
*	141,004	61	>75% Grass cover, Solar Array Area, HSG B
*	0	98	Solar Array Posts, HSG B
	164,396	61	Weighted Average
	164,396		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.5	100	0.0177	0.11		**Sheet Flow, Grass - Solar Array Area** Grass: Dense n= 0.240 P2= 3.40"
1.0	40	0.0085	0.65		**Shallow Concentrated Flow, Grass - Solar Array Area** Short Grass Pasture Kv= 7.0 fps
0.3	32	0.0625	1.75		**Shallow Concentrated Flow, Grass - Solar Array Area** Short Grass Pasture Kv= 7.0 fps
2.9	143	0.0140	0.83		**Shallow Concentrated Flow, Grass - Solar Array Area** Short Grass Pasture Kv= 7.0 fps
5.2	211	0.0095	0.68		**Shallow Concentrated Flow, Grass - Solar Array Area** Short Grass Pasture Kv= 7.0 fps
0.4	31	0.0323	1.26		**Shallow Concentrated Flow, Grass - Solar Array Area** Short Grass Pasture Kv= 7.0 fps
0.5	5	0.2000	0.17		**Sheet Flow, To swale (Flow disrupted by stone level spreader)** Grass: Dense n= 0.240 P2= 3.40"
24.8	562	Total			

Subcatchment 1S-B: Area 1 - North - Solar Arrays



Summary for Subcatchment 2S-A: Area 1 - West - DownGradient Swale

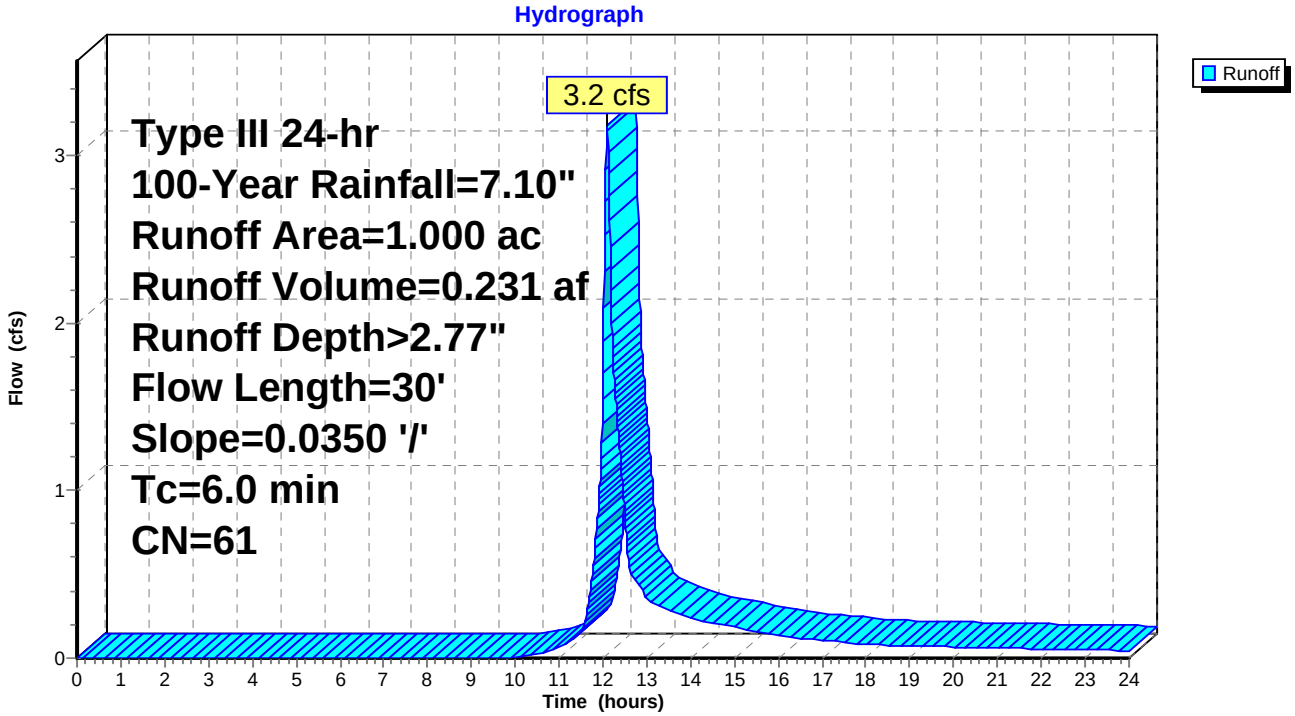
Runoff = 3.2 cfs @ 12.09 hrs, Volume= 0.231 af, Depth> 2.77"

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=7.10"

Area (ac)	CN	Description
1.000	61	>75% Grass cover, Good, HSG B
1.000		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.2	30	0.0350	0.12		**Sheet Flow, Grass Slope** Grass: Dense n= 0.240 P2= 3.40"
4.2	30	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 2S-A: Area 1 - West - DownGradient Swale



Summary for Subcatchment 2S-B: Area 1 - West

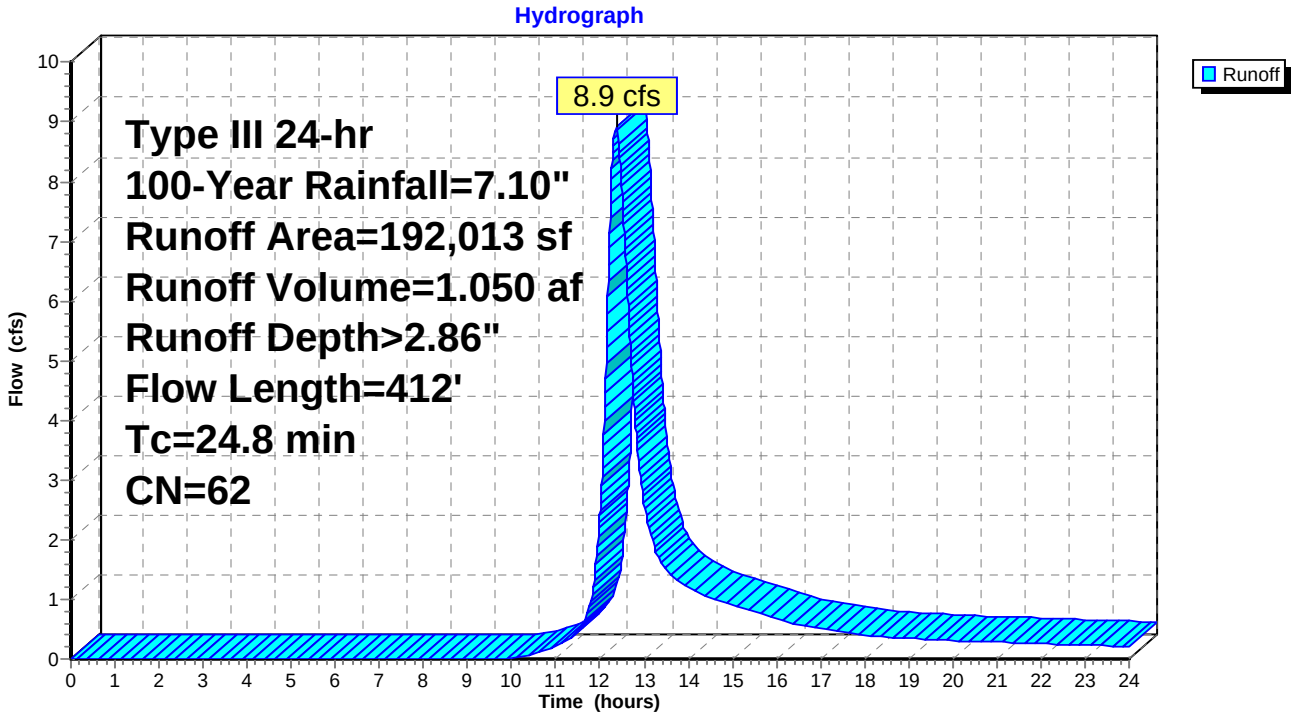
Runoff = 8.9 cfs @ 12.37 hrs, Volume= 1.050 af, Depth> 2.86"

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=7.10"

	Area (sf)	CN	Description
*	182,691	61	>75% Grass cover, Solar Array Area, HSG B
	8,538	85	Gravel roads, HSG B
*	0	98	Solar Array Racking Posts, HSG B
*	784	98	Concrete Equipment Pad, HSG B
	192,013	62	Weighted Average
	191,229		99.59% Pervious Area
	784		0.41% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.0	100	0.0120	0.10		**Sheet Flow, Grass - Solar Array Area** Grass: Dense n= 0.240 P2= 3.40"
7.3	307	0.0099	0.70		**Shallow Concentrated Flow, Grass - Solar Array Area** Short Grass Pasture Kv= 7.0 fps
0.5	5	0.2000	0.17		**Sheet Flow, Swale Slope (flow disrupted by stone level spreade** Grass: Dense n= 0.240 P2= 3.40"
24.8	412	Total			

Subcatchment 2S-B: Area 1 - West



Summary for Subcatchment 3S: Area 1 - East

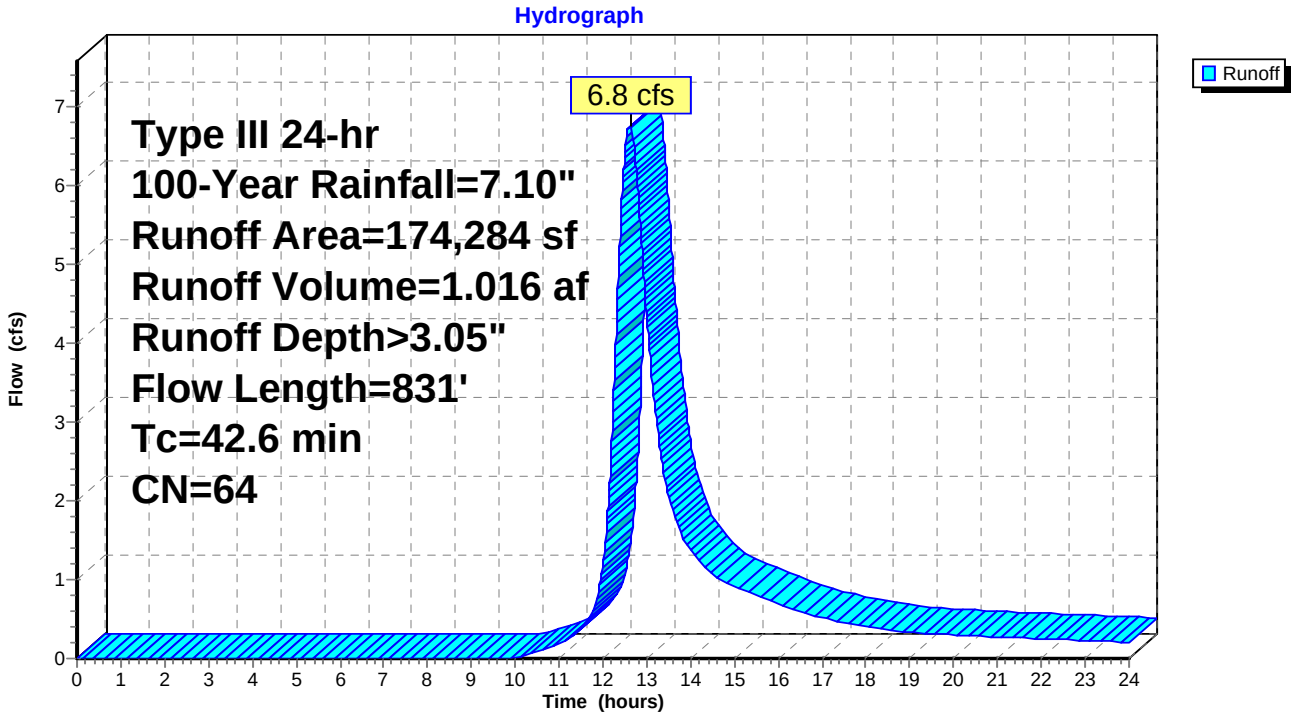
Runoff = 6.8 cfs @ 12.63 hrs, Volume= 1.016 af, Depth> 3.05"

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=7.10"

	Area (sf)	CN	Description
	19,602	85	Gravel roads, HSG B
*	153,878	61	>75% Grass cover, Solar Array Area, HSG B
*	4	98	Solar Array Racking Posts, HSG B
*	800	98	Concrete Equipment Pads, HSG B
	174,284	64	Weighted Average
	173,480		99.54% Pervious Area
	804		0.46% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
19.1	100	0.0090	0.09		**Sheet Flow, Grass - Solar Array Area** Grass: Dense n= 0.240 P2= 3.40"
7.1	174	0.0034	0.41		**Shallow Concentrated Flow, Grass - Solar Array Area** Short Grass Pasture Kv= 7.0 fps
16.3	526	0.0059	0.54		**Shallow Concentrated Flow, Grass** Short Grass Pasture Kv= 7.0 fps
0.1	31	0.0742	4.39		**Shallow Concentrated Flow, Grass/Gravel** Unpaved Kv= 16.1 fps
42.6	831	Total			

Subcatchment 3S: Area 1 - East



Summary for Subcatchment 4S: Area 2 - West

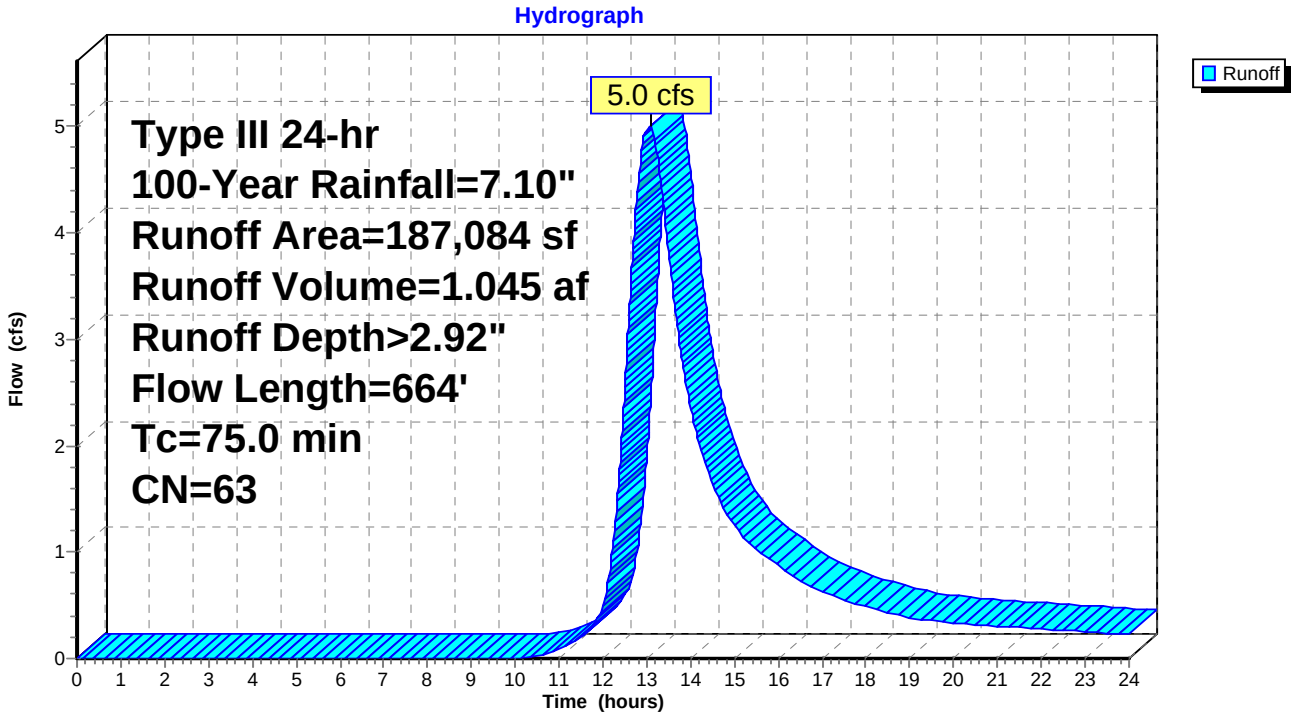
Runoff = 5.0 cfs @ 13.08 hrs, Volume= 1.045 af, Depth> 2.92"

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=7.10"

	Area (sf)	CN	Description
	10,060	60	Woods, Fair, HSG B
*	161,719	61	>75% Grass cover, Solar Array Area, HSG B
	14,898	85	Gravel roads, HSG B
*	7	98	Solar Array Racking Posts, HSG B
*	400	98	Concrete Equipment Pad, HSG B
	187,084	63	Weighted Average
	186,677		99.78% Pervious Area
	407		0.22% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
20.0	100	0.0080	0.08		**Sheet Flow, Grass - Solar Array Area** Grass: Dense n= 0.240 P2= 3.40"
1.3	86	0.0233	1.07		**Shallow Concentrated Flow, Grass - Solar Array Area** Short Grass Pasture Kv= 7.0 fps
7.5	235	0.0055	0.52		**Shallow Concentrated Flow, Grass - Solar Array Area** Short Grass Pasture Kv= 7.0 fps
13.3	177	0.0010	0.22		**Shallow Concentrated Flow, Grass - Solar Array Area** Short Grass Pasture Kv= 7.0 fps
32.9	66	0.0010	0.03		**Sheet Flow, Grass (Flow disrupted by stone check dam)** Grass: Dense n= 0.240 P2= 3.40"
75.0	664	Total			

Subcatchment 4S: Area 2 - West



Summary for Subcatchment 5S: Area 2 - East

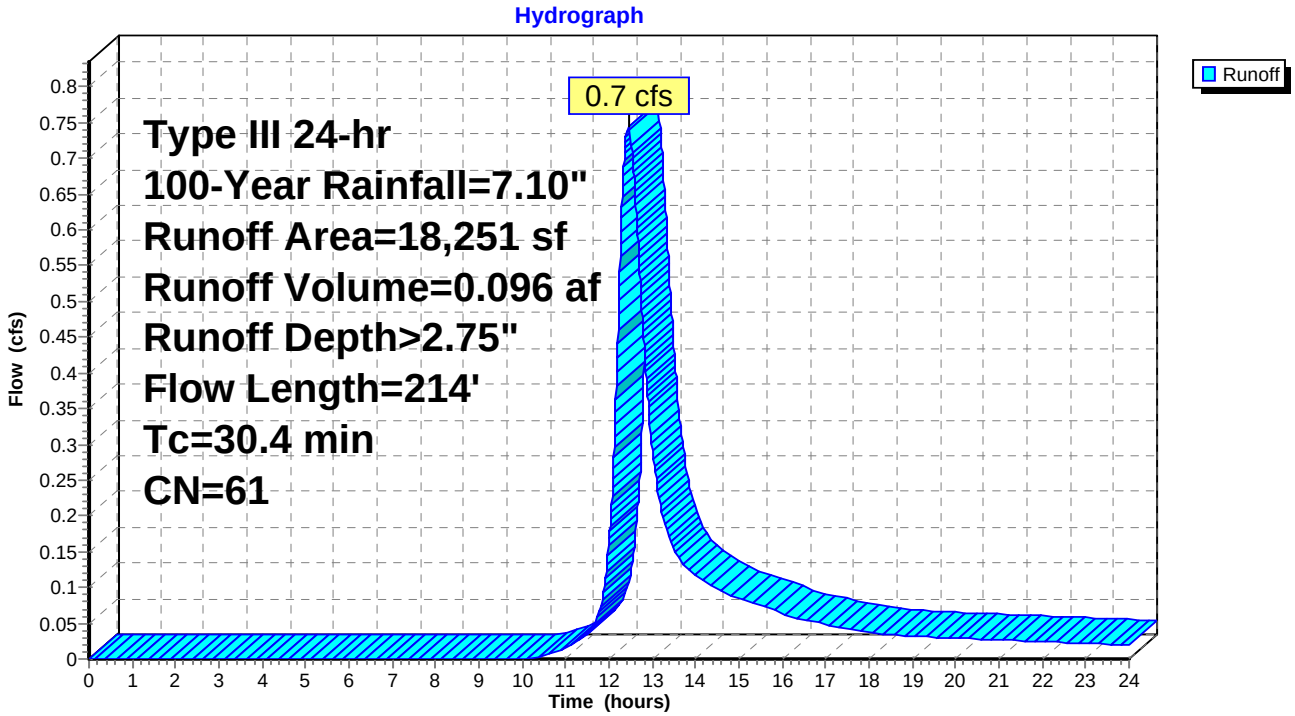
Runoff = 0.7 cfs @ 12.46 hrs, Volume= 0.096 af, Depth> 2.75"

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=7.10"

	Area (sf)	CN	Description
*	18,250	61	>75% Grass cover, Solar Array Area, HSG B
*	1	98	Solar Array Racking Posts, HSG B
	18,251	61	Weighted Average
	18,250		99.99% Pervious Area
	1		0.01% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.2	58	0.0034	0.05		**Sheet Flow, Grass - Solar Array Area** Grass: Dense n= 0.240 P2= 3.40"
8.5	42	0.0119	0.08		**Sheet Flow, Grass - Solar Array Area** Grass: Dense n= 0.240 P2= 3.40"
2.8	86	0.0105	0.51		**Shallow Concentrated Flow, Grass - Solar Array Area** Woodland Kv= 5.0 fps
0.9	28	0.0050	0.49		**Shallow Concentrated Flow, Grass** Short Grass Pasture Kv= 7.0 fps
30.4	214	Total			

Subcatchment 5S: Area 2 - East



Summary for Reach 3R: Overflow Swale

Inflow Area = 3.774 ac, 0.00% Impervious, Inflow Depth > 2.75" for 100-Year event
Inflow = 7.4 cfs @ 12.37 hrs, Volume= 0.866 af
Outflow = 7.3 cfs @ 12.37 hrs, Volume= 0.865 af, Atten= 0%, Lag= 0.1 min

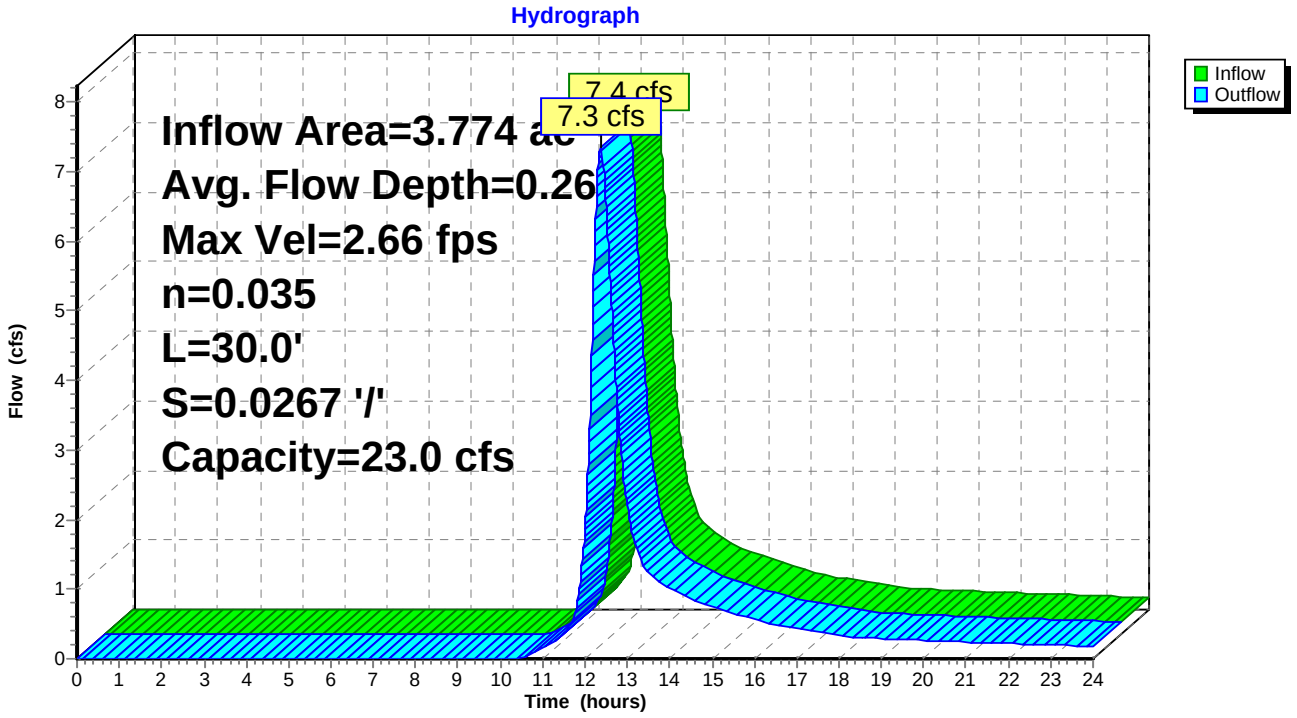
Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 2
Max. Velocity= 2.66 fps, Min. Travel Time= 0.2 min
Avg. Velocity = 0.97 fps, Avg. Travel Time= 0.5 min

Peak Storage= 83 cf @ 12.37 hrs
Average Depth at Peak Storage= 0.26'
Bank-Full Depth= 0.50' Flow Area= 5.8 sf, Capacity= 23.0 cfs

10.00' x 0.50' deep channel, n= 0.035 Earth, dense weeds
Side Slope Z-value= 3.0 '/' Top Width= 13.00'
Length= 30.0' Slope= 0.0267 '/'
Inlet Invert= 22.80', Outlet Invert= 22.00'

‡

Reach 3R: Overflow Swale



Summary for Reach 4R: Overflow Swale

Inflow Area = 4.408 ac, 0.41% Impervious, Inflow Depth > 2.85" for 100-Year event
Inflow = 8.9 cfs @ 12.37 hrs, Volume= 1.048 af
Outflow = 8.9 cfs @ 12.37 hrs, Volume= 1.048 af, Atten= 0%, Lag= 0.0 min

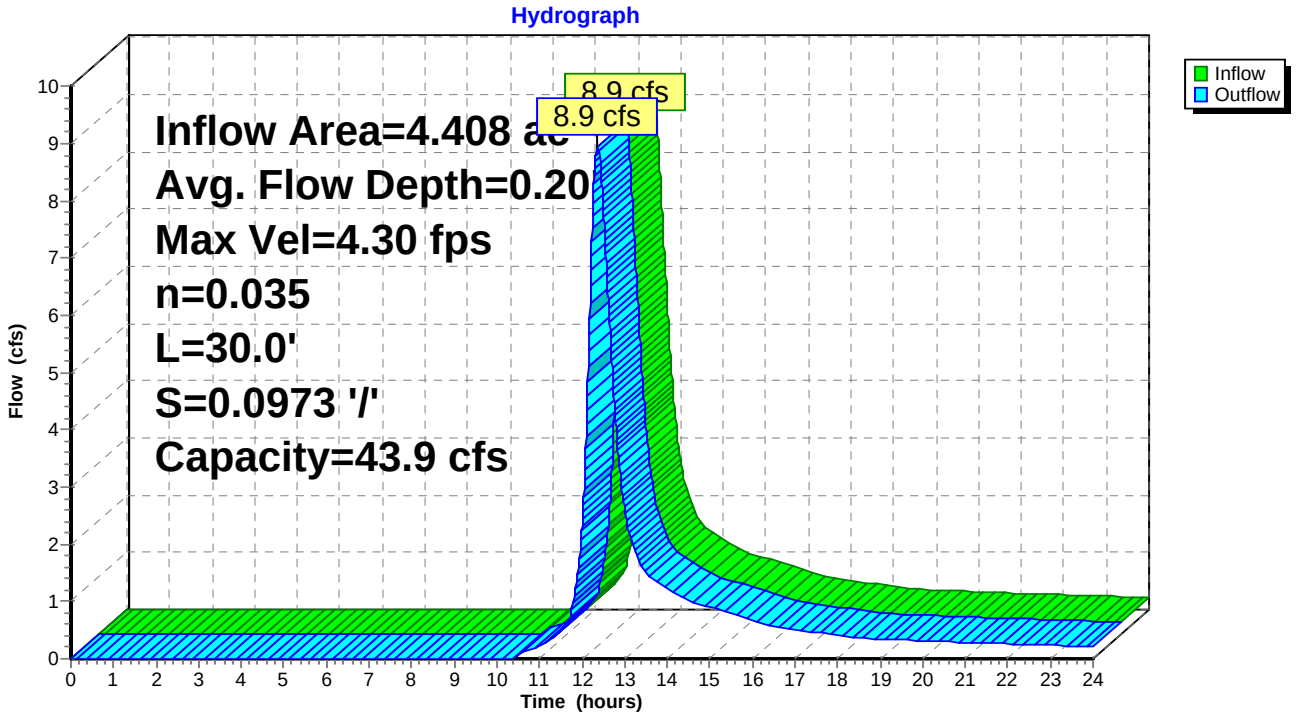
Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 2
Max. Velocity= 4.30 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 1.55 fps, Avg. Travel Time= 0.3 min

Peak Storage= 62 cf @ 12.37 hrs
Average Depth at Peak Storage= 0.20'
Bank-Full Depth= 0.50' Flow Area= 5.8 sf, Capacity= 43.9 cfs

10.00' x 0.50' deep channel, n= 0.035 Earth, dense weeds
Side Slope Z-value= 3.0 '/' Top Width= 13.00'
Length= 30.0' Slope= 0.0973 '/'
Inlet Invert= 25.00', Outlet Invert= 22.08'

‡

Reach 4R: Overflow Swale



Summary for Pond 2P: BioFiltration Cell

Inflow Area = 3.774 ac, 0.00% Impervious, Inflow Depth > 2.76" for 100-Year event
Inflow = 7.4 cfs @ 12.37 hrs, Volume= 0.867 af
Outflow = 7.4 cfs @ 12.37 hrs, Volume= 0.866 af, Atten= 0%, Lag= 0.1 min
Primary = 7.4 cfs @ 12.37 hrs, Volume= 0.866 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 23.29' @ 12.37 hrs Surf.Area= 0.006 ac Storage= 0.004 af

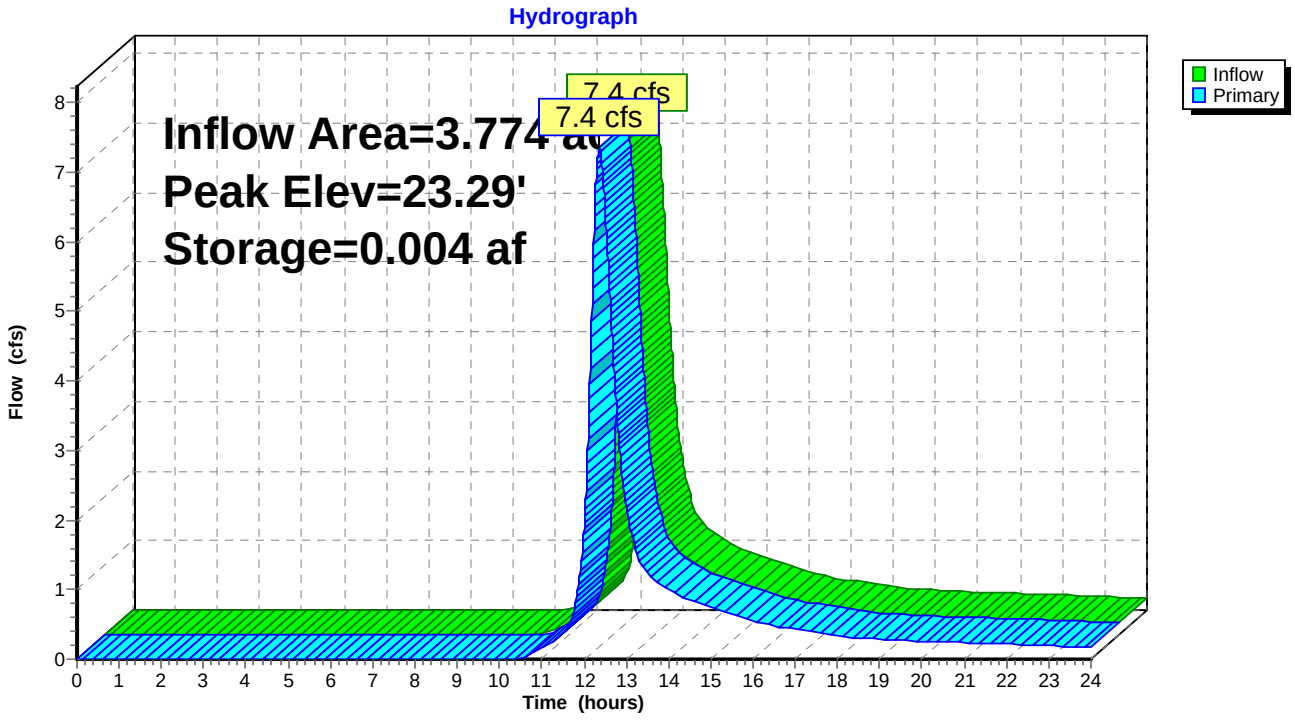
Plug-Flow detention time= 1.7 min calculated for 0.865 af (100% of inflow)
Center-of-Mass det. time= 0.6 min (864.8 - 864.2)

Volume	Invert	Avail.Storage	Storage Description
#1	22.30'	0.004 af	**4.00'W x 20.00'L x 1.00'H Filtration Cell Z=3.0**

Device	Routing	Invert	Outlet Devices
#1	Primary	22.80'	**10.0' long x 5.0' breadth Vegetated Swale** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=7.4 cfs @ 12.37 hrs HW=23.29' TW=23.06' (Dynamic Tailwater)
└─**1=Vegetated Swale** (Weir Controls 7.4 cfs @ 1.50 fps)

Pond 2P: BioFiltration Cell



Summary for Pond 5P: BioFiltration Cell

Inflow Area = 4.408 ac, 0.41% Impervious, Inflow Depth > 2.86" for 100-Year event
Inflow = 8.9 cfs @ 12.37 hrs, Volume= 1.050 af
Outflow = 8.9 cfs @ 12.37 hrs, Volume= 1.048 af, Atten= 0%, Lag= 0.1 min
Primary = 8.9 cfs @ 12.37 hrs, Volume= 1.048 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 25.52' @ 12.37 hrs Surf.Area= 0.006 ac Storage= 0.004 af

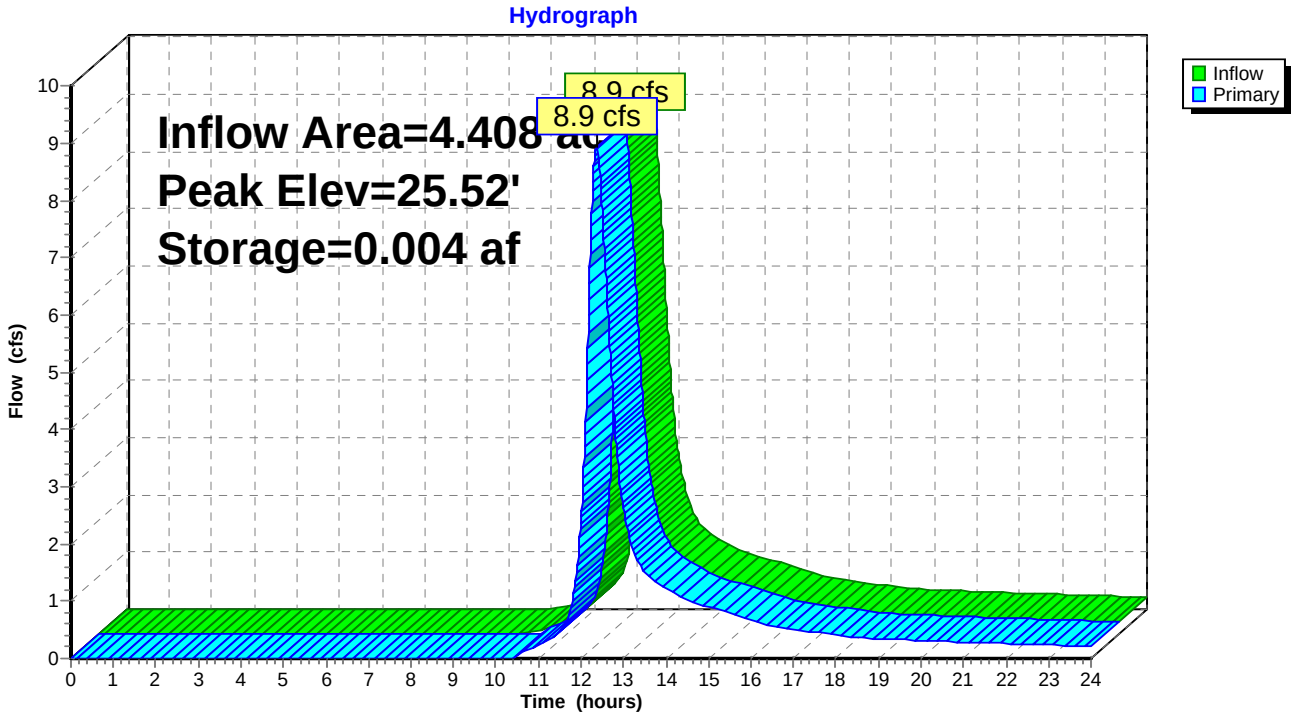
Plug-Flow detention time= 1.4 min calculated for 1.048 af (100% of inflow)
Center-of-Mass det. time= 0.6 min (862.5 - 861.9)

Volume	Invert	Avail.Storage	Storage Description
#1	24.50'	0.004 af	**4.00'W x 20.00'L x 1.10'H Filtration Cell Z=3.0**

Device	Routing	Invert	Outlet Devices
#1	Primary	25.00'	**10.0' long x 5.0' breadth Vegetated Swale** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88
#2	Primary	25.50'	**20.0' long x 5.0' breadth Swale Overtopping** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=8.9 cfs @ 12.37 hrs HW=25.52' TW=25.20' (Dynamic Tailwater)
└─**1=Vegetated Swale** (Weir Controls 8.8 cfs @ 1.70 fps)
└─**2=Swale Overtopping** (Weir Controls 0.1 cfs @ 0.32 fps)

Pond 5P: BioFiltration Cell

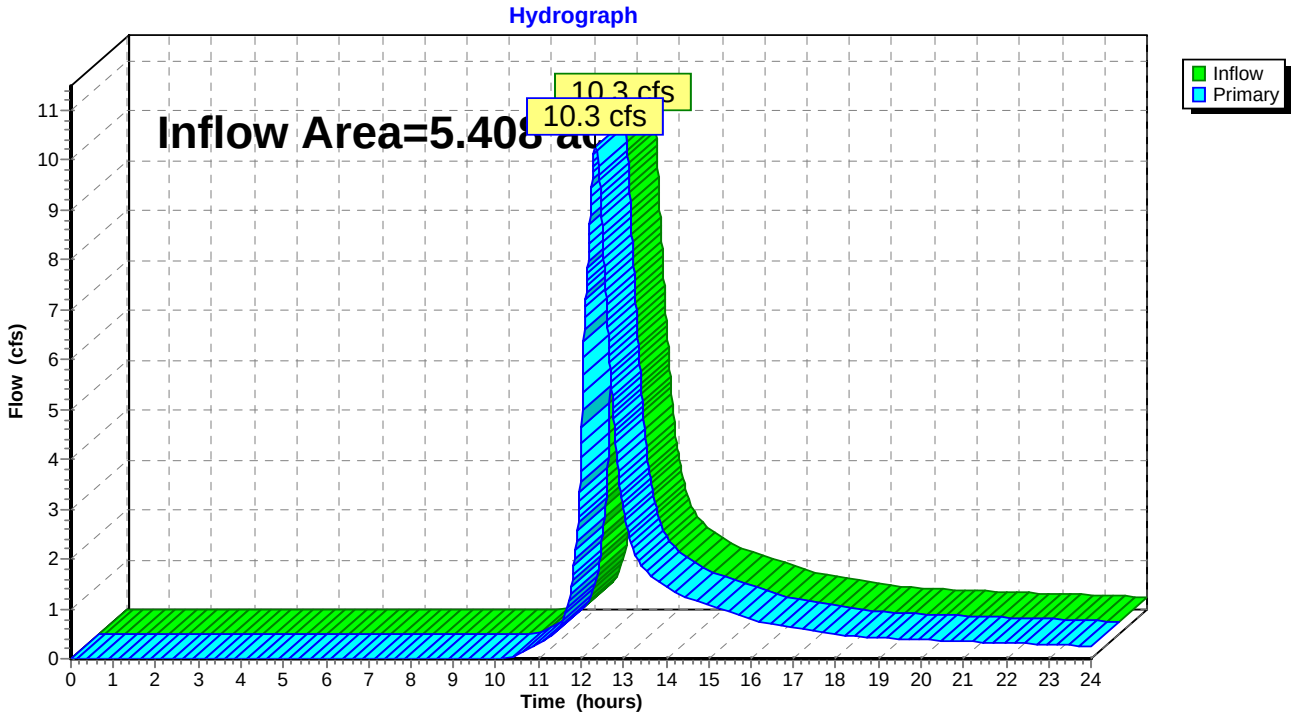


Summary for Link 3L: To Reservoir - South

Inflow Area = 5.408 ac, 0.33% Impervious, Inflow Depth > 2.84" for 100-Year event
Inflow = 10.3 cfs @ 12.34 hrs, Volume= 1.279 af
Primary = 10.3 cfs @ 12.34 hrs, Volume= 1.279 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Link 3L: To Reservoir - South

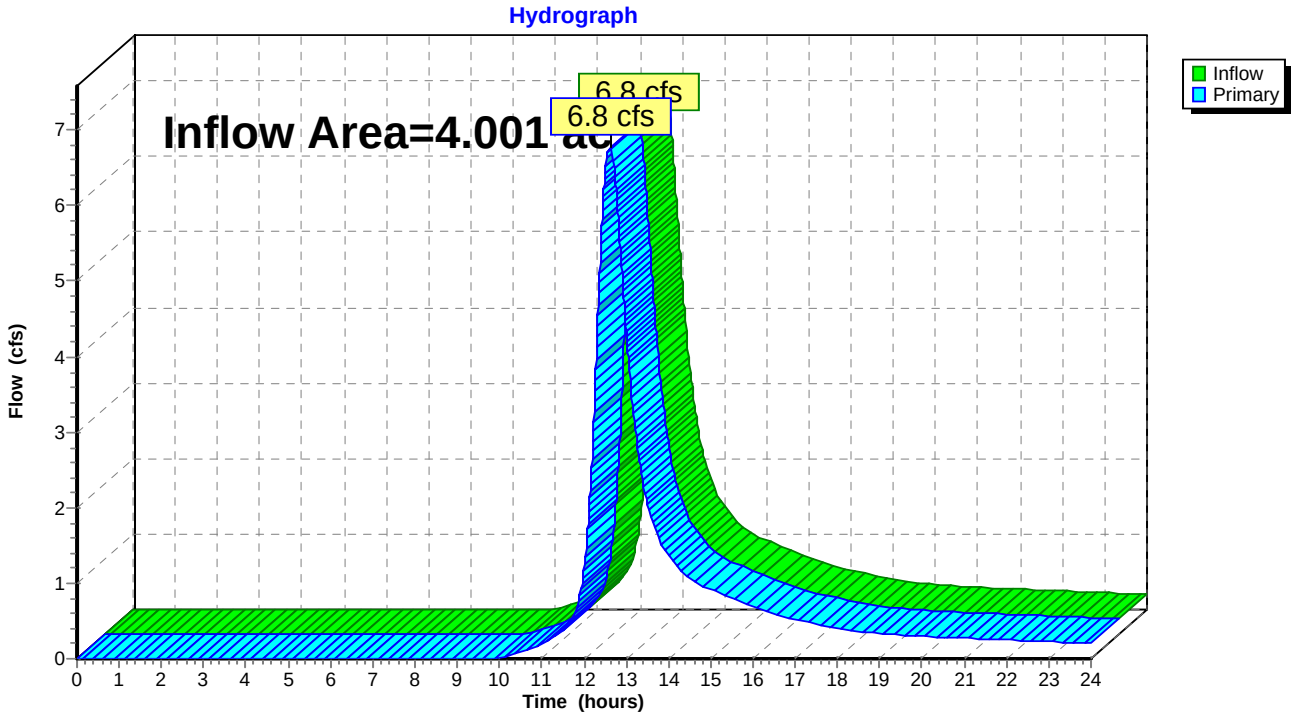


Summary for Link 4L: Wooded Area to East

Inflow Area = 4.001 ac, 0.46% Impervious, Inflow Depth > 3.05" for 100-Year event
Inflow = 6.8 cfs @ 12.63 hrs, Volume= 1.016 af
Primary = 6.8 cfs @ 12.63 hrs, Volume= 1.016 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Link 4L: Wooded Area to East

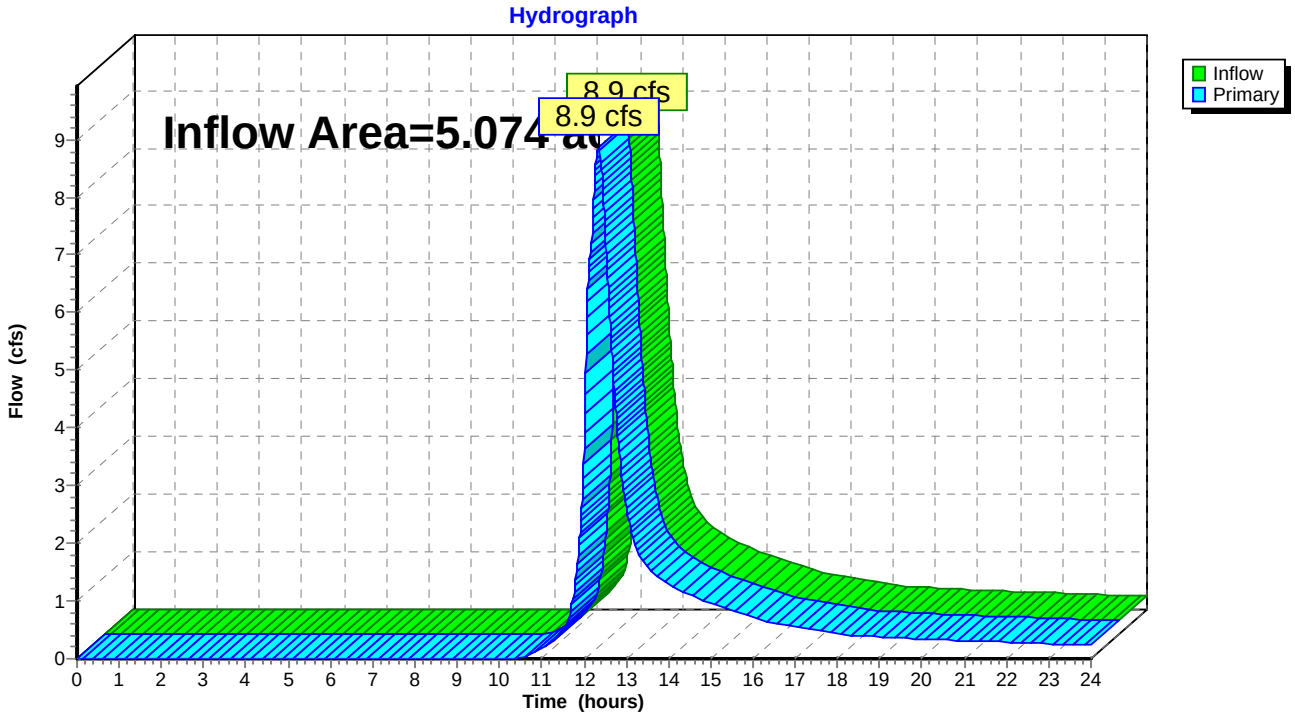


Summary for Link 6L: To Reservoir - North

Inflow Area = 5.074 ac, 0.00% Impervious, Inflow Depth > 2.66" for 100-Year event
Inflow = 8.9 cfs @ 12.33 hrs, Volume= 1.123 af
Primary = 8.9 cfs @ 12.33 hrs, Volume= 1.123 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Link 6L: To Reservoir - North

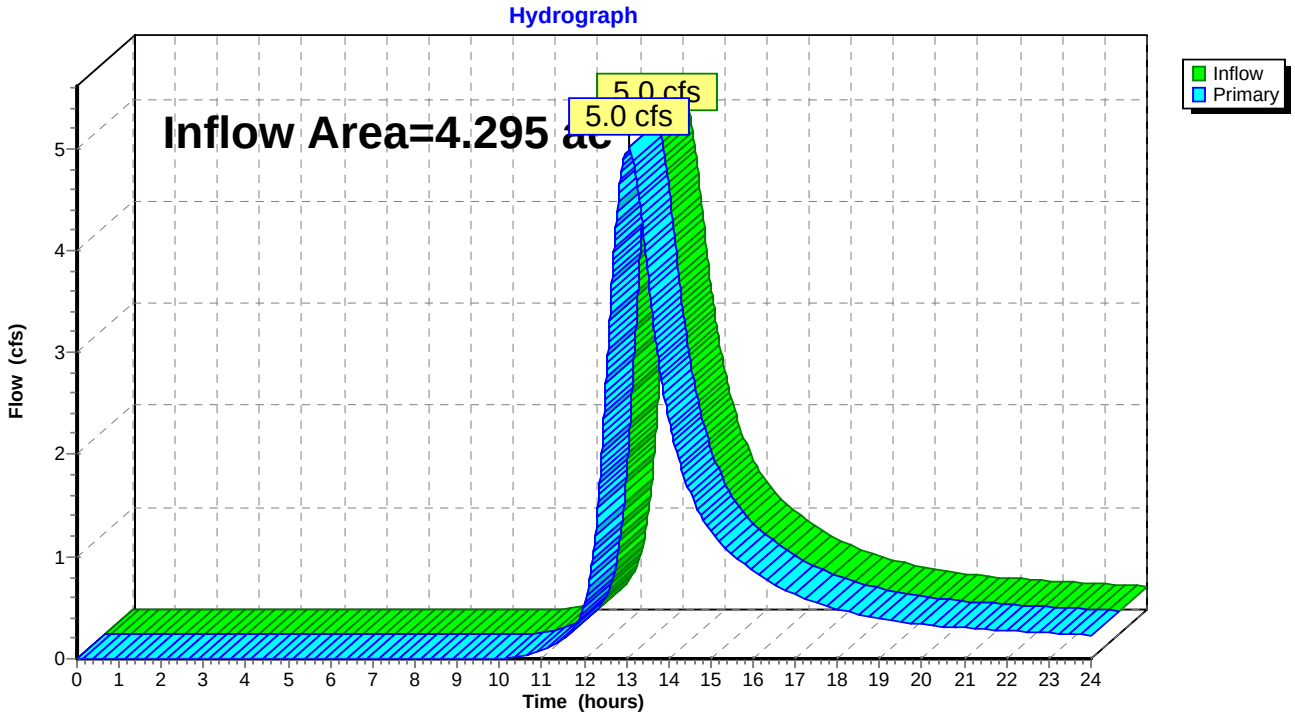


Summary for Link 7L: Off-Site Flow to South

Inflow Area = 4.295 ac, 0.22% Impervious, Inflow Depth > 2.92" for 100-Year event
Inflow = 5.0 cfs @ 13.08 hrs, Volume= 1.045 af
Primary = 5.0 cfs @ 13.08 hrs, Volume= 1.045 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Link 7L: Off-Site Flow to South

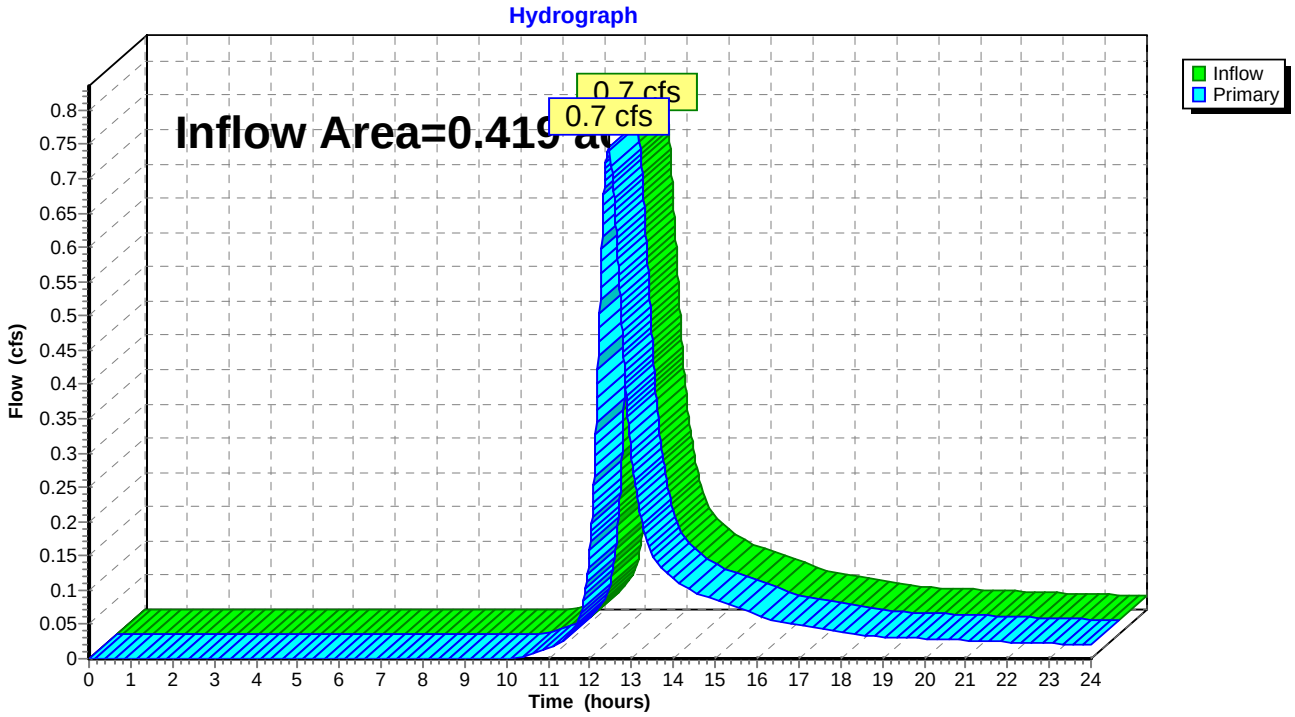


Summary for Link 8L: Off-Site Flow to East

Inflow Area = 0.419 ac, 0.01% Impervious, Inflow Depth > 2.75" for 100-Year event
Inflow = 0.7 cfs @ 12.46 hrs, Volume= 0.096 af
Primary = 0.7 cfs @ 12.46 hrs, Volume= 0.096 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Link 8L: Off-Site Flow to East



Attachment 3 – Notification Letter

GROTON UTILITIES

At Your Service

October 19, 2015

Mayor Marian Galbraith
City of Groton
295 Meridian Street
Groton, CT 06340

Dear Mayor Galbraith:

RE: Change of Use Permit Application – Groton Utilities' Water Filtration Plant

As required under Connecticut General Statutes (CGS) Section 25-32, I am informing you of Groton Utilities' (GU) filing of a State of Connecticut, Department of Public Health Change of Land Use permit application for the construction of a 4.05 megawatt photovoltaic energy system at the Groton Utilities' Water Filtration Plant located at 1240 Poquonnock Road. This change in use will allow for the installation of a Community Shared Solar garden that will supply Groton Utilities' customers with locally generated, clean, safe energy.

If you have any questions or require more information, please call me at 860-446-4091.

Sincerely,

Ronald A. Gaudet
Director of Utilities

295 Meridian Street
Groton, Connecticut 06340
T 860-446-4000 F 860-446-4098

UNITED STATES POSTAL SERVICE

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23 OCT '15

First-Class Mail
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USPS
Permit No. G-10

• Sender: Please print your name, address, and ZIP+4 in this box •

GROTON UTILITIES
295 MERIDIAN STREET

Admin Office

Attachment 4 – Wetland and Public Water Supply Protection Program

ALL-POINTS TECHNOLOGY CORPORATION

WETLAND AND PUBLIC WATER SUPPLY PROTECTION PROGRAM

Portions of the proposed Project are located in close proximity to wetlands and a public water supply reservoir. As a result, the following protective measures shall be followed to help avoid degradation of the nearby wetland and water systems.

It is of the utmost importance that the Contractor complies with the requirement for the installation of protective measures and the education of its employees and subcontractors performing work on the project site. These measures will also provide protection to a nearby wetland and water system. This protection program shall be implemented regardless of time of year the construction activities occur. All-Points Technology Corporation, P.C. ("APT") will serve as the Environmental Monitor for this project to ensure that wetland protection measures are implemented properly. The Contractor shall contact Dean Gustafson, Senior Environmental Scientist at APT, at least 5 business days prior to the pre-construction meeting. Mr. Gustafson can be reached by telephone at (860) 663-1697 ext. 201 or via email at dgustafson@allpointstech.com.

The wetland and public water supply protection program consists of several components: use of appropriate erosion control measures to control and contain erosion while avoiding/minimizing wildlife entanglement; periodic inspection and maintenance of isolation structures and erosion control measures; education of all contractors and sub-contractors prior to initiation of work on the site; protective measures; and, reporting.

1. **Erosion and Sedimentation Controls**

    a. Plastic netting used in a variety of erosion control products (i.e., erosion control blankets, fiber rolls [wattles], reinforced silt fence) has been found to entangle wildlife, including reptiles, amphibians, birds and small mammals. No permanent erosion control products or reinforced silt fence will be used on the project. Temporary Erosion control products will use either erosion control blankets and fiber rolls composed of processed fibers mechanically bound together to form a continuous matrix (net less) or netting composed of planar woven natural biodegradable fiber to avoid/minimize wildlife entanglement.

    b. Installation of erosion control measures shall be performed by the Contractor prior to any earthwork. The Environmental Monitor will inspect the work zone area prior to and following barrier installation to ensure erosion controls are properly installed.

    c. In addition to required daily inspection by the Contractor, the fencing will be inspected for tears or breeches in the fabric following installation periodically by the Environmental Monitor throughout the course of the construction project.

    d. The extent of the erosion controls will be as shown on the site plans. The Contractor shall have additional erosion control materials should field conditions warrant extending the fencing as directed by the Environmental Monitor.

    e. All silt fencing and other erosion control devices shall be removed within 30 days of completion of work and permanent stabilization of site soils. If fiber rolls/wattles, straw bales, or other natural material erosion control products are used, such devices will not be left in place to biodegrade and shall be promptly removed after soils are stable so as not to create a barrier to migrating wildlife. Seed from seeding of soils should not spread over fiber rolls/wattles as it makes them harder to remove once soils are stabilized by vegetation.

ALL-POINTS TECHNOLOGY CORPORATION, P.C.
☒ 3 SADDLEBROOK DRIVE · KILLINGWORTH, CT 06419 · PHONE 860-663-1697 · FAX 860-663-0935
☐ P.O. BOX 504 · 116 GRANDVIEW ROAD · CONWAY, NH 03818 · PHONE 603-496-5853 · FAX 603-447-2124

2. Contractor Education

a. Prior to work on site, the Contractor shall attend an educational session at the pre-construction meeting with the Environmental Monitor. This orientation and educational session will consist of an introductory meeting with the Environmental Monitor to understand the environmentally sensitive nature of the development site and the need to follow these protective measures.

3. Petroleum Materials Storage and Spill Prevention

a. Certain precautions are necessary to store petroleum materials, refuel and contain and properly clean up any inadvertent fuel or petroleum (i.e., oil, hydraulic fluid, etc.) spill due to the project's location in proximity to sensitive wetlands.

b. A spill containment kit consisting of a sufficient supply of absorbent pads and absorbent material will be maintained by the Contractor at the construction site throughout the duration of the project. In addition, a waste drum will be kept on site to contain any used absorbent pads/material for proper and timely disposal off site in accordance with applicable local, state and federal laws.

c. The following petroleum and hazardous materials storage and refueling restrictions and spill response procedures will be adhered to by the Contractor.

i. Petroleum and Hazardous Materials Storage and Refueling

1. Refueling of vehicles or machinery shall take place on an impervious pad with secondary containment designed to contain fuels as shown on Attachment 1.

2. Any fuel or hazardous materials that must be kept on site shall be stored on an impervious surface utilizing secondary containment as shown on Attachment 1.

ii. Initial Spill Response Procedures

1. Stop operations and shut off equipment.

2. Remove any sources of spark or flame.

3. Contain the source of the spill.

4. Determine the approximate volume of the spill.

5. Identify the location of natural flow paths to prevent the release of the spill to sensitive nearby waterways or wetlands.

6. Ensure that fellow workers are notified of the spill.

iii. Spill Clean Up & Containment

1. Obtain spill response materials from the on-site spill response kit. Place absorbent materials directly on the release area.

2. Limit the spread of the spill by placing absorbent materials around the perimeter of the spill.

3. Isolate and eliminate the spill source.

4. Contact appropriate local, state and/or federal agencies, as necessary.

5. Contact a disposal company to properly dispose of contaminated materials.

iv. Reporting

1. Complete an incident report.

2. Submit a completed incident report to Groton Utilities and other appropriate local, state and/or federal agencies, as necessary.

4. Herbicide and Pesticide Restrictions

a. No herbicide or pesticide usage is anticipated with the proposed solar facility.

5. Reporting

a. Any incidents of sediment release into the nearby wetland will be reported to the Connecticut Siting Council.

Attachment 5 – Tree Count Investigation & Replanting Assessment

TREE COUNT INVESTIGATION & REPLANTING ASSESSMENT

January 13, 2016

SolarCity Corporation
40 Walnut Street, Suite 301
Wesley, MA 02481

APT Project No.: CT443120

Re: Proposed Solar Facility Installation
1240 Poquonnock Road
Groton, Connecticut

All-Points Technology Corporation, P.C. ("APT") understands that a solar installation ("Project Area") is proposed by SolarCity Corporation ("SolarCity") at 1240 Poquonnock Road Groton, Connecticut ("Site" or "Subject Property"). At your request, Mathew Gustafson, a Connecticut registered Soil Scientist and trained Forester with APT conducted an inspection of the Subject Property on December 3, 2015 to determine the approximate number of trees to be cleared to construct the referenced project. The Project Area in totality includes approximately 13.5 acres of the Site, approximately 75% of which is comprised of previously disturbed land. A total of four (4) ± acres of woodlands will be removed to accommodate the Project. Note the total acreage of woodland to be removed includes those areas assessed as "open field" containing scattered individual trees (primarily focused in the northern portion of the Project Area).

In order to assess the approximate number of trees to be removed by the project a variable radius plot analysis was performed. For variable radius plot analyses, randomly selected points are established within the Project Area. Three points were selected at random distributed across the forested areas proposed for clearing. Plot points were taken in in the two distinct forest cover types (1 plot point for the Japanese Larch Stand, 2 plot points for the Eastern White Pine Stand). For each point, "In" trees were counted, species determined, and their diameter at breast height was measured and recorded. This information was then analyzed to determine approximate number of trees per acre within the two distinct forest cover types. In addition, individual trees were counted using remote sensing within open field areas. The results of the variable-radius analysis are provided below in Table 1. The approximate total number of trees to be removed by construction of the Facility is 356. In order to mitigate impacts from the proposed removal of these trees, SolarCity intends to replicate forested areas through tree plantings. Tree planting mitigation will occur in areas outside the Project Area on Town of Groton owned land to be determined by the Town. SolarCity will plant a total of 356 trees of various species to be determined based upon site specific conditions to replicate the trees to be removed.

Forest Cover Type	Estimated Trees Per Acre	Total Acres To Be Cleared	Total Estimated Trees Removed
Japanese Larch Stand	182	1.5±	273
Eastern White Pine Stand	53	1±	53
Individual Tree Count	N/A	1.5±	30
Total		4±	356

Following the tree removal assessment, Mr. Gustafson inspected other portions of the reservoir property in coordination with Groton Utilities to evaluate potential tree replanting areas to mitigate for the loss of woodland associated with the proposed solar project. Four areas located in close proximity to the reservoir located north of Interstate 95 were identified as suitable areas for tree replanting. In general, all four areas consist of previously cleared and disturbed areas mostly associated with previous sand and gravel removal operations. As indicated on the attached Reservoir Property Planting Plan, the four separate areas provide a total area of ±4.2 acres. Other areas noted on the map as "Future Tree Planting Area" were found to be currently unsuitable for tree replanting.

As previously noted, a loss of 356 trees will result from the clearing of 4 acres of woodland for the proposed solar project. Additional potential impact will result from a temporal loss of biomass (large trees being replaced with smaller trees). As such, a larger area of tree replanting is proposed (±4.2 ac.) with 450 trees recommended for replanting, accounting for a 15 percent mortality of planted trees. This tree replanting plan would equate to a tree spacing of approximately 20 feet on center. The proposed tree planting plan will result in a benefit to the existing water system due to the greater number of trees and larger planting area that adequately mitigates for the proposed woodland loss. A variety of native evergreen tree species including Eastern white pine (*Pinus strobus*), Eastern red cedar (*Juniperus virginiana*) and pitch pine (*Pinus rigida*) are proposed to be planted. A variety of native oak trees were also considered; however, concern over deer browse eliminated them from consideration.

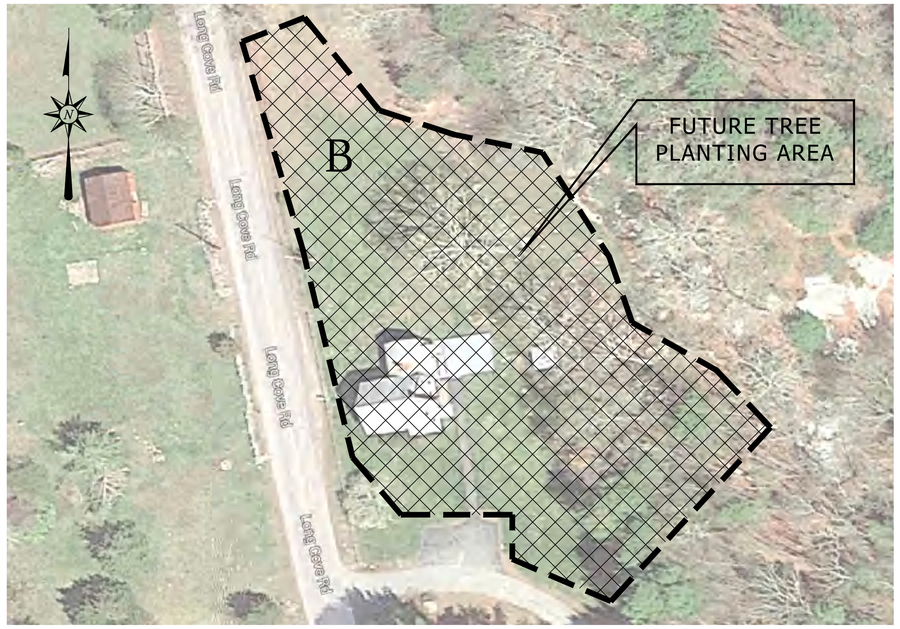
If you have any questions regarding the above-referenced information, please feel free to contact me at (860) 663-1697 ext. 202 or at mgustafson@allpointstech.com.

Sincerely,

All-Points Technology Corporation, P.C.

Matthew Gustafson
Registered Soil Scientist and Forester

Attachment



LEDYARD DAM HOUSE AREA

NTS

Aerial View - North of I-95

NTS

A=	SOIL:	SAND/GRAVEL
	PURPOSE:	REFORESTATION
		SOIL STABILIZATION
	SELECTION:	MIXED EVERGREEN

B=	SOIL:	TOP SOIL
	PURPOSE:	REFORESTATION
	SELECTION:	HARDWOOD/EVERGREEN

DATE	BY	REVISION

GROTON UTILITIES

RESERVOIR PROPERTY

PLANTING PLAN

SURVEY BY:		DATE:	SCALE: NTS
BASE PLAN BY:	DLL	DATE: 1/12/16	DWG. NO.
DESIGN BY:		DATE:	SHEET 1 OF 1