



# Stormwater Report

35 Taugwonk Spur Road  
Stonington, Connecticut

August 19, 2019  
**(Revised October 7, 2019)**

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ENGINEERING | PLANNING | LANDSCAPE ARCHITECTURE | ENVIRONMENTAL SCIENCE

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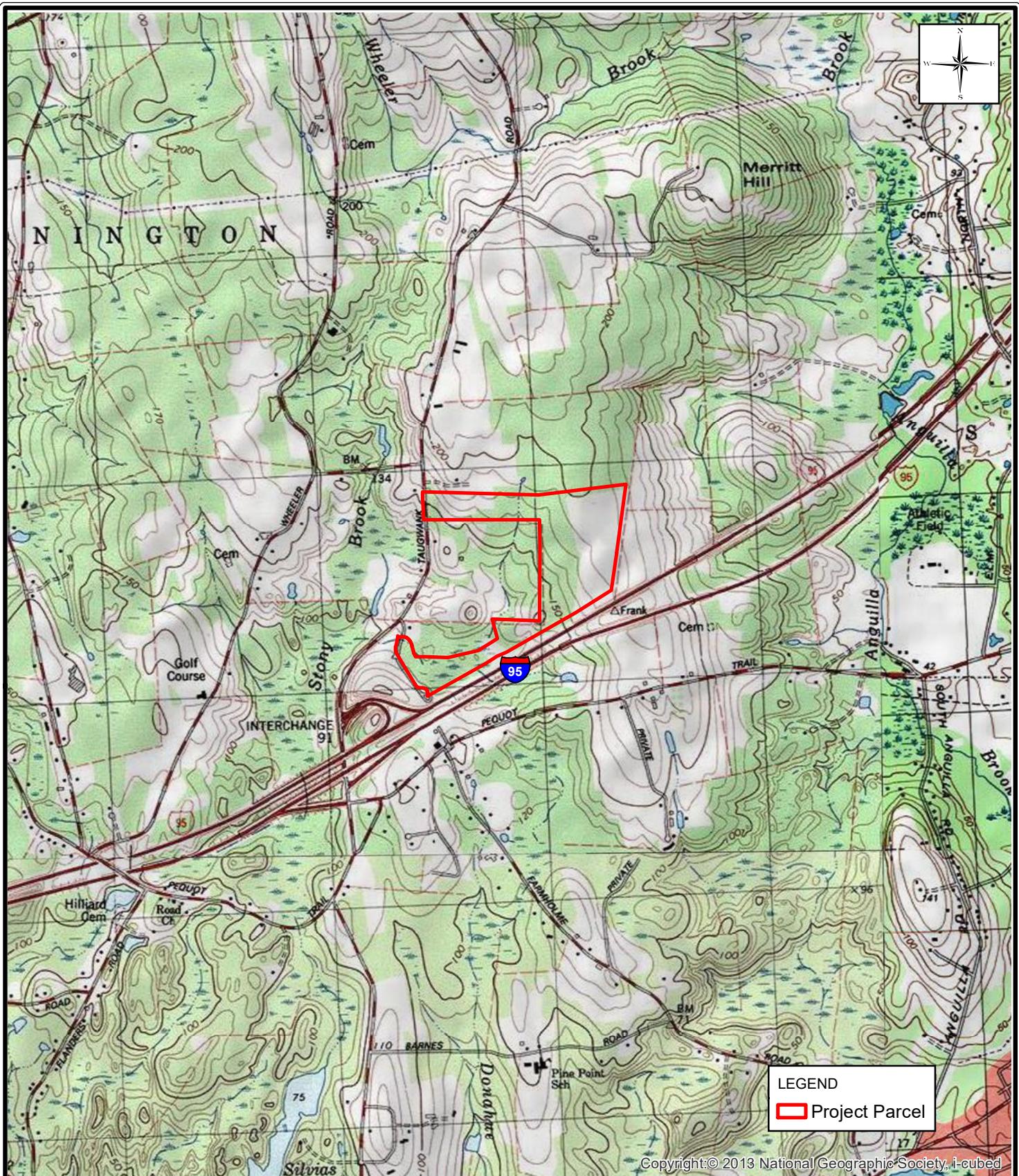
Construction Drawings  
Wetland Delineation Report

## 1.0 PROJECT OVERVIEW

Greenskies Renewable Energy, LLC (Greenskies) has retained Milone & MacBroom, Inc. (MMI) for engineering services and preparation of this Stormwater Report associated with the proposed solar facility located at 35 Taugwonk Spur Road in Stonington, Connecticut. The project site consists of Lot 2 on Assessor's Map 84 Block 1 and is currently zoned as L1-130 (Light Industrial) and GB 130 (Green Belt Residential). See Figure 2 – Zoning Map for the location of each zoning district. According to the landowner, the site has been continuously used for hay farming for the past 30 years. The project involves the installation of several ground-mounted photovoltaic (PV) solar panel arrays supported by above-grade galvanized steel brackets to facilitate the required vertical angle and southerly exposure of the PV panels. The solar facility will include six inverter pads and other electrical equipment to support the facility. A 7-foot-high chain link security fence will enclose the entire compound. An underground electrical service will carry power from the facility to the point of interconnection west of the site to the existing electric service on Taugwonk Road. The project will be constructed in two phases. The first phase includes the easterly side of the proposed array field on the currently open part of the site, which includes approximately half of the total panels. The second phase consists of work on the westerly side of the array field and will include some clearing of trees on the westerly side of the site.

This project also includes the construction of two stormwater management basins to provide peak-flow attenuation as a result of the land cover change associated with the project. Overall land cover consists mostly of grass field with some wooded area at the westerly side of the site. The site will be stabilized with the application of a conservation seed mix on all disturbed areas.

The project site is shown on the United States Geological Survey (USGS) Site Location Map (Figure 1).



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## OVERVIEW MAP

## STONINGTON PV SOLAR FACILITY

35 TAUGWONK ROAD  
STONINGTON, CONNECTICUT

SOURCE: 2013 NATIONAL GEOGRAPHIC SOCIETY

DATE: JULY 8, 2010

SCALE: 1" = 2000'

PROJ NO: 6763-05

DESIGNED AYO	DRAWN AYO	CHECKED MBR
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DRAWING NAME:

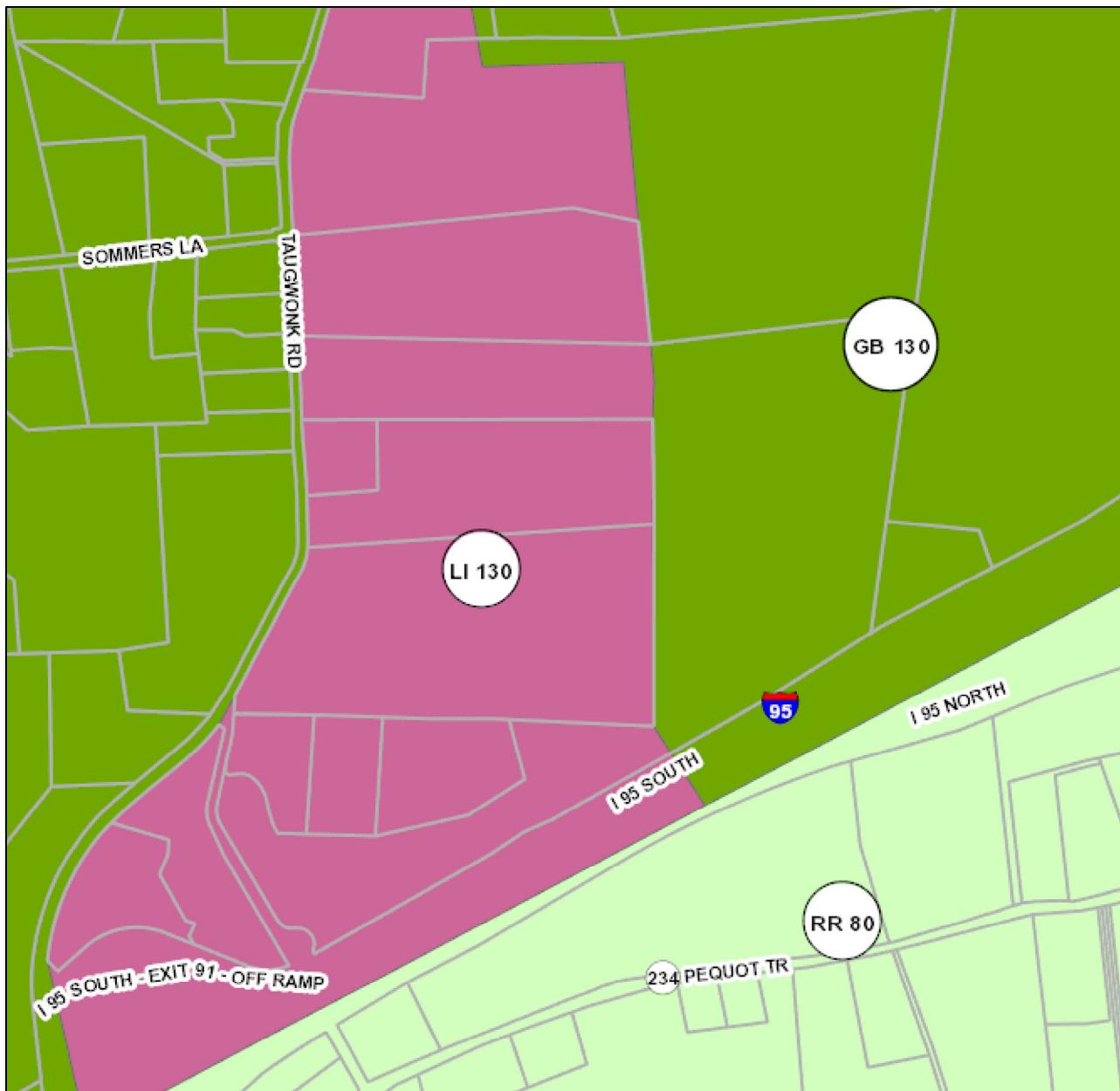
**FIG. 1**

# Town of Stonington

Geographic Information System (GIS)



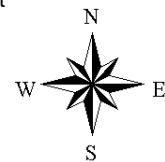
Date Printed: 7/24/2019



#### **MAP DISCLAIMER - NOTICE OF LIABILITY**

This map is for assessment purposes only. It is not for legal description or conveyances. All information is subject to verification by any user. The Town of Stonington and its mapping contractors assume no legal responsibility for the information contained herein.

Approximate Scale: 1 inch = 800 feet



## 2.0 SITE DESCRIPTION

### 2.1 Existing Conditions

The existing ±87-acre site is located at 35 Taugwonk Spur Road in the town of Stonington, Connecticut. The property is roughly horseshoe shaped, with one leg extending to Taugwonk Spur Road to the south and another leg extending to Taugwonk Road in the north. The site consists mainly of open agricultural field on the easterly side of the site and wooded area on the westerly side of the site. According to the landowner, the agricultural field has been used for hay farming for the past 30 years. This type of farming typically includes the consistent use of heavy vehicles and equipment for harvesting, baling, and removal of hay bales from the site. A gravel access road from Taugwonk Spur Road to the west runs along the southerly side of the site, which provides access to the agricultural field area. Interstate 95 runs along the southern property line. The land to the east of the property consists of agricultural field, and the area north of the property is wooded. A mix of commercial office park, single-family residences, and agricultural land is located west of the property. The site is shown on the USGS Site Locus Map (Figure 1).

### 2.2 Inland Wetland Resource Areas

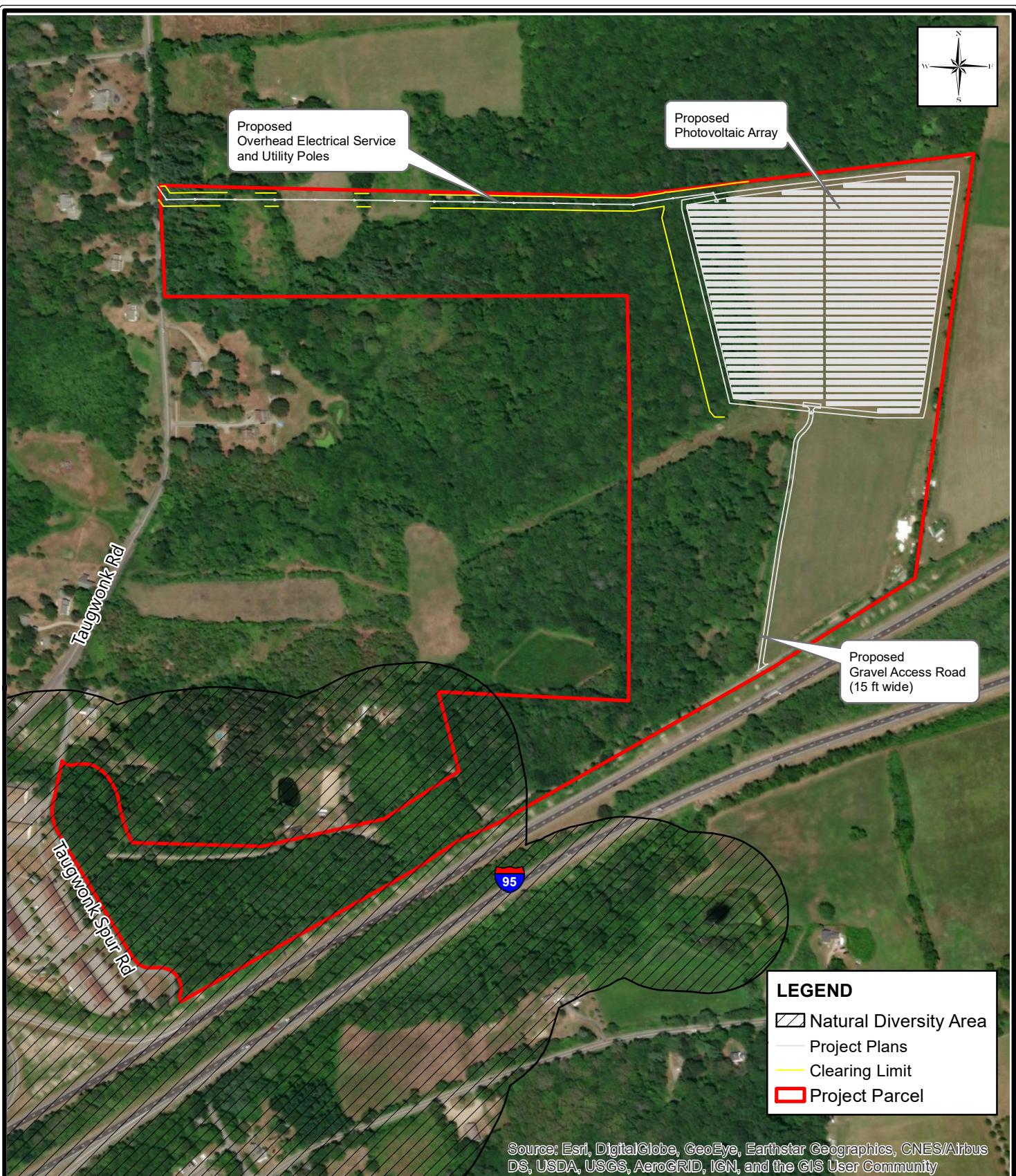
On May 20, 2019, MMI wetland scientists confirmed the wetland delineation previously done by others. Wetland areas consist of 11 inland wetlands and three intermittent streams on the site. Additionally, one vernal pool was identified within the previously delineated wetland boundary. Inland wetlands and watercourses were delineated in accordance with the Connecticut Inland Wetlands and Watercourses Act and Tidal Wetlands Act as well as Section 404 of the Clean Water Act. Wetlands and watercourses were delineated using the methodology provided in the United States Army Corps of Engineers (USACE) *Interim Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Northcentral and Northeast Region*. Refer to the attached Wetland and Watercourse Delineation Report for a detailed description of wetland resource areas.

### 2.3 Natural Diversity Data Base

Based on the Connecticut Department of Energy & Environmental Protection's (CTDEEP) Natural Diversity Data Base (NDDB), there is a mapped Natural Diversity Area in the southwesterly portion of the site. A Request for NDDB State Listed Species Review was submitted to CTDEEP on July 9, 2019, for review. The NDDB area is shown on Figure 3 – Detailed Site Map.

### 2.4 Farmland Soils

A portion of the site contains Prime Farmland Soils based on the available Farmland Soils layer provided by CTDEEP. A majority of the Prime Farmland Soils are located on the eastern portion of the site in the location of the current agricultural fields. There are additional areas of Prime Farmland Soil as well as Statewide Important Farmland Soils in the northwesterly area of the site between the agricultural fields and Taugwonk Road. Refer to Figure 4 for the location of Farmland Soils.



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### NDDB DETAILED SITE MAP

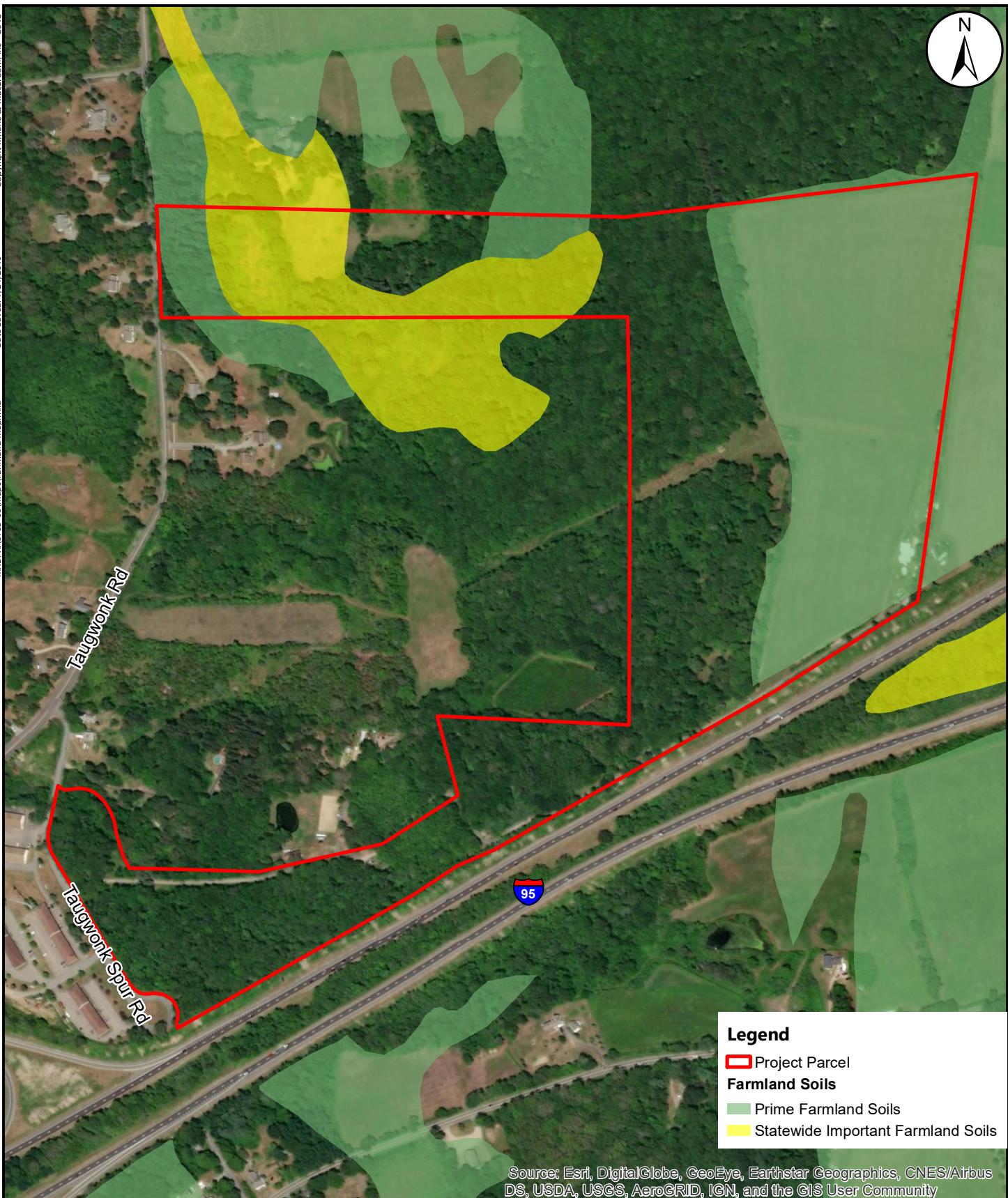
STONINGTON PV SOLAR FACILITY

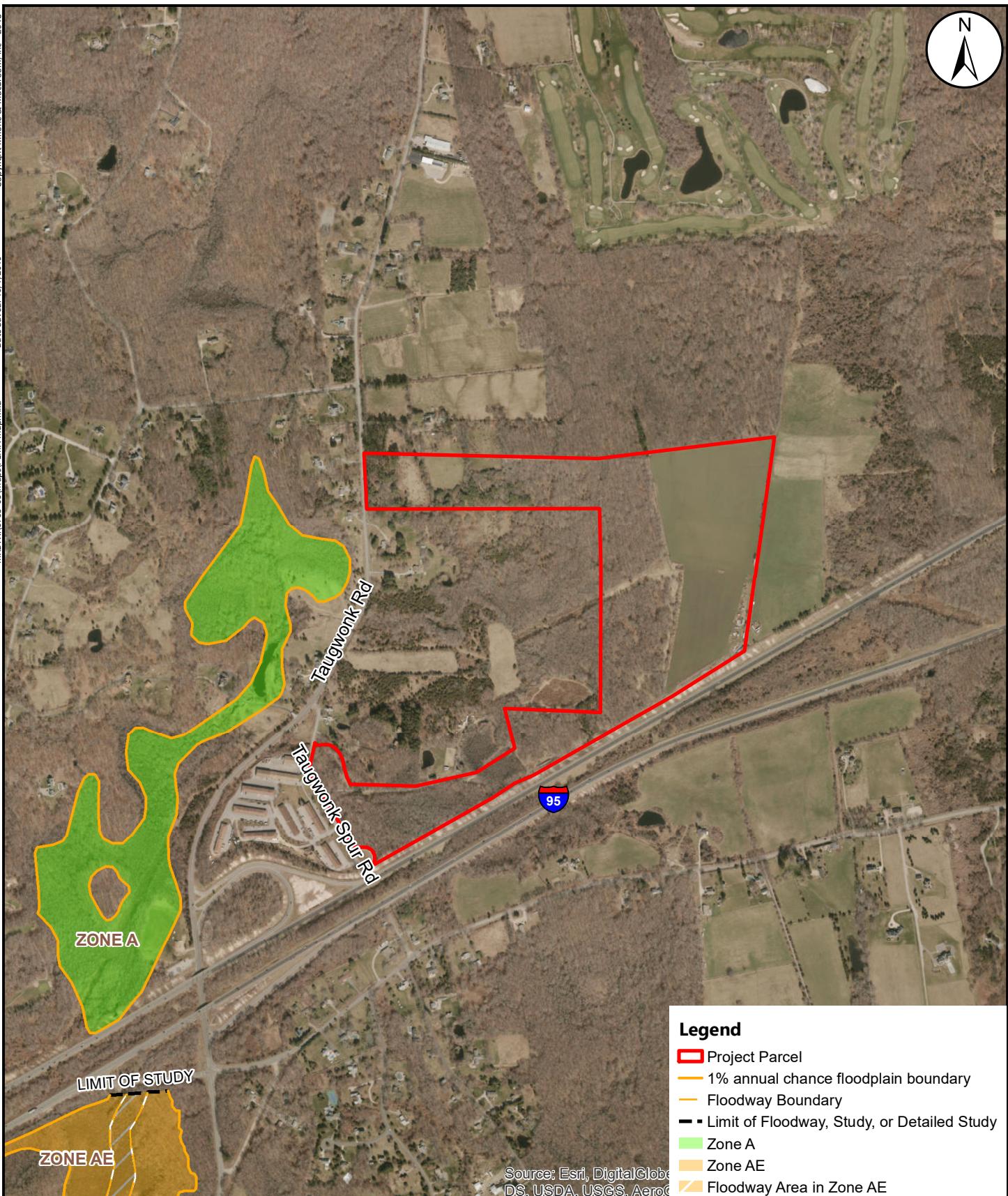
35 TAUGWONK ROAD  
STONINGTON, CONNECTICUT

SOURCE: 2016 AERIAL PHOTO, ESRI

DESIGNED AYO	DRAWN AYO	CHECKED MBR
DRAWING NAME:		

**FIG. 3**





**MILONE & MACBROOM**  
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413-241-6920

FEMA Map

STONINGTON PV SOLAR ARRAY  
35 TAUGWONK ROAD  
STONINGTON, CONNECTICUT

DESIGNED HMM	DRAWN HMM	CHECKED MRG	DATE
SOURCE			10/1/2019
SOURCE: 2016 AERIAL PHOTO, ESRI; FEMA DATA FROM CT DEEP			SCALE 1 " = 1,000'
			PROJ. NO. 6763-05
			DRAWING NAME <b>FIG. 5</b>



**MILONE & MACBROOM**  
 1350 Main St  
 Suite 1012  
 Springfield, MA 01103  
 413-241-6920

### Coastal Boundary Map

STONINGTON PV SOLAR ARRAY  
 35 TAUGWONK ROAD  
 STONINGTON, CONNECTICUT

DESIGNED HMM	DRAWN HMM	CHECKED MRG	DATE 10/1/2019
SOURCE			SCALE 1 " = 3,000'
			PROJ. NO. 6763-05
			DRAWING NAME <b>FIG. 6</b>

SOURCE: 2016 AERIAL  
 PHOTO, ESRI; COASTAL  
 BOUNDARY DATA FROM CT

## 2.5 Natural Resources Conservation Service (NRCS) Hydrologic Soil Group (HSG)

Soil types within the watershed were obtained from the NRCS Web Soil Survey for New London County, Connecticut. Most of the site is mapped by NRCS as Rainbow silt loam, with a small portion in the northeast as Woodbridge fine sandy loam. The Rainbow and Woodbridge soil series are designated by NRCS as "C" and "C/D" hydrologic soil groups, respectively.

On September 26, 2019, MMI completed a field investigation to confirm the mapped soil series and verify the hydrologic soil groups. A total of seven test pits were dug by hand to a depth of 24 inches or 2 feet below grade within the project limits. Five of the test pits were dug within the existing agricultural field where the proposed solar panels will be located, and two test pits were located within the forested area where the proposed sediment basin will be located (Figure 7).

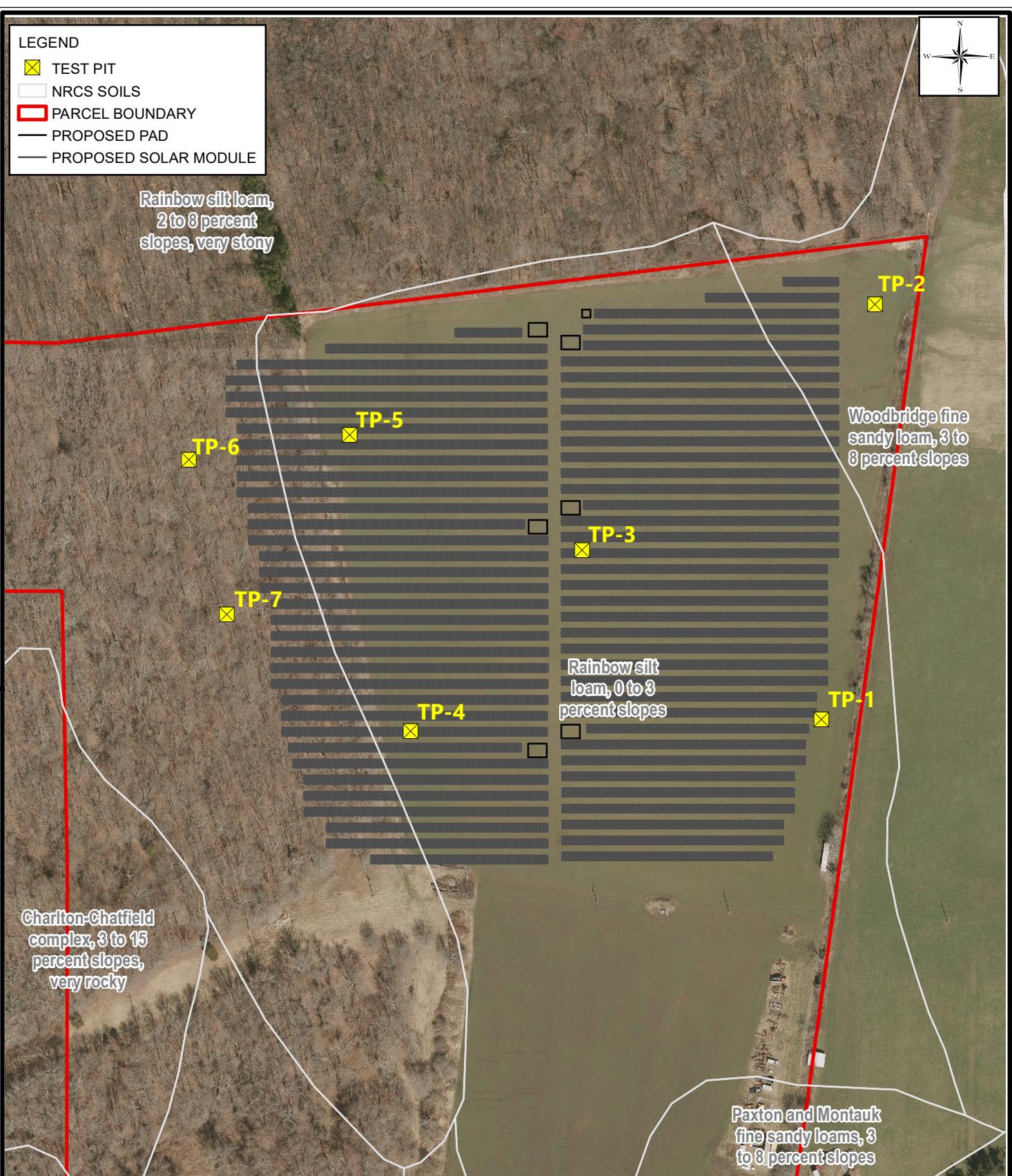
In general, the five test pits (TP-1 through TP-5) completed within the agricultural field were consistent with NRCS mapping. The soil encountered consisted of a relatively thick Ap horizon ranging from 6 to 9 inches; dark brown (10YR 4/2) silt loam; weak fine granular structure; very friable with a clear distinct boundary; followed by a Bw horizon to the bottom of the test pits consisting of yellowish brown (10YR 5/6) silt loam; weak blocky structure; few fine roots; and few pebbles.

The two test pits within the forested area (TP-6 and TP-7) were also consistent with NRCS mapping. The Rainbow silt loam within the wooded area is very stony in the upper horizon with a relatively thick (4 inches) humic organic layer underlain by a distinct Ap horizon (10 to 12 inches) consisting of dark brown silt loam (10 YR 4/2); weak friable granular structure; followed by Bw horizon (13 to 18 inches) consisting of yellowish brown (10 YR 5/4) silt loam with stones; and weak blocky structure.

A Group "C" soil is defined by the NRCS as soils having a slow infiltration rate when thoroughly wet and consists chiefly of soils with a layer that impedes downward movement of water or soils of moderately fine texture or fine texture.

Based on the test pits, the mapped hydrologic group of "C" is consistent with the results of the field investigation. In general, the upper 12 inches of soil consists of silt loam that has been farmed historically, or actively with a distinct boundary and weak granular structure, underlain by a fine-grained subsoil with a weak block structure that would impede downward movement of water with soils consisting of a moderately fine texture.

For the purposes of the stormwater assessment, the soils were assigned a hydrologic soil group "D" for proposed conditions in accordance with recent CTDEEP policies regarding solar projects. CTDEEP requires the hydrologic soil group be reduced by one step to account for soil compaction due to construction activity.



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#### TEST PIT LOCATIONS

STONINGTON PV SOLAR FACILITY  
 GREENSKIES RENEWABLE ENERGY, LLC

STONINGTON, CONNECTICUT

SOURCE: 2004 AERIAL PHOTO, CTDEEP, 2006

DATE: OCTOBER 2, 2019

SCALE: 1" = 200'

PROJ. NO.: 6763-05

DESIGNED PAS	DRAWN PAS	CHECKED MBR
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DRAWING NAME:

**FIG. 7**

## 3.0 PROJECT DESCRIPTION

### 3.1 Proposed Conditions

Greenskies intends to construct a solar energy facility on the property located at 35 Taugwonk Spur Road in Stonington, Connecticut. The solar facility will be located on approximately 18.2 acres of the ±87-acre site. The project will be constructed in two phases. The first phase is the eastern side of the site, containing approximately half of the solar panels and three of the six inverter pads, as well as the gravel access road. Phase 2 will contain the western half of the panels and the final three inverter pads. Phase 1 is located entirely on currently open agricultural field. Phase 2 will include the removal of trees and grubbing at the westerly side of the site. Access to the site is via a gravel road off Taugwonk Spur Road at the southern property boundary. The gravel access drive will be extended to the north along the edge of the tree line through the southerly agricultural field to the facility at the northerly side of the site. The transmission right-of-way will be along an existing gravel path at the northern property boundary and will connect to the existing system at Taugwonk Road. Some tree clearing will be required to create a 50-foot-wide path along the right-of-way. The solar facility will consist of several ground-mounted PV solar panel arrays. Galvanized steel brackets will support the panel array above grade to facilitate the required panel orientation. The compound will also contain six inverter pads and an electrical pad. A 7-foot-high chain link security fence will enclose the entire compound.

Proposed stormwater management improvements are designed to prevent an increase in the postdevelopment flows to off-site areas. Existing site drainage patterns are generally maintained where the easterly side of the site drains to the northeasterly corner of the property and then to the adjacent field to the east and where the westerly side of the property is generally directed toward the westerly wetland areas. Proposed stormwater best management practices (BMPs) utilize nonstructural practices, including natural stormwater conveyances and the disconnection of impervious runoff from the PV solar panels. Runoff from the elevated PV solar arrays will drain directly onto the grass below where it can soak into and filter over the grassed area. Peak flow is attenuated by two stormwater management basins located in the northeasterly corner and westerly side of the site. The basins are located to intercept runoff from the easterly and westerly sides of the site of the solar facility. Overall, peak flows for the site under postdevelopment conditions are reduced for the 2-, 10-, 25-, 50-, and 100-year events as shown in Table 4-3.

Four deep-hole test pits were dug on the site on August 16, 2019, in the vicinity of the proposed stormwater management basins. Test Pits 1, 2, and 3 were dug at approximately each end and the center of the proposed westerly basin. Groundwater was observed at 7.7', 8.0', and 7.0', respectively. Test Pit 4 was dug in the area of the proposed easterly stormwater management basin, and groundwater was observed at 5.5'. Test pit logs and a location map can be found in the Appendix.

### 3.2 Activities within the Buffer Zone

The proposed improvements will not alter the wetlands on the main site. Activities within the 100-foot buffer will include tree clearing, but no part of the PV array solar compound or access road will be constructed within the buffer zone. The proposed activities will require approximately 0.30 acres of work within the 100-foot buffer zone.

The transmission right-of-way will require the installation of overhead electrical service and utility poles within the wetland resource area and the 100-foot buffer to reach the point of interconnection on Taugwonk Road to the west. The proposed activities in the interconnection route will require approximately 0.35 acres of work within the wetland resource area and 0.95 acres of work within the 100-foot buffer zone.

### **3.3 Erosion and Sediment Control**

Erosion and sediment (E&S) controls will be installed and maintained throughout construction in accordance with the *2002 Connecticut Guidelines for Soil Erosion and Sediment Control*. Since this project will disturb more than 5 acres, the project will need to be registered with CTDEEP under the *CTDEEP General Permit for the Discharge of Stormwater and Dewatering Wastewaters from Construction Activities*. E&S controls will be installed and maintained for the duration of construction as shown on the drawings.

### **3.4 Construction Sequence and Schedule**

Construction is anticipated to commence no later than April 6, 2020, and will last approximately 3 months for phase one. The project will be constructed in two phases with phase two to follow at an undetermined date. The general sequence of construction is as follows:

#### Phase 1 (April 6 2020):

1. Stake out the limit of work. No disturbance is to take place beyond the limits of work shown on the drawings.
2. Install E&S controls as shown on the drawings.
3. Construct the stormwater management basin, outlet weir wall, and appurtenances.
4. Any disturbed slopes are to be established to finished grade with placement of topsoil before PV array racking installation. Stabilize all slopes outside of the PV array compound area with topsoil and seed.
5. Install PV solar panel arrays, electrical components, conduit, and perimeter fencing.
6. Remove E&S controls once all disturbed areas have completely stabilized.

#### Phase 2 (Commencement of construction to be determined):

1. Stake out the limit of work. No disturbance is to take place beyond the limits of work shown on the drawings.
2. Install E&S controls for site clearing activities as shown on the drawings.
3. Clear and grub the wooded area of the site within the limits shown on the plans.
4. Construct the stormwater management basin, outlet weir wall, and appurtenances.
5. Any disturbed slopes are to be established to finished grade with placement of topsoil before PV array racking installation. Stabilize all slopes outside of the PV array compound area with topsoil and seed.
6. Install PV solar panel arrays, electrical components, conduit, and perimeter fencing.
7. Remove E&S controls once all disturbed areas have completely stabilized.

## 4.0 STORMWATER MANAGEMENT

### 4.1 Existing Conditions

The existing site is a mix of open agricultural field on the central and eastern sides of the site and wooded area on the western side of the site. The property owner has stated that the site has been used for hay farming for the last 30 years. Topography on the site is gentle and slopes to the west, south, and east. Stormwater runoff from the easterly side of the site drains to a shallow swale along the easterly property line that outlets to an adjacent field in the northeasterly corner of the site. The westerly portion of the site generally drains to the west in the direction of the wetlands located along the westerly side of the property. The site is divided into drainage areas based on site survey and Geographic Information System (GIS) topographic mapping as shown in the Appendix.

### 4.2 Proposed Conditions

Existing site drainage patterns will be maintained under proposed conditions. Two stormwater management basins will be constructed as depicted on the drawings to provide peak-flow reduction of site runoff. The existing swale along the easterly property line will be maintained to promote runoff from the facility to the stormwater management basin at the easterly side of the facility. Runoff from the site and stormwater basins will continue to drain toward off-site areas west and east of the site, which is consistent with existing site drainage patterns. Under proposed conditions, the site is divided into the drainage areas as shown on the watershed mapping in the Appendix. The riprap aprons at the outlets were designed in accordance with the Connecticut Department of Transportation *Drainage Manual*. Computations are included in the Appendix.

Proposed stormwater BMPs utilize nonstructural practices consisting of disconnection of impervious runoff from the PV solar panels, a grass swale, and stormwater basins. Runoff from the elevated PV solar panel arrays will drain directly onto the grass below where it can infiltrate and travel over the grassed area. No new connected impervious area is proposed in this project. Peak-flow attenuation and stormwater quality enhancements will be improved with the construction of the stormwater management basins. A conservation seed mix will be applied on all disturbed slopes.

### 4.3 Hydrologic Analysis

A hydrologic analysis was conducted to analyze predevelopment versus postdevelopment peak-flow rates from the project site. In order to analyze the peak rates of runoff from the site, two analysis points were chosen as shown on the existing and proposed drainage area maps. Runoff analysis points are chosen based on drainage patterns that drain toward similar points for existing and proposed conditions.

Watershed areas encompassing the project site were used to determine the peak-flow rates based on the topography and drainage patterns to develop the existing conditions hydrology model. Similar drainage areas were used for the proposed conditions model and were modified to reflect the proposed land cover, grading, and the stormwater management system. The total

drainage area is similar under both existing and proposed conditions. A drainage area map for both existing and proposed conditions is included in the Appendix.

Peak flows were determined using the NRCS hydrologic method. The *HydroCAD* computer program was used to conduct watershed modeling. Schematic watershed diagrams are provided for the hydrologic model as shown in the Appendix of this report. The *HydroCAD* computer program forecasts the rate of surface water runoff and runoff volume based upon several factors. The input data includes information on land use, hydrologic soil group, vegetative cover, contributing watershed area, time of concentration, rainfall data, storage volumes, and the hydraulic capacity of structures. The computer model predicts the amount of runoff as a function of time with the ability to include the attenuation effect due to natural storage effects. The input data for rainfall events with statistical recurrence frequencies of 1, 2, 10, 25, and 100 years was obtained from the Hydrometeorological Design Studies Center of the National Oceanic and Atmospheric Administration (NOAA) National Weather Service (NWS). It released updated precipitation frequency estimates for the northeastern states including Connecticut on September 30, 2015. The precipitation frequency estimates are published in NOAA Atlas 14, Volume 10: *Precipitation-Frequency Atlas of the United States, Northeastern States*. The NOAA Atlas 14 precipitation frequency estimates supersede the estimates published in NWS HYDRO-35 (1977), Technical Paper No. 40 (1961), Technical Paper No. 49 (1964), and General Memorandum No. 14-04 "Interim 24-hour Precipitation Rates." For analysis in New London County, Connecticut, the Type III rainfall pattern with a 24-hour duration is appropriate.

Land use and coverage for the analysis under existing and proposed conditions were determined from project base mapping, review of orthophotos of the project area, and past use of the site. Land use types used in the analysis included woods, open space, agricultural field, unpaved, pervious, and impervious gravel surface cover.

Soil types in the watershed were obtained from the NRCS Web Soil Survey for New London County, Connecticut. For this analysis, the study area was generally determined to contain silt loam with some very stony areas to fine sandy loam. A majority of the area has a hydrologic soil group of "C" according to the latest NRCS Web Soil Survey, with smaller areas of "B" and "D" soils. The hydrologic soil groups for the site were confirmed with a field investigation by MMI on September 26, 2019. Hydrologic soil group "D" was assumed for the proposed conditions in accordance with recent CTDEEP policies regarding solar projects that require the hydrologic soil group be reduced by one step to account for soil compaction due to construction activity.

Peak rates of runoff were obtained from the hydrologic model results at the site analysis points (AP) as shown on the watershed maps and as follows:

**TABLE 4-1**  
**Peak-Flow Rates at Analysis Point 1**

Storm Frequency (years)	Peak-Flow Rates (cfs)				
	2	10	25	50	100
Predevelopment Conditions	5.33	11.83	17.33	22.66	29.09
Postdevelopment Conditions	5.22	11.65	16.84	21.55	28.49
Change in Peak-Flow Rate	-0.11	-0.18	-0.49	-1.11	-0.6

cfs = cubic feet per second

**TABLE 4-2**  
**Peak-Flow Rates at Analysis Point 2**

Storm Frequency (years)	Peak-Flow Rates (cfs)				
	2	10	25	50	100
Predevelopment Conditions	6.3	16.16	24.95	33.69	44.47
Postdevelopment Conditions	6.22	15.88	24.48	33.02	44.31
Change in Peak-Flow Rate	-0.08	-0.28	-0.47	-0.67	-0.16

cfs = cubic feet per second

**TABLE 4-3**  
**Peak-Flow Rates – Total Site**

Storm Frequency (years)	Peak-Flow Rates (cfs)				
	2	10	25	50	100
Predevelopment Conditions	11.63	27.99	42.28	56.35	73.56
Postdevelopment Conditions	11.44	27.53	41.32	54.57	72.8
Change in Peak-Flow Rate	-0.19	-0.46	-0.96	-1.78	-0.76
Percent Reduction	-2%	-2%	-2%	-3%	-1%

cfs = cubic feet per second

#### 4.4 Peak-Flow Attenuation

The results of the hydrologic analysis show an overall reduction in peak flows from the project site that can be anticipated at the point of analysis for all storm events modeled. Peak-flow attenuation is attributed to installation of two stormwater basins. In addition, the PV solar panel arrays are unconnected impervious areas that allow runoff from each individual panel array to contact the ground directly below and dissipate over the surrounding grassed surface.

## 5.0 WATER QUALITY MANAGEMENT

Water quality measures are included in the stormwater management design to maintain water quality both during construction and after completion of the project. A postconstruction Operation and Maintenance Plan is included herein for maintenance of stormwater BMPs that describes the required frequency of inspections and maintenance procedures to sustain long-term functionality. Implementation of these measures will enhance protection of areas downgradient of the site. The bottom of the trapezoidal weir notch outlet is 6 inches above the bottom of the basins to provide storage of sediment transported by runoff to the basins. The stormwater management basins will also be planted with grass to provide pollutant removal by filtering stormwater runoff and will absorb excess nutrients that may be present in the runoff. The basins will also help trap sediment and debris from the contributing drainage area both during and after construction.

## 6.0 EROSION AND SEDIMENT CONTROL PLAN

### 6.1 Erosion and Sediment Controls

An E&S Control Plan has been developed to mitigate the short-term impacts of the site improvements during construction. The E&S Control Plan includes descriptive specifications concerning land grading, topsoiling, temporary vegetative cover, permanent vegetative cover, vegetative cover selection and mulching, and erosion checks. Details have been provided for all erosion controls with corresponding labels on the E&S Control Plan. In all cases, the E&S Control Plan shall be implemented in accordance with the *2002 Connecticut Guidelines for Soil Erosion and Sediment Control*.

### 6.2 Temporary Stabilization

Sediment control fencing and compost filter tubes shall be installed around the site as shown on the drawings. Sediment control fencing shall be "dug in" using a narrow ditch witch device. Sediment control fencing shall be reinforced with straw bale barriers as shown on the drawings. Prior to commencing any tree cutting or earthwork, a stabilized construction entrance shall be installed at the entrance into the site. This entrance shall be utilized as the exclusive construction entrance. Compost filter tubes shall be placed around stockpiles as shown on the drawings.

The stormwater management basins will be constructed prior to any upland grading activities. Erosion control matting shall be installed along the slopes of the stormwater management basins as shown on the drawings. The basins will be monitored throughout construction for the accumulation of sediment and debris. Sediment will be removed from the basin when the depth reaches 6 inches.

### 6.3 Permanent Stabilization

Disturbed areas of the project site where construction activities permanently cease shall be stabilized with permanent seed no later than 7 days after the last construction activity. The permanent seed mix shall be in accordance with the project specifications and plans. Construction and maintenance of E&S control measures are in accordance with the 2002

*Connecticut Guidelines for Soil Erosion and Sediment Control.* Permanent stockpiles will be stabilized with permanent seed mix as specified on the drawings.

#### 6.4 Sediment Tracking

A stabilized construction entrance shall be installed and maintained as necessary to help reduce vehicular tracking of sediment. The entrance shall be cleaned of sediment and redressed when voids in the crushed stone become filled and vehicular tracking of sediment is occurring. Dump trucks hauling materials to and from the construction project area shall be covered with a tarpaulin to reduce dust. Any sediment and debris tracked from the work area along roadways adjacent to the project shall be immediately removed with a street sweeper or equivalent sweeping method. The project engineer and contracting officer will establish inspection and removal protocols at the beginning of construction to ensure all materials tracked onto the roadway are removed daily for the duration of the project.

#### 6.5 Maintenance of Controls

E&S controls will be installed and maintained throughout the construction in accordance with local, state, and federal requirements.

The E&S control measures shall be constructed prior to clearing or grading of any portion of the project. Once construction activity ceases permanently in an area, that area shall be stabilized with permanent measures. Any accumulated sediment shall be disposed of on site in a location away from any wetlands and watercourses in a stable vegetated area and be permanently stabilized. Erosion control devices shall remain in place until disturbed areas are permanently stabilized.

If site inspections identify BMPs that are not operating effectively, maintenance must be performed as soon as possible and before the next storm event, whenever practicable, to maintain the continued effectiveness of stormwater controls. If existing BMPs need to be modified or if additional BMPs are necessary, implementation must be completed before the next storm event whenever practicable. If implementation before the next storm event is impractical, the situation must be documented, and alternative BMPs must be implemented as soon as possible.

## 7.0 STORMWATER CONSTRUCTION WASTE MANAGEMENT PLAN

### 7.1 Contact Information/Responsible Parties

#### **Operator(s):**

Greenskies Renewable Energy, LLC  
P.O. Box 251  
180 Johnson Street  
Middletown, CT 06457

#### **Project Manager(s) or Site Supervisor(s):**

To be determined

### 7.2 Waste Management

No storage of waste or hazardous materials will generally be permitted by Greenskies Renewable Energy, LLC unless required. Storage of materials and handling will comply with the following requirements:

- 7.2.1 Foreign waste materials shall be collected and stored in a secured area until removal and disposal by a licensed solid waste management company. All trash and construction debris from the project shall be disposed of in a portable container unit. No foreign waste materials shall be buried in the project area.
- 7.2.2 All personnel shall be instructed regarding the correct procedure for waste disposal. Notices stating these practices shall be posted in the project trailer, and the operator will be responsible for seeing that these procedures are followed.
- 7.2.3 Hazardous Waste – All hazardous waste materials shall be disposed of in a manner specified by local or state regulations or by the manufacturer. Project personnel shall be instructed in these practices, and the operator shall be responsible for ensuring that these practices are followed.
- 7.2.4 Sanitary Waste – Any sanitary waste from portable units shall be collected from the portable units by a licensed sanitary waste management contractor as required by the CDEEP regulations.

Generation of waste is not anticipated from the project after completion.

### 7.3 Staff Training Program

- 7.3.1 Personnel should meet the minimum training requirements to conduct the respective operation and maintenance tasks.
- 7.3.2 Personnel should have the required training to effectively carry out the responsibilities of their positions.

#### **7.4 Spill Prevention and Control Plan**

The following are the material management practices that shall be used to reduce the risk of spills or other accidental exposure of materials and substances to stormwater runoff.

#### **7.5 Good Housekeeping**

The following good housekeeping practices shall be followed within project areas during construction:

- An effort shall be made to store only enough products required to do the job.
- All materials stored within project areas shall be stored in a neat, orderly manner in their appropriate containers and, if possible, under a roof or other enclosure.
- Products shall be kept in their original containers with the original manufacturer's label.
- Substances shall not be mixed with one another unless recommended by the manufacturer.
- Whenever possible, all of a product shall be used up before disposing of the container.
- Manufacturers' recommendations for proper use and disposal shall be followed.
- The project superintendent shall inspect daily to ensure proper use and disposal of materials.

#### **7.6 Hazardous Products**

The following practices are used to reduce the risks associated with hazardous materials:

- Products shall be kept in original containers unless they are not resealable.
- Original labels and Material Safety Data Sheets shall be retained.
- If surplus product must be disposed of, manufacturers' or local-/state-recommended methods of proper disposal shall be followed.
- Material Safety Data Sheets for all hazardous products shall be available within the project area for the duration of construction.

## **7.7 Product-Specific Practices**

The following product-specific practices shall be followed within the project areas:

Petroleum products – All project-related vehicles shall be monitored for leaks and receive regular preventative maintenance to reduce the chance of leakage. Petroleum products shall be stored in tightly sealed containers that are clearly labeled. Fuel tanks should not be stored within 100 feet of any watercourse or wetland.

Fertilizers – Fertilizers used shall be applied only in the minimum amounts recommended by the manufacturer. Once applied, fertilizers shall be worked into the soil to limit exposure to stormwater runoff and shall be stored in a covered or other contained area.

## **7.8 Spill Control Practices**

The contractor will be responsible for preparing a project-area-specific spill control plan in accordance with local and CTDEEP regulations. The plan should describe procedures and practices for controlling fuel and hydraulic fluid spills. A spill kit consisting of absorbent materials should be available on site in a predesignated location during all phases of construction. At a minimum, this plan should do the following:

- Reduce stormwater contact if there is a spill.
- Contain the spill.
- Stop the source of the spill.
- Dispose of contaminated material in accordance with manufacturers' procedures and CTDEEP regulations.
- Identify responsible and trained personnel.
- Ensure that the spill area is well ventilated.

## **7.9 Nonstormwater Discharges**

Allowable nonstormwater discharges that could occur during construction on this project include the following:

1. Discharges from firefighting activities
2. Water used to control, to the extent practicable, off-site vehicle tracking of sediments onto paved surfaces and the generation of dust
3. Uncontaminated air conditioning or compressor condensate
4. Uncontaminated groundwater or spring water
5. Foundation or footing drains where flows are not contaminated with process materials such as solvents
6. Uncontaminated excavation dewatering
7. Landscape irrigation

No other stormwater discharges are expected to exit the project area during construction.

## 8.0 POSTCONSTRUCTION STORMWATER MANAGEMENT OPERATION AND MAINTENANCE PLAN

### 8.1 Contact Information/Responsible Parties

#### **Operator(s):**

Greenskies Renewable Energy, LLC  
P.O. Box 251  
180 Johnson Street  
Middletown, CT 06457

#### **Project Manager(s) or Site Supervisor(s):**

To be determined

### 8.2 Good Housekeeping Practices

#### 8.2.1 Material Handling and Waste Management

8.2.1.1 No storage of waste or hazardous materials will generally be permitted by Greenskies unless required for specific repairs or maintenance tasks of the facility. Storage of materials and handling will comply with the following requirements:

- a) All materials shall be stored in a neat, orderly manner in their appropriate containers and, if possible, under a roof or other enclosure.
- b) Products shall be kept in their original containers with the original manufacturer's label.
- c) Substances shall not be mixed with one another unless recommended by the manufacturer.
- d) Manufacturers' recommendations for proper use and disposal shall be followed.

8.2.1.2 Generation of waste is not anticipated from the project after completion.

#### 8.2.2 Site Maintenance/Cleanup

8.2.2.1 The site will be reviewed biannually for any generation of trash or debris that has accumulated. These materials will be collected and disposed of in a proper manner.

8.2.2.2 Greenskies will be responsible for scheduling the activity each year.

#### 8.2.3 Staff Training Program

8.2.3.1 Personnel should meet the minimum training requirements to conduct the respective operation and maintenance tasks.

8.2.3.2 Personnel should have the required training to effectively carry out the responsibilities of their positions.

### 8.3 Spill Prevention and Control Plan

#### 8.3.1 Spill Prevention Control

The following provisions are the material management practices that shall be used to reduce the risk of spills or other accidental exposure of materials and substances to stormwater runoff. The site owner or designated contractor will be responsible for preparing a project-area-specific spill control plan in accordance with local and CTDEEP regulations. The plan should describe procedures and practices for controlling fuel and hydraulic fluids from machinery. A spill kit consisting of absorbent materials should be available on site in a predesignated location during site construction or for specific postconstruction activities that require the use of construction equipment. At a minimum, this plan should indicate or include the following:

- Reduce stormwater contact if there is a spill.
- Contain the spill.
- Stop the source of the spill.
- Dispose of contaminated material in accordance with manufacturers' procedures and CTDEEP regulations.
- Identify responsible and trained personnel.
- Ensure that the spill area is well ventilated.

#### 8.3.2 Illicit Discharges

8.3.2.1 All illicit discharges to the stormwater management system are prohibited. These discharges include but are not limited to wastewater, stormwater contaminated by contact with process waste, raw materials, toxic pollutants, hazardous substances, oil, or grease. To my knowledge, there are no existing illicit discharges on the site.

I, \_\_\_\_\_ hereby certify that I have read and understand that any illicit discharges to the stormwater management system are prohibited.

Signature: \_\_\_\_\_ Date: \_\_\_\_\_

## 8.4 Schedule for Inspection and Maintenance

This inspection and maintenance schedule has been prepared to ensure that the BMPs continue to function properly and as designed.

During construction, stormwater management facilities will be cleaned/maintained as required based upon inspection. The cleaning and maintenance BMPs during construction include removing sediment, replacing or repairing any damaged structure or pipe, and ensuring that soil erosion is kept to a minimum. The owner will be responsible for inspection and maintenance during construction.

### **Best Management Practices**

#### Stormwater Management Basins

The stormwater management basins shall be inspected at least four times per year. Accumulated sediment shall be removed when the depth exceeds 6 inches, and grass shall be mowed to a height of 4 inches. Check for rills or gullies and repair as necessary. Remove the sediment by hand (i.e., a person with a shovel) so as not to disturb underlying vegetation and soils.

#### Grass Swale

The grass swale shall be inspected semiannually the first year and at least once a year thereafter. Site inspections shall also be conducted after major storm events (generally after storms greater than 3 inches in 24 hours). Inspect for sufficient grass growth, and on the side slopes, for signs of erosion or formation of rills or gullies. Remove accumulated trash or debris prior to mowing operations. Mow grass to a height no less than 4 inches, and mow on an as-needed basis to keep the height no more than 6 inches. Check on a yearly basis the amount of sediment buildup and remove on an as-needed basis. Remove the sediment by hand (i.e., a person with a shovel) so as not to disturb underlying vegetation and soils.

## INSPECTION AND MAINTENANCE LOG

ITEM	DATE OF INSPECTION AND REQUIRED MAINTENANCE	MAINTENANCE TO BE PROVIDED/COMMENTS	DATE MAINTENANCE COMPLETE
Stormwater Management Basins			
Grass Swale			

Inspected by: \_\_\_\_\_ Date: \_\_\_\_\_

6763-05-03-o719-rpt.docx

## APPENDIX A

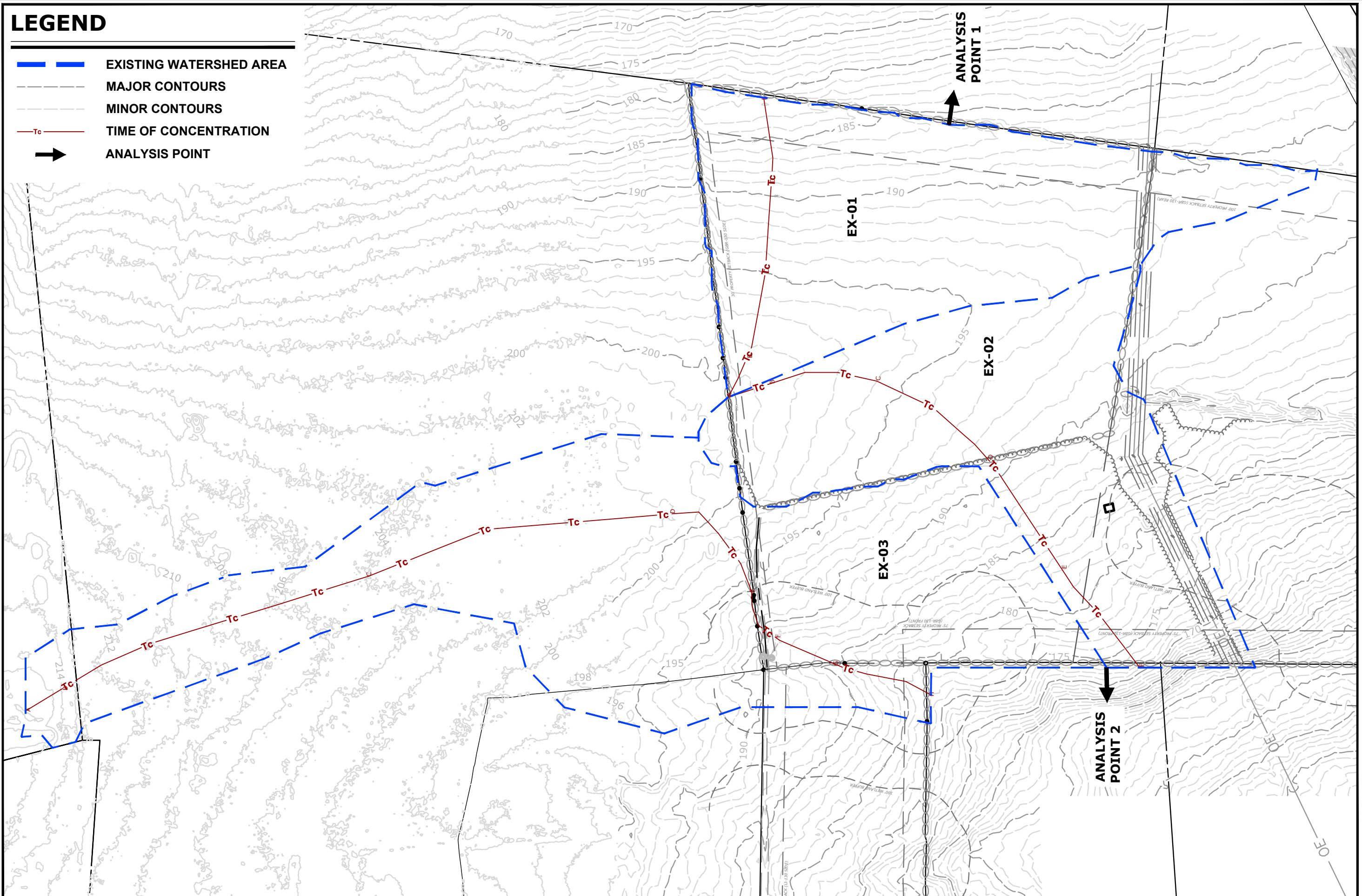
### WATERSHED MAPS

# LEGEND

- EXISTING WATERSHED AREA
- MAJOR CONTOURS
- MINOR CONTOURS
- TIME OF CONCENTRATION
- ANALYSIS POINT

Drawing: C:\USERS\HEATHERM\APPDATA\LOCAL\TEMP\ACCPUBLISH\_5704\ST-WATERSHED-EX-V2.DWG Layout Tab:WS-EX

Plotted by: HEATHERM On this date: Fri, 2019 July 19 - 4:22pm



MILONE &  
MACBROOM

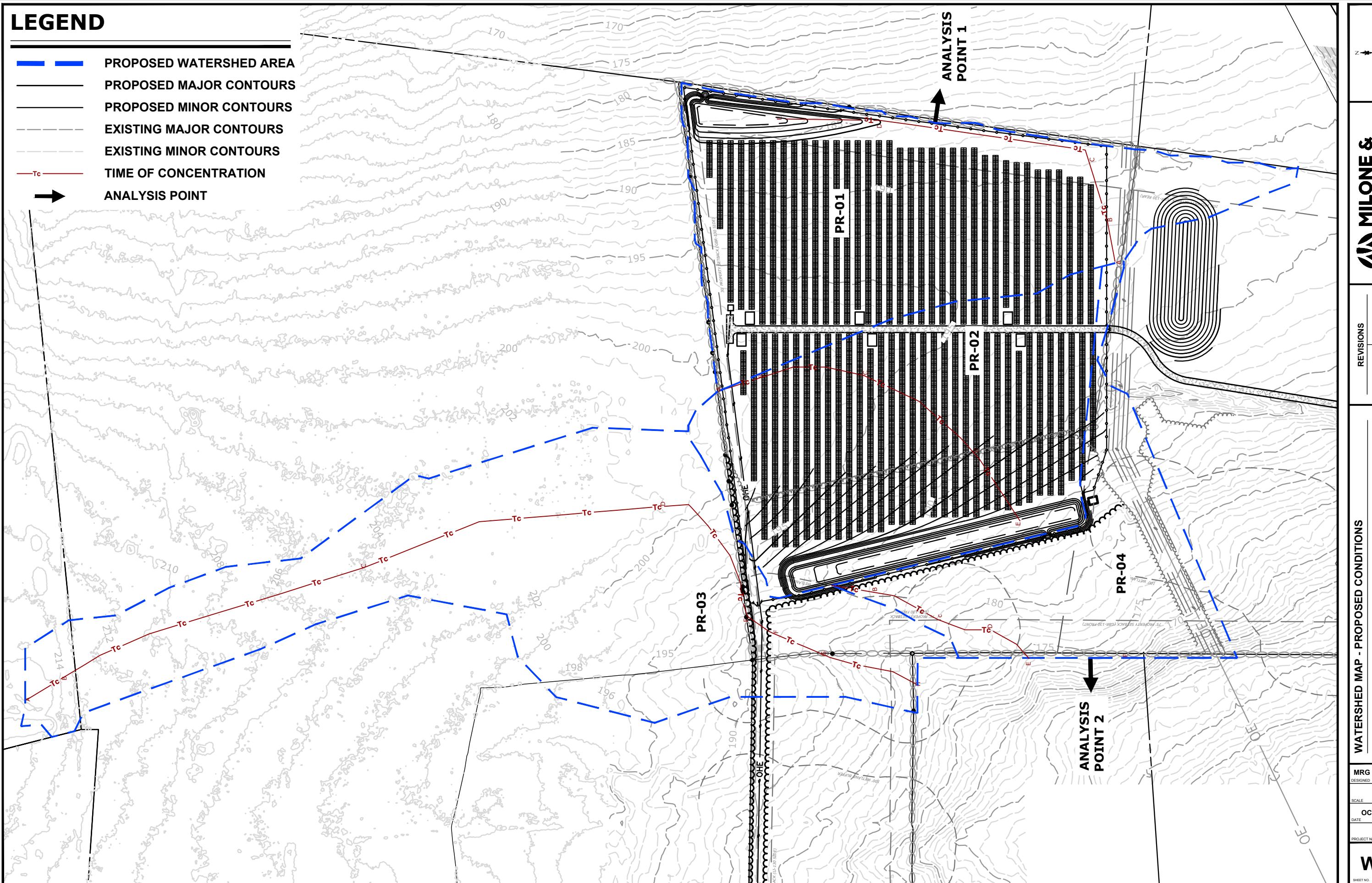
## WATERSHED MAP - EXISTING CONDITIONS



The map displays the Stonnington PV Solar Array and GreenSkies Renewable Energy LLC locations. The array is a large, dense cluster of solar panels located in the northern part of the watershed. GreenSkies Renewable Energy LLC is a smaller facility located further south. The map also shows the watershed boundary and various water bodies.

DESIGNED	DRAWN	CHECKED
<b>1"=200'</b>		
SCALE		
<b>JULY 22, 2019</b>		
DATE		
<b>6763-05</b>		
PROJECT NO.		

# WS-EX



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1350 MAIN STREET, SUITE 1012  
SPRINGFIELD, MA  
413.241.6920  
WWW.MMMINC.COM

REVISIONS
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MRG DESIGNED	HMM DRAWN	MRG CHECKED
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1"=200'

OCTOBER 7, 2019

DATE

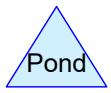
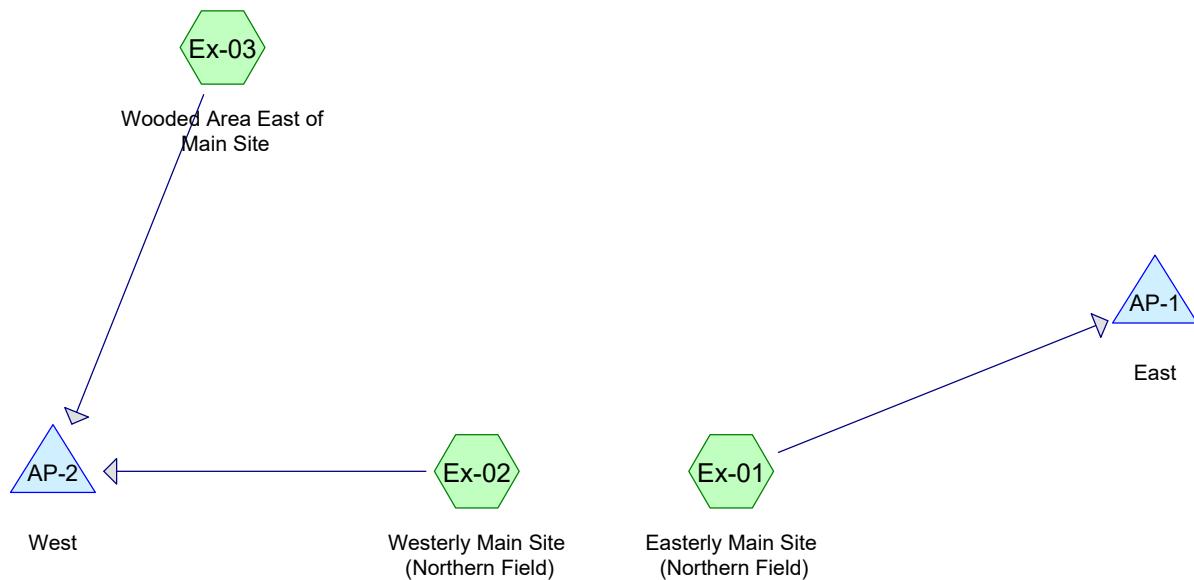
6763-05

PROJECT NO.

SHEET NO.

## APPENDIX B

### HYDROLOGIC MODELS



**Routing Diagram for ST-Existing-2019-10-04 NS**  
Prepared by Hewlett-Packard Company, Printed 10/4/2019  
HydroCAD® 10.00-22 s/n 07599 © 2018 HydroCAD Software Solutions LLC

**Summary for Subcatchment Ex-01: Easterly Main Site (Northern Field)**

Runoff = 5.33 cfs @ 12.67 hrs, Volume= 0.936 af, Depth= 0.98"

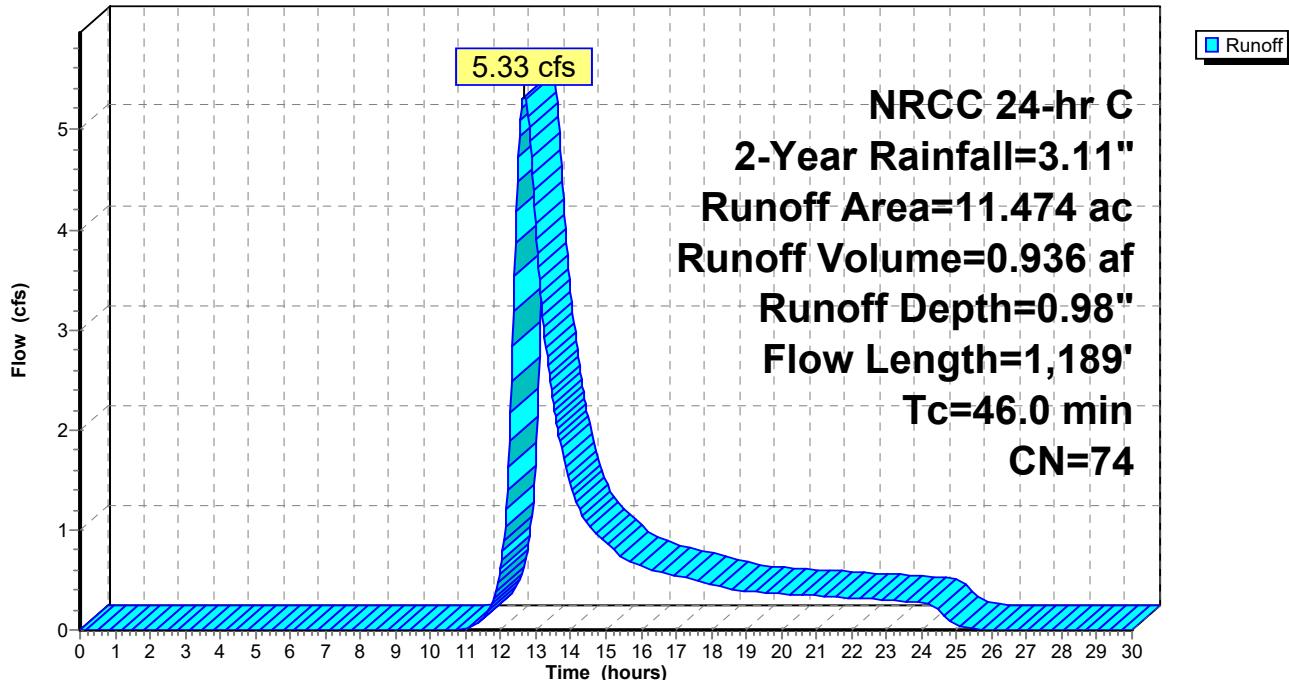
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs  
NRCC 24-hr C 2-Year Rainfall=3.11"

Area (ac)	CN	Description
11.164	74	>75% Grass cover, Good, HSG C
0.310	79	50-75% Grass cover, Fair, HSG C
11.474	74	Weighted Average
11.474		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.4	100	0.0110	0.09		<b>Sheet Flow, A-B</b> Grass: Dense n= 0.240 P2= 3.11"
3.1	169	0.0170	0.91		<b>Shallow Concentrated Flow, B-C</b> Short Grass Pasture Kv= 7.0 fps
24.5	920	0.0080	0.63		<b>Shallow Concentrated Flow, C-D</b> Short Grass Pasture Kv= 7.0 fps
46.0	1,189				Total

**Subcatchment Ex-01: Easterly Main Site (Northern Field)**

Hydrograph



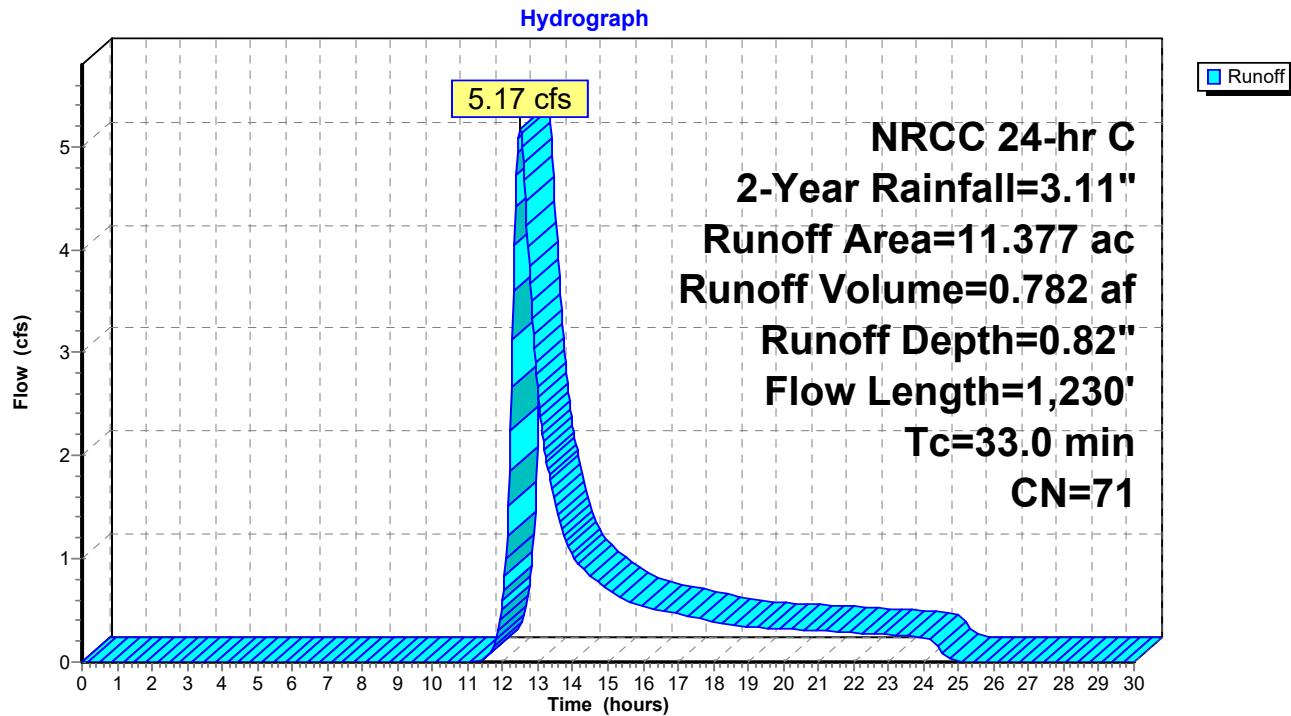
**Summary for Subcatchment Ex-02: Westerly Main Site (Northern Field)**

Runoff = 5.17 cfs @ 12.50 hrs, Volume= 0.782 af, Depth= 0.82"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs  
NRCC 24-hr C 2-Year Rainfall=3.11"

Area (ac)	CN	Description
0.738	74	>75% Grass cover, Good, HSG C
6.629	74	>75% Grass cover, Good, HSG C
2.585	70	Woods, Good, HSG C
0.261	61	>75% Grass cover, Good, HSG B
1.164	55	Woods, Good, HSG B
11.377	71	Weighted Average
11.377		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.6	100	0.0170	0.16		<b>Sheet Flow, A-B</b> Grass: Short n= 0.150 P2= 3.11"
5.8	244	0.0100	0.70		<b>Shallow Concentrated Flow, B-C</b> Short Grass Pasture Kv= 7.0 fps
6.5	310	0.0130	0.80		<b>Shallow Concentrated Flow, C-D</b> Short Grass Pasture Kv= 7.0 fps
5.4	297	0.0330	0.91		<b>Shallow Concentrated Flow, D-E</b> Woodland Kv= 5.0 fps
4.7	279	0.0390	0.99		<b>Shallow Concentrated Flow, E-F</b> Woodland Kv= 5.0 fps
33.0	1,230	Total			

**Subcatchment Ex-02: Westerly Main Site (Northern Field)**

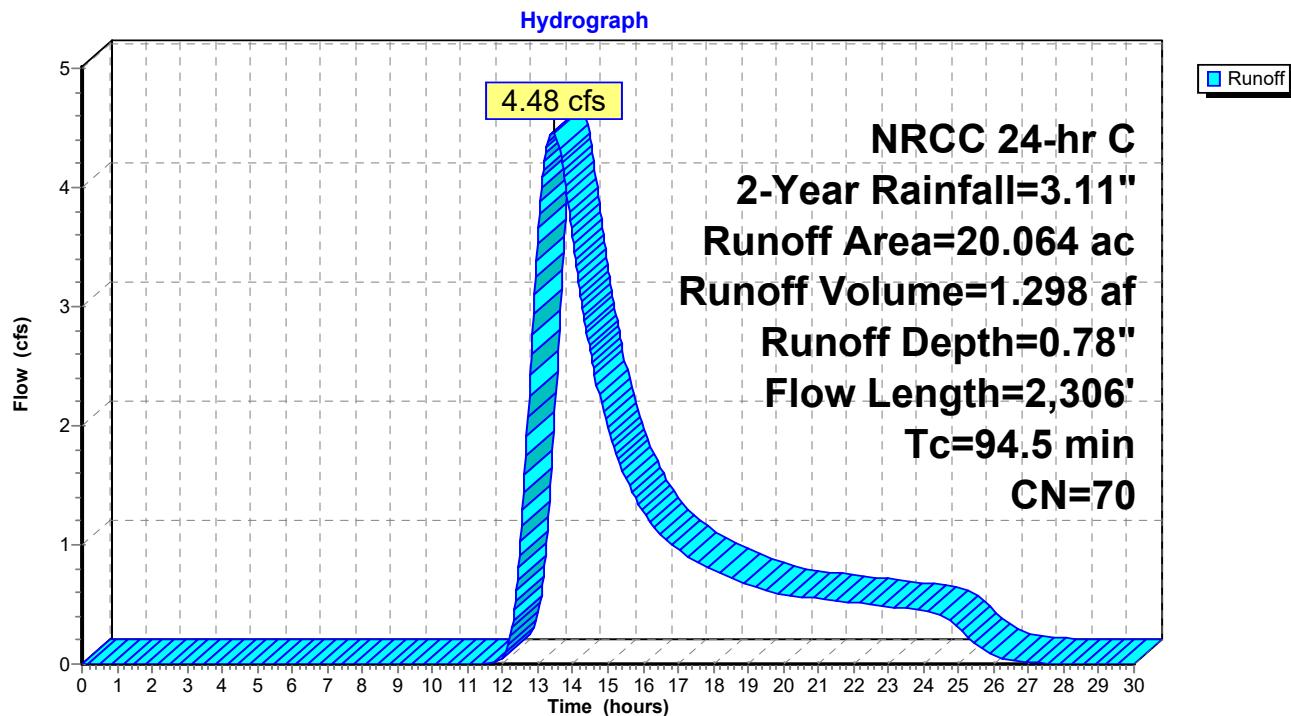
**Summary for Subcatchment Ex-03: Wooded Area East of Main Site**

Runoff = 4.48 cfs @ 13.43 hrs, Volume= 1.298 af, Depth= 0.78"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs  
NRCC 24-hr C 2-Year Rainfall=3.11"

Area (ac)	CN	Description
18.710	70	Woods, Good, HSG C
0.249	55	Woods, Good, HSG B
1.105	77	Woods, Good, HSG D
20.064	70	Weighted Average
20.064		100.00% Pervious Area

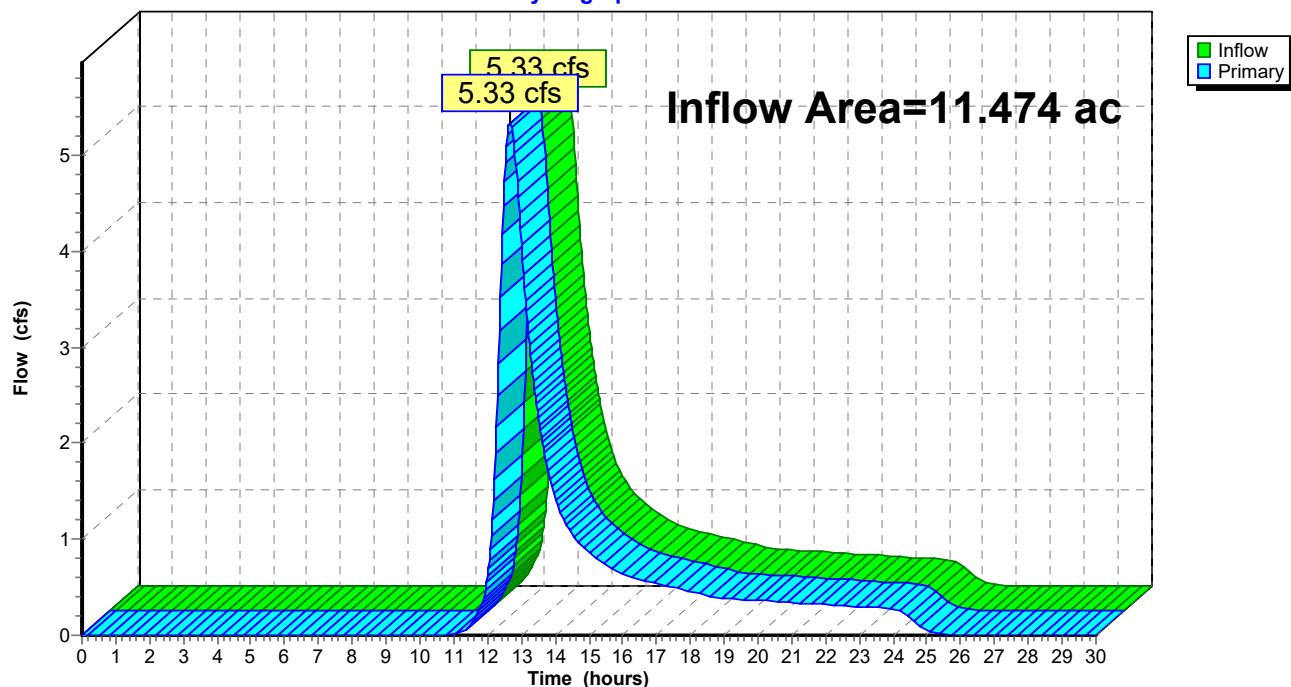
Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.5	100	0.0400	0.10		<b>Sheet Flow, A-B</b> Woods: Light underbrush n= 0.400 P2= 3.11"
20.6	731	0.0140	0.59		<b>Shallow Concentrated Flow, B-C</b> Woodland Kv= 5.0 fps
42.4	697	0.0030	0.27		<b>Shallow Concentrated Flow, C-D</b> Woodland Kv= 5.0 fps
5.9	280	0.0250	0.79		<b>Shallow Concentrated Flow, D-E</b> Woodland Kv= 5.0 fps
2.0	136	0.0530	1.15		<b>Shallow Concentrated Flow, E-F</b> Woodland Kv= 5.0 fps
3.2	152	0.0250	0.79		<b>Shallow Concentrated Flow, F-G</b> Woodland Kv= 5.0 fps
3.9	210	0.0320	0.89		<b>Shallow Concentrated Flow, G-H</b> Woodland Kv= 5.0 fps
94.5	2,306	Total			

**Subcatchment Ex-03: Wooded Area East of Main Site**

**Summary for Pond AP-1: East**

Inflow Area = 11.474 ac, 0.00% Impervious, Inflow Depth = 0.98" for 2-Year event  
Inflow = 5.33 cfs @ 12.67 hrs, Volume= 0.936 af  
Primary = 5.33 cfs @ 12.67 hrs, Volume= 0.936 af, Atten= 0%, Lag= 0.0 min

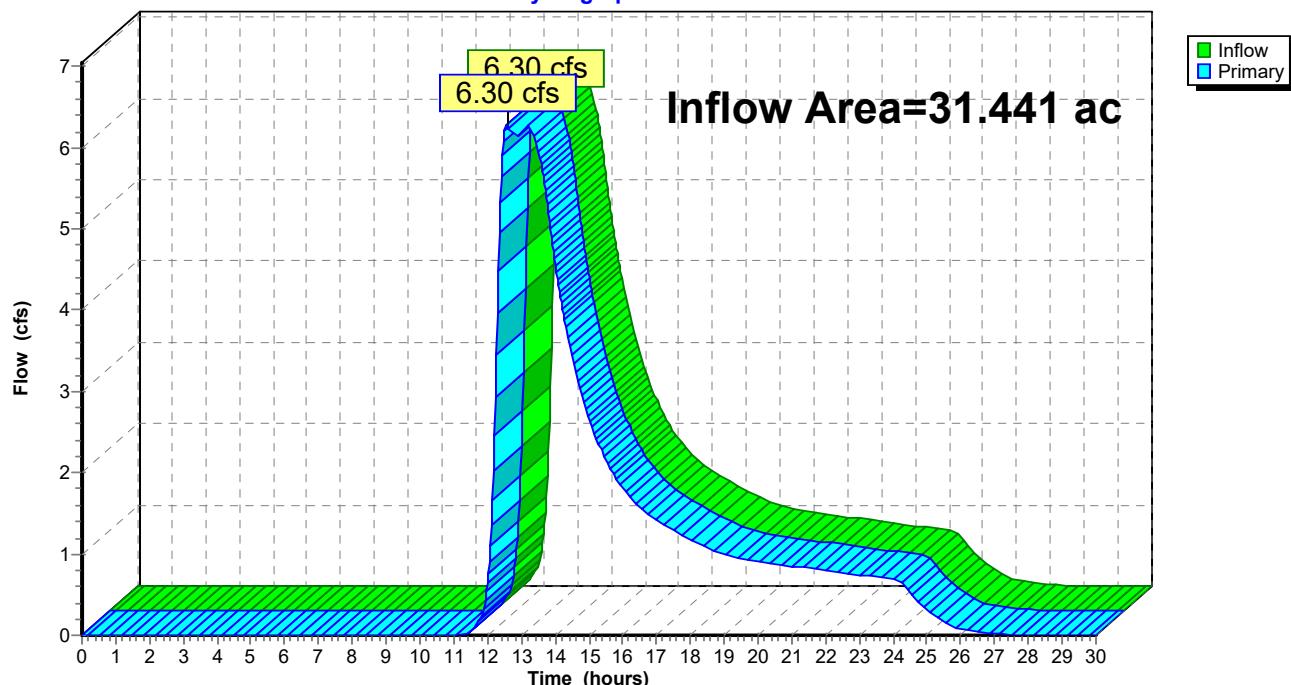
Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs

**Pond AP-1: East****Hydrograph**

**Summary for Pond AP-2: West**

Inflow Area = 31.441 ac, 0.00% Impervious, Inflow Depth = 0.79" for 2-Year event  
Inflow = 6.30 cfs @ 12.57 hrs, Volume= 2.080 af  
Primary = 6.30 cfs @ 12.57 hrs, Volume= 2.080 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs

**Pond AP-2: West****Hydrograph**

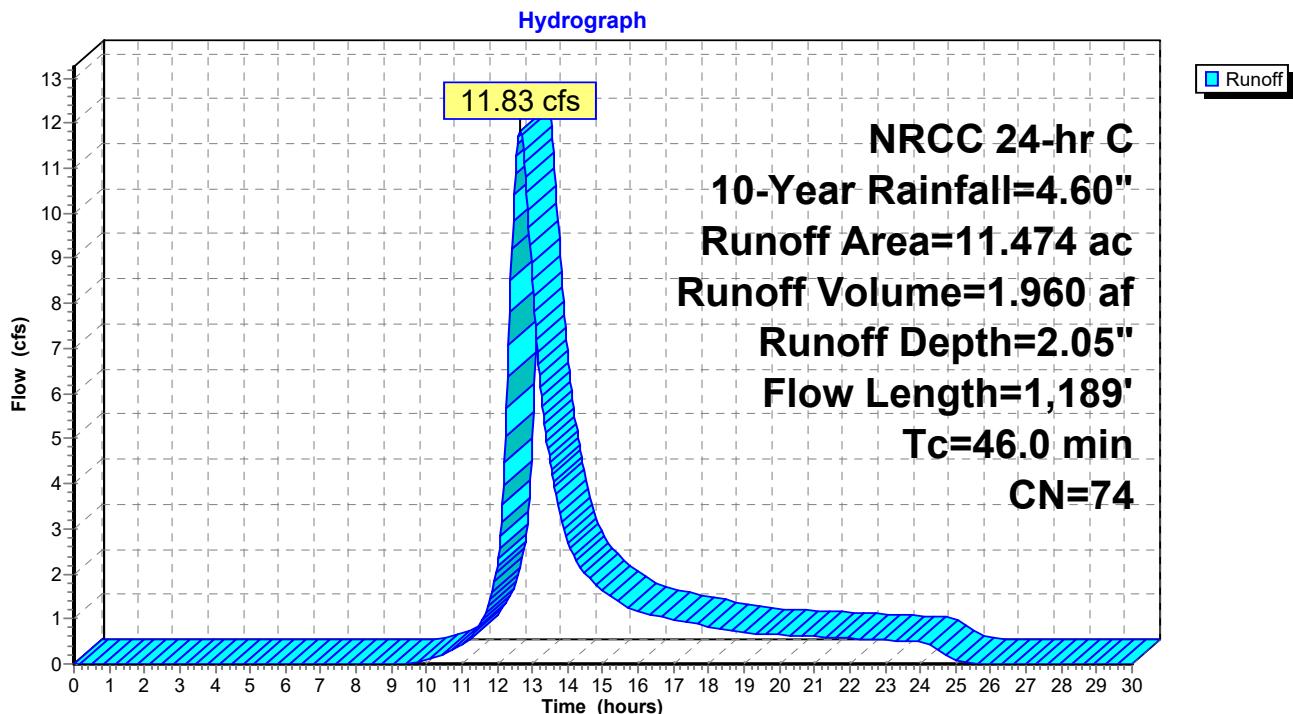
**Summary for Subcatchment Ex-01: Easterly Main Site (Northern Field)**

Runoff = 11.83 cfs @ 12.64 hrs, Volume= 1.960 af, Depth= 2.05"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs  
NRCC 24-hr C 10-Year Rainfall=4.60"

Area (ac)	CN	Description
11.164	74	>75% Grass cover, Good, HSG C
0.310	79	50-75% Grass cover, Fair, HSG C
11.474	74	Weighted Average
11.474		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.4	100	0.0110	0.09		<b>Sheet Flow, A-B</b> Grass: Dense n= 0.240 P2= 3.11"
3.1	169	0.0170	0.91		<b>Shallow Concentrated Flow, B-C</b> Short Grass Pasture Kv= 7.0 fps
24.5	920	0.0080	0.63		<b>Shallow Concentrated Flow, C-D</b> Short Grass Pasture Kv= 7.0 fps
46.0	1,189				Total

**Subcatchment Ex-01: Easterly Main Site (Northern Field)**

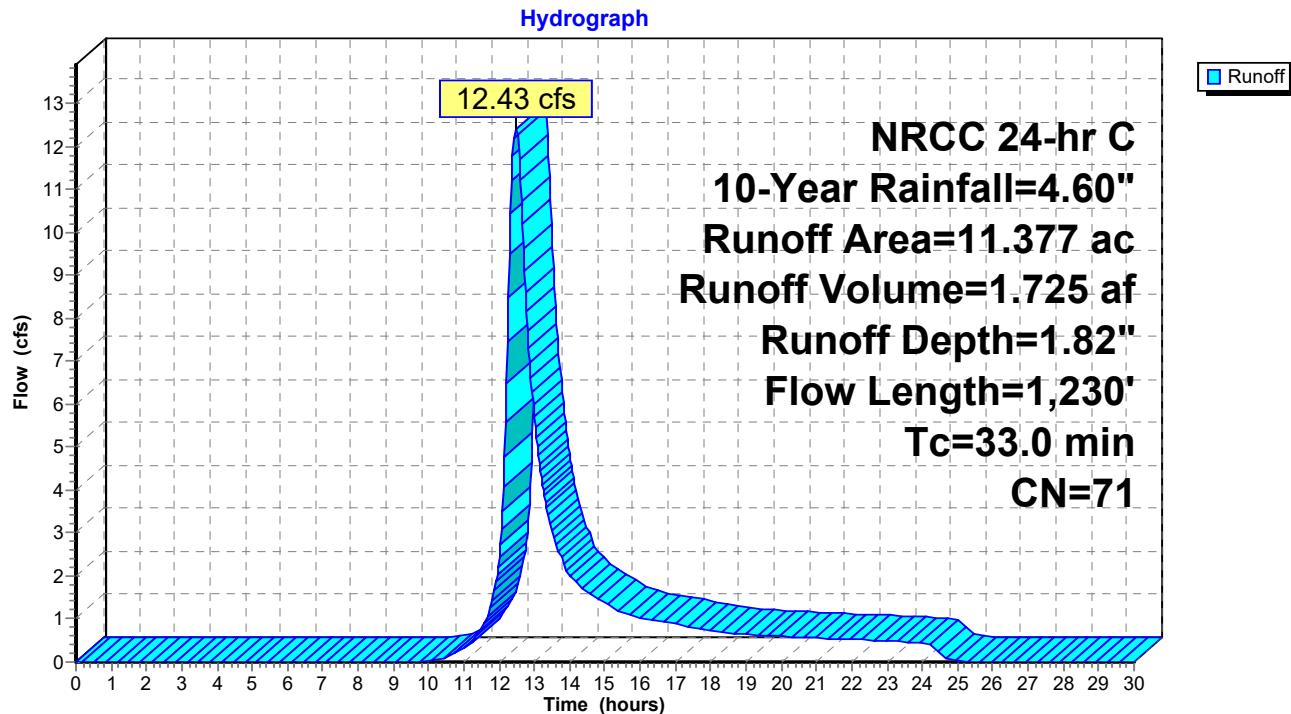
**Summary for Subcatchment Ex-02: Westerly Main Site (Northern Field)**

Runoff = 12.43 cfs @ 12.47 hrs, Volume= 1.725 af, Depth= 1.82"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs  
NRCC 24-hr C 10-Year Rainfall=4.60"

Area (ac)	CN	Description
0.738	74	>75% Grass cover, Good, HSG C
6.629	74	>75% Grass cover, Good, HSG C
2.585	70	Woods, Good, HSG C
0.261	61	>75% Grass cover, Good, HSG B
1.164	55	Woods, Good, HSG B
11.377	71	Weighted Average
11.377		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.6	100	0.0170	0.16		<b>Sheet Flow, A-B</b> Grass: Short n= 0.150 P2= 3.11"
5.8	244	0.0100	0.70		<b>Shallow Concentrated Flow, B-C</b> Short Grass Pasture Kv= 7.0 fps
6.5	310	0.0130	0.80		<b>Shallow Concentrated Flow, C-D</b> Short Grass Pasture Kv= 7.0 fps
5.4	297	0.0330	0.91		<b>Shallow Concentrated Flow, D-E</b> Woodland Kv= 5.0 fps
4.7	279	0.0390	0.99		<b>Shallow Concentrated Flow, E-F</b> Woodland Kv= 5.0 fps
33.0	1,230	Total			

**Subcatchment Ex-02: Westerly Main Site (Northern Field)**

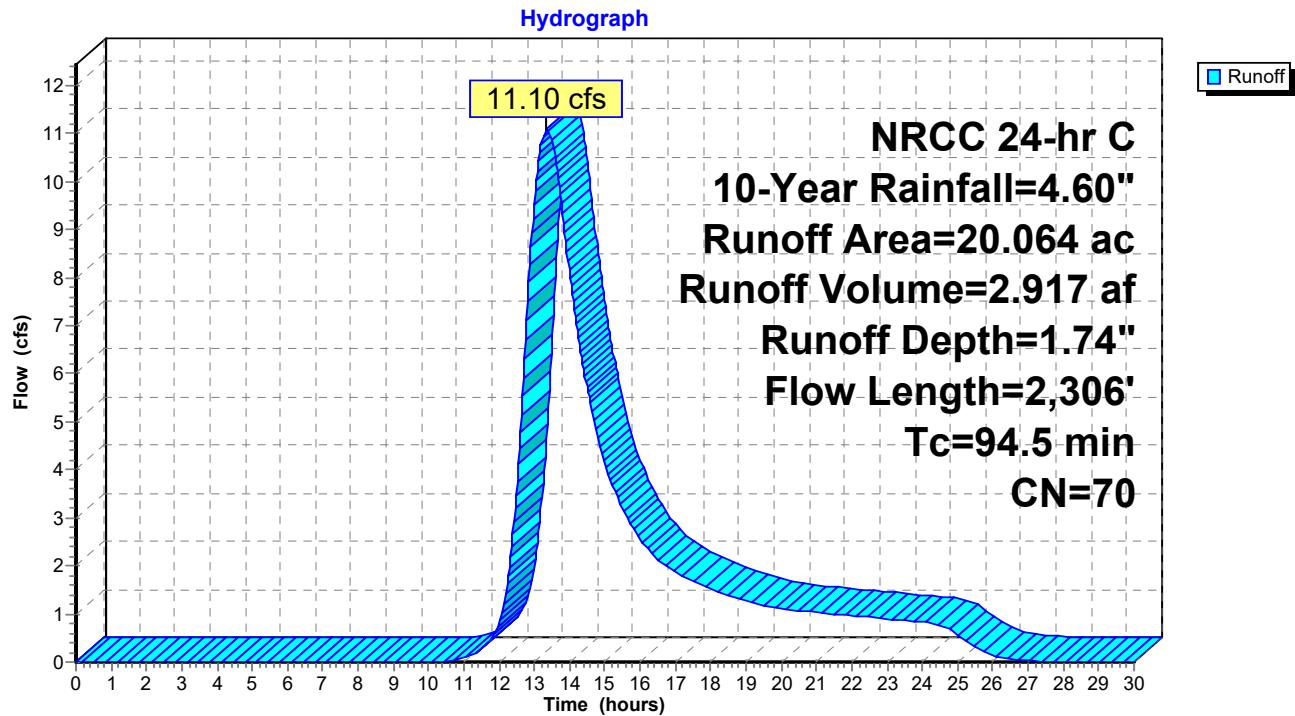
**Summary for Subcatchment Ex-03: Wooded Area East of Main Site**

Runoff = 11.10 cfs @ 13.34 hrs, Volume= 2.917 af, Depth= 1.74"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs  
NRCC 24-hr C 10-Year Rainfall=4.60"

Area (ac)	CN	Description
18.710	70	Woods, Good, HSG C
0.249	55	Woods, Good, HSG B
1.105	77	Woods, Good, HSG D
20.064	70	Weighted Average
20.064		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.5	100	0.0400	0.10		<b>Sheet Flow, A-B</b> Woods: Light underbrush n= 0.400 P2= 3.11"
20.6	731	0.0140	0.59		<b>Shallow Concentrated Flow, B-C</b> Woodland Kv= 5.0 fps
42.4	697	0.0030	0.27		<b>Shallow Concentrated Flow, C-D</b> Woodland Kv= 5.0 fps
5.9	280	0.0250	0.79		<b>Shallow Concentrated Flow, D-E</b> Woodland Kv= 5.0 fps
2.0	136	0.0530	1.15		<b>Shallow Concentrated Flow, E-F</b> Woodland Kv= 5.0 fps
3.2	152	0.0250	0.79		<b>Shallow Concentrated Flow, F-G</b> Woodland Kv= 5.0 fps
3.9	210	0.0320	0.89		<b>Shallow Concentrated Flow, G-H</b> Woodland Kv= 5.0 fps
94.5	2,306	Total			

**Subcatchment Ex-03: Wooded Area East of Main Site**

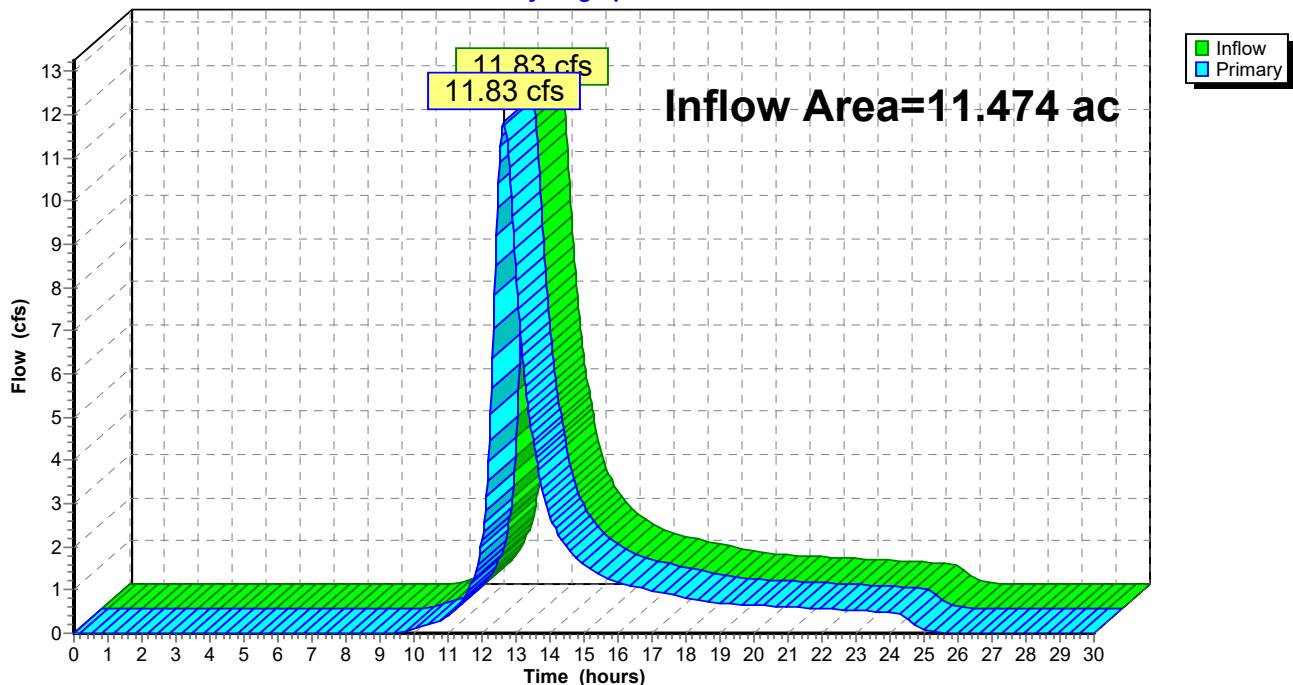
**Summary for Pond AP-1: East**

Inflow Area = 11.474 ac, 0.00% Impervious, Inflow Depth = 2.05" for 10-Year event

Inflow = 11.83 cfs @ 12.64 hrs, Volume= 1.960 af

Primary = 11.83 cfs @ 12.64 hrs, Volume= 1.960 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs

**Pond AP-1: East****Hydrograph**

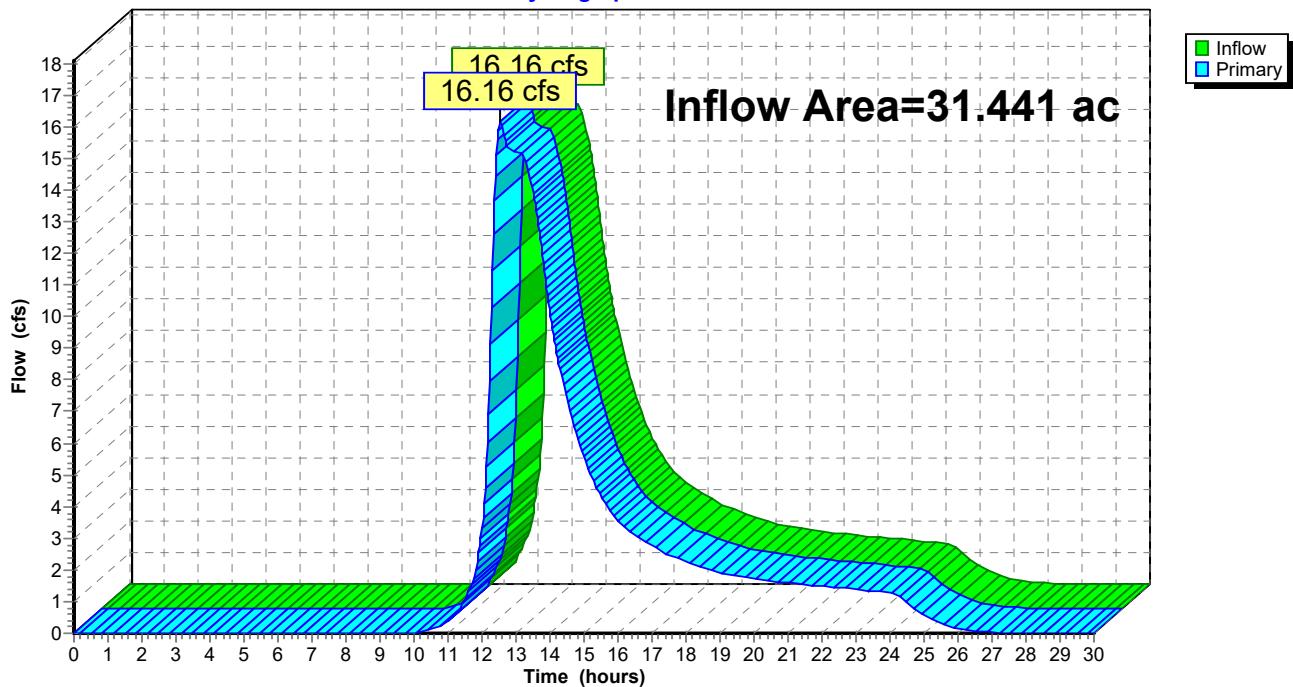
**Summary for Pond AP-2: West**

Inflow Area = 31.441 ac, 0.00% Impervious, Inflow Depth = 1.77" for 10-Year event

Inflow = 16.16 cfs @ 12.55 hrs, Volume= 4.642 af

Primary = 16.16 cfs @ 12.55 hrs, Volume= 4.642 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs

**Pond AP-2: West****Hydrograph**

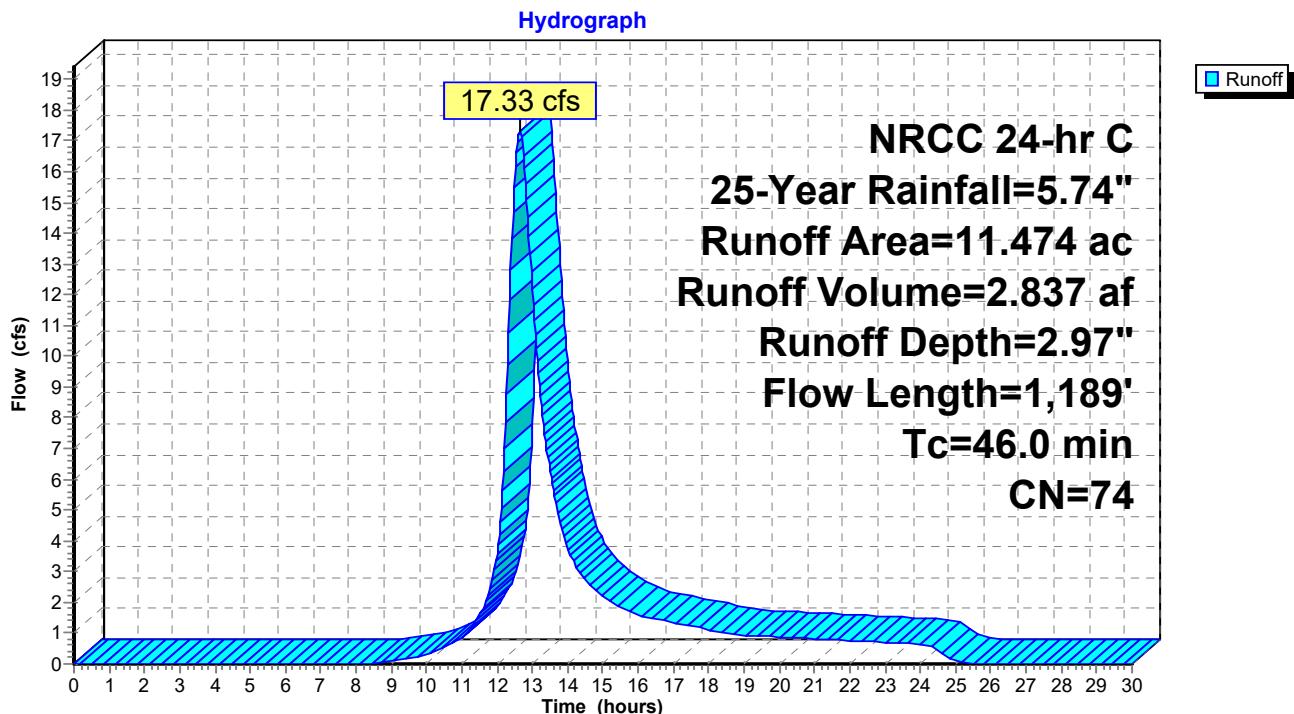
**Summary for Subcatchment Ex-01: Easterly Main Site (Northern Field)**

Runoff = 17.33 cfs @ 12.63 hrs, Volume= 2.837 af, Depth= 2.97"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs  
NRCC 24-hr C 25-Year Rainfall=5.74"

Area (ac)	CN	Description
11.164	74	>75% Grass cover, Good, HSG C
0.310	79	50-75% Grass cover, Fair, HSG C
11.474	74	Weighted Average
11.474		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.4	100	0.0110	0.09		<b>Sheet Flow, A-B</b> Grass: Dense n= 0.240 P2= 3.11"
3.1	169	0.0170	0.91		<b>Shallow Concentrated Flow, B-C</b> Short Grass Pasture Kv= 7.0 fps
24.5	920	0.0080	0.63		<b>Shallow Concentrated Flow, C-D</b> Short Grass Pasture Kv= 7.0 fps
46.0	1,189				Total

**Subcatchment Ex-01: Easterly Main Site (Northern Field)**

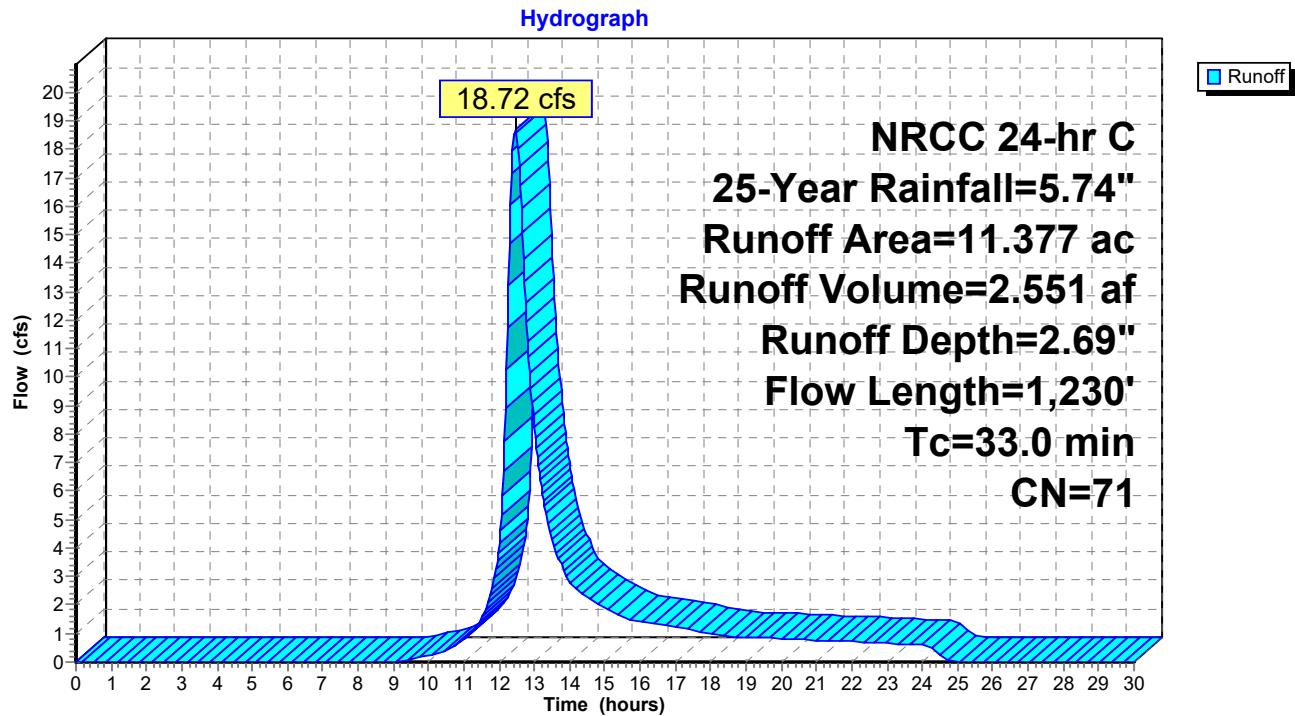
**Summary for Subcatchment Ex-02: Westerly Main Site (Northern Field)**

Runoff = 18.72 cfs @ 12.46 hrs, Volume= 2.551 af, Depth= 2.69"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs  
NRCC 24-hr C 25-Year Rainfall=5.74"

Area (ac)	CN	Description
0.738	74	>75% Grass cover, Good, HSG C
6.629	74	>75% Grass cover, Good, HSG C
2.585	70	Woods, Good, HSG C
0.261	61	>75% Grass cover, Good, HSG B
1.164	55	Woods, Good, HSG B
11.377	71	Weighted Average
11.377		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.6	100	0.0170	0.16		<b>Sheet Flow, A-B</b> Grass: Short n= 0.150 P2= 3.11"
5.8	244	0.0100	0.70		<b>Shallow Concentrated Flow, B-C</b> Short Grass Pasture Kv= 7.0 fps
6.5	310	0.0130	0.80		<b>Shallow Concentrated Flow, C-D</b> Short Grass Pasture Kv= 7.0 fps
5.4	297	0.0330	0.91		<b>Shallow Concentrated Flow, D-E</b> Woodland Kv= 5.0 fps
4.7	279	0.0390	0.99		<b>Shallow Concentrated Flow, E-F</b> Woodland Kv= 5.0 fps
33.0	1,230	Total			

**Subcatchment Ex-02: Westerly Main Site (Northern Field)**

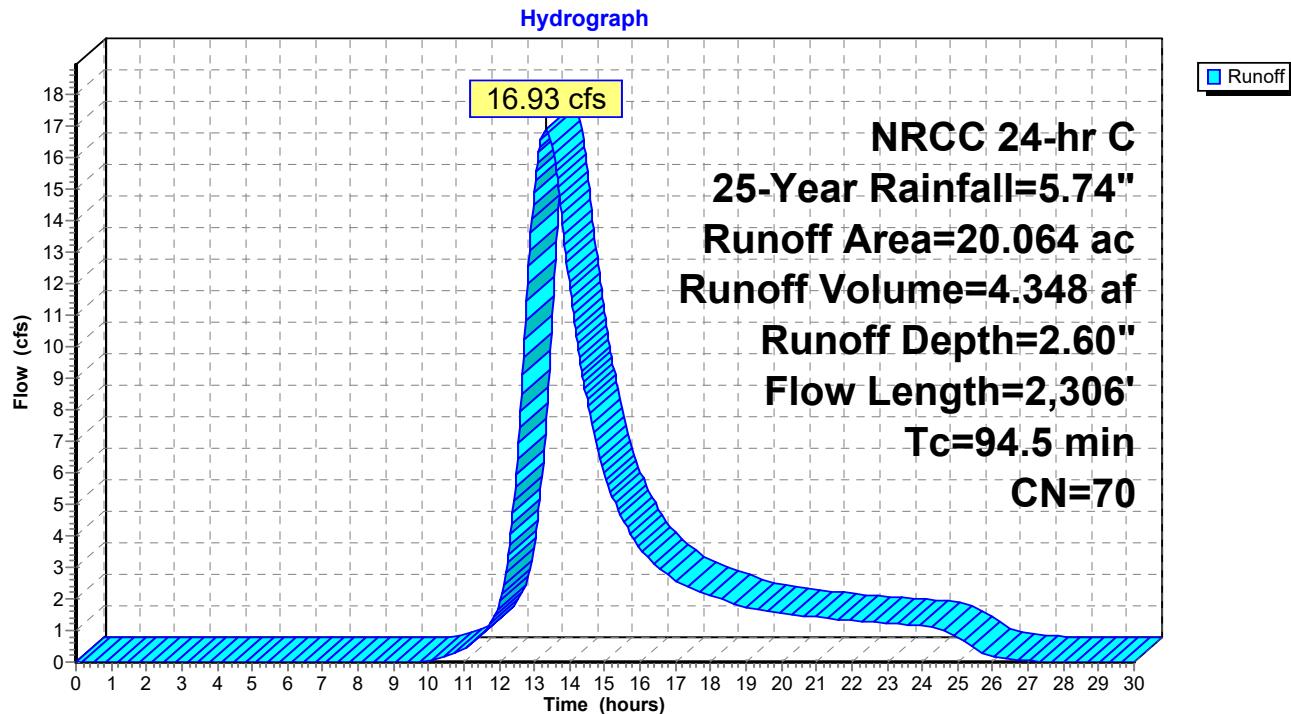
**Summary for Subcatchment Ex-03: Wooded Area East of Main Site**

Runoff = 16.93 cfs @ 13.33 hrs, Volume= 4.348 af, Depth= 2.60"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs  
NRCC 24-hr C 25-Year Rainfall=5.74"

Area (ac)	CN	Description
18.710	70	Woods, Good, HSG C
0.249	55	Woods, Good, HSG B
1.105	77	Woods, Good, HSG D
20.064	70	Weighted Average
20.064		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.5	100	0.0400	0.10		<b>Sheet Flow, A-B</b> Woods: Light underbrush n= 0.400 P2= 3.11"
20.6	731	0.0140	0.59		<b>Shallow Concentrated Flow, B-C</b> Woodland Kv= 5.0 fps
42.4	697	0.0030	0.27		<b>Shallow Concentrated Flow, C-D</b> Woodland Kv= 5.0 fps
5.9	280	0.0250	0.79		<b>Shallow Concentrated Flow, D-E</b> Woodland Kv= 5.0 fps
2.0	136	0.0530	1.15		<b>Shallow Concentrated Flow, E-F</b> Woodland Kv= 5.0 fps
3.2	152	0.0250	0.79		<b>Shallow Concentrated Flow, F-G</b> Woodland Kv= 5.0 fps
3.9	210	0.0320	0.89		<b>Shallow Concentrated Flow, G-H</b> Woodland Kv= 5.0 fps
94.5	2,306	Total			

**Subcatchment Ex-03: Wooded Area East of Main Site**

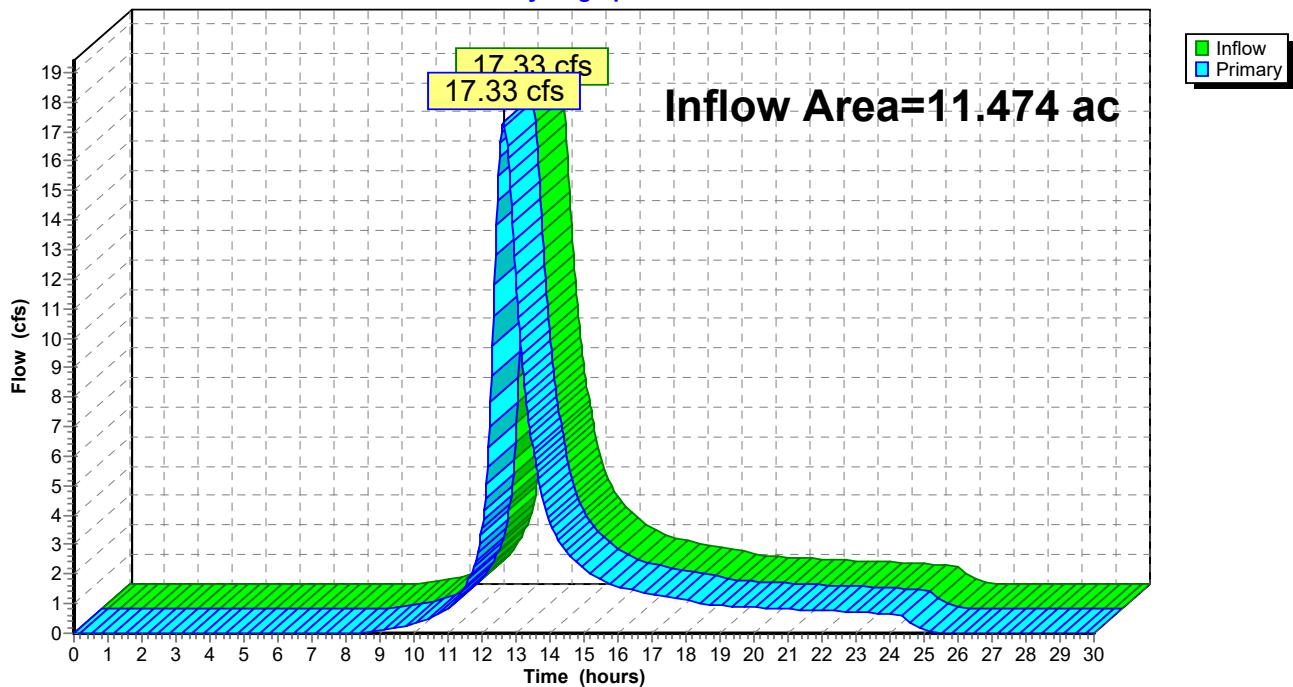
**Summary for Pond AP-1: East**

Inflow Area = 11.474 ac, 0.00% Impervious, Inflow Depth = 2.97" for 25-Year event

Inflow = 17.33 cfs @ 12.63 hrs, Volume= 2.837 af

Primary = 17.33 cfs @ 12.63 hrs, Volume= 2.837 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs

**Pond AP-1: East****Hydrograph**

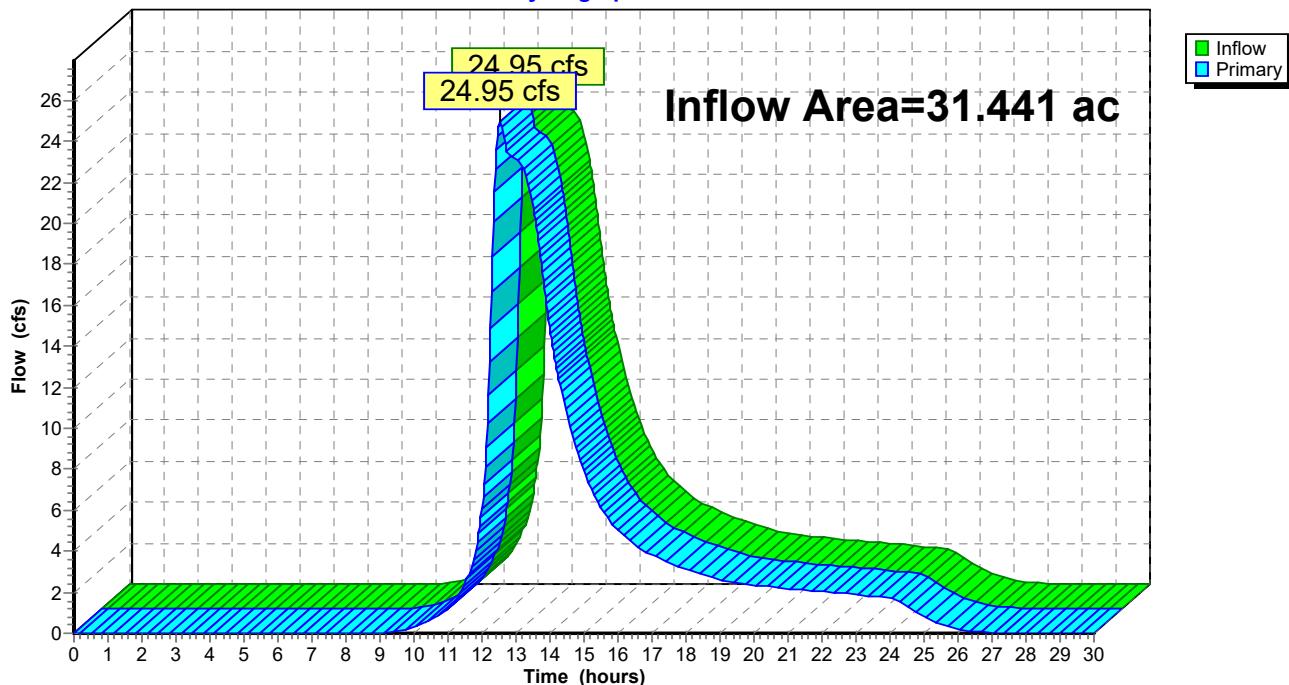
**Summary for Pond AP-2: West**

Inflow Area = 31.441 ac, 0.00% Impervious, Inflow Depth = 2.63" for 25-Year event

Inflow = 24.95 cfs @ 12.53 hrs, Volume= 6.899 af

Primary = 24.95 cfs @ 12.53 hrs, Volume= 6.899 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs

**Pond AP-2: West****Hydrograph**

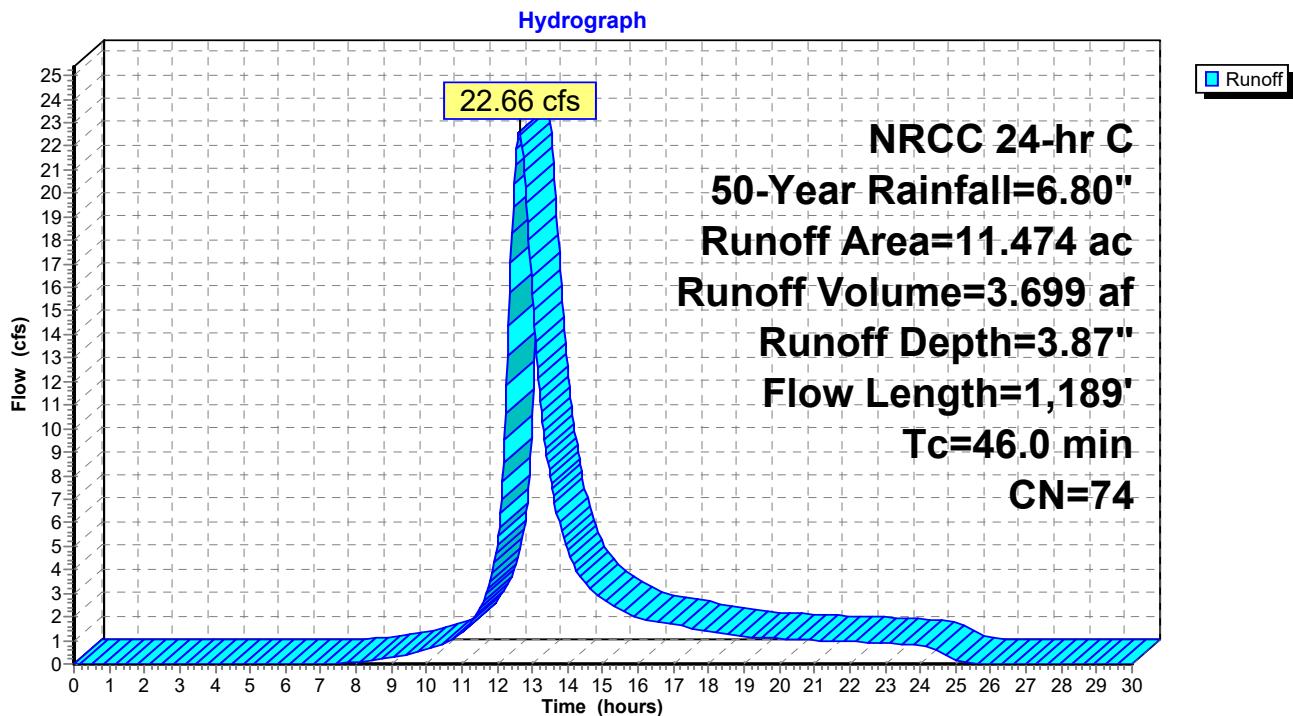
**Summary for Subcatchment Ex-01: Easterly Main Site (Northern Field)**

Runoff = 22.66 cfs @ 12.63 hrs, Volume= 3.699 af, Depth= 3.87"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs  
NRCC 24-hr C 50-Year Rainfall=6.80"

Area (ac)	CN	Description
11.164	74	>75% Grass cover, Good, HSG C
0.310	79	50-75% Grass cover, Fair, HSG C
11.474	74	Weighted Average
11.474		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.4	100	0.0110	0.09		<b>Sheet Flow, A-B</b> Grass: Dense n= 0.240 P2= 3.11"
3.1	169	0.0170	0.91		<b>Shallow Concentrated Flow, B-C</b> Short Grass Pasture Kv= 7.0 fps
24.5	920	0.0080	0.63		<b>Shallow Concentrated Flow, C-D</b> Short Grass Pasture Kv= 7.0 fps
46.0	1,189				Total

**Subcatchment Ex-01: Easterly Main Site (Northern Field)**

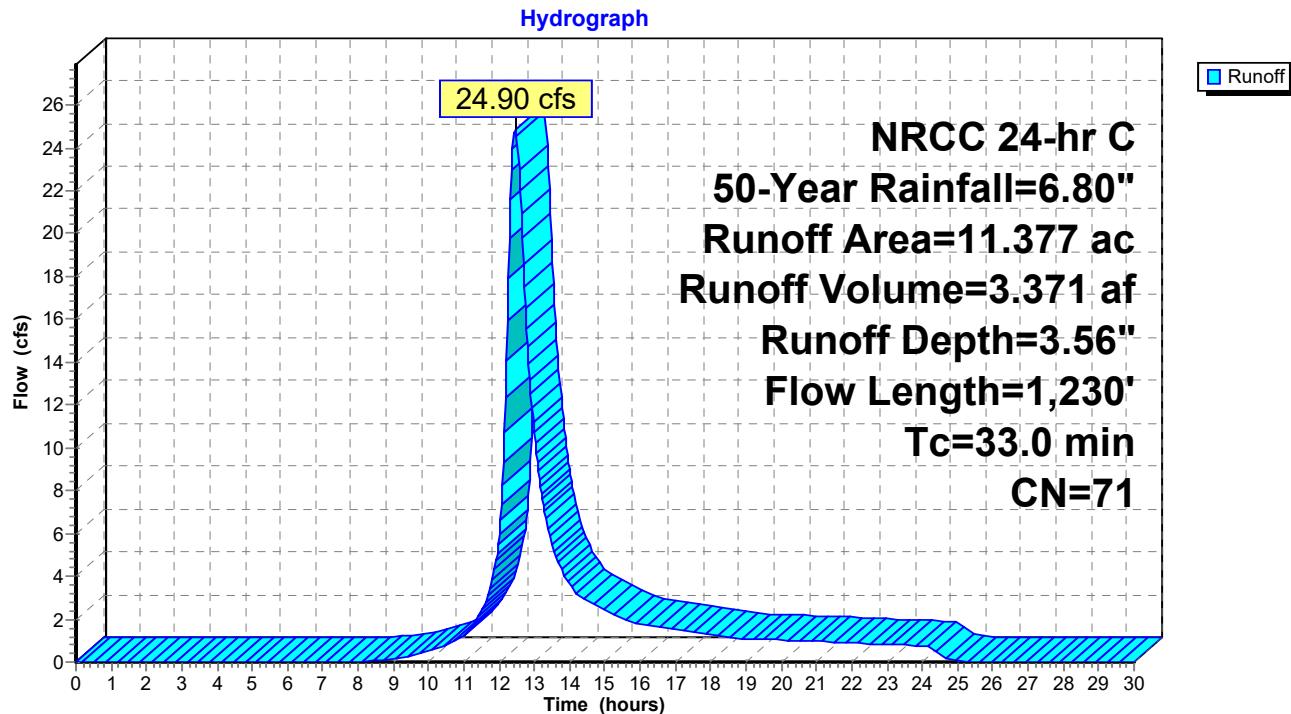
**Summary for Subcatchment Ex-02: Westerly Main Site (Northern Field)**

Runoff = 24.90 cfs @ 12.46 hrs, Volume= 3.371 af, Depth= 3.56"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs  
NRCC 24-hr C 50-Year Rainfall=6.80"

Area (ac)	CN	Description
0.738	74	>75% Grass cover, Good, HSG C
6.629	74	>75% Grass cover, Good, HSG C
2.585	70	Woods, Good, HSG C
0.261	61	>75% Grass cover, Good, HSG B
1.164	55	Woods, Good, HSG B
11.377	71	Weighted Average
11.377		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.6	100	0.0170	0.16		<b>Sheet Flow, A-B</b> Grass: Short n= 0.150 P2= 3.11"
5.8	244	0.0100	0.70		<b>Shallow Concentrated Flow, B-C</b> Short Grass Pasture Kv= 7.0 fps
6.5	310	0.0130	0.80		<b>Shallow Concentrated Flow, C-D</b> Short Grass Pasture Kv= 7.0 fps
5.4	297	0.0330	0.91		<b>Shallow Concentrated Flow, D-E</b> Woodland Kv= 5.0 fps
4.7	279	0.0390	0.99		<b>Shallow Concentrated Flow, E-F</b> Woodland Kv= 5.0 fps
33.0	1,230	Total			

**Subcatchment Ex-02: Westerly Main Site (Northern Field)**

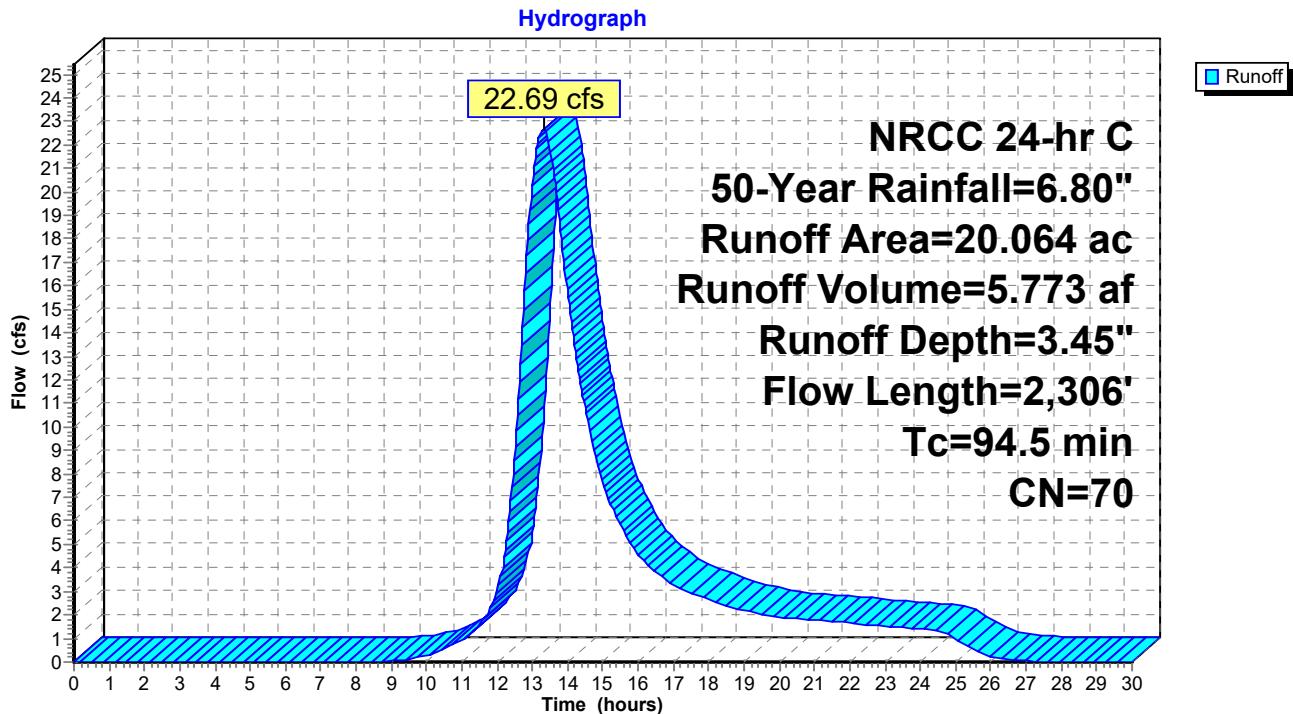
**Summary for Subcatchment Ex-03: Wooded Area East of Main Site**

Runoff = 22.69 cfs @ 13.32 hrs, Volume= 5.773 af, Depth= 3.45"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs  
NRCC 24-hr C 50-Year Rainfall=6.80"

Area (ac)	CN	Description
18.710	70	Woods, Good, HSG C
0.249	55	Woods, Good, HSG B
1.105	77	Woods, Good, HSG D
20.064	70	Weighted Average
20.064		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.5	100	0.0400	0.10		<b>Sheet Flow, A-B</b> Woods: Light underbrush n= 0.400 P2= 3.11"
20.6	731	0.0140	0.59		<b>Shallow Concentrated Flow, B-C</b> Woodland Kv= 5.0 fps
42.4	697	0.0030	0.27		<b>Shallow Concentrated Flow, C-D</b> Woodland Kv= 5.0 fps
5.9	280	0.0250	0.79		<b>Shallow Concentrated Flow, D-E</b> Woodland Kv= 5.0 fps
2.0	136	0.0530	1.15		<b>Shallow Concentrated Flow, E-F</b> Woodland Kv= 5.0 fps
3.2	152	0.0250	0.79		<b>Shallow Concentrated Flow, F-G</b> Woodland Kv= 5.0 fps
3.9	210	0.0320	0.89		<b>Shallow Concentrated Flow, G-H</b> Woodland Kv= 5.0 fps
94.5	2,306	Total			

**Subcatchment Ex-03: Wooded Area East of Main Site**

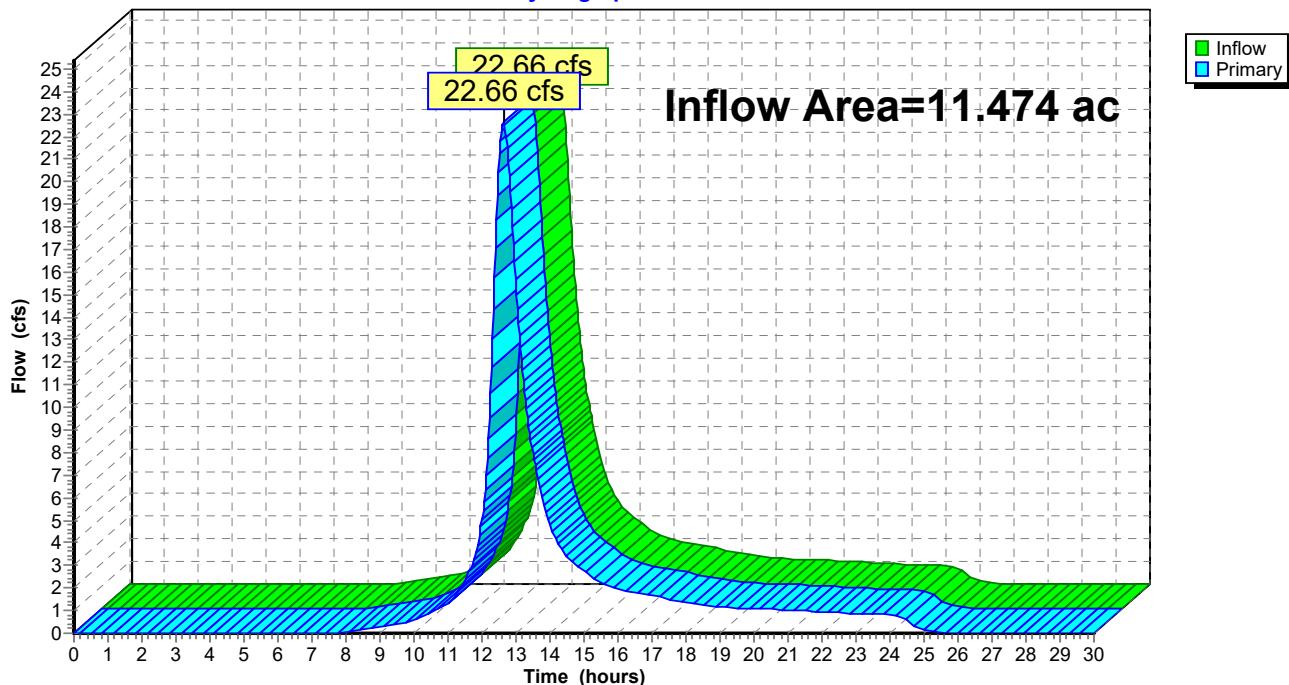
**Summary for Pond AP-1: East**

Inflow Area = 11.474 ac, 0.00% Impervious, Inflow Depth = 3.87" for 50-Year event

Inflow = 22.66 cfs @ 12.63 hrs, Volume= 3.699 af

Primary = 22.66 cfs @ 12.63 hrs, Volume= 3.699 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs

**Pond AP-1: East****Hydrograph**

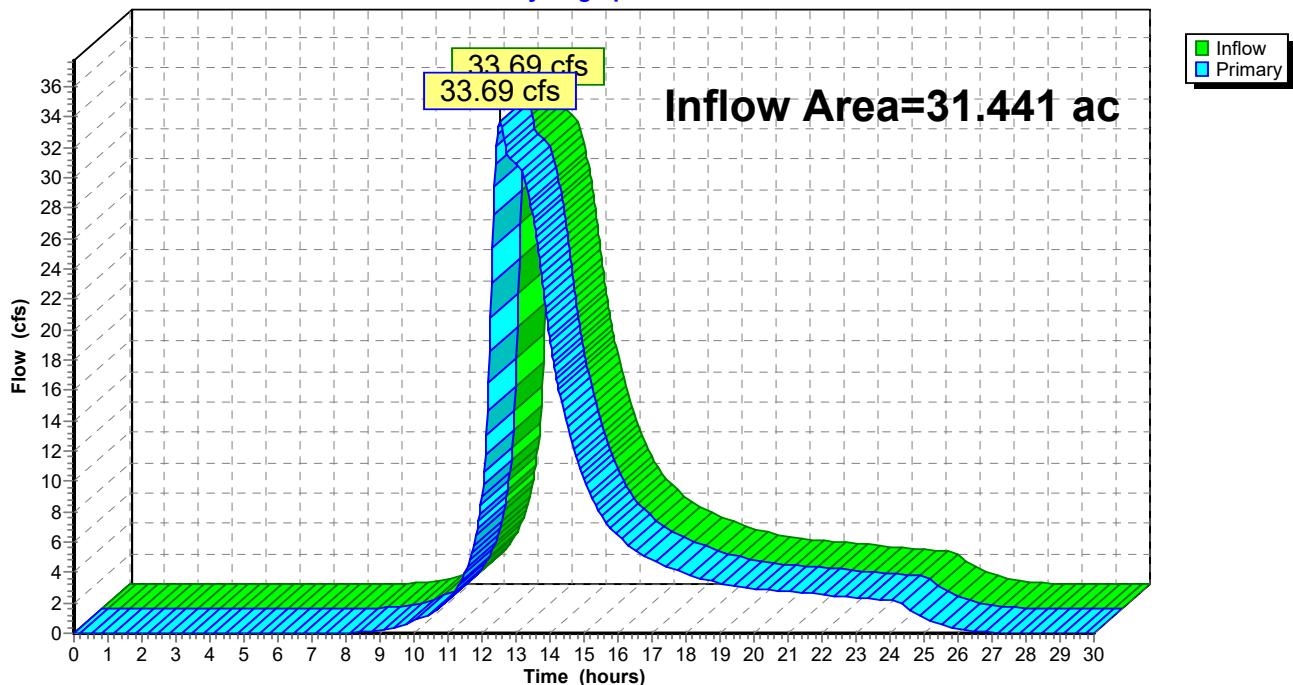
**Summary for Pond AP-2: West**

Inflow Area = 31.441 ac, 0.00% Impervious, Inflow Depth = 3.49" for 50-Year event

Inflow = 33.69 cfs @ 12.53 hrs, Volume= 9.144 af

Primary = 33.69 cfs @ 12.53 hrs, Volume= 9.144 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs

**Pond AP-2: West****Hydrograph**

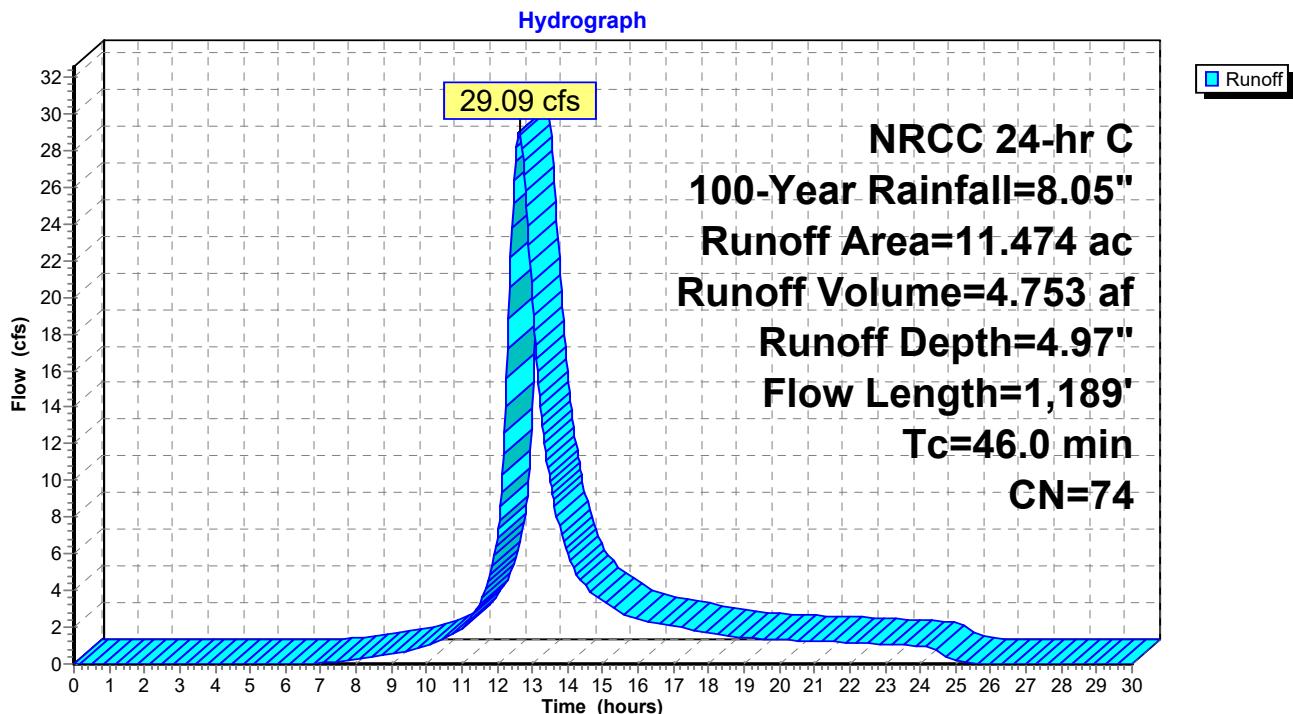
**Summary for Subcatchment Ex-01: Easterly Main Site (Northern Field)**

Runoff = 29.09 cfs @ 12.63 hrs, Volume= 4.753 af, Depth= 4.97"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs  
NRCC 24-hr C 100-Year Rainfall=8.05"

Area (ac)	CN	Description
11.164	74	>75% Grass cover, Good, HSG C
0.310	79	50-75% Grass cover, Fair, HSG C
11.474	74	Weighted Average
11.474		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.4	100	0.0110	0.09		<b>Sheet Flow, A-B</b> Grass: Dense n= 0.240 P2= 3.11"
3.1	169	0.0170	0.91		<b>Shallow Concentrated Flow, B-C</b> Short Grass Pasture Kv= 7.0 fps
24.5	920	0.0080	0.63		<b>Shallow Concentrated Flow, C-D</b> Short Grass Pasture Kv= 7.0 fps
46.0	1,189				Total

**Subcatchment Ex-01: Easterly Main Site (Northern Field)**

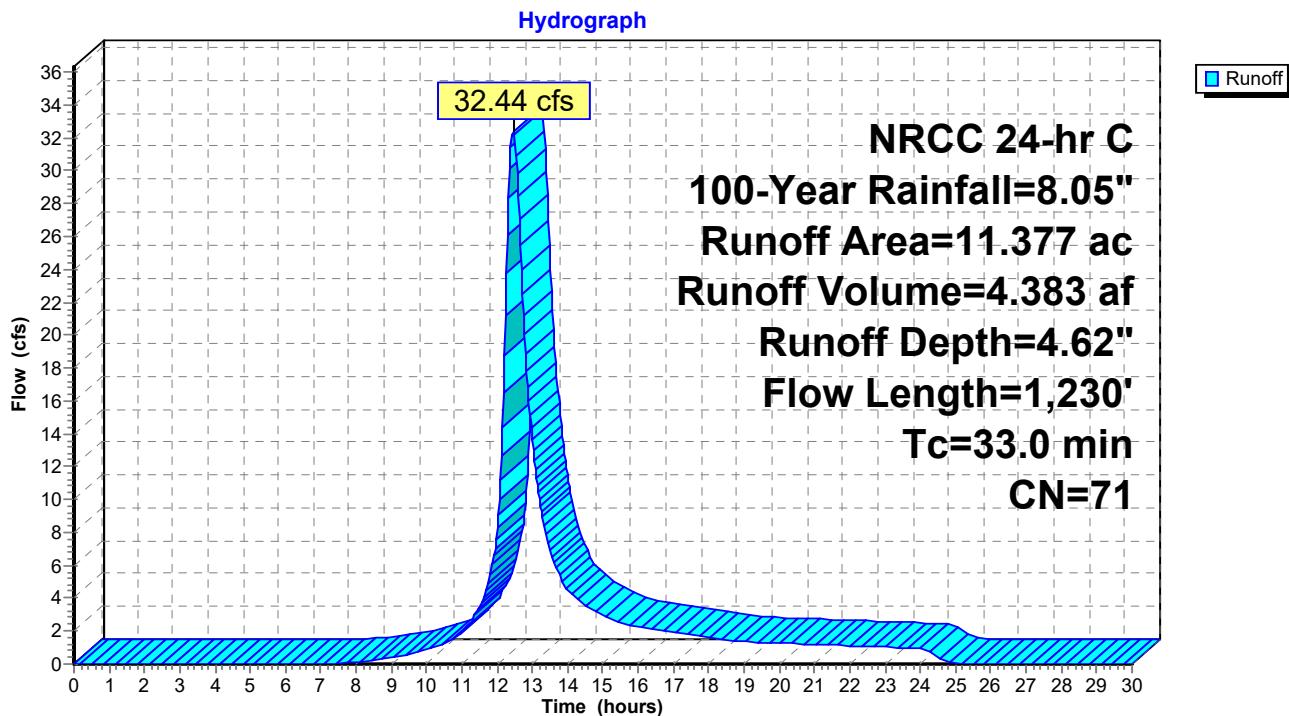
**Summary for Subcatchment Ex-02: Westerly Main Site (Northern Field)**

Runoff = 32.44 cfs @ 12.45 hrs, Volume= 4.383 af, Depth= 4.62"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs  
NRCC 24-hr C 100-Year Rainfall=8.05"

Area (ac)	CN	Description
0.738	74	>75% Grass cover, Good, HSG C
6.629	74	>75% Grass cover, Good, HSG C
2.585	70	Woods, Good, HSG C
0.261	61	>75% Grass cover, Good, HSG B
1.164	55	Woods, Good, HSG B
11.377	71	Weighted Average
11.377		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.6	100	0.0170	0.16		<b>Sheet Flow, A-B</b> Grass: Short n= 0.150 P2= 3.11"
5.8	244	0.0100	0.70		<b>Shallow Concentrated Flow, B-C</b> Short Grass Pasture Kv= 7.0 fps
6.5	310	0.0130	0.80		<b>Shallow Concentrated Flow, C-D</b> Short Grass Pasture Kv= 7.0 fps
5.4	297	0.0330	0.91		<b>Shallow Concentrated Flow, D-E</b> Woodland Kv= 5.0 fps
4.7	279	0.0390	0.99		<b>Shallow Concentrated Flow, E-F</b> Woodland Kv= 5.0 fps
33.0	1,230	Total			

**Subcatchment Ex-02: Westerly Main Site (Northern Field)**

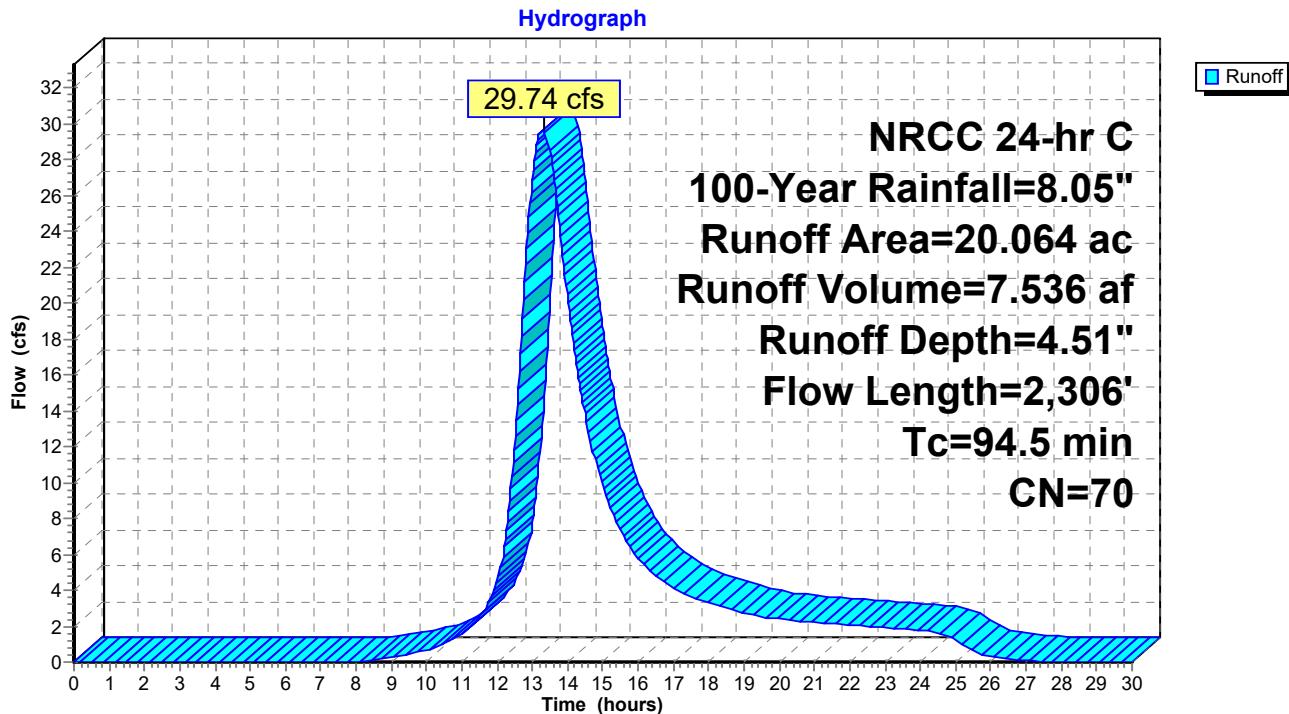
**Summary for Subcatchment Ex-03: Wooded Area East of Main Site**

Runoff = 29.74 cfs @ 13.31 hrs, Volume= 7.536 af, Depth= 4.51"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs  
NRCC 24-hr C 100-Year Rainfall=8.05"

Area (ac)	CN	Description
18.710	70	Woods, Good, HSG C
0.249	55	Woods, Good, HSG B
1.105	77	Woods, Good, HSG D
20.064	70	Weighted Average
20.064		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.5	100	0.0400	0.10		<b>Sheet Flow, A-B</b> Woods: Light underbrush n= 0.400 P2= 3.11"
20.6	731	0.0140	0.59		<b>Shallow Concentrated Flow, B-C</b> Woodland Kv= 5.0 fps
42.4	697	0.0030	0.27		<b>Shallow Concentrated Flow, C-D</b> Woodland Kv= 5.0 fps
5.9	280	0.0250	0.79		<b>Shallow Concentrated Flow, D-E</b> Woodland Kv= 5.0 fps
2.0	136	0.0530	1.15		<b>Shallow Concentrated Flow, E-F</b> Woodland Kv= 5.0 fps
3.2	152	0.0250	0.79		<b>Shallow Concentrated Flow, F-G</b> Woodland Kv= 5.0 fps
3.9	210	0.0320	0.89		<b>Shallow Concentrated Flow, G-H</b> Woodland Kv= 5.0 fps
94.5	2,306	Total			

**Subcatchment Ex-03: Wooded Area East of Main Site**

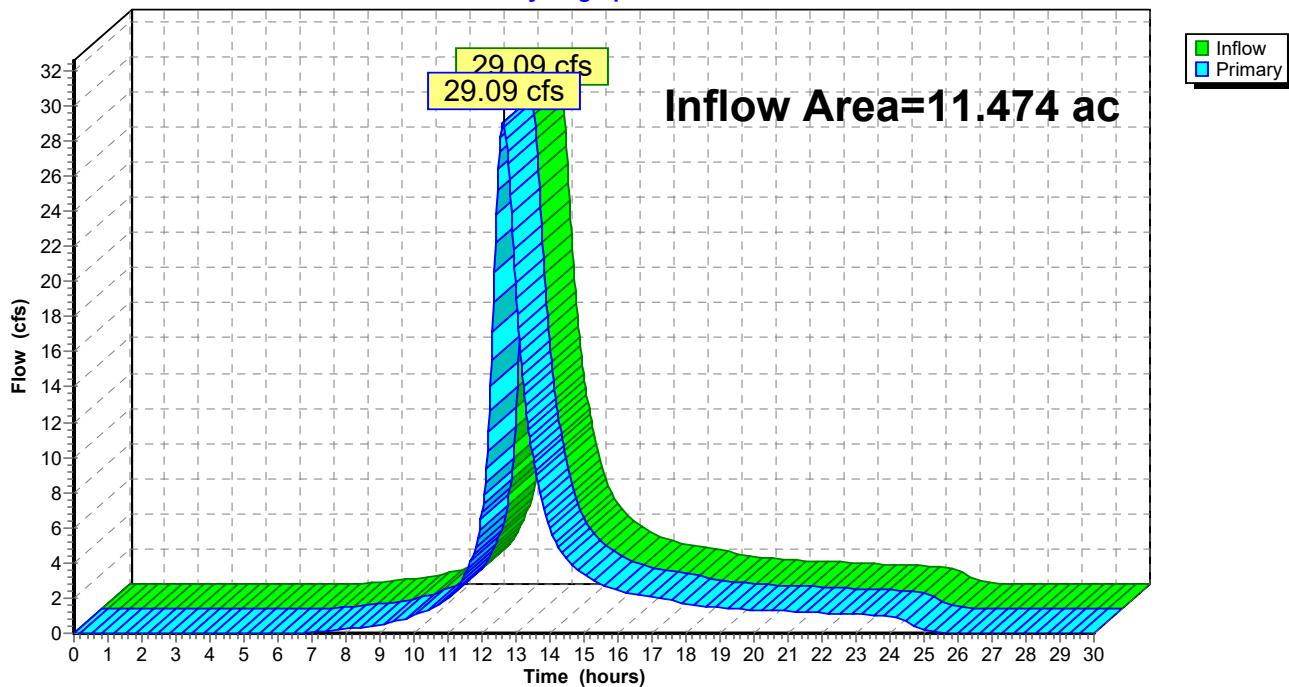
**Summary for Pond AP-1: East**

Inflow Area = 11.474 ac, 0.00% Impervious, Inflow Depth = 4.97" for 100-Year event

Inflow = 29.09 cfs @ 12.63 hrs, Volume= 4.753 af

Primary = 29.09 cfs @ 12.63 hrs, Volume= 4.753 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs

**Pond AP-1: East****Hydrograph**

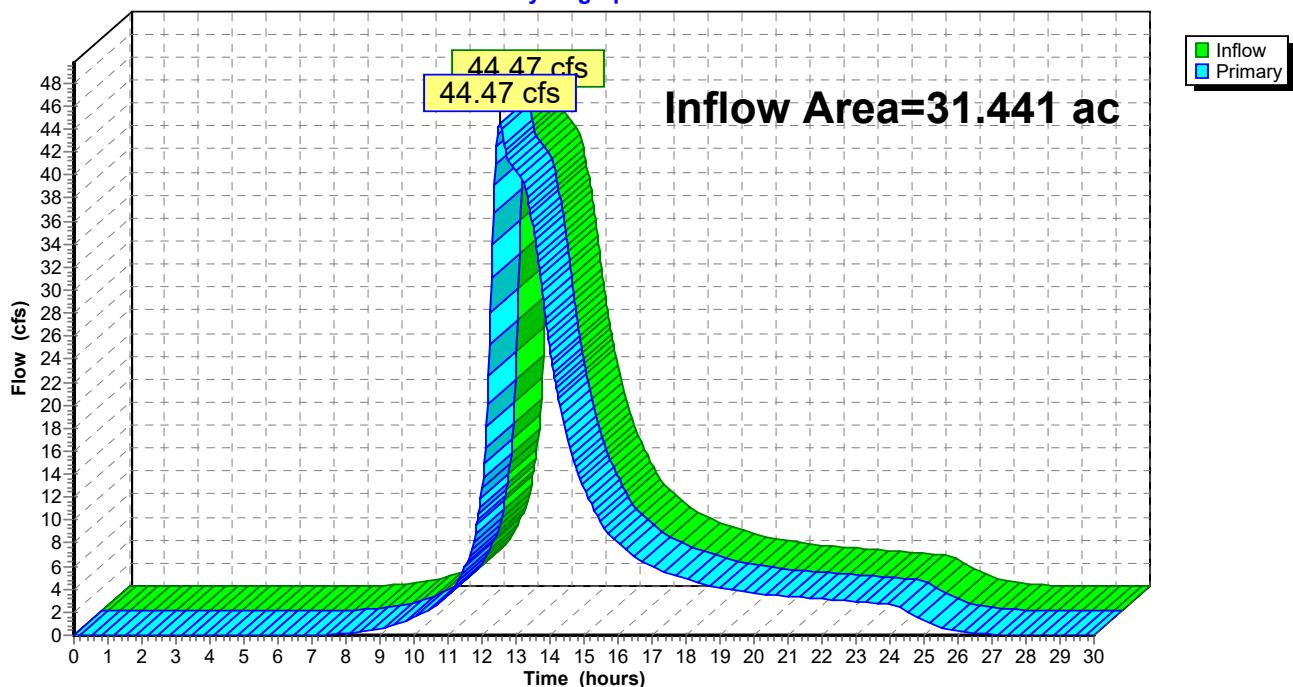
**Summary for Pond AP-2: West**

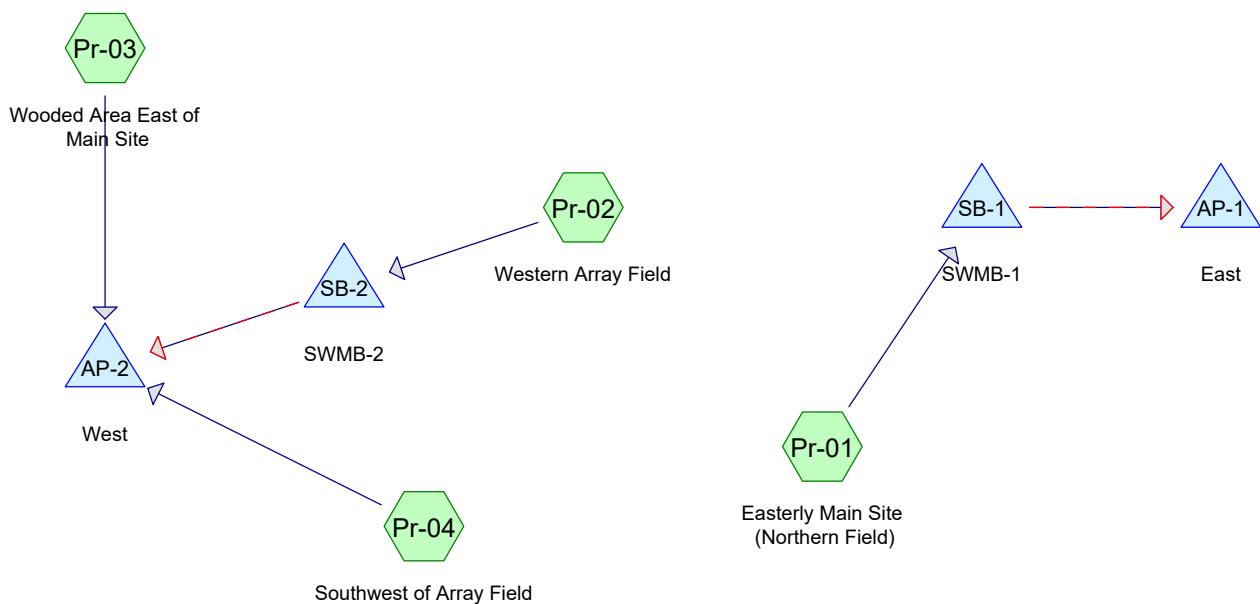
Inflow Area = 31.441 ac, 0.00% Impervious, Inflow Depth = 4.55" for 100-Year event

Inflow = 44.47 cfs @ 12.52 hrs, Volume= 11.919 af

Primary = 44.47 cfs @ 12.52 hrs, Volume= 11.919 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs

**Pond AP-2: West****Hydrograph**



**Summary for Subcatchment Pr-01: Easterly Main Site (Northern Field)**

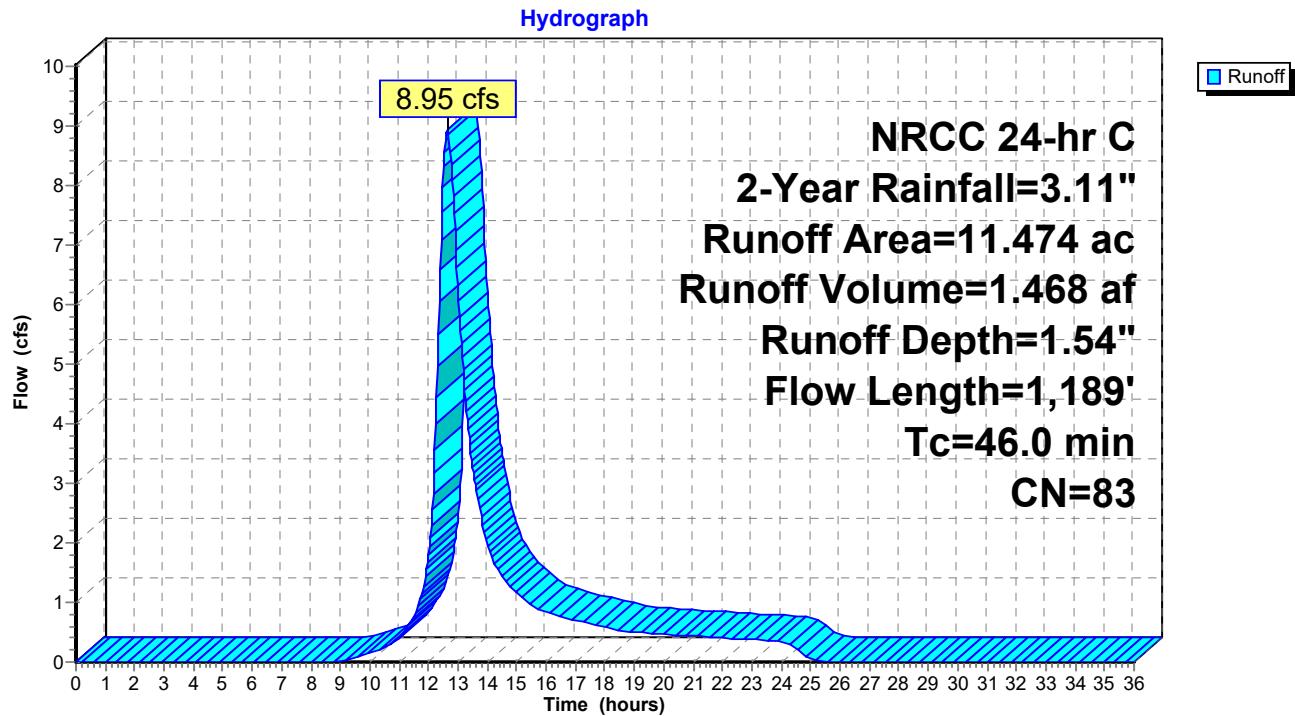
Runoff = 8.95 cfs @ 12.63 hrs, Volume= 1.468 af, Depth= 1.54"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.03 hrs  
NRCC 24-hr C 2-Year Rainfall=3.11"

Area (ac)	CN	Description
6.697	74	>75% Grass cover, Good, HSG C
0.310	79	50-75% Grass cover, Fair, HSG C
4.341	98	Unconnected roofs, HSG C
0.126	96	Gravel surface, HSG C

11.474	83	Weighted Average
7.133		62.17% Pervious Area
4.341		37.83% Impervious Area
4.341		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.4	100	0.0110	0.09		<b>Sheet Flow, A-B</b> Grass: Dense n= 0.240 P2= 3.11"
3.1	169	0.0170	0.91		<b>Shallow Concentrated Flow, B-C</b> Short Grass Pasture Kv= 7.0 fps
24.5	920	0.0080	0.63		<b>Shallow Concentrated Flow, C-D</b> Short Grass Pasture Kv= 7.0 fps
46.0	1,189	Total			

**Subcatchment Pr-01: Easterly Main Site (Northern Field)**

**Summary for Subcatchment Pr-02: Western Array Field**

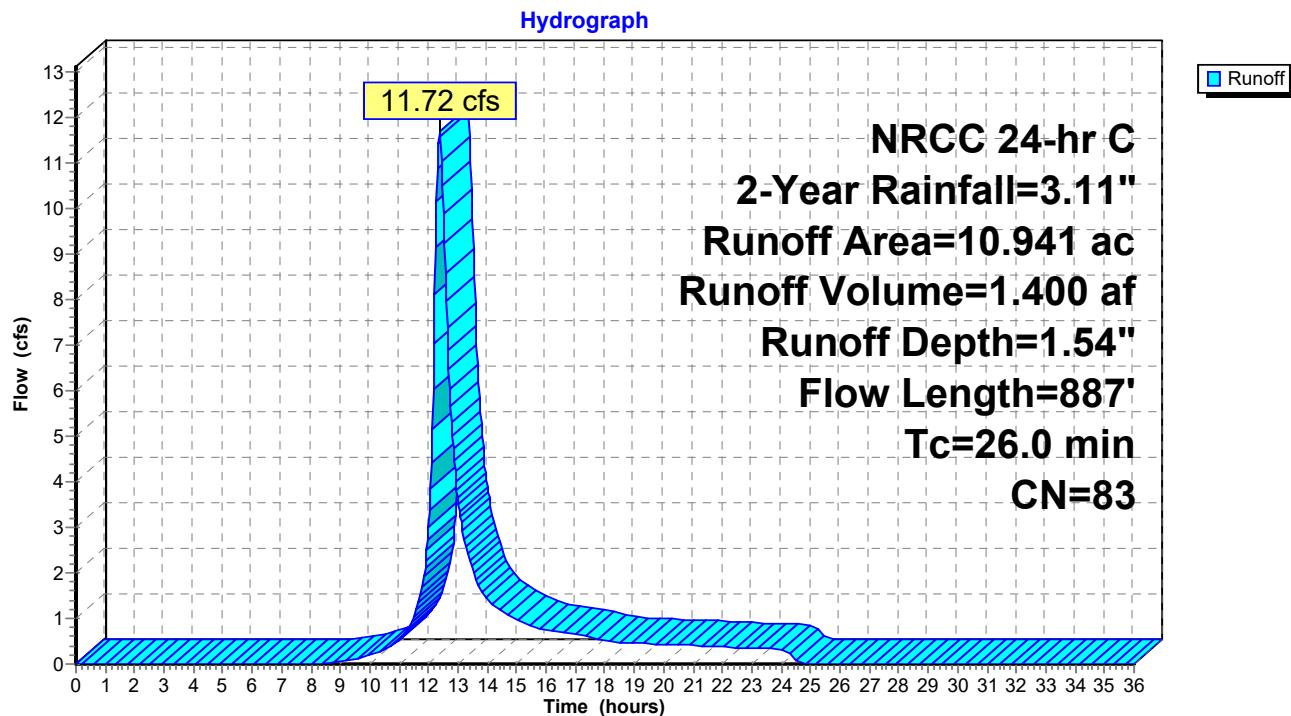
Runoff = 11.72 cfs @ 12.38 hrs, Volume= 1.400 af, Depth= 1.54"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.03 hrs  
NRCC 24-hr C 2-Year Rainfall=3.11"

Area (ac)	CN	Description
6.455	74	>75% Grass cover, Good, HSG C
0.294	70	Woods, Good, HSG C
4.005	98	Unconnected roofs, HSG C
0.187	96	Gravel surface, HSG C

10.941	83	Weighted Average
6.936		63.39% Pervious Area
4.005		36.61% Impervious Area
4.005		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.6	100	0.0170	0.16		<b>Sheet Flow, A-B</b> Grass: Short n= 0.150 P2= 3.11"
5.8	244	0.0100	0.70		<b>Shallow Concentrated Flow, B-C</b> Short Grass Pasture Kv= 7.0 fps
6.5	310	0.0130	0.80		<b>Shallow Concentrated Flow, C-D</b> Short Grass Pasture Kv= 7.0 fps
3.1	233	0.0330	1.27		<b>Shallow Concentrated Flow, D-E</b> Short Grass Pasture Kv= 7.0 fps
26.0	887	Total			

**Subcatchment Pr-02: Western Array Field**

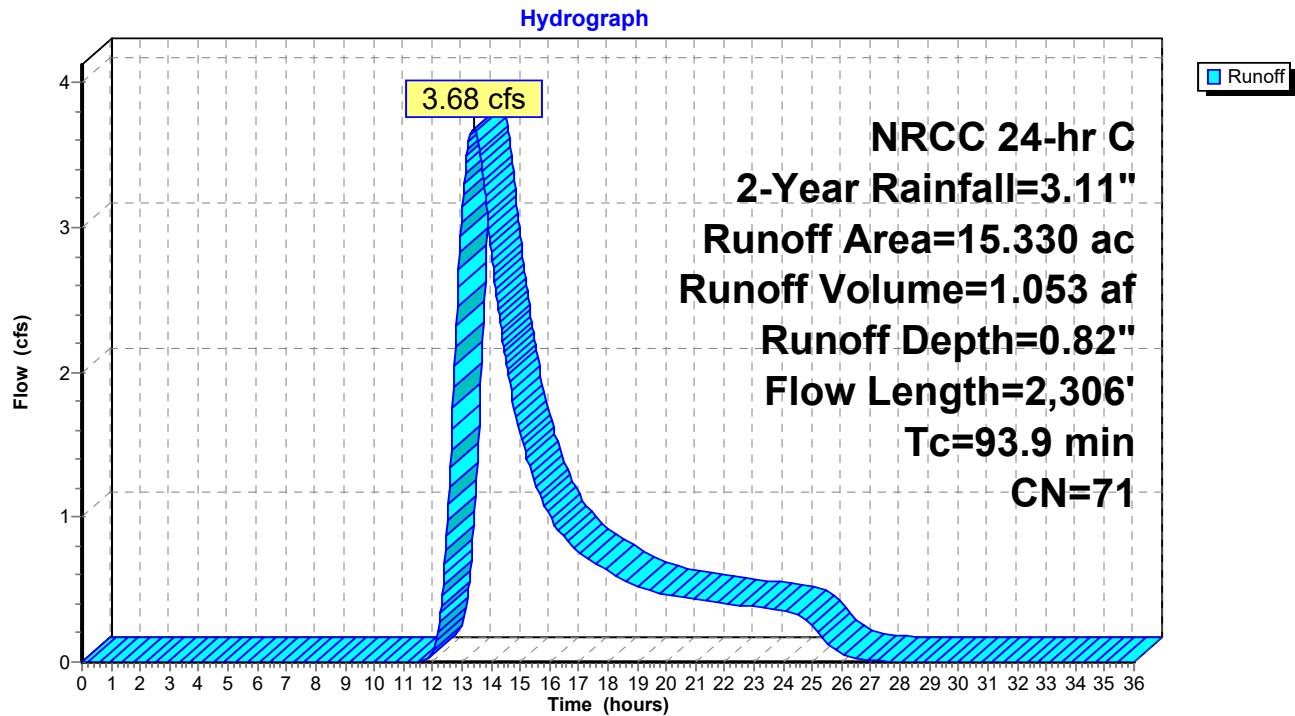
**Summary for Subcatchment Pr-03: Wooded Area East of Main Site**

Runoff = 3.68 cfs @ 13.44 hrs, Volume= 1.053 af, Depth= 0.82"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.03 hrs  
NRCC 24-hr C 2-Year Rainfall=3.11"

Area (ac)	CN	Description
13.669	70	Woods, Good, HSG C
1.105	77	Woods, Good, HSG D
0.556	74	>75% Grass cover, Good, HSG C
15.330	71	Weighted Average
15.330		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.5	100	0.0400	0.10		<b>Sheet Flow, A-B</b> Woods: Light underbrush n= 0.400 P2= 3.11"
20.6	731	0.0140	0.59		<b>Shallow Concentrated Flow, B-C</b> Woodland Kv= 5.0 fps
42.4	697	0.0030	0.27		<b>Shallow Concentrated Flow, C-D</b> Woodland Kv= 5.0 fps
5.9	280	0.0250	0.79		<b>Shallow Concentrated Flow, D-E</b> Woodland Kv= 5.0 fps
1.4	136	0.0530	1.61		<b>Shallow Concentrated Flow, E-F</b> Short Grass Pasture Kv= 7.0 fps
3.2	152	0.0250	0.79		<b>Shallow Concentrated Flow, F-G</b> Woodland Kv= 5.0 fps
3.9	210	0.0320	0.89		<b>Shallow Concentrated Flow, G-H</b> Woodland Kv= 5.0 fps
93.9	2,306	Total			

**Subcatchment Pr-03: Wooded Area East of Main Site**

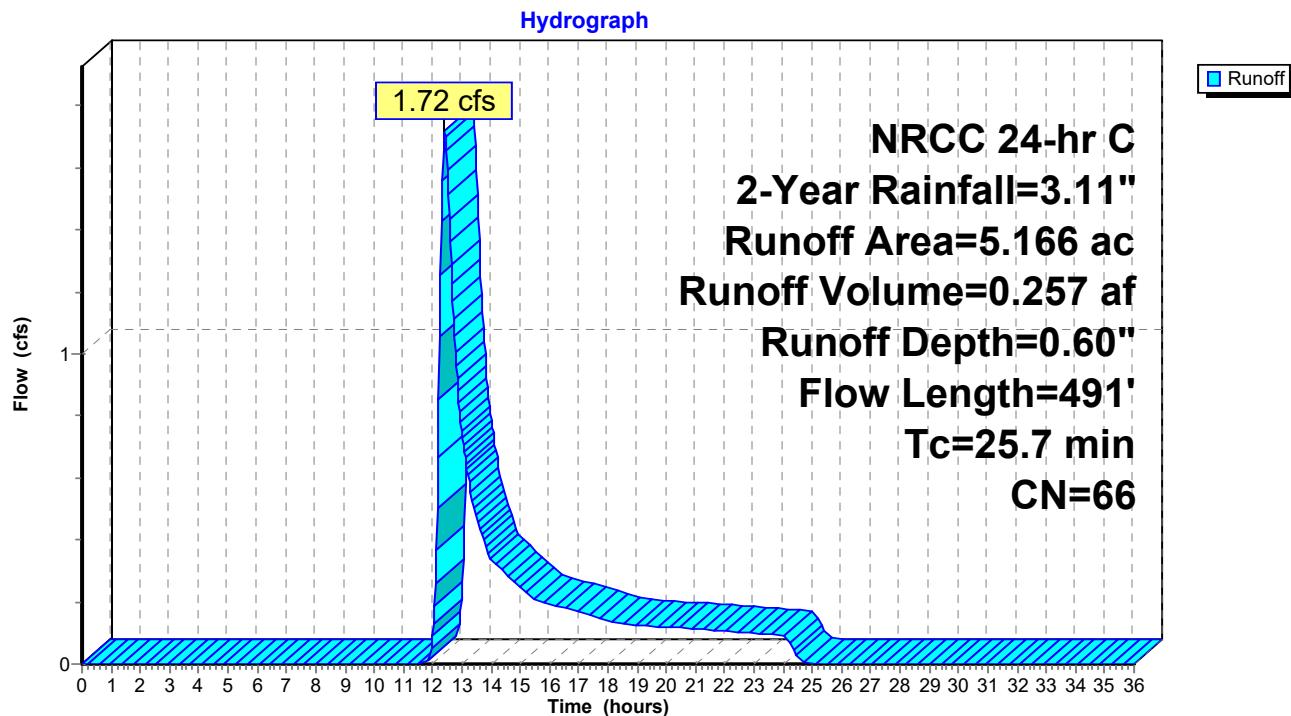
**Summary for Subcatchment Pr-04: Southwest of Array Field**

Runoff = 1.72 cfs @ 12.42 hrs, Volume= 0.257 af, Depth= 0.60"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.03 hrs  
NRCC 24-hr C 2-Year Rainfall=3.11"

Area (ac)	CN	Description
2.679	70	Woods, Good, HSG C
1.412	55	Woods, Good, HSG B
0.814	74	>75% Grass cover, Good, HSG C
0.261	61	>75% Grass cover, Good, HSG B
5.166	66	Weighted Average
5.166		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.5	100	0.0300	0.09		<b>Sheet Flow, A-B</b> Woods: Light underbrush n= 0.400 P2= 3.11"
2.7	154	0.0360	0.95		<b>Shallow Concentrated Flow, B-C</b> Woodland Kv= 5.0 fps
2.8	129	0.0230	0.76		<b>Shallow Concentrated Flow, C-D</b> Woodland Kv= 5.0 fps
1.7	108	0.0460	1.07		<b>Shallow Concentrated Flow, D-E</b> Woodland Kv= 5.0 fps
25.7	491	Total			

**Subcatchment Pr-04: Southwest of Array Field**

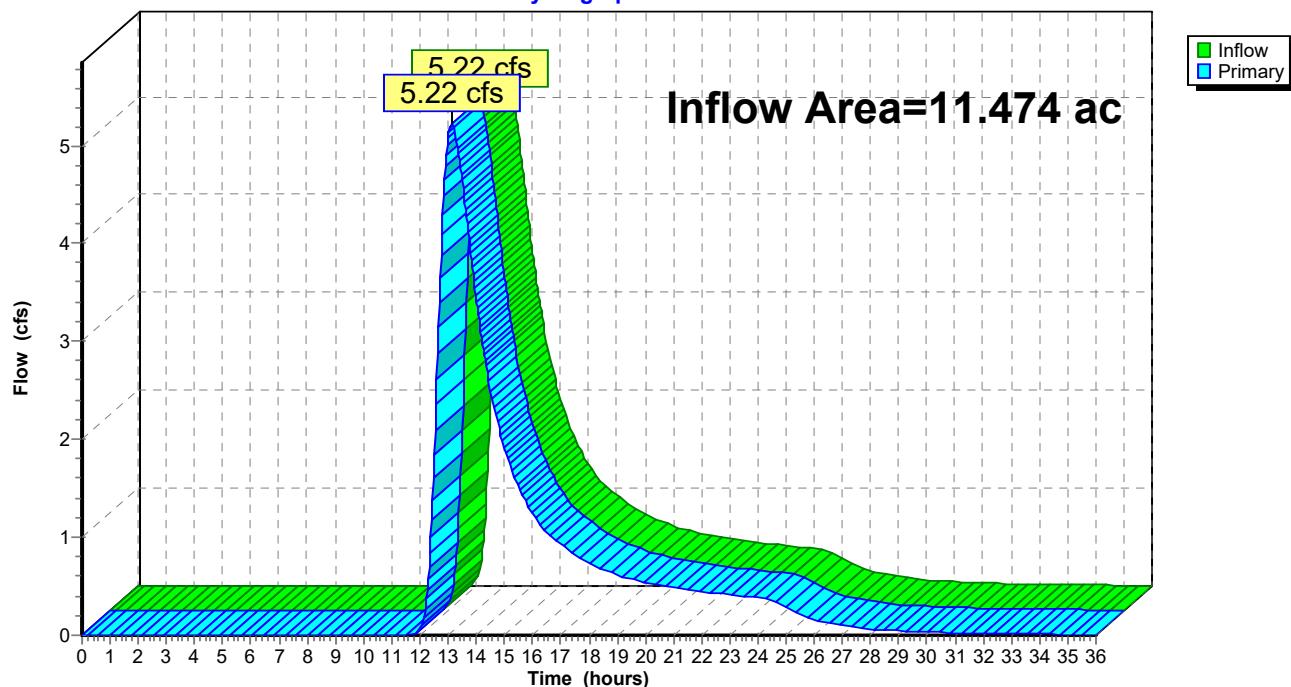
**Summary for Pond AP-1: East**

Inflow Area = 11.474 ac, 37.83% Impervious, Inflow Depth > 1.44" for 2-Year event

Inflow = 5.22 cfs @ 13.13 hrs, Volume= 1.380 af

Primary = 5.22 cfs @ 13.13 hrs, Volume= 1.380 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.03 hrs

**Pond AP-1: East****Hydrograph**

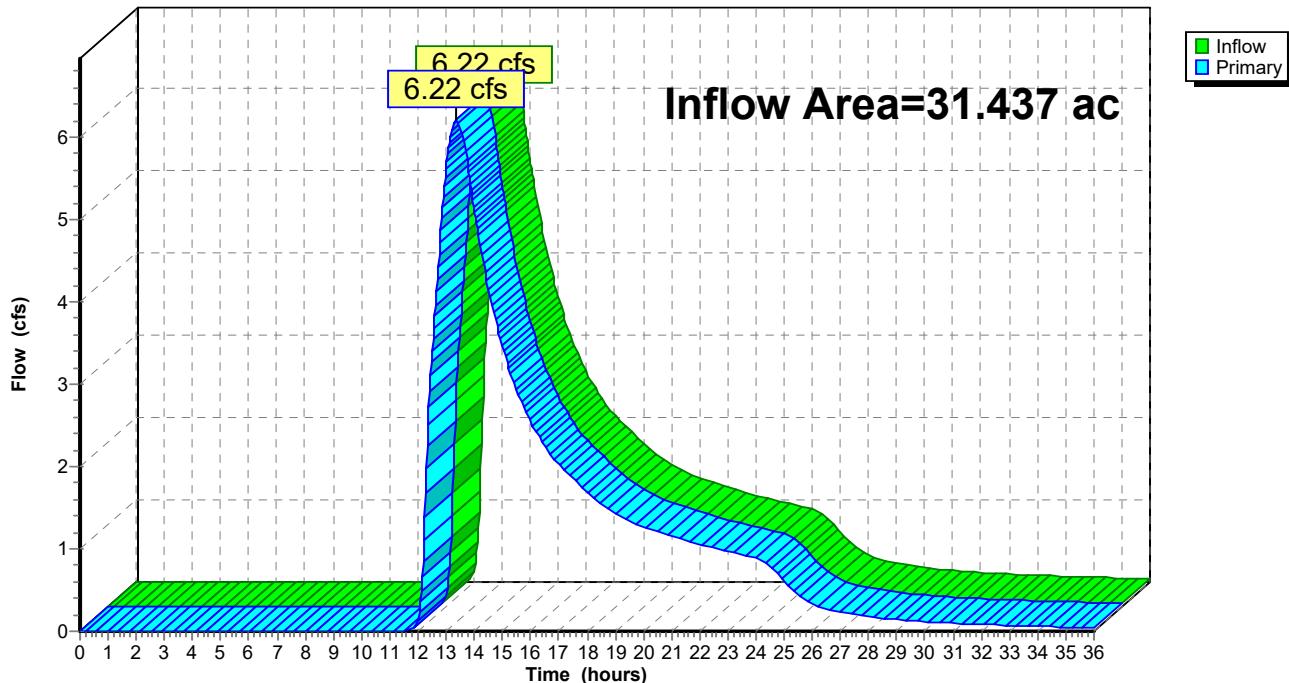
**Summary for Pond AP-2: West**

Inflow Area = 31.437 ac, 12.74% Impervious, Inflow Depth &gt; 0.94" for 2-Year event

Inflow = 6.22 cfs @ 13.35 hrs, Volume= 2.467 af

Primary = 6.22 cfs @ 13.35 hrs, Volume= 2.467 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.03 hrs

**Pond AP-2: West****Hydrograph**

**Summary for Pond SB-1: SWMB-1**

Inflow Area = 11.474 ac, 37.83% Impervious, Inflow Depth = 1.54" for 2-Year event  
 Inflow = 8.95 cfs @ 12.63 hrs, Volume= 1.468 af  
 Outflow = 5.22 cfs @ 13.13 hrs, Volume= 1.380 af, Atten= 42%, Lag= 29.5 min  
 Primary = 5.22 cfs @ 13.13 hrs, Volume= 1.380 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.03 hrs  
 Peak Elev= 183.23' @ 13.13 hrs Surf.Area= 15,990 sf Storage= 19,410 cf

Plug-Flow detention time= 120.2 min calculated for 1.379 af (94% of inflow)  
 Center-of-Mass det. time= 88.0 min ( 969.8 - 881.8 )

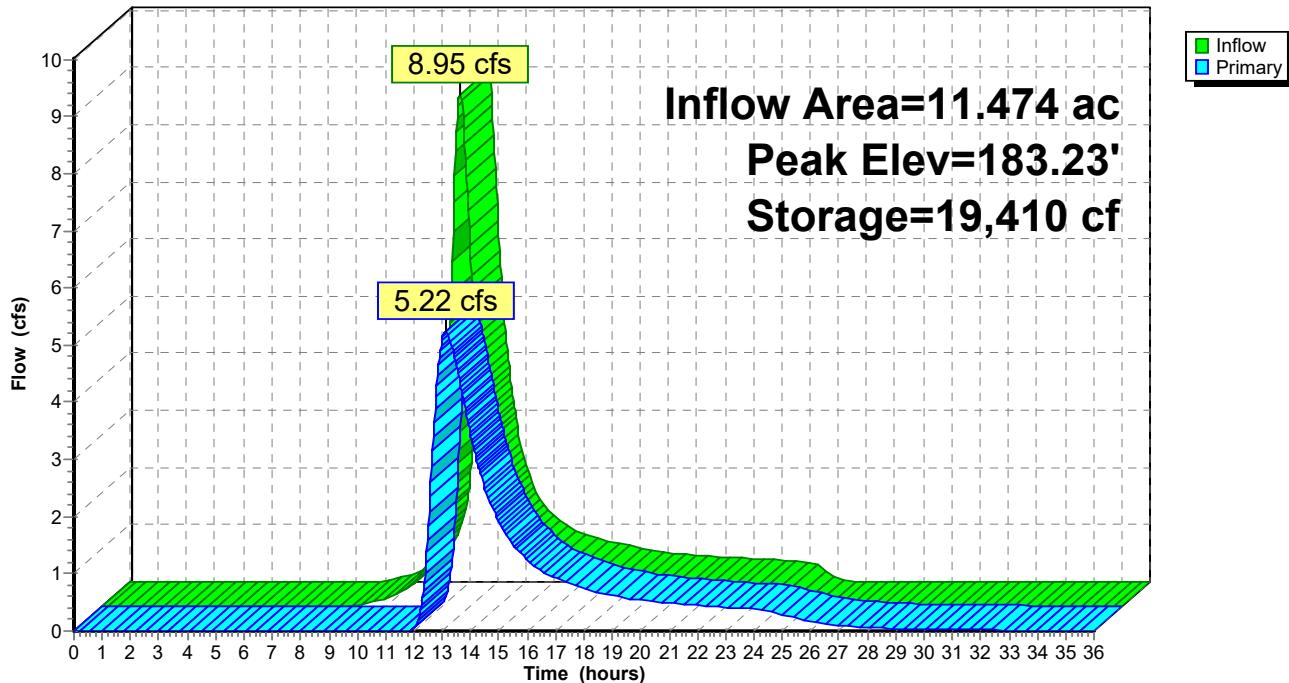
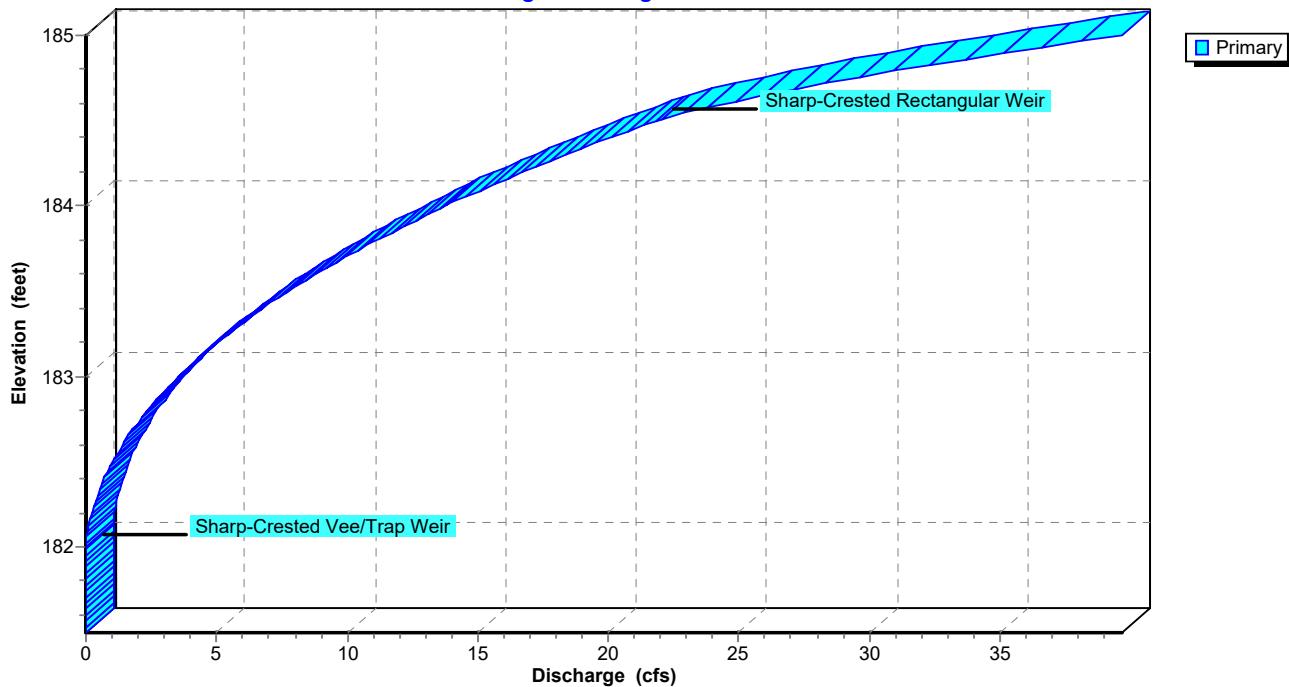
Volume	Invert	Avail.Storage	Storage Description
#1	181.50'	55,773 cf	<b>Custom Stage Data (Prismatic)</b> Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
181.50	5,638	0	0
182.00	9,046	3,671	3,671
183.00	15,331	12,189	15,860
184.00	18,238	16,785	32,644
185.00	28,019	23,129	55,773

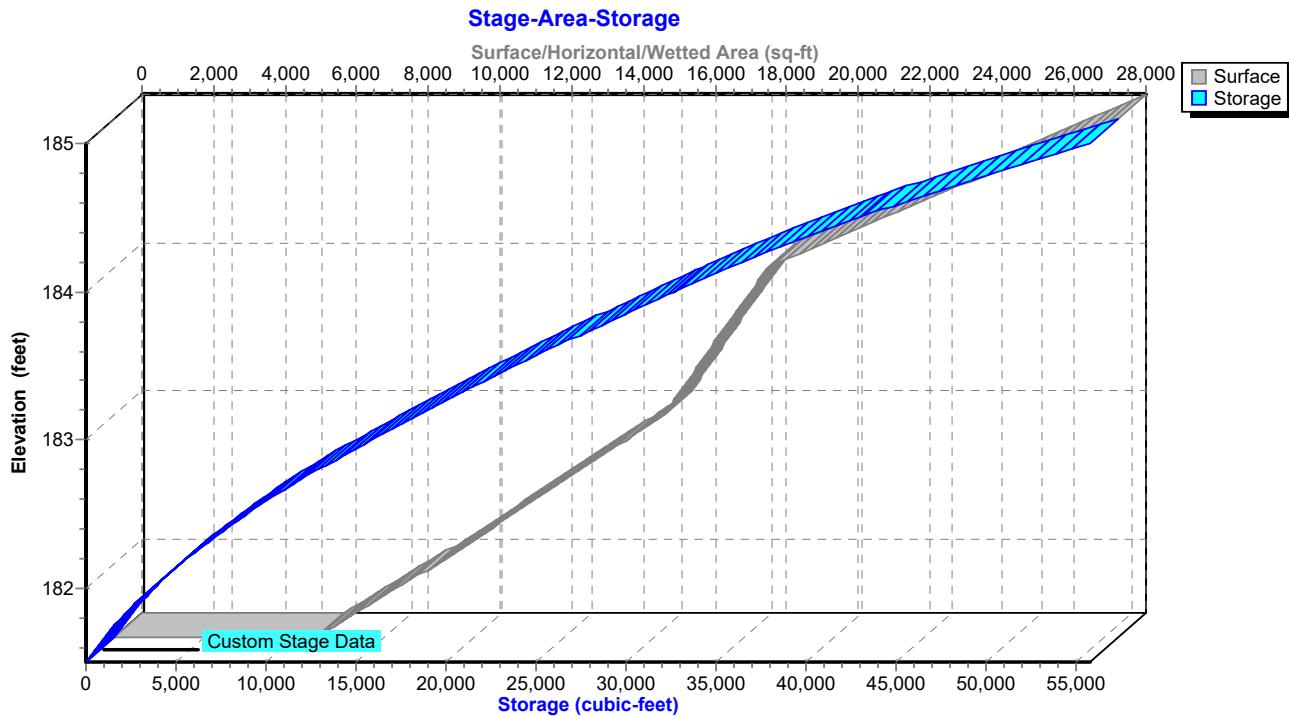
Device	Routing	Invert	Outlet Devices
#1	Primary	182.00'	<b>55.0 deg x 0.7' long x 2.50' rise Sharp-Crested Vee/Trap Weir</b> Cv= 2.54 (C= 3.17)
#2	Primary	184.50'	<b>10.0' long Sharp-Crested Rectangular Weir</b> 2 End Contraction(s)

**Primary OutFlow** Max=5.22 cfs @ 13.13 hrs HW=183.23' (Free Discharge)

1=Sharp-Crested Vee/Trap Weir (Weir Controls 5.22 cfs @ 3.18 fps)

2=Sharp-Crested Rectangular Weir ( Controls 0.00 cfs )

**Pond SB-1: SWMB-1****Hydrograph****Pond SB-1: SWMB-1****Stage-Discharge**

**Pond SB-1: SWMB-1**

**Summary for Pond SB-2: SWMB-2**

Inflow Area = 10.941 ac, 36.61% Impervious, Inflow Depth = 1.54" for 2-Year event  
 Inflow = 11.72 cfs @ 12.38 hrs, Volume= 1.400 af  
 Outflow = 2.02 cfs @ 13.52 hrs, Volume= 1.156 af, Atten= 83%, Lag= 68.7 min  
 Primary = 2.02 cfs @ 13.52 hrs, Volume= 1.156 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.03 hrs  
 Peak Elev= 183.85' @ 13.52 hrs Surf.Area= 28,354 sf Storage= 30,414 cf

Plug-Flow detention time= 306.8 min calculated for 1.155 af (83% of inflow)  
 Center-of-Mass det. time= 229.9 min ( 1,093.1 - 863.2 )

Volume	Invert	Avail.Storage	Storage Description
#1	182.50'	104,895 cf	<b>Custom Stage Data (Prismatic)</b> Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
182.50	13,382	0	0
183.00	22,109	8,873	8,873
184.00	29,424	25,767	34,639
185.00	35,113	32,269	66,908
186.00	40,861	37,987	104,895

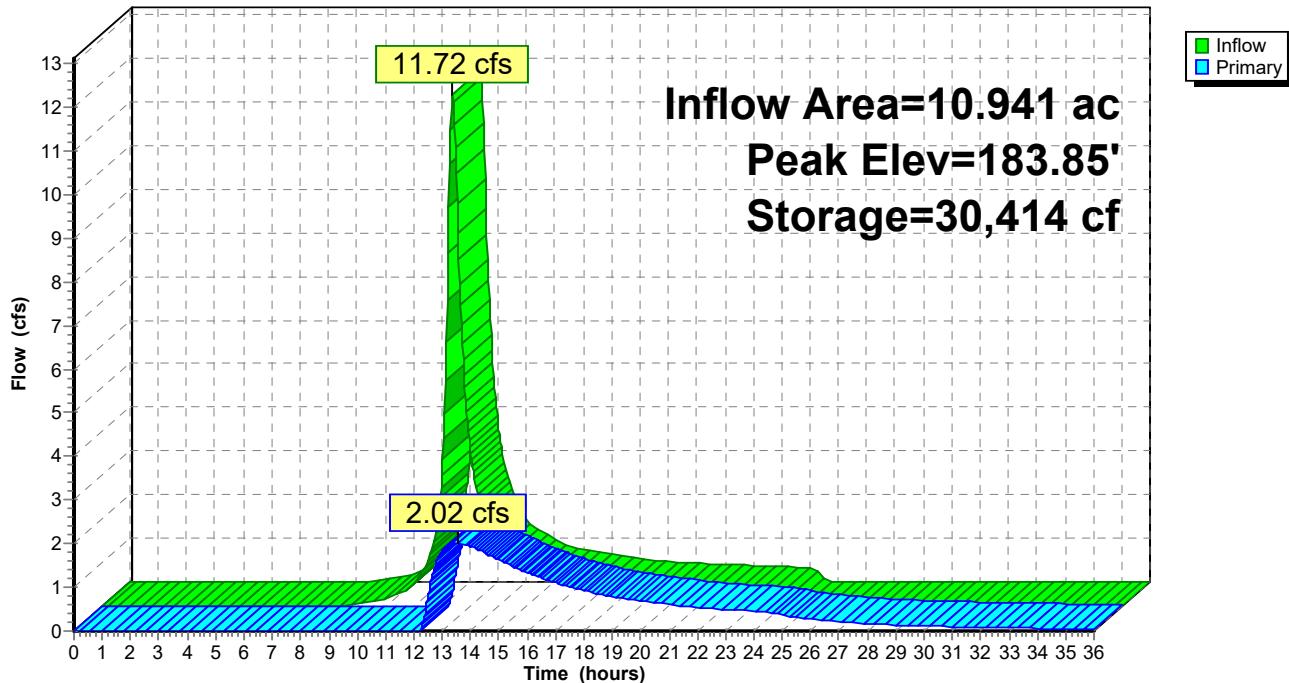
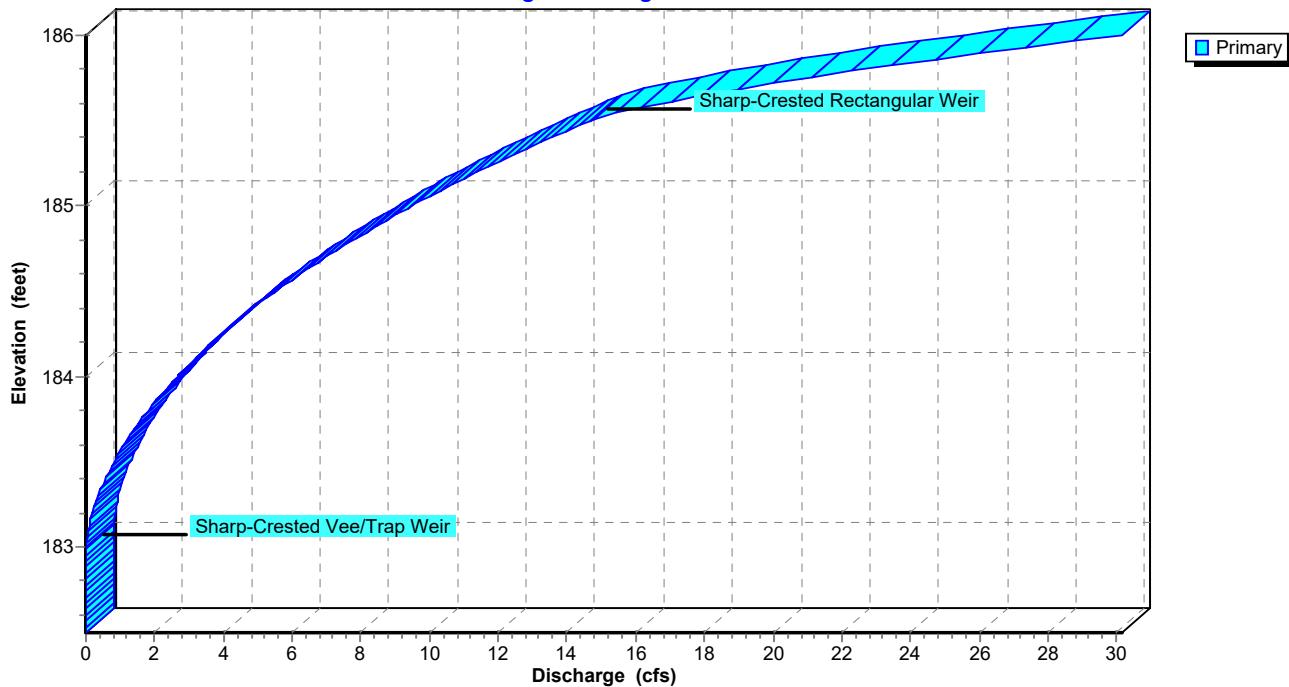
  

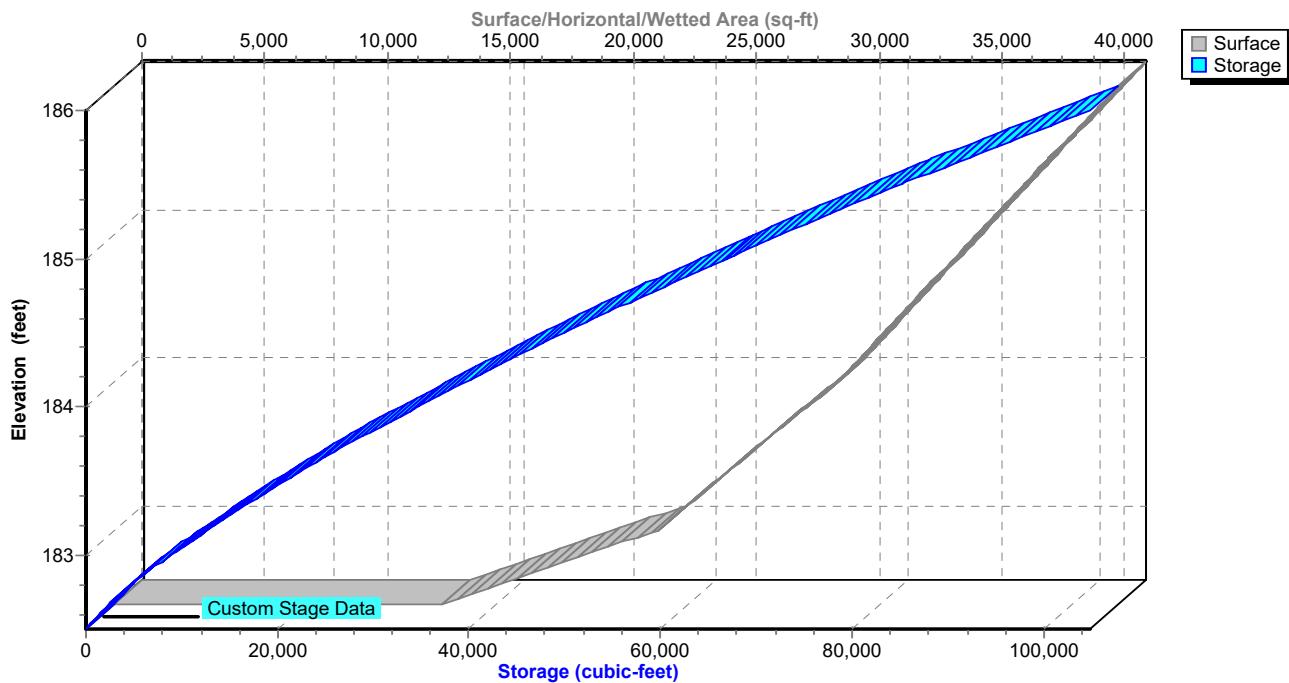
Device	Routing	Invert	Outlet Devices
#1	Primary	183.00'	<b>30.0 deg x 0.6' long x 2.50' rise Sharp-Crested Vee/Trap Weir</b> Cv= 2.61 (C= 3.26)
#2	Primary	185.50'	<b>10.0' long Sharp-Crested Rectangular Weir</b> 2 End Contraction(s)

**Primary OutFlow** Max=2.02 cfs @ 13.52 hrs HW=183.85' (Free Discharge)

1=Sharp-Crested Vee/Trap Weir (Weir Controls 2.02 cfs @ 2.85 fps)

2=Sharp-Crested Rectangular Weir ( Controls 0.00 cfs )

**Pond SB-2: SWMB-2****Hydrograph****Pond SB-2: SWMB-2****Stage-Discharge**

**Pond SB-2: SWMB-2****Stage-Area-Storage**

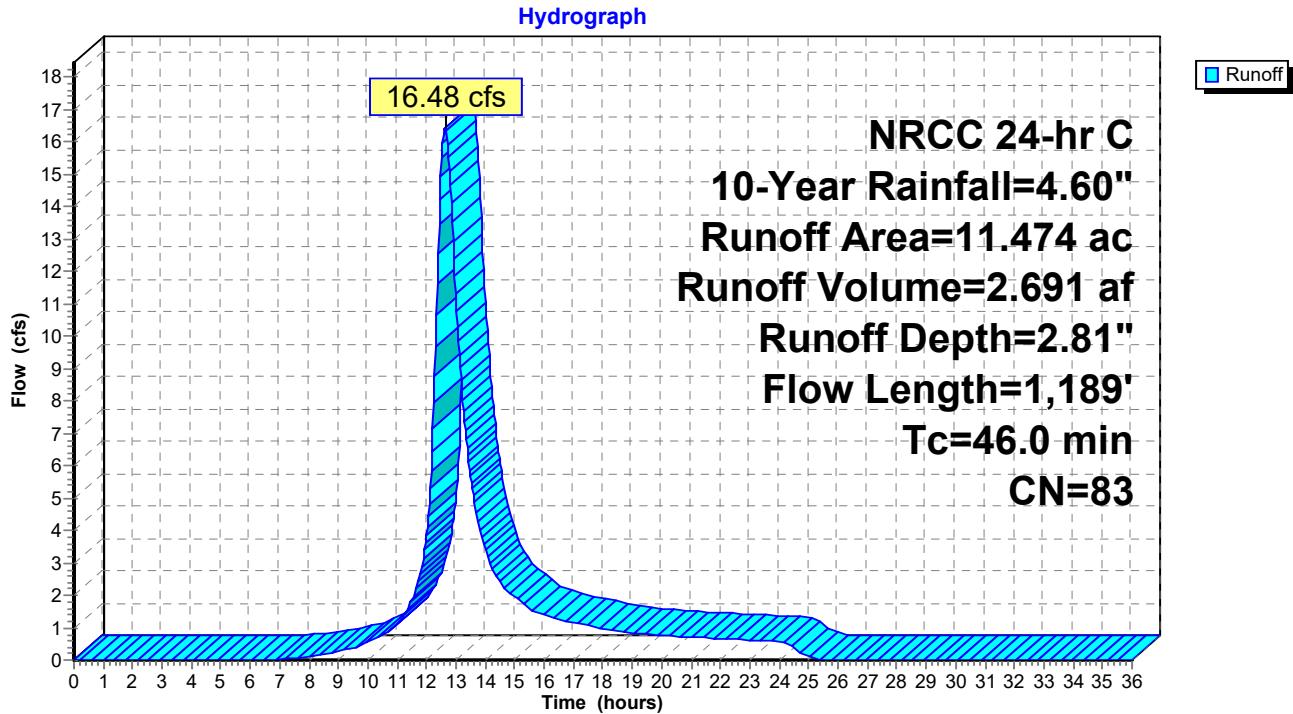
**Summary for Subcatchment Pr-01: Easterly Main Site (Northern Field)**

Runoff = 16.48 cfs @ 12.63 hrs, Volume= 2.691 af, Depth= 2.81"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.03 hrs  
NRCC 24-hr C 10-Year Rainfall=4.60"

Area (ac)	CN	Description
6.697	74	>75% Grass cover, Good, HSG C
0.310	79	50-75% Grass cover, Fair, HSG C
4.341	98	Unconnected roofs, HSG C
0.126	96	Gravel surface, HSG C
11.474	83	Weighted Average
7.133		62.17% Pervious Area
4.341		37.83% Impervious Area
4.341		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.4	100	0.0110	0.09		<b>Sheet Flow, A-B</b> Grass: Dense n= 0.240 P2= 3.11"
3.1	169	0.0170	0.91		<b>Shallow Concentrated Flow, B-C</b> Short Grass Pasture Kv= 7.0 fps
24.5	920	0.0080	0.63		<b>Shallow Concentrated Flow, C-D</b> Short Grass Pasture Kv= 7.0 fps
46.0	1,189	Total			

**Subcatchment Pr-01: Easterly Main Site (Northern Field)**

**Summary for Subcatchment Pr-02: Western Array Field**

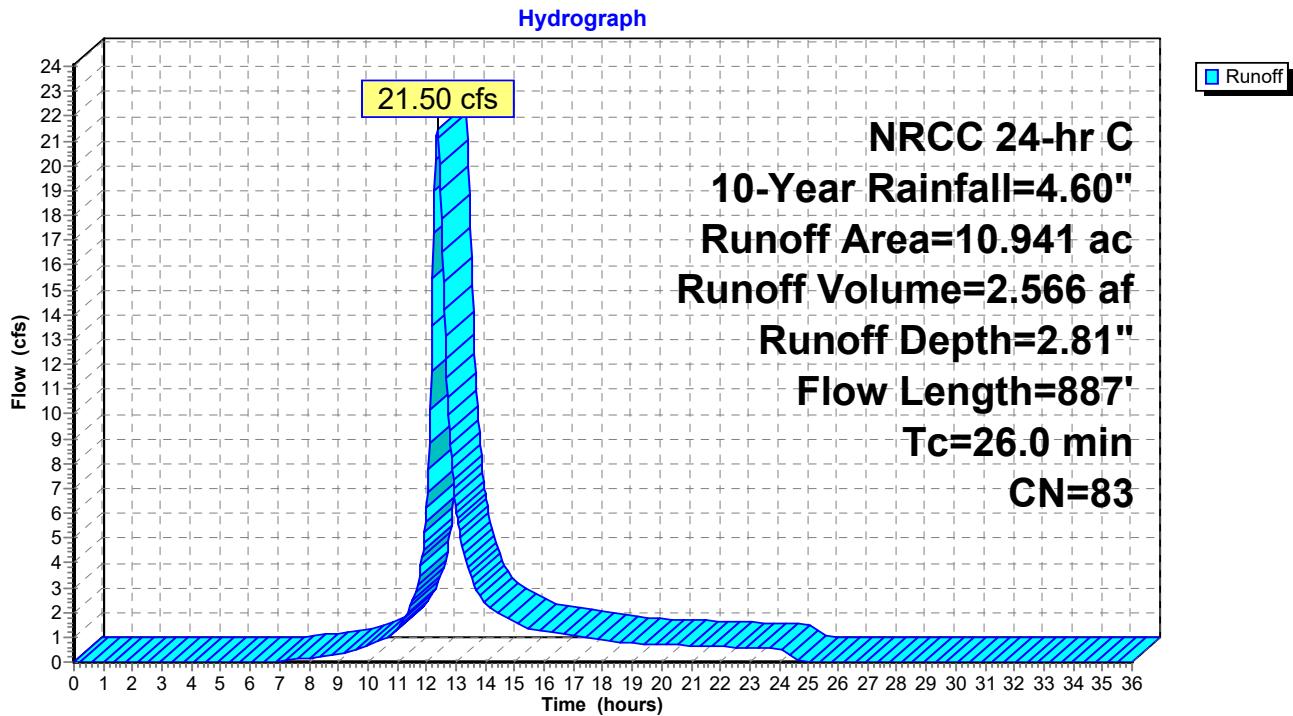
Runoff = 21.50 cfs @ 12.37 hrs, Volume= 2.566 af, Depth= 2.81"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.03 hrs  
NRCC 24-hr C 10-Year Rainfall=4.60"

Area (ac)	CN	Description
6.455	74	>75% Grass cover, Good, HSG C
0.294	70	Woods, Good, HSG C
4.005	98	Unconnected roofs, HSG C
0.187	96	Gravel surface, HSG C

10.941	83	Weighted Average
6.936		63.39% Pervious Area
4.005		36.61% Impervious Area
4.005		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.6	100	0.0170	0.16		<b>Sheet Flow, A-B</b> Grass: Short n= 0.150 P2= 3.11"
5.8	244	0.0100	0.70		<b>Shallow Concentrated Flow, B-C</b> Short Grass Pasture Kv= 7.0 fps
6.5	310	0.0130	0.80		<b>Shallow Concentrated Flow, C-D</b> Short Grass Pasture Kv= 7.0 fps
3.1	233	0.0330	1.27		<b>Shallow Concentrated Flow, D-E</b> Short Grass Pasture Kv= 7.0 fps
26.0	887	Total			

**Subcatchment Pr-02: Western Array Field**

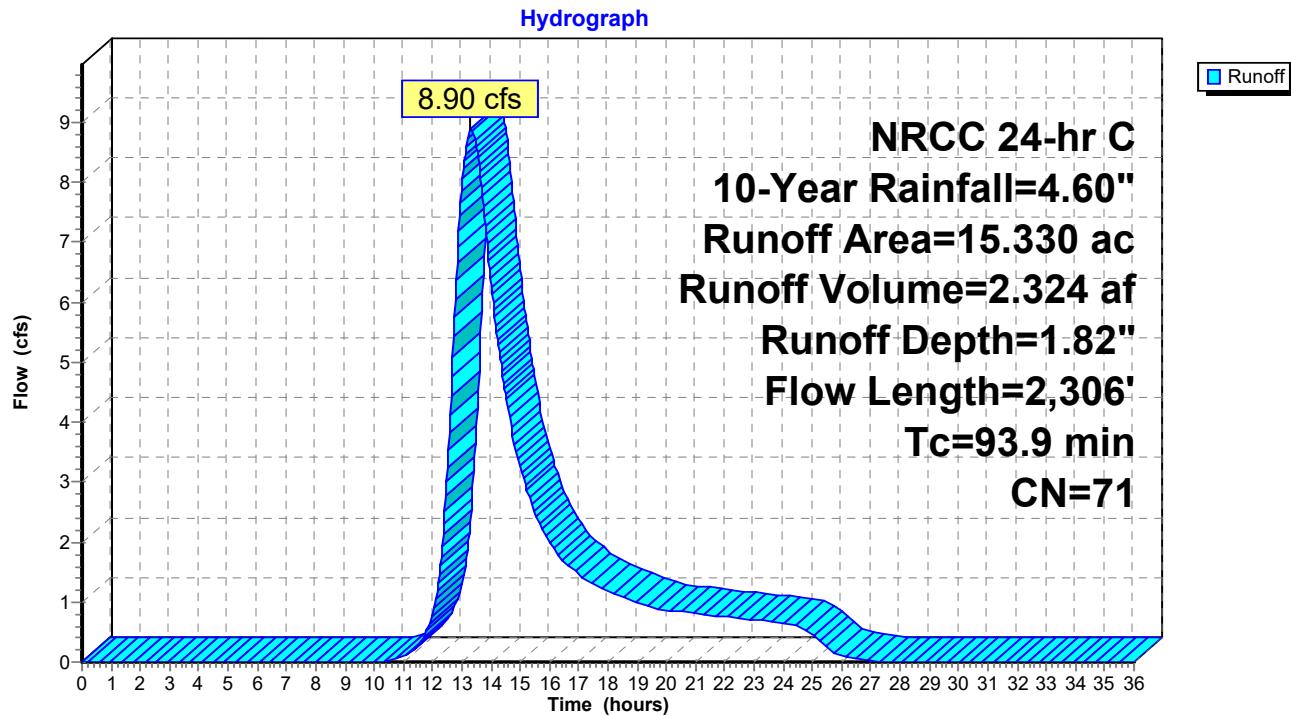
**Summary for Subcatchment Pr-03: Wooded Area East of Main Site**

Runoff = 8.90 cfs @ 13.27 hrs, Volume= 2.324 af, Depth= 1.82"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.03 hrs  
NRCC 24-hr C 10-Year Rainfall=4.60"

Area (ac)	CN	Description
13.669	70	Woods, Good, HSG C
1.105	77	Woods, Good, HSG D
0.556	74	>75% Grass cover, Good, HSG C
15.330	71	Weighted Average
15.330		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.5	100	0.0400	0.10		<b>Sheet Flow, A-B</b> Woods: Light underbrush n= 0.400 P2= 3.11"
20.6	731	0.0140	0.59		<b>Shallow Concentrated Flow, B-C</b> Woodland Kv= 5.0 fps
42.4	697	0.0030	0.27		<b>Shallow Concentrated Flow, C-D</b> Woodland Kv= 5.0 fps
5.9	280	0.0250	0.79		<b>Shallow Concentrated Flow, D-E</b> Woodland Kv= 5.0 fps
1.4	136	0.0530	1.61		<b>Shallow Concentrated Flow, E-F</b> Short Grass Pasture Kv= 7.0 fps
3.2	152	0.0250	0.79		<b>Shallow Concentrated Flow, F-G</b> Woodland Kv= 5.0 fps
3.9	210	0.0320	0.89		<b>Shallow Concentrated Flow, G-H</b> Woodland Kv= 5.0 fps
93.9	2,306	Total			

**Subcatchment Pr-03: Wooded Area East of Main Site**

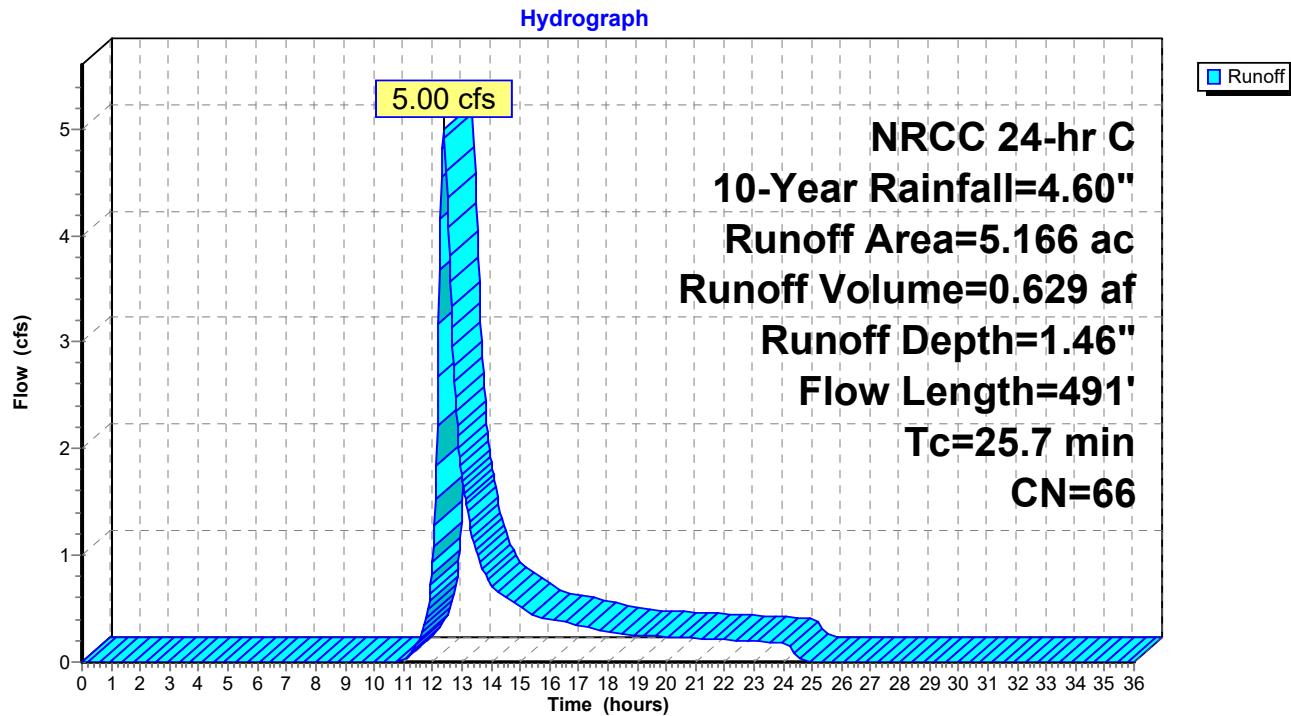
**Summary for Subcatchment Pr-04: Southwest of Array Field**

Runoff = 5.00 cfs @ 12.38 hrs, Volume= 0.629 af, Depth= 1.46"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.03 hrs  
NRCC 24-hr C 10-Year Rainfall=4.60"

Area (ac)	CN	Description
2.679	70	Woods, Good, HSG C
1.412	55	Woods, Good, HSG B
0.814	74	>75% Grass cover, Good, HSG C
0.261	61	>75% Grass cover, Good, HSG B
5.166	66	Weighted Average
5.166		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.5	100	0.0300	0.09		<b>Sheet Flow, A-B</b> Woods: Light underbrush n= 0.400 P2= 3.11"
2.7	154	0.0360	0.95		<b>Shallow Concentrated Flow, B-C</b> Woodland Kv= 5.0 fps
2.8	129	0.0230	0.76		<b>Shallow Concentrated Flow, C-D</b> Woodland Kv= 5.0 fps
1.7	108	0.0460	1.07		<b>Shallow Concentrated Flow, D-E</b> Woodland Kv= 5.0 fps
25.7	491	Total			

**Subcatchment Pr-04: Southwest of Array Field**

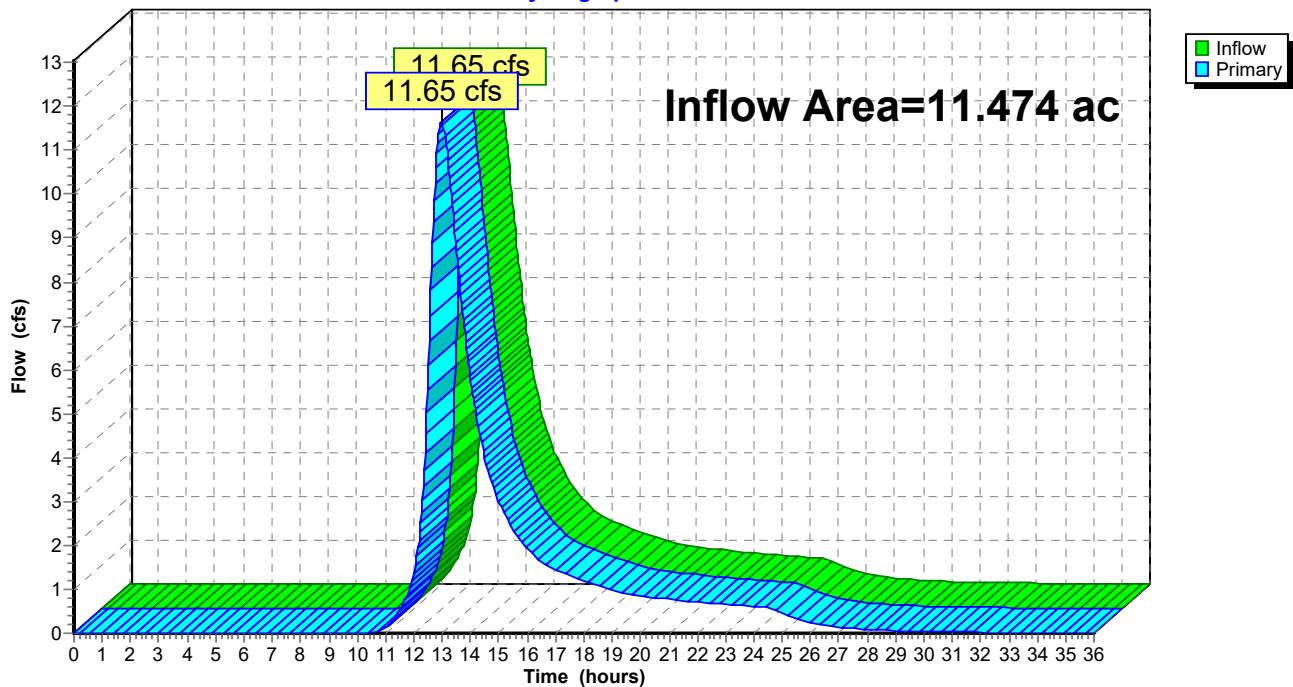
**Summary for Pond AP-1: East**

Inflow Area = 11.474 ac, 37.83% Impervious, Inflow Depth > 2.72" for 10-Year event

Inflow = 11.65 cfs @ 12.97 hrs, Volume= 2.602 af

Primary = 11.65 cfs @ 12.97 hrs, Volume= 2.602 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.03 hrs

**Pond AP-1: East****Hydrograph**

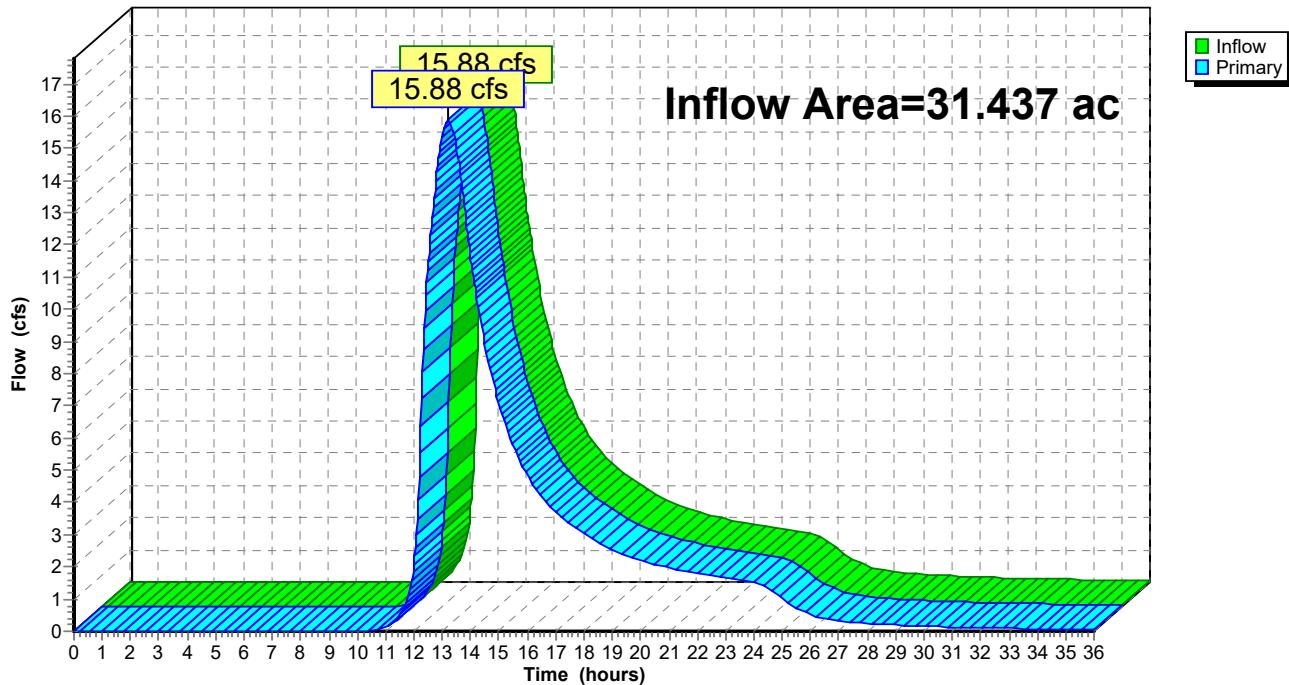
**Summary for Pond AP-2: West**

Inflow Area = 31.437 ac, 12.74% Impervious, Inflow Depth > 2.01" for 10-Year event

Inflow = 15.88 cfs @ 13.23 hrs, Volume= 5.270 af

Primary = 15.88 cfs @ 13.23 hrs, Volume= 5.270 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.03 hrs

**Pond AP-2: West****Hydrograph**

**Summary for Pond SB-1: SWMB-1**

Inflow Area = 11.474 ac, 37.83% Impervious, Inflow Depth = 2.81" for 10-Year event  
 Inflow = 16.48 cfs @ 12.63 hrs, Volume= 2.691 af  
 Outflow = 11.65 cfs @ 12.97 hrs, Volume= 2.602 af, Atten= 29%, Lag= 20.6 min  
 Primary = 11.65 cfs @ 12.97 hrs, Volume= 2.602 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.03 hrs  
 Peak Elev= 183.84' @ 12.97 hrs Surf.Area= 17,780 sf Storage= 29,806 cf

Plug-Flow detention time= 88.7 min calculated for 2.600 af (97% of inflow)  
 Center-of-Mass det. time= 70.0 min ( 932.6 - 862.5 )

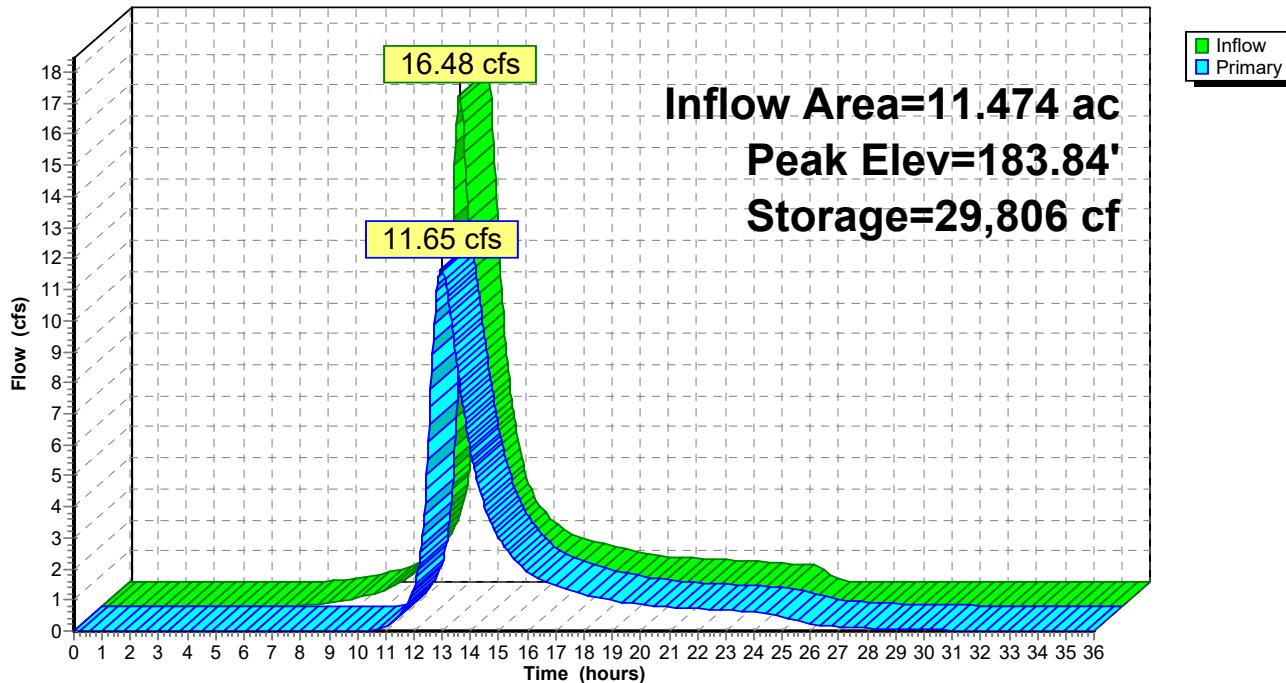
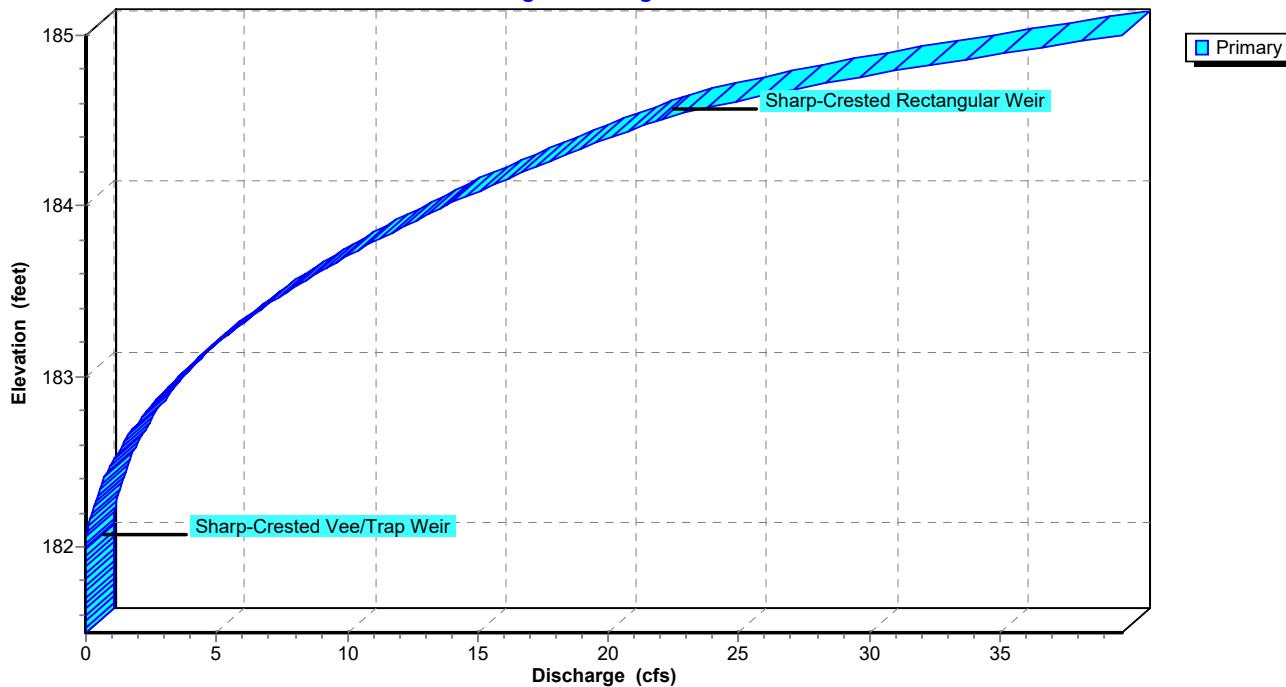
Volume	Invert	Avail.Storage	Storage Description
#1	181.50'	55,773 cf	<b>Custom Stage Data (Prismatic)</b> Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
181.50	5,638	0	0
182.00	9,046	3,671	3,671
183.00	15,331	12,189	15,860
184.00	18,238	16,785	32,644
185.00	28,019	23,129	55,773

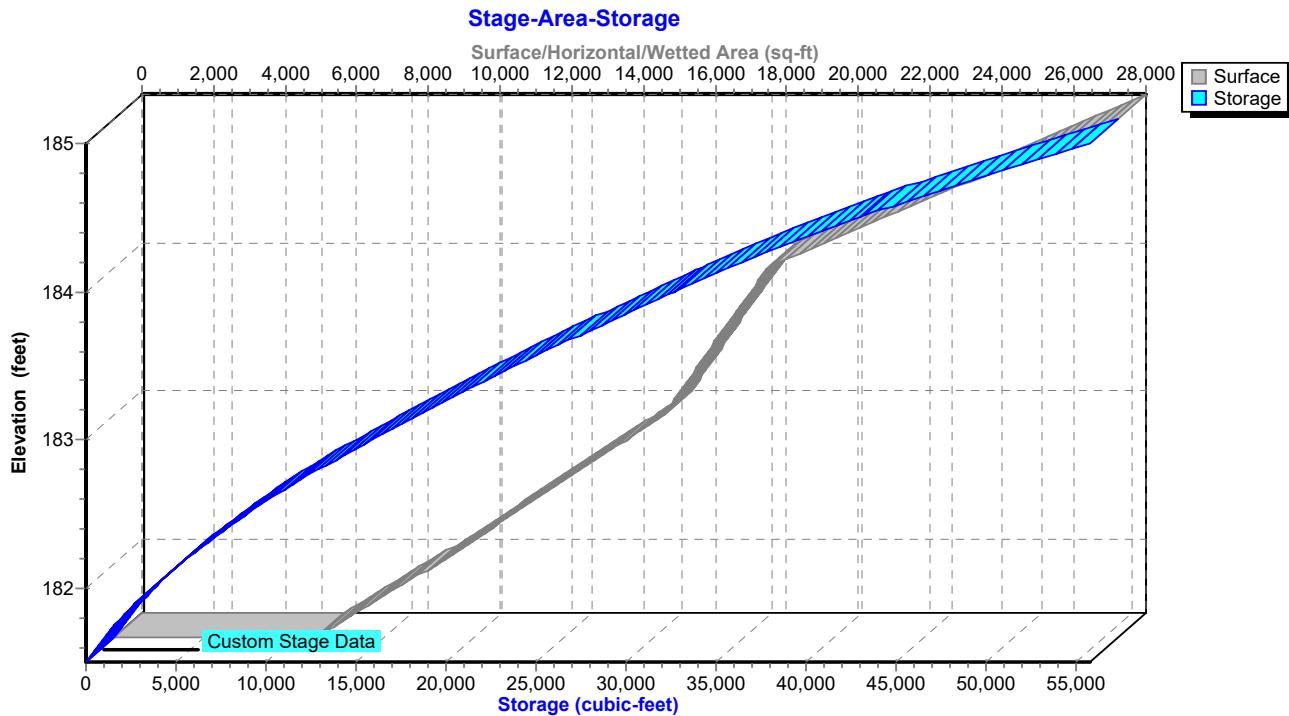
  

Device	Routing	Invert	Outlet Devices
#1	Primary	182.00'	<b>55.0 deg x 0.7' long x 2.50' rise Sharp-Crested Vee/Trap Weir</b> Cv= 2.54 (C= 3.17)
#2	Primary	184.50'	<b>10.0' long Sharp-Crested Rectangular Weir</b> 2 End Contraction(s)

**Primary OutFlow** Max=11.64 cfs @ 12.97 hrs HW=183.84' (Free Discharge)

1=Sharp-Crested Vee/Trap Weir (Weir Controls 11.64 cfs @ 3.81 fps)  
 2=Sharp-Crested Rectangular Weir ( Controls 0.00 cfs)

**Pond SB-1: SWMB-1****Hydrograph****Pond SB-1: SWMB-1****Stage-Discharge**

**Pond SB-1: SWMB-1**

**Summary for Pond SB-2: SWMB-2**

Inflow Area = 10.941 ac, 36.61% Impervious, Inflow Depth = 2.81" for 10-Year event  
 Inflow = 21.50 cfs @ 12.37 hrs, Volume= 2.566 af  
 Outflow = 5.78 cfs @ 13.05 hrs, Volume= 2.317 af, Atten= 73%, Lag= 40.9 min  
 Primary = 5.78 cfs @ 13.05 hrs, Volume= 2.317 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.03 hrs  
 Peak Elev= 184.54' @ 13.05 hrs Surf.Area= 32,478 sf Storage= 51,257 cf

Plug-Flow detention time= 228.8 min calculated for 2.317 af (90% of inflow)  
 Center-of-Mass det. time= 179.0 min ( 1,023.0 - 844.0 )

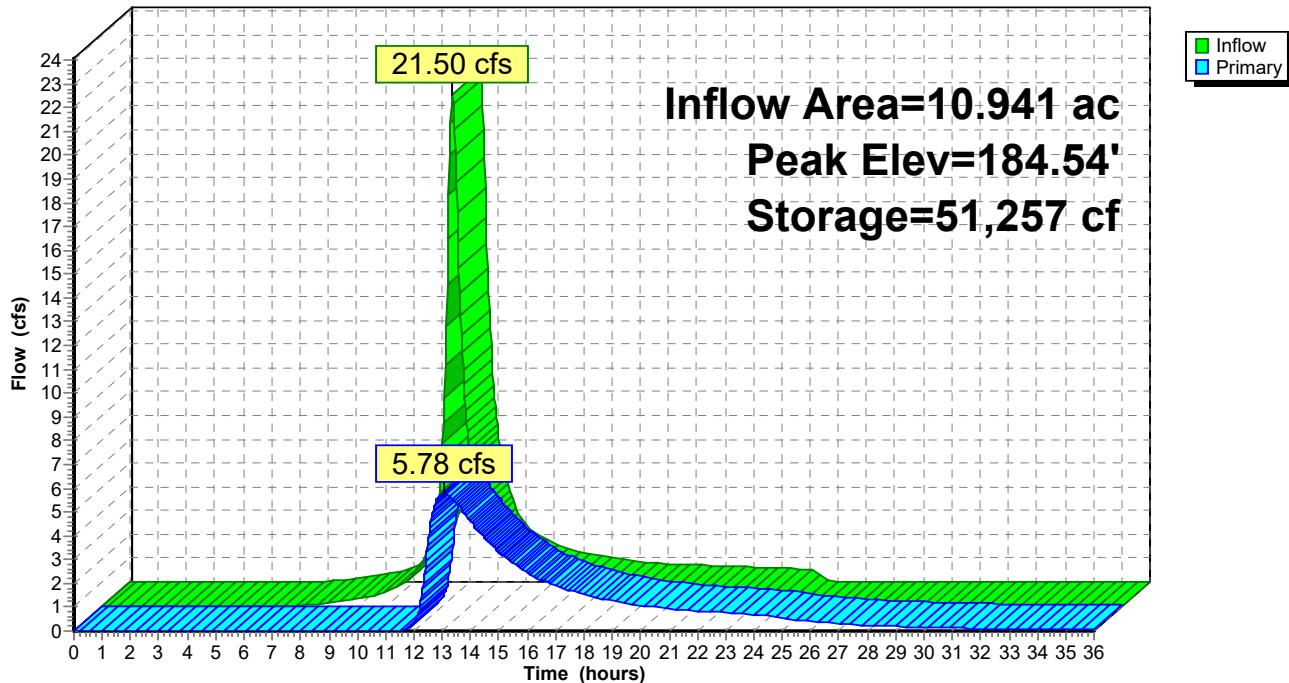
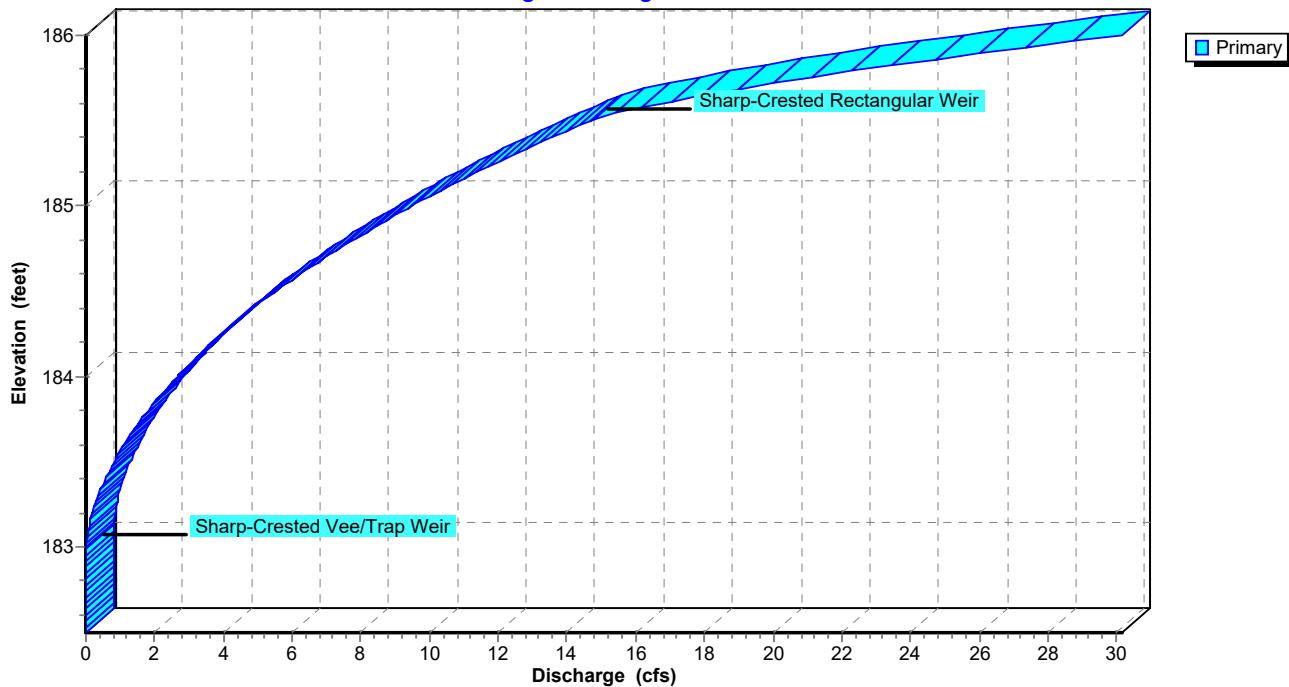
Volume	Invert	Avail.Storage	Storage Description
#1	182.50'	104,895 cf	<b>Custom Stage Data (Prismatic)</b> Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
182.50	13,382	0	0
183.00	22,109	8,873	8,873
184.00	29,424	25,767	34,639
185.00	35,113	32,269	66,908
186.00	40,861	37,987	104,895

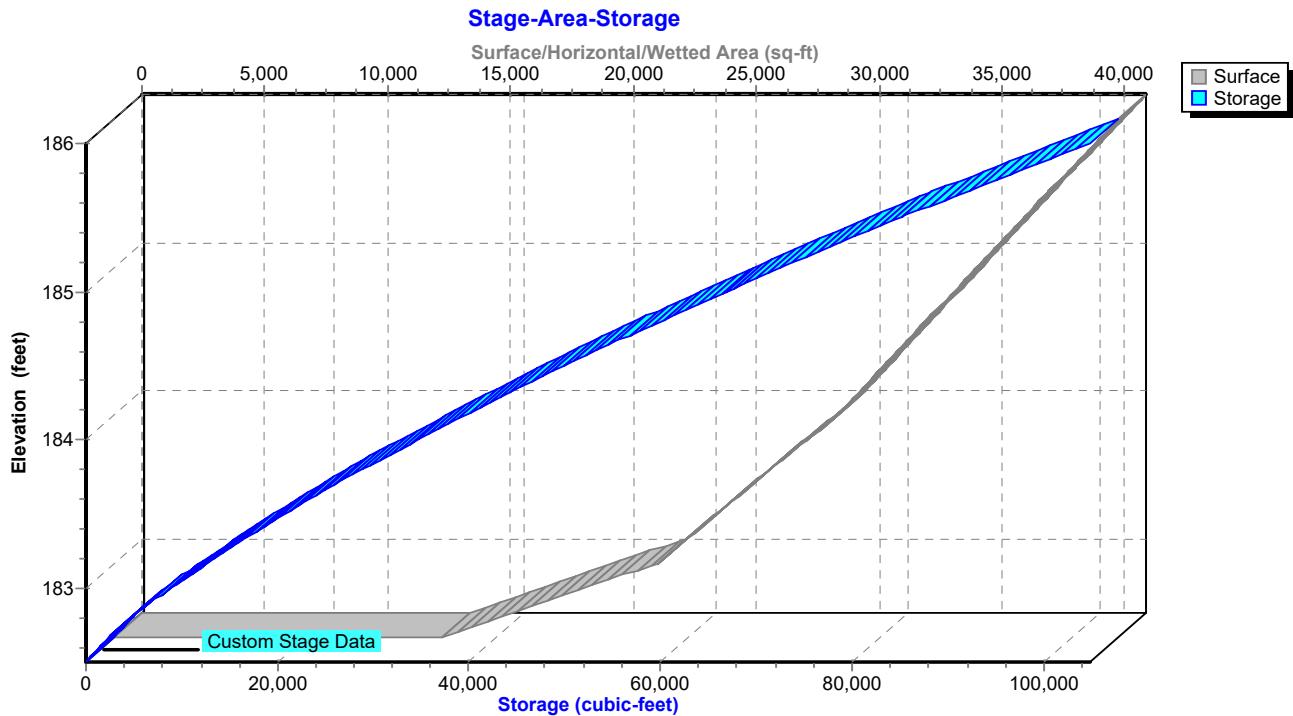
Device	Routing	Invert	Outlet Devices
#1	Primary	183.00'	<b>30.0 deg x 0.6' long x 2.50' rise Sharp-Crested Vee/Trap Weir</b> Cv= 2.61 (C= 3.26)
#2	Primary	185.50'	<b>10.0' long Sharp-Crested Rectangular Weir</b> 2 End Contraction(s)

**Primary OutFlow** Max=5.78 cfs @ 13.05 hrs HW=184.54' (Free Discharge)

1=Sharp-Crested Vee/Trap Weir (Weir Controls 5.78 cfs @ 3.72 fps)  
 2=Sharp-Crested Rectangular Weir ( Controls 0.00 cfs )

**Pond SB-2: SWMB-2****Hydrograph****Pond SB-2: SWMB-2****Stage-Discharge**

## Pond SB-2: SWMB-2

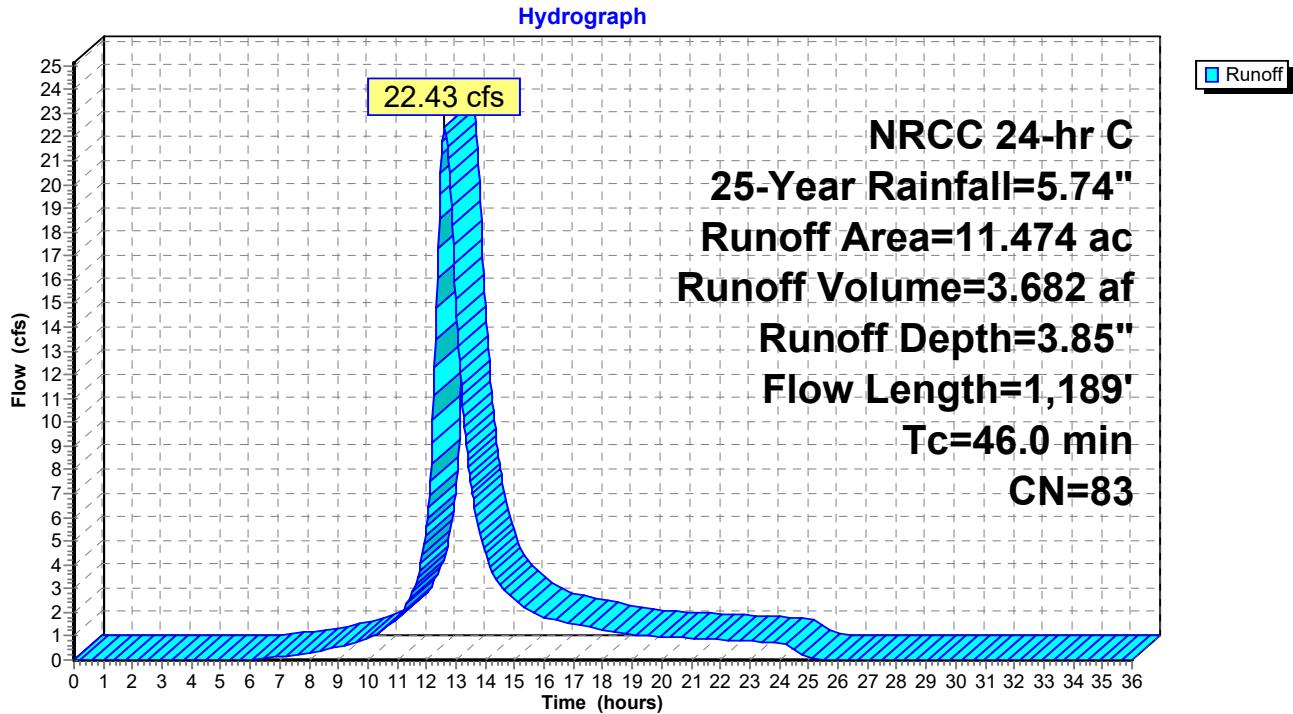


**Summary for Subcatchment Pr-01: Easterly Main Site (Northern Field)**

Runoff = 22.43 cfs @ 12.62 hrs, Volume= 3.682 af, Depth= 3.85"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.03 hrs  
NRCC 24-hr C 25-Year Rainfall=5.74"

Area (ac)	CN	Description			
6.697	74	>75% Grass cover, Good, HSG C			
0.310	79	50-75% Grass cover, Fair, HSG C			
4.341	98	Unconnected roofs, HSG C			
0.126	96	Gravel surface, HSG C			
11.474	83	Weighted Average			
7.133		62.17% Pervious Area			
4.341		37.83% Impervious Area			
4.341		100.00% Unconnected			
Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.4	100	0.0110	0.09		<b>Sheet Flow, A-B</b> Grass: Dense n= 0.240 P2= 3.11"
3.1	169	0.0170	0.91		<b>Shallow Concentrated Flow, B-C</b> Short Grass Pasture Kv= 7.0 fps
24.5	920	0.0080	0.63		<b>Shallow Concentrated Flow, C-D</b> Short Grass Pasture Kv= 7.0 fps
46.0	1,189	Total			

**Subcatchment Pr-01: Easterly Main Site (Northern Field)**

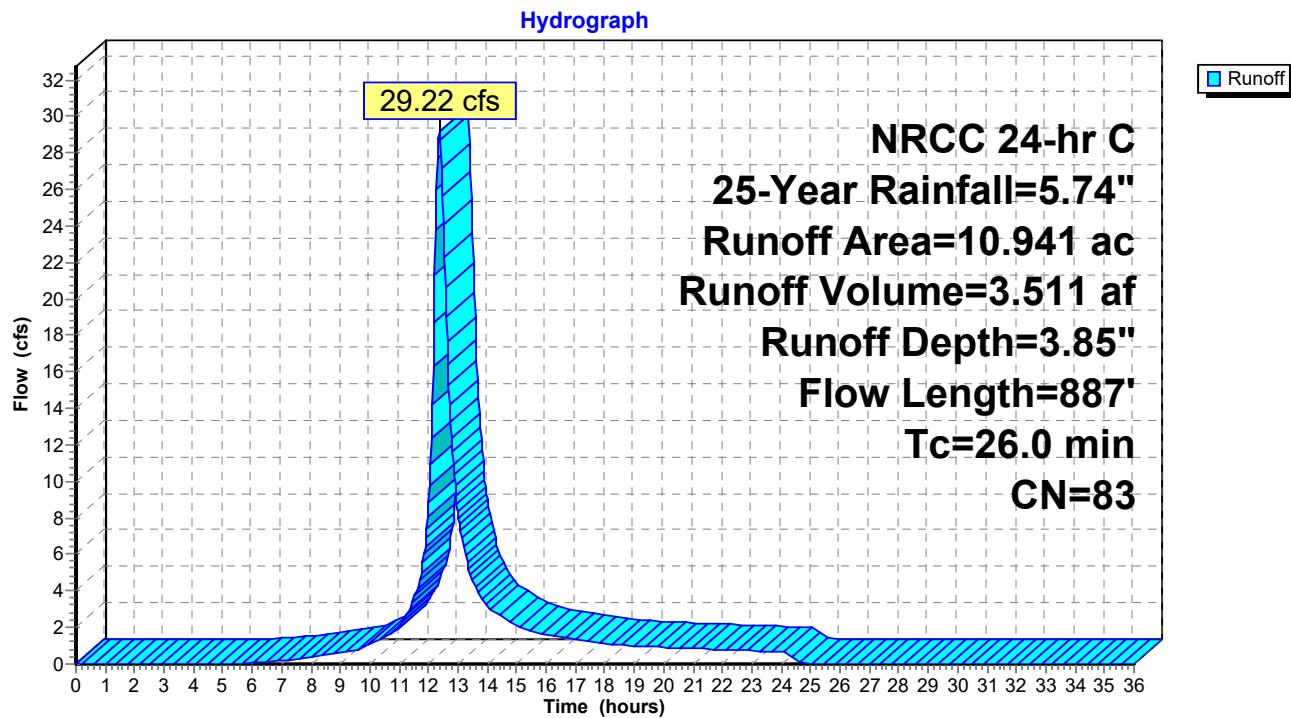
**Summary for Subcatchment Pr-02: Western Array Field**

Runoff = 29.22 cfs @ 12.37 hrs, Volume= 3.511 af, Depth= 3.85"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.03 hrs  
NRCC 24-hr C 25-Year Rainfall=5.74"

Area (ac)	CN	Description
6.455	74	>75% Grass cover, Good, HSG C
0.294	70	Woods, Good, HSG C
4.005	98	Unconnected roofs, HSG C
0.187	96	Gravel surface, HSG C
10.941	83	Weighted Average
6.936		63.39% Pervious Area
4.005		36.61% Impervious Area
4.005		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.6	100	0.0170	0.16		<b>Sheet Flow, A-B</b> Grass: Short n= 0.150 P2= 3.11"
5.8	244	0.0100	0.70		<b>Shallow Concentrated Flow, B-C</b> Short Grass Pasture Kv= 7.0 fps
6.5	310	0.0130	0.80		<b>Shallow Concentrated Flow, C-D</b> Short Grass Pasture Kv= 7.0 fps
3.1	233	0.0330	1.27		<b>Shallow Concentrated Flow, D-E</b> Short Grass Pasture Kv= 7.0 fps
26.0	887	Total			

**Subcatchment Pr-02: Western Array Field**

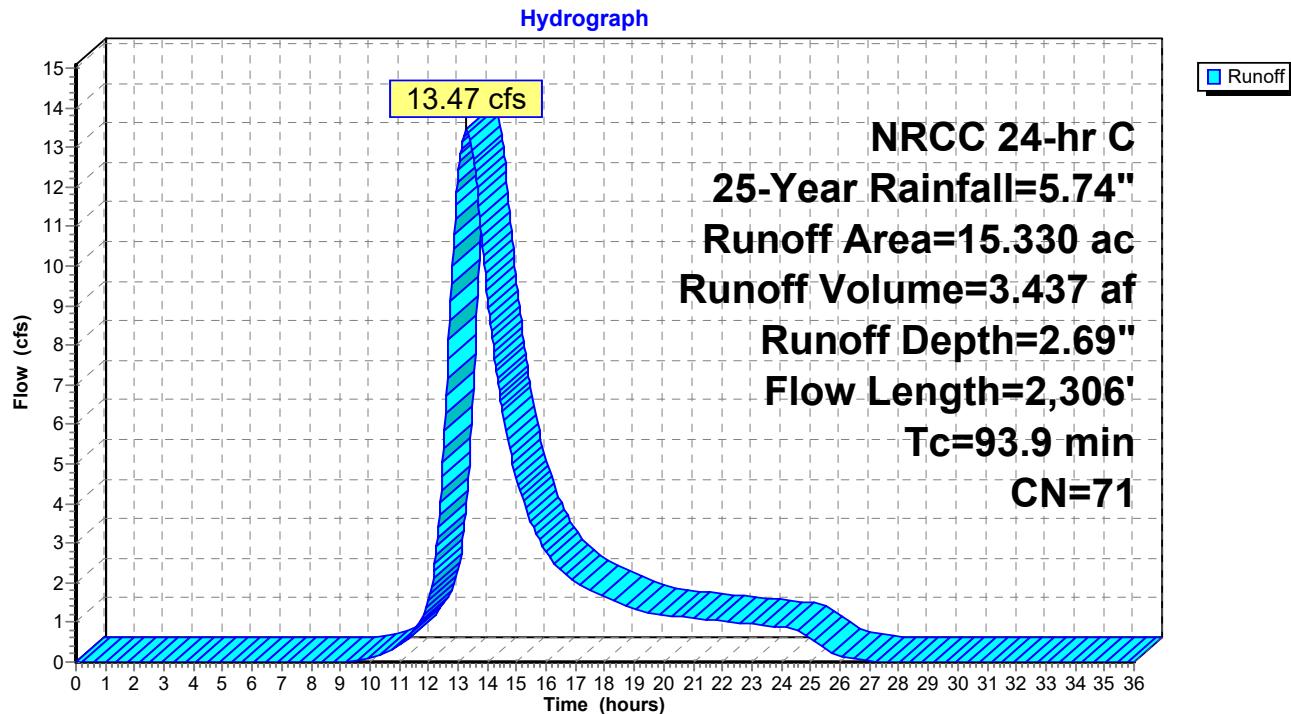
**Summary for Subcatchment Pr-03: Wooded Area East of Main Site**

Runoff = 13.47 cfs @ 13.26 hrs, Volume= 3.437 af, Depth= 2.69"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.03 hrs  
NRCC 24-hr C 25-Year Rainfall=5.74"

Area (ac)	CN	Description
13.669	70	Woods, Good, HSG C
1.105	77	Woods, Good, HSG D
0.556	74	>75% Grass cover, Good, HSG C
15.330	71	Weighted Average
15.330		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.5	100	0.0400	0.10		<b>Sheet Flow, A-B</b> Woods: Light underbrush n= 0.400 P2= 3.11"
20.6	731	0.0140	0.59		<b>Shallow Concentrated Flow, B-C</b> Woodland Kv= 5.0 fps
42.4	697	0.0030	0.27		<b>Shallow Concentrated Flow, C-D</b> Woodland Kv= 5.0 fps
5.9	280	0.0250	0.79		<b>Shallow Concentrated Flow, D-E</b> Woodland Kv= 5.0 fps
1.4	136	0.0530	1.61		<b>Shallow Concentrated Flow, E-F</b> Short Grass Pasture Kv= 7.0 fps
3.2	152	0.0250	0.79		<b>Shallow Concentrated Flow, F-G</b> Woodland Kv= 5.0 fps
3.9	210	0.0320	0.89		<b>Shallow Concentrated Flow, G-H</b> Woodland Kv= 5.0 fps
93.9	2,306	Total			

**Subcatchment Pr-03: Wooded Area East of Main Site**

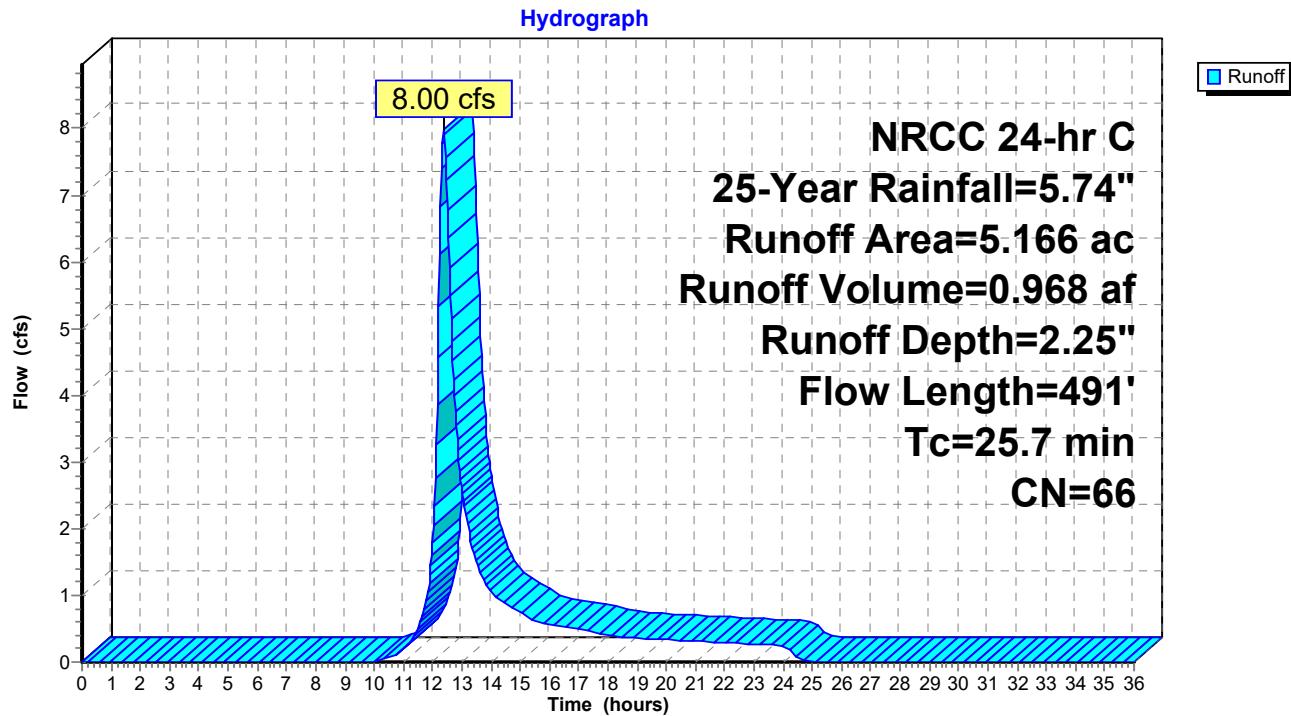
**Summary for Subcatchment Pr-04: Southwest of Array Field**

Runoff = 8.00 cfs @ 12.37 hrs, Volume= 0.968 af, Depth= 2.25"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.03 hrs  
NRCC 24-hr C 25-Year Rainfall=5.74"

Area (ac)	CN	Description
2.679	70	Woods, Good, HSG C
1.412	55	Woods, Good, HSG B
0.814	74	>75% Grass cover, Good, HSG C
0.261	61	>75% Grass cover, Good, HSG B
5.166	66	Weighted Average
5.166		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.5	100	0.0300	0.09		<b>Sheet Flow, A-B</b> Woods: Light underbrush n= 0.400 P2= 3.11"
2.7	154	0.0360	0.95		<b>Shallow Concentrated Flow, B-C</b> Woodland Kv= 5.0 fps
2.8	129	0.0230	0.76		<b>Shallow Concentrated Flow, C-D</b> Woodland Kv= 5.0 fps
1.7	108	0.0460	1.07		<b>Shallow Concentrated Flow, D-E</b> Woodland Kv= 5.0 fps
25.7	491	Total			

**Subcatchment Pr-04: Southwest of Array Field**

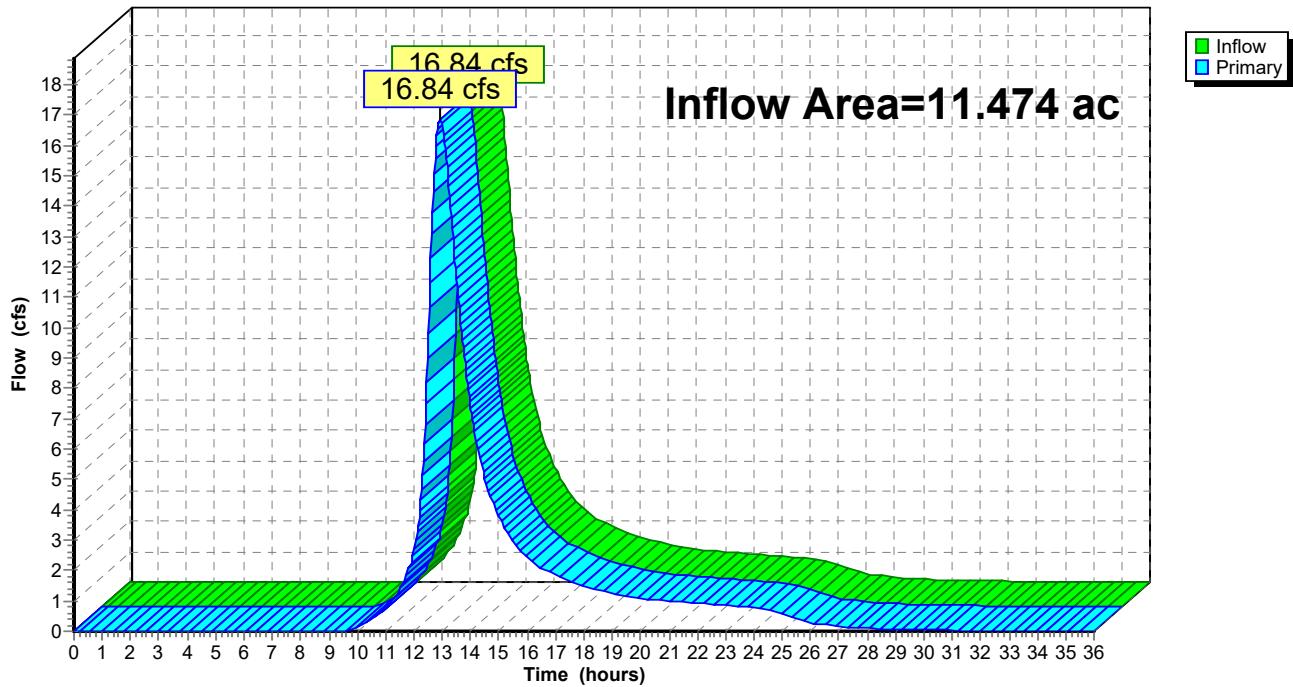
**Summary for Pond AP-1: East**

Inflow Area = 11.474 ac, 37.83% Impervious, Inflow Depth &gt; 3.76" for 25-Year event

Inflow = 16.84 cfs @ 12.92 hrs, Volume= 3.593 af

Primary = 16.84 cfs @ 12.92 hrs, Volume= 3.593 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.03 hrs

**Pond AP-1: East****Hydrograph**

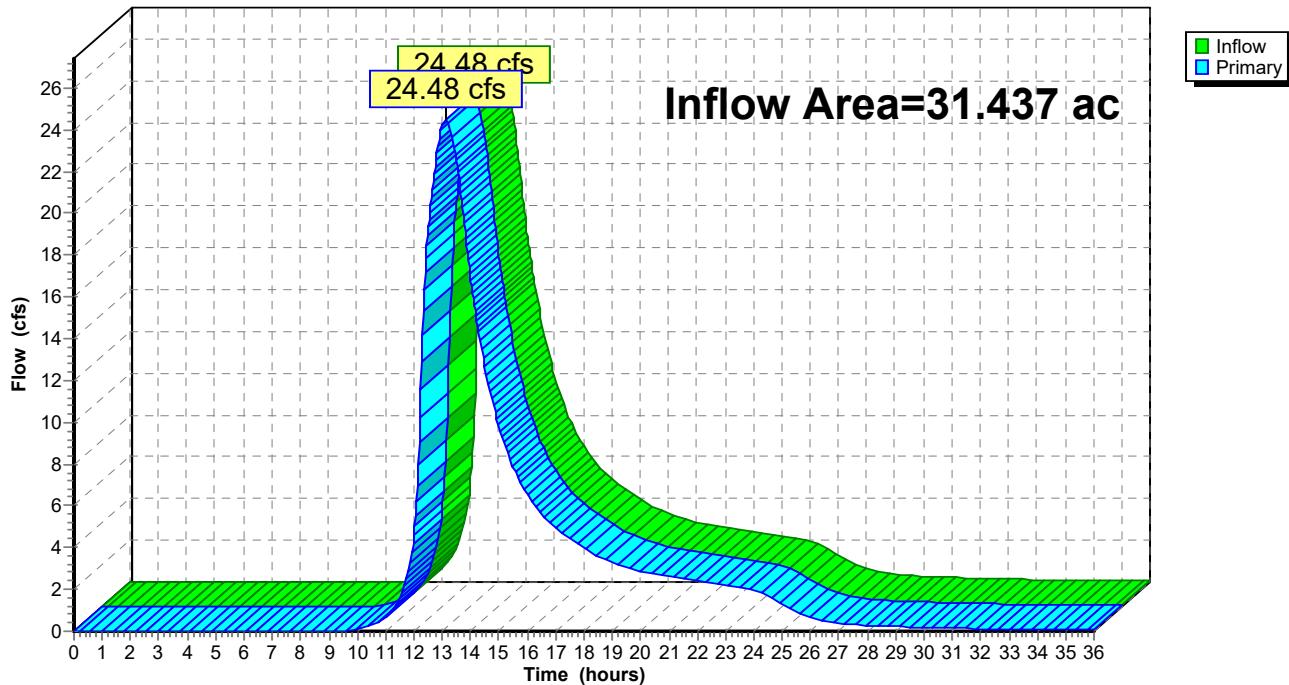
**Summary for Pond AP-2: West**

Inflow Area = 31.437 ac, 12.74% Impervious, Inflow Depth > 2.93" for 25-Year event

Inflow = 24.48 cfs @ 13.13 hrs, Volume= 7.665 af

Primary = 24.48 cfs @ 13.13 hrs, Volume= 7.665 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.03 hrs

**Pond AP-2: West****Hydrograph**

**Summary for Pond SB-1: SWMB-1**

Inflow Area = 11.474 ac, 37.83% Impervious, Inflow Depth = 3.85" for 25-Year event  
 Inflow = 22.43 cfs @ 12.62 hrs, Volume= 3.682 af  
 Outflow = 16.84 cfs @ 12.92 hrs, Volume= 3.593 af, Atten= 25%, Lag= 18.1 min  
 Primary = 16.84 cfs @ 12.92 hrs, Volume= 3.593 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.03 hrs  
 Peak Elev= 184.21' @ 12.92 hrs Surf.Area= 20,252 sf Storage= 36,608 cf

Plug-Flow detention time= 76.8 min calculated for 3.590 af (97% of inflow)  
 Center-of-Mass det. time= 62.8 min ( 915.5 - 852.6 )

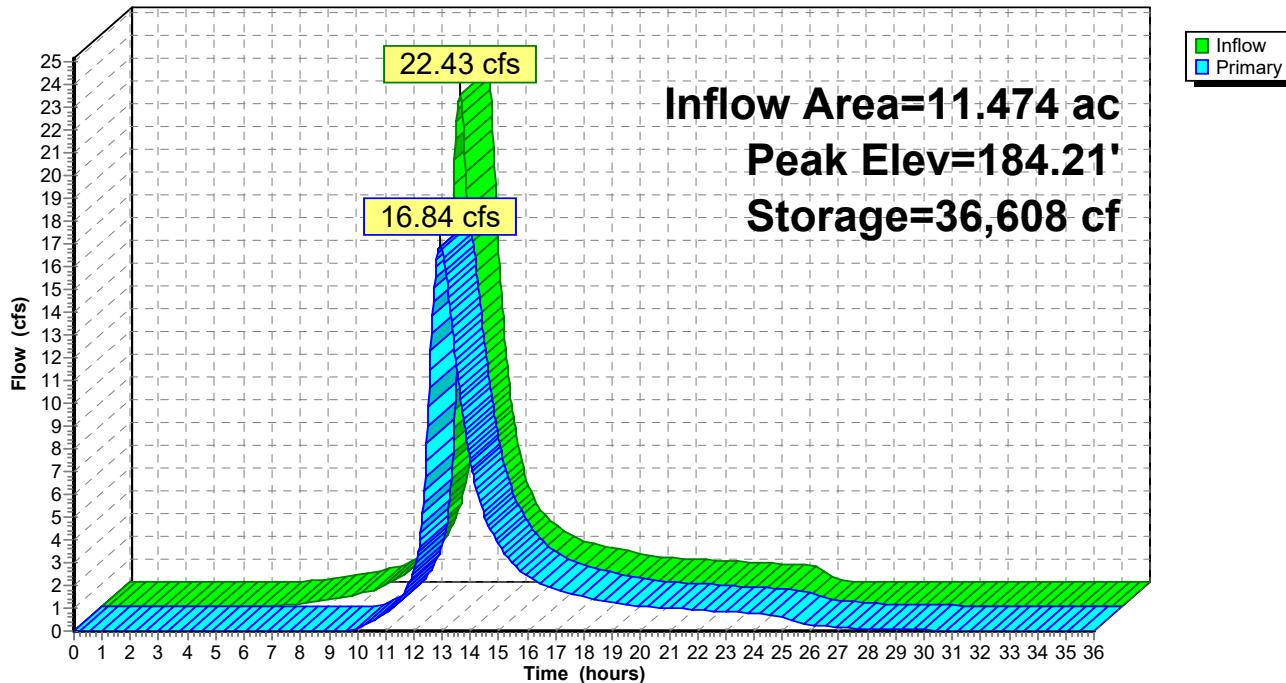
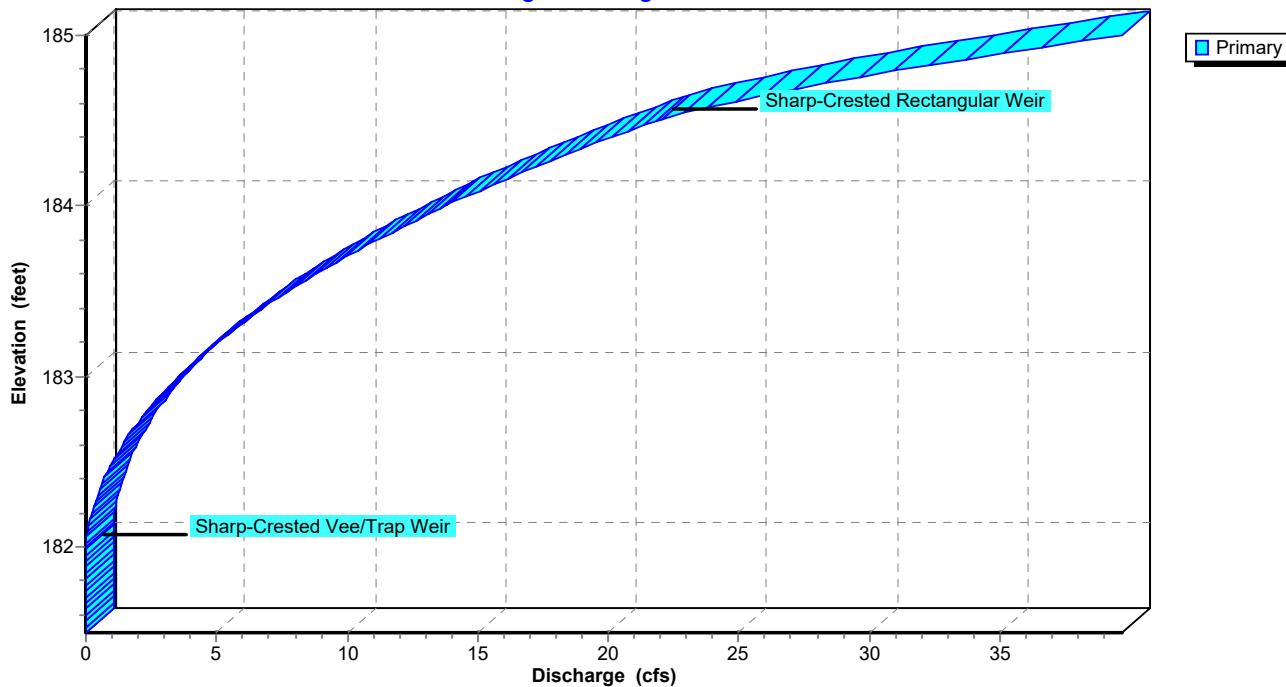
Volume	Invert	Avail.Storage	Storage Description
#1	181.50'	55,773 cf	<b>Custom Stage Data (Prismatic)</b> Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
181.50	5,638	0	0
182.00	9,046	3,671	3,671
183.00	15,331	12,189	15,860
184.00	18,238	16,785	32,644
185.00	28,019	23,129	55,773

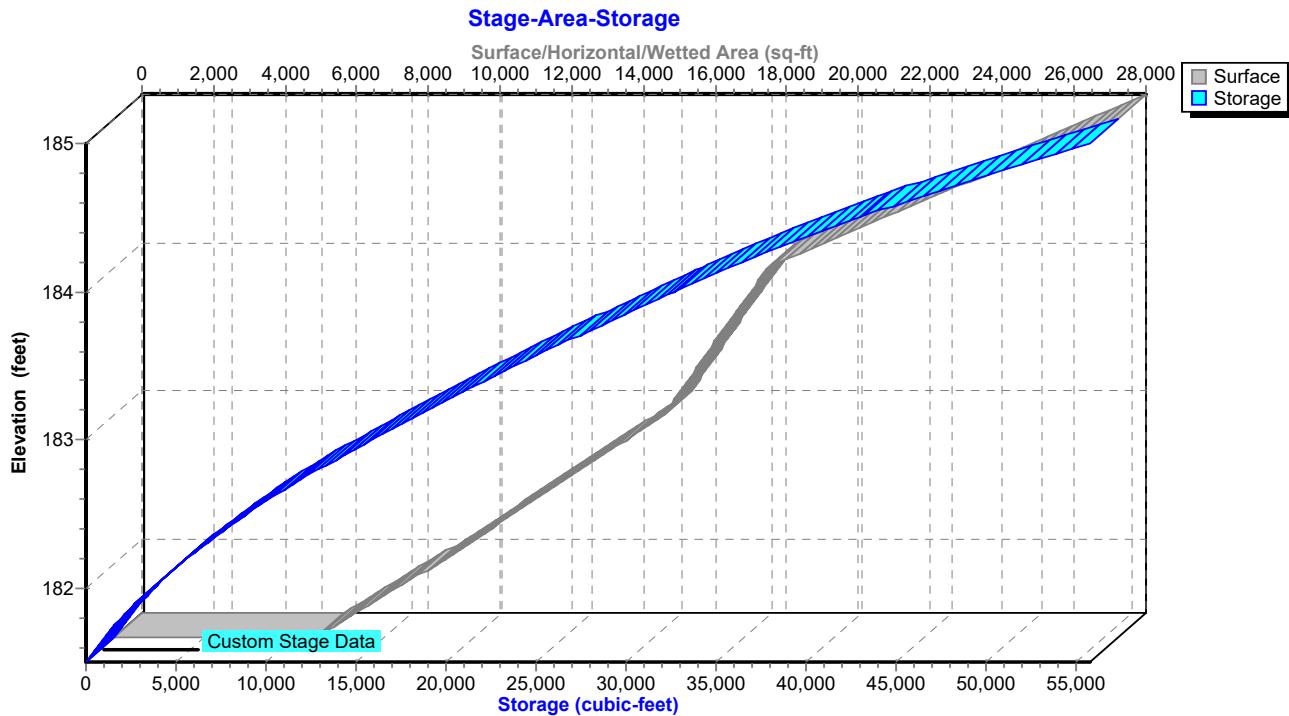
  

Device	Routing	Invert	Outlet Devices
#1	Primary	182.00'	<b>55.0 deg x 0.7' long x 2.50' rise Sharp-Crested Vee/Trap Weir</b> Cv= 2.54 (C= 3.17)
#2	Primary	184.50'	<b>10.0' long Sharp-Crested Rectangular Weir</b> 2 End Contraction(s)

**Primary OutFlow** Max=16.83 cfs @ 12.92 hrs HW=184.21' (Free Discharge)

1=Sharp-Crested Vee/Trap Weir (Weir Controls 16.83 cfs @ 4.13 fps)  
 2=Sharp-Crested Rectangular Weir ( Controls 0.00 cfs)

**Pond SB-1: SWMB-1****Hydrograph****Pond SB-1: SWMB-1****Stage-Discharge**

**Pond SB-1: SWMB-1**

**Summary for Pond SB-2: SWMB-2**

Inflow Area = 10.941 ac, 36.61% Impervious, Inflow Depth = 3.85" for 25-Year event  
 Inflow = 29.22 cfs @ 12.37 hrs, Volume= 3.511 af  
 Outflow = 9.46 cfs @ 12.92 hrs, Volume= 3.259 af, Atten= 68%, Lag= 33.1 min  
 Primary = 9.46 cfs @ 12.92 hrs, Volume= 3.259 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.03 hrs  
 Peak Elev= 185.00' @ 12.92 hrs Surf.Area= 35,089 sf Storage= 66,762 cf

Plug-Flow detention time= 198.1 min calculated for 3.259 af (93% of inflow)  
 Center-of-Mass det. time= 159.2 min ( 993.3 - 834.1 )

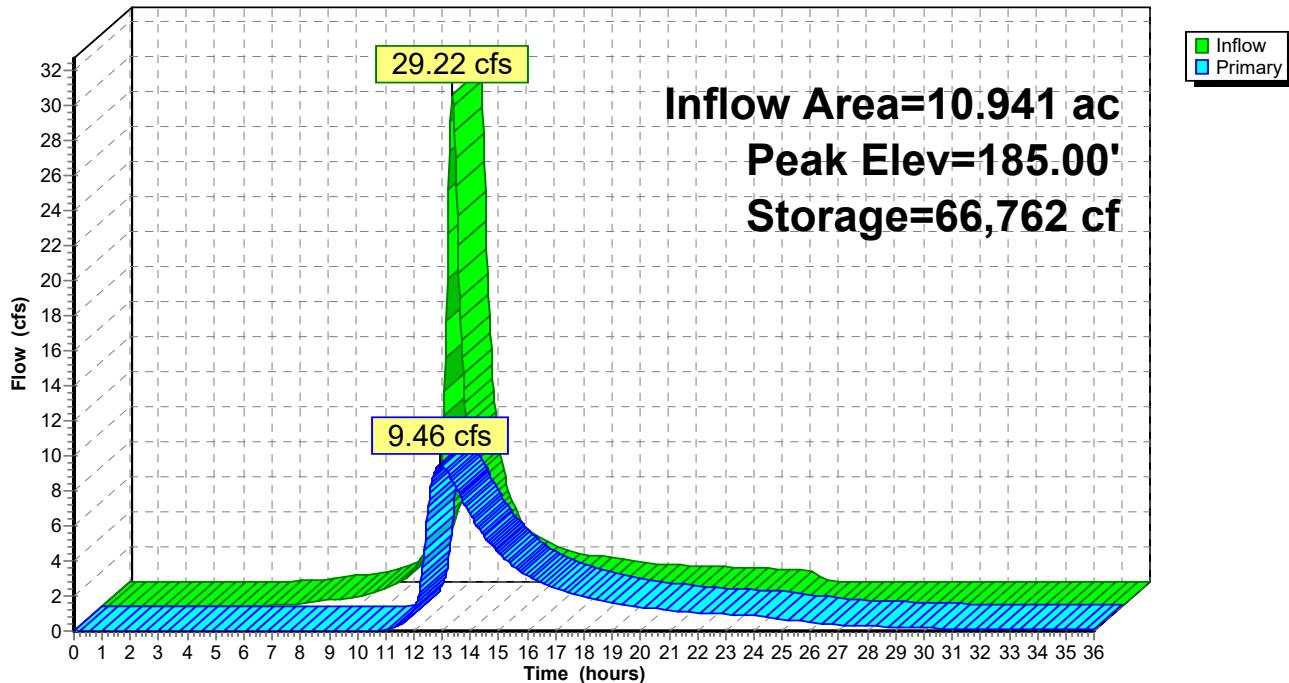
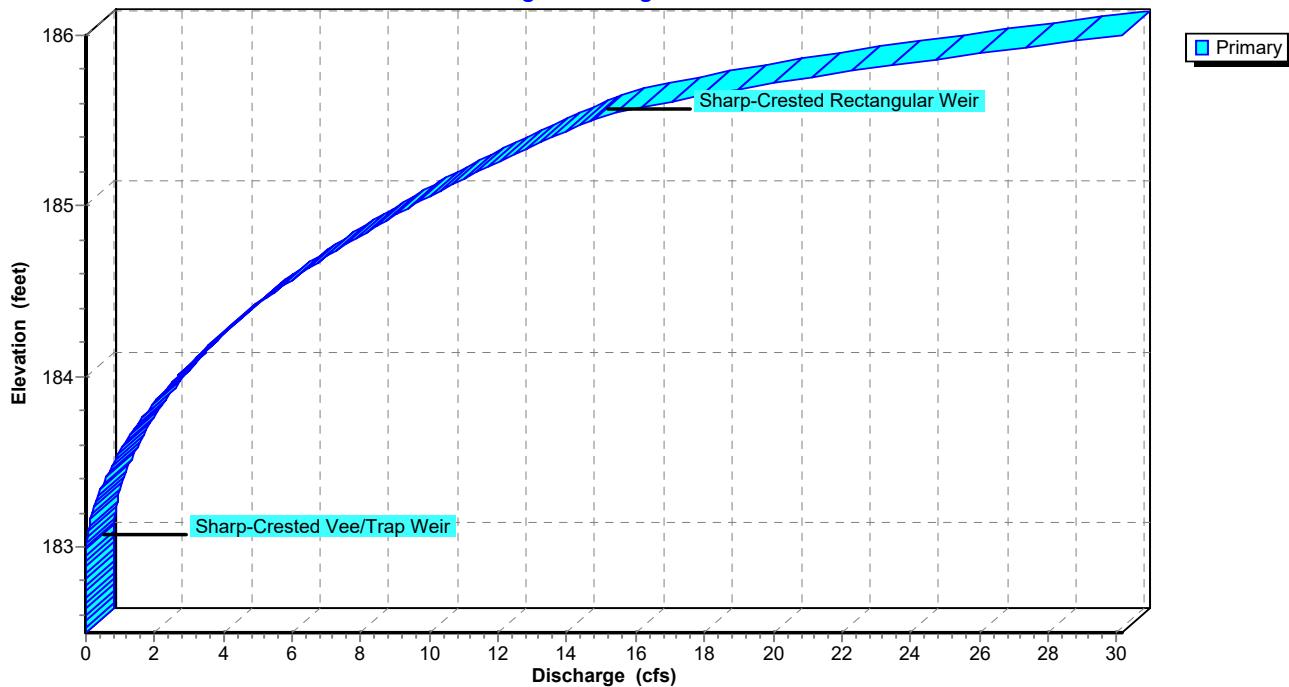
Volume	Invert	Avail.Storage	Storage Description
#1	182.50'	104,895 cf	<b>Custom Stage Data (Prismatic)</b> Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
182.50	13,382	0	0
183.00	22,109	8,873	8,873
184.00	29,424	25,767	34,639
185.00	35,113	32,269	66,908
186.00	40,861	37,987	104,895

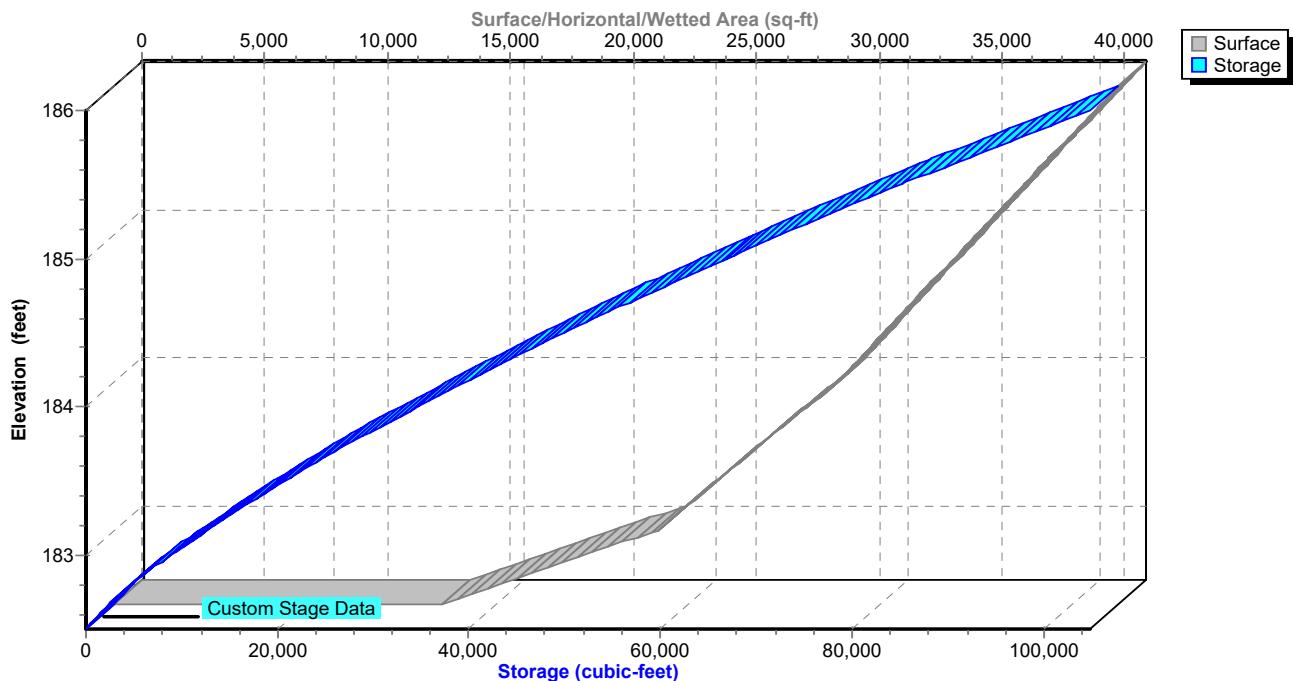
  

Device	Routing	Invert	Outlet Devices
#1	Primary	183.00'	<b>30.0 deg x 0.6' long x 2.50' rise Sharp-Crested Vee/Trap Weir</b> Cv= 2.61 (C= 3.26)
#2	Primary	185.50'	<b>10.0' long Sharp-Crested Rectangular Weir</b> 2 End Contraction(s)

**Primary OutFlow** Max=9.45 cfs @ 12.92 hrs HW=185.00' (Free Discharge)

1=Sharp-Crested Vee/Trap Weir (Weir Controls 9.45 cfs @ 4.17 fps)  
 2=Sharp-Crested Rectangular Weir ( Controls 0.00 cfs)

**Pond SB-2: SWMB-2****Hydrograph****Pond SB-2: SWMB-2****Stage-Discharge**

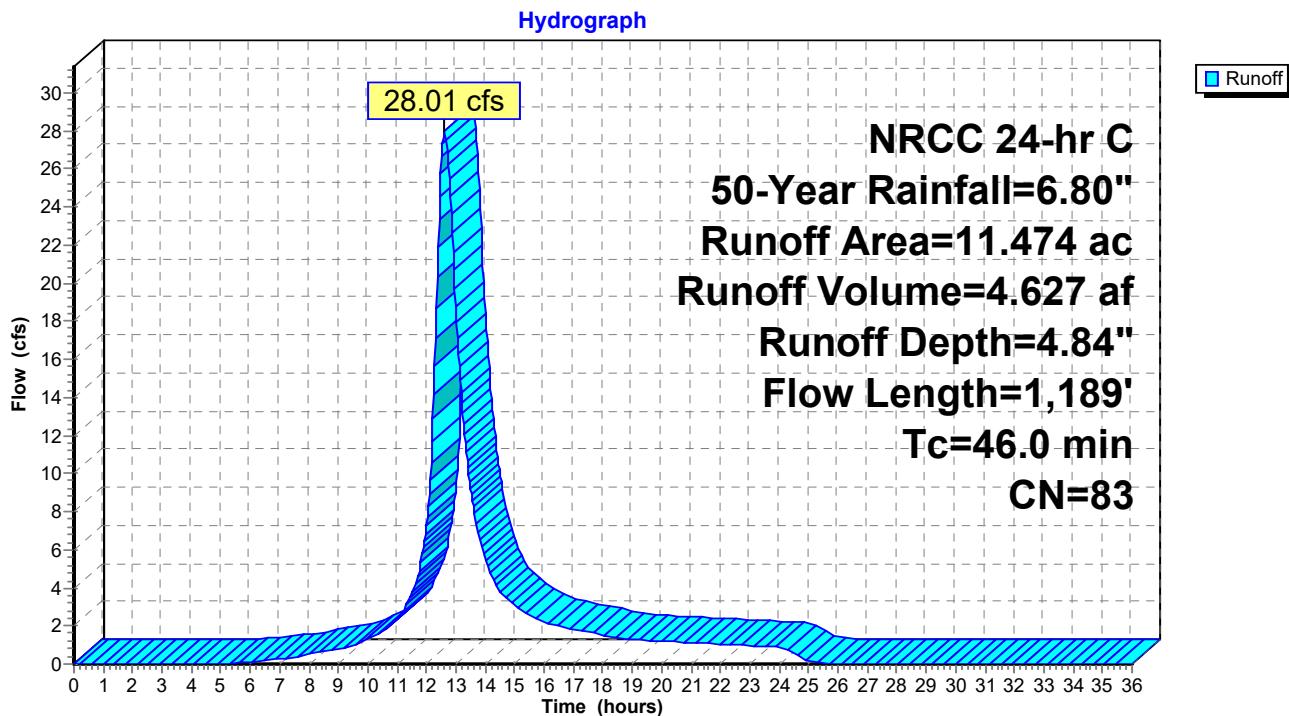
**Pond SB-2: SWMB-2****Stage-Area-Storage**

**Summary for Subcatchment Pr-01: Easterly Main Site (Northern Field)**

Runoff = 28.01 cfs @ 12.62 hrs, Volume= 4.627 af, Depth= 4.84"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.03 hrs  
NRCC 24-hr C 50-Year Rainfall=6.80"

Area (ac)	CN	Description			
6.697	74	>75% Grass cover, Good, HSG C			
0.310	79	50-75% Grass cover, Fair, HSG C			
4.341	98	Unconnected roofs, HSG C			
0.126	96	Gravel surface, HSG C			
11.474	83	Weighted Average			
7.133		62.17% Pervious Area			
4.341		37.83% Impervious Area			
4.341		100.00% Unconnected			
Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.4	100	0.0110	0.09		<b>Sheet Flow, A-B</b> Grass: Dense n= 0.240 P2= 3.11"
3.1	169	0.0170	0.91		<b>Shallow Concentrated Flow, B-C</b> Short Grass Pasture Kv= 7.0 fps
24.5	920	0.0080	0.63		<b>Shallow Concentrated Flow, C-D</b> Short Grass Pasture Kv= 7.0 fps
46.0	1,189	Total			

**Subcatchment Pr-01: Easterly Main Site (Northern Field)**

**Summary for Subcatchment Pr-02: Western Array Field**

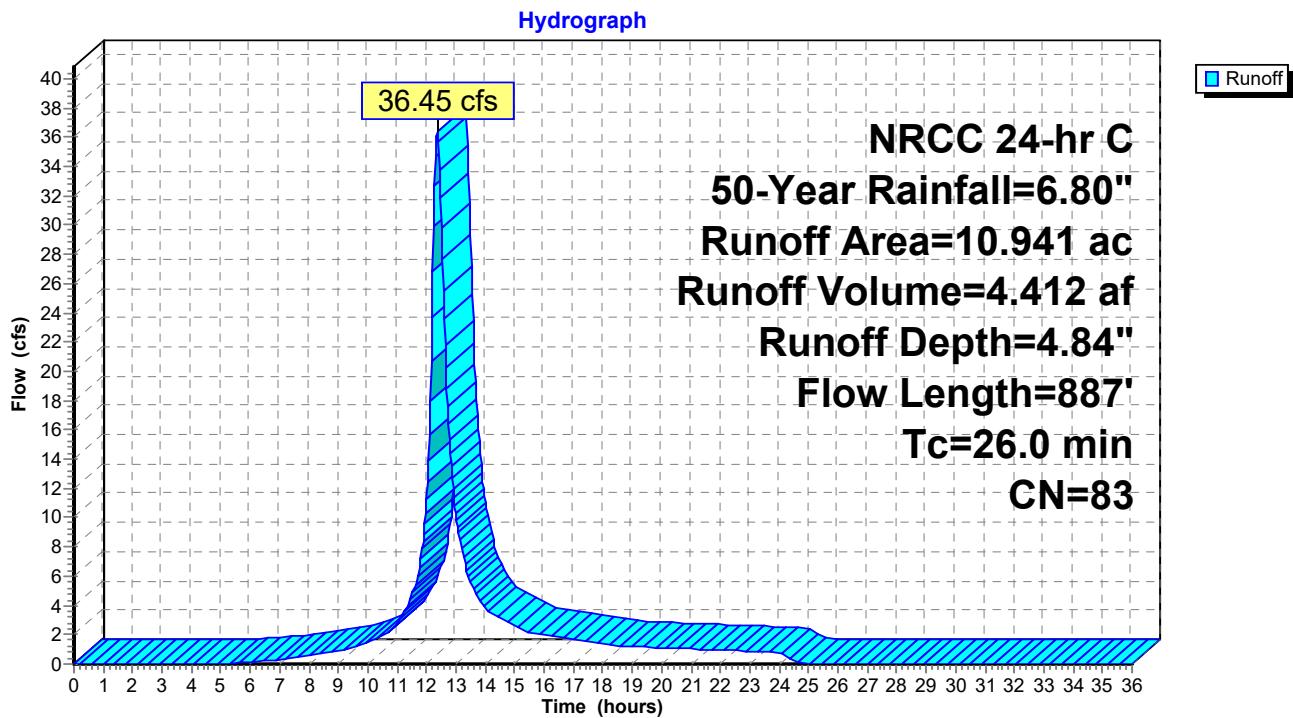
Runoff = 36.45 cfs @ 12.36 hrs, Volume= 4.412 af, Depth= 4.84"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.03 hrs  
NRCC 24-hr C 50-Year Rainfall=6.80"

Area (ac)	CN	Description
6.455	74	>75% Grass cover, Good, HSG C
0.294	70	Woods, Good, HSG C
4.005	98	Unconnected roofs, HSG C
0.187	96	Gravel surface, HSG C

10.941	83	Weighted Average
6.936		63.39% Pervious Area
4.005		36.61% Impervious Area
4.005		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.6	100	0.0170	0.16		<b>Sheet Flow, A-B</b> Grass: Short n= 0.150 P2= 3.11"
5.8	244	0.0100	0.70		<b>Shallow Concentrated Flow, B-C</b> Short Grass Pasture Kv= 7.0 fps
6.5	310	0.0130	0.80		<b>Shallow Concentrated Flow, C-D</b> Short Grass Pasture Kv= 7.0 fps
3.1	233	0.0330	1.27		<b>Shallow Concentrated Flow, D-E</b> Short Grass Pasture Kv= 7.0 fps
26.0	887	Total			

**Subcatchment Pr-02: Western Array Field**

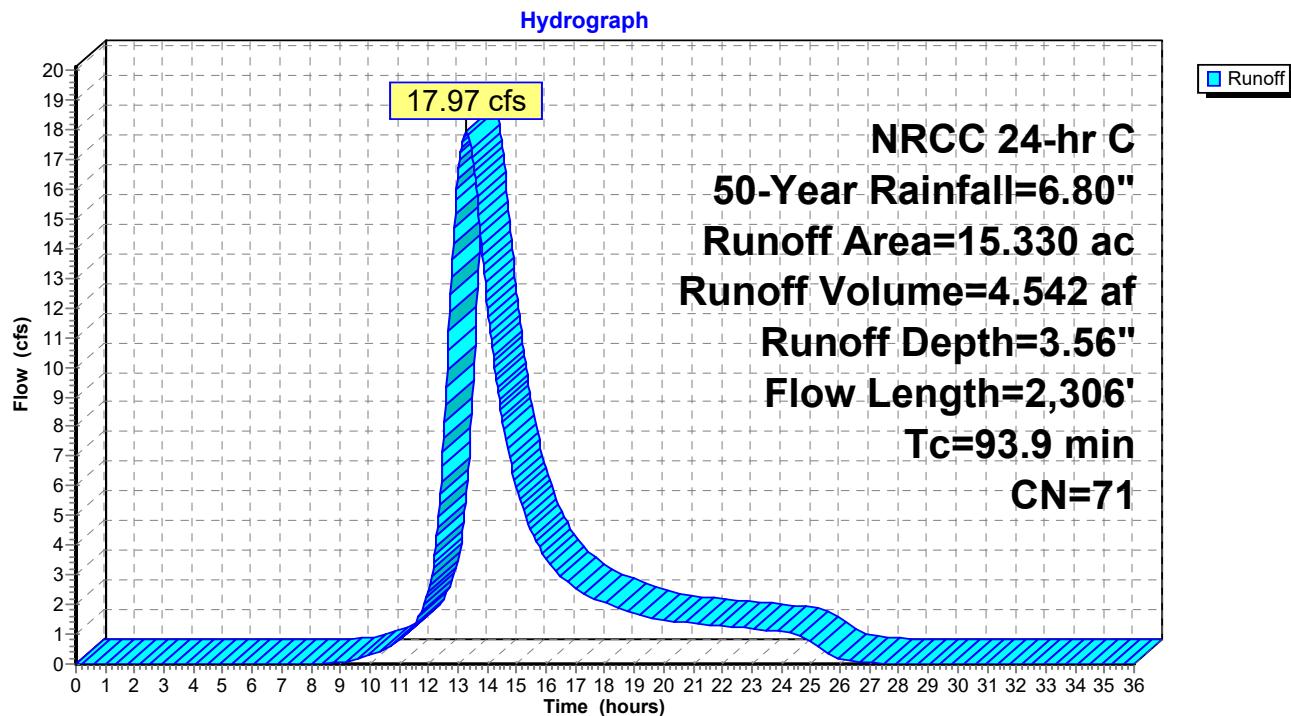
**Summary for Subcatchment Pr-03: Wooded Area East of Main Site**

Runoff = 17.97 cfs @ 13.26 hrs, Volume= 4.542 af, Depth= 3.56"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.03 hrs  
NRCC 24-hr C 50-Year Rainfall=6.80"

Area (ac)	CN	Description
13.669	70	Woods, Good, HSG C
1.105	77	Woods, Good, HSG D
0.556	74	>75% Grass cover, Good, HSG C
15.330	71	Weighted Average
15.330		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.5	100	0.0400	0.10		<b>Sheet Flow, A-B</b> Woods: Light underbrush n= 0.400 P2= 3.11"
20.6	731	0.0140	0.59		<b>Shallow Concentrated Flow, B-C</b> Woodland Kv= 5.0 fps
42.4	697	0.0030	0.27		<b>Shallow Concentrated Flow, C-D</b> Woodland Kv= 5.0 fps
5.9	280	0.0250	0.79		<b>Shallow Concentrated Flow, D-E</b> Woodland Kv= 5.0 fps
1.4	136	0.0530	1.61		<b>Shallow Concentrated Flow, E-F</b> Short Grass Pasture Kv= 7.0 fps
3.2	152	0.0250	0.79		<b>Shallow Concentrated Flow, F-G</b> Woodland Kv= 5.0 fps
3.9	210	0.0320	0.89		<b>Shallow Concentrated Flow, G-H</b> Woodland Kv= 5.0 fps
93.9	2,306	Total			

**Subcatchment Pr-03: Wooded Area East of Main Site**

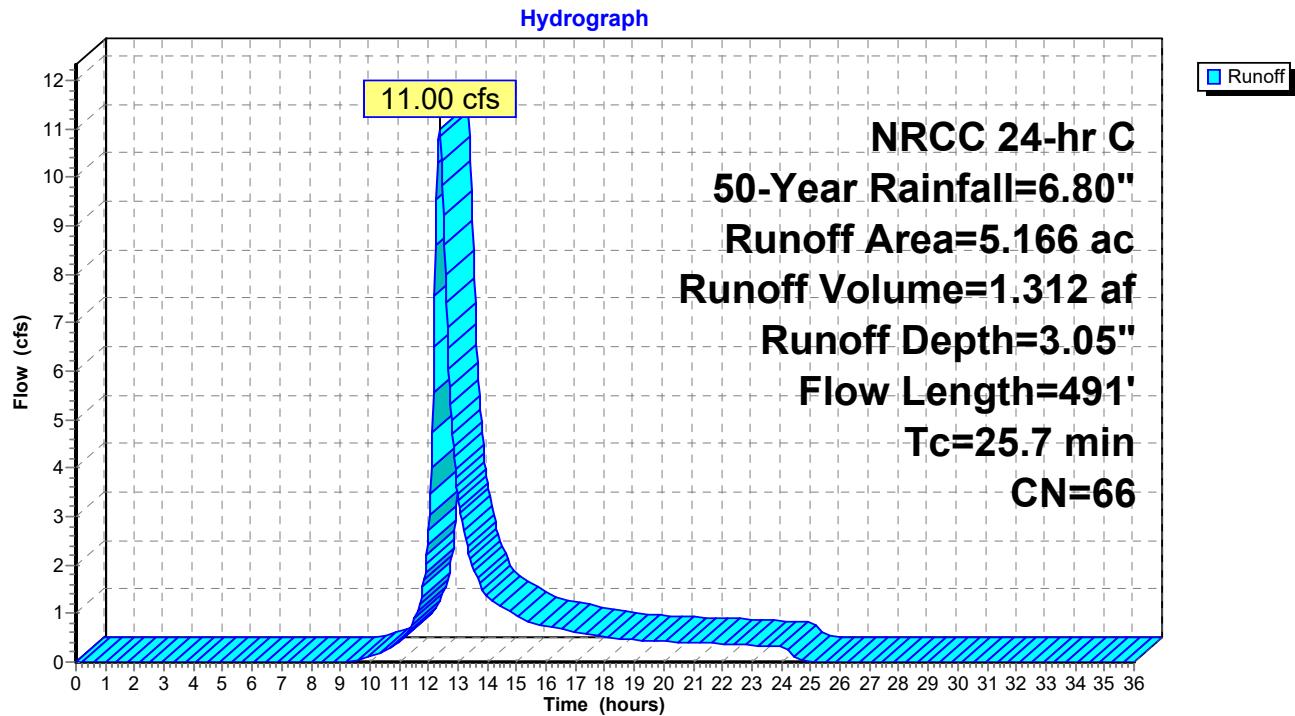
**Summary for Subcatchment Pr-04: Southwest of Array Field**

Runoff = 11.00 cfs @ 12.37 hrs, Volume= 1.312 af, Depth= 3.05"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.03 hrs  
NRCC 24-hr C 50-Year Rainfall=6.80"

Area (ac)	CN	Description
2.679	70	Woods, Good, HSG C
1.412	55	Woods, Good, HSG B
0.814	74	>75% Grass cover, Good, HSG C
0.261	61	>75% Grass cover, Good, HSG B
5.166	66	Weighted Average
5.166		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.5	100	0.0300	0.09		<b>Sheet Flow, A-B</b> Woods: Light underbrush n= 0.400 P2= 3.11"
2.7	154	0.0360	0.95		<b>Shallow Concentrated Flow, B-C</b> Woodland Kv= 5.0 fps
2.8	129	0.0230	0.76		<b>Shallow Concentrated Flow, C-D</b> Woodland Kv= 5.0 fps
1.7	108	0.0460	1.07		<b>Shallow Concentrated Flow, D-E</b> Woodland Kv= 5.0 fps
25.7	491	Total			

**Subcatchment Pr-04: Southwest of Array Field**

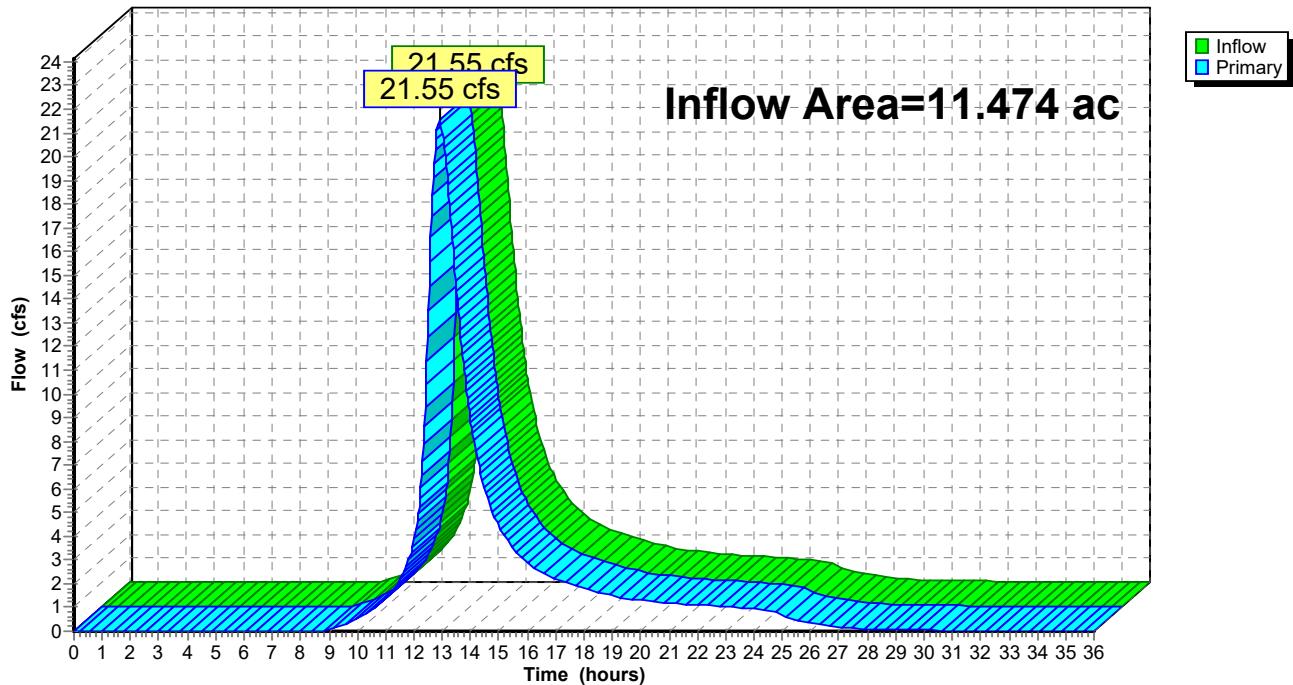
**Summary for Pond AP-1: East**

Inflow Area = 11.474 ac, 37.83% Impervious, Inflow Depth &gt; 4.75" for 50-Year event

Inflow = 21.55 cfs @ 12.90 hrs, Volume= 4.538 af

Primary = 21.55 cfs @ 12.90 hrs, Volume= 4.538 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.03 hrs

**Pond AP-1: East****Hydrograph**

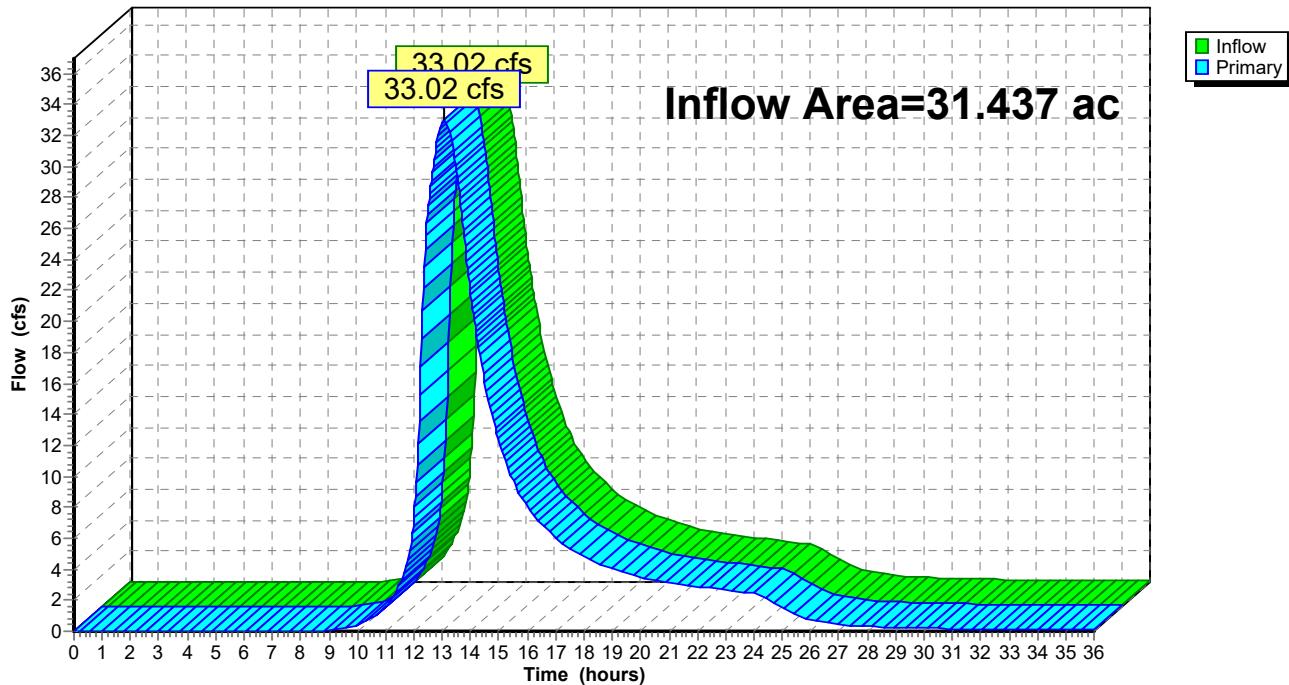
**Summary for Pond AP-2: West**

Inflow Area = 31.437 ac, 12.74% Impervious, Inflow Depth &gt; 3.82" for 50-Year event

Inflow = 33.02 cfs @ 13.05 hrs, Volume= 10.013 af

Primary = 33.02 cfs @ 13.05 hrs, Volume= 10.013 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.03 hrs

**Pond AP-2: West****Hydrograph**

**Summary for Pond SB-1: SWMB-1**

Inflow Area = 11.474 ac, 37.83% Impervious, Inflow Depth = 4.84" for 50-Year event  
 Inflow = 28.01 cfs @ 12.62 hrs, Volume= 4.627 af  
 Outflow = 21.55 cfs @ 12.90 hrs, Volume= 4.538 af, Atten= 23%, Lag= 17.0 min  
 Primary = 21.55 cfs @ 12.90 hrs, Volume= 4.538 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.03 hrs  
 Peak Elev= 184.48' @ 12.90 hrs Surf.Area= 22,968 sf Storage= 42,607 cf

Plug-Flow detention time= 69.5 min calculated for 4.534 af (98% of inflow)  
 Center-of-Mass det. time= 58.2 min ( 903.7 - 845.5 )

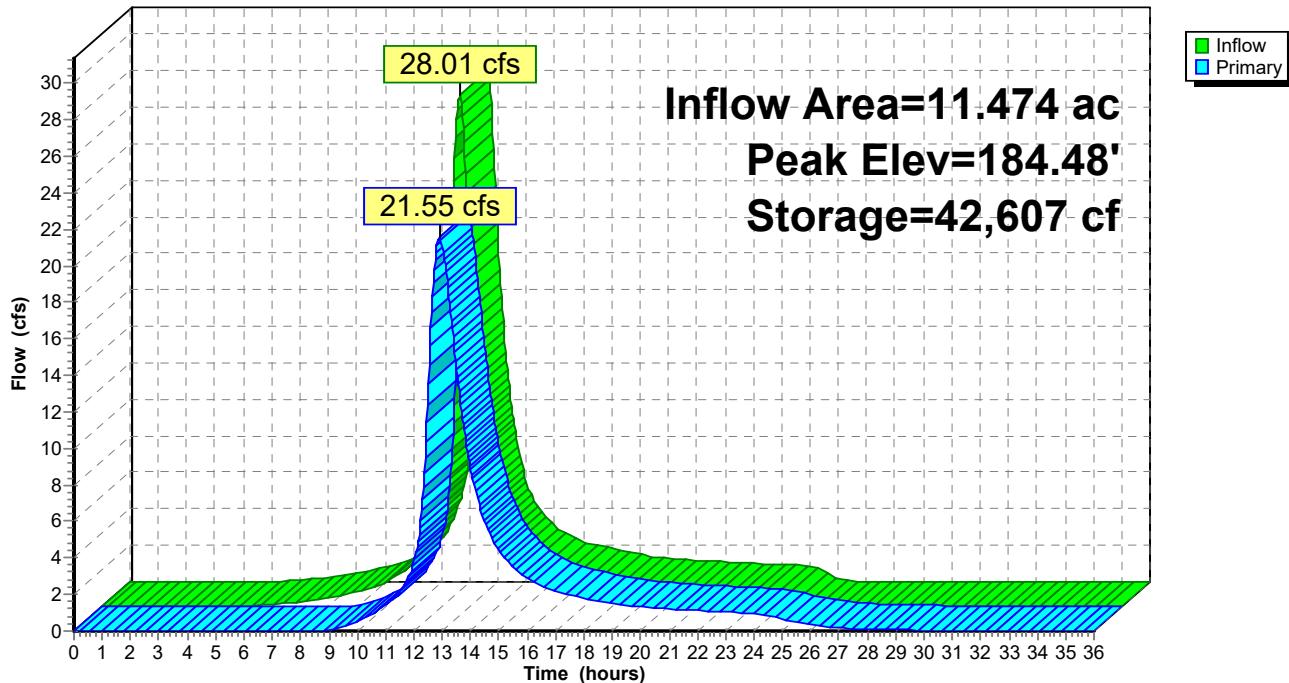
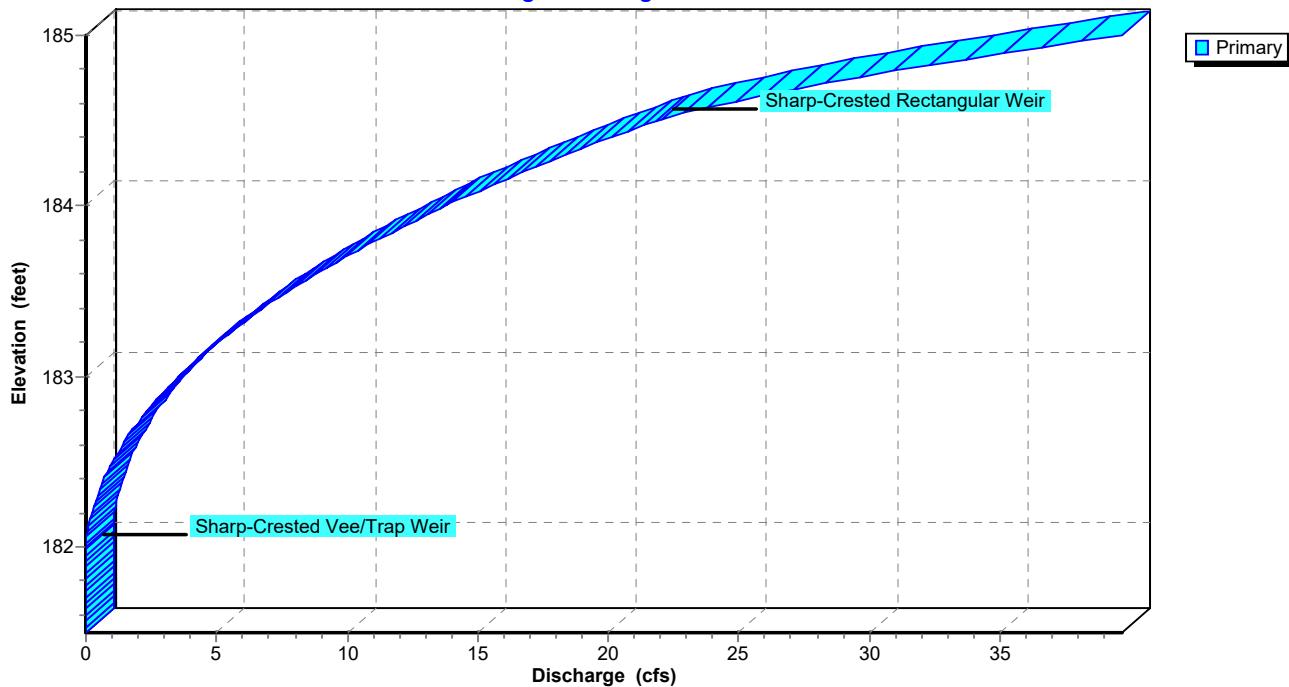
Volume	Invert	Avail.Storage	Storage Description
#1	181.50'	55,773 cf	<b>Custom Stage Data (Prismatic)</b> Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
181.50	5,638	0	0
182.00	9,046	3,671	3,671
183.00	15,331	12,189	15,860
184.00	18,238	16,785	32,644
185.00	28,019	23,129	55,773

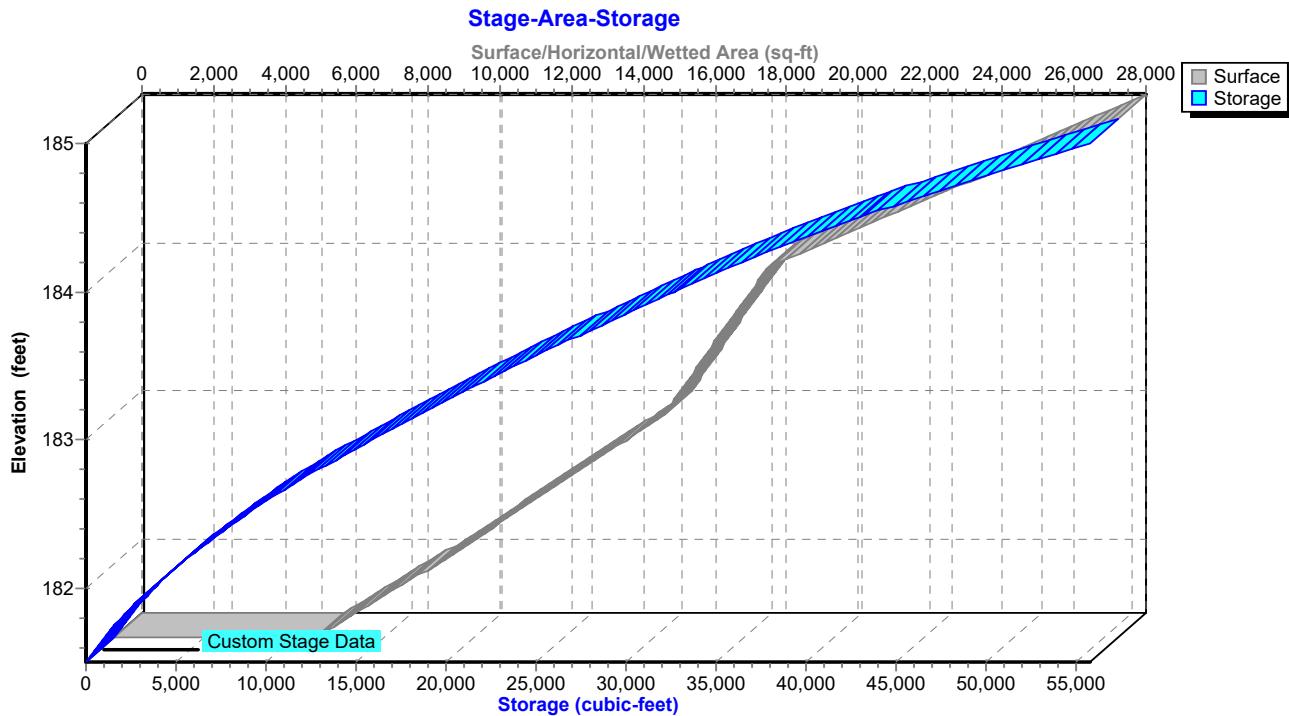
  

Device	Routing	Invert	Outlet Devices
#1	Primary	182.00'	<b>55.0 deg x 0.7' long x 2.50' rise Sharp-Crested Vee/Trap Weir</b> Cv= 2.54 (C= 3.17)
#2	Primary	184.50'	<b>10.0' long Sharp-Crested Rectangular Weir</b> 2 End Contraction(s)

**Primary OutFlow** Max=21.55 cfs @ 12.90 hrs HW=184.48' (Free Discharge)

1=Sharp-Crested Vee/Trap Weir (Weir Controls 21.55 cfs @ 4.35 fps)  
 2=Sharp-Crested Rectangular Weir ( Controls 0.00 cfs)

**Pond SB-1: SWMB-1****Hydrograph****Pond SB-1: SWMB-1****Stage-Discharge**

**Pond SB-1: SWMB-1**

**Summary for Pond SB-2: SWMB-2**

Inflow Area = 10.941 ac, 36.61% Impervious, Inflow Depth = 4.84" for 50-Year event  
 Inflow = 36.45 cfs @ 12.36 hrs, Volume= 4.412 af  
 Outflow = 13.22 cfs @ 12.85 hrs, Volume= 4.158 af, Atten= 64%, Lag= 29.2 min  
 Primary = 13.22 cfs @ 12.85 hrs, Volume= 4.158 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.03 hrs  
 Peak Elev= 185.37' @ 12.85 hrs Surf.Area= 37,254 sf Storage= 80,385 cf

Plug-Flow detention time= 179.0 min calculated for 4.158 af (94% of inflow)  
 Center-of-Mass det. time= 146.6 min ( 973.6 - 826.9 )

Volume	Invert	Avail.Storage	Storage Description
#1	182.50'	104,895 cf	<b>Custom Stage Data (Prismatic)</b> Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
182.50	13,382	0	0
183.00	22,109	8,873	8,873
184.00	29,424	25,767	34,639
185.00	35,113	32,269	66,908
186.00	40,861	37,987	104,895

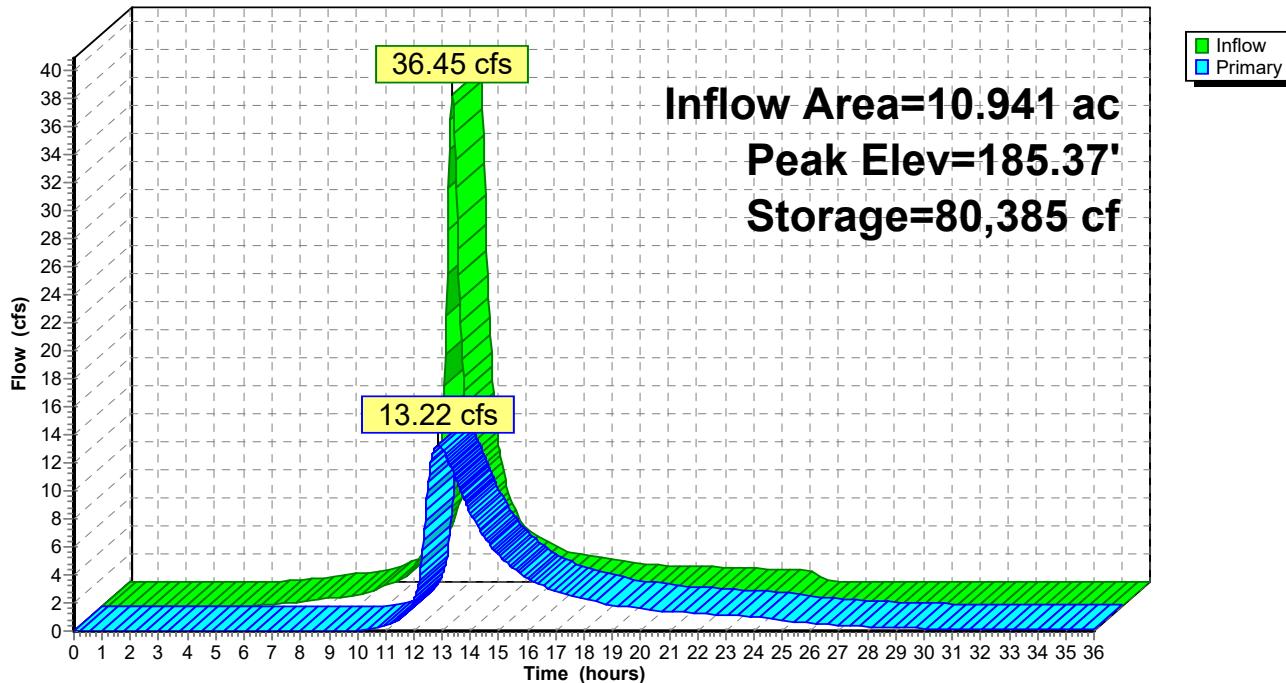
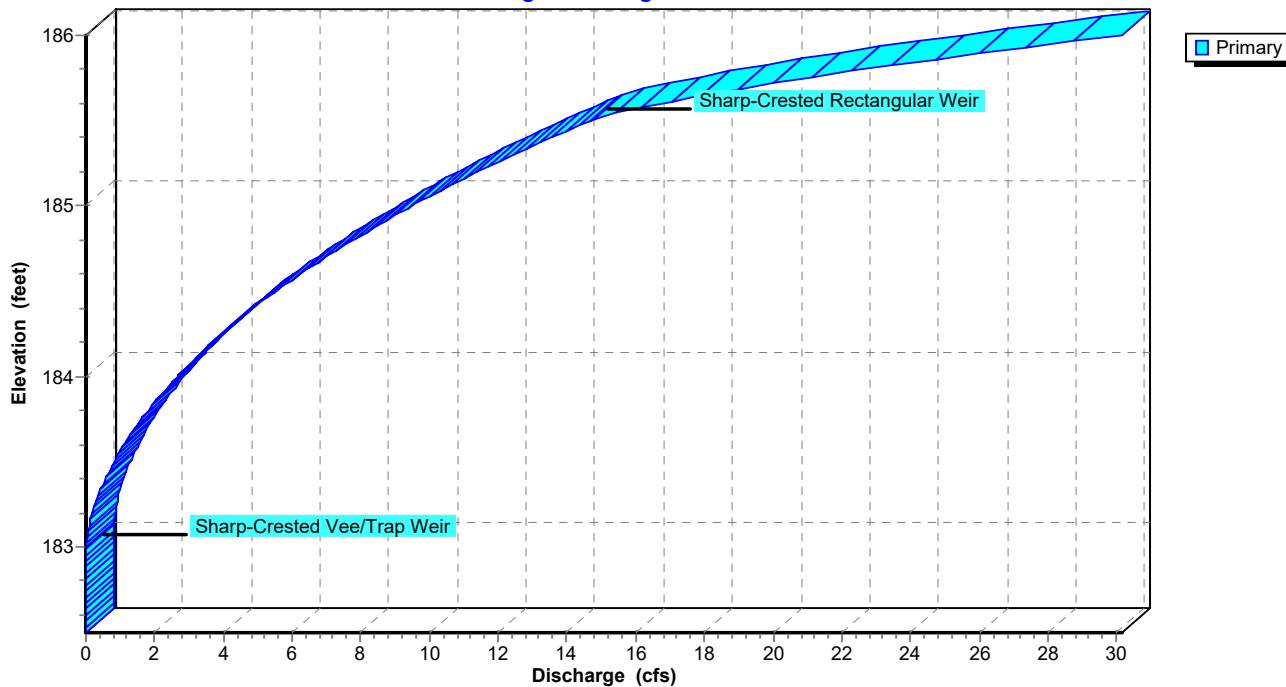
  

Device	Routing	Invert	Outlet Devices
#1	Primary	183.00'	<b>30.0 deg x 0.6' long x 2.50' rise Sharp-Crested Vee/Trap Weir</b> Cv= 2.61 (C= 3.26)
#2	Primary	185.50'	<b>10.0' long Sharp-Crested Rectangular Weir</b> 2 End Contraction(s)

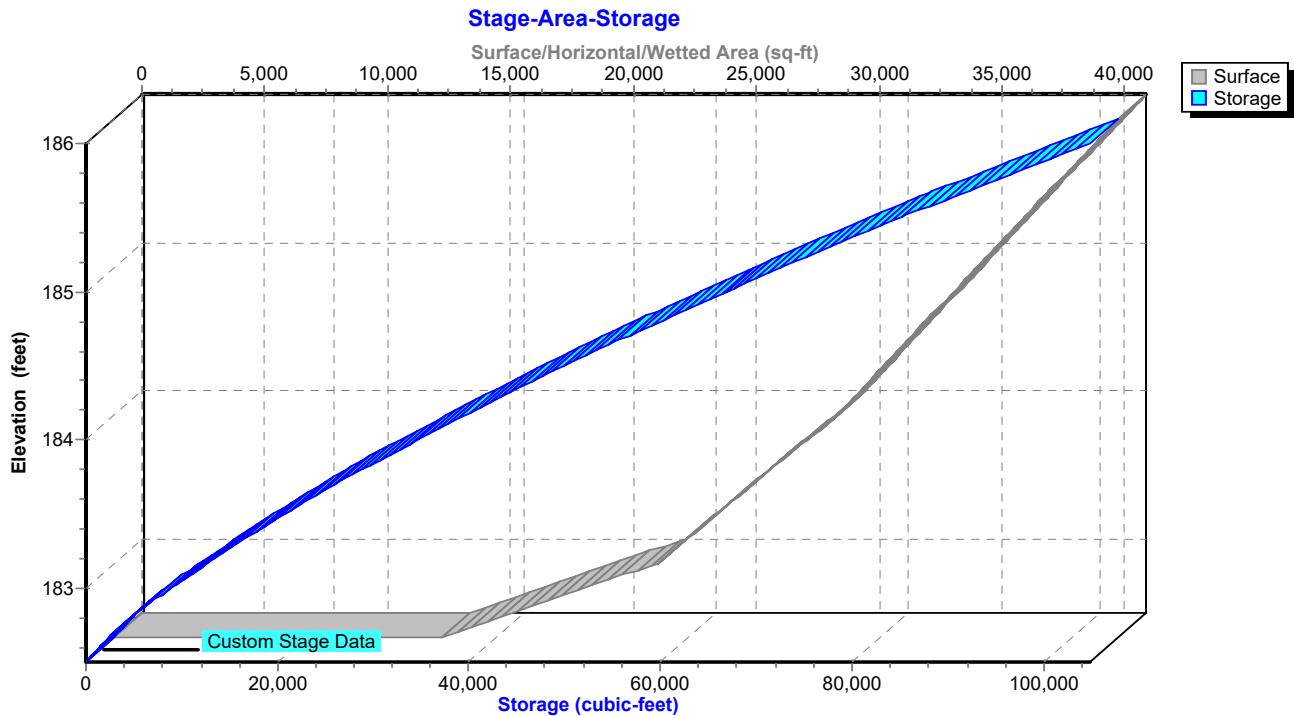
**Primary OutFlow** Max=13.21 cfs @ 12.85 hrs HW=185.37' (Free Discharge)

1=Sharp-Crested Vee/Trap Weir (Weir Controls 13.21 cfs @ 4.51 fps)

2=Sharp-Crested Rectangular Weir ( Controls 0.00 cfs )

**Pond SB-2: SWMB-2****Hydrograph****Pond SB-2: SWMB-2****Stage-Discharge**

## Pond SB-2: SWMB-2



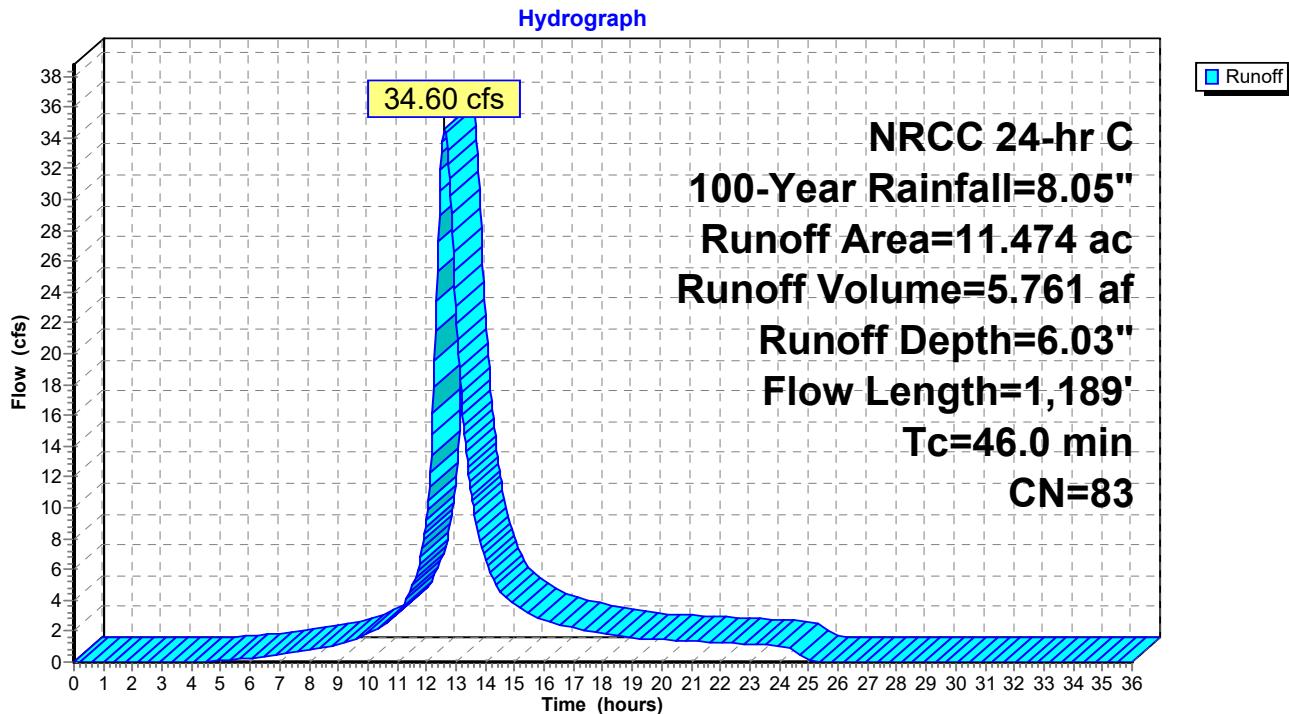
**Summary for Subcatchment Pr-01: Easterly Main Site (Northern Field)**

Runoff = 34.60 cfs @ 12.62 hrs, Volume= 5.761 af, Depth= 6.03"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.03 hrs  
NRCC 24-hr C 100-Year Rainfall=8.05"

Area (ac)	CN	Description
6.697	74	>75% Grass cover, Good, HSG C
0.310	79	50-75% Grass cover, Fair, HSG C
4.341	98	Unconnected roofs, HSG C
0.126	96	Gravel surface, HSG C
11.474	83	Weighted Average
7.133		62.17% Pervious Area
4.341		37.83% Impervious Area
4.341		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.4	100	0.0110	0.09		<b>Sheet Flow, A-B</b> Grass: Dense n= 0.240 P2= 3.11"
3.1	169	0.0170	0.91		<b>Shallow Concentrated Flow, B-C</b> Short Grass Pasture Kv= 7.0 fps
24.5	920	0.0080	0.63		<b>Shallow Concentrated Flow, C-D</b> Short Grass Pasture Kv= 7.0 fps
46.0	1,189	Total			

**Subcatchment Pr-01: Easterly Main Site (Northern Field)**

**Summary for Subcatchment Pr-02: Western Array Field**

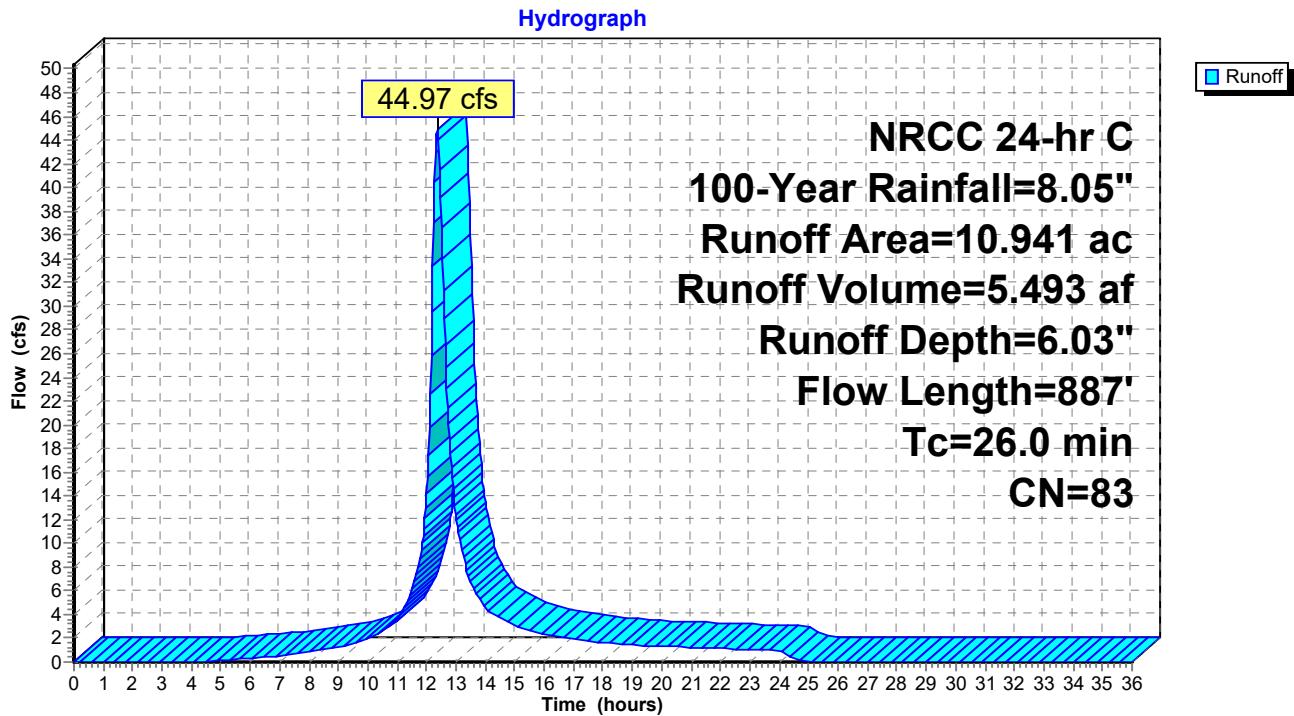
Runoff = 44.97 cfs @ 12.36 hrs, Volume= 5.493 af, Depth= 6.03"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.03 hrs  
NRCC 24-hr C 100-Year Rainfall=8.05"

Area (ac)	CN	Description
6.455	74	>75% Grass cover, Good, HSG C
0.294	70	Woods, Good, HSG C
4.005	98	Unconnected roofs, HSG C
0.187	96	Gravel surface, HSG C

10.941	83	Weighted Average
6.936		63.39% Pervious Area
4.005		36.61% Impervious Area
4.005		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.6	100	0.0170	0.16		<b>Sheet Flow, A-B</b> Grass: Short n= 0.150 P2= 3.11"
5.8	244	0.0100	0.70		<b>Shallow Concentrated Flow, B-C</b> Short Grass Pasture Kv= 7.0 fps
6.5	310	0.0130	0.80		<b>Shallow Concentrated Flow, C-D</b> Short Grass Pasture Kv= 7.0 fps
3.1	233	0.0330	1.27		<b>Shallow Concentrated Flow, D-E</b> Short Grass Pasture Kv= 7.0 fps
26.0	887	Total			

**Subcatchment Pr-02: Western Array Field**

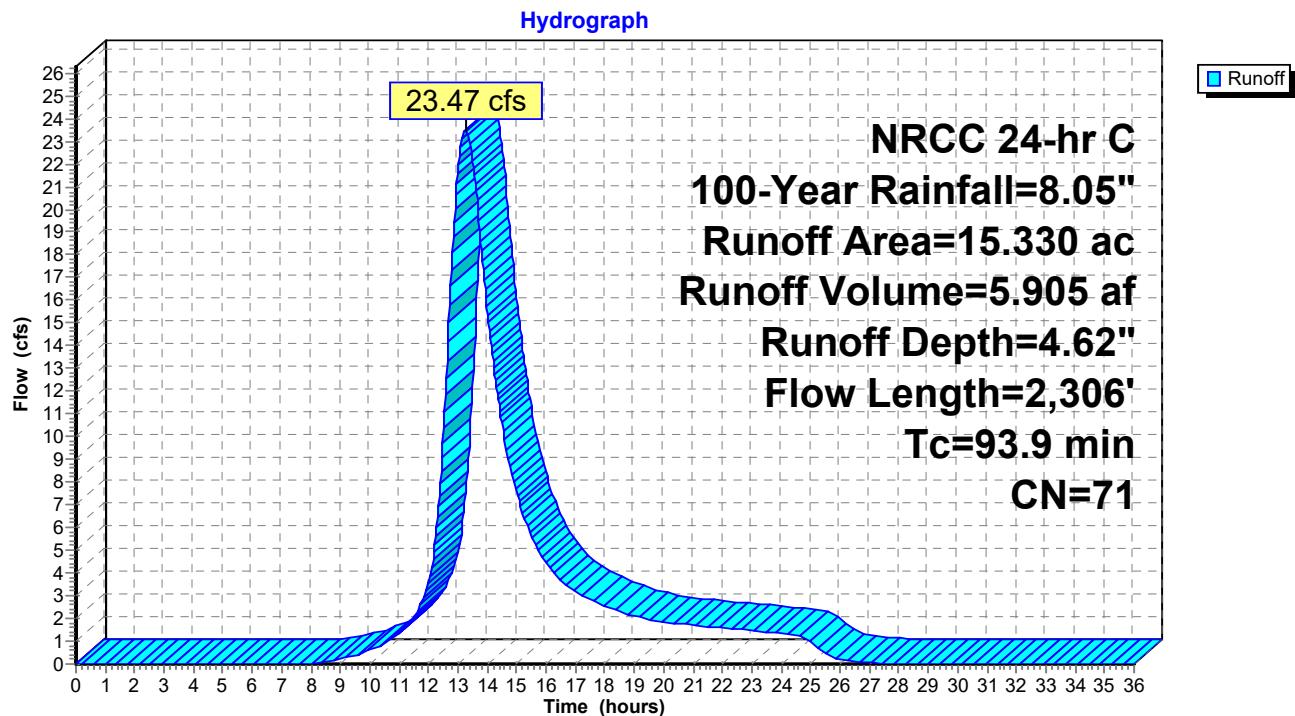
**Summary for Subcatchment Pr-03: Wooded Area East of Main Site**

Runoff = 23.47 cfs @ 13.25 hrs, Volume= 5.905 af, Depth= 4.62"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.03 hrs  
NRCC 24-hr C 100-Year Rainfall=8.05"

Area (ac)	CN	Description
13.669	70	Woods, Good, HSG C
1.105	77	Woods, Good, HSG D
0.556	74	>75% Grass cover, Good, HSG C
15.330	71	Weighted Average
15.330		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.5	100	0.0400	0.10		<b>Sheet Flow, A-B</b> Woods: Light underbrush n= 0.400 P2= 3.11"
20.6	731	0.0140	0.59		<b>Shallow Concentrated Flow, B-C</b> Woodland Kv= 5.0 fps
42.4	697	0.0030	0.27		<b>Shallow Concentrated Flow, C-D</b> Woodland Kv= 5.0 fps
5.9	280	0.0250	0.79		<b>Shallow Concentrated Flow, D-E</b> Woodland Kv= 5.0 fps
1.4	136	0.0530	1.61		<b>Shallow Concentrated Flow, E-F</b> Short Grass Pasture Kv= 7.0 fps
3.2	152	0.0250	0.79		<b>Shallow Concentrated Flow, F-G</b> Woodland Kv= 5.0 fps
3.9	210	0.0320	0.89		<b>Shallow Concentrated Flow, G-H</b> Woodland Kv= 5.0 fps
93.9	2,306	Total			

**Subcatchment Pr-03: Wooded Area East of Main Site**

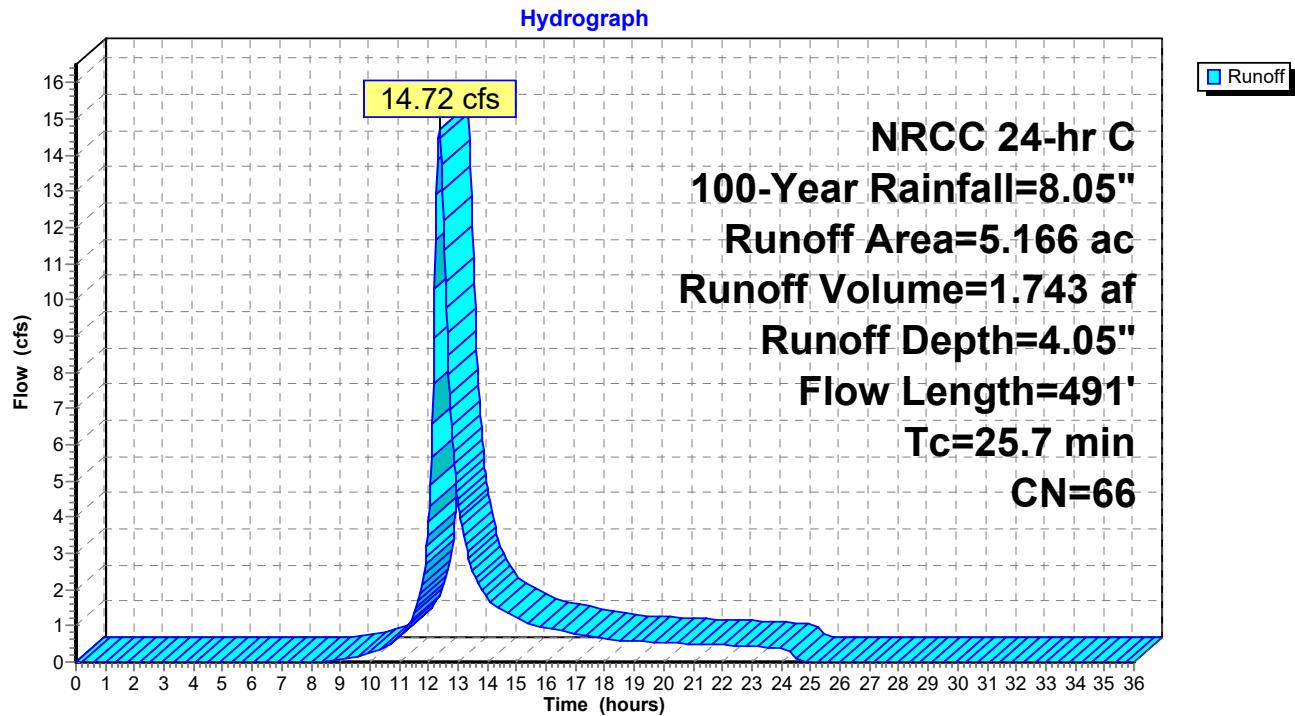
**Summary for Subcatchment Pr-04: Southwest of Array Field**

Runoff = 14.72 cfs @ 12.37 hrs, Volume= 1.743 af, Depth= 4.05"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.03 hrs  
NRCC 24-hr C 100-Year Rainfall=8.05"

Area (ac)	CN	Description
2.679	70	Woods, Good, HSG C
1.412	55	Woods, Good, HSG B
0.814	74	>75% Grass cover, Good, HSG C
0.261	61	>75% Grass cover, Good, HSG B
5.166	66	Weighted Average
5.166		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.5	100	0.0300	0.09		<b>Sheet Flow, A-B</b> Woods: Light underbrush n= 0.400 P2= 3.11"
2.7	154	0.0360	0.95		<b>Shallow Concentrated Flow, B-C</b> Woodland Kv= 5.0 fps
2.8	129	0.0230	0.76		<b>Shallow Concentrated Flow, C-D</b> Woodland Kv= 5.0 fps
1.7	108	0.0460	1.07		<b>Shallow Concentrated Flow, D-E</b> Woodland Kv= 5.0 fps
25.7	491	Total			

**Subcatchment Pr-04: Southwest of Array Field**

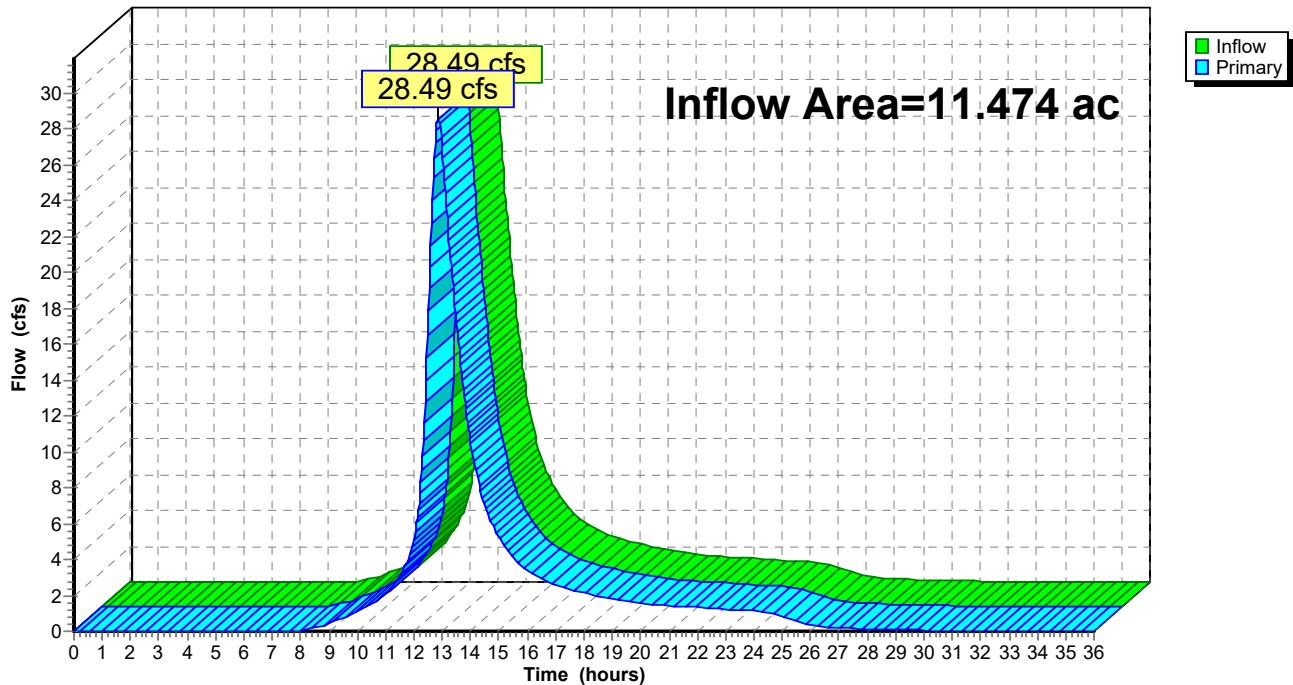
**Summary for Pond AP-1: East**

Inflow Area = 11.474 ac, 37.83% Impervious, Inflow Depth &gt; 5.93" for 100-Year event

Inflow = 28.49 cfs @ 12.86 hrs, Volume= 5.672 af

Primary = 28.49 cfs @ 12.86 hrs, Volume= 5.672 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.03 hrs

**Pond AP-1: East****Hydrograph**

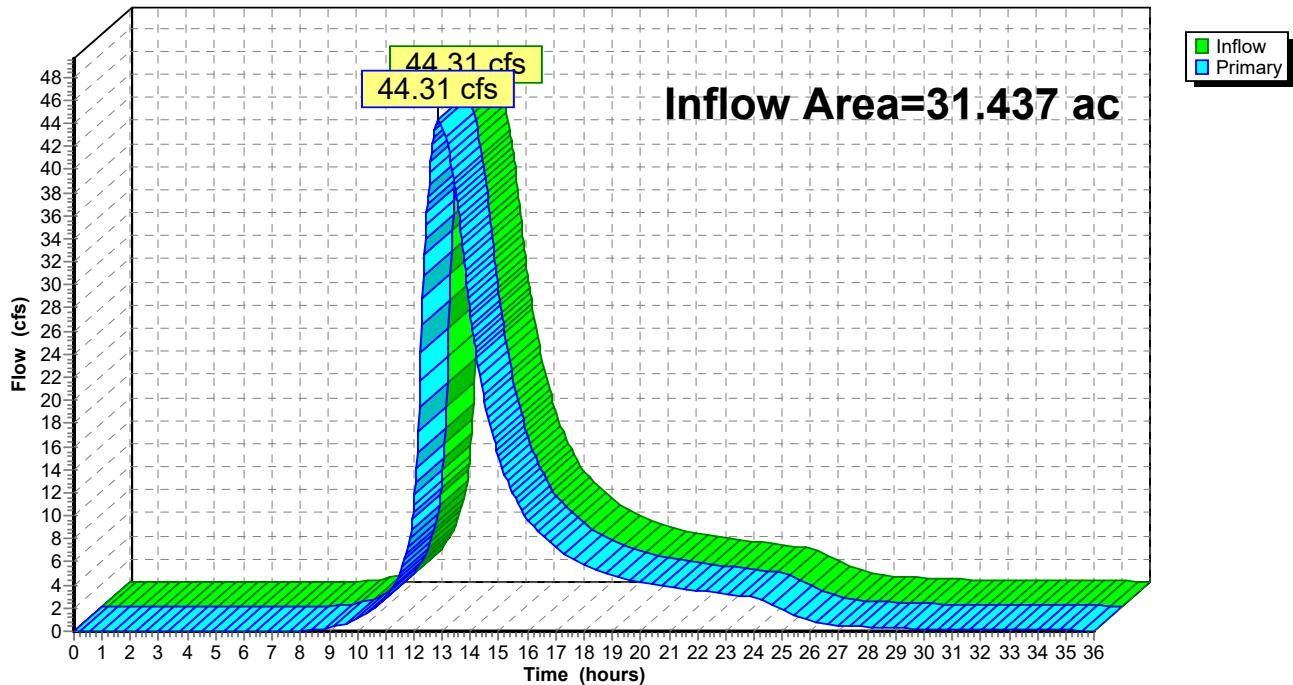
**Summary for Pond AP-2: West**

Inflow Area = 31.437 ac, 12.74% Impervious, Inflow Depth > 4.92" for 100-Year event

Inflow = 44.31 cfs @ 12.85 hrs, Volume= 12.886 af

Primary = 44.31 cfs @ 12.85 hrs, Volume= 12.886 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.03 hrs

**Pond AP-2: West****Hydrograph**

**Summary for Pond SB-1: SWMB-1**

Inflow Area = 11.474 ac, 37.83% Impervious, Inflow Depth = 6.03" for 100-Year event  
 Inflow = 34.60 cfs @ 12.62 hrs, Volume= 5.761 af  
 Outflow = 28.49 cfs @ 12.86 hrs, Volume= 5.672 af, Atten= 18%, Lag= 14.2 min  
 Primary = 28.49 cfs @ 12.86 hrs, Volume= 5.672 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.03 hrs  
 Peak Elev= 184.72' @ 12.86 hrs Surf.Area= 25,317 sf Storage= 48,405 cf

Plug-Flow detention time= 63.1 min calculated for 5.667 af (98% of inflow)  
 Center-of-Mass det. time= 54.0 min ( 892.6 - 838.7 )

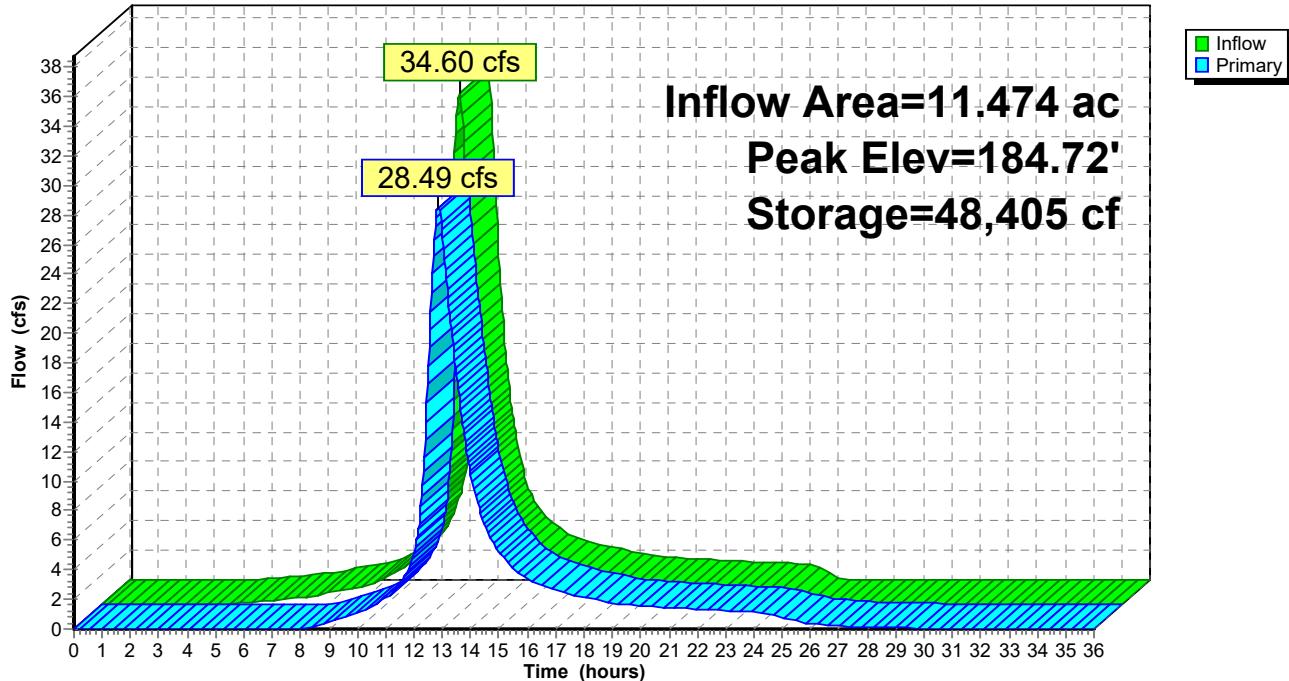
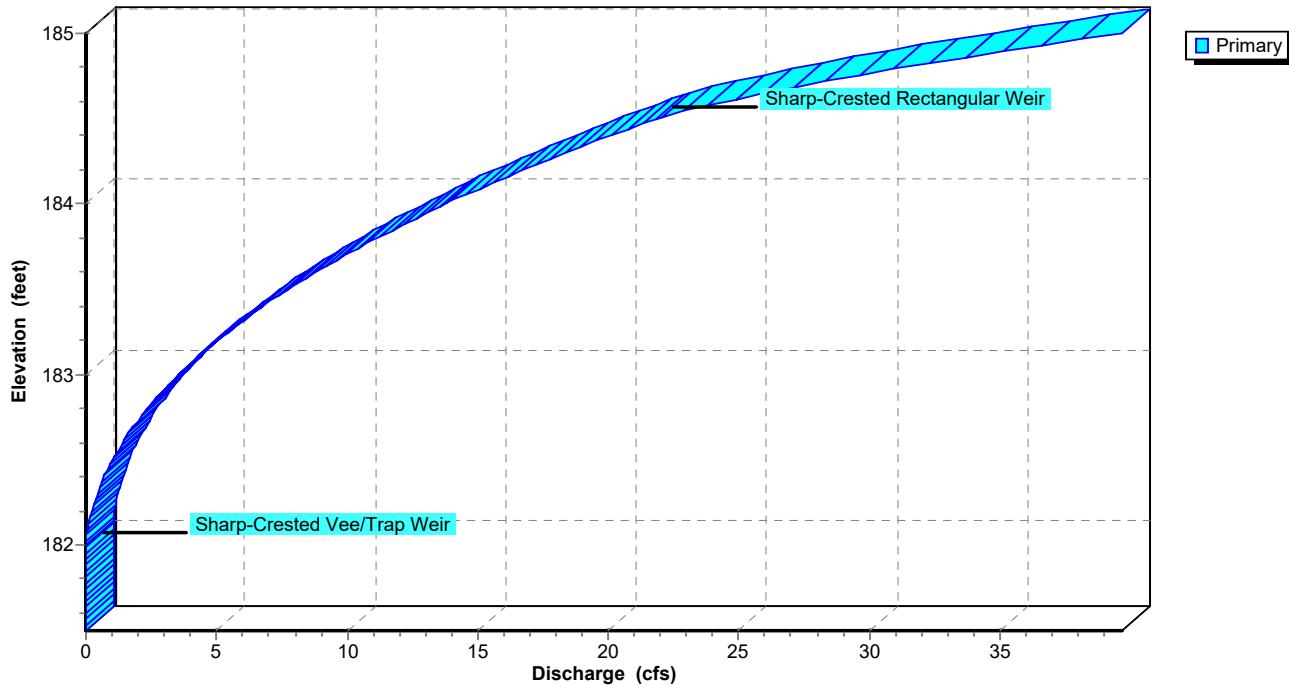
Volume	Invert	Avail.Storage	Storage Description	
#1	181.50'	55,773 cf	<b>Custom Stage Data (Prismatic)</b>	Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	
181.50	5,638	0	0	
182.00	9,046	3,671	3,671	
183.00	15,331	12,189	15,860	
184.00	18,238	16,785	32,644	
185.00	28,019	23,129	55,773	

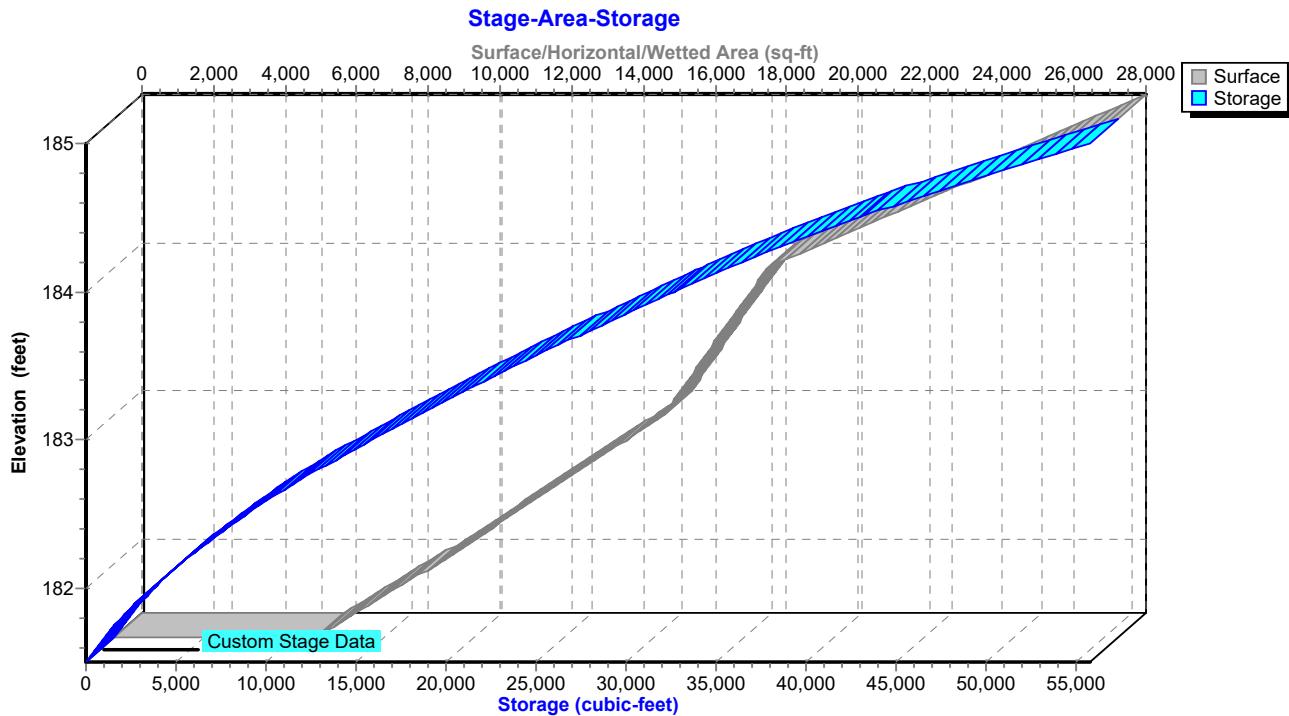
  

Device	Routing	Invert	Outlet Devices
#1	Primary	182.00'	<b>55.0 deg x 0.7' long x 2.50' rise Sharp-Crested Vee/Trap Weir</b> Cv= 2.54 (C= 3.17)
#2	Primary	184.50'	<b>10.0' long Sharp-Crested Rectangular Weir</b> 2 End Contraction(s)

**Primary OutFlow** Max=28.46 cfs @ 12.86 hrs HW=184.72' (Free Discharge)

1=Sharp-Crested Vee/Trap Weir (Orifice Controls 25.03 cfs @ 5.00 fps)  
 2=Sharp-Crested Rectangular Weir (Weir Controls 3.43 cfs @ 1.54 fps)

**Pond SB-1: SWMB-1****Hydrograph****Pond SB-1: SWMB-1****Stage-Discharge**

**Pond SB-1: SWMB-1**

**Summary for Pond SB-2: SWMB-2**

Inflow Area = 10.941 ac, 36.61% Impervious, Inflow Depth = 6.03" for 100-Year event  
 Inflow = 44.97 cfs @ 12.36 hrs, Volume= 5.493 af  
 Outflow = 20.13 cfs @ 12.75 hrs, Volume= 5.237 af, Atten= 55%, Lag= 23.2 min  
 Primary = 20.13 cfs @ 12.75 hrs, Volume= 5.237 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.03 hrs  
 Peak Elev= 185.72' @ 12.75 hrs Surf.Area= 39,274 sf Storage= 93,834 cf

Plug-Flow detention time= 161.7 min calculated for 5.237 af (95% of inflow)  
 Center-of-Mass det. time= 134.7 min ( 954.9 - 820.1 )

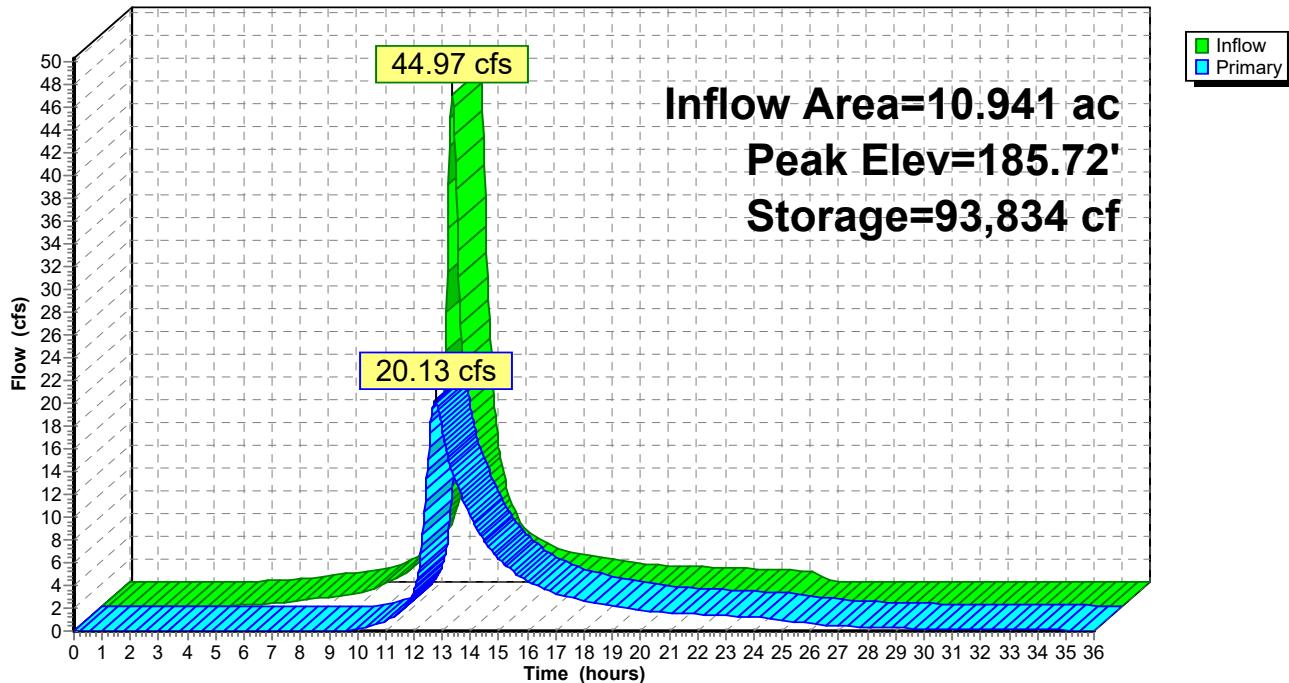
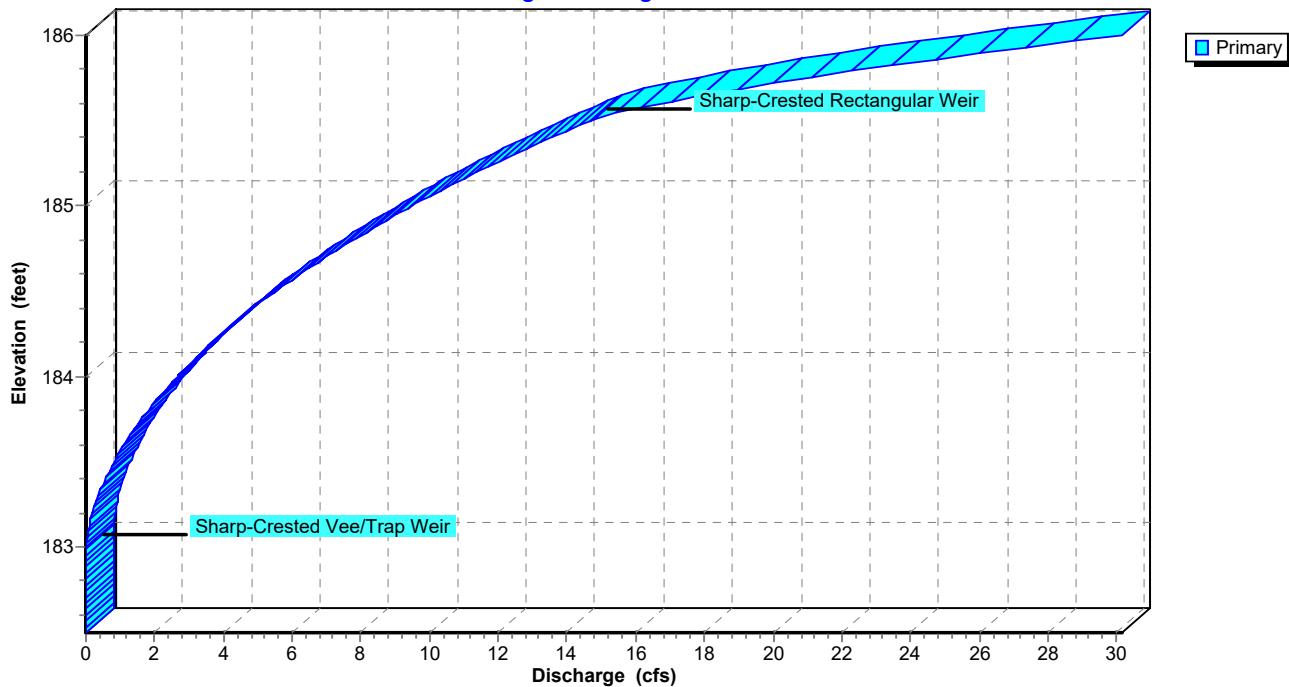
Volume	Invert	Avail.Storage	Storage Description	
#1	182.50'	104,895 cf	<b>Custom Stage Data (Prismatic)</b>	Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	
182.50	13,382	0	0	
183.00	22,109	8,873	8,873	
184.00	29,424	25,767	34,639	
185.00	35,113	32,269	66,908	
186.00	40,861	37,987	104,895	

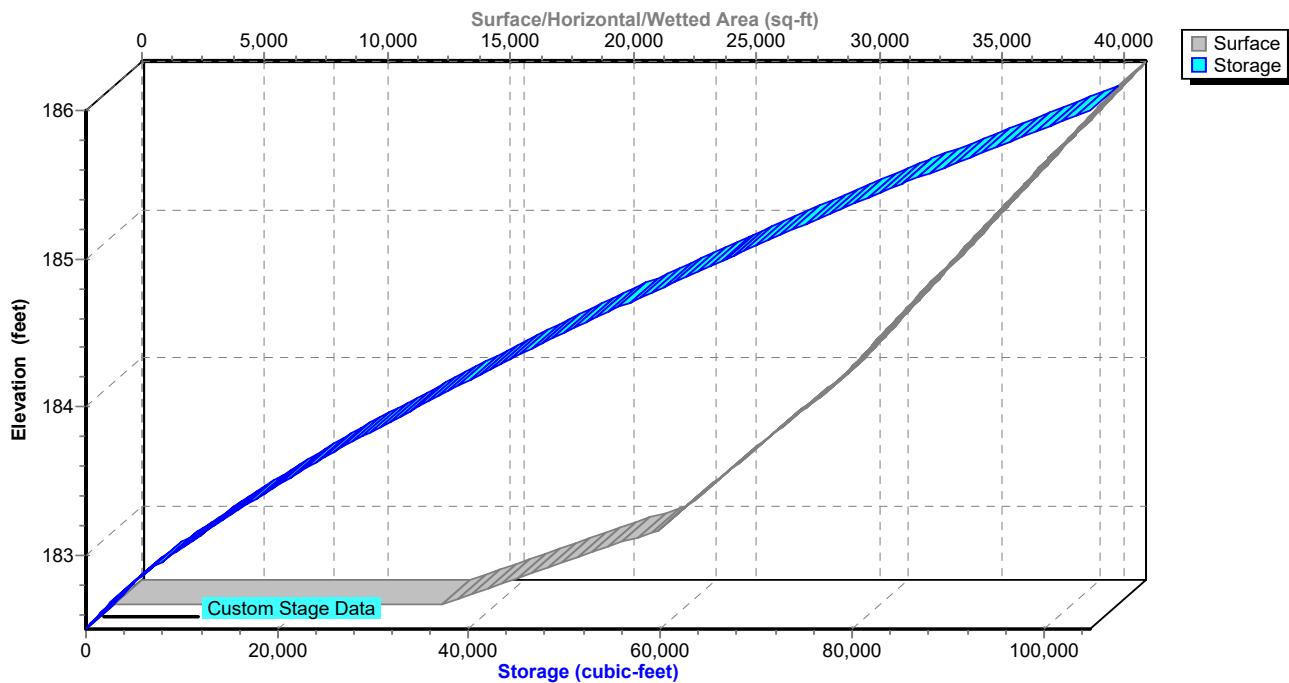
  

Device	Routing	Invert	Outlet Devices
#1	Primary	183.00'	<b>30.0 deg x 0.6' long x 2.50' rise Sharp-Crested Vee/Trap Weir</b> Cv= 2.61 (C= 3.26)
#2	Primary	185.50'	<b>10.0' long Sharp-Crested Rectangular Weir</b> 2 End Contraction(s)

**Primary OutFlow** Max=20.13 cfs @ 12.75 hrs HW=185.72' (Free Discharge)

1=Sharp-Crested Vee/Trap Weir (Orifice Controls 16.68 cfs @ 5.25 fps)  
 2=Sharp-Crested Rectangular Weir (Weir Controls 3.45 cfs @ 1.55 fps)

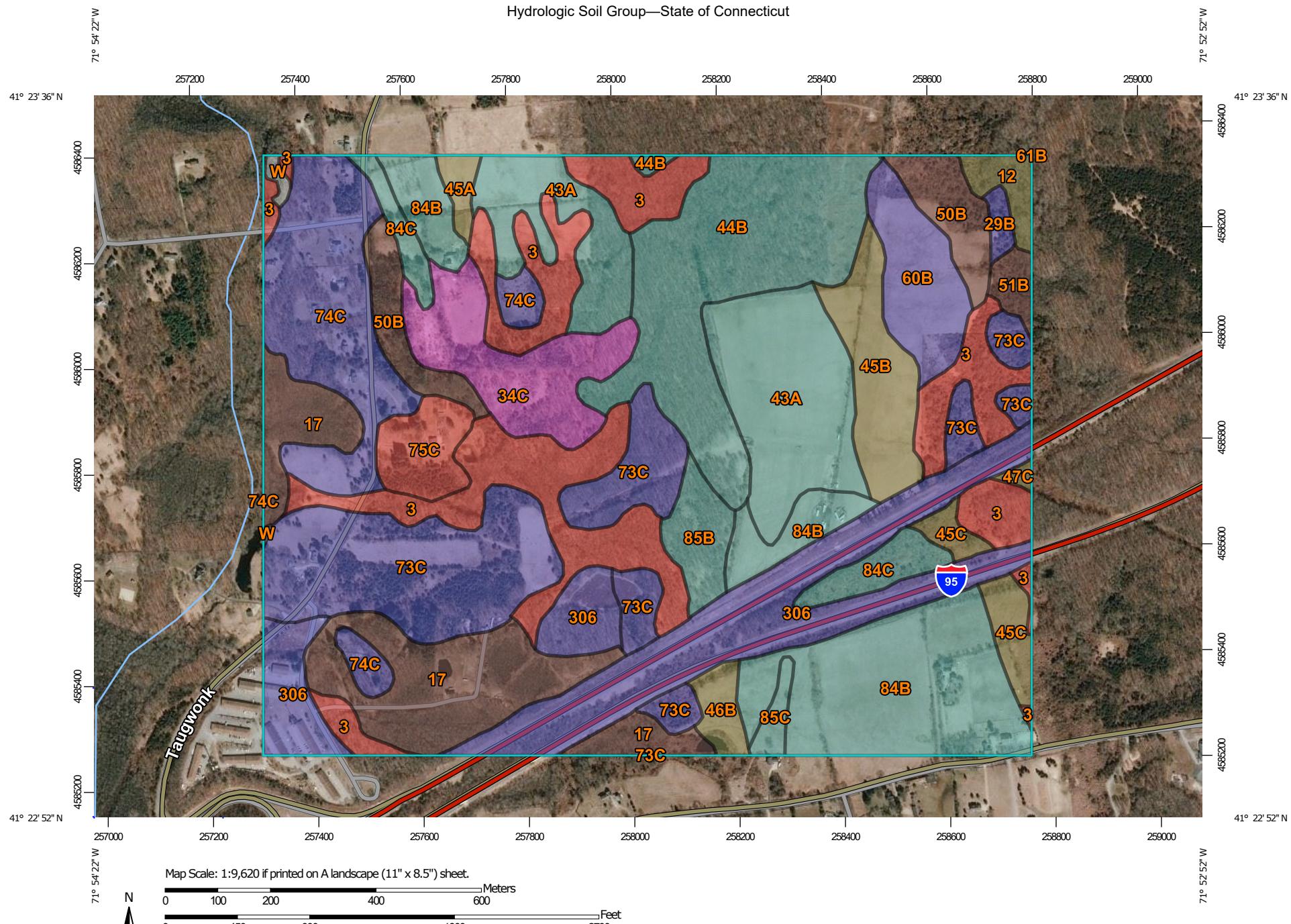
**Pond SB-2: SWMB-2****Hydrograph****Pond SB-2: SWMB-2****Stage-Discharge**

**Pond SB-2: SWMB-2****Stage-Area-Storage**

## APPENDIX C

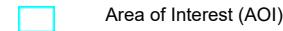
NRCS WEB SOIL SURVEY

## Hydrologic Soil Group—State of Connecticut



Natural Resources  
Conservation Service

Web Soil Survey  
National Cooperative Soil Survey

**MAP LEGEND****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.

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

Source of Map: Natural Resources Conservation Service

Web Soil Survey URL:

Coordinate System: Web Mercator (EPSG:3857)

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

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

Soil Survey Area: State of Connecticut

Survey Area Data: Version 18, Dec 6, 2018

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

Date(s) aerial images were photographed: Mar 20, 2019—Mar 27, 2019

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.



## Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
3	Ridgebury, Leicester, and Whitman soils, 0 to 8 percent slopes, extremely stony	D	48.5	11.8%
12	Raypol silt loam	C/D	3.3	0.8%
17	Timakwa and Natchaug soils, 0 to 2 percent slopes	B/D	31.5	7.7%
29B	Agawam fine sandy loam, 3 to 8 percent slopes	B	1.3	0.3%
34C	Merrimac fine sandy loam, 8 to 15 percent slopes	A	17.5	4.3%
43A	Rainbow silt loam, 0 to 3 percent slopes	C	36.5	8.9%
44B	Rainbow silt loam, 2 to 8 percent slopes, very stony	C	38.6	9.4%
45A	Woodbridge fine sandy loam, 0 to 3 percent slopes	C/D	2.0	0.5%
45B	Woodbridge fine sandy loam, 3 to 8 percent slopes	C/D	12.7	3.1%
45C	Woodbridge fine sandy loam, 8 to 15 percent slopes	C/D	5.7	1.4%
46B	Woodbridge fine sandy loam, 0 to 8 percent slopes, very stony	C/D	3.3	0.8%
47C	Woodbridge fine sandy loam, 3 to 15 percent slopes, extremely stony	C/D	0.6	0.1%
50B	Sutton fine sandy loam, 3 to 8 percent slopes	B/D	12.5	3.0%
51B	Sutton fine sandy loam, 0 to 8 percent slopes, very stony	B/D	2.3	0.6%
60B	Charlton fine sandy loams, 3 to 8 percent slopes	B	11.6	2.8%
61B	Charlton fine sandy loams, 0 to 8 percent slopes, very stony	B	0.0	0.0%

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
73C	Charlton-Chatfield complex, 0 to 15 percent slopes, very rocky	B	45.6	11.1%
74C	Narragansett-Hollis complex, 3 to 15 percent slopes, very rocky	B	30.2	7.4%
75C	Hollis-Chatfield-Rock outcrop complex, 3 to 15 percent slopes	D	6.8	1.7%
84B	Paxton and Montauk fine sandy loams, 3 to 8 percent slopes	C	40.4	9.8%
84C	Paxton and Montauk fine sandy loams, 8 to 15 percent slopes	C	7.6	1.9%
85B	Paxton and Montauk fine sandy loams, 3 to 8 percent slopes, very stony	C	6.1	1.5%
85C	Paxton and Montauk fine sandy loams, 8 to 15 percent slopes, very stony	C	1.9	0.5%
306	Udorthents-Urban land complex	B	43.8	10.7%
W	Water		0.7	0.2%
<b>Totals for Area of Interest</b>			<b>410.9</b>	<b>100.0%</b>

## Description

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.

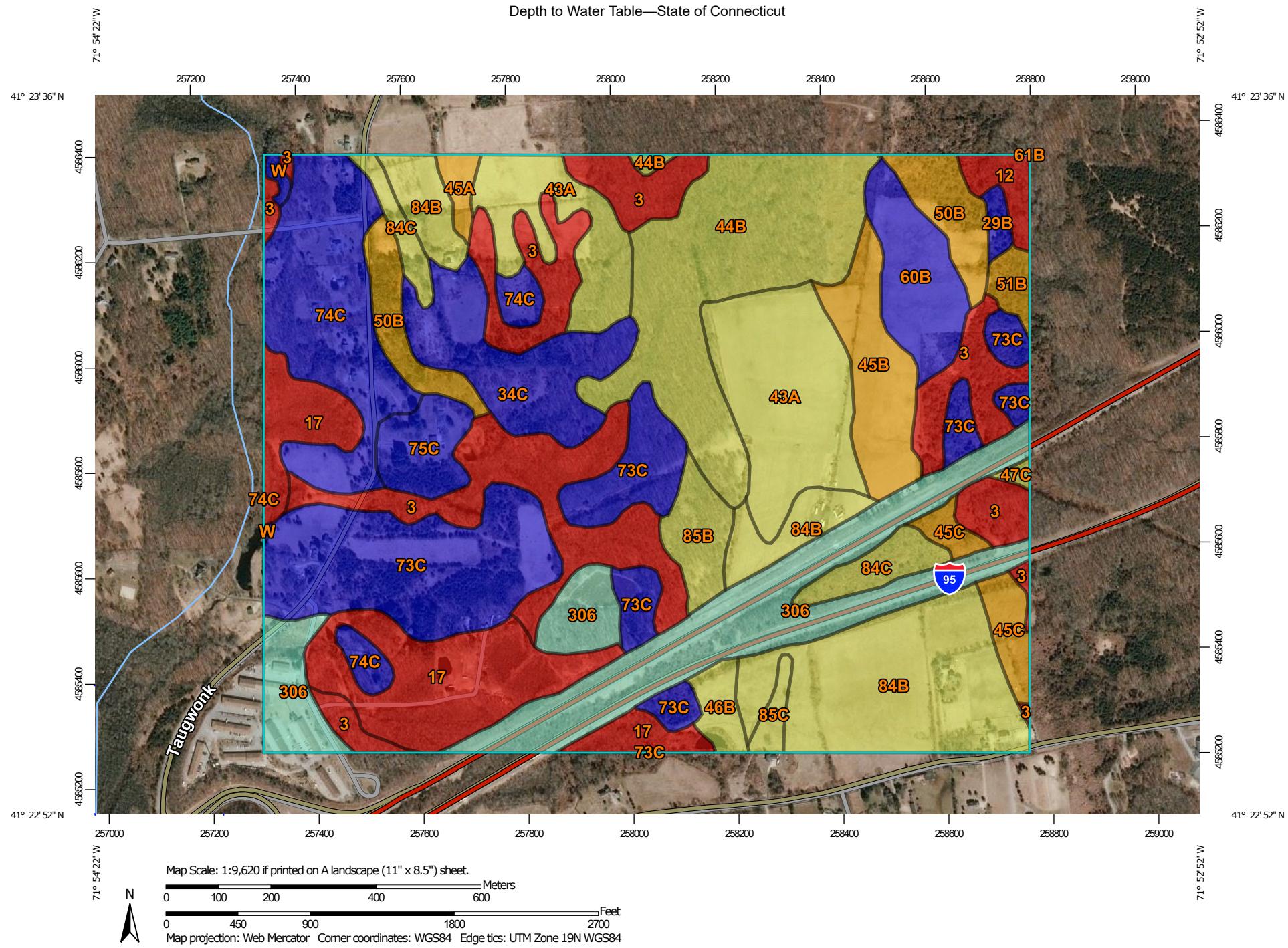
## Rating Options

*Aggregation Method:* Dominant Condition

*Component Percent Cutoff:* None Specified

*Tie-break Rule:* Higher

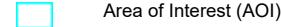
## Depth to Water Table—State of Connecticut



Natural Resources  
Conservation Service

Web Soil Survey  
National Cooperative Soil Survey

7/15/2019  
Page 1 of 5

**MAP LEGEND****Area of Interest (AOI)****Soils****Soil Rating Polygons**

- 0 - 25
- 25 - 50
- 50 - 100
- 100 - 150
- 150 - 200
- > 200
- Not rated or not available

**Soil Rating Lines**

- 0 - 25
- 25 - 50
- 50 - 100
- 100 - 150
- 150 - 200
- > 200
- Not rated or not available

**Soil Rating Points**

- 0 - 25
- 25 - 50
- 50 - 100
- 100 - 150
- 150 - 200
- > 200

■ Not rated or not available**Water Features****Transportation**

- +---+ Rails
- ~~~~~ Interstate Highways
- ~~~~~ US Routes
- ~~~~~ Major Roads
- ~~~~~ Local Roads

**Background****MAP INFORMATION**

The soil surveys that comprise your AOI were mapped at 1:12,000.

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

Source of Map: Natural Resources Conservation Service

Web Soil Survey URL:

Coordinate System: Web Mercator (EPSG:3857)

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

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

Soil Survey Area: State of Connecticut

Survey Area Data: Version 18, Dec 6, 2018

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

Date(s) aerial images were photographed: Mar 20, 2019—Mar 27, 2019

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.



## Depth to Water Table

Map unit symbol	Map unit name	Rating (centimeters)	Acres in AOI	Percent of AOI
3	Ridgebury, Leicester, and Whitman soils, 0 to 8 percent slopes, extremely stony	8	48.5	11.8%
12	Raypol silt loam	15	3.3	0.8%
17	Timakwa and Natchaug soils, 0 to 2 percent slopes	0	31.5	7.7%
29B	Agawam fine sandy loam, 3 to 8 percent slopes	>200	1.3	0.3%
34C	Merrimac fine sandy loam, 8 to 15 percent slopes	>200	17.5	4.3%
43A	Rainbow silt loam, 0 to 3 percent slopes	61	36.5	8.9%
44B	Rainbow silt loam, 2 to 8 percent slopes, very stony	61	38.6	9.4%
45A	Woodbridge fine sandy loam, 0 to 3 percent slopes	46	2.0	0.5%
45B	Woodbridge fine sandy loam, 3 to 8 percent slopes	46	12.7	3.1%
45C	Woodbridge fine sandy loam, 8 to 15 percent slopes	46	5.7	1.4%
46B	Woodbridge fine sandy loam, 0 to 8 percent slopes, very stony	51	3.3	0.8%
47C	Woodbridge fine sandy loam, 3 to 15 percent slopes, extremely stony	51	0.6	0.1%
50B	Sutton fine sandy loam, 3 to 8 percent slopes	43	12.5	3.0%
51B	Sutton fine sandy loam, 0 to 8 percent slopes, very stony	48	2.3	0.6%
60B	Canton and Charlton fine sandy loams, 3 to 8 percent slopes	>200	11.6	2.8%
61B	Canton and Charlton fine sandy loams, 0 to 8 percent slopes, very stony	>200	0.0	0.0%

Map unit symbol	Map unit name	Rating (centimeters)	Acres in AOI	Percent of AOI
73C	Charlton-Chatfield complex, 0 to 15 percent slopes, very rocky	>200	45.6	11.1%
74C	Narragansett-Hollis complex, 3 to 15 percent slopes, very rocky	>200	30.2	7.4%
75C	Hollis-Chatfield-Rock outcrop complex, 3 to 15 percent slopes	>200	6.8	1.7%
84B	Paxton and Montauk fine sandy loams, 3 to 8 percent slopes	61	40.4	9.8%
84C	Paxton and Montauk fine sandy loams, 8 to 15 percent slopes	61	7.6	1.9%
85B	Paxton and Montauk fine sandy loams, 3 to 8 percent slopes, very stony	66	6.1	1.5%
85C	Paxton and Montauk fine sandy loams, 8 to 15 percent slopes, very stony	66	1.9	0.5%
306	Udorthents-Urban land complex	150	43.8	10.7%
W	Water	>200	0.7	0.2%
<b>Totals for Area of Interest</b>			<b>410.9</b>	<b>100.0%</b>

## Description

"Water table" refers to a saturated zone in the soil. It occurs during specified months. Estimates of the upper limit are based mainly on observations of the water table at selected sites and on evidence of a saturated zone, namely grayish colors (redoximorphic features) in the soil. A saturated zone that lasts for less than a month is not considered a water table.

This attribute is actually recorded as three separate values in the database. A low value and a high value indicate the range of this attribute for the soil component. A "representative" value indicates the expected value of this attribute for the component. For this soil property, only the representative value is used.

## Rating Options

*Units of Measure:* centimeters

*Aggregation Method:* Dominant Component

*Component Percent Cutoff:* None Specified



*Tie-break Rule:* Lower

*Interpret Nulls as Zero:* No

*Beginning Month:* January

*Ending Month:* December

## APPENDIX D

### DEEP HOLE TEST PIT RESULTS

<b>Project:</b>	Stonington PV Solar, Taugwonk Spur Road, Stonington, CT	<b>Job No.:</b>	6763-05
<b>Date:</b>	August 16, 2019	<b>Weather:</b>	Clear, 70°
<b>Test Performed by:</b>	Michael R. Gagnon, P.E.	<b>Test Hole No.:</b>	1
<b>Test Hole Depth:</b>	7.7 feet	<b>Depth to Groundwater:</b>	7.7 feet

SOIL STRATUM ENCOUNTERED

<b>From</b>	<b>To</b>	<b>Description of Soils</b>
0.0'	1.1'	Topsoil and organics
1.1'	3.2'	Light brown fine sand
3.2'	7.7'	Grey fine sand, silt
		Groundwater observed at 7.7'

<p><b>Photo 1</b> Test Pit No. 1</p>	
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TEST PIT LOG

<b>Project:</b>	Stonington PV Solar, Taugwonk Spur Road, Stonington, CT	<b>Job No.:</b>	6763-05
<b>Date:</b>	August 16, 2019	<b>Weather:</b>	Clear, 70°
<b>Test Performed by:</b>	Michael R. Gagnon, P.E.	<b>Test Hole No.:</b>	2
<b>Test Hole Depth:</b>	8.0 feet	<b>Depth to Groundwater:</b>	8.0 feet

SOIL STRATUM ENCOUNTERED

<b>From</b>	<b>To</b>	<b>Description of Soils</b>
0.0'	0.5'	Topsoil and organics
0.5'	2.3'	Light brown fine to medium sand
2.3'	6.3'	Grey fine sand, silt
		Groundwater observed at 8.0'

<b>Photo 2</b> Test Pit No. 2	
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TEST PIT LOG

<b>Project:</b>	Stonington PV Solar, Taugwonk Spur Road, Stonington, CT	<b>Job No.:</b>	6763-05
<b>Date:</b>	August 16, 2019	<b>Weather:</b>	Clear, 70°
<b>Test Performed by:</b>	Michael R. Gagnon, P.E.	<b>Test Hole No.:</b>	3
<b>Test Hole Depth:</b>	7.7 feet	<b>Depth to Groundwater:</b>	7.0 feet

SOIL STRATUM ENCOUNTERED

<b>From</b>	<b>To</b>	<b>Description of Soils</b>
0.0'	1.2'	Topsoil and organics
1.2'	3.4'	Light brown fine to medium sand
3.4'	7.7'	Grey fine sand, silt
		Groundwater observed at 7.0'

<b>Photo 3</b> Test Pit No. 3	
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TEST PIT LOG

<b>Project:</b>	Stonington PV Solar, Taugwonk Spur Road, Stonington, CT	<b>Job No.:</b>	6763-05
<b>Date:</b>	August 16, 2019	<b>Weather:</b>	Clear, 70°
<b>Test Performed by:</b>	Michael R. Gagnon, P.E.	<b>Test Hole No.:</b>	4
<b>Test Hole Depth:</b>	7.7 feet	<b>Depth to Groundwater:</b>	5.5 feet

SOIL STRATUM ENCOUNTERED

From	To	Description of Soils
0.0'	0.7'	Topsoil
0.7'	3.5'	Light brown fine to medium sand, little silt
3.5'	5.5'	Light brown and grey fine sand, silt
		Groundwater observed at 5.5'
<b>Photo 4</b>		
Test Pit No. 4		



Legend  
● Test Pit Locations

			DESIGNED HMM	DRAWN HMM	CHECKED MRG	DATE 10/1/2019
			SOURCE			SCALE 1" = 200'
			2016 ORTHO PHOTO FROM CT ECO			PROJ. NO. 6763-05
						DRAWING NAME <b>FIG. A</b>