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*20202934.0001*

# WINSTON FARMS

## SAUGERTIES, NY

PREPARED FOR:
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# 1.0 EXECUTIVE SUMMARY

The proposed project is located along NYS Route 32 and Route 212 right of way. The project consists of a parcel situated on approximately 863.6 acres. The lot will consist of several new parcels that will primarily become residential areas, with some larger sections proposed to have commercial structures on site. This project is subject to a NYSDEC General Permit for the Discharge of Stormwater during Construction Activity and post-construction quality and quantity controls (GP-0-20-001). Best management practices as defined in the New York State Standards and Specifications for Erosion and Sediment Control Manual will be adhered to during construction. Post-construction stormwater practices shall be designed using the New York State Stormwater Management Design Manual

Under the existing conditions the majority of the stormwater generally drains to the east via sheet flow and shallow concentrated flow towards the Beaver Kill Creek before flowing away from the property to the north. A portion of the westerly side of the site drains via sheet flow and shallow concentrated flow to NYSDEC wetlands on-site and then towards the north in an existing unnamed stream.

Under the developed conditions runoff generally follows the same flow pattern as the existing conditions, now flowing to the proposed pond areas area located in the southern portion of the site. The stormwater management area will discharge to the Beaver Kill and flow north. With stormwater storage and controlled outflow, there is a ±14% decrease in peak discharge on average. Additionally, the site uses both standard and green infrastructure practices including but not limited to rooftop disconnects, filter strips, rain gardens, bioretention filters and ponds to meet NYSDEC stormwater quality minimum requirements, which include water quality volume, runoff reduction volume, and channel protection volume (Section 5 of this report provides more detail on this subject). Where soils meet the NYSDEC infiltration criteria, infiltration practices will be used. The summary table below shows the site water quantity and quality comparisons between existing and proposed conditions:

Table 1: *Summary Table*

**Runoff Comparison Table**

| Analysis Point: | Condition: | Runoff (cfs) | | |
|---|---|---|---|---|
| | | 1 year | 10 year | 100 year |
| Analysis Point 1 | EXISTING | 27.08 | 153.24 | 420.21 |
| | PROPOSED | 18.74 | 112.32 | 281.349 |
| Analysis Point 2 | EXISTING | 480.29 | 2,379.32 | 6,187.17 |
| | PROPOSED | 475.73 | 922.56 | 1,889.21 |
| Total Site | EXISTING | 507.37 | 2,532.56 | 6,607.38 |
| | PROPOSED | 494.47 | 1,034.88 | 2,170.55 |
| | **PERCENT REDUCTION** | **2.54%** | **59.14%** | **67.15%** |

As shown above, the proposed stormwater pollution prevention plan meets minimum stormwater quality andquantity requirements set forth by the NYSDEC.

## 2.0 INTRODUCTION

The Winston Farm site is the largest single-owned property in the Town of Saugerties. Saugerties Farm LLC is proposing to rezone ±840 acres of predominately vacant land in the General Business (GB) and Moderate Density Residential (MDR) districts to a Planned Development District (PDD). The subject property is located on the corner of Route 32 South and Route 212 and is located to the east of the Village of Saugerties. The property is directly to the east of Interstate-90. This site encompasses 11 Tax-IDs: 17.2-3-10, 17.2-4-32, 17.2-5-38, 17.2-5-39.120, 17.2-5-40, 17.2-5-41, 17.15-3-8, 17.16-1-1.110, 17.16-1-36, 17.2-3-15, and 17.15-3-4. The site is bounded by residential properties to the north, east, and south and by commercial properties to the west.

The PDD includes a development concept map and regulations, which will guide future development and redevelopment. A PDD is a land use planning and regulatory approach that aligns with the Town of Saugerties Zoning Law (2008), and the Town and Village of Saugerties Comprehensive Plan (2021). The change in zoning will position Winston Farm as a premier regional mixed-use destination venue for the Hudson Valley by permitting a wide range of diverse residential, nonresidential, agricultural, recreational, entertainment, hospitality uses, and a mix of complementary uses.

There are several structures or remnants of structures on the site, including the caretaker's residence, the Red Cottage (vacation rental) which is occupied year-round, an abandoned mansion, the remains of a former barn and other outbuildings, and a small family cemetery.

Refer to Appendix C for the Site Location Map.

Public sewer, water, gas, electric and telecommunications/cable will be newly connected along Augusta Savage Road and NY Route 32.

The provided Stormwater Management Plan (SWMP) materials adhere to the State Pollutant Discharge Elimination System (SPDES) General Permit (GP-0-20-01) for Stormwater Discharges from Construction Activity. The guidelines specified by the *New York State Stormwater Management Design Manual, January 2015* (SWDM) were used to analyze the proposed stormwater management facilities for this project. Erosion and Sediment controls were designed in conformance with *New York Standards and Specifications for Erosion and Sediment Controls*.

A copy of this SWPPP and associated inspection logs will be kept on site in the proposed office space and job trailer/SWPPP mailbox.

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## 2.1 Scenario Evaluation in Accordance with DGEIS

To assess any potential adverse environmental impacts due to the proposed project, three alternatives are being considered:

- Sponsor's Preferred Plan (SP)
- Reasonable Worst Case Scenario plan (RWCS)
- As-Of-Right plan (AOR).

The SP plan includes careful planning and consideration of where development should occur on the site based on a host of studies that have been commissioned by the landowners. These technical studies have been used to fine-tune the SP plan relative to the location of buildings, roads, and uses on the project site. A detailed stormwater model, calculations and drainage maps are provided in the appendices for this scenario.

The RWCS plan was created to show a maximum amount of development scenario of what could reasonably go on the project site under the new proposed zoning regulations. The stormwater management contemplated for this RWCS scenario is very similar to that detailed for the Sponsor's Preferred Plan, so no detailed stormwater management report and drainage plan are included.

The AOR plan includes development quantities and locations based on the current zoning of the property. The stormwater management contemplated for this AOR scenario is very similar to that detailed for the Sponsor's Preferred Plan, so no detailed stormwater management report and drainage plan are included.

# 3.0 EXISTING SITE CONDITIONS

## 3.1 Topography/ Drainage/Land Coverage

The parcel has varied land cover, which ranges from wooded areas to open fields. The land also varies in slope throughout the site, with slopes between 0%-50%.

Stormwater generally drains to via shallow concentrated flow overland, generally to the south into the Beaver Kill Creek before discharging offsite.

The western portion of the project site, approximately 500 acres, is heavily wooded and not readily accessible. The eastern 300 acres of the farm parcels are primarily open fields that are farmed for hay. Access to the eastern portion of Winston Farm is primarily provided via Augusta Savage Road, which begins at Route 32 and ends where the road begins its uphill climb into the western portion of the project site. All internal roads and parking areas are dirt and gravel. Access to the western portion of Winston Farm is provided via Buffalo Road which is paved until it transitions to dirt and gravel.

Along most of its eastern boundary is the Beaver Kill, a small stream that flows north into the Kaaterskill Creek and eventually into the Hudson River in Catskill, NY. The project site is bordered on the east by Route 32, a Holiday Inn, and the Wynkoop House, a National Register listed property. To the south, the property is bordered by a number of houses along Route 212, including the Snyder Farm, a National Register listed farm complex. To the west, the property is partially bordered and bisected by a Central Hudson Gas and Electric right-of-way easement. A rectangular combined parcel of +/- 69 is on the west side of the Central Hudson right-of-way easement. To the north, the project site is bordered by the backyards of houses fronting on Mower Mill Road and other parcels that front on Hommelville Road, which is further to the north.

The Winston Farm parcels straddle the drainage divide formed by a series of tiered ridges generally running from north to south and beginning in the approximate center of the site and increasing in elevation from east to west with most of the site draining east toward the Beaver Kill, and a portion beyond the highest ridge elevations draining west, toward unnamed tributaries to the Beaver Kill. Properties along NYS Route 212 and 32 are relatively flat. The project site ranges in elevation from 150 feet above mean sea level (amsl) to approximately 450 feet amsl.

The site is situated in an area of glacial till and glaciofluvial deposits with bedrock relatively shallow in some areas as indicated on the Surficial Geology Map of New York, Lower Hudson Sheet. The bedrock is identified as the Normanskill Formation on the Geologic Map of New York. This bedrock formation includes shale, argillite, and siltstone. The United States Department of Agriculture (USDA) web survey maps also shows areas of shallow bedrock. The eastern part of the site where more development is contemplated has grass and weed vegetation with patches of brush and trees. The recent and present use of the lowland portions of the property are mainly as livestock farming land.

The western part of the project site is primarily forested land and has extensive areas with shallow bedrock as delineated in the USDA web survey maps. The USDA information indicates that areas of shallow rock and rock outcrops predominate. The soil bodies there include ARD, BOD, LOC and NBF among others. The development concept plan identifies Subareas 1 and 4 as the primary location for single family lots, cabins, and other light development.

The eastern part of Winston Farm, Subareas 2, 3 and 4, which has been extensively farmed in the past. This eastern portion of Winston Farm is the area being considered for more concentrated development. For the purpose of describing the overall subsurface pattern of Subareas 2, 3, and 5, it has been divided into an eastern area which has deeper predominantly silt and clay or lacustrine soils and a western area which has predominantly gravelly silt loam soils and relatively shallow soils over bedrock.

The soil map indicates that the soil units predominating in the eastern part of the site are fine-grained soils including silt loams or silty clay loams in agricultural or soil science terms. In engineering terminology these soils would be classified as lacustrine clay and silt soils. The names of these soil units include the Hudson soils (HuB, HuC, and HwD) along with Rhinebeck soils (RhA) and Madalin Soils (Ma). There is a substantial soil unit with shallow rock at the northeastern edge of the site (STD). In the western part of Subareas 2, 3, and 5, the soils are gravelly loam, gravelly silt loam soils (BnC, MgB) and similar soils shallow over bedrock (NBf, BOD). There are narrow strips of fine-grained silt and clay soils in the shallow rock areas to the west (Ma & Cd).

There are five (5) drainage areas on site that drain to two analysis points, an off-site wetland to the west and the Beaver Kill Creek on-site, respectively, see below for descriptions of the existing drainage area:

*Existing Drainage Area 1:*

This area encompasses the western most portion of the property and consists primarily of forested area and some residential locations. In total the area is 190 acres. Runoff from this area flows primarily overland via shallow concentrated flow to the southwest before flowing into the Beaver Kill Creek, which then flows offsite. The Curve Number (CN) and Time of Concentration (Tc) are 73 and 73.8 minutes respectively.

*Existing Drainage Area 2:*

This area encompasses a majority of the northern portion of the site consisting of wooded areas, open fields, and some residential spots. In total the area is 584 acres. Runoff from this area flows to the south primarily via overland shallow concentrated flow to the Beaver Kill Creek before flowing offsite. The Curve Number (CN) and Time of Concentration (Tc) are 75 and 30.9 minutes respectively.

*Existing Drainage Area 3:*

This area encompasses the majority of the southern half of the site, consisting of wooded areas, open fields, as well as residential and some commercial properties. In total the area is 619 acres. Runoff from this area flows to the north/northeast via shallow concentrated overland flow to the Beaver Kill Creek before flowing offsite. The Curve Number (CN) and Time of Concentration (Tc) are 75 and 15.5 Minutes respectively.

*Existing Drainage Area 4:*

This area encompasses the remaining eastern portion of the site, consisting of some residential and wooded areas. In total the area is 109 acres. Runoff from this area flows to the west to the Beaver Kill creek before flowing away from the site. The Curve Number (CN) and Time of Concentration (Tc) are 75 and 36.4 minutes respectively.

*Existing Drainage Area 5:*

This area encompasses the remaining portion of the property to the south, consisting of mostly residential areas. In total the area is 35 acres. Runoff from this area flows primarily via shallow concentrated flow overland to the Beaver Kill Creek before flowing off site. The Curve Number (CN) and Time of Concentration (Tc) are 77 and 22.6 Minutes respectively.

The provided existing drainage map graphically shows this drainage area, as well as the other hydraulic characteristics:

## 3.2 Wetlands/Tributary

The site was reviewed for the existence of federal and state regulated wetlands within the property boundaries. Federal wetlands were researched using the National Wetlands Inventory (NWI) using an online U.S. Fish and Wildlife website search. State regulated wetlands were researched using the NYSDEC's online Environmental Resource Mapper website. Refer to Appendix E for the federal and state regulated wetlands mapping. In addition to online mapping, a wetland delineation report and jurisdictional determination was conducted.

Final wetland and jurisdictional determination mapping is shown in appendix E.

## 3.3 Floodplain

According to FEMA's National Flood Hazard FIRMette Mapper, the site is located in Flood Zone A, a special flood hazard area subject to inundation by the 1% annual chance flood per community panel no. 3611C0305E dated 09/25/2009. Refer to Appendix E for the FIRMette map and an enlarged floodplain map of the site. Refer to Appendix G for the FEMA mapping figure.

## 3.4 NYSDEC Environmental Resources

The NYSDEC has an Environmental Resource Mapper on its website. The Environmental Resource Mapper is an interactive mapping application that can be used to identify some of New York State's natural resources and environmental features that are state protected, or of conservation concern. It displays the following:

1. Animals and plants that are rare in New York, including those listed as Endangered or Threatened (generalized locations).
2. Significant natural communities, such as rare or high-quality forests, wetlands, and other habitat types.
3. New York's streams, rivers, lakes, and ponds; water quality classifications are also displayed.

According to this database, there are rare and endangered animals in the vicinity of the project and there are natural communities on the project site.

This location is in the vicinity of the Red Headed Woodpecker, which is listed as a special concern by NYS. The Chestnut Oak Forest is a natural community on and near the project site.

Additionally, the project was submitted to the US Fish and Wildlife Service's "Information for Planning & Consultation" (IPaC) online tool. The IPaC tool is designed to streamline the regulatory review for USFWS in accordance with the Endangered Species Act. IPaC has provided a list of threatened or endangered species that could be impacted by the project and requires review by the USFWS regional office Biologist. The regional biologist has completed review and there are no expected take of an threatened or endangered animals as a result of the project.

## 3.5 State Historic Preservation Office Review

The site was reviewed for the presence of archeological sensitive areas using online GIS tools found at the NYS Historic Preservation Office (SHPO). The Cultural Resource Information System mapping of the area found the Wynkoop House as a National Register Building Site. The SHPO map is included in Appendix H. A letter of review and no impact for this re-zoning action from SHPO is provided in Appendix H.

# 4.0 DEVELOPED SITE CONDITIONS

The site will be segmented into 24 proposed drainage areas. See below for a description of these drainage areas:

## 4.1 Proposed Drainage Area 1:

This drainage area (1) encompasses onsite and offsite contributary areas consisting mainly of woods in fair condition in "C" soils. In total the drainage area is 190.34 acres having a CN value of 73 and a time of concentration (Tc) of 135.9 minutes. Stormwater flows as overland sheet flow and then as shallow concentrated flow to existing wetlands. This area does not require water quality treatment as no added impervious. This drainage area discharges to analysis point one (AP-1).

## 4.2 Proposed Drainage Area 1A:

This drainage area (1A) encompasses onsite and offsite contributary areas consisting mainly of woods in fair condition and large residential lots in "C" soils. In total the drainage area is 53.10 acres having a CN value of 77 and a time of concentration (Tc) of 121.9 minutes. Stormwater flows as overland sheet flow and then as shallow concentrated flow to existing wetlands. This area is directed to a forebay for pre-treatment and then to a pocket pond for water quality and quantity controls. Within this area green practices such as rooftop disconnects, buffer strips, filter strips, tree planting and swales will also be incorporated for water quality treatment. This drainage area discharges to analysis point one (AP-1).

## 4.3 Proposed Drainage Area 1B:

This drainage area (1B) encompasses onsite and offsite contributary areas consisting mainly of woods in fair condition and large residential lots in "C" soils. In total the drainage area is 48.263 acres having a CN value of 74 and a time of concentration (Tc) of 78.6 minutes. Stormwater flows as overland sheet flow and then as shallow concentrated flow to existing wetlands. This area is directed to a forebay for pre-treatment and then to a pocket pond for water quality and quantity controls. Within this area green practices such as rooftop disconnects, buffer strips, filter strips, tree planting and swales will also be incorporated for water quality treatment. This drainage area discharges to analysis point one (AP-1).

## 4.4 Proposed Drainage Area 2:

This drainage area (2) encompasses onsite and offsite contributary areas consisting mainly of woods in fair condition in "C" soils. In total the drainage area is 202.288 acres having a CN value of 70 and a time of concentration (Tc) of 43.1 minutes. Stormwater flows as overland sheet flow and then as shallow concentrated flow off site to the Beaverkill. This area does not require water quality treatment as no added impervious. This drainage area discharges to analysis point two (AP-2).

## 4.5 Proposed Drainage Area 2A:

This drainage area (2A) encompasses onsite and offsite contributary areas consisting mainly of woods in fair condition and large residential lots in "C" soils. In total the drainage area is 36.879 acres having a CN value of 77 and a time of concentration (Tc) of 194.7 minutes. Stormwater flows as overland sheet flow and then as shallow concentrated flow to existing wetlands. This area is directed to a forebay for pre-treatment and then to a pocket pond for water quality and quantity controls. Within this area green practices such as rooftop disconnects, buffer strips, filter strips, tree planting and swales will also be incorporated for water quality treatment. This drainage area discharges to analysis point two (AP-2).

## 4.6 Proposed Drainage Area 2B:

This drainage area (2B) encompasses onsite contributary areas consisting mainly of woods in fair condition and large residential lots in "C" soils. In total the drainage area is 55.045 acres having a CN value of 77 and a time of concentration (Tc) of 79.3 minutes. Stormwater flows as overland sheet flow and then as shallow concentrated flow to existing Beaverkill Tributary. This area is directed to a forebay for pre-treatment and then to a pocket pond for water quality and quantity controls. Within this area green practices such as rooftop disconnects, buffer strips, filter strips, tree planting and swales will also be incorporated for water quality treatment. This drainage area discharges to analysis point two (AP-2).

## 4.7 Proposed Drainage Area 2C:

This drainage area (2C) encompasses onsite contributary areas consisting mainly of woods in fair condition and large residential lots in "C" soils. In total the drainage area is 31.804 acres having a CN value of 77 and a time of concentration (Tc) of 74.8 minutes. Stormwater flows as overland sheet flow and then as shallow concentrated flow to existing Beaverkill Tributary. This area is directed to a forebay for pre-treatment and then to a pocket pond for water quality and quantity controls. Within this area green practices such as rooftop disconnects, buffer strips, filter strips, tree planting and swales will also be incorporated for water quality treatment. This drainage area discharges to analysis point two (AP-2).

## 4.8 Proposed Drainage Area 2D:

This drainage area (2D) encompasses onsite contributary areas consisting mainly of woods in fair condition, lawn area and 2 acre lots in "C" soils. In total the drainage area is 39.716 acres having a CN value of 77 and a time of concentration (Tc) of 45.7 minutes. Stormwater flows as overland sheet flow and then as shallow concentrated flow to the proposed stormwater management practice. This area is directed to a forebay for pre-treatment and then to a pocket pond for water quality and quantity controls. Within this area green practices such as rooftop disconnects, buffer strips, filter strips, tree planting and swales will also be incorporated for water quality treatment. This drainage area discharges to analysis point two (AP-2).

## 4.9 Proposed Drainage Area 2E:

This drainage area (2E) encompasses onsite contributary areas consisting mainly of woods in fair condition, lawn area and 2 acre lots in "C" soils. In total the drainage area is 45.892 acres having a CN value of 77 and a time of concentration (Tc) of 48.7 minutes. Stormwater flows as overland sheet flow and then as shallow concentrated flow to the proposed stormwater management practice. This area is directed to a forebay for pre-treatment and then to a pocket pond for water quality and quantity controls. Within this area green practices such as rooftop disconnects, buffer strips, filter strips, tree planting and swales will also be incorporated for water quality treatment. This drainage area discharges to analysis point two (AP-2).

## 4.10 Proposed Drainage Area 2F:

This drainage area (2F) encompasses onsite contributary areas consisting mainly of woods in fair condition and 7 1-story buildings with a parking/loading area in "C" soils. In total the drainage area is 42.396 acres having a CN value of 81 and a time of concentration (Tc) of 53.7 minutes. Stormwater flows as overland sheet flow and then as shallow concentrated flow to the proposed stormwater management practice. This area is directed to a forebay for pre-treatment and then to a pocket pond for water quality and quantity controls. Within this area green practices such as rooftop disconnects, buffer strips, filter strips, tree planting and swales will also be incorporated for water quality treatment. This drainage area discharges to analysis point two (AP-2).

## 4.11 Proposed Drainage Area 2G:

This drainage area (2G) encompasses onsite contributary areas consisting mainly of lawn area with an amphitheater and parking lot in "C" soils. In total the drainage area is 16.853 acres having a CN value of 81 and a time of concentration (Tc) of 22.4 minutes. Stormwater flows as overland sheet flow and then as shallow concentrated flow to the proposed stormwater management practice. This area is directed to a forebay for pre-treatment and then to a pocket pond for water quality and quantity controls. Within this area green practices such as rooftop disconnects, buffer strips, filter strips, tree planting and swales will also be incorporated for water quality treatment. This drainage area discharges to analysis point two (AP-2).

## 4.12 Proposed Drainage Area 2H:

This drainage area (2H) encompasses onsite contributary areas consisting mainly of lawn area with 2 parking/loading areas and 2 buildings in "C" soils. In total the drainage area is 24.219 acres having a CN value of 81 and a time of concentration (Tc) of 22.5 minutes. Stormwater flows as overland sheet flow and then as shallow concentrated flow to the proposed stormwater management practice. This area is directed to a forebay for pre-treatment and then to a pocket pond for water quality and quantity controls. Within this area green practices such as rooftop disconnects, buffer strips, filter strips, tree planting and swales will also be incorporated for water quality treatment. This drainage area discharges to analysis point two (AP-2).

## 4.13 Proposed Drainage Area 3:

This drainage area (3) encompasses onsite and offsite contributary areas consisting mainly of woods in fair condition in "C" soils. In total the drainage area is 436.528 acres having a CN value of 70 and a time of concentration (Tc) of 81.9 minutes. Stormwater flows as overland sheet flow and then as shallow concentrated flow to the Beaverkill. This area does not require water quality treatment as no added impervious. This drainage area discharges to analysis point two (AP-2).

## 4.14 Proposed Drainage Area 3A:

This drainage area (3A) encompasses onsite contributary areas consisting mainly of woods in fair condition in "C" soils. In total the drainage area is 52.953 acres having a CN value of 70 and a time of concentration (Tc) of 50.8 minutes. Stormwater flows as overland sheet flow and then as shallow concentrated flow to an existing Beaverkill Tributary. This area is directed to a forebay for pre-treatment and then to a pocket pond for water quality and quantity controls. Within this area green practices such as rooftop disconnects, buffer strips, filter strips, tree planting and swales will also be incorporated for water quality treatment. This drainage area discharges to analysis point two (AP-2).

## 4.15 Proposed Drainage Area 3B:

This drainage area (3B) encompasses onsite contributary areas consisting mainly of lawn area and 1/8 acre lots in "C" soils. In total the drainage area is 14.21 acres having a CN value of 88 and a time of concentration (Tc) of 13.6 minutes. Stormwater flows as overland sheet flow and then as shallow concentrated flow to the proposed stormwater management practice. This area is directed to a forebay for pre-treatment and then to a pocket pond for water quality and quantity controls. Within this area green practices such as rooftop disconnects, buffer strips, filter strips, tree planting and swales will also be incorporated for water quality treatment. This drainage area discharges to analysis point two (AP-2).

## 4.16 Proposed Drainage Area 3C:

This drainage area (3C) encompasses onsite contributary areas consisting mainly of lawn area and 1/8 acre lots in "C" soils. In total the drainage area is 20.73 acres having a CN value of 88 and a time of concentration (Tc) of 36.3 minutes. Stormwater flows as overland sheet flow and then as shallow concentrated flow to the proposed stormwater management practice. This area is directed to a forebay for pre-treatment and then to a pocket pond for water quality and quantity controls. Within this area green practices such as rooftop disconnects, buffer strips, filter strips, tree planting and swales will also be incorporated for water quality treatment. This drainage area discharges to analysis point two (AP-2).

## 4.17 Proposed Drainage Area 3D:

This drainage area (3D) encompasses onsite contributary areas consisting mainly of lawn area and 6 56-unit apartment building in “C” soils. In total the drainage area is 29.499 acres having a CN value of 81 and a time of concentration (Tc) of 16.2 minutes. Stormwater flows as overland sheet flow and then as shallow concentrated flow to the proposed stormwater management practice. This area is directed to a forebay for pre-treatment and then to a pocket pond for water quality and quantity controls. Within this area green practices such as rooftop disconnects, buffer strips, filter strips, tree planting and swales will also be incorporated for water quality treatment. This drainage area discharges to analysis point two (AP-2).

## 4.18 Proposed Drainage Area 3E:

This drainage area (3E) encompasses onsite contributary areas consisting mainly of woods in fair condition, lawn area, a renovated mansion and hotel expansion area with parking in “C” soils. In total the drainage area is 17.433 acres having a CN value of 81 and a time of concentration (Tc) of 35.1 minutes. Stormwater flows as overland sheet flow and then as shallow concentrated flow to the proposed stormwater management practice. This area is directed to a forebay for pre-treatment and then to a pocket pond for water quality and quantity controls. Within this area green practices such as rooftop disconnects, buffer strips, filter strips, tree planting and swales will also be incorporated for water quality treatment. This drainage area discharges to analysis point two (AP-2).

## 4.19 Proposed Drainage Area 3F:

This drainage area (3F) encompasses onsite contributary areas consisting mainly of lawn area, a parking lot and 3 4-story mixed use buildings in “C” soils. In total the drainage area is 26.813 acres having a CN value of 81 and a time of concentration (Tc) of 17.8 minutes. Stormwater flows as overland sheet flow and then as shallow concentrated flow to the proposed stormwater management practice. This area is directed to a forebay for pre-treatment and then to a pocket pond for water quality and quantity controls. Within this area green practices such as rooftop disconnects, buffer strips, filter strips, tree planting and swales will also be incorporated for water quality treatment. This drainage area discharges to analysis point two (AP-2).

## 4.20 Proposed Drainage Area 3G:

This drainage area (3G) encompasses onsite contributary areas consisting mainly of lawn area with mixed use buildings and apartments in “C” soils. In total the drainage area is 39.934 acres having a CN value of 83 and a time of concentration (Tc) of 22.0 minutes. Stormwater flows as overland sheet flow and then as shallow concentrated flow to the proposed stormwater management practice. This area is directed to a forebay for pre-treatment and then to a pocket pond for water quality and quantity controls. Within this area green practices such as rooftop disconnects, buffer strips, filter strips, tree planting and swales will also be incorporated for water quality treatment. This drainage area discharges to analysis point two (AP-2).

## 4.21 Proposed Drainage Area 4:

This drainage area (4) encompasses onsite and offsite contributary areas consisting mainly of woods in fair condition in “C” soils. In total the drainage area is 58.713 acres having a CN value of 70 and a time of concentration (Tc) of 62.2 minutes. Stormwater flows as overland sheet flow and then as shallow concentrated flow to the Beaverkill. This area does not require water quality treatment as no added impervious. This drainage area discharges to analysis point two (AP-2).

### 4.22 Proposed Drainage Area 4A:

This drainage area (4A) encompasses onsite contributary areas consisting mainly of woods in fair condition, a 4-story hotel, 5 1-story buildings and a large parking area in “C” soils. In total the drainage area is 40.328 acres having a CN value of 83 and a time of concentration (Tc) of 39.5 minutes. Stormwater flows as overland sheet flow and then as shallow concentrated flow to the proposed stormwater management practice. This area is directed to a forebay for pre-treatment and then to a pocket pond for water quality and quantity controls. Within this area green practices such as rooftop disconnects, buffer strips, filter strips, tree planting and swales will also be incorporated for water quality treatment. This drainage area discharges to analysis point two (AP-2).

### 4.23 Proposed Drainage Area 4B:

This drainage area (4B) encompasses onsite contributary areas consisting mainly of lawn area and 3 10,000 sf 1-story buildings in “C” soils. In total the drainage area is 9.481 acres having a CN value of 90 and a time of concentration (Tc) of 9.8 minutes. Stormwater flows as overland sheet flow and then as shallow concentrated flow to the proposed stormwater management practice. This area is directed to a forebay for pre-treatment and then to a pocket pond for water quality and quantity controls. Within this area green practices such as rooftop disconnects, buffer strips, filter strips, tree planting and swales will also be incorporated for water quality treatment. This drainage area discharges to analysis point two (AP-2).

### 4.24 Proposed Drainage Area 5:

This drainage area (5) encompasses onsite and offsite contributary areas consisting mainly of woods in fair condition in “C” soils. In total the drainage area is 34.851 acres having a CN value of 77 and a time of concentration (Tc) of 22.6 minutes. Stormwater flows as overland sheet flow and then as shallow concentrated flow to the Beaverkill. This area does not require water quality treatment as no added impervious. This drainage area discharges to analysis point two (AP-2).

## 5.0 STORMWATER QUALITY

Stormwater quality requirements will be achieved using green infrastructure practices as well as standard stormwater practices. Chapter 5 of the NYSDEC Stormwater Management Design Manual was used to design the green infrastructure for this project. The design manual outlines which practices are best suited for specific scenarios including but not limited to soil conditions, depth to groundwater and/or rock and how to properly size these practices. Water Quality Volume (WQv) and Runoff Reduction Volume (RRv) requirements will be met using green infrastructure practices as well as other standard stormwater management practices.

This project will use buffer strips, grass filter strips, rooftop disconnects, tree plantings, bioretention, rain gardens, and pocket ponds among other preapproved practices to meet all NYSDEC requirements for stormwater quality.

## 5.1 Infrastructure Practice Type Example: Bioretention:

The bioretention areas will be shown on the plans to treat runoff from proposed impervious areas. Runoff will filter through the soil media to underdrains, which connect to outlet control structures that discharge to the proposed conveyances. Pretreatment practices such as filter strips, gravel diaphragms or preapproved proprietary devices will be incorporated. Stabilized emergency overflow weirs will be incorporated to ensure excessive ponding does not occur in the infiltration-bioretention areas during extreme storm events which will allow stormwater to overflow the basin.

## 5.2 Infrastructure Type Example: Pocket Pond:

Pocket ponds with forebays for pretreatment may be used to treat WQv by allowing sediment to settle, specific plantings and sunlight are also a part of the treatment prior to water discharge from the stormwater management area. The pocket pond incorporates a 15’ aquatic bench that will serve as an area for vegetation growth and slope stability. For safety purposes pond embankments will be limited to slopes of 1:4.

Using the green infrastructure and standard stormwater practices/methods listed above, all minimum NYSDEC stormwater quality requirements are met (see table below):

**Table 2:** *Stormwater Quality Comparison*

| Water Quality | | |
|---|---|---|
| **Description:** | **Required** | **Provided** |
| WQv Total (acre-ft) | 17.609 | 17.609 |
| Min RRv Total (acre-ft) | 4.521 | 4.824 |

| | | |
|---|---|---|
| CPv Total (acre-ft) | 165.77 | 166.53 |
| Qp Total (cfs) | 2,408.55 | 1,036.59 |
| Qf Total (cfs) | 6,292.22 | 2,191.45 |

See the Appendix K for water quality volume and runoff reduction volume calculations.

## 6.0 STORMWATER QUANTITY

The proposed development will increase impervious area on site, which increases the rate of stormwater runoff from the site. This runoff must be reduced to a rate that is less than the offsite flow rate during existing conditions. Reduction for this project is achieved through a new stormwater management area that will be used to release stormwater runoff at a controlled rate via an outlet control structure.

See the comparison table below for the sites analysis points under existing and proposed conditions:

**Table 3:** *Stormwater Quantity Comparison*

**Runoff Comparison Table**

| Analysis Point: | Condition: | Runoff (cfs) 1 year | 10 year | 100 year |
|---|---|---|---|---|
| Analysis Point 1 | EXISTING | 27.08 | 153.24 | 420.21 |
| | PROPOSED | 18.74 | 112.32 | 281.349 |
| Analysis Point 2 | EXISTING | 480.29 | 2,379.32 | 6,187.17 |
| | PROPOSED | 483.23 | 946.14 | 1,910.11 |
| Total Site | EXISTING | 507.37 | 2,532.56 | 6,607.38 |
| | PROPOSED | 501.97 | 1,058.37 | 2,191.45 |
| | **PERCENT REDUCTION** | **1.06%** | **58.21%** | **66.83%** |

As shown above, the proposed design meets the requirements of stormwater management by releasing the water at a reduced rate that does not lead to erosion or high levels or pollution. The design does meet the Town of Saugerties and the NYSDEC requirement of providing reduction during the 1, 10, and 100-year events.

Refer to Appendix J for the HydroCAD analysis and the associated drainage maps.

# 7.0 CONSTRUCTION EROSION CONTROL PRACTICES & INSPECTIONS

The Owner is responsible for having monthly inspections of the storm water management facility completed. The inspections shall review and document the following at a minimum: visual inspection of the outlet structure, check of the outlets for excessive sediment accumulation, burrowing, vegetation degradation, or any other issues of concern. A certified copy of the annual summary of inspections report will be provided to the Town of Saugerties by the first of December. The owner is also responsible for having SWPPP inspections once per week once disturbance of the site starts. Copies of the SWPPP inspection reports will be sent to the town, owner, and contractor and deficiencies should be addressed immediately.

Several erosion control practices will be utilized during construction by the contractor under direct supervision by the owner and a qualified SWPPP inspector (S.W.T.). These practices are explained below and shown in detail in the appendix of this report and the construction plans:

- Silt Fence → Silt fencing shall be installed at the toe of all slopes along the perimeter of the disturbed areas and at the toe of slope for any soil stock pile areas. Also, a row of silt fence will be installed around the perimeter of all wetlands in an effort to delineate its boundary. The fencing will be installed in accordance with the NYSDEC construction standards and at the instruction of this plan. The silt fencing shall be buried in the ground at least 6 inches. The contractor shall provide continued monitoring to ensure the silt fencing remains intact, and shall repair as needed. When the silt accumulates to greater than 1/3 the height of the fence the contractor shall remove and dispose of the silt.

- Stabilized Construction Entrance → The existing project entrance shall serve as the construction entrance to the project. The contractor shall ensure that mud is not tracked onto the adjacent roadways and that the stone entrance properly removes mud and debris from construction vehicles.

- Drop Inlet Protection → All field inlets and catch basins shall have inlet protection in accordance with the detail the Appendix. Drop Inlet protection can be removed from catch basins in the roadway when the sub base is installed, and from the field inlets when the adjacent area is brought to final grade and stabilized.

- Seeding and Stabilization → The contractor shall seed and stabilize all disturbed areas not to be worked for 7 days within 7 days of the last disturbance. Stabilization measures may include but are not limited to straw mulching, wood chip mulching, jute mesh and hydroseeding. The SMA and adjacent areas shall be stabilized immediately following their shaping and installation. All embankments greater than 3:1 shall be stabilized with jute mesh.

- Check Dam → 24 inch high stone check dams will be installed in all temporary and permanent diversion swales. The check dams will be installed every 2 vertical feet. Once the site is stabilized, these check dams will be removed.

- Truck Washdown area → a truck washdown area will be provided adjacent to the construction entrance. This area will be constructed such that it drains to a sediment basin immediately adjacent prior to discharging offsite.

- Winter Shutdown → The contractor may request to enter winter shutdown provided the contractor has fulfilled the requirements set forth in the NYSDEC Blue Book Standard and Specifications for Winter Stabilization contained in Appendix I of this report. The certified SWPPP inspector will then perform an inspection and upon agreement with the contractor's practice, shall complete the "Notice to reduce Frequency of SPDES Site Inspections" Form contained in Appendix Q of this report. The form will then be submitted to the regulatory MS4 (or NYSDEC regional office should there be no MS4 for the project area) for review. After the regulatory MS4 or NYSDEC regional office has approved the request, the site will enter winter shutdown and SPDES site inspections may drop to monthly. Should the certified SWPPP inspector find any problems during winter shutdown, the contractor is liable to correct the issues on site in the same timely manner as an active project.

Additional measures may be required during construction at the guidance of the owner or certified SWPPP Inspector. The contractor shall begin to make all adjustments to the erosion control within 24 hours of receipt of any deficiencies. The owner will be responsible for providing weekly reports when the site disturbance totals less than 5 acres. Inspections are to be completed by a qualified inspector in accordance with the GP-0-20-001, during construction to the Town of Saugerties. Additional best management practices and specifications are provided in Appendix I for contractor reference.

If the developer of site plans to increase the disturbance greater than 5 acres at any given time, a 5 acre waiver must be submitted to the NYSDEC and approval granted prior to reaching this limit. The developer must adhere to the conditions set forth in the SPDES General Permit GP-0-20-001 Part II.D.3, located as Appendix L of this report. The conditions of Part II.D.3 are outlined below:

1. The owner or operator shall have a qualified inspector conduct at least two (2) site inspections in accordance with Part IV.C. of this permit every seven (7) calendar days, for as long as greater than five (5) acres of soil remain disturbed. The two (2) inspections shall be separated by a minimum of two (2) full calendar days.

2. In areas where soil disturbance activity has temporarily or permanently ceased, the application of soil stabilization measures must be initiated by the end of the next business day and completed within seven (7) days from the date the current soil disturbance activity ceased. The soil stabilization measures selected shall be in conformance with the technical standard, New York State Standards and Specifications for Erosion and Sediment Control, dated November 2016.

3. The owner or operator shall prepare a phasing plan that defines maximum disturbed area per phase and shows required cuts and fills.

4. The owner or operator shall install any additional site-specific practices needed to protect water quality.

Any modifications to the SWPPP will be reported and approved by the Town in writing prior to implementation. See Appendix A for additional SWPPP information. The owner is responsible for having a qualified operator on site at all times who has at least 4 hours of erosion control training in accordance with the GP-0-20-001. Once the site has achieved 80% stabilization and ground cover, the Town may sign off on the Notice of Termination prior to submission to the NYSDEC. Removal of all temporary erosion and sediment control practices is required prior to demobilization.

# 8.0 POST CONSTRUCTION

The owner of the subject project will be responsible for all post construction practices. The contact information for the owner is illustrated on the cover of this plan as well as the design plans for the project. The post construction practices include performing annual inspections of the SMAs to ensure proper working conditions and ensure continual stabilized cover of all project areas to 80% cover, minimum. All applicable inspection and maintenance activities shall continue until the 80% cover is met. Any silt removal will be disposed either off site or on site and immediately stabilized in accordance with the practices of this plan.

Additionally, annual monitoring of the storm sewer structures will be provided by the owner to ensure that they are functioning properly. All documentation related to this SWPPP and post construction monitoring reports, shall be kept by the owner for five years after project completion. These inspections will be certified by a Professional Engineer and a copy of the inspection report will be furnished to the Town of Saugerties.

# 9.0 SUMMARY

The proposed project requires stormwater management practices which conform to NYSDEC regulations. The proposed standard stormwater management practices will also result in a net decrease in peak runoff from the site while meeting the NYSDEC requirements for Runoff Reduction, Water Quality and Channel Protection. Continued monitoring of the practices included in this plan will be provided by the owner and a designated SWPPP Inspector.

Pollutant loads are calculated based on groundcover conditions and land-use conditions. Typically, the keystone pollutants would be Total Suspended Solids (TSS) and Total Phosphorus (TP). The stormwater practices outlined in the NYS Stormwater Design Manual are designed to reduce both of these keystone pollutants. The stormwater practices typically reduce the total phosphorus in site runoff by 40% and reduce the total suspended solids by 80%.

Agricultural/pasture lands produce approximately 145 mg/L of TSS and 0.37 mg/L of TP and forested lands produce approximately 51 mg/L of TSS and 0.11 mg/L of TP. Low to medium density residential development produces approximately 70 mg/L of TSS and 0.52 mg/L of TP, commercial development produces approximately 77 mg/L of TSS and 0.33 mg/L of TP. The integration of stormwater practices into the developed site would reduce the TSS removal from the proposed development by 80% and the TP by 40%.

It is anticipated that the TSS load would be greatly reduced through the incorporation of stormwater practices and the reduction of agricultural use, which is a large TSS contributor, and that TP would be slightly increased due to the change in land use and cover condition. Once the project is past the Zoning Phase and actual Site Development Plans are prepared the proposed pollutant loads can be compared with the existing pollutants loads that are currently being discharged from the existing site.

The existing TSS load is approximately 167,507 lbs/year and the existing TP load is 406 lbs/ year.

*Based on the NURP (1983), Horner et al. (1994), and Cave et al. (1994)

The following appendices of this report illustrate the additional requirements and specifications for stormwater pollution prevention. All practices included in this report and incorporated in the proposed project have been designed in compliance with the NYS Storm Water Design Manual and NYS Standards and Specifications for Erosion and Sediment Control.

# APPENDICES

# APPENDIX A: SWPPP PRACTICES PROCEDURES AND CERTIFICATIONS

## POLLUTION PREVENTION PLAN CERTIFICATION

I certify under penalty of law that I understand and agree to comply with the terms and conditions of the SWPPP for the construction site identified in such SWPPP as a condition of authorization to discharge stormwater. I also understand that the operator must comply with the terms and conditions of the New York State Pollutant Discharge Elimination System (“SPDES”) general permit for stormwater discharges from construction activities and that it is unlawful for any person to cause or contribute to a violation of water quality standards.

Signed:______________________________
Owner

Date:________________________

## CONTRACTOR'S CERTIFICATION

"I hereby certify under penalty of law that I understand and agree to comply with the terms and conditions of the SWPPP and agree to implement any corrective actions identified by the qualified inspector during a site inspection. I also understand that the owner or operator must comply with the terms and conditions of the most current version of the New York State Pollutant Discharge Elimination System ("SPDES") general permit for stormwater discharges from construction activities and that it is unlawful for any person to cause or contribute to a violation of water quality standards. Furthermore, I am aware that there are significant penalties for submitting false information, that I do not believe to be true, including the possibility of fine and imprisonment for knowing violations"

| Signature | For | Responsible for |
|---|---|---|
| Trained Contractor<br>_________________________________<br>Date:_________________ | | |
| _________________________________<br>Date:_________________ | | |
| _________________________________<br>Date:_________________ | | |
| _________________________________<br>Date:_________________ | | |
| _________________________________<br>Date:_________________ | | |

| Signature | For | Responsible for |
|---|---|---|
| ______________________________ Date:________________ | | |
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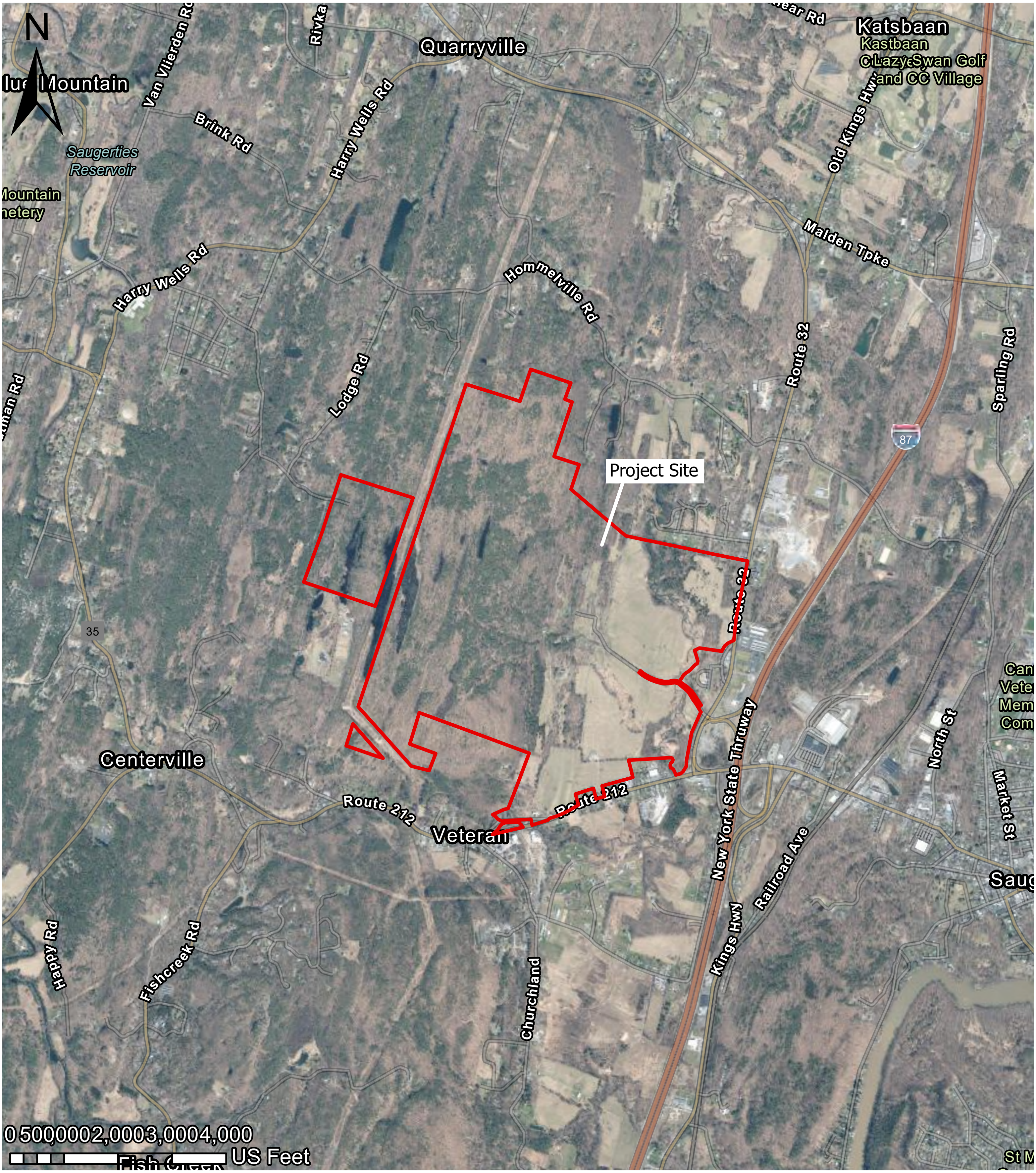
| ______________________________ Date:________________ | | |

# APPENDIX B: AERIAL PHOTOGRAPH




# Winston Farms Location Map

Maps created by: Passero Associates GIS
CRS: NAD83 State Plane New York West
Municipality: Town of Saugerties
Source: Ulster County GIS

**Legend**

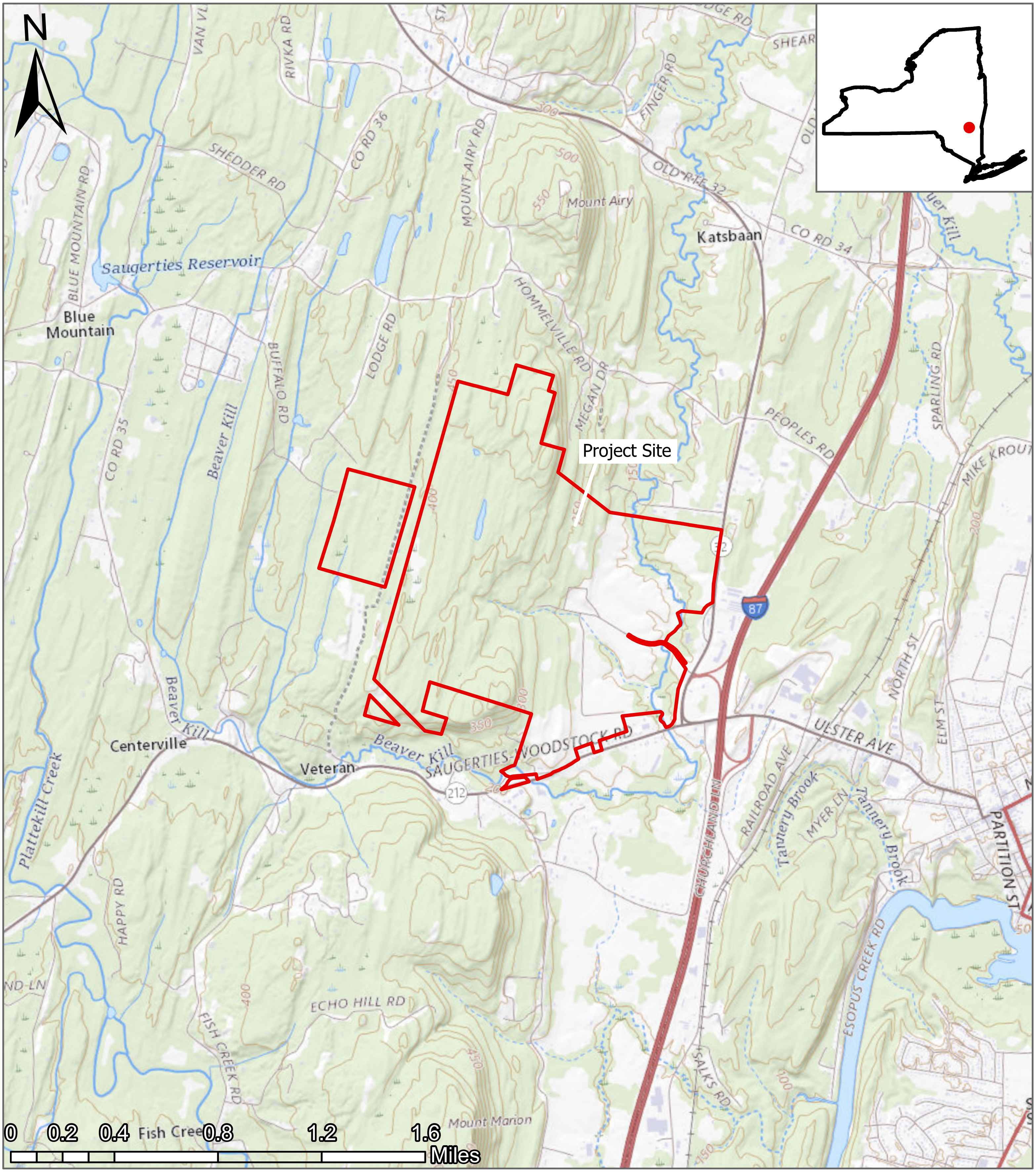
Project Site

PASSERO
architecture engineering

**Service Credits:**
Esri, HERE, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS, EPA, NPS, US Census Bureau, USDA, New York State, Earthstar Geographics

**Date: 11/21/2023**

# APPENDIX C: USGS QUADRANGLE MAP




**Legend**

Project Site

# Winston Farms USGS Map

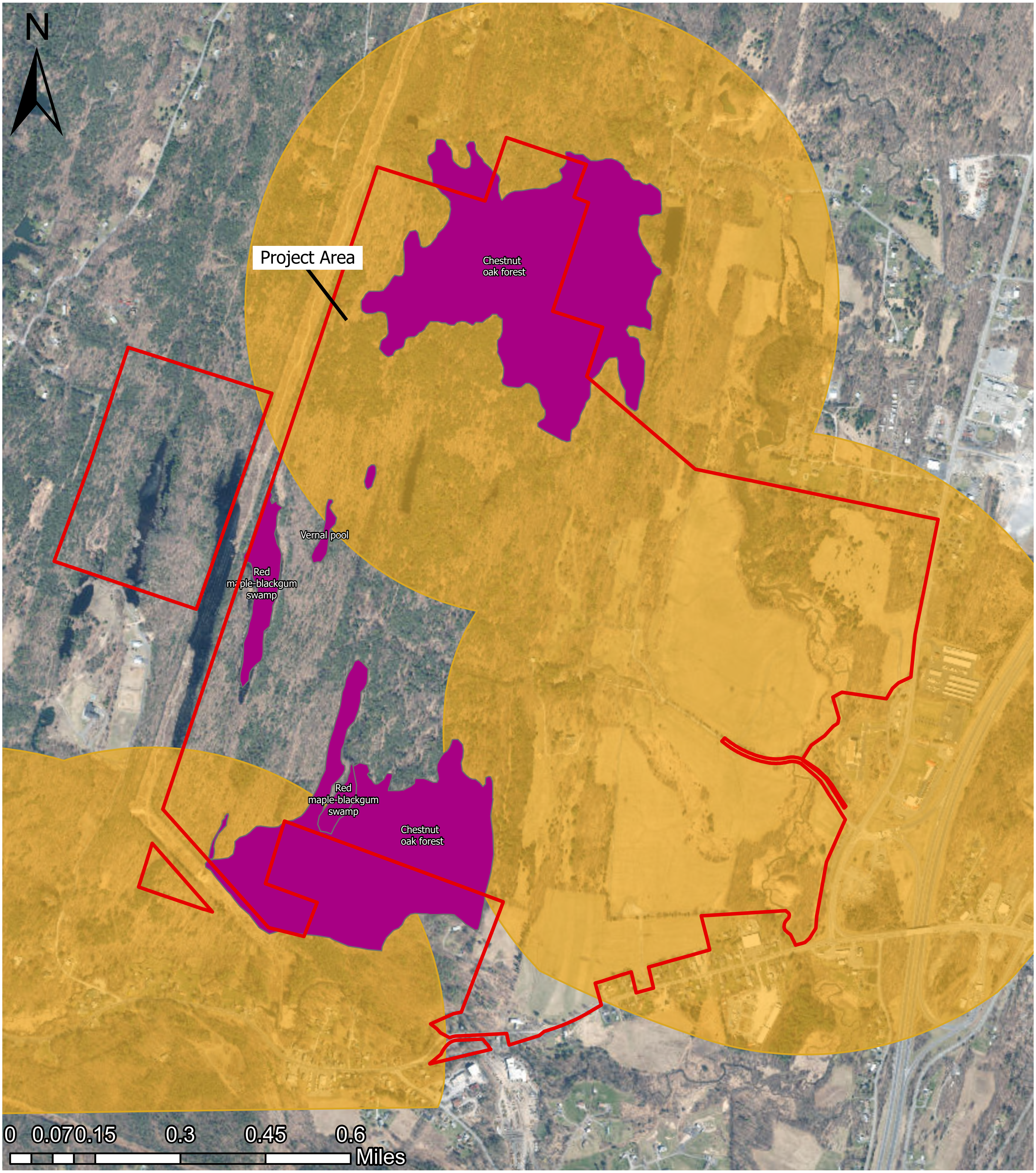
Maps created by: Passero Associates GIS
CRS: NAD83 State Plane New York West
Municipality: Town of Saugerties
Source: United States Geological Survey

PASSERO
architecture engineering

**Service Credits:**
USGS The National Map: National Boundaries Dataset, 3DEP Elevation Program, Geographic Names Information System, National Hydrography Dataset, National Land Cover Database, National Structures Dataset, and National Transportation Dataset; USGS Global Ecosystems; U.S. Census Bureau TIGER/Line data; USFS Road Data; Natural Earth Data; U.S. Department of State Humanitarian Information Unit; and NOAA National Centers for Environmental Information, U.S. Coastal Relief Model. Data refreshed April, 2023.

**Date: 11/21/2023**

# APPENDIX D: ENVIRONMENTAL RESOURCE MAPPER




**Legend**

Significant Natural Community

Rare Plants and Animals

# Environmental Resource Map

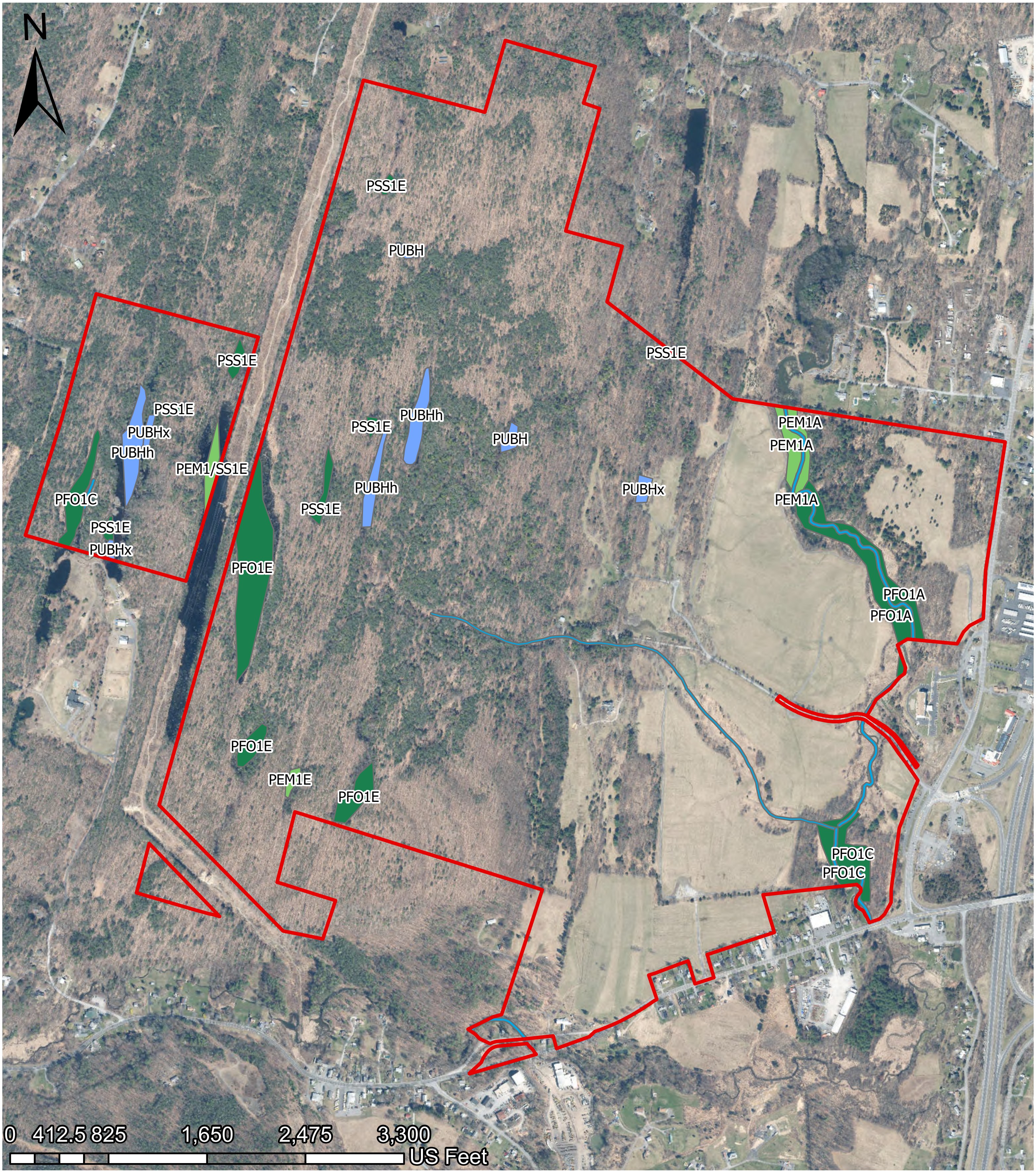
Maps created by: Passero Associates GIS
CRS: NAD83 State Plane New York East
Municipality: Town of Saugerties
Source: Environmental Resource Mapper

PASSERO architecture engineering

**Service Credits:**
New York State, Maxar

**Date: 11/27/2023**

# APPENDIX E: WETLAND MAPPING




**Legend**

Wetlands

- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond
- Riverine

# USFWS National Wetlands Inventory

Maps created by: Passero Associates GIS
CRS: NAD83 State Plane New York East
Municipality: Town of Saugerties
Source: U.S. Fish and Wildlife Service

PASSERO
architecture engineering

**Service Credits:**
New York State, Maxar

**Date: 11/27/2023**

LEGEND:

- PROPERTY BOUNDARY
- EXISTING MAJOR CONTOUR
- EXISTING MINOR CONTOUR
- EXISTING WETLAND AREA
- WETLAND FLAG

NOTES:

1. WETLANDS SHOWN AS FLAGGED IN 2021 BY MICHAEL NOWICKI OF ECOLOGICAL SOLUTIONS LLC AND ARE DEPICTED AS SURVEYED BY PRAETORICIOUS AND CONRAD PC AND AS SHOWN IN THE FIELD SKETCH PROVIDED BY ECOLOGICAL SOLUTIONS LLC.

| Parcel Number | Owner | Total Acreage |
|---|---|---|
| 17.15-3-4 | | |
| 17.15-3-8 | | |
| 17.16-1-1.110 | | |
| 17.16-1-36 | | |
| 17.2-3-10 | | |
| 17.2-3-15 | Saugerties Farm LLC | 840 AC |
| 17.2-4-32 | | |
| 17.2-5-38 | | |
| 17.2-5-39.120 | | |
| 17.2-5-40 | | |
| 17.2-5-41 | | |

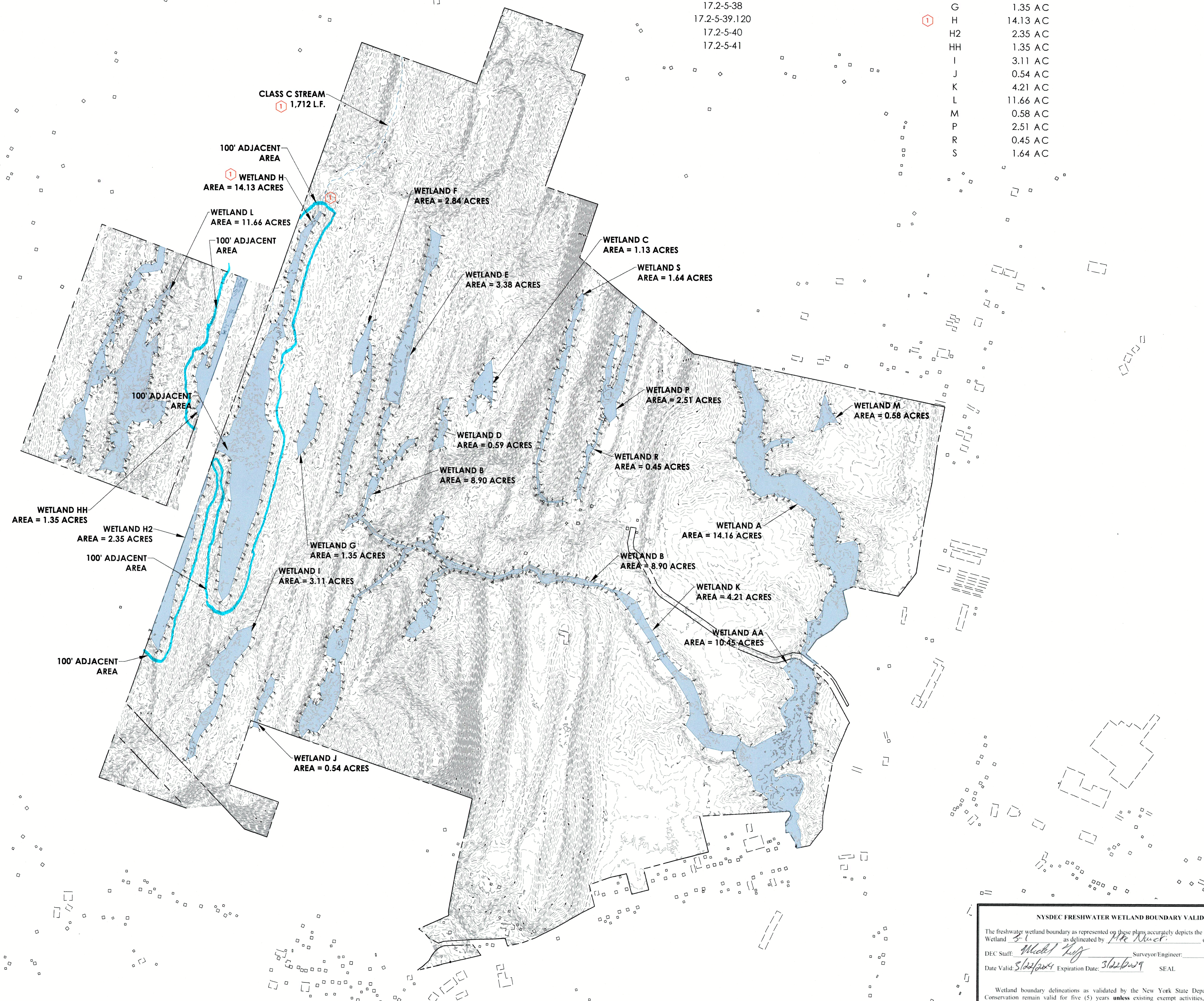
| Wetland Identifier | Total Acreage |
|---|---|
| A | 14.16 AC |
| AA | 10.45 AC |
| B | 8.90 AC |
| C | 1.13 AC |
| D | 0.59 AC |
| E | 3.38 AC |
| F | 2.84 AC |
| G | 1.35 AC |
| 1 H | 14.13 AC |
| H2 | 2.35 AC |
| HH | 1.35 AC |
| I | 3.11 AC |
| J | 0.54 AC |
| K | 4.21 AC |
| L | 11.66 AC |
| M | 0.58 AC |
| P | 2.51 AC |
| R | 0.45 AC |
| S | 1.64 AC |

HORIZONTAL SCALE

500 0 250 500 1000

SCALE: 1"=500'

N




**NYSDEC FRESHWATER WETLAND BOUNDARY VALIDATION**

The freshwater wetland boundary as represented on these plans accurately depicts the limits of Freshwater Wetland S-1 as delineated by Mike Nowicki on ________.

DEC Staff: Michael Tuff Surveyor/Engineer: ________

Date Valid: 3/22/2024 Expiration Date: 3/22/2029 SEAL

Wetland boundary delineations as validated by the New York State Department of Environmental Conservation remain valid for five (5) years **unless** existing exempt activities, area hydrology, or land use practices change (e.g., agricultural to residential). **After five (5) years the boundary must be revalidated by DEC staff.** Revalidation may include a new delineation and survey of the wetland boundary.

Any proposed construction, grading, filling, excavating, clearing or other regulated activity in the freshwater wetland or within 100 feet of the wetland boundary as depicted on this plan requires a permit from the NYS Department of Environmental Conservation under Article 24 of the Environmental Conservation Law (Freshwater Wetlands Act) prior to commencement of work.

PA
PASSERO ASSOCIATES
engineering architecture

Client:
SAUGERTIES FARM LLC

SAUGERTIES, NY


PASSERO ASSOCIATES
242 West Main Street Suite 100
Rochester, New York 14614
(585) 325-1000
Fax: (585) 325-1691

Principal-in-Charge Jess Sudol, PE
Project Manager Chris LaPorta, PE, CDT
Designed by D.J. Goodall, EIT


Revisions

| No. | Date | By | Description |
|---|---|---|---|
| 1 | 24/02/15 | PM | ADDRESSED NYSDEC COMMENTS |


UNAUTHORIZED ALTERATIONS OR ADDITIONS TO THIS DRAWING IS IN VIOLATION OF STATE EDUCATION LAW ARTICLE 145 SECTION 7209 AND ARTICLE 147 SECTION 7307. THESE PLANS ARE COPYRIGHT PROTECTED ©


MAP OF WETLANDS

WINSTON FARM

Town/City: SAUGERTIES
County: ULSTER State: NEW YORK

Project No.: 20202934.0001

Drawing No.: W-0 Sheet No.: 1

Scale: 1" = 500'

Date: JANUARY, 2021

NOT FOR CONSTRUCTION


Y:\PROJECTS-NEW\2020\20202934\20202934.0001\01 CAD - BIM - MODELS\CIVIL\20202934.0001_WETLANDS.DWG 3/13/2024 2:29 PM DJ Goodall

## LEGEND:

PROPERTY BOUNDARY
EXISTING MAJOR CONTOUR
EXISTING MINOR CONTOUR
EXISTING WETLAND AREA
WETLAND FLAG

## NOTES:

1. WETLANDS SHOWN AS FLAGGED IN 2021 BY MICHAEL NOWICKI OF ECOLOGICAL SOLUTIONS LLC AND ARE DEPICTED AS SURVEYED BY PRAETORICIOUS AND CONRAD PC AND AS SHOWN IN THE FIELD SKETCH PROVIDED BY ECOLOGICAL SOLUTIONS LLC.

### NYSDEC FRESHWATER WETLAND BOUNDARY VALIDATION

The freshwater wetland boundary as represented on these plans accurately depicts the limits of Freshwater Wetland 5-1 as delineated by Mike Nowicki on ____.

DEC Staff: [signature] Surveyor/Engineer: ____

Date Valid: 3/22/24 Expiration Date: 3/22/2029 SEAL

Wetland boundary delineations as validated by the New York State Department of Environmental Conservation remain valid for five (5) years **unless** existing exempt activities, area hydrology, or land use practices change (e.g., agricultural to residential). **After five (5) years the boundary must be revalidated by DEC staff.** Revalidation may include a new delineation and survey of the wetland boundary.

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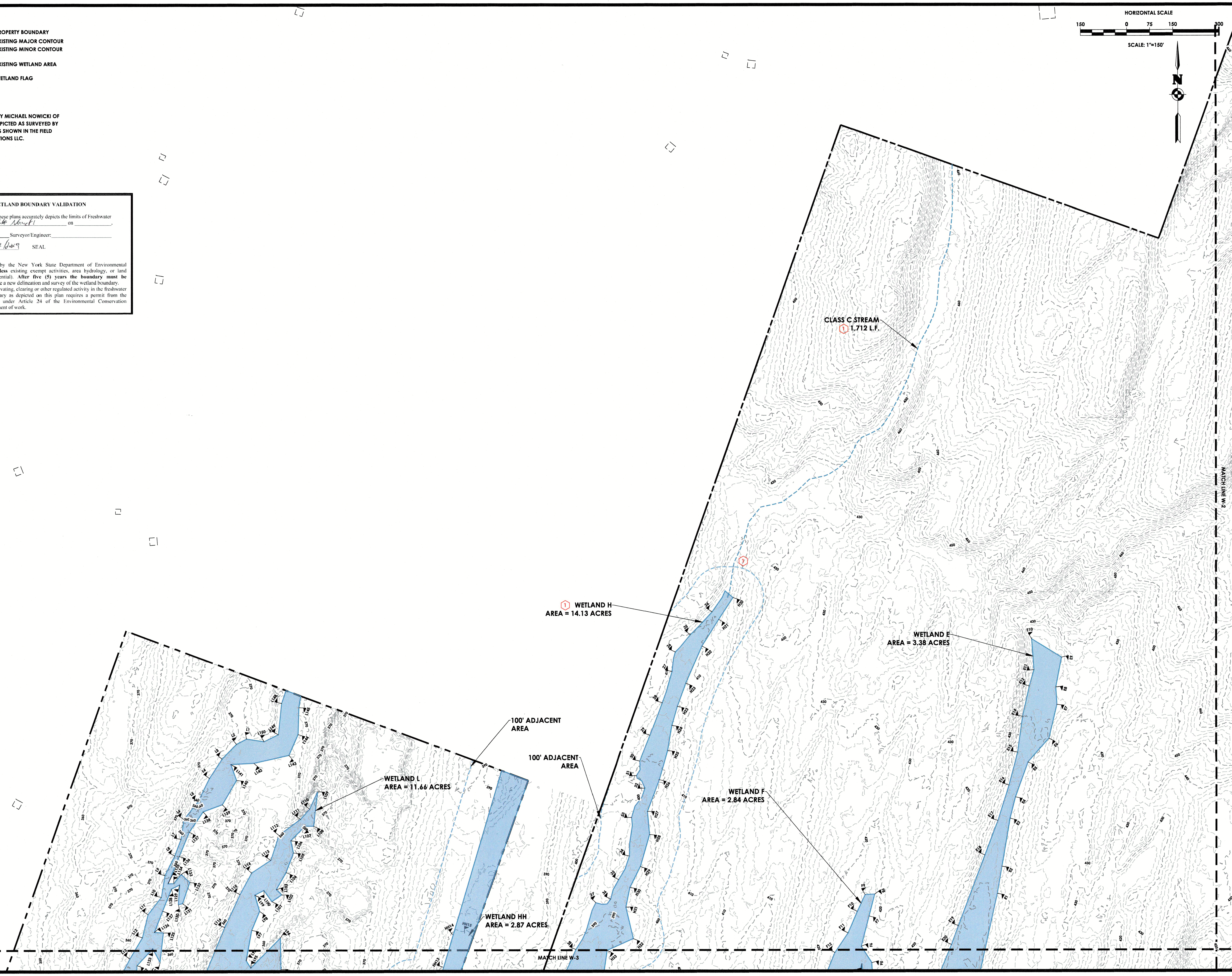


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Client:
SAUGERTIES FARM LLC
SAUGERTIES, NY

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242 West Main Street Suite 100
Rochester, New York 14614
(585) 325-1000
Fax: (585) 325-1691

| | |
|---|---|
| Principal-in-Charge | Jess Sudol, PE |
| Project Manager | Chris LaPorta, PE, CDT |
| Designed by | D.J. Goodall, EIT |

Revisions

| No. | Date | By | Description |
|---|---|---|---|
| 1 | 24/02/15 | PM | ADDRESSED NYSDEC COMMENTS |

UNAUTHORIZED ALTERATIONS OR ADDITIONS TO THIS DRAWING IS IN VIOLATION OF STATE EDUCATION LAW ARTICLE 145 SECTION 7209 AND ARTICLE 147 SECTION 7307. THESE PLANS ARE COPYRIGHT PROTECTED ©

MAP OF WETLANDS

WINSTON FARM

Town/City: SAUGERTIES
County: ULSTER State: NEW YORK

Project No. 20202934.0001

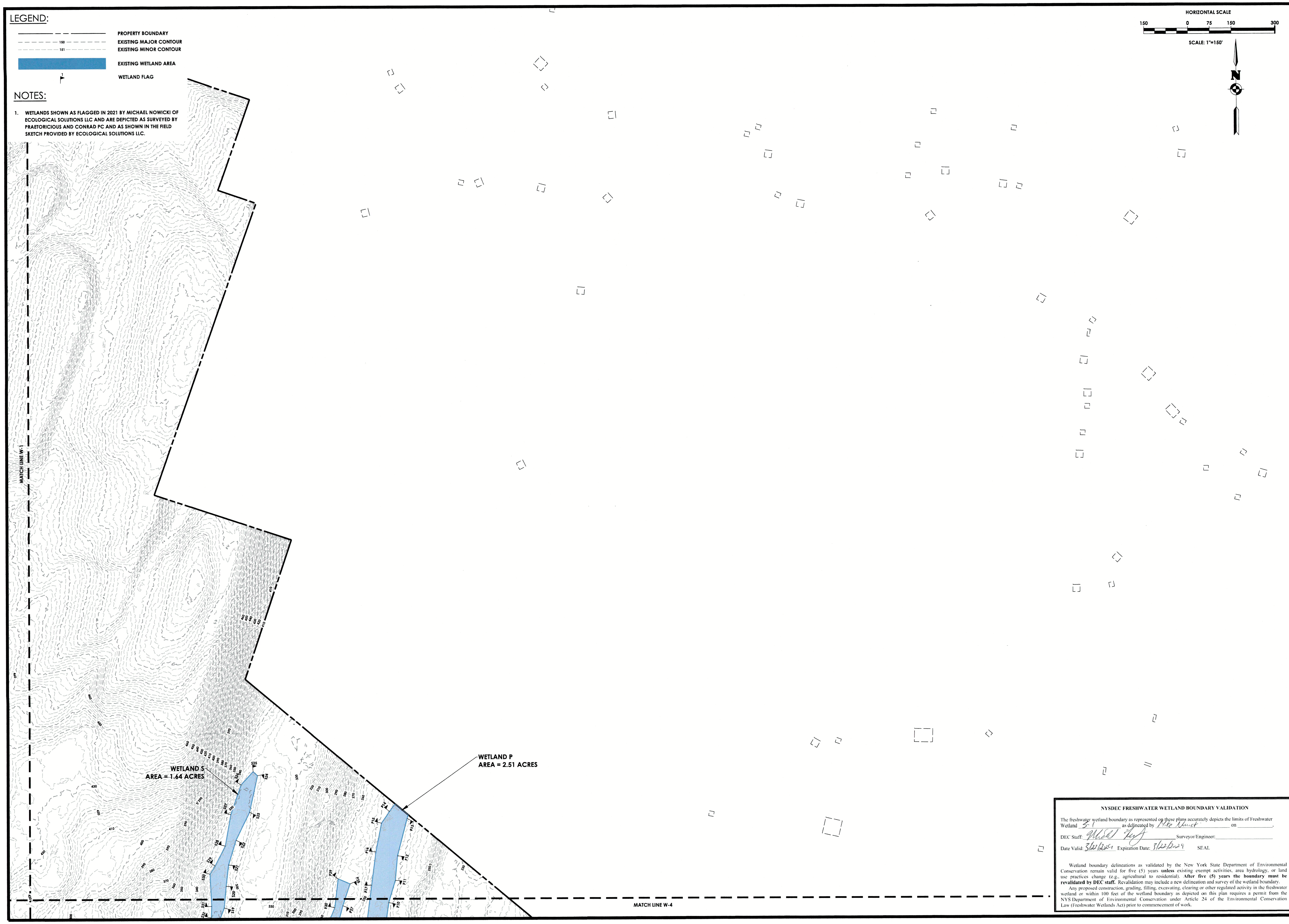
Drawing No. W-1 Sheet No. 2

Scale: 1" = 150'

Date JANUARY, 2021

NOT FOR CONSTRUCTION

Y:\PROJECTS-NEW\2020\20202934\20202934.0001\01 CAD - BIM - MODELS\CIVIL\20202934.0001_WETLANDS.DWG 3/13/2024 2:29 PM DJ Goodall




NOTES:

1. WETLANDS SHOWN AS FLAGGED IN 2021 BY MICHAEL NOWICKI OF ECOLOGICAL SOLUTIONS LLC AND ARE DEPICTED AS SURVEYED BY PRAETORICIOUS AND CONRAD PC AND AS SHOWN IN THE FIELD SKETCH PROVIDED BY ECOLOGICAL SOLUTIONS LLC.

**NYSDEC FRESHWATER WETLAND BOUNDARY VALIDATION**

The freshwater wetland boundary as represented on these plans accurately depicts the limits of Freshwater Wetland S-1 as delineated by Mike Nowicki on ______.

DEC Staff: Michael Ferry  Surveyor/Engineer: ______

Date Valid: 3/22/2024  Expiration Date: 3/22/2029  SEAL

Wetland boundary delineations as validated by the New York State Department of Environmental Conservation remain valid for five (5) years **unless** existing exempt activities, area hydrology, or land use practices change (e.g., agricultural to residential). **After five (5) years the boundary must be revalidated by DEC staff.** Revalidation may include a new delineation and survey of the wetland boundary.

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Principal-in-Charge Jess Sudol, PE
Project Manager Chris LaPorta, PE, CDT
Designed by D.J. Goodall, EIT


Revisions

| No. | Date | By | Description |
|---|---|---|---|
| 1 | 24/02/15 | PM | ADDRESSED NYSDEC COMMENTS |

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# MAP OF WETLANDS

WINSTON FARM

Town/City: SAUGERTIES
County: ULSTER  State: NEW YORK

Project No. 20202934.0001

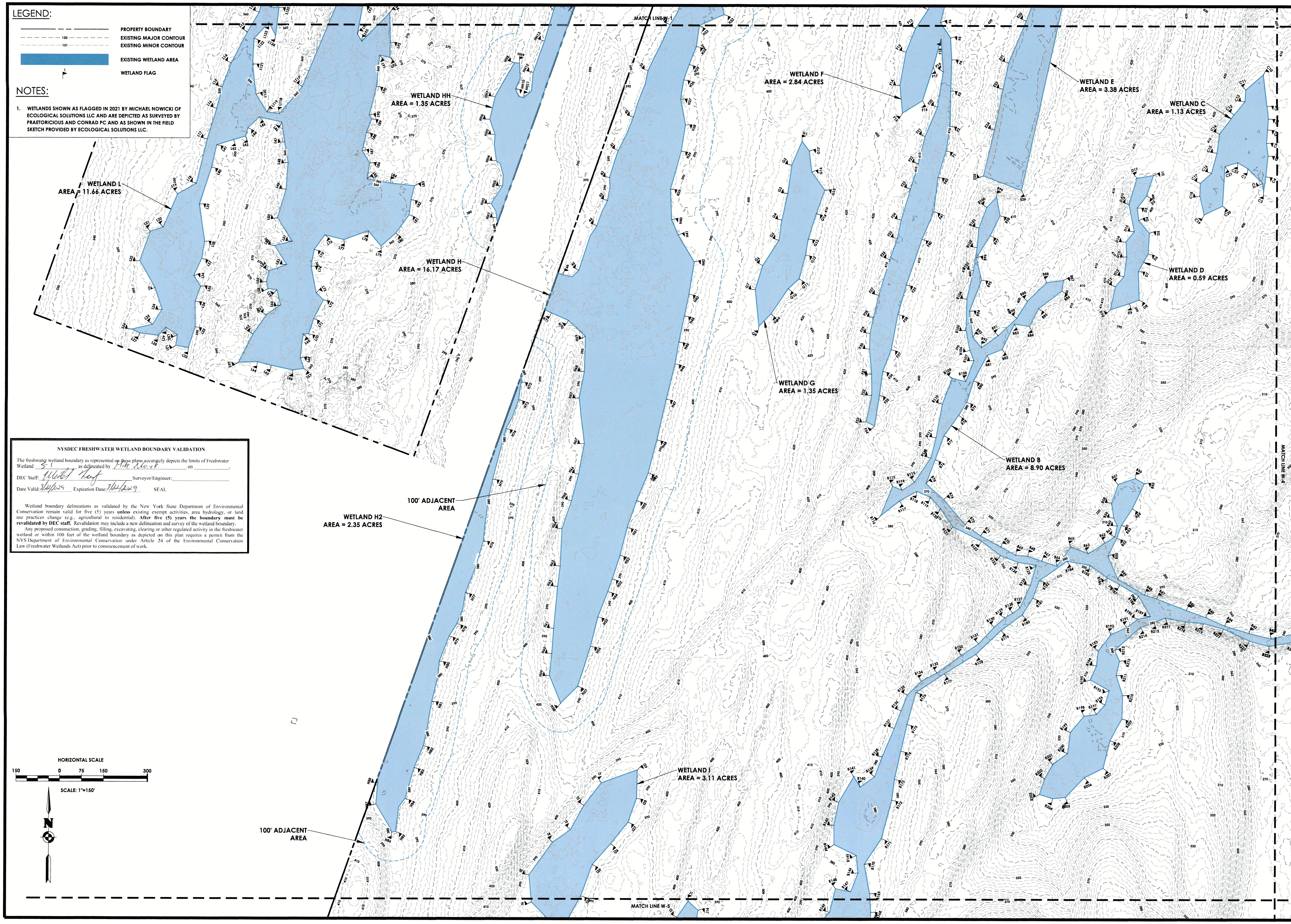
Drawing No. W-2  Sheet No. 3

Scale: 1" = 150'

Date: JANUARY, 2021

NOT FOR CONSTRUCTION

Y:\PROJECTS-NEW\2020\2020234\20202934.0001\01 CAD - BIM - MODELS\CIVIL\20202934.0001_WETLANDS.DWG 3/13/2024 2:29 PM DJ Goodall




LEGEND:

PROPERTY BOUNDARY
EXISTING MAJOR CONTOUR
EXISTING MINOR CONTOUR
EXISTING WETLAND AREA
WETLAND FLAG

NOTES:

1. WETLANDS SHOWN AS FLAGGED IN 2021 BY MICHAEL NOWICKI OF ECOLOGICAL SOLUTIONS LLC AND ARE DEPICTED AS SURVEYED BY PRAETORICIOUS AND CONRAD PC AND AS SHOWN IN THE FIELD SKETCH PROVIDED BY ECOLOGICAL SOLUTIONS LLC.

**NYSDEC FRESHWATER WETLAND BOUNDARY VALIDATION**

The freshwater wetland boundary as represented on these plans accurately depicts the limits of Freshwater Wetland S-1 as delineated by Mike Nowick on ____.

DEC Staff: [signature] Surveyor/Engineer: ____

Date Valid: 3/22/2024 Expiration Date: 3/22/2029 SEAL

Wetland boundary delineations as validated by the New York State Department of Environmental Conservation remain valid for five (5) years **unless** existing exempt activities, area hydrology, or land use practices change (e.g., agricultural to residential). **After five (5) years the boundary must be revalidated by DEC staff.** Revalidation may include a new delineation and survey of the wetland boundary.

Any proposed construction, grading, filling, excavating, clearing or other regulated activity in the freshwater wetland or within 100 feet of the wetland boundary as depicted on this plan requires a permit from the NYS Department of Environmental Conservation under Article 24 of the Environmental Conservation Law (Freshwater Wetlands Act) prior to commencement of work.

PA
PASSERO ASSOCIATES
engineering architecture

Client:
SAUGERTIES FARM LLC

SAUGERTIES, NY

PASSERO ASSOCIATES
242 West Main Street Suite 100
Rochester, New York 14614
(585) 325-1000
Fax: (585) 325-1691

Principal-in-Charge Jess Sudol, PE
Project Manager Chris LaPorta, PE, CDT
Designed by D.J. Goodall, EIT

Revisions

| No. | Date | By | Description |
|---|---|---|---|
| 1 | 24/02/15 | PM | ADDRESSED NYSDEC COMMENTS |

UNAUTHORIZED ALTERATIONS OR ADDITIONS TO THIS DRAWING IS IN VIOLATION OF STATE EDUCATION LAW ARTICLE 145 SECTION 7209 AND ARTICLE 147 SECTION 7307. THESE PLANS ARE COPYRIGHT PROTECTED ©

# MAP OF WETLANDS

## WINSTON FARM

Town/City: SAUGERTIES
County: ULSTER State: NEW YORK

Project No. 20202934.0001

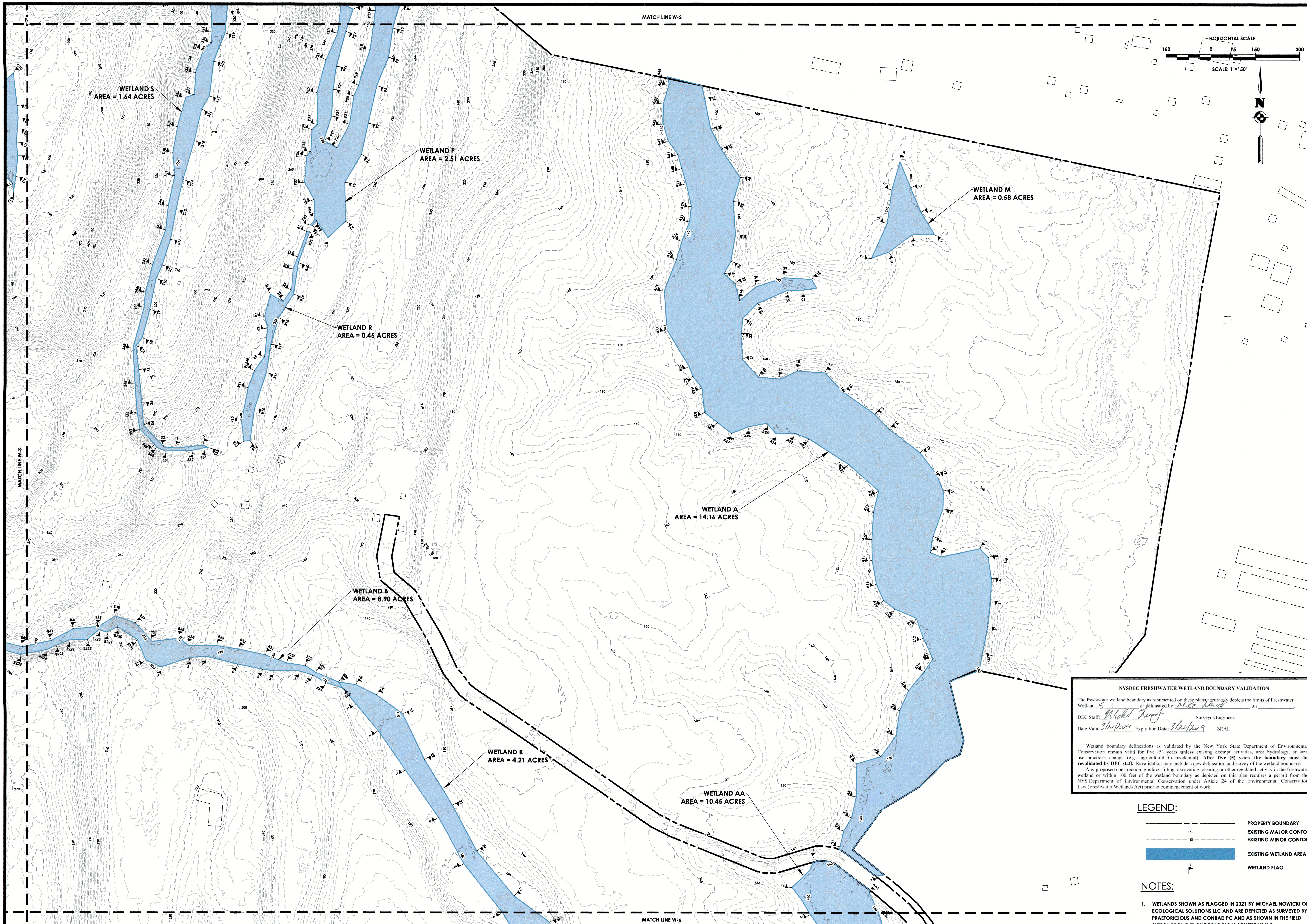
Drawing No. W-3
Sheet No. 4

Scale: 1" = 150'

Date JANUARY, 2021

NOT FOR CONSTRUCTION

Y:\PROJECTS-NEW\2020\20202934\20202934.0001\01 CAD - BIM - MODELS\CIVIL\20202934.0001_WETLANDS.DWG 3/13/2024 2:30 PM DJ Goodall




**NYSDEC FRESHWATER WETLAND BOUNDARY VALIDATION**

The freshwater wetland boundary as represented on these plans accurately depicts the limits of Freshwater Wetland S-1 as delineated by MRC Nacif on ________.

DEC Staff: Michael Kurz Surveyor/Engineer: ________

Date Valid: 3/12/2024 Expiration Date: 3/22/2029 SEAL

Wetland boundary delineations as validated by the New York State Department of Environmental Conservation remain valid for five (5) years **unless** existing exempt activities, area hydrology, or land use practices change (e.g., agricultural to residential). **After five (5) years the boundary must be revalidated by DEC staff.** Revalidation may include a new delineation and survey of the wetland boundary.

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## LEGEND:

- PROPERTY BOUNDARY
- EXISTING MAJOR CONTOUR (180)
- EXISTING MINOR CONTOUR (181)
- EXISTING WETLAND AREA
- WETLAND FLAG

## NOTES:

1. WETLANDS SHOWN AS FLAGGED IN 2021 BY MICHAEL NOWICKI OF ECOLOGICAL SOLUTIONS LLC AND ARE DEPICTED AS SURVEYED BY PRAETORICIOUS AND CONRAD PC AND AS SHOWN IN THE FIELD SKETCH PROVIDED BY ECOLOGICAL SOLUTIONS LLC.

PASSERO ASSOCIATES
engineering architecture

Client:
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SAUGERTIES, NY

PASSERO ASSOCIATES
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Fax: (585) 325-1691

Principal-in-Charge: Jess Sudol, PE
Project Manager: Chris LaPorta, PE, CDT
Designed by: D.J. Goodall, EIT

Revisions

| No. | Date | By | Description |
|---|---|---|---|
| 1 | 24/02/15 | PM | ADDRESSED NYSDEC COMMENTS |

UNAUTHORIZED ALTERATIONS OR ADDITIONS TO THIS DRAWING IS IN VIOLATION OF STATE EDUCATION LAW ARTICLE 145 SECTION 7209 AND ARTICLE 147 SECTION 7307. THESE PLANS ARE COPYRIGHT PROTECTED ©

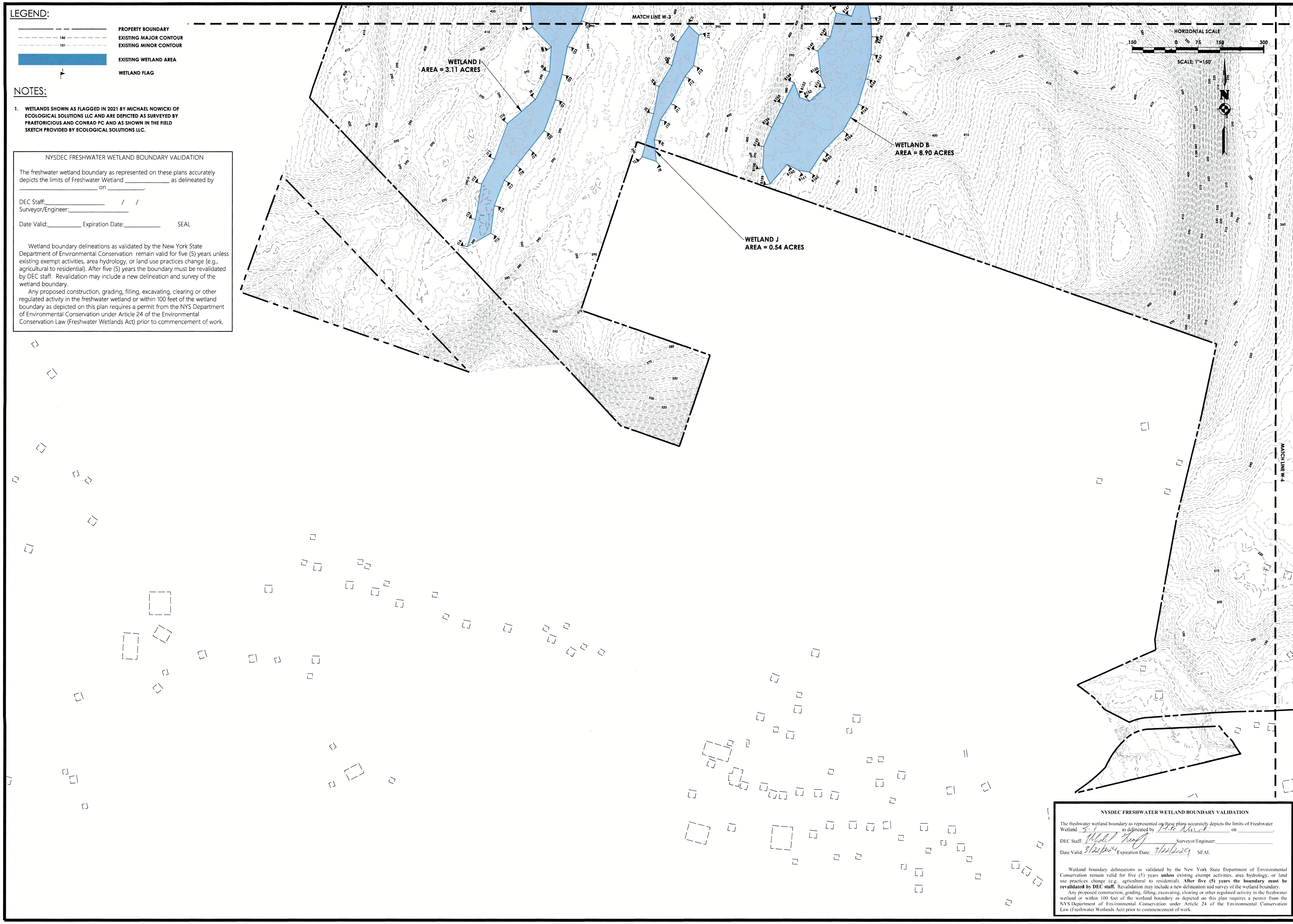
# MAP OF WETLANDS

## WINSTON FARM

Town/City: SAUGERTIES
County: ULSTER State: NEW YORK

Project No.: 20202934.0001
Drawing No.: W-4
Sheet No.: 5
Scale: 1" = 150'
Date: JANUARY, 2021

NOT FOR CONSTRUCTION




## LEGEND:

PROPERTY BOUNDARY
EXISTING MAJOR CONTOUR
EXISTING MINOR CONTOUR
EXISTING WETLAND AREA
WETLAND FLAG

## NOTES:

1. WETLANDS SHOWN AS FLAGGED IN 2021 BY MICHAEL NOWICKI OF ECOLOGICAL SOLUTIONS LLC AND ARE DEPICTED AS SURVEYED BY PRAETORICIOUS AND CONRAD PC AND AS SHOWN IN THE FIELD SKETCH PROVIDED BY ECOLOGICAL SOLUTIONS LLC.

NYSDEC FRESHWATER WETLAND BOUNDARY VALIDATION

The freshwater wetland boundary as represented on these plans accurately depicts the limits of Freshwater Wetland ______________ as delineated by ______________ on ______________.

DEC Staff: ______________ / /
Surveyor/Engineer: ______________

Date Valid: __________ Expiration Date: __________ SEAL

Wetland boundary delineations as validated by the New York State Department of Environmental Conservation remain valid for five (5) years unless existing exempt activities, area hydrology, or land use practices change (e.g., agricultural to residential). After five (5) years the boundary must be revalidated by DEC staff. Revalidation may include a new delineation and survey of the wetland boundary.

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**NYSDEC FRESHWATER WETLAND BOUNDARY VALIDATION**

The freshwater wetland boundary as represented on these plans accurately depicts the limits of Freshwater Wetland 5-1 as delineated by Mike Nowicki on ______________.

DEC Staff: Michael Kraft Surveyor/Engineer: ______________

Date Valid: 3/22/2024 Expiration Date: 3/22/2029 SEAL

Wetland boundary delineations as validated by the New York State Department of Environmental Conservation remain valid for five (5) years **unless** existing exempt activities, area hydrology, or land use practices change (e.g., agricultural to residential). **After five (5) years the boundary must be revalidated by DEC staff.** Revalidation may include a new delineation and survey of the wetland boundary.

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PA
PASSERO ASSOCIATES
engineering architecture

Client:
SAUGERTIES FARM LLC

SAUGERTIES, NY

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(585) 325-1000
Fax: (585) 325-1691

Principal-in-Charge: Jess Sudol, PE
Project Manager: Chris LaPorta, PE, CDT
Designed by: D.J. Goodall, EIT

Revisions

| No. | Date | By | Description |
|---|---|---|---|
| 1 | 24/02/15 | PM | ADDRESSED NYSDEC COMMENTS |

UNAUTHORIZED ALTERATIONS OR ADDITIONS TO THIS DRAWING IS IN VIOLATION OF STATE EDUCATION LAW ARTICLE 145 SECTION 7209 AND ARTICLE 147 SECTION 7307. THESE PLANS ARE COPYRIGHT PROTECTED ©

# MAP OF WETLANDS

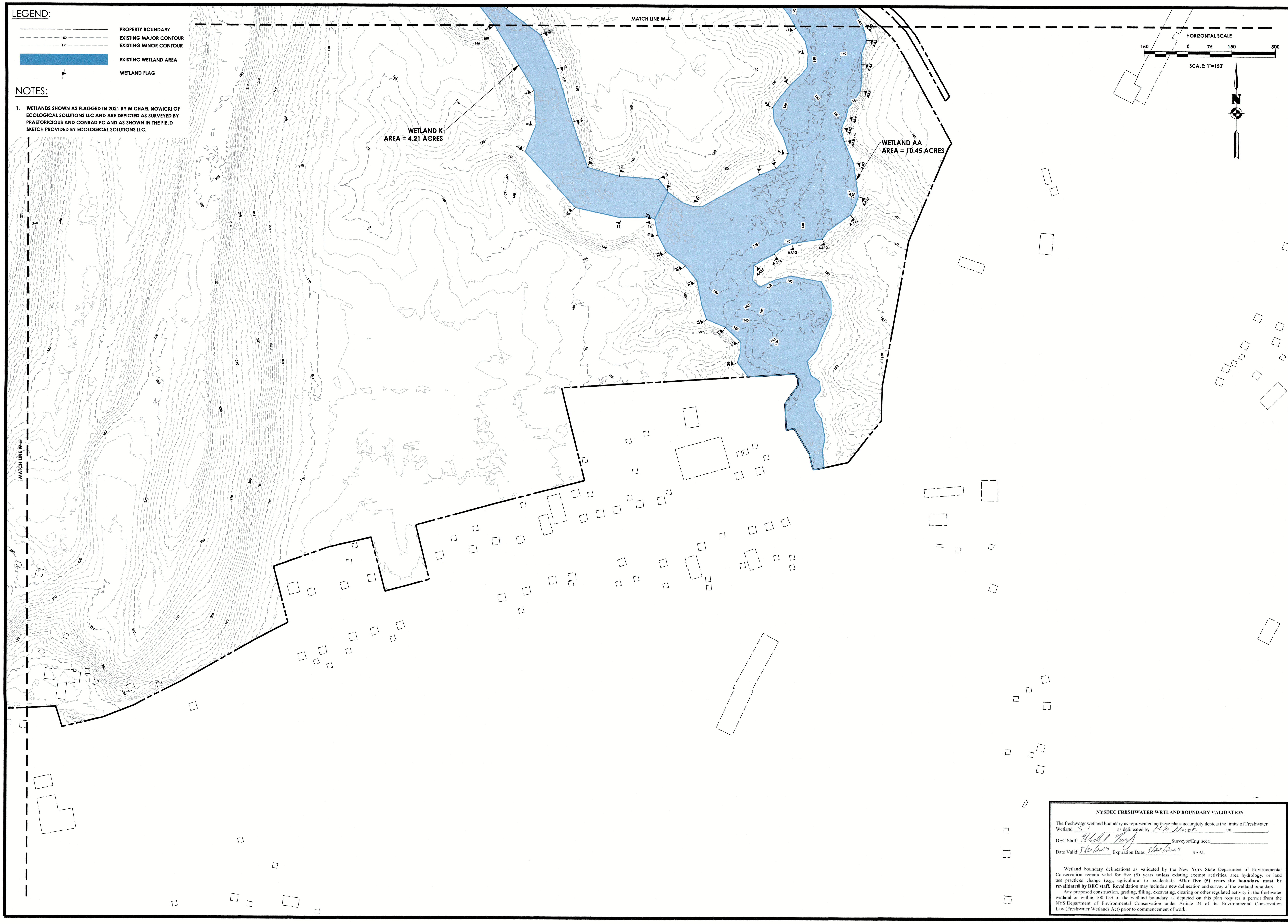
# WINSTON FARM

Town/City: SAUGERTIES
County: ULSTER State: NEW YORK

Project No.: 20202934.0001
Drawing No.: W-5
Sheet No.: 6
Scale: 1" = 150'
Date: JANUARY, 2021

NOT FOR CONSTRUCTION

Y:\PROJECTS-NEW\2020\20202934\20202934.0001\01 CAD - BIM - MODELS\CIVIL\20202934.0001_WETLANDS.DWG 3/13/2024 2:30 PM DJ Goodall




LEGEND:

- PROPERTY BOUNDARY
- EXISTING MAJOR CONTOUR
- EXISTING MINOR CONTOUR
- EXISTING WETLAND AREA
- WETLAND FLAG

NOTES:

1. WETLANDS SHOWN AS FLAGGED IN 2021 BY MICHAEL NOWICKI OF ECOLOGICAL SOLUTIONS LLC AND ARE DEPICTED AS SURVEYED BY PRAETORICIOUS AND CONRAD PC AND AS SHOWN IN THE FIELD SKETCH PROVIDED BY ECOLOGICAL SOLUTIONS LLC.

**NYSDEC FRESHWATER WETLAND BOUNDARY VALIDATION**

The freshwater wetland boundary as represented on these plans accurately depicts the limits of Freshwater Wetland S-1 as delineated by Mike Nowick. on ______.

DEC Staff: [signature] Surveyor/Engineer: ______

Date Valid: 3/22/2024 Expiration Date: 3/22/2029 SEAL

Wetland boundary delineations as validated by the New York State Department of Environmental Conservation remain valid for five (5) years **unless** existing exempt activities, area hydrology, or land use practices change (e.g., agricultural to residential). **After five (5) years the boundary must be revalidated by DEC staff.** Revalidation may include a new delineation and survey of the wetland boundary.

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PA
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SAUGERTIES, NY


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Principal-in-Charge Jess Sudol, PE
Project Manager Chris LaPorta, PE, CPT
Designed by D.J. Goodall, EIT


Revisions

| No. | Date | By | Description |
|---|---|---|---|
| 1 | 24/02/15 | PM | ADDRESSED NYSDEC COMMENTS |

UNAUTHORIZED ALTERATIONS OR ADDITIONS TO THIS DRAWING IS IN VIOLATION OF STATE EDUCATION LAW ARTICLE 145 SECTION 7209 AND ARTICLE 147 SECTION 7307. THESE PLANS ARE COPYRIGHT PROTECTED ©

MAP OF WETLANDS

WINSTON FARM

Town/City: SAUGERTIES
County: ULSTER State: NEW YORK

Project No. 20202934.0001

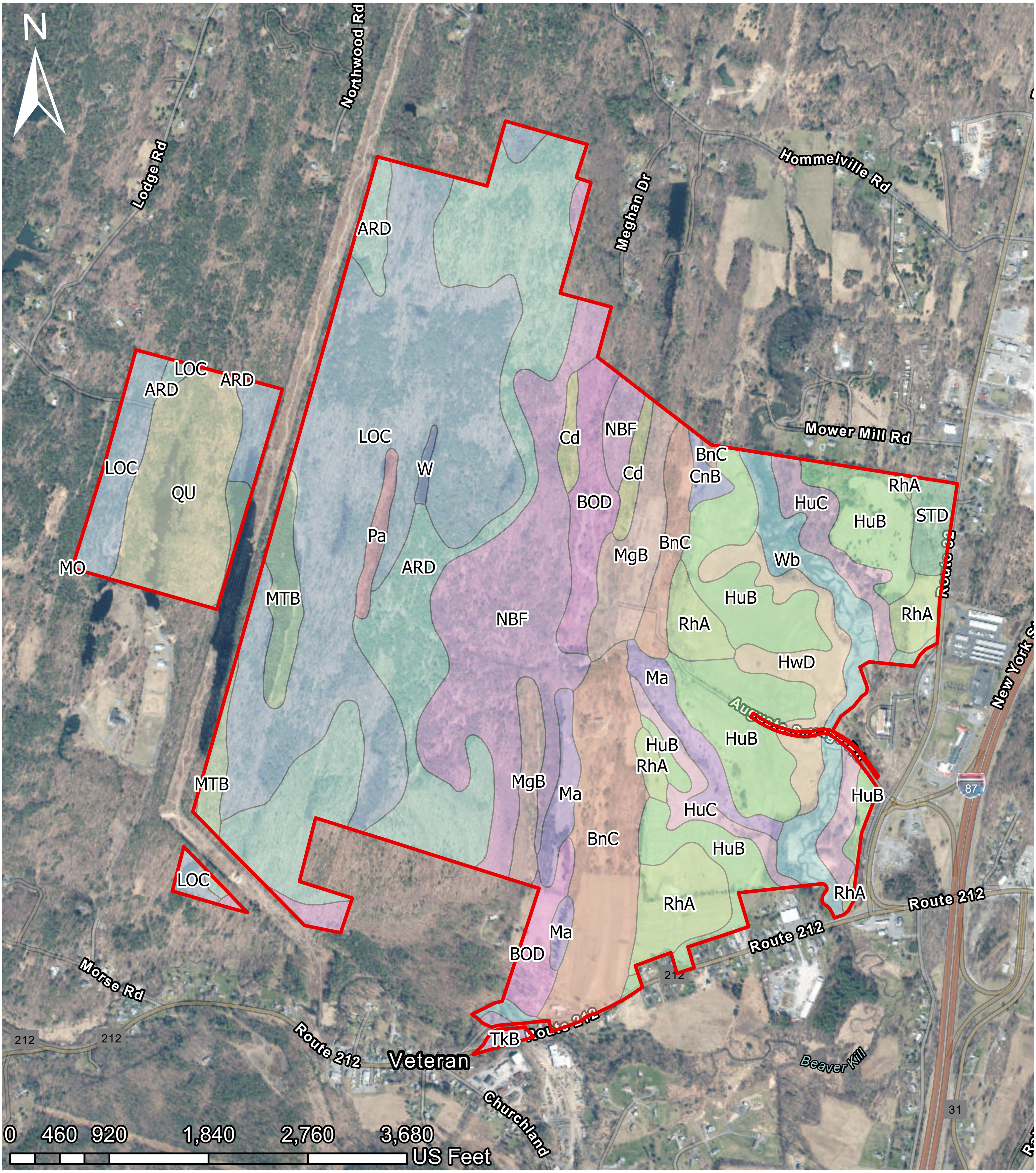
Drawing No. W-6 Sheet No. 7

Scale: 1" = 150'

Date JANUARY, 2021

NOT FOR CONSTRUCTION

# APPENDIX F: SOILS MAP




**Legend**

Soils

| | |
|---|---|
| ARD | MTB |
| BOD | Ma |
| BnC | MgB |
| Cd | NBF |
| CnB | Pa |
| HuB | QU |
| HuC | RhA |
| HwD | STD |
| LOC | TkB |
| MO | W |
| | Wb |

# Soil Map

Maps created by: Passero Associates GIS
CRS: NAD83 State Plane New York East
Municipality: Town of Saugerties
Source: NRCS Web Soil Survey

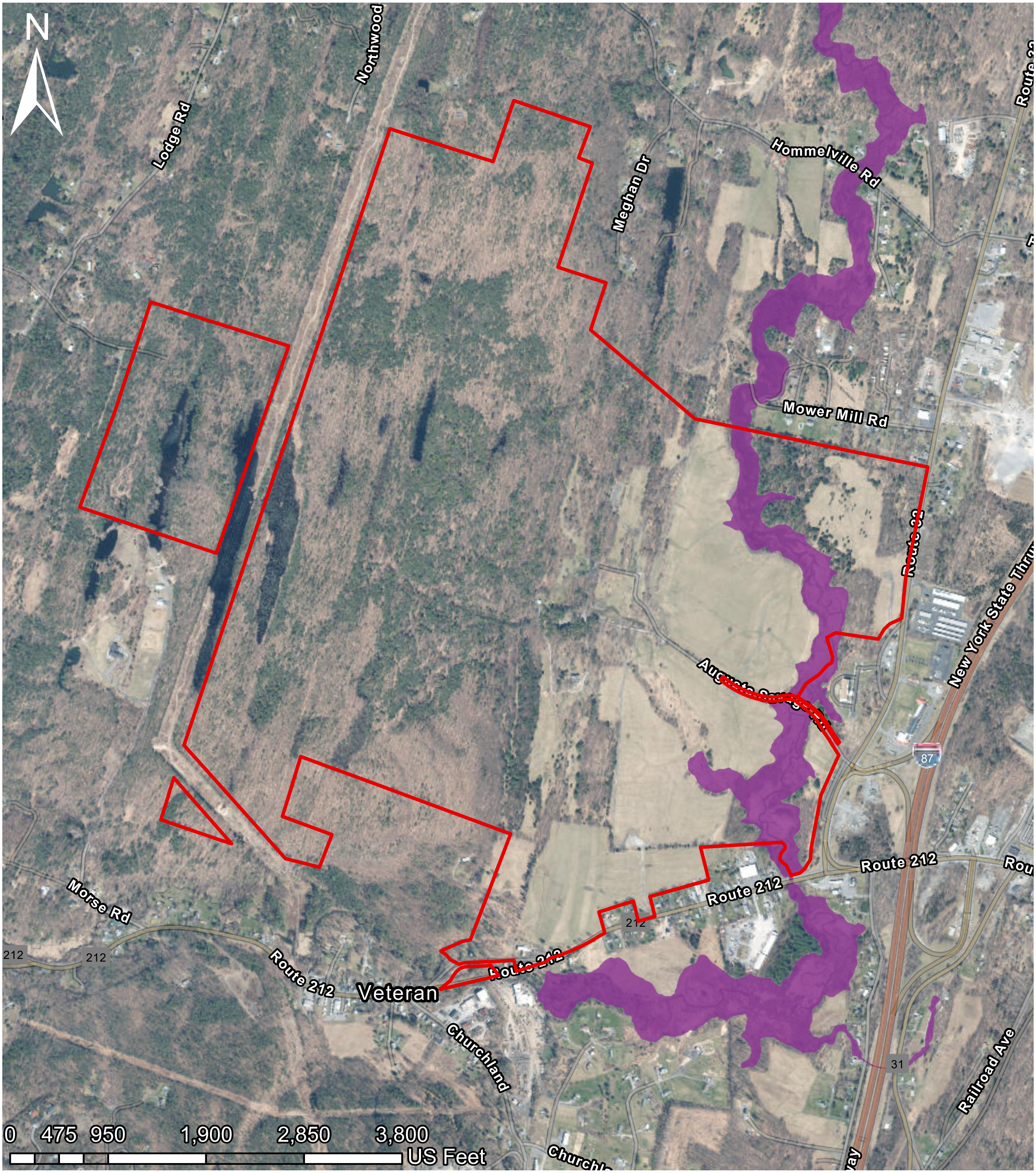
PASSERO
architecture engineering

**Service Credits:**

Esri Community Maps Contributors, Esri, HERE, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS, EPA, NPS, US Census Bureau, USDA, New York State, Maxar

**Date: 11/22/2023**

# APPENDIX G: FEMA MAPPING




**Legend**

Project Site

1% Annual Chance Flood Hazard

# FEMA Flood Areas Map

Maps created by: Passero Associates GIS
CRS: NAD83 State Plane New York East
Municipality: Town of Saugerties
Source: FEMA

PASSERO
architecture engineering

**Service Credits:**
Esri Community Maps Contributors, Esri, HERE, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS, EPA, NPS, US Census Bureau, USDA, New York State, Maxar

**Date: 11/22/2023**

# NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The **community map repository** should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations** (BFEs) and/or **floodways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

**Coastal Base Flood Elevations** shown on this map apply only landward of 0.0' North American Vertical Datum of 1988 (NAVD 88). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations tables in the Flood Insurance Study report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations tables should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study report for information on flood control structures for this jurisdiction.

The **projection** used in the preparation of this map was Universal Transverse Mercator (UTM) zone 18. The **horizontal datum** was NAD 83, GRS1980 spheroid. Differences in datum, spheroid, projection or UTM zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Flood elevations on this map are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same **vertical datum**. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at http://www.ngs.noaa.gov or contact the National Geodetic Survey at the following address:

NGS Information Services
NOAA, N/NGS12
National Geodetic Survey
SSMC-3, #9202
1315 East-West Highway
Silver Spring, Maryland 20910-3282

To obtain current elevation, description, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at **(301) 713-3242**, or visit its website at http://www.ngs.noaa.gov.

**Base map** information shown on this FIRM was derived from digital orthophotography provided by the NY Office of Cyber Security & Critical Infrastructure Coordination from photography dated April 2004.

This map reflects more detailed and up-to-date **stream channel configurations** than those shown on the previous FIRM for this jurisdiction. The floodplains and floodways that were transferred from the previous FIRM may have been adjusted to conform to these new stream channel configurations. As a result, the Flood Profiles and Floodway Data tables in the Flood Insurance Study Report (which contains authoritative hydraulic data) may reflect stream channel distances that differ from what is shown on this map.

**Corporate limits** shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

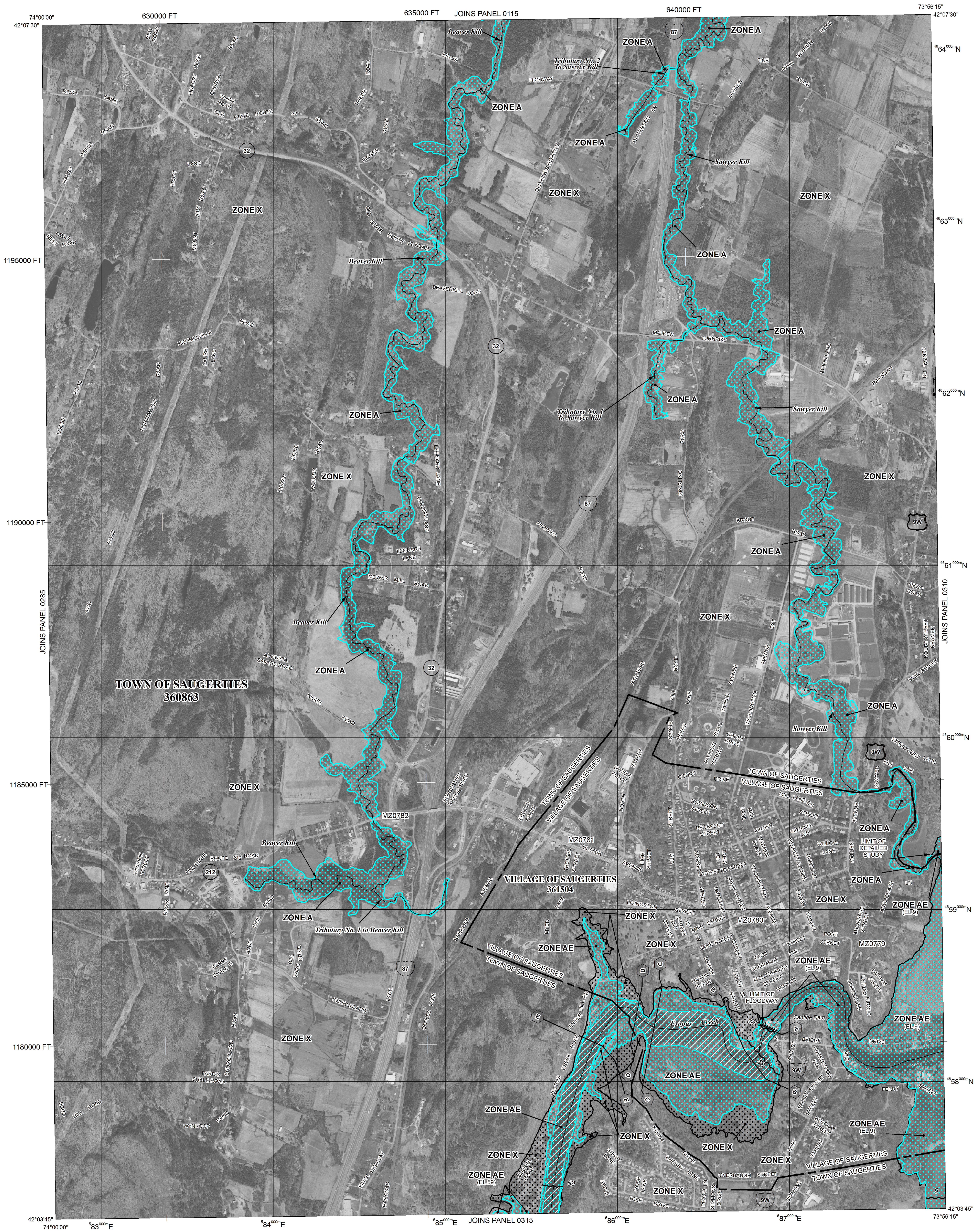
Please refer to the separately printed **Map Index** for an overview map of the county showing the layout of map panels; community map repository addresses; and a Listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which each community is located.

Contact the **FEMA Map Service Center** at 1-800-358-9616 for information on available products associated with this FIRM. Available products may include previously issued Letters of Map Change, a *Flood Insurance Study report*, and/or digital versions of this map. The FEMA Map Service Center may also be reached by Fax at 1-800-358-9620 and its website at http://www.msc.fema.gov/.

If you have **questions about this map** or questions concerning the National Flood Insurance Program in general, please call **1-877-FEMA MAP** (1-877-336-2627) or visit the FEMA website at http://www.fema.gov/.

CTP Cooperating Technical Partners

This digital FIRM was produced through a unique cooperative partnership between the New York State Department of Environmental Conservation (NYSDEC) and FEMA. As part of the effort, NYSDEC has joined in a Cooperative Technical Partnership agreement to produce and maintain FEMA's digital FIRM.




# LEGEND

SPECIAL FLOOD HAZARD AREAS SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

| | |
|---|---|
| **ZONE A** | No Base Flood Elevations determined. |
| **ZONE AE** | Base Flood Elevations determined. |
| **ZONE AH** | Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined. |
| **ZONE AO** | Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined. |
| **ZONE AR** | Special Flood Hazard Area formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood. |
| **ZONE A99** | Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined. |
| **ZONE V** | Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined. |
| **ZONE VE** | Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined. |

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

**ZONE X** — Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

**ZONE X** — Areas determined to be outside the 0.2% annual chance floodplain.

**ZONE D** — Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

| | |
|---|---|
| | 1% annual chance floodplain boundary |
| | 0.2% annual chance floodplain boundary |
| | Floodway boundary |
| | Zone D boundary |
| | CBRS and OPA boundary |
| | Boundary dividing Special Flood Hazard Area Zones and boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities. |
| | Limit of Moderate Wave Action |
| 513 | Base Flood Elevation line and value; elevation in feet* |
| (EL 987) | Base Flood Elevation value where uniform within zone; elevation in feet* |

* Referenced to the North American Vertical Datum of 1988

| | |
|---|---|
| A — A | Cross section line |
| 23 - - - 23 | Transect line |
| | Culvert, Flume, Penstock or Aqueduct |
| | Road or Railroad Bridge |
| | Footbridge |
| 87°07'45", 32°22'30" | Geographic coordinates referenced to the North American Datum of 1983 (NAD 83), Western Hemisphere |
| $^{24}76^{000m}$N | 1000-meter Universal Transverse Mercator grid values, zone 18N |
| 600000 FT | 5000-foot grid values: New York State Plane coordinate system, East zone (FIPSZONE 3101), Transverse Mercator projection |
| DX5510 × | Bench mark (see explanation in Notes to Users section of this FIRM panel) |
| ● M1.5 | River Mile |

MAP REPOSITORY
Refer to listing of Map Repositories on Map Index

EFFECTIVE DATE OF COUNTYWIDE
FLOOD INSURANCE RATE MAP
September 25, 2009

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your Insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

N

**MAP SCALE 1" = 1000'**

**500 0 1000 2000 FEET**

**300 0 300 600 METERS**

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

**PANEL 0305E**

# FIRM

**FLOOD INSURANCE RATE MAP**

**ULSTER COUNTY,**
**NEW YORK**
**(ALL JURISDICTIONS)**

**PANEL 305 OF 910**

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

| COMMUNITY | NUMBER | PANEL | SUFFIX |
|---|---|---|---|
| SAUGERTIES, TOWN OF | 360863 | 0305 | E |
| SAUGERTIES, VILLAGE OF | 361504 | 0305 | E |

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

**MAP NUMBER**
**36111C0305E**

**EFFECTIVE DATE**
**SEPTEMBER 25, 2009**

**Federal Emergency Management Agency**

# APPENDIX H: ARCHEOLOGICAL SENSITIVE AREAS MAP

New York State
Parks, Recreation and
Historic Preservation

**KATHY HOCHUL**
Governor

**ERIK KULLESEID**
Commissioner

July 12, 2023

Nathan Herzog, Planner
Passero Associates
242 W Main St., Suite 100
Rochester, NY 14614

Re: DEC
Winston Farm Planned Development
Town of Saugerties, Ulster County, NY
22PR08664

Dear Nathan Herzog:

Thank you for requesting the comments of the Division for Historic Preservation of the Office of Parks, Recreation and Historic Preservation (OPRHP). We have reviewed the submitted materials in accordance with the New York State Historic Preservation Act of 1980 (section 14.09 of the New York Parks, Recreation and Historic Preservation Law). These comments are those of the Division for Historic Preservation and relate only to Historic/Cultural resources.

OPRHP has reviewed the Phase IA Archaeological Survey report entitled "Phase 1A Cultural Resource Investigation for Winston Farm Planned Development, Town of Saugerties, Ulster County, NY" prepared by Atlas Archaeology LLC (May 2023; 23SR00322). The Phase IA Survey reported that numerous precontact Indigenous archaeological sites and one multicomponent colonial period historic/precontact Indigenous archaeological site were previously identified in the proposed development area. During the recent Phase IA site visit, Atlas Archaeology observed and reported numerous historic archaeological ruins/stone structures, isolated structures, extraction sites (quarries), and a cemetery. The proposed development has high potential to contain additional archaeological sites.

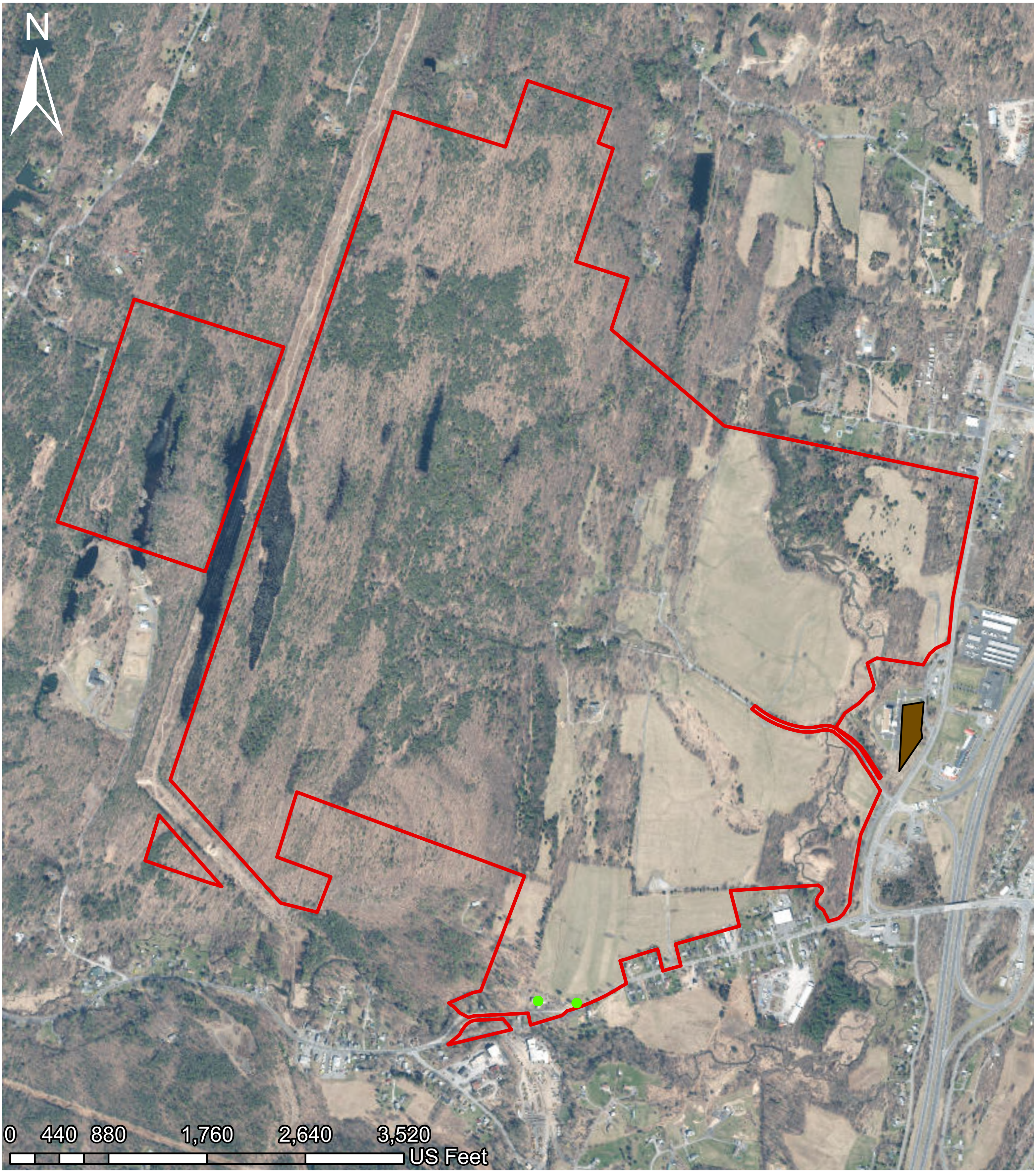
We understand that the *Winston Farm Masterplan* submitted to our office on November 30, 2022 is conceptual and no development plans are being submitted for review at this time (David Brennan, Young Sommer LLC, letter dated 6/16/23). We will provide additional comments once proposed development plans are submitted to our office for review.

If you have any questions, I can be reached at Jessica.Schreyer@parks.ny.gov.

Sincerely,

Jessica E. Schreyer

Jessica Schreyer
Historic Preservation Program Analyst - Archaeologist




**Legend**

Historic Sites

Eligible Historic Sites

# Archeological Sensitive Areas

Maps created by: Passero Associates GIS
CRS: NAD83 State Plane New York East
Municipality: Town of Saugerties
Source: Cultural Resource Information System

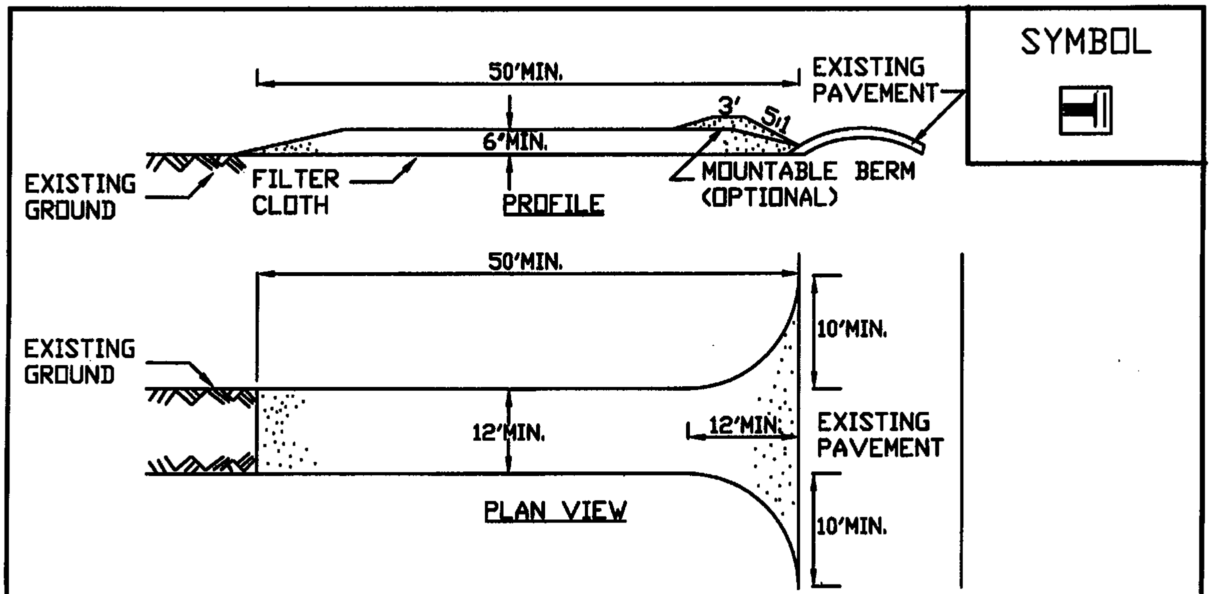
PASSERO
architecture engineering

**Service Credits:**
New York State, Maxar

**Date: 11/27/2023**

# APPENDIX I: EROSION CONTROL DETAILS AND BEST MANAGEMENT PRACTICES

# Figure 5A.35
# Stabilized Construction Entrance

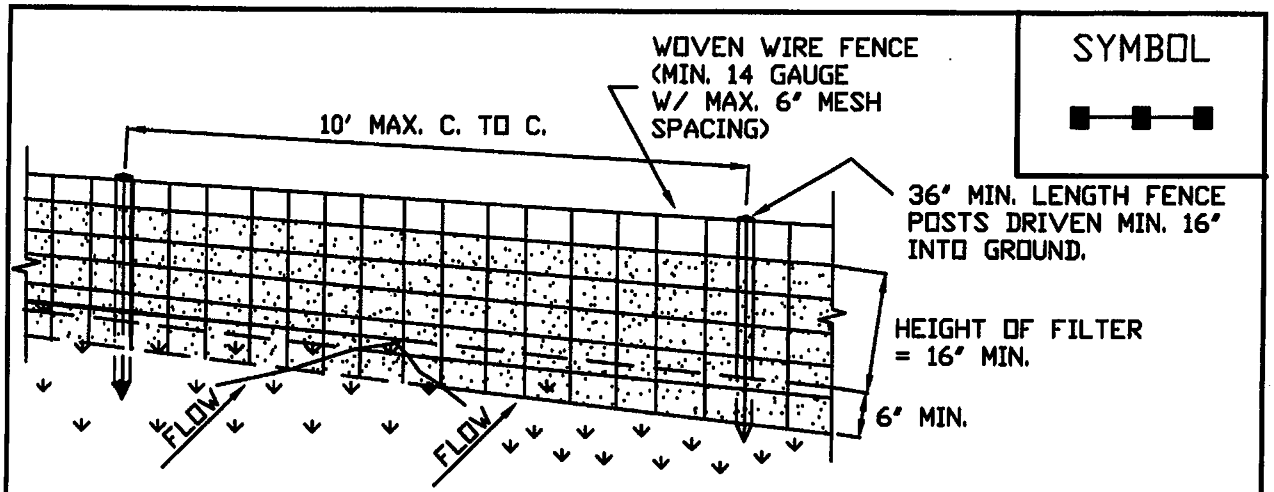



## CONSTRUCTION SPECIFICATIONS

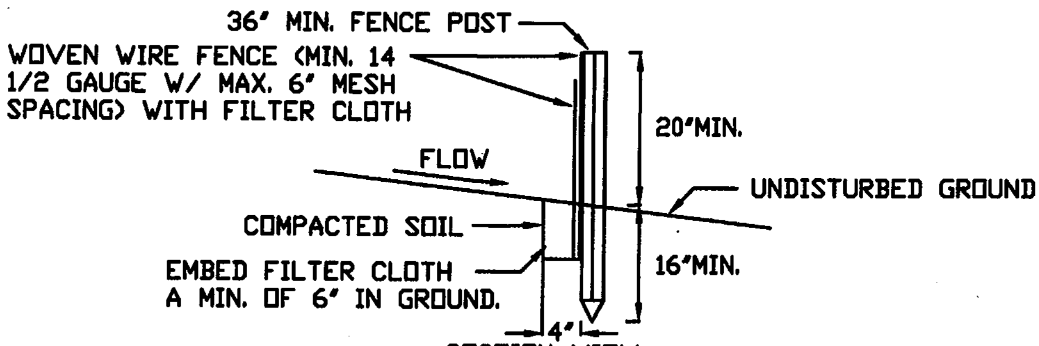
1. STONE SIZE - USE 1-4 INCH STONE, OR RECLAIMED OR RECYCLED CONCRETE EQUIVALENT.
2. LENGTH - NOT LESS THAN 50 FEET (EXCEPT ON A SINGLE RESIDENCE LOT WHERE A 30 FOOT MINIMUM LENGTH WOULD APPLY).
3. THICKNESS - NOT LESS THAN SIX (6) INCHES.
4. WIDTH - TWELVE (12) FOOT MINIMUM, BUT NOT LESS THAN THE FULL WIDTH AT POINTS WHERE INGRESS OR EGRESS OCCURS. TWENTY-FOUR (24) FOOT IF SINGLE ENTRANCE TO SITE.
5. GEOTEXTILE - WILL BE PLACED OVER THE ENTIRE AREA PRIOR TO PLACING OF STONE.
6. SURFACE WATER - ALL SURFACE WATER FLOWING OR DIVERTED TOWARD CONSTRUCTION ENTRANCES SHALL BE PIPED BENEATH THE ENTRANCE. IF PIPING IS IMPRACTICAL, A MOUNTABLE BERM WITH 5:1 SLOPES WILL BE PERMITTED.
7. MAINTENANCE - THE ENTRANCE SHALL BE MAINTAINED IN A CONDITION WHICH WILL PREVENT TRACKING OR FLOWING OF SEDIMENT ONTO PUBLIC RIGHTS-OF-WAY. ALL SEDIMENT SPILLED, DROPPED, WASHED OR TRACTED ONTO PUBLIC RIGHTS-OF-WAY MUST BE REMOVED IMMEDIATELY.
8. WHEN WASHING IS REQUIRED, IT SHALL BE DONE ON A AREA STABILIZED WITH STONE AND WHICH DRAINS INTO AN APPROVED SEDIMENT TRAPPING DEVICE.
9. PERIODIC INSPECTION AND NEEDED MAINTENANCE SHALL BE PROVIDED AFTER EACH RAIN.

| | |
|---|---|
| ADAPTED FROM DETAILS PROVIDED BY: USDA - NRCS, NEW YORK STATE DEPARTMENT OF TRANSPORTATION, NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION, NEW YORK STATE SOIL & WATER CONSERVATION COMMITTEE | STABILIZED CONSTRUCTION ENTRANCE |

# Figure 5A.8
# Silt Fence




PERSPECTIVE VIEW



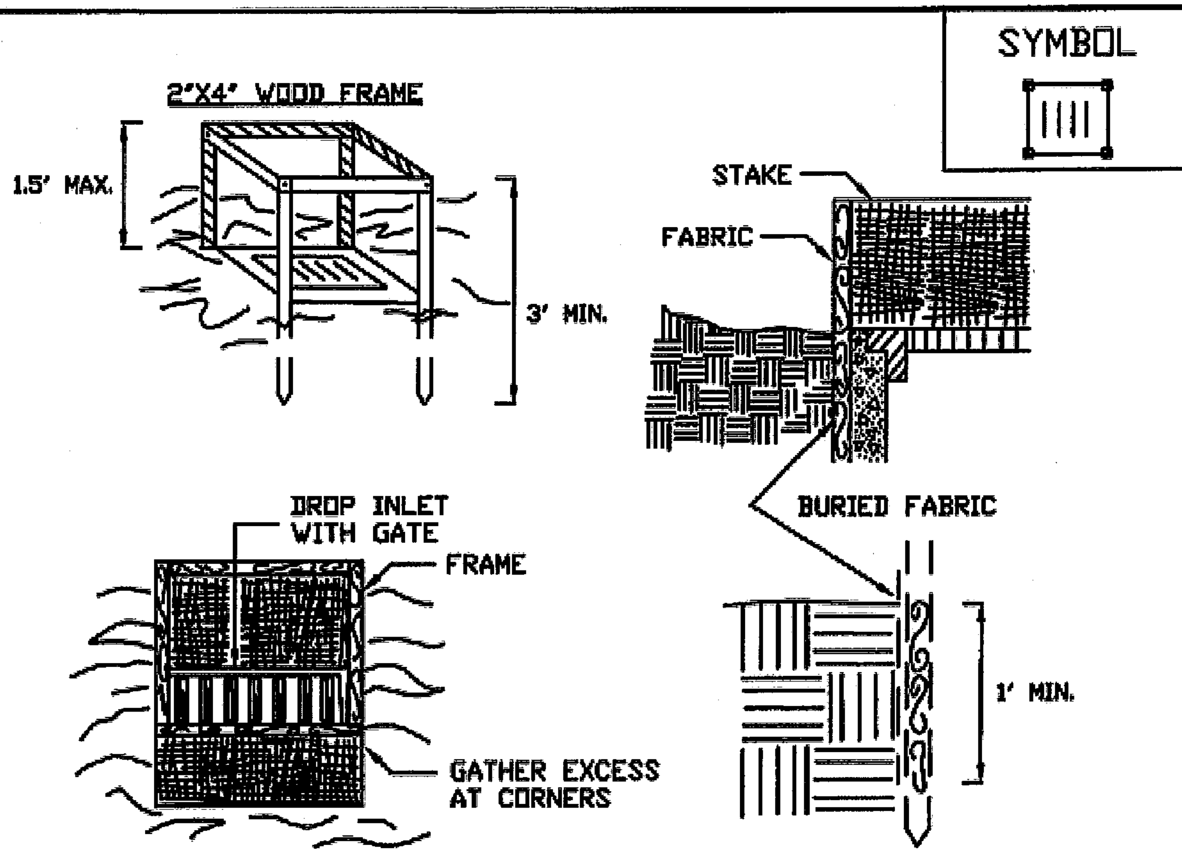

SECTION VIEW

## CONSTRUCTION SPECIFICATIONS

1. WOVEN WIRE FENCE TO BE FASTENED SECURELY TO FENCE POSTS WITH WIRE TIES OR STAPLES. POSTS SHALL BE STEEL EITHER "T" OR "U" TYPE OR HARDWOOD.
2. FILTER CLOTH TO BE TO BE FASTENED SECURELY TO WOVEN WIRE FENCE WITH TIES SPACED EVERY 24" AT TOP AND MID SECTION. FENCE SHALL BE WOVEN WIRE, 6" MAXIMUM MESH OPENING.
3. WHEN TWO SECTIONS OF FILTER CLOTH ADJOIN EACH OTHER THEY SHALL BE OVER-LAPPED BY SIX INCHES AND FOLDED. FILTER CLOTH SHALL BE EITHER FILTER X, MIRAFI 100X, STABILINKA T140N, OR APPROVED EQUIVALENT.
4. PREFABRICATED UNITS SHALL BE GEOFAB, ENVIROFENCE, OR APPROVED EQUIVALENT.
5. MAINTENANCE SHALL BE PERFORMED AS NEEDED AND MATERIAL REMOVED WHEN "BULGES" DEVELOP IN THE SILT FENCE.

| | |
|---|---|
| ADAPTED FROM DETAILS PROVIDED BY: USDA - NRCS, NEW YORK STATE DEPARTMENT OF TRANSPORTATION, NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION, NEW YORK STATE SOIL & WATER CONSERVATION COMMITTEE | SILT FENCE |

# Figure 5A.12
# Filter Fabric Drop Inlet Protection



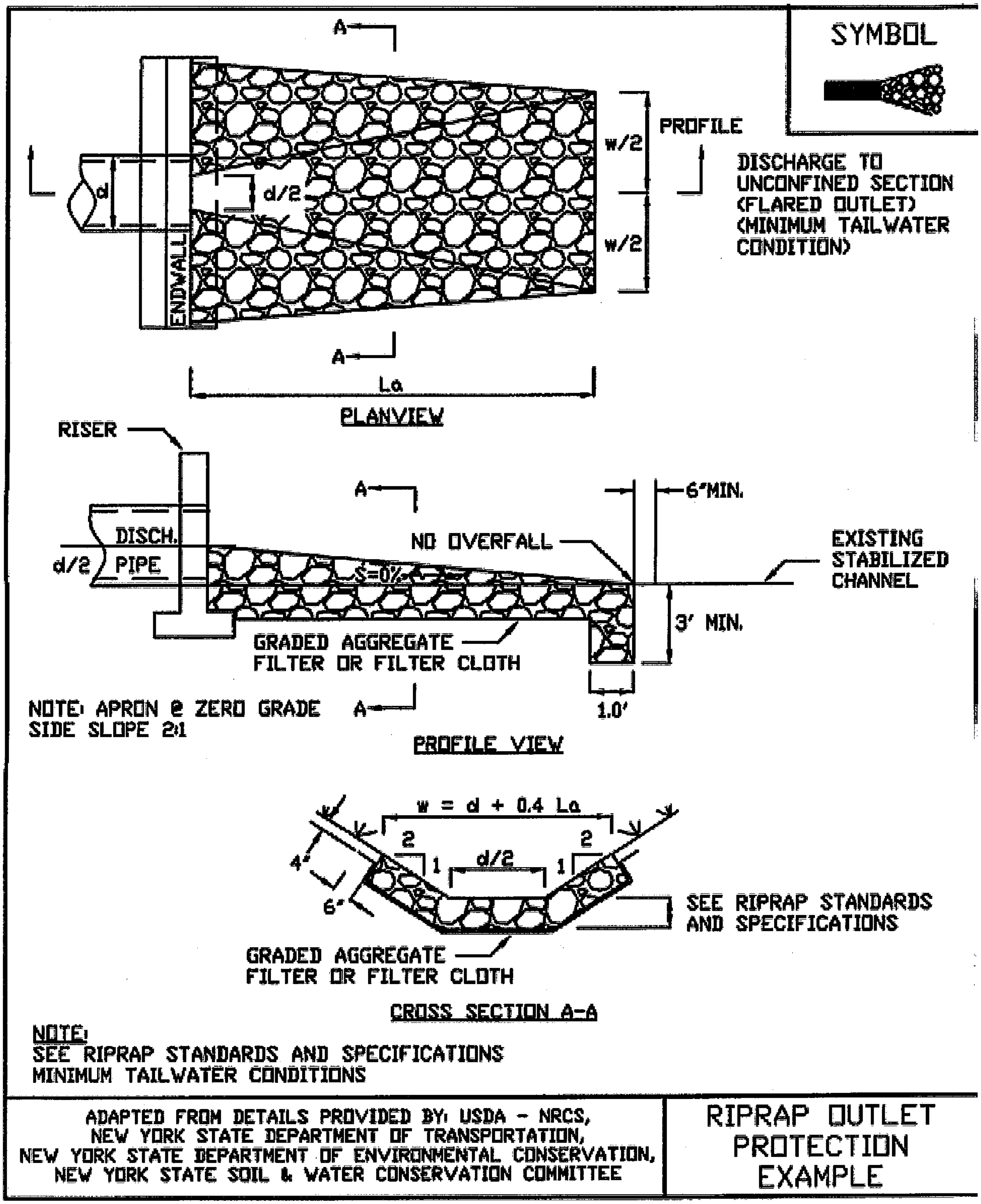

## CONSTRUCTION SPECIFICATIONS

1. FILTER FABRIC SHALL HAVE AN EOS OF 40-85. BURLAP MAY BE USED FOR SHORT TERM APPLICATIONS.
2. CUT FABRIC FROM A CONTINUOUS ROLL TO ELIMINATE JOINTS. IF JOINTS ARE NEEDED THEY WILL BE OVERLAPPED TO THE NEXT STAKE.
3. STAKE MATERIALS WILL BE STANDARD 2" x 4" WOOD OR EQUIVALENT. METAL WITH A MINIMUM LENGTH OF 3 FEET.
4. SPACE STAKES EVENLY AROUND INLET 3 FEET APART AND DRIVE A MINIMUM 18 INCHES DEEP. SPANS GREATER THAN 3 FEET MAY BE BRIDGED WITH THE USE OF WIRE MESH BEHIND THE FILTER FABRIC FOR SUPPORT.
5. FABRIC SHALL BE EMBEDDED 1 FOOT MINIMUM BELOW GROUND AND BACKFILLED. IT SHALL BE SECURELY FASTENED TO THE STAKES AND FRAME.
6. A 2" x 4" WOOD FRAME SHALL BE COMPLETED AROUND THE CREST OF THE FABRIC FOR OVER FLOW STABILITY.

MAXIMUN DRAINAGE AREA 1 ACRE

| | |
|---|---|
| ADAPTED FROM DETAILS PROVIDED BY: USDA - NRCS, NEW YORK STATE DEPARTMENT OF TRANSPORTATION, NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION, NEW YORK STATE SOIL & WATER CONSERVATION COMMITTEE | FILTER FABRIC DROP INLET PROTECTION |

# Figure 5B.14
# Riprap Outlet Protection Detail (1)



# Agricultural Best Management Practice Systems Catalogue

## NYS Soil and Water Conservation Committee

**Approved June 2023**

# TABLE OF CONTENTS

# Introduction – Purpose – Use of Catalogue

**Agricultural Best Management Practice Systems Catalogue**

The Agricultural Best Management Practices Catalogue was developed and approved by the NYS Soil and Water Conservation Committee in 2014 to replace The Agricultural Catalogue for Nonpoint Source Pollution Prevention and Water Quality Protection in NYS. This revised and maintained Catalogue shall provide guidance during the watershed planning process to select appropriate Agricultural Best Management Practice Systems for the control and treatment of pollutants from agricultural nonpoint sources; this Catalogue will also service other NYS SWCC Cost-Share Programs. Utilizing a complete Agricultural BMP System ensures a consistent and effective approach to addressing resource concerns, provides levels of protection and benefits to the environment that partial systems may not deliver, results in an effective use of public resources, and supports the reporting and planning efforts throughout many watersheds both entirely within NYS and those extending beyond (e.g., Clean Water Act 303(d) Programs, Clean Water Plans, and TMDLs for Chesapeake Bay, Lake Champlain, Long Island Sound, Finger Lakes).

For more information on Clean Water Planning: https://www.dec.ny.gov/chemical/23835.html

**What are Agricultural Best Management Practice (BMP) Systems?**

Complete Agricultural BMP Systems may include one, two, or even a series of National Resources Conservation Service (NRCS) Conservation Practice Standards (CPS), referred to as Component BMPs.

Agricultural BMP Systems prevent or reduce the source or transport of substances originating from agricultural activities which may adversely affect surface and ground waters or other resources. While an Agricultural BMP System has Standards and Specifications associated with its installation, operation, and maintenance of Component BMPs, it does not impose effluent limits for specific pollutants. Rather, it provides an effective means of reducing or preventing the impact of nonpoint source pollutants from a specific resource concern. Agricultural Environmental Management (AEM) is a framework created to assist Soil and Water Conservation Districts and their partners in developing and delivering a science-based agricultural conservation program centered on local priorities and goals. A 5-Tiered AEM planning approach identifies resource concerns and Agricultural BMP System alternatives to address those concerns.

See the following for more information about the AEM 5-Tiered Approach to conservation:
https://agriculture.ny.gov/soil-and-water/agricultural-environmental-management

**Resource Concerns and Agricultural Best Management Practice (BMP) Systems**

The AEM Planning Process requires each individual management area or resource concern area to be clearly identified, assessed / evaluated, and planned as its own entity; this approach allows each of these areas to be planned as a complete Agricultural BMP System on their own. For example: a farm with two different barnyards, each evaluated as a possible resource concern, may be planned, and further treated by two separate Livestock Heavy Use Are Runoff Management Systems, each Agricultural BMP System unique to its own management area, considerations, and Component BMPs.

Agricultural BMP Systems and Component BMPs are expressed in unique measurable quantities and units (e.g., number, linear feet, square feet, acres); correct measurable units may be found in this Catalogue as well as the NRCS Field Office Technical Guide. Further unit descriptors in addition to required NRCS reportable units are acceptable and often beneficial (e.g., (Waste Transfer (CPS 634) - 1 NO, 100 ft), (Waste Storage Facility (CPS 313) – 1 NO, 2 Million Gallons)).

In some cases, multiple Agricultural BMP Systems may work within or adjacent one another to properly control and treat a resource concern; scenarios utilizing two or more Agricultural BMP Systems should have each System listed. For example: An Access Control System with an adjacent and supporting Riparian Buffer System, both Systems used in conjunction to address one or more resource concerns.

The Agricultural BMP Catalogue is not a design manual and should not be used to replace NRCS Conservation Practice Standards and Specifications.

## Interacting with the Agricultural BMP Systems Catalogue

Updates to the Agricultural BMP Systems Catalogue may be conducted on an annual basis, as NRCS Conservation Practice Standards change, or when new information is available for incorporation. Please direct questions about content and application of this directory to the following NYS SWCC Staff:


Ron Bush, CNMP Specialist: Ronald.Bush@agriculture.ny.gov
Brendan Jordan, CNMP Specialist: Brendan.Jordan@agriculture.ny.gov
Greg Albrecht, AEM Coordinator, CNMP Specialist: Greg.Albrecht@agriculture.ny.gov

# Table I – Agricultural BMP Systems and Potential Components BMPs

| Access Control System | |
|---|---|
| Access Control | 472 |
| Fence | 382 |
| Trails and Walkways | 575 |
| Access Road | 560 |
| Watering Facility | 614 |
| Heavy Use Area Protection | 561 |
| Livestock Pipeline | 516 |
| Pond | 378 |
| Pumping Plant | 533 |
| Spring Development | 574 |
| Structure for Water Control | 587 |
| Stream Crossing | 578 |
| Water Well | 642 |
| Field Border | 386 |

| Agrichemical Handling and Storage System | |
|---|---|
| Agrichemical Handling Facility | 309 |
| Access Road | 560 |
| Heavy Use Area Protection | 561 |
| Diversion | 362 |
| Pumping Plant | 533 |
| Underground Outlet | 620 |
| Grassed Waterway | 412 |

| Composting System – Animal | |
|---|---|
| Animal Mortality Facility | 316 |
| Composting Facility | 317 |
| Access Road | 560 |
| Diversion | 362 |
| Heavy Use Area Protection | 561 |
| Roofs and Covers | 367 |
| Vegetated Treatment Area | 635 |
| Waste Storage Facility | 313 |
| Waste Transfer | 634 |

| Erosion Control System – Structural | |
|---|---|
| Water and Sediment Control Basin (WASCOB) | 638 |
| Sediment Basin | 350 |
| Grade Stabilization Structure | 410 |
| Grassed Waterway | 412 |

| Erosion Control Systems – Structural | |
|---|---|
| Diversion | 362 |
| Filter Strip | 393 |
| Critical Area Planting | 342 |
| Lined Waterway or Outlet | 468 |
| Conservation Cover | 327 |
| Terrace | 600 |
| Subsurface Drain | 606 |
| Underground Outlet | 620 |
| Obstruction Removal | 500 |
| Fence | 382 |
| Access Road | 560 |
| Roof Runoff Structure | 558 |
| Trails and Walkways | 575 |

| Feed Management System | |
|---|---|
| Feed Management | 592 |

| Integrated Pest Management System | |
|---|---|
| Pest Management Conservation System | 595 |
| Herbaceous Weed Treatment | 315 |
| Conservation Crop Rotation | 328 |
| Conservation Cover | 327 |
| Field Border | 386 |
| Filter Strip | 393 |
| Forage Harvest Management | 511 |
| Irrigation Water Management | 449 |

| Irrigation Water Management System | |
|---|---|
| Irrigation Water Management | 449 |
| Irrigation Pipeline | 430 |
| Irrigation Reservoir | 436 |
| Irrigation System, Microirrigation | 441 |
| Sprinkler System | 442 |
| Irrigation System, Surface and Subsurface | 443 |
| Pumping Plant | 533 |
| Water Well | 642 |

**Irrigation Water Management System (continued)**

| | |
|---|---|
| Nutrient Management | 590 |
| Pest Management Conservation System | 595 |

**Livestock Heavy Use Area Runoff Management System**

| | |
|---|---|
| Heavy Use Area Protection | 561 |
| Access Control | 472 |
| Trails and Walkways | 575 |
| Fence | 382 |
| Access Road | 560 |
| Roof Runoff Structure | 558 |
| Roofs and Covers | 367 |
| Conservation Cover | 327 |
| Critical Area Planting | 342 |
| Vegetated Treatment Area | 635 |
| Diversion | 362 |
| Grassed Waterway | 412 |
| Lined Waterway or Outlet | 468 |
| Pumping Plant | 533 |
| Sediment Basin | 350 |
| Subsurface Drain | 606 |
| Underground Outlet | 620 |
| Waste Separation Facility | 632 |
| Waste Storage Facility | 313 |
| Waste Transfer | 634 |
| Water and Sediment Control Basin (WASCOB) | 638 |
| Watering Facility | 614 |

**Manure and Agricultural Waste Treatment Systems**

| | |
|---|---|
| Waste Separation Facility | 632 |
| Waste Storage Facility | 313 |
| Waste Transfer | 634 |
| Waste Treatment | 629 |
| Anaerobic Digester | 366 |
| Composting Facility | 317 |
| Pumping Plant | 533 |
| Roofs and Covers | 367 |
| Heavy Use Area Protection | 561 |

**Nutrient Management System – Cultural**

| | |
|---|---|
| Nutrient Management | 590 |

**Pathogen Management System**

| | |
|---|---|
| Animal Mortality Facility | 316 |
| Composting Facility | 317 |
| Ground Water Testing | 355 |
| Access Control | 472 |

**Pathogen Management System (continued)**

| | |
|---|---|
| Anaerobic Digester | 366 |
| Fence | 382 |
| Heavy Use Area Protection | 561 |
| Waste Separation Facility | 632 |
| Waste Storage Facility | 313 |
| Waste Transfer | 634 |
| Waste Treatment | 629 |
| Vegetated Treatment Area | 635 |
| Nutrient Management | 590 |
| Roofs and Covers | 367 |
| Diversion | 362 |

**Petroleum and Oil Products Storage System**

| | |
|---|---|
| On-Farm Secondary Containment Facility | 319 |
| Access Road | 560 |
| Access Control | 472 |
| Heavy Use Area Protection | 561 |
| Conservation Cover | 327 |

**Prescribed Rotational Grazing System**

| | |
|---|---|
| Prescribed Grazing | 528 |
| Pasture and Hay Planting | 512 |
| Forage Harvest Management | 511 |
| Fence | 382 |
| Field Border | 386 |
| Trails and Walkways | 575 |
| Watering Facility | 614 |
| Livestock Pipeline | 516 |
| Pumping Plant | 533 |
| Structure for Water Control | 587 |
| Water Well | 642 |
| Spring Development | 574 |
| Pond | 378 |
| Access Road | 560 |
| Access Control | 472 |
| Grazing Land Mechanical Treatment | 548 |
| Brush Management | 314 |

**Prescribed Rotational Grazing System (continued)**

| | |
|---|---|
| Herbaceous Weed Treatment | 315 |
| Heavy Use Area Protection | 561 |
| Stream Crossing | 578 |
| Subsurface Drain | 606 |
| Underground Outlet | 620 |

**Process Wash Water Management System**

| | |
|---|---|
| Vegetated Treatment Area | 635 |
| Waste Separation Facility | 632 |
| Waste Transfer | 634 |
| Pumping Plant | 533 |
| Waste Storage Facility | 313 |
| Structure for Water Control | 587 |
| Subsurface Drain | 606 |
| Heavy Use Area Protection | 561 |

**Riparian Buffer System**

| | |
|---|---|
| Riparian Forest Buffer | 391 |
| Riparian Herbaceous Cover | 390 |
| Tree/Shrub Establishment | 612 |
| Tree/Shrub Site Preparation | 490 |
| Conservation Cover | 327 |
| Critical Area Planting | 342 |
| Stream Crossing | 578 |
| Access Control | 472 |
| Access Road | 560 |
| Trails and Walkways | 575 |
| Brush Management | 314 |
| Fence | 382 |
| Filter Strip | 393 |
| Pasture and Hay Planting | 512 |
| Grassed Waterway | 412 |
| Herbaceous Weed Treatment | 315 |
| Pest Management Conservation System | 595 |
| Lined Waterway or Outlet | 468 |
| Structure for Water Control | 587 |
| Water and Sediment Control Basin (WASCOB) | 638 |

**Short-Term Waste Collection and Transfer System**

| | |
|---|---|
| Waste Storage Facility | 313 |
| *NYS SWCC Short-Term Waste Collection and Transfer System – Modified NRCS CPS Waste Storage Facility* | *313* |
| Waste Transfer | 634 |
| Waste Separation Facility | 632 |
| Waste Treatment | 629 |
| Waste Facility Closure | 360 |
| Nutrient Management | 590 |
| Pumping Plant | 533 |
| Roofs and Covers | 367 |
| Subsurface Drain | 606 |
| Access Control | 472 |
| Access Road | 560 |
| Diversion | 362 |
| Fence | 382 |
| Heavy Use Area Protection | 561 |
| Hedgerow Planting | 422 |
| Pond Sealing or Lining – Geomembrane or Geosynthetic Clay Liner | 521 |
| Pond Sealing or Lining – Compacted Soil Treatment | 520 |
| Pond Sealing or Lining – Concrete | 522 |

**Silage Leachate Control and Treatment System**

| | |
|---|---|
| Vegetated Treatment Area | 635 |
| Waste Separation Facility | 632 |
| Waste Transfer | 634 |
| Pumping Plant | 533 |
| Dike | 356 |
| Diversion | 362 |
| Subsurface Drain | 606 |
| Structure for Water Control | 587 |
| Heavy Use Area Protection | 561 |
| Waste Storage Facility | 313 |
| Sprinkler System | 442 |
| Irrigation Water Management | 449 |
| Sediment Basin | 350 |
| Fence | 382 |
| Conservation Crop Rotation | 328 |

**Soil Health System**

| | |
|---|---|
| Conservation Crop Rotation | 328 |
| Conservation Cover | 327 |
| Contour Farming | 330 |
| Cover Crop | 340 |
| Pasture and Hay Planting | 512 |
| Mulching | 484 |

# Table II – Structural Agricultural Conservation Practices

Coverage by the SPDES General Permit for Stormwater Discharges from Construction Activity may be required if a project involving one or more of the structural agricultural conservation practices listed below will disturb one (1) or more acres (5000 square feet in the New York City Watershed East of the Hudson) of soil. See the SPDES General Permit for Stormwater Discharges from Construction Activity for more information (www.dec.ny.gov/chemical/43133.html) and contact the NYSDEC with any questions.

| **NRCS Conservation Practice Standard (NY)** https://efotg.sc.egov.usda.gov/#/state/NY/documents/section=4&folder=-3 | **Practice Code** |
|---|---|
| Access Road | 560 |
| Agrichemical Handling Facility | 309 |
| Anaerobic Digester | 366 |
| Animal Mortality Facility | 316 |
| Composting Facility | 317 |
| Dike or Levee | 356 |
| Diversion | 362 |
| Dry Hydrant | 432 |
| Energy Efficiency Agricultural Operation | 374 |
| Fence | 382 |
| Forest Trails & Landings | 655 |
| Grade Stabilization Structure | 410 |
| Grassed Waterway | 412 |
| Heavy Use Area Protection | 561 |
| High Tunnel System | 325 |
| Irrigation Pipeline | 430 |
| Irrigation Reservoir | 436 |
| Lined Waterway or Outlet | 468 |
| Livestock Pipeline | 516 |
| Monitoring Well | 353 |
| Obstruction Removal (soil disturbing) | 500 |
| On-Farm Secondary Containment Facility | 319 |
| Open Channel | 582 |
| Pond | 378 |
| Pond Sealing or Lining - Compacted Soil Treatment | 520 |
| Pond Sealing or Lining - Concrete | 522 |
| Pond Sealing or Lining - Geomembrane or Geosynthetic Clay Liner | 521 |
| Pumping Plant | 533 |
| Road/ Trail/ Landing Closure & Treatment | 654 |
| Roof Runoff Structure | 558 |
| Roofs and Covers | 367 |
| Sediment Basin | 350 |
| Shallow Water Development and Management | 646 |

| NRCS Conservation Practice Standard (NY) https://efotg.sc.egov.usda.gov/#/state/NY/documents/section=4&folder=-3 | Practice Code |
|---|---|
| Sinkhole Treatment | 527 |
| Spring Development | 574 |
| Stormwater Runoff Control | 570 |
| Stream Crossing | 578 |
| Streambank and Shoreline Protection | 580 |
| Structure for Water Control | 587 |
| Subsurface Drain | 606 |
| Trails and Walkways | 575 |
| Underground Outlet | 620 |
| Vegetative Treatment Area | 635 |
| Vertical Drain | 630 |
| Waste Facility Closure | 360 |
| Waste Separation Facility | 632 |
| Waste Storage Facility | 313 |
| Waste Transfer | 634 |
| Waste Treatment | 629 |
| Water Well | 642 |
| Watering Facility | 614 |
| Well Decommissioning | 351 |
| Wetland Creation | 658 |
| Wetland Enhancement | 659 |
| Wetland Restoration | 657 |

# Table III – Agricultural BMP System Lifespans

- The following listed lifespans are for Agricultural BMP Systems implemented through NYS AGM and NYS SWCC Cost-Share Programs.
- Agricultural BMP System Lifespan indicates the minimum term that Operation and Maintenance **MUST** be performed on the Agricultural BMP System. Implementation of an Operation and Maintenance (O&M) plan is required to assure efficient operation of the System and may extend the System lifespan, and its effectiveness, beyond the minimum term.
- Agricultural BMP System Design Criteria is variable depending on the Component BMPs that are used, and the specific resource concerns being addressed.

| Agricultural BMP System | Lifespan (years) |
|---|---|
| Access Control System | 10 |
| Agrichemical Handling and Storage System | 10 |
| Composting System – Animal | 10 |
| Erosion Control System – Structural | 10 |
| Feed Management System | 1 |
| Integrated Pest Management Conservation System | 1 |
| Irrigation Water Management System | 1 |
| Livestock Heavy Use Area Runoff Management System | 10 |
| Manure and Agricultural Waste Treatment System | 10 |
| Nutrient Management System – Cultural | 1 |
| Pathogen Management System | 10 |
| Petroleum and Oil Products Storage System | 10 |
| Prescribed Rotational Grazing System | 10 |
| Process Wash Water Management System | 10 |
| Riparian Buffer System | 10 |
| Short-Term Waste Collection and Transfer System | 10 |
| Silage Leachate Control and Treatment System | 10 |
| Soil Health System | 1 - 5 |
| Stream Corridor and Shoreline Management System | 10 |
| Waste Storage and Transfer System | 10 |

# Access Control System

**DEFINITION**
An Access Control System provides for the permanent exclusion of livestock from a waterbody or hydrologically sensitive area to protect water quality.

**WATER QUALITY PURPOSE**
To prevent the direct deposition of manure and urine into waterbodies and hydrologically sensitive areas, and to protect the stability of the banks of a waterbody from livestock traffic.

**POLLUTANT CONTROLLED**
Nutrients, pathogens, biochemical oxygen demand (BOD), sediment, or thermal modification.

**WHERE USED**
On farmsteads, pastures, and fields where livestock have access to surface waterbodies and hydrologically sensitive areas, and a resource concern has been identified.

**SYSTEM DESCRIPTION**
An Access Control System involves the use of appropriate fence and associated components to exclude livestock from having significant direct access to surface waters and hydrologically sensitive areas to protect water quality. Other Component BMPs that provide an alternative source of water or allow for the controlled access to or crossing of streams may be included in the System.

In some cases, multiple Agricultural BMP Systems may work within or adjacent one another to properly control and treat a resource concern; scenarios utilizing two or more BMP Systems should have each System listed. For example: An Access Control System with an adjacent and supporting Riparian Buffer System, both Systems used in conjunction to address one or more resource concerns.

**SYSTEM EFFECTIVENESS**
Eliminating access of livestock to waterbodies and hydrologically sensitive areas prevents direct nutrient, pathogen, and organic matter contributions by livestock as well as protecting bank stability and vegetation, which leads to less erosion and improved wildlife habitat.

**IMPACTS ON SURFACE WATER**
Beneficial – reduces the risk of contamination from nutrients, pathogens, biochemical oxygen demand (BOD), sediment, and thermal modification.

**IMPACTS ON GROUND WATER**
Neutral - It may be beneficial in areas where groundwater is recharged directly from surface waterbodies or there is a direct surface connection to groundwater.

**IMPACTS ON OTHER RESOURCES (OFF-SITE)**

Soil: Beneficial by excluding livestock from the banks of waterbodies helping to maintain bank stability and vegetation reducing soil erosion and sedimentation.
Air: Neutral.
Plants: Beneficial by excluding livestock from the banks of waterbodies helping to maintain bank vegetation.

Animals: Beneficial as it can help protect riparian vegetation that in turn provides habitat, wildlife corridors and water quality benefits.
Humans: Beneficial by improving overall water quality and recreational opportunities.
Energy: Neutral but may be negative if alternative water requires pumping.

**ADVANTAGES TO FARM**

- Easy to implement.
- Relative low cost.
- Could improve neighbor relations due to livestock control and increased aesthetics in the stream corridor.

**DISADVANTAGES TO FARM**

- Requires fence maintenance and potential replacement after flood events.
- Often requires the installation of an alternative water supply system.

**SYSTEM LIFESPAN**

Ten (10) years.

**COST**

Each Agricultural BMP System is unique and must be customized to the situation in which it is employed resulting in a wide and variable range in cost. Some factors impacting cost include the type of livestock involved, the length and type of fence needed, the need for alternative water, and stream crossings.

**OPERATION AND MAINTENANCE**

Each Agricultural BMP System is unique and must be customized for every situation. The following are generally key components to the operation and maintenance of the System:

- Pastures within the Access Control System shall be managed and maintained to remain vegetated, and the development of future resource concerns shall be avoided (e.g., heavily disturbed areas, runoff to nearby Highly Sensitive Areas).
- Basic maintenance to fence, crossings, and watering stations is needed.
- Periodic access of livestock to protected areas may be allowed, if in line with NRCS CPS Access Control, Riparian Herbaceous Buffer, or other relevant Standard operation and maintenance guidelines.
- Significant flooding may result in the need for repair or replacement.

See the documents in Section 4 of the NRCS Field Office Technical Guide (FOTG) under the specific conservation practice standard being utilized for additional information on operation and maintenance needs.

**MISCELLANEOUS COMMENTS**

Agricultural BMP Systems and associated component practices that will eliminate or provide effective treatment of one or more resource concerns may be eligible for cost-share funding. Compliance with Federal, State, and local laws should be adhered to including the potential need for construction stormwater permits, plans, and practices; other permits; as well as contacting Underground Utilities Protection before excavation, SHPO, and others as applicable. Livestock farms that have been designated as a CAFO are required to comply with CAFO regulations.

**NRCS CONSERVATION PRACTICE STANDARDS TO UTILIZE***

For the most current information on each NRCS Conservation Practice Standard, please go to the NY Field Office Technical Guide (FOTG) at https://efotg.sc.egov.usda.gov/#/state/NY/documents.
Use the drop box in the left side to reach Section 4 – Practice Standards and Supporting Documents, click on the folder for Conservation Practice Standards & Support Documents and locate the appropriate practice. Under each practice, you will find, at the minimum, the practice standard. You may also find: a Statement of Work; Practice Overview; Implementation Requirement; Conservation Practice Effects Network Diagram; and other document that will assist in the planning, installation, or operation of the practice.

| NRCS Name | Standard # | Reportable Item | Date | Life Span |
|---|---|---|---|---|
| Access Control | 472 | Acre | April 2019 | 10 |
| Fence | 382 | Feet | October 2022 | 20 |
| Trails and Walkways | 575 | Feet | September 2021 | 10 |
| Access Road | 560 | Feet | March 2021 | 10 |
| Watering Facility | 614 | Number | March 2021 | 10 |
| Heavy Use Area Protection | 561 | Sq. Feet | September 2021 | 10 |
| Livestock Pipeline | 516 | Feet | March 2021 | 20 |
| Pond | 378 | Number | May 2018 | 20 |
| Pumping Plant | 533 | Number | October 2022 | 15 |
| Spring Development | 574 | Number | September 2021 | 20 |
| Structure for Water Control | 587 | Number | March 2019 | 20 |
| Stream Crossing | 578 | Number | January 2023 | 10 |
| Water Well | 642 | Number | March 2021 | 20 |
| Field Border | 386 | Acre | October 2017 | 10 |

*This is a listing of the primary Component BMPs to use but is not all inclusive and other NRCS Conservation Practice Standards may be utilized. Please check with a SWCC representative for approval.

**NYS Program Lifespans (listed above in Table III) refers to the minimum time period that a program participant must perform Operation and Maintenance of an Agricultural BMP System and the Component BMPs. Alternatively, NRCS CPS Lifespans (as found in the Standards) refer to specific design criteria and defines how long a conservation practice should function under an appropriate level of Operation and Maintenance. To meet NRCS Standards, a conservation practice must be designed to meet the CPS Lifespan, and all materials and installation methods must meet or exceed the NRCS defined Lifespan criteria.

**REFERENCES**

- USDA NRCS FOTG for NY: https://efotg.sc.egov.usda.gov/#/state/NY/documents
- Pasture Management AEM Tier 2 Worksheet and Information Sheet
- Stream and Floodplain Management AEM Tier 2 Worksheet and Information Sheet

# Agrichemical Handling and Storage System

**DEFINITION**
A permanent structure, with associated operation and maintenance procedures, that includes an impervious surface to provide an environmentally safe on-farm area for agrichemical storage, handling, mixing, loading, recovery, and rinsing.

**WATER QUALITY PURPOSE**
To reduce the potential for soil, groundwater, and surface water contamination during agrichemical storage, mixing, loading, unloading, rinsing, and recycling operations.

**POLLUTANT CONTROLLED**
Agrichemicals – (e.g., pesticides, fertilizers).

**WHERE USED**
On farms where current methods of storing, mixing, loading, and unloading of agrichemicals; and the rinsing of equipment or agrichemical containers are polluting or have the potential to pollute ground or surface waters; and a resource concern has been identified.

**SYSTEM DESCRIPTION**
An agrichemical mixing facility consists of a watertight containment structure comprised of a concrete pad and all necessary equipment for pumping, transferring, and storing water used in agrichemical mixing, loading, unloading, and rinsing operations. The size of the pad and storage capacity is related to the volume and size of the largest spray tank on the pad. Containment storage vessels incorporated into the facility design allow for the recovery of agrichemical, rinsate storage, plus handling/mixing/recovery/disposal. Surface runoff from a 25-year, 24-hour duration storm event is diverted away from the facility. A roof and sidewalls may be used to shelter the facility from rain, snow, and ice, preventing precipitation from accumulating on the pad and contaminating runoff.

**SYSTEM EFFECTIVENESS**
Little or no information exists on the documented effectiveness of agrichemical handling facilities on water quality improvement. Much is known about water quality impacts when these facilities are not available for agrichemical handling and rinsing operations. A recent study of commercial pesticide mixing and loading sites in Wisconsin, without pesticide handling facilities, found that two-thirds of the sites had significant groundwater contamination.

Pesticides were detected in groundwater at more than half of these sites, with concentrations exceeding groundwater standards at one-third of the sites surveyed. Officials and the pesticide industry in Wisconsin recognized that use of agrichemical mixing facilities minimize the potential for surface and groundwater contamination.

**IMPACTS ON SURFACE WATER**
Beneficial.

**IMPACTS ON GROUND WATER**
Beneficial.

**IMPACTS ON OTHER RESOURCES (OFF-SITE)**

Soil: Beneficial as it greatly reduces the risk of soil contamination due to leaks and spills.
Air: Beneficial as it greatly reduces the risk of air contamination resulting from leaks and spills.
Plants: Neutral.
Animals: Neutral.
Human: Beneficial as it improves environmental safety.
Energy: Neutral.

**ADVANTAGES TO FARM**

- Improves environmental safety by preventing contamination of ground and surface water from routine use and accidental spills.
- Allows compliance with federal and state regulations.
- Enhances owner / operator management.
- Promotes recycling of rinse water as tank make up water.
- Reduces liability risk.

**DISADVANTAGES TO FARM**

- Can be very expensive.
- Must perform maintenance frequently and diligently to ensure proper facility operation and water source protection.
- Expansive cropland acreage makes it difficult to pick one central location to protect and utilize exclusively.

**SYSTEM LIFESPAN**

Ten (10) years.

**COST**

Each Agricultural BMP System is unique and must be customized to the situation in which it is employed resulting in a wide and variable range in cost.

**OPERATION AND MAINTENANCE**

Each Agricultural BMP System is unique and must be customized for every situation. The following are generally key components to the operation and maintenance of the System:

- An Emergency Action Plan should be a part of the written O&M plan, in case of an accidental agrichemical spill, exposure, fire or other incident that could adversely affect environmental health. The plan should include a record-keeping component to accurately log spills, exposure, fire, or other incidents.
- Safe agrichemical handling procedures and frequent maintenance are critical to the performance of any agrichemical mixing facility.
- The proper disposal/utilization of rinsate, exterior wash water, accumulated sediment and spilled wastewater must be accomplished in accordance with the pesticide labeling requirements and federal, state and local laws and codes.
- Operator must perform periodic checks of any backflow prevention devices, inspect the pad and sump for cracks and leaks, clean the sump and pad between different chemical mixing operations and remove sediment accumulation from the sump.
- Personal protective equipment must be used during O&M procedures.
- Accurate records indicating maintenance, cleaning, and inspection of equipment are necessary.
- Pesticide containers are to be triple rinsed and properly recycled.

See the documents in Section 4 of the NRCS field Office Technical Guide (FOTG) under the specific conservation practice standard being utilized for additional information on operation and maintenance needs.

**MISCELLANEOUS COMMENTS**
Agricultural BMP Systems and associated component practices that will eliminate or provide effective treatment of one or more resource concerns may be eligible for cost-share funding. Compliance with Federal, State, and local laws should be adhered to including the potential need for construction stormwater permits, plans, and practices; other permits; as well as contacting Underground Utilities Protection before excavation, SHPO, and others as applicable. Livestock farms that have been designated as a CAFO are required to comply with CAFO regulations.

NYSDEC recommends that all pesticide rinsates, including wash waters from cleaning of spray equipment, should be collected and stored aboveground. Stored rinsates should be recycled for future mixing with the same concentrates.

An agrichemical storage facility should have good air ventilation and an impervious floor and sides to contain spills and leaks. The building should be locked at all times and be located adjacent to the pad.

**NRCS CONSERVATION PRACTICE STANDARDS TO UTILIZE***
For the most current information on each NRCS Conservation Practice Standard, please go to the NY Field Office Technical Guide (FOTG) at https://efotg.sc.egov.usda.gov/#/state/NY/documents.
Use the drop box in the left side to reach Section 4 – Practice Standards and Supporting Documents, click on the folder for Conservation Practice Standards & Support Documents and locate the appropriate practice. Under each practice, you will find, at the minimum, the practice standard. You may also find: a Statement of Work; Practice Overview; Implementation Requirement; Conservation Practice Effects Network Diagram; and other document that will assist in the planning, installation, or operation of the practice.

| NRCS Name | Standard # | Reportable Item | Date | Life Span |
|---|---|---|---|---|
| Agrichemical Handling Facility | 309 | Number | October 2022 | 15 |
| Access Road | 560 | Feet | March 2021 | 10 |
| Access Control | 472 | Acre | April 2019 | 10 |
| Heavy Use Area Protection | 561 | Sq. Feet | September 2021 | 10 |
| Diversion | 362 | Feet | May 2017 | 10 |
| Pumping Plant | 533 | Number | October 2022 | 15 |
| Underground Outlet | 620 | Feet | September 2021 | 20 |
| Grassed Waterway | 412 | Acre | September 2021 | 10 |

*This is a listing of the primary Component BMPs to use but is not all inclusive and other NRCS Conservation Practice Standards may be utilized. Please check with a SWCC representative for approval.

**NYS Program Lifespans (listed above in Table III) refers to the minimum time period that a program participant must perform Operation and Maintenance of an Agricultural BMP System and the Component BMPs. Alternatively, NRCS CPS Lifespans (as found in the Standards) refer to specific design criteria and defines how long a conservation practice should function under an appropriate level of Operation and Maintenance. To meet NRCS Standards, a conservation practice must be designed to meet the CPS Lifespan, and all materials and installation methods must meet or exceed the NRCS defined Lifespan criteria.

**REFERENCES**

- USDA NRCS FOTG for NY: https://efotg.sc.egov.usda.gov/#/state/NY/documents
- Pesticide Storage, Mixing and Loading AEM Tier 2 Worksheet and Information Sheet

# Composting System – Animal

**DEFINITION**
An on-farm System to safely facilitate the treatment or disposal through controlled aerobic decomposition of livestock and poultry carcasses, by micro-organisms into a biologically stable, soil-enriching material useful for soil amendment. This System is especially useful when rendering services are not available or too costly.

**WATER QUALITY PURPOSE**
To have a System for the safe decomposition and ultimate utilization of nutrients from animal composting in a safe environmental manner.

**POLLUTANT CONTROLLED**
Pathogens, nutrients.

**WHERE USED**
On farms where safe disposal of livestock carcasses is needed.

**SYSTEM DESCRIPTION**
A facility to safely compost animal carcasses. To protect surface and groundwater and allow for proper composting of animal carcasses, the facility may be located on lower permeability soils, an improved pad, or be a building with a roof and concrete floor, depending on the operation and need. Clean surface water will be diverted from the site and all contaminated run-off will be contained and treated.

Composting on the farm is accomplished by mixing an energy source (carbonaceous material: wood chips, sawdust, straw, corn cobs, or well-bedded horse manure) with a nutrient source (nitrogenous material: animal carcasses,) in a prescribed manner under aerobic conditions. Microorganisms (primarily bacteria and fungi) break down the raw organic waste under controlled conditions. Air, water, nutrients, surface area, temperature and pH are all important factors in the composting process.

Two types of carcass composting operations are common for on-farm use and either can be managed outside or in a controlled environment or building:

- The most common - Static Piles – carcasses are placed on bulky, high carbon organic material (such as wood chips) and then covered with more organic material and not turned during the composting process. Correct moisture content and bulk density facilitate air movement throughout the pile.
- Aerated Windrows - organic materials are formed into long narrow piles, called windrows, and turned periodically with power equipment to aerate the piles and promote the composting process. This method is the most suitable for smaller carcasses, such as poultry and but has been done on larger scales in the Midwest.

**SYSTEM EFFECTIVENESS**
Unsafe disposal of animal carcasses can be a large source of pathogens and nutrients. Proper composting, including the collection and treatment of any leachate from the process, greatly reduces the issues with pathogens and when the final product is land applied in accordance with a Nutrient Management Plan, the loss of nutrients is negligible.

**IMPACTS ON SURFACE WATER**
Beneficial - Improper disposal of carcasses can cause surface water contamination and a proper composting facility can eliminate the potential.

**IMPACTS ON GROUND WATER**
Beneficial - Improper burial or improper composting on well drained soils, shallow to fractured rock or near high groundwater tables can have negative effects on ground water quality. Proper composting facility will be installed in proper soils or lined and will not affect ground water quality.

**IMPACTS ON OTHER RESOURCES (OFF-SITE)**

Soil: Beneficial. Nutrients and organic matter will be incorporated in the soil and approve the soil health and nutrient values.
Air: Beneficial. Improper disposal or improperly operated composting facilities can cause major air quality issues on a farm. Properly operated and maintained composting facilities will create little to no odor.
Plants: Beneficial. Plants will benefit from increased nutrients in the soil.
Animals: Beneficial. Properly operated composting facilities will not be an attractant to wild animals or vectors.
Human: Beneficial. Protection of ground and surface water, odor control and vector control will all benefit humans.
Energy**:** Negative. Increased energy will be needed to properly run a composting system which requires increased equipment time over some forms of disposal (dragging carcass into woodlot), but energy use can be less than needed for proper burial.

**ADVANTAGES TO FARM**

- Can be done simply, at low cost and may not require engineering assistance (for non-structural composting facilities).
- Can utilize on-farm waste products for cover material, such as refusals, spoiled feed, etc.
- Compost can be used as a soil amendment increasing soil tilth and water-holding capacity.

**DISADVANTAGES TO FARM**

- Requires input (and possible purchase) of materials for composting, such as wood chips.
- Increased cost of initial investment (can be expensive, especially if a building or roofed structure).
- Higher degree of management by farm.
- Requires monitoring for run-off, temperature, proper covering with suitable materials.
- Some practices may require a SPDES permit for site disturbance.

**SYSTEM LIFESPAN**
Ten (10) years.

**COST**
Each Agricultural BMP System is unique and must be customized to the situation in which it is employed resulting in a wide and variable range in cost. Costs can range from little to no out of pocket cost when there is a readily available supply of high carbon material for a base or can be very expensive for a building where large volumes of material are composted – range $0 to $150,000.

**OPERATION AND MAINTENANCE**

Each Agricultural BMP System is unique and must be customized for every situation. The following are generally key components to the operation and maintenance of the System:

- Maintain correct operating temperatures, proper aeration, carbon to nitrogen (C: N) ratio, and perform periodic testing of compost.
- Check for run-off, kill zones or other signs of nutrient loss after storm events.

See the documents in Section 4 of the NRCS Field Office Technical Guide (FOTG) under the specific practice standard being utilized for additional information on operation and maintenance needs.

**MISCELLANEOUS COMMENTS**

Agricultural BMP Systems and associated component practices that will eliminate or provide effective treatment of one or more resource concerns may be eligible for cost-share funding. Compliance with Federal, State, and local laws should be adhered to including the potential need for construction stormwater permits, plans, and practices; other permits; as well as contacting Underground Utilities Protection before excavation, SHPO, and others as applicable. Livestock farms that have been designated as a CAFO are required to comply with CAFO regulations.

Testing of compost for nutrients or heavy metals can be arranged through the local Cornell Cooperative Extension or through the Cornell Nutrient Analysis Laboratory.

**NRCS CONSERVATION PRACTICE STANDARDS TO UTILIZE***

For the most current information on each NRCS Conservation Practice Standard, please go to the NY Field Office Technical Guide (FOTG) at https://efotg.sc.egov.usda.gov/#/state/NY/documents.
Use the drop box in the left side to reach Section 4 – Practice Standards and Supporting Documents, click on the folder for Conservation Practice Standards & Support Documents and locate the appropriate practice. Under each practice, you will find, at the minimum, the practice standard. You may also find: a Statement of Work; Practice Overview; Implementation Requirement; Conservation Practice Effects Network Diagram; and other document that will assist in the planning, installation, or operation of the practice.

| NRCS Name | Standard # | Reportable Item | Date | Life Span |
|---|---|---|---|---|
| Animal Mortality Facility | 316 | Number | April 2016 | 15 |
| Composting Facility | 317 | Number | September 2021 | 15 |
| Access Road | 560 | Feet | March 2021 | 10 |
| Diversion | 362 | Feet | May 2017 | 10 |
| Heavy Use Area Protection | 561 | Sq. Feet | September 2021 | 10 |
| Roofs and Covers | 367 | Number | October 2016 | 10 |
| Vegetative Treatment Area | 635 | Acre | February 2017 | 10 |
| Waste Storage Facility | 313 | Number | March 2018 | 15 |

| | | | | |
|---|---|---|---|---|
| Waste Transfer | 634 | Number | October 2022 | 15 |

*This is a listing of the primary Component BMPs to use but is not all inclusive and other NRCS Conservation Practice Standards may be utilized. Please check with a SWCC representative for approval.

**NYS Program Lifespans (listed above in Table III) refers to the minimum time period that a program participant must perform Operation and Maintenance of an Agricultural BMP System and the Component BMPs. Alternatively, NRCS CPS Lifespans (as found in the Standards) refer to specific design criteria and defines how long a conservation practice should function under an appropriate level of Operation and Maintenance. To meet NRCS Standards, a conservation practice must be designed to meet the CPS Lifespan, and all materials and installation methods must meet or exceed the NRCS defined Lifespan criteria.

**REFERENCES**

- USDA NRCS FOTG for NY: https://efotg.sc.egov.usda.gov/#/state/NY/documents
- National Engineering Handbook Part 637, Chapter 2 – Composting (NEH 637.0213, Dead Animal Composting)
- National Engineering Handbook Part 651
- Agricultural Waste Management Field Handbook, Chapter 10 Mortality Management (NEH 651.1007), NRCS or comparable extension publication
- Bonhotal, J., L Telega, J. Petzen. Natural Rendering: Composting Livestock Mortality and Butcher Waste. 2002. Cornell Waste Management Institute: http://compost.css.cornell.edu/naturalrenderingFS.pdf
- Northeast Regional Agricultural Engineering Service publication No. 54, On Farm Composting Handbook, Cornell Cooperative Extension, Ithaca, NY
- Waste Disposal AEM Tier 2 Worksheet and Information Sheet

# Erosion Control System - Structural

**DEFINITION**
The construction of an Erosion Control System to control the loss of soil from sheet, ephemeral, rill or gully erosion on agricultural lands, farmsteads, and production areas. This includes Systems utilizing terraces, diversions, water and sediment control basins (WASCoBs), waterways (both grassed and lined), roof runoff practices, access roads, and associated earthmoving practices.

**WATER QUALITY PURPOSE**
To reduce all forms of erosion and thereby reducing sediment delivery to waterbodies. This includes shortening slope lengths, cutting off sheet and concentrated flows from adjacent land uses, stabilizing gullies and providing safe outlets for flowing waters.

**POLLUTANT CONTROLLED**
Sediment, nutrients, or pathogens.

**WHERE USED**
On erodible land, in both crop fields and pastures, where soil erosion and runoff must be controlled and the use of crop rotation, minimum tillage, or seeding does not or cannot limit the erosion to acceptable levels.

Within and adjacent farmsteads where excessive volumes of clean water concentrate and result in soil erosion and un-controlled runoff. This system would not be appropriate as a treatment method of concentrated nutrient-laden runoff (e.g., livestock heavy use area runoff, feed storage area runoff, waste storage and transfer sites); other practice systems within this Catalogue may apply to forementioned resource concern areas.

**SYSTEM DESCRIPTION**
This System may be one practice or several; terraces, diversion and WASCoB's are generally constructed across the slope, usually on the contour to intercept and conduct surface runoff at a non-erosive velocity to stable outlets, reducing ephemeral and gully erosion. These practices control erosion by shortening slope length and regulating surface runoff. They can outlet into established grassed waterways, flat vegetated areas or other stabilized outlets. They also can be total storage structures that release the flow through underground outlets within 24 to 48 hours, depending on crops grown. These Systems also act as sediment traps and help to reduce sediment-bound pollutants in surface run-off.

This System will also be used for the construction of waterways; grassed, lined or stone-centered, which are used to convey concentrated flows down slope to protected outlets to prevent gully erosion or to act as outlets for other erosion control practices. On slopes of less than 1% where out-of-bank flow will not cause erosion or property damage, the confinement of flow is not a design requirement.

Structures can be cropped, seeded to grasses and legumes to stabilize the slopes or lined with another material, such as rock, when velocities require.

Soil and water resources are often further conserved when structural erosion control practices are paired with cultural soil health practices (e.g., crop rotation, strip cropping, cover crop, conservation tillage) and nutrient management practices to further reduce pollutant transport and loss.

Within and adjacent farmsteads, Component BMPs may be compiled to collect, store, convey, and safely outlet clean water sources, thus protecting nearby management areas and infrastructure from possible damage or potential runoff.

**SYSTEM EFFECTIVENESS**

Structural erosion control practices are effective at reducing soil loss significantly as well as limiting nutrient losses and runoff.

**IMPACTS ON SURFACE WATER**

Beneficial – Terraces, diversions, waterways and WASCoB's reduce erosion by controlling surface runoff and gully erosion which lessen loads delivered to the receiving waterbody. Terraces, diversions, and WASCoBs can also reduce nutrient loading through settling in areas of water retention.

**IMPACTS ON GROUND WATER**

Slight to Moderate – Can be beneficial in areas where the groundwater is recharged from surface waterbodies. In the absence of a Nutrient Management Plan, terraces and diversions may increase nutrient leaching to groundwater. Impacts on groundwater may be reduced by increasing terrace or diversion release rates, thereby decreasing runoff storage time and potential soil saturation. Diversions decrease the amount of surface runoff infiltrating into the soil, reducing the risk of transporting nutrients and pesticides to groundwater. Waterways generally have little to no impact on ground water.

**IMPACTS ON OTHER RESOURCES (OFF-SITE)**

Soil: Beneficial to soil resources as soil loss will be diminished.

Air: Slightly beneficial and can have beneficial effects as erosion rates are reduced and the possibility that fines in the air will also be reduced.

Plants: Neutral.

Animals: Slightly beneficial improvement to wildlife as cross field practices could provide pathways for wildlife movement. Slight to moderate for fisheries as erosion rates will be lessened and delivery of sediment to waterbodies controlled.

Human: Slight to no effect on humans unless sediment reduction in waterbodies for public use are impacted.

Energy: Energy use may be slightly higher due to increased tractor use to go around conservation practices instead of normal plowing.

**ADVANTAGES TO FARM**

- Are relatively easy to design and install.
- Can be cheap to install for simple practices.
- May allow timelier planting and potential yield increases by removing surface runoff.
- Controls surface runoff and gully and ephemeral erosion.
- Can provides flood protection for crop fields.
- Stores runoff up to 48 hours, allowing sediment and sediment-bound pollutants to settle out.
- Protects management areas and farmstead infrastructure.
- Collects surface flows during storm events and provides safe clean water outlets.

**DISADVANTAGES TO FARM**

- Can take land out of crop production.
- Systems may need to be in conjunction with other conservation practices such as conservation tillage, crop rotations, and contour or strip cropping to bring soil loss to acceptable levels.

- Some systems can be very expensive and usually are not considered cost-effective management practices in relation to cultural control measures.
- Require increased maintenance as trapped sediment accumulates in the structure and removal of sediment or reconstruction is required to maintain capacity.
- Grassed waterways may be unsuitable for areas where a base flow exists (sustained wetness prevents adequate vegetative cover) unless a stone-center lining and a subsurface drain and surface inlet are installed.
- Use may be precluded or have an increased cost if a stable outlet is lacking.

**SYSTEM LIFESPAN**
Ten (10) years.

**COST**
Each Agricultural BMP System is unique and must be customized to the situation in which it is employed resulting in a wide and variable range in cost. Costs can range from $1.00 per foot for a cross slope ditch to $10 a foot for storage structures with outlets.

**OPERATION AND MAINTENANCE**
Each Agricultural BMP System is unique and must be customized for every situation. The following are generally key components to the operation and maintenance of the system that need to be performed annually and after large storm events:

- Maintain capacity, storage, ridge height and outlets.
- Clean out inlets for underground outlets.
- Remove sediment build-up and redistribute.
- Inspect channel cross-section for stable side slopes, points of scour, rodent holes, and breaches.
- Check channel bottom for erosion or excessive scour, deposition of sediment or other obstructions.
- Outlets should be checked to ensure that they remain adequate, show no sign of erosion or loss of structural integrity.
- Vegetated structures will need to be periodically mowed.
- Periodic inspection and repair of roof runoff structures, outlets, access roads, etc.

See the documents in Section 4 of the NRCS Field Office Technical Guide (FOTG) under the specific practice standard being utilized for additional information on operation and maintenance needs.

**MISCELLANEOUS COMMENTS**
Agricultural BMP Systems and associated component practices that will eliminate or provide effective treatment of one or more resource concerns may be eligible for cost-share funding. Compliance with Federal, State, and local laws should be adhered to including the potential need for construction stormwater permits, plans, and practices; other permits; as well as contacting Underground Utilities Protection before excavation, SHPO, and others as applicable. Livestock farms that have been designated as a CAFO are required to comply with CAFO regulations.

**NRCS CONSERVATION PRACTICE STANDARDS TO UTILIZE***
For the most current information on each NRCS Conservation Practice Standard, please go to the NY Field Office Technical Guide (FOTG) at https://efotg.sc.egov.usda.gov/#/state/NY/documents.
Use the drop box in the left side to reach Section 4 – Practice Standards and Supporting Documents, click on the folder for Conservation Practice Standards & Support Documents and locate the appropriate practice. Under each practice, you will find, at the minimum, the practice standard. You may also find: a

Statement of Work; Practice Overview; Implementation Requirement; Conservation Practice Effects Network Diagram; and other document that will assist in the planning, installation, or operation of the practice.

| NRCS Name | Standard # | Reportable Item | Date | Life Span |
|---|---|---|---|---|
| Water and Sediment Control Basin | 638 | Number | March 2019 | 10 |
| Sediment Basin | 350 | Number | May 2017 | 20 |
| Diversion | 362 | Feet | May 2017 | 10 |
| Grassed Waterway | 412 | Acre | September 2021 | 10 |
| Filter Strips | 393 | Acre | October 2017 | 10 |
| Grade Stabilization Structure | 410 | Number | March 2021 | 15 |
| Critical Area Planting | 342 | Acre | October 2017 | 10 |
| Lined Waterway or Outlet | 468 | Feet | September 2021 | 15 |
| Conservation Cover | 327 | Acre | July 2019 | 5 |
| Terrace | 600 | Feet | September 2021 | 10 |
| Subsurface Drain | 606 | Feet | May 2020 | 20 |
| Underground Outlet | 620 | Feet | September 2021 | 20 |
| Obstruction Removal | 500 | Number | September 2021 | 10 |
| Fence | 382 | Feet | October 2022 | 20 |
| Access Road | 560 | Feet | March 2021 | 10 |
| Roof Runoff Structure | 558 | Number | October 2022 | 15 |
| Trails and Walkways | 575 | Feet | September 2021 | 10 |

*This is a listing of the primary Component BMPs to use but is not all inclusive and other NRCS Conservation Practice Standards may be utilized. Please check with a SWCC representative for approval.

**NYS Program Lifespans (listed above in Table III) refers to the minimum time period that a program participant must perform Operation and Maintenance of an Agricultural BMP System and the Component BMPs. Alternatively, NRCS CPS Lifespans (as found in the Standards) refer to specific design criteria and defines how long a conservation practice should function under an appropriate level of

Operation and Maintenance. To meet NRCS Standards, a conservation practice must be designed to meet the CPS Lifespan, and all materials and installation methods must meet or exceed the NRCS defined Lifespan criteria.

**REFERENCES**

- USDA NRCS FOTG for NY: https://efotg.sc.egov.usda.gov/#/state/NY/documents
- Soil Management AEM Tier 2 Worksheet and Information Sheet

# Feed Management System

**DEFINITION**
The continual process of providing adequate, not excess, nutrients to dairy animals through the integration of feeding and crop management to reduce nutrient excretion in manure and nutrient accumulation in soil, lower potential pollution risks to water and air resources, and improve farm profitability.

**WATER QUALITY PURPOSE**
Reduces the accumulation and potential loss of nitrogen and phosphorus in manure from dairy farms.

**POLLUTANT CONTROLLED**
Nutrients, pathogens, biochemical oxygen demand (BOD), or ammonia.

**WHERE USED**
Dairy farms.

**SYSTEM DESCRIPTION**
Feed management is a continuous improvement process involving benchmarking, planning, implementation, and monitoring. It is facilitated by a feed management specialist and adopted and directed by farm management to meet goals in three areas:

1. improved nutrient use efficiency, homegrown feed utilization, and income-over-feed cost;
2. crop production and purchased feeds are optimized for the feeding system; and
3. reduced nutrient overfeeding, excretion, and accumulation.

Dairy farms using the feed management process pursue those goals often by improving the digestible nutrient content of homegrown feeds produced and fed; accurately estimating feed nutrient intakes by animals and tracking feed inventories; employing scientific standards to determine nutrient requirements and ration levels; and increasing the level of homegrown feeds (forages or grains) in the diet.

Feed management recommendations should be based on the best available research information. The USDA-NRCS Feed Management Standard (NY-592) provides specific technical details and references about planning, implementation, and operation and maintenance. The Cornell Precision Feed Management guidelines and Precision Feed Management Benchmarking tools provide further information for effective feed management with dairy cows. Management of feed rations and forages should be consistent with Cornell recommendations, where available; otherwise, National Research Council recommendations should be utilized.

**SYSTEM EFFECTIVENESS**
Improving a farm's nutrient mass balance (the amount of nutrients imported compared to the amount of nutrients exported) will reduce the amount of nutrients that have the potential to be lost to the environment. Changes in the feeding program can have a significant influence on farm nutrient management and its mass nutrient balance. While it varies widely by farm size and management, a substantial portion of the nutrients imported to dairy farms in the form of purchased (imported) feeds, and to a lesser degree fertilizers, often remains on the farm where they may accumulate in farm soils and may be lost to air and water resources. Farms that intensively manage their feeding program reduce

nutrient excretion in the manure, increase feed nutrient utilization, and subsequently improve the farm's mass nutrient balance.

A 60% reduction in nitrogen and phosphorus mass nutrient balances has been documented by Cornell University and Cornell Cooperative Extension research on over 40 dairy farms that adopted feed management practices between 2004 and 2008. Those dairy farms also realized lower operating costs ($1.33/CWT) and 11% higher milk production that similar sized farms not participating in the feed management process in the region.

**IMPACTS ON SURFACE WATER**
Beneficial, including nutrients and pathogens.

**IMPACTS ON GROUND WATER**
Beneficial, including nutrients and pathogens.

**IMPACTS ON OTHER RESOURCES (OFF-SITE)**

Soil: Beneficial, the soil health/conservation often must improve in order to optimize homegrown crop production for herd forage or grain needs.

Air: Beneficial, as it has the potential to reduce particulate matter from ammonia volatilization and nitrous oxide emissions.

Plants: Beneficial, as it can reduce nutrient losses and subsequent impacts on neighboring plant communities.

Animals: Beneficial, as it can reduce nutrient losses and subsequent impacts on terrestrial and aquatic habitat.

Human: Beneficial, as it can further safeguard drinking water sources, improve land and water resources for recreation, and provide economic growth.

Energy: Beneficial, as it can reduce use of transportation fuels for imported feed and fertilizer and improve livestock output per energy input.

**ADVANTAGES TO FARM**
- Potential to reduce nutrient losses and improve animal and crop production.
- Potential to improve herd/flock health.
- Often a positive impact on farm profitability.

**DISADVANTAGES TO FARM**
- Higher level of farm management is required may result in increased labor and equipment costs.
- Requires additional time and training to adjust to new management strategies.
- Cost to change management may be prohibitive for some farms.

**SYSTEM LIFESPAN**
One (1) year.

**COST**
Each Agricultural BMP System is unique and must be customized to the situation in which it is employed resulting in a wide and variable range in cost. Costs for feed management depend on several factors, including the size and type of farm, existing level of farm management, feeding and feed storage facilities, history of herd, feed, and other farm records, available equipment, and familiarity with custom operators. Consultation fees for developing and maintaining a feed management plan should be considered in addition to the costs for feed and forage analyses.

**OPERATION AND MAINTENANCE**
Each Agricultural BMP System is unique and must be customized for every situation. Feed management is a continuous improvement process, involving regular monitoring through benchmarking, planning to address opportunities, implementing those plans, and evaluating the plans via benchmarking.

See the documents in Section 4 of the NRCS Field Office Technical Guide (FOTG) under the specific conservation practice standard being utilized for additional information on operation and maintenance needs.

**MISCELLANEOUS COMMENTS**
Agricultural BMP Systems and associated component practices that will eliminate or provide effective treatment of one or more resource concerns may be eligible for cost-share funding. Compliance with Federal, State, and local laws should be adhered to including the potential need for construction stormwater permits, plans, and practices; other permits; as well as contacting Underground Utilities Protection before excavation, SHPO, and others as applicable. Livestock farms that have been designated as a CAFO are required to comply with CAFO regulations.

See Cornell Feed Management guidelines and Precision Feed Management Benchmarking tools as well as the USDA-NRCS Feed Management Standard (NY-592) for specific technical details about planning, implementation, and operation and maintenance.

**NRCS CONSERVATION PRACTICE STANDARDS TO UTILIZE***
For the most current information on each NRCS Conservation Practice Standard, please go to the NY Field Office Technical Guide (FOTG) at https://efotg.sc.egov.usda.gov/#/state/NY/documents.
Use the drop box in the left side to reach Section 4 – Practice Standards and Supporting Documents, click on the folder for Conservation Practice Standards & Support Documents and locate the appropriate practice. Under each practice, you will find, at the minimum, the practice standard. You may also find: a Statement of Work; Practice Overview; Implementation Requirement; Conservation Practice Effects Network Diagram; and other document that will assist in the planning, installation, or operation of the practice.

| NRCS Name | Standard # | Reportable Item | Date | Life Span |
|---|---|---|---|---|
| Feed Management | 592 | Animals Units Affected | October 2022 | 1 |

*This is a listing of the primary Component BMPs to use but is not all inclusive and other NRCS Conservation Practice Standards may be utilized. Please check with a SWCC representative for approval.

**NYS Program Lifespans (listed above in Table III) refers to the minimum time period that a program participant must perform Operation and Maintenance of an Agricultural BMP System and the Component BMPs. Alternatively, NRCS CPS Lifespans (as found in the Standards) refer to specific design criteria and defines how long a conservation practice should function under an appropriate level of Operation and Maintenance. To meet NRCS Standards, a conservation practice must be designed to meet the CPS Lifespan, and all materials and installation methods must meet or exceed the NRCS defined Lifespan criteria.

**REFERENCES**


- USDA NRCS FOTG for NY: https://efotg.sc.egov.usda.gov/#/state/NY/documents
- Cornell Precision Feed Management: https://cnydfc.cce.cornell.edu/topic.php?id=19
- Management of Dairy Feed Nutrients AEM Tier 2 Worksheet and Information Sheet

# Integrated Pest Management System

**DEFINITION**
An ecologically based, site-specific integrated pest control strategy utilizing a combination of pest prevention, pest avoidance, pest monitoring, and pest suppression strategies coupled with precision application techniques and Best Management Practices when pesticide application is warranted.

**WATER QUALITY PURPOSE**
To reduce pesticide use, availability, and losses to the environment in crop and livestock production.

**POLLUTANT CONTROLLED**
Pesticides.

**WHERE USED**
On all agricultural lands where pests will be managed, and a resource concern has been identified.

**SYSTEM DESCRIPTION**
Integrated Pest Management (IPM) strategies that keep pest populations below economically damaging levels and minimize pest resistance are used to reduce pest management risks to water quality and the environment. Specific IPM techniques include:

> Prevention – activities such as cleaning equipment when leaving an infested area, using pest free seeds and transplants, and irrigation scheduling to limit situations that are conducive to disease development,
> Avoidance – activities such as using pest resistant varieties, crop rotation, refuge management, and maintaining healthy and diverse plant communities,
> Monitoring – activities such as crop scouting, establishing trap crops, degree-day modeling and weather forecasting to help target suppression strategies and avoid routine preventative treatments,
> Suppression – activities such as the judicious use of cultural, mechanical, biological, and chemical control methods that reduce or eliminate a pest population or its impacts while minimizing risks to non-target organisms. As part of a suppression system, precision application techniques in an IPM system can further minimize pesticide risks to natural resources and humans. Examples of such techniques include: appropriate equipment calibration to include the correct rate, boom height, appropriate nozzle type, nozzle spacing, operating speed and pressure; computer-controlled application technologies; and advanced technology equipment.

**SYSTEM EFFECTIVENESS**
Overall, IPM is effective, profitable, and relatively safe. Few if any studies have established a solid link between IPM usage and reduction of pesticide levels in receiving waters. However, IPM has been credited with the reduction in chemical usage. IPM is an effective management practice for consideration in vegetables, fruit, ornamentals, or field crops especially where large amounts of pesticides are applied, waterbodies are adjacent to crop fields, and soils are highly permeable. Numerous studies have shown pesticide use can be reduced up to 45% in fields employing IPM strategies verses conventional fields. Pesticide use for the control of house flies in dairy barns can be reduced 50 to 80% if manure is removed on a timely basis and fly biological control agent populations are enhanced.

When a pesticide is used its effectiveness depends upon the proper application and placement of the chemical. It is estimated that 60% of sprayers have a calibration error rate greater than plus or minus 10%. Frequent calibration checks or computerized precision application greatly reduce this problem.

Associated conservation practices that provide for adequate plant nutrients and soil moisture, including a favorable pH and soil quality, can reduce plant stress, improve plant vigor and increase the plant's overall ability to tolerate pests thereby reducing the need for pesticide use.

**IMPACTS ON SURFACE WATER**
Beneficial – In most management options the availability of pesticides as a nonpoint source pollutant is reduced.

**IMPACTS ON GROUND WATER**
Beneficial – In most management options the availability of pesticides as a nonpoint source pollutant is reduced.

**IMPACTS ON OTHER RESOURCES (OFF-SITE)**

Soil: Beneficial as the use of pesticides generally declines reducing risk of carry over and accumulation in the soil.
Air**:** Beneficial as IPM strategies generally result in less pesticide drift.
Plants: Beneficial as overall less use of pesticide and more precise application is a benefit to non-target plants.
Animals: Beneficial as IPM strategies and precision application techniques reduce the impact of pesticides on non-target organisms such as pollinators.
Human: Beneficial as it is an economically and environmentally defensible practice which realizes a higher net return per acre due to improved commodity quality.
Energy: Neutral.

**ADVANTAGES TO FARM**
- Use of pesticides usually declines with the use of IPM strategies.
- Usually requires fewer pesticides on a per acre basis.
- IPM generally results in higher average per acre crop yield.

**DISADVANTAGES TO FARM**
- May result in more pesticide applications per growing season as scouting may find pest populations over threshold.
- Higher level of grower management is required which may result in increased labor and equipment costs.
- Requires additional time and training to adjust to new management strategies.
- May have control costs higher than conventional control techniques.
- Cost of some advanced technology equipment may not be economical for small pesticide applicators.

**SYSTEM LIFESPAN**
One (1) year for IPM plan and may vary up to 10 years for various application equipment.

**COST**
Each Agricultural BMP System is unique and must be customized to the situation in which it is employed resulting in a wide and variable range in cost. The cost of this system will be highly variable depending on the control strategies employed.

**OPERATION AND MAINTENANCE**
Each Agricultural BMP System is unique and must be customized for every situation. The following are generally key components to the operation and maintenance of the system:

- Scouting and monitoring is an on-going activity.
- O&M is specific for each prevention, avoidance, monitoring, and suppression technique used. Record keeping is an essential component of all these practices.
- Follow label directions when pesticides are used.
- Follow equipment manufacturer's directions.

See the documents in Section 4 of the NRCS Field Office Technical Guide (FOTG) under the specific conservation practice standard being utilized for additional information on operation and maintenance needs.

**MISCELLANEOUS COMMENTS**
Agricultural BMP Systems and associated component practices that will eliminate or provide effective treatment of one or more resource concerns may be eligible for cost-share funding. Compliance with Federal, State, and local laws should be adhered to including the potential need for construction stormwater permits, plans, and practices; other permits; as well as contacting Underground Utilities Protection before excavation, SHPO, and others as applicable. Livestock farms that have been designated as a CAFO are required to comply with CAFO regulations.

**NRCS CONSERVATION PRACTICE STANDARDS TO UTILIZE***
For the most current information on each NRCS Conservation Practice Standard, please go to the NY Field Office Technical Guide (FOTG) at https://efotg.sc.egov.usda.gov/#/state/NY/documents.
Use the drop box in the left side to reach Section 4 – Practice Standards and Supporting Documents, click on the folder for Conservation Practice Standards & Support Documents and locate the appropriate practice. Under each practice, you will find, at the minimum, the practice standard. You may also find: a Statement of Work; Practice Overview; Implementation Requirement; Conservation Practice Effects Network Diagram; and other document that will assist in the planning, installation, or operation of the practice.

| NRCS Name | Standard # | Reportable Item | Date | Life Span |
|---|---|---|---|---|
| Pest Management Conservation System | 595 | Acre | September 2020 | 1 |
| Conservation Cover | 327 | Acre | July 2019 | 5 |
| Herbaceous Weed Treatment | 315 | Acre | April 2021 | 5 |
| Conservation Crop Rotation | 328 | Acre | October 2015 | 1 |
| Field Border | 386 | Acre | October 2017 | 10 |

| | | | | |
|---|---|---|---|---|
| Filter Strip | 393 | Acre | October 2017 | 10 |
| Forage Harvest Management | 511 | Acre | September 2021 | 1 |
| Irrigation Water Management | 449 | Acre | October 2022 | 1 |

*This is a listing of the primary Component BMPs to use but is not all inclusive and other NRCS Conservation Practice Standards may be utilized. Please check with a SWCC representative for approval.

**NYS Program Lifespans (listed above in Table III) refers to the minimum time period that a program participant must perform Operation and Maintenance of an Agricultural BMP System and the Component BMPs. Alternatively, NRCS CPS Lifespans (as found in the Standards) refer to specific design criteria and defines how long a conservation practice should function under an appropriate level of Operation and Maintenance. To meet NRCS Standards, a conservation practice must be designed to meet the CPS Lifespan, and all materials and installation methods must meet or exceed the NRCS defined Lifespan criteria.

**REFERENCES**

- USDA NRCS FOTG for NY: https://efotg.sc.egov.usda.gov/#/state/NY/documents
- Pesticide Use AEM Tier 2 Worksheet and Information Sheet

# Irrigation Water Management System

**DEFINITION**
A planned System that determines and controls the rate, amount, placement, and timing of irrigation water.

**WATER QUALITY PURPOSE**
To reduce surface water runoff, including any associated erosion or leaching of nutrients and pesticides by applying irrigation water based upon the capacity of the soil to hold water and the needs of the crop.

**POLLUTANT CONTROLLED**
Sediment, nutrients, or pesticides.

**WHERE USED**
On agricultural fields requiring irrigation where the potential for surface water runoff or groundwater contamination exists, and a resource concern has been identified.

**SYSTEM DESCRIPTION**
Irrigation water management is utilized on cropland to supplement rainfall, and to apply fertilizer and pesticides to target crops. Several irrigation methods exist. Selection of the irrigation system to be used is based on the needs of the crop to be grown, soil type, topography, climate, distance to streams or other water bodies, and the source of water to be used for irrigation. To decrease non-point source pollution of surface and groundwater resources, water application must be at rates that minimize the transport of sediments, nutrients and chemicals to surface waters and that minimize the transport of nutrients and chemicals to groundwater.

The development of an "Irrigation Water Management Plan" that addresses the irrigation scheduling, in both timing and amount, control of runoff, minimizing deep percolation, and the uniform application of water is an essential component of this practice.

**SYSTEM EFFECTIVENESS**
This System can help prevent over irrigation and the resulting loss of sediment, nutrients, and pesticides by surface runoff and leaching.

**IMPACTS ON SURFACE WATER**
Beneficial.

**IMPACTS ON GROUND WATER**
Beneficial- Leaching losses of nutrients and pesticides are minimized when scheduling is a part of an irrigation water management system. However, other associated practices that promote infiltration may have adverse impacts on groundwater.

**IMPACTS ON OTHER RESOURCES (OFF-SITE)**

Soil: Beneficial by minimizing irrigation induced soil erosion and sedimentation.
Water: Beneficial by reducing water waste – applies what the crop needs.
Air: Beneficial by managing soil moisture to reduce particulate matter movement.
Plants: Neutral.
Animals: Neutral.

Human: Beneficial due to positive impacts on soil, water, air and energy.
Energy: Beneficial as it can reduce energy use.

**ADVANTAGES TO FARM**

- Manages air, soil, or plant micro-climate.
- Provides the medium and guidance for proper and safe chemigation and fertigation.
- Avoids crop stress due to under-irrigation and may increase crop yields.
- May reduce operating and labor costs.
- May reduce energy costs.

**DISADVANTAGES TO FARM**

- May require additional training, or an increase in irrigation management skills.
- Requires additional time and equipment to collect data.
- Changes in irrigation methods may require changes in equipment which can be costly.

**SYSTEM LIFESPAN**

One (1) year.

**COST**

Each Agricultural BMP System is unique and must be customized to the situation in which it is employed resulting in a wide and variable range in cost. Some factors impacting cost include additional labor and equipment expenses to collect data and automated irrigation scheduling software may need to be purchased.

**OPERATION AND MAINTENANCE**

Each Agricultural BMP System is unique and must be customized for every situation. The following are generally key components to the operation and maintenance of the system:

- Accurate and timely records of rate, amount, timing and maintenance of equipment is a necessary component of this practice.
- A record keeping system and O&M plan must be prepared for the system.

See the documents in Section 4 of the NRCS Field Office Technical Guide (FOTG) under the specific conservation practice standard being utilized for additional information on operation and maintenance needs.

**MISCELLANEOUS COMMENTS**

Agricultural BMP Systems and associated component practices that will eliminate or provide effective treatment of one or more resource concerns may be eligible for cost-share funding. Compliance with Federal, State, and local laws should be adhered to including the potential need for construction stormwater permits, plans, and practices; other permits; as well as contacting Underground Utilities Protection before excavation, SHPO, and others as applicable. Livestock farms that have been designated as a CAFO are required to comply with CAFO regulations.

**NRCS CONSERVATION PRACTICE STANDARDS TO UTILIZE***

For the most current information on each NRCS Conservation Practice Standard, please go to the NY Field Office Technical Guide (FOTG) at https://efotg.sc.egov.usda.gov/#/state/NY/documents.
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Statement of Work; Practice Overview; Implementation Requirement; Conservation Practice Effects Network Diagram; and other document that will assist in the planning, installation, or operation of the practice.

| NRCS Name | Standard # | Reportable Item | Date | Life Span |
|---|---|---|---|---|
| Irrigation Water Management | 449 | Acre | October 2022 | 1 |
| Irrigation Pipeline | 430 | Feet | September 2021 | 20 |
| Irrigation Reservoir | 436 | Number | October 2022 | 15 |
| Irrigation System, Microirrigation | 441 | Acre | October 2022 | 15 |
| Sprinkler System | 442 | Acre | October 2022 | 15 |
| Irrigation System, Surface and Subsurface | 443 | Acre | October 2017 | 15 |
| Pumping Plant | 533 | Number | October 2022 | 15 |
| Water Well | 642 | Number | March 2021 | 20 |
| Nutrient Management | 590 | Acre | September 2020 | 1 |
| Pest Management Conservation System | 595 | Acre | September 2020 | 1 |

*This is a listing of the primary Component BMPs to use but is not all inclusive and other NRCS Conservation Practice Standards may be utilized. Please check with a SWCC representative for approval.

**NYS Program Lifespans (listed above in Table III) refers to the minimum time period that a program participant must perform Operation and Maintenance of an Agricultural BMP System and the Component BMPs. Alternatively, NRCS CPS Lifespans (as found in the Standards) refer to specific design criteria and defines how long a conservation practice should function under an appropriate level of Operation and Maintenance. To meet NRCS Standards, a conservation practice must be designed to meet the CPS Lifespan, and all materials and installation methods must meet or exceed the NRCS defined Lifespan criteria.

**REFERENCES**

- USDA NRCS FOTG for NY: https://efotg.sc.egov.usda.gov/#/state/NY/documents
- Irrigation Water Management AEM Tier 2 Worksheet and Information Sheet

# Livestock Heavy Use Area Runoff Management System

**DEFINITION**
A System for the interception, collection, and safe treatment of runoff water from a barnyard or concentrated livestock area.

**WATER QUALITY PURPOSE**
To exclude clean water from the concentrated livestock areas and to reduce the transport of pollutants from barnyards and concentrated livestock areas into surface or groundwaters.

**POLLUTANT CONTROLLED**
Nutrients, sediments, pathogens, or biochemical oxygen demand (BOD).

**WHERE USED**
Barns, barnyards, loafing areas, paddocks, feedlots, calf hutch areas or any area where livestock concentrate, and a resource concern has been identified.

**SYSTEM DESCRIPTION**
The System is composed of one or more component practices. Structural practices may be employed to exclude clean water from areas of livestock concentrations (for example, diversions that intercept and transport upslope surface water away from barnyards and roof runoff systems that collect rainwater from barn roofs). Heavy Use Areas are used to facilitate clean up and direct polluted runoff where a variety of structural, vegetative and operational practices are used to treat polluted runoff and seepage from barnyards, loafing areas and other areas with concentrated waste. Examples include settling tanks, collection or vegetative treatment areas.

Alternatives also include elimination, utilizing gates and laneways to move livestock to barns or managed pastures, or as a last resort, installation of roofs to isolate the barnyard from precipitation.

**SYSTEM EFFECTIVENESS**
Because Livestock Heavy Use Area Management Systems are site-specific and are composed of one or more Component BMPs, System effectiveness varies. Key factors for effectiveness include success of cutting off clean water before it reaches pollutants, reducing the size of the affected area, and collecting and treating polluted run-off.

**IMPACTS ON SURFACE WATER**
Beneficial.

**IMPACTS ON GROUND WATER**
Beneficial - Can be negative if the abandoned heavy use areas are not remediated and nutrient laden soil and manure is not removed allowing nutrient losses to the groundwater.

**IMPACTS ON OTHER RESOURCES (OFF-SITE)**

Soil: Neutral.
Air: Beneficial. Clean barnyards, where manure and organics are collected more frequently, tend to have less odor issues.
Plants: Neutral.
Animals: Beneficial. Controlling or treating run-off leads to cleaner streams.

Human: Beneficial. Barnyard areas that are kept clean are more aesthetically pleasing and produce less odors, flies or vectors.
Energy: Negative. Increased fuel use.

**ADVANTAGES TO FARM**

- Dries up barnyard and loafing area.
- Improves ease of daily operating procedures.
- Less clean-up time during milking.
- Decreases the chance of milk production reduction during wet periods.
- Increased milk value due to lower somatic cell counts.
- Can include herd health benefits (less risk of mastitis and hoof rot in cattle).
- Depends on the system. Improved barnyards require more energy to clean up on a regular basis (more each day instead of a massive amount every few years) but are more efficient and can save energy required for cow-clean up, milking center clean-up (from less sediment and manure to treat).
- More manure collected to utilize for crop fertility.

**DISADVANTAGES TO FARM**

- Requires a higher level of producer management skill to achieve positive pollution control.
- May be expensive initial investment and operating costs.
- Increased fuel consumption.

**SYSTEM LIFESPAN**

Ten (10) years.

**COST**

Each Agricultural BMP System is unique and must be customized to the situation in which it is employed resulting in a wide and variable range in cost. Range: $3,000 to $150,000 or more, depending upon system design, complexity, and number of animals treated and total area to be treated.

**OPERATION AND MAINTENANCE**

Each Agricultural BMP System is unique and must be customized for every situation. The following are generally key components to the operation and maintenance of the system:

- Daily to weekly scraping of concrete pads.
- Maintain fences and gates.
- Re-grade barnyards as needed to control water.
- Maintain vegetation.
- Check roof gutters after heavy storm events and remove debris and ice.
- Maintain gravel/stone heavy use areas, if applicable.
- Ensure dosing on VTA to not overload system. Harvest and remove filter area vegetation.

See the documents in Section 4 of the NRCS Field Office Technical Guide (FOTG) under the specific practice standard being utilized for additional information on operation and maintenance needs.

**MISCELLANEOUS COMMENTS**

Agricultural BMP Systems and associated component practices that will eliminate or provide effective treatment of one or more resource concerns may be eligible for cost-share funding. Compliance with Federal, State, and local laws should be adhered to including the potential need for construction stormwater permits, plans, and practices; other permits; as well as contacting Underground Utilities

Protection before excavation, SHPO, and others as applicable. Livestock farms that have been designated as a CAFO are required to comply with CAFO regulations.

For an ANSACP grant application, it is required to utilize the Roof Screening Tool if a covered facility is included in the grant.

**NRCS CONSERVATION PRACTICE STANDARDS TO UTILIZE***

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| NRCS Name | Standard # | Reportable Item | Date | Life Span |
|---|---|---|---|---|
| Heavy Use Area Protection | 561 | Sq. Feet | September 2021 | 10 |
| Access Control | 472 | Acres | April 2019 | 10 |
| Trails and Walkways | 575 | Feet | September 2021 | 10 |
| Fence | 382 | Feet | October 2022 | 20 |
| Access Road | 560 | Feet | March 2021 | 10 |
| Roof Runoff Structure | 558 | Number | October 2022 | 15 |
| Roofs and Covers | 367 | Number | October 2016 | 10 |
| Conservation Cover | 327 | Acre | July 2019 | 5 |
| Critical Area Planting | 342 | Acre | October 2017 | 10 |
| Vegetated Treatment Area | 635 | Acre | February 2017 | 10 |
| Diversion | 362 | Feet | May 2017 | 10 |
| Grassed Waterway | 412 | Acre | September 2021 | 10 |
| Lined Waterway or Outlet | 468 | Feet | September 2021 | 15 |
| Pumping Plant | 533 | Number | October 2022 | 15 |
| Sediment Basin | 350 | Number | May 2017 | 20 |
| Subsurface Drain | 606 | Feet | May 2020 | 20 |

| | | | | |
|---|---|---|---|---|
| Underground Outlet | 620 | Feet | September 2021 | 20 |
| Waste Separation Facility | 632 | Number | October 2022 | 15 |
| Waste Storage Facility | 313 | Number | March 2018 | 15 |
| Waste Transfer | 634 | Number | October 2022 | 15 |
| Water and Sediment Control Basin | 638 | Number | March 2019 | 10 |
| Watering Facility | 614 | Number | March 2021 | 10 |

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**REFERENCES**

- USDA NRCS FOTG for NY: https://efotg.sc.egov.usda.gov/#/state/NY/documents
- Livestock Heavy Use Area AEM Tier 2 Worksheet and Information Sheet

# Manure and Agricultural Waste Treatment System

**DEFINITION**
A System for the mechanical, chemical or biological treatment of agricultural wastes.

**WATER QUALITY PURPOSE**
Treating manure and other agricultural wastes in order to improve nutrient and pathogen management and reduce losses to surface water and groundwater.

**POLLUTANT CONTROLLED**
Nutrients, pathogens, biochemical oxygen demand (BOD), or ammonia.

**WHERE USED**
Any farm with agricultural wastes, such as manure, process wastewaters, crop residues, or other organic residues, where nutrient, pathogen, or odor management could be improved through treatment of the wastes.

**SYSTEM DESCRIPTION**
Manure and Agricultural Waste Treatment Systems encompass a broad set of technologies used to process wastes for the purposes of:

- improving ground and surface water quality by reducing the nutrient content, biochemical oxygen demand (BOD), or pathogen levels of agricultural waste;
- improving air quality by reducing odors and gaseous emissions;
- producing value added byproducts; or
- facilitating desirable waste handling, storage, or land application alternatives.

This Agricultural BMP System applies where the form and characteristics of agricultural waste make it difficult to manage, where changing the form or composition provides additional utilization alternatives, and where conventional waste management alternatives are deemed not as effective.

Systems may be comprised of one or more of the following established treatment practices:

- anaerobic digestion;
- liquid solid separation;
- biological or chemical amendments;
- manure or agricultural waste composting facility (other than animal carcass);
- waste facility cover (and flare, where applicable).

Manure and Agricultural Waste Treatment Systems are often also combined with other Agricultural BMP Systems and Component BMPs, such as waste storage and transfer, composting, vegetated treatment areas, Nutrient Management Plans, etc.

**SYSTEM EFFECTIVENESS**
Manure and Agricultural Waste Treatment Systems must be planned, designed, implemented, and maintained to address the unique set of resource concerns for each farm, so Systems will be comprised of different components and achieve varying levels of effectiveness. In general, any System that utilizes high temperatures (such as anaerobic digestion) for prolonged periods will achieve significant pathogen control and odor control, allowing for improved nutrient management, water quality protection and neighbor relations. If such a System is anaerobic, it will also result in enhanced methane

production/capture which, if flared or used for heat or electricity production, could have positive greenhouse gas and renewable energy benefits. Systems that cover manure and other wastes reduce total volume by eliminating additions from precipitation and reduce ammonia, methane, and odor compound emissions. Systems that separate the waste into liquid and solid pools allow for more precise and efficient nutrient management (pumping, drag line application, incorporation, etc.) as well as the potential for value added products (solids re-used as bedding, compost for sale off farm, lower-risk solid manure for nutrient applications in sensitive areas, etc.). Most of these Systems do not make nutrients disappear, but they concentrate, separate, etc. nutrients into forms that facilitate more efficient for re-use by crops or sale/export from the farm.

**IMPACTS ON SURFACE WATER**

Beneficial - including reduced losses of nutrients, biochemical oxygen demand (BOD), ammonia, and pathogens.

**IMPACTS ON GROUND WATER**

Beneficial - including nutrients and pathogens.

**IMPACTS ON OTHER RESOURCES (OFF-SITE)**

Soil: Beneficial if system allows more precise application of nutrients with less soil compaction. Could be neutral or negative if the system results in significant manure/waste organic matter to be sold/exported from farm and not returned to cropland.

Air: Beneficial, as it has the potential to reduce emissions of ammonia, greenhouse gas, and odor compounds. May be negative if the treatment system is not operated correctly.

Plants: Beneficial, as it can reduce nutrient losses and subsequent impacts on neighboring plant communities.

Animals: Beneficial, as it can reduce pathogen losses as well as nutrient losses and subsequent impacts on terrestrial and aquatic habitat.

Human: Beneficial, as it can further safeguard drinking water sources, improve land and water resources for recreation, reduce odor, and provide economic growth.

Energy: Beneficial, as such systems often improve the use of on-farm nutrients, thereby reducing energy for fertilizer production and transport. Some treatment systems also allow for on-farm energy production.

**ADVANTAGES TO FARM**

- Reduced nutrient losses.
- Improved productivity of crops and livestock as well as greater management flexibility.
- Can have a positive impact on farm profitability and diversify income streams.
- Improved neighbor relations.

**DISADVANTAGES TO FARM**

- High capital costs, early stage of technology, sometimes inadequate infrastructure to deliver energy to market, competition with much larger energy entities, etc. may present significant barriers to entry.
- Soil organic matter may decline if systems involve significant exports/sales of manure solids.
- Higher level of farm management required may result in increased labor and equipment costs.
- Requires significant additional time and training to adjust to new management strategies.

**SYSTEM LIFESPAN**
Variable depending on Component BMPs of the System but generally 10 years.

**COST**
Each Agricultural BMP System is unique and must be customized to the situation in which it is employed resulting in a wide and variable range in cost. The cost is variable depending on the type of manure and agricultural waste treatment system. More complex systems, such as anaerobic digestion, coupled with liquid solid separation, electricity generation, solids composting, effluent storage, and drag hose land application, can be very expensive to design, build, and operate, but allow farms to realize other economic, community, and environmental goals.

**OPERATION AND MAINTENANCE**
Each Agricultural BMP System is unique and must be customized for every situation. Very regular monitoring and maintenance are required with these systems, according to the O&M associated with the various system components.

See the documents in Section 4 of the NRCS Field Office Technical Guide (FOTG) under the specific conservation practice standard being utilized for additional information on operation and maintenance needs.

**MISCELLANEOUS COMMENTS**
Agricultural BMP Systems and associated component practices that will eliminate or provide effective treatment of one or more resource concerns may be eligible for cost-share funding. Compliance with Federal, State, and local laws should be adhered to including the potential need for construction stormwater permits, plans, and practices; other permits; as well as contacting Underground Utilities Protection before excavation, SHPO, and others as applicable. Livestock farms that have been designated as a CAFO are required to comply with CAFO regulations.

**NRCS CONSERVATION PRACTICE STANDARDS TO UTILIZE***
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| NRCS Name | Standard # | Reportable Item | Date | Life Span |
|---|---|---|---|---|
| Waste Separation Facility | 632 | Number | October 2022 | 15 |
| Waste Storage Facility | 313 | Number | March 2018 | 15 |
| Waste Transfer | 634 | Number | October 2022 | 15 |
| Waste Treatment | 629 | Number | October 2013 | 10 |
| Anaerobic Digester | 366 | Number | March 2019 | 25 |

| | | | | |
|---|---|---|---|---|
| Composting Facility | 317 | Number | September 2021 | 15 |
| Pumping Plant | 533 | Number | October 2022 | 15 |
| Roofs and Covers | 367 | Number | October 2016 | 10 |
| Heavy Use Area Protection | 561 | Sq. Feet | September 2021 | 10 |

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**REFERENCES**

- USDA NRCS FOTG for NY: https://efotg.sc.egov.usda.gov/#/state/NY/documents
- Cornell University Dairy Environmental Systems: https://cals.cornell.edu/pro-dairy/our-expertise/environmental-systems
- Greenhouse Gas Mitigation Opportunities AEM Tier 2 Worksheet
- IS#2 Dairy Manure Storage & & Greenhouse Gas Mitigation Opportunities
- IS#3 Planning for Quantitative Methane Capture & Destruction from Liquid Dairy Manure Storage

# Nutrient Management System - Cultural

**DEFINITION**
Managing the amount (rate), source, placement (method of application), and timing of plant nutrient and soil amendment applications for efficient use by crops and reduced losses to the environment. If applicable, this can include addressing the issues from farmstead areas as it relates to non-point sources of pollutants.

**WATER QUALITY PURPOSE**
To reduce or prevent nutrient losses from runoff, erosion, and leaching to surface and groundwater resources.

**POLLUTANT CONTROLLED**
Sediment, nutrients, pathogens, biochemical oxygen demand (BOD), or ammonia.

**WHERE USED**
Cropland, hayland, pasture, vegetable and fruit production, orchards, vineyards, turf, biomass production, and ornamental production, including greenhouses.

**SYSTEM DESCRIPTION**
Nutrients are managed for the economic production of crops, forages, pasture, ornamentals, and biomass, and the protection of natural resources. Cultural nutrient management consists of applying nutrients and soil amendments to crops in the right amount, right source, right method, and right timing ("the 4Rs") according to several, integrated factors:

- farm management and goals including realistic crop yields;
- an accurate estimate of crop nutrient needs;
- nutrients credits in soil and manure;
- nutrient credits from crop residues;
- risk assessments for runoff, leaching, and erosion;
- setbacks from hydrologically active areas;
- weather and soil conditions; and
- adaptive management over time.

A well-integrated Nutrient Management Plan provides recommendations for manure, fertilizer, process wastewaters, composts, or lime applications according to the factors, above. It promotes nutrient use efficiency and controls nutrient loss by focusing on the use of on-farm nutrient sources, emphasizing the 4Rs, and, in many cases, reducing nutrient imports onto farms. Nutrient Management Plan recommendations should be based on the best available research information for the soils and climate in New York State. Nutrient applications and their management should be consistent with Cornell Nutrient Guidelines.

**SYSTEM EFFECTIVENESS**
Proper nutrient management prevents excessive applications, can decrease nutrient imports on farms, and reduces the potential for nutrient loss. Long-term experimentation demonstrates that recommendations based on field research, conducted in New York, provide the best estimate of economic response and improved nutrient cycling for our conditions. Several studies from Cornell University demonstrate reductions in whole farm nutrient balances and nutrient purchases as well as nutrient losses via runoff and leaching through improved nutrient management.

Specifically, there are many management opportunities that advance conservation and crop productivity through nutrient applications made with the 4Rs, including:

- counting nitrogen credits from soil organic matter, past manure applications, and crop residues can significantly reduce the need for supplemental nitrogen fertilizer without sacrificing crop yield;
- regular soil and manure testing helps make the most of on-farm nutrient sources and better target purchased fertilizers, saving money and excess nutrient applications without sacrificing crop yield;
- on-farm tracking of soil tests, manure tests, and field records over time improves confidence in the nutrient management program and allows continual improvement through adaptive management;
- incorporating/injecting manure soon after application to a growing crop or just before planting in the spring can increase the nitrogen supply from the manure, reduce the need for supplemental nitrogen fertilizer, reduce the risk of over applying phosphorus relative to crop uptake, and reduce risk of surface runoff losses;
- considering hydrologically active areas, weather, field risk assessments, and timing of crop nutrient use to prioritize nutrient applications improves crop uptake and lowers risk of runoff or leaching;
- using cover crops scavenges nutrients remaining after the main crop, reducing losses from runoff, erosion, and leaching, as well as conserving nutrients and organic matter for the following crop;
- applying fertilizer with a method and timing to allow optimal plant uptake reduces losses and improves efficiency;
- etc.

**IMPACTS ON SURFACE WATER**

Beneficial - including nutrients, sediment, and pathogens.

**IMPACTS ON GROUND WATER**

Beneficial - including nitrogen and pathogens.

**IMPACTS ON OTHER RESOURCES (OFF-SITE)**

Soil: Beneficial, as it generally improves soil health and reduces erosion.

Air: Beneficial, as it has the potential to reduce particulate matter from ammonia volatilization and odors.

Plants: Beneficial, as it can reduce nutrient losses and subsequent impacts on neighboring plant communities.

Animals: Beneficial, as it can reduce pathogen losses as well as nutrient losses and subsequent impacts on terrestrial and aquatic habitat.

Human: Beneficial, as it can further safeguard drinking water sources, improve land and water resources for recreation, reduce odor, and provide economic growth.

Energy: Beneficial, as it can reduce use of farm fuels, energy for fertilizer manufacturing and transportation fuels for imported fertilizer and feed.

**ADVANTAGES TO FARM**

- Reduced nutrient losses and improved nutrient use efficiency.
- Improved crop yield and quality, often across the range of optimal and extreme weather conditions (improved soil health).

- Beneficial or neutral impact on farm profitability.
- Improved neighbor relations.

**DISADVANTAGES TO FARM**

- Higher level of farm management required may result in increased labor, equipment costs, and capital investment (e.g., manure storage).
- Requires additional time and training to adjust to new management strategies.
- Cost to change management may be prohibitive for some farms.

**SYSTEM LIFESPAN**

One (1) year.

**COST**

Each Agricultural BMP System is unique and must be customized to the situation in which it is employed resulting in a wide and variable range in cost. Costs depend on several factors, including the size and type of farm, existing level of farm management, history of nutrient analyses and farm records, available equipment, familiarity with custom operators, and, on livestock farms, existing manure storage and transfer capacity. Consultation fees for developing and maintaining a nutrient management plan should be considered in addition to the costs for soil testing and manure nutrient analyses.

**OPERATION AND MAINTENANCE**

Each Agricultural BMP System is unique and must be customized for every situation. The following are generally key components to the operation and maintenance of the system:

- annual updating of the nutrient management plan.
- soil testing every three years and manure analyses once per calendar year.
- records showing manure tests, date and conditions when applied, amount applied, application method, manure source, and location.
- crop management records are maintained.
- calibration of manure and fertilizer application equipment

See the documents in Section 4 of the NRCS Field Office Technical Guide (FOTG) under the specific conservation practice standard being utilized for additional information on operation and maintenance needs.

**MISCELLANEOUS COMMENTS**

See Cornell Nutrient Guidelines and the USDA-NRCS Nutrient Management Practice Standard (NY-590) for specific technical details about planning, implementation, and operation and maintenance.

Nutrient Management Plans are limited to the management of nutrients and soil health/conservation practices on fields, pastures, and in greenhouses. Comprehensive Nutrient Management Plans (CNMPs) address resource concerns across fields, pastures, and farmstead concentrated sources on livestock farms and should be given priority consideration where:

- excess nutrients are produced or imported;
- other farm related environmental concerns exist (e.g., silage leachate runoff, barnyard runoff, milkhouse wastewater, petroleum product storage, pesticide storage, mixing and loading, pesticide use and waste disposal);
- the farm has been determined to be a Concentrated Animal Feeding Operation (CAFO) by NYS Department of Environmental Conservation;
- etc.

Note: a Nutrient Management Plan (NRCS Standard 590), alone, does not meet the NYS requirements for CAFOs. A Comprehensive Nutrient Management Plan (NRCS Standard 312) must be developed for these farms.

Nutrient Management Plans, Comprehensive Nutrient Management Plans, and certain Component BMPs may be eligible for cost-sharing. Check with the local NRCS or SWCD office to determine practice eligibility and the availability of funds.

**NRCS CONSERVATION PRACTICE STANDARDS TO UTILIZE***

For the most current information on each NRCS Conservation Practice Standard, please go to the NY Field Office Technical Guide (FOTG) at https://efotg.sc.egov.usda.gov/#/state/NY/documents.
Use the drop box in the left side to reach Section 4 – Practice Standards and Supporting Documents, click on the folder for Conservation Practice Standards & Support Documents and locate the appropriate practice. Under each practice, you will find, at the minimum, the practice standard. You may also find: a Statement of Work; Practice Overview; Implementation Requirement; Conservation Practice Effects Network Diagram; and other document that will assist in the planning, installation, or operation of the practice.

| NRCS Name | Standard # | Reportable Item | Date | Life Span |
|---|---|---|---|---|
| Nutrient Management | 590 | Acre | September 2020 | 1 |

*This is a listing of the primary Component BMPs to use but is not all inclusive and other NRCS Conservation Practice Standards may be utilized. Please check with a SWCC representative for approval.

**NYS Program Lifespans (listed above in Table III) refers to the minimum time period that a program participant must perform Operation and Maintenance of an Agricultural BMP System and the Component BMPs. Alternatively, NRCS CPS Lifespans (as found in the Standards) refer to specific design criteria and defines how long a conservation practice should function under an appropriate level of Operation and Maintenance. To meet NRCS Standards, a conservation practice must be designed to meet the CPS Lifespan, and all materials and installation methods must meet or exceed the NRCS defined Lifespan criteria.

**REFERENCES**

- USDA NRCS FOTG for NY: https://efotg.sc.egov.usda.gov/#/state/NY/documents
- Cornell Nutrient Guidelines for Field Crops: http://nmsp.cals.cornell.edu/guidelines/nutrientguide.html
- Cornell Nutrient Guidelines for Vegetable Crops: https://www.vegetables.cornell.edu/crops
- Cornell Nutrient Guidelines for Grapes: https://cals.cornell.edu/cornell-agritech/products-we-research/grapes
- Cornell Nutrient Guidelines for Berries: https://cals.cornell.edu/cornell-agritech/products-we-research/berries
- Cornell Nutrient Guidelines for Tree Fruits: https://cals.cornell.edu/cornell-agritech/products-we-research/tree-fruits
- Cornell Guidelines for Greenhouses: www.greenhouse.cornell.edu
- Cornell Guidelines for Turf: https://turf.cals.cornell.edu/
- Nutrient Management: Manure and Fertilizer AEM Tier 2 Worksheet and Information Sheet

# Pathogen Management System

**DEFINITION**
Use of preventative measures, livestock management and conservation practices to provide multiple barriers to the introduction, replication, and survival of pathogens in domestic livestock and reducing the risk of pathogen contamination of surface and groundwater resources by treatment or controlling the movement of pathogens to water.

**WATER QUALITY PURPOSE**
To reduce the threat to surface and ground water from contamination by pathogenic organisms (e.g., Giardia and Cryptosporidium) found in farm animals.

**POLLUTANT CONTROLLED**
Pathogens or nutrients.

**WHERE USED**
Primarily on agricultural land (livestock and poultry operations) where a resource concern has been identified citing runoff from young stock housing or exercise lots or land receiving manure applications containing feces from infected animals which could enter a nearby watercourse.

**SYSTEM DESCRIPTION**
A Pathogen Management System Plan which incorporates a 4-barrier approach, as described below, shall be developed. The Pathogen Management Plan will address each of the four barriers. A veterinarian, or other qualified professional, utilizing the protocol from the New York State Cattle Health Assurance Program (NYSCHAP), or other similar protocols for appropriate species, shall develop the first two barriers.

The **FIRST** barrier is reducing the potential for pathogens to enter the farm. This shall be accomplished by carrying out actions such as the following:

- The testing of non-chlorinated water supplies that serve the herd or flock for fecal coliform bacteria
- Establishing appropriate biosecurity measures, including those controlling people, pets, pests and other animals, equipment or materials that may transport pathogens from other sources.
- Maintaining good hygiene and minimizing herd or flock contact with manure from other animal groups.
- Maintaining an accurate animal identification system and record of all health events

The **SECOND** barrier minimizes cross-contamination among animals and amplification of infection within a herd or flock. This shall be accomplished by actions such as:

- Keeping animal raising areas clean and dry,
- Proper worker hygiene when moving between facilities or animal groups,
- Ensuring that all feeds are stored and handled properly, and feeding utensils are clean, specifically avoiding manure contamination of feed.
- Implementing rodent and pest control programs,
- Separating pre-weaned animals to prevent direct contact with another young animal and with adult manure,
- Isolating infected animals until they are no longer infectious,

- Identifying the order in which animals should be fed (e.g., youngest to oldest, etc. depending upon the pathogen of concern).

The **THIRD** barrier provides for collection, handling, and treatment of manure and wastes appropriately to minimize the spread of the pathogens. This shall be accomplished by practices such as:

- Vegetated Treatment Areas (635) conservation practice standard to reducing runoff
- Composting (317) conservation practice standard for the composting of manures
- Animal Mortality (316) conservation practice standard for proper disposal of animal mortalities
- Waste Storage Structure (313) conservation practice standard to extension of waste storage time or isolation of waste storages to take advantage of pathogen die-off using:
    - Anaerobic Digester (366) conservation practice standard
    - Groundwater Testing (355) conservation practice standard

The **FORTH** barrier restricts movement of contaminated feces into watercourses or groundwater. This shall be accomplished by practices such as:

- Diversion (362) conservation practice standard to divert clean water away from livestock facilities
- Nutrient Management (590) conservation practice standard to spreading manure.
- Access Control (472) conservation practice standard for the exclusion of animals from waterbodies, such as streams, creeks, rivers and lakes
- Fence (382) conservation practice standard for isolating septic systems, leach fields and filter areas, and other septage disposal areas from grazing animals
- Protecting aquifer recharge areas and wellheads from manure runoff from fields
- Filter Strips (393), Riparian Forested Buffer (391) Riparian Herbaceous Cover (390) conservation practice standards

**SYSTEM EFFECTIVENESS**

Pollution prevention effectiveness increases if a multi-barrier approach is implemented that controls pathogens at the source (e.g., improved calf management) while also controlling pathogen transport on the farm (e.g., composting of infected manure) and controlling pollutants at the water course (e.g., vegetative filter strip).

**IMPACTS ON SURFACE WATER**

Potential for significant reduction in the risk of waterborne disease outbreaks from agricultural activities.

**IMPACTS ON GROUND WATER**

Actual risk of pathogens from agricultural activities polluting groundwater sources still needs to be determined. Avoiding spreading of infected manure on karst topography and within recharge areas of wells would reduce risk of well contamination.

**IMPACTS ON OTHER RESOURCES (OFF-SITE)**

Soil: Neutral.
Air: Neutral.
Plants: Beneficial, as it often also results in reduced nutrient losses which can lead to less fertilization of off-site plant communities.
Animals: Beneficial, as it can reduce pathogen losses, transmission of pathogens to wildlife, and nutrient losses all of which can impact wildlife and their habitat.

Human: Beneficial, as it can further safeguard drinking water sources and improve land and water resources for recreation.
Energy: Neutral.

**ADVANTAGES TO FARM**

- Practices to improve health and survivability of young stock can increase overall farm production, profitability, and, in some cases, labor efficiency.
- Further reduces risk of pathogen contamination of farm wells used for drinking water.

**DISADVANTAGES TO FARM**

- Some solutions may involve high costs of providing separate housing facilities for raising calves on farms.

**SYSTEM LIFESPAN**

Ten (10) years.

**COST**

Each Agricultural BMP System is unique and must be customized to the situation in which it is employed resulting in a wide and variable range in cost, from no cost to $1000 to 1500 per calf if separate housing and waste storage is needed.

**OPERATION AND MAINTENANCE**

Each Agricultural BMP System is unique and must be customized for every situation. The following are generally key components to the operation and maintenance of the system:

- periodic plan review to determine if adjustments or modifications to the plan are needed.
- inspection and maintenance of animal exclusion.
- on-going monitoring of animal health is needed to determine practice effectiveness.

See the documents in Section 4 of the NRCS Field Office Technical Guide (FOTG) under the specific conservation practice standard being utilized for additional information on operation and maintenance needs.

**MISCELLANEOUS COMMENTS**

For this System to be cost-shared, several criteria must be met. At a minimum, a Pathogen Management Plan (PMP) or a PMP included in a CNMP must be completed. All Four Tiers must be implemented for any one practice to be cost-shared. For example, to qualify for alternative calf housing (Tier 2), the farm must have implemented Tier I and agrees to implement Tier 3 and 4 during the Lifespan of the practice.

Agricultural BMP Systems and associated component practices that will eliminate or provide effective treatment of one or more resource concerns may be eligible for cost-share funding. Compliance with Federal, State, and local laws should be adhered to including the potential need for construction stormwater permits, plans, and practices; other permits; as well as contacting Underground Utilities Protection before excavation, SHPO, and others as applicable. Livestock farms that have been designated as a CAFO are required to comply with CAFO regulations.

**NRCS CONSERVATION PRACTICE STANDARDS TO UTILIZE***

For the most current information on each NRCS Conservation Practice Standard, please go to the NY Field Office Technical Guide (FOTG) at https://efotg.sc.egov.usda.gov/#/state/NY/documents.

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| NRCS Name | Standard # | Reportable Item | Date | Life Span |
|---|---|---|---|---|
| Animal Mortality Facility | 316 | Number | April 2016 | 15 |
| Composting Facility | 317 | Number | September 2021 | 15 |
| Groundwater Testing | 355 | Number | March 2021 | 1 |
| Access Control | 472 | Acres | April 2019 | 10 |
| Anaerobic Digester | 366 | Number | March 2019 | 25 |
| Fence | 382 | Feet | October 2022 | 20 |
| Heavy Use Area Protection | 561 | Sq. Feet | September 2021 | 10 |
| Waste Separation Facility | 632 | Number | October 2022 | 15 |
| Waste Storage Facility | 313 | Number | March 2018 | 15 |
| Waste Transfer | 634 | Number | October 2022 | 15 |
| Waste Treatment | 629 | Number | October 2013 | 10 |
| Vegetated Treatment Area | 635 | Acre | February 2017 | 10 |
| Nutrient Management | 590 | Acre | September 2020 | 1 |
| Roofs and Covers | 367 | Number | October 2016 | 10 |
| Diversion | 362 | Feet | May 2017 | 10 |

*This is a listing of the primary Component BMPs to use but is not all inclusive and other NRCS Conservation Practice Standards may be utilized. Please check with a SWCC representative for approval.

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**REFERENCES**

- USDA NRCS FOTG for NY: https://efotg.sc.egov.usda.gov/#/state/NY/documents
- NYS Cattle Health Assurance Program: http://nyschap.vet.cornell.edu
- Water Borne Pathogens AEM Tier 2 Worksheet and Information Sheet

# Petroleum and Oil Products Storage System

**DEFINITION**
An oil and petroleum product storage tank is a stationary facility which may include one or more above ground tanks, underground tanks, or a combination of both, for the storage, transfer, and usage of liquid oil or oil products such as diesel fuel, gasoline, kerosene, fuel oil, lubrication oil, hydraulic oil, crop oil, vegetable oil, waste oils, or animal fat. A Petroleum and Oil Products Storage System involves planning, implementation of standard operating procedures, proper tank siting, design and installation, spill and overfill prevention, leak monitoring and inspection, secondary containment, operation and maintenance, and emergency action planning.

**WATER QUALITY PURPOSE**
To prevent contamination of surface and groundwater from oil product storage facility leaks and spills.

**POLLUTANT CONTROLLED**
Petroleum/oil products and biochemical oxygen demand (BOD) (for organic oil products).

**WHERE USED**
On agricultural operations where liquid oil products are stored or utilized, and a resource concern has been identified.

**SYSTEM DESCRIPTION**
This System consists of a combination of one or more of the following depending on the water quality risk posed by the storage facility as well as the regulatory requirements defined by NYS DEC and USEPA:

1. Proper storage tank siting – includes consideration of soil characteristics (corrosivity, permeability, bearing capacity, etc.), depth to groundwater, distance from a surface waterbody or drinking water well, location of floodplains, vehicular traffic patterns around the tank site, and distance from existing and planned farm buildings.

2. Proper tank design and installation – includes the use of corrosion resistant tanks and pipes (i.e., tank contains label that it conforms with 6 NYCRR Part 614), double wall tanks with wall thickness of at least 7/16th inch to protect against ballistics, steel posts to protect against vehicular traffic, anchoring or diking to avoid floatation in areas subject to flooding, a roof over tank to exclude rain water, etc., and utilizing an experienced tank installer who is familiar with state petroleum tank installation requirements.

3. Spill and overfill prevention equipment – includes color coding of fill ports, operating and shutoff valves, gauges and high-level alarms, automated shutoff devices, tank labels (showing design and working capacity), spill catchment basin for fill ports of underground storage tanks.

4. Leak monitoring and tank inspection – includes checking of aboveground tank for corrosion and leaks, installing underground piping access ports for leak testing, installing a concrete pad under aboveground tanks to detect levels and installation of a monitoring well (e.g., 4" slotted plastic pipe) between underground storage tank and secondary containment barrier.

5. Secondary containment barrier – includes aboveground engineered dikes, curbs, liners, or diversion system designed to contain spills from above-ground tank rupture, overfills, vandals and

equipment failure. Also included are drainage provisions for storm water that accumulates within the dike, curb or liner and installing double-wall tanks.

6. Spill emergency response plan – includes a written emergency plan at the storage facility location that shows action to be taken in case of a spill, leak, fire or explosion. Cleanup equipment should also be available at the site.

**SYSTEM EFFECTIVENESS**
When properly designed, installed, maintained, and managed this System may significantly reduce the risk of a contamination event occurring from the spill or leak of an oil product.

**IMPACTS ON SURFACE WATER**
Beneficial as a complete System should greatly reduce the risk of contaminants from reaching a surface water body.

**IMPACTS ON GROUND WATER**
Beneficial as a complete System should greatly reduce the risk of contaminants from reaching groundwater.

**IMPACTS ON OTHER RESOURCES (OFF-SITE)**
Soil**:** Beneficial by reducing the risk of leaks and spills that could contaminate soil.
Air**:** Neutral.
Plants**:** Beneficial as movement of product offsite following a major spill or leak could destroy vegetation.
Animals**:** Beneficial as movement of product offsite could have a detrimental effect on animal health and habitat.
Human**:** Beneficial by reducing the risk of health impacts through contamination of water and air resources.
Energy**:** Neutral.

**ADVANTAGES TO FARM**
- May provide direct protection to farmstead water supply if water source is a well.
- Can save product.
- May reduce farmer liability.

**DISADVANTAGES TO FARM**
- Requires continuous monitoring for potential leakage.

**SYSTEM LIFESPAN**
Ten (10) years.

**COST**
Each Agricultural BMP System is unique and must be customized for every situation in which it is employed resulting in a wide and variable range in cost. Factors impacting cost may include site characteristics, and the number of upgrades or add-ons to the system are required to reduce risk or comply with regulations.

**OPERATION AND MAINTENANCE**

Each Agricultural BMP System is unique and must be customized for every situation. The following are generally key components to the operation and maintenance of the system:

- Daily inspection for leaks either visually or check of leak monitoring system.
- All applicable State and Federal regulations and manufacturers recommendations regarding operation and maintenance and record keeping will be followed.
- An emergency action plan should be developed and may be required for certain threshold volumes.

See documents in Section 4 of the NRCS Field Office Technical Guide (FOTG) under the specific conservation practice standard being utilized for additional information on operation and maintenance needs.

**MISCELLANEOUS COMMENTS**

Agricultural BMP Systems and associated component practices that will eliminate or provide effective treatment of one or more resource concerns may be eligible for cost-share funding. Compliance with Federal, State, and local laws should be adhered to including the potential need for construction stormwater permits, plans, and practices; other permits; as well as contacting Underground Utilities Protection before excavation, SHPO, and others as applicable. Livestock farms that have been designated as a CAFO are required to comply with CAFO regulations.

Leaks from underground petroleum storage are difficult to detect especially since most of the tanks installed on farms lack a leak monitoring system. Also, most landowners are unaware of the significant groundwater contamination risk to their own water supply posed by these storage tanks.

Farms with certain types and capacities of petroleum or oil product storages are required to comply with the NYS Department of Environmental Conservation (DEC) Petroleum Bulk Storage (PBS) regulation or the US EPA's Spill Prevention, Control, and Countermeasure (SPCC) regulation. To absolutely determine whether a farm is regulated under PBS or SPCC and the regulatory requirements for each, please visit these web sites: www.dec.ny.gov/chemical/287.html
www.epa.gov/ceppo/web/content/spcc/

**NRCS CONSERVATION PRACTICE STANDARDS TO UTILIZE***

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| NRCS Name | Standard # | Reportable Item | Date | Life Span |
|---|---|---|---|---|
| On-Farm Secondary Containment Facility | 319 | Number | October 2022 | 15 |
| Access Road | 560 | Feet | March 2021 | 10 |

| | | | | |
|---|---|---|---|---|
| Access Control | 472 | Acre | April 2019 | 10 |
| Heavy Use Area Protection | 561 | Sq. Feet | September 2021 | 10 |
| Conservation Cover | 327 | Acre | July 2019 | 5 |

*This is a listing of the primary Component BMPs to use but is not all inclusive and other NRCS Conservation Practice Standards may be utilized. Please check with a SWCC representative for approval.

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**REFERENCES**

- USDA NRCS FOTG for NY: https://efotg.sc.egov.usda.gov/#/state/NY/documents
- NYS Department of Environmental Conservation (DEC) Petroleum Bulk Storage (PBS) regulation: www.dec.ny.gov/chemical/287.html
- US EPA’s Spill Prevention, Control, and Countermeasure (SPCC) regulation: www.epa.gov/ceppo/web/content/spcc/
- Petroleum and Oil Products Storage AEM Tier 2 Worksheet and information Sheet

# Prescribed Rotational Grazing System

**DEFINITION**
A Prescribed Rotational Grazing System using 5 or more paddocks for a grazing season, alternating paddocks to allow for forage vigor and re-growth. Livestock graze for no more than 7 days before they are rotated to another paddock.

**WATER QUALITY PURPOSE**
To prevent soil erosion; reduce water runoff that may transport nutrients, sediments, and pathogens; and allow for the management of animal manure and nutrients.

**POLLUTANT CONTROLLED**
Sediment, nutrients, pathogens, biochemical oxygen demand (BOD), or ammonia.

**WHERE USED**
On continuously grazed pastures, and fields including cropland that can be converted to pasture where a resource concern has been identified.

**SYSTEM DESCRIPTION**
A Prescribed Rotational Grazing System involves subdividing pastures and hayfields into grazing units called paddocks. The size and number of paddocks depend on the level of pasture productivity, stocking rate of livestock, and the residency period in the paddock. Individual paddocks are grazed for a period long enough to harvest available forage, and then rotated to allow optimal re-growth of the forage before livestock are returned to the paddock. Livestock may be moved as often as twice per day but at least once per week. The frequent rotation of livestock allows forage to recover from grazing, permitting plant re-growth and resulting in increased plant productivity.

**SYSTEM EFFECTIVENESS**
Many of the resource concerns associated with livestock on pasture are the result of overgrazing and allowing livestock direct access to surface waterbodies. When comparing Prescribed Rotational Grazing Systems to continuous grazing, forage quality is improved, and ground cover is increased reducing erosion and runoff potential. Prescribed Rotational Grazing Systems reduce the time livestock spend grazing on any single paddock and improve the uniformity of manure and urine deposition over the pasture allowing for improved plant utilization and reduced runoff of nutrients. Controlled grazing pressure increases the quality and quantity of forage, thereby reducing the fiber content in manure and increasing the speed of manure decomposition. Livestock manure from a prescribed rotational grazing system is less likely to cause surface water pollution compared to a continuous grazing system. Because Prescribed Rotational Grazing Systems improve overall pasture yields, farmers can fence out riparian areas, wetlands, and other areas adjacent to waterbodies and still meet or exceed their pasture requirements.

**IMPACTS ON SURFACE WATER**
Beneficial as the practices reduces erosion and water runoff that may transport nutrients, sediment, and pathogens to waterbodies.

**IMPACTS ON GROUND WATER**
Beneficial as the System can improve the distribution of nutrients across a farm, address areas of livestock concentration, and result in a conversion of row crop acres to perennial pasture seedings.

**IMPACTS ON OTHER RESOURCES (OFF-SITE)**

Soil: Beneficial by reducing erosion, sedimentation, and improving or maintaining soil quality.
Air: Beneficial as it has the potential to reduce motorized equipment use and sequester carbon.
Plants: Neutral.
Animals: Beneficial as it may provide or improve wildlife habitat.
Human: Beneficial as farmers have reported positive comments from their nonfarm neighbors who like seeing livestock out on lush green pasture.
Energy: Beneficial by allowing livestock to harvest their own feed and spread their own manure saving fossil fuels in the process.

**ADVANTAGES TO FARM**

- It allows for the recovery of the economic investment in 1 to 5 years.
- Promotes harvest efficiency thus maximizing animal production per acre.
- Has the potential to lower annual feed costs and reduce dependence on purchased feeds.
- Proper implementation can improve forage quality, species composition, and yield.
- Can reduce energy, labor and equipment requirements.
- Practice has the potential to improve livestock health.

**DISADVANTAGES TO FARM**

- Requires a high degree of management skills.
- May be necessary to install stabilized stream crossing and alternative water supplies to provide livestock access to all grazed forage resources while protecting riparian areas and waterbodies.
- Requires a fencing system to subdivide existing pastures.

**SYSTEM LIFESPAN**

Ten (10) years.

**COST**

Each Agricultural BMP System is unique and must be customized to the situation in which it is employed resulting in a wide and variable range in cost. Some factors which will influence cost include:

- the number and type of livestock;
- system design, including the number and size of paddocks;
- the need for and design of watering facilities;
- pasture improvement needs such as seeding, lime, fertilizer, and pest management; laneway and stream crossing needs; and
- the amount and condition of existing fence.

**OPERATION AND MAINTENANCE**

Each Agricultural BMP System is unique and must be customized for every situation. The following are generally key components to the operation and maintenance of the system:

- Soil analysis on at least a 3-year rotation to determine pH and fertility needs.
- Periodic forage analyses from actual pasture samples should be done about 3 times throughout the growing season.
- Excess forage growth (spring flush) must be captured either by mechanically harvesting or allowing another livestock group to graze it.
- Paddocks must be rotated according to forage growth stage.
- Basic maintenance as needed to fences, laneways, crossings, and watering stations.

See the documents in Section 4 of the NRCS Field Office Technical Guide (FOTG) under the specific conservation practice standard being utilized for additional information on operation and maintenance needs.

**MISCELLANEOUS COMMENTS**
Agricultural BMP Systems and associated component practices that will eliminate or provide effective treatment of one or more resource concerns may be eligible for cost-share funding. Compliance with Federal, State, and local laws should be adhered to including the potential need for construction stormwater permits, plans, and practices; other permits; as well as contacting Underground Utilities Protection before excavation, SHPO, and others as applicable. Livestock farms that have been designated as a CAFO are required to comply with CAFO regulations.

Stream crossing or disturbance of stream banks may require a permit.

**NRCS CONSERVATION PRACTICE STANDARDS TO UTILIZE***
For the most current information on each NRCS Conservation Practice Standard, please go to the NY Field Office Technical Guide (FOTG) at https://efotg.sc.egov.usda.gov/#/state/NY/documents.
Use the drop box in the left side to reach Section 4 – Practice Standards and Supporting Documents, click on the folder for Conservation Practice Standards & Support Documents and locate the appropriate practice. Under each practice, you will find, at the minimum, the practice standard. You may also find: a Statement of Work; Practice Overview; Implementation Requirement; Conservation Practice Effects Network Diagram; and other document that will assist in the planning, installation, or operation of the practice.

| NRCS Name | Standard # | Reportable Item | Date | Life Span |
|---|---|---|---|---|
| Prescribed Grazing | 528 | Acre | May 2018 | 1 |
| Pasture and Hay Planting | 512 | Acre | March 2022 | 5 |
| Forage Harvest Management | 511 | Acre | September 2021 | 1 |
| Fence | 382 | Feet | October 2022 | 20 |
| Field Border | 386 | Acre | October 2017 | 10 |
| Trails and Walkways | 575 | Feet | September 2021 | 10 |
| Watering Facility | 614 | Number | March 2021 | 10 |
| Livestock Pipeline | 516 | Feet | March 2021 | 20 |
| Pumping Plant | 533 | Number | October 2022 | 15 |
| Structure for Water Control | 587 | Number | March 2019 | 20 |
| Water Well | 642 | Number | March 2021 | 20 |
| Spring Development | 574 | Number | September 2021 | 20 |

| | | | | |
|---|---|---|---|---|
| Pond | 378 | Number | May 2018 | 20 |
| Access Road | 560 | Feet | March 2021 | 10 |
| Access Control | 472 | Acre | April 2019 | 10 |
| Grazing Land Mechanical Treatment | 548 | Acre | May 2011 | 1 |
| Brush Management | 314 | Acre | March 2018 | 10 |
| Herbaceous Weed Treatment | 315 | Acre | April 2021 | 5 |
| Heavy Use Area Protection | 561 | Sq. Feet | September 2021 | 10 |
| Stream Crossing | 578 | Number | January 2023 | 10 |
| Subsurface Drain | 606 | Feet | May 2020 | 20 |
| Underground Outlet | 620 | Feet | September 2021 | 20 |

*This is a listing of the primary Component BMPs to use but is not all inclusive and other NRCS Conservation Practice Standards may be utilized. Please check with a SWCC representative for approval.

**NYS Program Lifespans (listed above in Table III) refers to the minimum time period that a program participant must perform Operation and Maintenance of an Agricultural BMP System and the Component BMPs. Alternatively, NRCS CPS Lifespans (as found in the Standards) refer to specific design criteria and defines how long a conservation practice should function under an appropriate level of Operation and Maintenance. To meet NRCS Standards, a conservation practice must be designed to meet the CPS Lifespan, and all materials and installation methods must meet or exceed the NRCS defined Lifespan criteria.

**REFERENCES**

- USDA NRCS FOTG for NY: https://efotg.sc.egov.usda.gov/#/state/NY/documents
- Pasture Management AEM Tier 2 Worksheet and Information Sheet

# Process Wash Water Management System

**DEFINITION**
A System designed for the collection, storage, treatment and disposal of effluents from processes on farms that include milking centers, horse washing, egg washing, vegetable washing and fruit washing. They may contain milk solids, nutrients, liniments, organic matter and soil along with detergents, acid rinses and sanitizer, all mixed with a quantity of water. This System is not applicable for wash water containing manure and other animal waste or for wash water from commercial processing like cheese production or vegetable or fruit processing (like vineyard waste).

**WATER QUALITY PURPOSE**
To reduce the organic and nutrient component of the liquid waste from regular processes on a farm, into receiving waters.

**POLLUTANT CONTROLLED**
Primarily biodegradable organics and soluble phosphorous. Secondary pollutants include ammonia, nitrates, or pathogens.

**WHERE USED**
On operations where water is used to assist in the on-farm processing or clean-up of organic materials in areas such as milking centers, horse barns, egg farms or produce washing facilities that are not part of a value-added operations (such as cheese or wine making, commercial processing, etc.) or that require a NYS SPEDES Permit or are deemed to be a point source of pollution.

**SYSTEM DESCRIPTION**
The System is composed of an area where water is used to either clean up the barn or facility or is used to clean the animals or products. The wastewater is collected and then treated by a combination of tanks for settling of materials, transfer to proper waste storage structures, daily or periodic spreading or treatment by the use of vegetative measures or a combination there of.

**SYSTEM EFFECTIVENESS**
These Systems can be very effective in the removal of organic material including milk solids, soil, nutrients and some chemicals when properly installed and maintained on a regular basis or incorporated into a waste management system and land applied in accordance with a Nutrient Management Plan.

**IMPACTS ON SURFACE WATER**
Beneficial - Reduces phosphorous, fecal coliform and organics loading.

**IMPACTS ON GROUND WATER**
Beneficial if sited properly and care is given to avoid areas of shallow bedrock or groundwater.

**IMPACTS ON OTHER RESOURCES**

Soil: Beneficial by adding nutrients when applied in accordance with a Nutrient Management Plan.
Air: Negative if system is not operated or managed properly.
Plants: Beneficial.
Animals: Neutral.
Human: Beneficial as system protect water quality.

Energy: Negative to Beneficial depending on the system designed and its additional energy use or energy saving.

**ADVANTAGES TO FARM**

- Can be treated separately and does not need to add additional water to manure system.
- Can be made to perform with gravity and be relatively management free.
- Can be relatively inexpensive.

**DISADVANTAGES TO FARM**

- Some systems need high level of management to perform correctly.
- May require additional pumps and tanks that require clean-out and maintenance on a regular basis.
- Can be expensive if major modification to the existing infrastructure is required.

**SYSTEM LIFESPAN**

Ten (10) years.

**COST**

Each Agricultural BMP System is unique and must be customized to the situation in which it is employed resulting in a wide and variable range in cost. Cost can run from $3,000 to $45,000 depending on the complexity of the system and the material to be treated.

**OPERATION AND MAINTENANCE**

Each Agricultural BMP System is unique and must be customized for every situation. The following are generally key components to the operation and maintenance of the system:

- Tanks installed in the system for settling of solids, collection of milk fats, etc. need to be emptied on a regular basis.
- Pumps need to be monitored, maintained and or replaced.
- Vegetated treatments need to be mowed and material removed.
- Flocculation systems need to be emptied and maintained.

See the documents in Section 4 of the NRCS Field Office Technical Guide (FOTG) under the specific practice standard being utilized for additional information on operation and maintenance needs.

**MISCELLANEOUS COMMENTS**

Agricultural BMP Systems and associated component practices that will eliminate or provide effective treatment of one or more resource concerns may be eligible for cost-share funding. Compliance with Federal, State, and local laws should be adhered to including the potential need for construction stormwater permits, plans, and practices; other permits; as well as contacting Underground Utilities Protection before excavation, SHPO, and others as applicable. Livestock farms that have been designated as a CAFO are required to comply with CAFO regulations.

**NRCS CONSERVATION PRACTICE STANDARDS TO UTILIZE***

For the most current information on each NRCS Conservation Practice Standard, please go to the NY Field Office Technical Guide (FOTG) at https://efotg.sc.egov.usda.gov/#/state/NY/documents.
Use the drop box in the left side to reach Section 4 – Practice Standards and Supporting Documents, click on the folder for Conservation Practice Standards & Support Documents and locate the appropriate practice. Under each practice, you will find, at the minimum, the practice standard. You may also find: a Statement of Work; Practice Overview; Implementation Requirement; Conservation Practice Effects

Network Diagram; and other document that will assist in the planning, installation, or operation of the practice.

| NRCS Name | Standard # | Reportable Item | Date | Life Span |
|---|---|---|---|---|
| Vegetated Treatment Area | 635 | Acres | February 2017 | 10 |
| Waste Separation Facility | 632 | Number | October 2022 | 15 |
| Waste Transfer | 634 | Number | October 2022 | 15 |
| Pumping Plant | 533 | Number | October 2022 | 15 |
| Waste Storage Facility | 313 | Number | March 2018 | 15 |
| Structure for Water Control | 587 | Number | March 2019 | 20 |
| Subsurface Drain | 606 | Feet | May 2020 | 20 |
| Heavy Use Area Protection | 561 | Sq. Feet | September 2021 | 10 |

*This is a listing of the primary Component BMPs to use but is not all inclusive and other NRCS Conservation Practice Standards may be utilized. Please check with a SWCC representative for approval.

**NYS Program Lifespans (listed above in Table III) refers to the minimum time period that a program participant must perform Operation and Maintenance of an Agricultural BMP System and the Component BMPs. Alternatively, NRCS CPS Lifespans (as found in the Standards) refer to specific design criteria and defines how long a conservation practice should function under an appropriate level of Operation and Maintenance. To meet NRCS Standards, a conservation practice must be designed to meet the CPS Lifespan, and all materials and installation methods must meet or exceed the NRCS defined Lifespan criteria.

**REFERENCES**


- USDA NRCS FOTG for NY: https://efotg.sc.egov.usda.gov/#/state/NY/documents
- Process Wash Water AEM Tier 2 Worksheet and Information Sheet

# Riparian Buffer System

**DEFINITION**
An area of grasses, sedges, rushes, ferns, legumes, forbs, shrubs, or trees tolerant of intermittent flooding or saturated soils located adjacent to and up-gradient from waterbodies.

**WATER QUALITY PURPOSE**
To intercept surface runoff, subsurface flow and shallow groundwater flow from agricultural sources in order to reduce excess amounts of pollutants. Systems can be used to create shade to lower or maintain surface water temperature, and to reduce pesticide drift from entering a waterbody.

**POLLUTANT CONTROLLED**
Sediment, nutrients, pesticides, biochemical oxygen demand (BOD), or thermal modification.

**WHERE USED**
This System can be applied to agricultural lands adjacent to permanent or intermittent waterbodies where a resource concern has been identified. This System is not applied to stabilize stream banks or shorelines, as a standalone System; this System and Component BMPs may be used in conjunction with the Stream Corridor and Shoreline Management System to aid in the stabilization of stream banks or shorelines.

**SYSTEM DESCRIPTION**
A Riparian Buffer System consists of an area containing a variety of vegetation situated between agricultural lands and waterbodies that are designed to filter surface runoff and shallow groundwater by encouraging sheet flow and infiltration and impede concentrated flow. The type and extent of vegetation is suited to the soil and hydrology of the site and for the water quality purpose. Up to three distinct zones may be employed to achieve desired results. In all cases livestock must be excluded or controlled. Appropriate site preparation is essential to establishing desired vegetation, and practices that promote the vigor and reproduction of desired plant species, including pest management, may be employed. In addition, excessive sheet-rill and concentrated flow erosion may need to be controlled in the areas immediately adjacent and up-gradient of the buffer area.

**SYSTEM EFFECTIVENESS**
A Riparian Buffer System will be most effective when used as a component of an overall conservation system including nutrient management, pest management, and runoff, sediment and erosion control practices. The filtering effects of riparian buffers are most effective when used in conjunction with erosion reducing management practices. Riparian buffers can be very effective for sediment and sediment-bound pollutant removal with trapping efficiencies exceeding 50%. Riparian buffers are less effective at removing soluble phosphorous or nitrates.

**IMPACTS ON SURFACE WATER**
Beneficial – this System does not generally address pollutants at the source (thermal modification is an exception), but “polishes” surface runoff by removing additional amounts of pollutants such as sediment, soil attached nutrients, and organic matter.

**IMPACTS ON GROUND WATER**
Neutral – It may be beneficial in areas where groundwater is recharged directly from surface waterbodies or there is a direct surface connection to groundwater.

**IMPACTS ON OTHER RESOURCES (OFF-SITE)**

Soil: Neutral.
Air: Beneficial by increasing carbon storage in plant biomass and soils.
Plants: Neutral.
Animals: Beneficial by improving riparian habitat and potentially providing a source of detritus and large woody debris. Provides food and cover for fish, wildlife, and livestock. Establish and maintain habitat corridors. Enhance pollen, nectar, and nesting habitat for pollinators. Improves overall surface water quality.
Human: Increase water storage on flood plains potentially reducing flood impacts.
Energy: Neutral.

**ADVANTAGES TO FARM**

- Provides a low cost, cost-effective approach to treat agricultural runoff.
- Restore, improve, or maintain riparian plant communities.
- May provide a buffer for cropland and farm infrastructure from flood damage.

**DISADVANTAGES TO FARM**

- May take cropland and pasture out of production.
- Requires a large land area.

**SYSTEM LIFESPAN**

Ten (10) years.

**COST**

Each Agricultural BMP System is unique and must be customized to the situation in which it is employed resulting in a wide and variable range in cost. Factors impacting costs may include buffer length, width, types of vegetation, and the need for associated practices to exclude livestock or maintain sheet flow.

**OPERATION AND MAINTENANCE**

Each Agricultural BMP System is unique and must be customized to the situation. The following are generally key components to the operation and maintenance of the system:

- Inspections conducted annually and immediately following severe storms for evidence of sediment deposit, erosion, or concentrated flow channels.
- Avoid use of fertilizers, pesticides, other chemicals, vehicular traffic or disturbance of vegetation and litter inconsistent with erosion control and buffering objectives.
- Portions of the buffer may need to be periodically mowed and the clippings removed to promote dense vegetative growth and removal of nutrients.

See the documents in Section 4 of the NRCS Field Office Technical Guide (FOTG) under the specific conservation practice standard being utilized for additional information on operation and maintenance needs.

**MISCELLANEOUS COMMENTS**

Agricultural BMP Systems and associated component practices that will eliminate or provide effective treatment of one or more resource concerns may be eligible for cost-share funding. Compliance with Federal, State, and local laws should be adhered to including the potential need for construction stormwater permits, plans, and practices; other permits; as well as contacting Underground Utilities Protection before excavation, SHPO, and others as applicable. Livestock farms that have been designated as a CAFO are required to comply with CAFO regulations.

Some activities may require stream disturbance or wetlands permits.

**NRCS CONSERVATION PRACTICE STANDARDS TO UTILIZE***

For the most current information on each NRCS Conservation Practice Standard, please go to the NY Field Office Technical Guide (FOTG) at https://efotg.sc.egov.usda.gov/#/state/NY/documents.
Use the drop box in the left side to reach Section 4 – Practice Standards and Supporting Documents, click on the folder for Conservation Practice Standards & Support Documents and locate the appropriate practice. Under each practice, you will find, at the minimum, the practice standard. You may also find: a Statement of Work; Practice Overview; Implementation Requirement; Conservation Practice Effects Network Diagram; and other document that will assist in the planning, installation, or operation of the practice.

| NRCS Name | Standard # | Reportable Item | Date | Life Span |
|---|---|---|---|---|
| Riparian Forest Buffer | 391 | Acre | September 2021 | 15 |
| Riparian Herbaceous Cover | 390 | Acre | May 2011 | 5 |
| Tree/Shrub Establishment | 612 | Acre | April 2017 | 15 |
| Tree/Shrub Site Preparation | 490 | Acre | September 2021 | 1 |
| Conservation Cover | 327 | Acre | July 2019 | 5 |
| Critical Area Planting | 342 | Acre | October 2017 | 10 |
| Stream Crossing | 578 | Number | January 2023 | 10 |
| Access Control | 472 | Acre | April 2019 | 10 |
| Access Road | 560 | Feet | March 2021 | 10 |
| Trails & Walkways | 575 | Feet | September 2021 | 10 |
| Brush Management | 314 | Acre | March 2018 | 10 |
| Fence | 382 | Feet | October 2022 | 20 |
| Filter Strip | 393 | Acre | October 2017 | 10 |
| Pasture and Hay Planting | 512 | Acre | March 22 | 5 |
| Grassed Waterway | 412 | Acre | September 2021 | 10 |
| Herbaceous Weed Treatment | 315 | Acre | April 2021 | 5 |
| Pest Management Conservation System | 595 | Acre | September 2020 | 1 |
| Structure for Water Control | 587 | Number | March 2019 | 20 |
| Lined Waterway or Outlet | 468 | Feet | September 2021 | 15 |

| | | | | |
|---|---|---|---|---|
| Water & Sediment Control Basin | 638 | Number | March 2019 | 10 |

*This is a listing of the primary Component BMPs to use but is not all inclusive and other NRCS Conservation Practice Standards may be utilized. Please check with a SWCC representative for approval.

**NYS Program Lifespans (listed above in Table III) refers to the minimum time period that a program participant must perform Operation and Maintenance of an Agricultural BMP System and the Component BMPs. Alternatively, NRCS CPS Lifespans (as found in the Standards) refer to specific design criteria and defines how long a conservation practice should function under an appropriate level of Operation and Maintenance. To meet NRCS Standards, a conservation practice must be designed to meet the CPS Lifespan, and all materials and installation methods must meet or exceed the NRCS defined Lifespan criteria.

**REFERENCES**

- USDA NRCS FOTG for NY: https://efotg.sc.egov.usda.gov/#/state/NY/documents
- Stream and Floodplain Management AEM Tier 2 Worksheet and Information Sheet

# Short-Term Waste Collection and Transfer System

**DEFINITION**
A System designed for the collection, transfer, and short-term storage for up to 60 days of generated or imported agricultural materials, including manure, by-products, process wastewater, or organic material being utilized as a land applied nutrient source or amendment rather than animal feed or bedding.

Waste is a Natural Resources Conservation Service - Conservation Practice Standard term used in reference to manure, agricultural by-products, wastewater, and contaminated runoff from agricultural production or processing.

**WATER QUALITY PURPOSE**
To reduce surface and subsurface loss of nutrients from concentrated livestock areas, manure, or other agricultural materials.

**POLLUTANT CONTROLLED**
Nutrients, pathogens, or organics.

**WHERE USED**
This Agricultural BMP System is designed, aligned, and intended to serve both Animal Feeding Operations (AFOs), such as a smaller dairy, beef, horse, sheep, and goat farms, as well as crop farms. Concentrated Animal Feeding Operation (CAFO)-permitted farms are directed to plan and implement NRCS CPS Waste Transfer (634) or NRCS CPS Waste Storage Facility (313) using the Waste Storage and Transfer System.

The System, described above, is appropriate for all situations on farms where agricultural materials, such as manure, by-products, process wastewater, or organic material are currently managed such that a resource concern has been identified; and where the proper collection, transfer, and short-term storage of materials is recommended to address resource concerns and improve nutrient utilization.

The purpose of this System is to aid daily spread farms (or farms receiving imported agricultural materials) in addressing primarily farmstead nutrient management resource concerns, as well as improving application flexibility to fields and pastures, given factors such as weather, seasonal workload, crop management timing, or field conditions. Properly collecting, transferring, and storing agricultural materials around farmstead facilities will protect adjacent resources, as well as organize and efficiently support manure transfer and targeted field applications. Due to the short-term storage duration, the System requires regular monitoring of manure or material amounts in the storage and applications to fields based on the Farm's Nutrient Management Plan.

This System is not used to contain and facilitate an aerobic microbial ecosystem for the decomposition of manure, other organic material, or both. Thus, NRCS CPS Composting Facility (317) is not an allowable BMP in a Short-Term Waste Collection and Transfer System, because the limited duration does not effectively support biological processes necessary for proper composting.

This System may be utilized to address resource concerns associated with existing barns, bedded pack facilities, and heavy use areas. The Waste Storage and Transfer System would be appropriate if a new or future bedded pack / composted bedded pack system is planned and necessary to treat the resource concerns.

**SYSTEM DESCRIPTION**
The System may be composed of multiple component practices that collect agricultural materials and effectively transfer materials to application equipment or to a structural NRCS CPS Waste Storage Facility (313). System design is dependent upon the farm, site location and management considerations.

Systems may address one or multiple manure sources or imported agricultural materials and their existing transfer areas; collection of multiple sources to one appropriately planned NRCS CPS Waste Storage Facility (313) or multiple Waste Storage Facilities per each source is allowed.

Depending on the existing agricultural material's consistency (i.e., solid, semi-solid, liquid), consider the implications of storing waste, environmental inputs (precipitation), or combining variable waste streams of different consistency. System design will depend upon the existing manure handling equipment or will include provisions for procuring alternative equipment (e.g., solid vs. liquid manure spreader).

NRCS CPS Roofs and Covers (367) is required to exclude clean water and maintain appropriate manure moisture content for solid / semi-solid NRCS CPS Waste Storage Facilities (313). Excessive moisture will increase the potential for air emissions of volatile organic compounds, ammonia, and nitrous oxide, and may lead to anaerobic conditions, which will increase the potential for emissions of methane and hydrogen sulfide.

NRCS CPS Roofs and Covers (367) is not required for liquid NRCS CPS Waste Storage Facilities (313).

Consider a minimum storage duration capacity of 30 days of agricultural materials. Systems designed to manage materials below the minimum storage duration capacity may become overwhelmed easily, possibly resulting in resource concerns at the transfer or storage areas.

Future planning considerations: compatibility with future, longer-duration Waste Storage and Transfer Systems should be considered when siting and sizing Short-Term Waste Collection and Transfer Systems.

To both address the farmstead resource concerns and properly recycle nutrients on fields and pastures, Short-Term Waste Collection and Transfer Systems proposed for NYS SWCC Funding Programs shall have one of the following plan types completed before submitting the project for program application and a complete system meeting all NRCS Standards must result:

- *AEM Tier 3A Farmstead + Nutrient Management-Core Plan combination or*
    - *Requires a Certified Crop Adviser*
    - *See details below regarding use of The NYS Soil and Water Conservation Committee Short-Term Waste Collection and Transfer System Modified NRCS CPS Waste Storage Facility (313) Policy*
- *AEM Tier 3A Farmstead + Full 590 Nutrient Management Plan combination or*
    - *Requires an AEM Certified Planner*
- *CNMP*
    - *Requires an AEM Certified Planner*

This Policy does not require a Comprehensive Nutrient Management Plan (CNMP) for the planning and implementation of NRCS CPS Waste Storage Facilities (313) included in this BMP System with a storage duration less than 60 days of farm generated or imported agricultural materials.

NRCS CPS Waste Storage Facilities (313) planned and designed without a Full NRCS CPS Nutrient Management Plan (590) or a Comprehensive Nutrient Management Plan would not meet all requirements of the (313) Standard and would not be eligible for Federal Cost-Share Programs.

**SYSTEM EFFECTIVENESS**
NRCS CPS Waste Transfer (634) is effective in reducing losses from agricultural materials (especially where runoff potential or leaching potential risk is high) by properly collecting, controlling, and conveying materials around farmstead facilities to either manure application equipment or a NRCS CPS Waste Storage Facility (313)

NRCS CPS Waste Transfer (634) paired with a short-term NRCS CPS Waste Storage Facilities (313) is also effective in reducing loss of nutrients and pathogens by safely storing agricultural materials during critical runoff periods and applying materials and nutrients under the guidelines of the Farm's Nutrient Management Plan.

**IMPACTS ON SURFACE WATER**
Beneficial when agricultural materials and nutrients are applied in accordance with a Nutrient Management Plan and NRCS CPS Waste Transfers (634) and NRCS CPS Waste Storage Facilities (313) are designed and operated according to the Plan.

**IMPACTS ON GROUND WATER**
Beneficial as agricultural materials will be better controlled at the farmstead.

**IMPACTS ON OTHER RESOURCES (OFF-SITE)**

Soil: Beneficial as agricultural materials can replenish organic material and matter in the soil and improve soil health.

Air: Negative or beneficial. When agricultural materials, such as manure and wastes, is stored and applied at certain times of the year, odor issues increase for that time period unless the material is applied and incorporated or injected. Conversely, by storing waste, odors are not created when spreading daily. Greenhouse gas emissions may be the same or a modest increase relative to the management without a Short-Term Waste Collection and Transfer System, but can be mitigated with practices that maintain manure in a dryer, largely aerobic state (methane); limit the time manure is in storage (methane), especially during months with higher ambient temperatures; and apply manure for improved nitrogen use by crops (nitrous oxide).

Plants: Beneficial as nutrients may be applied based on agronomic guidelines within the Nutrient Management Plan.

Animals: Beneficial as improved nutrient management on cropland can improve habitat (especially aquatic).

Human: Beneficial as system protects water quality while also improving farm aesthetics, management, and crop production.

Energy: Beneficial depending on the system designed and its additional energy use or energy saving.

**ADVANTAGES TO FARM**
- Allows the farm to effectively collect and transfer agricultural materials around the farmstead.
- Allows livestock manure and other waste to be treated as a valuable nutrient resource rather than a waste.
- May reduce cost for purchased commercial fertilizer.
- May avoid or eliminate the need for daily spreading and allow for strategic and efficient spreading activities and targeted manure applications based on the Nutrient Management Plan.

- Can improve aesthetics and relations with neighbors if managed properly.
- Helps to reduce nutrient loss when runoff and erosion potential is high.

**DISADVANTAGES TO FARM**

- Can be expensive to implement and operate the System based on site constraints and existing infrastructure.
- Requires increased level of management and labor especially during times of application.
- May require additional equipment or expensive operation and maintenance procedures.
- May result in significant nutrient loss if emptied when surface runoff and erosion potential is high.
- May cause damage to streams and fish if storage structure leaks or fails.

**SYSTEM LIFESPAN**

Ten (10) years.

**COST**

Each Agricultural BMP System is unique and must be customized to the situation in which it is employed resulting in a wide and variable range in cost.

**OPERATION AND MAINTENANCE**

Each Agricultural BMP System is unique and must be customized for every situation. The following are generally key components to the operation and maintenance of the System:

- A written plan should be prepared for each system designed, including regular removal of manure or material from the System and application to fields or pastures according to a Nutrient Management Plan.
- Accurate records of timing of manure or material application and location need to be kept.
- Storages must be fenced or walled, and warning signs maintained.
- Pumps need to be regularly checked and maintained.
- Safety measures need to be kept up to date.
- Other items need to be addressed based on specific system requirements.

See the documents in Section 4 of the NRCS Field Office Technical Guide (FOTG) under the specific conservation practice standard being utilized for additional information on operation and maintenance needs.

**MISCELLANEOUS COMMENTS**

Agricultural BMP Systems and associated component practices that will eliminate or provide effective treatment of one or more resource concerns may be eligible for cost-share funding. Compliance with Federal, State, and local laws should be adhered to including the potential need for construction stormwater permits, plans, and practices; other permits; as well as contacting Underground Utilities Protection before excavation, SHPO, and others as applicable. Livestock farms that have been designated as a CAFO are required to comply with CAFO regulations.

**NRCS CONSERVATION PRACTICE STANDARDS TO UTILIZE***

For the most current information on each NRCS Conservation Practice Standard, please go to the NY Field Office Technical Guide (FOTG) at [https://efotg.sc.egov.usda.gov/#/state/NY/documents](https://efotg.sc.egov.usda.gov/#/state/NY/documents).
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Statement of Work; Practice Overview; Implementation Requirement; Conservation Practice Effects Network Diagram; and other document that will assist in the planning, installation, or operation of the practice.

| NRCS Name | Standard # | Reportable Item | Date | Life Span** |
|---|---|---|---|---|
| Waste Storage Facility | 313 | Number | March 2018 | 15 years |
| NYS SWCC Short-Term Waste Collection and Transfer System<br><br>Modified NRCS CPS Waste Storage Facility (313) Policy *** | 313 | Number | March 2018 (NRCS) – October 2022 NYS SWCC Program Policy | 15 Years |
| Waste Transfer | 634 | Number | October 2022 | 15 Years |
| Waste Separation Facility | 632 | Number | October 2022 | 15 Years |
| Waste Treatment | 629 | Number | October 2013 | 10 Years |
| Waste Facility Closure | 360 | Number | May 2020 | 15 Year |
| Nutrient Management | 590 | Acre | September 2020 | 1 year |
| Pumping Plant | 533 | Number | October 2022 | 15 Years |
| Roofs and Covers | 367 | Number | October 2016 | 10 Years |
| Subsurface Drain | 606 | Feet | May 2020 | 20 Years |
| Access Control | 472 | Acre | April 2019 | 10 Years |
| Access Road | 560 | Feet | March 2021 | 10 Years |
| Diversion | 362 | Feet | May 2017 | 10 Years |
| Fence | 382 | Feet | October 2022 | 20 Years |
| Heavy Use Area Protection | 561 | Sq. Feet | October 2021 | 10 Years |
| Hedgerow Planting | 422 | Feet | May 2011 | 15 Years |
| Pond Sealing or Lining – Geomembrane or Geosynthetic Clay Liner | 521 | Sq. Feet | March 2019 | 20 Years |

| | | | | |
|---|---|---|---|---|
| Pond Sealing or Lining – Compacted Soil Treatment | 520 | Sq. Feet | May 2017 | 15 Years |
| Pond Sealing or Lining – Concrete | 522 | Sq. Feet | May 2017 | 20 Years |

*This is a listing of the primary Component BMPs to use but is not all inclusive and other NRCS Conservation Practice Standards may be utilized. Please check with a SWCC representative for approval.

**NYS Program Lifespans (listed above in Table III) refers to the minimum time period that a program participant must perform Operation and Maintenance of an Agricultural BMP System and the Component BMPs. Alternatively, NRCS CPS Lifespans (as found in the Standards) refer to specific design criteria and defines how long a conservation practice should function under an appropriate level of Operation and Maintenance. To meet NRCS Standards, a conservation practice must be designed to meet the CPS Lifespan, and all materials and installation methods must meet or exceed the NRCS defined Lifespan criteria.

***The NYS Soil and Water Conservation Committee Short-Term Waste Collection and Transfer System Modified NRCS CPS Waste Storage Facility (313) Policy should be utilized by Professional Engineers when designing and certifying NRCS CPS Waste Storage Facilities (313) that are planned, supported, and operated as part of the Short-Term Waste Collection and Transfer System from a combination of NYS AEM Tier 3A Farmstead and Nutrient Management-Core Plans. These NRCS CPS Waste Storage Facilities (313) are eligible for funding from NYS SWCC Cost-Share Programs, but not Federal Cost-Share Programs.

**REFERENCES**

- USDA NRCS FOTG for NY: https://efotg.sc.egov.usda.gov/#/state/NY/documents
- Manure and Fertilizer Storage AEM Tier 2 Worksheet and Information Sheets
- Nutrient Management: Manure and Fertilizer AEM Tier 2 Worksheet and Information Sheets
- Greenhouse Gas Mitigation Opportunities AEM Tier 2 Worksheets and Information Sheets
- 2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories
- The NYS Soil and Water Conservation Committee Short-Term Waste Collection and Transfer System Modified NRCS CPS Waste Storage Facility (313) Policy

# Silage Leachate Control and Treatment System

**DEFINITION**
A System designed to reduce the generation of silage leachate and for the collection, storage, treatment and disposal of effluents and runoff from the storage of silage crops from upright and bunk silos, as well as silage storage bags.

**WATER QUALITY PURPOSE**
To manage silage leachate to reduce surface and ground water biochemical oxygen demand (BOD) loading as well as nutrient loading.

**POLLUTANT CONTROLLED**
Nutrients, sediment, organic loading or biochemical oxygen demand (BOD).

**WHERE USED**
In situations where the storage of silage and haylage can yield effluent and runoff which can enter either a surface water body or ground water and a resource concern has been identified. This practice can be used in barnyards, farmsteads, fields, or other areas where upright silos, bunk silos and silage bagging systems are located.

**SYSTEM DESCRIPTION**
Silage effluent and runoff control would be composed of a combination of structural and non-structural management practices to control the source of the material or manage the collection and treatment or disposal of it. Source reduction can lessen the amount of low-flow high concentrate leachate produced and can be accomplished with several management techniques including growing the proper variety of corn for the area, harvesting when corn or haylage are at the proper maturity and at the correct moisture content along with proper operation and maintenance of the structure. When source reduction does not eliminate leachate, a system to collect, store or treat the silo effluent and runoff can be installed. If a suitable waste storage is available, the silage leachate can be transferred there. Otherwise, a system to separate low and high flows, collection of low flows and a treatment system such as a Vegetated Treatment Area is required. Relocation of silage storage to an area that is not a resource concern is another option. The System should also include an area for the storage of waste or spoiled feed for later application to crop fields in accordance with a Nutrient Management Plan. Use of covered storage and exclusion of surface water runoff from the storage area will also reduce the overall amount of liquid requiring treatment.

**SYSTEM EFFECTIVENESS**
Silage leachate exerts a high organic loading on the receiving water and produces a high biochemical oxygen demand (BOD) which will deplete available dissolved oxygen resulting in fish kills, tastes and odors, and a general unaesthetic appearance. The proper management of leachate from silos and other types of storage facilities can significantly reduce these problems. In addition, Silage Leachate Control and Treatment Systems may provide Component BMPs which may greatly reduce or eliminate the degradation of clean water entering the site, stabilize the management area to reduce disturbed ground or access roads (reducing erosion, runoff, and sedimentation), allow better collection and management of waste or spoiled feed, and greatly influence the overall source of potential contaminates by incorporating proper feed harvesting and feed storage practices, as well as end use feed management practices.

**IMPACTS ON SURFACE WATER**
Beneficial - Reduces organic loading and resultant depletion of dissolved oxygen.

**IMPACTS ON GROUND WATER**
Beneficial - The oxygen depletion in ground water resulting from organic loading can cause bad odors and tastes which may be sustained for extended periods of time due to very low re-aeration rates.

**IMPACTS ON OTHER RESOURCES (OFF-SITE)**

Soil: Beneficial when leachate is applied in accordance with a Nutrient Management Plan.
Air: Negative is system is not operated or managed properly.
Plants: Beneficial by eliminating kill zones and correct application rates.
Animals: Beneficial – protects fish from high BOD.
Human: Beneficial as system protects water quality but can be negative if not operated or maintained effectively.
Energy: Negative to Beneficial depending on the system design and its additional energy use or energy saving.

**ADVANTAGES TO FARM**
- May be corrected by growing a different variety of corn and changing timing of harvest.
- Can be built as a gravity system.
- Can be plumbed into existing waste management system.
- The system design includes an area for waste feed storage for utilization as a nutrient source.

**DISADVANTAGES TO FARM**
- Can be expensive if separate collection and storage are required.
- Due to amino acid content of silage leachate, collection facilities should be made of corrosion resistant material and land application should be carefully managed to prevent kill-off.
- Require heightened level of management as run-off is precipitation driven and solid separation can require frequent maintenance.

**SYSTEM LIFESPAN**
Ten (10) years.

**COST**
Each Agricultural BMP System is unique and must be customized to the situation in which it is employed resulting in a wide and variable range in cost. Cost can run from $3,000 to $70,000 or more depending on the complexity of the system.

**OPERATION AND MAINTENANCE**
Each Agricultural BMP System is unique and must be customized for every situation. The following are generally key components to the operation and maintenance of the system:
- Low flow/high flow separation must be adjusted frequently to ensure capture of adequate low flow.
- Checking solid separation after each rainfall to remove debris.
- Keeping records of where silage leachate is applied to reduce potential over application.
- Periodic inspection and repair of storage facility to assure no leakage through floors and walls.
- Periodic inspection and repair of pipes and other connections to eliminate leakage opportunities.
- Tanks installed must be checked for need for emptying.

- Periodic inspection and repair of roads, heavy use areas, and waste feed management areas.
- Maintain clean water practices associated with the management areas.

See the documents in Section 4 of the NRCS Field Office Technical Guide (FOTG) under the specific conservation practice standard being utilized for additional information on operation and maintenance needs.

**MISCELLANEOUS COMMENTS**

Agricultural BMP Systems and associated component practices that will eliminate or provide effective treatment of one or more resource concerns may be eligible for cost-share funding. Compliance with Federal, State, and local laws should be adhered to including the potential need for construction stormwater permits, plans, and practices; other permits; as well as contacting Underground Utilities Protection before excavation, SHPO, and others as applicable. Livestock farms that have been designated as a CAFO are required to comply with CAFO regulations.

**NRCS CONSERVATION PRACTICE STANDARDS TO UTILIZE***

For the most current information on each NRCS Conservation Practice Standard, please go to the NY Field Office Technical Guide (FOTG) at https://efotg.sc.egov.usda.gov/#/state/NY/documents.
Use the drop box in the left side to reach Section 4 – Practice Standards and Supporting Documents, click on the folder for Conservation Practice Standards & Support Documents and locate the appropriate practice. Under each practice, you will find, at the minimum, the practice standard. You may also find: a Statement of Work; Practice Overview; Implementation Requirement; Conservation Practice Effects Network Diagram; and other document that will assist in the planning, installation, or operation of the practice.

| NRCS Name | Standard # | Reportable Item | Date | Life Span |
|---|---|---|---|---|
| Vegetated Treatment Area | 635 | Acre | February 2017 | 10 |
| Waste Separation Facility | 632 | Number | October 2022 | 15 |
| Waste Transfer | 634 | Number | October 2022 | 15 |
| Pumping Plant | 533 | Number | October 2022 | 15 |
| Dike | 356 | Feet | December 2012 | 20 |
| Diversion | 362 | Feet | May 2017 | 10 |
| Subsurface Drain | 606 | Feet | May 2020 | 20 |
| Sediment Basin | 350 | Number | May 2017 | 20 |
| Structure for Water Control | 587 | Number | March 2019 | 20 |
| Heavy Use Area Protection | 561 | Sq. Feet | September 2021 | 10 |
| Waste Storage Facility | 313 | Number | March 2018 | 15 |

| | | | | |
|---|---|---|---|---|
| Sprinkler System | 442 | Acre | October 2022 | 15 |
| Irrigation Water Management | 449 | Acre | October 2022 | 1 |
| Fence | 382 | Feet | October 2022 | 20 |
| Conservation Crop Rotation | 328 | Acre | October 2015 | 1 |

*This is a listing of the primary Component BMPs to use but is not all inclusive and other NRCS Conservation Practice Standards may be utilized. Please check with a SWCC representative for approval.

**NYS Program Lifespans (listed above in Table III) refers to the minimum time period that a program participant must perform Operation and Maintenance of an Agricultural BMP System and the Component BMPs. Alternatively, NRCS CPS Lifespans (as found in the Standards) refer to specific design criteria and defines how long a conservation practice should function under an appropriate level of Operation and Maintenance. To meet NRCS Standards, a conservation practice must be designed to meet the CPS Lifespan, and all materials and installation methods must meet or exceed the NRCS defined Lifespan criteria.

**REFERENCES**

- USDA NRCS FOTG for NY: https://efotg.sc.egov.usda.gov/#/state/NY/documents
- Silage Storage AEM Tier 2 Worksheet and Information Sheet

# Soil Health System

**DEFINITION**
Soil Health Systems employ cultural (i.e., non-structural, cultural or management-based) measures such as crop rotation, tillage, mulching, cover cropping, or other practices according to a soil conservation plan to control soil erosion, reduce run-off, and enhance soil health.

**WATER QUALITY PURPOSE**
To reduce the detachment, transport, and loss of sediment and solid-phase nutrients as well as runoff volumes.

**POLLUTANT CONTROLLED**
Sediment, nutrients, pathogens, pesticides, or biochemical oxygen demand (BOD).

**WHERE USED**
Cropland, pasture, vegetable and fruit production, orchards, vineyards, or biomass production areas where a resource concern has been identified.

**SYSTEM DESCRIPTION**
Soil Health Systems consist of non-structural, management-based practices working in concert to control soil erosion, reduce runoff volumes, enhance soil health, and improve productivity of the land. Such systems advance soil health, water quality, and productivity through a few general approaches, including:

- reducing the intensity of tillage and oxidization of soil organic matter;
- maintaining greater soil cover throughout the year, by living crops or crop residues;
- preventing or slowing sheet and rill flows;
- increasing the diversity of crops grown throughout the rotation; and
- increasing organic matter additions to the soil, by crop residues or amendments.

Individual practices often utilized in soil health systems include:

- residue and tillage management, such as no-till, zone-till, mulch-till, etc.;
- cover crops;
- strip cropping;
- contour planting;
- long term perennial forage or biomass planting on cropland acres;
- mulching;
- etc.

The Soil Health System is based on a well-integrated, Cropland Soil Conservation Plan (or a Soil Conservation Plan within a broader Nutrient Management Plan or Comprehensive Nutrient Management Plan). The Plan is utilized to assess risk of water and wind erosion and other soil health resource concerns and make specific recommendations for how various practices will work together to address those concerns. These recommendations may extend beyond the cultural practices addressed with this System to dovetail with other Agricultural BMP Systems on the farm, including Erosion Control System - Structural, Nutrient Management System - Cultural, Prescribed Rotational Grazing System, etc.

**SYSTEM EFFECTIVENESS**

A systems approach to soil health provides multiple barriers against soil erosion and water quality degradation while improving soil function. Crop rotation, conservation tillage, cover cropping, strip cropping, organic matter amendments (manure, compost, green manures, mulch, etc.) and other cultural conservation practices help protect soil from erosion by wind and water and help maintain or increase soil organic matter. Soil organic matter improves soil tilth, reduces susceptibility to compaction, increases nutrient and water holding capacity, slows the movement of pesticides through the soil, reduces runoff losses, and protects against erosion. Several tons of soil loss per acre can be avoided annually with these practices, as well as significant improvements in nutrient use efficiency and crop production. Soil and water resources are often further conserved when cultural soil health practices are paired with structural soil conservation systems and nutrient management, per the multiple barrier approach.

**IMPACTS ON SURFACE WATER**

Beneficial - including reduced losses of sediment, nutrients, pathogens, pesticides, and biochemical oxygen demand (BOD).

**IMPACTS ON GROUND WATER**

Beneficial in most cases, but may be negative in some soil types with annual crops in long-term no-till because significant macropores may establish and aid the loss of nutrients and pathogens to groundwater or tile drainage systems.

**IMPACTS ON OTHER RESOURCES (OFF-SITE)**

Soil: Beneficial, as it generally improves soil health and reduces erosion.
Air: Beneficial, as it can reduce dust and fossil fuel combustion used in crop production.
Plants: Beneficial, as it can reduce sediment and nutrient losses and subsequent impacts on neighboring plant communities.
Animals: Beneficial, as it can reduce off-site impacts from sediment, nutrients, pathogens, pesticides, and biochemical oxygen demand (BOD) on terrestrial and aquatic habitats.
Human: Beneficial, as it can further safeguard drinking water sources, improve land and water resources for recreation, reduce maintenance costs on public infrastructure (e.g., road ditches, culverts, reservoirs), and provide economic growth.
Energy: Beneficial, as it can reduce use of farm fuels, energy for fertilizer manufacturing, and transportation fuels for imported fertilizer and feed.

**ADVANTAGES TO FARM**

- Potential to reduce soil loss, reduce negative effects of extreme weather years on crop production, and improve crop yield and quality.
- Improved labor efficiency and timing for crop management.
- Often a neutral or positive impact on farm profitability.
- Improved neighbor relations.

**DISADVANTAGES TO FARM**

- Higher level of farm management required may result in increased labor and equipment costs.
- Requires additional time and training to adjust to new management strategies.

**SYSTEM LIFESPAN**

1 to 5 years depending on components in the soil health system.

**COST**
Each Agricultural BMP System is unique and must be customized to the situation in which it is employed resulting in a wide and variable range in cost. Costs depend on several factors, including the size and type of farm, existing level of farm management, availability of equipment, familiarity/availability of custom operators, etc.

**OPERATION AND MAINTENANCE**
Each Agricultural BMP System is unique and must be customized for every situation. Often annual evaluation and fine tuning of cultural conservation system is required because many component practices are annual practices and can be refined based on prior years' experiences and the current year's conditions.

See the documents in Section 4 of the NRCS Field Office Technical Guide (FOTG) under the specific conservation practice standard being utilized for additional information on operation and maintenance needs.

**MISCELLANEOUS COMMENTS**
Agricultural BMP Systems and associated component practices that will eliminate or provide effective treatment of one or more resource concerns may be eligible for cost-share funding. Livestock farms that have been designated as a CAFO are required to comply with CAFO regulations.

NOTE: a soil conservation plan, alone, does not meet the NYS requirements for CAFOs. A Comprehensive Nutrient Management Plan must be developed for these farms. Compliance with USDA Food Security Act program requirements should be considered.

See the USDA-NRCS Field Office Technical Guide for specific technical details about planning, implementation, and operation and maintenance. Guidance for the AEM Base Program provides details on developing Tier 3A cropland conservation plans. Also, the Cornell Soil Health Program offers technical resources for advancing soil health and productivity.

**NRCS CONSERVATION PRACTICE STANDARDS TO UTILIZE***
For the most current information on each NRCS Conservation Practice Standard, please go to the NY Field Office Technical Guide (FOTG) at https://efotg.sc.egov.usda.gov/#/state/NY/documents.
Use the drop box in the left side to reach Section 4 – Practice Standards and Supporting Documents, click on the folder for Conservation Practice Standards & Support Documents and locate the appropriate practice. Under each practice, you will find, at the minimum, the practice standard. You may also find: a Statement of Work; Practice Overview; Implementation Requirement; Conservation Practice Effects Network Diagram; and other document that will assist in the planning, installation, or operation of the practice.

| NRCS Name | Standard # | Reportable Item | Date | Life Span |
|---|---|---|---|---|
| Conservation Crop Rotation | 328 | Acre | October 2015 | 1 |
| Conservation Cover | 327 | Acre | July 2019 | 5 |
| Contour Farming | 330 | Acre | March 2019 | 5 |
| Cover Crop | 340 | Acre | October 2015 | 1 |

| | | | | |
|---|---|---|---|---|
| Pasture and Hay Planting | 512 | Acre | March 2022 | 5 |
| Mulching | 484 | Acre | March 2019 | 1 |
| Residue and Tillage Management, No-Till | 329 | Acre | October 2017 | 1 |
| Residue and Tillage Management, Reduced Till | 345 | Acre | October 2017 | 1 |
| Strip Cropping | 585 | Acre | March 2019 | 5 |

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**REFERENCES**

- USDA NRCS FOTG for NY: https://efotg.sc.egov.usda.gov/#/state/NY/documents
- Cornell Soil Health Program: http://soilhealth.cals.cornell.edu/
- Soil Management AEM Tier 2 Worksheet and Information Sheet

# Stream Corridor and Shoreline Management System

**DEFINITION**
A planned System of vegetation, structures, bio-technology, or management techniques to stabilize or protect stream channels, streambanks and shorelines while also enhancing natural hydrologic processes and improving fish and wildlife habitat.

**WATER QUALITY PURPOSE**
To reduce sediment and nutrients entering waterbodies from eroding channels, streambanks, and shorelines. Systems can be used to maintain, improve, or restore the physical, chemical and biological functions of a stream, constructed channel, or shoreline while also protecting the designated use classification of the waterbody.

**POLLUTANT CONTROLLED**
Sediment, nutrients, or thermal modification.

**WHERE USED**
Streambanks, constructed channels, lake shores, estuaries and coastal shorelines on agricultural land.

**SYSTEM DESCRIPTION**
The System may be composed of a variety of operational, structural, and vegetative Agricultural BMP System and Component BMPs that may be aimed at one specific goal, such as controlling streambank erosion, or at a combination of goals. Component BMPs may be implemented within several areas of the stream corridor and shoreline area (i.e., within the channel, along the banks, or in the immediate riparian zones). Listed below are some of the components that may be utilized in a Stream Corridor and Shoreline Management System:

- Implement management techniques such as removing impeding vegetation along the banks (clearing) or selectively removing woody snags, sediment depositions/drifts, or other obstructions (snagging) that have negative impacts on stream flow and increase either bank or channel erosion.
- Establish vegetation to prevent or reduce erosion along the streambank toe, within adjacent riparian zones, and associated floodplains. Examples include shrubs, trees, grasses, rushes and sedges among other site-specific species; see Critical Area Planting practice as well.
- Install structural improvements such as slope stabilization, filter fabric, riprap, deflectors, sediment fencing, bulkheads, or groin systems.
- Employ biotechnical alternatives such as willow wattles, coir logs or direct seeding.
- Utilize fluvial geomorphology techniques.

**SYSTEM EFFECTIVENESS**
The effectiveness of a Streambank and Shoreline Management System should be evaluated based on the Component BMPs installed. In general, the System can attenuate the peak flow and bed load of the stream, reduce soil erosion, and decrease sediment and nutrient delivery to waterbodies. The System should not degrade the stream channel beyond tolerable limits, increase or promote new erosion concerns, increase sedimentation, induce gully formations, or disrupt stream habitat, the natural flow regime, and the interaction between the stream and the floodplain.

**IMPACTS ON SURFACE WATER**
Beneficial - Can control erosion rates and sediment delivery to receiving water bodies. Improving vegetation along a waterbody may decrease thermal modification, thus enhancing the freshwater biome and water quality.

**IMPACTS ON GROUND WATER**
Neutral - Vegetative cover and some structural practices may increase infiltration.

**IMPACTS ON OTHER RESOURCES (OFF-SITE)**

Soil: Beneficial by minimizing soil erosion.
Air: Neutral.
Plants: Beneficial by establishing streambank vegetation.
Animal: Beneficial for wildlife corridor establishment and fish habitat.
Human: Beneficial. Increased recreational opportunities, stable fish habitat. Reduction of flood impacts on agricultural lands and civil infrastructure.
Energy: Neutral.

**ADVANTAGES TO FARM**

- Stops loss of agricultural land.
- Improves fish and wildlife habitat.
- Restores water flow, capacity and direction.
- Improve landscape aesthetics.
- Protects best use of water bodies.
- Improved neighbor relations.

**DISADVANTAGES TO FARM**

- Cost of structural practices may be substantial.
- Can move problem areas downstream.
- Investment of practices may be lost by severe storm damage.
- Operation and Maintenance program has significant costs of time and money.

**SYSTEM LIFESPAN**
Ten (10) years.

**COST**
Each Agricultural BMP System is unique and must be customized to the situation in which it is employed resulting in a wide and variable range in cost. Costs can vary greatly. For example, bio-technical components can cost as little as $5 per linear foot while structural components could cost in excess of $200 per foot.

**OPERATION AND MAINTENANCE**
Each Agricultural BMP System is unique and must be customized for every situation. The following are generally key components to the operation and maintenance of the system:

- Debris should be removed from the stabilized streambank or shoreline.
- Structural practices should be inspected and repaired after storm events.
- Vegetation destroyed by bank failure must be replaced to maintain cover integrity.
- Subsequent planting or establishment of failed vegetation to practice integrity.

See the documents in Section 4 of the NRCS Field Office Technical Guide (FOTG) under the specific conservation practice standard being utilized for additional information on operation and maintenance needs.

**MISCELLANEOUS COMMENTS**
Agricultural BMP Systems and associated component practices that will eliminate or provide effective treatment of one or more resource concerns may be eligible for cost-share funding. Compliance with Federal, State, and local laws should be adhered to including the potential need for construction stormwater permits, plans, and practices; other permits; as well as contacting Underground Utilities Protection before excavation, SHPO, and others as applicable. Livestock farms that have been designated as a CAFO are required to comply with CAFO regulations.

Streambank and shoreline disturbance generally require a DEC and or Army Corp of Engineer permit. Other permits from various agencies may also be required.

**NRCS CONSERVATION PRACTICE STANDARDS TO UTILIZE***
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| NRCS Name | Standard # | Reportable Item | Date | Life Span |
|---|---|---|---|---|
| Stream Habitat Improvement and Management | 395 | Acre | September 2020 | 5 |
| Streambank and Shoreline Protection | 580 | Feet | September 2021 | 20 |
| Clearing and Snagging | 326 | Feet | May 2017 | 5 |
| Critical Area Planting | 342 | Acre | October 2017 | 10 |
| Obstruction Removal | 500 | Number | September 2021 | 10 |
| Open Channel | 582 | Feet | October 2016 | 15 |
| Stream Crossing | 578 | Number | January 2023 | 10 |
| Riparian Forest Buffer | 391 | Acre | September 2021 | 15 |
| Riparian Herbaceous Cover | 390 | Acre | May 2011 | 5 |
| Tree/Shrub Establishment | 612 | Acre | April 2017 | 15 |

| | | | | |
|---|---|---|---|---|
| Tree/Shrub Site Preparation | 490 | Acre | September 2021 | 1 |
| Access Control | 472 | Acre | April 2019 | 10 |

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**REFERENCES**

- USDA NRCS FOTG for NY: https://efotg.sc.egov.usda.gov/#/state/NY/documents
- Stream and Floodplain Management AEM Tier 2 Worksheet and Information Sheet

# Waste Storage and Transfer System

**DEFINITION**
A System designed for the collection, transfer, or storage of agricultural livestock and recognizable process waste.

**WATER QUALITY PURPOSE**
To reduce surface and subsurface loss of nutrients.

**POLLUTANT CONTROLLED**
Nutrients, pathogens, or organics.

**WHERE USED**
In situations where the collection, transfer, or storage of manure or other organic waste is recommended to address water quality concerns and improve a farm's ability to apply nutrients with the right timing, placement, method, and rate for recycling by crops. This includes scenarios where storage addresses seasonal limitations for manure application due to lack of suitable crop and hayland to safely apply during adverse weather or field conditions. It may also include Systems to better collect manure and other organic wastes for application to fields, without significant (if any) storage component. This System can be used whenever waste is transferred or stored and includes manure, milking center waste, process wastewater, silage leachate, barnyard run-off, etc. These Systems may also include the use of bedded pack or composting bedded pack barns.

**SYSTEM DESCRIPTION**
The System is composed of multiple Component BMPs that collect agricultural waste and transport it to a structural storage facility. System design is dependent upon agricultural operation, site location and management considerations. A Waste Storage and Transfer System controls the loss of nutrients and pathogens by safely storing waste during critical runoff and leaching periods. It can include the use of storage covers to trap greenhouse gases or to limit rainfall contribution to spreading volumes.

***(NOTE: Prior to adoption of a Waste Storage and Transfer System, a Comprehensive Nutrient Management Plan needs to be developed.)***

**SYSTEM EFFECTIVENESS**
Storing waste is effective in reducing losses of nitrogen and phosphorus when surface runoff and erosion potential is high. Storages can reduce pathogen loads through die-off during storage and when applied to soil and incorporated. Significant nutrient loss and water quality degradation may result if the storage is emptied when surface runoff, leaching or erosion potential is high, or waste is applied at non-agronomically recommended rates. A Comprehensive Nutrient Management Plan is an important component of this practice.

**IMPACTS ON SURFACE WATER**
Beneficial when waste is applied in accordance with a Comprehensive Nutrient Management Plan and transfers are designed and operated according to the Plan.

**IMPACTS ON GROUND WATER**
Beneficial as applications of waste can be timed to coincide with plant uptake and not during times of nutrient loss to groundwater. However, care must be taken in site selection and construction of storage facilities.

**IMPACTS ON OTHER RESOURCES (OFF-SITE)**

Soil: Beneficial as organic waste can replenish organic matter in the soil and improve soil health.
Air: Negative or beneficial. When waste is stored and applied at certain times of the year, odor issues increase for that time period unless incorporation of waste is utilized. But conversely, by storing waste, odors are not created when daily spread. Covers trap greenhouse gases and collect them for flaring or use.
Plants: Beneficial as nutrients can be applied during times of plant uptake.
Animals: Beneficial as improved nutrient management on cropland can improve habitat (especially aquatic).
Human: Beneficial as system protect water quality.
Energy: Beneficial depending on the system designed and its additional energy use or energy saving.

**ADVANTAGES TO FARM**

- Allows for spreading at certain times of the year and eliminated the need for daily spreading.
- Allows for semi-solid or liquid manure which lends itself to gravity systems.
- Can allow for irrigation of waste.
- Allows livestock manure and other waste to be treated as a resource rather than a waste.
- Reduces cost for purchased commercial fertilizer.
- Can improve aesthetics and relations with neighbors if managed properly.
- Helps to reduce nutrient loss when runoff and erosion potential is high.

**DISADVANTAGES TO FARM**

- Can be expensive if soils are not suitable and liners or other materials need to be utilized.
- Require increased level of management and manpower especially during times of application.
- Requires increased management and energy when sand is used for bedding.
- Requires frequent maintenance.
- May result in significant nutrient loss if emptied when surface runoff and erosion potential is high.
- May cause serious damage to streams and fish if storage structure leaks or fail.

**SYSTEM LIFESPAN**
Ten (10) years.

**COST**
Each Agricultural BMP System is unique and must be customized to the situation in which it is employed resulting in a wide and variable range in cost. Cost can run from $30,000 to $400,000 or more depending on the complexity of the system.

**OPERATION AND MAINTENANCE**
Each Agricultural BMP System is unique and must be customized for every situation. The following are generally key components to the operation and maintenance of the system:

- A written plan should be prepared for each system designed.
- Accurate records of timing of manure application and location need to be kept.
- Storages must be fenced, and warning signs maintained.

- Earthen storages require mowing several times a year to keep the growth of woody vegetation down and to be able to scout for rodent damage of the dike.
- Settled solids need to be removed on a regular basis increasing frequency with use of inorganics like sand bedding.
- Pumps need to be regularly checked and maintained.
- Safety measures need to be kept up to date.
- Other items need to be addressed based on specific system requirements.

See the documents in Section 4 of the NRCS Field Office Technical Guide (FOTG) under the specific conservation practice standard being utilized for additional information on operation and maintenance needs.

**MISCELLANEOUS COMMENTS**

Agricultural BMP Systems and associated component practices that will eliminate or provide effective treatment of one or more resource concerns may be eligible for cost-share funding. Compliance with Federal, State, and local laws should be adhered to including the potential need for construction stormwater permits, plans, and practices; other permits; as well as contacting Underground Utilities Protection before excavation, SHPO, and others as applicable. Livestock farms that have been designated as a CAFO are required to comply with CAFO regulations.

**NRCS CONSERVATION PRACTICE STANDARDS TO UTILIZE***

For the most current information on each NRCS Conservation Practice Standard, please go to the NY Field Office Technical Guide (FOTG) at https://efotg.sc.egov.usda.gov/#/state/NY/documents.
Use the drop box in the left side to reach Section 4 – Practice Standards and Supporting Documents, click on the folder for Conservation Practice Standards & Support Documents and locate the appropriate practice. Under each practice, you will find, at the minimum, the practice standard. You may also find: a Statement of Work; Practice Overview; Implementation Requirement; Conservation Practice Effects Network Diagram; and other document that will assist in the planning, installation, or operation of the practice.

| NRCS Name | Standard # | Reportable Item | Date | Life Span |
|---|---|---|---|---|
| Waste Storage Facility | 313 | Number | March 2018 | 15 years |
| Waste Transfer | 634 | Number | October 2022 | 15 Years |
| Waste Separation Facility | 632 | Number | October 2022 | 15 Years |
| Waste Treatment | 629 | Number | October 2013 | 10 years |
| Waste Facility Closure | 360 | Number | May 2020 | 15 Year |
| Nutrient Management | 590 | Acre | September 2020 | 1 year |
| Pumping Plant | 533 | Number | October 2022 | 15 Years |
| Roofs and Covers | 367 | Number | October 2016 | 10 Years |
| Subsurface Drain | 606 | Feet | May 2020 | 20 Years |

| | | | | |
|---|---|---|---|---|
| Access Control | 472 | Acre | April 2019 | 10 Years |
| Access Road | 560 | Feet | March 2021 | 10 Years |
| Composting Facility | 317 | Number | September 2021 | 15 Years |
| Diversion | 362 | Feet | May 2017 | 10 Years |
| Fence | 382 | Feet | October 2022 | 20 Years |
| Heavy Use Area Protection | 561 | Sq. Feet | September 2021 | 10 Years |
| Hedgerow Planting | 422 | Feet | May 2011 | 15 Years |
| Pond Sealing or Lining – Geomembrane or Geosynthetic Clay Liner | 521 | Sq. Feet | March 2019 | 20 Years |
| Pond Sealing or Lining – Compacted Soil Treatment | 520 | Sq. Feet | May 2017 | 15 Years |
| Pond Sealing or Lining – Concrete | 522 | Sq. Feet | May 2017 | 20 Years |

*This is a listing of the primary Component BMPs to use but is not all inclusive and other NRCS Conservation Practice Standards may be utilized. Please check with a SWCC representative for approval.

**NYS Program Lifespans (listed above in Table III) refers to the minimum time period that a program participant must perform Operation and Maintenance of an Agricultural BMP System and the Component BMPs. Alternatively, NRCS CPS Lifespans (as found in the Standards) refer to specific design criteria and defines how long a conservation practice should function under an appropriate level of Operation and Maintenance. To meet NRCS Standards, a conservation practice must be designed to meet the CPS Lifespan, and all materials and installation methods must meet or exceed the NRCS defined Lifespan criteria.

**REFERENCES**


- USDA NRCS FOTG for NY: https://efotg.sc.egov.usda.gov/#/state/NY/documents
- Manure and Fertilizer Storage AEM Tier 2 Worksheet and Information Sheet
- Nutrient Management: Manure and Fertilizer AEM Tier 2 Worksheet and Information Sheet

New York State Department of Environmental Conservation

New York State
DEPARTMENT OF ENVIRONMENTAL CONSERVATION

Division of Water

# Deep-Ripping and Decompaction

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**New York State**
**Department of Environmental Conservation**

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Alternative Stormwater Management
Deep-Ripping and Decompaction

## Description

The two-phase practice of 1) “Deep Ripping;” and 2) “Decompaction” (deep subsoiling), of the soil material as a step in the cleanup and restoration/landscaping of a construction site, helps mitigate the physically induced impacts of soil compression; i.e.: soil compaction or the substantial increase in the bulk density of the soil material.

Deep Ripping and Decompaction are key factors which help in restoring soil pore space and permeability for water infiltration. Conversely, the physical actions of cut-and-fill work, land grading, the ongoing movement of construction equipment and the transport of building materials throughout a site alter the architecture and structure of the soil, resulting in: the mixing of layers (horizons) of soil materials, compression of those materials and diminished soil porosity which, if left unchecked, severely impairs the soil’s water holding capacity and vertical drainage (rainfall infiltration), from the surface downward.

In a humid climate region, compaction damage on a site is virtually guaranteed over the duration of a project. Soil in very moist to wet condition when compacted, will have severely reduced permeability. Figure 1 displays the early stage of the deep-ripping phase (Note that all topsoil was stripped prior to construction access, and it remains stockpiled until the next phase – decompaction – is complete). A heavy-duty tractor is pulling a three-shank ripper on the first of several series of incrementally deepening passes through the construction access corridor's densely compressed subsoil material. Figure 2 illustrates the approximate volumetric composition of a loam surface soil when conditions are good for plant growth, with adequate natural pore space for fluctuating moisture conditions.

Fig. 1. A typical deep ripping phase of this practice, during the first in a series of progressively deeper “rips” through severely compressed subsoil.

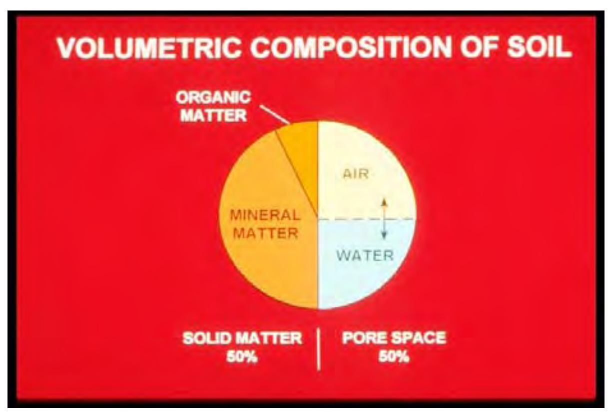



Fig. 2. About 50% of the volume of undisturbed loam surface soil is pore space, when soil is in good condition for plant growth. Brady, 2002.

## Recommended Application of Practice

Fig. 3. Construction site with significant compaction of the deep basal till subsoil extends 24 inches below this exposed cut-and-fill work surface.

The objective of Deep Ripping and Decompaction is to effectively fracture (vertically and laterallly) through the thickness of the physically compressed subsoil material (see Figure 3), restoring soil porosity and permeability and aiding infiltration to help reduce runoff. Together with topsoil stripping, the “two-phase” practice of Deep Ripping and Decompaction first became established as a “best management practice” through ongoing success on commercial farmlands affected by heavy utility construction right-of-way projects (transmission pipelines and large power lines).

Soil permeability, soil drainage and cropland productivity were restored. For broader construction application, the two-phase practice of Deep Ripping and Decompaction is best adapted to areas impacted with significant soil compaction, on contiguous open portions of large construction sites and inside long, open construction corridors used as temporary access over the duration of construction. Each mitigation area should have minimal above-and-below-ground obstructions for the easy avoidance and maneuvering of a large tractor and ripping/decompacting implements. Conversely, the complete two-phase practice is not recommended in congested or obstructed areas due to the limitations on tractor and implement movement.

## Benefits

Aggressive “deep ripping” through the compressed thickness of exposed subsoil before the replacement/respreading of the topsoil layer, followed by “decompaction,” i.e.: “sub-soiling,” through the restored topsoil layer down into the subsoil, offers the following benefits:

- Increases the project (larger size) area’s direct surface infiltration of rainfall by providing the open site’s mitigated soil condition and lowers the demand on concentrated runoff control structures

- Enhances direct groundwater recharge through greater dispersion across and through a broader surface than afforded by some runoff-control structural measures

- Decreases runoff volume generated and provides hydrologic source control

- May be planned for application in feasible open locations either alone or in conjunction with plans for structural practices (e.g., subsurface drain line or infiltration basin) serving the same or contiguous areas

- Promotes successful long-term revegetation by restoring soil permeability, drainage and water holding capacity for healthy (rather than restricted) root-system development of trees, shrubs and deep rooted ground cover, minimizing plant drowning during wet periods and burnout during dry periods.

## Feasibility / Limitations

The effectiveness of Deep Ripping and Decompaction is governed mostly by site factors such as: the original (undisturbed) soil's hydrologic characteristics; the general slope; local weather/timing (soil moisture) for implementation; the space-related freedom of equipment/implement maneuverability (noted above in **Recommended Application of Practice**), and by the proper selection and operation of tractor and implements (explained below in **Design Guidance**). The more notable site-related factors include:

**Soil**

In the undisturbed condition, each identified soil type comprising a site is grouped into one of four categories of soil hydrology, Hydrologic Soil Group A, B, C or D, determined primarily by a range of characteristics including soil texture, drainage capability when thoroughly wet, and depth to water table. The natural rates of infiltration and transmission of soil-water through the undisturbed soil layers for Group A is "high" with a low runoff potential while soils in Group B are moderate in infiltration and the transmission of soil-water with a moderate runoff potential, depending somewhat on slope. Soils in Group C have slow rates of infiltration and transmission of soil-water and a moderately high runoff potential influenced by soil texture and slope; while soils in Group D have exceptionally slow rates of infiltration and transmission of soil-water, and high runoff potential.

In Figure 4, the profile displays the undisturbed horizons of a soil in Hydrologic Soil Group C and the naturally slow rate of infiltration through the subsoil. The slow rate of infiltration begins immediately below the topsoil horizon (30 cm), due to the limited amount of macro pores, e.g.: natural subsoil fractures, worm holes and root channels. Infiltration after the construction-induced mixing and compression of such subsoil material is virtually absent; but can be restored back to this natural level with the two-phase practice of deep ripping and decompaction, followed by the permanent establishment of an appropriate, deep taproot

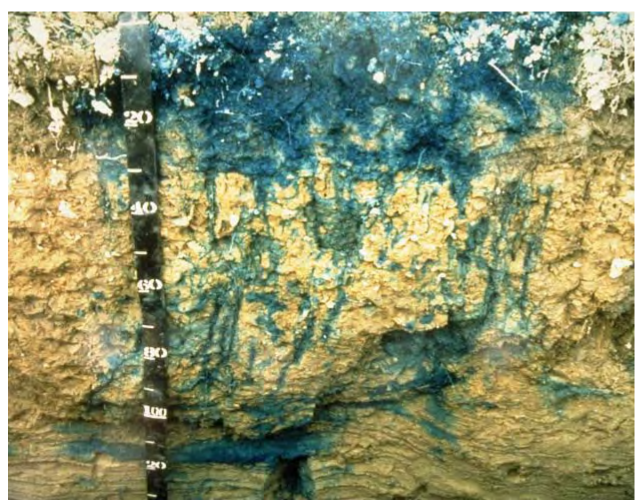


Fig. 4. Profile (in centimeters) displaying the infiltration test result of the natural undisturbed horizons of a soil in Hydrologic Soil Group C.

lawn/ground cover to help maintain the restored subsoil structure. Infiltration after construction-induced mixing and compression of such subsoil material can be notably rehabilitated with the Deep Ripping and Decompaction practice, which prepares the site for the appropriate long-term lawn/ground cover mix including deep taproot plants such as clover, fescue or trefoil, etc. needed for all rehabilitated soils.

Generally, soils in Hydrologic Soil Groups A and B, which respectively may include deep, well-drained, sandy-gravelly materials or deep, moderately well-drained basal till materials, are among the easier ones to restore permeability and infiltration, by deep ripping and decompaction. Among the many different soils in Hydrologic Soil Group C are those unique glacial tills having a natural fragipan zone, beginning about 12 to 18 inches (30 – 45cm), below surface. Although soils in Hydrologic Soil Group C do require a somewhat more carefully applied level of the Deep Ripping and Decompaction practice, it can greatly benefit such affected areas by reducing the runoff and fostering infiltration to a level equal to that of pre-disturbance.

Soils in Hydrologic Soil Group D typically have a permanent high water table close to the surface, influenced by a clay or other highly impervious layer of material. In many locations with clay subsoil material, the bulk density is so naturally high that heavy trafficking has little or no added impact on infiltration; and structural runoff control practices rather than Deep Ripping and Decompaction should be considered.

The information about Hydrologic Soil Groups is merely a general guideline. Site-specific data such as limited depths of cut-and-fill grading with minimal removal or translocation of the inherent subsoil materials (as analyzed in the county soil survey) or, conversely, the excavation and translocation of deeper, unconsolidated substratum or consolidated bedrock materials (unlike the analyzed subsoil horizons' materials referred to in the county soil survey) should always be taken into account.

Sites made up with significant quantities of large rocks, or having a very shallow depth to bedrock, are not conducive to deep ripping and decompation (subsoiling); and other measures may be more practical.

**Slope**

The two-phase application of 1) deep ripping and 2) decompaction (deep subsoiling), is most practical on flat, gentle and moderate slopes. In some situations, such as but not limited to temporary construction access corridors, inclusion areas that are moderately steep along a project's otherwise gentle or moderate slope may also be deep ripped and decompacted. For limited instances of moderate steepness on other projects, however, the post-construction land use and the relative alignment of the potential ripping and decompaction work in relation to the lay of the slope should be reviewed for safety and practicality. In broad construction areas predominated by moderately steep or steep slopes, the practice is generally not used.

**Local Weather/Timing/Soil Moisture**

Effective fracturing of compressed subsoil material from the exposed work surface, laterally and vertically down through the affected zone is achieved only when the soil material is moderately dry to moderately moist. Neither one of the two-phases, deep ripping nor decompaction (deep subsoiling), can be effectively conducted when the soil material (subsoil or replaced topsoil) is in either a “plastic” or “liquid” state of soil consistency. Pulling the respective implements legs through the soil when it is overly moist only results in the “slicing and smearing” of the material or added “squeezing and compression” instead of the necessary fracturing. Ample drying time is needed for a “rippable” soil condition not merely in the material close to the surface, but throughout the material located down to the bottom of the physically compressed zone of the subsoil.

Fig. 5. Augered from a depth of 19 inches below the surface of the replaced topsoil, this subsoil sample was hand rolled to a 1/8-inch diameter. The test shows the soil at this site stretches out too far without crumbling; it indicates the material is in a plastic state of consistence, too wet for final decompaction (deep subsoiling) at this time.

The “poor man’s Atterberg field test” for soil plasticity is a simple “hand-roll” method used for quick, on-site determination of whether or not the moisture level of the affected soil material is low enough for: effective deep ripping of subsoil; respreading of topsoil in a friable state; and final decompaction (deep subsoiling). Using a sample of soil material obtained from the planned bottom depth of ripping, e.g.: 20 - 24 inches below exposed subsoil surface, the sample is hand rolled between the palms down to a 1/8-inch diameter thread. (Use the same test for stored topsoil material before respreading on the site.) If the respective soil sample crumbles apart in segments no greater than 3/8 of an inch long, by the time it is rolled down to 1/8 inch diameter, it is low enough in moisture for deep ripping (or topsoil replacement), and decompaction. Conversely, as shown in Figure 5, if the rolled sample stretches out in increments greater than 3/8 of an inch long before crumbling, it is in a “plastic” state of soil consistency and is too wet for subsoil ripping (as well as topsoil replacement) and final decompaction.

## Design Guidance

Beyond the above-noted site factors, a vital requirement for the effective Deep Ripping and Decompaction (deep subsoiling), is implementing the practice in its distinct, two-phase process:

1) Deep rip the affected thickness of exposed subsoil material (see Figure 10 and 11), aggressively fracturing it before the protected topsoil is reapplied on the site (see Figure 12); and

2) Decompact (deep subsoil), simultaneously through the restored topsoil layer and the upper half of the affected subsoil (Figure 13). The second phase, “decompaction,” mitigates the partial recompaction which occurs during the heavy process of topsoil spreading/grading. Prior to deep ripping and decompacting the site, all construction activity, including construction equipment and material storage, site cleanup and trafficking (Figure 14), should be finished; and the site closed off to further disturbance. Likewise, once the practice is underway and the area’s soil permeability and

rainfall infiltration are being restored, a policy limiting all further traffic to permanent travel lanes is maintained.

The other critical elements, outlined below, are: using the proper implements (deep, heavy-duty rippers and subsoilers), and ample pulling-power equipment (tractors); and conducting the practice at the appropriate speed, depth and pattern(s) of movement.

Note that an appropriate plan for the separate practice of establishing a healthy perennial ground cover, with deep rooting to help maintain the restored soil structure, should be developed in advance. This may require the assistance of an agronomist or landscape horticulturist.

**Implements**

Avoid the use of all undersize implements. The small-to-medium, light-duty tool will, at best, only "scarify" the uppermost surface portion of the mass of compacted subsoil material. The term "chisel plow" is commonly but incorrectly applied to a broad range of implements. While a few may be adapted for the moderate subsoiling of non-impacted soils, the majority are less durable and used for only lighter land-fitting (see Figure 6).

Fig. 6. A light duty chisel implement, not adequate for either the deep ripping or decompaction (deep subsoiling) phase.

Fig. 7. One of several variations of an agricultural ripper. This unit has long, rugged shanks mounted on a steel V-frame for deep, aggressive fracturing through Phase 1.

Use a "heavy duty" agricultural-grade, deep ripper (see Figures 7,9,10 and 11) for the first phase: the lateral and vertical fracturing of the mass of exposed and compressed subsoil, down and through, to the bottom of impact, prior to the replacement of the topsoil layer. (Any oversize rocks which are uplifted to the subsoil surface during the deep ripping phase are picked and removed.) Like the heavy-duty class of implement for the first phase, the decompaction (deep subsoiling) of Phase 2 is conducted with the heavy-duty version of the deep subsoiler. More preferable is the angled-leg variety of deep subsoiler (shown in Figures 8 and 13). It minimizes the inversion of the subsoil and topsoil layers while laterally and vertically fracturing the upper half of the previously ripped subsoil layer and all of the topsoil layer by delivering a momentary, wave-like "lifting and shattering" action up through the soil layers as it is pulled.

**Pulling-Power of Equipment**

Use the following rule of thumb for tractor horsepower (hp) whenever deep ripping and decompacting a significantly impacted site: For both types of implement, have at least 40 hp of tractor pull available for each mounted shank/ leg.

Using the examples of a 3-shank and a 5-shank implement, the respective tractors should have 120 and 200 hp available for fracturing down to the final depth of 20-to-24 inches per phase. Final depth for the deep ripping in Phase 1 is achieved incrementally by a progressive series of passes (see Depth and Patterns of Movement, below); while for Phase 2, the full operating depth of the deep subsoiler is applied from the beginning.

The operating speed for pulling both types of implement should not exceed 2 to 3 mph. At this slow and managed rate of operating speed, maximum functional performance is sustained by the tractor and the implement performing the soil fracturing. Referring to Figure 8, the implement is the 6-leg version of the deep angled-leg subsoiler. Its two outside legs are “chained up” so that only four legs will be engaged (at the maximum depth), requiring no less than 160 hp, (rather than 240 hp) of pull. The 4-wheel drive, articulated-frame tractor in Figure 8 is 174 hp. It will be decompacting this unobstructed, former construction access area simultaneously through 11 inches of replaced topsoil and the upper 12 inches of the previously deep-ripped subsoil. In constricted areas of Phase 1) Deep Ripping, a medium-size tractor with adequate hp, such as the one in Figure 9 pulling a 3-shank deep ripper, may be more maneuverable.

Fig. 8. A deep, angled-leg subsoiler, ideal for Phase 2 decompaction of after the topsoil layer is graded on top of the ripped subsoil.

Some industrial-grade variations of ripping implements are attached to power graders and bulldozers. Although highly durable, they are generally not recommended. Typically, the shanks or “teeth” of these rippers are too short and stout; and they are mounted too far apart to achieve the well-distributed type of lateral and vertical fracturing of the soil materials necessary to restore soil permeability and infiltration. In addition, the power graders and bulldozers, as pullers, are far less maneuverable for turns and patterns than the tractor.

Fig. 9. This medium tractor is pulling a 3-shank deep ripper. The severely compacted construction access corridor is narrow, and the 120 hp tractor is more maneuverable for Phase 1 deep ripping (subsoil fracturing), here.

**Depth and Patterns of Movement**

As previously noted both Phase 1 Deep Ripping through significantly compressed, exposed subsoil and Phase 2 Decompaction (deep subsoiling) through the replaced topsoil and upper subsoil need to be performed at maximum capable depth of each implement. With an implement's guide wheels attached, some have a "normal" maximum operating depth of 18 inches, while others may go deeper. In many situations, however, the tractor/implement operator must first remove the guide wheels and other non essential elements from the implement. This adapts the ripper or the deep subsoiler for skillful pulling with its frame only a few inches above surface, while the shanks or legs, fracture the soil material 20-to-24 inches deep.

There may be construction sites where the depth of the exposed subsoil's compression is moderate, e.g.: 12 inches, rather than deep. This can be verified by using a ¾ inch cone penetrometer and a shovel to test the subsoil for its level of compaction, incrementally, every three inches of increasing depth. Once the full thickness of the subsoil's compacted zone is finally "pieced" and there is a significant drop in the psi measurements of the soil penetrometer, the depth/thickness of compaction is determined. This is repeated at several representative locations of the construction site. If the thickness of the site's subsoil compaction is verified as, for example, ten inches, then the Phase 1 Deep Ripping can be correspondingly reduced to the implement's minimum operable depth of 12 inches. However, the Phase 2 simultaneous Decompation (subsoiling) of an 11 inch thick layer of replaced topsoil and the upper subsoil should run at the subsoiling implements full operating depth.

Fig. 10. An early pass with a 3-shank deep ripper penetrating only 8 inches into this worksite's severely compressed subsoil.

Fig. 11. A repeat run of the 3-shank ripper along the same patterned pass area as Fig. 9; here, incrementally reaching 18 of the needed 22 inches of subsoil fracture.

Typically, three separate series (patterns) are used for both the Phase 1 Deep Ripping and the Phase 2 Decompaction on significantly compacted sites. For Phase 1, each series begins with a moderate depth of rip and, by repeat-pass, continues until full depth is reached. Phase 2 applies the full depth of Decompation (subsoiling), from the beginning.

Every separate series (pattern) consists of parallel, forward-and-return runs, with each progressive pass of the implement's legs or shanks evenly staggered between those from the previous pass. This compensates for the shank or leg-spacing on the implement, e.g., with 24-to-30 inches between each shank or leg. The staggered return pass ensures lateral and vertical fracturing actuated every 12 to 15 inches across the densely compressed soil mass.

**Large, Unobstructed Areas**

For larger easy areas, use the standard patterns of movement:

- The first series (pattern) of passes is applied lengthwise, parallel with the longest spread of the site; gradually progressing across the site's width, with each successive pass.

- The second series runs obliquely, crossing the first series at an angle of about 45 degrees.

- The third series runs at right angle (or 90 degrees), to the first series to complete the fracturing and shattering on severely compacted sites, and avoid leaving large unbroken blocks of compressed soil material. (In certain instances, the third series may be optional, depending on how thoroughly the first two series loosen the material and eliminate large chunks/blocks of material as verified by tests with a ¾-inch cone penetrometer.)


Fig. 12. Moderately dry topsoil is being replaced on the affected site now that Phase 1 deep ripping of the compressed subsoil is complete.

Fig. 13. The same deep, angled-leg subsoiler shown in Fig. 7 is engaged at maximum depth for Phase 2, decompaction (deep soiling), of the replaced topsoil and the upper subsoil materials.

**Corridors**

In long corridors of limited width and less maneuverability than larger sites, e.g.: along compacted areas used as temporary construction access, a modified series of pattern passes are used.

- First, apply the same initial lengthwise, parallel series of passes described above.

● A second series of passes makes a broad "S" shaped pattern of rips, continually and gradually alternating the "S" curves between opposite edges inside the compacted corridor.

● The third and final series again uses the broad, alternating S pattern, but it is "flip-flopped" to continually cross the previous S pattern along the corridor's centerline. This final series of the S pattern curves back along the edge areas skipped by the second series.

## Maintenance and Cost

Once the two-phase practice of Deep Ripping and Decompation is completed, two items are essential for maintaining a site's soil porosity and permeability for infiltration. They are: planting and maintaining the appropriate ground cover with deep roots to maintain the soil structure (see Figure 15); and keeping the site free of traffic or other weight loads.

Note that site-specific choice of an appropriate vegetative ground-cover seed mix, including the proper seeding ratio of one or more perennial species with a deep taproot system and the proper amount of lime and soil nutrients (fertilizer mix) adapted to the soil-needs, are basic to the final practice of landscaping, i.e: surface tillage, seeding/planting/fertilizing and culti-packing or mulching is applied. The "maintenance" of an effectively deep-ripped and decompacted area is generally limited to the successful perennial (long-term) landscape ground cover; as long as no weight-bearing force of soil compaction is applied.

Fig. 14. The severely compacted soil of a temporary construction yard used daily by heavy equipment for four months; shown before deep ripping, topsoil replacement, and decompaction.

Fig. 15. The same site as Fig. 14 after deep ripping of the exposed subsoil, topsoil replacement, decompaction through the topsoil and upper subsoil and final surface tillage and revegetation to maintain soil permeability and infiltration.

The Deep Ripping and Decompaction practice is, by necessity, more extensive than periodic subsoiling of farmland.The cost of deep ripping and decompacting (deep subsoiling), will vary according to the depth and severity of soil-material compression and the relative amount of tractor and implement time that is required. In some instances, depending on open maneuverability, two-to-three acres of compacted project area may be deep-ripped in one day. In other situations of more severe compaction and - or less maneuverability, as little as one acre may be fully ripped in a day. Generally, if the Phase 1) Deep Ripping is fully effective, the Phase 2) Decompaction should be completed in 2/3 to 3/4 of the time required for Phase 1.

Using the example of two acres of Phase 1) Deep Ripping in one day, at $1800 per day, the net cost is $900 per acre. If the Phase 2) Decompacting or deep subsoiling takes 3/4 the time as Phase 1, it costs $675 per acre for a combined total of $1575 per acre to complete the practice (these figures do not include the cost of the separate practice of topsoil stripping and replacement). Due to the many variables, it must be recognized that cost will be determined by the specific conditions or constraints of the site and the availability of proper equipment.

## Resources

Publications:


- American Society of Agricultural Engineers. 1971. *Compaction of Agricultural Soils.* ASAE.

- Brady, N.C., and R.R. Weil. 2002. *The Nature and Properties of Soils. 13th ed.* Pearson Education, Inc.

- Baver, L.D. 1948. *Soil Physics.* John Wiley & Sons.

- Carpachi, N. 1987 (1995 fifth printing). *Excavation and Grading Handbook, Revised. 2nd ed.* Craftsman Book Company
- Ellis, B. (Editor). 1997. Safe & Easy Lawn Care: The Complete Guide to Organic Low Maintenance Lawn. Houghton Mifflin.

- Harpstead, M.I., T.J. Sauer, and W.F. Bennett. 2001. *Soil Science Simplified. 4th ed.* Iowa State University Press.

- Magdoff, F., and H. van Es. 2000. *Building Soils for Better Crops. 2nd ed.* Sustainable Agricultural Networks

- McCarthy, D.F. 1993. *Essentials of Soil Mechanics and Foundations, Basic Geotechnics 4th ed.* Regents/Prentice Hall.

- Plaster, E.J. 1992. *Soil Science & Management. 3rd ed.* Delmar Publishers.

- Union Gas Limited, Ontario, Canada. 1984. *Rehabilitation of Agricultural Lands, Dawn-Kerwood Loop Pipeline; Technical Report*. Ecological Services for Planning, Ltd.; Robinson, Merritt & Devries, Ltd. and Smith, Hoffman Associates, Ltd.

- US Department of Agriculture in cooperation with Cornell University Agricultural Experiment Station. Various years. *Soil Survey of (various names) County, New York.* USDA.


Internet Access:

- Examples of implements:

V-Rippers. Access by internet search of *John Deere Ag -New Equipment for 915* (larger-frame model) *V-Rippe*; and, *for 913* (smaller-frame model) *V-Ripper*. Deep, angled-leg subsoiler. Access by internet search of: B*igham Brothers Shear Bolt Paratill-Subsoiler*. http://salesmanual.deere.com/sales/salesmanual/en_NA/primary_tillage/2008/feature/rippers/915v_pattern_frame.html?sbu=ag&link=prodcat Last visited March 08.

- Soils data of USDA Natural Resources Conservation Service. *NRCS Web Soil Survey.* http://websoilsurvey.nrcs.usda.gov/app/ and *USDA-NRCS Official Soil Series Descriptions; View by Name.* http://ortho.ftw.nrcs.usda.gov/cgi-bin/osd/osdname.cgi . *Last visited Jan. 08.*

- Soil penetrometer information. Access by internet searches of: *Diagnosing Soil Compaction using a Penetrometer (soil compaction tester), PSU Extension;* as well as *Dickey-john Soil Compaction Tester.* http://www.dickey-johnproducts.com/pdf/SoilCompactionTest.pdf and http://cropsoil.psu.edu/Extension/Facts/uc178pdf Last visited Sept. 07

# STANDARD AND SPECIFICATIONS FOR CHECK DAM

## Definition & Scope

Small barriers or dams constructed of stone, bagged sand or gravel, or other durable materials across a drainageway to reduce erosion in a drainage channel by reducing the velocity of flow in the channel.

## Conditions Where Practice Applies

This practice is used as a **temporary** and, in some cases, a **permanent** measure to limit erosion by reducing velocities in open channels that are degrading or subject to erosion or where permanent stabilization is impractical due to short period of usefulness and time constraints of construction.

## Design Criteria

**Drainage Area:** Maximum drainage area above the check dam shall not exceed two (2) acres.

**Height:** Not greater than 2 feet. Center shall be maintained 9 inches lower than abutments at natural ground elevation.

**Side Slopes:** Shall be 2:1 or flatter.

**Spacing:** The check dams shall be spaced as necessary in the channel so that the crest of the downstream dam is at the elevation of the toe of the upstream dam. This spacing is equal to the height of the check dam divided by the channel slope.

Therefore:

$$S = \frac{h}{s}$$

Where: S = spacing interval (ft.)
h = height of check dam (ft.)
s = channel slope (ft./ft.)

Example:

For a channel with a 4% slope and 2 ft. high stone check dams, they are spaced as follows:

$$S = \frac{2\ \text{ft}}{0.04\ \frac{\text{ft}}{\text{ft}}} = 50\ \text{ft}$$

**For stone check dams:** Use a well graded stone matrix 2 to 9 inches in size (NYS – DOT Light Stone Fill meets these requirements).

The overflow of the check dams will be stabilized to resist erosion that might be caused by the check dam. See Figure 3.1 on page 3.3 for details.

Check dams should be anchored in the channel by a cutoff trench 1.5 ft. wide and 0.5 ft. deep and lined with filter fabric to prevent soil migration.

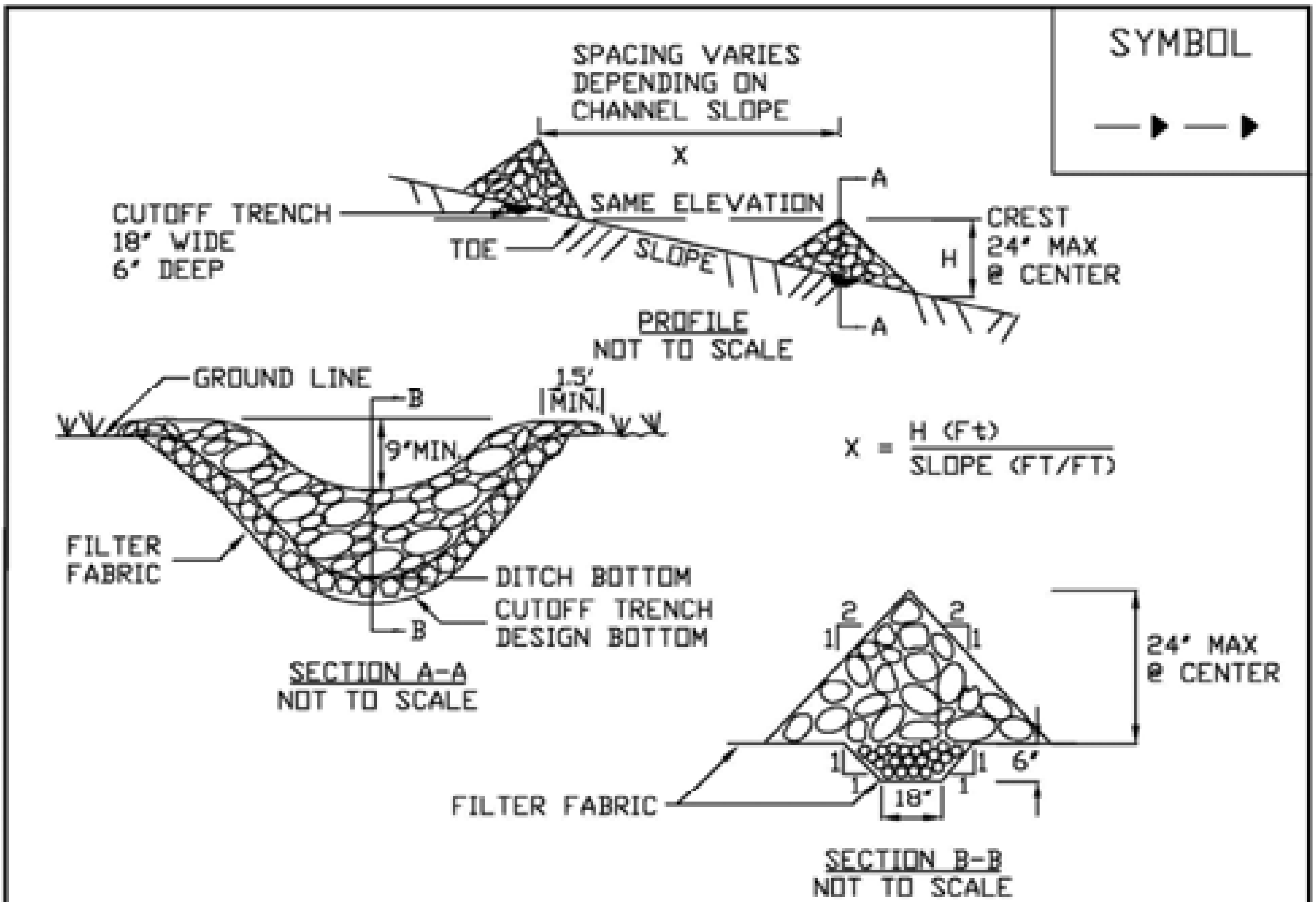
**For filter sock or fiber roll check dams:** The check dams will be anchored by staking the dam to the earth contact surface. The dam will extend to the top of the bank. The check dam will have a splash apron of NYS DOT #2 crushed stone extending a minimum 3 feet downstream from the dam and 1 foot up the sides of the channel. The compost and materials for a filter sock check dam shall meet the requirements shown in the standard for Compost Filter Sock on page 5.7.

## Maintenance

The check dams should be inspected after each runoff event. Correct all damage immediately. If significant erosion has occurred between structures, a liner of stone or other suitable material should be installed in that portion of the channel or additional check dams added.

Remove sediment accumulated behind the dam as needed to allow channel to drain through the stone check dam and prevent large flows from carrying sediment over the dam.

**Figure 3.1**
**Stone Check Dam Detail**




## CONSTRUCTION SPECIFICATIONS

1. STONE WILL BE PLACED ON A FILTER FABRIC FOUNDATION TO THE LINES, GRADES AND LOCATIONS SHOWN IN THE PLAN.
2. SET SPACING OF CHECK DAMS TO ASSUME THAT THE ELEVATIONS OF THE CREST OF THE DOWNSTREAM DAM IS AT THE SAME ELEVATION OF THE TOE OF THE UPSTREAM DAM.
3. EXTEND THE STONE A MINIMUM OF 1.5 FEET BEYOND THE DITCH BANKS TO PREVENT CUTTING AROUND THE DAM.
4. PROTECT THE CHANNEL DOWNSTREAM OF THE LOWEST CHECK DAM FROM SCOUR AND EROSION WITH STONE OR LINER AS APPROPRIATE.
5. ENSURE THAT CHANNEL APPURTENANCES SUCH AS CULVERT ENTRANCES BELOW CHECK DAMS ARE NOT SUBJECT TO DAMAGE OR BLOCKAGE FROM DISPLACED STONE.

MAXIMUM DRAINAGE AREA 2 ACRES.

| | |
|---|---|
| ADAPTED FROM DETAILS PROVIDED BY: USDA - NRCS, NEW YORK STATE DEPARTMENT OF TRANSPORTATION, NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION, NEW YORK STATE SOIL & WATER CONSERVATION COMMITTEE | STONE CHECK DAM |

# STANDARD AND SPECIFICATIONS FOR CONCRETE TRUCK WASHOUT

## Definition & Scope

A temporary excavated or above ground lined constructed pit where concrete truck mixers and equipment can be washed after their loads have been discharged, to prevent highly alkaline runoff from entering storm drainage systems or leaching into soil.

## Conditions Where Practice Applies

Washout facilities shall be provided for every project where concrete will be poured or otherwise formed on the site. This facility will receive highly alkaline wash water from the cleaning of chutes, mixers, hoppers, vibrators, placing equipment, trowels, and screeds. Under no circumstances will wash water from these operations be allowed to infiltrate into the soil or enter surface waters.

## Design Criteria

**Capacity:** The washout facility should be sized to contain solids, wash water, and rainfall and sized to allow for the evaporation of the wash water and rainfall. Wash water shall be estimated at 7 gallons per chute and 50 gallons per hopper of the concrete pump truck and/or discharging drum. The minimum size shall be 8 feet by 8 feet at the bottom and 2 feet deep. If excavated, the side slopes shall be 2 horizontal to 1 vertical.

**Location:** Locate the facility a minimum of 100 feet from drainage swales, storm drain inlets, wetlands, streams and other surface waters. Prevent surface water from entering the structure except for the access road. Provide appropriate access with a gravel access road sloped down to the structure. Signs shall be placed to direct drivers to the facility after their load is discharged.

**Liner:** All washout facilities will be lined to prevent leaching of liquids into the ground. The liner shall be plastic sheeting with a minimum thickness of 10 mils with no holes or tears, and anchored beyond the top of the pit with an earthen berm, sand bags, stone, or other structural appurtenance except at the access point.

If pre-fabricated washouts are used they must ensure the capture and containment of the concrete wash and be sized based on the expected frequency of concrete pours. They shall be sited as noted in the location criteria.

## Maintenance

- All concrete washout facilities shall be inspected daily. Damaged or leaking facilities shall be deactivated and repaired or replaced immediately. Excess rainwater that has accumulated over hardened concrete should be pumped to a stabilized area, such as a grass filter strip.
- Accumulated hardened material shall be removed when 75% of the storage capacity of the structure is filled. Any excess wash water shall be pumped into a containment vessel and properly disposed of off site.
- Dispose of the hardened material off-site in a construction/demolition landfill. On-site disposal may be allowed if this has been approved and accepted as part of the projects SWPPP. In that case, the material should be recycled as specified, or buried and covered with a minimum of 2 feet of clean compacted earthfill that is permanently stabilized to prevent erosion.
- The plastic liner shall be replaced with each cleaning of the washout facility.
- Inspect the project site frequently to ensure that no concrete discharges are taking place in non-designated areas.

# STANDARD AND SPECIFICATIONS FOR CONSTRUCTION DITCH

## Definition & Scope

A **temporary** excavated drainage way to intercept sediment laden water and divert it to a sediment trapping device or to prevent runoff from entering disturbed areas by intercepting and diverting it to a stabilized outlet.

## Conditions Where Practice Applies

Construction ditches are constructed:

1. to divert flows from entering a disturbed area.
2. intermittently across disturbed areas to shorten overland flow distances.
3. to direct sediment laden water along the base of slopes to a trapping device.
4. to transport offsite flows across disturbed areas such as rights-of-way.

Ditches collecting runoff from disturbed areas shall remain in place until the disturbed areas are permanently stabilized.

## Design Criteria

See Figure 3.2 on page 3.6 for details.

**General**

| | Ditch A | Ditch B |
|---|---|---|
| Drainage Area | <5 Ac | 5-10 Ac |
| Bottom Width of Flow Channel | 4 ft. | 6 ft. |
| Depth of Flow Channel | 1 ft. | 1 ft. |
| Side Slopes | 2:1 or flatter | 2:1 or flatter |
| Grade | 0.5% Min.<br>10% Max. | 0.5% Min.<br>10% Max. |

For drainage areas larger than 10 acres, refer to the Standard and Specification for Grassed Waterways on page 3.23 and 3.24.

**Stabilization**

Stabilization of the ditch shall be completed within 2 days of installation in accordance with the appropriate standard and specifications for vegetative stabilization or stabilization with mulch as determined by the time of year. The flow channel shall be stabilized as per the following criteria:

The seeding for vegetative stabilization shall be in accordance with the standard on Page 4.78. The seeded area will be mulched in accordance with the standard on Page 4.39.

| Type of Treatment | Channel Grade[1] | Flow Channel | |
|---|---|---|---|
| | | A (<5 Ac.) | B (5-10 Ac.) |
| 1 | 0.5-3.0% | Seed & Straw Mulch | Seed & Straw Mulch |
| 2 | 3.1-5.0% | Seed & Straw Mulch | Seed and cover with RECP[2], Sod, or lined with plastic or 2" stone |
| 3 | 5.1-8.0% | Seed and cover with RECP[2], Sod, or line with plastic or 2 in. stone | Line with 4-8 in. rip-rap or, geotextile |
| 4 | 8.1-10% | Line with 4-8 in. rip-rap or geotextile | Site Specific Design |

1 In highly erodible soils, as defined by the local approving agency, refer to the next higher slope grade for type of stabilization.
2 Rolled Erosion Control Product.

**Outlet**

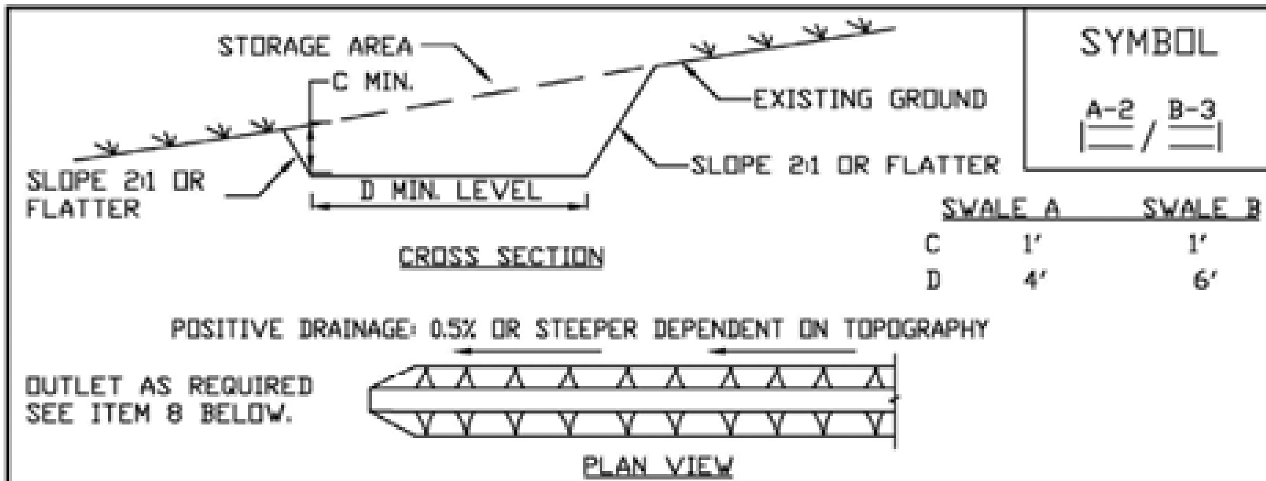
Ditch shall have an outlet that functions with a minimum of erosion, and dissipates runoff velocity prior to discharge off the site.

Runoff shall be conveyed to a sediment trapping device such as a sediment trap or sediment basin until the drainage area above the ditch is adequately stabilized.

The on-site location may need to be adusted to meet field conditions in order to utilize the most suitable outlet condition.

If a ditch is used to divert clean water flows from entering a disturbed area, a sediment trapping device may not be needed.

# Figure 3.2
# Construction Ditch Detail




## CONSTRUCTION SPECIFICATIONS

1. ALL CONSTRUCTION DITCHES SHALL HAVE UNINTERUPTED POSITIVE GRADE TO AN OUTLET.
2. DIVERTED RUNOFF FROM A DISTURBED AREA SHALL BE CONVEYED TO A SEDIMENT TRAPPING DEVICE.
3. DIVERTED RUNOFF FROM AN UNDISTURBED AREA SHALL OUTLET DIRECTLY INTO AN UNDISTURBED STABILIZED AREA AT NON-EROSIVE VELOCITY.
4. ALL TREES, BRUSH, STUMPS, OBSTRUCTIONS, AND OTHER OBJECTIONABLE MATERIAL SHALL BE REMOVED AND DISPOSED OF SO AS NOT TO INTERFERE WITH THE PROPER FUNCTIONING OF THE SWALE.
5. THE DITCH SHALL BE EXCAVATED OR SHAPED TO LINE, GRADE, AND CROSS SECTION AS REQUIRED TO MEET THE CRITERIA SPECIFIED HEREIN AND BE FREE OF BANK PROJECTIONS OR OTHER IRREGULARITIES WHICH WILL IMPEDE NORMAL FLOW.
6. FILLS SHALL BE COMPACTED BY EARTH MOVING EQUIPMENT.
7. ALL EARTH REMOVED AND NOT NEEDED FOR CONSTRUCTION SHALL BE PLACED SO THAT IT WILL NOT INTERFERE WITH THE FUNCTIONING OF THE DITCH.
8. STABILIZATION SHALL BE AS PER THE FLOW CHANNEL STABILIZATION CHART BELOW:

| TYPE OF TREATMENT | CHANNEL GRADE | A(5 AC. OR LESS) | B(5 AC -10AC) |
|---|---|---|---|
| 1 | 0.5-3.0% | SEED AND STRAW MULCH | SEED AND STRAW MULCH |
| 2 | 3.1-5.0% | SEED AND STRAW MULCH | SEED AND COVER USING RECP |
| 3 | 5.1-8.0% | SEED AND COVER WITH RECP | LINED WITH 4-8" RIP-RAP OR GEOTEXTILE |
| 4 | 8.1-10.% | LINED WITH 4-8" RIP-RAP OR GEOTEXTILE | SITE SPECIFIC DESIGN |

9. PERIODIC INSPECTION AND REQUIRED MAINTENANCE MUST BE PROVIDED AFTER EACH RAIN EVENT.

ADAPTED FROM DETAILS PROVIDED BY: USDA - NRCS, NEW YORK STATE DEPARTMENT OF TRANSPORTATION, NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION, NEW YORK STATE SOIL & WATER CONSERVATION COMMITTEE

CONSTRUCTION DITCH

# STANDARD AND SPECIFICATIONS FOR CONSTRUCTION ROAD STABILIZATION

## Definition & Scope

The stabilization of temporary construction access routes, on-site vehicle transportation routes, and construction parking areas to control erosion on temporary construction routes and parking areas.

## Conditions Where Practice Applies

All traffic routes and parking areas for temporary use by construction traffic.

## Design Criteria

Construction roads should be located to reduce erosion potential, minimize impact on existing site resources, and maintain operations in a safe manner. Highly erosive soils, wet or rocky areas, and steep slopes should be avoided. Roads should be routed where seasonal water tables are deeper than 18 inches. Surface runoff and control should be in accordance with other standards.

**Road Grade** – A maximum grade of 12% is recommended, although grades up to 15% are possible for short distances.

**Road Width** – 12 foot minimum for one-way traffic or 24 foot minimum for two-way traffic.

**Side Slope of Road Embankment** – 2:1 or flatter.

**Ditch Capacity** – On-site roadside ditch and culvert capacities shall be the 10 yr. peak runoff.

**Composition** – Use a 6-inch layer of NYS DOT sub-base Types 1,2,3, 4 or equivalent as specified in NYSDOT Standard Specifications.

## Construction Specifications

1. Clear and strip roadbed and parking areas of all vegetation, roots, and other objectionable material.

2. Locate parking areas on naturally flat areas as available. Keep grades sufficient for drainage, but not more than 2 to 3 percent.

3. Provide surface drainage and divert excess runoff to stabilized areas.

4. Maintain cut and fill slopes to 2:1 or flatter and stabilized with vegetation as soon as grading is accomplished.

5. Spread 6-inch layer of sub-base material evenly over the full width of the road and smooth to avoid depressions.

6. Provide appropriate sediment control measures to prevent offsite sedimentation.

## Maintenance

Inspect construction roads and parking areas periodically for condition of surface. Top dress with new gravel as needed. Check ditches for erosion and sedimentation after rainfall events. Maintain vegetation in a healthy, vigorous condition. Areas producing sediment should be treated immediately.

# STANDARD AND SPECIFICATIONS FOR DIVERSION

## Definition & Scope

A drainage way of parabolic or trapezoidal cross-section with a supporting ridge on the lower side that is constructed across the slope to intercept and convey runoff to stable outlets at non-erosive velocities.

## Conditions Where Practice Applies

Diversions are used where:

1. Runoff from higher areas has potential for damaging properties, causing erosion, or interfering with, or preventing the establishment of, vegetation on lower areas.

2. Surface and/or shallow subsurface flow is damaging sloping upland.

3. The length of slopes needs to be reduced so that soil loss will be kept to a minimum.

Diversions are only applicable below stabilized or protected areas. Avoid establishment on slopes greater than fifteen percent. Diversions should be used with caution on soils subject to slippage. Construction of diversions shall be in compliance with state and local drainage and water laws.

## Design Criteria

### Location

Diversion location shall be determined by considering outlet conditions, topography, land use, soil type, length of slope, seep planes (when seepage is a problem), and the development layout.

### Capacity

Peak rates of runoff values used in determining the capacity requirements shall be calculated using the most current hydrologic data from the Northeast Regional Climate Center in an appropriate model.

The constructed diversion shall have capacity to carry, as a minimum, the peak discharge from a 10 year frequency rainfall event with freeboard of not less than 0.3 feet.

Diversions designed to protect homes, schools, industrial buildings, roads, parking lots, and comparable high-risk areas, and those designed to function in connection with other structures, shall have sufficient capacity to carry peak runoff expected from a storm frequency consistent with the hazard involved.

### Cross Section

The diversion channel shall be parabolic or trapezoidal in shape. Parabolic Diversion design charts are provided in Tables 3.2, 3.3 and 3.4 on pages 3.10, 3.12 and 3.13**.** The diversion shall be designed to have stable side slopes. The side slopes shall not be steeper than 2:1 and shall be flat enough to ensure ease of maintenance of the diversion and its protective vegetative cover.

The ridge shall have a minimum width of four feet at the design water elevation; a minimum of 0.3 feet freeboard and a reasonable settlement factor shall be provided.

### Velocity and Grade

The permissible velocity for the specified method of stabilization will determine the maximum grade. Maximum permissible velocities of flow for the stated conditions of stabilization shall be as shown in Table 3.1 on page 3.10 of this standard.

Diversions are not usually applicable below high sediment producing areas unless land treatment practices or structural measures, designed to prevent damaging accumulations of sediment in the channels, are installed with, or before, the diversions.

### Outlets

Each diversion must have an adequate outlet. The outlet may be a grassed waterway, vegetated or paved area, grade stabilization structure, flow spreader, flow diffuser, stable watercourse, or subsurface drain outlet. In all cases, the outlet must convey runoff to a point where outflow will not cause damage. Vegetated outlets shall be installed before diversion construction, if needed, to ensure establishment of vegetative cover in the outlet channel.

The design elevation of the water surface in the diversion shall not be lower than the design elevation of the water surface in the outlet at their junction when both are operating at design flow.

**Stabilization**

Vegetated diversions shall be stabilized in accordance with the following tables.

## Table 3.1
## Diversion Maximum Permissible Design Velocities Table

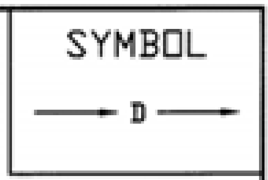
| Soil Texture | Retardance and Cover | Permissible Velocity (ft / second) for Selected Channel Vegetation |
|---|---|---|
| Sand, Silt, Sandy loam, silty loam, loamy sand (ML, SM, SP, SW) | C-Kentucky 31 tall fescue and Kentucky bluegrass | 3.0 |
| | D-Annuals[1] Small grain (rye, oats, barley, millet) Ryegrass | 2.5 |
| Silty clay loam, Sandy clay loam (ML-CL, SC) | C-Kentucky 31 tall fescue and Kentucky bluegrass | 4.0 |
| | D-Annuals[1] Small grain (rye, oats, barley, millet) Ryegrass | 3.5 |
| Clay (CL) | C-Kentucky 31 tall fescue and Kentucky bluegrass | 5.0 |
| | D-Annuals[1] Small grain (rye, oats, barley, millet) Ryegrass | 4.0 |

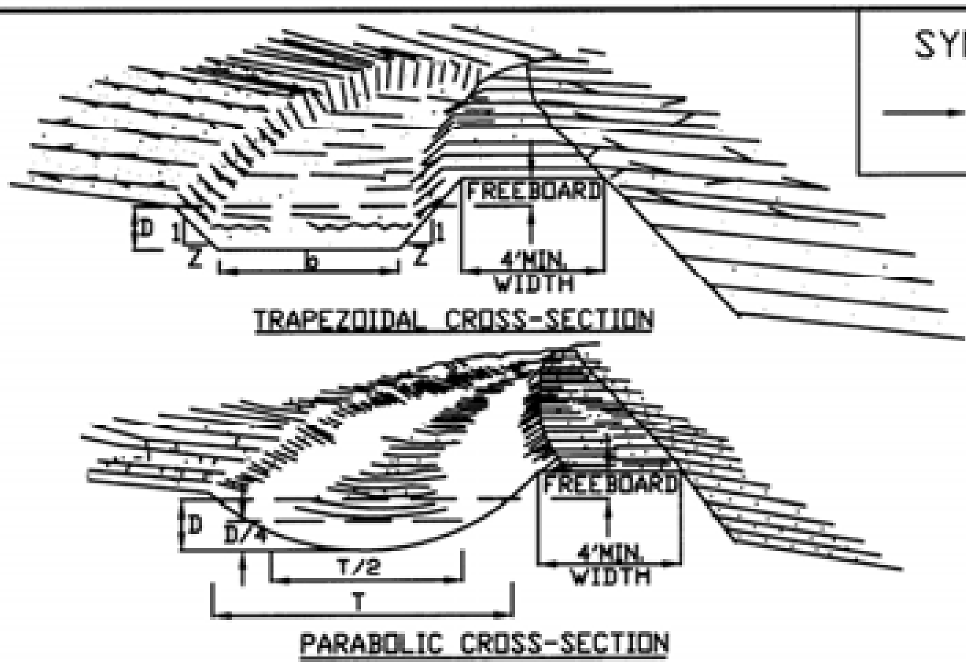
[1] Annuals—Use only as temporary protection until permanent vegetation is established.

## Table 3.2 - Retardance Factors for Various Grasses and Legumes Table

| Retardance | Cover | Condition |
|---|---|---|
| A | Reed canarygrass | Excellent stand, tall (average 36 inches) |
| B | Smooth bromegrass | Good stand, mowed (average 12 to 15 inches) |
| | Tall fescue | Good stand, unmowed (average 18 inches) |
| | Grass-legume mixture—Timothy, smooth bromegrass, or Orchard grass with birdsfoot trefoil | Good stand, uncut (average 20 inches) |
| | Reed canarygrass | Good stand, mowed (average 12 to 15 inches) |
| | Tall fescue, with birdsfoot trefoil or ladino clover | Good stand, uncut (average 18 inches) |
| C | Redtop | Good stand, headed (15 to 20 inches) |
| | Grass-legume mixture—summer (Orchard grass, redtop, Annual ryegrass, and ladino or white clover) | Good stand, uncut (6 to 8 inches) |
| | Kentucky bluegrass | Good stand, headed (6 to 12 inches) |
| D | Red fescue | Good stand, headed (12 to 18 inches) |
| | Grass-legume mixture—fall, spring (Orchard grass, redtop, Annual ryegrass, and white or ladino clover) | Good stand, uncut (4 to 5 inches) |

# Figure 3.4
# Diversion Detail




## CONSTRUCTION SPECIFICATIONS

1. ALL TREES, BRUSH, STUMPS, OBSTRUCTIONS, AND OTHER OBJECTIONABLE MATERIAL SHALL BE REMOVED AND DISPOSED OF SO AS NOT TO INTERFERE WITH THE PROPER FUNCTIONING OF THE DIVERSION.
2. THE DIVERSION SHALL BE EXCAVATED OR SHAPED TO LINE, GRADE, AND CROSS SECTION AS REQUIRED TO MEET THE CRITERIA SPECIFIED HEREIN, AND BE FREE OF BANK PROJECTIONS OR OTHER IRREGULARITIES WHICH WILL IMPEDE NORMAL FLOW.
3. FILLS SHALL BE COMPACTED AS NEEDED TO PREVENT UNEQUAL SETTLEMENT THAT WOULD CAUSE DAMAGE IN THE COMPLETE DIVERSION.
4. ALL EARTH REMOVED AND NOT NEEDED IN CONSTRUCTION SHALL BE SPREAD OR DISPOSED OF SO THAT IT WILL NOT INTERFERE WITH THE FUNCTIONING OF THE DIVERSION.
5. STABILIZATION SHALL BE DONE ACCORDING TO THE APPROPRIATE STANDARD AND SPECIFICATIONS FOR VEGETATIVE PRACTICES.
   A. FOR DESIGN VELOCITIES OF LESS THAN 3.5 FT. PER. SEC., SEEDING AND MULCHING MAY BE USED FOR THE ESTABLISHMENT OF THE VEGETATION. IT IS RECOMMENDED THAT, WHEN CONDITIONS PERMIT, TEMPORARY DIVERSIONS OR OTHER MEANS SHOULD BE USED TO PREVENT WATER FROM ENTERING THE DIVERSION DURING THE ESTABLISHMENT OF THE VEGETATION.
   B. FOR DESIGN VELOCITIES OF MORE THAN 3.5 FT. PER. SEC., THE DIVERSION SHALL BE STABILIZED WITH SOD, WITH SEEDING PROTECTED BY JUTE OR EXCELSIOR MATTING OR WITH SEEDING AND MULCHING INCLUDING TEMPORARY DIVERSION OF THE WATER UNTIL THE VEGETATION IS ESTABLISHED.

| | |
|---|---|
| ADAPTED FROM DETAILS PROVIDED BY: USDA - NRCS, NEW YORK STATE DEPARTMENT OF TRANSPORTATION, NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION, NEW YORK STATE SOIL & WATER CONSERVATION COMMITTEE | DIVERSION |

# Table 3.3
## Parabolic Diversion Design, Without Freeboard Tables - 1 (USDA– NRCS)

### PARABOLIC DIVERSION DESIGN, WITHOUT FREEBOARD

RETARDANCE - D & C
GRADE, % - 0.50

$V_1$ Based on Permissible Velocity of the Soil With Retardance "D"
Top Width, Depth & $V_2$ Based on Retardance "C"

| Q | $V_1$ = 2.0 | $V_1$ = 2.5 | $V_1$ = 3.0 | $V_1$ = 3.5 | $V_1$ = 4.0 | $V_1$ = 4.5 | $V_1$ = 5.0 | $V_1$ = 5.5 | $V_1$ = 6.0 |
|---|---|---|---|---|---|---|---|---|---|
| cfs | T D $V_2$ | T D $V_2$ | T D $V_2$ | T D $V_2$ | T D $V_2$ | T D $V_2$ | T D $V_2$ | T D $V_2$ | T D $V_2$ |
| 15 | 9 1.6 1.6 | | | | | | | | |
| 20 | 11 1.6 1.7 | | | | | | | | |
| 25 | 14 1.6 1.7 | 9 1.9 2.1 | | | | | | | |
| 30 | 17 1.6 1.7 | 11 1.9 2.2 | 8 2.2 2.5 | | | | | | |
| 35 | 20 1.6 1.7 | 12 1.9 2.3 | 9 2.1 2.6 | | | | | | |
| 40 | 22 1.6 1.7 | 14 1.8 2.3 | 11 2.1 2.7 | | | | | | |
| 45 | 25 1.5 1.7 | 16 1.8 2.3 | 12 2.0 2.8 | | | | | | |
| 50 | 28 1.5 1.7 | 18 1.8 2.4 | 13 2.0 2.8 | 10 2.4 3.2 | | | | | |
| 55 | 31 1.5 1.7 | 19 1.8 2.4 | 15 2.0 2.8 | 11 2.4 3.3 | | | | | |
| 60 | 33 1.5 1.7 | 21 1.8 2.4 | 16 2.0 2.8 | 11 2.4 3.3 | | | | | |
| 65 | 36 1.5 1.8 | 23 1.8 2.4 | 17 2.0 2.9 | 12 2.4 3.3 | | | | | |
| 70 | 39 1.5 1.7 | 24 1.8 2.4 | 18 2.0 2.9 | 13 2.3 3.4 | | | | | |
| 75 | 42 1.5 1.8 | 26 1.8 2.4 | 19 2.0 2.9 | 14 2.3 3.4 | 11 2.7 3.7 | | | | |
| 80 | 44 1.5 1.8 | 28 1.8 2.4 | 21 2.0 2.9 | 15 2.3 3.4 | 12 2.7 3.8 | | | | |
| 90 | 50 1.5 1.8 | 31 1.8 2.4 | 24 2.0 2.9 | 17 2.3 3.4 | 13 2.7 3.8 | | | | |
| 100 | 55 1.5 1.8 | 35 1.8 2.4 | 26 2.0 2.9 | 19 2.3 3.5 | 15 2.6 3.9 | 12 3.0 4.1 | | | |

### PARABOLIC DIVERSION DESIGN, WITHOUT FREEBOARD

RETARDANCE - D & C
GRADE, % - 1.0

$V_1$ based on Permissible Velocity of the Soil With Retardance "D"
Top Width, Depth & $V_2$ Based on Retardance "C"

| Q | $V_1$ = 2.0 | $V_1$ = 2.5 | $V_1$ = 3.0 | $V_1$ = 3.5 | $V_1$ = 4.0 | $V_1$ = 4.5 | $V_1$ = 5.0 | $V_1$ = 5.5 | $V_1$ = 6.0 |
|---|---|---|---|---|---|---|---|---|---|
| cfs | T D $V_2$ | T D $V_2$ | T D $V_2$ | T D $V_2$ | T D $V_2$ | T D $V_2$ | T D $V_2$ | T D $V_2$ | T D $V_2$ |
| 15 | 13 1.1 1.5 | 8 1.3 2.0 | | | | | | | |
| 20 | 18 1.1 1.5 | 11 1.3 2.1 | 8 1.5 2.6 | | | | | | |
| 25 | 22 1.1 1.5 | 14 1.3 2.1 | 9 1.5 2.6 | 8 1.6 3.0 | | | | | |
| 30 | 27 1.1 1.5 | 17 1.3 2.1 | 11 1.5 2.7 | 9 1.6 3.0 | | | | | |
| 35 | 31 1.1 1.5 | 19 1.3 2.2 | 13 1.5 2.8 | 11 1.6 3.1 | 8 1.8 3.6 | | | | |
| 40 | 35 1.1 1.5 | 22 1.3 2.1 | 15 1.4 2.8 | 12 1.5 3.1 | 9 1.8 3.7 | | | | |
| 45 | 40 1.1 1.5 | 25 1.3 2.2 | 17 1.5 2.8 | 13 1.6 3.2 | 10 1.8 3.7 | | | | |
| 50 | 44 1.1 1.5 | 28 1.3 2.2 | 19 1.4 2.8 | 15 1.6 3.2 | 11 1.8 3.7 | 9 2.0 4.2 | | | |
| 55 | 48 1.1 1.5 | 30 1.3 2.2 | 20 1.4 2.8 | 16 1.5 3.3 | 12 1.8 3.8 | 10 2.0 4.3 | | | |
| 60 | 53 1.1 1.5 | 33 1.3 2.2 | 22 1.4 2.8 | 18 1.5 3.3 | 14 1.7 3.8 | 10 2.0 4.3 | | | |
| 65 | 57 1.1 1.5 | 36 1.3 2.2 | 24 1.4 2.8 | 19 1.5 3.3 | 15 1.7 3.8 | 11 2.0 4.3 | 9 2.2 4.7 | | |
| 70 | 61 1.1 1.5 | 38 1.3 2.2 | 26 1.4 2.8 | 21 1.5 3.3 | 16 1.7 3.9 | 12 2.0 4.4 | 10 2.2 4.7 | | |
| 75 | 66 1.1 1.5 | 41 1.3 2.2 | 28 1.4 2.9 | 22 1.5 3.3 | 17 1.7 3.9 | 13 2.0 4.5 | 11 2.2 4.7 | | |
| 80 | 70 1.1 1.5 | 44 1.3 2.2 | 29 1.4 2.9 | 24 1.5 3.3 | 18 1.7 3.9 | 14 2.0 4.4 | 11 2.2 4.9 | | |
| 90 | 79 1.1 1.5 | 49 1.3 2.2 | 33 1.4 2.9 | 27 1.5 3.3 | 20 1.7 3.9 | 15 1.9 4.5 | 13 2.2 4.9 | 11 2.4 5.2 | |
| 100 | 87 1.1 1.5 | 55 1.3 2.2 | 37 1.4 2.9 | 29 1.5 3.3 | 22 1.7 3.9 | 17 1.9 4.5 | 14 2.2 4.9 | 12 2.4 5.3 | |

# Table 3.4
## Parabolic Diversion Design, Without Freeboard Tables - 2 (USDA– NRCS)

### PARABOLIC DIVERSION DESIGN, WITHOUT FREEBOARD

RETARDANCE - D & C
GRADE, % - 1.5

$V_1$ Based on Permissible Velocity of the Soil With Retardance "D"
Top Width, Depth & $V_2$ Based on Retardance "C"

| Q | $V_1$ = 2.0 | | | $V_1$ = 2.5 | | | $V_1$ = 3.0 | | | $V_1$ = 3.5 | | | $V_1$ = 4.0 | | | $V_1$ = 4.5 | | | $V_1$ = 5.0 | | | $V_1$ = 5.5 | | | $V_1$ = 6.0 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| cfs | T | D | $V_2$ | T | D | $V_2$ | T | D | $V_2$ | T | D | $V_2$ | T | D | $V_2$ | T | D | $V_2$ | T | D | $V_2$ | T | D | $V_2$ | T | D | $V_2$ |
| 15 | 17 | 0.9 | 1.4 | 11 | 1.1 | 1.9 | 8 | 1.2 | 2.4 | | | | | | | | | | | | | | | | | | |
| 20 | 23 | 0.9 | 1.4 | 15 | 1.0 | 1.9 | 10 | 1.2 | 2.5 | 7 | 1.4 | 3.0 | 6 | 1.5 | 3.4 | | | | | | | | | | | | |
| 25 | 28 | 0.9 | 1.4 | 19 | 1.0 | 1.9 | 12 | 1.2 | 2.6 | 8 | 1.4 | 3.2 | 7 | 1.5 | 3.6 | | | | | | | | | | | | |
| 30 | 34 | 0.9 | 1.4 | 22 | 1.0 | 1.9 | 15 | 1.2 | 2.6 | 10 | 1.3 | 3.2 | 8 | 1.5 | 3.6 | 7 | 1.6 | 4.0 | | | | | | | | | |
| 35 | 40 | 0.9 | 1.4 | 26 | 1.0 | 2.0 | 17 | 1.1 | 2.6 | 12 | 1.3 | 3.3 | 10 | 1.4 | 3.7 | 8 | 1.6 | 4.1 | | | | | | | | | |
| 40 | 45 | 0.9 | 1.4 | 30 | 1.0 | 1.9 | 20 | 1.2 | 2.6 | 14 | 1.3 | 3.3 | 11 | 1.4 | 3.7 | 9 | 1.6 | 4.2 | 7 | 1.8 | 4.6 | | | | | | |
| 45 | 51 | 0.9 | 1.4 | 33 | 1.0 | 2.0 | 22 | 1.1 | 2.6 | 15 | 1.3 | 3.4 | 12 | 1.4 | 3.8 | 10 | 1.5 | 4.3 | 8 | 1.8 | 4.6 | | | | | | |
| 50 | 56 | 0.9 | 1.4 | 37 | 1.0 | 2.0 | 25 | 1.1 | 2.7 | 17 | 1.3 | 3.4 | 14 | 1.4 | 3.9 | 11 | 1.5 | 4.3 | 9 | 1.8 | 4.8 | | | | | | |
| 55 | 62 | 0.9 | 1.5 | 41 | 1.0 | 2.0 | 27 | 1.1 | 2.6 | 19 | 1.3 | 3.4 | 15 | 1.4 | 3.9 | 12 | 1.5 | 4.3 | 10 | 1.7 | 4.9 | 8 | 1.9 | 5.1 | | | |
| 60 | 67 | 0.9 | 1.5 | 44 | 1.0 | 2.0 | 30 | 1.1 | 2.7 | 20 | 1.3 | 3.4 | 16 | 1.4 | 3.9 | 14 | 1.5 | 4.4 | 11 | 1.7 | 4.9 | 9 | 1.9 | 5.2 | | | |
| 65 | 73 | 0.9 | 1.5 | 48 | 1.0 | 2.0 | 32 | 1.1 | 2.7 | 22 | 1.3 | 3.4 | 18 | 1.4 | 3.9 | 15 | 1.5 | 4.4 | 11 | 1.7 | 5.0 | 10 | 1.9 | 5.3 | | | |
| 70 | 78 | 0.9 | 1.5 | 51 | 1.0 | 2.0 | 34 | 1.1 | 2.7 | 24 | 1.3 | 3.4 | 19 | 1.4 | 3.9 | 16 | 1.5 | 4.4 | 12 | 1.7 | 4.9 | 10 | 1.9 | 5.4 | 9 | 2.1 | 5.6 |
| 75 | 83 | 0.9 | 1.5 | 55 | 1.0 | 2.0 | 37 | 1.1 | 2.7 | 25 | 1.3 | 3.4 | 21 | 1.4 | 3.9 | 17 | 1.5 | 4.4 | 13 | 1.7 | 5.0 | 11 | 1.9 | 5.4 | 9 | 2.1 | 5.6 |
| 80 | 89 | 0.9 | 1.5 | 59 | 1.0 | 2.0 | 39 | 1.1 | 2.7 | 27 | 1.3 | 3.4 | 22 | 1.4 | 3.9 | 18 | 1.5 | 4.4 | 14 | 1.7 | 5.0 | 12 | 1.9 | 5.5 | 10 | 2.1 | 5.8 |
| 90 | 100 | 0.9 | 1.5 | 66 | 1.0 | 2.0 | 44 | 1.1 | 2.7 | 30 | 1.3 | 3.5 | 25 | 1.4 | 3.9 | 20 | 1.5 | 4.4 | 15 | 1.7 | 5.0 | 13 | 1.9 | 5.4 | 11 | 2.0 | 5.9 |
| 100 | | | | 73 | 1.0 | 2.0 | 49 | 1.1 | 2.7 | 33 | 1.3 | 3.5 | 27 | 1.4 | 3.9 | 22 | 1.5 | 4.5 | 17 | 1.7 | 5.1 | 15 | 1.9 | 5.5 | 12 | 2.0 | 6.0 |

### PARABOLIC DIVERSION DESIGN, WITHOUT FREEBOARD

RETARDANCE - D & C
GRADE, % - 2.0

$V_1$ Based on Permissible Velocity of the Soil With Retardance "D"
Top Width, Depth & $V_2$ Based on Retardance "C"

| Q | $V_1$ = 2.0 | | | $V_1$ = 2.5 | | | $V_1$ = 3.0 | | | $V_1$ = 3.5 | | | $V_1$ = 4.0 | | | $V_1$ = 4.5 | | | $V_1$ = 5.0 | | | $V_1$ = 5.5 | | | $V_1$ = 6.0 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| cfs | T | D | $V_2$ | T | D | $V_2$ | T | D | $V_2$ | T | D | $V_2$ | T | D | $V_2$ | T | D | $V_2$ | T | D | $V_2$ | T | D | $V_2$ | T | D | $V_2$ |
| 15 | 21 | 0.8 | 1.3 | 13 | 0.9 | 1.9 | 9 | 1.0 | 2.4 | 7 | 1.2 | 2.9 | | | | | | | | | | | | | | | |
| 20 | 28 | 0.8 | 1.3 | 17 | 0.9 | 1.9 | 12 | 1.0 | 2.4 | 9 | 1.1 | 3.0 | 7 | 1.3 | 3.5 | 5 | 1.4 | 3.8 | | | | | | | | | |
| 25 | 35 | 0.8 | 1.3 | 21 | 0.9 | 1.9 | 15 | 1.0 | 2.4 | 11 | 1.1 | 3.0 | 8 | 1.3 | 3.7 | 7 | 1.4 | 4.0 | | | | | | | | | |
| 30 | 41 | 0.8 | 1.3 | 26 | 0.9 | 1.9 | 18 | 1.0 | 2.5 | 13 | 1.1 | 3.0 | 10 | 1.2 | 3.7 | 8 | 1.3 | 4.2 | 7 | 1.5 | 4.5 | | | | | | |
| 35 | 48 | 0.8 | 1.4 | 30 | 0.9 | 1.9 | 22 | 1.0 | 2.4 | 15 | 1.1 | 3.1 | 11 | 1.2 | 3.8 | 9 | 1.3 | 4.2 | 8 | 1.5 | 4.7 | | | | | | |
| 40 | 55 | 0.8 | 1.3 | 34 | 0.9 | 1.9 | 25 | 1.0 | 2.5 | 18 | 1.1 | 3.1 | 13 | 1.2 | 3.8 | 11 | 1.3 | 4.3 | 9 | 1.5 | 4.7 | 7 | 1.7 | 5.0 | | | |
| 45 | 62 | 0.8 | 1.4 | 38 | 0.9 | 1.9 | 28 | 1.0 | 2.5 | 20 | 1.1 | 3.1 | 14 | 1.2 | 3.8 | 12 | 1.3 | 4.3 | 10 | 1.4 | 4.8 | 8 | 1.6 | 5.2 | | | |
| 50 | 68 | 0.8 | 1.4 | 42 | 0.9 | 1.9 | 31 | 1.0 | 2.5 | 22 | 1.1 | 3.1 | 16 | 1.2 | 3.9 | 13 | 1.3 | 4.3 | 11 | 1.4 | 4.8 | 9 | 1.6 | 5.3 | 8 | 1.7 | 5.6 |
| 55 | 75 | 0.8 | 1.4 | 46 | 0.9 | 1.9 | 34 | 1.0 | 2.5 | 24 | 1.1 | 3.1 | 17 | 1.2 | 3.8 | 14 | 1.3 | 4.3 | 12 | 1.4 | 4.9 | 10 | 1.6 | 5.3 | 8 | 1.7 | 5.8 |
| 60 | 82 | 0.8 | 1.4 | 51 | 0.9 | 1.9 | 37 | 1.0 | 2.5 | 26 | 1.1 | 3.1 | 19 | 1.2 | 3.9 | 16 | 1.3 | 4.4 | 13 | 1.4 | 4.8 | 11 | 1.6 | 5.3 | 9 | 1.7 | 5.7 |
| 65 | 88 | 0.8 | 1.4 | 55 | 0.9 | 1.9 | 40 | 1.0 | 2.5 | 28 | 1.1 | 3.1 | 21 | 1.2 | 3.9 | 17 | 1.3 | 4.4 | 14 | 1.4 | 4.9 | 11 | 1.6 | 5.4 | 10 | 1.7 | 5.7 |
| 70 | 95 | 0.8 | 1.4 | 59 | 0.9 | 1.9 | 43 | 1.0 | 2.5 | 30 | 1.1 | 3.1 | 22 | 1.2 | 3.9 | 18 | 1.3 | 4.4 | 15 | 1.4 | 4.9 | 12 | 1.6 | 5.4 | 10 | 1.7 | 5.8 |
| 75 | | | | 63 | 0.9 | 1.9 | 46 | 1.0 | 2.5 | 32 | 1.1 | 3.2 | 24 | 1.2 | 3.9 | 20 | 1.3 | 4.4 | 16 | 1.4 | 5.0 | 13 | 1.6 | 5.5 | 11 | 1.7 | 5.9 |
| 80 | | | | 67 | 0.9 | 2.0 | 48 | 1.0 | 2.5 | 35 | 1.1 | 3.1 | 25 | 1.2 | 3.9 | 21 | 1.3 | 4.4 | 17 | 1.4 | 4.9 | 14 | 1.6 | 5.4 | 12 | 1.7 | 6.0 |
| 90 | | | | 75 | 0.9 | 2.0 | 54 | 1.0 | 2.5 | 39 | 1.1 | 3.2 | 28 | 1.2 | 3.9 | 23 | 1.3 | 4.4 | 19 | 1.4 | 4.9 | 16 | 1.6 | 5.5 | 13 | 1.7 | 5.9 |
| 100 | | | | 83 | 0.9 | 2.0 | 60 | 1.0 | 2.5 | 43 | 1.1 | 3.2 | 31 | 1.2 | 3.9 | 26 | 1.3 | 4.4 | 21 | 1.4 | 5.0 | 17 | 1.6 | 5.5 | 15 | 1.7 | 6.0 |

# STANDARD AND SPECIFICATIONS FOR DUST CONTROL

## Definition & Scope

The control of dust resulting from land-disturbing activities, to prevent surface and air movement of dust from disturbed soil surfaces that may cause off-site damage, health hazards, and traffic safety problems.

## Conditions Where Practice Applies

On construction roads, access points, and other disturbed areas subject to surface dust movement and dust blowing where off-site damage may occur if dust is not controlled.

## Design Criteria

**Construction operations should be scheduled to minimize the amount of area disturbed at one time.** Buffer areas of vegetation should be left where practical. Temporary or permanent stabilization measures shall be installed. No specific design criteria is given; see construction specifications below for common methods of dust control.

Water quality must be considered when materials are selected for dust control. Where there is a potential for the material to wash off to a stream, ingredient information must be provided to the NYSDEC.

No polymer application shall take place without written approval from the NYSDEC.

## Construction Specifications

A. **Non-driving Areas –** These areas use products and materials applied or placed on soil surfaces to prevent airborne migration of soil particles.

   **Vegetative Cover** – For disturbed areas not subject to traffic, vegetation provides the most practical method of dust control (see Section 3).

   **Mulch** (including gravel mulch) – Mulch offers a fast effective means of controlling dust. This can also include rolled erosion control blankets.

   **Spray adhesives** – These are products generally composed of polymers in a liquid or solid form that are mixed with water to form an emulsion that is sprayed on the soil surface with typical hydroseeding equipment. The mixing ratios and application rates will be in accordance with the manufacturer's recommendations for the specific soils on the site. In no case should the application of these adhesives be made on wet soils or if there is a probability of precipitation within 48 hours of its proposed use. Material Safety Data Sheets will be provided to all applicators and others working with the material.

B. **Driving Areas** – These areas utilize water, polymer emulsions, and barriers to prevent dust movement from the traffic surface into the air.

   **Sprinkling** – The site may be sprayed with water until the surface is wet. This is especially effective on haul roads and access route to provide short term limited dust control.

   **Polymer Additives –** These polymers are mixed with water and applied to the driving surface by a water truck with a gravity feed drip bar, spray bar or automated distributor truck. The mixing ratios and application rates will be in accordance with the manufacturer's recommendations. Incorporation of the emulsion into the soil will be done to the appropriate depth based on expected traffic. Compaction after incorporation will be by vibratory roller to a minimum of 95%. The prepared surface shall be moist and no application of the polymer will be made if there is a probability of precipitation within 48 hours of its proposed use. Material Safety Data Sheets will be provided to all applicators working with the material.

   **Barriers** – Woven geo-textiles can be placed on the driving surface to effectively reduce dust throw and particle migration on haul roads. Stone can also be used for construction roads for effective dust control.

   **Windbreak –** A silt fence or similar barrier can control air currents at intervals equal to ten times the barrier height. Preserve existing wind barrier vegetation as much as practical.

## Maintenance

Maintain dust control measures through dry weather periods until all disturbed areas are stabilized.

# STANDARD AND SPECIFICATIONS FOR FERTILIZER APPLICATION

## Definition & Scope

The **permanent** incorporation of fertilizer into the planting zone of the soil profile to provide nutrient amendments to the soil for vigorous support to plant and vegetation growth.

## Conditions Where Practice Applies

This standard applies to all areas where permanent seeding, sodding, and plant establishment is required. All application of fertilizer shall be in accordance with Nutrient Runoff Law - ECL Article 17, Title 21. Phosphorus runoff poses a threat to water quality. Therefore, under New York Law, fertilizer containing phosphorus may only be applied to lawn or non-agricultural turf when:

1. A soil test indicates that additional phosphorus is needed for growth of that lawn or non-agricultural turf, or

2. The fertilizer is used for newly established lawn or non -agricultural turf during the first growing season.

For projects located within watersheds where enhanced phosphorus removal standards are required as part of its post-construction stormwater management plan, use of any fertilizer containing more than 0.67 percent phosphate ($P_20_5$) content will be done only with a valid soil test demonstrating the need for that formulation.

## Design Criteria

Fertilizer is sold with an analysis printed on the tag or bag shown as three numbers separated by a dash, such as 5-10-5. The first number is the percent of the total weight of the bag that is nitrogen (N), the second is the percent of phosphate (phosphorus, P), and the third is the percent of potash (potassium, K). Other elements are sometimes included and are listed with these three basic components.

For example a 40 lb bag of 5-10-5 fertilizer contains 5% of 40 lbs of Nitrogen which equals 2 lbs. There is 10% of 40 lbs of phosphate (phosphorus) which equals 4 lbs, and there is 5% of potash (potassium), another 2 lbs., for a total of 8 lbs of active fertilizer in the 40 lb bag. The rest is filler to aid in spreading the material over the area to be treated.

Specify the design fertilizer mix and application rates based on the results of the soil tests.

## Specifications

1. In no case shall fertilizer be applied between December 1 and April 1 annually.

2. Fertilizer shall not be spread within 20 feet of a surface water.

3. Any fertilizer falling or spilled into impervious surface areas such as parking lots, roadways, and sidewalks should be immediately contained and legally applied or placed in an appropriate container.

4. Incorporate the fertilizer, and lime if specified, into the top 2-4 inches of the topsoil or soil profile.

5. When applying fertilizer by hydro seeding care should be taken to apply mix only to seed bed areas at an appropriate flow rate to prevent erosion and spraying onto impervious areas.

# STANDARD AND SPECIFICATIONS FOR FIBER ROLL

## Definition & Scope

A fiber roll is a coir (coconut fiber), straw, or excelsior roll encased in netting of jute, nylon, or burlap to dissipate energy along streambanks, channels, and bodies of water and to reduce sheet flow on slopes.

## Conditions Where Practice Applies

Fiber rolls are used where the water surface levels are relatively constant. Artificially controlled streams for hydropower are not good candidates for this technique. The rolls provide a good medium for the introduction of herbaceous vegetation. Planting in the fiber roll is appropriate where the roll will remain continuously wet.

## Design Criteria

1. The roll is placed in a shallow trench dug below baseflow or in a 4 inch trench on the slope contour and anchored by 2" x 2", 3-foot long posts driven on each side of the roll (see Figure 4.8).

2. The roll is contained by a 9-gauge non-galvanized wire placed over the roll from post to post. Braided nylon rope (1/8" thick) may be used.

3. The anchor posts shall be spaced laterally 4 feet on center on both sides of the roll and driven down to the top of the roll.

4. Soil is placed behind the roll and planted with suitable herbaceous or woody vegetation. If the roll will be continuously saturated, wetland plants may be planted into voids created in the upper surface of the roll.

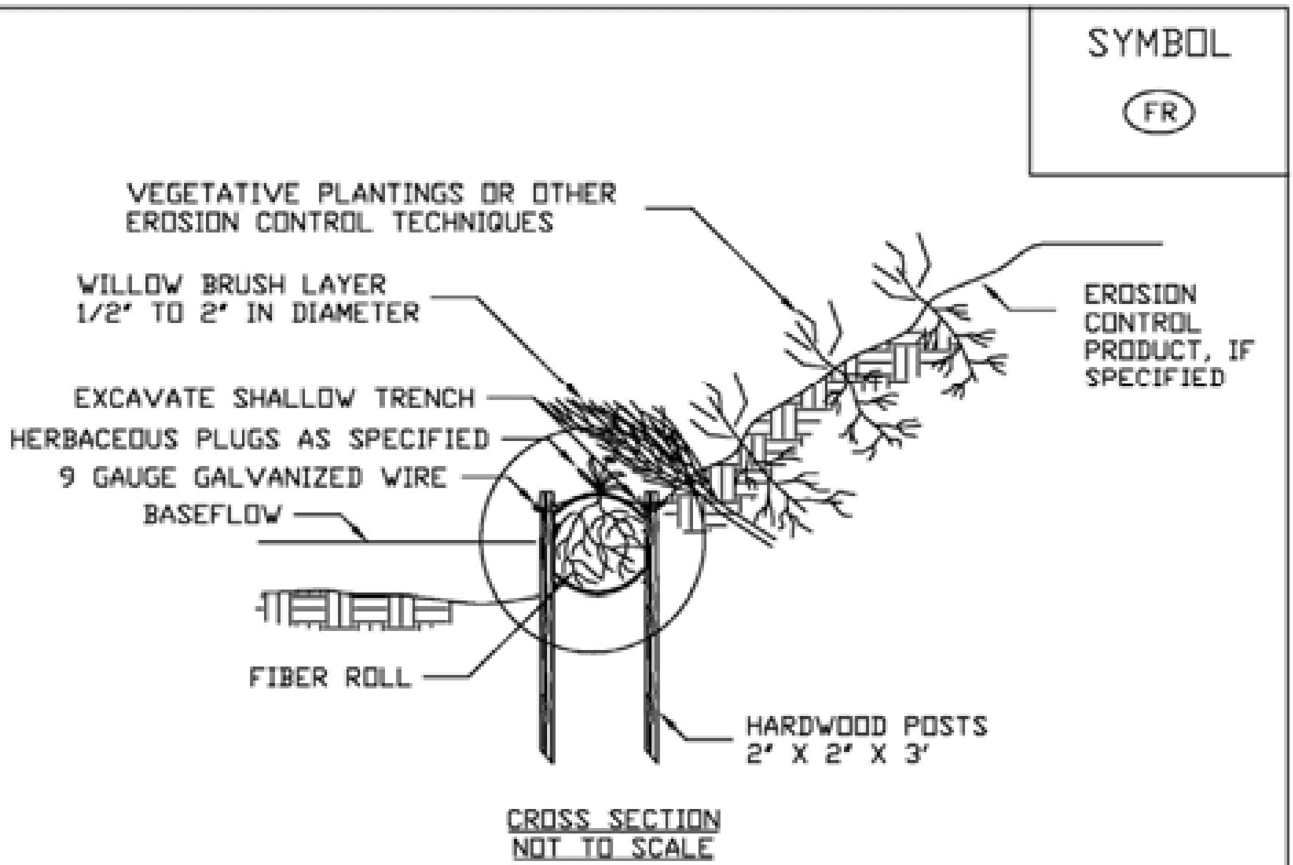
5. Where water levels may fall below the bottom edge of the roll, a brush layer of willow should be installed so as to lay across the top edge of the roll.

6. Where fiber rolls are used to reduce sheet flow on slopes they should be at least 12" in diameter and spaced according to the straw bale dike standard for sediment control.

## Maintenance

Due to the susceptibility of plant materials to the physical constraints of the site, climate conditions, and animal populations, it is necessary to inspect installations frequently. This is especially important during the first year or two of establishment. Plant materials missing or damaged should be replaced as soon as possible. Sloughs or breaks in drainage pattern should be reestablished for the site as quickly as possible to maintain stability.

**Figure 4.8**
**Fiber Roll**




## CONSTRUCTION SPECIFICATIONS

1. EXCAVATE A SHALLOW TRENCH SLIGHTLY BELOW BASEFLOW OR A 4" TRENCH ON SLOPE CONTOURS.
2. PLACE THE ROLL IN THE TRENCH AND ANCHOR WITH 2" x 2" POSTS PLACED ON BOTH SIDES OF THE ROLL AND SPACED LATERALLY ON 2' TO 4' CENTERS. TRIM THE TOP OF THE POSTS EVEN WITH THE EDGE OF THE ROLL, IF NECESSARY.
3. NOTCH THE POSTS AND TIE TOGETHER, ACROSS THE ROLL, WITH 9 GAUGE GALVANIZED WIRE OR 1/8" DIAMETER BRAIDED NYLON ROPE..
4. PLACE SOIL EXCAVATED FROM THE TRENCH BEHIND THE ROLL AND HAND TAMP. PLANT WITH SUITABLE HERBACEOUS OR WOODY VEGETATION AS SPECIFIED ELSEWHERE IN THE CONTRACT DOCUMENTS. VEGETATION SHALL BE PLACED IMMEDIATELY ADJACENT TO THE ROLL TO PROMOTE ROOT GROWTH INTO THE FIBER. HERBACEOUS VEGETATION, IF SPECIFIED, SHALL BE PLANTED INTO THE FIBER ROLL.

| | |
|---|---|
| ADAPTED FROM DETAILS PROVIDED BY: USDA - NRCS, NEW YORK STATE DEPARTMENT OF TRANSPORTATION, NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION, NEW YORK STATE SOIL & WATER CONSERVATION COMMITTEE | FIBER ROLL |

# STANDARD AND SPECIFICATIONS FOR LANDGRADING

## Definition & Scope

**Permanent** reshaping of the existing land surface by grading in accordance with an engineering topographic plan and specification to provide for erosion control and vegetative establishment on disturbed, reshaped areas.

## Design Criteria

The grading plan should be based upon the incorporation of building designs and street layouts that fit and utilize existing topography and desirable natural surrounding to avoid extreme grade modifications. Information submitted must provide sufficient topographic surveys and soil investigations to determine limitations that must be imposed on the grading operation related to slope stability, effect on adjacent properties and drainage patterns, measures for drainage and water removal, and vegetative treatment, etc.

Many municipalities and counties have regulations and design procedures already established for land grading and cut and fill slopes. Where these requirements exist, they shall be followed.

The plan must show existing and proposed contours of the area(s) to be graded. The plan shall also include practices for erosion control, slope stabilization, safe disposal of runoff water and drainage, such as waterways, lined ditches, reverse slope benches (include grade and cross section), grade stabilization structures, retaining walls, and surface and subsurface drains. The plan shall also include phasing of these practices. The following shall be incorporated into the plan:

1. Provisions shall be made to safely convey surface runoff to storm drains, protected outlets, or to stable water courses to ensure that surface runoff will not damage slopes or other graded areas; see standards and specifications for Grassed Waterway, Diversion, or Grade Stabilization Structure.

2. Cut and fill slopes that are to be stabilized with grasses shall not be steeper than 2:1. When slopes exceed 2:1, special design and stabilization consideration are required and shall be adequately shown on the plans. (Note: Where the slope is to be mowed, the slope should be no steeper than 3:1, although 4:1 is preferred because of safety factors related to mowing steep slopes.)

3. Reverse slope benches or diversion shall be provided whenever the vertical interval (height) of any 2:1 slope exceeds 20 feet; for 3:1 slope it shall be increased to 30 feet and for 4:1 to 40 feet. Benches shall be located to divide the slope face as equally as possible and shall convey the water to a stable outlet. Soils, seeps, rock outcrops, etc., shall also be taken into consideration when designing benches.

   A. Benches shall be a minimum of six feet wide to provide for ease of maintenance.

   B. Benches shall be designed with a reverse slope of 6:1 or flatter to the toe of the upper slope and with a minimum of one foot in depth. Bench gradient to the outlet shall be between 2 percent and 3 percent, unless accompanied by appropriate design and computations.

   C. The flow length within a bench shall not exceed 800 feet unless accompanied by appropriate design and computations; see Standard and Specifications for Diversion on page 3.9

4. Surface water shall be diverted from the face of all cut and/or fill slopes by the use of diversions, ditches and swales or conveyed downslope by the use of a designed structure, except where:

   A. The face of the slope is or shall be stabilized and the face of all graded slopes shall be protected from surface runoff until they are stabilized.

   B. The face of the slope shall not be subject to any concentrated flows of surface water such as from natural drainage ways, graded ditches, downspouts, etc.

   C. The face of the slope will be protected by anchored stabilization matting, sod, gravel, riprap, or other stabilization method.

5. Cut slopes occurring in ripable rock shall be serrated as shown in Figure 4.9 on page 4.26. The serrations shall be made with conventional equipment as the excavation is made. Each step or serration shall be constructed on the contour and will have steps cut at nominal two-foot intervals with nominal three-foot horizontal shelves. These steps will vary depending on the slope ratio or the cut slope. The nominal slope line is 1 ½: 1. These steps will weather and act to hold moisture, lime, fertilizer, and seed thus producing a much quicker and longer-lived vegetative cover and better slope stabilization. Overland flow shall be diverted from the top of all serrated cut slopes and carried to a suitable outlet.

6. Subsurface drainage shall be provided where necessary to intercept seepage that would otherwise adversely affect slope stability or create excessively wet site conditions.

7. Slopes shall not be created so close to property lines as to endanger adjoining properties without adequately protecting such properties against sedimentation, erosion, slippage, settlement, subsidence, or other related damages.

8. Fill material shall be free of brush, rubbish, rocks, logs, stumps, building debris, and other objectionable material. It should be free of stones over two (2) inches in diameter where compacted by hand or mechanical tampers or over eight (8) inches in diameter where compacted by rollers or other equipment. Frozen material shall not be placed in the fill nor shall the fill material be placed on a frozen foundation.

9. Stockpiles, borrow areas, and spoil shall be shown on the plans and shall be subject to the provisions of this Standard and Specifications.

10. All disturbed areas shall be stabilized structurally or vegetatively in compliance with the Permanent Construction Area Planting Standard on page 4.42.

## Construction Specifications

See Figures 4.9 and 4.10 for details.

1. All graded or disturbed areas, including slopes, shall be protected during clearing and construction in accordance with the erosion and sediment control plan until they are adequately stabilized.

2. All erosion and sediment control practices and measures shall be constructed, applied and maintained in accordance with the erosion and sediment control plan and these standards.

3. Topsoil required for the establishment of vegetation shall be stockpiled in amount necessary to complete finished grading of all exposed areas.

4. Areas to be filled shall be cleared, grubbed, and stripped of topsoil to remove trees, vegetation, roots, or other objectionable material.

5. Areas that are to be topsoiled shall be scarified to a minimum depth of four inches prior to placement of topsoil.

6. All fills shall be compacted as required to reduce erosion, slippage, settlement, subsidence, or other related problems. Fill intended to support buildings, structures, and conduits, etc., shall be compacted in accordance with local requirements or codes.

7. All fill shall be placed and compacted in layers not to exceed 9 inches in thickness.

8. Except for approved landfills or nonstructural fills, fill material shall be free of frozen particles, brush, roots, sod, or other foreign objectionable materials that would interfere with, or prevent, construction of satisfactory fills.

9. Frozen material or soft, mucky or highly compressible materials shall not be incorporated into fill slopes or structural fills.

10. Fill shall not be placed on saturated or frozen surfaces.

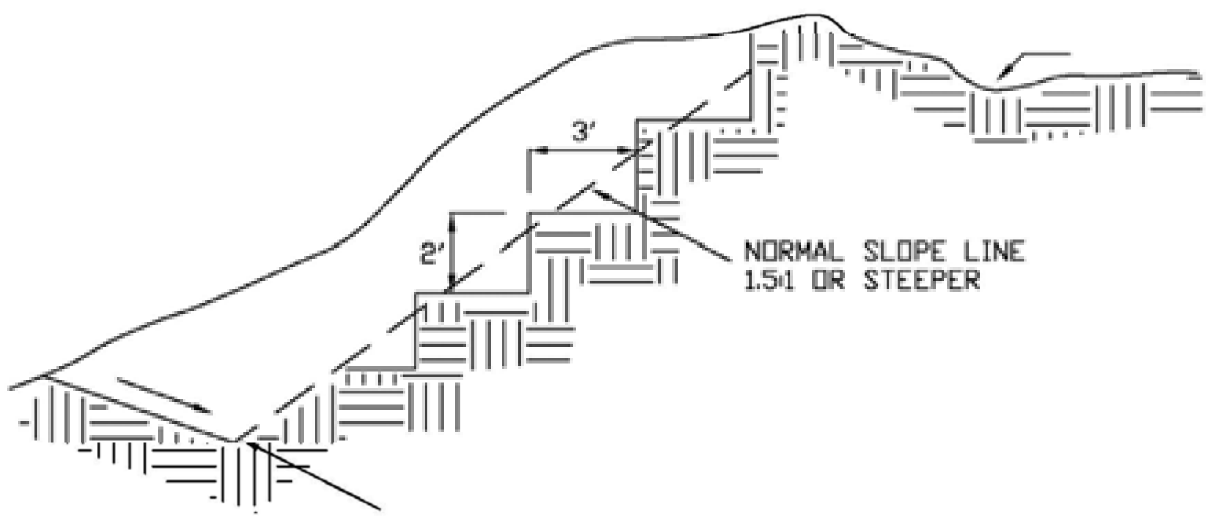
11. All benches shall be kept free of sediment during all phases of development.

12. Seeps or springs encountered during construction shall be handled in accordance with the Standard and Specification for Subsurface Drain on page 3.48 or other approved methods.

13. All graded areas shall be permanently stabilized immediately following finished grading.

14. Stockpiles, borrow areas, and spoil areas shall be shown on the plans and shall be subject to the provisions of this Standard and Specifications.

# Figure 4.9
# Typical Section of Serrated Cut Slope

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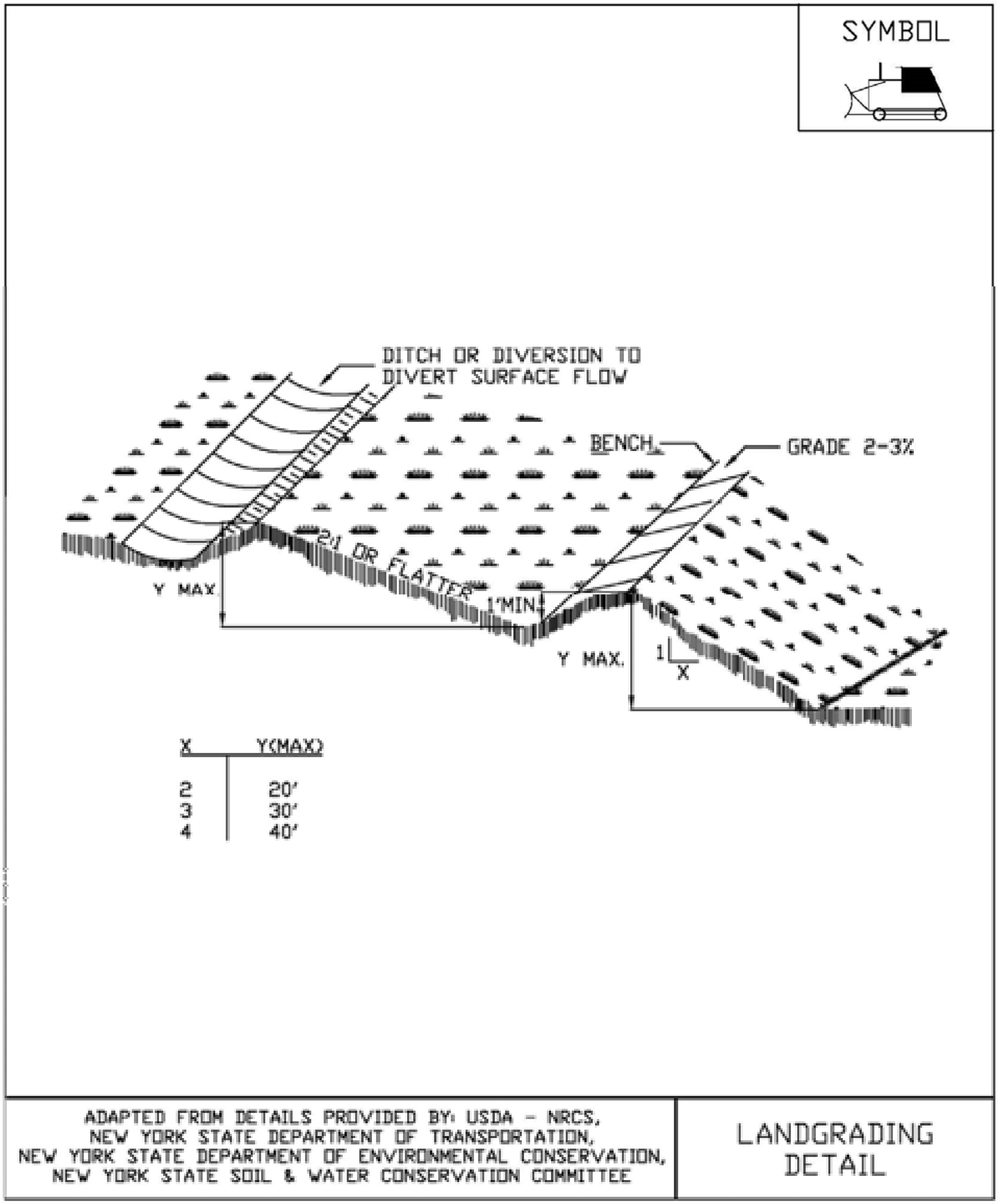
|---|---|
| ADAPTED FROM DETAILS PROVIDED BY: USDA - NRCS,<br>NEW YORK STATE DEPARTMENT OF TRANSPORTATION,<br>NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION,<br>NEW YORK STATE SOIL & WATER CONSERVATION COMMITTEE | TYPICAL SECTION OF SERRATED CUT SLOPE |

# Figure 4.10
# Landgrading



## Figure 4.11
## Landgrading - Construction Specifications

# CONSTRUCTION SPECIFICATIONS

1. ALL GRADED OR DISTURBED AREAS INCLUDING SLOPES SHALL BE PROTECTED DURING CLEARING AND CONSTRUCTION IN ACCORDANCE WITH THE APPROVED EROSION AND SEDIMENT CONTROL PLAN UNTIL THEY ARE PERMANENTLY STABILIZED.
2. ALL SEDIMENT CONTROL PRACTICES AND MEASURES SHALL BE CONSTRUCTED, APPLIED AND MAINTAINED IN ACCORDANCE WITH THE APPROVED EROSION AND SEDIMENT CONTROL PLAN.
3. TOPSOIL REQUIRED FOR THE ESTABLISHMENT OF VEGETATION SHALL BE STOCKPILED IN AMOUNT NECESSARY TO COMPLETE FINISHED GRADING OF ALL EXPOSED AREAS.
4. AREAS TO BE FILLED SHALL BE CLEARED, GRUBBED, AND STRIPPED OF TOPSOIL TO REMOVE TREES, VEGETATION, ROOTS OR OTHER OBJECTIONABLE MATERIAL.
5. AREAS WHICH ARE TO BE TOPSOILED SHALL BE SCARIFIED TO A MINIMUM DEPTH OF FOUR INCHES PRIOR TO PLACEMENT OF TOPSOIL.
6. ALL FILLS SHALL BE COMPACTED AS REQUIRED TO REDUCE EROSION, SLIPPAGE, SETTLEMENT, SUBSIDENCE OR OTHER RELATED PROBLEMS. FILL INTENDED TO SUPPORT BUILDINGS, STRUCTURES AND CONDUITS, ETC. SHALL BE COMPACTED IN ACCORDANCE WITH LOCAL REQUIREMENTS OR CODES.
7. ALL FILL SHALL BE PLACED AND COMPACTED IN LAYERS NOT TO EXCEED 9 INCHES IN THICKNESS.
8. EXCEPT FOR APPROVED LANDFILLS, FILL MATERIAL SHALL BE FREE OF FROZEN PARTICLES, BRUSH, ROOTS, SOD, OR OTHER FOREIGN OR OTHER OBJECTIONABLE MATERIALS THAT WOULD INTERFERE WITH OR PREVENT CONSTRUCTION OF SATISFACTORY FILLS.
9. FROZEN MATERIALS OR SOFT, MUCKY OR HIGHLY COMPRESSIBLE MATERIALS SHALL NOT BE INCORPORATED IN FILLS.
10. FILL SHALL NOT BE PLACED ON SATURATED OR FROZEN SURFACES.
11. ALL BENCHES SHALL BE KEPT FREE OF SEDIMENT DURING ALL PHASES OF DEVELOPMENT.
12. SEEPS OR SPRINGS ENCOUNTERED DURING CONSTRUCTION SHALL BE HANDLED IN ACCORDANCE WITH THE STANDARD AND SPECIFICATION FOR SUBSURFACE DRAIN OR OTHER APPROVED METHOD.
13. ALL GRADED AREAS SHALL BE PERMANENTLY STABILIZED IMMEDIATELY FOLLOWING FINISHED GRADING.
14. STOCKPILES, BORROW AREAS AND SPOIL AREAS SHALL BE SHOWN ON THE PLANS AND SHALL BE SUBJECT TO THE PROVISIONS OF THIS STANDARD AND SPECIFICATION.

| | |
|---|---|
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# STANDARD AND SPECIFICATIONS FOR PROTECTING VEGETATION DURING CONSTRUCTION

## Definition & Scope

The protection of trees, shrubs, ground cover and other vegetation from damage by construction equipment. In order to preserve existing vegetation determined to be important for soil erosion control, water quality protection, shade, screening, buffers, wildlife habitat, wetland protection, and other values.

## Conditions Where Practices Applies

On planned construction sites where valued vegetation exists and needs to be preserved.

## Design Criteria

1. Planning Considerations

   A. Inventory:

   1) Property boundaries, topography, vegetation and soils information should be gathered. Identify potentially high erosion areas, areas with tree windthrow potential, etc. A vegetative cover type map should be made on a copy of a topographic map which shows other natural and manmade features. Vegetation that is desirable to preserve because of its value for screening, shade, critical erosion control, endangered species, aesthetics, etc., should be identified and marked on the map.

   2) Based upon this data, general statements should be prepared about the present condition, potential problem areas, and unique features of the property.

   B. Planning:

   1) After engineering plans (plot maps) are prepared, another field review should take place and recommendations made for the vegetation to be saved. Minor adjustments in location of roads, dwellings, and utilities may be needed. Construction on steep slopes, erodible soils, wetlands, and streams should be avoided. Clearing limits should be delineated (See “Determine Limits of Clearing and Grading” on page 2.2).

   2) Areas to be seeded and planted should be identified. Remaining vegetation should blend with their surroundings and/or provide special function such as a filter strip, buffer zone, or screen.

   3) Trees and shrubs of special seasonal interest, such as flowering dogwood, red maple, striped maple, serviceberry, or shadbush, and valuable potential shade trees should be identified and marked for special protective treatment as appropriate.

   4) Trees to be cut should be marked on the plans. If timber can be removed for salable products, a forester should be consulted for marketing advice.

   5) Trees that may become a hazard to people, personal property, or utilities should be removed. These include trees that are weak-wooded, disease-prone, subject to windthrow, or those that have severely damaged root systems.

   6) The vigor of remaining trees may be improved by a selective thinning. A forester should be consulted for implementing this practice.

2. Measures to Protect Vegetation

   A. Limit soil placement over existing tree and shrub roots to a maximum of 3 inches. Soils with loamy texture and good structure should be used.

   B. Use retaining walls and terraces to protect roots of trees and shrubs when grades are lowered. Lowered grades should start no closer than the dripline of the tree. For narrow-canopied trees and shrubs, the stem diameter in inches is converted to feet and doubled, such that a 10 inch tree should be protected to 20 feet.

   C. Trenching across tree root systems should be the same minimum distance from the trunk, as in “B”. Tunnels under root systems for underground utilities should start 18 inches or deeper below the normal ground surface. Tree roots which must be severed should be cut clean. Backfill material that will be in contact with the roots should be topsoil or a prepared planting soil mixture.

   D. Construct sturdy fences, or barriers, of wood, steel, or other protective material around valuable vegetation for protection from construction equipment. Place barriers far enough away from trees, but not less than the specifications in "B", so that tall equipment such as backhoes and dump trucks do not contact tree branches.

E. Construction limits should be identified and clearly marked to exclude equipment.

F. Avoid spills of oil/gas and other contaminants.

G. Obstructive and broken branches should be pruned properly. The branch collar on all branches whether living or dead should not be damaged. The 3 or 4 cut method should be used on all branches larger than two inches at the cut. First cut about one-third the way through the underside of the limb (about 6-12 inches from the tree trunk). Then (approximately an inch further out) make a second cut through the limb from the upper side. When the branch is removed, there is no splintering of the main tree trunk. Remove the stub. If the branch is larger than 5-6 inches in diameter, use the four cut system. Cuts 1 and 2 remain the same and cut 3 should be from the underside of the limb, on the outside of the branch collar. Cut 4 should be from the top and in alignment with the 3rd cut. Cut 3 should be 1/4 to 1/3 the way through the limb. This will prevent the bark from peeling down the trunk. Do not paint the cut surface.

H. Penalties for damage to valuable trees, shrubs, and herbaceous plants should be clearly spelled out in the contract.

## PROTECTING TREES IN HEAVY USE AREAS

The compaction of soil over the roots of trees and shrubs by the trampling of recreationists, vehicular traffic, etc., reduces oxygen, water, and nutrient uptake by feeder roots. This weakens and may eventually kill the plants. Table 2.6 rates the “Susceptibility of Tree Species to Compaction.”

Where heavy compaction is anticipated, apply and maintain a 3 to 4 inch layer of undecayed wood chips or 2 inches of No. 2 washed, crushed gravel. In addition, use of a wooden or plastic mat may be used to lessen compaction, if applicable.

# STANDARD AND SPECIFICATIONS FOR ROCK OUTLET PROTECTION

## Definition & Scope

A **permanent** section of rock protection placed at the outlet end of the culverts, conduits, or channels to reduce the depth, velocity, and energy of water, such that the flow will not erode the receiving downstream reach.

## Conditions Where Practice Applies

This practice applies where discharge velocities and energies at the outlets of culverts, conduits, or channels are sufficient to erode the next downstream reach. This applies to:

1. Culvert outlets of all types.
2. Pipe conduits from all sediment basins, dry storm water ponds, and permanent type ponds.
3. New channels constructed as outlets for culverts and conduits.

## Design Criteria

The design of rock outlet protection depends entirely on the location. Pipe outlet at the top of cuts or on slopes steeper than 10 percent, cannot be protected by rock aprons or riprap sections due to re-concentration of flows and high velocities encountered after the flow leaves the apron.

Many counties and state agencies have regulations and design procedures already established for dimensions, type and size of materials, and locations where outlet protection is required. Where these requirements exist, they shall be followed.

### Tailwater Depth

The depth of tailwater immediately below the pipe outlet must be determined for the design capacity of the pipe. If the tailwater depth is less than half the diameter of the outlet pipe, and the receiving stream is wide enough to accept divergence of the flow, it shall be classified as a Minimum Tailwater Condition; see Figure 3.16 on page 3.42 as an example. If the tailwater depth is greater than half the pipe diameter and the receiving stream will continue to confine the flow, it shall be classified as a Maximum Tailwater Condition; see Figure 3.17 on page 3.43 as an example. Pipes which outlet onto flat areas with no defined channel may be assumed to have a Minimum Tailwater Condition; see Figure 3.16 on page 3.42 as an example.

### Apron Size

The apron length and width shall be determined from the curves according to the tailwater conditions:

Minimum Tailwater – Use Figure 3.16 on page 3.42
Maximum Tailwater – Use Figure 3.17 on page 3.43

If the pipe discharges directly into a well defined channel, the apron shall extend across the channel bottom and up the channel banks to an elevation one foot above the maximum tailwater depth or to the top of the bank, whichever is less.

The upstream end of the apron, adjacent to the pipe, shall have a width two (2) times the diameter of the outlet pipe, or conform to pipe end section if used.

### Bottom Grade

The outlet protection apron shall be constructed with no slope along its length. There shall be no overfall at the end of the apron. The elevation of the downstream end of the apron shall be equal to the elevation of the receiving channel or adjacent ground.

### Alignment

The outlet protection apron shall be located so that there are no bends in the horizontal alignment.

### Materials

The outlet protection may be done using rock riprap, grouted riprap, or gabions. Outlets constructed on the bank of a stream or wetland shall not use grouted rip-rap, gabions or concrete.

Riprap shall be composed of a well-graded mixture of rock size so that 50 percent of the pieces, by weight, shall be larger than the $d_{50}$ size determined by using the charts. A well-graded mixture, as used herein, is defined as a mixture composed primarily of larger rock sizes, but with a sufficient mixture of other sizes to fill the smaller voids between the rocks. The diameter of the largest rock size in such a mixture shall be 1.5 times the $d_{50}$ size.

**Thickness**

The minimum thickness of the riprap layer shall be 1.5 times the maximum rock diameter for $d_{50}$ of 15 inches or less; and 1.2 times the maximum rock size for $d_{50}$ greater than 15 inches. The following chart lists some examples:

| $D_{50}$ (inches) | $d_{max}$ (inches) | Minimum Blanket Thickness (inches) |
|---|---|---|
| 4 | 6 | 9 |
| 6 | 9 | 14 |
| 9 | 14 | 20 |
| 12 | 18 | 27 |
| 15 | 22 | 32 |
| 18 | 27 | 32 |
| 21 | 32 | 38 |
| 24 | 36 | 43 |

**Rock Quality**

Rock for riprap shall consist of field rock or rough unhewn quarry rock. The rock shall be hard and angular and of a quality that will not disintegrate on exposure to water or weathering. The specific gravity of the individual rocks shall be at least 2.5.

**Filter**

A filter is a layer of material placed between the riprap and the underlying soil surface to prevent soil movement into and through the riprap. Riprap shall have a filter placed under it in all cases.

A filter can be of two general forms: a gravel layer or a plastic filter cloth. The plastic filter cloth can be woven or non-woven monofilament yarns, and shall meet these base requirements: thickness 20-60 mils, grab strength 90-120 lbs; and shall conform to ASTM D-1777 and ASTM D-1682.

Gravel filter blanket, when used, shall be designed by comparing particle sizes of the overlying material and the base material. Design criteria are available in Standard and Specification for Anchored Slope and Channel Stabilization on page 4.7.

**Gabions**

Gabions shall be made of hexagonal triple twist mesh with heavily galvanized steel wire. The maximum linear dimension of the mesh opening shall not exceed 4 ½ inches and the area of the mesh opening shall not exceed 10 square inches.

Gabions shall be fabricated in such a manner that the sides, ends, and lid can be assembled at the construction site into a rectangular basket of the specified sizes. Gabions shall be of single unit construction and shall be installed according to manufacturer's recommendations.

The area on which the gabion is to be installed shall be graded as shown on the drawings. Foundation conditions shall be the same as for placing rock riprap, and filter cloth shall be placed under all gabions. Where necessary, key, or tie, the structure into the bank to prevent undermining of the main gabion structure.

**Maintenance**

Once a riprap outlet has been installed, the maintenance needs are very low. It should be inspected after high flows for evidence of scour beneath the riprap or for dislodged rocks. Repairs should be made immediately.

## Design Procedure

1. Investigate the downstream channel to assure that nonerosive velocities can be maintained.

2. Determine the tailwater condition at the outlet to establish which curve to use.

3. Use the appropriate chart with the design discharge to determine the riprap size and apron length required. It is noted that references to pipe diameters in the charts are based on full flow. For other than full pipe flow, the parameters of depth of flow and velocity must be used to adjust the design discharges.

4. Calculate apron width at the downstream end if a flare section is to be employed.

**Design Examples are demonstrated in Appendix B.**

## Construction Specifications

1. The subgrade for the filter, riprap, or gabion shall be prepared to the required lines and grades. Any fill required in the subgrade shall be compacted to a density of approximately that of the surrounding undisturbed material.

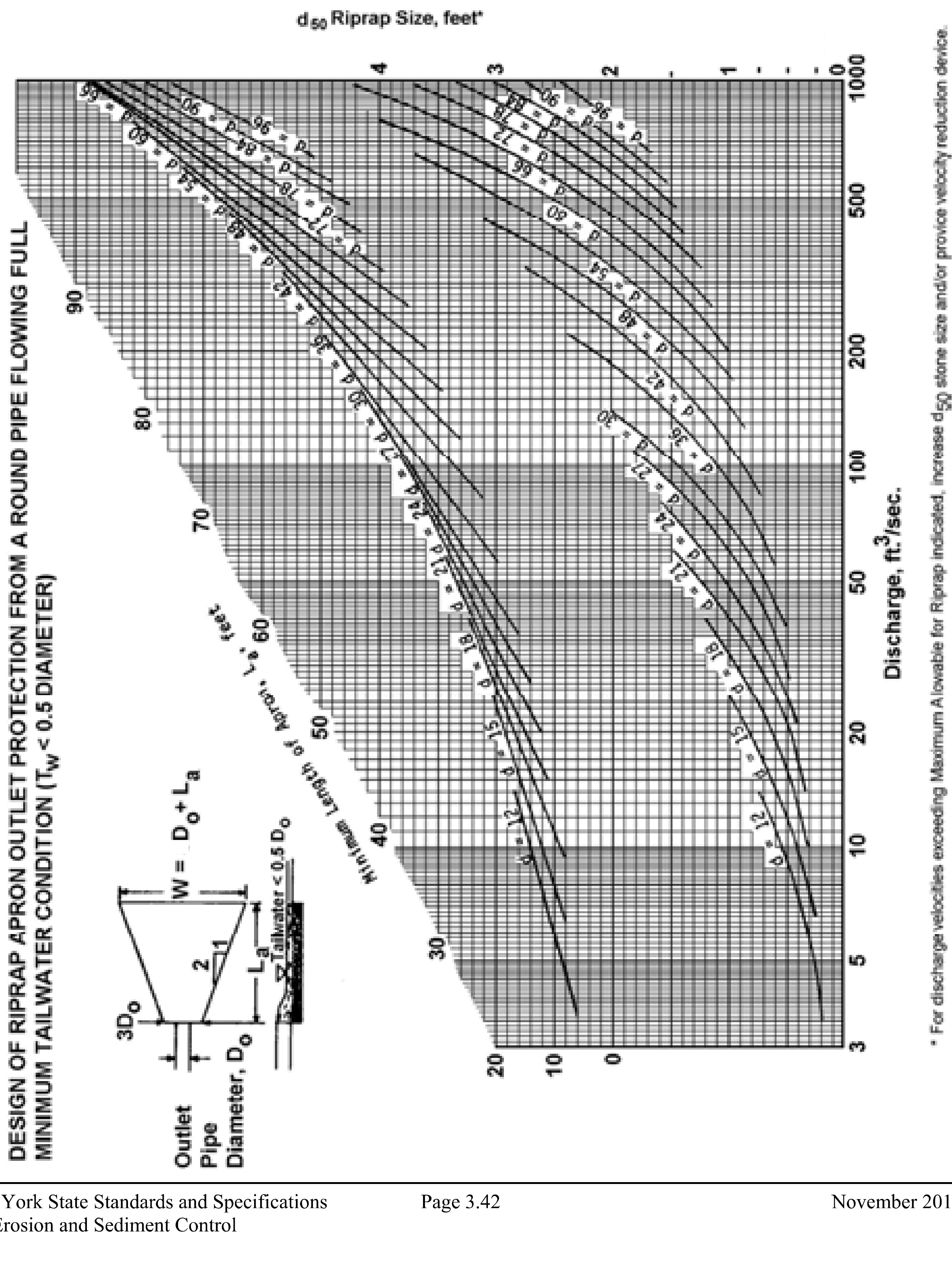
2. The rock or gravel shall conform to the specified grad-

ing limits when installed respectively in the riprap or filter.

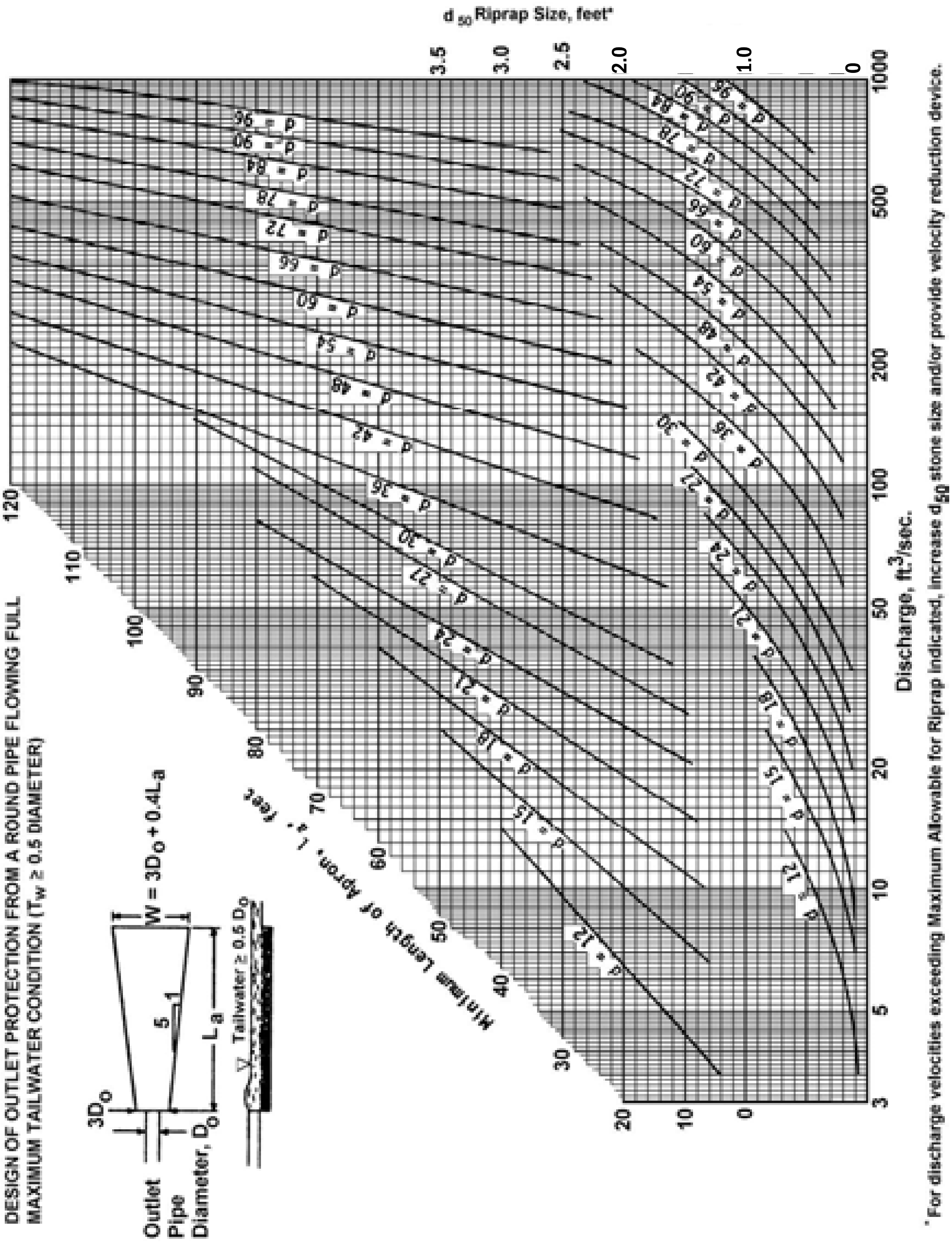
3. Filter cloth shall be protected from punching, cutting, or tearing. Any damage other than an occasional small hole shall be repaired by placing another piece of cloth over the damaged part or by completely replacing the cloth. All overlaps, whether for repairs or for joining two pieces of cloth shall be a minimum of one foot.

4. Rock for the riprap or gabion outlets may be placed by equipment. Both shall each be constructed to the full course thickness in one operation and in such a manner as to avoid displacement of underlying materials. The rock for riprap or gabion outlets shall be delivered and placed in a manner that will ensure that it is reasonably homogenous with the smaller rocks and spalls filling the voids between the larger rocks. Riprap shall be placed in a manner to prevent damage to the filter blanket or filter cloth. Hand placement will be required to the extent necessary to prevent damage to the permanent works.

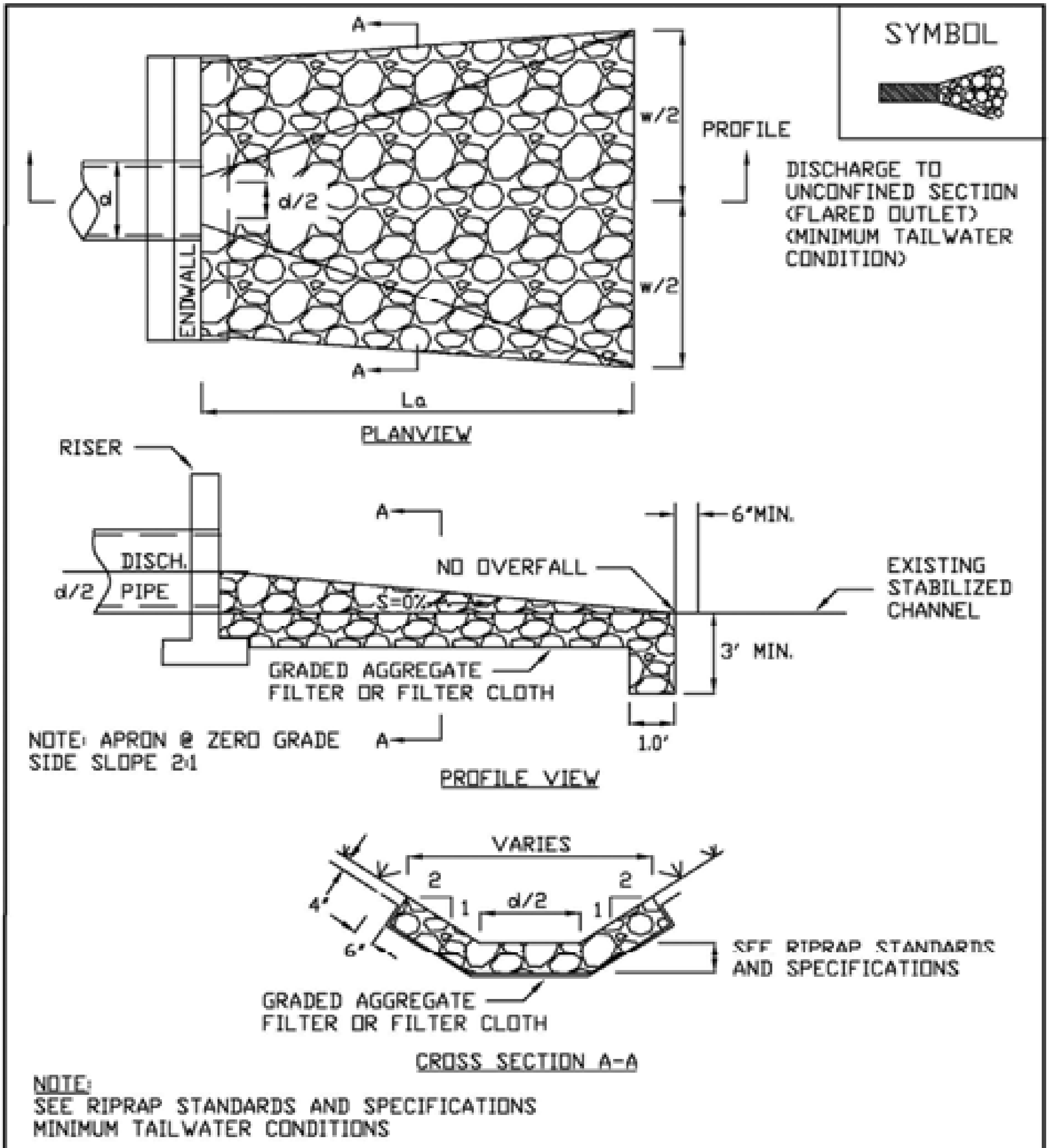
# Figure 3.16
## Outlet Protection Design—Minimum Tailwater Condition Chart
## (Design of Outlet Protection from a Round Pipe Flowing Full, Minimum Tailwater Condition: $T_w < 0.5D_o$) (USDA - NRCS)



# Figure 3.17
# Outlet Protection Design—Maximum Tailwater Condition Chart (Design of Outlet Protection from a Round Pipe Flowing Full, Maximum Tailwater Condition: $T_w \geq 0.5D_o$) (USDA - NRCS)



# Figure 3.18
# Riprap Outlet Protection Detail (1)

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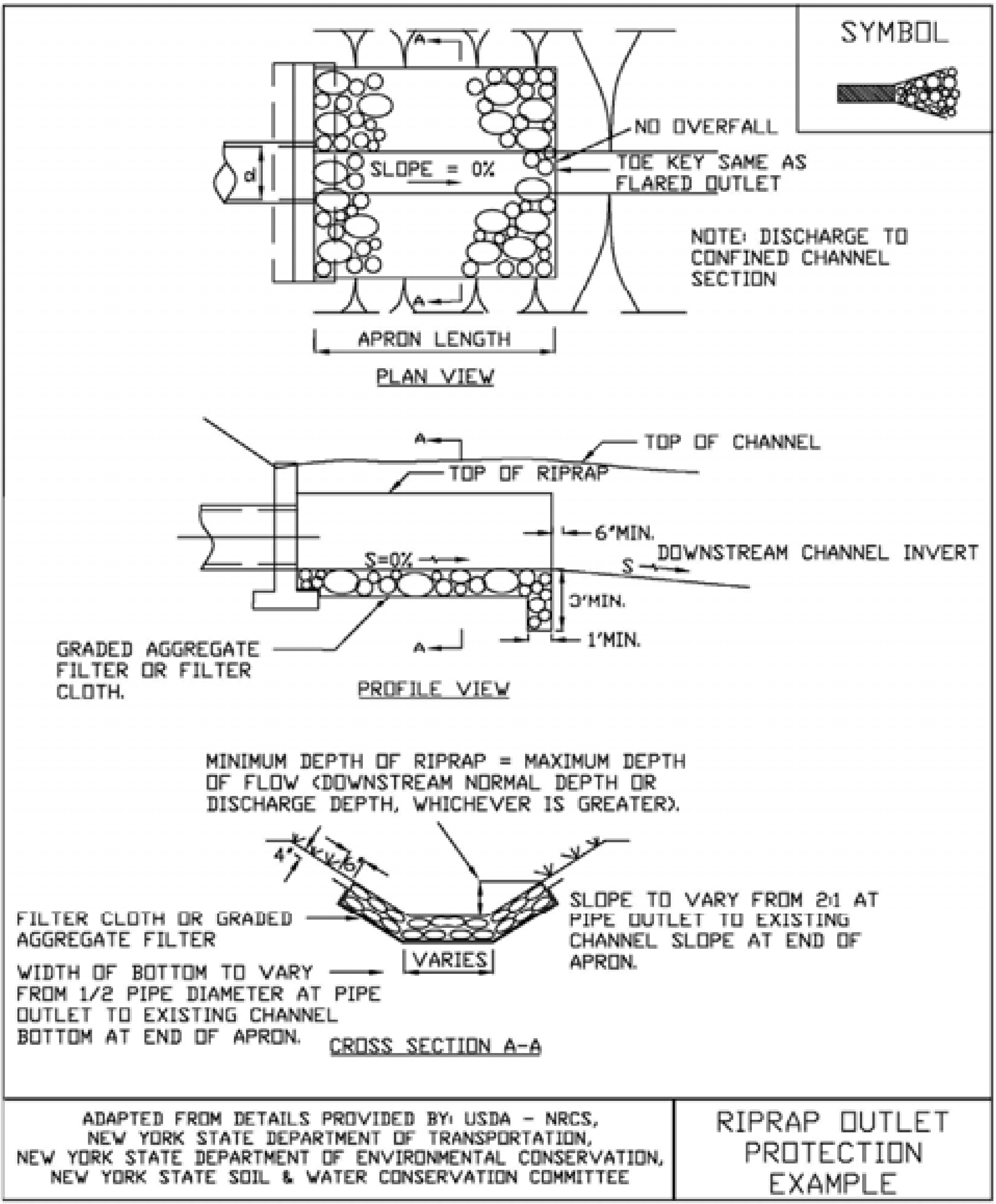
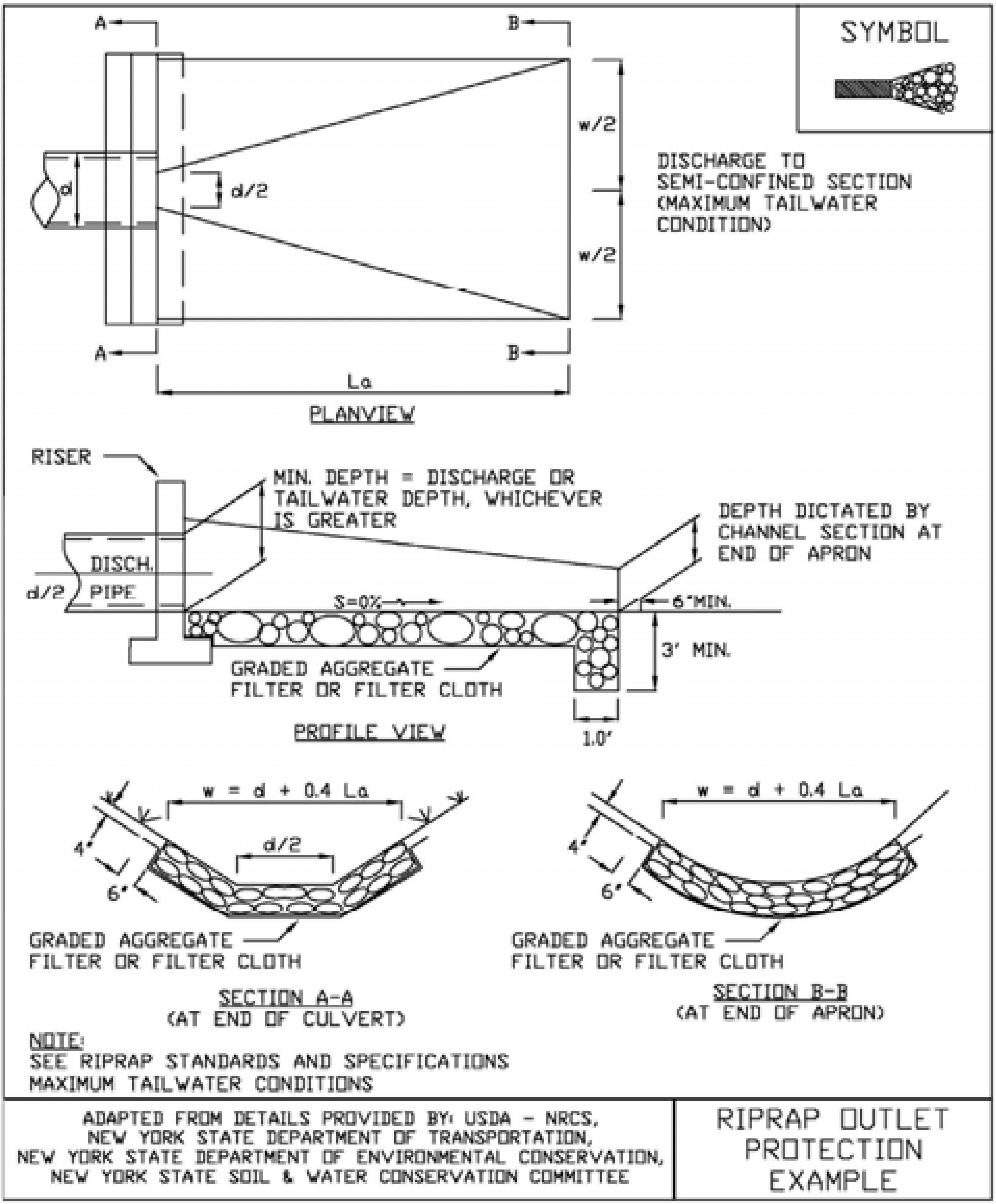
# Figure 3.19
# Riprap Outlet Protection Detail (2)



# Figure 3.20
# Riprap Outlet Protection Detail (3)



# STANDARD AND SPECIFICATIONS FOR SITE POLLUTION PREVENTION

## Definition & Scope

A collection of management practices intended to control non-sediment pollutants associated with construction activities to prevent the generation of pollutants due to improper handling, storage, and spills and prevent the movement of toxic substances from the site into surface waters.

## Conditions Where Practice Applies

On all construction sites where the earth disturbance exceeds 5,000 square feet, and involves the use of fertilizers, pesticides, petroleum based chemicals, fuels and lubricants, as well as sealers, paints, cleared woody vegetation, garbage, and sanitary wastes.

## Design Criteria

The variety of pollutants on a particular site and the severity of their impacts depend on factors such as the nature of the construction activity, the physical characteristics of the construction site, and the proximity of water bodies and conveyances to the pollutant source.

1. All state and federal regulations shall be followed for the storage, handling, application, usage, and disposal of pesticides, fertilizers, and petroleum products.

2. Vehicle and construction equipment staging and maintenance areas will be located away from all drainage ways with their parking areas graded so the runoff from these areas is collected, contained and treated prior to discharge from the site.

3. Provide sanitary facilities for on-site personnel.

4. Store, cover, and isolate construction materials including topsoil, and chemicals, to prevent runoff of pollutants and contamination of groundwater and surface waters.

5. Develop and implement a spill prevention and control plan. The plan should include NYSDEC's spill reporting and initial notification requirements.

6. Provide adequate disposal for solid waste including woody debris, stumps, and other construction waste and include these methods and directions in the construction details on the site construction drawings. Fill, woody debris, stumps and construction waste shall not be placed in regulated wetlands, streams or other surface waters.

7. Distribute or post informational material regarding proper handling, spill response, spill kit location, and emergency actions to be taken, to all construction personnel.

8. Refueling equipment shall be located at least 100 feet from all wetlands, streams and other surface waters.

# STANDARD AND SPECIFICATIONS FOR STABILIZED CONSTRUCTION ACCESS

## Definition & Scope

A stabilized pad of aggregate underlain with geotextile located at any point where traffic will be entering or leaving a construction site to or from a public right-of-way, street, alley, sidewalk, or parking area. The purpose of stabilized construction access is to reduce or eliminate the tracking of sediment onto public rights-of-way or streets.

## Conditions Where Practice Applies

A stabilized construction access shall be used at all points of construction ingress and egress.

## Design Criteria

See Figure 2.1 on page 2.31 for details.

**Aggregate Size:** Use a matrix of 1-4 inch stone, or reclaimed or recycled concrete equivalent.

**Thickness:** Not less than six (6) inches.

**Width:** 12-foot minimum but not less than the full width of points where ingress or egress occurs. 24-foot minimum if there is only one access to the site.

**Length:** As required, but not less than 50 feet (except on a single residence lot where a 30 foot minimum would apply).

**Geotextile:** To be placed over the entire area to be covered with aggregate. Filter cloth will not be required on a single-family residence lot. Piping of surface water under entrance shall be provided as required. If piping is impossible, a mountable berm with 5:1 slopes will be permitted.

**Criteria for Geotextile:** The geotextile shall be woven or nonwoven fabric consisting only of continuous chain polymeric filaments or yarns of polyester. The fabric shall be inert to commonly encountered chemicals, hydro-carbons, mildew, rot resistant, and conform to the fabric properties as shown:

| Fabric Properties[3] | Light Duty[1] Roads Grade Subgrade | Heavy Duty[2] Haul Roads Rough Graded | Test Method |
|---|---|---|---|
| Grab Tensile Strength (lbs) | 200 | 220 | ASTM D1682 |
| Elongation at Failure (%) | 50 | 60 | ASTM D1682 |
| Mullen Burst Strength (lbs) | 190 | 430 | ASTM D3786 |
| Puncture Strength (lbs) | 40 | 125 | ASTM D751 Modified |
| Equivalent | 40-80 | 40-80 | US Std Sieve |
| Opening Size | | | CW-02215 |
| Aggregate Depth | 6 | 10 | - |

[1]Light Duty Road: Area sites that have been graded to subgrade and where most travel would be single axle vehicles and an occasional multi-axle truck. Acceptable materials are Trevira Spunbond 1115, Mirafi 100X, Typar 3401, or equivalent.

[2]Heavy Duty Road: Area sites with only rough grading, and where most travel would be multi-axle vehicles. Acceptable materials are Trevira Spunbond 1135, Mirafi 600X, or equivalent.

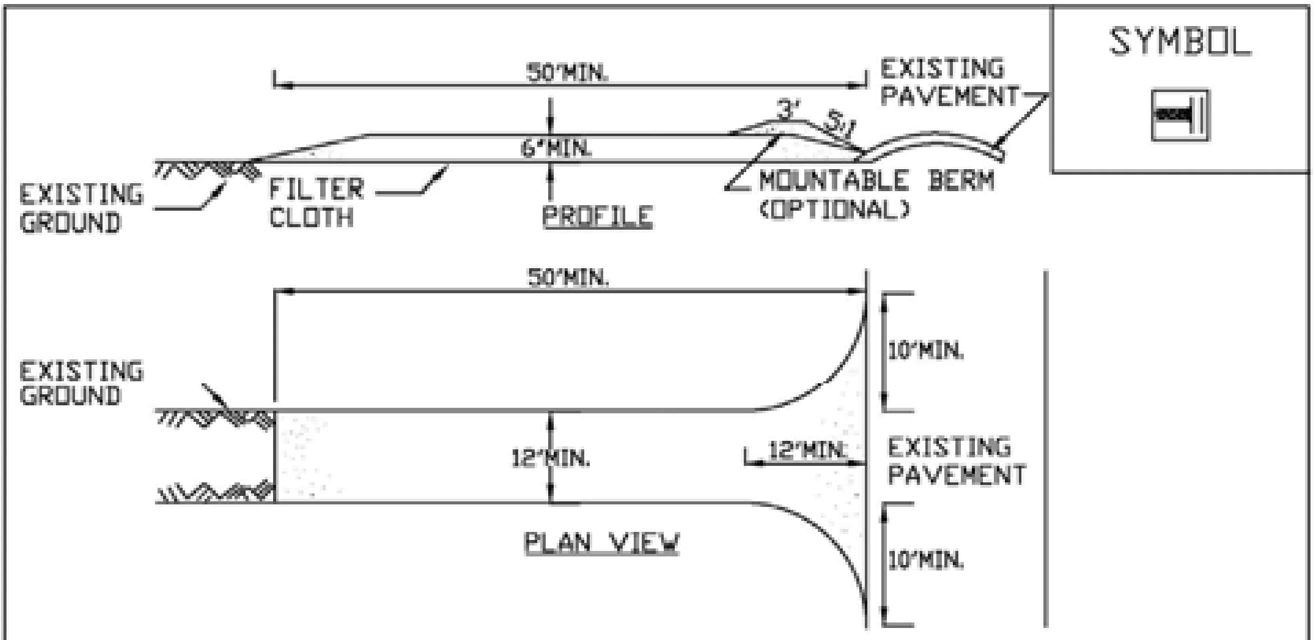
[3]Fabrics not meeting these specifications may be used only when design procedure and supporting documentation are supplied to determine aggregate depth and fabric strength.

## Maintenance

The access shall be maintained in a condition which will prevent tracking of sediment onto public rights-of-way or streets. This may require periodic top dressing with additional aggregate. All sediment spilled, dropped, or washed onto public rights-of-way must be removed immediately.

When necessary, wheels must be cleaned to remove sediment prior to entrance onto public rights-of-way. When washing is required, it shall be done on an area stabilized with aggregate, which drains into an approved sediment-trapping device. All sediment shall be prevented from entering storm drains, ditches, or watercourses.

# Figure 2.1
# Stabilized Construction Access




## CONSTRUCTION SPECIFICATIONS

1. STONE SIZE - USE 1-4 INCH STONE, OR RECLAIMED OR RECYCLED CONCRETE EQUIVALENT.
2. LENGTH - NOT LESS THAN 50 FEET (EXCEPT ON A SINGLE RESIDENCE LOT WHERE A 30 FOOT MINIMUM LENGTH WOULD APPLY).
3. THICKNESS - NOT LESS THAN SIX (6) INCHES.
4. WIDTH - TWELVE (12) FOOT MINIMUM, BUT NOT LESS THAN THE FULL WIDTH AT POINTS WHERE INGRESS OR EGRESS OCCURS. TWENTY-FOUR (24) FOOT IF SINGLE ENTRANCE TO SITE.
5. GEOTEXTILE - WILL BE PLACED OVER THE ENTIRE AREA PRIOR TO PLACING OF STONE.
6. SURFACE WATER - ALL SURFACE WATER FLOWING OR DIVERTED TOWARD CONSTRUCTION ACCESS SHALL BE PIPED BENEATH THE ENTRANCE. IF PIPING IS IMPRACTICAL, A MOUNTABLE BERM WITH 5:1 SLOPES WILL BE PERMITTED.
7. MAINTENANCE - THE ENTRANCE SHALL BE MAINTAINED IN A CONDITION WHICH WILL PREVENT TRACKING OR FLOWING OF SEDIMENT ONTO PUBLIC RIGHTS-OF-WAY, ALL SEDIMENT SPILLED, DROPPED, WASHED OR TRACKED ONTO PUBLIC RIGHTS-OF-WAY MUST BE REMOVED IMMEDIATELY.
8. WHEN WASHING IS REQUIRED, IT SHALL BE DONE ON A AREA STABILIZED WITH STONE AND WHICH DRAINS INTO AN APPROVED SEDIMENT TRAPPING DEVICE.
9. PERIODIC INSPECTION AND NEEDED MAINTENANCE SHALL BE PROVIDED AFTER EACH RAIN.

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# STANDARD AND SPECIFICATIONS FOR WINTER STABILIZATION

## Definition & Scope

A temporary site specific, enhanced erosion and sediment control plan to manage runoff and sediment at the site during construction activities in the winter months to protect off-site water resources.

## Conditions Where Practice Applies

This standard applies to all construction activities involved with ongoing land disturbance and exposure between November 15th to the following April 1st.

## Design Criteria

1. Prepare a snow management plan with adequate storage for snow and control of melt water, requiring cleared snow to be stored in a manner not affecting ongoing construction activities.

2. Enlarge and stabilize access points to provide for snow management and stockpiling. Snow management activities must not destroy or degrade installed erosion and sediment control practices.

3. A minimum 25 foot buffer shall be maintained from all perimeter controls such as silt fence. Mark silt fence with tall stakes that are visible above the snow pack.

4. Edges of disturbed areas that drain to a waterbody within 100 feet will have 2 rows of silt fence, 5 feet apart, installed on the contour.

5. Drainage structures must be kept open and free of snow and ice dams. All debris, ice dams, or debris from plowing operations, that restrict the flow of runoff and meltwater, shall be removed.

6. Sediment barriers must be installed at all appropriate perimeter and sensitive locations. Silt fence and other practices requiring earth disturbance must be installed before the ground freezes.

7. Soil stockpiles must be protected by the use of established vegetation, anchored straw mulch, rolled stabilization matting, or other durable covering. A barrier must be installed at least 15 feet from the toe of the stockpile to prevent soil migration and to capture loose soil.

8. In areas where soil disturbance activity has temporarily or permanently ceased, the application of soil stabilization measures should be initiated by the end of the next business day and completed within three (3) days. Rolled erosion control blankets must be used on all slopes 3 horizontal to 1 vertical or steeper.

9. If straw mulch alone is used for temporary stabilization, it shall be applied at double the standard rate of 2 tons per acre, making the application rate 4 tons per acre. Other manufactured mulches should be applied at double the manufacturer's recommended rate.

10. To ensure adequate stabilization of disturbed soil in advance of a melt event, areas of disturbed soil should be stabilized at the end of each work day unless:

    a. work will resume within 24 hours in the same area and no precipitation is forecast or;

    b. the work is in disturbed areas that collect and retain runoff, such as open utility trenches, foundation excavations, or water management areas.

11. Use stone paths to stabilize access perimeters of buildings under construction and areas where construction vehicle traffic is anticipated. Stone paths should be a minimum 10 feet in width but wider as necessary to accommodate equipment.

## Maintenance

The site shall be inspected frequently to ensure that the erosion and sediment control plan is performing its winter stabilization function. If the site will not have earth disturbing activities ongoing during the "winter season", **all** bare exposed soil must be stabilized by established vegetation, straw or other acceptable mulch, matting, rock, or other approved material such as rolled erosion control products. Seeding of areas with mulch cover is preferred but seeding alone is not acceptable for proper stabilization.

Compliance inspections must be performed and reports filed properly in accordance with the SWPPP for all sites under a winter shutdown.

# STANDARD AND SPECIFICATIONS FOR BUFFER FILTER STRIP

| Land Slope (%) | Minimum Filter Strip Width (ft.) |
|---|---|
| ≤10 | 50 |
| 20 | 60 |
| 30 | 85 |
| 40 | 105 |
| 50 | 125 |
| 60 | 145 |
| 70 | 165 |

## Definition & Scope

A **temporary/permanent** well vegetated grassed area below a disturbed area that can be used to remove sediment from runoff prior to it reaching surface waters or other designated areas of concern, such as parking lots and road pavement.

## Condition Where Practice Applies

This practice is effective when the flow is in the form of sheet flow and the vegetative cover is established prior to disturbance. Surface water must be protected from sediment-laden runoff until buffer filter strip vegetation is established, and then the proposed disturbance can be undertaken. This practice is effective when the flow is in the form of sheet flow (maximum of 150 feet).

## Design Criteria

1. The vegetation should be a well established perennial grass. Wooded and brushy areas are not acceptable for purposes of sediment removal.

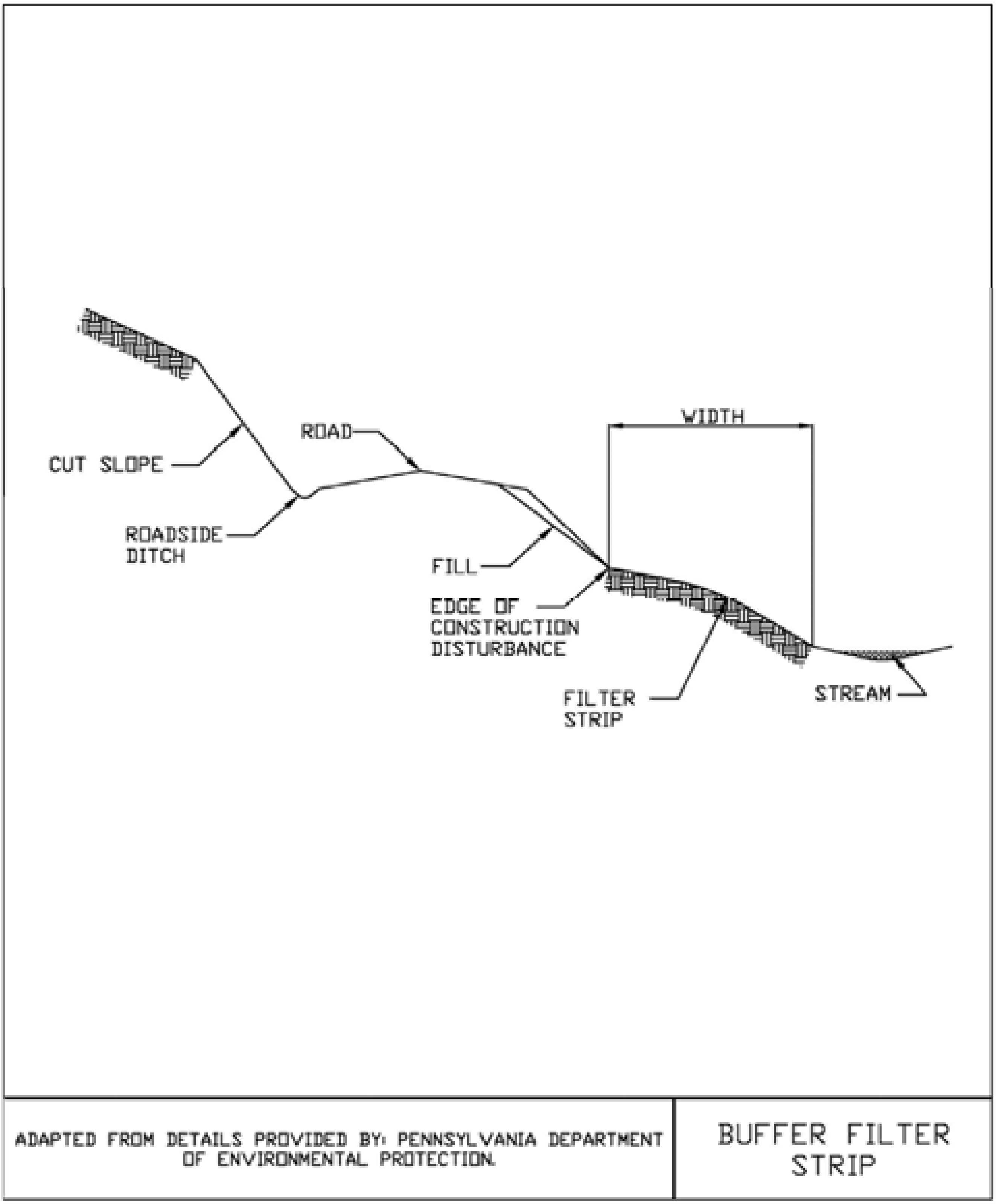
2. The minimum buffer filter strip width for stream protection shall be in accordance with the following table:

3. The minimum buffer filter strip width to protect paved areas during construction is 20 feet.

## Maintenance

If at any time the width of the buffer filter strip has been reduced by sediment deposition to half its original width or concentrated flow has developed, suitable additional practices should be installed. The erosion and sediment control plan shall include these details.

# Figure 5.1
# Buffer Filter Strip



# STANDARD AND SPECIFICATIONS FOR COMPOST FILTER SOCK

## Definition & Scope

A **temporary** sediment control practice composed of a degradable geotextile mesh tube filled with compost filter media to filter sediment and other pollutants associated with construction activity to prevent their migration offsite.

## Condition Where Practice Applies

Compost filter socks can be used in many construction site applications where erosion will occur in the form of sheet erosion and there is no concentration of water flowing to the sock. In areas with steep slopes and/or rocky terrain, soil conditions must be such that good continuous contact between the sock and the soil is maintained throughout its length. For use on impervious surfaces such as road pavement or parking areas, proper anchorage must be provided to prevent shifting of the sock or separation of the contact between the sock and the pavement. Compost filter socks are utilized both at the site perimeter as well as within the construction areas. These socks may be filled after placement by blowing compost into the tube pneumatically, or filled at a staging location and moved into its designed location.

## Design Criteria

1. Compost filter socks will be placed on the contour with both terminal ends of the sock extended 8 feet upslope at a 45 degree angle to prevent bypass flow.

2. Diameters designed for use shall be 12" – 32" except that 8" diameter socks may be used for residential lots to control areas less than 0.25 acres.

3. The flat dimension of the sock shall be at least 1.5 times the nominal diameter.

4. The **Maximum Slope Length** (in feet) above a compost filter sock shall not exceed the following limits:

| Dia. (in.) | Slope % | | | | | | |
|---|---|---|---|---|---|---|---|
| | 2 | 5 | 10 | 20 | 25 | 33 | 50 |
| 8 | 225* | 200 | 100 | 50 | 20 | — | — |
| 12 | 250 | 225 | 125 | 65 | 50 | 40 | 25 |
| 18 | 275 | 250 | 150 | 70 | 55 | 45 | 30 |
| 24 | 350 | 275 | 200 | 130 | 100 | 60 | 35 |
| 32 | 450 | 325 | 275 | 150 | 120 | 75 | 50 |

* Length in feet

5. The compost infill shall be well decomposed (matured at least 3 months), weed-free, organic matter. It shall be aerobically composted, possess no objectionable odors, and contain less than 1%, by dry weight, of man-made foreign matter. The physical parameters of the compost shall meet the standards listed in Table 5.2 - Compost Standards Table. **Note: All biosolids compost produced in New York State (or approved for importation) must meet NYS DEC's 6 NYCRR Part 360 (Solid Waste Management Facilities) requirements. The Part 360 requirements are equal to or more stringent than 40 CFR Part 503 which ensure safe standards for pathogen reduction and heavy metals content. When using compost filter socks adjacent to surface water, the compost should have a low nutrient value.**

6. The compost filter sock fabric material shall meet the

7. Compost filter socks shall be anchored in earth with 2" x 2" wooden stakes driven 12" into the soil on 10 foot centers on the centerline of the sock. On uneven terrain, effective ground contact can be enhanced by the placement of a fillet of filter media on the disturbed area side of the compost sock.

8. All specific construction details and material specifications shall appear on the erosion and sediment control constructions drawings when compost filter socks are included in the plan.

## Maintenance

1. Traffic shall not be permitted to cross filter socks.

2. Accumulated sediment shall be removed when it reaches half the above ground height of the sock and disposed of in accordance with the plan.

3. Socks shall be inspected weekly and after each runoff event. Damaged socks shall be repaired in the manner required by the manufacturer or replaced within 24 hours of inspection notification.

4. Biodegradable filter socks shall be replaced after 6 months; photodegradable filter socks after 1 year. Polypropylene socks shall be replaced according to the manufacturer's recommendations.

5. Upon stabilization of the area contributory to the sock, stakes shall be removed. The sock may be left in place and vegetated or removed in accordance with the stabilization plan. For removal the mesh can be cut and the compost spread as an additional mulch to act as a soil supplement.

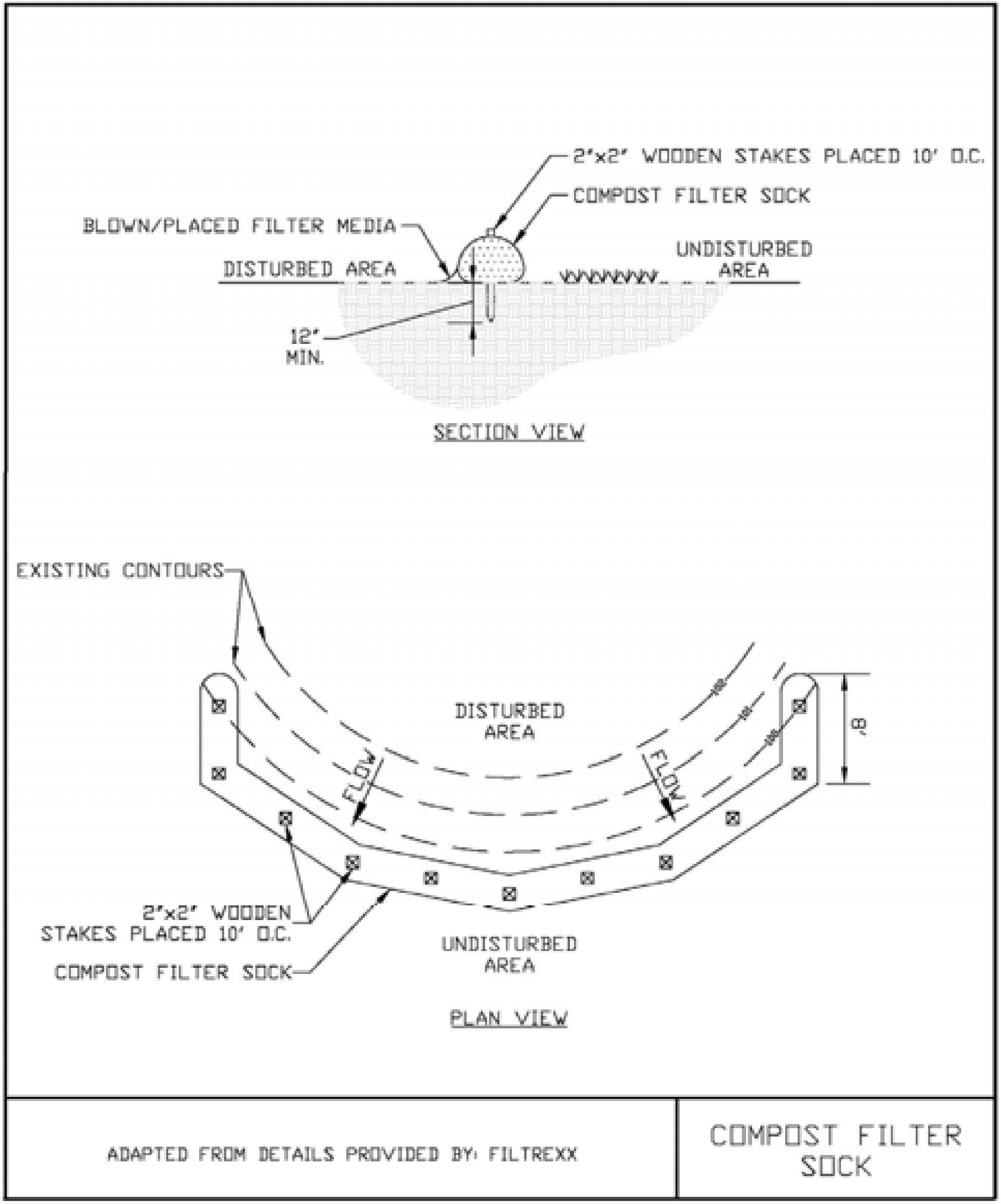
# Table 5.1 - Compost Sock Fabric Minimum Specifications Table

| Material Type | 3 mil HDPE | 5 mil HDPE | 5 mil HDPE | Multi-Filament Polypropylene (MFPP) | Heavy Duty Multi-Filament Polypropylene (HDMFPP) |
|---|---|---|---|---|---|
| Material Characteristics | Photodegradable | Photodegradable | Biodegradable | Photodegradable | Photodegradable |
| Sock Diameters | 12"<br>18" | 12"<br>18"<br>24"<br>32" | 12"<br>18"<br>24"<br>32" | 12"<br>18"<br>24"<br>32" | 12"<br>18"<br>24"<br>32" |
| Mesh Opening | 3/8" | 3/8" | 3/8" | 3/8" | 1/8" |
| Tensile Strength | | 26 psi | 26 psi | 44 psi | 202 psi |
| Ultraviolet Stability % Original Strength (ASTM G-155) | 23% at 1000 hr. | 23% at 1000 hr. | | 100% at 1000 hr. | 100% at 1000 hr. |
| Minimum Functional Longevity | 6 months | 9 months | 6 months | 1 year | 2 years |

# Table 5.2 - Compost Standards Table

| | |
|---|---|
| Organic matter content | 25% - 100% (dry weight) |
| Organic portion | Fibrous and elongated |
| pH | 6.0 – 8.0 |
| Moisture content | 30% - 60% |
| Particle size | 100% passing a 1" screen and<br>10 - 50% passing a 3/8" screen |
| Soluble salt concentration | 5.0 dS/m (mmhos/cm) maximum |

# Figure 5.2
# Compost Filter Sock



# STANDARD AND SPECIFICATIONS FOR GEOTEXTILE FILTER BAG

## Definition & Scope

A **temporary** portable device through which sediment laden water is pumped to trap and retain sediment prior to its discharge to drainageways or off-site.

## Condition Where Practice Applies

On sites where space is limited such as urban construction or linear projects (e.g. roads and utility work) where rights-of-way are limited and larger de-silting practices are impractical.

## Design Criteria

1. Location - The portable filter bag should be located to minimize interference with construction activities and pedestrian traffic. It should also be placed in a location that is vegetated, relatively level, and provides for ease of access by heavy equipment, cleanout, disposal of trapped sediment, and proper release of filtered water.

   The filter bag shall also be placed at least 50 feet from all wetlands, streams or other surface waters.

2. Size - Geotextile filter bag shall be sized in accordance with the manufacturers recommendations based on the pump discharge rate.

## Materials and Installation

1. The geotextile material will have the following attributes:

| | |
|---|---|
| Minimum Grab Tensile Strength | 200 lbs. |
| Minimum Grab Tensile Elongation | 50 % |
| Minimum Trapezoid Tear Strength | 80 lbs. |
| Mullen Burst Strength | 380 psi |
| Minimum Puncture Strength | 130 lbs |
| Apparent Opening Size | 40 - 80 US sieve |
| Minimum UV Resistance | 70% |
| Minimum Flow Thru Rate | 70 gpm/sq ft |

2. The bag shall be sewn with a double needle machine using high strength thread, double stitched "Joe" type capable of minimum roll strength of 100 lbs/inch (ASTM D4884).
3. The geotextile filter bag shall have an opening large enough to accommodate a 4 inch diameter discharge hose with an attached strap to tie off the bag to the hose to prevent back flow.
4. The geotextile shall be placed on a gravel bed 2 inches thick, a straw mat 4 inches thick, or a vegetated filter strip to allow water to flow out of the bag in all directions.

## Maintenance

1. The geotextile filter bag is considered full when remaining bag flow area has been reduced by 75%. At this point, it should be replaced with a new bag.
2. Disposal may be accomplished by removing the bag to an appropriate designated upland area, cut open, remove the geotextile for disposal, and spread sediment contents and seeded and mulched according to the vegetative plan.

# STANDARD AND SPECIFICATIONS FOR MULCHING

## Definition and Scope

Applying coarse plant residue or chips, or other suitable materials, to cover the soil surface to provide initial erosion control while a seeding or shrub planting is establishing. Mulch will conserve moisture and modify the surface soil temperature and reduce fluctuation of both. Mulch will prevent soil surface crusting and aid in weed control. Mulch can also be used alone for temporary stabilization in non-growing months. Use of stone as a mulch could be more permanent and should not be limited to non-growing months.

## Conditions Where Practice Applies

On soils subject to erosion and on new seedings and shrub plantings. Mulch is useful on soils with low infiltration rates by retarding runoff.

## Criteria

Site preparation prior to mulching requires the installation of necessary erosion control or water management practices and drainage systems.

Slope, grade and smooth the site to fit needs of selected mulch products.

Remove all undesirable stones and other debris to meet the needs of the anticipated land use and maintenance required.

Apply mulch after soil amendments and planting is accomplished or simultaneously if hydroseeding is used.

Select appropriate mulch material and application rate or material needs. Hay mulch shall not be used in wetlands or in areas of permanent seeding. Clean straw mulch is preferred alternative in wetland application. Determine local availability.

Select appropriate mulch anchoring material.

NOTE: The best combination for grass/legume establishment is straw (cereal grain) mulch applied at 2 ton/acre (90 lbs./1000sq.ft.) and anchored with wood fiber mulch (hydromulch) at 500 – 750 lbs./acre (11 – 17 lbs./1000 sq. ft.). The wood fiber mulch must be applied through a hydroseeder immediately after mulching.

# Table 4.2
## Guide to Mulch Materials, Rates, and Uses

| Mulch Material | Quality Standards | per 1000 Sq. Ft. | per Acre | Depth of Application | Remarks |
|---|---|---|---|---|---|
| Wood chips or shavings | Air-dried. Free of objectionable coarse material | 500-900 lbs. | 10-20 tons | 2-7” | Used primarily around shrub and tree plantings and recreation trails to inhibit weed competition. Resistant to wind blowing. Decomposes slowly. |
| Wood fiber cellulose (partly digested wood fibers) | Made from natural wood usually with green dye and dispersing agent | 50 lbs. | 2,000 lbs. | — | Apply with hydromulcher. No tie down required. Less erosion control provided than 2 tons of hay or straw. |
| Gravel, Crushed Stone or Slag | Washed; Size 2B or 3A—1 1/2” | 9 cu. yds. | 405 cu. yds. | 3” | Excellent mulch for short slopes and around plants and ornamentals. Use 2B where subject to traffic. (Approximately 2,000 lbs./cu. yd.). Frequently used over filter fabric for better weed control. |
| Hay or Straw | Air-dried; free of undesirable seeds & coarse materials | 90-100 lbs. 2-3 bales | 2 tons (100-120 bales) | cover about 90% surface | Use small grain straw where mulch is maintained for more than three months. Subject to wind blowing unless anchored. Most commonly used mulching material. Provides the best micro-environment for germinating seeds. |
| Jute twisted yarn | Undyed, unbleached plain weave. Warp 78 ends/yd., Weft 41 ends/yd. 60-90 lbs./roll | 48” x 50 yds. or 48” x 75 yds. | — | — | Use without additional mulch. Tie down as per manufacturers specifications. Good for center line of concentrated water flow. |
| Excelsior wood fiber mats | Interlocking web of excelsior fibers with photodegradable plastic netting | 4’ x 112.5’ or 8’ x 112.5’. | — | — | Use without additional mulch. Excellent for seeding establishment. Anchor as per manufacturers specifications. Approximately 72 lbs./roll for excelsior with plastic on both sides. Use two sided plastic for centerline of waterways. |
| Straw or coconut fiber, or combination | Photodegradable plastic net on one or two sides | Most are 6.5 ft. x 3.5 ft. | 81 rolls | — | Designed to tolerate higher velocity water flow, centerlines of waterways, 60 sq. yds. per roll. |

# Table 4.3
# Mulch Anchoring Guide

| Anchoring Method or Material | Kind of Mulch to be Anchored | How to Apply |
|---|---|---|
| 1. Peg and Twine | Hay or straw | After mulching, divide areas into blocks approximately 1 sq. yd. in size. Drive 4-6 pegs per block to within 2” to 3” of soil surface. Secure mulch to surface by stretching twine between pegs in criss-cross pattern on each block. Secure twine around each peg with 2 or more tight turns. Drive pegs flush with soil. Driving stakes into ground tightens the twine. |
| 2. Mulch netting | Hay or straw | Staple the light-weight paper, jute, wood fiber, or plastic nettings to soil surface according to manufacturer’s recommendations. Should be biodegradable. Most products are not suitable for foot traffic. |
| 3. Wood cellulose fiber | Hay or straw | Apply with hydroseeder immediately after mulching. Use 500 lbs. wood fiber per acre. Some products contain an adhesive material (“tackifier”), possibly advantageous. |
| 4. Mulch anchoring tool | Hay or straw | Apply mulch and pull a mulch anchoring tool (blunt, straight discs) over mulch as near to the contour as possible. Mulch material should be “tucked” into soil surface about 3”. |
| 5. Tackifier | Hay or straw | Mix and apply polymeric and gum tackifiers according to manufacturer’s instructions. Avoid application during rain. A 24-hour curing period and a soil temperature higher than $45^0$ Fahrenheit are required. |

# STANDARD AND SPECIFICATIONS FOR SEDIMENT TRAP

## Definition & Scope

A **temporary** sediment control device formed by excavation and/or embankment to intercept sediment-laden runoff and trap the sediment in order to protect drainageways, properties, and rights-of-way below the sediment trap from sedimentation.

## Conditions Where Practice Applies

A sediment trap is usually installed in a drainageway, at a storm drain inlet, or other points of collection from a disturbed area for one construction season.

Sediment traps should be used to artificially break up the natural drainage area into smaller sections where a larger device (sediment basin) would be less effective.

## Design Criteria

If the drainage area to the proposed trap location exceeds 5 acres, or the trap is in place beyond one construction season, or any of the additional design criteria presented here cannot be met, a full Sediment Basin must be used. See Standard and Specification for Sediment Basin on page 5.19.

### Drainage Area

The maximum drainage area for all sediment traps shall be 5 acres.

### Location

Sediment traps shall be located so that they can be installed prior to grading or filling in the drainage area they are to protect. Traps must **not be located any closer than 20 feet** from a proposed building foundation if the trap is to function during building construction. Locate traps to obtain maximum storage benefit from the terrain and for ease of cleanout and disposal of the trapped sediment.

### Trap Size

The volume of a sediment trap as measured at the elevation of the crest of the outlet shall be at least 3,600 cubic feet per acre of drainage area. A minimum length to width ratio of 2:1 should be provided. The volume of a constructed trap shall be calculated using standard mathematical procedures. The volume of a natural sediment trap may be approximated by the equation: Volume (cu.ft.) = 0.4 x surface area (sq.ft.) x maximum depth (ft.).

### Trap Cleanout

Sediment shall be removed and the trap restored to the original dimensions when the sediment has accumulated to ½ of the design depth of traps I-II, and 1/3 the depth for trap III. Sediment removed from the trap shall be deposited in a protected area and in such a manner that it will not erode.

### Embankment

All earth embankments for sediment traps shall not exceed five (5) feet in height as measured at the low point of the original ground along the centerline of the embankment. Embankments shall have a minimum four (4) foot wide top and side slopes of 2:1 or flatter. The embankment shall be compacted by traversing with equipment while it is being constructed. The embankment shall be stabilized with seed and mulch as soon as it is completed

The elevation of the top of any dike directing water to any sediment trap will equal or exceed the maximum height of the outlet structure along the entire length of the trap.

### Excavation

All excavation operations shall be carried out in such a manner that erosion and water pollution shall be minimal. Excavated portions of sediment traps shall have 1:1 or flatter slopes.

### Outlet

The outlet shall be designed, constructed, and maintained in such a manner that sediment does not leave the trap and that erosion at or below the outlet does not occur.

Sediment traps must outlet onto stabilized (preferable undisturbed) ground, into a watercourse, stabilized channel, or into a storm drain system. Distance between inlet and outlet should be maximized to the longest length practicable.

All traps must be seeded and mulched immediately after construction.

## Trap Details Needed on Erosion and Sediment Control Plans

Each trap shall be delineated on the plans in such a manner that it will not be confused with any other features. Each trap on a plan shall indicate all the information necessary to properly construct and maintain the structure. If the drawings are such that this information cannot be delineated on the drawings, then a table shall be developed. If a table is developed, then each trap on a plan shall have a number and the numbers shall be consecutive.

The following information shall be shown for each trap in a summary table format on the plans.

1. Trap number
2. Type of trap
3. Drainage area
4. Storage required
5. Storage provided (if applicable)
6. Outlet length or pipe sizes
7. Storage depth below outlet or cleanout elevation
8. Embankment height and elevation (if applicable)

## Type of Sediment Traps

There are three (3) specific types of sediment traps which vary according to their function, location, or drainage area.

I. Pipe Outlet Sediment Trap
II. Stone Outlet Sediment Trap
III. Compost Filter Sock Sediment Trap

### I. Pipe Outlet Sediment Trap

A Pipe Outlet Sediment Trap consists of a trap formed by embankment or excavation. The outlet for the trap is through a perforated riser and a pipe through the embankment. The outlet pipe and riser shall be made of steel, corrugated metal or other suitable material. The top of the embankment shall be at least 1 ½ feet above the crest of the riser. The preferred method of dewatering the sediment trap is by surface skimmer. See Dewatering Device Standard, page 5.10. If the riser alone is used for dewatering, the top 2/3 of the riser shall be perforated with one (1) inch nominal diameter holes or slits spaced six (6) inches vertically and horizontally placed in the concave portion of the corrugated pipe.

No holes or slits will be allowed within six (6) inches of the top of the horizontal barrel. All pipe connections shall be watertight. The riser shall be wrapped with ½ to ¼ inch hardware cloth wire then wrapped with filter cloth with a sieve size between #40-80 and secured with strapping or connecting band at the top and bottom of the cloth. The cloth shall cover an area at least six (6) inches above the highest hole and six (6) inches below the lowest hole. The top of the riser pipe shall not be covered with filter cloth. The riser shall have a base with sufficient weight to prevent flotation of the riser. Two approved bases are:

1. A concrete base 12 in. thick with the riser embedded 9 in. into the concrete base, or

2. One quarter inch, minimum, thick steel plate attached to the riser by a continuous weld around the circumference of the riser to form a watertight connection. The plate shall have 2.5 feet of stone, gravel, or earth placed on it to prevent flotation. In either case, each side of the square base measurement shall be the riser diameter plus 24 inches.

Pipe outlet sediment traps shall be limited to a five (5) acre maximum drainage area. Pipe outlet sediment trap is interchangeable in the field with stone outlet provided that these sediment traps are constructed in accordance with the detail and specifications for that trap.

Select pipe diameter from the following table:
See details for Pipe Outlet Sediment Trap ST-I in Figure 5.25 and 5.26 on pages 5.49 and 5.50.

Optional sediment trap dewatering devices are shown on Figure 5.29 on Page 5.53.

Minimum Sizes

| Barrel Diameter[1] (in.) | Riser Diameter[1] (in.) | Maximum Drainage Area (ac.) |
|---|---|---|
| 12 | 15 | 1 |
| 15 | 18 | 2 |
| 18 | 21 | 3 |
| 21 | 24 | 4 |
| 21 | 27 | 5 |

[1] Barrel diameter may be same size as riser diameter

## II. Stone Outlet Sediment Trap

A Stone Outlet Sediment Trap consists of a trap formed by an embankment or excavation. The outlet of this trap is over a stone section placed on level ground. The minimum length (feet) of the outlet shall be equal to four (4) times the drainage area (acres).

Required storage shall be 3,600 cubic feet per acre of drainage area.

The outlet crest (top of stone in weir section) shall be level, at least one (1) foot below top of embankment and no more than one (1) foot above ground beneath the outlet. Stone used in the outlet shall be small riprap (4 in. x 8 in.). To provide more efficient trapping effect, a layer of filter cloth should be embedded one (1) foot back into the upstream face of the outlet stone or a one (1) foot thick layer of two (2) inch or finer aggregate shall be placed on the upstream face of the outlet.

Stone Outlet Sediment Traps may be interchangeable in the field with pipe outlet sediment traps provided they are constructed in accordance with the detail and specifications for those traps. Stone outlet sediment traps shall be limited to a five (5) acre maximum drainage area.

See details for Stone Outlet Sediment Trap ST-II in Figure 5.27 on page 5.51

## III. Compost Sock Sediment Trap

A compost sock sediment trap consists of a trap formed by creating an enclosure of geotextile mesh tubes filled with a compost filter media. These traps are used in locations where there is no opportunity to direct runoff into larger traps or well vegetated areas. This could occur at site entrances and access points or in tight areas due to construction boundary limits.

Surface runoff can be directed to the trap with standard conveyance practices. Groundwater or surface ponding in low areas can be pumped into the compost sock sediment trap with appropriate energy dissipation at the pump outlet to prevent scour.
Design criteria for Compost Sock Sediment Trap

1. The maximum drainage area tributary to the trap shall be 5 acres.

2. The minimum settled height above ground shall be 2.0 feet formed by staking 3 compost filter socks in a pyramid as shown in Figure 5.28 on page 5.52.

3. The storage volume provided in the compost sock sediment trap shall be 3,600 cubic feet per tributary drainage acre.

4. If necessary, additional storage area can be created by excavating a sump 1 foot deep beginning at least 5 feet away from the inside sock.

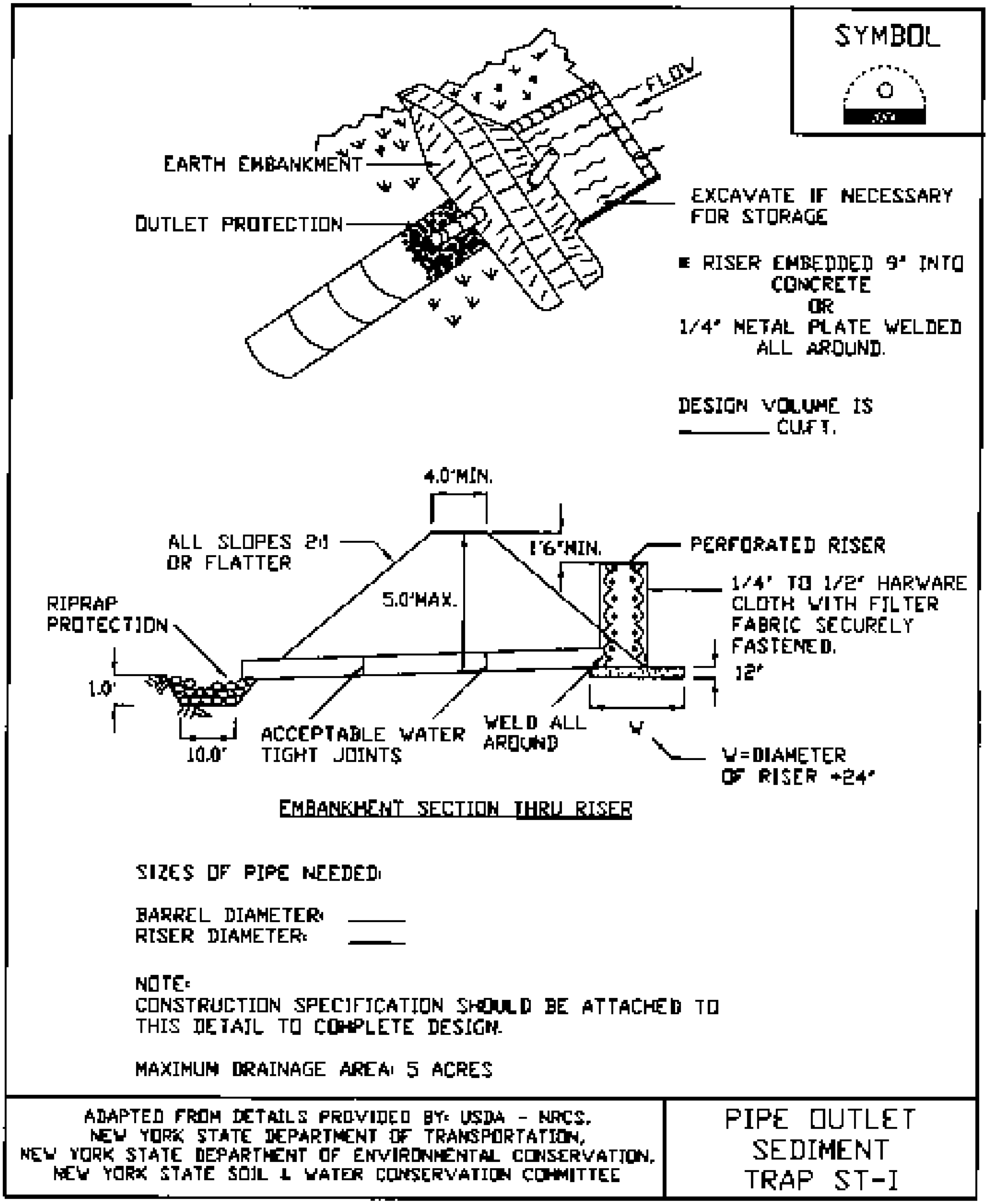
5. All compost filter sock materials, mesh, and compost, will meet the material specifications listed in the Compost Filter Sock standard. No spillway is required.

6. Compost filter sock sediment traps shall be inspected weekly and after every rainfall event. Sediment shall be removed when it reaches one third, 1/3, the height of the trap.

7. The maximum limit of use for a compost sock sediment trap is one (1) year. The existing trap shall be replaced if there is a need for a trap beyond that time limit.

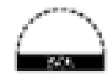
8. Upon completion of the work, the compost sock sediment trap shall be removed. The compost within the socks may be used during cleanup as a vegetative growth medium in accordance with the site stabilization plan.

# Figure 5.25
# Pipe Outlet Sediment Trap: ST-I



# Figure 5.26
# Pipe Outlet Sediment Trap: ST-I - Construction Specifications

SYMBOL

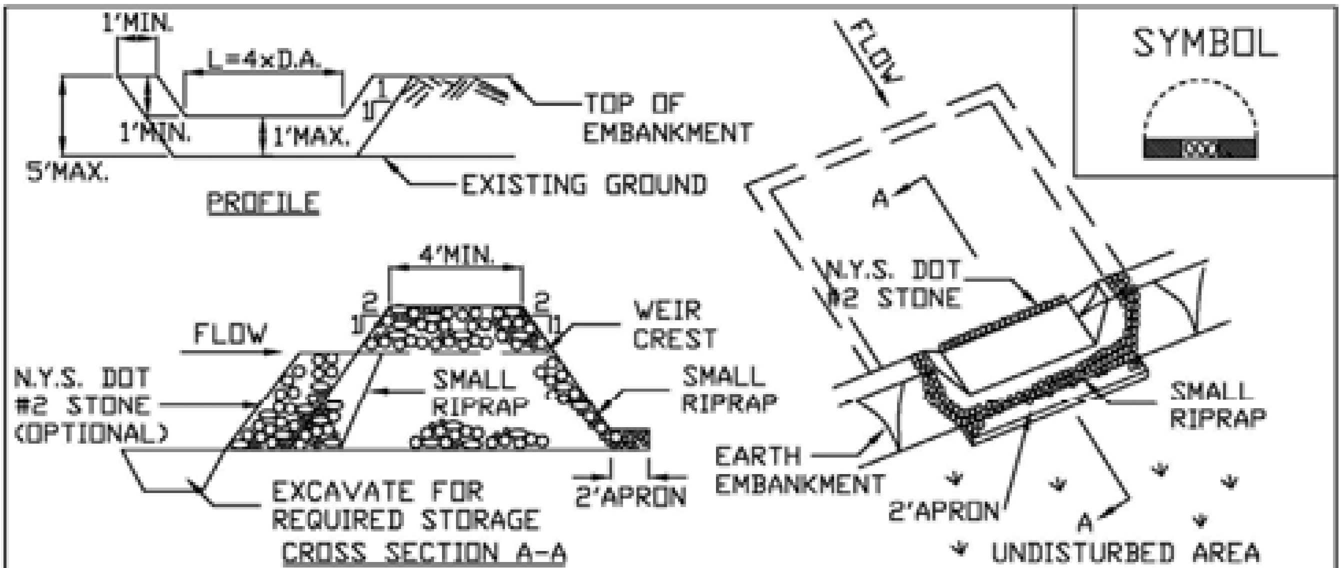


## CONSTRUCTION SPECIFICATIONS

1. AREA UNDER EMBANKMENT SHALL BE CLEARED, GRUBBED AND STRIPPED OF ANY VEGETATION AND ROOT MAT. THE POOL AREA SHALL BE CLEARED.
2. THE FILL MATERIAL FOR THE EMBANKMENT SHALL BE FREE OF ROOTS OR OTHER WOODY VEGETATION AS WELL AS OVER-SIZED STONES, ROCKS, ORGANIC MATERIAL, OR OTHER OBJECTIONABLE MATERIAL. THE EMBANKMENT SHALL BE COMPACTED BY TRAVERSING WITH EQUIPMENT WHILE IT IS BEING CONSTRUCTED.
3. VOLUME OF SEDIMENT STORAGE SHALL BE 3600 CUBIC FEET PER ACRE OF CONTRIBUTORY DRAINAGE.
4. SEDIMENT SHALL BE REMOVED AND TRAP RESTORED TO ITS ORIGINAL DIMENSIONS WHEN THE SEDIMENT HAS ACCUMULATED TO 1/2 THE DESIGN DEPTH OF THE TRAP. REMOVED SEDIMENT SHALL BE DEPOSITED IN A SUITABLE AREA AND STABILIZED.
5. THE STRUCTURE SHALL BE INSPECTED AFTER EACH RAIN AND REPAIRS MADE AS NEEDED.
6. CONSTRUCTION OPERATIONS SHALL BE CARRIED OUT IN SUCH A MANNER THAT EROSION AND SEDIMENT ARE CONTROLLED.
7. THE STRUCTURE SHALL BE REMOVED AND AREA STABILIZED WHEN THE DRAINAGE AREA HAS BEEN PROPERLY STABILIZED.
8. ALL FILL SLOPES SHALL BE 2:1 OR FLATTER; CUT SLOPES 1:1 OR FLATTER.
9. ALL PIPE CONNECTIONS SHALL BE WATERTIGHT.
10. THE TOP 2/3 OF THE RISER SHALL BE PERFORATED WITH ONE (1) INCH DIAMETER HOLES OR SLITS SPACED SIX (6) INCHES VERTICALLY AND HORIZONTALLY AND PLACED IN THE CONCAVE PORTION OF PIPE. NO HOLES WILL BE ALLOWED WITHIN SIX (6) INCHES OF THE HORIZONTAL BARREL.
11. THE RISER SHALL BE WRAPPED WITH 1/4 TO 1/2 INCH HARDWARE CLOTH WIRE THEN WRAPPED WITH FILTER CLOTH (HAVING AN EQUIVALENT SIEVE SIZE OF 40-80). THE FILTER CLOTH SHALL EXTEND SIX (6) INCHES ABOVE THE HIGHEST HOLE AND SIX (6) INCHES BELOW THE LOWEST HOLE. WHERE ENDS OF THE FILTER CLOTH COME TOGETHER, THEY SHALL BE OVER-LAPPED, FOLDED AND STAPLED TO PREVENT BYPASS.
12. STRAPS OR CONNECTING BANDS SHALL BE USED TO HOLD THE FILTER CLOTH AND WIRE FABRIC IN PLACE. THEY SHALL BE PLACED AT THE TOP AND BOTTOM OF THE CLOTH.
13. FILL MATERIAL AROUND THE PIPE SPILLWAY SHALL BE HAND COMPACTED IN FOUR (4) INCH LAYERS. A MINIMUM OF TWO (2) FEET OF HAND COMPACTED BACKFILL SHALL BE PLACED OVER THE PIPE SPILLWAY BEFORE CROSSING IT WITH CONSTRUCTION EQUIPMENT.
14. THE RISER SHALL BE ANCHORED WITH EITHER A CONCRETE BASE OR STEEL PLATE BASE TO PREVENT FLOTATION. FOR CONCRETE BASE THE DEPTH SHALL BE TWELVE (12) INCHES WITH THE RISER EMBEDDED NINE (9) INCHES. A 1/4 INCH MINIMUM THICKNESS STEEL PLATE SHALL BE ATTACHED TO THE RISER BY A CONTINUOUS WELD AROUND THE BOTTOM TO FORM A WATERTIGHT CONNECTION AND THEN PLACE TWO (2) FEET OF STONE, GRAVEL, OR TAMPED EARTH ON THE PLATE.

| | |
|---|---|
| ADAPTED FROM DETAILS PROVIDED BY: USDA - NRCS, NEW YORK STATE DEPARTMENT OF TRANSPORTATION, NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION, NEW YORK STATE SOIL & WATER CONSERVATION COMMITTEE | PIPE OUTLET SEDIMENT TRAP ST-I |

# Figure 5.27
# Stone Outlet Sediment Trap: ST-II




OPTION: A ONE FOOT LAYER OF N.Y.S. DOT #2 STONE MAY BE PLACED ON THE UPSTREAM SIDE OF THE RIPRAP INPLACE OF THE EMBEDDED FILTER CLOTH.

## CONSTRUCTION SPECIFICATIONS

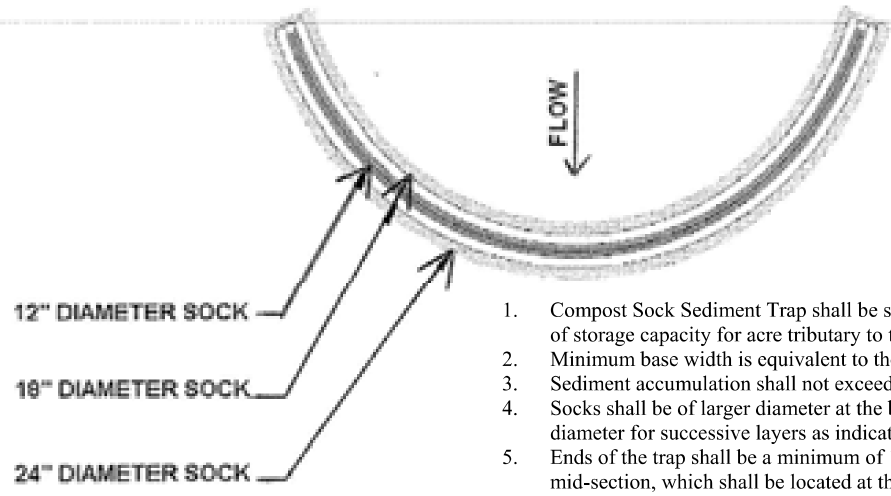
1. AREA UNDER EMBANKMENT SHALL BE CLEARED, GRUBBED AND STRIPPED OF ANY VEGETATION AND ROOT MAT. THE POOL AREA SHALL BE CLEARED.
2. THE FILL MATERIAL FOR THE EMBANKMENT SHALL BE FREE OF ROOTS AND OTHER WOODY VEGETATION AS WELL AS OVER-SIZED STONES, ROCKS, ORGANIC MATERIAL OR OTHER OBJECTIONABLE MATERIAL. THE EMBANKMENT SHALL BE COMPACTED BY TRAVERSING WITH EQUIPMENT WHILE IT IS BEING CONSTRUCTED.
3. ALL CUT AND FILL SLOPES SHALL BE 2:1 OR FLATTER.
4. THE STONE USED IN THE OUTLET SHALL BE SMALL RIPRAP 4"-8" ALONG WITH A 1' THICKNESS OF 2" AGGREGATE PLACED ON THE UP-GRADE SIDE ON THE SMALL RIPRAP OR EMBEDDED FILTER CLOTH IN THE RIPRAP.
5. SEDIMENT SHALL BE REMOVED AND TRAP RESTORED TO ITS ORIGINAL DIMENSIONS WHEN THE SEDIMENT HAS ACCUMULATED TO 1/2 THE DESIGN DEPTH OF THE TRAP. IT SHALL BE PLACED ON SITE AND STABILIZED.
6. THE STRUCTURE SHALL BE INSPECTED AFTER EACH RAIN AND REPAIRS MADE AS NEEDED.
7. CONSTRUCTION OPERATIONS SHALL BE CARRIED OUT IN SUCH A MANNER THAT EROSION AND SEDIMENT ARE CONTROLLED.
8. THE STRUCTURE SHALL BE REMOVED AND THE AREA STABILIZED WHEN THE DRAINAGE AREA HAS BEEN PROPERLY STABILIZED.

MAXIMUM DRAINAGE AREA 5 ACRES

| | |
|---|---|
| ADAPTED FROM DETAILS PROVIDED BY: USDA - NRCS, NEW YORK STATE DEPARTMENT OF TRANSPORTATION, NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION, NEW YORK STATE SOIL & WATER CONSERVATION COMMITTEE | STONE OUTLET SEDIMENT TRAP ST-II |

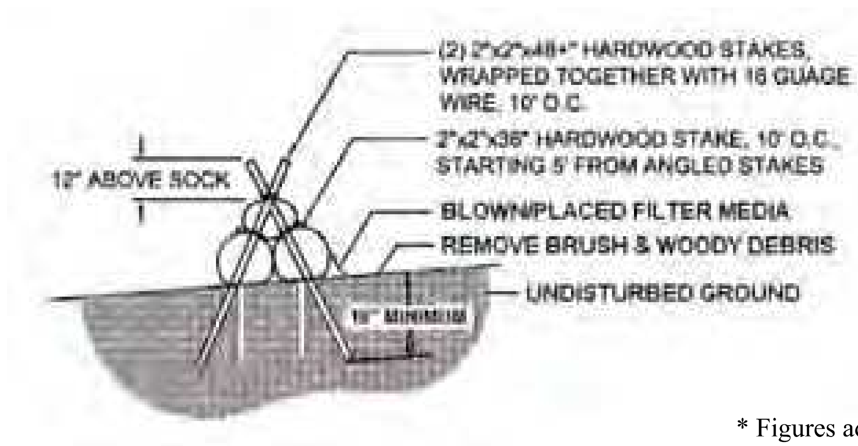
# Figure 5.28
# Compost Filter Sock Sediment Trap: ST-III

## Plan View




1. Compost Sock Sediment Trap shall be sized to provide 3,600 cubic feet of storage capacity for acre tributary to the trap.
2. Minimum base width is equivalent to the height.
3. Sediment accumulation shall not exceed 1/3 the total height of the trap.
4. Socks shall be of larger diameter at the base of the trap and decrease in diameter for successive layers as indicated to the left.
5. Ends of the trap shall be a minimum of 1 foot higher in elevation that the mid-section, which shall be located at the point of discharge.

## Staking Detail




* Figures adapted from Filtrexx

**Specifications:**

1. Sock infill and filter media material shall meet the standards of Table 5.1 on page 5.8 . Compost shall meet the compost filter sock standard of Table 5.2 on page 5.8.

2. Compost sock sediment traps shall not exceed three socks in height and shall be stacked in pyramidal form as shown above. Minimum trap height is one 24 inch diameter sock. Additional storage may be provided by means of an excavated sump 12 inches deep extending 1 to 3 feet upslope of the socks along the lower side of the trap.

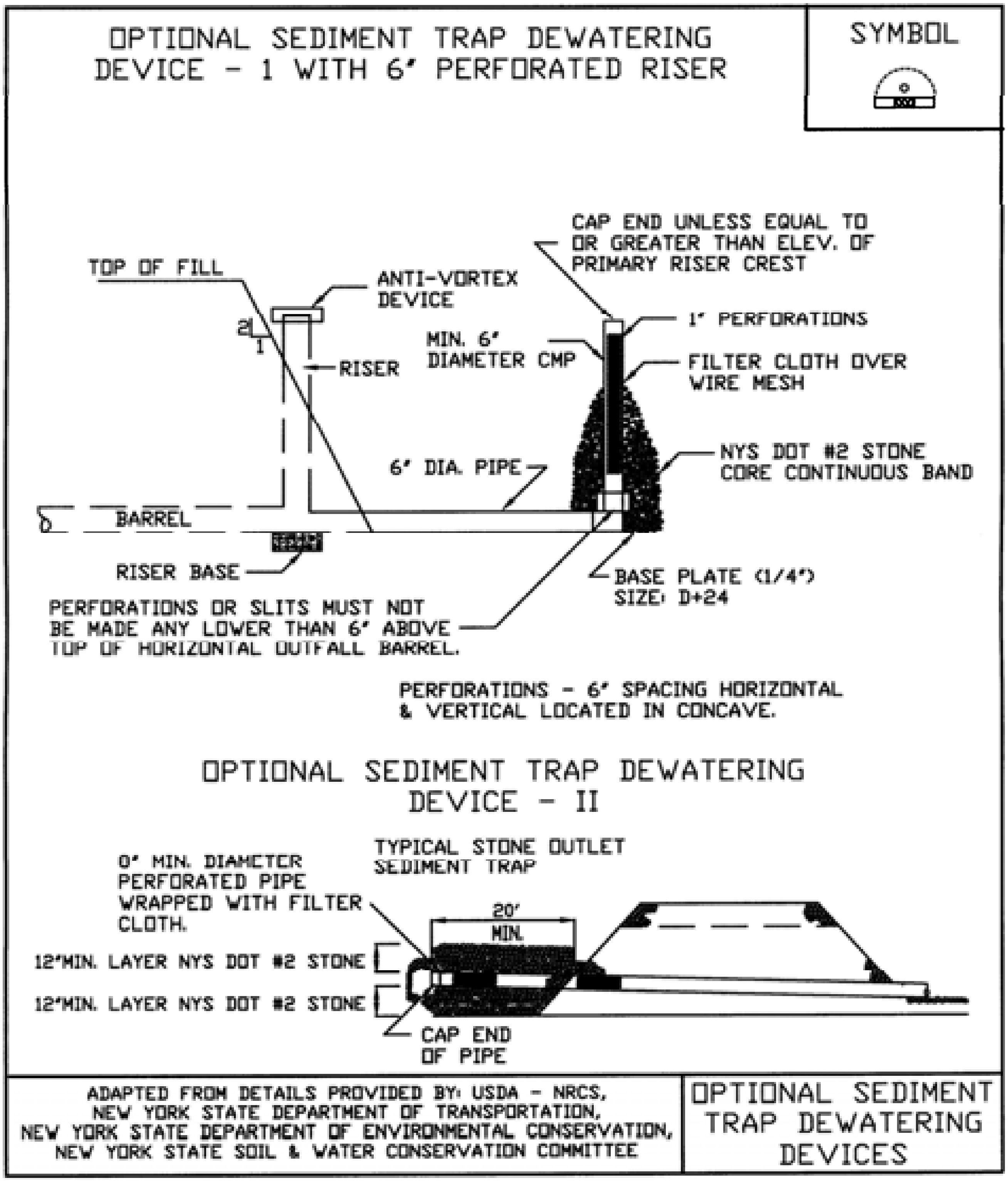
3. Compost sock sediment traps shall provide 3,600 cubic feet storage capacity with 12 inches of freeboard for each tributary drainage acreage. (See manufacturer for anticipated settlement.)

4. The maximum tributary drainage area is 5.0 acres. Since compost socks are “flow-through,” no spillway is required.

5. Compost sock sediment traps shall be inspected weekly and after each runoff event. Sediment shall be removed when it reaches 1/3 the height of the socks.

6. Photodegradable and biodegradable socks shall not be used for more than 1 year.

# Figure 5.29
# Optional Sediment Trap Dewatering Devices
# for Traps with <5 Acres Drainage Area



# STANDARD AND SPECIFICATIONS FOR SILT FENCE

## Definition & Scope

A **temporary** barrier of geotextile fabric installed on the contours across a slope used to intercept sediment laden runoff from small drainage areas of disturbed soil by temporarily ponding the sediment laden runoff allowing settling to occur. The maximum period of use is limited by the ultraviolet stability of the fabric (approximately one year).

## Conditions Where Practice Applies

A silt fence may be used subject to the following conditions:

1. Maximum allowable slope length and fence length will not exceed the limits shown in the Design Criteria for the specific type of silt fence used ; and
2. Maximum ponding depth of 1.5 feet behind the fence; and
3. Erosion would occur in the form of sheet erosion; and
4. There is no concentration of water flowing to the barrier; and
5. Soil conditions allow for proper keying of fabric, or other anchorage, to prevent blowouts.

## Design Criteria

1. Design computations are not required for installations of 1 month or less. Longer installation periods should be designed for expected runoff.
2. All silt fences shall be placed as close to the disturbed area as possible, but at least 10 feet from the toe of a slope steeper than 3H:1V, to allow for maintenance and roll down. The area beyond the fence must be undisturbed or stabilized.
3. The type of silt fence specified for each location on the plan shall not exceed the maximum slope length and maximum fence length requirements shown in the following table:

| | | Slope Length/Fence Length (ft.) | | |
|---|---|---|---|---|
| Slope | Steepness | Standard | Reinforced | Super |
| <2% | < 50:1 | 300/1500 | N/A | N/A |
| 2-10% | 50:1 to 10:1 | 125/1000 | 250/2000 | 300/2500 |
| 10-20% | 10:1 to 5:1 | 100/750 | 150/1000 | 200/1000 |
| 20-33% | 5:1 to 3:1 | 60/500 | 80/750 | 100/1000 |
| 33-50% | 3:1 to 2:1 | 40/250 | 70/350 | 100/500 |
| >50% | > 2:1 | 20/125 | 30/175 | 50/250 |

**Standard Silt Fence (SF)** is fabric rolls stapled to wooden stakes driven 16 inches in the ground.
**Reinforced Silt Fence (RSF)** is fabric placed against welded wire fabric with anchored steel posts driven 16 inches in the ground.
**Super Silt Fence (SSF)** is fabric placed against chain link fence as support backing with posts driven 3 feet in the ground.

4. Silt fence shall be removed as soon as the disturbed area has achieved final stabilization.

The silt fence shall be installed in accordance with the appropriate details. Where ends of filter cloth come together, they shall be overlapped, folded and stapled to prevent sediment bypass. Butt joints are not acceptable. A detail of the silt fence shall be shown on the plan. See Figure 5.30 on page 5.56 for Reinforced Silt Fence as an example of details to be provided.

## Criteria for Silt Fence Materials

1. Silt Fence Fabric: The fabric shall meet the following specifications unless otherwise approved by the appropriate erosion and sediment control plan approval authority. Such approval shall not constitute statewide acceptance.

| Fabric Properties | Minimum Acceptable Value | Test Method |
|---|---|---|
| Grab Tensile Strength (lbs) | 110 | ASTM D 4632 |
| Elongation at Failure (%) | 20 | ASTM D 4632 |
| Mullen Burst Strength (PSI) | 300 | ASTM D 3786 |
| Puncture Strength (lbs) | 60 | ASTM D 4833 |
| Minimum Trapezoidal Tear Strength (lbs) | 50 | ASTM D 4533 |
| Flow Through Rate (gal/ min/sf) | 25 | ASTM D 4491 |
| Equivalent Opening Size | 40-80 | US Std Sieve ASTM D 4751 |
| Minimum UV Residual (%) | 70 | ASTM D 4355 |

2. Fence Posts (for fabricated units): The length shall be a minimum of 36 inches long. Wood posts will be of sound quality hardwood with a minimum cross sectional area of 3.5 square inches. Steel posts will be standard T and U section weighing not less than 1.00 pound per linear foot. Posts for super silt fence shall be standard chain link fence posts.

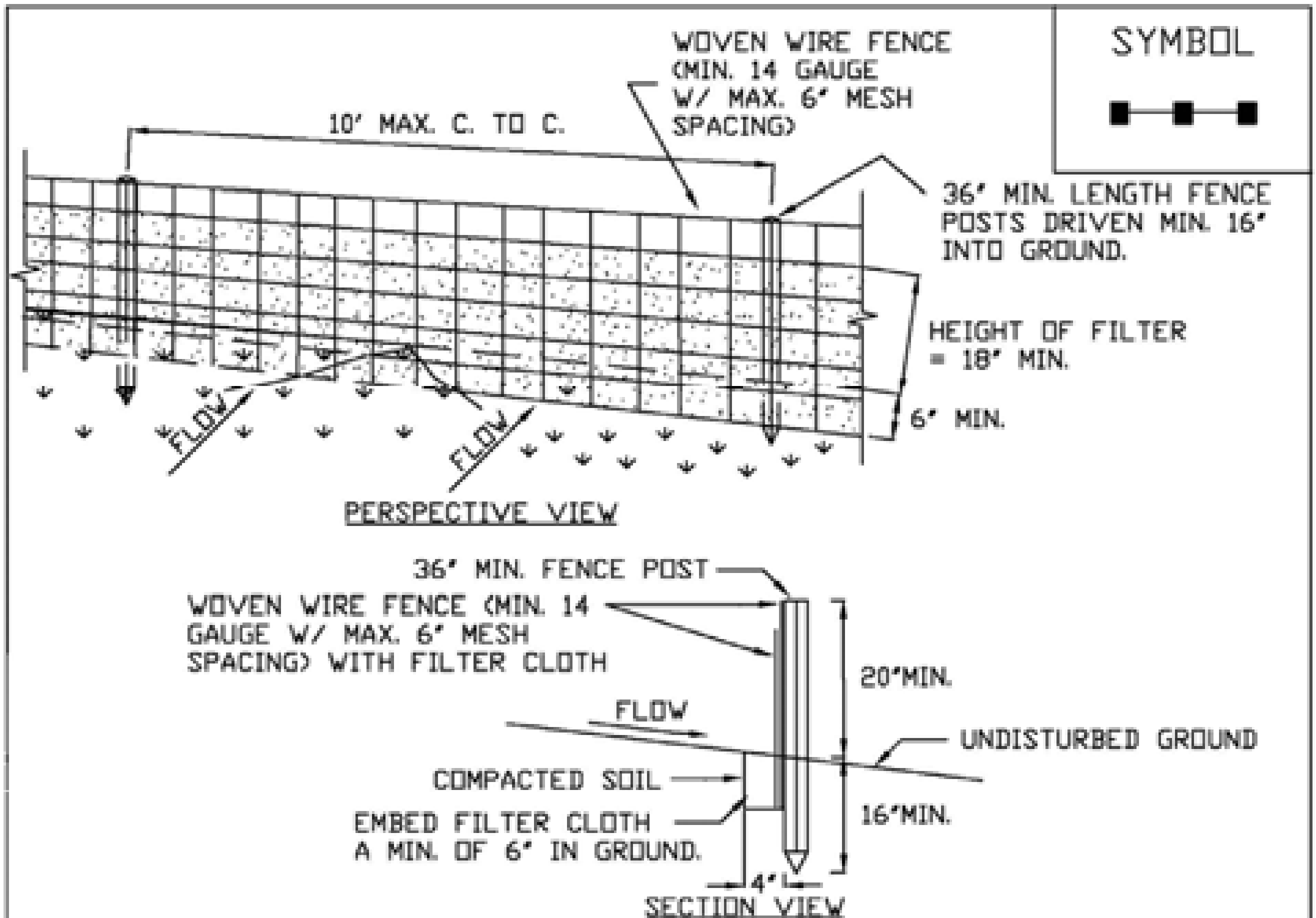
3. Wire Fence for reinforced silt fence: Wire fencing shall be a minimum 14 gage with a maximum 6 in. mesh opening, or as approved.

4. Prefabricated silt fence is acceptable as long as all material specifications are met.

Reinforced Silt Fence

Super Silt Fence

# Figure 5.30
# Reinforced Silt Fence




## CONSTRUCTION SPECIFICATIONS

1. WOVEN WIRE FENCE TO BE FASTENED SECURELY TO FENCE POSTS WITH WIRE TIES OR STAPLES. POSTS SHALL BE STEEL EITHER "T" OR "U" TYPE OR HARDWOOD.
2. FILTER CLOTH TO BE FASTENED SECURELY TO WOVEN WIRE FENCE WITH TIES SPACED EVERY 24" AT TOP AND MID SECTION. FENCE SHALL BE WOVEN WIRE, 6" MAXIMUM MESH OPENING.
3. WHEN TWO SECTIONS OF FILTER CLOTH ADJOIN EACH OTHER THEY SHALL BE OVER-LAPPED BY SIX INCHES AND FOLDED. FILTER CLOTH SHALL BE EITHER FILTER X, MIRAFI 100X, STABILINKA T140N, OR APPROVED EQUIVALENT.
4. PREFABRICATED UNITS SHALL MEET THE MINIMUM REQUIREMENTS SHOWN.
5. MAINTENANCE SHALL BE PERFORMED AS NEEDED AND MATERIAL REMOVED WHEN "BULGES" DEVELOP IN THE SILT FENCE.

| | |
|---|---|
| ADAPTED FROM DETAILS PROVIDED BY: USDA - NRCS, NEW YORK STATE DEPARTMENT OF TRANSPORTATION, NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION, NEW YORK STATE SOIL & WATER CONSERVATION COMMITTEE | REINFORCED SILT FENCE |

# STANDARD AND SPECIFICATIONS FOR SOIL RESTORATION

## Definition & Scope

The decompaction of areas of a development site or construction project where soils have been disturbed to recover the original properties and porosity of the soil; thus providing a sustainable growth medium for vegetation, reduction of runoff and filtering of pollutants from stormwater runoff.

## Conditions Where Practice Applies

Soil restoration is to be applied to areas whose heavy construction traffic is done and final stabilization is to begin. This is generally applied in the cleanup, site restoration, and landscaping phase of construction followed by the permanent establishment of an appropriate ground cover to maintain the soil structure. Soil restoration measures should be applied over and adjacent to any runoff reduction practices to achieve design performance.

## Design Criteria

1. Soil restoration areas will be designated on the plan views of areas to be disturbed.
2. Soil restoration will be completed in accordance with Table 4.6 on page 4.53.

## Specification for Full Soil Restoration

During periods of relatively low to moderate subsoil moisture, the disturbed subsoils are returned to rough grade and the following Soil Restoration steps applied:

1. Apply 3 inches of compost over subsoil. The compost shall be well decomposed (matured at least 3 months), weed-free, organic matter. It shall be aerobically composted, possess no objectionable odors, and contain less than 1%, by dry weight, of man-made foreign matter. The physical parameters of the compost shall meet the standards listed in Table 5.2 - Compost Standards Table, except for "Particle Size" 100% will pass the 1/2" sieve. **Note: All biosolids compost produced in New York State (or approved for importation) must meet NYS DEC's 6 NYCRR Part 360 (Solid Waste Management Facilities) requirements. The Part 360 requirements are equal to or more stringent than 40 CFR Part 503 which ensure safe standards for pathogen reduction and heavy metals content.**

2. Till compost into subsoil to a depth of at least 12 inches using a cat-mounted ripper, tractor mounted disc, or tiller, to mix and circulate air and compost into the subsoil.

3. Rock-pick until uplifted stone/rock materials of four inches and larger size are cleaned off the site.

4. Apply topsoil to a depth of 6 inches.

5. Vegetate as required by the seeding plan. Use appropriate ground cover with deep roots to maintain the soil structure.

6. Topsoil may be manufactured as a mixture or a mineral component and organic material such as compost.

At the end of the project an inspector should be able to push a 3/8" metal bar 12 inches into the soil just with body weight. This should not be performed within the drip line of any existing trees or over utility installations that are within 24 inches of the surface.

## Maintenance

Keep the site free of vehicular and foot traffic or other weight loads. Consider pedestrian footpaths.

# Table 4.6
# Soil Restoration Requirements

<table>
<tr><th>Type of Soil Disturbance</th><th colspan="2">Soil Restoration Requirement</th><th>Comments/Examples</th></tr>
<tr><td>No soil disturbance</td><td colspan="2">Restoration not permitted</td><td>Preservation of Natural Features</td></tr>
<tr><td>Minimal soil disturbance</td><td colspan="2">Restoration not required</td><td>Clearing and grubbing</td></tr>
<tr><td rowspan="2">Areas where topsoil is stripped only - no change in grade</td><td>HSG A&B</td><td>HSG C&D</td><td rowspan="2">Protect area from any ongoing construction activities.</td></tr>
<tr><td>Apply 6 inches of topsoil</td><td>Aerate* and apply 6 inches of topsoil</td></tr>
<tr><td rowspan="2">Areas of cut or fill</td><td>HSG A&B</td><td>HSG C&D</td><td rowspan="2"></td></tr>
<tr><td>Aerate* and apply 6 inches of topsoil</td><td>Apply full Soil Restoration**</td></tr>
<tr><td>Heavy traffic areas on site (especially in a zone 5-25 feet around buildings but not within a 5 foot perimeter around foundation walls)</td><td colspan="2">Apply full Soil Restoration (decompaction and compost enhancement)</td><td></td></tr>
<tr><td>Areas where Runoff Reduction and/or Infiltration practices are applied</td><td colspan="2">Restoration not required, but may be applied to enhance the reduction specified for appropriate practices.</td><td>Keep construction equipment from crossing these areas. To protect newly installed practice from any ongoing construction activities construct a single phase operation fence area</td></tr>
<tr><td>Redevelopment projects</td><td colspan="2">Soil Restoration is required on redevelopment projects in areas where existing impervious area will be converted to pervious area.</td><td></td></tr>
<tr><td colspan="4">* Aeration includes the use of machines such as tractor-drawn implements with coulters making a narrow slit in the soil, a roller with many spikes making indentations in the soil, or prongs which function like a mini-subsoiler.<br>** Per "Deep Ripping and De-compaction, DEC 2008".</td></tr>
</table>

# STANDARD AND SPECIFICATIONS FOR STORM DRAIN INLET PROTECTION

## Definition & Scope

A **temporary** barrier with low permeability, installed around inlets in the form of a fence, berm or excavation around an opening, detaining water and thereby reducing the sediment content of sediment laden water by settling thus preventing heavily sediment laden water from entering a storm drain system.

## Conditions Where Practice Applies

This practice shall be used where the drainage area to an inlet is disturbed, it is not possible to temporarily divert the storm drain outfall into a trapping device, and watertight blocking of inlets is not advisable. **It is not to be used in place of sediment trapping devices.** This practice shall be used with an upstream buffer strip if placed at a storm drain inlet on a paved surface. It may be used in conjunction with storm drain diversion to help prevent siltation of pipes installed with low slope angle.

**Types of Storm Drain Inlet Practices**

There are five (5) specific types of storm drain inlet protection practices that vary according to their function, location, drainage area, and availability of materials:

I. Excavated Drop Inlet Protection
II. Fabric Drop Inlet Protection
III. Stone & Block Drop Inlet Protection
IV. Paved Surface Inlet Protection
V. Manufactured Insert Inlet Protection

## Design Criteria

Drainage Area – The drainage area for storm drain inlets shall not exceed one acre. Erosion control/temporary stabilization measures must be implemented on the disturbed drainage area tributary to the inlet. The crest elevations of these practices shall provide storage and minimize bypass flow.

**Type I – Excavated Drop Inlet Protection**

This practice is generally used during initial overlot grading after the storm drain trunk line is installed.

Limit the drainage area to the inlet device to 1 acre. Excavated side slopes shall be no steeper than 2:1. The minimum depth shall be 1 foot and the maximum depth 2 feet as measured from the crest of the inlet structure. Shape the excavated basin to fit conditions with the longest dimension oriented toward the longest inflow area to provide maximum trap efficiency. The capacity of the excavated basin should be established to contain 900 cubic feet per acre of disturbed area. Weep holes, protected by fabric and stone, should be provided for draining the temporary pool.

Inspect and clean the excavated basin after every storm. Sediment should be removed when 50 percent of the storage volume is achieved This material should be incorporated into the site in a stabilized manner.

**Type II – Fabric Drop Inlet Protection**

This practice is generally used during final elevation grading phases after the storm drain system is completed.

Limit the drainage area to 1 acre per inlet device. Land area slope immediately surrounding this device should not exceed 1 percent. The maximum height of the fabric above the inlet crest shall not exceed 1.5 feet unless reinforced.

The top of the barrier should be maintained to allow overflow to drop into the drop inlet and not bypass the inlet to unprotected lower areas. Support stakes for fabric shall be a minimum of 3 feet long, spaced a maximum 3 feet apart. They should be driven close to the inlet so any overflow drops into the inlet and not on the unprotected soil. Improved performance and sediment storage volume can be obtained by excavating the area.

Inspect the fabric barrier after each rain event and make repairs as needed. Remove sediment from the pool area as necessary with care not to undercut or damage the filter fabric. Upon stabilization of the drainage area, remove all materials and unstable sediment and dispose of properly. Bring the adjacent area of the drop inlet to grade, smooth and compact and stabilize in the appropriate manner to the site.

**Type III – Stone and Block Drop Inlet Protection**

This practice is generally used during the initial and intermediate overlot grading of a construction site.

Limit the drainage area to 1 acre at the drop inlet. The stone barrier should have a minimum height of 1 foot and a maximum height of 2 feet. Do not use mortar. The height should be limited to prevent excess ponding and bypass flow.

Recess the first course of blocks at least 2 inches below the crest opening of the storm drain for lateral support. Subsequent courses can be supported laterally if needed by placing a 2x4 inch wood stud through the block openings perpendicular to the course. The bottom row should have a few blocks oriented so flow can drain through the block to dewater the basin area.

The stone should be placed just below the top of the blocks on slopes of 2:1 or flatter. Place hardware cloth of wire mesh with ½ inch openings over all block openings to hold stone in place.

As an optional design, the concrete blocks may be omitted and the entire structure constructed of stone, ringing the outlet ("doughnut"). The stone should be kept at a 3:1 slope toward the inlet to keep it from being washed into the inlet. A level area 1 foot wide and four inches below the crest will further prevent wash. Stone on the slope toward the inlet should be at least 3 inches in size for stability and 1 inch or smaller away from the inlet to control flow rate. The elevation of the top of the stone crest must be maintained 6 inches lower than the ground elevation down slope from the inlet to ensure that all storm flows pass over the stone into the storm drain and not past the structure. Temporary diking should be used as necessary to prevent bypass flow.

The barrier should be inspected after each rain event and repairs made where needed. Remove sediment as necessary to provide for accurate storage volume for subsequent rains. Upon stabilization of contributing drainage area, remove all materials and any unstable soil and dispose of properly.

Bring the disturbed area to proper grade, smooth, compact and stabilize in a manner appropriate to the site.

**Type IV – Paved Surface Inlet Protection**

This practice is generally used after pavement construction has been done while final grading and soil stabilization is occurring. These practices should be used with upstream buffer strips in linear construction applications, and with temporary surface stabilization for overlot areas, to reduce the sediment load at the practice. This practice includes sand bags, compost filter socks, geo-tubes filled with ballast, and manufactured surface barriers. Pea gravel can also be used in conjunction with these practices to improve performance. When the inlet is not at a low point, and is offset from the pavement or gutter line, protection should be selected and installed so that flows are not diverted around the inlet.

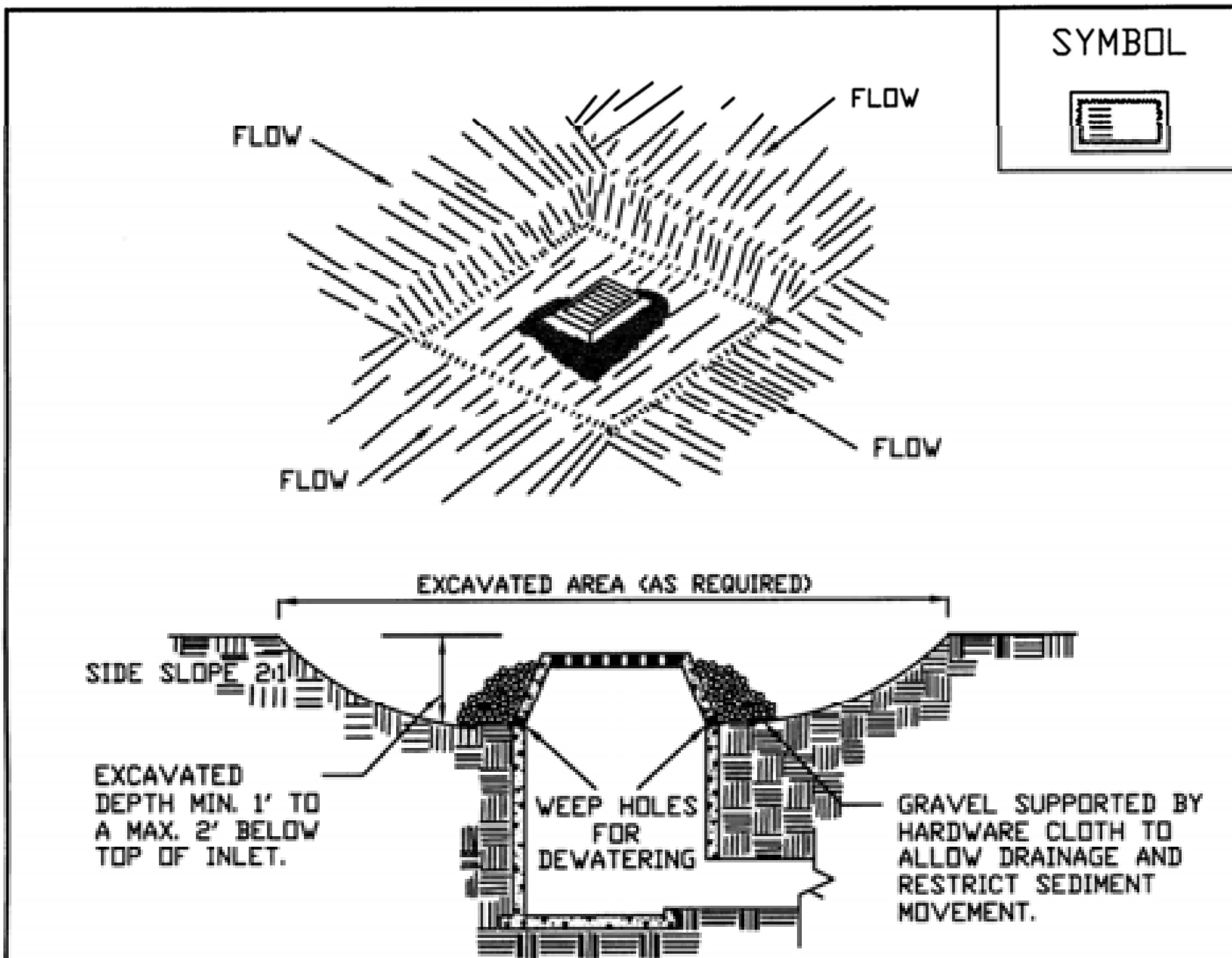
The drainage area should be limited to 1 acre at the drain inlet. All practices will be placed at the inlet perimeter or beyond to maximize the flow capacity of the inlet. Practices shall be weighted, braced, tied, or otherwise anchored to prevent movement or shifting of location on paved surfaces. Traffic safety shall be integrated with the use of this practice. All practices should be marked with traffic safety cones as appropriate. Structure height shall not cause flooding or by-pass flow that would cause additional erosion.

The structure should be inspected after every storm event. Any sediment should be removed and disposed of on the site. Any broken or damaged components should be replaced. Check all materials for proper anchorage and secure as necessary.

**Type V - Manufactured Insert Inlet Protection**

The drainage area shall be limited to 1 acre at the drain inlet. All inserts will be installed and anchored in accordance with the manufacturers recommendations and design details. The fabric portion of the structure will equal or exceed the performance standard for the silt fence fabric. The inserts will be installed to preserve a minimum of 50 percent of the open, unobstructed design flow area of the storm drain inlet opening to maintain capacity for storm events.

## Figure 5.31
## Excavated Drop Inlet Protection



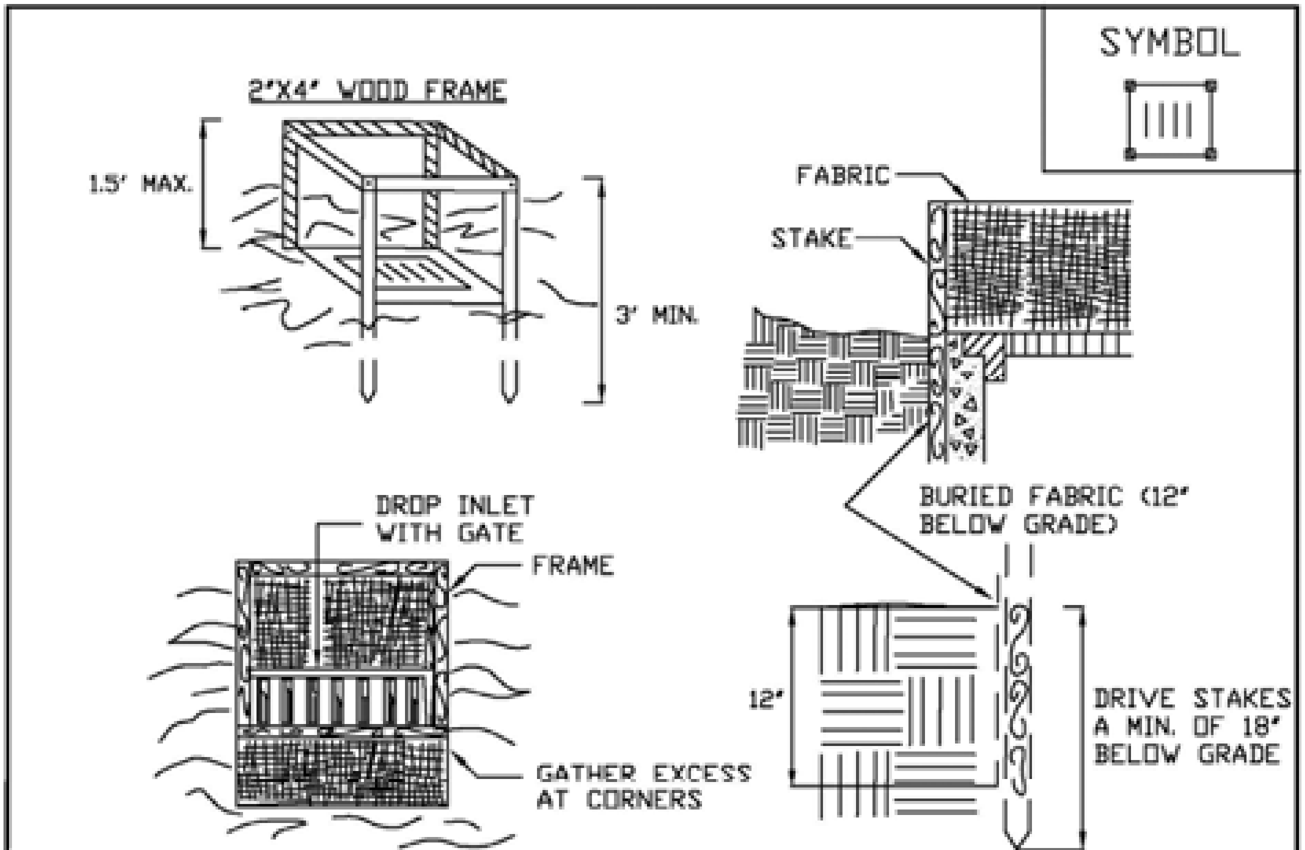

### CONSTRUCTION SPECIFICATIONS

1. CLEAR THE AREA OF ALL DEBRIS THAT WILL HINDER EXCAVATION.
2. GRADE APPROACH TO THE INLET UNIFORMLY AROUND THE BASIN.
3. WEEP HOLES SHALL BE PROTECTED BY GRAVEL.
4. UPON STABILIZATION OF CONTRIBUTING DRAINAGE AREA, SEAL WEEP HOLES, FILL EXCAVATION WITH STABLE SOIL TO FINAL GRADE, COMPACT IT PROPERLY AND STABILIZE WITH PERMANENT SEEDING.

MAXIMUM DRAINAGE AREA 1 ACRE

| | |
|---|---|
| ADAPTED FROM DETAILS PROVIDED BY: USDA - NRCS, NEW YORK STATE DEPARTMENT OF TRANSPORTATION, NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION, NEW YORK STATE SOIL & WATER CONSERVATION COMMITTEE | EXCAVATED DROP INLET PROTECTION |

# Figure 5.32
# Fabric Drop Inlet Protection




## CONSTRUCTION SPECIFICATIONS

1. FABRIC SHALL HAVE AN EOS OF 40-85. BURLAP MAY BE USED FOR SHORT TERM APPLICATIONS.
2. CUT FABRIC FROM A CONTINUOUS ROLL TO ELIMINATE JOINTS. IF JOINTS ARE NEEDED THEY WILL BE OVERLAPPED TO THE NEXT STAKE.
3. STAKE MATERIALS WILL BE STANDARD 2" x 4" WOOD OR EQUIVALENT. METAL WITH A MINIMUM LENGTH OF 3 FEET.
4. SPACE STAKES EVENLY AROUND INLET 3 FEET APART AND DRIVE A MINIMUM 18 INCHES DEEP. SPANS GREATER THAN 3 FEET MAY BE BRIDGED WITH THE USE OF WIRE MESH BEHIND THE FILTER FABRIC FOR SUPPORT.
5. FABRIC SHALL BE EMBEDDED 1 FOOT MINIMUM BELOW GROUND AND BACKFILLED. IT SHALL BE SECURELY FASTENED TO THE STAKES AND FRAME.
6. A 2" x 4" WOOD FRAME SHALL BE COMPLETED AROUND THE CREST OF THE FABRIC FOR OVER FLOW STABILITY.

MAXIMUM DRAINAGE AREA 1 ACRE

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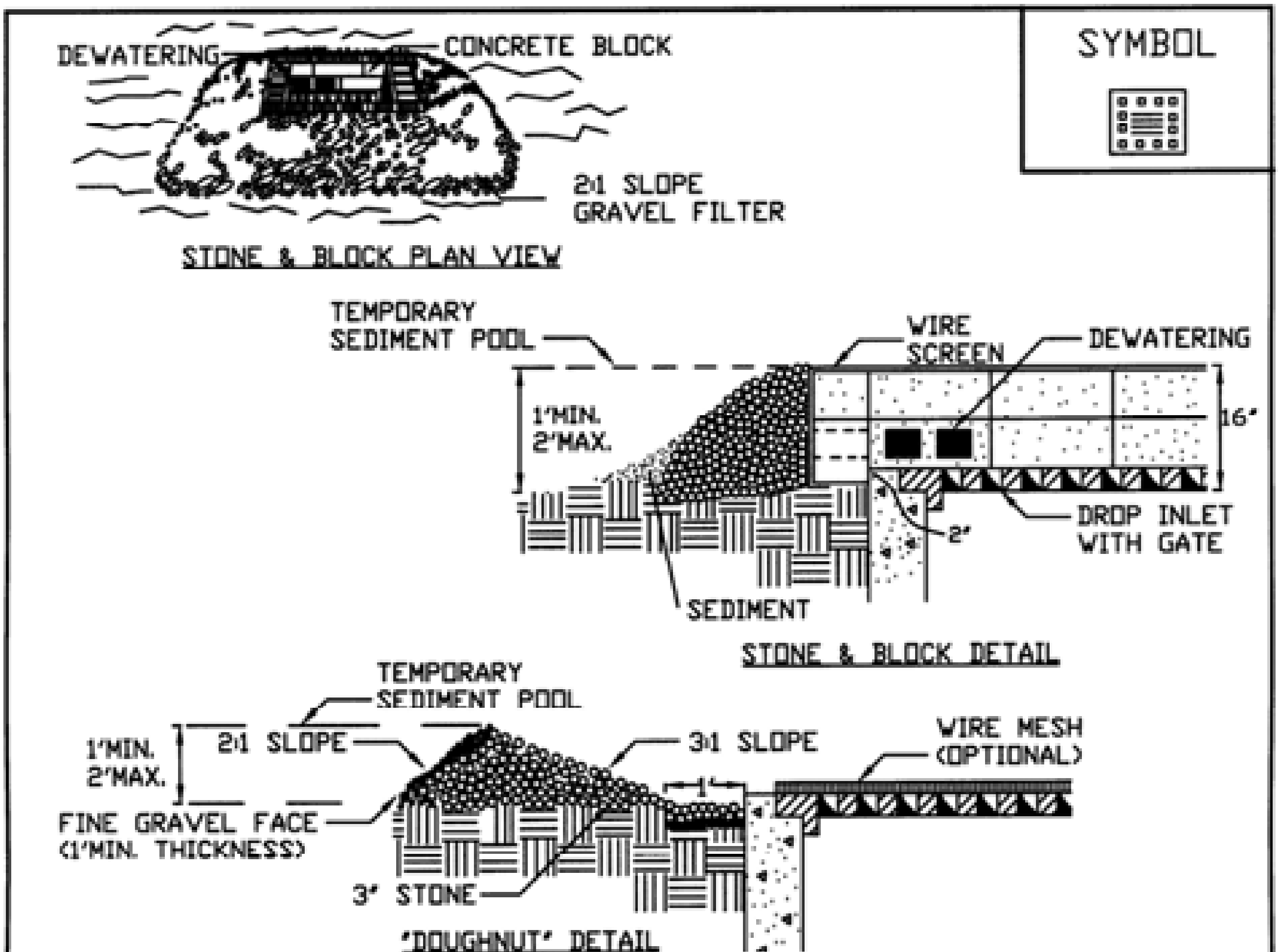
|---|---|

## Figure 5.33
## Stone & Block Drop Inlet Protection




## CONSTRUCTION SPECIFICATIONS

1. LAY ONE BLOCK ON EACH SIDE OF THE STRUCTURE ON ITS SIDE FOR DEWATERING. FOUNDATION SHALL BE 2 INCHES MINIMUM BELOW REST OF INLET AND BLOCKS SHALL BE PLACED AGAINST INLET FOR SUPPORT.
2. HARDWARE CLOTH OR 1/2" WIRE MESH SHALL BE PLACED OVER BLOCK OPENINGS TO SUPPORT STONE.
3. USE CLEAN STONE OR GRAVEL 1/2-3/4 INCH IN DIAMETER PLACED 2 INCHES BELOW TOP OF THE BLOCK ON A 2:1 SLOPE OR FLATTER.
4. FOR STONE STRUCTURES ONLY, A 1 FOOT THICK LAYER OF THE FILTER STONE WILL BE PLACED AGAINST THE 3 INCH STONE AS SHOWN ON THE DRAWINGS.

MAXIMUM DRAINAGE AREA 1 ACRE

| | |
|---|---|
| ADAPTED FROM DETAILS PROVIDED BY: USDA - NRCS,<br>NEW YORK STATE DEPARTMENT OF TRANSPORTATION,<br>NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION,<br>NEW YORK STATE SOIL & WATER CONSERVATION COMMITTEE | STONE & BLOCK<br>DROP INLET<br>PROTECTION |

# STANDARD AND SPECIFICATIONS FOR SURFACE ROUGHENING

## Definition & Scope

Roughening a bare soil surface whether through creating horizontal grooves across a slope, stair-stepping, or tracking with construction equipment to aid the establishment of vegetative cover from seed, to reduce runoff velocity and increase infiltration, and to reduce erosion and provide for trapping of sediment.

## Conditions Where Practice Applies

All construction slopes require surface roughening to facilitate stabilization with vegetation, particularly slopes steeper than 3:1.

## Design Criteria

There are many different methods to achieve a roughened soil surface on a slope. No specific design criteria is required. However, the selection of the appropriate method depends on the type of slope. Methods include tracking, grooving, and stair-stepping. Steepness, mowing requirements, and/or a cut or fill slope operation are all factors considered in choosing a roughening method.

## Construction Specifications

1. Cut Slope, No mowing.

   A. Stair-step grade or groove cut slopes with a gradient steeper than 3:1 (Figure 4.18).

   B. Use stair-step grading on any erodible material soft enough to be ripped with a bulldozer. Slopes of soft rock with some soil are particularly suited to stair-step grading.

   C. Make the vertical cut distance less than the horizontal distance, and slightly slope the horizontal position of the “step” to the vertical wall.

   D. Do not make vertical cuts more than 2 feet in soft materials or 3 feet in rocky materials.

Grooving uses machinery to create a series of ridges and depressions that run perpendicular to the slope following the contour. Groove using any appropriate implement that can be safely operated on the slope, such as disks, tillers, spring harrows, or the teeth of a front-end loader bucket. Do not make the grooves less than 3 inches deep or more than 15 inches apart.

2. Fill Slope, No mowing

   A. Place fill to create slopes with a gradient no steeper than 2:1 in lifts 9 inches or less and properly compacted. Ensure the face of the slope consists of loose, uncompacted fill 4 to 6 inches deep. Use grooving as described above to roughen the slope, if necessary.

   B. Do not back blade or scrape the final slope face.

3. Cuts/Fills, Mowed Maintenance

   A. Make mowed slopes no steeper than 3:1.

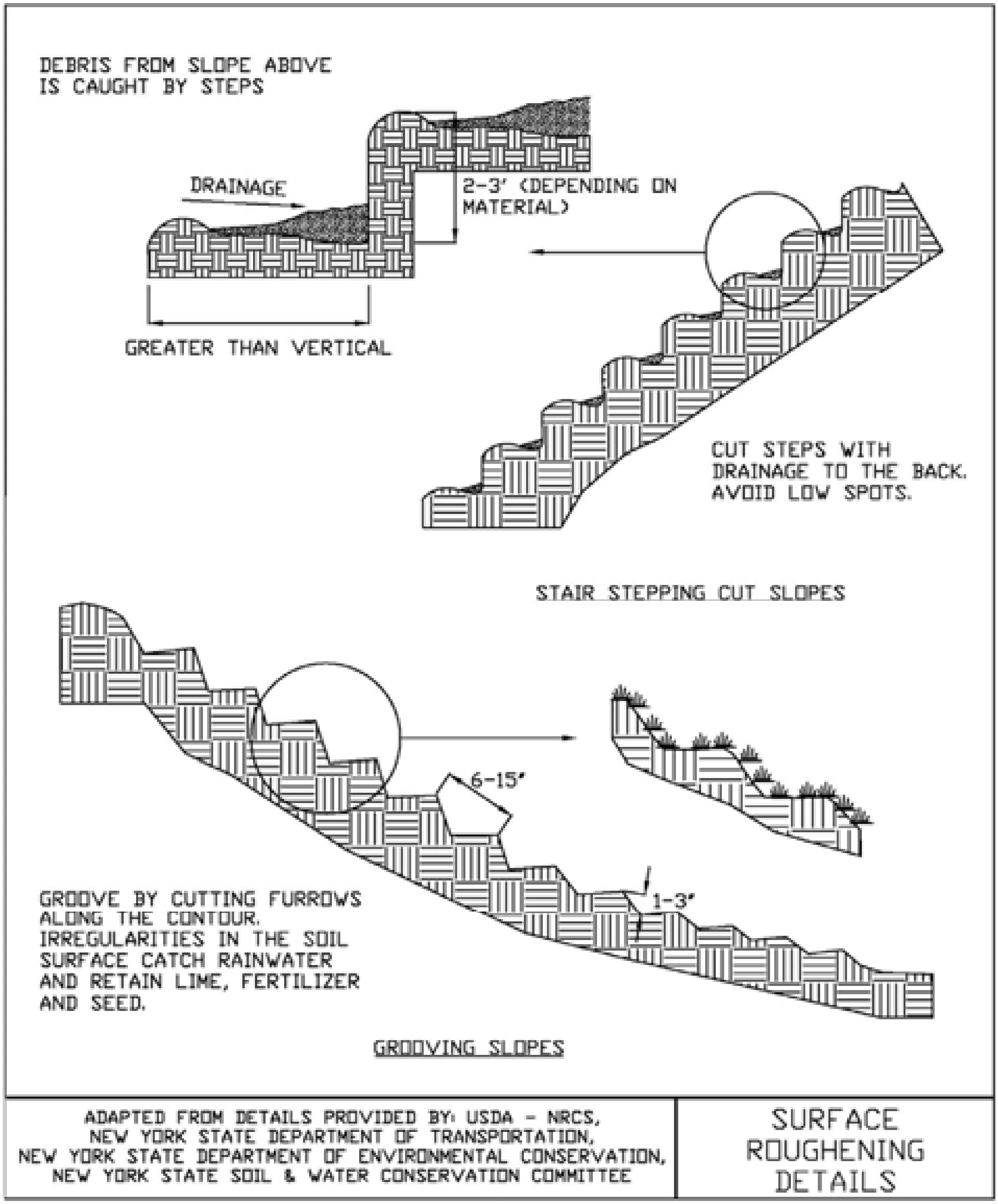
   B. Roughen these areas to shallow grooves by normal tilling, disking, harrowing, or use of cultipacker-seeder. Make the final pass of such tillage equipment on the contour.

   C. Make grooves at least 1 inch deep and a maximum of 10 inches apart.

   D. Excessive roughness is undesirable where mowing is planned.

Tracking should be used primarily in sandy soils to avoid undue compaction of the soil surface. Tracking is generally not as effective as the other roughening methods described. (It has been used as a method to track down mulch.) Operate tracked machinery up and down the slope to leave horizontal depressions in the soil. Do not back-blade during the final grading operation.

# Figure 4.18
# Surface Roughening



# STANDARD AND SPECIFICATIONS FOR TOPSOILING

## Definition & Scope

Spreading a specified quality and quantity of topsoil materials on graded or constructed subsoil areas to provide acceptable plant cover growing conditions, thereby reducing erosion; to reduce irrigation water needs; and to reduce the need for nitrogen fertilizer application.

## Conditions Where Practice Applies

Topsoil is applied to subsoils that are droughty (low available moisture for plants), stony, slowly permeable, salty or extremely acid. It is also used to backfill around shrub and tree transplants. This standard does not apply to wetland soils.

## Design Criteria

1. Preserve existing topsoil in place where possible, thereby reducing the need for added topsoil.
2. Conserve by stockpiling topsoil and friable fine textured subsoils that must be stripped from the excavated site and applied after final grading where vegetation will be established. Topsoil stockpiles must be stabilized. Stockpile surfaces can be stabilized by vegetation, geotextile or plastic covers. This can be aided by orientating the stockpile lengthwise into prevailing winds.
3. Refer to USDA Natural Resource Conservation Service soil surveys or soil interpretation record sheets for further soil texture information for selecting appropriate design topsoil depths.

**Site Preparation**

1. As needed, install erosion and sediment control practices such as diversions, channels, sediment traps, and stabilizing measures, or maintain if already installed.
2. Complete rough grading and final grade, allowing for depth of topsoil to be added.
3. Scarify all compact, slowly permeable, medium and fine textured subsoil areas. Scarify at approximately right angles to the slope direction in soil areas that are steeper than 5 percent. Areas that have been overly compacted shall be decompacted in accordance with the Soil Restoration Standard.
4. Remove refuse, woody plant parts, stones over 3 inches in diameter, and other litter.

**Topsoil Materials**

1. Topsoil shall have at least 6 percent by weight of fine textured stable organic material, and no greater than 20 percent. Muck soil shall not be considered topsoil.
2. Topsoil shall have not less than 20 percent fine textured material (passing the NO. 200 sieve) and not more than 15 percent clay.
3. Topsoil treated with soil sterilants or herbicides shall be so identified to the purchaser.
4. Topsoil shall be relatively free of stones over 1 1/2 inches in diameter, trash, noxious weeds such as nut sedge and quackgrass, and will have less than 10 percent gravel.
5. Topsoil containing soluble salts greater than 500 parts per million shall not be used.
6. Topsoil may be manufactured as a mixture of a mineral component and organic material such as compost.

**Application and Grading**

1. Topsoil shall be distributed to a uniform depth over the area. It shall not be placed when it is partly frozen, muddy, or on frozen slopes or over ice, snow, or standing water puddles.
2. Topsoil placed and graded on slopes steeper than 5 percent shall be promptly fertilized, seeded, mulched, and stabilized by “tracking” with suitable equipment.
3. Apply topsoil in the amounts shown in Table 4.7 below:

| Table 4.7 - Topsoil Application Depth | | |
|---|---|---|
| **Site Conditions** | **Intended Use** | **Minimum Topsoil Depth** |
| 1. Deep sand or loamy sand | Mowed lawn | 6 in. |
| | Tall legumes, unmowed | 2 in. |
| | Tall grass, unmowed | 1 in. |
| 2. Deep sandy loam | Mowed lawn | 5 in. |
| | Tall legumes, unmowed | 2 in. |
| | Tall grass, unmowed | none |
| 3. Six inches or more: silt loam, clay loam, loam, or silt | Mowed lawn | 4 in. |
| | Tall legumes, unmowed | 1 in. |
| | Tall grass, unmowed | 1 in. |

# APPENDIX J: HYDROCAD CALCULATIONS WITH EXISTING & PROPOSED DRAINAGE MAPS

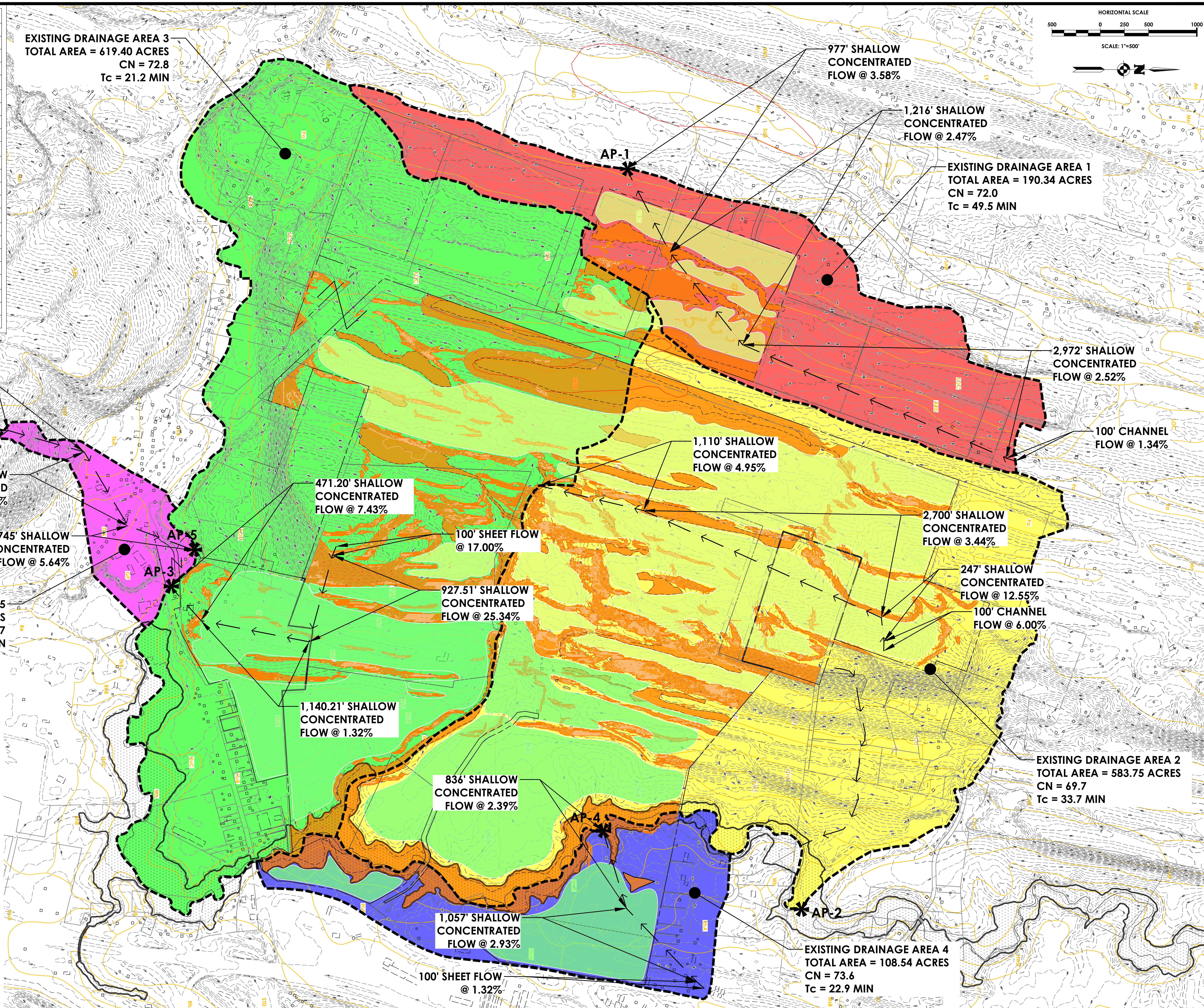
| Existing Drainage Area 1 | |
|---|---|
| Area (acres): | 190.34 |
| Cn Value: | 71.99 |
| Tc (Min.): | 49.50 |

| Existing Drainage Area 2 | |
|---|---|
| Area (acres): | 583.75 |
| Cn Value: | 69.70 |
| Tc (Min.): | 29.10 |

| Existing Drainage Area 3 | |
|---|---|
| Area (acres): | 619.40 |
| Cn Value: | 72.84 |
| Tc (Min.): | 21.20 |

| Existing Drainage Area 4 | |
|---|---|
| Area (acres): | 108.54 |
| Cn Value: | 73.59 |
| Tc (Min.): | 22.90 |

| Existing Drainage Area 5 | |
|---|---|
| Area (acres): | 34.85 |
| Cn Value: | 59.65 |
| Tc (Min.): | 28.40 |




PASSERO ASSOCIATES
engineering architecture

Client:
SAUGERTIES FARM LLC

SAUGERTIES, NY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Principal-in-Charge Jess Sudol, PE
Project Manager Chris LaPorta, PE, CDT
Designed by D.J. Goodall, EIT


STATE OF NEW YORK
JESS DANIEL SUDOL
EXCELSIOR
092235
LICENSED PROFESSIONAL ENGINEER

Revisions

| No. | Date | By | Description |
|---|---|---|---|
| 1 | 24/02/15 | PM | ADDRESSED NYSDEC COMMENTS |


UNAUTHORIZED ALTERATIONS OR ADDITIONS TO THIS DRAWING IS IN VIOLATION OF STATE EDUCATION LAW ARTICLE 145 SECTION 7209 AND ARTICLE 147 SECTION 7307. THESE PLANS ARE COPYRIGHT PROTECTED ©


EXISTING DRAINAGE AREA MAP

WINSTON FARM

Town/City: SAUGERTIES
County: ULSTER State: NEW YORK

Project No. 20202934.0001

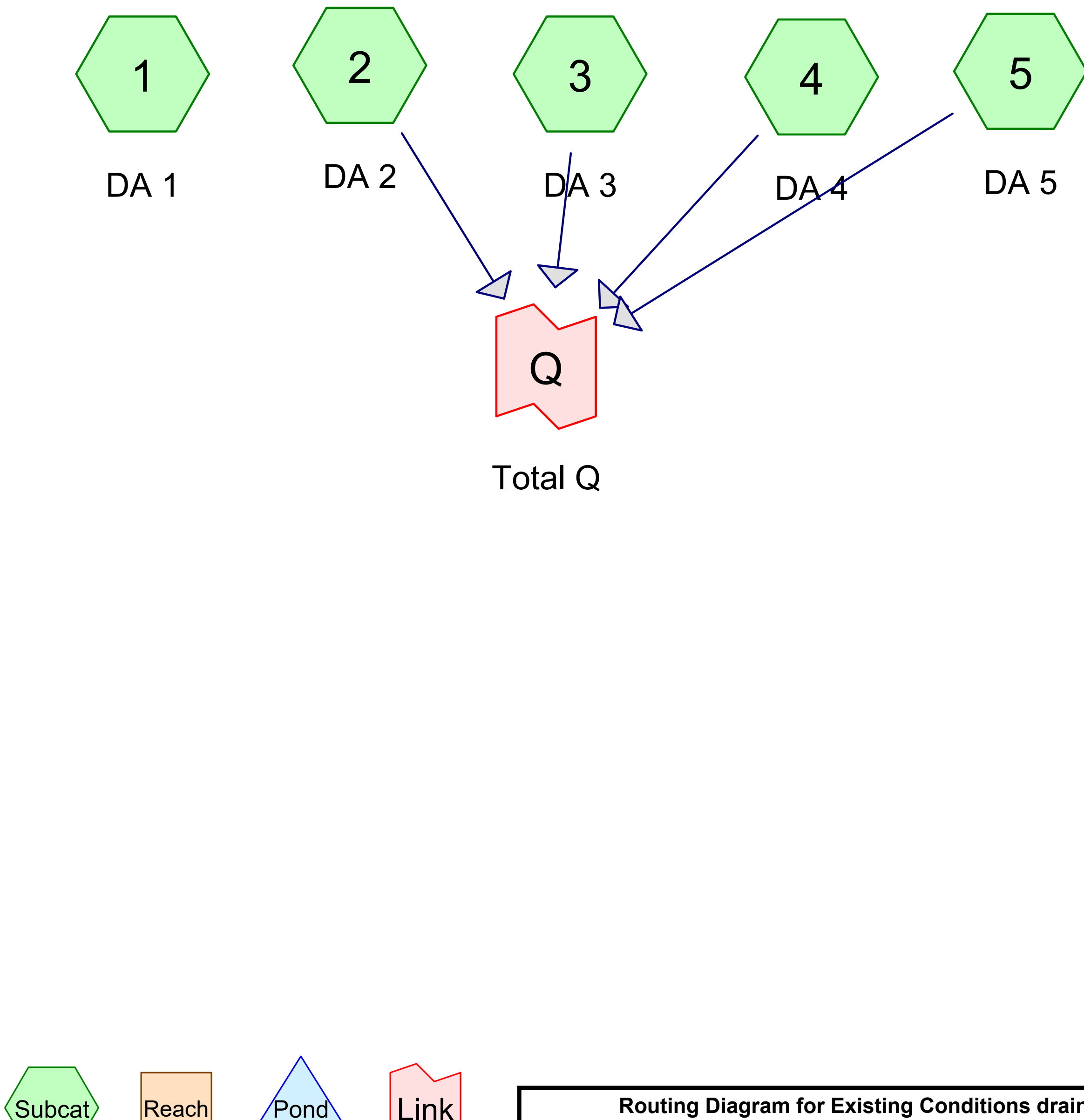
Drawing No. C-190
Sheet No. DA-1

Scale: 1" = 500'

Date JANUARY, 2021

NOT FOR CONSTRUCTION

Y:\PROJECTS-NEW\2020\20202934\20202934.0001\01 CAD - BIM - MODELS\CIVIL\20202934.0001_DRAINAGE-EX-PA.DWG 4/2/2024 2:28 PM Patrick Mitchell




**Routing Diagram for Existing Conditions drainage**
Prepared by Passero Associates, Printed 3/7/2024
HydroCAD® 10.20-4a s/n 13263 © 2023 HydroCAD Software Solutions LLC

## Rainfall Events Listing (selected events)

| Event# | Event Name | Storm Type | Curve | Mode | Duration (hours) | B/B | Depth (inches) | AMC |
|---|---|---|---|---|---|---|---|---|
| 1 | 1-Year Event | Type II 24-hr | | Default | 24.00 | 1 | 2.20 | 2 |
| 2 | 10-Year Event | Type II 24-hr | | Default | 24.00 | 1 | 4.40 | 2 |
| 3 | 100-Year Event | Type II 24-hr | | Default | 24.00 | 1 | 8.00 | 2 |
| 4 | WQv Event | Type II 24-hr | | Default | 24.00 | 1 | 1.50 | 2 |

## Area Listing (all nodes)

| Area (acres) | CN | Description (subcatchment-numbers) |
|---|---|---|
| 34.850 | 77 | 2 acre lots, 12% imp, HSG C (5) |
| 108.540 | 75 | Woods, Brush, Field, road (4) |
| 190.340 | 73 | Woods, Fair, HSG C (1) |
| 1,203.150 | 75 | Woods, fields, gravel roads (2, 3) |
| **1,536.880** | **75** | **TOTAL AREA** |

## Ground Covers (all nodes)

| HSG-A (acres) | HSG-B (acres) | HSG-C (acres) | HSG-D (acres) | Other (acres) | Total (acres) | Ground Cover | Subcatchment Numbers |
|---|---|---|---|---|---|---|---|
| 0.000 | 0.000 | 34.850 | 0.000 | 0.000 | 34.850 | 2 acre lots, 12% imp | 5 |
| 0.000 | 0.000 | 0.000 | 0.000 | 108.540 | 108.540 | Woods, Brush, Field, road | 4 |
| 0.000 | 0.000 | 190.340 | 0.000 | 0.000 | 190.340 | Woods, Fair | 1 |
| 0.000 | 0.000 | 0.000 | 0.000 | 1,203.150 | 1,203.150 | Woods, fields, gravel roads | 2, 3 |
| **0.000** | **0.000** | **225.190** | **0.000** | **1,311.690** | **1,536.880** | **TOTAL AREA** | |

Time span=1.00-40.00 hrs, dt=0.01 hrs, 3901 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Sim-Route method - Pond routing by Sim-Route method

**Subcatchment1: DA 1** Runoff Area=190.340 ac 0.00% Impervious Runoff Depth=0.41"
Flow Length=5,265' Tc=73.8 min CN=73 Runoff=27.08 cfs 6.556 af

**Subcatchment2: DA 2** Runoff Area=583.750 ac 0.00% Impervious Runoff Depth=0.48"
Flow Length=2,366' Tc=30.9 min CN=75 Runoff=195.81 cfs 23.501 af

**Subcatchment3: DA 3** Runoff Area=619.400 ac 0.00% Impervious Runoff Depth=0.48"
Flow Length=1,028' Tc=15.5 min CN=75 Runoff=331.46 cfs 24.936 af

**Subcatchment4: DA 4** Runoff Area=108.540 ac 0.00% Impervious Runoff Depth=0.48"
Flow Length=1,157' Tc=36.4 min CN=75 Runoff=32.36 cfs 4.370 af

**Subcatchment5: DA 5** Runoff Area=34.850 ac 12.00% Impervious Runoff Depth=0.56"
Flow Length=2,150' Tc=22.6 min CN=77 Runoff=17.90 cfs 1.625 af

**Link Q: Total Q** Inflow=480.29 cfs 54.432 af
Primary=480.29 cfs 54.432 af

**Total Runoff Area = 1,536.880 ac Runoff Volume = 60.988 af Average Runoff Depth = 0.48"**
**99.73% Pervious = 1,532.698 ac 0.27% Impervious = 4.182 ac**

## Summary for Subcatchment 1: DA 1

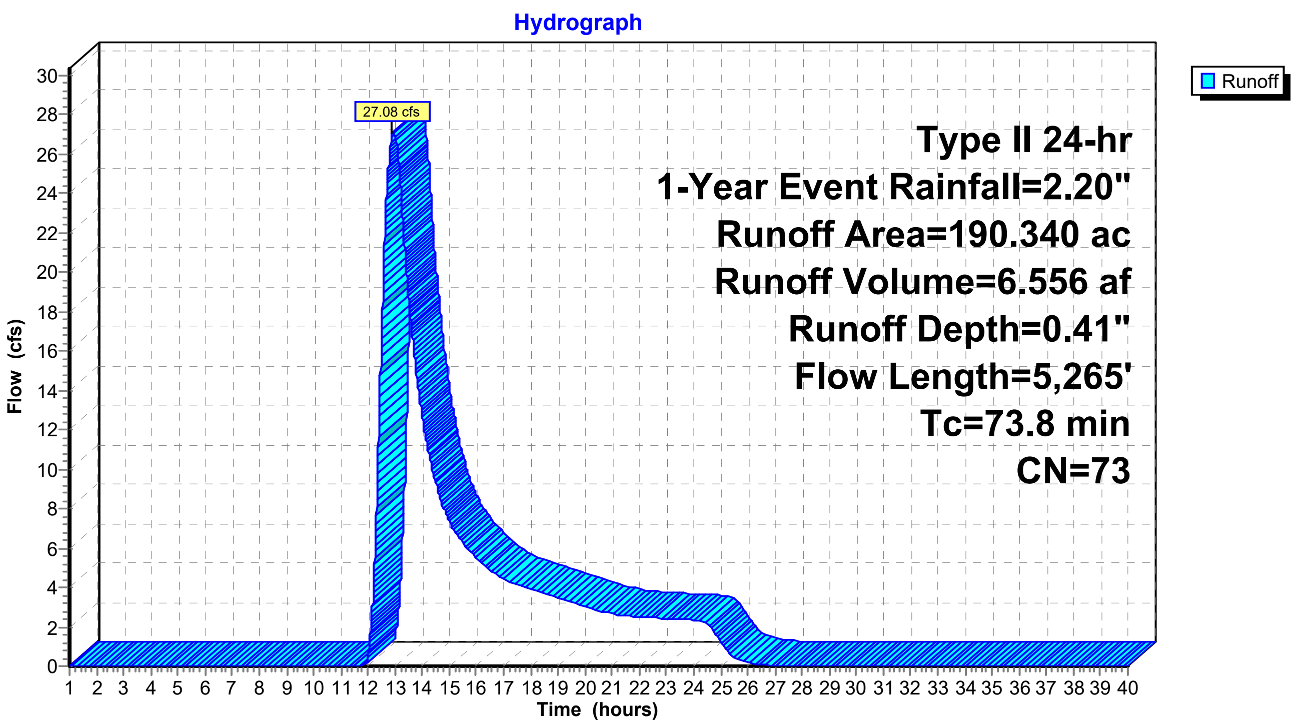
Runoff = 27.08 cfs @ 12.88 hrs, Volume= 6.556 af, Depth= 0.41"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-40.00 hrs, dt= 0.01 hrs
Type II 24-hr 1-Year Event Rainfall=2.20"

| Area (ac) | CN | Description |
|---|---|---|
| 190.340 | 73 | Woods, Fair, HSG C |
| 190.340 | | 100.00% Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 23.3 | 100 | 0.0134 | 0.07 | | **Sheet Flow, Woods**<br>Woods: Light underbrush n= 0.400 P2= 3.75" |
| 19.4 | 2,972 | 0.0252 | 2.56 | | **Shallow Concentrated Flow, Woods**<br>Unpaved Kv= 16.1 fps |
| 25.8 | 1,216 | 0.0247 | 0.79 | | **Shallow Concentrated Flow, woodland**<br>Woodland Kv= 5.0 fps |
| 5.3 | 977 | 0.0358 | 3.05 | | **Shallow Concentrated Flow, woodland**<br>Unpaved Kv= 16.1 fps |
| 73.8 | 5,265 | Total | | | |

### Subcatchment 1: DA 1



## Summary for Subcatchment 2: DA 2

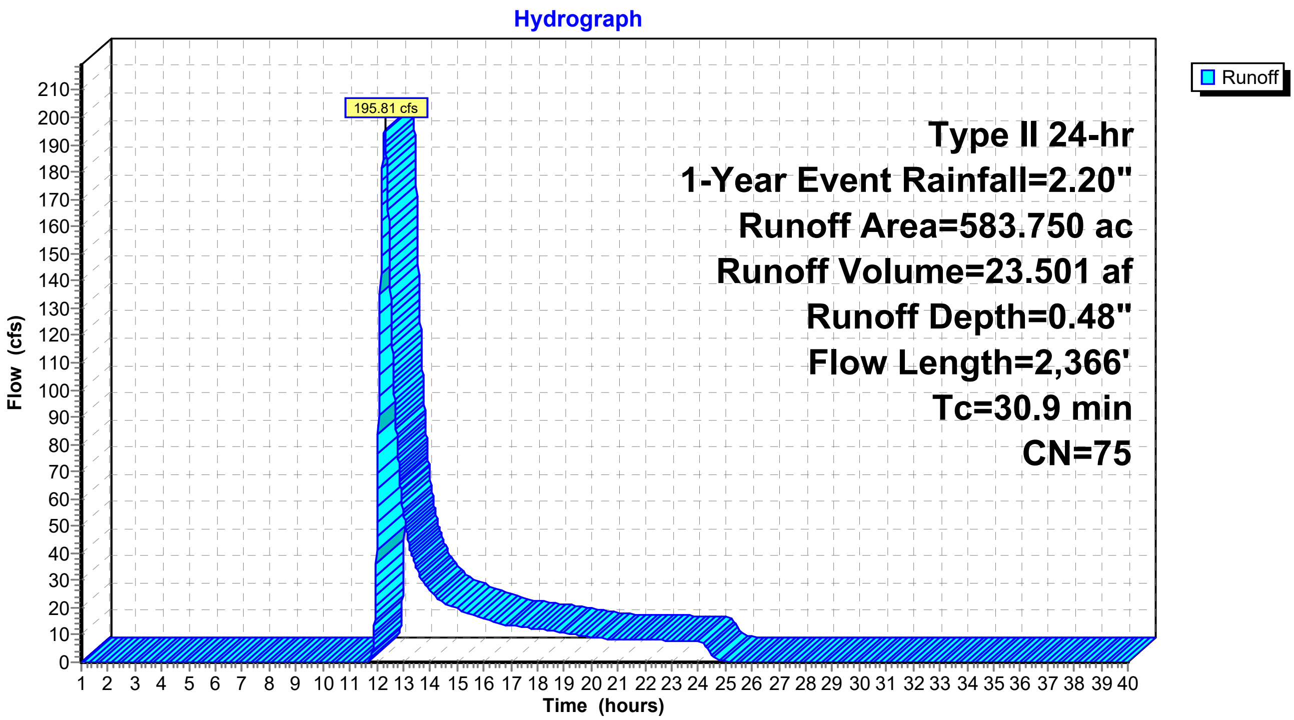
Runoff = 195.81 cfs @ 12.30 hrs, Volume= 23.501 af, Depth= 0.48"
Routed to Link Q : Total Q

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-40.00 hrs, dt= 0.01 hrs
Type II 24-hr 1-Year Event Rainfall=2.20"

| | Area (ac) | CN | Description |
|---|---|---|---|
| * | 583.750 | 75 | Woods, fields, gravel roads |
| | 583.750 | | 100.00% Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 12.0 | 100 | 0.0700 | 0.14 | | **Sheet Flow, Woods**<br>Woods: Light underbrush n= 0.400 P2= 3.75" |
| 18.9 | 2,266 | 0.1600 | 2.00 | | **Shallow Concentrated Flow, Woods**<br>Woodland Kv= 5.0 fps |
| 30.9 | 2,366 | Total | | | |

### Subcatchment 2: DA 2



## Summary for Subcatchment 3: DA 3

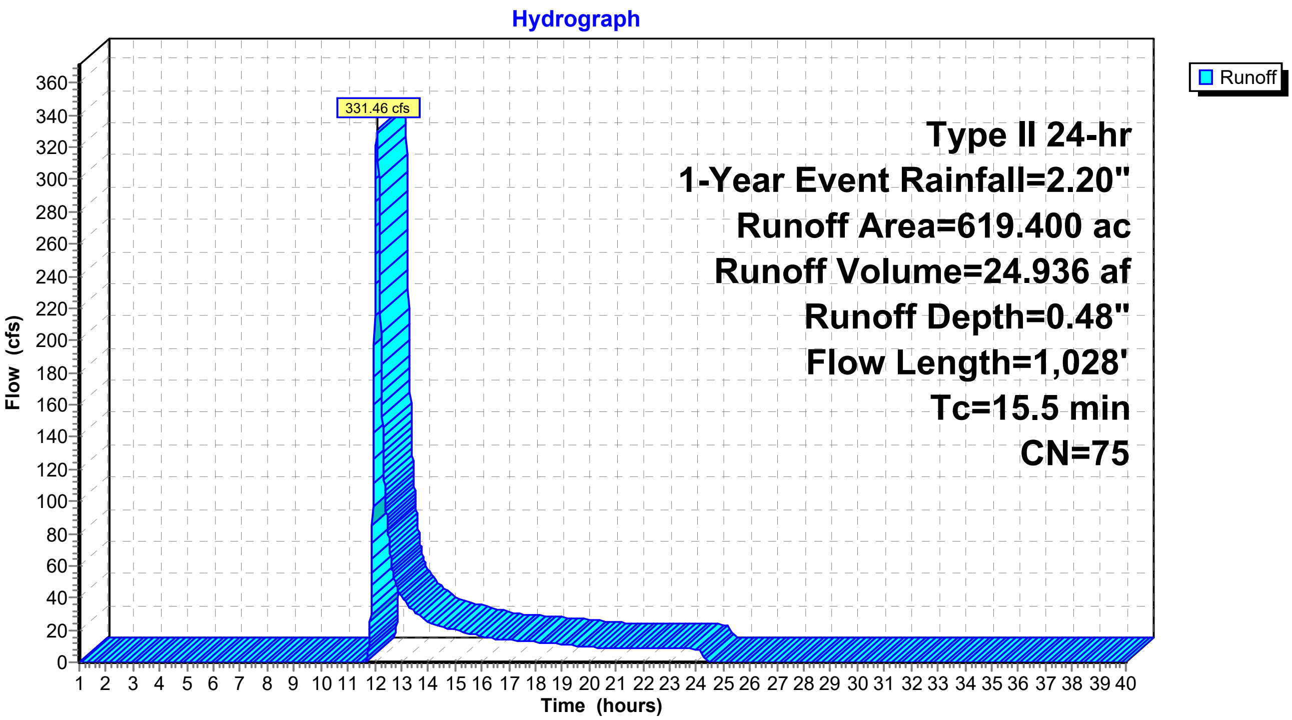
Runoff = 331.46 cfs @ 12.10 hrs, Volume= 24.936 af, Depth= 0.48"
Routed to Link Q : Total Q

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-40.00 hrs, dt= 0.01 hrs
Type II 24-hr 1-Year Event Rainfall=2.20"

| | Area (ac) | CN | Description |
|---|---|---|---|
| * | 619.400 | 75 | Woods, fields, gravel roads |
| | 619.400 | | 100.00% Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 9.4 | 100 | 0.1300 | 0.18 | | **Sheet Flow, Woods** Woods: Light underbrush n= 0.400 P2= 3.75" |
| 6.1 | 928 | 0.2600 | 2.55 | | **Shallow Concentrated Flow, Woods** Woodland Kv= 5.0 fps |
| 15.5 | 1,028 | Total | | | |

### Subcatchment 3: DA 3



## Summary for Subcatchment 4: DA 4

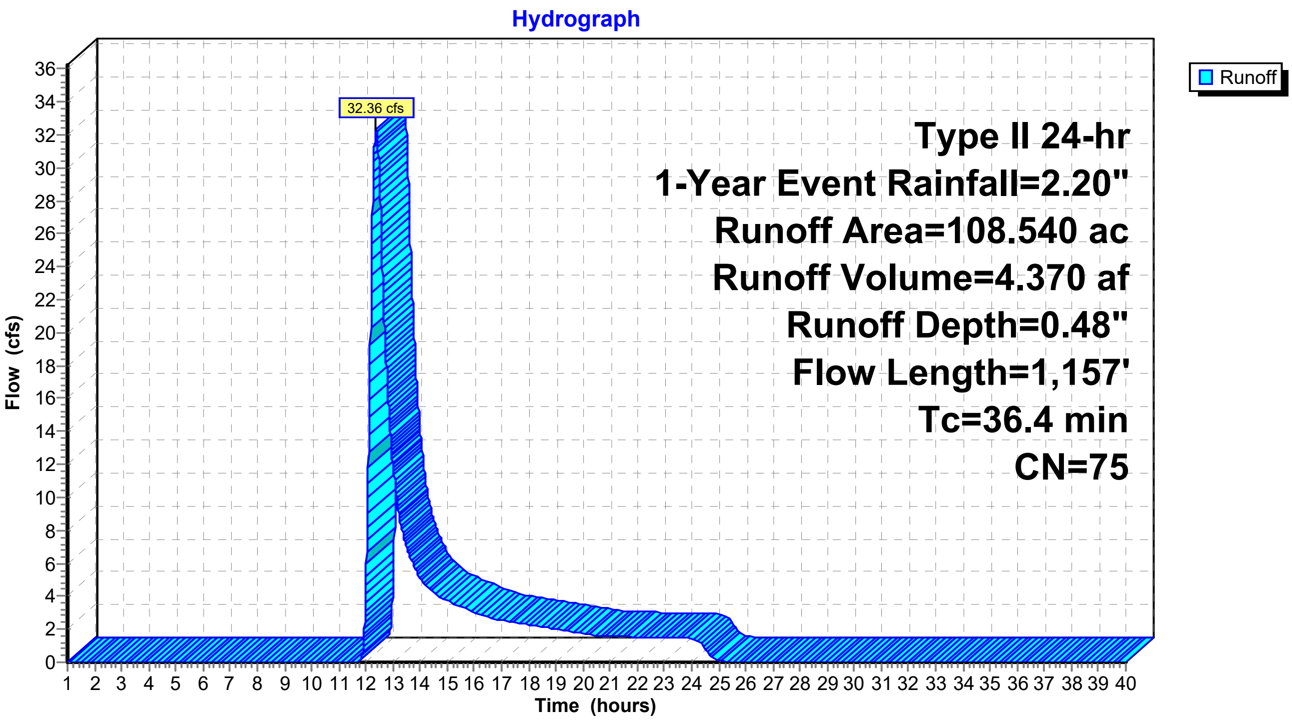
Runoff = 32.36 cfs @ 12.38 hrs, Volume= 4.370 af, Depth= 0.48"
Routed to Link Q : Total Q

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-40.00 hrs, dt= 0.01 hrs
Type II 24-hr 1-Year Event Rainfall=2.20"

| | Area (ac) | CN | Description |
|---|---|---|---|
| * | 108.540 | 75 | Woods, Brush, Field, road |
| | 108.540 | | 100.00% Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 19.8 | 100 | 0.0200 | 0.08 | | **Sheet Flow, Woods**<br>Woods: Light underbrush n= 0.400 P2= 3.75" |
| 16.6 | 1,057 | 0.0450 | 1.06 | | **Shallow Concentrated Flow, Brush**<br>Woodland Kv= 5.0 fps |
| 36.4 | 1,157 | Total | | | |

### Subcatchment 4: DA 4



## Summary for Subcatchment 5: DA 5

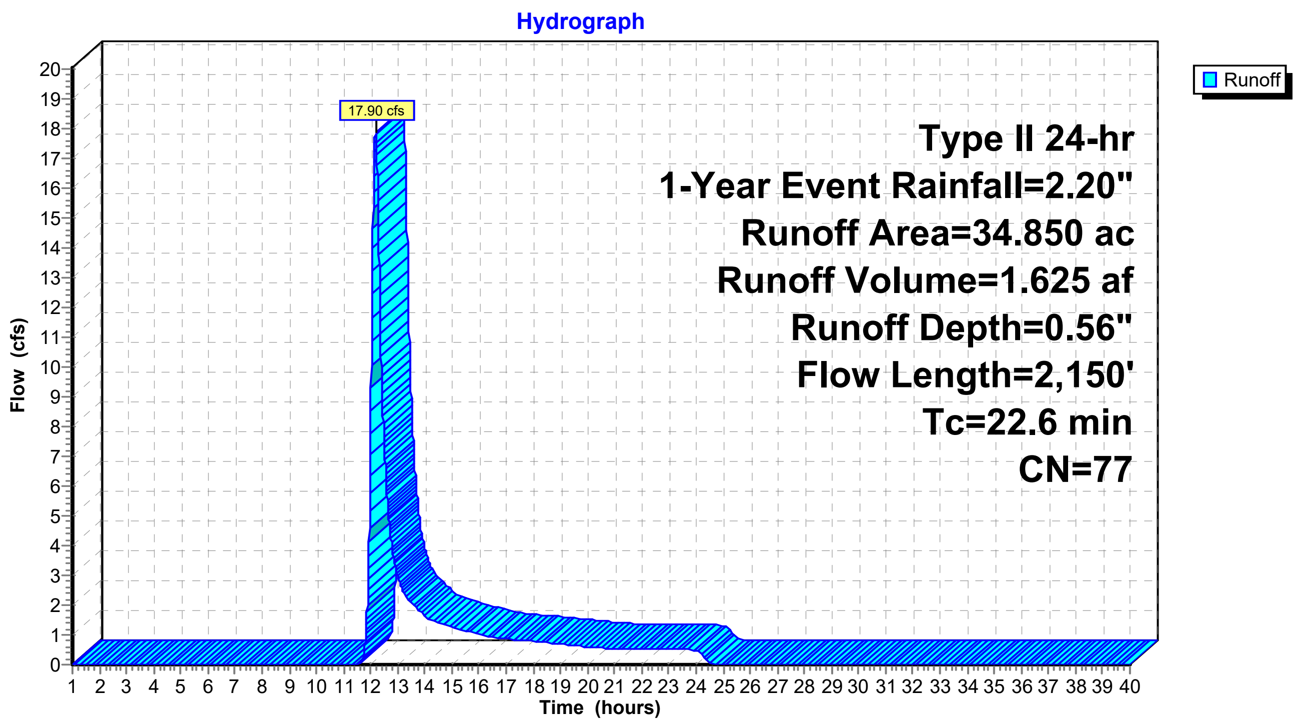
Runoff = 17.90 cfs @ 12.18 hrs, Volume= 1.625 af, Depth= 0.56"
Routed to Link Q : Total Q

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-40.00 hrs, dt= 0.01 hrs
Type II 24-hr 1-Year Event Rainfall=2.20"

| Area (ac) | CN | Description |
|---|---|---|
| 34.850 | 77 | 2 acre lots, 12% imp, HSG C |
| 30.668 | | 88.00% Pervious Area |
| 4.182 | | 12.00% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 7.9 | 100 | 0.2000 | 0.21 | | **Sheet Flow, Woods**<br>Woods: Light underbrush n= 0.400 P2= 3.75" |
| 14.7 | 2,050 | 0.0240 | 2.32 | | **Shallow Concentrated Flow, Lawn**<br>Grassed Waterway Kv= 15.0 fps |
| 22.6 | 2,150 | Total | | | |

## Subcatchment 5: DA 5

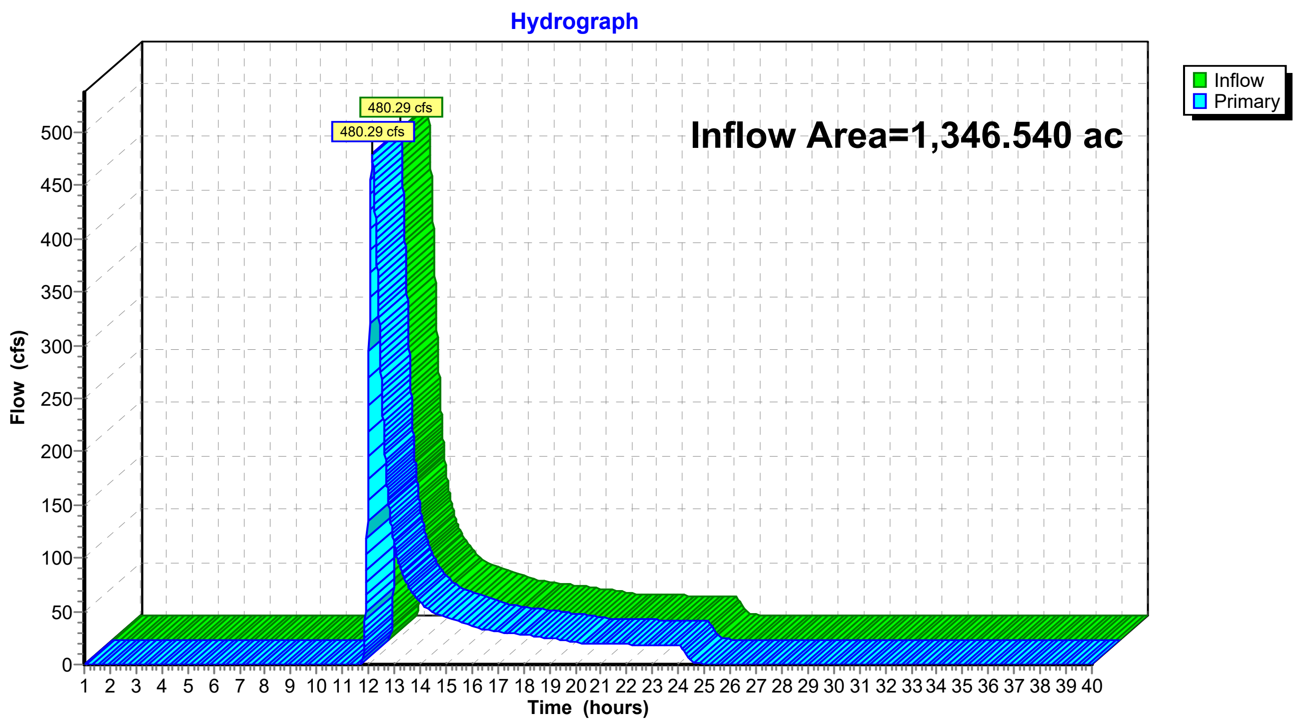


## Summary for Link Q: Total Q

Inflow Area = 1,346.540 ac, 0.31% Impervious, Inflow Depth = 0.49" for 1-Year Event event
Inflow = 480.29 cfs @ 12.14 hrs, Volume= 54.432 af
Primary = 480.29 cfs @ 12.15 hrs, Volume= 54.432 af, Atten= 0%, Lag= 0.6 min

Primary outflow = Inflow, Time Span= 1.00-40.00 hrs, dt= 0.01 hrs

### Link Q: Total Q



Time span=1.00-40.00 hrs, dt=0.01 hrs, 3901 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Sim-Route method - Pond routing by Sim-Route method

**Subcatchment1: DA 1** Runoff Area=190.340 ac 0.00% Impervious Runoff Depth=1.82"
Flow Length=5,265' Tc=73.8 min CN=73 Runoff=153.24 cfs 28.878 af

**Subcatchment2: DA 2** Runoff Area=583.750 ac 0.00% Impervious Runoff Depth=1.97"
Flow Length=2,366' Tc=30.9 min CN=75 Runoff=965.28 cfs 95.945 af

**Subcatchment3: DA 3** Runoff Area=619.400 ac 0.00% Impervious Runoff Depth=1.97"
Flow Length=1,028' Tc=15.5 min CN=75 Runoff=1,550.61 cfs 101.805 af

**Subcatchment4: DA 4** Runoff Area=108.540 ac 0.00% Impervious Runoff Depth=1.97"
Flow Length=1,157' Tc=36.4 min CN=75 Runoff=160.50 cfs 17.840 af

**Subcatchment5: DA 5** Runoff Area=34.850 ac 12.00% Impervious Runoff Depth=2.13"
Flow Length=2,150' Tc=22.6 min CN=77 Runoff=76.43 cfs 6.185 af

**Link Q: Total Q** Inflow=2,379.32 cfs 221.775 af
Primary=2,379.32 cfs 221.775 af

**Total Runoff Area = 1,536.880 ac Runoff Volume = 250.653 af Average Runoff Depth = 1.96"**
**99.73% Pervious = 1,532.698 ac 0.27% Impervious = 4.182 ac**

## Summary for Subcatchment 1: DA 1

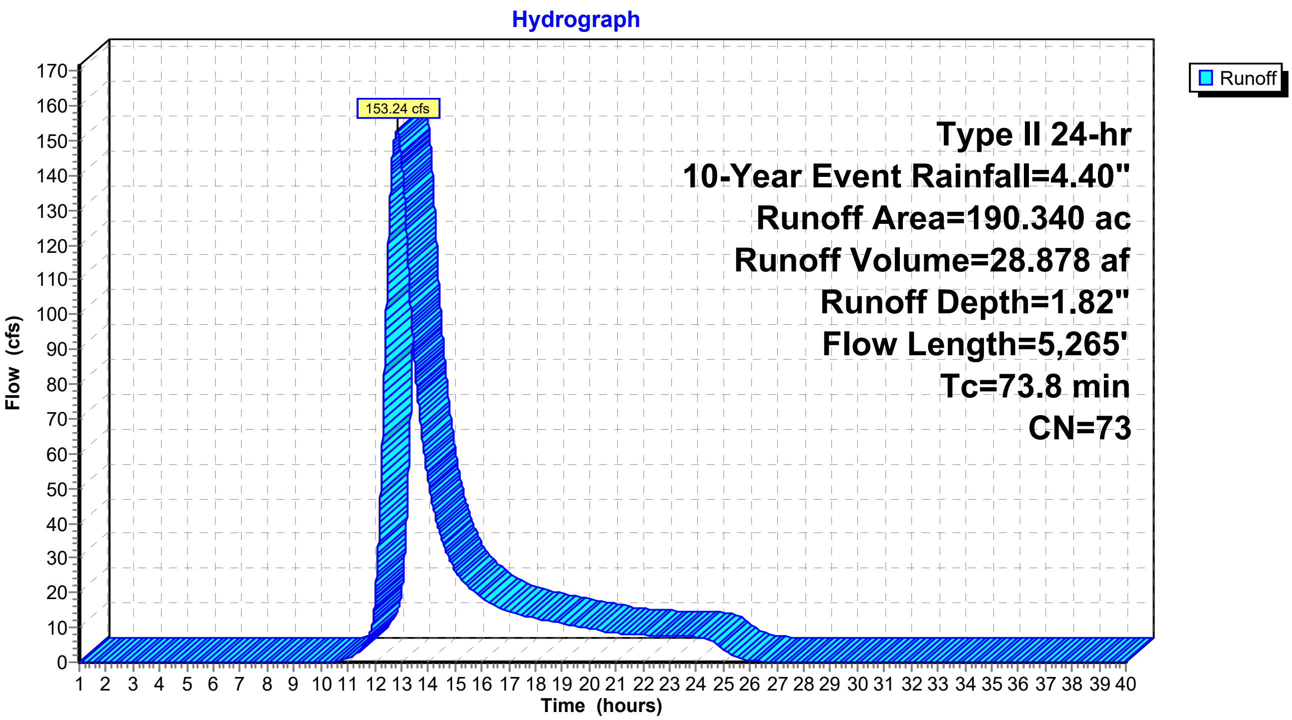
Runoff = 153.24 cfs @ 12.87 hrs, Volume= 28.878 af, Depth= 1.82"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-40.00 hrs, dt= 0.01 hrs
Type II 24-hr 10-Year Event Rainfall=4.40"

| Area (ac) | CN | Description |
|---|---|---|
| 190.340 | 73 | Woods, Fair, HSG C |
| 190.340 | | 100.00% Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 23.3 | 100 | 0.0134 | 0.07 | | **Sheet Flow, Woods**<br>Woods: Light underbrush n= 0.400 P2= 3.75" |
| 19.4 | 2,972 | 0.0252 | 2.56 | | **Shallow Concentrated Flow, Woods**<br>Unpaved Kv= 16.1 fps |
| 25.8 | 1,216 | 0.0247 | 0.79 | | **Shallow Concentrated Flow, woodland**<br>Woodland Kv= 5.0 fps |
| 5.3 | 977 | 0.0358 | 3.05 | | **Shallow Concentrated Flow, woodland**<br>Unpaved Kv= 16.1 fps |
| 73.8 | 5,265 | Total | | | |

### Subcatchment 1: DA 1



## Summary for Subcatchment 2: DA 2

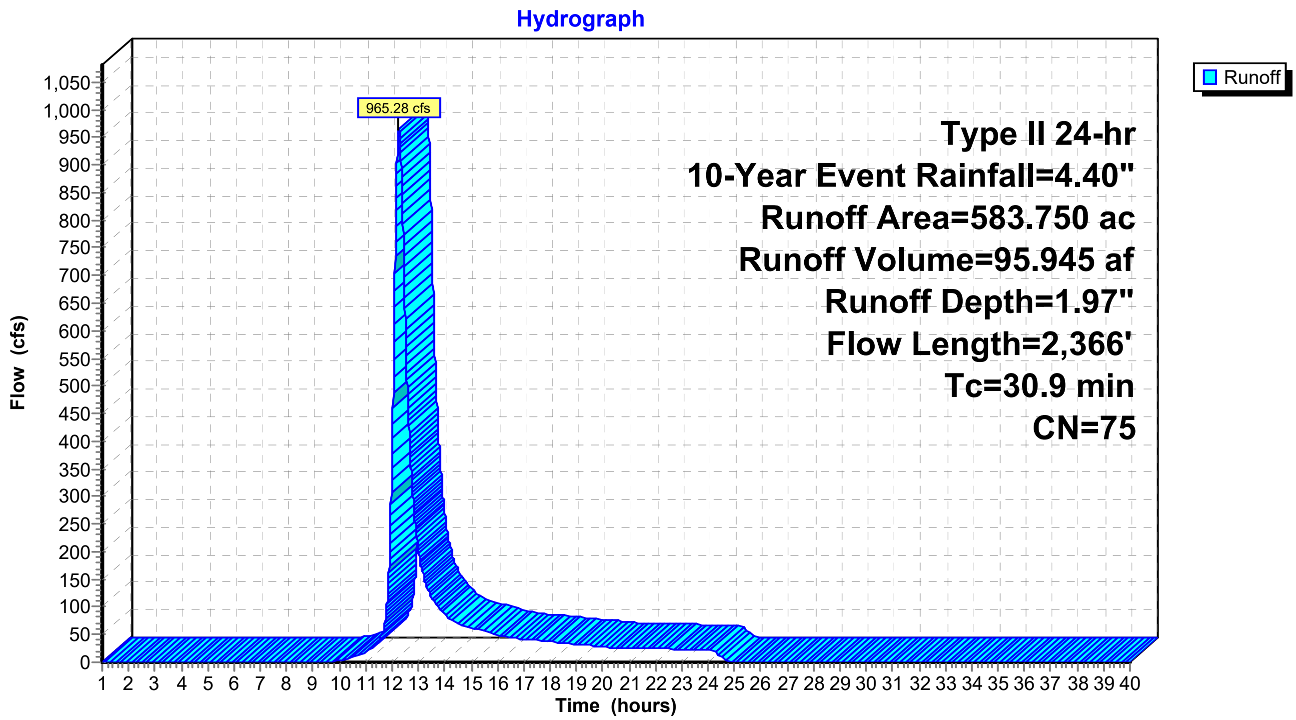
Runoff = 965.28 cfs @ 12.26 hrs, Volume= 95.945 af, Depth= 1.97"
Routed to Link Q : Total Q

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-40.00 hrs, dt= 0.01 hrs
Type II 24-hr 10-Year Event Rainfall=4.40"

| | Area (ac) | CN | Description |
|---|---|---|---|
| * | 583.750 | 75 | Woods, fields, gravel roads |
| | 583.750 | | 100.00% Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 12.0 | 100 | 0.0700 | 0.14 | | **Sheet Flow, Woods** Woods: Light underbrush n= 0.400 P2= 3.75" |
| 18.9 | 2,266 | 0.1600 | 2.00 | | **Shallow Concentrated Flow, Woods** Woodland Kv= 5.0 fps |
| 30.9 | 2,366 | Total | | | |

## Subcatchment 2: DA 2



## Summary for Subcatchment 3: DA 3

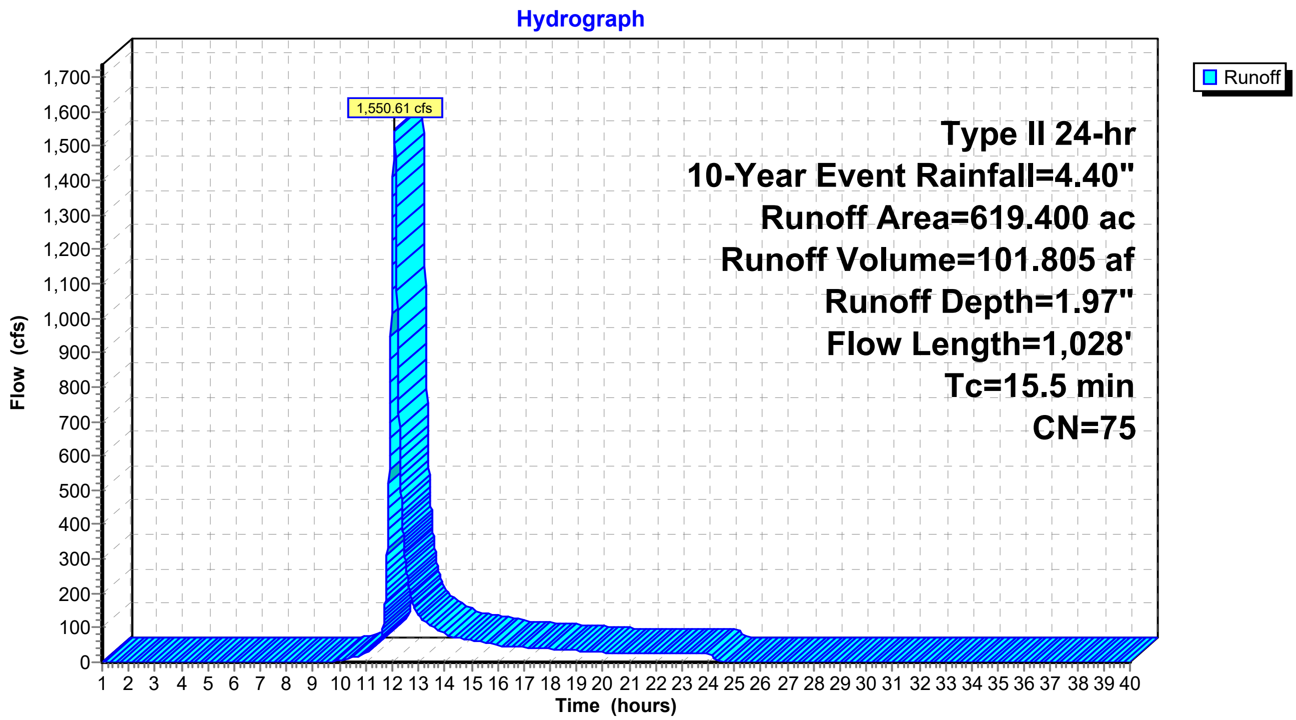
Runoff = 1,550.61 cfs @ 12.08 hrs, Volume= 101.805 af, Depth= 1.97"
Routed to Link Q : Total Q

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-40.00 hrs, dt= 0.01 hrs
Type II 24-hr 10-Year Event Rainfall=4.40"

| | Area (ac) | CN | Description |
|---|---|---|---|
| * | 619.400 | 75 | Woods, fields, gravel roads |
| | 619.400 | | 100.00% Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 9.4 | 100 | 0.1300 | 0.18 | | **Sheet Flow, Woods**<br>Woods: Light underbrush n= 0.400 P2= 3.75" |
| 6.1 | 928 | 0.2600 | 2.55 | | **Shallow Concentrated Flow, Woods**<br>Woodland Kv= 5.0 fps |
| 15.5 | 1,028 | Total | | | |

### Subcatchment 3: DA 3



## Summary for Subcatchment 4: DA 4

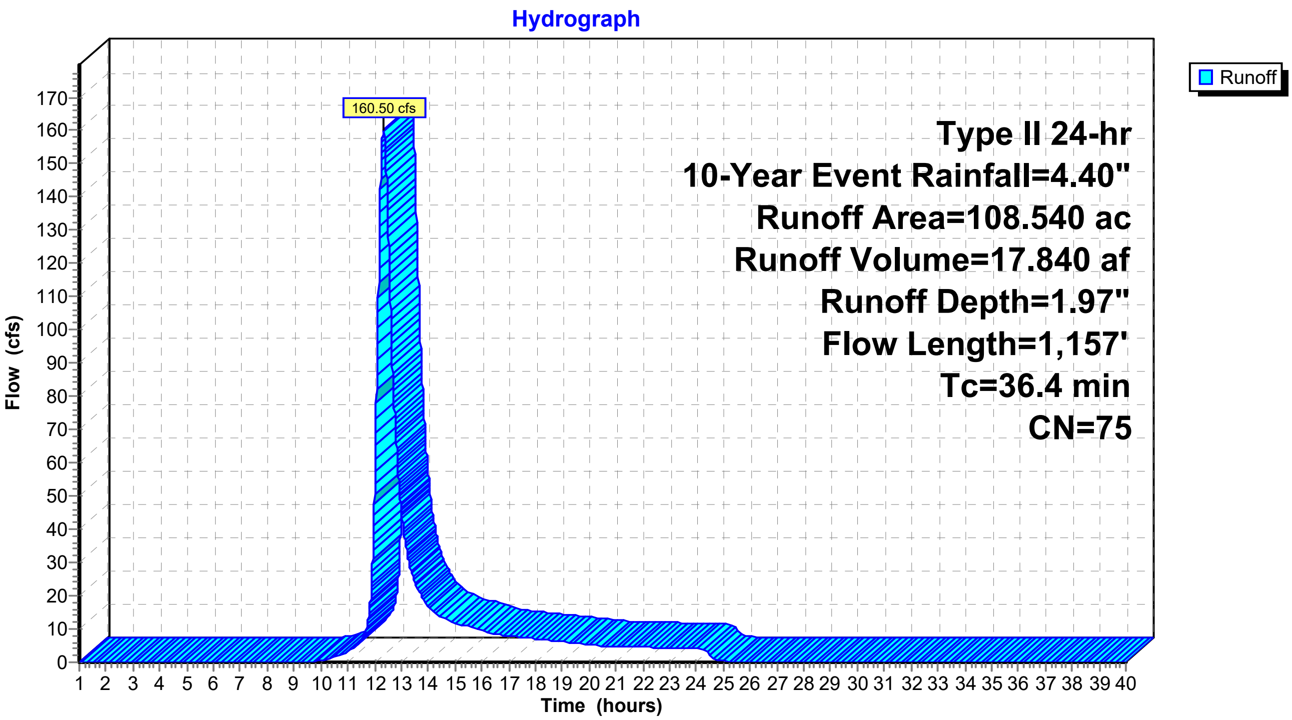
Runoff = 160.50 cfs @ 12.33 hrs, Volume= 17.840 af, Depth= 1.97"
Routed to Link Q : Total Q

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-40.00 hrs, dt= 0.01 hrs
Type II 24-hr 10-Year Event Rainfall=4.40"

| | Area (ac) | CN | Description |
|---|---|---|---|
| * | 108.540 | 75 | Woods, Brush, Field, road |
| | 108.540 | | 100.00% Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 19.8 | 100 | 0.0200 | 0.08 | | **Sheet Flow, Woods** Woods: Light underbrush n= 0.400 P2= 3.75" |
| 16.6 | 1,057 | 0.0450 | 1.06 | | **Shallow Concentrated Flow, Brush** Woodland Kv= 5.0 fps |
| 36.4 | 1,157 | Total | | | |

## Subcatchment 4: DA 4



## Summary for Subcatchment 5: DA 5

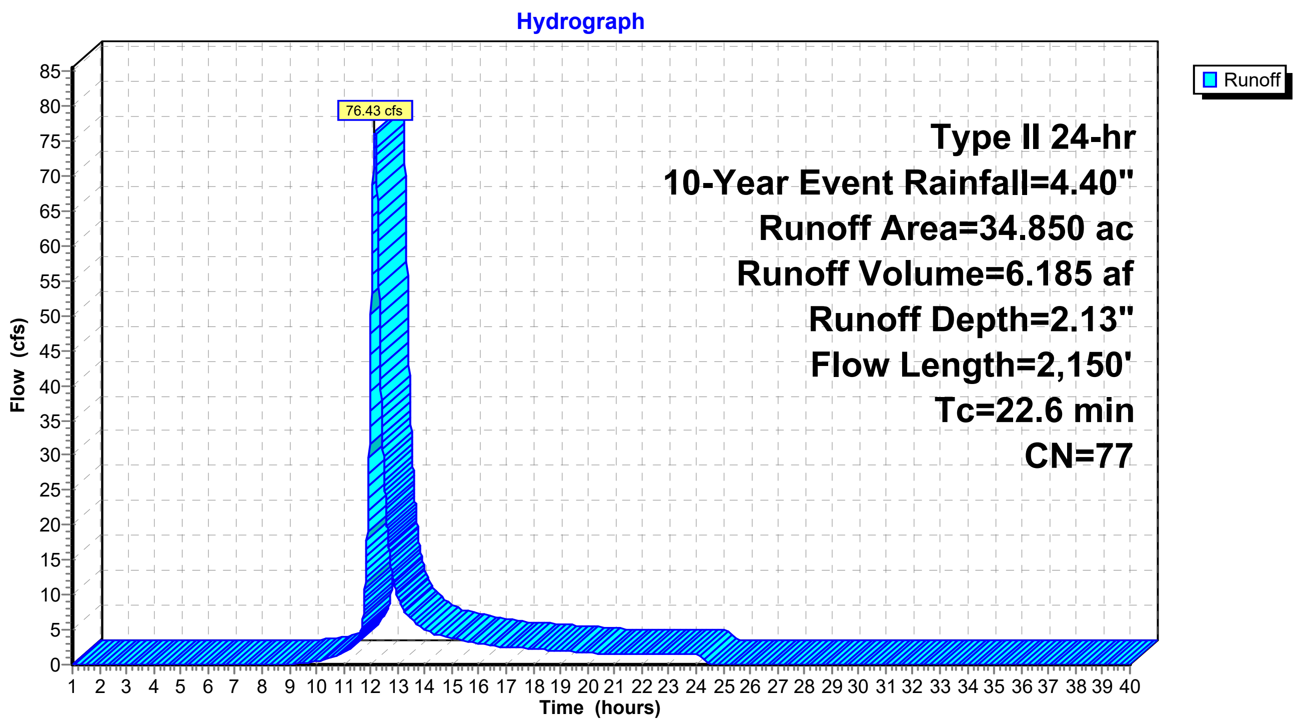
Runoff = 76.43 cfs @ 12.16 hrs, Volume= 6.185 af, Depth= 2.13"
Routed to Link Q : Total Q

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-40.00 hrs, dt= 0.01 hrs
Type II 24-hr 10-Year Event Rainfall=4.40"

| Area (ac) | CN | Description |
|---|---|---|
| 34.850 | 77 | 2 acre lots, 12% imp, HSG C |
| 30.668 | | 88.00% Pervious Area |
| 4.182 | | 12.00% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 7.9 | 100 | 0.2000 | 0.21 | | **Sheet Flow, Woods**<br>Woods: Light underbrush n= 0.400 P2= 3.75" |
| 14.7 | 2,050 | 0.0240 | 2.32 | | **Shallow Concentrated Flow, Lawn**<br>Grassed Waterway Kv= 15.0 fps |
| 22.6 | 2,150 | Total | | | |

### Subcatchment 5: DA 5

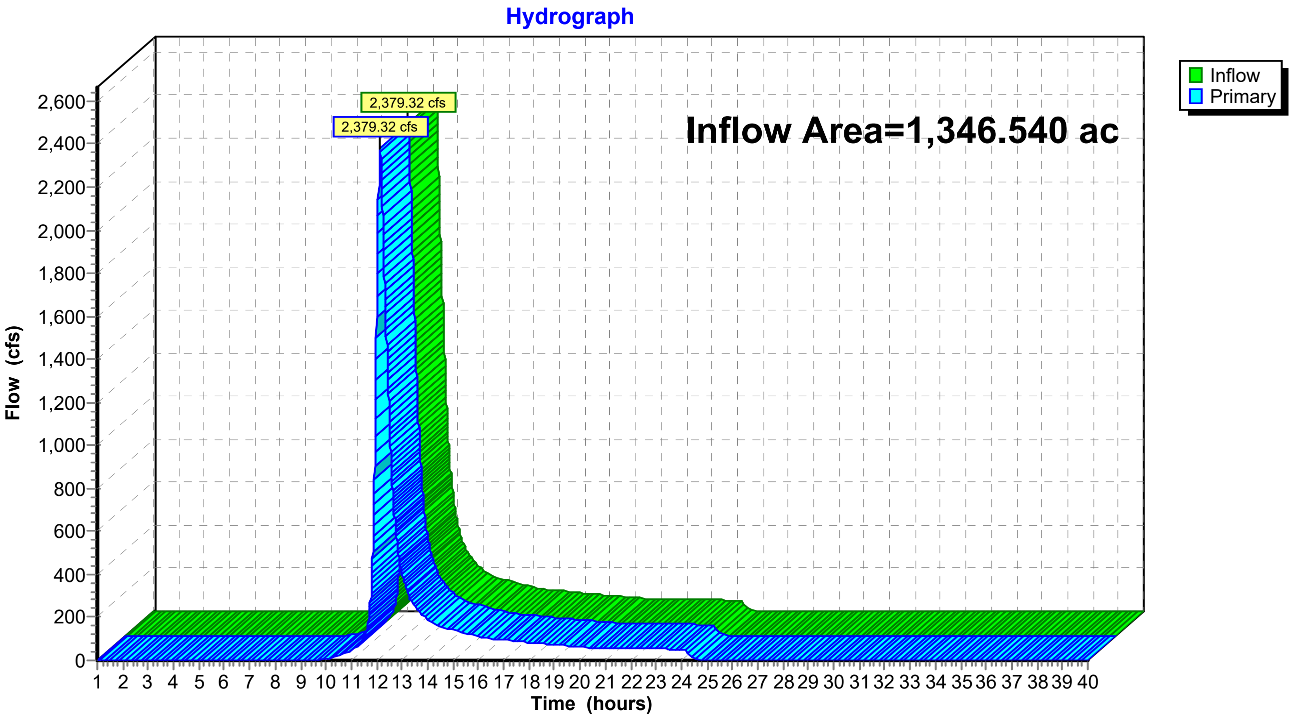


## Summary for Link Q: Total Q

Inflow Area = 1,346.540 ac, 0.31% Impervious, Inflow Depth = 1.98" for 10-Year Event event
Inflow = 2,379.32 cfs @ 12.11 hrs, Volume= 221.775 af
Primary = 2,379.32 cfs @ 12.12 hrs, Volume= 221.775 af, Atten= 0%, Lag= 0.6 min

Primary outflow = Inflow, Time Span= 1.00-40.00 hrs, dt= 0.01 hrs

### Link Q: Total Q



Time span=1.00-40.00 hrs, dt=0.01 hrs, 3901 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Sim-Route method - Pond routing by Sim-Route method

**Subcatchment1: DA 1** Runoff Area=190.340 ac 0.00% Impervious Runoff Depth=4.81"
Flow Length=5,265' Tc=73.8 min CN=73 Runoff=420.21 cfs 76.294 af

**Subcatchment2: DA 2** Runoff Area=583.750 ac 0.00% Impervious Runoff Depth=5.04"
Flow Length=2,366' Tc=30.9 min CN=75 Runoff=2,507.55 cfs 245.256 af

**Subcatchment3: DA 3** Runoff Area=619.400 ac 0.00% Impervious Runoff Depth=5.04"
Flow Length=1,028' Tc=15.5 min CN=75 Runoff=3,961.90 cfs 260.234 af

**Subcatchment4: DA 4** Runoff Area=108.540 ac 0.00% Impervious Runoff Depth=5.04"
Flow Length=1,157' Tc=36.4 min CN=75 Runoff=417.65 cfs 45.602 af

**Subcatchment5: DA 5** Runoff Area=34.850 ac 12.00% Impervious Runoff Depth=5.27"
Flow Length=2,150' Tc=22.6 min CN=77 Runoff=189.36 cfs 15.318 af

**Link Q: Total Q** Inflow=6,187.17 cfs 566.410 af
Primary=6,187.17 cfs 566.410 af

**Total Runoff Area = 1,536.880 ac Runoff Volume = 642.703 af Average Runoff Depth = 5.02"**
**99.73% Pervious = 1,532.698 ac 0.27% Impervious = 4.182 ac**

## Summary for Subcatchment 1: DA 1

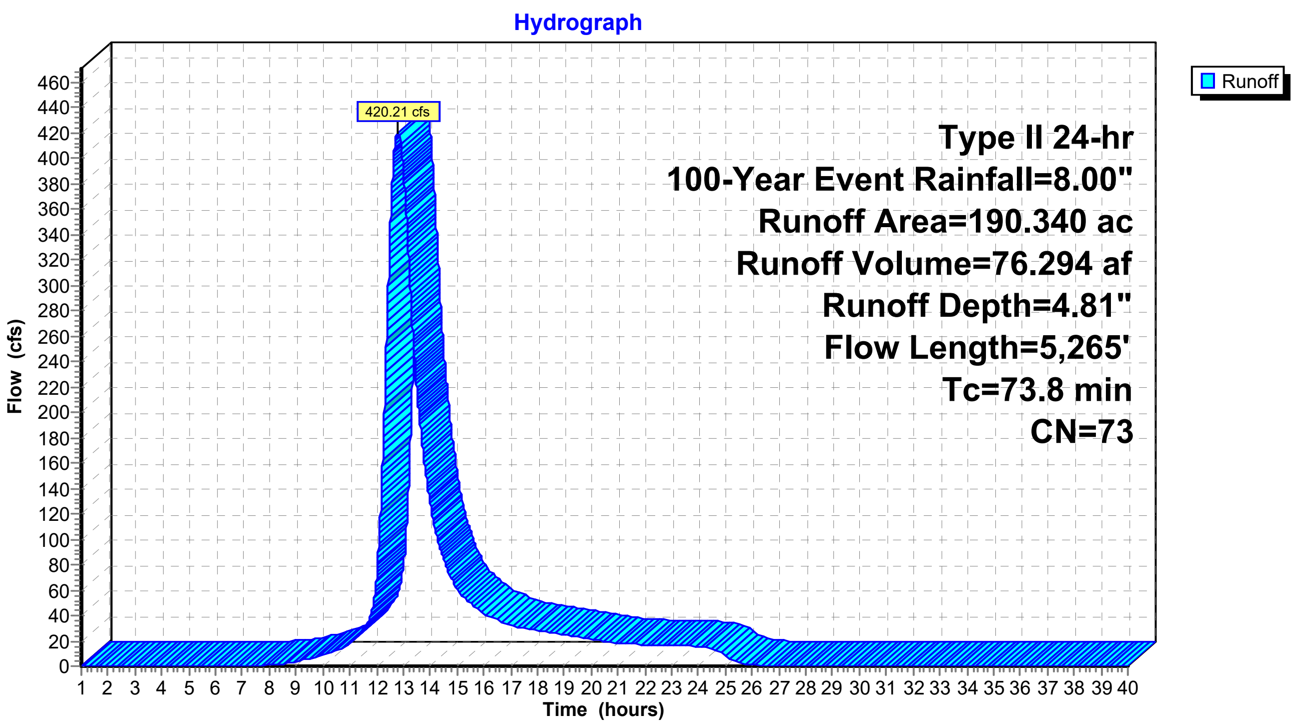
Runoff = 420.21 cfs @ 12.79 hrs, Volume= 76.294 af, Depth= 4.81"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-40.00 hrs, dt= 0.01 hrs
Type II 24-hr 100-Year Event Rainfall=8.00"

| Area (ac) | CN | Description |
|---|---|---|
| 190.340 | 73 | Woods, Fair, HSG C |
| 190.340 | | 100.00% Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 23.3 | 100 | 0.0134 | 0.07 | | **Sheet Flow, Woods**<br>Woods: Light underbrush n= 0.400 P2= 3.75" |
| 19.4 | 2,972 | 0.0252 | 2.56 | | **Shallow Concentrated Flow, Woods**<br>Unpaved Kv= 16.1 fps |
| 25.8 | 1,216 | 0.0247 | 0.79 | | **Shallow Concentrated Flow, woodland**<br>Woodland Kv= 5.0 fps |
| 5.3 | 977 | 0.0358 | 3.05 | | **Shallow Concentrated Flow, woodland**<br>Unpaved Kv= 16.1 fps |
| 73.8 | 5,265 | Total | | | |

## Subcatchment 1: DA 1



## Summary for Subcatchment 2: DA 2

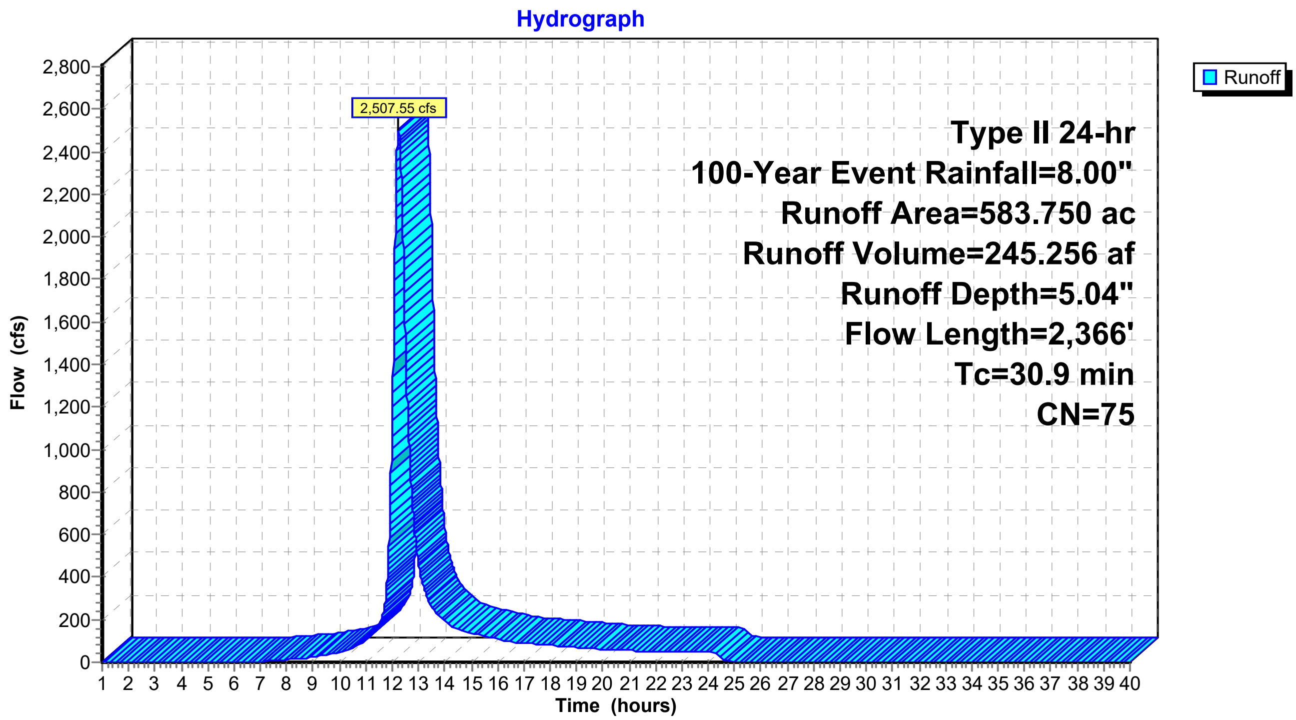
Runoff = 2,507.55 cfs @ 12.26 hrs, Volume= 245.256 af, Depth= 5.04"
Routed to Link Q : Total Q

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-40.00 hrs, dt= 0.01 hrs
Type II 24-hr 100-Year Event Rainfall=8.00"

| | Area (ac) | CN | Description |
|---|---|---|---|
| * | 583.750 | 75 | Woods, fields, gravel roads |
| | 583.750 | | 100.00% Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 12.0 | 100 | 0.0700 | 0.14 | | **Sheet Flow, Woods**<br>Woods: Light underbrush n= 0.400 P2= 3.75" |
| 18.9 | 2,266 | 0.1600 | 2.00 | | **Shallow Concentrated Flow, Woods**<br>Woodland Kv= 5.0 fps |
| 30.9 | 2,366 | Total | | | |

## Subcatchment 2: DA 2



## Summary for Subcatchment 3: DA 3

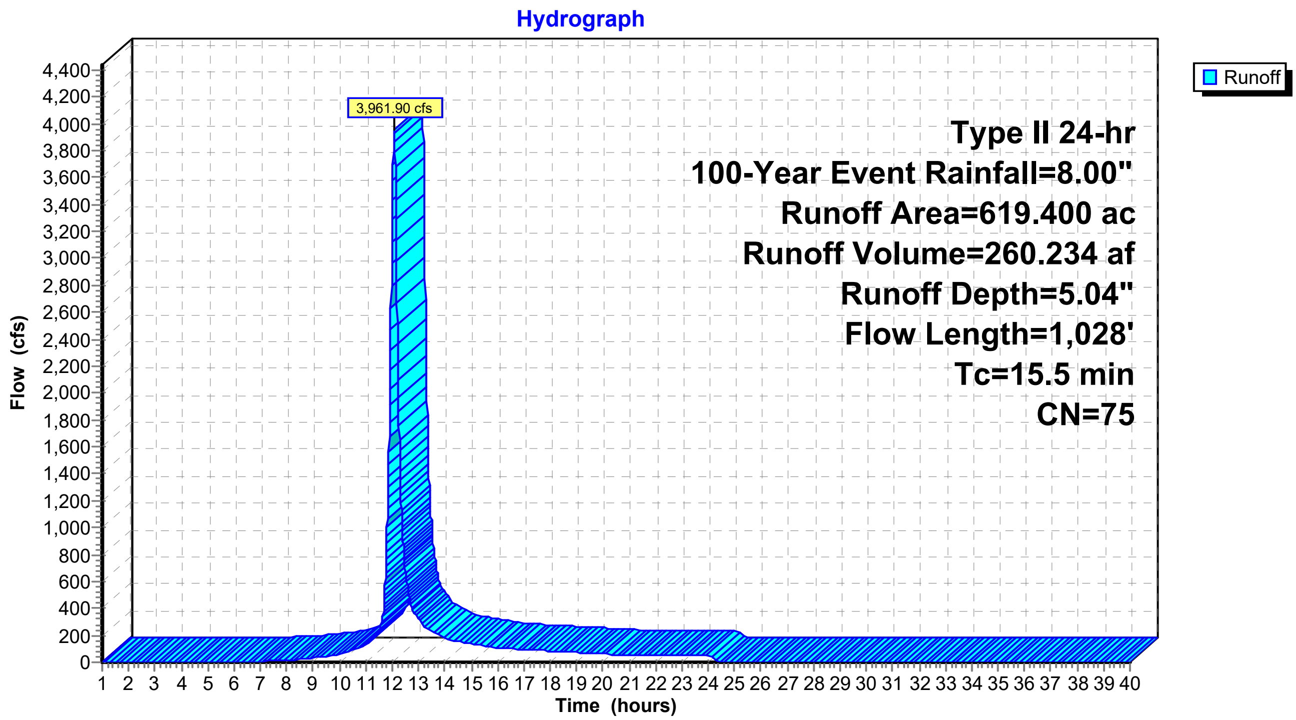
Runoff = 3,961.90 cfs @ 12.07 hrs, Volume= 260.234 af, Depth= 5.04"
Routed to Link Q : Total Q

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-40.00 hrs, dt= 0.01 hrs
Type II 24-hr 100-Year Event Rainfall=8.00"

| | Area (ac) | CN | Description |
|---|---|---|---|
| * | 619.400 | 75 | Woods, fields, gravel roads |
| | 619.400 | | 100.00% Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 9.4 | 100 | 0.1300 | 0.18 | | **Sheet Flow, Woods** Woods: Light underbrush n= 0.400 P2= 3.75" |
| 6.1 | 928 | 0.2600 | 2.55 | | **Shallow Concentrated Flow, Woods** Woodland Kv= 5.0 fps |
| 15.5 | 1,028 | Total | | | |

## Subcatchment 3: DA 3



## Summary for Subcatchment 4: DA 4

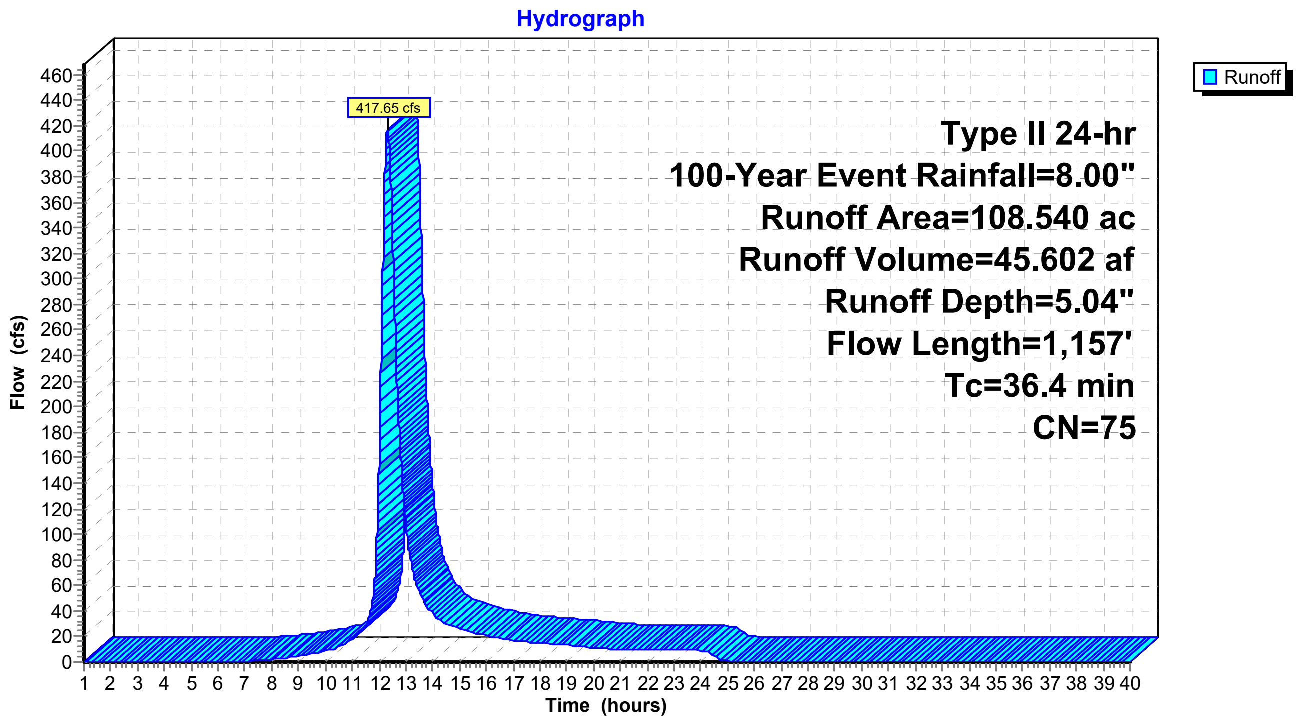
Runoff = 417.65 cfs @ 12.33 hrs, Volume= 45.602 af, Depth= 5.04"
Routed to Link Q : Total Q

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-40.00 hrs, dt= 0.01 hrs
Type II 24-hr 100-Year Event Rainfall=8.00"

| | Area (ac) | CN | Description |
|---|---|---|---|
| * | 108.540 | 75 | Woods, Brush, Field, road |
| | 108.540 | | 100.00% Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 19.8 | 100 | 0.0200 | 0.08 | | **Sheet Flow, Woods**<br>Woods: Light underbrush n= 0.400 P2= 3.75" |
| 16.6 | 1,057 | 0.0450 | 1.06 | | **Shallow Concentrated Flow, Brush**<br>Woodland Kv= 5.0 fps |
| 36.4 | 1,157 | Total | | | |

## Subcatchment 4: DA 4



## Summary for Subcatchment 5: DA 5

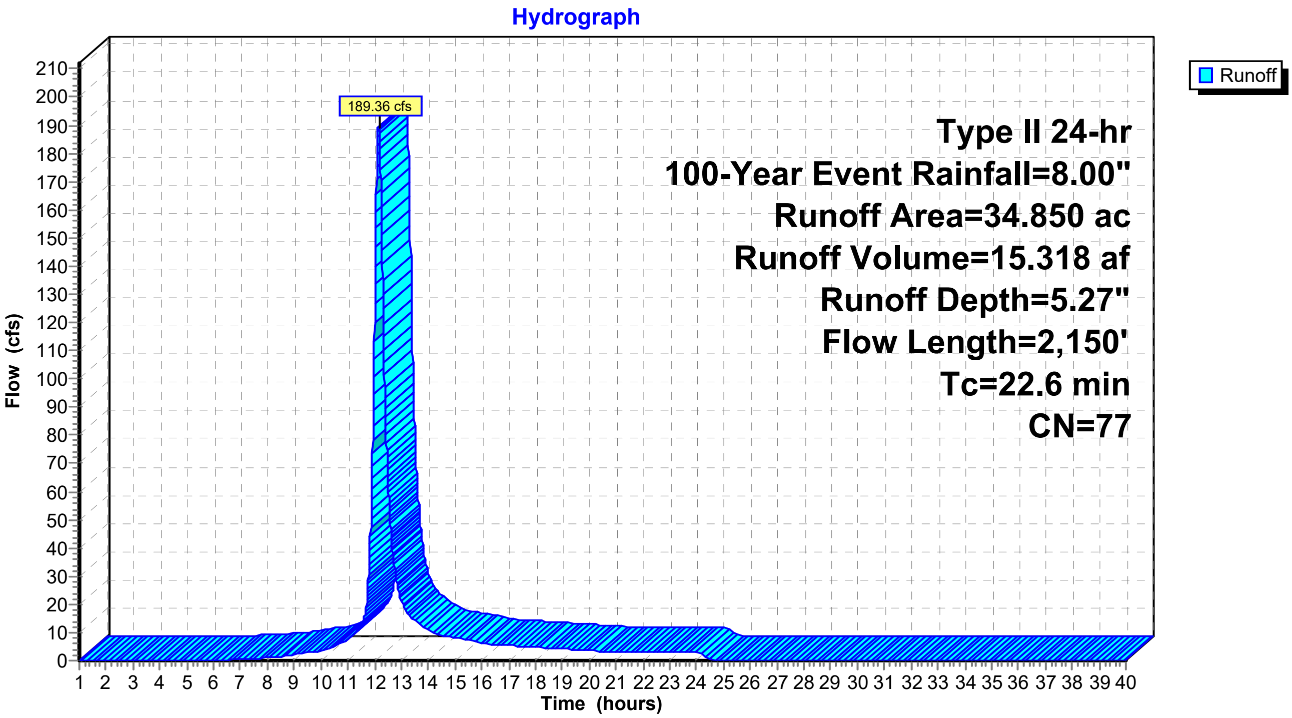
Runoff = 189.36 cfs @ 12.15 hrs, Volume= 15.318 af, Depth= 5.27"
Routed to Link Q : Total Q

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-40.00 hrs, dt= 0.01 hrs
Type II 24-hr 100-Year Event Rainfall=8.00"

| Area (ac) | CN | Description |
|---|---|---|
| 34.850 | 77 | 2 acre lots, 12% imp, HSG C |
| 30.668 | | 88.00% Pervious Area |
| 4.182 | | 12.00% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 7.9 | 100 | 0.2000 | 0.21 | | **Sheet Flow, Woods** Woods: Light underbrush n= 0.400 P2= 3.75" |
| 14.7 | 2,050 | 0.0240 | 2.32 | | **Shallow Concentrated Flow, Lawn** Grassed Waterway Kv= 15.0 fps |
| 22.6 | 2,150 | Total | | | |

## Subcatchment 5: DA 5

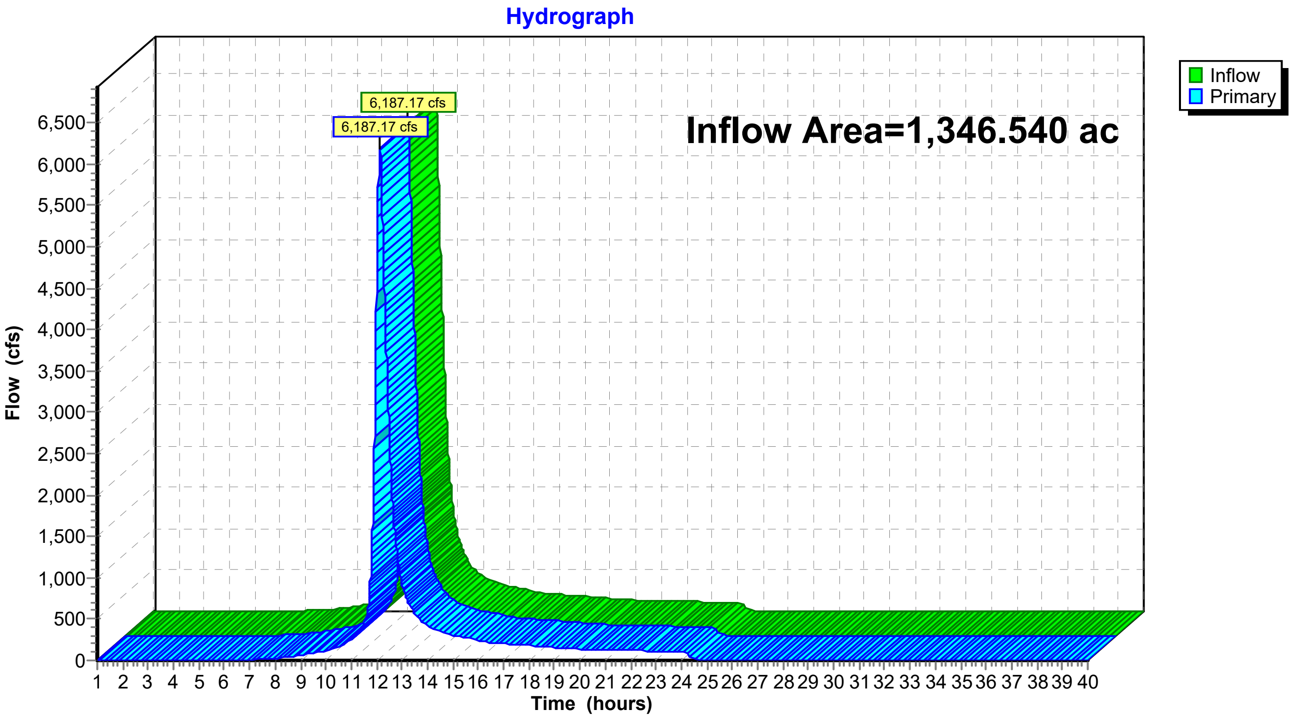


## Summary for Link Q: Total Q

Inflow Area = 1,346.540 ac, 0.31% Impervious, Inflow Depth = 5.05" for 100-Year Event event
Inflow = 6,187.17 cfs @ 12.11 hrs, Volume= 566.410 af
Primary = 6,187.17 cfs @ 12.12 hrs, Volume= 566.410 af, Atten= 0%, Lag= 0.6 min

Primary outflow = Inflow, Time Span= 1.00-40.00 hrs, dt= 0.01 hrs

### Link Q: Total Q



Time span=1.00-40.00 hrs, dt=0.01 hrs, 3901 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Sim-Route method - Pond routing by Sim-Route method

**Subcatchment1: DA 1** Runoff Area=190.340 ac 0.00% Impervious Runoff Depth=0.13"
Flow Length=5,265' Tc=73.8 min CN=73 Runoff=5.50 cfs 2.056 af

**Subcatchment2: DA 2** Runoff Area=583.750 ac 0.00% Impervious Runoff Depth=0.17"
Flow Length=2,366' Tc=30.9 min CN=75 Runoff=44.39 cfs 8.108 af

**Subcatchment3: DA 3** Runoff Area=619.400 ac 0.00% Impervious Runoff Depth=0.17"
Flow Length=1,028' Tc=15.5 min CN=75 Runoff=75.56 cfs 8.603 af

**Subcatchment4: DA 4** Runoff Area=108.540 ac 0.00% Impervious Runoff Depth=0.17"
Flow Length=1,157' Tc=36.4 min CN=75 Runoff=7.42 cfs 1.507 af

**Subcatchment5: DA 5** Runoff Area=34.850 ac 12.00% Impervious Runoff Depth=0.21"
Flow Length=2,150' Tc=22.6 min CN=77 Runoff=4.93 cfs 0.608 af

**Link Q: Total Q** Inflow=105.88 cfs 18.826 af
Primary=105.88 cfs 18.826 af

**Total Runoff Area = 1,536.880 ac Runoff Volume = 20.882 af Average Runoff Depth = 0.16"**
**99.73% Pervious = 1,532.698 ac 0.27% Impervious = 4.182 ac**

## Summary for Subcatchment 1: DA 1

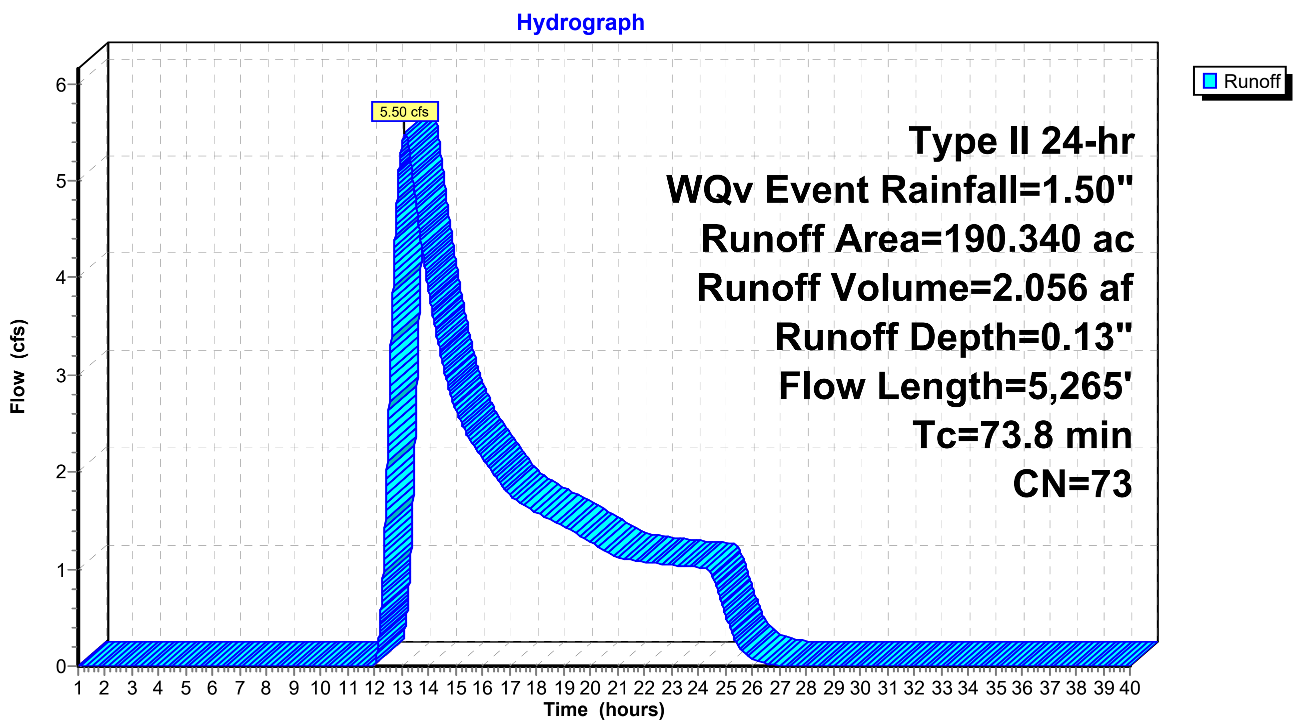
Runoff = 5.50 cfs @ 13.12 hrs, Volume= 2.056 af, Depth= 0.13"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-40.00 hrs, dt= 0.01 hrs
Type II 24-hr WQv Event Rainfall=1.50"

| Area (ac) | CN | Description |
|---|---|---|
| 190.340 | 73 | Woods, Fair, HSG C |
| 190.340 | | 100.00% Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 23.3 | 100 | 0.0134 | 0.07 | | **Sheet Flow, Woods**<br>Woods: Light underbrush n= 0.400 P2= 3.75" |
| 19.4 | 2,972 | 0.0252 | 2.56 | | **Shallow Concentrated Flow, Woods**<br>Unpaved Kv= 16.1 fps |
| 25.8 | 1,216 | 0.0247 | 0.79 | | **Shallow Concentrated Flow, woodland**<br>Woodland Kv= 5.0 fps |
| 5.3 | 977 | 0.0358 | 3.05 | | **Shallow Concentrated Flow, woodland**<br>Unpaved Kv= 16.1 fps |
| 73.8 | 5,265 | Total | | | |

### Subcatchment 1: DA 1



## Summary for Subcatchment 2: DA 2

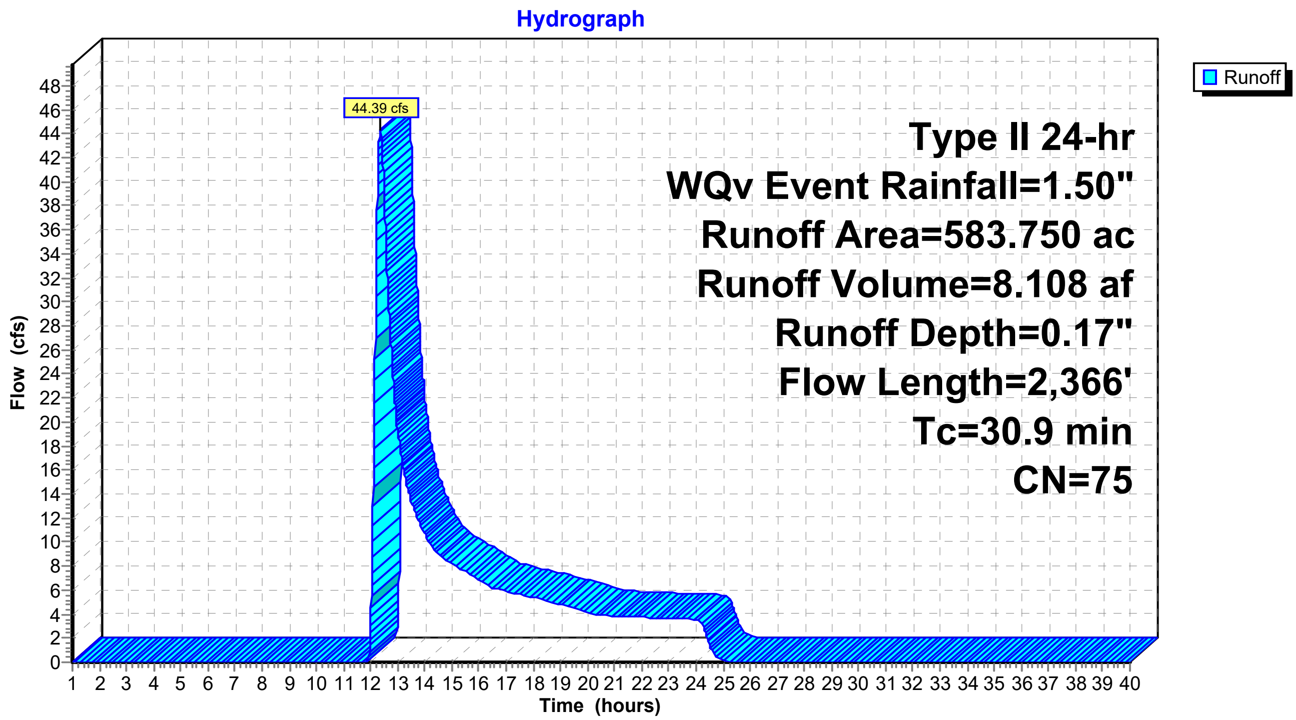
Runoff = 44.39 cfs @ 12.36 hrs, Volume= 8.108 af, Depth= 0.17"
Routed to Link Q : Total Q

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-40.00 hrs, dt= 0.01 hrs
Type II 24-hr WQv Event Rainfall=1.50"

| | Area (ac) | CN | Description |
|---|---|---|---|
| * | 583.750 | 75 | Woods, fields, gravel roads |
| | 583.750 | | 100.00% Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 12.0 | 100 | 0.0700 | 0.14 | | **Sheet Flow, Woods**<br>Woods: Light underbrush n= 0.400 P2= 3.75" |
| 18.9 | 2,266 | 0.1600 | 2.00 | | **Shallow Concentrated Flow, Woods**<br>Woodland Kv= 5.0 fps |
| 30.9 | 2,366 | Total | | | |

### Subcatchment 2: DA 2



## Summary for Subcatchment 3: DA 3

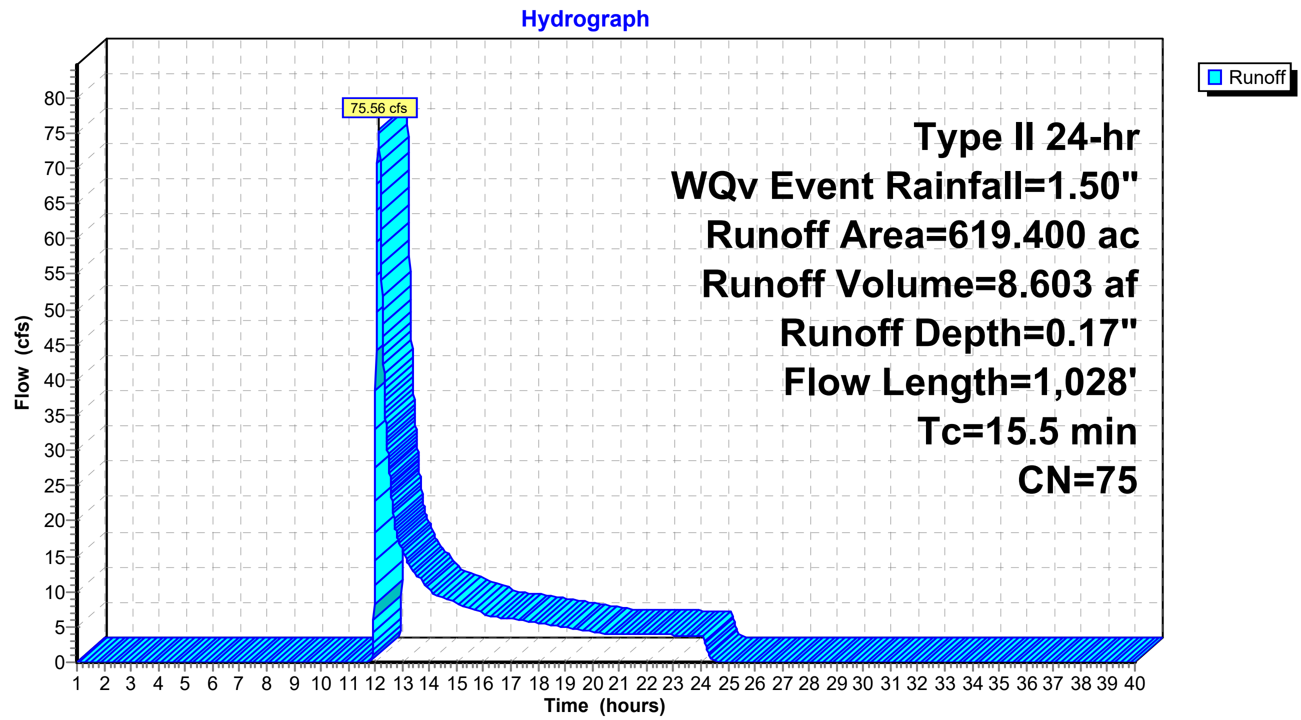
Runoff = 75.56 cfs @ 12.13 hrs, Volume= 8.603 af, Depth= 0.17"
Routed to Link Q : Total Q

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-40.00 hrs, dt= 0.01 hrs
Type II 24-hr WQv Event Rainfall=1.50"

| | Area (ac) | CN | Description |
|---|---|---|---|
| * | 619.400 | 75 | Woods, fields, gravel roads |
| | 619.400 | | 100.00% Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 9.4 | 100 | 0.1300 | 0.18 | | **Sheet Flow, Woods** Woods: Light underbrush n= 0.400 P2= 3.75" |
| 6.1 | 928 | 0.2600 | 2.55 | | **Shallow Concentrated Flow, Woods** Woodland Kv= 5.0 fps |
| 15.5 | 1,028 | Total | | | |

### Subcatchment 3: DA 3



## Summary for Subcatchment 4: DA 4

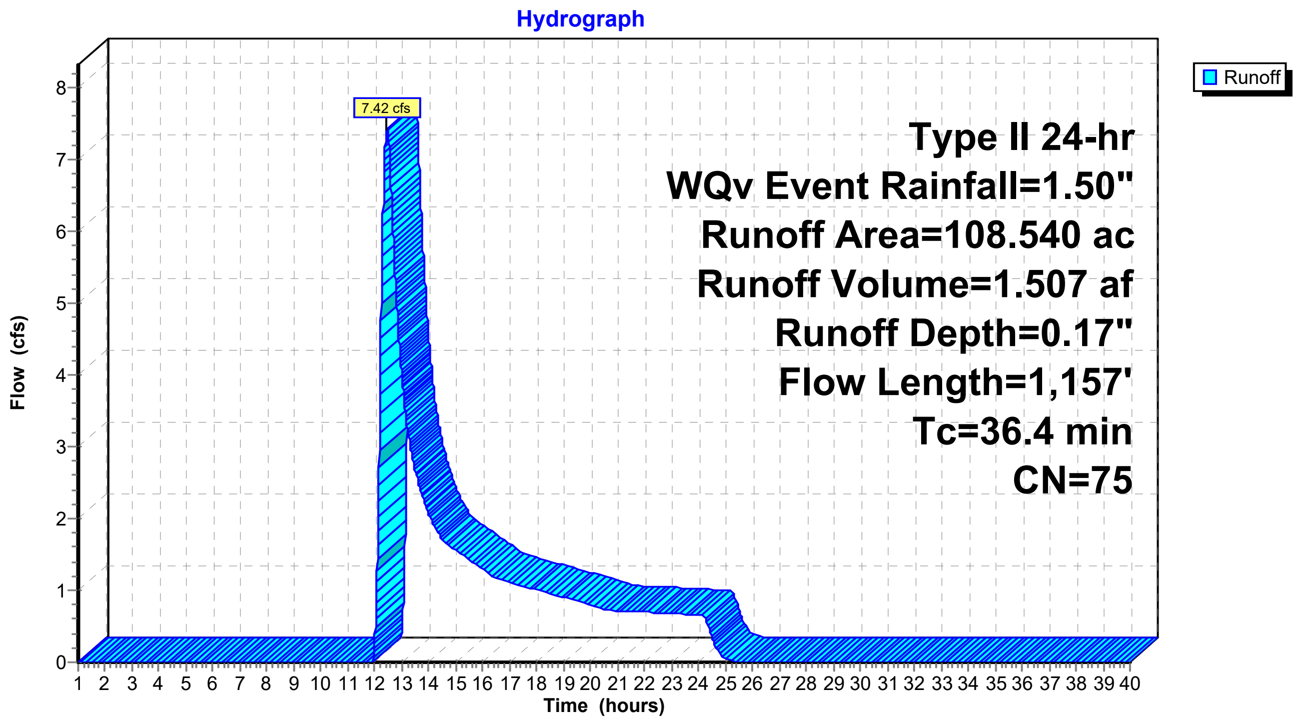
Runoff = 7.42 cfs @ 12.45 hrs, Volume= 1.507 af, Depth= 0.17"
Routed to Link Q : Total Q

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-40.00 hrs, dt= 0.01 hrs
Type II 24-hr WQv Event Rainfall=1.50"

| | Area (ac) | CN | Description |
|---|---|---|---|
| * | 108.540 | 75 | Woods, Brush, Field, road |
| | 108.540 | | 100.00% Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 19.8 | 100 | 0.0200 | 0.08 | | **Sheet Flow, Woods**<br>Woods: Light underbrush n= 0.400 P2= 3.75" |
| 16.6 | 1,057 | 0.0450 | 1.06 | | **Shallow Concentrated Flow, Brush**<br>Woodland Kv= 5.0 fps |
| 36.4 | 1,157 | Total | | | |

### Subcatchment 4: DA 4



## Summary for Subcatchment 5: DA 5

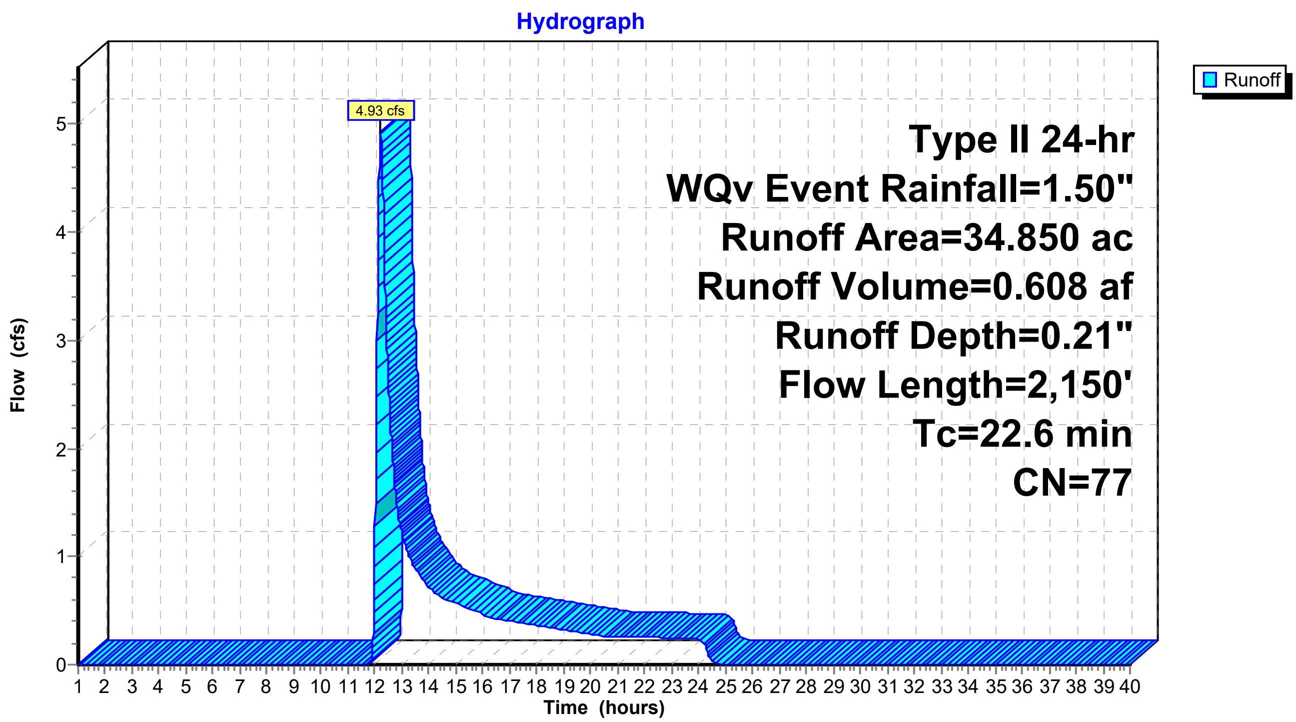
Runoff = 4.93 cfs @ 12.22 hrs, Volume= 0.608 af, Depth= 0.21"
Routed to Link Q : Total Q

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-40.00 hrs, dt= 0.01 hrs
Type II 24-hr WQv Event Rainfall=1.50"

| Area (ac) | CN | Description |
|---|---|---|
| 34.850 | 77 | 2 acre lots, 12% imp, HSG C |
| 30.668 | | 88.00% Pervious Area |
| 4.182 | | 12.00% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 7.9 | 100 | 0.2000 | 0.21 | | **Sheet Flow, Woods**<br>Woods: Light underbrush n= 0.400 P2= 3.75" |
| 14.7 | 2,050 | 0.0240 | 2.32 | | **Shallow Concentrated Flow, Lawn**<br>Grassed Waterway Kv= 15.0 fps |
| 22.6 | 2,150 | Total | | | |

### Subcatchment 5: DA 5

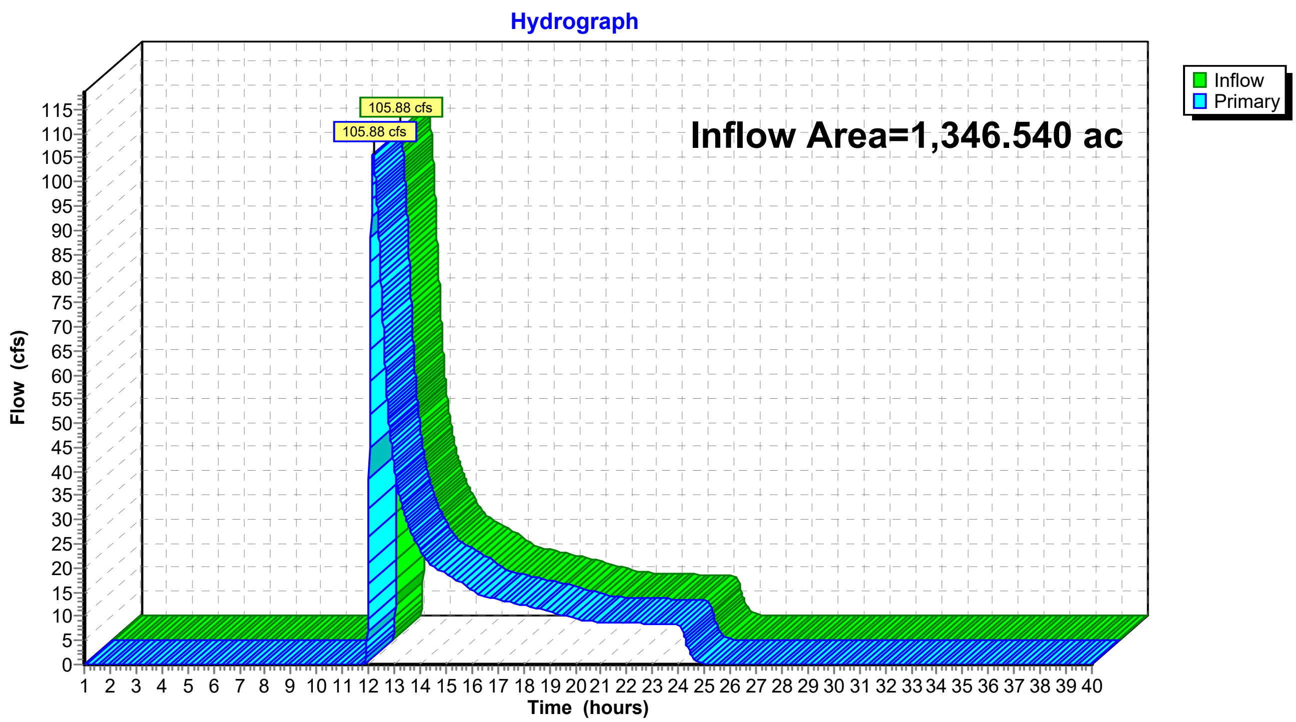


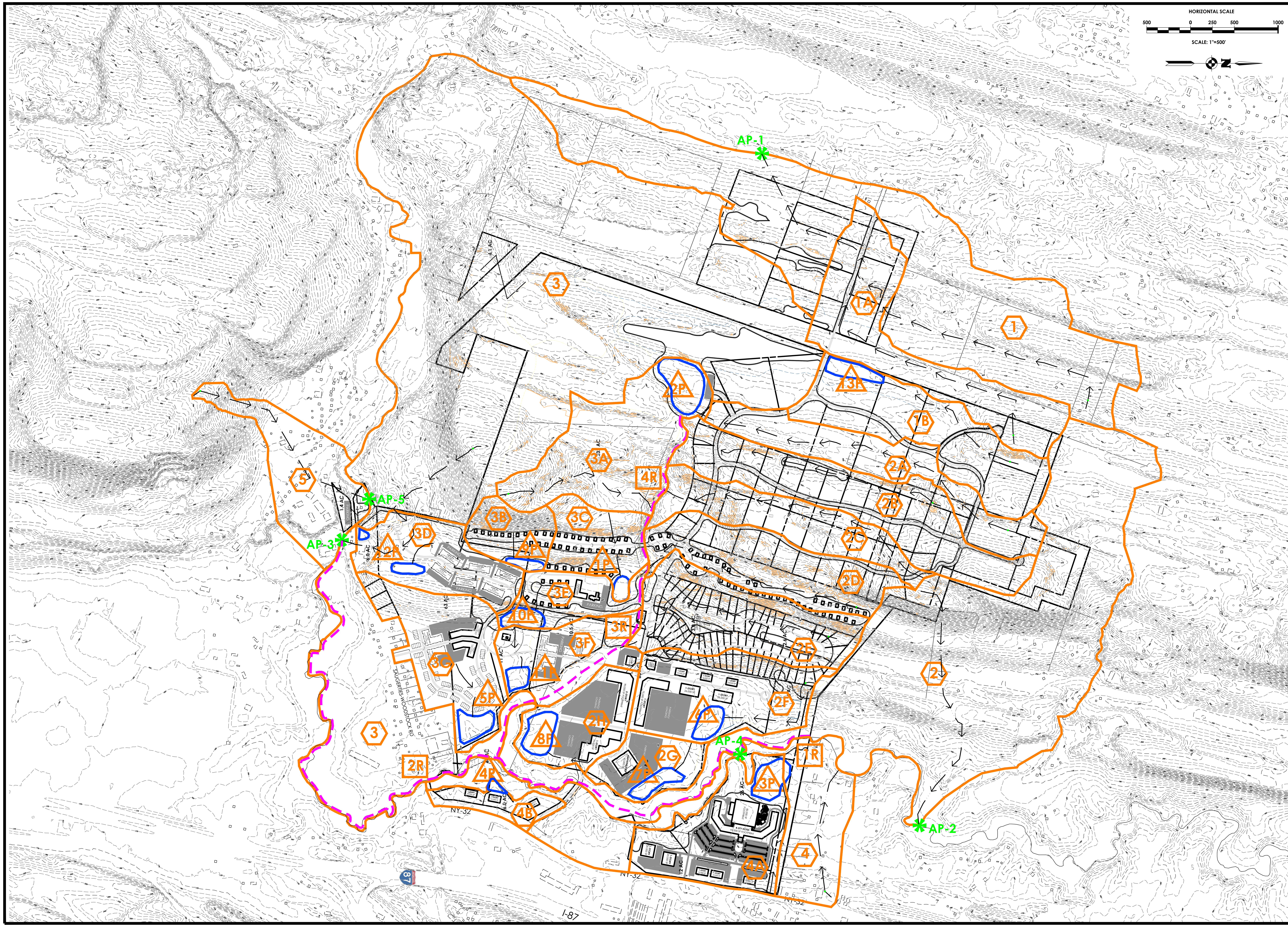
## Summary for Link Q: Total Q

Inflow Area = 1,346.540 ac, 0.31% Impervious, Inflow Depth = 0.17" for WQv Event event
Inflow = 105.88 cfs @ 12.18 hrs, Volume= 18.826 af
Primary = 105.88 cfs @ 12.19 hrs, Volume= 18.826 af, Atten= 0%, Lag= 0.6 min

Primary outflow = Inflow, Time Span= 1.00-40.00 hrs, dt= 0.01 hrs

### Link Q: Total Q






Y:\PROJECTS-NEW\2020\20202934\20202934.0001\01 CAD - BIM - MODELS\CIVIL\20202934.0001_DRAINAGE-SP-PM.DWG 3/13/2024 2:39 PM Patrick Mitchell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SAUGERTIES, NY


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Designed by D.J. Goodall, EIT


STATE OF NEW YORK
JESS DANIEL SUDOL
LICENSED PROFESSIONAL ENGINEER
092235

Revisions

| No. | Date | By | Description |
|---|---|---|---|
| 1 | 24/02/15 | PM | ADDRESSED NYSDEC COMMENTS |

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# PROPOSED DRAINAGE AREA MAP

## WINSTON FARM

Town/City: SAUGERTIES
County: ULSTER
State: NEW YORK

Project No.
20202934.0001

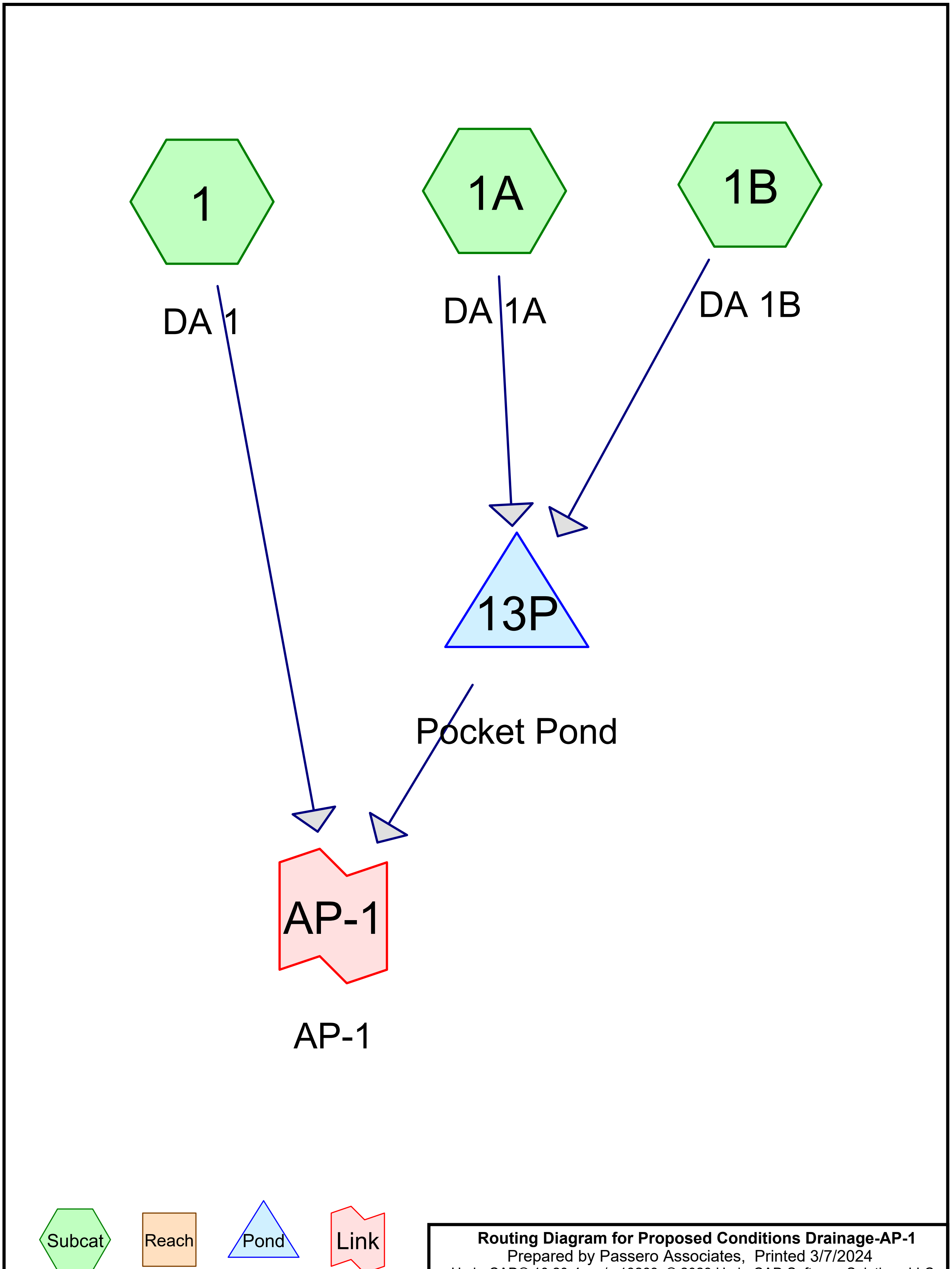
Drawing No.
C-191

Sheet No.
DA-4

Scale:
1" = 500'

Date
JANUARY, 2021

NOT FOR CONSTRUCTION




**Routing Diagram for Proposed Conditions Drainage-AP-1**
Prepared by Passero Associates, Printed 3/7/2024
HydroCAD® 10.20-4a s/n 13263 © 2023 HydroCAD Software Solutions LLC

## Rainfall Events Listing (selected events)

| Event# | Event Name | Storm Type | Curve | Mode | Duration (hours) | B/B | Depth (inches) | AMC |
|---|---|---|---|---|---|---|---|---|
| 1 | 1-Year Event | Type II 24-hr | | Default | 24.00 | 1 | 2.20 | 2 |
| 2 | 10-Year Event | Type II 24-hr | | Default | 24.00 | 1 | 4.40 | 2 |
| 3 | 100-Year Event | Type II 24-hr | | Default | 24.00 | 1 | 8.00 | 2 |
| 4 | WQv Event | Type II 24-hr | | Default | 24.00 | 1 | 1.50 | 2 |

## Area Listing (all nodes)

| Area (acres) | CN | Description (subcatchment-numbers) |
|---|---|---|
| 78.409 | 77 | 2 acre lots, 12% imp, HSG C (1A, 1B) |
| 158.926 | 73 | Woods, Fair, HSG C (1) |
| 22.957 | 70 | Woods, Good, HSG C (1B) |
| **260.292** | **74** | **TOTAL AREA** |

## Ground Covers (all nodes)

| HSG-A (acres) | HSG-B (acres) | HSG-C (acres) | HSG-D (acres) | Other (acres) | Total (acres) | Ground Cover | Subcatchment Numbers |
|---|---|---|---|---|---|---|---|
| 0.000 | 0.000 | 78.409 | 0.000 | 0.000 | 78.409 | 2 acre lots, 12% imp | 1A, 1B |
| 0.000 | 0.000 | 158.926 | 0.000 | 0.000 | 158.926 | Woods, Fair | 1 |
| 0.000 | 0.000 | 22.957 | 0.000 | 0.000 | 22.957 | Woods, Good | 1B |
| **0.000** | **0.000** | **260.292** | **0.000** | **0.000** | **260.292** | **TOTAL AREA** | |

Time span=1.00-40.00 hrs, dt=0.01 hrs, 3901 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Sim-Route method - Pond routing by Sim-Route method

**Subcatchment1: DA 1** Runoff Area=158.926 ac 0.00% Impervious Runoff Depth=0.41"
Flow Length=5,413' Tc=135.9 min CN=73 Runoff=14.72 cfs 5.474 af

**Subcatchment1A: DA 1A** Runoff Area=53.103 ac 12.00% Impervious Runoff Depth=0.56"
Flow Length=5,343' Tc=121.9 min CN=77 Runoff=7.85 cfs 2.476 af

**Subcatchment1B: DA 1B** Runoff Area=48.263 ac 6.29% Impervious Runoff Depth=0.45"
Flow Length=1,873' Tc=78.6 min CN=74 Runoff=7.40 cfs 1.799 af

**Pond 13P: Pocket Pond** Peak Elev=395.99' Storage=71,406 cf Inflow=14.01 cfs 4.276 af
Outflow=5.77 cfs 4.017 af

**Link AP-1: AP-1** Inflow=18.74 cfs 9.491 af
Primary=18.74 cfs 9.491 af

**Total Runoff Area = 260.292 ac Runoff Volume = 9.750 af Average Runoff Depth = 0.45"**
**96.39% Pervious = 250.883 ac 3.61% Impervious = 9.409 ac**

## Summary for Subcatchment 1: DA 1

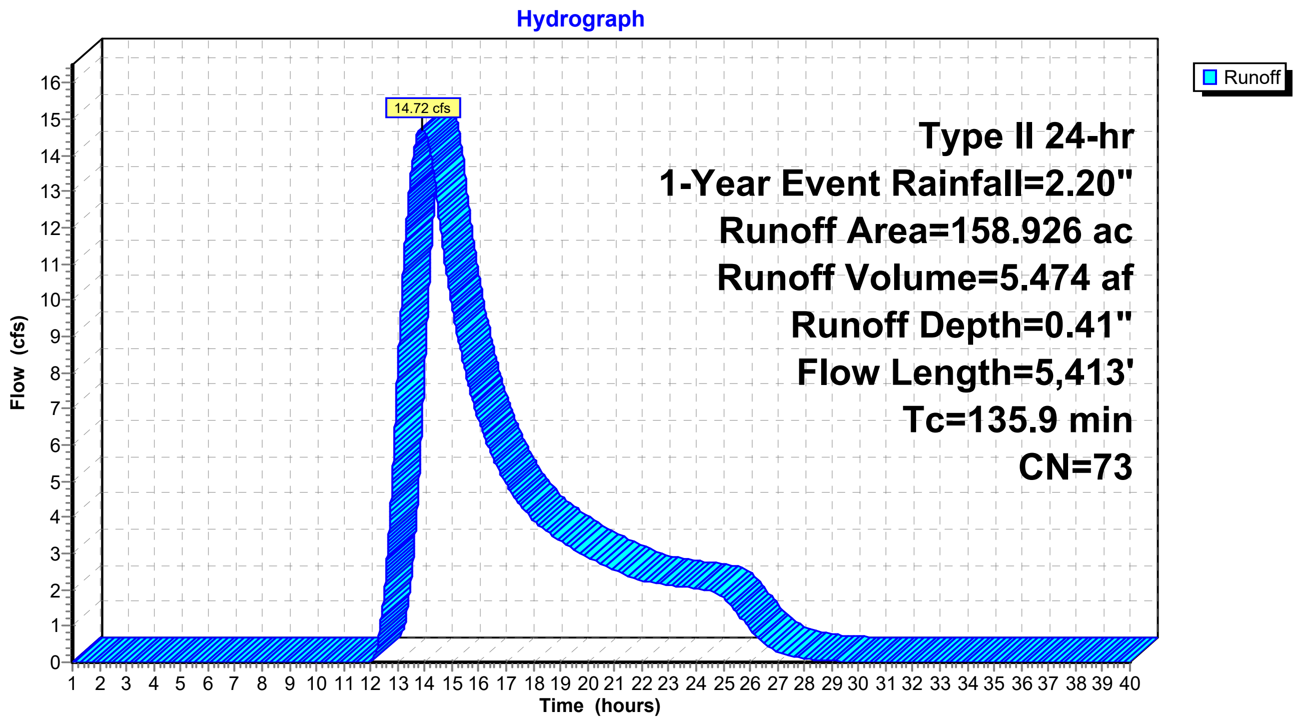
Runoff = 14.72 cfs @ 13.89 hrs, Volume= 5.474 af, Depth= 0.41"
Routed to Link AP-1 : AP-1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-40.00 hrs, dt= 0.01 hrs
Type II 24-hr 1-Year Event Rainfall=2.20"

| Area (ac) | CN | Description |
|---|---|---|
| 158.926 | 73 | Woods, Fair, HSG C |
| 158.926 | | 100.00% Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 23.9 | 100 | 0.0500 | 0.07 | | **Sheet Flow, Woods**<br>Woods: Dense underbrush n= 0.800 P2= 3.75" |
| 112.0 | 5,313 | 0.0250 | 0.79 | | **Shallow Concentrated Flow, Woods**<br>Woodland Kv= 5.0 fps |
| 135.9 | 5,413 | Total | | | |

### Subcatchment 1: DA 1



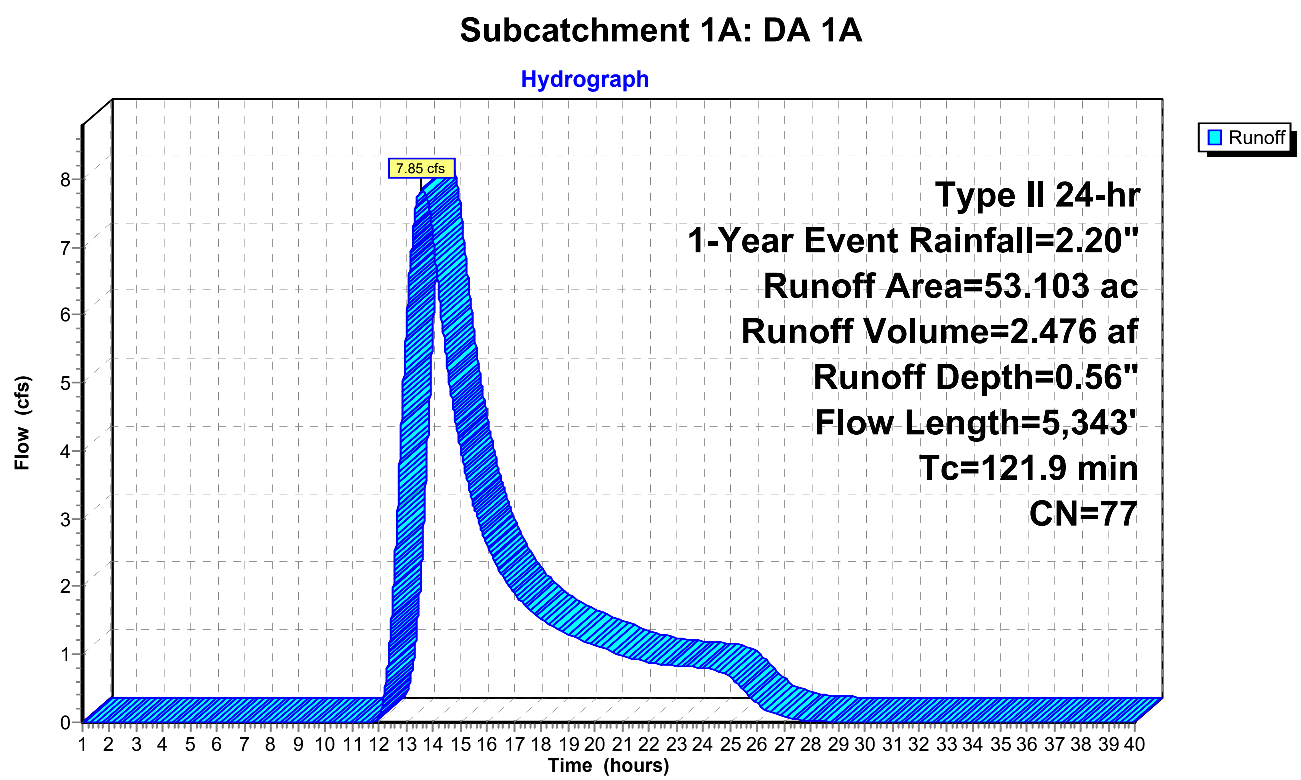
## Summary for Subcatchment 1A: DA 1A

Runoff = 7.85 cfs @ 13.55 hrs, Volume= 2.476 af, Depth= 0.56"
Routed to Pond 13P : Pocket Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-40.00 hrs, dt= 0.01 hrs
Type II 24-hr 1-Year Event Rainfall=2.20"

| Area (ac) | CN | Description |
|---|---|---|
| 53.103 | 77 | 2 acre lots, 12% imp, HSG C |
| 46.731 | | 88.00% Pervious Area |
| 6.372 | | 12.00% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 17.5 | 100 | 0.1100 | 0.10 | | **Sheet Flow, Woods**<br>Woods: Dense underbrush n= 0.800 P2= 3.75" |
| 104.4 | 5,243 | 0.0280 | 0.84 | | **Shallow Concentrated Flow, Woods**<br>Woodland Kv= 5.0 fps |
| 121.9 | 5,343 | Total | | | |



## Summary for Subcatchment 1B: DA 1B

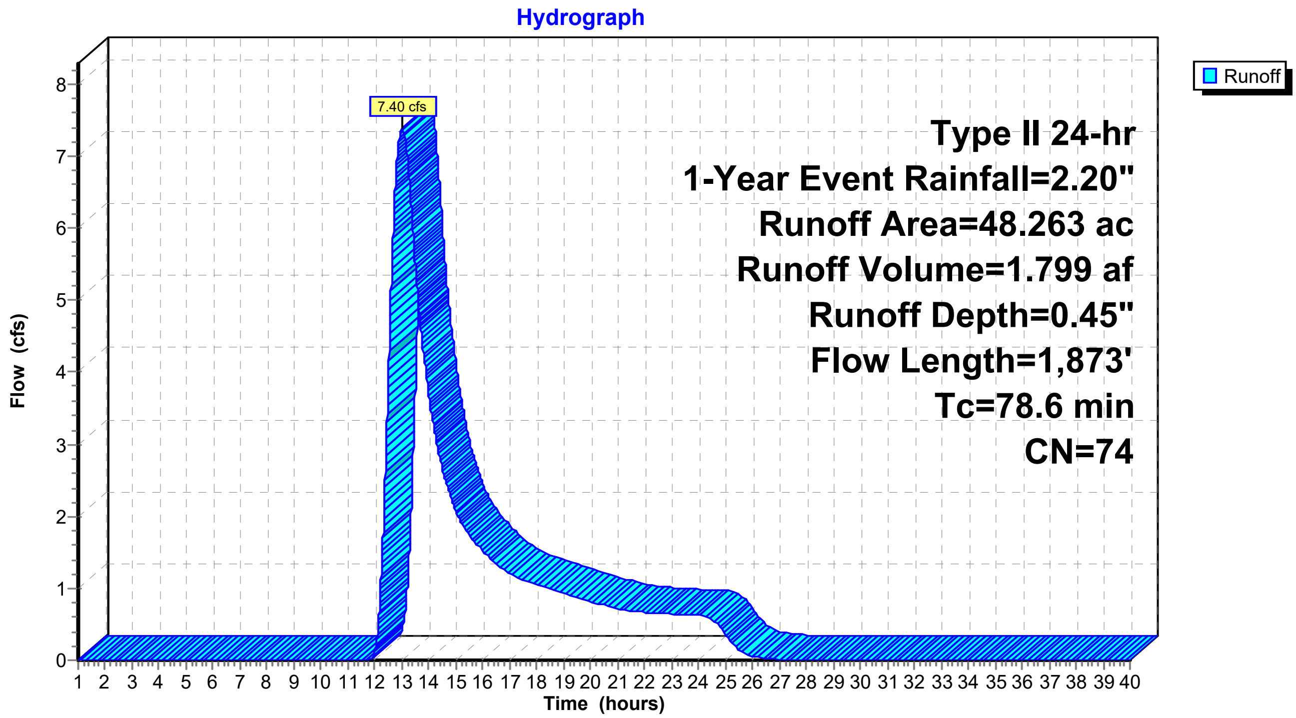
Runoff = 7.40 cfs @ 13.01 hrs, Volume= 1.799 af, Depth= 0.45"
Routed to Pond 13P : Pocket Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-40.00 hrs, dt= 0.01 hrs
Type II 24-hr 1-Year Event Rainfall=2.20"

| Area (ac) | CN | Description |
|---|---|---|
| 22.957 | 70 | Woods, Good, HSG C |
| 25.306 | 77 | 2 acre lots, 12% imp, HSG C |
| 48.263 | 74 | Weighted Average |
| 45.226 | | 93.71% Pervious Area |
| 3.037 | | 6.29% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 45.6 | 100 | 0.0100 | 0.04 | | **Sheet Flow, Woods**<br>Woods: Dense underbrush n= 0.800 P2= 3.75" |
| 33.0 | 1,773 | 0.0320 | 0.89 | | **Shallow Concentrated Flow, Woods**<br>Woodland Kv= 5.0 fps |
| 78.6 | 1,873 | Total | | | |

## Subcatchment 1B: DA 1B



## Summary for Pond 13P: Pocket Pond

Inflow Area = 101.366 ac, 9.28% Impervious, Inflow Depth = 0.51" for 1-Year Event event
Inflow = 14.01 cfs @ 13.27 hrs, Volume= 4.276 af
Outflow = 5.77 cfs @ 15.13 hrs, Volume= 4.017 af, Atten= 59%, Lag= 111.9 min
Primary = 5.77 cfs @ 15.13 hrs, Volume= 4.017 af
Routed to Link AP-1 : AP-1

Routing by Sim-Route method, Time Span= 1.00-40.00 hrs, dt= 0.01 hrs
Peak Elev= 395.99' @ 15.13 hrs Surf.Area= 73,694 sf Storage= 71,406 cf

Plug-Flow detention time= 268.4 min calculated for 4.016 af (94% of inflow)
Center-of-Mass det. time= 235.9 min ( 1,206.0 - 970.1 )

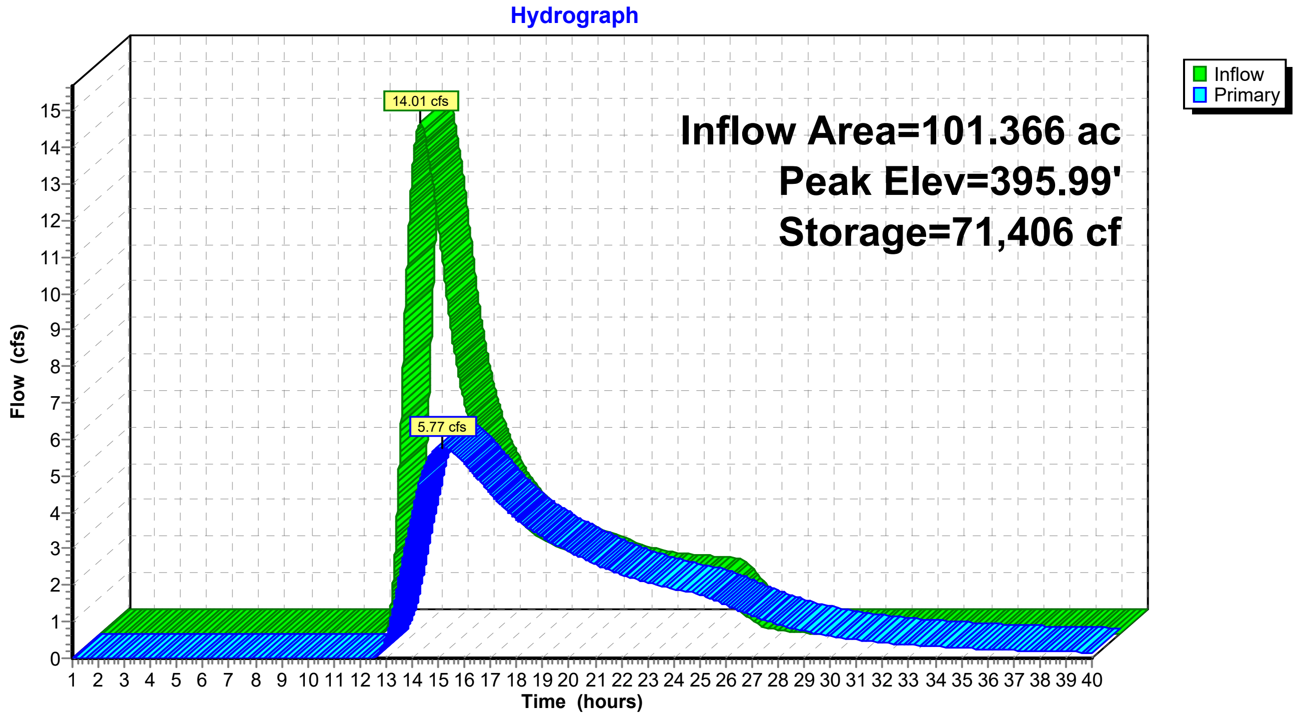
| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 395.00' | 757,850 cf | **Custom Stage Data (Prismatic)** Listed below (Recalc) |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 395.00 | 70,734 | 0 | 0 |
| 404.00 | 97,677 | 757,850 | 757,850 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 395.00' | **30.0" Round Culvert**<br>L= 50.0' CPP, square edge headwall, Ke= 0.500<br>Inlet / Outlet Invert= 395.00' / 394.50' S= 0.0100 '/' Cc= 0.900<br>n= 0.011 Concrete pipe, straight & clean, Flow Area= 4.91 sf |
| #2 | Device 1 | 395.00' | **24.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads |
| #3 | Device 1 | 395.80' | **24.0" W x 6.0" H Vert. Orifice/Grate** C= 0.600<br>Limited to weir flow at low heads |
| #4 | Device 1 | 397.90' | **36.0" x 36.0" Horiz. Orifice/Grate** C= 0.600<br>Limited to weir flow at low heads |

**Primary OutFlow** Max=5.77 cfs @ 15.13 hrs HW=395.99' TW=0.00' (Dynamic Tailwater)
└─**1=Culvert** (Passes 5.77 cfs of 5.90 cfs potential flow)
  ├─**2=Orifice/Grate** (Orifice Controls 5.24 cfs @ 3.39 fps)
  ├─**3=Orifice/Grate** (Orifice Controls 0.53 cfs @ 1.39 fps)
  └─**4=Orifice/Grate** ( Controls 0.00 cfs)

## Pond 13P: Pocket Pond

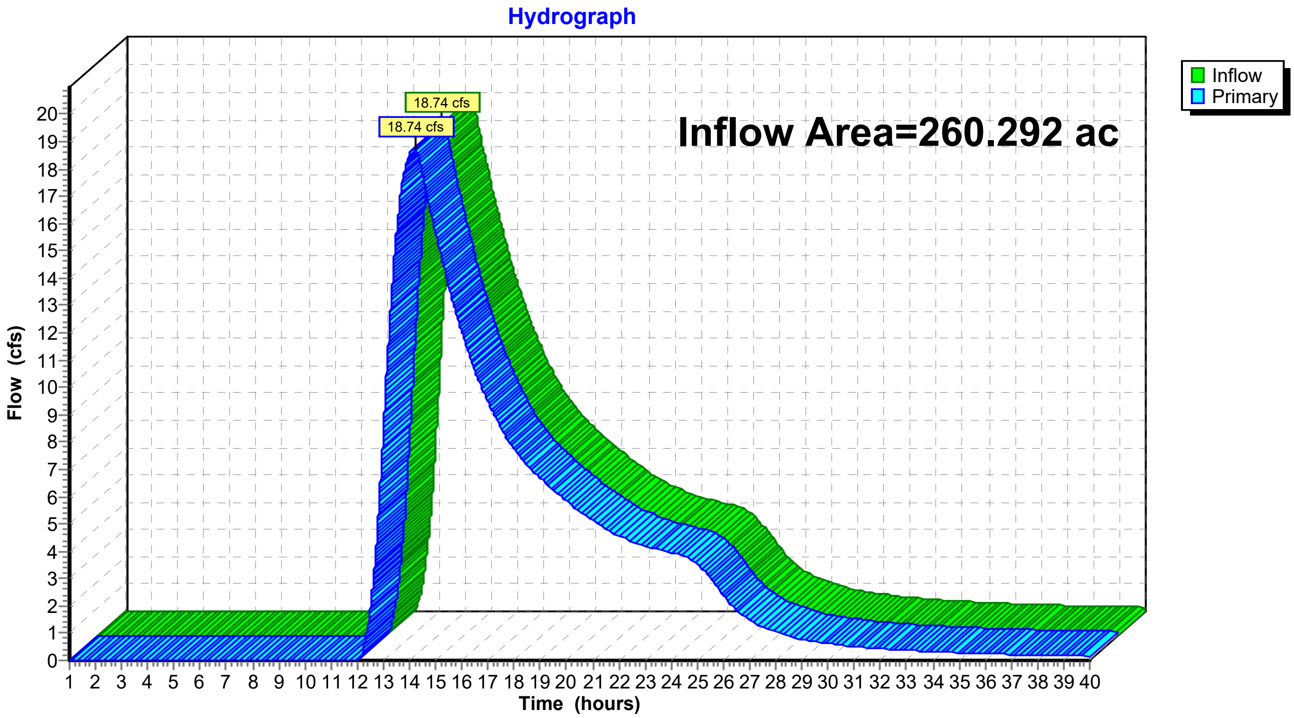


## Summary for Link AP-1: AP-1

Inflow Area = 260.292 ac, 3.61% Impervious, Inflow Depth > 0.44" for 1-Year Event event
Inflow = 18.74 cfs @ 14.19 hrs, Volume= 9.491 af
Primary = 18.74 cfs @ 14.20 hrs, Volume= 9.491 af, Atten= 0%, Lag= 0.6 min

Primary outflow = Inflow, Time Span= 1.00-40.00 hrs, dt= 0.01 hrs

### Link AP-1: AP-1



Time span=1.00-40.00 hrs, dt=0.01 hrs, 3901 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Sim-Route method - Pond routing by Sim-Route method

**Subcatchment1: DA 1** Runoff Area=158.926 ac 0.00% Impervious Runoff Depth=1.82"
Flow Length=5,413' Tc=135.9 min CN=73 Runoff=80.47 cfs 24.112 af

**Subcatchment1A: DA 1A** Runoff Area=53.103 ac 12.00% Impervious Runoff Depth=2.13"
Flow Length=5,343' Tc=121.9 min CN=77 Runoff=34.76 cfs 9.424 af

**Subcatchment1B: DA 1B** Runoff Area=48.263 ac 6.29% Impervious Runoff Depth=1.90"
Flow Length=1,873' Tc=78.6 min CN=74 Runoff=38.63 cfs 7.625 af

**Pond 13P: Pocket Pond** Peak Elev=398.33' Storage=251,929 cf Inflow=67.54 cfs 17.049 af
Outflow=33.72 cfs 16.751 af

**Link AP-1: AP-1** Inflow=112.23 cfs 40.862 af
Primary=112.23 cfs 40.862 af

**Total Runoff Area = 260.292 ac Runoff Volume = 41.161 af Average Runoff Depth = 1.90"**
**96.39% Pervious = 250.883 ac 3.61% Impervious = 9.409 ac**

## Summary for Subcatchment 1: DA 1

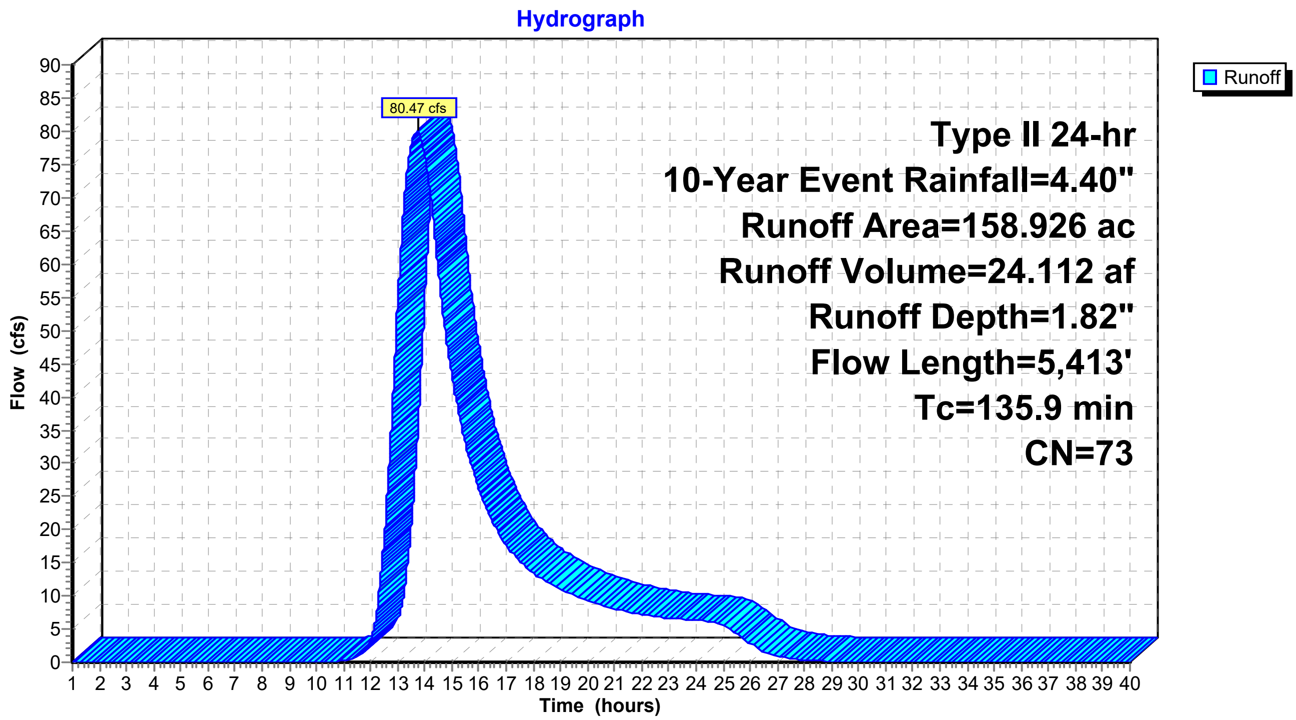
Runoff = 80.47 cfs @ 13.74 hrs, Volume= 24.112 af, Depth= 1.82"
Routed to Link AP-1 : AP-1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-40.00 hrs, dt= 0.01 hrs
Type II 24-hr 10-Year Event Rainfall=4.40"

| Area (ac) | CN | Description |
|---|---|---|
| 158.926 | 73 | Woods, Fair, HSG C |
| 158.926 | | 100.00% Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 23.9 | 100 | 0.0500 | 0.07 | | **Sheet Flow, Woods** Woods: Dense underbrush n= 0.800 P2= 3.75" |
| 112.0 | 5,313 | 0.0250 | 0.79 | | **Shallow Concentrated Flow, Woods** Woodland Kv= 5.0 fps |
| 135.9 | 5,413 | Total | | | |

## Subcatchment 1: DA 1



## Summary for Subcatchment 1A: DA 1A

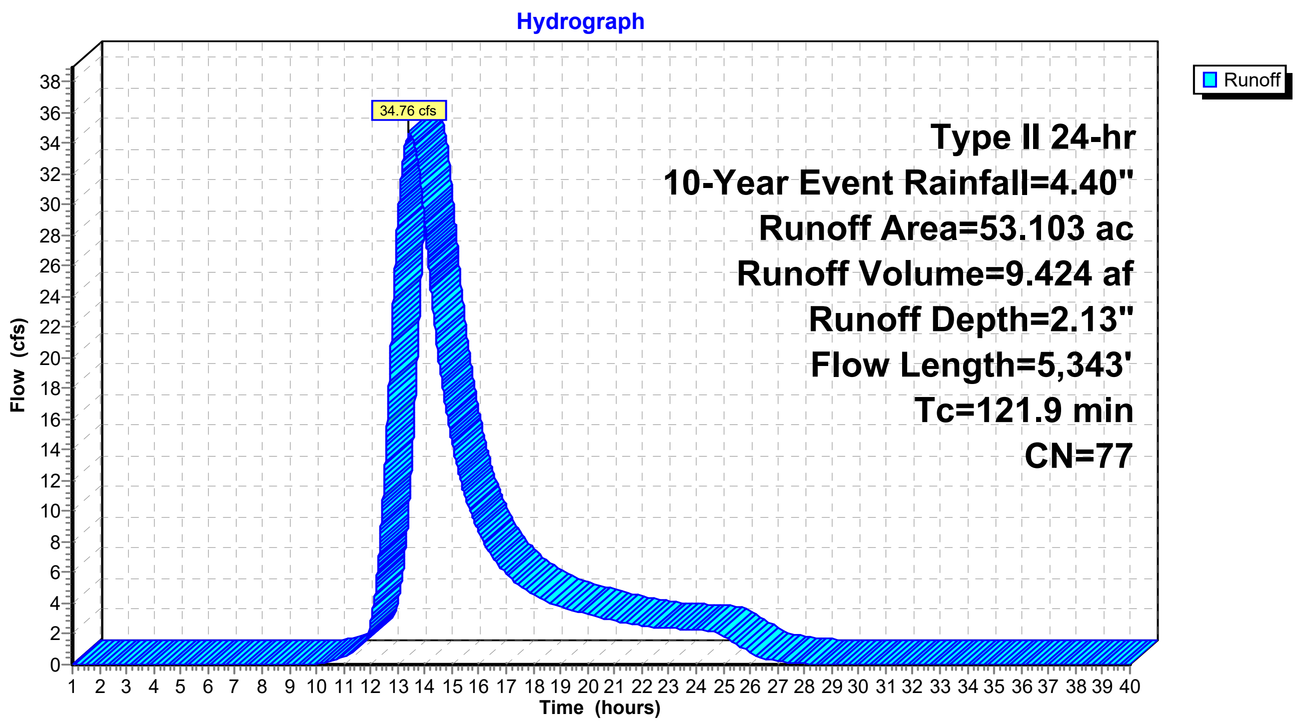
Runoff = 34.76 cfs @ 13.41 hrs, Volume= 9.424 af, Depth= 2.13"
Routed to Pond 13P : Pocket Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-40.00 hrs, dt= 0.01 hrs
Type II 24-hr 10-Year Event Rainfall=4.40"

| Area (ac) | CN | Description |
|---|---|---|
| 53.103 | 77 | 2 acre lots, 12% imp, HSG C |
| 46.731 | | 88.00% Pervious Area |
| 6.372 | | 12.00% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 17.5 | 100 | 0.1100 | 0.10 | | **Sheet Flow, Woods** Woods: Dense underbrush n= 0.800 P2= 3.75" |
| 104.4 | 5,243 | 0.0280 | 0.84 | | **Shallow Concentrated Flow, Woods** Woodland Kv= 5.0 fps |
| 121.9 | 5,343 | Total | | | |

## Subcatchment 1A: DA 1A



## Summary for Subcatchment 1B: DA 1B

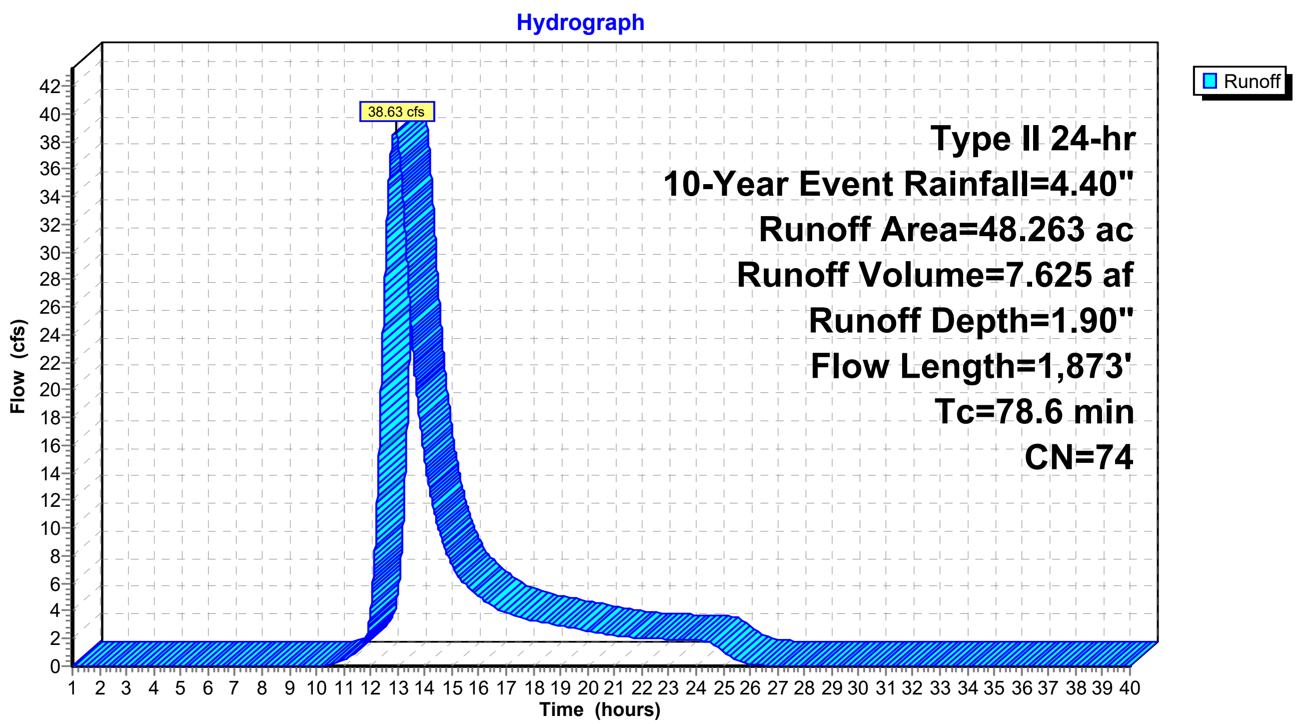
Runoff = 38.63 cfs @ 12.92 hrs, Volume= 7.625 af, Depth= 1.90"
Routed to Pond 13P : Pocket Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-40.00 hrs, dt= 0.01 hrs
Type II 24-hr 10-Year Event Rainfall=4.40"

| Area (ac) | CN | Description |
|---|---|---|
| 22.957 | 70 | Woods, Good, HSG C |
| 25.306 | 77 | 2 acre lots, 12% imp, HSG C |
| 48.263 | 74 | Weighted Average |
| 45.226 | | 93.71% Pervious Area |
| 3.037 | | 6.29% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 45.6 | 100 | 0.0100 | 0.04 | | **Sheet Flow, Woods** Woods: Dense underbrush n= 0.800 P2= 3.75" |
| 33.0 | 1,773 | 0.0320 | 0.89 | | **Shallow Concentrated Flow, Woods** Woodland Kv= 5.0 fps |
| 78.6 | 1,873 | Total | | | |

### Subcatchment 1B: DA 1B



## Summary for Pond 13P: Pocket Pond

Inflow Area = 101.366 ac, 9.28% Impervious, Inflow Depth = 2.02" for 10-Year Event event
Inflow = 67.54 cfs @ 13.10 hrs, Volume= 17.049 af
Outflow = 33.72 cfs @ 14.50 hrs, Volume= 16.751 af, Atten= 50%, Lag= 83.8 min
Primary = 33.72 cfs @ 14.50 hrs, Volume= 16.751 af
Routed to Link AP-1 : AP-1

Routing by Sim-Route method, Time Span= 1.00-40.00 hrs, dt= 0.01 hrs
Peak Elev= 398.33' @ 14.35 hrs Surf.Area= 80,695 sf Storage= 251,929 cf

Plug-Flow detention time= 152.4 min calculated for 16.747 af (98% of inflow)
Center-of-Mass det. time= 141.8 min ( 1,067.3 - 925.5 )

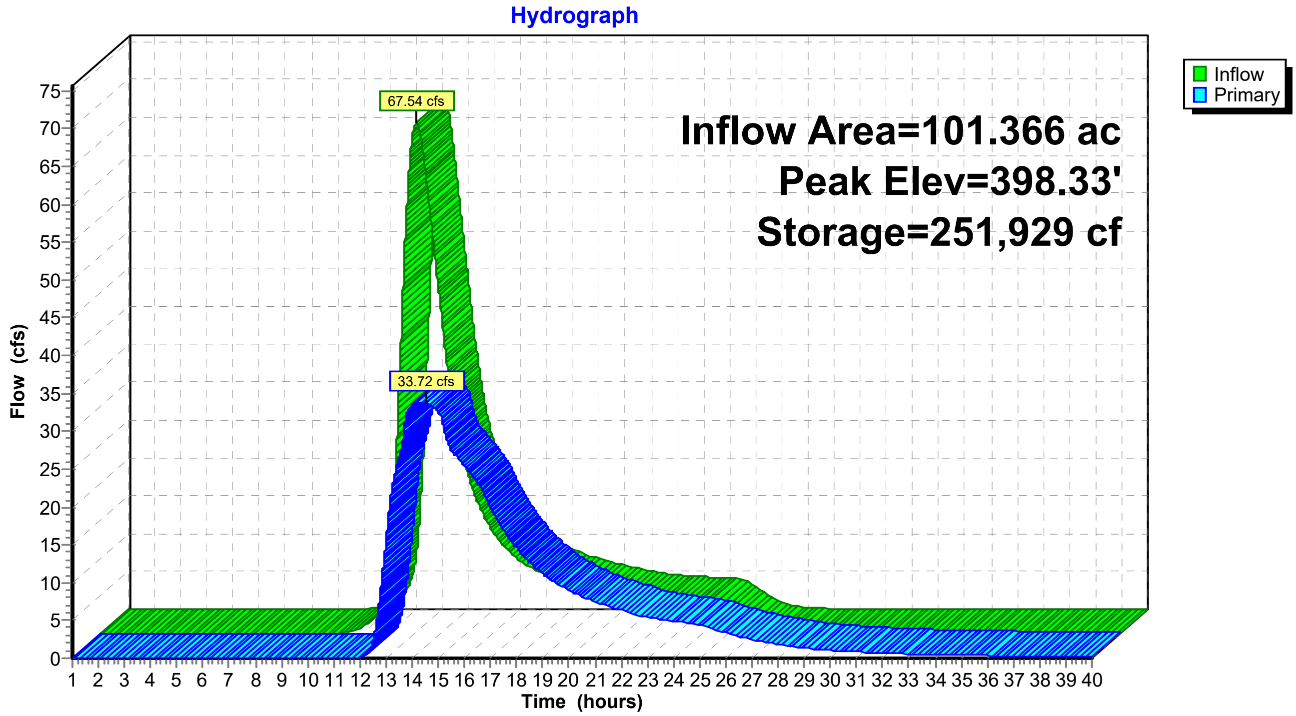
| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 395.00' | 757,850 cf | **Custom Stage Data (Prismatic)** Listed below (Recalc) |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 395.00 | 70,734 | 0 | 0 |
| 404.00 | 97,677 | 757,850 | 757,850 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 395.00' | **30.0" Round Culvert**<br>L= 50.0' CPP, square edge headwall, Ke= 0.500<br>Inlet / Outlet Invert= 395.00' / 394.50' S= 0.0100 '/' Cc= 0.900<br>n= 0.011 Concrete pipe, straight & clean, Flow Area= 4.91 sf |
| #2 | Device 1 | 395.00' | **24.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads |
| #3 | Device 1 | 395.80' | **24.0" W x 6.0" H Vert. Orifice/Grate** C= 0.600<br>Limited to weir flow at low heads |
| #4 | Device 1 | 397.90' | **36.0" x 36.0" Horiz. Orifice/Grate** C= 0.600<br>Limited to weir flow at low heads |

**Primary OutFlow** Max=33.72 cfs @ 14.50 hrs HW=398.32' TW=0.00' (Dynamic Tailwater)
└─**1=Culvert** (Barrel Controls 33.72 cfs @ 6.87 fps)
  ├─**2=Orifice/Grate** (Passes < 23.02 cfs potential flow)
  ├─**3=Orifice/Grate** (Passes < 7.24 cfs potential flow)
  └─**4=Orifice/Grate** (Passes < 10.50 cfs potential flow)

## Pond 13P: Pocket Pond

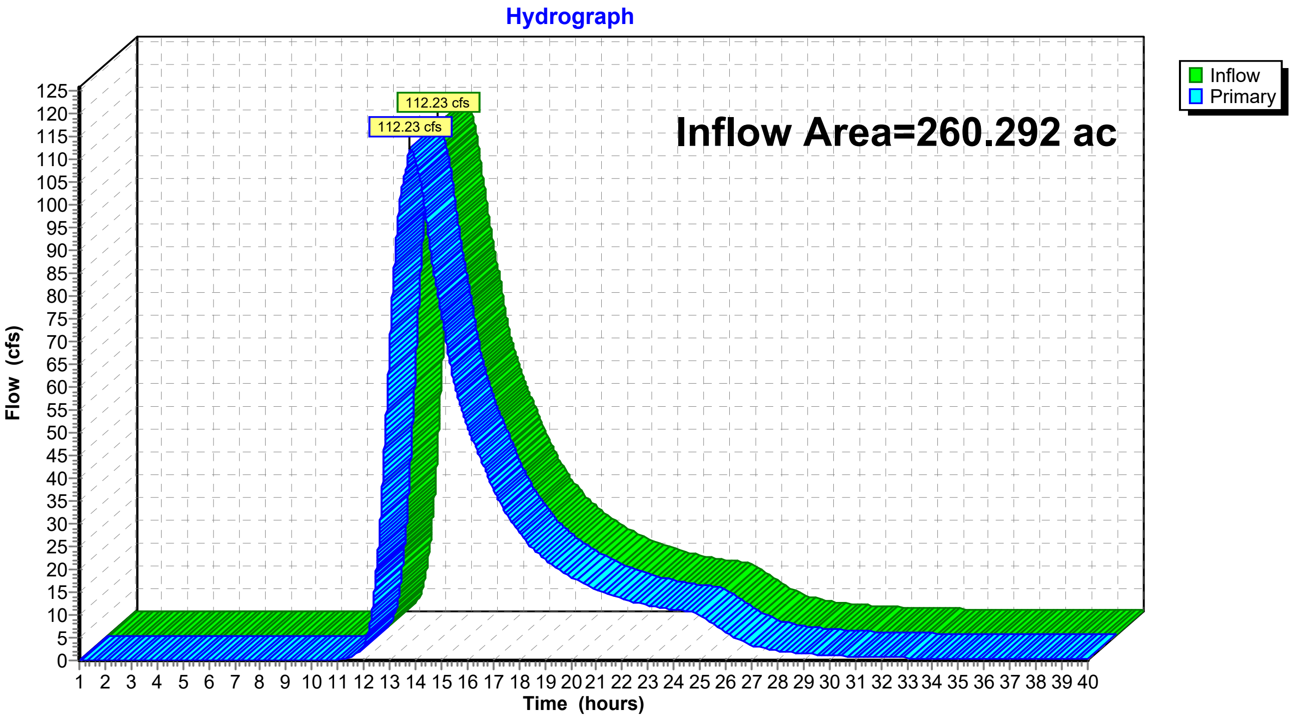


## Summary for Link AP-1: AP-1

| | | | |
|---|---|---|---|
| Inflow Area = | 260.292 ac, | 3.61% Impervious, Inflow Depth > 1.88" | for 10-Year Event event |
| Inflow = | 112.23 cfs @ | 13.77 hrs, Volume= | 40.862 af |
| Primary = | 112.23 cfs @ | 13.78 hrs, Volume= | 40.862 af, Atten= 0%, Lag= 0.6 min |

Primary outflow = Inflow, Time Span= 1.00-40.00 hrs, dt= 0.01 hrs

### Link AP-1: AP-1



Time span=1.00-40.00 hrs, dt=0.01 hrs, 3901 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Sim-Route method - Pond routing by Sim-Route method

**Subcatchment1: DA 1** Runoff Area=158.926 ac 0.00% Impervious Runoff Depth=4.81"
Flow Length=5,413' Tc=135.9 min CN=73 Runoff=220.28 cfs 63.702 af

**Subcatchment1A: DA 1A** Runoff Area=53.103 ac 12.00% Impervious Runoff Depth=5.27"
Flow Length=5,343' Tc=121.9 min CN=77 Runoff=88.09 cfs 23.340 af

**Subcatchment1B: DA 1B** Runoff Area=48.263 ac 6.29% Impervious Runoff Depth=4.93"
Flow Length=1,873' Tc=78.6 min CN=74 Runoff=104.23 cfs 19.811 af

**Pond 13P: Pocket Pond** Peak Elev=403.96' Storage=753,588 cf Inflow=177.31 cfs 43.151 af
Outflow=65.61 cfs 42.826 af

**Link AP-1: AP-1** Inflow=281.34 cfs 106.528 af
Primary=281.34 cfs 106.528 af

**Total Runoff Area = 260.292 ac Runoff Volume = 106.853 af Average Runoff Depth = 4.93"**
**96.39% Pervious = 250.883 ac 3.61% Impervious = 9.409 ac**

## Summary for Subcatchment 1: DA 1

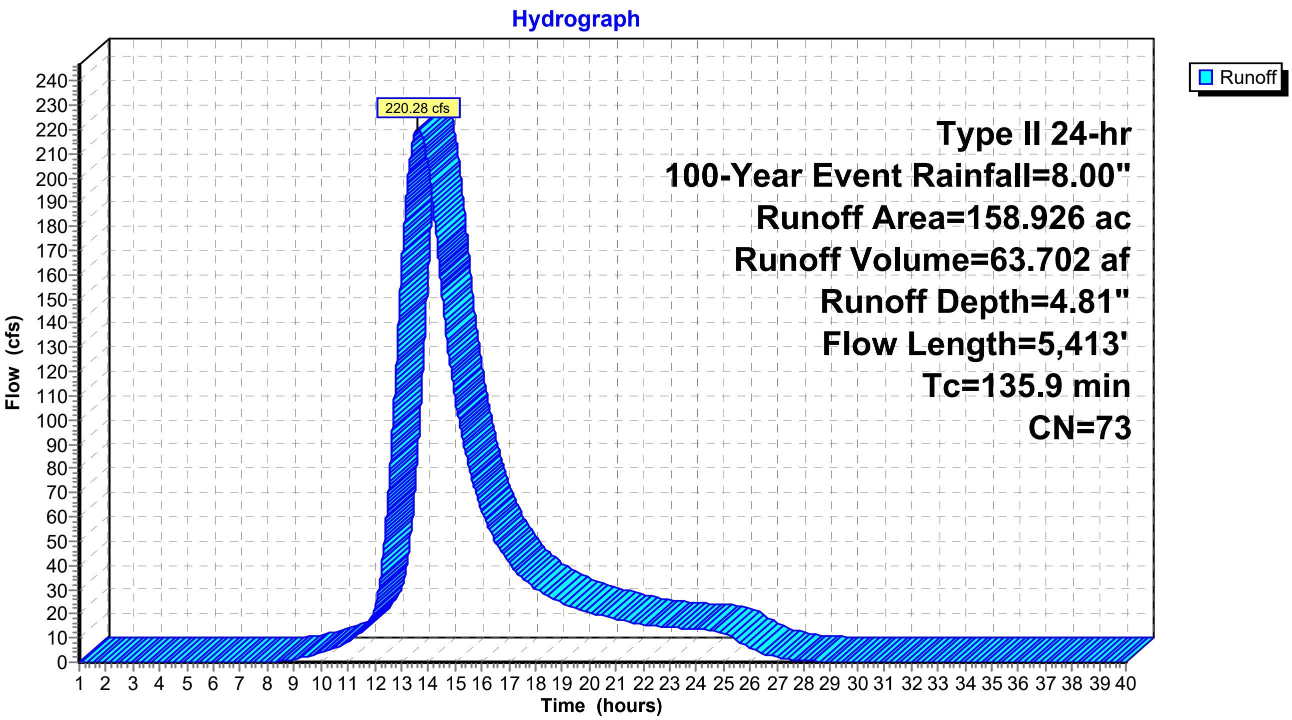
Runoff = 220.28 cfs @ 13.60 hrs, Volume= 63.702 af, Depth= 4.81"
Routed to Link AP-1 : AP-1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-40.00 hrs, dt= 0.01 hrs
Type II 24-hr 100-Year Event Rainfall=8.00"

| Area (ac) | CN | Description |
|---|---|---|
| 158.926 | 73 | Woods, Fair, HSG C |
| 158.926 | | 100.00% Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 23.9 | 100 | 0.0500 | 0.07 | | **Sheet Flow, Woods** Woods: Dense underbrush n= 0.800 P2= 3.75" |
| 112.0 | 5,313 | 0.0250 | 0.79 | | **Shallow Concentrated Flow, Woods** Woodland Kv= 5.0 fps |
| 135.9 | 5,413 | Total | | | |

## Subcatchment 1: DA 1



## Summary for Subcatchment 1A: DA 1A

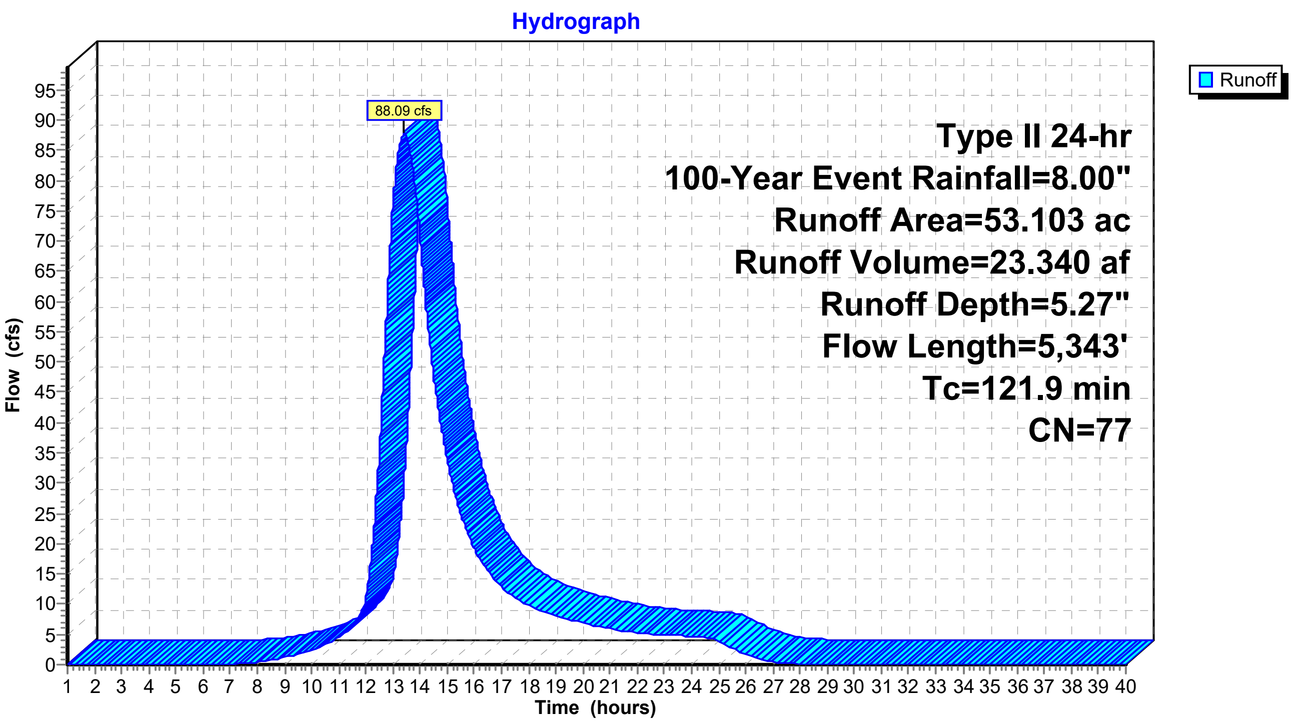
Runoff = 88.09 cfs @ 13.41 hrs, Volume= 23.340 af, Depth= 5.27"
Routed to Pond 13P : Pocket Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-40.00 hrs, dt= 0.01 hrs
Type II 24-hr 100-Year Event Rainfall=8.00"

| Area (ac) | CN | Description |
|---|---|---|
| 53.103 | 77 | 2 acre lots, 12% imp, HSG C |
| 46.731 | | 88.00% Pervious Area |
| 6.372 | | 12.00% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 17.5 | 100 | 0.1100 | 0.10 | | **Sheet Flow, Woods** Woods: Dense underbrush n= 0.800 P2= 3.75" |
| 104.4 | 5,243 | 0.0280 | 0.84 | | **Shallow Concentrated Flow, Woods** Woodland Kv= 5.0 fps |
| 121.9 | 5,343 | Total | | | |

### Subcatchment 1A: DA 1A



## Summary for Subcatchment 1B: DA 1B

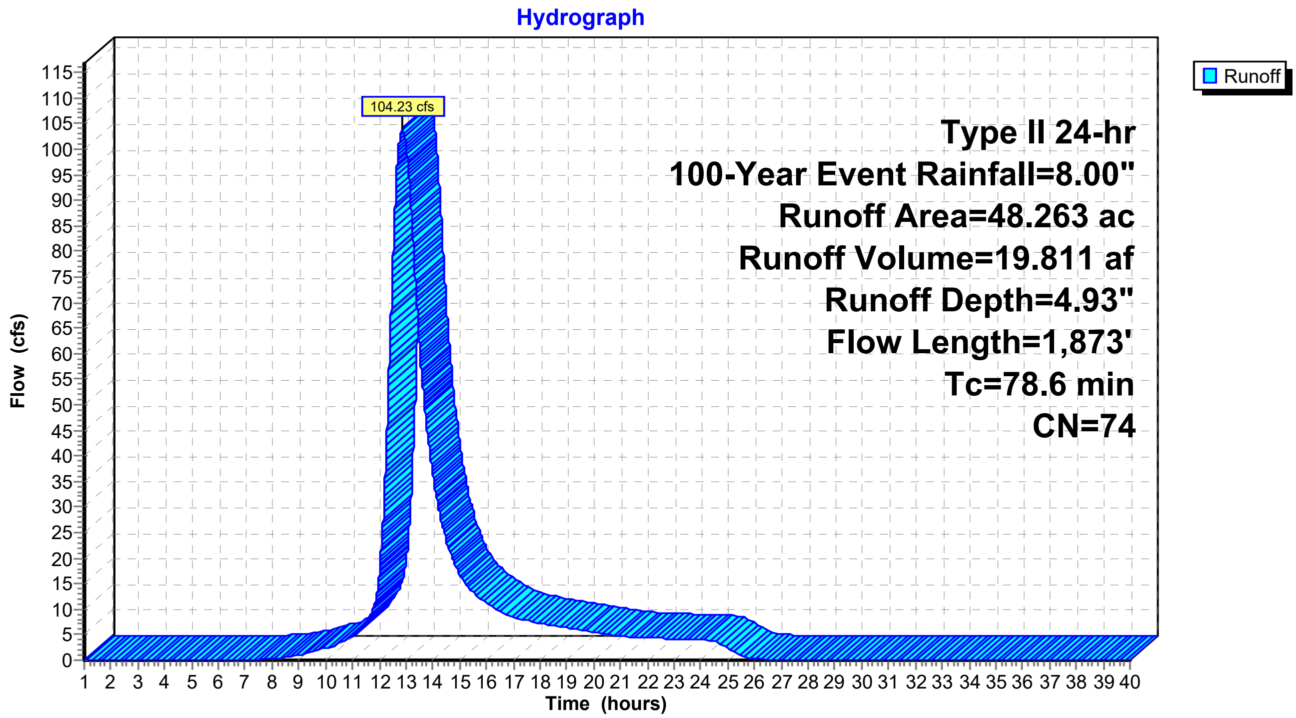
Runoff = 104.23 cfs @ 12.84 hrs, Volume= 19.811 af, Depth= 4.93"
Routed to Pond 13P : Pocket Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-40.00 hrs, dt= 0.01 hrs
Type II 24-hr 100-Year Event Rainfall=8.00"

| Area (ac) | CN | Description |
|---|---|---|
| 22.957 | 70 | Woods, Good, HSG C |
| 25.306 | 77 | 2 acre lots, 12% imp, HSG C |
| 48.263 | 74 | Weighted Average |
| 45.226 | | 93.71% Pervious Area |
| 3.037 | | 6.29% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 45.6 | 100 | 0.0100 | 0.04 | | **Sheet Flow, Woods**<br>Woods: Dense underbrush n= 0.800 P2= 3.75" |
| 33.0 | 1,773 | 0.0320 | 0.89 | | **Shallow Concentrated Flow, Woods**<br>Woodland Kv= 5.0 fps |
| 78.6 | 1,873 | Total | | | |

### Subcatchment 1B: DA 1B



## Summary for Pond 13P: Pocket Pond

Inflow Area = 101.366 ac, 9.28% Impervious, Inflow Depth = 5.11" for 100-Year Event event
Inflow = 177.31 cfs @ 13.01 hrs, Volume= 43.151 af
Outflow = 65.61 cfs @ 14.62 hrs, Volume= 42.826 af, Atten= 63%, Lag= 96.2 min
Primary = 65.61 cfs @ 14.62 hrs, Volume= 42.826 af
Routed to Link AP-1 : AP-1

Routing by Sim-Route method, Time Span= 1.00-40.00 hrs, dt= 0.01 hrs
Peak Elev= 403.96' @ 14.62 hrs Surf.Area= 97,546 sf Storage= 753,588 cf

Plug-Flow detention time= 163.3 min calculated for 42.826 af (99% of inflow)
Center-of-Mass det. time= 158.3 min ( 1,056.9 - 898.6 )

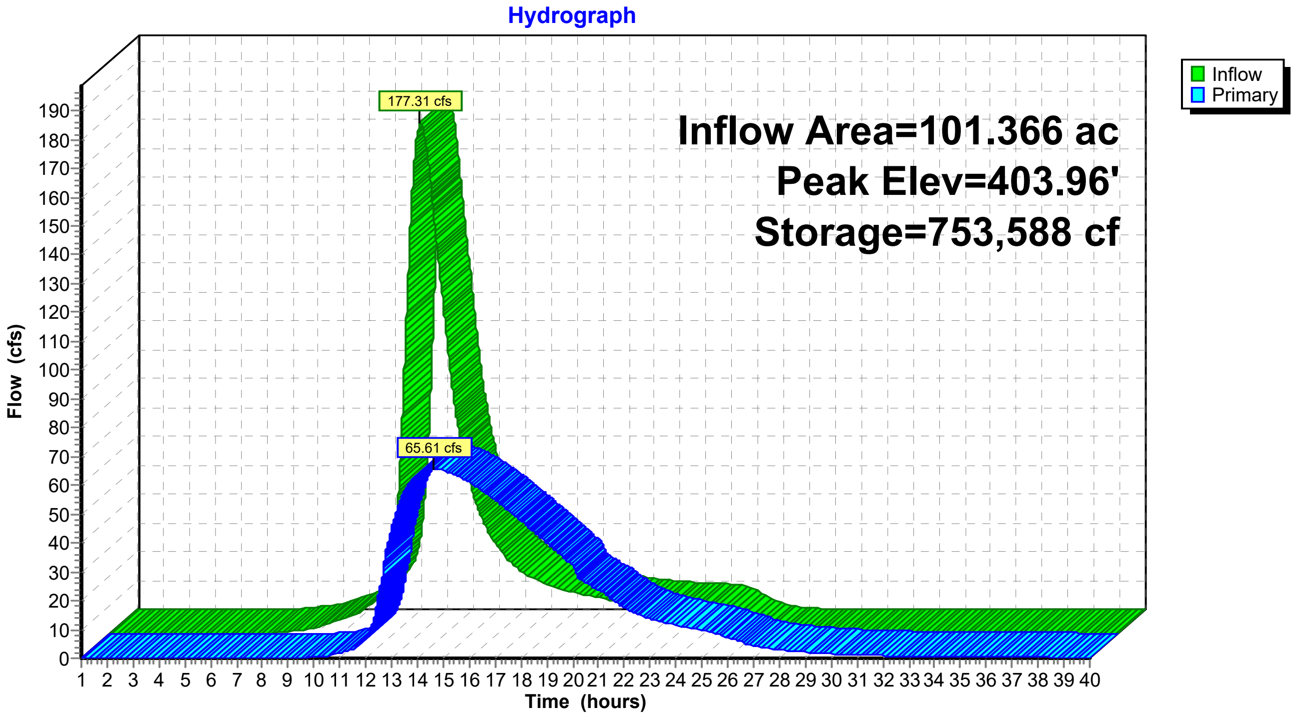
| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 395.00' | 757,850 cf | **Custom Stage Data (Prismatic)** Listed below (Recalc) |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 395.00 | 70,734 | 0 | 0 |
| 404.00 | 97,677 | 757,850 | 757,850 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 395.00' | **30.0" Round Culvert**<br>L= 50.0' CPP, square edge headwall, Ke= 0.500<br>Inlet / Outlet Invert= 395.00' / 394.50' S= 0.0100 '/' Cc= 0.900<br>n= 0.011 Concrete pipe, straight & clean, Flow Area= 4.91 sf |
| #2 | Device 1 | 395.00' | **24.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads |
| #3 | Device 1 | 395.80' | **24.0" W x 6.0" H Vert. Orifice/Grate** C= 0.600<br>Limited to weir flow at low heads |
| #4 | Device 1 | 397.90' | **36.0" x 36.0" Horiz. Orifice/Grate** C= 0.600<br>Limited to weir flow at low heads |

**Primary OutFlow** Max=65.61 cfs @ 14.62 hrs HW=403.96' TW=0.00' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 65.61 cfs @ 13.37 fps)
  ├─**2=Orifice/Grate** (Passes < 42.67 cfs potential flow)
  ├─**3=Orifice/Grate** (Passes < 13.54 cfs potential flow)
  └─**4=Orifice/Grate** (Passes < 106.65 cfs potential flow)

## Pond 13P: Pocket Pond

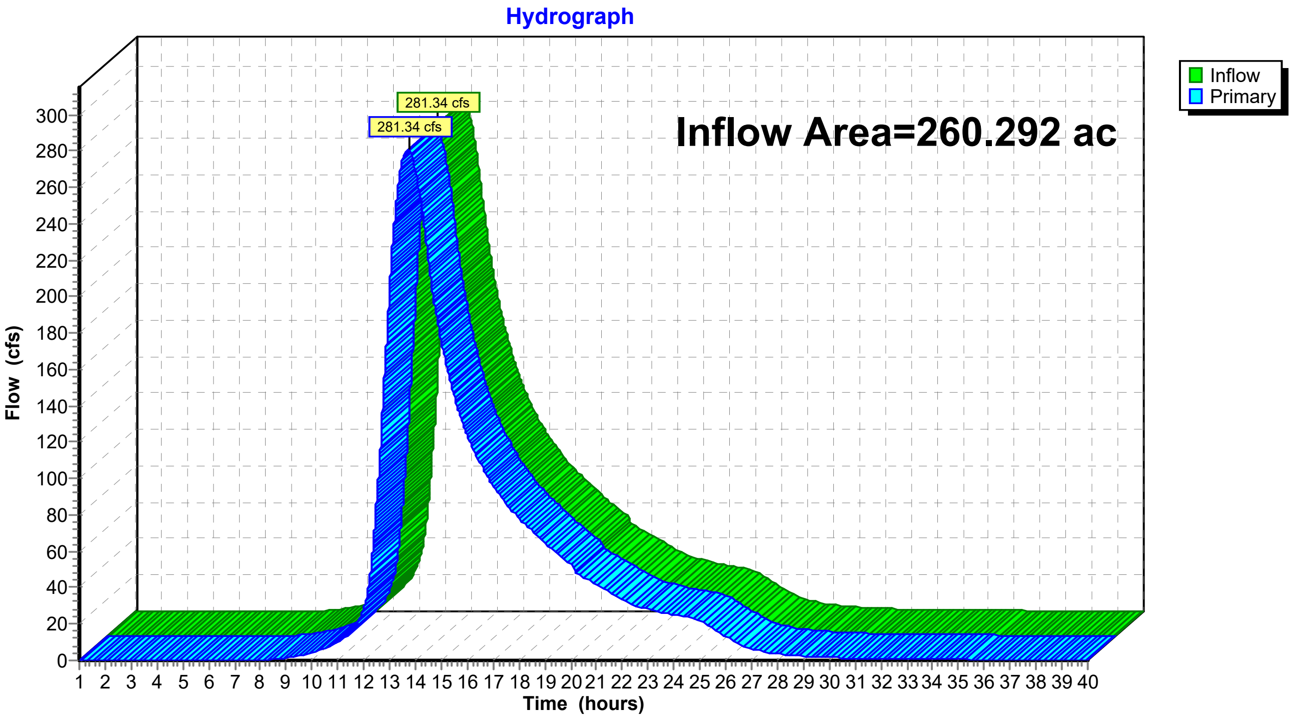


## Summary for Link AP-1: AP-1

| | | | | | |
|---|---|---|---|---|---|
| Inflow Area = | 260.292 ac, | 3.61% Impervious, | Inflow Depth > 4.91" | for 100-Year Event event | |
| Inflow = | 281.34 cfs @ | 13.74 hrs, | Volume= | 106.528 af | |
| Primary = | 281.34 cfs @ | 13.75 hrs, | Volume= | 106.528 af, | Atten= 0%, Lag= 0.6 min |

Primary outflow = Inflow, Time Span= 1.00-40.00 hrs, dt= 0.01 hrs

### Link AP-1: AP-1



Time span=1.00-40.00 hrs, dt=0.01 hrs, 3901 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Sim-Route method - Pond routing by Sim-Route method

| | |
|---|---|
| **Subcatchment1: DA 1** | Runoff Area=158.926 ac 0.00% Impervious Runoff Depth=0.13"<br>Flow Length=5,413' Tc=135.9 min CN=73 Runoff=3.34 cfs 1.717 af |
| **Subcatchment1A: DA 1A** | Runoff Area=53.103 ac 12.00% Impervious Runoff Depth=0.21"<br>Flow Length=5,343' Tc=121.9 min CN=77 Runoff=2.37 cfs 0.927 af |
| **Subcatchment1B: DA 1B** | Runoff Area=48.263 ac 6.29% Impervious Runoff Depth=0.15"<br>Flow Length=1,873' Tc=78.6 min CN=74 Runoff=1.70 cfs 0.593 af |
| **Pond 13P: Pocket Pond** | Peak Elev=395.43' Storage=30,976 cf Inflow=3.80 cfs 1.520 af<br>Outflow=1.13 cfs 1.295 af |
| **Link AP-1: AP-1** | Inflow=3.82 cfs 3.012 af<br>Primary=3.82 cfs 3.012 af |

**Total Runoff Area = 260.292 ac Runoff Volume = 3.237 af Average Runoff Depth = 0.15"**
**96.39% Pervious = 250.883 ac 3.61% Impervious = 9.409 ac**

## Summary for Subcatchment 1: DA 1

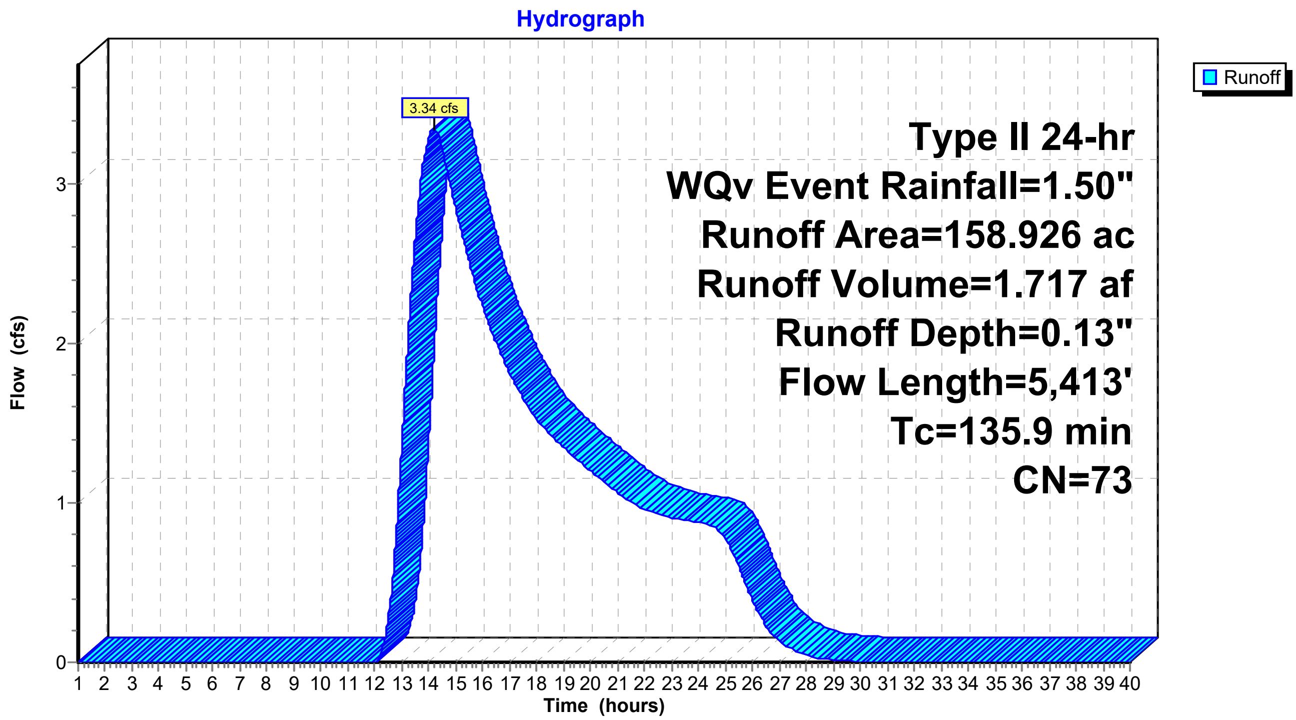
Runoff = 3.34 cfs @ 14.19 hrs, Volume= 1.717 af, Depth= 0.13"
Routed to Link AP-1 : AP-1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-40.00 hrs, dt= 0.01 hrs
Type II 24-hr WQv Event Rainfall=1.50"

| Area (ac) | CN | Description |
|---|---|---|
| 158.926 | 73 | Woods, Fair, HSG C |
| 158.926 | | 100.00% Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 23.9 | 100 | 0.0500 | 0.07 | | **Sheet Flow, Woods**<br>Woods: Dense underbrush n= 0.800 P2= 3.75" |
| 112.0 | 5,313 | 0.0250 | 0.79 | | **Shallow Concentrated Flow, Woods**<br>Woodland Kv= 5.0 fps |
| 135.9 | 5,413 | Total | | | |

### Subcatchment 1: DA 1



## Summary for Subcatchment 1A: DA 1A

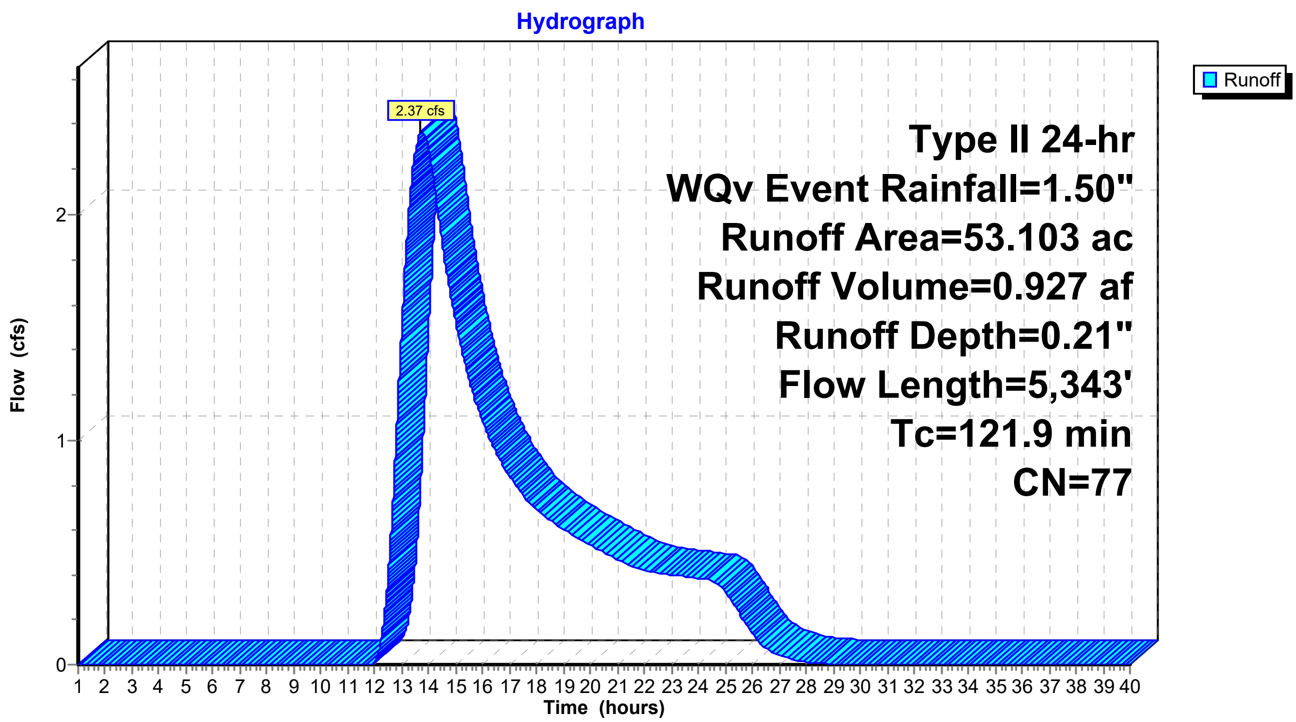
Runoff = 2.37 cfs @ 13.69 hrs, Volume= 0.927 af, Depth= 0.21"
Routed to Pond 13P : Pocket Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-40.00 hrs, dt= 0.01 hrs
Type II 24-hr WQv Event Rainfall=1.50"

| Area (ac) | CN | Description |
|---|---|---|
| 53.103 | 77 | 2 acre lots, 12% imp, HSG C |
| 46.731 | | 88.00% Pervious Area |
| 6.372 | | 12.00% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 17.5 | 100 | 0.1100 | 0.10 | | **Sheet Flow, Woods** Woods: Dense underbrush n= 0.800 P2= 3.75" |
| 104.4 | 5,243 | 0.0280 | 0.84 | | **Shallow Concentrated Flow, Woods** Woodland Kv= 5.0 fps |
| 121.9 | 5,343 | Total | | | |

## Subcatchment 1A: DA 1A



## Summary for Subcatchment 1B: DA 1B

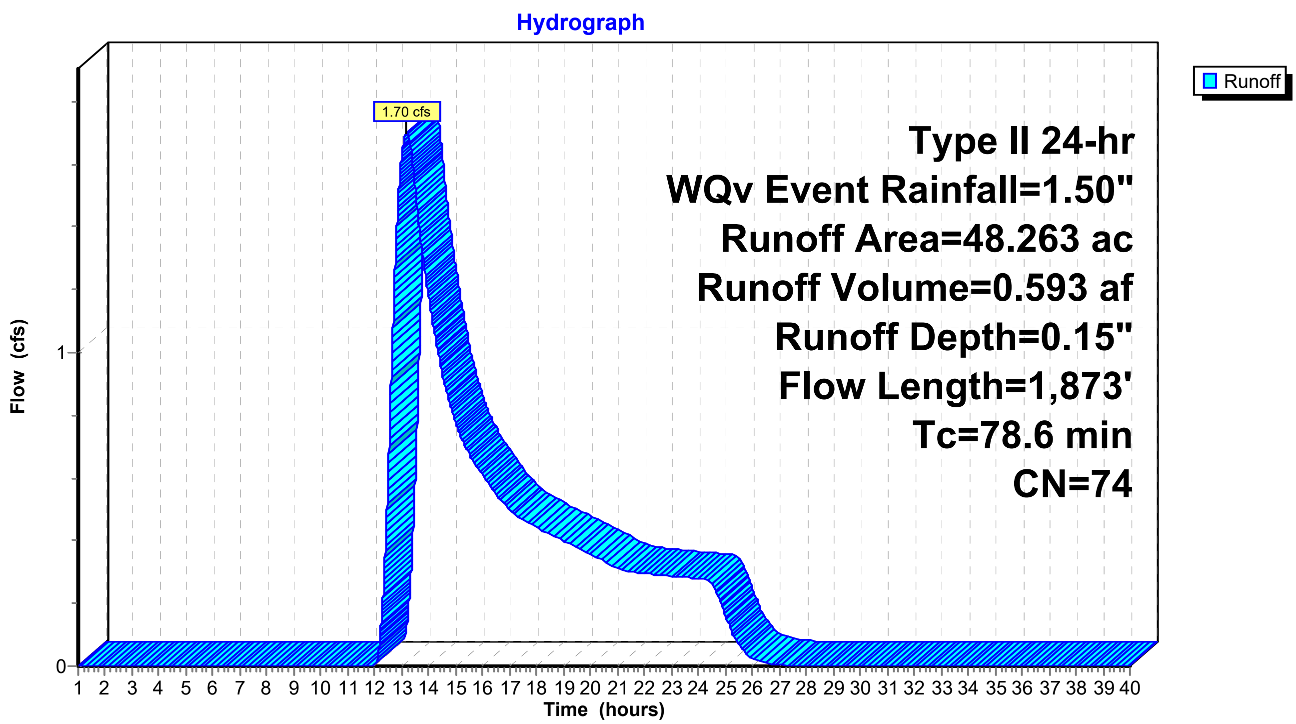
Runoff = 1.70 cfs @ 13.19 hrs, Volume= 0.593 af, Depth= 0.15"
Routed to Pond 13P : Pocket Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-40.00 hrs, dt= 0.01 hrs
Type II 24-hr WQv Event Rainfall=1.50"

| Area (ac) | CN | Description |
|---|---|---|
| 22.957 | 70 | Woods, Good, HSG C |
| 25.306 | 77 | 2 acre lots, 12% imp, HSG C |
| 48.263 | 74 | Weighted Average |
| 45.226 | | 93.71% Pervious Area |
| 3.037 | | 6.29% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 45.6 | 100 | 0.0100 | 0.04 | | **Sheet Flow, Woods** Woods: Dense underbrush n= 0.800 P2= 3.75" |
| 33.0 | 1,773 | 0.0320 | 0.89 | | **Shallow Concentrated Flow, Woods** Woodland Kv= 5.0 fps |
| 78.6 | 1,873 | Total | | | |

## Subcatchment 1B: DA 1B



## Summary for Pond 13P: Pocket Pond

Inflow Area = 101.366 ac, 9.28% Impervious, Inflow Depth = 0.18" for WQv Event event
Inflow = 3.80 cfs @ 13.41 hrs, Volume= 1.520 af
Outflow = 1.13 cfs @ 18.04 hrs, Volume= 1.295 af, Atten= 70%, Lag= 277.6 min
Primary = 1.13 cfs @ 18.04 hrs, Volume= 1.295 af
Routed to Link AP-1 : AP-1

Routing by Sim-Route method, Time Span= 1.00-40.00 hrs, dt= 0.01 hrs
Peak Elev= 395.43' @ 18.04 hrs Surf.Area= 72,033 sf Storage= 30,976 cf

Plug-Flow detention time= 425.8 min calculated for 1.295 af (85% of inflow)
Center-of-Mass det. time= 355.8 min ( 1,370.5 - 1,014.7 )

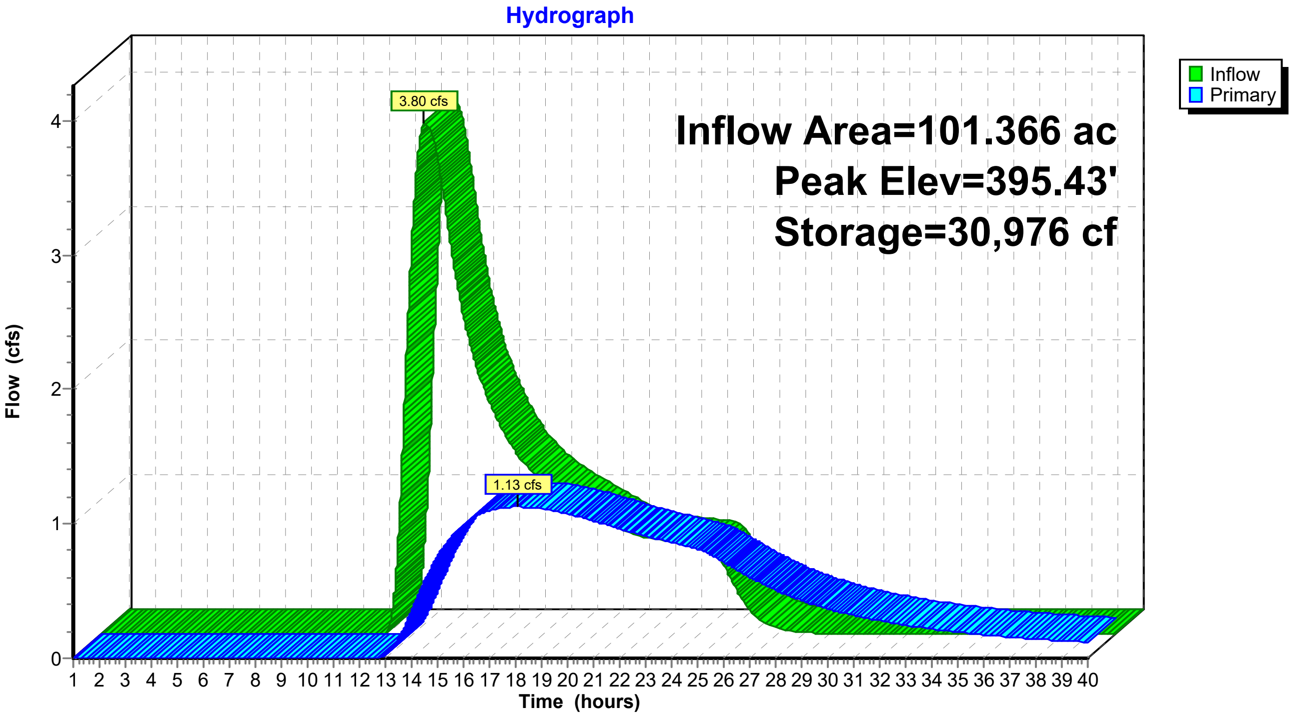
| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 395.00' | 757,850 cf | **Custom Stage Data (Prismatic)** Listed below (Recalc) |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 395.00 | 70,734 | 0 | 0 |
| 404.00 | 97,677 | 757,850 | 757,850 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 395.00' | **30.0" Round Culvert**<br>L= 50.0' CPP, square edge headwall, Ke= 0.500<br>Inlet / Outlet Invert= 395.00' / 394.50' S= 0.0100 '/' Cc= 0.900<br>n= 0.011 Concrete pipe, straight & clean, Flow Area= 4.91 sf |
| #2 | Device 1 | 395.00' | **24.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads |
| #3 | Device 1 | 395.80' | **24.0" W x 6.0" H Vert. Orifice/Grate** C= 0.600<br>Limited to weir flow at low heads |
| #4 | Device 1 | 397.90' | **36.0" x 36.0" Horiz. Orifice/Grate** C= 0.600<br>Limited to weir flow at low heads |

**Primary OutFlow** Max=1.13 cfs @ 18.04 hrs HW=395.43' TW=0.00' (Dynamic Tailwater)
└─**1=Culvert** (Passes 1.13 cfs of 1.28 cfs potential flow)
  ├─**2=Orifice/Grate** (Orifice Controls 1.13 cfs @ 2.24 fps)
  ├─**3=Orifice/Grate** ( Controls 0.00 cfs)
  └─**4=Orifice/Grate** ( Controls 0.00 cfs)

## Pond 13P: Pocket Pond

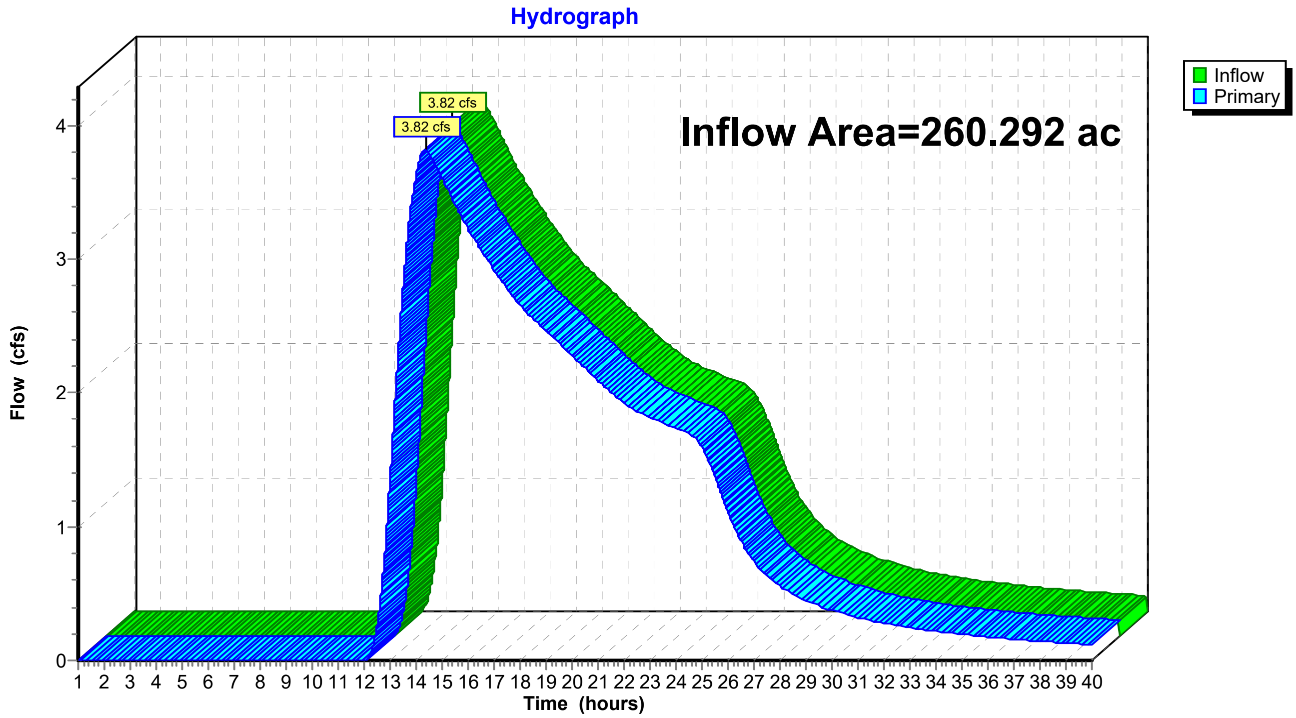


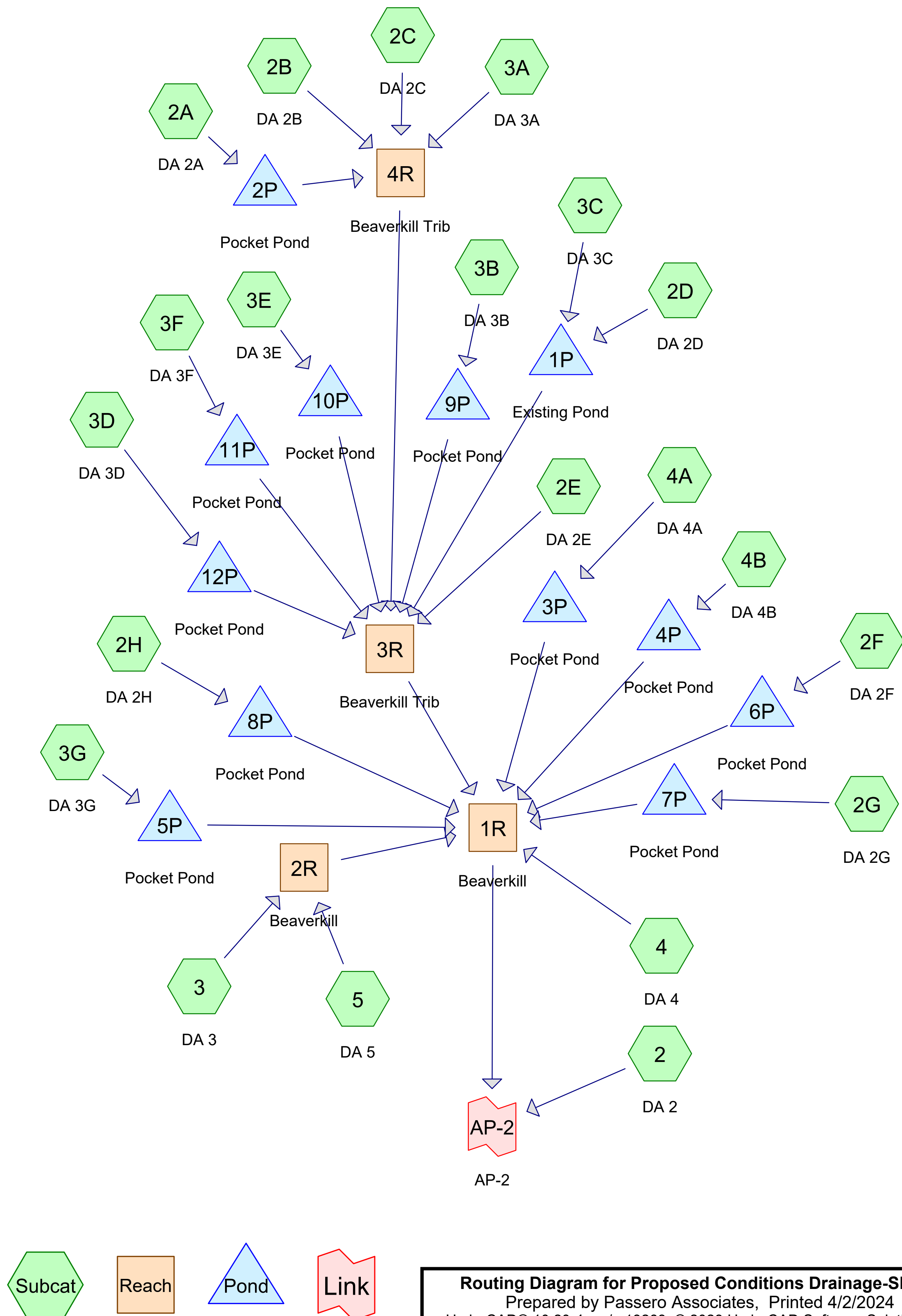
## Summary for Link AP-1: AP-1

Inflow Area = 260.292 ac, 3.61% Impervious, Inflow Depth > 0.14" for WQv Event event
Inflow = 3.82 cfs @ 14.35 hrs, Volume= 3.012 af
Primary = 3.82 cfs @ 14.36 hrs, Volume= 3.012 af, Atten= 0%, Lag= 0.6 min

Primary outflow = Inflow, Time Span= 1.00-40.00 hrs, dt= 0.01 hrs

### Link AP-1: AP-1






**Routing Diagram for Proposed Conditions Drainage-SP-AP-2**
Prepared by Passero Associates, Printed 4/2/2024
HydroCAD® 10.20-4a s/n 13263 © 2023 HydroCAD Software Solutions LLC

## Rainfall Events Listing (selected events)

| Event# | Event Name | Storm Type | Curve | Mode | Duration (hours) | B/B | Depth (inches) | AMC |
|---|---|---|---|---|---|---|---|---|
| 1 | 1-Year Event | Type II 24-hr | | Default | 24.00 | 1 | 2.20 | 2 |
| 2 | 10-Year Event | Type II 24-hr | | Default | 24.00 | 1 | 4.40 | 2 |
| 3 | 100-Year Event | Type II 24-hr | | Default | 24.00 | 1 | 8.00 | 2 |
| 4 | WQv Event | Type II 24-hr | | Default | 24.00 | 1 | 1.50 | 2 |

## Area Listing (all nodes)

| Area (acres) | CN | Description (subcatchment-numbers) |
|---|---|---|
| 157.213 | 81 | 1/3 acre lots, 30% imp, HSG C (2F, 2G, 2H, 3D, 3E, 3F) |
| 80.262 | 83 | 1/4 acre lots, 38% imp, HSG C (3G, 4A) |
| 34.943 | 88 | 1/8 acre lots, 65% imp, HSG C (3B, 3C) |
| 9.481 | 90 | 1/8 acre lots, 65% imp, HSG C (4B) |
| 244.187 | 77 | 2 acre lots, 12% imp, HSG C (2A, 2B, 2C, 2D, 2E, 5) |
| 0.275 | 98 | Unconnected pavement, HSG C (4) |
| 750.207 | 70 | Woods, Good, HSG C (2, 3, 3A, 4) |
| **1,276.568** | **74** | **TOTAL AREA** |

## Ground Covers (all nodes)

| HSG-A (acres) | HSG-B (acres) | HSG-C (acres) | HSG-D (acres) | Other (acres) | Total (acres) | Ground Cover | Subcatchment Numbers |
|---|---|---|---|---|---|---|---|
| 0.000 | 0.000 | 157.213 | 0.000 | 0.000 | 157.213 | 1/3 acre lots, 30% imp | 2F, 2G, 2H, 3D, 3E, 3F |
| 0.000 | 0.000 | 80.262 | 0.000 | 0.000 | 80.262 | 1/4 acre lots, 38% imp | 3G, 4A |
| 0.000 | 0.000 | 44.424 | 0.000 | 0.000 | 44.424 | 1/8 acre lots, 65% imp | 3B, 3C, 4B |
| 0.000 | 0.000 | 244.187 | 0.000 | 0.000 | 244.187 | 2 acre lots, 12% imp | 2A, 2B, 2C, 2D, 2E, 5 |
| 0.000 | 0.000 | 0.275 | 0.000 | 0.000 | 0.275 | Unconnected pavement | 4 |
| 0.000 | 0.000 | 750.207 | 0.000 | 0.000 | 750.207 | Woods, Good | 2, 3, 3A, 4 |
| **0.000** | **0.000** | **1,276.568** | **0.000** | **0.000** | **1,276.568** | **TOTAL AREA** | |

Time span=1.00-40.00 hrs, dt=0.01 hrs, 3901 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Sim-Route method - Pond routing by Sim-Route method

**Subcatchment2: DA 2** Runoff Area=202.288 ac 0.00% Impervious Runoff Depth=0.32"
Flow Length=3,062' Tc=43.1 min CN=70 Runoff=28.74 cfs 5.401 af

**Subcatchment2A: DA 2A** Runoff Area=36.879 ac 12.00% Impervious Runoff Depth=0.56"
Flow Length=4,070' Tc=194.7 min CN=77 Runoff=3.89 cfs 1.720 af

**Subcatchment2B: DA 2B** Runoff Area=55.045 ac 12.00% Impervious Runoff Depth=0.56"
Flow Length=3,070' Tc=79.3 min CN=77 Runoff=11.40 cfs 2.567 af

**Subcatchment2C: DA 2C** Runoff Area=31.804 ac 12.00% Impervious Runoff Depth=0.56"
Flow Length=3,344' Tc=74.8 min CN=77 Runoff=6.87 cfs 1.483 af

**Subcatchment2D: DA 2D** Runoff Area=39.716 ac 12.00% Impervious Runoff Depth=0.56"
Flow Length=2,728' Tc=45.7 min CN=77 Runoff=12.33 cfs 1.852 af

**Subcatchment2E: DA 2E** Runoff Area=45.892 ac 12.00% Impervious Runoff Depth=0.56"
Flow Length=2,892' Tc=48.7 min CN=77 Runoff=13.57 cfs 2.140 af

**Subcatchment2F: DA 2F** Runoff Area=42.396 ac 30.00% Impervious Runoff Depth=0.73"
Flow Length=1,411' Tc=53.7 min CN=81 Runoff=16.72 cfs 2.596 af

**Subcatchment2G: DA 2G** Runoff Area=16.853 ac 30.00% Impervious Runoff Depth=0.73"
Flow Length=552' Slope=0.0100 '/' Tc=22.4 min CN=81 Runoff=12.27 cfs 1.032 af

**Subcatchment2H: DA 2H** Runoff Area=24.219 ac 30.00% Impervious Runoff Depth=0.73"
Flow Length=559' Slope=0.0100 '/' Tc=22.5 min CN=81 Runoff=17.56 cfs 1.483 af

**Subcatchment3: DA 3** Runoff Area=436.528 ac 0.00% Impervious Runoff Depth=0.32"
Flow Length=2,575' Tc=81.9 min CN=70 Runoff=39.96 cfs 11.654 af

**Subcatchment3A: DA 3A** Runoff Area=52.953 ac 0.00% Impervious Runoff Depth=0.32"
Flow Length=1,950' Tc=50.8 min CN=70 Runoff=6.69 cfs 1.414 af

**Subcatchment3B: DA 3B** Runoff Area=14.213 ac 65.00% Impervious Runoff Depth=1.13"
Flow Length=288' Tc=13.6 min CN=88 Runoff=21.78 cfs 1.337 af

**Subcatchment3C: DA 3C** Runoff Area=20.730 ac 65.00% Impervious Runoff Depth=1.13"
Flow Length=741' Tc=36.3 min CN=88 Runoff=17.75 cfs 1.950 af

**Subcatchment3D: DA 3D** Runoff Area=29.499 ac 30.00% Impervious Runoff Depth=0.73"
Flow Length=370' Tc=16.2 min CN=81 Runoff=26.01 cfs 1.807 af

**Subcatchment3E: DA 3E** Runoff Area=17.433 ac 30.00% Impervious Runoff Depth=0.73"
Flow Length=302' Tc=35.1 min CN=81 Runoff=9.32 cfs 1.068 af

**Subcatchment3F: DA 3F** Runoff Area=26.813 ac 30.00% Impervious Runoff Depth=0.73"
Flow Length=488' Tc=17.8 min CN=81 Runoff=22.44 cfs 1.642 af

**Subcatchment3G: DA 3G** Runoff Area=39.934 ac 38.00% Impervious Runoff Depth=0.84"
Flow Length=684' Tc=22.0 min CN=83 Runoff=34.12 cfs 2.779 af

**Subcatchment4: DA 4** Runoff Area=58.713 ac 0.47% Impervious Runoff Depth=0.32"
Flow Length=1,537' Tc=62.2 min CN=70 Runoff=6.50 cfs 1.568 af

**Subcatchment4A: DA 4A** Runoff Area=40.328 ac 38.00% Impervious Runoff Depth=0.84"
Flow Length=1,258' Tc=39.5 min CN=83 Runoff=23.14 cfs 2.806 af

**Subcatchment4B: DA 4B** Runoff Area=9.481 ac 65.00% Impervious Runoff Depth=1.27"
Flow Length=196' Tc=9.8 min CN=90 Runoff=18.54 cfs 1.001 af

**Subcatchment5: DA 5** Runoff Area=34.851 ac 12.00% Impervious Runoff Depth=0.56"
Flow Length=2,150' Tc=22.6 min CN=77 Runoff=17.90 cfs 1.625 af

**Reach 1R: Beaverkill** Avg. Flow Depth=1.58' Max Vel=2.32 fps Inflow=479.61 cfs 1,316.341 af
n=0.030 L=4,728.0' S=0.0021 '/' Capacity=2,310.71 cfs Outflow=472.54 cfs 1,296.803 af

**Reach 2R: Beaverkill** Avg. Flow Depth=1.54' Max Vel=2.21 fps Inflow=376.67 cfs 1,089.809 af
n=0.030 L=6,756.0' S=0.0021 '/' Capacity=1,684.63 cfs Outflow=367.59 cfs 1,066.069 af

**Reach 3R: Beaverkill Trib** Avg. Flow Depth=0.77' Max Vel=10.13 fps Inflow=117.43 cfs 243.927 af
n=0.025 L=1,000.0' S=0.0535 '/' Capacity=1,071.30 cfs Outflow=117.42 cfs 243.795 af

**Reach 4R: Beaverkill Trib** Avg. Flow Depth=0.69' Max Vel=9.47 fps Inflow=95.70 cfs 237.895 af
n=0.030 L=2,239.0' S=0.0768 '/' Capacity=688.52 cfs Outflow=95.65 cfs 237.524 af

**Pond 1P: Existing Pond** Peak Elev=208.79' Storage=116,749 cf Inflow=28.87 cfs 3.802 af
Outflow=2.28 cfs 1.225 af

**Pond 2P: Pocket Pond** Peak Elev=393.39' Storage=66,812 cf Inflow=3.89 cfs 1.720 af
Outflow=0.20 cfs 0.365 af

**Pond 3P: Pocket Pond** Peak Elev=147.53' Storage=106,298 cf Inflow=23.14 cfs 2.806 af
Outflow=0.39 cfs 0.828 af

**Pond 4P: Pocket Pond** Peak Elev=151.74' Storage=27,905 cf Inflow=18.54 cfs 1.001 af
Outflow=0.53 cfs 0.900 af

**Pond 5P: Pocket Pond** Peak Elev=154.36' Storage=94,658 cf Inflow=34.12 cfs 2.779 af
Outflow=0.83 cfs 1.181 af

**Pond 6P: Pocket Pond** Peak Elev=147.77' Storage=94,917 cf Inflow=16.72 cfs 2.596 af
Outflow=0.44 cfs 0.926 af

**Pond 7P: Pocket Pond** Peak Elev=147.50' Storage=35,217 cf Inflow=12.27 cfs 1.032 af
Outflow=0.24 cfs 0.492 af

**Pond 8P: Pocket Pond** Peak Elev=147.80' Storage=46,133 cf Inflow=17.56 cfs 1.483 af
Outflow=0.45 cfs 0.919 af

**Pond 9P: Pocket Pond** Peak Elev=221.08' Storage=23,100 cf Inflow=21.78 cfs 1.337 af
24.0" Round Culvert n=0.011 L=50.0' S=0.0200 '/' Outflow=6.12 cfs 1.316 af

**Pond 10P: Pocket Pond** Peak Elev=180.82' Storage=46,503 cf Inflow=9.32 cfs 1.068 af
24.0" Round Culvert n=0.011 L=50.0' S=0.0200 '/' Outflow=0.00 cfs 0.000 af

**Pond 11P: Pocket Pond** Peak Elev=146.70' Storage=71,525 cf Inflow=22.44 cfs 1.642 af
24.0" Round Culvert n=0.011 L=50.0' S=0.0200 '/' Outflow=0.00 cfs 0.000 af

**Pond 12P: Pocket Pond** Peak Elev=216.18' Storage=27,143 cf Inflow=26.01 cfs 1.807 af
24.0" Round Culvert n=0.011 L=50.0' S=0.0100 '/' Outflow=6.79 cfs 1.782 af

**Link AP-2: AP-2** Inflow=483.23 cfs 1,301.866 af
Primary=483.23 cfs 1,301.866 af

**Total Runoff Area = 1,276.568 ac Runoff Volume = 50.924 af Average Runoff Depth = 0.48"**
**89.34% Pervious = 1,140.451 ac 10.66% Impervious = 136.117 ac**

## Summary for Subcatchment 2: DA 2

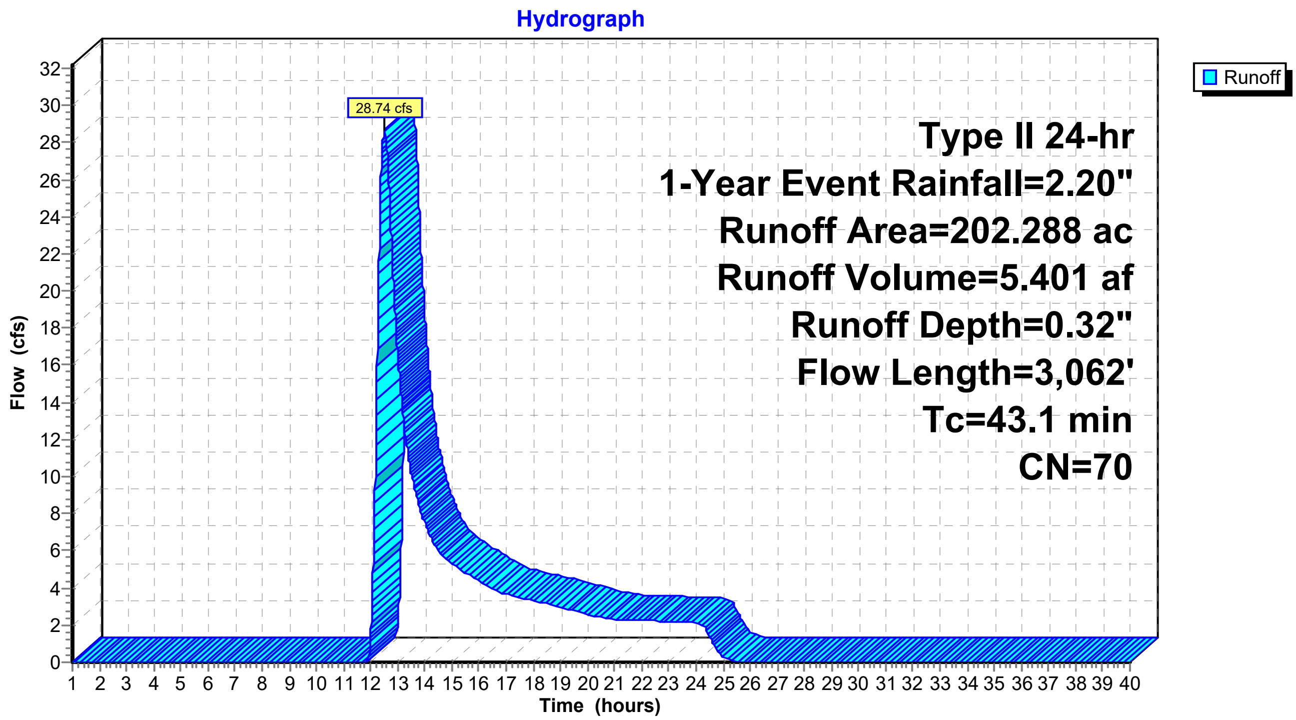
Runoff = 28.74 cfs @ 12.50 hrs, Volume= 5.401 af, Depth= 0.32"
Routed to Link AP-2 : AP-2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-40.00 hrs, dt= 0.01 hrs
Type II 24-hr 1-Year Event Rainfall=2.20"

| Area (ac) | CN | Description |
|---|---|---|
| 202.288 | 70 | Woods, Good, HSG C |
| 202.288 | | 100.00% Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 34.5 | 100 | 0.0200 | 0.05 | | **Sheet Flow, Woods**<br>Woods: Dense underbrush n= 0.800 P2= 3.75" |
| 8.6 | 2,962 | 0.1280 | 5.76 | | **Shallow Concentrated Flow, Woods**<br>Unpaved Kv= 16.1 fps |
| 43.1 | 3,062 | Total | | | |

## Subcatchment 2: DA 2



## Summary for Subcatchment 2A: DA 2A

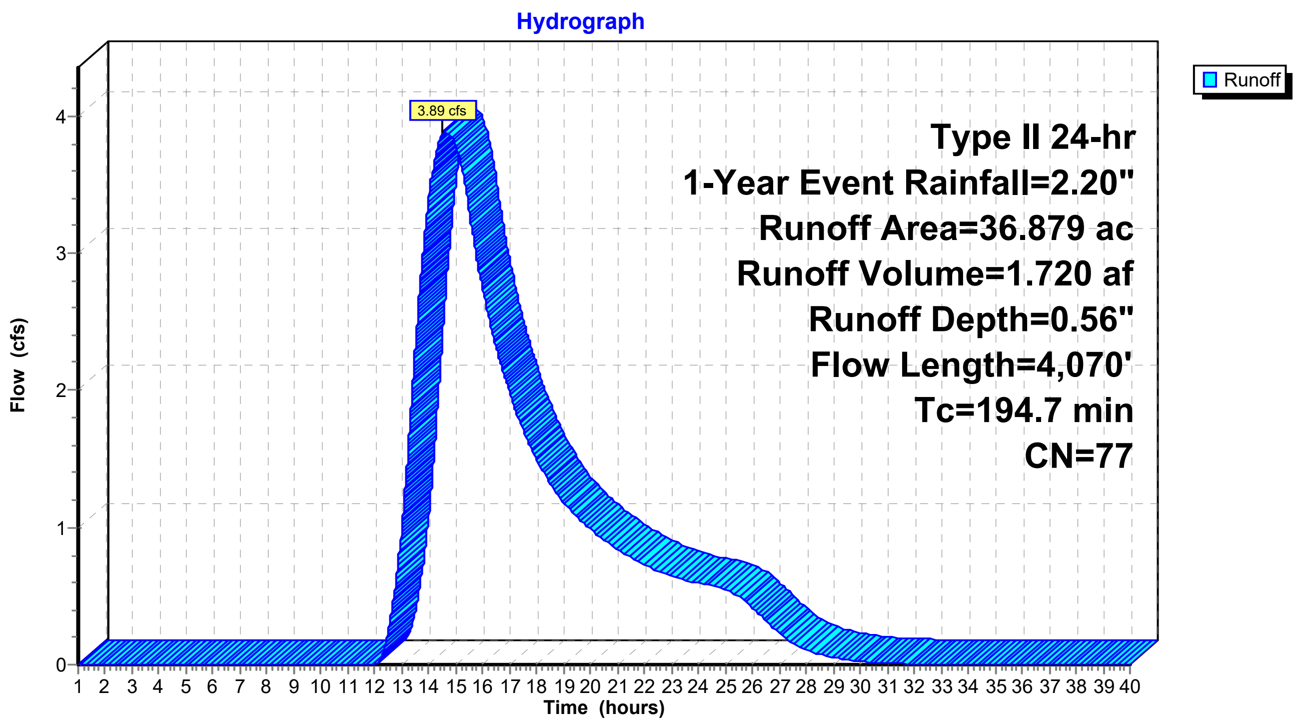
Runoff = 3.89 cfs @ 14.50 hrs, Volume= 1.720 af, Depth= 0.56"
Routed to Pond 2P : Pocket Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-40.00 hrs, dt= 0.01 hrs
Type II 24-hr 1-Year Event Rainfall=2.20"

| Area (ac) | CN | Description |
|---|---|---|
| 36.879 | 77 | 2 acre lots, 12% imp, HSG C |
| 32.454 | | 88.00% Pervious Area |
| 4.425 | | 12.00% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 23.9 | 100 | 0.0500 | 0.07 | | **Sheet Flow, Woods**<br>Woods: Dense underbrush n= 0.800 P2= 3.75" |
| 170.8 | 3,970 | 0.0240 | 0.39 | | **Shallow Concentrated Flow, Woods**<br>Forest w/Heavy Litter Kv= 2.5 fps |
| 194.7 | 4,070 | Total | | | |

## Subcatchment 2A: DA 2A



## Summary for Subcatchment 2B: DA 2B

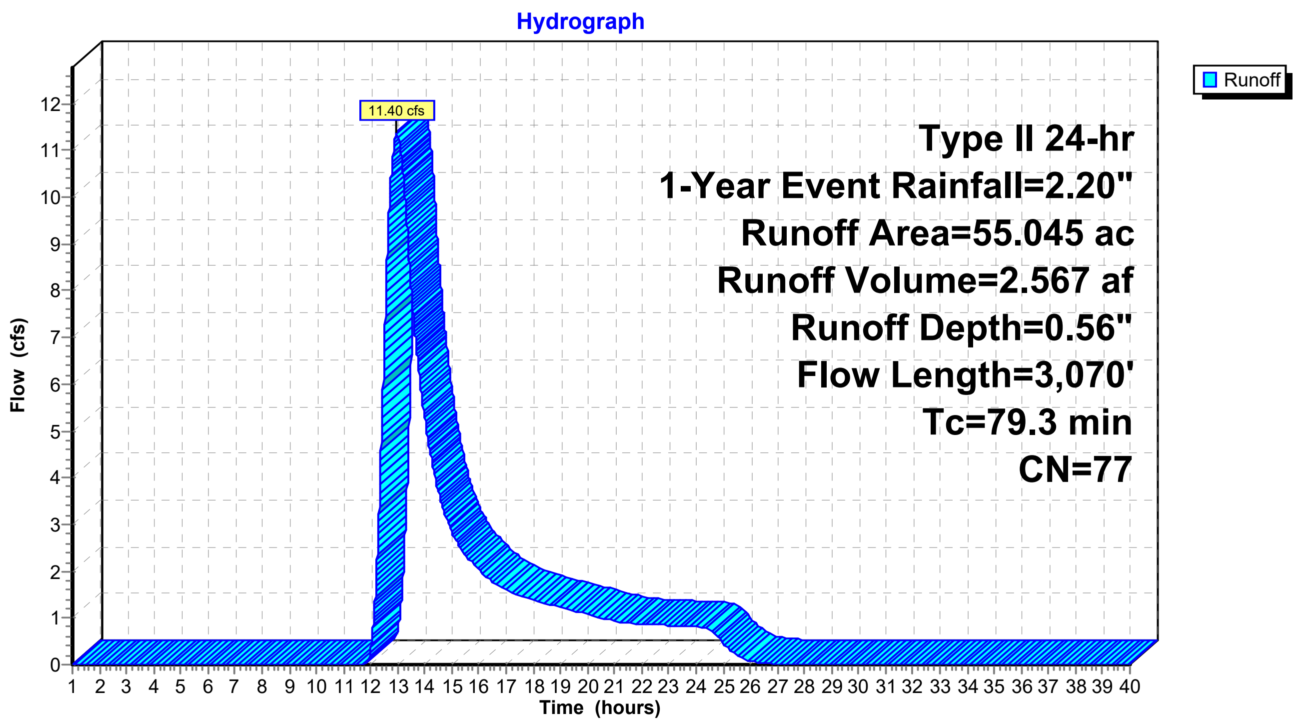
Runoff = 11.40 cfs @ 12.95 hrs, Volume= 2.567 af, Depth= 0.56"
Routed to Reach 4R : Beaverkill Trib

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-40.00 hrs, dt= 0.01 hrs
Type II 24-hr 1-Year Event Rainfall=2.20"

| Area (ac) | CN | Description |
|---|---|---|
| 55.045 | 77 | 2 acre lots, 12% imp, HSG C |
| 48.440 | | 88.00% Pervious Area |
| 6.605 | | 12.00% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 15.4 | 100 | 0.1500 | 0.11 | | **Sheet Flow, Woods**<br>Woods: Dense underbrush n= 0.800 P2= 3.75" |
| 63.9 | 2,970 | 0.0240 | 0.77 | | **Shallow Concentrated Flow, Woods**<br>Woodland Kv= 5.0 fps |
| 79.3 | 3,070 | Total | | | |

### Subcatchment 2B: DA 2B



## Summary for Subcatchment 2C: DA 2C

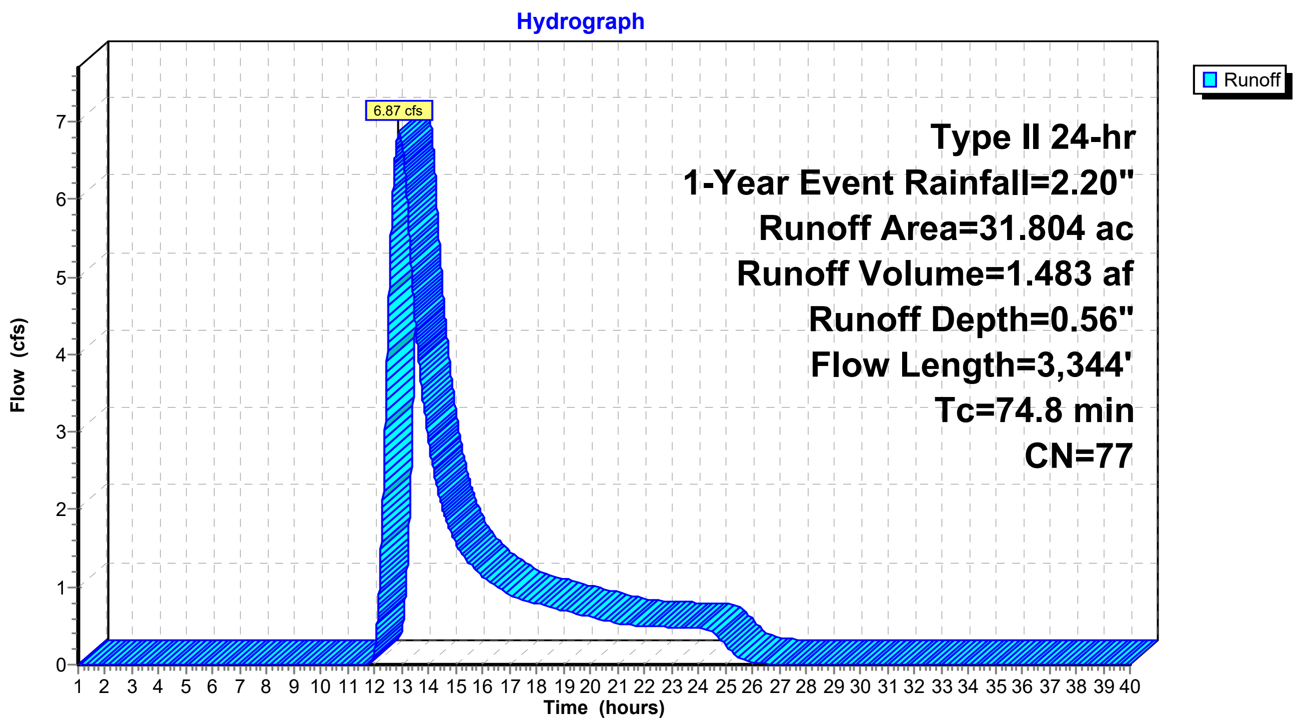
Runoff = 6.87 cfs @ 12.88 hrs, Volume= 1.483 af, Depth= 0.56"
Routed to Reach 4R : Beaverkill Trib

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-40.00 hrs, dt= 0.01 hrs
Type II 24-hr 1-Year Event Rainfall=2.20"

| Area (ac) | CN | Description |
|---|---|---|
| 31.804 | 77 | 2 acre lots, 12% imp, HSG C |
| 27.988 | | 88.00% Pervious Area |
| 3.816 | | 12.00% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 32.1 | 100 | 0.0240 | 0.05 | | **Sheet Flow, Woods** Woods: Dense underbrush n= 0.800 P2= 3.75" |
| 42.7 | 3,244 | 0.0640 | 1.26 | | **Shallow Concentrated Flow, Woods** Woodland Kv= 5.0 fps |
| 74.8 | 3,344 | Total | | | |

## Subcatchment 2C: DA 2C



## Summary for Subcatchment 2D: DA 2D

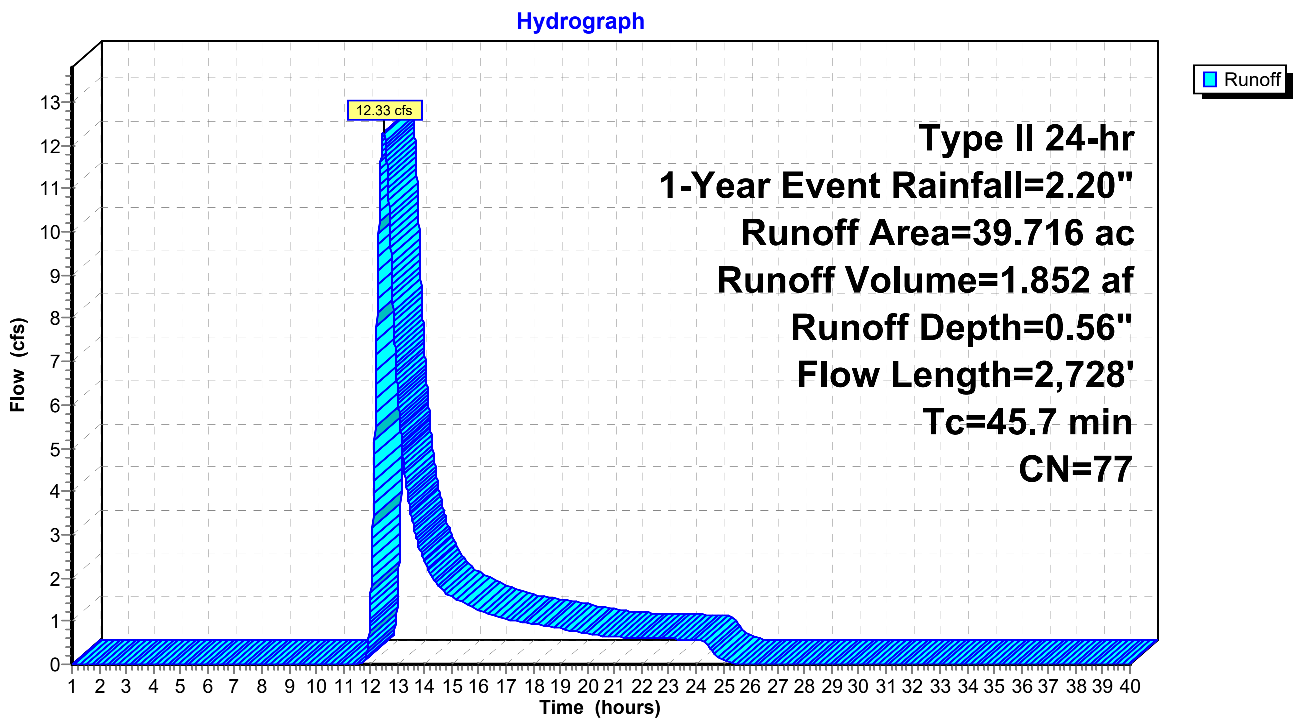
Runoff = 12.33 cfs @ 12.49 hrs, Volume= 1.852 af, Depth= 0.56"
Routed to Pond 1P : Existing Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-40.00 hrs, dt= 0.01 hrs
Type II 24-hr 1-Year Event Rainfall=2.20"

| Area (ac) | CN | Description |
|---|---|---|
| 39.716 | 77 | 2 acre lots, 12% imp, HSG C |
| 34.950 | | 88.00% Pervious Area |
| 4.766 | | 12.00% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 32.1 | 100 | 0.0240 | 0.05 | | **Sheet Flow, Woods**<br>Woods: Dense underbrush n= 0.800 P2= 3.75" |
| 13.6 | 2,628 | 0.0460 | 3.22 | | **Shallow Concentrated Flow, Lawn**<br>Grassed Waterway Kv= 15.0 fps |
| 45.7 | 2,728 | Total | | | |

## Subcatchment 2D: DA 2D



## Summary for Subcatchment 2E: DA 2E

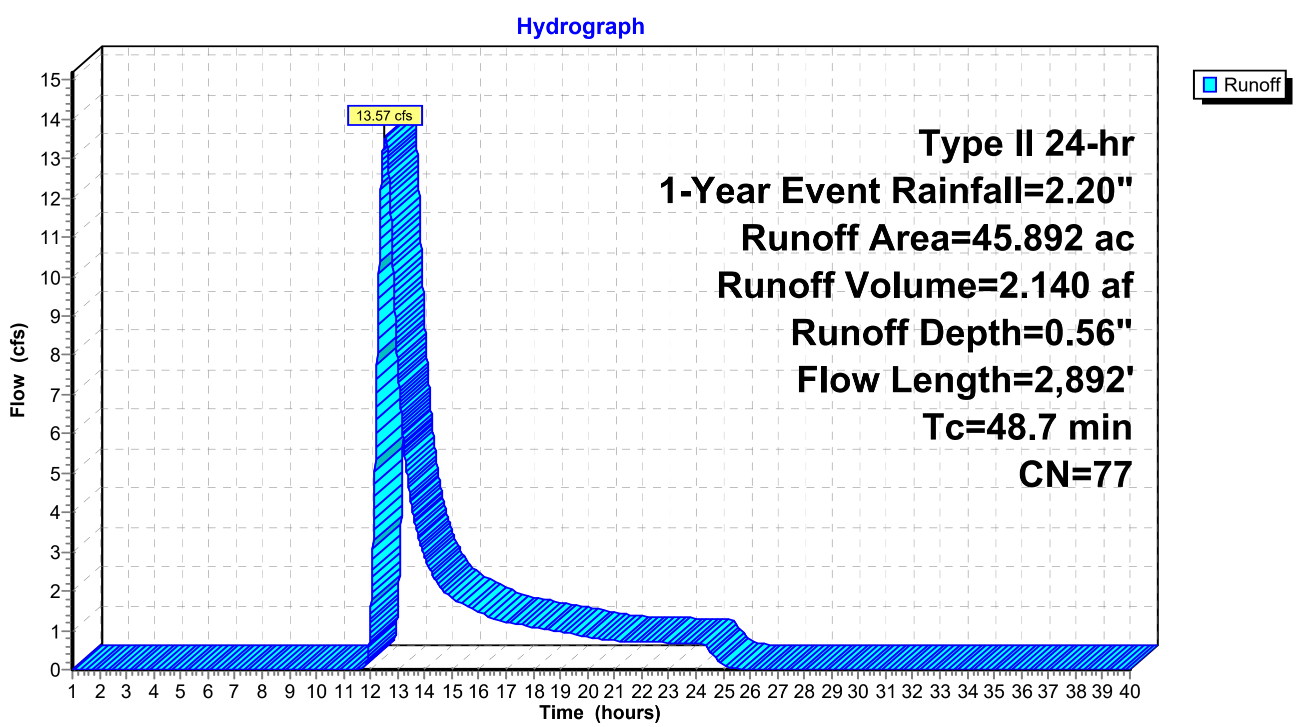
Runoff = 13.57 cfs @ 12.51 hrs, Volume= 2.140 af, Depth= 0.56"
Routed to Reach 3R : Beaverkill Trib

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-40.00 hrs, dt= 0.01 hrs
Type II 24-hr 1-Year Event Rainfall=2.20"

| Area (ac) | CN | Description |
|---|---|---|
| 45.892 | 77 | 2 acre lots, 12% imp, HSG C |
| 40.385 | | 88.00% Pervious Area |
| 5.507 | | 12.00% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 32.1 | 100 | 0.0240 | 0.05 | | **Sheet Flow, Woods** Woods: Dense underbrush n= 0.800 P2= 3.75" |
| 16.6 | 2,792 | 0.0350 | 2.81 | | **Shallow Concentrated Flow, Lawn** Grassed Waterway Kv= 15.0 fps |
| 48.7 | 2,892 | Total | | | |

## Subcatchment 2E: DA 2E



## Summary for Subcatchment 2F: DA 2F

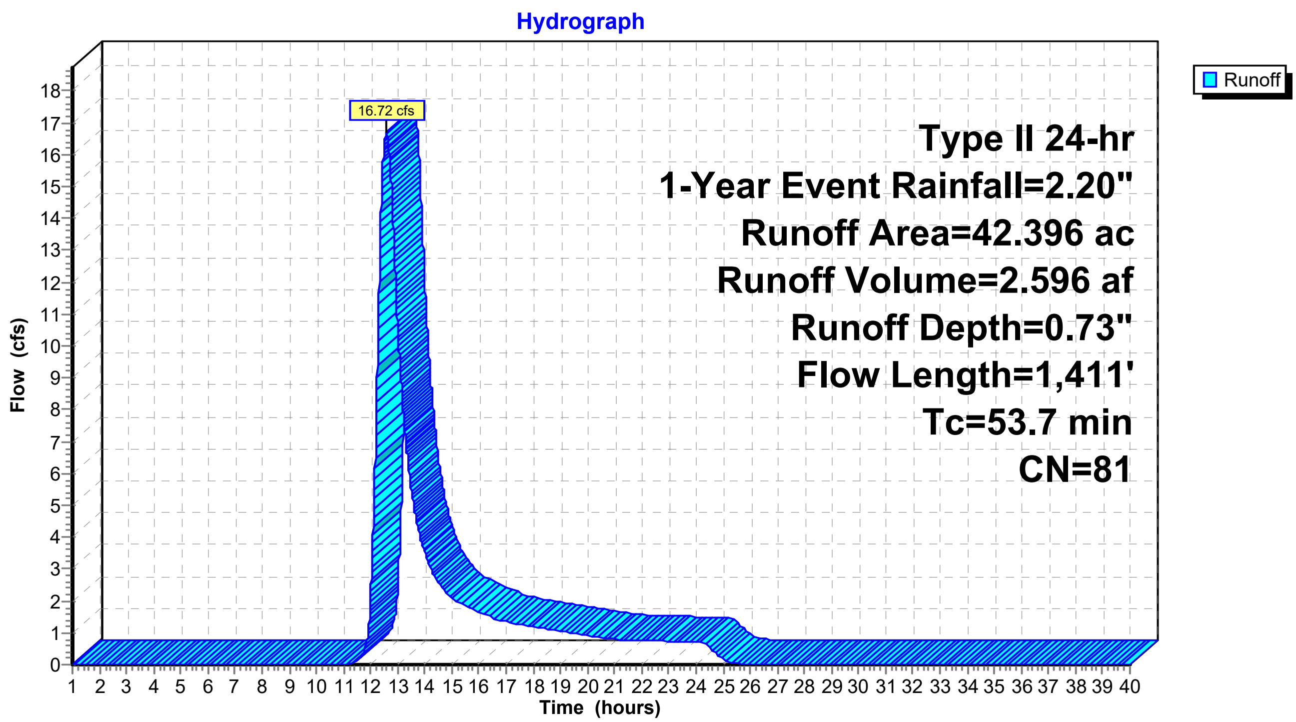
Runoff = 16.72 cfs @ 12.59 hrs, Volume= 2.596 af, Depth= 0.73"
Routed to Pond 6P : Pocket Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-40.00 hrs, dt= 0.01 hrs
Type II 24-hr 1-Year Event Rainfall=2.20"

| Area (ac) | CN | Description |
|---|---|---|
| 42.396 | 81 | 1/3 acre lots, 30% imp, HSG C |
| 29.677 | | 70.00% Pervious Area |
| 12.719 | | 30.00% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 34.5 | 100 | 0.0200 | 0.05 | | **Sheet Flow, Woods** Woods: Dense underbrush n= 0.800 P2= 3.75" |
| 19.2 | 1,311 | 0.0520 | 1.14 | | **Shallow Concentrated Flow, Woods** Woodland Kv= 5.0 fps |
| 53.7 | 1,411 | Total | | | |

### Subcatchment 2F: DA 2F



## Summary for Subcatchment 2G: DA 2G

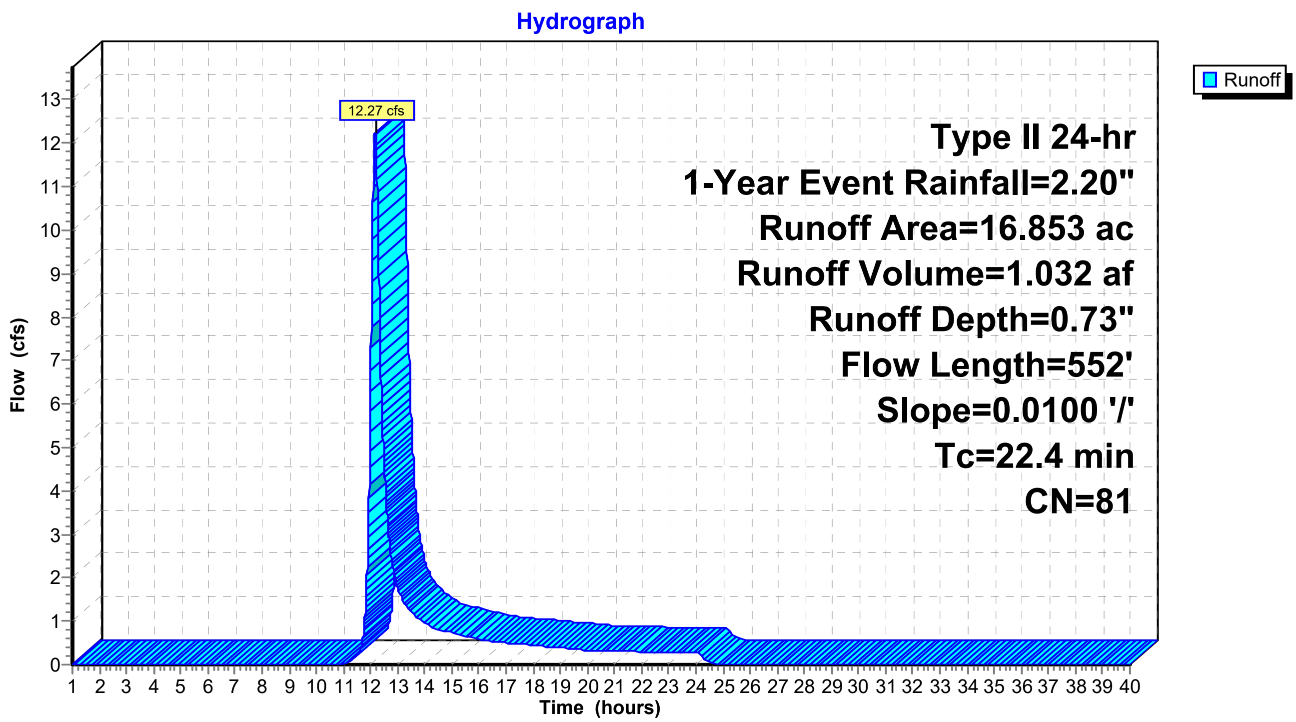
Runoff = 12.27 cfs @ 12.17 hrs, Volume= 1.032 af, Depth= 0.73"
Routed to Pond 7P : Pocket Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-40.00 hrs, dt= 0.01 hrs
Type II 24-hr 1-Year Event Rainfall=2.20"

| Area (ac) | CN | Description |
|---|---|---|
| 16.853 | 81 | 1/3 acre lots, 30% imp, HSG C |
| 11.797 | | 70.00% Pervious Area |
| 5.056 | | 30.00% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 17.4 | 100 | 0.0100 | 0.10 | | **Sheet Flow, Lawn** Grass: Dense n= 0.240 P2= 3.75" |
| 5.0 | 452 | 0.0100 | 1.50 | | **Shallow Concentrated Flow, Lawn** Grassed Waterway Kv= 15.0 fps |
| 22.4 | 552 | Total | | | |

### Subcatchment 2G: DA 2G



## Summary for Subcatchment 2H: DA 2H

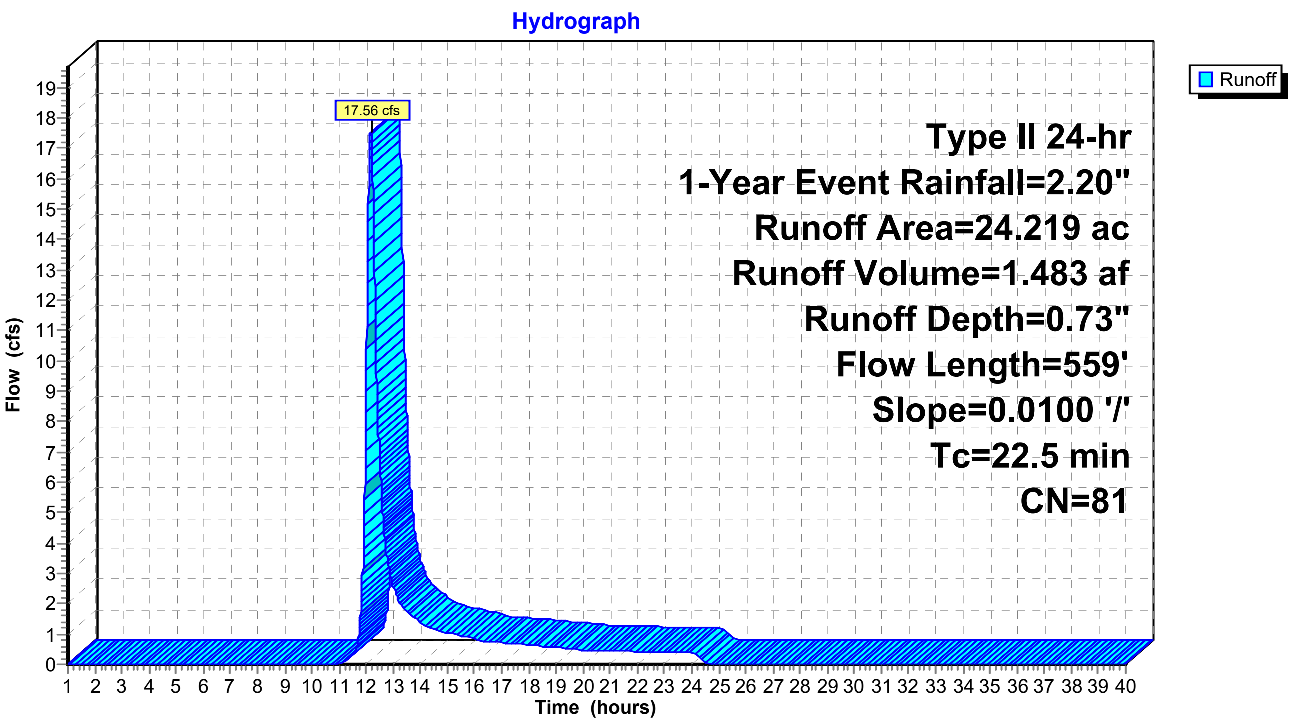
Runoff = 17.56 cfs @ 12.17 hrs, Volume= 1.483 af, Depth= 0.73"
Routed to Pond 8P : Pocket Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-40.00 hrs, dt= 0.01 hrs
Type II 24-hr 1-Year Event Rainfall=2.20"

| Area (ac) | CN | Description |
|---|---|---|
| 24.219 | 81 | 1/3 acre lots, 30% imp, HSG C |
| 16.953 | | 70.00% Pervious Area |
| 7.266 | | 30.00% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 17.4 | 100 | 0.0100 | 0.10 | | **Sheet Flow, Lawn** Grass: Dense n= 0.240 P2= 3.75" |
| 5.1 | 459 | 0.0100 | 1.50 | | **Shallow Concentrated Flow, Lawn** Grassed Waterway Kv= 15.0 fps |
| 22.5 | 559 | Total | | | |

## Subcatchment 2H: DA 2H



## Summary for Subcatchment 3: DA 3

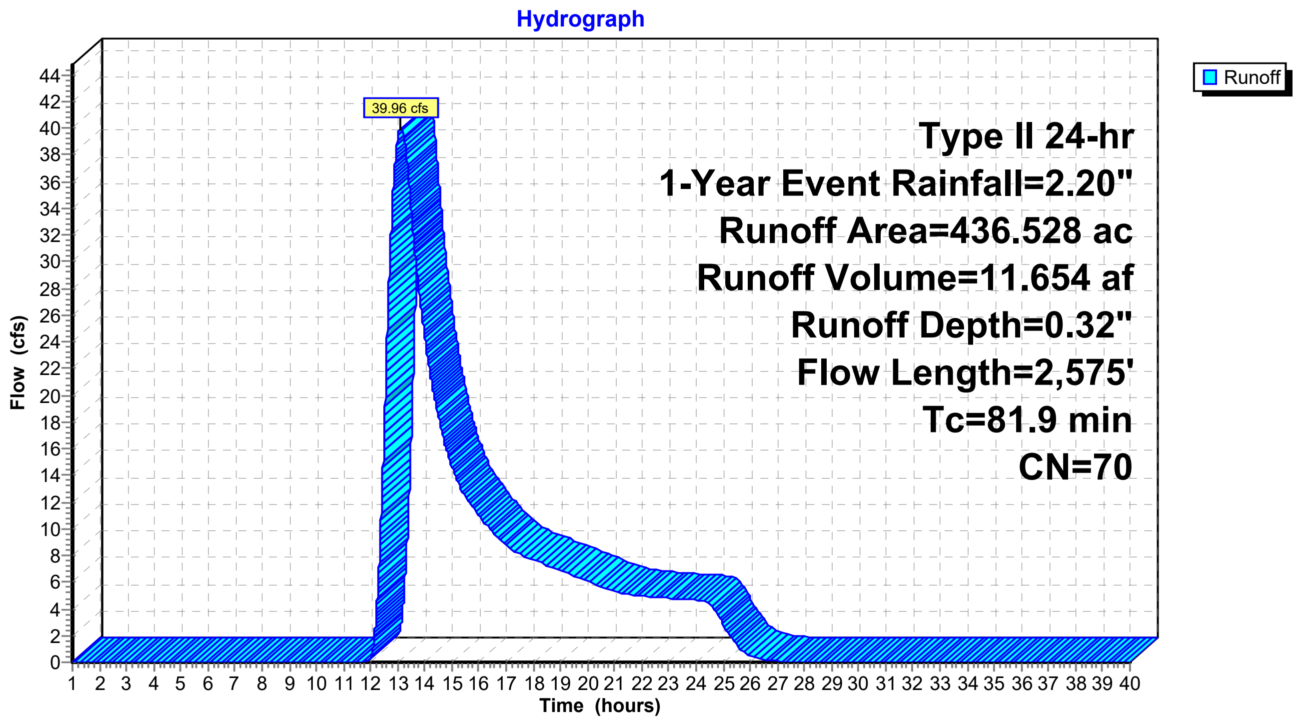
Runoff = 39.96 cfs @ 13.10 hrs, Volume= 11.654 af, Depth= 0.32"
Routed to Reach 2R : Beaverkill

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-40.00 hrs, dt= 0.01 hrs
Type II 24-hr 1-Year Event Rainfall=2.20"

| Area (ac) | CN | Description |
|---|---|---|
| 436.528 | 70 | Woods, Good, HSG C |
| 436.528 | | 100.00% Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 34.5 | 100 | 0.0200 | 0.05 | | **Sheet Flow, Woods**<br>Woods: Dense underbrush n= 0.800 P2= 3.75" |
| 47.4 | 2,475 | 0.1210 | 0.87 | | **Shallow Concentrated Flow, Woods**<br>Forest w/Heavy Litter Kv= 2.5 fps |
| 81.9 | 2,575 | Total | | | |

## Subcatchment 3: DA 3



## Summary for Subcatchment 3A: DA 3A

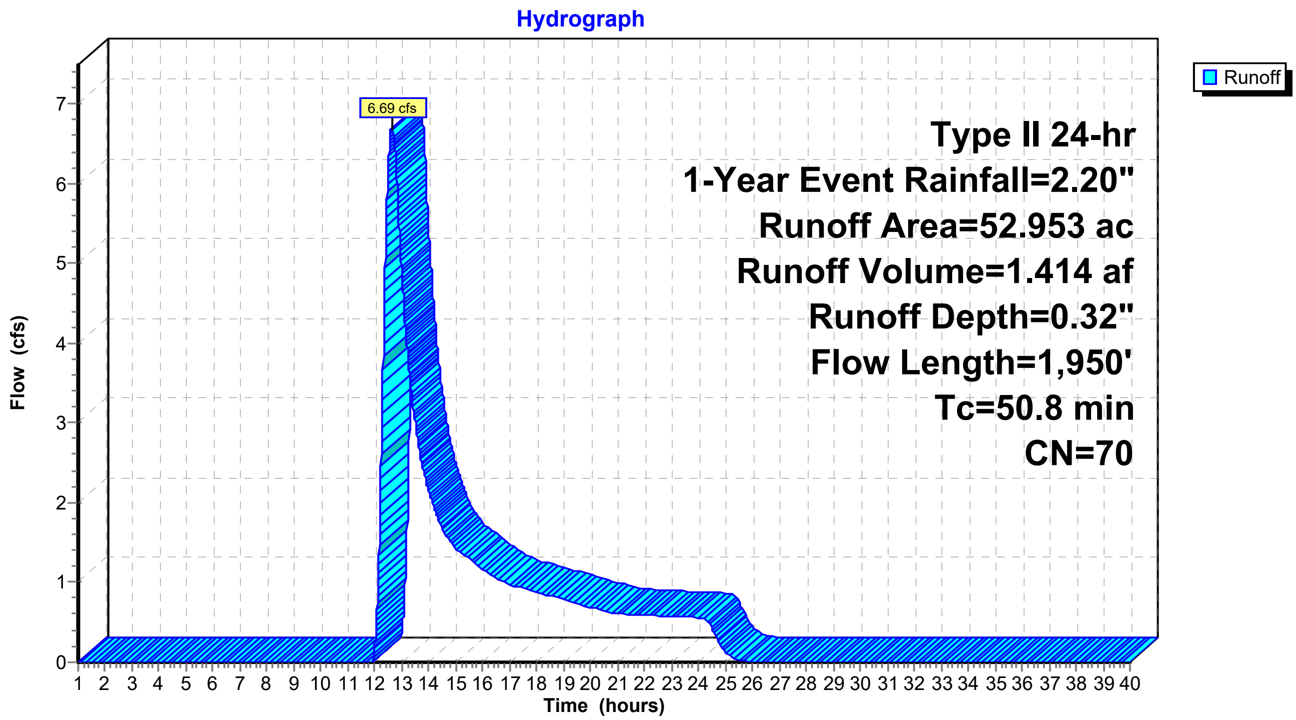
Runoff = 6.69 cfs @ 12.64 hrs, Volume= 1.414 af, Depth= 0.32"
Routed to Reach 4R : Beaverkill Trib

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-40.00 hrs, dt= 0.01 hrs
Type II 24-hr 1-Year Event Rainfall=2.20"

| Area (ac) | CN | Description |
|---|---|---|
| 52.953 | 70 | Woods, Good, HSG C |
| 52.953 | | 100.00% Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 31.6 | 100 | 0.0250 | 0.05 | | **Sheet Flow, Woods**<br>Woods: Dense underbrush n= 0.800 P2= 3.75" |
| 19.2 | 1,850 | 0.1030 | 1.60 | | **Shallow Concentrated Flow, Woods**<br>Woodland Kv= 5.0 fps |
| 50.8 | 1,950 | Total | | | |

## Subcatchment 3A: DA 3A



## Summary for Subcatchment 3B: DA 3B

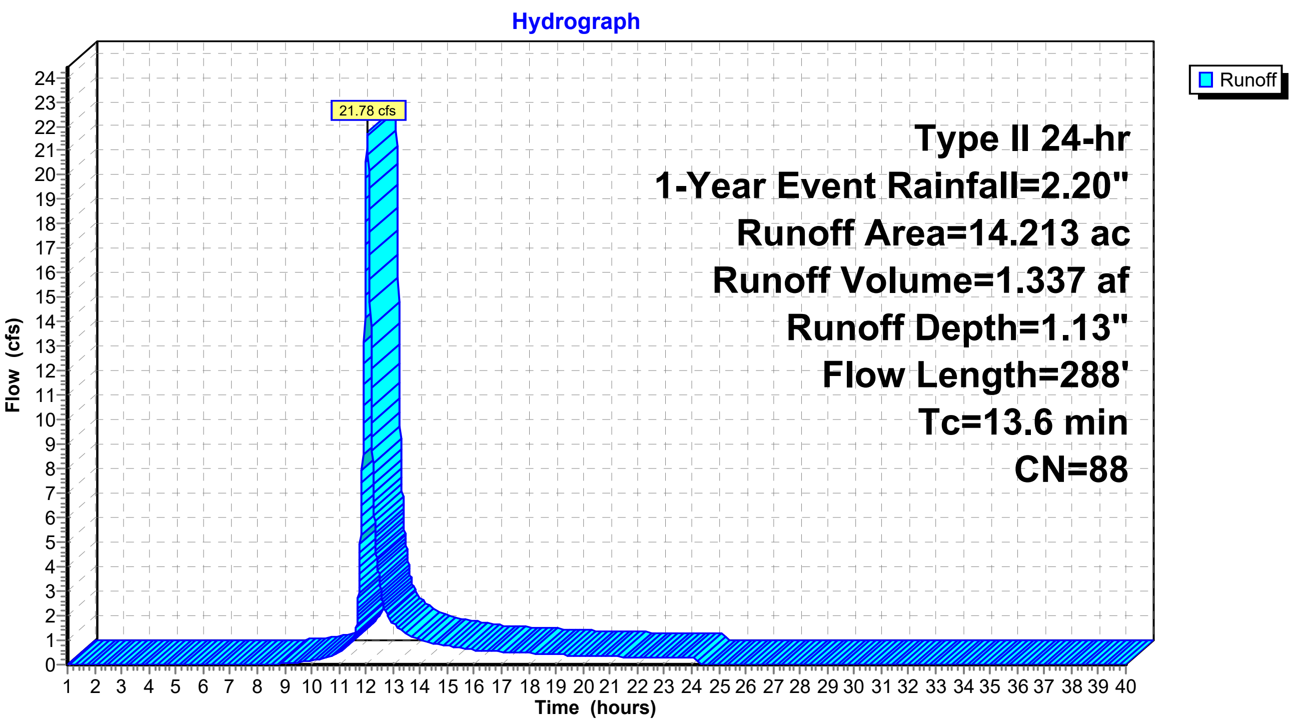
Runoff = 21.78 cfs @ 12.06 hrs, Volume= 1.337 af, Depth= 1.13"
Routed to Pond 9P : Pocket Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-40.00 hrs, dt= 0.01 hrs
Type II 24-hr 1-Year Event Rainfall=2.20"

| | Area (ac) | CN | Description |
|---|---|---|---|
| * | 14.213 | 88 | 1/8 acre lots, 65% imp, HSG C |
| | 4.975 | | 35.00% Pervious Area |
| | 9.238 | | 65.00% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 13.2 | 100 | 0.0200 | 0.13 | | **Sheet Flow, Lawn** Grass: Dense n= 0.240 P2= 3.75" |
| 0.4 | 188 | 0.2500 | 7.50 | | **Shallow Concentrated Flow, Lawn** Grassed Waterway Kv= 15.0 fps |
| 13.6 | 288 | Total | | | |

### Subcatchment 3B: DA 3B



## Summary for Subcatchment 3C: DA 3C

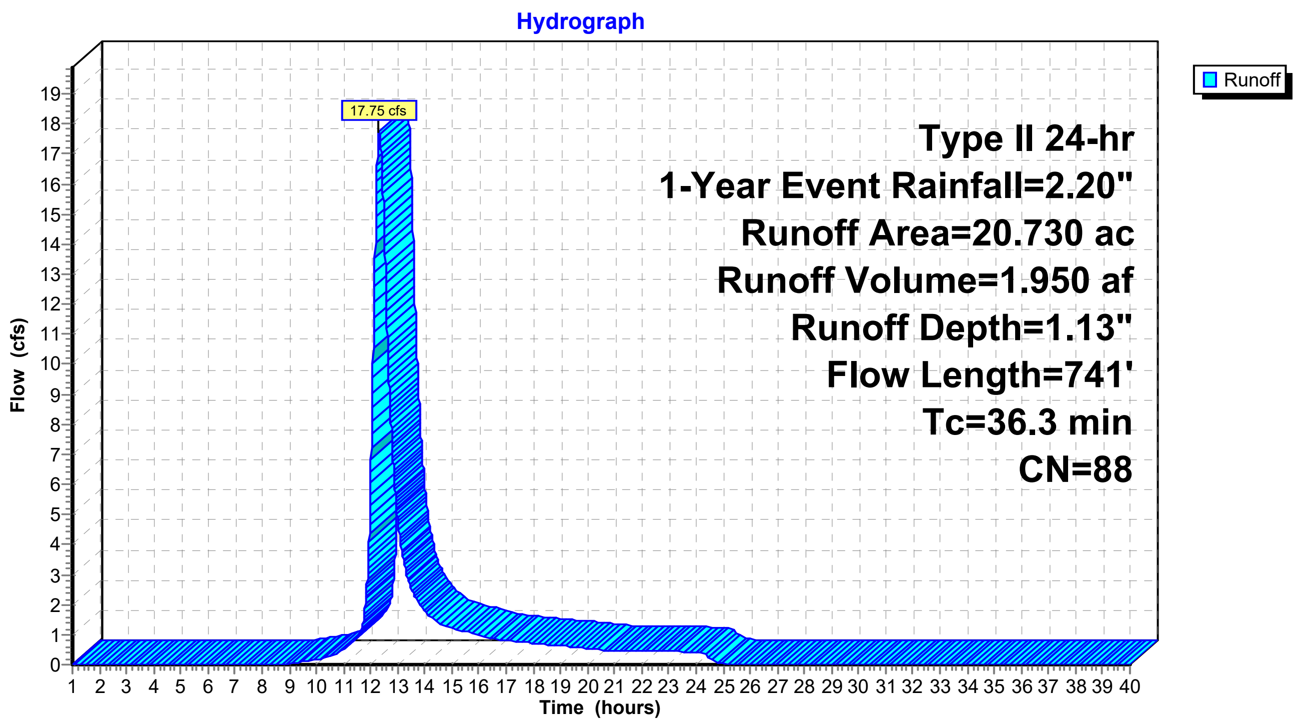
Runoff = 17.75 cfs @ 12.31 hrs, Volume= 1.950 af, Depth= 1.13"
Routed to Pond 1P : Existing Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-40.00 hrs, dt= 0.01 hrs
Type II 24-hr 1-Year Event Rainfall=2.20"

| | Area (ac) | CN | Description |
|---|---|---|---|
| * | 20.730 | 88 | 1/8 acre lots, 65% imp, HSG C |
| | 7.255 | | 35.00% Pervious Area |
| | 13.475 | | 65.00% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 34.5 | 100 | 0.0200 | 0.05 | | **Sheet Flow, Woods** Woods: Dense underbrush n= 0.800 P2= 3.75" |
| 1.8 | 641 | 0.1500 | 5.81 | | **Shallow Concentrated Flow, Lawn** Grassed Waterway Kv= 15.0 fps |
| 36.3 | 741 | Total | | | |

### Subcatchment 3C: DA 3C



## Summary for Subcatchment 3D: DA 3D

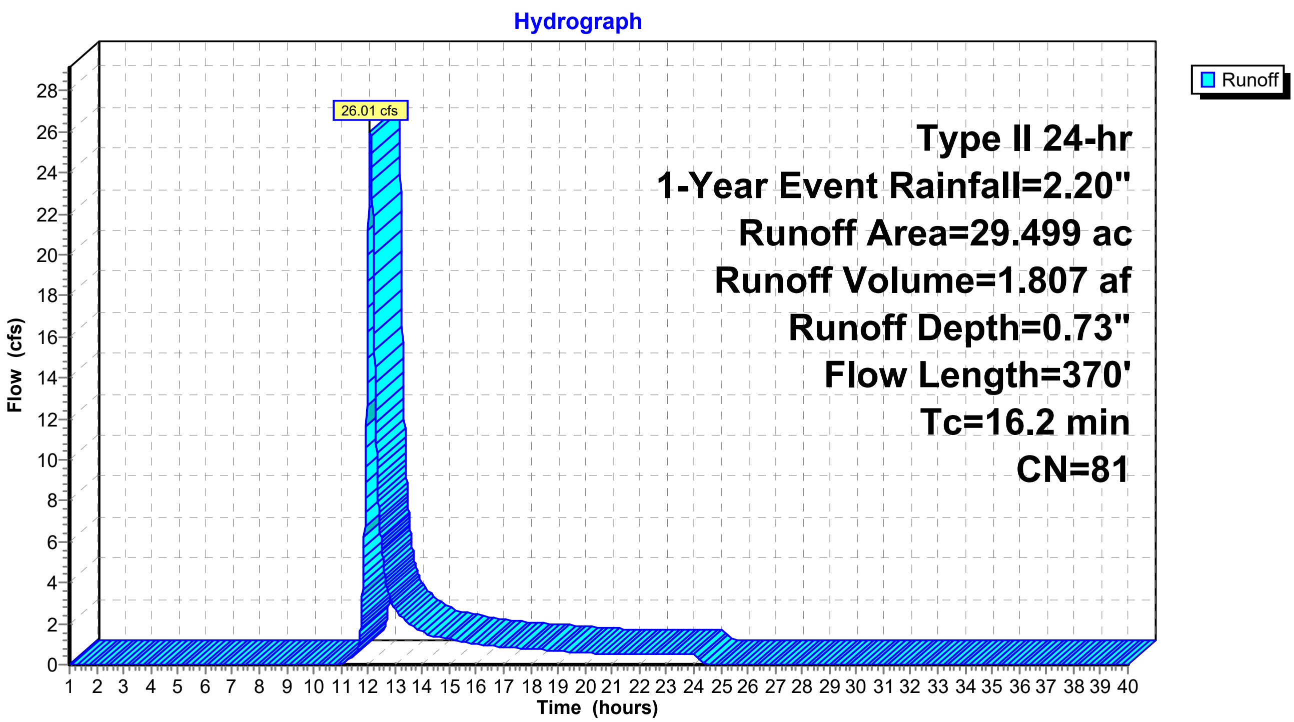
Runoff = 26.01 cfs @ 12.10 hrs, Volume= 1.807 af, Depth= 0.73"
Routed to Pond 12P : Pocket Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-40.00 hrs, dt= 0.01 hrs
Type II 24-hr 1-Year Event Rainfall=2.20"

| Area (ac) | CN | Description |
|---|---|---|
| 29.499 | 81 | 1/3 acre lots, 30% imp, HSG C |
| 20.649 | | 70.00% Pervious Area |
| 8.850 | | 30.00% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 14.8 | 100 | 0.0150 | 0.11 | | **Sheet Flow, Lawn** Grass: Dense n= 0.240 P2= 3.75" |
| 1.4 | 270 | 0.0480 | 3.29 | | **Shallow Concentrated Flow, Lawn** Grassed Waterway Kv= 15.0 fps |
| 16.2 | 370 | Total | | | |

## Subcatchment 3D: DA 3D



## Summary for Subcatchment 3E: DA 3E

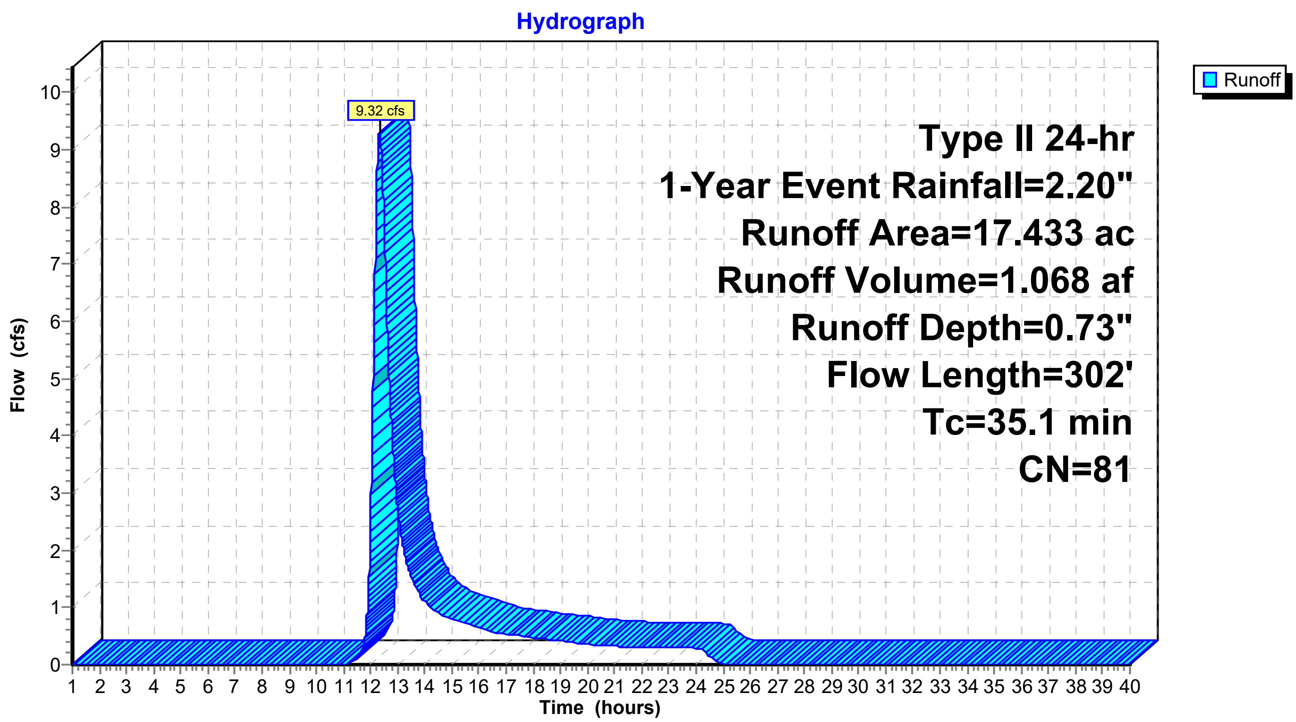
Runoff = 9.32 cfs @ 12.33 hrs, Volume= 1.068 af, Depth= 0.73"
Routed to Pond 10P : Pocket Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-40.00 hrs, dt= 0.01 hrs
Type II 24-hr 1-Year Event Rainfall=2.20"

| Area (ac) | CN | Description |
|---|---|---|
| 17.433 | 81 | 1/3 acre lots, 30% imp, HSG C |
| 12.203 | | 70.00% Pervious Area |
| 5.230 | | 30.00% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 34.5 | 100 | 0.0200 | 0.05 | | **Sheet Flow, Woods** Woods: Dense underbrush n= 0.800 P2= 3.75" |
| 0.6 | 202 | 0.1500 | 5.81 | | **Shallow Concentrated Flow, Lawn** Grassed Waterway Kv= 15.0 fps |
| 35.1 | 302 | Total | | | |

## Subcatchment 3E: DA 3E



## Summary for Subcatchment 3F: DA 3F

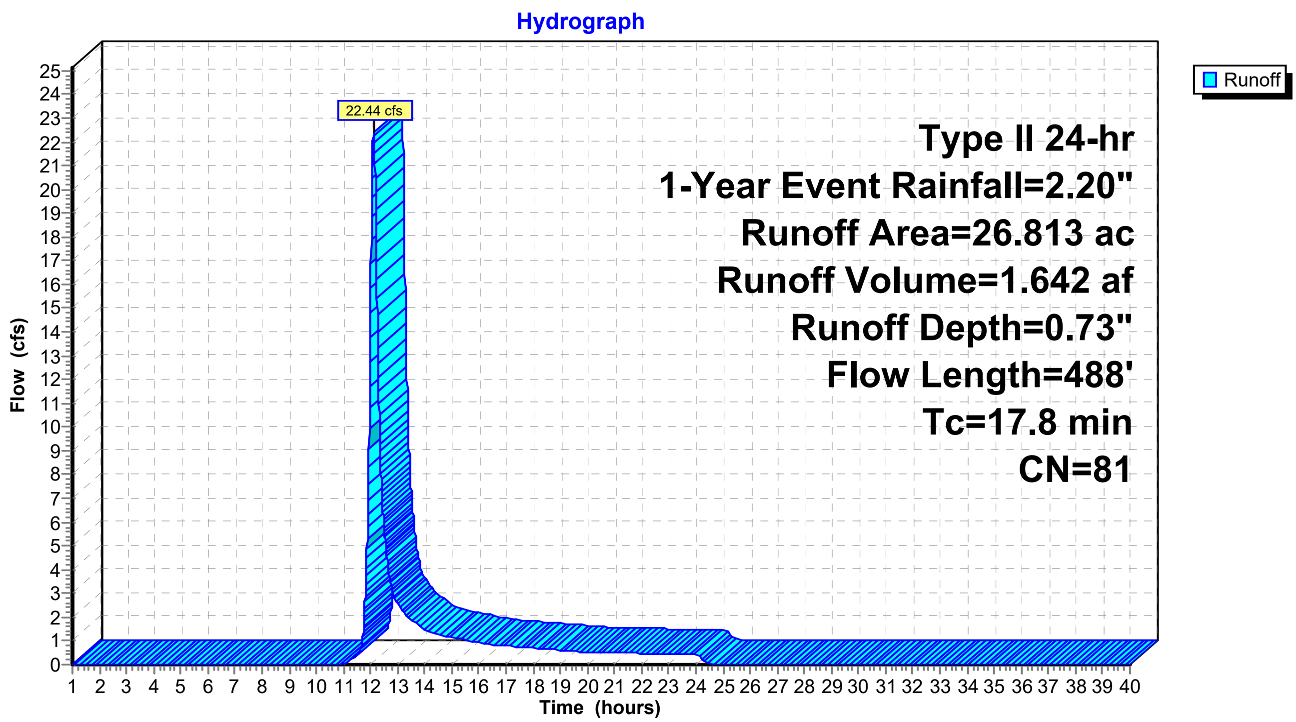
Runoff = 22.44 cfs @ 12.12 hrs, Volume= 1.642 af, Depth= 0.73"
Routed to Pond 11P : Pocket Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-40.00 hrs, dt= 0.01 hrs
Type II 24-hr 1-Year Event Rainfall=2.20"

| Area (ac) | CN | Description |
|---|---|---|
| 26.813 | 81 | 1/3 acre lots, 30% imp, HSG C |
| 18.769 | | 70.00% Pervious Area |
| 8.044 | | 30.00% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 14.8 | 100 | 0.0150 | 0.11 | | **Sheet Flow, Lawn** Grass: Dense n= 0.240 P2= 3.75" |
| 3.0 | 388 | 0.0200 | 2.12 | | **Shallow Concentrated Flow, Lawn** Grassed Waterway Kv= 15.0 fps |
| 17.8 | 488 | Total | | | |

## Subcatchment 3F: DA 3F



## Summary for Subcatchment 3G: DA 3G

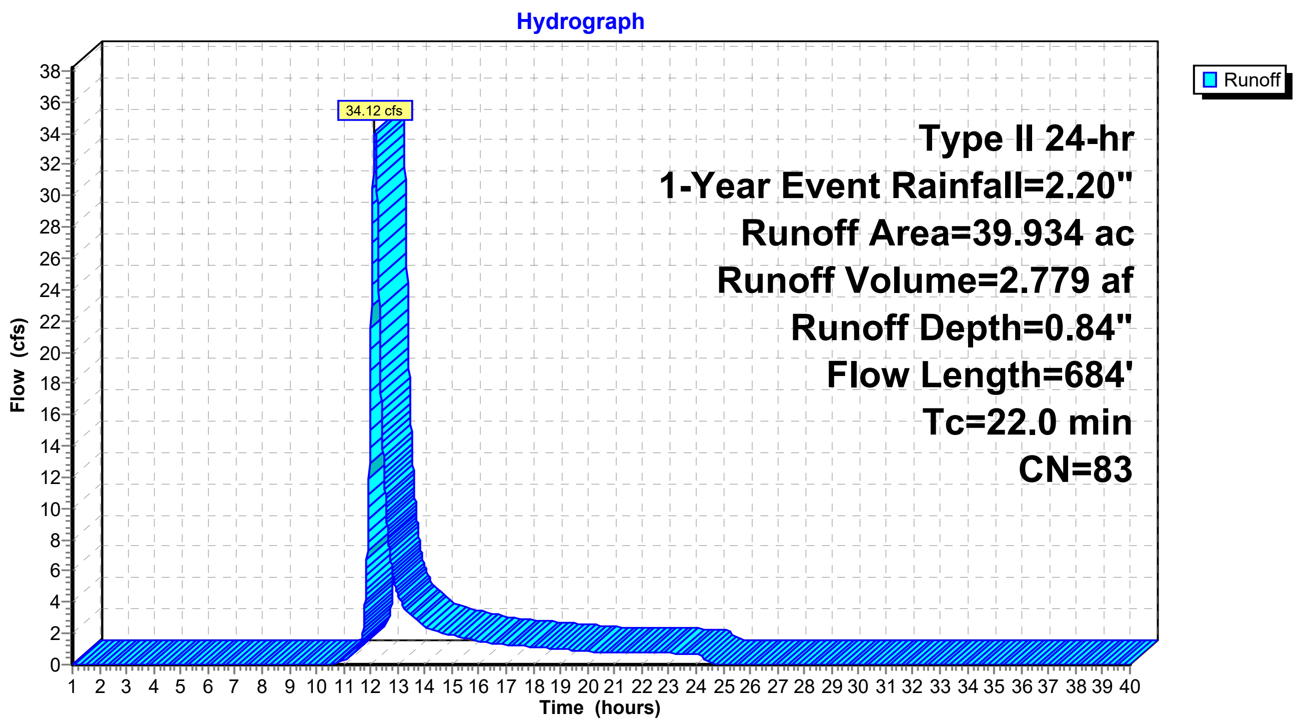
Runoff = 34.12 cfs @ 12.15 hrs, Volume= 2.779 af, Depth= 0.84"
Routed to Pond 5P : Pocket Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-40.00 hrs, dt= 0.01 hrs
Type II 24-hr 1-Year Event Rainfall=2.20"

| Area (ac) | CN | Description |
|---|---|---|
| 39.934 | 83 | 1/4 acre lots, 38% imp, HSG C |
| 24.759 | | 62.00% Pervious Area |
| 15.175 | | 38.00% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 17.4 | 100 | 0.0100 | 0.10 | | **Sheet Flow, Lawn**<br>Grass: Dense n= 0.240 P2= 3.75" |
| 4.6 | 584 | 0.0200 | 2.12 | | **Shallow Concentrated Flow, Lawn**<br>Grassed Waterway Kv= 15.0 fps |
| 22.0 | 684 | Total | | | |

### Subcatchment 3G: DA 3G



## Summary for Subcatchment 4: DA 4

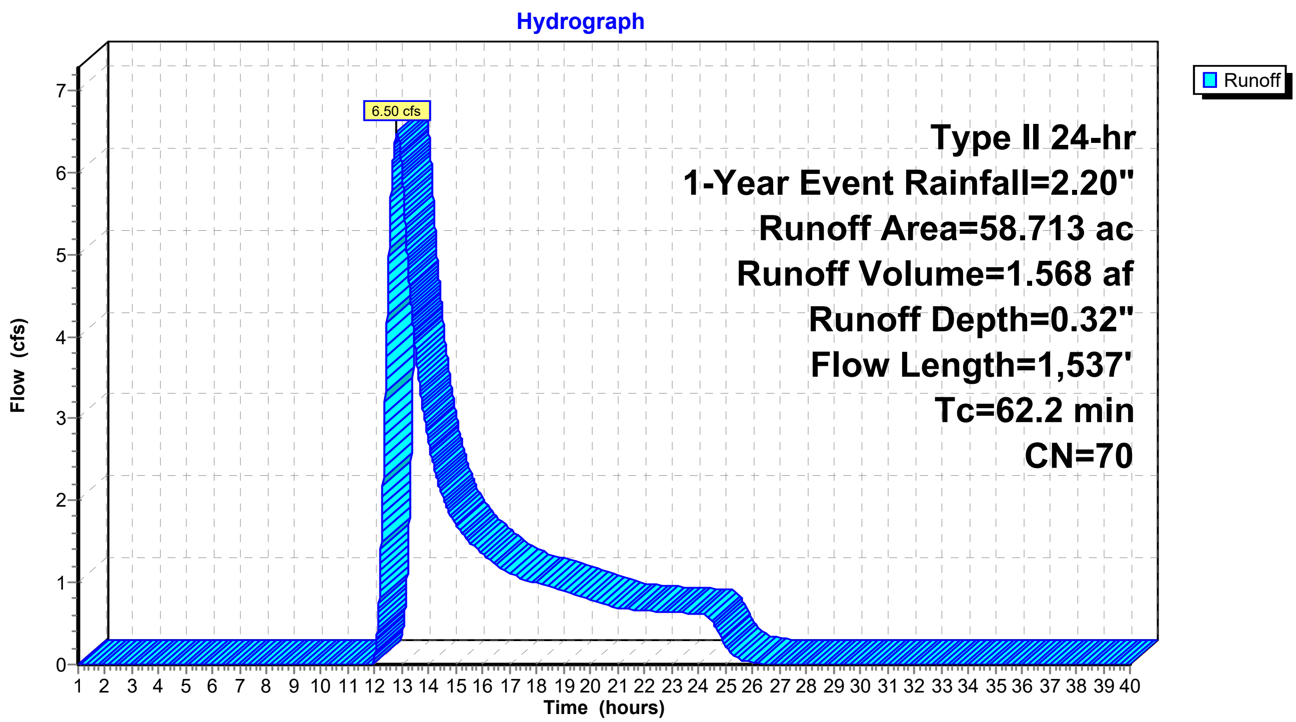
Runoff = 6.50 cfs @ 12.79 hrs, Volume= 1.568 af, Depth= 0.32"
Routed to Reach 1R : Beaverkill

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-40.00 hrs, dt= 0.01 hrs
Type II 24-hr 1-Year Event Rainfall=2.20"

| Area (ac) | CN | Description |
|---|---|---|
| 58.438 | 70 | Woods, Good, HSG C |
| 0.275 | 98 | Unconnected pavement, HSG C |
| 58.713 | 70 | Weighted Average |
| 58.438 | | 99.53% Pervious Area |
| 0.275 | | 0.47% Impervious Area |
| 0.275 | | 100.00% Unconnected |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 34.5 | 100 | 0.0200 | 0.05 | | **Sheet Flow, Woods** |
| | | | | | Woods: Dense underbrush n= 0.800 P2= 3.75" |
| 27.7 | 1,437 | 0.0300 | 0.87 | | **Shallow Concentrated Flow, Woods** |
| | | | | | Woodland Kv= 5.0 fps |
| 62.2 | 1,537 | Total | | | |

### Subcatchment 4: DA 4



## Summary for Subcatchment 4A: DA 4A

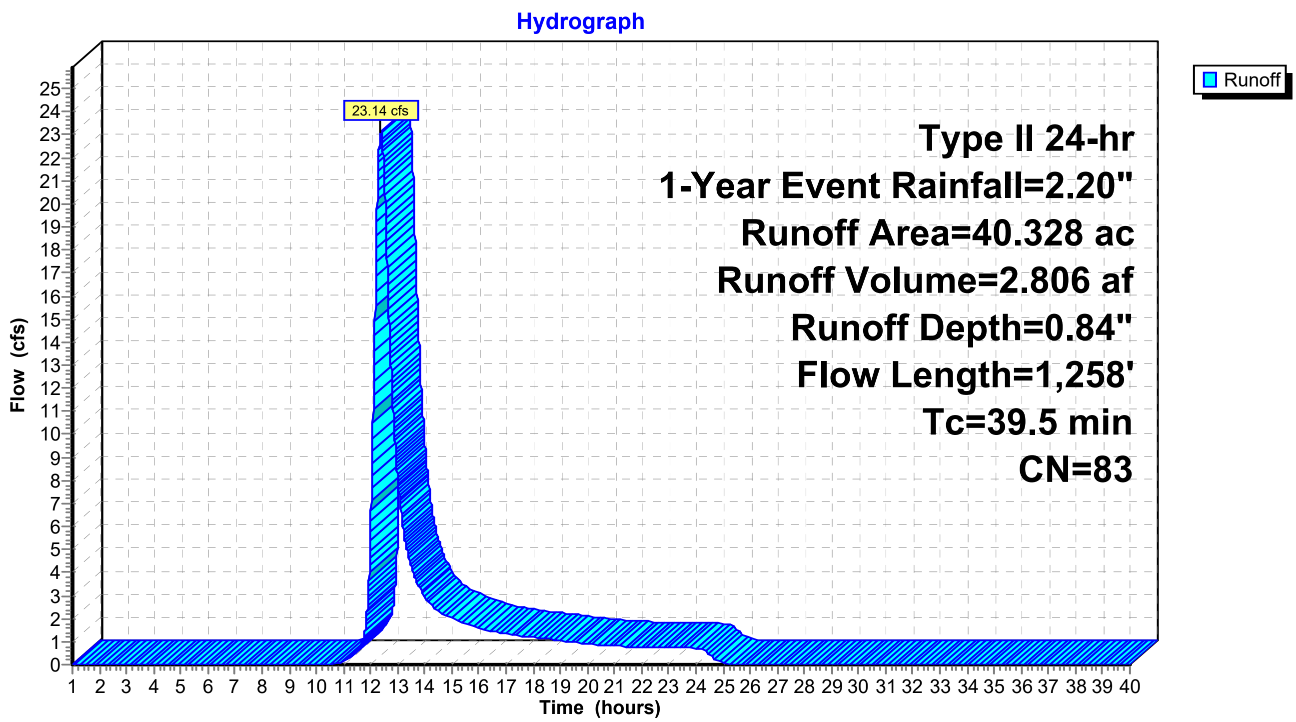
Runoff = 23.14 cfs @ 12.38 hrs, Volume= 2.806 af, Depth= 0.84"
Routed to Pond 3P : Pocket Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-40.00 hrs, dt= 0.01 hrs
Type II 24-hr 1-Year Event Rainfall=2.20"

| Area (ac) | CN | Description |
|---|---|---|
| 40.328 | 83 | 1/4 acre lots, 38% imp, HSG C |
| 25.003 | | 62.00% Pervious Area |
| 15.325 | | 38.00% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 18.9 | 100 | 0.0900 | 0.09 | | **Sheet Flow, Woods** Woods: Dense underbrush n= 0.800 P2= 3.75" |
| 20.6 | 1,158 | 0.0350 | 0.94 | | **Shallow Concentrated Flow, Woods** Woodland Kv= 5.0 fps |
| 39.5 | 1,258 | Total | | | |

### Subcatchment 4A: DA 4A



## Summary for Subcatchment 4B: DA 4B

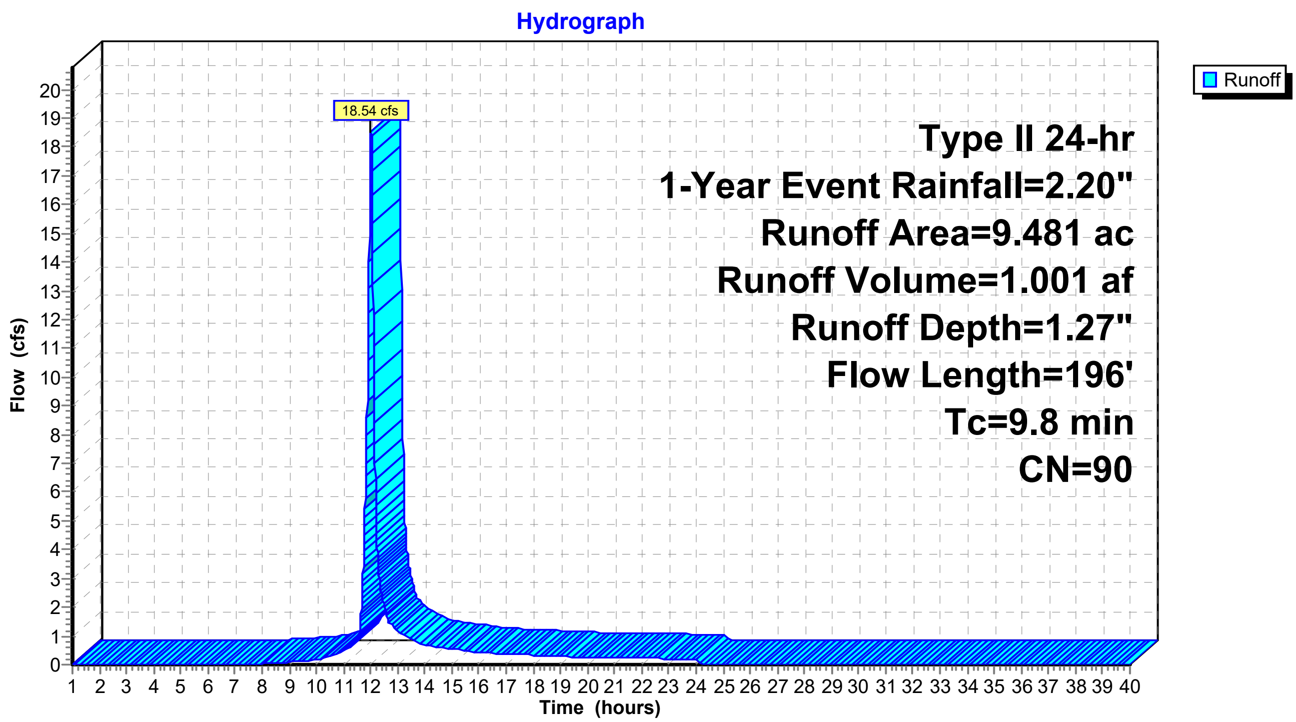
Runoff = 18.54 cfs @ 12.01 hrs, Volume= 1.001 af, Depth= 1.27"
Routed to Pond 4P : Pocket Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-40.00 hrs, dt= 0.01 hrs
Type II 24-hr 1-Year Event Rainfall=2.20"

| Area (ac) | CN | Description |
|---|---|---|
| 9.481 | 90 | 1/8 acre lots, 65% imp, HSG C |
| 3.318 | | 35.00% Pervious Area |
| 6.163 | | 65.00% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 9.1 | 100 | 0.0500 | 0.18 | | **Sheet Flow, Lawn**<br>Grass: Dense n= 0.240 P2= 3.75" |
| 0.7 | 96 | 0.0200 | 2.28 | | **Shallow Concentrated Flow, Lawn**<br>Unpaved Kv= 16.1 fps |
| 9.8 | 196 | Total | | | |

## Subcatchment 4B: DA 4B



## Summary for Subcatchment 5: DA 5

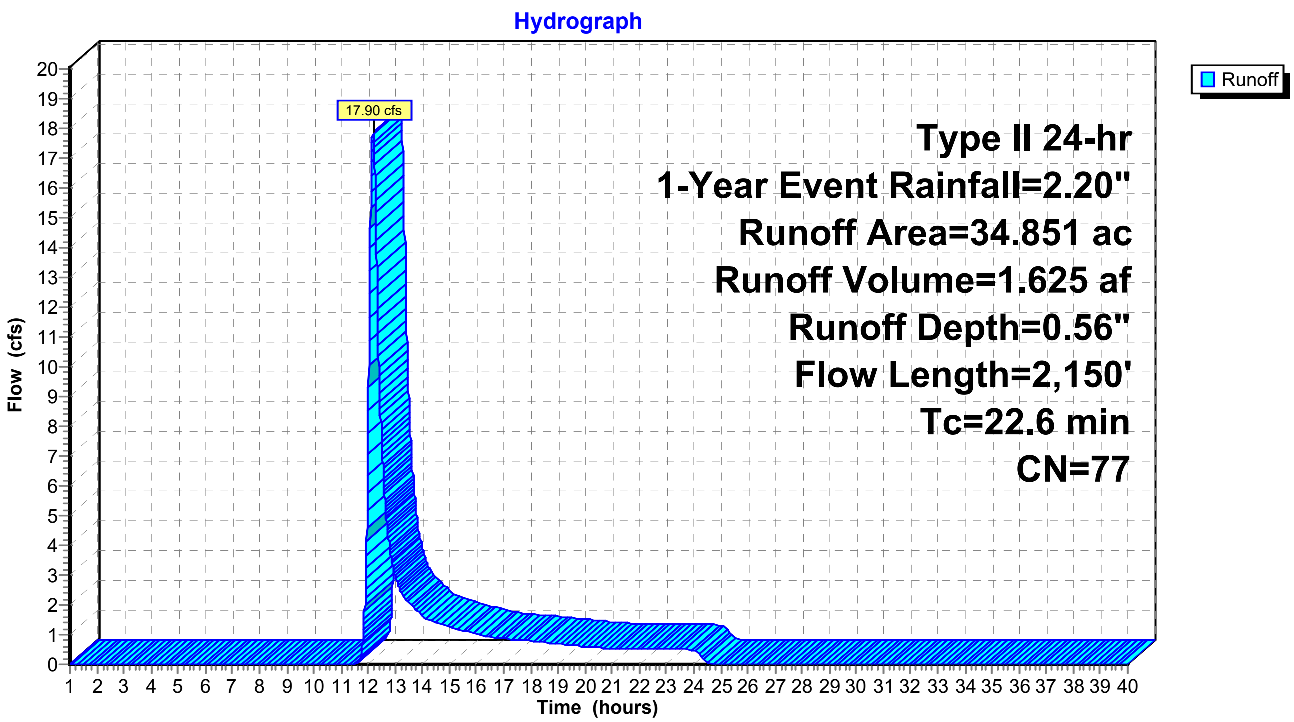
Runoff = 17.90 cfs @ 12.18 hrs, Volume= 1.625 af, Depth= 0.56"
Routed to Reach 2R : Beaverkill

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-40.00 hrs, dt= 0.01 hrs
Type II 24-hr 1-Year Event Rainfall=2.20"

| Area (ac) | CN | Description |
|---|---|---|
| 34.851 | 77 | 2 acre lots, 12% imp, HSG C |
| 30.669 | | 88.00% Pervious Area |
| 4.182 | | 12.00% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 7.9 | 100 | 0.2000 | 0.21 | | **Sheet Flow, Woods** |
| | | | | | Woods: Light underbrush n= 0.400 P2= 3.75" |
| 14.7 | 2,050 | 0.0240 | 2.32 | | **Shallow Concentrated Flow, Lawn** |
| | | | | | Grassed Waterway Kv= 15.0 fps |
| 22.6 | 2,150 | Total | | | |

## Subcatchment 5: DA 5



## Summary for Reach 1R: Beaverkill

Inflow Area = 1,074.280 ac, 12.67% Impervious, Inflow Depth > 14.70" for 1-Year Event event
Inflow = 479.61 cfs @ 12.99 hrs, Volume= 1,316.341 af
Outflow = 472.54 cfs @ 13.51 hrs, Volume= 1,296.803 af, Atten= 1%, Lag= 31.2 min
Routed to Link AP-2 : AP-2

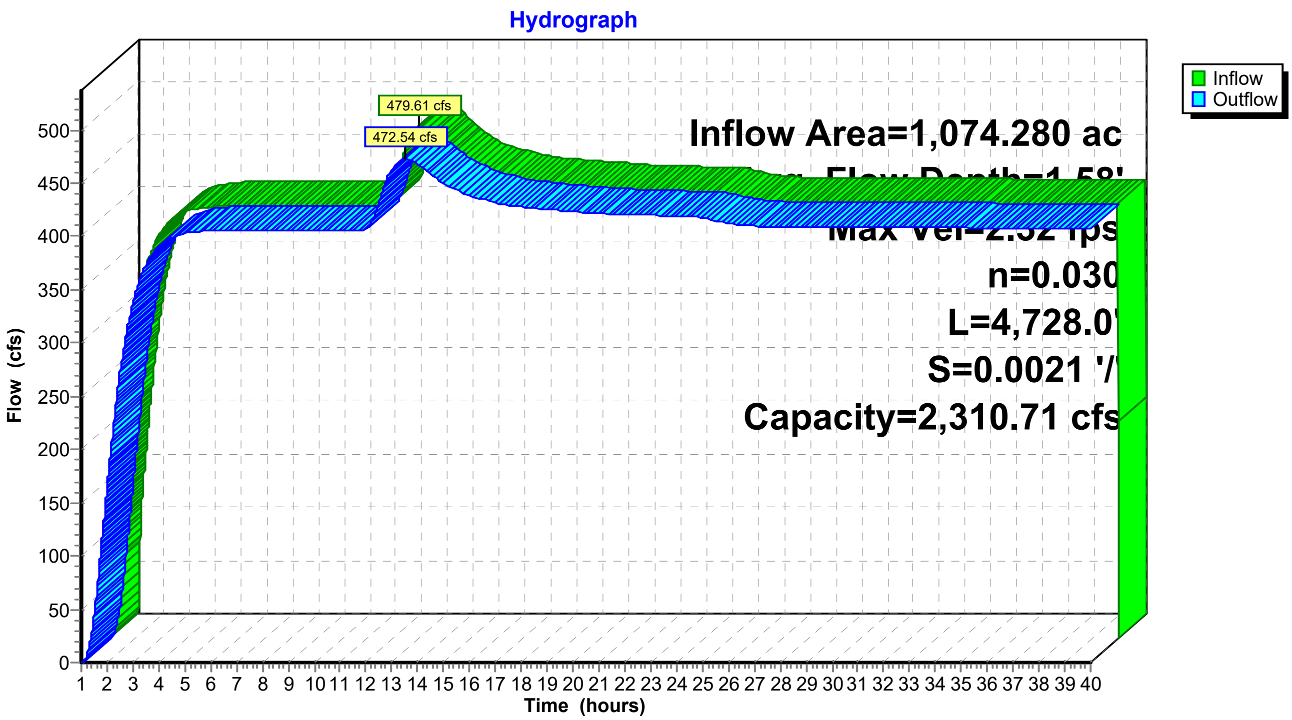
Routing by Sim-Route method, Time Span= 1.00-40.00 hrs, dt= 0.01 hrs
Max. Velocity= 2.32 fps, Min. Travel Time= 34.0 min
Avg. Velocity = 2.20 fps, Avg. Travel Time= 35.8 min

Peak Storage= 964,182 cf @ 13.51 hrs
Average Depth at Peak Storage= 1.58' , Surface Width= 198.72'
Bank-Full Depth= 3.25' Flow Area= 659.8 sf, Capacity= 2,310.71 cfs

60.00' x 3.25' deep channel, n= 0.030 Earth, grassed & winding
Side Slope Z-value= 44.0 '/' Top Width= 346.00'
Length= 4,728.0' Slope= 0.0021 '/'
Inlet Invert= 145.00', Outlet Invert= 135.00'

‡

### Reach 1R: Beaverkill



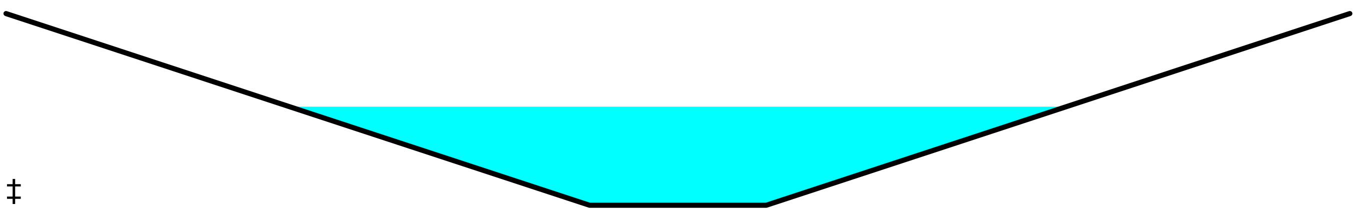
## Summary for Reach 2R: Beaverkill

Inflow Area = 471.379 ac, 0.89% Impervious, Inflow Depth > 27.74" for 1-Year Event event
Inflow = 376.67 cfs @ 13.10 hrs, Volume= 1,089.809 af, Incl. 334.00 cfs Base Flow
Outflow = 367.59 cfs @ 13.60 hrs, Volume= 1,066.069 af, Atten= 2%, Lag= 30.0 min
Routed to Reach 1R : Beaverkill

Routing by Sim-Route method, Time Span= 1.00-40.00 hrs, dt= 0.01 hrs
Max. Velocity= 2.21 fps, Min. Travel Time= 50.9 min
Avg. Velocity = 2.14 fps, Avg. Travel Time= 52.5 min

Peak Storage= 1,123,018 cf @ 13.60 hrs
Average Depth at Peak Storage= 1.54' , Surface Width= 175.65'
Bank-Full Depth= 3.00' Flow Area= 516.0 sf, Capacity= 1,684.63 cfs

40.00' x 3.00' deep channel, n= 0.030 Earth, grassed & winding
Side Slope Z-value= 44.0 '/' Top Width= 304.00'
Length= 6,756.0' Slope= 0.0021 '/'
Inlet Invert= 160.00', Outlet Invert= 145.50'



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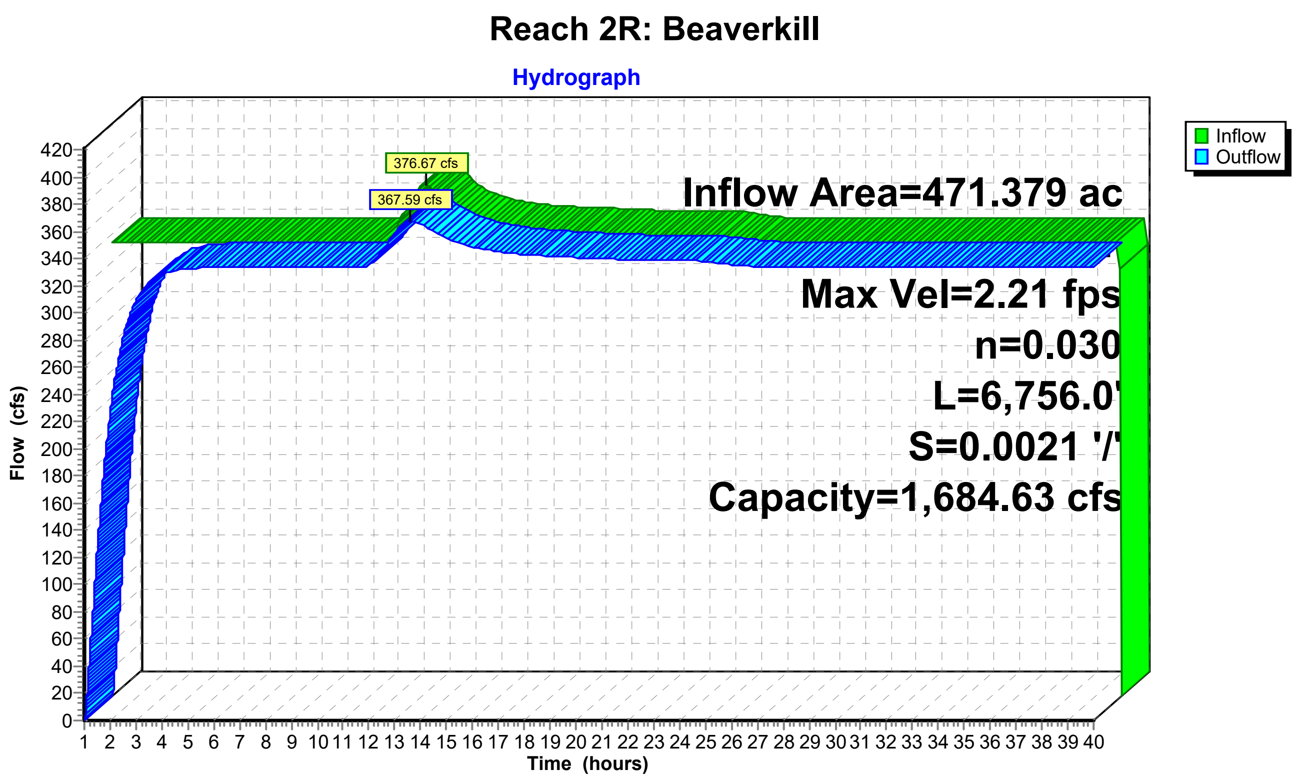


## Summary for Reach 3R: Beaverkill Trib

Inflow Area = 370.977 ac, 18.86% Impervious, Inflow Depth > 7.89" for 1-Year Event event
Inflow = 117.43 cfs @ 12.70 hrs, Volume= 243.927 af
Outflow = 117.42 cfs @ 12.72 hrs, Volume= 243.795 af, Atten= 0%, Lag= 0.9 min
Routed to Reach 1R : Beaverkill

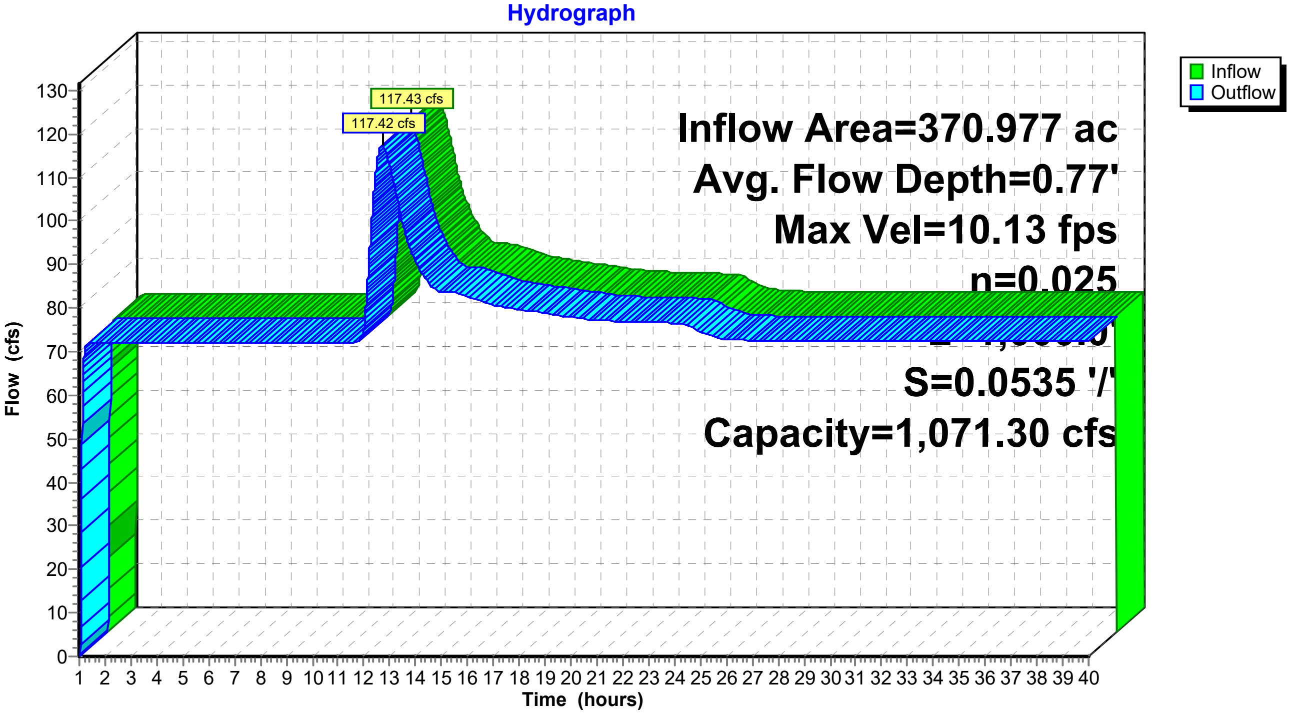
Routing by Sim-Route method, Time Span= 1.00-40.00 hrs, dt= 0.01 hrs
Max. Velocity= 10.13 fps, Min. Travel Time= 1.6 min
Avg. Velocity = 8.75 fps, Avg. Travel Time= 1.9 min

Peak Storage= 11,596 cf @ 12.72 hrs
Average Depth at Peak Storage= 0.77' , Surface Width= 18.15'
Bank-Full Depth= 2.50' Flow Area= 55.0 sf, Capacity= 1,071.30 cfs

12.00' x 2.50' deep channel, n= 0.025 Earth, clean & winding
Side Slope Z-value= 4.0 '/' Top Width= 32.00'
Length= 1,000.0' Slope= 0.0535 '/'
Inlet Invert= 200.00', Outlet Invert= 146.50'

‡

### Reach 3R: Beaverkill Trib



## Summary for Reach 4R: Beaverkill Trib

Inflow Area = 176.681 ac, 8.40% Impervious, Inflow Depth > 16.16" for 1-Year Event event
Inflow = 95.70 cfs @ 12.86 hrs, Volume= 237.895 af, Incl. 72.00 cfs Base Flow
Outflow = 95.65 cfs @ 12.89 hrs, Volume= 237.524 af, Atten= 0%, Lag= 1.8 min
Routed to Reach 3R : Beaverkill Trib

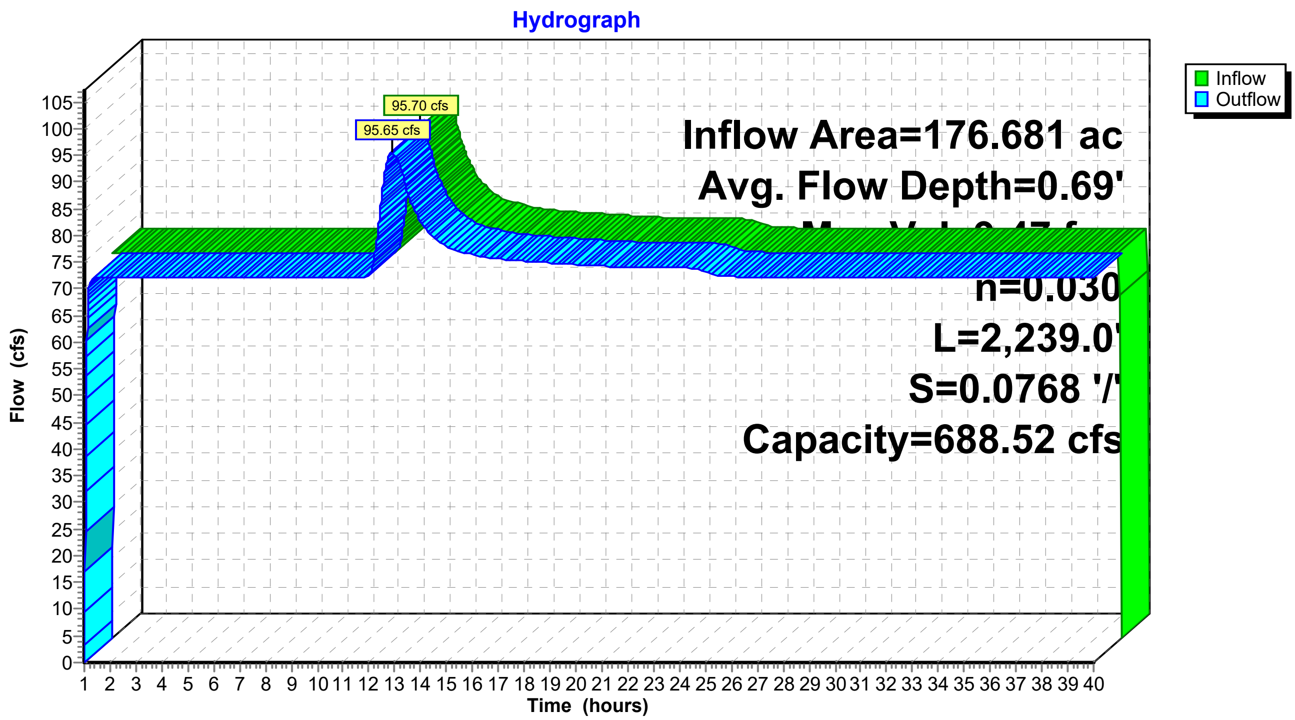
Routing by Sim-Route method, Time Span= 1.00-40.00 hrs, dt= 0.01 hrs
Max. Velocity= 9.47 fps, Min. Travel Time= 3.9 min
Avg. Velocity = 8.68 fps, Avg. Travel Time= 4.3 min

Peak Storage= 22,627 cf @ 12.89 hrs
Average Depth at Peak Storage= 0.69' , Surface Width= 17.48'
Bank-Full Depth= 2.00' Flow Area= 40.0 sf, Capacity= 688.52 cfs

12.00' x 2.00' deep channel, n= 0.030 Earth, grassed & winding
Side Slope Z-value= 4.0 '/' Top Width= 28.00'
Length= 2,239.0' Slope= 0.0768 '/'
Inlet Invert= 386.00', Outlet Invert= 214.00'

‡

**Reach 4R: Beaverkill Trib**



## Summary for Pond 1P: Existing Pond

Inflow Area = 60.446 ac, 30.18% Impervious, Inflow Depth = 0.75" for 1-Year Event event
Inflow = 28.87 cfs @ 12.39 hrs, Volume= 3.802 af
Outflow = 2.28 cfs @ 15.95 hrs, Volume= 1.225 af, Atten= 92%, Lag= 213.9 min
Primary = 2.28 cfs @ 15.95 hrs, Volume= 1.225 af
Routed to Reach 3R : Beaverkill Trib

Routing by Sim-Route method, Time Span= 1.00-40.00 hrs, dt= 0.01 hrs
Peak Elev= 208.79' @ 15.95 hrs Surf.Area= 15,399 sf Storage= 116,749 cf

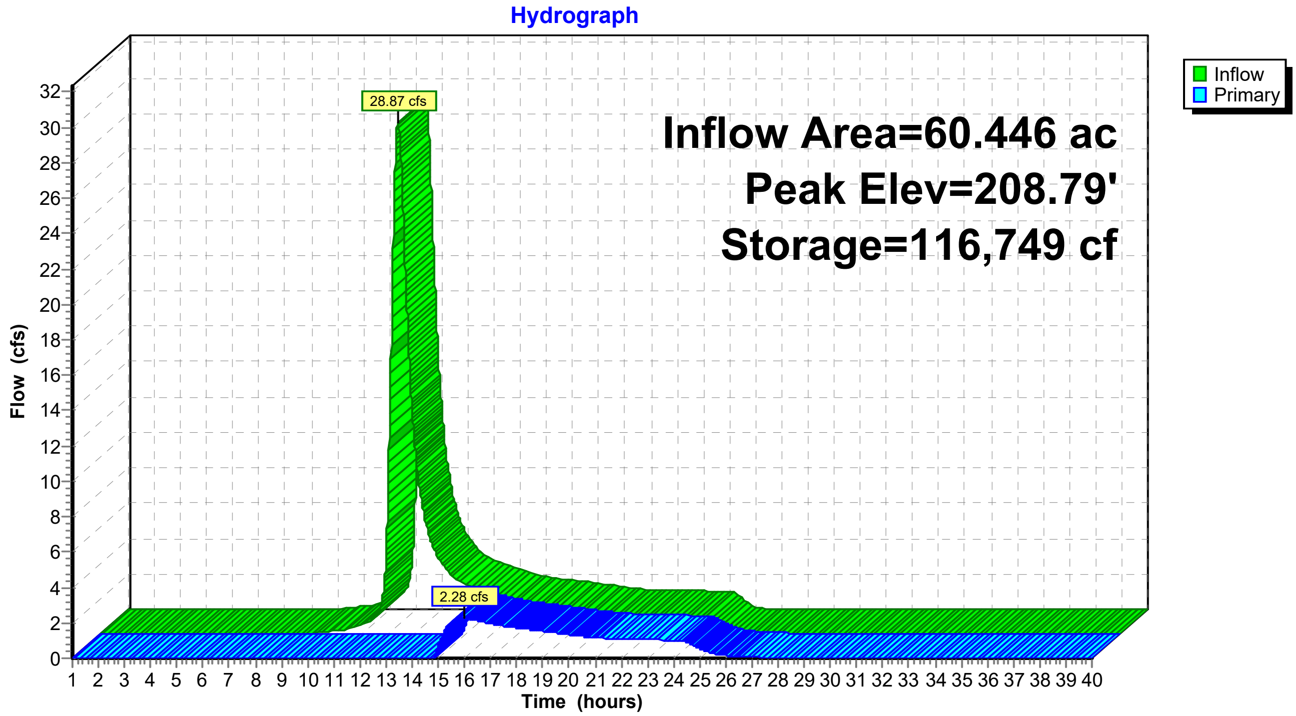
Plug-Flow detention time= 434.6 min calculated for 1.224 af (32% of inflow)
Center-of-Mass det. time= 284.8 min ( 1,167.5 - 882.7 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 200.00' | 203,971 cf | **84.00'W x 134.00'L x 14.00'H Prismatoid Z=1.0** |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 208.50' | **5.0' long x 0.5' breadth Broad-Crested Rectangular Weir**<br>Head (feet) 0.20 0.40 0.60 0.80 1.00<br>Coef. (English) 2.80 2.92 3.08 3.30 3.32 |
| #2 | Primary | 211.50' | **40.0' long x 0.5' breadth Broad-Crested Rectangular Weir**<br>Head (feet) 0.20 0.40 0.60 0.80 1.00<br>Coef. (English) 2.80 2.92 3.08 3.30 3.32 |

**Primary OutFlow** Max=2.28 cfs @ 15.95 hrs HW=208.79' TW=200.63' (Dynamic Tailwater)
**1=Broad-Crested Rectangular Weir** (Weir Controls 2.28 cfs @ 1.55 fps)
**2=Broad-Crested Rectangular Weir** ( Controls 0.00 cfs)

## Pond 1P: Existing Pond



## Summary for Pond 2P: Pocket Pond

Inflow Area = 36.879 ac, 12.00% Impervious, Inflow Depth = 0.56" for 1-Year Event event
Inflow = 3.89 cfs @ 14.50 hrs, Volume= 1.720 af
Outflow = 0.20 cfs @ 27.21 hrs, Volume= 0.365 af, Atten= 95%, Lag= 762.3 min
Primary = 0.20 cfs @ 27.21 hrs, Volume= 0.365 af
Routed to Reach 4R : Beaverkill Trib

Routing by Sim-Route method, Time Span= 1.00-40.00 hrs, dt= 0.01 hrs
Peak Elev= 393.39' @ 27.21 hrs Surf.Area= 172,301 sf Storage= 66,812 cf

Plug-Flow detention time= 864.6 min calculated for 0.365 af (21% of inflow)
Center-of-Mass det. time= 643.9 min ( 1,692.8 - 1,049.0 )

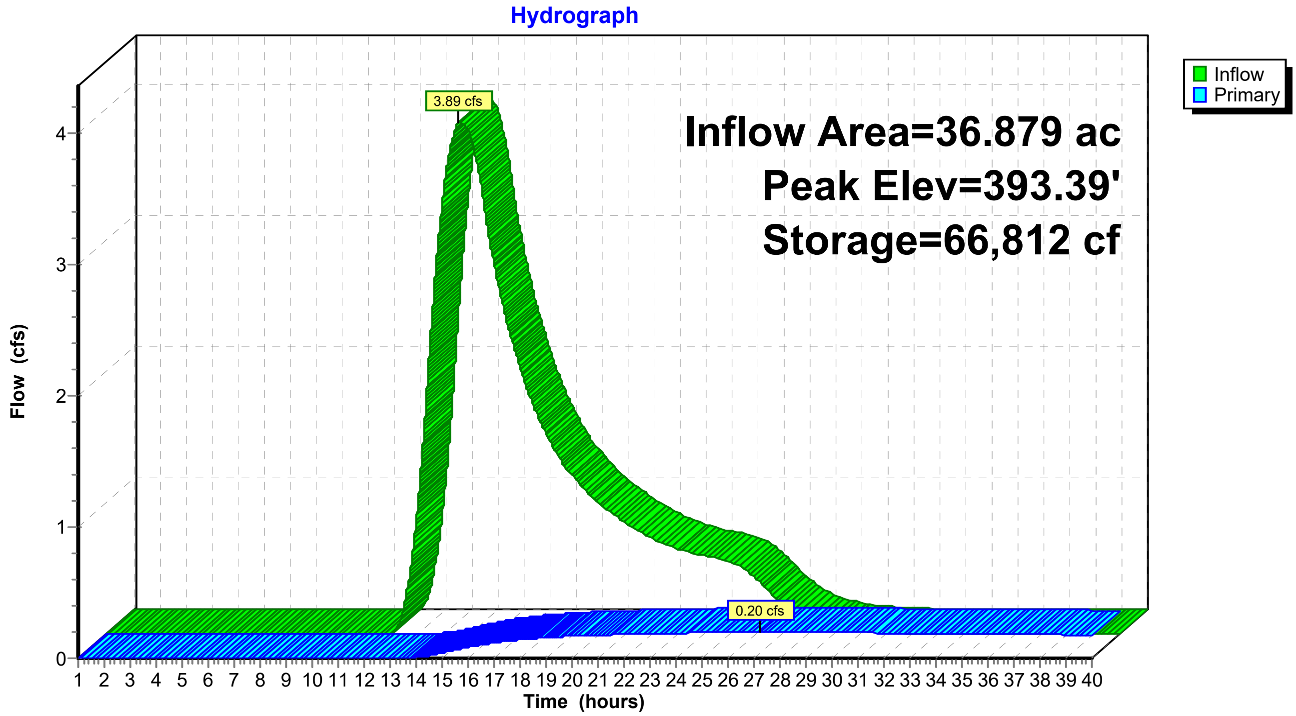
| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 393.00' | 1,369,452 cf | **Custom Stage Data (Prismatic)** Listed below (Recalc) |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 393.00 | 169,366 | 0 | 0 |
| 400.00 | 221,906 | 1,369,452 | 1,369,452 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 393.00' | **18.0" Round Culvert**<br>L= 75.0' CPP, square edge headwall, Ke= 0.500<br>Inlet / Outlet Invert= 393.00' / 389.00' S= 0.0533 '/' Cc= 0.900<br>n= 0.011 Concrete pipe, straight & clean, Flow Area= 1.77 sf |
| #2 | Device 1 | 393.00' | **4.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads |

**Primary OutFlow** Max=0.20 cfs @ 27.21 hrs HW=393.39' TW=386.58' (Dynamic Tailwater)
↑—**1=Culvert** (Passes 0.20 cfs of 0.78 cfs potential flow)
↑—**2=Orifice/Grate** (Orifice Controls 0.20 cfs @ 2.28 fps)

## Pond 2P: Pocket Pond



## Summary for Pond 3P: Pocket Pond

Inflow Area = 40.328 ac, 38.00% Impervious, Inflow Depth = 0.84" for 1-Year Event event
Inflow = 23.14 cfs @ 12.38 hrs, Volume= 2.806 af
Outflow = 0.39 cfs @ 24.53 hrs, Volume= 0.828 af, Atten= 98%, Lag= 729.3 min
Primary = 0.39 cfs @ 24.53 hrs, Volume= 0.828 af
Routed to Reach 1R : Beaverkill

Routing by Sim-Route method, Time Span= 1.00-40.00 hrs, dt= 0.01 hrs
Peak Elev= 147.53' @ 24.53 hrs Surf.Area= 107,125 sf Storage= 106,298 cf

Plug-Flow detention time= 846.7 min calculated for 0.828 af (29% of inflow)
Center-of-Mass det. time= 701.1 min ( 1,581.0 - 879.9 )

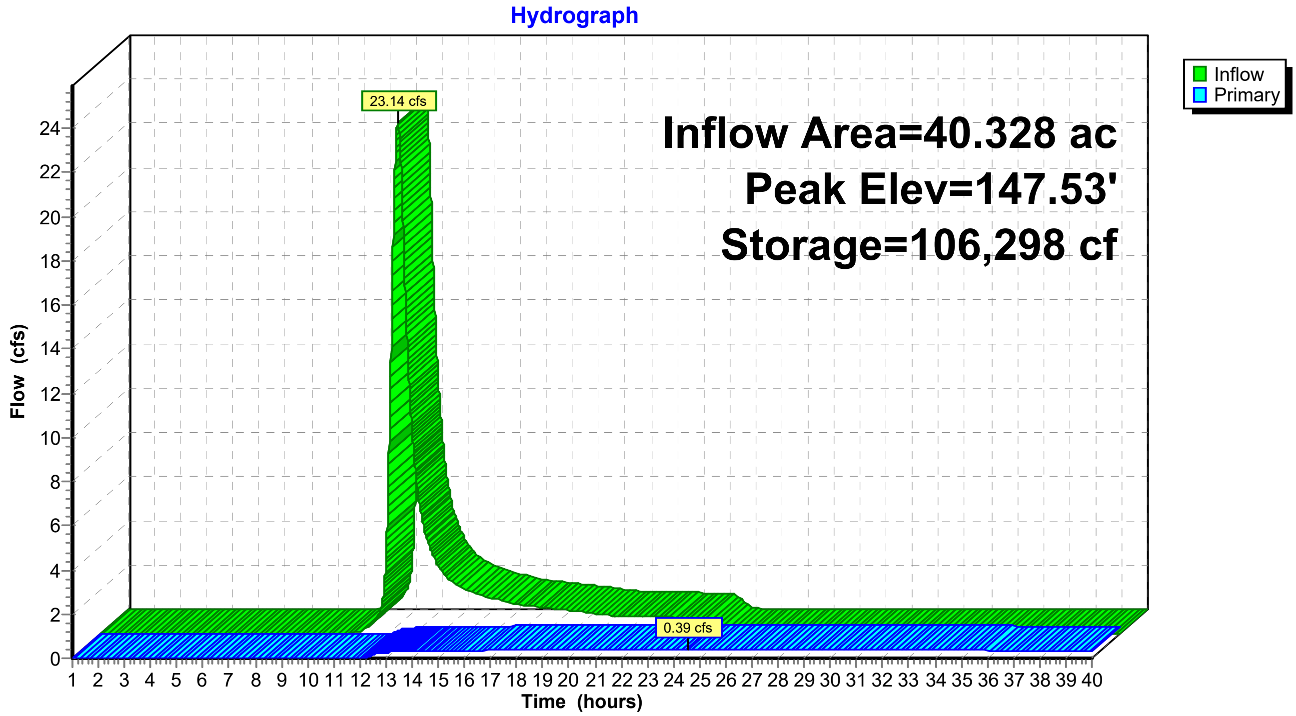
| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 146.50' | 659,406 cf | **Custom Stage Data (Prismatic)** Listed below (Recalc) |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 146.50 | 99,492 | 0 | 0 |
| 152.00 | 140,292 | 659,406 | 659,406 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 146.50' | **24.0" Round Culvert**<br>L= 50.0' CPP, square edge headwall, Ke= 0.500<br>Inlet / Outlet Invert= 146.50' / 146.00' S= 0.0100 '/' Cc= 0.900<br>n= 0.011 Concrete pipe, straight & clean, Flow Area= 3.14 sf |
| #2 | Device 1 | 146.50' | **4.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads |
| #3 | Device 1 | 147.55' | **24.0" x 24.0" Horiz. Orifice/Grate** C= 0.600<br>Limited to weir flow at low heads |

**Primary OutFlow** Max=0.39 cfs @ 24.53 hrs HW=147.53' TW=146.49' (Dynamic Tailwater)
**1=Culvert** (Passes 0.39 cfs of 5.43 cfs potential flow)
**2=Orifice/Grate** (Orifice Controls 0.39 cfs @ 4.47 fps)
**3=Orifice/Grate** ( Controls 0.00 cfs)

## Pond 3P: Pocket Pond



## Summary for Pond 4P: Pocket Pond

Inflow Area = 9.481 ac, 65.00% Impervious, Inflow Depth = 1.27" for 1-Year Event event
Inflow = 18.54 cfs @ 12.01 hrs, Volume= 1.001 af
Outflow = 0.53 cfs @ 15.18 hrs, Volume= 0.900 af, Atten= 97%, Lag= 189.9 min
Primary = 0.53 cfs @ 15.18 hrs, Volume= 0.900 af
Routed to Reach 1R : Beaverkill

Routing by Sim-Route method, Time Span= 1.00-40.00 hrs, dt= 0.01 hrs
Peak Elev= 151.74' @ 15.18 hrs Surf.Area= 16,242 sf Storage= 27,905 cf

Plug-Flow detention time= 631.6 min calculated for 0.900 af (90% of inflow)
Center-of-Mass det. time= 580.5 min ( 1,403.1 - 822.7 )

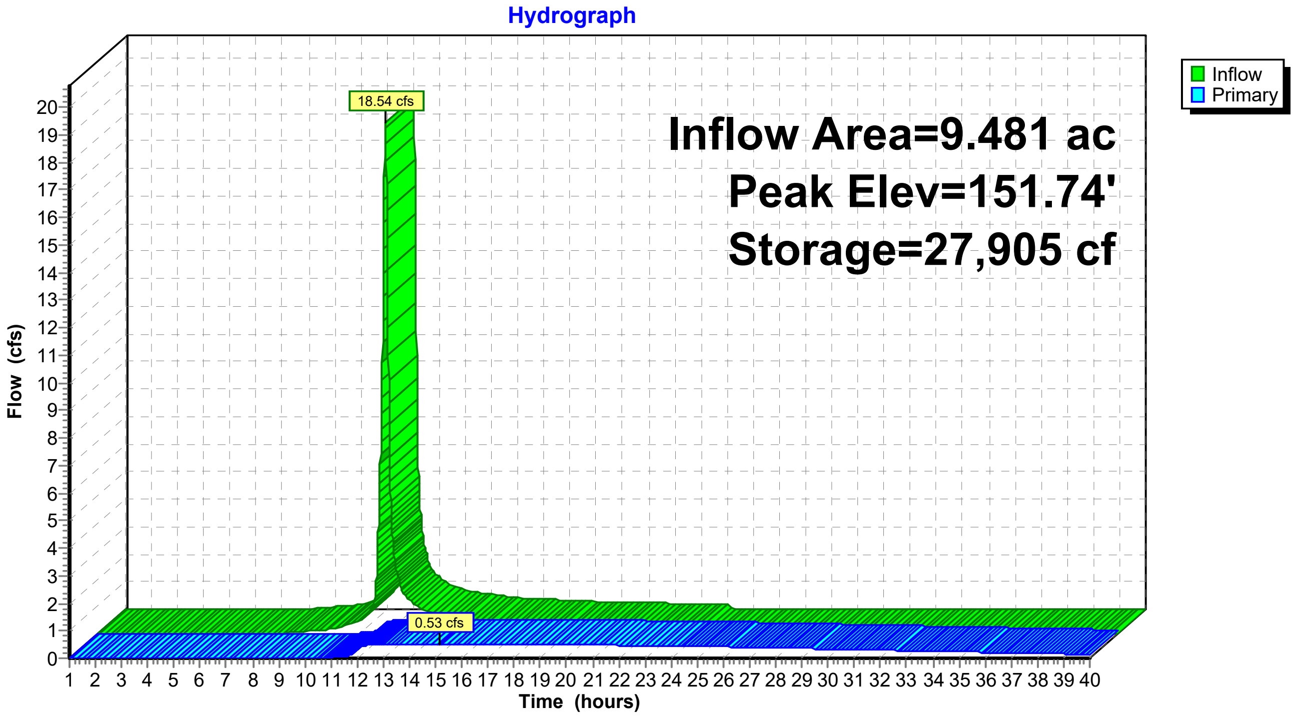
| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 150.00' | 169,025 cf | **Custom Stage Data (Prismatic)** Listed below (Recalc) |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 150.00 | 15,890 | 0 | 0 |
| 160.00 | 17,915 | 169,025 | 169,025 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 150.00' | **18.0" Round Culvert**<br>L= 50.0' CPP, square edge headwall, Ke= 0.500<br>Inlet / Outlet Invert= 150.00' / 149.50' S= 0.0100 '/' Cc= 0.900<br>n= 0.011 Concrete pipe, straight & clean, Flow Area= 1.77 sf |
| #2 | Device 1 | 150.00' | **4.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads |
| #3 | Device 1 | 151.75' | **24.0" x 24.0" Horiz. Orifice/Grate** C= 0.600<br>Limited to weir flow at low heads |

**Primary OutFlow** Max=0.53 cfs @ 15.18 hrs HW=151.74' TW=146.54' (Dynamic Tailwater)
└─**1=Culvert** (Passes 0.53 cfs of 8.45 cfs potential flow)
  ├─**2=Orifice/Grate** (Orifice Controls 0.53 cfs @ 6.03 fps)
  └─**3=Orifice/Grate** ( Controls 0.00 cfs)

## Pond 4P: Pocket Pond



## Summary for Pond 5P: Pocket Pond

Inflow Area = 39.934 ac, 38.00% Impervious, Inflow Depth = 0.84" for 1-Year Event event
Inflow = 34.12 cfs @ 12.15 hrs, Volume= 2.779 af
Outflow = 0.83 cfs @ 20.15 hrs, Volume= 1.181 af, Atten= 98%, Lag= 480.0 min
Primary = 0.83 cfs @ 20.15 hrs, Volume= 1.181 af
Routed to Reach 1R : Beaverkill

Routing by Sim-Route method, Time Span= 1.00-40.00 hrs, dt= 0.01 hrs
Peak Elev= 154.36' @ 20.15 hrs Surf.Area= 73,426 sf Storage= 94,658 cf

Plug-Flow detention time= 782.5 min calculated for 1.181 af (43% of inflow)
Center-of-Mass det. time= 646.4 min ( 1,510.1 - 863.7 )

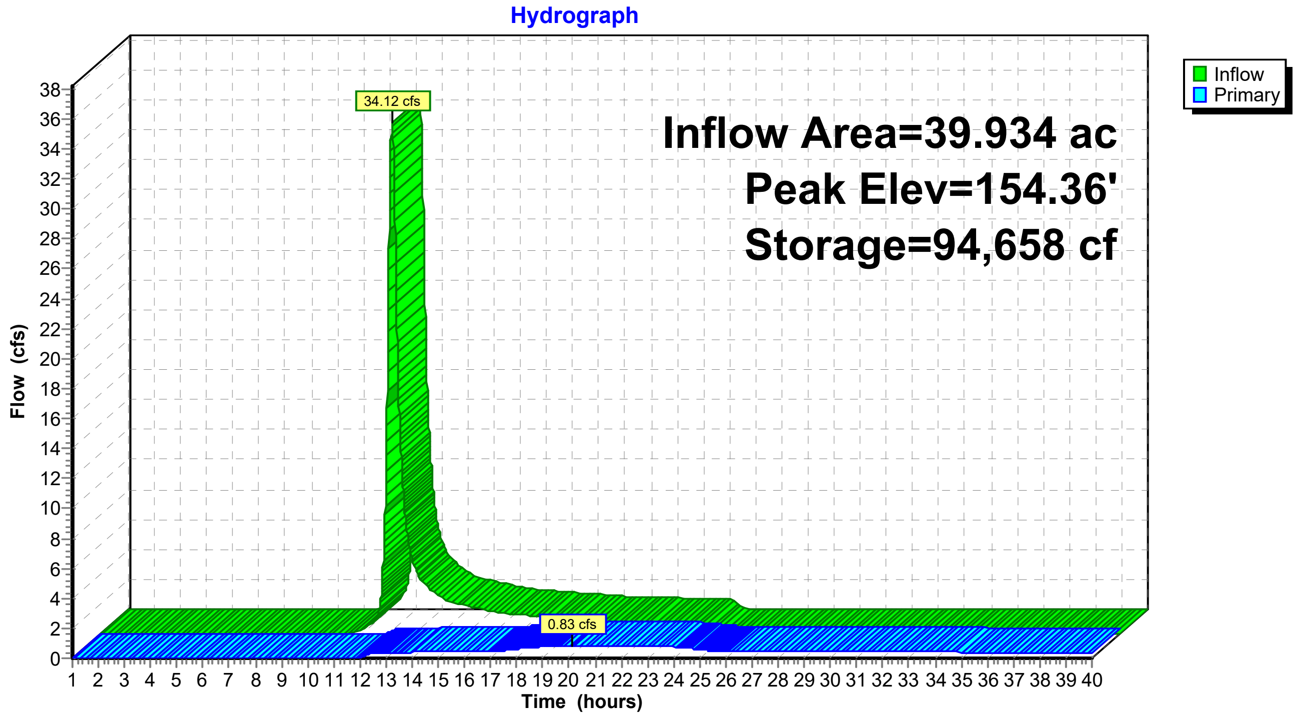
| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 153.00' | 597,195 cf | **Custom Stage Data (Prismatic)** Listed below (Recalc) |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 153.00 | 65,881 | 0 | 0 |
| 160.00 | 104,746 | 597,195 | 597,195 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 153.00' | **36.0" Round Culvert**<br>L= 50.0' CPP, square edge headwall, Ke= 0.500<br>Inlet / Outlet Invert= 153.00' / 152.00' S= 0.0200 '/' Cc= 0.900<br>n= 0.011 Concrete pipe, straight & clean, Flow Area= 7.07 sf |
| #2 | Device 1 | 153.00' | **4.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads |
| #3 | Device 1 | 154.30' | **24.0" x 24.0" Horiz. Orifice/Grate** C= 0.600<br>Limited to weir flow at low heads |

**Primary OutFlow** Max=0.83 cfs @ 20.15 hrs HW=154.36' TW=146.50' (Dynamic Tailwater)
└─**1=Culvert** (Passes 0.83 cfs of 12.35 cfs potential flow)
  ├─**2=Orifice/Grate** (Orifice Controls 0.46 cfs @ 5.26 fps)
  └─**3=Orifice/Grate** (Weir Controls 0.37 cfs @ 0.79 fps)

## Pond 5P: Pocket Pond



## Summary for Pond 6P: Pocket Pond

Inflow Area = 42.396 ac, 30.00% Impervious, Inflow Depth = 0.73" for 1-Year Event event
Inflow = 16.72 cfs @ 12.59 hrs, Volume= 2.596 af
Outflow = 0.44 cfs @ 24.66 hrs, Volume= 0.926 af, Atten= 97%, Lag= 724.2 min
Primary = 0.44 cfs @ 24.66 hrs, Volume= 0.926 af
Routed to Reach 1R : Beaverkill

Routing by Sim-Route method, Time Span= 1.00-40.00 hrs, dt= 0.01 hrs
Peak Elev= 147.77' @ 24.66 hrs Surf.Area= 76,223 sf Storage= 94,917 cf

Plug-Flow detention time= 831.8 min calculated for 0.926 af (36% of inflow)
Center-of-Mass det. time= 681.3 min ( 1,582.4 - 901.1 )

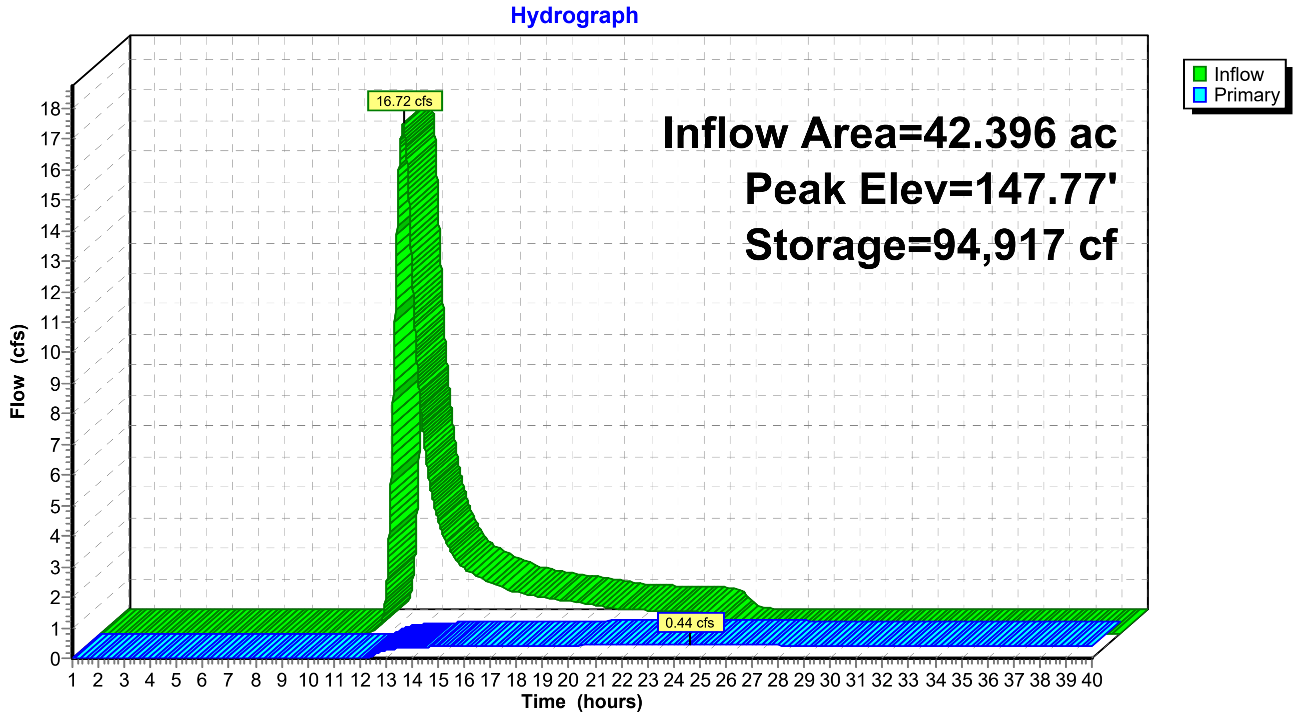
| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 146.50' | 621,484 cf | **Custom Stage Data (Prismatic)** Listed below (Recalc) |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 146.50 | 72,806 | 0 | 0 |
| 154.00 | 92,923 | 621,484 | 621,484 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 146.50' | **24.0" Round Culvert**<br>L= 50.0' CPP, square edge headwall, Ke= 0.500<br>Inlet / Outlet Invert= 146.50' / 146.00' S= 0.0100 '/' Cc= 0.900<br>n= 0.011 Concrete pipe, straight & clean, Flow Area= 3.14 sf |
| #2 | Device 1 | 146.50' | **4.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads |
| #3 | Device 1 | 148.00' | **24.0" x 24.0" Horiz. Orifice/Grate** C= 0.600<br>Limited to weir flow at low heads |

**Primary OutFlow** Max=0.44 cfs @ 24.66 hrs HW=147.77' TW=146.49' (Dynamic Tailwater)
**1=Culvert** (Passes 0.44 cfs of 7.67 cfs potential flow)
**2=Orifice/Grate** (Orifice Controls 0.44 cfs @ 5.07 fps)
**3=Orifice/Grate** ( Controls 0.00 cfs)

## Pond 6P: Pocket Pond



## Summary for Pond 7P: Pocket Pond

Inflow Area = 16.853 ac, 30.00% Impervious, Inflow Depth = 0.73" for 1-Year Event event
Inflow = 12.27 cfs @ 12.17 hrs, Volume= 1.032 af
Outflow = 0.24 cfs @ 24.19 hrs, Volume= 0.492 af, Atten= 98%, Lag= 721.0 min
Primary = 0.24 cfs @ 24.19 hrs, Volume= 0.492 af
Routed to Reach 1R : Beaverkill

Routing by Sim-Route method, Time Span= 1.00-40.00 hrs, dt= 0.01 hrs
Peak Elev= 147.50' @ 24.19 hrs Surf.Area= 70,918 sf Storage= 35,217 cf

Plug-Flow detention time= 814.6 min calculated for 0.492 af (48% of inflow)
Center-of-Mass det. time= 675.8 min ( 1,547.9 - 872.1 )

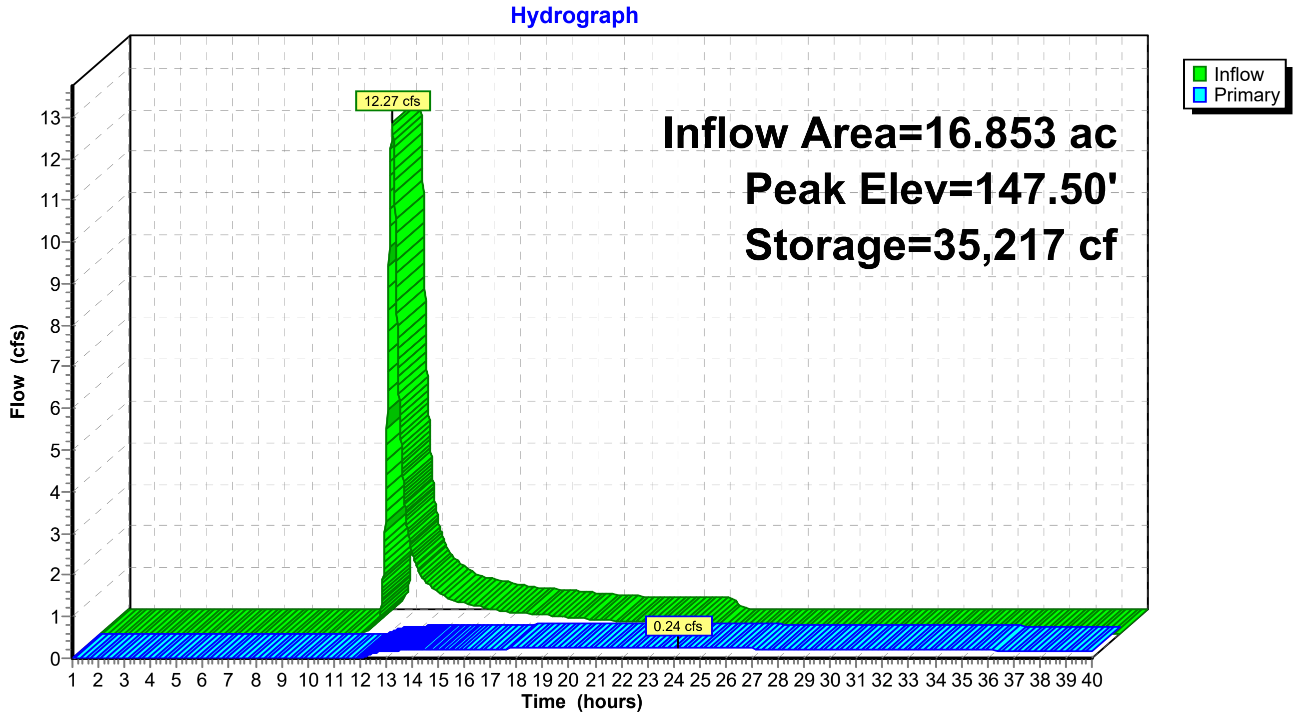
| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 147.00' | 734,018 cf | **Custom Stage Data (Prismatic)** Listed below (Recalc) |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 147.00 | 69,584 | 0 | 0 |
| 156.00 | 93,531 | 734,018 | 734,018 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 147.00' | **24.0" Round Culvert**<br>L= 50.0' CPP, square edge headwall, Ke= 0.500<br>Inlet / Outlet Invert= 147.00' / 146.50' S= 0.0100 '/' Cc= 0.900<br>n= 0.011 Concrete pipe, straight & clean, Flow Area= 3.14 sf |
| #2 | Device 1 | 147.00' | **4.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads |
| #3 | Device 1 | 147.60' | **36.0" x 36.0" Horiz. Orifice/Grate** C= 0.600<br>Limited to weir flow at low heads |

**Primary OutFlow** Max=0.24 cfs @ 24.19 hrs HW=147.50' TW=146.49' (Dynamic Tailwater)
└─**1=Culvert** (Passes 0.24 cfs of 1.49 cfs potential flow)
  ├─**2=Orifice/Grate** (Orifice Controls 0.24 cfs @ 2.79 fps)
  └─**3=Orifice/Grate** ( Controls 0.00 cfs)

## Pond 7P: Pocket Pond



## Summary for Pond 8P: Pocket Pond

Inflow Area = 24.219 ac, 30.00% Impervious, Inflow Depth = 0.73" for 1-Year Event event
Inflow = 17.56 cfs @ 12.17 hrs, Volume= 1.483 af
Outflow = 0.45 cfs @ 20.94 hrs, Volume= 0.919 af, Atten= 97%, Lag= 526.0 min
Primary = 0.45 cfs @ 20.94 hrs, Volume= 0.919 af
Routed to Reach 1R : Beaverkill

Routing by Sim-Route method, Time Span= 1.00-40.00 hrs, dt= 0.01 hrs
Peak Elev= 147.80' @ 20.94 hrs Surf.Area= 37,307 sf Storage= 46,133 cf

Plug-Flow detention time= 782.6 min calculated for 0.919 af (62% of inflow)
Center-of-Mass det. time= 656.9 min ( 1,529.1 - 872.2 )

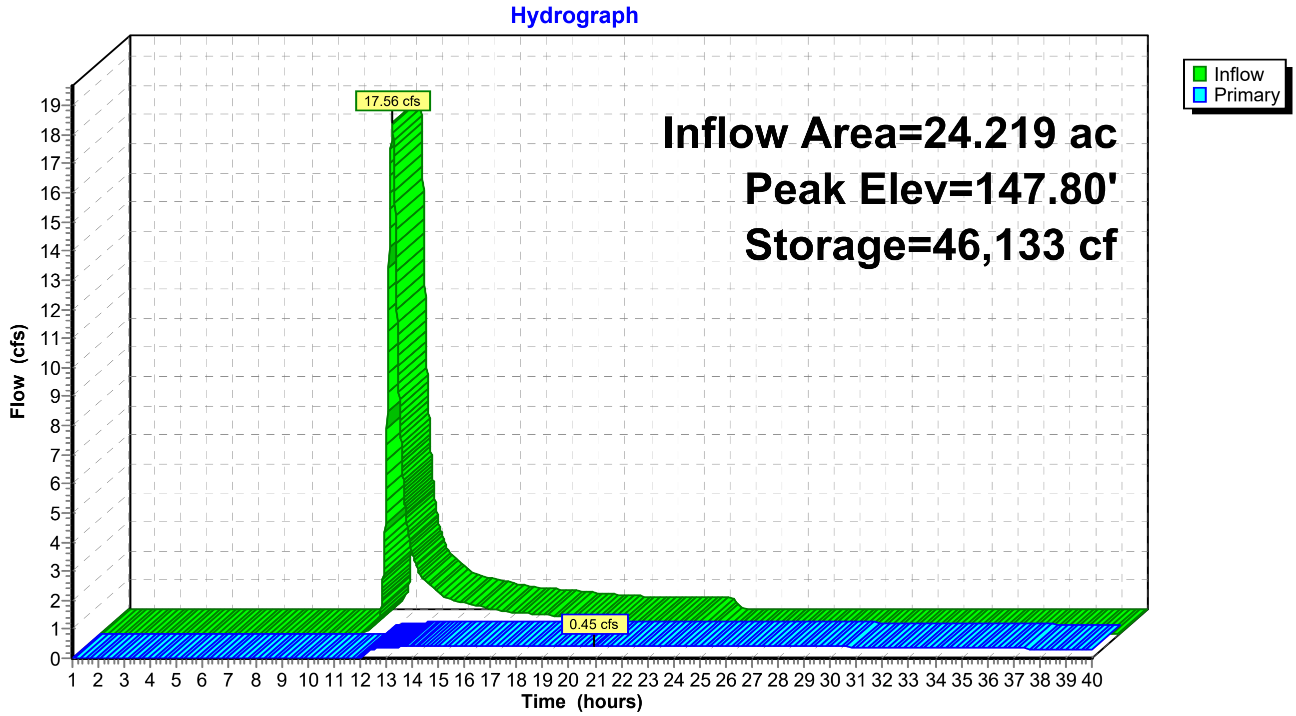
| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 146.50' | 383,826 cf | **Custom Stage Data (Prismatic)** Listed below (Recalc) |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 146.50 | 33,862 | 0 | 0 |
| 155.00 | 56,450 | 383,826 | 383,826 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 146.50' | **24.0" Round Culvert**<br>L= 50.0' CPP, square edge headwall, Ke= 0.500<br>Inlet / Outlet Invert= 146.50' / 146.00' S= 0.0100 '/' Cc= 0.900<br>n= 0.011 Concrete pipe, straight & clean, Flow Area= 3.14 sf |
| #2 | Device 1 | 146.50' | **4.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads |
| #3 | Device 1 | 148.40' | **24.0" x 24.0" Horiz. Orifice/Grate** C= 0.600<br>Limited to weir flow at low heads |

**Primary OutFlow** Max=0.45 cfs @ 20.94 hrs HW=147.80' TW=146.49' (Dynamic Tailwater)
└─**1=Culvert** (Passes 0.45 cfs of 7.89 cfs potential flow)
  ├─**2=Orifice/Grate** (Orifice Controls 0.45 cfs @ 5.12 fps)
  └─**3=Orifice/Grate** ( Controls 0.00 cfs)

## Pond 8P: Pocket Pond



## Summary for Pond 9P: Pocket Pond

Inflow Area = 14.213 ac, 65.00% Impervious, Inflow Depth = 1.13" for 1-Year Event event
Inflow = 21.78 cfs @ 12.06 hrs, Volume= 1.337 af
Outflow = 6.12 cfs @ 12.31 hrs, Volume= 1.316 af, Atten= 72%, Lag= 15.4 min
Primary = 6.12 cfs @ 12.31 hrs, Volume= 1.316 af
Routed to Reach 3R : Beaverkill Trib

Routing by Sim-Route method, Time Span= 1.00-40.00 hrs, dt= 0.01 hrs
Peak Elev= 221.08' @ 12.31 hrs Surf.Area= 22,900 sf Storage= 23,100 cf

Plug-Flow detention time= 126.2 min calculated for 1.316 af (98% of inflow)
Center-of-Mass det. time= 117.0 min ( 952.3 - 835.3 )

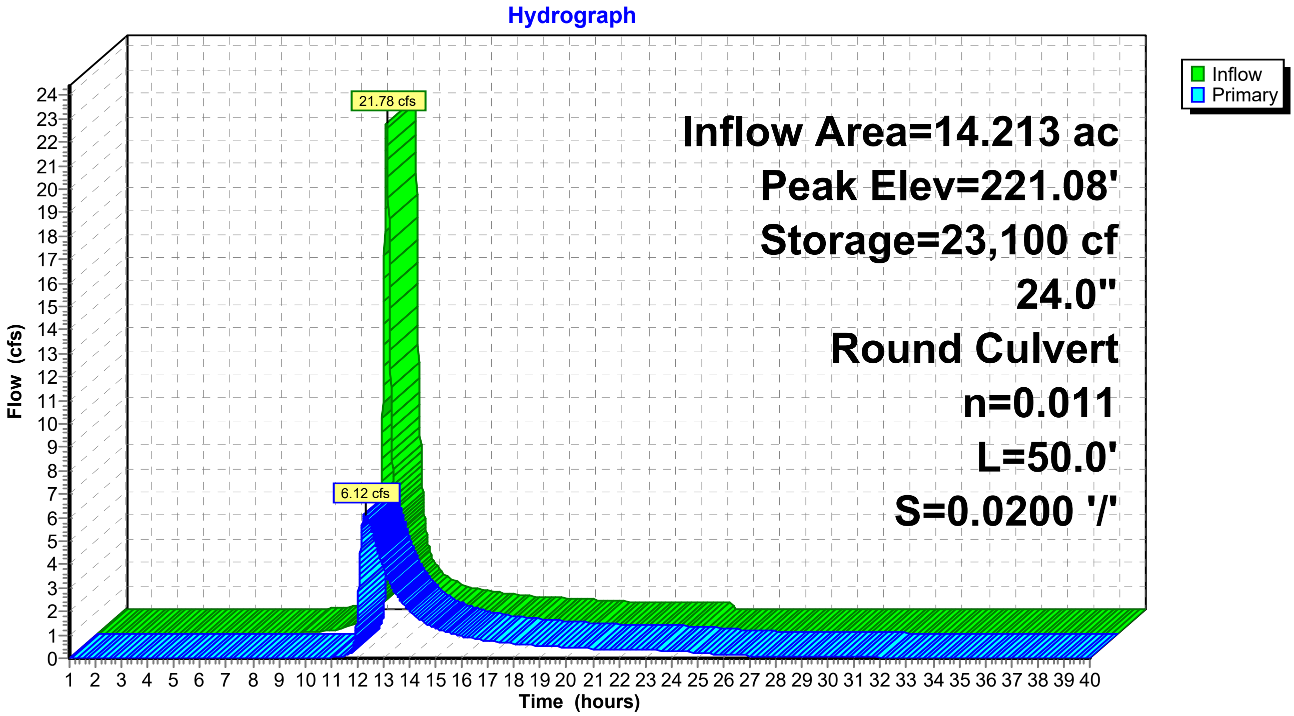
| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 220.00' | 338,770 cf | **Custom Stage Data (Prismatic)** Listed below (Recalc) |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 220.00 | 19,876 | 0 | 0 |
| 230.00 | 47,878 | 338,770 | 338,770 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 220.00' | **24.0" Round Culvert**<br>L= 50.0' CPP, square edge headwall, Ke= 0.500<br>Inlet / Outlet Invert= 220.00' / 219.00' S= 0.0200 '/' Cc= 0.900<br>n= 0.011 Concrete pipe, straight & clean, Flow Area= 3.14 sf |

**Primary OutFlow** Max=6.12 cfs @ 12.31 hrs HW=221.08' TW=200.71' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 6.12 cfs @ 3.54 fps)

## Pond 9P: Pocket Pond



## Summary for Pond 10P: Pocket Pond

Inflow Area = 17.433 ac, 30.00% Impervious, Inflow Depth = 0.73" for 1-Year Event event
Inflow = 9.32 cfs @ 12.33 hrs, Volume= 1.068 af
Outflow = 0.00 cfs @ 1.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min
Primary = 0.00 cfs @ 1.00 hrs, Volume= 0.000 af
Routed to Reach 3R : Beaverkill Trib

Routing by Sim-Route method, Time Span= 1.00-40.00 hrs, dt= 0.01 hrs
Peak Elev= 180.82' @ 25.98 hrs Surf.Area= 57,857 sf Storage= 46,503 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no outflow)

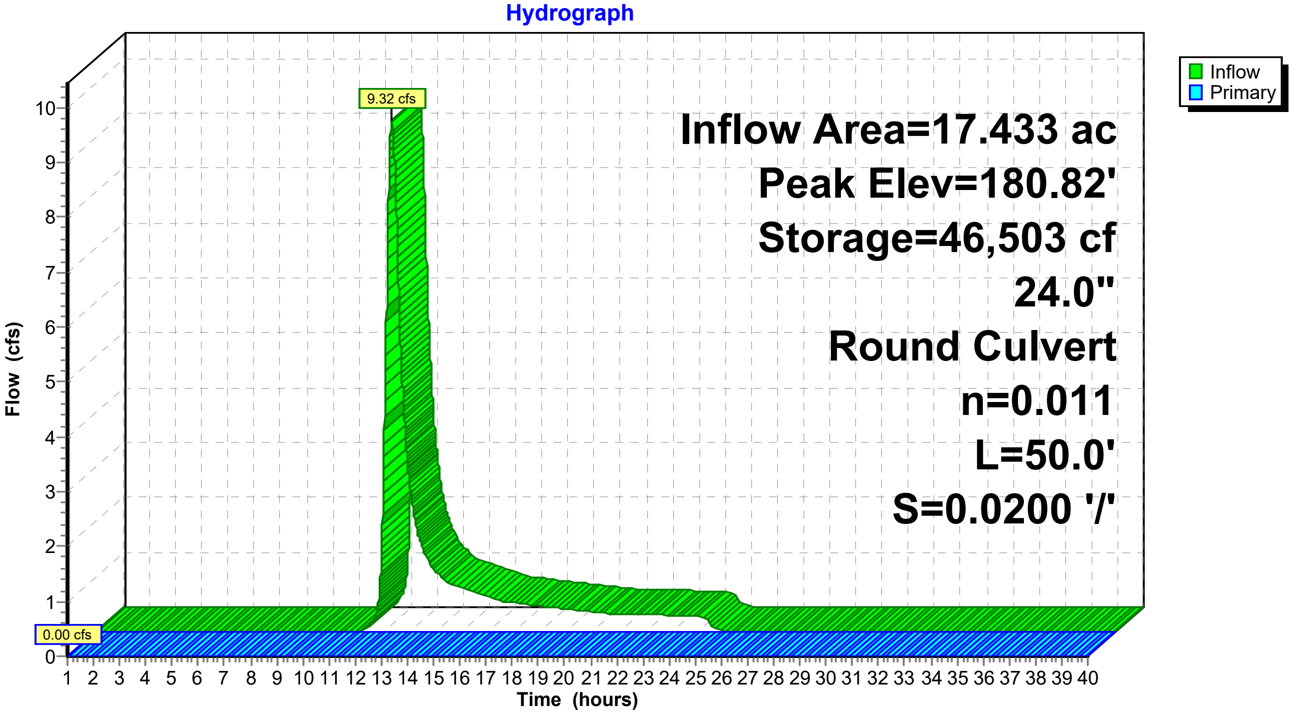
| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 180.00' | 724,100 cf | **Custom Stage Data (Prismatic)** Listed below (Recalc) |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 180.00 | 54,984 | 0 | 0 |
| 190.00 | 89,836 | 724,100 | 724,100 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 180.00' | **24.0" Round Culvert**<br>L= 50.0' CPP, square edge headwall, Ke= 0.500<br>Inlet / Outlet Invert= 180.00' / 179.00' S= 0.0200 '/' Cc= 0.900<br>n= 0.011 Concrete pipe, straight & clean, Flow Area= 3.14 sf |

**Primary OutFlow** Max=0.00 cfs @ 1.00 hrs HW=180.00' TW=200.00' (Dynamic Tailwater)
└─**1=Culvert** ( Controls 0.00 cfs)

## Pond 10P: Pocket Pond



## Summary for Pond 11P: Pocket Pond

Inflow Area = 26.813 ac, 30.00% Impervious, Inflow Depth = 0.73" for 1-Year Event event
Inflow = 22.44 cfs @ 12.12 hrs, Volume= 1.642 af
Outflow = 0.00 cfs @ 1.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min
Primary = 0.00 cfs @ 1.00 hrs, Volume= 0.000 af
Routed to Reach 3R : Beaverkill Trib

Routing by Sim-Route method, Time Span= 1.00-40.00 hrs, dt= 0.01 hrs
Peak Elev= 146.70' @ 25.01 hrs Surf.Area= 43,656 sf Storage= 71,525 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no outflow)

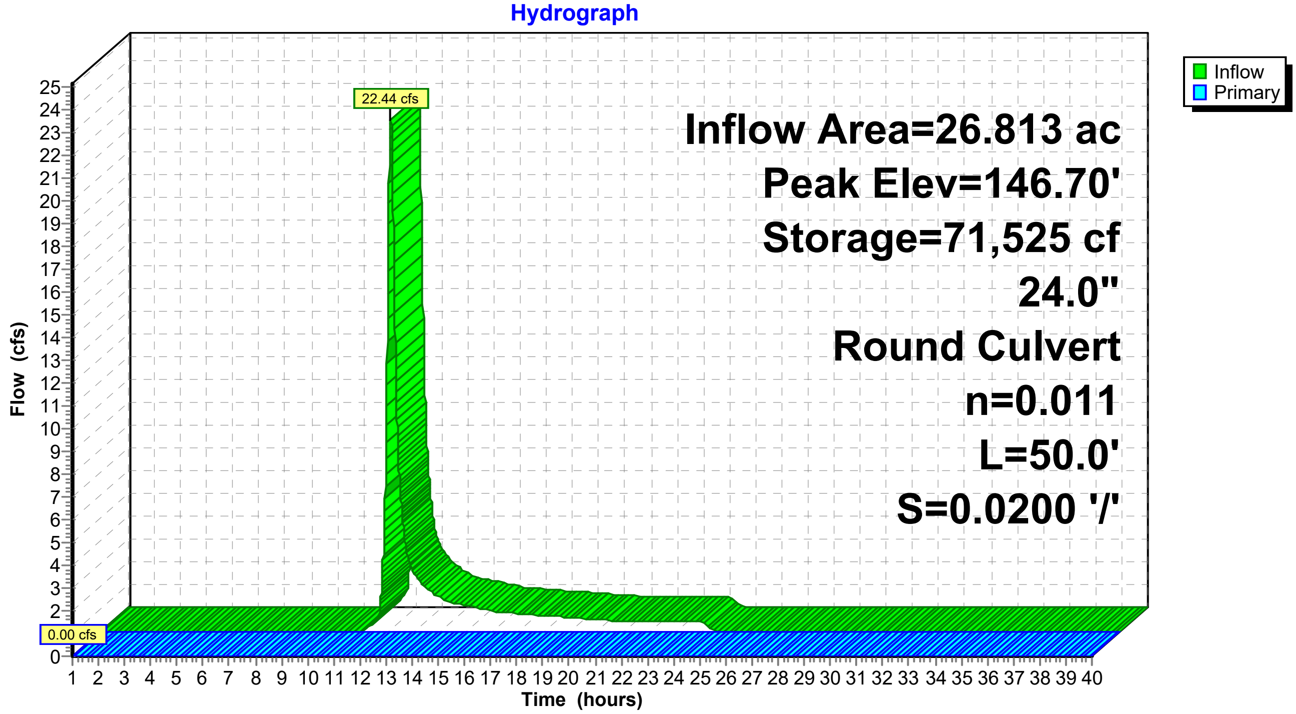
| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 145.00' | 807,405 cf | **Custom Stage Data (Prismatic)** Listed below (Recalc) |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 145.00 | 40,684 | 0 | 0 |
| 160.00 | 66,970 | 807,405 | 807,405 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 150.00' | **24.0" Round Culvert**<br>L= 50.0' CPP, square edge headwall, Ke= 0.500<br>Inlet / Outlet Invert= 150.00' / 149.00' S= 0.0200 '/' Cc= 0.900<br>n= 0.011 Concrete pipe, straight & clean, Flow Area= 3.14 sf |

**Primary OutFlow** Max=0.00 cfs @ 1.00 hrs HW=145.00' TW=200.00' (Dynamic Tailwater)
└─**1=Culvert** ( Controls 0.00 cfs)

## Pond 11P: Pocket Pond



## Summary for Pond 12P: Pocket Pond

Inflow Area = 29.499 ac, 30.00% Impervious, Inflow Depth = 0.73" for 1-Year Event event
Inflow = 26.01 cfs @ 12.10 hrs, Volume= 1.807 af
Outflow = 6.79 cfs @ 12.45 hrs, Volume= 1.782 af, Atten= 74%, Lag= 21.1 min
Primary = 6.79 cfs @ 12.45 hrs, Volume= 1.782 af
Routed to Reach 3R : Beaverkill Trib

Routing by Sim-Route method, Time Span= 1.00-40.00 hrs, dt= 0.01 hrs
Peak Elev= 216.18' @ 12.45 hrs Surf.Area= 24,741 sf Storage= 27,143 cf

Plug-Flow detention time= 118.2 min calculated for 1.782 af (99% of inflow)
Center-of-Mass det. time= 110.5 min ( 976.9 - 866.3 )

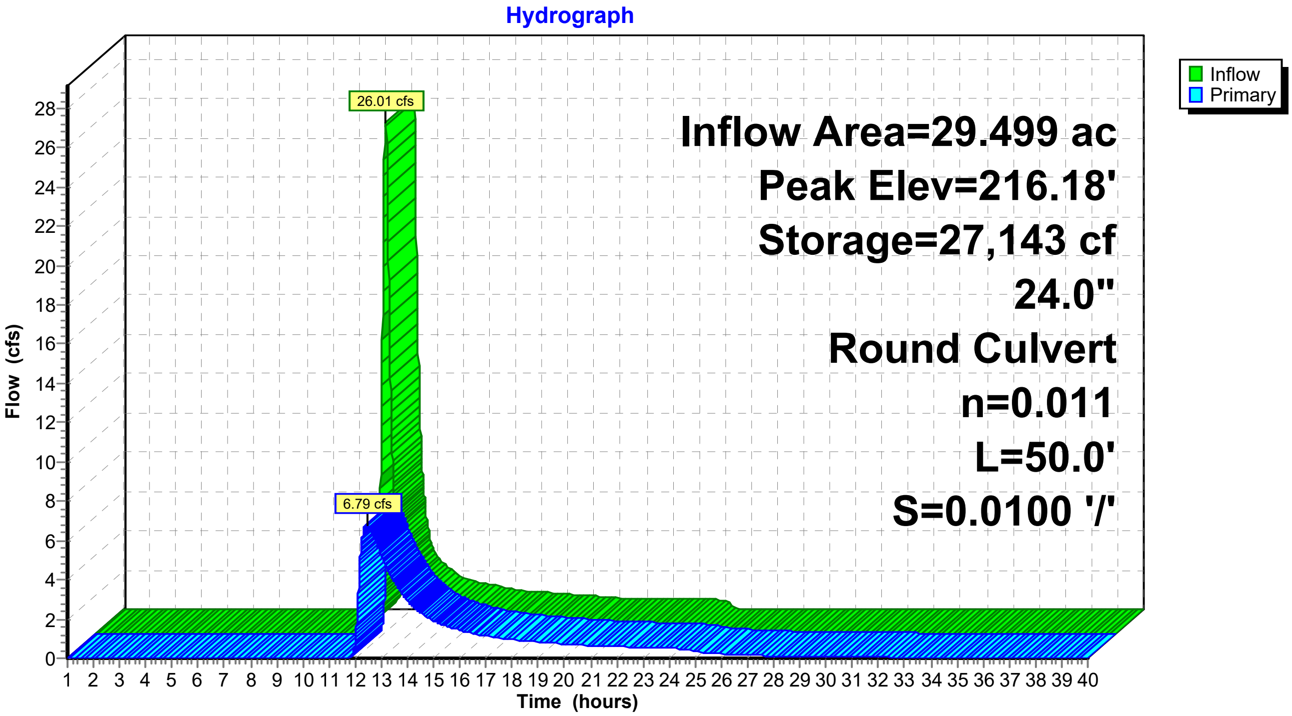
| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 215.00' | 360,450 cf | **Custom Stage Data (Prismatic)** Listed below (Recalc) |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 215.00 | 21,248 | 0 | 0 |
| 225.00 | 50,842 | 360,450 | 360,450 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 215.00' | **24.0" Round Culvert**<br>L= 50.0' CPP, square edge headwall, Ke= 0.500<br>Inlet / Outlet Invert= 215.00' / 214.50' S= 0.0100 '/' Cc= 0.900<br>n= 0.011 Concrete pipe, straight & clean, Flow Area= 3.14 sf |

**Primary OutFlow** Max=6.79 cfs @ 12.45 hrs HW=216.18' TW=200.74' (Dynamic Tailwater)
**1=Culvert** (Barrel Controls 6.79 cfs @ 5.06 fps)

## Pond 12P: Pocket Pond

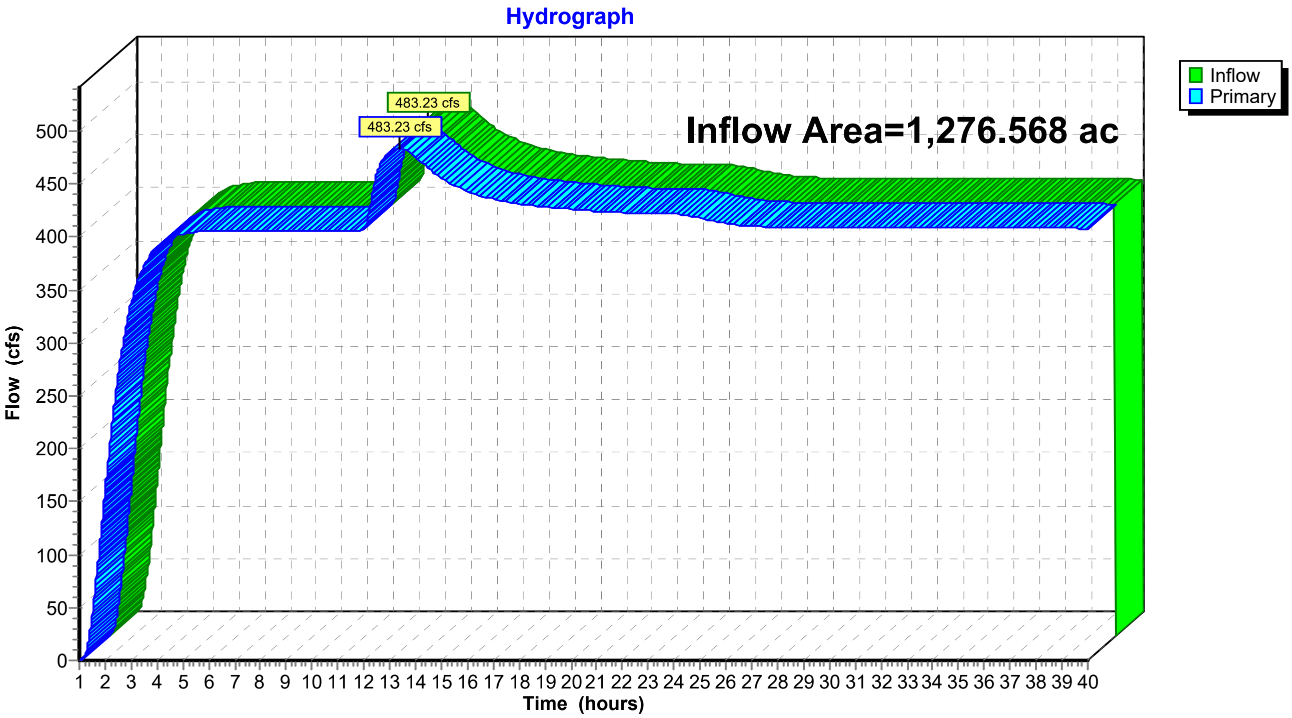


## Summary for Link AP-2: AP-2

Inflow Area = 1,276.568 ac, 10.66% Impervious, Inflow Depth > 12.24" for 1-Year Event event
Inflow = 483.23 cfs @ 13.36 hrs, Volume= 1,301.866 af
Primary = 483.23 cfs @ 13.37 hrs, Volume= 1,301.866 af, Atten= 0%, Lag= 0.6 min

Primary outflow = Inflow, Time Span= 1.00-40.00 hrs, dt= 0.01 hrs

### Link AP-2: AP-2



Time span=1.00-40.00 hrs, dt=0.01 hrs, 3901 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Sim-Route method - Pond routing by Sim-Route method

**Subcatchment2: DA 2** Runoff Area=202.288 ac 0.00% Impervious Runoff Depth=1.60"
Flow Length=3,062' Tc=43.1 min CN=70 Runoff=208.11 cfs 27.028 af

**Subcatchment2A: DA 2A** Runoff Area=36.879 ac 12.00% Impervious Runoff Depth=2.13"
Flow Length=4,070' Tc=194.7 min CN=77 Runoff=16.91 cfs 6.545 af

**Subcatchment2B: DA 2B** Runoff Area=55.045 ac 12.00% Impervious Runoff Depth=2.13"
Flow Length=3,070' Tc=79.3 min CN=77 Runoff=50.10 cfs 9.769 af

**Subcatchment2C: DA 2C** Runoff Area=31.804 ac 12.00% Impervious Runoff Depth=2.13"
Flow Length=3,344' Tc=74.8 min CN=77 Runoff=30.26 cfs 5.644 af

**Subcatchment2D: DA 2D** Runoff Area=39.716 ac 12.00% Impervious Runoff Depth=2.13"
Flow Length=2,728' Tc=45.7 min CN=77 Runoff=54.56 cfs 7.049 af

**Subcatchment2E: DA 2E** Runoff Area=45.892 ac 12.00% Impervious Runoff Depth=2.13"
Flow Length=2,892' Tc=48.7 min CN=77 Runoff=60.11 cfs 8.145 af

**Subcatchment2F: DA 2F** Runoff Area=42.396 ac 30.00% Impervious Runoff Depth=2.46"
Flow Length=1,411' Tc=53.7 min CN=81 Runoff=60.27 cfs 8.698 af

**Subcatchment2G: DA 2G** Runoff Area=16.853 ac 30.00% Impervious Runoff Depth=2.46"
Flow Length=552' Slope=0.0100 '/' Tc=22.4 min CN=81 Runoff=43.22 cfs 3.457 af

**Subcatchment2H: DA 2H** Runoff Area=24.219 ac 30.00% Impervious Runoff Depth=2.46"
Flow Length=559' Slope=0.0100 '/' Tc=22.5 min CN=81 Runoff=61.94 cfs 4.969 af

**Subcatchment3: DA 3** Runoff Area=436.528 ac 0.00% Impervious Runoff Depth=1.60"
Flow Length=2,575' Tc=81.9 min CN=70 Runoff=279.05 cfs 58.325 af

**Subcatchment3A: DA 3A** Runoff Area=52.953 ac 0.00% Impervious Runoff Depth=1.60"
Flow Length=1,950' Tc=50.8 min CN=70 Runoff=48.29 cfs 7.075 af

**Subcatchment3B: DA 3B** Runoff Area=14.213 ac 65.00% Impervious Runoff Depth=3.10"
Flow Length=288' Tc=13.6 min CN=88 Runoff=58.48 cfs 3.674 af

**Subcatchment3C: DA 3C** Runoff Area=20.730 ac 65.00% Impervious Runoff Depth=3.10"
Flow Length=741' Tc=36.3 min CN=88 Runoff=48.95 cfs 5.359 af

**Subcatchment3D: DA 3D** Runoff Area=29.499 ac 30.00% Impervious Runoff Depth=2.46"
Flow Length=370' Tc=16.2 min CN=81 Runoff=90.69 cfs 6.052 af

**Subcatchment3E: DA 3E** Runoff Area=17.433 ac 30.00% Impervious Runoff Depth=2.46"
Flow Length=302' Tc=35.1 min CN=81 Runoff=33.52 cfs 3.576 af

**Subcatchment3F: DA 3F** Runoff Area=26.813 ac 30.00% Impervious Runoff Depth=2.46"
Flow Length=488' Tc=17.8 min CN=81 Runoff=78.33 cfs 5.501 af

**Subcatchment 3G: DA 3G** Runoff Area=39.934 ac 38.00% Impervious Runoff Depth=2.64"
Flow Length=684' Tc=22.0 min CN=83 Runoff=111.10 cfs 8.775 af

**Subcatchment 4: DA 4** Runoff Area=58.713 ac 0.47% Impervious Runoff Depth=1.60"
Flow Length=1,537' Tc=62.2 min CN=70 Runoff=46.02 cfs 7.845 af

**Subcatchment 4A: DA 4A** Runoff Area=40.328 ac 38.00% Impervious Runoff Depth=2.64"
Flow Length=1,258' Tc=39.5 min CN=83 Runoff=76.65 cfs 8.862 af

**Subcatchment 4B: DA 4B** Runoff Area=9.481 ac 65.00% Impervious Runoff Depth=3.30"
Flow Length=196' Tc=9.8 min CN=90 Runoff=46.39 cfs 2.607 af

**Subcatchment 5: DA 5** Runoff Area=34.851 ac 12.00% Impervious Runoff Depth=2.13"
Flow Length=2,150' Tc=22.6 min CN=77 Runoff=76.43 cfs 6.185 af

**Reach 1R: Beaverkill** Avg. Flow Depth=2.11' Max Vel=2.73 fps Inflow=945.41 cfs 1,436.985 af
n=0.030 L=4,728.0' S=0.0021 '/' Capacity=2,310.71 cfs Outflow=884.20 cfs 1,417.425 af

**Reach 2R: Beaverkill** Avg. Flow Depth=1.86' Max Vel=2.46 fps Inflow=622.61 cfs 1,141.039 af
n=0.030 L=6,756.0' S=0.0021 '/' Capacity=1,684.63 cfs Outflow=559.11 cfs 1,117.300 af

**Reach 3R: Beaverkill Trib** Avg. Flow Depth=1.44' Max Vel=14.37 fps Inflow=366.05 cfs 282.749 af
n=0.025 L=1,000.0' S=0.0535 '/' Capacity=1,071.30 cfs Outflow=366.00 cfs 282.616 af

**Reach 4R: Beaverkill Trib** Avg. Flow Depth=1.01' Max Vel=11.81 fps Inflow=192.13 cfs 255.527 af
n=0.030 L=2,239.0' S=0.0768 '/' Capacity=688.52 cfs Outflow=191.78 cfs 255.156 af

**Pond 1P: Existing Pond** Peak Elev=211.43' Storage=159,072 cf Inflow=100.20 cfs 12.408 af
Outflow=83.11 cfs 9.830 af

**Pond 2P: Pocket Pond** Peak Elev=394.50' Storage=262,072 cf Inflow=16.91 cfs 6.545 af
Outflow=0.48 cfs 0.973 af

**Pond 3P: Pocket Pond** Peak Elev=148.43' Storage=205,652 cf Inflow=76.65 cfs 8.862 af
Outflow=14.22 cfs 6.678 af

**Pond 4P: Pocket Pond** Peak Elev=153.21' Storage=52,076 cf Inflow=46.39 cfs 2.607 af
Outflow=13.35 cfs 2.455 af

**Pond 5P: Pocket Pond** Peak Elev=155.56' Storage=186,908 cf Inflow=111.10 cfs 8.775 af
Outflow=22.28 cfs 7.127 af

**Pond 6P: Pocket Pond** Peak Elev=148.91' Storage=183,122 cf Inflow=60.27 cfs 8.698 af
Outflow=17.95 cfs 6.567 af

**Pond 7P: Pocket Pond** Peak Elev=148.10' Storage=78,340 cf Inflow=43.22 cfs 3.457 af
Outflow=6.08 cfs 2.758 af

**Pond 8P: Pocket Pond** Peak Elev=149.18' Storage=100,227 cf Inflow=61.94 cfs 4.969 af
Outflow=17.63 cfs 3.975 af

**Pond 9P: Pocket Pond** Peak Elev=222.55' Storage=59,912 cf Inflow=58.48 cfs 3.674 af
24.0" Round Culvert n=0.011 L=50.0' S=0.0200 '/' Outflow=18.86 cfs 3.652 af

**Pond 10P: Pocket Pond** Peak Elev=182.62' Storage=155,786 cf Inflow=33.52 cfs 3.576 af
24.0" Round Culvert n=0.011 L=50.0' S=0.0200 '/' Outflow=0.00 cfs 0.000 af

**Pond 11P: Pocket Pond** Peak Elev=150.29' Storage=239,608 cf Inflow=78.33 cfs 5.501 af
24.0" Round Culvert n=0.011 L=50.0' S=0.0200 '/' Outflow=0.00 cfs 0.000 af

**Pond 12P: Pocket Pond** Peak Elev=218.68' Storage=98,249 cf Inflow=90.69 cfs 6.052 af
24.0" Round Culvert n=0.011 L=50.0' S=0.0100 '/' Outflow=24.77 cfs 6.025 af

**Link AP-2: AP-2** Inflow=946.14 cfs 1,444.115 af
Primary=946.14 cfs 1,444.115 af

**Total Runoff Area = 1,276.568 ac Runoff Volume = 205.140 af Average Runoff Depth = 1.93"**
**89.34% Pervious = 1,140.451 ac 10.66% Impervious = 136.117 ac**

## Summary for Subcatchment 2: DA 2

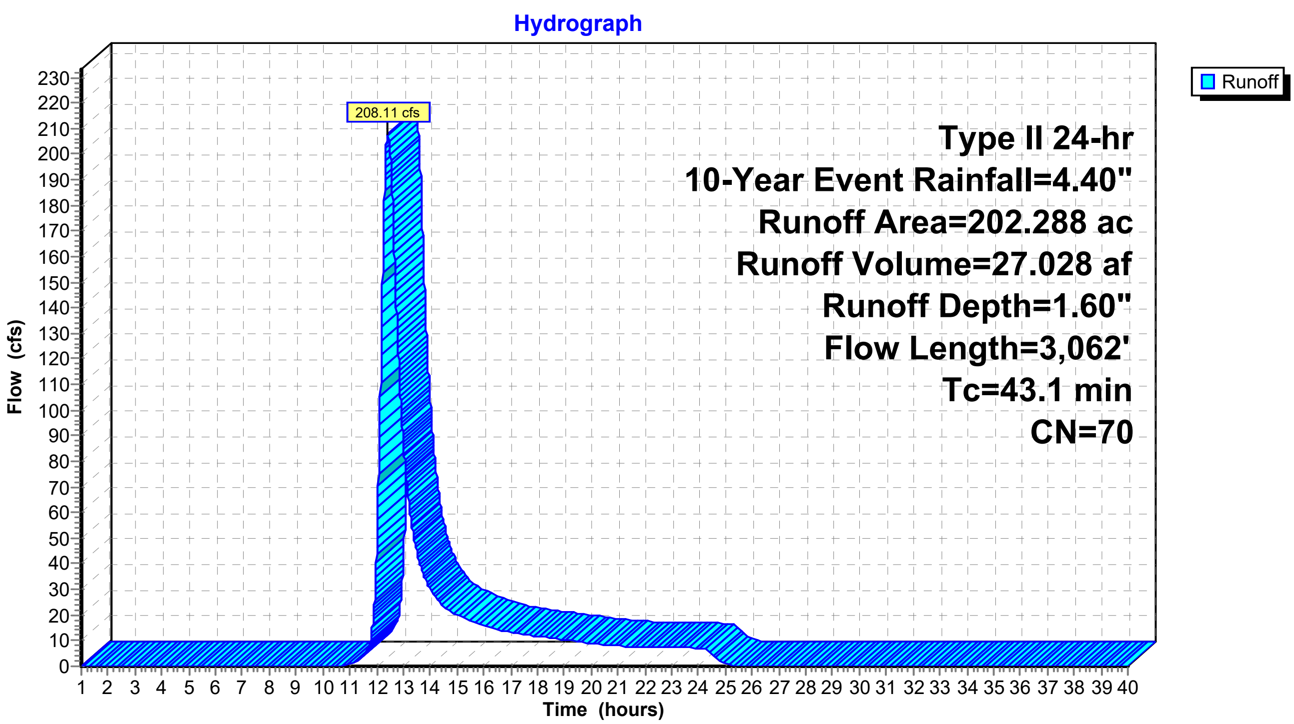
Runoff = 208.11 cfs @ 12.41 hrs, Volume= 27.028 af, Depth= 1.60"
Routed to Link AP-2 : AP-2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-40.00 hrs, dt= 0.01 hrs
Type II 24-hr 10-Year Event Rainfall=4.40"

| Area (ac) | CN | Description |
|---|---|---|
| 202.288 | 70 | Woods, Good, HSG C |
| 202.288 | | 100.00% Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 34.5 | 100 | 0.0200 | 0.05 | | **Sheet Flow, Woods**<br>Woods: Dense underbrush n= 0.800 P2= 3.75" |
| 8.6 | 2,962 | 0.1280 | 5.76 | | **Shallow Concentrated Flow, Woods**<br>Unpaved Kv= 16.1 fps |
| 43.1 | 3,062 | Total | | | |

## Subcatchment 2: DA 2



## Summary for Subcatchment 2A: DA 2A

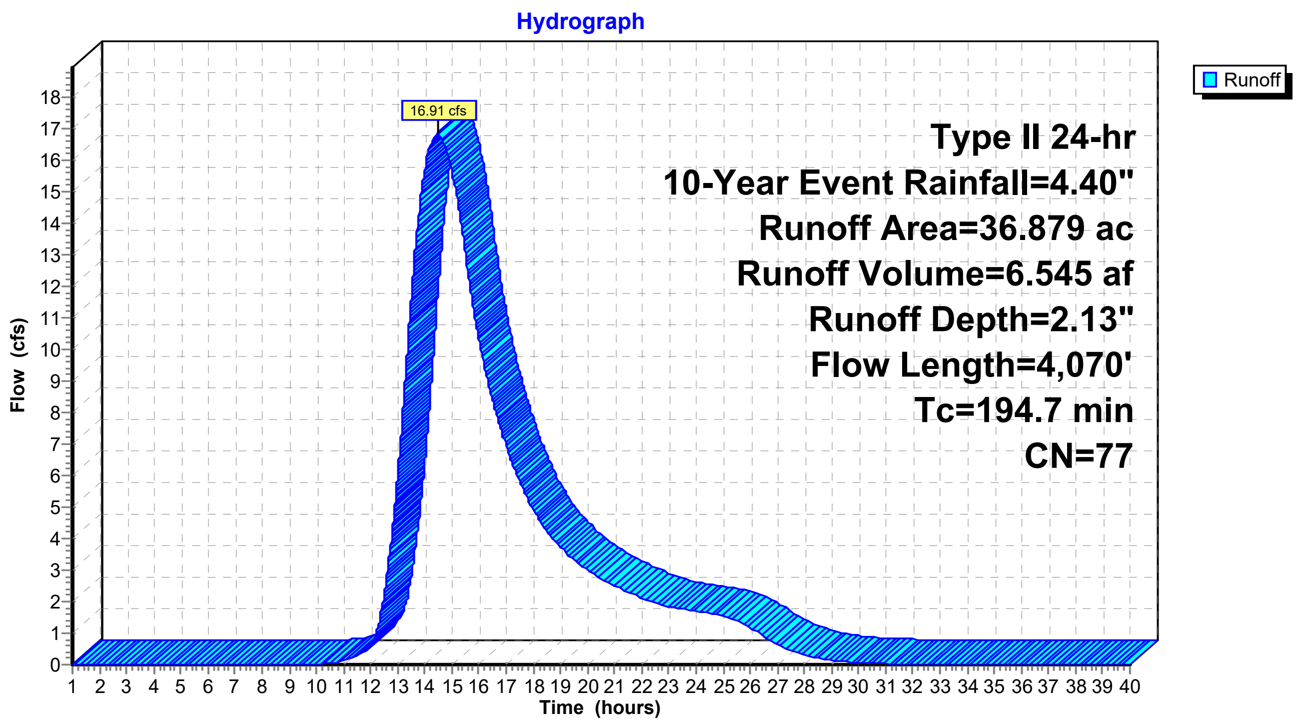
Runoff = 16.91 cfs @ 14.49 hrs, Volume= 6.545 af, Depth= 2.13"
Routed to Pond 2P : Pocket Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-40.00 hrs, dt= 0.01 hrs
Type II 24-hr 10-Year Event Rainfall=4.40"

| Area (ac) | CN | Description |
|---|---|---|
| 36.879 | 77 | 2 acre lots, 12% imp, HSG C |
| 32.454 | | 88.00% Pervious Area |
| 4.425 | | 12.00% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 23.9 | 100 | 0.0500 | 0.07 | | **Sheet Flow, Woods** Woods: Dense underbrush n= 0.800 P2= 3.75" |
| 170.8 | 3,970 | 0.0240 | 0.39 | | **Shallow Concentrated Flow, Woods** Forest w/Heavy Litter Kv= 2.5 fps |
| 194.7 | 4,070 | Total | | | |

### Subcatchment 2A: DA 2A



## Summary for Subcatchment 2B: DA 2B

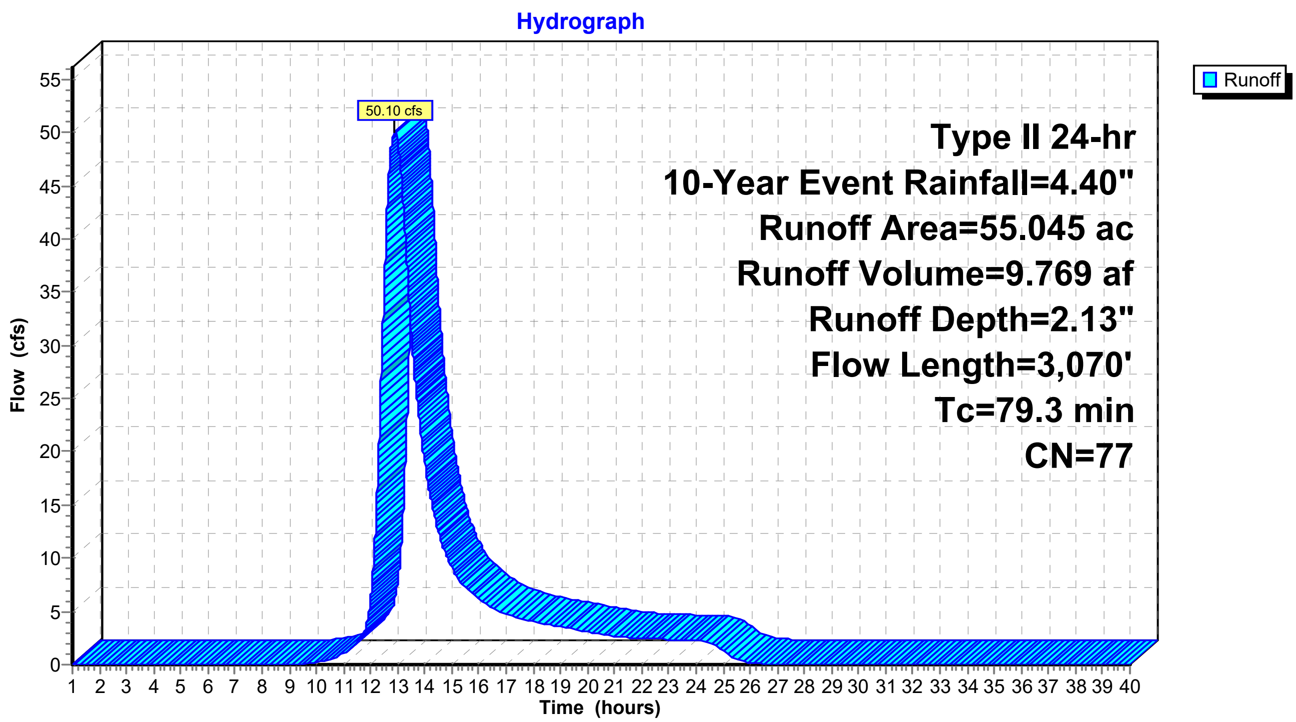
Runoff = 50.10 cfs @ 12.87 hrs, Volume= 9.769 af, Depth= 2.13"
Routed to Reach 4R : Beaverkill Trib

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-40.00 hrs, dt= 0.01 hrs
Type II 24-hr 10-Year Event Rainfall=4.40"

| Area (ac) | CN | Description |
|---|---|---|
| 55.045 | 77 | 2 acre lots, 12% imp, HSG C |
| 48.440 | | 88.00% Pervious Area |
| 6.605 | | 12.00% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 15.4 | 100 | 0.1500 | 0.11 | | **Sheet Flow, Woods**<br>Woods: Dense underbrush n= 0.800 P2= 3.75" |
| 63.9 | 2,970 | 0.0240 | 0.77 | | **Shallow Concentrated Flow, Woods**<br>Woodland Kv= 5.0 fps |
| 79.3 | 3,070 | Total | | | |

## Subcatchment 2B: DA 2B



## Summary for Subcatchment 2C: DA 2C

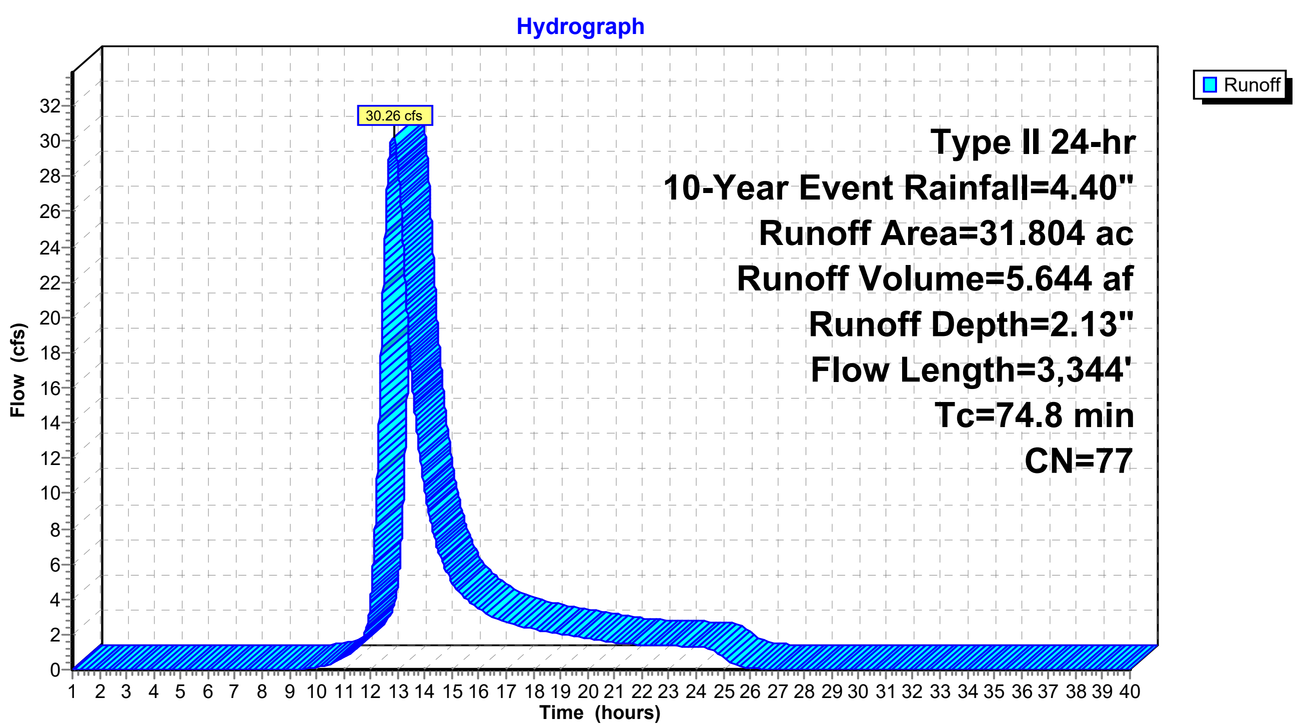
Runoff = 30.26 cfs @ 12.88 hrs, Volume= 5.644 af, Depth= 2.13"
Routed to Reach 4R : Beaverkill Trib

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-40.00 hrs, dt= 0.01 hrs
Type II 24-hr 10-Year Event Rainfall=4.40"

| Area (ac) | CN | Description |
|---|---|---|
| 31.804 | 77 | 2 acre lots, 12% imp, HSG C |
| 27.988 | | 88.00% Pervious Area |
| 3.816 | | 12.00% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 32.1 | 100 | 0.0240 | 0.05 | | **Sheet Flow, Woods**<br>Woods: Dense underbrush n= 0.800 P2= 3.75" |
| 42.7 | 3,244 | 0.0640 | 1.26 | | **Shallow Concentrated Flow, Woods**<br>Woodland Kv= 5.0 fps |
| 74.8 | 3,344 | Total | | | |

### Subcatchment 2C: DA 2C



## Summary for Subcatchment 2D: DA 2D

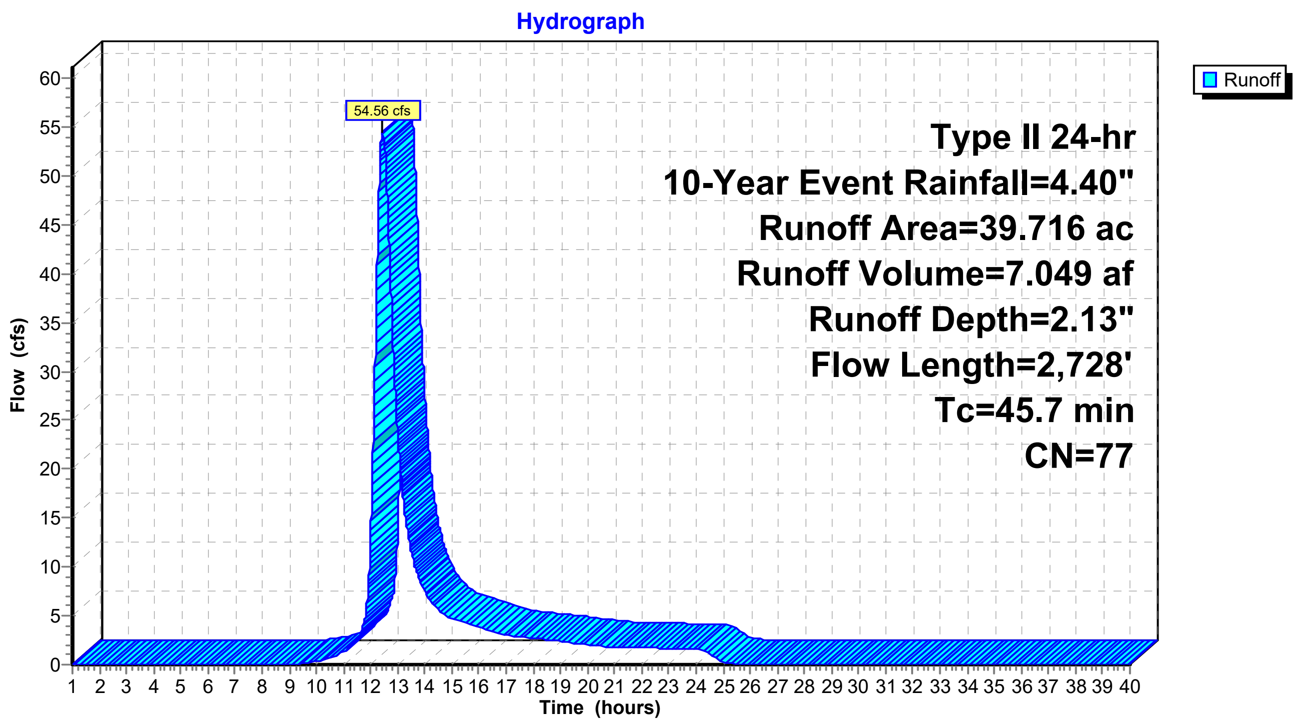
Runoff = 54.56 cfs @ 12.44 hrs, Volume= 7.049 af, Depth= 2.13"
Routed to Pond 1P : Existing Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-40.00 hrs, dt= 0.01 hrs
Type II 24-hr 10-Year Event Rainfall=4.40"

| Area (ac) | CN | Description |
|---|---|---|
| 39.716 | 77 | 2 acre lots, 12% imp, HSG C |
| 34.950 | | 88.00% Pervious Area |
| 4.766 | | 12.00% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 32.1 | 100 | 0.0240 | 0.05 | | **Sheet Flow, Woods** Woods: Dense underbrush n= 0.800 P2= 3.75" |
| 13.6 | 2,628 | 0.0460 | 3.22 | | **Shallow Concentrated Flow, Lawn** Grassed Waterway Kv= 15.0 fps |
| 45.7 | 2,728 | Total | | | |

## Subcatchment 2D: DA 2D



## Summary for Subcatchment 2E: DA 2E

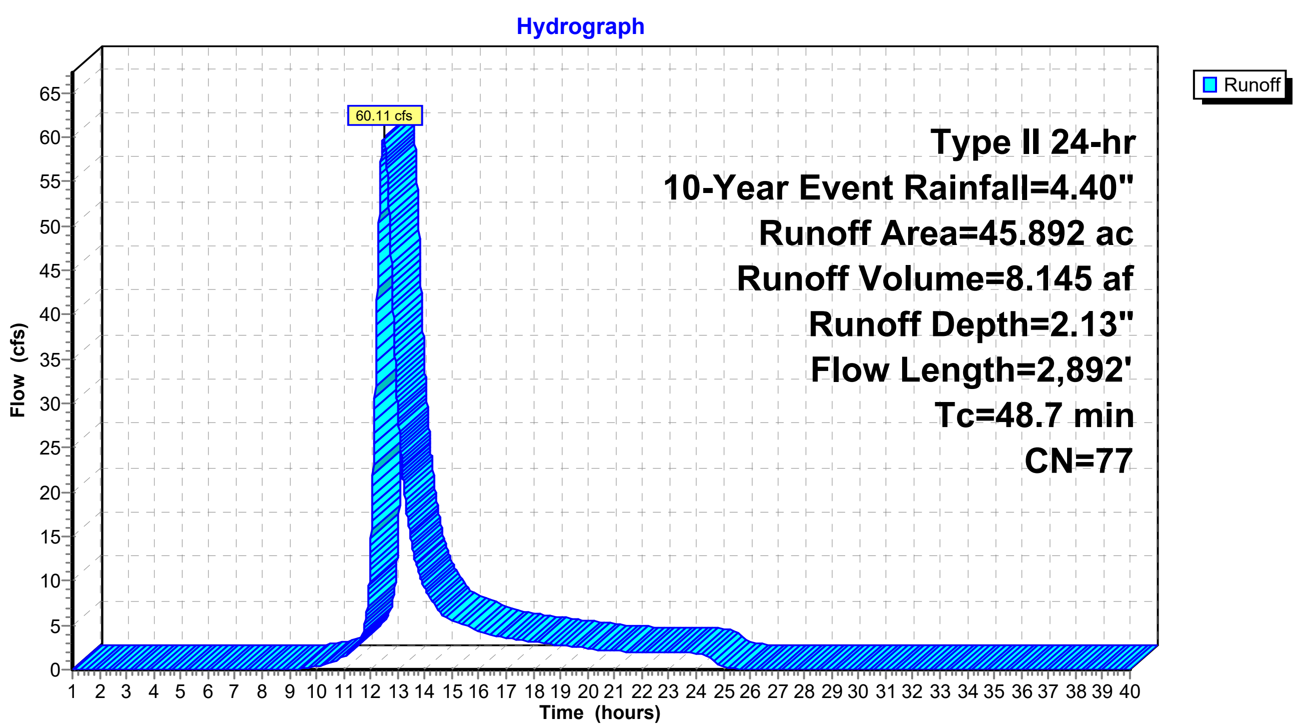
Runoff = 60.11 cfs @ 12.50 hrs, Volume= 8.145 af, Depth= 2.13"
Routed to Reach 3R : Beaverkill Trib

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-40.00 hrs, dt= 0.01 hrs
Type II 24-hr 10-Year Event Rainfall=4.40"

| Area (ac) | CN | Description |
|---|---|---|
| 45.892 | 77 | 2 acre lots, 12% imp, HSG C |
| 40.385 | | 88.00% Pervious Area |
| 5.507 | | 12.00% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 32.1 | 100 | 0.0240 | 0.05 | | **Sheet Flow, Woods**<br>Woods: Dense underbrush n= 0.800 P2= 3.75" |
| 16.6 | 2,792 | 0.0350 | 2.81 | | **Shallow Concentrated Flow, Lawn**<br>Grassed Waterway Kv= 15.0 fps |
| 48.7 | 2,892 | Total | | | |

## Subcatchment 2E: DA 2E



## Summary for Subcatchment 2F: DA 2F

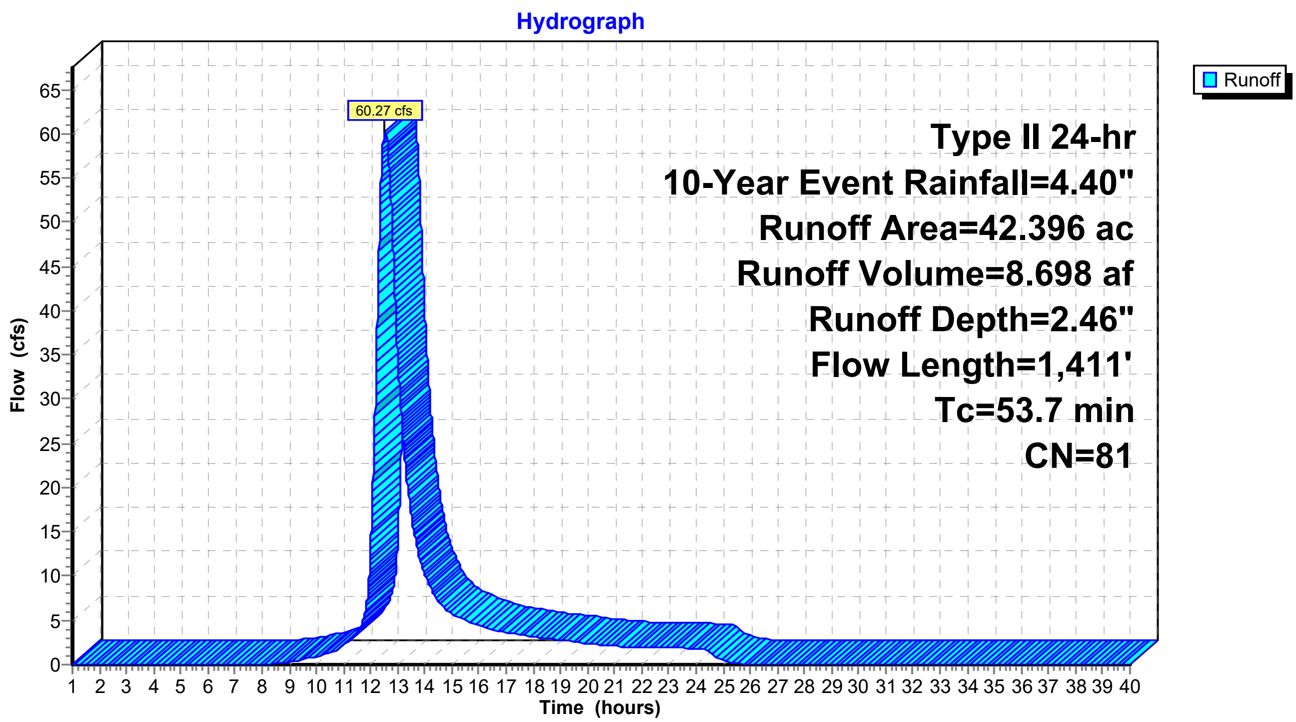
Runoff = 60.27 cfs @ 12.53 hrs, Volume= 8.698 af, Depth= 2.46"
Routed to Pond 6P : Pocket Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-40.00 hrs, dt= 0.01 hrs
Type II 24-hr 10-Year Event Rainfall=4.40"

| Area (ac) | CN | Description |
|---|---|---|
| 42.396 | 81 | 1/3 acre lots, 30% imp, HSG C |
| 29.677 | | 70.00% Pervious Area |
| 12.719 | | 30.00% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 34.5 | 100 | 0.0200 | 0.05 | | **Sheet Flow, Woods**<br>Woods: Dense underbrush n= 0.800 P2= 3.75" |
| 19.2 | 1,311 | 0.0520 | 1.14 | | **Shallow Concentrated Flow, Woods**<br>Woodland Kv= 5.0 fps |
| 53.7 | 1,411 | Total | | | |

## Subcatchment 2F: DA 2F



## Summary for Subcatchment 2G: DA 2G

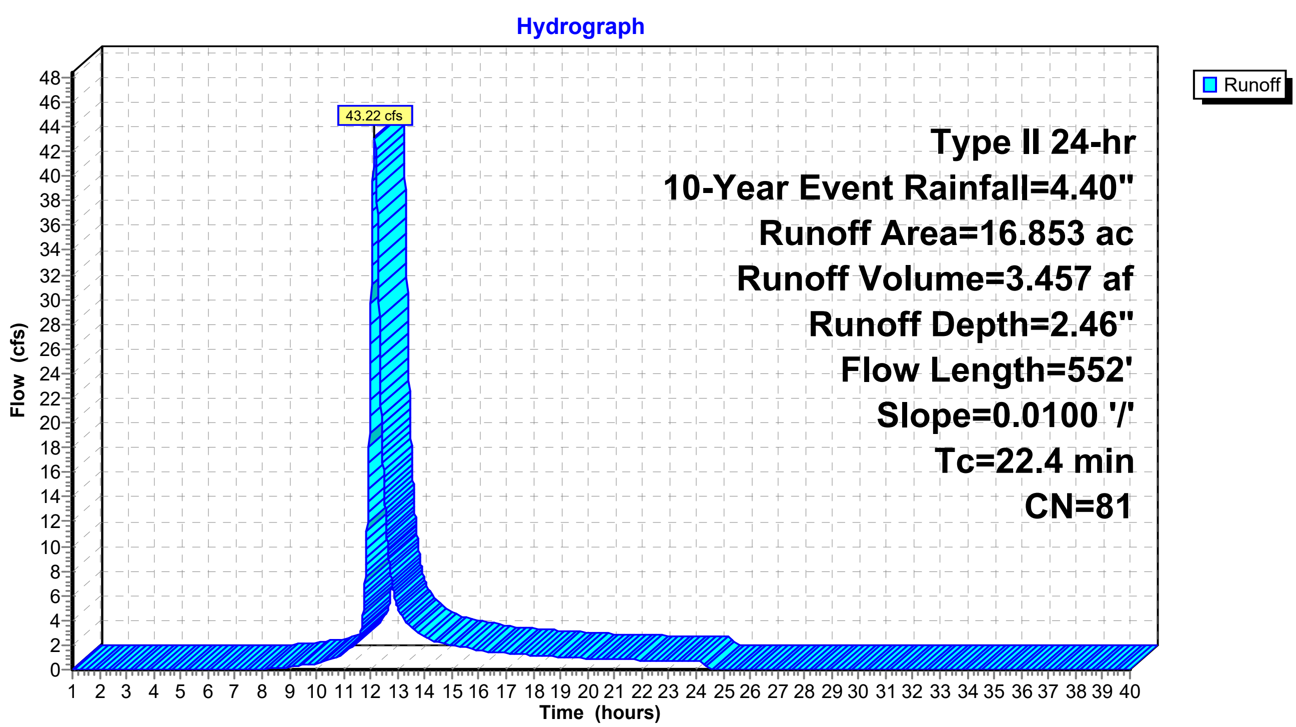
Runoff = 43.22 cfs @ 12.15 hrs, Volume= 3.457 af, Depth= 2.46"
Routed to Pond 7P : Pocket Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-40.00 hrs, dt= 0.01 hrs
Type II 24-hr 10-Year Event Rainfall=4.40"

| Area (ac) | CN | Description |
|---|---|---|
| 16.853 | 81 | 1/3 acre lots, 30% imp, HSG C |
| 11.797 | | 70.00% Pervious Area |
| 5.056 | | 30.00% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 17.4 | 100 | 0.0100 | 0.10 | | **Sheet Flow, Lawn**<br>Grass: Dense n= 0.240 P2= 3.75" |
| 5.0 | 452 | 0.0100 | 1.50 | | **Shallow Concentrated Flow, Lawn**<br>Grassed Waterway Kv= 15.0 fps |
| 22.4 | 552 | Total | | | |

### Subcatchment 2G: DA 2G



## Summary for Subcatchment 2H: DA 2H

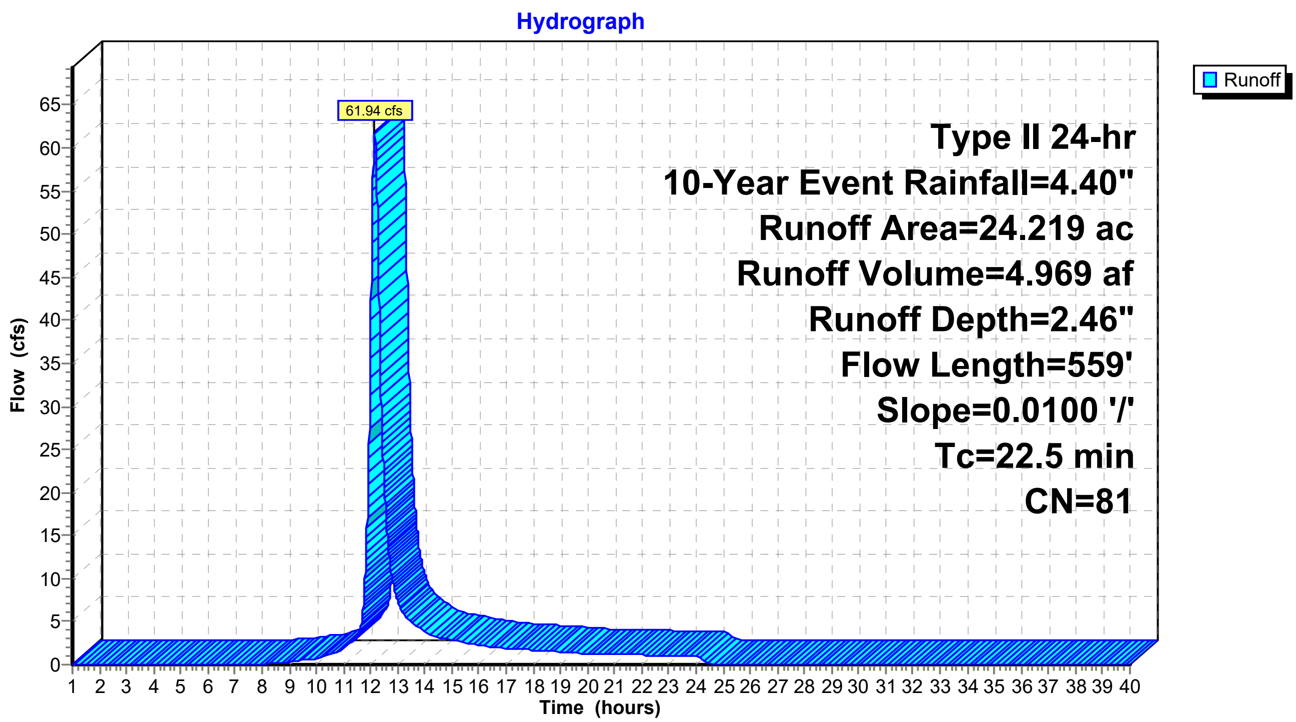
Runoff = 61.94 cfs @ 12.15 hrs, Volume= 4.969 af, Depth= 2.46"
Routed to Pond 8P : Pocket Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-40.00 hrs, dt= 0.01 hrs
Type II 24-hr 10-Year Event Rainfall=4.40"

| Area (ac) | CN | Description |
|---|---|---|
| 24.219 | 81 | 1/3 acre lots, 30% imp, HSG C |
| 16.953 | | 70.00% Pervious Area |
| 7.266 | | 30.00% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 17.4 | 100 | 0.0100 | 0.10 | | **Sheet Flow, Lawn**<br>Grass: Dense n= 0.240 P2= 3.75" |
| 5.1 | 459 | 0.0100 | 1.50 | | **Shallow Concentrated Flow, Lawn**<br>Grassed Waterway Kv= 15.0 fps |
| 22.5 | 559 | Total | | | |

## Subcatchment 2H: DA 2H



## Summary for Subcatchment 3: DA 3

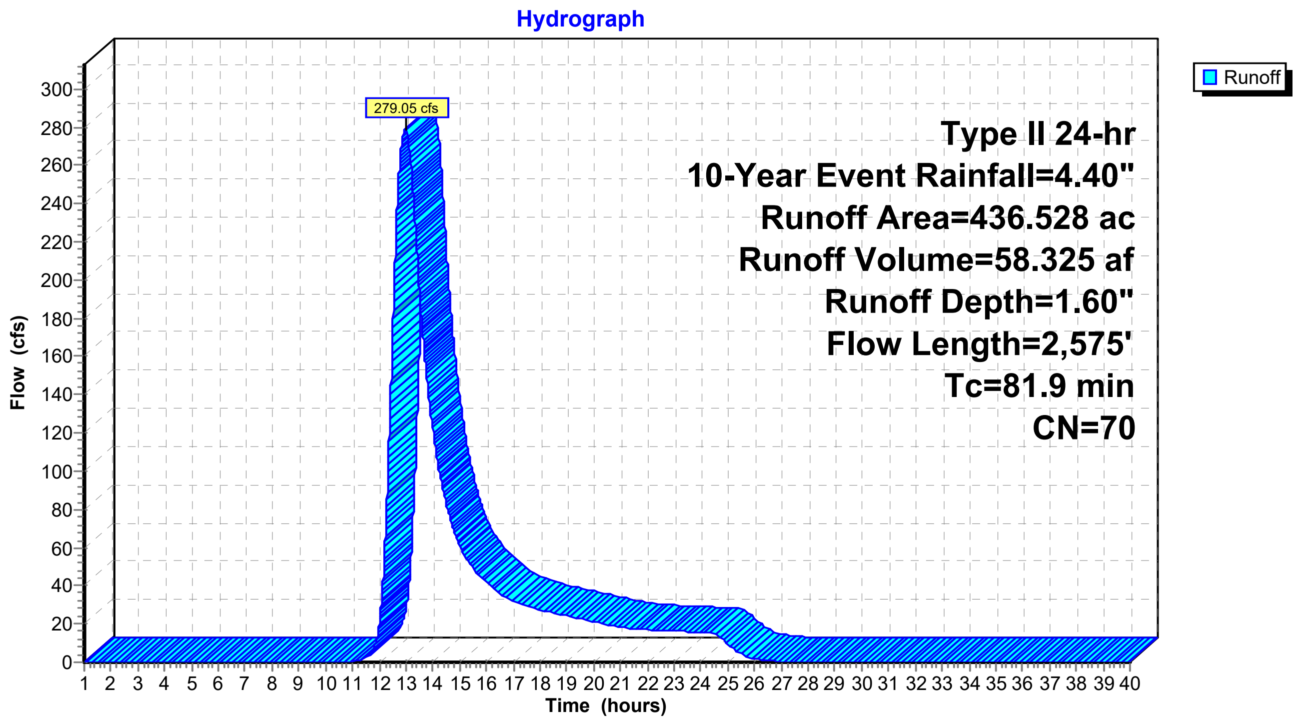
Runoff = 279.05 cfs @ 13.01 hrs, Volume= 58.325 af, Depth= 1.60"
Routed to Reach 2R : Beaverkill

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-40.00 hrs, dt= 0.01 hrs
Type II 24-hr 10-Year Event Rainfall=4.40"

| Area (ac) | CN | Description |
|---|---|---|
| 436.528 | 70 | Woods, Good, HSG C |
| 436.528 | | 100.00% Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 34.5 | 100 | 0.0200 | 0.05 | | **Sheet Flow, Woods** Woods: Dense underbrush n= 0.800 P2= 3.75" |
| 47.4 | 2,475 | 0.1210 | 0.87 | | **Shallow Concentrated Flow, Woods** Forest w/Heavy Litter Kv= 2.5 fps |
| 81.9 | 2,575 | Total | | | |

## Subcatchment 3: DA 3



## Summary for Subcatchment 3A: DA 3A

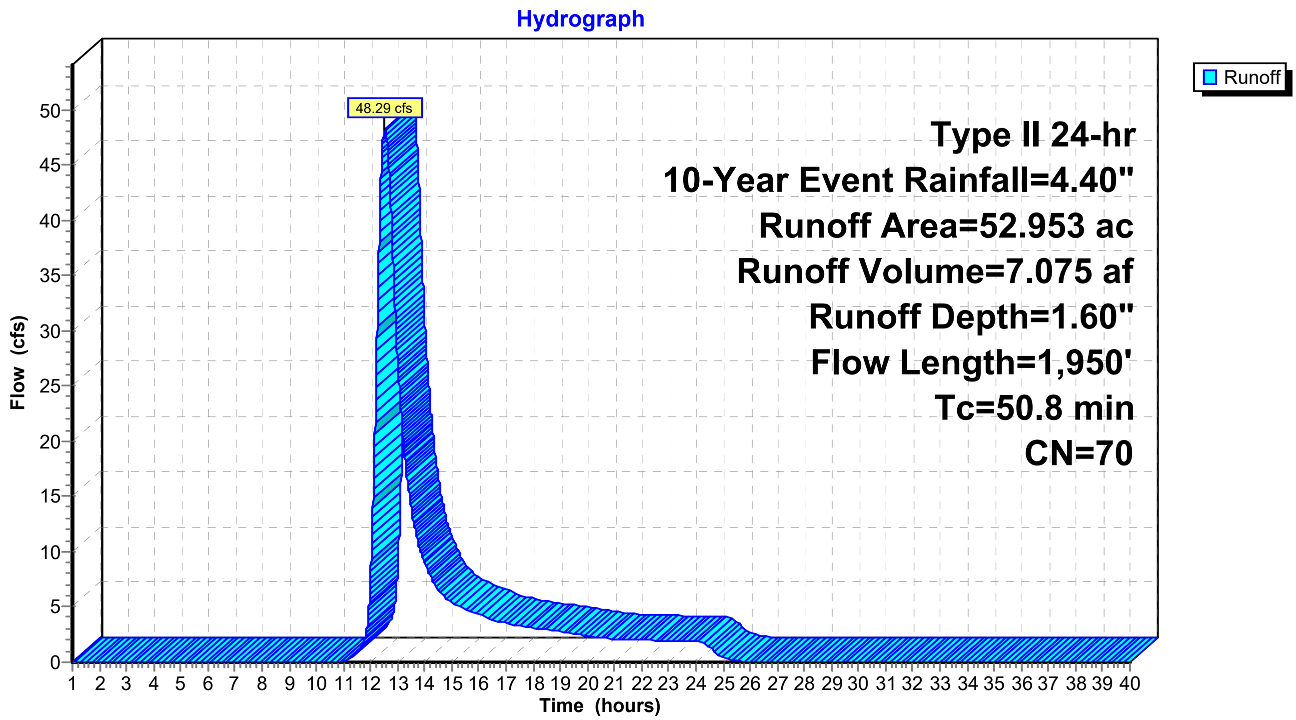
Runoff = 48.29 cfs @ 12.53 hrs, Volume= 7.075 af, Depth= 1.60"
Routed to Reach 4R : Beaverkill Trib

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-40.00 hrs, dt= 0.01 hrs
Type II 24-hr 10-Year Event Rainfall=4.40"

| Area (ac) | CN | Description |
|---|---|---|
| 52.953 | 70 | Woods, Good, HSG C |
| 52.953 | | 100.00% Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 31.6 | 100 | 0.0250 | 0.05 | | **Sheet Flow, Woods**<br>Woods: Dense underbrush n= 0.800 P2= 3.75" |
| 19.2 | 1,850 | 0.1030 | 1.60 | | **Shallow Concentrated Flow, Woods**<br>Woodland Kv= 5.0 fps |
| 50.8 | 1,950 | Total | | | |

### Subcatchment 3A: DA 3A



## Summary for Subcatchment 3B: DA 3B

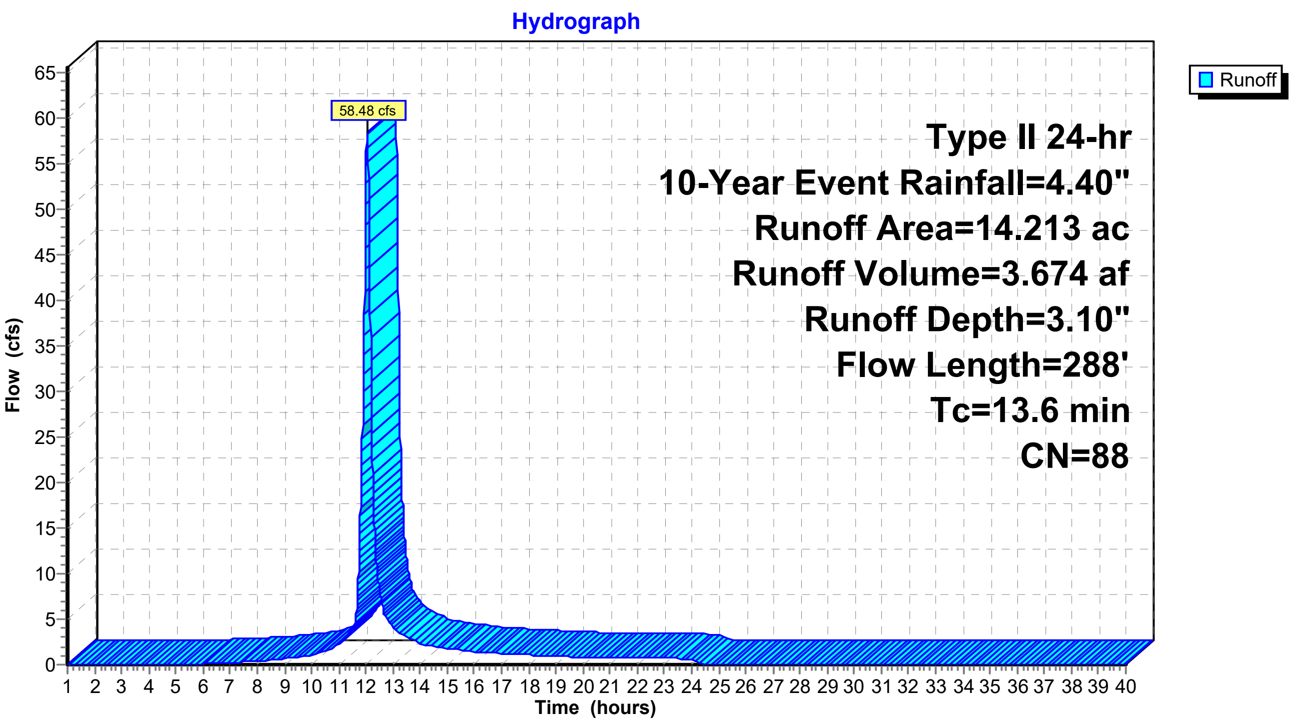
Runoff = 58.48 cfs @ 12.05 hrs, Volume= 3.674 af, Depth= 3.10"
Routed to Pond 9P : Pocket Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-40.00 hrs, dt= 0.01 hrs
Type II 24-hr 10-Year Event Rainfall=4.40"

| | Area (ac) | CN | Description |
|---|---|---|---|
| * | 14.213 | 88 | 1/8 acre lots, 65% imp, HSG C |
| | 4.975 | | 35.00% Pervious Area |
| | 9.238 | | 65.00% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 13.2 | 100 | 0.0200 | 0.13 | | **Sheet Flow, Lawn** Grass: Dense n= 0.240 P2= 3.75" |
| 0.4 | 188 | 0.2500 | 7.50 | | **Shallow Concentrated Flow, Lawn** Grassed Waterway Kv= 15.0 fps |
| 13.6 | 288 | Total | | | |

### Subcatchment 3B: DA 3B



## Summary for Subcatchment 3C: DA 3C

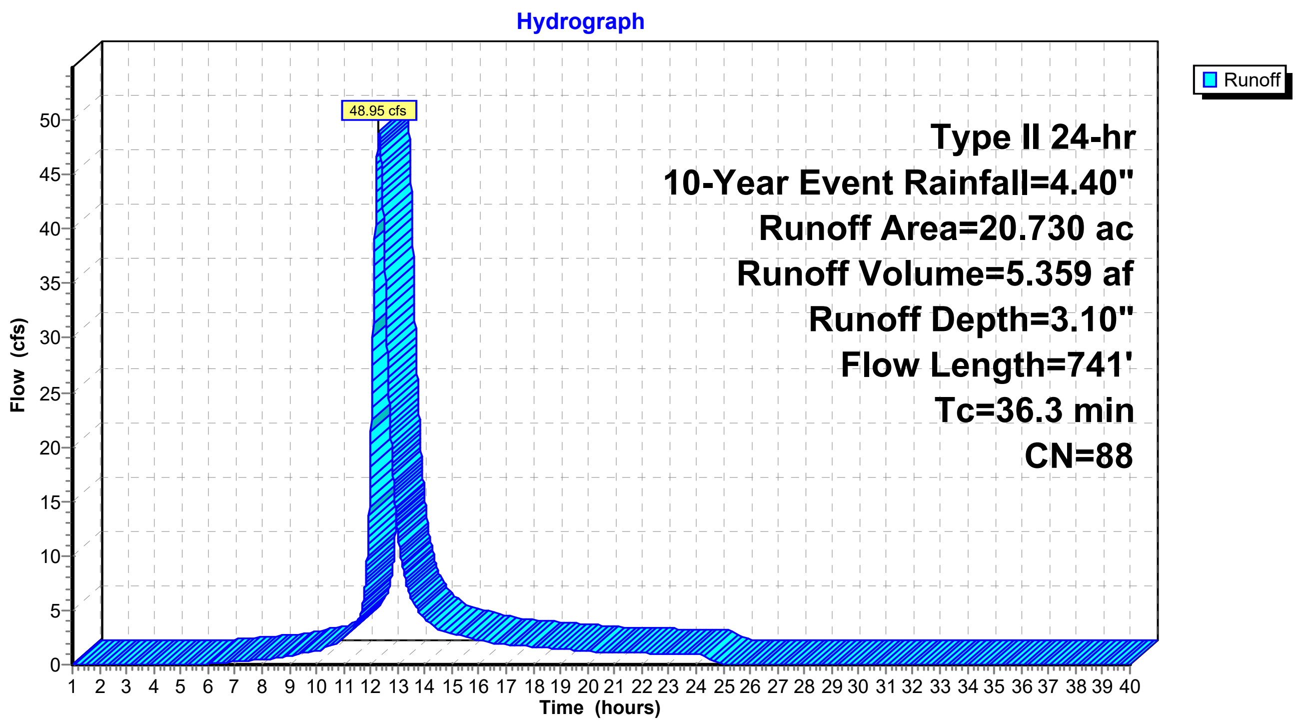
Runoff = 48.95 cfs @ 12.30 hrs, Volume= 5.359 af, Depth= 3.10"
Routed to Pond 1P : Existing Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-40.00 hrs, dt= 0.01 hrs
Type II 24-hr 10-Year Event Rainfall=4.40"

| | Area (ac) | CN | Description |
|---|---|---|---|
| * | 20.730 | 88 | 1/8 acre lots, 65% imp, HSG C |
| | 7.255 | | 35.00% Pervious Area |
| | 13.475 | | 65.00% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 34.5 | 100 | 0.0200 | 0.05 | | **Sheet Flow, Woods** Woods: Dense underbrush n= 0.800 P2= 3.75" |
| 1.8 | 641 | 0.1500 | 5.81 | | **Shallow Concentrated Flow, Lawn** Grassed Waterway Kv= 15.0 fps |
| 36.3 | 741 | Total | | | |

## Subcatchment 3C: DA 3C



## Summary for Subcatchment 3D: DA 3D

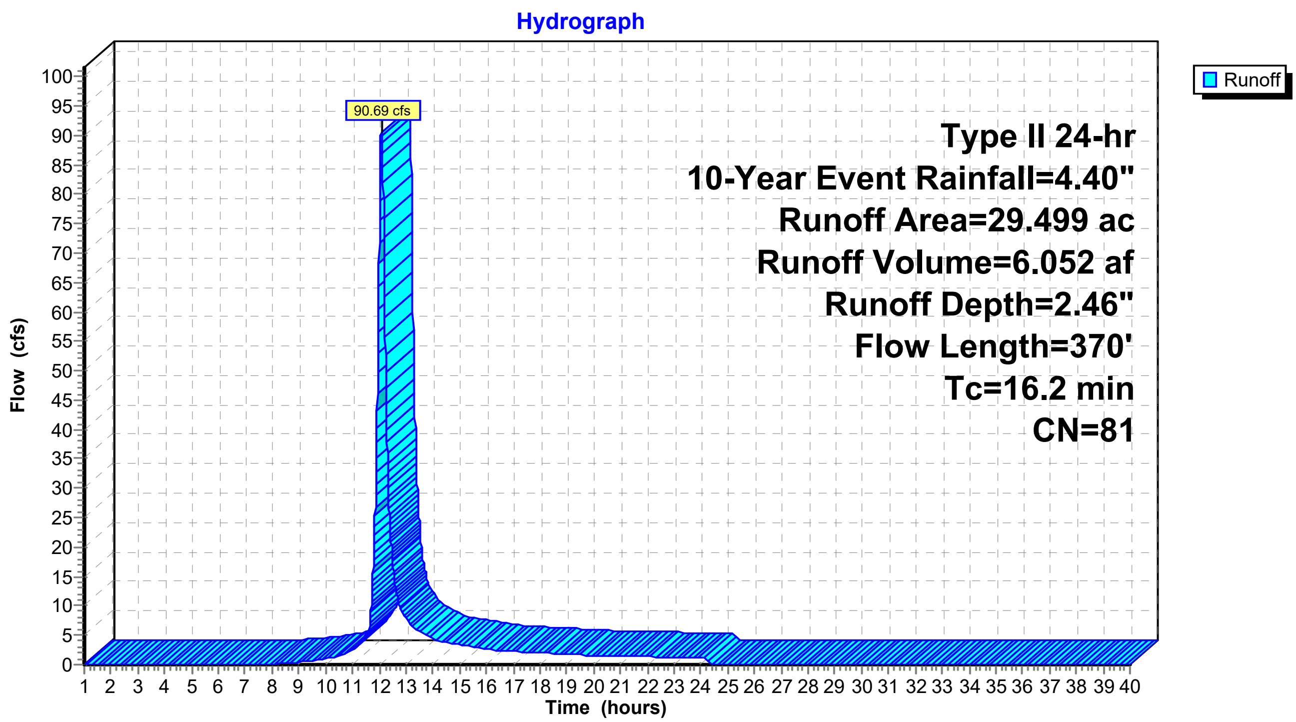
Runoff = 90.69 cfs @ 12.08 hrs, Volume= 6.052 af, Depth= 2.46"
Routed to Pond 12P : Pocket Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-40.00 hrs, dt= 0.01 hrs
Type II 24-hr 10-Year Event Rainfall=4.40"

| Area (ac) | CN | Description |
|---|---|---|
| 29.499 | 81 | 1/3 acre lots, 30% imp, HSG C |
| 20.649 | | 70.00% Pervious Area |
| 8.850 | | 30.00% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 14.8 | 100 | 0.0150 | 0.11 | | **Sheet Flow, Lawn**<br>Grass: Dense n= 0.240 P2= 3.75" |
| 1.4 | 270 | 0.0480 | 3.29 | | **Shallow Concentrated Flow, Lawn**<br>Grassed Waterway Kv= 15.0 fps |
| 16.2 | 370 | Total | | | |

## Subcatchment 3D: DA 3D



## Summary for Subcatchment 3E: DA 3E

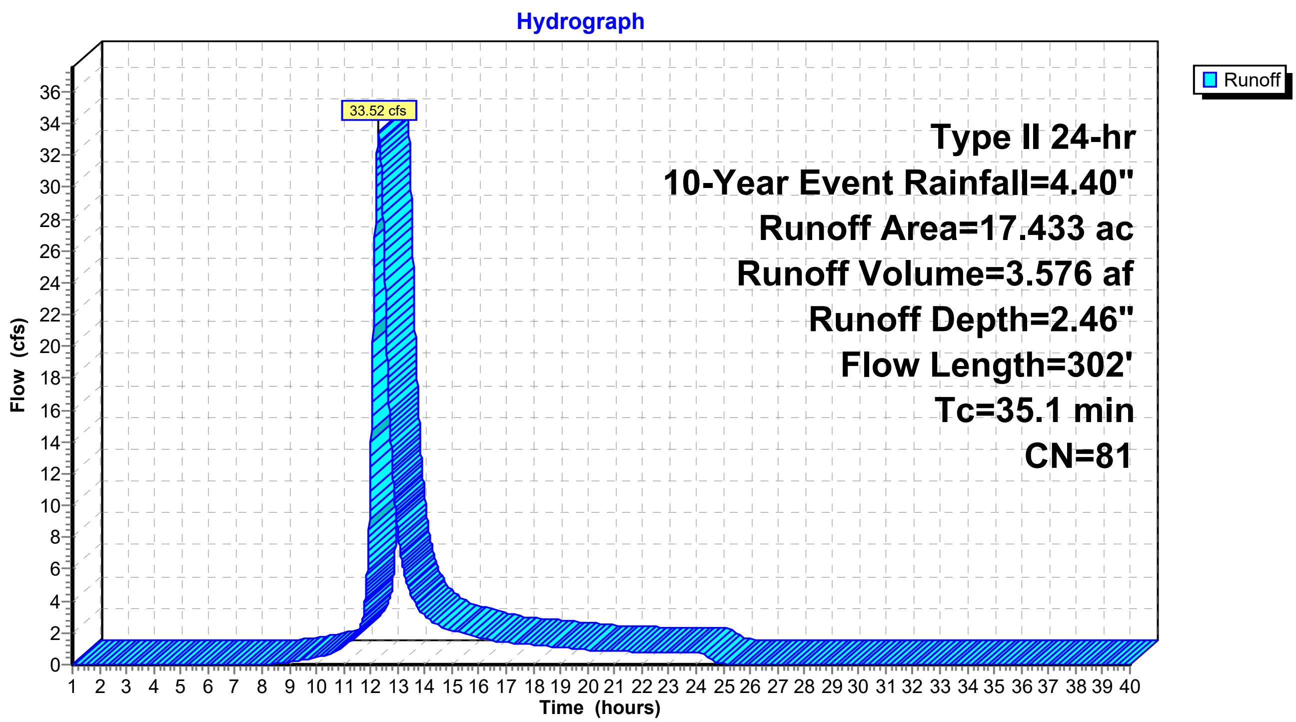
Runoff = 33.52 cfs @ 12.29 hrs, Volume= 3.576 af, Depth= 2.46"
Routed to Pond 10P : Pocket Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-40.00 hrs, dt= 0.01 hrs
Type II 24-hr 10-Year Event Rainfall=4.40"

| Area (ac) | CN | Description |
|---|---|---|
| 17.433 | 81 | 1/3 acre lots, 30% imp, HSG C |
| 12.203 | | 70.00% Pervious Area |
| 5.230 | | 30.00% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 34.5 | 100 | 0.0200 | 0.05 | | **Sheet Flow, Woods** Woods: Dense underbrush n= 0.800 P2= 3.75" |
| 0.6 | 202 | 0.1500 | 5.81 | | **Shallow Concentrated Flow, Lawn** Grassed Waterway Kv= 15.0 fps |
| 35.1 | 302 | Total | | | |

## Subcatchment 3E: DA 3E



## Summary for Subcatchment 3F: DA 3F

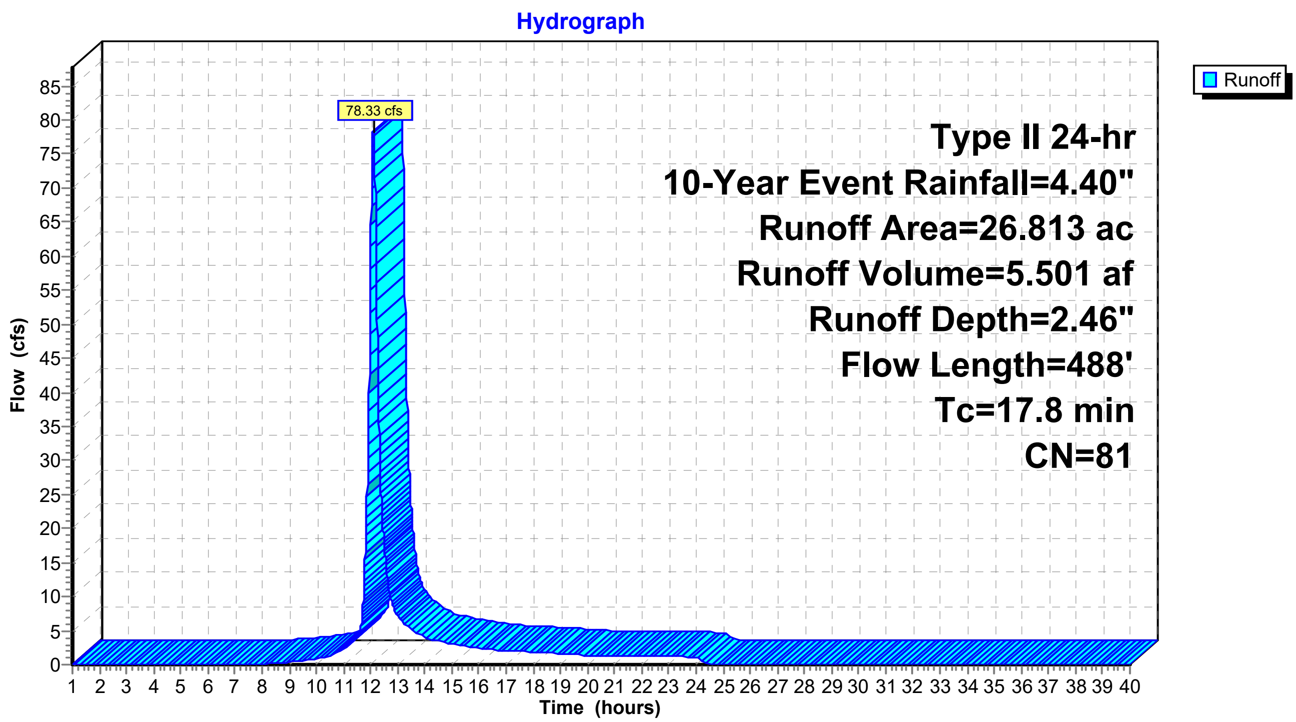
Runoff = 78.33 cfs @ 12.10 hrs, Volume= 5.501 af, Depth= 2.46"
Routed to Pond 11P : Pocket Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-40.00 hrs, dt= 0.01 hrs
Type II 24-hr 10-Year Event Rainfall=4.40"

| Area (ac) | CN | Description |
|---|---|---|
| 26.813 | 81 | 1/3 acre lots, 30% imp, HSG C |
| 18.769 | | 70.00% Pervious Area |
| 8.044 | | 30.00% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 14.8 | 100 | 0.0150 | 0.11 | | **Sheet Flow, Lawn**<br>Grass: Dense n= 0.240 P2= 3.75" |
| 3.0 | 388 | 0.0200 | 2.12 | | **Shallow Concentrated Flow, Lawn**<br>Grassed Waterway Kv= 15.0 fps |
| 17.8 | 488 | Total | | | |

### Subcatchment 3F: DA 3F



## Summary for Subcatchment 3G: DA 3G

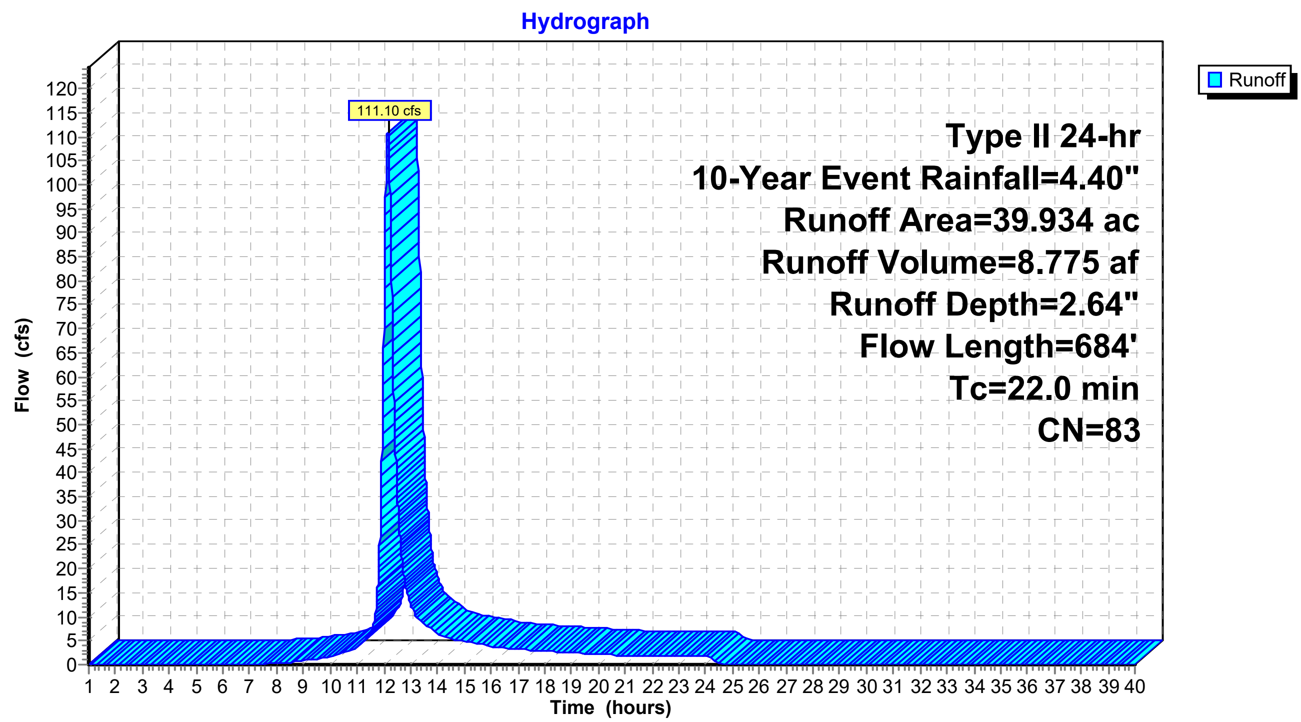
Runoff = 111.10 cfs @ 12.15 hrs, Volume= 8.775 af, Depth= 2.64"
Routed to Pond 5P : Pocket Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-40.00 hrs, dt= 0.01 hrs
Type II 24-hr 10-Year Event Rainfall=4.40"

| Area (ac) | CN | Description |
|---|---|---|
| 39.934 | 83 | 1/4 acre lots, 38% imp, HSG C |
| 24.759 | | 62.00% Pervious Area |
| 15.175 | | 38.00% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 17.4 | 100 | 0.0100 | 0.10 | | **Sheet Flow, Lawn**<br>Grass: Dense n= 0.240 P2= 3.75" |
| 4.6 | 584 | 0.0200 | 2.12 | | **Shallow Concentrated Flow, Lawn**<br>Grassed Waterway Kv= 15.0 fps |
| 22.0 | 684 | Total | | | |

### Subcatchment 3G: DA 3G



## Summary for Subcatchment 4: DA 4

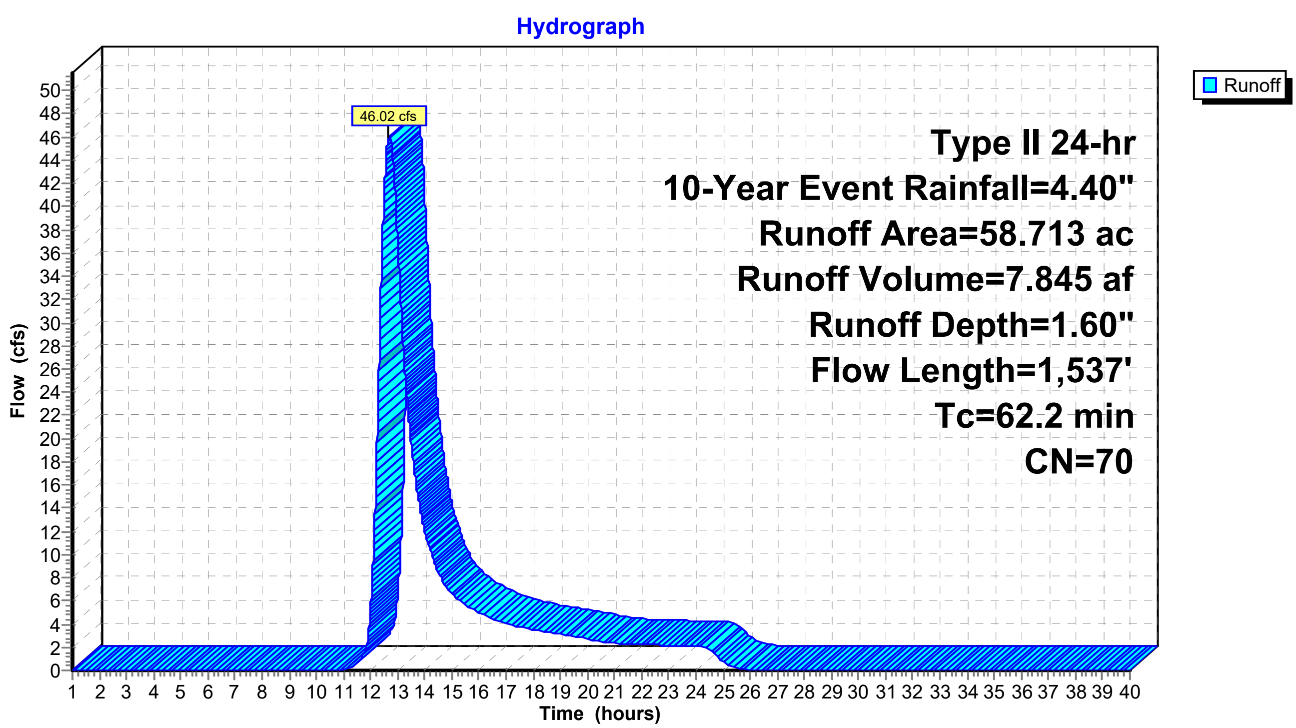
Runoff = 46.02 cfs @ 12.65 hrs, Volume= 7.845 af, Depth= 1.60"
Routed to Reach 1R : Beaverkill

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-40.00 hrs, dt= 0.01 hrs
Type II 24-hr 10-Year Event Rainfall=4.40"

| Area (ac) | CN | Description |
|---|---|---|
| 58.438 | 70 | Woods, Good, HSG C |
| 0.275 | 98 | Unconnected pavement, HSG C |
| 58.713 | 70 | Weighted Average |
| 58.438 | | 99.53% Pervious Area |
| 0.275 | | 0.47% Impervious Area |
| 0.275 | | 100.00% Unconnected |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 34.5 | 100 | 0.0200 | 0.05 | | **Sheet Flow, Woods**<br>Woods: Dense underbrush n= 0.800 P2= 3.75" |
| 27.7 | 1,437 | 0.0300 | 0.87 | | **Shallow Concentrated Flow, Woods**<br>Woodland Kv= 5.0 fps |
| 62.2 | 1,537 | Total | | | |

## Subcatchment 4: DA 4



## Summary for Subcatchment 4A: DA 4A

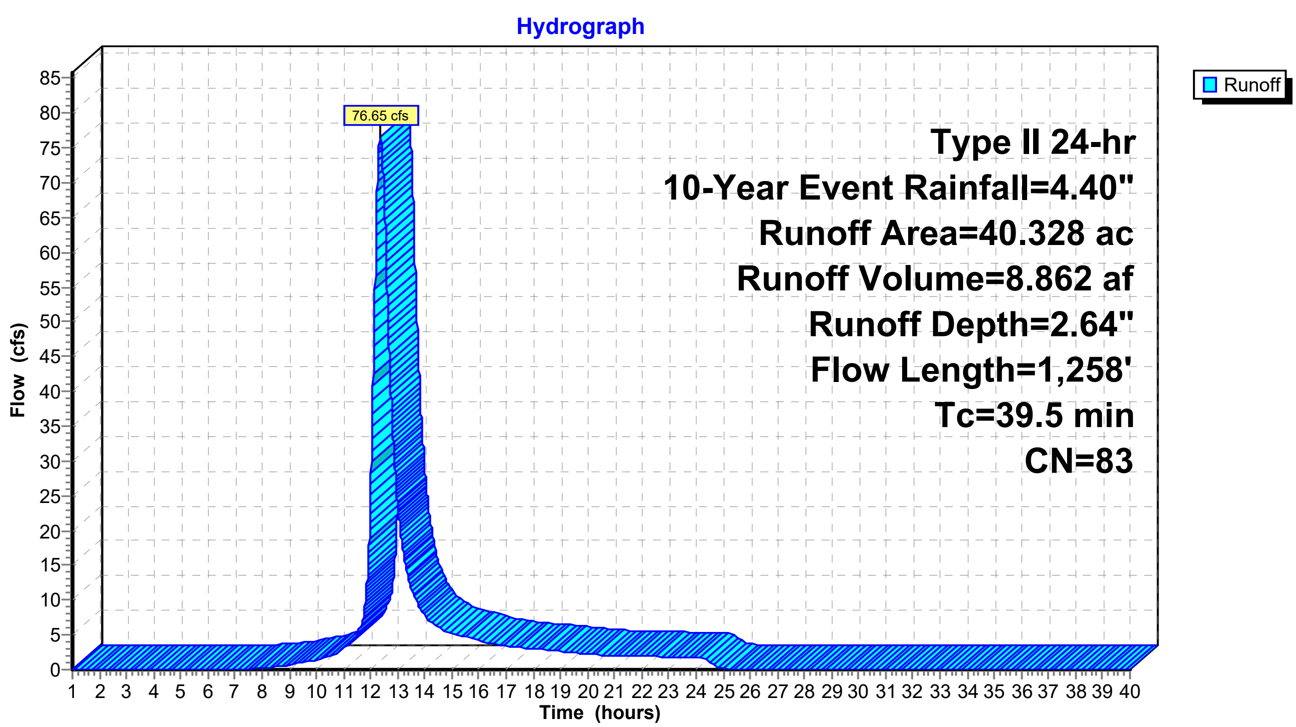
Runoff = 76.65 cfs @ 12.34 hrs, Volume= 8.862 af, Depth= 2.64"
Routed to Pond 3P : Pocket Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-40.00 hrs, dt= 0.01 hrs
Type II 24-hr 10-Year Event Rainfall=4.40"

| Area (ac) | CN | Description |
|---|---|---|
| 40.328 | 83 | 1/4 acre lots, 38% imp, HSG C |
| 25.003 | | 62.00% Pervious Area |
| 15.325 | | 38.00% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 18.9 | 100 | 0.0900 | 0.09 | | **Sheet Flow, Woods** Woods: Dense underbrush n= 0.800 P2= 3.75" |
| 20.6 | 1,158 | 0.0350 | 0.94 | | **Shallow Concentrated Flow, Woods** Woodland Kv= 5.0 fps |
| 39.5 | 1,258 | Total | | | |

### Subcatchment 4A: DA 4A



## Summary for Subcatchment 4B: DA 4B

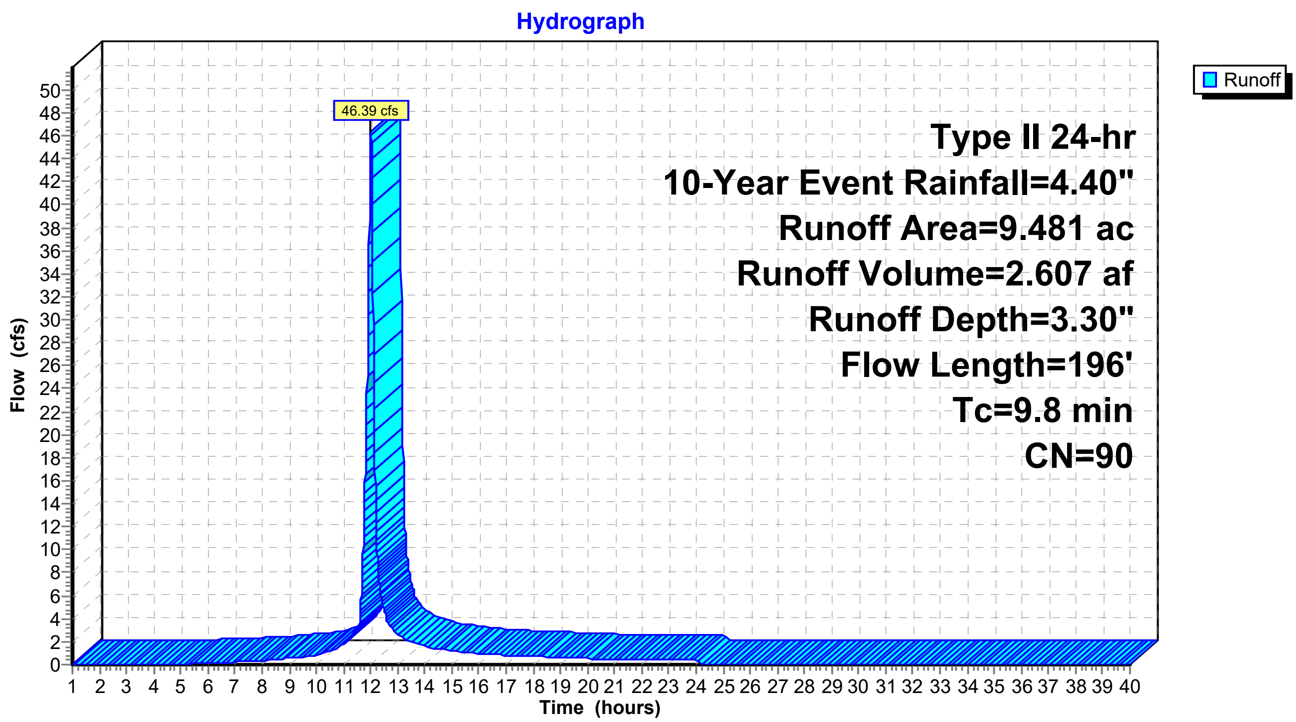
Runoff = 46.39 cfs @ 12.01 hrs, Volume= 2.607 af, Depth= 3.30"
Routed to Pond 4P : Pocket Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-40.00 hrs, dt= 0.01 hrs
Type II 24-hr 10-Year Event Rainfall=4.40"

| Area (ac) | CN | Description |
|---|---|---|
| 9.481 | 90 | 1/8 acre lots, 65% imp, HSG C |
| 3.318 | | 35.00% Pervious Area |
| 6.163 | | 65.00% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 9.1 | 100 | 0.0500 | 0.18 | | **Sheet Flow, Lawn** Grass: Dense n= 0.240 P2= 3.75" |
| 0.7 | 96 | 0.0200 | 2.28 | | **Shallow Concentrated Flow, Lawn** Unpaved Kv= 16.1 fps |
| 9.8 | 196 | Total | | | |

## Subcatchment 4B: DA 4B



## Summary for Subcatchment 5: DA 5

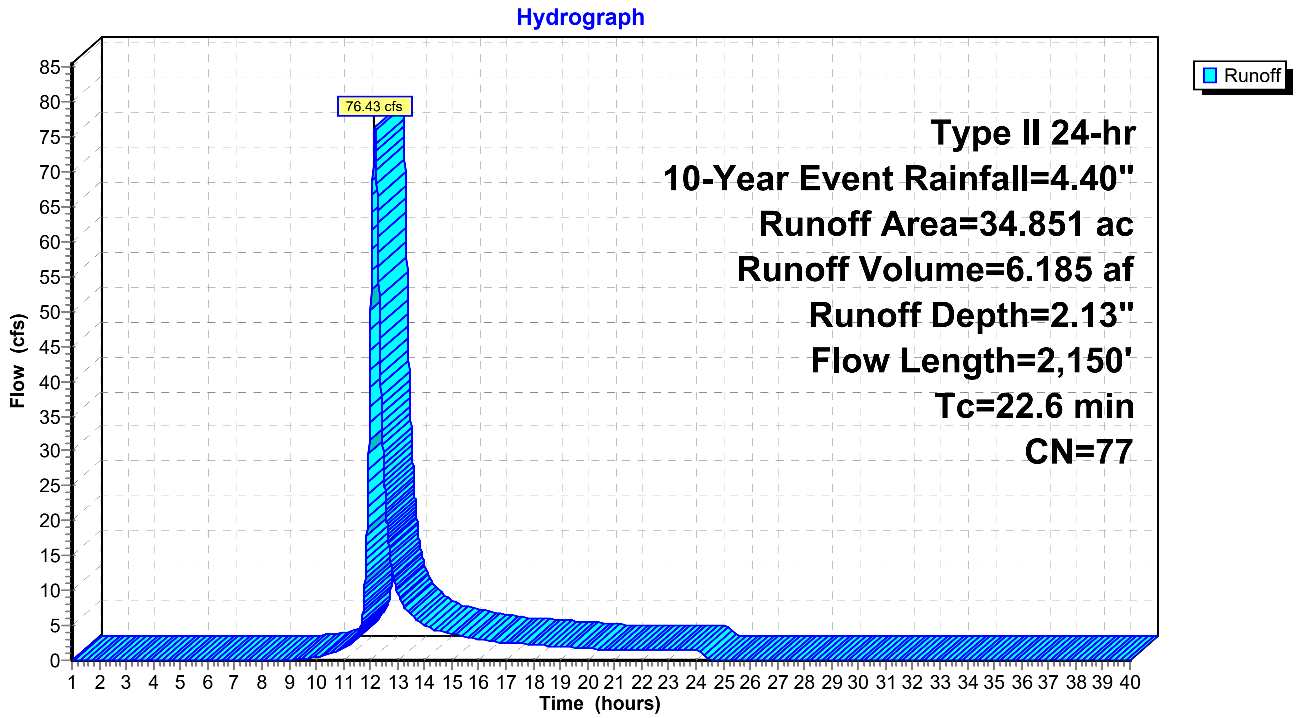
Runoff = 76.43 cfs @ 12.16 hrs, Volume= 6.185 af, Depth= 2.13"
Routed to Reach 2R : Beaverkill

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-40.00 hrs, dt= 0.01 hrs
Type II 24-hr 10-Year Event Rainfall=4.40"

| Area (ac) | CN | Description |
|---|---|---|
| 34.851 | 77 | 2 acre lots, 12% imp, HSG C |
| 30.669 | | 88.00% Pervious Area |
| 4.182 | | 12.00% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 7.9 | 100 | 0.2000 | 0.21 | | **Sheet Flow, Woods** Woods: Light underbrush n= 0.400 P2= 3.75" |
| 14.7 | 2,050 | 0.0240 | 2.32 | | **Shallow Concentrated Flow, Lawn** Grassed Waterway Kv= 15.0 fps |
| 22.6 | 2,150 | Total | | | |

## Subcatchment 5: DA 5



## Summary for Reach 1R: Beaverkill

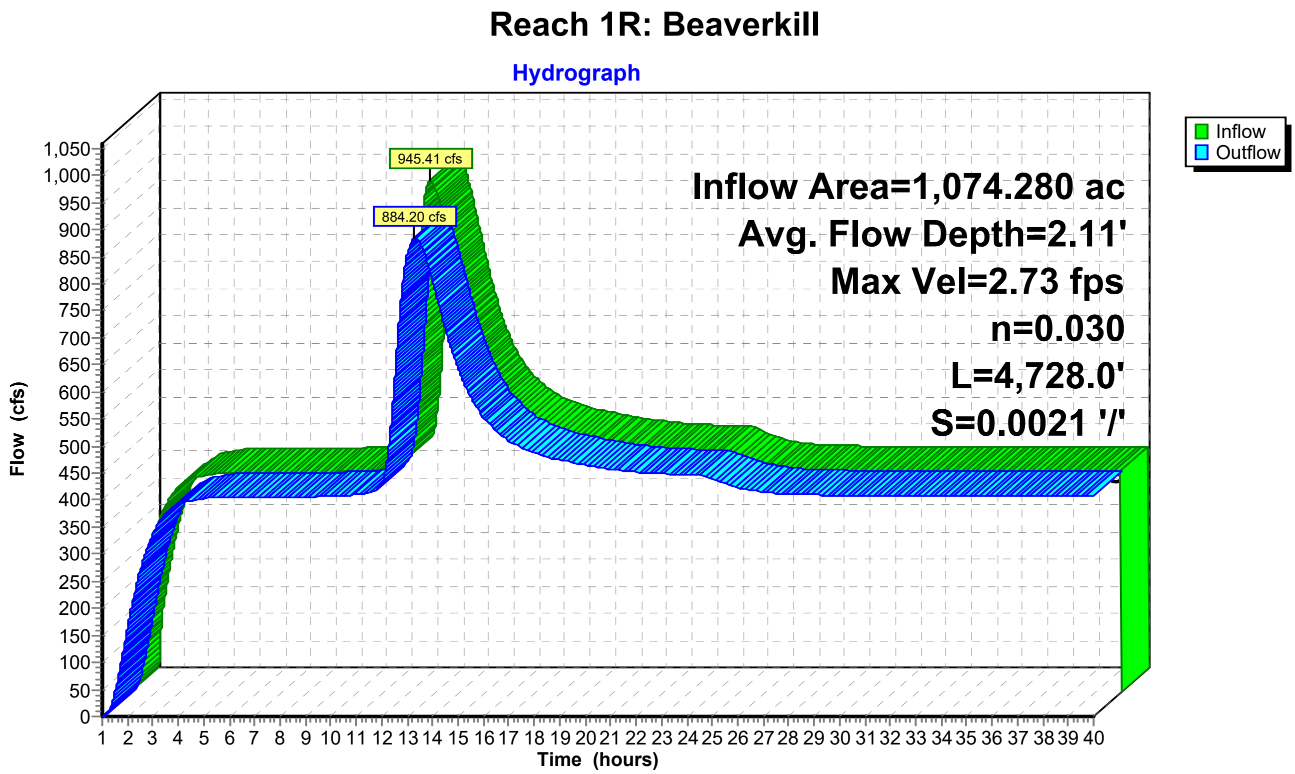
Inflow Area = 1,074.280 ac, 12.67% Impervious, Inflow Depth > 16.05" for 10-Year Event event
Inflow = 945.41 cfs @ 12.81 hrs, Volume= 1,436.985 af
Outflow = 884.20 cfs @ 13.31 hrs, Volume= 1,417.425 af, Atten= 6%, Lag= 30.0 min
Routed to Link AP-2 : AP-2

Routing by Sim-Route method, Time Span= 1.00-40.00 hrs, dt= 0.01 hrs
Max. Velocity= 2.73 fps, Min. Travel Time= 28.8 min
Avg. Velocity = 2.25 fps, Avg. Travel Time= 35.1 min

Peak Storage= 1,529,331 cf @ 13.31 hrs
Average Depth at Peak Storage= 2.11' , Surface Width= 246.03'
Bank-Full Depth= 3.25' Flow Area= 659.8 sf, Capacity= 2,310.71 cfs

60.00' x 3.25' deep channel, n= 0.030 Earth, grassed & winding
Side Slope Z-value= 44.0 '/' Top Width= 346.00'
Length= 4,728.0' Slope= 0.0021 '/'
Inlet Invert= 145.00', Outlet Invert= 135.00'

‡



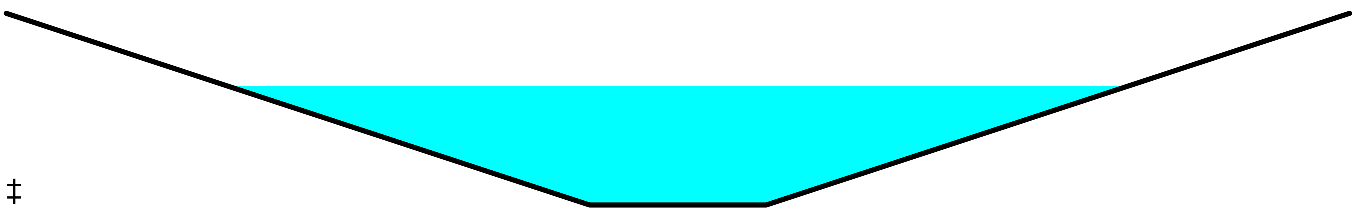
## Summary for Reach 2R: Beaverkill

Inflow Area = 471.379 ac, 0.89% Impervious, Inflow Depth > 29.05" for 10-Year Event event
Inflow = 622.61 cfs @ 12.93 hrs, Volume= 1,141.039 af, Incl. 334.00 cfs Base Flow
Outflow = 559.11 cfs @ 13.40 hrs, Volume= 1,117.300 af, Atten= 10%, Lag= 28.1 min
Routed to Reach 1R : Beaverkill

Routing by Sim-Route method, Time Span= 1.00-40.00 hrs, dt= 0.01 hrs
Max. Velocity= 2.46 fps, Min. Travel Time= 45.7 min
Avg. Velocity = 2.17 fps, Avg. Travel Time= 51.9 min

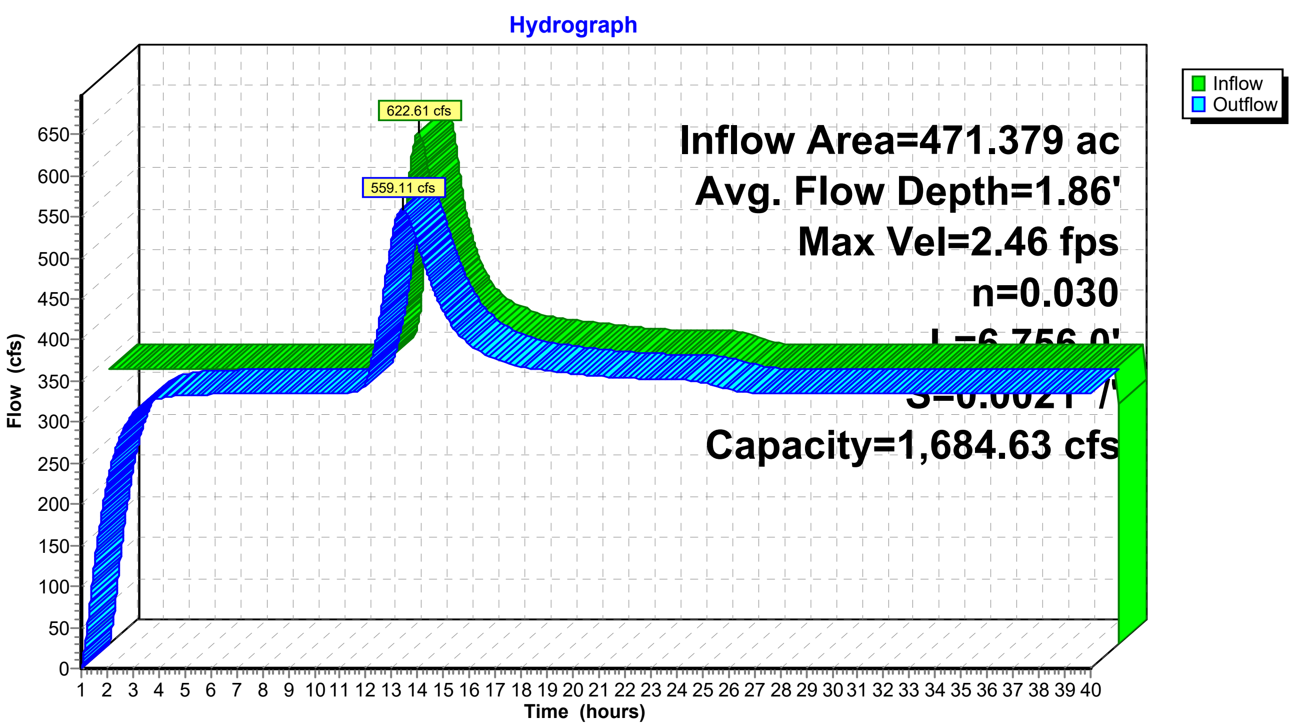
Peak Storage= 1,532,675 cf @ 13.40 hrs
Average Depth at Peak Storage= 1.86' , Surface Width= 203.78'
Bank-Full Depth= 3.00' Flow Area= 516.0 sf, Capacity= 1,684.63 cfs

40.00' x 3.00' deep channel, n= 0.030 Earth, grassed & winding
Side Slope Z-value= 44.0 '/' Top Width= 304.00'
Length= 6,756.0' Slope= 0.0021 '/'
Inlet Invert= 160.00', Outlet Invert= 145.50'



‡

### Reach 2R: Beaverkill



## Summary for Reach 3R: Beaverkill Trib

Inflow Area = 370.977 ac, 18.86% Impervious, Inflow Depth > 9.15" for 10-Year Event event
Inflow = 366.05 cfs @ 12.60 hrs, Volume= 282.749 af
Outflow = 366.00 cfs @ 12.62 hrs, Volume= 282.616 af, Atten= 0%, Lag= 0.8 min
Routed to Reach 1R : Beaverkill

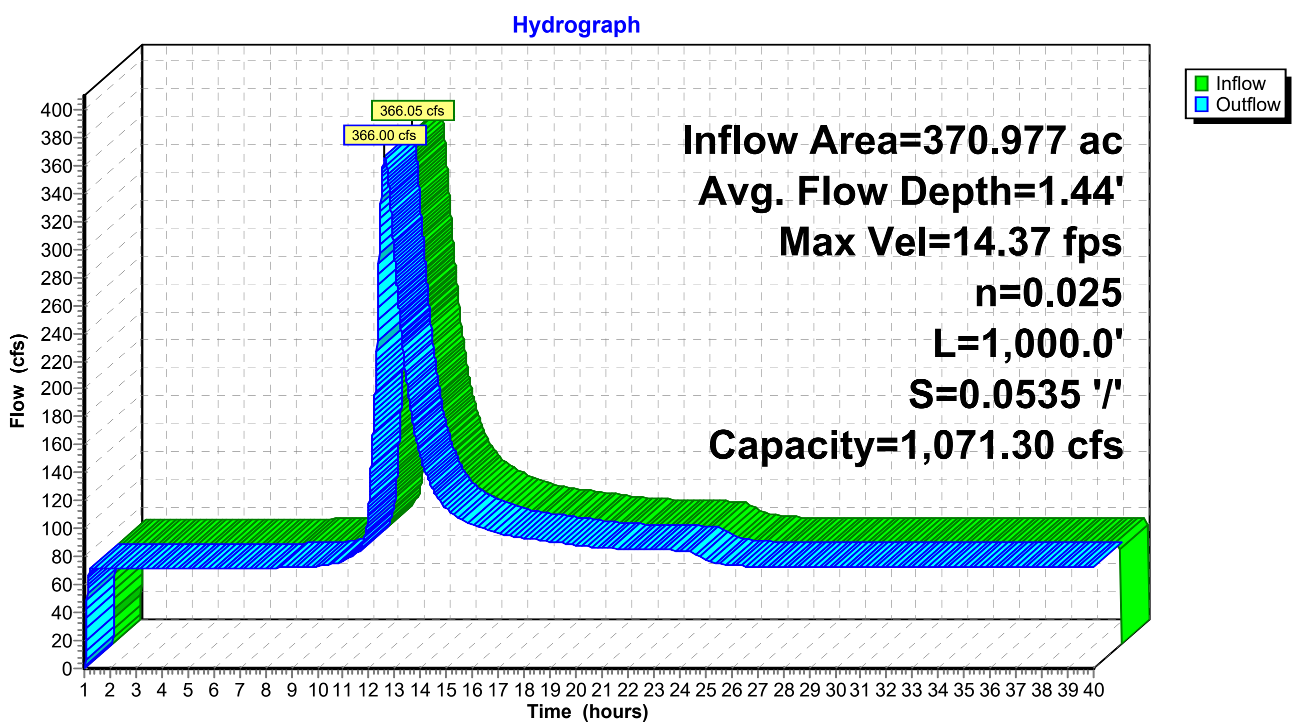
Routing by Sim-Route method, Time Span= 1.00-40.00 hrs, dt= 0.01 hrs
Max. Velocity= 14.37 fps, Min. Travel Time= 1.2 min
Avg. Velocity = 9.07 fps, Avg. Travel Time= 1.8 min

Peak Storage= 25,471 cf @ 12.62 hrs
Average Depth at Peak Storage= 1.44' , Surface Width= 23.48'
Bank-Full Depth= 2.50' Flow Area= 55.0 sf, Capacity= 1,071.30 cfs

12.00' x 2.50' deep channel, n= 0.025 Earth, clean & winding
Side Slope Z-value= 4.0 '/' Top Width= 32.00'
Length= 1,000.0' Slope= 0.0535 '/'
Inlet Invert= 200.00', Outlet Invert= 146.50'

‡

### Reach 3R: Beaverkill Trib



## Summary for Reach 4R: Beaverkill Trib

Inflow Area = 176.681 ac, 8.40% Impervious, Inflow Depth > 17.36" for 10-Year Event event
Inflow = 192.13 cfs @ 12.71 hrs, Volume= 255.527 af, Incl. 72.00 cfs Base Flow
Outflow = 191.78 cfs @ 12.74 hrs, Volume= 255.156 af, Atten= 0%, Lag= 2.3 min
Routed to Reach 3R : Beaverkill Trib

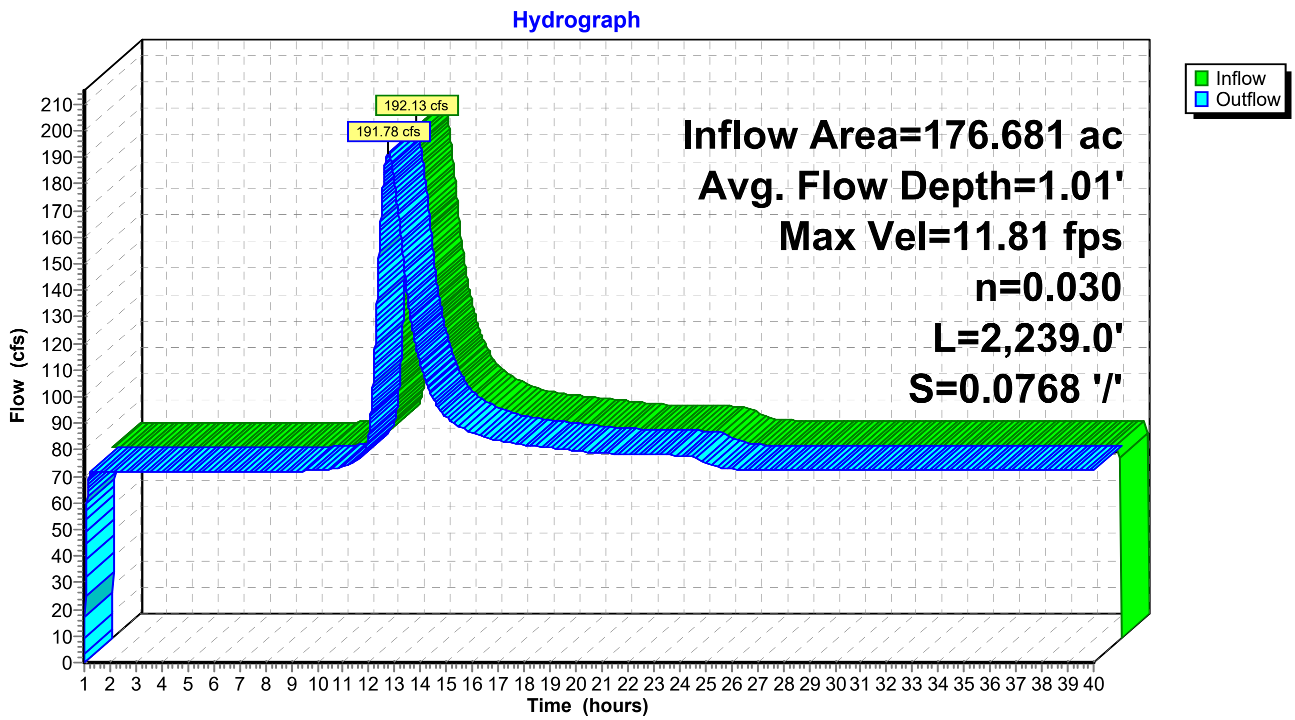
Routing by Sim-Route method, Time Span= 1.00-40.00 hrs, dt= 0.01 hrs
Max. Velocity= 11.81 fps, Min. Travel Time= 3.2 min
Avg. Velocity = 8.85 fps, Avg. Travel Time= 4.2 min

Peak Storage= 36,352 cf @ 12.74 hrs
Average Depth at Peak Storage= 1.01' , Surface Width= 20.09'
Bank-Full Depth= 2.00' Flow Area= 40.0 sf, Capacity= 688.52 cfs

12.00' x 2.00' deep channel, n= 0.030 Earth, grassed & winding
Side Slope Z-value= 4.0 '/' Top Width= 28.00'
Length= 2,239.0' Slope= 0.0768 '/'
Inlet Invert= 386.00', Outlet Invert= 214.00'

‡

### Reach 4R: Beaverkill Trib



## Summary for Pond 1P: Existing Pond

Inflow Area = 60.446 ac, 30.18% Impervious, Inflow Depth = 2.46" for 10-Year Event event
Inflow = 100.20 cfs @ 12.38 hrs, Volume= 12.408 af
Outflow = 83.11 cfs @ 12.58 hrs, Volume= 9.830 af, Atten= 17%, Lag= 11.7 min
Primary = 83.11 cfs @ 12.58 hrs, Volume= 9.830 af
Routed to Reach 3R : Beaverkill Trib

Routing by Sim-Route method, Time Span= 1.00-40.00 hrs, dt= 0.01 hrs
Peak Elev= 211.43' @ 12.58 hrs Surf.Area= 16,760 sf Storage= 159,072 cf

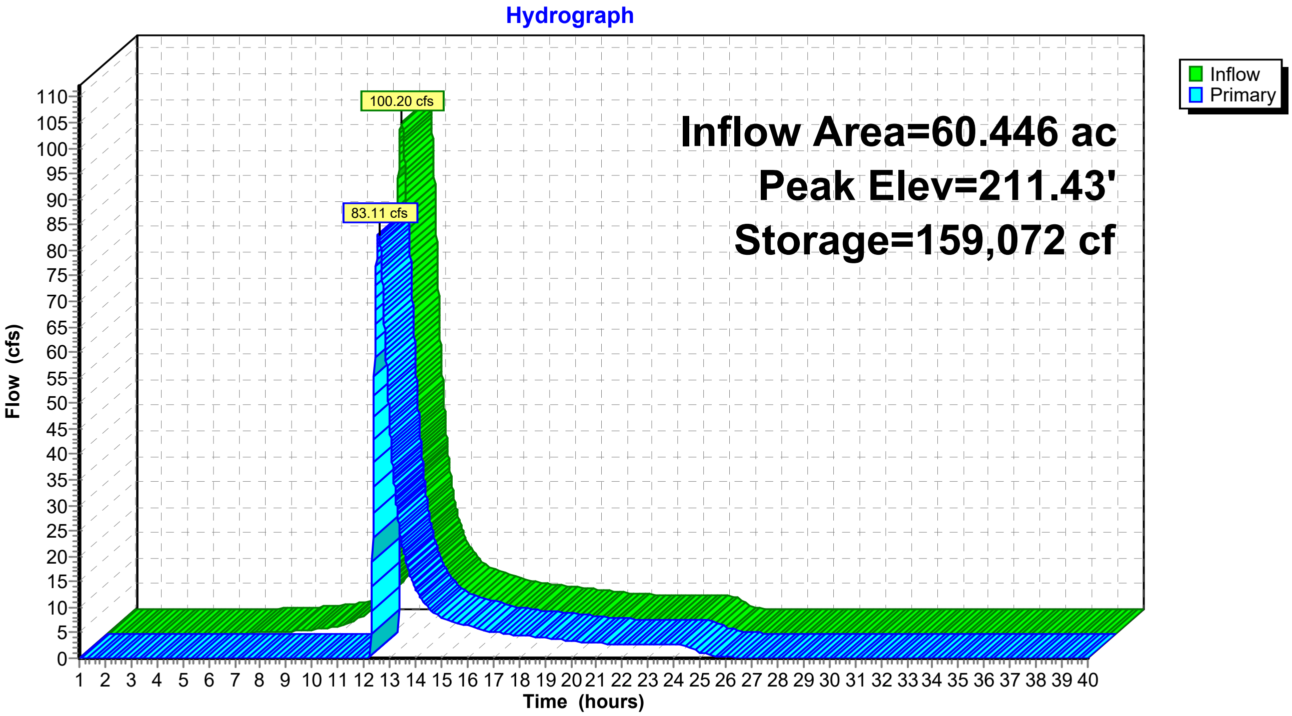
Plug-Flow detention time= 143.2 min calculated for 9.830 af (79% of inflow)
Center-of-Mass det. time= 57.7 min ( 909.0 - 851.3 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 200.00' | 203,971 cf | **84.00'W x 134.00'L x 14.00'H Prismatoid Z=1.0** |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 208.50' | **5.0' long x 0.5' breadth Broad-Crested Rectangular Weir**<br>Head (feet) 0.20 0.40 0.60 0.80 1.00<br>Coef. (English) 2.80 2.92 3.08 3.30 3.32 |
| #2 | Primary | 211.50' | **40.0' long x 0.5' breadth Broad-Crested Rectangular Weir**<br>Head (feet) 0.20 0.40 0.60 0.80 1.00<br>Coef. (English) 2.80 2.92 3.08 3.30 3.32 |

**Primary OutFlow** Max=83.10 cfs @ 12.58 hrs HW=211.43' TW=201.43' (Dynamic Tailwater)
├**1=Broad-Crested Rectangular Weir** (Weir Controls 83.10 cfs @ 5.68 fps)
└**2=Broad-Crested Rectangular Weir** ( Controls 0.00 cfs)

## Pond 1P: Existing Pond



## Summary for Pond 2P: Pocket Pond

Inflow Area = 36.879 ac, 12.00% Impervious, Inflow Depth = 2.13" for 10-Year Event event
Inflow = 16.91 cfs @ 14.49 hrs, Volume= 6.545 af
Outflow = 0.48 cfs @ 27.40 hrs, Volume= 0.973 af, Atten= 97%, Lag= 774.4 min
Primary = 0.48 cfs @ 27.40 hrs, Volume= 0.973 af
Routed to Reach 4R : Beaverkill Trib

Routing by Sim-Route method, Time Span= 1.00-40.00 hrs, dt= 0.01 hrs
Peak Elev= 394.50' @ 27.40 hrs Surf.Area= 180,607 sf Storage= 262,072 cf

Plug-Flow detention time= 857.2 min calculated for 0.973 af (15% of inflow)
Center-of-Mass det. time= 643.7 min ( 1,651.7 - 1,008.0 )

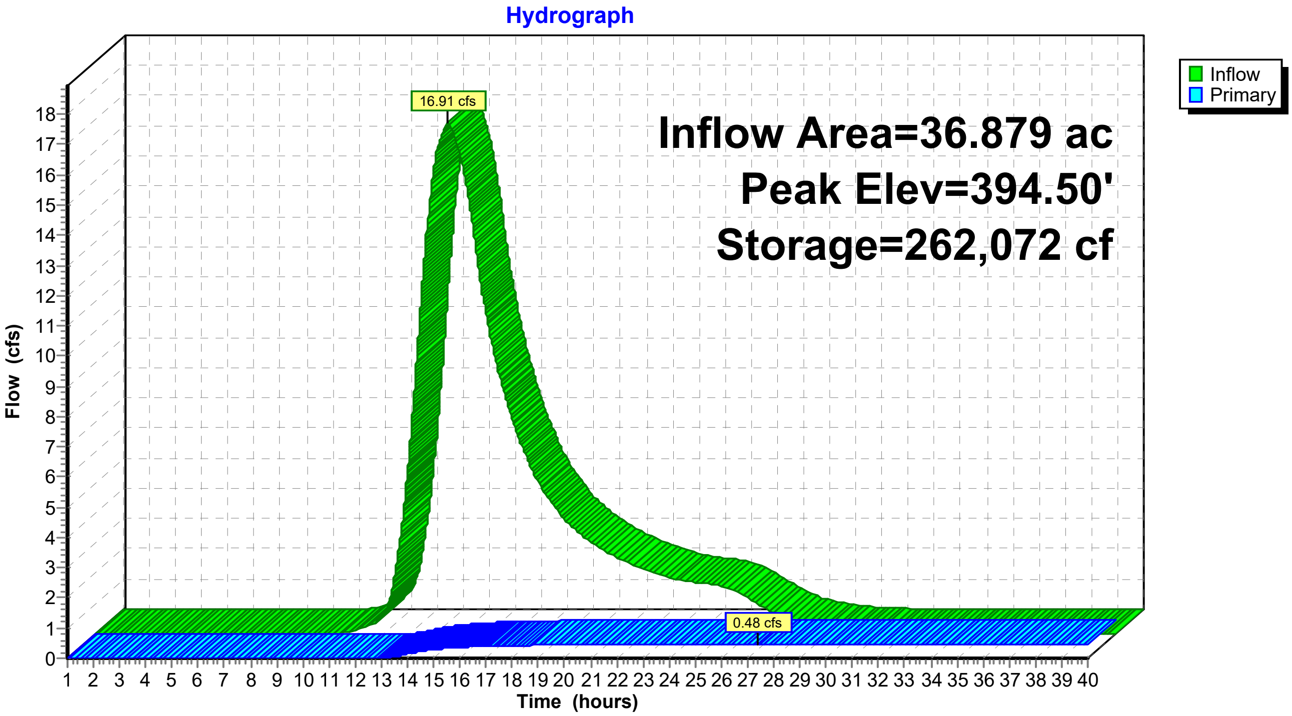
| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 393.00' | 1,369,452 cf | **Custom Stage Data (Prismatic)** Listed below (Recalc) |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 393.00 | 169,366 | 0 | 0 |
| 400.00 | 221,906 | 1,369,452 | 1,369,452 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 393.00' | **18.0" Round Culvert**<br>L= 75.0' CPP, square edge headwall, Ke= 0.500<br>Inlet / Outlet Invert= 393.00' / 389.00' S= 0.0533 '/' Cc= 0.900<br>n= 0.011 Concrete pipe, straight & clean, Flow Area= 1.77 sf |
| #2 | Device 1 | 393.00' | **4.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads |

**Primary OutFlow** Max=0.48 cfs @ 27.40 hrs HW=394.50' TW=386.59' (Dynamic Tailwater)
└─**1=Culvert** (Passes 0.48 cfs of 7.36 cfs potential flow)
  └─**2=Orifice/Grate** (Orifice Controls 0.48 cfs @ 5.55 fps)

## Pond 2P: Pocket Pond



## Summary for Pond 3P: Pocket Pond

Inflow Area = 40.328 ac, 38.00% Impervious, Inflow Depth = 2.64" for 10-Year Event event
Inflow = 76.65 cfs @ 12.34 hrs, Volume= 8.862 af
Outflow = 14.22 cfs @ 13.34 hrs, Volume= 6.678 af, Atten= 81%, Lag= 59.6 min
Primary = 14.22 cfs @ 13.34 hrs, Volume= 6.678 af
Routed to Reach 1R : Beaverkill

Routing by Sim-Route method, Time Span= 1.00-40.00 hrs, dt= 0.01 hrs
Peak Elev= 148.43' @ 13.34 hrs Surf.Area= 113,797 sf Storage= 205,652 cf

Plug-Flow detention time= 307.8 min calculated for 6.677 af (75% of inflow)
Center-of-Mass det. time= 215.6 min ( 1,062.3 - 846.7 )

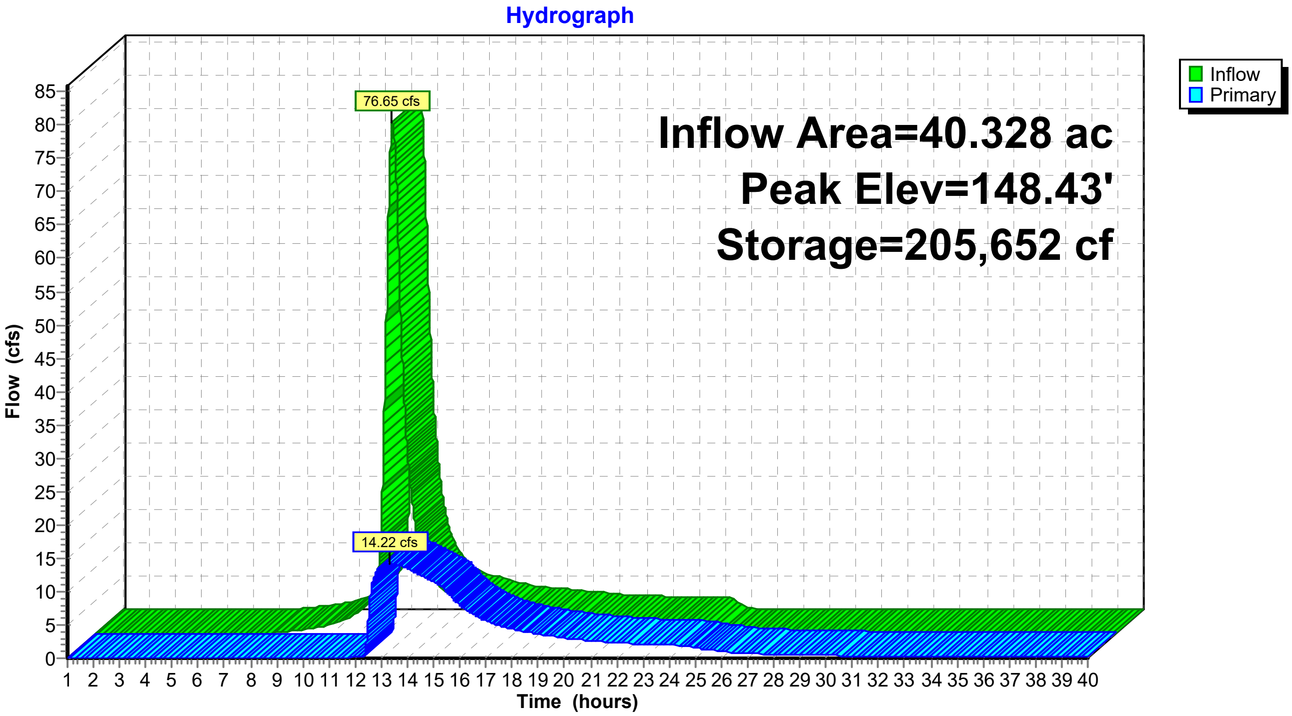
| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 146.50' | 659,406 cf | **Custom Stage Data (Prismatic)** Listed below (Recalc) |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 146.50 | 99,492 | 0 | 0 |
| 152.00 | 140,292 | 659,406 | 659,406 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 146.50' | **24.0" Round Culvert**<br>L= 50.0' CPP, square edge headwall, Ke= 0.500<br>Inlet / Outlet Invert= 146.50' / 146.00' S= 0.0100 '/' Cc= 0.900<br>n= 0.011 Concrete pipe, straight & clean, Flow Area= 3.14 sf |
| #2 | Device 1 | 146.50' | **4.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads |
| #3 | Device 1 | 147.55' | **24.0" x 24.0" Horiz. Orifice/Grate** C= 0.600<br>Limited to weir flow at low heads |

**Primary OutFlow** Max=14.22 cfs @ 13.34 hrs HW=148.43' TW=147.11' (Dynamic Tailwater)
└─**1=Culvert** (Barrel Controls 14.22 cfs @ 5.84 fps)
  ├─**2=Orifice/Grate** (Passes < 0.48 cfs potential flow)
  └─**3=Orifice/Grate** (Passes < 18.05 cfs potential flow)

## Pond 3P: Pocket Pond



## Summary for Pond 4P: Pocket Pond

Inflow Area = 9.481 ac, 65.00% Impervious, Inflow Depth = 3.30" for 10-Year Event event
Inflow = 46.39 cfs @ 12.01 hrs, Volume= 2.607 af
Outflow = 13.35 cfs @ 12.19 hrs, Volume= 2.455 af, Atten= 71%, Lag= 11.0 min
Primary = 13.35 cfs @ 12.19 hrs, Volume= 2.455 af
Routed to Reach 1R : Beaverkill

Routing by Sim-Route method, Time Span= 1.00-40.00 hrs, dt= 0.01 hrs
Peak Elev= 153.21' @ 12.19 hrs Surf.Area= 16,540 sf Storage= 52,076 cf

Plug-Flow detention time= 296.2 min calculated for 2.454 af (94% of inflow)
Center-of-Mass det. time= 263.2 min ( 1,058.7 - 795.5 )

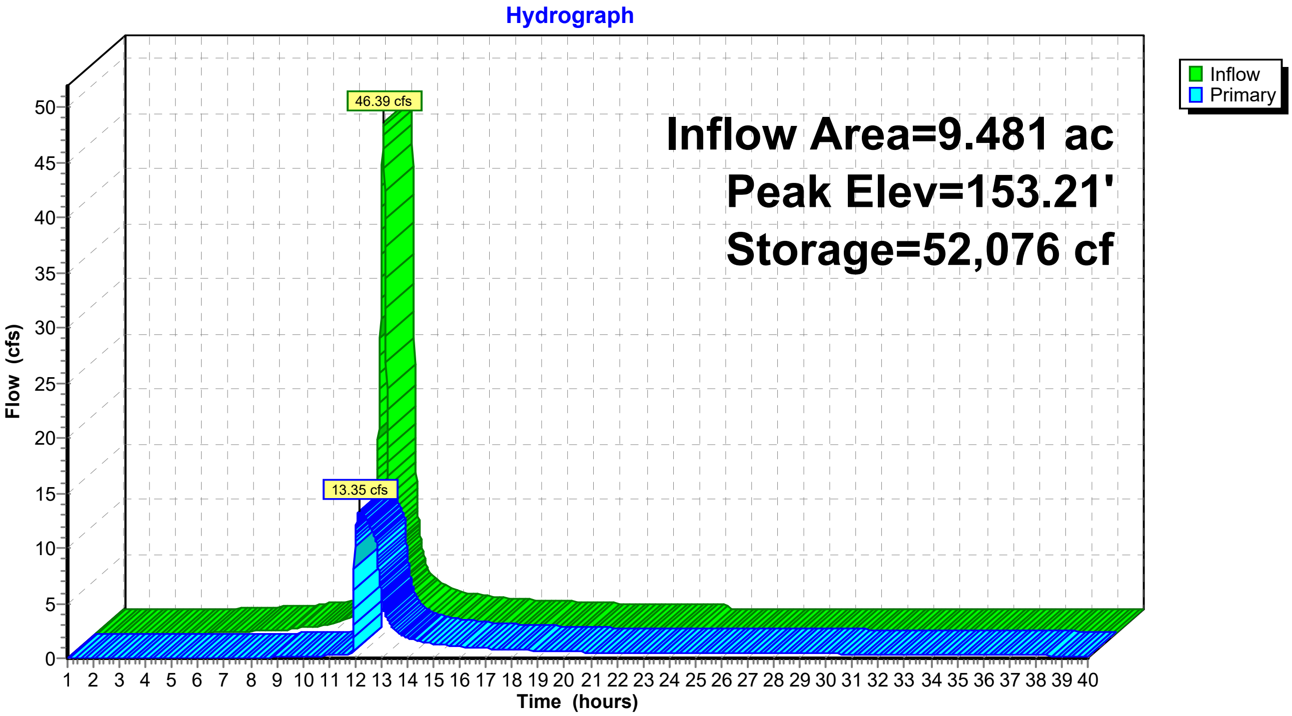
| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 150.00' | 169,025 cf | **Custom Stage Data (Prismatic)** Listed below (Recalc) |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 150.00 | 15,890 | 0 | 0 |
| 160.00 | 17,915 | 169,025 | 169,025 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 150.00' | **18.0" Round Culvert**<br>L= 50.0' CPP, square edge headwall, Ke= 0.500<br>Inlet / Outlet Invert= 150.00' / 149.50' S= 0.0100 '/' Cc= 0.900<br>n= 0.011 Concrete pipe, straight & clean, Flow Area= 1.77 sf |
| #2 | Device 1 | 150.00' | **4.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads |
| #3 | Device 1 | 151.75' | **24.0" x 24.0" Horiz. Orifice/Grate** C= 0.600<br>Limited to weir flow at low heads |

**Primary OutFlow** Max=13.35 cfs @ 12.19 hrs HW=153.21' TW=146.57' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 13.35 cfs @ 7.55 fps)
  ├─**2=Orifice/Grate** (Passes < 0.73 cfs potential flow)
  └─**3=Orifice/Grate** (Passes < 23.28 cfs potential flow)

## Pond 4P: Pocket Pond



## Summary for Pond 5P: Pocket Pond

Inflow Area = 39.934 ac, 38.00% Impervious, Inflow Depth = 2.64" for 10-Year Event event
Inflow = 111.10 cfs @ 12.15 hrs, Volume= 8.775 af
Outflow = 22.28 cfs @ 12.67 hrs, Volume= 7.127 af, Atten= 80%, Lag= 31.6 min
Primary = 22.28 cfs @ 12.67 hrs, Volume= 7.127 af
Routed to Reach 1R : Beaverkill

Routing by Sim-Route method, Time Span= 1.00-40.00 hrs, dt= 0.01 hrs
Peak Elev= 155.56' @ 12.67 hrs Surf.Area= 80,099 sf Storage= 186,908 cf

Plug-Flow detention time= 258.3 min calculated for 7.127 af (81% of inflow)
Center-of-Mass det. time= 178.8 min ( 1,009.3 - 830.5 )

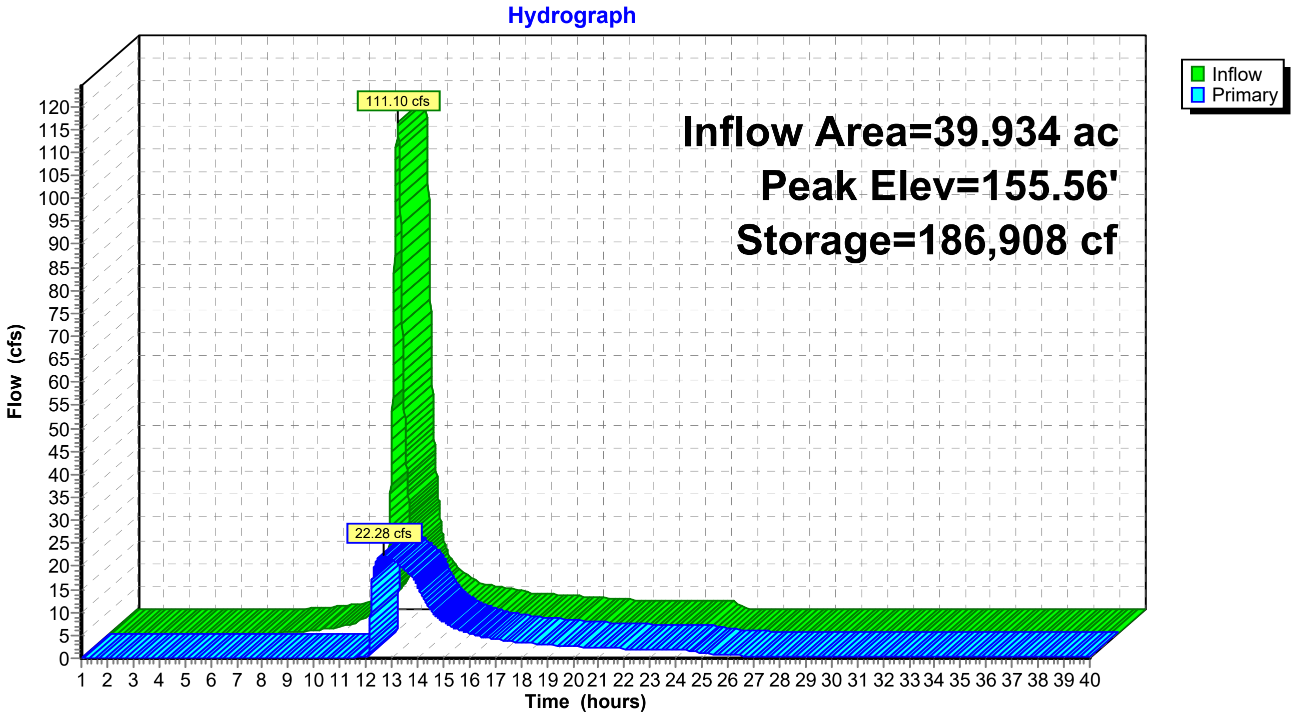
| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 153.00' | 597,195 cf | **Custom Stage Data (Prismatic)** Listed below (Recalc) |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 153.00 | 65,881 | 0 | 0 |
| 160.00 | 104,746 | 597,195 | 597,195 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 153.00' | **36.0" Round Culvert**<br>L= 50.0' CPP, square edge headwall, Ke= 0.500<br>Inlet / Outlet Invert= 153.00' / 152.00' S= 0.0200 '/' Cc= 0.900<br>n= 0.011 Concrete pipe, straight & clean, Flow Area= 7.07 sf |
| #2 | Device 1 | 153.00' | **4.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads |
| #3 | Device 1 | 154.30' | **24.0" x 24.0" Horiz. Orifice/Grate** C= 0.600<br>Limited to weir flow at low heads |

**Primary OutFlow** Max=22.28 cfs @ 12.67 hrs HW=155.56' TW=146.93' (Dynamic Tailwater)
└─**1=Culvert** (Passes 22.28 cfs of 35.01 cfs potential flow)
  ├─**2=Orifice/Grate** (Orifice Controls 0.65 cfs @ 7.45 fps)
  └─**3=Orifice/Grate** (Orifice Controls 21.63 cfs @ 5.41 fps)

## Pond 5P: Pocket Pond



## Summary for Pond 6P: Pocket Pond

Inflow Area = 42.396 ac, 30.00% Impervious, Inflow Depth = 2.46" for 10-Year Event event
Inflow = 60.27 cfs @ 12.53 hrs, Volume= 8.698 af
Outflow = 17.95 cfs @ 13.46 hrs, Volume= 6.567 af, Atten= 70%, Lag= 55.4 min
Primary = 17.95 cfs @ 13.46 hrs, Volume= 6.567 af
Routed to Reach 1R : Beaverkill

Routing by Sim-Route method, Time Span= 1.00-40.00 hrs, dt= 0.01 hrs
Peak Elev= 148.91' @ 13.46 hrs Surf.Area= 79,266 sf Storage= 183,122 cf

Plug-Flow detention time= 295.7 min calculated for 6.567 af (76% of inflow)
Center-of-Mass det. time= 202.3 min ( 1,068.0 - 865.7 )

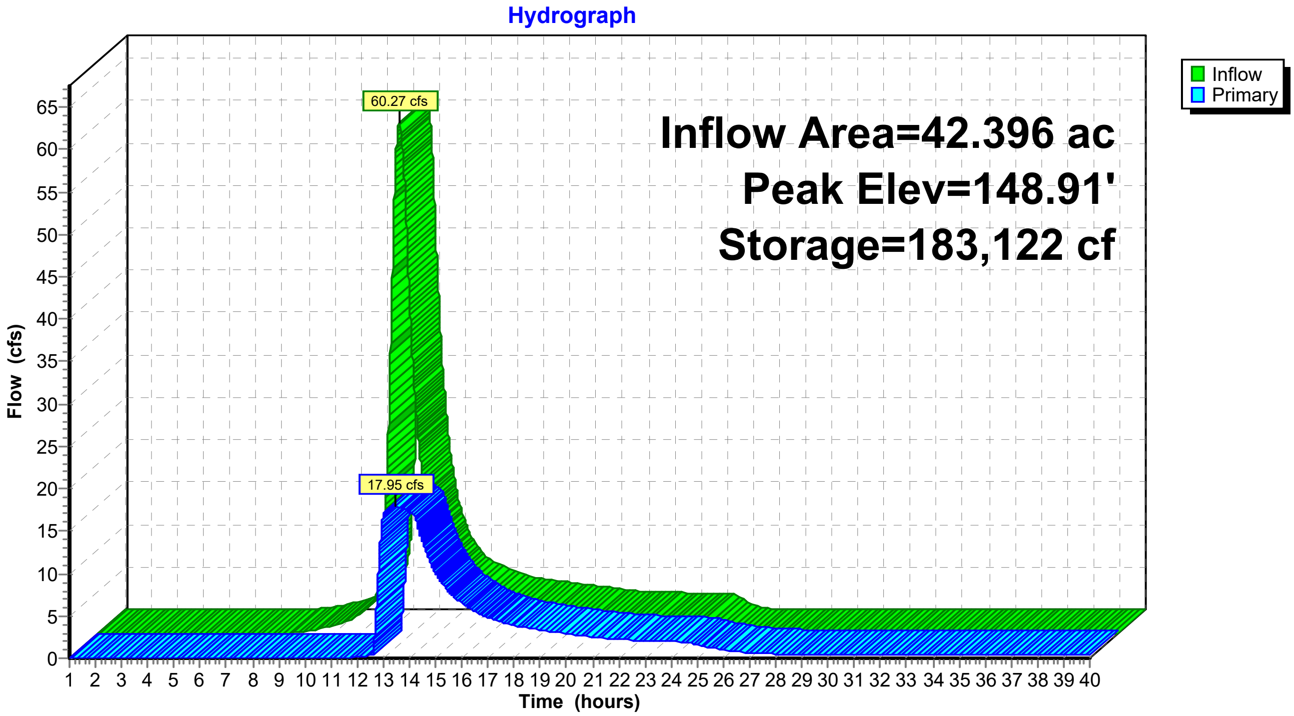
| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 146.50' | 621,484 cf | **Custom Stage Data (Prismatic)** Listed below (Recalc) |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 146.50 | 72,806 | 0 | 0 |
| 154.00 | 92,923 | 621,484 | 621,484 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 146.50' | **24.0" Round Culvert**<br>L= 50.0' CPP, square edge headwall, Ke= 0.500<br>Inlet / Outlet Invert= 146.50' / 146.00' S= 0.0100 '/' Cc= 0.900<br>n= 0.011 Concrete pipe, straight & clean, Flow Area= 3.14 sf |
| #2 | Device 1 | 146.50' | **4.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads |
| #3 | Device 1 | 148.00' | **24.0" x 24.0" Horiz. Orifice/Grate** C= 0.600<br>Limited to weir flow at low heads |

**Primary OutFlow** Max=17.95 cfs @ 13.46 hrs HW=148.91' TW=147.11' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 17.95 cfs @ 5.71 fps)
  ├─**2=Orifice/Grate** (Passes < 0.56 cfs potential flow)
  └─**3=Orifice/Grate** (Passes < 18.36 cfs potential flow)

## Pond 6P: Pocket Pond



## Summary for Pond 7P: Pocket Pond

Inflow Area = 16.853 ac, 30.00% Impervious, Inflow Depth = 2.46" for 10-Year Event event
Inflow = 43.22 cfs @ 12.15 hrs, Volume= 3.457 af
Outflow = 6.08 cfs @ 12.87 hrs, Volume= 2.758 af, Atten= 86%, Lag= 43.2 min
Primary = 6.08 cfs @ 12.87 hrs, Volume= 2.758 af
Routed to Reach 1R : Beaverkill

Routing by Sim-Route method, Time Span= 1.00-40.00 hrs, dt= 0.01 hrs
Peak Elev= 148.10' @ 12.87 hrs Surf.Area= 72,518 sf Storage= 78,340 cf

Plug-Flow detention time= 318.0 min calculated for 2.758 af (80% of inflow)
Center-of-Mass det. time= 234.5 min ( 1,071.2 - 836.7 )

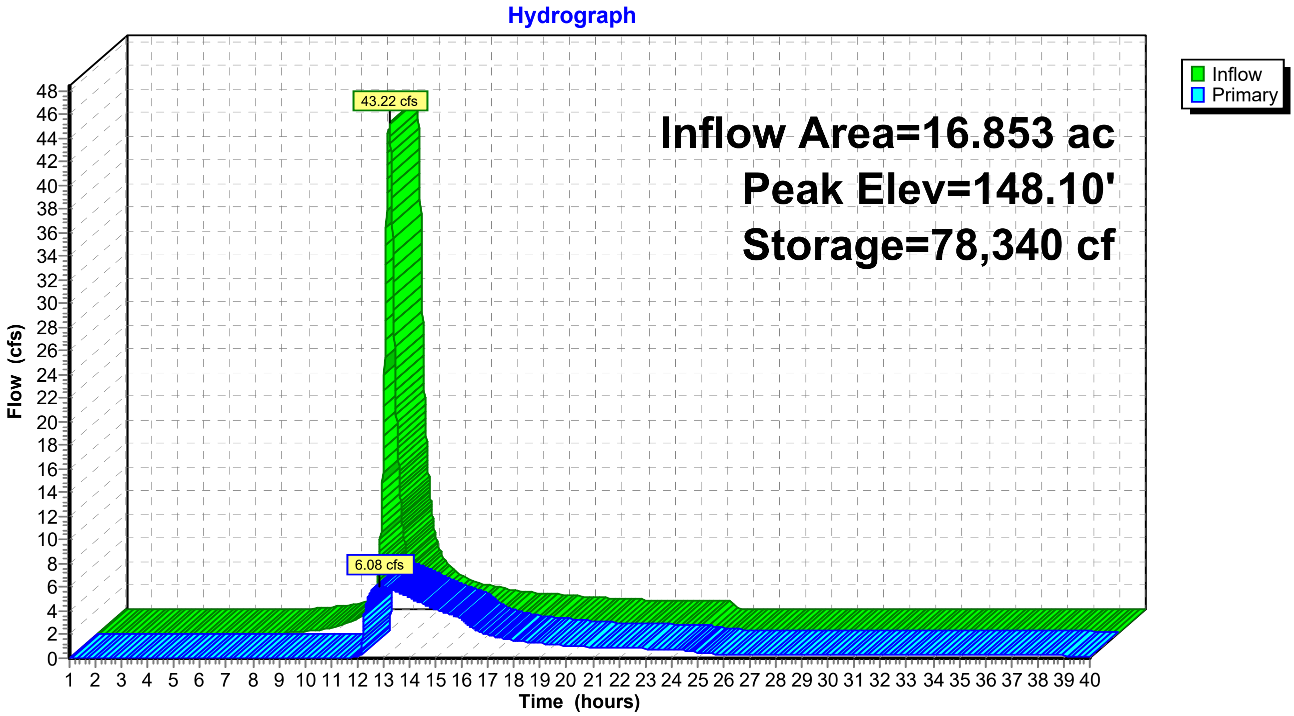
| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 147.00' | 734,018 cf | **Custom Stage Data (Prismatic)** Listed below (Recalc) |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 147.00 | 69,584 | 0 | 0 |
| 156.00 | 93,531 | 734,018 | 734,018 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 147.00' | **24.0" Round Culvert**<br>L= 50.0' CPP, square edge headwall, Ke= 0.500<br>Inlet / Outlet Invert= 147.00' / 146.50' S= 0.0100 '/' Cc= 0.900<br>n= 0.011 Concrete pipe, straight & clean, Flow Area= 3.14 sf |
| #2 | Device 1 | 147.00' | **4.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads |
| #3 | Device 1 | 147.60' | **36.0" x 36.0" Horiz. Orifice/Grate** C= 0.600<br>Limited to weir flow at low heads |

**Primary OutFlow** Max=6.08 cfs @ 12.87 hrs HW=148.10' TW=147.04' (Dynamic Tailwater)
└─**1=Culvert** (Barrel Controls 6.08 cfs @ 4.96 fps)
  ├─**2=Orifice/Grate** (Passes < 0.41 cfs potential flow)
  └─**3=Orifice/Grate** (Passes < 13.98 cfs potential flow)

## Pond 7P: Pocket Pond



## Summary for Pond 8P: Pocket Pond

Inflow Area = 24.219 ac, 30.00% Impervious, Inflow Depth = 2.46" for 10-Year Event event
Inflow = 61.94 cfs @ 12.15 hrs, Volume= 4.969 af
Outflow = 17.63 cfs @ 12.57 hrs, Volume= 3.975 af, Atten= 72%, Lag= 24.7 min
Primary = 17.63 cfs @ 12.57 hrs, Volume= 3.975 af
Routed to Reach 1R : Beaverkill

Routing by Sim-Route method, Time Span= 1.00-40.00 hrs, dt= 0.01 hrs
Peak Elev= 149.18' @ 12.57 hrs Surf.Area= 40,980 sf Storage= 100,227 cf

Plug-Flow detention time= 332.7 min calculated for 3.974 af (80% of inflow)
Center-of-Mass det. time= 249.8 min ( 1,086.5 - 836.8 )

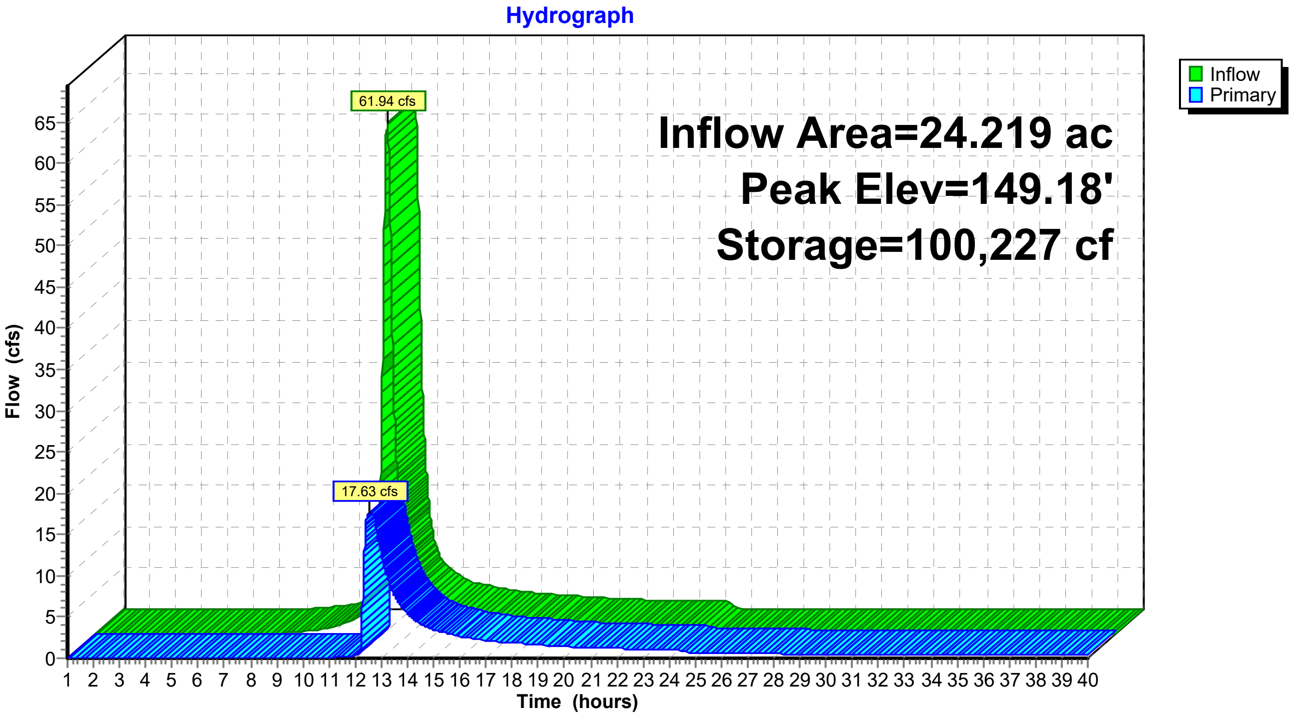
| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 146.50' | 383,826 cf | **Custom Stage Data (Prismatic)** Listed below (Recalc) |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 146.50 | 33,862 | 0 | 0 |
| 155.00 | 56,450 | 383,826 | 383,826 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 146.50' | **24.0" Round Culvert**<br>L= 50.0' CPP, square edge headwall, Ke= 0.500<br>Inlet / Outlet Invert= 146.50' / 146.00' S= 0.0100 '/' Cc= 0.900<br>n= 0.011 Concrete pipe, straight & clean, Flow Area= 3.14 sf |
| #2 | Device 1 | 146.50' | **4.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads |
| #3 | Device 1 | 148.40' | **24.0" x 24.0" Horiz. Orifice/Grate** C= 0.600<br>Limited to weir flow at low heads |

**Primary OutFlow** Max=17.63 cfs @ 12.57 hrs HW=149.18' TW=146.85' (Dynamic Tailwater)
└─**1=Culvert** (Passes 17.63 cfs of 19.60 cfs potential flow)
  ├─**2=Orifice/Grate** (Orifice Controls 0.64 cfs @ 7.35 fps)
  └─**3=Orifice/Grate** (Orifice Controls 16.99 cfs @ 4.25 fps)

## Pond 8P: Pocket Pond



## Summary for Pond 9P: Pocket Pond

Inflow Area = 14.213 ac, 65.00% Impervious, Inflow Depth = 3.10" for 10-Year Event event
Inflow = 58.48 cfs @ 12.05 hrs, Volume= 3.674 af
Outflow = 18.86 cfs @ 12.27 hrs, Volume= 3.652 af, Atten= 68%, Lag= 13.4 min
Primary = 18.86 cfs @ 12.27 hrs, Volume= 3.652 af
Routed to Reach 3R : Beaverkill Trib

Routing by Sim-Route method, Time Span= 1.00-40.00 hrs, dt= 0.01 hrs
Peak Elev= 222.55' @ 12.27 hrs Surf.Area= 27,029 sf Storage= 59,912 cf

Plug-Flow detention time= 84.8 min calculated for 3.651 af (99% of inflow)
Center-of-Mass det. time= 81.1 min ( 887.7 - 806.5 )

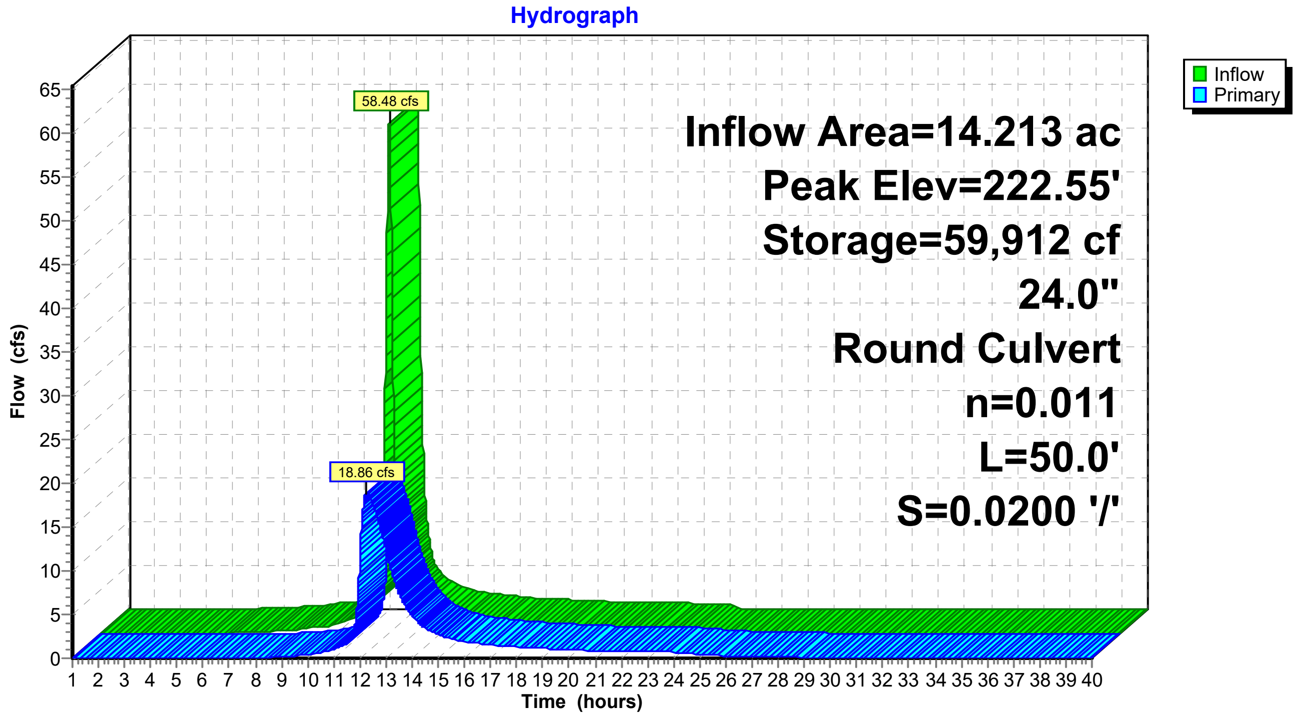
| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 220.00' | 338,770 cf | **Custom Stage Data (Prismatic)** Listed below (Recalc) |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 220.00 | 19,876 | 0 | 0 |
| 230.00 | 47,878 | 338,770 | 338,770 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 220.00' | **24.0" Round Culvert**<br>L= 50.0' CPP, square edge headwall, Ke= 0.500<br>Inlet / Outlet Invert= 220.00' / 219.00' S= 0.0200 '/' Cc= 0.900<br>n= 0.011 Concrete pipe, straight & clean, Flow Area= 3.14 sf |

**Primary OutFlow** Max=18.86 cfs @ 12.27 hrs HW=222.55' TW=201.06' (Dynamic Tailwater)
**1=Culvert** (Inlet Controls 18.86 cfs @ 6.00 fps)

## Pond 9P: Pocket Pond



## Summary for Pond 10P: Pocket Pond

Inflow Area = 17.433 ac, 30.00% Impervious, Inflow Depth = 2.46" for 10-Year Event event
Inflow = 33.52 cfs @ 12.29 hrs, Volume= 3.576 af
Outflow = 0.00 cfs @ 1.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min
Primary = 0.00 cfs @ 1.00 hrs, Volume= 0.000 af
Routed to Reach 3R : Beaverkill Trib

Routing by Sim-Route method, Time Span= 1.00-40.00 hrs, dt= 0.01 hrs
Peak Elev= 182.62' @ 25.98 hrs Surf.Area= 64,102 sf Storage= 155,786 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no outflow)

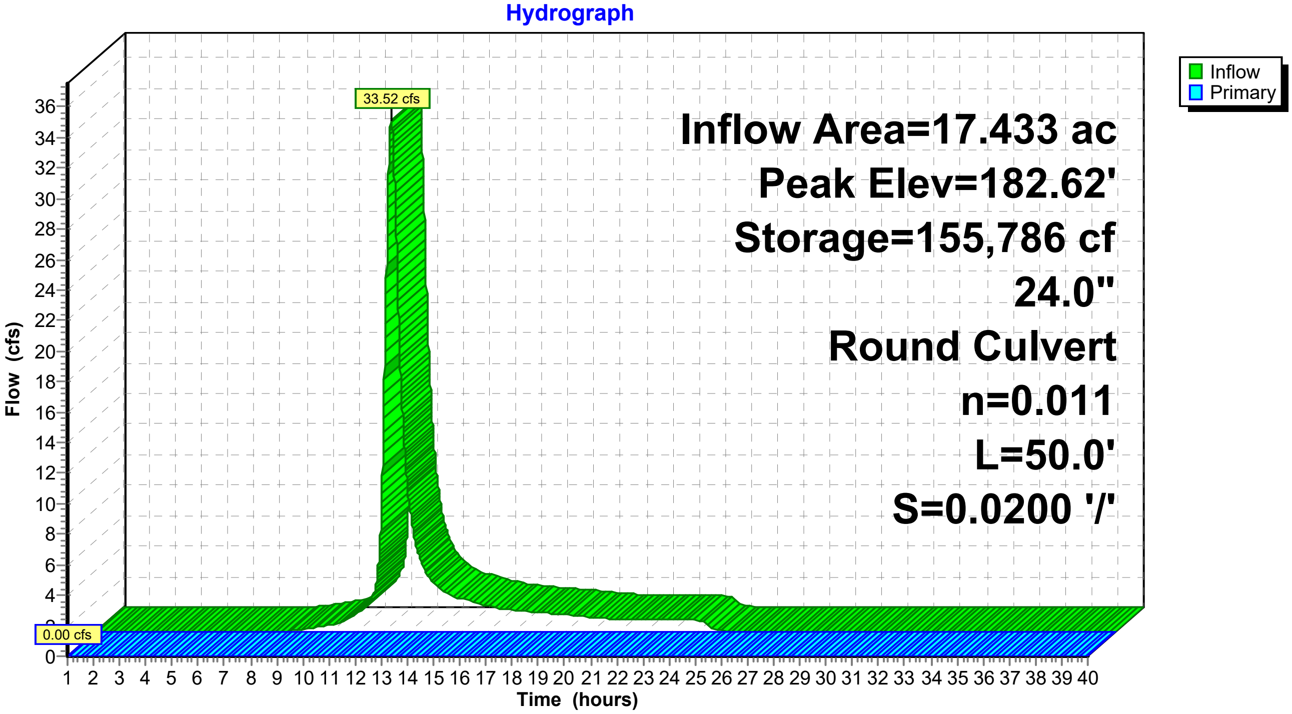
| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 180.00' | 724,100 cf | **Custom Stage Data (Prismatic)** Listed below (Recalc) |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 180.00 | 54,984 | 0 | 0 |
| 190.00 | 89,836 | 724,100 | 724,100 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 180.00' | **24.0" Round Culvert**<br>L= 50.0' CPP, square edge headwall, Ke= 0.500<br>Inlet / Outlet Invert= 180.00' / 179.00' S= 0.0200 '/' Cc= 0.900<br>n= 0.011 Concrete pipe, straight & clean, Flow Area= 3.14 sf |

**Primary OutFlow** Max=0.00 cfs @ 1.00 hrs HW=180.00' TW=200.00' (Dynamic Tailwater)
└─**1=Culvert** ( Controls 0.00 cfs)

## Pond 10P: Pocket Pond



## Summary for Pond 11P: Pocket Pond

Inflow Area = 26.813 ac, 30.00% Impervious, Inflow Depth = 2.46" for 10-Year Event event
Inflow = 78.33 cfs @ 12.10 hrs, Volume= 5.501 af
Outflow = 0.00 cfs @ 1.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min
Primary = 0.00 cfs @ 1.00 hrs, Volume= 0.000 af
Routed to Reach 3R : Beaverkill Trib

Routing by Sim-Route method, Time Span= 1.00-40.00 hrs, dt= 0.01 hrs
Peak Elev= 150.29' @ 25.01 hrs Surf.Area= 49,950 sf Storage= 239,608 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no outflow)

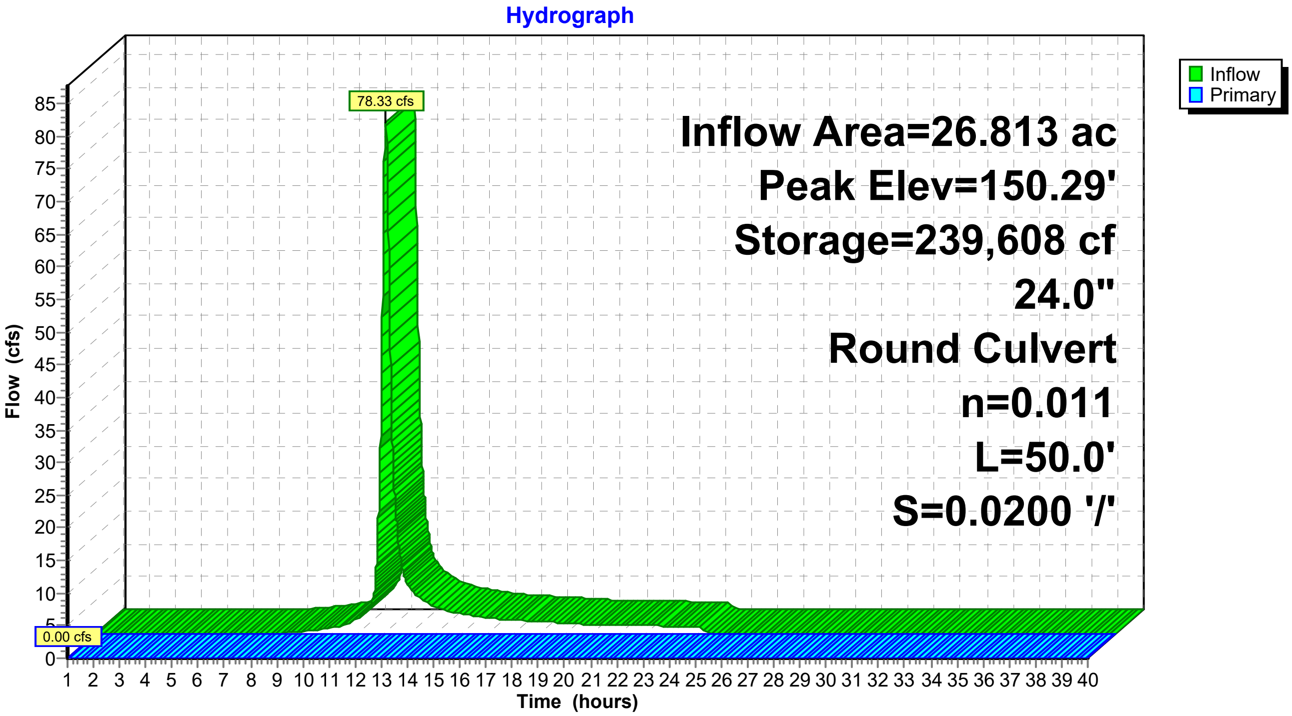
| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 145.00' | 807,405 cf | **Custom Stage Data (Prismatic)** Listed below (Recalc) |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 145.00 | 40,684 | 0 | 0 |
| 160.00 | 66,970 | 807,405 | 807,405 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 150.00' | **24.0" Round Culvert**<br>L= 50.0' CPP, square edge headwall, Ke= 0.500<br>Inlet / Outlet Invert= 150.00' / 149.00' S= 0.0200 '/' Cc= 0.900<br>n= 0.011 Concrete pipe, straight & clean, Flow Area= 3.14 sf |

**Primary OutFlow** Max=0.00 cfs @ 1.00 hrs HW=145.00' TW=200.00' (Dynamic Tailwater)
└─**1=Culvert** ( Controls 0.00 cfs)

## Pond 11P: Pocket Pond



## Summary for Pond 12P: Pocket Pond

Inflow Area = 29.499 ac, 30.00% Impervious, Inflow Depth = 2.46" for 10-Year Event event
Inflow = 90.69 cfs @ 12.08 hrs, Volume= 6.052 af
Outflow = 24.77 cfs @ 12.39 hrs, Volume= 6.025 af, Atten= 73%, Lag= 18.7 min
Primary = 24.77 cfs @ 12.39 hrs, Volume= 6.025 af
Routed to Reach 3R : Beaverkill Trib

Routing by Sim-Route method, Time Span= 1.00-40.00 hrs, dt= 0.01 hrs
Peak Elev= 218.68' @ 12.39 hrs Surf.Area= 32,140 sf Storage= 98,249 cf

Plug-Flow detention time= 78.5 min calculated for 6.024 af (100% of inflow)
Center-of-Mass det. time= 76.0 min ( 906.9 - 830.9 )

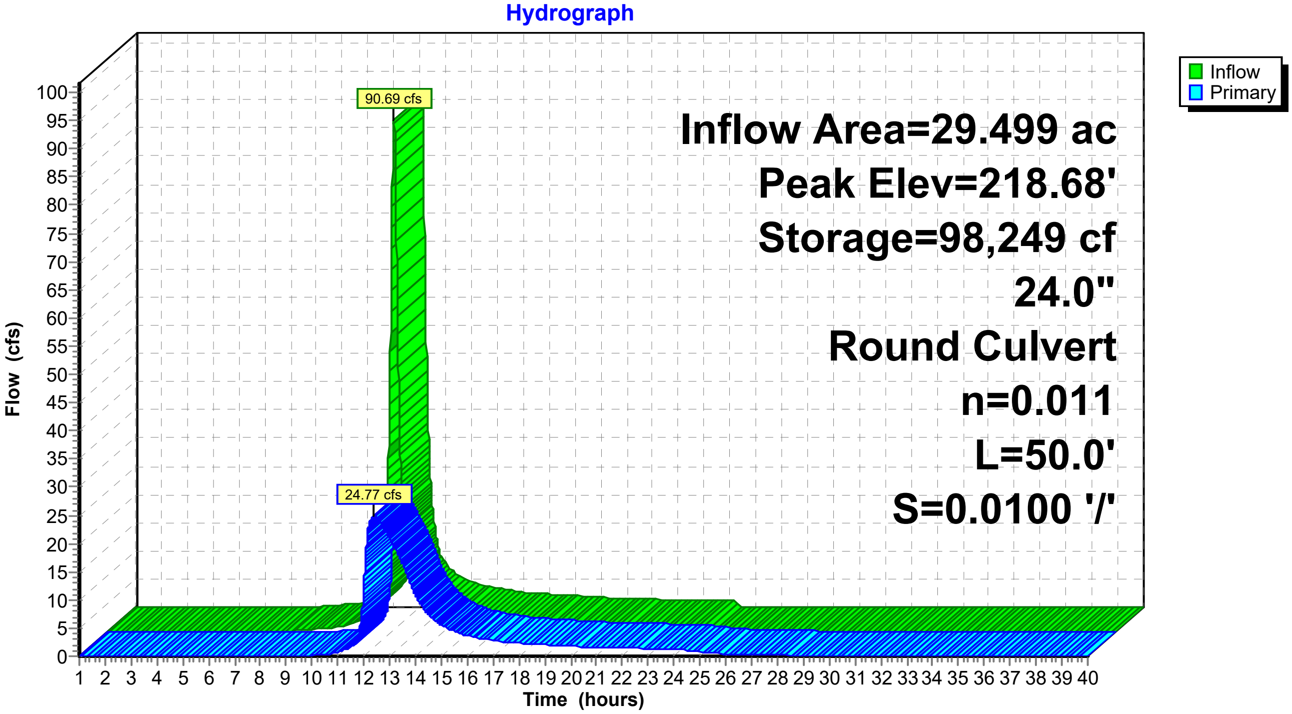
| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 215.00' | 360,450 cf | **Custom Stage Data (Prismatic)** Listed below (Recalc) |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 215.00 | 21,248 | 0 | 0 |
| 225.00 | 50,842 | 360,450 | 360,450 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 215.00' | **24.0" Round Culvert**<br>L= 50.0' CPP, square edge headwall, Ke= 0.500<br>Inlet / Outlet Invert= 215.00' / 214.50' S= 0.0100 '/' Cc= 0.900<br>n= 0.011 Concrete pipe, straight & clean, Flow Area= 3.14 sf |

**Primary OutFlow** Max=24.77 cfs @ 12.39 hrs HW=218.68' TW=201.27' (Dynamic Tailwater)
**1=Culvert** (Inlet Controls 24.77 cfs @ 7.88 fps)

## Pond 12P: Pocket Pond

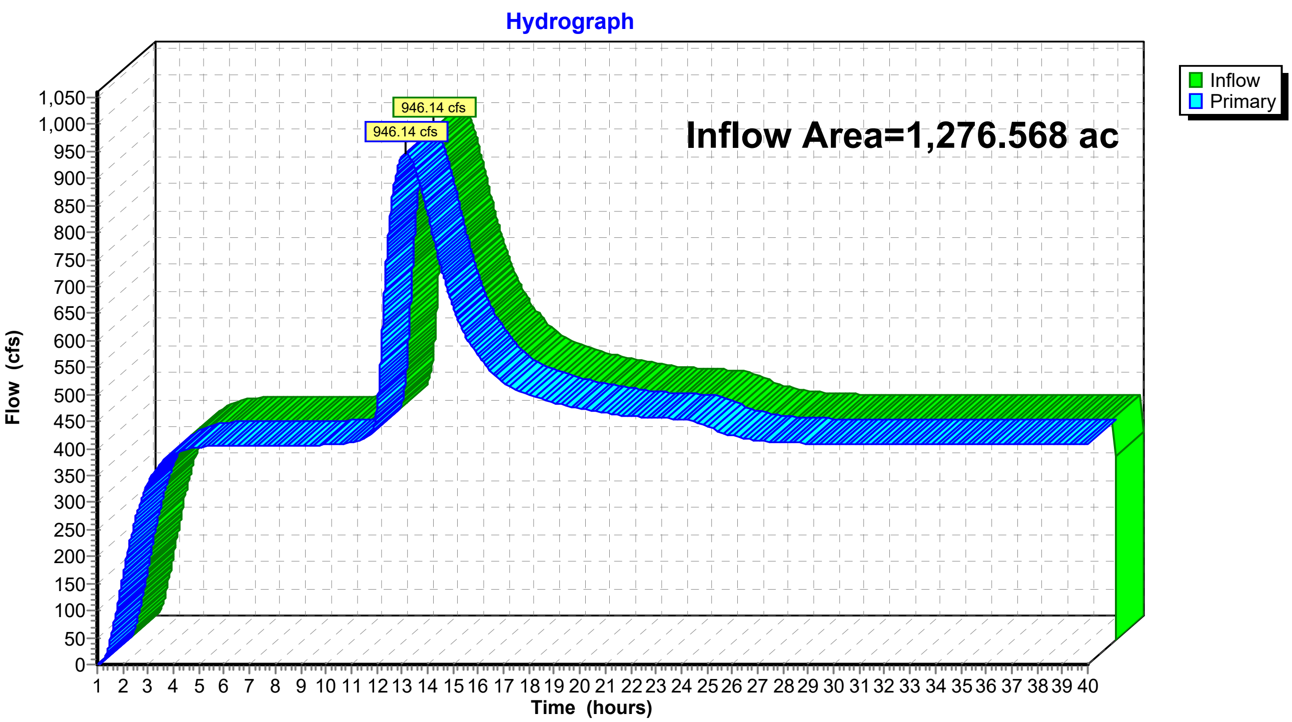


## Summary for Link AP-2: AP-2

Inflow Area = 1,276.568 ac, 10.66% Impervious, Inflow Depth > 13.57" for 10-Year Event event
Inflow = 946.14 cfs @ 13.14 hrs, Volume= 1,444.115 af
Primary = 946.14 cfs @ 13.15 hrs, Volume= 1,444.115 af, Atten= 0%, Lag= 0.6 min

Primary outflow = Inflow, Time Span= 1.00-40.00 hrs, dt= 0.01 hrs

### Link AP-2: AP-2



Time span=1.00-40.00 hrs, dt=0.01 hrs, 3901 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Sim-Route method - Pond routing by Sim-Route method

**Subcatchment2: DA 2** Runoff Area=202.288 ac 0.00% Impervious Runoff Depth=4.46"
Flow Length=3,062' Tc=43.1 min CN=70 Runoff=613.72 cfs 75.256 af

**Subcatchment2A: DA 2A** Runoff Area=36.879 ac 12.00% Impervious Runoff Depth=5.27"
Flow Length=4,070' Tc=194.7 min CN=77 Runoff=42.70 cfs 16.209 af

**Subcatchment2B: DA 2B** Runoff Area=55.045 ac 12.00% Impervious Runoff Depth=5.27"
Flow Length=3,070' Tc=79.3 min CN=77 Runoff=126.39 cfs 24.194 af

**Subcatchment2C: DA 2C** Runoff Area=31.804 ac 12.00% Impervious Runoff Depth=5.27"
Flow Length=3,344' Tc=74.8 min CN=77 Runoff=76.27 cfs 13.979 af

**Subcatchment2D: DA 2D** Runoff Area=39.716 ac 12.00% Impervious Runoff Depth=5.27"
Flow Length=2,728' Tc=45.7 min CN=77 Runoff=136.82 cfs 17.456 af

**Subcatchment2E: DA 2E** Runoff Area=45.892 ac 12.00% Impervious Runoff Depth=5.27"
Flow Length=2,892' Tc=48.7 min CN=77 Runoff=150.39 cfs 20.171 af

**Subcatchment2F: DA 2F** Runoff Area=42.396 ac 30.00% Impervious Runoff Depth=5.74"
Flow Length=1,411' Tc=53.7 min CN=81 Runoff=140.27 cfs 20.287 af

**Subcatchment2G: DA 2G** Runoff Area=16.853 ac 30.00% Impervious Runoff Depth=5.74"
Flow Length=552' Slope=0.0100 '/' Tc=22.4 min CN=81 Runoff=99.30 cfs 8.065 af

**Subcatchment2H: DA 2H** Runoff Area=24.219 ac 30.00% Impervious Runoff Depth=5.74"
Flow Length=559' Slope=0.0100 '/' Tc=22.5 min CN=81 Runoff=142.34 cfs 11.589 af

**Subcatchment3: DA 3** Runoff Area=436.528 ac 0.00% Impervious Runoff Depth=4.46"
Flow Length=2,575' Tc=81.9 min CN=70 Runoff=823.51 cfs 162.399 af

**Subcatchment3A: DA 3A** Runoff Area=52.953 ac 0.00% Impervious Runoff Depth=4.46"
Flow Length=1,950' Tc=50.8 min CN=70 Runoff=142.46 cfs 19.700 af

**Subcatchment3B: DA 3B** Runoff Area=14.213 ac 65.00% Impervious Runoff Depth=6.57"
Flow Length=288' Tc=13.6 min CN=88 Runoff=119.06 cfs 7.779 af

**Subcatchment3C: DA 3C** Runoff Area=20.730 ac 65.00% Impervious Runoff Depth=6.57"
Flow Length=741' Tc=36.3 min CN=88 Runoff=100.91 cfs 11.347 af

**Subcatchment3D: DA 3D** Runoff Area=29.499 ac 30.00% Impervious Runoff Depth=5.74"
Flow Length=370' Tc=16.2 min CN=81 Runoff=207.02 cfs 14.116 af

**Subcatchment3E: DA 3E** Runoff Area=17.433 ac 30.00% Impervious Runoff Depth=5.74"
Flow Length=302' Tc=35.1 min CN=81 Runoff=77.76 cfs 8.342 af

**Subcatchment3F: DA 3F** Runoff Area=26.813 ac 30.00% Impervious Runoff Depth=5.74"
Flow Length=488' Tc=17.8 min CN=81 Runoff=179.22 cfs 12.831 af

**Subcatchment3G: DA 3G** Runoff Area=39.934 ac 38.00% Impervious Runoff Depth=5.98"
Flow Length=684' Tc=22.0 min CN=83 Runoff=246.33 cfs 19.892 af

**Subcatchment4: DA 4** Runoff Area=58.713 ac 0.47% Impervious Runoff Depth=4.46"
Flow Length=1,537' Tc=62.2 min CN=70 Runoff=136.42 cfs 21.843 af

**Subcatchment4A: DA 4A** Runoff Area=40.328 ac 38.00% Impervious Runoff Depth=5.98"
Flow Length=1,258' Tc=39.5 min CN=83 Runoff=171.90 cfs 20.088 af

**Subcatchment4B: DA 4B** Runoff Area=9.481 ac 65.00% Impervious Runoff Depth=6.81"
Flow Length=196' Tc=9.8 min CN=90 Runoff=91.53 cfs 5.377 af

**Subcatchment5: DA 5** Runoff Area=34.851 ac 12.00% Impervious Runoff Depth=5.27"
Flow Length=2,150' Tc=22.6 min CN=77 Runoff=189.37 cfs 15.318 af

**Reach 1R: Beaverkill** Avg. Flow Depth=2.85' Max Vel=3.25 fps Inflow=1,812.80 cfs 1,688.594 af
n=0.030 L=4,728.0' S=0.0021 '/' Capacity=2,310.71 cfs Outflow=1,718.69 cfs 1,669.023 af

**Reach 2R: Beaverkill** Avg. Flow Depth=2.42' Max Vel=2.87 fps Inflow=1,181.17 cfs 1,254.246 af
n=0.030 L=6,756.0' S=0.0021 '/' Capacity=1,684.63 cfs Outflow=1,019.40 cfs 1,230.506 af

**Reach 3R: Beaverkill Trib** Avg. Flow Depth=2.15' Max Vel=17.93 fps Inflow=794.56 cfs 359.366 af
n=0.025 L=1,000.0' S=0.0535 '/' Capacity=1,071.30 cfs Outflow=794.48 cfs 359.233 af

**Reach 4R: Beaverkill Trib** Avg. Flow Depth=1.49' Max Vel=14.65 fps Inflow=392.53 cfs 291.557 af
n=0.030 L=2,239.0' S=0.0768 '/' Capacity=688.52 cfs Outflow=392.24 cfs 291.185 af

**Pond 1P: Existing Pond** Peak Elev=212.36' Storage=174,900 cf Inflow=231.00 cfs 28.803 af
Outflow=230.73 cfs 26.226 af

**Pond 2P: Pocket Pond** Peak Elev=396.64' Storage=666,215 cf Inflow=42.70 cfs 16.209 af
Outflow=0.78 cfs 1.619 af

**Pond 3P: Pocket Pond** Peak Elev=150.76' Storage=490,820 cf Inflow=171.90 cfs 20.088 af
Outflow=26.46 cfs 17.867 af

**Pond 4P: Pocket Pond** Peak Elev=156.28' Storage=103,718 cf Inflow=91.53 cfs 5.377 af
Outflow=20.00 cfs 5.213 af

**Pond 5P: Pocket Pond** Peak Elev=158.51' Storage=447,344 cf Inflow=246.33 cfs 19.892 af
Outflow=40.49 cfs 18.218 af

**Pond 6P: Pocket Pond** Peak Elev=152.13' Storage=452,457 cf Inflow=140.27 cfs 20.287 af
Outflow=31.74 cfs 18.126 af

**Pond 7P: Pocket Pond** Peak Elev=149.48' Storage=180,467 cf Inflow=99.30 cfs 8.065 af
Outflow=18.38 cfs 7.350 af

**Pond 8P: Pocket Pond** Peak Elev=152.22' Storage=237,209 cf Inflow=142.34 cfs 11.589 af
Outflow=32.83 cfs 10.576 af

**Pond 9P: Pocket Pond** Peak Elev=224.81' Storage=127,836 cf Inflow=119.06 cfs 7.779 af
24.0" Round Culvert n=0.011 L=50.0' S=0.0200 '/' Outflow=29.51 cfs 7.756 af

**Pond 10P: Pocket Pond** Peak Elev=185.61' Storage=363,380 cf Inflow=77.76 cfs 8.342 af
24.0" Round Culvert n=0.011 L=50.0' S=0.0200 '/' Outflow=0.00 cfs 0.000 af

**Pond 11P: Pocket Pond** Peak Elev=156.09' Storage=558,902 cf Inflow=179.22 cfs 12.831 af
24.0" Round Culvert n=0.011 L=50.0' S=0.0200 '/' Outflow=0.00 cfs 0.000 af

**Pond 12P: Pocket Pond** Peak Elev=222.70' Storage=251,550 cf Inflow=207.02 cfs 14.116 af
24.0" Round Culvert n=0.011 L=50.0' S=0.0100 '/' Outflow=39.17 cfs 14.088 af

**Link AP-2: AP-2** Inflow=1,910.11 cfs 1,743.941 af
Primary=1,910.11 cfs 1,743.941 af

**Total Runoff Area = 1,276.568 ac Runoff Volume = 526.237 af Average Runoff Depth = 4.95"**
**89.34% Pervious = 1,140.451 ac 10.66% Impervious = 136.117 ac**

## Summary for Subcatchment 2: DA 2

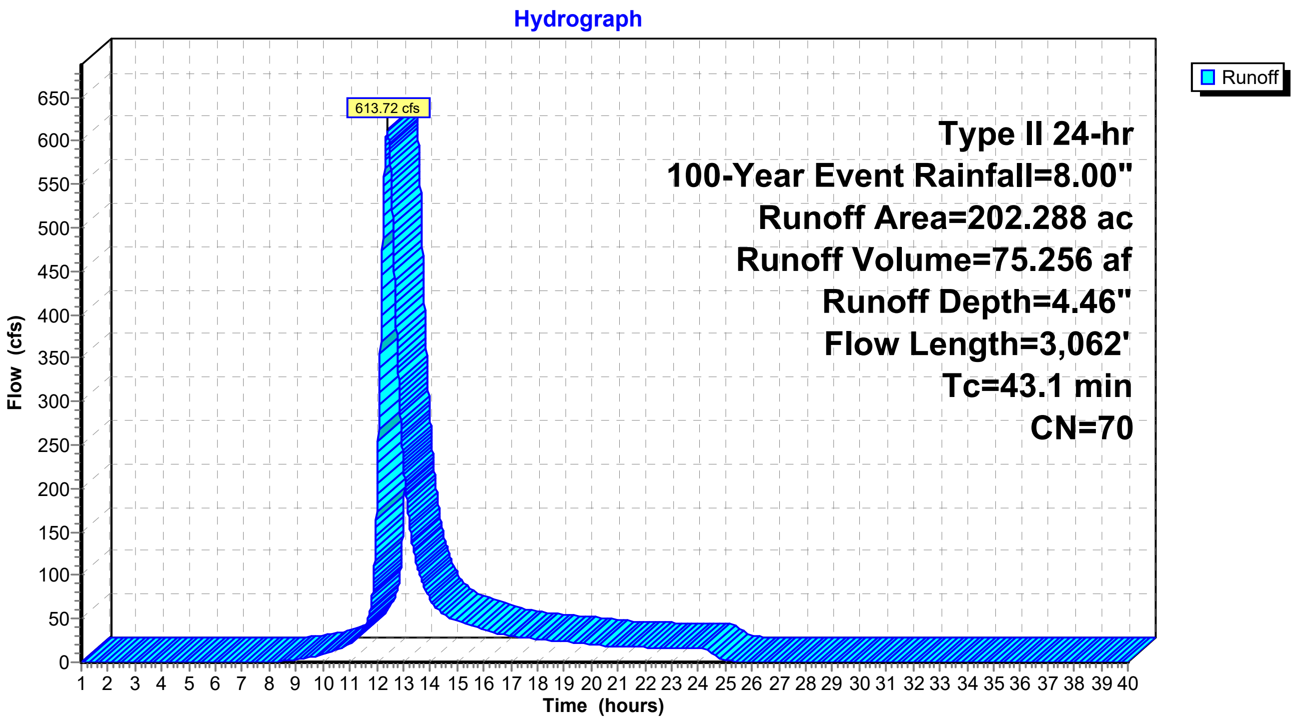
Runoff = 613.72 cfs @ 12.40 hrs, Volume= 75.256 af, Depth= 4.46"
Routed to Link AP-2 : AP-2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-40.00 hrs, dt= 0.01 hrs
Type II 24-hr 100-Year Event Rainfall=8.00"

| Area (ac) | CN | Description |
|---|---|---|
| 202.288 | 70 | Woods, Good, HSG C |
| 202.288 | | 100.00% Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 34.5 | 100 | 0.0200 | 0.05 | | **Sheet Flow, Woods**<br>Woods: Dense underbrush n= 0.800 P2= 3.75" |
| 8.6 | 2,962 | 0.1280 | 5.76 | | **Shallow Concentrated Flow, Woods**<br>Unpaved Kv= 16.1 fps |
| 43.1 | 3,062 | Total | | | |

### Subcatchment 2: DA 2



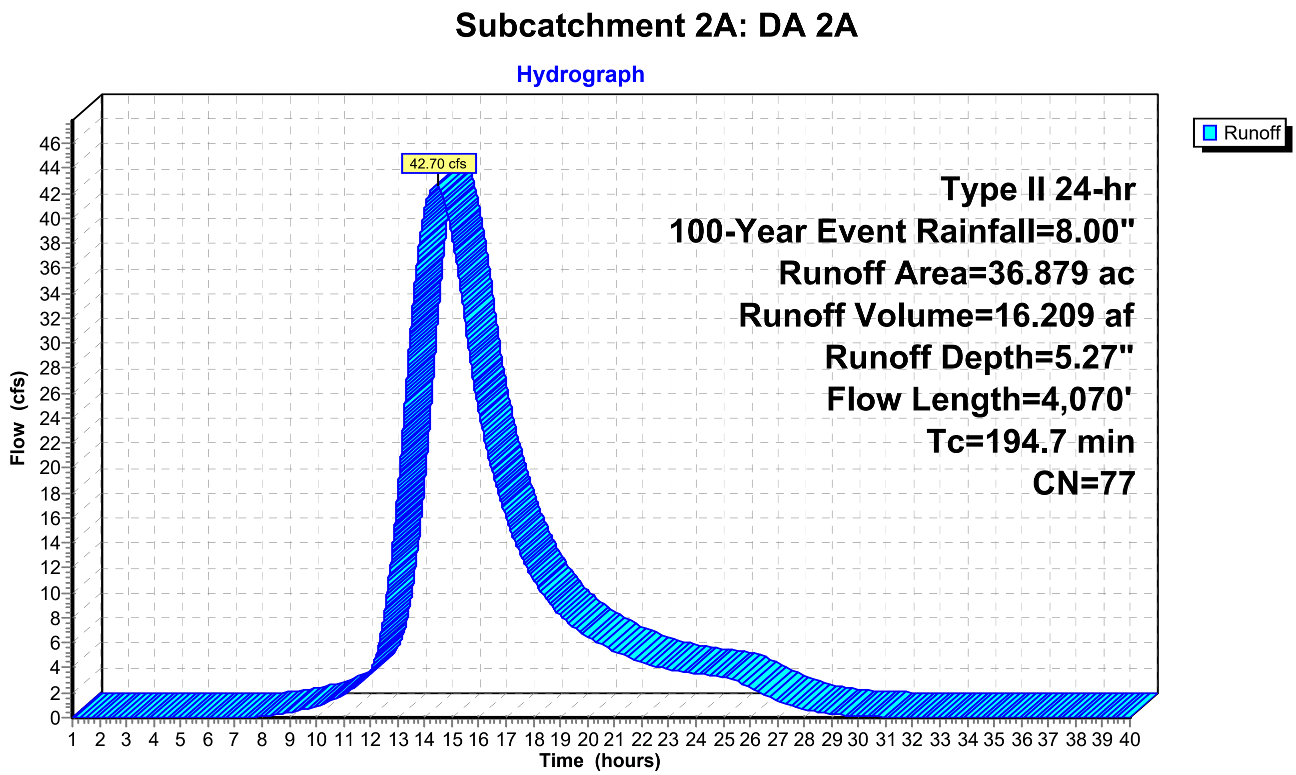
## Summary for Subcatchment 2A: DA 2A

Runoff = 42.70 cfs @ 14.49 hrs, Volume= 16.209 af, Depth= 5.27"
Routed to Pond 2P : Pocket Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-40.00 hrs, dt= 0.01 hrs
Type II 24-hr 100-Year Event Rainfall=8.00"

| Area (ac) | CN | Description |
|---|---|---|
| 36.879 | 77 | 2 acre lots, 12% imp, HSG C |
| 32.454 | | 88.00% Pervious Area |
| 4.425 | | 12.00% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 23.9 | 100 | 0.0500 | 0.07 | | **Sheet Flow, Woods** Woods: Dense underbrush n= 0.800 P2= 3.75" |
| 170.8 | 3,970 | 0.0240 | 0.39 | | **Shallow Concentrated Flow, Woods** Forest w/Heavy Litter Kv= 2.5 fps |
| 194.7 | 4,070 | Total | | | |



## Summary for Subcatchment 2B: DA 2B

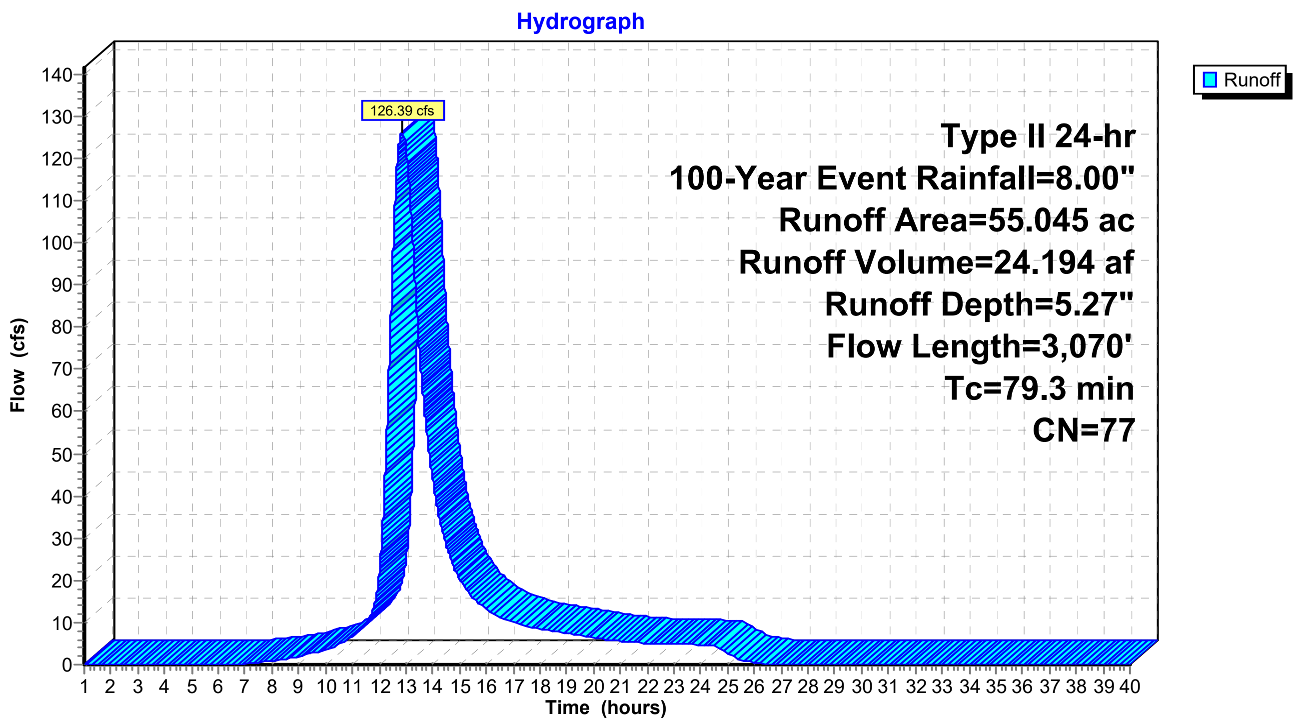
Runoff = 126.39 cfs @ 12.86 hrs, Volume= 24.194 af, Depth= 5.27"
Routed to Reach 4R : Beaverkill Trib

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-40.00 hrs, dt= 0.01 hrs
Type II 24-hr 100-Year Event Rainfall=8.00"

| Area (ac) | CN | Description |
|---|---|---|
| 55.045 | 77 | 2 acre lots, 12% imp, HSG C |
| 48.440 | | 88.00% Pervious Area |
| 6.605 | | 12.00% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 15.4 | 100 | 0.1500 | 0.11 | | **Sheet Flow, Woods** Woods: Dense underbrush n= 0.800 P2= 3.75" |
| 63.9 | 2,970 | 0.0240 | 0.77 | | **Shallow Concentrated Flow, Woods** Woodland Kv= 5.0 fps |
| 79.3 | 3,070 | Total | | | |

## Subcatchment 2B: DA 2B



## Summary for Subcatchment 2C: DA 2C

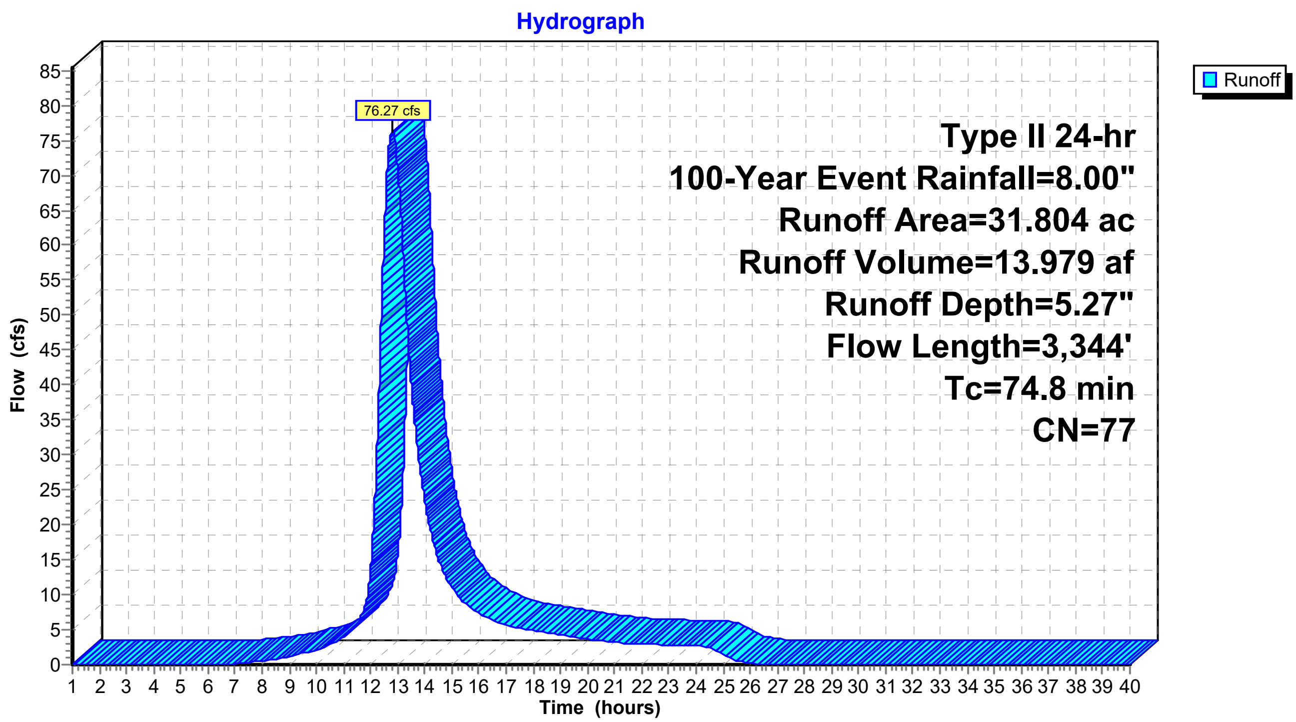
Runoff = 76.27 cfs @ 12.80 hrs, Volume= 13.979 af, Depth= 5.27"
Routed to Reach 4R : Beaverkill Trib

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-40.00 hrs, dt= 0.01 hrs
Type II 24-hr 100-Year Event Rainfall=8.00"

| Area (ac) | CN | Description |
|---|---|---|
| 31.804 | 77 | 2 acre lots, 12% imp, HSG C |
| 27.988 | | 88.00% Pervious Area |
| 3.816 | | 12.00% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 32.1 | 100 | 0.0240 | 0.05 | | **Sheet Flow, Woods** Woods: Dense underbrush n= 0.800 P2= 3.75" |
| 42.7 | 3,244 | 0.0640 | 1.26 | | **Shallow Concentrated Flow, Woods** Woodland Kv= 5.0 fps |
| 74.8 | 3,344 | Total | | | |

## Subcatchment 2C: DA 2C



## Summary for Subcatchment 2D: DA 2D

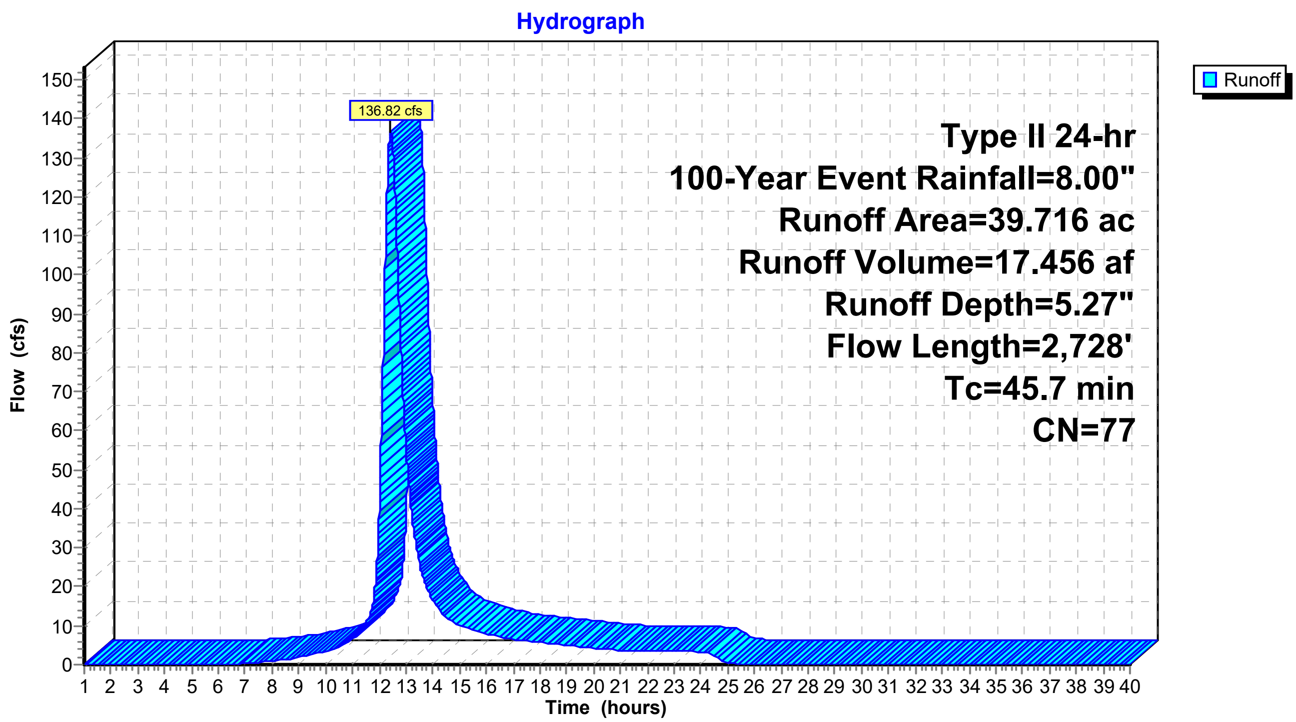
Runoff = 136.82 cfs @ 12.44 hrs, Volume= 17.456 af, Depth= 5.27"
Routed to Pond 1P : Existing Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-40.00 hrs, dt= 0.01 hrs
Type II 24-hr 100-Year Event Rainfall=8.00"

| Area (ac) | CN | Description |
|---|---|---|
| 39.716 | 77 | 2 acre lots, 12% imp, HSG C |
| 34.950 | | 88.00% Pervious Area |
| 4.766 | | 12.00% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 32.1 | 100 | 0.0240 | 0.05 | | **Sheet Flow, Woods** Woods: Dense underbrush n= 0.800 P2= 3.75" |
| 13.6 | 2,628 | 0.0460 | 3.22 | | **Shallow Concentrated Flow, Lawn** Grassed Waterway Kv= 15.0 fps |
| 45.7 | 2,728 | Total | | | |

## Subcatchment 2D: DA 2D



## Summary for Subcatchment 2E: DA 2E

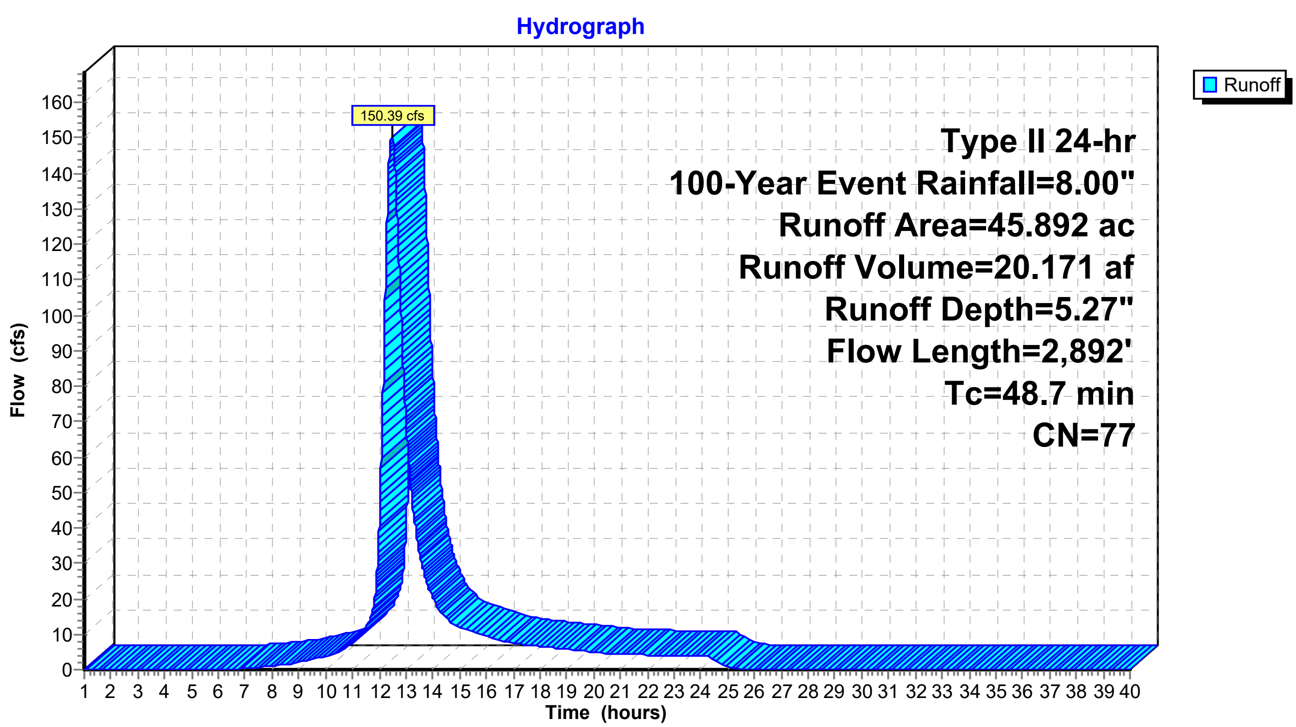
Runoff = 150.39 cfs @ 12.49 hrs, Volume= 20.171 af, Depth= 5.27"
Routed to Reach 3R : Beaverkill Trib

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-40.00 hrs, dt= 0.01 hrs
Type II 24-hr 100-Year Event Rainfall=8.00"

| Area (ac) | CN | Description |
|---|---|---|
| 45.892 | 77 | 2 acre lots, 12% imp, HSG C |
| 40.385 | | 88.00% Pervious Area |
| 5.507 | | 12.00% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 32.1 | 100 | 0.0240 | 0.05 | | **Sheet Flow, Woods** Woods: Dense underbrush n= 0.800 P2= 3.75" |
| 16.6 | 2,792 | 0.0350 | 2.81 | | **Shallow Concentrated Flow, Lawn** Grassed Waterway Kv= 15.0 fps |
| 48.7 | 2,892 | | | | Total |

## Subcatchment 2E: DA 2E



## Summary for Subcatchment 2F: DA 2F

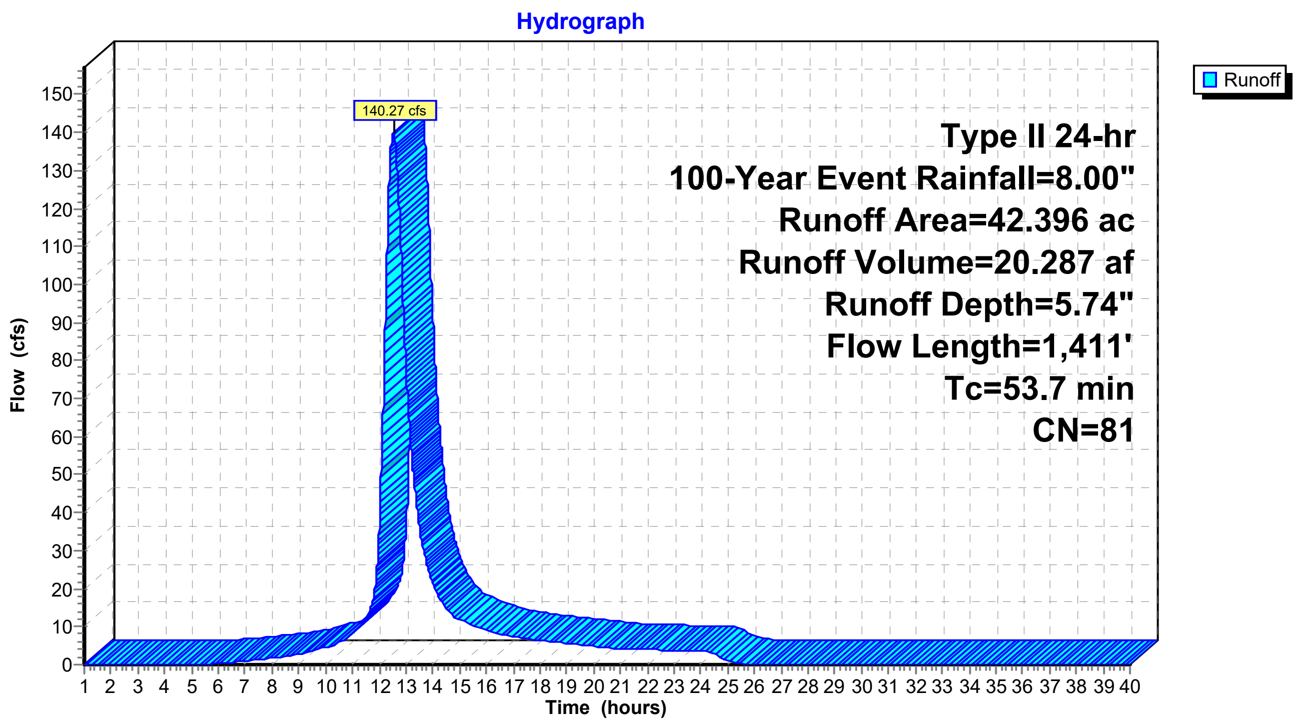
Runoff = 140.27 cfs @ 12.53 hrs, Volume= 20.287 af, Depth= 5.74"
Routed to Pond 6P : Pocket Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-40.00 hrs, dt= 0.01 hrs
Type II 24-hr 100-Year Event Rainfall=8.00"

| Area (ac) | CN | Description |
|---|---|---|
| 42.396 | 81 | 1/3 acre lots, 30% imp, HSG C |
| 29.677 | | 70.00% Pervious Area |
| 12.719 | | 30.00% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 34.5 | 100 | 0.0200 | 0.05 | | **Sheet Flow, Woods**<br>Woods: Dense underbrush n= 0.800 P2= 3.75" |
| 19.2 | 1,311 | 0.0520 | 1.14 | | **Shallow Concentrated Flow, Woods**<br>Woodland Kv= 5.0 fps |
| 53.7 | 1,411 | Total | | | |

## Subcatchment 2F: DA 2F



## Summary for Subcatchment 2G: DA 2G

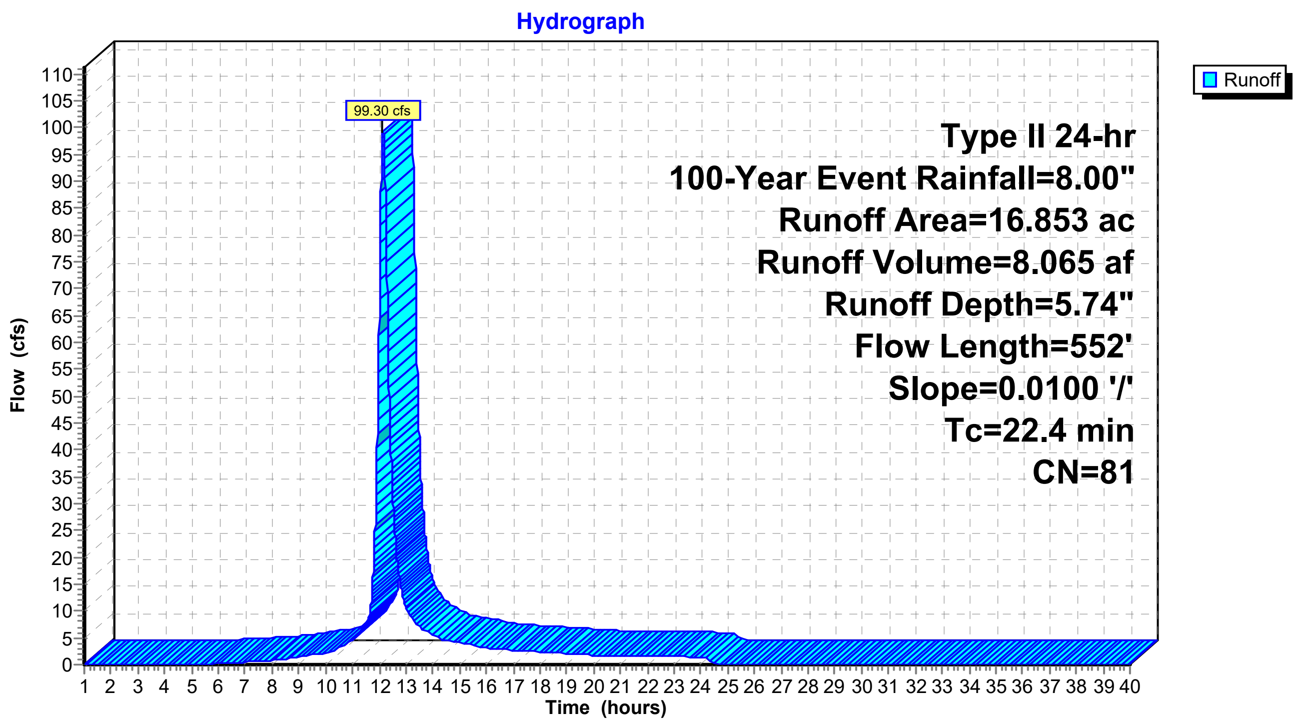
Runoff = 99.30 cfs @ 12.15 hrs, Volume= 8.065 af, Depth= 5.74"
Routed to Pond 7P : Pocket Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-40.00 hrs, dt= 0.01 hrs
Type II 24-hr 100-Year Event Rainfall=8.00"

| Area (ac) | CN | Description |
|---|---|---|
| 16.853 | 81 | 1/3 acre lots, 30% imp, HSG C |
| 11.797 | | 70.00% Pervious Area |
| 5.056 | | 30.00% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 17.4 | 100 | 0.0100 | 0.10 | | **Sheet Flow, Lawn** Grass: Dense n= 0.240 P2= 3.75" |
| 5.0 | 452 | 0.0100 | 1.50 | | **Shallow Concentrated Flow, Lawn** Grassed Waterway Kv= 15.0 fps |
| 22.4 | 552 | Total | | | |

## Subcatchment 2G: DA 2G



## Summary for Subcatchment 2H: DA 2H

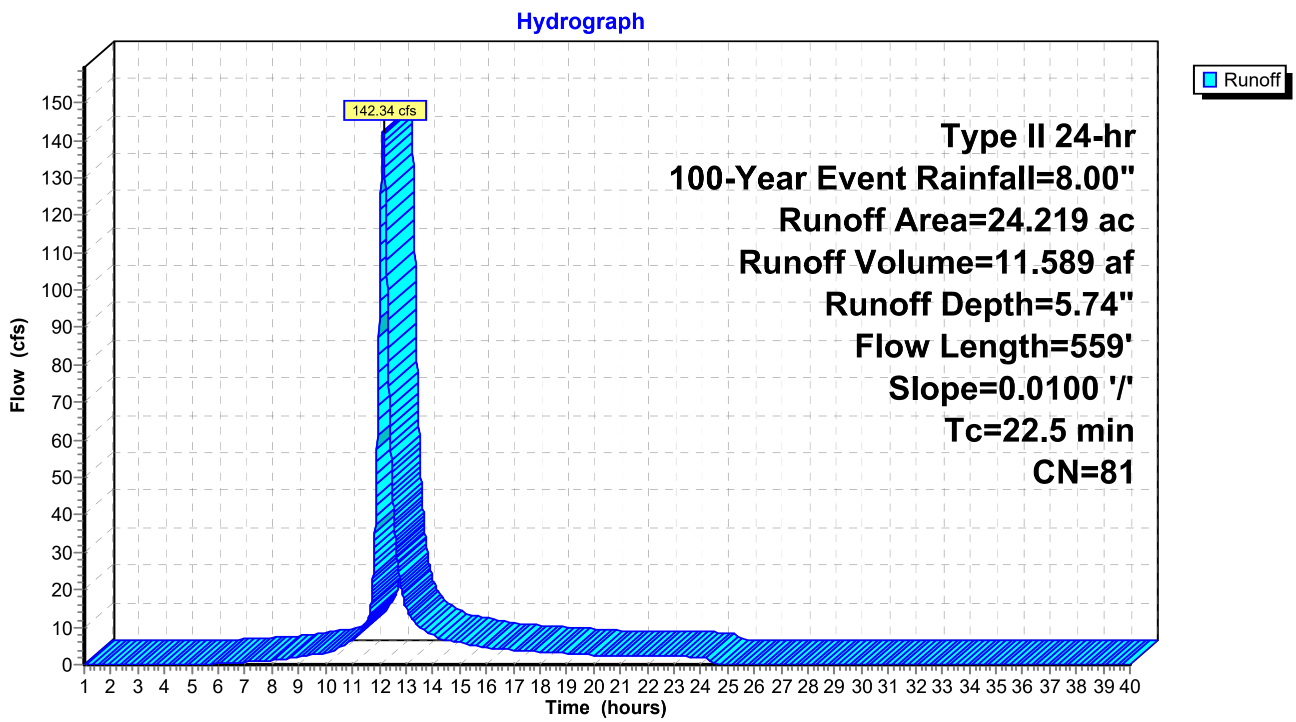
Runoff = 142.34 cfs @ 12.15 hrs, Volume= 11.589 af, Depth= 5.74"
Routed to Pond 8P : Pocket Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-40.00 hrs, dt= 0.01 hrs
Type II 24-hr 100-Year Event Rainfall=8.00"

| Area (ac) | CN | Description |
|---|---|---|
| 24.219 | 81 | 1/3 acre lots, 30% imp, HSG C |
| 16.953 | | 70.00% Pervious Area |
| 7.266 | | 30.00% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 17.4 | 100 | 0.0100 | 0.10 | | **Sheet Flow, Lawn** Grass: Dense n= 0.240 P2= 3.75" |
| 5.1 | 459 | 0.0100 | 1.50 | | **Shallow Concentrated Flow, Lawn** Grassed Waterway Kv= 15.0 fps |
| 22.5 | 559 | Total | | | |

## Subcatchment 2H: DA 2H



## Summary for Subcatchment 3: DA 3

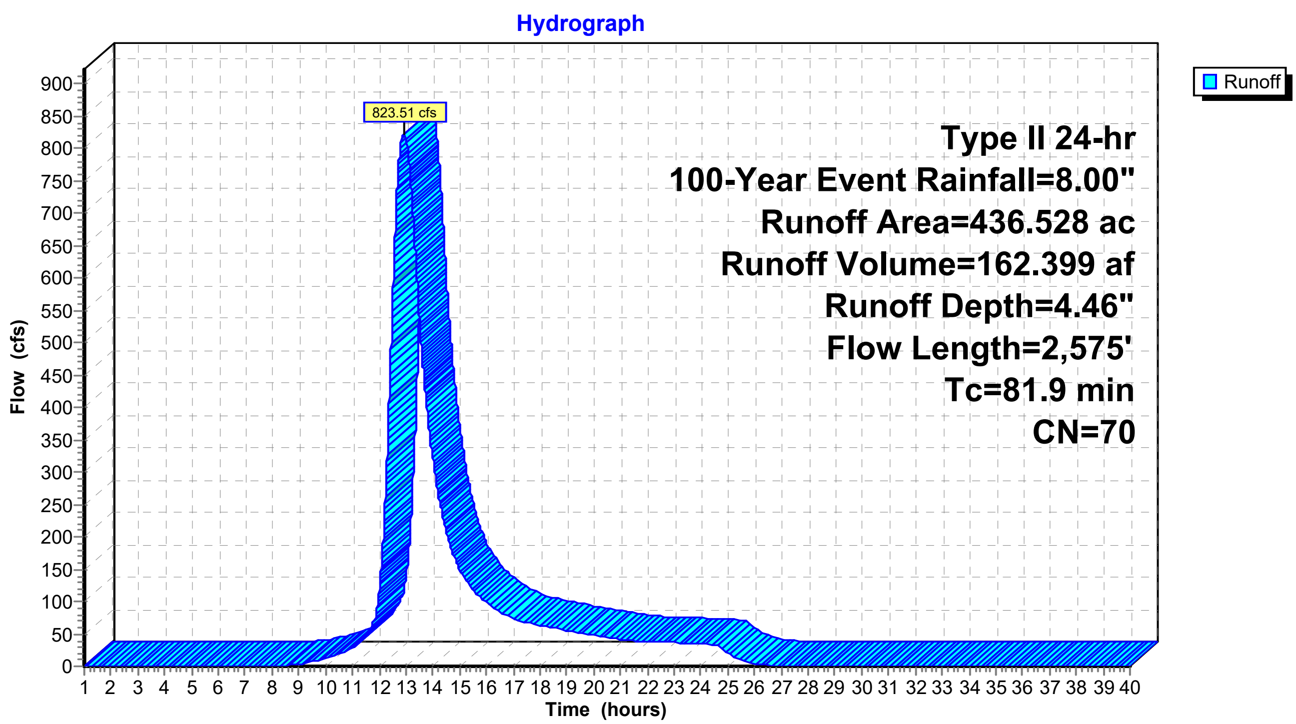
Runoff = 823.51 cfs @ 12.92 hrs, Volume= 162.399 af, Depth= 4.46"
Routed to Reach 2R : Beaverkill

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-40.00 hrs, dt= 0.01 hrs
Type II 24-hr 100-Year Event Rainfall=8.00"

| Area (ac) | CN | Description |
|---|---|---|
| 436.528 | 70 | Woods, Good, HSG C |
| 436.528 | | 100.00% Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 34.5 | 100 | 0.0200 | 0.05 | | **Sheet Flow, Woods**<br>Woods: Dense underbrush n= 0.800 P2= 3.75" |
| 47.4 | 2,475 | 0.1210 | 0.87 | | **Shallow Concentrated Flow, Woods**<br>Forest w/Heavy Litter Kv= 2.5 fps |
| 81.9 | 2,575 | Total | | | |

## Subcatchment 3: DA 3



## Summary for Subcatchment 3A: DA 3A

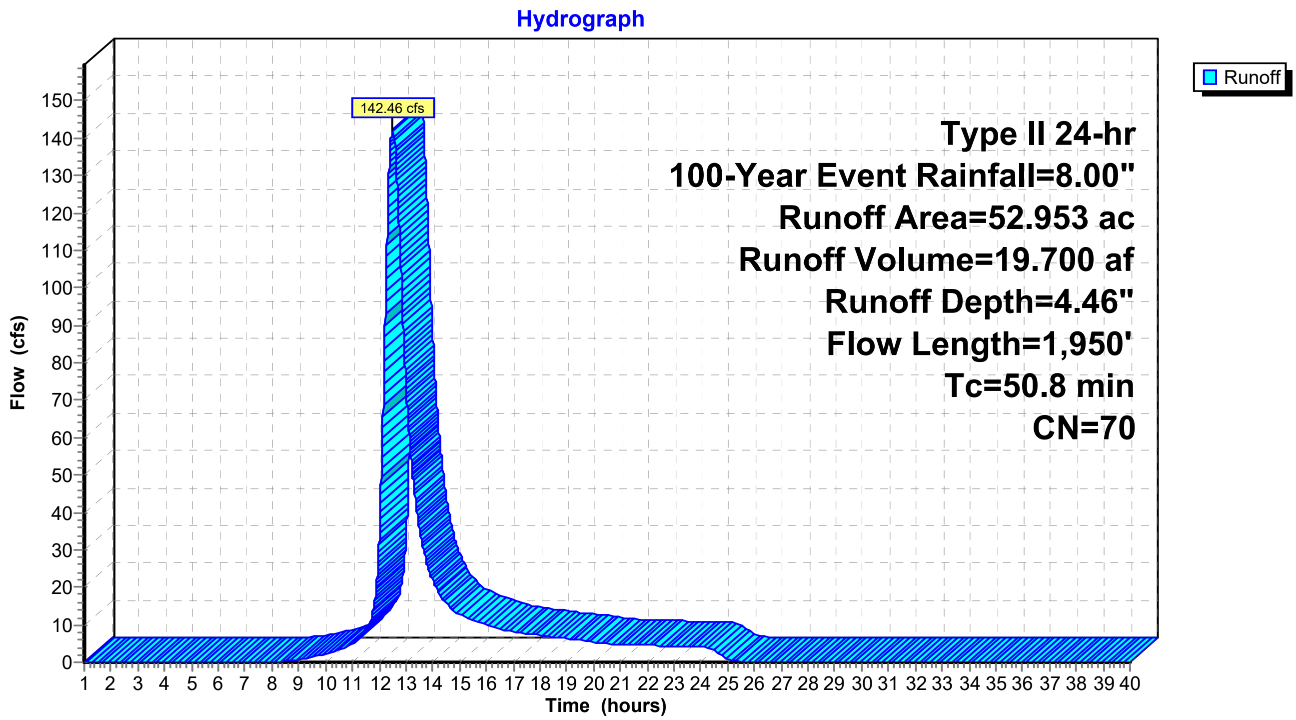
Runoff = 142.46 cfs @ 12.48 hrs, Volume= 19.700 af, Depth= 4.46"
Routed to Reach 4R : Beaverkill Trib

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-40.00 hrs, dt= 0.01 hrs
Type II 24-hr 100-Year Event Rainfall=8.00"

| Area (ac) | CN | Description |
|---|---|---|
| 52.953 | 70 | Woods, Good, HSG C |
| 52.953 | | 100.00% Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 31.6 | 100 | 0.0250 | 0.05 | | **Sheet Flow, Woods** Woods: Dense underbrush n= 0.800 P2= 3.75" |
| 19.2 | 1,850 | 0.1030 | 1.60 | | **Shallow Concentrated Flow, Woods** Woodland Kv= 5.0 fps |
| 50.8 | 1,950 | Total | | | |

## Subcatchment 3A: DA 3A



## Summary for Subcatchment 3B: DA 3B

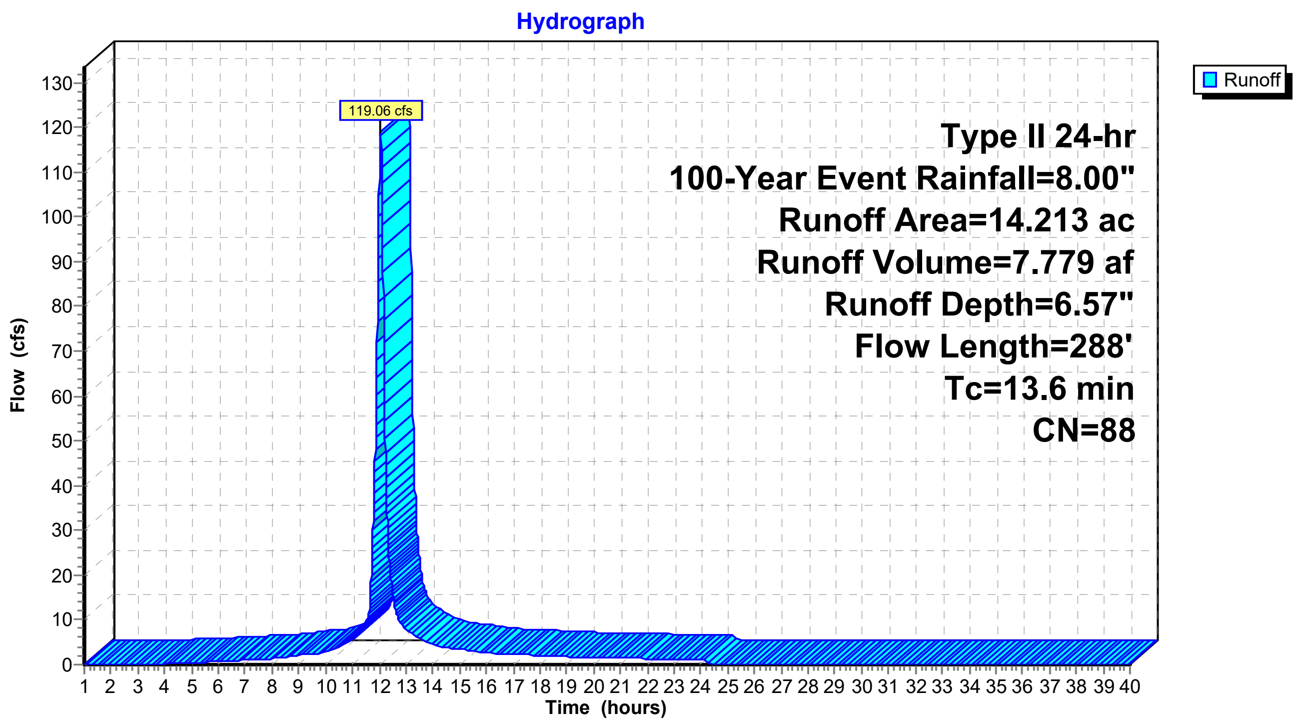
Runoff = 119.06 cfs @ 12.05 hrs, Volume= 7.779 af, Depth= 6.57"
Routed to Pond 9P : Pocket Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-40.00 hrs, dt= 0.01 hrs
Type II 24-hr 100-Year Event Rainfall=8.00"

| | Area (ac) | CN | Description |
|---|---|---|---|
| * | 14.213 | 88 | 1/8 acre lots, 65% imp, HSG C |
| | 4.975 | | 35.00% Pervious Area |
| | 9.238 | | 65.00% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 13.2 | 100 | 0.0200 | 0.13 | | **Sheet Flow, Lawn** Grass: Dense n= 0.240 P2= 3.75" |
| 0.4 | 188 | 0.2500 | 7.50 | | **Shallow Concentrated Flow, Lawn** Grassed Waterway Kv= 15.0 fps |
| 13.6 | 288 | Total | | | |

### Subcatchment 3B: DA 3B



## Summary for Subcatchment 3C: DA 3C

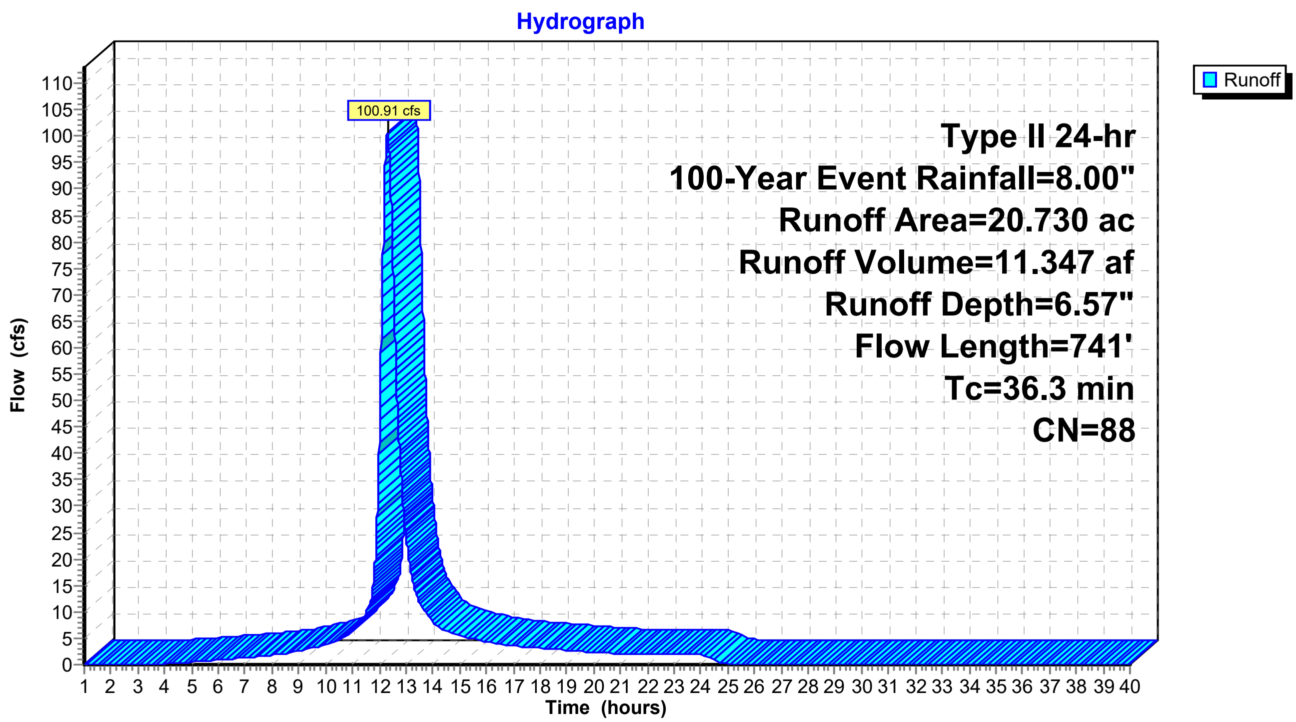
Runoff = 100.91 cfs @ 12.30 hrs, Volume= 11.347 af, Depth= 6.57"
Routed to Pond 1P : Existing Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-40.00 hrs, dt= 0.01 hrs
Type II 24-hr 100-Year Event Rainfall=8.00"

| | Area (ac) | CN | Description |
|---|---|---|---|
| * | 20.730 | 88 | 1/8 acre lots, 65% imp, HSG C |
| | 7.255 | | 35.00% Pervious Area |
| | 13.475 | | 65.00% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 34.5 | 100 | 0.0200 | 0.05 | | **Sheet Flow, Woods**<br>Woods: Dense underbrush n= 0.800 P2= 3.75" |
| 1.8 | 641 | 0.1500 | 5.81 | | **Shallow Concentrated Flow, Lawn**<br>Grassed Waterway Kv= 15.0 fps |
| 36.3 | 741 | Total | | | |

## Subcatchment 3C: DA 3C



## Summary for Subcatchment 3D: DA 3D

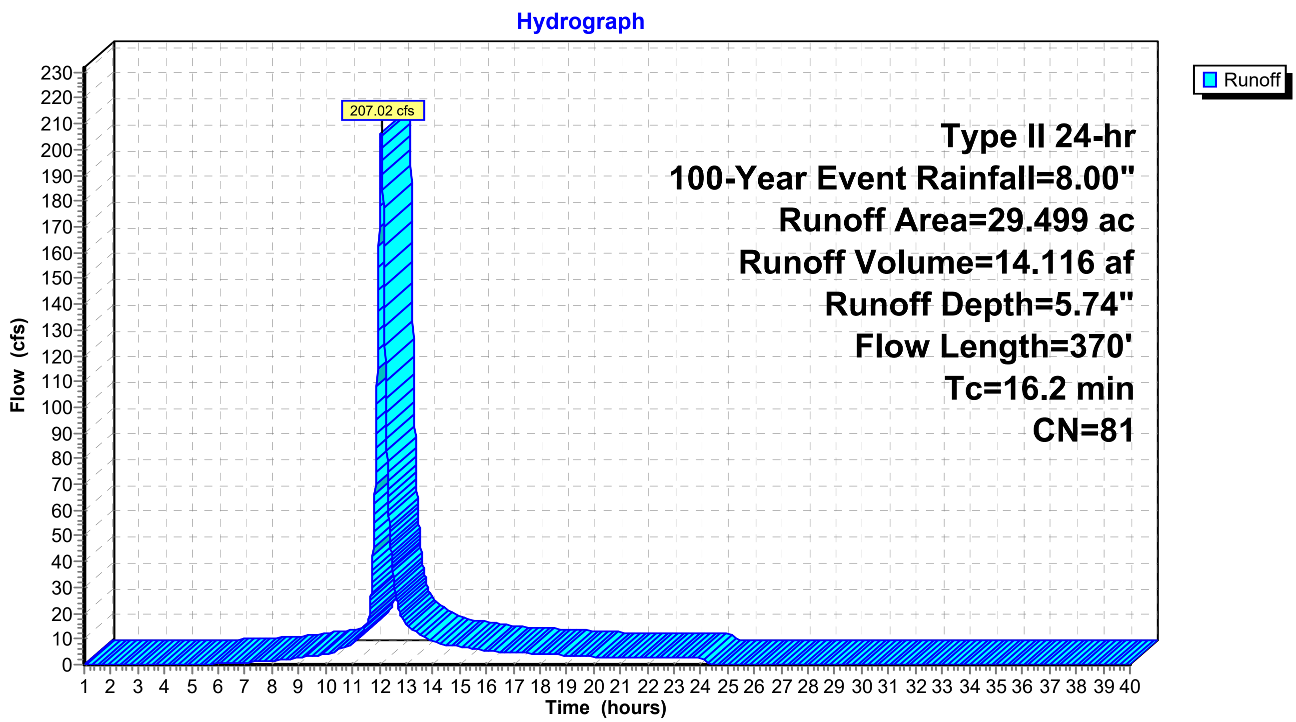
Runoff = 207.02 cfs @ 12.08 hrs, Volume= 14.116 af, Depth= 5.74"
Routed to Pond 12P : Pocket Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-40.00 hrs, dt= 0.01 hrs
Type II 24-hr 100-Year Event Rainfall=8.00"

| Area (ac) | CN | Description |
|---|---|---|
| 29.499 | 81 | 1/3 acre lots, 30% imp, HSG C |
| 20.649 | | 70.00% Pervious Area |
| 8.850 | | 30.00% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 14.8 | 100 | 0.0150 | 0.11 | | **Sheet Flow, Lawn**<br>Grass: Dense n= 0.240 P2= 3.75" |
| 1.4 | 270 | 0.0480 | 3.29 | | **Shallow Concentrated Flow, Lawn**<br>Grassed Waterway Kv= 15.0 fps |
| 16.2 | 370 | Total | | | |

## Subcatchment 3D: DA 3D



## Summary for Subcatchment 3E: DA 3E

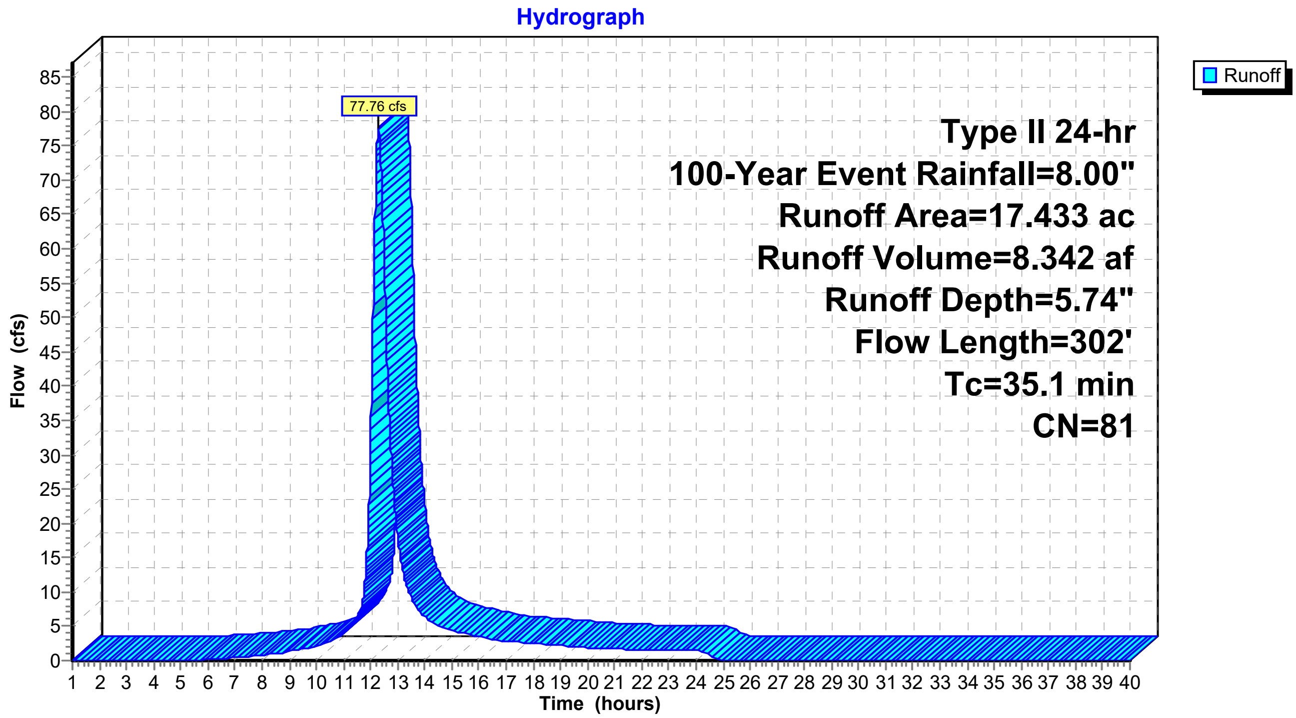
Runoff = 77.76 cfs @ 12.29 hrs, Volume= 8.342 af, Depth= 5.74"
Routed to Pond 10P : Pocket Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-40.00 hrs, dt= 0.01 hrs
Type II 24-hr 100-Year Event Rainfall=8.00"

| Area (ac) | CN | Description |
|---|---|---|
| 17.433 | 81 | 1/3 acre lots, 30% imp, HSG C |
| 12.203 | | 70.00% Pervious Area |
| 5.230 | | 30.00% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 34.5 | 100 | 0.0200 | 0.05 | | **Sheet Flow, Woods** Woods: Dense underbrush n= 0.800 P2= 3.75" |
| 0.6 | 202 | 0.1500 | 5.81 | | **Shallow Concentrated Flow, Lawn** Grassed Waterway Kv= 15.0 fps |
| 35.1 | 302 | Total | | | |

### Subcatchment 3E: DA 3E



## Summary for Subcatchment 3F: DA 3F

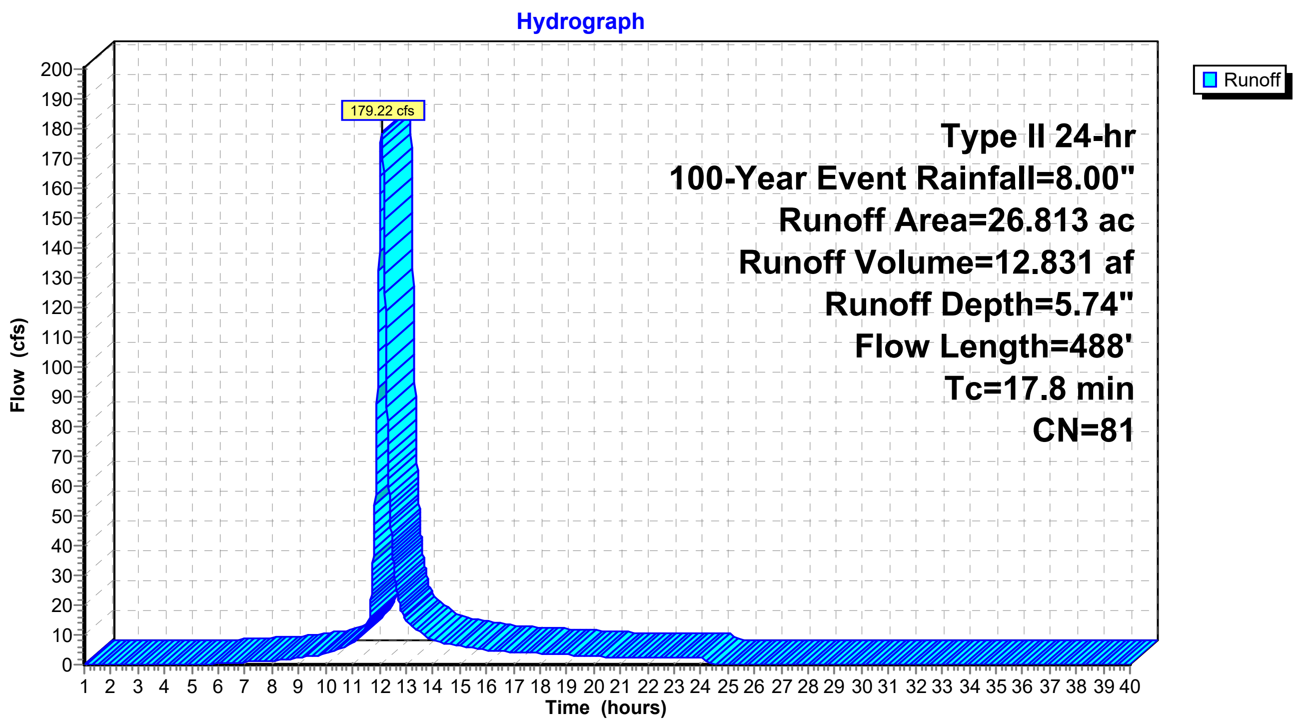
Runoff = 179.22 cfs @ 12.09 hrs, Volume= 12.831 af, Depth= 5.74"
Routed to Pond 11P : Pocket Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-40.00 hrs, dt= 0.01 hrs
Type II 24-hr 100-Year Event Rainfall=8.00"

| Area (ac) | CN | Description |
|---|---|---|
| 26.813 | 81 | 1/3 acre lots, 30% imp, HSG C |
| 18.769 | | 70.00% Pervious Area |
| 8.044 | | 30.00% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 14.8 | 100 | 0.0150 | 0.11 | | **Sheet Flow, Lawn** Grass: Dense n= 0.240 P2= 3.75" |
| 3.0 | 388 | 0.0200 | 2.12 | | **Shallow Concentrated Flow, Lawn** Grassed Waterway Kv= 15.0 fps |
| 17.8 | 488 | Total | | | |

## Subcatchment 3F: DA 3F



## Summary for Subcatchment 3G: DA 3G

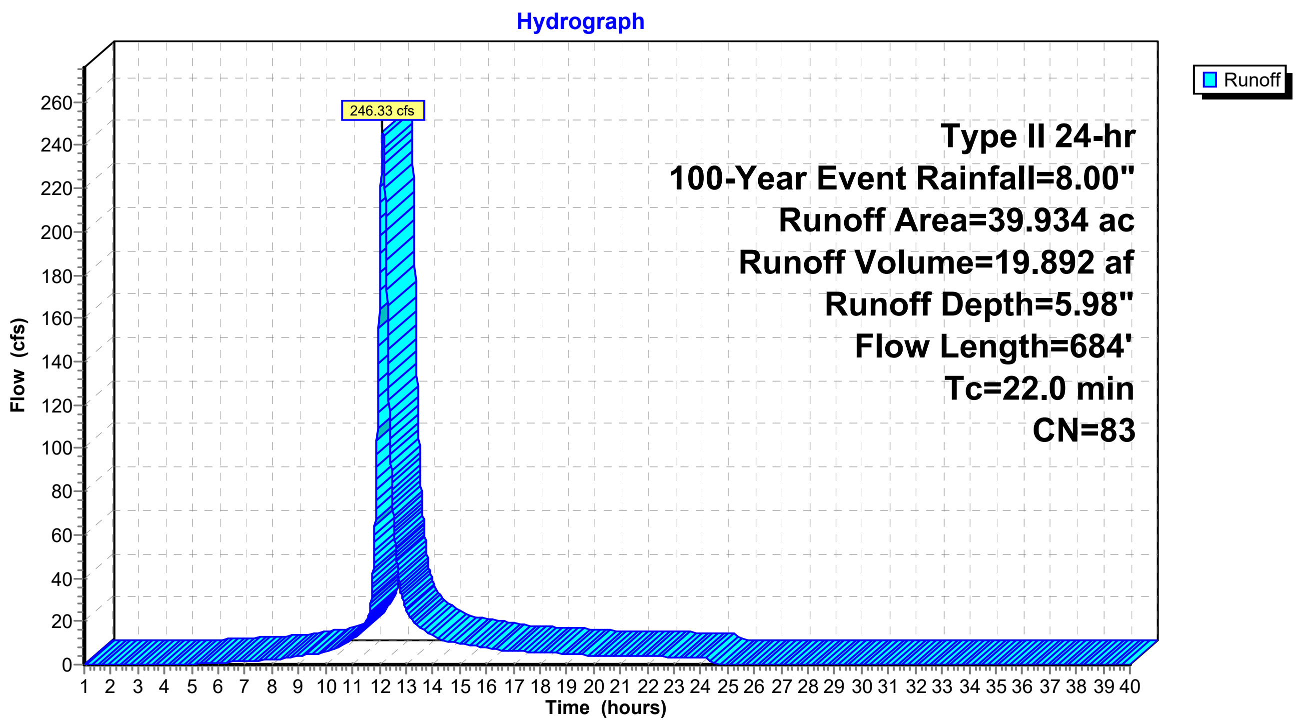
Runoff = 246.33 cfs @ 12.15 hrs, Volume= 19.892 af, Depth= 5.98"
Routed to Pond 5P : Pocket Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-40.00 hrs, dt= 0.01 hrs
Type II 24-hr 100-Year Event Rainfall=8.00"

| Area (ac) | CN | Description |
|---|---|---|
| 39.934 | 83 | 1/4 acre lots, 38% imp, HSG C |
| 24.759 | | 62.00% Pervious Area |
| 15.175 | | 38.00% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 17.4 | 100 | 0.0100 | 0.10 | | **Sheet Flow, Lawn** Grass: Dense n= 0.240 P2= 3.75" |
| 4.6 | 584 | 0.0200 | 2.12 | | **Shallow Concentrated Flow, Lawn** Grassed Waterway Kv= 15.0 fps |
| 22.0 | 684 | Total | | | |

### Subcatchment 3G: DA 3G



## Summary for Subcatchment 4: DA 4

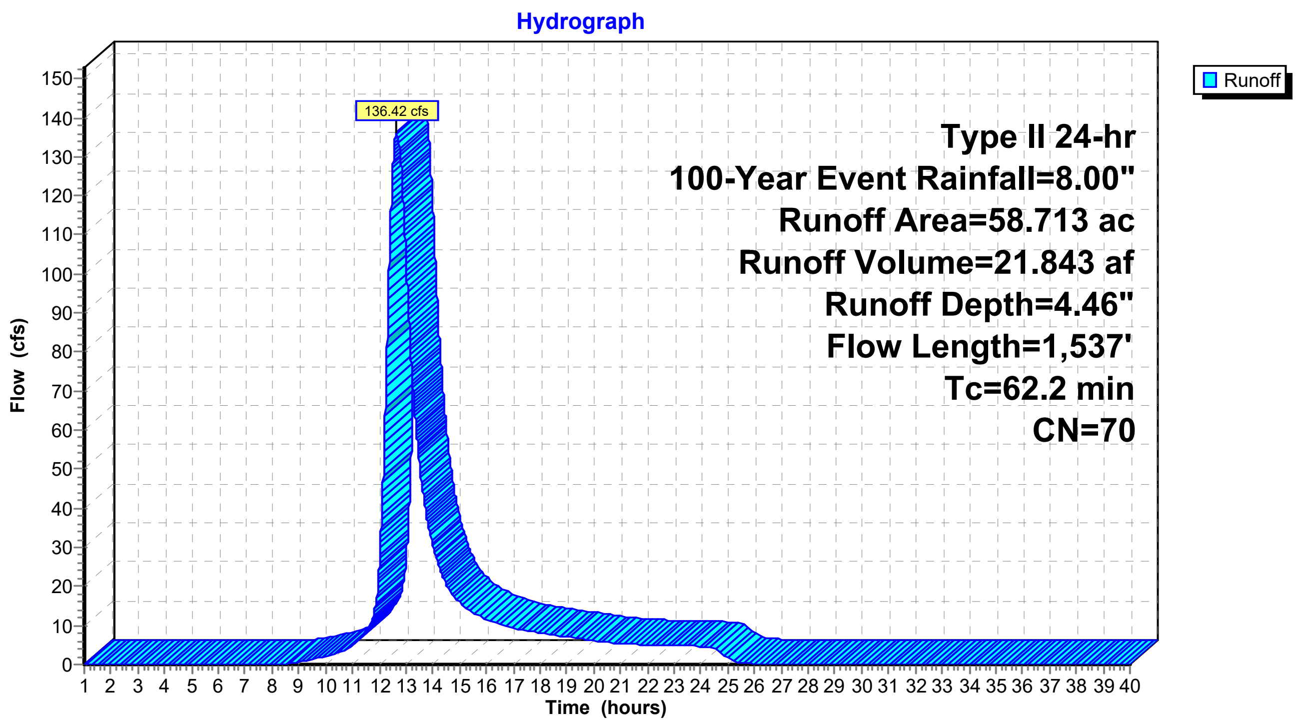
Runoff = 136.42 cfs @ 12.65 hrs, Volume= 21.843 af, Depth= 4.46"
Routed to Reach 1R : Beaverkill

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-40.00 hrs, dt= 0.01 hrs
Type II 24-hr 100-Year Event Rainfall=8.00"

| Area (ac) | CN | Description |
|---|---|---|
| 58.438 | 70 | Woods, Good, HSG C |
| 0.275 | 98 | Unconnected pavement, HSG C |
| 58.713 | 70 | Weighted Average |
| 58.438 | | 99.53% Pervious Area |
| 0.275 | | 0.47% Impervious Area |
| 0.275 | | 100.00% Unconnected |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 34.5 | 100 | 0.0200 | 0.05 | | **Sheet Flow, Woods** Woods: Dense underbrush n= 0.800 P2= 3.75" |
| 27.7 | 1,437 | 0.0300 | 0.87 | | **Shallow Concentrated Flow, Woods** Woodland Kv= 5.0 fps |
| 62.2 | 1,537 | Total | | | |

## Subcatchment 4: DA 4



## Summary for Subcatchment 4A: DA 4A

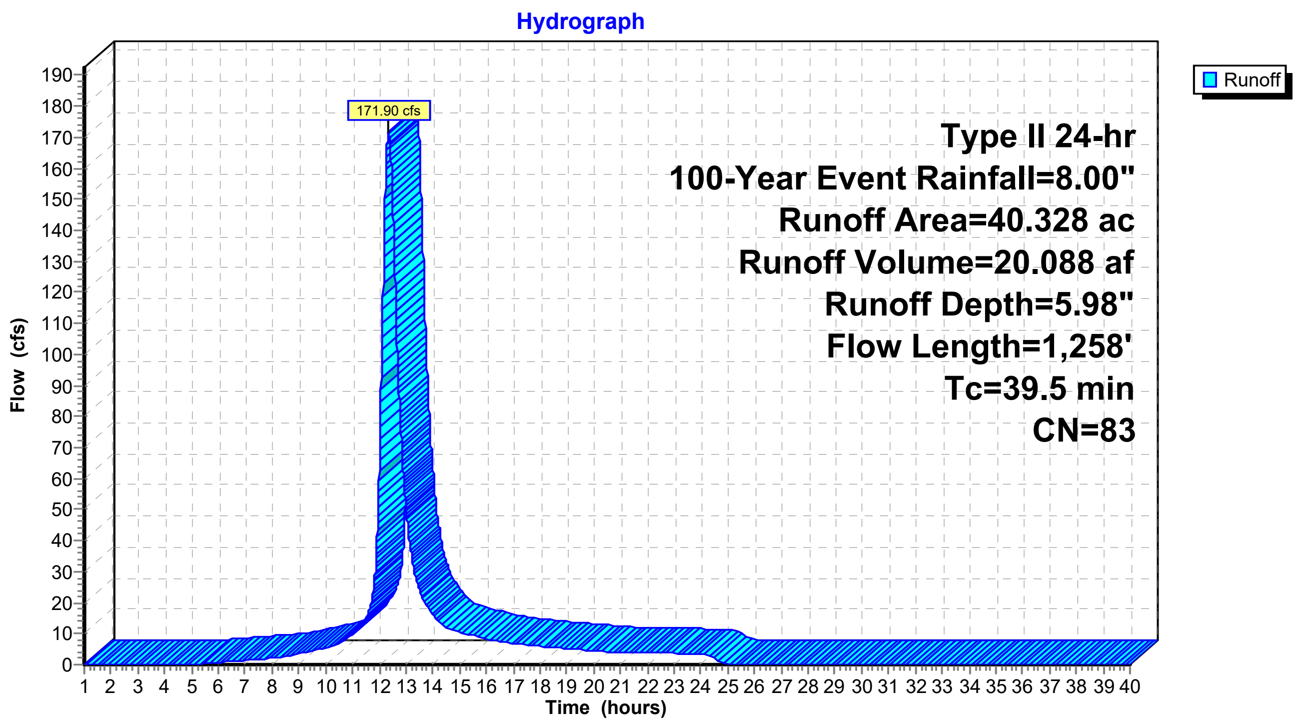
Runoff = 171.90 cfs @ 12.34 hrs, Volume= 20.088 af, Depth= 5.98"
Routed to Pond 3P : Pocket Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-40.00 hrs, dt= 0.01 hrs
Type II 24-hr 100-Year Event Rainfall=8.00"

| Area (ac) | CN | Description |
|---|---|---|
| 40.328 | 83 | 1/4 acre lots, 38% imp, HSG C |
| 25.003 | | 62.00% Pervious Area |
| 15.325 | | 38.00% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 18.9 | 100 | 0.0900 | 0.09 | | **Sheet Flow, Woods** Woods: Dense underbrush n= 0.800 P2= 3.75" |
| 20.6 | 1,158 | 0.0350 | 0.94 | | **Shallow Concentrated Flow, Woods** Woodland Kv= 5.0 fps |
| 39.5 | 1,258 | Total | | | |

## Subcatchment 4A: DA 4A



## Summary for Subcatchment 4B: DA 4B

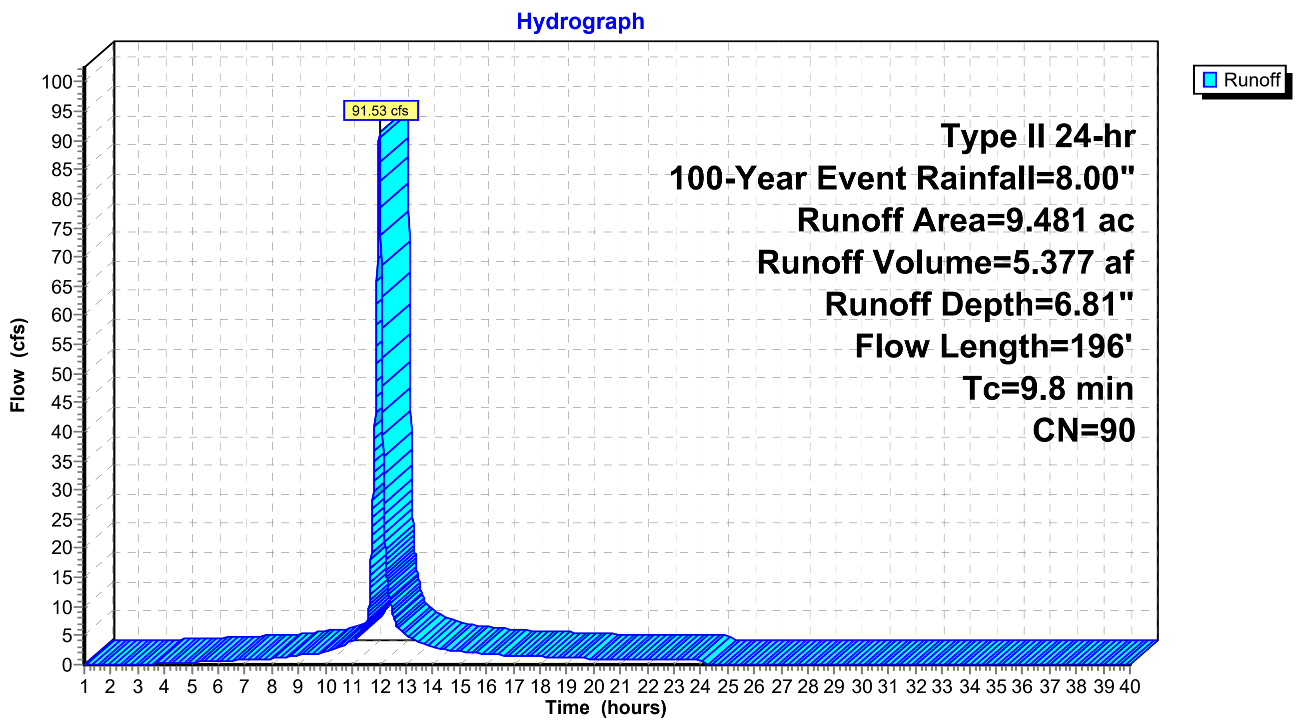
Runoff = 91.53 cfs @ 12.01 hrs, Volume= 5.377 af, Depth= 6.81"
Routed to Pond 4P : Pocket Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-40.00 hrs, dt= 0.01 hrs
Type II 24-hr 100-Year Event Rainfall=8.00"

| Area (ac) | CN | Description |
|---|---|---|
| 9.481 | 90 | 1/8 acre lots, 65% imp, HSG C |
| 3.318 | | 35.00% Pervious Area |
| 6.163 | | 65.00% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 9.1 | 100 | 0.0500 | 0.18 | | **Sheet Flow, Lawn**<br>Grass: Dense n= 0.240 P2= 3.75" |
| 0.7 | 96 | 0.0200 | 2.28 | | **Shallow Concentrated Flow, Lawn**<br>Unpaved Kv= 16.1 fps |
| 9.8 | 196 | Total | | | |

### Subcatchment 4B: DA 4B



## Summary for Subcatchment 5: DA 5

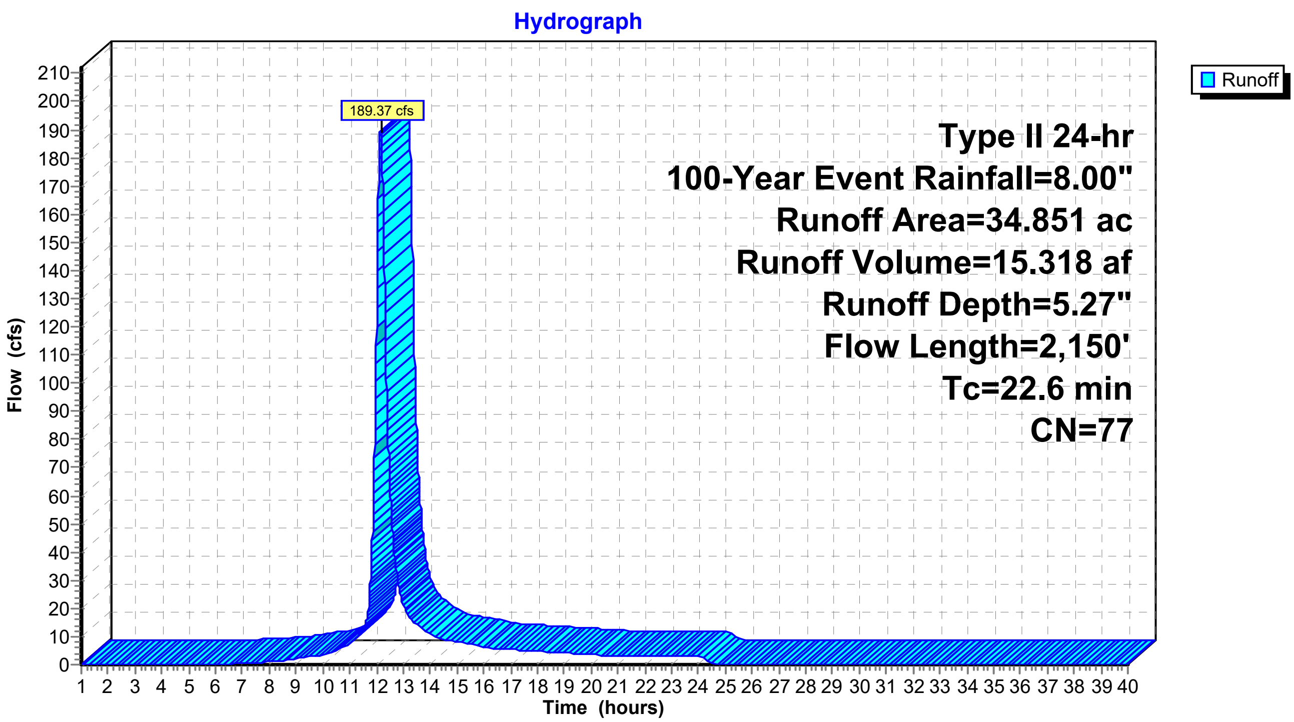
Runoff = 189.37 cfs @ 12.15 hrs, Volume= 15.318 af, Depth= 5.27"
Routed to Reach 2R : Beaverkill

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-40.00 hrs, dt= 0.01 hrs
Type II 24-hr 100-Year Event Rainfall=8.00"

| Area (ac) | CN | Description |
|---|---|---|
| 34.851 | 77 | 2 acre lots, 12% imp, HSG C |
| 30.669 | | 88.00% Pervious Area |
| 4.182 | | 12.00% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 7.9 | 100 | 0.2000 | 0.21 | | **Sheet Flow, Woods**<br>Woods: Light underbrush n= 0.400 P2= 3.75" |
| 14.7 | 2,050 | 0.0240 | 2.32 | | **Shallow Concentrated Flow, Lawn**<br>Grassed Waterway Kv= 15.0 fps |
| 22.6 | 2,150 | Total | | | |

## Subcatchment 5: DA 5



## Summary for Reach 1R: Beaverkill

Inflow Area = 1,074.280 ac, 12.67% Impervious, Inflow Depth > 18.86" for 100-Year Event event
Inflow = 1,812.80 cfs @ 12.79 hrs, Volume= 1,688.594 af
Outflow = 1,718.69 cfs @ 13.23 hrs, Volume= 1,669.023 af, Atten= 5%, Lag= 26.5 min
Routed to Link AP-2 : AP-2

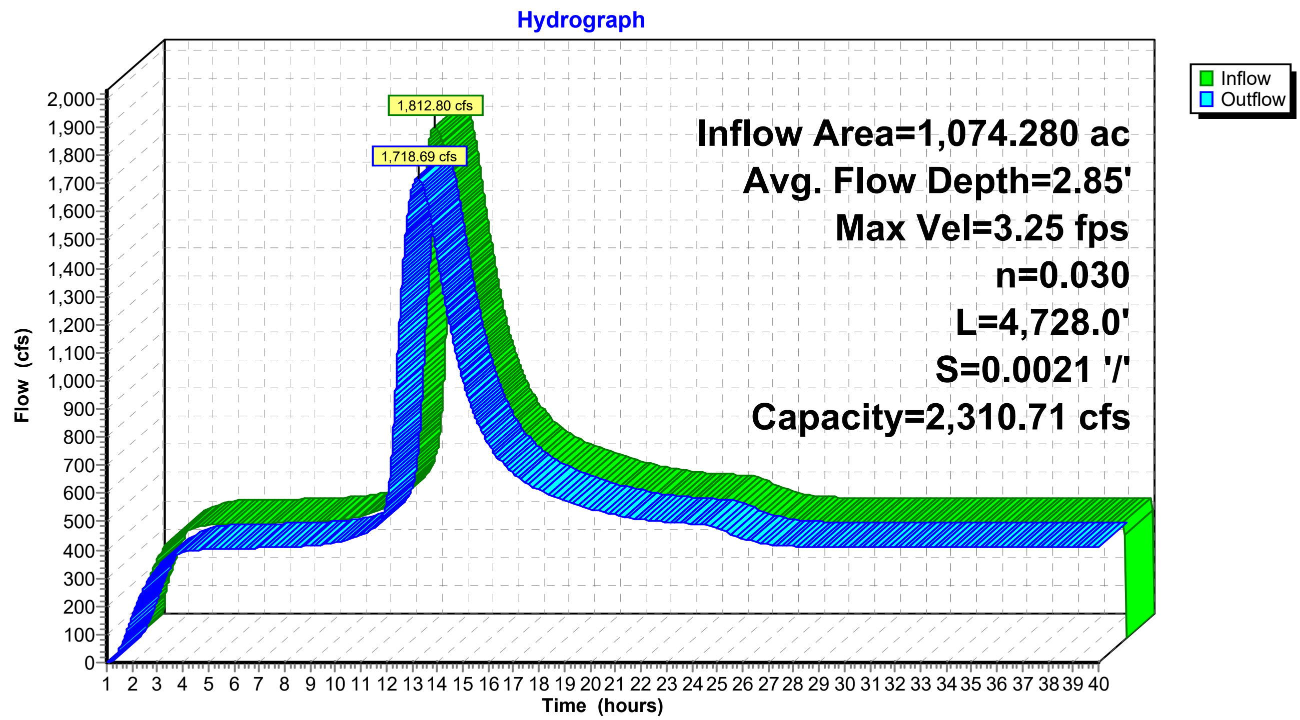
Routing by Sim-Route method, Time Span= 1.00-40.00 hrs, dt= 0.01 hrs
Max. Velocity= 3.25 fps, Min. Travel Time= 24.3 min
Avg. Velocity = 2.32 fps, Avg. Travel Time= 34.0 min

Peak Storage= 2,502,954 cf @ 13.23 hrs
Average Depth at Peak Storage= 2.85' , Surface Width= 311.08'
Bank-Full Depth= 3.25' Flow Area= 659.8 sf, Capacity= 2,310.71 cfs

60.00' x 3.25' deep channel, n= 0.030 Earth, grassed & winding
Side Slope Z-value= 44.0 '/' Top Width= 346.00'
Length= 4,728.0' Slope= 0.0021 '/'
Inlet Invert= 145.00', Outlet Invert= 135.00'

‡

### Reach 1R: Beaverkill



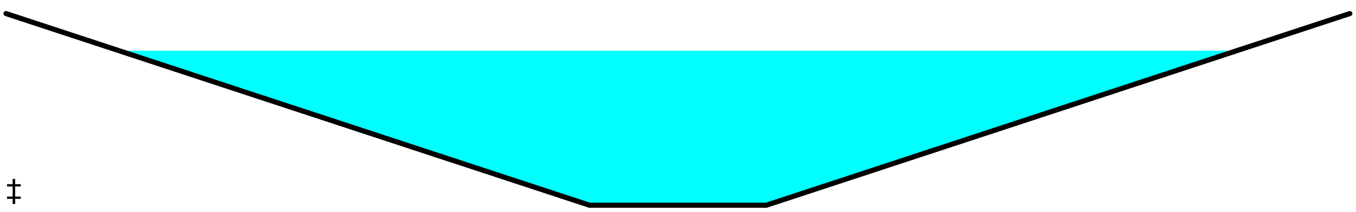
## Summary for Reach 2R: Beaverkill

Inflow Area = 471.379 ac, 0.89% Impervious, Inflow Depth > 31.93" for 100-Year Event event
Inflow = 1,181.17 cfs @ 12.92 hrs, Volume= 1,254.246 af, Incl. 334.00 cfs Base Flow
Outflow = 1,019.40 cfs @ 13.31 hrs, Volume= 1,230.506 af, Atten= 14%, Lag= 23.7 min
Routed to Reach 1R : Beaverkill

Routing by Sim-Route method, Time Span= 1.00-40.00 hrs, dt= 0.01 hrs
Max. Velocity= 2.87 fps, Min. Travel Time= 39.2 min
Avg. Velocity = 2.21 fps, Avg. Travel Time= 51.0 min

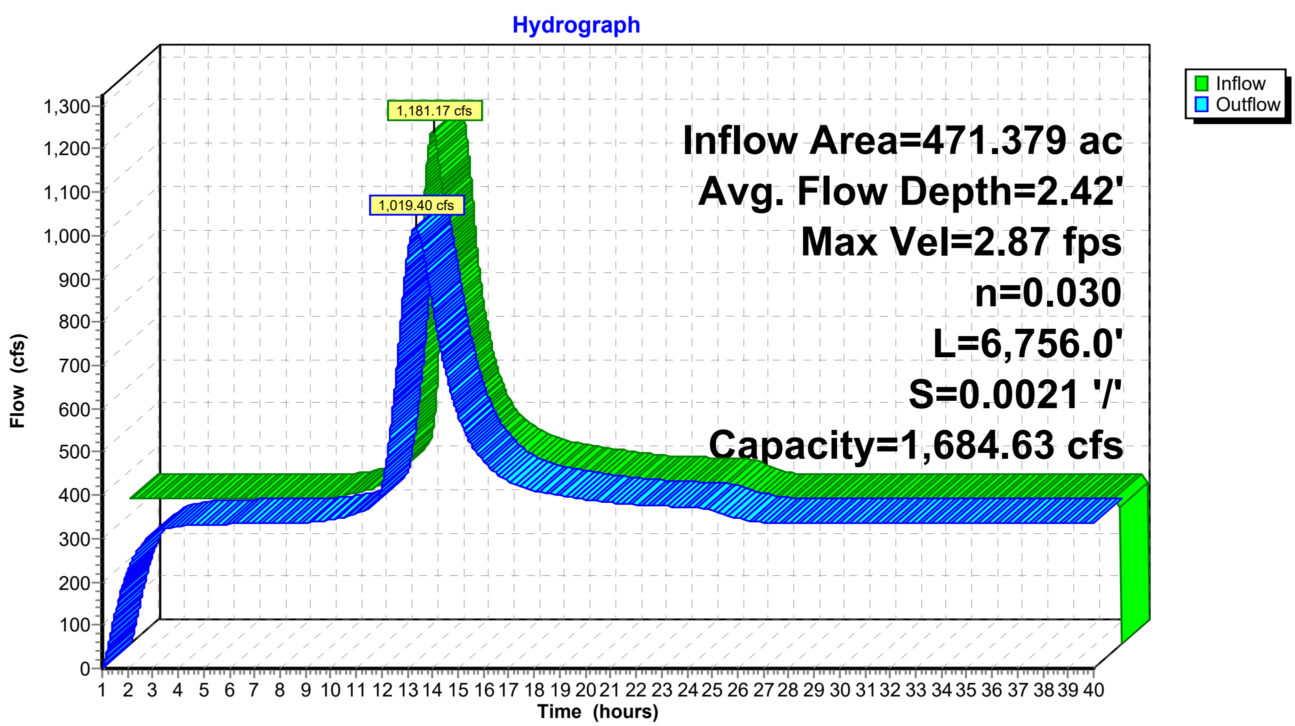
Peak Storage= 2,396,511 cf @ 13.31 hrs
Average Depth at Peak Storage= 2.42' , Surface Width= 253.04'
Bank-Full Depth= 3.00' Flow Area= 516.0 sf, Capacity= 1,684.63 cfs

40.00' x 3.00' deep channel, n= 0.030 Earth, grassed & winding
Side Slope Z-value= 44.0 '/' Top Width= 304.00'
Length= 6,756.0' Slope= 0.0021 '/'
Inlet Invert= 160.00', Outlet Invert= 145.50'



‡

### Reach 2R: Beaverkill



## Summary for Reach 3R: Beaverkill Trib

Inflow Area = 370.977 ac, 18.86% Impervious, Inflow Depth > 11.62" for 100-Year Event event
Inflow = 794.56 cfs @ 12.50 hrs, Volume= 359.366 af
Outflow = 794.48 cfs @ 12.51 hrs, Volume= 359.233 af, Atten= 0%, Lag= 0.7 min
Routed to Reach 1R : Beaverkill

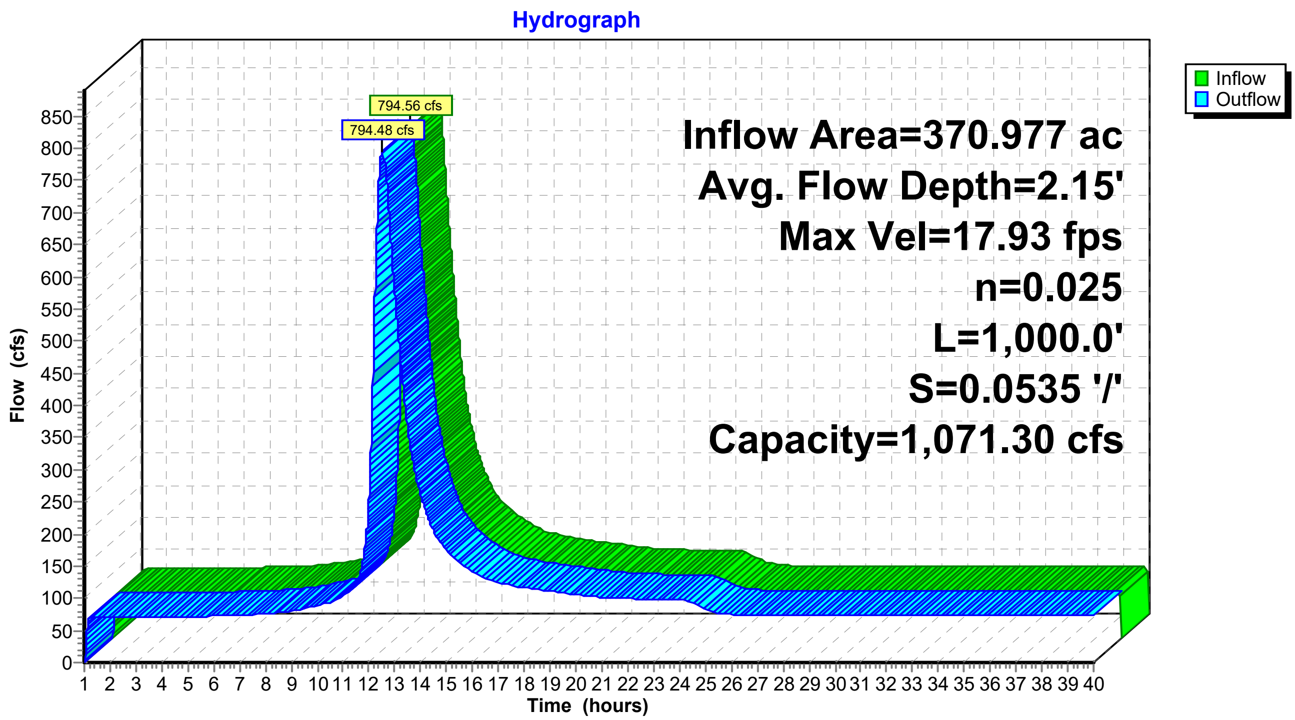
Routing by Sim-Route method, Time Span= 1.00-40.00 hrs, dt= 0.01 hrs
Max. Velocity= 17.93 fps, Min. Travel Time= 0.9 min
Avg. Velocity = 9.51 fps, Avg. Travel Time= 1.8 min

Peak Storage= 44,298 cf @ 12.51 hrs
Average Depth at Peak Storage= 2.15' , Surface Width= 29.20'
Bank-Full Depth= 2.50' Flow Area= 55.0 sf, Capacity= 1,071.30 cfs

12.00' x 2.50' deep channel, n= 0.025 Earth, clean & winding
Side Slope Z-value= 4.0 '/' Top Width= 32.00'
Length= 1,000.0' Slope= 0.0535 '/'
Inlet Invert= 200.00', Outlet Invert= 146.50'

‡

### Reach 3R: Beaverkill Trib



## Summary for Reach 4R: Beaverkill Trib

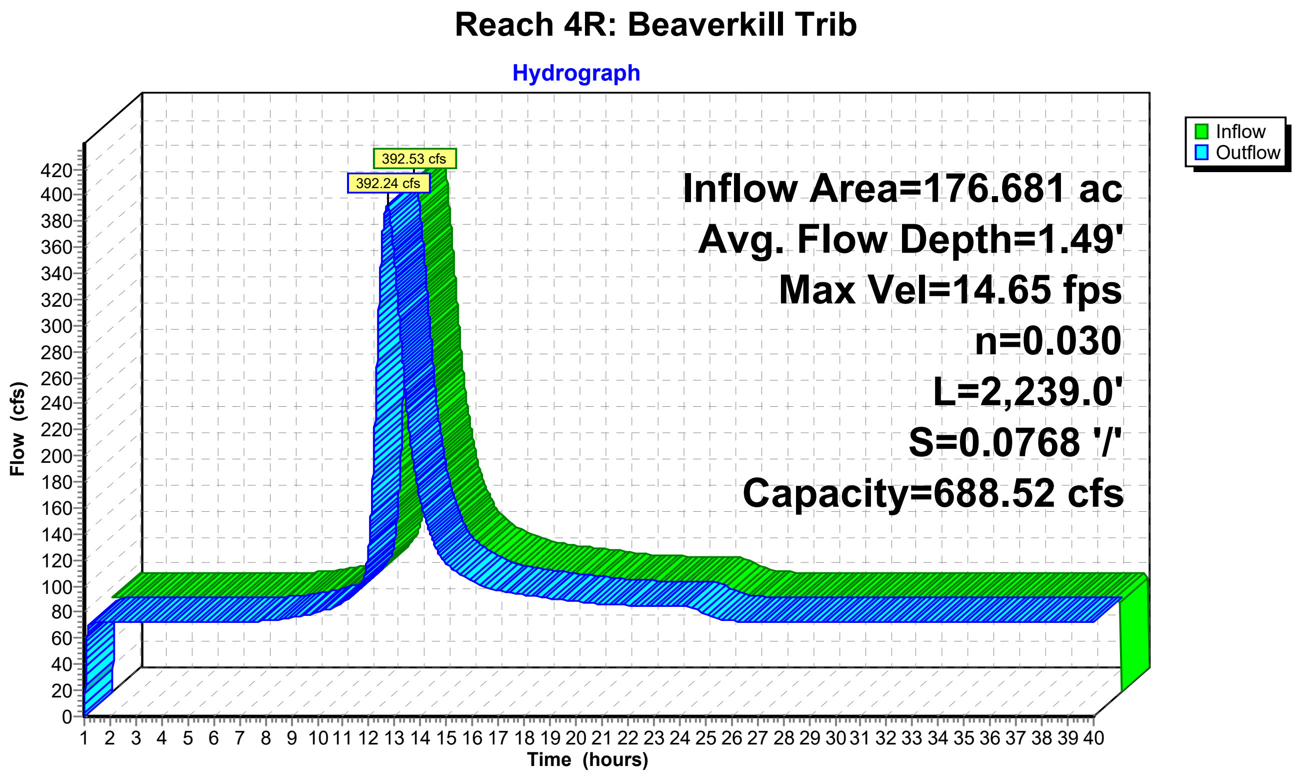
Inflow Area = 176.681 ac, 8.40% Impervious, Inflow Depth > 19.80" for 100-Year Event event
Inflow = 392.53 cfs @ 12.68 hrs, Volume= 291.557 af, Incl. 72.00 cfs Base Flow
Outflow = 392.24 cfs @ 12.70 hrs, Volume= 291.185 af, Atten= 0%, Lag= 1.2 min
Routed to Reach 3R : Beaverkill Trib

Routing by Sim-Route method, Time Span= 1.00-40.00 hrs, dt= 0.01 hrs
Max. Velocity= 14.65 fps, Min. Travel Time= 2.5 min
Avg. Velocity = 9.12 fps, Avg. Travel Time= 4.1 min

Peak Storage= 59,951 cf @ 12.70 hrs
Average Depth at Peak Storage= 1.49' , Surface Width= 23.92'
Bank-Full Depth= 2.00' Flow Area= 40.0 sf, Capacity= 688.52 cfs

12.00' x 2.00' deep channel, n= 0.030 Earth, grassed & winding
Side Slope Z-value= 4.0 '/' Top Width= 28.00'
Length= 2,239.0' Slope= 0.0768 '/'
Inlet Invert= 386.00', Outlet Invert= 214.00'

‡



## Summary for Pond 1P: Existing Pond

Inflow Area = 60.446 ac, 30.18% Impervious, Inflow Depth = 5.72" for 100-Year Event event
Inflow = 231.00 cfs @ 12.38 hrs, Volume= 28.803 af
Outflow = 230.73 cfs @ 12.40 hrs, Volume= 26.226 af, Atten= 0%, Lag= 1.0 min
Primary = 230.73 cfs @ 12.40 hrs, Volume= 26.226 af
Routed to Reach 3R : Beaverkill Trib

Routing by Sim-Route method, Time Span= 1.00-40.00 hrs, dt= 0.01 hrs
Peak Elev= 212.36' @ 12.40 hrs Surf.Area= 17,255 sf Storage= 174,900 cf

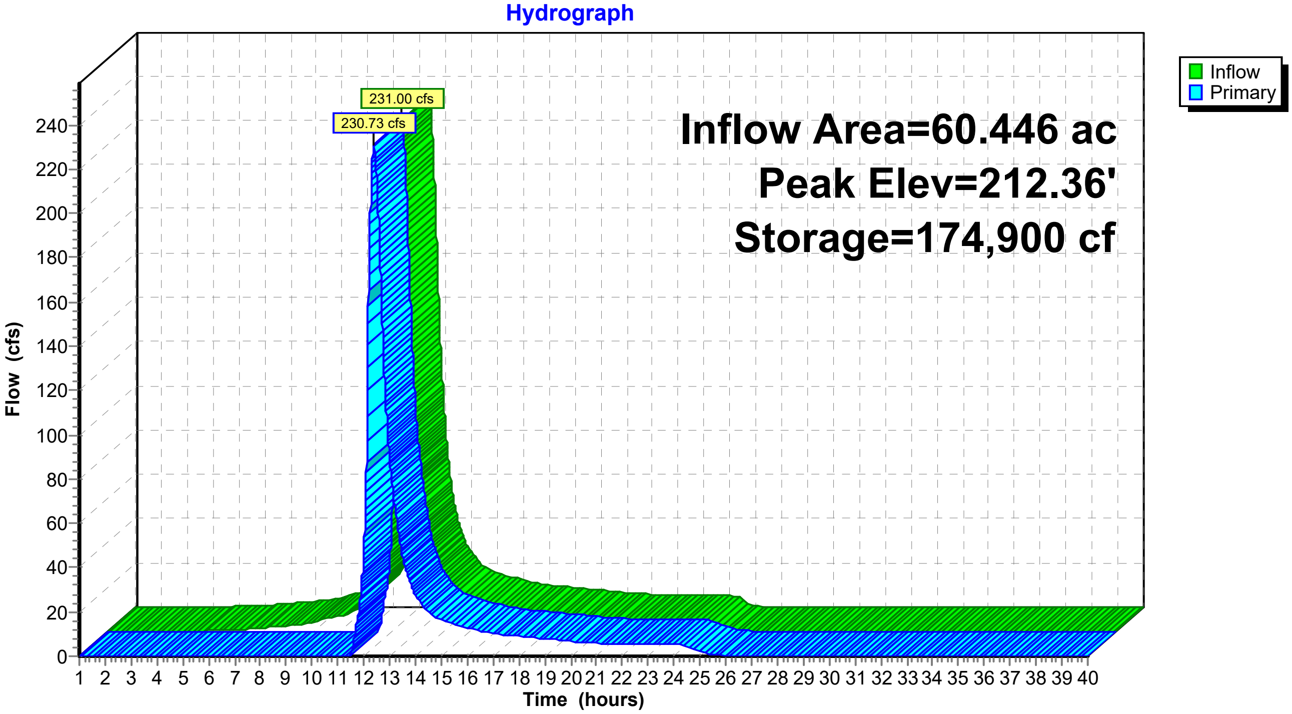
Plug-Flow detention time= 82.2 min calculated for 26.219 af (91% of inflow)
Center-of-Mass det. time= 35.2 min ( 864.3 - 829.0 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 200.00' | 203,971 cf | **84.00'W x 134.00'L x 14.00'H Prismatoid Z=1.0** |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 208.50' | **5.0' long x 0.5' breadth Broad-Crested Rectangular Weir**<br>Head (feet) 0.20 0.40 0.60 0.80 1.00<br>Coef. (English) 2.80 2.92 3.08 3.30 3.32 |
| #2 | Primary | 211.50' | **40.0' long x 0.5' breadth Broad-Crested Rectangular Weir**<br>Head (feet) 0.20 0.40 0.60 0.80 1.00<br>Coef. (English) 2.80 2.92 3.08 3.30 3.32 |

**Primary OutFlow** Max=230.67 cfs @ 12.40 hrs HW=212.36' TW=202.09' (Dynamic Tailwater)
**1=Broad-Crested Rectangular Weir** (Weir Controls 125.75 cfs @ 6.52 fps)
**2=Broad-Crested Rectangular Weir** (Weir Controls 104.93 cfs @ 3.06 fps)

## Pond 1P: Existing Pond



## Summary for Pond 2P: Pocket Pond

Inflow Area = 36.879 ac, 12.00% Impervious, Inflow Depth = 5.27" for 100-Year Event event
Inflow = 42.70 cfs @ 14.49 hrs, Volume= 16.209 af
Outflow = 0.78 cfs @ 27.72 hrs, Volume= 1.619 af, Atten= 98%, Lag= 793.8 min
Primary = 0.78 cfs @ 27.72 hrs, Volume= 1.619 af
Routed to Reach 4R : Beaverkill Trib

Routing by Sim-Route method, Time Span= 1.00-40.00 hrs, dt= 0.01 hrs
Peak Elev= 396.64' @ 27.72 hrs Surf.Area= 196,687 sf Storage= 666,215 cf

Plug-Flow detention time= 895.7 min calculated for 1.619 af (10% of inflow)
Center-of-Mass det. time= 652.8 min ( 1,635.0 - 982.1 )

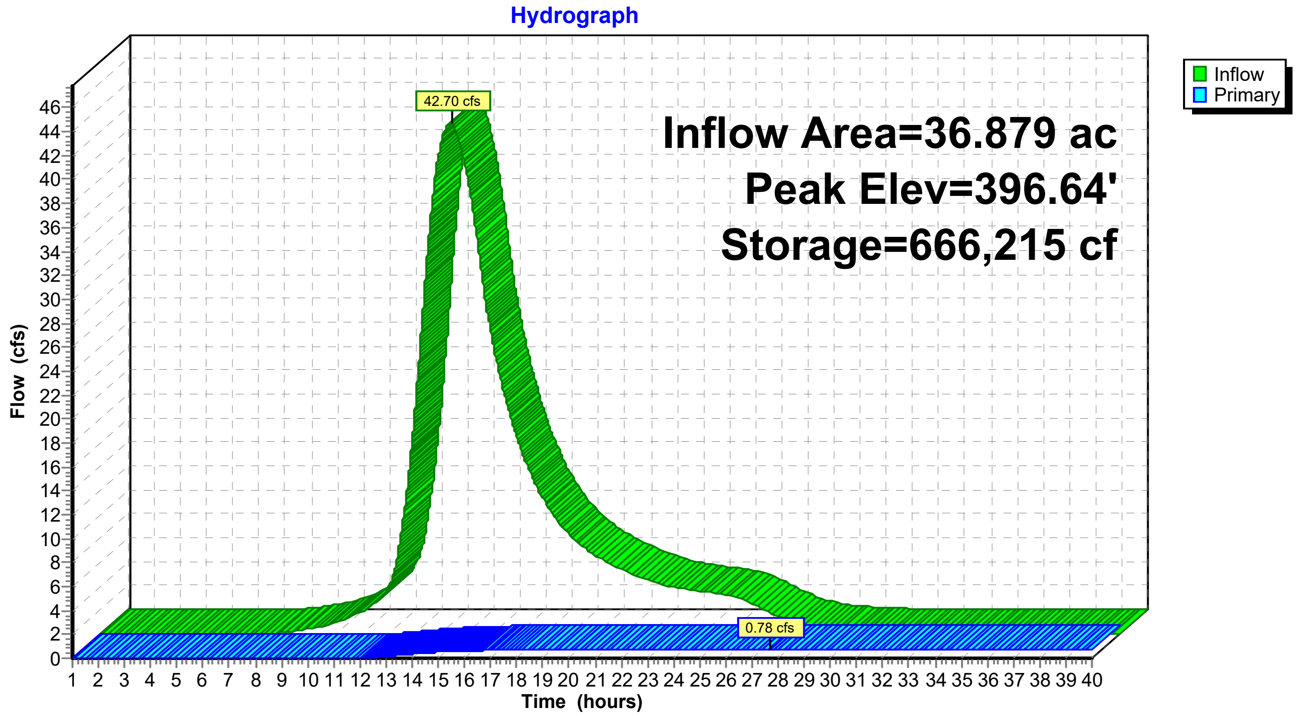
| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 393.00' | 1,369,452 cf | **Custom Stage Data (Prismatic)** Listed below (Recalc) |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 393.00 | 169,366 | 0 | 0 |
| 400.00 | 221,906 | 1,369,452 | 1,369,452 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 393.00' | **18.0" Round Culvert**<br>L= 75.0' CPP, square edge headwall, Ke= 0.500<br>Inlet / Outlet Invert= 393.00' / 389.00' S= 0.0533 '/' Cc= 0.900<br>n= 0.011 Concrete pipe, straight & clean, Flow Area= 1.77 sf |
| #2 | Device 1 | 393.00' | **4.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads |

**Primary OutFlow** Max=0.78 cfs @ 27.72 hrs HW=396.64' TW=386.59' (Dynamic Tailwater)
└—**1=Culvert** (Passes 0.78 cfs of 14.46 cfs potential flow)
  └—**2=Orifice/Grate** (Orifice Controls 0.78 cfs @ 8.97 fps)

## Pond 2P: Pocket Pond



## Summary for Pond 3P: Pocket Pond

Inflow Area = 40.328 ac, 38.00% Impervious, Inflow Depth = 5.98" for 100-Year Event event
Inflow = 171.90 cfs @ 12.34 hrs, Volume= 20.088 af
Outflow = 26.46 cfs @ 14.32 hrs, Volume= 17.867 af, Atten= 85%, Lag= 118.8 min
Primary = 26.46 cfs @ 14.32 hrs, Volume= 17.867 af
Routed to Reach 1R : Beaverkill

Routing by Sim-Route method, Time Span= 1.00-40.00 hrs, dt= 0.01 hrs
Peak Elev= 150.76' @ 13.44 hrs Surf.Area= 131,075 sf Storage= 490,820 cf

Plug-Flow detention time= 273.6 min calculated for 17.867 af (89% of inflow)
Center-of-Mass det. time= 218.4 min ( 1,042.0 - 823.5 )

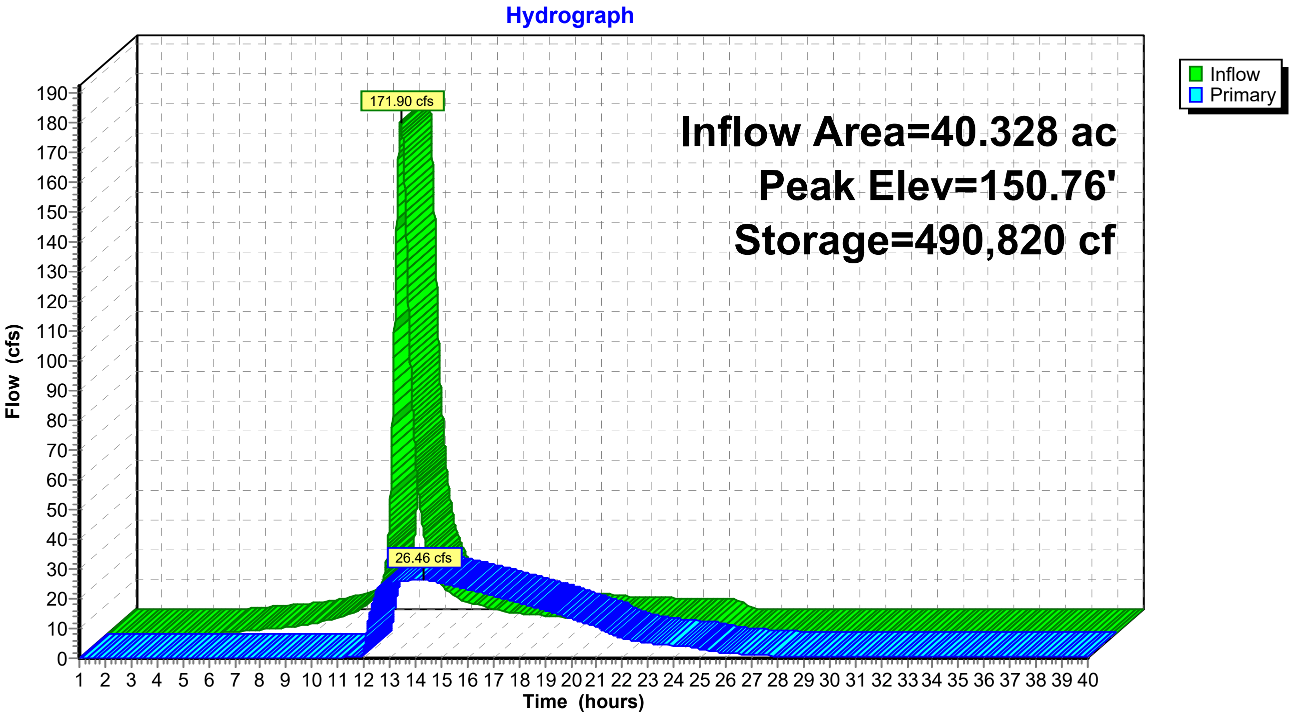
| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 146.50' | 659,406 cf | **Custom Stage Data (Prismatic)** Listed below (Recalc) |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 146.50 | 99,492 | 0 | 0 |
| 152.00 | 140,292 | 659,406 | 659,406 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 146.50' | **24.0" Round Culvert**<br>L= 50.0' CPP, square edge headwall, Ke= 0.500<br>Inlet / Outlet Invert= 146.50' / 146.00' S= 0.0100 '/' Cc= 0.900<br>n= 0.011 Concrete pipe, straight & clean, Flow Area= 3.14 sf |
| #2 | Device 1 | 146.50' | **4.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads |
| #3 | Device 1 | 147.55' | **24.0" x 24.0" Horiz. Orifice/Grate** C= 0.600<br>Limited to weir flow at low heads |

**Primary OutFlow** Max=26.47 cfs @ 14.32 hrs HW=150.56' TW=147.50' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 26.47 cfs @ 8.43 fps)
  ├─**2=Orifice/Grate** (Passes < 0.74 cfs potential flow)
  └─**3=Orifice/Grate** (Passes < 33.42 cfs potential flow)

# Pond 3P: Pocket Pond



## Summary for Pond 4P: Pocket Pond

Inflow Area = 9.481 ac, 65.00% Impervious, Inflow Depth = 6.81" for 100-Year Event event
Inflow = 91.53 cfs @ 12.01 hrs, Volume= 5.377 af
Outflow = 20.00 cfs @ 12.23 hrs, Volume= 5.213 af, Atten= 78%, Lag= 13.5 min
Primary = 20.00 cfs @ 12.23 hrs, Volume= 5.213 af
Routed to Reach 1R : Beaverkill

Routing by Sim-Route method, Time Span= 1.00-40.00 hrs, dt= 0.01 hrs
Peak Elev= 156.28' @ 12.23 hrs Surf.Area= 17,161 sf Storage= 103,718 cf

Plug-Flow detention time= 182.2 min calculated for 5.213 af (97% of inflow)
Center-of-Mass det. time= 163.2 min ( 939.2 - 776.0 )

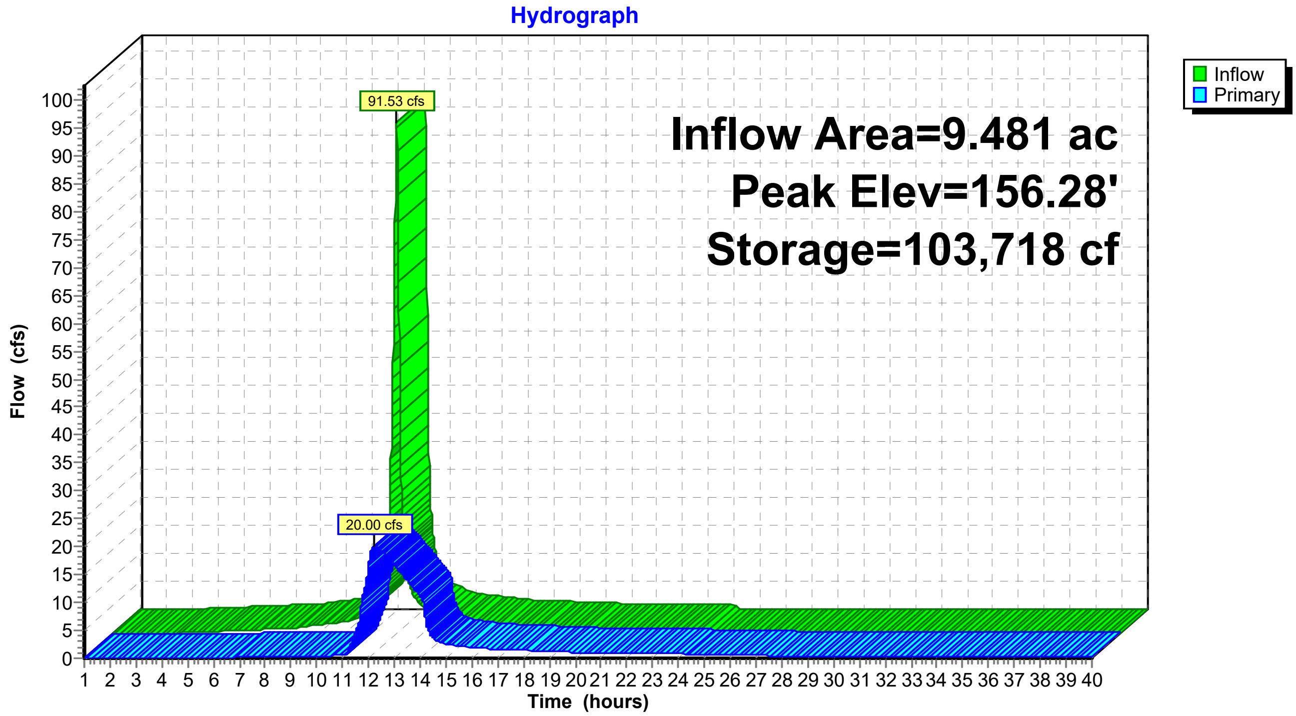
| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 150.00' | 169,025 cf | **Custom Stage Data (Prismatic)** Listed below (Recalc) |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 150.00 | 15,890 | 0 | 0 |
| 160.00 | 17,915 | 169,025 | 169,025 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 150.00' | **18.0" Round Culvert**<br>L= 50.0' CPP, square edge headwall, Ke= 0.500<br>Inlet / Outlet Invert= 150.00' / 149.50' S= 0.0100 '/' Cc= 0.900<br>n= 0.011 Concrete pipe, straight & clean, Flow Area= 1.77 sf |
| #2 | Device 1 | 150.00' | **4.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads |
| #3 | Device 1 | 151.75' | **24.0" x 24.0" Horiz. Orifice/Grate** C= 0.600<br>Limited to weir flow at low heads |

**Primary OutFlow** Max=20.00 cfs @ 12.23 hrs HW=156.28' TW=146.98' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 20.00 cfs @ 11.32 fps)
  ├─**2=Orifice/Grate** (Passes < 1.04 cfs potential flow)
  └─**3=Orifice/Grate** (Passes < 40.97 cfs potential flow)

## Pond 4P: Pocket Pond



## Summary for Pond 5P: Pocket Pond

Inflow Area = 39.934 ac, 38.00% Impervious, Inflow Depth = 5.98" for 100-Year Event event
Inflow = 246.33 cfs @ 12.15 hrs, Volume= 19.892 af
Outflow = 40.49 cfs @ 12.73 hrs, Volume= 18.218 af, Atten= 84%, Lag= 35.1 min
Primary = 40.49 cfs @ 12.73 hrs, Volume= 18.218 af
Routed to Reach 1R : Beaverkill

Routing by Sim-Route method, Time Span= 1.00-40.00 hrs, dt= 0.01 hrs
Peak Elev= 158.51' @ 12.73 hrs Surf.Area= 96,477 sf Storage= 447,344 cf

Plug-Flow detention time= 198.6 min calculated for 18.218 af (92% of inflow)
Center-of-Mass det. time= 153.9 min ( 961.1 - 807.3 )

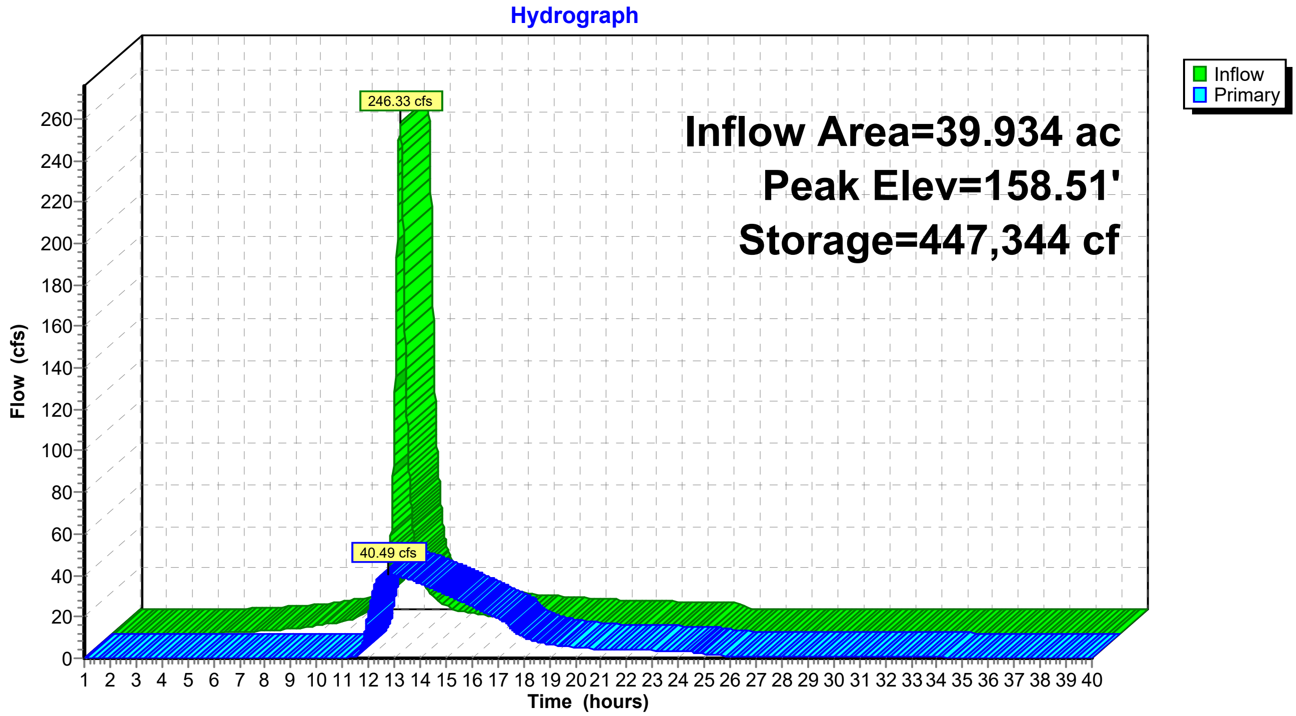
| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 153.00' | 597,195 cf | **Custom Stage Data (Prismatic)** Listed below (Recalc) |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 153.00 | 65,881 | 0 | 0 |
| 160.00 | 104,746 | 597,195 | 597,195 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 153.00' | **36.0" Round Culvert**<br>L= 50.0' CPP, square edge headwall, Ke= 0.500<br>Inlet / Outlet Invert= 153.00' / 152.00' S= 0.0200 '/' Cc= 0.900<br>n= 0.011 Concrete pipe, straight & clean, Flow Area= 7.07 sf |
| #2 | Device 1 | 153.00' | **4.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads |
| #3 | Device 1 | 154.30' | **24.0" x 24.0" Horiz. Orifice/Grate** C= 0.600<br>Limited to weir flow at low heads |

**Primary OutFlow** Max=40.49 cfs @ 12.73 hrs HW=158.51' TW=147.68' (Dynamic Tailwater)
└─**1=Culvert** (Passes 40.49 cfs of 68.16 cfs potential flow)
  ├─**2=Orifice/Grate** (Orifice Controls 0.97 cfs @ 11.13 fps)
  └─**3=Orifice/Grate** (Orifice Controls 39.52 cfs @ 9.88 fps)

## Pond 5P: Pocket Pond



## Summary for Pond 6P: Pocket Pond

Inflow Area = 42.396 ac, 30.00% Impervious, Inflow Depth = 5.74" for 100-Year Event event
Inflow = 140.27 cfs @ 12.53 hrs, Volume= 20.287 af
Outflow = 31.74 cfs @ 14.01 hrs, Volume= 18.126 af, Atten= 77%, Lag= 88.9 min
Primary = 31.74 cfs @ 14.01 hrs, Volume= 18.126 af
Routed to Reach 1R : Beaverkill

Routing by Sim-Route method, Time Span= 1.00-40.00 hrs, dt= 0.01 hrs
Peak Elev= 152.13' @ 13.62 hrs Surf.Area= 87,909 sf Storage= 452,457 cf

Plug-Flow detention time= 229.8 min calculated for 18.126 af (89% of inflow)
Center-of-Mass det. time= 176.1 min ( 1,017.7 - 841.6 )

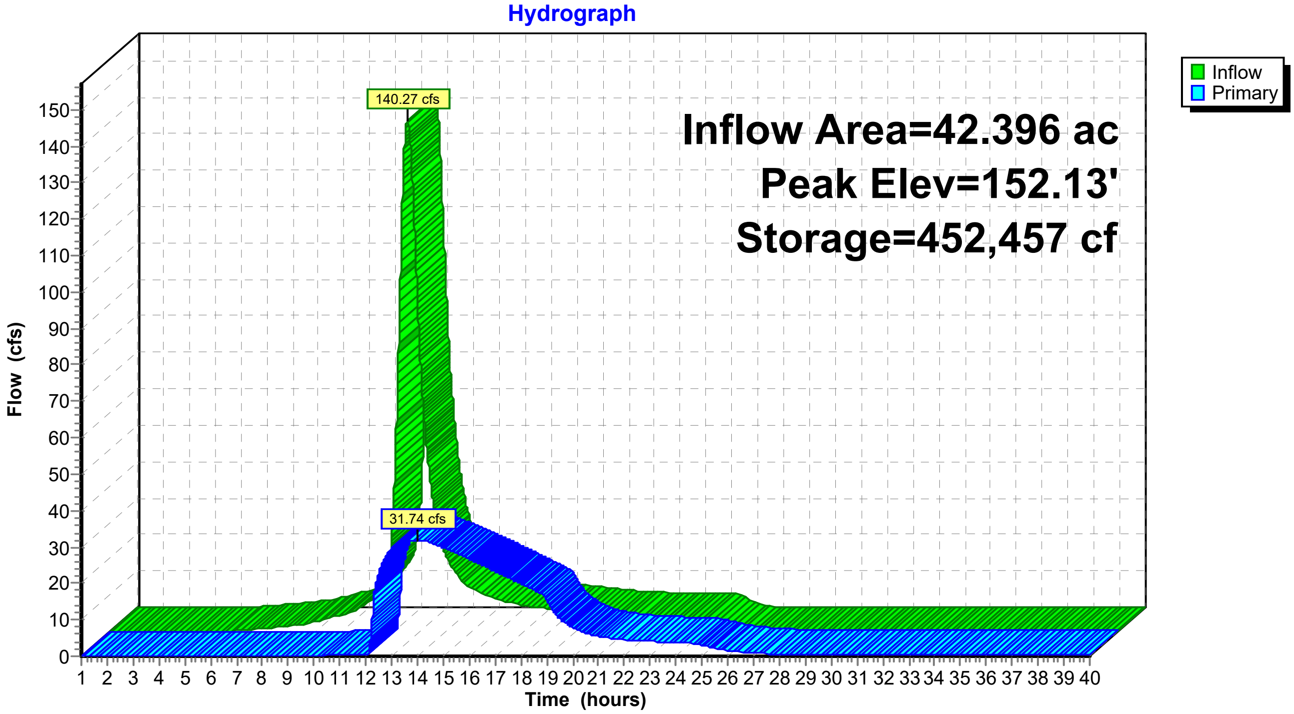
| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 146.50' | 621,484 cf | **Custom Stage Data (Prismatic)** Listed below (Recalc) |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 146.50 | 72,806 | 0 | 0 |
| 154.00 | 92,923 | 621,484 | 621,484 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 146.50' | **24.0" Round Culvert**<br>L= 50.0' CPP, square edge headwall, Ke= 0.500<br>Inlet / Outlet Invert= 146.50' / 146.00' S= 0.0100 '/' Cc= 0.900<br>n= 0.011 Concrete pipe, straight & clean, Flow Area= 3.14 sf |
| #2 | Device 1 | 146.50' | **4.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads |
| #3 | Device 1 | 148.00' | **24.0" x 24.0" Horiz. Orifice/Grate** C= 0.600<br>Limited to weir flow at low heads |

**Primary OutFlow** Max=31.76 cfs @ 14.01 hrs HW=152.04' TW=147.63' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 31.76 cfs @ 10.11 fps)
  ├─**2=Orifice/Grate** (Passes < 0.88 cfs potential flow)
  └─**3=Orifice/Grate** (Passes < 38.70 cfs potential flow)

## Pond 6P: Pocket Pond



## Summary for Pond 7P: Pocket Pond

Inflow Area = 16.853 ac, 30.00% Impervious, Inflow Depth = 5.74" for 100-Year Event event
Inflow = 99.30 cfs @ 12.15 hrs, Volume= 8.065 af
Outflow = 18.38 cfs @ 12.70 hrs, Volume= 7.350 af, Atten= 81%, Lag= 33.1 min
Primary = 18.38 cfs @ 12.70 hrs, Volume= 7.350 af
Routed to Reach 1R : Beaverkill

Routing by Sim-Route method, Time Span= 1.00-40.00 hrs, dt= 0.01 hrs
Peak Elev= 149.48' @ 12.70 hrs Surf.Area= 76,173 sf Storage= 180,467 cf

Plug-Flow detention time= 215.1 min calculated for 7.350 af (91% of inflow)
Center-of-Mass det. time= 168.5 min ( 981.1 - 812.6 )

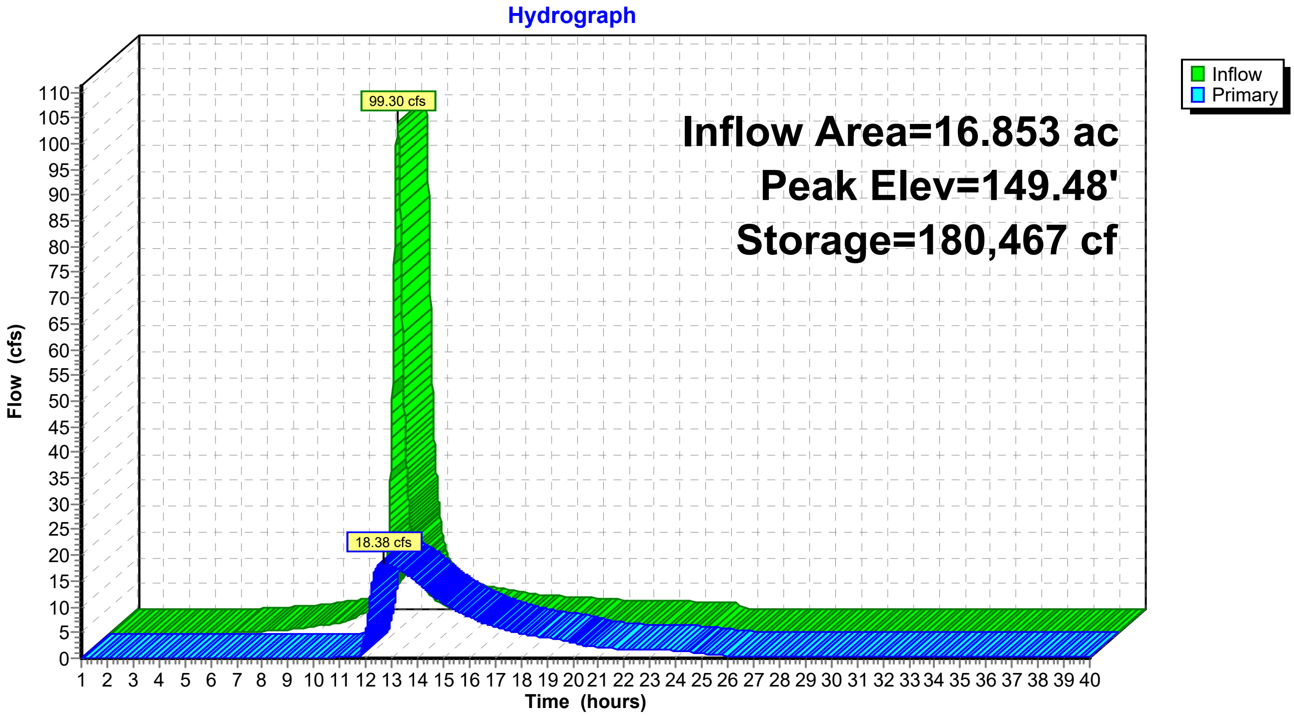
| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 147.00' | 734,018 cf | **Custom Stage Data (Prismatic)** Listed below (Recalc) |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 147.00 | 69,584 | 0 | 0 |
| 156.00 | 93,531 | 734,018 | 734,018 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 147.00' | **24.0" Round Culvert**<br>L= 50.0' CPP, square edge headwall, Ke= 0.500<br>Inlet / Outlet Invert= 147.00' / 146.50' S= 0.0100 '/' Cc= 0.900<br>n= 0.011 Concrete pipe, straight & clean, Flow Area= 3.14 sf |
| #2 | Device 1 | 147.00' | **4.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads |
| #3 | Device 1 | 147.60' | **36.0" x 36.0" Horiz. Orifice/Grate** C= 0.600<br>Limited to weir flow at low heads |

**Primary OutFlow** Max=18.38 cfs @ 12.70 hrs HW=149.48' TW=147.66' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 18.38 cfs @ 5.85 fps)
  ├─**2=Orifice/Grate** (Passes < 0.57 cfs potential flow)
  └─**3=Orifice/Grate** (Passes < 58.46 cfs potential flow)

## Pond 7P: Pocket Pond



## Summary for Pond 8P: Pocket Pond

Inflow Area = 24.219 ac, 30.00% Impervious, Inflow Depth = 5.74" for 100-Year Event event
Inflow = 142.34 cfs @ 12.15 hrs, Volume= 11.589 af
Outflow = 32.83 cfs @ 12.57 hrs, Volume= 10.576 af, Atten= 77%, Lag= 25.0 min
Primary = 32.83 cfs @ 12.57 hrs, Volume= 10.576 af
Routed to Reach 1R : Beaverkill

Routing by Sim-Route method, Time Span= 1.00-40.00 hrs, dt= 0.01 hrs
Peak Elev= 152.22' @ 12.62 hrs Surf.Area= 49,065 sf Storage= 237,209 cf

Plug-Flow detention time= 190.2 min calculated for 10.573 af (91% of inflow)
Center-of-Mass det. time= 144.4 min ( 957.1 - 812.7 )

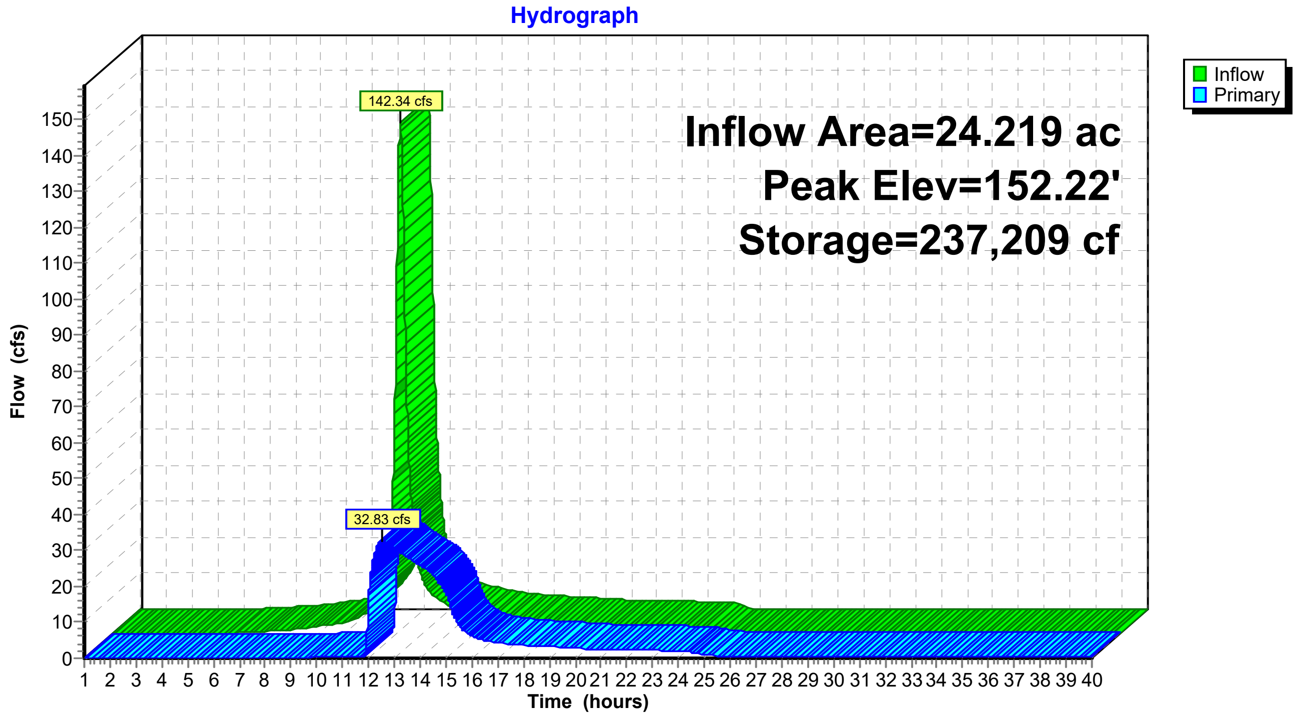
| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 146.50' | 383,826 cf | **Custom Stage Data (Prismatic)** Listed below (Recalc) |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 146.50 | 33,862 | 0 | 0 |
| 155.00 | 56,450 | 383,826 | 383,826 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 146.50' | **24.0" Round Culvert**<br>L= 50.0' CPP, square edge headwall, Ke= 0.500<br>Inlet / Outlet Invert= 146.50' / 146.00' S= 0.0100 '/' Cc= 0.900<br>n= 0.011 Concrete pipe, straight & clean, Flow Area= 3.14 sf |
| #2 | Device 1 | 146.50' | **4.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads |
| #3 | Device 1 | 148.40' | **24.0" x 24.0" Horiz. Orifice/Grate** C= 0.600<br>Limited to weir flow at low heads |

**Primary OutFlow** Max=32.79 cfs @ 12.57 hrs HW=152.21' TW=147.51' (Dynamic Tailwater)
**1=Culvert** (Inlet Controls 32.79 cfs @ 10.44 fps)
**2=Orifice/Grate** (Passes < 0.91 cfs potential flow)
**3=Orifice/Grate** (Passes < 37.59 cfs potential flow)

## Pond 8P: Pocket Pond



## Summary for Pond 9P: Pocket Pond

Inflow Area = 14.213 ac, 65.00% Impervious, Inflow Depth = 6.57" for 100-Year Event event
Inflow = 119.06 cfs @ 12.05 hrs, Volume= 7.779 af
Outflow = 29.51 cfs @ 12.32 hrs, Volume= 7.756 af, Atten= 75%, Lag= 16.5 min
Primary = 29.51 cfs @ 12.32 hrs, Volume= 7.756 af
Routed to Reach 3R : Beaverkill Trib

Routing by Sim-Route method, Time Span= 1.00-40.00 hrs, dt= 0.01 hrs
Peak Elev= 224.81' @ 12.32 hrs Surf.Area= 33,332 sf Storage= 127,836 cf

Plug-Flow detention time= 75.2 min calculated for 7.754 af (100% of inflow)
Center-of-Mass det. time= 73.5 min ( 859.3 - 785.8 )

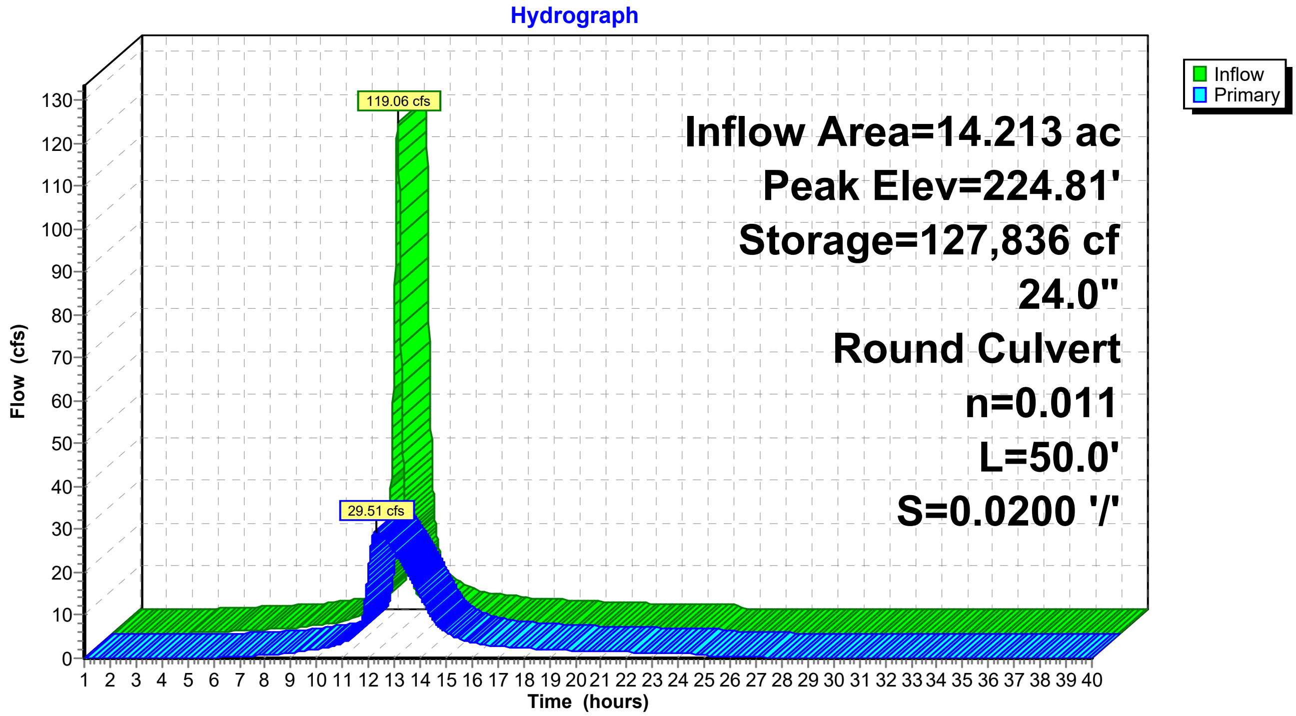
| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 220.00' | 338,770 cf | **Custom Stage Data (Prismatic)** Listed below (Recalc) |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 220.00 | 19,876 | 0 | 0 |
| 230.00 | 47,878 | 338,770 | 338,770 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 220.00' | **24.0" Round Culvert**<br>L= 50.0' CPP, square edge headwall, Ke= 0.500<br>Inlet / Outlet Invert= 220.00' / 219.00' S= 0.0200 '/' Cc= 0.900<br>n= 0.011 Concrete pipe, straight & clean, Flow Area= 3.14 sf |

**Primary OutFlow** Max=29.51 cfs @ 12.32 hrs HW=224.81' TW=202.00' (Dynamic Tailwater)
↑**1=Culvert** (Inlet Controls 29.51 cfs @ 9.39 fps)

## Pond 9P: Pocket Pond



## Summary for Pond 10P: Pocket Pond

Inflow Area = 17.433 ac, 30.00% Impervious, Inflow Depth = 5.74" for 100-Year Event event
Inflow = 77.76 cfs @ 12.29 hrs, Volume= 8.342 af
Outflow = 0.00 cfs @ 1.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min
Primary = 0.00 cfs @ 1.00 hrs, Volume= 0.000 af
Routed to Reach 3R : Beaverkill Trib

Routing by Sim-Route method, Time Span= 1.00-40.00 hrs, dt= 0.01 hrs
Peak Elev= 185.61' @ 25.98 hrs Surf.Area= 74,540 sf Storage= 363,380 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no outflow)

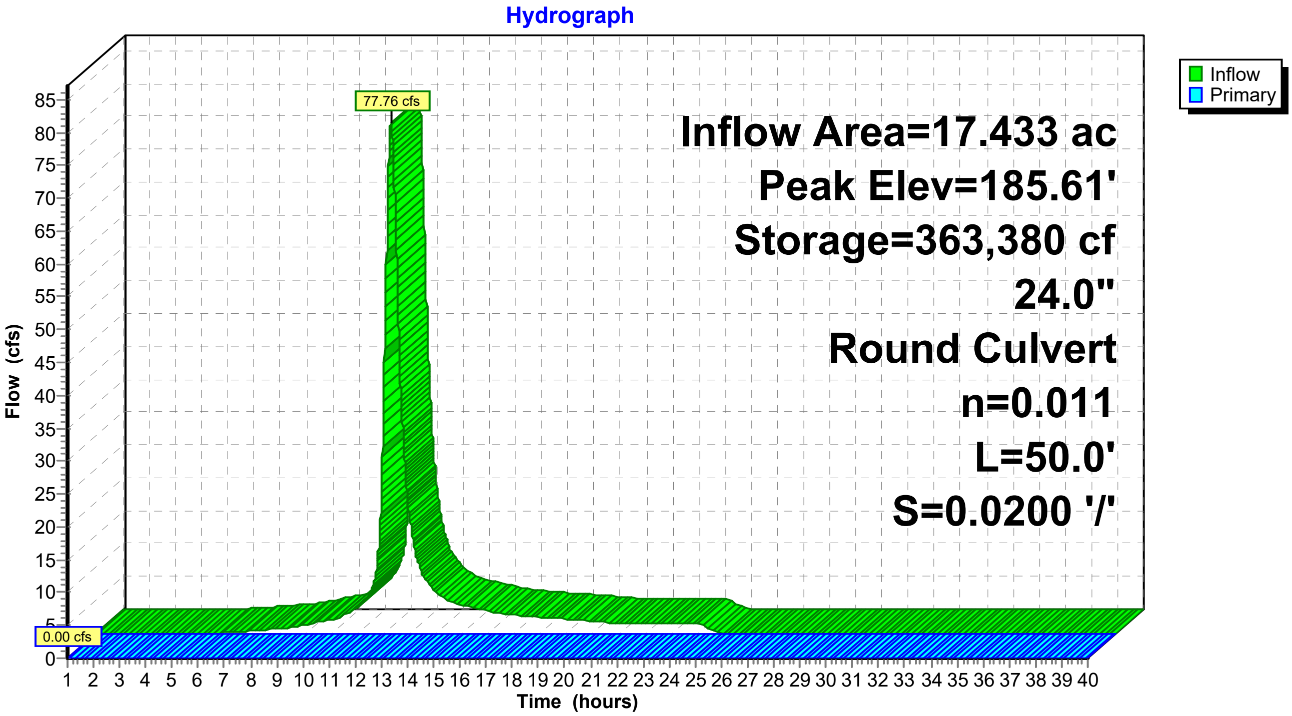
| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 180.00' | 724,100 cf | **Custom Stage Data (Prismatic)** Listed below (Recalc) |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 180.00 | 54,984 | 0 | 0 |
| 190.00 | 89,836 | 724,100 | 724,100 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 180.00' | **24.0" Round Culvert**<br>L= 50.0' CPP, square edge headwall, Ke= 0.500<br>Inlet / Outlet Invert= 180.00' / 179.00' S= 0.0200 '/' Cc= 0.900<br>n= 0.011 Concrete pipe, straight & clean, Flow Area= 3.14 sf |

**Primary OutFlow** Max=0.00 cfs @ 1.00 hrs HW=180.00' TW=200.00' (Dynamic Tailwater)
└─**1=Culvert** ( Controls 0.00 cfs)

## Pond 10P: Pocket Pond



## Summary for Pond 11P: Pocket Pond

Inflow Area = 26.813 ac, 30.00% Impervious, Inflow Depth = 5.74" for 100-Year Event event
Inflow = 179.22 cfs @ 12.09 hrs, Volume= 12.831 af
Outflow = 0.00 cfs @ 1.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min
Primary = 0.00 cfs @ 1.00 hrs, Volume= 0.000 af
Routed to Reach 3R : Beaverkill Trib

Routing by Sim-Route method, Time Span= 1.00-40.00 hrs, dt= 0.01 hrs
Peak Elev= 156.09' @ 25.01 hrs Surf.Area= 60,117 sf Storage= 558,902 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no outflow)

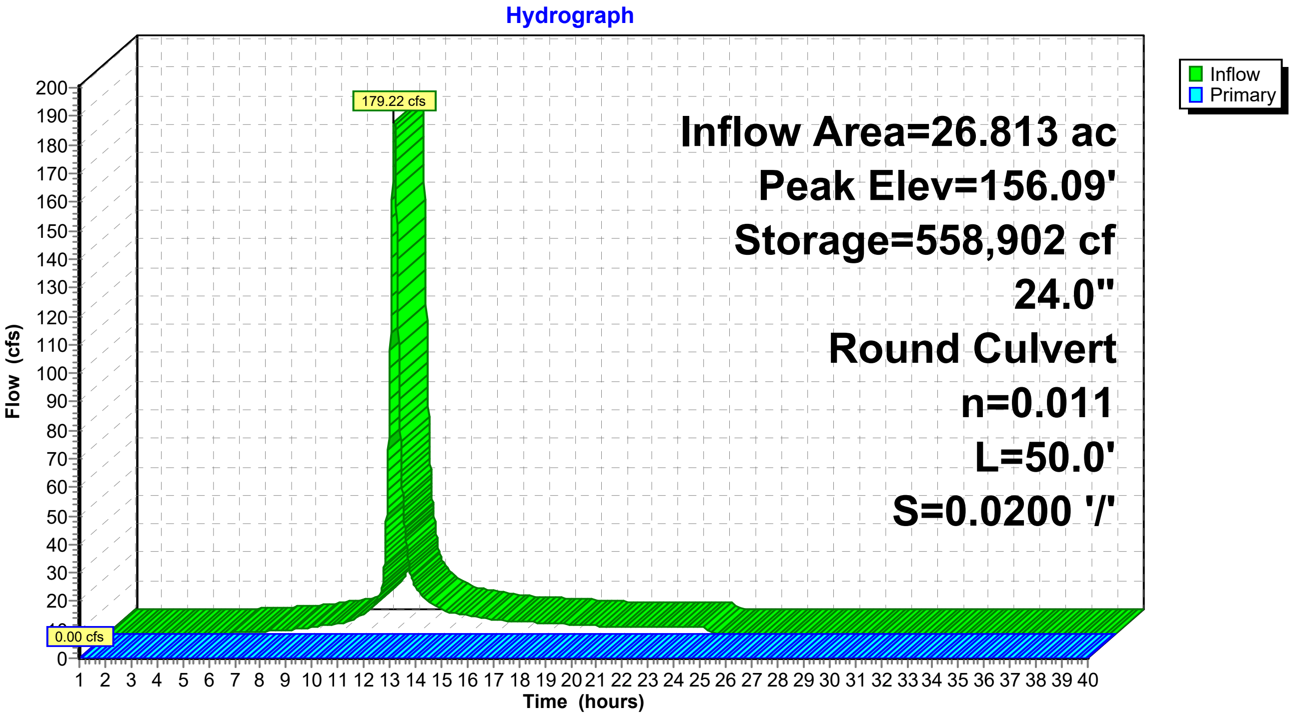
| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 145.00' | 807,405 cf | **Custom Stage Data (Prismatic)** Listed below (Recalc) |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 145.00 | 40,684 | 0 | 0 |
| 160.00 | 66,970 | 807,405 | 807,405 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 150.00' | **24.0" Round Culvert**<br>L= 50.0' CPP, square edge headwall, Ke= 0.500<br>Inlet / Outlet Invert= 150.00' / 149.00' S= 0.0200 '/' Cc= 0.900<br>n= 0.011 Concrete pipe, straight & clean, Flow Area= 3.14 sf |

**Primary OutFlow** Max=0.00 cfs @ 1.00 hrs HW=145.00' TW=200.00' (Dynamic Tailwater)
└─**1=Culvert** ( Controls 0.00 cfs)

## Pond 11P: Pocket Pond



## Summary for Pond 12P: Pocket Pond

Inflow Area = 29.499 ac, 30.00% Impervious, Inflow Depth = 5.74" for 100-Year Event event
Inflow = 207.02 cfs @ 12.08 hrs, Volume= 14.116 af
Outflow = 39.17 cfs @ 12.49 hrs, Volume= 14.088 af, Atten= 81%, Lag= 24.5 min
Primary = 39.17 cfs @ 12.49 hrs, Volume= 14.088 af
Routed to Reach 3R : Beaverkill Trib

Routing by Sim-Route method, Time Span= 1.00-40.00 hrs, dt= 0.01 hrs
Peak Elev= 222.70' @ 12.49 hrs Surf.Area= 44,049 sf Storage= 251,550 cf

Plug-Flow detention time= 84.0 min calculated for 14.088 af (100% of inflow)
Center-of-Mass det. time= 82.7 min ( 889.6 - 806.9 )

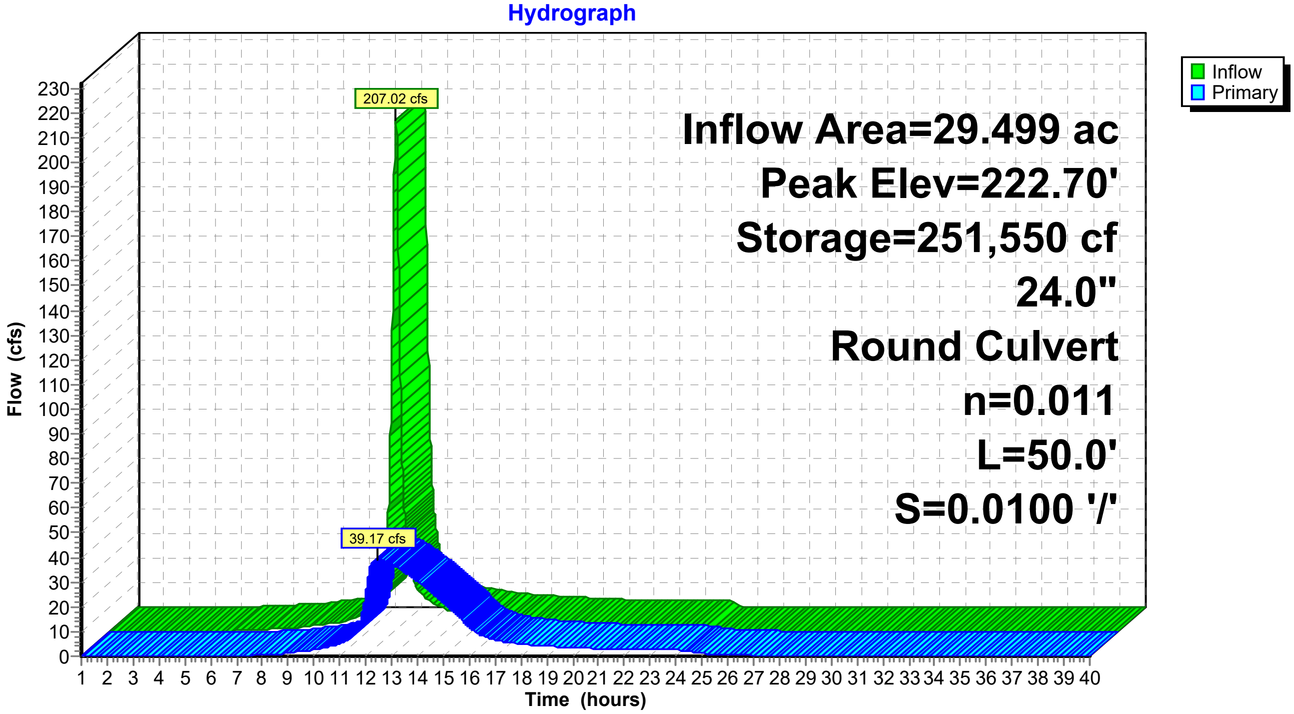
| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 215.00' | 360,450 cf | **Custom Stage Data (Prismatic)** Listed below (Recalc) |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 215.00 | 21,248 | 0 | 0 |
| 225.00 | 50,842 | 360,450 | 360,450 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 215.00' | **24.0" Round Culvert**<br>L= 50.0' CPP, square edge headwall, Ke= 0.500<br>Inlet / Outlet Invert= 215.00' / 214.50' S= 0.0100 '/' Cc= 0.900<br>n= 0.011 Concrete pipe, straight & clean, Flow Area= 3.14 sf |

**Primary OutFlow** Max=39.17 cfs @ 12.49 hrs HW=222.70' TW=202.15' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 39.17 cfs @ 12.47 fps)

## Pond 12P: Pocket Pond

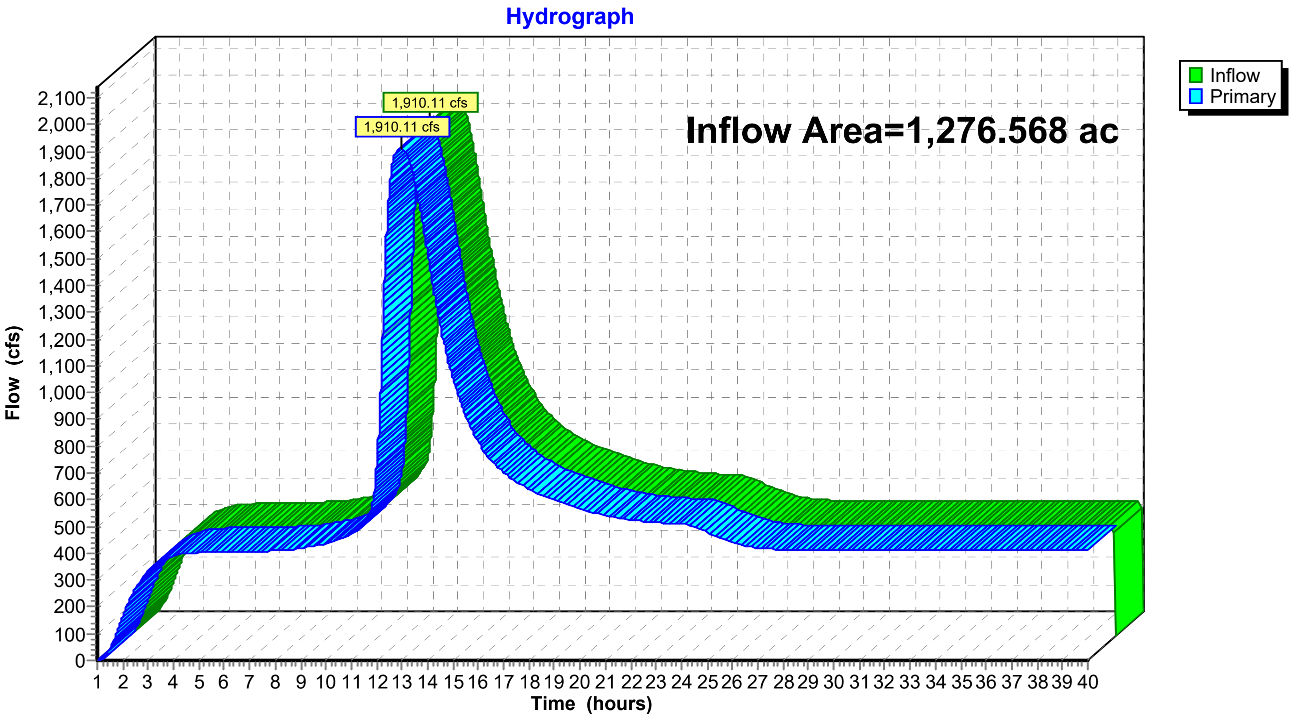


## Summary for Link AP-2: AP-2

Inflow Area = 1,276.568 ac, 10.66% Impervious, Inflow Depth > 16.39" for 100-Year Event event
Inflow = 1,910.11 cfs @ 12.95 hrs, Volume= 1,743.941 af
Primary = 1,910.11 cfs @ 12.96 hrs, Volume= 1,743.941 af, Atten= 0%, Lag= 0.6 min

Primary outflow = Inflow, Time Span= 1.00-40.00 hrs, dt= 0.01 hrs

### Link AP-2: AP-2



Time span=1.00-40.00 hrs, dt=0.01 hrs, 3901 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Sim-Route method - Pond routing by Sim-Route method

**Subcatchment2: DA 2** Runoff Area=202.288 ac 0.00% Impervious Runoff Depth=0.08"
Flow Length=3,062' Tc=43.1 min CN=70 Runoff=3.32 cfs 1.414 af

**Subcatchment2A: DA 2A** Runoff Area=36.879 ac 12.00% Impervious Runoff Depth=0.21"
Flow Length=4,070' Tc=194.7 min CN=77 Runoff=1.22 cfs 0.644 af

**Subcatchment2B: DA 2B** Runoff Area=55.045 ac 12.00% Impervious Runoff Depth=0.21"
Flow Length=3,070' Tc=79.3 min CN=77 Runoff=3.28 cfs 0.961 af

**Subcatchment2C: DA 2C** Runoff Area=31.804 ac 12.00% Impervious Runoff Depth=0.21"
Flow Length=3,344' Tc=74.8 min CN=77 Runoff=1.97 cfs 0.555 af

**Subcatchment2D: DA 2D** Runoff Area=39.716 ac 12.00% Impervious Runoff Depth=0.21"
Flow Length=2,728' Tc=45.7 min CN=77 Runoff=3.45 cfs 0.693 af

**Subcatchment2E: DA 2E** Runoff Area=45.892 ac 12.00% Impervious Runoff Depth=0.21"
Flow Length=2,892' Tc=48.7 min CN=77 Runoff=3.82 cfs 0.801 af

**Subcatchment2F: DA 2F** Runoff Area=42.396 ac 30.00% Impervious Runoff Depth=0.31"
Flow Length=1,411' Tc=53.7 min CN=81 Runoff=6.07 cfs 1.112 af

**Subcatchment2G: DA 2G** Runoff Area=16.853 ac 30.00% Impervious Runoff Depth=0.31"
Flow Length=552' Slope=0.0100 '/' Tc=22.4 min CN=81 Runoff=4.54 cfs 0.442 af

**Subcatchment2H: DA 2H** Runoff Area=24.219 ac 30.00% Impervious Runoff Depth=0.31"
Flow Length=559' Slope=0.0100 '/' Tc=22.5 min CN=81 Runoff=6.51 cfs 0.635 af

**Subcatchment3: DA 3** Runoff Area=436.528 ac 0.00% Impervious Runoff Depth=0.08"
Flow Length=2,575' Tc=81.9 min CN=70 Runoff=5.71 cfs 3.050 af

**Subcatchment3A: DA 3A** Runoff Area=52.953 ac 0.00% Impervious Runoff Depth=0.08"
Flow Length=1,950' Tc=50.8 min CN=70 Runoff=0.82 cfs 0.370 af

**Subcatchment3B: DA 3B** Runoff Area=14.213 ac 65.00% Impervious Runoff Depth=0.58"
Flow Length=288' Tc=13.6 min CN=88 Runoff=11.07 cfs 0.689 af

**Subcatchment3C: DA 3C** Runoff Area=20.730 ac 65.00% Impervious Runoff Depth=0.58"
Flow Length=741' Tc=36.3 min CN=88 Runoff=8.83 cfs 1.004 af

**Subcatchment3D: DA 3D** Runoff Area=29.499 ac 30.00% Impervious Runoff Depth=0.31"
Flow Length=370' Tc=16.2 min CN=81 Runoff=9.86 cfs 0.774 af

**Subcatchment3E: DA 3E** Runoff Area=17.433 ac 30.00% Impervious Runoff Depth=0.31"
Flow Length=302' Tc=35.1 min CN=81 Runoff=3.42 cfs 0.457 af

**Subcatchment3F: DA 3F** Runoff Area=26.813 ac 30.00% Impervious Runoff Depth=0.31"
Flow Length=488' Tc=17.8 min CN=81 Runoff=8.44 cfs 0.703 af

**Subcatchment3G: DA 3G** Runoff Area=39.934 ac 38.00% Impervious Runoff Depth=0.38"
Flow Length=684' Tc=22.0 min CN=83 Runoff=14.06 cfs 1.261 af

**Subcatchment4: DA 4** Runoff Area=58.713 ac 0.47% Impervious Runoff Depth=0.08"
Flow Length=1,537' Tc=62.2 min CN=70 Runoff=0.85 cfs 0.410 af

**Subcatchment4A: DA 4A** Runoff Area=40.328 ac 38.00% Impervious Runoff Depth=0.38"
Flow Length=1,258' Tc=39.5 min CN=83 Runoff=9.42 cfs 1.273 af

**Subcatchment4B: DA 4B** Runoff Area=9.481 ac 65.00% Impervious Runoff Depth=0.68"
Flow Length=196' Tc=9.8 min CN=90 Runoff=10.07 cfs 0.540 af

**Subcatchment5: DA 5** Runoff Area=34.851 ac 12.00% Impervious Runoff Depth=0.21"
Flow Length=2,150' Tc=22.6 min CN=77 Runoff=4.93 cfs 0.608 af

**Reach 1R: Beaverkill** Avg. Flow Depth=1.49' Max Vel=2.25 fps Inflow=423.41 cfs 1,294.894 af
n=0.030 L=4,728.0' S=0.0021 '/' Capacity=2,310.71 cfs Outflow=421.96 cfs 1,275.394 af

**Reach 2R: Beaverkill** Avg. Flow Depth=1.49' Max Vel=2.17 fps Inflow=340.61 cfs 1,080.187 af
n=0.030 L=6,756.0' S=0.0021 '/' Capacity=1,684.63 cfs Outflow=339.83 cfs 1,056.448 af

**Reach 3R: Beaverkill Trib** Avg. Flow Depth=0.64' Max Vel=9.08 fps Inflow=84.12 cfs 235.829 af
n=0.025 L=1,000.0' S=0.0535 '/' Capacity=1,071.30 cfs Outflow=84.12 cfs 235.697 af

**Reach 4R: Beaverkill Trib** Avg. Flow Depth=0.61' Max Vel=8.85 fps Inflow=78.05 cfs 234.038 af
n=0.030 L=2,239.0' S=0.0768 '/' Capacity=688.52 cfs Outflow=78.03 cfs 233.668 af

**Pond 1P: Existing Pond** Peak Elev=205.88' Storage=73,942 cf Inflow=11.62 cfs 1.697 af
Outflow=0.00 cfs 0.000 af

**Pond 2P: Pocket Pond** Peak Elev=393.15' Storage=26,170 cf Inflow=1.22 cfs 0.644 af
Outflow=0.05 cfs 0.086 af

**Pond 3P: Pocket Pond** Peak Elev=146.96' Storage=46,751 cf Inflow=9.42 cfs 1.273 af
Outflow=0.23 cfs 0.457 af

**Pond 4P: Pocket Pond** Peak Elev=150.87' Storage=13,871 cf Inflow=10.07 cfs 0.540 af
Outflow=0.35 cfs 0.495 af

**Pond 5P: Pocket Pond** Peak Elev=153.64' Storage=43,464 cf Inflow=14.06 cfs 1.261 af
Outflow=0.29 cfs 0.590 af

**Pond 6P: Pocket Pond** Peak Elev=147.03' Storage=38,726 cf Inflow=6.07 cfs 1.112 af
Outflow=0.25 cfs 0.496 af

**Pond 7P: Pocket Pond** Peak Elev=147.23' Storage=15,811 cf Inflow=4.54 cfs 0.442 af
Outflow=0.10 cfs 0.180 af

**Pond 8P: Pocket Pond** Peak Elev=147.02' Storage=17,897 cf Inflow=6.51 cfs 0.635 af
Outflow=0.25 cfs 0.458 af

**Pond 9P: Pocket Pond** Peak Elev=220.59' Storage=12,172 cf Inflow=11.07 cfs 0.689 af
24.0" Round Culvert n=0.011 L=50.0' S=0.0200 '/' Outflow=2.01 cfs 0.669 af

**Pond 10P: Pocket Pond** Peak Elev=180.36' Storage=19,912 cf Inflow=3.42 cfs 0.457 af
24.0" Round Culvert n=0.011 L=50.0' S=0.0200 '/' Outflow=0.00 cfs 0.000 af

**Pond 11P: Pocket Pond** Peak Elev=145.74' Storage=30,631 cf Inflow=8.44 cfs 0.703 af
24.0" Round Culvert n=0.011 L=50.0' S=0.0200 '/' Outflow=0.00 cfs 0.000 af

**Pond 12P: Pocket Pond** Peak Elev=215.52' Storage=11,446 cf Inflow=9.86 cfs 0.774 af
24.0" Round Culvert n=0.011 L=50.0' S=0.0100 '/' Outflow=1.59 cfs 0.751 af

**Link AP-2: AP-2** Inflow=424.43 cfs 1,276.471 af
Primary=424.43 cfs 1,276.471 af

**Total Runoff Area = 1,276.568 ac Runoff Volume = 18.396 af Average Runoff Depth = 0.17"**
**89.34% Pervious = 1,140.451 ac 10.66% Impervious = 136.117 ac**

## Summary for Subcatchment 2: DA 2

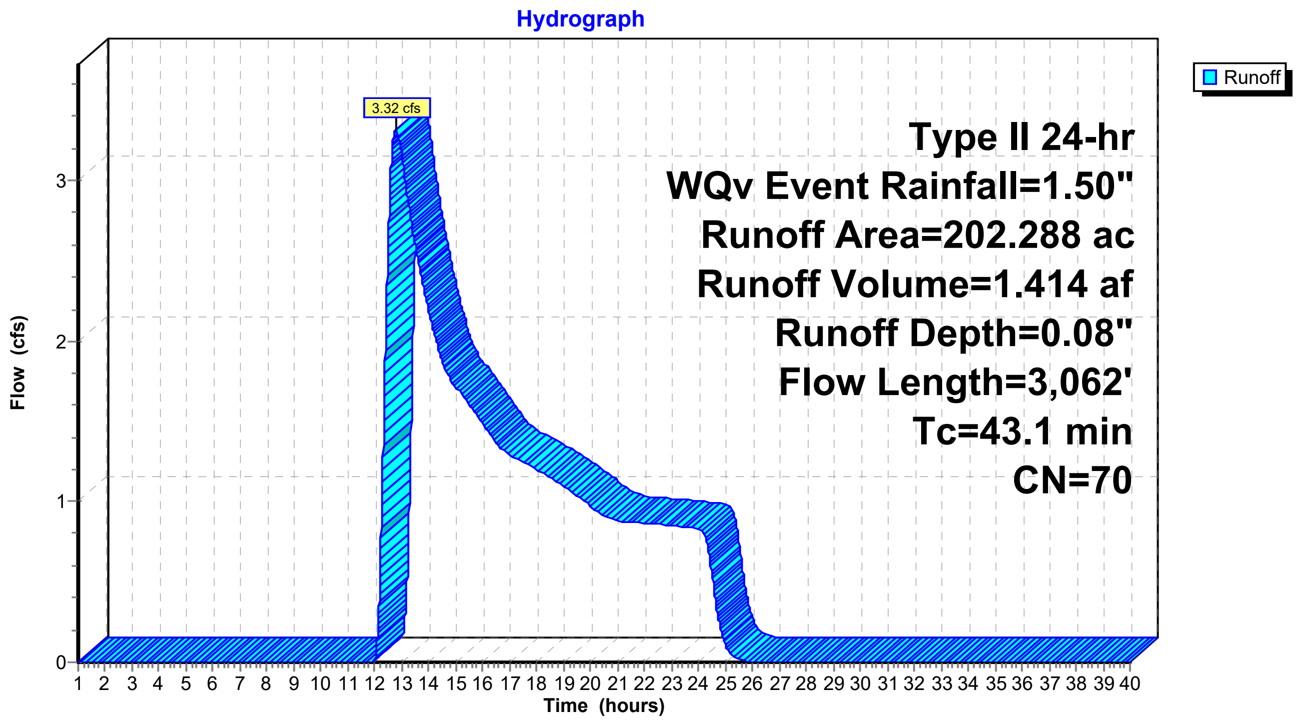
Runoff = 3.32 cfs @ 12.78 hrs, Volume= 1.414 af, Depth= 0.08"
Routed to Link AP-2 : AP-2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-40.00 hrs, dt= 0.01 hrs
Type II 24-hr WQv Event Rainfall=1.50"

| Area (ac) | CN | Description |
|---|---|---|
| 202.288 | 70 | Woods, Good, HSG C |
| 202.288 | | 100.00% Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 34.5 | 100 | 0.0200 | 0.05 | | **Sheet Flow, Woods**<br>Woods: Dense underbrush n= 0.800 P2= 3.75" |
| 8.6 | 2,962 | 0.1280 | 5.76 | | **Shallow Concentrated Flow, Woods**<br>Unpaved Kv= 16.1 fps |
| 43.1 | 3,062 | Total | | | |

### Subcatchment 2: DA 2



## Summary for Subcatchment 2A: DA 2A

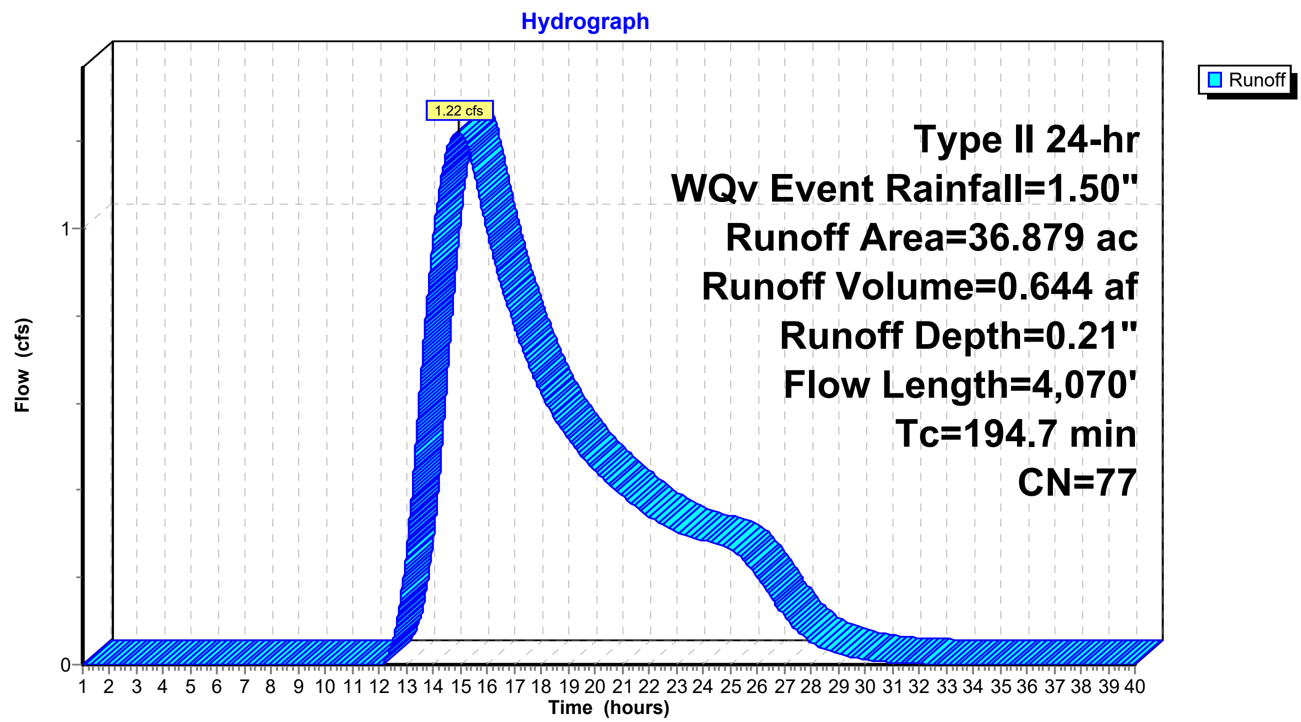
Runoff = 1.22 cfs @ 14.93 hrs, Volume= 0.644 af, Depth= 0.21"
Routed to Pond 2P : Pocket Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-40.00 hrs, dt= 0.01 hrs
Type II 24-hr WQv Event Rainfall=1.50"

| Area (ac) | CN | Description |
|---|---|---|
| 36.879 | 77 | 2 acre lots, 12% imp, HSG C |
| 32.454 | | 88.00% Pervious Area |
| 4.425 | | 12.00% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 23.9 | 100 | 0.0500 | 0.07 | | **Sheet Flow, Woods**<br>Woods: Dense underbrush n= 0.800 P2= 3.75" |
| 170.8 | 3,970 | 0.0240 | 0.39 | | **Shallow Concentrated Flow, Woods**<br>Forest w/Heavy Litter Kv= 2.5 fps |
| 194.7 | 4,070 | Total | | | |

### Subcatchment 2A: DA 2A



## Summary for Subcatchment 2B: DA 2B

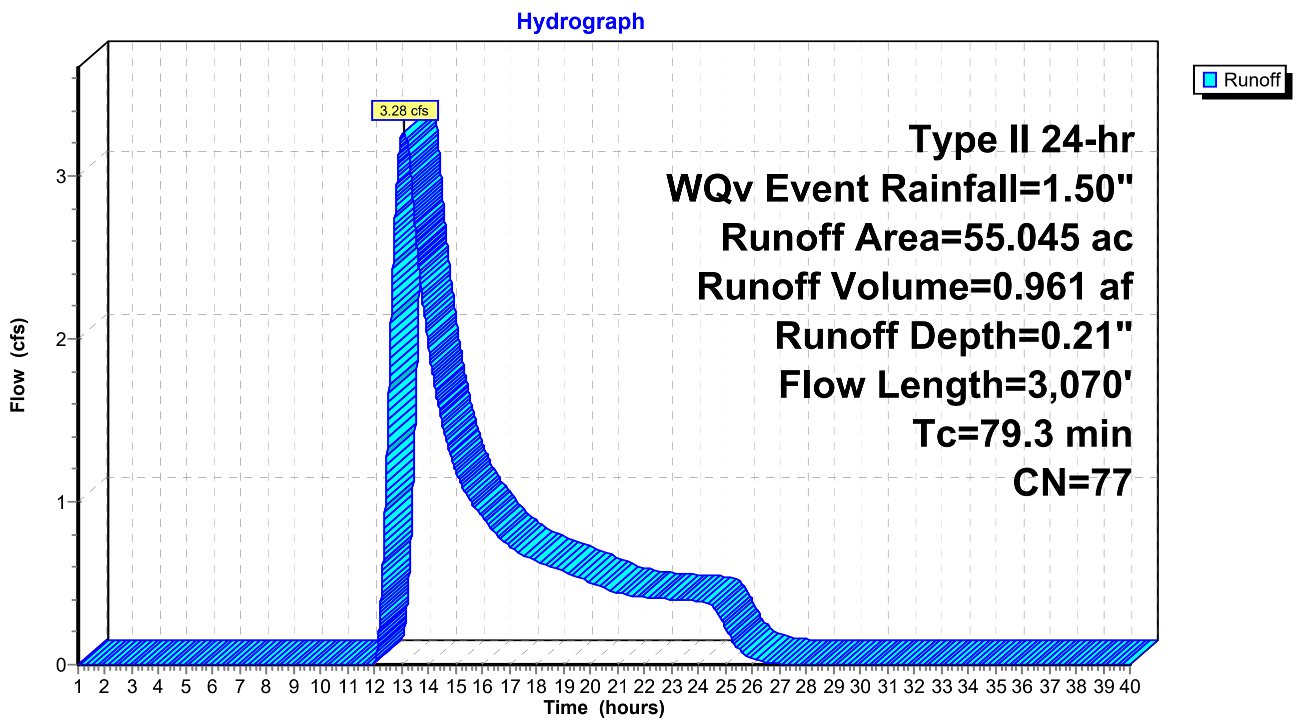
Runoff = 3.28 cfs @ 13.12 hrs, Volume= 0.961 af, Depth= 0.21"
Routed to Reach 4R : Beaverkill Trib

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-40.00 hrs, dt= 0.01 hrs
Type II 24-hr WQv Event Rainfall=1.50"

| Area (ac) | CN | Description |
|---|---|---|
| 55.045 | 77 | 2 acre lots, 12% imp, HSG C |
| 48.440 | | 88.00% Pervious Area |
| 6.605 | | 12.00% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 15.4 | 100 | 0.1500 | 0.11 | | **Sheet Flow, Woods**<br>Woods: Dense underbrush n= 0.800 P2= 3.75" |
| 63.9 | 2,970 | 0.0240 | 0.77 | | **Shallow Concentrated Flow, Woods**<br>Woodland Kv= 5.0 fps |
| 79.3 | 3,070 | Total | | | |

## Subcatchment 2B: DA 2B



## Summary for Subcatchment 2C: DA 2C

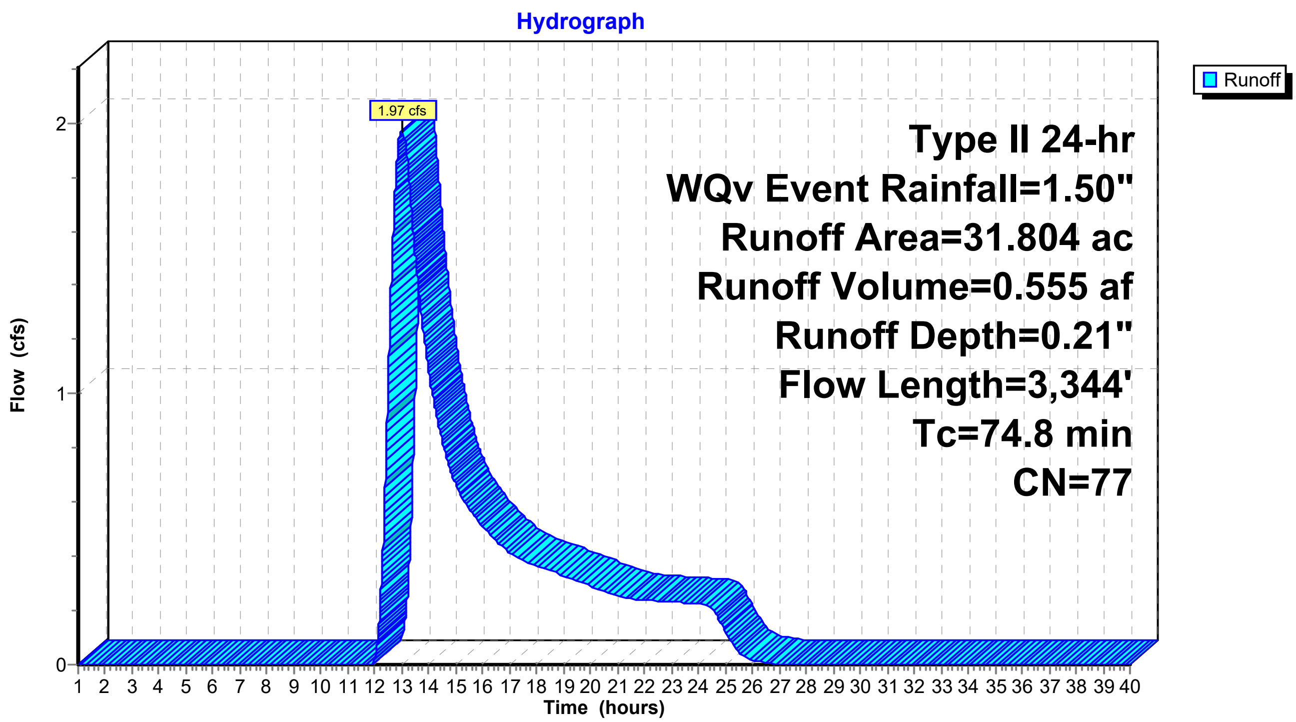
Runoff = 1.97 cfs @ 13.04 hrs, Volume= 0.555 af, Depth= 0.21"
Routed to Reach 4R : Beaverkill Trib

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-40.00 hrs, dt= 0.01 hrs
Type II 24-hr WQv Event Rainfall=1.50"

| Area (ac) | CN | Description |
|---|---|---|
| 31.804 | 77 | 2 acre lots, 12% imp, HSG C |
| 27.988 | | 88.00% Pervious Area |
| 3.816 | | 12.00% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 32.1 | 100 | 0.0240 | 0.05 | | **Sheet Flow, Woods**<br>Woods: Dense underbrush n= 0.800 P2= 3.75" |
| 42.7 | 3,244 | 0.0640 | 1.26 | | **Shallow Concentrated Flow, Woods**<br>Woodland Kv= 5.0 fps |
| 74.8 | 3,344 | Total | | | |

### Subcatchment 2C: DA 2C



## Summary for Subcatchment 2D: DA 2D

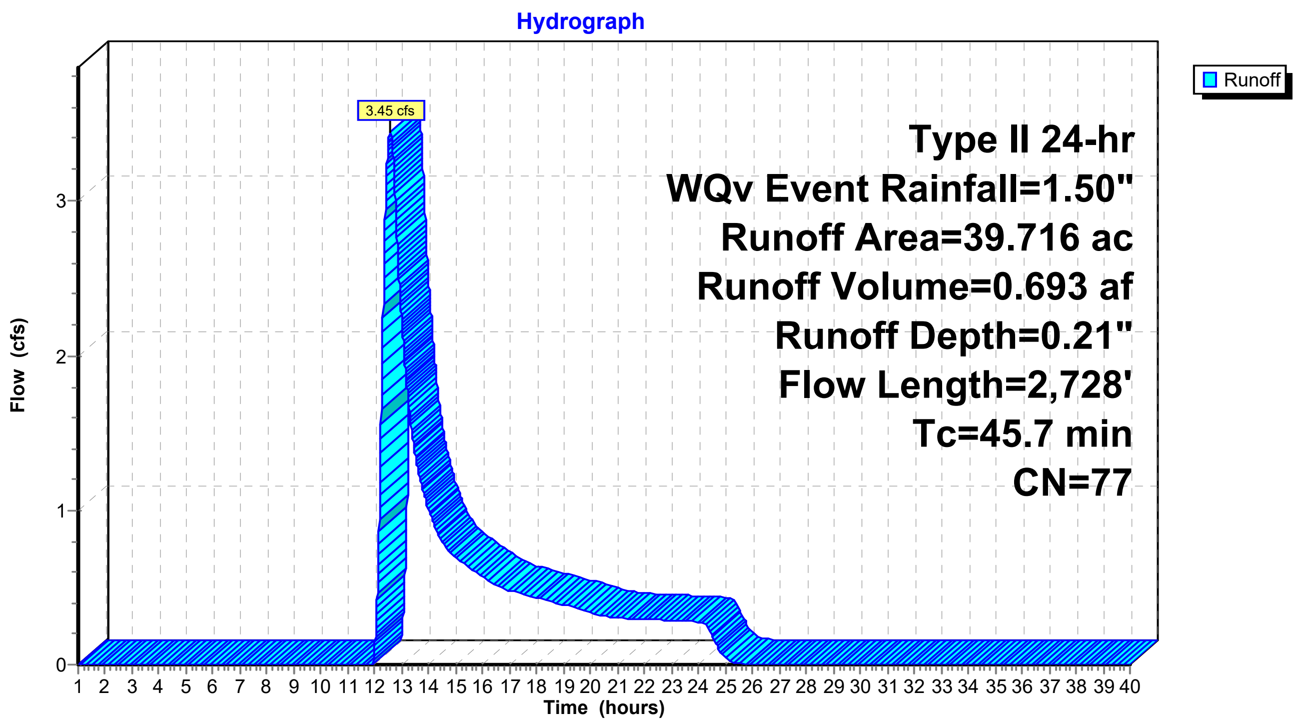
Runoff = 3.45 cfs @ 12.55 hrs, Volume= 0.693 af, Depth= 0.21"
Routed to Pond 1P : Existing Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-40.00 hrs, dt= 0.01 hrs
Type II 24-hr WQv Event Rainfall=1.50"

| Area (ac) | CN | Description |
|---|---|---|
| 39.716 | 77 | 2 acre lots, 12% imp, HSG C |
| 34.950 | | 88.00% Pervious Area |
| 4.766 | | 12.00% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 32.1 | 100 | 0.0240 | 0.05 | | **Sheet Flow, Woods** Woods: Dense underbrush n= 0.800 P2= 3.75" |
| 13.6 | 2,628 | 0.0460 | 3.22 | | **Shallow Concentrated Flow, Lawn** Grassed Waterway Kv= 15.0 fps |
| 45.7 | 2,728 | Total | | | |

## Subcatchment 2D: DA 2D



## Summary for Subcatchment 2E: DA 2E

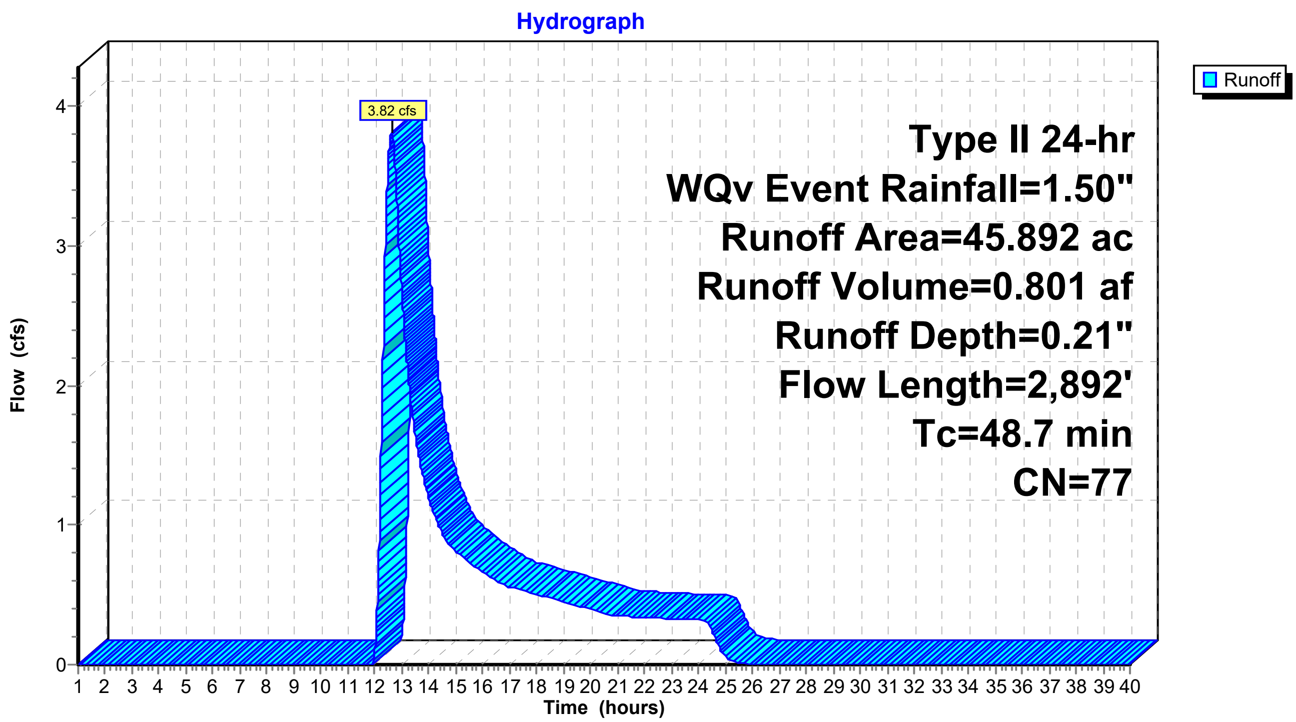
Runoff = 3.82 cfs @ 12.61 hrs, Volume= 0.801 af, Depth= 0.21"
Routed to Reach 3R : Beaverkill Trib

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-40.00 hrs, dt= 0.01 hrs
Type II 24-hr WQv Event Rainfall=1.50"

| Area (ac) | CN | Description |
|---|---|---|
| 45.892 | 77 | 2 acre lots, 12% imp, HSG C |
| 40.385 | | 88.00% Pervious Area |
| 5.507 | | 12.00% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 32.1 | 100 | 0.0240 | 0.05 | | **Sheet Flow, Woods** Woods: Dense underbrush n= 0.800 P2= 3.75" |
| 16.6 | 2,792 | 0.0350 | 2.81 | | **Shallow Concentrated Flow, Lawn** Grassed Waterway Kv= 15.0 fps |
| 48.7 | 2,892 | Total | | | |

## Subcatchment 2E: DA 2E



## Summary for Subcatchment 2F: DA 2F

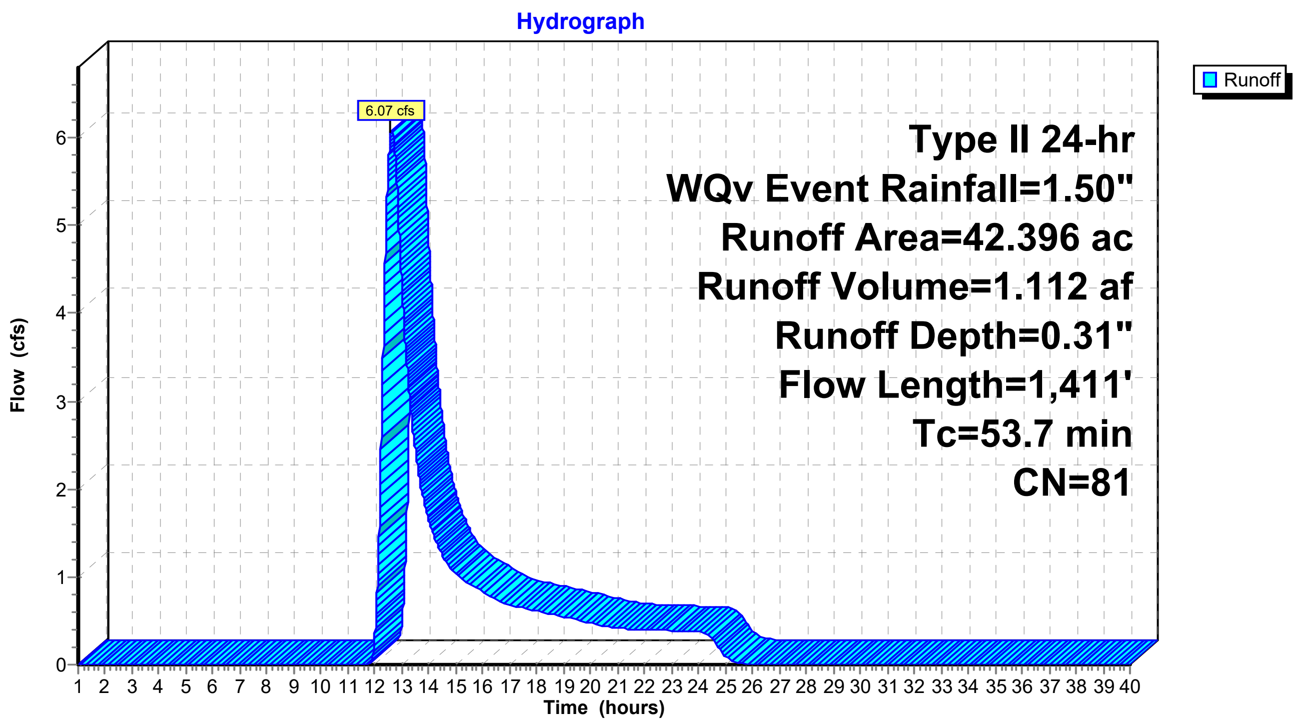
Runoff = 6.07 cfs @ 12.60 hrs, Volume= 1.112 af, Depth= 0.31"
Routed to Pond 6P : Pocket Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-40.00 hrs, dt= 0.01 hrs
Type II 24-hr WQv Event Rainfall=1.50"

| Area (ac) | CN | Description |
|---|---|---|
| 42.396 | 81 | 1/3 acre lots, 30% imp, HSG C |
| 29.677 | | 70.00% Pervious Area |
| 12.719 | | 30.00% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 34.5 | 100 | 0.0200 | 0.05 | | **Sheet Flow, Woods** Woods: Dense underbrush n= 0.800 P2= 3.75" |
| 19.2 | 1,311 | 0.0520 | 1.14 | | **Shallow Concentrated Flow, Woods** Woodland Kv= 5.0 fps |
| 53.7 | 1,411 | Total | | | |

### Subcatchment 2F: DA 2F



## Summary for Subcatchment 2G: DA 2G

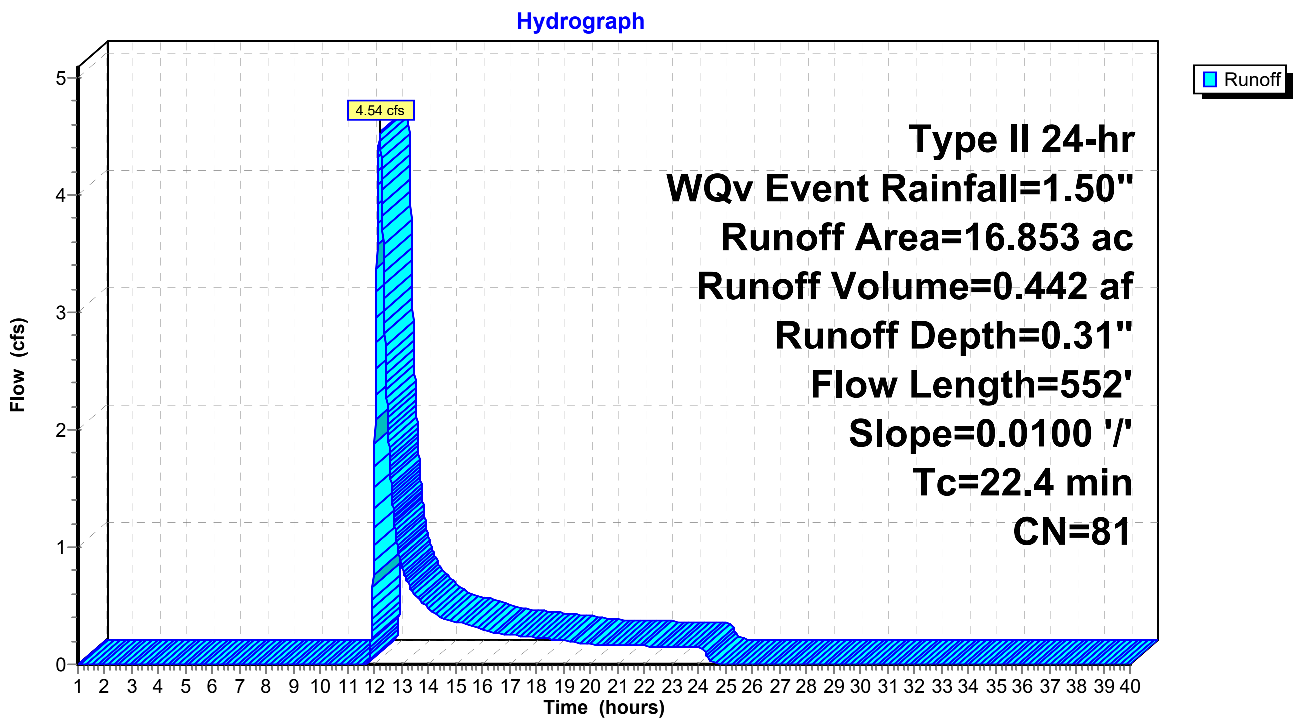
Runoff = 4.54 cfs @ 12.18 hrs, Volume= 0.442 af, Depth= 0.31"
Routed to Pond 7P : Pocket Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-40.00 hrs, dt= 0.01 hrs
Type II 24-hr WQv Event Rainfall=1.50"

| Area (ac) | CN | Description |
|---|---|---|
| 16.853 | 81 | 1/3 acre lots, 30% imp, HSG C |
| 11.797 | | 70.00% Pervious Area |
| 5.056 | | 30.00% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 17.4 | 100 | 0.0100 | 0.10 | | **Sheet Flow, Lawn**<br>Grass: Dense n= 0.240 P2= 3.75" |
| 5.0 | 452 | 0.0100 | 1.50 | | **Shallow Concentrated Flow, Lawn**<br>Grassed Waterway Kv= 15.0 fps |
| 22.4 | 552 | Total | | | |

### Subcatchment 2G: DA 2G



## Summary for Subcatchment 2H: DA 2H

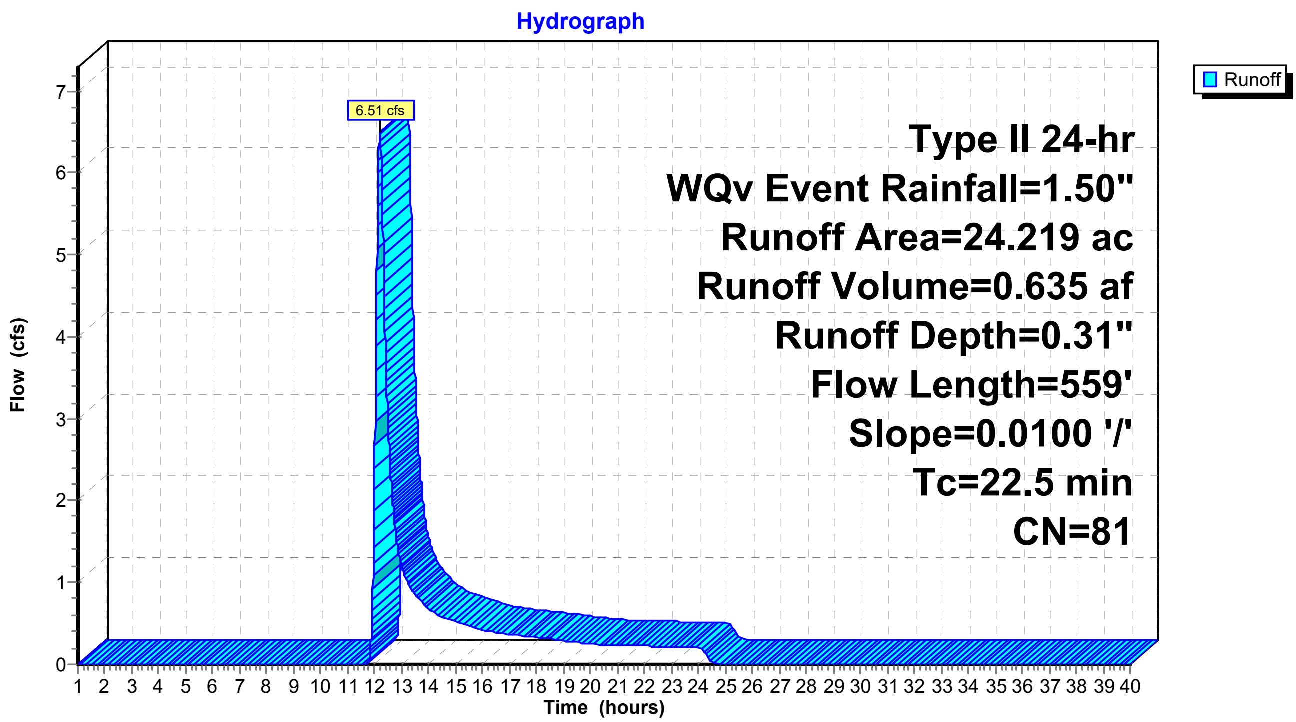
Runoff = 6.51 cfs @ 12.18 hrs, Volume= 0.635 af, Depth= 0.31"
Routed to Pond 8P : Pocket Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-40.00 hrs, dt= 0.01 hrs
Type II 24-hr WQv Event Rainfall=1.50"

| Area (ac) | CN | Description |
|---|---|---|
| 24.219 | 81 | 1/3 acre lots, 30% imp, HSG C |
| 16.953 | | 70.00% Pervious Area |
| 7.266 | | 30.00% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 17.4 | 100 | 0.0100 | 0.10 | | **Sheet Flow, Lawn** Grass: Dense n= 0.240 P2= 3.75" |
| 5.1 | 459 | 0.0100 | 1.50 | | **Shallow Concentrated Flow, Lawn** Grassed Waterway Kv= 15.0 fps |
| 22.5 | 559 | Total | | | |

### Subcatchment 2H: DA 2H



## Summary for Subcatchment 3: DA 3

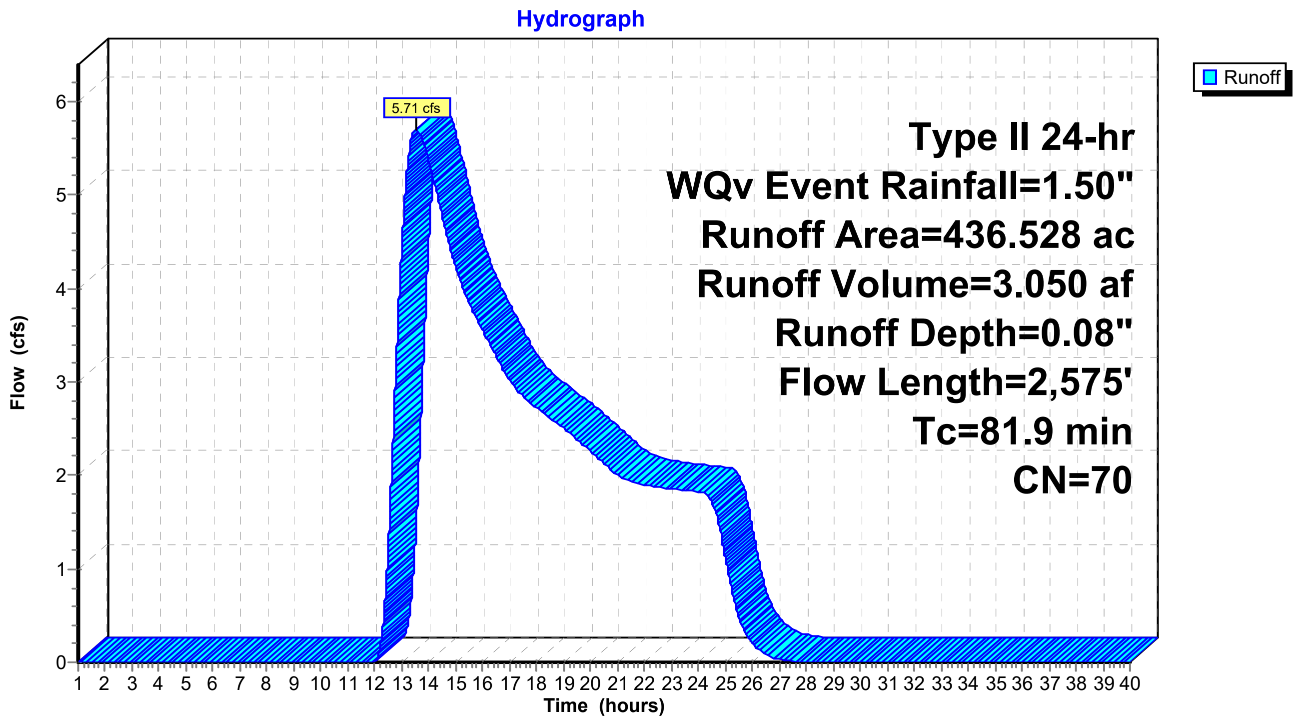
Runoff = 5.71 cfs @ 13.56 hrs, Volume= 3.050 af, Depth= 0.08"
Routed to Reach 2R : Beaverkill

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-40.00 hrs, dt= 0.01 hrs
Type II 24-hr WQv Event Rainfall=1.50"

| Area (ac) | CN | Description |
|---|---|---|
| 436.528 | 70 | Woods, Good, HSG C |
| 436.528 | | 100.00% Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 34.5 | 100 | 0.0200 | 0.05 | | **Sheet Flow, Woods**<br>Woods: Dense underbrush n= 0.800 P2= 3.75" |
| 47.4 | 2,475 | 0.1210 | 0.87 | | **Shallow Concentrated Flow, Woods**<br>Forest w/Heavy Litter Kv= 2.5 fps |
| 81.9 | 2,575 | Total | | | |

### Subcatchment 3: DA 3



## Summary for Subcatchment 3A: DA 3A

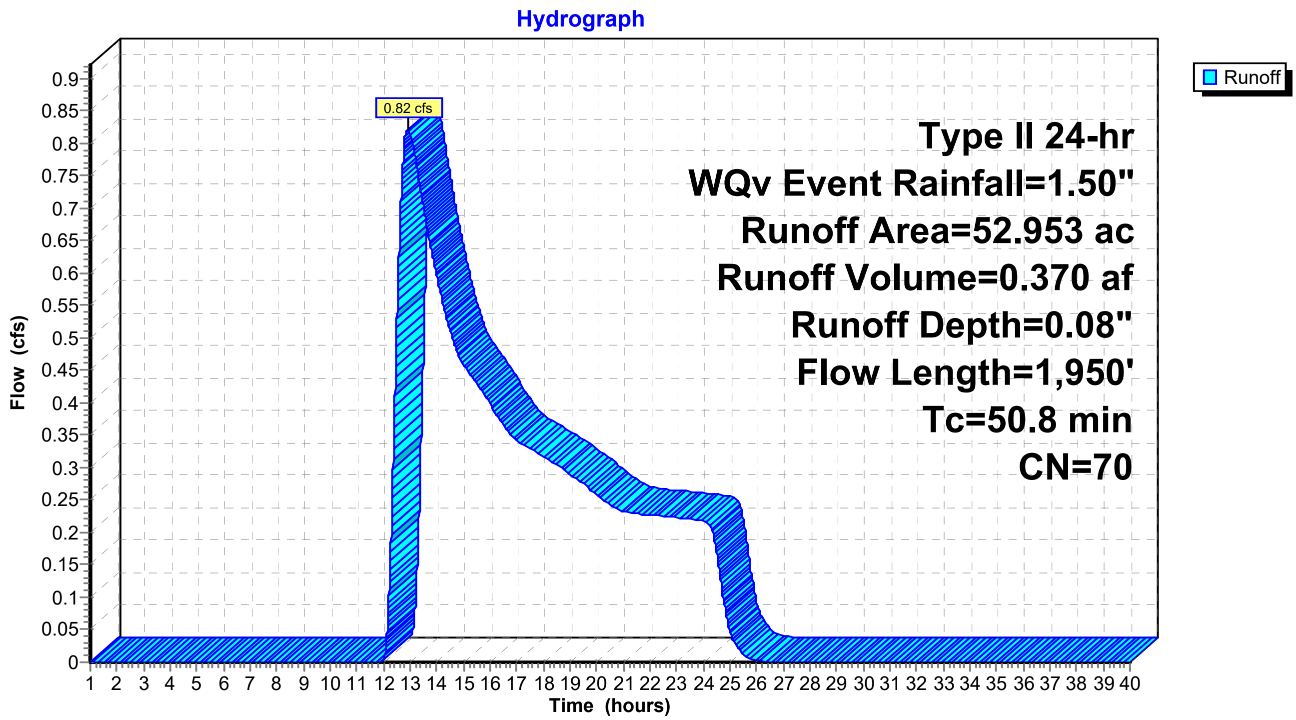
Runoff = 0.82 cfs @ 12.92 hrs, Volume= 0.370 af, Depth= 0.08"
Routed to Reach 4R : Beaverkill Trib

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-40.00 hrs, dt= 0.01 hrs
Type II 24-hr WQv Event Rainfall=1.50"

| Area (ac) | CN | Description |
|---|---|---|
| 52.953 | 70 | Woods, Good, HSG C |
| 52.953 | | 100.00% Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 31.6 | 100 | 0.0250 | 0.05 | | **Sheet Flow, Woods** Woods: Dense underbrush n= 0.800 P2= 3.75" |
| 19.2 | 1,850 | 0.1030 | 1.60 | | **Shallow Concentrated Flow, Woods** Woodland Kv= 5.0 fps |
| 50.8 | 1,950 | Total | | | |

## Subcatchment 3A: DA 3A



## Summary for Subcatchment 3B: DA 3B

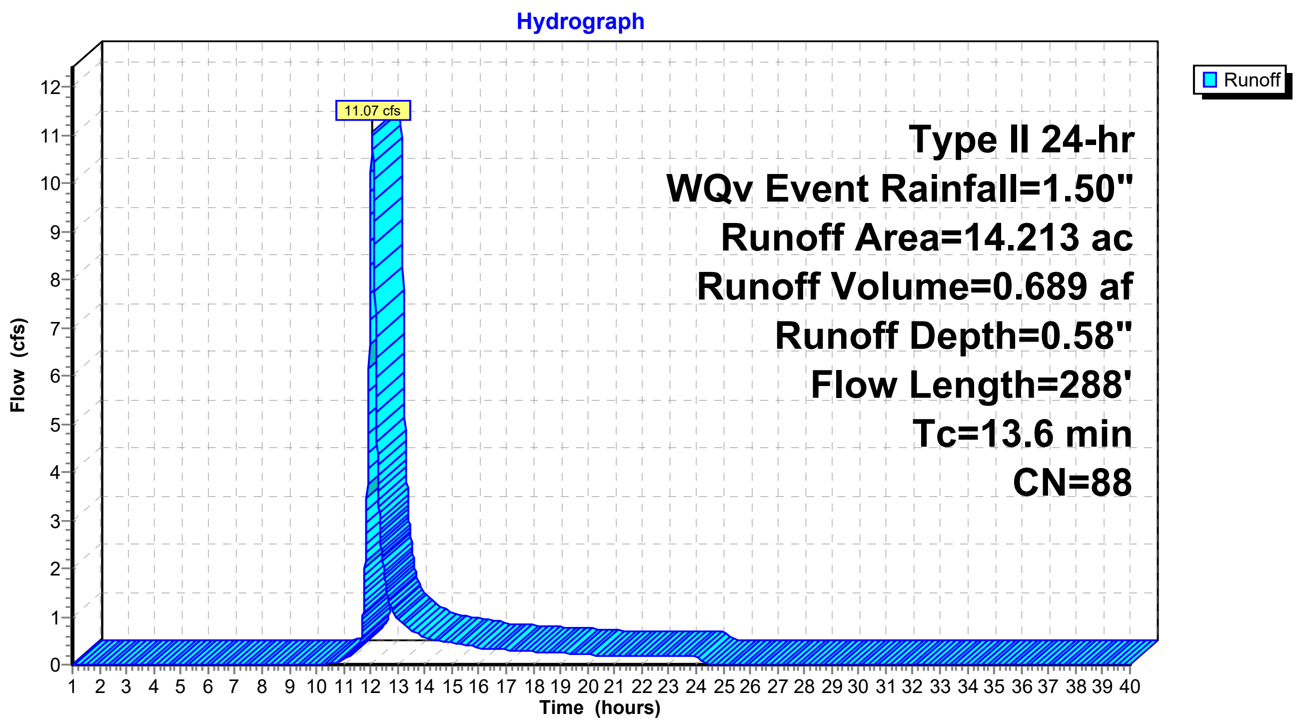
Runoff = 11.07 cfs @ 12.06 hrs, Volume= 0.689 af, Depth= 0.58"
Routed to Pond 9P : Pocket Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-40.00 hrs, dt= 0.01 hrs
Type II 24-hr WQv Event Rainfall=1.50"

| | Area (ac) | CN | Description |
|---|---|---|---|
| * | 14.213 | 88 | 1/8 acre lots, 65% imp, HSG C |
| | 4.975 | | 35.00% Pervious Area |
| | 9.238 | | 65.00% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 13.2 | 100 | 0.0200 | 0.13 | | **Sheet Flow, Lawn** Grass: Dense n= 0.240 P2= 3.75" |
| 0.4 | 188 | 0.2500 | 7.50 | | **Shallow Concentrated Flow, Lawn** Grassed Waterway Kv= 15.0 fps |
| 13.6 | 288 | Total | | | |

### Subcatchment 3B: DA 3B



## Summary for Subcatchment 3C: DA 3C

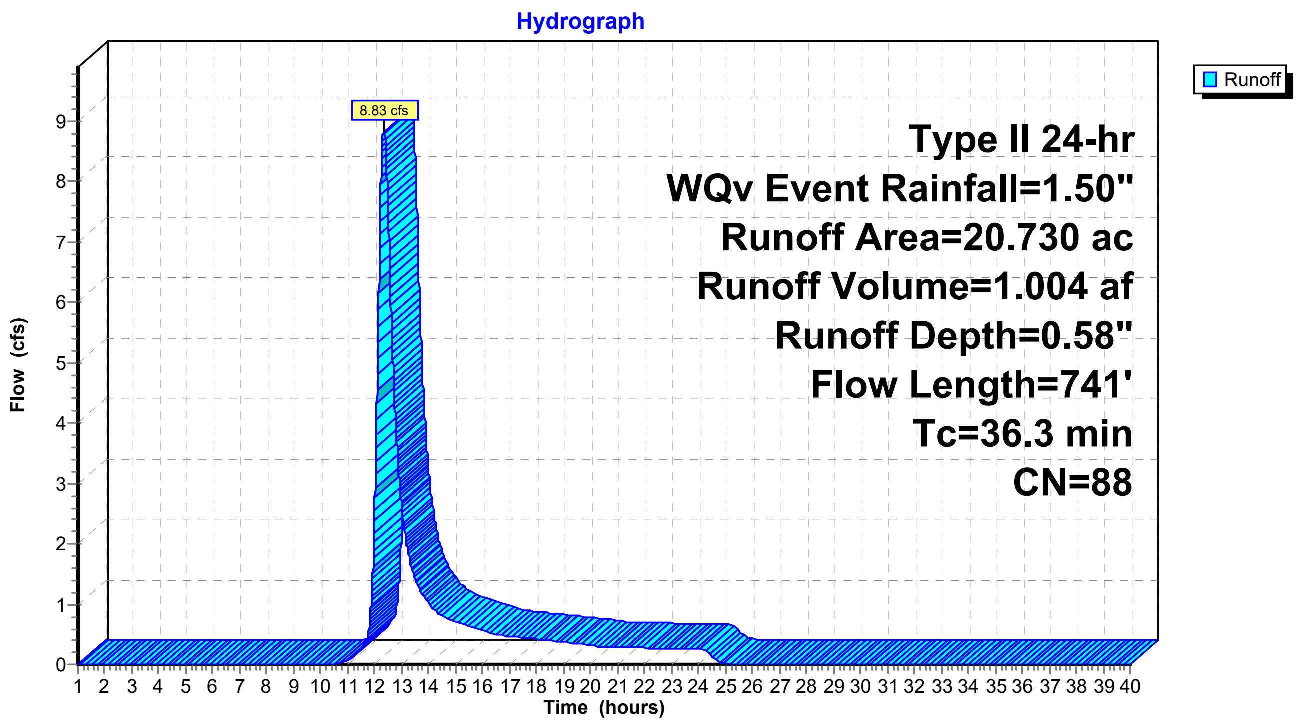
Runoff = 8.83 cfs @ 12.34 hrs, Volume= 1.004 af, Depth= 0.58"
Routed to Pond 1P : Existing Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-40.00 hrs, dt= 0.01 hrs
Type II 24-hr WQv Event Rainfall=1.50"

| | Area (ac) | CN | Description |
|---|---|---|---|
| * | 20.730 | 88 | 1/8 acre lots, 65% imp, HSG C |
| | 7.255 | | 35.00% Pervious Area |
| | 13.475 | | 65.00% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 34.5 | 100 | 0.0200 | 0.05 | | **Sheet Flow, Woods**<br>Woods: Dense underbrush n= 0.800 P2= 3.75" |
| 1.8 | 641 | 0.1500 | 5.81 | | **Shallow Concentrated Flow, Lawn**<br>Grassed Waterway Kv= 15.0 fps |
| 36.3 | 741 | Total | | | |

## Subcatchment 3C: DA 3C



## Summary for Subcatchment 3D: DA 3D

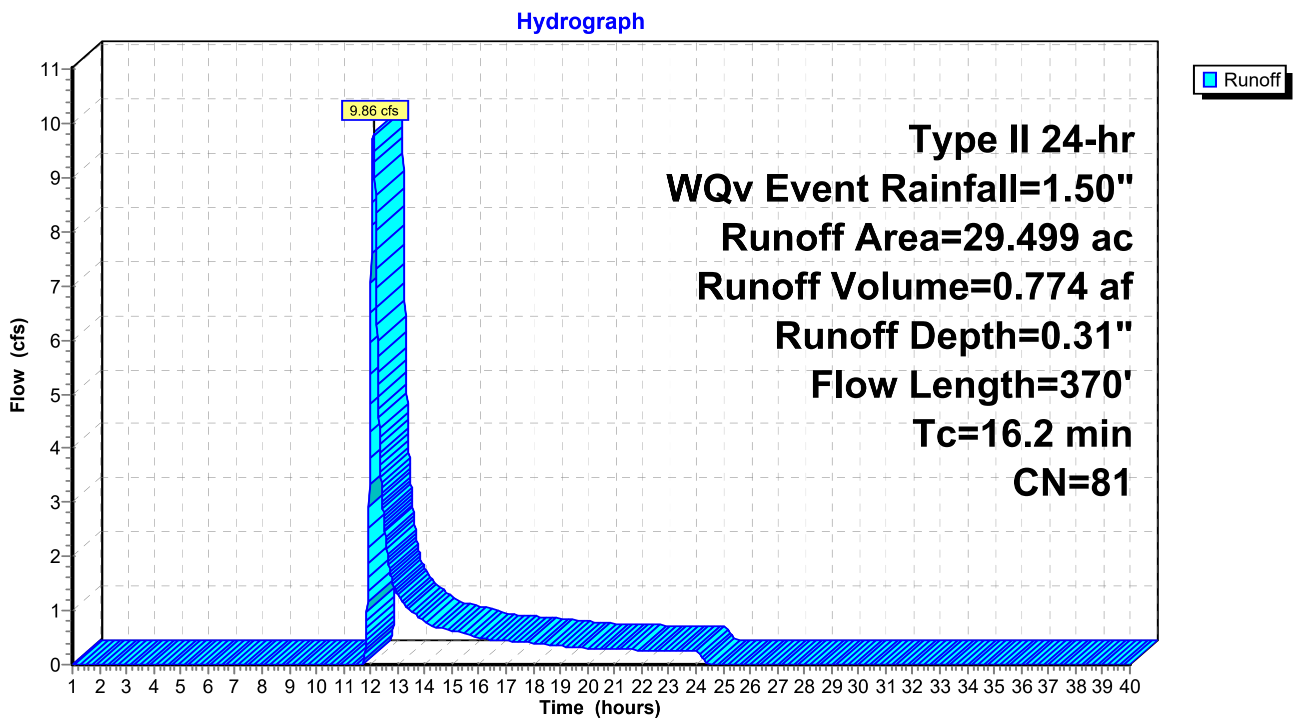
Runoff = 9.86 cfs @ 12.11 hrs, Volume= 0.774 af, Depth= 0.31"
Routed to Pond 12P : Pocket Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-40.00 hrs, dt= 0.01 hrs
Type II 24-hr WQv Event Rainfall=1.50"

| Area (ac) | CN | Description |
|---|---|---|
| 29.499 | 81 | 1/3 acre lots, 30% imp, HSG C |
| 20.649 | | 70.00% Pervious Area |
| 8.850 | | 30.00% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 14.8 | 100 | 0.0150 | 0.11 | | **Sheet Flow, Lawn**<br>Grass: Dense n= 0.240 P2= 3.75" |
| 1.4 | 270 | 0.0480 | 3.29 | | **Shallow Concentrated Flow, Lawn**<br>Grassed Waterway Kv= 15.0 fps |
| 16.2 | 370 | Total | | | |

### Subcatchment 3D: DA 3D



## Summary for Subcatchment 3E: DA 3E

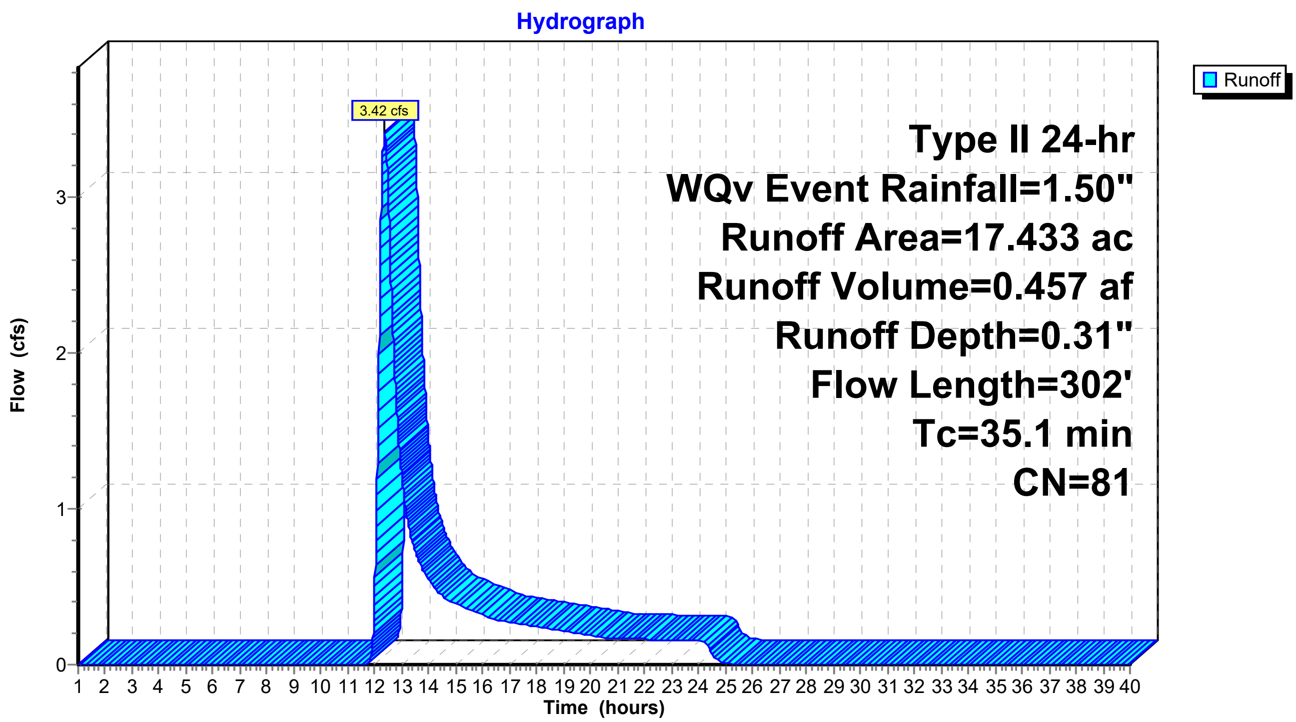
Runoff = 3.42 cfs @ 12.36 hrs, Volume= 0.457 af, Depth= 0.31"
Routed to Pond 10P : Pocket Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-40.00 hrs, dt= 0.01 hrs
Type II 24-hr WQv Event Rainfall=1.50"

| Area (ac) | CN | Description |
|---|---|---|
| 17.433 | 81 | 1/3 acre lots, 30% imp, HSG C |
| 12.203 | | 70.00% Pervious Area |
| 5.230 | | 30.00% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 34.5 | 100 | 0.0200 | 0.05 | | **Sheet Flow, Woods**<br>Woods: Dense underbrush n= 0.800 P2= 3.75" |
| 0.6 | 202 | 0.1500 | 5.81 | | **Shallow Concentrated Flow, Lawn**<br>Grassed Waterway Kv= 15.0 fps |
| 35.1 | 302 | Total | | | |

### Subcatchment 3E: DA 3E



## Summary for Subcatchment 3F: DA 3F

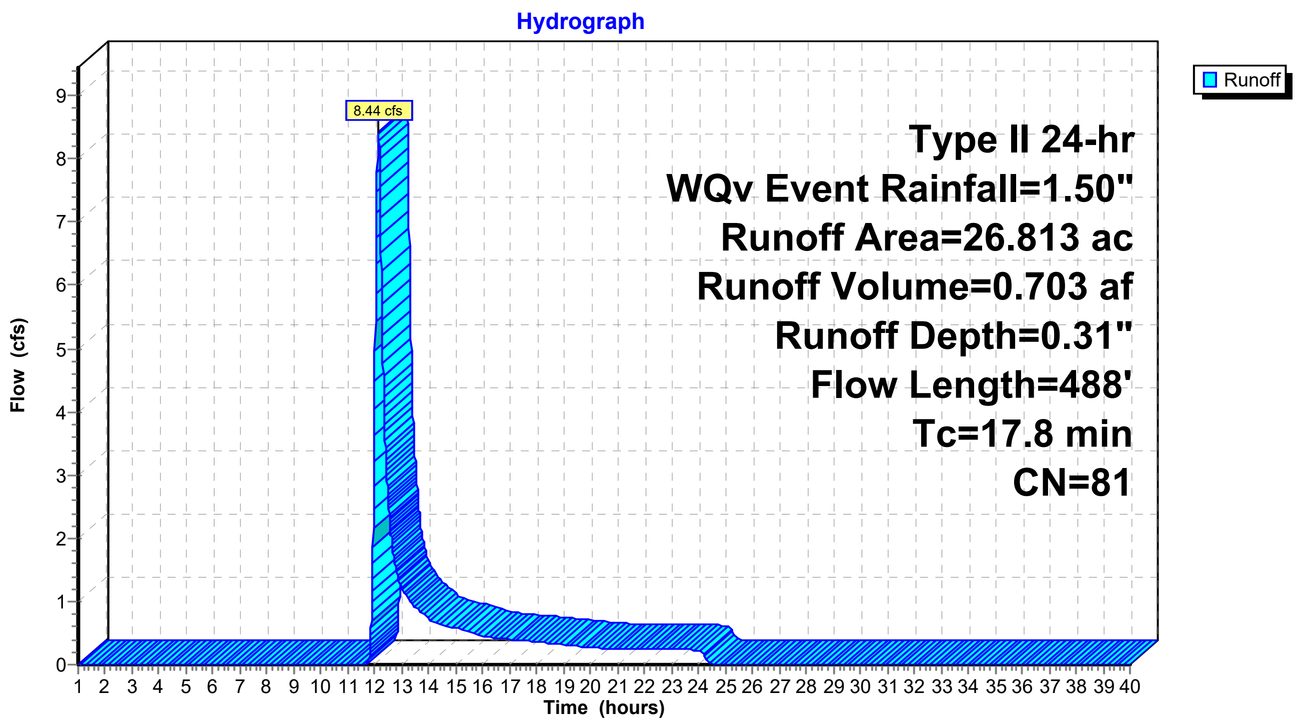
Runoff = 8.44 cfs @ 12.13 hrs, Volume= 0.703 af, Depth= 0.31"
Routed to Pond 11P : Pocket Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-40.00 hrs, dt= 0.01 hrs
Type II 24-hr WQv Event Rainfall=1.50"

| Area (ac) | CN | Description |
|---|---|---|
| 26.813 | 81 | 1/3 acre lots, 30% imp, HSG C |
| 18.769 | | 70.00% Pervious Area |
| 8.044 | | 30.00% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 14.8 | 100 | 0.0150 | 0.11 | | **Sheet Flow, Lawn** Grass: Dense n= 0.240 P2= 3.75" |
| 3.0 | 388 | 0.0200 | 2.12 | | **Shallow Concentrated Flow, Lawn** Grassed Waterway Kv= 15.0 fps |
| 17.8 | 488 | Total | | | |

### Subcatchment 3F: DA 3F



## Summary for Subcatchment 3G: DA 3G

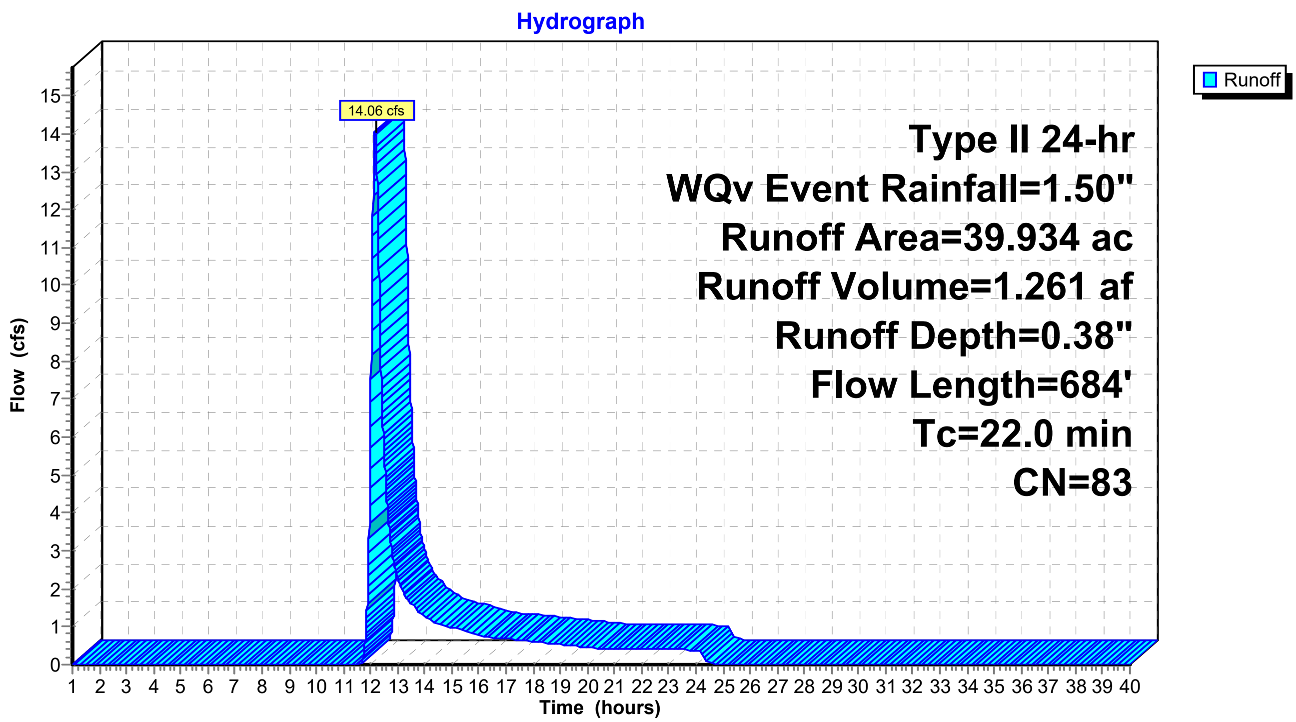
Runoff = 14.06 cfs @ 12.17 hrs, Volume= 1.261 af, Depth= 0.38"
Routed to Pond 5P : Pocket Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-40.00 hrs, dt= 0.01 hrs
Type II 24-hr WQv Event Rainfall=1.50"

| Area (ac) | CN | Description |
|---|---|---|
| 39.934 | 83 | 1/4 acre lots, 38% imp, HSG C |
| 24.759 | | 62.00% Pervious Area |
| 15.175 | | 38.00% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 17.4 | 100 | 0.0100 | 0.10 | | **Sheet Flow, Lawn**<br>Grass: Dense n= 0.240 P2= 3.75" |
| 4.6 | 584 | 0.0200 | 2.12 | | **Shallow Concentrated Flow, Lawn**<br>Grassed Waterway Kv= 15.0 fps |
| 22.0 | 684 | Total | | | |

### Subcatchment 3G: DA 3G



## Summary for Subcatchment 4: DA 4

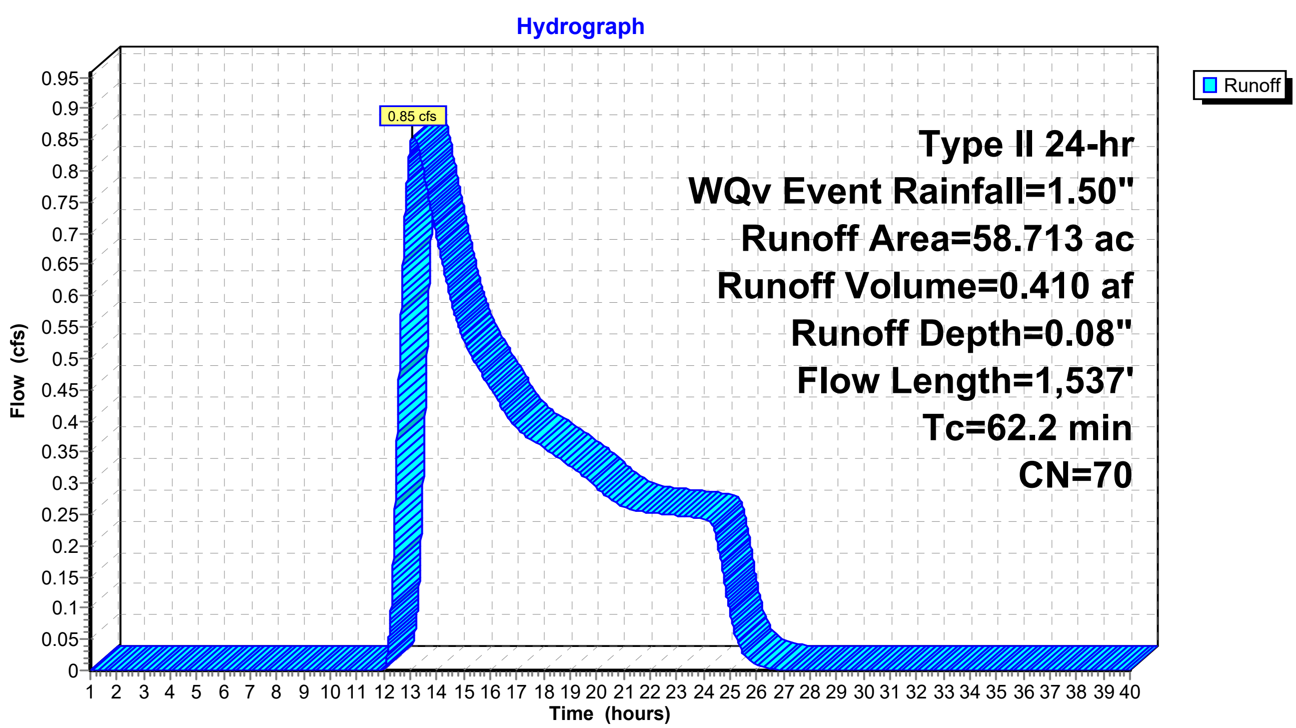
Runoff = 0.85 cfs @ 13.07 hrs, Volume= 0.410 af, Depth= 0.08"
Routed to Reach 1R : Beaverkill

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-40.00 hrs, dt= 0.01 hrs
Type II 24-hr WQv Event Rainfall=1.50"

| Area (ac) | CN | Description |
|---|---|---|
| 58.438 | 70 | Woods, Good, HSG C |
| 0.275 | 98 | Unconnected pavement, HSG C |
| 58.713 | 70 | Weighted Average |
| 58.438 | | 99.53% Pervious Area |
| 0.275 | | 0.47% Impervious Area |
| 0.275 | | 100.00% Unconnected |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 34.5 | 100 | 0.0200 | 0.05 | | **Sheet Flow, Woods** Woods: Dense underbrush n= 0.800 P2= 3.75" |
| 27.7 | 1,437 | 0.0300 | 0.87 | | **Shallow Concentrated Flow, Woods** Woodland Kv= 5.0 fps |
| 62.2 | 1,537 | Total | | | |

### Subcatchment 4: DA 4



## Summary for Subcatchment 4A: DA 4A

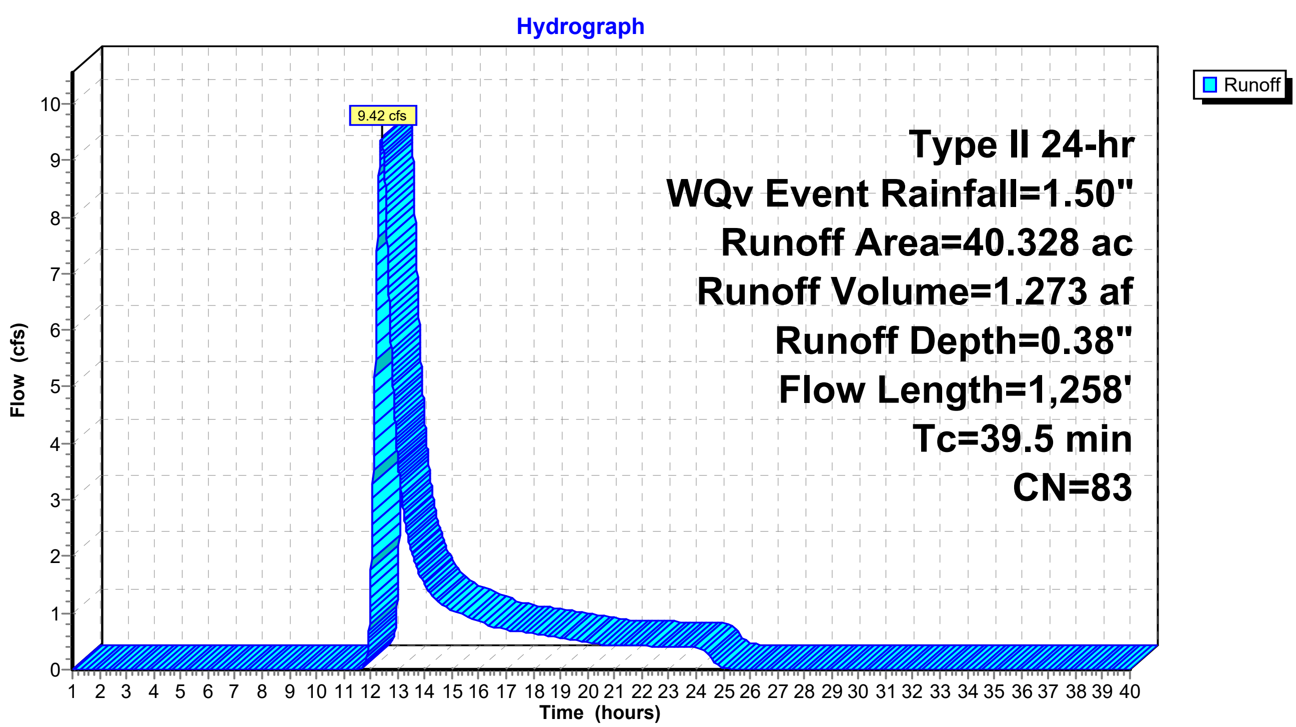
Runoff = 9.42 cfs @ 12.42 hrs, Volume= 1.273 af, Depth= 0.38"
Routed to Pond 3P : Pocket Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-40.00 hrs, dt= 0.01 hrs
Type II 24-hr WQv Event Rainfall=1.50"

| Area (ac) | CN | Description |
|---|---|---|
| 40.328 | 83 | 1/4 acre lots, 38% imp, HSG C |
| 25.003 | | 62.00% Pervious Area |
| 15.325 | | 38.00% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 18.9 | 100 | 0.0900 | 0.09 | | **Sheet Flow, Woods** Woods: Dense underbrush n= 0.800 P2= 3.75" |
| 20.6 | 1,158 | 0.0350 | 0.94 | | **Shallow Concentrated Flow, Woods** Woodland Kv= 5.0 fps |
| 39.5 | 1,258 | Total | | | |

## Subcatchment 4A: DA 4A



## Summary for Subcatchment 4B: DA 4B

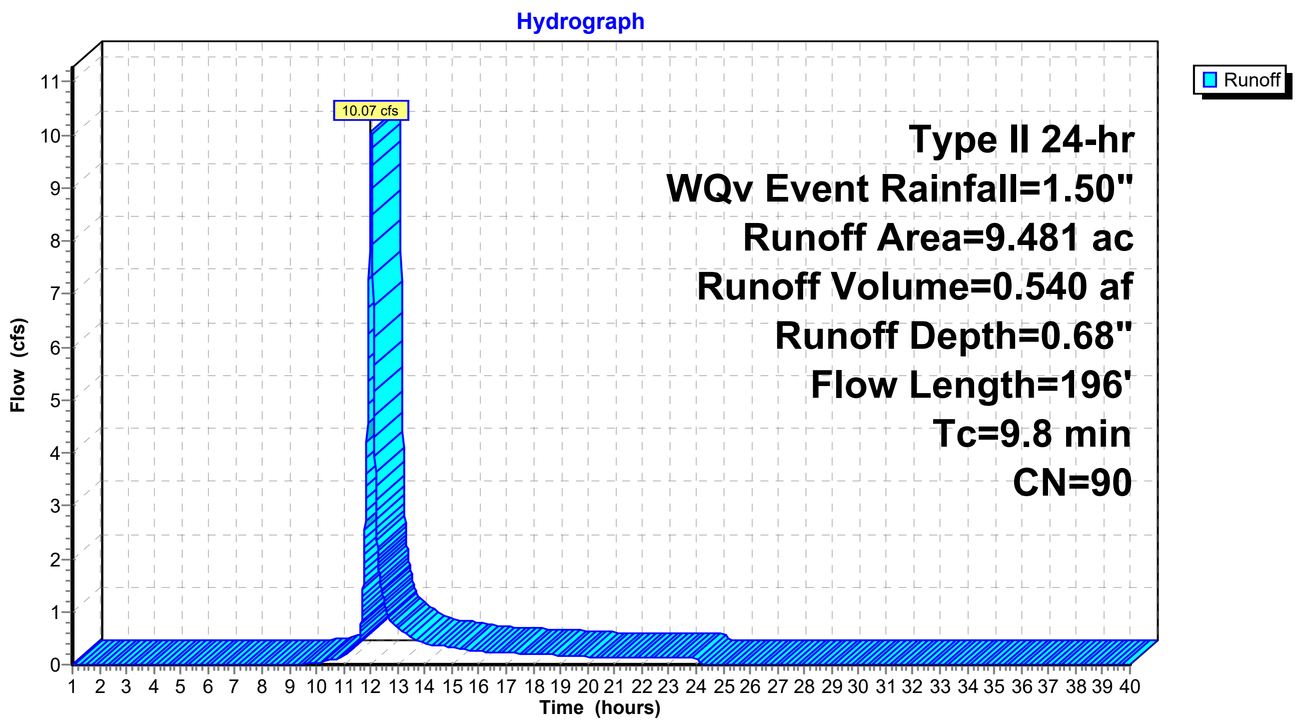
Runoff = 10.07 cfs @ 12.02 hrs, Volume= 0.540 af, Depth= 0.68"
Routed to Pond 4P : Pocket Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-40.00 hrs, dt= 0.01 hrs
Type II 24-hr WQv Event Rainfall=1.50"

| Area (ac) | CN | Description |
|---|---|---|
| 9.481 | 90 | 1/8 acre lots, 65% imp, HSG C |
| 3.318 | | 35.00% Pervious Area |
| 6.163 | | 65.00% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 9.1 | 100 | 0.0500 | 0.18 | | **Sheet Flow, Lawn**<br>Grass: Dense n= 0.240 P2= 3.75" |
| 0.7 | 96 | 0.0200 | 2.28 | | **Shallow Concentrated Flow, Lawn**<br>Unpaved Kv= 16.1 fps |
| 9.8 | 196 | Total | | | |

### Subcatchment 4B: DA 4B



## Summary for Subcatchment 5: DA 5

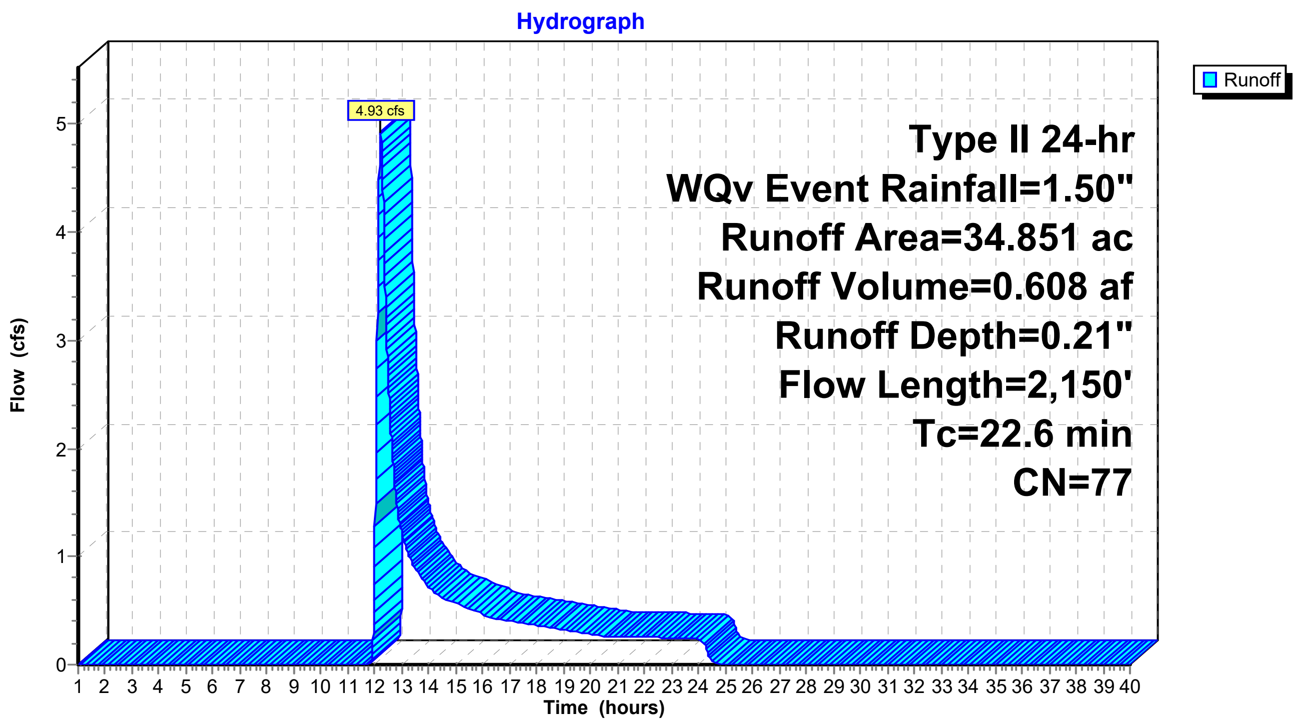
Runoff = 4.93 cfs @ 12.22 hrs, Volume= 0.608 af, Depth= 0.21"
Routed to Reach 2R : Beaverkill

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-40.00 hrs, dt= 0.01 hrs
Type II 24-hr WQv Event Rainfall=1.50"

| Area (ac) | CN | Description |
|---|---|---|
| 34.851 | 77 | 2 acre lots, 12% imp, HSG C |
| 30.669 | | 88.00% Pervious Area |
| 4.182 | | 12.00% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 7.9 | 100 | 0.2000 | 0.21 | | **Sheet Flow, Woods** Woods: Light underbrush n= 0.400 P2= 3.75" |
| 14.7 | 2,050 | 0.0240 | 2.32 | | **Shallow Concentrated Flow, Lawn** Grassed Waterway Kv= 15.0 fps |
| 22.6 | 2,150 | Total | | | |

## Subcatchment 5: DA 5



## Summary for Reach 1R: Beaverkill

Inflow Area = 1,074.280 ac, 12.67% Impervious, Inflow Depth > 14.46" for WQv Event event
Inflow = 423.41 cfs @ 13.10 hrs, Volume= 1,294.894 af
Outflow = 421.96 cfs @ 13.69 hrs, Volume= 1,275.394 af, Atten= 0%, Lag= 35.6 min
Routed to Link AP-2 : AP-2

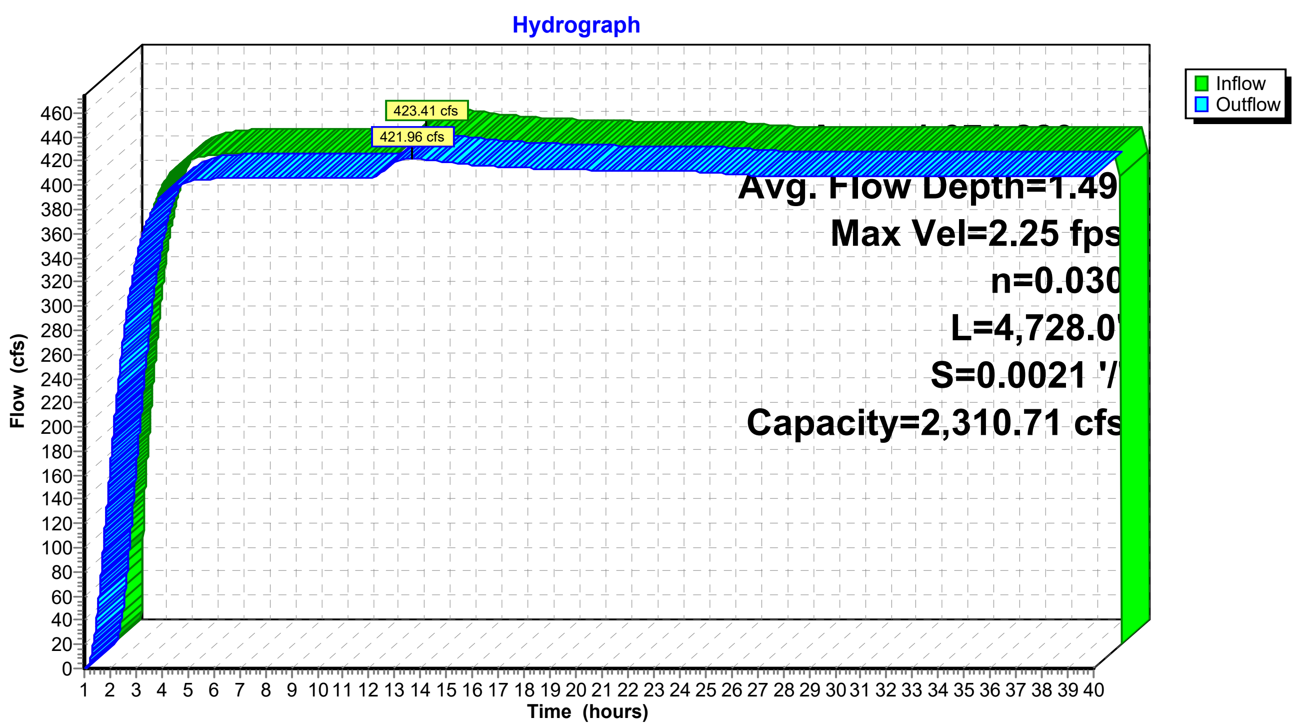
Routing by Sim-Route method, Time Span= 1.00-40.00 hrs, dt= 0.01 hrs
Max. Velocity= 2.25 fps, Min. Travel Time= 35.0 min
Avg. Velocity = 2.19 fps, Avg. Travel Time= 35.9 min

Peak Storage= 887,390 cf @ 13.69 hrs
Average Depth at Peak Storage= 1.49' , Surface Width= 191.40'
Bank-Full Depth= 3.25' Flow Area= 659.8 sf, Capacity= 2,310.71 cfs

60.00' x 3.25' deep channel, n= 0.030 Earth, grassed & winding
Side Slope Z-value= 44.0 '/' Top Width= 346.00'
Length= 4,728.0' Slope= 0.0021 '/'
Inlet Invert= 145.00', Outlet Invert= 135.00'

‡

**Reach 1R: Beaverkill**



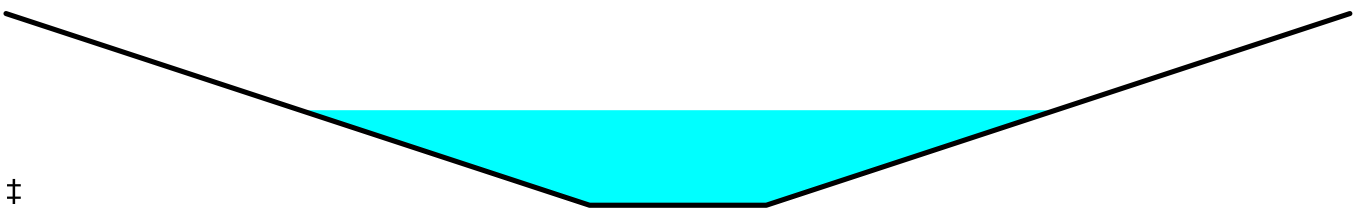
## Summary for Reach 2R: Beaverkill

Inflow Area = 471.379 ac, 0.89% Impervious, Inflow Depth > 27.50" for WQv Event event
Inflow = 340.61 cfs @ 13.38 hrs, Volume= 1,080.187 af, Incl. 334.00 cfs Base Flow
Outflow = 339.83 cfs @ 14.19 hrs, Volume= 1,056.448 af, Atten= 0%, Lag= 48.0 min
Routed to Reach 1R : Beaverkill

Routing by Sim-Route method, Time Span= 1.00-40.00 hrs, dt= 0.01 hrs
Max. Velocity= 2.17 fps, Min. Travel Time= 52.0 min
Avg. Velocity = 2.14 fps, Avg. Travel Time= 52.6 min

Peak Storage= 1,059,620 cf @ 14.19 hrs
Average Depth at Peak Storage= 1.49' , Surface Width= 170.89'
Bank-Full Depth= 3.00' Flow Area= 516.0 sf, Capacity= 1,684.63 cfs

40.00' x 3.00' deep channel, n= 0.030 Earth, grassed & winding
Side Slope Z-value= 44.0 '/' Top Width= 304.00'
Length= 6,756.0' Slope= 0.0021 '/'
Inlet Invert= 160.00', Outlet Invert= 145.50'



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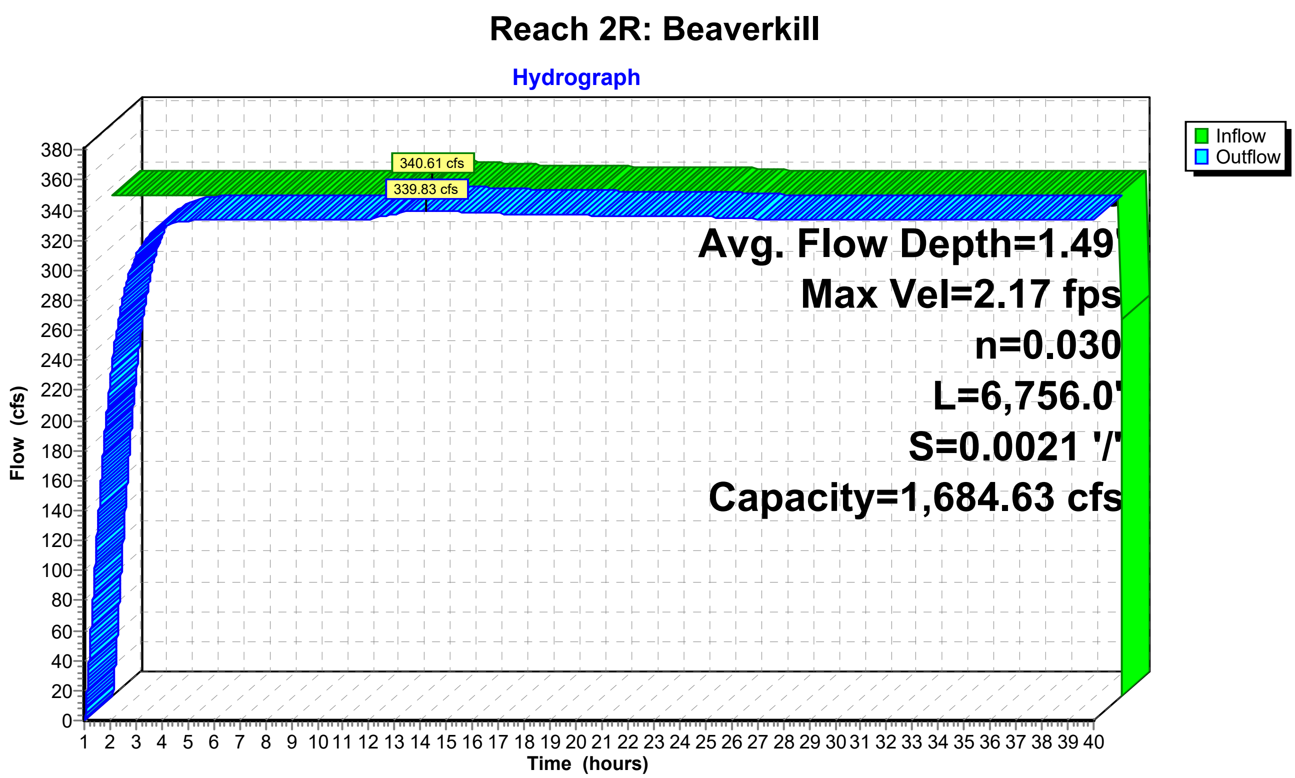


## Summary for Reach 3R: Beaverkill Trib

Inflow Area = 370.977 ac, 18.86% Impervious, Inflow Depth > 7.63" for WQv Event event
Inflow = 84.12 cfs @ 12.83 hrs, Volume= 235.829 af
Outflow = 84.12 cfs @ 12.85 hrs, Volume= 235.697 af, Atten= 0%, Lag= 1.4 min
Routed to Reach 1R : Beaverkill

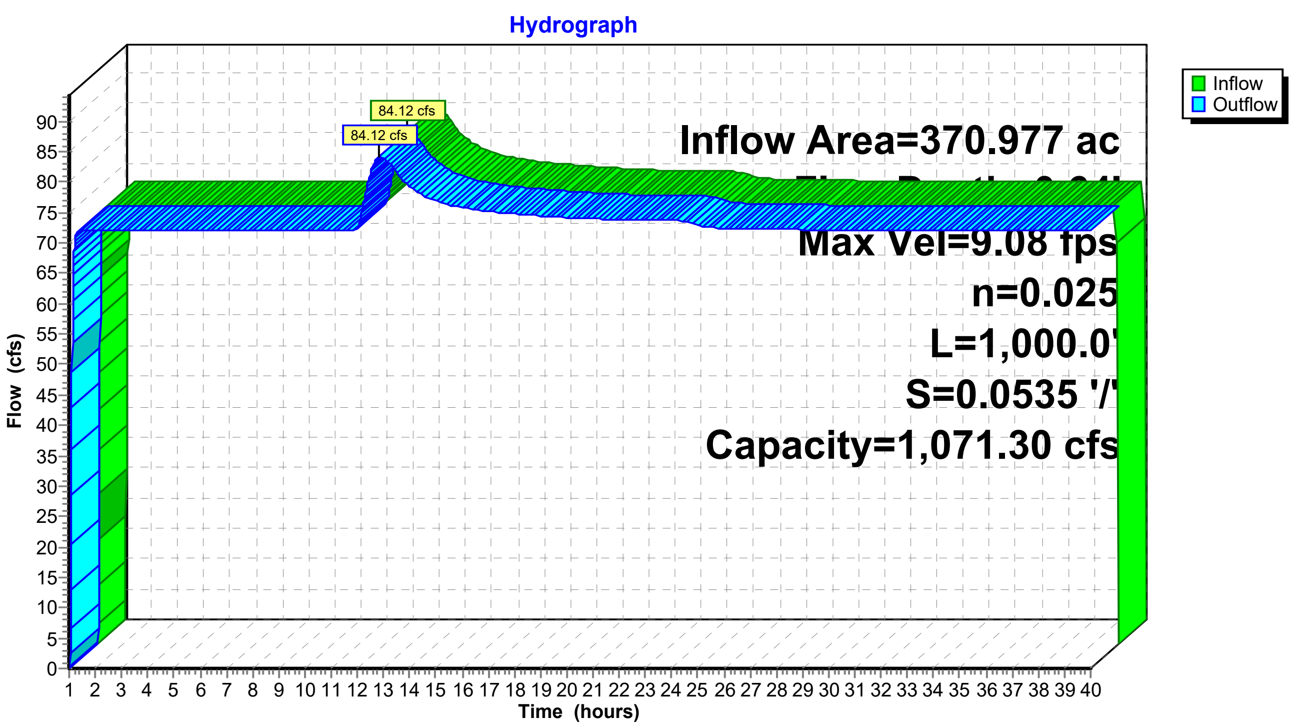
Routing by Sim-Route method, Time Span= 1.00-40.00 hrs, dt= 0.01 hrs
Max. Velocity= 9.08 fps, Min. Travel Time= 1.8 min
Avg. Velocity = 8.66 fps, Avg. Travel Time= 1.9 min

Peak Storage= 9,263 cf @ 12.85 hrs
Average Depth at Peak Storage= 0.64' , Surface Width= 17.09'
Bank-Full Depth= 2.50' Flow Area= 55.0 sf, Capacity= 1,071.30 cfs

12.00' x 2.50' deep channel, n= 0.025 Earth, clean & winding
Side Slope Z-value= 4.0 '/' Top Width= 32.00'
Length= 1,000.0' Slope= 0.0535 '/'
Inlet Invert= 200.00', Outlet Invert= 146.50'

‡

### Reach 3R: Beaverkill Trib



## Summary for Reach 4R: Beaverkill Trib

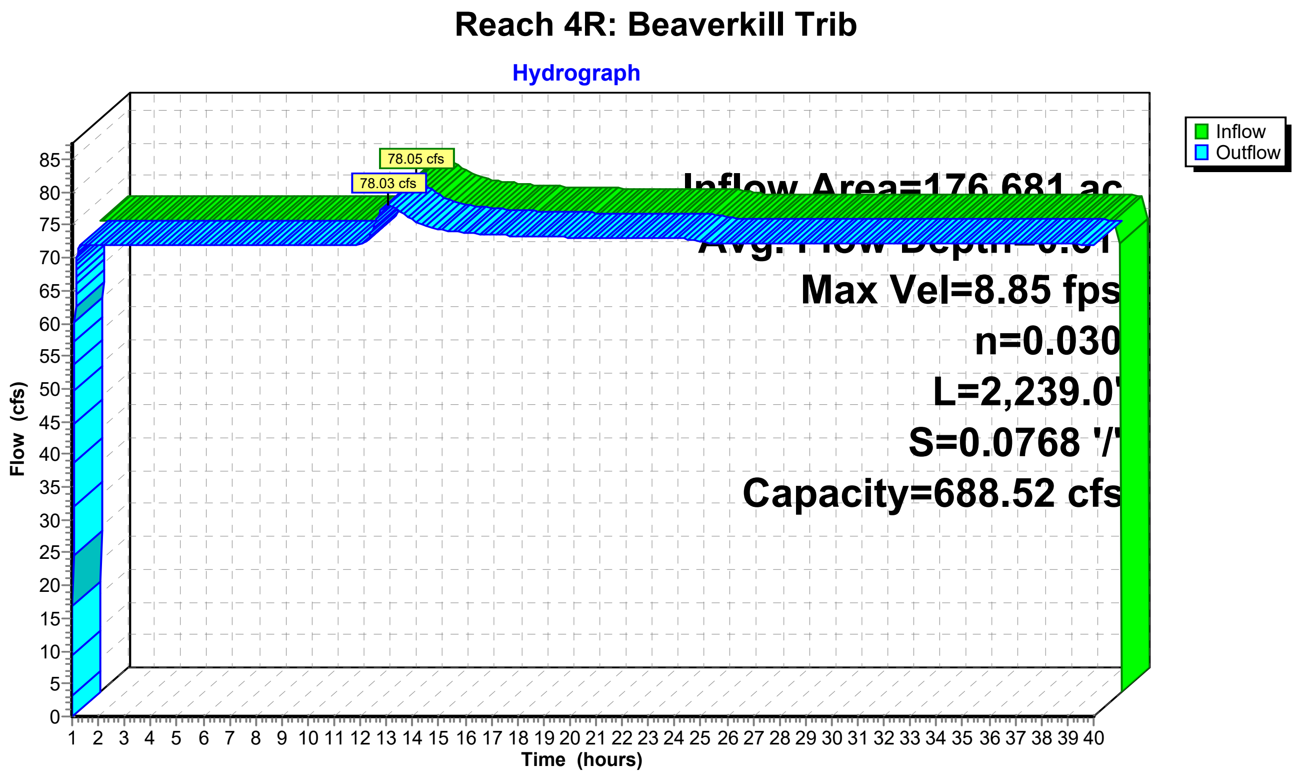
Inflow Area = 176.681 ac, 8.40% Impervious, Inflow Depth > 15.90" for WQv Event event
Inflow = 78.05 cfs @ 13.04 hrs, Volume= 234.038 af, Incl. 72.00 cfs Base Flow
Outflow = 78.03 cfs @ 13.08 hrs, Volume= 233.668 af, Atten= 0%, Lag= 2.3 min
Routed to Reach 3R : Beaverkill Trib

Routing by Sim-Route method, Time Span= 1.00-40.00 hrs, dt= 0.01 hrs
Max. Velocity= 8.85 fps, Min. Travel Time= 4.2 min
Avg. Velocity = 8.63 fps, Avg. Travel Time= 4.3 min

Peak Storage= 19,742 cf @ 13.08 hrs
Average Depth at Peak Storage= 0.61' , Surface Width= 16.88'
Bank-Full Depth= 2.00' Flow Area= 40.0 sf, Capacity= 688.52 cfs

12.00' x 2.00' deep channel, n= 0.030 Earth, grassed & winding
Side Slope Z-value= 4.0 '/' Top Width= 28.00'
Length= 2,239.0' Slope= 0.0768 '/'
Inlet Invert= 386.00', Outlet Invert= 214.00'

‡



## Summary for Pond 1P: Existing Pond

Inflow Area = 60.446 ac, 30.18% Impervious, Inflow Depth = 0.34" for WQv Event event
Inflow = 11.62 cfs @ 12.38 hrs, Volume= 1.697 af
Outflow = 0.00 cfs @ 1.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min
Primary = 0.00 cfs @ 1.00 hrs, Volume= 0.000 af
Routed to Reach 3R : Beaverkill Trib

Routing by Sim-Route method, Time Span= 1.00-40.00 hrs, dt= 0.01 hrs
Peak Elev= 205.88' @ 26.62 hrs Surf.Area= 13,956 sf Storage= 73,942 cf

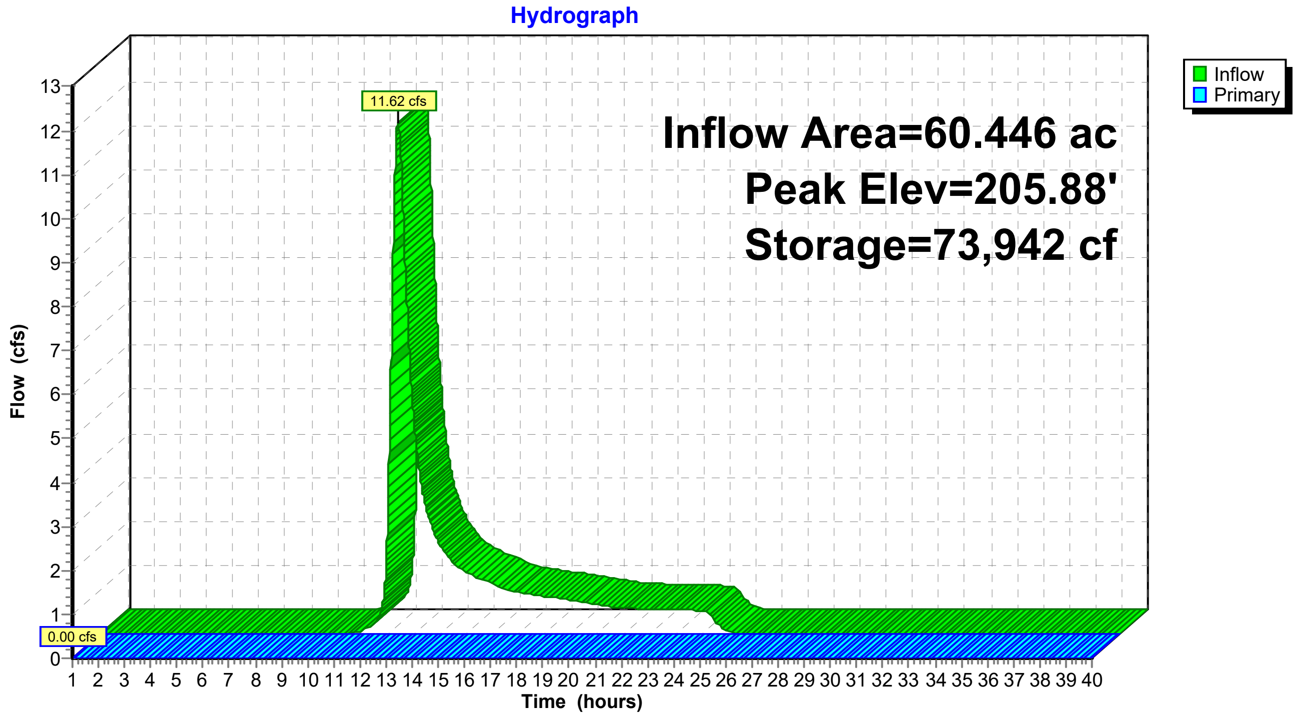
Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no outflow)

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 200.00' | 203,971 cf | **84.00'W x 134.00'L x 14.00'H Prismatoid Z=1.0** |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 208.50' | **5.0' long x 0.5' breadth Broad-Crested Rectangular Weir**<br>Head (feet) 0.20 0.40 0.60 0.80 1.00<br>Coef. (English) 2.80 2.92 3.08 3.30 3.32 |
| #2 | Primary | 211.50' | **40.0' long x 0.5' breadth Broad-Crested Rectangular Weir**<br>Head (feet) 0.20 0.40 0.60 0.80 1.00<br>Coef. (English) 2.80 2.92 3.08 3.30 3.32 |

**Primary OutFlow** Max=0.00 cfs @ 1.00 hrs HW=200.00' TW=200.00' (Dynamic Tailwater)
├─**1=Broad-Crested Rectangular Weir** ( Controls 0.00 cfs)
└─**2=Broad-Crested Rectangular Weir** ( Controls 0.00 cfs)

## Pond 1P: Existing Pond



## Summary for Pond 2P: Pocket Pond

Inflow Area = 36.879 ac, 12.00% Impervious, Inflow Depth = 0.21" for WQv Event event
Inflow = 1.22 cfs @ 14.93 hrs, Volume= 0.644 af
Outflow = 0.05 cfs @ 27.98 hrs, Volume= 0.086 af, Atten= 96%, Lag= 783.5 min
Primary = 0.05 cfs @ 27.98 hrs, Volume= 0.086 af
Routed to Reach 4R : Beaverkill Trib

Routing by Sim-Route method, Time Span= 1.00-40.00 hrs, dt= 0.01 hrs
Peak Elev= 393.15' @ 27.98 hrs Surf.Area= 170,522 sf Storage= 26,170 cf

Plug-Flow detention time= 927.5 min calculated for 0.086 af (13% of inflow)
Center-of-Mass det. time= 663.1 min ( 1,750.8 - 1,087.7 )

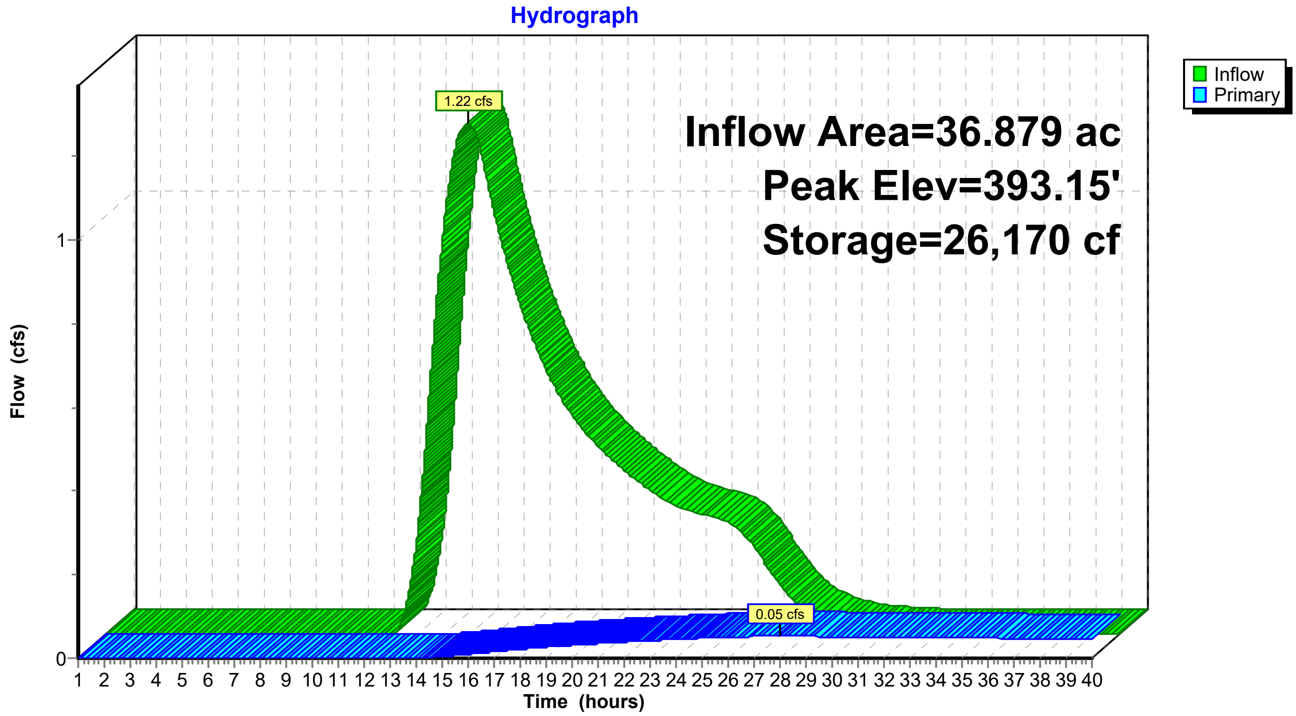
| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 393.00' | 1,369,452 cf | **Custom Stage Data (Prismatic)** Listed below (Recalc) |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 393.00 | 169,366 | 0 | 0 |
| 400.00 | 221,906 | 1,369,452 | 1,369,452 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 393.00' | **18.0" Round Culvert**<br>L= 75.0' CPP, square edge headwall, Ke= 0.500<br>Inlet / Outlet Invert= 393.00' / 389.00' S= 0.0533 '/' Cc= 0.900<br>n= 0.011 Concrete pipe, straight & clean, Flow Area= 1.77 sf |
| #2 | Device 1 | 393.00' | **4.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads |

**Primary OutFlow** Max=0.05 cfs @ 27.98 hrs HW=393.15' TW=386.58' (Dynamic Tailwater)
└─**1=Culvert** (Passes 0.05 cfs of 0.13 cfs potential flow)
  └─**2=Orifice/Grate** (Orifice Controls 0.05 cfs @ 1.34 fps)

## Pond 2P: Pocket Pond



## Summary for Pond 3P: Pocket Pond

Inflow Area = 40.328 ac, 38.00% Impervious, Inflow Depth = 0.38" for WQv Event event
Inflow = 9.42 cfs @ 12.42 hrs, Volume= 1.273 af
Outflow = 0.23 cfs @ 24.51 hrs, Volume= 0.457 af, Atten= 98%, Lag= 725.6 min
Primary = 0.23 cfs @ 24.51 hrs, Volume= 0.457 af
Routed to Reach 1R : Beaverkill

Routing by Sim-Route method, Time Span= 1.00-40.00 hrs, dt= 0.01 hrs
Peak Elev= 146.96' @ 24.51 hrs Surf.Area= 102,919 sf Storage= 46,751 cf

Plug-Flow detention time= 842.3 min calculated for 0.457 af (36% of inflow)
Center-of-Mass det. time= 682.7 min ( 1,587.9 - 905.2 )

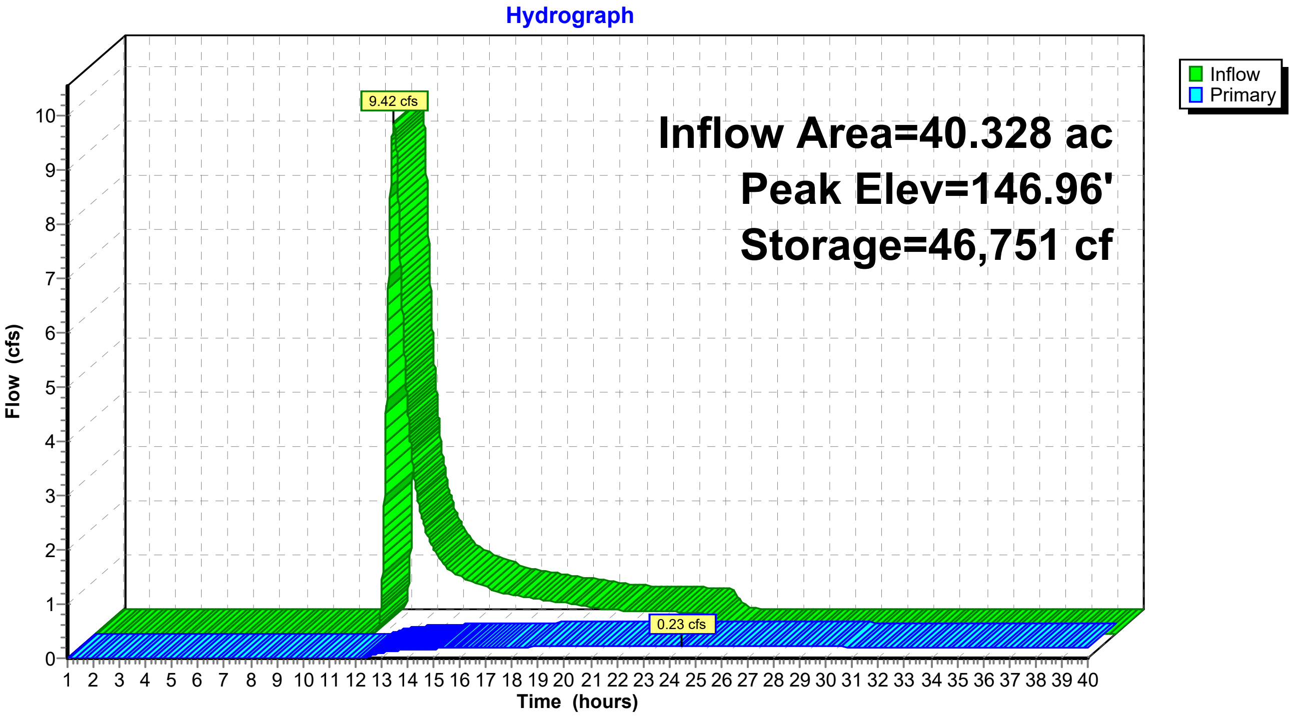
| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 146.50' | 659,406 cf | **Custom Stage Data (Prismatic)** Listed below (Recalc) |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 146.50 | 99,492 | 0 | 0 |
| 152.00 | 140,292 | 659,406 | 659,406 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 146.50' | **24.0" Round Culvert**<br>L= 50.0' CPP, square edge headwall, Ke= 0.500<br>Inlet / Outlet Invert= 146.50' / 146.00' S= 0.0100 '/' Cc= 0.900<br>n= 0.011 Concrete pipe, straight & clean, Flow Area= 3.14 sf |
| #2 | Device 1 | 146.50' | **4.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads |
| #3 | Device 1 | 147.55' | **24.0" x 24.0" Horiz. Orifice/Grate** C= 0.600<br>Limited to weir flow at low heads |

**Primary OutFlow** Max=0.23 cfs @ 24.51 hrs HW=146.96' TW=146.47' (Dynamic Tailwater)
└**1=Culvert** (Passes 0.23 cfs of 1.20 cfs potential flow)
  ├**2=Orifice/Grate** (Orifice Controls 0.23 cfs @ 2.62 fps)
  └**3=Orifice/Grate** ( Controls 0.00 cfs)

## Pond 3P: Pocket Pond



## Summary for Pond 4P: Pocket Pond

Inflow Area = 9.481 ac, 65.00% Impervious, Inflow Depth = 0.68" for WQv Event event
Inflow = 10.07 cfs @ 12.02 hrs, Volume= 0.540 af
Outflow = 0.35 cfs @ 14.65 hrs, Volume= 0.495 af, Atten= 97%, Lag= 158.0 min
Primary = 0.35 cfs @ 14.65 hrs, Volume= 0.495 af
Routed to Reach 1R : Beaverkill

Routing by Sim-Route method, Time Span= 1.00-40.00 hrs, dt= 0.01 hrs
Peak Elev= 150.87' @ 14.65 hrs Surf.Area= 16,066 sf Storage= 13,871 cf

Plug-Flow detention time= 512.9 min calculated for 0.495 af (92% of inflow)
Center-of-Mass det. time= 468.6 min ( 1,308.9 - 840.3 )

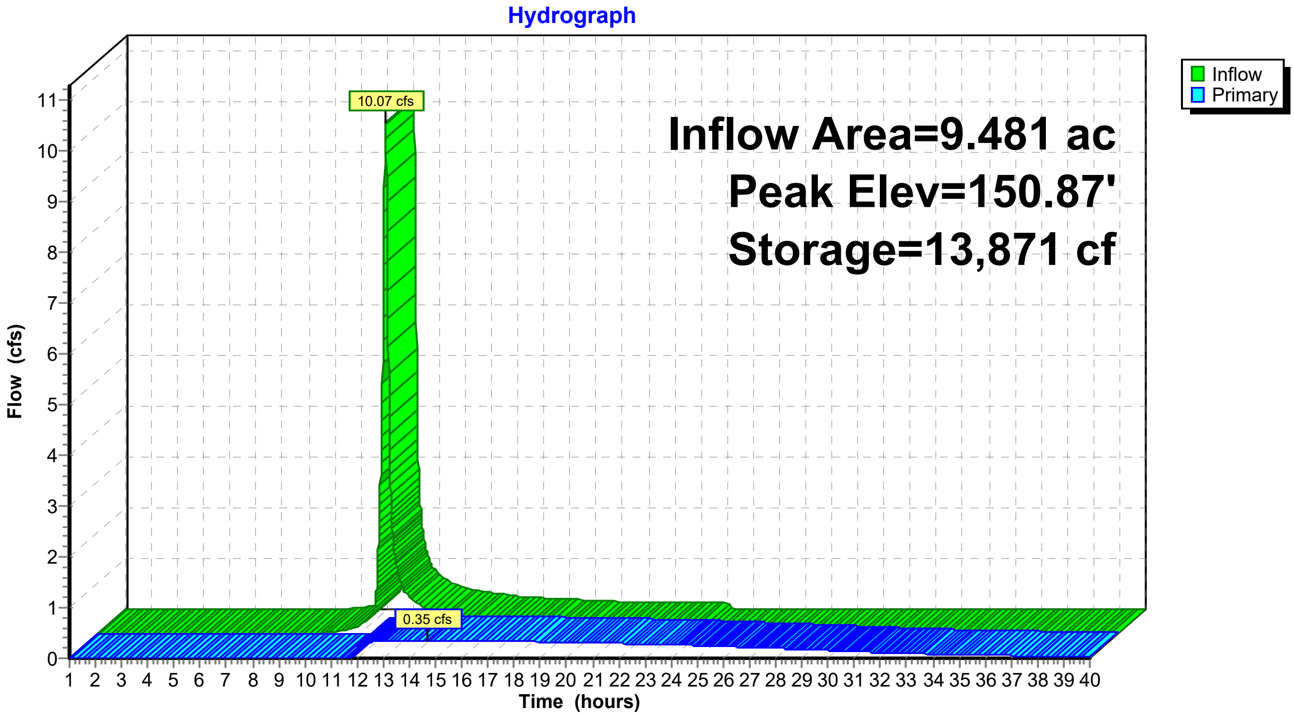
| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 150.00' | 169,025 cf | **Custom Stage Data (Prismatic)** Listed below (Recalc) |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 150.00 | 15,890 | 0 | 0 |
| 160.00 | 17,915 | 169,025 | 169,025 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 150.00' | **18.0" Round Culvert**<br>L= 50.0' CPP, square edge headwall, Ke= 0.500<br>Inlet / Outlet Invert= 150.00' / 149.50' S= 0.0100 '/' Cc= 0.900<br>n= 0.011 Concrete pipe, straight & clean, Flow Area= 1.77 sf |
| #2 | Device 1 | 150.00' | **4.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads |
| #3 | Device 1 | 151.75' | **24.0" x 24.0" Horiz. Orifice/Grate** C= 0.600<br>Limited to weir flow at low heads |

**Primary OutFlow** Max=0.35 cfs @ 14.65 hrs HW=150.87' TW=146.49' (Dynamic Tailwater)
└─**1=Culvert** (Passes 0.35 cfs of 3.34 cfs potential flow)
  ├─**2=Orifice/Grate** (Orifice Controls 0.35 cfs @ 4.03 fps)
  └─**3=Orifice/Grate** ( Controls 0.00 cfs)

## Pond 4P: Pocket Pond



## Summary for Pond 5P: Pocket Pond

Inflow Area = 39.934 ac, 38.00% Impervious, Inflow Depth = 0.38" for WQv Event event
Inflow = 14.06 cfs @ 12.17 hrs, Volume= 1.261 af
Outflow = 0.29 cfs @ 24.23 hrs, Volume= 0.590 af, Atten= 98%, Lag= 723.5 min
Primary = 0.29 cfs @ 24.23 hrs, Volume= 0.590 af
Routed to Reach 1R : Beaverkill

Routing by Sim-Route method, Time Span= 1.00-40.00 hrs, dt= 0.01 hrs
Peak Elev= 153.64' @ 24.23 hrs Surf.Area= 69,447 sf Storage= 43,464 cf

Plug-Flow detention time= 820.8 min calculated for 0.590 af (47% of inflow)
Center-of-Mass det. time= 670.0 min ( 1,559.0 - 889.0 )

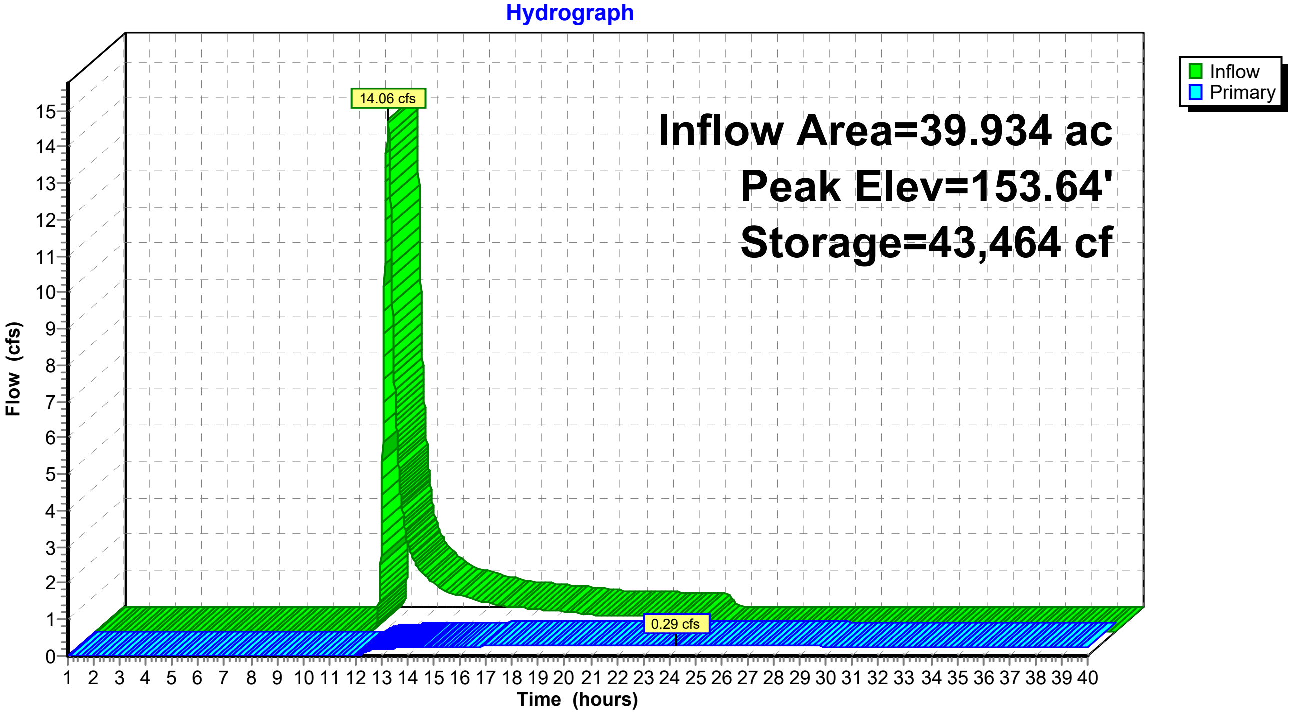
| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 153.00' | 597,195 cf | **Custom Stage Data (Prismatic)** Listed below (Recalc) |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 153.00 | 65,881 | 0 | 0 |
| 160.00 | 104,746 | 597,195 | 597,195 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 153.00' | **36.0" Round Culvert**<br>L= 50.0' CPP, square edge headwall, Ke= 0.500<br>Inlet / Outlet Invert= 153.00' / 152.00' S= 0.0200 '/' Cc= 0.900<br>n= 0.011 Concrete pipe, straight & clean, Flow Area= 7.07 sf |
| #2 | Device 1 | 153.00' | **4.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads |
| #3 | Device 1 | 154.30' | **24.0" x 24.0" Horiz. Orifice/Grate** C= 0.600<br>Limited to weir flow at low heads |

**Primary OutFlow** Max=0.29 cfs @ 24.23 hrs HW=153.64' TW=146.48' (Dynamic Tailwater)
└─**1=Culvert** (Passes 0.29 cfs of 3.03 cfs potential flow)
  ├─**2=Orifice/Grate** (Orifice Controls 0.29 cfs @ 3.32 fps)
  └─**3=Orifice/Grate** ( Controls 0.00 cfs)

## Pond 5P: Pocket Pond



## Summary for Pond 6P: Pocket Pond

Inflow Area = 42.396 ac, 30.00% Impervious, Inflow Depth = 0.31" for WQv Event event
Inflow = 6.07 cfs @ 12.60 hrs, Volume= 1.112 af
Outflow = 0.25 cfs @ 24.62 hrs, Volume= 0.496 af, Atten= 96%, Lag= 720.8 min
Primary = 0.25 cfs @ 24.62 hrs, Volume= 0.496 af
Routed to Reach 1R : Beaverkill

Routing by Sim-Route method, Time Span= 1.00-40.00 hrs, dt= 0.01 hrs
Peak Elev= 147.03' @ 24.62 hrs Surf.Area= 74,219 sf Storage= 38,726 cf

Plug-Flow detention time= 816.6 min calculated for 0.495 af (45% of inflow)
Center-of-Mass det. time= 654.4 min ( 1,584.4 - 930.0 )

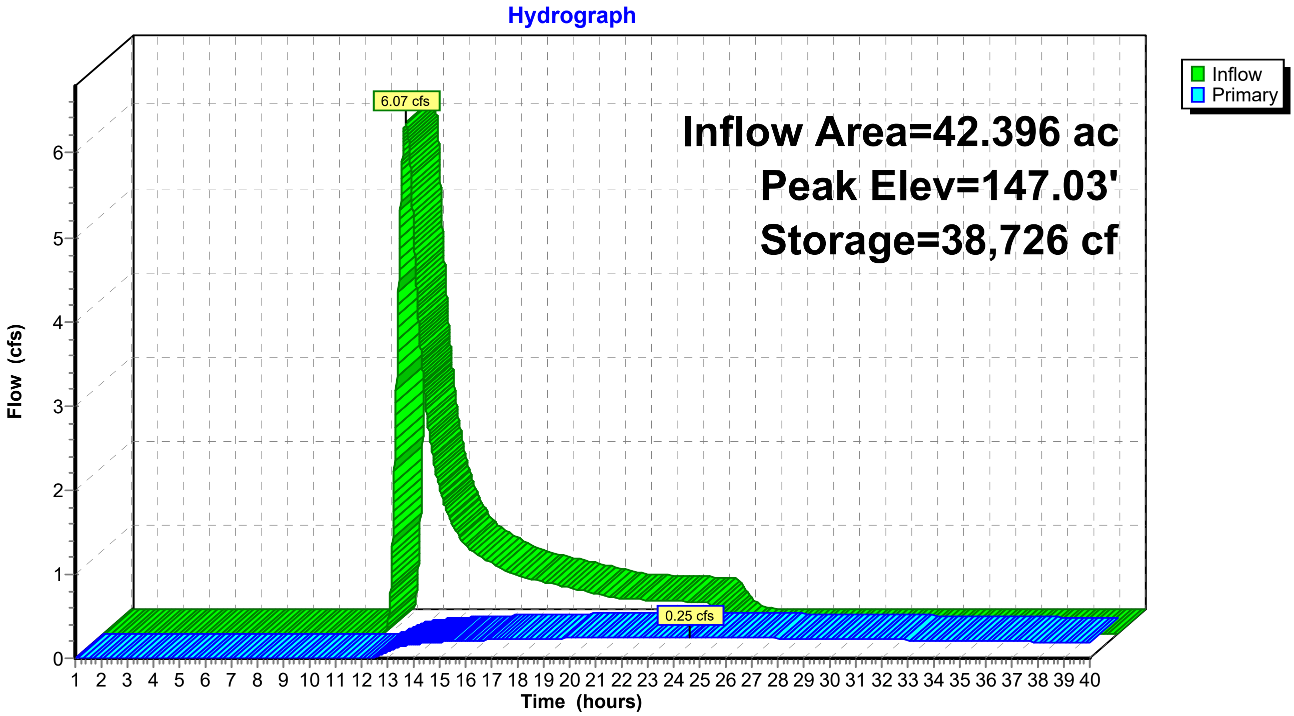
| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 146.50' | 621,484 cf | **Custom Stage Data (Prismatic)** Listed below (Recalc) |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 146.50 | 72,806 | 0 | 0 |
| 154.00 | 92,923 | 621,484 | 621,484 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 146.50' | **24.0" Round Culvert**<br>L= 50.0' CPP, square edge headwall, Ke= 0.500<br>Inlet / Outlet Invert= 146.50' / 146.00' S= 0.0100 '/' Cc= 0.900<br>n= 0.011 Concrete pipe, straight & clean, Flow Area= 3.14 sf |
| #2 | Device 1 | 146.50' | **4.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads |
| #3 | Device 1 | 148.00' | **24.0" x 24.0" Horiz. Orifice/Grate** C= 0.600<br>Limited to weir flow at low heads |

**Primary OutFlow** Max=0.25 cfs @ 24.62 hrs HW=147.03' TW=146.47' (Dynamic Tailwater)
**1=Culvert** (Passes 0.25 cfs of 1.60 cfs potential flow)
**2=Orifice/Grate** (Orifice Controls 0.25 cfs @ 2.89 fps)
**3=Orifice/Grate** ( Controls 0.00 cfs)

## Pond 6P: Pocket Pond



## Summary for Pond 7P: Pocket Pond

Inflow Area = 16.853 ac, 30.00% Impervious, Inflow Depth = 0.31" for WQv Event event
Inflow = 4.54 cfs @ 12.18 hrs, Volume= 0.442 af
Outflow = 0.10 cfs @ 24.25 hrs, Volume= 0.180 af, Atten= 98%, Lag= 724.2 min
Primary = 0.10 cfs @ 24.25 hrs, Volume= 0.180 af
Routed to Reach 1R : Beaverkill

Routing by Sim-Route method, Time Span= 1.00-40.00 hrs, dt= 0.01 hrs
Peak Elev= 147.23' @ 24.25 hrs Surf.Area= 70,186 sf Storage= 15,811 cf

Plug-Flow detention time= 829.3 min calculated for 0.180 af (41% of inflow)
Center-of-Mass det. time= 665.8 min ( 1,566.7 - 901.0 )

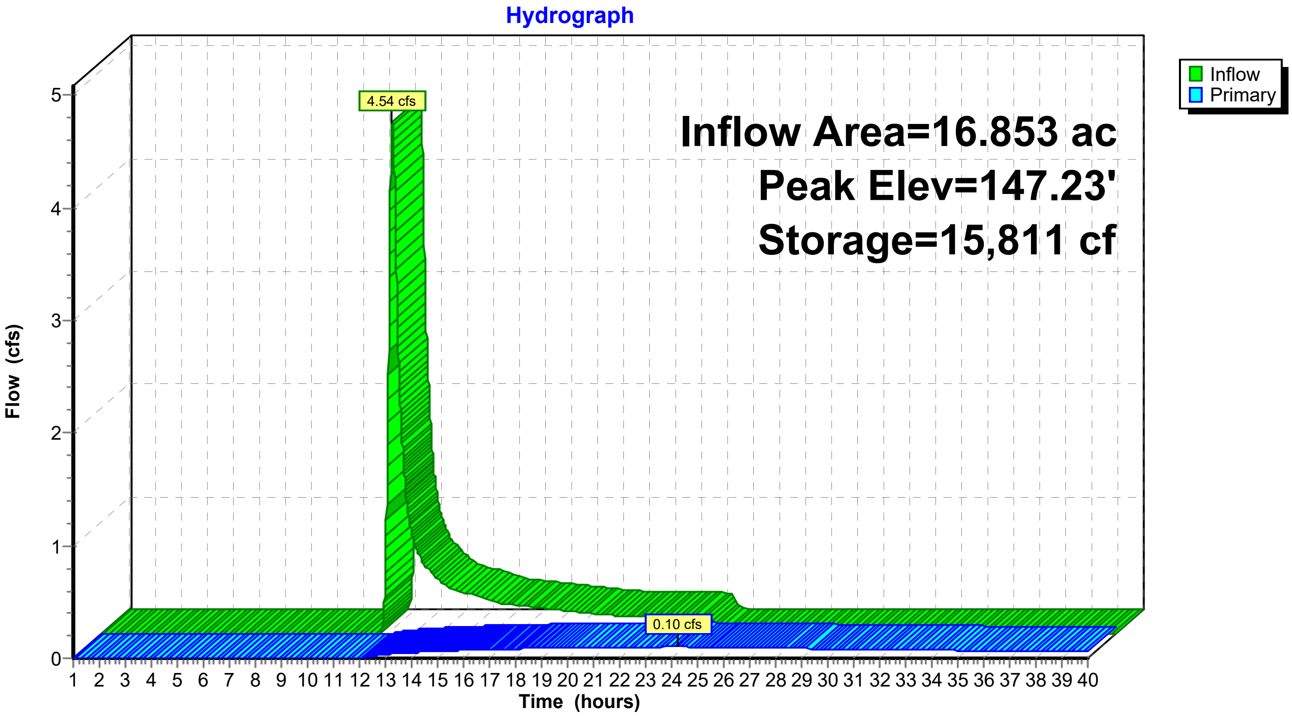
| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 147.00' | 734,018 cf | **Custom Stage Data (Prismatic)** Listed below (Recalc) |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 147.00 | 69,584 | 0 | 0 |
| 156.00 | 93,531 | 734,018 | 734,018 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 147.00' | **24.0" Round Culvert**<br>L= 50.0' CPP, square edge headwall, Ke= 0.500<br>Inlet / Outlet Invert= 147.00' / 146.50' S= 0.0100 '/' Cc= 0.900<br>n= 0.011 Concrete pipe, straight & clean, Flow Area= 3.14 sf |
| #2 | Device 1 | 147.00' | **4.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads |
| #3 | Device 1 | 147.60' | **36.0" x 36.0" Horiz. Orifice/Grate** C= 0.600<br>Limited to weir flow at low heads |

**Primary OutFlow** Max=0.10 cfs @ 24.25 hrs HW=147.23' TW=146.48' (Dynamic Tailwater)
**1=Culvert** (Passes 0.10 cfs of 0.32 cfs potential flow)
**2=Orifice/Grate** (Orifice Controls 0.10 cfs @ 1.62 fps)
**3=Orifice/Grate** ( Controls 0.00 cfs)

## Pond 7P: Pocket Pond



## Summary for Pond 8P: Pocket Pond

Inflow Area = 24.219 ac, 30.00% Impervious, Inflow Depth = 0.31" for WQv Event event
Inflow = 6.51 cfs @ 12.18 hrs, Volume= 0.635 af
Outflow = 0.25 cfs @ 20.05 hrs, Volume= 0.458 af, Atten= 96%, Lag= 471.9 min
Primary = 0.25 cfs @ 20.05 hrs, Volume= 0.458 af
Routed to Reach 1R : Beaverkill

Routing by Sim-Route method, Time Span= 1.00-40.00 hrs, dt= 0.01 hrs
Peak Elev= 147.02' @ 20.05 hrs Surf.Area= 35,239 sf Storage= 17,897 cf

Plug-Flow detention time= 697.3 min calculated for 0.458 af (72% of inflow)
Center-of-Mass det. time= 583.6 min ( 1,484.6 - 901.1 )

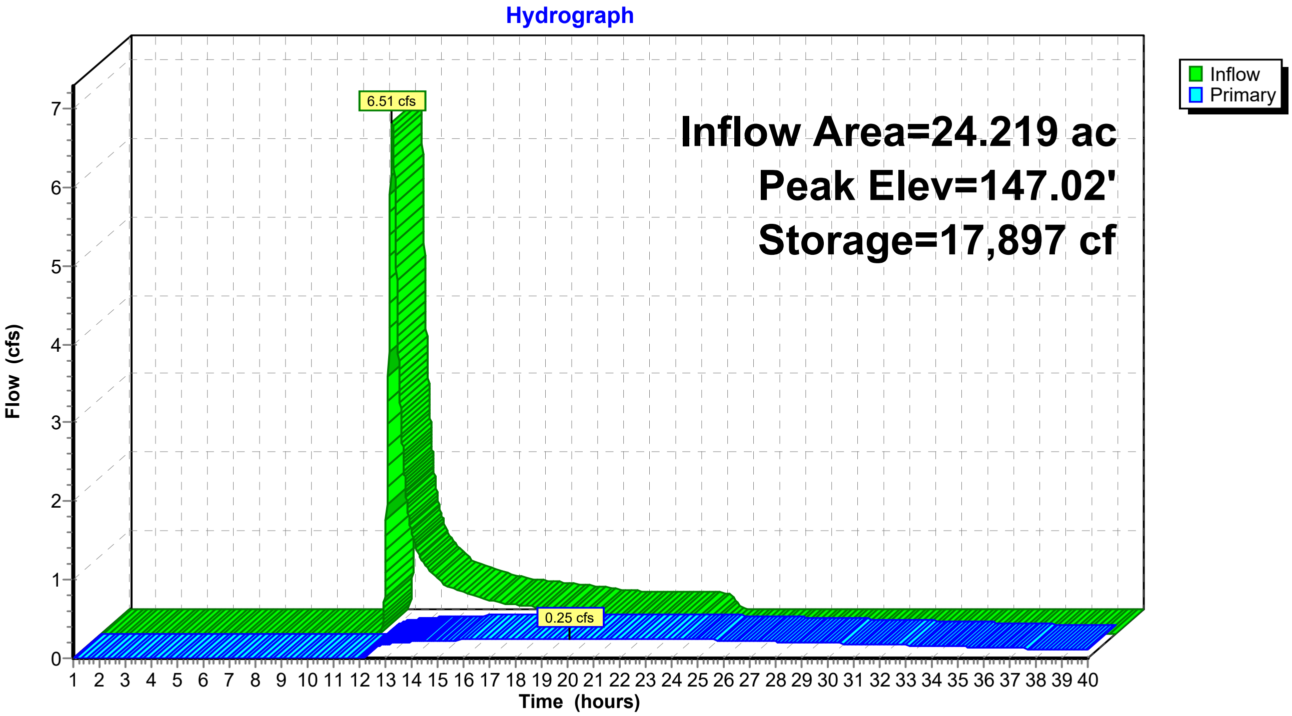
| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 146.50' | 383,826 cf | **Custom Stage Data (Prismatic)** Listed below (Recalc) |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 146.50 | 33,862 | 0 | 0 |
| 155.00 | 56,450 | 383,826 | 383,826 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 146.50' | **24.0" Round Culvert**<br>L= 50.0' CPP, square edge headwall, Ke= 0.500<br>Inlet / Outlet Invert= 146.50' / 146.00' S= 0.0100 '/' Cc= 0.900<br>n= 0.011 Concrete pipe, straight & clean, Flow Area= 3.14 sf |
| #2 | Device 1 | 146.50' | **4.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads |
| #3 | Device 1 | 148.40' | **24.0" x 24.0" Horiz. Orifice/Grate** C= 0.600<br>Limited to weir flow at low heads |

**Primary OutFlow** Max=0.25 cfs @ 20.05 hrs HW=147.02' TW=146.48' (Dynamic Tailwater)
└─**1=Culvert** (Passes 0.25 cfs of 1.53 cfs potential flow)
  ├─**2=Orifice/Grate** (Orifice Controls 0.25 cfs @ 2.85 fps)
  └─**3=Orifice/Grate** ( Controls 0.00 cfs)

## Pond 8P: Pocket Pond



## Summary for Pond 9P: Pocket Pond

Inflow Area = 14.213 ac, 65.00% Impervious, Inflow Depth = 0.58" for WQv Event event
Inflow = 11.07 cfs @ 12.06 hrs, Volume= 0.689 af
Outflow = 2.01 cfs @ 12.47 hrs, Volume= 0.669 af, Atten= 82%, Lag= 24.6 min
Primary = 2.01 cfs @ 12.47 hrs, Volume= 0.669 af
Routed to Reach 3R : Beaverkill Trib

Routing by Sim-Route method, Time Span= 1.00-40.00 hrs, dt= 0.01 hrs
Peak Elev= 220.59' @ 12.47 hrs Surf.Area= 21,523 sf Storage= 12,172 cf

Plug-Flow detention time= 175.4 min calculated for 0.669 af (97% of inflow)
Center-of-Mass det. time= 159.3 min ( 1,013.9 - 854.6 )

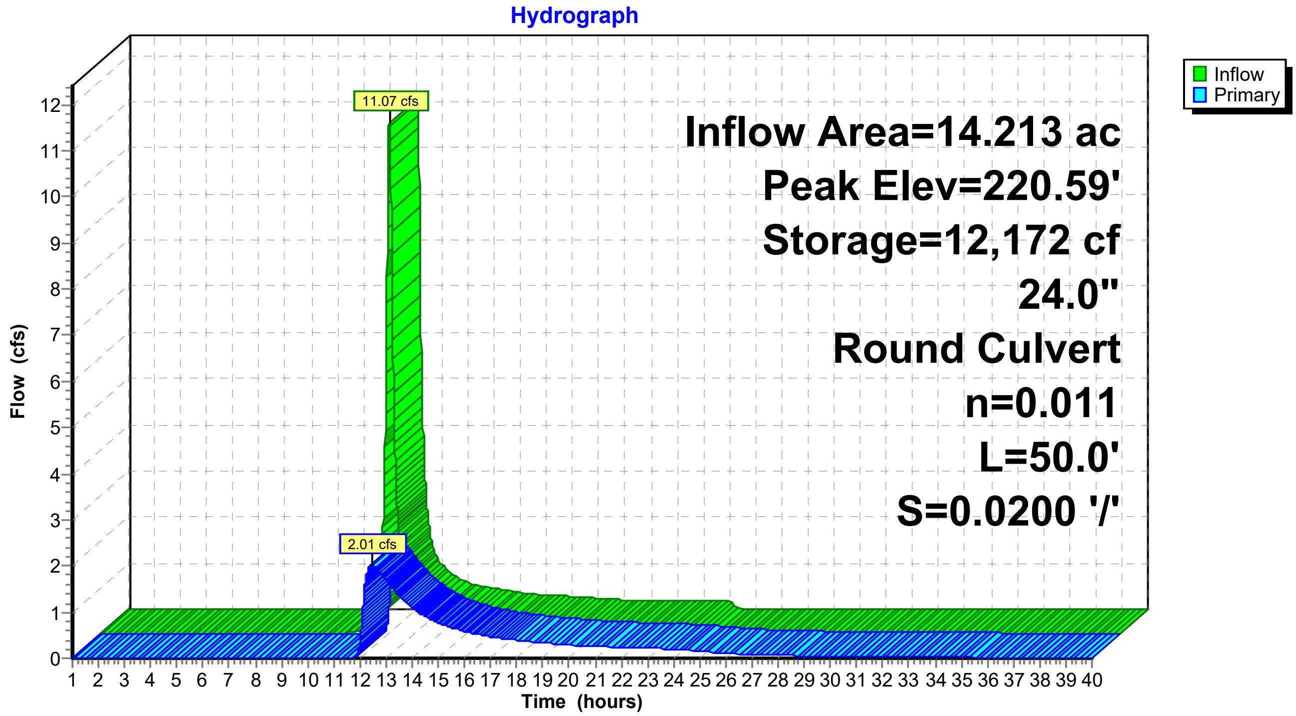
| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 220.00' | 338,770 cf | **Custom Stage Data (Prismatic)** Listed below (Recalc) |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 220.00 | 19,876 | 0 | 0 |
| 230.00 | 47,878 | 338,770 | 338,770 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 220.00' | **24.0" Round Culvert**<br>L= 50.0' CPP, square edge headwall, Ke= 0.500<br>Inlet / Outlet Invert= 220.00' / 219.00' S= 0.0200 '/' Cc= 0.900<br>n= 0.011 Concrete pipe, straight & clean, Flow Area= 3.14 sf |

**Primary OutFlow** Max=2.01 cfs @ 12.47 hrs HW=220.59' TW=200.62' (Dynamic Tailwater)
**1=Culvert** (Inlet Controls 2.01 cfs @ 2.61 fps)

## Pond 9P: Pocket Pond



## Summary for Pond 10P: Pocket Pond

Inflow Area = 17.433 ac, 30.00% Impervious, Inflow Depth = 0.31" for WQv Event event
Inflow = 3.42 cfs @ 12.36 hrs, Volume= 0.457 af
Outflow = 0.00 cfs @ 1.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min
Primary = 0.00 cfs @ 1.00 hrs, Volume= 0.000 af
Routed to Reach 3R : Beaverkill Trib

Routing by Sim-Route method, Time Span= 1.00-40.00 hrs, dt= 0.01 hrs
Peak Elev= 180.36' @ 25.98 hrs Surf.Area= 56,232 sf Storage= 19,912 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no outflow)

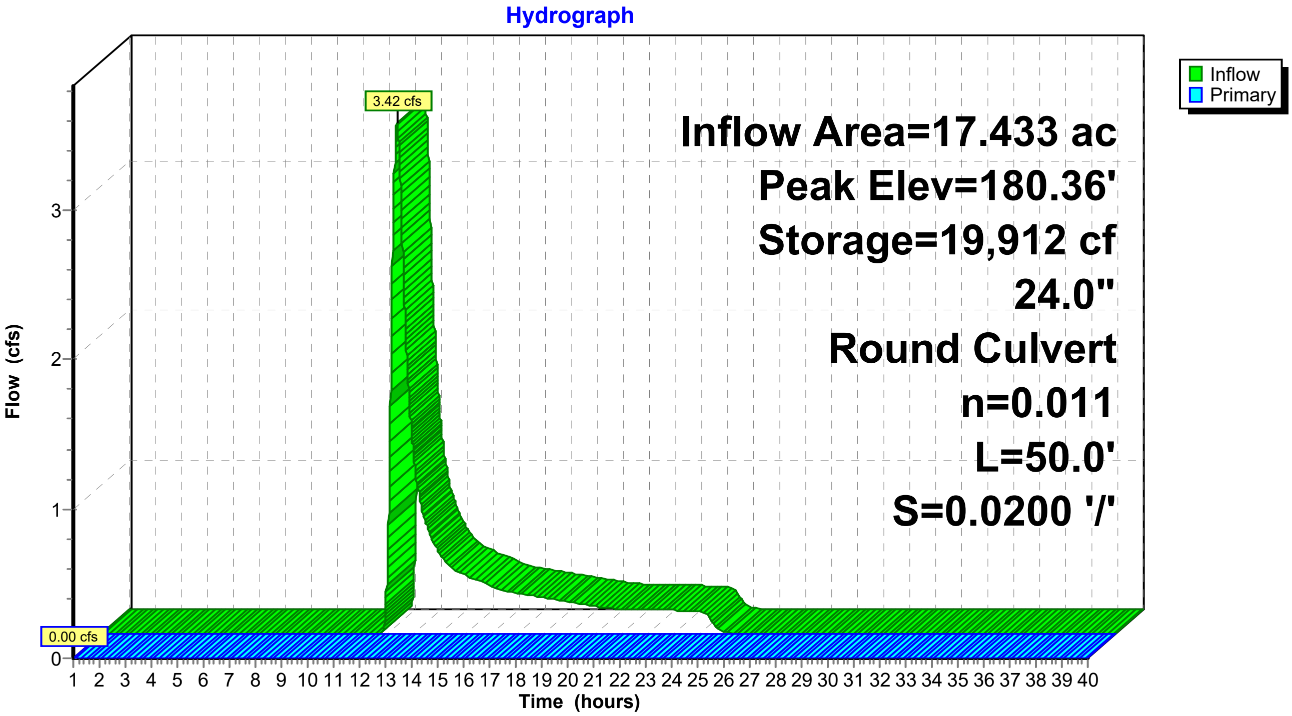
| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 180.00' | 724,100 cf | **Custom Stage Data (Prismatic)** Listed below (Recalc) |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 180.00 | 54,984 | 0 | 0 |
| 190.00 | 89,836 | 724,100 | 724,100 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 180.00' | **24.0" Round Culvert**<br>L= 50.0' CPP, square edge headwall, Ke= 0.500<br>Inlet / Outlet Invert= 180.00' / 179.00' S= 0.0200 '/' Cc= 0.900<br>n= 0.011 Concrete pipe, straight & clean, Flow Area= 3.14 sf |

**Primary OutFlow** Max=0.00 cfs @ 1.00 hrs HW=180.00' TW=200.00' (Dynamic Tailwater)
└─**1=Culvert** ( Controls 0.00 cfs)

## Pond 10P: Pocket Pond



## Summary for Pond 11P: Pocket Pond

Inflow Area = 26.813 ac, 30.00% Impervious, Inflow Depth = 0.31" for WQv Event event
Inflow = 8.44 cfs @ 12.13 hrs, Volume= 0.703 af
Outflow = 0.00 cfs @ 1.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min
Primary = 0.00 cfs @ 1.00 hrs, Volume= 0.000 af
Routed to Reach 3R : Beaverkill Trib

Routing by Sim-Route method, Time Span= 1.00-40.00 hrs, dt= 0.01 hrs
Peak Elev= 145.74' @ 25.01 hrs Surf.Area= 41,983 sf Storage= 30,631 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no outflow)

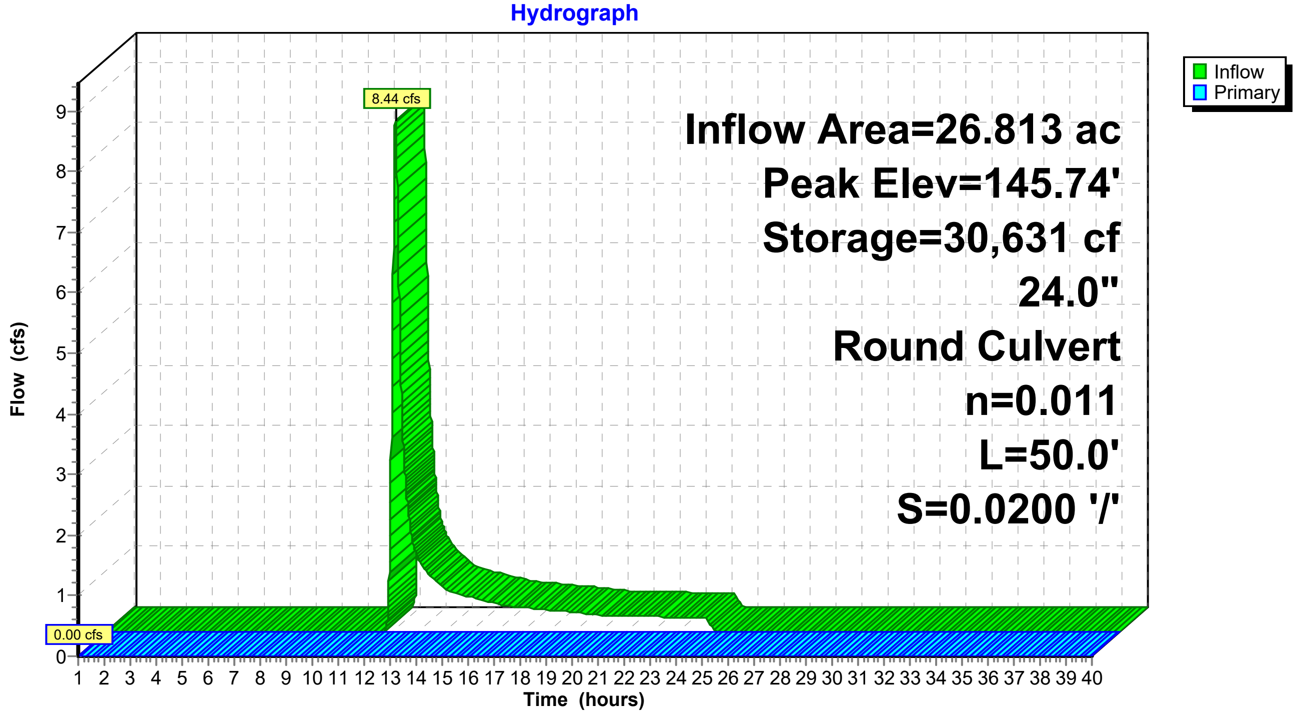
| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 145.00' | 807,405 cf | **Custom Stage Data (Prismatic)** Listed below (Recalc) |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 145.00 | 40,684 | 0 | 0 |
| 160.00 | 66,970 | 807,405 | 807,405 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 150.00' | **24.0" Round Culvert**<br>L= 50.0' CPP, square edge headwall, Ke= 0.500<br>Inlet / Outlet Invert= 150.00' / 149.00' S= 0.0200 '/' Cc= 0.900<br>n= 0.011 Concrete pipe, straight & clean, Flow Area= 3.14 sf |

**Primary OutFlow** Max=0.00 cfs @ 1.00 hrs HW=145.00' TW=200.00' (Dynamic Tailwater)
└─**1=Culvert** ( Controls 0.00 cfs)

## Pond 11P: Pocket Pond



## Summary for Pond 12P: Pocket Pond

Inflow Area = 29.499 ac, 30.00% Impervious, Inflow Depth = 0.31" for WQv Event event
Inflow = 9.86 cfs @ 12.11 hrs, Volume= 0.774 af
Outflow = 1.59 cfs @ 12.77 hrs, Volume= 0.751 af, Atten= 84%, Lag= 39.8 min
Primary = 1.59 cfs @ 12.77 hrs, Volume= 0.751 af
Routed to Reach 3R : Beaverkill Trib

Routing by Sim-Route method, Time Span= 1.00-40.00 hrs, dt= 0.01 hrs
Peak Elev= 215.52' @ 12.77 hrs Surf.Area= 22,787 sf Storage= 11,446 cf

Plug-Flow detention time= 181.6 min calculated for 0.750 af (97% of inflow)
Center-of-Mass det. time= 165.5 min ( 1,060.7 - 895.2 )

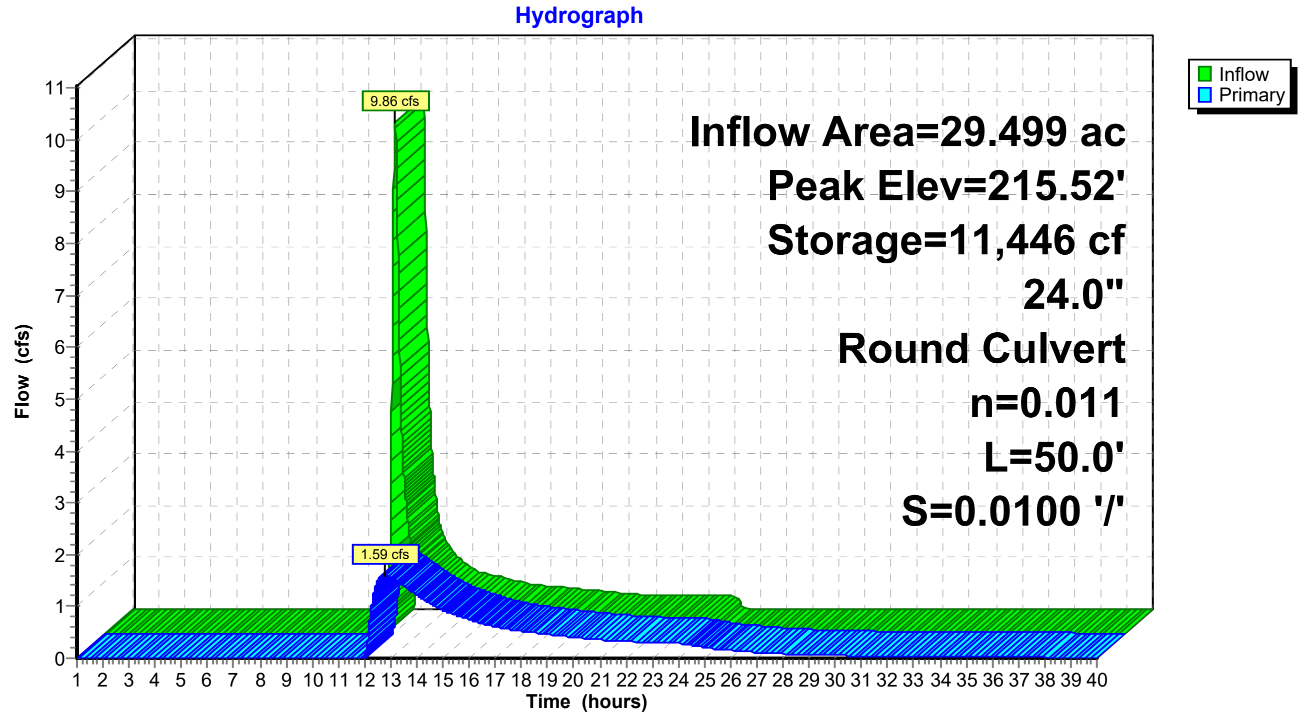
| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 215.00' | 360,450 cf | **Custom Stage Data (Prismatic)** Listed below (Recalc) |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 215.00 | 21,248 | 0 | 0 |
| 225.00 | 50,842 | 360,450 | 360,450 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 215.00' | **24.0" Round Culvert**<br>L= 50.0' CPP, square edge headwall, Ke= 0.500<br>Inlet / Outlet Invert= 215.00' / 214.50' S= 0.0100 '/' Cc= 0.900<br>n= 0.011 Concrete pipe, straight & clean, Flow Area= 3.14 sf |

**Primary OutFlow** Max=1.59 cfs @ 12.77 hrs HW=215.52' TW=200.64' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 1.59 cfs @ 2.45 fps)

## Pond 12P: Pocket Pond

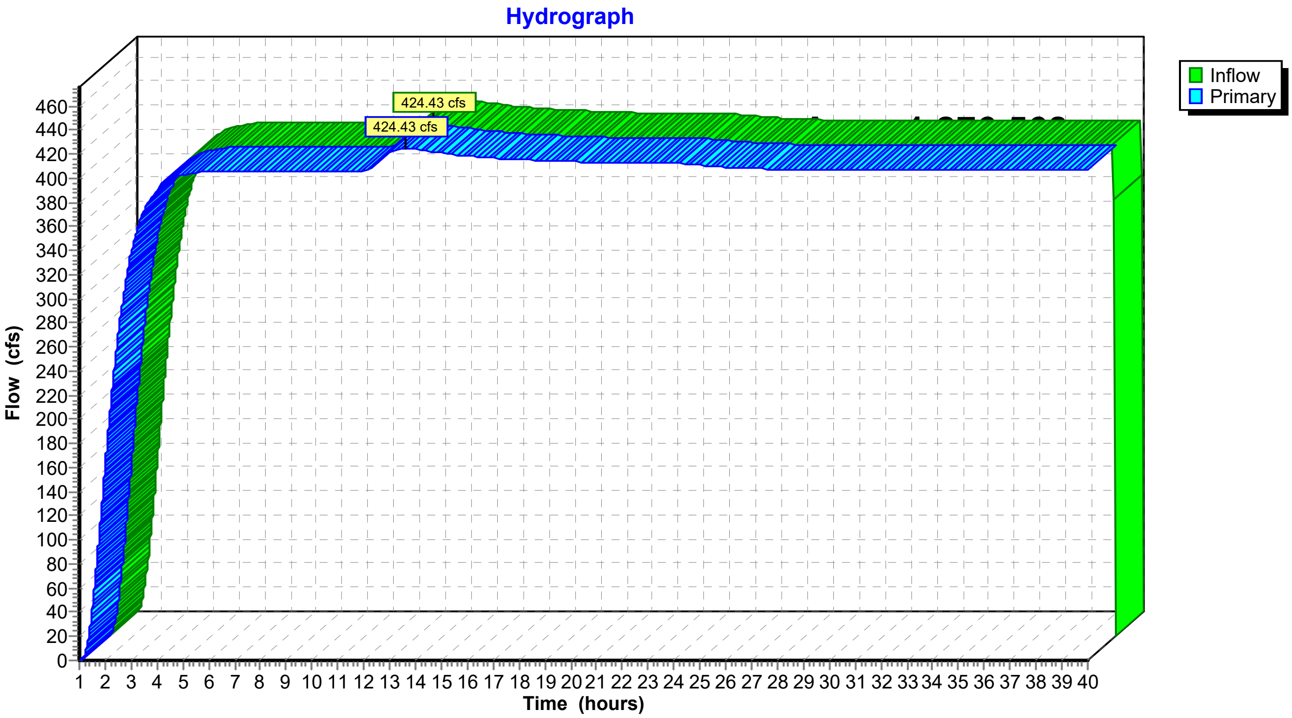


## Summary for Link AP-2: AP-2

Inflow Area = 1,276.568 ac, 10.66% Impervious, Inflow Depth > 12.00" for WQv Event event
Inflow = 424.43 cfs @ 13.58 hrs, Volume= 1,276.471 af
Primary = 424.43 cfs @ 13.59 hrs, Volume= 1,276.471 af, Atten= 0%, Lag= 0.6 min

Primary outflow = Inflow, Time Span= 1.00-40.00 hrs, dt= 0.01 hrs

### Link AP-2: AP-2



# APPENDIX K: WATER QUALITY CALCULATIONS

PASSERO

| | | | |
|---|---|---|---|
| JOB | 20202934.0001 Winston Farm DGEIS | | |
| SHEET NO. | 1 | OF | 4 |
| CALCULATED BY | PM | DATE | 3/5/2024 |
| CHECKED BY | xx | DATE | xx |
| SCALE | Sponsors Preferred RRv | | |

## Runoff Reduction Volume-For added impervious area

**DA** 592.6 acres **HSG** C **90% RAIN** 1.35 inch

1. **Planning (check all that apply)**

| | |
|---|---|
| | Preserve undisturbed areas, natural buffer, and critical environmental areas |
| | Employ open space, conservation, clustering site design techniques |
| | Avoid developing in environmentally sensitive areas |
| | Minimize impervious surfaces, building footprints, parking, roads, walks and drives |
| | Minimize clearing and grading |

PASSERO

2. **Water Quality Volume (before runoff reduction)** WQv=P*A*Rv/12 **WQv=** 17.610 af

767075.27 cf

**DA** 592.6 acres **Impervious Area** 141 **Rv=** 0.264

3. **Minimum RRv Requirements** RRv=P*.95*S*AI/12

**P=** 1.35 inch **S=** 0.3 **AI=** 141.000 **RRv=** 4.521 af

196926.59 cf

4. **Area Reduction Practices (check all that apply)**

| | | | | | | |
|---|---|---|---|---|---|---|
| X | Conservation of natural areas | contributing AI= | 2.00 | Area= | 300.00 | ac |
| X | Riparian Buffers/filter strips | contributing AI= | 8.00 | Area= | 20.00 | ac |
| **X** | Tree Planting/Tree preservation | contributing AI= | 4.00 | Area= | 10.00 | ac |
| | Total Area Reduction | | | | 330.00 | ac |
| | Total Impervious area within area reduction | | | | 14.00 | ac |

5.

Remaining drainage area: (#2-#4) 262.6 ac

Remaining impervious area: (#2 AI-#4 AI) 127 ac

6. **Recalculate WQv for site area remaining after area reductions:**

Remaining DA= 262.6

Remaining AI= 127

Rv= 0.485 Area reduced WQv= 14.336 af

7. **Runoff reduction volume (RRv) from #2: (#2 WQv-#6 WQv)=** **RRv=** 3.274 af

**Rooftop Disconnect**

8. **Incorporate rooftop area disconnection:**

Total disconnected rooftop area (now considered pervious for Rv calculation — Area= 0.000 ac

9. **Recalculate WQv with Rv modified for impervious disconnect:**

**DA from (#5)** 262.6 **Remaining AI=** 127 **Rv=** 0.485 Rv reduced WQv= 14.336 af

10. **Runoff reduction volume: #6 (area reduced WQv) - #9 (Rv reduced WQv)=** RRv= 0.000 af
0 cf

**Source Control WQv Treatment Practices (from attached worksheet)**

| | | | |
|---|---|---|---|
| 11a. | **Subtotal DA tributary to Source Control treatment practices=** | 53.000 | acres |
| 11b. | **Subtotal Source Control WQv Treatment Volume=** | 1.550 | af |
| 11c. | **Subtotal Runoff Reduction Volume (RRv)=** | 4.824 | af |

**TOTAL Runoff Reduction Volume (RRv)**

12. **Total RRv provided (#7 + #10 + 11c) =** Total RRv= 8.098 af

13. **Is RRv (#12) ≥ original WQv (#2)** YES NO If yes, skip to #18

14. **Is RRv (#12) ≥ minimum WQv (#3)** YES NO If no, provide add'l RRV and recalculate

15. **Total drainage area treated with runoff reduction/source control practices=** 383.000 ac
(Area reduction from #4 + total DA tributary to source control #11a.)

16. **Is all of the watershed DA treated by either area reduction or source control practices?**
YES NO If yes, skip to #18

**Standard WQv Treatment**

17. **Provide treatment for any remaining untreated watershed DA with standard practices**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Remaining untreated DA=DA (#2) | 592.6 | ac | - treated DA (#15) | 383.000 | ac = | 209.600 | ac |
| Remaining impervious=AI (#2) | 141 | ac | - treated AI (#11, #8, #4) | 39.000 | ac = | 102.000 | ac |
| Remaining DA = | 209.600 | ac | | | | | |
| Remaining AI= | 102.000 | ac | | | | | |
| Rv= | 0.400 | | | | | | |
| WQv= | 11.805 | af | | | | | |

**Standard WQv Treatment (Continued)**

| | | | | |
|---|---|---|---|---|
| Ponds | WQv Provided | ________ | af | *Minimum Rv= 0.20 |
| Wetlands | WQv Provided | ________ | af | |
| Infiltration | WQv Provided | ________ | af | |
| Filters | WQv Provided | ________ | af | |
| Open Channels | WQv Provided | ________ | af | |

**Peak Flow Attenuation**

18. **Calculate peak runoff rates for pre-development site conditions (from HydroCAD model)**

DA= 0 ac RCN= 0 Tc (hours) 0.00

Q1= 507.37
Q10= 2532.56
Q100= 6607.38

19. **Calculate peak runoff rates for post-development site conditions with RRv (method used "HydroCAD")**

DA= 0 ac RCN= 0 Tc (hours) 0.000

Q1= 494.47
Q10= 1034.88
Q100= 2170.55

20. **Provide necessary stormwater volume detention for channel protection, overbank and extreme storm runoff to mitigate any increase in post-developed runoff from pre-developed conditions using:**

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Ponds | CP vol | ________ | cf | OB vol | ________ | cf | ES vol | ________ | cf |
| Wetlands | CP vol | ________ | cf | OB vol | ________ | cf | ES vol | ________ | cf |
| Dry Detention | CP vol | | cf | OB vol | | cf | ES vol | | cf |
| Underground storage | CP vol | ________ | cf | OB vol | ________ | cf | ES vol | ________ | cf |
| Blue roofs | CP vol | ________ | cf | OB vol | ________ | cf | ES vol | ________ | cf |

| | | | |
|---|---|---|---|
| JOB | 20202934.0001 Winston Farm DGEIS | | |
| SHEET NO. | 4 | OF | 4 |
| CALCULATED BY | PM | DATE | 3/5/2024 |
| CHECKED BY | xx | DATE | xx |
| SCALE | Sponsors Preferred RRv | | |

## 11. SOURCE CONTROL WQv TREATMENT PRACTICES WORKSHEET

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| X Infiltration | | | | | | Allowable Reduction | |
| DA(ac)= | 10.00 | Rv= | 0.680 | | 100% of WQv= | | 0.765 |
| AI (ac)= | 7.00 | WQv= | 0.765 | | | | |
| X Bioretention | | | | | | Allowable Reduction | |
| DA(ac)= | 40.00 | Rv= | 0.388 | A/B soils | 80% of WQv= | | 0.000 |
| AI (ac)= | 15.00 | WQv= | 1.744 | C/D soils | 40% of WQv= | | 0.698 |
| Dry Swale | | | | | | Allowable Reduction | |
| DA(ac)= | 0.00 | Rv= | 0.000 | A/B soils | 40% of WQv= | | 0.000 |
| AI (ac)= | 0.00 | WQv= | 0.000 | C/D soils | 20% of WQv= | | 0.000 |
| Vegetated Swale | | | | | | Allowable Reduction | |
| DA(ac)= | 0.00 | Rv= | 0.000 | A/B soils | 20% of WQv= | | 0.000 |
| AI (ac)= | 0.00 | WQv= | 0.000 | C/D soils | 10% of WQv= | | 0.000 |
| Green Roof | | | | | | Allowable Reduction | |
| Roof= | 0.00 | Rv= | 0.000 | | 100% of WQv= | | 0.000 |
| | | WQv= | 0.000 | | | | |
| X Rain Garden | | | | | | Allowable Reduction | |
| DA(ac)= | 3.00 | Rv= | 0.650 | A/B soils | 100% of WQv= | | 0.000 |
| AI (ac)= | 2.00 | WQv= | 0.219 | C/D soils | 40% of WQv= | | 0.088 |
| Cisterns/Rain Barrels | | | | | | Allowable Reduction | |
| Roof= | 0.00 | Rv= | 0.000 | A/B soils | 100% of WQv= | | 0.000 |
| | | WQv= | 0.000 | C/D soils | 40% of WQv= | | 0.000 |
| Stormwater Planters | | | | | | Allowable Reduction | |
| DA(ac)= | 0.00 | Rv= | 0.000 | | 100% of WQv= | | 0.000 |
| AI (ac)= | 0.00 | WQv= | 0.000 | | | | |
| Porous Pavement | | | | | | Allowable Reduction | |
| DA(ac)= | 0.00 | Rv= | 0.000 | | 100% of WQv= | | 0.000 |
| AI (ac)= | 0.00 | WQv= | 0.000 | | | | |

| | | | |
|---|---|---|---|
| 11a. | **Subtotal DA tributary to Source Control WQv Treatment=** | 53 | ac |
| 11b. | **Subtotal Source Control WQv Treatment Volume=** | 1.550 | af |
| 11c. | **Subtotal of All Runoff Reduction Volume (RRv)=** | Subtotal RRv= | **4.824** |

PASSERO

JOB 20202934.0001 Winston Farm DGEIS
SHEET NO. 1 OF 1
CALCULATED BY PM DATE 3/4/2024
CHECKED BY DATE
SCALE Sponsors Preferred Water Quality Volume

## Initial Water Quality Volume

**WQv = [(P)(Rv)(A)]/12**

Where:
Rv = 0.05 + 0.009(I)
I = impervious cover in percent
P = 90% rainfall (see Figure 4.1)
A = site area in acres

*TARGET WQv IS FOR REDEVELOPMENT WHERE 100% OF THE NEW IMPERVIOUS IS TREATED AND 25% OF THE EXISTING IMPERVIOUS IS TREATED

| Location | Site Area (ac) | New Impervious Area (ac) | Replaced Impervious Area (ac) | % Impervious | Rv | Rainfall (P) (inches) | WQv (ac-ft) | Target WQv (ac-ft) | cf |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 158.926 | 0.000 | | | | | | | |
| 1A | 53.103 | 6.372 | | 12.0% | 0.16 | 1.35 | 0.944 | 0.944 | 41114.9 |
| 1B | 48.263 | 3.037 | | 6.3% | 0.11 | 1.35 | 0.579 | 0.579 | 25220.2 |
| 2 | 202.288 | 0.000 | | | | | | | |
| 2A | 36.879 | 4.425 | | 12.0% | 0.16 | 1.35 | 0.655 | 0.655 | 28552.5 |
| 2B | 55.045 | 6.605 | | 12.0% | 0.16 | 1.35 | 0.978 | 0.978 | 42618.4 |
| 2C | 31.804 | 3.816 | | 12.0% | 0.16 | 1.35 | 0.565 | 0.565 | 24623.1 |
| 2D | 39.716 | 4.766 | | 12.0% | 0.16 | 1.35 | 0.706 | 0.706 | 30751.6 |
| 2E | 45.892 | 5.507 | | 12.0% | 0.16 | 1.35 | 0.816 | 0.816 | 35533 |
| 2F | 42.396 | 12.719 | | 30.0% | 0.32 | 1.35 | 1.526 | 1.526 | 66484.6 |
| 2G | 16.853 | 5.056 | | 30.0% | 0.32 | 1.35 | 0.607 | 0.607 | 26428.6 |
| 2H | 24.219 | 7.266 | | 30.0% | 0.32 | 1.35 | 0.872 | 0.872 | 37980.6 |
| 3 | 436.528 | 0.000 | | | | | | | |
| 3A | 52.953 | 0.000 | | | | | | | |
| 3B | 14.213 | 9.238 | | 65.0% | 0.63 | 1.35 | 1.015 | 1.015 | 44226.3 |
| 3C | 20.730 | 13.475 | | 65.0% | 0.64 | 1.35 | 1.481 | 1.481 | 64510.2 |
| 3D | 29.499 | 8.850 | | 30.0% | 0.32 | 1.35 | 1.062 | 1.062 | 46260.5 |
| 3E | 17.433 | 5.230 | | 30.0% | 0.32 | 1.35 | 0.628 | 0.628 | 27338.2 |
| 3F | 26.813 | 8.044 | | 30.0% | 0.32 | 1.35 | 0.965 | 0.965 | 42047.5 |
| 3G | 39.934 | 15.137 | | 37.9% | 0.39 | 1.35 | 1.757 | 1.757 | 76545.8 |
| 4 | 58.713 | 0.275 | | | | | | | |
| 4A | 40.328 | 15.290 | | 37.9% | 0.39 | 1.35 | 1.775 | 1.775 | 77317.1 |
| 4B | 9.481 | 6.163 | | 65.0% | 0.64 | 1.35 | 0.677 | 0.677 | 29504.7 |
| 5 | 34.851 | 4.182 | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| WQv | 592.601 | 140.996 | | 23.8% | 0.26 | 1.35 | 17.609 | 17.609 | 767058 |

# APPENDIX L: NYSDEC SPEDES GENERAL PERMIT FOR STORMWATER DISCHARGES FROM CONSTRUCTION ACTIVITY (PERMIT NO. GP-0-20-001)

NEW YORK STATE
DEPARTMENT OF ENVIRONMENTAL CONSERVATION

SPDES GENERAL PERMIT
FOR STORMWATER DISCHARGES

From

**CONSTRUCTION ACTIVITY**

Permit No. GP- 0-20-001

Issued Pursuant to Article 17, Titles 7, 8 and Article 70

of the Environmental Conservation Law

Effective Date: January 29, 2020

Expiration Date: January 28, 2025

John J. Ferguson

Chief Permit Administrator

1-23-20

Authorized Signature

Date

Address: NYS DEC
Division of Environmental Permits
625 Broadway, 4th Floor
Albany, N.Y. 12233-1750

## PREFACE

Pursuant to Section 402 of the Clean Water Act ("CWA"), stormwater *discharges* from certain *construction activities* are unlawful unless they are authorized by a *National Pollutant Discharge Elimination System ("NPDES")* permit or by a state permit program. New York administers the approved State Pollutant Discharge Elimination System (SPDES) program with permits issued in accordance with the New York State Environmental Conservation Law (ECL) Article 17, Titles 7, 8 and Article 70.

An *owner or operator* of a *construction activity* that is eligible for coverage under this permit must obtain coverage prior to the *commencement of construction activity*. Activities that fit the definition of "*construction activity*", as defined under 40 CFR 122.26(b)(14)(x), (15)(i), and (15)(ii), constitute construction of a *point source* and therefore, pursuant to ECL section 17-0505 and 17-0701, the *owner or operator* must have coverage under a SPDES permit prior to *commencing construction activity*. The *owner or operator* cannot wait until there is an actual *discharge* from the *construction site* to obtain permit coverage.

***Note: The italicized words/phrases within this permit are defined in Appendix A.**

**NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
SPDES GENERAL PERMIT FOR STORMWATER DISCHARGES FROM
CONSTRUCTION ACTIVITIES**

## Table of Contents

## Part 1. PERMIT COVERAGE AND LIMITATIONS

### A. Permit Application

This permit authorizes stormwater *discharges* to *surface waters of the State* from the following *construction activities* identified within 40 CFR Parts 122.26(b)(14)(x), 122.26(b)(15)(i) and 122.26(b)(15)(ii), provided all of the eligibility provisions of this permit are met:

1. *Construction activities* involving soil disturbances of one (1) or more acres; including disturbances of less than one acre that are part of a *larger common plan of development or sale* that will ultimately disturb one or more acres of land; excluding *routine maintenance activity* that is performed to maintain the original line and grade, hydraulic capacity or original purpose of a facility;

2. *Construction activities* involving soil disturbances of less than one (1) acre where the Department has determined that a *SPDES* permit is required for stormwater *discharges* based on the potential for contribution to a violation of a *water quality standard* or for significant contribution of *pollutants* to *surface waters of the State.*

3. *Construction activities* located in the watershed(s) identified in Appendix D that involve soil disturbances between five thousand (5,000) square feet and one (1) acre of land.

### B. Effluent Limitations Applicable to Discharges from Construction Activities

*Discharge*s authorized by this permit must achieve, at a minimum, the effluent limitations in Part I.B.1. (a) – (f) of this permit. These limitations represent the degree of effluent reduction attainable by the application of best practicable technology currently available.

1. Erosion and Sediment Control Requirements - The *owner or operator* must select, design, install, implement and maintain control measures to *minimize* the *discharge* of *pollutants* and prevent a violation of the *water quality standards*. The selection, design, installation, implementation, and maintenance of these control measures must meet the non-numeric effluent limitations in Part I.B.1.(a) – (f) of this permit and be in accordance with the New York State Standards and Specifications for Erosion and Sediment Control, dated November 2016, using sound engineering judgment. Where control measures are not designed in conformance with the design criteria included in the technical standard, the *owner or operator* must include in the *Stormwater Pollution Prevention Plan* (“SWPPP”) the reason(s) for the

deviation or alternative design and provide information which demonstrates that the deviation or alternative design is *equivalent* to the technical standard.

a. **Erosion and Sediment Controls.** Design, install and maintain effective erosion and sediment controls to *minimize* the *discharge* of *pollutants* and prevent a violation of the *water quality standards*. At a minimum, such controls must be designed, installed and maintained to:

(i) *Minimize* soil erosion through application of runoff control and soil stabilization control measure to *minimize pollutant discharges*;

(ii) Control stormwater *discharge*s, including both peak flowrates and total stormwater volume, to *minimize* channel and *streambank* erosion and scour in the immediate vicinity of the *discharge* points;

(iii) *Minimize* the amount of soil exposed during *construction activity*;

(iv) *Minimize* the disturbance of *steep slopes*;

(v) *Minimize* sediment *discharge*s from the site;

(vi) Provide and maintain *natural buffer*s around surface waters, direct stormwater to vegetated areas and maximize stormwater infiltration to reduce *pollutant discharge*s, unless *infeasible*;

(vii) *Minimize* soil compaction. Minimizing soil compaction is not required where the intended function of a specific area of the site dictates that it be compacted;

(viii) Unless *infeasible*, preserve a sufficient amount of topsoil to complete soil restoration and establish a uniform, dense vegetative cover; and

(ix) *Minimize* dust. On areas of exposed soil, *minimize* dust through the appropriate application of water or other dust suppression techniques to control the generation of pollutants that could be discharged from the site.

b. **Soil Stabilization**. In areas where soil disturbance activity has temporarily or permanently ceased, the application of soil stabilization measures must be initiated by the end of the next business day and completed within fourteen (14) days from the date the current soil disturbance activity ceased. For construction sites that *directly discharge* to one of the 303(d) segments listed in Appendix E or is located in one of the watersheds listed in Appendix C, the application of soil stabilization measures must be initiated by the end of the next business day and completed within seven (7) days from the date the current soil disturbance activity ceased. See Appendix A for definition of *Temporarily Ceased*.

c. **Dewatering**. *Discharge*s from *dewatering* activities, including *discharge*s from *dewatering* of trenches and excavations, must be managed by appropriate control measures.

d. **Pollution Prevention Measures**. Design, install, implement, and maintain effective pollution prevention measures to *minimize* the *discharge* of *pollutants* and prevent a violation of the *water quality standards*. At a minimum, such measures must be designed, installed, implemented and maintained to:

(i) *Minimize* the *discharge* of *pollutants* from equipment and vehicle washing, wheel wash water, and other wash waters. This applies to washing operations that use clean water only. Soaps, detergents and solvents cannot be used;

(ii) *Minimize* the exposure of building materials, building products, construction wastes, trash, landscape materials, fertilizers, pesticides, herbicides, detergents, sanitary waste, hazardous and toxic waste, and other materials present on the site to precipitation and to stormwater. Minimization of exposure is not required in cases where the exposure to precipitation and to stormwater will not result in a *discharge* of *pollutants*, or where exposure of a specific material or product poses little risk of stormwater contamination (such as final products and materials intended for outdoor use) ; and

(iii) Prevent the *discharge* of *pollutants* from spills and leaks and implement chemical spill and leak prevention and response procedures.

e. **Prohibited *Discharge*s.** The following *discharge*s are prohibited:

(i) Wastewater from washout of concrete;

(ii) Wastewater from washout and cleanout of stucco, paint, form release oils, curing compounds and other construction materials;

(iii) Fuels, oils, or other *pollutants* used in vehicle and equipment operation and maintenance;

(iv) Soaps or solvents used in vehicle and equipment washing; and

(v) Toxic or hazardous substances from a spill or other release.

f. Surface Outlets. When discharging from basins and impoundments, the outlets shall be designed, constructed and maintained in such a manner that sediment does not leave the basin or impoundment and that erosion at or below the outlet does not occur.

**C. Post-construction Stormwater Management Practice Requirements**

1. The *owner or operator* of a *construction activity* that requires post-construction stormwater management practices pursuant to Part III.C. of this permit must select, design, install, and maintain the practices to meet the *performance criteria* in the New York State Stormwater Management Design Manual ("Design Manual"), dated January 2015, using sound engineering judgment. Where post-construction stormwater management practices ("SMPs") are not designed in conformance with the *performance criteria* in the Design Manual, the *owner or operator* must include in the SWPPP the reason(s) for the deviation or alternative design and provide information which demonstrates that the deviation or alternative design is *equivalent* to the technical standard.

2. The *owner or operator* of a *construction activity* that requires post-construction stormwater management practices pursuant to Part III.C. of this permit must design the practices to meet the applicable *sizing criteria* in Part I.C.2.a., b., c. or d. of this permit.

**a. Sizing Criteria for New Development**

(i) Runoff Reduction Volume ("RRv"): Reduce the total Water Quality Volume ("WQv") by application of RR techniques and standard SMPs with RRv capacity. The total WQv shall be calculated in accordance with the criteria in Section 4.2 of the Design Manual.

(ii) Minimum RRv and Treatment of Remaining Total WQv: Construction activities that cannot meet the criteria in Part I.C.2.a.(i) of this permit due to site limitations shall direct runoff from all newly constructed impervious areas to a RR technique or standard SMP with RRv capacity unless infeasible. The specific site limitations that prevent the reduction of 100% of the WQv shall be documented in the SWPPP.

For each impervious area that is not directed to a RR technique or standard SMP with RRv capacity, the SWPPP must include documentation which demonstrates that all options were considered and for each option explains why it is considered infeasible.

**In no case shall the runoff reduction achieved from the newly constructed impervious areas be less than the Minimum RRv as calculated using the criteria in Section 4.3 of the Design Manual.** The remaining portion of the total WQv that cannot be reduced shall be treated by application of standard SMPs.

(iii) Channel Protection Volume (“Cpv”): Provide 24 hour extended detention of the post-developed 1-year, 24-hour storm event; remaining after runoff reduction. The Cpv requirement does not apply when:
(1) Reduction of the entire Cpv is achieved by application of runoff reduction techniques or infiltration systems, or
(2) The site discharges directly to tidal waters, or fifth order or larger streams.

(iv) *Overbank* Flood Control Criteria (“Qp”): Requires storage to attenuate the post-development 10-year, 24-hour peak discharge rate (Qp) to predevelopment rates. The Qp requirement does not apply when:
(1) the site discharges directly to tidal waters or fifth order or larger streams, or
(2) A downstream analysis reveals that *overbank* control is not required.

(v) Extreme Flood Control Criteria (“Qf”): Requires storage to attenuate the post-development 100-year, 24-hour peak discharge rate (Qf) to predevelopment rates. The Qf requirement does not apply when:
(1) the site discharges directly to tidal waters or fifth order or larger streams, or
(2) A downstream analysis reveals that *overbank* control is not required.

**b. *Sizing Criteria* for *New Development* in Enhanced Phosphorus Removal Watershed**

(i) Runoff Reduction Volume (RRv): Reduce the total Water Quality Volume (WQv) by application of RR techniques and standard SMPs with RRv capacity. The total WQv is the runoff volume from the 1-year, 24 hour design storm over the post-developed watershed and shall be calculated in accordance with the criteria in Section 10.3 of the Design Manual.

(ii) Minimum RRv and Treatment of Remaining Total WQv: *Construction activities* that cannot meet the criteria in Part I.C.2.b.(i) of this permit due to *site limitations* shall direct runoff from all newly constructed *impervious areas* to a RR technique or standard SMP with RRv capacity unless *infeasible*. The specific *site limitations* that prevent the reduction of 100% of the WQv shall be documented in the SWPPP. For each *impervious area* that is not directed to a RR technique or standard SMP with RRv capacity, the SWPPP must include documentation which demonstrates that all options were considered and for each option explains why it is considered *infeasible.*

**In no case shall the runoff reduction achieved from the newly constructed *impervious areas* be less than the Minimum RRv as calculated using the criteria in Section 10.3 of the Design Manual.** The remaining portion of the total WQv that cannot be reduced shall be treated by application of standard SMPs.

(iii) Channel Protection Volume (Cpv): Provide 24 hour extended detention of the post-developed 1-year, 24-hour storm event; remaining after runoff reduction. The Cpv requirement does not apply when:
(1) Reduction of the entire Cpv is achieved by application of runoff reduction techniques or infiltration systems, or
(2) The site *discharge*s directly to tidal waters, or fifth order or larger streams.

(iv) *Overbank* Flood Control Criteria (Qp): Requires storage to attenuate the post-development 10-year, 24-hour peak *discharge* rate (Qp) to predevelopment rates. The Qp requirement does not apply when:
(1) the site *discharge*s directly to tidal waters or fifth order or larger streams, or
(2) A downstream analysis reveals that *overbank* control is not required.

(v) Extreme Flood Control Criteria (Qf): Requires storage to attenuate the post-development 100-year, 24-hour peak *discharge* rate (Qf) to predevelopment rates. The Qf requirement does not apply when:
(1) the site *discharge*s directly to tidal waters or fifth order or larger streams, or
(2) A downstream analysis reveals that *overbank* control is not required.

**c. Sizing Criteria for Redevelopment Activity**

(i) Water Quality Volume (WQv): The WQv treatment objective for *redevelopment activity* shall be addressed by one of the following options. *Redevelopment activities* located in an Enhanced Phosphorus Removal Watershed (see Part III.B.3. and Appendix C of this permit) shall calculate the WQv in accordance with Section 10.3 of the Design Manual. All other *redevelopment activities* shall calculate the WQv in accordance with Section 4.2 of the Design Manual.

(1) Reduce the existing *impervious cover* by a minimum of 25% of the total disturbed, *impervious area*. The Soil Restoration criteria in Section 5.1.6 of the Design Manual must be applied to all newly created pervious areas, or

(2) Capture and treat a minimum of 25% of the WQv from the disturbed, *impervious area* by the application of standard SMPs; or reduce 25% of the WQv from the disturbed, *impervious area* by the application of RR techniques or standard SMPs with RRv capacity., or

(3) Capture and treat a minimum of 75% of the WQv from the disturbed, *impervious area* as well as any additional runoff from tributary areas by application of the alternative practices discussed in Sections 9.3 and 9.4 of the Design Manual., or

(4) Application of a combination of 1, 2 and 3 above that provide a weighted average of at least two of the above methods. Application of this method shall be in accordance with the criteria in Section 9.2.1(B) (IV) of the Design Manual.

If there is an existing post-construction stormwater management practice located on the site that captures and treats runoff from the *impervious area* that is being disturbed, the WQv treatment option selected must, at a minimum, provide treatment equal to the treatment that was being provided by the existing practice(s) if that treatment is greater than the treatment required by options 1 – 4 above.

(ii) Channel Protection Volume (Cpv): Not required if there are no changes to hydrology that increase the *discharge* rate from the project site.

(iii) *Overbank* Flood Control Criteria (Qp): Not required if there are no changes to hydrology that increase the *discharge* rate from the project site.

(iv) Extreme Flood Control Criteria (Qf): Not required if there are no changes to hydrology that increase the *discharge* rate from the project site

**d. Sizing Criteria for Combination of Redevelopment Activity and New Development**

Construction projects that include both New Development and Redevelopment Activity shall provide post-construction stormwater management controls that meet the sizing criteria calculated as an aggregate of the Sizing Criteria in Part I.C.2.a. or b. of this permit for the New Development portion of the project and Part I.C.2.c of this permit for Redevelopment Activity portion of the project.

## D. Maintaining Water Quality

The Department expects that compliance with the conditions of this permit will control *discharge*s necessary to meet applicable *water quality standards*. It shall be a violation of the *ECL* for any discharge to either cause or contribute to a violation of *water quality standards* as contained in Parts 700 through 705 of Title 6 of the Official Compilation of Codes, Rules and Regulations of the State of New York, such as:

1. There shall be no increase in turbidity that will cause a substantial visible contrast to natural conditions;

2. There shall be no increase in suspended, colloidal or settleable solids that will cause deposition or impair the waters for their best usages; and

3. There shall be no residue from oil and floating substances, nor visible oil film, nor globules of grease.

If there is evidence indicating that the stormwater *discharge*s authorized by this permit are causing, have the reasonable potential to cause, or are contributing to a violation of the *water quality standards*; the *owner or operator* must take appropriate corrective action in accordance with Part IV.C.5. of this general permit and document in accordance with Part IV.C.4. of this general permit. To address the *water quality standard* violation the *owner or operator* may need to provide additional information, include and implement appropriate controls in the SWPPP to correct the problem, or obtain an individual SPDES permit.

If there is evidence indicating that despite compliance with the terms and conditions of this general permit it is demonstrated that the stormwater *discharge*s authorized by this permit are causing or contributing to a violation of *water quality standards*, or if the Department determines that a modification of the permit is necessary to prevent a violation of *water quality standards*, the authorized *discharge*s will no longer be eligible for coverage under this permit. The Department may require the *owner or operator* to obtain an individual SPDES permit to continue discharging.

## E. Eligibility Under This General Permit

1. This permit may authorize all *discharges* of stormwater from *construction activity* to *surface waters of the State* and *groundwaters* except for ineligible *discharges* identified under subparagraph F. of this Part.

2. Except for non-stormwater *discharges* explicitly listed in the next paragraph, this permit only authorizes stormwater *discharge*s; including stormwater runoff, snowmelt runoff, and surface runoff and drainage, from *construction activities*.

3. Notwithstanding paragraphs E.1 and E.2 above, the following non-stormwater discharges are authorized by this permit: those listed in 6 NYCRR 750-1.2(a)(29)(vi), with the following exception: "Discharges from firefighting activities are authorized only when the firefighting activities are emergencies/unplanned"; waters to which other components have not been added that are used to control dust in accordance with the SWPPP; and uncontaminated *discharge*s from *construction site* de-watering operations. All non-stormwater discharges must be identified in the SWPPP. Under all circumstances, the *owner or operator* must still comply with *water quality standards* in Part I.D of this permit.

4. The *owner or operator* must maintain permit eligibility to *discharge* under this permit. Any *discharges* that are not compliant with the eligibility conditions of this permit are not authorized by the permit and the *owner or operator* must either apply for a separate permit to cover those ineligible *discharges* or take steps necessary to make the *discharge* eligible for coverage.

## F. Activities Which Are Ineligible for Coverage Under This General Permit

All of the following are **<u>not</u>** authorized by this permit:

1. *Discharge*s after *construction activities* have been completed and the site has undergone *final stabilization*;

2. *Discharge*s that are mixed with sources of non-stormwater other than those expressly authorized under subsection E.3. of this Part and identified in the SWPPP required by this permit;

3. *Discharges* that are required to obtain an individual SPDES permit or another SPDES general permit pursuant to Part VII.K. of this permit;

4. *Construction activities* or *discharges* from *construction activities* that may adversely affect an *endangered or threatened species* unless the *owner or*

*operator* has obtained a permit issued pursuant to 6 NYCRR Part 182 for the project or the Department has issued a letter of non-jurisdiction for the project. All documentation necessary to demonstrate eligibility shall be maintained on site in accordance with Part II.D.2 of this permit;

5. *Discharges* which either cause or contribute to a violation of *water quality standards* adopted pursuant to the *ECL* and its accompanying regulations;

6. *Construction activities* for residential, commercial and institutional projects:

   a. Where the *discharge*s from the *construction activities* are tributary to waters of the state classified as AA or AA-s; and

   b. Which are undertaken on land with no existing *impervious cover*; and

   c. Which disturb one (1) or more acres of land designated on the current United States Department of Agriculture ("USDA") Soil Survey as Soil Slope Phase "D", (provided the map unit name is inclusive of slopes greater than 25%), or Soil Slope Phase "E" or "F" (regardless of the map unit name), or a combination of the three designations.

7. *Construction activities* for linear transportation projects and linear utility projects:

   a. Where the *discharge*s from the *construction activities* are tributary to waters of the state classified as AA or AA-s; and

   b. Which are undertaken on land with no existing *impervious cover*; and

   c. Which disturb two (2) or more acres of land designated on the current USDA Soil Survey as Soil Slope Phase "D" (provided the map unit name is inclusive of slopes greater than 25%), or Soil Slope Phase "E" or "F" (regardless of the map unit name), or a combination of the three designations.

8. *Construction activities* that have the potential to affect an *historic property*, unless there is documentation that such impacts have been resolved. The following documentation necessary to demonstrate eligibility with this requirement shall be maintained on site in accordance with Part II.D.2 of this permit and made available to the Department in accordance with Part VII.F of this permit:

    a. Documentation that the *construction activity* is not within an archeologically sensitive area indicated on the sensitivity map, and that the *construction activity* is not located on or immediately adjacent to a property listed or determined to be eligible for listing on the National or State Registers of Historic Places, and that there is no new permanent building on the *construction site* within the following distances from a building, structure, or object that is more than 50 years old, or if there is such a new permanent building on the *construction site* within those parameters that NYS Office of Parks, Recreation and Historic Preservation (OPRHP), a Historic Preservation Commission of a Certified Local Government, or a qualified preservation professional has determined that the building, structure, or object more than 50 years old is not historically/archeologically significant.

        - 1-5 acres of disturbance - 20 feet
        - 5-20 acres of disturbance - 50 feet
        - 20+ acres of disturbance - 100 feet, or

    b. DEC consultation form sent to OPRHP, and copied to the NYS DEC Agency Historic Preservation Officer (APO), and
        (i) the State Environmental Quality Review (SEQR) Environmental Assessment Form (EAF) with a negative declaration or the Findings Statement, with documentation of OPRHP's agreement with the resolution; or
        (ii) documentation from OPRHP that the *construction activity* will result in No Impact; or
        (iii) documentation from OPRHP providing a determination of No Adverse Impact; or
        (iv) a Letter of Resolution signed by the owner/operator, OPRHP and the DEC APO which allows for this *construction activity* to be eligible for coverage under the general permit in terms of the State Historic Preservation Act (SHPA); or

    c. Documentation of satisfactory compliance with Section 106 of the National Historic Preservation Act for a coterminous project area:

(i) No Affect
(ii) No Adverse Affect
(iii) Executed Memorandum of Agreement, or

d. Documentation that:

(i) SHPA Section 14.09 has been completed by NYS DEC or another state agency.

9. *Discharge*s from *construction activities* that are subject to an existing SPDES individual or general permit where a SPDES permit for *construction activity* has been terminated or denied; or where the *owner or operator* has failed to renew an expired individual permit.

## Part II. PERMIT COVERAGE

### A. How to Obtain Coverage

1. An *owner or operator* of a *construction activity* that is not subject to the requirements of a regulated, traditional land use control MS4 must first prepare a SWPPP in accordance with all applicable requirements of this permit and then submit a completed Notice of Intent (NOI) to the Department to be authorized to discharge under this permit.

2. An *owner or operator* of a *construction activity* that is subject to the requirements of a *regulated, traditional land use control MS4* must first prepare a SWPPP in accordance with all applicable requirements of this permit and then have the SWPPP reviewed and accepted by the *regulated, traditional land use control MS4* prior to submitting the NOI to the Department. The *owner or operator* shall have the "MS4 SWPPP Acceptance" form signed in accordance with Part VII.H., and then submit that form along with a completed NOI to the Department.

3. The requirement for an *owner or operator* to have its SWPPP reviewed and accepted by the *regulated, traditional land use control MS4* prior to submitting the NOI to the Department does not apply to an *owner or operator* that is obtaining permit coverage in accordance with the requirements in Part II.F. (Change of *Owner or Operator*) or where the *owner or operator* of the *construction activity* is the *regulated, traditional land use control MS4* . This exemption does not apply to *construction activities* subject to the New York City Administrative Code.

## B. Notice of Intent (NOI) Submittal

1. Prior to December 21, 2020, an owner or operator shall use either the electronic (eNOI) or paper version of the NOI that the Department prepared. Both versions of the NOI are located on the Department's website (http://www.dec.ny.gov/ ). The paper version of the NOI shall be signed in accordance with Part VII.H. of this permit and submitted to the following address:

    **NOTICE OF INTENT**
    **NYS DEC, Bureau of Water Permits**
    **625 Broadway, 4th Floor**
    **Albany, New York 12233-3505**

2. Beginning December 21, 2020 and in accordance with EPA's 2015 NPDES Electronic Reporting Rule (40 CFR Part 127), the *owner or operator* must submit the NOI electronically using the *Department's* online NOI.

3. The *owner or operator* shall have the SWPPP preparer sign the "SWPPP Preparer Certification" statement on the NOI prior to submitting the form to the Department.

4. As of the date the NOI is submitted to the Department, the *owner or operator* shall make the NOI and SWPPP available for review and copying in accordance with the requirements in Part VII.F. of this permit.

## C. Permit Authorization

1. An *owner or operator* shall not *commence construction activity* until their authorization to *discharge* under this permit goes into effect.

2. Authorization to *discharge* under this permit will be effective when the *owner or operator* has satisfied all of the following criteria:

    a. project review pursuant to the State Environmental Quality Review Act ("SEQRA") have been satisfied, when SEQRA is applicable. See the Department's website (http://www.dec.ny.gov/) for more information,

    b. where required, all necessary Department permits subject to the *Uniform Procedures Act ("UPA")* (see 6 NYCRR Part 621), or the equivalent from another New York State agency, have been obtained, unless otherwise notified by the Department pursuant to 6 NYCRR 621.3(a)(4). *Owners or operators* of *construction activities* that are required to obtain *UPA* permits must submit a preliminary SWPPP to the appropriate DEC Permit Administrator at the Regional Office listed in Appendix F at the time all other necessary *UPA* permit applications are submitted. The preliminary SWPPP must include sufficient information to demonstrate that the *construction activity* qualifies for authorization under this permit,

c. the final SWPPP has been prepared, and

d. a complete NOI has been submitted to the Department in accordance with the requirements of this permit.

3. An *owner or operator* that has satisfied the requirements of Part II.C.2 above will be authorized to *discharge* stormwater from their *construction activity* in accordance with the following schedule:

   a. For *construction activities* that are not subject to the requirements of a *regulated, traditional land use control MS4*:

      (i) Five (5) business days from the date the Department receives a complete electronic version of the NOI (eNOI) for *construction activities* with a SWPPP that has been prepared in conformance with the design criteria in the technical standard referenced in Part III.B.1 and the *performance criteria* in the technical standard referenced in Parts III.B., 2 or 3, for *construction activities* that require post-construction stormwater management practices pursuant to Part III.C.; or

      (ii) Sixty (60) business days from the date the Department receives a complete NOI (electronic or paper version) for *construction activities* with a SWPPP that has not been prepared in conformance with the design criteria in technical standard referenced in Part III.B.1. or, for *construction activities* that require post-construction stormwater management practices pursuant to Part III.C., the *performance criteria* in the technical standard referenced in Parts III.B., 2 or 3, or;

      (iii) Ten (10) business days from the date the Department receives a complete paper version of the NOI for *construction activities* with a SWPPP that has been prepared in conformance with the design criteria in the technical standard referenced in Part III.B.1 and the *performance criteria* in the technical standard referenced in Parts III.B., 2 or 3, for *construction activities* that require post-construction stormwater management practices pursuant to Part III.C.

b. For *construction activities* that are subject to the requirements of a *regulated, traditional land use control MS4*:

(i) Five (5) business days from the date the Department receives both a complete electronic version of the NOI (eNOI) and signed "*MS4* SWPPP Acceptance" form, or

(ii) Ten (10) business days from the date the Department receives both a complete paper version of the NOI and signed "MS4 SWPPP Acceptance" form.

4. Coverage under this permit authorizes stormwater *discharges* from only those areas of disturbance that are identified in the NOI. If an *owner or operator* wishes to have stormwater *discharges* from future or additional areas of disturbance authorized, they must submit a new NOI that addresses that phase of the development, unless otherwise notified by the Department. The *owner or operator* shall not *commence construction activity* on the future or additional areas until their authorization to *discharge* under this permit goes into effect in accordance with Part II.C. of this permit.

## D. General Requirements For Owners or Operators With Permit Coverage

1. The *owner or operator* shall ensure that the provisions of the SWPPP are implemented from the *commencement of construction activity* until all areas of disturbance have achieved *final stabilization* and the Notice of Termination ("NOT") has been submitted to the Department in accordance with Part V. of this permit. This includes any changes made to the SWPPP pursuant to Part III.A.4. of this permit.

2. The *owner or operator* shall maintain a copy of the General Permit (GP-0-20-001), NOI, *NOI Acknowledgment Letter*, SWPPP, MS4 SWPPP Acceptance form, inspection reports, responsible contractor's or subcontractor's certification statement (see Part III.A.6.), and all documentation necessary to demonstrate eligibility with this permit at the *construction site* until all disturbed areas have achieved *final stabilization* and the NOT has been submitted to the Department. The documents must be maintained in a secure location, such as a job trailer, on-site construction office, or mailbox with lock. The secure location must be accessible during normal business hours to an individual performing a compliance inspection.

*3.* The *owner or operator* of a *construction activity* shall not disturb greater than five (5) acres of soil at any one time without prior written authorization from the Department or, in areas under the jurisdiction of a *regulated, traditional land* *use control MS4,* the *regulated, traditional land use control MS4* (provided the *regulated, traditional land use control MS4* is not the *owner or operator* of the *construction activity*). At a minimum, the *owner or operator* must comply with the following requirements in order to be authorized to disturb greater than five (5) acres of soil at any one time:

a. The *owner or operator* shall have a *qualified inspector* conduct **at least** two (2) site inspections in accordance with Part IV.C. of this permit every seven (7) calendar days, for as long as greater than five (5) acres of soil remain disturbed. The two (2) inspections shall be separated by a minimum of two (2) full calendar days.

b. In areas where soil disturbance activity has temporarily or permanently ceased, the application of soil stabilization measures must be initiated by the end of the next business day and completed within seven (7) days from the date the current soil disturbance activity ceased. The soil stabilization measures selected shall be in conformance with the technical standard, New York State Standards and Specifications for Erosion and Sediment Control, dated November 2016.

c. The *owner or operator* shall prepare a phasing plan that defines maximum disturbed area per phase and shows required cuts and fills.

d. The *owner or operator* shall install any additional site-specific practices needed to protect water quality.

e. The *owner or operator* shall include the requirements above in their SWPPP.

4. In accordance with statute, regulations, and the terms and conditions of this permit, the Department may suspend or revoke an *owner's or operator's* coverage under this permit at any time if the Department determines that the SWPPP does not meet the permit requirements or consistent with Part VII.K..

5. Upon a finding of significant non-compliance with the practices described in the SWPPP or violation of this permit, the Department may order an immediate stop to all activity at the site until the non-compliance is remedied. The stop work order shall be in writing, describe the non-compliance in detail, and be sent to the *owner or operator*.

6. For *construction activities* that are subject to the requirements of a *regulated, traditional land use control MS4*, the *owner or operator* shall notify the

*regulated, traditional land use control MS4* in writing of any planned amendments or modifications to the post-construction stormwater management practice component of the SWPPP required by Part III.A. 4. and 5. of this permit. Unless otherwise notified by the *regulated, traditional land use control MS4*, the *owner or operator* shall have the SWPPP amendments or modifications reviewed and accepted by the *regulated, traditional land use control MS4* prior to commencing construction of the post-construction stormwater management practice.

## E. Permit Coverage for Discharges Authorized Under GP-0-15-002

1. Upon renewal of SPDES General Permit for Stormwater Discharges from *Construction Activity* (Permit No. GP-0-15-002), an *owner or operator* of *a construction activity* with coverage under GP-0-15-002, as of the effective date of GP- 0-20-001, shall be authorized to *discharge* in accordance with GP- 0-20-001, unless otherwise notified by the Department.

   An *owner or operator* may continue to implement the technical/design components of the post-construction stormwater management controls provided that such design was done in conformance with the technical standards in place at the time of initial project authorization. However, they must comply with the other, non-design provisions of GP-0-20-001.

## F. Change of Owner or Operator

1. When property ownership changes or when there is a change in operational control over the construction plans and specifications, the original *owner or operator* must notify the new *owner or operator*, in writing, of the requirement to obtain permit coverage by submitting a NOI with the Department. For *construction activities* subject to the requirements of a *regulated, traditional land use control MS4,* the original *owner or operator* must also notify the MS4, in writing, of the change in ownership at least 30 calendar days prior to the change in ownership.

2. Once the new *owner or operator* obtains permit coverage, the original *owner or operator* shall then submit a completed NOT with the name and permit identification number of the new *owner or operator* to the Department at the address in Part II.B.1. of this permit. If the original *owner or operator* maintains ownership of a portion of the *construction activity* and will disturb soil, they must maintain their coverage under the permit.

3. Permit coverage for the new *owner or operator* will be effective as of the date the Department receives a complete NOI, provided the original *owner or*

*operator* was not subject to a sixty (60) business day authorization period that has not expired as of the date the Department receives the NOI from the new *owner or operator*.

## Part III. STORMWATER POLLUTION PREVENTION PLAN (SWPPP)

### A. General SWPPP Requirements

1. A SWPPP shall be prepared and implemented by the *owner or operator* of each *construction activity* covered by this permit. The SWPPP must document the selection, design, installation, implementation and maintenance of the control measures and practices that will be used to meet the effluent limitations in Part I.B. of this permit and where applicable, the post-construction stormwater management practice requirements in Part I.C. of this permit. The SWPPP shall be prepared prior to the submittal of the NOI. The NOI shall be submitted to the Department prior to the *commencement of construction activity*. A copy of the completed, final NOI shall be included in the SWPPP.

2. The SWPPP shall describe the erosion and sediment control practices and where required, post-construction stormwater management practices that will be used and/or constructed to reduce the *pollutants* in stormwater *discharges* and to assure compliance with the terms and conditions of this permit. In addition, the SWPPP shall identify potential sources of pollution which may reasonably be expected to affect the quality of stormwater *discharges*.

3. All SWPPPs that require the post-construction stormwater management practice component shall be prepared by a *qualified professional* that is knowledgeable in the principles and practices of stormwater management and treatment.

4. The *owner or operator* must keep the SWPPP current so that it at all times accurately documents the erosion and sediment controls practices that are being used or will be used during construction, and all post-construction stormwater management practices that will be constructed on the site. At a minimum, the *owner or operator* shall amend the SWPPP, including construction drawings:

    a. whenever the current provisions prove to be ineffective in minimizing *pollutants* in stormwater *discharges* from the site;

b. whenever there is a change in design, construction, or operation at the *construction site* that has or could have an effect on the *discharge* of *pollutants*;

c. to address issues or deficiencies identified during an inspection by the *qualified inspector,* the Department or other regulatory authority; and

d. to document the final construction conditions.

5. The Department may notify the *owner or operator* at any time that the SWPPP does not meet one or more of the minimum requirements of this permit. The notification shall be in writing and identify the provisions of the SWPPP that require modification. Within fourteen (14) calendar days of such notification, or as otherwise indicated by the Department, the *owner or operator* shall make the required changes to the SWPPP and submit written notification to the Department that the changes have been made. If the *owner or operator* does not respond to the Department's comments in the specified time frame, the Department may suspend the *owner's or operator's* coverage under this permit or require the *owner or operator* to obtain coverage under an individual SPDES permit in accordance with Part II.D.4. of this permit.

6. Prior to the *commencement of construction activity*, the *owner or operator* must identify the contractor(s) and subcontractor(s) that will be responsible for installing, constructing, repairing, replacing, inspecting and maintaining the erosion and sediment control practices included in the SWPPP; and the contractor(s) and subcontractor(s) that will be responsible for constructing the post-construction stormwater management practices included in the SWPPP. The *owner or operator* shall have each of the contractors and subcontractors identify at least one person from their company that will be responsible for implementation of the SWPPP. This person shall be known as the *trained contractor.* The *owner or operator* shall ensure that at least one *trained contractor* is on site on a daily basis when soil disturbance activities are being performed.

   The *owner or operator* shall have each of the contractors and subcontractors identified above sign a copy of the following certification statement below before they commence any *construction activity*:

   "I hereby certify under penalty of law that I understand and agree to comply with the terms and conditions of the SWPPP and agree to implement any corrective actions identified by the *qualified inspector* during a site inspection. I also understand that the *owner or operator* must comply with the terms and conditions of the most current version of the New York State Pollutant Discharge Elimination System ("SPDES") general permit for stormwater *discharge*s from *construction activities* and that it is unlawful for any person to cause or contribute to a violation of *water quality standards*. Furthermore, I am aware that there are significant penalties for submitting false information, that I do not believe to be true, including the possibility of fine and imprisonment for knowing violations"

In addition to providing the certification statement above, the certification page must also identify the specific elements of the SWPPP that each contractor and subcontractor will be responsible for and include the name and title of the person providing the signature; the name and title of the *trained contractor* responsible for SWPPP implementation; the name, address and telephone number of the contracting firm; the address (or other identifying description) of the site; and the date the certification statement is signed. The *owner or operator* shall attach the certification statement(s) to the copy of the SWPPP that is maintained at the *construction site*. If new or additional contractors are hired to implement measures identified in the SWPPP after construction has commenced, they must also sign the certification statement and provide the information listed above.

7. For projects where the Department requests a copy of the SWPPP or inspection reports, the *owner or operator* shall submit the documents in both electronic (PDF only) and paper format within five (5) business days, unless otherwise notified by the Department.

## B. Required SWPPP Contents

1. Erosion and sediment control component - All SWPPPs prepared pursuant to this permit shall include erosion and sediment control practices designed in conformance with the technical standard, New York State Standards and Specifications for Erosion and Sediment Control, dated November 2016. Where erosion and sediment control practices are not designed in conformance with the design criteria included in the technical standard, the *owner or operator* must demonstrate *equivalence* to the technical standard. At a minimum, the erosion and sediment control component of the SWPPP shall include the following:

   a. Background information about the scope of the project, including the location, type and size of project

b. A site map/construction drawing(s) for the project, including a general location map. At a minimum, the site map shall show the total site area; all improvements; areas of disturbance; areas that will not be disturbed; existing vegetation; on-site and adjacent off-site surface water(s); floodplain/floodway boundaries; wetlands and drainage patterns that could be affected by the *construction activity*; existing and final contours ; locations of different soil types with boundaries; material, waste, borrow or equipment storage areas located on adjacent properties; and location(s) of the stormwater *discharge*(s);

c. A description of the soil(s) present at the site, including an identification of the Hydrologic Soil Group (HSG);

d. A construction phasing plan and sequence of operations describing the intended order of *construction activities*, including clearing and grubbing, excavation and grading, utility and infrastructure installation and any other activity at the site that results in soil disturbance;

e. A description of the minimum erosion and sediment control practices to be installed or implemented for each *construction activity* that will result in soil disturbance. Include a schedule that identifies the timing of initial placement or implementation of each erosion and sediment control practice and the minimum time frames that each practice should remain in place or be implemented;

f. A temporary and permanent soil stabilization plan that meets the requirements of this general permit and the technical standard, New York State Standards and Specifications for Erosion and Sediment Control, dated November 2016, for each stage of the project, including initial land clearing and grubbing to project completion and achievement of *final stabilization*;

g. A site map/construction drawing(s) showing the specific location(s), size(s), and length(s) of each erosion and sediment control practice;

h. The dimensions, material specifications, installation details, and operation and maintenance requirements for all erosion and sediment control practices. Include the location and sizing of any temporary sediment basins and structural practices that will be used to divert flows from exposed soils;

i. A maintenance inspection schedule for the contractor(s) identified in Part III.A.6. of this permit, to ensure continuous and effective operation of the erosion and sediment control practices. The maintenance inspection schedule shall be in accordance with the requirements in the technical standard, New York State Standards and Specifications for Erosion and Sediment Control, dated November 2016;

j. A description of the pollution prevention measures that will be used to control litter, construction chemicals and construction debris from becoming a *pollutant* source in the stormwater *discharges*;

k. A description and location of any stormwater *discharges* associated with industrial activity other than construction at the site, including, but not limited to, stormwater *discharges* from asphalt plants and concrete plants located on the *construction site*; and

l. Identification of any elements of the design that are not in conformance with the design criteria in the technical standard, New York State Standards and Specifications for Erosion and Sediment Control, dated November 2016. Include the reason for the deviation or alternative design and provide information which demonstrates that the deviation or alternative design is *equivalent* to the technical standard.

2. Post-construction stormwater management practice component – The *owner or operator* of any construction project identified in Table 2 of Appendix B as needing post-construction stormwater management practices shall prepare a SWPPP that includes practices designed in conformance with the applicable *sizing criteria* in Part I.C.2.a., c. or d. of this permit and the *performance criteria* in the technical standard, New York State Stormwater Management Design Manual dated January 2015

   Where post-construction stormwater management practices are not designed in conformance with the *performance criteria* in the technical standard, the *owner or operator* must include in the SWPPP the reason(s) for the deviation or alternative design and provide information which demonstrates that the deviation or alternative design is *equivalent* to the technical standard.

   The post-construction stormwater management practice component of the SWPPP shall include the following:

   a. Identification of all post-construction stormwater management practices to be constructed as part of the project. Include the dimensions, material specifications and installation details for each post-construction stormwater management practice;

b. A site map/construction drawing(s) showing the specific location and size of each post-construction stormwater management practice;

c. A Stormwater Modeling and Analysis Report that includes:

(i) Map(s) showing pre-development conditions, including watershed/subcatchments boundaries, flow paths/routing, and design points;

(ii) Map(s) showing post-development conditions, including watershed/subcatchments boundaries, flow paths/routing, design points and post-construction stormwater management practices;

(iii) Results of stormwater modeling (i.e. hydrology and hydraulic analysis) for the required storm events. Include supporting calculations (model runs), methodology, and a summary table that compares pre and post-development runoff rates and volumes for the different storm events;

(iv) Summary table, with supporting calculations, which demonstrates that each post-construction stormwater management practice has been designed in conformance with the *sizing criteria* included in the Design Manual;

(v) Identification of any *sizing criteria* that is not required based on the requirements included in Part I.C. of this permit; and

(vi) Identification of any elements of the design that are not in conformance with the *performance criteria* in the Design Manual. Include the reason(s) for the deviation or alternative design and provide information which demonstrates that the deviation or alternative design is *equivalent* to the Design Manual;

d. Soil testing results and locations (test pits, borings);

e. Infiltration test results, when required; and

f. An operations and maintenance plan that includes inspection and maintenance schedules and actions to ensure continuous and effective operation of each post-construction stormwater management practice. The plan shall identify the entity that will be responsible for the long term operation and maintenance of each practice.

3. Enhanced Phosphorus Removal Standards - All construction projects identified in Table 2 of Appendix B that are located in the watersheds identified in Appendix C shall prepare a SWPPP that includes post-construction stormwater management practices designed in conformance with the applicable *sizing criteria* in Part I.C.2. b., c. or d. of this permit and the *performance criteria,* Enhanced Phosphorus Removal Standards included in the Design Manual. At a minimum, the post-construction stormwater management practice component of the SWPPP shall include items 2.a - 2.f. above.

### C. Required SWPPP Components by Project Type

Unless otherwise notified by the Department, *owners or operators* of *construction activities* identified in Table 1 of Appendix B are required to prepare a SWPPP that only includes erosion and sediment control practices designed in conformance with Part III.B.1 of this permit. *Owners or operators* of the *construction activities* identified in Table 2 of Appendix B shall prepare a SWPPP that also includes post-construction stormwater management practices designed in conformance with Part III.B.2 or 3 of this permit.

## Part IV. INSPECTION AND MAINTENANCE REQUIREMENTS

### A. General Construction Site Inspection and Maintenance Requirements

1. The *owner or operator* must ensure that all erosion and sediment control practices (including pollution prevention measures) and all post-construction stormwater management practices identified in the SWPPP are inspected and maintained in accordance with Part IV.B. and C. of this permit.

2. The terms of this permit shall not be construed to prohibit the State of New York from exercising any authority pursuant to the ECL, common law or federal law, or prohibit New York State from taking any measures, whether civil or criminal, to prevent violations of the laws of the State of New York or protect the public health and safety and/or the environment.

### B. Contractor Maintenance Inspection Requirements

1. The *owner or operator* of each *construction activity* identified in Tables 1 and 2 of Appendix B shall have a *trained contractor* inspect the erosion and sediment control practices and pollution prevention measures being implemented within the active work area daily to ensure that they are being maintained in effective operating condition at all times. If deficiencies are identified, the contractor shall

begin implementing corrective actions within one business day and shall complete the corrective actions in a reasonable time frame.

2. For construction sites where soil disturbance activities have been temporarily suspended (e.g. winter shutdown) and *temporary stabilization* measures have been applied to all disturbed areas, the *trained contractor* can stop conducting the maintenance inspections. The *trained contractor* shall begin conducting the maintenance inspections in accordance with Part IV.B.1. of this permit as soon as soil disturbance activities resume.

3. For construction sites where soil disturbance activities have been shut down with partial project completion, the *trained contractor* can stop conducting the maintenance inspections if all areas disturbed as of the project shutdown date have achieved *final stabilization* <u>and</u> all post-construction stormwater management practices required for the completed portion of the project have been constructed in conformance with the SWPPP and are operational.

**C. Qualified Inspector Inspection Requirements**

The *owner or operator* shall have a *qualified inspector* conduct site inspections in conformance with the following requirements:

[Note: The *trained contractor* identified in Part III.A.6. and IV.B. of this permit **cannot** conduct the *qualified inspector* site inspections unless they meet the *qualified inspector* qualifications included in Appendix A. In order to perform these inspections, the *trained contractor* would have to be a:

- licensed Professional Engineer,
- Certified Professional in Erosion and Sediment Control (CPESC),
- New York State Erosion and Sediment Control Certificate Program holder
- Registered Landscape Architect, or
- someone working under the direct supervision of, and at the same company as, the licensed Professional Engineer or Registered Landscape Architect, provided they have received four (4) hours of Department endorsed training in proper erosion and sediment control principles from a Soil and Water Conservation District, or other Department endorsed entity].

1. A *qualified inspector* shall conduct site inspections for all *construction activities* identified in Tables 1 and 2 of Appendix B, <u>with the exception of</u>:

   a. the construction of a single family residential subdivision with 25% or less *impervious cover* at total site build-out that involves a soil disturbance of one (1) or more acres of land but less than five (5) acres and is <u>not</u> located in one of the watersheds listed in Appendix C and <u>not</u> directly discharging to one of the 303(d) segments listed in Appendix E;

b. the construction of a single family home that involves a soil disturbance of one (1) or more acres of land but less than five (5) acres and is <u>not</u> located in one of the watersheds listed in Appendix C and <u>not</u> directly discharging to one of the 303(d) segments listed in Appendix E;

c. construction on agricultural property that involves a soil disturbance of one (1) or more acres of land but less than five (5) acres; and

d. *construction activities* located in the watersheds identified in Appendix D that involve soil disturbances between five thousand (5,000) square feet and one (1) acre of land.

2. Unless otherwise notified by the Department, the *qualified inspector* shall conduct site inspections in accordance with the following timetable:

   a. For construction sites where soil disturbance activities are on-going, the *qualified inspector* shall conduct a site inspection at least once every seven (7) calendar days.

   b. For construction sites where soil disturbance activities are on-going and the *owner or operator* has received authorization in accordance with Part II.D.3 to disturb greater than five (5) acres of soil at any one time, the *qualified inspector* shall conduct at least two (2) site inspections every seven (7) calendar days. The two (2) inspections shall be separated by a minimum of two (2) full calendar days.

   c. For construction sites where soil disturbance activities have been temporarily suspended (e.g. winter shutdown) and *temporary stabilization* measures have been applied to all disturbed areas, the *qualified inspector* shall conduct a site inspection at least once every thirty (30) calendar days. The *owner or operator* shall notify the DOW Water (SPDES) Program contact at the Regional Office (see contact information in Appendix F) or, in areas under the jurisdiction of a *regulated, traditional land use control MS4,* the *regulated, traditional land use control MS4* (provided the *regulated, traditional land use control MS4* is not the *owner or operator* of the *construction activity*) in writing prior to reducing the frequency of inspections.

d. For construction sites where soil disturbance activities have been shut down with partial project completion, the *qualified inspector* can stop conducting inspections if all areas disturbed as of the project shutdown date have achieved *final stabilization* and all post-construction stormwater management practices required for the completed portion of the project have been constructed in conformance with the SWPPP and are operational. The *owner or operator* shall notify the DOW Water (SPDES) Program contact at the Regional Office (see contact information in Appendix F) or, in areas under the jurisdiction of a *regulated, traditional land use control MS4,* the *regulated, traditional land use control MS4* (provided the *regulated, traditional land use control MS4* is not the *owner or operator* of the *construction activity*) in writing prior to the shutdown. If soil disturbance activities are not resumed within 2 years from the date of shutdown, the *owner or operator* shall have the *qualified inspector* perform a final inspection and certify that all disturbed areas have achieved *final stabilization,* and all temporary, structural erosion and sediment control measures have been removed*;* and that all post-construction stormwater management practices have been constructed in conformance with the SWPPP by signing the "*Final Stabilization*" and "Post-Construction Stormwater Management Practice" certification statements on the NOT. The *owner or operator* shall then submit the completed NOT form to the address in Part II.B.1 of this permit.

e. For construction sites that directly *discharge* to one of the 303(d) segments listed in Appendix E or is located in one of the watersheds listed in Appendix C, the *qualified inspector* shall conduct at least two (2) site inspections every seven (7) calendar days. The two (2) inspections shall be separated by a minimum of two (2) full calendar days.

3. At a minimum, the *qualified inspector* shall inspect all erosion and sediment control practices and pollution prevention measures to ensure integrity and effectiveness, all post-construction stormwater management practices under construction to ensure that they are constructed in conformance with the SWPPP, all areas of disturbance that have not achieved *final stabilization,* all points of *discharge* to natural surface waterbodies located within, or immediately adjacent to, the property boundaries of the *construction site*, and all points of *discharge* from the *construction site*.

4. The *qualified inspector* shall prepare an inspection report subsequent to each and every inspection. At a minimum, the inspection report shall include and/or address the following:

a. Date and time of inspection;

b. Name and title of person(s) performing inspection;

c. A description of the weather and soil conditions (e.g. dry, wet, saturated) at the time of the inspection;

d. A description of the condition of the runoff at all points of *discharge* from the *construction site*. This shall include identification of any *discharges* of sediment from the *construction site*. Include *discharges* from conveyance systems (i.e. pipes, culverts, ditches, etc.) and overland flow;

e. A description of the condition of all natural surface waterbodies located within, or immediately adjacent to, the property boundaries of the *construction site* which receive runoff from disturbed areas. This shall include identification of any *discharges* of sediment to the surface waterbody;

f. Identification of all erosion and sediment control practices and pollution prevention measures that need repair or maintenance;

g. Identification of all erosion and sediment control practices and pollution prevention measures that were not installed properly or are not functioning as designed and need to be reinstalled or replaced;

h. Description and sketch of areas with active soil disturbance activity, areas that have been disturbed but are inactive at the time of the inspection, and areas that have been stabilized (temporary and/or final) since the last inspection;

i. Current phase of construction of all post-construction stormwater management practices and identification of all construction that is not in conformance with the SWPPP and technical standards;

j. Corrective action(s) that must be taken to install, repair, replace or maintain erosion and sediment control practices and pollution prevention measures; and to correct deficiencies identified with the construction of the post-construction stormwater management practice(s);

k. Identification and status of all corrective actions that were required by previous inspection; and

l. Digital photographs, with date stamp, that clearly show the condition of all practices that have been identified as needing corrective actions. The *qualified inspector* shall attach paper color copies of the digital photographs to the inspection report being maintained onsite within seven (7) calendar days of the date of the inspection. The *qualified inspector* shall also take digital photographs, with date stamp, that clearly show the condition of the practice(s) after the corrective action has been completed. The *qualified inspector* shall attach paper color copies of the digital photographs to the inspection report that documents the completion of the corrective action work within seven (7) calendar days of that inspection.

5. Within one business day of the completion of an inspection, the *qualified inspector* shall notify the *owner or operator* and appropriate contractor or subcontractor identified in Part III.A.6. of this permit of any corrective actions that need to be taken. The contractor or subcontractor shall begin implementing the corrective actions within one business day of this notification and shall complete the corrective actions in a reasonable time frame.

6. All inspection reports shall be signed by the *qualified inspector.* Pursuant to Part II.D.2. of this permit, the inspection reports shall be maintained on site with the SWPPP.

## Part V. TERMINATION OF PERMIT COVERAGE

### A. Termination of Permit Coverage

1. An *owner or operator* that is eligible to terminate coverage under this permit must submit a completed NOT form to the address in Part II.B.1 of this permit. The NOT form shall be one which is associated with this permit, signed in accordance with Part VII.H of this permit.

2. An *owner or operator* may terminate coverage when one or more the following conditions have been met:

   a. Total project completion - All *construction activity* identified in the SWPPP has been completed; <u>and</u> all areas of disturbance have achieved *final stabilization*; <u>and</u> all temporary, structural erosion and sediment control measures have been removed; <u>and</u> all post-construction stormwater management practices have been constructed in conformance with the SWPPP and are operational;

b. Planned shutdown with partial project completion - All soil disturbance activities have ceased; and all areas disturbed as of the project shutdown date have achieved *final stabilization*; and all temporary, structural erosion and sediment control measures have been removed; and all post-construction stormwater management practices required for the completed portion of the project have been constructed in conformance with the SWPPP and are operational;

c. A new *owner or operator* has obtained coverage under this permit in accordance with Part II.F. of this permit.

d. The *owner or operator* obtains coverage under an alternative SPDES general permit or an individual SPDES permit.

3. For *construction activities* meeting subdivision 2a. or 2b. of this Part, the *owner or operator* shall have the *qualified inspector* perform a final site inspection prior to submitting the NOT. The *qualified inspector* shall, by signing the "*Final Stabilization*" and "Post-Construction Stormwater Management Practice certification statements on the NOT, certify that all the requirements in Part V.A.2.a. or b. of this permit have been achieved.

4. For *construction activities* that are subject to the requirements of a *regulated, traditional land use control MS4* and meet subdivision 2a. or 2b. of this Part, the *owner or operator* shall have the *regulated, traditional land use control MS4* sign the "MS4 Acceptance" statement on the NOT in accordance with the requirements in Part VII.H. of this permit. The *regulated, traditional land use control MS4* official, by signing this statement, has determined that it is acceptable for the *owner or operator* to submit the NOT in accordance with the requirements of this Part. The *regulated, traditional land use control MS4* can make this determination by performing a final site inspection themselves or by accepting the *qualified inspector*'s final site inspection certification(s) required in Part V.A.3. of this permit.

5. For *construction activities* that require post-construction stormwater management practices and meet subdivision 2a. of this Part, the *owner or operator* must, prior to submitting the NOT, ensure one of the following:

a. the post-construction stormwater management practice(s) and any right-of-way(s) needed to maintain such practice(s) have been deeded to the municipality in which the practice(s) is located,

b. an executed maintenance agreement is in place with the municipality that will maintain the post-construction stormwater management practice(s),

c. for post-construction stormwater management practices that are privately owned, the *owner or operator* has a mechanism in place that requires operation and maintenance of the practice(s) in accordance with the operation and maintenance plan, such as a deed covenant in the *owner or operator's* deed of record,

d. for post-construction stormwater management practices that are owned by a public or private institution (e.g. school, university, hospital), government agency or authority, or public utility; the *owner or operator* has policy and procedures in place that ensures operation and maintenance of the practices in accordance with the operation and maintenance plan.

## Part VI. REPORTING AND RETENTION RECORDS

### A. Record Retention

The *owner or operator* shall retain a copy of the NOI, NOI Acknowledgment Letter, SWPPP, MS4 SWPPP Acceptance form and any inspection reports that were prepared in conjunction with this permit for a period of at least five (5) years from the date that the Department receives a complete NOT submitted in accordance with Part V. of this general permit.

### B. Addresses

With the exception of the NOI, NOT, and MS4 SWPPP Acceptance form (which must be submitted to the address referenced in Part II.B.1 of this permit), all written correspondence requested by the Department, including individual permit applications, shall be sent to the address of the appropriate DOW Water (SPDES) Program contact at the Regional Office listed in Appendix F.

## Part VII. STANDARD PERMIT CONDITIONS

### A. Duty to Comply

The *owner or operator* must comply with all conditions of this permit. All contractors and subcontractors associated with the project must comply with the terms of the SWPPP. Any non-compliance with this permit constitutes a violation of the Clean Water

Act (CWA) and the ECL and is grounds for an enforcement action against the *owner or operator* and/or the contractor/subcontractor; permit revocation, suspension or modification; or denial of a permit renewal application. Upon a finding of significant non-compliance with this permit or the applicable SWPPP, the Department may order an immediate stop to all *construction activity* at the site until the non-compliance is remedied. The stop work order shall be in writing, shall describe the non-compliance in detail, and shall be sent to the *owner or operator*.

If any human remains or archaeological remains are encountered during excavation, the *owner or operator* must immediately cease, or cause to cease, all *construction activity* in the area of the remains and notify the appropriate Regional Water Engineer (RWE). *Construction activity* shall not resume until written permission to do so has been received from the RWE.

## B. Continuation of the Expired General Permit

This permit expires five (5) years from the effective date. If a new general permit is not issued prior to the expiration of this general permit, an *owner or operator* with coverage under this permit may continue to operate and *discharge* in accordance with the terms and conditions of this general permit, if it is extended pursuant to the State Administrative Procedure Act and 6 NYCRR Part 621, until a new general permit is issued.

## C. Enforcement

Failure of the *owner or operator,* its contractors, subcontractors, agents and/or assigns to strictly adhere to any of the permit requirements contained herein shall constitute a violation of this permit. There are substantial criminal, civil, and administrative penalties associated with violating the provisions of this permit. Fines of up to $37,500 per day for each violation and imprisonment for up to fifteen (15) years may be assessed depending upon the nature and degree of the offense.

## D. Need to Halt or Reduce Activity Not a Defense

It shall not be a defense for an *owner or operator* in an enforcement action that it would have been necessary to halt or reduce the *construction activity* in order to maintain compliance with the conditions of this permit.

## E. Duty to Mitigate

The *owner or operator* and its contractors and subcontractors shall take all reasonable steps to *minimize* or prevent any *discharge* in violation of this permit which has a reasonable likelihood of adversely affecting human health or the environment.

## F. Duty to Provide Information

The *owner or operator* shall furnish to the Department, within a reasonable specified time period of a written request, all documentation necessary to demonstrate eligibility and any information to determine compliance with this permit or to determine whether cause exists for modifying or revoking this permit, or suspending or denying coverage under this permit, in accordance with the terms and conditions of this permit. The NOI, SWPPP and inspection reports required by this permit are public documents that the *owner or operator* must make available for review and copying by any person within five (5) business days of the *owner or operator* receiving a written request by any such person to review these documents. Copying of documents will be done at the requester's expense.

## G. Other Information

When the *owner or operator* becomes aware that they failed to submit any relevant facts, or submitted incorrect information in the NOI or in any of the documents required by this permit , or have made substantive revisions to the SWPPP (e.g. the scope of the project changes significantly, the type of post-construction stormwater management practice(s) changes, there is a reduction in the sizing of the post-construction stormwater management practice, or there is an increase in the disturbance area or *impervious area*), which were not reflected in the original NOI submitted to the Department, they shall promptly submit such facts or information to the Department using the contact information in Part II.A. of this permit. Failure of the *owner or operator* to correct or supplement any relevant facts within five (5) business days of becoming aware of the deficiency shall constitute a violation of this permit.

## H. Signatory Requirements

1. All NOIs and NOTs shall be signed as follows:

    a. For a corporation these forms shall be signed by a responsible corporate officer. For the purpose of this section, a responsible corporate officer means:

(i) a president, secretary, treasurer, or vice-president of the corporation in charge of a principal business function, or any other person who performs similar policy or decision-making functions for the corporation; or

(ii) the manager of one or more manufacturing, production or operating facilities, provided the manager is authorized to make management decisions which govern the operation of the regulated facility including having the explicit or implicit duty of making major capital investment recommendations, and initiating and directing other comprehensive measures to assure long term environmental compliance with environmental laws and regulations; the manager can ensure that the necessary systems are established or actions taken to gather complete and accurate information for permit application requirements; and where authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures;

b. For a partnership or sole proprietorship these forms shall be signed by a general partner or the proprietor, respectively; or

c. For a municipality, State, Federal, or other public agency these forms shall be signed by either a principal executive officer or ranking elected official. For purposes of this section, a principal executive officer of a Federal agency includes:

(i) the chief executive officer of the agency, or

(ii) a senior executive officer having responsibility for the overall operations of a principal geographic unit of the agency (e.g., Regional Administrators of EPA).

2. The SWPPP and other information requested by the Department shall be signed by a person described in Part VII.H.1. of this permit or by a duly authorized representative of that person. A person is a duly authorized representative only if:

a. The authorization is made in writing by a person described in Part VII.H.1. of this permit;

b. The authorization specifies either an individual or a position having responsibility for the overall operation of the regulated facility or activity, such as the position of plant manager, operator of a well or a well field, superintendent, position of *equivalent* responsibility, or an individual or position having overall responsibility for environmental matters for the company. (A duly authorized representative may thus be either a named individual or any individual occupying a named position) and,

c. The written authorization shall include the name, title and signature of the authorized representative and be attached to the SWPPP.

3. All inspection reports shall be signed by the *qualified inspector* that performs the inspection.

4. The MS4 SWPPP Acceptance form shall be signed by the principal executive officer or ranking elected official from the *regulated, traditional land use control MS4,* or by a duly authorized representative of that person.

   It shall constitute a permit violation if an incorrect and/or improper signatory authorizes any required forms, SWPPP and/or inspection reports.

## I. Property Rights

The issuance of this permit does not convey any property rights of any sort, nor any exclusive privileges, nor does it authorize any injury to private property nor any invasion of personal rights, nor any infringement of Federal, State or local laws or regulations. *Owners or operators* must obtain any applicable conveyances, easements, licenses and/or access to real property prior to *commencing construction activity*.

## J. Severability

The provisions of this permit are severable, and if any provision of this permit, or the application of any provision of this permit to any circumstance, is held invalid, the application of such provision to other circumstances, and the remainder of this permit shall not be affected thereby.

## K. Requirement to Obtain Coverage Under an Alternative Permit

1. The Department may require any owner or operator authorized by this permit to apply for and/or obtain either an individual SPDES permit or another SPDES general permit. When the Department requires any discharger authorized by a general permit to apply for an individual SPDES permit, it shall notify the discharger in writing that a permit application is required. This notice shall

include a brief statement of the reasons for this decision, an application form, a statement setting a time frame for the owner or operator to file the application for an individual SPDES permit, and a deadline, not sooner than 180 days from owner or operator receipt of the notification letter, whereby the authorization to discharge under this general permit shall be terminated. Applications must be submitted to the appropriate Permit Administrator at the Regional Office. The Department may grant additional time upon demonstration, to the satisfaction of the Department, that additional time to apply for an alternative authorization is necessary or where the Department has not provided a permit determination in accordance with Part 621 of this Title.

2. When an individual SPDES permit is issued to a discharger authorized to *discharge* under a general SPDES permit for the same *discharge*(s), the general permit authorization for outfalls authorized under the individual SPDES permit is automatically terminated on the effective date of the individual permit unless termination is earlier in accordance with 6 NYCRR Part 750.

## L. Proper Operation and Maintenance

The *owner or operator* shall at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the *owner or operator* to achieve compliance with the conditions of this permit and with the requirements of the SWPPP.

## M. Inspection and Entry

The *owner or operator* shall allow an authorized representative of the Department, EPA, applicable county health department, or, in the case of a *construction site* which *discharges* through an *MS4*, an authorized representative of the *MS4* receiving the discharge, upon the presentation of credentials and other documents as may be required by law, to:

1. Enter upon the owner’s or operator's premises where a regulated facility or activity is located or conducted or where records must be kept under the conditions of this permit;

2. Have access to and copy at reasonable times, any records that must be kept under the conditions of this permit; and

3. Inspect at reasonable times any facilities or equipment (including monitoring and control equipment), practices or operations regulated or required by this permit.

4. Sample or monitor at reasonable times, for purposes of assuring permit compliance or as otherwise authorized by the Act or ECL, any substances or parameters at any location.

**N. Permit Actions**

This permit may, at any time, be modified, suspended, revoked, or renewed by the Department in accordance with 6 NYCRR Part 621. The filing of a request by the *owner or operator* for a permit modification, revocation and reissuance, termination, a notification of planned changes or anticipated noncompliance does not limit, diminish and/or stay compliance with any terms of this permit.

**O. Definitions**

Definitions of key terms are included in Appendix A of this permit.

**P. Re-Opener Clause**

1. If there is evidence indicating potential or realized impacts on water quality due to any stormwater discharge associated with construction activity covered by this permit, the owner or operator of such discharge may be required to obtain an individual permit or alternative general permit in accordance with Part VII.K. of this permit or the permit may be modified to include different limitations and/or requirements.

2. Any Department initiated permit modification, suspension or revocation will be conducted in accordance with 6 NYCRR Part 621, 6 NYCRR 750-1.18, and 6 NYCRR 750-1.20.

**Q. Penalties for Falsification of Forms and Reports**

In accordance with 6NYCRR Part 750-2.4 and 750-2.5, any person who knowingly makes any false material statement, representation, or certification in any application, record, report or other document filed or required to be maintained under this permit, including reports of compliance or noncompliance shall, upon conviction, be punished in accordance with ECL §71-1933 and or Articles 175 and 210 of the New York State Penal Law.

## R. Other Permits

Nothing in this permit relieves the *owner or operator* from a requirement to obtain any other permits required by law.

## APPENDIX A – Acronyms and Definitions

**Acronyms**

APO – Agency Preservation Officer
BMP – Best Management Practice
CPESC – Certified Professional in Erosion and Sediment Control
Cpv – Channel Protection Volume
CWA – Clean Water Act (or the Federal Water Pollution Control Act, 33 U.S.C. §1251 et seq)
DOW – Division of Water
EAF – Environmental Assessment Form
ECL - Environmental Conservation Law
EPA – U. S. Environmental Protection Agency
HSG – Hydrologic Soil Group
MS4 – Municipal Separate Storm Sewer System
NOI – Notice of Intent
NOT – Notice of Termination
NPDES – National Pollutant Discharge Elimination System
OPRHP – Office of Parks, Recreation and Historic Places
Qf – Extreme Flood
Qp – Overbank Flood
RRv – Runoff Reduction Volume
RWE – Regional Water Engineer
SEQR – State Environmental Quality Review
SEQRA - State Environmental Quality Review Act
SHPA – State Historic Preservation Act
SPDES – State Pollutant Discharge Elimination System
SWPPP – Stormwater Pollution Prevention Plan
TMDL – Total Maximum Daily Load
UPA – Uniform Procedures Act
USDA – United States Department of Agriculture
WQv – Water Quality Volume

## Definitions

All definitions in this section are solely for the purposes of this permit.

**Agricultural Building –** a structure designed and constructed to house farm implements, hay, grain, poultry, livestock or other horticultural products; excluding any structure designed, constructed or used, in whole or in part, for human habitation, as a place of employment where agricultural products are processed, treated or packaged, or as a place used by the public.

**Agricultural Property** –means the land for construction of a barn, *agricultural building*, silo, stockyard, pen or other structural practices identified in Table II in the "Agricultural Management Practices Catalog for Nonpoint Source Pollution in New York State" prepared by the Department in cooperation with agencies of New York Nonpoint Source Coordinating Committee (dated June 2007).

**Alter Hydrology from Pre to Post-Development Conditions -** means the post-development peak flow rate(s) has increased by more than 5% of the pre-developed condition for the design storm of interest (e.g. 10 yr and 100 yr).

**Combined Sewer -** means a sewer that is designed to collect and convey both "sewage" and "stormwater".

**Commence (Commencement of) Construction Activities -** means the initial disturbance of soils associated with clearing, grading or excavation activities; or other construction related activities that disturb or expose soils such as demolition, stockpiling of fill material, and the initial installation of erosion and sediment control practices required in the SWPPP. See definition for "*Construction Activity(ies)*" also.

**Construction Activity(ies) -** means any clearing, grading, excavation, filling, demolition or stockpiling activities that result in soil disturbance. Clearing activities can include, but are not limited to, logging equipment operation, the cutting and skidding of trees, stump removal and/or brush root removal. Construction activity does not include routine maintenance that is performed to maintain the original line and grade, hydraulic capacity, or original purpose of a facility.

**Construction Site** – means the land area where *construction activity(ies)* will occur. See definition for "*Commence (Commencement of) Construction Activities"* and "*Larger Common Plan of Development or Sale" also.*

**Dewatering** – means the act of draining rainwater and/or groundwater from building foundations, vaults or excavations/trenches.

**Direct Discharge (to a specific surface waterbody) -** means that runoff flows from a *construction site* by overland flow and the first point of discharge is the specific surface waterbody, or runoff flows from a *construction site* to a separate storm sewer system and the first point of discharge from the separate storm sewer system is the specific surface waterbody.

**Discharge(s)** - means any addition of any pollutant to waters of the State through an outlet or *point source*.

**Embankment** –means an earthen or rock slope that supports a road/highway.

**Endangered or Threatened Species** – see 6 NYCRR Part 182 of the Department's rules and regulations for definition of terms and requirements.

**Environmental Conservation Law (ECL)** - means chapter 43-B of the Consolidated Laws of the State of New York, entitled the Environmental Conservation Law.

**Equivalent (Equivalence)** – means that the practice or measure meets all the performance, longevity, maintenance, and safety objectives of the technical standard and will provide an equal or greater degree of water quality protection.

**Final Stabilization -** means that all soil disturbance activities have ceased and a uniform, perennial vegetative cover with a density of eighty (80) percent over the entire pervious surface has been established; or other equivalent stabilization measures, such as permanent landscape mulches, rock rip-rap or washed/crushed stone have been applied on all disturbed areas that are not covered by permanent structures, concrete or pavement.

**General SPDES permit** - means a SPDES permit issued pursuant to 6 NYCRR Part 750-1.21 and Section 70-0117 of the ECL authorizing a category of discharges.

**Groundwater(s)** - means waters in the saturated zone. The saturated zone is a subsurface zone in which all the interstices are filled with water under pressure greater than that of the atmosphere. Although the zone may contain gas-filled interstices or interstices filled with fluids other than water, it is still considered saturated.

**Historic Property** – means any building, structure, site, object or district that is listed on the State or National Registers of Historic Places or is determined to be eligible for listing on the State or National Registers of Historic Places.

**Impervious Area (Cover) -** means all impermeable surfaces that cannot effectively infiltrate rainfall. This includes paved, concrete and gravel surfaces (i.e. parking lots, driveways, roads, runways and sidewalks); building rooftops and miscellaneous impermeable structures such as patios, pools, and sheds.

**Infeasible** – means not technologically possible, or not economically practicable and achievable in light of best industry practices.

**Larger Common Plan of Development or Sale -** means a contiguous area where multiple separate and distinct *construction activities* are occurring, or will occur, under one plan. The term “plan” in “larger common plan of development or sale” is broadly defined as any announcement or piece of documentation (including a sign, public notice or hearing, marketing plan, advertisement, drawing, permit application, State Environmental Quality Review Act (SEQRA) environmental assessment form or other documents, zoning request, computer design, etc.) or physical demarcation (including boundary signs, lot stakes, surveyor markings, etc.) indicating that *construction activities* may occur on a specific plot.

For discrete construction projects that are located within a larger common plan of development or sale that are at least 1/4 mile apart, each project can be treated as a separate plan of development or sale provided any interconnecting road, pipeline or utility project that is part of the same “common plan” is not concurrently being disturbed.

**Minimize** – means reduce and/or eliminate to the extent achievable using control measures (including best management practices) that are technologically available and economically practicable and achievable in light of best industry practices.

**Municipal Separate Storm Sewer (MS4)** - a conveyance or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, man-made channels, or storm drains):

(i) Owned or operated by a State, city, town, borough, county, parish, district, association, or other public body (created by or pursuant to State law) having jurisdiction over disposal of sewage, industrial wastes, stormwater, or other wastes, including special districts under State law such as a sewer district, flood control district or drainage district, or similar entity, or an Indian tribe or an authorized Indian tribal organization, or a designated and approved management agency under section 208 of the CWA that discharges to surface waters of the State*;*
(ii) Designed or used for collecting or conveying stormwater;
(iii) Which is not a *combined sewer*; and
(iv) Which is not part of a Publicly Owned Treatment Works (POTW) as defined at 40 CFR 122.2.

**National Pollutant Discharge Elimination System (NPDES)** - means the national system for the issuance of wastewater and stormwater permits under the Federal Water Pollution Control Act (Clean Water Act).

**Natural Buffer** –means an undisturbed area with natural cover running along a surface water (e.g. wetland, stream, river, lake, etc.).

**New Development** – means any land disturbance that does not meet the definition of Redevelopment Activity included in this appendix.

**New York State Erosion and Sediment Control Certificate Program** – a certificate program that establishes and maintains a process to identify and recognize individuals who are capable of developing, designing, inspecting and maintaining erosion and sediment control plans on projects that disturb soils in New York State. The certificate program is administered by the New York State Conservation District Employees Association.

**NOI Acknowledgment Letter** - means the letter that the Department sends to an owner or operator to acknowledge the Department's receipt and acceptance of a complete Notice of Intent. This letter documents the owner's or operator's authorization to discharge in accordance with the general permit for stormwater discharges from *construction activity*.

**Nonpoint Source** - means any source of water pollution or pollutants which is not a discrete conveyance or *point source* permitted pursuant to Title 7 or 8 of Article 17 of the Environmental Conservation Law (see ECL Section 17-1403).

**Overbank** –means flow events that exceed the capacity of the stream channel and spill out into the adjacent floodplain.

**Owner or Operator** - means the person, persons or legal entity which owns or leases the property on which the *construction activity* is occurring;  an entity that has operational control over the construction plans and specifications, including the ability to make modifications to the plans and specifications; and/or an entity that has day-to-day operational control of those activities at a project that are necessary to ensure compliance with the permit conditions.

**Performance Criteria** – means the design criteria listed under the "Required Elements" sections in Chapters 5, 6 and 10 of the technical standard, New York State Stormwater Management Design Manual, dated January 2015. It does not include the Sizing Criteria (i.e. WQv, RRv, Cpv, Qp and Qf ) in Part I.C.2. of the permit.

**Point Source** - means any discernible, confined and discrete conveyance, including but not limited to any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operation, vessel or other floating craft, or landfill leachate collection system from which *pollutants* are or may be discharged.

**Pollutant** - means dredged spoil, filter backwash, solid waste, incinerator residue, sewage, garbage, sewage sludge, munitions, chemical wastes, biological materials, radioactive materials, heat, wrecked or discarded equipment, rock, sand and industrial, municipal, agricultural waste and ballast discharged into water; which may cause or might reasonably be expected to cause pollution of the waters of the state in contravention of the standards or guidance values adopted as provided in 6 NYCRR Parts 700 et seq .

**Qualified Inspector** - means a person that is knowledgeable in the principles and practices of erosion and sediment control, such as a licensed Professional Engineer, Certified Professional in Erosion and Sediment Control (CPESC), Registered Landscape Architect, New York State Erosion and Sediment Control Certificate Program holder or other Department endorsed individual(s).

It can also mean someone working under the direct supervision of, and at the same company as, the licensed Professional Engineer or Registered Landscape Architect, provided that person has training in the principles and practices of erosion and sediment control. Training in the principles and practices of erosion and sediment control means that the individual working under the direct supervision of the licensed Professional Engineer or Registered Landscape Architect has received four (4) hours of Department endorsed training in proper erosion and sediment control principles from a Soil and Water Conservation District, or other Department endorsed entity. After receiving the initial training, the individual working under the direct supervision of the licensed Professional Engineer or Registered Landscape Architect shall receive four (4) hours of training every three (3) years.

It can also mean a person that meets the *Qualified Professional* qualifications in addition to the *Qualified Inspector* qualifications.

Note: Inspections of any post-construction stormwater management practices that include structural components, such as a dam for an impoundment, shall be performed by a licensed Professional Engineer.

**Qualified Professional -** means a person that is knowledgeable in the principles and practices of stormwater management and treatment, such as a licensed Professional Engineer, Registered Landscape Architect or other Department endorsed individual(s). Individuals preparing SWPPPs that require the post-construction stormwater management practice component must have an understanding of the principles of hydrology, water quality management practice design, water quantity control design, and, in many cases, the principles of hydraulics. All components of the SWPPP that involve the practice of engineering, as defined by the NYS Education Law (see Article 145), shall be prepared by, or under the direct supervision of, a professional engineer licensed to practice in the State of New York.

**Redevelopment Activity(ies)** – means the disturbance and reconstruction of existing impervious area, including impervious areas that were removed from a project site within five (5) years of preliminary project plan submission to the local government (i.e. site plan, subdivision, etc.).

**Regulated, Traditional Land Use Control MS4 -** means a city, town or village with land use control authority that is authorized to discharge under New York State DEC's

SPDES General Permit For Stormwater Discharges from Municipal Separate Stormwater Sewer Systems (MS4s) or the City of New York's Individual SPDES Permit for their Municipal Separate Storm Sewer Systems (NY-0287890).

**Routine Maintenance Activity -** means *construction activity* that is performed to maintain the original line and grade, hydraulic capacity, or original purpose of a facility, including, but not limited to:

- Re-grading of gravel roads or parking lots,
- Cleaning and shaping of existing roadside ditches and culverts that maintains the approximate original line and grade, and hydraulic capacity of the ditch,
- Cleaning and shaping of existing roadside ditches that does not maintain the approximate original grade, hydraulic capacity and purpose of the ditch if the changes to the line and grade, hydraulic capacity or purpose of the ditch are installed to improve water quality and quantity controls (e.g. installing grass lined ditch),
- Placement of aggregate shoulder backing that stabilizes the transition between the road shoulder and the ditch or *embankment*,
- Full depth milling and filling of existing asphalt pavements, replacement of concrete pavement slabs, and similar work that does not expose soil or disturb the bottom six (6) inches of subbase material,
- Long-term use of equipment storage areas at or near highway maintenance facilities,
- Removal of sediment from the edge of the highway to restore a previously existing sheet-flow drainage connection from the highway surface to the highway ditch or *embankment*,
- Existing use of Canal Corp owned upland disposal sites for the canal, and
- Replacement of curbs, gutters, sidewalks and guide rail posts.

**Site limitations –** means site conditions that prevent the use of an infiltration technique and or infiltration of the total WQv. Typical site limitations include: seasonal high groundwater, shallow depth to bedrock, and soils with an infiltration rate less than 0.5 inches/hour. The existence of site limitations shall be confirmed and documented using actual field testing (i.e. test pits, soil borings, and infiltration test) or using information from the most current United States Department of Agriculture (USDA) Soil Survey for the County where the project is located.

**Sizing Criteria** – means the criteria included in Part I.C.2 of the permit that are used to size post-construction stormwater management control practices. The criteria include; Water Quality Volume (WQv), Runoff Reduction Volume (RRv), Channel Protection Volume (Cpv), *Overbank* Flood (Qp), and Extreme Flood (Qf).

**State Pollutant Discharge Elimination System (SPDES)** - means the system established pursuant to Article 17 of the ECL and 6 NYCRR Part 750 for issuance of permits authorizing discharges to the waters of the state.

**Steep Slope** – means land area designated on the current United States Department of Agriculture ("USDA") Soil Survey as Soil Slope Phase "D", (provided the map unit name is inclusive of slopes greater than 25%) , or Soil Slope Phase E or F, (regardless of the map unit name), or a combination of the three designations.

**Streambank** – as used in this permit, means the terrain alongside the bed of a creek or stream. The bank consists of the sides of the channel, between which the flow is confined.

**Stormwater Pollution Prevention Plan (SWPPP)** – means a project specific report, including construction drawings, that among other things: describes the construction activity(ies), identifies the potential sources of pollution at the *construction site*; describes and shows the stormwater controls that will be used to control the pollutants (i.e. erosion and sediment controls; for many projects, includes post-construction stormwater management controls); and identifies procedures the *owner or operator* will implement to comply with the terms and conditions of the permit. See Part III of the permit for a complete description of the information that must be included in the SWPPP.

**Surface Waters of the State** - shall be construed to include lakes, bays, sounds, ponds, impounding reservoirs, springs, rivers, streams, creeks, estuaries, marshes, inlets, canals, the Atlantic ocean within the territorial seas of the state of New York and all other bodies of surface water, natural or artificial, inland or coastal, fresh or salt, public or private (except those private waters that do not combine or effect a junction with natural surface waters), which are wholly or partially within or bordering the state or within its jurisdiction. Waters of the state are further defined in 6 NYCRR Parts 800 to 941.

**Temporarily Ceased** – means that an existing disturbed area will not be disturbed again within 14 calendar days of the previous soil disturbance.

**Temporary Stabilization** - means that exposed soil has been covered with material(s) as set forth in the technical standard, New York Standards and Specifications for Erosion and Sediment Control, to prevent the exposed soil from eroding. The materials can include, but are not limited to, mulch, seed and mulch, and erosion control mats (e.g. jute twisted yarn, excelsior wood fiber mats).

**Total Maximum Daily Loads** (TMDLs) - A TMDL is the sum of the allowable loads of a single pollutant from all contributing point and *nonpoint source*s. It is a calculation of the maximum amount of a pollutant that a waterbody can receive on a daily basis and still meet *water quality standards*, and an allocation of that amount to the pollutant's sources. A TMDL stipulates wasteload allocations (WLAs) for *point source* discharges, load allocations (LAs) for *nonpoint source*s, and a margin of safety (MOS).

**Trained Contractor -** means an employee from the contracting (construction) company, identified in Part III.A.6., that has received four (4) hours of Department endorsed training in proper erosion and sediment control principles from a Soil and Water Conservation District, or other Department endorsed entity. After receiving the initial training, the *trained contractor* shall receive four (4) hours of training every three (3) years.

It can also mean an employee from the contracting (construction) company, identified in Part III.A.6., that meets the *qualified inspector* qualifications (e.g. licensed Professional Engineer, Certified Professional in Erosion and Sediment Control (CPESC), Registered Landscape Architect, New York State Erosion and Sediment Control Certificate Program holder, or someone working under the direct supervision of, and at the same company as, the licensed Professional Engineer or Registered Landscape Architect, provided they have received four (4) hours of Department endorsed training in proper erosion and sediment control principles from a Soil and Water Conservation District, or other Department endorsed entity).

The *trained contractor* is responsible for the day to day implementation of the SWPPP.

**Uniform Procedures Act (UPA) Permit** - means a permit required under 6 NYCRR Part 621 of the Environmental Conservation Law (ECL), Article 70.

**Water Quality Standard** - means such measures of purity or quality for any waters in relation to their reasonable and necessary use as promulgated in 6 NYCRR Part 700 et seq.

## APPENDIX B – Required SWPPP Components by Project Type

**Table 1**
**Construction Activities that Require the Preparation of a SWPPP That Only Includes Erosion and Sediment Controls**

| |
|---|
| **The following construction activities that involve soil disturbances of one (1) or more acres of land, but less than five (5) acres:**<br><br>• Single family home not located in one of the watersheds listed in Appendix C or not *directly discharging* to one of the 303(d) segments listed in Appendix E<br>• Single family residential subdivisions with 25% or less impervious cover at total site build-out and not located in one of the watersheds listed in Appendix C and not directly discharging to one of the 303(d) segments listed in Appendix E<br>• Construction of a barn or other *agricultural building*, silo, stock yard or pen. |
| **The following construction activities that involve soil disturbances between five thousand (5000) square feet and one (1) acre of land:**<br><br>All construction activities located in the watersheds identified in Appendix D that involve soil disturbances between five thousand (5,000) square feet and one (1) acre of land. |
| **The following construction activities that involve soil disturbances of one (1) or more acres of land:**<br><br>• Installation of underground, linear utilities; such as gas lines, fiber-optic cable, cable TV, electric, telephone, sewer mains, and water mains<br>• Environmental enhancement projects, such as wetland mitigation projects, stormwater retrofits and stream restoration projects<br>• Pond construction<br>• Linear bike paths running through areas with vegetative cover, including bike paths surfaced with an impervious cover<br>• Cross-country ski trails and walking/hiking trails<br>• Sidewalk, bike path or walking path projects, surfaced with an impervious cover, that are not part of residential, commercial or institutional development;<br>• Sidewalk, bike path or walking path projects, surfaced with an impervious cover, that include incidental shoulder or curb work along an existing highway to support construction of the sidewalk, bike path or walking path.<br>• Slope stabilization projects<br>• Slope flattening that changes the grade of the site, but does not significantly change the runoff characteristics |

## Table 1 (Continued) CONSTRUCTION ACTIVITIES THAT REQUIRE THE PREPARATION OF A SWPPP THAT ONLY INCLUDES EROSION AND SEDIMENT CONTROLS

**The following construction activities that involve soil disturbances of one (1) or more acres of land:**

- Spoil areas that will be covered with vegetation
- Vegetated open space projects (i.e. recreational parks, lawns, meadows, fields, downhill ski trails) excluding projects that *alter hydrology from pre to post development* conditions,
- Athletic fields (natural grass) that do not include the construction or reconstruction of *impervious area* <u>and</u> do not *alter hydrology from pre to post development* conditions
- Demolition project where vegetation will be established, and no redevelopment is planned
- Overhead electric transmission line project that does not include the construction of permanent access roads or parking areas surfaced with *impervious cover*
- Structural practices as identified in Table II in the “Agricultural Management Practices Catalog for Nonpoint Source Pollution in New York State”, excluding projects that involve soil disturbances of greater than five acres and construction activities that include the construction or reconstruction of impervious area
- Temporary access roads, median crossovers, detour roads, lanes, or other temporary impervious areas that will be restored to pre-construction conditions once the construction activity is complete

## Table 2

### CONSTRUCTION ACTIVITIES THAT REQUIRE THE PREPARATION OF A SWPPP THAT INCLUDES POST-CONSTRUCTION STORMWATER MANAGEMENT PRACTICES

**The following construction activities that involve soil disturbances of one (1) or more acres of land:**

- Single family home located in one of the watersheds listed in Appendix C or *directly discharging* to one of the 303(d) segments listed in Appendix E
- Single family home that disturbs five (5) or more acres of land
- Single family residential subdivisions located in one of the watersheds listed in Appendix C or *directly discharging* to one of the 303(d) segments listed in Appendix E
- Single family residential subdivisions that involve soil disturbances of between one (1) and five (5) acres of land with greater than 25% impervious cover at total site build-out
- Single family residential subdivisions that involve soil disturbances of five (5) or more acres of land, and single family residential subdivisions that involve soil disturbances of less than five (5) acres that are part of a larger common plan of development or sale that will ultimately disturb five or more acres of land
- Multi-family residential developments; includes duplexes, townhomes, condominiums, senior housing complexes, apartment complexes, and mobile home parks
- Airports
- Amusement parks
- Breweries, cideries, and wineries, including establishments constructed on agricultural land
- Campgrounds
- Cemeteries that include the construction or reconstruction of impervious area (>5% of disturbed area) or *alter the hydrology from pre to post development* conditions
- Commercial developments
- Churches and other places of worship
- Construction of a barn or other *agricultural building* (e.g. silo) and structural practices as identified in Table II in the “Agricultural Management Practices Catalog for Nonpoint Source Pollution in New York State” that include the construction or reconstruction of *impervious area*, excluding projects that involve soil disturbances of less than five acres.
- Golf courses
- Institutional development; includes hospitals, prisons, schools and colleges
- Industrial facilities; includes industrial parks
- Landfills
- Municipal facilities; includes highway garages, transfer stations, office buildings, POTW’s, water treatment plants, and water storage tanks
- Office complexes
- Playgrounds that include the construction or reconstruction of impervious area
- Sports complexes
- Racetracks; includes racetracks with earthen (dirt) surface
- Road construction or reconstruction, including roads constructed as part of the construction activities listed in Table 1

## Table 2 (Continued)

### Construction Activities that Require the Preparation of a SWPPP That Includes Post-construction Stormwater Management Practices

**The following construction activities that involve soil disturbances of one (1) or more acres of land:**

- Parking lot construction or reconstruction, including parking lots constructed as part of the construction activities listed in Table 1
- Athletic fields (natural grass) that include the construction or reconstruction of impervious area (>5% of disturbed area) or *alter the hydrology from pre to post development* conditions
- Athletic fields with artificial turf
- Permanent access roads, parking areas, substations, compressor stations and well drilling pads, surfaced with *impervious cover,* and constructed as part of an over-head electric transmission line project, wind-power project, cell tower project, oil or gas well drilling project, sewer or water main project or other linear utility project
- Sidewalk, bike path or walking path projects, surfaced with an impervious cover, that are part of a residential, commercial or institutional development
- Sidewalk, bike path or walking path projects, surfaced with an impervious cover, that are part of a highway construction or reconstruction project
- All other construction activities that include the construction or reconstruction of *impervious area* or *alter the hydrology from pre to post development* conditions, and are not listed in Table 1

## APPENDIX C – Watersheds Requiring Enhanced Phosphorus Removal

**Watersheds where *owners or operators* of construction activities identified in Table 2 of Appendix B must prepare a SWPPP that includes post-construction stormwater management practices designed in conformance with the Enhanced Phosphorus Removal Standards included in the technical standard, New York State Stormwater Management Design Manual ("Design Manual").**

- Entire New York City Watershed located east of the Hudson River **-** Figure 1
- Onondaga Lake Watershed **-** Figure 2
- Greenwood Lake Watershed **-**Figure 3
- Oscawana Lake Watershed – Figure 4
- Kinderhook Lake Watershed – Figure 5

**Figure 1 - New York City Watershed East of the Hudson**

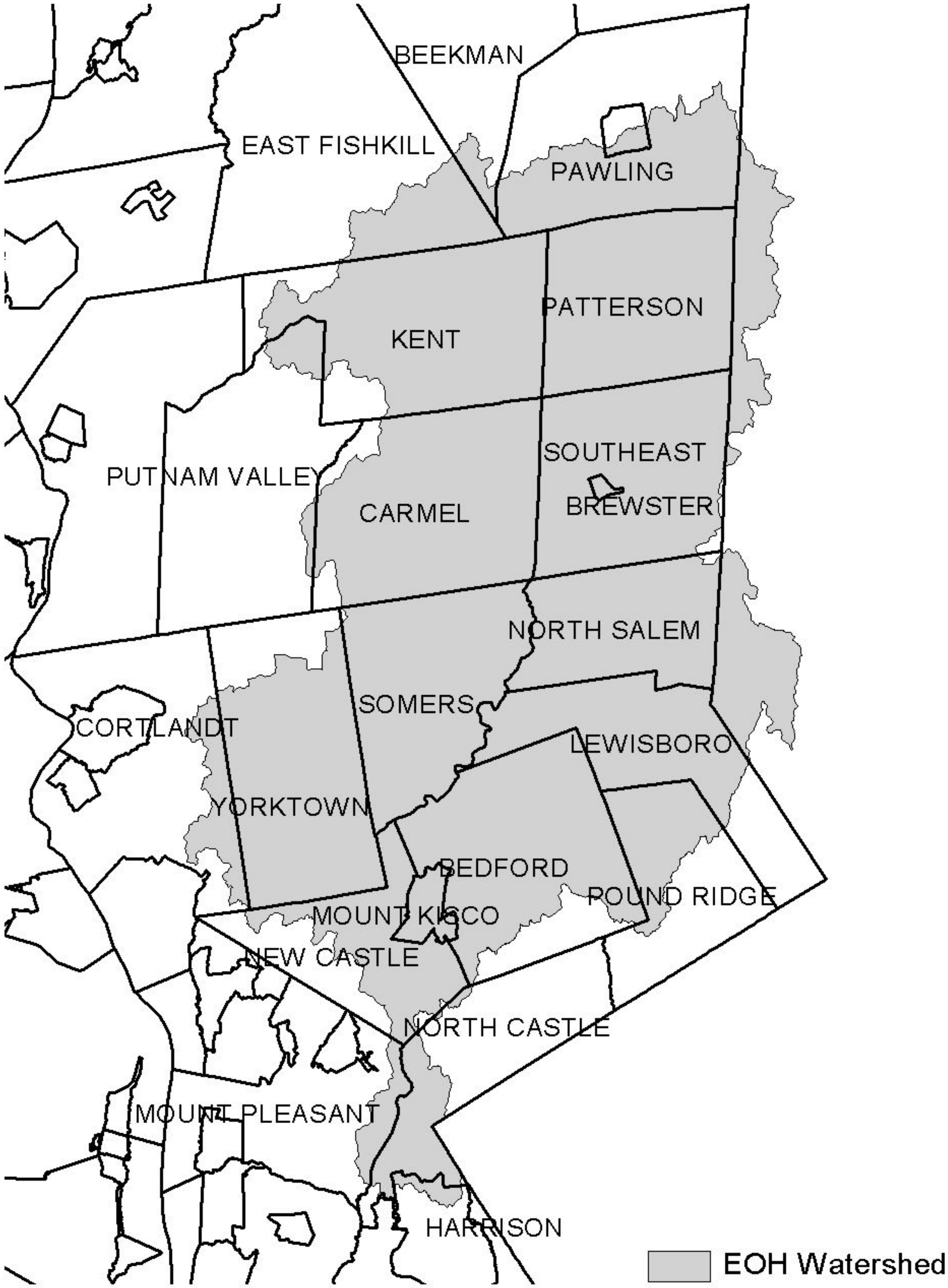


**Figure 2 - Onondaga Lake Watershed**

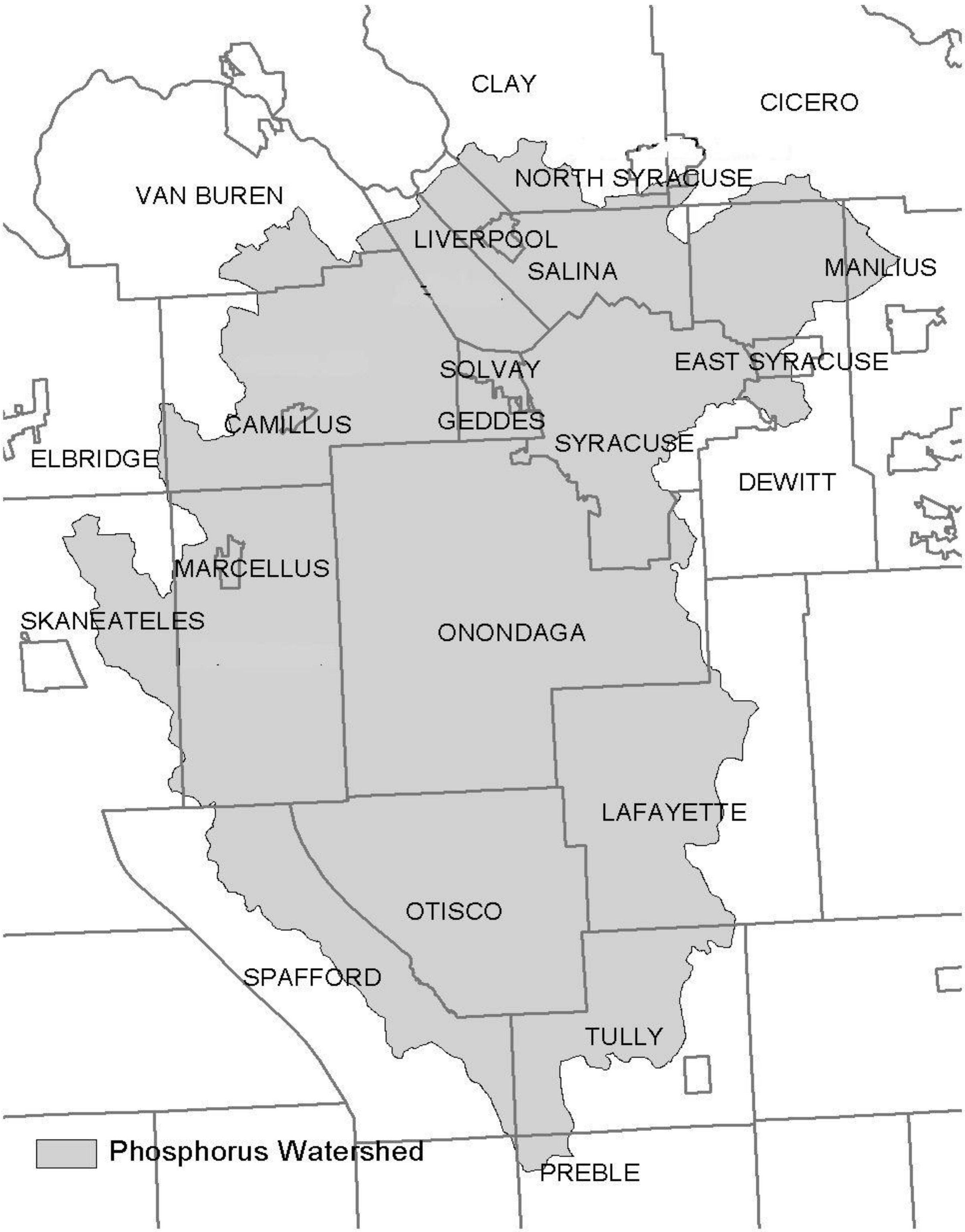
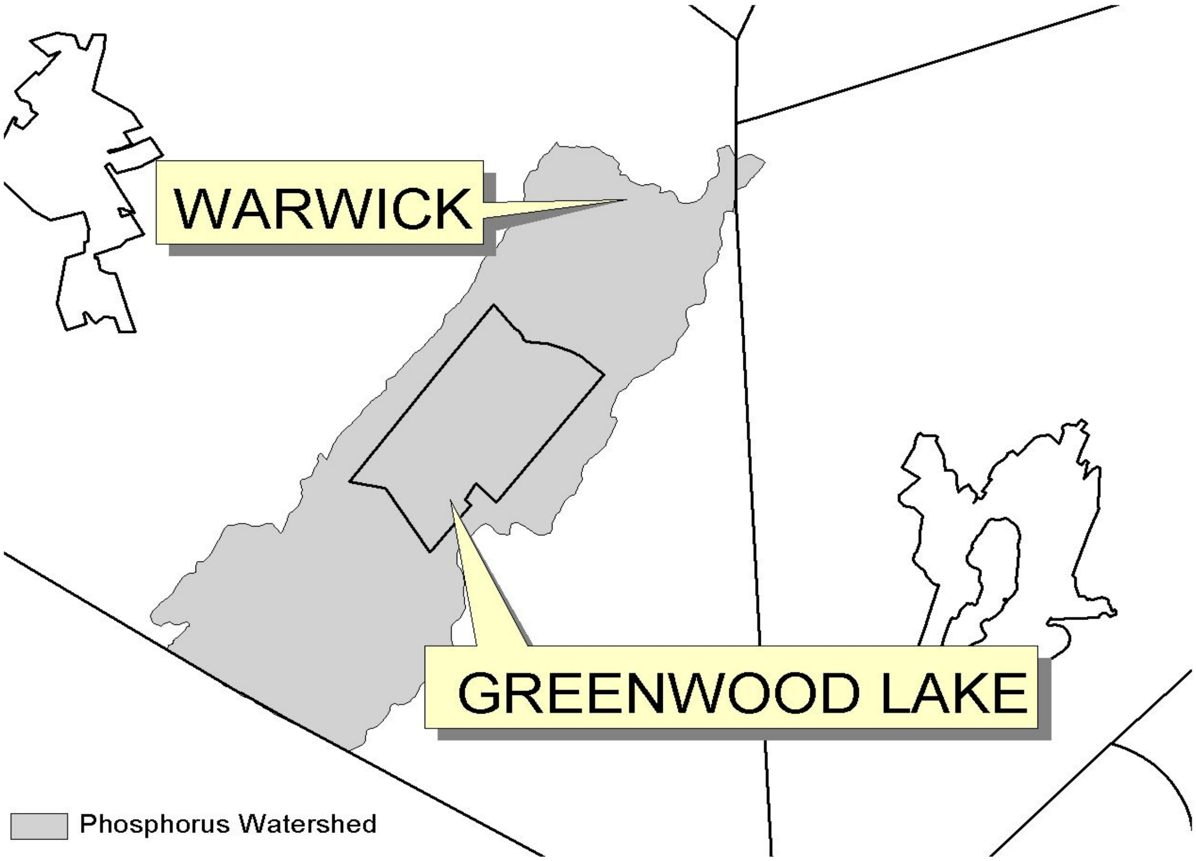
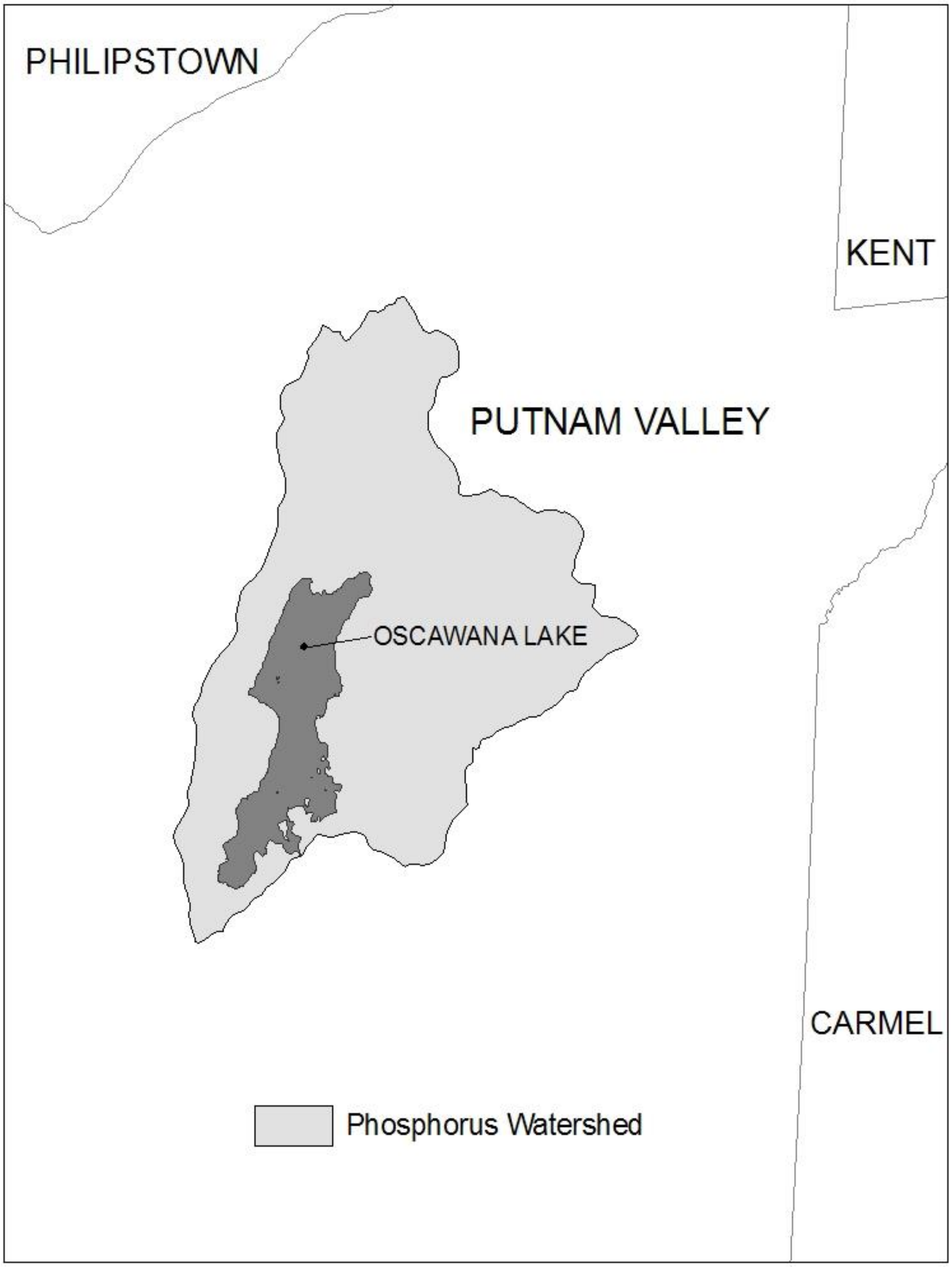


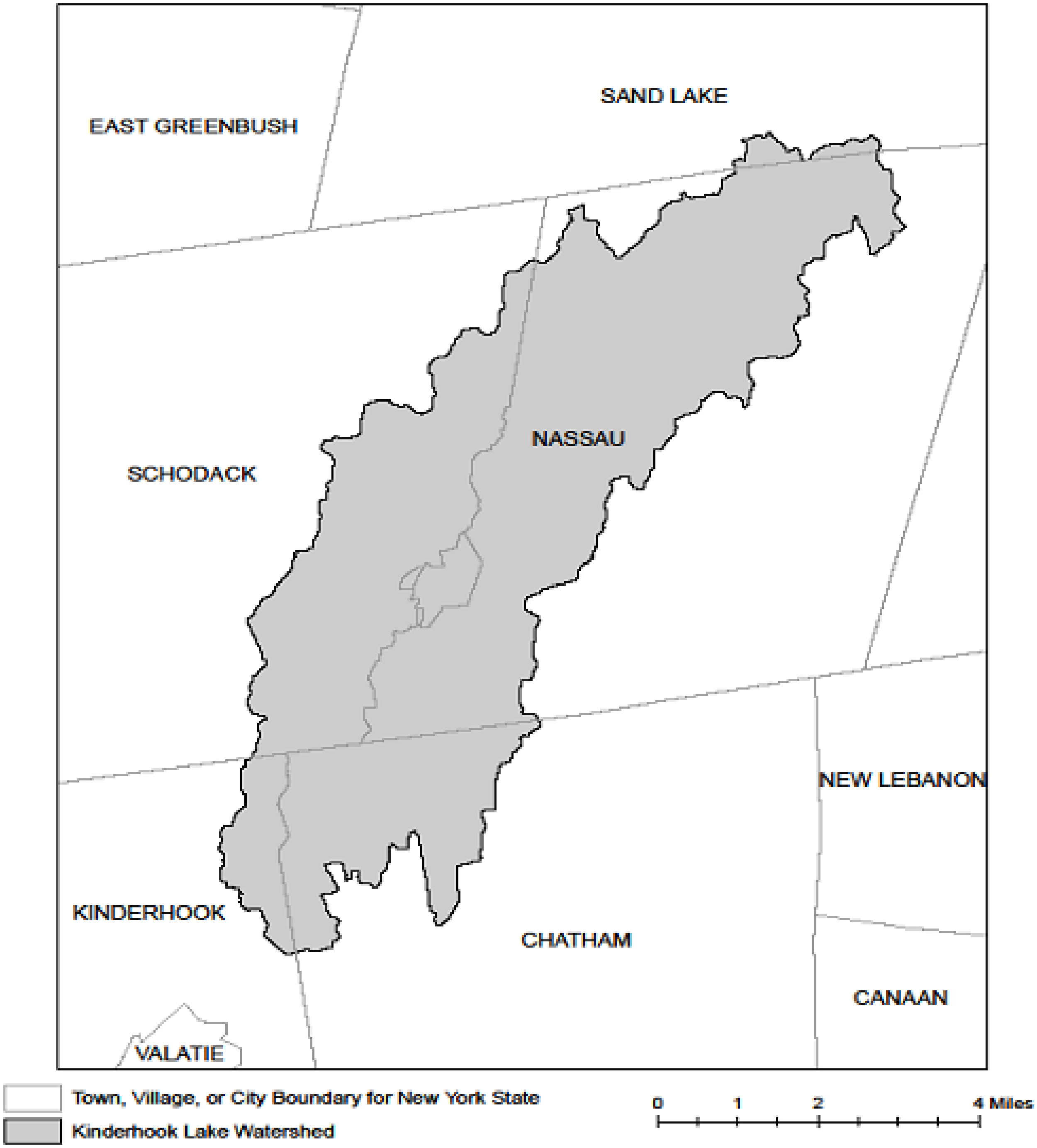
**Figure 3 - Greenwood Lake Watershed**



## Figure 4 - Oscawana Lake Watershed



## Figure 5 - Kinderhook Lake Watershed



## APPENDIX D – Watersheds with Lower Disturbance Threshold

**Watersheds where *owners or operators* of construction activities that involve soil disturbances between five thousand (5000) square feet and one (1) acre of land must obtain coverage under this permit.**

| |
|---|
| Entire New York City Watershed that is located east of the Hudson River **-** See Figure 1 in Appendix C |

## APPENDIX E – 303(d) Segments Impaired by Construction Related Pollutant(s)

List of 303(d) segments impaired by pollutants related to *construction activity* (e.g. silt, sediment or nutrients). The list was developed using "The Final New York State 2016 Section 303(d) List of Impaired Waters Requiring a TMDL/Other Strategy" dated November 2016. *Owners or operators* of single family home and single family residential subdivisions with 25% or less total impervious cover at total site build-out that involve soil disturbances of one or more acres of land, but less than 5 acres, and *directly discharge* to one of the listed segments below shall prepare a SWPPP that includes post-construction stormwater management practices designed in conformance with the New York State Stormwater Management Design Manual ("Design Manual"), dated January 2015.

| COUNTY | WATERBODY | POLLUTANT |
|---|---|---|
| Albany | Ann Lee (Shakers) Pond, Stump Pond | Nutrients |
| Albany | Basic Creek Reservoir | Nutrients |
| Allegany | Amity Lake, Saunders Pond | Nutrients |
| Bronx | Long Island Sound, Bronx | Nutrients |
| Bronx | Van Cortlandt Lake | Nutrients |
| Broome | Fly Pond, Deer Lake, Sky Lake | Nutrients |
| Broome | Minor Tribs to Lower Susquehanna (north) | Nutrients |
| Broome | Whitney Point Lake/Reservoir | Nutrients |
| Cattaraugus | Allegheny River/Reservoir | Nutrients |
| Cattaraugus | Beaver (Alma) Lake | Nutrients |
| Cattaraugus | Case Lake | Nutrients |
| Cattaraugus | Linlyco/Club Pond | Nutrients |
| Cayuga | Duck Lake | Nutrients |
| Cayuga | Little Sodus Bay | Nutrients |
| Chautauqua | Bear Lake | Nutrients |
| Chautauqua | Chadakoin River and tribs | Nutrients |
| Chautauqua | Chautauqua Lake, North | Nutrients |
| Chautauqua | Chautauqua Lake, South | Nutrients |
| Chautauqua | Findley Lake | Nutrients |
| Chautauqua | Hulburt/Clymer Pond | Nutrients |
| Clinton | Great Chazy River, Lower, Main Stem | Silt/Sediment |
| Clinton | Lake Champlain, Main Lake, Middle | Nutrients |
| Clinton | Lake Champlain, Main Lake, North | Nutrients |
| Columbia | Kinderhook Lake | Nutrients |
| Columbia | Robinson Pond | Nutrients |
| Cortland | Dean Pond | Nutrients |

### 303(d) Segments Impaired by Construction Related Pollutant(s)

| | | |
|---|---|---|
| Dutchess | Fall Kill and tribs | Nutrients |
| Dutchess | Hillside Lake | Nutrients |
| Dutchess | Wappingers Lake | Nutrients |
| Dutchess | Wappingers Lake | Silt/Sediment |
| Erie | Beeman Creek and tribs | Nutrients |
| Erie | Ellicott Creek, Lower, and tribs | Silt/Sediment |
| Erie | Ellicott Creek, Lower, and tribs | Nutrients |
| Erie | Green Lake | Nutrients |
| Erie | Little Sister Creek, Lower, and tribs | Nutrients |
| Erie | Murder Creek, Lower, and tribs | Nutrients |
| Erie | Rush Creek and tribs | Nutrients |
| Erie | Scajaquada Creek, Lower, and tribs | Nutrients |
| Erie | Scajaquada Creek, Middle, and tribs | Nutrients |
| Erie | Scajaquada Creek, Upper, and tribs | Nutrients |
| Erie | South Branch Smoke Cr, Lower, and tribs | Silt/Sediment |
| Erie | South Branch Smoke Cr, Lower, and tribs | Nutrients |
| Essex | Lake Champlain, Main Lake, South | Nutrients |
| Essex | Lake Champlain, South Lake | Nutrients |
| Essex | Willsboro Bay | Nutrients |
| Genesee | Bigelow Creek and tribs | Nutrients |
| Genesee | Black Creek, Middle, and minor tribs | Nutrients |
| Genesee | Black Creek, Upper, and minor tribs | Nutrients |
| Genesee | Bowen Brook and tribs | Nutrients |
| Genesee | LeRoy Reservoir | Nutrients |
| Genesee | Oak Orchard Cr, Upper, and tribs | Nutrients |
| Genesee | Tonawanda Creek, Middle, Main Stem | Nutrients |
| Greene | Schoharie Reservoir | Silt/Sediment |
| Greene | Sleepy Hollow Lake | Silt/Sediment |
| Herkimer | Steele Creek tribs | Silt/Sediment |
| Herkimer | Steele Creek tribs | Nutrients |
| Jefferson | Moon Lake | Nutrients |
| Kings | Hendrix Creek | Nutrients |
| Kings | Prospect Park Lake | Nutrients |
| Lewis | Mill Creek/South Branch, and tribs | Nutrients |
| Livingston | Christie Creek and tribs | Nutrients |
| Livingston | Conesus Lake | Nutrients |
| Livingston | Mill Creek and minor tribs | Silt/Sediment |
| Monroe | Black Creek, Lower, and minor tribs | Nutrients |
| Monroe | Buck Pond | Nutrients |
| Monroe | Cranberry Pond | Nutrients |

### 303(d) Segments Impaired by Construction Related Pollutant(s)

| | | |
|---|---|---|
| Monroe | Lake Ontario Shoreline, Western | Nutrients |
| Monroe | Long Pond | Nutrients |
| Monroe | Mill Creek and tribs | Nutrients |
| Monroe | Mill Creek/Blue Pond Outlet and tribs | Nutrients |
| Monroe | Minor Tribs to Irondequoit Bay | Nutrients |
| Monroe | Rochester Embayment - East | Nutrients |
| Monroe | Rochester Embayment - West | Nutrients |
| Monroe | Shipbuilders Creek and tribs | Nutrients |
| Monroe | Thomas Creek/White Brook and tribs | Nutrients |
| Nassau | Beaver Lake | Nutrients |
| Nassau | Camaans Pond | Nutrients |
| Nassau | East Meadow Brook, Upper, and tribs | Silt/Sediment |
| Nassau | East Rockaway Channel | Nutrients |
| Nassau | Grant Park Pond | Nutrients |
| Nassau | Hempstead Bay | Nutrients |
| Nassau | Hempstead Lake | Nutrients |
| Nassau | Hewlett Bay | Nutrients |
| Nassau | Hog Island Channel | Nutrients |
| Nassau | Long Island Sound, Nassau County Waters | Nutrients |
| Nassau | Massapequa Creek and tribs | Nutrients |
| Nassau | Milburn/Parsonage Creeks, Upp, and tribs | Nutrients |
| Nassau | Reynolds Channel, west | Nutrients |
| Nassau | Tidal Tribs to Hempstead Bay | Nutrients |
| Nassau | Tribs (fresh) to East Bay | Nutrients |
| Nassau | Tribs (fresh) to East Bay | Silt/Sediment |
| Nassau | Tribs to Smith/Halls Ponds | Nutrients |
| Nassau | Woodmere Channel | Nutrients |
| New York | Harlem Meer | Nutrients |
| New York | The Lake in Central Park | Nutrients |
| Niagara | Bergholtz Creek and tribs | Nutrients |
| Niagara | Hyde Park Lake | Nutrients |
| Niagara | Lake Ontario Shoreline, Western | Nutrients |
| Niagara | Lake Ontario Shoreline, Western | Nutrients |
| Oneida | Ballou, Nail Creeks and tribs | Nutrients |
| Onondaga | Harbor Brook, Lower, and tribs | Nutrients |
| Onondaga | Ley Creek and tribs | Nutrients |
| Onondaga | Minor Tribs to Onondaga Lake | Nutrients |
| Onondaga | Ninemile Creek, Lower, and tribs | Nutrients |
| Onondaga | Onondaga Creek, Lower, and tribs | Nutrients |
| Onondaga | Onondaga Creek, Middle, and tribs | Nutrients |

## 303(d) Segments Impaired by Construction Related Pollutant(s)

| | | |
|---|---|---|
| Onondaga | Onondaga Lake, northern end | Nutrients |
| Onondaga | Onondaga Lake, southern end | Nutrients |
| Ontario | Great Brook and minor tribs | Silt/Sediment |
| Ontario | Great Brook and minor tribs | Nutrients |
| Ontario | Hemlock Lake Outlet and minor tribs | Nutrients |
| Ontario | Honeoye Lake | Nutrients |
| Orange | Greenwood Lake | Nutrients |
| Orange | Monhagen Brook and tribs | Nutrients |
| Orange | Orange Lake | Nutrients |
| Orleans | Lake Ontario Shoreline, Western | Nutrients |
| Orleans | Lake Ontario Shoreline, Western | Nutrients |
| Oswego | Lake Neatahwanta | Nutrients |
| Oswego | Pleasant Lake | Nutrients |
| Putnam | Bog Brook Reservoir | Nutrients |
| Putnam | Boyd Corners Reservoir | Nutrients |
| Putnam | Croton Falls Reservoir | Nutrients |
| Putnam | Diverting Reservoir | Nutrients |
| Putnam | East Branch Reservoir | Nutrients |
| Putnam | Lake Carmel | Nutrients |
| Putnam | Middle Branch Reservoir | Nutrients |
| Putnam | Oscawana Lake | Nutrients |
| Putnam | Palmer Lake | Nutrients |
| Putnam | West Branch Reservoir | Nutrients |
| Queens | Bergen Basin | Nutrients |
| Queens | Flushing Creek/Bay | Nutrients |
| Queens | Jamaica Bay, Eastern, and tribs (Queens) | Nutrients |
| Queens | Kissena Lake | Nutrients |
| Queens | Meadow Lake | Nutrients |
| Queens | Willow Lake | Nutrients |
| Rensselaer | Nassau Lake | Nutrients |
| Rensselaer | Snyders Lake | Nutrients |
| Richmond | Grasmere Lake/Bradys Pond | Nutrients |
| Rockland | Congers Lake, Swartout Lake | Nutrients |
| Rockland | Rockland Lake | Nutrients |
| Saratoga | Ballston Lake | Nutrients |
| Saratoga | Dwaas Kill and tribs | Silt/Sediment |
| Saratoga | Dwaas Kill and tribs | Nutrients |
| Saratoga | Lake Lonely | Nutrients |
| Saratoga | Round Lake | Nutrients |
| Saratoga | Tribs to Lake Lonely | Nutrients |

## 303(d) Segments Impaired by Construction Related Pollutant(s)

| | | |
|---|---|---|
| Schenectady | Collins Lake | Nutrients |
| Schenectady | Duane Lake | Nutrients |
| Schenectady | Mariaville Lake | Nutrients |
| Schoharie | Engleville Pond | Nutrients |
| Schoharie | Summit Lake | Nutrients |
| Seneca | Reeder Creek and tribs | Nutrients |
| St.Lawrence | Black Lake Outlet/Black Lake | Nutrients |
| St.Lawrence | Fish Creek and minor tribs | Nutrients |
| Steuben | Smith Pond | Nutrients |
| Suffolk | Agawam Lake | Nutrients |
| Suffolk | Big/Little Fresh Ponds | Nutrients |
| Suffolk | Canaan Lake | Silt/Sediment |
| Suffolk | Canaan Lake | Nutrients |
| Suffolk | Flanders Bay, West/Lower Sawmill Creek | Nutrients |
| Suffolk | Fresh Pond | Nutrients |
| Suffolk | Great South Bay, East | Nutrients |
| Suffolk | Great South Bay, Middle | Nutrients |
| Suffolk | Great South Bay, West | Nutrients |
| Suffolk | Lake Ronkonkoma | Nutrients |
| Suffolk | Long Island Sound, Suffolk County, West | Nutrients |
| Suffolk | Mattituck (Marratooka) Pond | Nutrients |
| Suffolk | Meetinghouse/Terrys Creeks and tribs | Nutrients |
| Suffolk | Mill and Seven Ponds | Nutrients |
| Suffolk | Millers Pond | Nutrients |
| Suffolk | Moriches Bay, East | Nutrients |
| Suffolk | Moriches Bay, West | Nutrients |
| Suffolk | Peconic River, Lower, and tidal tribs | Nutrients |
| Suffolk | Quantuck Bay | Nutrients |
| Suffolk | Shinnecock Bay and Inlet | Nutrients |
| Suffolk | Tidal tribs to West Moriches Bay | Nutrients |
| Sullivan | Bodine, Montgomery Lakes | Nutrients |
| Sullivan | Davies Lake | Nutrients |
| Sullivan | Evens Lake | Nutrients |
| Sullivan | Pleasure Lake | Nutrients |
| Tompkins | Cayuga Lake, Southern End | Nutrients |
| Tompkins | Cayuga Lake, Southern End | Silt/Sediment |
| Tompkins | Owasco Inlet, Upper, and tribs | Nutrients |
| Ulster | Ashokan Reservoir | Silt/Sediment |
| Ulster | Esopus Creek, Upper, and minor tribs | Silt/Sediment |
| Warren | Hague Brook and tribs | Silt/Sediment |

## 303(d) Segments Impaired by Construction Related Pollutant(s)

| | | |
|---|---|---|
| Warren | Huddle/Finkle Brooks and tribs | Silt/Sediment |
| Warren | Indian Brook and tribs | Silt/Sediment |
| Warren | Lake George | Silt/Sediment |
| Warren | Tribs to L.George, Village of L George | Silt/Sediment |
| Washington | Cossayuna Lake | Nutrients |
| Washington | Lake Champlain, South Bay | Nutrients |
| Washington | Tribs to L.George, East Shore | Silt/Sediment |
| Washington | Wood Cr/Champlain Canal and minor tribs | Nutrients |
| Wayne | Port Bay | Nutrients |
| Westchester | Amawalk Reservoir | Nutrients |
| Westchester | Blind Brook, Upper, and tribs | Silt/Sediment |
| Westchester | Cross River Reservoir | Nutrients |
| Westchester | Lake Katonah | Nutrients |
| Westchester | Lake Lincolndale | Nutrients |
| Westchester | Lake Meahagh | Nutrients |
| Westchester | Lake Mohegan | Nutrients |
| Westchester | Lake Shenorock | Nutrients |
| Westchester | Long Island Sound, Westchester (East) | Nutrients |
| Westchester | Mamaroneck River, Lower | Silt/Sediment |
| Westchester | Mamaroneck River, Upper, and minor tribs | Silt/Sediment |
| Westchester | Muscoot/Upper New Croton Reservoir | Nutrients |
| Westchester | New Croton Reservoir | Nutrients |
| Westchester | Peach Lake | Nutrients |
| Westchester | Reservoir No.1 (Lake Isle) | Nutrients |
| Westchester | Saw Mill River, Lower, and tribs | Nutrients |
| Westchester | Saw Mill River, Middle, and tribs | Nutrients |
| Westchester | Sheldrake River and tribs | Silt/Sediment |
| Westchester | Sheldrake River and tribs | Nutrients |
| Westchester | Silver Lake | Nutrients |
| Westchester | Teatown Lake | Nutrients |
| Westchester | Titicus Reservoir | Nutrients |
| Westchester | Truesdale Lake | Nutrients |
| Westchester | Wallace Pond | Nutrients |
| Wyoming | Java Lake | Nutrients |
| Wyoming | Silver Lake | Nutrients |

## APPENDIX F – List of NYS DEC Regional Offices

| Region | COVERING THE FOLLOWING COUNTIES: | DIVISION OF ENVIRONMENTAL PERMITS (DEP) PERMIT ADMINISTRATORS | DIVISION OF WATER (DOW) WATER (SPDES) PROGRAM |
|---|---|---|---|
| 1 | NASSAU AND SUFFOLK | 50 CIRCLE ROAD<br>STONY BROOK, NY 11790<br>TEL. (631) 444-0365 | 50 CIRCLE ROAD<br>STONY BROOK, NY 11790-3409<br>TEL. (631) 444-0405 |
| 2 | BRONX, KINGS, NEW YORK, QUEENS AND RICHMOND | 1 HUNTERS POINT PLAZA,<br>47-40 21ST ST.<br>LONG ISLAND CITY, NY 11101-5407<br>TEL. (718) 482-4997 | 1 HUNTERS POINT PLAZA,<br>47-40 21ST ST.<br>LONG ISLAND CITY, NY 11101-5407<br>TEL. (718) 482-4933 |
| 3 | DUTCHESS, ORANGE, PUTNAM, ROCKLAND, SULLIVAN, ULSTER AND WESTCHESTER | 21 SOUTH PUTT CORNERS ROAD<br>NEW PALTZ, NY 12561-1696<br>TEL. (845) 256-3059 | 100 HILLSIDE AVENUE, SUITE 1W<br>WHITE PLAINS, NY 10603<br>TEL. (914) 428 - 2505 |
| 4 | ALBANY, COLUMBIA, DELAWARE, GREENE, MONTGOMERY, OTSEGO, RENSSELAER, SCHENECTADY AND SCHOHARIE | 1150 NORTH WESTCOTT ROAD<br>SCHENECTADY, NY 12306-2014<br>TEL. (518) 357-2069 | 1130 NORTH WESTCOTT ROAD<br>SCHENECTADY, NY 12306-2014<br>TEL. (518) 357-2045 |
| 5 | CLINTON, ESSEX, FRANKLIN, FULTON, HAMILTON, SARATOGA, WARREN AND WASHINGTON | 1115 STATE ROUTE 86, PO BOX 296<br>RAY BROOK, NY 12977-0296<br>TEL. (518) 897-1234 | 232 GOLF COURSE ROAD<br>WARRENSBURG, NY 12885-1172 TEL. (518) 623-1200 |
| 6 | HERKIMER, JEFFERSON, LEWIS, ONEIDA AND ST. LAWRENCE | STATE OFFICE BUILDING<br>317 WASHINGTON STREET<br>WATERTOWN, NY 13601-3787<br>TEL. (315) 785-2245 | STATE OFFICE BUILDING<br>207 GENESEE STREET<br>UTICA, NY 13501-2885 TEL. (315) 793-2554 |
| 7 | BROOME, CAYUGA, CHENANGO, CORTLAND, MADISON, ONONDAGA, OSWEGO, TIOGA AND TOMPKINS | 615 ERIE BLVD. WEST<br>SYRACUSE, NY 13204-2400<br>TEL. (315) 426-7438 | 615 ERIE BLVD. WEST<br>SYRACUSE, NY 13204-2400<br>TEL. (315) 426-7500 |
| 8 | CHEMUNG, GENESEE, LIVINGSTON, MONROE, ONTARIO, ORLEANS, SCHUYLER, SENECA, STEUBEN, WAYNE AND YATES | 6274 EAST AVON-LIMA<br>ROADAVON, NY 14414-9519<br>TEL. (585) 226-2466 | 6274 EAST AVON-LIMA RD.<br>AVON, NY 14414-9519<br>TEL. (585) 226-2466 |
| 9 | ALLEGANY, CATTARAUGUS, CHAUTAUQUA, ERIE, NIAGARA AND WYOMING | 270 MICHIGAN AVENUE<br>BUFFALO, NY 14203-2999<br>TEL. (716) 851-7165 | 270 MICHIGAN AVENUE<br>BUFFALO, NY 14203-2999<br>TEL. (716) 851-7070 |

# APPENDIX M: CONSTRUCTION SITE INSPECTION AND MAINTENANCE LOG SHEETS

**Contractor/Subcontractor SPDES Permit Certification**

Description: ______________________________________________

Town, Village, City: ______________________________________________

County: ______________________________________________

Check Applicable Box: ☐ Prime Contractor ☐ Subcontractor

Name of Contractor/
Subcontractor: ______________________________________________

Address: ______________________________________________

City: ____________________________ State: __________ ZIP: __________

Phone: __________________________ Fax: ___________________________

**Mandatory Certification:** The SPEDS General Permit for Stormwater Discharges from Construction Activities (Permit No. GP-0-10-001) requires the Prime Contractor (and subcontractors) to certify they understand the Stormwater Pollution Prevention Plan (SWPPP), the General Permit conditions, and their responsibilities for compliance. The certification must be signed prior to performing any contract work. The certification shall be signed by an Owner, Principal, President, Secretary or Treasurer of the Firm.

> "*I hereby certify that I understand and agree to comply with the terms and conditions of the SWPPP and agree to implement any corrective actions identified inspector during a site inspection. I also understand that the owner or operator must comply with the terms and conditions of the New York State Pollutant Discharge Elimination System (SPDES) general permit for stormwater discharges from construction activities and that it is unlawful for any person to cause or contribute to a violation of water quality standards. Furthermore, I understand that certifying false, incorrect or inaccurate information is a violation of the referenced permit and the laws of the State of New York and could subject me to criminal, civil and/or administrative proceedings.*"

Signature: ______________________________ Date: ______________________

Name: ______________________________ Title: ______________________

Effective April 30, 2010, the SPDES General Permit also requires the Prime Contractor to identify at least one trained individual who will be responsible for implementing the SWPPP and who shall be on-site on a daily basis when soil disturbance activities are being performed. (Prior training is not required if the trained individual is a licensed Professional Engineer, licensed Landscape Architect, or CPESC.) Provide the name and title of the trained individual who will be on-site and responsible for SWPPP implementation on this Contract:

Name/Title of Trained Individual: ______________________________________

Name of Training Course: ______________________________________

Training Provider: ______________________________________

Date of Training: ______________________________________

## Contractor/Subcontractor SPDES Permit Certification

Description: ______________________________

Town, Village, City: ______________________________

County: ______________________________

Check Applicable Box: ☐ Prime Contractor ☐ Subcontractor

Name of Contractor/
Subcontractor: ______________________________

Address: ______________________________

City: ____________________ State: __________ ZIP: __________

Phone: ____________________ Fax: ____________________

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Name/Title of Trained Individual: ______________________________

Name of Training Course: ______________________________

Training Provider: ______________________________

Date of Training: ______________________________

# Contractor/Subcontractor SPDES Permit Certification

Description: ______________________________________________

Town, Village, City: ______________________________________________

County: ______________________________________________

Check Applicable Box: ☐ Prime Contractor ☐ Subcontractor

Name of Contractor/
Subcontractor: ______________________________________________

Address: ______________________________________________

City: ____________________________ State: __________ ZIP: __________

Phone: __________________________ Fax: ___________________________

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Signature: ______________________________ Date: ______________________

Name: ______________________________ Title: ______________________

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Date of Training: ________________________________________

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Description: ______________________________________________

Town, Village, City: ______________________________________________

County: ______________________________________________

Check Applicable Box: ☐ Prime Contractor ☐ Subcontractor

Name of Contractor/
Subcontractor: ______________________________________________

Address: ______________________________________________

City: ____________________________ State: __________ ZIP: __________

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Name: __________________________ Title: ____________________

Effective April 30, 2010, the SPDES General Permit also requires the Prime Contractor to identify at least one trained individual who will be responsible for implementing the SWPPP and who shall be on-site on a daily basis when soil disturbance activities are being performed. (Prior training is not required if the trained individual is a licensed Professional Engineer, licensed Landscape Architect, or CPESC.) Provide the name and title of the trained individual who will be on-site and responsible for SWPPP implementation on this Contract:

Name/Title of Trained Individual: ________________________________

Name of Training Course: ________________________________

Training Provider: ________________________________

Date of Training: ________________________________

# REVIEW AGENCY INSPECTION CHECKLIST

Refer to additional regulation in site specific SWPPP

## GENERAL PROJECT INFORMATION

| | | | |
|---|---|---|---|
| **Date of Inspection** | | | |
| **Name and Title of Person performing inspection** | | | |
| **Signature of Inspector** | | | |
| **Weather Condition** | Temperature: | | |
| | Weather Condition: | | Clear |
| | | | Rain |
| | | | Snow |
| **Soil Condition** | | Saturated | |
| | | Wet | |
| | | Dry | |

| **Erosion Control Practice:** | **Condition:** | **Remarks:** |
|---|---|---|
| Temporary Swale | | |
| Tree and Vegetation Barrier | | |
| Check Dams | | |
| Dust Control | | |
| Topsoiling | | |
| Silt Fence | | |
| Rock Outlet Protection | | |
| Land Grading | | |
| Surface Roughening | | |
| Mulching | | |
| Stabilized Construction Entrance | | |
| Sediment Trap | | |
| Stockpiles | | |
| | | |
| **Stormwater Management Practice**: | **Condition:** | **Remarks:** |
| Rock Outlet Protection | | |
| Bio-retention basins | | |
| Basins | | |
| Basin outfalls | | |

# SITE INSPECTION LOG

Qualified Inspector shall conduct a site inspection at least once every seven (7) calendar days.

Refer to additional regulation - SPDES General Permit

## GENERAL PROJECT INFORMATION

| | | | |
|---|---|---|---|
| **Date of Inspection** | | | |
| **Name and Title of Person performing inspection** | | | |
| **Signature of Inspector** | | | |
| **Weather Condition** | Temperature: | | |
| | Weather Condition: | | Clear |
| | | | Rain |
| | | | Snow |
| **Soil Condition** | | Saturated | |
| | | Wet | |
| | | Dry | |
| **Description of Runoff At Point of Discharge** | | | |
| | | | |
| | | | |
| | | | |

## EROSION AND SEDIMENT CONTROL OBSERVATIONS: DATE________________

| Part of Plan Y/N | Need Action | Photo | Control Practices in need of repair; | Comments | Number of Acres Disturbed: |
|---|---|---|---|---|---|
| | | | Silt Fence | | |
| | | | Inlet Protection | | |
| | | | Mulching | | |
| | | | Permanent Seeding | | |
| | | | Temporary Check Dam | | |
| | | | Temporary Sediment Basin | | |
| | | | Diversion Swales | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

**STORMWATER MANAGEMENT PRACTICES:**
**DATE________________**

| Part of Plan Y/N | Need Action | Photo | Control Practices in need of repair; | Comments |
|---|---|---|---|---|
| | | | **Infiltration Basin 1** | |
| | | | **Inlet Structure** | |
| | | | **Infiltration Basin 2** | |
| | | | **Inlet Structure** | |
| | | | **Infiltration Basin 3** | |
| | | | **Inlet Structure** | |
| | | | **Plunge Pools** | |
| | | | **Swale (Dry or wet)** | |
| | | | **Rock Inlet Protection** | |
| | | | **Closed Drainage System** | |
| | | | **Final Grading and Seeding** | |
| | | | | |

**Notes:**

# CORRECTIVE ACTION LOG

**SWPPP Contact:_______________________________**

| Inspection Date | Inspector Name(s), Title | Description of BMP Deficiency | Corrective Action Needed (including planned date/ responsible person) | Date Action Taken Responsible Party |
|---|---|---|---|---|
| | | | | |
| | | | | |
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| | | | | |
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| | | | | |

Permit Compliance Forms

**SWPPP Change / Update Log**

**SWPPP Contact:_______________________________**

| Amendment No. | Description of the Amendment | Date of Amendment | Amendment Prepared by [Name(s) and Title] |
|---|---|---|---|
| | | | |
| | | | |
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| | | | |

**NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION**

Sample

# Construction Stormwater Inspection Manual

**Primarily for Government Inspectors Evaluating Compliance with Construction Stormwater Control Requirements**

**New York State**
**Department of Environmental Conservation**

# TABLE OF CONTENTS

Version 1.05 (8/27/07)



## ATTACHMENTS

# 1.0 INTRODUCTION AND PURPOSE

The New York State Department of Environmental Conservation Division of Water (DOW) considers there to be two types of inspections germane to construction stormwater; compliance inspections and self-inspections.

This manual is for use by DOW and other regulatory oversight construction stormwater inspectors in performing compliance inspections, as well as for site operators in performing self inspections. The manual should be used in conjunction with the *New York State Standards and Specifications for Erosion and Sediment Control*, August 2005.

## 1.1 Compliance Inspections

Regulatory compliance inspections are performed by regulatory oversight authorities such as DOW staff, or representatives of DOW and local municipal construction stormwater inspectors. These inspections are intended to determine compliance with the state or local requirements for control of construction stormwater through erosion and sediment control and post construction practices. Compliance inspections focus on determinations of compliance with legal and water quality standards. Typically, compliance inspections can be further sub-categorized to include comprehensive inspections, and follow-up or reconnaissance inspections.

Compliance inspectors will focus on determining whether:

- the project is causing water quality standard violations;
- the required Stormwater Pollution Prevention Plan (SWPPP) includes appropriate erosion and sediment controls and, to some extent, post construction controls;
- the owner/operator is complying with the SWPPP;
- where required, self-inspections are being properly performed; and
- where self-inspections are required, the owner/operator responds appropriately to the self-inspector's reports.

### 1.1.1 Comprehensive Inspection

Comprehensive inspections are designed to verify permittee compliance with all applicable regulatory requirements, effluent controls, and compliance schedules. This inspection involves records reviews, visual observations, and evaluations of management practices, effluents, and receiving waters.

Comprehensive inspections should be conducted according to a neutral or random inspection scheme, or in accordance with established priorities. A neutral monitoring scheme provides some objective basis for scheduling inspections and sampling visits by establishing a system (whether complex factor-based, alphabetic, or geographic) for setting prioritiesto ensure that a particular facility is not unfairly selected for inspection or sampling. The selection of which facility to inspect must be made without bias to ensure that the regulatory oversight authority, if challenged for being arbitrary and capricious manner, can reasonably defend itself.

A neutral inspection scheme should set the criteria the inspector uses to choose which facilities to inspect, but the schedule for the actual inspection should remain confidential, and may be kept separate from the neutral plan.

A routine comprehensive compliance inspection is most effective when it is unannounced or conducted with very little advance warning.

### 1.1.2 Reconnaissance Inspection

A reconnaissance inspection is performed in lieu of, or following a comprehensive inspection to obtain a preliminary overview of an owner/operator's compliance program, to respond to a citizen complaint, or to assess a non-permitted site. The inspector performs a brief (generally about an hour) visual inspection of the site, discharges and receiving waters. A reconnaissance inspection uses the inspector's experience and judgement to summarize potential compliance problems, without conducting a full comprehensive inspection. The objective of a reconnaissance inspection is to expand inspection coverage without increasing inspection resource expenditures. The reconnaissance inspection is the shortest and least resource intensive of all inspections.

Reconnaissance inspections may be initiated in response to known or suspected violations, a public complaint, a violation of regulatory requirements, or as follow-up to verify that necessary actions were taken in response to a previous inspection.

## 1.2 Self-inspections

For some projects, the site owner/operator is required by their State Pollutant Discharge Elimination System (SPDES) Permit and/or local requirements to have a qualified professional[1] perform a "self-inspection" at the site. In self-inspections, the qualified professional determines whether the site is being managed in accordance with the SWPPP, and whether the SWPPP's recommended erosion and sediment controls are effective. If activities are not in accordance with the SWPPP, or if the SWPPP erosion and sediment controls are not effective, the qualified professional inspecting the site recommends corrections to the owner/operator.

[1] A "Qualified professional" is a person knowledgeable in the principles and practice of erosion and sediment controls, such as a licensed professional engineer, Certified Professional in Erosion and Sediment Control (CPESC), licensed landscape architect or soil scientist.

# 2.0 PRE-INSPECTION ACTIVITIES

## 2.1 Regulatory Oversight Authorities

This section is intended for inspectors with regulatory oversight authority such as agents of the DOW or a local municipality, or others acting on their behalf, such as county Soil and Water Conservation District staff. Examples of other regulatory oversight authorities include: the United States Environmental Protection Agency (EPA); New York City Department of Environmental Protection (DEP), Adirondack Park Agency (APA); the Lake George Park Commission (LGPC), and the Skaneateles Lake Watershed Authority (SLWA). Before arriving on-site to conduct the inspection, considerations concerning communication, documentation and equipment must be made.

Regulatory oversight authority is granted by state or local law to government agencies or, depending upon the particular law, an authorized representative of state or local government. SPDES rules 6 NYCRR 750-2.3 and Environmental Conservation Law 17-0303(6) and 17-0829(a) all allow for authorized representatives of the (NYSDEC) commissioner to perform all the duties of an inspector.

### 2.1.1 Communication

Coordination with Other Entities
Where appropriate, prior to selecting sites for inspection, compliance inspectors should communicate with other regulatory oversight authorities to avoid unnecessary duplication or to coordinate follow-up to inspections performed by other regulatory oversight authorities.

Announced vs. Unannounced Inspection
Inspections may be announced or unannounced. Each method has its own advantages and disadvantages. Unannounced inspections are preferred, however many job sites are not continuously manned, or not always staffed by someone who is familiar with the SWPPP, thus necessitating an announced inspection. As an alternative, when an announced inspection is necessary, inspectors should try to give as little advanced warning as possible (24 hours is suggested).

Itinerary
For obvious safety reasons, inspectors should be sure to inform someone in their office which site or sites they will be visiting prior to leaving the to perform inspections.

### 2.1.2 Documentation

Data Review
The inspector should review any available information such as:

- Notice of Intent
- Stormwater Pollution Prevention Plan
- Past inspection records
- Phasing plan

- Construction sequence
- Inspection and Maintenance schedules
- Site specific issues
- Consent Orders
- Access agreements

Inspection Form
The inspector should have copies of, and be familiar with, the inspection form used by their regulatory oversight authority (example in Attachment 1) before leaving the office. Static information such as name, location and permit number can be entered onto the inspection form prior to arriving at the inspection site.

Credentials
Inspectors should always carry proper identification to prove that they are employed by an entity with jurisdictional authority. Failure to display proper credentials may be legal grounds for denial of entry to a site.

2.1.3 Equipment

Personal Protective Equipment
DOW employees must conform to the DOW Health and Safety policy as it relates to personal protective equipment. Other regulatory oversight authorities should have their own safety policies or, if not, may wish to consult the OSHA health and safety tool at: www.osha.gov/dep/etools/ehasp/ to develop a health and safety plan.

The following is a list of some of the most common health and safety gear that may be needed:

- Hard hat (Class G, Type1 or better)
- Safety toe shoes
- Reflective vest
- Hearing protection (to achieve 85 dBA - 8 hr TWA)
- Safety glasses with side shields

If the construction is on an industrial site or a hazardous waste site, special training may be required prior to entering the site. The inspector should consult with OSHA or NYSDEC prior to entering such a site.

Monitoring Equipment
The following is a list of some equipment that may be helpful to document facts and verify compliance:

- Digital Camera
- Measuring tape or wheel
- Hand level or clinometer
- Turbidity meter (in limited circumstances)

## 2.2 Permittee's Self-inspection

This section is intended for qualified professionals who conduct site self-inspections on behalf of owner/operators. Self-inspectors are responsible for performing inspections in accordance with permit requirements and reporting to site owners and operators the results and any recommendations resulting from the inspection.

Prior to conducting inspections, qualified professionals should ensure familiarity with the Stormwater Pollution Prevention Plan and previous inspection reports.

# 3.0 ON-SITE INSPECTION PROCESS

## 3.1 Compliance Inspections

### 3.1.1 Professionalism

*Don't Pretend to Possess Knowledge*

**Unless the inspector has experience with a particular management practice, do not pretend to possess knowledge**. Inspectors cannot be expert in all areas; their job is to collect information, not to demonstrate superior wisdom. Site operators are often willing to talk to someone who is inquisitive and interested. Within reason, asking questions to obtain new information about a management practice, construction technique or piece of equipment is one of the inspector's main roles in an inspection.

*Don't Recommend Solutions*

**The inspector should not recommend solutions or endorse products**. The solution to a compliance problem may appear obvious based on the inspector's experience. However, the responsibility should be placed on the site owner to implement a workable solution to a compliance problem that meets NYSDEC standards. The inspector should refer the site operator to the New York Standards and Specifications for Erosion and Sediment Control (the Blue Book) or the New York State Stormwater Management Design Manual (the Design Manual).

Key advice must be offered carefully. One experienced stormwater inspector suggests saying: "I can't direct you or make recommendations, but what we've seen work in other situations is ..."

The way inspectors present themselves is important to the effectiveness of the inspection. An inspector cannot be overly familiar, but will be more effective if able to establish a minimum level of communication.

### 3.1.2 Safety

DOW employees must conform to Division health and safety policies when on a construction site. Other regulatory oversight authorities should have their own safety policies or, if not, may wish to consult the OSHA health and safety tool at:

www.osha.gov/dep/etools/ehasp to develop a health and safety plan.

Some general protections for construction sites are:

- Beware of heavy equipment, avoid operator blind spots and make sure of operator eye contact around heavy equipment.
- Avoid walking on rock rip-rap if possible. Loose rock presents a slip hazard.
- Stay out of confined spaces like tanks, trenches and foundation holes.
- Avoid lightning danger. Monitor weather conditions, get out of water, avoid open areas and high points, do not huddle in groups or near trees.
- Protect yourself from sun and heat exposure. Use sun screen or shading clothing. Remain hydrated by drinking water, watching for signs of heat cramps, exhaustion (fatigue, nausea, dizziness, headache, cool or moist skin), or stroke (high body temperature; red, hot and dry skin)
- Protect yourself from cold weather. Wear multiple layers of thin clothing. Wear a warm hat. Drink warm fluids or eat hot foods, and keep dry.
- Avoid scaffolding in excess of 4 feet above grade.
- Beware of ticks, stinging insects, snakes and poison ivy or sumac.

3.1.3 Legal access

DOW has general powers, set forth under ECL 17-0303, subparagraph 6, to enter premises for inspections. In addition, ECL 3-0301.2 conveys general statutory authority granting the DOW the power to access private property to fulfill DOW obligations under the law.

ECL 15-0305 gives the DOW the authority to enter at all times in or upon any property, public or private, for the purpose of inspecting or investigating conditions affecting the construction of improvements to or developments of water resources for the public health, safety or welfare.

ECL 17-0829 allows an authorized DOW representative, upon presentation of their credentials, to enter upon any premises where any effluent source is located, or in which records are required to be maintained. The representative may at reasonable times have access to, and sample discharges/pollutants to the waters or to publicly owned treatment plants where the effluent source is located. This subparagraph provides DOW representatives performing their duties authority to enter a site to pursue administrative violations. Pursuing criminal violations may require a warrant or the owner’s permission to enter the site.

For sites that are permitted, DOW has authority under the permit to enter the site.

If the owner/operator’s representatives onsite deny access, the inspector *should not* physically force entry. Under these circumstances the attorney representing the inspector should be immediately notified and consideration should be given to soliciting the aid of a law officer to obtain entry.

DOW staff have the right to enter at any reasonable time. If no one is available, and the site is fenced or posted, DOW staff should make all reasonable efforts to identify, contact and notify the owner that the DOW is entering the site. If the inspector has made all reasonable efforts to contact site owners, but was unable to do so, the site can then be accessed. All efforts should be taken not to cause any damage to the facility.

Other regulatory oversight authorities should seek advice on their legal authorities to enter a job site. Municipalities that have adopted Article 6 of the New York State Sample Local Law for Stormwater Management and Erosion and Sediment Control (NYSDEC, 2004, updated 2006) will have legal authority to enter sites in accordance with that chapter and any other existing municipal authority .

Agents of DOW have authority similar DOW staff authority to enter sites. However, DOW staff enjoy significant personal liability protections as state employees. That liability protection may not be the same for authorized representatives of DOW. For authorized representatives of DOW (or other regulatory oversight authorities), it is prudent to obtain permission to enter the site. If such permission is denied, the authorized representatives should inform the appropriate DOW contact, usually the regional water manager.

3.1.4 Find the Legally Responsible Party (Construction Manager, Self-inspector)

The first action a compliance inspector should take upon entering a construction site is to find the construction trailer or the construction or project manager if they are available. The inspector should present appropriate identification to the site's responsible party and state the reason for the inspection; construction stormwater complaint response or neutral construction stormwater inspection. If the inspection is initiated as a response to a complaint, frequently the responsible party will ask who made the complaint. DOW keeps private individual complainants confidential. If the complainant is another regulatory oversight authority, DOW tends to make that known to the site's responsible party.

3.1.5 On-site records review (NOI, SWPPP, Self-inspection Reports, Permit)

Generally, the compliance inspector should next review the on-site records. Verify that a copy of the construction stormwater permit and NOI are on-site. Verify that the acreage, site conditions, and receiving water listed on the NOI are accurate. Compare the on-site documentation with documentation already submitted to, or obtained by the compliance inspector.

If the SWPPP has not been reviewed in the office, verify that it exists and contains the minimum required components (16 for a basic plan and 22 for a full plan). On-site review of the SWPPP should determine if: there is an appropriate phasing plan; the acreage disturbed in each phase, construction sequence for each phase; proposed implementation of erosion and sediment control measures; and, where required, post construction controls. For each of the erosion and sediment control practices, the SWPPP must show design details in accordance with the NYS Standards for Erosion and Sediment Controls. The SWPPP must also include provisions for maintenance of practices during construction. On-site review of post construction controls is generally limited to verification that the proposed stormwater management practices are shown on the site plan.

Where self-inspections are required, self-inspection reports are a significant tool for the compliance inspector to determine the performance history of the site. The self-inspection reports should be done with the required frequency . Self-inspection reports must include all the details required by the permit. Generally, it is desirable for permit information to be shown on a site plan. The compliance inspector should become familiar with the report and use that familiarity to judge whether the self-inspections are being performed correctly and that the site operator is correcting deficiencies noted in the report.

### 3.1.6 Walk the Site

During wet weather conditions, it may be advantageous to observe the receiving waters prior to walking the rest of the site. At some point during the inspection, the receiving water conditions must be observed and noted. It is critical to note if there is a substantial visible contrast to natural conditions, or evidence of deposition, streambank erosion, construction debris or waste materials (e.g. concrete washdown) in the receiving stream.

Each inspector should evaluate actual implementation and maintenance of practices on-site compared to how implementation and maintenance is detailed in the SWPPP. At a minimum, the compliance inspector should observe all areas of active construction. Observing equipment or materials storage, recently stabilized areas, or stockpile areas is also appropriate to evaluate the effectiveness of management practices.

### 3.1.7 Taking Photographs

Evidence of poor receiving water conditions and poor or ineffective practices should be documented with digital photographs. Those photographs should be logged date stamped and stored on media that cannot be edited (e.g. write only CDs). Photos should also be appended to the site inspector’s report.

It is also beneficial to take photographs of good practices for educational and technology transfer reasons.

### 3.1.8 Exit Interview

Clearly communicate expectations and consequences. If it is clear from the inspection that the owner/operator must modify the SWPPP, or modify management practices within an assigned period (e.g. 24 hours, 48 hours, one week, two weeks), then that finding should be communicated at the time of the exit interview. The inspector should assign the period based on factors such as how long it would reasonably take to complete such modifications and the level of risk to water quality associated with failure to make such modifications.

The inspector should make clear that NYSDEC reserves rights to future enforcement actions. If the inspector’s supervisor or enforcement coordinator determines additional enforcement actions are necessary, the inspector *should not* reassure the owner/operator that the current situation is acceptable.

### 3.2 Non-permitted Site Inspections

For sites not authorized in accordance with state or local laws, the process will be abbreviated. First verify the need for authorization and observe receiving waters to detect water quality standard violations. If there is a violation, notify the owner of the violation or other compliance actions in response to their illicit activity. For DOW staff, Attachment 2 or a similar notice can be used to notify the site owner/operator that stormwater authorization is required.

### 3.3 Self-inspections

The role of the self-inspector is to verify that the site is complying with stormwater requirements. In particular, the self-inspector verifies that the SWPPP is being properly implemented. The self-inspector also documents SWPPP implementation so regulatory agencies can review implementation activities.

**It is <u>not</u> the role of the self-inspector to report directly to regulatory authorities**.

Appendix H of *The New York Standards and Specifications for Erosion and Sediment Control* - August 2005 (the Blue Book) includes a Construction Duration Inspection checklist that can be used by the owner/operators qualified professional for self-inspections. The Blue Book is available on the NYSDEC website.

3.3.1 Purpose

The self inspector should ensure that the project's SWPPP is being properly implemented. This includes ensuring that the erosion and sediment control practices are properly installed and being maintained in accordance with the SWPPP/Blue Book.

The project must be properly phased to limit the disturbance to less than five acres, and the construction sequence for each phase must be followed. The SWPPP must also be modified to address evolving circumstances. Finally, and most importantly, receiving waters must be protected.

If a soil disturbance will be greater than five acres at any given time, the site operator must obtain written permission from the DOW regional office.

3.3.2 Pre-construction Conference

The parties responsible for various aspects of stormwater compliance should be identified at the pre-construction conference. Responsible parties may include, but are not limited to, owner's engineer, owner/operator/permittee, contractors, and subcontractors.

Typical responsibilities include: installation of erosion and sediment control (E & SC) practices; maintenance of E & SC practices, inspection of E&SC practices, installation of post construction stormwater management practices (SMPs), inspection of post construction SMPs, SWPPP revisions, and contractor direction.

All parties should clearly know what is expected of them. Responsible parties should complete the Pre-construction Site Assessment Checklist provided in Appendix H of the Blue Book.

3.3.3 Inspection Preparation

The inspector should review the project's SWPPP (including the phasing plan, construction sequence and site specific issues) and the last few inspection reports (if the inspector has them available).

3.3.4 Self-inspection Components

<u>Inspect installation, performance and maintenance of all E&SC practices</u>

The self inspector should inspect all areas that are under active construction or disturbance and areas that are vulnerable to erosion. The self-inspector should also inspect areas that will be disturbed prior to the next inspection for measures required prior to construction (e.g. silt barriers, stabilized construction entrance, diversions). Finally, self-inspectors should inspect post-construction controls during and after installation.

<u>Identify site deficiencies and corrective measures</u>

The self-inspector's reports must be maintained in a log book on site and the log book must be made available to the regulatory authorities. Although the legal responsibility for filing a Notice of Termination lies with the owner/operator, the self-inspector may also be called upon to perform a final site inspection, including post construction SMPs, prior to filing the Notice of Termination.

# 4.0 POST-INSPECTION ACTIVITIES

## 4.1 Regulatory Oversight Authorities

This section is intended for inspectors with regulatory oversight authority such as agents of the DOW or a local municipality, or others acting on their behalf (such as County Soil and Water Conservation District staff.) Upon completion of an inspection, inspection results should be documented for the record.

4.1.1 Written Notification

The inspector should inform the permittee or the on-site representative of their inspection results in writing by sending the permittee a complete, signed copy of the inspection report. The inspection report should be transmitted under a cover letter which elaborates on any deficiencies noted in the inspection report. It is not a good idea to commend exceptional efforts by the owner/operator in a letter, because such letters tend to undermine enforcement efforts when compliance status at a site degrades.

The inspector should consider providing a copy of the cover letter and inspection report to other parties with including:

- Permittee
- Contractor(s)
- Other regulatory oversight authorities
- Other parties present during the inspection (e.g. SWPPP preparer, permittee's self-inspector, etc.)

For DOW staff, an example of the inspection cover letter is included as Attachment 3.

#### 4.1.2 Inspection Tracking

DOW staff must enter their inspection results into the electronic *Water Compliance System*.

Local municipalities and other regulatory oversight authorities are encouraged to develop an electronic tracking system in which to record their inspections.

### 4.2 Permittee's Self-inspections

This section is intended for qualified professionals who conduct site inspections for permittees in accordance with a SPDES permit or local requirements.

#### 4.2.1 Written Records

Inspection Reports
The inspector shall prepare a written report summarizing inspection results. The inspection report is then provided to the permittee, or the permittee's duly authorized representative, and to the contractor responsible for implementing stormwater controls on-site in order to correct deficiencies noted in the inspection report. Finally, the inspection report must be added to the site log book that is required to be maintained on-site, and be available to regulatory oversight authorities for review.

#### 4.2.2 Stormwater Pollution Prevention Plan Revisions

The inspector must inform the permittee of his/her duty to amend the Stormwater Pollution Prevention Plan (SWPPP) whenever an inspection proves the SWPPP to be ineffective in:

- Eliminating or significantly minimizing pollutants from on-site sources
- Achieving the general objectives of controlling pollutants in stormwater discharges from permitted construction activity
- Eliminating discharges that cause a substantial visible contrast to natural conditions

# ATTACHMENT 1

Construction Stormwater Compliance Inspection Report

| Project Name and Location: | Date: | Page 1 of 2 |
|---|---|---|
| | Permit # (if any): **NYR** | |
| Municipality: County: | Entry Time: | Exit Time: |
| On-site Representative(s) and contact information: | Weather Conditions: | |
| Name and Address of SPDES Permittee/Title/Phone/Fax Numbers: Contacted: Yes ☐ No ☐ | | |

## INSPECTION CHECKLIST

**SPDES Authority**

| | Yes | No | N/A | | Law, rule or permit citation |
|---|---|---|---|---|---|
| 1. | ☐ | ☐ | ☐ | Is a copy of the NOI posted at the construction site for public viewing? | |
| 2. | ☐ | ☐ | ☐ | Is an up-to-date copy of the signed SWPPP retained at the construction site? | |
| 3. | ☐ | ☐ | ☐ | Is a copy of the SPDES General Permit retained at the construction site? | |

**SWPPP Content**

| | Yes | No | N/A | | Law, rule or permit citation |
|---|---|---|---|---|---|
| 4. | ☐ | ☐ | ☐ | Does the SWPPP describe and identify the erosion & sediment control measures to be employed? | |
| 5. | ☐ | ☐ | ☐ | Does the SWPPP provide a maintenance schedule for the erosion & sediment control measures? | |
| 6. | ☐ | ☐ | ☐ | Does the SWPPP describe and identify the post-construction SW control measures to be employed? | |
| 7. | ☐ | ☐ | ☐ | Does the SWPPP identify the contractor(s) and subcontractor(s) responsible for each measure? | |
| 8. | ☐ | ☐ | ☐ | Does the SWPPP include all the necessary 'CONTRACTOR CERTIFICATION' statements? | |
| 9. | ☐ | ☐ | ☐ | Is the SWPPP signed/certified by the permittee? | |

**Recordkeeping**

| | Yes | No | N/A | | Law, rule or permit citation |
|---|---|---|---|---|---|
| 10. | ☐ | ☐ | ☐ | Are inspections performed as required by the permit (every 7 days and after ½" rain event)? | |
| 11. | ☐ | ☐ | ☐ | Are the site inspections performed by a qualified professional? | |
| 12. | ☐ | ☐ | ☐ | Are all required reports properly signed/certified? | |
| 13. | ☐ | ☐ | ☐ | Does the SWPPP include copies of the monthly/quarterly written summaries of compliance status? | |

**Visual Observations**

| | Yes | No | N/A | | Law, rule or permit citation |
|---|---|---|---|---|---|
| 14. | ☐ | ☐ | ☐ | Are all erosion and sediment control measures installed/constructed? | |
| 15. | ☐ | ☐ | ☐ | Are all erosion and sediment control measures maintained properly? | |
| 16. | ☐ | ☐ | ☐ | Have all disturbances of 5 acres or more been approved prior to the disturbance? | |
| 17. | ☐ | ☐ | ☐ | Are stabilization measures initiated in inactive areas? | |
| 18. | ☐ | ☐ | ☐ | Are permanent stormwater control measures implemented? | |
| 19. | ☐ | ☐ | ☐ | Was there a discharge into the receiving water on the day of inspection? | |
| 20. | ☐ | ☐ | ☐ | Are receiving waters free of there evidence of turbidity, sedimentation, or oil ? (If no , complete Page 2) | |

| **Overall Inspection Rating:** ❑ Satisfactory ❑ Marginal ❑ Unsatisfactory | |
|---|---|
| **Name/Agency of Lead Inspector:** | **Signature of Lead Inspector:** |
| **Names/Agencies of Other Inspectors:** | |

**Water Quality Observations**

Describe the discharge(s) [source(s), impact on receiving water(s), etc.] ____________________

Describe the quality of the receiving water(s) both upstream and downstream of the discharge____________________

Describe any other water quality standards or permit violations ____________________

Additional Comments:____________________

☐ Photographs attached

**ATTACHMENT 2**

# **** NOTICE ****

On March 10, 2003, provisions of the Federal Clean Water Act went into effect that apply to many construction operations.

If your construction operations result in the disturbance of one acre or greater and stormwater runoff from your site reaches surface waters (i.e., lake, stream, road side ditch, swale, storm sewer system, etc.), the stormwater runoff from your site must be covered by a State Pollutant Discharge Elimination System (SPDES) Permit issued by the New York State Department of Environmental Conservation (NYSDEC).

To facilitate your compliance with the law, NYSDEC has issued a General Permit which may be applicable to your project. To obtain coverage under this General Permit, you need to prepare a Stormwater Pollution Prevention Plan (SWPPP) and then file a Notice of Intent (NOI) to the NYSDEC headquarters in Albany. The NOI form is available on the DEC website. You may also obtain a copy of the NOI form at the nearest NYSDEC regional offices.

When you file your NOI you are certifying that you have developed a SWPPP and that it will be implemented prior to commencing construction. When you submit the NOI you need to indicate if your SWPPP is in conformance with published NYSDEC technical standards; if it is, your SPDES permit coverage will be effective in as few as five business days. If your SWPPP does not conform to the DEC technical standards, coverage will not be available for at least 60 business days.

**Failure to have the required permit can result in legal actions which include Stop Work Orders and/or monetary penalties of up to $37,500/day**

If your construction operations are already in progress and you are not covered by an appropriate NYSDEC permit contact the NYSDEC Regional Water Engineer as soon as possible. If your construction field operations have not yet commenced, review the NOI and the General Permit on the DEC's website or at the DEC regional office for your area. When you are comfortable that you understand and comply with the requirements, file your NOI.

The requirement to file an NOI does not replace any local requirements. Developers/Contractors are directed to contact the Local Code Enforcement Officer or Stormwater Management Officer for local requirements.

**ATTACHMENT 3**

<< Date >>

Mr. John Smith
123 Main Street
Ferracane, NY 12345

**Re: Stormwater Inspection**
**SPDES Permit Identification No. NYR10Z000 (through SPDES No. GP-02-01)**
**Blowing Leaves Subdivision**
**Gasper (T), Eaton (Co.)**

Dear Mr. Smith:

On the afternoon of << date >> I conducted an inspection of the construction activities associated with the Blowing Leaves Subdivision located on County Route 1 in the town of Gasper, Eaton County. The inspection was conducted in the presence of you and Mr. Samuel Siltfence of Acme Excavating Co., Inc. The purpose of the inspection was to verify compliance with the *State Pollutant Discharge Elimination System (SPDES) General Permit for Storm Water Discharges from Construction Activity* ("the general permit").

The overall rating for the project at the time of the inspection was ***unsatisfactory***. A copy of my inspection report is attached for your information. In addition to the report, I would like to elaborate on the following:

**SPDES Authority**

- In accordance with subdivision 750-2.1 (a) of Title 6 of the Official Compilation of Codes, Rules, and Regulations of the State of New York (6 NYCRR), a copy of your permit must be retained at the construction site. You did not have a copy of the general permit at the site. **Your failure to retain a copy of the general permit at the construction site is a violation of 6 NYCRR Part 750-2.1 (a).** Please retain a copy of the general permit at the site from this point forward.

**SWPPP Content**

- In accordance with Part III.E.2. of the general permit, contractors and subcontractors must certify that they understand the terms and conditions of the general permit and the SWPPP before undertaking any construction activity at the site. Your SWPPP does not include a certification statement from Acme Excavating Co., Inc. **The failure of your contractor to sign this certification before undertaking construction activity at the site is a violation of Part III.E.2. of the general permit.** Please obtain copies of all necessary certifications and provide copies of them to each party who holds a copy of your SWPPP.

- In accordance with Part V.H.2. of the general permit, SWPPP's must be certified by the permittee. Your SWPPP was not certified by you. **Your failure to certify your SWPPP is a**

**violation of Part V.H.2. of the general permit.** Please certify your SWPPP.

**Recordkeeping**

- In accordance with Parts III.D.3.a. and III.D.3.b. of the general permit, permittees must have a qualified professional conduct site inspections within 24 hours of the end of 0.5" or greater rain events and at least once per week. A review of your records revealed that your "self-inspections" are only being conducted about two or three times per month. **Your failure to have a qualified professional conduct inspections at the required frequency is a violation of Part III.D.3.b. of the general permit.** Please immediately direct your qualified professional to conduct your site inspections at the required frequency.

- Although the frequency of self-inspections does not meet rquirements, the quality of them is very good. Your qualified professional has accurately noted the same SWPPP deficiencies and necessary maintenance activities that I also observed, and prepared thorough sketches on the self-inspection site maps.

- In accordance with Part V.H.2. of the general permit, the permittee must certify all reports required by the permit. A review of your records showed that your self-inspection reports were not certified. **Your failure to certify your self-inspection reports is a violation of Part V.H.2. of the general permit.** Please sign and certify any and all existing and future self-inspection reports.

**Visual Observations**

- In accordance with Parts III.A.2. and III.A.3. of the general permit, all erosion and sediment controls (E&SC) measures must be installed (as detailed in the SWPPP) prior to the initiation of construction. During the inspection, I noted all of your E&SC measures have been correctly installed at the right times and locations.

- In accordance with Part V.L. of the general permit, all of the E&SC measures at your site must be maintained properly. While on site I observed that, among other things, the section of silt fence in place parallel to County Route 1 is in various stages of disrepair. **The failure of your contractor to adequately maintain the E&SC measures currently in place at your site is a violation of Part V.L of the general permit.** Please direct your contractor to repair this silt fence immediately and to diligently maintain all of the other required E&SC measures as they are brought to his attention by your qualified professional.

- This inspection was conducted during a rain event which resulted in a stormwater discharge to the municipal separate storm sewer system (MS4) being operated by the Eaton County Department of Public Works. Your discharge was visibly turbid whereas upstream water MS4 was clear. As a result, the discharge from the MS4 outfall into Karimipour Creek was causing slight turbidity. Please be advised that the narrative water quality standard for turbidity in Karimipour Creek is “no increase that will cause a substantial visible contrast to natural conditions.” I attribute the lack of maintenance of your E&SC measures to be the primary cause of the turbid discharge. Please be reminded that the general permit does not authorize you cause or contribute to a condition in contravention of any water quality standards.

If you have any questions or comments, please feel free to contact me at (999) 456-5432.

Sincerely,

Hector D. Inspector, CPESC
Environmental Program Specialist 2

HDI:ms
Attachment

cc w/att.: Chester Checkdam, (T) Gasper Code Enforcement Officer
Samuel Siltfence, Acme Excavating Co., Inc.

# APPENDIX H

**STATE POLLUTANT DISCHARGE ELIMINATION SYSTEM FOR CONSTRUCTION ACTIVITIES**

# CONSTRUCTION SITE LOG BOOK

Table of Contents



Properly completing forms such as those contained in Appendix H meet the inspection requirement of NYS-DEC SPDES GP for Construction Activities. Completed forms shall be kept on site at all times and made available to authorities upon request.

## I. PRE-CONSTRUCTION MEETING DOCUMENTS

**Project Name** ______________________________

**Permit No.** ______________________ **Date of Authorization** ____________

**Name of Operator** ______________________________

**Prime Contractor** ______________________________

### a. Preamble to Site Assessment and Inspections

The Following Information To Be Read By All Person's Involved in The Construction of Stormwater Related Activities:

The Operator agrees to have a qualified professional[1] conduct an assessment of the site prior to the commencement of construction[2] and certify in this inspection report that the appropriate erosion and sediment controls described in the SWPPP have been adequately installed or implemented to ensure overall preparedness of the site for the commencement of construction.

Prior to the commencement of construction, the Operator shall certify in this site logbook that the SWPPP has been prepared in accordance with the State's standards and meets all Federal, State and local erosion and sediment control requirements.

When construction starts, site inspections shall be conducted by the qualified professional at least every 7 calendar days and within 24 hours of the end of a storm event of 0.5 inches or greater (Construction Duration Inspections). The Operator shall maintain a record of all inspection reports in this site logbook. The site logbook shall be maintained on site and be made available to the permitting authorities upon request. The Operator shall post at the site, in a publicly accessible location, a summary of the site inspection activities on a monthly basis (Monthly Summary Report).

The operator shall also prepare a written summary of compliance with this general permit at a minimum frequency of every three months (Operator's Compliance Response Form), while coverage exists. The summary should address the status of achieving each component of the SWPPP.

Prior to filing the Notice of Termination or the end of permit term, the Operator shall have a qualified professional perform a final site inspection. The qualified professional shall certify that the site has undergone final stabilization[3] using either vegetative or structural stabilization methods and that all temporary erosion and sediment controls (such as silt fencing) not needed for long-term erosion control have been removed. In addition, the Operator must identify and certify that all permanent structures described in the SWPPP have been constructed and provide the owner(s) with an operation and maintenance plan that ensures the structure(s) continuously functions as designed.

1 "Qualified Professional means a person knowledgeable in the principles and practice of erosion and sediment controls, such as a Certified Professional in Erosion and Sediment Control (CPESC), soil scientist, licensed engineer or someone working under the direction and supervision of a licensed engineer (person must have experience in the principles and practices of erosion and sediment control).

2 "Commencement of construction" means the initial removal of vegetation and disturbance of soils associated with clearing, grading or excavating activities or other construction activities.

3 "Final stabilization" means that all soil-disturbing activities at the site have been completed and a uniform, perennial vegetative cover with a density of eighty (80) percent has been established or equivalent stabilization measures (such as the use of mulches or geotextiles) have been employed on all unpaved areas and areas not covered by permanent structures.

**b. Operators Certification**

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. Further, I hereby certify that the SWPPP meets all Federal, State, and local erosion and sediment control requirements. I am aware that false statements made herein are punishable as a class A misdemeanor pursuant to Section 210.45 of the Penal Law.

**Name (please print):** ______________________________

**Title** ______________________________ **Date:** ______________

**Address:** ______________________________

**Phone:** ______________ **Email:** ______________________________

**Signature:** ______________________________

**c. Qualified Professional's Credentials & Certification**

"I hereby certify that I meet the criteria set forth in the General Permit to conduct site inspections for this project and that the appropriate erosion and sediment controls described in the SWPPP and as described in the following Pre-construction Site Assessment Checklist have been adequately installed or implemented, ensuring the overall preparedness of this site for the commencement of construction."

**Name (please print):** ______________________________

**Title** ______________________________ **Date:** ______________

**Address:** ______________________________

**Phone:** ______________ **Email:** ______________________________

**Signature:** ______________________________

**d. Pre-construction Site Assessment Checklist**
**(NOTE: Provide comments below as necessary)**

1. Notice of Intent, SWPPP, and Contractors Certification:
**Yes No NA**
[ ] [ ] [ ] Has a Notice of Intent been filed with the NYS Department of Conservation?
[ ] [ ] [ ] Is the SWPPP on-site? Where?______________________________
[ ] [ ] [ ] Is the Plan current? What is the latest revision date?_____________
[ ] [ ] [ ] Is a copy of the NOI (with brief description) onsite? Where?_____________
[ ] [ ] [ ] Have all contractors involved with stormwater related activities signed a contractor's certification?

2. Resource Protection
**Yes No NA**
[ ] [ ] [ ] Are construction limits clearly flagged or fenced?
[ ] [ ] [ ] Important trees and associated rooting zones, on-site septic system absorption fields, existing vegetated areas suitable for filter strips, especially in perimeter areas, have been flagged for protection.
[ ] [ ] [ ] Creek crossings installed prior to land-disturbing activity, including clearing and blasting.

3. Surface Water Protection
**Yes No NA**
[ ] [ ] [ ] Clean stormwater runoff has been diverted from areas to be disturbed.
[ ] [ ] [ ] Bodies of water located either on site or in the vicinity of the site have been identified and protected.
[ ] [ ] [ ] Appropriate practices to protect on-site or downstream surface water are installed.
[ ] [ ] [ ] Are clearing and grading operations divided into areas <5 acres?

4. Stabilized Construction Entrance
**Yes No NA**
[ ] [ ] [ ] A temporary construction entrance to capture mud and debris from construction vehicles before they enter the public highway has been installed.
[ ] [ ] [ ] Other access areas (entrances, construction routes, equipment parking areas) are stabilized immediately as work takes place with gravel or other cover.
[ ] [ ] [ ] Sediment tracked onto public streets is removed or cleaned on a regular basis.

5. Perimeter Sediment Controls
**Yes No NA**
[ ] [ ] [ ] Silt fence material and installation comply with the standard drawing and specifications.
[ ] [ ] [ ] Silt fences are installed at appropriate spacing intervals
[ ] [ ] [ ] Sediment/detention basin was installed as first land disturbing activity.
[ ] [ ] [ ] Sediment traps and barriers are installed.

6. Pollution Prevention for Waste and Hazardous Materials
**Yes No NA**
[ ] [ ] [ ] The Operator or designated representative has been assigned to implement the spill prevention avoidance and response plan.
[ ] [ ] [ ] The plan is contained in the SWPPP on page ______
[ ] [ ] [ ] Appropriate materials to control spills are onsite. Where? __________________

## II. CONSTRUCTION DURATION INSPECTIONS

**a. Directions:**

**Inspection Forms will be filled out during the entire construction phase of the project.**

Required Elements:

(1) On a site map, indicate the extent of all disturbed site areas and drainage pathways. Indicate site areas that are expected to undergo initial disturbance or significant site work within the next 14-day period;

(2) Indicate on a site map all areas of the site that have undergone temporary or permanent stabilization;

(3) Indicate all disturbed site areas that have not undergone active site work during the previous 14-day period;

(4) Inspect all sediment control practices and record the approximate degree of sediment accumulation as a percentage of sediment storage volume (for example, 10 percent, 20 percent, 50 percent);

(5) Inspect all erosion and sediment control practices and record all maintenance requirements such as verifying the integrity of barrier or diversion systems (earthen berms or silt fencing) and containment systems (sediment basins and sediment traps). Identify any evidence of rill or gully erosion occurring on slopes and any loss of stabilizing vegetation or seeding/mulching. Document any excessive deposition of sediment or ponding water along barrier or diversion systems. Record the depth of sediment within containment structures, any erosion near outlet and overflow structures, and verify the ability of rock filters around perforated riser pipes to pass water; and

(6) Immediately report to the Operator any deficiencies that are identified with the implementation of the SWPPP.

**SITE PLAN/SKETCH**

________________________________ ________________________________

**Inspector (print name)** **Date of Inspection**

________________________________ ________________________________

**Qualified Professional (print name)** **Qualified Professional Signature**

The above signed acknowledges that, to the best of his/her knowledge, all information provided on the forms is accurate and complete.

**Maintaining Water Quality**

**Yes No NA**
[ ] [ ] [ ] Is there an increase in turbidity causing a substantial visible contrast to natural conditions?
[ ] [ ] [ ] Is there residue from oil and floating substances, visible oil film, or globules or grease?
[ ] [ ] [ ] All disturbance is within the limits of the approved plans.
[ ] [ ] [ ] Have receiving lake/bay, stream, and/or wetland been impacted by silt from project?

**Housekeeping**

1. General Site Conditions
**Yes No NA**
[ ] [ ] [ ] Is construction site litter and debris appropriately managed?
[ ] [ ] [ ] Are facilities and equipment necessary for implementation of erosion and sediment control in working order and/or properly maintained?
[ ] [ ] [ ] Is construction impacting the adjacent property?
[ ] [ ] [ ] Is dust adequately controlled?

2. Temporary Stream Crossing
**Yes No NA**
[ ] [ ] [ ] Maximum diameter pipes necessary to span creek without dredging are installed.
[ ] [ ] [ ] Installed non-woven geotextile fabric beneath approaches.
[ ] [ ] [ ] Is fill composed of aggregate (no earth or soil)?
[ ] [ ] [ ] Rock on approaches is clean enough to remove mud from vehicles & prevent sediment from entering stream during high flow.

**Runoff Control Practices**

1. Excavation Dewatering
**Yes No NA**
[ ] [ ] [ ] Upstream and downstream berms (sandbags, inflatable dams, etc.) are installed per plan.
[ ] [ ] [ ] Clean water from upstream pool is being pumped to the downstream pool.
[ ] [ ] [ ] Sediment laden water from work area is being discharged to a silt-trapping device.
[ ] [ ] [ ] Constructed upstream berm with one-foot minimum freeboard.

2. Level Spreader
**Yes No NA**
[ ] [ ] [ ] Installed per plan.
[ ] [ ] [ ] Constructed on undisturbed soil, not on fill, receiving only clear, non-sediment laden flow.
[ ] [ ] [ ] Flow sheets out of level spreader without erosion on downstream edge.

3. Interceptor Dikes and Swales
**Yes No NA**
[ ] [ ] [ ] Installed per plan with minimum side slopes 2H:1V or flatter.
[ ] [ ] [ ] Stabilized by geotextile fabric, seed, or mulch with no erosion occurring.
[ ] [ ] [ ] Sediment-laden runoff directed to sediment trapping structure

4. Stone Check Dam
**Yes No NA**
[ ] [ ] [ ] Is channel stable? (flow is not eroding soil underneath or around the structure).
[ ] [ ] [ ] Check is in good condition (rocks in place and no permanent pools behind the structure).
[ ] [ ] [ ] Has accumulated sediment been removed?.

5. Rock Outlet Protection
**Yes No NA**
[ ] [ ] [ ] Installed per plan.
[ ] [ ] [ ] Installed concurrently with pipe installation.

**Soil Stabilization**

1. Topsoil and Spoil Stockpiles
**Yes No NA**
[ ] [ ] [ ] Stockpiles are stabilized with vegetation and/or mulch.
[ ] [ ] [ ] Sediment control is installed at the toe of the slope.

2. Revegetation
**Yes No NA**
[ ] [ ] [ ] Temporary seedings and mulch have been applied to idle areas.
[ ] [ ] [ ] 4 inches minimum of topsoil has been applied under permanent seedings

**Sediment Control Practices**

1. Stabilized Construction Entrance
**Yes No NA**
[ ] [ ] [ ] Stone is clean enough to effectively remove mud from vehicles.
[ ] [ ] [ ] Installed per standards and specifications?
[ ] [ ] [ ] Does all traffic use the stabilized entrance to enter and leave site?
[ ] [ ] [ ] Is adequate drainage provided to prevent ponding at entrance?

2. Silt Fence
**Yes No NA**
[ ] [ ] [ ] Installed on Contour, 10 feet from toe of slope (not across conveyance channels).
[ ] [ ] [ ] Joints constructed by wrapping the two ends together for continuous support.
[ ] [ ] [ ] Fabric buried 6 inches minimum.
[ ] [ ] [ ] Posts are stable, fabric is tight and without rips or frayed areas.
Sediment accumulation is ___% of design capacity.

**Sediment Control Practices (continued)**

3. Storm Drain Inlet Protection (Use for Stone & Block; Filter Fabric; Curb; or, Excavated practices)
**Yes No NA**
[ ] [ ] [ ] Installed concrete blocks lengthwise so open ends face outward, not upward.
[ ] [ ] [ ] Placed wire screen between No. 3 crushed stone and concrete blocks.
[ ] [ ] [ ] Drainage area is 1acre or less.
[ ] [ ] [ ] Excavated area is 900 cubic feet.
[ ] [ ] [ ] Excavated side slopes should be 2:1.
[ ] [ ] [ ] 2" x 4" frame is constructed and structurally sound.
[ ] [ ] [ ] Posts 3-foot maximum spacing between posts.
[ ] [ ] [ ] Fabric is embedded 1 to 1.5 feet below ground and secured to frame/posts with staples at max 8-inch spacing.
[ ] [ ] [ ] Posts are stable, fabric is tight and without rips or frayed areas.
Sediment accumulation ___% of design capacity.

4. Temporary Sediment Trap
**Yes No NA**
[ ] [ ] [ ] Outlet structure is constructed per the approved plan or drawing.
[ ] [ ] [ ] Geotextile fabric has been placed beneath rock fill.
Sediment accumulation is ___% of design capacity.

5. Temporary Sediment Basin
**Yes No NA**
[ ] [ ] [ ] Basin and outlet structure constructed per the approved plan.
[ ] [ ] [ ] Basin side slopes are stabilized with seed/mulch.
[ ] [ ] [ ] Drainage structure flushed and basin surface restored upon removal of sediment basin facility.
Sediment accumulation is ___% of design capacity.

Note: Not all erosion and sediment control practices are included in this listing. Add additional pages to this list as required by site specific design.
Construction inspection checklists for post-development stormwater management practices can be found in Appendix F of the New York Stormwater Management Design Manual.

## CONSTRUCTION DURATION INSPECTIONS

### b. Modifications to the SWPPP (To be completed as described below)

The Operator shall amend the SWPPP whenever:

1. There is a significant change in design, construction, operation, or maintenance which may have a significant effect on the potential for the discharge of pollutants to the waters of the United States and which has not otherwise been addressed in the SWPPP; or
2. The SWPPP proves to be ineffective in:
   a. Eliminating or significantly minimizing pollutants from sources identified in the SWPPP and as required by this permit; or
   b. Achieving the general objectives of controlling pollutants in stormwater discharges from permitted construction activity; and
3. Additionally, the SWPPP shall be amended to identify any new contractor or subcontractor that will implement any measure of the SWPPP.

**Modification & Reason:**

## III. Monthly Summary of Site Inspection Activities

| Name of Permitted Facility: | Today's Date: | Reporting Month: |
|---|---|---|
| Location: | Permit Identification #: | |
| Name and Telephone Number of Site Inspector: | | |

| Date of Inspection | Regular / Rainfall based Inspection | Name of Inspector | Items of Concern |
|---|---|---|---|
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***Owner/Operator Certification:***

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that false statements made herein are punishable as a class A misdemeanor pursuant to Section 210.45 of the Penal Law."

Signature of Permittee or Duly Authorized Representative

Name of Permittee or Duly Authorized Representative

Date

Duly authorized representatives must have written authorization, submitted to DEC, to sign any permit documents.

## NYS DEC Spill Prevention and Response:

*From the DEC Website: www.dec.ny.gov/chemical*

Article 12 of the Navigation Law, the legislation which applies to Oil Spill Prevention, Control, and Compensation, defines a discharge as:

*any intentional or unintentional action or omission resulting in the releasing, spilling, leaking, pumping, pouring, emitting, emptying or dumping of petroleum into the waters of the state or onto lands from which it might flow or drain into said waters, or into waters outside the jurisdiction of the state when damage may result to the lands, waters or natural resources within the jurisdiction of the state;*

The terms **"release"**, **"spill"** and **"leak"** are commonly used in an interchangeable manner on this website, DEC documents, and by program staff to refer to discharges.

**Remediation** is the act or process of removing contamination from the soil, groundwater, or other medium. The term **"cleanup"** is commonly used in referring to remediation. Cleanup typically is used a in broader context and may refer to activities such as using speed-i-dry to recover oil from a roadway, or sorbent pads to collect oil from the water's surface.

All petroleum spills that occur within New York State (NYS) must be reported to the NYS Spill Hotline (1-800-457-7362) within 2 hours of discovery, except spills which meet **all of the following criteria:**

1. The quantity is known to be less than 5 gallons; and
2. The spill is contained and under the control of the spiller; and
3. The spill has not and will not reach the State's water or any land; and
4. The spill is cleaned up within 2 hours of discovery.

A spill is considered to have not impacted land if it occurs on a paved surface such as asphalt or concrete. A spill in a dirt or gravel parking lot is considered to have impacted land and is reportable.

More details on notification and reporting requirements can be found in the Spill Guidance Manual Section 1.1 - PDF 87 KB (34 pgs.)

## Report Environmental Problems:

**1-800-TIPP DEC (1-800-847-7332)** - call the TIPPs hotline to report any environmental violations

**1-800-457-7362** (within NY State) or **(518) 457-7362** (outside NY State) - call the Spill Hotline to report a chemical or oil spill

**(518)-891-0235** - to report a wildland fire

All the numbers above may be called 24 hours a day. All callers names can be kept confidential

TECHNICAL

FIELD GUIDANCE

**SPILL REPORTING AND INITIAL NOTIFICATION REQUIREMENTS**

**NOTES**

**Spill Reporting and Initial Notification Requirements**

## GUIDANCE SUMMARY AT-A-GLANCE

- Reporting spills is a crucial first step in the response process.
- You should understand the spill reporting requirements to be able to inform the spillers of their responsibilities.
- Several different state, local, and federal laws and regulations require spillers to report petroleum and hazardous materials spills.
- The state and federal reporting requirements are summarized in Exhibit 1.1-1.
- Petroleum spills must be reported to DEC unless they meet <u>all</u> of the following criteria:
  - The spill is known to be less than 5 gallons; and
  - The spill is contained and under the control of the spiller; and
  - The spill has not and will not reach the State’s water or any land; and
  - The spill is cleaned up within 2 hours of discovery.

  All reportable petroleum spills and most hazardous materials spills must be reported to DEC hotline (1-800-457-7362) <u>within</u> New York State; and (1-518 457-7362) from <u>outside</u> New York State. For spills not deemed reportable, it is strongly recommended that the facts concerning the incident be documented by the spiller and a record maintained for one year.
- Inform the spiller to report the spill to other federal or local authorities, if required.
- Report yourself those spills for which you are unable to locate the responsible spiller.
- Make note of other agencies' emergency response telephone numbers in case you require their on-scene assistance, or if the response is their responsibility and not BSPR's.

**NOTES**

### 1.1.1 Notification Requirements for Oil Spills and Hazardous Material Spills

Spillers are required under state law and under certain local and federal laws to report spills. These various requirements, summarized in Exhibit 1.1-1, often overlap; that is, a particular spill might be required to be reported under several laws or regulations and to several authorities. Under state law, all petroleum and most hazardous material spills must be reported to DEC Hotline (1-800-457-7362), within New York State, and to 1-518-457-7362 from outside New York State. Prompt reporting by spillers allows for a quick response, which may reduce the likelihood of any adverse impact to human health and the environment. Yo will often have to inform spillers of there responsibilities.

Although the spiller is responsible for reporting spills, other persons with knowledge of a spill, leak, or discharge is required to report the incident (see Appendices A and B). You will often have to inform spillers of their responsibilities. You may also have to report spills yourself in situations where the spiller is not known or cannot be located. However, it is the legal responsibility of the spiller to report spills to both state and other authorities.

BSPR personnel also are responsible for notifying other response agencies when the expertise or assistance of other agencies is needed. For example, the local fire department should be notified of spills that pose a potential explosion and/or fire hazard. If such a hazard is detected and the fire department has not been notified, call for their assistance immediately. Fire departments are trained and equipped to respond to these situations; you should not proceed with your response until the fire/safety hazard is eliminated. For more information on interagency coordination in emergency situations see Part 1, Section 3, Emergency Response.

Another important responsibility is notifying health department officials when a drinking water supply is found to be contaminated as a result of a spill. It will be the health department's responsibility to advise you on the health risk associated with any contamination.

Exhibits 1.1-1 and 1.1-2 list the state and federal requirements to report petroleum and hazardous substance spills, respectively. The charts describe the type of material covered, the applicable act or regulation, the agency that must be notified, what must be reported, and the person responsible for reporting. New York state also has a emergency notification network for spill situations (e.g., major chemical releases) that escalate beyond the capabilities of local and regional response agencies/authorities to provide adequate response. The New York State Emergency Management Office (SEMO) coordinates emergency response activities among local, state, and federal government organizations in these cases.

**Exhibit 1.1-1**

**State and Federal Reporting Requirements for Petroleum Spills, Leaks, and Discharges**

| Materials Covered | Act or Regulation | Agency to Notify | What Must Be Reported and When | Who Must Report |
|---|---|---|---|---|
| Petroleum from any source | Navigation Law Article 12; 17 NYCRR 32.3 and 32.4 | DEC Hotline 1-800-457-7362 | The notification of a discharge must be immediate, but in no case later than two hours after discharge.<br>1. Name of person making report and his relationship to any person which might be responsible for causing the discharge.<br>2. Time and date of discharge.<br>3. Probable source of discharge.<br>4. The location of the discharge, both geographic and with respect to bodies of water.<br>5. Type of petroleum discharges.<br>6. Possible health or fire hazards resulting from the discharge.<br>7. Amount of petroleum discharged.<br>8. All actions that are being taken to clean up and remove the discharge.<br>9. The personnel presently on the scene.<br>10. Other government agencies that have been or will be notified. | Any person causing discharge of petroleum. Owner or person in actual or constructive control must notify DEC unless that person has adequate assurance that such notice has already been given. |
| All aboveground petroleum and underground storage facilities with a combined storage capacity of over 1100 gallons. | ECL §17-1007;<br>6 NYCRR §613.8 | DEC Hotline 1-800-457-7362 | 1. Report spill incident within two hours of discovery.<br>2. Also when results of any inventory, record, test, or inspection shows a facility is leaking, that fact must be reported within two hours of discovery. | Any person with knowledge of a spill, leak, or discharge. |
| Petroleum contaminated with PCB. | Chemical Bulk Storage Act 6 NYCRR Parts 595, 596, 597 | DEC Hotline 1-800-457-7362 | Releases of a reportable quantity of PCB oil. | Owner or person in actual or constructive possession or control of the substance, or a person in contractual relationship, who inspects, tests, or repairs for owner. |

**Exhibit 1.1-1**

**State and Federal Reporting Requirements for Petroleum Spills, Leaks, and Discharges (continued)**

| Materials Covered | Act or Regulation | Agency to Notify | What Must Be Reported and When | Who Must Report |
|---|---|---|---|---|
| Any liquid (petroleum included) that if released would be likely to pollute lands or waters of the state. | ECL §17-1743 | DEC Hotline 1-800-457-7362 | Immediate notification that a spill, release, or discharge of any amount has occurred. Owner or person in actual or constructive possession or control of more than 1,100 gallons of the liquid. | |
| Petroleum Discharge in violation of §311(b)(3) of the Clean Water Act | 40 CFR §110.10 (Clean Water Act) | 1. National Response Center (NRC) 1-800-424-8802.<br>2. If not possible to notify NRC, notify Coast Guard or predesignated on-scene coordinator.<br>3. If not possible to notify either 1 or 2, reports may be made immediately to nearest Coast Guard units, provided NRC notified as soon as possible. | Immediate notification as soon as there is knowledge of an oil discharge that violates water quality standards or causes sheen on navigable waters. Procedures for notice are set forth in 33 CFR Part 153, Subpart B, and in the National Oil and Hazardous Substances Pollution Contingency Plan, 40 CFR Part 300, Subpart E. | Person in charge of vessel or on-shore or off-shore facility. |
| Petroleum, petroleum by-products or other dangerous liquid commodities that may create a hazardous or toxic condition spilled into navigable waters. | 33 CFR 126.29 (Ports and Waters Safety Act) | Captain of the Port or District Commander | As soon as discharge occurs, owner or master of vessel must immediately report that a discharge has occurred. | Owner or master of vessel or owner or operator of the facility at which the discharge occurred. |

**Exhibit 1.1-1**

**State and Federal Reporting Requirements for Petroleum Spills, Leaks, and Discharges (continued)**

| Materials Covered | Act or Regulation | Agency to Notify | What Must Be Reported and When | Who Must Report |
|---|---|---|---|---|
| Petroleum or hazardous substance from a vessel, on-shore or off-shore facility in violation of §311(b)(3) of the Clean Water Act. | 33 CFR 153.203 (Clean Water Act) | 1. NRC U.S. Coast Guard, 2100 Second Street, SW, Washington, DC 20593; 1-800-424-8802.<br>2. Where direct reporting not practicable, reports may be made to the Coast Guard (District Offices), the 3rd and 9th district of the EPA regional office at 26 Federal Plaza, NY, NY 10278; 1-201-548-8730.<br>3. Where none of the above is possible, may contact nearest Coast Guard unit, provided NRC notified as soon as possible. | Any discharger shall immediately notify the NRC of such discharge. | Person in charge of vessel or facility. |

**Exhibit 1.1-2**

**State and Federal Reporting Requirements for Hazardous Substance Spills, Leaks, and Discharges**

| Materials Covered | Act or Regulation | Agency to Notify | What Must Be Reported and When | Who Must Report |
|---|---|---|---|---|
| Any hazardous substance pursuant to Article 37. Does not include petroleum. | Chemical Bulk Storage Act 6 NYCRR Parts 595, 596, 597; ECL 40-0113(d) | DEC Hotline 1-800-457-7362 | Releases of a reportable quantity of a hazardous substance. | Owner or person in actual or constructive possession or control of the substance, or a person in contractual relationship, who inspects, tests, or repairs for owner. |
| Hazardous materials or substances as defined in 49 CFR §171.8 that are transported. (See federal reporting requirements.) | Transportation Law 14(f); 17 NYCRR 507.4(b) | Local fire department or police department or local municipality | Immediate notification must be given of incident in which any of the following occurs as a direct result of a spill of hazardous materials:<br>1. Person is killed.<br>2. Person receives injuries requiring hospitalization.<br>3. Estimated damage to carrier or other property exceeds $50,000.<br>4. Fire, breakage, spillage, or suspected contamination due to radioactive materials.<br>5. Fire, breakage, spillage, or suspected contamination involving etiologic agents.<br>6. Situation is such that, in the judgment of the carrier, a continuing danger to life or property exists at the scene of the incident. | All persons and carriers engaged in the transportation of hazardous materials. |

**Exhibit 1.1-2**
**State and Federal Reporting Requirements for Hazardous Substance Spills, Leaks, and Discharges**
**(continued)**

| Materials Covered | Act or Regulation | Agency to Notify | What Must Be Reported and When | Who Must Report |
|---|---|---|---|---|
| Hazardous materials (wastes included) that are transported, whose carrier is involved in an accident. | Department of Transportation Regulations<br>49 CFR 171.15; 17 NYCRR Part 924;<br>17 NYCRR Part 507 | 1. U.S. Department of Transportation 1-800-424-8802<br>2. DEC Hotline 1-800-457-7362<br>3. Rail Carrier <u>On-Duty</u> 518-457-1046 <u>Off-Duty</u> 518-457-6164<br>4. Notify local police or fire department. | Notice should be given by telephone at the earliest practicable moment and should include:<br>1. Name of reporter.<br>2. Name and address of carrier represented by reporter.<br>3. Phone number where reporter can be contacted.<br>4. Date, time, and location of incident.<br>5. The extent of injuries, if any.<br>6. Classification, name and quantity of hazardous materials involved, if available.<br>7. Type of incident and nature of hazardous material involved and whether a continuing danger to life exists at scene.<br>8. Each carrier making this report must also make the report required by §171.16. | Each carrier that transports hazardous materials involves in an accident that causes any of the following as a direct result:<br>1. A person is killed<br>2. A person receives injuries requiring hospitalization<br>3. Estimated damage to carrier or other property exceeds $50,000<br>4. Fire, breakage, spillage, suspected or otherwise involving radioactive material.<br>5. Fire, breakage, spillage, suspected contamination involving etiologic agents.<br>6. Situation is such that carrier thinks it should be reported in accordance with paragraph b. |

**Exhibit 1.1-2**
**State and Federal Reporting Requirements for Hazardous Substance Spills, Leaks, and Discharges**
**(continued)**

| Materials Covered | Act or Regulation | Agency to Notify | What Must Be Reported and When | Who Must Report |
|---|---|---|---|---|
| Reportable quantity of a hazardous substance into navigable waters or adjoining shorelines. Substances are listed in 40 CFR 302.4. | Department of Transportation Regulations 49 CFR §171.16 as authorized by the Hazardous Materials Transportation Act | U.S. Coast Guard National Response Center (NRC), 1-800-424-8802 or 1-202-267-2675 | As soon as person in charge becomes aware of a spill incident, he must notify NRC and provide the following information:<br>1. The information required by 49 CFR §171.15 (see above).<br>2. Name of shipper of hazardous substance.<br>3. Quantity of hazardous substance discharged, if known.<br>4. If person in charge is incapacitated, carrier shall make the notification.<br>5. Estimate of quantity of hazardous substance removed from the scene and the manner of disposition of any unremoved hazardous substance shall be entered in Part (H) of the report required by 49 CFR 171.16 (see above). | Person in charge of aircraft, vessel, transport vehicle, or facility. Must inform NRC directly, or indirectly through carrier. |
| Reportable quantity of a hazardous substance from vessel, on-shore or off-shore facility. Substances and requirements specified in 40 CFR §117.3. | 40 CFR §117.21 as authorized under the FWPCA | NRC 1-800-424-8802. If not practicable report may be made to the Coast Guard (3rd or 9th Districts) District Offices or to EPA, designated On-Scene Coordinator, Region II, 26 Federal Plaza, NY, NY 10278; 1-201-548-8730 | Immediate notification is required. | Person in charge of vessel, or on-shore or off-shore facility |

**Exhibit 1.1-2**
**State and Federal Reporting Requirements for Hazardous Substance Spills, Leaks, and Discharges (continued)**

| Materials Covered | Act or Regulation | Agency to Notify | What Must Be Reported and When | Who Must Report |
|---|---|---|---|---|
| Facilities where a hazardous chemical is produced, used, or stored, and there is a reportable quantity of any extremely hazardous substance as set out in Appendix A to 40 CFR 355 or a CERCLA hazardous substance as specified in 40 CFR 302.4. (This section does not apply to a release that does not go beyond the facility, that emanates from a facility that is federally permitted, is continuous as defined under §103(f) of CERCLA or to any release exempt from CERCLA §103(a) reporting under §101(22) of CERCLA.) | 40 CFR 355.40 (SARA)<br><br>Releases of CERCLA Hazardous Substances are subject to release reporting requirements of CERCLA §103, codified at 40 CFR Part 302, in addition to being subject to the requirements of this Part. | Community emergency coordinator for the local emergency planning committee of any area likely to be affected and the State Emergency Response Commission of any state likely to be affected by the release. If there is no local emergency planning commission notification shall be made to relevant local emergency response personnel. | Immediately notify agencies at left and provide the following information when available:<br><br>1. Chemical name or identity of any substance involved in the release.<br>2. Indication of whether the substance is an extremely hazardous substance.<br>3. An estimate of the quantity released.<br>4. Time and duration of release.<br>5. Medium or media into which the release occurred.<br>6. Known health risks associated with emergency and where appropriate advice regarding medical attention for those exposed.<br>7. Proper precautions/actions that should be taken, including evacuation.<br>8. Names and telephone numbers of person to be contacted for further information.<br><br>As soon as practicable after release, followup notification by providing the following information:<br><br>1. Actions taken to respond to and contain the release.<br>2. Health risks.<br>3. Advice on medical attention for exposed individuals. | Owner or operator of facility |

**Exhibit 1.1-2**
**State and Federal Reporting Requirements for Hazardous Substance Spills, Leaks, and Discharges (continued)**

| Materials Covered | Act or Regulation | Agency to Notify | What Must Be Reported and When | Who Must Report |
|---|---|---|---|---|
| Hazardous liquids transported in pipelines, a release of which results in any circumstances as set out in 195.50(a) through (f). Also any incident that results in circumstances listed in 195.52(g). | 49 CFR 195.50, 195.52 and 195.54 (Hazardous Liquid Pipeline Safety Act). | NRC, 1-800-424-8802 | Notice must be given at the earliest practicable moment and the following information provided:<br>1. Name and address of the operator.<br>2. Name and telephone number of the reporter.<br>3. Location of the failure.<br>4. The time of the failure.<br>5. The fatalities and personal injuries, if any.<br>6. All other significant facts known by the operator that are relevant to the cause of the failure or extent of the damages. | Operator of system. |
| Hazardous wastes in transport | 40 CFR §263.30(a) (RCRA) | 1. Local authorities<br>2. If required by 49 CFR 171.15, notify the NRC at 1-800-424-8802 or 1-202-426-2675<br>3. Report in writing to Director of Hazardous Materials Regulations, Materials Transportation Bureau, Department of Transportation, Washington, DC 20590 | Notification must be immediate.<br>For discharge of hazardous waste by air, rail, highway, or water, the transporter must:<br>1. Give notice as in 49 CFR 161.15 (if applicable).<br>2. Report in writing as in 49 CFR 171.16.<br>Wastes transporter (bulk shipment) must give same notice as required by 33 CFR 153.20. | Transporter by air, rail, highway, or water. |

**Exhibit 1.1-2**
**State and Federal Reporting Requirements for Hazardous Substance Spills, Leaks, and Discharges**
**(continued)**

| Materials Covered | Act or Regulation | Agency to Notify | What Must Be Reported and When | Who Must Report |
|---|---|---|---|---|
| Vinyl Chloride from any manual vent valve, or polyvinyl chloride plants | Clean Air Act<br>40 CFR 61.64 | Administrator of EPA | Within 10 days of any discharge from any manual vent valve, report must be made, in writing, and the following information provided:<br>1. Source, nature and cause of the discharge<br>2. Date and time of the discharge<br>3. Approximate total vinyl chloride loss during discharge<br>4. Method used for determining loss<br>5. Action taken to prevent the discharge<br>6. Measures adopted to prevent future discharges. | Owner or operator of plant. |
| Radioactive Materials | 6 NYCRR §380.7 | Commissioner of DEC | 1. Notify immediately by telephone when concentration, averaged over a 24-hour period, exceeds or threatens to exceed 5000 times the limits set forth in Schedule 2 of 380.9 (in uncontrolled areas).<br>2. Notify within 24 hours by telephone when concentration, averaged over 24- hour period, exceeds or threatens to exceed 500 times the limits set forth in Schedule 2 above (in uncontrolled areas).<br>3. Report within 30 days the concentration and quantity of radioactive material involved, the cause of the discharge, and corrective steps taken or planned to ensure no recurrence of the discharge. | Operator of the radiation installation. |

**Exhibit 1.1-2**
**State and Federal Reporting Requirements for Hazardous Substance Spills, Leaks, and Discharges**
**(continued)**

| Materials Covered | Act or Regulation | Agency to Notify | What Must Be Reported and When | Who Must Report |
|---|---|---|---|---|
| Low Level radioactive wastes in transport. Any suspected or actual uncontrolled releases. | 6 NYCRR 381.16<br>ECL §27-0305<br>Waste Transporter Permits | DEC and Department of Health | Immediate notification. | Transporter |

TECHNICAL

FIELD GUIDANCE

**SPILL REPORTING AND INITIAL NOTIFICATION ENFORCEMENT OF SPILLER RESPONSIBILITY**

**NOTES**

**Spill Reporting and Initial Notification -**
**Enforcement of Spiller Responsibility**

**GUIDANCE SUMMARY-AT-A-GLANCE**

# Use the "Notification Procedures Checklist" (Exhibit 1.1-3) to document conversations with the responsible party or potentially responsible party (PRP/RP) concerning his or her clean-up responsibilities.

# The steps to follow when you inform the PRP/RP of his or her legal responsibility are:

-- Give your name and identify yourself as a DEC employee;

-- Inform them that they have been identified as the party responsible for the spill;

-- Inform PRP/Rps of their liability for all clean-up and removal costs. (If necessary, cite Section 181 of the Navigation Law);

-- Ask PRP/Rps "point blank" if they will accept responsibility for the cleanup; and

-- If the PRP/RP does not accept responsibility, or does not admit to being the PRP/RP, inform him or her that DEC will conduct the cleanup and send the bill to whoever is the PRP/RP. Also inform them that a DEC-conducted cleanup could be more costly than a PRP/RP-conducted cleanup, and that the PRP/RP could face interest charges and penalties for refusing to clean up the spill.

# If the PRP/RP accepts responsibility for the cleanup:

(1) Send the PRP/RP a "Spiller Responsibility Letter" (Exhibit 1.1-5) and an "Acceptance of Financial Responsibility Form" (Exhibit 1.1-6) and

(2) Send the PRP/RP an "Option Letter," which should outline the options available to the PRP/RP to clean up the spill. See Exhibit 1.1-4 for a summary of how and when to use these forms and what they may include.

**NOTES**

### 1.1.2 Spill Reporting and Initial Notification - Enforcement of Spiller Responsibility

This section provides guidance on those steps you take to inform responsible parties or potentially responsible parties (PRP/Rps) or spillers of their responsibility under state law for cleaning up spills. This guidance applies to all contacts (by phone, by mail, or in person) you have with Rps throughout the response process concerning their fulfillment of this legal responsibility. The possible consequences of an RP's refusal or inability to conduct the spill response are also discussed.

#### 1. State Law and Policy

Under Article 12 of the Navigation Law and Article 71 of the Environmental Conservation law (ECL), those parties responsible for a petroleum release are liable for all costs associated with cleaning up the spill as well as third party damages (see Introduction-A for more information). Section 181 of the Navigation Law states:

> *Any person who has discharged petroleum shall be strictly liable, without regard to fault, for all cleanup and removal costs and all direct damages, no matter by whom sustained as defined in this section.*

There are two ways by which PRP/RPs can pay for the costs associated with cleanups. First, the PRP/RP can reimburse the state for site investigation, clean-up, and remediation costs incurred by the State Oil Spill Fund or federal Leaking Underground Storage Tank (LUST) Trust Fund. Second, the PRP/RP can assume full responsibility for the cleanup from the beginning and bear all costs throughout the clean-up process. It is DEC's policy to make every effort to have PRP/RPs pay for cleanups from the outset.[1]

To achieve PRP/RP-directed and PRP/RP-financed cleanups, your responsibilities are to: (1) identify the PRP/RP(s), (2) inform them of their legal responsibilities for the spill, and (3) ensure that they carry out these responsibilities. All investigations of spills and PRP/RPs should be pursued vigorously and without prejudice. Use to your advantage the argument that having the PRP/RP assume responsibility for clean-up costs benefits both DEC and the spiller. It saves DEC the expense of cost-recovery procedures. It also allows the PRP/RP to be more involved in clean-up decisions (e.g., choosing their clean-up contractors) and, more significantly, it usually results in lower clean-up costs. Because the PRP/RP is responsible for all indirect costs incurred if DEC conducts the cleanup, the spiller will pay for the DEC contractor's clean-up work, as well as the supervision costs incurred by DEC, any third-party claims associated with the spill, and any punitive fines levied.

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[1] Spillers are not only responsible for assuming the costs of a cleanup, but also can be subject to a $25,000 per day fine for not paying the clean-up costs (among other violations). The Navigation Law provides for these penalties in Section 192, which states:

> Any person who knowingly gives or causes to be given any false information as a part of, or in response to, any claim made pursuant to this article for cleanup and removal costs, direct or indirect damages resulting from a discharge, or who otherwise violates any of the provisions of this article or any rule promulgated thereunder or who fails to comply with any duty created by this article shall be liable to a penalty of not more than twenty-five thousand dollars for each offense in court of competent jurisdiction. If the violation is of a continuing nature each day during which it continues shall constitute an additional, separate, and distinct offense. (emphasis added)

**NOTES**

## 2. Notification Process

Part 1, Section 4, of this manual discusses the process of identifying the PRP/RP as part of the spill investigation for a particular site. Once you identify the PRP/RP, follow the guidance provided below for informing the PRP/RP of his or her responsibilities for spill cleanup. If you are uncertain about who the PRP/RP is, apply the procedures outlined below with all suspected RPs until the responsible party or parties are identified.

### a. Informing RPs of Their Responsibility at the Spill Scene

It is important to inform PRP/RPs of their legal responsibility to clean up a spill as soon as possible. When you arrive at a spill site, you should immediately inform the representative of any PRP/RP of their liability under the Navigation Law and the Environmental Conservation Law. In doing so, follow the steps covered in the "Notification Procedures Checklist" (Exhibit 1.1-3).

Document completion of the notification steps, and identify your contact(s).

> Although you should be firm and direct in informing the PRP/RP of their responsibility, you should make every attempt to avoid an adversarial relationship with the RP. The full cooperation of the PRP/RP will result in a more efficient and effective cleanup.

### b. Informing Spillers of Their Responsibility in Writing

You should send three different letters to the PRP/RP to inform them of their responsibility (see Exhibit 1.1-4, "Notification Forms Summary"). If a site response was initiated and you are able to confirm the spill visually, the "Spiller Responsibility Letter" (Exhibit 1.1-5) along with an "Acceptance of Financial Responsibility Form" (Exhibit 1.1-6) should be sent as soon as possible. In addition, an "Option Letter" that informs the PRP/RP of their possible options for addressing a spill should be sent. These letters should be kept as part of the Corrective Action Plan (CAP) (see Part 1, Section 5, "Corrective Action Plans.")

**Exhibit 1.1-3**
**Notification Procedures Checklist**

| Completed | Step | | Date | Contact(s) |
|---|---|---|---|---|
| ____________ | 1. | Give your name and identify yourself as a DEC employee. | | |
| ____________ | 2. | Inform the PRP/RP that he/she has been identified as the party responsible for the spill. | | |
| ____________ | 3. | Inform PRP/RPs of their responsibility to pay for all clean-up costs. (As necessary, cite Section 181 of the Navigation Law or Article 71 of the ECL.) | | |
| ____________ | 4. | Ask PRP/RPs "point blank" if they will accept responsibility for the cleanup. | | |
| | Response: ____________________________ ____________________________ ____________________________ ____________________________ ________________________ | | | |
| ____________ | 5. | If the PRP/RP does not accept responsibility, or does not admit to being the spiller, inform him/her that DEC will conduct the cleanup and send the bill to whoever is the spiller. | | |
| ____________ | 6. | If the PRP/RP does not accept responsibility also inform him or her that a DEC-conducted cleanup could be more costly than a spiller-conducted cleanup, and that the spiller could face interest charges and a fine for refusing to pay for the billed clean-up costs. | | |

Exhibit 1-A-4

## Notification Forms Summary
## (Send Forms by Certified Mail)

| Notification Form | When and How to Use | Information to be Included |
|---|---|---|
| Spiller Responsibility Letter | Send by certified mail to PRP/RP for confirmed spill. | # Spill location;<br># Spiller's responsibility under the Navigation Law;<br># Penalties that can be levied if the spiller does not cooperate; and<br># Deadline for spiller to begin containment and removal of the spill. |
| Acceptance of Spiller Responsibility Form | Send by certified mail to PRP/RP for confirmed spill. | # Request for spiller's signature acknowledging his or her acceptance of responsibility for the spill cleanup. |
| Option Letter | Send by certified mail to PRP/RP for confirmed or suspected release (e.g., failed tightness test). | # Spill number;<br># Date spill was discovered or reported;<br># Exact location of the spill;<br># Authority of Article 12 of the Navigation Act; and<br># Penalties for noncompliance. |

Exhibit 1.1-5

Spiller Responsibility Letter

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[Date]

[Addressee]
[Address]

Dear [ ]:

This is to inform you that as a result of investigation by our Department, we consider you responsible for Petroleum Spill Number __________, dated _______, at ____________________________. Under Article 12 of the Navigation Law, Section 192, any person who discharges petroleum without a permit and fails to promptly clean up such prohibited discharge may be subject to a penalty of up to $25,000 a day.

Containment and removal of this spill must be initiated within _____ hours.

Your failure to initiate timely spill cleanup and removal, in addition to the penalty stated above, will result in your being billed for all actual costs incurred by New York State as set forth in Section 181 of the Navigation Law. These costs include cleanup and removal, all direct and indirect damages, including damages incurred by third parties.

Sincerely,

Regional Spill Engineer
Region

---

Exhibit 1.1-6
Acceptance of Spiller Responsibility Letter

---

[Date]

SPILL #_________

ACCEPTANCE OF FINANCIAL RESPONSIBILITY

___________________________, hereby assumes responsibility for containment and
(Name of Company and Person)

cleanup of _______________ discharged from________________________
(Substance) (Source)

on _______, and recognizes that the determination of the adequacy and propriety of
(Date)

the containment and cleanup operation continues to rest with the New York State

Department of Environmental Conservation On-Scene Coordinator.

______________________
(Authorized Signature and Title)

______________________
(Name and Title Printed)

______________________
(Address of Company)

______________________
(Date and Time)

______________________
(Witness)

NOTES

The "Spiller Responsibility Letter" informs spillers of their responsibility under the Navigation Law and explains the penalties that can be levied if the spiller does not cooperate. It should be sent to the spiller or suspected spiller as soon as a petroleum spill has been confirmed. The letter notifies the spiller that he or she is required to initiate containment and removal of the spill within a period of time you specify.

There are at least three factors you should consider when specifying a deadline in this letter:

# The size and nature of the spill;

# The proximity of the spill to, or its possible effects on, water supplies (surface or ground water), nearby homes and other structures, and/or sensitive environmental areas; and The possible environmental, safety, and/or human health effects of delaying containment and removal.

The "Acceptance of Spiller Responsibility Form" requires the spiller's signature acknowledging his or her responsibility for containment and cleanup of the spill. This form and the "Spiller Responsibility Letter" should be sent by certified mail.

The "Option Letter" outlines the possible options available to the PRP/RP for cleanup of the spill. The contents of this letter can vary somewhat depending on how the release was discovered (e.g., through a complaint or a failed tightness test), the extent and type of spill, and the policies and procedures of your regional office. There is, however, some information that should appear in every "Option Letter." All "Option Letters" should contain the following: spill number, date the spill was discovered, and exact location of the spill. In addition, the letter should cite the response authority provided DEC by Article 12 of the Navigation Act and describe the penalties for noncompliance.

Each "Option Letter" should outline clearly the options open to the PRP/RP to address the spill and the information you wish submitted, and may also specify certain deadlines for taking action. However, it is up to you to determine the particular options, information requirements, and dates you include in the letter. Depending on the circumstances, you may list in your letter one or several options from which the PRP/RP can choose. For example, when an UST fails an initial tank test the following options could be included:

# Conduct separate integrity tests on the piping and the tanks in order to verify the release source within the tank system.

# Remove the "non-tight" tank and either remove and dispose of all contaminated soils, or install monitoring wells.

NOTES

- # Install monitoring wells and abandon the "non-tight" tank in-place.

- # Remove the tank within 30 days, according to the requirements for tank removal (outline these requirements in the letter).

The "Option Letter" should always be sent by certified mail. In addition, you should have the PRP/RP inform you as soon as possible about the option(s) he or she has chosen.

Several examples of possible "Option Letters" are included as Exhibits 1.1-7 through 1.1-12. These are provided as examples only; you should use "Option Letters" developed by your own office, or develop your own.

Exhibit 1.1-7 is a sample option letter to an PRP/RP for removal of contaminated soil from an UST release. Note that this option letter includes: (a) specific requirements for removal of the contaminated soil; (b) dates for when the removal must be completed, and (c) requirements for the PRP/RP to forward to DEC copies of the landfill disposal receipt and ample test results. The additional sample option letters apply to the following situations: when an UST has failed an initial tightness test (Exhibit 1.1-8), when an UST fails an isolation tank test (Exhibit 1.1-9), when an UST fails a Petro-tite Systems Test (Exhibit 1.1-10), and ground-water contamination cleanup (Exhibit 1.1-11).

### 3. Dealing with Uncooperative Spillers

There are generally two ways in which an PRP/RP may fail to fulfill his or her legal responsibilities for spill cleanup: (1) a PRP/RP may refuse from the beginning to accept responsibility, or (2) an PRP/RP may fail to conduct a cleanup in the manner, or in as timely a fashion, as agreed upon with the DEC. If a PRP/RP refuses to cooperate from the outset, try again to change the RP's mind. Send additional notices of spiller responsibility (Exhibit 1.1-12) and/or initiate phone conversations with PRP/RPs to inform them again of the consequences of not cooperating (i.e., higher clean-up costs and possible penalties). If a party claims not to be the PRP/RP, you should inform them of your reasons for believing they are the PRP/RP under the Navigation Law.

If a PRP/RP agrees to conduct and pay for the cleanup and then does not proceed in the manner agreed upon or as quickly as agreed upon, you should inform the PRP/RP immediately that you are dissatisfied with the progress of the cleanup and that DEC is considering taking it over. There are no hard-and-fast rules for deciding when you should take over a cleanup. If possible, you should always work toward having the PRP/RP continue the cleanup in the agreed-upon manner. Attempt to determine why the cleanup is not proceeding as planned and consider means of helping the PRP/RP-directed cleanup get back on track.

**Exhibit 1.1-7**

Sample Option Letter:
Soil Cleanup Spill

[Date]

[Addressee]
[Address]

Dear [ ]:

This letter is to confirm your - (site meeting) (telephone conversation) with _____________ of this Department on ___________________________,
(Name) (day) (date) (year)
in regards to the above-mentioned spill site. This site involves ___________________________
(explanation)

The following items were discussed and agreed upon:

1. All contaminated material must be removed and stored on site until it can be properly disposed of at a properly permitted landfill.

2. All contaminated material must be sampled for ____________________________________________________________________________________. The results must be
(analyses)
negative for the material to be considered non-hazardous oily debris. You must contact your selected sanitary landfill to verify the sample analyses that they require for disposal.

3. A hauler with a Part 364 permit must be used to haul the contaminated soil to your selected landfill.

4. Please notify this Department after the work is completed but prior to any backfilling of the spill area so that an inspection of the excavation may be made.

5. Please forward to us a copy of the landfill disposal receipt and the sample results.

A schedule for this work is required by ______________________________.
(day) (date) (year)

Cleanup must be performed by no later than ______________________________.
(day) (date) (year)

If you have any questions, please feel free to contact ___________________________________
(Name)
at 847-4590. Your cooperation will be appreciated.

Very truly yours,

Senior Sanitary Engineer

**Exhibit 1.1-8**

Sample Option Letter:
Initial Tank Failure

---

[Date]

[Addressee]
[Address]

Dear [ ]:

This Department received notification on ______________________that (a)
(day) (date) (year)
_______________________tank(s) failed its (their) tank test performed by
(gallons) (product stored)
_____________. On _________, Mr._____________of this Department
(contractor) (date) (name)
discussed with __________ that one of the following options must be done concerning this tank.
(person)

OPTION 1:

1. The tank is to be immediately isolated from the piping and is to be retested. If the tank tests tight, it may remain in service.
2. The lines are to be repaired, if necessary, and retested by a state-approved method. Exposed piping may be air tested.
3. A copy of any test results are to be sent to this office.

OPTION 2: If the tank fails the retest, or if you decide not to retest, the following must now be done:

1. All product must be immediately removed from the tank.
2. The tank itself must be removed within thirty days. A Petroleum Bulk Storage form must be submitted to this Department prior to tank removal.
3. The interior surface of the tank must be cleaned, and all sludge and residue generated by this process must be properly disposed. The tank must be cut open to allow for this work and to ensure proper ventilation of the tank interior.
4. All safety precautions regarding the opening, cleaning and entering of the tank must be followed. The interior atmosphere of the tank may be explosive and proper procedures must be followed.
5. Once the tank has been cleaned out, it may be disposed as scrap.

Mr.________must be notified when you have a firm date for retesting or removal. Please note, we must be present when this tank is removed to determine if any groundwater or soil contamination exists. If groundwater or soil contamination is found, further remedial work will be required.

If you have any questions, please contact________ at 847-4590. Your cooperation will be appreciated.

Sincerely,

[ ]

**Exhibit 1.1-9**

Sample Option Letter:
Retest Failure, Tank Removal

---

[Date]

[Addressee]
[Address]

Dear [ ]:

On____________________, a ______gallon ________________, underground store storage tank at the
(day) (date) (year) (#) (material)
above-mentioned address failed a system tank test. On____________________, this tank failed an isolation tank test.
(day) (date) (year)
Since the tank failed the retest, the following must now be done:

1. All product must be immediately removed from the tank.

2. The tank itself must be removed within thirty days. A Petroleum Bulk Storage form (enclosed) must be submitted to this Department prior to tank removal.

3. The interior surface of the tank must be cleaned, and all sludge and residue generated by this process must be properly disposed. The tank must be cut open to allow for this work and to ensure proper ventilation of the tank interior.

4. All safety precautions regarding the opening, cleaning and entering of the tank must be followed. The interior atmosphere of the tank may be explosive and proper procedures must be followed.

5. Once the tank has been cleaned out, it may be disposed as scrap.

____________________of this Department must be notified when you have a firm
(Name)
date for removal. We must be present when this tank is removed to determine if any groundwater or soil contamination exists. If groundwater or soil contamination is found, further remedial work will be required.

For your use, enclosed is a list of contractors that are known by this Department to do this type of work. This list is by no means complete. Any contractor may be used by you for this work.

If you have any questions, please feel free to call ________________________at 847-4590.
(Name)
Your cooperation will be appreciated.

Sincerely,

[ ]

**Exhibit 1.1-10**

Sample Option Letter:
Failed Tank Test

[Date]

CERTIFIED - RETURN RECEIPT REQUESTED

[Addressee]
[Address]

RE: Spill No.

Gentlemen:

This office has been informed by ______(Name)____ that __(tank)__ failed a Petrotite systems test. In accordance with Article 12 of the New York State Navigation Law, I must determine if there has been any harm to the lands or the groundwater of the State. In order for me to make this determination, you have three options:

1. Prove that it was not a leaking tank by removing all the piping from the tank and separately Petrotite test the tank. If the tank passes the Petrotite test, it is a piping leak. The tank may then be abandoned or the piping can be repaired, attached to the tank, and the system Petrotite tested.

2. Excavate and remove the tank in the presence of a representative from this office so that an inspection of the tank and the soil can be made. If the tank is sound, and there is no evidence of product loss, nothing further need be done. If there is a problem, proceed as in 3 below.

3. Abandon the tank in-place and install several four (4) inch diameter PVC site wells extending five (5) feet into the groundwater with a screen length of ten (10) feet, with slot size of .020 inches. The exact location and number of wells will be determined by a representative from this office. These wells will be checked for a period of twelve months by New York State, and if there is no evidence of product for that period, the spill will be removed from our listing. If free or dissolved product appears, cleanup must begin immediately.

If cleanup does not begin by __(Date)__ by the responsible party, the State will begin the cleanup and bill the responsible party.

Sincerely,

[ ]

**Exhibit 1.1-11**

Sample Option Letter:
Ground-water Cleanup

[Date]

[Addressee]
[Address]

Dear [ ]:

This letter is to confirm your (site meeting) (telephone conversation) with (Name) of this Department on (day) (date) (year). Groundwater at this spill site is contaminated with (free floating oil) (dissolved oil components). The following items were discussed and agreed upon:

1. (#) additional four-inch monitoring wells will be installed at the agreed upon locations. A sketch of a typical monitoring well is enclosed for your use.

2. One recovery well will be installed to recover oil product. Groundwater must be pumped to depress the groundwater table. The groundwater must be pumped to an oil-water separator tank. Accumulated oil may be recovered from the well by bailing or by a second pump. A second type of recovery well pumps both oil and water to a separator tank. Oil from the tank is then recovered. You should check with your contractor to determine the best method for the recovery well. Groundwater must be pumped to depress the groundwater table.

3. The discharge water must be sampled for (Contaminates). Dependent upon the sampling results, it may be discharged with a SPDES permit to (Name). The water must at all times be sheenless. An air stripper or a carbon filter may be necessary for the discharge water.

4. All collected oil must be properly disposed. Copies of receipts indicating the disposal site must be forwarded to this office.

It was also agreed that these actions be completed by (Date). Should you have any questions, please do not hesitate to contact (Name) at 847-4590. Your cooperation will be appreciated.

Sincerely,

[ ]

**Exhibit 1.1-12**

Sample Option Letter:
Soil Disposal, Soil Still On Site

[Date]

[Addressee]
[Address]

Dear [ ]:

A recent inspection by___(Name)_______of this office indicated that the contaminated soil at your facility still remains on site. We are requesting this oil be removed by__(day)__(date)__(year)_to an acceptable landfill. Please send a copy of the disposal receipt to this office.

If you cannot remove the soil by that date, please contact this office immediately. If you do not contact this office and the soil still remains on site past_ (Date)_, DEC will have the soil removed from your site. You will then be billed for the costs of removal and disposal as well any relevant penalties.

If you have any questions, please feel free to contact__(Name)________at 847-4590. Your cooperation will be appreciated.

Very truly yours,

Senior Sanitary Engineer

**NOTES**

If all efforts to encourage a PRP/RP to continue the cleanup fail, send a certified letter (Exhibit 1.1-13) notifying them that their actions have been unsatisfactory and that DEC will assume responsibility for the cleanup. This letter again informs the PRP/RP of his or her liability for all costs incurred by DEC during its cleanup.

**Exhibit 1.1-13**

Unsatisfactory Cleanup Notice Letter

[Date]

CERTIFIED MAIL SPILL #

[Addressee]
[Address]

Dear Sir:

My letter of (Date) notified you of New York State's interest in a pollution incident for which you are presently considered responsible.

You are hereby given notice that your actions to remove the pollutant and mitigate its effects have been evaluated as unsatisfactory. Effective (Date), the New York State Department of Environmental Conservation will conduct all cleanup activities under the authority of Article 12 of the Navigation Law. Removal will be effected in accordance with the regulations of the Department of Environmental Conservation. You will be billed for all actual costs incurred by New York State as set forth in Section 181 of the Navigation Law, as well as interest and penalties.

Should you require further information concerning this matter, contact: (Name)
.

Sincerely,

[ ]

Received and Acknowledged

______________________ ____________ ____________
Time Date

**TECHNICAL**

**FIELD GUIDANCE**

**SPILL REPORTING AND INITIAL NOTIFICATIONS - ACCESS AND RIGHT-OF-ENTRY**

**NOTES**

## Spill Reporting and Initial Notifications -
## Access and Right-of-Entry

### GUIDANCE SUMMARY AT-A-GLANCE

# Section 178 of the Navigation Law gives you the authority to enter private property to investigate or clean up a suspected spill.

# In general, you should inform the property owner of your right to enter onto private property and obtain consent from the owner. This consent can be either written or verbal.

# Detailed information and procedures for access and right-of-entry is considered confidential for spill responders. This information is contained in Appendix L, and is marked confidential.

**NOTES**

### 1.1.3 Access and Right-of-Entry

This section addresses the right of NYSDEC personnel to enter private property on which a spill has occurred or is suspected, for the purpose of investigating, containing, and/or cleaning up the spill. Detailed information and procedures of access and right-of-entry are considered confidential. Therefore, this information can be found in Appendix L, including your legal rights to enter property and the procedures to follow to ensure that no charges of trespassing are brought against the Department.

1. State Law and Policy

You have the authority, under the Navigation Law, to enter property to investigate or clean up a real or suspected spill. Specifically, Section 178 of the Navigation Law states:

> *The department is hereby authorized to enter and inspect any property or premises for the purpose of inspecting facilities and investigating either actual or suspected sources of discharges or violation of this article or any rule or regulations promulgated pursuant to this article. The department is further authorized to enter on property or premises in order to assist in the cleanup or removal of the discharge. Any information relating to secret processes or methods of manufacture shall be kept confidential.*

In any emergency or non-emergency, you must possess information supporting a reasonable belief to suspect that a spill has occurred or is occurring, or that the spill is impacting the premises for which access is sought. A reasonable belief may be based on a report of a spill or visual observation. For example, if a gasoline station operator reports an unexpected loss of product from his underground storage tanks that are located near private household wells, you might want to investigate those wells and check the water.

Although you have the authority to enter the premises, *it is always advisable to obtain the consent of the property owner or his or her agent before entering the property.* This consent can be either written or verbal. Obtaining this consent may help avoid civil or criminal charges for trespass being logged. In cases where the owner/agent is not available or not ascertainable, entry should be made.

# APPENDIX N: MAINTENANCE/CONSTRUCTION INSPECTION REPORTS

**STATE POLLUTANT DISCHARGE ELIMINATION SYSTEM FOR CONSTRUCTION ACTIVITIES**

# Standardized Qualified Inspector Form

<table>
<tr><td rowspan="3">Project Name and Location of Project: ________________________________________<br>________________________________________________________________________<br>________________________________________________________________________<br>Municipality:_________________________________________________________<br>County: ____________________________________________________________<br>Qualified Inspector: __________________________________________________<br>Qualified Inspector Title:_______________________________________________</td><td>Date:</td><td>Weather:</td></tr>
<tr><td colspan="2">Permit #: NYR10</td></tr>
<tr><td>Entry Time:</td><td>Exit Time:</td></tr>
<tr><td colspan="3">5 Acre Waiver: □ Yes □ No<br>Name of SPDES Permittee:______________________________________________________________________<br>Phone: ________________________________Fax:____________________________________________<br>Name of Representative on Site: ____________________________________________________________</td></tr>
</table>

## Qualified Inspector's Credentials & Certification

Qualified Inspector (QI) means a person that is knowledgeable in the principles and practices of erosion and sediment control (ESC). A person is considered qualified under the following conditions:

1. A licensed Professional Engineer; licensed Landscape Architect with documented training and education in the principles and practices of ESC;
2. An individual certified in ESC by CPESC, Incorporated or any other agency endorsed by the NYS Department of Environmental Conservation Office of Water Resources;
3. An individual working under the direct supervision of a qualified licensed Professional Engineer or qualified licensed Landscape Architect with documented training and education in the principles and practices of ESC **and has** completed the four (4) hour training program in the principles and practices of erosion and sediment control from either a Soil and Water Conservation District, CPESC or any other agency endorsed by the NYS Department of Environmental Conservation Office of Water Resources. This initial training must be completed no later than May 1, 2010. After receiving the initial training, an individual working under the direct supervision of a qualified licensed Professional Engineer or qualified licensed Landscape Architect must complete four (4) hours of training every three (3) years.
4. Any other individual endorsed by the NYS Department of Environmental Conservation by written documentation.
5. Inspections of any post-construction stormwater management practices that include structural components, such as a dam for an impoundment, shall be performed by a licensed Professional Engineer.1

**Part I. CONSTRUCTION DURATION INSPECTIONS** **Page 2 of _______**

**a.** **SITE PLAN/SKETCH OF AREAS DISTURBED AT TIME OF INSPECTION AND AREAS THAT HAVE BEEN STABILIZED (TEMPORARY OR FINAL) SINCE LAST INSPECTION**:

**Part I. CONSTRUCTION DURATION INSPECTIONS** **Page 3 of ______**

### b. Other Permit Required Reporting

Maintaining Water Quality - *Attach Color Photographs of the site documenting discharge points and site conditions.*
Describe the condition of runoff at all points of discharge.
Is there an increase in turbidity causing a substantial visible contrast to natural conditions? ____________
Is there residue from oil and floating substances, visible oil film, or globules or grease? _______________
Is there evidence of silt deposition from project in a stream, wetland, or other water body? ____________
If yes, where? __________________________________remedial measure needed? __________________
Provide a description of the conditions of all natural water bodies within or immediately adjacent to the project. ________________________________________________________________________________

Area of Disturbance
Total area of disturbance (as shown on sketch plan and not including areas that have temporary or permanent stabilization measures applied) ______________________________________________________________
Are all disturbances within the limits of the SWPPP? _____________________________________________

Weather Conditions
A description of the weather and soil conditions (e.g. dry, wet, saturated) at the time of the inspection;
__________________________________________________________________________________________
__________________________________________________________________________________________

General Housekeeping
Are facilities and equipment necessary for implementation of erosion and sediment control in working order and/or properly maintained?___________________________________________________________________
Is construction impacting the adjacent property? ________________________________________________
Is dust adequately controlled?______________________________________________________________
Describe corrective action(s): ______________________________________________________________
**Date correction needed**: _________________________________________________________________

### c. Runoff Controls *Direct runoff away from exposed soil surfaces and control water that falls onto the site*

Runoff conveyance systems ☐ N A
Are all runoff conveyance systems called for in the SWPPP installed, stabilized and working? _________
If not, what specific areas need detailing?____________________________________________________
With minimum side slopes 2H:1V or flatter? _______ Stabilized by geotextile fabric, seed, or mulch with no erosion occurring? _______Sediment-laden runoff directed to sediment trapping structure? ___________
Describe corrective action(s): ______________________________________________________________
**Date correction needed**: _________________________________________________________________

Runoff Control Structures ☐ N A
Have all required runoff control structures (rock outlets and aprons) been installed and constructed per plan and according to the Blue Book?____________ Installed concurrently with pipe installation? ____________
Describe corrective action(s): ______________________________________________________________
**Date correction needed**: _________________________________________________________________

Temporary Stream or Channel Crossing ☐ N A
Have construction crossings at concentrated flow areas been culverted?____________________________
Describe corrective action(s): ____________________________________________________________
**Date correction needed**: _________________________________________________________________

Stone Check Dam ☐ N A
Installed per standards? __________ channel stable (flow is not eroding soil underneath or around the structure). ________does sediment need to be removed? __________________________________________
Describe corrective action(s): ____________________________________________________________
**Date correction needed**: _________________________________________________________________

Excavation Dewatering ☐ N A
1. Flowing water ☐ N A – Upstream berm (sandbags, inflatable dams, etc. with one-foot minimum freeboard) and downstream berms are installed per plan? _______and functioning? (clean water from upstream pool is being pumped to the downstream pool)?
_____________________________________________________
2. Sediment laden water from work area ☐ N A - Is being discharged to a silt-trapping device? ___________
3. Groundwater from excavations ☐ N A - is being managed properly (sumps and sediment control)? ______
Describe corrective action(s): ____________________________________________________________
**Date correction needed**: _________________________________________________________________

### d. Soil Stabilization *Basic erosion control is achieved by covering all bare ground areas.*

Topsoil and Spoil Stockpiles ☐ N A
Stabilized - sediment controls at downhill slope? ________________________________________________
Describe corrective action(s): ____________________________________________________________
**Date correction needed**: _________________________________________________________________

Revegetation/Stabilization ☐ N A
Has temporary or permanent seeding *and* mulch (as shown on site sketch plan) been applied to areas that have been inactive for 14 days or less (or, inactive for 7 days if over 5 acres disturbed)?_____________________
Has soil preparation been applied as specified in the SWPPP and in accordance with the Blue Book (Assure that all the necessary soil testing/fertilizer/lime, topsoil, decompaction has been applied)?
________________
Have rolled erosion control products specified for steep slopes or channels been installed? _______________
Describe corrective action(s): ____________________________________________________________
**Date correction needed**: _________________________________________________________________

### e. Sediment Controls

Stabilized Construction Entrance ☐ N A
Stone is clean and all access areas covered (entrances, construction routes, materials storage areas, equipment parking)?_________________ Tracking onto public streets is minimized and cleaned daily? _____________
Describe:__________________________________________________________________________
**Date correction needed**: _________________________________________________________________

Silt Fence ☐ N A

Installed on contour? not across conveyance channels?__________ At least 10 feet from toe of slope?_____________At appropriate spacing intervals based on slope?________Wrapped ends for continuous support?___________Fabric is tight, without rips or frayed areas?__________Posts are stable?____________ buried 6 inches minimum?_________Any "bulges"?____________________________

Describe:_______________________________________________________________________

_______________________________________________________________________________

**Date correction needed**: ____________________________________________________

Temporary Sediment Trap ☐ N A

Is outlet structure constructed properly?__________geotextile fabric has been placed beneath rock fill?_____________Maintenance – depth of sediment in basin? ____________ 50% capacity? ____________

Describe:_______________________________________________________________________

_______________________________________________________________________________

**Date correction needed**: ____________________________________________________

Temporary Sediment Basin ☐ N A

Is basin and outlet structure constructed per the approved plan? ____________________________

Are basin side slopes stabilized with seed/mulch?

_________________________________________________

Maintenance – depth of sediment in basin? ____________ 50% capacity?

____________________________

Describe:_______________________________________________________________________

_______________________________________________________________________________

**Date correction needed**: ____________________________________________________

Drop Inlet Protection ☐ N A

Type(s) of inlet control? _______________________________________________________

Installed per Blue Book specifications: drainage area (typically 1 acre)? __________________________

Appropriate for location? _______________________________________________________

Describe:_______________________________________________________________________

_______________________________________________________________________________

**Date correction needed**: ____________________________________________________

### f. Digital Color Photographs of Deficient BMPs

The *qualified inspector* shall attach paper color copies of the digital photographs to this inspection report of deficient BMPs with date stamp, that clearly show the condition of all practices that have been identified as needing corrective actions.

### g. Digital Color Photographs of BMPs that have been Corrected

The *qualified inspector* shall attach paper color copies of the digital photographs to this inspection report of corrected BMPs with date stamp, that clearly show the condition of the practice(s) after the corrective actions has been completed.

## h. Post-Construction Stormwater Management

*Report of any corrective action(s) that must be taken to install, correct, repair, replace or maintain any deficiencies identified with the construction of the post-construction stormwater management practice(s).*
Report the current phase of construction of all post-construction stormwater management practice(s) and whether the installation appears to be geometrically consistent with the approved hydraulic design (e.g. the pond, the outlet structure, orifice, pipe sizing and slope is geometrically consistent with the SWPPP):____________________________________

______________________________________________________________________________

______________________________________________________________________________

______________________________________________________________________________

## i. Revisions to SWPPP

When the owner or operator becomes aware that they failed to submit any relevant facts, or submitted incorrect information in the NOI or in any other report, or have made substantive revisions to the SWPPP (e.g. the scope of the project changes significantly, the type of post-construction stormwater management practice(s) changes, there is a reduction in the sizing of the post-construction stormwater management practice, or there is an increase in the disturbance area or impervious area) which were not reflected in the original NOI submitted to the Department and/or the MS4, they shall promptly submit such facts or information. Failure of the owner or operator to correct or supplement any relevant facts within five (5) business days of becoming aware of the deficiency shall constitute a permit violation (GP-0-10-001 PartVII.G)

______________________________________________________________________________

______________________________________________________________________________

______________________________________________________________________________

______________________________________________________________________________

## j. Inspection Notes and Signature

Inspection Notes:

______________________________________________________________________________

______________________________________________________________________________

______________________________________________________________________________

______________________________________________________________________________

______________________________________________________________________________

______________________________________________________________________________

______________________________________________________________________________

______________________________________________________________________________

______________________________________________________________________________

______________________________________________________________________________

______________________________________________________________________________

______________________________________________________________________________

## PART I. j. Signature

GP-0-10-001 Part VII.Q

**Articles 175 and 210 of the New York State Penal Law provide for Criminal penalty of a fine and/or imprisonment for falsifying forms and reports required by this permit.**

_______________________________________________ _____________________________________

**Qualified Inspector (print name)** **Date of Inspection**

_______________________________________________

**Signature**

The above signed acknowledges that, to the best of his/her knowledge, all information provided on the forms is accurate and complete.

Title: ____________________________________ Address: _________________________________

Phone: ________________________ Email: ____________________________________________

**CPESC#:** ____________________________________

**Stormwater Training Number** for *Trained Individuals*: _____________________________________

P.E. or L.A. Supervisor Name for *Trained Individuals*:________________________________________

## Compliance certification:

Received and reviewed by____________________________________Title:____________________________

The above signed acknowledges receipt of this inspection report

**NYS Department of Environmental Conservation**
**Division of Water**
**625 Broadway, 4th Floor**
**Albany, New York 12233-3505**

# MS4 Stormwater Pollution Prevention Plan (SWPPP) Acceptance Form

**for**

**Construction Activities Seeking Authorization Under SPDES General Permit**

*(NOTE: Attach Completed Form to Notice Of Intent and Submit to Address Above)

| |
|---|
| **I. Project Owner/Operator Information** |
| 1. Owner/Operator Name: |
| 2. Contact Person: |
| 3. Street Address: |
| 4. City/State/Zip: |
| **II. Project Site Information** |
| 5. Project/Site Name: |
| 6. Street Address: |
| 7. City/State/Zip: |
| **III. Stormwater Pollution Prevention Plan (SWPPP) Review and Acceptance Information** |
| 8. SWPPP Reviewed by: |
| 9. Title/Position: |
| 10. Date Final SWPPP Reviewed and Accepted: |
| **IV. Regulated MS4 Information** |
| 11. Name of MS4: |
| 12. MS4 SPDES Permit Identification Number: NYR20A |
| 13. Contact Person: |
| 14. Street Address: |
| 15. City/State/Zip: |
| 16. Telephone Number: |

# MS4 SWPPP Acceptance Form - continued

**V. Certification Statement - MS4 Official (principal executive officer or ranking elected official) or Duly Authorized Representative**

I hereby certify that the final Stormwater Pollution Prevention Plan (SWPPP) for the construction project identified in question 5 has been reviewed and meets the substantive requirements in the SPDES General Permit For Stormwater Discharges from Municipal Separate Storm Sewer Systems (MS4s). Note: The MS4, through the acceptance of the SWPPP, assumes no responsibility for the accuracy and adequacy of the design included in the SWPPP. In addition, review and acceptance of the SWPPP by the MS4 does not relieve the owner/operator or their SWPPP preparer of responsibility or liability for errors or omissions in the plan.

Printed Name:

Title/Position:

Signature:

Date:

**VI. Additional Information**

(NYS DEC - MS4 SWPPP Acceptance Form - January 2015)

**New York State Department of Environmental Conservation**
**Division of Water**
**625 Broadway, 4th Floor**
**Albany, New York 12233-3505**
***(NOTE: Submit completed form to address above)***

# NOTICE OF TERMINATION for Storm Water Discharges Authorized under the SPDES General Permit for Construction Activity

**Please indicate your permit identification number:** NYR ___ ___ ___ ___ ___ ___

**I. Owner or Operator Information**

1. Owner/Operator Name:

2. Street Address:

3. City/State/Zip:

4. Contact Person:

4a.Telephone:

4b. Contact Person E-Mail:

**II. Project Site Information**

5. Project/Site Name:

6. Street Address:

7. City/Zip:

8. County:

**III. Reason for Termination**

9a. □ All disturbed areas have achieved final stabilization in accordance with the general permit and SWPPP. ***Date final stabilization completed** (month/year): ________________________________

9b. □ Permit coverage has been transferred to new owner/operator. Indicate new owner/operator's permit identification number: NYR ____ ____ ____ ____ ____ ____
(Note: Permit coverage can not be terminated by owner identified in I.1. above until new owner/operator obtains coverage under the general permit)

9c. □ Other (Explain on Page 2)

**IV. Final Site Information**:

10a. Did this construction activity require the development of a SWPPP that includes post-construction stormwater management practices? □ yes □ no ( If no, go to question 10f.)

10b. Have all post-construction stormwater management practices included in the final SWPPP been constructed? □ yes □ no (If no, explain on Page 2)

10c. Identify the entity responsible for long-term operation and maintenance of practice(s)?

________________________________________________________________

**NOTICE OF TERMINATION for Storm Water Discharges Authorized under the SPDES General Permit for Construction Activity - continued**

10d. Has the entity responsible for long-term operation and maintenance been given a copy of the operation and maintenance plan required by the general permit? □ yes □ no

10e. Indicate the method used to ensure long-term operation and maintenance of the post-construction stormwater management practice(s):

□ Post-construction stormwater management practice(s) and any right-of-way(s) needed to maintain practice(s) have been deeded to the municipality.

□ Executed maintenance agreement is in place with the municipality that will maintain the post-construction stormwater management practice(s).

□ For post-construction stormwater management practices that are privately owned, a mechanism is in place that requires operation and maintenance of the practice(s) in accordance with the operation and maintenance plan, such as a deed covenant in the owner or operator's deed of record.

□ For post-construction stormwater management practices that are owned by a public or private institution (e.g. school, university or hospital), government agency or authority, or public utility; policy and procedures are in place that ensures operation and maintenance of the practice(s) in accordance with the operation and maintenance plan.

10f. Provide the total area of impervious surface (i.e. roof, pavement, concrete, gravel, etc.) constructed within the disturbance area? ______________________________ (acres)

11. Is this project subject to the requirements of a regulated, traditional land use control MS4? □ yes □ no

(If Yes, complete section VI - "MS4 Acceptance" statement

**V. Additional Information/Explanation:**

(Use this section to answer questions 9c. and 10b., if applicable)

**VI. MS4 Acceptance - MS4 Official (principal executive officer or ranking elected official) or Duly Authorized Representative** (Note: Not required when 9b. is checked -transfer of coverage)

I have determined that it is acceptable for the owner or operator of the construction project identified in question 5 to submit the Notice of Termination at this time.

| | |
|---|---|
| Printed Name: | |
| Title/Position: | |
| Signature: | Date: |

## NOTICE OF TERMINATION for Storm Water Discharges Authorized under the SPDES General Permit for Construction Activity - continued

| | |
|---|---|
| **VII. Qualified Inspector Certification - Final Stabilization**: | |
| I hereby certify that all disturbed areas have achieved final stabilization as defined in the current version of the general permit, and that all temporary, structural erosion and sediment control measures have been removed. Furthermore, I understand that certifying false, incorrect or inaccurate information is a violation of the referenced permit and the laws of the State of New York and could subject me to criminal, civil and/or administrative proceedings. | |
| Printed Name: | |
| Title/Position: | |
| Signature: | Date: |
| **VIII. Qualified Inspector Certification - Post-construction Stormwater Management Practice(s):** | |
| I hereby certify that all post-construction stormwater management practices have been constructed in conformance with the SWPPP. Furthermore, I understand that certifying false, incorrect or inaccurate information is a violation of the referenced permit and the laws of the State of New York and could subject me to criminal, civil and/or administrative proceedings. | |
| Printed Name: | |
| Title/Position: | |
| Signature: | Date: |
| **IX. Owner or Operator Certification** | |
| I hereby certify that this document was prepared by me or under my direction or supervision. My determination, based upon my inquiry of the person(s) who managed the construction activity, or those persons directly responsible for gathering the information, is that the information provided in this document is true, accurate and complete. Furthermore, I understand that certifying false, incorrect or inaccurate information is a violation of the referenced permit and the laws of the State of New York and could subject me to criminal, civil and/or administrative proceedings. | |
| Printed Name: | |
| Title/Position: | |
| Signature: | Date: |

NEW YORK STATE OF OPPORTUNITY | Department of Environmental Conservation

# Owner/Operator Certification Form

**SPDES General Permit For Stormwater Discharges From Construction Activity (GP-0-20-001)**

**Project/Site Name:** ______________________________

**eNOI Submission Number:** ______________________________

**eNOI Submitted by:** ☐ **Owner/Operator** ☐ **SWPPP Preparer** ☐ **Other**

### Certification Statement - Owner/Operator

I have read or been advised of the permit conditions and believe that I understand them. I also understand that, under the terms of the permit, there may be reporting requirements. I hereby certify that this document and the corresponding documents were prepared under my direction or supervision. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations. I further understand that coverage under the general permit will be identified in the acknowledgment that I will receive as a result of submitting this NOI and can be as long as sixty (60) business days as provided for in the general permit. I also understand that, by submitting this NOI, I am acknowledging that the SWPPP has been developed and will be implemented as the first element of construction, and agreeing to comply with all the terms and conditions of the general permit for which this NOI is being submitted.

Owner/Operator First Name M.I. Last Name

______________________________

Signature

______________________________

Date

NEW YORK STATE OF OPPORTUNITY | Department of Environmental Conservation

# SWPPP Preparer Certification Form

*SPDES General Permit for Stormwater Discharges From Construction Activity (GP-0-20-001)*

## Project Site Information

**Project/Site Name**

## Owner/Operator Information

**Owner/Operator (Company Name/Private Owner/Municipality Name)**

## Certification Statement – SWPPP Preparer

I hereby certify that the Stormwater Pollution Prevention Plan (SWPPP) for this project has been prepared in accordance with the terms and conditions of the GP-0-20-001. Furthermore, I understand that certifying false, incorrect or inaccurate information is a violation of this permit and the laws of the State of New York and could subject me to criminal, civil and/or administrative proceedings.

| First name | MI | Last Name |
|---|---|---|

Signature

Date