STORM WATER POLLUTION PREVENTION PLAN FOR THE CONSTRUCTION OF

DIVERSIFIED EQUIPMENT, LLC

1947 State Route 332

Canandaigua, NY

Ontario County, New York

Prepared for:
Diversified Equipment, LLC

Prepared by:
McCormick Engineering PC

294 Skuse Road, Geneva, NY 14456

MAY 2022

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FOR THE CONSTRUCTION OF

DIVERSIFIED EQUIPMENT, LLC

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MCCORMICK ENGINEERING PC

294 SKUSE ROAD

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1.0 INTRODUCTION

The Clean Water Act states that storm water discharges associated with an industrial activity from a point source, including through a separate municipal storm sewer system, is unlawful unless authorized by a National Pollutant Discharge Elimination System (NPDES) permit. In New York State, the New York State Department of Environmental Conservation (NYSDEC) administers the NPDES through the State Pollution Discharge Elimination System (SPDES) program. According to the SPDES General Permit, construction sites or common plans of development that result in disturbance of one or more acres are subject to permitting requirements.

This plan outlines the manner in which to reduce the potential of storm water runoff pollution during construction activities and assigns responsibilities to ensure that the contractor and his subcontractors implement the requirements of the Storm Water Pollution Prevention Plan (SWPPP). The SWPPP was developed based on the SPDES General Permit (GP-0-20-001) for Storm Water Discharges from Construction Activities that are classified as "Associated with Construction Activity", effective January 29, 2020.

2.0 NOTICE OF INTENT REQUIREMENTS

To obtain coverage under a general permit, a Notice of Intent (NOI) must be submitted by the owner at least five days prior to commencement of construction activities. A copy of the completed NOI for this project will be included in Appendix A upon filling.

3.0 STORM WATER POLLUTION PREVENTION PLAN

This Storm Water Pollution Prevention Plan (SWPPP) was developed to set operating guidelines during construction activities. A copy of this SWPPP shall be retained at the construction site throughout the duration of this project.

The Contractor shall meet all conditions of this SWPPP and all conditions within the NYSDEC SPDES General Permit for Stormwater discharges from Construction Activities - Permit No. GP-0-20-001 effective date January 29, 2020.

During the course of the project and upon approval by the owner, the contractor shall amend the plan whenever there is a change in construction, operation, or maintenance, which may have an effect on the potential for the discharge of pollutants. In addition, if a new subcontractor is utilized at the site who will implement tasks included in the plan, the SWPPP shall be amended.

4.0 SITE DESCRIPTION AND INFORMATION

4.1 SITE DESCRIPTION:

The project is located along NYS Route 332 in the town of Canandaigua, Ontario County, NY(see the enclosed site location map, with related mapping, Appendix B-1). The project includes the construction of a new building to be used as a equipment repair shop, on equipment storage building and a parking lot.

The site currently has one (1) existing farm silo on site.

4.2 REVIEW OF ENVIRONMENTAL RESOURCES:

4.2.1

4.2.2 GEOTECHNICAL INFORMATION

A custom NRCS soils resource report has been included in Appendix B. The NRCS soils report includes the NRCS ratings for soil erosion susceptibility at the site as well as the sites Hydrologic Soils Group (HSG) ratings. This site is mostly comprised of Odessa silt loam and a Hydrologic Soil Group Type D.

4.2.3 WETLANDS AND CRITICAL ENVIRONMENTAL AREAS

It was determined that the area of the Project site does not contain State or Federal Wetlands. There is a federally listed freshwater pond located in the north west corner of the project site. A review of the NYS DEC on-line environmental resources did not determine any critical environmental features within the project area. Based on this information, it is not anticipated that critical environmental issues will be encountered by this project.

5.0 DRAINAGE ANALYSIS

This site will be a commercial type development disturbing approximately 2.48 acres. All of the storm water runoff from this project will be conveyed to a low spot at the property line. The runoff from the site is eventually directed to the sNYS Route 332 drainage system. Review of the existing topography reveals that the overall drainage area, after development, will discharge across the same general areas and therefore, the overall drainage patterns have not been altered.

Based on the drainage patterns described above, one drainage areas was delineated to represent the drainage catchment within the site boundary. Drainage Area 1 encompasses a portion of the forested area, a portion of the adjacent agricultural field and all of the existing and proposed impervious area from the Lakeside Entertainment site. As a result of the proposed development Drainage Area 1 was split up to 4 smaller sub-catchments. As shown on the Proposed Conditions Drainage Plan, which can be found in appendix C, smaller sub-catchments were delineated that were tributary to the (3) proposed stormwater practices.

The proposed parking lot and buildings are designed to pitch any runoff to an infiltration basin that is adjacent to the northerly property line. Erosion and sediment control measures can be seen on the Erosion and Sediment Control Plan, Sheet C-102.

6.0 WATER QUALITY:

As a portion of the site is a Redevelopment Activity, the development and proposed project is required to meet the regulations in Chapter 9 of the NYS Stormwater Management Design Manual for water quality for both a New Development and Redevelopment. Section 9.2.1(B) provides four options to achieve water quality. This development utilizes the method behind option II in the above references section for the redevelopment portion. A minimum of 25% of the total disturbed impervious areas were captured and treated with a vegetated swale. In addition, the design has also incorporated treating the entire area of new development with the dry swale. A level spreader was designed in order to provide 10% pre- treatment prior to entering the dry swale. The breakout of redevelopment and new development can be seen below.

The proposed development was sized in accordance with the sizing criteria in Chapter 4. As per Section 4.2, water quality volume required to be treated was calculated to be 2,831 CF as shown below.

Total Design New Development Impervious = 0.75 acres

Total Design Redevelopment Impervious = 0.10 acres

New WQv = 2744 (0.063 acre-feet)

Redev WQv = 87 CF (0.002 acre-feet)

In accordance with the NYSDEC stormwater design criteria, this increased impervious runoff requires water quality treatment in addition to runoff reduction. The water quality volume (WQv) and runoff reduction volume (RRv) were calculated for the drainage area within the site. These calculations can be found in Appendix C. The following table summarizes the water quality requirements for the site:

Table 1: Water Quality Summary Table

WQv Required (ac.- ft.)	WQv Provided (ac.-ft.)	Min. RRv Required (ac.-ft.)	RRv Provided (ac.-ft.)	Practice
0.065	0.100	0.010	0.015	Dry and Vegetated Swales

6.1 DRY SWALE:

The new dry swale has been designed to meet the NYSDEC Water Quality Volume (WQv) and Runoff Reduction Volume (RRv) requirements for redevelopment areas and new development at the site. In order to treat the increased impervious from the new parking lot a dry swale has been designed. The dry swale includes a pre- treatment practice in the form of a permanent check dam at the inlet of the swale and a level spreader. Trapping sediment before it enters the facility reduces maintenance burden and ensures longevity of the practice. The dry swale has a 4' wide bottom and is 1'-6" deep. The side slopes of the swale are kept to a maximum of 4:1. The dry swale is 145'-0" long in order to capture all of the sheet from the proposed parking lot. Because the dry swale is located in D soils an underdrain must be installed to ensure dewatering of the practice. The designed dry swale exceeds the required sizing criteria, as shown in Appendix C-6.

6.2 VEGETATED SWALE:

The two (2) new vegetated swales have been designed to meet the NYSDEC Water Quality Volume (WQv) and Runoff Volume (RRv) requirements for the redevelopment and new development areas at the site. The runoff generated from the impervious area from the added handicap parking areas and the new building will be directed to one of the vegetated swales before exiting the site. The vegetated swales will help treat the runoff as well as decrease the peak runoff rates generated from the increased in impervious area. The designed vegetated swales exceed the required sizing criteria, as shown in Appendix C-6.

7.0 WATER QUANTITY

In addition to water quality, water quantity requirements must be met. Within New York State, these requirements include the channel protection volume (CPv), the overbank flood (Qp) and the extreme storm (Qf)h. In proposed conditions, the discharge rate must be less than or equal to the predevelopment discharge rate. The following table provides a summary of pre and post development flow rates for all year storm events:

Table 2: Pre- and Post- Development Discharge

Pre-Development & Post-Development		
Rainfall Event	Pre- Development Peak Discharge	Post- Development Peak Discharge
	(cfs)	(cfs)
1-yr	3.50	2.83
2-yr	4.80	3.76
5-yr	6.96	5.74
10-yr	8.95	8.13
25-yr	12.28	11.79
50-yr	15.37	15.15
100-yr	18.97	18.61

The proposed development of the site will reduce the runoff from the pre- development conditions, thus decreasing the peak discharge rates for all year storm events. In accordance with Chapter 9 of the Department of Environmental Conservation's New York State Stormwater Management Design Manual, meeting channel protection criteria is not required if the post-construction discharge rate and velocity are less than or equal to the pre- construction discharge rate.

8.0 SUMMARY

An existing drainage map, and a proposed drainage map have been included in Appendix C, in addition to the Erosion and Sediment Control Plan and Details. The soil erosion and sediment control plan and details identify controls to be utilized for this project. The project's design and mitigation meets the current requirements of the General Permit for Stormwater Discharges and the parameters set forth in the NYSDEC Design Manual.

This Storm Water Pollution Prevention Plan will minimize the potential for storm water pollution during construction activities for the site infrastructure. Pollution prevention during construction includes the protection from soil disturbance induced pollution as well as potential chemical pollution from construction materials and equipment stored on-site during the construction of this project. This Storm Water Pollution Prevention Plan will minimize the potential for storm water pollution during construction activities for the site infrastructure.

9.0 NOTICE OF TERMINATION

The operator of a stormwater discharge who obtained coverage under the SPDES General Permit for construction (GP-0-20-001) must submit a Notice of Termination (NOT) form in order to cancel the permit coverage. Once the form is completed it should be sent to:

NYS DEC "Notice of Termination"

Bureau of Water Permits

625 Broadway, Albany, NY 12233

The Owner during construction will be:

Diversified Equipment. LLC

The Contact person for the project is: Brian Cafalone

*All Erosion and Sediment Control practice descriptions can be found below. Locations and sizing are identified in the drawings prepared by McCormick Engineering PC.

10.0 CONTROLS

The Contractor shall be required to construct and maintain the following controls in accordance with this document and the associated Contract Documents for this project.

10.1 CONSTRUCTION SEQUENCE

* All drawings referenced within the construction sequence can be found in the drawings prepared by McCormick Engineering PC.

1. Install the stabilized construction entrances for the project as shown on the plans.
2. Install the silt fences along outside perimeter of the project site and all other areas as shown on the plans.
3. Clear trees and brush (no grubbing and stump removal) to the limits shown on the plans.
4. Set up the staging areas at location shown on the plan. Establish location for staging area, soil stockpile and concrete washout as shown on plans. If these areas are not conducive due to any unforeseen conditions, identify new location under direction of engineer.
5. Install all perimeter swales as shown on the plans. Topsoil, seed, and mulch the swales and install stone check dams as shown on the plans or as necessary.

6. Finish remaining clearing and grubbing and begin grading of the project site. Upon completion of rough grading, complete final grading, topsoil, seeding and mulching of all temporary swales and overland grading for the project.

7. Complete final grading of the project site, including installation site roadways materials.

8. Temporarily seed and mulch inactive rough graded areas to establish vegetation and prevent erosion.

9. Complete paving operations of all parking areas and the site access driveway as shown on the plans.

10. Install final dry swale and vegetated swales, complete earthwork grading, and remaining storm sewer infrastructure as shown on the plans. Contractor shall minimize use of heavy equipment within the dry swale and vegetated swale footprint.

11. As construction progresses, maintain all erosion control features onsite in accordance with this SWPPP and the Contract Drawings.

12. Upon establishment of substantial vegetative cover (85% min.) remove all temporary erosion and sediment controls. Seed and mulch the remaining disturbed areas (resulting from temporary erosion control measure removal).

13. Upon final acceptance by the owner's representative, and certification by the qualified professional retained to perform the required site inspections, the owner will file the notice of termination (not) with the NYSDEC.

10.2 STABILIZATION PRACTICES

10.2.1 SEEDING

Immediately after completion of grading operations, topsoil shall be replaced where it is required and all areas disturbed from grading operations shall be seeded in an effort to stabilize the site. Stabilization measures (including top-soiling, seeding and mulching) shall be initiated as soon as practicable in portions of the site where construction activities have temporarily or permanently ceased, but in no case more than 14 days after the construction activity if that portion of the site has temporarily or permanently ceased, except as noted below:

- Where the initiation of stabilization measures by the 7th day after construction activity temporarily or permanently ceased is precluded by snow cover. In this situation, stabilization measures shall be initiated as soon as possible.
- Where construction activity will resume on a portion of the site within 14 days from when activities ceased, (e.g. the total time period that construction activity is temporarily ceased is less than 14 days) then stabilization measures do not have to be

initiated on that portion of site by the 14th day after construction activity temporarily ceased.

- In areas where soil disturbance activities have temporarily or permanently ceased, soil stabilization measures shall be initiated by the end of the next business day and completed within fourteen says (seven days if open disturbed area exceeds 5 acres, or three days if between November 15th and April 1st).
- The staging area shall be restored to original grade and stabilized with seed and mulch.

10.2.2 Mulching

Directly after seeding, all disturbed areas shall be mulched to prevent surface compaction, reduce runoff and erosion, control weeds and help establish plant cover.

10.2.3 Preservation of Vegetation

The contractor shall make every effort to protect trees, shrubs, ground cover and any other vegetation adjacent to the work areas that is not shown to be removed as part of this project. The purpose of preserving existing vegetation where obtainable is to reduce soil erosion and enhance water quality.

10.2.4 Stabilized Construction Entrance

A stabilized construction entrance shall be constructed where traffic will be entering or leaving a construction site to or from a public street, alley, sidewalk or parking area. The purpose of the stabilized construction entrance is to reduce or eliminate the tracking of sediment onto public streets.

10.3 Structural Practices

10.3.1 Silt Fence

Silt fence shall be installed to intercept sediment laden runoff from small drainage areas of disturbed soil. Areas below gradient of the silt fence shall be undisturbed or stabilized immediately after disturbance.

- Maintenance shall be performed as needed. Material shall be removed and replaced when bulges develop in the silt fence or when the sediment has accumulated to ½ the height of the silt fence.

10.4 Good Housekeeping and Control of Construction Wastes and Chemicals

10.4.1 Good Housekeeping

It is anticipated that construction materials such as concrete, asphalt, petroleum based products, stone, and fertilizers will be present on-site at various stages during the project. In order to prevent the conveyance to and contamination of any adjacent and/or downstream property, lands or water bodies, good housekeeping practices shall be employed. Such precautions shall include:

- Storing of only enough materials to complete the project, or active phases of the project;
- Materials stored on-site shall be stored in a neat and orderly manner and in their appropriate containers and, if possible, under a covered area or enclosed structure;
- The manufacturer's recommendations for use and disposal shall be followed at all times;
- The project site superintendent shall inspect the site daily to ensure proper use, storage and disposal of all materials on-site.

10.4.2 Hazardous Products

- Hazardous products shall be maintained in their original containers when possible, and be kept with their original labels and applicable MSD sheets;
- All petroleum product spills, if such occurs, shall be cleaned up immediately, the source of the spill is repaired or removed, and contained material shall be disposed of as required by applicable law;
- Fertilizers shall only be applied as recommended by the manufacturer, and once applied shall be worked into the soil to limit exposure to storm water runoff. Storage shall be within an enclosed or covered area;
- Paints, coatings and sealants shall be maintained in a tightly enclosed, leak-proof container at all times. Excess materials shall be disposed of as required by applicable laws and regulations;
- Excess concrete material shall be removed and disposed of off-site in an appropriate manner. Concrete wash water shall not be allowed to discharge to any storm water conveyances;
- Concrete washout shall only occur at the designated concrete washout area as designated by the Owner or Owner's Representative
- Excess asphalt material (excavated asphalt chunks) shall be removed and disposed of off-site in an appropriate manner.
- NYS DEC Spills Hotline (1-800-457-7362). 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:**
- The quantity 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; and

- 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 at the NYSDEC Website (http://www.dec.ny.gov/chemical/8428.html).

11.0 Storm Water Management

The best approach to storm water management for construction activities is through the use of a project specific designed Storm Water Pollution Prevention Plan (SWPPP). The development of the SWPPP is to prevent erosion and pollutants from the construction materials mixing with storm water runoff and being discharged from the project site.

Specific requirements for management of storm water and maintaining water quality include, but are not limited to:

1. There shall be no increase in turbidity that will cause a substantial visible contrast to natural condition;
2. There shall be no suspended, colloidal, and settle-able 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, visible oil film, globules or grease.

12.0 Other Requirements/ Permits

1. Any discharges other than storm water must be in compliance with the appropriate SPDES permit (other than this permit).
2. All construction activities shall be in compliance with all federal, state and local laws as required.
3. The contractor shall be responsible to insure that the plan has been approved by local officials or any authorized agency.

12.1 Inspections

Inspections are important for visually evaluating potential storm water runoff pollution sources at the facility. All projects should be inspected periodically to ensure contaminants are not present in the storm water exiting a project site. On projects which apply for coverage under the SPDES General Permit, a qualified professional (professional engineer, soil scientist, registered landscape architect or certified professional in erosion and sediment control) must inspect and evaluate the site. The qualified inspector retained to conduct site inspections shall meet the requirements set forth in Part IV.C of the General Permit. These inspections shall occur at least once every seven calendar days. If more than 5 acres are disturbed at one time, inspections shall be performed twice per week with a minimum separation of 2 days. Where portions of the construction area have been finally stabilized, the inspection of such portions shall be conducted at least once every month (30 days), until the entire site is finally stabilized. A copy of the weekly soil erosion and sediment control inspection form has been included in Appendix D.

Each inspection shall, at the minimum, include the following:

- Disturbed areas must be inspected for evidence of, or the potential for, pollutants entering the drainage system.
- Erosion and sediment control measures shall be inspected to ensure they are operating correctly.
- Discharge locations shall be inspected to ensure erosion control measures are effective in preventing significant impacts to receiving waters.
- Location where vehicles enter or exit the site shall be inspected for evidence of off-site sediment tracking.

The process for conducting the evaluation shall follow these steps:

- Review the Storm Water Pollution Prevention Plan and draw up a list of any items of concern.
- List all specified control measures and areas covered in the plan.
- Conduct inspections to determine whether all storm water pollution prevention measures are accurately identified in the plan, are in place, and working properly.
- Document findings. The inspection report shall meet the requirements set forth in Part IV.C.3 of the General Permit.
- Modify SWPPP as appropriate. (Note: The plan shall only be modified by the plan preparer. Modifications shall be acknowledged and agreed to by the site contractor, site inspector and owner within 7 days of the modification).
- The inspector shall send an electronic copy of the SWPPP inspection report to the Town Engineer at a minimum of once per month for the duration of the project.

13.0 MAINTENANCE

The contractor is required to inspect and maintain all soil erosion and sediment controls throughout the duration of the project and until final stabilization of the site. "Final Stabilization" means that all soil disturbing activities at the site have been completed, and that a uniform, perennial vegetative cover with a density of 85% has been obtained.

Maintenance shall include, but not be limited to; repair or replacement of any existing controls, removal of sediment and any other measures deemed necessary which would reduce soil erosion and sediment runoff. Refer to Section 8.0 for maintenance of individual control.

13.1 CONTRACTORS

The general site contractor, and all other contractors which will perform activities with potential to result in soil and vegetative disturbances on site, must sign a SWPPP Contractor's Certification Form before undertaking any construction activity at the site. The contractor is responsible for any and all subcontractors working on the SWPPP. A copy of the Contractor's Certification Form has been included in Appendix D.

13.2 RECORD RETENTION

A copy of the SWPPP, NOI, NOI Acknowledgement Letter, and MS4 SWPPP acceptance form shall be retained at the job site throughout the duration of the project. The Owner shall retain copies of the SWPPP, all reports, and records of data used to complete Notice of Intent, for five (5) years from the date the site is finally stabilized.

14.0 NOTICE OF TERMINATION

When the project is completed and the site has been stabilized, a Notice of Termination (NOT) shall be submitted to the NYS Department of Environmental Conservation, certifying completion and final stabilization of the project, and compliance with the approved Storm Water Pollution Prevention Plan (SWPPP). The NOT form shall be submitted to the following address:

NYS Department of Environmental Conservation

Division of Water

625 Broadway, 4th Floor

Albany, NY 12233-3505

APPENDIX A

Permit Documents

Appendix A-1: NYSSPDES General Permit No. GP-0-20-001 for Stormwater Discharges from Construction Activities

Appendix A-2: Notice of Intent Form (NOI)

Appendix A-3: NYSDEC Acknowledgement Letter (To be inserted)

Appendix A-4: Notice of Termination (NOT)

Appendix A-5: SEQR Resolution (To be inserted)

Appendix A-6: SHPO Correspondence (To be inserted)

APPENDIX A-1

NYSSPDES General Permit No. GP-0-20-001 for Stormwater Discharges from Construction Activities

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

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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 *Discharges*.** 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 **not** 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. *Discharges* 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 not 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 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;

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; <u>and</u> all areas disturbed as of the project shutdown date 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 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

<u>All definitions in this section are solely for the purposes of this permit.</u>

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:

- 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
- 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
- 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:

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:

- Installation of underground, linear utilities; such as gas lines, fiber-optic cable, cable TV, electric, telephone, sewer mains, and water mains
- Environmental enhancement projects, such as wetland mitigation projects, stormwater retrofits and stream restoration projects
- Pond construction
- Linear bike paths running through areas with vegetative cover, including bike paths surfaced with an impervious cover
- Cross-country ski trails and walking/hiking trails
- Sidewalk, bike path or walking path projects, surfaced with an impervious cover, that are not part of residential, commercial or institutional development;
- 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.
- Slope stabilization projects
- 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* and 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* <u>or</u> *alter the hydrology from pre to post development* conditions, <u>and</u> 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

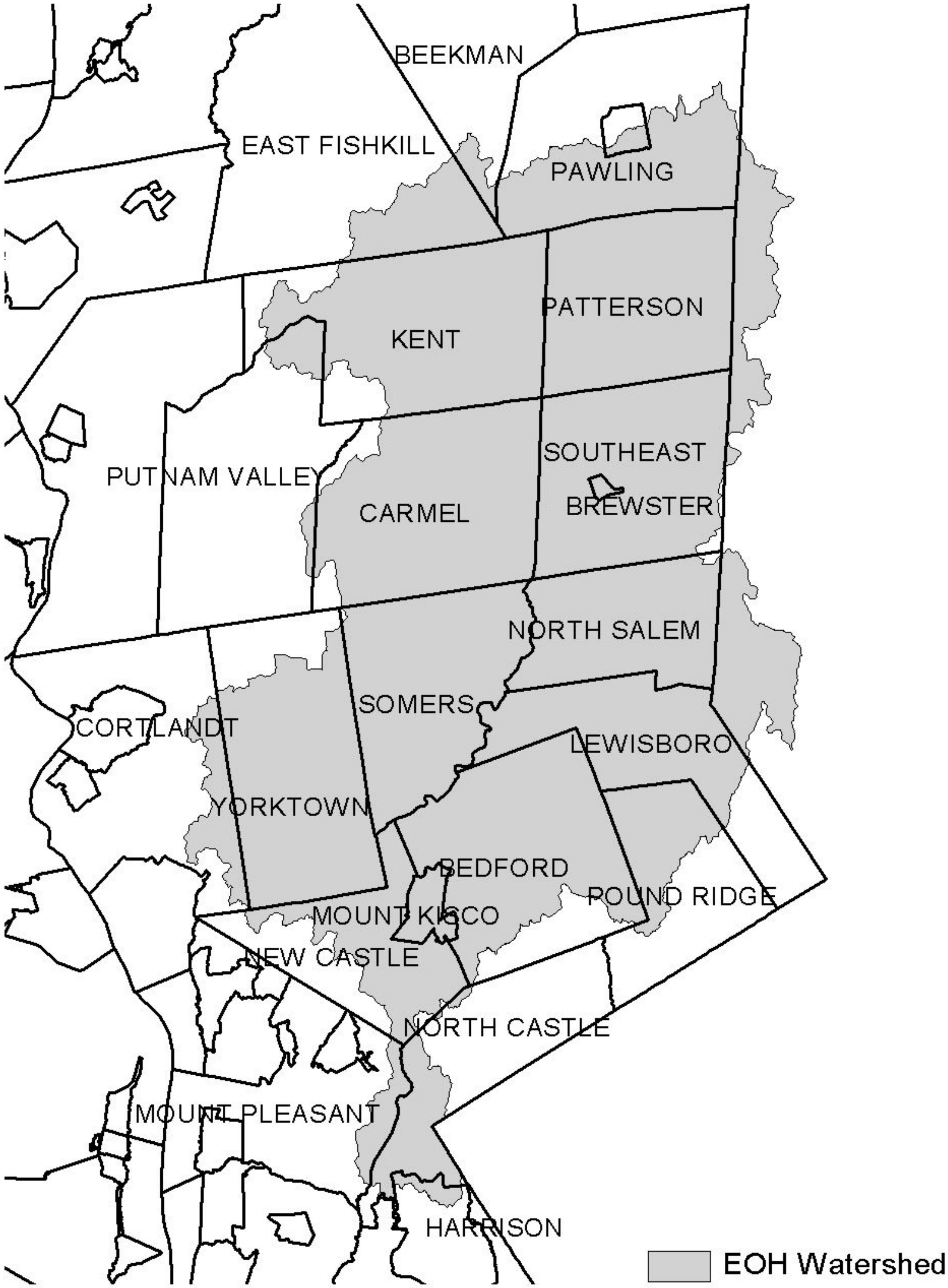


Figure 2 - Onondaga Lake Watershed

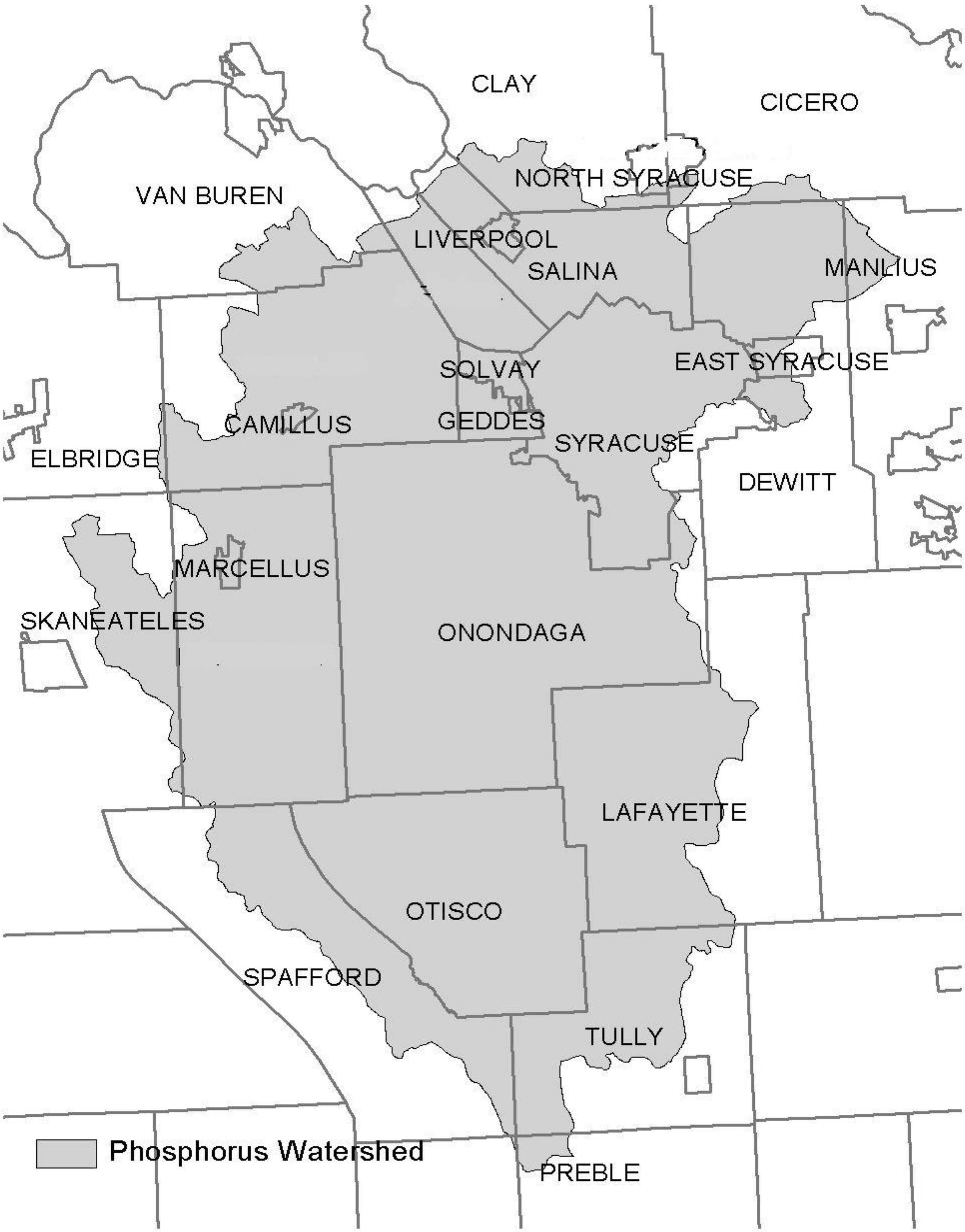


Figure 3 - Greenwood Lake Watershed

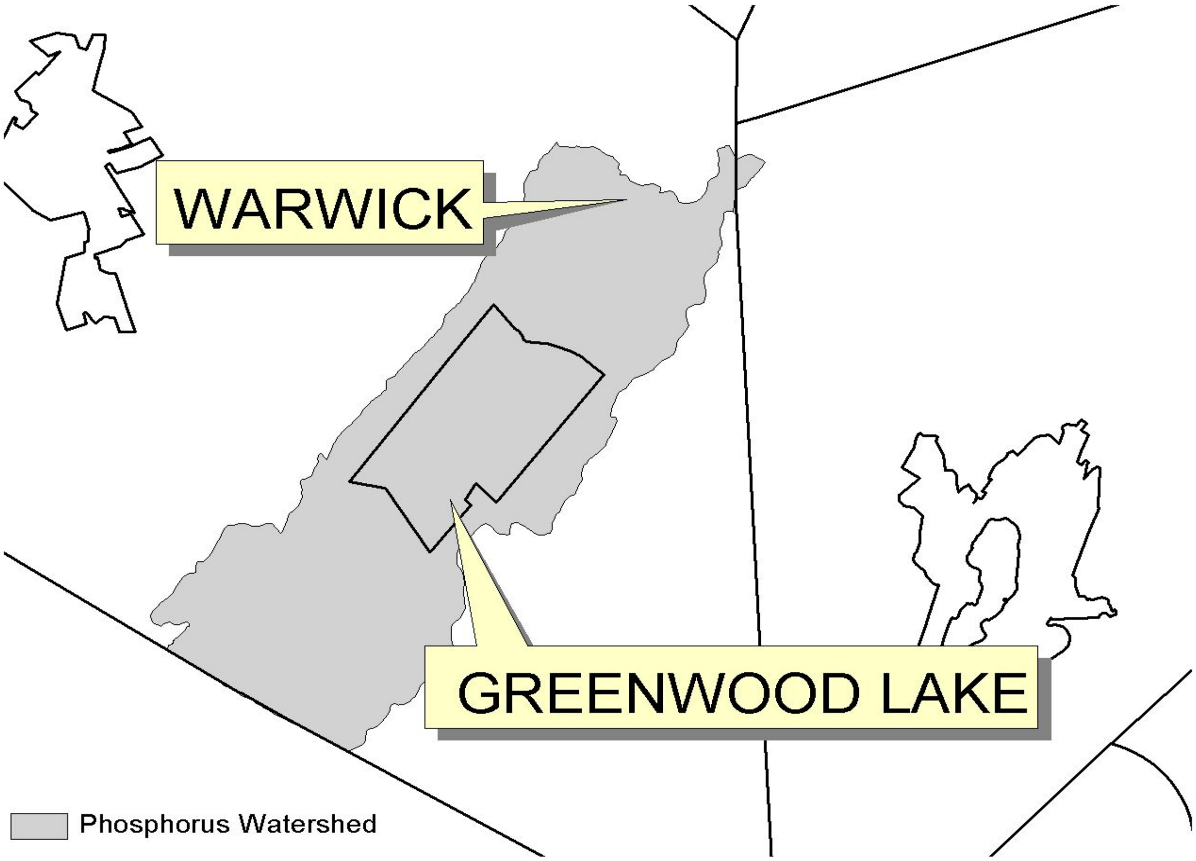


Figure 4 - Oscawana Lake Watershed

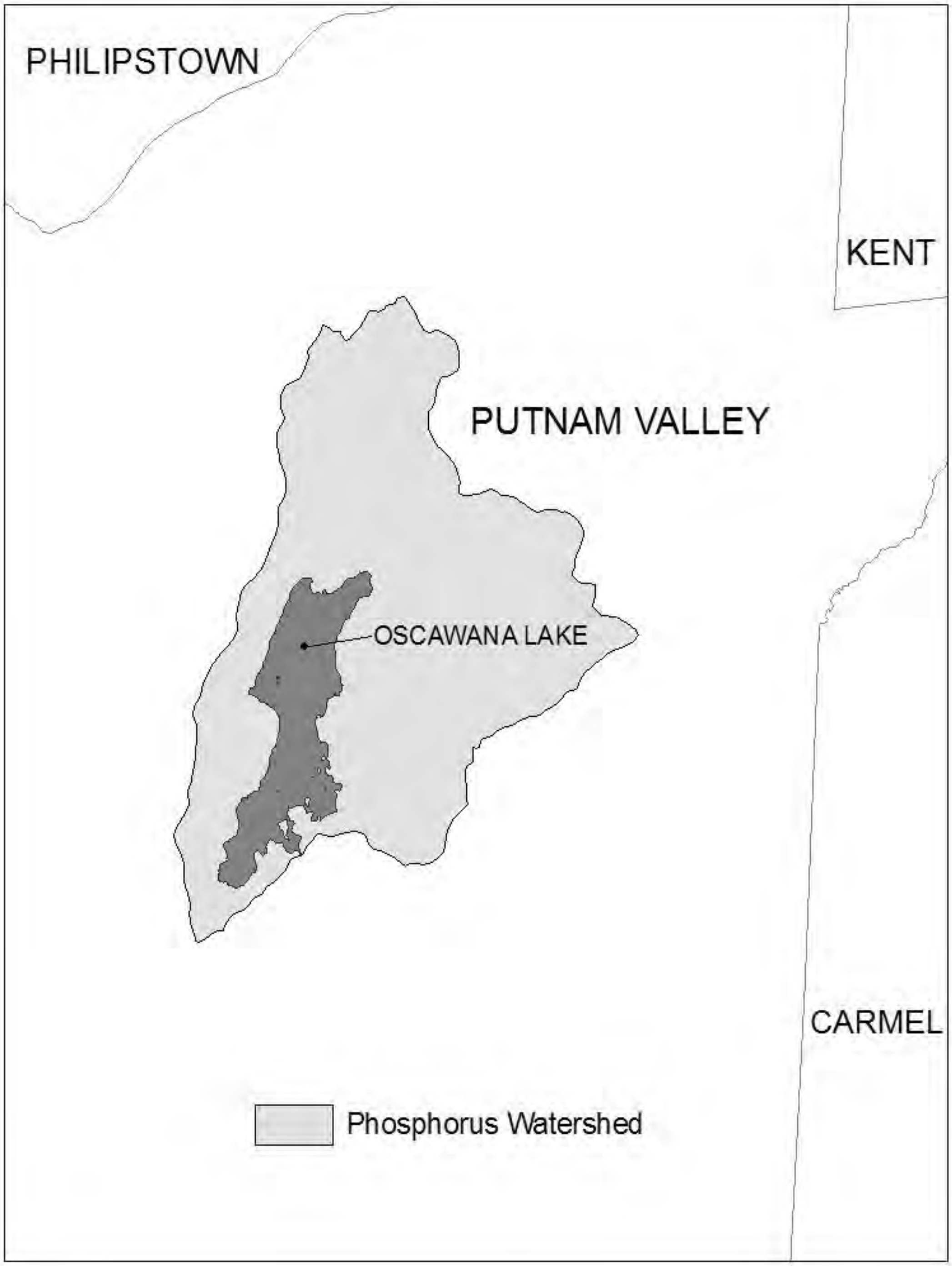
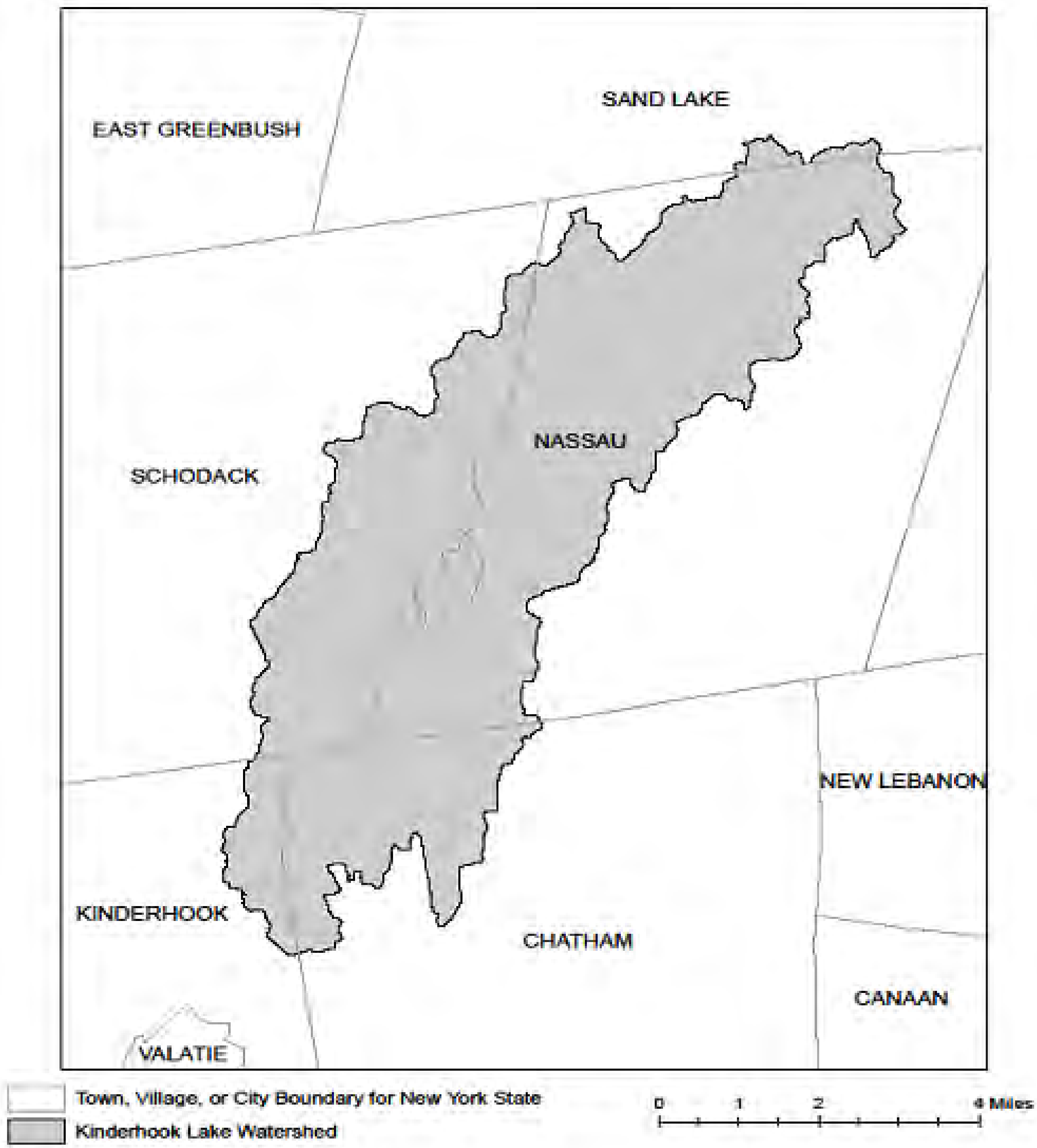


Figure 5 - Kinderhook Lake Watershed



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 Stony Brook, Ny 11790 Tel. (631) 444-0365	50 Circle Road Stony Brook, Ny 11790-3409 Tel. (631) 444-0405
2	Bronx, Kings, New York, Queens and Richmond	1 Hunters Point Plaza, 47-40 21st St. Long Island City, Ny 11101-5407 Tel. (718) 482-4997	1 Hunters Point Plaza, 47-40 21st St. Long Island City, Ny 11101-5407 Tel. (718) 482-4933
3	Dutchess, Orange, Putnam, Rockland, Sullivan, Ulster and Westchester	21 South Putt Corners Road New Paltz, Ny 12561-1696 Tel. (845) 256-3059	100 Hillside Avenue, Suite 1w White Plains, Ny 10603 Tel. (914) 428 - 2505
4	Albany, Columbia, Delaware, Greene, Montgomery, Otsego, Rensselaer, Schenectady and Schoharie	1150 North Westcott Road Schenectady, Ny 12306-2014 Tel. (518) 357-2069	1130 North Westcott Road Schenectady, Ny 12306-2014 Tel. (518) 357-2045
5	Clinton, Essex, Franklin, Fulton, Hamilton, Saratoga, Warren and Washington	1115 State Route 86, Po Box 296 Ray Brook, Ny 12977-0296 Tel. (518) 897-1234	232 Golf Course Road Warrensburg, Ny 12885-1172 Tel. (518) 623-1200
6	HERKIMER, JEFFERSON, LEWIS, ONEIDA AND ST. LAWRENCE	STATE OFFICE BUILDING 317 WASHINGTON STREET WATERTOWN, NY 13601-3787 TEL. (315) 785-2245	STATE OFFICE BUILDING 207 GENESEE STREET UTICA, NY 13501-2885 TEL. (315) 793-2554
7	BROOME, CAYUGA, CHENANGO, CORTLAND, MADISON, ONONDAGA, OSWEGO, TIOGA AND TOMPKINS	615 ERIE BLVD. WEST SYRACUSE, NY 13204-2400 TEL. (315) 426-7438	615 ERIE BLVD. WEST SYRACUSE, NY 13204-2400 TEL. (315) 426-7500
8	CHEMUNG, GENESEE, LIVINGSTON, MONROE, ONTARIO, ORLEANS, SCHUYLER, SENECA, STEUBEN, WAYNE AND YATES	6274 EAST AVON-LIMA ROADAVON, NY 14414-9519 TEL. (585) 226-2466	6274 EAST AVON-LIMA RD. AVON, NY 14414-9519 TEL. (585) 226-2466
9	ALLEGANY, CATTARAUGUS, CHAUTAUQUA, ERIE, NIAGARA AND WYOMING	270 MICHIGAN AVENUE BUFFALO, NY 14203-2999 TEL. (716) 851-7165	270 MICHIGAN AVENUE BUFFALO, NY 14203-2999 TEL. (716) 851-7070

APPENDIX A-2

Notice of Intent Form (eNOI)

NOI for coverage under Stormwater General Permit for Construction Activity
version 1.32

(Submission #: HPG-7KRC-5F322, version 1)

Details

Originally Started By	Katelyn Graham
Alternate Identifier	Lakeside Entertainment - Casino Project
Submission ID	HPG-7KRC-5F322
Submission Reason	New
Status	Draft

Form Input

Owner/Operator Information

Owner/Operator Name (Company/Private Owner/Municipality/Agency/Institution, etc.)
Cayuga Nation of New York

Owner/Operator Contact Person Last Name (NOT CONSULTANT)
Craig

Owner/Operator Contact Person First Name
Peterman

Owner/Operator Mailing Address
3161 State Route 414

City
Seneca Falls

State
NY

Zip
13148

Phone
315-730-8694

Email
craig@petermanlumber.net

Federal Tax ID
NONE PROVIDED

Project Location

Project/Site Name
Lakeside Entertainment - Casino Project

Street Address (Not P.O. Box)
271 Cayuga Street

Side of Street
West

City/Town/Village (THAT ISSUES BUILDING PERMIT)
Union Springs

State
NY

Zip
13160

DEC Region
7

County
CAYUGA

Name of Nearest Cross Street
Maple Way

Distance to Nearest Cross Street (Feet)
60

Project In Relation to Cross Street
East

Tax Map Numbers Section-Block-Parcel
NONE PROVIDED

Tax Map Numbers
NONE PROVIDED

1. Coordinates

Provide the Geographic Coordinates for the project site. The two methods are:
- Navigate to the project location on the map (below) and click to place a marker and obtain the XY coordinates.
- The "Find Me" button will provide the lat/long for the person filling out this form. Then pan the map to the correct location and click the map to place a marker and obtain the XY coordinates.

Navigate to your location and click on the map to get the X,Y coordinates
42.8536913,-76.691417

271 Cayuga St, Union Springs, NY 13160, USA

Project Details

2. What is the nature of this project?
Redevelopment with increase in impervious area

3. Select the predominant land use for both pre and post development conditions.

Pre-Development Existing Landuse
Commercial

Post-Development Future Land Use
Commercial

3a. If Single Family Subdivision was selected in question 3, enter the number of subdivision lots.
NONE PROVIDED

---

4. In accordance with the larger common plan of development or sale, enter the total project site acreage, the acreage to be disturbed and the future impervious area (acreage)within the disturbed area.

*** ROUND TO THE NEAREST TENTH OF AN ACRE. ***

Total Site Area (acres)
4.50

Total Area to be Disturbed (acres)
1.48

Existing Impervious Area to be Disturbed (acres)
0.10

Future Impervious Area Within Disturbed Area (acres)
0.85

5. Do you plan to disturb more than 5 acres of soil at any one time?
No

---

6. Indicate the percentage (%) of each Hydrologic Soil Group(HSG) at the site.

A (%)
NONE PROVIDED

B (%)
NONE PROVIDED

C (%)
NONE PROVIDED

D (%)
100

7. Is this a phased project?
No

8. Enter the planned start and end dates of the disturbance activities.

Start Date
4/1/2022

End Date
4/1/2023

9. Identify the nearest surface waterbody(ies) to which construction site runoff will discharge.
State Wetland- Offsite

9a. Type of waterbody identified in question 9?
Wetland/State Jurisdiction Off Site

Other Waterbody Type Off Site Description
NONE PROVIDED

9b. If "wetland" was selected in 9A, how was the wetland identified?
Regulatory Map

10. Has the surface waterbody(ies in question 9 been identified as a 303(d) segment in Appendix E of GP-0-20-001?
No

11. Is this project located in one of the Watersheds identified in Appendix C of GP-0-20-001?
No

12. Is the project located in one of the watershed areas associated with AA and AA-S classified waters?
No

If No, skip question 13.

13. Does this construction activity disturb land with no existing impervious cover and where the Soil Slope Phase is identified as an E or F on the USDA Soil Survey?
NONE PROVIDED

If Yes, what is the acreage to be disturbed?
NONE PROVIDED

14. Will the project disturb soils within a State regulated wetland or the protected 100 foot adjacent area?
No

15. Does the site runoff enter a separate storm sewer system (including roadside drains, swales, ditches, culverts, etc)?
No

16. What is the name of the municipality/entity that owns the separate storm sewer system?
NONE PROVIDED

17. Does any runoff from the site enter a sewer classified as a Combined Sewer?
No

18. Will future use of this site be an agricultural property as defined by the NYS Agriculture and Markets Law?
No

19. Is this property owned by a state authority, state agency, federal government or local government?
No

20. Is this a remediation project being done under a Department approved work plan? (i.e. CERCLA, RCRA, Voluntary Cleanup Agreement, etc.)
No

Required SWPPP Components

21. Has the required Erosion and Sediment Control component of the SWPPP been developed in conformance with the current NYS Standards and Specifications for Erosion and Sediment Control (aka Blue Book)?
Yes

22. Does this construction activity require the development of a SWPPP that includes the post-construction stormwater management practice component (i.e. Runoff Reduction, Water Quality and Quantity Control practices/techniques)?
Yes

If you answered No in question 22, skip question 23 and the Post-construction Criteria and Post-construction SMP Identification sections.

23. Has the post-construction stormwater management practice component of the SWPPP been developed in conformance with the current NYS Stormwater Management Design Manual?
Yes

24. The Stormwater Pollution Prevention Plan (SWPPP) was prepared by:
Professional Engineer (P.E.)

SWPPP Preparer
C&S Companies

Contact Name (Last, Space, First)
Kenna, Eric

Mailing Address
499 Col. Eileen Collins Blvd.

City
Syracuse

State
NY

Zip
13212

Phone
315-455-2000

Email
ekenna@cscos.com

Download SWPPP Preparer Certification Form
Please take the following steps to prepare and upload your preparer certification form:

1) Click on the link below to download a blank certification form
2) The certified SWPPP preparer should sign this form

3) Scan the signed form
4) Upload the scanned document
[Download SWPPP Preparer Certification Form]

Please upload the SWPPP Preparer Certification

> NONE PROVIDED
> **Comment**
> NONE PROVIDED

Erosion & Sediment Control Criteria

25. Has a construction sequence schedule for the planned management practices been prepared?
Yes

26. Select all of the erosion and sediment control practices that will be employed on the project site:

Temporary Structural
Check Dams
Construction Road Stabilization
Dust Control
Silt Fence
Stabilized Construction Entrance
Storm Drain Inlet Protection

Biotechnical
None

Vegetative Measures
Mulching
Protecting Vegetation
Seeding
Topsoiling

Permanent Structural
Land Grading
Rock Outlet Protection

Other
NONE PROVIDED

Post-Construction Criteria

*** IMPORTANT: Completion of Questions 27-39 is not required if response to Question 22 is No.**

27. Identify all site planning practices that were used to prepare the final site plan/layout for the project.
Preservation of Undisturbed Area
Reduction of Clearing and Grading

27a. Indicate which of the following soil restoration criteria was used to address the requirements in Section 5.1.6("Soil Restoration") of the Design Manual (2010 version).
All disturbed areas will be restored in accordance with the Soil Restoration requirements in Table 5.3 of the Design Manual (see page 5-22).

28. Provide the total Water Quality Volume (WQv) required for this project (based on final site plan/layout). (Acre-feet)
0.065

29. Post-construction SMP Identification
Use the Post-construction SMP Identification section to identify the RR techniques (Area Reduction), RR techniques(Volume Reduction) and Standard SMPs with RRv Capacity that were used to reduce the Total WQv Required (#28).

Identify the SMPs to be used by providing the total impervious area that contributes runoff to each technique/practice selected. For the Area Reduction Techniques, provide the total contributing area (includes pervious area) and, if applicable, the total impervious area that contributes runoff to the technique/practice.

Note: Redevelopment projects shall use the Post-Construction SMP Identification section to identify the SMPs used to treat and/or reduce the WQv required. If runoff reduction techniques will not be used to reduce the required WQv, skip to question 33a after identifying the SMPs.

30. Indicate the Total RRv provided by the RR techniques (Area/Volume Reduction) and Standard SMPs with RRv capacity identified in question 29. (acre-feet)
0.015

31. Is the Total RRv provided (#30) greater than or equal to the total WQv required (#28)?
No

If Yes, go to question 36. If No, go to question 32.

32. Provide the Minimum RRv required based on HSG. [Minimum RRv Required = (P)(0.95) (Ai) / 12, Ai=(s) (Aic)] (acre-feet)
0.010

32a. Is the Total RRv provided (#30) greater than or equal to the Minimum RRv Required (#32)?
Yes

If Yes, go to question 33.

Note: Use the space provided in question #39 to summarize the specific site limitations and justification for not reducing 100% of WQv required (#28). A detailed evaluation of the specific site limitations and justification for not reducing 100% of the WQv required (#28) must also be included in the SWPPP.

If No, sizing criteria has not been met; therefore, NOI can not be processed. SWPPP preparer must modify design to meet sizing criteria.

33. SMPs
Use the Post-construction SMP Identification section to identify the Standard SMPs and, if applicable, the Alternative SMPs to be used to treat the remaining total WQv (=Total WQv Required in #28 - Total RRv Provided in #30).

Also, provide the total impervious area that contributes runoff to each practice selected.

NOTE: Use the Post-construction SMP Identification section to identify the SMPs used on Redevelopment projects.

33a. Indicate the Total WQv provided (i.e. WQv treated) by the SMPs identified in question #33 and Standard SMPs with RRv Capacity identified in question #29. (acre-feet)
0.10

Note: For the standard SMPs with RRv capacity, the WQv provided by each practice = the WQv calculated using the contributing drainage area to the practice - provided by the practice. (See Table 3.5 in Design Manual)

34. Provide the sum of the Total RRv provided (#30) and the WQv provided (#33a).
0.115

35. Is the sum of the RRv provided (#30) and the WQv provided (#33a) greater than or equal to the total WQv required (#28)?
Yes

If Yes, go to question 36.

If No, sizing criteria has not been met; therefore, NOI can not be processed. SWPPP preparer must modify design to meet sizing criteria.

36. Provide the total Channel Protection Storage Volume (CPv required and provided or select waiver (#36a), if applicable.

CPv Required (acre-feet)
NONE PROVIDED

CPv Provided (acre-feet)
NONE PROVIDED

36a. The need to provide channel protection has been waived because:
Reduction of the total CPv is achieved on site through runoff reduction techniques or infiltration systems.

37. Provide the Overbank Flood (Qp) and Extreme Flood (Qf) control criteria or select waiver (#37a), if applicable.

Overbank Flood Control Criteria (Qp)

Pre-Development (CFS)
8.95

Post-Development (CFS)
8.13

Total Extreme Flood Control Criteria (Qf)

Pre-Development (CFS)
18.97

Post-Development (CFS)
18.61

37a. The need to meet the Qp and Qf criteria has been waived because:
NONE PROVIDED

38. Has a long term Operation and Maintenance Plan for the post-construction stormwater management practice(s) been developed?
Yes

If Yes, Identify the entity responsible for the long term Operation and Maintenance
Cayuga Nation of New York

39. Use this space to summarize the specific site limitations and justification for not reducing 100% of WQv required (#28). (See question #32a) This space can also be used for other pertinent project information.
The total WQv was not reduced using RRv practices because of a few specific site limitations. As shown in the USDA Soil Survey, the Hydrologic Soil Group is classified as "Group D" for the entire site. Therefore, the soils onsite have very slow infiltration rates. The 2D footprint of the site is also minimized due to the efforts to reduce the disturbance area.

Post-Construction SMP Identification

Runoff Reduction (RR) Techniques, Standard Stormwater Management Practices (SMPs) and Alternative SMPs
Identify the Post-construction SMPs to be used by providing the total impervious area that contributes runoff to each technique/practice selected. For the Area Reduction Techniques, provide the total contributing area (includes pervious area) and, if applicable, the total impervious area that contributes runoff to the technique/practice.

RR Techniques (Area Reduction)

Round to the nearest tenth

Total Contributing Acres for Conservation of Natural Area (RR-1)
NONE PROVIDED

Total Contributing Impervious Acres for Conservation of Natural Area (RR-1)
NONE PROVIDED

Total Contributing Acres for Sheetflow to Riparian Buffers/Filter Strips (RR-2)
NONE PROVIDED

Total Contributing Impervious Acres for Sheetflow to Riparian Buffers/Filter Strips (RR-2)
NONE PROVIDED

Total Contributing Acres for Tree Planting/Tree Pit (RR-3)
NONE PROVIDED

Total Contributing Impervious Acres for Tree Planting/Tree Pit (RR-3)
NONE PROVIDED

Total Contributing Acres for Disconnection of Rooftop Runoff (RR-4)
NONE PROVIDED

RR Techniques (Volume Reduction)

Total Contributing Impervious Acres for Disconnection of Rooftop Runoff (RR-4)
NONE PROVIDED

Total Contributing Impervious Acres for Vegetated Swale (RR-5)
0.17

Total Contributing Impervious Acres for Rain Garden (RR-6)
NONE PROVIDED

Total Contributing Impervious Acres for Stormwater Planter (RR-7)
NONE PROVIDED

Total Contributing Impervious Acres for Rain Barrel/Cistern (RR-8)
NONE PROVIDED

Total Contributing Impervious Acres for Porous Pavement (RR-9)
NONE PROVIDED

Total Contributing Impervious Acres for Green Roof (RR-10)
NONE PROVIDED

Standard SMPs with RRv Capacity

Total Contributing Impervious Acres for Infiltration Trench (I-1)
NONE PROVIDED

Total Contributing Impervious Acres for Infiltration Basin (I-2)
NONE PROVIDED

Total Contributing Impervious Acres for Dry Well (I-3)
NONE PROVIDED

Total Contributing Impervious Acres for Underground Infiltration System (I-4)
NONE PROVIDED

Total Contributing Impervious Acres for Bioretention (F-5)
NONE PROVIDED

Total Contributing Impervious Acres for Dry Swale (O-1)
0.68

Standard SMPs

Total Contributing Impervious Acres for Micropool Extended Detention (P-1)
NONE PROVIDED

Total Contributing Impervious Acres for Wet Pond (P-2)
NONE PROVIDED

Total Contributing Impervious Acres for Wet Extended Detention (P-3)
NONE PROVIDED

Total Contributing Impervious Acres for Multiple Pond System (P-4)
NONE PROVIDED

Total Contributing Impervious Acres for Pocket Pond (P-5)
NONE PROVIDED

Total Contributing Impervious Acres for Surface Sand Filter (F-1)
NONE PROVIDED

Total Contributing Impervious Acres for Underground Sand Filter (F-2)
NONE PROVIDED

Total Contributing Impervious Acres for Perimeter Sand Filter (F-3)
NONE PROVIDED

Total Contributing Impervious Acres for Organic Filter (F-4)
NONE PROVIDED

Total Contributing Impervious Acres for Shallow Wetland (W-1)
NONE PROVIDED

Total Contributing Impervious Acres for Extended Detention Wetland (W-2)
NONE PROVIDED

Total Contributing Impervious Acres for Pond/Wetland System (W-3)
NONE PROVIDED

Total Contributing Impervious Acres for Pocket Wetland (W-4)
NONE PROVIDED

Total Contributing Impervious Acres for Wet Swale (O-2)
NONE PROVIDED

Alternative SMPs (DO NOT INCLUDE PRACTICES BEING USED FOR PRETREATMENT ONLY)

Total Contributing Impervious Area for Hydrodynamic
NONE PROVIDED

Total Contributing Impervious Area for Wet Vault
NONE PROVIDED

Total Contributing Impervious Area for Media Filter
NONE PROVIDED

"Other" Alternative SMP?
NONE PROVIDED

Total Contributing Impervious Area for "Other"
NONE PROVIDED

Provide the name and manufaturer of the alternative SMPs (i.e. proprietary practice(s)) being used for WQv treatment.

Note: Redevelopment projects which do not use RR techniques, shall use questions 28, 29, 33 and 33a to provide SMPs used, total WQv required and total WQv provided for the project.

Manufacturer of Alternative SMP
NONE PROVIDED

Name of Alternative SMP
NONE PROVIDED

Other Permits

40. Identify other DEC permits, existing and new, that are required for this project/facility.
None

If SPDES Multi-Sector GP, then give permit ID
NONE PROVIDED

If Other, then identify
NONE PROVIDED

41. Does this project require a US Army Corps of Engineers Wetland Permit?
No

If "Yes," then indicate Size of Impact, in acres, to the nearest tenth
NONE PROVIDED

42. If this NOI is being submitted for the purpose of continuing or transferring coverage under a general permit for stormwater runoff from construction activities, please indicate the former SPDES number assigned.
NONE PROVIDED

MS4 SWPPP Acceptance

43. Is this project subject to the requirements of a regulated, traditional land use control MS4?
No

If No, skip question 44

44. Has the "MS4 SWPPP Acceptance" form been signed by the principal executive officer or ranking elected official and submitted along with this NOI?
NONE PROVIDED

MS4 SWPPP Acceptance Form Download
Download form from the link below. Complete, sign, and upload.
MS4 SWPPP Acceptance Form

MS4 Acceptance Form Upload

> NONE PROVIDED
> **Comment**
> NONE PROVIDED

Owner/Operator Certification

Owner/Operator Certification Form Download
Download the certification form by clicking the link below. Complete, sign, scan, and upload the form.

Owner/Operator Certification Form (PDF, 45KB)

Upload Owner/Operator Certification Form

NONE PROVIDED

Comment

NONE PROVIDED

APPENDIX A-3

NYSDEC Acknowledgement Letter – TO BE INSERTED

APPENDIX A-4

Notice of Termination (NOT)

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: Cayuga Nation of New York

2. Street Address: 3161 State Route 414

3. City/State/Zip: Seneca Falls, NY, 13148

4. Contact Person: Peterman Lumber/Craig Peterman | 4a.Telephone: 315-730-8694

4b. Contact Person E-Mail: craig@petermanlumber.net

II. Project Site Information

5. Project/Site Name: Lakeside Entertainment - Casino Project

6. Street Address: 271 Cayuga Street

7. City/Zip: Union Springs, 13160

8. County: Cayuga

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:

(NYS DEC Notice of Termination - January 2015)

APPENDIX A-5

SEQR Resolution- TO BE INSERTED

APPENDIX A-6

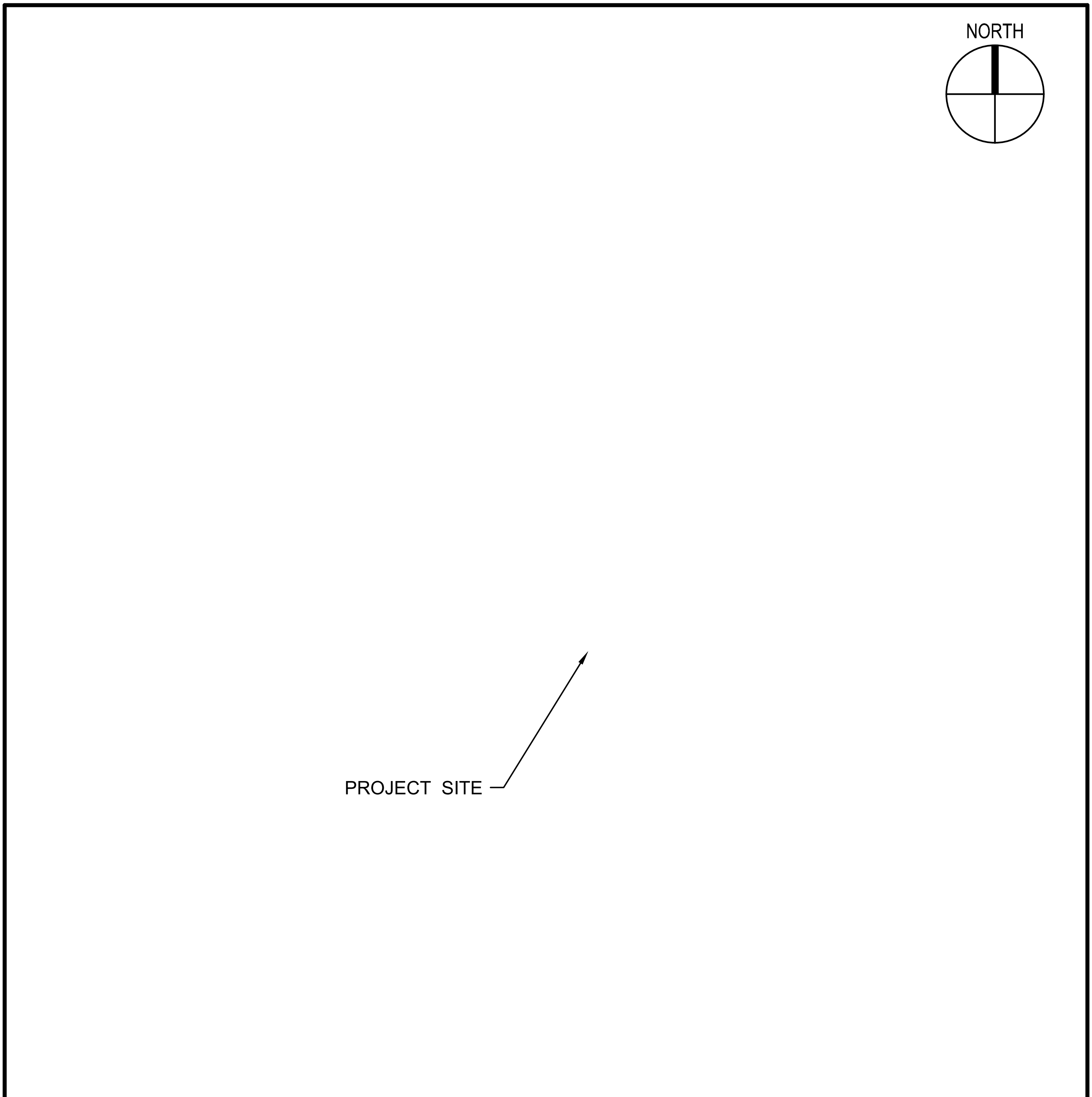
SHPO Correspondance- TO BE INSERTED

APPENDIX B

Site Characteristics

APPENDIX B-1

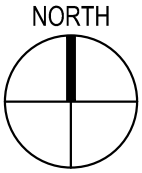
Location Plan

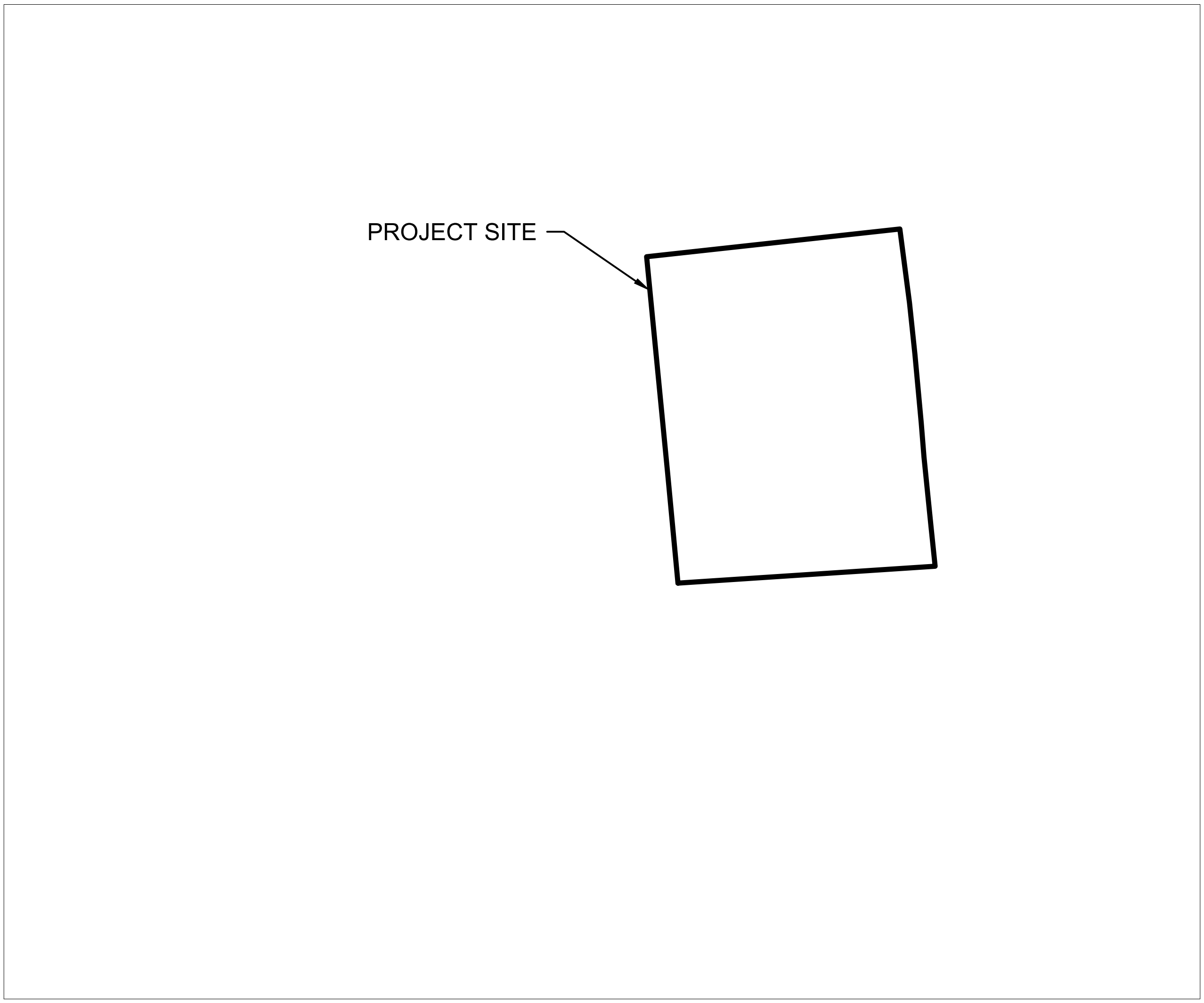


LOCATION PLAN

APPENDIX B-2

Aerial Image

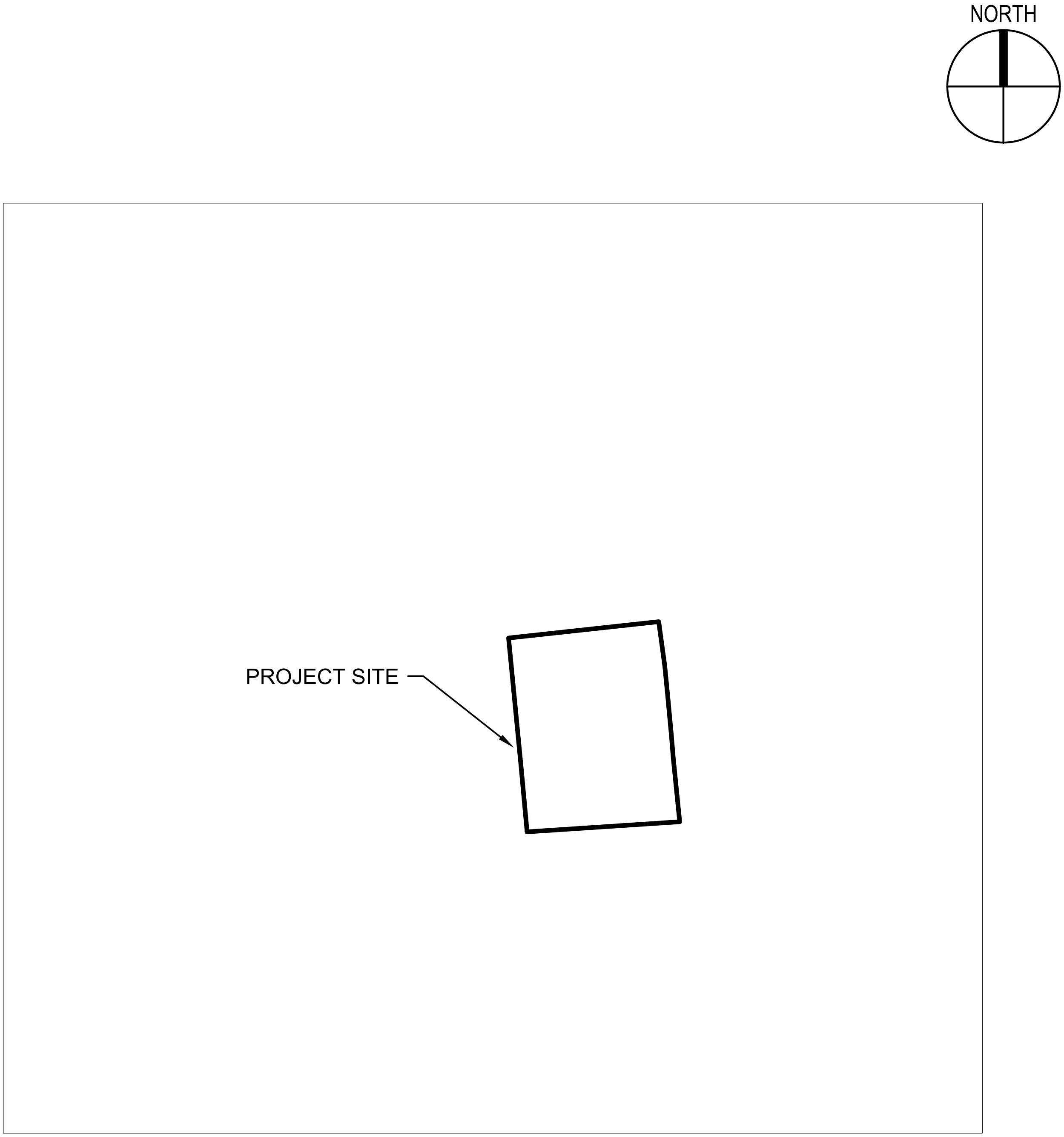




AERIAL IMAGE

APPENDIX B-3

USGS Topographic Map



USGS IMAGE

APPENDIX B-4

USDA NRCS Soils Report

Hydrologic Soil Group—Cayuga County, New York

MAP LEGEND

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

Soils

Soil Rating Polygons
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Lines
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Points
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Water Features
- Streams and Canals

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

Background
- Aerial Photography

MAP INFORMATION

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

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

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

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

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

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

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

Soil Survey Area: Cayuga County, New York
Survey Area Data: Version 18, Aug 29, 2021

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

Date(s) aerial images were photographed: Apr 1, 2020—Oct 1, 2020

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

Hydrologic Soil Group

Description

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

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

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

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

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

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

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

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

APPENDIX C

Appendix C-1: Grading Plan

Appendix C-2: Erosions and Sediment Control Plan and Details

Appendix C-3: Standard and Specifications for Erosion and Sediment Control

Appendix C-4: Existing and Proposed Conditions Drainage Plans

Appendix C-5: HydroCAD Stormwater Output (Drainage Analysis)

Appendix C-6: WQv and RRv Calculations

APPENDIX C-1

Grading Plan

APPENDIX C-2

Erosion and Sediment Control
Plan and Details

APPENDIX C-3

Standard and Specifications for Erosion and Sediment Control

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 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 FLOW DIFFUSER

Definition & Scope

A permanent non-erosive outlet for concentrated runoff constructed to diffuse flow uniformly through a stone matrix onto a stablilized area in the form of shallow, low velocity, sheet flow.

Conditions Where Practice Applies

Where sediment-free stormwater runoff can be released in low velocity sheet flow down stabilized areas without causing erosion; where the ground slope at the outlet of the diffuser is less than 30% and the runoff will not re-concentrate after release; and where construction of a flow spreader is not practicable.

Design Criteria

1. **Drainage area:** The maximum drainage area to the diffuser may not exceed 0.10 acre per foot length of the flow diffuser. The drainage area served by the diffuser discharging directly cannot be 10-20% more than half the size of the receiving buffer area.

2. **Discharge from diffuser onto receiving area:** The peak stormwater flow rate from a flow diffuser onto a receiving area from a 10-year 24-hour storm must be less than 0.25 cubic feet per second (0.25 cfs) per linear foot of weir crest length.

3. **Receiving area of buffer:** Each flow diffuser shall have a vegetated receiving area with a minimum continuous length of 150 feet and the capacity to pass the flow without erosion. The receiving area shall be stable prior to the construction of the flow diffuser. The receiving area shall have topography regular enough to prevent undue flow concentration before entering a stable watercourse but it shall have a slope that is less than 30%. If the receiving area is not presently stable, then the receiving area shall be stabilized prior to construction of the flow diffuser. The receiving area below the flow diffuser shall be protected from harm during construction. Sodding and/or turf reinforcement mat (TRM) in combination with vegetative measures shall stabilize disturbed areas. The receiving area shall not be used by the flow diffuser until stabilization has been accomplished. A temporary diversion may be necessary in this case.

4. **Cross-section:** The minimum stone diffuser cross-section shall be trapezoidal with a height of 1 foot above natural ground; top width equal to 2 foot and side slope equal to 1 horizontal to 1 vertical. The storage area behind the diffuser shall be excavated to a depth of 1 foot and overall width of storage area equal to 6 feet minimum.

5. **Sizing the diffuser:** The length of the stone diffuser is governed by the size of the stone in the structure, the height of the diffuser, and the flow length through it. The following equation is used to establish the design of the diffuser:

$$Q_d = \frac{h^{3/2} W}{[(\frac{L}{D}) + 2.5 + L^2]^{0.5}}$$

Where:

Q_d = Outflow through the stone diffuser (cfs)
h = Ponding depth behind the diffuser (ft.)
W = Linear length of the diffuser along centerline (ft.)
L = Average horizontal flow length through the diffuser perpendicular to the centerline (ft.)
D = Average stone diameter (d_{50}) in the structure (ft.)

The maximum d_{50} size shall be 9" or 0.75'.

The designer shall calculate the length of diffuser needed depending on the geometry of the cross-section and rock size to be used recognizing that the maximum allowable discharge through the diffuser shall be 0.25 cfs per foot of length.

Once the discharge is calculated for the 10 year storm for the drainage area to the diffuser (Q_{10}) it can be divided by the design discharge of the diffuser to determine the diffuser length as follows:

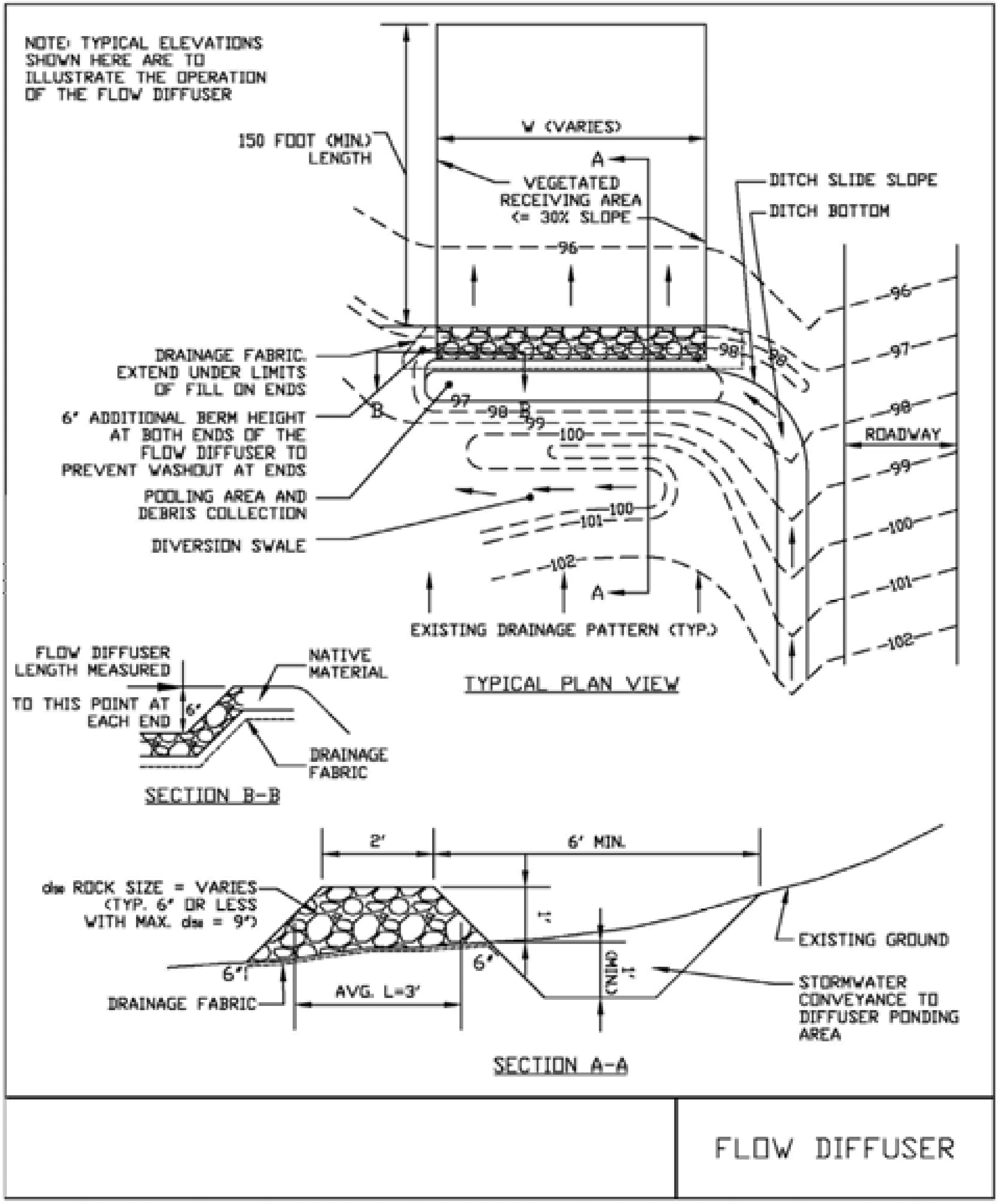
$$W = \frac{Q_{10}}{Q_d}$$

Where:

Q_d = Outflow through the stone diffuser (cfs/ft)
Q_{10} = Discharge rate for the 10 year storm (cfs)
W = Linear length of the diffuser along centerline (ft.)

Design examples are shown in Appendix B.

Figure 3.6
Flow Diffuser Detail



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 PERMANENT CONSTRUCTION AREA PLANTING

Definition & Scope

Establishing **permanent** grasses with other forbs and/or shrubs to provide a minimum 80% perennial vegetative cover on areas disturbed by construction and critical areas to reduce erosion and sediment transport. Critical areas may include but are not limited to steep excavated cut or fill slopes as well as eroding or denuded natural slopes and areas subject to erosion.

Conditions Where Practice Applies

This practice applies to all disturbed areas void of, or having insufficient, cover to prevent erosion and sediment transport. See additional standards for special situations such as sand dunes and sand and gravel pits.

Criteria

All water control measures will be installed as needed prior to final grading and seedbed preparation. Any severely compacted sections will require chiseling or disking to provide an adequate rooting zone, to a minimum depth of 12", see Soil Restoration Standard. The seedbed must be prepared to allow good soil to seed contact, with the soil not too soft and not too compact. Adequate soil moisture must be present to accomplish this. If surface is powder dry or sticky wet, postpone operations until moisture changes to a favorable condition. If seeding is accomplished within 24 hours of final grading, additional scarification is generally not needed, especially on ditch or stream banks. Remove all stones and other debris from the surface that are greater than 4 inches, or that will interfere with future mowing or maintenance.

Soil amendments should be incorporated into the upper 2 inches of soil when feasible. **The soil should be tested to determine the amounts of amendments needed.** Apply ground agricultural limestone to attain a pH of 6.0 in the upper 2 inches of soil. If soil must be fertilized before results of a soil test can be obtained to determine fertilizer needs, apply commercial fertilizer at 600 lbs. per acre of 5-5-10 or equivalent. If manure is used, apply a quantity to meet the nutrients of the above fertilizer. This requires an appropriate manure analysis prior to applying to the site. Do not use manure on sites to be planted with birdsfoot trefoil or in the path of concentrated water flow.

Seed mixtures may vary depending on location within the state and time of seeding. Generally, warm season grasses should only be seeded during early spring, April to May. These grasses are primarily used for vegetating excessively drained sands and gravels. See Standard and Specification for Sand and Gravel Mine Reclamation. Other grasses may be seeded any time of the year when the soil is not frozen and is workable. When legumes such as birdsfoot trefoil are included, spring seeding is preferred. See Table 4.4, "Permanent Construction Area Planting Mixture Recommendations" for additional seed mixtures.

General Seed Mix:	**Variety**	**lbs./ acre**	**lbs/1000 sq. ft.**
Red Clover[1] OR	Acclaim, Rally, Red Head II, Renegade	8[2]	0.20
Common white clover[1]	Common	8	0.20
PLUS			
Creeping Red Fescue	Common	20	0.45
PLUS			
Smooth Bromegrass OR	Common	2	0.05
Ryegrass (perennial)	Pennfine/Linn	5	0.10
[1] add inoculant immediately prior to seeding [2] Mix 4 lbs each of Empire and Pardee OR 4 lbs of Birdsfoot and 4 lbs white clover per acre. All seeding rates are given for Pure Live Seed (PLS)			

Pure Live Seed, or (PLS) refers to the amount of live seed in a lot of bulk seed. Information on the seed bag label includes the type of seed, supplier, test date, source of seed, purity, and germination. Purity is the percentage of pure seed. Germination is the percentage of pure seed that will produce normal plants when planted under favorable conditions.

To compute Pure Live Seed multiply the "germination percent" times the "purity" and divide that by 100 to get Pure Live Seed.

$$\text{Pure Live Seed (PLS)} = \frac{\%\text{ Germination} \times \%\text{ Purity}}{100}$$

For example, the PLS for a lot of Kentucky Blue grass with 75% purity and 96% germination would be calculated as follows:

$$\frac{(96) \times (75)}{100} = 72\%\text{ Pure Live Seed}$$

For 10lbs of PLS from this lot =

$$\frac{10}{0.72} = 13.9\text{ lbs}$$

Therefore, 13.9 lbs of seed is the actual weight needed to meet 10lbs PSL from this specific seed lot.

Time of Seeding: The optimum timing for the general seed mixture is early spring. Permanent seedings may be made any time of year if properly mulched and adequate moisture is provided. Late June through early August is not a good time to seed, but may facilitate covering the land without additional disturbance if construction is completed. Portions of the seeding may fail due to drought and heat. These areas may need reseeding in late summer/fall or the following spring.

Method of seeding: Broadcasting, drilling, cultipack type seeding, or hydroseeding are acceptable methods. Proper soil to seed contact is key to successful seedings.

Mulching: Mulching is essential to obtain a uniform stand of seeded plants. Optimum benefits of mulching new seedings are obtained with the use of small grain straw applied at a rate of 2 tons per acre, and anchored with a netting or tackifier. See the Standard and Specifications for Mulching for choices and requirements.

Irrigation: Watering may be essential to establish a new seeding when a drought condition occurs shortly after a new seeding emerges. Irrigation is a specialized practice and care must be taken not to exceed the application rate for the soil or subsoil. When disconnecting irrigation pipe, be sure pipes are drained in a safe manor, not creating an erosion concern.

80% Perennial Vegetative Cover

50% Perennial Vegetative Cover

Table 4.4
Permanent Construction Area Planting Mixture Recommendations

Seed Mixture	Variety	Rate in lbs./acre (PLS)	Rate in lbs./ 1, 000 ft^2
Mix #1			
Creeping red fescue	Ensylva, Pennlawn, Boreal	10	.25
Perennial ryegrass	Pennfine, Linn	10	.25
*This mix is used extensively for shaded areas.			
Mix #2			
Switchgrass	Shelter, Pathfinder, Trailblazer, or Blackwell	20	.50
*This rate is in pure live seed, this would be an excellent choice along the upland edge of a wetland to filter runoff and provide wildlife benefits. In areas where erosion may be a problem, a companion seeding of sand lovegrass should be added to provide quick cover at a rate of 2 lbs. per acre (0.05 lbs. per 1000 sq. ft.).			
Mix #3			
Switchgrass	Shelter, Pathfinder, Trailblazer, or Blackwell	4	.10
Big bluestem	Niagara	4	.10
Little bluestem	Aldous or Camper	2	.05
Indiangrass	Rumsey	4	.10
Coastal panicgrass	Atlantic	2	.05
Sideoats grama	El Reno or Trailway	2	.05
Wildflower mix		.50	.01
*This mix has been successful on sand and gravel plantings. It is very difficult to seed without a warm season grass seeder such as a Truax seed drill. Broadcasting this seed is very difficult due to the fluffy nature of some of the seed, such as bluestems and indiangrass.			
Mix #4			
Switchgrass	Shelter, Pathfinder, Trailblazer, or Blackwell	10	.25
Coastal panicgrass	Atlantic	10	.25
*This mix is salt tolerant, a good choice along the upland edge of tidal areas and roadsides.			
Mix #5			
Saltmeadow cordgrass (Spartina patens)—This grass is used for tidal shoreline protection and tidal marsh restoration. It is planted by vegetative stem divisions. 'Cape' American beachgrass can be planted for sand dune stabilization above the saltmeadow cordgrass zone.			
Mix #6			
Creeping red fescue	Ensylva, Pennlawn, Boreal	20	.45
Chewings Fescue	Common	20	.45
Perennial ryegrass	Pennfine, Linn	5	.10
Red Clover	Common	10	.45
*General purpose erosion control mix. Not to be used for a turf planting or play grounds.			

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.

Table 2.6
Susceptibility of Tree Species to Compaction[1]

Resistant:

Box elder………………	*Acer negundo*	Willows…………………	*Salix spp.*
Green ash……………..	*Fraxinus pennsylvanica*	Honey locust……………	*Gleditsia triacanthos*
Red elm………………..	*Ulmus rubra*	Eastern cottonwood…….	*Populus deltoides*
Hawthornes……………	*Crataegus spp.*	Swamp white oak……….	*Quercus bicolor*
Bur oak………………..	*Quercus macrocarpa*	Hophornbeam……………	*Ostrya virginiana*
Northern white cedar….	*Thuja occidentalis*		

Intermediate:

Red maple…………….	*Acer rubrum*	Sweetgum……………….	*Liquidambar styraciflua*
Silver maple…………..	*Acer saccharinum*	Norway maple………….	*Acer platanoides*
Hackberry…………….	*Celtis occidentalis*	Shagbark hickory……….	*Carya ovata*
Black gum……………	*Nyssa sylvatica*	London plane…………..	*Platanus x hybrida*
Red oak………………	*Quercus rubra*	Pin oak………………….	*Quercus palustris*
Basswood…………….	*Tilia americana*		

Susceptible:

Sugar maple…………….	*Acer saccharum*	Austrian Pine……………	*Pinus nigra*
White pine………………	*Pinus strobus*	White ash……………….	*Fraxinus americana*
Blue spruce……………..	*Picea pungens*	Paper birch……………..	*Betula papyrifera*
White oak………………	*Quercus alba*	Moutain ash…………….	*Sorbus aucuparia*
Red pine………………..	*Pinus resinosa*	Japanese maple………..	*Acer palmatum*

[1] If a tree species does not appear on the list, insufficient information is available to rate it for this purpose.

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.

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.

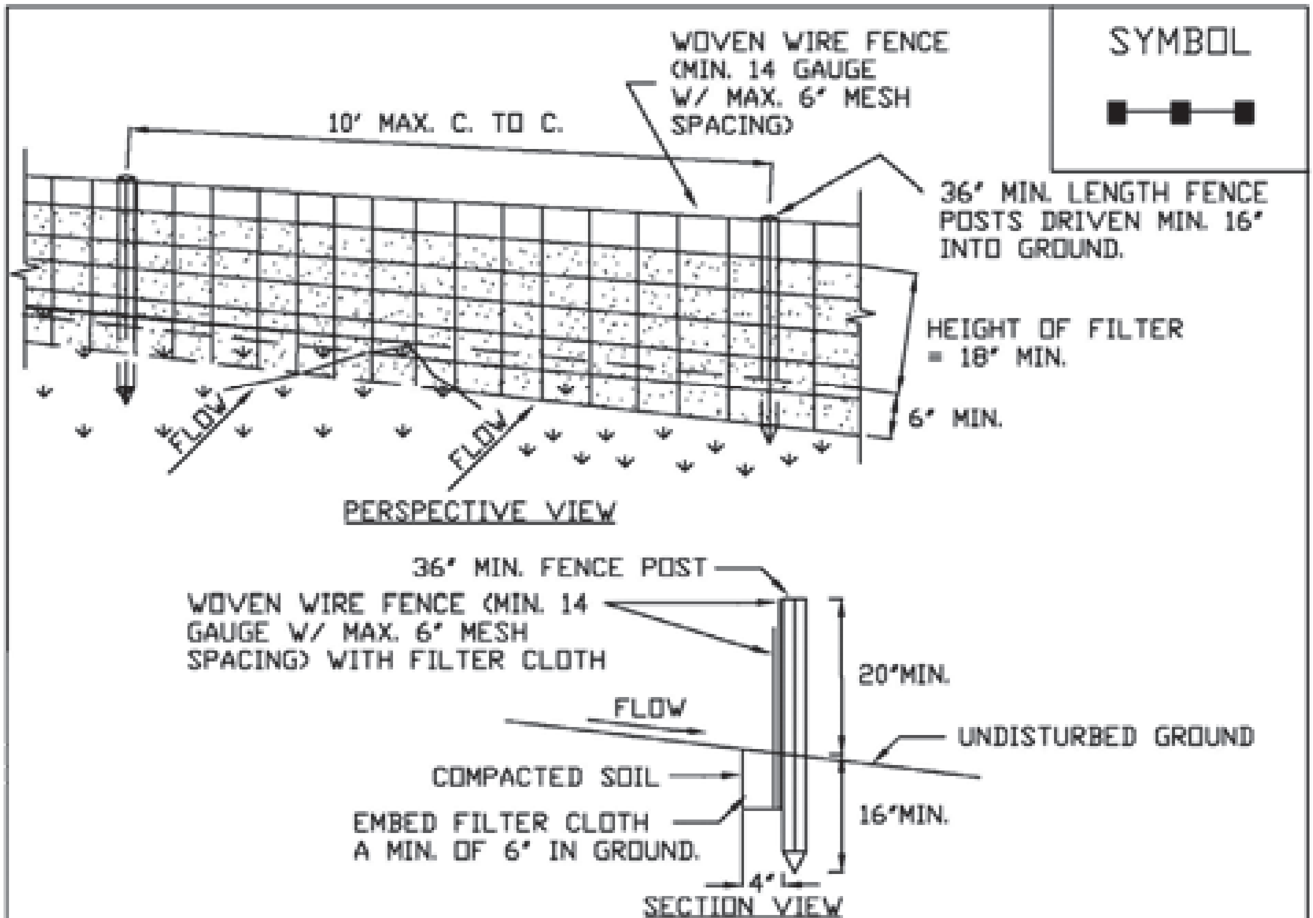
3. Wire Fence for reinforced silt fence: Wire fencing shall be a minimum 14 gage with a maximum 6 in. mesh opening, or as approved.

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 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 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

Type of Soil Disturbance	Soil Restoration Requirement		Comments/Examples
No soil disturbance	Restoration not permitted		Preservation of Natural Features
Minimal soil disturbance	Restoration not required		Clearing and grubbing
Areas where topsoil is stripped only - no change in grade	HSG A&B	HSG C&D	Protect area from any ongoing construction activities.
	Apply 6 inches of topsoil	Aerate* and apply 6 inches of topsoil	
Areas of cut or fill	HSG A&B	HSG C&D	
	Aerate* and apply 6 inches of topsoil	Apply full Soil Restoration**	
Heavy traffic areas on site (especially in a zone 5-25 feet around buildings but not within a 5 foot perimeter around foundation walls)	Apply full Soil Restoration (decompaction and compost enhancement)		
Areas where Runoff Reduction and/or Infiltration practices are applied	Restoration not required, but may be applied to enhance the reduction specified for appropriate practices.		Keep construction equipment from crossing these areas. To protect newly installed practice from any ongoing construction activities construct a single phase operation fence area
Redevelopment projects	Soil Restoration is required on redevelopment projects in areas where existing impervious area will be converted to pervious area.		

* 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.
** Per “Deep Ripping and De-compaction, DEC 2008”.

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.

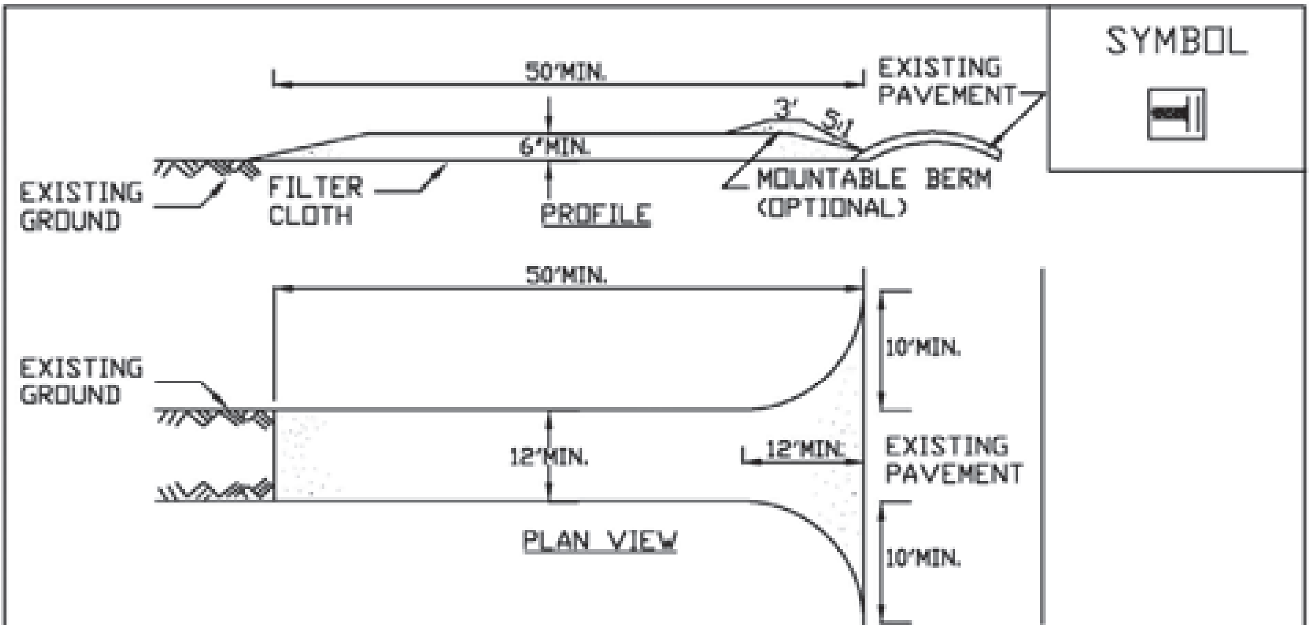
[3]Fabrics not meeting these specifications may be used only when design procedure and supporting documentation are supplied to determine aggregate depth and fabric strength.

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.

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 ACCESS

STANDARD AND SPECIFICATIONS FOR TEMPORARY CONSTRUCTION AREA SEEDING

Definition & Scope

Providing temporary erosion control protection to disturbed areas and/or localized critical areas for an interim period by covering all bare ground that exists as a result of construction activities or a natural event. Critical areas may include but are not limited to steep excavated cut or fill slopes and any disturbed, denuded natural slopes subject to erosion.

Conditions Where Practice Applies

Temporary seedings may be necessary on construction sites to protect an area, or section, where final grading is complete, when preparing for winter work shutdown, or to provide cover when permanent seedings are likely to fail due to mid-summer heat and drought. The intent is to provide temporary protective cover during temporary shutdown of construction and/or while waiting for optimal planting time.

Criteria

Water management practices must be installed as appropriate for site conditions. The area must be rough graded and slopes physically stable. Large debris and rocks are usually removed. Seedbed must be seeded within 24 hours of disturbance or scarification of the soil surface will be necessary prior to seeding.

Fertilizer or lime are not typically used for temporary seedings.

IF: Spring or summer or early fall, then seed the area with ryegrass (annual or perennial) at 30 lbs. per acre (Approximately 0.7 lb./1000 sq. ft. or use 1 lb./1000 sq. ft.).

IF: Late fall or early winter, then seed Certified 'Aroostook' winter rye (cereal rye) at 100 lbs. per acre (2.5 lbs./1000 sq. ft.).

Any seeding method may be used that will provide uniform application of seed to the area and result in relatively good soil to seed contact.

Mulch the area with hay or straw at 2 tons/acre (approx. 90 lbs./1000 sq. ft. or 2 bales). Quality of hay or straw mulch allowable will be determined based on long term use and visual concerns. Mulch anchoring will be required where wind or areas of concentrated water are of concern. Wood fiber hydromulch or other sprayable products approved for erosion control (nylon web or mesh) may be used if applied according to manufacturers' specification. Caution is advised when using nylon or other synthetic products. They may be difficult to remove prior to final seeding and can be a hazard to young wildlife species.

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.

VEGETATIVE MEASURES FOR EROSION AND SEDIMENT CONTROL

Erosion is the gradual wearing away of the land surface as a result of uncontrolled wind and water energy. Sedimentation is the result of transport and delivery of eroded soil particles, deposited at some point. Erosion and sediment control is a complex interaction of soils, engineering water management, agronomic and horticultural practices. Decisions for resolving erosion conditions, both on site and within the upper watershed, are formulated based on surface and subsurface water, soil material, climatic conditions, and anticipated land use. Creating a stable slope is necessary prior to vegetating. Sloughing and slumping are not helpful in establishing a uniform protective cover.

General planning considerations for vegetating a steep slope will include evaluating the soil. Factors such as soil texture and steepness affect the stability of the slope. Texture also influences the permeability and water holding capacity of the soil. Many slopes are stripped of topsoil during the construction phase, leaving an infertile, compacted soil surface, void of valuable organic matter. Topsoil must be reapplied. Overly compacted slopes should be decompacted with appropriate equipment. Soil pH and nutrient level are determined by obtaining a representative soil sample for analysis from an accredited lab. Appropriate plants are selected to meet the final slope and soil conditions for the site.

Liming material sold in New York varies considerably in several ways. The mineral content (calcium and magnesium) of the limestone may be high or low, the fineness or particle sizes vary between suppliers, and the cost varies greatly. Two types of limestone are sold. The most common is limestone high in calcium. Dolomitic limestone contains magnesium (Mg) and calcium (Ca). Limestone sold in NY varies from 0 to 20% Mg while the calcium content of lime varies from 14.7% to 51.5%. Particle size determines how rapidly the calcium and magnesium will react with the acid in the soil. The finer the particle sizes, the quicker the reaction.

When purchasing agricultural limestone, one should state on the order that the amount should be adjusted to 100% effective neutralizing value (ENV). This is the way to compare materials as it adjusts for the reactive Ca and Mg and the particle size. The ENV is stated as the ratio needed to convert a limestone recommendation to 100% ENV. Thus, if the recommendation is 4 tons/acre of 100% ENV lime and the lime being used had an 80% ENV (1/ENV = 1.25), 4 times 1.25 or 5 tons/acre would be required.

The amount of limestone needed can be estimated by using the table below. A soil test is the only way to determine the soil pH. This table is very general, but it is useful for planning.

General lime guidelines (at 100% ENV)

Initial Soil pH	*Sands*	*Sandy Loams*	*Loams and Silt Loams*	*Silty Clay Loams*
		T/A of lime[1]		
4.5	2.5	6.0	9.5	13.0
4.6-4.7	2.5	6.0	9.0	12.5
4.8-4.9	2.5	5.5	8.5	12.0
5.0-5.1	2.0	5.0	7.5	10.5
5.2-5.3	1.5	4.0	6.5	8.5
5.4-5.5	1.0	3.0	4.0	6.0
5.6-5.7	1.0	2.0	3.0	4.5
5.8-5.9	0.7	1.5	2.5	3.5
6.0-6.1	0.6	1.5	2.0	3.0
6.2-6.3	0.4	1.0	1.5	2.0
6.~6.5	0.3	0.7	1.0	1.5
6.6-6.7	0.2	0.5	0.7	1.0

Lime guidelines are in tons per acre and are based on a plow depth of 8.0 inches. Correct rate if plowing to a different depth.

REFERENCE: Cornell Cooperative Extension. 2003 Cornell Guide for Integrated Field Crop Management, Pg. 32.

Fertilizer is sold with an analysis printed on the tag or bag. The first number is the percent of nitrogen (N), the second is phosphorus (P), and the third is potassium (K). Other elements are sometimes included and are listed with these basic three components. For example, a forty pound bag of 5-10-5 contains 2 lbs. N, 4 lbs. P (as P_2O_5), and 2 lbs. of K (as K_20). Select an appropriate analysis to meet the nutrients required for the specific site. Always apply as closely as possible the required amount of fertilizer to meet the requirements of the site. Adding surplus nitrogen may cause pollution of drinking water and saltwater ecosystems. Excessive phosphorus may accelerate the aging process of freshwater ecosystems. Excessive amounts of N and K2O may result in 'burning' the grass and killing it.

Water management on and above potentially eroding sites is extremely important. Large watersheds above a site may require extensive water control measures. Water flow paths must be controlled to allow the safe delivery of the water to an outlet to the side or bottom of the slope. Shallow ditches or diversions across the slope and above the area to be seeded is an effective method of avoiding wash-out of the seed and soil. Diversions may be constructed at a point where surface runoff water is intercepted and carried away from the slope and to a safe outlet. On large slopes, benching may be necessary for bench drains or future maintenance (see standard for Land Grading). Subsurface drainage is frequently included to prevent long term saturated soil conditions and sloughing.

Conservation plantings need to effectively hold soil and control erosion, and they should enhance and blend with their surroundings. Mature plant size, form, and appearance must be considered along with their functionality to match the anticipated land use. Basic erosion control is accomplished by providing cover to the soil surface utilizing plants and/or mulch. It is the system of seedbed preparation, soil amendments, plant selection, proper timing of planting, and mulching that will optimize the chances of success. Characteristics of grasses such as low growth, horizontal above and below ground stems, leafy growth, and many fine roots for binding soil particles, make them the primary choice for vegetating slopes. Once the grass type is selected, then appropriate forbs, shrubs, or trees may be added to meet site conditions. The use of appropriate mulches will depend on site criteria and should be carefully evaluated. Although some materials are costly, they may prevent the need for more costly reshaping and reseeding.

Selection of proper vegetative materials for site stabilization is critical for environmental success. Species should be selected that are not considered "invasive." A primary list of invasive plants can be found at the website of the Invasive Plant Council of New York State (http://www.ipcnys.org). Any species not on this list but considered suspect should be verified at the appropriate regional or local level for acceptance.

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.

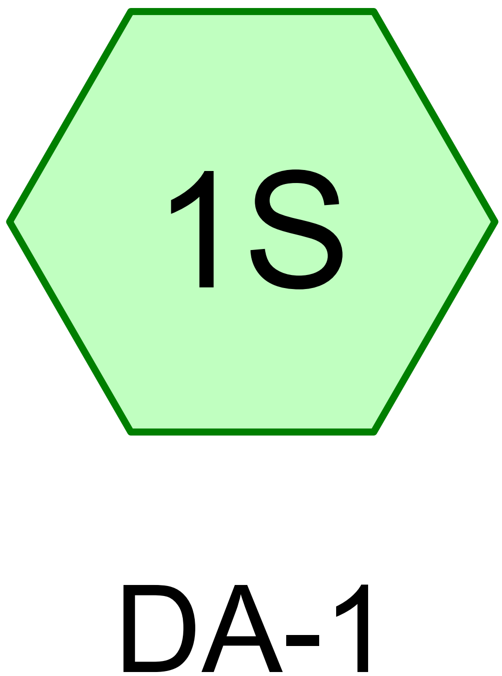
APPENDIX C-4

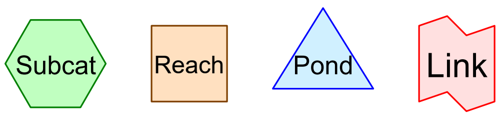
Existing and Proposed Conditions Drainage Plan

1 2 3 4

APPENDIX C-5

HydroCAD Stormwater Output (Drainage Analysis)





Routing Diagram for Existing Conditions
Prepared by C&S Companies, Printed 3/16/2022

Rainfall Events Listing

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	1-Year	NRCC 24-hr	A	Default	24.00	1	1.98	2
2	2-Year	NRCC 24-hr	A	Default	24.00	1	2.33	2
3	5-Year	NRCC 24-hr	A	Default	24.00	1	2.87	2
4	10-Year	NRCC 24-hr	A	Default	24.00	1	3.35	2
5	25-Year	NRCC 24-hr	A	Default	24.00	1	4.13	2
6	50-Year	NRCC 24-hr	A	Default	24.00	1	4.84	2
7	100-Year	NRCC 24-hr	A	Default	24.00	1	5.66	2

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
2.670	80	>75% Grass cover, Good, HSG D (1S)
1.260	98	Impervious (1S)
1.300	77	Woods, Good, HSG D (1S)
5.230	**84**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
0.000	HSG B	
0.000	HSG C	
3.970	HSG D	1S
1.260	Other	1S
5.230		**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	0.000	2.670	0.000	2.670	>75% Grass cover, Good	1S
0.000	0.000	0.000	0.000	1.260	1.260	Impervious	1S
0.000	0.000	0.000	1.300	0.000	1.300	Woods, Good	1S
0.000	**0.000**	**0.000**	**3.970**	**1.260**	**5.230**	**TOTAL AREA**	

Time span=5.00-36.00 hrs, dt=0.05 hrs, 621 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1S: DA-1 Runoff Area=5.230 ac 24.09% Impervious Runoff Depth=0.73"
Flow Length=509' Tc=21.6 min CN=84 Runoff=3.50 cfs 0.318 af

Total Runoff Area = 5.230 ac Runoff Volume = 0.318 af Average Runoff Depth = 0.73"
75.91% Pervious = 3.970 ac 24.09% Impervious = 1.260 ac

Summary for Subcatchment 1S: DA-1

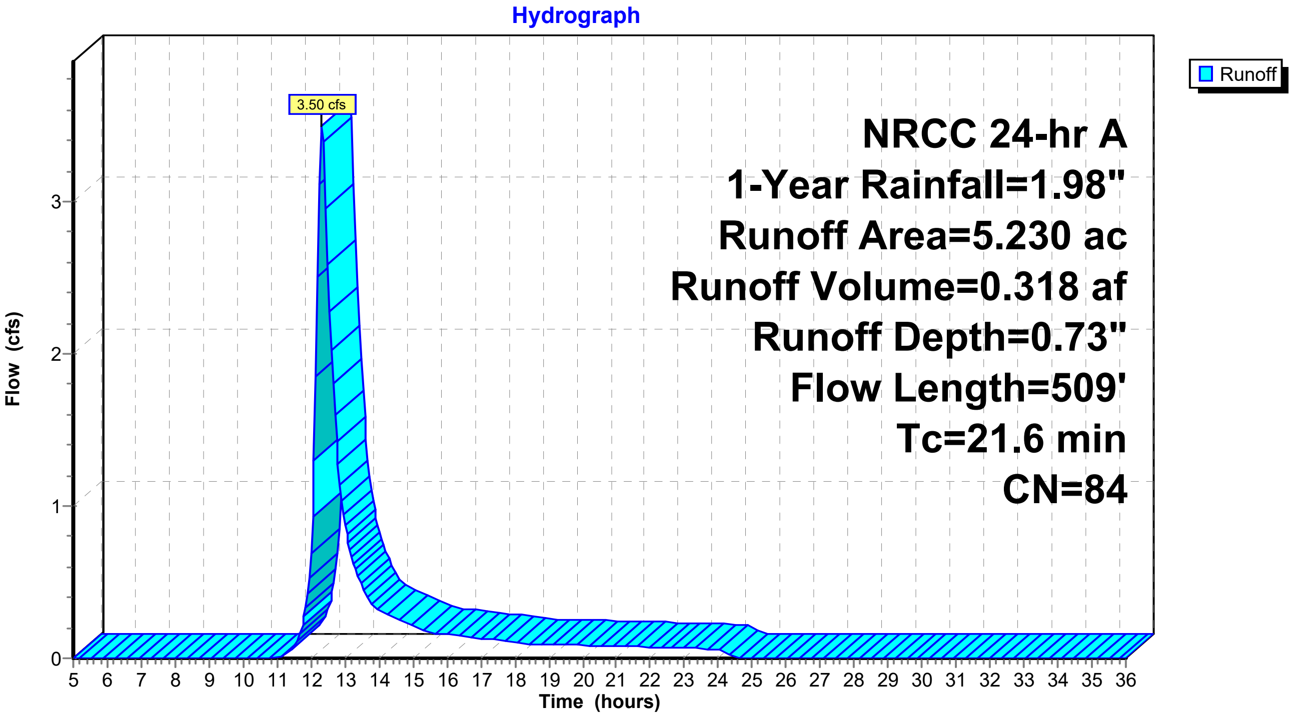
Runoff = 3.50 cfs @ 12.33 hrs, Volume= 0.318 af, Depth= 0.73"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-36.00 hrs, dt= 0.05 hrs
NRCC 24-hr A 1-Year Rainfall=1.98"

	Area (ac)	CN	Description
	2.670	80	>75% Grass cover, Good, HSG D
	1.300	77	Woods, Good, HSG D
*	1.260	98	Impervious
	5.230	84	Weighted Average
	3.970		75.91% Pervious Area
	1.260		24.09% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
19.1	100	0.0400	0.09		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.33"
0.3	73	0.0500	3.60		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.5	122	0.0700	4.26		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.6	78	0.0170	2.10		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.1	9	0.0170	2.65		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
1.0	127	0.0170	2.10		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
21.6	509	Total			

Subcatchment 1S: DA-1



Time span=5.00-36.00 hrs, dt=0.05 hrs, 621 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1S: DA-1 Runoff Area=5.230 ac 24.09% Impervious Runoff Depth=0.99"
Flow Length=509' Tc=21.6 min CN=84 Runoff=4.80 cfs 0.430 af

Total Runoff Area = 5.230 ac Runoff Volume = 0.430 af Average Runoff Depth = 0.99"
75.91% Pervious = 3.970 ac 24.09% Impervious = 1.260 ac

Summary for Subcatchment 1S: DA-1

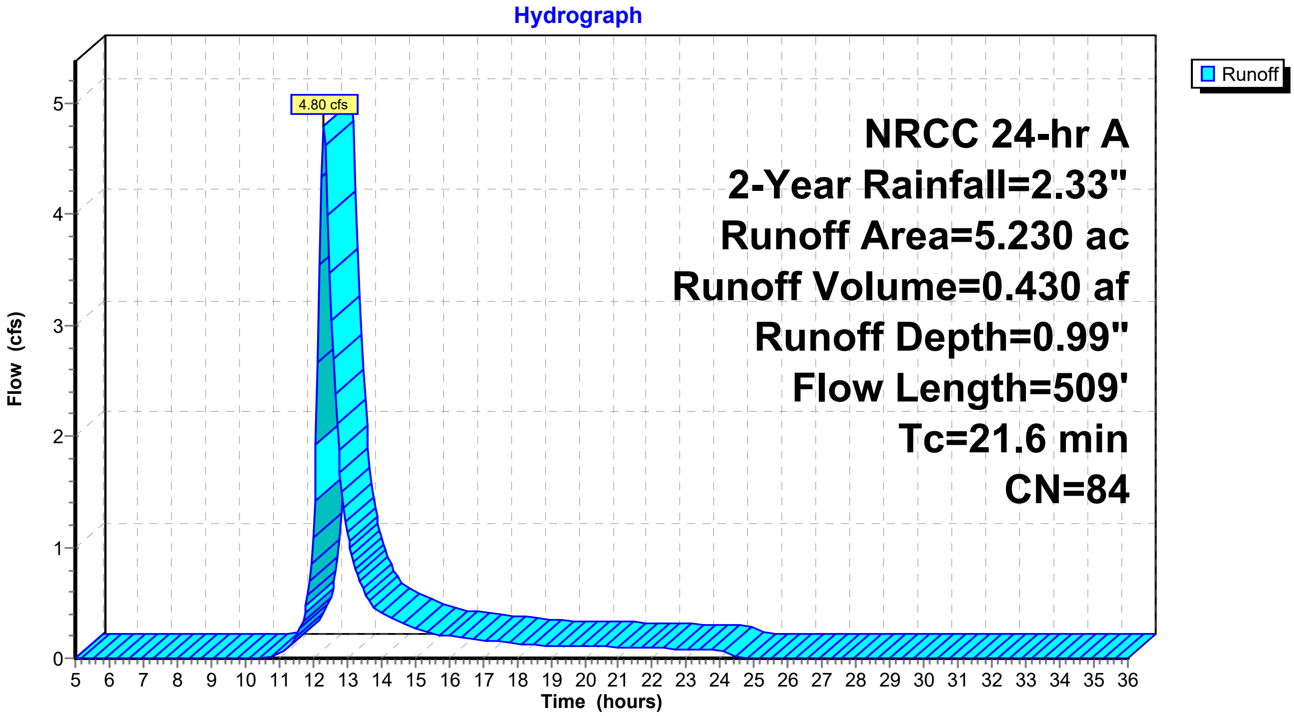
Runoff = 4.80 cfs @ 12.33 hrs, Volume= 0.430 af, Depth= 0.99"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-36.00 hrs, dt= 0.05 hrs
NRCC 24-hr A 2-Year Rainfall=2.33"

	Area (ac)	CN	Description
	2.670	80	>75% Grass cover, Good, HSG D
	1.300	77	Woods, Good, HSG D
*	1.260	98	Impervious
	5.230	84	Weighted Average
	3.970		75.91% Pervious Area
	1.260		24.09% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
19.1	100	0.0400	0.09		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.33"
0.3	73	0.0500	3.60		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.5	122	0.0700	4.26		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.6	78	0.0170	2.10		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.1	9	0.0170	2.65		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
1.0	127	0.0170	2.10		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
21.6	509	Total			

Subcatchment 1S: DA-1



Time span=5.00-36.00 hrs, dt=0.05 hrs, 621 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1S: DA-1 Runoff Area=5.230 ac 24.09% Impervious Runoff Depth=1.41"
Flow Length=509' Tc=21.6 min CN=84 Runoff=6.96 cfs 0.615 af

Total Runoff Area = 5.230 ac Runoff Volume = 0.615 af Average Runoff Depth = 1.41"
75.91% Pervious = 3.970 ac 24.09% Impervious = 1.260 ac

Summary for Subcatchment 1S: DA-1

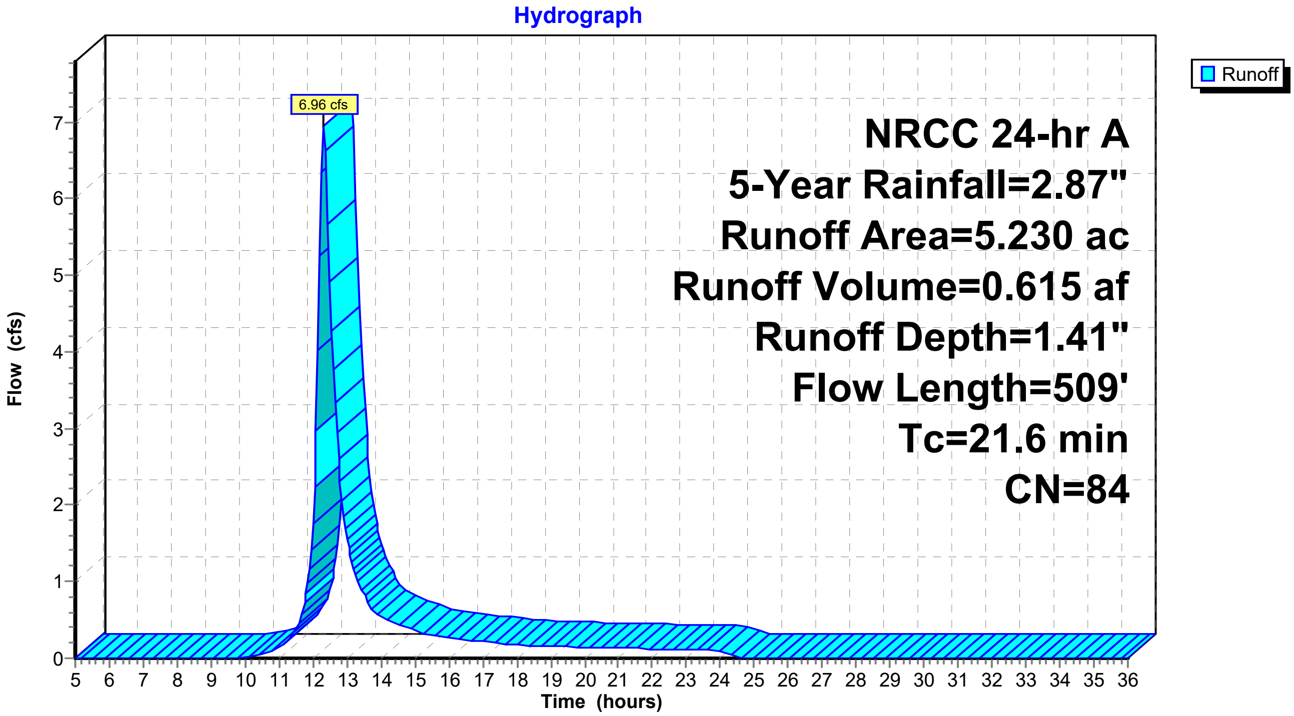
Runoff = 6.96 cfs @ 12.32 hrs, Volume= 0.615 af, Depth= 1.41"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-36.00 hrs, dt= 0.05 hrs
NRCC 24-hr A 5-Year Rainfall=2.87"

	Area (ac)	CN	Description
	2.670	80	>75% Grass cover, Good, HSG D
	1.300	77	Woods, Good, HSG D
*	1.260	98	Impervious
	5.230	84	Weighted Average
	3.970		75.91% Pervious Area
	1.260		24.09% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
19.1	100	0.0400	0.09		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.33"
0.3	73	0.0500	3.60		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.5	122	0.0700	4.26		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.6	78	0.0170	2.10		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.1	9	0.0170	2.65		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
1.0	127	0.0170	2.10		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
21.6	509	Total			

Subcatchment 1S: DA-1



Time span=5.00-36.00 hrs, dt=0.05 hrs, 621 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1S: DA-1 Runoff Area=5.230 ac 24.09% Impervious Runoff Depth=1.81"
Flow Length=509' Tc=21.6 min CN=84 Runoff=8.95 cfs 0.788 af

Total Runoff Area = 5.230 ac Runoff Volume = 0.788 af Average Runoff Depth = 1.81"
75.91% Pervious = 3.970 ac 24.09% Impervious = 1.260 ac

Summary for Subcatchment 1S: DA-1

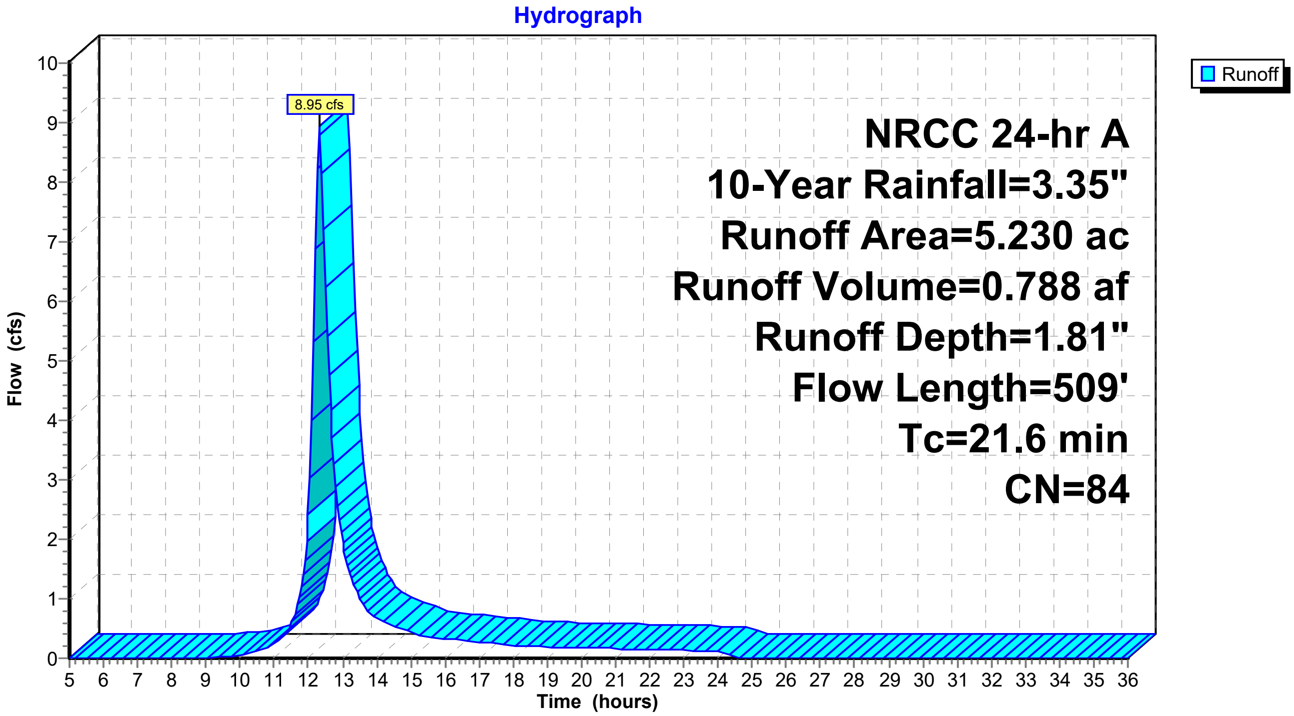
Runoff = 8.95 cfs @ 12.32 hrs, Volume= 0.788 af, Depth= 1.81"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-36.00 hrs, dt= 0.05 hrs
NRCC 24-hr A 10-Year Rainfall=3.35"

	Area (ac)	CN	Description
	2.670	80	>75% Grass cover, Good, HSG D
	1.300	77	Woods, Good, HSG D
*	1.260	98	Impervious
	5.230	84	Weighted Average
	3.970		75.91% Pervious Area
	1.260		24.09% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
19.1	100	0.0400	0.09		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.33"
0.3	73	0.0500	3.60		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.5	122	0.0700	4.26		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.6	78	0.0170	2.10		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.1	9	0.0170	2.65		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
1.0	127	0.0170	2.10		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
21.6	509	Total			

Subcatchment 1S: DA-1



Time span=5.00-36.00 hrs, dt=0.05 hrs, 621 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1S: DA-1 Runoff Area=5.230 ac 24.09% Impervious Runoff Depth=2.49"
Flow Length=509' Tc=21.6 min CN=84 Runoff=12.28 cfs 1.083 af

Total Runoff Area = 5.230 ac Runoff Volume = 1.083 af Average Runoff Depth = 2.49"
75.91% Pervious = 3.970 ac 24.09% Impervious = 1.260 ac

Summary for Subcatchment 1S: DA-1

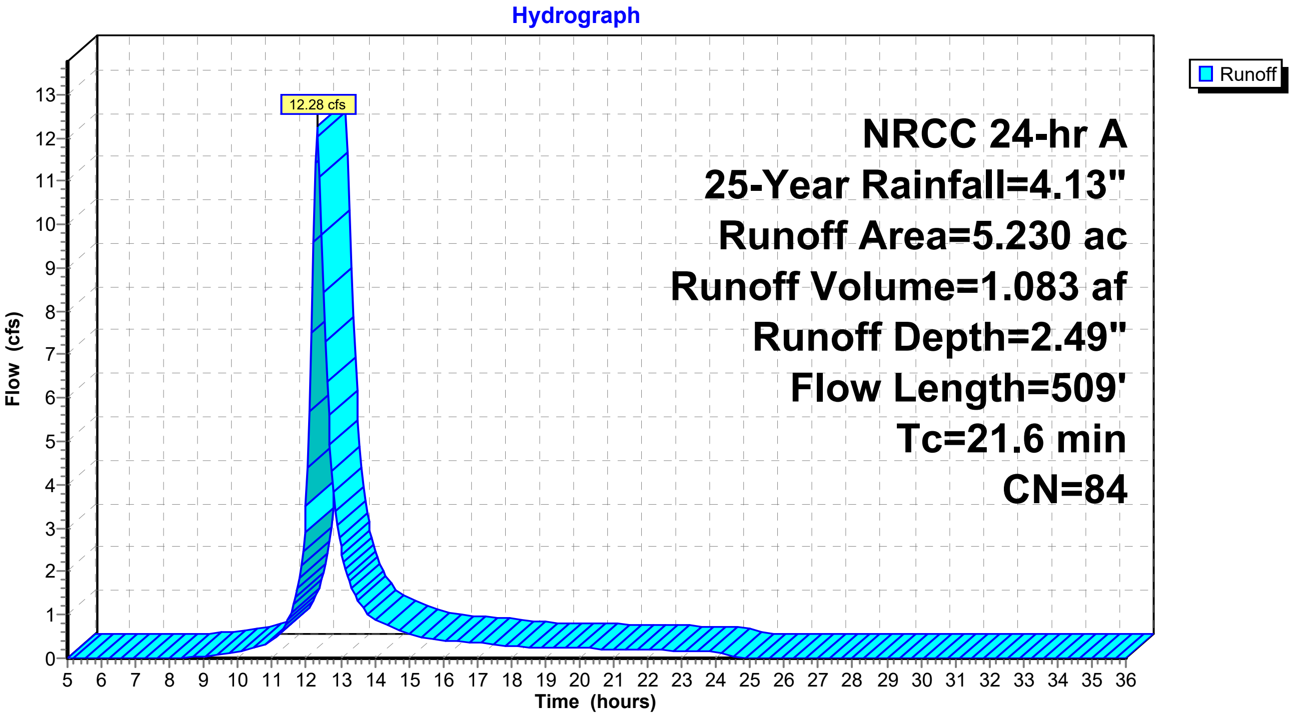
Runoff = 12.28 cfs @ 12.32 hrs, Volume= 1.083 af, Depth= 2.49"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-36.00 hrs, dt= 0.05 hrs
NRCC 24-hr A 25-Year Rainfall=4.13"

	Area (ac)	CN	Description
	2.670	80	>75% Grass cover, Good, HSG D
	1.300	77	Woods, Good, HSG D
*	1.260	98	Impervious
	5.230	84	Weighted Average
	3.970		75.91% Pervious Area
	1.260		24.09% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
19.1	100	0.0400	0.09		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.33"
0.3	73	0.0500	3.60		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.5	122	0.0700	4.26		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.6	78	0.0170	2.10		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.1	9	0.0170	2.65		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
1.0	127	0.0170	2.10		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
21.6	509	Total			

Subcatchment 1S: DA-1



Time span=5.00-36.00 hrs, dt=0.05 hrs, 621 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1S: DA-1 Runoff Area=5.230 ac 24.09% Impervious Runoff Depth=3.12"
Flow Length=509' Tc=21.6 min CN=84 Runoff=15.37 cfs 1.362 af

Total Runoff Area = 5.230 ac Runoff Volume = 1.362 af Average Runoff Depth = 3.12"
75.91% Pervious = 3.970 ac 24.09% Impervious = 1.260 ac

Summary for Subcatchment 1S: DA-1

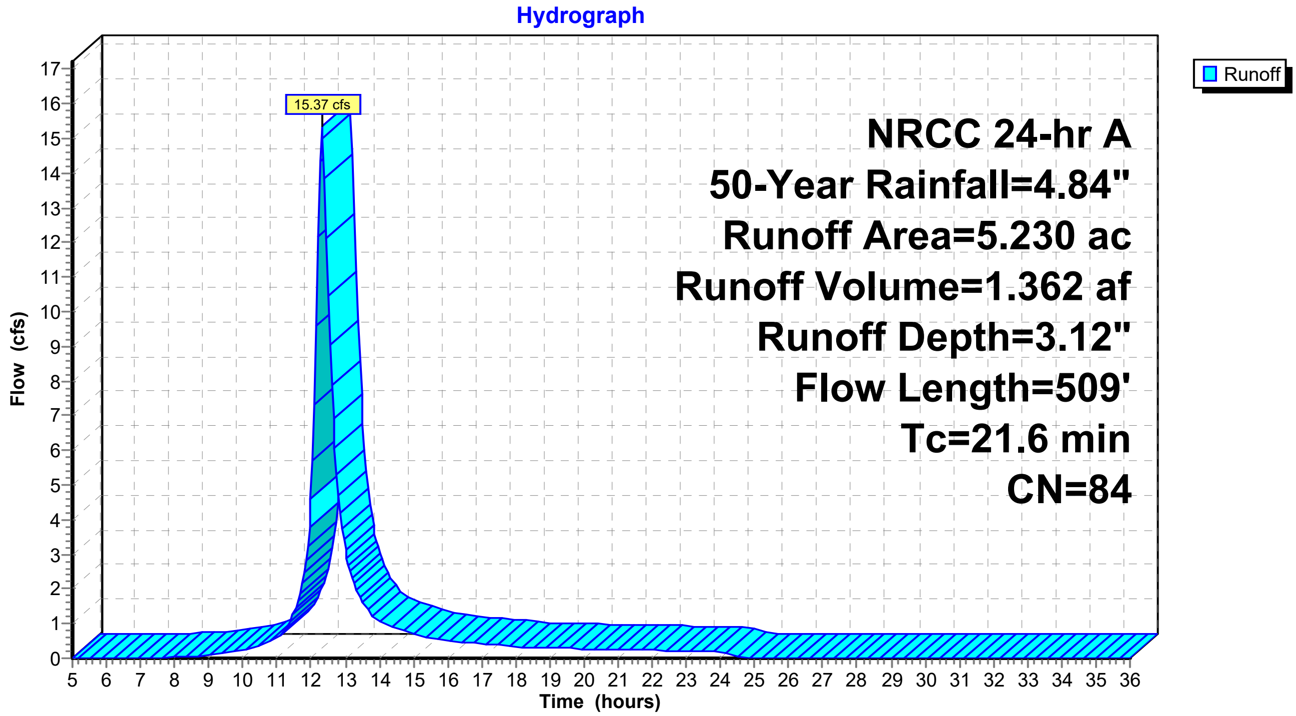
Runoff = 15.37 cfs @ 12.31 hrs, Volume= 1.362 af, Depth= 3.12"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-36.00 hrs, dt= 0.05 hrs
NRCC 24-hr A 50-Year Rainfall=4.84"

	Area (ac)	CN	Description
	2.670	80	>75% Grass cover, Good, HSG D
	1.300	77	Woods, Good, HSG D
*	1.260	98	Impervious
	5.230	84	Weighted Average
	3.970		75.91% Pervious Area
	1.260		24.09% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
19.1	100	0.0400	0.09		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.33"
0.3	73	0.0500	3.60		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.5	122	0.0700	4.26		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.6	78	0.0170	2.10		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.1	9	0.0170	2.65		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
1.0	127	0.0170	2.10		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
21.6	509	Total			

Subcatchment 1S: DA-1



Time span=5.00-36.00 hrs, dt=0.05 hrs, 621 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1S: DA-1 Runoff Area=5.230 ac 24.09% Impervious Runoff Depth=3.88"
Flow Length=509' Tc=21.6 min CN=84 Runoff=18.97 cfs 1.691 af

Total Runoff Area = 5.230 ac Runoff Volume = 1.691 af Average Runoff Depth = 3.88"
75.91% Pervious = 3.970 ac 24.09% Impervious = 1.260 ac

Summary for Subcatchment 1S: DA-1

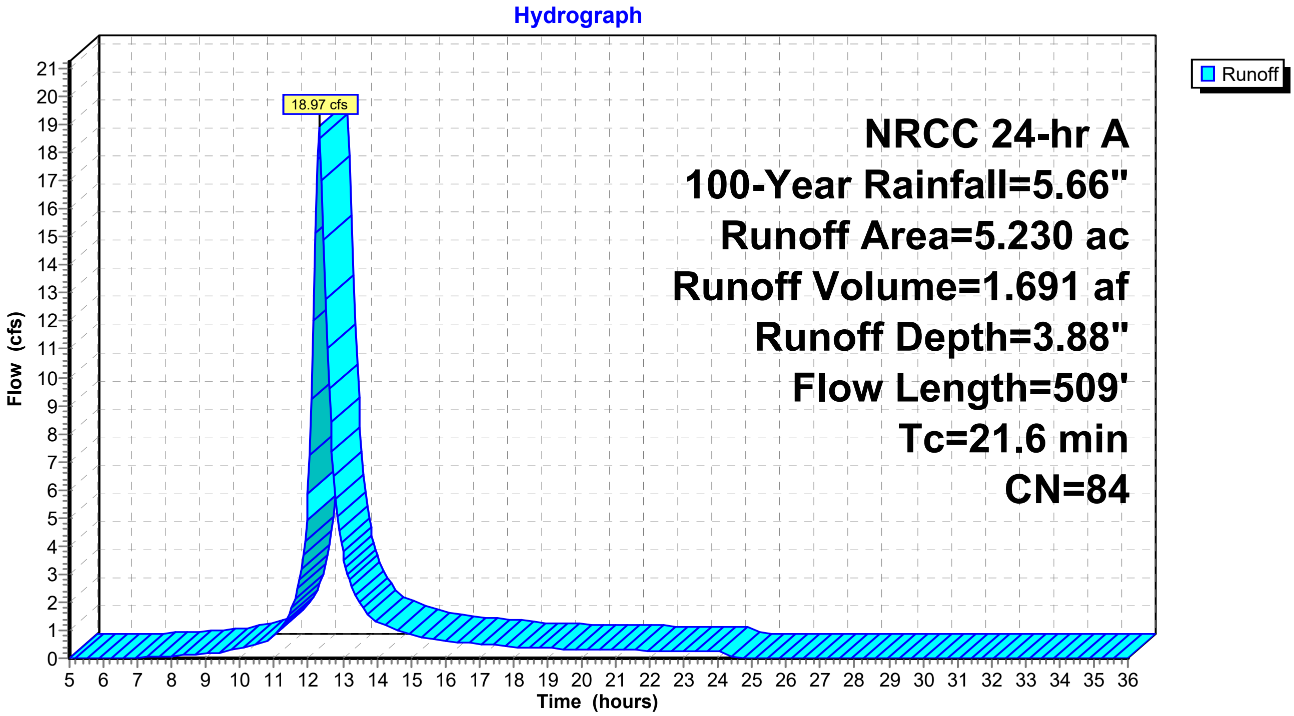
Runoff = 18.97 cfs @ 12.31 hrs, Volume= 1.691 af, Depth= 3.88"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-36.00 hrs, dt= 0.05 hrs
NRCC 24-hr A 100-Year Rainfall=5.66"

	Area (ac)	CN	Description
	2.670	80	>75% Grass cover, Good, HSG D
	1.300	77	Woods, Good, HSG D
*	1.260	98	Impervious
	5.230	84	Weighted Average
	3.970		75.91% Pervious Area
	1.260		24.09% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
19.1	100	0.0400	0.09		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.33"
0.3	73	0.0500	3.60		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.5	122	0.0700	4.26		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.6	78	0.0170	2.10		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.1	9	0.0170	2.65		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
1.0	127	0.0170	2.10		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
21.6	509	Total			

Subcatchment 1S: DA-1



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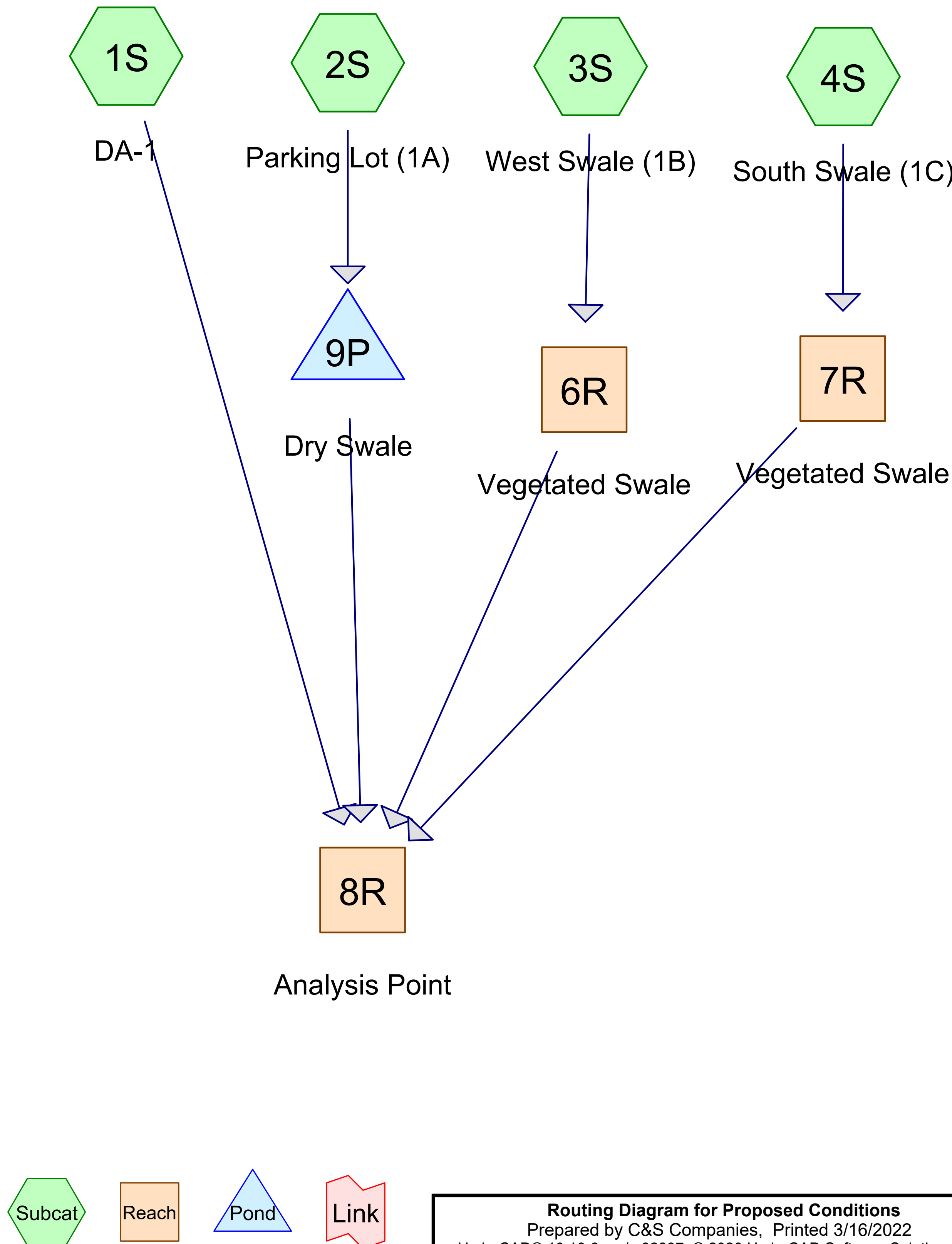


Routing Diagram for Proposed Conditions
Prepared by C&S Companies, Printed 3/16/2022
HydroCAD® 10.10-3a s/n 02837 © 2020 HydroCAD Software Solutions LLC

Rainfall Events Listing

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	1-Year	NRCC 24-hr	A	Default	24.00	1	1.98	2
2	2-Year	NRCC 24-hr	A	Default	24.00	1	2.33	2
3	5-Year	NRCC 24-hr	A	Default	24.00	1	2.87	2
4	10-Year	NRCC 24-hr	A	Default	24.00	1	3.35	2
5	25-Year	NRCC 24-hr	A	Default	24.00	1	4.13	2
6	50-Year	NRCC 24-hr	A	Default	24.00	1	4.84	2
7	100-Year	NRCC 24-hr	A	Default	24.00	1	5.66	2

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
2.420	80	>75% Grass cover, Good, HSG D (1S, 2S, 3S, 4S)
2.010	98	Impervious (1S, 2S, 3S, 4S)
0.800	77	Woods, Good, HSG D (1S, 2S)
5.230	**86**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
0.000	HSG B	
0.000	HSG C	
3.220	HSG D	1S, 2S, 3S, 4S
2.010	Other	1S, 2S, 3S, 4S
5.230		**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	0.000	2.420	0.000	2.420	>75% Grass cover, Good	1S, 2S, 3S, 4S
0.000	0.000	0.000	0.000	2.010	2.010	Impervious	1S, 2S, 3S, 4S
0.000	0.000	0.000	0.800	0.000	0.800	Woods, Good	1S, 2S
0.000	**0.000**	**0.000**	**3.220**	**2.010**	**5.230**	**TOTAL AREA**	

Pipe Listing (all nodes)

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Diam/Width (inches)	Height (inches)	Inside-Fill (inches)
1	9P	438.50	438.20	30.0	0.0100	0.011	4.0	0.0	0.0

Time span=0.00-36.00 hrs, dt=0.05 hrs, 721 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1S: DA-1 Runoff Area=3.410 ac 23.17% Impervious Runoff Depth=0.73"
Flow Length=697' Tc=23.6 min CN=84 Runoff=2.18 cfs 0.207 af

Subcatchment2S: Parking Lot (1A) Runoff Area=1.260 ac 71.43% Impervious Runoff Depth=1.30"
Tc=6.0 min CN=93 Runoff=2.42 cfs 0.136 af

Subcatchment3S: West Swale (1B) Runoff Area=0.280 ac 46.43% Impervious Runoff Depth=0.95"
Tc=6.0 min CN=88 Runoff=0.40 cfs 0.022 af

Subcatchment4S: South Swale (1C) Runoff Area=0.280 ac 67.86% Impervious Runoff Depth=1.22"
Tc=6.0 min CN=92 Runoff=0.51 cfs 0.028 af

Reach 6R: Vegetated Swale Avg. Flow Depth=0.15' Max Vel=1.03 fps Inflow=0.40 cfs 0.022 af
n=0.035 L=95.0' S=0.0100 '/' Capacity=45.18 cfs Outflow=0.37 cfs 0.022 af

Reach 7R: Vegetated Swale Avg. Flow Depth=0.13' Max Vel=1.55 fps Inflow=0.51 cfs 0.028 af
n=0.035 L=120.0' S=0.0267 '/' Capacity=73.78 cfs Outflow=0.47 cfs 0.028 af

Reach 8R: Analysis Point Inflow=2.83 cfs 0.394 af
Outflow=2.83 cfs 0.394 af

Pond 9P: Dry Swale Peak Elev=439.66' Storage=2,668 cf Inflow=2.42 cfs 0.136 af
Outflow=0.33 cfs 0.136 af

Total Runoff Area = 5.230 ac Runoff Volume = 0.394 af Average Runoff Depth = 0.90"
61.57% Pervious = 3.220 ac 38.43% Impervious = 2.010 ac

Summary for Subcatchment 1S: DA-1

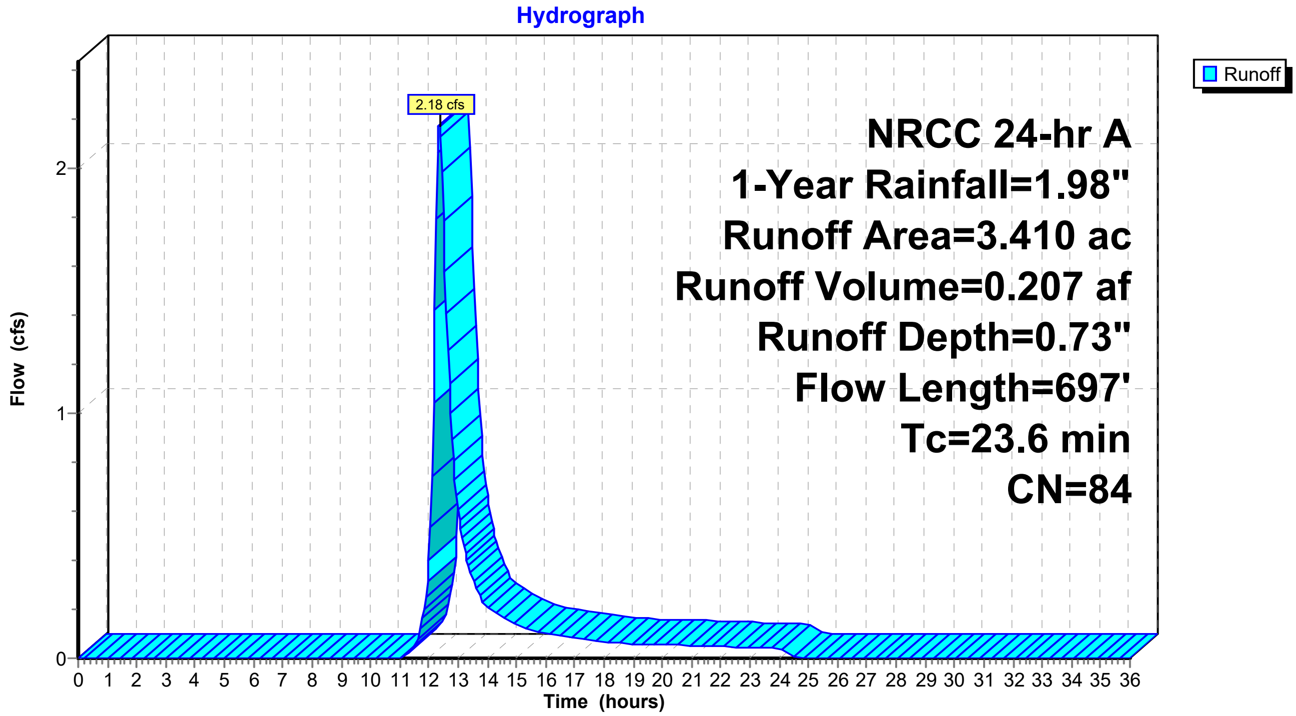
Runoff = 2.18 cfs @ 12.36 hrs, Volume= 0.207 af, Depth= 0.73"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
NRCC 24-hr A 1-Year Rainfall=1.98"

	Area (ac)	CN	Description
	1.880	80	>75% Grass cover, Good, HSG D
	0.740	77	Woods, Good, HSG D
*	0.790	98	Impervious
	3.410	84	Weighted Average
	2.620		76.83% Pervious Area
	0.790		23.17% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
19.1	100	0.0400	0.09		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.33"
0.3	73	0.0500	3.60		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.0	13	0.0800	4.55		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.0	20	0.3300	9.25		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
1.7	114	0.0050	1.14		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.5	85	0.0350	3.01		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.5	73	0.0270	2.65		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.4	53	0.0150	1.97		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.1	10	0.0150	2.49		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.1	14	0.0150	1.97		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.9	142	0.0280	2.69		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
23.6	697	Total			

Subcatchment 1S: DA-1



Summary for Subcatchment 2S: Parking Lot (1A)

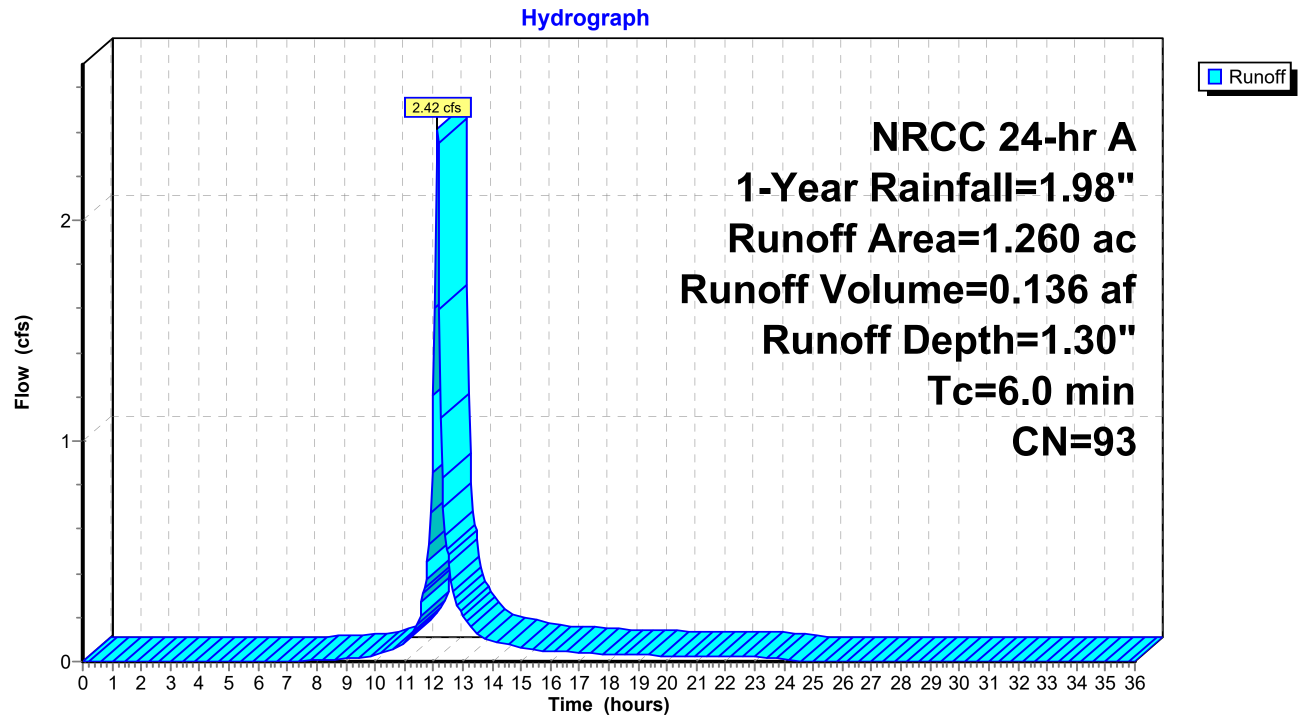
Runoff = 2.42 cfs @ 12.13 hrs, Volume= 0.136 af, Depth= 1.30"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
NRCC 24-hr A 1-Year Rainfall=1.98"

	Area (ac)	CN	Description
*	0.900	98	Impervious
	0.060	77	Woods, Good, HSG D
	0.300	80	>75% Grass cover, Good, HSG D
	1.260	93	Weighted Average
	0.360		28.57% Pervious Area
	0.900		71.43% Impervious Area

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

Subcatchment 2S: Parking Lot (1A)



Summary for Subcatchment 3S: West Swale (1B)

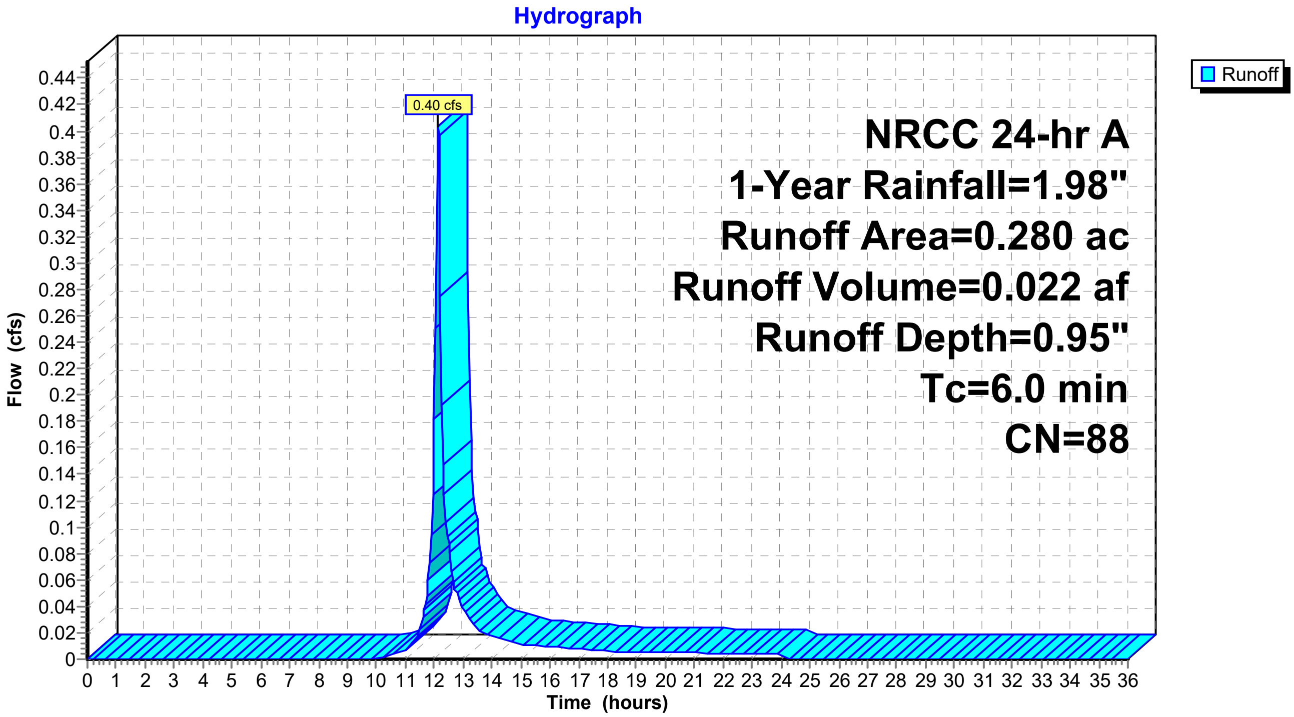
Runoff = 0.40 cfs @ 12.13 hrs, Volume= 0.022 af, Depth= 0.95"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
NRCC 24-hr A 1-Year Rainfall=1.98"

	Area (ac)	CN	Description
*	0.130	98	Impervious
	0.150	80	>75% Grass cover, Good, HSG D
	0.280	88	Weighted Average
	0.150		53.57% Pervious Area
	0.130		46.43% Impervious Area

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

Subcatchment 3S: West Swale (1B)



Summary for Subcatchment 4S: South Swale (1C)

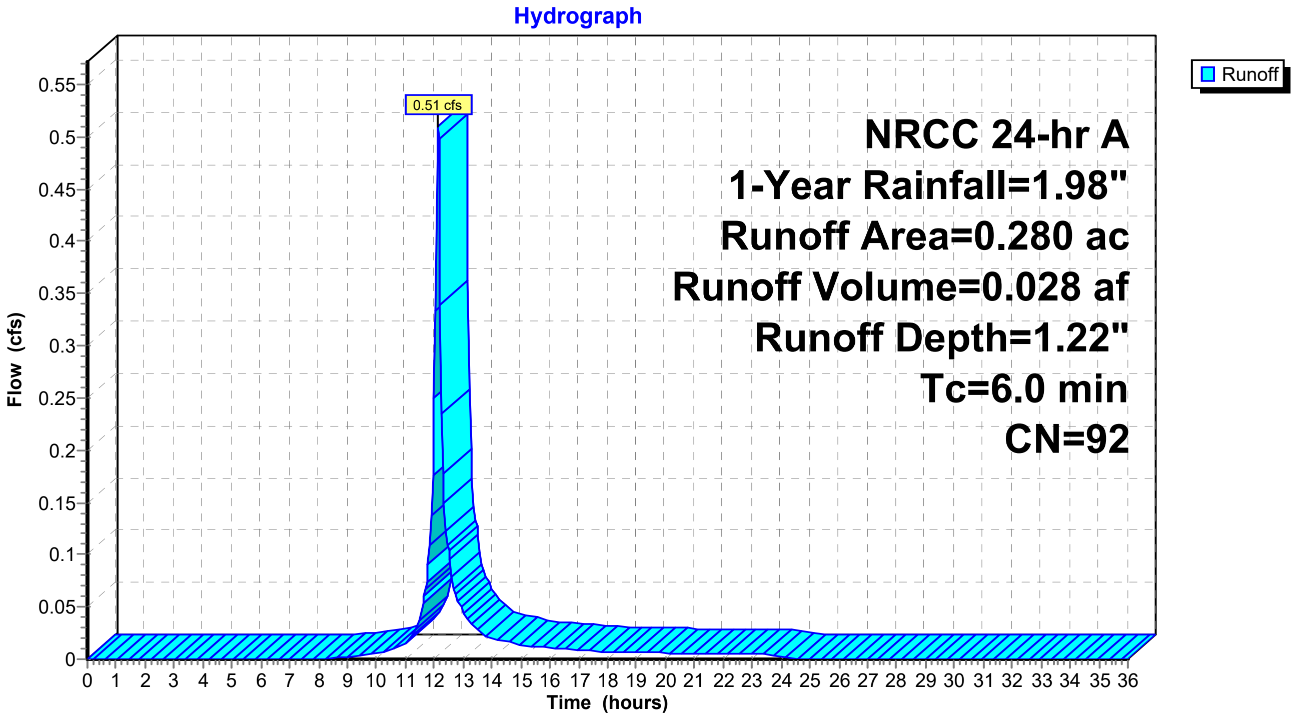
Runoff = 0.51 cfs @ 12.13 hrs, Volume= 0.028 af, Depth= 1.22"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
NRCC 24-hr A 1-Year Rainfall=1.98"

	Area (ac)	CN	Description
*	0.190	98	Impervious
	0.090	80	>75% Grass cover, Good, HSG D
	0.280	92	Weighted Average
	0.090		32.14% Pervious Area
	0.190		67.86% Impervious Area

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

Subcatchment 4S: South Swale (1C)



Summary for Reach 6R: Vegetated Swale

Inflow Area = 0.280 ac, 46.43% Impervious, Inflow Depth = 0.95" for 1-Year event
Inflow = 0.40 cfs @ 12.13 hrs, Volume= 0.022 af
Outflow = 0.37 cfs @ 12.18 hrs, Volume= 0.022 af, Atten= 9%, Lag= 2.6 min

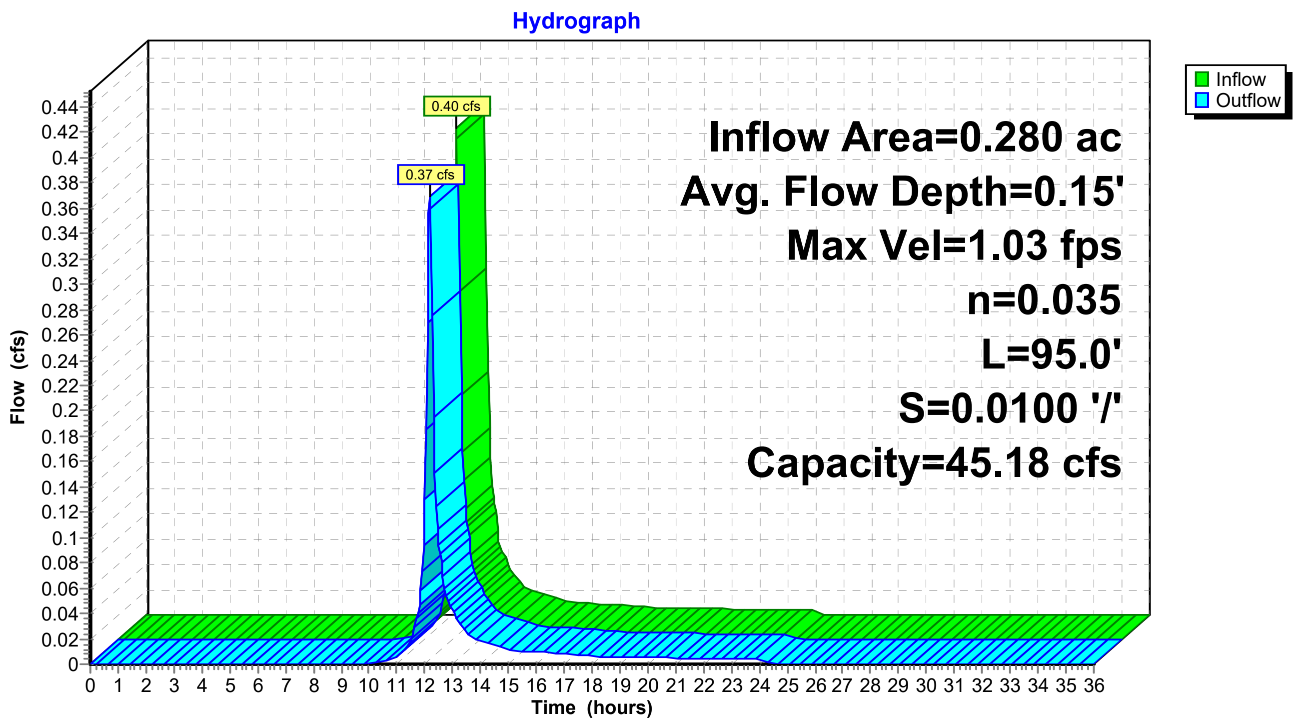
Routing by Stor-Ind+Trans method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.03 fps, Min. Travel Time= 1.5 min
Avg. Velocity = 0.31 fps, Avg. Travel Time= 5.1 min

Peak Storage= 36 cf @ 12.15 hrs
Average Depth at Peak Storage= 0.15' , Surface Width= 3.18'
Bank-Full Depth= 1.50' Flow Area= 12.0 sf, Capacity= 45.18 cfs

2.00' x 1.50' deep channel, n= 0.035 High grass
Side Slope Z-value= 4.0 '/' Top Width= 14.00'
Length= 95.0' Slope= 0.0100 '/'
Inlet Invert= 435.08', Outlet Invert= 434.13'

‡

Reach 6R: Vegetated Swale



Stage-Area-Storage for Reach 6R: Vegetated Swale

Elevation (feet)	End-Area (sq-ft)	Storage (cubic-feet)	Elevation (feet)	End-Area (sq-ft)	Storage (cubic-feet)
435.08	0.0	0	436.10	6.2	589
435.10	0.0	4	436.12	6.4	609
435.12	0.1	8	436.14	6.6	628
435.14	0.1	13	436.16	6.8	648
435.16	0.2	18	436.18	7.0	669
435.18	0.2	23	436.20	7.3	689
435.20	0.3	28	436.22	7.5	710
435.22	0.4	34	436.24	7.7	732
435.24	0.4	40	436.26	7.9	753
435.26	0.5	47	436.28	8.2	775
435.28	0.6	53	436.30	8.4	797
435.30	0.6	60	436.32	8.6	820
435.32	0.7	67	436.34	8.9	843
435.34	0.8	75	436.36	9.1	866
435.36	0.9	83	436.38	9.4	889
435.38	1.0	91	436.40	9.6	913
435.40	1.0	100	436.42	9.9	937
435.42	1.1	109	436.44	10.1	961
435.44	1.2	118	436.46	10.4	986
435.46	1.3	127	436.48	10.6	1,011
435.48	1.4	137	436.50	10.9	1,036
435.50	1.5	147	436.52	11.2	1,062
435.52	1.7	157	436.54	11.4	1,087
435.54	1.8	168	436.56	11.7	1,114
435.56	1.9	179	436.58	**12.0**	**1,140**
435.58	2.0	190			
435.60	2.1	202			
435.62	2.2	213			
435.64	2.4	226			
435.66	2.5	238			
435.68	2.6	251			
435.70	2.8	264			
435.72	2.9	277			
435.74	3.1	291			
435.76	3.2	305			
435.78	3.4	319			
435.80	3.5	334			
435.82	3.7	349			
435.84	3.8	364			
435.86	4.0	379			
435.88	4.2	395			
435.90	4.3	411			
435.92	4.5	428			
435.94	4.7	444			
435.96	4.9	461			
435.98	5.0	479			
436.00	5.2	496			
436.02	5.4	514			
436.04	5.6	533			
436.06	5.8	551			
436.08	6.0	570			

Summary for Reach 7R: Vegetated Swale

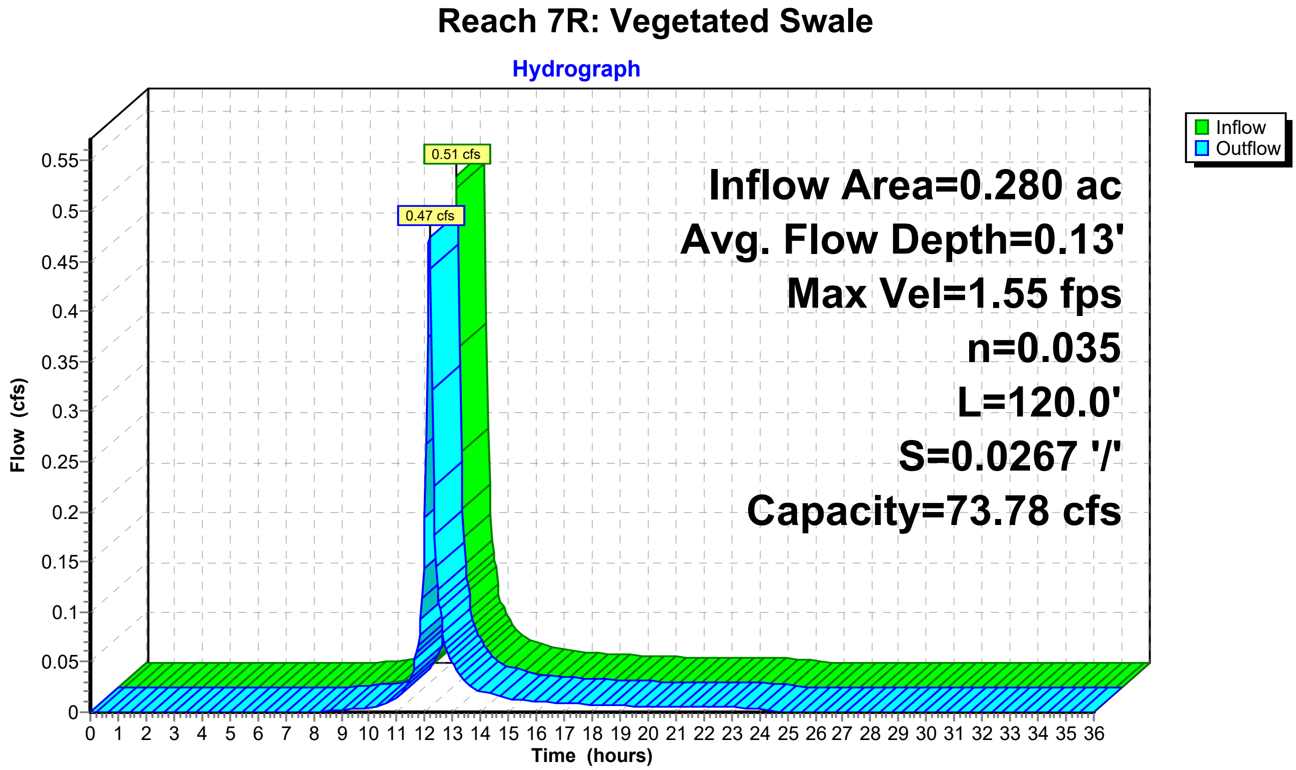
Inflow Area = 0.280 ac, 67.86% Impervious, Inflow Depth = 1.22" for 1-Year event
Inflow = 0.51 cfs @ 12.13 hrs, Volume= 0.028 af
Outflow = 0.47 cfs @ 12.16 hrs, Volume= 0.028 af, Atten= 7%, Lag= 2.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.55 fps, Min. Travel Time= 1.3 min
Avg. Velocity = 0.48 fps, Avg. Travel Time= 4.2 min

Peak Storage= 39 cf @ 12.15 hrs
Average Depth at Peak Storage= 0.13' , Surface Width= 3.03'
Bank-Full Depth= 1.50' Flow Area= 12.0 sf, Capacity= 73.78 cfs

2.00' x 1.50' deep channel, n= 0.035 High grass
Side Slope Z-value= 4.0 '/' Top Width= 14.00'
Length= 120.0' Slope= 0.0267 '/'
Inlet Invert= 438.00', Outlet Invert= 434.80'

‡



Stage-Area-Storage for Reach 7R: Vegetated Swale

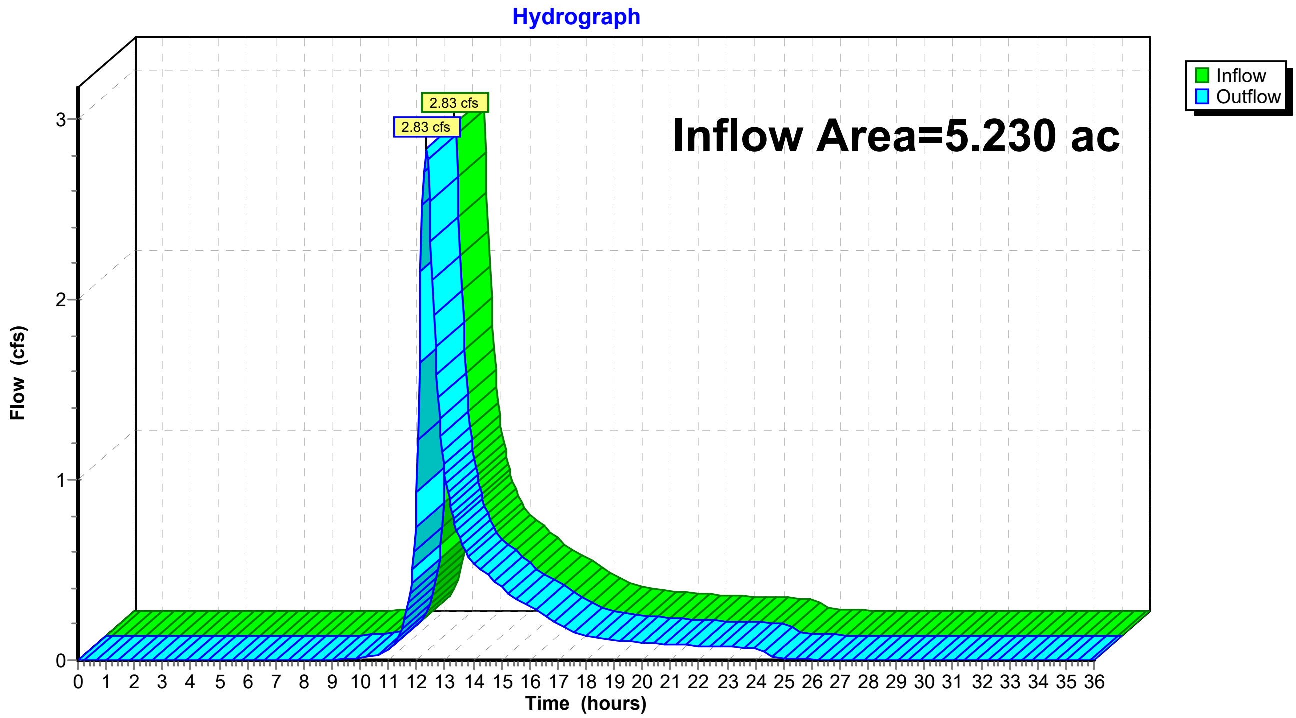
Elevation (feet)	End-Area (sq-ft)	Storage (cubic-feet)	Elevation (feet)	End-Area (sq-ft)	Storage (cubic-feet)
438.00	0.0	0	439.02	6.2	744
438.02	0.0	5	439.04	6.4	769
438.04	0.1	10	439.06	6.6	794
438.06	0.1	16	439.08	6.8	819
438.08	0.2	22	439.10	7.0	845
438.10	0.2	29	439.12	7.3	871
438.12	0.3	36	439.14	7.5	897
438.14	0.4	43	439.16	7.7	924
438.16	0.4	51	439.18	7.9	952
438.18	0.5	59	439.20	8.2	979
438.20	0.6	67	439.22	8.4	1,007
438.22	0.6	76	439.24	8.6	1,036
438.24	0.7	85	439.26	8.9	1,064
438.26	0.8	95	439.28	9.1	1,094
438.28	0.9	105	439.30	9.4	1,123
438.30	1.0	115	439.32	9.6	1,153
438.32	1.0	126	439.34	9.9	1,184
438.34	1.1	137	439.36	10.1	1,214
438.36	1.2	149	439.38	10.4	1,245
438.38	1.3	161	439.40	10.6	1,277
438.40	1.4	173	439.42	10.9	1,309
438.42	1.5	185	439.44	11.2	1,341
438.44	1.7	199	439.46	11.4	1,374
438.46	1.8	212	439.48	11.7	1,407
438.48	1.9	226	439.50	**12.0**	**1,440**
438.50	2.0	240			
438.52	2.1	255			
438.54	2.2	270			
438.56	2.4	285			
438.58	2.5	301			
438.60	2.6	317			
438.62	2.8	333			
438.64	2.9	350			
438.66	3.1	367			
438.68	3.2	385			
438.70	3.4	403			
438.72	3.5	422			
438.74	3.7	440			
438.76	3.8	460			
438.78	4.0	479			
438.80	4.2	499			
438.82	4.3	520			
438.84	4.5	540			
438.86	4.7	561			
438.88	4.9	583			
438.90	5.0	605			
438.92	5.2	627			
438.94	5.4	650			
438.96	5.6	673			
438.98	5.8	696			
439.00	6.0	720			

Summary for Reach 8R: Analysis Point

Inflow Area = 5.230 ac, 38.43% Impervious, Inflow Depth > 0.90" for 1-Year event
Inflow = 2.83 cfs @ 12.33 hrs, Volume= 0.394 af
Outflow = 2.83 cfs @ 12.33 hrs, Volume= 0.394 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

Reach 8R: Analysis Point



Summary for Pond 9P: Dry Swale

Inflow Area = 1.260 ac, 71.43% Impervious, Inflow Depth = 1.30" for 1-Year event
Inflow = 2.42 cfs @ 12.13 hrs, Volume= 0.136 af
Outflow = 0.33 cfs @ 12.64 hrs, Volume= 0.136 af, Atten= 86%, Lag= 30.4 min
Primary = 0.33 cfs @ 12.64 hrs, Volume= 0.136 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 439.66' @ 12.64 hrs Surf.Area= 3,416 sf Storage= 2,668 cf

Plug-Flow detention time= 100.4 min calculated for 0.136 af (100% of inflow)
Center-of-Mass det. time= 99.6 min (901.9 - 802.4)

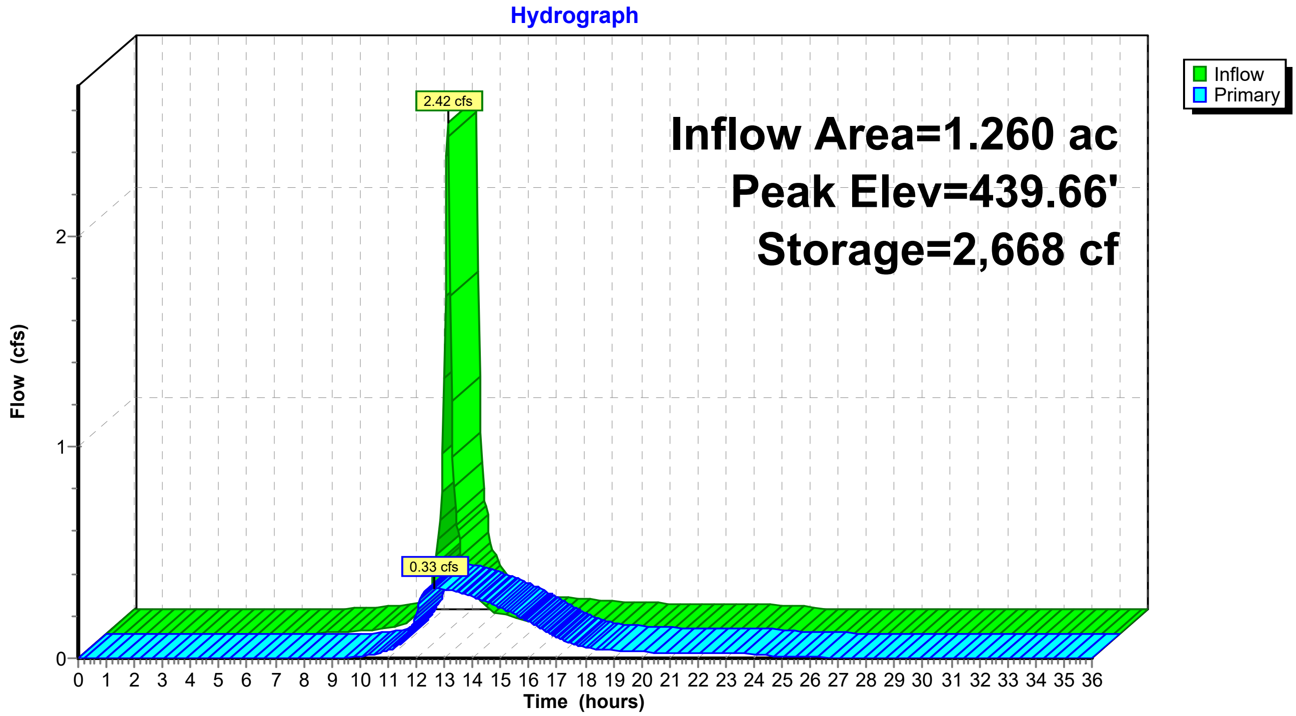
Volume	Invert	Avail.Storage	Storage Description
#1	438.50'	6,120 cf	**Custom Stage Data (Conic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
438.50	1,245	0	0	1,245
439.50	3,157	2,128	2,128	3,164
440.50	4,890	3,992	6,120	4,911

Device	Routing	Invert	Outlet Devices
#1	Primary	440.00'	**10.0' long x 2.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32
#2	Primary	438.50'	**4.0" Round Culvert** L= 30.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 438.50' / 438.20' S= 0.0100 '/' Cc= 0.900 n= 0.011 PVC, smooth interior, Flow Area= 0.09 sf

Primary OutFlow Max=0.33 cfs @ 12.64 hrs HW=439.66' (Free Discharge)
├─**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)
└─**2=Culvert** (Inlet Controls 0.33 cfs @ 3.80 fps)

Pond 9P: Dry Swale



Stage-Area-Storage for Pond 9P: Dry Swale

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
438.50	1,245	0	439.52	3,188	2,192
438.52	1,275	25	439.54	3,219	2,256
438.54	1,305	51	439.56	3,250	2,320
438.56	1,335	77	439.58	3,282	2,386
438.58	1,366	104	439.60	3,313	2,452
438.60	1,397	132	439.62	3,345	2,518
438.62	1,428	160	439.64	3,377	2,585
438.64	1,460	189	439.66	3,409	2,653
438.66	1,492	219	439.68	3,441	2,722
438.68	1,525	249	439.70	3,473	2,791
438.70	1,557	280	439.72	3,506	2,861
438.72	1,591	311	439.74	3,538	2,931
438.74	1,624	343	439.76	3,571	3,002
438.76	1,658	376	439.78	3,604	3,074
438.78	1,692	410	439.80	3,637	3,146
438.80	1,727	444	439.82	3,670	3,220
438.82	1,762	479	439.84	3,704	3,293
438.84	1,797	514	439.86	3,737	3,368
438.86	1,833	551	439.88	3,771	3,443
438.88	1,869	588	439.90	3,805	3,519
438.90	1,905	625	439.92	3,839	3,595
438.92	1,942	664	439.94	3,873	3,672
438.94	1,979	703	439.96	3,907	3,750
438.96	2,016	743	439.98	3,942	3,828
438.98	2,054	784	440.00	3,976	3,908
439.00	2,092	825	440.02	4,011	3,987
439.02	2,130	867	440.04	4,046	4,068
439.04	2,169	910	440.06	4,081	4,149
439.06	2,208	954	440.08	4,116	4,231
439.08	2,248	999	440.10	4,151	4,314
439.10	2,287	1,044	440.12	4,187	4,397
439.12	2,328	1,090	440.14	4,223	4,481
439.14	2,368	1,137	440.16	4,258	4,566
439.16	2,409	1,185	440.18	4,294	4,652
439.18	2,450	1,233	440.20	4,330	4,738
439.20	2,492	1,283	440.22	4,367	4,825
439.22	2,534	1,333	440.24	4,403	4,913
439.24	2,576	1,384	440.26	4,440	5,001
439.26	2,618	1,436	440.28	4,476	5,090
439.28	2,661	1,489	440.30	4,513	5,180
439.30	2,705	1,543	440.32	4,550	5,271
439.32	2,748	1,597	440.34	4,587	5,362
439.34	2,792	1,653	440.36	4,625	5,454
439.36	2,837	1,709	440.38	4,662	5,547
439.38	2,881	1,766	440.40	4,700	5,641
439.40	2,926	1,824	440.42	4,737	5,735
439.42	2,972	1,883	440.44	4,775	5,830
439.44	3,018	1,943	440.46	4,813	5,926
439.46	3,064	2,004	440.48	4,852	6,023
439.48	3,110	2,066	440.50	**4,890**	**6,120**
439.50	3,157	2,128			

Time span=0.00-36.00 hrs, dt=0.05 hrs, 721 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1S: DA-1 Runoff Area=3.410 ac 23.17% Impervious Runoff Depth=0.99"
Flow Length=697' Tc=23.6 min CN=84 Runoff=2.99 cfs 0.280 af

Subcatchment2S: Parking Lot (1A) Runoff Area=1.260 ac 71.43% Impervious Runoff Depth=1.62"
Tc=6.0 min CN=93 Runoff=2.99 cfs 0.170 af

Subcatchment3S: West Swale (1B) Runoff Area=0.280 ac 46.43% Impervious Runoff Depth=1.24"
Tc=6.0 min CN=88 Runoff=0.52 cfs 0.029 af

Subcatchment4S: South Swale (1C) Runoff Area=0.280 ac 67.86% Impervious Runoff Depth=1.54"
Tc=6.0 min CN=92 Runoff=0.64 cfs 0.036 af

Reach 6R: Vegetated Swale Avg. Flow Depth=0.17' Max Vel=1.12 fps Inflow=0.52 cfs 0.029 af
n=0.035 L=95.0' S=0.0100 '/' Capacity=45.18 cfs Outflow=0.48 cfs 0.029 af

Reach 7R: Vegetated Swale Avg. Flow Depth=0.15' Max Vel=1.67 fps Inflow=0.64 cfs 0.036 af
n=0.035 L=120.0' S=0.0267 '/' Capacity=73.78 cfs Outflow=0.60 cfs 0.036 af

Reach 8R: Analysis Point Inflow=3.76 cfs 0.515 af
Outflow=3.76 cfs 0.515 af

Pond 9P: Dry Swale Peak Elev=439.88' Storage=3,442 cf Inflow=2.99 cfs 0.170 af
Outflow=0.37 cfs 0.170 af

Total Runoff Area = 5.230 ac Runoff Volume = 0.515 af Average Runoff Depth = 1.18"
61.57% Pervious = 3.220 ac 38.43% Impervious = 2.010 ac

Summary for Subcatchment 1S: DA-1

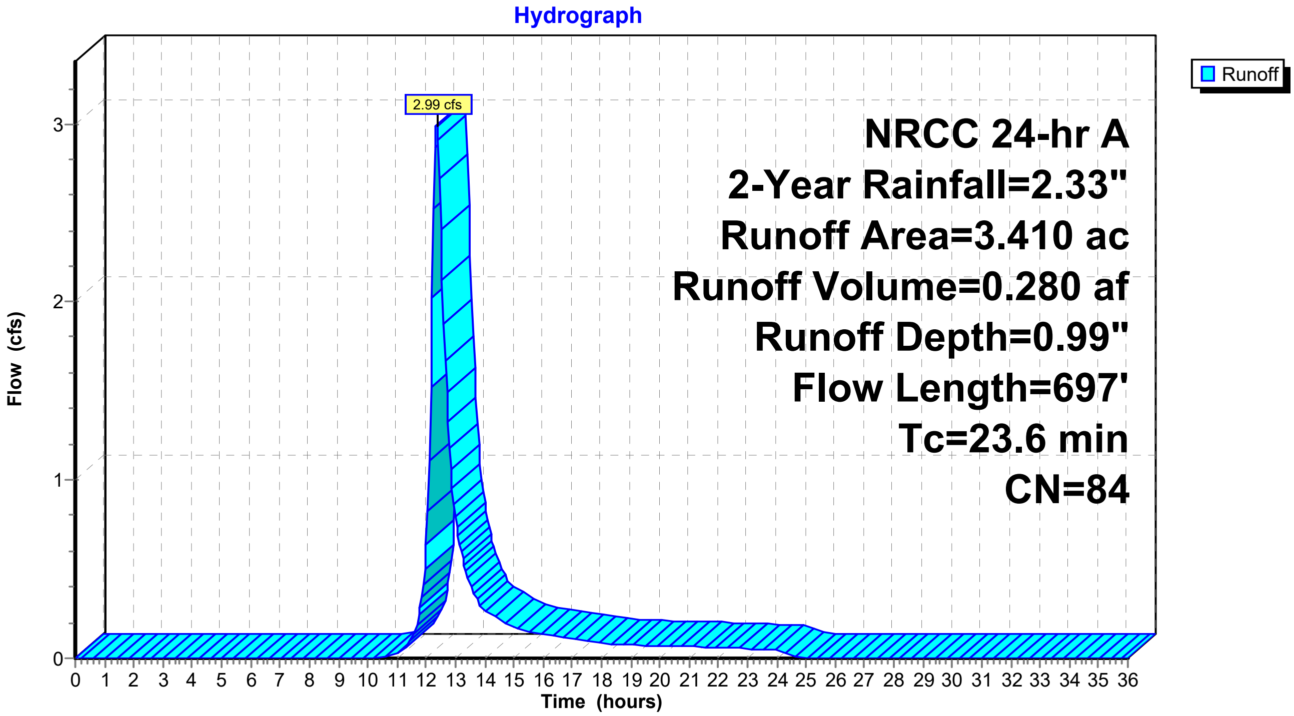
Runoff = 2.99 cfs @ 12.36 hrs, Volume= 0.280 af, Depth= 0.99"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
NRCC 24-hr A 2-Year Rainfall=2.33"

	Area (ac)	CN	Description
	1.880	80	>75% Grass cover, Good, HSG D
	0.740	77	Woods, Good, HSG D
*	0.790	98	Impervious
	3.410	84	Weighted Average
	2.620		76.83% Pervious Area
	0.790		23.17% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
19.1	100	0.0400	0.09		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.33"
0.3	73	0.0500	3.60		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.0	13	0.0800	4.55		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.0	20	0.3300	9.25		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
1.7	114	0.0050	1.14		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.5	85	0.0350	3.01		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.5	73	0.0270	2.65		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.4	53	0.0150	1.97		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.1	10	0.0150	2.49		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.1	14	0.0150	1.97		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.9	142	0.0280	2.69		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
23.6	697	Total			

Subcatchment 1S: DA-1



Summary for Subcatchment 2S: Parking Lot (1A)

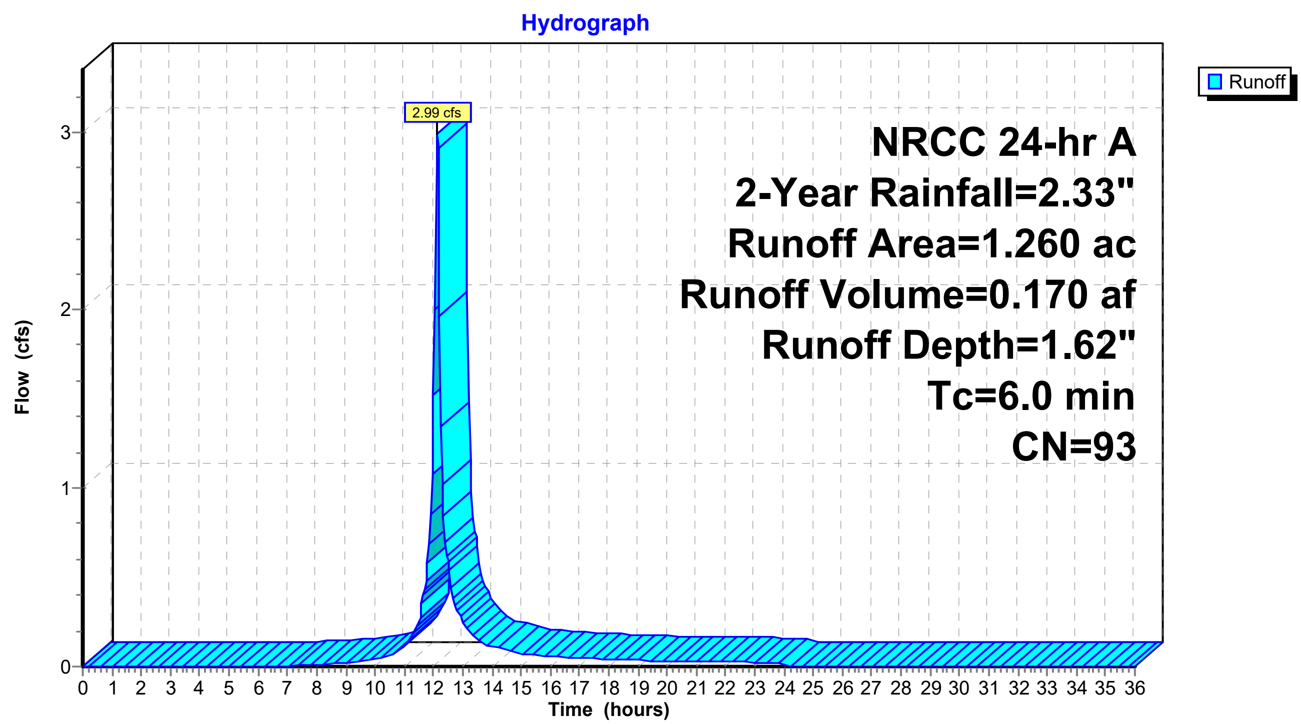
Runoff = 2.99 cfs @ 12.13 hrs, Volume= 0.170 af, Depth= 1.62"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
NRCC 24-hr A 2-Year Rainfall=2.33"

	Area (ac)	CN	Description
*	0.900	98	Impervious
	0.060	77	Woods, Good, HSG D
	0.300	80	>75% Grass cover, Good, HSG D
	1.260	93	Weighted Average
	0.360		28.57% Pervious Area
	0.900		71.43% Impervious Area

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

Subcatchment 2S: Parking Lot (1A)



Summary for Subcatchment 3S: West Swale (1B)

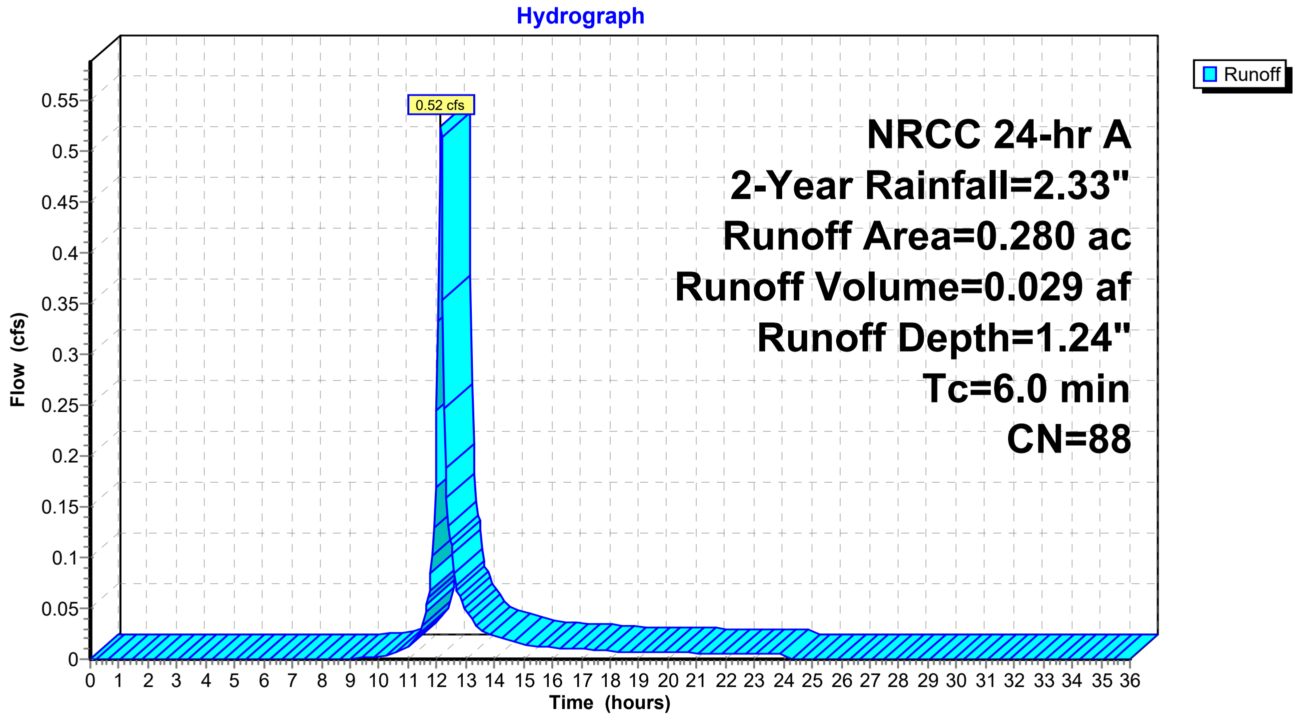
Runoff = 0.52 cfs @ 12.13 hrs, Volume= 0.029 af, Depth= 1.24"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
NRCC 24-hr A 2-Year Rainfall=2.33"

	Area (ac)	CN	Description
*	0.130	98	Impervious
	0.150	80	>75% Grass cover, Good, HSG D
	0.280	88	Weighted Average
	0.150		53.57% Pervious Area
	0.130		46.43% Impervious Area

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

Subcatchment 3S: West Swale (1B)



Summary for Subcatchment 4S: South Swale (1C)

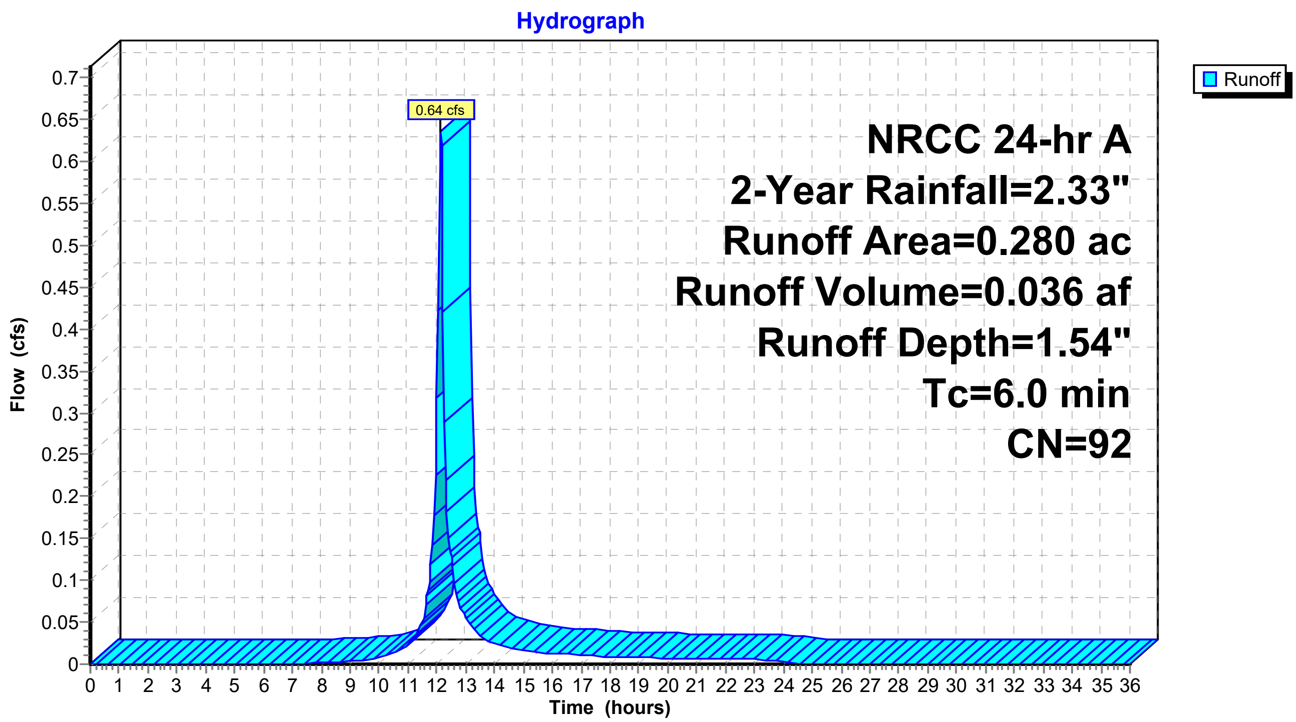
Runoff = 0.64 cfs @ 12.13 hrs, Volume= 0.036 af, Depth= 1.54"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
NRCC 24-hr A 2-Year Rainfall=2.33"

	Area (ac)	CN	Description
*	0.190	98	Impervious
	0.090	80	>75% Grass cover, Good, HSG D
	0.280	92	Weighted Average
	0.090		32.14% Pervious Area
	0.190		67.86% Impervious Area

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

Subcatchment 4S: South Swale (1C)



Summary for Reach 6R: Vegetated Swale

Inflow Area = 0.280 ac, 46.43% Impervious, Inflow Depth = 1.24" for 2-Year event
Inflow = 0.52 cfs @ 12.13 hrs, Volume= 0.029 af
Outflow = 0.48 cfs @ 12.17 hrs, Volume= 0.029 af, Atten= 8%, Lag= 2.3 min

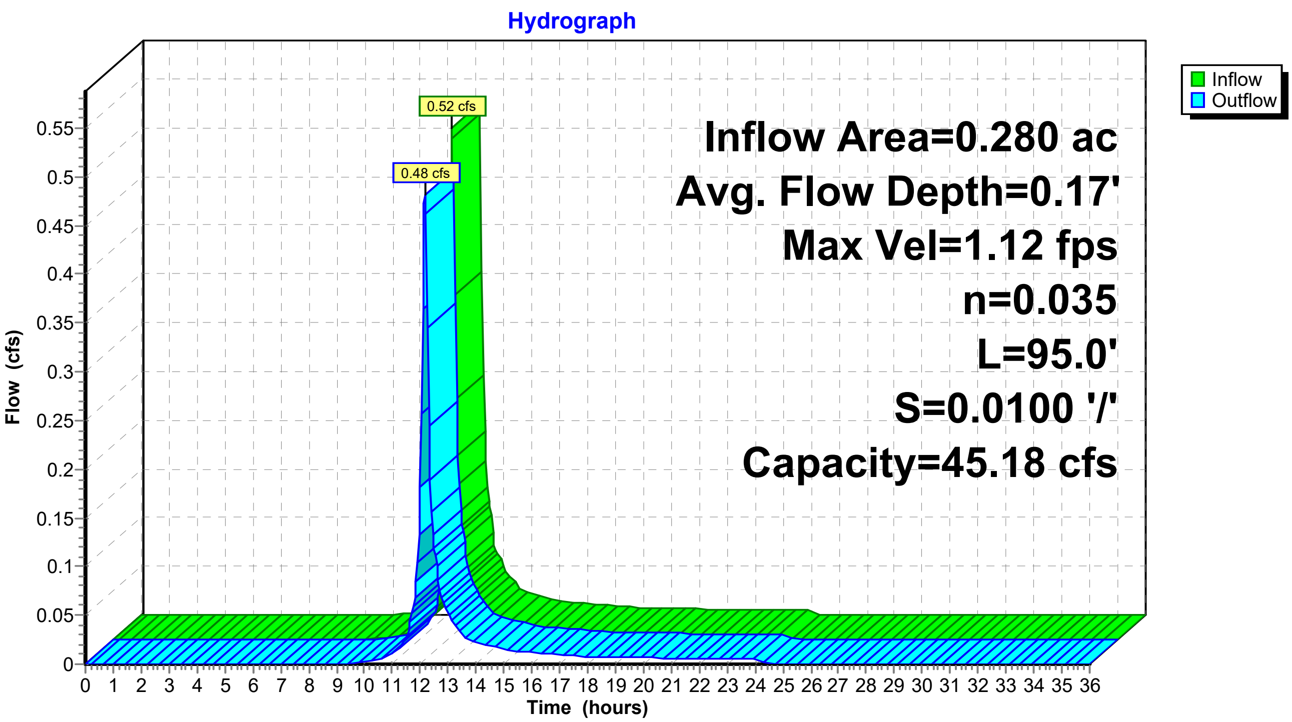
Routing by Stor-Ind+Trans method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.12 fps, Min. Travel Time= 1.4 min
Avg. Velocity = 0.32 fps, Avg. Travel Time= 4.9 min

Peak Storage= 44 cf @ 12.15 hrs
Average Depth at Peak Storage= 0.17' , Surface Width= 3.37'
Bank-Full Depth= 1.50' Flow Area= 12.0 sf, Capacity= 45.18 cfs

2.00' x 1.50' deep channel, n= 0.035 High grass
Side Slope Z-value= 4.0 '/' Top Width= 14.00'
Length= 95.0' Slope= 0.0100 '/'
Inlet Invert= 435.08', Outlet Invert= 434.13'

‡

Reach 6R: Vegetated Swale



Stage-Area-Storage for Reach 6R: Vegetated Swale

Elevation (feet)	End-Area (sq-ft)	Storage (cubic-feet)	Elevation (feet)	End-Area (sq-ft)	Storage (cubic-feet)
435.08	0.0	0	436.10	6.2	589
435.10	0.0	4	436.12	6.4	609
435.12	0.1	8	436.14	6.6	628
435.14	0.1	13	436.16	6.8	648
435.16	0.2	18	436.18	7.0	669
435.18	0.2	23	436.20	7.3	689
435.20	0.3	28	436.22	7.5	710
435.22	0.4	34	436.24	7.7	732
435.24	0.4	40	436.26	7.9	753
435.26	0.5	47	436.28	8.2	775
435.28	0.6	53	436.30	8.4	797
435.30	0.6	60	436.32	8.6	820
435.32	0.7	67	436.34	8.9	843
435.34	0.8	75	436.36	9.1	866
435.36	0.9	83	436.38	9.4	889
435.38	1.0	91	436.40	9.6	913
435.40	1.0	100	436.42	9.9	937
435.42	1.1	109	436.44	10.1	961
435.44	1.2	118	436.46	10.4	986
435.46	1.3	127	436.48	10.6	1,011
435.48	1.4	137	436.50	10.9	1,036
435.50	1.5	147	436.52	11.2	1,062
435.52	1.7	157	436.54	11.4	1,087
435.54	1.8	168	436.56	11.7	1,114
435.56	1.9	179	436.58	**12.0**	**1,140**
435.58	2.0	190			
435.60	2.1	202			
435.62	2.2	213			
435.64	2.4	226			
435.66	2.5	238			
435.68	2.6	251			
435.70	2.8	264			
435.72	2.9	277			
435.74	3.1	291			
435.76	3.2	305			
435.78	3.4	319			
435.80	3.5	334			
435.82	3.7	349			
435.84	3.8	364			
435.86	4.0	379			
435.88	4.2	395			
435.90	4.3	411			
435.92	4.5	428			
435.94	4.7	444			
435.96	4.9	461			
435.98	5.0	479			
436.00	5.2	496			
436.02	5.4	514			
436.04	5.6	533			
436.06	5.8	551			
436.08	6.0	570			

Summary for Reach 7R: Vegetated Swale

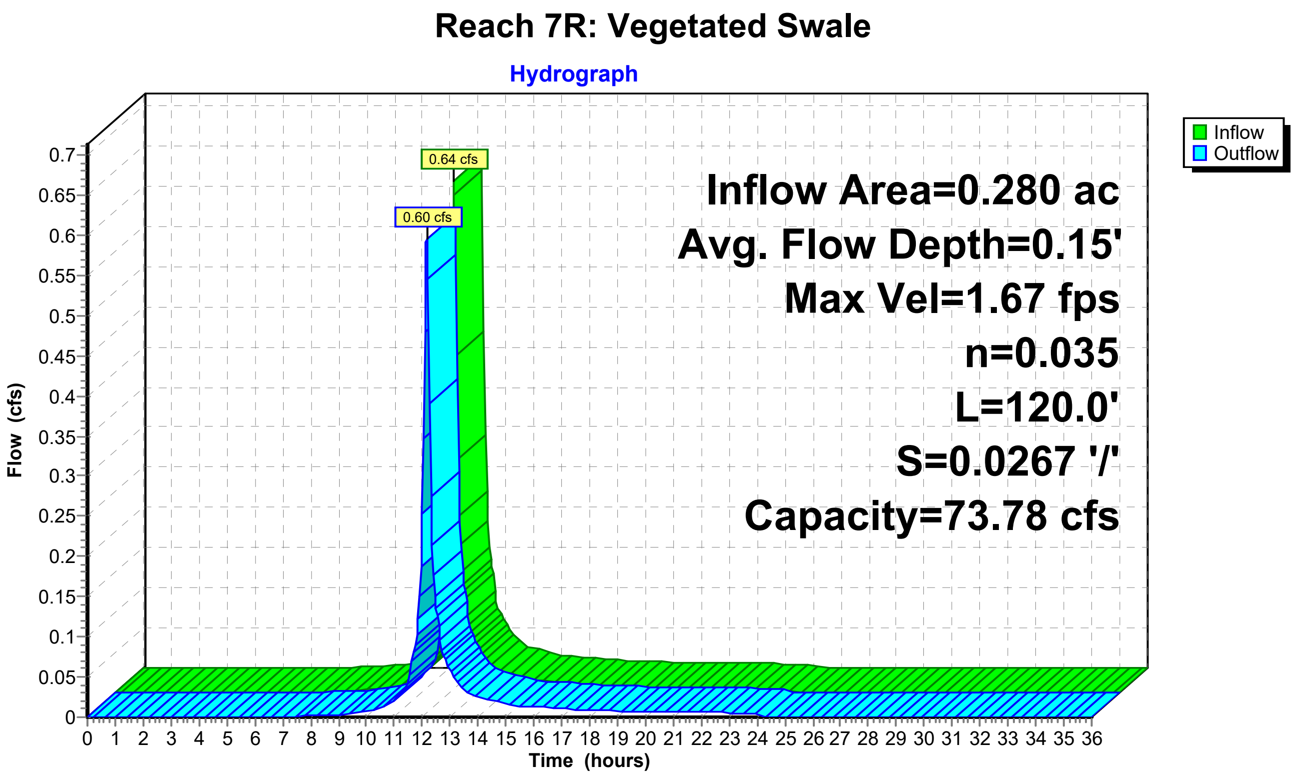
Inflow Area = 0.280 ac, 67.86% Impervious, Inflow Depth = 1.54" for 2-Year event
Inflow = 0.64 cfs @ 12.13 hrs, Volume= 0.036 af
Outflow = 0.60 cfs @ 12.16 hrs, Volume= 0.036 af, Atten= 7%, Lag= 1.8 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.67 fps, Min. Travel Time= 1.2 min
Avg. Velocity = 0.49 fps, Avg. Travel Time= 4.1 min

Peak Storage= 45 cf @ 12.14 hrs
Average Depth at Peak Storage= 0.15' , Surface Width= 3.17'
Bank-Full Depth= 1.50' Flow Area= 12.0 sf, Capacity= 73.78 cfs

2.00' x 1.50' deep channel, n= 0.035 High grass
Side Slope Z-value= 4.0 '/' Top Width= 14.00'
Length= 120.0' Slope= 0.0267 '/'
Inlet Invert= 438.00', Outlet Invert= 434.80'

‡



Stage-Area-Storage for Reach 7R: Vegetated Swale

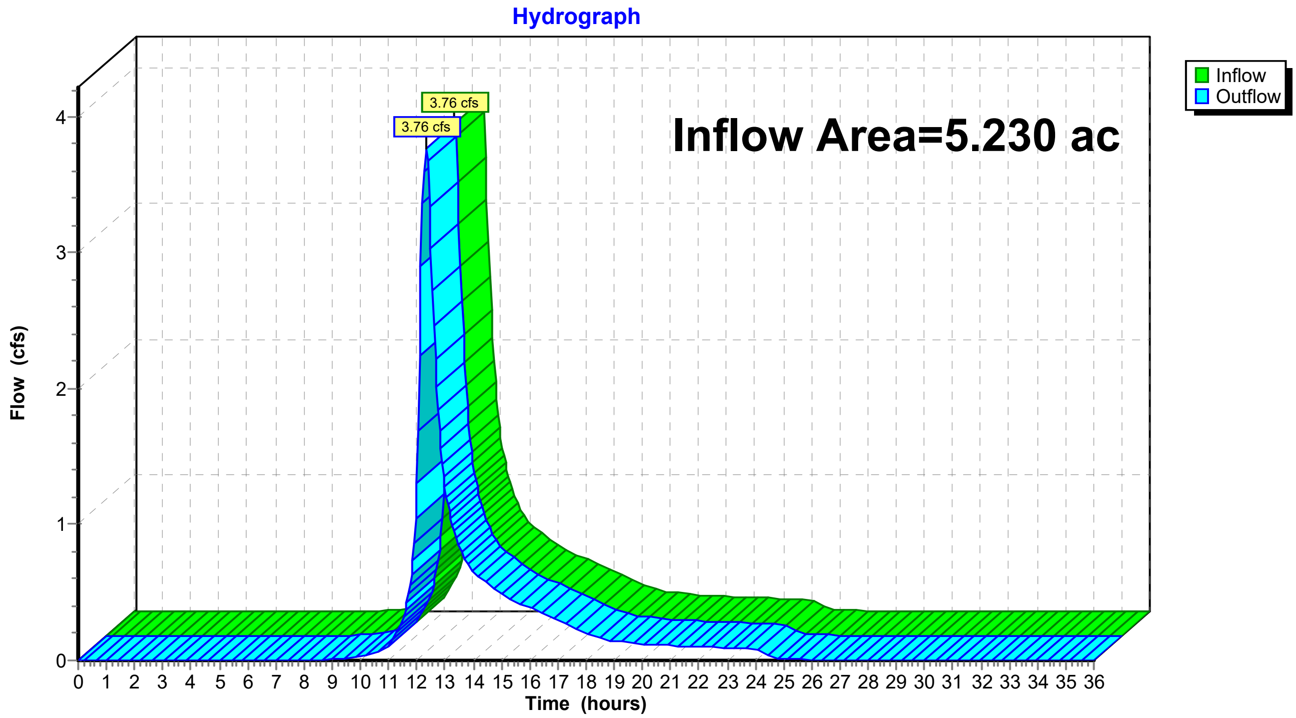
Elevation (feet)	End-Area (sq-ft)	Storage (cubic-feet)	Elevation (feet)	End-Area (sq-ft)	Storage (cubic-feet)
438.00	0.0	0	439.02	6.2	744
438.02	0.0	5	439.04	6.4	769
438.04	0.1	10	439.06	6.6	794
438.06	0.1	16	439.08	6.8	819
438.08	0.2	22	439.10	7.0	845
438.10	0.2	29	439.12	7.3	871
438.12	0.3	36	439.14	7.5	897
438.14	0.4	43	439.16	7.7	924
438.16	0.4	51	439.18	7.9	952
438.18	0.5	59	439.20	8.2	979
438.20	0.6	67	439.22	8.4	1,007
438.22	0.6	76	439.24	8.6	1,036
438.24	0.7	85	439.26	8.9	1,064
438.26	0.8	95	439.28	9.1	1,094
438.28	0.9	105	439.30	9.4	1,123
438.30	1.0	115	439.32	9.6	1,153
438.32	1.0	126	439.34	9.9	1,184
438.34	1.1	137	439.36	10.1	1,214
438.36	1.2	149	439.38	10.4	1,245
438.38	1.3	161	439.40	10.6	1,277
438.40	1.4	173	439.42	10.9	1,309
438.42	1.5	185	439.44	11.2	1,341
438.44	1.7	199	439.46	11.4	1,374
438.46	1.8	212	439.48	11.7	1,407
438.48	1.9	226	439.50	**12.0**	**1,440**
438.50	2.0	240			
438.52	2.1	255			
438.54	2.2	270			
438.56	2.4	285			
438.58	2.5	301			
438.60	2.6	317			
438.62	2.8	333			
438.64	2.9	350			
438.66	3.1	367			
438.68	3.2	385			
438.70	3.4	403			
438.72	3.5	422			
438.74	3.7	440			
438.76	3.8	460			
438.78	4.0	479			
438.80	4.2	499			
438.82	4.3	520			
438.84	4.5	540			
438.86	4.7	561			
438.88	4.9	583			
438.90	5.0	605			
438.92	5.2	627			
438.94	5.4	650			
438.96	5.6	673			
438.98	5.8	696			
439.00	6.0	720			

Summary for Reach 8R: Analysis Point

Inflow Area = 5.230 ac, 38.43% Impervious, Inflow Depth > 1.18" for 2-Year event
Inflow = 3.76 cfs @ 12.33 hrs, Volume= 0.515 af
Outflow = 3.76 cfs @ 12.33 hrs, Volume= 0.515 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

Reach 8R: Analysis Point



Summary for Pond 9P: Dry Swale

Inflow Area = 1.260 ac, 71.43% Impervious, Inflow Depth = 1.62" for 2-Year event
Inflow = 2.99 cfs @ 12.13 hrs, Volume= 0.170 af
Outflow = 0.37 cfs @ 12.68 hrs, Volume= 0.170 af, Atten= 88%, Lag= 33.2 min
Primary = 0.37 cfs @ 12.68 hrs, Volume= 0.170 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 439.88' @ 12.68 hrs Surf.Area= 3,770 sf Storage= 3,442 cf

Plug-Flow detention time= 111.8 min calculated for 0.170 af (100% of inflow)
Center-of-Mass det. time= 110.5 min (907.5 - 797.0)

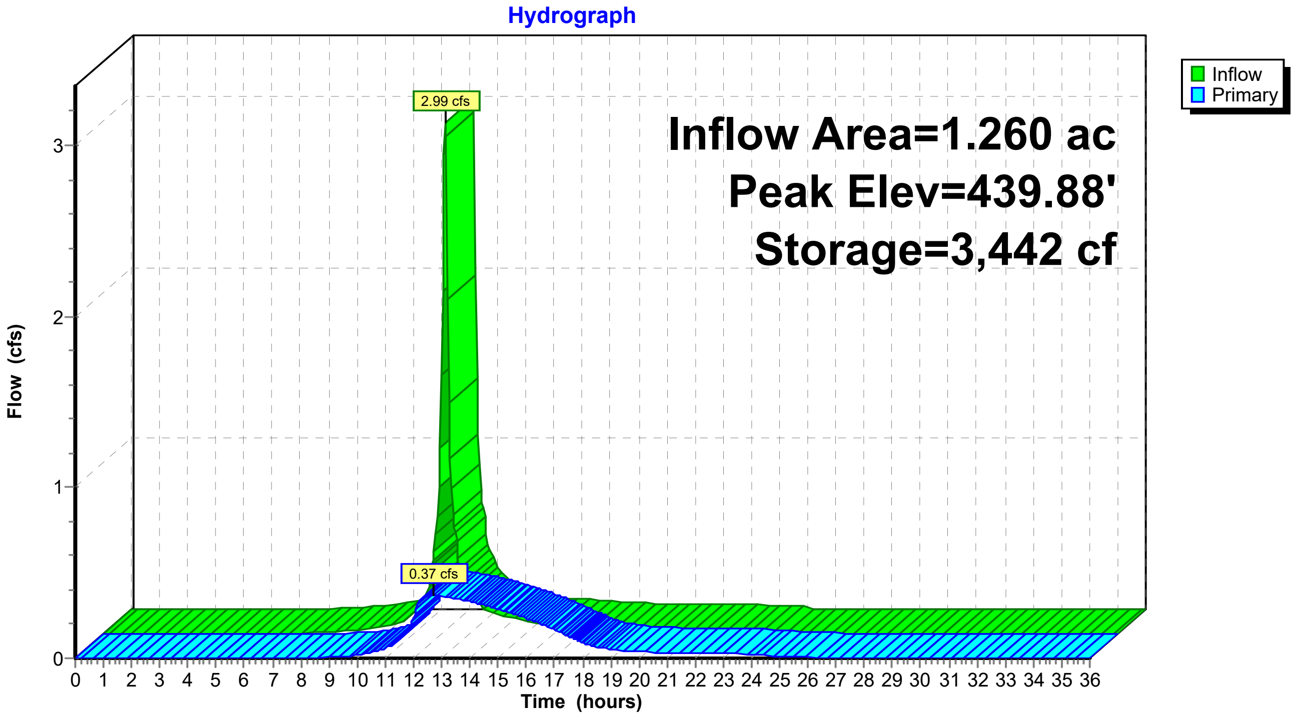
Volume	Invert	Avail.Storage	Storage Description
#1	438.50'	6,120 cf	**Custom Stage Data (Conic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
438.50	1,245	0	0	1,245
439.50	3,157	2,128	2,128	3,164
440.50	4,890	3,992	6,120	4,911

Device	Routing	Invert	Outlet Devices
#1	Primary	440.00'	**10.0' long x 2.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32
#2	Primary	438.50'	**4.0" Round Culvert** L= 30.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 438.50' / 438.20' S= 0.0100 '/' Cc= 0.900 n= 0.011 PVC, smooth interior, Flow Area= 0.09 sf

Primary OutFlow Max=0.37 cfs @ 12.68 hrs HW=439.88' (Free Discharge)
├─**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)
└─**2=Culvert** (Inlet Controls 0.37 cfs @ 4.19 fps)

Pond 9P: Dry Swale



Stage-Area-Storage for Pond 9P: Dry Swale

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
438.50	1,245	0	439.52	3,188	2,192
438.52	1,275	25	439.54	3,219	2,256
438.54	1,305	51	439.56	3,250	2,320
438.56	1,335	77	439.58	3,282	2,386
438.58	1,366	104	439.60	3,313	2,452
438.60	1,397	132	439.62	3,345	2,518
438.62	1,428	160	439.64	3,377	2,585
438.64	1,460	189	439.66	3,409	2,653
438.66	1,492	219	439.68	3,441	2,722
438.68	1,525	249	439.70	3,473	2,791
438.70	1,557	280	439.72	3,506	2,861
438.72	1,591	311	439.74	3,538	2,931
438.74	1,624	343	439.76	3,571	3,002
438.76	1,658	376	439.78	3,604	3,074
438.78	1,692	410	439.80	3,637	3,146
438.80	1,727	444	439.82	3,670	3,220
438.82	1,762	479	439.84	3,704	3,293
438.84	1,797	514	439.86	3,737	3,368
438.86	1,833	551	439.88	3,771	3,443
438.88	1,869	588	439.90	3,805	3,519
438.90	1,905	625	439.92	3,839	3,595
438.92	1,942	664	439.94	3,873	3,672
438.94	1,979	703	439.96	3,907	3,750
438.96	2,016	743	439.98	3,942	3,828
438.98	2,054	784	440.00	3,976	3,908
439.00	2,092	825	440.02	4,011	3,987
439.02	2,130	867	440.04	4,046	4,068
439.04	2,169	910	440.06	4,081	4,149
439.06	2,208	954	440.08	4,116	4,231
439.08	2,248	999	440.10	4,151	4,314
439.10	2,287	1,044	440.12	4,187	4,397
439.12	2,328	1,090	440.14	4,223	4,481
439.14	2,368	1,137	440.16	4,258	4,566
439.16	2,409	1,185	440.18	4,294	4,652
439.18	2,450	1,233	440.20	4,330	4,738
439.20	2,492	1,283	440.22	4,367	4,825
439.22	2,534	1,333	440.24	4,403	4,913
439.24	2,576	1,384	440.26	4,440	5,001
439.26	2,618	1,436	440.28	4,476	5,090
439.28	2,661	1,489	440.30	4,513	5,180
439.30	2,705	1,543	440.32	4,550	5,271
439.32	2,748	1,597	440.34	4,587	5,362
439.34	2,792	1,653	440.36	4,625	5,454
439.36	2,837	1,709	440.38	4,662	5,547
439.38	2,881	1,766	440.40	4,700	5,641
439.40	2,926	1,824	440.42	4,737	5,735
439.42	2,972	1,883	440.44	4,775	5,830
439.44	3,018	1,943	440.46	4,813	5,926
439.46	3,064	2,004	440.48	4,852	6,023
439.48	3,110	2,066	440.50	**4,890**	**6,120**
439.50	3,157	2,128			

Time span=0.00-36.00 hrs, dt=0.05 hrs, 721 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: DA-1 Runoff Area=3.410 ac 23.17% Impervious Runoff Depth=1.41"
Flow Length=697' Tc=23.6 min CN=84 Runoff=4.32 cfs 0.401 af

Subcatchment 2S: Parking Lot (1A) Runoff Area=1.260 ac 71.43% Impervious Runoff Depth=2.13"
Tc=6.0 min CN=93 Runoff=3.87 cfs 0.224 af

Subcatchment 3S: West Swale (1B) Runoff Area=0.280 ac 46.43% Impervious Runoff Depth=1.70"
Tc=6.0 min CN=88 Runoff=0.72 cfs 0.040 af

Subcatchment 4S: South Swale (1C) Runoff Area=0.280 ac 67.86% Impervious Runoff Depth=2.04"
Tc=6.0 min CN=92 Runoff=0.83 cfs 0.048 af

Reach 6R: Vegetated Swale Avg. Flow Depth=0.20' Max Vel=1.23 fps Inflow=0.72 cfs 0.040 af
n=0.035 L=95.0' S=0.0100 '/' Capacity=45.18 cfs Outflow=0.66 cfs 0.040 af

Reach 7R: Vegetated Swale Avg. Flow Depth=0.17' Max Vel=1.81 fps Inflow=0.83 cfs 0.048 af
n=0.035 L=120.0' S=0.0267 '/' Capacity=73.78 cfs Outflow=0.78 cfs 0.048 af

Reach 8R: Analysis Point Inflow=5.74 cfs 0.711 af
Outflow=5.74 cfs 0.711 af

Pond 9P: Dry Swale Peak Elev=440.08' Storage=4,215 cf Inflow=3.87 cfs 0.224 af
Outflow=0.93 cfs 0.223 af

Total Runoff Area = 5.230 ac Runoff Volume = 0.712 af Average Runoff Depth = 1.63"
61.57% Pervious = 3.220 ac 38.43% Impervious = 2.010 ac

Summary for Subcatchment 1S: DA-1

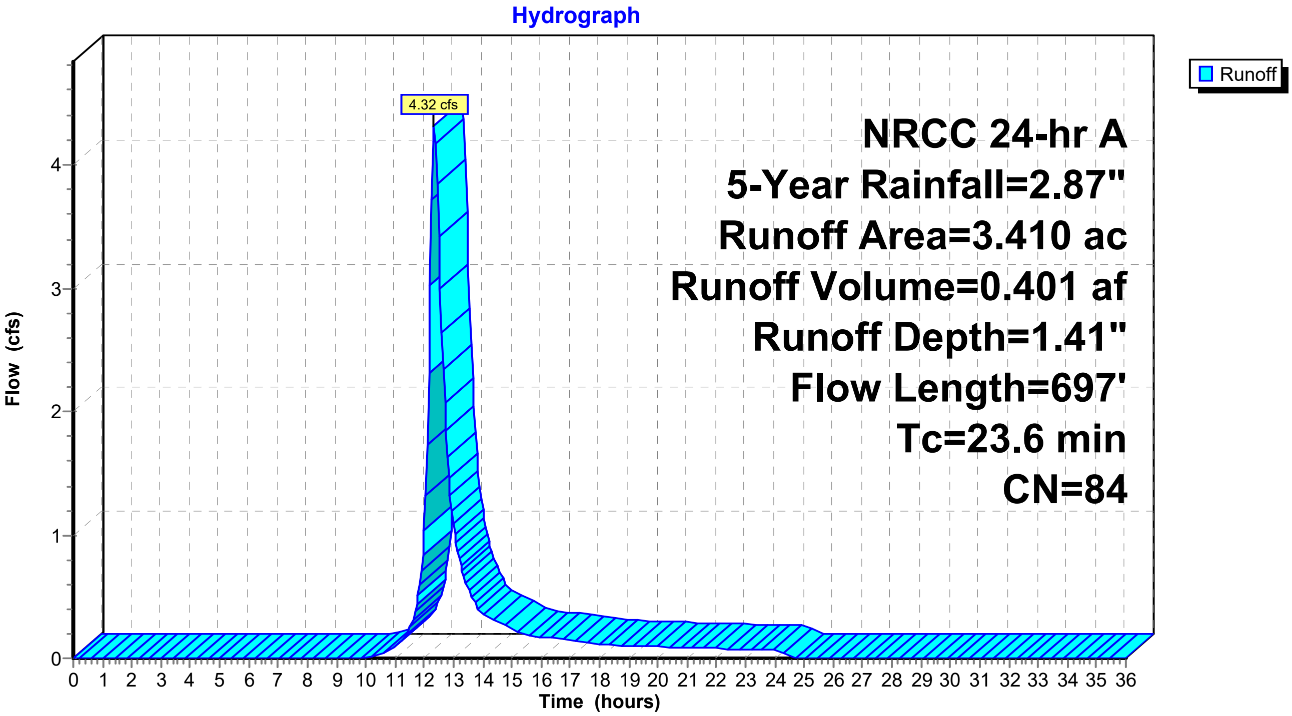
Runoff = 4.32 cfs @ 12.35 hrs, Volume= 0.401 af, Depth= 1.41"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
NRCC 24-hr A 5-Year Rainfall=2.87"

	Area (ac)	CN	Description
	1.880	80	>75% Grass cover, Good, HSG D
	0.740	77	Woods, Good, HSG D
*	0.790	98	Impervious
	3.410	84	Weighted Average
	2.620		76.83% Pervious Area
	0.790		23.17% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
19.1	100	0.0400	0.09		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.33"
0.3	73	0.0500	3.60		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.0	13	0.0800	4.55		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.0	20	0.3300	9.25		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
1.7	114	0.0050	1.14		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.5	85	0.0350	3.01		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.5	73	0.0270	2.65		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.4	53	0.0150	1.97		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.1	10	0.0150	2.49		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.1	14	0.0150	1.97		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.9	142	0.0280	2.69		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
23.6	697	Total			

Subcatchment 1S: DA-1



Summary for Subcatchment 2S: Parking Lot (1A)

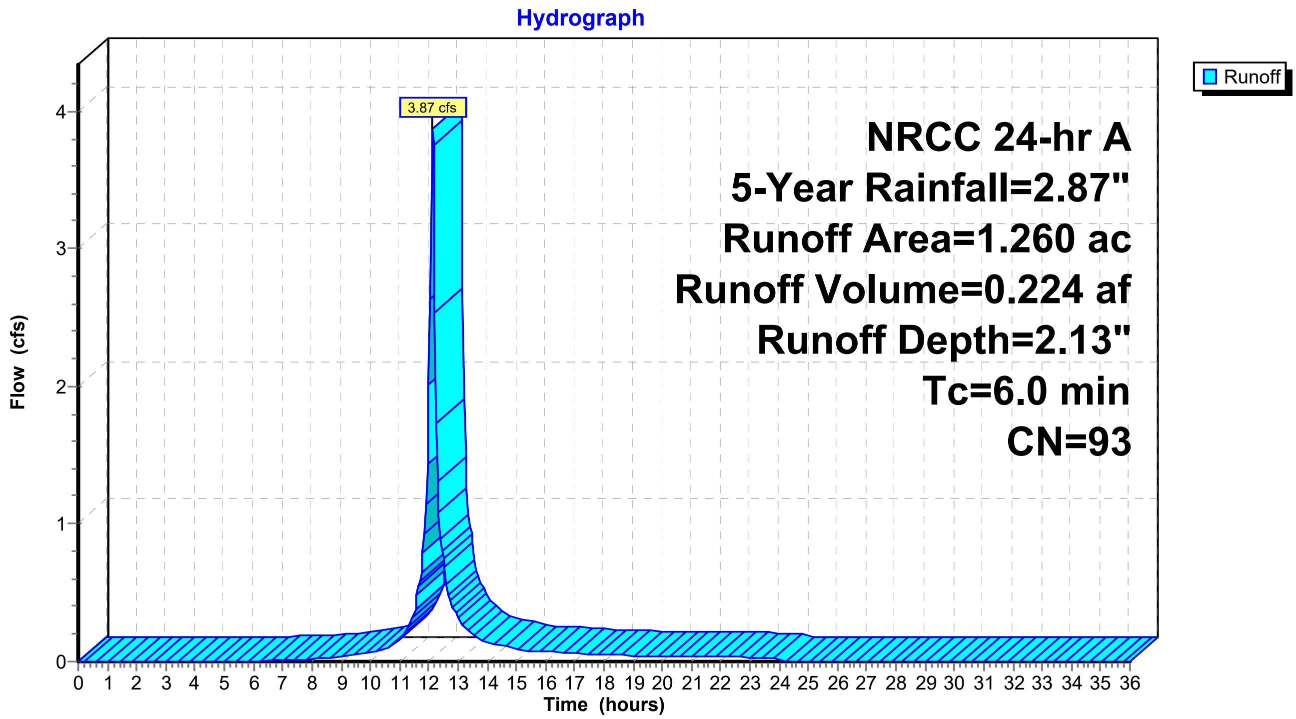
Runoff = 3.87 cfs @ 12.13 hrs, Volume= 0.224 af, Depth= 2.13"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
NRCC 24-hr A 5-Year Rainfall=2.87"

	Area (ac)	CN	Description
*	0.900	98	Impervious
	0.060	77	Woods, Good, HSG D
	0.300	80	>75% Grass cover, Good, HSG D
	1.260	93	Weighted Average
	0.360		28.57% Pervious Area
	0.900		71.43% Impervious Area

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

Subcatchment 2S: Parking Lot (1A)



Summary for Subcatchment 3S: West Swale (1B)

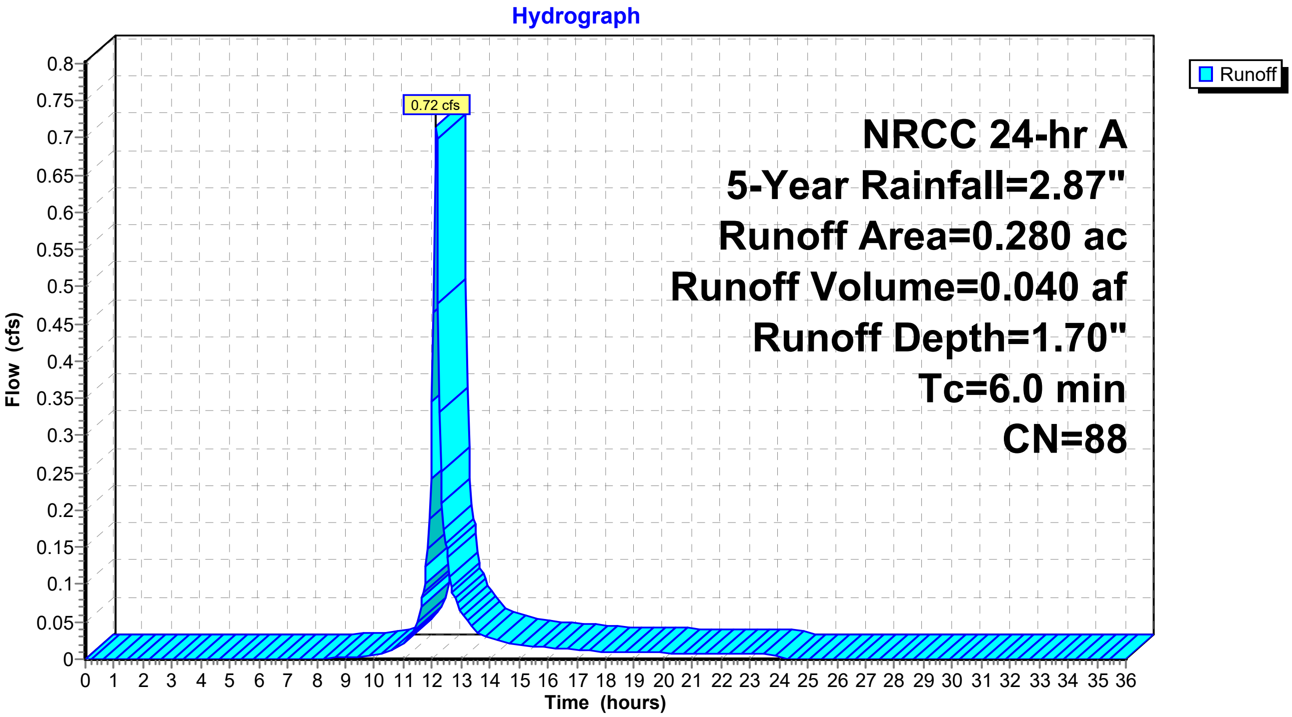
Runoff = 0.72 cfs @ 12.13 hrs, Volume= 0.040 af, Depth= 1.70"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
NRCC 24-hr A 5-Year Rainfall=2.87"

	Area (ac)	CN	Description
*	0.130	98	Impervious
	0.150	80	>75% Grass cover, Good, HSG D
	0.280	88	Weighted Average
	0.150		53.57% Pervious Area
	0.130		46.43% Impervious Area

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

Subcatchment 3S: West Swale (1B)



Summary for Subcatchment 4S: South Swale (1C)

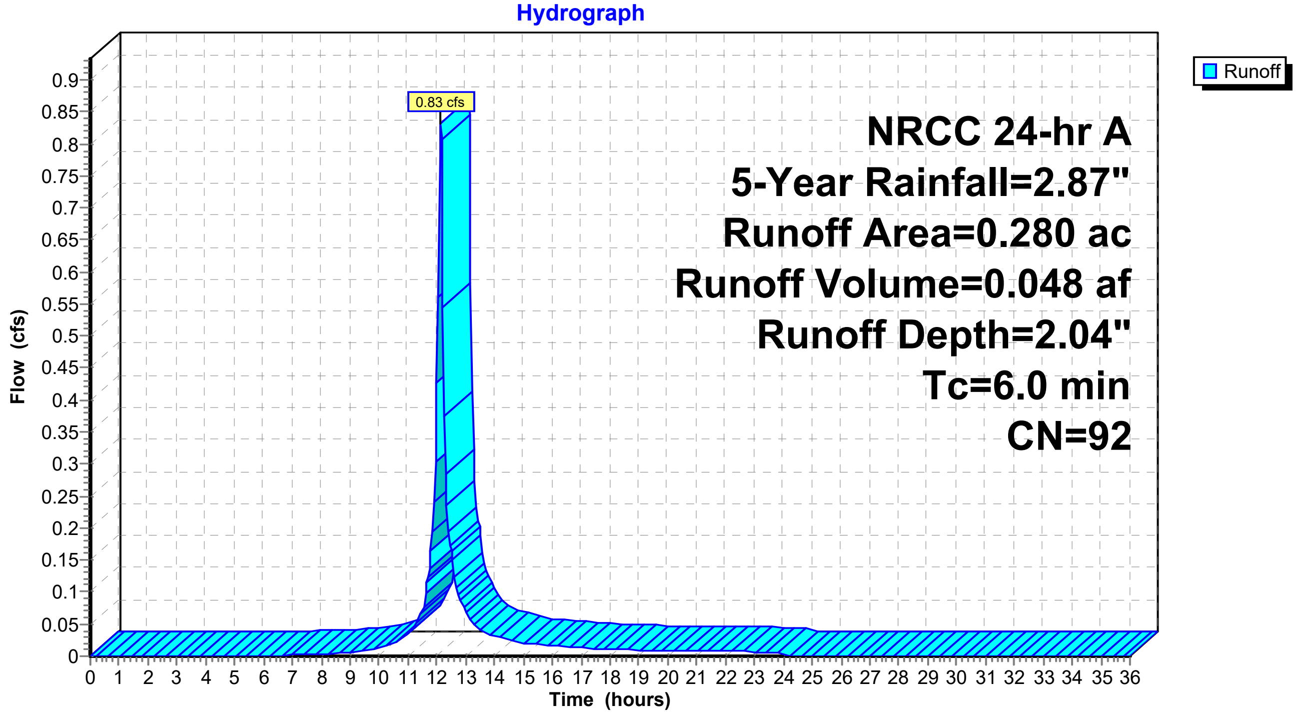
Runoff = 0.83 cfs @ 12.13 hrs, Volume= 0.048 af, Depth= 2.04"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
NRCC 24-hr A 5-Year Rainfall=2.87"

	Area (ac)	CN	Description
*	0.190	98	Impervious
	0.090	80	>75% Grass cover, Good, HSG D
	0.280	92	Weighted Average
	0.090		32.14% Pervious Area
	0.190		67.86% Impervious Area

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

Subcatchment 4S: South Swale (1C)



Summary for Reach 6R: Vegetated Swale

Inflow Area = 0.280 ac, 46.43% Impervious, Inflow Depth = 1.70" for 5-Year event
Inflow = 0.72 cfs @ 12.13 hrs, Volume= 0.040 af
Outflow = 0.66 cfs @ 12.16 hrs, Volume= 0.040 af, Atten= 7%, Lag= 2.0 min

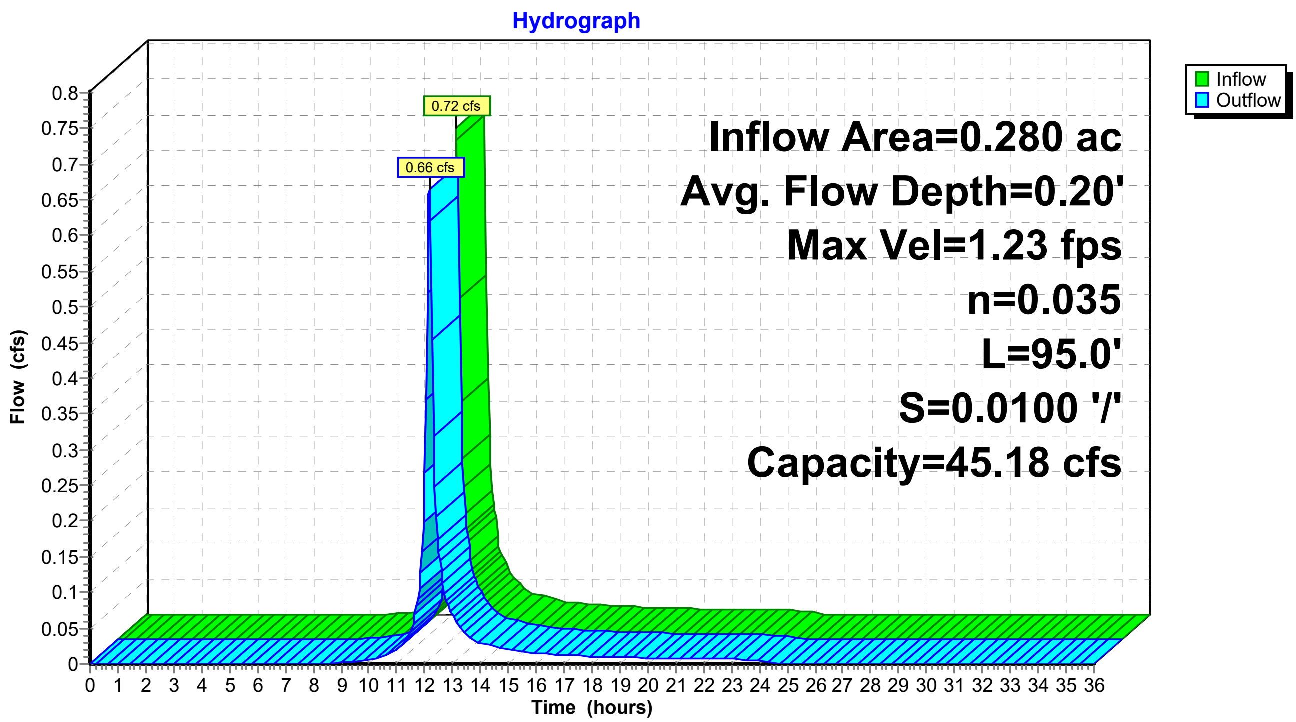
Routing by Stor-Ind+Trans method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.23 fps, Min. Travel Time= 1.3 min
Avg. Velocity = 0.34 fps, Avg. Travel Time= 4.6 min

Peak Storage= 54 cf @ 12.15 hrs
Average Depth at Peak Storage= 0.20' , Surface Width= 3.63'
Bank-Full Depth= 1.50' Flow Area= 12.0 sf, Capacity= 45.18 cfs

2.00' x 1.50' deep channel, n= 0.035 High grass
Side Slope Z-value= 4.0 '/' Top Width= 14.00'
Length= 95.0' Slope= 0.0100 '/'
Inlet Invert= 435.08', Outlet Invert= 434.13'

‡


Reach 6R: Vegetated Swale



Stage-Area-Storage for Reach 6R: Vegetated Swale

Elevation (feet)	End-Area (sq-ft)	Storage (cubic-feet)
435.08	0.0	0
435.10	0.0	4
435.12	0.1	8
435.14	0.1	13
435.16	0.2	18
435.18	0.2	23
435.20	0.3	28
435.22	0.4	34
435.24	0.4	40
435.26	0.5	47
435.28	0.6	53
435.30	0.6	60
435.32	0.7	67
435.34	0.8	75
435.36	0.9	83
435.38	1.0	91
435.40	1.0	100
435.42	1.1	109
435.44	1.2	118
435.46	1.3	127
435.48	1.4	137
435.50	1.5	147
435.52	1.7	157
435.54	1.8	168
435.56	1.9	179
435.58	2.0	190
435.60	2.1	202
435.62	2.2	213
435.64	2.4	226
435.66	2.5	238
435.68	2.6	251
435.70	2.8	264
435.72	2.9	277
435.74	3.1	291
435.76	3.2	305
435.78	3.4	319
435.80	3.5	334
435.82	3.7	349
435.84	3.8	364
435.86	4.0	379
435.88	4.2	395
435.90	4.3	411
435.92	4.5	428
435.94	4.7	444
435.96	4.9	461
435.98	5.0	479
436.00	5.2	496
436.02	5.4	514
436.04	5.6	533
436.06	5.8	551
436.08	6.0	570
436.10	6.2	589
436.12	6.4	609
436.14	6.6	628
436.16	6.8	648
436.18	7.0	669
436.20	7.3	689
436.22	7.5	710
436.24	7.7	732
436.26	7.9	753
436.28	8.2	775
436.30	8.4	797
436.32	8.6	820
436.34	8.9	843
436.36	9.1	866
436.38	9.4	889
436.40	9.6	913
436.42	9.9	937
436.44	10.1	961
436.46	10.4	986
436.48	10.6	1,011
436.50	10.9	1,036
436.52	11.2	1,062
436.54	11.4	1,087
436.56	11.7	1,114
436.58	**12.0**	**1,140**

Summary for Reach 7R: Vegetated Swale

Inflow Area = 0.280 ac, 67.86% Impervious, Inflow Depth = 2.04" for 5-Year event
Inflow = 0.83 cfs @ 12.13 hrs, Volume= 0.048 af
Outflow = 0.78 cfs @ 12.16 hrs, Volume= 0.048 af, Atten= 6%, Lag= 1.6 min

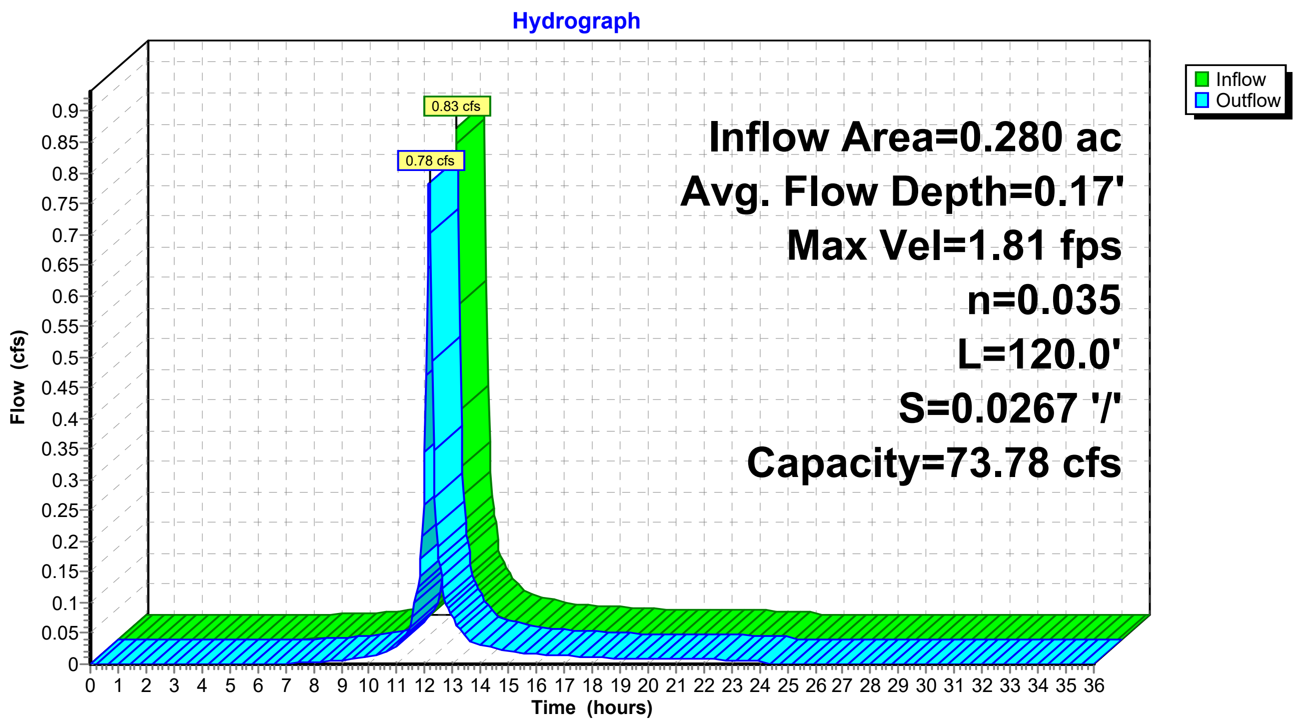
Routing by Stor-Ind+Trans method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.81 fps, Min. Travel Time= 1.1 min
Avg. Velocity = 0.51 fps, Avg. Travel Time= 3.9 min

Peak Storage= 55 cf @ 12.14 hrs
Average Depth at Peak Storage= 0.17' , Surface Width= 3.36'
Bank-Full Depth= 1.50' Flow Area= 12.0 sf, Capacity= 73.78 cfs

2.00' x 1.50' deep channel, n= 0.035 High grass
Side Slope Z-value= 4.0 '/' Top Width= 14.00'
Length= 120.0' Slope= 0.0267 '/'
Inlet Invert= 438.00', Outlet Invert= 434.80'

‡

Reach 7R: Vegetated Swale



Stage-Area-Storage for Reach 7R: Vegetated Swale

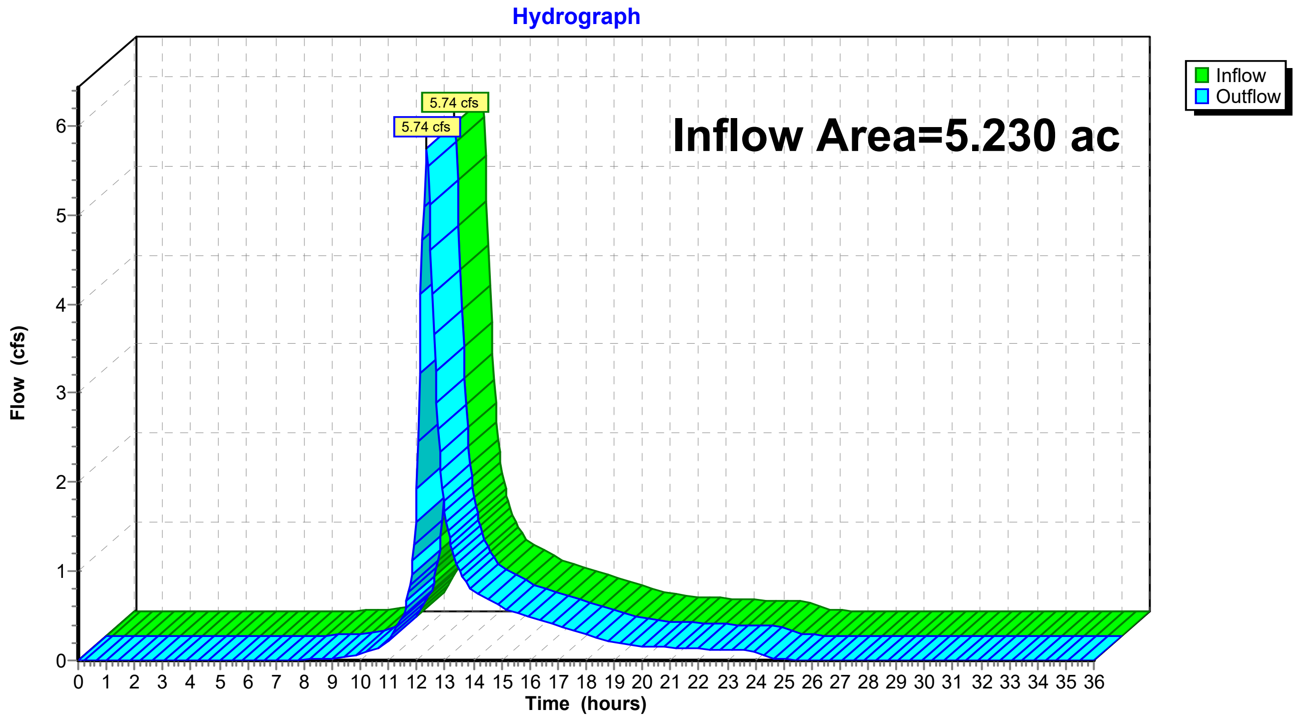
Elevation (feet)	End-Area (sq-ft)	Storage (cubic-feet)	Elevation (feet)	End-Area (sq-ft)	Storage (cubic-feet)
438.00	0.0	0	439.02	6.2	744
438.02	0.0	5	439.04	6.4	769
438.04	0.1	10	439.06	6.6	794
438.06	0.1	16	439.08	6.8	819
438.08	0.2	22	439.10	7.0	845
438.10	0.2	29	439.12	7.3	871
438.12	0.3	36	439.14	7.5	897
438.14	0.4	43	439.16	7.7	924
438.16	0.4	51	439.18	7.9	952
438.18	0.5	59	439.20	8.2	979
438.20	0.6	67	439.22	8.4	1,007
438.22	0.6	76	439.24	8.6	1,036
438.24	0.7	85	439.26	8.9	1,064
438.26	0.8	95	439.28	9.1	1,094
438.28	0.9	105	439.30	9.4	1,123
438.30	1.0	115	439.32	9.6	1,153
438.32	1.0	126	439.34	9.9	1,184
438.34	1.1	137	439.36	10.1	1,214
438.36	1.2	149	439.38	10.4	1,245
438.38	1.3	161	439.40	10.6	1,277
438.40	1.4	173	439.42	10.9	1,309
438.42	1.5	185	439.44	11.2	1,341
438.44	1.7	199	439.46	11.4	1,374
438.46	1.8	212	439.48	11.7	1,407
438.48	1.9	226	439.50	**12.0**	**1,440**
438.50	2.0	240			
438.52	2.1	255			
438.54	2.2	270			
438.56	2.4	285			
438.58	2.5	301			
438.60	2.6	317			
438.62	2.8	333			
438.64	2.9	350			
438.66	3.1	367			
438.68	3.2	385			
438.70	3.4	403			
438.72	3.5	422			
438.74	3.7	440			
438.76	3.8	460			
438.78	4.0	479			
438.80	4.2	499			
438.82	4.3	520			
438.84	4.5	540			
438.86	4.7	561			
438.88	4.9	583			
438.90	5.0	605			
438.92	5.2	627			
438.94	5.4	650			
438.96	5.6	673			
438.98	5.8	696			
439.00	6.0	720			

Summary for Reach 8R: Analysis Point

Inflow Area = 5.230 ac, 38.43% Impervious, Inflow Depth = 1.63" for 5-Year event
Inflow = 5.74 cfs @ 12.35 hrs, Volume= 0.711 af
Outflow = 5.74 cfs @ 12.35 hrs, Volume= 0.711 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

Reach 8R: Analysis Point



Summary for Pond 9P: Dry Swale

Inflow Area =	1.260 ac, 71.43% Impervious, Inflow Depth = 2.13" for 5-Year event		
Inflow =	3.87 cfs @ 12.13 hrs, Volume=	0.224 af	
Outflow =	0.93 cfs @ 12.40 hrs, Volume=	0.223 af,	Atten= 76%, Lag= 16.3 min
Primary =	0.93 cfs @ 12.40 hrs, Volume=	0.223 af	

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 440.08' @ 12.40 hrs Surf.Area= 4,109 sf Storage= 4,215 cf

Plug-Flow detention time= 110.5 min calculated for 0.223 af (100% of inflow)
Center-of-Mass det. time= 109.5 min (900.1 - 790.5)

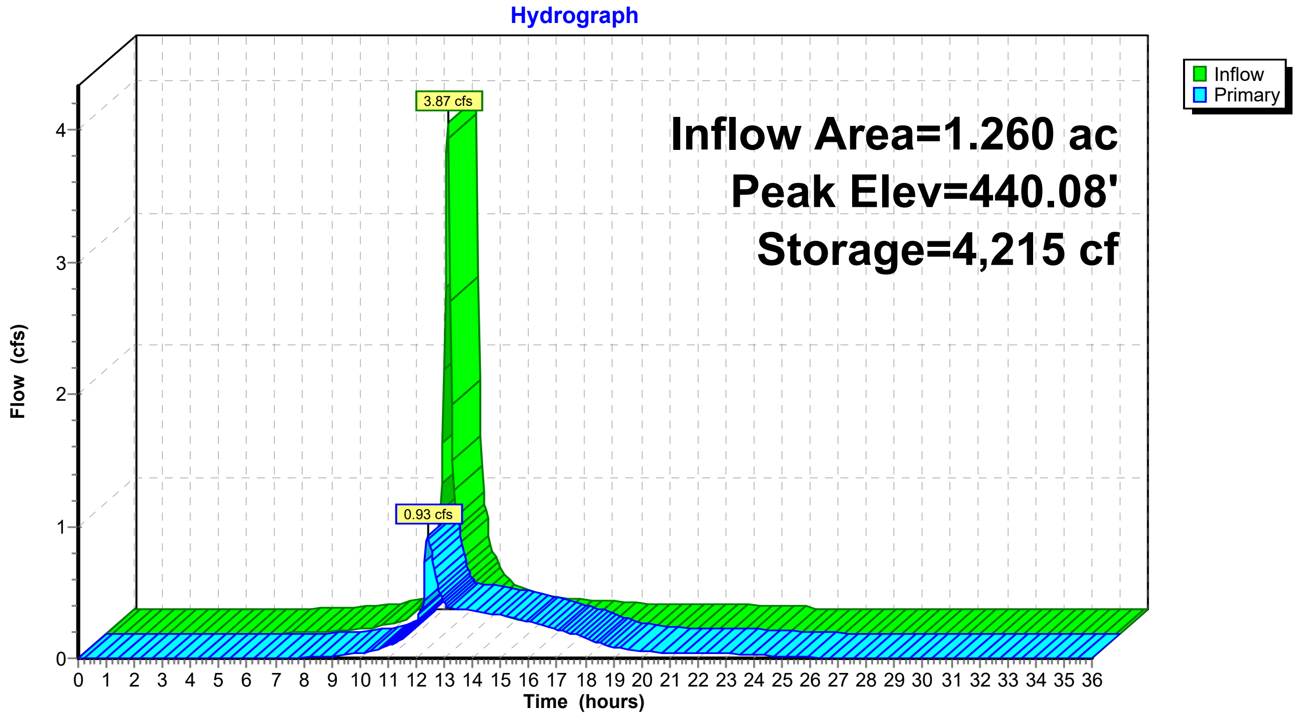
Volume	Invert	Avail.Storage	Storage Description
#1	438.50'	6,120 cf	**Custom Stage Data (Conic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
438.50	1,245	0	0	1,245
439.50	3,157	2,128	2,128	3,164
440.50	4,890	3,992	6,120	4,911

Device	Routing	Invert	Outlet Devices
#1	Primary	440.00'	**10.0' long x 2.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32
#2	Primary	438.50'	**4.0" Round Culvert** L= 30.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 438.50' / 438.20' S= 0.0100 '/' Cc= 0.900 n= 0.011 PVC, smooth interior, Flow Area= 0.09 sf

Primary OutFlow Max=0.93 cfs @ 12.40 hrs HW=440.08' (Free Discharge)
├─**1=Broad-Crested Rectangular Weir** (Weir Controls 0.53 cfs @ 0.70 fps)
└─**2=Culvert** (Inlet Controls 0.39 cfs @ 4.51 fps)

Pond 9P: Dry Swale



Stage-Area-Storage for Pond 9P: Dry Swale

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
438.50	1,245	0	439.52	3,188	2,192
438.52	1,275	25	439.54	3,219	2,256
438.54	1,305	51	439.56	3,250	2,320
438.56	1,335	77	439.58	3,282	2,386
438.58	1,366	104	439.60	3,313	2,452
438.60	1,397	132	439.62	3,345	2,518
438.62	1,428	160	439.64	3,377	2,585
438.64	1,460	189	439.66	3,409	2,653
438.66	1,492	219	439.68	3,441	2,722
438.68	1,525	249	439.70	3,473	2,791
438.70	1,557	280	439.72	3,506	2,861
438.72	1,591	311	439.74	3,538	2,931
438.74	1,624	343	439.76	3,571	3,002
438.76	1,658	376	439.78	3,604	3,074
438.78	1,692	410	439.80	3,637	3,146
438.80	1,727	444	439.82	3,670	3,220
438.82	1,762	479	439.84	3,704	3,293
438.84	1,797	514	439.86	3,737	3,368
438.86	1,833	551	439.88	3,771	3,443
438.88	1,869	588	439.90	3,805	3,519
438.90	1,905	625	439.92	3,839	3,595
438.92	1,942	664	439.94	3,873	3,672
438.94	1,979	703	439.96	3,907	3,750
438.96	2,016	743	439.98	3,942	3,828
438.98	2,054	784	440.00	3,976	3,908
439.00	2,092	825	440.02	4,011	3,987
439.02	2,130	867	440.04	4,046	4,068
439.04	2,169	910	440.06	4,081	4,149
439.06	2,208	954	440.08	4,116	4,231
439.08	2,248	999	440.10	4,151	4,314
439.10	2,287	1,044	440.12	4,187	4,397
439.12	2,328	1,090	440.14	4,223	4,481
439.14	2,368	1,137	440.16	4,258	4,566
439.16	2,409	1,185	440.18	4,294	4,652
439.18	2,450	1,233	440.20	4,330	4,738
439.20	2,492	1,283	440.22	4,367	4,825
439.22	2,534	1,333	440.24	4,403	4,913
439.24	2,576	1,384	440.26	4,440	5,001
439.26	2,618	1,436	440.28	4,476	5,090
439.28	2,661	1,489	440.30	4,513	5,180
439.30	2,705	1,543	440.32	4,550	5,271
439.32	2,748	1,597	440.34	4,587	5,362
439.34	2,792	1,653	440.36	4,625	5,454
439.36	2,837	1,709	440.38	4,662	5,547
439.38	2,881	1,766	440.40	4,700	5,641
439.40	2,926	1,824	440.42	4,737	5,735
439.42	2,972	1,883	440.44	4,775	5,830
439.44	3,018	1,943	440.46	4,813	5,926
439.46	3,064	2,004	440.48	4,852	6,023
439.48	3,110	2,066	440.50	**4,890**	**6,120**
439.50	3,157	2,128			

Time span=0.00-36.00 hrs, dt=0.05 hrs, 721 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1S: DA-1 Runoff Area=3.410 ac 23.17% Impervious Runoff Depth=1.81"
Flow Length=697' Tc=23.6 min CN=84 Runoff=5.56 cfs 0.514 af

Subcatchment2S: Parking Lot (1A) Runoff Area=1.260 ac 71.43% Impervious Runoff Depth=2.59"
Tc=6.0 min CN=93 Runoff=4.65 cfs 0.272 af

Subcatchment3S: West Swale (1B) Runoff Area=0.280 ac 46.43% Impervious Runoff Depth=2.13"
Tc=6.0 min CN=88 Runoff=0.89 cfs 0.050 af

Subcatchment4S: South Swale (1C) Runoff Area=0.280 ac 67.86% Impervious Runoff Depth=2.49"
Tc=6.0 min CN=92 Runoff=1.01 cfs 0.058 af

Reach 6R: Vegetated Swale Avg. Flow Depth=0.23' Max Vel=1.31 fps Inflow=0.89 cfs 0.050 af
n=0.035 L=95.0' S=0.0100 '/' Capacity=45.18 cfs Outflow=0.83 cfs 0.050 af

Reach 7R: Vegetated Swale Avg. Flow Depth=0.19' Max Vel=1.92 fps Inflow=1.01 cfs 0.058 af
n=0.035 L=120.0' S=0.0267 '/' Capacity=73.78 cfs Outflow=0.95 cfs 0.058 af

Reach 8R: Analysis Point Inflow=8.13 cfs 0.894 af
Outflow=8.13 cfs 0.894 af

Pond 9P: Dry Swale Peak Elev=440.16' Storage=4,571 cf Inflow=4.65 cfs 0.272 af
Outflow=2.05 cfs 0.272 af

Total Runoff Area = 5.230 ac Runoff Volume = 0.894 af Average Runoff Depth = 2.05"
61.57% Pervious = 3.220 ac 38.43% Impervious = 2.010 ac

Summary for Subcatchment 1S: DA-1

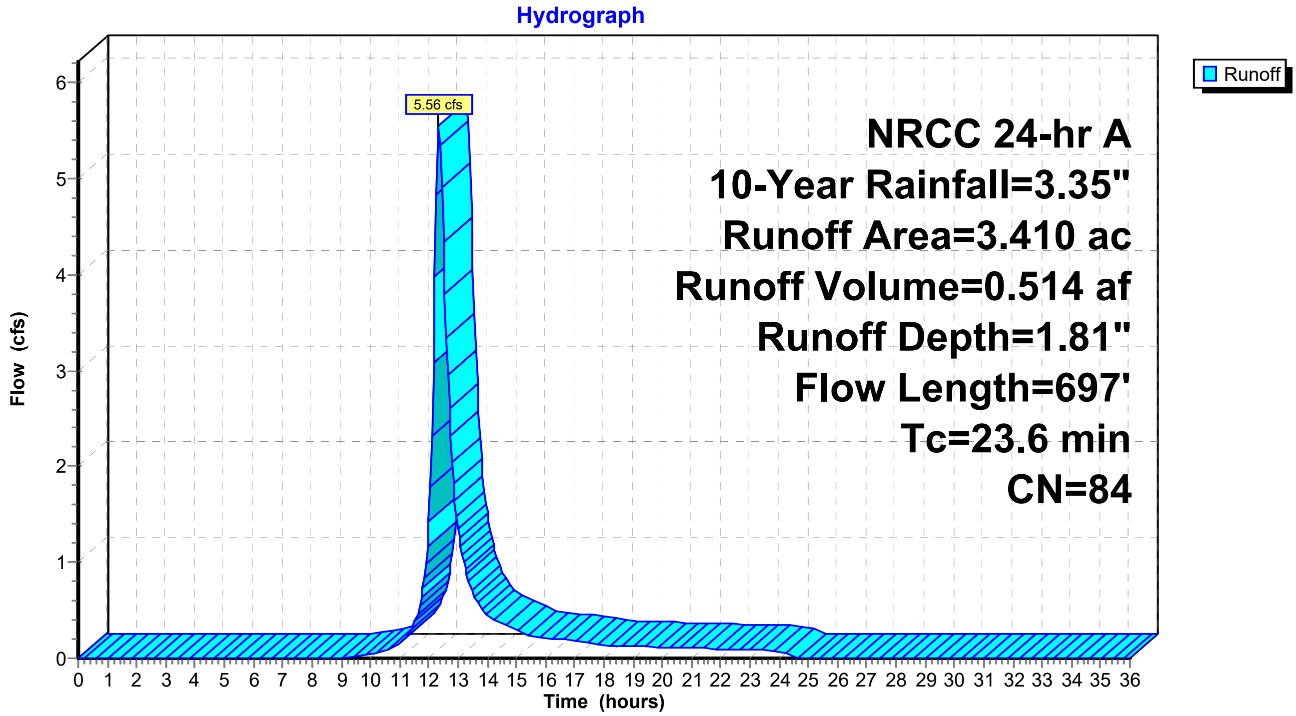
Runoff = 5.56 cfs @ 12.35 hrs, Volume= 0.514 af, Depth= 1.81"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
NRCC 24-hr A 10-Year Rainfall=3.35"

	Area (ac)	CN	Description
	1.880	80	>75% Grass cover, Good, HSG D
	0.740	77	Woods, Good, HSG D
*	0.790	98	Impervious
	3.410	84	Weighted Average
	2.620		76.83% Pervious Area
	0.790		23.17% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
19.1	100	0.0400	0.09		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.33"
0.3	73	0.0500	3.60		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.0	13	0.0800	4.55		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.0	20	0.3300	9.25		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
1.7	114	0.0050	1.14		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.5	85	0.0350	3.01		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.5	73	0.0270	2.65		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.4	53	0.0150	1.97		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.1	10	0.0150	2.49		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.1	14	0.0150	1.97		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.9	142	0.0280	2.69		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
23.6	697	Total			

Subcatchment 1S: DA-1



Summary for Subcatchment 2S: Parking Lot (1A)

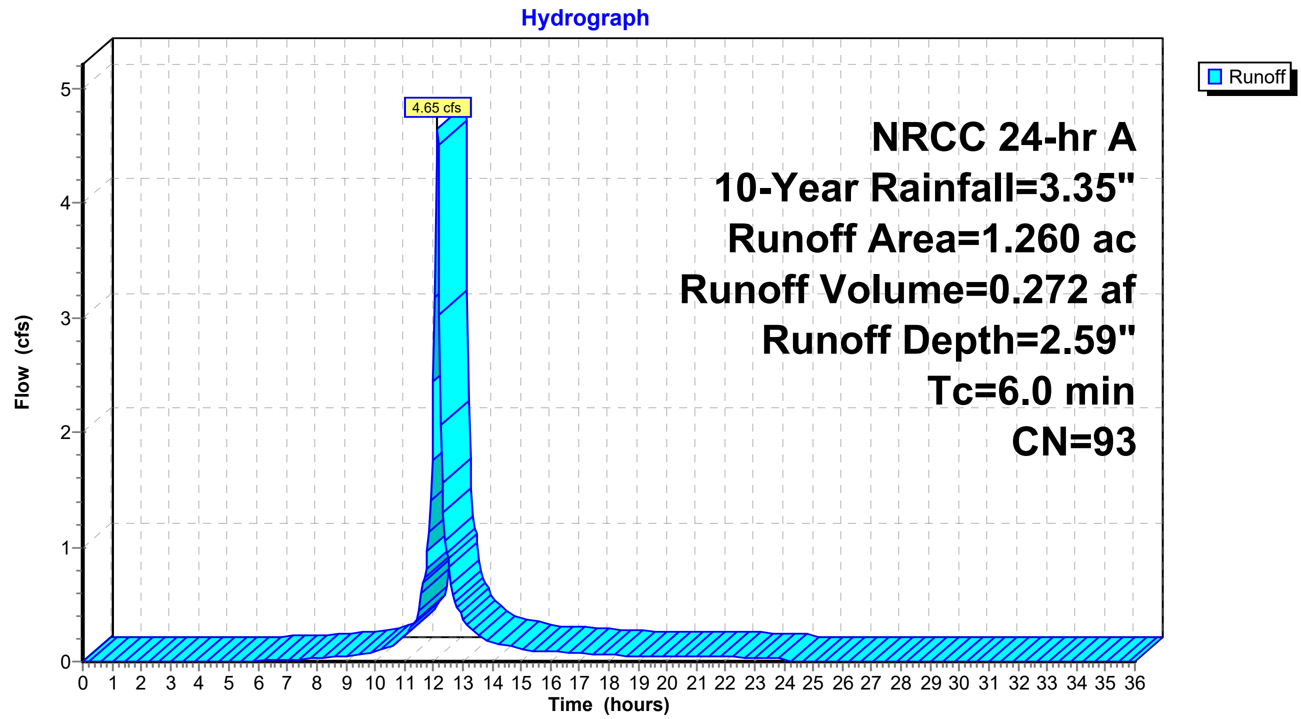
Runoff = 4.65 cfs @ 12.13 hrs, Volume= 0.272 af, Depth= 2.59"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
NRCC 24-hr A 10-Year Rainfall=3.35"

	Area (ac)	CN	Description
*	0.900	98	Impervious
	0.060	77	Woods, Good, HSG D
	0.300	80	>75% Grass cover, Good, HSG D
	1.260	93	Weighted Average
	0.360		28.57% Pervious Area
	0.900		71.43% Impervious Area

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

Subcatchment 2S: Parking Lot (1A)



Summary for Subcatchment 3S: West Swale (1B)

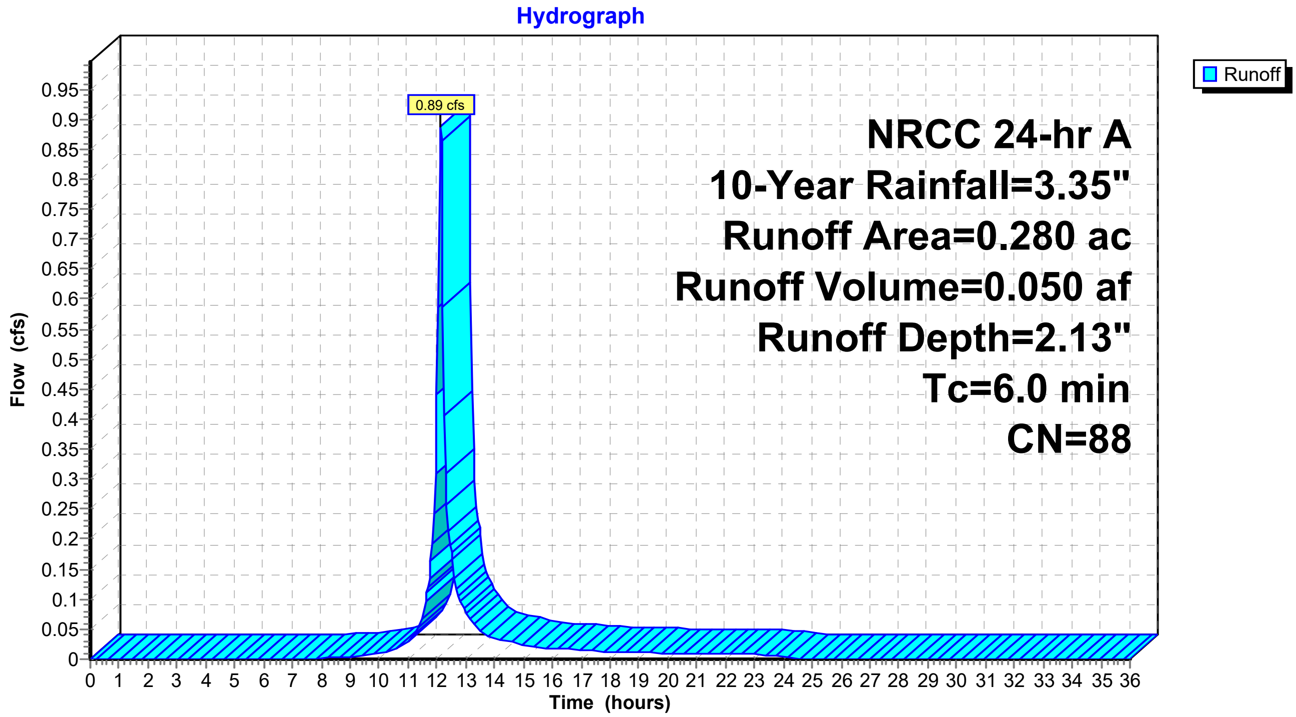
Runoff = 0.89 cfs @ 12.13 hrs, Volume= 0.050 af, Depth= 2.13"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
NRCC 24-hr A 10-Year Rainfall=3.35"

	Area (ac)	CN	Description
*	0.130	98	Impervious
	0.150	80	>75% Grass cover, Good, HSG D
	0.280	88	Weighted Average
	0.150		53.57% Pervious Area
	0.130		46.43% Impervious Area

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

Subcatchment 3S: West Swale (1B)



Summary for Subcatchment 4S: South Swale (1C)

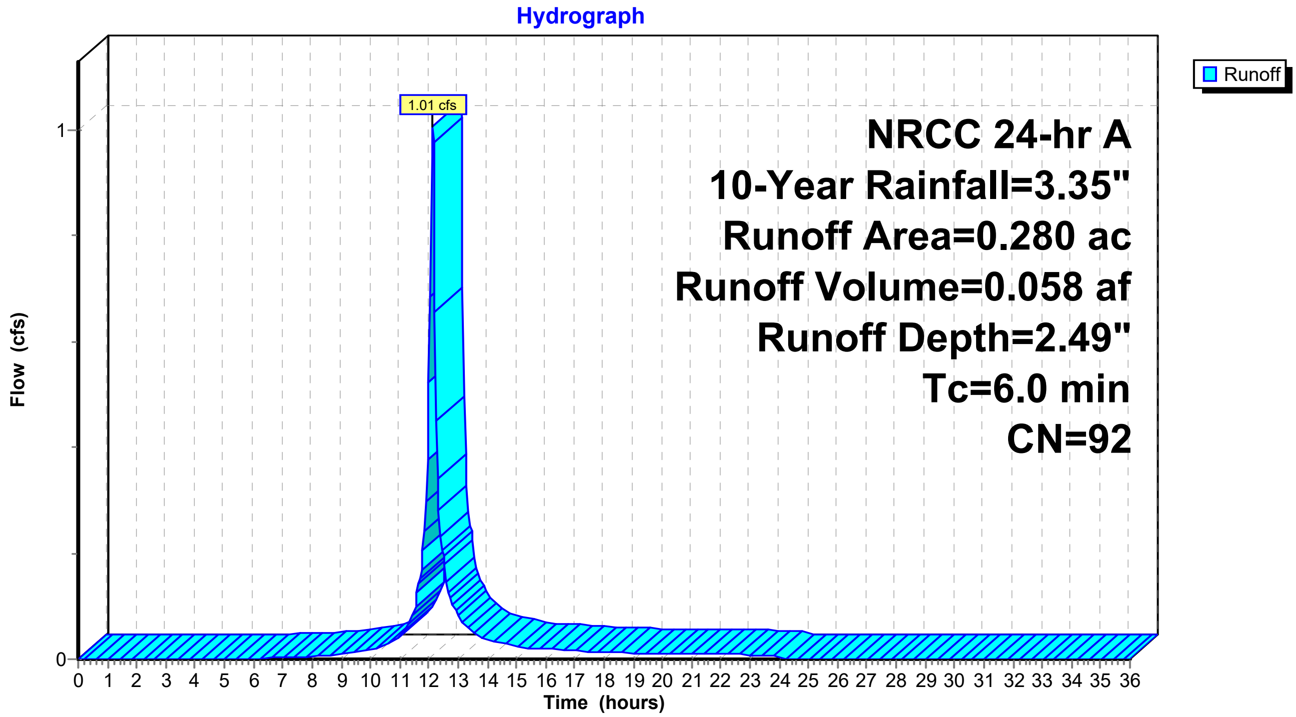
Runoff = 1.01 cfs @ 12.13 hrs, Volume= 0.058 af, Depth= 2.49"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
NRCC 24-hr A 10-Year Rainfall=3.35"

	Area (ac)	CN	Description
*	0.190	98	Impervious
	0.090	80	>75% Grass cover, Good, HSG D
	0.280	92	Weighted Average
	0.090		32.14% Pervious Area
	0.190		67.86% Impervious Area

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

Subcatchment 4S: South Swale (1C)



Summary for Reach 6R: Vegetated Swale

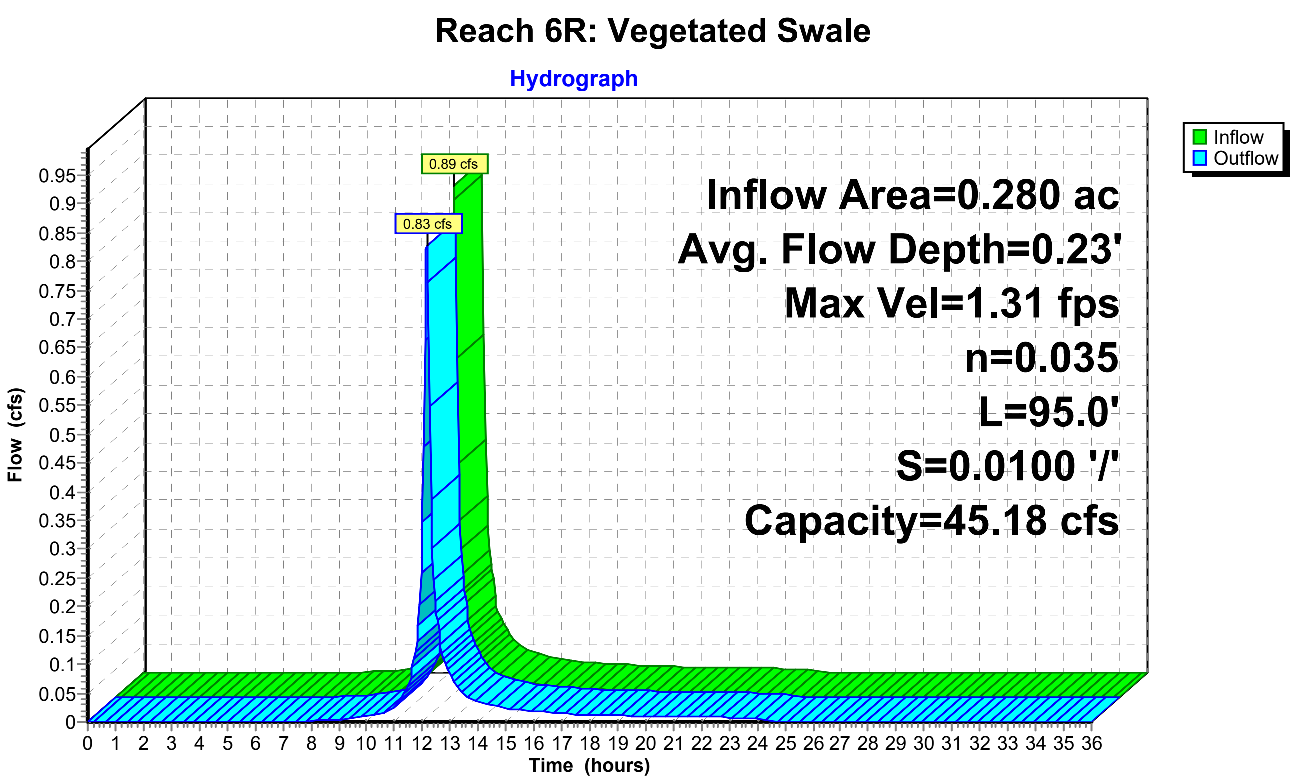
Inflow Area = 0.280 ac, 46.43% Impervious, Inflow Depth = 2.13" for 10-Year event
Inflow = 0.89 cfs @ 12.13 hrs, Volume= 0.050 af
Outflow = 0.83 cfs @ 12.16 hrs, Volume= 0.050 af, Atten= 7%, Lag= 1.8 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.31 fps, Min. Travel Time= 1.2 min
Avg. Velocity = 0.36 fps, Avg. Travel Time= 4.4 min

Peak Storage= 63 cf @ 12.15 hrs
Average Depth at Peak Storage= 0.23' , Surface Width= 3.83'
Bank-Full Depth= 1.50' Flow Area= 12.0 sf, Capacity= 45.18 cfs

2.00' x 1.50' deep channel, n= 0.035 High grass
Side Slope Z-value= 4.0 '/' Top Width= 14.00'
Length= 95.0' Slope= 0.0100 '/'
Inlet Invert= 435.08', Outlet Invert= 434.13'

‡



Stage-Area-Storage for Reach 6R: Vegetated Swale

Elevation (feet)	End-Area (sq-ft)	Storage (cubic-feet)
435.08	0.0	0
435.10	0.0	4
435.12	0.1	8
435.14	0.1	13
435.16	0.2	18
435.18	0.2	23
435.20	0.3	28
435.22	0.4	34
435.24	0.4	40
435.26	0.5	47
435.28	0.6	53
435.30	0.6	60
435.32	0.7	67
435.34	0.8	75
435.36	0.9	83
435.38	1.0	91
435.40	1.0	100
435.42	1.1	109
435.44	1.2	118
435.46	1.3	127
435.48	1.4	137
435.50	1.5	147
435.52	1.7	157
435.54	1.8	168
435.56	1.9	179
435.58	2.0	190
435.60	2.1	202
435.62	2.2	213
435.64	2.4	226
435.66	2.5	238
435.68	2.6	251
435.70	2.8	264
435.72	2.9	277
435.74	3.1	291
435.76	3.2	305
435.78	3.4	319
435.80	3.5	334
435.82	3.7	349
435.84	3.8	364
435.86	4.0	379
435.88	4.2	395
435.90	4.3	411
435.92	4.5	428
435.94	4.7	444
435.96	4.9	461
435.98	5.0	479
436.00	5.2	496
436.02	5.4	514
436.04	5.6	533
436.06	5.8	551
436.08	6.0	570

Elevation (feet)	End-Area (sq-ft)	Storage (cubic-feet)
436.10	6.2	589
436.12	6.4	609
436.14	6.6	628
436.16	6.8	648
436.18	7.0	669
436.20	7.3	689
436.22	7.5	710
436.24	7.7	732
436.26	7.9	753
436.28	8.2	775
436.30	8.4	797
436.32	8.6	820
436.34	8.9	843
436.36	9.1	866
436.38	9.4	889
436.40	9.6	913
436.42	9.9	937
436.44	10.1	961
436.46	10.4	986
436.48	10.6	1,011
436.50	10.9	1,036
436.52	11.2	1,062
436.54	11.4	1,087
436.56	11.7	1,114
436.58	**12.0**	**1,140**

Summary for Reach 7R: Vegetated Swale

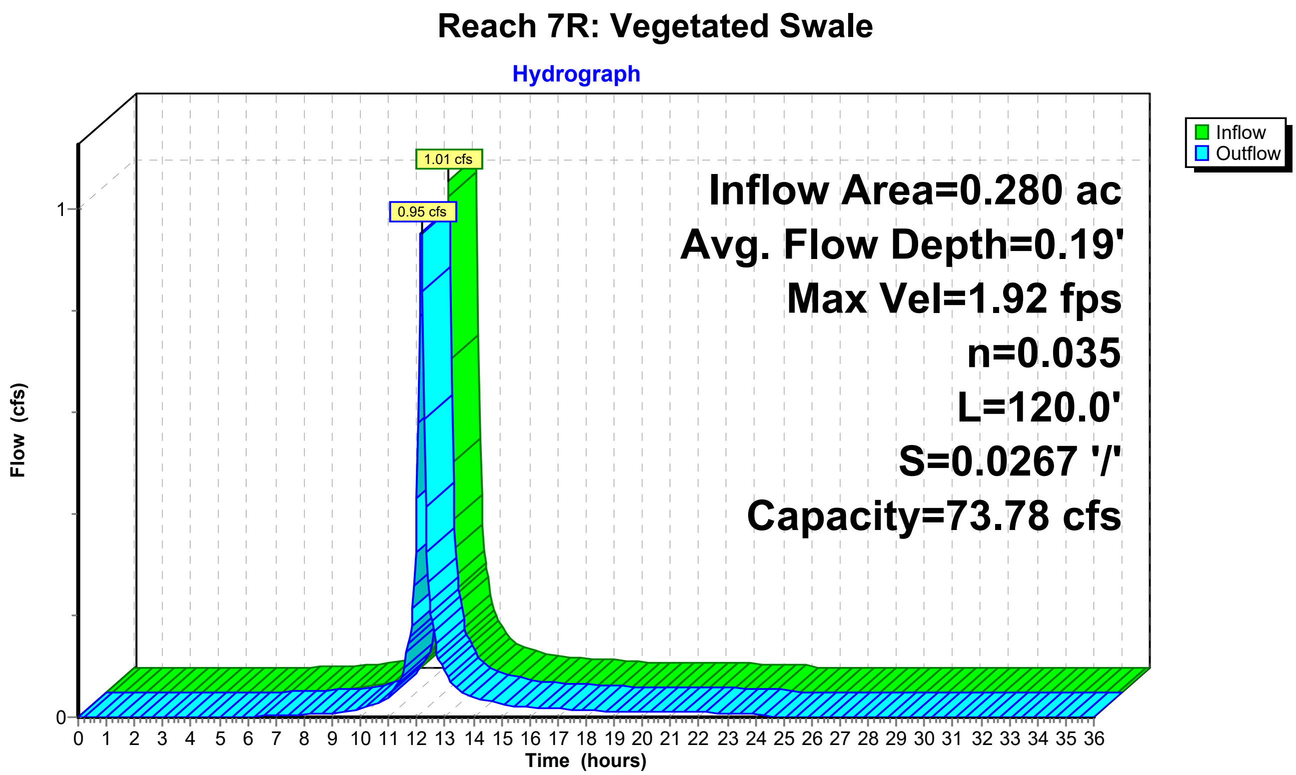
Inflow Area = 0.280 ac, 67.86% Impervious, Inflow Depth = 2.49" for 10-Year event
Inflow = 1.01 cfs @ 12.13 hrs, Volume= 0.058 af
Outflow = 0.95 cfs @ 12.15 hrs, Volume= 0.058 af, Atten= 5%, Lag= 1.5 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.92 fps, Min. Travel Time= 1.0 min
Avg. Velocity = 0.53 fps, Avg. Travel Time= 3.8 min

Peak Storage= 62 cf @ 12.14 hrs
Average Depth at Peak Storage= 0.19' , Surface Width= 3.51'
Bank-Full Depth= 1.50' Flow Area= 12.0 sf, Capacity= 73.78 cfs

2.00' x 1.50' deep channel, n= 0.035 High grass
Side Slope Z-value= 4.0 '/' Top Width= 14.00'
Length= 120.0' Slope= 0.0267 '/'
Inlet Invert= 438.00', Outlet Invert= 434.80'

‡



Stage-Area-Storage for Reach 7R: Vegetated Swale

Elevation (feet)	End-Area (sq-ft)	Storage (cubic-feet)
438.00	0.0	0
438.02	0.0	5
438.04	0.1	10
438.06	0.1	16
438.08	0.2	22
438.10	0.2	29
438.12	0.3	36
438.14	0.4	43
438.16	0.4	51
438.18	0.5	59
438.20	0.6	67
438.22	0.6	76
438.24	0.7	85
438.26	0.8	95
438.28	0.9	105
438.30	1.0	115
438.32	1.0	126
438.34	1.1	137
438.36	1.2	149
438.38	1.3	161
438.40	1.4	173
438.42	1.5	185
438.44	1.7	199
438.46	1.8	212
438.48	1.9	226
438.50	2.0	240
438.52	2.1	255
438.54	2.2	270
438.56	2.4	285
438.58	2.5	301
438.60	2.6	317
438.62	2.8	333
438.64	2.9	350
438.66	3.1	367
438.68	3.2	385
438.70	3.4	403
438.72	3.5	422
438.74	3.7	440
438.76	3.8	460
438.78	4.0	479
438.80	4.2	499
438.82	4.3	520
438.84	4.5	540
438.86	4.7	561
438.88	4.9	583
438.90	5.0	605
438.92	5.2	627
438.94	5.4	650
438.96	5.6	673
438.98	5.8	696
439.00	6.0	720

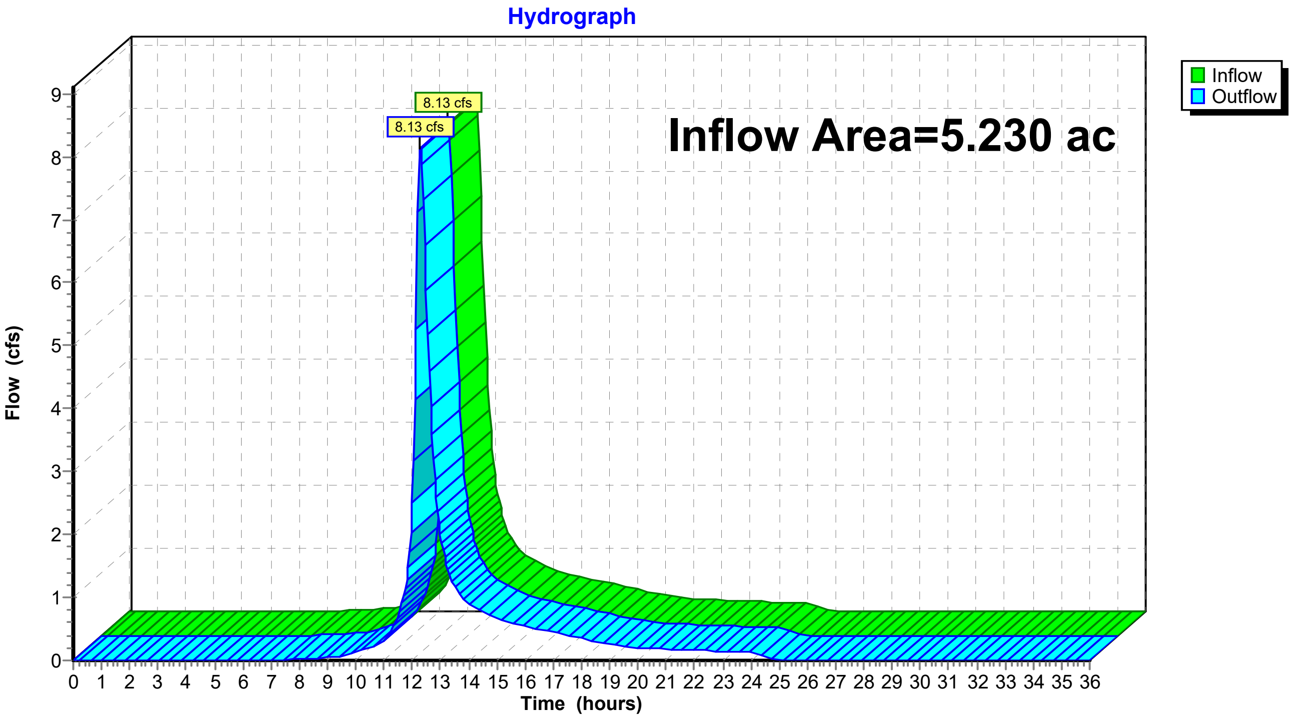
Elevation (feet)	End-Area (sq-ft)	Storage (cubic-feet)
439.02	6.2	744
439.04	6.4	769
439.06	6.6	794
439.08	6.8	819
439.10	7.0	845
439.12	7.3	871
439.14	7.5	897
439.16	7.7	924
439.18	7.9	952
439.20	8.2	979
439.22	8.4	1,007
439.24	8.6	1,036
439.26	8.9	1,064
439.28	9.1	1,094
439.30	9.4	1,123
439.32	9.6	1,153
439.34	9.9	1,184
439.36	10.1	1,214
439.38	10.4	1,245
439.40	10.6	1,277
439.42	10.9	1,309
439.44	11.2	1,341
439.46	11.4	1,374
439.48	11.7	1,407
439.50	**12.0**	**1,440**

Summary for Reach 8R: Analysis Point

Inflow Area =	5.230 ac,	38.43% Impervious,	Inflow Depth = 2.05"	for 10-Year event
Inflow =	8.13 cfs @	12.29 hrs, Volume=	0.894 af	
Outflow =	8.13 cfs @	12.29 hrs, Volume=	0.894 af,	Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

Reach 8R: Analysis Point



Summary for Pond 9P: Dry Swale

Inflow Area = 1.260 ac, 71.43% Impervious, Inflow Depth = 2.59" for 10-Year event
Inflow = 4.65 cfs @ 12.13 hrs, Volume= 0.272 af
Outflow = 2.05 cfs @ 12.27 hrs, Volume= 0.272 af, Atten= 56%, Lag= 8.3 min
Primary = 2.05 cfs @ 12.27 hrs, Volume= 0.272 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 440.16' @ 12.27 hrs Surf.Area= 4,260 sf Storage= 4,571 cf

Plug-Flow detention time= 99.9 min calculated for 0.272 af (100% of inflow)
Center-of-Mass det. time= 99.1 min (885.0 - 785.9)

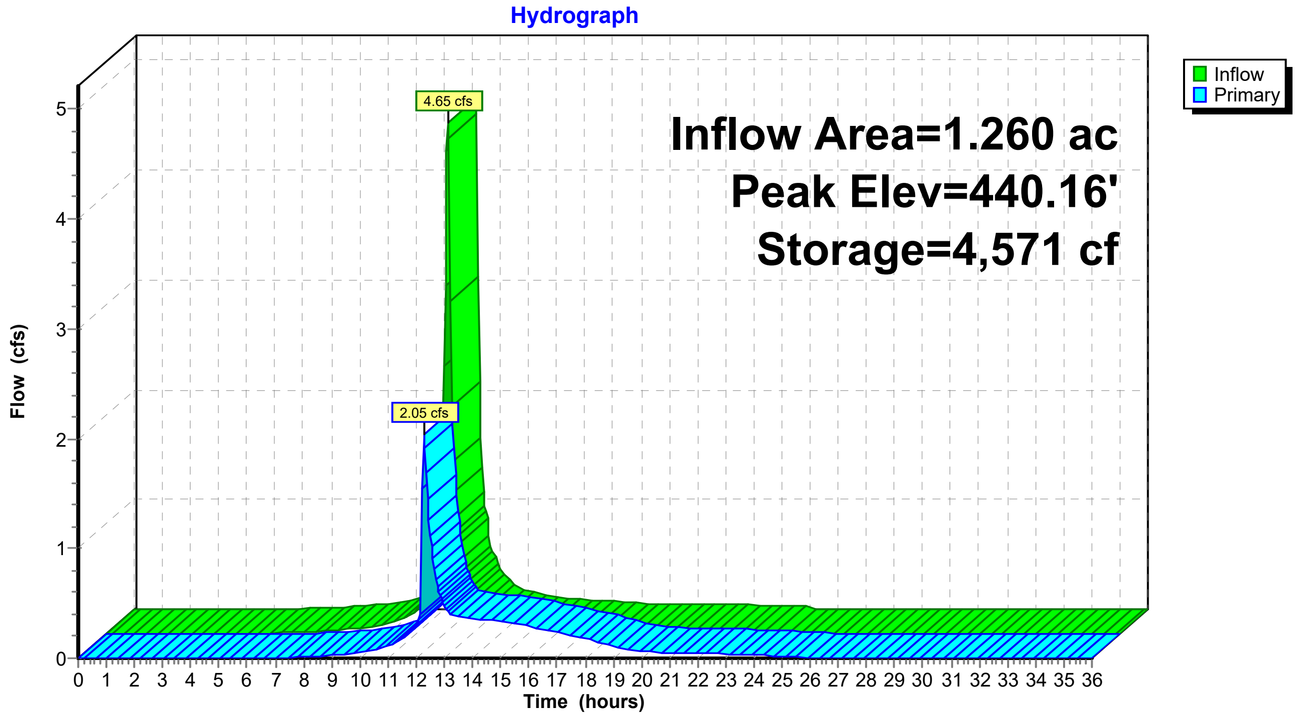
Volume	Invert	Avail.Storage	Storage Description
#1	438.50'	6,120 cf	**Custom Stage Data (Conic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
438.50	1,245	0	0	1,245
439.50	3,157	2,128	2,128	3,164
440.50	4,890	3,992	6,120	4,911

Device	Routing	Invert	Outlet Devices
#1	Primary	440.00'	**10.0' long x 2.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32
#2	Primary	438.50'	**4.0" Round Culvert** L= 30.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 438.50' / 438.20' S= 0.0100 '/' Cc= 0.900 n= 0.011 PVC, smooth interior, Flow Area= 0.09 sf

Primary OutFlow Max=1.98 cfs @ 12.27 hrs HW=440.16' (Free Discharge)
├─**1=Broad-Crested Rectangular Weir** (Weir Controls 1.58 cfs @ 1.01 fps)
└─**2=Culvert** (Inlet Controls 0.40 cfs @ 4.64 fps)

Pond 9P: Dry Swale



Stage-Area-Storage for Pond 9P: Dry Swale

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
438.50	1,245	0	439.52	3,188	2,192
438.52	1,275	25	439.54	3,219	2,256
438.54	1,305	51	439.56	3,250	2,320
438.56	1,335	77	439.58	3,282	2,386
438.58	1,366	104	439.60	3,313	2,452
438.60	1,397	132	439.62	3,345	2,518
438.62	1,428	160	439.64	3,377	2,585
438.64	1,460	189	439.66	3,409	2,653
438.66	1,492	219	439.68	3,441	2,722
438.68	1,525	249	439.70	3,473	2,791
438.70	1,557	280	439.72	3,506	2,861
438.72	1,591	311	439.74	3,538	2,931
438.74	1,624	343	439.76	3,571	3,002
438.76	1,658	376	439.78	3,604	3,074
438.78	1,692	410	439.80	3,637	3,146
438.80	1,727	444	439.82	3,670	3,220
438.82	1,762	479	439.84	3,704	3,293
438.84	1,797	514	439.86	3,737	3,368
438.86	1,833	551	439.88	3,771	3,443
438.88	1,869	588	439.90	3,805	3,519
438.90	1,905	625	439.92	3,839	3,595
438.92	1,942	664	439.94	3,873	3,672
438.94	1,979	703	439.96	3,907	3,750
438.96	2,016	743	439.98	3,942	3,828
438.98	2,054	784	440.00	3,976	3,908
439.00	2,092	825	440.02	4,011	3,987
439.02	2,130	867	440.04	4,046	4,068
439.04	2,169	910	440.06	4,081	4,149
439.06	2,208	954	440.08	4,116	4,231
439.08	2,248	999	440.10	4,151	4,314
439.10	2,287	1,044	440.12	4,187	4,397
439.12	2,328	1,090	440.14	4,223	4,481
439.14	2,368	1,137	440.16	4,258	4,566
439.16	2,409	1,185	440.18	4,294	4,652
439.18	2,450	1,233	440.20	4,330	4,738
439.20	2,492	1,283	440.22	4,367	4,825
439.22	2,534	1,333	440.24	4,403	4,913
439.24	2,576	1,384	440.26	4,440	5,001
439.26	2,618	1,436	440.28	4,476	5,090
439.28	2,661	1,489	440.30	4,513	5,180
439.30	2,705	1,543	440.32	4,550	5,271
439.32	2,748	1,597	440.34	4,587	5,362
439.34	2,792	1,653	440.36	4,625	5,454
439.36	2,837	1,709	440.38	4,662	5,547
439.38	2,881	1,766	440.40	4,700	5,641
439.40	2,926	1,824	440.42	4,737	5,735
439.42	2,972	1,883	440.44	4,775	5,830
439.44	3,018	1,943	440.46	4,813	5,926
439.46	3,064	2,004	440.48	4,852	6,023
439.48	3,110	2,066	440.50	**4,890**	**6,120**
439.50	3,157	2,128			

Time span=0.00-36.00 hrs, dt=0.05 hrs, 721 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1S: DA-1 Runoff Area=3.410 ac 23.17% Impervious Runoff Depth=2.49"
Flow Length=697' Tc=23.6 min CN=84 Runoff=7.63 cfs 0.706 af

Subcatchment2S: Parking Lot (1A) Runoff Area=1.260 ac 71.43% Impervious Runoff Depth=3.35"
Tc=6.0 min CN=93 Runoff=5.91 cfs 0.351 af

Subcatchment3S: West Swale (1B) Runoff Area=0.280 ac 46.43% Impervious Runoff Depth=2.85"
Tc=6.0 min CN=88 Runoff=1.17 cfs 0.066 af

Subcatchment4S: South Swale (1C) Runoff Area=0.280 ac 67.86% Impervious Runoff Depth=3.24"
Tc=6.0 min CN=92 Runoff=1.29 cfs 0.076 af

Reach 6R: Vegetated Swale Avg. Flow Depth=0.27' Max Vel=1.42 fps Inflow=1.17 cfs 0.066 af
n=0.035 L=95.0' S=0.0100 '/' Capacity=45.18 cfs Outflow=1.10 cfs 0.066 af

Reach 7R: Vegetated Swale Avg. Flow Depth=0.22' Max Vel=2.07 fps Inflow=1.29 cfs 0.076 af
n=0.035 L=120.0' S=0.0267 '/' Capacity=73.78 cfs Outflow=1.23 cfs 0.076 af

Reach 8R: Analysis Point Inflow=11.79 cfs 1.200 af
Outflow=11.79 cfs 1.200 af

Pond 9P: Dry Swale Peak Elev=440.27' Storage=5,068 cf Inflow=5.91 cfs 0.351 af
Outflow=4.12 cfs 0.351 af

Total Runoff Area = 5.230 ac Runoff Volume = 1.200 af Average Runoff Depth = 2.75"
61.57% Pervious = 3.220 ac 38.43% Impervious = 2.010 ac

Summary for Subcatchment 1S: DA-1

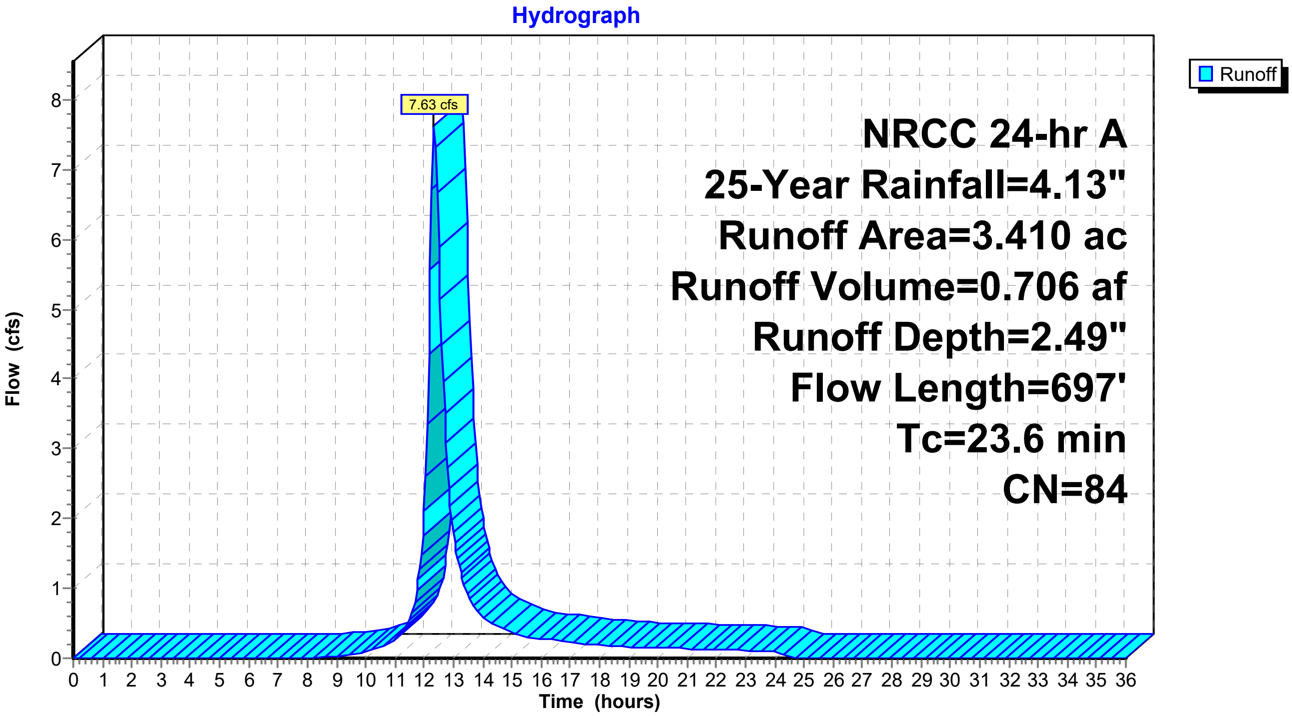
Runoff = 7.63 cfs @ 12.34 hrs, Volume= 0.706 af, Depth= 2.49"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
NRCC 24-hr A 25-Year Rainfall=4.13"

	Area (ac)	CN	Description
	1.880	80	>75% Grass cover, Good, HSG D
	0.740	77	Woods, Good, HSG D
*	0.790	98	Impervious
	3.410	84	Weighted Average
	2.620		76.83% Pervious Area
	0.790		23.17% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
19.1	100	0.0400	0.09		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.33"
0.3	73	0.0500	3.60		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.0	13	0.0800	4.55		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.0	20	0.3300	9.25		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
1.7	114	0.0050	1.14		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.5	85	0.0350	3.01		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.5	73	0.0270	2.65		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.4	53	0.0150	1.97		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.1	10	0.0150	2.49		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.1	14	0.0150	1.97		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.9	142	0.0280	2.69		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
23.6	697	Total			

Subcatchment 1S: DA-1



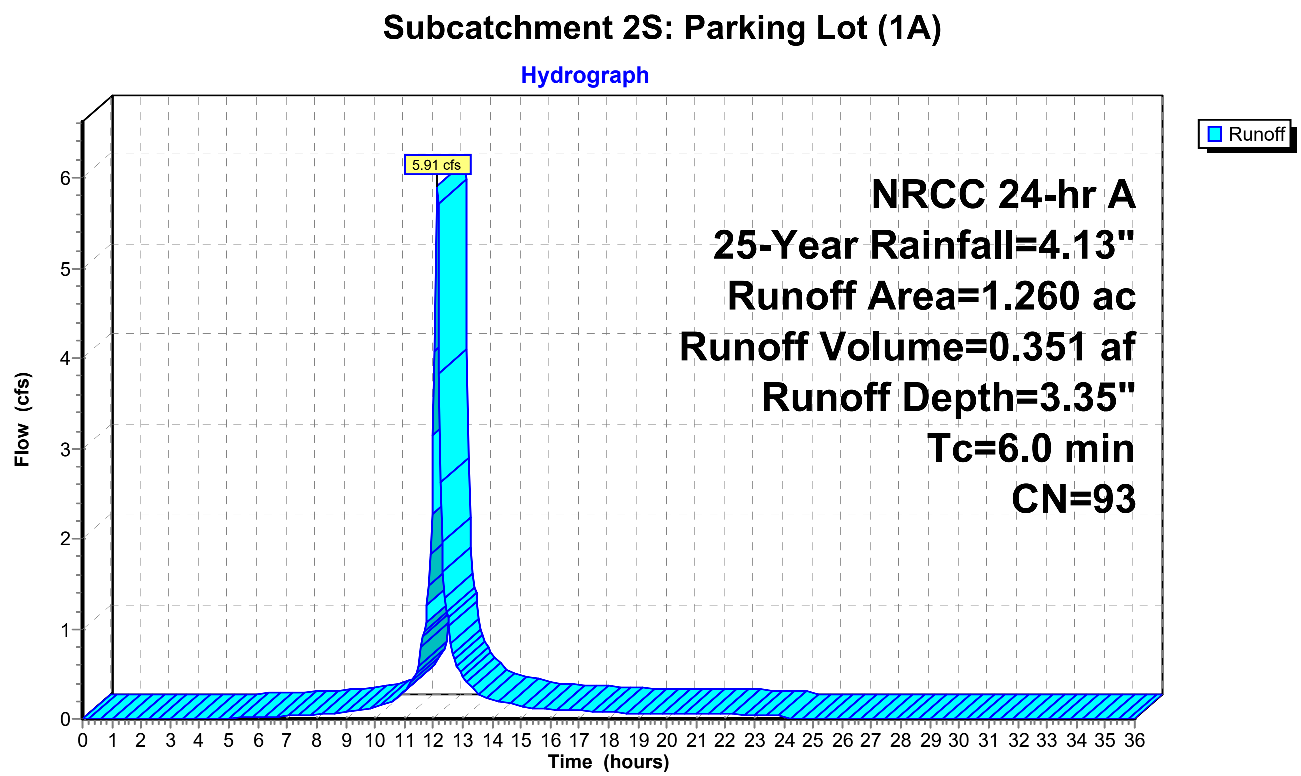
Summary for Subcatchment 2S: Parking Lot (1A)

Runoff = 5.91 cfs @ 12.13 hrs, Volume= 0.351 af, Depth= 3.35"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
NRCC 24-hr A 25-Year Rainfall=4.13"

	Area (ac)	CN	Description
*	0.900	98	Impervious
	0.060	77	Woods, Good, HSG D
	0.300	80	>75% Grass cover, Good, HSG D
	1.260	93	Weighted Average
	0.360		28.57% Pervious Area
	0.900		71.43% Impervious Area

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



Summary for Subcatchment 3S: West Swale (1B)

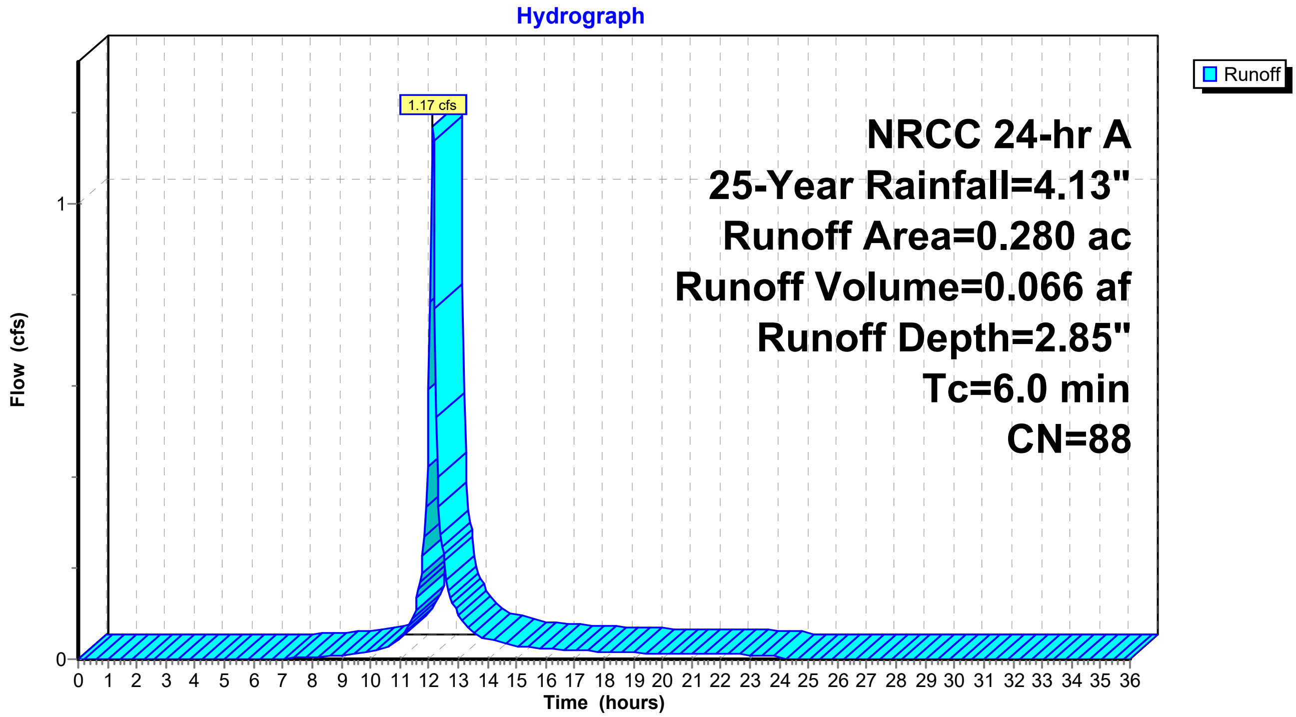
Runoff = 1.17 cfs @ 12.13 hrs, Volume= 0.066 af, Depth= 2.85"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
NRCC 24-hr A 25-Year Rainfall=4.13"

	Area (ac)	CN	Description
*	0.130	98	Impervious
	0.150	80	>75% Grass cover, Good, HSG D
	0.280	88	Weighted Average
	0.150		53.57% Pervious Area
	0.130		46.43% Impervious Area

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

Subcatchment 3S: West Swale (1B)



Summary for Subcatchment 4S: South Swale (1C)

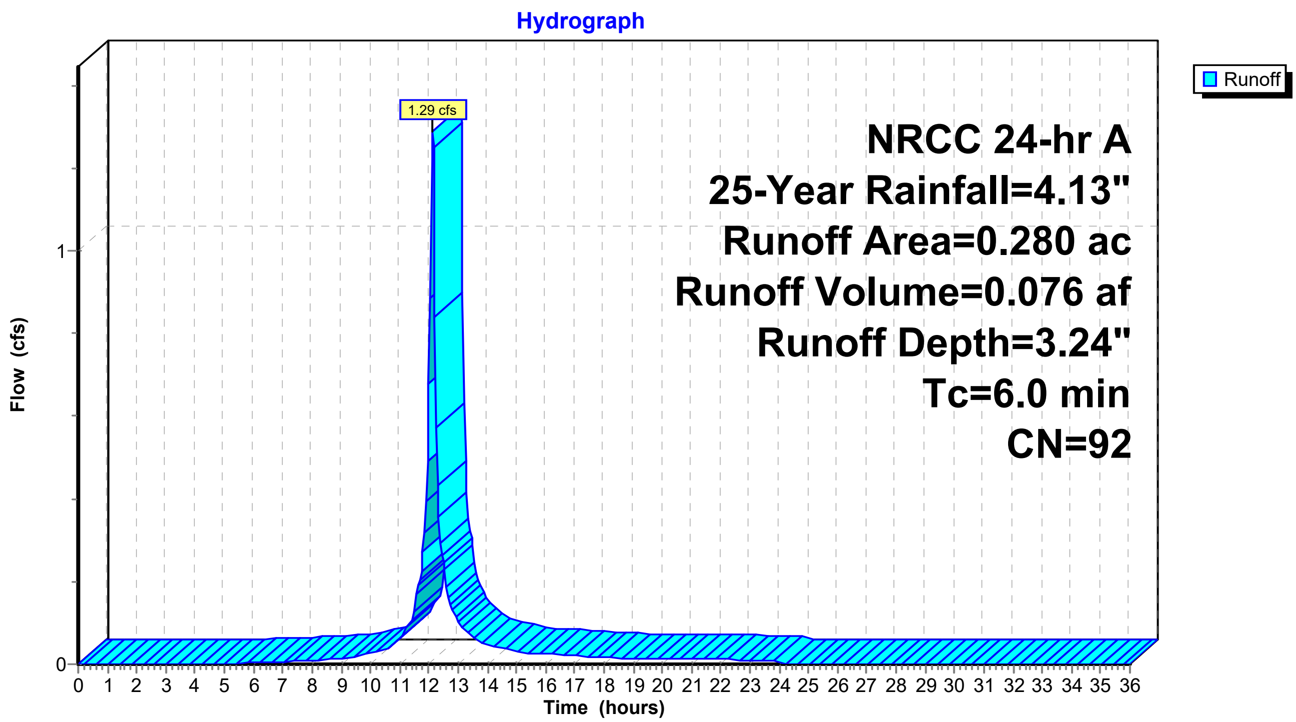
Runoff = 1.29 cfs @ 12.13 hrs, Volume= 0.076 af, Depth= 3.24"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
NRCC 24-hr A 25-Year Rainfall=4.13"

	Area (ac)	CN	Description
*	0.190	98	Impervious
	0.090	80	>75% Grass cover, Good, HSG D
	0.280	92	Weighted Average
	0.090		32.14% Pervious Area
	0.190		67.86% Impervious Area

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

Subcatchment 4S: South Swale (1C)



Summary for Reach 6R: Vegetated Swale

Inflow Area = 0.280 ac, 46.43% Impervious, Inflow Depth = 2.85" for 25-Year event
Inflow = 1.17 cfs @ 12.13 hrs, Volume= 0.066 af
Outflow = 1.10 cfs @ 12.16 hrs, Volume= 0.066 af, Atten= 6%, Lag= 1.7 min

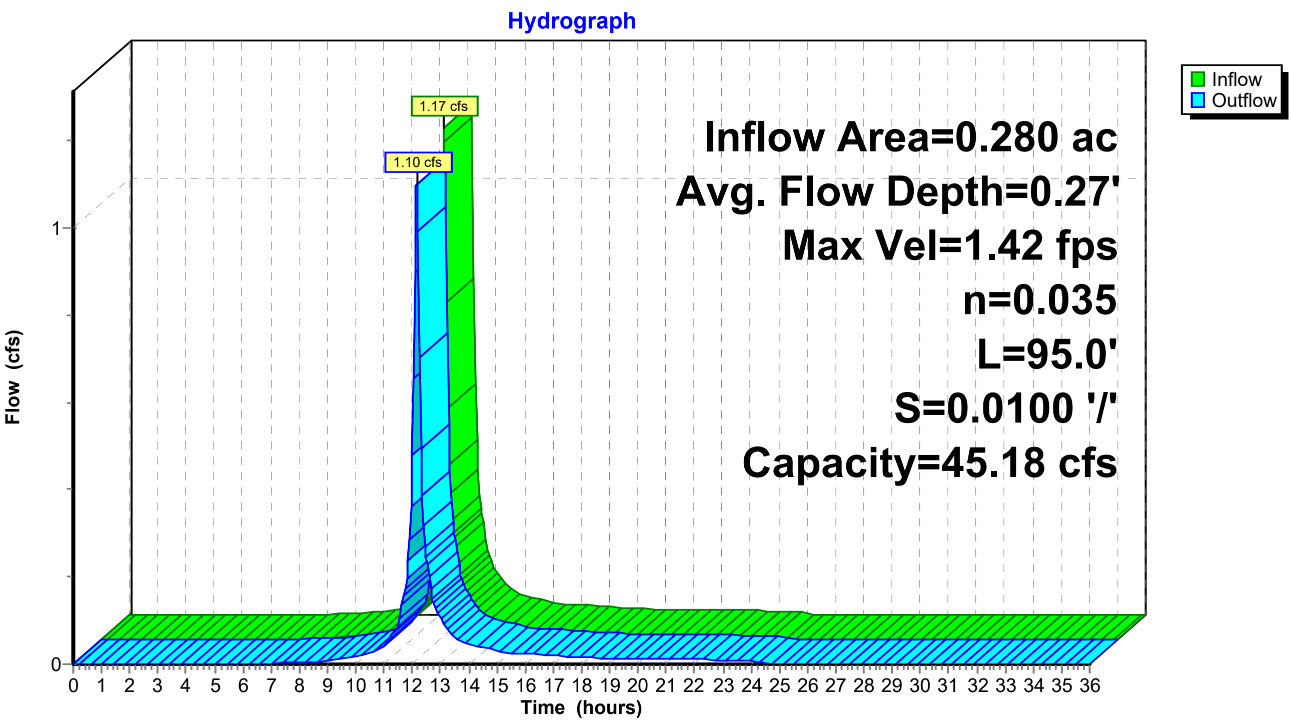
Routing by Stor-Ind+Trans method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.42 fps, Min. Travel Time= 1.1 min
Avg. Velocity = 0.39 fps, Avg. Travel Time= 4.1 min

Peak Storage= 77 cf @ 12.14 hrs
Average Depth at Peak Storage= 0.27' , Surface Width= 4.12'
Bank-Full Depth= 1.50' Flow Area= 12.0 sf, Capacity= 45.18 cfs

2.00' x 1.50' deep channel, n= 0.035 High grass
Side Slope Z-value= 4.0 '/' Top Width= 14.00'
Length= 95.0' Slope= 0.0100 '/'
Inlet Invert= 435.08', Outlet Invert= 434.13'

‡

Reach 6R: Vegetated Swale



Stage-Area-Storage for Reach 6R: Vegetated Swale

Elevation (feet)	End-Area (sq-ft)	Storage (cubic-feet)
435.08	0.0	0
435.10	0.0	4
435.12	0.1	8
435.14	0.1	13
435.16	0.2	18
435.18	0.2	23
435.20	0.3	28
435.22	0.4	34
435.24	0.4	40
435.26	0.5	47
435.28	0.6	53
435.30	0.6	60
435.32	0.7	67
435.34	0.8	75
435.36	0.9	83
435.38	1.0	91
435.40	1.0	100
435.42	1.1	109
435.44	1.2	118
435.46	1.3	127
435.48	1.4	137
435.50	1.5	147
435.52	1.7	157
435.54	1.8	168
435.56	1.9	179
435.58	2.0	190
435.60	2.1	202
435.62	2.2	213
435.64	2.4	226
435.66	2.5	238
435.68	2.6	251
435.70	2.8	264
435.72	2.9	277
435.74	3.1	291
435.76	3.2	305
435.78	3.4	319
435.80	3.5	334
435.82	3.7	349
435.84	3.8	364
435.86	4.0	379
435.88	4.2	395
435.90	4.3	411
435.92	4.5	428
435.94	4.7	444
435.96	4.9	461
435.98	5.0	479
436.00	5.2	496
436.02	5.4	514
436.04	5.6	533
436.06	5.8	551
436.08	6.0	570
436.10	6.2	589
436.12	6.4	609
436.14	6.6	628
436.16	6.8	648
436.18	7.0	669
436.20	7.3	689
436.22	7.5	710
436.24	7.7	732
436.26	7.9	753
436.28	8.2	775
436.30	8.4	797
436.32	8.6	820
436.34	8.9	843
436.36	9.1	866
436.38	9.4	889
436.40	9.6	913
436.42	9.9	937
436.44	10.1	961
436.46	10.4	986
436.48	10.6	1,011
436.50	10.9	1,036
436.52	11.2	1,062
436.54	11.4	1,087
436.56	11.7	1,114
436.58	**12.0**	**1,140**

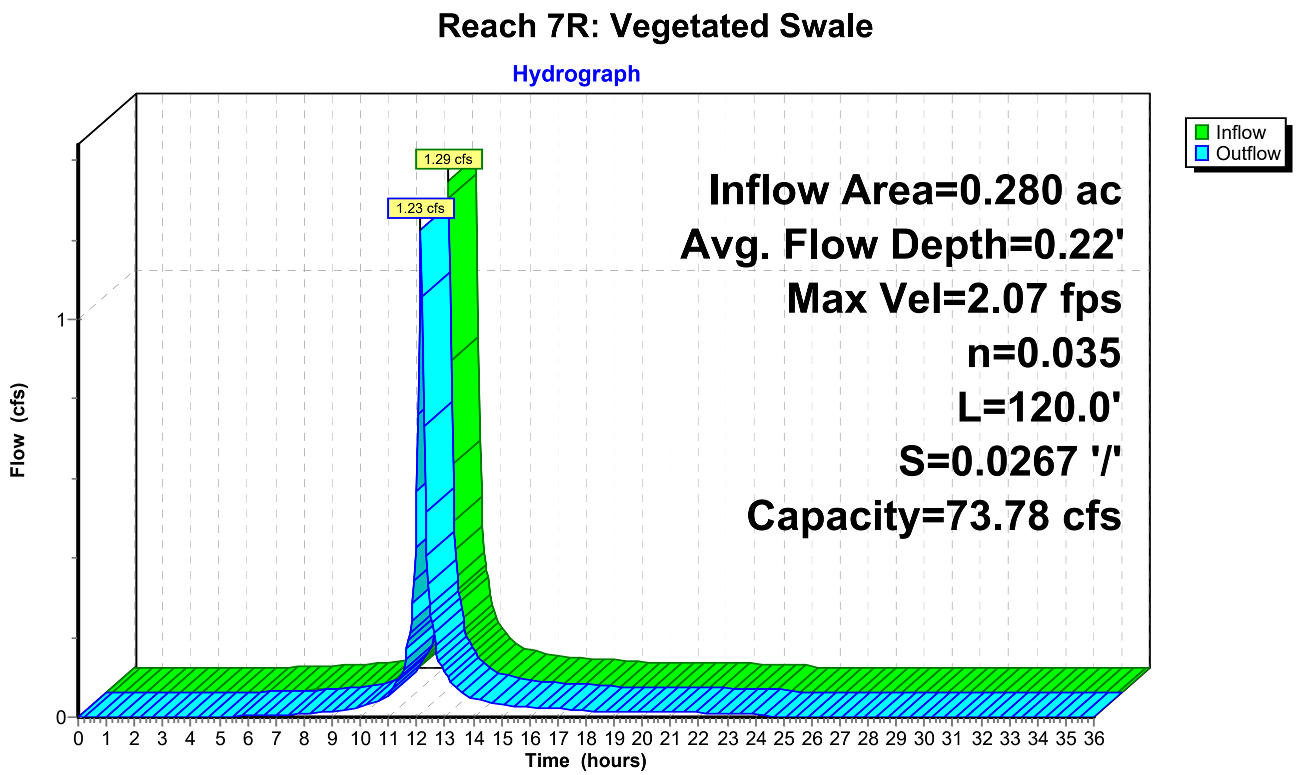
Summary for Reach 7R: Vegetated Swale

Inflow Area = 0.280 ac, 67.86% Impervious, Inflow Depth = 3.24" for 25-Year event
Inflow = 1.29 cfs @ 12.13 hrs, Volume= 0.076 af
Outflow = 1.23 cfs @ 12.15 hrs, Volume= 0.076 af, Atten= 5%, Lag= 1.4 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.07 fps, Min. Travel Time= 1.0 min
Avg. Velocity = 0.55 fps, Avg. Travel Time= 3.6 min

Peak Storage= 74 cf @ 12.14 hrs
Average Depth at Peak Storage= 0.22' , Surface Width= 3.73'
Bank-Full Depth= 1.50' Flow Area= 12.0 sf, Capacity= 73.78 cfs

2.00' x 1.50' deep channel, n= 0.035 High grass
Side Slope Z-value= 4.0 '/' Top Width= 14.00'
Length= 120.0' Slope= 0.0267 '/'
Inlet Invert= 438.00', Outlet Invert= 434.80'



Stage-Area-Storage for Reach 7R: Vegetated Swale

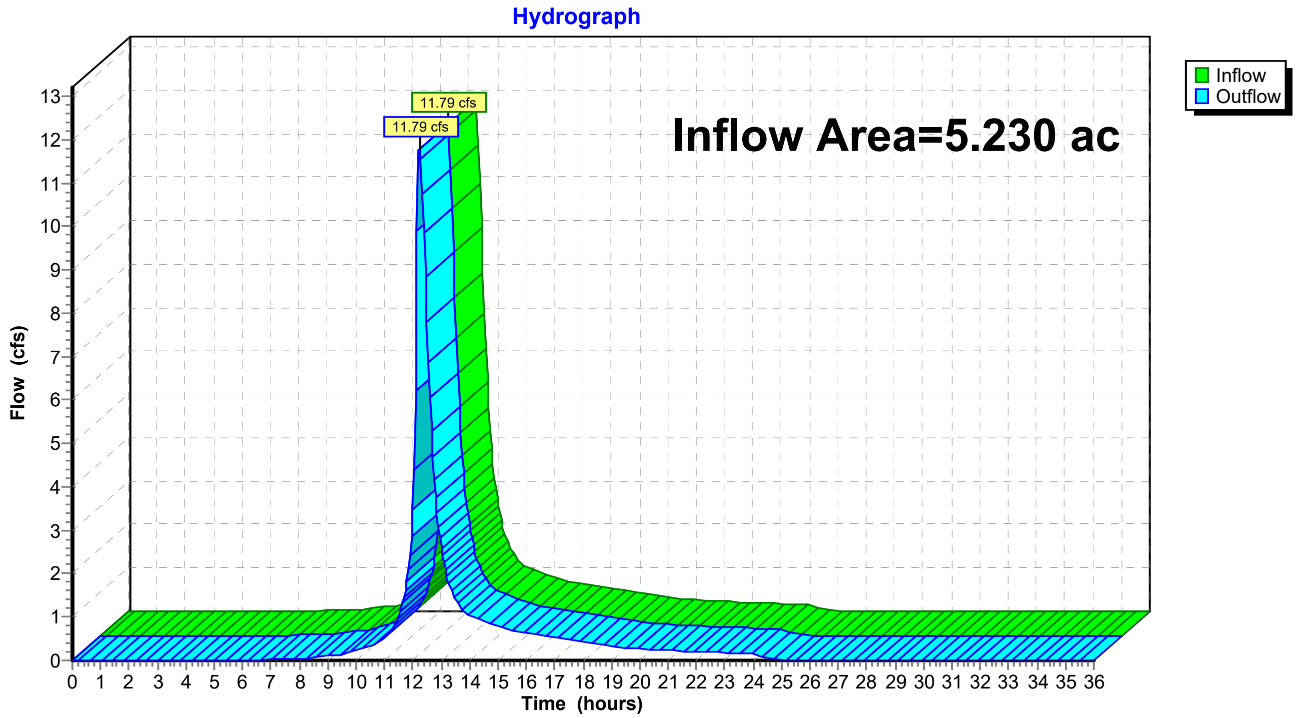
Elevation (feet)	End-Area (sq-ft)	Storage (cubic-feet)	Elevation (feet)	End-Area (sq-ft)	Storage (cubic-feet)
438.00	0.0	0	439.02	6.2	744
438.02	0.0	5	439.04	6.4	769
438.04	0.1	10	439.06	6.6	794
438.06	0.1	16	439.08	6.8	819
438.08	0.2	22	439.10	7.0	845
438.10	0.2	29	439.12	7.3	871
438.12	0.3	36	439.14	7.5	897
438.14	0.4	43	439.16	7.7	924
438.16	0.4	51	439.18	7.9	952
438.18	0.5	59	439.20	8.2	979
438.20	0.6	67	439.22	8.4	1,007
438.22	0.6	76	439.24	8.6	1,036
438.24	0.7	85	439.26	8.9	1,064
438.26	0.8	95	439.28	9.1	1,094
438.28	0.9	105	439.30	9.4	1,123
438.30	1.0	115	439.32	9.6	1,153
438.32	1.0	126	439.34	9.9	1,184
438.34	1.1	137	439.36	10.1	1,214
438.36	1.2	149	439.38	10.4	1,245
438.38	1.3	161	439.40	10.6	1,277
438.40	1.4	173	439.42	10.9	1,309
438.42	1.5	185	439.44	11.2	1,341
438.44	1.7	199	439.46	11.4	1,374
438.46	1.8	212	439.48	11.7	1,407
438.48	1.9	226	439.50	**12.0**	**1,440**
438.50	2.0	240			
438.52	2.1	255			
438.54	2.2	270			
438.56	2.4	285			
438.58	2.5	301			
438.60	2.6	317			
438.62	2.8	333			
438.64	2.9	350			
438.66	3.1	367			
438.68	3.2	385			
438.70	3.4	403			
438.72	3.5	422			
438.74	3.7	440			
438.76	3.8	460			
438.78	4.0	479			
438.80	4.2	499			
438.82	4.3	520			
438.84	4.5	540			
438.86	4.7	561			
438.88	4.9	583			
438.90	5.0	605			
438.92	5.2	627			
438.94	5.4	650			
438.96	5.6	673			
438.98	5.8	696			
439.00	6.0	720			

Summary for Reach 8R: Analysis Point

Inflow Area = 5.230 ac, 38.43% Impervious, Inflow Depth = 2.75" for 25-Year event
Inflow = 11.79 cfs @ 12.23 hrs, Volume= 1.200 af
Outflow = 11.79 cfs @ 12.23 hrs, Volume= 1.200 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

Reach 8R: Analysis Point



Summary for Pond 9P: Dry Swale

Inflow Area = 1.260 ac, 71.43% Impervious, Inflow Depth = 3.35" for 25-Year event
Inflow = 5.91 cfs @ 12.13 hrs, Volume= 0.351 af
Outflow = 4.12 cfs @ 12.21 hrs, Volume= 0.351 af, Atten= 30%, Lag= 4.7 min
Primary = 4.12 cfs @ 12.21 hrs, Volume= 0.351 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 440.27' @ 12.21 hrs Surf.Area= 4,467 sf Storage= 5,068 cf

Plug-Flow detention time= 88.0 min calculated for 0.351 af (100% of inflow)
Center-of-Mass det. time= 87.3 min (867.2 - 780.0)

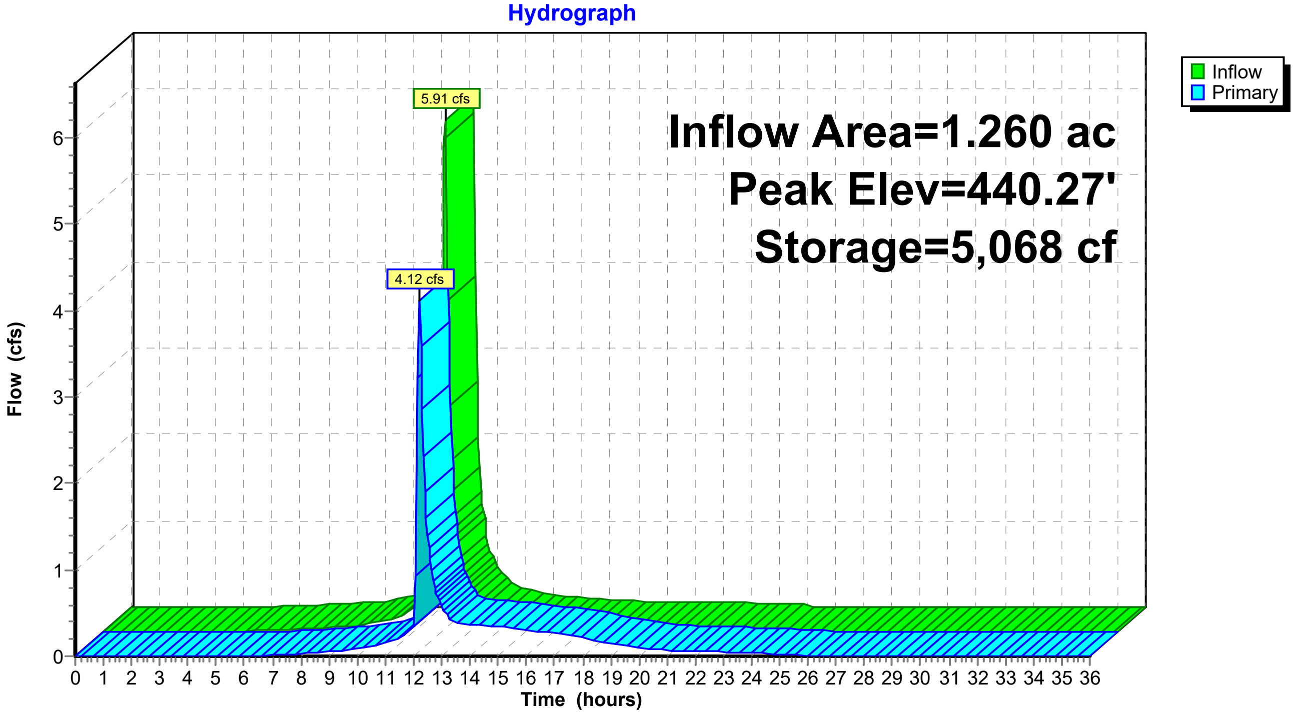
Volume	Invert	Avail.Storage	Storage Description
#1	438.50'	6,120 cf	**Custom Stage Data (Conic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
438.50	1,245	0	0	1,245
439.50	3,157	2,128	2,128	3,164
440.50	4,890	3,992	6,120	4,911

Device	Routing	Invert	Outlet Devices
#1	Primary	440.00'	**10.0' long x 2.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32
#2	Primary	438.50'	**4.0" Round Culvert** L= 30.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 438.50' / 438.20' S= 0.0100 '/' Cc= 0.900 n= 0.011 PVC, smooth interior, Flow Area= 0.09 sf

Primary OutFlow Max=4.04 cfs @ 12.21 hrs HW=440.27' (Free Discharge)
1=Broad-Crested Rectangular Weir (Weir Controls 3.62 cfs @ 1.33 fps)
2=Culvert (Inlet Controls 0.42 cfs @ 4.81 fps)

Pond 9P: Dry Swale



Stage-Area-Storage for Pond 9P: Dry Swale

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
438.50	1,245	0	439.52	3,188	2,192
438.52	1,275	25	439.54	3,219	2,256
438.54	1,305	51	439.56	3,250	2,320
438.56	1,335	77	439.58	3,282	2,386
438.58	1,366	104	439.60	3,313	2,452
438.60	1,397	132	439.62	3,345	2,518
438.62	1,428	160	439.64	3,377	2,585
438.64	1,460	189	439.66	3,409	2,653
438.66	1,492	219	439.68	3,441	2,722
438.68	1,525	249	439.70	3,473	2,791
438.70	1,557	280	439.72	3,506	2,861
438.72	1,591	311	439.74	3,538	2,931
438.74	1,624	343	439.76	3,571	3,002
438.76	1,658	376	439.78	3,604	3,074
438.78	1,692	410	439.80	3,637	3,146
438.80	1,727	444	439.82	3,670	3,220
438.82	1,762	479	439.84	3,704	3,293
438.84	1,797	514	439.86	3,737	3,368
438.86	1,833	551	439.88	3,771	3,443
438.88	1,869	588	439.90	3,805	3,519
438.90	1,905	625	439.92	3,839	3,595
438.92	1,942	664	439.94	3,873	3,672
438.94	1,979	703	439.96	3,907	3,750
438.96	2,016	743	439.98	3,942	3,828
438.98	2,054	784	440.00	3,976	3,908
439.00	2,092	825	440.02	4,011	3,987
439.02	2,130	867	440.04	4,046	4,068
439.04	2,169	910	440.06	4,081	4,149
439.06	2,208	954	440.08	4,116	4,231
439.08	2,248	999	440.10	4,151	4,314
439.10	2,287	1,044	440.12	4,187	4,397
439.12	2,328	1,090	440.14	4,223	4,481
439.14	2,368	1,137	440.16	4,258	4,566
439.16	2,409	1,185	440.18	4,294	4,652
439.18	2,450	1,233	440.20	4,330	4,738
439.20	2,492	1,283	440.22	4,367	4,825
439.22	2,534	1,333	440.24	4,403	4,913
439.24	2,576	1,384	440.26	4,440	5,001
439.26	2,618	1,436	440.28	4,476	5,090
439.28	2,661	1,489	440.30	4,513	5,180
439.30	2,705	1,543	440.32	4,550	5,271
439.32	2,748	1,597	440.34	4,587	5,362
439.34	2,792	1,653	440.36	4,625	5,454
439.36	2,837	1,709	440.38	4,662	5,547
439.38	2,881	1,766	440.40	4,700	5,641
439.40	2,926	1,824	440.42	4,737	5,735
439.42	2,972	1,883	440.44	4,775	5,830
439.44	3,018	1,943	440.46	4,813	5,926
439.46	3,064	2,004	440.48	4,852	6,023
439.48	3,110	2,066	440.50	**4,890**	**6,120**
439.50	3,157	2,128			

Time span=0.00-36.00 hrs, dt=0.05 hrs, 721 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: DA-1 Runoff Area=3.410 ac 23.17% Impervious Runoff Depth=3.12"
Flow Length=697' Tc=23.6 min CN=84 Runoff=9.55 cfs 0.888 af

Subcatchment 2S: Parking Lot (1A) Runoff Area=1.260 ac 71.43% Impervious Runoff Depth=4.04"
Tc=6.0 min CN=93 Runoff=7.05 cfs 0.424 af

Subcatchment 3S: West Swale (1B) Runoff Area=0.280 ac 46.43% Impervious Runoff Depth=3.52"
Tc=6.0 min CN=88 Runoff=1.43 cfs 0.082 af

Subcatchment 4S: South Swale (1C) Runoff Area=0.280 ac 67.86% Impervious Runoff Depth=3.93"
Tc=6.0 min CN=92 Runoff=1.54 cfs 0.092 af

Reach 6R: Vegetated Swale Avg. Flow Depth=0.30' Max Vel=1.51 fps Inflow=1.43 cfs 0.082 af
n=0.035 L=95.0' S=0.0100 '/' Capacity=45.18 cfs Outflow=1.35 cfs 0.082 af

Reach 7R: Vegetated Swale Avg. Flow Depth=0.24' Max Vel=2.18 fps Inflow=1.54 cfs 0.092 af
n=0.035 L=120.0' S=0.0267 '/' Capacity=73.78 cfs Outflow=1.47 cfs 0.092 af

Reach 8R: Analysis Point Inflow=15.15 cfs 1.486 af
Outflow=15.15 cfs 1.486 af

Pond 9P: Dry Swale Peak Elev=440.34' Storage=5,382 cf Inflow=7.05 cfs 0.424 af
Outflow=5.66 cfs 0.424 af

Total Runoff Area = 5.230 ac Runoff Volume = 1.486 af Average Runoff Depth = 3.41"
61.57% Pervious = 3.220 ac 38.43% Impervious = 2.010 ac

Summary for Subcatchment 1S: DA-1

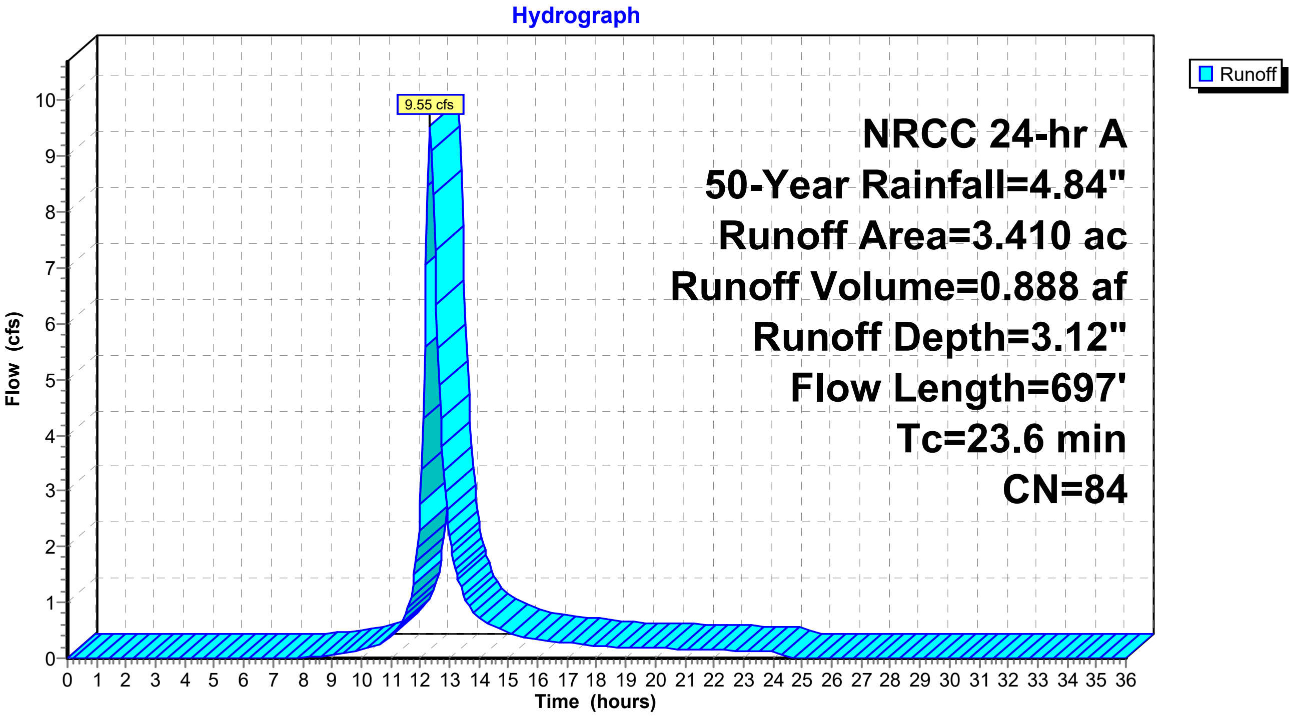
Runoff = 9.55 cfs @ 12.34 hrs, Volume= 0.888 af, Depth= 3.12"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
NRCC 24-hr A 50-Year Rainfall=4.84"

	Area (ac)	CN	Description
	1.880	80	>75% Grass cover, Good, HSG D
	0.740	77	Woods, Good, HSG D
*	0.790	98	Impervious
	3.410	84	Weighted Average
	2.620		76.83% Pervious Area
	0.790		23.17% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
19.1	100	0.0400	0.09		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.33"
0.3	73	0.0500	3.60		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.0	13	0.0800	4.55		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.0	20	0.3300	9.25		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
1.7	114	0.0050	1.14		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.5	85	0.0350	3.01		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.5	73	0.0270	2.65		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.4	53	0.0150	1.97		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.1	10	0.0150	2.49		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.1	14	0.0150	1.97		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.9	142	0.0280	2.69		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
23.6	697	Total			

Subcatchment 1S: DA-1



Summary for Subcatchment 2S: Parking Lot (1A)

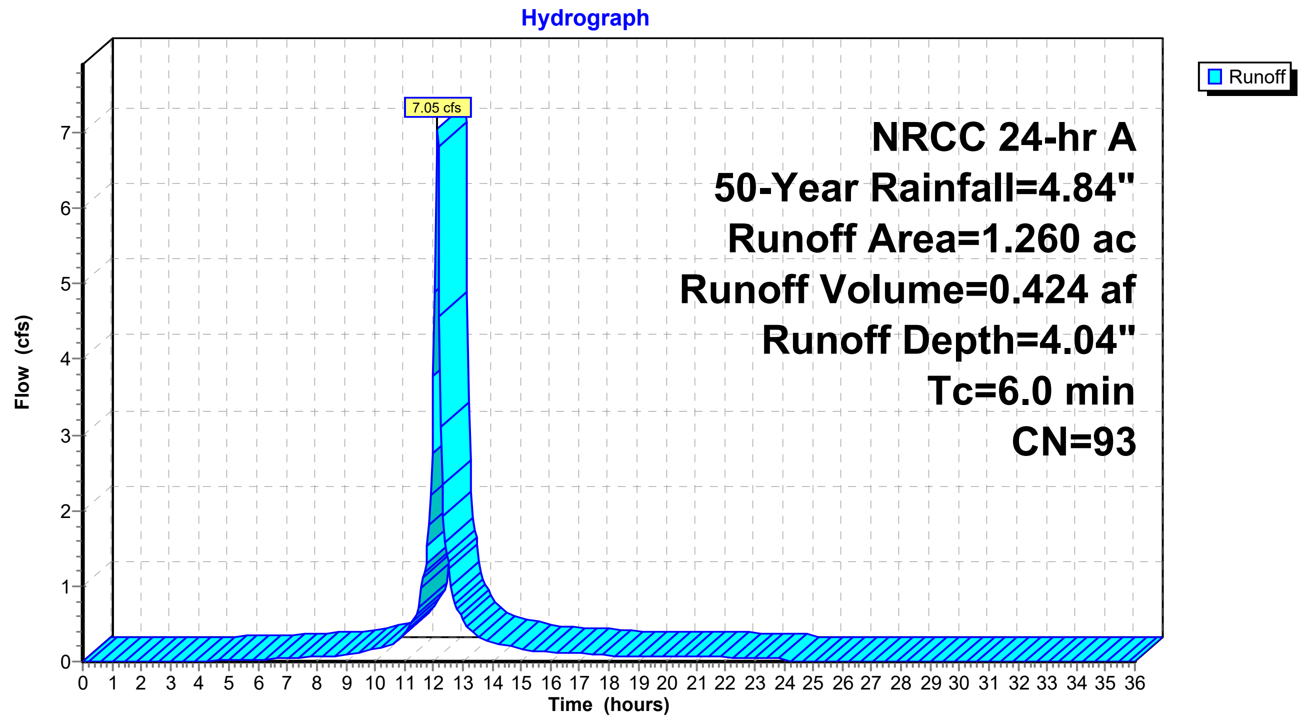
Runoff = 7.05 cfs @ 12.13 hrs, Volume= 0.424 af, Depth= 4.04"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
NRCC 24-hr A 50-Year Rainfall=4.84"

	Area (ac)	CN	Description
*	0.900	98	Impervious
	0.060	77	Woods, Good, HSG D
	0.300	80	>75% Grass cover, Good, HSG D
	1.260	93	Weighted Average
	0.360		28.57% Pervious Area
	0.900		71.43% Impervious Area

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

Subcatchment 2S: Parking Lot (1A)



Summary for Subcatchment 3S: West Swale (1B)

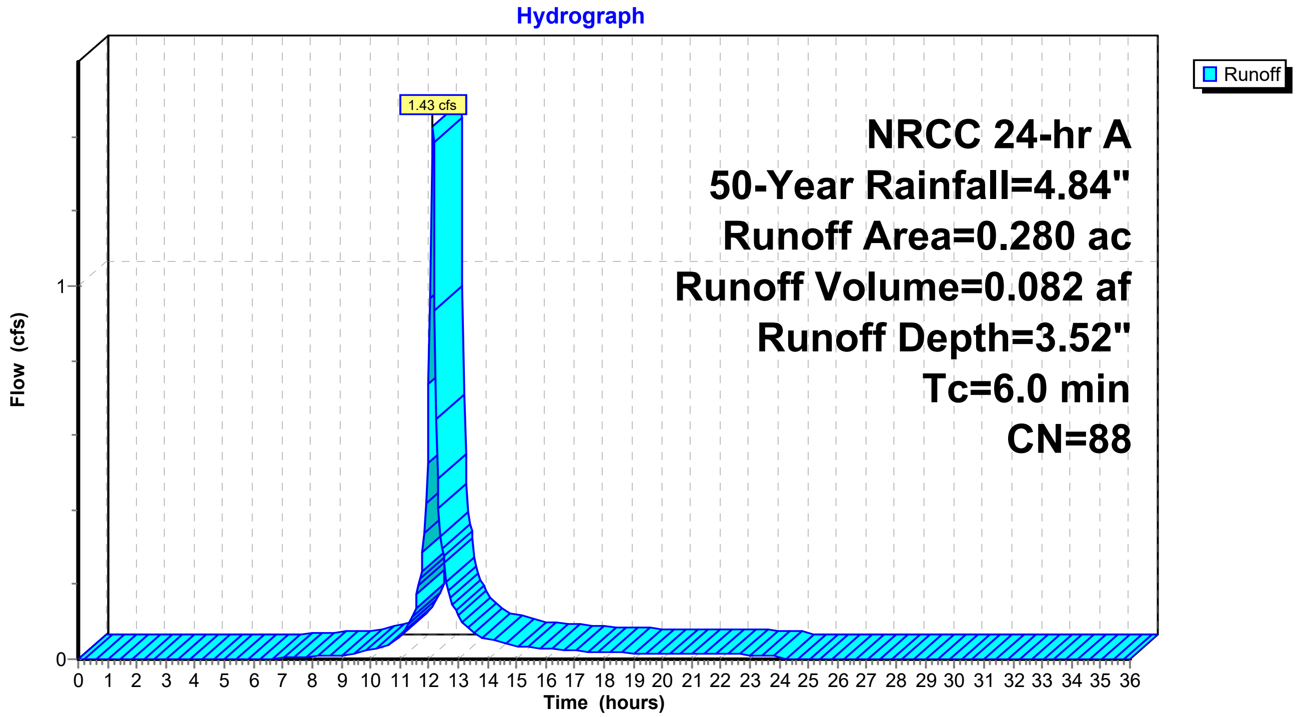
Runoff = 1.43 cfs @ 12.13 hrs, Volume= 0.082 af, Depth= 3.52"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
NRCC 24-hr A 50-Year Rainfall=4.84"

	Area (ac)	CN	Description
*	0.130	98	Impervious
	0.150	80	>75% Grass cover, Good, HSG D
	0.280	88	Weighted Average
	0.150		53.57% Pervious Area
	0.130		46.43% Impervious Area

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

Subcatchment 3S: West Swale (1B)



Summary for Subcatchment 4S: South Swale (1C)

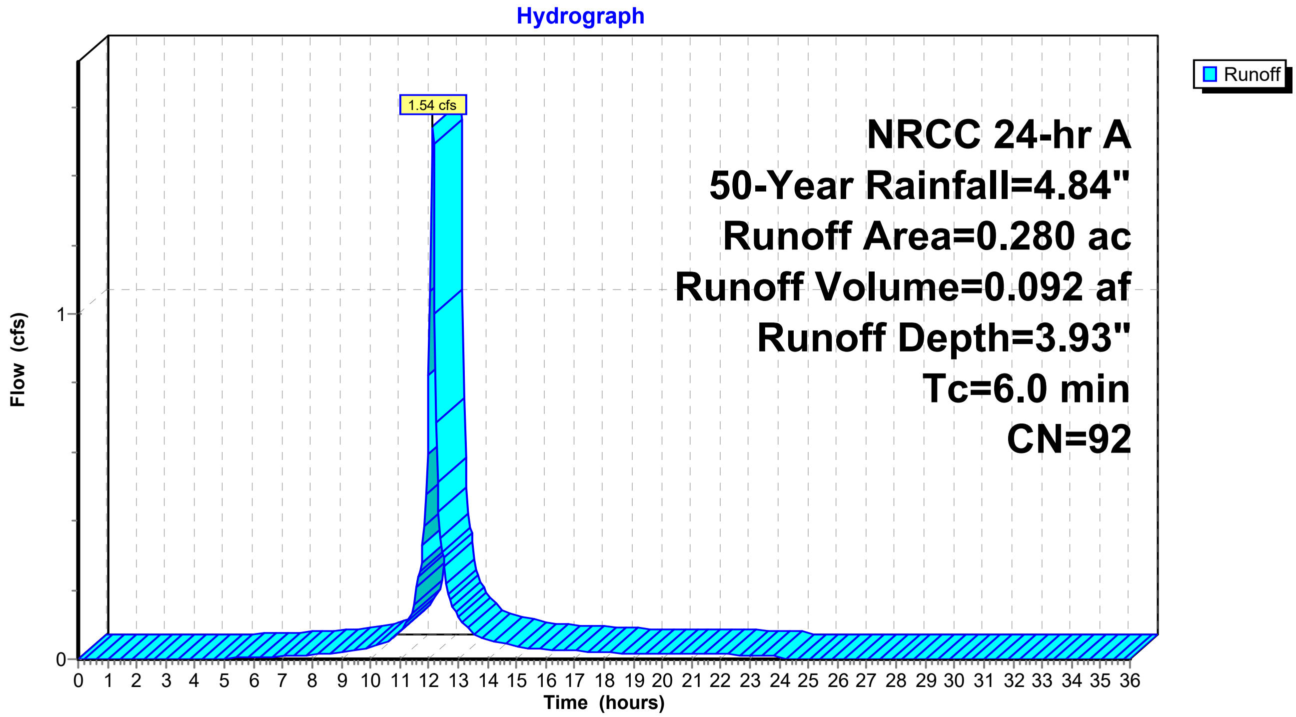
Runoff = 1.54 cfs @ 12.13 hrs, Volume= 0.092 af, Depth= 3.93"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
NRCC 24-hr A 50-Year Rainfall=4.84"

	Area (ac)	CN	Description
*	0.190	98	Impervious
	0.090	80	>75% Grass cover, Good, HSG D
	0.280	92	Weighted Average
	0.090		32.14% Pervious Area
	0.190		67.86% Impervious Area

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

Subcatchment 4S: South Swale (1C)



Summary for Reach 6R: Vegetated Swale

Inflow Area = 0.280 ac, 46.43% Impervious, Inflow Depth = 3.52" for 50-Year event
Inflow = 1.43 cfs @ 12.13 hrs, Volume= 0.082 af
Outflow = 1.35 cfs @ 12.16 hrs, Volume= 0.082 af, Atten= 6%, Lag= 1.6 min

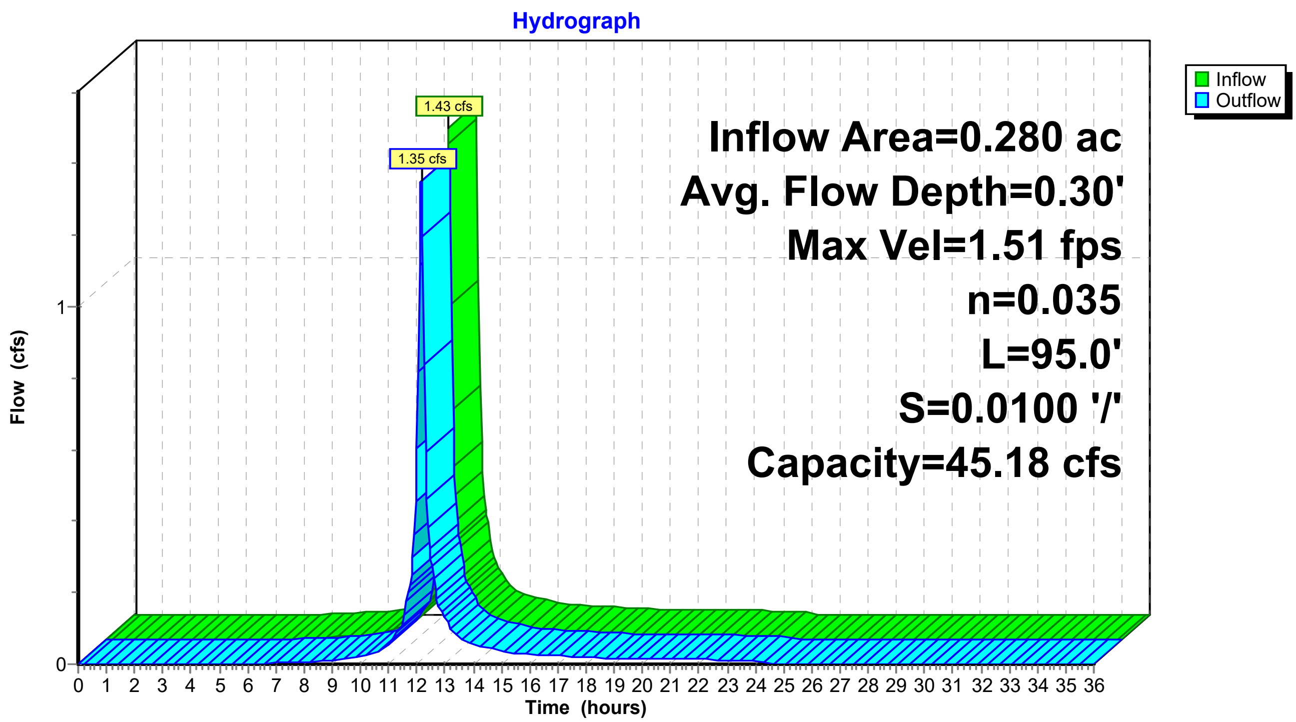
Routing by Stor-Ind+Trans method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.51 fps, Min. Travel Time= 1.1 min
Avg. Velocity = 0.41 fps, Avg. Travel Time= 3.9 min

Peak Storage= 89 cf @ 12.14 hrs
Average Depth at Peak Storage= 0.30' , Surface Width= 4.36'
Bank-Full Depth= 1.50' Flow Area= 12.0 sf, Capacity= 45.18 cfs

2.00' x 1.50' deep channel, n= 0.035 High grass
Side Slope Z-value= 4.0 '/' Top Width= 14.00'
Length= 95.0' Slope= 0.0100 '/'
Inlet Invert= 435.08', Outlet Invert= 434.13'

‡

Reach 6R: Vegetated Swale



Stage-Area-Storage for Reach 6R: Vegetated Swale

Elevation (feet)	End-Area (sq-ft)	Storage (cubic-feet)	Elevation (feet)	End-Area (sq-ft)	Storage (cubic-feet)
435.08	0.0	0	436.10	6.2	589
435.10	0.0	4	436.12	6.4	609
435.12	0.1	8	436.14	6.6	628
435.14	0.1	13	436.16	6.8	648
435.16	0.2	18	436.18	7.0	669
435.18	0.2	23	436.20	7.3	689
435.20	0.3	28	436.22	7.5	710
435.22	0.4	34	436.24	7.7	732
435.24	0.4	40	436.26	7.9	753
435.26	0.5	47	436.28	8.2	775
435.28	0.6	53	436.30	8.4	797
435.30	0.6	60	436.32	8.6	820
435.32	0.7	67	436.34	8.9	843
435.34	0.8	75	436.36	9.1	866
435.36	0.9	83	436.38	9.4	889
435.38	1.0	91	436.40	9.6	913
435.40	1.0	100	436.42	9.9	937
435.42	1.1	109	436.44	10.1	961
435.44	1.2	118	436.46	10.4	986
435.46	1.3	127	436.48	10.6	1,011
435.48	1.4	137	436.50	10.9	1,036
435.50	1.5	147	436.52	11.2	1,062
435.52	1.7	157	436.54	11.4	1,087
435.54	1.8	168	436.56	11.7	1,114
435.56	1.9	179	436.58	**12.0**	**1,140**
435.58	2.0	190			
435.60	2.1	202			
435.62	2.2	213			
435.64	2.4	226			
435.66	2.5	238			
435.68	2.6	251			
435.70	2.8	264			
435.72	2.9	277			
435.74	3.1	291			
435.76	3.2	305			
435.78	3.4	319			
435.80	3.5	334			
435.82	3.7	349			
435.84	3.8	364			
435.86	4.0	379			
435.88	4.2	395			
435.90	4.3	411			
435.92	4.5	428			
435.94	4.7	444			
435.96	4.9	461			
435.98	5.0	479			
436.00	5.2	496			
436.02	5.4	514			
436.04	5.6	533			
436.06	5.8	551			
436.08	6.0	570			

Summary for Reach 7R: Vegetated Swale

Inflow Area = 0.280 ac, 67.86% Impervious, Inflow Depth = 3.93" for 50-Year event
Inflow = 1.54 cfs @ 12.13 hrs, Volume= 0.092 af
Outflow = 1.47 cfs @ 12.15 hrs, Volume= 0.092 af, Atten= 5%, Lag= 1.4 min

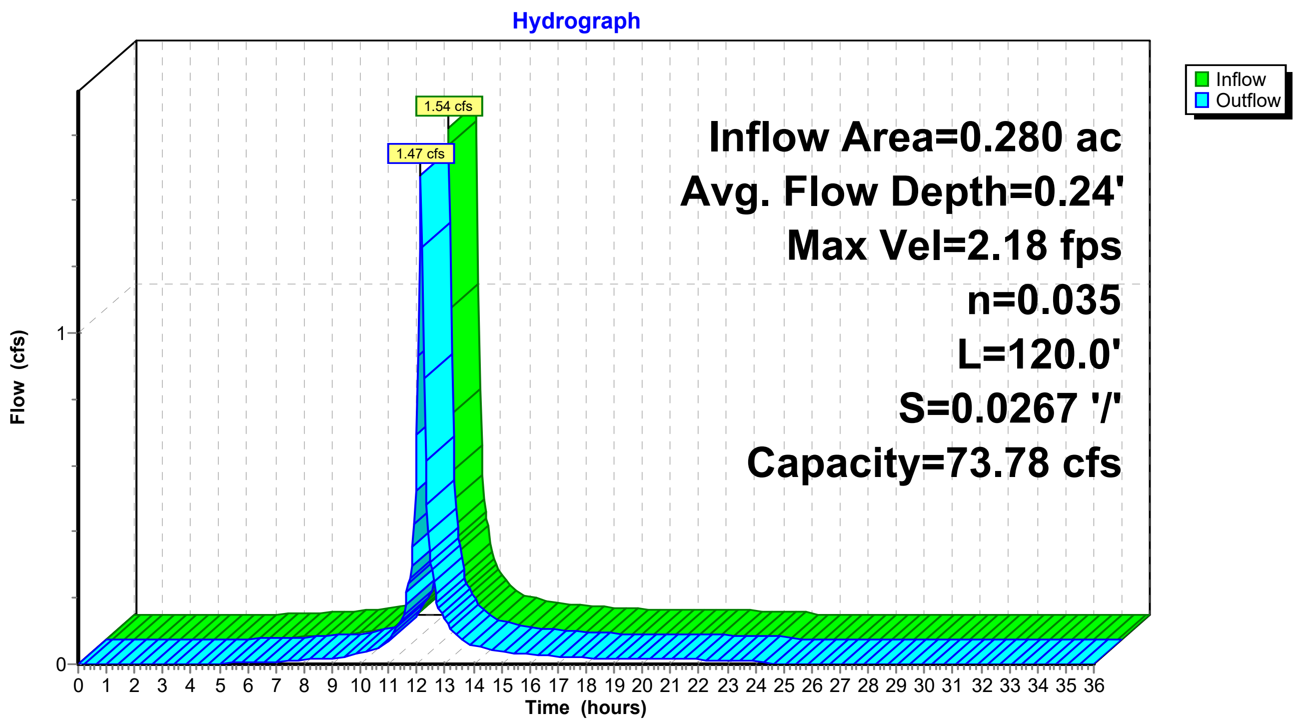
Routing by Stor-Ind+Trans method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.18 fps, Min. Travel Time= 0.9 min
Avg. Velocity = 0.58 fps, Avg. Travel Time= 3.5 min

Peak Storage= 84 cf @ 12.14 hrs
Average Depth at Peak Storage= 0.24' , Surface Width= 3.90'
Bank-Full Depth= 1.50' Flow Area= 12.0 sf, Capacity= 73.78 cfs

2.00' x 1.50' deep channel, n= 0.035 High grass
Side Slope Z-value= 4.0 '/' Top Width= 14.00'
Length= 120.0' Slope= 0.0267 '/'
Inlet Invert= 438.00', Outlet Invert= 434.80'

‡

Reach 7R: Vegetated Swale



Stage-Area-Storage for Reach 7R: Vegetated Swale

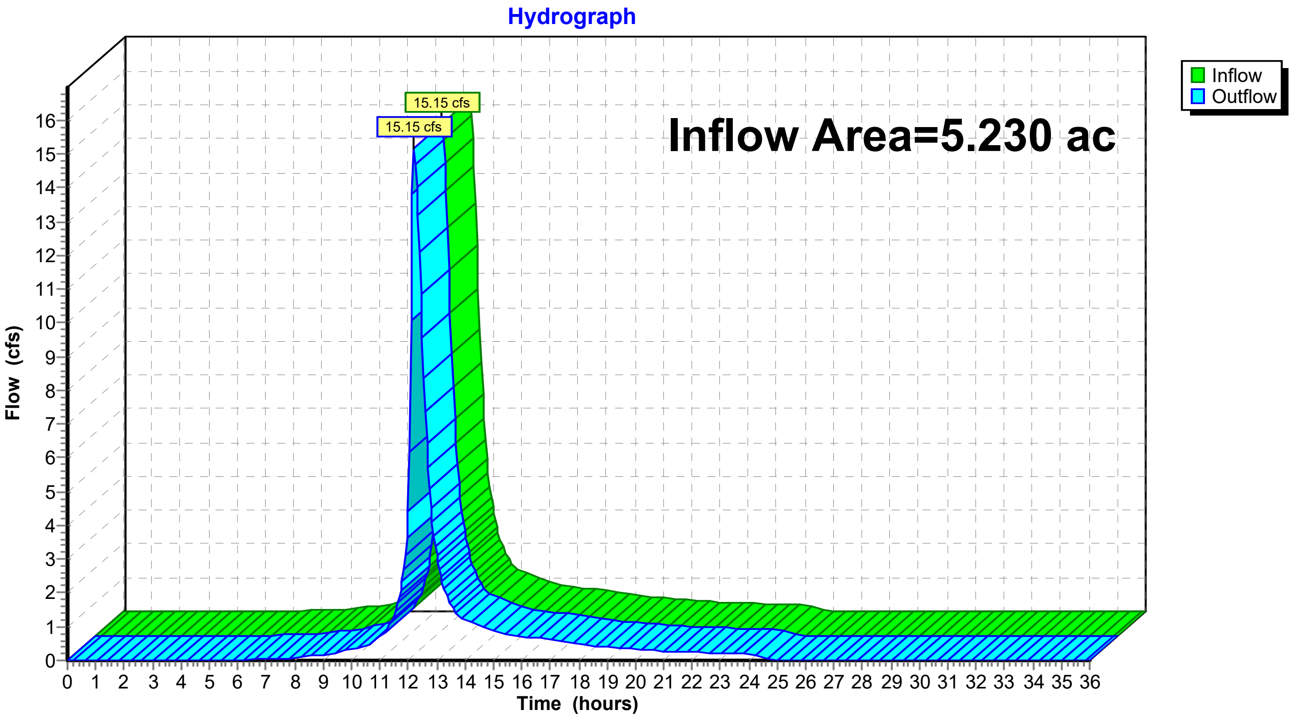
Elevation (feet)	End-Area (sq-ft)	Storage (cubic-feet)
438.00	0.0	0
438.02	0.0	5
438.04	0.1	10
438.06	0.1	16
438.08	0.2	22
438.10	0.2	29
438.12	0.3	36
438.14	0.4	43
438.16	0.4	51
438.18	0.5	59
438.20	0.6	67
438.22	0.6	76
438.24	0.7	85
438.26	0.8	95
438.28	0.9	105
438.30	1.0	115
438.32	1.0	126
438.34	1.1	137
438.36	1.2	149
438.38	1.3	161
438.40	1.4	173
438.42	1.5	185
438.44	1.7	199
438.46	1.8	212
438.48	1.9	226
438.50	2.0	240
438.52	2.1	255
438.54	2.2	270
438.56	2.4	285
438.58	2.5	301
438.60	2.6	317
438.62	2.8	333
438.64	2.9	350
438.66	3.1	367
438.68	3.2	385
438.70	3.4	403
438.72	3.5	422
438.74	3.7	440
438.76	3.8	460
438.78	4.0	479
438.80	4.2	499
438.82	4.3	520
438.84	4.5	540
438.86	4.7	561
438.88	4.9	583
438.90	5.0	605
438.92	5.2	627
438.94	5.4	650
438.96	5.6	673
438.98	5.8	696
439.00	6.0	720
439.02	6.2	744
439.04	6.4	769
439.06	6.6	794
439.08	6.8	819
439.10	7.0	845
439.12	7.3	871
439.14	7.5	897
439.16	7.7	924
439.18	7.9	952
439.20	8.2	979
439.22	8.4	1,007
439.24	8.6	1,036
439.26	8.9	1,064
439.28	9.1	1,094
439.30	9.4	1,123
439.32	9.6	1,153
439.34	9.9	1,184
439.36	10.1	1,214
439.38	10.4	1,245
439.40	10.6	1,277
439.42	10.9	1,309
439.44	11.2	1,341
439.46	11.4	1,374
439.48	11.7	1,407
439.50	**12.0**	**1,440**

Summary for Reach 8R: Analysis Point

Inflow Area = 5.230 ac, 38.43% Impervious, Inflow Depth = 3.41" for 50-Year event
Inflow = 15.15 cfs @ 12.21 hrs, Volume= 1.486 af
Outflow = 15.15 cfs @ 12.21 hrs, Volume= 1.486 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

Reach 8R: Analysis Point



Summary for Pond 9P: Dry Swale

Inflow Area = 1.260 ac, 71.43% Impervious, Inflow Depth = 4.04" for 50-Year event
Inflow = 7.05 cfs @ 12.13 hrs, Volume= 0.424 af
Outflow = 5.66 cfs @ 12.18 hrs, Volume= 0.424 af, Atten= 20%, Lag= 3.3 min
Primary = 5.66 cfs @ 12.18 hrs, Volume= 0.424 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 440.34' @ 12.18 hrs Surf.Area= 4,595 sf Storage= 5,382 cf

Plug-Flow detention time= 80.0 min calculated for 0.423 af (100% of inflow)
Center-of-Mass det. time= 80.0 min (855.7 - 775.6)

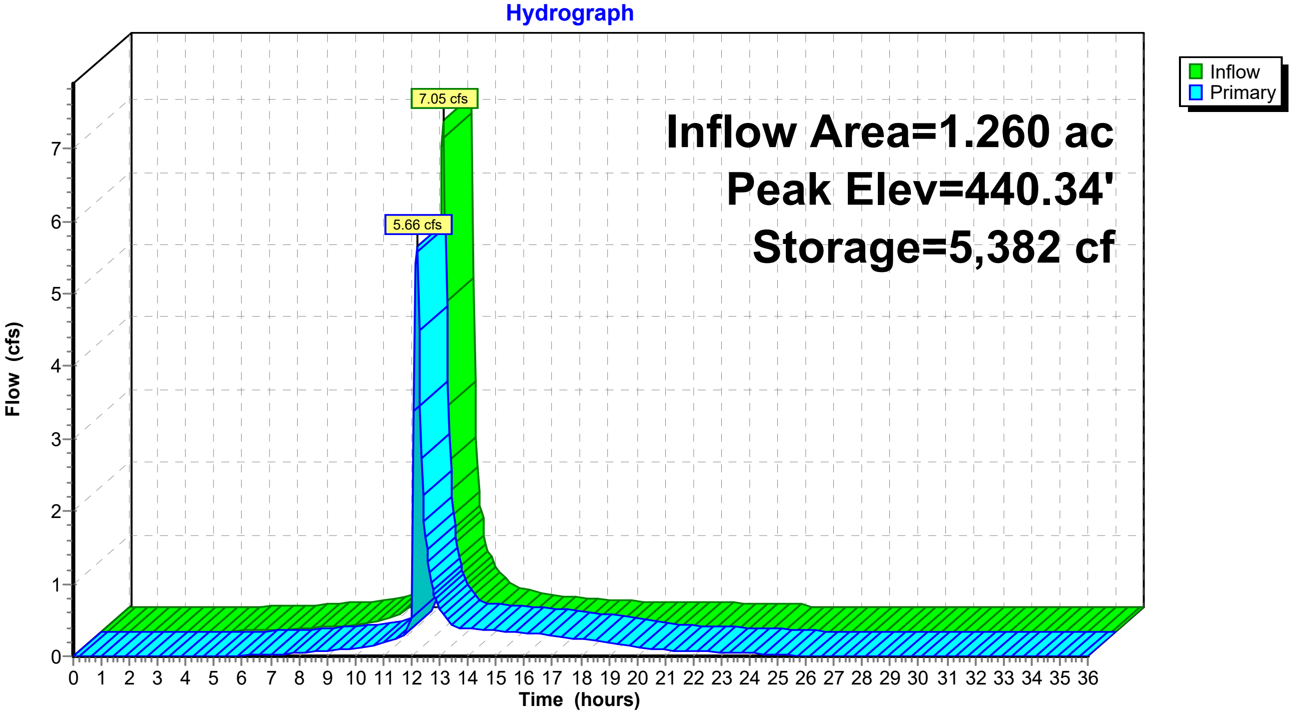
Volume	Invert	Avail.Storage	Storage Description
#1	438.50'	6,120 cf	**Custom Stage Data (Conic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
438.50	1,245	0	0	1,245
439.50	3,157	2,128	2,128	3,164
440.50	4,890	3,992	6,120	4,911

Device	Routing	Invert	Outlet Devices
#1	Primary	440.00'	**10.0' long x 2.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32
#2	Primary	438.50'	**4.0" Round Culvert** L= 30.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 438.50' / 438.20' S= 0.0100 '/' Cc= 0.900 n= 0.011 PVC, smooth interior, Flow Area= 0.09 sf

Primary OutFlow Max=5.51 cfs @ 12.18 hrs HW=440.34' (Free Discharge)
├─**1=Broad-Crested Rectangular Weir** (Weir Controls 5.08 cfs @ 1.50 fps)
└─**2=Culvert** (Barrel Controls 0.43 cfs @ 4.91 fps)

Pond 9P: Dry Swale



Stage-Area-Storage for Pond 9P: Dry Swale

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
438.50	1,245	0	439.52	3,188	2,192
438.52	1,275	25	439.54	3,219	2,256
438.54	1,305	51	439.56	3,250	2,320
438.56	1,335	77	439.58	3,282	2,386
438.58	1,366	104	439.60	3,313	2,452
438.60	1,397	132	439.62	3,345	2,518
438.62	1,428	160	439.64	3,377	2,585
438.64	1,460	189	439.66	3,409	2,653
438.66	1,492	219	439.68	3,441	2,722
438.68	1,525	249	439.70	3,473	2,791
438.70	1,557	280	439.72	3,506	2,861
438.72	1,591	311	439.74	3,538	2,931
438.74	1,624	343	439.76	3,571	3,002
438.76	1,658	376	439.78	3,604	3,074
438.78	1,692	410	439.80	3,637	3,146
438.80	1,727	444	439.82	3,670	3,220
438.82	1,762	479	439.84	3,704	3,293
438.84	1,797	514	439.86	3,737	3,368
438.86	1,833	551	439.88	3,771	3,443
438.88	1,869	588	439.90	3,805	3,519
438.90	1,905	625	439.92	3,839	3,595
438.92	1,942	664	439.94	3,873	3,672
438.94	1,979	703	439.96	3,907	3,750
438.96	2,016	743	439.98	3,942	3,828
438.98	2,054	784	440.00	3,976	3,908
439.00	2,092	825	440.02	4,011	3,987
439.02	2,130	867	440.04	4,046	4,068
439.04	2,169	910	440.06	4,081	4,149
439.06	2,208	954	440.08	4,116	4,231
439.08	2,248	999	440.10	4,151	4,314
439.10	2,287	1,044	440.12	4,187	4,397
439.12	2,328	1,090	440.14	4,223	4,481
439.14	2,368	1,137	440.16	4,258	4,566
439.16	2,409	1,185	440.18	4,294	4,652
439.18	2,450	1,233	440.20	4,330	4,738
439.20	2,492	1,283	440.22	4,367	4,825
439.22	2,534	1,333	440.24	4,403	4,913
439.24	2,576	1,384	440.26	4,440	5,001
439.26	2,618	1,436	440.28	4,476	5,090
439.28	2,661	1,489	440.30	4,513	5,180
439.30	2,705	1,543	440.32	4,550	5,271
439.32	2,748	1,597	440.34	4,587	5,362
439.34	2,792	1,653	440.36	4,625	5,454
439.36	2,837	1,709	440.38	4,662	5,547
439.38	2,881	1,766	440.40	4,700	5,641
439.40	2,926	1,824	440.42	4,737	5,735
439.42	2,972	1,883	440.44	4,775	5,830
439.44	3,018	1,943	440.46	4,813	5,926
439.46	3,064	2,004	440.48	4,852	6,023
439.48	3,110	2,066	440.50	**4,890**	**6,120**
439.50	3,157	2,128			

Time span=0.00-36.00 hrs, dt=0.05 hrs, 721 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1S: DA-1 Runoff Area=3.410 ac 23.17% Impervious Runoff Depth=3.88"
Flow Length=697' Tc=23.6 min CN=84 Runoff=11.79 cfs 1.102 af

Subcatchment2S: Parking Lot (1A) Runoff Area=1.260 ac 71.43% Impervious Runoff Depth=4.85"
Tc=6.0 min CN=93 Runoff=8.36 cfs 0.509 af

Subcatchment3S: West Swale (1B) Runoff Area=0.280 ac 46.43% Impervious Runoff Depth=4.30"
Tc=6.0 min CN=88 Runoff=1.73 cfs 0.100 af

Subcatchment4S: South Swale (1C) Runoff Area=0.280 ac 67.86% Impervious Runoff Depth=4.74"
Tc=6.0 min CN=92 Runoff=1.84 cfs 0.110 af

Reach 6R: Vegetated Swale Avg. Flow Depth=0.33' Max Vel=1.59 fps Inflow=1.73 cfs 0.100 af
n=0.035 L=95.0' S=0.0100 '/' Capacity=45.18 cfs Outflow=1.64 cfs 0.100 af

Reach 7R: Vegetated Swale Avg. Flow Depth=0.26' Max Vel=2.30 fps Inflow=1.84 cfs 0.110 af
n=0.035 L=120.0' S=0.0267 '/' Capacity=73.78 cfs Outflow=1.76 cfs 0.110 af

Reach 8R: Analysis Point Inflow=18.61 cfs 1.822 af
Outflow=18.61 cfs 1.822 af

Pond 9P: Dry Swale Peak Elev=440.41' Storage=5,678 cf Inflow=8.36 cfs 0.509 af
Outflow=7.23 cfs 0.509 af

Total Runoff Area = 5.230 ac Runoff Volume = 1.822 af Average Runoff Depth = 4.18"
61.57% Pervious = 3.220 ac 38.43% Impervious = 2.010 ac

Summary for Subcatchment 1S: DA-1

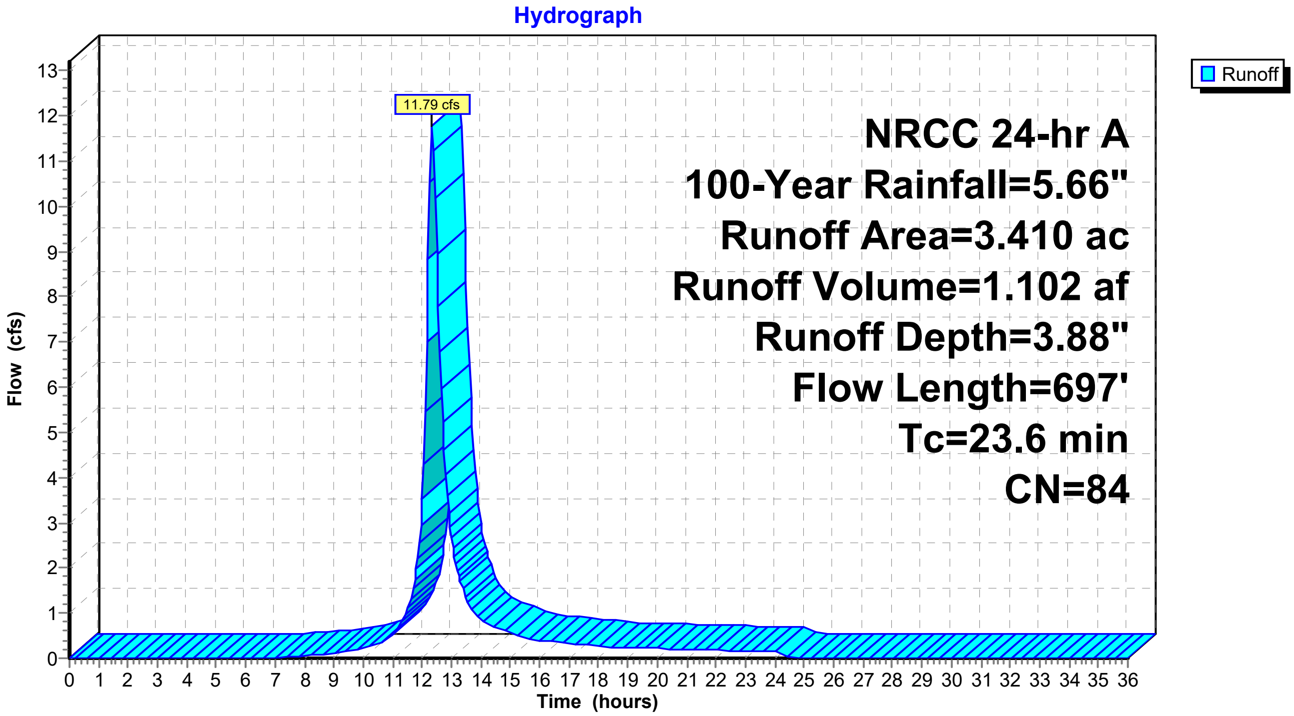
Runoff = 11.79 cfs @ 12.34 hrs, Volume= 1.102 af, Depth= 3.88"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
NRCC 24-hr A 100-Year Rainfall=5.66"

	Area (ac)	CN	Description
	1.880	80	>75% Grass cover, Good, HSG D
	0.740	77	Woods, Good, HSG D
*	0.790	98	Impervious
	3.410	84	Weighted Average
	2.620		76.83% Pervious Area
	0.790		23.17% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
19.1	100	0.0400	0.09		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.33"
0.3	73	0.0500	3.60		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.0	13	0.0800	4.55		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.0	20	0.3300	9.25		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
1.7	114	0.0050	1.14		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.5	85	0.0350	3.01		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.5	73	0.0270	2.65		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.4	53	0.0150	1.97		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.1	10	0.0150	2.49		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.1	14	0.0150	1.97		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.9	142	0.0280	2.69		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
23.6	697	Total			

Subcatchment 1S: DA-1



Summary for Subcatchment 2S: Parking Lot (1A)

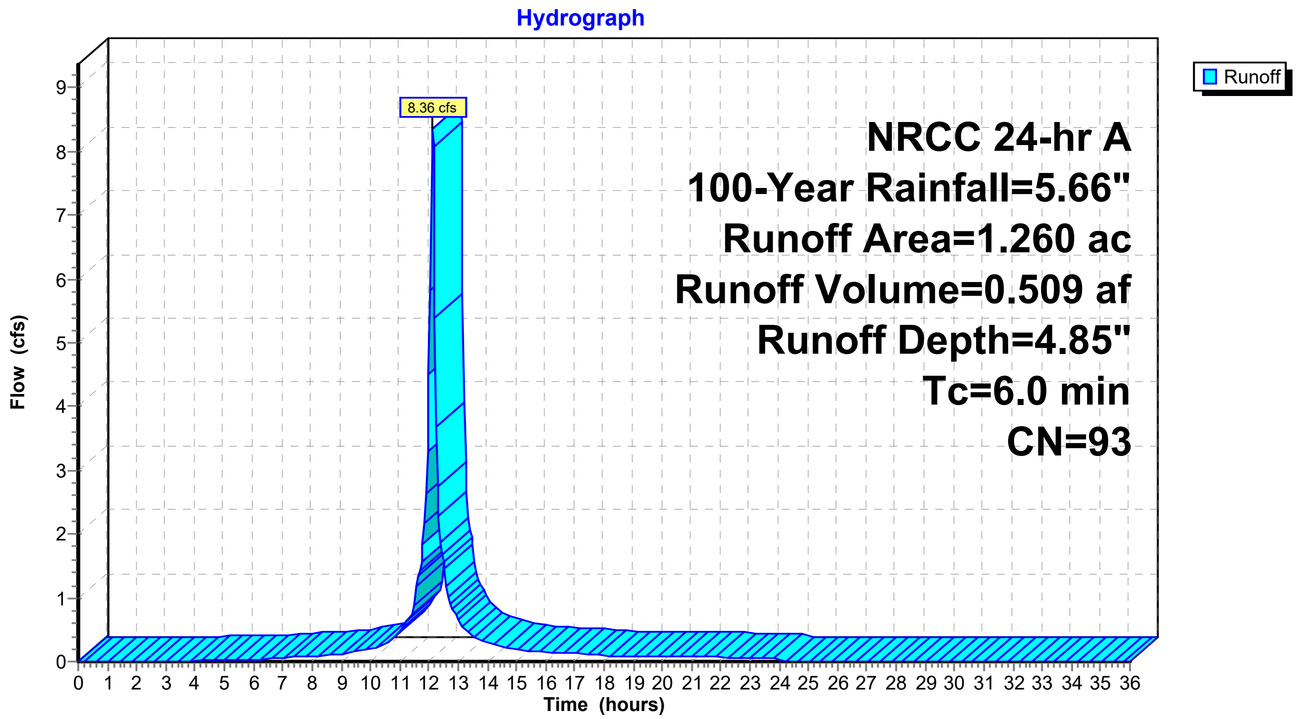
Runoff = 8.36 cfs @ 12.13 hrs, Volume= 0.509 af, Depth= 4.85"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
NRCC 24-hr A 100-Year Rainfall=5.66"

	Area (ac)	CN	Description
*	0.900	98	Impervious
	0.060	77	Woods, Good, HSG D
	0.300	80	>75% Grass cover, Good, HSG D
	1.260	93	Weighted Average
	0.360		28.57% Pervious Area
	0.900		71.43% Impervious Area

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

Subcatchment 2S: Parking Lot (1A)



Summary for Subcatchment 3S: West Swale (1B)

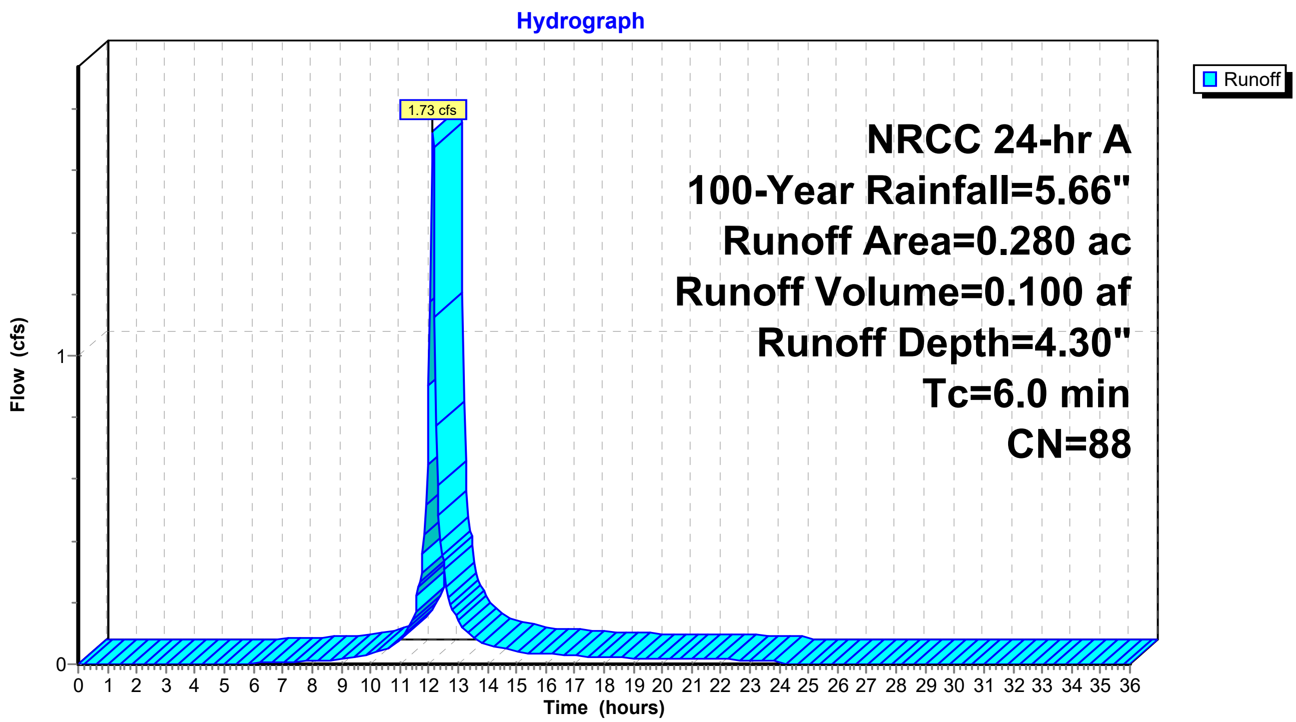
Runoff = 1.73 cfs @ 12.13 hrs, Volume= 0.100 af, Depth= 4.30"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
NRCC 24-hr A 100-Year Rainfall=5.66"

	Area (ac)	CN	Description
*	0.130	98	Impervious
	0.150	80	>75% Grass cover, Good, HSG D
	0.280	88	Weighted Average
	0.150		53.57% Pervious Area
	0.130		46.43% Impervious Area

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

Subcatchment 3S: West Swale (1B)



Summary for Subcatchment 4S: South Swale (1C)

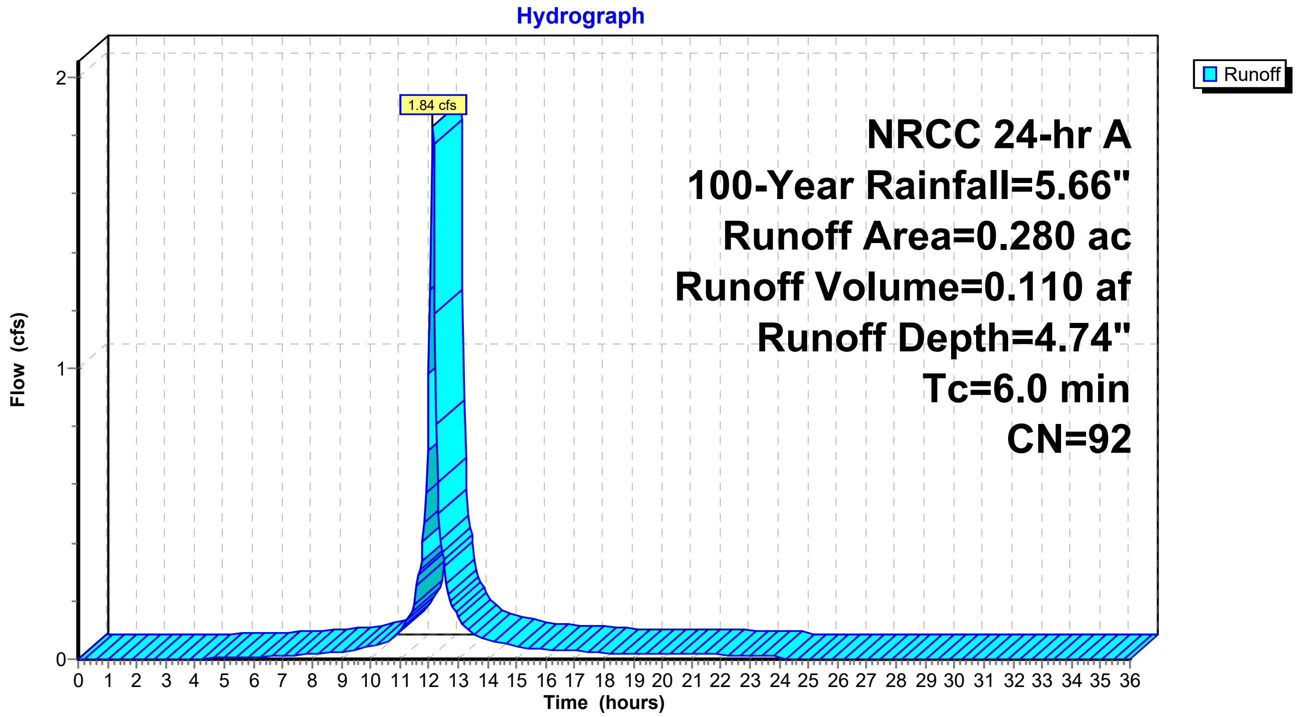
Runoff = 1.84 cfs @ 12.13 hrs, Volume= 0.110 af, Depth= 4.74"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
NRCC 24-hr A 100-Year Rainfall=5.66"

	Area (ac)	CN	Description
*	0.190	98	Impervious
	0.090	80	>75% Grass cover, Good, HSG D
	0.280	92	Weighted Average
	0.090		32.14% Pervious Area
	0.190		67.86% Impervious Area

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

Subcatchment 4S: South Swale (1C)



Summary for Reach 6R: Vegetated Swale

Inflow Area = 0.280 ac, 46.43% Impervious, Inflow Depth = 4.30" for 100-Year event
Inflow = 1.73 cfs @ 12.13 hrs, Volume= 0.100 af
Outflow = 1.64 cfs @ 12.15 hrs, Volume= 0.100 af, Atten= 5%, Lag= 1.5 min

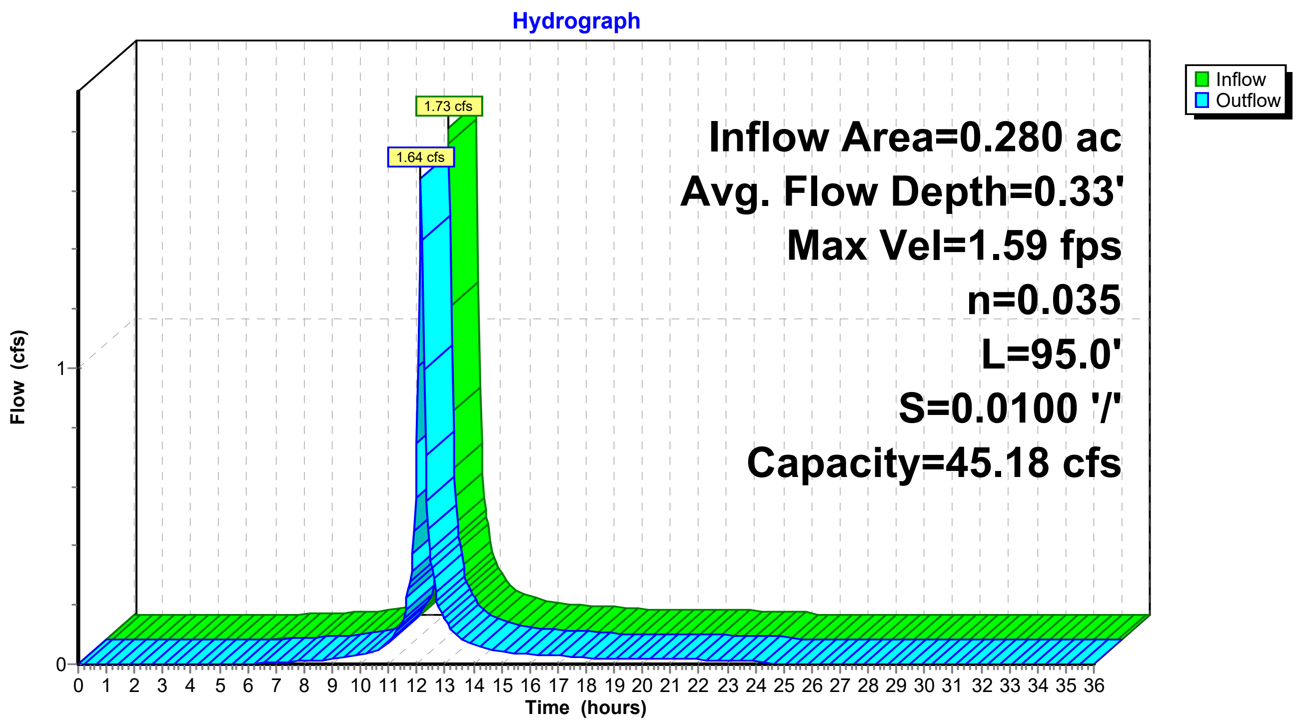
Routing by Stor-Ind+Trans method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.59 fps, Min. Travel Time= 1.0 min
Avg. Velocity = 0.43 fps, Avg. Travel Time= 3.7 min

Peak Storage= 102 cf @ 12.14 hrs
Average Depth at Peak Storage= 0.33' , Surface Width= 4.61'
Bank-Full Depth= 1.50' Flow Area= 12.0 sf, Capacity= 45.18 cfs

2.00' x 1.50' deep channel, n= 0.035 High grass
Side Slope Z-value= 4.0 '/' Top Width= 14.00'
Length= 95.0' Slope= 0.0100 '/'
Inlet Invert= 435.08', Outlet Invert= 434.13'

‡

Reach 6R: Vegetated Swale



Stage-Area-Storage for Reach 6R: Vegetated Swale

Elevation (feet)	End-Area (sq-ft)	Storage (cubic-feet)
435.08	0.0	0
435.10	0.0	4
435.12	0.1	8
435.14	0.1	13
435.16	0.2	18
435.18	0.2	23
435.20	0.3	28
435.22	0.4	34
435.24	0.4	40
435.26	0.5	47
435.28	0.6	53
435.30	0.6	60
435.32	0.7	67
435.34	0.8	75
435.36	0.9	83
435.38	1.0	91
435.40	1.0	100
435.42	1.1	109
435.44	1.2	118
435.46	1.3	127
435.48	1.4	137
435.50	1.5	147
435.52	1.7	157
435.54	1.8	168
435.56	1.9	179
435.58	2.0	190
435.60	2.1	202
435.62	2.2	213
435.64	2.4	226
435.66	2.5	238
435.68	2.6	251
435.70	2.8	264
435.72	2.9	277
435.74	3.1	291
435.76	3.2	305
435.78	3.4	319
435.80	3.5	334
435.82	3.7	349
435.84	3.8	364
435.86	4.0	379
435.88	4.2	395
435.90	4.3	411
435.92	4.5	428
435.94	4.7	444
435.96	4.9	461
435.98	5.0	479
436.00	5.2	496
436.02	5.4	514
436.04	5.6	533
436.06	5.8	551
436.08	6.0	570
436.10	6.2	589
436.12	6.4	609
436.14	6.6	628
436.16	6.8	648
436.18	7.0	669
436.20	7.3	689
436.22	7.5	710
436.24	7.7	732
436.26	7.9	753
436.28	8.2	775
436.30	8.4	797
436.32	8.6	820
436.34	8.9	843
436.36	9.1	866
436.38	9.4	889
436.40	9.6	913
436.42	9.9	937
436.44	10.1	961
436.46	10.4	986
436.48	10.6	1,011
436.50	10.9	1,036
436.52	11.2	1,062
436.54	11.4	1,087
436.56	11.7	1,114
436.58	**12.0**	**1,140**

Summary for Reach 7R: Vegetated Swale

Inflow Area = 0.280 ac, 67.86% Impervious, Inflow Depth = 4.74" for 100-Year event
Inflow = 1.84 cfs @ 12.13 hrs, Volume= 0.110 af
Outflow = 1.76 cfs @ 12.15 hrs, Volume= 0.110 af, Atten= 4%, Lag= 1.3 min

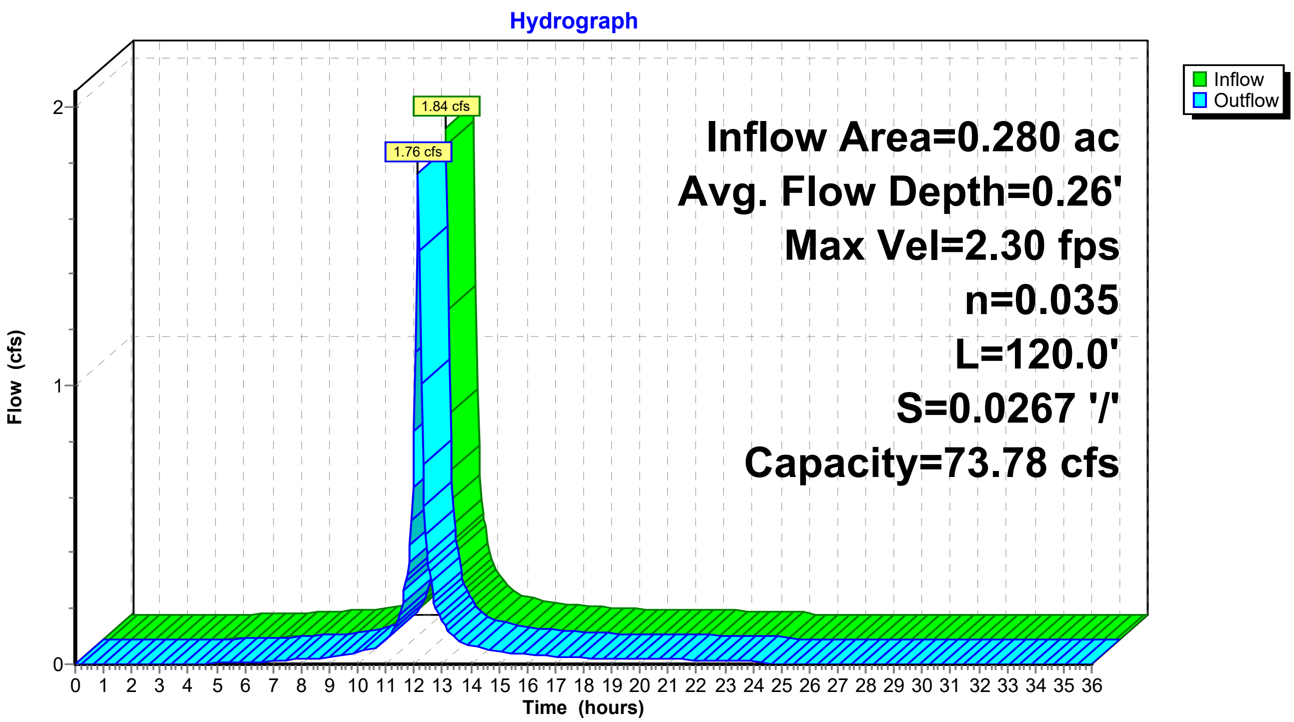
Routing by Stor-Ind+Trans method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.30 fps, Min. Travel Time= 0.9 min
Avg. Velocity = 0.61 fps, Avg. Travel Time= 3.3 min

Peak Storage= 95 cf @ 12.14 hrs
Average Depth at Peak Storage= 0.26' , Surface Width= 4.09'
Bank-Full Depth= 1.50' Flow Area= 12.0 sf, Capacity= 73.78 cfs

2.00' x 1.50' deep channel, n= 0.035 High grass
Side Slope Z-value= 4.0 '/' Top Width= 14.00'
Length= 120.0' Slope= 0.0267 '/'
Inlet Invert= 438.00', Outlet Invert= 434.80'

‡

Reach 7R: Vegetated Swale



Stage-Area-Storage for Reach 7R: Vegetated Swale

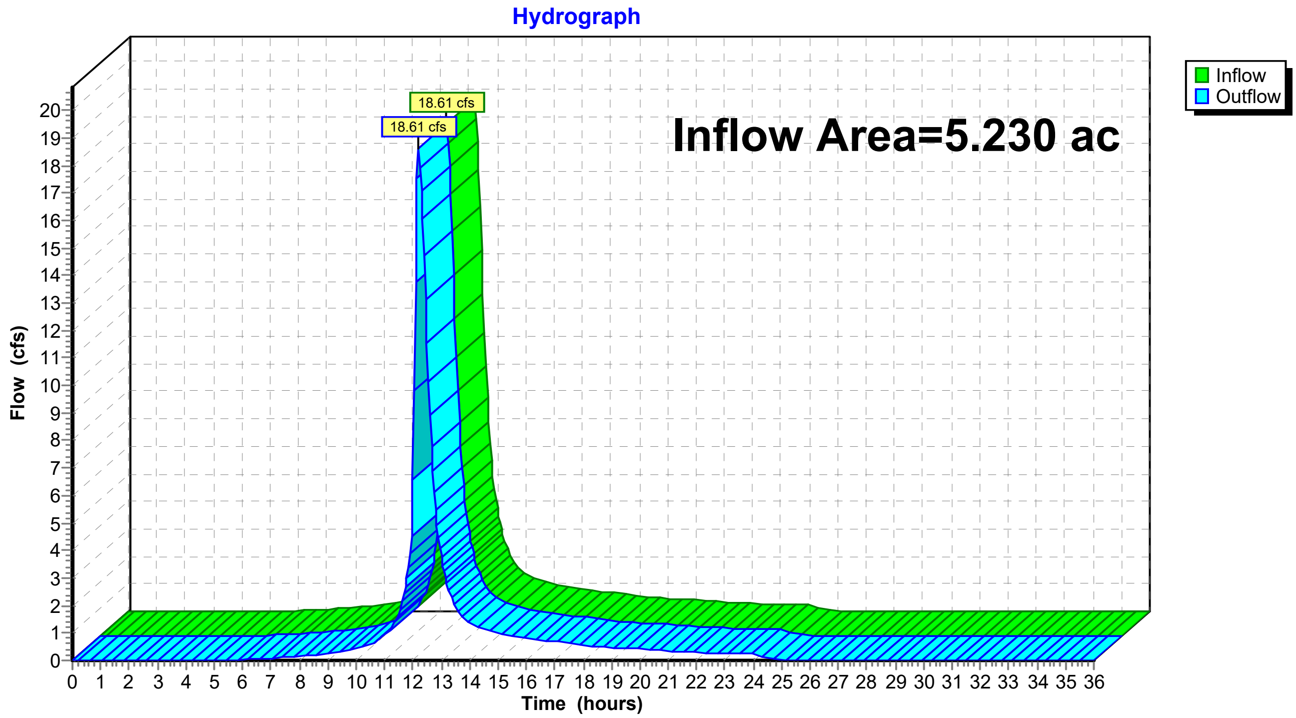
Elevation (feet)	End-Area (sq-ft)	Storage (cubic-feet)	Elevation (feet)	End-Area (sq-ft)	Storage (cubic-feet)
438.00	0.0	0	439.02	6.2	744
438.02	0.0	5	439.04	6.4	769
438.04	0.1	10	439.06	6.6	794
438.06	0.1	16	439.08	6.8	819
438.08	0.2	22	439.10	7.0	845
438.10	0.2	29	439.12	7.3	871
438.12	0.3	36	439.14	7.5	897
438.14	0.4	43	439.16	7.7	924
438.16	0.4	51	439.18	7.9	952
438.18	0.5	59	439.20	8.2	979
438.20	0.6	67	439.22	8.4	1,007
438.22	0.6	76	439.24	8.6	1,036
438.24	0.7	85	439.26	8.9	1,064
438.26	0.8	95	439.28	9.1	1,094
438.28	0.9	105	439.30	9.4	1,123
438.30	1.0	115	439.32	9.6	1,153
438.32	1.0	126	439.34	9.9	1,184
438.34	1.1	137	439.36	10.1	1,214
438.36	1.2	149	439.38	10.4	1,245
438.38	1.3	161	439.40	10.6	1,277
438.40	1.4	173	439.42	10.9	1,309
438.42	1.5	185	439.44	11.2	1,341
438.44	1.7	199	439.46	11.4	1,374
438.46	1.8	212	439.48	11.7	1,407
438.48	1.9	226	439.50	**12.0**	**1,440**
438.50	2.0	240			
438.52	2.1	255			
438.54	2.2	270			
438.56	2.4	285			
438.58	2.5	301			
438.60	2.6	317			
438.62	2.8	333			
438.64	2.9	350			
438.66	3.1	367			
438.68	3.2	385			
438.70	3.4	403			
438.72	3.5	422			
438.74	3.7	440			
438.76	3.8	460			
438.78	4.0	479			
438.80	4.2	499			
438.82	4.3	520			
438.84	4.5	540			
438.86	4.7	561			
438.88	4.9	583			
438.90	5.0	605			
438.92	5.2	627			
438.94	5.4	650			
438.96	5.6	673			
438.98	5.8	696			
439.00	6.0	720			

Summary for Reach 8R: Analysis Point

Inflow Area = 5.230 ac, 38.43% Impervious, Inflow Depth = 4.18" for 100-Year event
Inflow = 18.61 cfs @ 12.21 hrs, Volume= 1.822 af
Outflow = 18.61 cfs @ 12.21 hrs, Volume= 1.822 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

Reach 8R: Analysis Point



Summary for Pond 9P: Dry Swale

Inflow Area = 1.260 ac, 71.43% Impervious, Inflow Depth = 4.85" for 100-Year event
Inflow = 8.36 cfs @ 12.13 hrs, Volume= 0.509 af
Outflow = 7.23 cfs @ 12.17 hrs, Volume= 0.509 af, Atten= 13%, Lag= 2.5 min
Primary = 7.23 cfs @ 12.17 hrs, Volume= 0.509 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 440.41' @ 12.17 hrs Surf.Area= 4,715 sf Storage= 5,678 cf

Plug-Flow detention time= 74.1 min calculated for 0.508 af (100% of inflow)
Center-of-Mass det. time= 74.1 min (845.7 - 771.6)

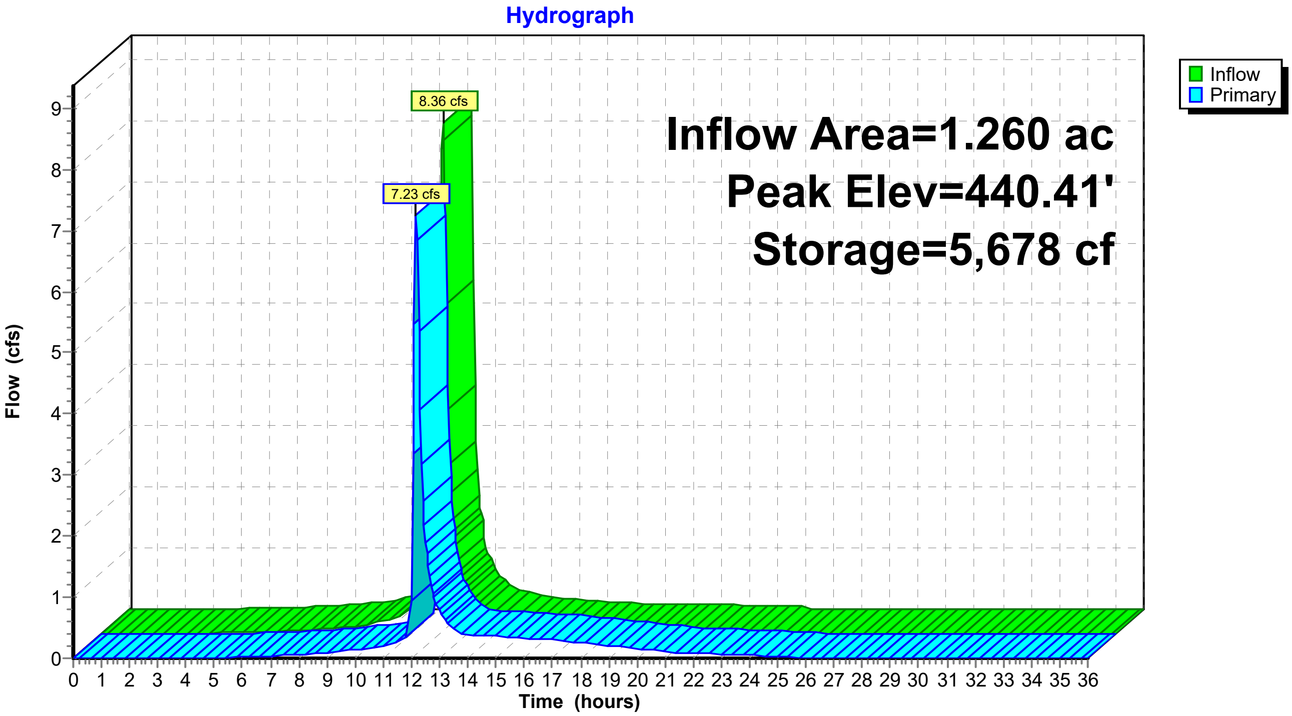
Volume	Invert	Avail.Storage	Storage Description
#1	438.50'	6,120 cf	**Custom Stage Data (Conic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
438.50	1,245	0	0	1,245
439.50	3,157	2,128	2,128	3,164
440.50	4,890	3,992	6,120	4,911

Device	Routing	Invert	Outlet Devices
#1	Primary	440.00'	**10.0' long x 2.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32
#2	Primary	438.50'	**4.0" Round Culvert** L= 30.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 438.50' / 438.20' S= 0.0100 '/' Cc= 0.900 n= 0.011 PVC, smooth interior, Flow Area= 0.09 sf

Primary OutFlow Max=7.01 cfs @ 12.17 hrs HW=440.40' (Free Discharge)
1=Broad-Crested Rectangular Weir (Weir Controls 6.58 cfs @ 1.65 fps)
2=Culvert (Barrel Controls 0.44 cfs @ 4.99 fps)

Pond 9P: Dry Swale



Stage-Area-Storage for Pond 9P: Dry Swale

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
438.50	1,245	0	439.52	3,188	2,192
438.52	1,275	25	439.54	3,219	2,256
438.54	1,305	51	439.56	3,250	2,320
438.56	1,335	77	439.58	3,282	2,386
438.58	1,366	104	439.60	3,313	2,452
438.60	1,397	132	439.62	3,345	2,518
438.62	1,428	160	439.64	3,377	2,585
438.64	1,460	189	439.66	3,409	2,653
438.66	1,492	219	439.68	3,441	2,722
438.68	1,525	249	439.70	3,473	2,791
438.70	1,557	280	439.72	3,506	2,861
438.72	1,591	311	439.74	3,538	2,931
438.74	1,624	343	439.76	3,571	3,002
438.76	1,658	376	439.78	3,604	3,074
438.78	1,692	410	439.80	3,637	3,146
438.80	1,727	444	439.82	3,670	3,220
438.82	1,762	479	439.84	3,704	3,293
438.84	1,797	514	439.86	3,737	3,368
438.86	1,833	551	439.88	3,771	3,443
438.88	1,869	588	439.90	3,805	3,519
438.90	1,905	625	439.92	3,839	3,595
438.92	1,942	664	439.94	3,873	3,672
438.94	1,979	703	439.96	3,907	3,750
438.96	2,016	743	439.98	3,942	3,828
438.98	2,054	784	440.00	3,976	3,908
439.00	2,092	825	440.02	4,011	3,987
439.02	2,130	867	440.04	4,046	4,068
439.04	2,169	910	440.06	4,081	4,149
439.06	2,208	954	440.08	4,116	4,231
439.08	2,248	999	440.10	4,151	4,314
439.10	2,287	1,044	440.12	4,187	4,397
439.12	2,328	1,090	440.14	4,223	4,481
439.14	2,368	1,137	440.16	4,258	4,566
439.16	2,409	1,185	440.18	4,294	4,652
439.18	2,450	1,233	440.20	4,330	4,738
439.20	2,492	1,283	440.22	4,367	4,825
439.22	2,534	1,333	440.24	4,403	4,913
439.24	2,576	1,384	440.26	4,440	5,001
439.26	2,618	1,436	440.28	4,476	5,090
439.28	2,661	1,489	440.30	4,513	5,180
439.30	2,705	1,543	440.32	4,550	5,271
439.32	2,748	1,597	440.34	4,587	5,362
439.34	2,792	1,653	440.36	4,625	5,454
439.36	2,837	1,709	440.38	4,662	5,547
439.38	2,881	1,766	440.40	4,700	5,641
439.40	2,926	1,824	440.42	4,737	5,735
439.42	2,972	1,883	440.44	4,775	5,830
439.44	3,018	1,943	440.46	4,813	5,926
439.46	3,064	2,004	440.48	4,852	6,023
439.48	3,110	2,066	440.50	**4,890**	**6,120**
439.50	3,157	2,128			

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25-Year Event

50-Year Event

100-Year Event

APPENDIX C-6

WQv and RRv Calculations

Version 1.6
Last Updated: 03/28/2014

Total Water Quality Volume Calculation
WQv(acre-feet) = [(P)(Rv)(A)] /12

Is this project subject to Chapter 10 of the NYS Design Manual (i.e. WQv is equal to post-development 1 year runoff volume)?..						
Design Point:						
P=	1.00	*inch*				
Breakdown of Subcatchments						
Catchment Number	**Total Area** *(Acres)*	**Impervious Area** *(Acres)*	**Percent Impervious** *%*	**Rv**	**WQv** *(ft ^{3})*	**Description**
1	1.05	0.68	65%	0.63	2,412	Dry Swale
2	0.57	0.07	12%	0.16	332	Vegetated Swale
Redev (25%) 3	0.10	0.10	100%	0.95	87	Vegetated Swale
4						
5						
6						
7						
8						
9						
10						
Subtotal (1-30)	1.48	0.85	57%	0.57	**2,831**	**Subtotal 1**
Total	1.48	0.85	57%	0.57	**2,831**	**Initial WQv**

Total WQv Req. =
0.065 ac.-ft.

Minimum RRv

Enter the Soils Data for the site		
Soil Group	Acres	S
A	0.00	55%
B	0.00	40%
C	0.00	30%
D	**1.48**	20%
Total Area	1.48	
Calculate the Minimum RRv		
S =	**0.20**	
Impervious =	0.85	*acre*
Precipitation	1	*in*
Rv	0.95	
Minimum RRv	**586**	***ft3***
	0.01	af

Min RRv for Dry Swale: 0.01 af
Min RRv for Vegetated Swale: 0.002 af

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DRAINAGE AREA 1				
Dry Swale A				
Bottom Width (ft)	4.00			
Side Slope (x:1)	4.00			
Flow Depth (ft)	1.50			
Top Width (ft)	16.00			
Area (sf)	15.00			
Length (ft)	145.00			
Storage Capacity (cu ft)	2416.20			
Pre- treatment (10% of WQv)	241.20			
WQv required (cu ft)	2412.00	**WQv provided (cu ft)**	2416.20	
WQv required (af)	0.055	**WQv provided (af)**	0.055	
Min. RRv required (cu ft)	435.6	**RRv provided (cu ft)**	483.24	*note: RRv is 20% of WQv
Min. RRv required (af)	0.010	**RRv provided (af)**	0.011	

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DRAINAGE AREA 1			
Vegetated Swale B & C			
Bottom Width (ft)	2.00		
Side Slope (x:1)	3.00		
Flow Depth (ft)	1.50		
Top Width (ft)	11.00		
Area (sf)	9.75		
Length (ft)	195.00		
Storage Capacity (cu ft)	1943.15		
Pre- treatment (10% of WQv)	41.90		
WQv required (cu ft)	419.00	**WQv provided (cu ft)**	1943.15
WQv required (af)	0.010	**WQv provided (af)**	0.045
Min. RRv required (cu ft)	87.1	**RRv provided (cu ft)**	194.32
Min. RRv required (af)	0.002	**RRv provided (af)**	0.004

*note: RRv is 10% of WQv

APPENDIX D

Appendix D-1: Contractor's Certification Statement

Appendix D-2: Weekly Erosion & Sediment Control Inspection Form

Appendix D-3: Deep Ripping and De- Compaction Requirements

APPENDIX D-1

Contractor’s Certification Statement

Contractor's Certification Statement

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.

Project Name & Location:
Lakeside Entertainment – Casino Project
271 Cayuga Street
Union Springs, NY 13160

Owners Name / Address / Contact Information:

Cayuga Nation of New York 3161 State Route 414 Seneca Falls, NY 13148	Contact: Peterman Lumber/Craig Peterman Title: Phone: 315-7308694 Fax: - E-Mail: craig@petermanlumber.net

Contractor's Name / Address / Contact Information:

	Contact: Title Phone: Fax: E-Mail:

Contractor's SWPPP Element Responsibilities On-Site:

Contractor's Trained Individual(s) Responsible for SWPPP Implementation:

Signatures

Contractor:

____
print

______________________________ ______________________
sign **date**

APPENDIX D-2

Weekly Erosion & Sediment Control Inspection Form

C&S Companies
499 Col. Eileen Collins Blvd.
Syracuse, NY 13212
p: (315) 455-2000
f: (315) 455-9667
www.cscos.com

CONSTRUCTION STORMWATER INSPECTION REPORT FOR SPDES GENERAL PERMIT GP-0-10-001

Project Name: Lakeside Entertainment – Casino Project	**Date & Time of Inspection:**
Project Location: 271 Cayuga Street, Union Springs, NY 13160	**Reason for Inspection:**
Project No.	**NYSDEC Permit No:**
Inspector' Name:	**On-site Representative(s) (phone):**
Current soil conditions: (dry, wet, saturated)	**Current Weather Conditions:**

Visual Observations:

1.) Yes __ No __ N/A ___ Is a copy of the NOI and Acknowledgment Letter available on-site and accessible for viewing?
2.) Yes __ No __ N/A ___ Is a copy of the MS4 SWPPP acceptance form available on-site and accessible for viewing?
3.) Yes __ No __ N/A __ Is an up-to-date copy of the signed SWPPP retained at the construction site?
4.) Yes __ No _ N/A __ Is a copy of the SPDES General permit retained at the construction site?
5.) Yes __ No _ N/A __ Are all Erosion and Sediment Control measures installed properly?
6.) Yes __ No __ N/A __ Are all Erosion and Sediment Control measures being maintained properly?
7.) Yes __ No __ N/A __ Are there currently more than 5 acres of disturbed soil at the site without prior approval?
8.) Yes ___ No _ N/A __ Have stabilization measures been implemented in inactive areas per Erosion and Sediment Control Standards?
9.) Yes ___ No ___ N/A __ Are Post-Construction stormwater management practices constructed and installed correctly?
10.) Yes ___No___ N/A ___ Was there a discharge from the site on the day of the inspection? If yes, complete Water Quality Observations.

Water Quality Observations (if applicable):

Describe the discharge(s): location, 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:

Inspection Checklist:

INSPECTION ITEM	YES	NO	PERSON NOTIFIED	COMMENTS
a. For sediment trapping devices, what percentage of the sediment storage volume is currently utilized? Record percentage 0 % (SPDES permit requires sediment to be removed once it exceeds 50% of the sediment storage volume provided.) Is clean-out required?				
b. Are protected areas such as wetlands, property boundaries, and vegetation preservation areas, properly delineated?				
c. Have silt fences been installed? If so, are they in need of maintenance?				
d. Any erosion at the outlet of pipes, swales or ditches?				
e. Is the construction entrance stabilized and operating correctly?				
f. If Diversion Berms and/or Earth Dikes are required, have they been installed? If so, are they in need of maintenance?				
g. If Check Dams are present, is cleanout of accumulated sediment required? If so, does stone need to be cleaned or replaced?				
h. Do catch basins and drainage inlets have proper protection - i.e., filter fabric, stone and block, etc. - inlet protection? If so, is maintenance required?				
i. Is there any loss of stabilizing vegetation, or seeding and mulching?				
j. Any evidence of rill or gully erosion occurring on slopes?				

Additional Comments:

__ Photographs Attached __ Site Map Attached

Overall Inspection Rating: ___Satisfactory ____Marginal ___Unsatisfactory	
Signature of Inspector:	**Date:**
Qualified Professional (Printed name)	**Qualified Professional Signature**

APPENDIX D-3

Deep Ripping and De- Compaction Requirements

New York State
DEPARTMENT OF ENVIRONMENTAL CONSERVATION

Division of Water

Deep-Ripping and Decompaction

April 2008

New York State
Department of Environmental Conservation

Document Prepared by:

John E. Lacey,
Land Resource Consultant and Environmental Compliance Monitor
(Formerly with the Division of Agricultural Protection and Development Services,
NYS Dept. of Agriculture & Markets)

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.

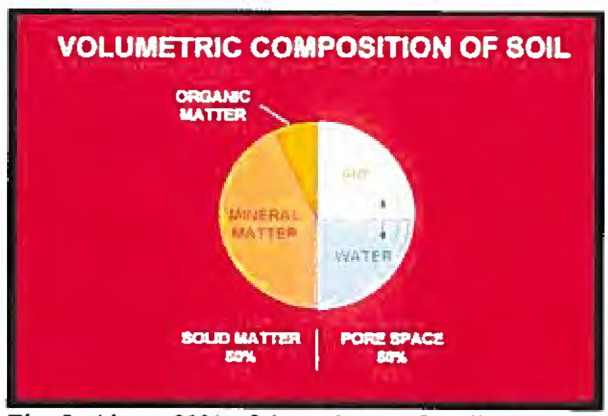

Fig. 2. About 50% of the volume of undisturbed loam surface soil is pore space, when soil is in good condition for plant growth. Brady, 2002.

Recommended Application of Practice

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).


Fig. 3. Construction site with significant compaction of the deep basal till subsoil extends 24 inches below this exposed cut-and-fill work surface.

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.

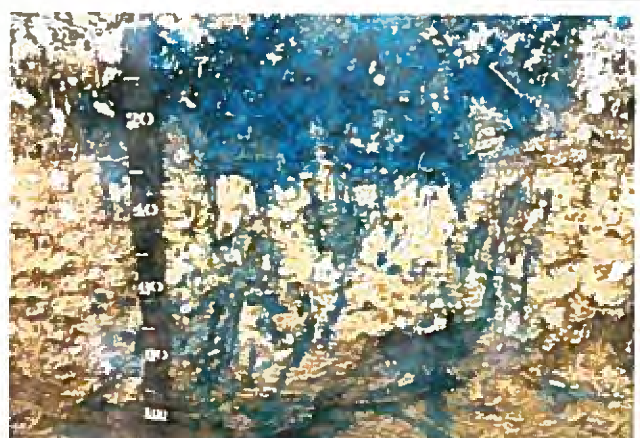

Fig. 4. Profile (in centimeters) displaying the infiltration test result of the natural undisturbed horizons of a soil in Hydrologic Soil Group C.

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 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.

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.

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.

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.


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.

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.

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

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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: *Bigham 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

APPENDIX E

Appendix E-1: Long Term Maintenance Recommendations

APPENDIX E-1

Long Term Maintenance Recommendations

LONG-TERM MAINTENANCE RECOMMENDATIONS

Periodic maintenance of the storm water management solar array field, and filter strips is required to ensure proper functioning of these facilities. The following are recommendations for maintenance frequency of these facilities once the site plan has been accepted by the Town of Union Springs, and the Owner has assumed responsibility for their maintenance. Specific design data for all drainage facilities is included in this SWPPP as well as the Approved Site Drawing's and Final SWPPP which are retained by the Town.

Item	Initial Year (Year 1)	Subsequent Years
Inspection of side-slope vegetation and erosion – fill, reseed and mulch when necessary	Monthly	Annually
Mowing of filter strips	--	Annually
Inspection of outfalls for signs of erosion or blockage	At acceptance	Annually
Drainage Swales	After rainfall events of 0.5" or more of rainfall to: Detect erosion; Detect scour or loss of rip-rap at culvert outfalls.	Repair and re-seed; Replace lost material and rip-rap as necessary.
Rock Outlet Protection	Annually and after significant rainfall events to: Inspect for scour and loss of rip-rap Inspect for accumulated sediment within rip-rap voids	Repair and/or replace rip-rap Remove accumulated sediment and replace rip-rap

It is recommended that all facilities be inspected after significant (2.5 inches or greater) rainfall events to ensure that the storm water quantity management features are adequately functioning.