Storm Water Pollution Prevention Plan for Bonavenia Enterprises Subdivision

Location:
East Noxon Road and Clapp Hill Road
Town of Union Vale
County of Dutchess

Date: November 30, 2023

DAY | STOKOSA
ENGINEERING P.C.

3 Van Wyck Lane
Suite 2
Wappingers Falls, New York 12590
Phone: 845-223-3202

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Certification Statements

Owner's/Operator's Certification

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluated the information submitted. Based on my inquiry of the persons or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. Further, I hereby certify that the SWPPP meets all Federal, State, and local erosion and sediment control requirements. I am aware that false statements made herein are punishable as a class A misdemeanor pursuant to Section 210.45 of the Penal Law."

Name (please print) ______________________________

Title ______________________________ **Date** ______________

Address ______________________________

Phone ______________ **Email** ______________________________

Signature ______________________________

Contractor's Certification

"I hereby certify that I understand and agree to comply with the terms and conditions of the SWPPP and agree to implement any corrective actions identified 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 New York State Pollutant Discharge Elimination System ("SPDES") general permit for stormwater discharges from construction activities and that it is unlawful for any person to cause or contribute to a violation of water quality standards. Furthermore, I understand that certifying false, incorrect or inaccurate information is a violation of the referenced permit and the laws of State of New York and could subject me to criminal, civil and/or administrative proceedings."

Contracting Firm Name (please print) ______________________________

Address ______________________________

Phone ________________ **Fax** ________________

Name (please print) ______________________________

Title ________________ **Date** ________________

Signature ______________________________

SWPPP Responsibilities ______________________________

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Trained Individual Name (please print) ______________________________

Title ________________ **Date** ________________

Signature ______________________________

SWPPP Responsibilities ______________________________

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Note: All contractors involved with Stormwater related activities shall sign a contractor's certification form.

Subcontractor's Certification

"I hereby certify that I understand and agree to comply with the terms and conditions of the SWPPP and agree to implement any corrective actions identified 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 New York State Pollutant Discharge Elimination System ("SPDES") general permit for stormwater discharges from construction activities and that it is unlawful for any person to cause or contribute to a violation of water quality standards. Furthermore, I understand that certifying false, incorrect or inaccurate information is a violation of the referenced permit and the laws of State of New York and could subject me to criminal, civil and/or administrative proceedings."

Subcontracting Firm Name (please print) ______________________________

Address ______________________________

Phone ______________ **Fax** ______________

Name (please print) ______________________________

Title ______________________ **Date** ______________

Signature ______________________________

SWPPP Responsibilities ______________________________

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Trained Individual Name (please print) ______________________________

Title ______________________ **Date** ______________

Signature ______________________________

SWPPP Responsibilities ______________________________

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Note: All contractors involved with Stormwater related activities shall sign a contractor's certification form.

Qualified Professional's Credentials and Certification

"I hereby certify that I meet the criteria set forth in the General Permit to conduct site inspections for this project and that the appropriate erosion and sediment controls described in the SWPPP and as described in the following Pre-Construction Site Assessment Checklist have been adequately installed or implemented, ensuring the overall preparedness of this site for the commencement of construction."

Name (please print) ______________________________

Title ______________________________ **Date** ______________

Address ______________________________

Phone ______________ **Email** ______________________

Signature ______________________________

"Qualified Professional" means a person knowledgeable in the principles and practices of erosion and sediment controls, such as a Certified Professional in Erosion and Sediment Control (CPESC), soil scientist, licensed engineer or someone working under the direction and supervision of a licensed engineer (person must have experience in the principles and practices of erosion and sediment control).

1 Introduction

This Stormwater Pollution Prevention Plan (SWPPP) has been prepared for Bonavenia Enterprises Subdivisions and has been developed in accordance with New York State Department of Environmental Conservation (NYSDEC) technical standards as presented in the New York Standards and Specifications for Erosion and Sediment Control Manual, November 2016, and the New York State Stormwater Management Design Manual, January 2015. This report has also been drafted to meet the criteria requirements of the New York State Pollutant Discharge Elimination System (SPDES) General Permit GP-0-20-001.

1.1 Project Background

The parcel is approximately 44.83 acres in size located in the Town of Union Vale at the intersection of East Noxon Road and Clapp Hill Road. The parcel tax map number is 135400-6660-00-437115. The project is located within the Town Center Zone (TC) zoning district. The site is served by individual private wells and sewage septic systems.

The site is formerly used as a mining site for sand and gravel by Bonavenia Enterprises. There are existing improvements, traveled paths and structures clustered along the southern portion of the site which supported the mining operations on the subject site and adjoining parcel under permit from the NYS DEC since the 1990's. Most of the improvement's pre-date zoning.

A location map has been provided in Figure A below, which shows an aerial view of the site and the surrounding area.

1.2 Proposed Project

The applicant wishes to subdivide the parcel into 53 parcels. 3 of the parcels will consist of single-family residential building lots. Each of the proposed 48 townhouses will be provided with an individual lot as is typical. A single lot will encompass the existing structures that will remain in conjunction with the business operations of Bonavenia Enterprises. The balance of the parent parcel will be held by a Homeowners Association and contain all improvements and shared infrastructure serving the town house lots including stormwater, common sewer, public water, visitor parking, roads, open space etc. The single family lots and commercial lot will be served by private water and sewage facilitates on each site and are not included in the HOA

According to Table 2 within the NY SPDES General Permit Appendix B, commercial development that disturbs over an acre and subdivisions that disturb over 5 acres require the preparation of a SWPPP that include post-construction stormwater management practices; therefore, a complete SWPPP shall be provided that conforms to the sizing requirements of chapter 4 of the stormwater design manual.

Disturbance to the site during construction will be minimized to every extent possible. Temporary erosion and sediment control measures have been provided and locations have been shown on the plan to indicate the limits of disturbance and to delineate the areas deemed necessary for re-grading and clearing during construction. This report has been designed to offer both temporary and permanent mitigation practices during and after the construction phase to reduce the sediment laden runoff created by the disturbed areas within the limits of construction disturbance.

Figure A - Location Map

2 Existing Site Features

The site in the present condition is mostly mowed upland meadow ground cover. There is a forested wetland with wooded wetland drainage ways that extend southward from the northeastern portion of the site. There is also a perennial stream in the southern portion of the site that runs under Clapp Hill Road and across the parcel in a westerly direction approximately parallel to the property line. The existing impervious improvements are located between this stream and the southern property line. A location map has been provided in Figure A above, which shows an aerial view of the site and the surrounding area.

2.1 Site Soils

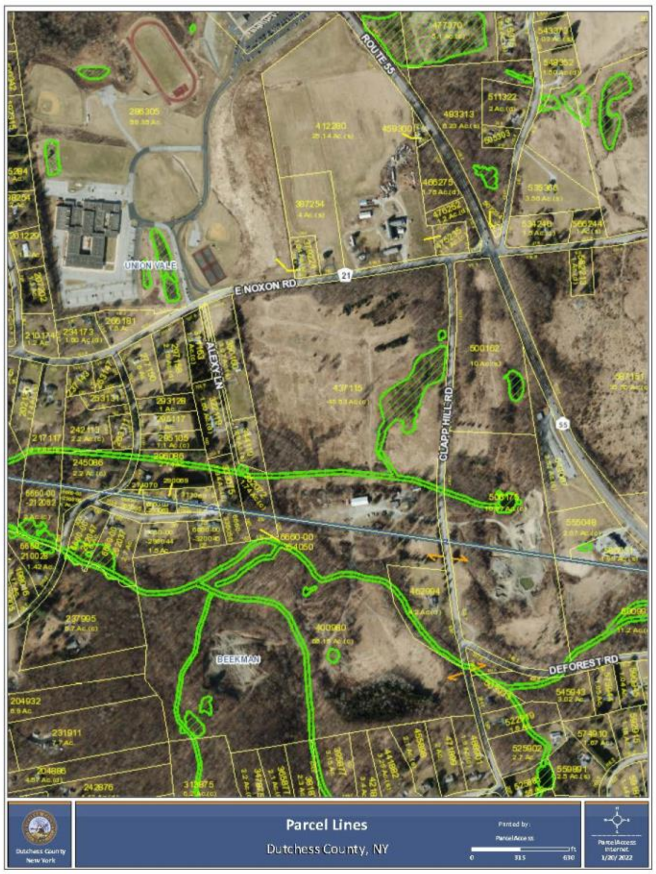
The official soil types indicated by the USDA National Resources Conservation Service for the Site is “Hoosioc Gravelly Loam” of various slopes, “Fredon Silt Loam” and “Sun Silt Loam”. Refer to the soil report and soils map in the appendix for additional soil information and descriptions.

Figure B - Soil Map

2.2 Wetlands

The project is located in the vicinity of a federal wetlands according to the USFWS wetlands inventory. The mapping is provided in Figure C below for reference.

Figure C - Wetland Map



The limits of the wetland have been delineated by a consultant and included in the site plan. No disturbed of the wetland is proposed. Additional information is provided in the appendix

2.3 Threated and Endangered Species

According to the online NYS DEC environmental mapper screening tool (https://www.dec.ny.gov/eafmapper/) the project site is subject to areas that may be a suitable habitat for the Indiana Bat. A threatened and endangered species habitat suitability assessment report has been completed by the consultant concluding that disturbance activities will not result in an adverse impact to the species. A copy of the report is included in the appendix of the report.

2.4 Cultural Resources

According to the online NYS DEC environmental mapper screening tool (https://www.dec.ny.gov/eafmapper/) the project site is neither located in an area of archeological sensitivity nor contains a structure listed on either the State or National Register of Historic places. As confirmed during the SEQRA process and determination with the Town Planning Board, there are no existing or potential cultural resource factors to consider.

3 Pre vs Post Hydrology

3.1 Methodology

This office prepared a Pre vs. Post- Development analysis for the project to determine the impacts for a 1-yr, 2-yr, 10-yr and 100-yr storm event. Software was used to generate relevant pre and post development hydrographs and determine total site discharge for the various storm events analyzed.

HydroCAD® s Stormwater Modeling software was used for the stormwater analysis in conjunction with the most recent rainfall data available (IDF Curve) from http://precip.eas.cornell.edu/ for the project location to generate site specific rainfall distributions (mass curves) which were than used in the analysis.

Based on the existing and proposed topography various catchments were delineated for the pre and post development analysis. Each catchment is comprised of the various soil complexes and land coverages within the area. A separate runoff calculation for each Curve Number (CN) was combined for a weighted composite flow.

Flow paths for catchments were developed based upon the longest hydraulic route through the catchment. All resulting T_c values were adjusted as needed to ensure that the minimum of 6.0 minutes (0.1 hrs) required by the methodology (TR-55) used

All dual hydraulic soil groups were considered as “D” as a conservative approach and to be consistent.

3.2 Pre-Development Drainage

The site in the precondition was modeled as three areas. Area #1 consist of nearly the entire site as entire area flows towards the onsite perennial stream. Area #3 is comprised of the area between the southern property line and the perennial stream and includes various structures and heavily traveled paths and parking areas The point where the stream crosses the western property line is the design point (DP) and both Area #1 and Area #3 flow to it. Area #2 consist of the upper northwest section of the property. This isolated area flows towards East Noxon Road and flows offsite to the west. These areas are mostly mowed meadows and forested areas.

Refer to Appendix "A" for a detailed calculation of the Area, CN and T_c values. A summary of the post development drainage can be found in Table 1 below.

Table 1: Pre-Development Drainage Area Summary:

Area	Total Area (acres)	CN	T_c (minutes)
Area #1	37.123	52	108.4
Area #2	1.470	40	11.0
Area #3	8.674	60	24.8

3.3 Post Development Drainage

It is proposed clear and grade the sites to accommodate structures, parking, and improvements incidental to the scope of the use that will be provided. This will alter the existing topography and will therefore change the existing drainage patterns. The same design points that are analyzed in the pre-development condition will be analyzed in the post-development condition.

The site was developed into 4 separate areas. Area #1A encompasses the largest part of the site including most of the conservation areas and wetlands. This area continues to flow to the perennial stream. Area #1B includes the town house development and supporting improvements. A storm sewer will collect this runoff and discharge to an underground infiltration chamber system. Area #2 remains unchanged from the pre-condition. Area #3 remains unchanged from the pre except that, as part of the proposal, some of the buildings will be removed therefore reducing the total impervious coverage will decrease.

The proposed townhouse roof gutters will be discharged to rain gardens in the front of each unit. A separate area will isolate 50% of the total proposed roof area and discharge to the rain gardens.

Flow paths were not impacted by the location of the development and remain unchanged from the pre-construction condition. All townhouse areas with short flow distances and/or sewer collection system were assumed to be the minimum of 6.0 minutes.

Refer to Appendix "B" for a detailed calculation of the Area, CN and T_c values. A summary of the post development drainage can be found in Table 2 below

Table 2: Post Development Drainage Area Summary:

Area	Total Area (acres)	CN	T_c (minutes)
Area #1A	29.263	56	108.4
Area #1B	7.067	62	6.0*
Area #2	1.431	40	11.0
Area #3	8.674	60	24.s
50% Townhouse	0.793	98	6.0*

*Minimum required by methodology used

3.4 Pre vs Post Runoff Analysis

All drainage areas in both the pre and post development conditions should use common design points in the analysis where possible. Post Construction includes mitigation elements in the form of infiltration practices which have been modeled.

A comparison of the total runoff in both the pre and post conditions for the developed areas is outlined below. The relevant hydraulic flows are provided in the tables below for comparison:

Table 3: Hydrograph Summary DP:

Storm Event	Pre (cfs)	Post (cfs)	Delta (cfs)
1-year	3.84	3.71	-0.13
2-year	5.90	5.63	-0.27
10-year	12.88	12.13	-0.75
100-year	32.96	32.85	-0.11

Table 4: Hydrograph Summary Area #2:

Storm Event	Pre (cfs)	Post (cfs)	Delta (cfs)
1-year	0.50	0.50	0.00
2-year	0.60	0.60	0.00
10-year	0.85	0.85	0.00
100-year	1.47	1.47	0.00

The roof areas provide with a rain garden as mitigation did not have any discharge for any storm event.

4 The Six Step Process for Stormwater Site Planning and Practice Selection

The stormwater management planning and selection process is outlined in the six steps below in accordance with Chapter 3 of the stormwater design manual:

4.1 Step 1: Site Planning

During the planning process, as many green aspects should be incorporated into the site layout. As possible. Some of the likely practices to be include are the preservation of natural features and the reduction of impervious cover.

4.1.1 Reduction of Impervious Cover

The site has been designed to minimize the amount of required impervious cover. The following manage practices have been integrated into the site layout:

Building Footprint Reduction – The site has been revised existing building no longer required for operations will be removed; thereby reducing the impervious coverage of the existing site resulting from roofs.
Driveway Reduction –Front facing driveways are provided as opposed to Town code rear lots therefore eliminating otherwise required large paved rear access.

4.2 Step 2: Determine Water Quality Treatment Volumes (WQ_v)

The Water Quality Volume is to be calculated for each of the design areas in the post conditions which has proposed disturbance and new impervious surfaces. This is comprised of Area #1B and the 50% Townhouse roofs area in one calculation and the three residential lots portion in area #1A.

The required WQ_v have been calculated below in accordance with Chapter 4: *Unified Stormwater Sizing Criteria,* of the New York State Stormwater Management Design Manual January 2015.

$$WQ_v = \frac{(P)(R_v)(A)}{12}$$

Where:

WQ_V	=	Runoff Reduction Volume (acre-feet)
P	=	90% Rainfall event number, see figure 4.1 manual (1.4 in)
A	=	Contributing area in acres
R_v	=	0.05 +0.009(I) where I is % impervious cover

The WQv for proposed Townhouse is as follows:

$$WQ_v = \frac{(P)(R_v)(A)}{12}$$

$$WQ_v = \frac{(1.4)(0.46)(7.860)}{12}$$

$$WQ_v = 0.422\ ac\ ft\ or\ 18{,}375\ ft3$$

4.3 Step 3: Runoff Reduction by Applying Runoff Reduction Techniques and Standard SMPs with RRv Capacity

By applying a combination of runoff reduction techniques and standard SMP's with RRv capacity, the total runoff WQv calculated in section 4.2 shall be reduced. For each of the practices referenced as being provided in this section, please refer to Section 5 of this report for pertinent performance criteria.

4.3.1 Runoff Reduction Techniques

It is proposed that much of the site is provided for conservation of natural areas. The three residential areas sheet flow to this area which includes a wetland and buffer. The area will be legally protected and will be undisturbed during construction. It is permissible to subtract the contributing area and impervious for the residential lots from calculation

4.3.2 Standard SMP's with RRv Capacity

This site includes the use of standard SMP's with RRv Capacity. Appropriate practices', including the corresponding RRv capacity, is provided in the following table provided in the stormwater design manual:

Table 3.5 Runoff Reduction Capacity for Standard SMPs	
SMP	**RRv Capacity (% of WQv provided by practice)**
Infiltration Practices (by source control)	100%
Bioretention Practice	100% in HSG A and B (without underdrain)
	40% HSG C and D (with underdrain)
Dry Swale (Open Channel Practice)	40% in HSG A and B
	20% in HSG C and D

It is proposed that Infiltration Practices be installed to capture, temporarily store and infiltrate the WQ_v within 48 hours.

A Cultec Recharger® 902HD underground chamber system is proposed. Typically, when using this model fewer chambers are required resulting in less labor and a smaller installation area. The system will have a storage capacity of 23,942ft^3.

Typical rain gardens will be provided for an additional 5,530ft^3. This is credited in the same manner as bioretention and while not required to meet goals, is conservative and provides for future changes in impervious coverage.

4.4 Step 4: Determine the Minimum RR_v Required

This step is not required as the full WQv required has been reduced by the total RRv capacity provided in section 4.3.

4.5 Step 5: Apply Standard Stormwater Management Practices to Address Remaining Water Quality Volumes

This step is not required as the full WQv required was not reduced by the total RRv capacity provided in section 4.3.

4.6 Step 6: Apply Volume & Peak Rate Control Practices if Still Needed to Meet Requirements

4.6.1 Minimum Runoff Reduction Volume

Sites that cannot provide the required water quality volume must provide the minimum RRv_{min} The infiltration system fully provides the WQ_v and the RRv required, as such the site meets all required runoff reduction volumes.

4.6.2 Stream Channel Protection Volume

Stream channel protection (CP_v) requirements are designed to protect stream channels from erosion. According to the New York State Stormwater Management Design Manual, stream channel protection can be accomplished by providing 24-hour extended detention (ED) of the one year, 24-hour storm event.

Reduction of the entire CPv is achieved through infiltration systems provided in section 4.3.

4.6.3 Overbank Flood Protection

The primary purpose of overbank flood control (Q_p) sizing criterion is to prevent an increase in the frequency and magnitude of out-of-bank flooding generated by urban development. Overbank control requires storage to attenuate the post development 10-year, 24-hour peak discharge rate to or below that of the 10-year, 24-hour peak discharge rate in the predevelopment condition.

The hydrology and hydraulic analysis for the project site shows that the post-construction 1-year 24-hour discharge rate and velocity are less than or equal to the pre-construction discharge rate and no further controls are needed

4.6.4 Extreme Flood Protection

The intent of extreme flood protection (Q_f) criteria is to prevent the increased risk of flood damage from large storm events and maintain the boundaries of the pre-development 100-year floodplain and protect the physical integrity of stormwater management practices. 100-year flood controls requires storage to attenuate the post development 100-year, 24-hour peak discharge rate to or below that of pre-development rates.

The hydrology and hydraulic analysis for the project site shows that the post-construction 100-year 24-hour discharge rate and velocity are less than or equal to the pre-construction discharge rate and no further controls are needed.

5 Permanent Water Quality and Quantity Controls

Structural stormwater management practices have six common performance goals as outlined below for each provided practice.

5.1 Infiltration Management Practice

It is proposed to provide an infiltration facility. Most of the disturbance and proposed improvements will be directed to these mitigation measures. A hydrodynamic separator will be provided as 100 % pretreatment given the high infiltration rate.

5.1.1 Feasibility

- *Minimum soil infiltration rate of 0.5 inches per hour*
- *Soils less than 20% clay, and 40% silt/clay, and no fill soils*
- *Natural slope less than 15%*
- *Cannot accept hotspot runoff, except under the conditions outlined in Section 6.3.1.*
- *Separation from groundwater table of at least three feet (four feet in sole source aquifers).*
- *25’ separation from structures for I-1 and I-2; 10’ for I-3*.

5.1.2 Conveyance

- *Overland Flows exiting the practice must be non-erosive (3.5 to 5.0 fps).*
- *Maximum dewatering time of 48 hours.*
- *Design off-line if stormwater is conveyed to the practice by a storm drainpipe*

5.1.3 Pretreatment

- *100% pretreatment in areas with fc >5.0 inches/hour.*
- *Exit velocities from pretreatment must be non-erosive for the 2-year storm.*

5.1.4 Treatment

- *Water quality volume designed to exfiltrate through the floor of the practice.*
- *Construction sequence to maximize practice life.*

5.1.5 Landscaping

- *Upstream area shall be completely stabilized before flow is directed to the practice*.

5.1.6 Maintenance Requirements

- *Never serves as a sediment control device.*
- *Provide direct maintenance access.*

6 Temporary Erosion & Sediment Control Measures

This SWPPP adheres to the erosion and sediment control requirements as described in the New York State Standards and Specifications for Erosion and Sediment Control. Construction on the project site involves the disturbance of greater than one (1) acre of soil and, therefore, requires GP-0-20-001 permit coverage. Coverage under this permit requires that a comprehensive Erosion and Sediment Control Plan be developed for the site during the construction phase.

The following items are proposed to be used on site and are temporary in nature, in that they are installed prior to construction commencing and will be removed upon final stabilization of the site:

- Silt Fence
- Stock Pile
- Dust Control
- Truck washout
- Stabilized Entrance
- Temporary Seeding.

Please refer to Appendix K herein for specific details related to the referenced items

7 Permanent Erosion & Sediment Control Measures

This SWPPP adheres to the erosion and sediment control requirements as described in the New York State Standards and Specifications for Erosion and Sediment Control. Construction on the project site involves the disturbance of greater than one (1) acre of soil and, therefore, requires GP-0-20-001 permit coverage. Coverage under this permit requires that a comprehensive Erosion and Sediment Control Plan be developed for the site during the construction phase.

The following items are proposed to be used on site and are permanent in nature, in that they are installed during and/or at the end of construction and will be not be removed upon final stabilization of the site or are :

- Anchored Stabilization Matting
- Plantings
- Land Grading
- Mulching
- Soil Restoration
- Top Soiling

Please refer to Appendix J herein for specific details related to the referenced items.

8 Construction Schedule

As required under GP-0-20-001 permit coverage, a construction schedule for the site is required and must be strictly followed. This project is able to be done in a single phases and still adhere to the NYS DEC policy of disturbing less than five (5) acres of land at any given time. Please refer to the construction schedule outlined below:

The construction sequence will be strictly followed unless a modified plan is submitted for review and approval by the Town.

8.1 Pre-Construction Schedule

<u>PRE-CONSTRUCTION SEQUENCE:</u>

1. Submit N.O.I. to bureau of water permits, Albany NY.
2. Receive acknowledgement back from NYSDEC.
3. Surveyor to mark out site as required.
4. Non-disturbance areas shall be marked with 4-ft orange snow fencing to town engineer's satisfaction prior to site disturbance, and shall be maintained until issuance of a Certificate-of-Occupancy.
5. Hold a pre-construction meeting with the site engineer, Town engineer, contractor, erosion control inspector and building inspector. Place a copy of the SWPPP report on site along with a copy of the inspector's log book containing copies of the weekly inspections. (Applicant’s erosion & sediment control inspection agent shall be a “Qualified Professional” and conduct an inspection on a weekly basis)

8.2 Construction Schedule

<u>CONSTRUCTION SEQUENCE:</u>

1. Install and stabilize temporary erosion & sediment control measures as shown on the SWPPP plan.
2. Install temporary diversion swales as necessary to divert runoff away from construction and construct the temporary sediment basin.
3. Begin remaining site grading, driveway grade construction and foundation excavation.
4. Rough cut driveway and parking area to sub-grade.
5. Pour concrete footings and foundations for proposed buildings.
6. Install remaining site utilities and/or infrastructure.
7. Install curbing once all major work on site is complete, as required.

8. Topsoil, seed and mulch all disturbed areas that have obtained finished grade elevations.
9. Install Infiltration structures in accordance with specifications upon soil stabilization of areas contributing to basin.
10. Seed and mulch all disturbed areas that will not be re-disturbed for at least 14 days.
11. Finalize building construction.
12. Once all major site disturbance activities have ceased and the site has achieved final stabilization, file an N.O.T. (notice of termination) with NYSDEC.
13. Terminate erosion control inspections.

8.3 Construction Waste Management

Construction waste management practices are designed to maintain a clean and orderly work environment. This will reduce the potential for significant materials to come into contact with stormwater. A maintenance schedule shall be developed for these areas. The general contractor shall implement the following practices:

Material resulting from the clearing and grubbing operation will be stockpiled up slope from adequate sedimentation controls.

Equipment cleaning, maintenance, and repair areas shall be designated and protected by a temporary perimeter berm.

The use of detergents for large scale washing is prohibited (i.e., vehicles, buildings, pavement surfaces, etc.).

<u>Spill Prevention and Response</u>
A Spill Prevention and Response Plan shall be developed for the site by the general contractor. The plan shall detail the steps needed to be followed in the event of an accidental spill and shall identify contact names and phone numbers of people and agencies that must be notified.

The plan shall include Material Safety Data Sheets (MSDS) for all materials to be stored on-site. All workers on-site will be required to be trained on safe handling and spill prevention procedures for all materials used during construction. Regular tailgate safety meetings shall be held and all workers that are expected on the site during the week shall be required to attend.

<u>Material Storage</u>
Construction materials shall be stored in a dedicated staging area. The staging area shall be located in an area that minimizes the impacts of the construction materials effecting stormwater quality.

Chemicals, paints, solvents, fertilizers, and other toxic material must be stored in waterproof containers. Except during application, the contents must be kept in trucks or within storage facilities. Runoff containing such material must be collected, removed from the site, treated and disposed at an approved solid waste or chemical disposal facility.

Temporary Concrete Washout Facility

Temporary concrete washout facilities should be located a minimum of 50 ft from storm drain inlets, open drainage facilities, and watercourses. Each facility should be located away from construction traffic or access areas to prevent disturbance or tracking. A sign should be installed adjacent to each washout facility to inform concrete equipment operators to utilize the proper facilities.

When temporary concrete washout facilities are no longer required for the work, the hardened concrete shall be removed and disposed of. Materials used to construct the temporary concrete washout facilities shall be removed from the site and disposed of. Holes, depressions or other ground disturbance caused by the removal of the temporary concrete washout facilities shall be backfilled and/or repaired and seeded and mulched for final stabilization.

Solid Waste Disposal

No solid materials, including building materials, are allowed to be discharged from the site with stormwater. All solid waste, including disposable materials incidental to the major construction activities, must be collected and placed in containers. The containers will be emptied periodically by a contract trash disposal service and hauled away from the site.

Substances that have the potential for polluting surface and/or groundwater must be controlled by whatever means necessary in order to ensure that they do not discharge from the site. As an example, special care must be exercised during equipment fueling and servicing operations. If a spill occurs, it must be contained and disposed so that it will not flow from the site or enter groundwater, even if this requires removal, treatment, and disposal of soil. In this regard, potentially polluting substances should be handled in a manner consistent with the impact they represent.

Water Source

Non-stormwater components of site discharge must be clean water. Water used for construction, which discharges from the site, must originate from a public water supply or private well approved by the Health Department. Water used for construction that does not originate from an approved public supply must not discharge from the site. It can be retained in the ponds until it infiltrates and evaporates.

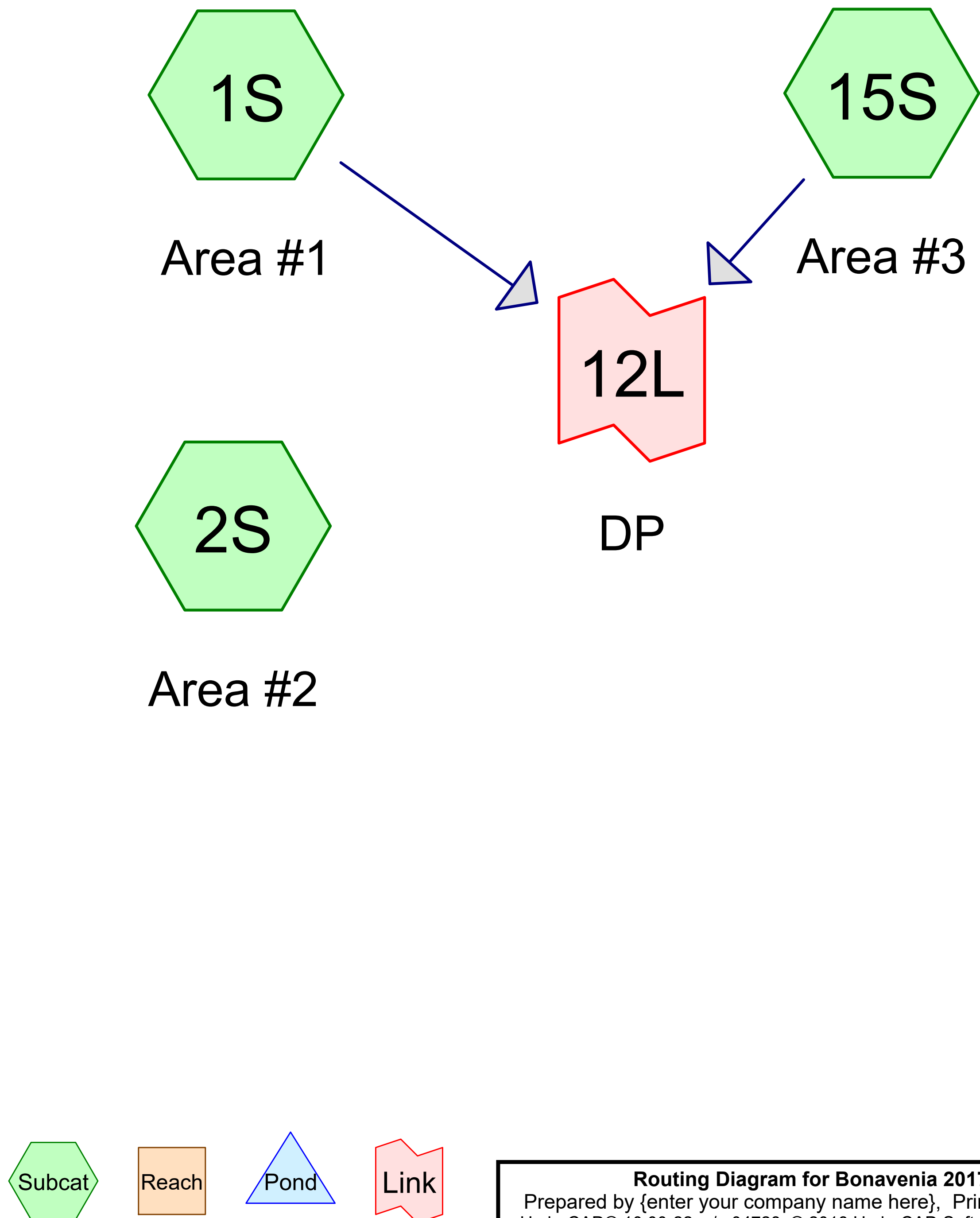
9 Conclusions

The SWPPP (Stormwater Pollution Prevention Plan) for the site to be known as “Bonavenia Enterprises Subdivision” has been designed in accordance with the *New York Standards and Specifications for Sediment and Erosion Control Manual November 2016*, and the *New York State Stormwater Management Design Manual June 2015*. All BMP (Best Management Practices) have been applied to the site to ensure the proper control of any erosion and sediment created on site from disturbance activities. The Town of Union Vale building inspector, Town Engineer and NYSDEC representative have the authority to modify, add or eliminate any erosion control practice on the construction site. The site’s owner shall electronically file an NOI, included in Appendix of this report, as required by the NYSDEC before starting construction.

Appendix

Appendix A

Pre-Development Cn, Tc Calculations, Pre-Development Hydrographs & Summary



Routing Diagram for Bonavenia 2017.196
Prepared by {enter your company name here}, Printed 11/30/2023
HydroCAD® 10.00-22 s/n 04728 © 2018 HydroCAD Software Solutions LLC

Summary for Subcatchment 1S: Area #1

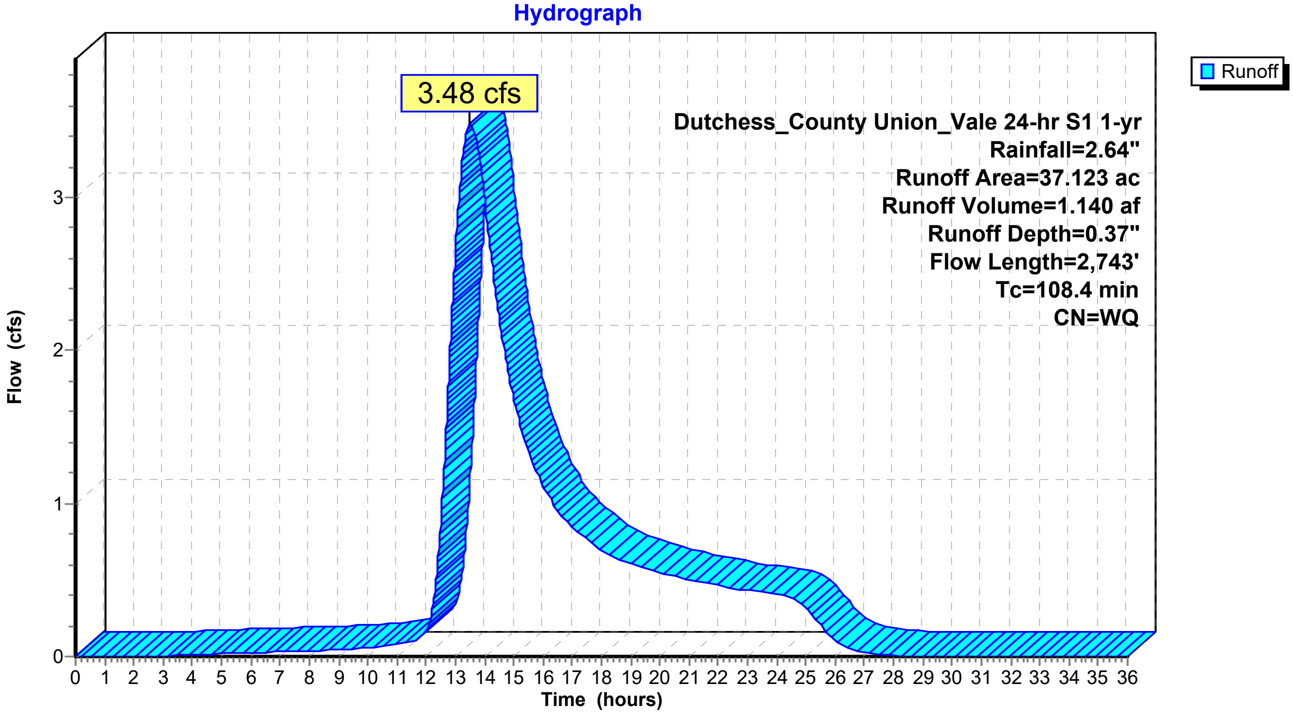
Runoff = 3.48 cfs @ 13.49 hrs, Volume= 1.140 af, Depth= 0.37"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Dutchess_County Union_Vale 24-hr S1 1-yr Rainfall=2.64"

	Area (ac)	CN	Description
	6.595	30	Woods, Good, HSG A
	2.263	77	Woods, Good, HSG D
	12.219	30	Brush, Good, HSG A
	15.222	73	Brush, Good, HSG D
*	0.683	98	Paved roads
*	0.141	98	Water Surface
	37.123		Weighted Average
	36.299	51	97.78% Pervious Area
	0.824	98	2.22% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.7	75	0.0250	0.08		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.18"
4.2	463	0.0150	1.84		**Shallow Concentrated Flow, B-C** Grassed Waterway Kv= 15.0 fps
10.5	580	0.0340	0.92		**Shallow Concentrated Flow, C-D** Woodland Kv= 5.0 fps
8.9	163	0.0150	0.31		**Shallow Concentrated Flow, D-E** Forest w/Heavy Litter Kv= 2.5 fps
0.6	152		4.01		**Lake or Reservoir, E-F** Mean Depth= 0.50'
62.0	658	0.0050	0.18		**Shallow Concentrated Flow, F-G** Forest w/Heavy Litter Kv= 2.5 fps
6.5	652	0.0200	1.68	3.00	**Parabolic Channel, G-H** W=4.00' D=0.67' Area=1.8 sf Perim=4.3' n= 0.070 Sluggish weedy reaches w/pools
108.4	2,743	Total			

Subcatchment 1S: Area #1



Summary for Subcatchment 2S: Area #2

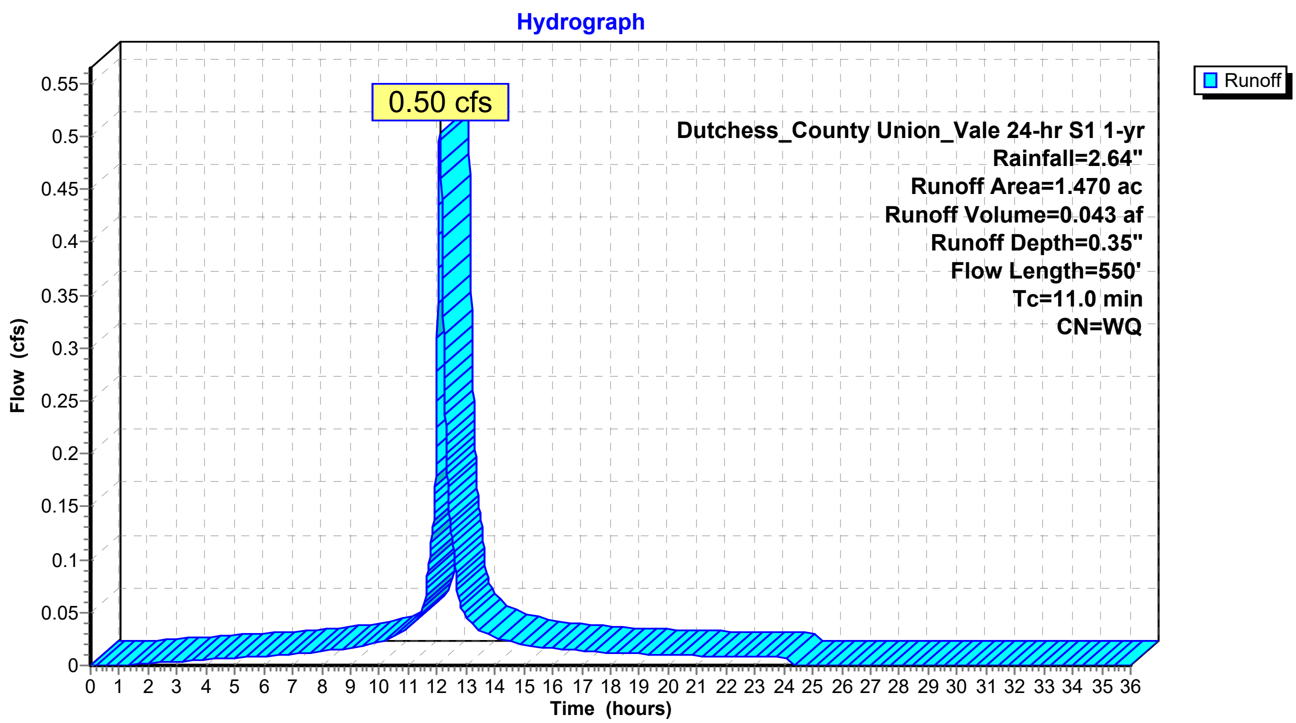
Runoff = 0.50 cfs @ 12.10 hrs, Volume= 0.043 af, Depth= 0.35"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Dutchess_County Union_Vale 24-hr S1 1-yr Rainfall=2.64"

Area (ac)	CN	Description
0.606	30	Woods, Good, HSG A
0.215	98	Paved roads
0.649	30	Brush, Good, HSG A
1.470		Weighted Average
1.255	30	85.37% Pervious Area
0.215	98	14.63% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.4	60	0.0750	0.12		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.18"
2.6	490	0.0450	3.18		**Shallow Concentrated Flow, B-C** Grassed Waterway Kv= 15.0 fps
11.0	550	Total			

Subcatchment 2S: Area #2



Summary for Subcatchment 15S: Area #3

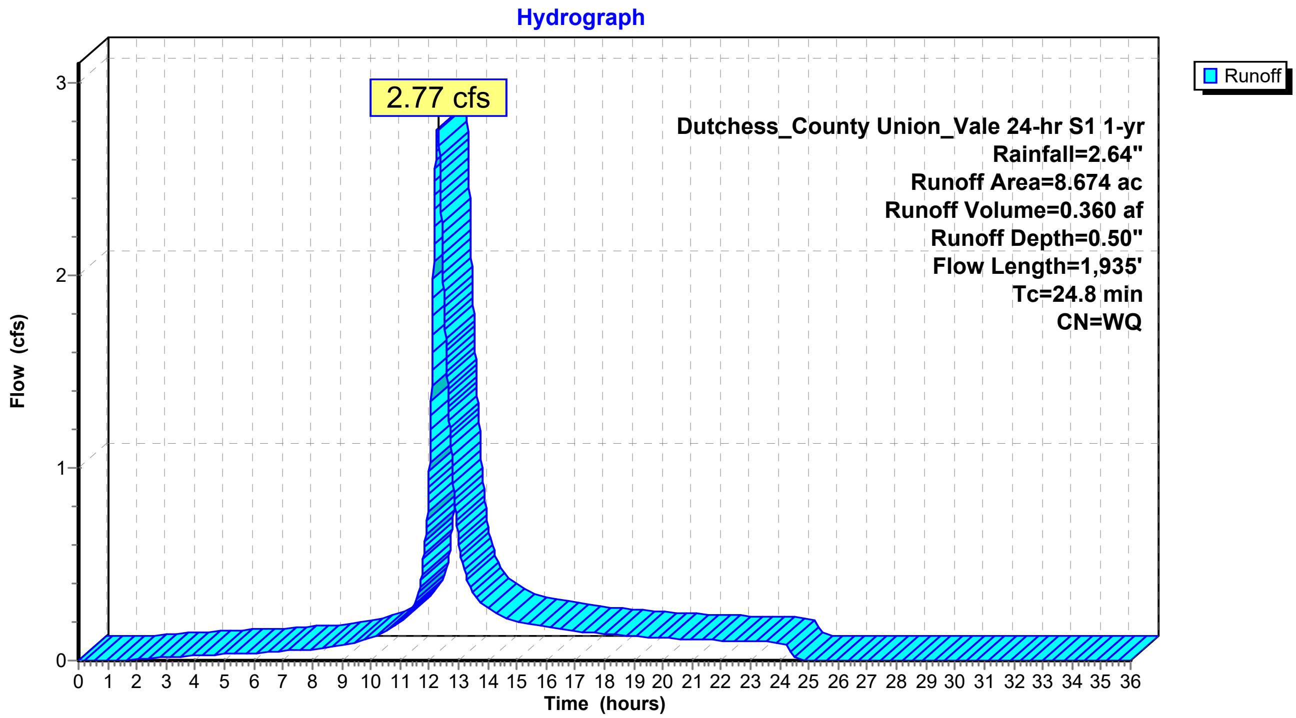
Runoff = 2.77 cfs @ 12.29 hrs, Volume= 0.360 af, Depth= 0.50"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Dutchess_County Union_Vale 24-hr S1 1-yr Rainfall=2.64"

	Area (ac)	CN	Description
*	1.019	98	Roofs Driveway
	1.379	84	50-75% Grass cover, Fair, HSG D
	6.276	49	50-75% Grass cover, Fair, HSG A
	8.674		Weighted Average
	7.655	55	88.25% Pervious Area
	1.019	98	11.75% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.1	75	0.0250	0.18		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 3.18"
0.9	98	0.0400	1.80		**Sheet Flow, B-C** Smooth surfaces n= 0.011 P2= 3.18"
10.3	1,110	0.0125	1.80		**Shallow Concentrated Flow, C-G** Unpaved Kv= 16.1 fps
6.5	652	0.0200	1.68	3.00	**Parabolic Channel, G-H** W=4.00' D=0.67' Area=1.8 sf Perim=4.3' n= 0.070 Sluggish weedy reaches w/pools
24.8	1,935	Total			

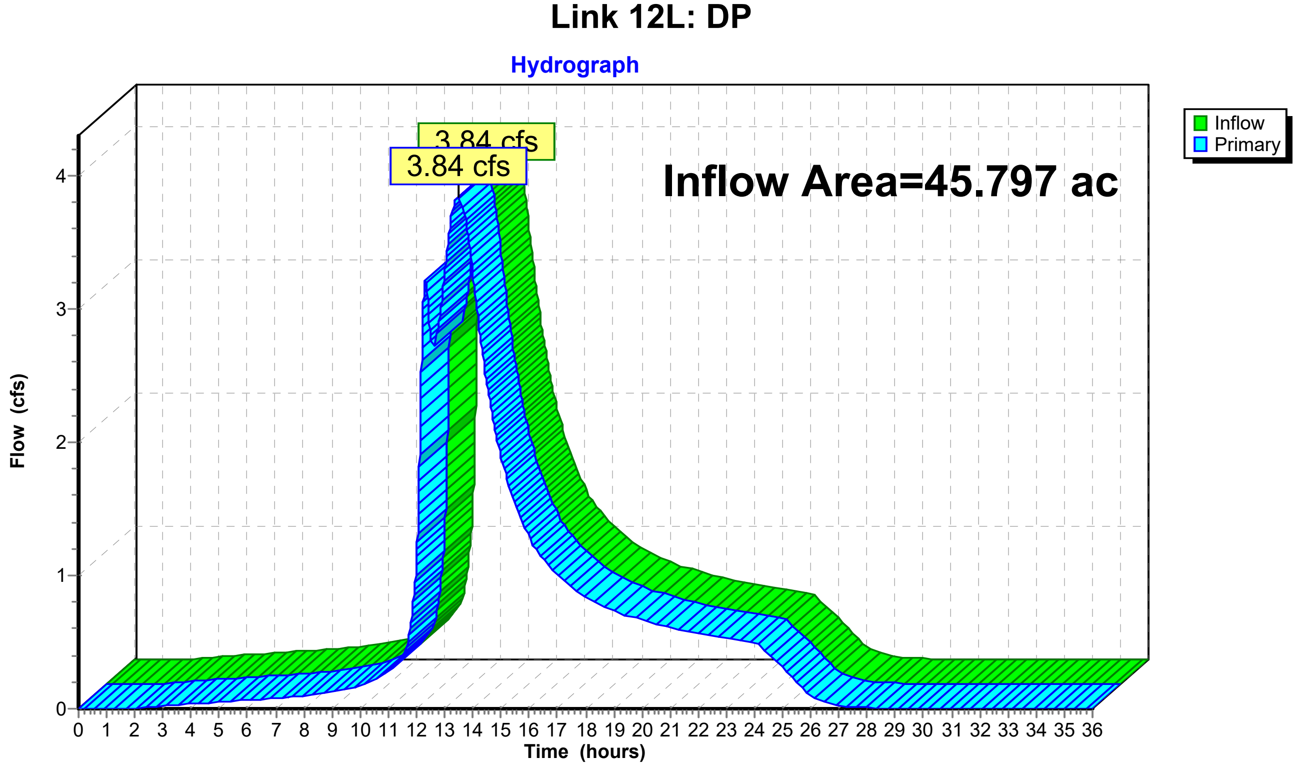
Subcatchment 15S: Area #3



Summary for Link 12L: DP

Inflow Area = 45.797 ac, 4.02% Impervious, Inflow Depth = 0.39" for 1-yr event
Inflow = 3.84 cfs @ 13.49 hrs, Volume= 1.500 af
Primary = 3.84 cfs @ 13.49 hrs, Volume= 1.500 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs



Summary for Subcatchment 1S: Area #1

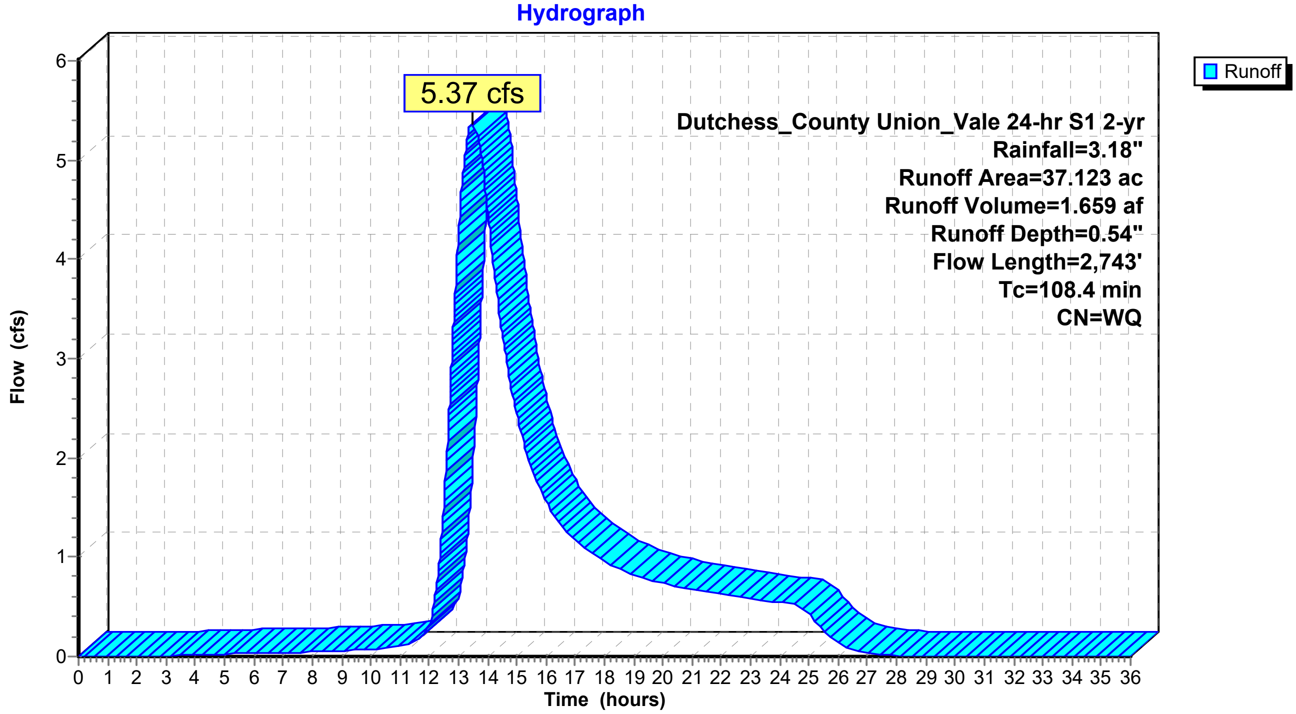
Runoff = 5.37 cfs @ 13.49 hrs, Volume= 1.659 af, Depth= 0.54"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Dutchess_County Union_Vale 24-hr S1 2-yr Rainfall=3.18"

	Area (ac)	CN	Description
	6.595	30	Woods, Good, HSG A
	2.263	77	Woods, Good, HSG D
	12.219	30	Brush, Good, HSG A
	15.222	73	Brush, Good, HSG D
*	0.683	98	Paved roads
*	0.141	98	Water Surface
	37.123		Weighted Average
	36.299	51	97.78% Pervious Area
	0.824	98	2.22% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.7	75	0.0250	0.08		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.18"
4.2	463	0.0150	1.84		**Shallow Concentrated Flow, B-C** Grassed Waterway Kv= 15.0 fps
10.5	580	0.0340	0.92		**Shallow Concentrated Flow, C-D** Woodland Kv= 5.0 fps
8.9	163	0.0150	0.31		**Shallow Concentrated Flow, D-E** Forest w/Heavy Litter Kv= 2.5 fps
0.6	152		4.01		**Lake or Reservoir, E-F** Mean Depth= 0.50'
62.0	658	0.0050	0.18		**Shallow Concentrated Flow, F-G** Forest w/Heavy Litter Kv= 2.5 fps
6.5	652	0.0200	1.68	3.00	**Parabolic Channel, G-H** W=4.00' D=0.67' Area=1.8 sf Perim=4.3' n= 0.070 Sluggish weedy reaches w/pools
108.4	2,743	Total			

Subcatchment 1S: Area #1



Summary for Subcatchment 2S: Area #2

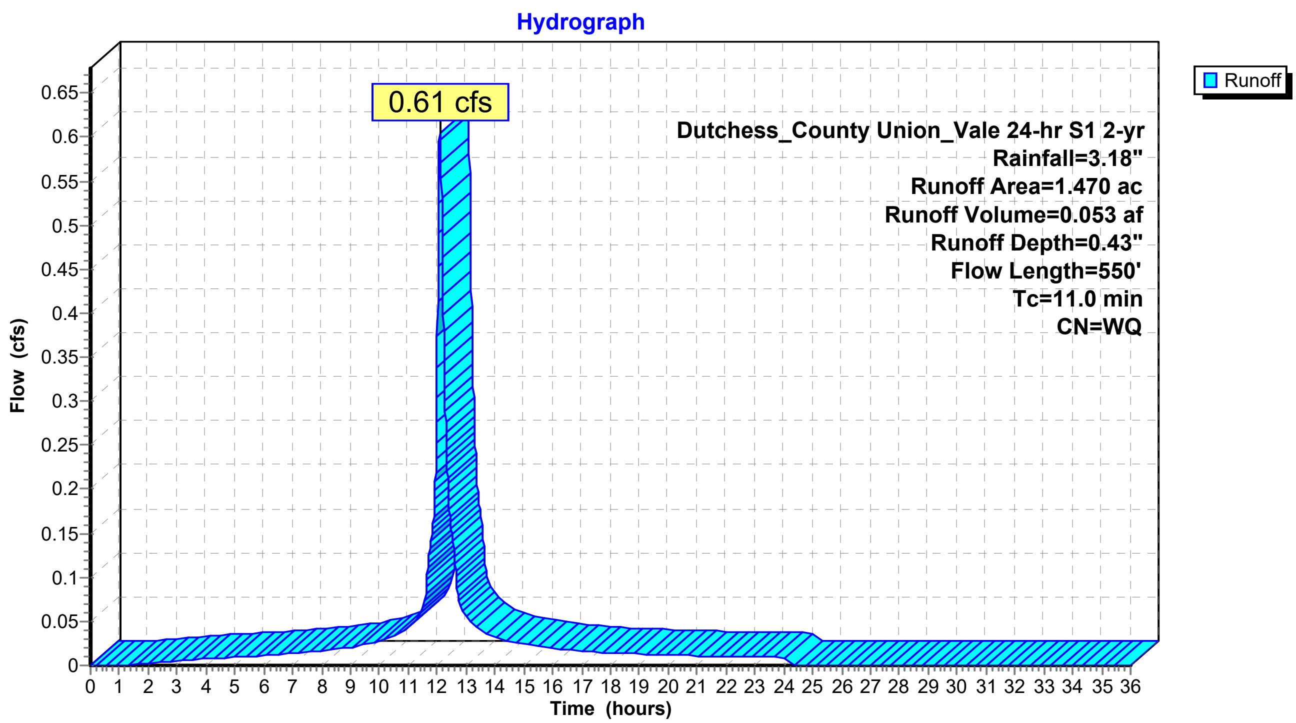
Runoff = 0.61 cfs @ 12.10 hrs, Volume= 0.053 af, Depth= 0.43"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Dutchess_County Union_Vale 24-hr S1 2-yr Rainfall=3.18"

Area (ac)	CN	Description
0.606	30	Woods, Good, HSG A
0.215	98	Paved roads
0.649	30	Brush, Good, HSG A
1.470		Weighted Average
1.255	30	85.37% Pervious Area
0.215	98	14.63% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.4	60	0.0750	0.12		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.18"
2.6	490	0.0450	3.18		**Shallow Concentrated Flow, B-C** Grassed Waterway Kv= 15.0 fps
11.0	550	Total			

Subcatchment 2S: Area #2



Summary for Subcatchment 15S: Area #3

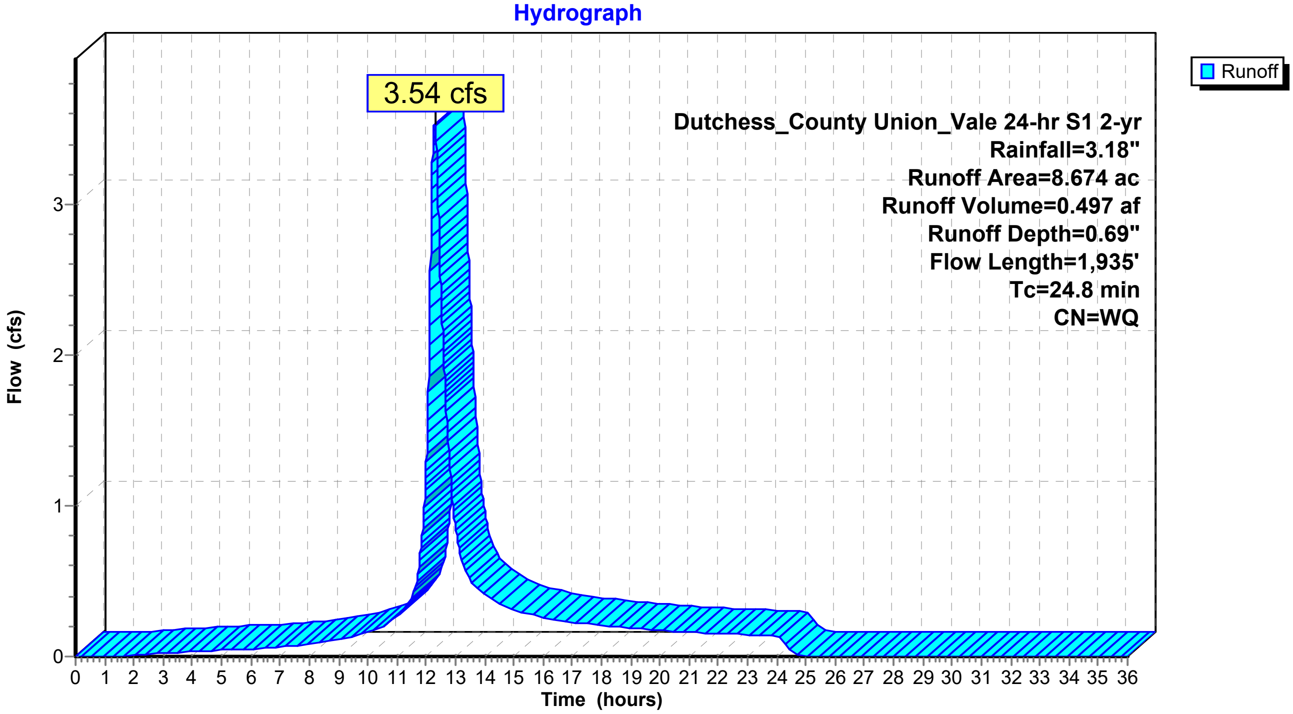
Runoff = 3.54 cfs @ 12.29 hrs, Volume= 0.497 af, Depth= 0.69"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Dutchess_County Union_Vale 24-hr S1 2-yr Rainfall=3.18"

	Area (ac)	CN	Description
*	1.019	98	Roofs Driveway
	1.379	84	50-75% Grass cover, Fair, HSG D
	6.276	49	50-75% Grass cover, Fair, HSG A
	8.674		Weighted Average
	7.655	55	88.25% Pervious Area
	1.019	98	11.75% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.1	75	0.0250	0.18		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 3.18"
0.9	98	0.0400	1.80		**Sheet Flow, B-C** Smooth surfaces n= 0.011 P2= 3.18"
10.3	1,110	0.0125	1.80		**Shallow Concentrated Flow, C-G** Unpaved Kv= 16.1 fps
6.5	652	0.0200	1.68	3.00	**Parabolic Channel, G-H** W=4.00' D=0.67' Area=1.8 sf Perim=4.3' n= 0.070 Sluggish weedy reaches w/pools
24.8	1,935	Total			

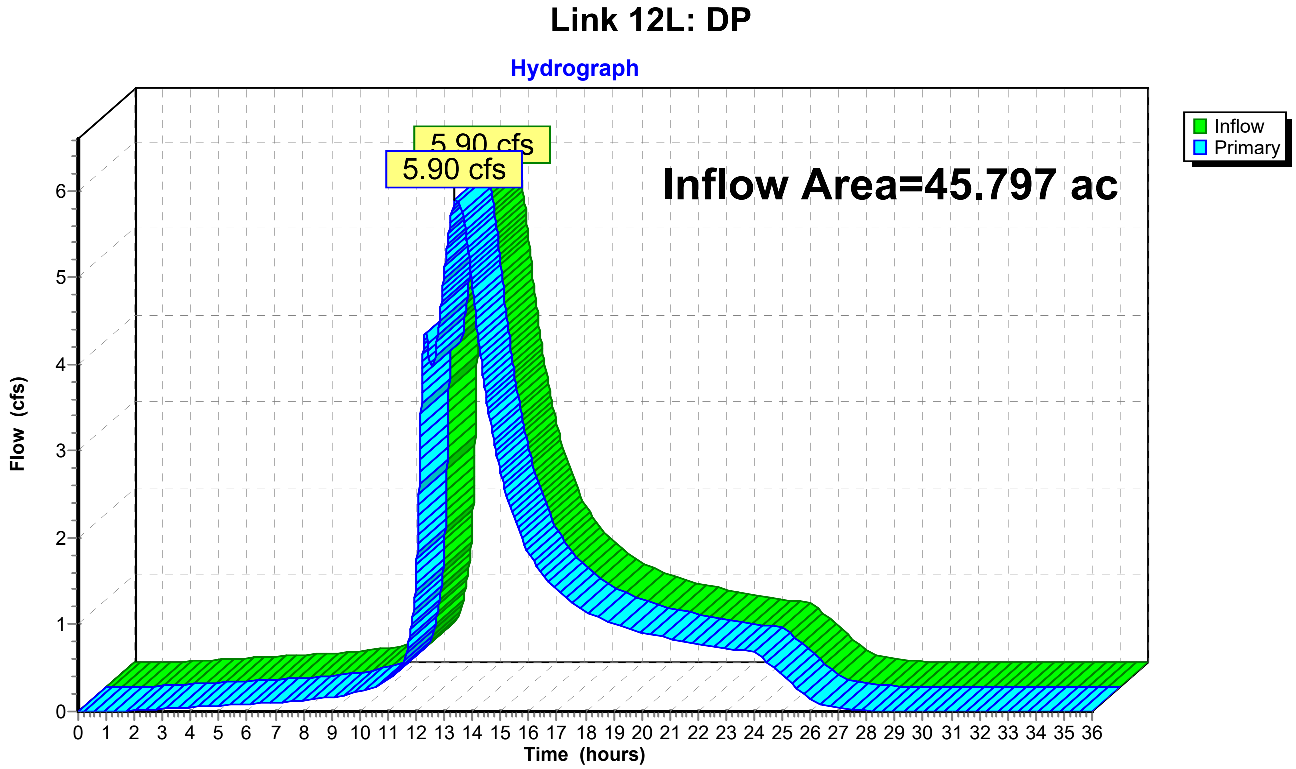
Subcatchment 15S: Area #3



Summary for Link 12L: DP

Inflow Area =	45.797 ac,	4.02% Impervious,	Inflow Depth = 0.56"	for 2-yr event	
Inflow =	5.90 cfs @	13.37 hrs,	Volume=	2.155 af	
Primary =	5.90 cfs @	13.37 hrs,	Volume=	2.155 af,	Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs



Summary for Subcatchment 1S: Area #1

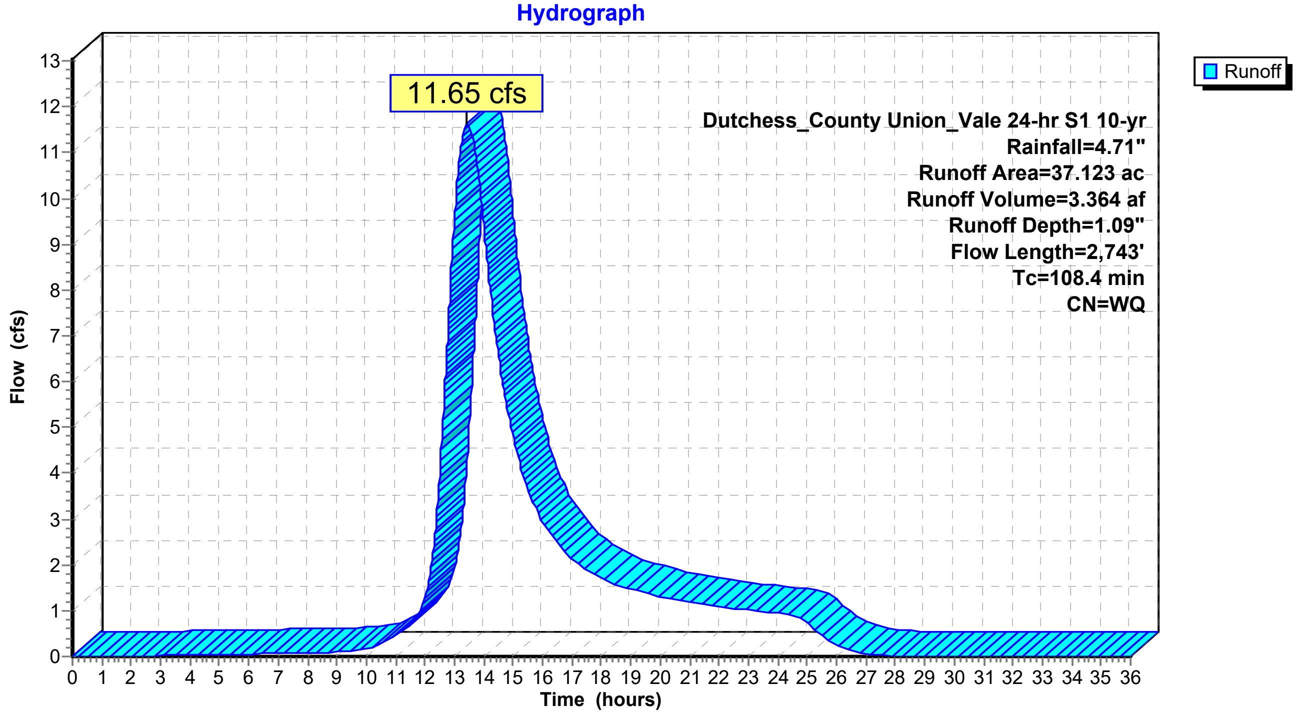
Runoff = 11.65 cfs @ 13.38 hrs, Volume= 3.364 af, Depth= 1.09"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Dutchess_County Union_Vale 24-hr S1 10-yr Rainfall=4.71"

	Area (ac)	CN	Description
	6.595	30	Woods, Good, HSG A
	2.263	77	Woods, Good, HSG D
	12.219	30	Brush, Good, HSG A
	15.222	73	Brush, Good, HSG D
*	0.683	98	Paved roads
*	0.141	98	Water Surface
	37.123		Weighted Average
	36.299	51	97.78% Pervious Area
	0.824	98	2.22% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.7	75	0.0250	0.08		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.18"
4.2	463	0.0150	1.84		**Shallow Concentrated Flow, B-C** Grassed Waterway Kv= 15.0 fps
10.5	580	0.0340	0.92		**Shallow Concentrated Flow, C-D** Woodland Kv= 5.0 fps
8.9	163	0.0150	0.31		**Shallow Concentrated Flow, D-E** Forest w/Heavy Litter Kv= 2.5 fps
0.6	152		4.01		**Lake or Reservoir, E-F** Mean Depth= 0.50'
62.0	658	0.0050	0.18		**Shallow Concentrated Flow, F-G** Forest w/Heavy Litter Kv= 2.5 fps
6.5	652	0.0200	1.68	3.00	**Parabolic Channel, G-H** W=4.00' D=0.67' Area=1.8 sf Perim=4.3' n= 0.070 Sluggish weedy reaches w/pools
108.4	2,743	Total			

Subcatchment 1S: Area #1



Summary for Subcatchment 2S: Area #2

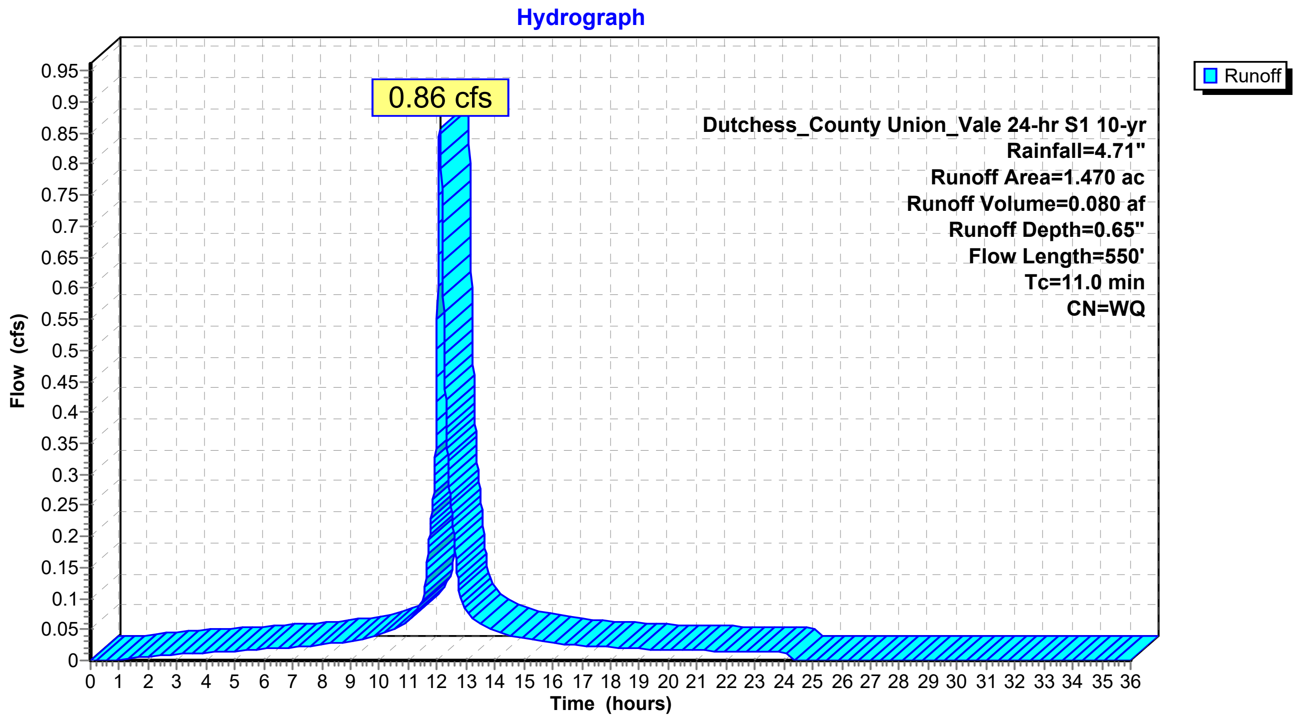
Runoff = 0.86 cfs @ 12.10 hrs, Volume= 0.080 af, Depth= 0.65"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Dutchess_County Union_Vale 24-hr S1 10-yr Rainfall=4.71"

Area (ac)	CN	Description
0.606	30	Woods, Good, HSG A
0.215	98	Paved roads
0.649	30	Brush, Good, HSG A
1.470		Weighted Average
1.255	30	85.37% Pervious Area
0.215	98	14.63% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.4	60	0.0750	0.12		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.18"
2.6	490	0.0450	3.18		**Shallow Concentrated Flow, B-C** Grassed Waterway Kv= 15.0 fps
11.0	550	Total			

Subcatchment 2S: Area #2



Summary for Subcatchment 15S: Area #3

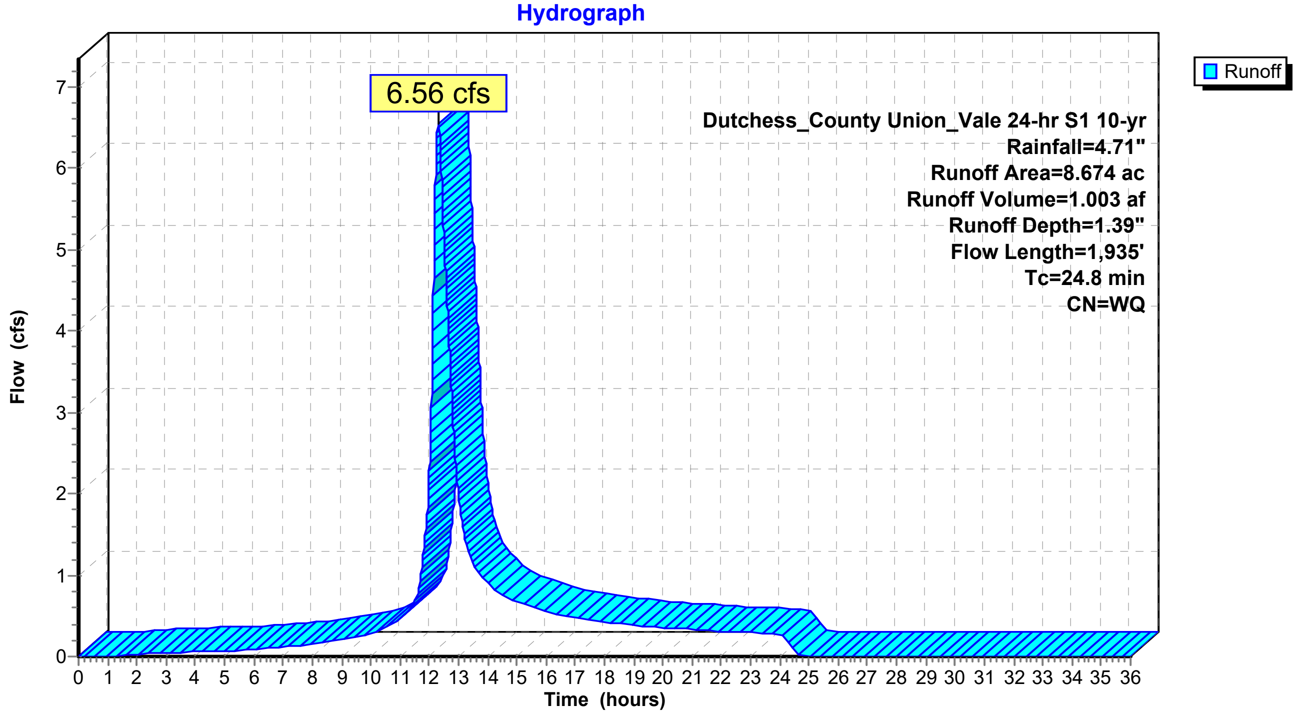
Runoff = 6.56 cfs @ 12.32 hrs, Volume= 1.003 af, Depth= 1.39"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Dutchess_County Union_Vale 24-hr S1 10-yr Rainfall=4.71"

	Area (ac)	CN	Description
*	1.019	98	Roofs Driveway
	1.379	84	50-75% Grass cover, Fair, HSG D
	6.276	49	50-75% Grass cover, Fair, HSG A
	8.674		Weighted Average
	7.655	55	88.25% Pervious Area
	1.019	98	11.75% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.1	75	0.0250	0.18		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 3.18"
0.9	98	0.0400	1.80		**Sheet Flow, B-C** Smooth surfaces n= 0.011 P2= 3.18"
10.3	1,110	0.0125	1.80		**Shallow Concentrated Flow, C-G** Unpaved Kv= 16.1 fps
6.5	652	0.0200	1.68	3.00	**Parabolic Channel, G-H** W=4.00' D=0.67' Area=1.8 sf Perim=4.3' n= 0.070 Sluggish weedy reaches w/pools
24.8	1,935	Total			

Subcatchment 15S: Area #3

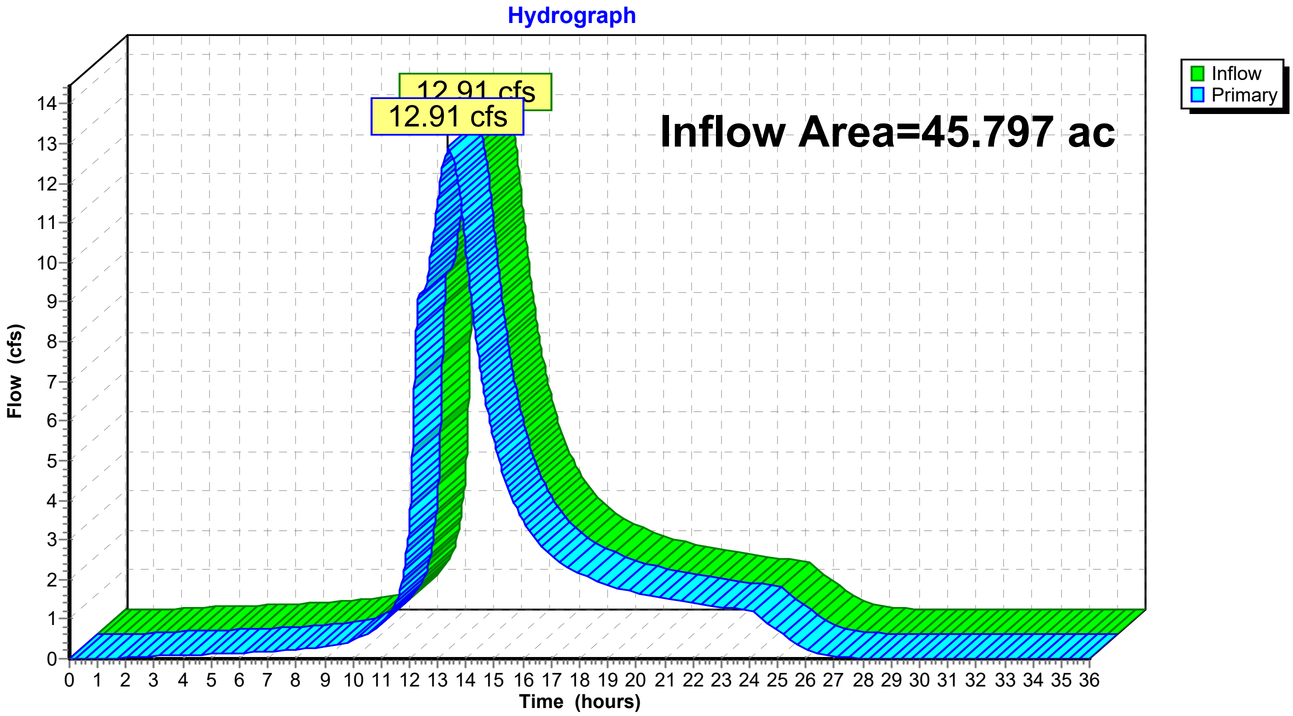


Summary for Link 12L: DP

Inflow Area = 45.797 ac, 4.02% Impervious, Inflow Depth = 1.14" for 10-yr event
Inflow = 12.91 cfs @ 13.37 hrs, Volume= 4.366 af
Primary = 12.91 cfs @ 13.37 hrs, Volume= 4.366 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Link 12L: DP



Summary for Subcatchment 1S: Area #1

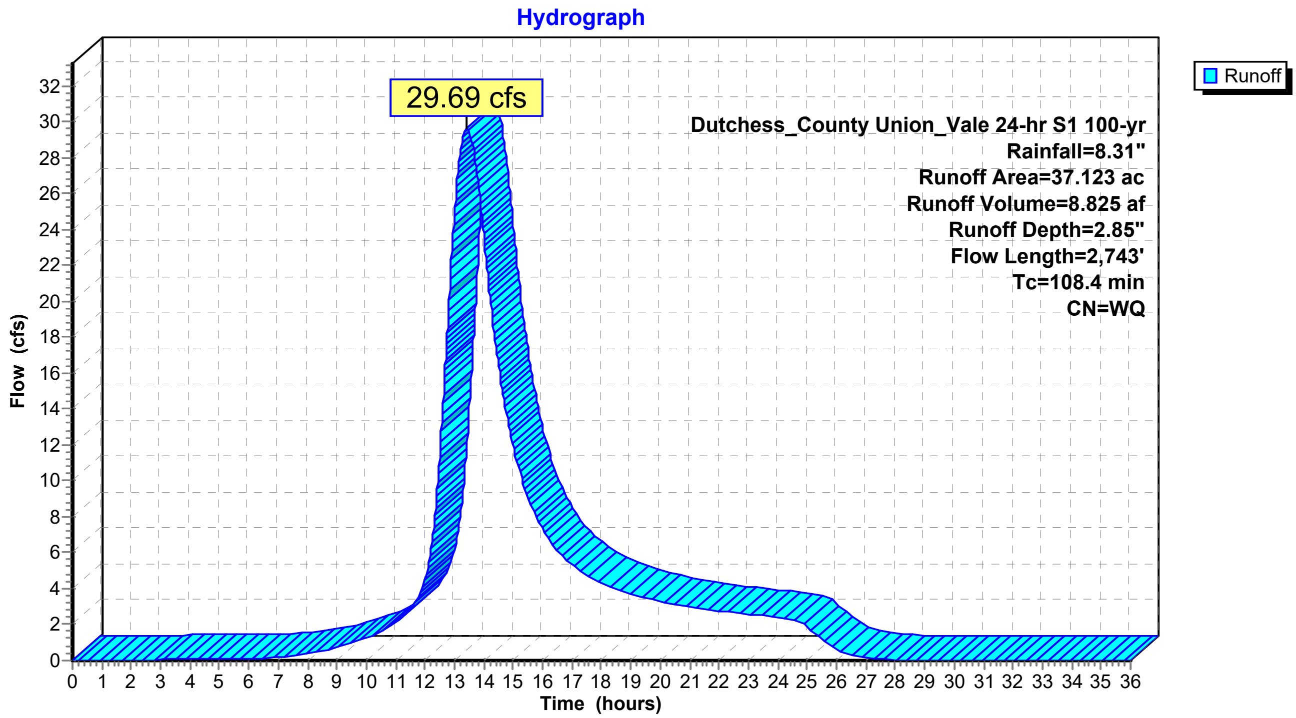
Runoff = 29.69 cfs @ 13.37 hrs, Volume= 8.825 af, Depth= 2.85"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Dutchess_County Union_Vale 24-hr S1 100-yr Rainfall=8.31"

	Area (ac)	CN	Description
	6.595	30	Woods, Good, HSG A
	2.263	77	Woods, Good, HSG D
	12.219	30	Brush, Good, HSG A
	15.222	73	Brush, Good, HSG D
*	0.683	98	Paved roads
*	0.141	98	Water Surface
	37.123		Weighted Average
	36.299	51	97.78% Pervious Area
	0.824	98	2.22% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.7	75	0.0250	0.08		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.18"
4.2	463	0.0150	1.84		**Shallow Concentrated Flow, B-C** Grassed Waterway Kv= 15.0 fps
10.5	580	0.0340	0.92		**Shallow Concentrated Flow, C-D** Woodland Kv= 5.0 fps
8.9	163	0.0150	0.31		**Shallow Concentrated Flow, D-E** Forest w/Heavy Litter Kv= 2.5 fps
0.6	152		4.01		**Lake or Reservoir, E-F** Mean Depth= 0.50'
62.0	658	0.0050	0.18		**Shallow Concentrated Flow, F-G** Forest w/Heavy Litter Kv= 2.5 fps
6.5	652	0.0200	1.68	3.00	**Parabolic Channel, G-H** W=4.00' D=0.67' Area=1.8 sf Perim=4.3' n= 0.070 Sluggish weedy reaches w/pools
108.4	2,743	Total			

Subcatchment 1S: Area #1



Summary for Subcatchment 2S: Area #2

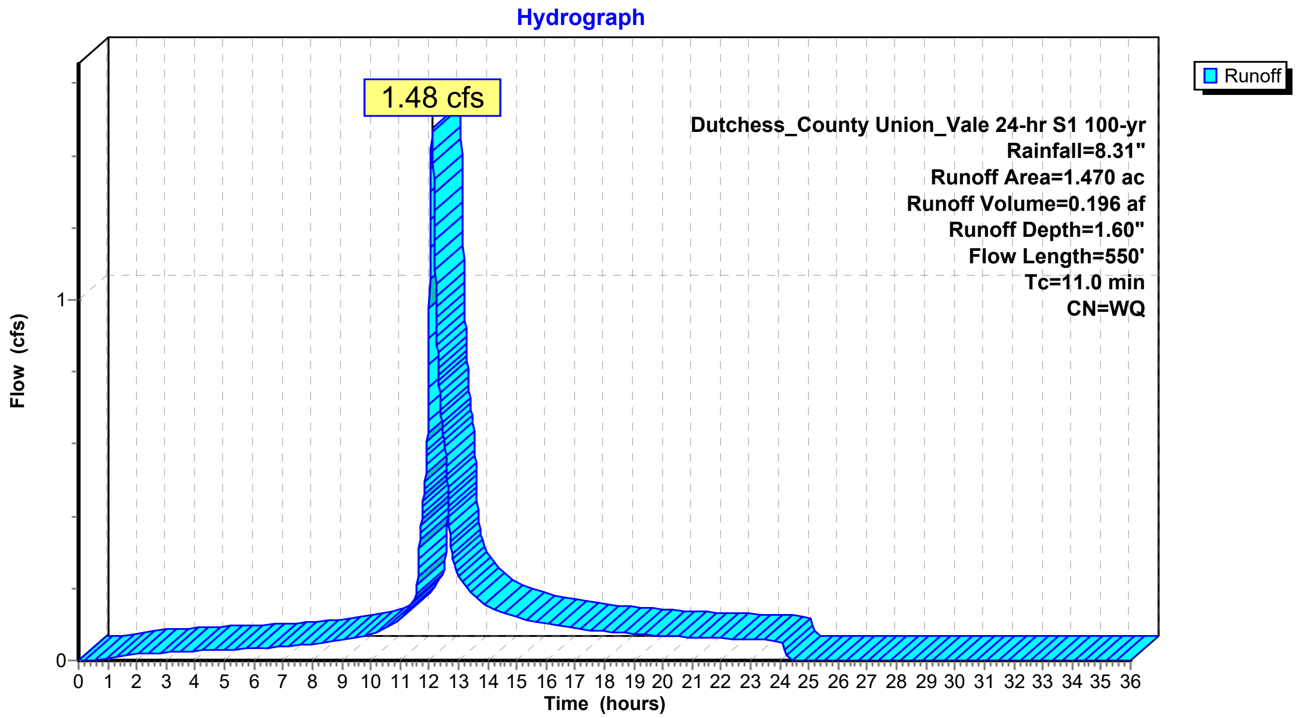
Runoff = 1.48 cfs @ 12.10 hrs, Volume= 0.196 af, Depth= 1.60"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Dutchess_County Union_Vale 24-hr S1 100-yr Rainfall=8.31"

Area (ac)	CN	Description
0.606	30	Woods, Good, HSG A
0.215	98	Paved roads
0.649	30	Brush, Good, HSG A
1.470		Weighted Average
1.255	30	85.37% Pervious Area
0.215	98	14.63% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.4	60	0.0750	0.12		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.18"
2.6	490	0.0450	3.18		**Shallow Concentrated Flow, B-C** Grassed Waterway Kv= 15.0 fps
11.0	550	Total			

Subcatchment 2S: Area #2



Summary for Subcatchment 15S: Area #3

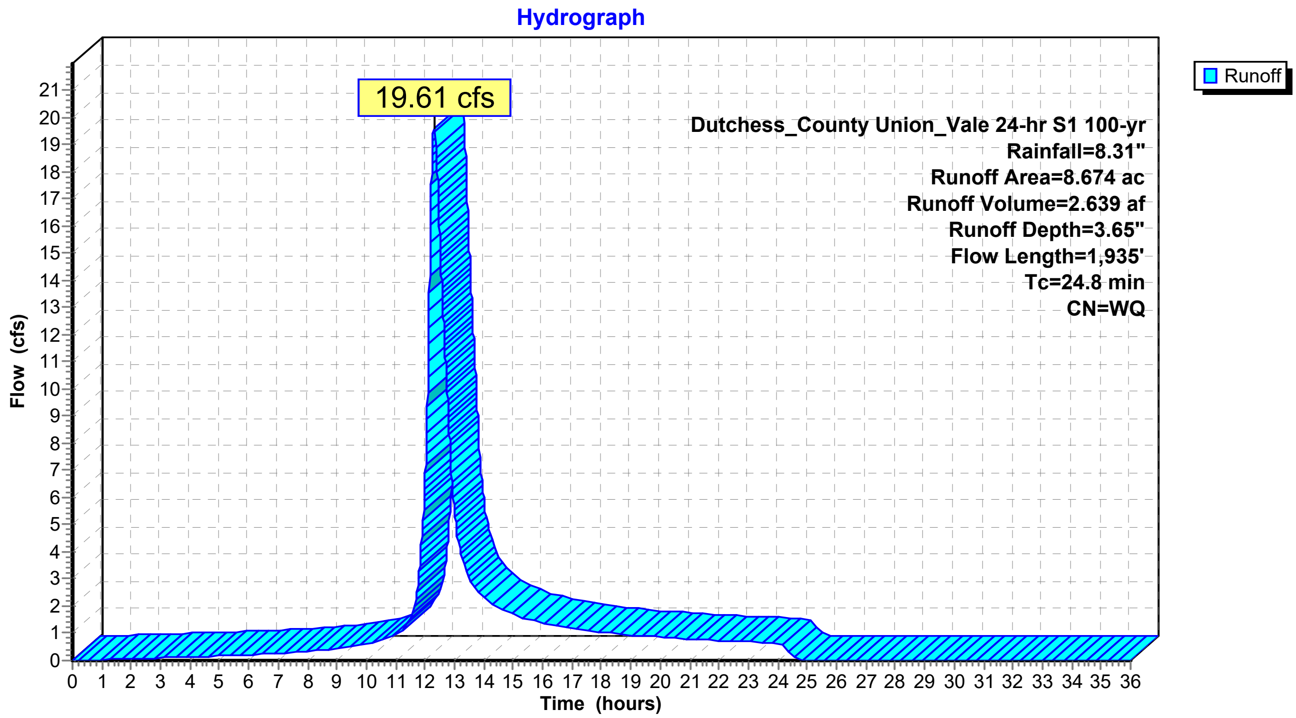
Runoff = 19.61 cfs @ 12.31 hrs, Volume= 2.639 af, Depth= 3.65"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Dutchess_County Union_Vale 24-hr S1 100-yr Rainfall=8.31"

	Area (ac)	CN	Description
*	1.019	98	Roofs Driveway
	1.379	84	50-75% Grass cover, Fair, HSG D
	6.276	49	50-75% Grass cover, Fair, HSG A
	8.674		Weighted Average
	7.655	55	88.25% Pervious Area
	1.019	98	11.75% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.1	75	0.0250	0.18		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 3.18"
0.9	98	0.0400	1.80		**Sheet Flow, B-C** Smooth surfaces n= 0.011 P2= 3.18"
10.3	1,110	0.0125	1.80		**Shallow Concentrated Flow, C-G** Unpaved Kv= 16.1 fps
6.5	652	0.0200	1.68	3.00	**Parabolic Channel, G-H** W=4.00' D=0.67' Area=1.8 sf Perim=4.3' n= 0.070 Sluggish weedy reaches w/pools
24.8	1,935	Total			

Subcatchment 15S: Area #3

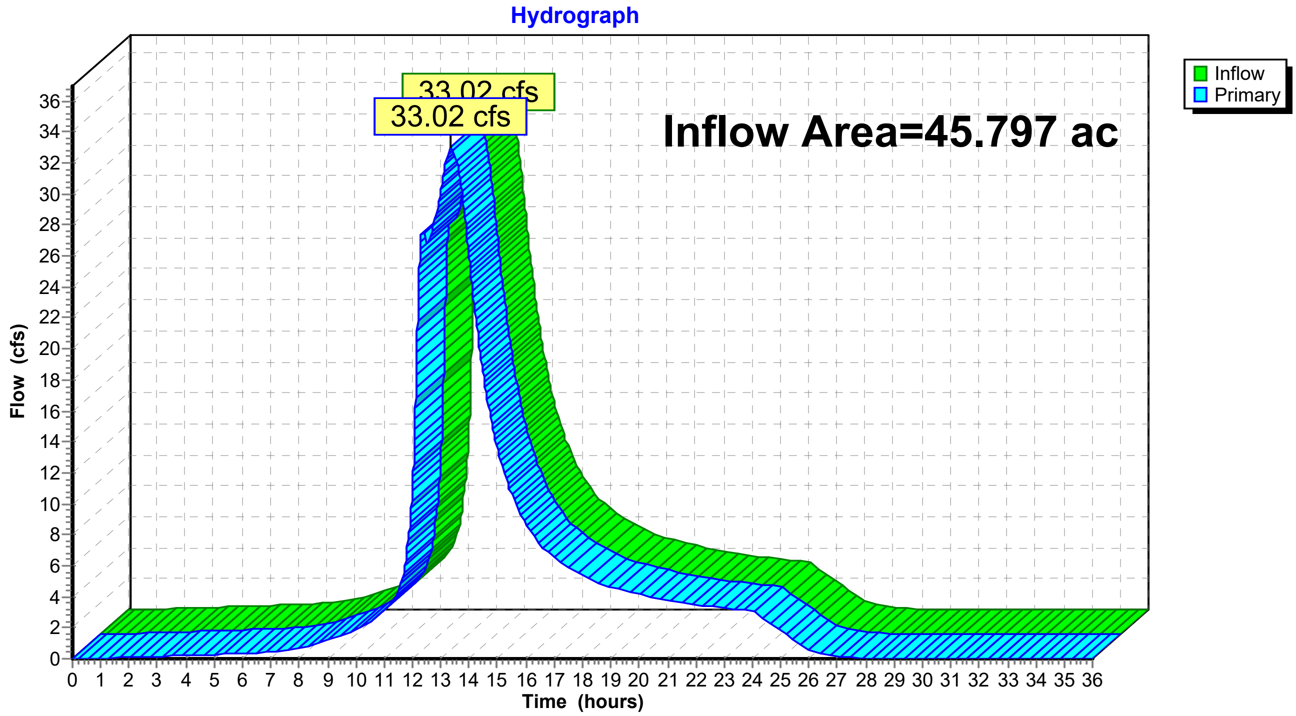


Summary for Link 12L: DP

Inflow Area = 45.797 ac, 4.02% Impervious, Inflow Depth = 3.00" for 100-yr event
Inflow = 33.02 cfs @ 13.37 hrs, Volume= 11.465 af
Primary = 33.02 cfs @ 13.37 hrs, Volume= 11.465 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Link 12L: DP



Extreme Precipitation Tables

Northeast Regional Climate Center

Data represents point estimates calculated from partial duration series. All precipitation amounts are displayed in inches.

Smoothing	No
State	New York
Location	
Longitude	73.730 degrees West
Latitude	41.647 degrees North
Elevation	0 feet
Date/Time	Tue, 18 Jan 2022 13:45:35 -0500

Extreme Precipitation Estimates

	5min	**10min**	**15min**	**30min**	**60min**	**120min**		**1hr**	**2hr**	**3hr**	**6hr**	**12hr**	**24hr**	**48hr**		**1day**	**2day**	**4day**	**7day**	**10day**	
1yr	0.32	0.49	0.60	0.81	0.99	1.19	**1yr**	0.86	1.16	1.36	1.71	2.16	2.64	2.96	**1yr**	2.33	2.85	3.30	3.99	4.59	**1yr**
2yr	0.38	0.59	0.72	0.98	1.20	1.43	**2yr**	1.04	1.40	1.62	2.09	2.64	3.18	3.58	**2yr**	2.81	3.44	3.94	4.68	5.30	**2yr**
5yr	0.45	0.70	0.87	1.19	1.51	1.76	**5yr**	1.31	1.73	2.01	2.58	3.26	3.97	4.55	**5yr**	3.52	4.38	5.03	5.84	6.59	**5yr**
10yr	0.52	0.81	1.00	1.39	1.80	2.07	**10yr**	1.56	2.03	2.36	3.03	3.83	4.71	5.47	**10yr**	4.17	5.26	6.05	6.92	7.77	**10yr**
25yr	0.64	0.97	1.21	1.73	2.27	2.56	**25yr**	1.96	2.51	2.94	3.76	4.75	5.90	6.98	**25yr**	5.22	6.71	7.73	8.65	9.67	**25yr**
50yr	0.74	1.13	1.40	2.01	2.71	3.01	**50yr**	2.34	2.95	3.47	4.42	5.59	7.00	8.39	**50yr**	6.20	8.07	9.31	10.25	11.42	**50yr**
100yr	0.87	1.31	1.64	2.36	3.24	3.55	**100yr**	2.80	3.47	4.09	5.21	6.57	8.31	10.10	**100yr**	7.36	9.71	11.21	12.15	13.49	**100yr**
200yr	1.01	1.52	1.92	2.78	3.88	4.18	**200yr**	3.35	4.08	4.84	6.14	7.74	9.87	12.16	**200yr**	8.74	11.69	13.52	14.40	15.93	**200yr**
500yr	1.25	1.85	2.38	3.46	4.92	5.18	**500yr**	4.25	5.07	6.04	7.63	9.62	12.40	15.55	**500yr**	10.98	14.95	17.32	18.05	19.88	**500yr**

Lower Confidence Limits

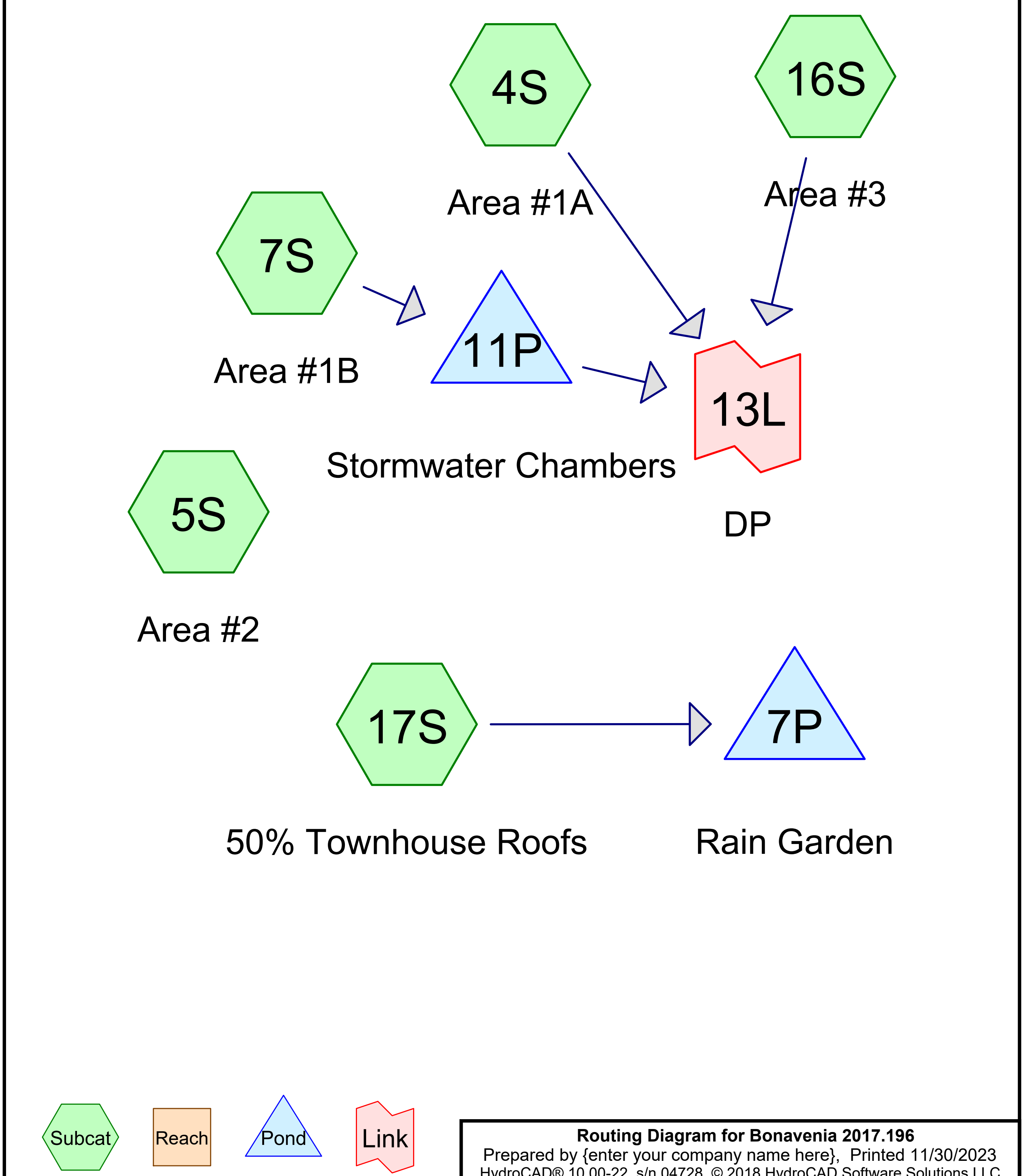
	5min	**10min**	**15min**	**30min**	**60min**	**120min**		**1hr**	**2hr**	**3hr**	**6hr**	**12hr**	**24hr**	**48hr**		**1day**	**2day**	**4day**	**7day**	**10day**	
1yr	0.23	0.36	0.44	0.59	0.73	0.92	**1yr**	0.63	0.90	1.20	1.53	1.86	2.35	2.55	**1yr**	2.08	2.46	2.76	3.69	4.19	**1yr**
2yr	0.37	0.57	0.70	0.94	1.16	1.38	**2yr**	1.00	1.35	1.57	2.03	2.54	3.08	3.46	**2yr**	2.73	3.33	3.82	4.53	5.15	**2yr**
5yr	0.41	0.64	0.79	1.09	1.39	1.62	**5yr**	1.20	1.59	1.80	2.36	2.98	3.68	4.22	**5yr**	3.26	4.06	4.65	5.40	6.12	**5yr**
10yr	0.46	0.71	0.88	1.23	1.58	1.81	**10yr**	1.37	1.77	1.99	2.63	3.35	4.22	4.87	**10yr**	3.73	4.69	5.39	6.12	6.98	**10yr**
25yr	0.52	0.80	0.99	1.42	1.87	2.09	**25yr**	1.61	2.04	2.22	3.06	3.85	5.04	5.89	**25yr**	4.46	5.66	6.54	7.22	8.30	**25yr**
50yr	0.58	0.88	1.10	1.58	2.13	2.32	**50yr**	1.84	2.27	2.41	3.44	4.29	5.78	6.83	**50yr**	5.11	6.57	7.60	8.18	9.47	**50yr**
100yr	0.64	0.97	1.22	1.76	2.41	2.59	**100yr**	2.08	2.53	2.61	3.87	4.80	6.63	7.93	**100yr**	5.87	7.63	8.83	9.24	10.83	**100yr**
200yr	0.72	1.08	1.37	1.98	2.76	2.67	**200yr**	2.38	2.61	2.81	4.36	5.38	7.60	9.24	**200yr**	6.72	8.88	10.29	10.48	12.40	**200yr**
500yr	0.83	1.24	1.60	2.32	3.30	3.05	**500yr**	2.84	2.98	3.08	5.13	6.27	9.13	11.34	**500yr**	8.08	10.90	12.60	12.35	14.90	**500yr**

Upper Confidence Limits

	5min	**10min**	**15min**	**30min**	**60min**	**120min**		**1hr**	**2hr**	**3hr**	**6hr**	**12hr**	**24hr**	**48hr**		**1day**	**2day**	**4day**	**7day**	**10day**	
1yr	0.36	0.55	0.67	0.91	1.11	1.30	**1yr**	0.96	1.27	1.49	1.94	2.41	2.87	3.21	**1yr**	2.54	3.09	3.55	4.26	4.90	**1yr**
2yr	0.41	0.63	0.77	1.05	1.29	1.50	**2yr**	1.11	1.47	1.72	2.16	2.75	3.29	3.74	**2yr**	2.91	3.60	4.17	4.88	5.50	**2yr**
5yr	0.49	0.75	0.93	1.28	1.63	1.91	**5yr**	1.41	1.87	2.21	2.83	3.56	4.30	4.92	**5yr**	3.81	4.73	5.46	6.32	7.07	**5yr**
10yr	0.58	0.90	1.11	1.55	2.00	2.32	**10yr**	1.73	2.27	2.71	3.48	4.39	5.26	6.10	**10yr**	4.66	5.87	6.81	7.72	8.57	**10yr**
25yr	0.74	1.12	1.40	2.00	2.63	3.01	**25yr**	2.27	2.94	3.58	4.58	5.80	6.90	8.09	**25yr**	6.10	7.78	9.13	10.08	11.04	**25yr**
50yr	0.88	1.34	1.67	2.40	3.24	3.67	**50yr**	2.79	3.59	4.44	5.64	7.17	8.46	10.02	**50yr**	7.48	9.64	11.42	12.34	13.36	**50yr**
100yr	1.06	1.61	2.01	2.91	3.99	4.50	**100yr**	3.44	4.40	5.52	6.95	8.87	10.38	12.42	**100yr**	9.19	11.94	14.29	15.11	16.17	**100yr**
200yr	1.28	1.92	2.44	3.53	4.92	6.34	**200yr**	4.25	6.20	6.86	8.56	10.95	12.74	15.38	**200yr**	11.28	14.79	17.87	18.50	19.57	**200yr**
500yr	1.64	2.45	3.15	4.58	6.51	8.48	**500yr**	5.61	8.29	9.20	11.30	14.48	16.73	20.39	**500yr**	14.81	19.61	24.02	24.22	25.16	**500yr**

Appendix B

Post-Development Cn, Tc Calculations, Post-Development Hydrographs & Summary



Routing Diagram for Bonavenia 2017.196
Prepared by {enter your company name here}, Printed 11/30/2023
HydroCAD® 10.00-22 s/n 04728 © 2018 HydroCAD Software Solutions LLC

Summary for Subcatchment 4S: Area #1A

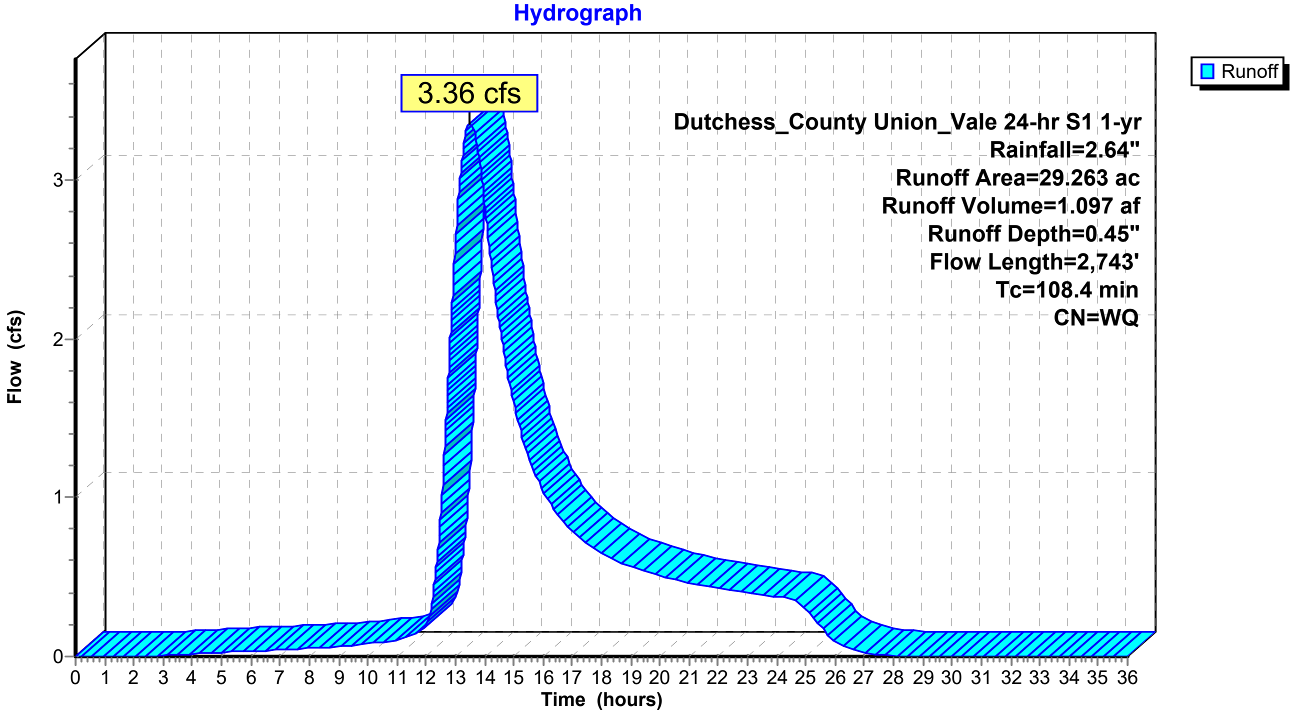
Runoff = 3.36 cfs @ 13.49 hrs, Volume= 1.097 af, Depth= 0.45"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Dutchess_County Union_Vale 24-hr S1 1-yr Rainfall=2.64"

	Area (ac)	CN	Description
	4.728	30	Woods, Good, HSG A
	1.902	77	Woods, Good, HSG D
	4.885	30	Brush, Good, HSG A
	13.703	73	Brush, Good, HSG D
*	0.654	98	Paved roads
*	0.141	98	Water Surface
	1.698	30	Woods, Good, HSG A
*	0.344	98	Unconnected Impervious, HSG A
	1.208	39	>75% Grass cover, Good, HSG A
	29.263		Weighted Average
	28.124	55	96.11% Pervious Area
	1.139	98	3.89% Impervious Area
	0.344		30.20% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.7	75	0.0250	0.08		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.18"
4.2	463	0.0150	1.84		**Shallow Concentrated Flow, B-C** Grassed Waterway Kv= 15.0 fps
10.5	580	0.0340	0.92		**Shallow Concentrated Flow, C-D** Woodland Kv= 5.0 fps
8.9	163	0.0150	0.31		**Shallow Concentrated Flow, D-E** Forest w/Heavy Litter Kv= 2.5 fps
0.6	152		4.01		**Lake or Reservoir, E-F** Mean Depth= 0.50'
62.0	658	0.0050	0.18		**Shallow Concentrated Flow, F-G** Forest w/Heavy Litter Kv= 2.5 fps
6.5	652	0.0200	1.68	3.00	**Parabolic Channel, G-H** W=4.00' D=0.67' Area=1.8 sf Perim=4.3' n= 0.070 Sluggish weedy reaches w/pools
108.4	2,743	Total			

Subcatchment 4S: Area #1A



Summary for Subcatchment 5S: Area #2

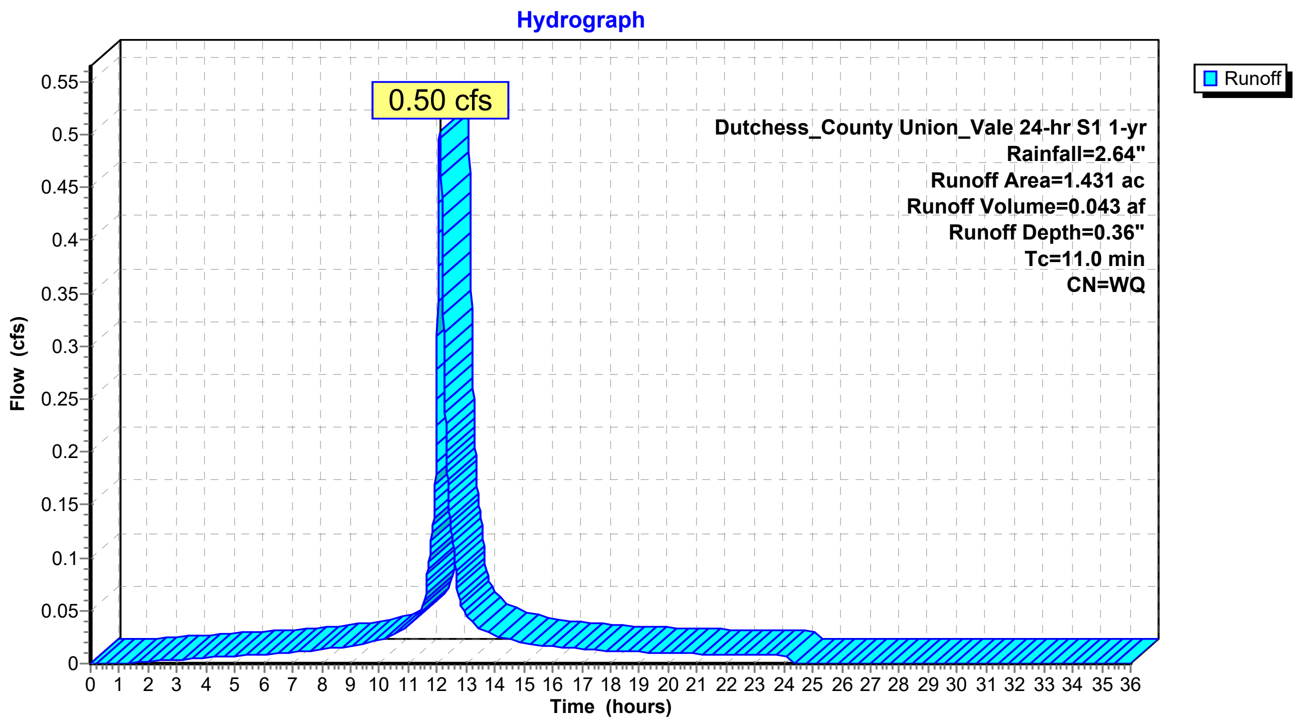
Runoff = 0.50 cfs @ 12.10 hrs, Volume= 0.043 af, Depth= 0.36"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Dutchess_County Union_Vale 24-hr S1 1-yr Rainfall=2.64"

Area (ac)	CN	Description
0.567	30	Woods, Good, HSG A
0.215	98	Paved roads
0.649	30	Brush, Good, HSG A
1.431		Weighted Average
1.216	30	84.98% Pervious Area
0.215	98	15.02% Impervious Area

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

Subcatchment 5S: Area #2



Summary for Subcatchment 7S: Area #1B

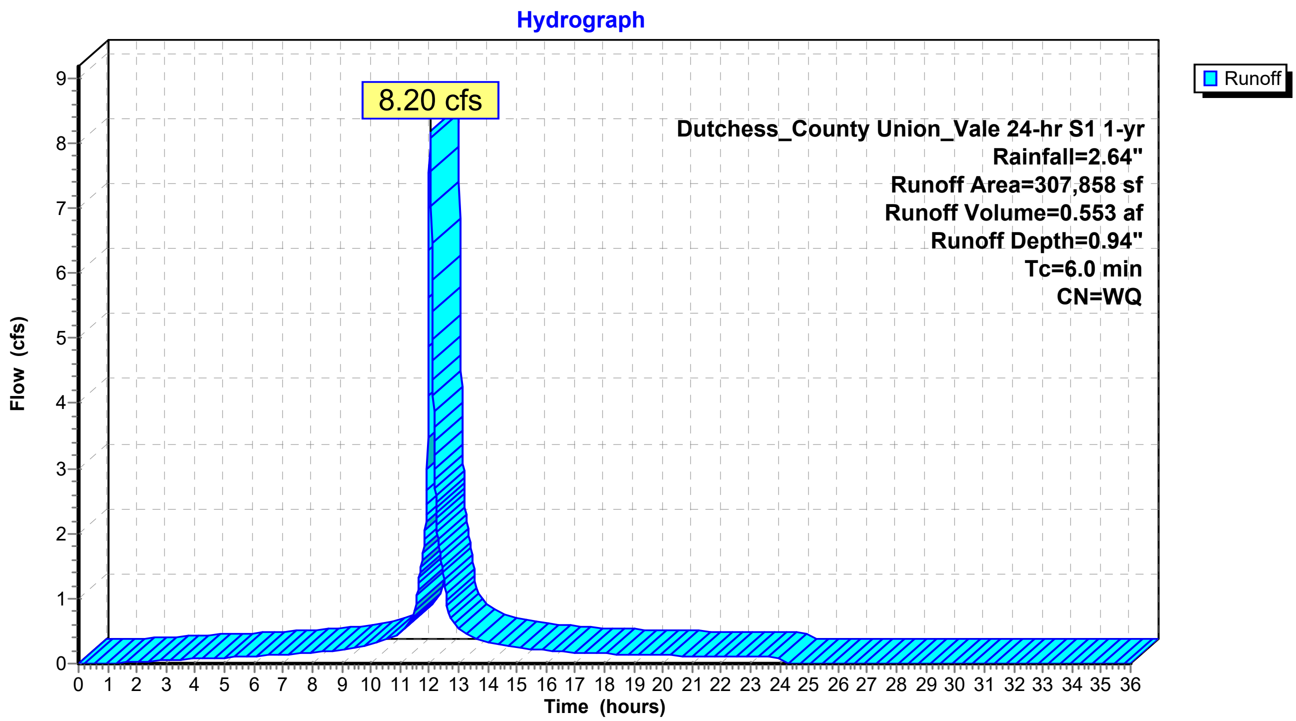
Runoff = 8.20 cfs @ 12.04 hrs, Volume= 0.553 af, Depth= 0.94"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Dutchess_County Union_Vale 24-hr S1 1-yr Rainfall=2.64"

	Area (sf)	CN	Description
	187,850	39	>75% Grass cover, Good, HSG A
*	62,160	98	Impervious Road, HSG A
*	57,848	98	Impervious Townhouses, HSG A
	307,858		Weighted Average
	187,850	39	61.02% Pervious Area
	120,008	98	38.98% Impervious Area

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

Subcatchment 7S: Area #1B



Summary for Subcatchment 16S: Area #3

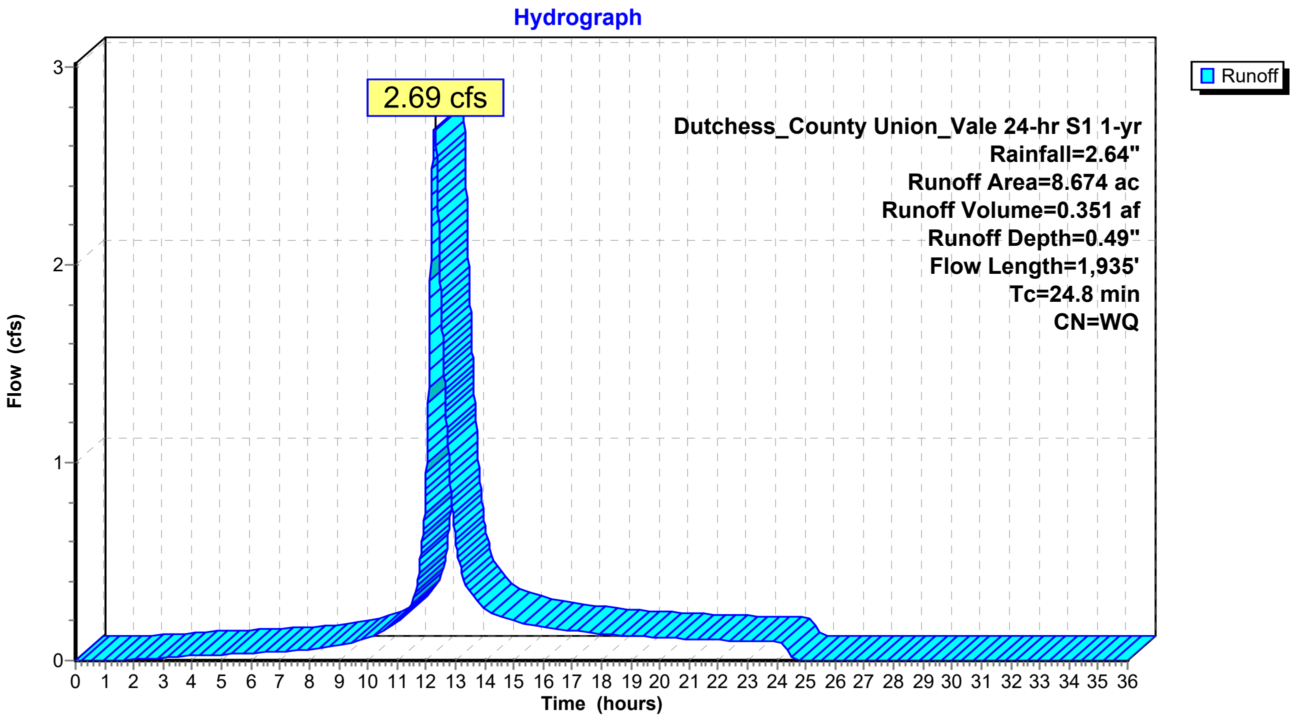
Runoff = 2.69 cfs @ 12.29 hrs, Volume= 0.351 af, Depth= 0.49"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Dutchess_County Union_Vale 24-hr S1 1-yr Rainfall=2.64"

	Area (ac)	CN	Description
*	0.966	98	Roofs Driveway
	1.387	84	50-75% Grass cover, Fair, HSG D
	6.321	49	50-75% Grass cover, Fair, HSG A
	8.674		Weighted Average
	7.708	55	88.86% Pervious Area
	0.966	98	11.14% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.1	75	0.0250	0.18		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 3.18"
0.9	98	0.0400	1.80		**Sheet Flow, B-C** Smooth surfaces n= 0.011 P2= 3.18"
10.3	1,110	0.0125	1.80		**Shallow Concentrated Flow, C-G** Unpaved Kv= 16.1 fps
6.5	652	0.0200	1.68	3.00	**Parabolic Channel, G-H** W=4.00' D=0.67' Area=1.8 sf Perim=4.3' n= 0.070 Sluggish weedy reaches w/pools
24.8	1,935	Total			

Subcatchment 16S: Area #3



Summary for Subcatchment 17S: 50% Townhouse Roofs

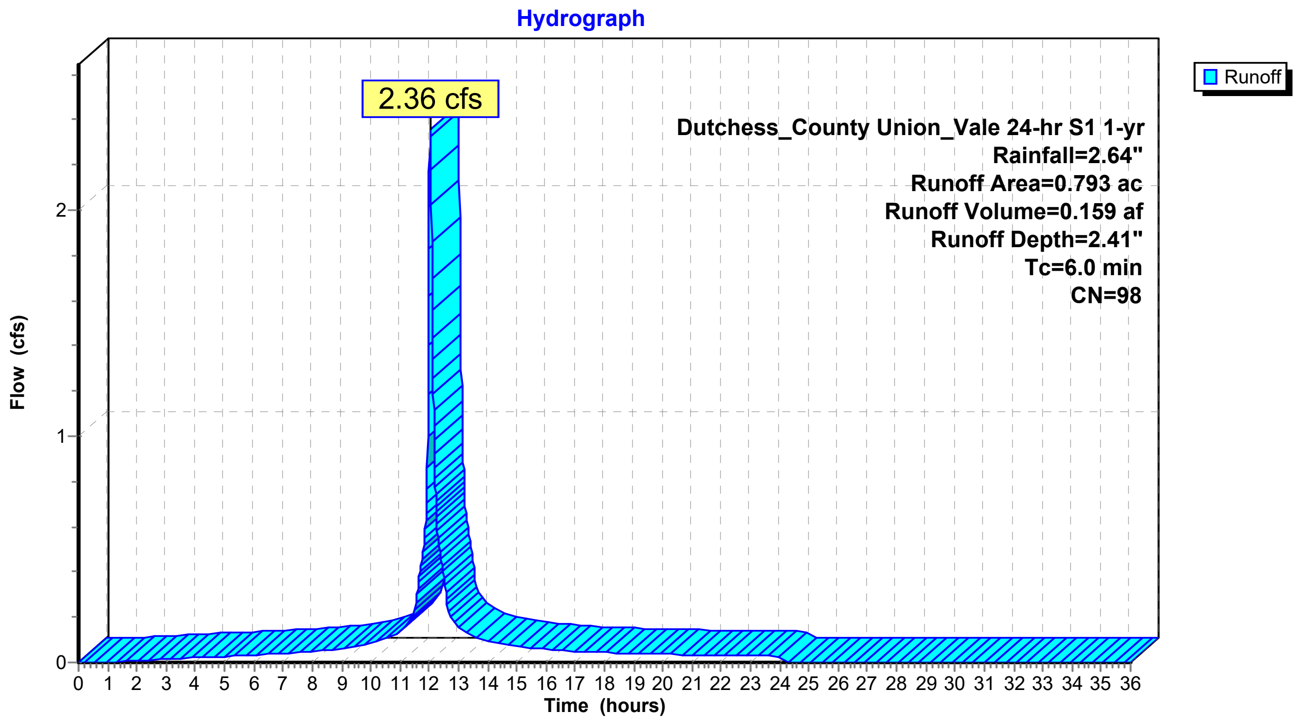
Runoff = 2.36 cfs @ 12.04 hrs, Volume= 0.159 af, Depth= 2.41"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Dutchess_County Union_Vale 24-hr S1 1-yr Rainfall=2.64"

	Area (ac)	CN	Description
*	0.793	98	1/2 Proposed Town Home Roofs
	0.793	98	100.00% Impervious Area

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

Subcatchment 17S: 50% Townhouse Roofs



Summary for Pond 7P: Rain Garden

Inflow Area = 0.793 ac,100.00% Impervious, Inflow Depth = 2.41" for 1-yr event
Inflow = 2.36 cfs @ 12.04 hrs, Volume= 0.159 af
Outflow = 1.28 cfs @ 11.98 hrs, Volume= 0.159 af, Atten= 46%, Lag= 0.0 min
Discarded = 1.28 cfs @ 11.98 hrs, Volume= 0.159 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 0.22' @ 12.13 hrs Surf.Area= 4,608 sf Storage= 408 cf

Plug-Flow detention time= 1.4 min calculated for 0.159 af (100% of inflow)
Center-of-Mass det. time= 1.4 min (764.6 - 763.2)

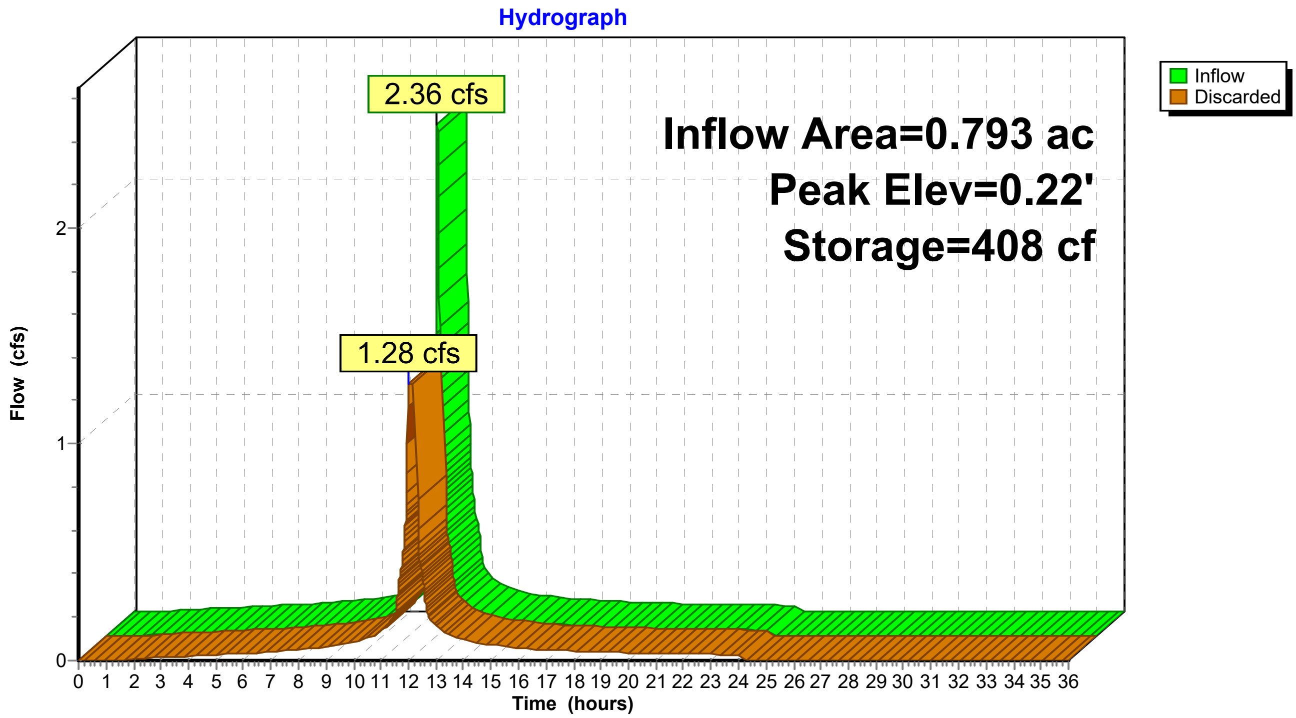
Volume	Invert	Avail.Storage	Storage Description
#1	0.00'	115 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)
		115 cf	x 48.00 = 5,530 cf Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
0.00	96	0.0	0	0
1.00	96	40.0	38	38
2.50	96	20.0	29	67
3.00	96	100.0	48	115

Device	Routing	Invert	Outlet Devices
#1	Discarded	0.00'	**12.000 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=1.28 cfs @ 11.98 hrs HW=0.03' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 1.28 cfs)

Pond 7P: Rain Garden



Summary for Pond 11P: Stormwater Chambers

Inflow Area = 7.067 ac, 38.98% Impervious, Inflow Depth = 0.94" for 1-yr event
Inflow = 8.20 cfs @ 12.04 hrs, Volume= 0.553 af
Outflow = 1.90 cfs @ 12.31 hrs, Volume= 0.553 af, Atten= 77%, Lag= 16.2 min
Discarded = 1.90 cfs @ 12.31 hrs, Volume= 0.553 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 1.09' @ 12.31 hrs Surf.Area= 0.149 ac Storage= 0.088 af

Plug-Flow detention time= 9.2 min calculated for 0.553 af (100% of inflow)
Center-of-Mass det. time= 9.2 min (772.4 - 763.2)

Volume	Invert	Avail.Storage	Storage Description
#1A	0.00'	0.204 af	**59.25'W x 109.37'L x 5.75'H Field A** 0.855 af Overall - 0.346 af Embedded = 0.510 af x 40.0% Voids
#2A	0.75'	0.346 af	**Cultec R-902HD** x 232 Inside #1 Effective Size= 69.8"W x 48.0"H => 17.65 sf x 3.67'L = 64.7 cf Overall Size= 78.0"W x 48.0"H x 4.10'L with 0.44' Overlap 8 Rows of 29 Chambers Cap Storage= +2.8 cf x 2 x 8 rows = 44.2 cf
		0.550 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	0.00'	**12.000 in/hr Exfiltration over Wetted area** Phase-In= 0.01'
#2	Primary	2.96'	**15.0" Round Culvert** L= 70.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 2.96' / 1.55' S= 0.0201 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf

Discarded OutFlow Max=1.90 cfs @ 12.31 hrs HW=1.09' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 1.90 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=0.00' (Free Discharge)
└─**2=Culvert** (Controls 0.00 cfs)

Pond 11P: Stormwater Chambers - Chamber Wizard Field A

Chamber Model = Cultec R-902HD (Cultec Recharger® 902HD)
Effective Size= 69.8"W x 48.0"H => 17.65 sf x 3.67'L = 64.7 cf
Overall Size= 78.0"W x 48.0"H x 4.10'L with 0.44' Overlap
Cap Storage= +2.8 cf x 2 x 8 rows = 44.2 cf

78.0" Wide + 9.0" Spacing = 87.0" C-C Row Spacing

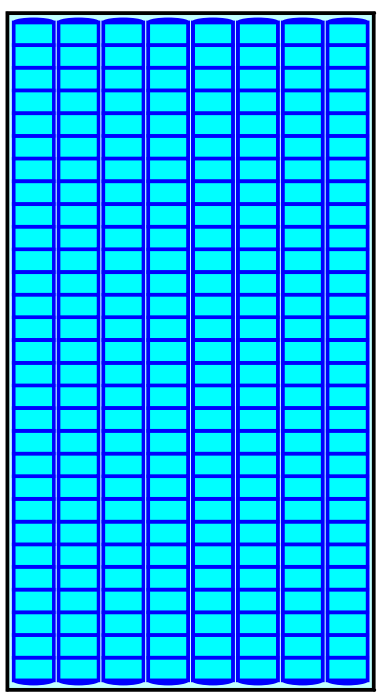
29 Chambers/Row x 3.67' Long +0.52' Cap Length x 2 = 107.37' Row Length +12.0" End Stone x 2 = 109.37' Base Length
8 Rows x 78.0" Wide + 9.0" Spacing x 7 + 12.0" Side Stone x 2 = 59.25' Base Width
9.0" Base + 48.0" Chamber Height + 12.0" Cover = 5.75' Field Height

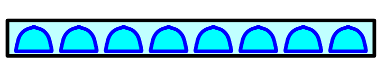
232 Chambers x 64.7 cf + 2.8 cf Cap Volume x 2 x 8 Rows = 15,062.7 cf Chamber Storage

37,259.9 cf Field - 15,062.7 cf Chambers = 22,197.2 cf Stone x 40.0% Voids = 8,878.9 cf Stone Storage

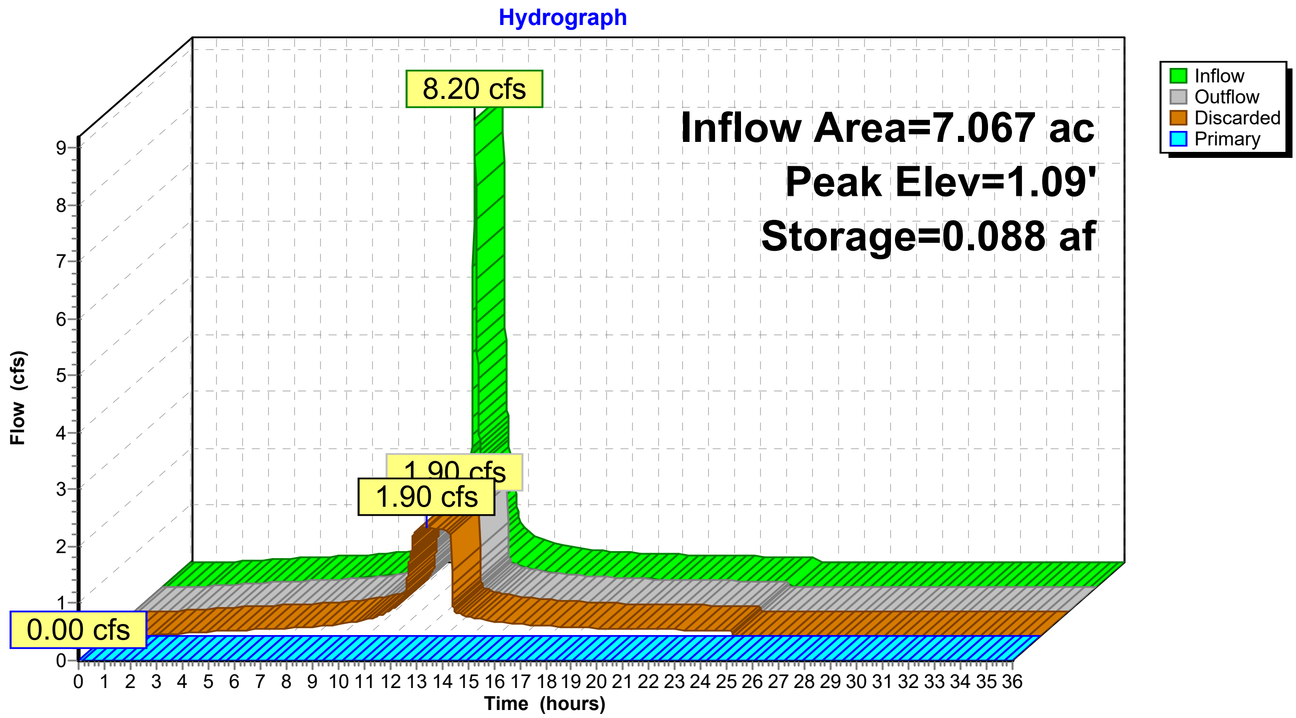
Chamber Storage + Stone Storage = 23,941.6 cf = 0.550 af
Overall Storage Efficiency = 64.3%
Overall System Size = 109.37' x 59.25' x 5.75'

232 Chambers
1,380.0 cy Field
822.1 cy Stone





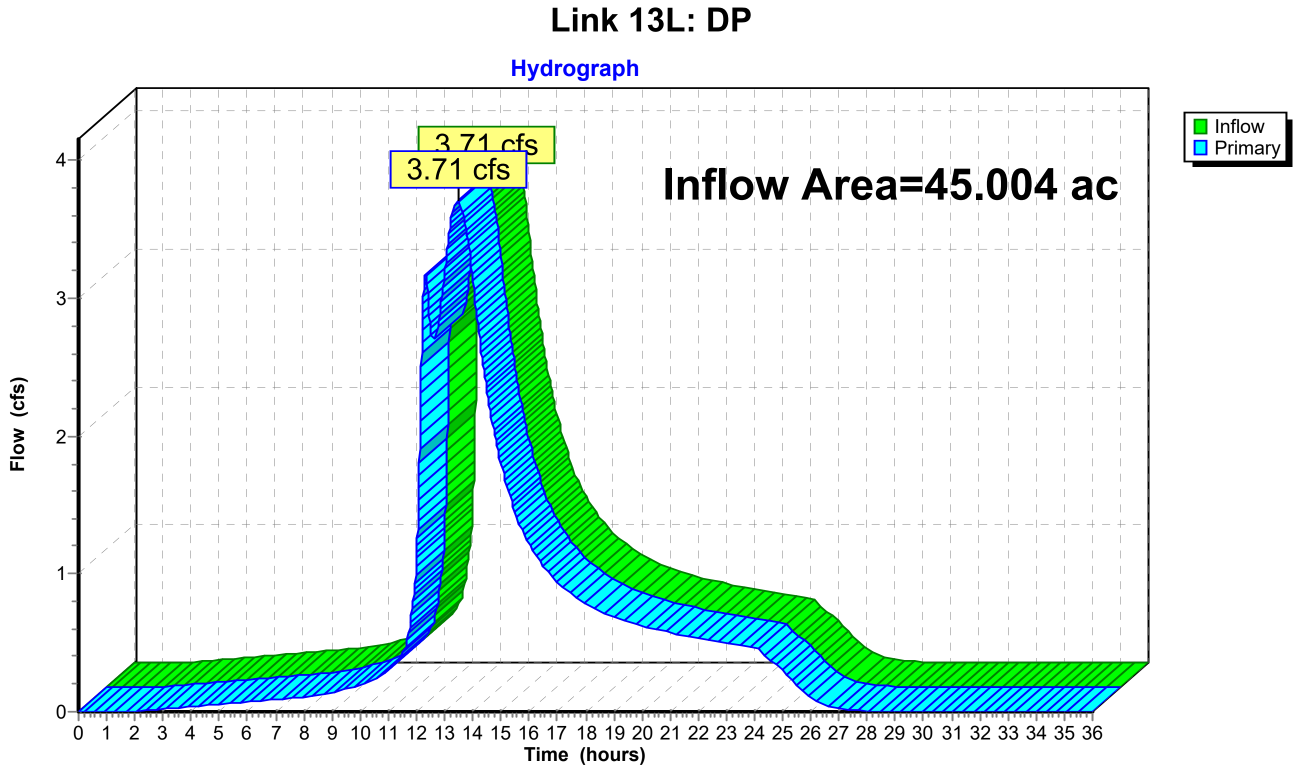
Pond 11P: Stormwater Chambers



Summary for Link 13L: DP

Inflow Area = 45.004 ac, 10.80% Impervious, Inflow Depth = 0.39" for 1-yr event
Inflow = 3.71 cfs @ 13.48 hrs, Volume= 1.447 af
Primary = 3.71 cfs @ 13.48 hrs, Volume= 1.447 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs



Summary for Subcatchment 4S: Area #1A

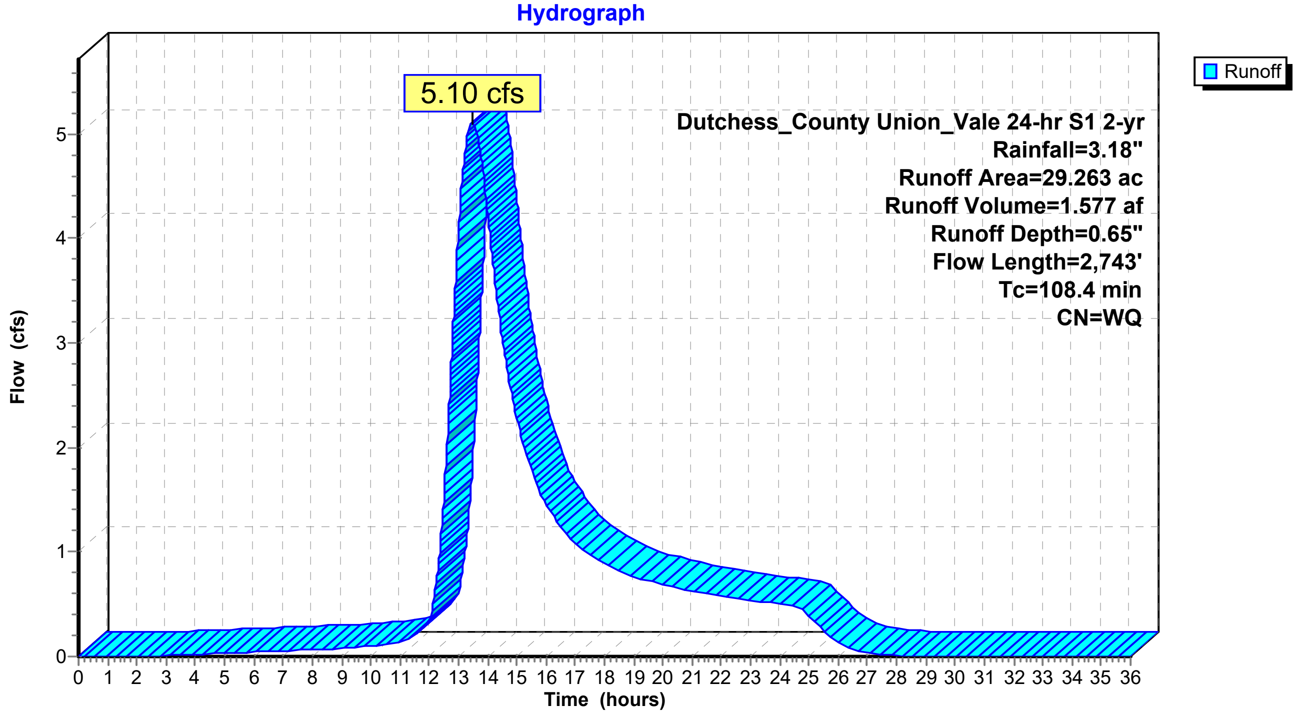
Runoff = 5.10 cfs @ 13.49 hrs, Volume= 1.577 af, Depth= 0.65"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Dutchess_County Union_Vale 24-hr S1 2-yr Rainfall=3.18"

	Area (ac)	CN	Description
	4.728	30	Woods, Good, HSG A
	1.902	77	Woods, Good, HSG D
	4.885	30	Brush, Good, HSG A
	13.703	73	Brush, Good, HSG D
*	0.654	98	Paved roads
*	0.141	98	Water Surface
	1.698	30	Woods, Good, HSG A
*	0.344	98	Unconnected Impervious, HSG A
	1.208	39	>75% Grass cover, Good, HSG A
	29.263		Weighted Average
	28.124	55	96.11% Pervious Area
	1.139	98	3.89% Impervious Area
	0.344		30.20% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.7	75	0.0250	0.08		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.18"
4.2	463	0.0150	1.84		**Shallow Concentrated Flow, B-C** Grassed Waterway Kv= 15.0 fps
10.5	580	0.0340	0.92		**Shallow Concentrated Flow, C-D** Woodland Kv= 5.0 fps
8.9	163	0.0150	0.31		**Shallow Concentrated Flow, D-E** Forest w/Heavy Litter Kv= 2.5 fps
0.6	152		4.01		**Lake or Reservoir, E-F** Mean Depth= 0.50'
62.0	658	0.0050	0.18		**Shallow Concentrated Flow, F-G** Forest w/Heavy Litter Kv= 2.5 fps
6.5	652	0.0200	1.68	3.00	**Parabolic Channel, G-H** W=4.00' D=0.67' Area=1.8 sf Perim=4.3' n= 0.070 Sluggish weedy reaches w/pools
108.4	2,743	Total			

Subcatchment 4S: Area #1A



Summary for Subcatchment 5S: Area #2

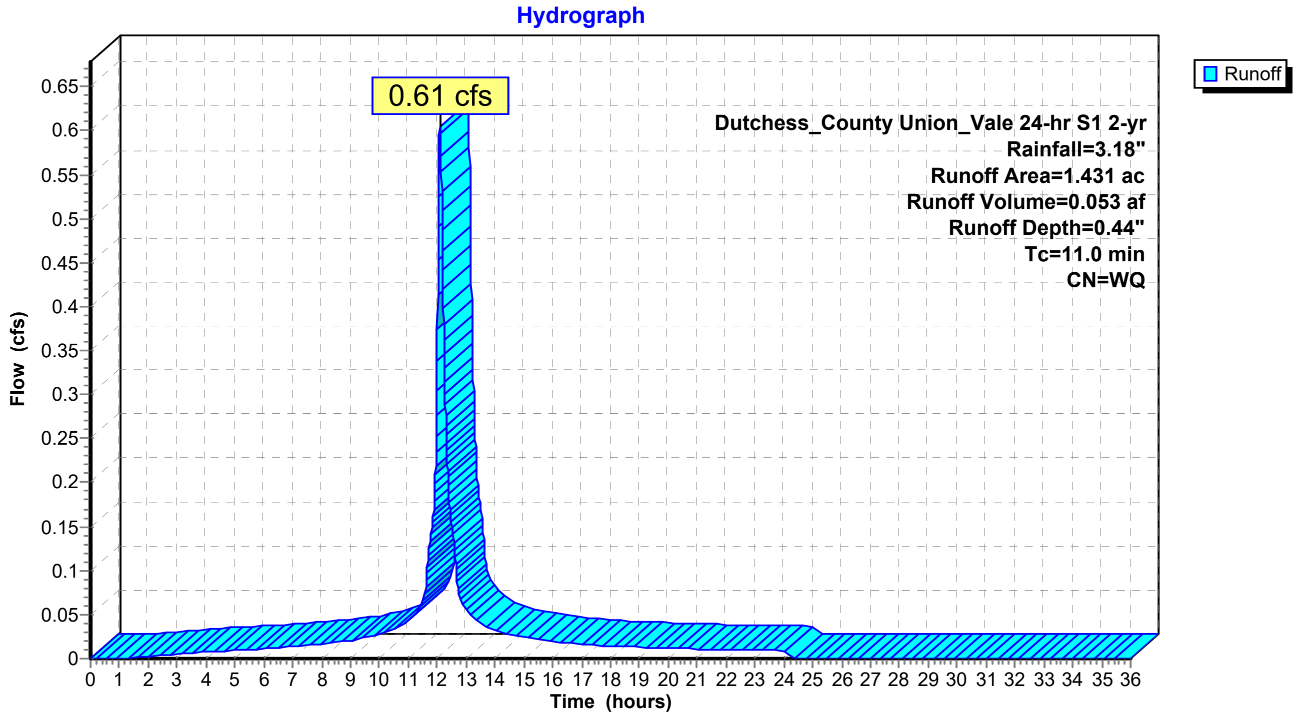
Runoff = 0.61 cfs @ 12.10 hrs, Volume= 0.053 af, Depth= 0.44"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Dutchess_County Union_Vale 24-hr S1 2-yr Rainfall=3.18"

Area (ac)	CN	Description
0.567	30	Woods, Good, HSG A
0.215	98	Paved roads
0.649	30	Brush, Good, HSG A
1.431		Weighted Average
1.216	30	84.98% Pervious Area
0.215	98	15.02% Impervious Area

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

Subcatchment 5S: Area #2



Summary for Subcatchment 7S: Area #1B

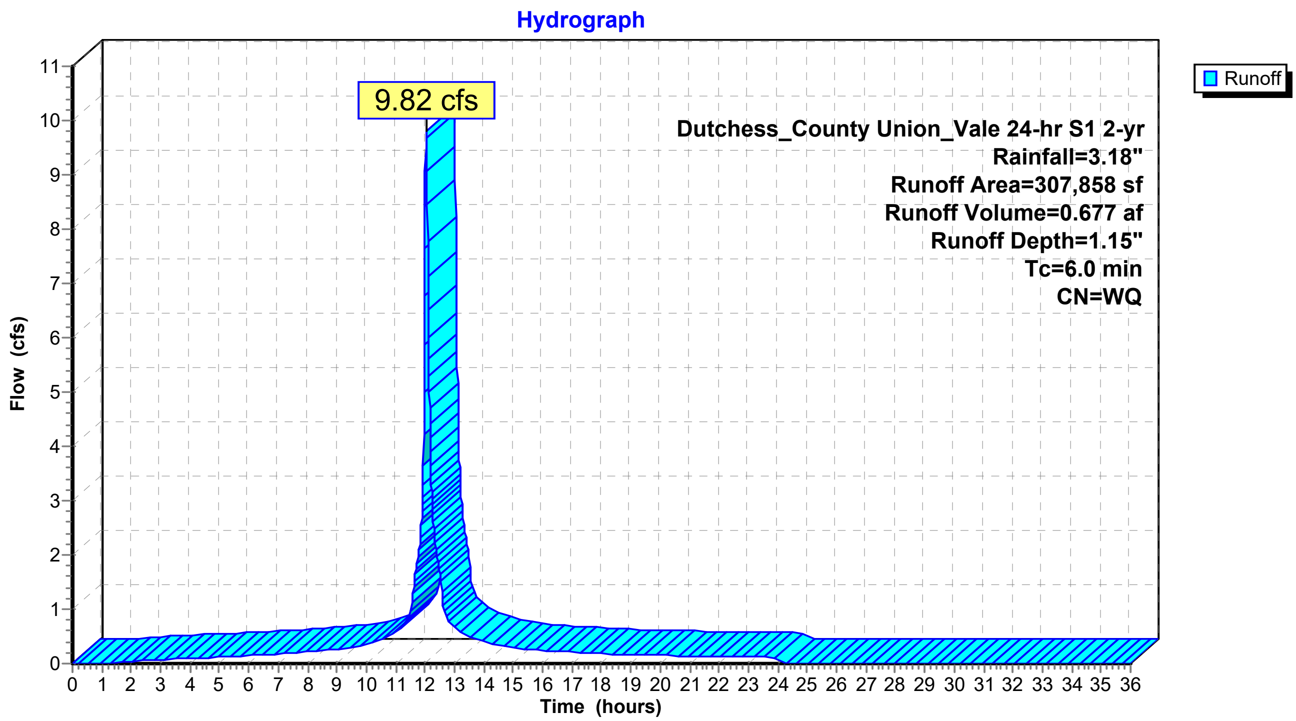
Runoff = 9.82 cfs @ 12.04 hrs, Volume= 0.677 af, Depth= 1.15"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Dutchess_County Union_Vale 24-hr S1 2-yr Rainfall=3.18"

	Area (sf)	CN	Description
	187,850	39	>75% Grass cover, Good, HSG A
*	62,160	98	Impervious Road, HSG A
*	57,848	98	Impervious Townhouses, HSG A
	307,858		Weighted Average
	187,850	39	61.02% Pervious Area
	120,008	98	38.98% Impervious Area

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

Subcatchment 7S: Area #1B



Summary for Subcatchment 16S: Area #3

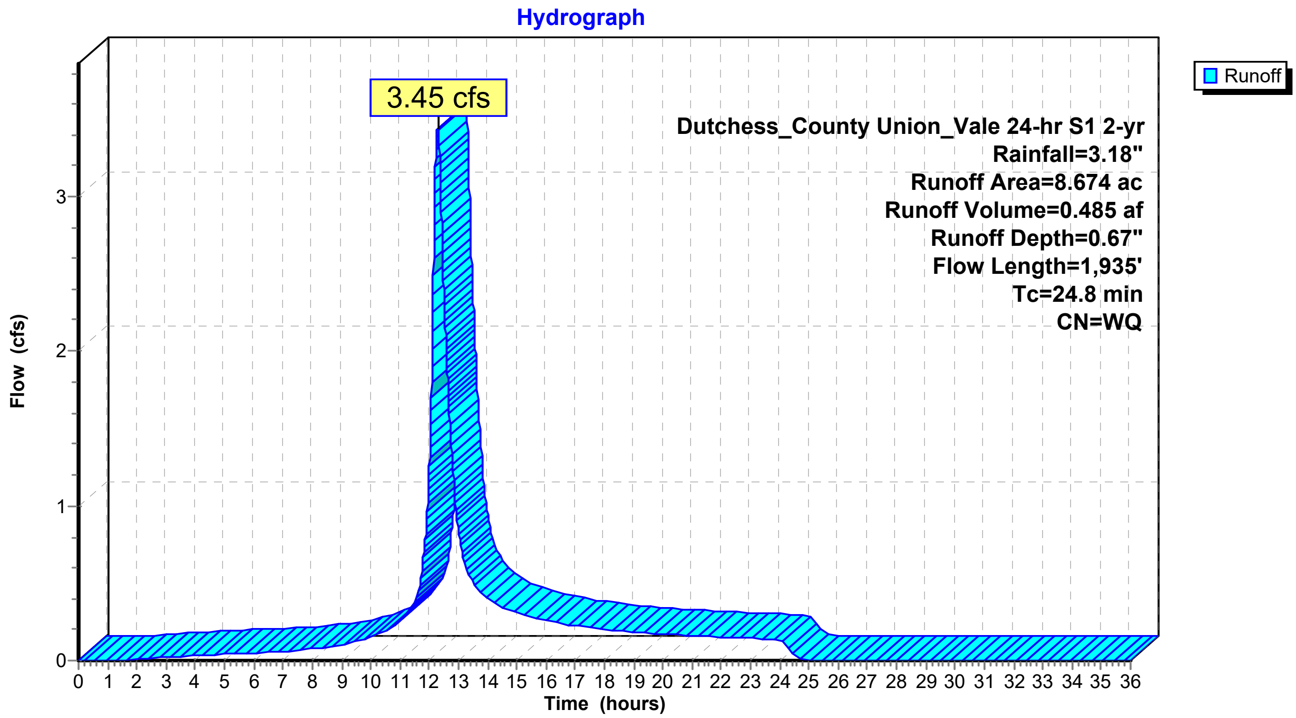
Runoff = 3.45 cfs @ 12.29 hrs, Volume= 0.485 af, Depth= 0.67"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Dutchess_County Union_Vale 24-hr S1 2-yr Rainfall=3.18"

	Area (ac)	CN	Description
*	0.966	98	Roofs Driveway
	1.387	84	50-75% Grass cover, Fair, HSG D
	6.321	49	50-75% Grass cover, Fair, HSG A
	8.674		Weighted Average
	7.708	55	88.86% Pervious Area
	0.966	98	11.14% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.1	75	0.0250	0.18		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 3.18"
0.9	98	0.0400	1.80		**Sheet Flow, B-C** Smooth surfaces n= 0.011 P2= 3.18"
10.3	1,110	0.0125	1.80		**Shallow Concentrated Flow, C-G** Unpaved Kv= 16.1 fps
6.5	652	0.0200	1.68	3.00	**Parabolic Channel, G-H** W=4.00' D=0.67' Area=1.8 sf Perim=4.3' n= 0.070 Sluggish weedy reaches w/pools
24.8	1,935	Total			

Subcatchment 16S: Area #3



Summary for Subcatchment 17S: 50% Townhouse Roofs

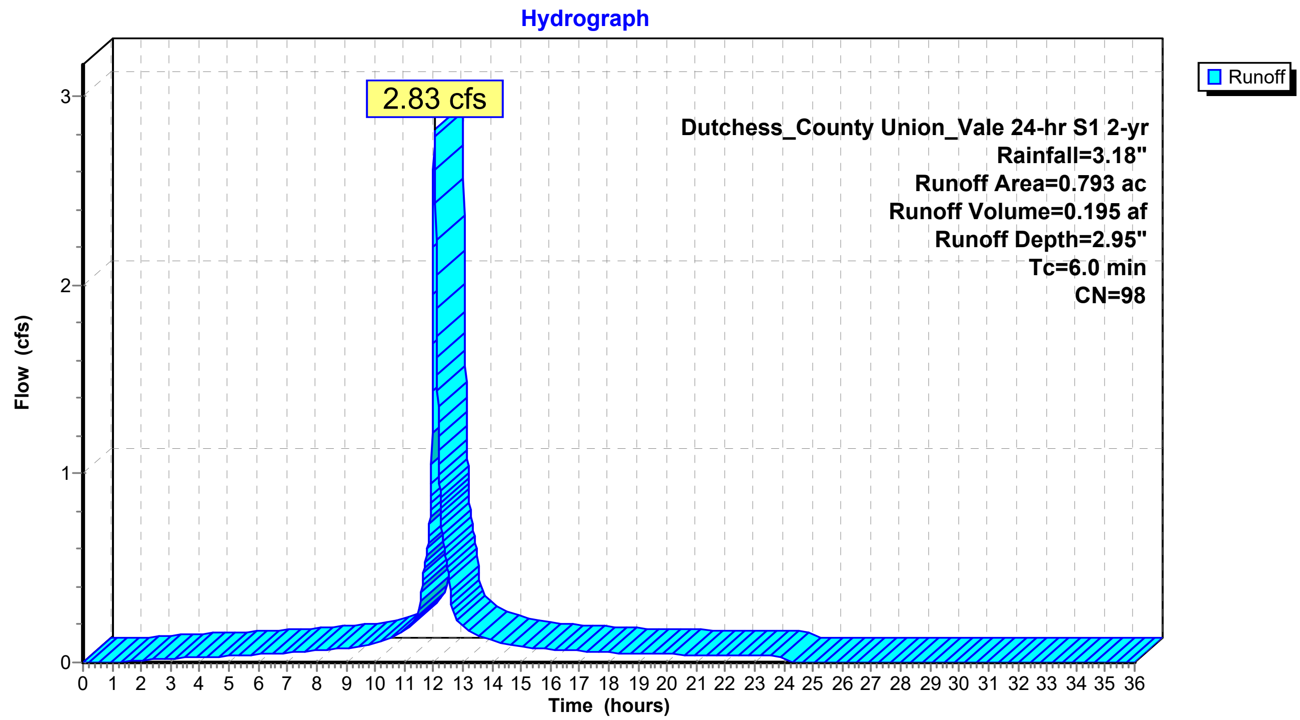
Runoff = 2.83 cfs @ 12.04 hrs, Volume= 0.195 af, Depth= 2.95"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Dutchess_County Union_Vale 24-hr S1 2-yr Rainfall=3.18"

	Area (ac)	CN	Description
*	0.793	98	1/2 Proposed Town Home Roofs
	0.793	98	100.00% Impervious Area

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

Subcatchment 17S: 50% Townhouse Roofs



Summary for Pond 7P: Rain Garden

Inflow Area = 0.793 ac,100.00% Impervious, Inflow Depth = 2.95" for 2-yr event
Inflow = 2.83 cfs @ 12.04 hrs, Volume= 0.195 af
Outflow = 1.28 cfs @ 11.97 hrs, Volume= 0.195 af, Atten= 55%, Lag= 0.0 min
Discarded = 1.28 cfs @ 11.97 hrs, Volume= 0.195 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 0.35' @ 12.16 hrs Surf.Area= 4,608 sf Storage= 653 cf

Plug-Flow detention time= 2.0 min calculated for 0.195 af (100% of inflow)
Center-of-Mass det. time= 2.0 min (760.4 - 758.4)

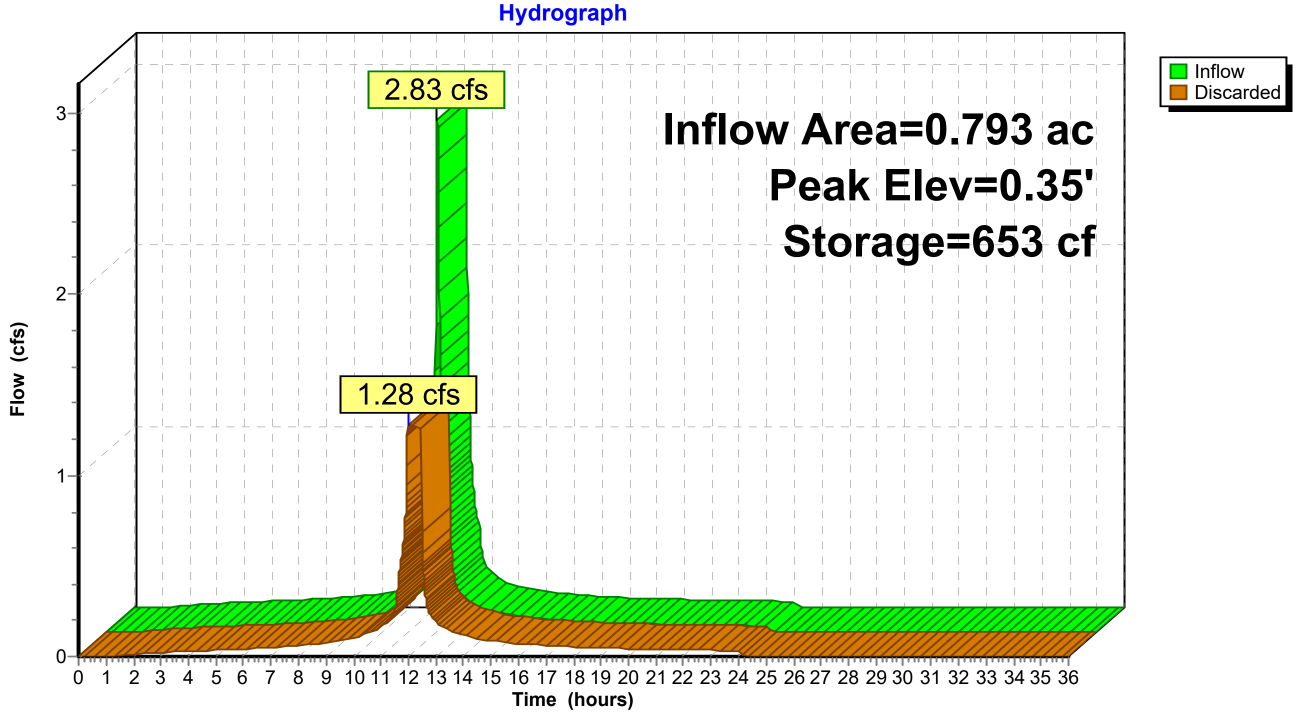
Volume	Invert	Avail.Storage	Storage Description
#1	0.00'	115 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)
		115 cf	x 48.00 = 5,530 cf Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
0.00	96	0.0	0	0
1.00	96	40.0	38	38
2.50	96	20.0	29	67
3.00	96	100.0	48	115

Device	Routing	Invert	Outlet Devices
#1	Discarded	0.00'	**12.000 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=1.28 cfs @ 11.97 hrs HW=0.03' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 1.28 cfs)

Pond 7P: Rain Garden



Summary for Pond 11P: Stormwater Chambers

Inflow Area =	7.067 ac,	38.98% Impervious,	Inflow Depth = 1.15"	for 2-yr event
Inflow =	9.82 cfs @	12.04 hrs, Volume=	0.677 af	
Outflow =	1.93 cfs @	12.40 hrs, Volume=	0.677 af,	Atten= 80%, Lag= 21.7 min
Discarded =	1.93 cfs @	12.40 hrs, Volume=	0.677 af	
Primary =	0.00 cfs @	0.00 hrs, Volume=	0.000 af	

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 1.38' @ 12.40 hrs Surf.Area= 0.149 ac Storage= 0.124 af

Plug-Flow detention time= 13.3 min calculated for 0.677 af (100% of inflow)
Center-of-Mass det. time= 13.3 min (771.8 - 758.5)

Volume	Invert	Avail.Storage	Storage Description
#1A	0.00'	0.204 af	**59.25'W x 109.37'L x 5.75'H Field A**
			0.855 af Overall - 0.346 af Embedded = 0.510 af x 40.0% Voids
#2A	0.75'	0.346 af	**Cultec R-902HD** x 232 Inside #1
			Effective Size= 69.8"W x 48.0"H => 17.65 sf x 3.67'L = 64.7 cf
			Overall Size= 78.0"W x 48.0"H x 4.10'L with 0.44' Overlap
			8 Rows of 29 Chambers
			Cap Storage= +2.8 cf x 2 x 8 rows = 44.2 cf
		0.550 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	0.00'	**12.000 in/hr Exfiltration over Wetted area** Phase-In= 0.01'
#2	Primary	2.96'	**15.0" Round Culvert**
			L= 70.0' CPP, projecting, no headwall, Ke= 0.900
			Inlet / Outlet Invert= 2.96' / 1.55' S= 0.0201 '/' Cc= 0.900
			n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf

Discarded OutFlow Max=1.93 cfs @ 12.40 hrs HW=1.38' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 1.93 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=0.00' (Free Discharge)
└─**2=Culvert** (Controls 0.00 cfs)

Pond 11P: Stormwater Chambers - Chamber Wizard Field A

Chamber Model = Cultec R-902HD (Cultec Recharger® 902HD)
Effective Size= 69.8"W x 48.0"H => 17.65 sf x 3.67'L = 64.7 cf
Overall Size= 78.0"W x 48.0"H x 4.10'L with 0.44' Overlap
Cap Storage= +2.8 cf x 2 x 8 rows = 44.2 cf

78.0" Wide + 9.0" Spacing = 87.0" C-C Row Spacing

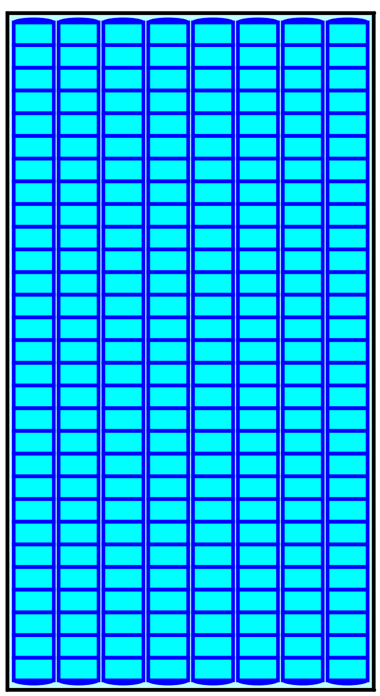
29 Chambers/Row x 3.67' Long +0.52' Cap Length x 2 = 107.37' Row Length +12.0" End Stone x 2 = 109.37' Base Length
8 Rows x 78.0" Wide + 9.0" Spacing x 7 + 12.0" Side Stone x 2 = 59.25' Base Width
9.0" Base + 48.0" Chamber Height + 12.0" Cover = 5.75' Field Height

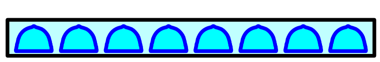
232 Chambers x 64.7 cf + 2.8 cf Cap Volume x 2 x 8 Rows = 15,062.7 cf Chamber Storage

37,259.9 cf Field - 15,062.7 cf Chambers = 22,197.2 cf Stone x 40.0% Voids = 8,878.9 cf Stone Storage

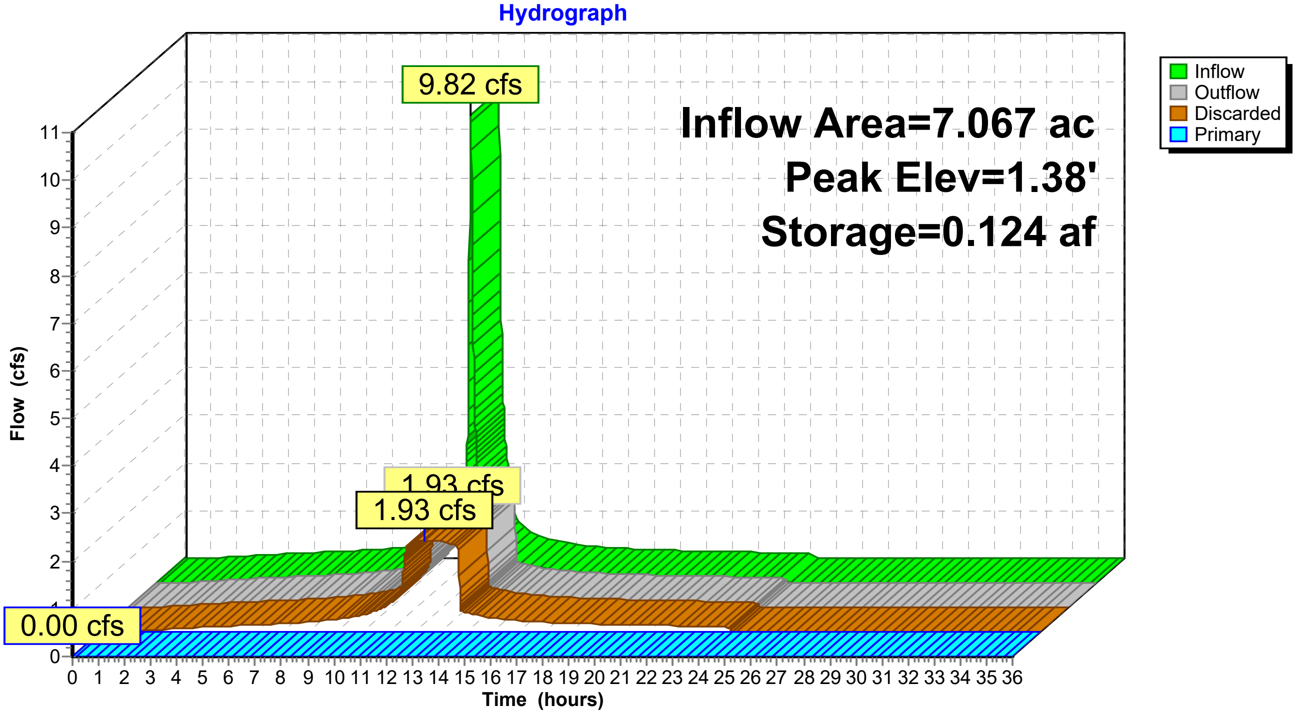
Chamber Storage + Stone Storage = 23,941.6 cf = 0.550 af
Overall Storage Efficiency = 64.3%
Overall System Size = 109.37' x 59.25' x 5.75'

232 Chambers
1,380.0 cy Field
822.1 cy Stone





Pond 11P: Stormwater Chambers

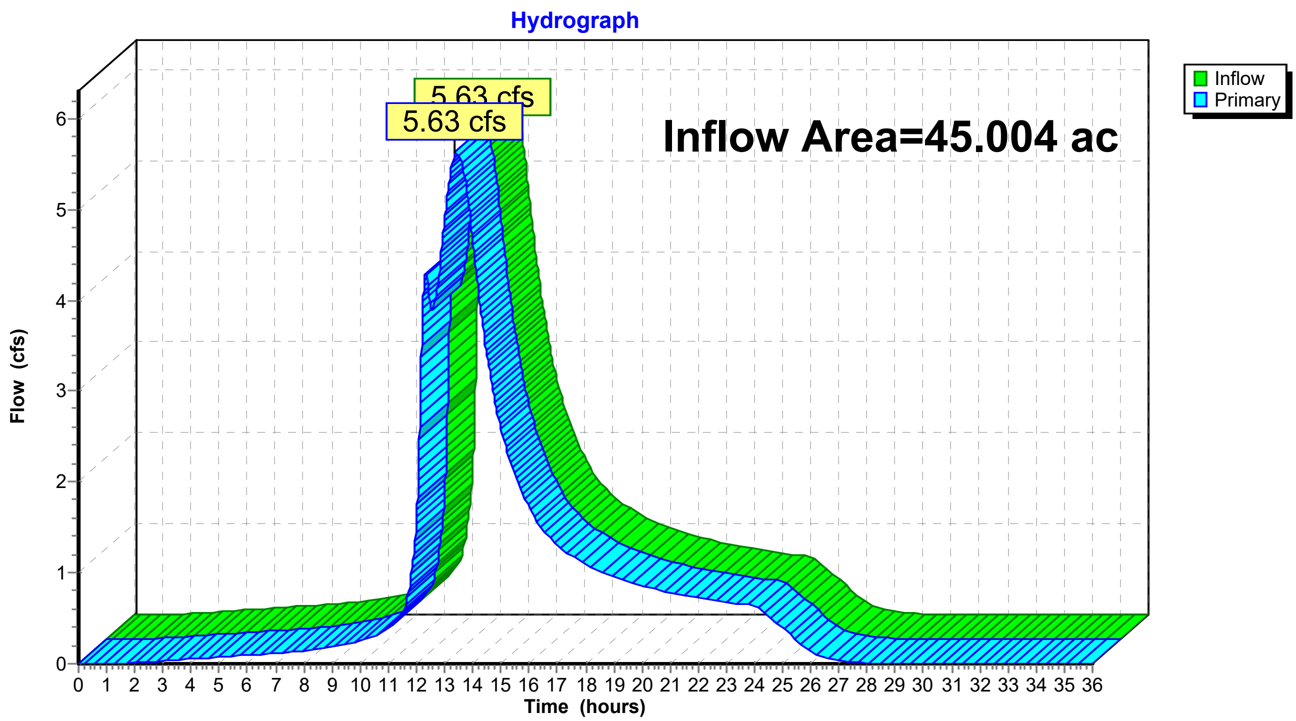


Summary for Link 13L: DP

Inflow Area = 45.004 ac, 10.80% Impervious, Inflow Depth = 0.55" for 2-yr event
Inflow = 5.63 cfs @ 13.37 hrs, Volume= 2.062 af
Primary = 5.63 cfs @ 13.37 hrs, Volume= 2.062 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Link 13L: DP



Summary for Subcatchment 4S: Area #1A

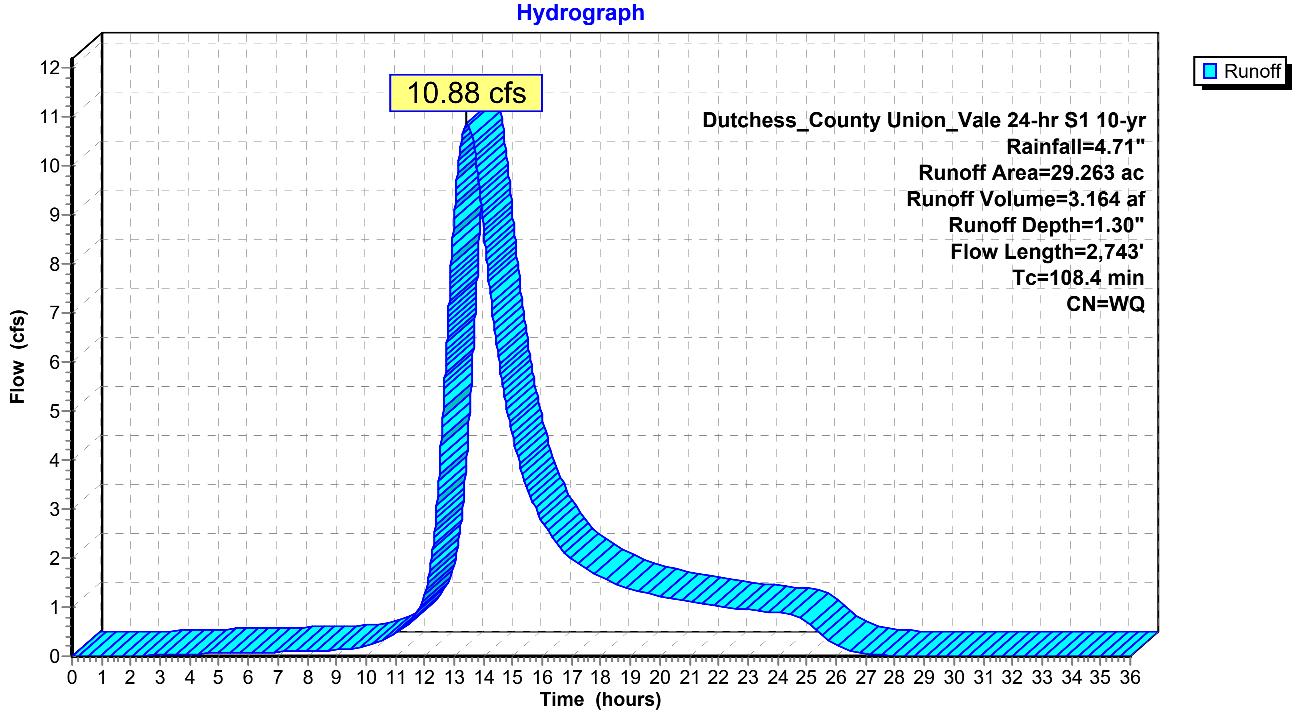
Runoff = 10.88 cfs @ 13.37 hrs, Volume= 3.164 af, Depth= 1.30"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Dutchess_County Union_Vale 24-hr S1 10-yr Rainfall=4.71"

	Area (ac)	CN	Description
	4.728	30	Woods, Good, HSG A
	1.902	77	Woods, Good, HSG D
	4.885	30	Brush, Good, HSG A
	13.703	73	Brush, Good, HSG D
*	0.654	98	Paved roads
*	0.141	98	Water Surface
	1.698	30	Woods, Good, HSG A
*	0.344	98	Unconnected Impervious, HSG A
	1.208	39	>75% Grass cover, Good, HSG A
	29.263		Weighted Average
	28.124	55	96.11% Pervious Area
	1.139	98	3.89% Impervious Area
	0.344		30.20% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.7	75	0.0250	0.08		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.18"
4.2	463	0.0150	1.84		**Shallow Concentrated Flow, B-C** Grassed Waterway Kv= 15.0 fps
10.5	580	0.0340	0.92		**Shallow Concentrated Flow, C-D** Woodland Kv= 5.0 fps
8.9	163	0.0150	0.31		**Shallow Concentrated Flow, D-E** Forest w/Heavy Litter Kv= 2.5 fps
0.6	152		4.01		**Lake or Reservoir, E-F** Mean Depth= 0.50'
62.0	658	0.0050	0.18		**Shallow Concentrated Flow, F-G** Forest w/Heavy Litter Kv= 2.5 fps
6.5	652	0.0200	1.68	3.00	**Parabolic Channel, G-H** W=4.00' D=0.67' Area=1.8 sf Perim=4.3' n= 0.070 Sluggish weedy reaches w/pools
108.4	2,743	Total			

Subcatchment 4S: Area #1A



Summary for Subcatchment 5S: Area #2

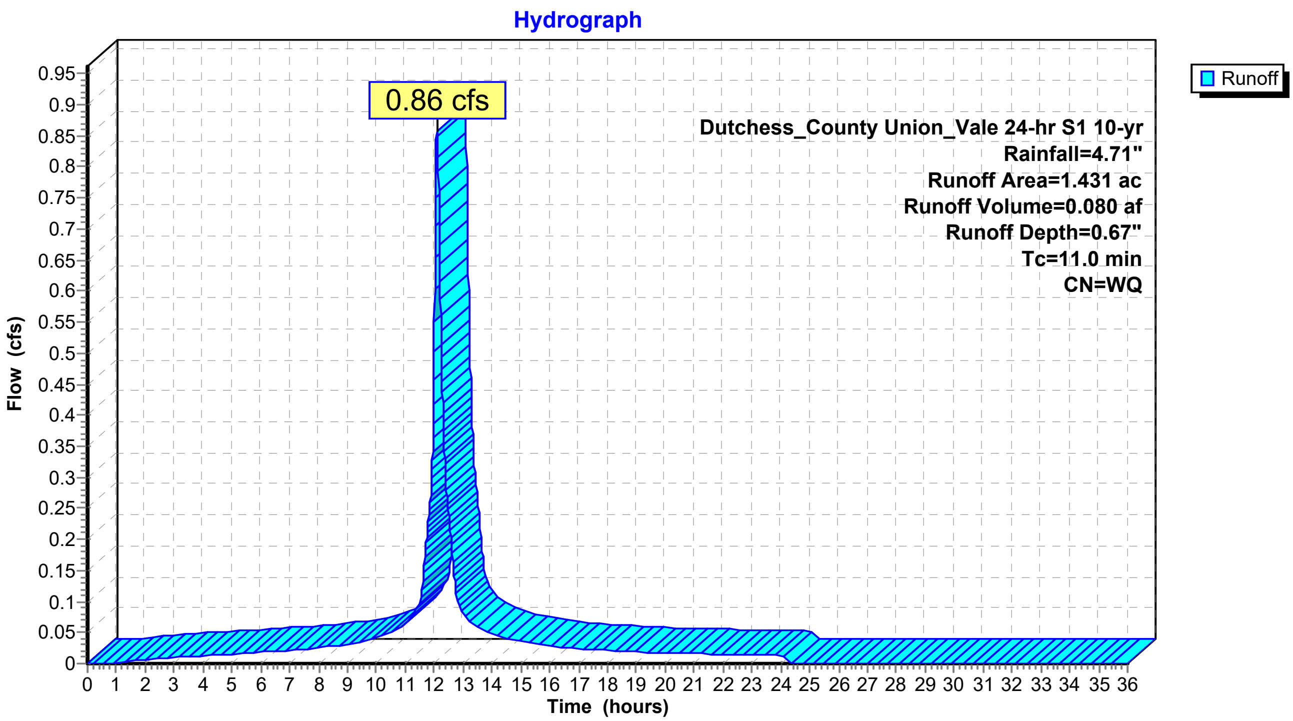
Runoff = 0.86 cfs @ 12.10 hrs, Volume= 0.080 af, Depth= 0.67"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Dutchess_County Union_Vale 24-hr S1 10-yr Rainfall=4.71"

Area (ac)	CN	Description
0.567	30	Woods, Good, HSG A
0.215	98	Paved roads
0.649	30	Brush, Good, HSG A
1.431		Weighted Average
1.216	30	84.98% Pervious Area
0.215	98	15.02% Impervious Area

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

Subcatchment 5S: Area #2



Summary for Subcatchment 7S: Area #1B

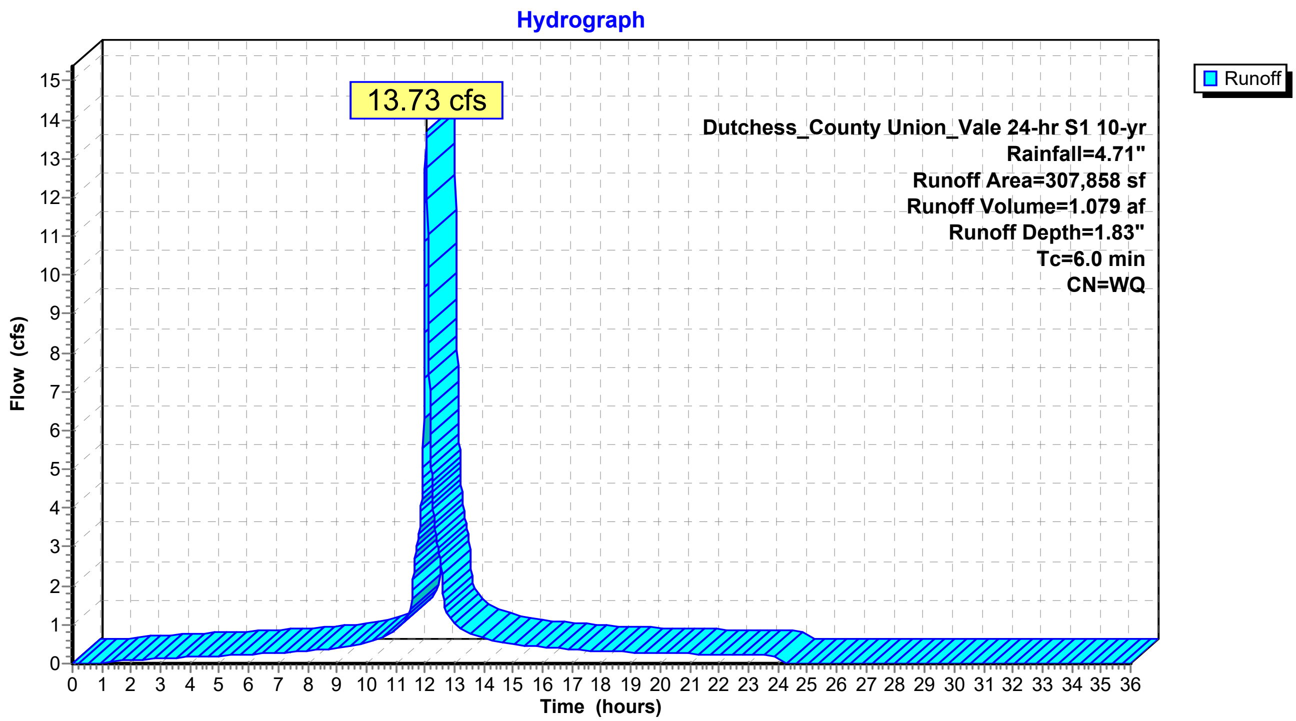
Runoff = 13.73 cfs @ 12.04 hrs, Volume= 1.079 af, Depth= 1.83"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Dutchess_County Union_Vale 24-hr S1 10-yr Rainfall=4.71"

	Area (sf)	CN	Description
	187,850	39	>75% Grass cover, Good, HSG A
*	62,160	98	Impervious Road, HSG A
*	57,848	98	Impervious Townhouses, HSG A
	307,858		Weighted Average
	187,850	39	61.02% Pervious Area
	120,008	98	38.98% Impervious Area

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

Subcatchment 7S: Area #1B



Summary for Subcatchment 16S: Area #3

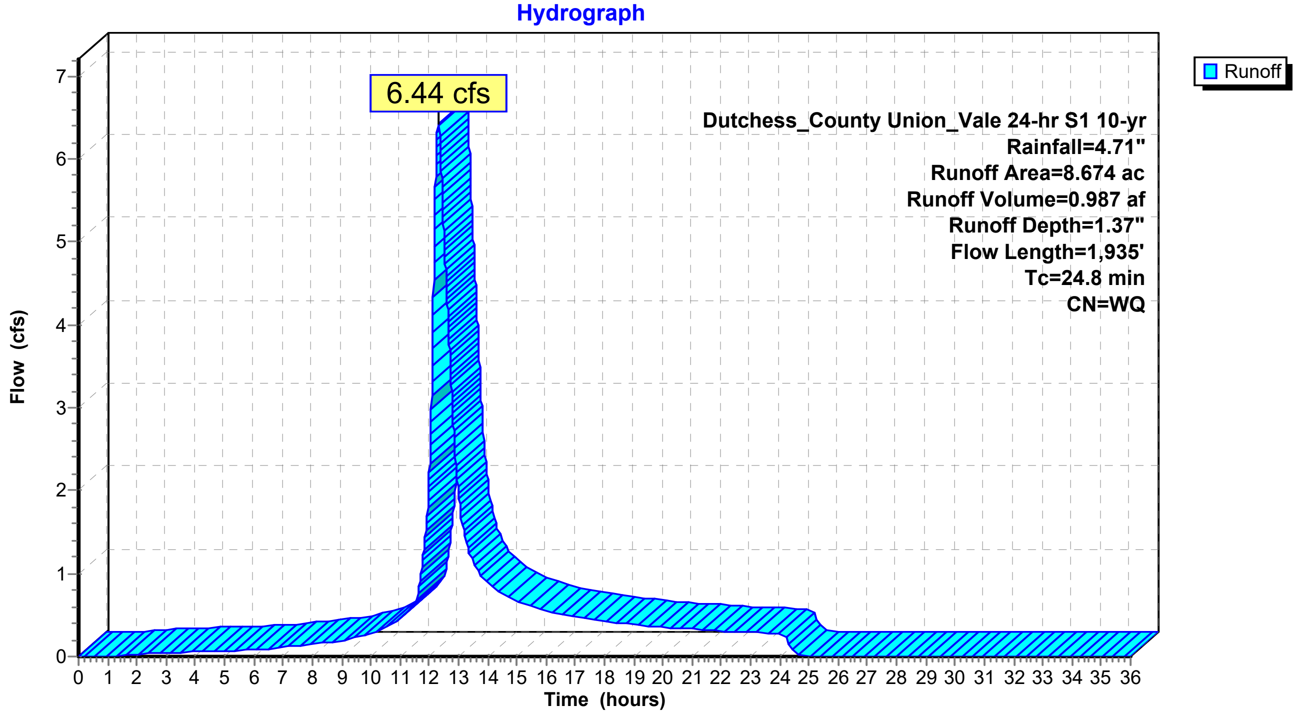
Runoff = 6.44 cfs @ 12.32 hrs, Volume= 0.987 af, Depth= 1.37"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Dutchess_County Union_Vale 24-hr S1 10-yr Rainfall=4.71"

	Area (ac)	CN	Description
*	0.966	98	Roofs Driveway
	1.387	84	50-75% Grass cover, Fair, HSG D
	6.321	49	50-75% Grass cover, Fair, HSG A
	8.674		Weighted Average
	7.708	55	88.86% Pervious Area
	0.966	98	11.14% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.1	75	0.0250	0.18		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 3.18"
0.9	98	0.0400	1.80		**Sheet Flow, B-C** Smooth surfaces n= 0.011 P2= 3.18"
10.3	1,110	0.0125	1.80		**Shallow Concentrated Flow, C-G** Unpaved Kv= 16.1 fps
6.5	652	0.0200	1.68	3.00	**Parabolic Channel, G-H** W=4.00' D=0.67' Area=1.8 sf Perim=4.3' n= 0.070 Sluggish weedy reaches w/pools
24.8	1,935	Total			

Subcatchment 16S: Area #3



Summary for Subcatchment 17S: 50% Townhouse Roofs

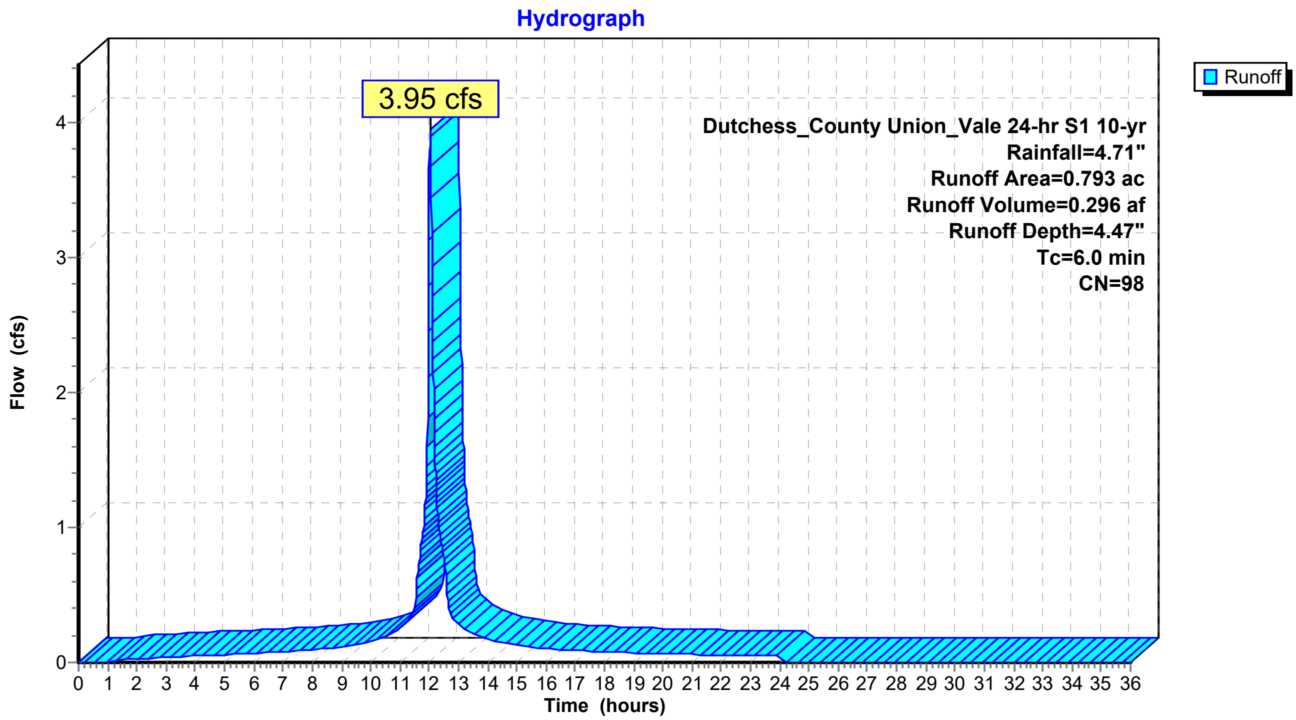
Runoff = 3.95 cfs @ 12.04 hrs, Volume= 0.296 af, Depth= 4.47"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Dutchess_County Union_Vale 24-hr S1 10-yr Rainfall=4.71"

	Area (ac)	CN	Description
*	0.793	98	1/2 Proposed Town Home Roofs
	0.793	98	100.00% Impervious Area

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

Subcatchment 17S: 50% Townhouse Roofs



Summary for Pond 7P: Rain Garden

Inflow Area = 0.793 ac,100.00% Impervious, Inflow Depth = 4.47" for 10-yr event
Inflow = 3.95 cfs @ 12.04 hrs, Volume= 0.296 af
Outflow = 1.28 cfs @ 11.91 hrs, Volume= 0.296 af, Atten= 68%, Lag= 0.0 min
Discarded = 1.28 cfs @ 11.91 hrs, Volume= 0.296 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 0.78' @ 12.25 hrs Surf.Area= 4,608 sf Storage= 1,441 cf

Plug-Flow detention time= 4.5 min calculated for 0.296 af (100% of inflow)
Center-of-Mass det. time= 4.5 min (754.3 - 749.8)

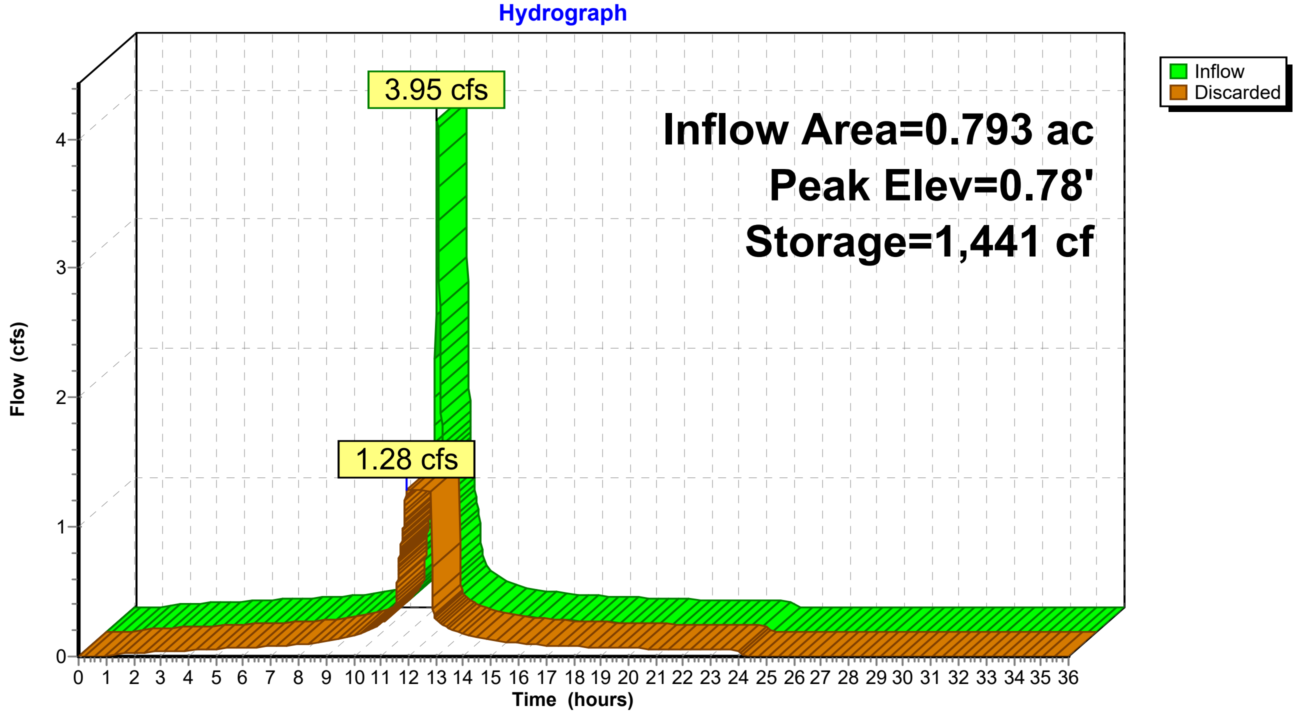
Volume	Invert	Avail.Storage	Storage Description
#1	0.00'	115 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)
		115 cf	x 48.00 = 5,530 cf Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
0.00	96	0.0	0	0
1.00	96	40.0	38	38
2.50	96	20.0	29	67
3.00	96	100.0	48	115

Device	Routing	Invert	Outlet Devices
#1	Discarded	0.00'	**12.000 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=1.28 cfs @ 11.91 hrs HW=0.03' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 1.28 cfs)

Pond 7P: Rain Garden



Summary for Pond 11P: Stormwater Chambers

Inflow Area = 7.067 ac, 38.98% Impervious, Inflow Depth = 1.83" for 10-yr event
Inflow = 13.73 cfs @ 12.04 hrs, Volume= 1.079 af
Outflow = 2.03 cfs @ 12.58 hrs, Volume= 1.079 af, Atten= 85%, Lag= 32.9 min
Discarded = 2.03 cfs @ 12.58 hrs, Volume= 1.079 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 2.41' @ 12.58 hrs Surf.Area= 0.149 ac Storage= 0.251 af

Plug-Flow detention time= 28.0 min calculated for 1.079 af (100% of inflow)
Center-of-Mass det. time= 28.0 min (793.6 - 765.7)

Volume	Invert	Avail.Storage	Storage Description
#1A	0.00'	0.204 af	**59.25'W x 109.37'L x 5.75'H Field A** 0.855 af Overall - 0.346 af Embedded = 0.510 af x 40.0% Voids
#2A	0.75'	0.346 af	**Cultec R-902HD** x 232 Inside #1 Effective Size= 69.8"W x 48.0"H => 17.65 sf x 3.67'L = 64.7 cf Overall Size= 78.0"W x 48.0"H x 4.10'L with 0.44' Overlap 8 Rows of 29 Chambers Cap Storage= +2.8 cf x 2 x 8 rows = 44.2 cf
		0.550 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	0.00'	**12.000 in/hr Exfiltration over Wetted area** Phase-In= 0.01'
#2	Primary	2.96'	**15.0" Round Culvert** L= 70.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 2.96' / 1.55' S= 0.0201 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf

Discarded OutFlow Max=2.03 cfs @ 12.58 hrs HW=2.41' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 2.03 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=0.00' (Free Discharge)
└─**2=Culvert** (Controls 0.00 cfs)

Pond 11P: Stormwater Chambers - Chamber Wizard Field A

Chamber Model = Cultec R-902HD (Cultec Recharger® 902HD)
Effective Size= 69.8"W x 48.0"H => 17.65 sf x 3.67'L = 64.7 cf
Overall Size= 78.0"W x 48.0"H x 4.10'L with 0.44' Overlap
Cap Storage= +2.8 cf x 2 x 8 rows = 44.2 cf

78.0" Wide + 9.0" Spacing = 87.0" C-C Row Spacing

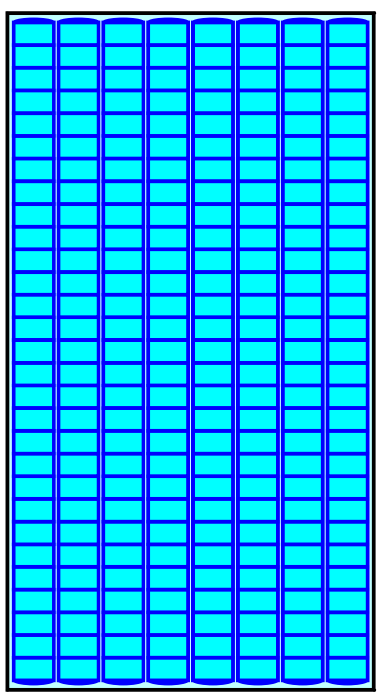
29 Chambers/Row x 3.67' Long +0.52' Cap Length x 2 = 107.37' Row Length +12.0" End Stone x 2 = 109.37' Base Length
8 Rows x 78.0" Wide + 9.0" Spacing x 7 + 12.0" Side Stone x 2 = 59.25' Base Width
9.0" Base + 48.0" Chamber Height + 12.0" Cover = 5.75' Field Height

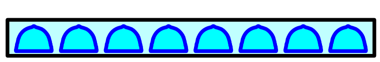
232 Chambers x 64.7 cf + 2.8 cf Cap Volume x 2 x 8 Rows = 15,062.7 cf Chamber Storage

37,259.9 cf Field - 15,062.7 cf Chambers = 22,197.2 cf Stone x 40.0% Voids = 8,878.9 cf Stone Storage

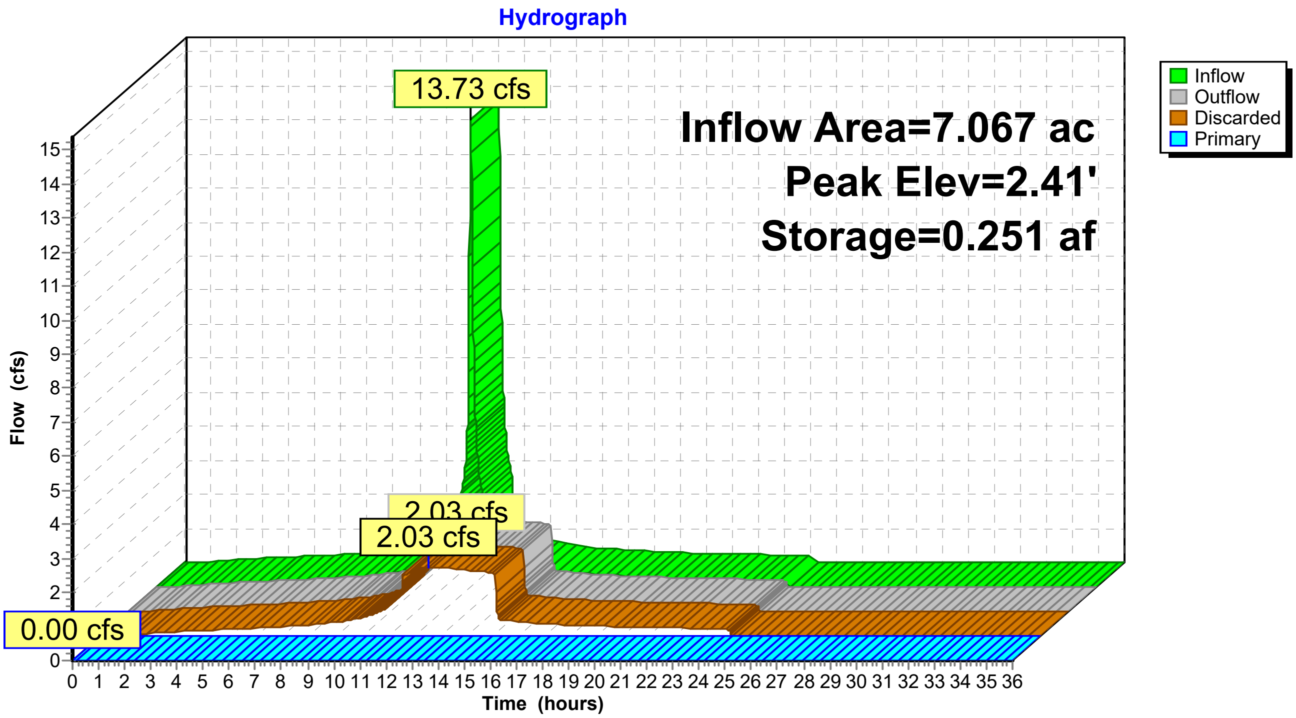
Chamber Storage + Stone Storage = 23,941.6 cf = 0.550 af
Overall Storage Efficiency = 64.3%
Overall System Size = 109.37' x 59.25' x 5.75'

232 Chambers
1,380.0 cy Field
822.1 cy Stone





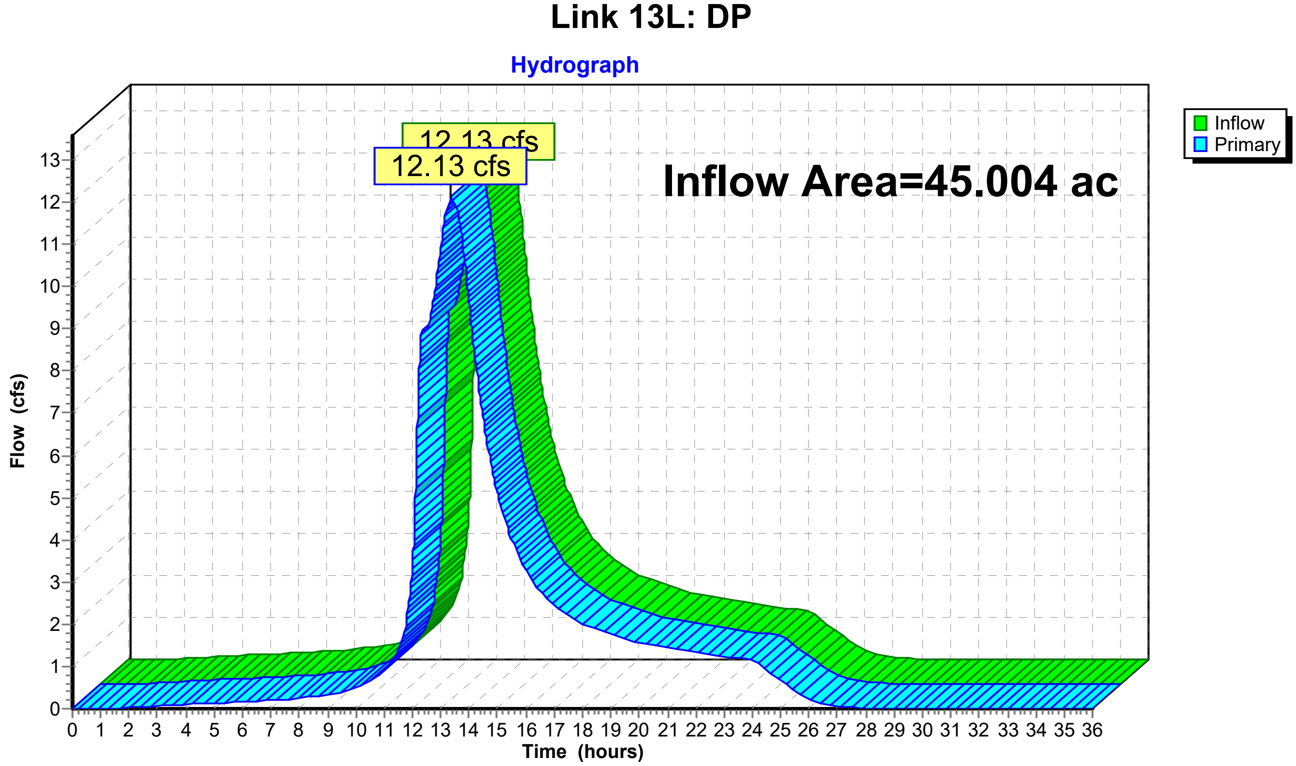
Pond 11P: Stormwater Chambers



Summary for Link 13L: DP

Inflow Area = 45.004 ac, 10.80% Impervious, Inflow Depth = 1.11" for 10-yr event
Inflow = 12.13 cfs @ 13.37 hrs, Volume= 4.151 af
Primary = 12.13 cfs @ 13.37 hrs, Volume= 4.151 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs



Summary for Subcatchment 4S: Area #1A

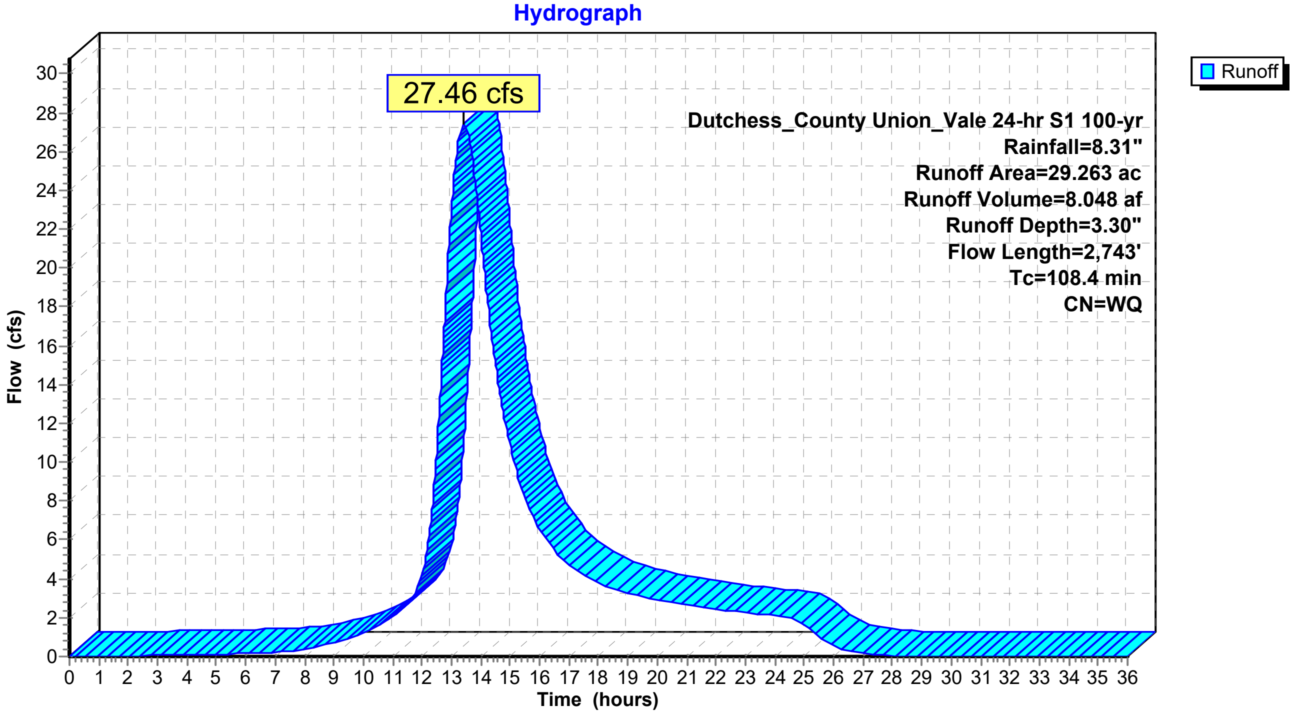
Runoff = 27.46 cfs @ 13.37 hrs, Volume= 8.048 af, Depth= 3.30"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Dutchess_County Union_Vale 24-hr S1 100-yr Rainfall=8.31"

	Area (ac)	CN	Description
	4.728	30	Woods, Good, HSG A
	1.902	77	Woods, Good, HSG D
	4.885	30	Brush, Good, HSG A
	13.703	73	Brush, Good, HSG D
*	0.654	98	Paved roads
*	0.141	98	Water Surface
	1.698	30	Woods, Good, HSG A
*	0.344	98	Unconnected Impervious, HSG A
	1.208	39	>75% Grass cover, Good, HSG A
	29.263		Weighted Average
	28.124	55	96.11% Pervious Area
	1.139	98	3.89% Impervious Area
	0.344		30.20% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.7	75	0.0250	0.08		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.18"
4.2	463	0.0150	1.84		**Shallow Concentrated Flow, B-C** Grassed Waterway Kv= 15.0 fps
10.5	580	0.0340	0.92		**Shallow Concentrated Flow, C-D** Woodland Kv= 5.0 fps
8.9	163	0.0150	0.31		**Shallow Concentrated Flow, D-E** Forest w/Heavy Litter Kv= 2.5 fps
0.6	152		4.01		**Lake or Reservoir, E-F** Mean Depth= 0.50'
62.0	658	0.0050	0.18		**Shallow Concentrated Flow, F-G** Forest w/Heavy Litter Kv= 2.5 fps
6.5	652	0.0200	1.68	3.00	**Parabolic Channel, G-H** W=4.00' D=0.67' Area=1.8 sf Perim=4.3' n= 0.070 Sluggish weedy reaches w/pools
108.4	2,743	Total			

Subcatchment 4S: Area #1A



Summary for Subcatchment 5S: Area #2

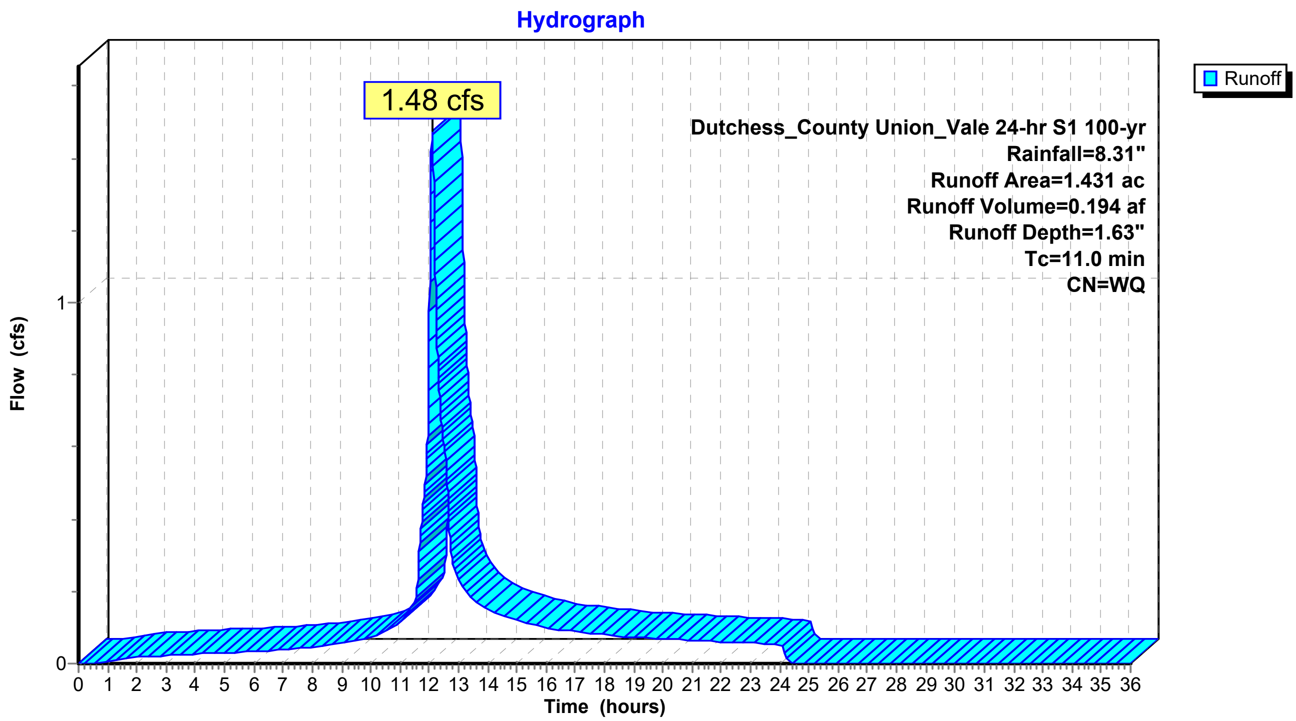
Runoff = 1.48 cfs @ 12.10 hrs, Volume= 0.194 af, Depth= 1.63"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Dutchess_County Union_Vale 24-hr S1 100-yr Rainfall=8.31"

Area (ac)	CN	Description
0.567	30	Woods, Good, HSG A
0.215	98	Paved roads
0.649	30	Brush, Good, HSG A
1.431		Weighted Average
1.216	30	84.98% Pervious Area
0.215	98	15.02% Impervious Area

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

Subcatchment 5S: Area #2



Summary for Subcatchment 7S: Area #1B

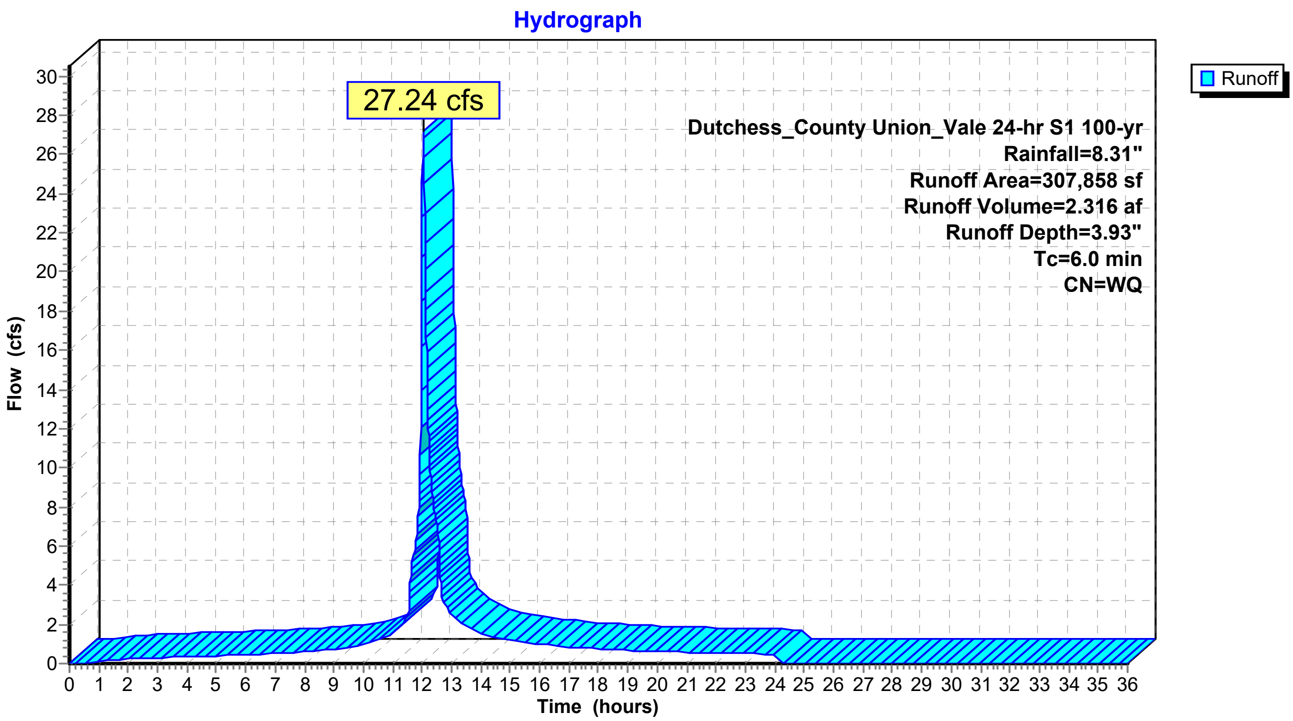
Runoff = 27.24 cfs @ 12.04 hrs, Volume= 2.316 af, Depth= 3.93"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Dutchess_County Union_Vale 24-hr S1 100-yr Rainfall=8.31"

	Area (sf)	CN	Description
	187,850	39	>75% Grass cover, Good, HSG A
*	62,160	98	Impervious Road, HSG A
*	57,848	98	Impervious Townhouses, HSG A
	307,858		Weighted Average
	187,850	39	61.02% Pervious Area
	120,008	98	38.98% Impervious Area

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

Subcatchment 7S: Area #1B



Summary for Subcatchment 16S: Area #3

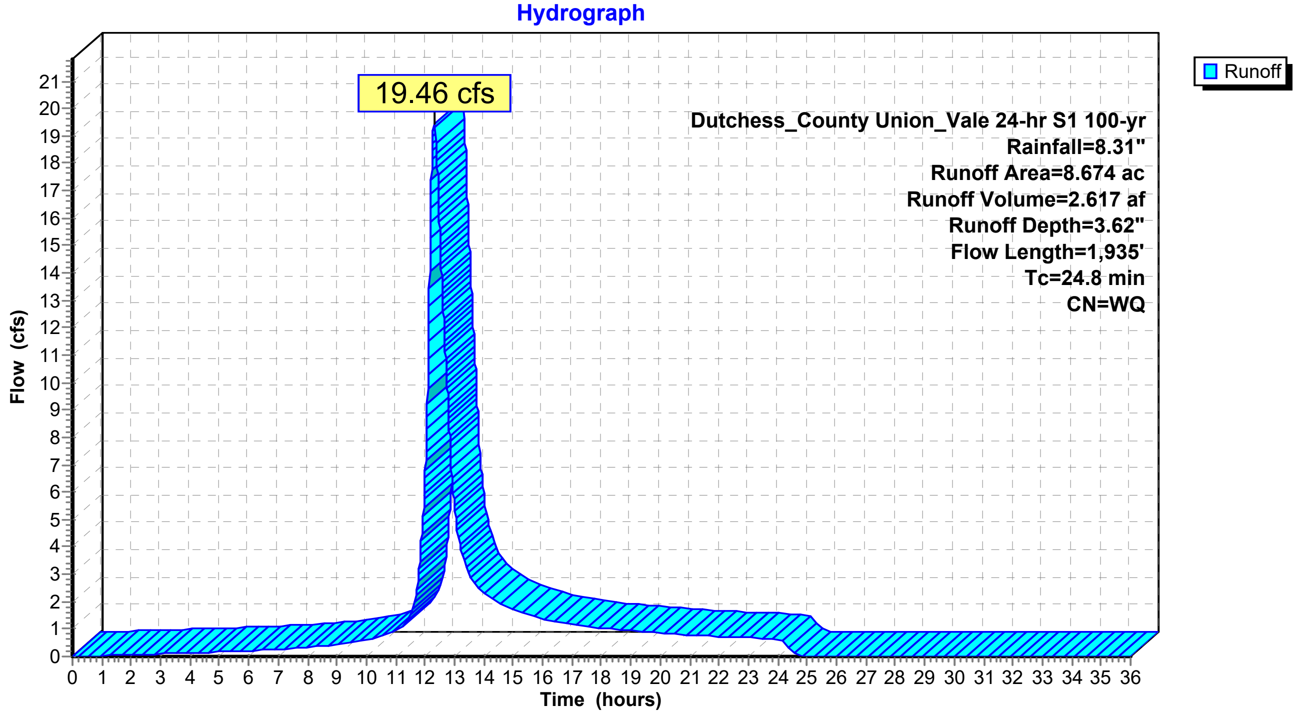
Runoff = 19.46 cfs @ 12.32 hrs, Volume= 2.617 af, Depth= 3.62"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Dutchess_County Union_Vale 24-hr S1 100-yr Rainfall=8.31"

	Area (ac)	CN	Description
*	0.966	98	Roofs Driveway
	1.387	84	50-75% Grass cover, Fair, HSG D
	6.321	49	50-75% Grass cover, Fair, HSG A
	8.674		Weighted Average
	7.708	55	88.86% Pervious Area
	0.966	98	11.14% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.1	75	0.0250	0.18		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 3.18"
0.9	98	0.0400	1.80		**Sheet Flow, B-C** Smooth surfaces n= 0.011 P2= 3.18"
10.3	1,110	0.0125	1.80		**Shallow Concentrated Flow, C-G** Unpaved Kv= 16.1 fps
6.5	652	0.0200	1.68	3.00	**Parabolic Channel, G-H** W=4.00' D=0.67' Area=1.8 sf Perim=4.3' n= 0.070 Sluggish weedy reaches w/pools
24.8	1,935	Total			

Subcatchment 16S: Area #3



Summary for Subcatchment 17S: 50% Townhouse Roofs

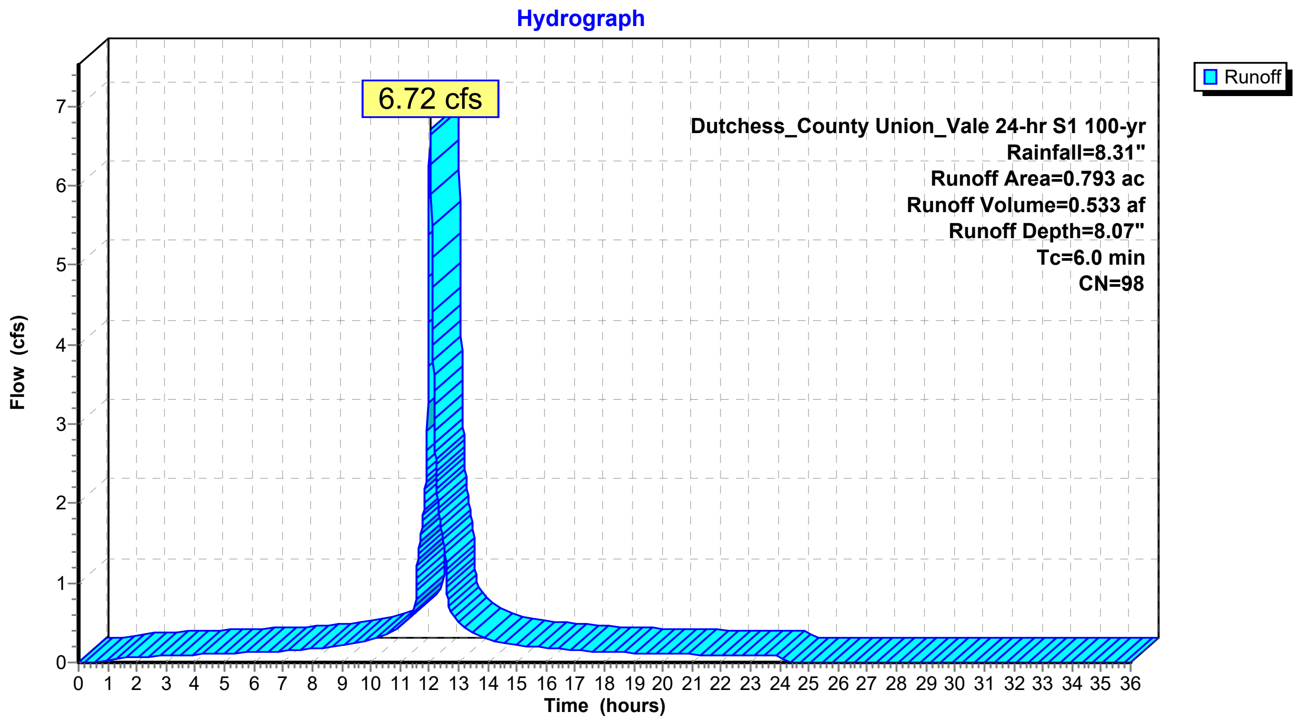
Runoff = 6.72 cfs @ 12.04 hrs, Volume= 0.533 af, Depth= 8.07"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Dutchess_County Union_Vale 24-hr S1 100-yr Rainfall=8.31"

	Area (ac)	CN	Description
*	0.793	98	1/2 Proposed Town Home Roofs
	0.793	98	100.00% Impervious Area

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

Subcatchment 17S: 50% Townhouse Roofs



Summary for Pond 7P: Rain Garden

Inflow Area = 0.793 ac,100.00% Impervious, Inflow Depth = 8.07" for 100-yr event
Inflow = 6.72 cfs @ 12.04 hrs, Volume= 0.533 af
Outflow = 1.28 cfs @ 11.63 hrs, Volume= 0.533 af, Atten= 81%, Lag= 0.0 min
Discarded = 1.28 cfs @ 11.63 hrs, Volume= 0.533 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 2.82' @ 12.56 hrs Surf.Area= 4,608 sf Storage= 4,682 cf

Plug-Flow detention time= 16.8 min calculated for 0.533 af (100% of inflow)
Center-of-Mass det. time= 16.8 min (757.5 - 740.6)

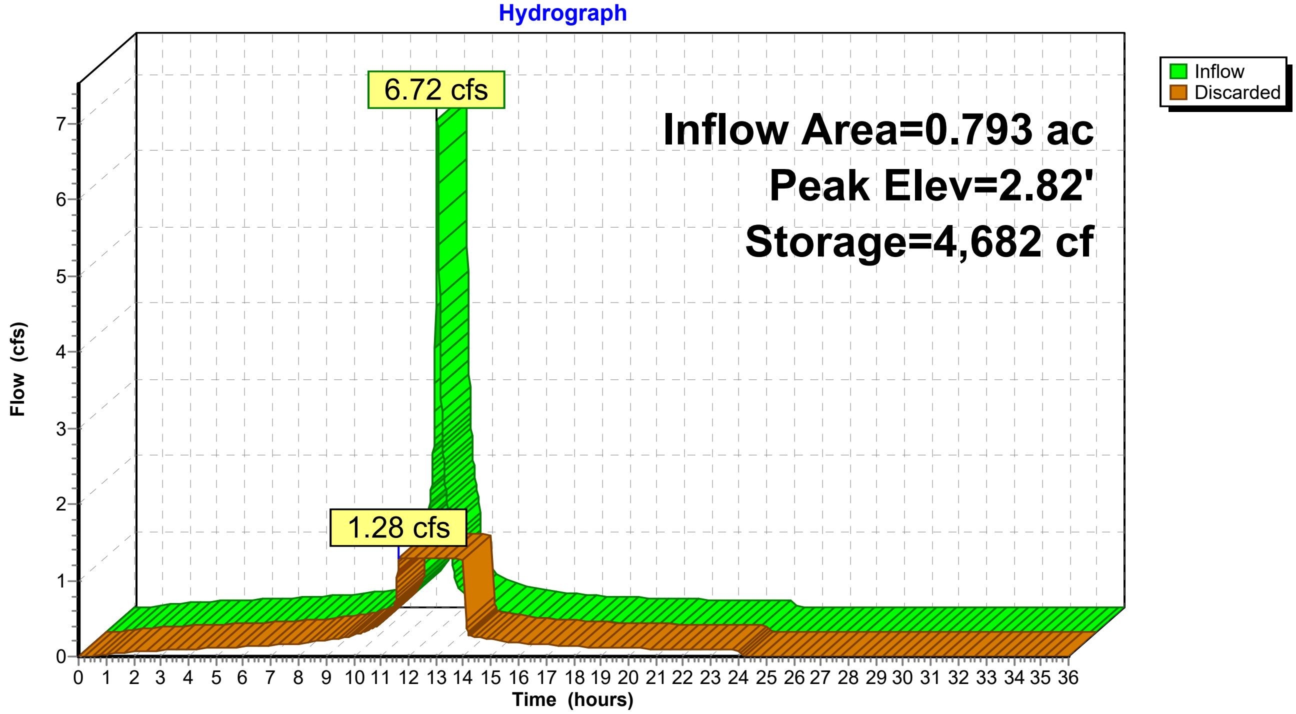
Volume	Invert	Avail.Storage	Storage Description
#1	0.00'	115 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)
		115 cf	x 48.00 = 5,530 cf Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
0.00	96	0.0	0	0
1.00	96	40.0	38	38
2.50	96	20.0	29	67
3.00	96	100.0	48	115

Device	Routing	Invert	Outlet Devices
#1	Discarded	0.00'	**12.000 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=1.28 cfs @ 11.63 hrs HW=0.03' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 1.28 cfs)

Pond 7P: Rain Garden



Summary for Pond 11P: Stormwater Chambers

Inflow Area = 7.067 ac, 38.98% Impervious, Inflow Depth = 3.93" for 100-yr event
Inflow = 27.24 cfs @ 12.04 hrs, Volume= 2.316 af
Outflow = 8.19 cfs @ 12.38 hrs, Volume= 2.316 af, Atten= 70%, Lag= 20.6 min
Discarded = 2.29 cfs @ 12.38 hrs, Volume= 1.913 af
Primary = 5.91 cfs @ 12.38 hrs, Volume= 0.404 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 5.19' @ 12.38 hrs Surf.Area= 0.149 ac Storage= 0.516 af

Plug-Flow detention time= 42.5 min calculated for 2.316 af (100% of inflow)
Center-of-Mass det. time= 42.5 min (821.5 - 778.9)

Volume	Invert	Avail.Storage	Storage Description
#1A	0.00'	0.204 af	**59.25'W x 109.37'L x 5.75'H Field A**
			0.855 af Overall - 0.346 af Embedded = 0.510 af x 40.0% Voids
#2A	0.75'	0.346 af	**Cultec R-902HD** x 232 Inside #1
			Effective Size= 69.8"W x 48.0"H => 17.65 sf x 3.67'L = 64.7 cf
			Overall Size= 78.0"W x 48.0"H x 4.10'L with 0.44' Overlap
			8 Rows of 29 Chambers
			Cap Storage= +2.8 cf x 2 x 8 rows = 44.2 cf
		0.550 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	0.00'	**12.000 in/hr Exfiltration over Wetted area** Phase-In= 0.01'
#2	Primary	2.96'	**15.0" Round Culvert**
			L= 70.0' CPP, projecting, no headwall, Ke= 0.900
			Inlet / Outlet Invert= 2.96' / 1.55' S= 0.0201 '/' Cc= 0.900
			n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf

Discarded OutFlow Max=2.29 cfs @ 12.38 hrs HW=5.19' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 2.29 cfs)

Primary OutFlow Max=5.91 cfs @ 12.38 hrs HW=5.19' (Free Discharge)
↑—**2=Culvert** (Inlet Controls 5.91 cfs @ 4.81 fps)

Pond 11P: Stormwater Chambers - Chamber Wizard Field A

Chamber Model = Cultec R-902HD (Cultec Recharger® 902HD)
Effective Size= 69.8"W x 48.0"H => 17.65 sf x 3.67'L = 64.7 cf
Overall Size= 78.0"W x 48.0"H x 4.10'L with 0.44' Overlap
Cap Storage= +2.8 cf x 2 x 8 rows = 44.2 cf

78.0" Wide + 9.0" Spacing = 87.0" C-C Row Spacing

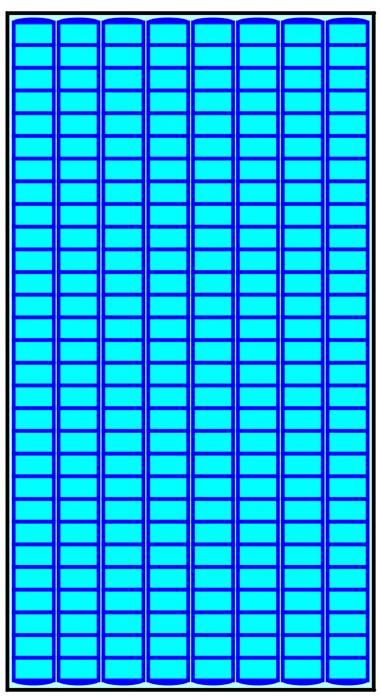
29 Chambers/Row x 3.67' Long +0.52' Cap Length x 2 = 107.37' Row Length +12.0" End Stone x 2 = 109.37' Base Length
8 Rows x 78.0" Wide + 9.0" Spacing x 7 + 12.0" Side Stone x 2 = 59.25' Base Width
9.0" Base + 48.0" Chamber Height + 12.0" Cover = 5.75' Field Height

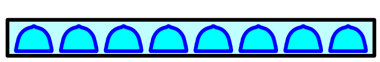
232 Chambers x 64.7 cf + 2.8 cf Cap Volume x 2 x 8 Rows = 15,062.7 cf Chamber Storage

37,259.9 cf Field - 15,062.7 cf Chambers = 22,197.2 cf Stone x 40.0% Voids = 8,878.9 cf Stone Storage

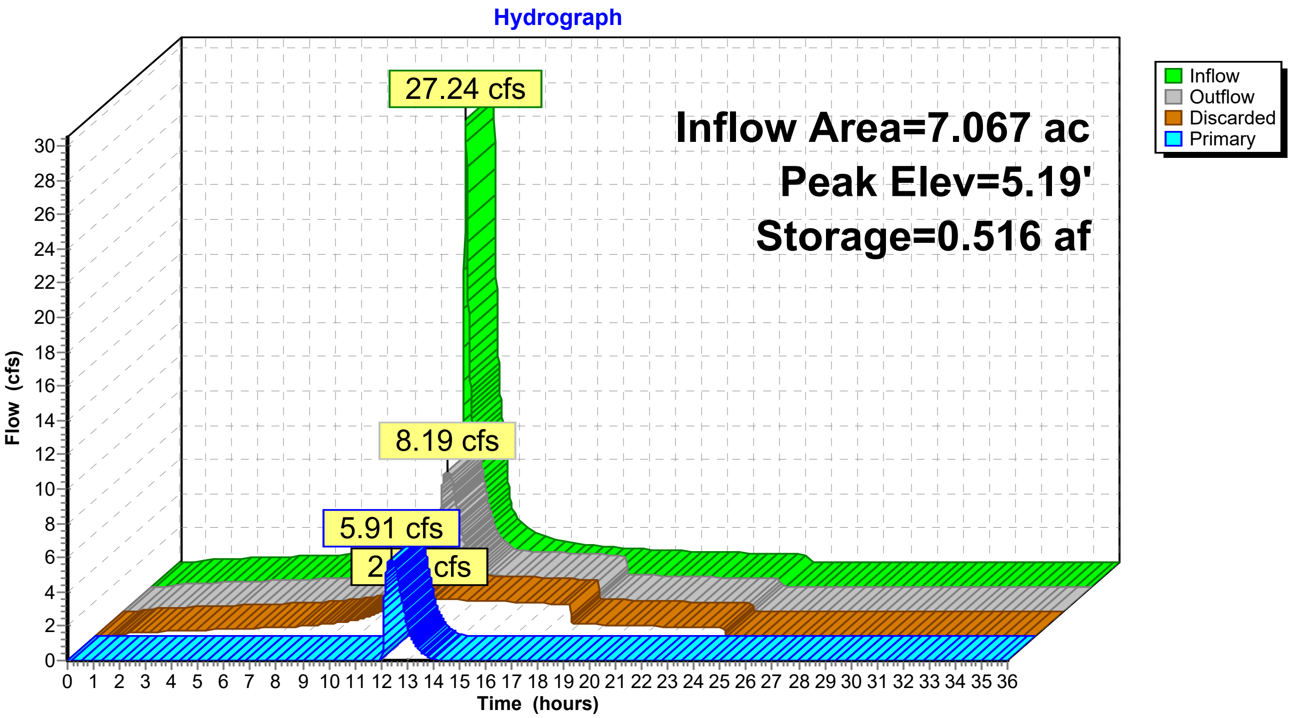
Chamber Storage + Stone Storage = 23,941.6 cf = 0.550 af
Overall Storage Efficiency = 64.3%
Overall System Size = 109.37' x 59.25' x 5.75'

232 Chambers
1,380.0 cy Field
822.1 cy Stone





Pond 11P: Stormwater Chambers

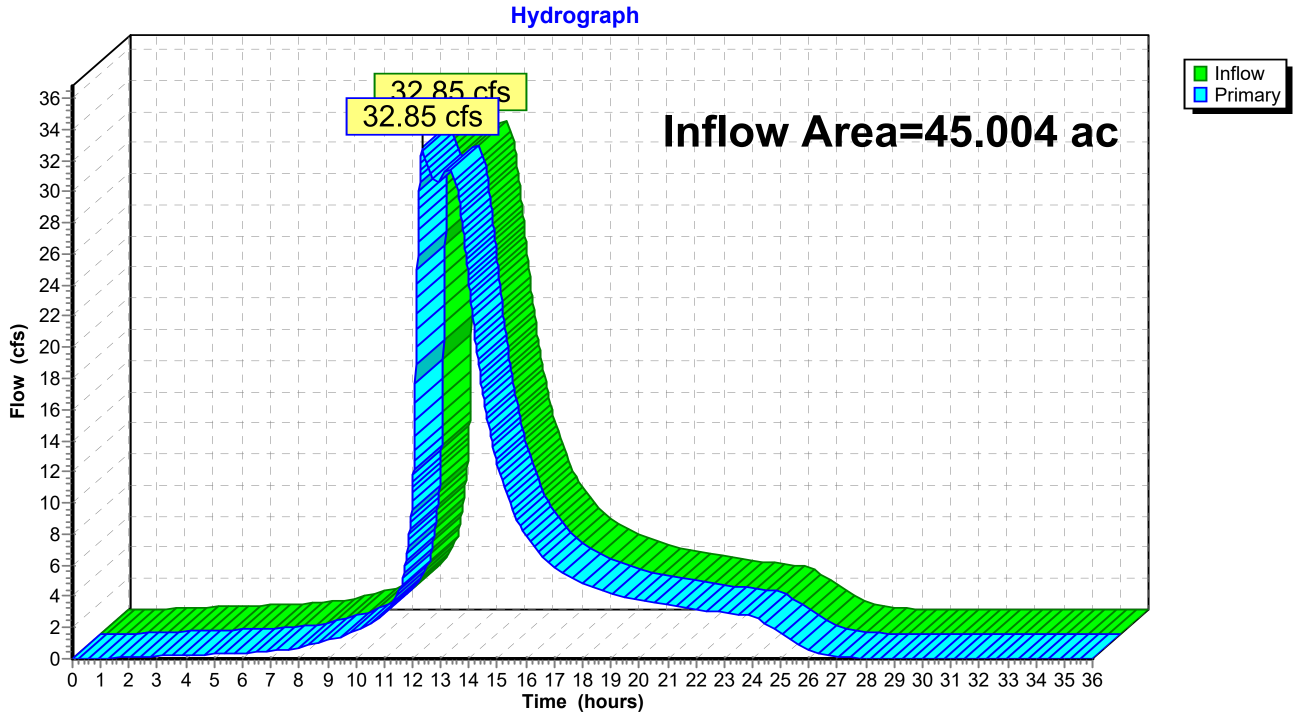


Summary for Link 13L: DP

Inflow Area = 45.004 ac, 10.80% Impervious, Inflow Depth = 2.95" for 100-yr event
Inflow = 32.85 cfs @ 12.37 hrs, Volume= 11.069 af
Primary = 32.85 cfs @ 12.37 hrs, Volume= 11.069 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Link 13L: DP



Extreme Precipitation Tables

Northeast Regional Climate Center

Data represents point estimates calculated from partial duration series. All precipitation amounts are displayed in inches.

Smoothing	No
State	New York
Location	
Longitude	73.730 degrees West
Latitude	41.647 degrees North
Elevation	0 feet
Date/Time	Tue, 18 Jan 2022 13:45:35 -0500

Extreme Precipitation Estimates

	5min	10min	15min	30min	60min	120min		1hr	2hr	3hr	6hr	12hr	24hr	48hr		1day	2day	4day	7day	10day	
1yr	0.32	0.49	0.60	0.81	0.99	1.19	**1yr**	0.86	1.16	1.36	1.71	2.16	2.64	2.96	**1yr**	2.33	2.85	3.30	3.99	4.59	**1yr**
2yr	0.38	0.59	0.72	0.98	1.20	1.43	**2yr**	1.04	1.40	1.62	2.09	2.64	3.18	3.58	**2yr**	2.81	3.44	3.94	4.68	5.30	**2yr**
5yr	0.45	0.70	0.87	1.19	1.51	1.76	**5yr**	1.31	1.73	2.01	2.58	3.26	3.97	4.55	**5yr**	3.52	4.38	5.03	5.84	6.59	**5yr**
10yr	0.52	0.81	1.00	1.39	1.80	2.07	**10yr**	1.56	2.03	2.36	3.03	3.83	4.71	5.47	**10yr**	4.17	5.26	6.05	6.92	7.77	**10yr**
25yr	0.64	0.97	1.21	1.73	2.27	2.56	**25yr**	1.96	2.51	2.94	3.76	4.75	5.90	6.98	**25yr**	5.22	6.71	7.73	8.65	9.67	**25yr**
50yr	0.74	1.13	1.40	2.01	2.71	3.01	**50yr**	2.34	2.95	3.47	4.42	5.59	7.00	8.39	**50yr**	6.20	8.07	9.31	10.25	11.42	**50yr**
100yr	0.87	1.31	1.64	2.36	3.24	3.55	**100yr**	2.80	3.47	4.09	5.21	6.57	8.31	10.10	**100yr**	7.36	9.71	11.21	12.15	13.49	**100yr**
200yr	1.01	1.52	1.92	2.78	3.88	4.18	**200yr**	3.35	4.08	4.84	6.14	7.74	9.87	12.16	**200yr**	8.74	11.69	13.52	14.40	15.93	**200yr**
500yr	1.25	1.85	2.38	3.46	4.92	5.18	**500yr**	4.25	5.07	6.04	7.63	9.62	12.40	15.55	**500yr**	10.98	14.95	17.32	18.05	19.88	**500yr**

Lower Confidence Limits

	5min	10min	15min	30min	60min	120min		1hr	2hr	3hr	6hr	12hr	24hr	48hr		1day	2day	4day	7day	10day	
1yr	0.23	0.36	0.44	0.59	0.73	0.92	**1yr**	0.63	0.90	1.20	1.53	1.86	2.35	2.55	**1yr**	2.08	2.46	2.76	3.69	4.19	**1yr**
2yr	0.37	0.57	0.70	0.94	1.16	1.38	**2yr**	1.00	1.35	1.57	2.03	2.54	3.08	3.46	**2yr**	2.73	3.33	3.82	4.53	5.15	**2yr**
5yr	0.41	0.64	0.79	1.09	1.39	1.62	**5yr**	1.20	1.59	1.80	2.36	2.98	3.68	4.22	**5yr**	3.26	4.06	4.65	5.40	6.12	**5yr**
10yr	0.46	0.71	0.88	1.23	1.58	1.81	**10yr**	1.37	1.77	1.99	2.63	3.35	4.22	4.87	**10yr**	3.73	4.69	5.39	6.12	6.98	**10yr**
25yr	0.52	0.80	0.99	1.42	1.87	2.09	**25yr**	1.61	2.04	2.22	3.06	3.85	5.04	5.89	**25yr**	4.46	5.66	6.54	7.22	8.30	**25yr**
50yr	0.58	0.88	1.10	1.58	2.13	2.32	**50yr**	1.84	2.27	2.41	3.44	4.29	5.78	6.83	**50yr**	5.11	6.57	7.60	8.18	9.47	**50yr**
100yr	0.64	0.97	1.22	1.76	2.41	2.59	**100yr**	2.08	2.53	2.61	3.87	4.80	6.63	7.93	**100yr**	5.87	7.63	8.83	9.24	10.83	**100yr**
200yr	0.72	1.08	1.37	1.98	2.76	2.67	**200yr**	2.38	2.61	2.81	4.36	5.38	7.60	9.24	**200yr**	6.72	8.88	10.29	10.48	12.40	**200yr**
500yr	0.83	1.24	1.60	2.32	3.30	3.05	**500yr**	2.84	2.98	3.08	5.13	6.27	9.13	11.34	**500yr**	8.08	10.90	12.60	12.35	14.90	**500yr**

Upper Confidence Limits

	5min	10min	15min	30min	60min	120min		1hr	2hr	3hr	6hr	12hr	24hr	48hr		1day	2day	4day	7day	10day	
1yr	0.36	0.55	0.67	0.91	1.11	1.30	**1yr**	0.96	1.27	1.49	1.94	2.41	2.87	3.21	**1yr**	2.54	3.09	3.55	4.26	4.90	**1yr**
2yr	0.41	0.63	0.77	1.05	1.29	1.50	**2yr**	1.11	1.47	1.72	2.16	2.75	3.29	3.74	**2yr**	2.91	3.60	4.17	4.88	5.50	**2yr**
5yr	0.49	0.75	0.93	1.28	1.63	1.91	**5yr**	1.41	1.87	2.21	2.83	3.56	4.30	4.92	**5yr**	3.81	4.73	5.46	6.32	7.07	**5yr**
10yr	0.58	0.90	1.11	1.55	2.00	2.32	**10yr**	1.73	2.27	2.71	3.48	4.39	5.26	6.10	**10yr**	4.66	5.87	6.81	7.72	8.57	**10yr**
25yr	0.74	1.12	1.40	2.00	2.63	3.01	**25yr**	2.27	2.94	3.58	4.58	5.80	6.90	8.09	**25yr**	6.10	7.78	9.13	10.08	11.04	**25yr**
50yr	0.88	1.34	1.67	2.40	3.24	3.67	**50yr**	2.79	3.59	4.44	5.64	7.17	8.46	10.02	**50yr**	7.48	9.64	11.42	12.34	13.36	**50yr**
100yr	1.06	1.61	2.01	2.91	3.99	4.50	**100yr**	3.44	4.40	5.52	6.95	8.87	10.38	12.42	**100yr**	9.19	11.94	14.29	15.11	16.17	**100yr**
200yr	1.28	1.92	2.44	3.53	4.92	6.34	**200yr**	4.25	6.20	6.86	8.56	10.95	12.74	15.38	**200yr**	11.28	14.79	17.87	18.50	19.57	**200yr**
500yr	1.64	2.45	3.15	4.58	6.51	8.48	**500yr**	5.61	8.29	9.20	11.30	14.48	16.73	20.39	**500yr**	14.81	19.61	24.02	24.22	25.16	**500yr**

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Appendix C

Infiltration System Specifications and Soil Testing

Infiltration Practices

Description: Excavated trench or basin used to capture and allow infiltration of stormwater runoff into the surrounding soils from the bottom and sides of the basin or trench.

Design Options: Infiltration Trench (I-1), Shallow Infiltration Basin (I-2), Dry Well (I-3)

KEY CONSIDERATIONS

FEASIBILITY

- Minimum soil infiltration rate of 0.5 inches per hour
- Soils less than 20% clay, and 40% silt/clay, and no fill soils.
- Natural slope less than 15%
- Cannot accept hotspot runoff, except under the conditions outlined in Section 6.3.1.
- Separation from groundwater table of at least three feet (four feet in sole source aquifers).
- 25’ separation from structures for I-1 and I-2; 10’ for I-3.

CONVEYANCE

- Flows exiting the practice must be non-erosive (3.5 to 5.0 fps)
- Maximum dewatering time of 48 hours.
- Design off-line if stormwater is conveyed to the practice by a storm drain pipe.

PRETREATMENT

- Pretreatment of 25% of the WQv at all sites.
- 50% pretreatment if fc >2.0 inches/hour.
- 100% pretreatment in areas with fc >5.0 inches/hour.
- Exit velocities from pretreatment must be non-erosive for the 2-year storm.

TREATMENT

- Water quality volume designed to exfiltrate through the floor of the practice.
- Construction sequence to maximize practice life.

STORMWATER MANAGEMENT SUITABILITY

X	Water Quality
X	Channel Protection
	Overbank Flood Protection
	Extreme Flood Protection

Accepts Hotspot Runoff: *No*

IMPLEMENTATION CONSIDERATIONS

H	Capital Cost
H	Maintenance Burden

Residential Subdivision Use: Yes

High Density/Ultra-Urban: *Yes*

Drainage Area: *10 acres max.*

Soils: *Pervious soils required (0.5 in/hr or greater)*

Other Considerations:

- *Must not be placed under pavement or concrete*

• Trench depth shall be less than four feet (I-2 and I-3). • Follow the methodologies in Chapter 6 to size practices. LANDSCAPING • Upstream area shall be completely stabilized before flow is directed to the practice. MAINTENANCE REQUIREMENTS • Never serves as a sediment control device • Observation well shall be installed in every trench, (6” PVC pipe, with a lockable cap) • Provide direct maintenance access.	Key: **L**=Low **M**=Moderate **H**=High **POLLUTANT REMOVAL** **G** Phosphorus **G** Nitrogen **G** Metals - Cadmium, Copper, Lead, and Zinc removal **G** Pathogens - Coliform, Streptococci, E.Coli removal **Key:** **G**=Good **F**=Fair **P**=Poor

C.2 Construction Specifications for Infiltration Practices

Infiltration Trench General Notes and Specifications

The infiltration trench systems may not receive run-off until the entire contributing drainage area to the infiltration system has received final stabilization.

1. Heavy equipment and traffic shall be restricted from traveling over the infiltration trench to minimize compaction of the soil.

2. Excavate the infiltration trench to the design dimensions. Excavated materials shall be placed away from the trench sides to enhance trench wall stability. Large tree roots must be trimmed flush with the trench sides in order to prevent fabric puncturing or tearing of the filter fabric during subsequent installation procedures. The side walls of the trench shall be roughened where sheared and sealed by heavy equipment.

3. A Class "C" geotextile or better shall interface between the trench side walls and between the stone reservoir and gravel filter layers. A partial list of non-woven filter fabrics that meet the Class "C" criteria is contained below. Any alternative filter fabric must be approved by the local municipality prior to installation.

   Mirafi 180-N
   Amoco 4552
   WEBTEC N70
   GEOLON N70
   Carthage FX-80S

   The width of the geotextile must include sufficient material to conform to trench perimeter irregularities and for a 6-inch minimum top overlap. The filter fabric shall be tucked under the sand layer on the bottom of the infiltration trench for a distance of 6 to 12 inches. Stones or other anchoring objects should be placed on the fabric at the edge of the trench to keep the trench open during windy periods. When overlaps are required between rolls, the uphill roll should lap a minimum of 2 feet over the downhill roll in order to provide a shingled effect.

4. A 6 inch sand layer may be placed on the bottom of the infiltration trench in lieu of filter fabric, and shall be compacted using plate compactors. The sand for the infiltration trench shall be washed and meet AASHTO Std. M-43, Size No. 9 or No. 10. Any alternative sand gradation must be approved by the Engineer or the local municipality.

5. The stone aggregate should be placed in lifts and compacted using plate compactors. A maximum loose lift thickness of 12 inches is recommended. Gravel filling (rounded bank run gravel is preferred) for the infiltration trench shall be washed and meet one of the following: AASHTO Std. M-43; Size No. 2 or No. 3.

6. Following the stone aggregate placement, the filter fabric shall be folded over the stone aggregate to form a 6-inch minimum longitudinal lap. The desired fill soil or stone aggregate shall be placed over the lap at sufficient intervals to maintain the lap during subsequent backfilling.

7. Care shall be exercised to prevent natural or fill soils from intermixing with the stone aggregate. All contaminated stone aggregate shall be removed and replaced with uncontaminated stone aggregate.

8. Voids can be created between the fabric and the excavation sides and shall be avoided. Removing boulders or other obstacles from the trench walls is one source of such voids, therefore, natural soils should be placed in these voids at the most convenient time during construction to ensure fabric conformity to the excavation sides.

9. Vertically excavated walls may be difficult to maintain in areas where soil moisture is high or where soft cohesive or cohesionless soils are predominate. These conditions may require laying back of the side slopes to maintain stability.

10. PVC distribution pipes shall be Schedule 40 and meet ASTM Std. D 1784. All fittings and perforations (1/2 inch in diameter) shall meet ASTM Std. D 2729. A perforated pipe shall be provided only within the infiltration trench and shall terminate 1 foot short of the infiltration trench wall. The end of the PVC pipe shall be capped.

11. Corrugated metal distribution pipes shall conform to AASHTO Std. M-36, and shall be aluminized in accordance with AASHTO Std. M-274. Coat aluminized pipe in contact with concrete with an inert compound capable of effecting isolation of the deleterious effect of the aluminum on the concrete. Perforated distribution pipe shall be provided only within the infiltration trench and shall terminate 1 foot short of the infiltration trench wall. An aluminized metal plate shall be welded to the end of the pipe.

12. The observation well is to consist of 6-inch diameter PVC Schedule 40 pipe (ASTM Std. D 1784) with a cap set 6 inches above ground level and is to be located near the longitudinal center of the infiltration trench. Preferably the observation well will not be located in vehicular traffic areas. The pipe shall have a plastic collar with ribs to prevent rotation when removing cap. The screw top lid shall be a “Panella” type cleanout with a locking mechanism or special bolt to discourage vandalism. A perforated (1/2 inch in diameter) PVC Schedule 40 pipe shall be provided and placed vertically within the gravel portion of the infiltration trench and a cap provided at the bottom of the pipe. The bottom of the cap shall rest on the infiltration trench bottom.

13. If a distribution structure with a wet well is used, a 4-inch PVC drain pipe shall be provided at opposite ends of the infiltration trench distribution structure. Two (2) cubic feet of porous backfill meeting AASHTO Std. M-43 Size No. 57 shall be provided at each drain.

14. If a distribution structure is used, the manhole cover shall be bolted to the frame.

    NOTE: PVC pipe with a wall thickness classification of SDR-35 meeting ASTM standard D3034 is an acceptable substitution for PVC Schedule 40 pipe.

Infiltration Basins Notes and Specifications

1. The sequence of various phases of basin construction shall be coordinated with the overall project construction schedule. A program should schedule rough excavation of the basin (to not less than 2’ from final grade) with the rough grading phase of the project to permit use of the material as fill in earthwork areas. The partially excavated basin, however, **cannot** serve as a sedimentation basin.

   Specifications for basin construction should state: (1) the earliest point in progress when storm drainage may be directed to the basin, and (2) the means by which this delay in use is to be accomplished. Due to the wide variety of conditions encountered among projects, each should be separately evaluated in order to postpone use as long as is reasonably possible.

2. Initial basin excavation should be carried to within 2 feet of the final elevation of the basin floor. Final excavation to the finished grade should be deferred until all disturbed areas on the watershed have been stabilized or protected. The final phase excavation should remove all accumulated sediment. Relatively light tracked equipment is recommended for this operation to avoid compaction of the basin floor. After the final grading is completed, the basin should retain a highly porous surface texture.

3. Infiltration basins may be lined with a 6- to 12-inch layer of filter material such as coarse sand (AASHTO Std. M-43, Sizes 9 or 10) to help prevent the buildup of impervious deposits on the soil surface. The filter layer can be replaced or cleaned when it becomes clogged. When a 6-inch layer of coarse organic material is specified for discing (such as hulls, leaves, stems, etc.) or spading into the basin floor to increase the permeability of the soils, the basin floor should be soaked or inundated for a brief period, then allowed to dry subsequent to this operation. This induces the organic material to decay rapidly, loosening the upper soil layer.

4. Establishing dense vegetation on the basin side slopes and floor is recommended. A dense vegetative stand will not only prevent erosion and sloughing, but will also provide a natural means of maintaining relatively high infiltration rates. Erosion protection of inflow points to the basin shall also be provided.

5. Selection of suitable vegetative materials for the side slope and all other areas to be stabilized with vegetation and application of required lime, fertilizer, etc. shall be done in accordance with the NRCS Standards and Specifications or your local Standards and Specifications for Soil Erosion and Sediment Control.

6. Grasses of the fescue family are recommended for seeding primarily due to their adaptability to dry sandy soils, drought resistance, hardiness, and ability to withstand brief inundations. The use of fescues will also permit long intervals between mowings. This is important due to the relatively steep slopes which make mowing difficult. Mowing twice a year, once in June and again in September, is generally satisfactory.

RECHARGER® 360HD & 902HD
STORMWATER MANAGEMENT SOLUTIONS

INSTALLATION INSTRUCTIONS

RETENTION • DETENTION • INFILTRATION • WATER QUALITY

CULTEC

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Visit www.cultec.com/downloads.html for Product Downloads and CAD details.

Doc ID: CLT009 03-20
March 2020
You are using version CLT009 03-20 of our CULTEC Installation Instructions for Recharger® 360HD and 902HD Stormwater Systems.

These instructions are for single-layer traffic applications only. For multi-layer applications, contact CULTEC.
All illustrations and photos shown herein are examples of typical situations. Be sure to follow the engineer's drawings.
Actual designs may vary.

Required Materials and Equipment

- Proper geotechnical soil evaluation by a qualified engineer or soil scientist to determine suitability of structural installation
- OSHA compliance
- CULTEC warning tape, or equivalent
- Assurances from local utilities that no underground gas, electrical or other potentially dangerous pipelines or conduits are already buried at the site
- Acceptable 1– 2 inch washed, crushed stone as shown in Table 3, page 18. Cleanliness of stone to be verified by engineer.
- Acceptable fill material
- CULTEC No. 410™ non-woven geotextile or equivalent
- CULTEC No. 4800™ woven geotextile or equivalent, as required
- All CULTEC chambers and accessories as specified in the engineer's plans including CULTEC No. 410™ non-woven geotextile, CULTEC StormFilter® and CULTEC No. 4800™ woven geotextile, where applicable. Check CULTEC chambers for damage prior to installation. Do not use damaged CULTEC chambers. Contact your supplier immediately to report damage or packing list discrepancies.
- Reciprocating saw or router
- Stone bucket
- Stone conveyor and/or tracked excavator
- Transit or laser level measuring device
- Compaction equipment

Requirements for CULTEC Chamber System Installations

- CULTEC systems must be designed and installed in accordance with CULTEC's minimum requirements. Failure to do so will void the limited warranty. To request a copy and submit the CULTEC limited warranty, call CULTEC at 203-775-4416 or visit www.cultec.com.
- Installing contractors are expected to comprehend and use the most current installation instructions prior to beginning a system installation. If there is any question as to whether these are the most current instructions, contact CULTEC at (203)775-4416 or visit www.cultec.com.
- Contact CULTEC at least thirty days prior to system installation to arrange a pre-construction meeting.
- All CULTEC system designs must be certified by a registered professional engineer.
- Use these installation instructions as a guideline only. Actual design may vary. Refer to approved construction drawings for job-specific details. Be sure to follow the engineer's drawings as your primary guide.
- System cover/backfill requirements will vary based on installation type.
- Any discrepancies with the system sub-grade soil's bearing capacity must be reported to the design engineer.
- Non-woven geotextile must be used as specified in the engineer's drawings.
- Erosion and sediment-control measures must meet local codes and the design engineer's specifications throughout the entire site construction process.
- Responsibility for preventing vehicles that exceed CULTEC's requirements from traveling across or parking over the chamber system lies solely with the contractor throughout the entire site construction process. The placement of warning tape, temporary fencing, and/or appropriately located signs is highly recommended. Imprinted warning tape is available from CULTEC. For Acceptable Vehicle Load information, refer to Table 1 on page 16.

Chamber Specification Information

	Recharger 360HD Chamber	Recharger 902HD Chamber
Size (L x W x H)	4.17′ x 60″ x 36″	4.25' x 78" x 48"
Installed Length	3.67′	3.67'
Length Adjustment per Row		
with two end caps installed	2.50′	1.03'
when not using end caps	0.50′	0.58'
Chamber Storage	10.00 ft³/ft	17.31 ft³/ft
	36.66 ft³/unit	63.47 ft³/unit
Minimum Installed Storage	15.20 ft³/ft	27.06 ft³/ft
	55.73 ft³/unit	99.28 ft³/unit
Minimum Area Required	21.08 ft²	26.58 ft²
Minimum Center-to-Center Spacing	5.75′	7.25'
Minimum Spacing Between Chambers	9″	9″
Minimum Cover Requirements	18″ (Paved)	24″ (Paved)
	24″ (Unpaved)	30″ (Unpaved)
Maximum Allowable Cover	12′	8.3'
Maximum Allowable O.D. in Side Portal	10″ HDPE, 12″ PVC	10″ HDPE, 12″ PVC
Compatible Feed Connector	HVLV FC-48 Feed Connector	HVLV FC-48 Feed Connector

End Cap Specification Information

	Recharger 360HD End Cap	Recharger 902HD End Cap
Size (L x W x H)	18″ x 60″ x 36.5″	9.7" x 78" x 48.5"
Installed Length	15″	6.2"
End Cap Storage	5.17 ft³/ft	5.34 ft³/ft
	6.46 ft³/unit (interlocked)	2.76 ft³/unit (interlocked)
Minimum Installed Storage	12.40 ft³/ft	19.88 ft³/ft
	15.50 ft³/unit	10.28 ft³/unit
Maximum Inlet Opening in End Cap	24″ HDPE, 30″ PVC	30" HDPE, 36″ PVC

All dimensions are nominal. Actual dimensions may vary on-site due to shipping and temperature.

For more information, contact CULTEC at (203) 775-4416 or visit www.cultec.com.

CULTEC HVLV FC-48 Feed Connector Specification Information

	HVLV® FC-48 Feed Connector
Length	49"
Installed Length (exposed)	9" min.
Width	16"
Height	12"
Chamber Storage Capacity	0.91 ft³/ft
Pipe Comparison	Greater flow capacity than 12" pipe

Site Preparation and Excavation

- Excavate and level the area per engineer's drawings. Refer to plan view and cross-section details and excavate bed to accommodate chambers and manifold system. Be sure to allow for a minimum 12 inch stone border around the perimeter of the system and unforeseen overages in your excavation calculations.

- Remove any standing water and maintain positive drainage of the site throughout the installation. Dewatering procedures must be used, if necessary.

- Prepare the sub-grade soil for the chamber bed as specified by the engineer's drawings.

- Place CULTEC No. 410™ non-woven geotextile (or equivalent) on the excavated bed bottom and perimeter sidewalls as specified by the engineer's drawings. CULTEC No. 410™ non-woven geotextile is required on the sides and over the top of the system. It is also recommended on the system bottom. Overlap the geotextile by at least 24 inches where the fabric edges meet.

- Disperse a level base of 1 to 2 inch diameter washed, crushed stone over the entire area of the bed bottom. Refer to the engineer's drawings for sub-grade soil preparation and required stone foundation thickness.

- Compact the stone base to achieve a flat, level unyielding surface. For vibratory roller use, refer to Table 1 on page 16 for recommended guidelines.

Chamber Information for Recharger® Models 360HD & 902HD

Directional arrows located on the top of the chamber point towards the Small Rib End.

CULTEC Recharger® 360HD & 902HD Chambers

The Recharger models 360HD & 902HD chambers come in only one model type which is fully open on both ends. The chamber requires the coordinating End Cap (*sold separately*) to cap rows of chambers or to create single stand alone units. One rib is dimensionally smaller to be able to interlock with additional units. A directional arrow points towards the small rib end. Typically, the build of the row begins with the large rib end facing you.

Shown: Recharger 360HD & Recharger 902HD Chambers with overlapping End Caps.

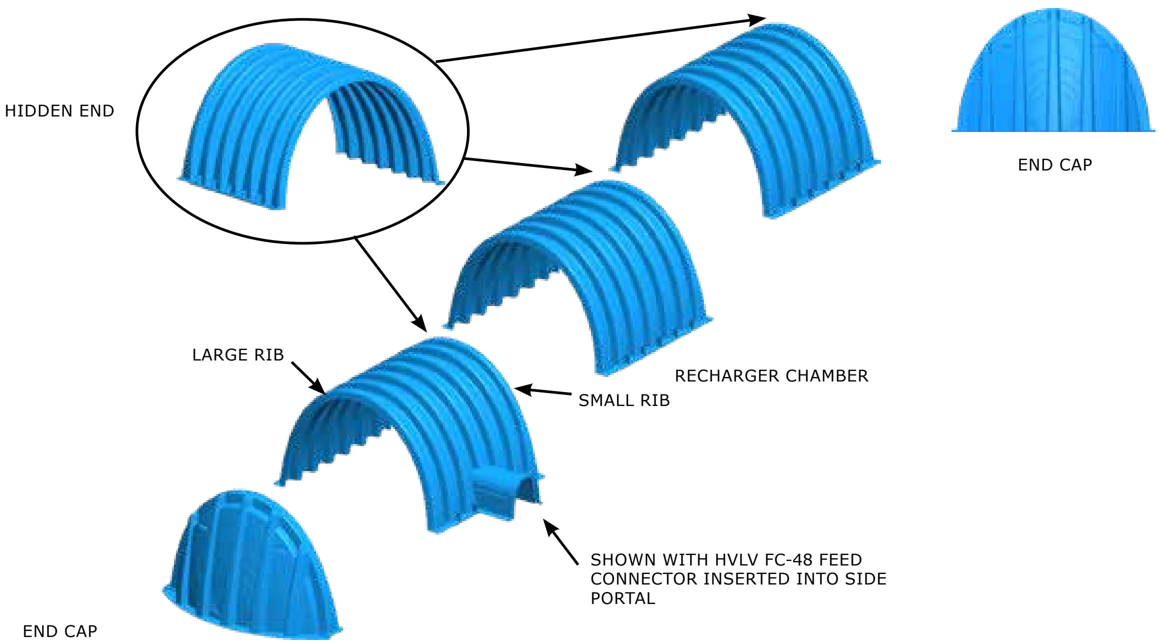
CULTEC Recharger® 360HD & 902HD End Caps

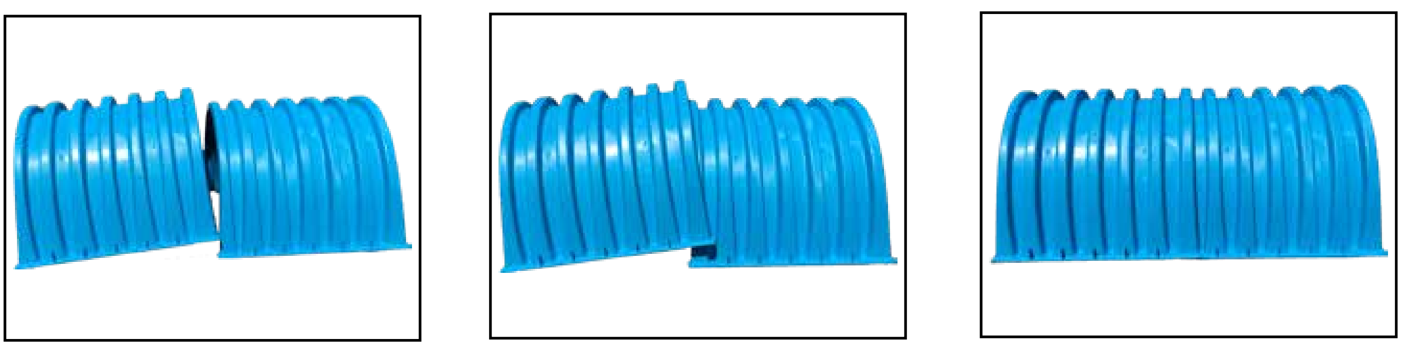
The End Cap is used in conjunction with the chamber to cap rows of chambers or to create single stand alone units.

Shown: Recharger 360HD End Cap & Recharger 902HD End Cap

Typical Installation Method

Interlock Recharger chambers using the overlapping rib connection.
Cap the ends of the lines using the Recharger End Cap.





Chamber Preparation and Installation

CULTEC Recharger® 360HD & 902HD chambers have the distinctive features of being fully open on both ends and utilize an overlapping rib connection. CULTEC chamber ribs are dimensionally sized with a large rib and a smaller rib to allow for an easy interlocking rib connection. The chambers require a separate end cap to cap off lines.

- Identify and group the chambers and end caps to ensure proper quantity and usage.
- Trim all side portals, end caps and inspection ports prior to installation for easier handling during trimming.
- Place one Recharger chamber for each row of units to be installed. Directional arrows point towards the small rib end of the chamber.
- If using the side portal internal manifold feature, trim the side portal(s) according to guidelines located on the sidewall of the chamber, as required. Insert one end of the HVLV FC-48 Feed Connector into the trimmed portal to create the internal manifold. Refer to Installation of Manifold section on page 9.
- Place the next Recharger chamber so the directional arrow located in the center of the unit points downstream towards the end of the line. Overlap the large rib over the small rib of the preceding chamber's end wall, interlocking the chambers together. When placing chambers take care to maintain separation requirements, measuring from the base of the chamber.
- To ease backfilling requirements, only install as many chambers as the stone-laying bucket or conveyor can reach.
- Place stone taking care not to drop stone over the last rib to be overlapped.
- Continue chamber and stone placement to extend the length of the row.
- Use the Recharger End Caps to cap off chamber rows. To install the end cap, lift the end cap above the chamber and slide down the chamber rib.
- Prior to the placement of the next line of chambers, check and correct the level and alignment of the chamber units, where needed.

Installation of Manifold

Utilize the side portals located on the chamber as an internal manifold in locations where indicated on the engineer's drawings. HVLV® FC-48 Feed Connectors are inserted into the portals to promote flow. An additional external manifold is not required unless specified by the engineer's design.

- CULTEC No. 4800™ woven geotextile is to be placed under all chambers utilizing the internal manifold feature and under all chambers accepting inlet/outlet pipe connections per engineer's drawings. If inserting a pipe 18" diameter or larger into the CULTEC chamber, the use of CULTEC No. 4800 woven geotextile is recommended to prevent washout of the bedding stone.

- Most installations are designed with the internal manifold located at the ends of the chamber bed. However, the side portal internal manifold feature allows for the manifold to be located at any point within the chamber run. Refer to system design for manifold location(s).

- Using a reciprocating saw or router, trim the sidewall portals of the units that are to receive the HVLV FC-48 Feed Connectors. Feed connectors may be placed on any chamber requiring a manifold, as indicated by the engineer's drawings.

- Place the HVLV FC-48 Feed Connector into the side portal of the chambers per engineer's drawings. Maintain a 9" min. separation between chamber rows.

- Check for correct center-to-center spacing of chamber runs according to engineer's drawings before proceeding to next row.

- Insert inflow/outflow pipe(s) into end cap or side portal as detailed on engineer's drawings. Maximum inlet sizes for the end caps are: 24" HDPE, 30" PVC for the Recharger 360HD End Cap and 30" HDPE, 36" PVC for the Recharger 902HD End Cap. Maximum pipe sizes for the side portals are: 10" HDPE, 12" PVC. There is no need to feed every row if utilizing the internal manifold feature.

If the manifold installation detail does not include CULTEC's side portal internal manifold, proceed according to the engineer's drawings for pipe manifold installation.

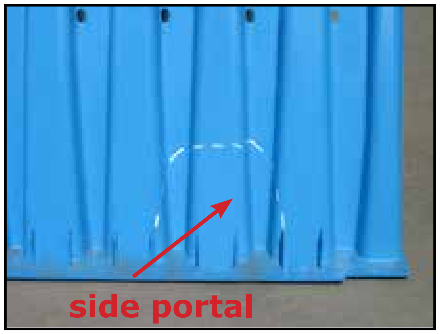
How to Trim CULTEC Chamber to Accommodate Pipe on End Cap

When using a conventional pipe manifold or inlet / outlet pipes, the contractor is required to trim the CULTEC Recharger End Cap on-site. Here are some quick steps to ensure a successful outcome:

- Lay out chambers according to engineered plans.
- Directional arrows located at the top of the chamber point towards the small rib end.
- Install end caps on the chambers as detailed on the engineer's drawing.
- Locate the proper diameter pipe outline on the end cap to accommodate the designed pipe size and invert elevation.
- Drill a hole on the chamber end wall large enough to accommodate a saw blade.
- Following the etched outline, use a reciprocating saw to trim out the opening to accommodate the pipe. Trimming should be within 1/4" tolerance of pipe O.D. to prevent stone intrusion.
- Insert the pipe or fitting a minimum of 8" into the chamber. This is not required to be a watertight connection. Maximum inlet pipe sizes: 360HD: 24" HDPE, 30" PVC, 902HD: 30" HDPE, 36" PVC.
- Backfill as noted in the installation instructions and engineering details.
- Trimming may only be performed on end caps or within side portal areas. Pipe may not be inserted into the sidewall of the chamber unless it is within the side portal trim lines.

How to Trim Side Portal to Accommodate HVLV FC-48 Feed Connector for Internal Manifold

When using the side portal internal manifold feature, the contractor is required to trim the side portal of the CULTEC Recharger chamber on site.



- Following the guides on the side portal, use a reciprocating saw to trim out the opening to accommodate the HVLV FC-48 Feed Connector. Trimming should be within 1/4” tolerance of HVLV FC-48 Feed Connector to prevent soil intrusion.

Trimming may only be performed on the side portal area. Side entry in any other location is unacceptable.

- Insert the HVLV FC-48 Feed Connector a minimum of 8” into the chamber. This is not required to be a watertight connection.

- Maintain proper separation of 9” minimum between chamber rows.

How to Trim Side Portal to Accommodate Pipe for Side Entry

When using the side portal feature as an inlet /outlet location, the contractor is required to trim the side portal of the CULTEC Chamber onsite.

- Line up the pipe on the chamber side portal to the designated pipe elevation as detailed on the engineer's drawing. The side portal may accommodate 10" HDPE or 12" PVC pipe.
- Using a grease pen, outline the pipe on the side portal of the CULTEC chamber. See Fig. 1 for acceptable trim area. Do not cut outside the side portal area guides.
- Drill a hole on the chamber side portal large enough to accommodate a saw blade.
- Following the grease pen outline, use a reciprocating saw to trim out the opening to accommodate the pipe. Trimming should be within 1/4" tolerance of pipe O.D. to prevent soil intrusion.
- Insert the pipe or fitting a minimum of 8" into the chamber. This is not required to be a watertight connection.

Fig. 1 - Acceptable Trim Area

Trimming may only be performed on the side portal area. Side entry in any other location is unacceptable.

Embedment Stone Backfill

Backfill using washed, crushed stone. To maintain row separation distance and prevent chamber displacement, slowly distribute stone on top of the center of the chamber crown so that stone trickles down and builds between chamber rows as required. Stone column differential should not exceed 12” between adjacent chamber rows or between chamber rows and perimeter.

Place the stone carefully over the centerline of the chamber crown. Embedment stone must only be placed by an excavator or telescoping conveyor boom. Placement of embedment stone with a bulldozer is not an acceptable method of installation and may cause damage to the chambers. Any chambers damaged using an unacceptable method of backfill are not covered under the CULTEC limited warranty.

Excavator-Placed Stone

Typically the most common method, excavator-placed stone is limited by the reach of the arm. To accommodate this issue with larger beds, it is common to prepare a bed by joining just a few chamber units at a time, then placing the stone and fabric before installing the next few units.

The excavator is usually operated within the excavation area. The excavator may work at grade level over recently placed chambers, provided coverage between the chambers and the excavator tracks meets the minimum requirements.

Telescoping Conveyor Boom Placement

With booms as much as 120-140 feet long, telescoping aggregate conveyors can greatly aid the process of stone placement.

With both stone-placement methods, ladling the stone carefully over the chambers’ centers will secure them in place. Evenly distributing the stones will help prevent chamber movement and maintain row separation.

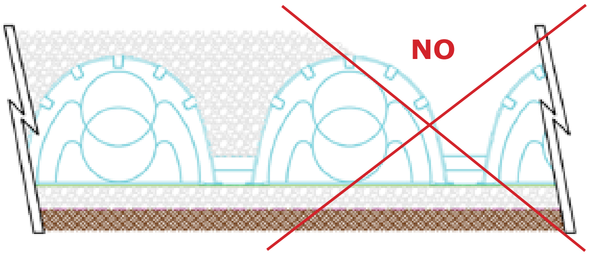
Once secured, stone may be placed to surround the chambers and fill the perimeter areas. Be sure to adhere to manufacturer recommendations and engineer’s drawings for system cover/backfill requirements.

Do not allow equipment to drive over the chambers unless the minimum cover is in place. Use a warning tape (available from CULTEC) to restrict access.

Repeat steps until all of the last chamber units are in place. Be certain to use the Recharger End Caps to end the line of chambers as specified by the drawings.

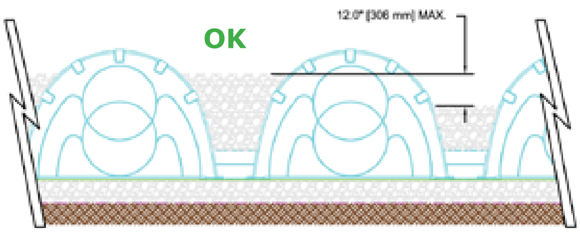
If a manifold system is designed on the back end of the chamber bed, follow manifold installation instructions as described previously.

Stone column height differential should never exceed 12 inches with adjacent chambers or between chamber rows and perimeter. Minimum depth of cover of properly compacted material must be met before allowing vehicles to drive over the bed. Avoid using large rocks and/or organic matter as backfill material. Refer to “Acceptable Fill Materials” or contact the design engineer for approved fill types.



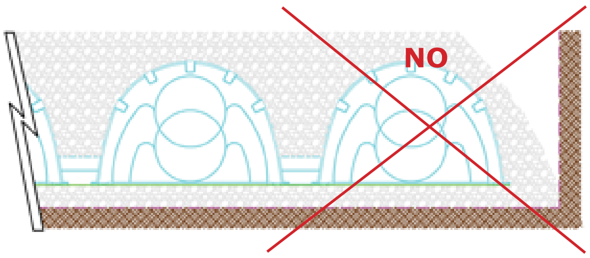
NOTE: CHAMBERS MUST BE BACKFILLED EVENLY.

UNEVEN BACKFILL - INCORRECT INSTALLATION



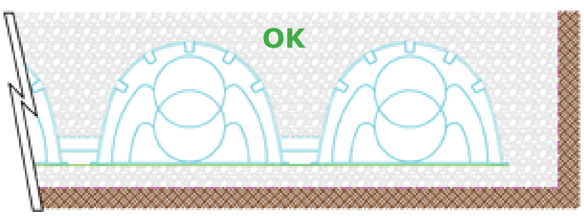
NOTE: STONE HEIGHT IN BETWEEN ROWS AND PERIMETER SHOULD NOT DIFFER BY MORE THAN 12" (300 mm).

EVEN BACKFILL - CORRECT INSTALLATION



NOTE: WHEN FILLING IN PERIMETER, STONE MUST BE FILLED IN EVENLY WITH CHAMBER ROWS.

PERIMETER NOT FULLY BACKFILLED
INCORRECT INSTALLATION



NOTE: PERIMETER MUST BE FULLY BACKFILLED WITH STONE AND EXTEND TO THE EXCAVATION WALL.

PERIMETER FULLY BACKFILLED
CORRECT INSTALLATION

Placement of Top Fabric Layer & System Backfill Process

- Place the stone over the entire bed area as described in previous section.
- Cover the entire installation area with CULTEC No. 410 non-woven geotextile starting from the perimeter and laying it on top of the stone. The geotextile must overlap at least 24 inches at the edges.
- Fill the first 12 inches with enough material (See 3 in Fig. 1, page 18) to meet the requirements as shown in Table 3, page 18. Backfill over the top of the geotextile (See 3 in Fig. 1, page 18) in lifts that do not exceed 6 inches, and disperse the fill with a vehicle that meets the maximum wheel loads or ground pressure limits as specified on specified in Table 1 on page 16.
- Compact each lift of backfill as specified in the engineer's drawings. CULTEC specifies compacting to a minimum of 95% of the standard proctor density using compaction equipment Refer to Table 1, page 16 for acceptable equipment.
- Backfill over the chamber bed (See 4 in Fig. 1, page 18) in 12-inch maximum lifts until the specified grade is achieved. For pavement sub-base or special fill requirements, see engineer's drawings.

NOTE:
Excavation alongside already installed chamber rows backfilled with stone is not acceptable.
No chambers may be added or subtracted from previously installed systems.

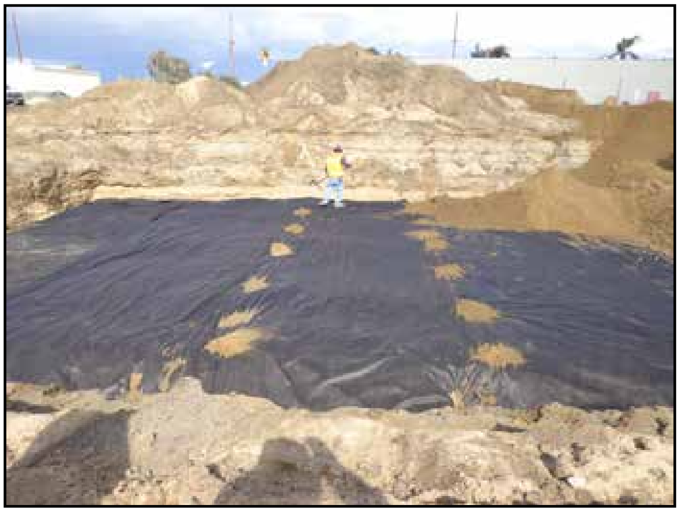


Table 1: Maximum Allowable Construction Loads

Material Location see Fig. 1, p. 18	**Cumulative Cover Depth over Chambers (in)**	**Maximum Allowable Wheel Loads**		**Maximum Allowable Track Loads**		**Maximum Allowable Compaction Loads**	
		Max Axle Load for Trucks (lbs)	**Max Axle Load for Loaders (lbs)**	**Track Shoe Width (in)**	**Max Ground Pressure (psi)**	**Maximum Centrifugal Force (lbs)**	**Max Gross Vehicle Weight (lbs)**
4 Final Fill Material	36 Compacted	32,000	16,000	12	23.8	38,000	16,000
				18	16.3		
				24	12.8		
				30	10.6		
				36	9.1		
	30 Compacted	32,000	16,000	12	20.5	24,000	12,000
				18	14.3		
				24	11.4		
				30	9.5		
				36	8.3		
3 Initial Fill Material	24 Compacted	32,000	16,000	12	17.2	20,000	12,000
				18	12.3		
				24	9.9		
				30	8.4		
				36	7.4		
	24 Loose/Dumped	360HD: 32,000 902HD: 24,000	360HD: 16,000 902HD: 12,000	12	15.6	20,000	12,000
				18	11.3		
				24	9.2		
				30	7.9		
				36	7.0		
	18 Compacted	360HD: 32,000 902HD: 24,000	360HD: 16,000 902HD: 12,000	12	14.0	360HD: 20,000 902HD: NOT ALLOWED	360HD: 12,000 902HD: 5,000
				18	10.3		
				24	8.5		
				30	7.4		
				36	6.6		
	18 Loose/Dumped	360HD: 16,000 902HD: NOT ALLOWED	NOT ALLOWED	12	12.6	NOT ALLOWED	360HD: 12,000 902HD: NOT ALLOWED
				18	9.3		
				24	7.7		
				30	6.7		
				36	6.0		
2 Embedment Stone	12	NOT ALLOWED	NOT ALLOWED	12	10.7	NOT ALLOWED	NOT ALLOWED
				18	8.3		
				24	7.0		
				30	6.3		
				36	5.8		
	6	NOT ALLOWED	NOT ALLOWED	NOT ALLOWED FOR RECHARGER 902HD. 6” FILL DEPTH TRACK LOAD DATA APPLIES TO RECHARGER 360HD ONLY		NOT ALLOWED	NOT ALLOWED
				12	7.4		
				18	6.3		
				24	5.6		
				30	5.3		
				36	5.0		

The use of wheeled equipment without proper cover is strictly prohibited.
For Tracked Vehicles: Ground pressure is vehicle operating weight divided by total truck contact area for both tracks. Turning should be kept to a minimum.
No wheeled vehicles are allowed prior to compacted fill placement

Table 2: Placement Methods and Descriptions

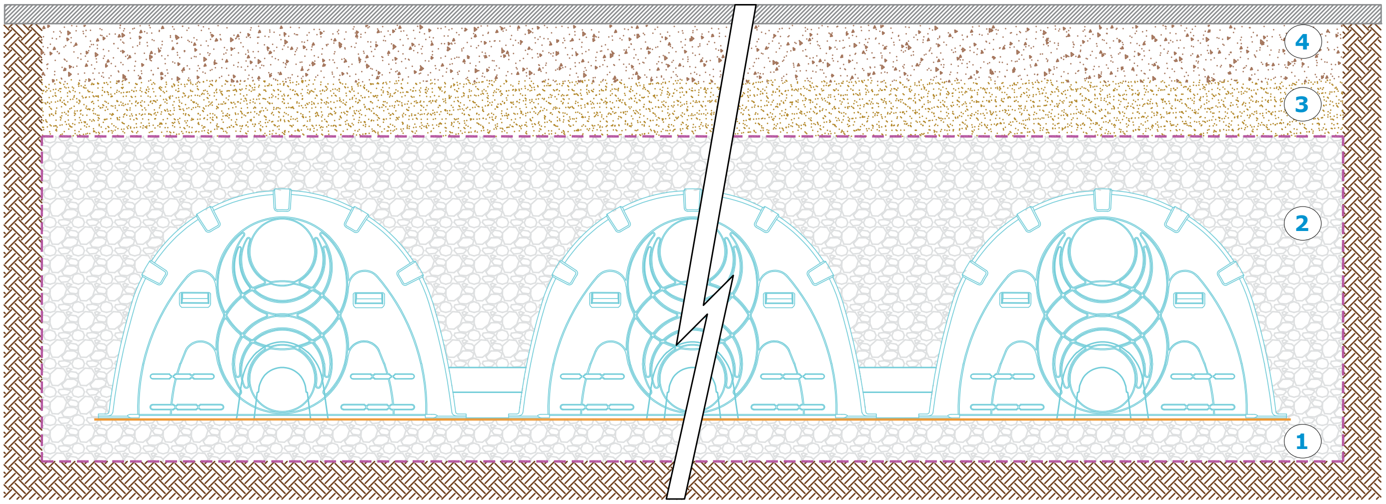
Material Location see Fig. 1, p.18	Placement Method/ Restrictions	Wheel Load Restrictions	Track Load Restrictions	Compaction Restrictions
	See Table 1, p. 16 for Maximum Construction Loads			
4 Final Fill Material	A variety of placement methods may be used. All construction loads shall not exceed the maximum values listed in Table 1.	902HD: 36” minimum cover for dump truck and wheel loader travel 360HD: 24” minimum cover for dump truck and wheel loader travel	Dozers shall push parallel to rows only.	902HD: Roller travel shall be parallel to rows only until 36” of cover is reached 360HD: Roller travel shall be parallel to rows only until 24” of cover is reached
3 Initial Fill Material	Excavator positioned off of bed or on foundation stone. Small LGP track dozer, track skid steer loaders may be used. Must maintain 12” minimum fill below tracks at all times.	902HD: Asphalt can be dumped into paver machine when total cumulative fill depth over chambers reaches 24” 360HD: Asphalt can be dumped into paver machine when total cumulative fill depth over chambers reaches 18”	Equipment direction of travel shall be parallel to rows at all times. Equipment shall not be permitted to turn direction over chambers.	Roller travel shall be parallel to rows only. 902HD: Dynamic roller mode shall be used only when total cumulative fill depth over chambers reaches 24” 360HD: Dynamic roller mode shall be used only when total cumulative fill depth over chambers reaches 18”
2 Embedment Stone	No equipment shall be permitted to contact the chambers. Stone conveyor positioned off of bed or on foundation stone. Excavator positioned off of bed or on foundation stone. Stone column height differential between chamber rows shall never exceed 12”. Stone to be placed at the crown of the chamber. No stone shall be pushed over chambers.	No wheel loads allowed. No wheel loaders permitted to dump stone directly onto chambers.	No tracked equipment is allowed on chambers until 12” of embedment stone is in place.	No rollers allowed.
1 Foundation	A variety of placement methods may be used including but not limited to excavator placement, stone conveyor placement or dozer placement. Plate compact or roll to achieve a flat, unyielding surface. Contractor is responsible for any conditions or requirements relating to subgrade bearing capacity, dewatering or protection of subgrade infiltrative capacity.			

Table 3: Acceptable Fill Materials

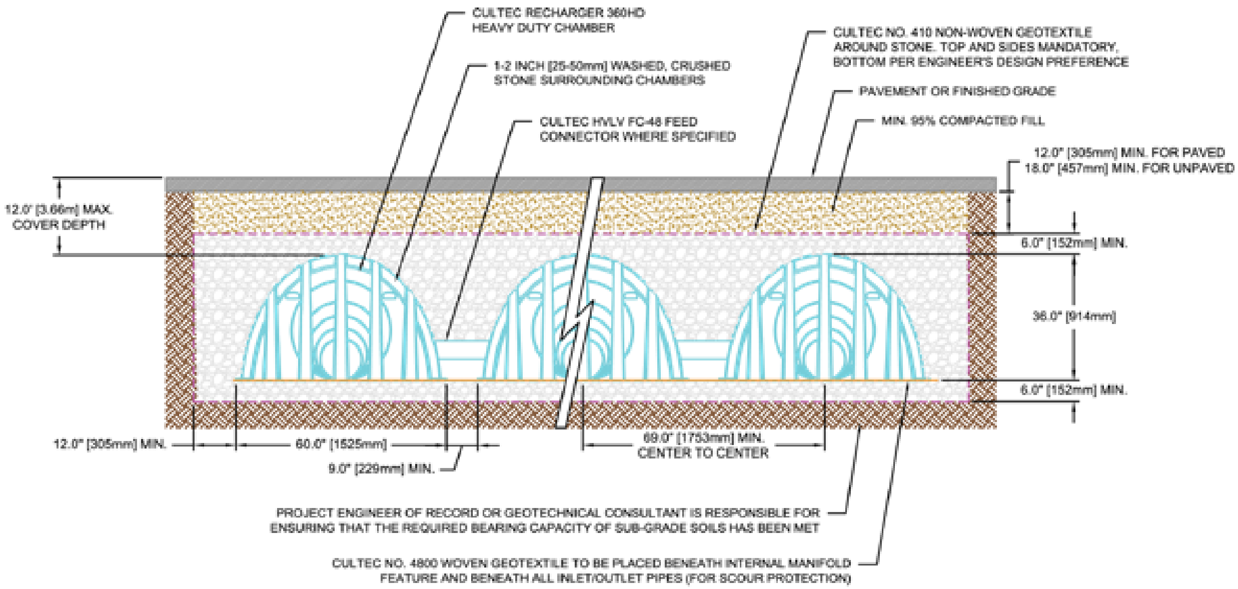
Material Location		Description	AASHTO M43 Classification	Compaction/ Density Requirement
4	Fill Material for Layer 4 starts from the top of Layer 3 to the bottom of pavement or unpaved finished grade above. Refer to cross section, page 19 for proper minimum fill requirements.	Any soil/rock materials, native soils or per engineer's plans. Check plans for pavement subgrade requirements.	Per engineer's drawings	Prepare per engineer's drawing. Paved installations may have strict material and preparation requirements.
3	Fill Material for Layer 3 starts from top of embedment stone (Layer 2) to minimum required depth above top of chamber. Refer to cross section, page 19 for proper minimum fill requirements.	Granular well-graded soil/aggregate mixtures, <35% fines	3, 4, 5, 6, 7, 8, 9, 10, 56, 57, 67, 68, 78, 89, 467	Compact in 6" lifts to a minimum 95% Standard Proctor density. Refer to Table 1 for acceptable gross vehicle weights.
2	Embedment Stone surrounding chambers and to a minimum elevation above chamber crown. 360HD: 6" min. required 902HD: 12" min. required.	Washed, crushed stone with the majority of particles between 1" - 2"	3, 4, 57, 67	No compaction required.
1	Foundation Stone below chambers per engineer's drawing 360HD: 6" min. required 902HD: 9" min. required.	Washed, crushed stone with the majority of particles between 1" - 2"	3, 4, 57, 67	Plate compact or roll to achieve a flat, unyielding surface.

The listed AASHTO classifications are for gradations. The stone must be washed, crushed and angular. See Table 5, page 20.
For example, the stone must be specified as washed, crushed No. 4 stone. Fill materials shall be free of debris, trash, frozen lumps and other deleterious matter.
Contact CULTEC for gradation requirements for specific projects that do not fall within the above specifications.

Fig. 1. Fill Material Locations - refer to Tables 1-3



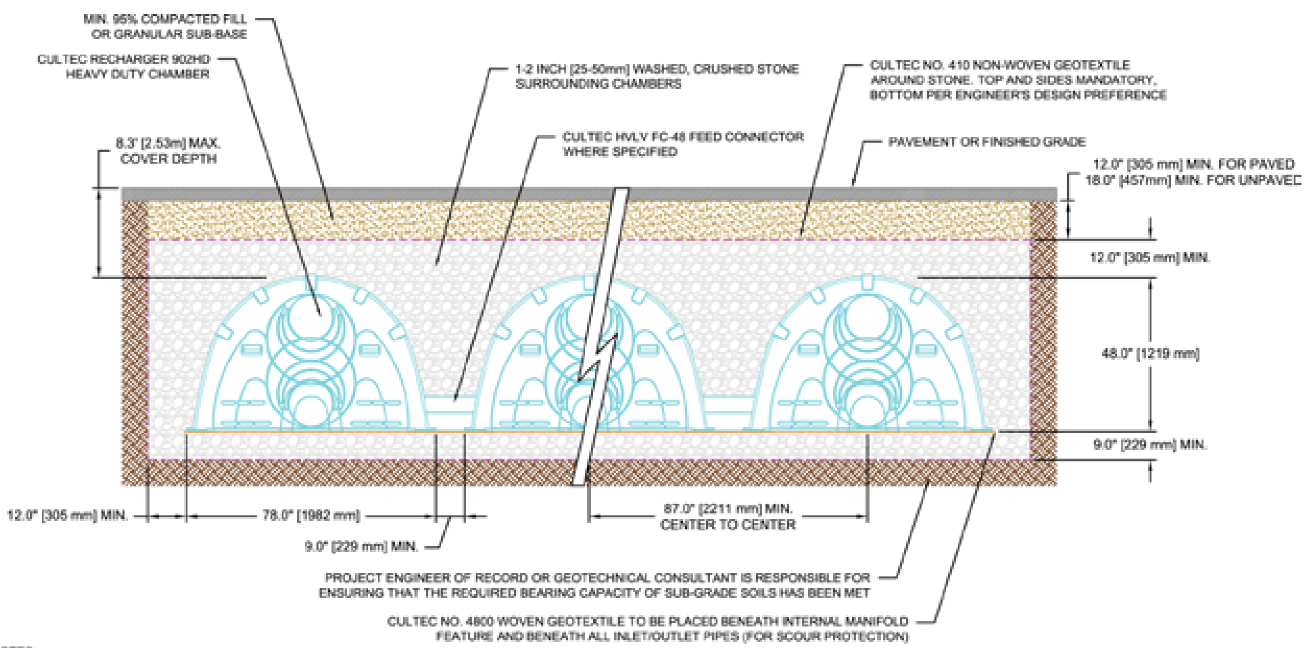
Recharger 360HD Typical Cross Section for Traffic Applications



NOTES:

1. THE CHAMBERS SHALL BE DESIGNED AND TESTED IN ACCORDANCE WITH ASTM F2787 "STANDARD PRACTICE FOR STRUCTURAL DESIGN OF THERMOPLASTIC CORRUGATED WALL STORMWATER COLLECTION CHAMBERS." THE LOAD CONFIGURATION SHALL INCLUDE:
   - 1.a. INSTANTANEOUS AASHTO DESIGN TRUCK LIVE LOAD AT MINIMUM COVER
   - 1.b. MAXIMUM PERMANENT (50-YEAR) COVER LOAD
   - 1.c. 1-WEEK PARKED AASHTO DESIGN TRUCK LOAD
2. THE CHAMBERS SHALL MEET THE REQUIREMENTS OF ASTM F3430-20 "STANDARD SPECIFICATION FOR CELLULAR POLYPROPYLENE (PP) CORRUGATED WALL STORMWATER COLLECTION CHAMBERS"
3. THE INSTALLED CHAMBER SYSTEM SHALL PROVIDE RESISTANCE TO THE LOADS AND LOAD FACTORS AS DEFINED IN THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS SECTION 12.12, WHEN INSTALLED ACCORDING TO CULTEC'S RECOMMENDED INSTALLATION INSTRUCTIONS. THE STRUCTURAL DESIGN OF THE CHAMBERS SHALL INCLUDE THE FOLLOWING:
   - 3.a. THE CREEP MODULUS SHALL BE 50-YEAR AS SPECIFIED IN ASTM F3430
   - 3.b. THE MINIMUM SAFETY FACTOR FOR LIVE LOADS SHALL BE 1.75
   - 3.c. THE MINIMUM SAFETY FACTOR FOR DEAD LOADS SHALL BE 1.95

Recharger 902HD Typical Cross Section for Traffic Applications



NOTES:

1. THE CHAMBERS SHALL BE DESIGNED AND TESTED IN ACCORDANCE WITH ASTM F2787 "STANDARD PRACTICE FOR STRUCTURAL DESIGN OF THERMOPLASTIC CORRUGATED WALL STORMWATER COLLECTION CHAMBERS." THE LOAD CONFIGURATION SHALL INCLUDE:
   - 1.a. INSTANTANEOUS AASHTO DESIGN TRUCK LIVE LOAD AT MINIMUM COVER
   - 1.b. MAXIMUM PERMANENT (50-YEAR) COVER LOAD
   - 1.c. 1-WEEK PARKED AASHTO DESIGN TRUCK LOAD
2. THE CHAMBERS SHALL MEET THE REQUIREMENTS OF ASTM F3430-20 "STANDARD SPECIFICATION FOR CELLULAR POLYPROPYLENE (PP) CORRUGATED WALL STORMWATER COLLECTION CHAMBERS"
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   - 3.a. THE CREEP MODULUS SHALL BE 50-YEAR AS SPECIFIED IN ASTM F3430
   - 3.b. THE MINIMUM SAFETY FACTOR FOR LIVE LOADS SHALL BE 1.75
   - 3.c. THE MINIMUM SAFETY FACTOR FOR DEAD LOADS SHALL BE 1.95

Table 3: CULTEC No. 410™ Non-Woven Geotextile Specification Information

Properties	ASTM Test Method	Test Results
Appearance		Black
Weight - Typical	D 5261	4.5 oz/sy
Tensile Strength	D 4632	120 lbs
Elongation @ Break	D 4632	50%
Mullen Burst*	D 3786*	225 psi
Puncture Strength*	D 4833*	65 lbs
CBR Puncture	D 6241	340 lbs
Trapezoid Tear	D 4533	50 lbs
AOS	D 4751	70 US Sieve
Permittivity	D 4491	1.70 Sec^{-1}
Water Flow Rate	D 4491	135 gal/min/sf
UV Resistance @ 500 Hours	D 4355	70%

** Historical averages (current values not available): Mullen Burst Strength ASTM D3786 is no longer recognized by ASTM D-35 on Geosynthetics as an acceptable test method. Puncture Strength ASTM D4833 is not recognized by AASHTO M288 and has been replaced with CBR Puncture ASTM D6241.*
Substitutions must meet or exceed these minimums. Non-woven geotextile placement is mandatory over top and sides of system. Coverage of system bottom is recommended. However, follow engineer's design preference.

Table 4: CULTEC No. 4800™ Woven Geotextile Specification Information

Properties	ASTM Test Method	Test Results
Appearance		Black
Tensile Strength	D 4632	550 x 550 lbs
Elongation @ Break	D 4632	20 x 20%
Wide Width Tensile	D 4595	5,070 x 5,070 lbs/ft
Wide Width Tensile @ 2% Strain	D 4595	960 x 1,096 lbs/ft
Wide Width Tensile @ 5% Strain	D 4595	2,740 x 2,740 lbs/ft
Wide Width Tensile @10% Strain	D 4595	4,800 x 4,800 lbs/ft
CBR Puncture	D 6241	1,700 lbs
Trapezoidal Tear	D 4533	180 x 180 lbs
Apparent Opening Size	D 4751	40 US Sieve
Permittivity	D 4491	0.15 Sec-1
Water Flow Rate	D 4491	11.5 g/min/sf
UV Resistance @ 500 Hours	D 4355	80%

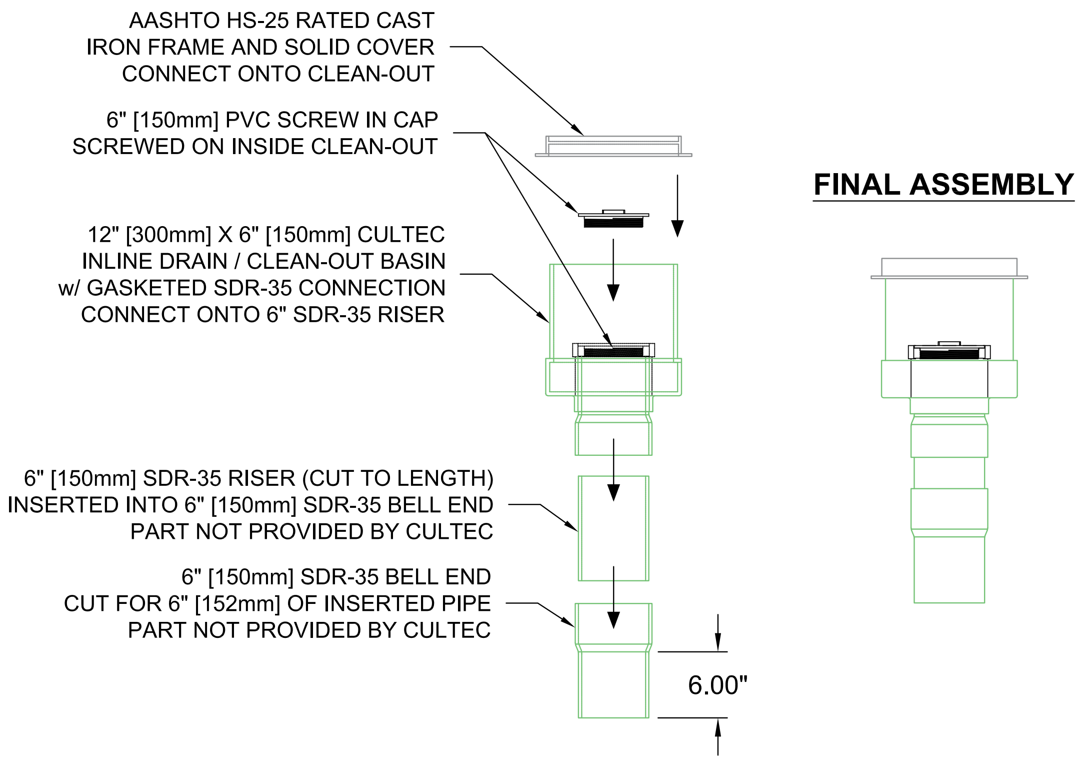
Substitutions must meet or exceed these minimums. To be used as scour protection and in conjunction with CULTEC Separator Row (if specified).

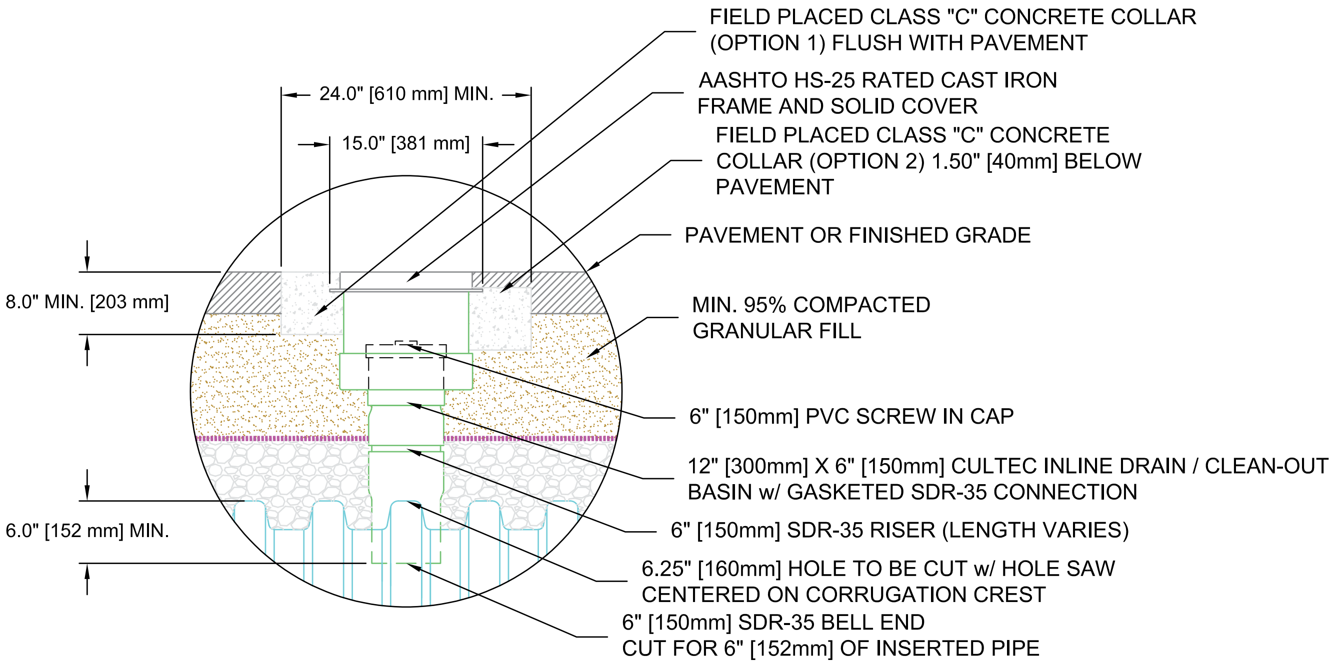
Table 5: Criteria for acceptable 1 - 2 inch washed, crushed, angular stone

Washed Crushed Stone	Description	Criteria
Acceptable	Angular	Stones have sharp edges and relatively plane sides with unpolished surfaces
	Subangular	Stones are similar to angular description but may have slightly rounded edges
Unacceptable	Subrounded	Stones have nearly plane sides but have well-rounded corners and edges
	Rounded	Stones have smoothly curved sides and no edges

See Item 1 and Item 2 of Table 3 on page 18 for additional stone requirements.

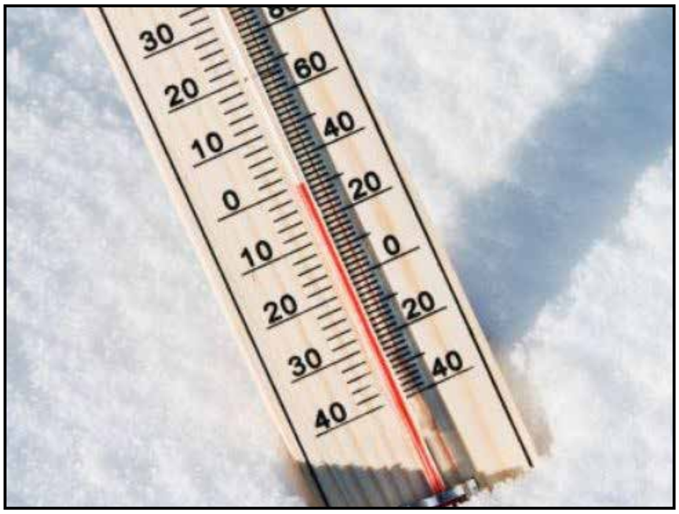
Inspection Port Detail for Paved Traffic Applications





Trim inspection port knock-out with reciprocating saw or hole-saw.
Corrugated pipe is not suitable for inspection port.

Special Handling Instructions for Polypropylene, Chambers in Colder Temperatures



CULTEC chambers are manufactured of impact-modified polypropylene, which is inherently resistant to corrosion and chemical breakdown and cold weather impact. Additional UV inhibitors and antioxidants increase the chambers' resistance to sunlight degradation. However, CULTEC recommends that, when installed in cold temperatures below 32 degrees F, the installer take special care when removing the chambers from the stacks, not allowing the chambers to fall from height. Avoid using machinery to handle the chambers. When possible, CULTEC recommends that the stone backfill be placed in temperatures above 32 degrees F to minimize depressions or deflections.


CAT

CULTEC, Inc.
878 Federal Road • P.O. Box 280 • Brookfield, CT 06804 USA
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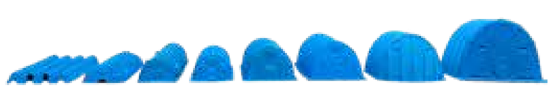


RETENTION • DETENTION • INFILTRATION • WATER QUALITY

CULTEC Stormwater Design Calculator

Date:	November 30, 2023

Project Information:
Bonavenia
Unionvale

Calculations Performed By:

RECHARGER 902HD

Recharger 902HD Chamber Specifications		
Height	**48.0**	inches
Width	**78.0**	inches
Length	**4.10**	feet
Installed Length	**3.67**	feet
Bare Chamber Volume	**63.47**	cu. feet
Installed Chamber Volume	**99.22**	cu. feet

Breakdown of Storage Provided by Recharger 902HD Stormwater System		
Within Chambers	**14,769.20**	cu. feet
Within Feed Connectors	**9.59**	cu. feet
Within Stone	**8,988.16**	cu. feet
Total Storage Provided	**23,766.9**	**cu. feet**
Total Storage Required	23500.00	cu. feet

Materials List

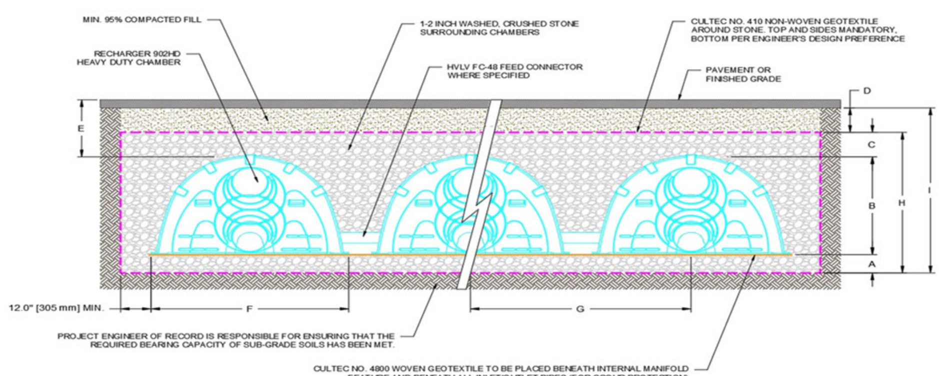
Recharger 902HD		
Total Number of Chambers Required	**232**	**pieces**
Chamber Units	**232**	pieces
End Caps	**16**	pieces
HVLV FC-48 Feed Connectors	**14**	pieces
CULTEC No. 410 Non-Woven Geotextile	**1767**	sq. yards
CULTEC No. 4800 Woven Geotextile	**232**	feet
Stone	**832**	cu. yards

Based on 2 Internal Manifolds

Bed Detail

Bed Layout Information		
Number of Rows Wide	**8**	pieces
Number of Chambers Long	**29**	pieces
Chamber Row Width	**57.25**	feet
Chamber Row Length	**107.34**	feet
Bed Width	**59.25**	feet
Bed Length	**109.34**	feet
Bed Area Required	**6478.12**	sq. feet
Length of Separator Row	**N/A**	feet

Bed detail for reference only. Not project specific. Not to scale.



Conceptual graphic only. Not job specific.

Cross Section Table Reference			
A	Depth of Stone Base	**9.0**	inches
B	Chamber Height	**48.0**	inches
C	Depth of Stone Above Units	**12.0**	inches
D	Depth of 95% Compacted Fill	**12.0**	inches
E	Max. Depth Allowed Above the Chamber	**8.33**	feet
F	Chamber Width	**78.0**	inches
G	Center to Center Spacing	**7.25**	feet
H	Effective Depth	**5.75**	feet
I	Bed Depth	**6.75**	feet

Hydro International

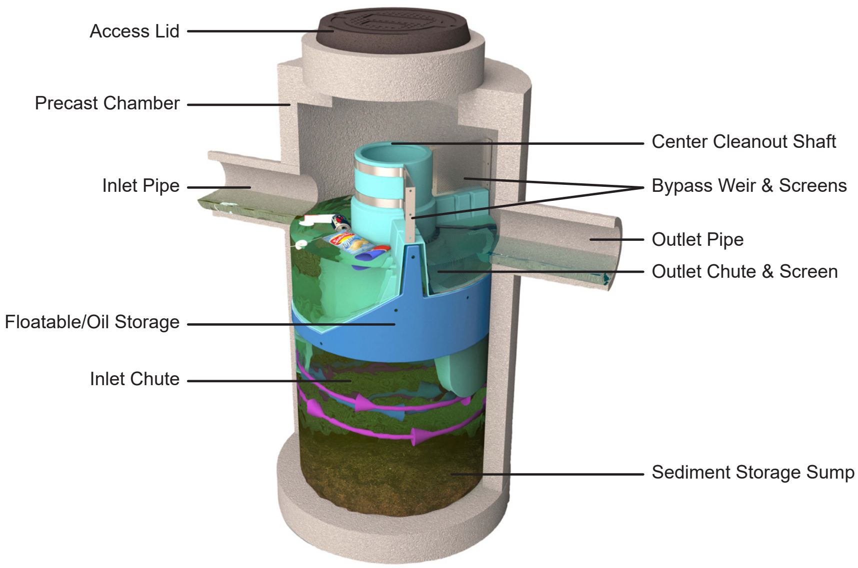
First Defense® FTC

Full Trash Capture Hydrodynamic Separator

Product Summary

First Defense Full Trash Capture (FTC) is an advanced hydrodynamic separator that combines enhanced vortex technology for total suspended solids (TSS) removal with a 5mm screen to meet full trash capture requirements set by the California Water Boards.*

Features



One-hour, one-year design storm.

Applications

- Removal of Total Suspended Solids (TSS), floatable trash, and petroleum products from stormwater runoff
- New construction or redevelopment of commercial and residential sites
- Pre-treatment for green infrastructure and ponds
- Pollutant hotspots such as maintenance yards, parking lots, gas stations, streets, highways, airports and transportation hubs
- LEED® development projects
- Retrofitting existing systems

How It Works

1. Stormwater enters the Inlet Chute, where water is directed downwards and into a rotational motion around the Sediment Storage Sump.
2. Free floating trash is retained in the Inlet Chute area. Sediment and other settleable solids are retained in the Sediment Storage Sump as water follows a rotational path to the screened Outlet Chute.
3. Water then exits upward in the Outlet Chute where a horizontal screen prevents the loss of any suspended debris larger than 5mm. High flows can bypass directly to the outlet via the Bypass Weirs.
4. Two Bypass Screens continue to treat and retain the free floating debris. In extreme events water can crest the bypass screen and go directly to the outlet to prevent upstream flooding.

Model Number	Diameter	Maximum Pipe Diameter[1]	Trash Storage Capacity[2]	Flow Rate (cfs) for Screen Blinding Percentage[3]				Bypass Capacity	Typical TSS Treatment Rates
Model	(ft / m)	(in / mm)	(yd^3 / m^3)	0%	25%	50%	75%	(cfs)	(cfs / L/s)
FD-3 FTC	3 / 0.9	18 / 450	0.4 / 0.3	2.93	2.33	1.75	1.17	15	1.06 / 30.0
FD-4 FTC	4 / 1.2	24 / 600	0.83 / 0.63	7.94	7.10	5.27	3.43	18	1.88 / 53.2
FD-5 FTC	5 / 1.5	24 / 600	1.54 / 1.18	13.02	10.51	7.87	6.07	20	2.94 / 83.2
FD-6 FTC	6 / 1.8	30 / 750	2.22 / 1.70	25.60	21.50	16.01	10.66	32	4.23 / 119.8
FD-8 FTC	8 / 2.4	48 / 1219	5.28 / 4.00	34.16	33.75	26.29	16.88	50	7.52 / 212.9
FD-10 FTC	10 / 3	48 / 1219	5.28 / 4.00	34.16	33.75	26.29	16.88	50	7.52 / 212.9

[1]Contact Hydro International when larger pipe sizes are required.
[2]Trash storage volume estimated as half the chamber volume from the base of the Inlet Chute to top of Bypass Weirs (not bypass screens). Actual volume of material stored will vary with size, density, and type. Larger volumes of trash may be retained.
[3]Calculated using HydroCAD modelling. A lower blinding factor can be applied to sites with lower anticipated loads.

Hydro International

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Tel: (207) 756-6200
Email: stormwaterinquiry@hydro-int.com
Web: www.hydro-int.com/firstdefense

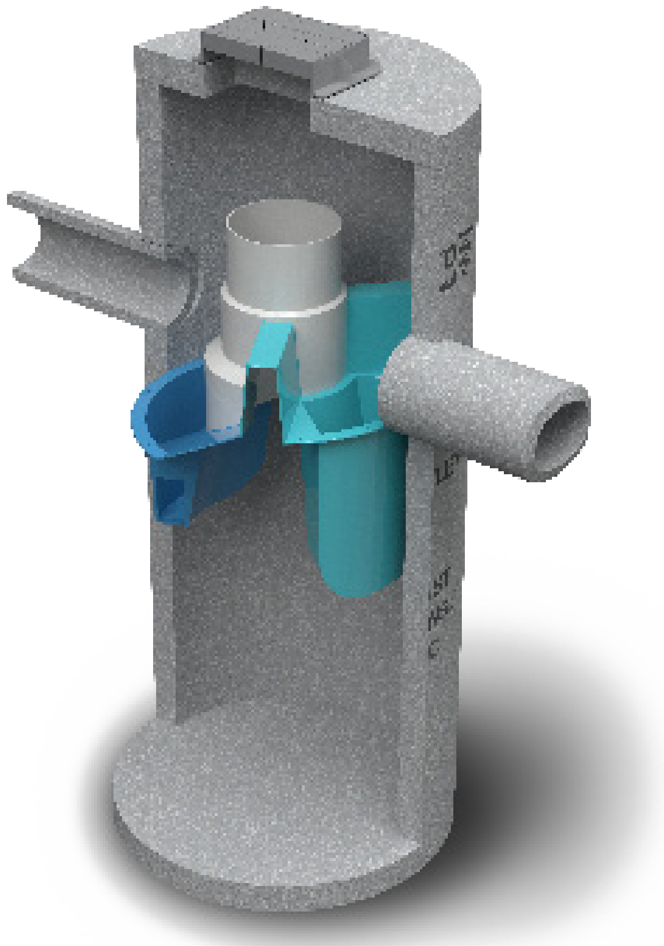
FD-FTC_SS_E_2309

Download Drawings:

→ hydro-int.com/fddrawings

Operation & Maintenance Manual:

→ hydro-int.com/fd-om



Operation and Maintenance Manual

First Defense® High Capacity and First Defense® Optimum

Vortex Separator for Stormwater Treatment

Table of Contents

Hydro International (Stormwater), 94 Hutchins Drive, Portland ME 04102
Tel: (207) 756-6200 Fax: (207) 756-6212 Web: www.hydro-int.com

I. First Defense® by Hydro International

Introduction

The First Defense® is an enhanced vortex separator that combines an effective and economical stormwater treatment chamber with an integral peak flow bypass. It efficiently removes total suspended solids (TSS), trash and hydrocarbons from stormwater runoff without washing out previously captured pollutants. The First Defense® is available in several model configurations to accommodate a wide range of pipe sizes, peak flows and depth constraints.

The two product models described in this guide are the First Defense® High Capacity and the First Defense® Optimum; they are inspected and maintained identically.

Operation

The First Defense® operates on simple fluid hydraulics. It is self-activating, has no moving parts, no external power requirement and is fabricated with durable non-corrosive components. No manual procedures are required to operate the unit and maintenance is limited to monitoring accumulations of stored pollutants and periodic clean-outs. The First Defense® has been designed to allow for easy and safe access for inspection, monitoring and clean-out procedures. Neither entry into the unit nor removal of the internal components is necessary for maintenance, thus safety concerns related to confined-space-entry are avoided.

Pollutant Capture and Retention

The internal components of the First Defense® have been designed to optimize pollutant capture. Sediment is captured and retained in the base of the unit, while oil and floatables are stored on the water surface in the inner volume (Fig.1).

The pollutant storage volumes are isolated from the built-in bypass chamber to prevent washout during high-flow storm events. The sump of the First Defense® retains a standing water level between storm events. This ensures a quiescent flow regime at the onset of a storm, preventing resuspension and washout of pollutants captured during previous events.

Accessories such as oil absorbent pads are available for enhanced oil removal and storage. Due to the separation of the oil and floatable storage volume from the outlet, the potential for washout of stored pollutants between clean-outs is minimized.

Applications

- Stormwater treatment at the point of entry into the drainage line
- Sites constrained by space, topography or drainage profiles with limited slope and depth of cover
- Retrofit installations where stormwater treatment is placed on or tied into an existing storm drain line
- Pretreatment for filters, infiltration and storage

Advantages

- Inlet options include surface grate or multiple inlet pipes
- Integral high capacity bypass conveys large peak flows without the need for “offline” arrangements using separate junction manholes
- Long flow path through the device ensures a long residence time within the treatment chamber, enhancing pollutant settling
- Delivered to site pre-assembled and ready for installation

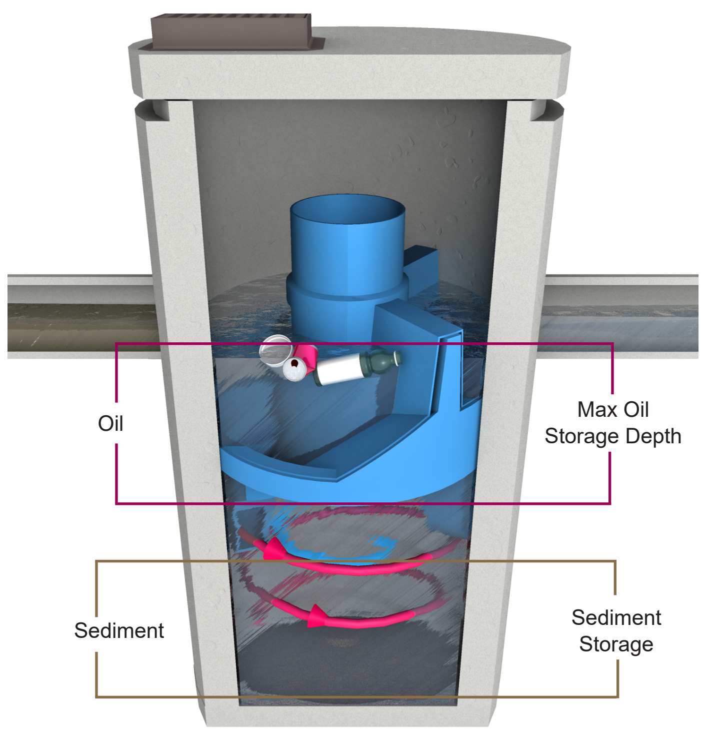


Fig.1 Pollutant storage volumes in the First Defense®.

II. Model Sizes & Configurations

The First Defense® inlet and internal bypass arrangements are available in several model sizes and configurations. The components have modified geometries allowing greater design flexibility to accommodate various site constraints.

All First Defense® models include the internal components that are designed to remove and retain total suspended solids (TSS), gross solids, floatable trash and hydrocarbons (Fig.2). First Defense® model sizes (diameter) are shown in Table 1.

III. Maintenance

First Defense® Components

1. **Built-In Bypass**
2. **Inlet Pipe**
3. **Inlet Chute**
4. **Floatables Draw-off Port**
5. **Outlet Pipe**
6. **Floatables Storage**
7. **Sediment Storage**
8. **Inlet Grate or Cover**

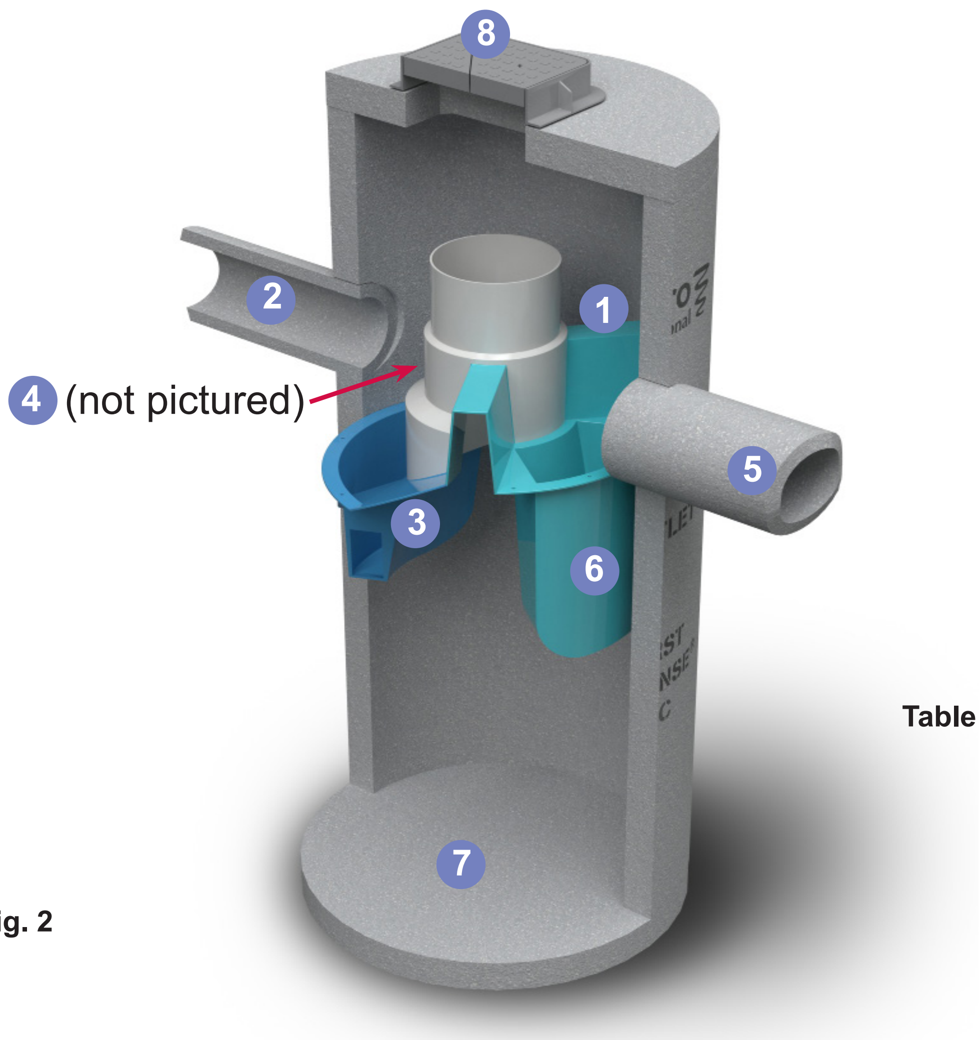


Fig. 2

Table 1

First Defense® Model Sizes
(ft / m) diameter
3 / 0.9
4 / 1.2
5 / 1.5
6 / 1.8
7 / 2.1
8 / 2.4
10 / 3.0

Hydro International (Stormwater), 94 Hutchins Drive, Portland ME 04102
Tel: (207) 756-6200 Fax: (207) 756-6212 Web: www.hydro-int.com

Overview

The First Defense® protects the environment by removing a wide range of pollutants from stormwater runoff. Periodic removal of these captured pollutants is essential to the continuous, long-term functioning of the First Defense®. The First Defense® will capture and retain sediment and oil until the sediment and oil storage volumes are full to capacity. When sediment and oil storage capacities are reached, the First Defense® will no longer be able to store removed sediment and oil.

The First Defense® allows for easy and safe inspection, monitoring and clean-out procedures. A commercially or municipally owned sump-vac is used to remove captured sediment and floatables. Access ports are located in the top of the manhole.

Maintenance events may include Inspection, Oil & Floatables Removal, and Sediment Removal. Maintenance events do not require entry into the First Defense®, nor do they require the internal components of the First Defense® to be removed. In the case of inspection and floatables removal, a vactor truck is not required. However, a vactor truck is required if the maintenance event is to include oil removal and/or sediment removal.

Maintenance Equipment Considerations

The internal components of the First Defense® have a centrally located circular shaft through which the sediment storage sump can be accessed with a sump vac hose. The open diameter of this access shaft is 15 inches in diameter (Fig.3). Therefore, the nozzle fitting of any vactor hose used for maintenance should be less than 15 inches in diameter.

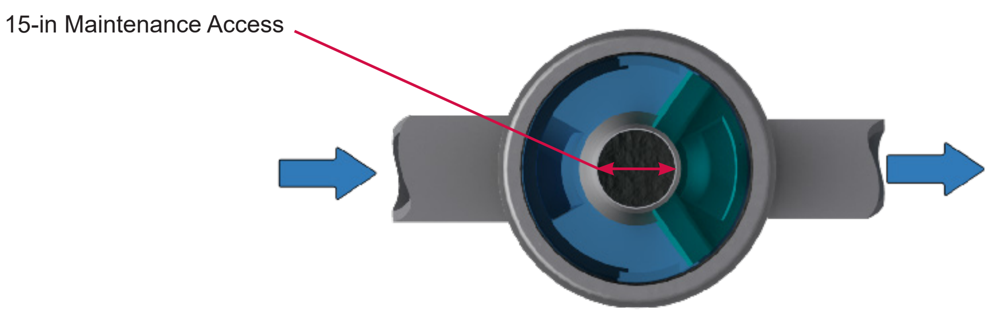


Fig.3 The central opening to the sump of the First Defense®is 15 inches in diameter.

Determining Your Maintenance Schedule

The frequency of clean out is determined in the field after installation. During the first year of operation, the unit should be inspected every six months to determine the rate of sediment and floatables accumulation. A simple probe such as a Sludge-Judge® can be used to determine the level of accumulated solids stored in the sump. This information can be recorded in the maintenance log (see page 9) to establish a routine maintenance schedule.

The vactor procedure, including both sediment and oil / flotables removal, for First Defense® typically takes less than 30 minutes and removes a combined water/oil volume of about 765 gallons.

Inspection Procedures

1. Set up any necessary safety equipment around the access port or grate of the First Defense® as stipulated by local ordinances. Safety equipment should notify passing pedestrian and road traffic that work is being done.

2. Remove the grate or lid to the manhole.

3. Without entering the vessel, look down into the chamber to inspect the inside. Make note of any irregularities. Fig.4 shows the standing water level that should be observed.

4. Without entering the vessel, use the pole with the skimmer net to remove floatables and loose debris from the components and water surface.

5. Using a sediment probe such as a Sludge Judge®, measure the depth of sediment that has collected in the sump of the vessel.

6. On the Maintenance Log (see page 9), record the date, unit location, estimated volume of floatables and gross debris removed, and the depth of sediment measured. Also note any apparent irregularities such as damaged components or blockages.

7. Securely replace the grate or lid.

8. Take down safety equipment.

9. Notify Hydro International of any irregularities noted during inspection.

Fig.4 Floatables are removed with a vactor hose

Floatables and Sediment Clean Out

Floatables clean out is typically done in conjunction with sediment removal. A commercially or municipally owned sump-vac is used to remove captured sediment and floatables (Fig.4).

Floatables and loose debris can also be netted with a skimmer and pole. The access port located at the top of the manhole provides unobstructed access for a vactor hose to be lowered to the base of the sump.

Scheduling

- Floatables and sump clean out are typically conducted once a year during any season.

- Floatables and sump clean out should occur as soon as possible following a spill in the contributing drainage area.

Recommended Equipment

- Safety Equipment (traffic cones, etc)

- Crow bar or other tool to remove grate or lid

- Pole with skimmer or net (if only floatables are being removed)

- Sediment probe (such as a Sludge Judge®)

- Vactor truck (flexible hose recommended)

- First Defense® Maintenance Log

Floatables and Sediment Clean Out Procedures

1. Set up any necessary safety equipment around the access port or grate of the First Defense® as stipulated by local ordinances. Safety equipment should notify passing pedestrian and road traffic that work is being done.

2. Remove the grate or lid to the manhole.

3. Without entering the vessel, look down into the chamber to inspect the inside. Make note of any irregularities.

4. Remove oil and floatables stored on the surface of the water with the vactor hose or with the skimmer or net

5. Using a sediment probe such as a Sludge Judge®, measure the depth of sediment that has collected in the sump of the vessel and record it in the Maintenance Log (page 9).

6. Once all floatables have been removed, drop the vactor hose to the base of the sump. Vactor out the sediment and gross debris off the sump floor

7. Retract the vactor hose from the vessel.

8. On the Maintenance Log provided by Hydro International, record the date, unit location, estimated volume of floatables and gross debris removed, and the depth of sediment measured. Also note any apparent irregularities such as damaged components, blockages, or irregularly high or low water levels.

9. Securely replace the grate or lid.

Maintenance at a Glance

Inspection	- Regularly during first year of installation - Every 6 months after the first year of installation
Oil and Floatables Removal	- Once per year, with sediment removal - Following a spill in the drainage area
Sediment Removal	- Once per year or as needed - Following a spill in the drainage area

NOTE: For most clean outs the entire volume of liquid does not need to be removed from the manhole. Only remove the first few inches of oils and floatables from the water surface to reduce the total volume of liquid removed during a clean out.

First Defense® Installation Log

HYDRO INTERNATIONAL REFERENCE NUMBER:	
SITE NAME:	
SITE LOCATION:	
OWNER:	CONTRACTOR:
CONTACT NAME:	CONTACT NAME:
COMPANY NAME:	COMPANY NAME:
ADDRESS:	ADDRESS:
TELEPHONE:	TELEPHONE:
FAX:	FAX:

INSTALLATION DATE: / /

MODEL SIZE (CIRCLE ONE): [3-FT] [4-FT] [5-FT] [6-FT] [7-FT] [8-FT] [10-FT]

INLET (CIRCLE ALL THAT APPLY): GRATED INLET (CATCH BASIN) INLET PIPE (FLOW THROUGH)

Hydro International®

First Defense® Inspection and Maintenance Log

Date	Initials	Depth of Floatables and Oils	Sediment Depth Measured	Volume of Sediment Removed	Site Activity and Comments

Hydro International (Stormwater), 94 Hutchins Drive, Portland ME 04102
Tel: (207) 756-6200 Fax: (207) 756-6212 Web: www.hydro-int.com

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Hydro International®

Stormwater Solutions

94 Hutchins Drive
Portland, ME 04102

Tel: (207) 756-6200
Fax: (207) 756-6212
stormwaterinquiry@hydro-int.com

www.hydro-int.com

Turning Water Around...®

Appendix D

SPDES General Permit
for
Stormwater Discharges from
Construction Activity

Permit No. GP-0-20-001

NEW YORK STATE OF OPPORTUNITY | Department of Environmental Conservation

NEW YORK STATE
DEPARTMENT OF ENVIRONMENTAL CONSERVATION

SPDES GENERAL PERMIT
FOR STORMWATER DISCHARGES

From

CONSTRUCTION ACTIVITY

Permit No. GP- 0-20-001

Issued Pursuant to Article 17, Titles 7, 8 and Article 70

of the Environmental Conservation Law

Effective Date: January 29, 2020

Expiration Date: January 28, 2025

John J. Ferguson

Chief Permit Administrator

1-23-20

Authorized Signature

Date

Address: NYS DEC
Division of Environmental Permits
625 Broadway, 4th Floor
Albany, N.Y. 12233-1750

PREFACE

Pursuant to Section 402 of the Clean Water Act ("CWA"), stormwater *discharges* from certain *construction activities* are unlawful unless they are authorized by a *National Pollutant Discharge Elimination System ("NPDES")* permit or by a state permit program. New York administers the approved State Pollutant Discharge Elimination System (SPDES) program with permits issued in accordance with the New York State Environmental Conservation Law (ECL) Article 17, Titles 7, 8 and Article 70.

An *owner or operator* of a *construction activity* that is eligible for coverage under this permit must obtain coverage prior to the *commencement of construction activity*. Activities that fit the definition of "*construction activity*", as defined under 40 CFR 122.26(b)(14)(x), (15)(i), and (15)(ii), constitute construction of a *point source* and therefore, pursuant to ECL section 17-0505 and 17-0701, the *owner or operator* must have coverage under a SPDES permit prior to *commencing construction activity*. The *owner or operator* cannot wait until there is an actual *discharge* from the *construction site* to obtain permit coverage.

***Note: The italicized words/phrases within this permit are defined in Appendix A.**

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
SPDES GENERAL PERMIT FOR STORMWATER DISCHARGES FROM CONSTRUCTION ACTIVITIES

Table of Contents

Part 1. PERMIT COVERAGE AND LIMITATIONS

A. Permit Application

This permit authorizes stormwater *discharges* to *surface waters of the State* from the following *construction activities* identified within 40 CFR Parts 122.26(b)(14)(x), 122.26(b)(15)(i) and 122.26(b)(15)(ii), provided all of the eligibility provisions of this permit are met:

1. *Construction activities* involving soil disturbances of one (1) or more acres; including disturbances of less than one acre that are part of a *larger common plan of development or sale* that will ultimately disturb one or more acres of land; excluding *routine maintenance activity* that is performed to maintain the original line and grade, hydraulic capacity or original purpose of a facility;

2. *Construction activities* involving soil disturbances of less than one (1) acre where the Department has determined that a *SPDES* permit is required for stormwater *discharges* based on the potential for contribution to a violation of a *water quality standard* or for significant contribution of *pollutants* to *surface waters of the State.*

3. *Construction activities* located in the watershed(s) identified in Appendix D that involve soil disturbances between five thousand (5,000) square feet and one (1) acre of land.

B. Effluent Limitations Applicable to Discharges from Construction Activities

*Discharge*s authorized by this permit must achieve, at a minimum, the effluent limitations in Part I.B.1. (a) – (f) of this permit. These limitations represent the degree of effluent reduction attainable by the application of best practicable technology currently available.

1. Erosion and Sediment Control Requirements - The *owner or operator* must select, design, install, implement and maintain control measures to *minimize* the *discharge* of *pollutants* and prevent a violation of the *water quality standards*. The selection, design, installation, implementation, and maintenance of these control measures must meet the non-numeric effluent limitations in Part I.B.1.(a) – (f) of this permit and be in accordance with the New York State Standards and Specifications for Erosion and Sediment Control, dated November 2016, using sound engineering judgment. Where control measures are not designed in conformance with the design criteria included in the technical standard, the *owner or operator* must include in the *Stormwater Pollution Prevention Plan* ("SWPPP") the reason(s) for the

deviation or alternative design and provide information which demonstrates that the deviation or alternative design is *equivalent* to the technical standard.

a. **Erosion and Sediment Controls.** Design, install and maintain effective erosion and sediment controls to *minimize* the *discharge* of *pollutants* and prevent a violation of the *water quality standards*. At a minimum, such controls must be designed, installed and maintained to:

(i) *Minimize* soil erosion through application of runoff control and soil stabilization control measure to *minimize pollutant discharges*;

(ii) Control stormwater *discharge*s, including both peak flowrates and total stormwater volume, to *minimize* channel and *streambank* erosion and scour in the immediate vicinity of the *discharge* points;

(iii) *Minimize* the amount of soil exposed during *construction activity*;

(iv) *Minimize* the disturbance of *steep slopes*;

(v) *Minimize* sediment *discharge*s from the site;

(vi) Provide and maintain *natural buffer*s around surface waters, direct stormwater to vegetated areas and maximize stormwater infiltration to reduce *pollutant discharge*s, unless *infeasible*;

(vii) *Minimize* soil compaction. Minimizing soil compaction is not required where the intended function of a specific area of the site dictates that it be compacted;

(viii) Unless *infeasible*, preserve a sufficient amount of topsoil to complete soil restoration and establish a uniform, dense vegetative cover; and

(ix) *Minimize* dust. On areas of exposed soil, *minimize* dust through the appropriate application of water or other dust suppression techniques to control the generation of pollutants that could be discharged from the site.

b. **Soil Stabilization**. In areas where soil disturbance activity has temporarily or permanently ceased, the application of soil stabilization measures must be initiated by the end of the next business day and completed within fourteen (14) days from the date the current soil disturbance activity ceased. For construction sites that *directly discharge* to one of the 303(d) segments listed in Appendix E or is located in one of the watersheds listed in Appendix C, the application of soil stabilization measures must be initiated by the end of the next business day and completed within seven (7) days from the date the current soil disturbance activity ceased. See Appendix A for definition of *Temporarily Ceased*.

c. **Dewatering**. *Discharge*s from *dewatering* activities, including *discharge*s from *dewatering* of trenches and excavations, must be managed by appropriate control measures.

d. **Pollution Prevention Measures**. Design, install, implement, and maintain effective pollution prevention measures to *minimize* the *discharge* of *pollutants* and prevent a violation of the *water quality standards*. At a minimum, such measures must be designed, installed, implemented and maintained to:

(i) *Minimize* the *discharge* of *pollutants* from equipment and vehicle washing, wheel wash water, and other wash waters. This applies to washing operations that use clean water only. Soaps, detergents and solvents cannot be used;

(ii) *Minimize* the exposure of building materials, building products, construction wastes, trash, landscape materials, fertilizers, pesticides, herbicides, detergents, sanitary waste, hazardous and toxic waste, and other materials present on the site to precipitation and to stormwater. Minimization of exposure is not required in cases where the exposure to precipitation and to stormwater will not result in a *discharge* of *pollutants*, or where exposure of a specific material or product poses little risk of stormwater contamination (such as final products and materials intended for outdoor use) ; and

(iii) Prevent the *discharge* of *pollutants* from spills and leaks and implement chemical spill and leak prevention and response procedures.

e. **Prohibited *Discharge*s.** The following *discharge*s are prohibited:

(i) Wastewater from washout of concrete;

(ii) Wastewater from washout and cleanout of stucco, paint, form release oils, curing compounds and other construction materials;

(iii) Fuels, oils, or other *pollutants* used in vehicle and equipment operation and maintenance;

(iv) Soaps or solvents used in vehicle and equipment washing; and

(v) Toxic or hazardous substances from a spill or other release.

f. Surface Outlets. When discharging from basins and impoundments, the outlets shall be designed, constructed and maintained in such a manner that sediment does not leave the basin or impoundment and that erosion at or below the outlet does not occur.

C. Post-construction Stormwater Management Practice Requirements

1. The *owner or operator* of a *construction activity* that requires post-construction stormwater management practices pursuant to Part III.C. of this permit must select, design, install, and maintain the practices to meet the *performance criteria* in the New York State Stormwater Management Design Manual ("Design Manual"), dated January 2015, using sound engineering judgment. Where post-construction stormwater management practices ("SMPs") are not designed in conformance with the *performance criteria* in the Design Manual, the *owner or operator* must include in the SWPPP the reason(s) for the deviation or alternative design and provide information which demonstrates that the deviation or alternative design is *equivalent* to the technical standard.

2. The *owner or operator* of a *construction activity* that requires post-construction stormwater management practices pursuant to Part III.C. of this permit must design the practices to meet the applicable *sizing criteria* in Part I.C.2.a., b., c. or d. of this permit.

a. Sizing Criteria for New Development

(i) Runoff Reduction Volume ("RRv"): Reduce the total Water Quality Volume ("WQv") by application of RR techniques and standard SMPs with RRv capacity. The total WQv shall be calculated in accordance with the criteria in Section 4.2 of the Design Manual.

(ii) Minimum RRv and Treatment of Remaining Total WQv: Construction activities that cannot meet the criteria in Part I.C.2.a.(i) of this permit due to site limitations shall direct runoff from all newly constructed impervious areas to a RR technique or standard SMP with RRv capacity unless infeasible. The specific site limitations that prevent the reduction of 100% of the WQv shall be documented in the SWPPP.

For each impervious area that is not directed to a RR technique or standard SMP with RRv capacity, the SWPPP must include documentation which demonstrates that all options were considered and for each option explains why it is considered infeasible.

In no case shall the runoff reduction achieved from the newly constructed impervious areas be less than the Minimum RRv as calculated using the criteria in Section 4.3 of the Design Manual. The remaining portion of the total WQv that cannot be reduced shall be treated by application of standard SMPs.

(iii) Channel Protection Volume (“Cpv”): Provide 24 hour extended detention of the post-developed 1-year, 24-hour storm event; remaining after runoff reduction. The Cpv requirement does not apply when:
(1) Reduction of the entire Cpv is achieved by application of runoff reduction techniques or infiltration systems, or
(2) The site discharges directly to tidal waters, or fifth order or larger streams.

(iv) *Overbank* Flood Control Criteria (“Qp”): Requires storage to attenuate the post-development 10-year, 24-hour peak discharge rate (Qp) to predevelopment rates. The Qp requirement does not apply when:
(1) the site discharges directly to tidal waters or fifth order or larger streams, or
(2) A downstream analysis reveals that *overbank* control is not required.

(v) Extreme Flood Control Criteria (“Qf”): Requires storage to attenuate the post-development 100-year, 24-hour peak discharge rate (Qf) to predevelopment rates. The Qf requirement does not apply when:
(1) the site discharges directly to tidal waters or fifth order or larger streams, or
(2) A downstream analysis reveals that *overbank* control is not required.

b. *Sizing Criteria* for *New Development* in Enhanced Phosphorus Removal Watershed

(i) Runoff Reduction Volume (RRv): Reduce the total Water Quality Volume (WQv) by application of RR techniques and standard SMPs with RRv capacity. The total WQv is the runoff volume from the 1-year, 24 hour design storm over the post-developed watershed and shall be calculated in accordance with the criteria in Section 10.3 of the Design Manual.

(ii) Minimum RRv and Treatment of Remaining Total WQv: *Construction activities* that cannot meet the criteria in Part I.C.2.b.(i) of this permit due to *site limitations* shall direct runoff from all newly constructed *impervious areas* to a RR technique or standard SMP with RRv capacity unless *infeasible*. The specific *site limitations* that prevent the reduction of 100% of the WQv shall be documented in the SWPPP. For each *impervious area* that is not directed to a RR technique or standard SMP with RRv capacity, the SWPPP must include documentation which demonstrates that all options were considered and for each option explains why it is considered *infeasible.*

In no case shall the runoff reduction achieved from the newly constructed *impervious areas* be less than the Minimum RRv as calculated using the criteria in Section 10.3 of the Design Manual. The remaining portion of the total WQv that cannot be reduced shall be treated by application of standard SMPs.

(iii) Channel Protection Volume (Cpv): Provide 24 hour extended detention of the post-developed 1-year, 24-hour storm event; remaining after runoff reduction. The Cpv requirement does not apply when:
(1) Reduction of the entire Cpv is achieved by application of runoff reduction techniques or infiltration systems, or
(2) The site *discharge*s directly to tidal waters, or fifth order or larger streams.

(iv) *Overbank* Flood Control Criteria (Qp): Requires storage to attenuate the post-development 10-year, 24-hour peak *discharge* rate (Qp) to predevelopment rates. The Qp requirement does not apply when:
(1) the site *discharge*s directly to tidal waters or fifth order or larger streams, or
(2) A downstream analysis reveals that *overbank* control is not required.

(v) Extreme Flood Control Criteria (Qf): Requires storage to attenuate the post-development 100-year, 24-hour peak *discharge* rate (Qf) to predevelopment rates. The Qf requirement does not apply when:
(1) the site *discharge*s directly to tidal waters or fifth order or larger streams, or
(2) A downstream analysis reveals that *overbank* control is not required.

c. Sizing Criteria for Redevelopment Activity

(i) Water Quality Volume (WQv): The WQv treatment objective for *redevelopment activity* shall be addressed by one of the following options. *Redevelopment activities* located in an Enhanced Phosphorus Removal Watershed (see Part III.B.3. and Appendix C of this permit) shall calculate the WQv in accordance with Section 10.3 of the Design Manual. All other *redevelopment activities* shall calculate the WQv in accordance with Section 4.2 of the Design Manual.

(1) Reduce the existing *impervious cover* by a minimum of 25% of the total disturbed, *impervious area*. The Soil Restoration criteria in Section 5.1.6 of the Design Manual must be applied to all newly created pervious areas, or

(2) Capture and treat a minimum of 25% of the WQv from the disturbed, *impervious area* by the application of standard SMPs; or reduce 25% of the WQv from the disturbed, *impervious area* by the application of RR techniques or standard SMPs with RRv capacity., or

(3) Capture and treat a minimum of 75% of the WQv from the disturbed, *impervious area* as well as any additional runoff from tributary areas by application of the alternative practices discussed in Sections 9.3 and 9.4 of the Design Manual., or

(4) Application of a combination of 1, 2 and 3 above that provide a weighted average of at least two of the above methods. Application of this method shall be in accordance with the criteria in Section 9.2.1(B) (IV) of the Design Manual.

If there is an existing post-construction stormwater management practice located on the site that captures and treats runoff from the *impervious area* that is being disturbed, the WQv treatment option selected must, at a minimum, provide treatment equal to the treatment that was being provided by the existing practice(s) if that treatment is greater than the treatment required by options 1 – 4 above.

(ii) Channel Protection Volume (Cpv): Not required if there are no changes to hydrology that increase the *discharge* rate from the project site.

(iii) *Overbank* Flood Control Criteria (Qp): Not required if there are no changes to hydrology that increase the *discharge* rate from the project site.

(iv) Extreme Flood Control Criteria (Qf): Not required if there are no changes to hydrology that increase the *discharge* rate from the project site

d. Sizing Criteria for Combination of Redevelopment Activity and New Development

Construction projects that include both New Development and Redevelopment Activity shall provide post-construction stormwater management controls that meet the sizing criteria calculated as an aggregate of the Sizing Criteria in Part I.C.2.a. or b. of this permit for the New Development portion of the project and Part I.C.2.c of this permit for Redevelopment Activity portion of the project.

D. Maintaining Water Quality

The Department expects that compliance with the conditions of this permit will control *discharge*s necessary to meet applicable *water quality standards*. It shall be a violation of the *ECL* for any discharge to either cause or contribute to a violation of *water quality standards* as contained in Parts 700 through 705 of Title 6 of the Official Compilation of Codes, Rules and Regulations of the State of New York, such as:

1. There shall be no increase in turbidity that will cause a substantial visible contrast to natural conditions;

2. There shall be no increase in suspended, colloidal or settleable solids that will cause deposition or impair the waters for their best usages; and

3. There shall be no residue from oil and floating substances, nor visible oil film, nor globules of grease.

If there is evidence indicating that the stormwater *discharge*s authorized by this permit are causing, have the reasonable potential to cause, or are contributing to a violation of the *water quality standards*; the *owner or operator* must take appropriate corrective action in accordance with Part IV.C.5. of this general permit and document in accordance with Part IV.C.4. of this general permit. To address the *water quality standard* violation the *owner or operator* may need to provide additional information, include and implement appropriate controls in the SWPPP to correct the problem, or obtain an individual SPDES permit.

If there is evidence indicating that despite compliance with the terms and conditions of this general permit it is demonstrated that the stormwater *discharge*s authorized by this permit are causing or contributing to a violation of *water quality standards*, or if the Department determines that a modification of the permit is necessary to prevent a violation of *water quality standards*, the authorized *discharge*s will no longer be eligible for coverage under this permit. The Department may require the *owner or operator* to obtain an individual SPDES permit to continue discharging.

E. Eligibility Under This General Permit

1. This permit may authorize all *discharges* of stormwater from *construction activity* to *surface waters of the State* and *groundwaters* except for ineligible *discharges* identified under subparagraph F. of this Part.

2. Except for non-stormwater *discharges* explicitly listed in the next paragraph, this permit only authorizes stormwater *discharge*s; including stormwater runoff, snowmelt runoff, and surface runoff and drainage, from *construction activities*.

3. Notwithstanding paragraphs E.1 and E.2 above, the following non-stormwater discharges are authorized by this permit: those listed in 6 NYCRR 750-1.2(a)(29)(vi), with the following exception: "Discharges from firefighting activities are authorized only when the firefighting activities are emergencies/unplanned"; waters to which other components have not been added that are used to control dust in accordance with the SWPPP; and uncontaminated *discharge*s from *construction site* de-watering operations. All non-stormwater discharges must be identified in the SWPPP. Under all circumstances, the *owner or operator* must still comply with *water quality standards* in Part I.D of this permit.

4. The *owner or operator* must maintain permit eligibility to *discharge* under this permit. Any *discharges* that are not compliant with the eligibility conditions of this permit are not authorized by the permit and the *owner or operator* must either apply for a separate permit to cover those ineligible *discharges* or take steps necessary to make the *discharge* eligible for coverage.

F. Activities Which Are Ineligible for Coverage Under This General Permit

All of the following are **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. *Discharge*s from *construction activities* that are subject to an existing SPDES individual or general permit where a SPDES permit for *construction activity* has been terminated or denied; or where the *owner or operator* has failed to renew an expired individual permit.

Part II. PERMIT COVERAGE

A. How to Obtain Coverage

1. An *owner or operator* of a *construction activity* that is not subject to the requirements of a regulated, traditional land use control MS4 must first prepare a SWPPP in accordance with all applicable requirements of this permit and then submit a completed Notice of Intent (NOI) to the Department to be authorized to discharge under this permit.

2. An *owner or operator* of a *construction activity* that is subject to the requirements of a *regulated, traditional land use control MS4* must first prepare a SWPPP in accordance with all applicable requirements of this permit and then have the SWPPP reviewed and accepted by the *regulated, traditional land use control MS4* prior to submitting the NOI to the Department. The *owner or operator* shall have the “MS4 SWPPP Acceptance” form signed in accordance with Part VII.H., and then submit that form along with a completed NOI to the Department.

3. The requirement for an *owner or operator* to have its SWPPP reviewed and accepted by the *regulated, traditional land use control MS4* prior to submitting the NOI to the Department does not apply to an *owner or operator* that is obtaining permit coverage in accordance with the requirements in Part II.F. (Change of *Owner or Operator*) or where the *owner or operator* of the *construction activity* is the *regulated, traditional land use control MS4* . This exemption does not apply to *construction activities* subject to the New York City Administrative Code.

B. Notice of Intent (NOI) Submittal

1. Prior to December 21, 2020, an owner or operator shall use either the electronic (eNOI) or paper version of the NOI that the Department prepared. Both versions of the NOI are located on the Department's website (http://www.dec.ny.gov/). The paper version of the NOI shall be signed in accordance with Part VII.H. of this permit and submitted to the following address:

   NOTICE OF INTENT
   NYS DEC, Bureau of Water Permits
   625 Broadway, 4th Floor
   Albany, New York 12233-3505

2. Beginning December 21, 2020 and in accordance with EPA's 2015 NPDES Electronic Reporting Rule (40 CFR Part 127), the *owner or operator* must submit the NOI electronically using the *Department's* online NOI.

3. The *owner or operator* shall have the SWPPP preparer sign the "SWPPP Preparer Certification" statement on the NOI prior to submitting the form to the Department.

4. As of the date the NOI is submitted to the Department, the *owner or operator* shall make the NOI and SWPPP available for review and copying in accordance with the requirements in Part VII.F. of this permit.

C. Permit Authorization

1. An *owner or operator* shall not *commence construction activity* until their authorization to *discharge* under this permit goes into effect.

2. Authorization to *discharge* under this permit will be effective when the *owner or operator* has satisfied all of the following criteria:

   a. project review pursuant to the State Environmental Quality Review Act ("SEQRA") have been satisfied, when SEQRA is applicable. See the Department's website (http://www.dec.ny.gov/) for more information,

   b. where required, all necessary Department permits subject to the *Uniform Procedures Act ("UPA")* (see 6 NYCRR Part 621), or the equivalent from another New York State agency, have been obtained, unless otherwise notified by the Department pursuant to 6 NYCRR 621.3(a)(4). *Owners or operators* of *construction activities* that are required to obtain *UPA* permits must submit a preliminary SWPPP to the appropriate DEC Permit Administrator at the Regional Office listed in Appendix F at the time all other necessary *UPA* permit applications are submitted. The preliminary SWPPP must include sufficient information to demonstrate that the *construction activity* qualifies for authorization under this permit,

c. the final SWPPP has been prepared, and

d. a complete NOI has been submitted to the Department in accordance with the requirements of this permit.

3. An *owner or operator* that has satisfied the requirements of Part II.C.2 above will be authorized to *discharge* stormwater from their *construction activity* in accordance with the following schedule:

   a. For *construction activities* that are not subject to the requirements of a *regulated, traditional land use control MS4*:

      (i) Five (5) business days from the date the Department receives a complete electronic version of the NOI (eNOI) for *construction activities* with a SWPPP that has been prepared in conformance with the design criteria in the technical standard referenced in Part III.B.1 and the *performance criteria* in the technical standard referenced in Parts III.B., 2 or 3, for *construction activities* that require post-construction stormwater management practices pursuant to Part III.C.; or

      (ii) Sixty (60) business days from the date the Department receives a complete NOI (electronic or paper version) for *construction activities* with a SWPPP that has not been prepared in conformance with the design criteria in technical standard referenced in Part III.B.1. or, for *construction activities* that require post-construction stormwater management practices pursuant to Part III.C., the *performance criteria* in the technical standard referenced in Parts III.B., 2 or 3, or;

      (iii) Ten (10) business days from the date the Department receives a complete paper version of the NOI for *construction activities* with a SWPPP that has been prepared in conformance with the design criteria in the technical standard referenced in Part III.B.1 and the *performance criteria* in the technical standard referenced in Parts III.B., 2 or 3, for *construction activities* that require post-construction stormwater management practices pursuant to Part III.C.

b. For *construction activities* that are subject to the requirements of a *regulated, traditional land use control MS4*:

(i) Five (5) business days from the date the Department receives both a complete electronic version of the NOI (eNOI) and signed "*MS4* SWPPP Acceptance" form, or

(ii) Ten (10) business days from the date the Department receives both a complete paper version of the NOI and signed "MS4 SWPPP Acceptance" form.

4. Coverage under this permit authorizes stormwater *discharges* from only those areas of disturbance that are identified in the NOI. If an *owner or operator* wishes to have stormwater *discharges* from future or additional areas of disturbance authorized, they must submit a new NOI that addresses that phase of the development, unless otherwise notified by the Department. The *owner or operator* shall not *commence construction activity* on the future or additional areas until their authorization to *discharge* under this permit goes into effect in accordance with Part II.C. of this permit.

D. General Requirements For Owners or Operators With Permit Coverage

1. The *owner or operator* shall ensure that the provisions of the SWPPP are implemented from the *commencement of construction activity* until all areas of disturbance have achieved *final stabilization* and the Notice of Termination ("NOT") has been submitted to the Department in accordance with Part V. of this permit. This includes any changes made to the SWPPP pursuant to Part III.A.4. of this permit.

2. The *owner or operator* shall maintain a copy of the General Permit (GP-0-20-001), NOI, *NOI Acknowledgment Letter*, SWPPP, MS4 SWPPP Acceptance form, inspection reports, responsible contractor's or subcontractor's certification statement (see Part III.A.6.), and all documentation necessary to demonstrate eligibility with this permit at the *construction site* until all disturbed areas have achieved *final stabilization* and the NOT has been submitted to the Department. The documents must be maintained in a secure location, such as a job trailer, on-site construction office, or mailbox with lock. The secure location must be accessible during normal business hours to an individual performing a compliance inspection.

3. The *owner or operator* of a *construction activity* shall not disturb greater than five (5) acres of soil at any one time without prior written authorization from the Department or, in areas under the jurisdiction of a *regulated, traditional land*

use control MS4, the *regulated, traditional land use control MS4* (provided the *regulated, traditional land use control MS4* is not the *owner or operator* of the *construction activity*). At a minimum, the *owner or operator* must comply with the following requirements in order to be authorized to disturb greater than five (5) acres of soil at any one time:

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

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

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

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

e. The *owner or operator* shall include the requirements above in their SWPPP.

4. In accordance with statute, regulations, and the terms and conditions of this permit, the Department may suspend or revoke an *owner's or operator's* coverage under this permit at any time if the Department determines that the SWPPP does not meet the permit requirements or consistent with Part VII.K..

5. Upon a finding of significant non-compliance with the practices described in the SWPPP or violation of this permit, the Department may order an immediate stop to all activity at the site until the non-compliance is remedied. The stop work order shall be in writing, describe the non-compliance in detail, and be sent to the *owner or operator*.

6. For *construction activities* that are subject to the requirements of a *regulated, traditional land use control MS4*, the *owner or operator* shall notify the

regulated, traditional land use control MS4 in writing of any planned amendments or modifications to the post-construction stormwater management practice component of the SWPPP required by Part III.A. 4. and 5. of this permit. Unless otherwise notified by the *regulated, traditional land use control MS4*, the *owner or operator* shall have the SWPPP amendments or modifications reviewed and accepted by the *regulated, traditional land use control MS4* prior to commencing construction of the post-construction stormwater management practice.

E. Permit Coverage for Discharges Authorized Under GP-0-15-002

1. Upon renewal of SPDES General Permit for Stormwater Discharges from *Construction Activity* (Permit No. GP-0-15-002), an *owner or operator* of *a construction activity* with coverage under GP-0-15-002, as of the effective date of GP- 0-20-001, shall be authorized to *discharge* in accordance with GP- 0-20-001, unless otherwise notified by the Department.

   An *owner or operator* may continue to implement the technical/design components of the post-construction stormwater management controls provided that such design was done in conformance with the technical standards in place at the time of initial project authorization. However, they must comply with the other, non-design provisions of GP-0-20-001.

F. Change of Owner or Operator

1. When property ownership changes or when there is a change in operational control over the construction plans and specifications, the original *owner or operator* must notify the new *owner or operator*, in writing, of the requirement to obtain permit coverage by submitting a NOI with the Department. For *construction activities* subject to the requirements of a *regulated, traditional land use control MS4,* the original *owner or operator* must also notify the MS4, in writing, of the change in ownership at least 30 calendar days prior to the change in ownership.

2. Once the new *owner or operator* obtains permit coverage, the original *owner or operator* shall then submit a completed NOT with the name and permit identification number of the new *owner or operator* to the Department at the address in Part II.B.1. of this permit. If the original *owner or operator* maintains ownership of a portion of the *construction activity* and will disturb soil, they must maintain their coverage under the permit.

3. Permit coverage for the new *owner or operator* will be effective as of the date the Department receives a complete NOI, provided the original *owner or*

operator was not subject to a sixty (60) business day authorization period that has not expired as of the date the Department receives the NOI from the new *owner or operator*.

Part III. STORMWATER POLLUTION PREVENTION PLAN (SWPPP)

A. General SWPPP Requirements

1. A SWPPP shall be prepared and implemented by the *owner or operator* of each *construction activity* covered by this permit. The SWPPP must document the selection, design, installation, implementation and maintenance of the control measures and practices that will be used to meet the effluent limitations in Part I.B. of this permit and where applicable, the post-construction stormwater management practice requirements in Part I.C. of this permit. The SWPPP shall be prepared prior to the submittal of the NOI. The NOI shall be submitted to the Department prior to the *commencement of construction activity*. A copy of the completed, final NOI shall be included in the SWPPP.

2. The SWPPP shall describe the erosion and sediment control practices and where required, post-construction stormwater management practices that will be used and/or constructed to reduce the *pollutants* in stormwater *discharges* and to assure compliance with the terms and conditions of this permit. In addition, the SWPPP shall identify potential sources of pollution which may reasonably be expected to affect the quality of stormwater *discharges*.

3. All SWPPPs that require the post-construction stormwater management practice component shall be prepared by a *qualified professional* that is knowledgeable in the principles and practices of stormwater management and treatment.

4. The *owner or operator* must keep the SWPPP current so that it at all times accurately documents the erosion and sediment controls practices that are being used or will be used during construction, and all post-construction stormwater management practices that will be constructed on the site. At a minimum, the *owner or operator* shall amend the SWPPP, including construction drawings:

    a. whenever the current provisions prove to be ineffective in minimizing *pollutants* in stormwater *discharges* from the site;

b. whenever there is a change in design, construction, or operation at the *construction site* that has or could have an effect on the *discharge* of *pollutants*;

c. to address issues or deficiencies identified during an inspection by the *qualified inspector,* the Department or other regulatory authority; and

d. to document the final construction conditions.

5. The Department may notify the *owner or operator* at any time that the SWPPP does not meet one or more of the minimum requirements of this permit. The notification shall be in writing and identify the provisions of the SWPPP that require modification. Within fourteen (14) calendar days of such notification, or as otherwise indicated by the Department, the *owner or operator* shall make the required changes to the SWPPP and submit written notification to the Department that the changes have been made. If the *owner or operator* does not respond to the Department's comments in the specified time frame, the Department may suspend the *owner's or operator's* coverage under this permit or require the *owner or operator* to obtain coverage under an individual SPDES permit in accordance with Part II.D.4. of this permit.

6. Prior to the *commencement of construction activity*, the *owner or operator* must identify the contractor(s) and subcontractor(s) that will be responsible for installing, constructing, repairing, replacing, inspecting and maintaining the erosion and sediment control practices included in the SWPPP; and the contractor(s) and subcontractor(s) that will be responsible for constructing the post-construction stormwater management practices included in the SWPPP. The *owner or operator* shall have each of the contractors and subcontractors identify at least one person from their company that will be responsible for implementation of the SWPPP. This person shall be known as the *trained contractor.* The *owner or operator* shall ensure that at least one *trained contractor* is on site on a daily basis when soil disturbance activities are being performed.

   The *owner or operator* shall have each of the contractors and subcontractors identified above sign a copy of the following certification statement below before they commence any *construction activity*:

   > "I hereby certify under penalty of law that I understand and agree to comply with the terms and conditions of the SWPPP and agree to implement any corrective actions identified by the *qualified inspector* during a site inspection. I also understand that the *owner or operator* must comply with

the terms and conditions of the most current version of the New York State Pollutant Discharge Elimination System ("SPDES") general permit for stormwater *discharge*s from *construction activities* and that it is unlawful for any person to cause or contribute to a violation of *water quality standards*. Furthermore, I am aware that there are significant penalties for submitting false information, that I do not believe to be true, including the possibility of fine and imprisonment for knowing violations"

In addition to providing the certification statement above, the certification page must also identify the specific elements of the SWPPP that each contractor and subcontractor will be responsible for and include the name and title of the person providing the signature; the name and title of the *trained contractor* responsible for SWPPP implementation; the name, address and telephone number of the contracting firm; the address (or other identifying description) of the site; and the date the certification statement is signed. The *owner or operator* shall attach the certification statement(s) to the copy of the SWPPP that is maintained at the *construction site*. If new or additional contractors are hired to implement measures identified in the SWPPP after construction has commenced, they must also sign the certification statement and provide the information listed above.

7. For projects where the Department requests a copy of the SWPPP or inspection reports, the *owner or operator* shall submit the documents in both electronic (PDF only) and paper format within five (5) business days, unless otherwise notified by the Department.

B. Required SWPPP Contents

1. Erosion and sediment control component - All SWPPPs prepared pursuant to this permit shall include erosion and sediment control practices designed in conformance with the technical standard, New York State Standards and Specifications for Erosion and Sediment Control, dated November 2016. Where erosion and sediment control practices are not designed in conformance with the design criteria included in the technical standard, the *owner or operator* must demonstrate *equivalence* to the technical standard. At a minimum, the erosion and sediment control component of the SWPPP shall include the following:

    a. Background information about the scope of the project, including the location, type and size of project

b. A site map/construction drawing(s) for the project, including a general location map. At a minimum, the site map shall show the total site area; all improvements; areas of disturbance; areas that will not be disturbed; existing vegetation; on-site and adjacent off-site surface water(s); floodplain/floodway boundaries; wetlands and drainage patterns that could be affected by the *construction activity*; existing and final contours ; locations of different soil types with boundaries; material, waste, borrow or equipment storage areas located on adjacent properties; and location(s) of the stormwater *discharge*(s);

c. A description of the soil(s) present at the site, including an identification of the Hydrologic Soil Group (HSG);

d. A construction phasing plan and sequence of operations describing the intended order of *construction activities*, including clearing and grubbing, excavation and grading, utility and infrastructure installation and any other activity at the site that results in soil disturbance;

e. A description of the minimum erosion and sediment control practices to be installed or implemented for each *construction activity* that will result in soil disturbance. Include a schedule that identifies the timing of initial placement or implementation of each erosion and sediment control practice and the minimum time frames that each practice should remain in place or be implemented;

f. A temporary and permanent soil stabilization plan that meets the requirements of this general permit and the technical standard, New York State Standards and Specifications for Erosion and Sediment Control, dated November 2016, for each stage of the project, including initial land clearing and grubbing to project completion and achievement of *final stabilization*;

g. A site map/construction drawing(s) showing the specific location(s), size(s), and length(s) of each erosion and sediment control practice;

h. The dimensions, material specifications, installation details, and operation and maintenance requirements for all erosion and sediment control practices. Include the location and sizing of any temporary sediment basins and structural practices that will be used to divert flows from exposed soils;

i. A maintenance inspection schedule for the contractor(s) identified in Part III.A.6. of this permit, to ensure continuous and effective operation of the erosion and sediment control practices. The maintenance inspection schedule shall be in accordance with the requirements in the technical standard, New York State Standards and Specifications for Erosion and Sediment Control, dated November 2016;

j. A description of the pollution prevention measures that will be used to control litter, construction chemicals and construction debris from becoming a *pollutant* source in the stormwater *discharges*;

k. A description and location of any stormwater *discharges* associated with industrial activity other than construction at the site, including, but not limited to, stormwater *discharges* from asphalt plants and concrete plants located on the *construction site*; and

l. Identification of any elements of the design that are not in conformance with the design criteria in the technical standard, New York State Standards and Specifications for Erosion and Sediment Control, dated November 2016. Include the reason for the deviation or alternative design and provide information which demonstrates that the deviation or alternative design is *equivalent* to the technical standard.

2. Post-construction stormwater management practice component – The *owner or operator* of any construction project identified in Table 2 of Appendix B as needing post-construction stormwater management practices shall prepare a SWPPP that includes practices designed in conformance with the applicable *sizing criteria* in Part I.C.2.a., c. or d. of this permit and the *performance criteria* in the technical standard, New York State Stormwater Management Design Manual dated January 2015

   Where post-construction stormwater management practices are not designed in conformance with the *performance criteria* in the technical standard, the *owner or operator* must include in the SWPPP the reason(s) for the deviation or alternative design and provide information which demonstrates that the deviation or alternative design is *equivalent* to the technical standard.

   The post-construction stormwater management practice component of the SWPPP shall include the following:

   a. Identification of all post-construction stormwater management practices to be constructed as part of the project. Include the dimensions, material specifications and installation details for each post-construction stormwater management practice;

b. A site map/construction drawing(s) showing the specific location and size of each post-construction stormwater management practice;

c. A Stormwater Modeling and Analysis Report that includes:
   (i) Map(s) showing pre-development conditions, including watershed/subcatchments boundaries, flow paths/routing, and design points;

   (ii) Map(s) showing post-development conditions, including watershed/subcatchments boundaries, flow paths/routing, design points and post-construction stormwater management practices;

   (iii) Results of stormwater modeling (i.e. hydrology and hydraulic analysis) for the required storm events. Include supporting calculations (model runs), methodology, and a summary table that compares pre and post-development runoff rates and volumes for the different storm events;

   (iv) Summary table, with supporting calculations, which demonstrates that each post-construction stormwater management practice has been designed in conformance with the *sizing criteria* included in the Design Manual;

   (v) Identification of any *sizing criteria* that is not required based on the requirements included in Part I.C. of this permit; and

   (vi) Identification of any elements of the design that are not in conformance with the *performance criteria* in the Design Manual. Include the reason(s) for the deviation or alternative design and provide information which demonstrates that the deviation or alternative design is *equivalent* to the Design Manual;

d. Soil testing results and locations (test pits, borings);

e. Infiltration test results, when required; and

f. An operations and maintenance plan that includes inspection and maintenance schedules and actions to ensure continuous and effective operation of each post-construction stormwater management practice. The plan shall identify the entity that will be responsible for the long term operation and maintenance of each practice.

3. Enhanced Phosphorus Removal Standards - All construction projects identified in Table 2 of Appendix B that are located in the watersheds identified in Appendix C shall prepare a SWPPP that includes post-construction stormwater management practices designed in conformance with the applicable *sizing criteria* in Part I.C.2. b., c. or d. of this permit and the *performance criteria,* Enhanced Phosphorus Removal Standards included in the Design Manual. At a minimum, the post-construction stormwater management practice component of the SWPPP shall include items 2.a - 2.f. above.

C. Required SWPPP Components by Project Type

Unless otherwise notified by the Department, *owners or operators* of *construction activities* identified in Table 1 of Appendix B are required to prepare a SWPPP that only includes erosion and sediment control practices designed in conformance with Part III.B.1 of this permit. *Owners or operators* of the *construction activities* identified in Table 2 of Appendix B shall prepare a SWPPP that also includes post-construction stormwater management practices designed in conformance with Part III.B.2 or 3 of this permit.

Part IV. INSPECTION AND MAINTENANCE REQUIREMENTS

A. General Construction Site Inspection and Maintenance Requirements

1. The *owner or operator* must ensure that all erosion and sediment control practices (including pollution prevention measures) and all post-construction stormwater management practices identified in the SWPPP are inspected and maintained in accordance with Part IV.B. and C. of this permit.

2. The terms of this permit shall not be construed to prohibit the State of New York from exercising any authority pursuant to the ECL, common law or federal law, or prohibit New York State from taking any measures, whether civil or criminal, to prevent violations of the laws of the State of New York or protect the public health and safety and/or the environment.

B. Contractor Maintenance Inspection Requirements

1. The *owner or operator* of each *construction activity* identified in Tables 1 and 2 of Appendix B shall have a *trained contractor* inspect the erosion and sediment control practices and pollution prevention measures being implemented within the active work area daily to ensure that they are being maintained in effective operating condition at all times. If deficiencies are identified, the contractor shall

begin implementing corrective actions within one business day and shall complete the corrective actions in a reasonable time frame.

2. For construction sites where soil disturbance activities have been temporarily suspended (e.g. winter shutdown) and *temporary stabilization* measures have been applied to all disturbed areas, the *trained contractor* can stop conducting the maintenance inspections. The *trained contractor* shall begin conducting the maintenance inspections in accordance with Part IV.B.1. of this permit as soon as soil disturbance activities resume.

3. For construction sites where soil disturbance activities have been shut down with partial project completion, the *trained contractor* can stop conducting the maintenance inspections if all areas disturbed as of the project shutdown date have achieved *final stabilization* <u>and</u> all post-construction stormwater management practices required for the completed portion of the project have been constructed in conformance with the SWPPP and are operational.

C. Qualified Inspector Inspection Requirements

The *owner or operator* shall have a *qualified inspector* conduct site inspections in conformance with the following requirements:

[Note: The *trained contractor* identified in Part III.A.6. and IV.B. of this permit **cannot** conduct the *qualified inspector* site inspections unless they meet the *qualified inspector* qualifications included in Appendix A. In order to perform these inspections, the *trained contractor* would have to be a:

- licensed Professional Engineer,
- Certified Professional in Erosion and Sediment Control (CPESC),
- New York State Erosion and Sediment Control Certificate Program holder
- Registered Landscape Architect, or
- someone working under the direct supervision of, and at the same company as, the licensed Professional Engineer or Registered Landscape Architect, provided they have received four (4) hours of Department endorsed training in proper erosion and sediment control principles from a Soil and Water Conservation District, or other Department endorsed entity].

1. A *qualified inspector* shall conduct site inspections for all *construction activities* identified in Tables 1 and 2 of Appendix B, <u>with the exception of</u>:

    a. the construction of a single family residential subdivision with 25% or less *impervious cover* at total site build-out that involves a soil disturbance of one (1) or more acres of land but less than five (5) acres and is <u>not</u> located in one of the watersheds listed in Appendix C and 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* <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. 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,* <u>and</u> 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

All definitions in this section are solely for the purposes of this permit.

Agricultural Building – a structure designed and constructed to house farm implements, hay, grain, poultry, livestock or other horticultural products; excluding any structure designed, constructed or used, in whole or in part, for human habitation, as a place of employment where agricultural products are processed, treated or packaged, or as a place used by the public.

Agricultural Property –means the land for construction of a barn, *agricultural building*, silo, stockyard, pen or other structural practices identified in Table II in the "Agricultural Management Practices Catalog for Nonpoint Source Pollution in New York State" prepared by the Department in cooperation with agencies of New York Nonpoint Source Coordinating Committee (dated June 2007).

Alter Hydrology from Pre to Post-Development Conditions - means the post-development peak flow rate(s) has increased by more than 5% of the pre-developed condition for the design storm of interest (e.g. 10 yr and 100 yr).

Combined Sewer - means a sewer that is designed to collect and convey both "sewage" and "stormwater".

Commence (Commencement of) Construction Activities - means the initial disturbance of soils associated with clearing, grading or excavation activities; or other construction related activities that disturb or expose soils such as demolition, stockpiling of fill material, and the initial installation of erosion and sediment control practices required in the SWPPP. See definition for "*Construction Activity(ies)*" also.

Construction Activity(ies) - means any clearing, grading, excavation, filling, demolition or stockpiling activities that result in soil disturbance. Clearing activities can include, but are not limited to, logging equipment operation, the cutting and skidding of trees, stump removal and/or brush root removal. Construction activity does not include routine maintenance that is performed to maintain the original line and grade, hydraulic capacity, or original purpose of a facility.

Construction Site – means the land area where *construction activity(ies)* will occur. See definition for "*Commence (Commencement of) Construction Activities"* and "*Larger Common Plan of Development or Sale" also.*

Dewatering – means the act of draining rainwater and/or groundwater from building foundations, vaults or excavations/trenches.

Direct Discharge (to a specific surface waterbody) - means that runoff flows from a *construction site* by overland flow and the first point of discharge is the specific surface waterbody, or runoff flows from a *construction site* to a separate storm sewer system and the first point of discharge from the separate storm sewer system is the specific surface waterbody.

Discharge(s) - means any addition of any pollutant to waters of the State through an outlet or *point source*.

Embankment –means an earthen or rock slope that supports a road/highway.

Endangered or Threatened Species – see 6 NYCRR Part 182 of the Department's rules and regulations for definition of terms and requirements.

Environmental Conservation Law (ECL) - means chapter 43-B of the Consolidated Laws of the State of New York, entitled the Environmental Conservation Law.

Equivalent (Equivalence) – means that the practice or measure meets all the performance, longevity, maintenance, and safety objectives of the technical standard and will provide an equal or greater degree of water quality protection.

Final Stabilization - means that all soil disturbance activities have ceased and a uniform, perennial vegetative cover with a density of eighty (80) percent over the entire pervious surface has been established; or other equivalent stabilization measures, such as permanent landscape mulches, rock rip-rap or washed/crushed stone have been applied on all disturbed areas that are not covered by permanent structures, concrete or pavement.

General SPDES permit - means a SPDES permit issued pursuant to 6 NYCRR Part 750-1.21 and Section 70-0117 of the ECL authorizing a category of discharges.

Groundwater(s) - means waters in the saturated zone. The saturated zone is a subsurface zone in which all the interstices are filled with water under pressure greater than that of the atmosphere. Although the zone may contain gas-filled interstices or interstices filled with fluids other than water, it is still considered saturated.

Historic Property – means any building, structure, site, object or district that is listed on the State or National Registers of Historic Places or is determined to be eligible for listing on the State or National Registers of Historic Places.

Impervious Area (Cover) - means all impermeable surfaces that cannot effectively infiltrate rainfall. This includes paved, concrete and gravel surfaces (i.e. parking lots, driveways, roads, runways and sidewalks); building rooftops and miscellaneous impermeable structures such as patios, pools, and sheds.

Infeasible – means not technologically possible, or not economically practicable and achievable in light of best industry practices.

Larger Common Plan of Development or Sale - means a contiguous area where multiple separate and distinct *construction activities* are occurring, or will occur, under one plan. The term "plan" in "larger common plan of development or sale" is broadly defined as any announcement or piece of documentation (including a sign, public notice or hearing, marketing plan, advertisement, drawing, permit application, State Environmental Quality Review Act (SEQRA) environmental assessment form or other documents, zoning request, computer design, etc.) or physical demarcation (including boundary signs, lot stakes, surveyor markings, etc.) indicating that *construction activities* may occur on a specific plot.

For discrete construction projects that are located within a larger common plan of development or sale that are at least 1/4 mile apart, each project can be treated as a separate plan of development or sale provided any interconnecting road, pipeline or utility project that is part of the same "common plan" is not concurrently being disturbed.

Minimize – means reduce and/or eliminate to the extent achievable using control measures (including best management practices) that are technologically available and economically practicable and achievable in light of best industry practices.

Municipal Separate Storm Sewer (MS4) - a conveyance or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, man-made channels, or storm drains):

(i) Owned or operated by a State, city, town, borough, county, parish, district, association, or other public body (created by or pursuant to State law) having jurisdiction over disposal of sewage, industrial wastes, stormwater, or other wastes, including special districts under State law such as a sewer district, flood control district or drainage district, or similar entity, or an Indian tribe or an authorized Indian tribal organization, or a designated and approved management agency under section 208 of the CWA that discharges to surface waters of the State*;*
(ii) Designed or used for collecting or conveying stormwater;
(iii) Which is not a *combined sewer*; and
(iv) Which is not part of a Publicly Owned Treatment Works (POTW) as defined at 40 CFR 122.2.

National Pollutant Discharge Elimination System (NPDES) - means the national system for the issuance of wastewater and stormwater permits under the Federal Water Pollution Control Act (Clean Water Act).

Natural Buffer –means an undisturbed area with natural cover running along a surface water (e.g. wetland, stream, river, lake, etc.).

New Development – means any land disturbance that does not meet the definition of Redevelopment Activity included in this appendix.

New York State Erosion and Sediment Control Certificate Program – a certificate program that establishes and maintains a process to identify and recognize individuals who are capable of developing, designing, inspecting and maintaining erosion and sediment control plans on projects that disturb soils in New York State. The certificate program is administered by the New York State Conservation District Employees Association.

NOI Acknowledgment Letter - means the letter that the Department sends to an owner or operator to acknowledge the Department's receipt and acceptance of a complete Notice of Intent. This letter documents the owner's or operator's authorization to discharge in accordance with the general permit for stormwater discharges from *construction activity*.

Nonpoint Source - means any source of water pollution or pollutants which is not a discrete conveyance or *point source* permitted pursuant to Title 7 or 8 of Article 17 of the Environmental Conservation Law (see ECL Section 17-1403).

Overbank –means flow events that exceed the capacity of the stream channel and spill out into the adjacent floodplain.

Owner or Operator - means the person, persons or legal entity which owns or leases the property on which the *construction activity* is occurring; an entity that has operational control over the construction plans and specifications, including the ability to make modifications to the plans and specifications; and/or an entity that has day-to-day operational control of those activities at a project that are necessary to ensure compliance with the permit conditions.

Performance Criteria – means the design criteria listed under the "Required Elements" sections in Chapters 5, 6 and 10 of the technical standard, New York State Stormwater Management Design Manual, dated January 2015. It does not include the Sizing Criteria (i.e. WQv, RRv, Cpv, Qp and Qf) in Part I.C.2. of the permit.

Point Source - means any discernible, confined and discrete conveyance, including but not limited to any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operation, vessel or other floating craft, or landfill leachate collection system from which *pollutants* are or may be discharged.

Pollutant - means dredged spoil, filter backwash, solid waste, incinerator residue, sewage, garbage, sewage sludge, munitions, chemical wastes, biological materials, radioactive materials, heat, wrecked or discarded equipment, rock, sand and industrial, municipal, agricultural waste and ballast discharged into water; which may cause or might reasonably be expected to cause pollution of the waters of the state in contravention of the standards or guidance values adopted as provided in 6 NYCRR Parts 700 et seq .

Qualified Inspector - means a person that is knowledgeable in the principles and practices of erosion and sediment control, such as a licensed Professional Engineer, Certified Professional in Erosion and Sediment Control (CPESC), Registered Landscape Architect, New York State Erosion and Sediment Control Certificate Program holder or other Department endorsed individual(s).

It can also mean someone working under the direct supervision of, and at the same company as, the licensed Professional Engineer or Registered Landscape Architect, provided that person has training in the principles and practices of erosion and sediment control. Training in the principles and practices of erosion and sediment control means that the individual working under the direct supervision of the licensed Professional Engineer or Registered Landscape Architect has received four (4) hours of Department endorsed training in proper erosion and sediment control principles from a Soil and Water Conservation District, or other Department endorsed entity. After receiving the initial training, the individual working under the direct supervision of the licensed Professional Engineer or Registered Landscape Architect shall receive four (4) hours of training every three (3) years.

It can also mean a person that meets the *Qualified Professional* qualifications in addition to the *Qualified Inspector* qualifications.

Note: Inspections of any post-construction stormwater management practices that include structural components, such as a dam for an impoundment, shall be performed by a licensed Professional Engineer.

Qualified Professional - means a person that is knowledgeable in the principles and practices of stormwater management and treatment, such as a licensed Professional Engineer, Registered Landscape Architect or other Department endorsed individual(s). Individuals preparing SWPPPs that require the post-construction stormwater management practice component must have an understanding of the principles of hydrology, water quality management practice design, water quantity control design, and, in many cases, the principles of hydraulics. All components of the SWPPP that involve the practice of engineering, as defined by the NYS Education Law (see Article 145), shall be prepared by, or under the direct supervision of, a professional engineer licensed to practice in the State of New York.

Redevelopment Activity(ies) – means the disturbance and reconstruction of existing impervious area, including impervious areas that were removed from a project site within five (5) years of preliminary project plan submission to the local government (i.e. site plan, subdivision, etc.).

Regulated, Traditional Land Use Control MS4 - means a city, town or village with land use control authority that is authorized to discharge under New York State DEC's

SPDES General Permit For Stormwater Discharges from Municipal Separate Stormwater Sewer Systems (MS4s) or the City of New York's Individual SPDES Permit for their Municipal Separate Storm Sewer Systems (NY-0287890).

Routine Maintenance Activity - means *construction activity* that is performed to maintain the original line and grade, hydraulic capacity, or original purpose of a facility, including, but not limited to:

- Re-grading of gravel roads or parking lots,
- Cleaning and shaping of existing roadside ditches and culverts that maintains the approximate original line and grade, and hydraulic capacity of the ditch,
- Cleaning and shaping of existing roadside ditches that does not maintain the approximate original grade, hydraulic capacity and purpose of the ditch if the changes to the line and grade, hydraulic capacity or purpose of the ditch are installed to improve water quality and quantity controls (e.g. installing grass lined ditch),
- Placement of aggregate shoulder backing that stabilizes the transition between the road shoulder and the ditch or *embankment*,
- Full depth milling and filling of existing asphalt pavements, replacement of concrete pavement slabs, and similar work that does not expose soil or disturb the bottom six (6) inches of subbase material,
- Long-term use of equipment storage areas at or near highway maintenance facilities,
- Removal of sediment from the edge of the highway to restore a previously existing sheet-flow drainage connection from the highway surface to the highway ditch or *embankment*,
- Existing use of Canal Corp owned upland disposal sites for the canal, and
- Replacement of curbs, gutters, sidewalks and guide rail posts.

Site limitations – means site conditions that prevent the use of an infiltration technique and or infiltration of the total WQv. Typical site limitations include: seasonal high groundwater, shallow depth to bedrock, and soils with an infiltration rate less than 0.5 inches/hour. The existence of site limitations shall be confirmed and documented using actual field testing (i.e. test pits, soil borings, and infiltration test) or using information from the most current United States Department of Agriculture (USDA) Soil Survey for the County where the project is located.

Sizing Criteria – means the criteria included in Part I.C.2 of the permit that are used to size post-construction stormwater management control practices. The criteria include; Water Quality Volume (WQv), Runoff Reduction Volume (RRv), Channel Protection Volume (Cpv), *Overbank* Flood (Qp), and Extreme Flood (Qf).

State Pollutant Discharge Elimination System (SPDES) - means the system established pursuant to Article 17 of the ECL and 6 NYCRR Part 750 for issuance of permits authorizing discharges to the waters of the state.

Steep Slope – means land area designated on the current United States Department of Agriculture ("USDA") Soil Survey as Soil Slope Phase "D", (provided the map unit name is inclusive of slopes greater than 25%) , or Soil Slope Phase E or F, (regardless of the map unit name), or a combination of the three designations.

Streambank – as used in this permit, means the terrain alongside the bed of a creek or stream. The bank consists of the sides of the channel, between which the flow is confined.

Stormwater Pollution Prevention Plan (SWPPP) – means a project specific report, including construction drawings, that among other things: describes the construction activity(ies), identifies the potential sources of pollution at the *construction site*; describes and shows the stormwater controls that will be used to control the pollutants (i.e. erosion and sediment controls; for many projects, includes post-construction stormwater management controls); and identifies procedures the *owner or operator* will implement to comply with the terms and conditions of the permit. See Part III of the permit for a complete description of the information that must be included in the SWPPP.

Surface Waters of the State - shall be construed to include lakes, bays, sounds, ponds, impounding reservoirs, springs, rivers, streams, creeks, estuaries, marshes, inlets, canals, the Atlantic ocean within the territorial seas of the state of New York and all other bodies of surface water, natural or artificial, inland or coastal, fresh or salt, public or private (except those private waters that do not combine or effect a junction with natural surface waters), which are wholly or partially within or bordering the state or within its jurisdiction. Waters of the state are further defined in 6 NYCRR Parts 800 to 941.

Temporarily Ceased – means that an existing disturbed area will not be disturbed again within 14 calendar days of the previous soil disturbance.

Temporary Stabilization - means that exposed soil has been covered with material(s) as set forth in the technical standard, New York Standards and Specifications for Erosion and Sediment Control, to prevent the exposed soil from eroding. The materials can include, but are not limited to, mulch, seed and mulch, and erosion control mats (e.g. jute twisted yarn, excelsior wood fiber mats).

Total Maximum Daily Loads (TMDLs) - A TMDL is the sum of the allowable loads of a single pollutant from all contributing point and *nonpoint source*s. It is a calculation of the maximum amount of a pollutant that a waterbody can receive on a daily basis and still meet *water quality standards*, and an allocation of that amount to the pollutant's sources. A TMDL stipulates wasteload allocations (WLAs) for *point source* discharges, load allocations (LAs) for *nonpoint source*s, and a margin of safety (MOS).

Trained Contractor - means an employee from the contracting (construction) company, identified in Part III.A.6., that has received four (4) hours of Department endorsed training in proper erosion and sediment control principles from a Soil and Water Conservation District, or other Department endorsed entity. After receiving the initial training, the *trained contractor* shall receive four (4) hours of training every three (3) years.

It can also mean an employee from the contracting (construction) company, identified in Part III.A.6., that meets the *qualified inspector* qualifications (e.g. licensed Professional Engineer, Certified Professional in Erosion and Sediment Control (CPESC), Registered Landscape Architect, New York State Erosion and Sediment Control Certificate Program holder, or someone working under the direct supervision of, and at the same company as, the licensed Professional Engineer or Registered Landscape Architect, provided they have received four (4) hours of Department endorsed training in proper erosion and sediment control principles from a Soil and Water Conservation District, or other Department endorsed entity).

The *trained contractor* is responsible for the day to day implementation of the SWPPP.

Uniform Procedures Act (UPA) Permit - means a permit required under 6 NYCRR Part 621 of the Environmental Conservation Law (ECL), Article 70.

Water Quality Standard - means such measures of purity or quality for any waters in relation to their reasonable and necessary use as promulgated in 6 NYCRR Part 700 et seq.

APPENDIX B – Required SWPPP Components by Project Type

Table 1
Construction Activities that Require the Preparation of a SWPPP That Only Includes Erosion and Sediment Controls

The following construction activities that involve soil disturbances of one (1) or more acres of land, but less than five (5) acres: • 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* <u>and</u> do not *alter hydrology from pre to post development* conditions
- Demolition project where vegetation will be established, and no redevelopment is planned
- Overhead electric transmission line project that does not include the construction of permanent access roads or parking areas surfaced with *impervious cover*
- Structural practices as identified in Table II in the “Agricultural Management Practices Catalog for Nonpoint Source Pollution in New York State”, excluding projects that involve soil disturbances of greater than five acres and construction activities that include the construction or reconstruction of impervious area
- Temporary access roads, median crossovers, detour roads, lanes, or other temporary impervious areas that will be restored to pre-construction conditions once the construction activity is complete

Table 2

CONSTRUCTION ACTIVITIES THAT REQUIRE THE PREPARATION OF A SWPPP THAT INCLUDES POST-CONSTRUCTION STORMWATER MANAGEMENT PRACTICES

The following construction activities that involve soil disturbances of one (1) or more acres of land:

- Single family home located in one of the watersheds listed in Appendix C or *directly discharging* to one of the 303(d) segments listed in Appendix E
- Single family home that disturbs five (5) or more acres of land
- Single family residential subdivisions located in one of the watersheds listed in Appendix C or *directly discharging* to one of the 303(d) segments listed in Appendix E
- Single family residential subdivisions that involve soil disturbances of between one (1) and five (5) acres of land with greater than 25% impervious cover at total site build-out
- Single family residential subdivisions that involve soil disturbances of five (5) or more acres of land, and single family residential subdivisions that involve soil disturbances of less than five (5) acres that are part of a larger common plan of development or sale that will ultimately disturb five or more acres of land
- Multi-family residential developments; includes duplexes, townhomes, condominiums, senior housing complexes, apartment complexes, and mobile home parks
- Airports
- Amusement parks
- Breweries, cideries, and wineries, including establishments constructed on agricultural land
- Campgrounds
- Cemeteries that include the construction or reconstruction of impervious area (>5% of disturbed area) or *alter the hydrology from pre to post development* conditions
- Commercial developments
- Churches and other places of worship
- Construction of a barn or other *agricultural building* (e.g. silo) and structural practices as identified in Table II in the "Agricultural Management Practices Catalog for Nonpoint Source Pollution in New York State" that include the construction or reconstruction of *impervious area*, excluding projects that involve soil disturbances of less than five acres.
- Golf courses
- Institutional development; includes hospitals, prisons, schools and colleges
- Industrial facilities; includes industrial parks
- Landfills
- Municipal facilities; includes highway garages, transfer stations, office buildings, POTW's, water treatment plants, and water storage tanks
- Office complexes
- Playgrounds that include the construction or reconstruction of impervious area
- Sports complexes
- Racetracks; includes racetracks with earthen (dirt) surface
- Road construction or reconstruction, including roads constructed as part of the construction activities listed in Table 1

Table 2 (Continued)

CONSTRUCTION ACTIVITIES THAT REQUIRE THE PREPARATION OF A SWPPP THAT INCLUDES POST-CONSTRUCTION STORMWATER MANAGEMENT PRACTICES

The following construction activities that involve soil disturbances of one (1) or more acres of land:

- Parking lot construction or reconstruction, including parking lots constructed as part of the construction activities listed in Table 1
- Athletic fields (natural grass) that include the construction or reconstruction of impervious area (>5% of disturbed area) or *alter the hydrology from pre to post development* conditions
- Athletic fields with artificial turf
- Permanent access roads, parking areas, substations, compressor stations and well drilling pads, surfaced with *impervious cover,* and constructed as part of an over-head electric transmission line project, wind-power project, cell tower project, oil or gas well drilling project, sewer or water main project or other linear utility project
- Sidewalk, bike path or walking path projects, surfaced with an impervious cover, that are part of a residential, commercial or institutional development
- Sidewalk, bike path or walking path projects, surfaced with an impervious cover, that are part of a highway construction or reconstruction project
- All other construction activities that include the construction or reconstruction of *impervious area* <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

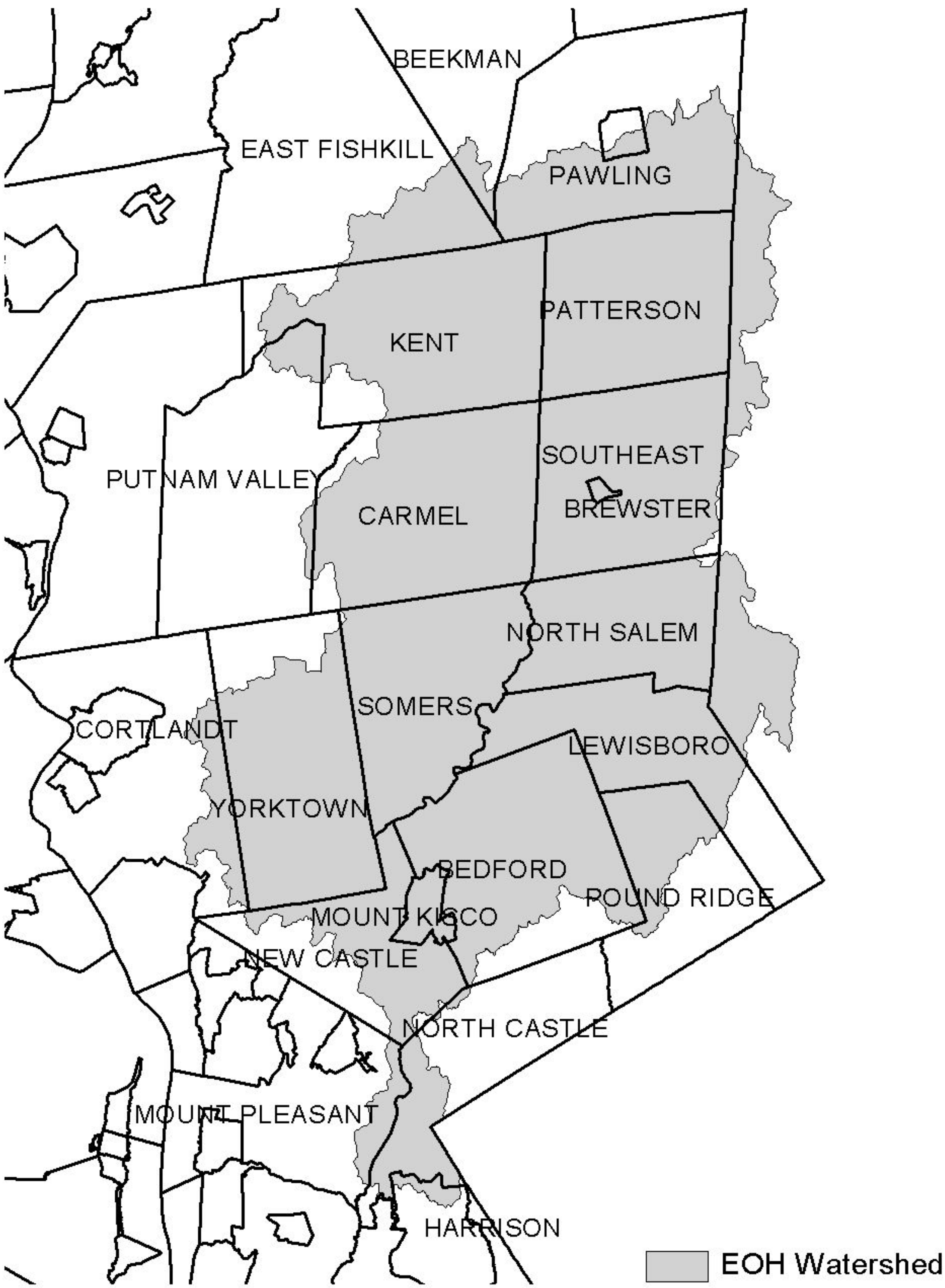


Figure 2 - Onondaga Lake Watershed

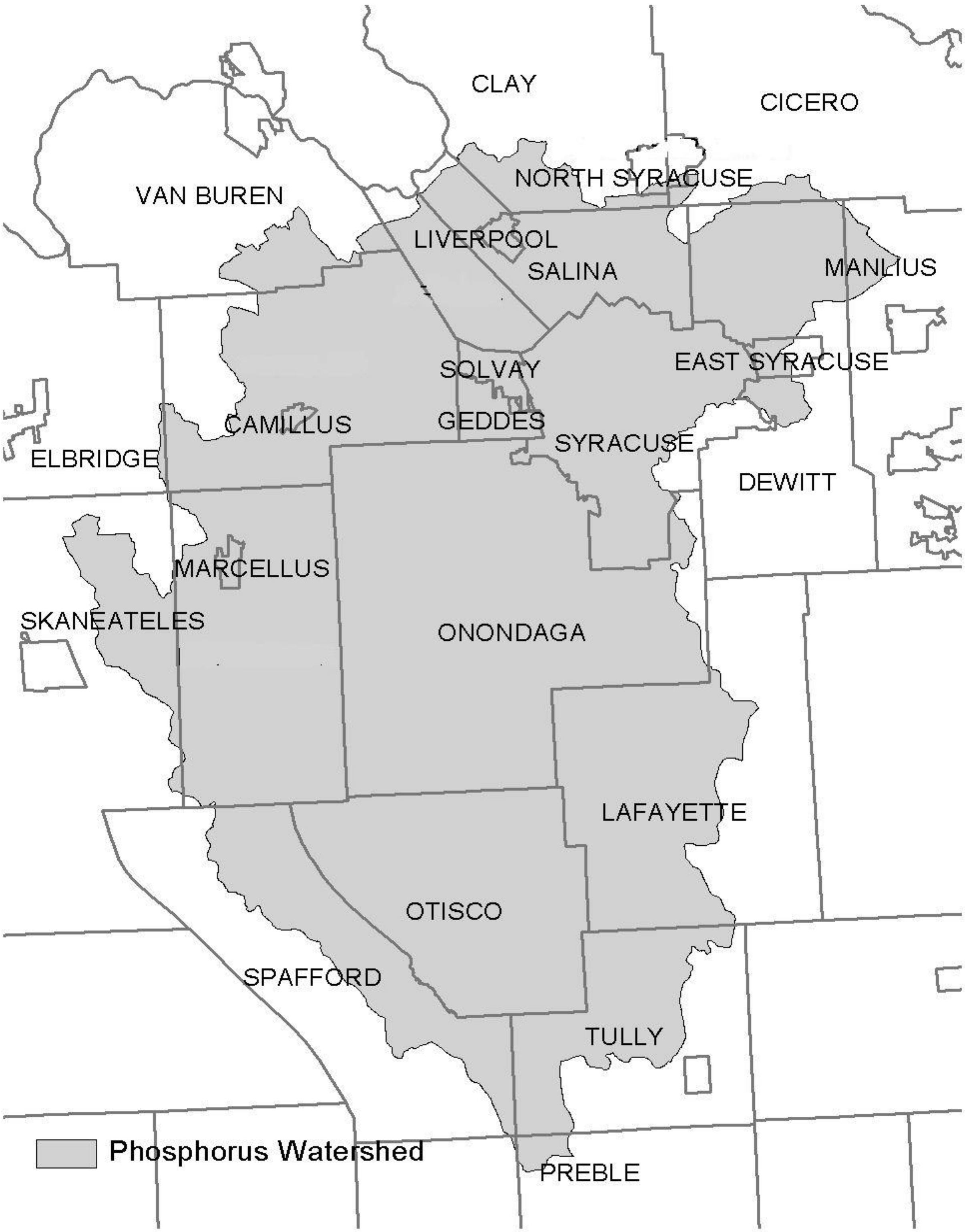
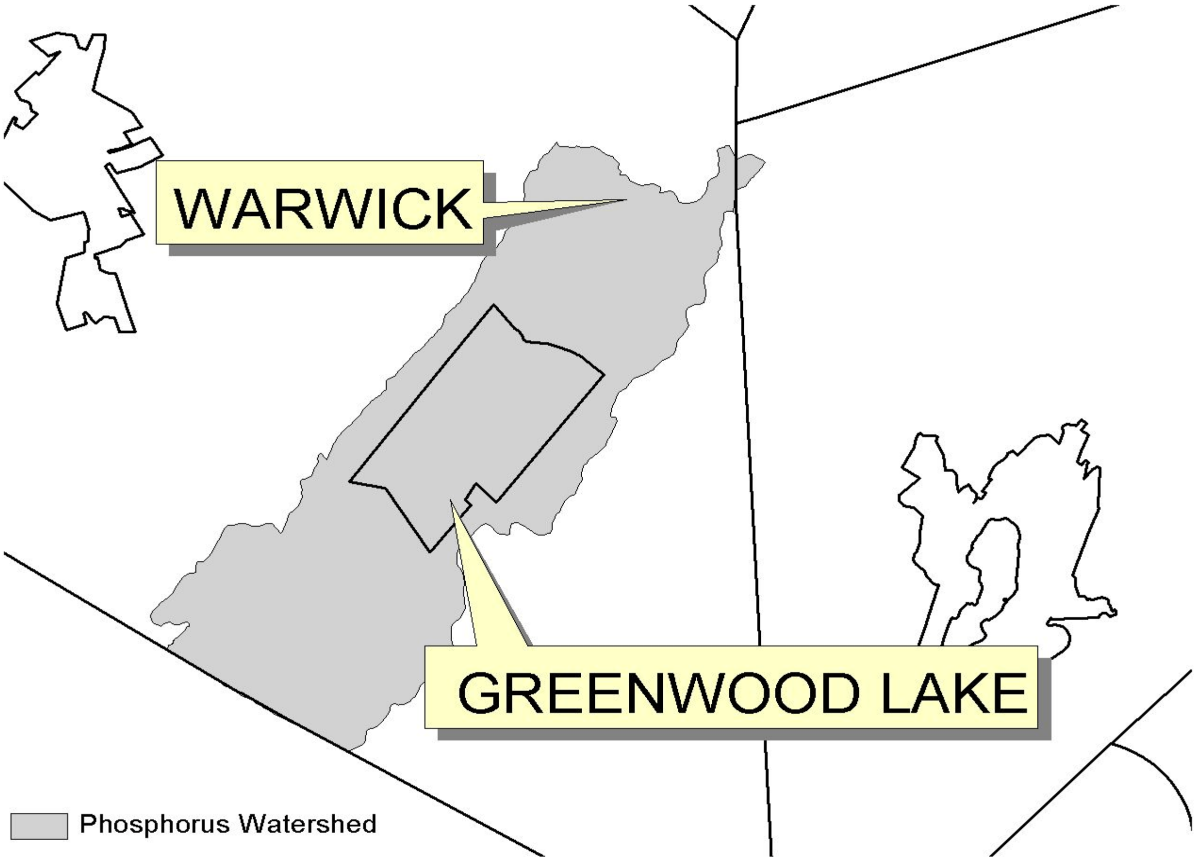


Figure 3 - Greenwood Lake Watershed



<u>Figure 4 - Oscawana Lake Watershed</u>

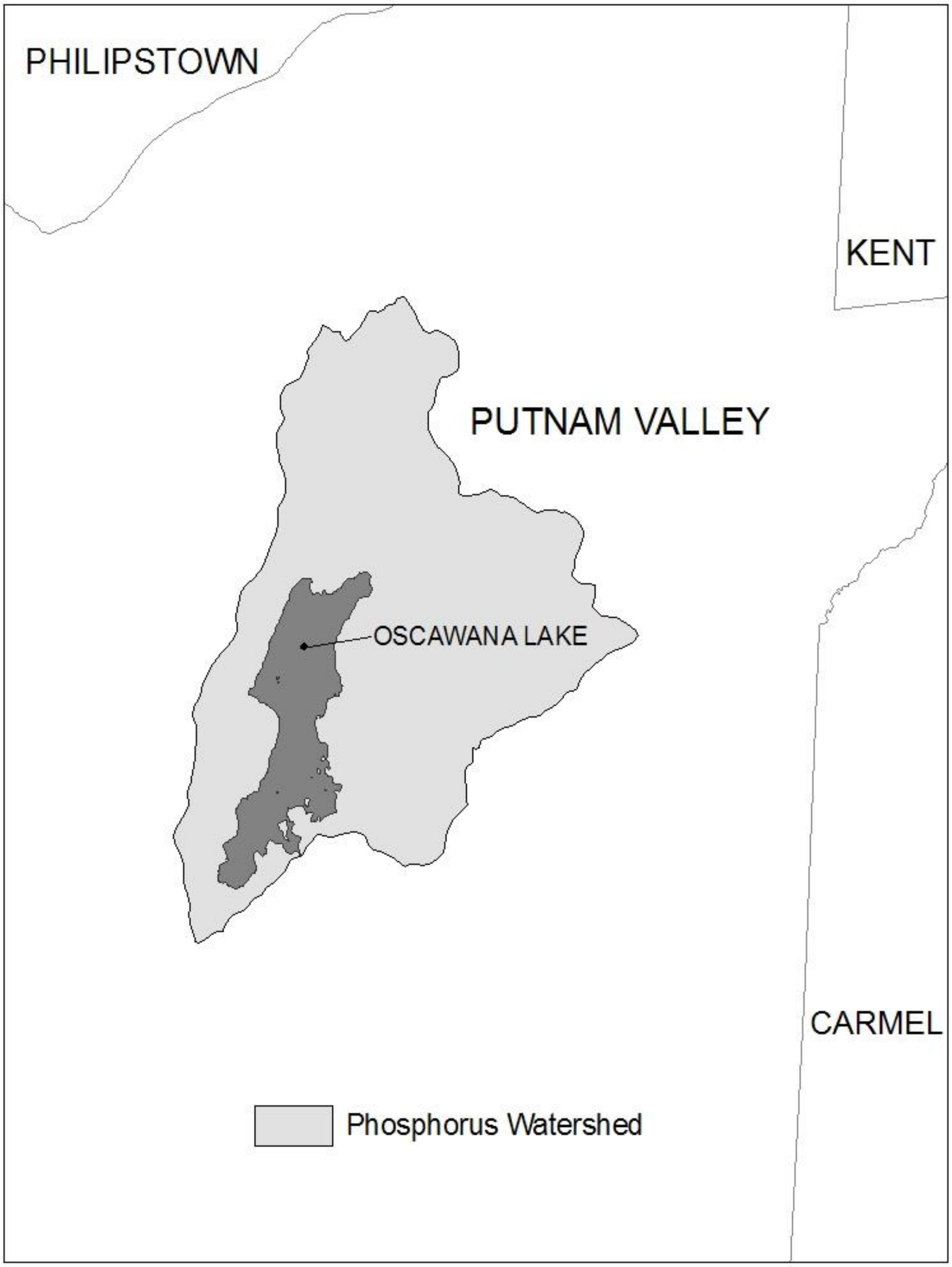
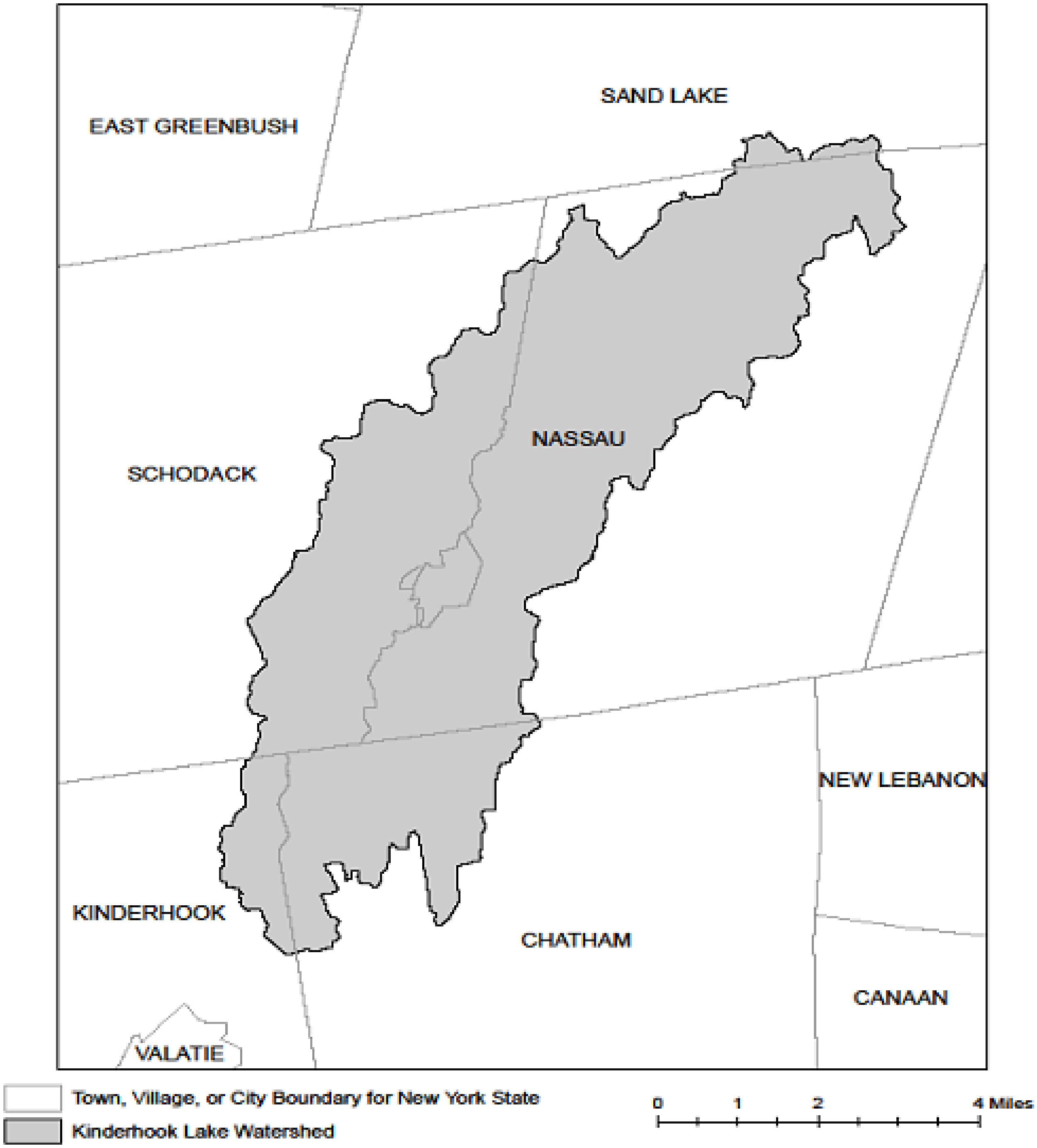


Figure 5 - Kinderhook Lake Watershed



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 E

Notice of Intent (NOI)

0644089821

NOTICE OF INTENT

New York State Department of Environmental Conservation
Division of Water
625 Broadway, 4th Floor
Albany, New York 12233-3505

NYR

(for DEC use only)

Stormwater Discharges Associated with Construction Activity Under State Pollutant Discharge Elimination System (SPDES) General Permit # GP-0-20-001

All sections must be completed unless otherwise noted. Failure to complete all items may result in this form being returned to you, thereby delaying your coverage under this General Permit. Applicants must read and understand the conditions of the permit and prepare a Stormwater Pollution Prevention Plan prior to submitting this NOI. Applicants are responsible for identifying and obtaining other DEC permits that may be required.

-IMPORTANT-

RETURN THIS FORM TO THE ADDRESS ABOVE

OWNER/OPERATOR MUST SIGN FORM

Owner/Operator Information

Owner/Operator (Company Name/Private Owner Name/Municipality Name)

Owner/Operator Contact Person Last Name (NOT CONSULTANT)

Owner/Operator Contact Person First Name

Owner/Operator Mailing Address

City

State

Zip -

Phone (Owner/Operator) - -

Fax (Owner/Operator) - -

Email (Owner/Operator)

FED TAX ID - (not required for individuals)

6401089828

Project Site Information

Project/Site Name

Street Address (NOT P.O. BOX)

Side of Street
○ **North** ○ **South** ○ **East** ○ **West**

City/Town/Village (THAT ISSUES BUILDING PERMIT)

State: N Y   Zip: -   County   DEC Region

Name of Nearest Cross Street

Distance to Nearest Cross Street (Feet)

Project In Relation to Cross Street
○ **North** ○ **South** ○ **East** ○ **West**

Tax Map Numbers
Section-Block-Parcel

Tax Map Numbers

1. Provide the Geographic Coordinates for the project site. To do this, go to the NYSDEC Stormwater Interactive Map on the DEC website at:

https://gisservices.dec.ny.gov/gis/stormwater/

Zoom into your Project Location such that you can accurately click on the centroid of your site. Once you have located the centroid of your project site, go to the bottom right hand corner of the map for the X, Y coordinates. Enter the coordinates into the boxes below. For problems with the interactive map use the help function.

X Coordinates (Easting)
-7
Ex. -73.749

Y Coordinates (Northing)
4
Ex. 42.652

2. What is the nature of this construction project?

○ **New Construction**

○ **Redevelopment with increase in impervious area**

○ **Redevelopment with no increase in impervious area**

3. Select the predominant land use for both pre and post development conditions.
SELECT ONLY ONE CHOICE FOR EACH

Pre-Development Existing Land Use

- ○ FOREST
- ○ PASTURE/OPEN LAND
- ○ CULTIVATED LAND
- ○ SINGLE FAMILY HOME
- ○ SINGLE FAMILY SUBDIVISION
- ○ TOWN HOME RESIDENTIAL
- ○ MULTIFAMILY RESIDENTIAL
- ○ INSTITUTIONAL/SCHOOL
- ○ INDUSTRIAL
- ○ COMMERCIAL
- ○ ROAD/HIGHWAY
- ○ RECREATIONAL/SPORTS FIELD
- ○ BIKE PATH/TRAIL
- ○ LINEAR UTILITY
- ○ PARKING LOT
- ○ OTHER

Post-Development Future Land Use

- ○ SINGLE FAMILY HOME
- ○ SINGLE FAMILY SUBDIVISION
- ○ TOWN HOME RESIDENTIAL
- ○ MULTIFAMILY RESIDENTIAL
- ○ INSTITUTIONAL/SCHOOL
- ○ INDUSTRIAL
- ○ COMMERCIAL
- ○ MUNICIPAL
- ○ ROAD/HIGHWAY
- ○ RECREATIONAL/SPORTS FIELD
- ○ BIKE PATH/TRAIL
- ○ LINEAR UTILITY (water, sewer, gas, etc.)
- ○ PARKING LOT
- ○ CLEARING/GRADING ONLY
- ○ DEMOLITION, NO REDEVELOPMENT
- ○ WELL DRILLING ACTIVITY *(Oil, Gas, etc.)
- ○ OTHER

Number of Lots

***Note**: for gas well drilling, non-high volume hydraulic fractured wells only

4. In accordance with the larger common plan of development or sale, enter the total project site area; the total area to be disturbed; existing impervious area to be disturbed (for redevelopment activities); and the future impervious area constructed within the disturbed area. (Round to the nearest tenth of an acre.)

Total Site Area	**Total Area To Be Disturbed**	**Existing Impervious Area To Be Disturbed**	**Future Impervious Area Within Disturbed Area**
.	.	.	.

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

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

A	**B**	**C**	**D**
%	%	%	%

7. Is this a phased project? ○ **Yes** ○ **No**

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

Start Date / / - **End Date** / /

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

Name

9a. Type of waterbody identified in Question 9?

- ○ Wetland / State Jurisdiction On Site (Answer 9b)
- ○ Wetland / State Jurisdiction Off Site
- ○ Wetland / Federal Jurisdiction On Site (Answer 9b)
- ○ Wetland / Federal Jurisdiction Off Site
- ○ Stream / Creek On Site
- ○ Stream / Creek Off Site
- ○ River On Site
- ○ River Off Site
- ○ Lake On Site
- ○ Lake Off Site
- ○ Other Type On Site
- ○ Other Type Off Site

9b. How was the wetland identified?

- ○ Regulatory Map
- ○ Delineated by Consultant
- ○ Delineated by Army Corps of Engineers
- ○ Other (identify)

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

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

12. Is the project located in one of the watershed areas associated with AA and AA-S classified waters? **If no, skip question 13.** ○ **Yes** ○ **No**

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? **If Yes, what is the acreage to be disturbed?** ○ **Yes** ○ **No**

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

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

16. What is the name of the municipality/entity that owns the separate storm sewer system?

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

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

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

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

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 ○ No

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 ○ No
If No, skip questions 23 and 27-39.

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 ○ No

24. The Stormwater Pollution Prevention Plan (SWPPP) was prepared by:

- ○ **Professional Engineer (P.E.)**
- ○ **Soil and Water Conservation District (SWCD)**
- ○ **Registered Landscape Architect (R.L.A)**
- ○ **Certified Professional in Erosion and Sediment Control (CPESC)**
- ○ **Owner/Operator**
- ○ **Other**

SWPPP Preparer

Contact Name (Last, Space, First)

Mailing Address

City

State Zip -

Phone - -

Fax - -

Email

SWPPP Preparer Certification

I hereby certify that the Stormwater Pollution Prevention Plan (SWPPP) for this project has been prepared in accordance with the terms and conditions of the GP-0-20-001. Furthermore, I understand that certifying false, incorrect or inaccurate information is a violation of this permit and the laws of the State of New York and could subject me to criminal, civil and/or administrative proceedings.

First Name **MI**

Last Name

Signature

Date / /

25. Has a construction sequence schedule for the planned management practices been prepared? ○ Yes ○ No

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
- ○ Earth Dike
- ○ Level Spreader
- ○ Perimeter Dike/Swale
- ○ Pipe Slope Drain
- ○ Portable Sediment Tank
- ○ Rock Dam
- ○ Sediment Basin
- ○ Sediment Traps
- ○ Silt Fence
- ○ Stabilized Construction Entrance
- ○ Storm Drain Inlet Protection
- ○ Straw/Hay Bale Dike
- ○ Temporary Access Waterway Crossing
- ○ Temporary Stormdrain Diversion
- ○ Temporary Swale
- ○ Turbidity Curtain
- ○ Water bars

Biotechnical

- ○ Brush Matting
- ○ Wattling

Vegetative Measures

- ○ Brush Matting
- ○ Dune Stabilization
- ○ Grassed Waterway
- ○ Mulching
- ○ Protecting Vegetation
- ○ Recreation Area Improvement
- ○ Seeding
- ○ Sodding
- ○ Straw/Hay Bale Dike
- ○ Streambank Protection
- ○ Temporary Swale
- ○ Topsoiling
- ○ Vegetating Waterways

Permanent Structural

- ○ Debris Basin
- ○ Diversion
- ○ Grade Stabilization Structure
- ○ Land Grading
- ○ Lined Waterway (Rock)
- ○ Paved Channel (Concrete)
- ○ Paved Flume
- ○ Retaining Wall
- ○ Riprap Slope Protection
- ○ Rock Outlet Protection
- ○ Streambank Protection

Other

Post-construction Stormwater Management Practice (SMP) Requirements

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 Areas**
- ○ **Preservation of Buffers**
- ○ **Reduction of Clearing and Grading**
- ○ **Locating Development in Less Sensitive Areas**
- ○ **Roadway Reduction**
- ○ **Sidewalk Reduction**
- ○ **Driveway Reduction**
- ○ **Cul-de-sac Reduction**
- ○ **Building Footprint Reduction**
- ○ **Parking Reduction**

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).

- ○ Compacted areas were considered as impervious cover when calculating the **WQv Required**, and the compacted areas were assigned a post-construction Hydrologic Soil Group (HSG) designation that is one level less permeable than existing conditions for the hydrology analysis.

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

Total WQv Required

☐☐☐.☐☐☐ **acre-feet**

29. Identify the RR techniques (Area Reduction), RR techniques(Volume Reduction) and Standard SMPs with RRv Capacity in Table 1 (See Page 9) that were used to reduce the Total WQv Required(#28).

Also, provide in Table 1 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 Tables 1 and 2 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.

Table 1 - Runoff Reduction (RR) Techniques and Standard Stormwater Management Practices (SMPs)

	Total Contributing Area (acres)		Total Contributing Impervious Area(acres)
RR Techniques (Area Reduction)			
○ Conservation of Natural Areas (RR-1) ...	.	and/or	.
○ Sheetflow to Riparian Buffers/Filters Strips (RR-2)	.	and/or	.
○ Tree Planting/Tree Pit (RR-3)	.	and/or	.
○ Disconnection of Rooftop Runoff (RR-4)..	.	and/or	.
RR Techniques (Volume Reduction)			
○ Vegetated Swale (RR-5)			.
○ Rain Garden (RR-6)			.
○ Stormwater Planter (RR-7)			.
○ Rain Barrel/Cistern (RR-8)			.
○ Porous Pavement (RR-9)			.
○ Green Roof (RR-10)			.
Standard SMPs with RRv Capacity			
○ Infiltration Trench (I-1)			.
○ Infiltration Basin (I-2)			.
○ Dry Well (I-3)			.
○ Underground Infiltration System (I-4)			.
○ Bioretention (F-5)			.
○ Dry Swale (O-1)			.
Standard SMPs			
○ Micropool Extended Detention (P-1)			.
○ Wet Pond (P-2)			.
○ Wet Extended Detention (P-3)			.
○ Multiple Pond System (P-4)			.
○ Pocket Pond (P-5)			.
○ Surface Sand Filter (F-1)			.
○ Underground Sand Filter (F-2)			.
○ Perimeter Sand Filter (F-3)			.
○ Organic Filter (F-4)			.
○ Shallow Wetland (W-1)			.
○ Extended Detention Wetland (W-2)			.
○ Pond/Wetland System (W-3)			.
○ Pocket Wetland (W-4)			.
○ Wet Swale (O-2)			.

Table 2 - Alternative SMPs (DO NOT INCLUDE PRACTICES BEING USED FOR PRETREATMENT ONLY)

Alternative SMP	Total Contributing Impervious Area(acres)
○ Hydrodynamic	.
○ Wet Vault	.
○ Media Filter	.
○ Other	.

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

Name

Manufacturer

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.

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

Total RRv provided

. **acre-feet**

31. Is the Total RRv provided (#30) greater than or equal to the total WQv required (#28).

○ **Yes** ○ **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)]

Minimum RRv Required

. **acre-feet**

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

○ **Yes** ○ **No**

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, so NOI can not be processed. SWPPP preparer must modify design to meet sizing criteria.

33. Identify the Standard SMPs in Table 1 and, if applicable, the Alternative SMPs in Table 2 that were used to treat the remaining total WQv(=Total WQv Required in 28 - Total RRv Provided in 30).

Also, provide in Table 1 and 2 the total impervious area that contributes runoff to each practice selected.

Note: Use Tables 1 and 2 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.

WQv Provided

☐☐☐.☐☐☐ **acre-feet**

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 - RRv 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). ☐☐☐.☐☐☐

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** ○ **No**

If Yes, go to question 36.
If No, sizing criteria has not been met, so 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**

CPv Provided ☐☐☐.☐☐☐ **acre-feet**

36a. The need to provide channel protection has been waived because:

○ Site discharges directly to tidal waters or a fifth order or larger stream.

○ 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.

Total Overbank Flood Control Criteria (Qp)

Pre-Development ☐☐☐.☐☐☐ **CFS**

Post-development ☐☐☐.☐☐☐ **CFS**

Total Extreme Flood Control Criteria (Qf)

Pre-Development ☐☐☐.☐☐☐ **CFS**

Post-development ☐☐☐.☐☐☐ **CFS**

37a. The need to meet the Qp and Qf criteria has been waived because:

○ Site discharges directly to tidal waters or a fifth order or larger stream.

○ Downstream analysis reveals that the Qp and Qf controls are not required

38. Has a long term Operation and Maintenance Plan for the post-construction stormwater management practice(s) been developed? ○ **Yes** ○ **No**

If Yes, Identify the entity responsible for the long term Operation and Maintenance

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.

40. Identify other DEC permits, existing and new, that are required for this project/facility.

- ○ Air Pollution Control
- ○ Coastal Erosion
- ○ Hazardous Waste
- ○ Long Island Wells
- ○ Mined Land Reclamation
- ○ Solid Waste
- ○ Navigable Waters Protection / Article 15
- ○ Water Quality Certificate
- ○ Dam Safety
- ○ Water Supply
- ○ Freshwater Wetlands/Article 24
- ○ Tidal Wetlands
- ○ Wild, Scenic and Recreational Rivers
- ○ Stream Bed or Bank Protection / Article 15
- ○ Endangered or Threatened Species(Incidental Take Permit)
- ○ Individual SPDES
- ○ SPDES Multi-Sector GP N Y R
- ○ Other
- ○ None

41. Does this project require a US Army Corps of Engineers Wetland Permit? ○ Yes ○ No
If Yes, Indicate Size of Impact. .

42. Is this project subject to the requirements of a regulated, traditional land use control MS4? ○ Yes ○ No
(If No, skip question 43)

43. Has the "MS4 SWPPP Acceptance" form been signed by the principal executive officer or ranking elected official and submitted along with this NOI? ○ Yes ○ No

44. 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. N Y R

Owner/Operator Certification

I have read or been advised of the permit conditions and believe that I understand them. I also understand that, under the terms of the permit, there may be reporting requirements. I hereby certify that this document and the corresponding documents were prepared under my direction or supervision. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations. I further understand that coverage under the general permit will be identified in the acknowledgment that I will receive as a result of submitting this NOI and can be as long as sixty (60) business days as provided for in the general permit. I also understand that, by submitting this NOI, I am acknowledging that the SWPPP has been developed and will be implemented as the first element of construction, and agreeing to comply with all the terms and conditions of the general permit for which this NOI is being submitted.

Print First Name **MI**

Print Last Name

Owner/Operator Signature

Date / /

Appendix F

MS4 Stormwater Pollution Prevention Plan (SWPPP) Acceptance Form

New York State Department of Environmental Conservation
Division of Water
625 Broadway, 4th Floor
Albany, New York 12233-3505

MS4 Stormwater Pollution Prevention Plan (SWPPP) Acceptance Form

for

Construction Activities Seeking Authorization Under SPDES General Permit

*(NOTE: Attach Completed Form to Notice Of Intent and Submit to Address Above)

I. Project Owner/Operator Information
1. Owner/Operator Name:
2. Contact Person:
3. Street Address:
4. City/State/Zip:
II. Project Site Information
5. Project/Site Name:
6. Street Address:
7. City/State/Zip:
III. Stormwater Pollution Prevention Plan (SWPPP) Review and Acceptance Information
8. SWPPP Reviewed by:
9. Title/Position:
10. Date Final SWPPP Reviewed and Accepted:
IV. Regulated MS4 Information
11. Name of MS4:
12. MS4 SPDES Permit Identification Number: NYR20A ________________________
13. Contact Person:
14. Street Address:
15. City/State/Zip:
16. Telephone Number:

(NYS DEC - MS4 SWPPP Acceptance Form - January 2010)

MS4 SWPPP Acceptance Form - continued

V. Certification Statement - MS4 Official (principal executive officer or ranking elected official) or Duly Authorized Representative

I hereby certify that the final Stormwater Pollution Prevention Plan (SWPPP) for the construction project identified in question 5 has been reviewed and meets the substantive requirements in the SPDES General Permit For Stormwater Discharges from Municipal Separate Storm Sewer Systems (MS4s).
Note: The MS4, through the acceptance of the SWPPP, assumes no responsibility for the accuracy and adequacy of the design included in the SWPPP. In addition, review and acceptance of the SWPPP by the MS4 does not relieve the owner/operator or their SWPPP preparer of responsibility or liability for errors or omissions in the plan.

Printed Name:

Title/Position:

Signature:

Date:

VI. Additional Information

Appendix G

Notice of Termination (NOT)

(To Be Completed Upon Completion of Project)

New York State Department of Environmental Conservation
Division of Water
625 Broadway, 4th Floor
Albany, New York 12233-3505
(NOTE: Submit completed form to address above)

NOTICE OF TERMINATION for Storm Water Discharges Authorized under the SPDES General Permit for Construction Activity

Please indicate your permit identification number: NYR ___ ___ ___ ___ ___ ___

I. Owner or Operator Information
1. Owner/Operator Name:
2. Street Address:
3. City/State/Zip:
4. Contact Person: 4a.Telephone:
4b. Contact Person E-Mail:
II. Project Site Information
5. Project/Site Name:
6. Street Address:
7. City/Zip:
8. County:
III. Reason for Termination
9a. □ All disturbed areas have achieved final stabilization in accordance with the general permit and SWPPP. ***Date final stabilization completed** (month/year): ______________________
9b. □ Permit coverage has been transferred to new owner/operator. Indicate new owner/operator's permit identification number: NYR ___ ___ ___ ___ ___ ___ (Note: Permit coverage can not be terminated by owner identified in I.1. above until new owner/operator obtains coverage under the general permit)
9c. □ Other (Explain on Page 2)
IV. Final Site Information:
10a. Did this construction activity require the development of a SWPPP that includes post-construction stormwater management practices? □ yes □ no (If no, go to question 10f.)
10b. Have all post-construction stormwater management practices included in the final SWPPP been constructed? □ yes □ no (If no, explain on Page 2)
10c. Identify the entity responsible for long-term operation and maintenance of practice(s)? ______________________

NOTICE OF TERMINATION for Storm Water Discharges Authorized under the SPDES General Permit for Construction Activity - continued

10d. Has the entity responsible for long-term operation and maintenance been given a copy of the operation and maintenance plan required by the general permit? □ yes □ no

10e. Indicate the method used to ensure long-term operation and maintenance of the post-construction stormwater management practice(s):

□ Post-construction stormwater management practice(s) and any right-of-way(s) needed to maintain practice(s) have been deeded to the municipality.

□ Executed maintenance agreement is in place with the municipality that will maintain the post-construction stormwater management practice(s).

□ For post-construction stormwater management practices that are privately owned, a mechanism is in place that requires operation and maintenance of the practice(s) in accordance with the operation and maintenance plan, such as a deed covenant in the owner or operator's deed of record.

□ For post-construction stormwater management practices that are owned by a public or private institution (e.g. school, university or hospital), government agency or authority, or public utility; policy and procedures are in place that ensures operation and maintenance of the practice(s) in accordance with the operation and maintenance plan.

10f. Provide the total area of impervious surface (i.e. roof, pavement, concrete, gravel, etc.) constructed within the disturbance area? ______________________________ (acres)

11. Is this project subject to the requirements of a regulated, traditional land use control MS4? □ yes □ no

(If Yes, complete section VI - "MS4 Acceptance" statement

V. Additional Information/Explanation:

(Use this section to answer questions 9c. and 10b., if applicable)

VI. MS4 Acceptance - MS4 Official (principal executive officer or ranking elected official) or Duly Authorized Representative (Note: Not required when 9b. is checked -transfer of coverage)

I have determined that it is acceptable for the owner or operator of the construction project identified in question 5 to submit the Notice of Termination at this time.

Printed Name:	
Title/Position:	
Signature:	Date:

NOTICE OF TERMINATION for Storm Water Discharges Authorized under the SPDES General Permit for Construction Activity - continued

VII. Qualified Inspector Certification - Final Stabilization:	
I hereby certify that all disturbed areas have achieved final stabilization as defined in the current version of the general permit, and that all temporary, structural erosion and sediment control measures have been removed. Furthermore, I understand that certifying false, incorrect or inaccurate information is a violation of the referenced permit and the laws of the State of New York and could subject me to criminal, civil and/or administrative proceedings.	
Printed Name:	
Title/Position:	
Signature:	Date:
VIII. Qualified Inspector Certification - Post-construction Stormwater Management Practice(s):	
I hereby certify that all post-construction stormwater management practices have been constructed in conformance with the SWPPP. Furthermore, I understand that certifying false, incorrect or inaccurate information is a violation of the referenced permit and the laws of the State of New York and could subject me to criminal, civil and/or administrative proceedings.	
Printed Name:	
Title/Position:	
Signature:	Date:
IX. Owner or Operator Certification	
I hereby certify that this document was prepared by me or under my direction or supervision. My determination, based upon my inquiry of the person(s) who managed the construction activity, or those persons directly responsible for gathering the information, is that the information provided in this document is true, accurate and complete. Furthermore, I understand that certifying false, incorrect or inaccurate information is a violation of the referenced permit and the laws of the State of New York and could subject me to criminal, civil and/or administrative proceedings.	
Printed Name:	
Title/Position:	
Signature:	Date:

(NYS DEC Notice of Termination - January 2015)

Appendix H

Pre & Post Hydrology Map

IT IS A VIOLATION OF NEW YORK STATE EDUCATION LAW FOR ANY PERSONS TO ALTER THESE PLANS, SPECIFICATIONS, OR REPORTS IN ANY WAY, UNLESS ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER OR LAND SURVEYOR.

Brian Stokosa, PE

Revisions	
	11/30/23
	10/26/23
	09/27/23

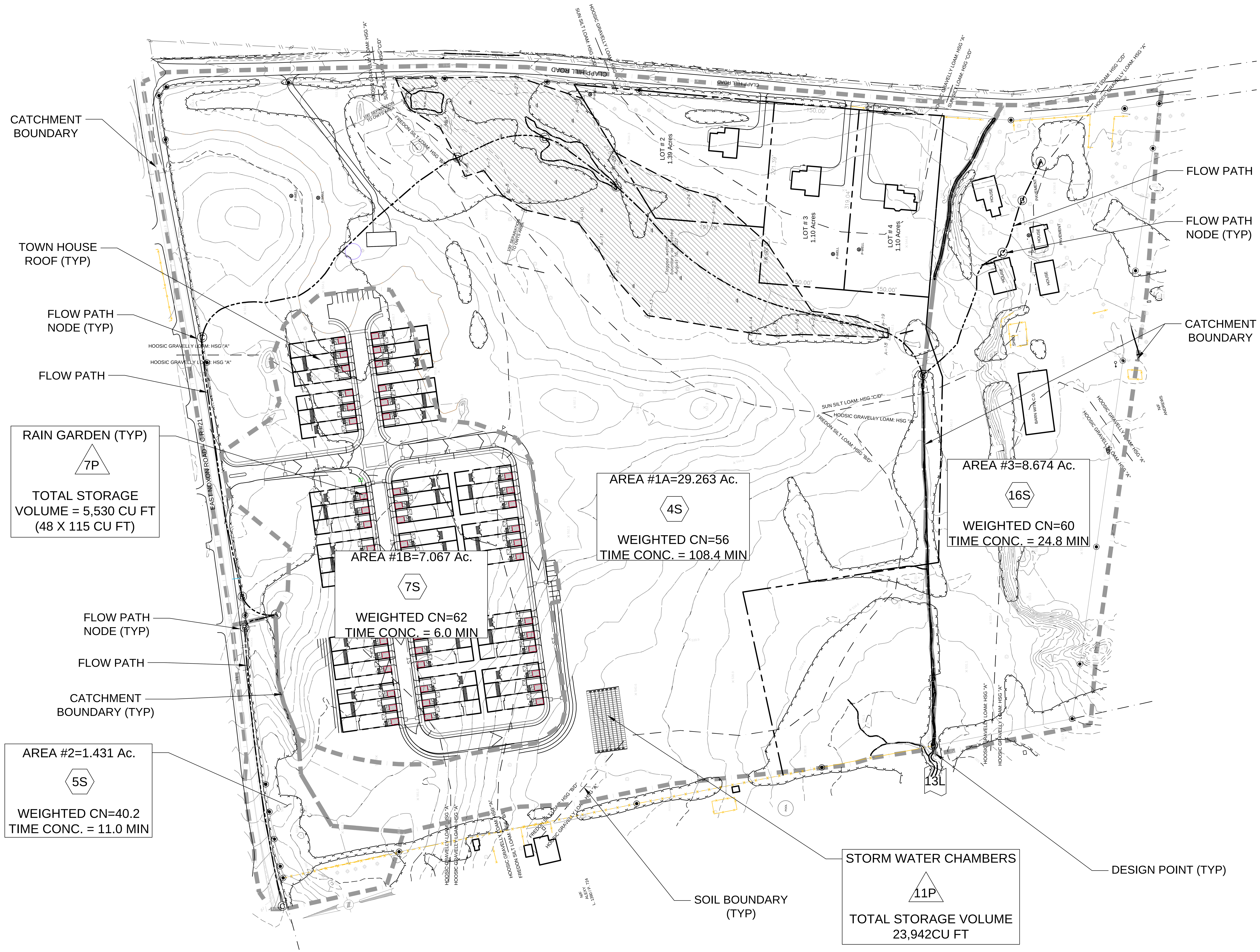
Project No. 2021:497 — License No. 083970

DAY | STOKOSA ENGINEERING P.C.
3 Van Wyck Lane
Wappingers Falls, New York
(845)-223-3202

PROJECT: Bonavenia Enterprises
Town of Union Vale — Dutchess County, New York

DRAWING: HYDROLOGY

SCALE	DRAWN BY	DRAWING No.
1" = 80'	BJS	PRE
DATE 07/27/23	CHECKED BY BJS	



IT IS A VIOLATION OF NEW YORK STATE EDUCATION LAW FOR ANY PERSONS TO ALTER THESE PLANS, SPECIFICATIONS, OR REPORTS IN ANY WAY, UNLESS ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER OR LAND SURVEYOR.

Brian Stokosa, PE

Revisions: 11/30/23, 10/26/23, 09/27/23

Project No. 2021:497 — License No. 083970

DAY STOKOSA ENGINEERING P.C.

3 Van Wyck Lane
Wappingers Falls, New York
(845)-223-3202

Project: Bonavenia Enterprises

Town of Union Vale — Dutchess County, New York

Drawing: HYDROLOGY

Scale: 1" = 80' — Drawn by: BJS — Drawing No.: POST

Date: 07/27/23 — Checked by: BJS

Appendix I

Erosion & Sediment Control Plan

Appendix J

Site Soil Report

United States Department of Agriculture

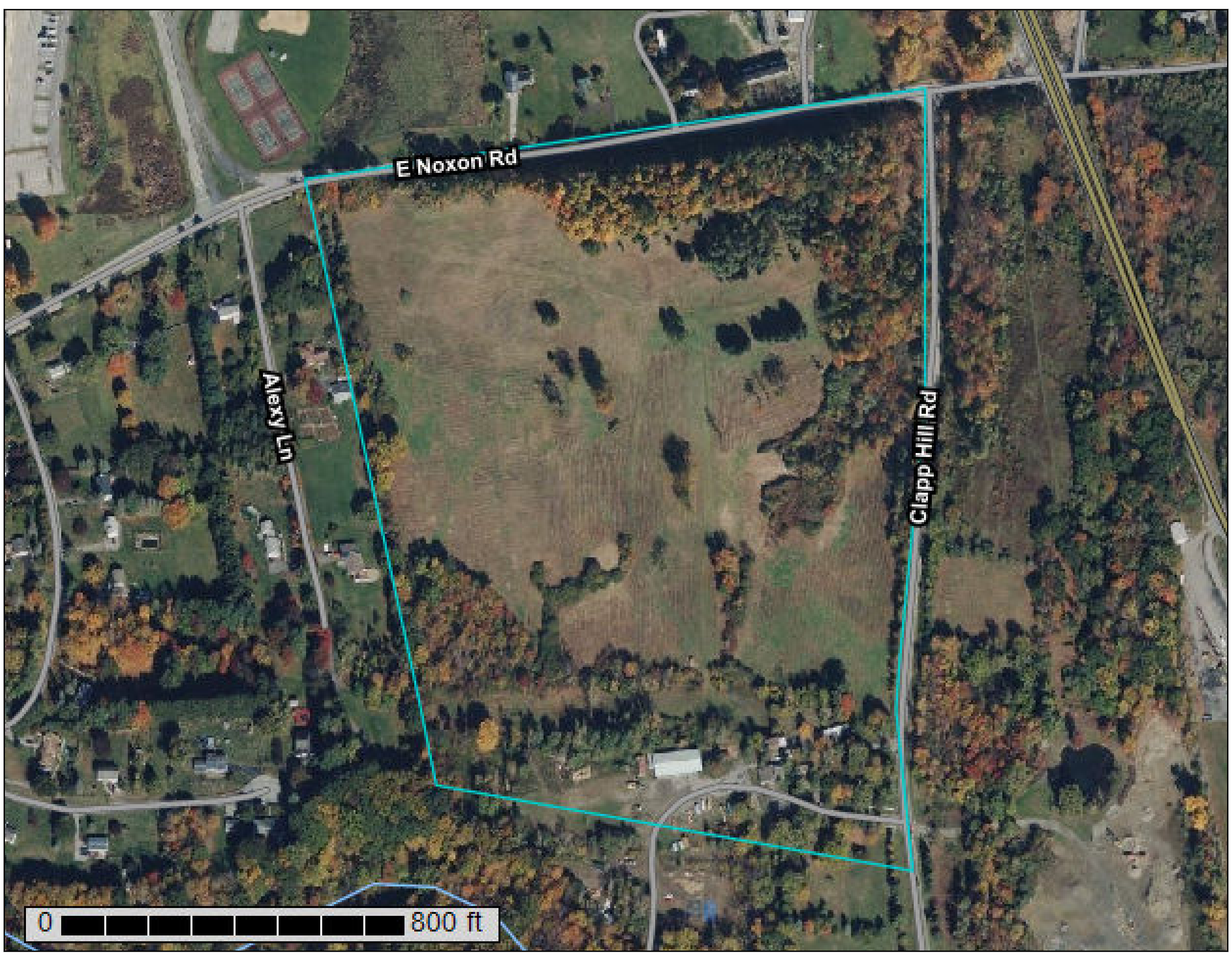
NRCS

Natural Resources Conservation Service

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

Custom Soil Resource Report for
Dutchess County, New York

Bonavenia Subdivision



January 18, 2022

Preface

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

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

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

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

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

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

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD). To file a complaint of discrimination, write to USDA, Director, Office of Civil Rights, 1400 Independence Avenue, S.W., Washington, D.C. 20250-9410 or call (800) 795-3272 (voice) or (202) 720-6382 (TDD). USDA is an equal opportunity provider and employer.

Contents

Soil Map

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

Soil Map

Map Scale: 1:3,410 if printed on A portrait (8.5" x 11") sheet.

Meters: 0, 50, 100, 200, 300

Feet: 0, 150, 300, 600, 900

N

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

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features

- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features

- Streams and Canals

Transportation

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

Background

- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

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

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

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

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

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

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

Soil Survey Area: Dutchess County, New York
Survey Area Data: Version 18, Sep 1, 2021

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

Date(s) aerial images were photographed: Oct 8, 2020—Oct 14, 2020

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

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
Fr	Fredon silt loam	10.7	22.7%
HsA	Hoosic gravelly loam, nearly level	5.4	11.6%
HsB	Hoosic gravelly loam, undulating	20.1	42.8%
HsC	Hoosic gravelly loam, rolling	2.1	4.4%
NwB	Nassau-Cardigan complex, undulating, very rocky	0.0	0.0%
Su	Sun silt loam	8.7	18.5%
Totals for Area of Interest		**47.1**	**100.0%**

Map Unit Descriptions

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

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

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

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

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

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

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

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

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

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

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

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

Dutchess County, New York

Fr—Fredon silt loam

Map Unit Setting

National map unit symbol: 9rfz
Elevation: 250 to 1,200 feet
Mean annual precipitation: 41 to 47 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 115 to 195 days
Farmland classification: Prime farmland if drained

Map Unit Composition

Fredon and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Fredon

Setting

Landform: Depressions
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Tread
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Loamy over sandy and gravelly glaciofluvial deposits

Typical profile

H1 - 0 to 9 inches: silt loam
H2 - 9 to 31 inches: very fine sandy loam
H3 - 31 to 70 inches: stratified very gravelly sand to loamy fine sand

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.20 to 1.98 in/hr)
Depth to water table: About 6 to 18 inches
Frequency of flooding: RareNone
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Available water supply, 0 to 60 inches: Moderate (about 6.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: B/D
Ecological site: F144AY029NY - Semi-Rich Wet Outwash
Hydric soil rating: No

Minor Components

Fredon, poorly drained

Percent of map unit: 5 percent
Landform: Depressions

Hydric soil rating: Yes

Unnamed soils, glacial outwash

Percent of map unit: 5 percent
Hydric soil rating: No

Halsey

Percent of map unit: 5 percent
Landform: Depressions
Hydric soil rating: Yes

HsA—Hoosic gravelly loam, nearly level

Map Unit Setting

National map unit symbol: 9rgj
Elevation: 100 to 1,100 feet
Mean annual precipitation: 41 to 47 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 115 to 195 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Hoosic and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Hoosic

Setting

Landform: Terraces, outwash plains, deltas
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Tread
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Sandy and gravelly glaciofluvial deposits

Typical profile

H1 - 0 to 9 inches: gravelly loam
H2 - 9 to 24 inches: very gravelly sandy loam
H3 - 24 to 70 inches: extremely gravelly loamy sand

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat excessively drained
Capacity of the most limiting layer to transmit water (Ksat): High to very high (1.98 to 19.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 3.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3s
Hydrologic Soil Group: A
Ecological site: F144AY022MA - Dry Outwash
Hydric soil rating: No

Minor Components

Knickerbocker

Percent of map unit: 5 percent
Hydric soil rating: No

Copake

Percent of map unit: 5 percent
Hydric soil rating: No

Haven

Percent of map unit: 5 percent
Hydric soil rating: No

Fredon

Percent of map unit: 4 percent
Landform: Depressions
Hydric soil rating: Yes

Halsey

Percent of map unit: 1 percent
Landform: Depressions
Hydric soil rating: Yes

HsB—Hoosic gravelly loam, undulating

Map Unit Setting

National map unit symbol: 9rgk
Elevation: 100 to 1,100 feet
Mean annual precipitation: 41 to 47 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 115 to 195 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Hoosic and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Hoosic

Setting

Landform: Terraces, outwash plains, deltas
Landform position (two-dimensional): Summit

Landform position (three-dimensional): Tread
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Sandy and gravelly glaciofluvial deposits

Typical profile

H1 - 0 to 9 inches: gravelly loam
H2 - 9 to 24 inches: very gravelly sandy loam
H3 - 24 to 70 inches: extremely gravelly loamy sand

Properties and qualities

Slope: 1 to 6 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat excessively drained
Capacity of the most limiting layer to transmit water (Ksat): High to very high (1.98 to 19.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 3.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3s
Hydrologic Soil Group: A
Ecological site: F144AY022MA - Dry Outwash
Hydric soil rating: No

Minor Components

Knickerbocker

Percent of map unit: 5 percent
Hydric soil rating: No

Haven

Percent of map unit: 5 percent
Hydric soil rating: No

Copake

Percent of map unit: 5 percent
Hydric soil rating: No

Fredon

Percent of map unit: 4 percent
Landform: Depressions
Hydric soil rating: Yes

Halsey

Percent of map unit: 1 percent
Landform: Depressions
Hydric soil rating: Yes

HsC—Hoosic gravelly loam, rolling

Map Unit Setting

National map unit symbol: 9rgl
Elevation: 100 to 1,100 feet
Mean annual precipitation: 41 to 47 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 115 to 195 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Hoosic and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Hoosic

Setting

Landform: Terraces, outwash plains, deltas
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Tread
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Sandy and gravelly glaciofluvial deposits

Typical profile

H1 - 0 to 9 inches: gravelly loam
H2 - 9 to 24 inches: very gravelly sandy loam
H3 - 24 to 70 inches: extremely gravelly loamy sand

Properties and qualities

Slope: 5 to 16 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat excessively drained
Capacity of the most limiting layer to transmit water (Ksat): High to very high (1.98 to 19.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 3.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: A
Ecological site: F144AY022MA - Dry Outwash
Hydric soil rating: No

Minor Components

Knickerbocker

Percent of map unit: 10 percent
Hydric soil rating: No

Copake

Percent of map unit: 5 percent
Hydric soil rating: No

Fredon

Percent of map unit: 4 percent
Landform: Depressions
Hydric soil rating: Yes

Halsey

Percent of map unit: 1 percent
Landform: Depressions
Hydric soil rating: Yes

NwB—Nassau-Cardigan complex, undulating, very rocky

Map Unit Setting

National map unit symbol: 9rhc
Elevation: 0 to 1,800 feet
Mean annual precipitation: 41 to 47 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 115 to 195 days
Farmland classification: Not prime farmland

Map Unit Composition

Nassau and similar soils: 45 percent
Cardigan and similar soils: 35 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Nassau

Setting

Landform: Till plains, ridges, benches
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Crest
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Channery loamy till derived mainly from local slate or shale

Typical profile

H1 - 0 to 5 inches: channery silt loam
H2 - 5 to 16 inches: very channery silt loam
H3 - 16 to 20 inches: unweathered bedrock

Properties and qualities

Slope: 1 to 6 percent
Depth to restrictive feature: 10 to 20 inches to lithic bedrock
Drainage class: Somewhat excessively drained
Capacity of the most limiting layer to transmit water (Ksat): Low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Very low (about 1.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: D
Ecological site: F144AY033MA - Shallow Dry Till Uplands
Hydric soil rating: No

Description of Cardigan

Setting

Landform: Ridges, hills
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Crest
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loamy till or colluvium derived from phyllite, slate, shale, and schist

Typical profile

H1 - 0 to 8 inches: channery silt loam
H2 - 8 to 20 inches: channery loam
H3 - 20 to 30 inches: channery silt loam
H4 - 30 to 34 inches: unweathered bedrock

Properties and qualities

Slope: 1 to 6 percent
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 4.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: C
Ecological site: F144AY034CT - Well Drained Till Uplands
Hydric soil rating: No

Minor Components

Dutchess

Percent of map unit: 10 percent

Hydric soil rating: No

Rock outcrop

Percent of map unit: 5 percent
Hydric soil rating: Unranked

Massena

Percent of map unit: 4 percent
Hydric soil rating: No

Sun

Percent of map unit: 1 percent
Landform: Depressions
Hydric soil rating: Yes

Su—Sun silt loam

Map Unit Setting

National map unit symbol: 9rj3
Elevation: 600 to 1,800 feet
Mean annual precipitation: 41 to 47 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 115 to 195 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Sun and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Sun

Setting

Landform: Depressions
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Loamy till derived primarily from limestone and sandstone, with a component of schist, shale, or granitic rocks in some areas

Typical profile

H1 - 0 to 4 inches: silt loam
H2 - 4 to 22 inches: loam
H3 - 22 to 80 inches: gravelly loam

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained

Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 0 inches
Frequency of flooding: None
Frequency of ponding: Occasional
Calcium carbonate, maximum content: 15 percent
Available water supply, 0 to 60 inches: Moderate (about 6.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: C/D
Ecological site: F144AY039NY - Semi-Rich Wet Till Depressions
Hydric soil rating: Yes

Minor Components

Massena

Percent of map unit: 5 percent
Hydric soil rating: No

Palms

Percent of map unit: 5 percent
Landform: Swamps, marshes
Hydric soil rating: Yes

Sun, stony

Percent of map unit: 5 percent
Landform: Depressions
Hydric soil rating: Yes

Canandaigua

Percent of map unit: 5 percent
Landform: Depressions
Hydric soil rating: Yes

Soil Information for All Uses

Soil Properties and Qualities

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

Soil Qualities and Features

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

Hydrologic Soil Group

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

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

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

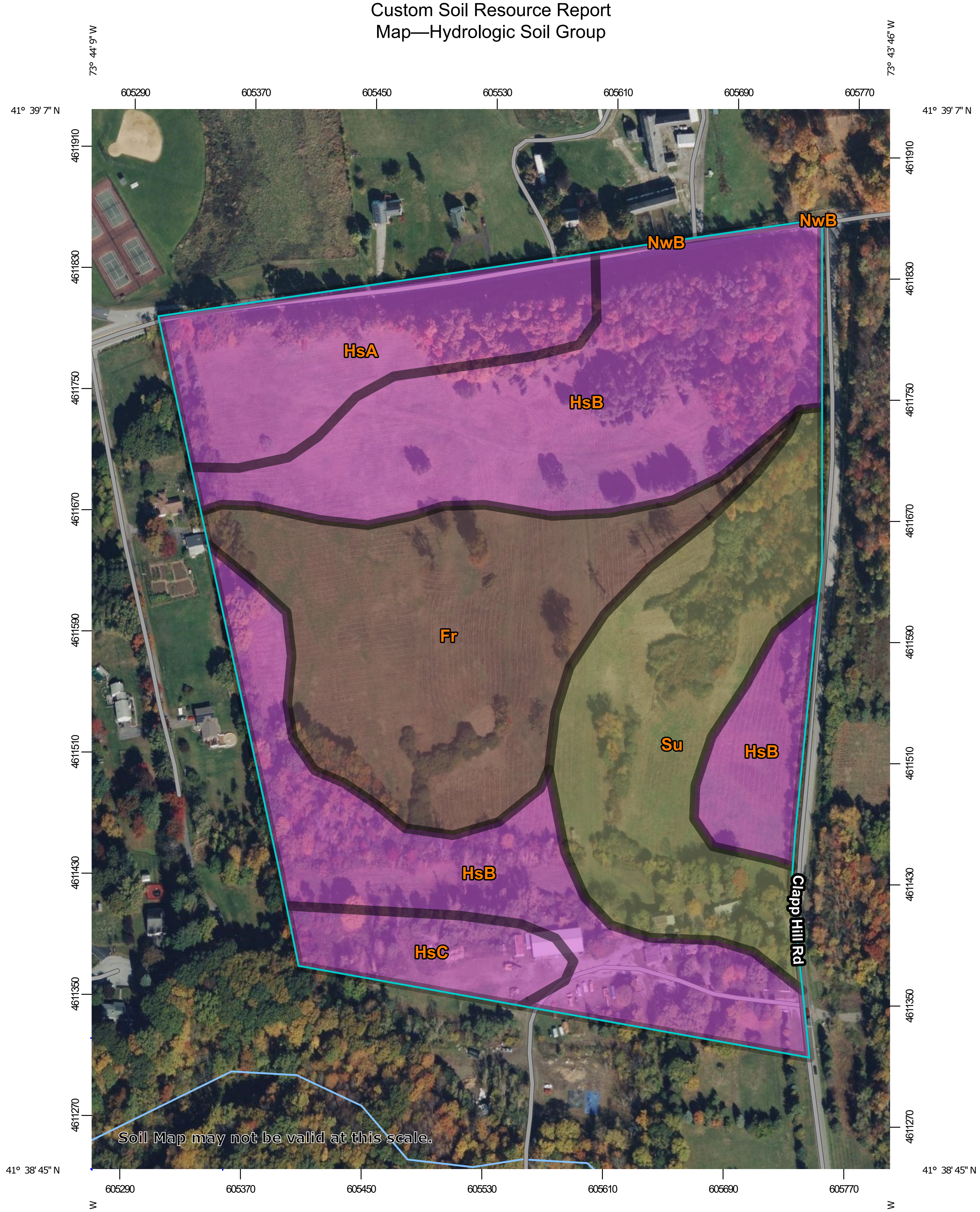
Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

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

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

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

Map—Hydrologic Soil Group



Map Scale: 1:3,410 if printed on A portrait (8.5" x 11") sheet.

Meters: 0, 50, 100, 200, 300

Feet: 0, 150, 300, 600, 900

N

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

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil 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 1:24,000.

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

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

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

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

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

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

Soil Survey Area: Dutchess County, New York
Survey Area Data: Version 18, Sep 1, 2021

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

Date(s) aerial images were photographed: Oct 8, 2020—Oct 14, 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.

Table—Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
Fr	Fredon silt loam	B/D	10.7	22.7%
HsA	Hoosic gravelly loam, nearly level	A	5.4	11.6%
HsB	Hoosic gravelly loam, undulating	A	20.1	42.8%
HsC	Hoosic gravelly loam, rolling	A	2.1	4.4%
NwB	Nassau-Cardigan complex, undulating, very rocky	D	0.0	0.0%
Su	Sun silt loam	C/D	8.7	18.5%
Totals for Area of Interest			**47.1**	**100.0%**

Rating Options—Hydrologic Soil Group

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

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LOCATION CARDIGAN NH+MA NY

Established Series
Rev: HRM-SALP-CAW
10/2012

CARDIGAN SERIES

The Cardigan series consists of moderately deep, well drained soils formed in till or colluvium. They are underlain by folded interbedded phyllite, slate, shale, and schist. They are on bedrock controlled landforms on hills and mountains. Slope ranges from 0 to 80 percent. The mean annual temperature is about 8 degrees C and mean annual precipitation is about 1066 mm.

TAXONOMIC CLASS: Coarse-loamy, mixed, active, mesic Typic Dystrudepts

TYPICAL PEDON: Cardigan silt loam, on an 18 percent southeast facing slope in a forested area. (Colors are for moist soil).

0e---0 to 2 cm; partially decomposed plant material.

A----2 to 12 cm; dark brown (10YR 3/3) silt loam; weak fine granular structure; very friable; many fine and common medium roots; 10 percent rock fragments of mostly channers and cobbles; very strongly acid; abrupt smooth boundary. (1 to 6 inches thick).

Bw1--12 to 22 cm; dark yellowish brown (10YR 4/4) silt loam; weak fine and medium granular structure; very friable; common fine and medium roots; 10 percent rock fragments of mostly channers and cobbles; very strongly acid; clear wavy boundary.

Bw2--22 to 58 cm; light olive brown (2.5Y 5/4) channery silt loam; weak fine and medium granular structure; very friable; common fine and few medium roots; 15 percent rock fragments of mostly channers and cobbles; strongly acid; clear wavy boundary. (Combined thickness of the Bw horizon is 22 to 76 cm).

C----58 to 78 cm; dark grayish brown (2.5Y 4/2) channery silt loam; massive; friable; few fine and medium roots; 15 percent rock fragments of mostly channers and cobbles; strongly acid; abrupt irregular boundary.

R----78 cm; gray phyllite bedrock.

TYPE LOCATION: Sullivan County, New Hampshire, town of Unity; 3750 feet east of the Charleston-Unity town line and 2750 feet south of the Claremont-Unity town line; approximate latitude 43 degrees 18 minutes 55 seconds N., and latitude 72 degrees 20 minutes 30 seconds W., NAD 27.

RANGE IN CHARACTERISTICS: Depth to bedrock ranges from 50 to 100 cm. Solum thickness ranges from 41 to 91 cm. Rock fragments of gravel, channers, flagstones, and cobbles range from 0 to 30 percent in the solum and 10 to 50 percent in the substratum. Reaction ranges from very strongly acid to moderately acid, unless limed. Clay content ranges from

4 to 18 percent and the weighted average silt content in the solum is greater than 40 percent.

The O horizon ranges from slightly decomposed to highly decomposed plant material. It 1s 0 to 3 inches thick.

The A horizon has hue of 10YR or 2.5Y, value of 3 or 4, and chroma of 1 to 3. Some pedons have an Ap horizon that has hue of 7.5YR to 2.5Y, value of 3 or 4, and chroma of 2 to 4. The A or Ap horizon is loam or silt loam in the fine-earth fraction.

The E horizon, where present, has hue of 7.5YR to 2.5Y, value of 4 to 6, and chroma of 1 or 2. Texture is similar to the A horizon.

The Bw horizon has hue of 7.5YR to 2.5Y, value of 4 or 5, and chroma of 4 or 6. It is loam, silt loam, or very fine sandy loam in the fine-earth fraction.

The BC horizon, where present, has hue of 10YR to 5Y, value of 3 to 5, and chroma of 2 to 4. Texture is similar to the Bw horizon.

The C horizon has hue of 10YR to 5Y, value of 3 to 5, and chroma of 2 to 4. It has weak granular or platy structure, or it is massive. Consistence ranges from very friable to firm. It is loam, silt loam, fine sandy loam, or very fine sandy loam in the fine-earth fraction. Some pedons have thin layers of soft bedrock overlying the hard bedrock.

COMPETING SERIES: These include the Ashe, Buladean, Charlton, Chestnut, Delaware, Dutchess, Edneyville, Foresthills, Gallimore, Greenbelt, Hazel, Lordstown, Newport, Riverhead, Rixeyville, Soco, St. Albans, Stecoah, Steinsburg, and Yalesville series. Ashe, Buladean, Chestnut, Edneyville, Gallimore, Rixeyville, Soco, and Stecoah soils are from outside LRR R. Ashe, Buladean, Chestnut Rixeyville, and Stecoah soils are underlain by saprolite and/or a paralithic contact. Hazel, Lordstown and Steinsburg soils have rock fragments dominated by hard sedimentary rocks. Charlton, Delaware, Dutchess, Riverhead, and St. Albans soils are deeper than 100 cm to bedrock. Greenbelt soils formed in anthropogenic material on modified landscapes in and near major urbanized areas. Newport soils are underlain by dense till. Yalesville soils have hue of 5YR or redder in the B and C horizons.

GEOGRAPHIC SETTING: Cardigan soils are nearly level to very steep. They are on bedrock controlled, glacially modified landforms. Slope ranges from 0 to 80 percent. The soils formed in till or colluvium derived from local phyllite, slate, shale, and schist. Mean annual precipitation ranges from 838 to 1270 mm and the frost-free period is 110 to 180 days.

GEOGRAPHICALLY ASSOCIATED SOILS: These are the Bernardston, Dutchess, Kearsarge, Nassau, and Pittstown soils. Bernardston and Pittstown soils formed in dense till. Dutchess soils are greater than 100 cm to bedrock and Kearsarge and Nassau soils are less than 50 cm to bedrock.

DRAINAGE AND SATURATED HYDRAULIC CONDUCTIVITY: Well drained. Surface runoff is moderate to very rapid. Saturated hydraulic conductivity is moderately high or high.

USE AND VEGETATION: Most of these soils are forested. Common trees are oak and hickory species, sugar maple, and eastern white pine. Cleared areas are used for hay, pasture, and corn, or are idle.

DISTRIBUTION AND EXTENT: MLRA 144A in New Hampshire, Massachusetts, and New York. The series is of moderate extent.

MLRA SOIL SURVEY REGIONAL OFFICE (MO) RESPONSIBLE: Amherst, Massachusetts.

SERIES ESTABLISHED: Sullivan County, New Hampshire, 1981.

REMARKS: The type location narrative was changed to match the narrative in the Sullivan County soil survey. Cardigan soils were previously included with the Hollis series in mapping. The description was updated to metric units in 2012; the typical pedon depths were originally described using English units.

Diagnostic horizons and features recognized in this pedon include:
a. Ochric epipedon - the zone from 0 to 12 cm (Oe and A horizons).
b. Cambic horizon - the zone from 12 to 58 cm (Bw horizon).
c. Lithic contact - phyllite bedrock at 78 inches.

National Cooperative Soil Survey
U.S.A.

LOCATION FREDON NY+CT MA NJ PA VT

Established Series
Rev. CFE-RS-SMF
05/2011

FREDON SERIES

The Fredon series consists of very deep, poorly and somewhat poorly drained soils formed in glaciofluvial materials. Fredon soils are on outwash terraces and outwash plains. Saturated hydraulic conductivity is moderately high or high in the solum and high or very high in the substratum. Slope ranges from 0 to 8 percent. The mean annual temperature is about 9 degrees C. (48 degrees F.) and the mean annual precipitation is about 940 mm. (37 inches).

TAXONOMIC CLASS: Coarse-loamy over sandy or sandy-skeletal, mixed, active, nonacid, mesic Aeric Endoaquepts

TYPICAL PEDON: Fredon silt loam in a hayfield at an elevation of about 158 meters (520 feet). (Colors are for moist soil unless otherwise stated.)

Ap--0 to 18 centimeters (0 to 7 inches); very dark gray (10YR 3/1) silt loam; weak fine granular structure; very friable; many roots; less than 5 percent gravel; neutral; abrupt smooth boundary. (10 to 25 centimeters (4 to 10 inches) thick)

Bg1--18 to 32 centimeters (7 to 13 inches); grayish brown (10YR 5/2) silt loam; weak coarse and very coarse (76 to 102 mm. across (3 to 4 inches)) prismatic structure parting to moderate fine subangular blocky structure; friable; many roots; common fine faint brown (10YR 4/3) iron concentrations and few medium distinct yellowish brown (10YR 5/4) iron concentrations; 5 percent rock fragments; neutral; clear wavy boundary.

2Bg2--32 to 56 centimeters (13 to 22 inches); gray (10YR 5/1) gravelly fine sandy loam; weak coarse prismatic structure parting to moderate fine subangular blocky structure; friable; few roots; thin clay films in pores; many medium prominent strong brown (7.5YR 5/8) iron concentrations; 20 percent rock fragments; neutral; clear wavy boundary. (Combined thickness of the B horizons is 18 to 69 centimeters (7 to 27 inches).)

2C1--56 to 127 centimeters (22 to 50 inches); dark grayish brown (2.5Y 4/2) gravelly loamy sand; single grain; loose; few roots in upper part; 20 percent fine gravel; discontinuous lenses of light olive brown (2.5Y 5/4) very fine sand; neutral; abrupt wavy boundary.

2C2--127 to 203 centimeters (50 to 80 inches); interbedded very dark grayish brown (10YR 3/2) and dark grayish brown (2.5Y 4/2) very gravelly sand; single grain; loose; 40 percent rock fragments; moderately alkaline; calcareous.

TYPE LOCATION: Washington County, New York; town of Cambridge; 46 meters (150 feet) south of Perry lane at a point about 0.80 kilometers (one-half mile) west of the intersection of Perry Lane and New York Route 372; in a hayfield; USGS Cambridge quadrangle; latitude 43 degrees, 1 minute, 56 seconds N.; longitude 73 degrees, 24 minutes, 26 seconds W., NAD 27.

RANGE IN CHARACTERISTICS: Thickness of solum ranges from 56 to 102 centimeters (22 to 40 inches). Depth to bedrock is more than 183 centimeters (6 feet). Content of rock fragments ranges from 0 to 35 percent in the A and B horizons, and from 0 to 65 percent in the 2C horizons. Unless limed the soil ranges from strongly acid to neutral in the solum and from moderately acid to moderately alkaline in the 2C horizon.

The A and Ap horizons have hue of 10YR or 2.5Y, value of 2 to 4, and chroma of 1 or 2. They are loam, fine sandy loam, very fine sandy loam, or silt loam.

BA horizons, where present, typically have the same characteristics as the B horizons and are 0 to 4 inches thick.

The B horizons have hue of 7.5YR to 5Y, value of 4 to 6, chroma of 1 to 4. They are loam, fine sandy loam, very fine sandy loam, or silt loam in the fine earth fraction. The B horizon has weak or moderate subangular blocky, weak coarse prismatic or moderate coarse platy structure. It ranges from very friable to firm in subhorizons.

BC horizons, where present, typically have characteristics similar to the B horizons and are 0 to 5 inches thick.

The 2C or 2Cg horizon has hue of 5YR to 5Y or is neutral, value of 3 to 6, and chroma of 0 to 4. It is coarse sand to loamy fine sand in the fine-earth fraction, and is commonly stratified. It may be calcareous or noncalcareous.

COMPETING SERIES: There are no other series currently in the same family.

The Halsey, Raypol, Red Hook, Rexford, and Walpole series are similar soils in related families. Halsey soils have chroma of 2 or less dominant in all horizons to a depth of 75 centimeters (30 inches). Raypol Soils have an acid reaction class. Red Hook soils have a coarse-loamy particle-size control section. Rexford soils have a coarse-loamy particle size control section and a fragipan. Walpole soils have a sandy particle-size control section.

GEOGRAPHIC SETTING: Fredon soils are level to gently sloping with slope gradients of 0 to 8 percent. They are on terraces that are slightly above the lowest depressions and stream floodplains. The soils formed in glaciofluvial material derived from slate, shale, sandstone, some limestone and small amounts of granitic gneiss. Climate is temperate and humid. Average annual temperature ranges from 7 to 11 degrees C. (45 to 52 degrees F.) and average annual precipitation from 864 to 1270 mm. (34 to 50 inches) usually distributed evenly throughout the year. Frost-free days range from 130 to 240.

GEOGRAPHICALLY ASSOCIATED SOILS: These are the Bath, Dutchess, Halsey, Hazen, Hero, Palmyra, Phelps, and Wassaic soils on nearby landscapes. Well drained Bath, Dutchess, and Wassaic soils formed in till on nearby uplands. The well drained Hazen and Palmyra soils, moderately well drained Hero and Phelps soils, and very poorly drained Halsey soils are in drainage sequences with Fredon soils.

DRAINAGE AND PERMEABILITY: Fredon soils are commonly poorly drained but the range includes somewhat poorly drained. Runoff is negligible to medium. The water table is commonly less than 30 centimeters (1 foot) but ranges to within 46 centimeters (1 1/2 feet) of the surface from October to June in most years. Saturated hydraulic conductivity is moderately high or high in the solum and high or very high in the substratum.

USE AND VEGETATION: Used as woodland, pasture and cropland. Natural vegetation is dominantly red maple, elm, willow, and ash and some sedges and wetland plants. Some areas have been cleared and are used for pasture or cropland.

DISTRIBUTION AND EXTENT: Glaciofluvial landforms in Connecticut, Massachusetts, New York, New Jersey, Pennsylvania, and Vermont; MLRAs 101, 139, 140, 142, 144A, and small mesic areas within MLRA 144B. The series is moderately extensive with a total extent of about 24,000 to 30,500 hectares (60,000 to 75,000 acres).

MLRA SOIL SURVEY REGIONAL OFFICE (MO) RESPONSIBLE: Amherst, Massachusetts

SERIES ESTABLISHED: Warren County, New Jersey, 1951.

REMARKS: With the revision in 2007 the typical pedon location is moved from Warren County, New Jersey in southern MLRA 144A to Washington County, New York in northern MLRA 144A. Data collected in the update soil survey activities for Warren and Sussex Counties, New Jersey did not support the maintenance of the official series type location for this series in that portion of MLRA 144A.

Geographic coordinates were determined in this revision from an interpretation of the narrative description of the location in the published Soil Survey of Washington, New York (September 1975). Dry color for the Ap horizon was not provided in the typical pedon but is presumed ochric. Cation-exchange activity class was estimated from a review of data for similar soils. Fredon soils were previously correlated in published surveys in Maine. Soil temperature regimes in Maine have been determined to be frigid and cryic.

Diagnostic horizons and other features recognized in the typical pedon include:

1. Ochric epipedon - from 0 to 18 cm. (0 to 7 inches) - Ap horizon.
2. Cambic horizon - from 18 to 56 cm. (7 to 22 inches)- Bg horizons.

3. Aquepts suborder - evidenced by matrix chroma of 2 or less and redox concentrations within 50 cm. (20 inches) of the soil surface - Bg horizons.
4. Aeric subgroup - as evidenced by matrix hue of 10YR or yellower and chroma of 2 with no redox concentrations in the zone from 56 cm. to 75 Cm. (22 to 30 inches) - 2C1 horizon.
5. Contrasting particle-size family within the control section that is coarse-loamy to 56 cm. (22 inches) and sandy or sandy-skeletal to a depth of 100 cm. (40 inches).

National Cooperative Soil Survey
U.S.A.

LOCATION HOOSIC NY+MA NH NJ

Established Series
Rev. MGC-WE-ERS
04/2016

HOOSIC SERIES

The Hoosic series consists of very deep, somewhat excessively drained soils formed in glacial outwash. They are nearly level to very steep soils on outwash plains, terraces, kames, eskers, and moraines. Slope ranges from 0 to 60 percent. Mean annual temperature is 48 degrees F. and mean annual precipitation is 38 inches.

TAXONOMIC CLASS: Sandy-skeletal, mixed, mesic Typic Dystrudepts

TYPICAL PEDON: Hoosic gravelly sandy loam, on a 4 percent slope in a pasture. (Colors are for moist soil.)

Ap -- 0 to 6 inches, dark grayish brown (10YR 4/2) gravelly sandy loam; weak fine granular structure; friable; many fine roots; 30 percent rock fragments; moderately acid; abrupt smooth boundary. (5 to 9 inches thick.)

Bwl -- 6 to 11 inches, yellowish brown (10YR 5/6) gravelly sandy loam; weak fine and medium granular structure; friable; common fine roots; many fine pores; 30 percent rock fragments with slate prominent; strongly acid; clear wavy boundary.

Bw2 -- 11 to 22 inches, yellowish brown (10YR 5/6) very gravelly sandy loam; weak fine granular structure; friable; common fine roots; many fine pores; 40 percent rock fragments with slate prominent; very strongly acid; gradual wavy boundary. (Combined thickness of the Bw horizons is 5 to 36 inches.)

BC -- 22 to 28 inches, yellowish brown (10YR 5/4) very gravelly loamy sand; very weak fine granular structure; very friable; few fine roots; common fine pores; 45 percent rock fragments with slate prominent; very strongly acid; gradual wavy boundary. (0 to 20 inches thick.)

2C -- 28 to 72 inches, light olive brown (2.5Y 5/4) and dark grayish brown (10YR 4/2) crudely stratified very gravelly sand; single grain; loose; 50 percent rock fragments dominated by slate; strongly acid.

TYPE LOCATION: Orange County, New York. Town of Mount Hope, 1/2 mile southeast of village of Otisville at northeast end of cemetery. USGS Otisville, NY topographic quadrangle; latitude 41 degrees, 27 minutes, 58 seconds N. and longitude 74 degrees, 32 minutes, 9 seconds W. NAD 1927.

RANGE IN CHARACTERISTICS: Thickness of the solum ranges from 14 to 36 inches. Bedrock is deeper than 60 inches. Rock fragments range from 10 to 35 percent by volume in the A horizons, 20 to 55 percent in the B horizon, and 35 to 75 percent in the 2C horizon. Cobblestones and flagstones make up as much as 15 percent of the solum and up to 20 percent of the substratum. Reaction unless limed, is very strongly acid or strongly acid above 30 inches, and ranges from very strongly acid through slightly acid below 30 inches except in some pedons it increases to mildly alkaline below depths of 7 feet.

The Ap horizon has hue of 7.5YR through 2.5Y, value of 3 through 5, and chroma of 2 or 3. Texture of the fine earth fraction ranges from sandy loam to silt loam. It has weak or moderate, medium or fine granular structure, some pedons range to subangular blocky. Consistence is friable or very friable.

The B horizons have hue of 5YR to 2.5Y, value of 4 or 5, and chroma of 3 through 6. They have textures ranging from coarse sandy loam to loam in the fine earth fraction above depths of 10 to 25 inches and textures of loamy fine sand, loamy sand or sand in the fine earth fraction below these depths. They have very weak or moderate, fine or medium granular or subangular blocky structure. Consistance is friable or very friable. Some subhorizons are single grained and loose. Some pedons have a 2BC horizon with color and textures similar to the 2C horizon.

The 2C horizons have hue of 7.5YR or 2.5Y, value of 3 through 5, and chroma of 2 through 4. They are stratified loamy sand, loamy coarse sand, coarse sand, or sand in the fine earth fraction. They are single grained and loose.

COMPETING SERIES: The Gloucester series are in the same family. Gloucester soils lack stratified 2C horizons. The Brandywine series may be in the same family once it is updated to the 8th Edition of the Keys to Soil Taxonomy. Brandywine soils lack stratified 2C horizons.

The Alton, Bonaparte, Chenango, Croton, Hartford, Hinckley, Juno, Manchester, Merrimac, Otisville, Quonset, Speelyai, Tunkhannock and Warwick series are similar soils in related families. Alton soils have a loamy-skeletal particle size control section, and have more than 60 percent base saturation within 30 inches. Bonaparte, Hinckley, Juno, Manchester, Otisville, Quonset, and Speelyai soils lack cambic horizons. Chenango, Tunkhannock and Warwick soils have loamy skeletal particle-size control sections. Croton soils have more than 60 percent base saturation within 30 inches. Hartford and Merrimac soils have sandy particle size control sections.

GEOGRAPHIC SETTING: Hoosic soils are nearly level to undulating soils on glacial outwash plains and valley trains and related terraces, kames, eskers, and water sorted parts of moraines. Slope ranges from 0 to 60 percent. The soils formed I water-sorted sandy and gravelly material containing varying proportions of sandstone, shale, phyllite and slate. Mean annual precipation ranges from 30 to 50 inches; mean annual air temperature ranges from 45 to 51 degrees F.; mean annual frost free period ranges from 135 to 200 days. Elevation ranges from 100 to 1100 feet above sea level.

GEOGRAPHICALLY ASSOCIATED SOILS: These are the competing Alton, Chenango, Hinckley, Otisville, Quonset, Tunkhannock and Warwick series and the Atherton, Braceville, Castile, Fredon, Halsey, and Oakville soils.

Atherton soils are poorly to very poorly drained and are associated in low areas. Braceville soils have a fragipan and are not as well drained. Castile soils are moderately well drained. Fredon soils are somewhat poorly to poorly drained. Halsey soils are very poorly drained and are in nearby depressions. Oakville soils are dominated by fine sand throughout and occur in less gravelly deposits.

DRAINAGE AND PERMEABILITY: Somewhat excessively drained. The potential for surface runoff ranges from low to high. Permeability is moderately rapid or rapid in the solum and very rapid in the substratum.

USE AND VEGETATION: Most areas have been cleared and are used to grow hay, pasture, corn, small grains, vegetable crops and deciduous fruit, or are idle. Woodlots contain sugar maple. oak, hickory, and in the coolest areas, American beech.

DISTRIBUTION AND EXTENT: Central, southern and eastern New York, New Hampshire, New Jersey and western Massachusetts. MLRA's 140, 142, 144A. The series is moderately extensive.

MLRA SOIL SURVEY REGIONAL OFFICE (MO) RESPONSIBLE: Amherst, Massachusetts

SERIES ESTABLISHED: Washington County, New York, 1909.

REMARKS: Diagnostic horizons and features recongnized in the typical pedon are:
(1) Ochric Epipedon - the zone from the surface of the soil to a depth of about 6 inches (Ap horizon).
(2) Cambic Horizon - the zone from 6 inches to a depth of about 28 inches (Bw1, Bw2 and BC horizons).
(3) Sandy-Sketetal feature - about 45 percent by volume weighted average rock fragments in the particle-size control section.

Soil Interpretation Records: NY0090, NY0425

National Cooperative Soil Survey
U.S.A.

LOCATION NASSAU NY MA NJ VT

Established Series
Rev. DCP
08/2017

NASSAU SERIES

The Nassau series consists of shallow, somewhat excessively drained soils formed in channery till derived from acid shale and slate. They are nearly level to very steep soils that overlie shale bedrock at depths of 25 to 50 cm. They are found on summits, shoulders, and backslopes of ridges and hills on glaciated uplands. Slope ranges from 0 to 70 percent. Mean annual temperature is 9 degrees C and mean annual precipitation is 1,200 mm.

TAXONOMIC CLASS: Loamy-skeletal, mixed, active, mesic Lithic Dystrudepts

TYPICAL PEDON: Nassau channery silt loam, on a 10 percent slope in a rolling area that is pastured. (Colors refer to moist soil unless otherwise noted).

Ap -- 0 to 8 cm; dark brown (10YR 3/3) channery silt loam; pale brown (10YR 6/3) dry: weak fine granular structure; very friable; common fine and medium roots; 35 percent shale fragments; strongly acid; abrupt smooth boundary. (8 to 25 cm thick.)

Bw -- 8 to 43 cm; yellowish brown (10YR 5/4) very channery silt loam; weak fine subangular blocky structure; friable; few fine roots; 45 percent shale fragments; strongly acid; abrupt wavy boundary. (10 to 38 cm thick.)

2R -- 43 cm; hard brown (10YR 4/3) and greenish gray (5G 5/1) folded shale interbedded with red and green shale.

TYPE LOCATION: Columbia County, New York. Town of Chatham, 600 feet west of Reed Road, 0.3 mile south of the intersection of Reed Road and Richmond Road. USGS East Chatham, NY topographic quadrangle; Latitude 42 degrees, 27 minutes, 21.3 seconds N. and Longitude 73 degrees, 36 minutes, 20.42 seconds W. WGS84.

RANGE IN CHARACTERISTICS: Thickness of the solum and depth to bedrock ranges from 25 to 50 cm. Rock fragments are mainly slate and shale with content ranging from 10 to 50 percent by volume in the Ap horizon and 35 to 70 percent in the B horizon. Rock fragments are mainly channers, but includes 0 to 20 percent flagstones in the A horizon and 0 to 25 percent flagstones below. Some areas are very stony or extremely stony.

The Ap horizon has hue of 7.5YR through 2.5Y, value of 3 or 5, and chroma of 2 or 3. Texture of the fine earth fraction is loam or silt loam. Structure is weak or moderate, medium or fine granular. Consistence is friable or very friable. Unless limed, reaction ranges from extremely acid to strongly acid. Some pedons have thin O horizons that are extremely acid or very acid.

The Bw horizon has hue of 7.5YR through 2.5Y, value of 4 or 5, and chroma of 3 through 8. Texture of the fine-earth fraction is loam or silt loam. Structure is weak or moderate, medium or fine subangular blocky. Consistence is friable or very friable. Unless limed, reaction ranges from very strongly acid through moderately acid.

Some thicker pedons have thin C or 2Cr horizons immediately above the bedrock. C or 2Cr horizons have a hue of 10YR or 2.5Y, value of 3 through 5 and chroma of 1 through 6. The C horizon has similar textures, rock fragment content, and reaction to the Bw horizon. The 2Cr horizon consists of highly fractured soft weathered bedrock.

COMPETING SERIES: The Arnot, Klinesville, Sylvatus, and Weikert series are in the same family. Arnot soils are dominated by siltstone and sandstone rock fragments. Klinesville soils have hues of 5YR or redder throughout. Sylvatus soils formed in residuum and have rock fragments that are dominantly metasedimentary phylitte. Weikert soils have 10 to 40 percent of the clay fraction dominated by kaolinite.

The Benson, Berks, Manlius, and Palatine soils are similar soils in related families. Benson soils have greater than 60 percent base saturation. Berks and Manlius soils have bedrock at depths of 50 to 100 cm. Palatine soils have mollic epipedons and are 50 to 100 cm deep to bedrock.

GEOGRAPHIC SETTING: Nassau soils are nearly level to steep soils on bedrock-controlled, glacially modified landforms. Slope ranges from 0 to 70 percent. They formed in till derived mainly from local slate or shale similar to that of the R horizon. Mean annual temperature ranges from 7 to 10 degrees C., mean annual precipitation ranges from 760 to 1,270 mm, and mean annual frost-free season ranges from 130 to 190 days. The elevation ranges from 45 to 275 meters above sea level.

GEOGRAPHICALLY ASSOCIATED SOILS: These are the Bath, Bernardston, Chippewa, Darien, Dutchess, Erie, Hudson, Mardin, Manlius, Marilla, Pittstown, Rhinebeck and Venango soils. Chippewa, Manlius and Venango are typically associated in the extreme southern portions of MLRA 144A. Bath, Chippewa, Erie, Mardin, Marilla and Venango are very deep soils that contain fragipans. Bernardston and Pittstown are very deep soils with C horizons in dense, very firm basal till. Darien soils are very deep somewhat poorly drained soils that contain argillic horizons. Dutchess soils are very deep and have a coarse loamy particle size. Hudson and Rhinebeck soils are very deep clayey soils that are moderately well drained and somewhat poorly drained, respectively. Manlius soils are 50 to 100 cm deep to bedrock.

DRAINAGE AND SATURATED HYDRAULIC CONDUCTIVITY: Somewhat excessively drained. The potential for surface runoff is medium to very high. Saturated hydraulic conductivity is moderately high or high.

USE AND VEGETATION: A large acreage is in woodlots containing sugar maple, red oak, American beech and other hardwoods. Hemlock is prominent on north-facing steep slopes. A high portion is idle or in unimproved pasture. Areas intimately associated with deeper soils are used for growing corn, oats, soy beans and hay.

DISTRIBUTION AND EXTENT: Central, southern and eastern New York, western Vermont, Massachusetts, and northwestern New Jersey. MLRA's 101, 140, 142, and 144A. The series is of large extent.

SOIL SURVEY REGIONAL OFFICE (SSRO) RESPONSIBLE: Amherst, Massachusetts

SERIES ESTABLISHED: Rensselaer County, New York, 1932.

REMARKS: Diagnostic horizons and features recognized in this pedon are:
1. Ochric epipedon - The zone from the surface to a depth of 8 cm (Ap horizon).
2. Cambic horizon - The zone from 8 to 43 cm (Bw horizon) with less than 60 percent base saturation as evidenced by strongly acid reaction.
3. Lithic contact - Bedrock at 43 cm.
4. Loamy-skeletal - Silt loam below 25 cm with 45 percent rock fragments.

National Cooperative Soil Survey
U.S.A.

LOCATION SUN NY

Established Series
Rev. WEH-ERS
07/2006

SUN SERIES

The Sun series consists of very deep, poorly drained soils formed in till derived primarily from limestone and sandstone with smaller amounts of schist, shale and granite in some areas. These soils are in low areas or depressions on till plains. Saturated hydraulic conductivity is moderately high to high in the mineral surface and subsoil, and moderately low and moderately high in the substratum. Slope ranges from 0 to 3 percent. Mean annual temperature is 48 degrees F., and mean annual precipitation is 38 inches.

TAXONOMIC CLASS: Coarse-loamy, mixed, active, nonacid, mesic Aeric Epiaquepts

TYPICAL PEDON: Sun loam, on a 1 percent slope in a brushy pasture. (Colors are for moist broken soil unless indicated otherwise)

Ap -- 0 to 9 inches; very dark gray (10YR 3/1) loam, light brownish gray (10YR 6/2) dry; weak coarse granular structure; friable; many fine roots; 5 percent rock fragments; slightly acid; abrupt smooth boundary. (6 to 13 inches thick.)

Bg -- 9 to 18 inches; gray (10YR 6/1) gravelly fine sandy loam; weak fine blocky structure; friable; few roots; few fine pores; 20 percent rock fragments; common medium distinct yellowish brown (10YR 5/4) and dark yellowish brown (10YR 4/4) masses of iron accumulation; slightly acid; gradual smooth boundary. (0 to 20 inches thick.)

Bw -- 18 to 36 inches; brown (10YR 5/3) gravelly fine sandy loam; weak medium subangular blocky structure; firm; few fine pores; 30 percent rock fragments; common medium and coarse distinct yellowish brown (10YR 5/6) masses of iron accumulation, and many medium distinct gray (10YR 5/1) areas of iron depletion; neutral; clear wavy boundary. (0 to 20 inches thick.)

Cd -- 36 to 72 inches; brown (10YR 5/3) gravelly fine sandy loam; massive; firm; few fine pores; 30 percent rock fragments; common medium and fine faint yellowish brown (10YR 5/4) masses of iron accumulation, and common medium distinct gray (10YR 5/1) areas of iron depletion; slightly effervescent; slightly alkaline.

TYPE LOCATION: Oswego County, New York; Town of Volney, 3 1/2 miles east of Minetto, 1-1/2 miles northwest of Mount Pleasant, 25 feet from intermittent drainage way below pond site. USGS Oswego East, NY topographic quadrangle; Latitude 43 degrees, 23 minutes, 55 seconds N. and Longitude 76 degrees, 24 minutes, 27 seconds W. NAD 1927.

RANGE IN CHARACTERISTICS: Thickness of the solum ranges from 20 to 40 inches. Depth to bedrock is greater than 60 inches. Depth to carbonates usually ranges from 20 to 70 inches however, some pedons lack carbonates. Rock fragments range in volume from 0 to 35 percent in the solum and from 15 to 50 percent in the substratum, but average less than 35 percent in the control section. These percentages include up to 10 percent greater than 3 inches in the A horizon and up to 15 percent in the B and C horizons. Reaction ranges from strongly acid through neutral in the mineral surface layer, from moderately acid through slightly alkaline in the subsoil, and from neutral through moderately alkaline in the substratum.

The Ap horizon has hue of 10YR or 2.5Y, value of 2 through 4, and chroma of 1 or 2. Texture of the fine-earth fraction is silt loam, loam, fine sandy loam, or sandy loam. Structure is weak or moderate, granular or subangular blocky. Consistence is friable or very friable. In uncultivated areas, the soil may have an O horizon up to 4 inches thick.

Some pedons have an E or BE horizon. They have hue of 5YR through 5Y, value of 3 through 5, and chroma of 2 through 4. Texture of the fine-earth fraction is silt loam, loam, fine sandy loam, or sandy loam in the fine-earth fraction. Structure is weak or moderate angular or subangular blocky, platy, or the horizon is massive. Consistence is friable or firm.

The Bg horizon, if present, is neutral or has hue of 10YR through 5Y, or is gley, value of 4 through 6, and chroma of 0 through 2 with chroma restricted to 0 or 1 if the horizon is massive. Redoximorphic concentrations are common or many. The Bg horizon may be absent in pedons having depleted ped face colors. Texture of the fine-earth fraction is silt loam, loam, fine sandy loam, or sandy loam. Structure is weak or moderate angular, subangular blocky, platy, or the horizon is massive. Consistence is friable or firm.

The Bw horizon, if present, has hue of 5YR through 5Y, or is gley, value of 3 through 5, and chroma of 2 through 4. It contains both areas of iron oxide accumulations and areas of iron depletions. Texture of the fine-earth fraction is sandy loam, fine sandy loam, silt loam, or loam. Structure and consistence are the same as the Bg.

Some pedons have a BC or BCg horizon with hue of 5YR through 5Y, value of 3 through 6, and chroma of 1 through 4. Texture of the fine-earth fraction is sandy loam, fine sandy loam, or loam. Structure is subangular blocky, platy, or the horizon is massive. Consistence is friable or firm. Carbonates are present in some pedons.

The Cd horizon has hue of 5YR through 5Y, or is gleyed with hue of 5G, 5GY or 5BG, value is 3 through 6, and chroma of 1 through 4. Texture of the fine-earth fraction is loam, fine sandy loam, or sandy loam. It is massive or has plate-like divisions. Consistence is firm or very firm.

COMPETING SERIES: The Painesville and Punsit series are in the same family. Painesville soils have textures of silt loam or silty clay loam in the substratum. Punsit soils are till derived dominantly from dark slate, phylite, shale or schists.

Closely related soils are the Conneaut, Lamson, Massena, Neversink, Newstead, Busti, Red Hook, and Suny series. Conneaut soils have less sand and more clay in the particle-size control section. Massena soils are somewhat poorly drained and in the horizon immediately below the A horizon has chroma of 3 or 4, if aggregated otherwise, it has chroma of 2. Lamson soils formed in deep sandy lacustrine deposits and do not have rock fragments. Neversink soils are more acid. Newstead soils have bedrock at 20 to 40 inches. Busti soils lack dense substrata, and are somewhat poorly drained. Red Hook soils have stratified C horizons. Suny soils have a colder soil temperature regime and are more acid.

GEOGRAPHIC SETTING: The Sun soils are in level and concave depressional areas of till plains. Slope ranges from 0 to 3 percent. The soils formed in till derived from sandstone and limestone, and in some areas have a component of schist, shale or granitic rocks. The upper horizons of some pedons are in local alluvium or colluvium up to 18 inches thick over till. The climate is humid and cool temperate. Mean annual precipitation ranges from 26 to 45 inches, mean annual temperature ranges from 45 to 50 degrees F., and the mean annual frost-free period ranges from 110 to 180 days. Elevation ranges from 50 to 1700 feet above sea-level.

GEOGRAPHICALLY ASSOCIATED SOILS: Nellis, Amenia and Massena soils are well drained, moderately well drained and somewhat poorly drained soils, respectively, that are associated in a drainage sequence with Sun soils. Other associated soils are the well drained and moderately well drained Pittsfield and Georgia soils that are on higher nearby landscapes.

DRAINAGE AND SATURATED HYDRAULIC CONDUCTIVITY: Poorly drained. The potential for surface runoff is negligible, high, or very high. Saturated hydraulic conductivity is moderately high to high in the mineral surface and subsoil, and moderately low and moderately high in the substratum.

USE AND VEGETATION: Cleared areas are used mainly for pasture or long-term hay. Woodlots contain red maple, black ash, alder, and other wetness-tolerant species.

DISTRIBUTION AND EXTENT: New York, and possibly Connecticut, and Massachusetts. MLRA's 101, 140, 141, 142, and 144A. The soil is moderately extensive.

MLRA SOIL SURVEY REGIONAL OFFICE (MO) RESPONSIBLE: Amherst, Massachusetts

SERIES ESTABLISHED: Essex County, New York, 1954

REMARKS: Original classification placed Sun in the great group of Haplaquepts. Because of changes in the 5th edition of `Keys to Soil Taxonomy' this soil now classifies into the great group of Epiaquepts. The C horizon has been redefined to a Cd and friable removed from the RIC of the Cd. The series is now defined as poorly drained only, and very poorly is dropped.

Diagnostic horizons and other features recognized in the typical pedon are:

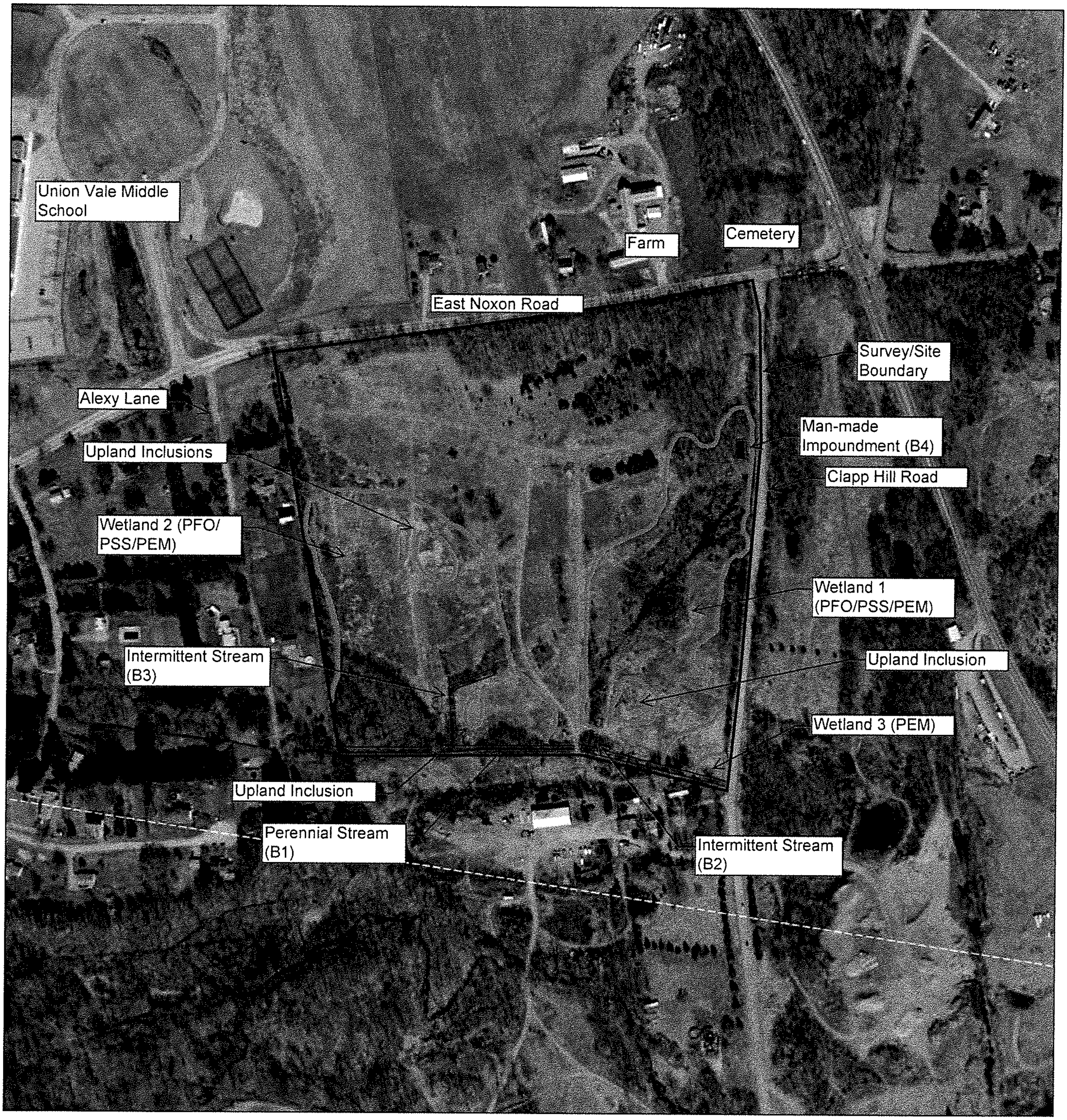
1) Ochric epipedon - the zone from 0 to 9 inches (Ap horizon).
2) Cambic horizon - the zone from 9 to 36 inches (Bg and Bw horizons).
3) Aquepts suborder (Aquic moisture conditions) - at a depth less than 20 inches a subhorizon with redoximorphic features and matrix chroma of 2 or less (Bg horizon).
4) Aeric subgroup - subhorizon within 30 inches of the soil surface that has more than 50 percent high chroma (greater than 2) colors (Bw horizon).

National Cooperative Soil Survey
U.S.A.

Appendix K

Wetland Information

Clapp Hill Road Property - Wetland Sketch



June 7, 2018

1:4,514

0 0.05 0.1 0.2 mi

0 0.075 0.15 0.3 km

Figure 7
Clapp Hill Road, Union Vale, NY
Wetland Field Sketch (6-7-18)

Esri, HERE, Garmin, © OpenStreetMap contributors, and the GIS user community
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Author: Phil London
Not a legal document

Angelo Bonavenia - Clap Hill Road Property
GPS Coordinates from Wetland Survey - 5.2018

ID	Longitude	Latitude	Elevation	Comment/Flag No.
1	-73.7343485	41.647722	430.554	B1-101
2	-73.7343391	41.647738	426.442	B1-201
3	-73.7342482	41.647733	432.218	202
4	-73.7342537	41.647723	423.889	102
5	-73.7341273	41.647757	421.254	203
6	-73.7341422	41.64774	429.994	103
7	-73.734088	41.647738	426.126	104
8	-73.7340502	41.64776	425.298	204
9	-73.733928	41.647751	424.126	205
10	-73.7339469	41.647729	424.803	105
11	-73.7339013	41.647753	431.276	206
12	-73.7338604	41.647734	424.806	106
13	-73.7338058	41.647725	424.464	107
14	-73.7336886	41.647734	425.312	108
15	-73.7336852	41.647754	441.63	208
16	-73.7335774	41.647739	425.669	109
17	-73.7335592	41.64777	426.832	209
18	-73.7334687	41.647761	439.523	210
19	-73.733459	41.647749	426.91	110 path
20	-73.7334593	41.647761	426.888	culvert 20 out
21	-73.733408	41.647758	427.39	culvert 20 in
22	-73.7334299	41.647764	428.31	path
23	-73.7334132	41.64774	436.155	111
24	-73.7334034	41.647772	428.37	211
25	-73.7332919	41.647745	419.475	112
26	-73.73325	41.647779	427.979	212
27	-73.7332031	41.647777	433.5	213
28	-73.733212	41.647758	425.738	113
29	-73.7331061	41.647776	429.576	214
30	-73.7331151	41.647752	428.831	114
31	-73.7330294	41.647751	429.203	115
32	-73.7330253	41.647788	429.413	215
33	-73.7328692	41.647743	421.437	116
34	-73.7328201	41.647764	423.767	117
35	-73.7328624	41.647757	449.226	216
36	-73.7327911	41.647799	432.229	217
37	-73.7326281	41.647792	443.228	218
38	-73.7326455	41.647746	446.238	118
39	-73.7325847	41.647794	445.058	219
40	-73.732572	41.647771	442.636	119
41	-73.7323981	41.647765	440.491	120
42	-73.7324008	41.647801	432.361	220
43	-73.7322552	41.647798	443.889	221
44	-73.7322673	41.647765	433.532	121
45	-73.7320863	41.647771	433.471	122
46	-73.7320794	41.647813	432.53	222

Angelo Bonavenia - Clap Hill Road Property
GPS Coordinates from Wetland Survey - 5.2018

47	-73.7319754	41.647776	435.107	123
48	-73.7319348	41.64778	434.997	124
49	-73.7319581	41.647802	433.452	223
50	-73.731937	41.647794	434.663	224
51	-73.7318711	41.647789	435.189	culvert 12 in
52	-73.7319351	41.647787	435.535	culvert 12 out
53	-73.7319025	41.647788	436.047	path
54	-73.731869	41.647773	435.151	125
55	-73.73187	41.647801	435.261	225
56	-73.7317632	41.647775	444.139	126
57	-73.7317512	41.647788	440.137	226
58	-73.7317844	41.647792	434.157	B2-101 connects to bank
59	-73.73173	41.647908	434.405	B2-102
60	-73.7317563	41.647915	436.034	B2-202
61	-73.7317448	41.64791	435.482	culvert 12 cmp buried out
62	-73.7317251	41.647924	435.565	path
63	-73.7318262	41.647791	438.054	B2-201
64	-73.7317059	41.647784	435.844	227
65	-73.7317128	41.647752	435.434	127
66	-73.7315012	41.647702	437.37	128
67	-73.7316891	41.64778	434.933	228
68	-73.7316992	41.64781	441.744	229
69	-73.7315002	41.647773	436.031	230
70	-73.7313716	41.647719	446.312	129
71	-73.7311941	41.647695	439.43	234
72	-73.7313769	41.647736	437.036	231
73	-73.7313547	41.647726	438.363	232
74	-73.7313201	41.647727	438.193	233
75	-73.7313488	41.647714	439.833	130
76	-73.7313228	41.647721	448.74	131
77	-73.7311897	41.647695	439.188	234
78	-73.7312579	41.647684	438.835	132
79	-73.7311128	41.647664	440.193	133
80	-73.7310496	41.647686	444.438	235
81	-73.7310484	41.647681	439.923	134
82	-73.7309184	41.647644	447.438	135
83	-73.7309077	41.647654	439.172	236
84	-73.7308514	41.647658	445.393	136
85	-73.7307815	41.647645	446.234	137
86	-73.7307909	41.647644	441.928	237
87	-73.7306778	41.647594	442.734	138
88	-73.7307248	41.647607	446.836	238
89	-73.7305973	41.647519	444.291	139
90	-73.7305435	41.647544	439.403	239
91	-73.7304278	41.647484	444.52	140
92	-73.7303983	41.647469	446.087	240
93	-73.7303189	41.647427	443.508	241

Angelo Bonavenia - Clap Hill Road Property
GPS Coordinates from Wetland Survey - 5.2018

94	-73.7303264	41.647416	443.371	141
95	-73.7303223	41.647424	443.588	culvert 12 pcp
96	-73.7317477	41.647944	435.987	143
97	-73.7317849	41.647956	435.61	142
98	-73.7317587	41.648076	436.132	141
99	-73.7317893	41.648241	435.828	140
100	-73.7317467	41.648489	437.651	139
101	-73.7317776	41.64869	437.793	138
102	-73.7318149	41.648839	438.63	137
103	-73.7318341	41.649038	438.979	136
104	-73.7317835	41.64921	439.345	135
105	-73.7316877	41.649354	439.49	134
106	-73.7315832	41.649394	439.418	133
107	-73.7313897	41.649441	439.482	132
108	-73.7312853	41.649458	439.523	131
109	-73.7311378	41.64939	438.628	130
110	-73.7309837	41.649492	438.775	129
111	-73.7310032	41.64963	439.321	128
112	-73.730932	41.649775	440.132	127
113	-73.7308793	41.649948	440.25	124
114	-73.7309227	41.650033	441.318	123
115	-73.730955	41.650072	441.891	122
116	-73.730944	41.650103	442.688	121
117	-73.7308448	41.650164	442.418	120
118	-73.7307551	41.650189	445.041	119
119	-73.730693	41.650139	443.966	118
120	-73.7307832	41.650106	464.944	117
121	-73.730663	41.650074	455.988	116
122	-73.7305495	41.650069	461.943	115
123	-73.7304992	41.650046	463.011	114
124	-73.7304896	41.650119	458.98	113
125	-73.7304041	41.650221	459.774	112
126	-73.7304762	41.650272	464.233	111
127	-73.7303693	41.650297	457.894	110
128	-73.7302726	41.650315	451.382	109
129	-73.7302169	41.650353	456.413	108
130	-73.7302059	41.650416	458.371	107
131	-73.7301679	41.650419	455.824	106
132	-73.7301459	41.65047	458.498	105
133	-73.7301211	41.650489	456.729	104
134	-73.7301249	41.650421	463.297	103
135	-73.7301052	41.650372	448.377	102
136	-73.7300367	41.650316	450.376	101
137	-73.7301422	41.650242	471.107	B4-101
138	-73.7302477	41.650249	454.251	B4-102
139	-73.7302405	41.650132	441.235	B4-103
140	-73.7302797	41.65012	444.215	B4-104

Angelo Bonavenia - Clap Hill Road Property
GPS Coordinates from Wetland Survey - 5.2018

141	-73.7302688	41.650091	449.614	B4-105
142	-73.7301561	41.650069	453.11	B4-106
143	-73.7301059	41.650109	448.124	B4-107
144	-73.7301129	41.650141	451.762	B4-108
145	-73.7301012	41.650205	453.047	B4-109 end
146	-73.7300029	41.650198	455.22	343
147	-73.7300207	41.65006	446.858	342
148	-73.7300227	41.649863	445.981	341
149	-73.7300393	41.649696	449.015	340
150	-73.7300538	41.649611	445.33	339
151	-73.7300732	41.649622	445.705	338
152	-73.7300748	41.649643	446.781	337
153	-73.7300922	41.649717	445.564	336
154	-73.7301143	41.649676	439.004	335
155	-73.7301583	41.649573	452.023	334
156	-73.730179	41.649441	432.64	333
157	-73.7301868	41.649373	438.895	332
158	-73.7303684	41.649266	442.254	331
159	-73.7304452	41.649081	444.057	330
160	-73.7305488	41.648988	437.505	329
161	-73.7305555	41.648837	443.319	328
162	-73.7305962	41.648672	440.972	327
163	-73.7307545	41.648545	441.895	326
164	-73.7304962	41.648495	438.141	325
165	-73.7305028	41.648467	438.812	324
166	-73.7305869	41.648424	439.367	323
167	-73.7306028	41.648381	439.648	322
168	-73.7304933	41.648323	440.67	321
169	-73.7305167	41.648272	437.682	320
170	-73.730547	41.648262	440.303	319
171	-73.7307868	41.648324	439.532	318
172	-73.730782	41.648259	442.027	317
173	-73.7306799	41.648203	439.542	316
174	-73.7305762	41.648127	435.409	315
175	-73.730326	41.648025	443.606	314
176	-73.7305099	41.647513	468.902	W3-101
177	-73.7304731	41.647567	460.21	W3-102
178	-73.730385	41.647554	444.836	W3-103
179	-73.730309	41.647526	446.438	W3-104
180	-73.7303167	41.647427	442.435	W3-105 put on bank
181	-73.7323622	41.647795	432.362	W2-101 on bank
182	-73.7322916	41.647844	432.167	W2-102
183	-73.7322404	41.647833	436.561	W2-103
184	-73.7321958	41.647897	436.701	104
185	-73.7321566	41.64805	443.202	105
186	-73.732154	41.648104	441.895	106
187	-73.732188	41.648153	441.093	107

Angelo Bonavenia - Clap Hill Road Property

GPS Coordinates from Wetland Survey - 5.2018

188	-73.7323385	41.648189	440.628	108
189	-73.7332353	41.647777	434.65	B3-101
190	-73.733233	41.647774	436.052	B3-201
191	-73.7331985	41.647856	450.729	B3-102
192	-73.7331935	41.64791	436.071	B3-103
193	-73.7332231	41.648014	437.375	B3-104
194	-73.7332199	41.648065	437.869	B3-105
195	-73.7332531	41.648068	437.725	culvert metal pipe mostly buried
196	-73.7332374	41.648106	438.488	B3-106
197	-73.7332766	41.648116	444.976	culvert 16 in metal pipe in
198	-73.7332332	41.648072	437.906	path
199	-73.7332478	41.648172	439.685	B3-107
200	-73.7332121	41.64827	441.237	B3-108
201	-73.733075	41.648301	447.862	B3-109
202	-73.7329482	41.648344	447.971	B3-110
203	-73.73286	41.64838	442.454	B3-111
204	-73.7328023	41.648436	445.621	B3-112 end
205	-73.733252	41.647846	464.391	B3-202
206	-73.7332328	41.64792	441.319	B33-203
207	-73.7332506	41.647988	444.405	B3-204
208	-73.7332588	41.648087	438.539	B3-205
209	-73.7332639	41.648099	440.465	B3-206
210	-73.7332862	41.64819	439.929	B3-207
211	-73.7332725	41.648257	439.969	B3-208
212	-73.7332296	41.648284	450.213	B3-209
213	-73.7331256	41.648315	441.156	B3-210
214	-73.7329836	41.648342	438.202	B3-211
215	-73.732859	41.64839	445.382	B3-212
216	-73.7328067	41.648445	440.454	B3-213 end
217	-73.7330005	41.647855	436.181	W2-201 inclusion
218	-73.7329455	41.64788	443.612	W2-202
219	-73.7329261	41.647987	434.862	203
220	-73.7329151	41.648061	432.705	204
221	-73.7329401	41.648135	431.997	205
222	-73.7330704	41.648124	434.467	206
223	-73.7330598	41.648009	432.556	207
224	-73.7324147	41.648102	438.104	109
225	-73.7324601	41.64795	435.557	110
226	-73.7325238	41.648124	426.631	111
227	-73.7324927	41.648226	433.539	112
228	-73.7324852	41.648264	437.311	113
229	-73.7325764	41.648355	434.156	114
230	-73.7326048	41.648499	435.847	115
231	-73.7326313	41.648571	430.161	116
232	-73.7326615	41.648639	433.132	117
233	-73.732686	41.648849	435.878	118
234	-73.7328078	41.649	439.836	119

Angelo Bonavenia - Clap Hill Road Property
GPS Coordinates from Wetland Survey - 5.2018

235	-73.7328731	41.649009	440.168	120
236	-73.7328842	41.649106	445.301	121
237	-73.7329515	41.649115	440.76	122
238	-73.7329601	41.649058	442.316	123
239	-73.7329825	41.649042	442.012	124
240	-73.7330226	41.649118	442.668	125
241	-73.733107	41.649174	436.291	126
242	-73.7330653	41.649232	438.551	127
243	-73.7331427	41.649252	443.55	128
244	-73.7332121	41.649304	441.775	129
245	-73.7332201	41.649426	438.713	130
246	-73.733314	41.649529	441.398	131
247	-73.7334537	41.649569	440.58	132
248	-73.7336273	41.64958	432.254	133
249	-73.7337679	41.649614	436.834	134
250	-73.7337961	41.649541	438.847	135
251	-73.7338823	41.64962	440.241	136
252	-73.7340321	41.649677	440.041	137
253	-73.7342038	41.649711	439.518	138
254	-73.734376	41.649731	439.359	139
255	-73.7345147	41.649774	440.497	140
256	-73.7346946	41.649761	439.709	141
257	-73.734732	41.6497	437.888	142
258	-73.7347485	41.649667	438.42	143
259	-73.73479	41.649528	437.379	144
260	-73.7347706	41.64943	436.452	145
261	-73.7347436	41.649332	436.697	146
262	-73.7346937	41.649338	436.489	147
263	-73.7346465	41.649381	436.218	148
264	-73.7344852	41.649224	439.363	149
265	-73.7344651	41.649026	434.794	150
266	-73.7344088	41.648782	431.291	151
267	-73.7344707	41.648563	429.951	152
268	-73.7345081	41.648521	426.752	153
269	-73.7345686	41.648451	432.163	154
270	-73.7345359	41.648362	430.867	155 end
271	-73.733294	41.649233	439.593	w2-301
272	-73.7332429	41.649123	435.944	302
273	-73.7331613	41.649069	438.304	303
274	-73.7331291	41.649031	436.236	304
275	-73.7331493	41.649	437.017	305
276	-73.7331499	41.648948	435.037	306
277	-73.7331119	41.648927	436.7	307
278	-73.7330881	41.648832	434.96	308
279	-73.7331166	41.648755	431.346	309
280	-73.7331904	41.648798	433.891	310
281	-73.733317	41.648874	434.143	311

Angelo Bonavenia - Clap Hill Road Property
GPS Coordinates from Wetland Survey - 5.2018

282	-73.733465	41.648932	434.131	312
283	-73.7335748	41.649048	435.193	313
284	-73.7336023	41.649237	437.076	314
285	-73.73367	41.649116	436.233	401
286	-73.733659	41.649016	434.808	402
287	-73.733726	41.64898	433.609	403
288	-73.7338773	41.649027	434.046	404
289	-73.7338689	41.649104	434.494	405
290	-73.7337208	41.649175	435.76	406
291	-73.733514	41.649307	438.178	315
292	-73.7334374	41.649151	437.823	316
293	-73.7333966	41.649144	437.797	317
294	-73.7333979	41.649223	435.998	318 end
295	-73.7317296	41.647908	435.416	w1-144end on ba k
296	-73.7316422	41.648065	435.74	W1- 201 inclusion
297	-73.7315951	41.648145	440.216	202
298	-73.7315796	41.64827	436.864	203
299	-73.7314421	41.648293	438.323	204
300	-73.7314454	41.648349	436.498	205
301	-73.7313849	41.648382	438.053	206
302	-73.7312908	41.648361	438.38	207
303	-73.7312071	41.648347	436.888	208
304	-73.7311881	41.648234	438.995	209
305	-73.7311071	41.648181	439.277	210
306	-73.7310806	41.648065	439.031	211
307	-73.7311593	41.648025	439.224	212
308	-73.73127	41.647991	438.47	213
309	-73.7313225	41.64804	438.39	214
310	-73.7313972	41.647991	437.441	215
311	-73.7314964	41.647939	436.982	216
312	-73.731517	41.647957	437.192	217
313	-73.7315402	41.647963	436.696	217
314	-73.7313946	41.648057	438.463	218
315	-73.7313932	41.648097	438.506	219
316	-73.7314347	41.648102	438.004	220
317	-73.7315161	41.648052	437.025	221
318	-73.7315883	41.648089	436.628	222 end
319	-73.7310769	41.647951	439.246	212A
320	-73.731281	41.647883	438.274	212B
321	-73.7310459	41.647669	440.882	301
322	-73.7310054	41.647751	439.283	302
323	-73.7310533	41.647861	439.374	303
324	-73.7309749	41.64795	439.195	304
325	-73.7308405	41.647917	444.253	305
326	-73.7306861	41.647875	440.382	306
327	-73.730741	41.647842	440.405	307
328	-73.730739	41.647784	440.572	308

Angelo Bonavenia - Clap Hill Road Property

GPS Coordinates from Wetland Survey - 5.2018

329	-73.7306022	41.647724	441.761	309
330	-73.7304756	41.647694	442.438	310
331	-73.7303532	41.647757	443.457	311
332	-73.7303486	41.647915	441.865	312
333	-73.7302851	41.647947	444.237	313is on 16o

Appendix L

T&ES Report

Threatened and Endangered Species
Habitat Suitability Assessment Report

BONAVENIA ENTERPRISES
Clapp Hill and East Noxon Road
Town of Union Vale, New York

July 28, 2021

Prepared by:

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1.0 INTRODUCTION

Ecological Solutions, LLC completed a threatened and endangered species habitat suitability assessment on the 45.83 acres BONAVENIA ENTERPRISES site (437115) located on Clapp Hill and East Noxon Road in the Town of Union Vale, Dutchess County, New York (*Figure 1*). The site contains mowed field and wetlands and the Applicant seeks to create a residential subdivision on the site.

The New York State Department of Environmental Conservation (NYSDEC) Environmental Assessment form indicates that the Indiana bat (*Myotis sodalis*) may be located in the vicinity of the site. This assessment was completed to determine if suitable habitat exists on the site for this species and determine potential impacts to suitable habitat and recommends measures to mitigate the impacts that can not be avoided or minimized.

Habitat observed on the site on July 26, 2021 is listed in Table 1.

TABLE 1
COVER TYPES IDENTIFIED ON THE SITE

1	Upland Meadow
2	Forested Wetland/Wet Meadow
3	Upland Hardwood Forest

Upland Meadow - The general area of the site is mowed upland meadow. Characteristic herbs include goldenrods (*Solidago altissima, S. nemoralis, S. rugosa, S. juncea, S. canadensis,* and *Euthamia graminifolia*), bluegrasses (*Poa pratensis, P. compressa*), timothy (*Phleum pratense*), quackgrass (*Agropyron repens*), smooth brome (*Bromus inermis*), sweet vernal grass (*Anthoxanthum odoratum*), orchard grass (*Dactylis glomerata*), common chickweed (*Cerastium arvense*), common evening primrose (*Oenothera biennis*), oldfield cinquefoil (*Potentilla simplex*), calico aster (*Aster lateriflorus*), New England aster (*Aster novae-angliae*), wild strawberry (*Fragaria virginiana*), Queen-Anne's lace (*Daucus carota*), ragweed (*Ambrosia artemisiifolia*), hawkweeds (*Hieracium* spp.), dandelion (*Taraxacum officinale*), and ox-tongue (*Picris hieracioides*). Shrubs are present, but collectively they have less than 50% cover in the community. Characteristic shrubs include gray dogwood (*Cornus foemina* ssp. *racemosa*), silky dogwood (*Cornus amomum*), arrowwood (*Viburnum recognitum*), raspberries (*Rubus* spp.), sumac (*Rhus typhina, R. glabra*), and eastern red cedar (*Juniperus virginiana*).

Wetland - There is a small wetland/ponded area located adjacent to Clapp Hill Road. This wetland is generally surrounded by upland mowed field area. The wetland is dominated by tall shrubs that occur as a transition zone to the red maple hardwood swamp. The substrate is mineral soil with some muck. The wetland on the site is codominated by a mixture of species, such as red osier dogwood (*Cornus sericea*), silky dogwood (*C. amomum*), gray dogwood (*Cornus foemina* ssp. *racemosa*), smooth alder (*Alnus* *serrulata*), spicebush (*Lindera benzoin*), willows (*Salix bebbiana, S. discolor, S. lucida, S. petiolaris*), and arrowwood (*Viburnum recognitum*).

Upland Hardwood Forest - There are small areas of upland hardwood forest on the site with small trees in the 5-12 inch dbh range with some larger tress located on the site. Some of the trees (sugar maple, black locust, and black oak contain exfoliating bark, crevices, or solar exposure.

2.0 HABITAT SUITABILITY ASSESSMENT/CONCLUSION

2.1 Indiana bat

The Indiana bat typically hibernates in caves/mines in the winter and roosts under bark or in tree crevices in the spring, summer, and fall. Suitable potential summer roosting habitat is characterized by trees (dead, dying, or alive) or snags with exfoliating or defoliating bark, or containing cracks or crevices that could potentially be used by Indiana bats as a roost. The minimum diameter of roost trees observed to date is 2.5 inches for males and 4.3 inches for females. However, maternity colonies generally use trees greater than or equal to 9 inches dbh. Overall, roost tree structure appears to be more important to Indiana bats than a particular tree species or habitat type. Females appear to be more habitat specific than males presumably because of the warmer temperature requirements associated with gestation and rearing of young. As a result, they are generally found at lower elevations than males may be found. Roosts are warmed by direct exposure to solar radiation, thus trees exposed to extended periods of direct sunlight are preferred over those in shaded areas. However, shaded roosts may be preferred in very hot conditions. As larger trees afford a greater thermal mass for heat retention, they appear to be preferred over smaller trees.

Streams associated with floodplain forests, and impounded water bodies (ponds, wetlands, reservoirs, etc.) where abundant supplies of flying insects are likely found provide preferred foraging habitat for Indiana bats, some of which may fly up to 2-5 miles from upland roosts on a regular basis. Indiana bats also forage within the canopy of upland forests, over clearings with early successional vegetation (*e.g.,* old fields), along the borders of croplands, along wooded fencerows, and over farm ponds in pastures. While Indiana bats appear to forage in a wide variety of habitats, they seem to tend to stay fairly close to tree cover.

Conclusion - This proposed project will require about +-5.0-6.0 acres of grubbing and earth moving in upland meadow area. The disturbance activities will not result in adverse to this species since tree loss is minimal. If clearing is necessary it will occur when bats are not on site between October 1 and March 31 or as approved by the NYSDEC (Emergence survey) outside this clearing timeframe. Generation of dust and noise, potential for changes to surface water quality, and increased lighting on the site may cause an impact to foraging bats but can be mitigated as per below.

The site owner proposes to avoid, minimize, and mitigate for effects by:

• Site lighting on the site will use approved light fixtures that have tops that direct light down to minimize light pollution and not interfere with potential bat foraging activities;
• Implementing soil conservation and dust control best management practices, such as watering dry disturbed soil areas to keep dust down, and using staked, recessed silt fence and anti tracking pads to prevent erosion and sedimentation in surface waters on the site, and;
• Stormwater pond/s will not be maintained with any chemicals that might adversely affect bats or insect populations on which they may feed.

These measures will result in avoiding adverse effects to Indiana bats.

3.0 PHOTOGRAPHS

Existing wetland/upland meadow boundary.

Upland Meadow on the site.

Site.

Figure 1 Location Map (Parcel 437115)

Appendix M

Sediment and Erosion Control Details

STANDARD AND SPECIFICATIONS FOR LANDGRADING

Definition & Scope

Permanent reshaping of the existing land surface by grading in accordance with an engineering topographic plan and specification to provide for erosion control and vegetative establishment on disturbed, reshaped areas.

Design Criteria

The grading plan should be based upon the incorporation of building designs and street layouts that fit and utilize existing topography and desirable natural surrounding to avoid extreme grade modifications. Information submitted must provide sufficient topographic surveys and soil investigations to determine limitations that must be imposed on the grading operation related to slope stability, effect on adjacent properties and drainage patterns, measures for drainage and water removal, and vegetative treatment, etc.

Many municipalities and counties have regulations and design procedures already established for land grading and cut and fill slopes. Where these requirements exist, they shall be followed.

The plan must show existing and proposed contours of the area(s) to be graded. The plan shall also include practices for erosion control, slope stabilization, safe disposal of runoff water and drainage, such as waterways, lined ditches, reverse slope benches (include grade and cross section), grade stabilization structures, retaining walls, and surface and subsurface drains. The plan shall also include phasing of these practices. The following shall be incorporated into the plan:

1. Provisions shall be made to safely convey surface runoff to storm drains, protected outlets, or to stable water courses to ensure that surface runoff will not damage slopes or other graded areas; see standards and specifications for Grassed Waterway, Diversion, or Grade Stabilization Structure.

2. Cut and fill slopes that are to be stabilized with grasses shall not be steeper than 2:1. When slopes exceed 2:1, special design and stabilization consideration are required and shall be adequately shown on the plans. (Note: Where the slope is to be mowed, the slope should be no steeper than 3:1, although 4:1 is preferred because of safety factors related to mowing steep slopes.)

3. Reverse slope benches or diversion shall be provided whenever the vertical interval (height) of any 2:1 slope exceeds 20 feet; for 3:1 slope it shall be increased to 30 feet and for 4:1 to 40 feet. Benches shall be located to divide the slope face as equally as possible and shall convey the water to a stable outlet. Soils, seeps, rock outcrops, etc., shall also be taken into consideration when designing benches.

   A. Benches shall be a minimum of six feet wide to provide for ease of maintenance.

   B. Benches shall be designed with a reverse slope of 6:1 or flatter to the toe of the upper slope and with a minimum of one foot in depth. Bench gradient to the outlet shall be between 2 percent and 3 percent, unless accompanied by appropriate design and computations.

   C. The flow length within a bench shall not exceed 800 feet unless accompanied by appropriate design and computations; see Standard and Specifications for Diversion on page 3.9

4. Surface water shall be diverted from the face of all cut and/or fill slopes by the use of diversions, ditches and swales or conveyed downslope by the use of a designed structure, except where:

   A. The face of the slope is or shall be stabilized and the face of all graded slopes shall be protected from surface runoff until they are stabilized.

   B. The face of the slope shall not be subject to any concentrated flows of surface water such as from natural drainage ways, graded ditches, downspouts, etc.

   C. The face of the slope will be protected by anchored stabilization matting, sod, gravel, riprap, or other stabilization method.

5. Cut slopes occurring in ripable rock shall be serrated as shown in Figure 4.9 on page 4.26. The serrations shall be made with conventional equipment as the excavation is made. Each step or serration shall be constructed on the contour and will have steps cut at nominal two-foot intervals with nominal three-foot horizontal shelves. These steps will vary depending on the slope ratio or the cut slope. The nominal slope line is 1 ½: 1. These steps will weather and act to hold moisture, lime, fertilizer, and seed thus producing a much quicker and longer-lived vegetative cover and better slope stabilization. Overland flow shall be diverted from the top of all serrated cut slopes and carried to a suitable outlet.

6. Subsurface drainage shall be provided where necessary to intercept seepage that would otherwise adversely affect slope stability or create excessively wet site conditions.

7. Slopes shall not be created so close to property lines as to endanger adjoining properties without adequately protecting such properties against sedimentation, erosion, slippage, settlement, subsidence, or other related damages.

8. Fill material shall be free of brush, rubbish, rocks, logs, stumps, building debris, and other objectionable material. It should be free of stones over two (2) inches in diameter where compacted by hand or mechanical tampers or over eight (8) inches in diameter where compacted by rollers or other equipment. Frozen material shall not be placed in the fill nor shall the fill material be placed on a frozen foundation.

9. Stockpiles, borrow areas, and spoil shall be shown on the plans and shall be subject to the provisions of this Standard and Specifications.

10. All disturbed areas shall be stabilized structurally or vegetatively in compliance with the Permanent Construction Area Planting Standard on page 4.42.

Construction Specifications

See Figures 4.9 and 4.10 for details.

1. All graded or disturbed areas, including slopes, shall be protected during clearing and construction in accordance with the erosion and sediment control plan until they are adequately stabilized.

2. All erosion and sediment control practices and measures shall be constructed, applied and maintained in accordance with the erosion and sediment control plan and these standards.

3. Topsoil required for the establishment of vegetation shall be stockpiled in amount necessary to complete finished grading of all exposed areas.

4. Areas to be filled shall be cleared, grubbed, and stripped of topsoil to remove trees, vegetation, roots, or other objectionable material.

5. Areas that are to be topsoiled shall be scarified to a minimum depth of four inches prior to placement of topsoil.

6. All fills shall be compacted as required to reduce erosion, slippage, settlement, subsidence, or other related problems. Fill intended to support buildings, structures, and conduits, etc., shall be compacted in accordance with local requirements or codes.

7. All fill shall be placed and compacted in layers not to exceed 9 inches in thickness.

8. Except for approved landfills or nonstructural fills, fill material shall be free of frozen particles, brush, roots, sod, or other foreign objectionable materials that would interfere with, or prevent, construction of satisfactory fills.

9. Frozen material or soft, mucky or highly compressible materials shall not be incorporated into fill slopes or structural fills.

10. Fill shall not be placed on saturated or frozen surfaces.

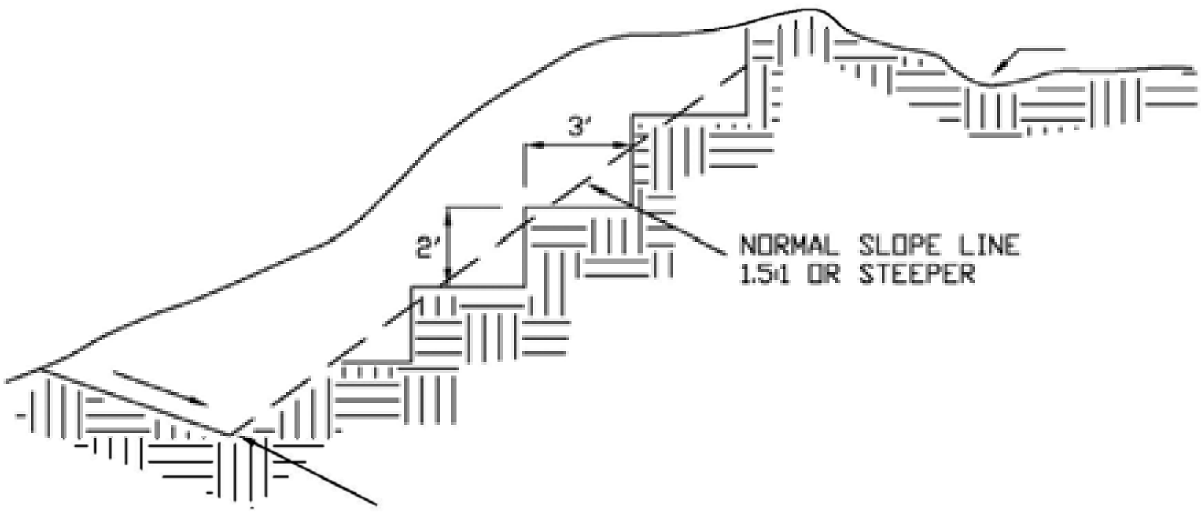
11. All benches shall be kept free of sediment during all phases of development.

12. Seeps or springs encountered during construction shall be handled in accordance with the Standard and Specification for Subsurface Drain on page 3.48 or other approved methods.

13. All graded areas shall be permanently stabilized immediately following finished grading.

14. Stockpiles, borrow areas, and spoil areas shall be shown on the plans and shall be subject to the provisions of this Standard and Specifications.

Figure 4.9
Typical Section of Serrated Cut Slope



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	TYPICAL SECTION OF SERRATED CUT SLOPE

Figure 4.10
Landgrading

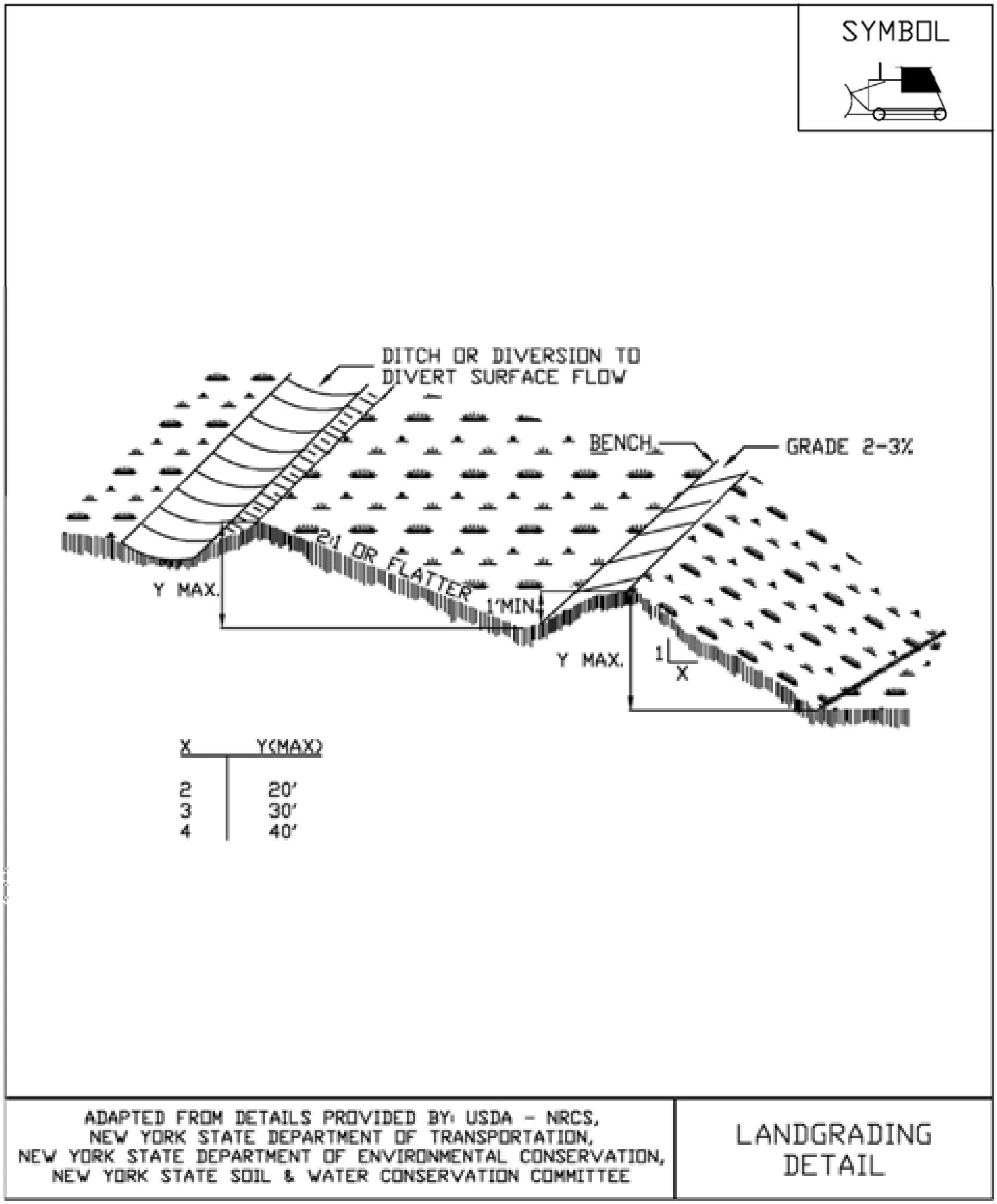


Figure 4.11
Landgrading - Construction Specifications

CONSTRUCTION SPECIFICATIONS

1. ALL GRADED OR DISTURBED AREAS INCLUDING SLOPES SHALL BE PROTECTED DURING CLEARING AND CONSTRUCTION IN ACCORDANCE WITH THE APPROVED EROSION AND SEDIMENT CONTROL PLAN UNTIL THEY ARE PERMANENTLY STABILIZED.
2. ALL SEDIMENT CONTROL PRACTICES AND MEASURES SHALL BE CONSTRUCTED, APPLIED AND MAINTAINED IN ACCORDANCE WITH THE APPROVED EROSION AND SEDIMENT CONTROL PLAN.
3. TOPSOIL REQUIRED FOR THE ESTABLISHMENT OF VEGETATION SHALL BE STOCKPILED IN AMOUNT NECESSARY TO COMPLETE FINISHED GRADING OF ALL EXPOSED AREAS.
4. AREAS TO BE FILLED SHALL BE CLEARED, GRUBBED, AND STRIPPED OF TOPSOIL TO REMOVE TREES, VEGETATION, ROOTS OR OTHER OBJECTIONABLE MATERIAL.
5. AREAS WHICH ARE TO BE TOPSOILED SHALL BE SCARIFIED TO A MINIMUM DEPTH OF FOUR INCHES PRIOR TO PLACEMENT OF TOPSOIL.
6. ALL FILLS SHALL BE COMPACTED AS REQUIRED TO REDUCE EROSION, SLIPPAGE, SETTLEMENT, SUBSIDENCE OR OTHER RELATED PROBLEMS. FILL INTENDED TO SUPPORT BUILDINGS, STRUCTURES AND CONDUITS, ETC. SHALL BE COMPACTED IN ACCORDANCE WITH LOCAL REQUIREMENTS OR CODES.
7. ALL FILL SHALL BE PLACED AND COMPACTED IN LAYERS NOT TO EXCEED 9 INCHES IN THICKNESS.
8. EXCEPT FOR APPROVED LANDFILLS, FILL MATERIAL SHALL BE FREE OF FROZEN PARTICLES, BRUSH, ROOTS, SOD, OR OTHER FOREIGN OR OTHER OBJECTIONABLE MATERIALS THAT WOULD INTERFERE WITH OR PREVENT CONSTRUCTION OF SATISFACTORY FILLS.
9. FROZEN MATERIALS OR SOFT, MUCKY OR HIGHLY COMPRESSIBLE MATERIALS SHALL NOT BE INCORPORATED IN FILLS.
10. FILL SHALL NOT BE PLACED ON SATURATED OR FROZEN SURFACES.
11. ALL BENCHES SHALL BE KEPT FREE OF SEDIMENT DURING ALL PHASES OF DEVELOPMENT.
12. SEEPS OR SPRINGS ENCOUNTERED DURING CONSTRUCTION SHALL BE HANDLED IN ACCORDANCE WITH THE STANDARD AND SPECIFICATION FOR SUBSURFACE DRAIN OR OTHER APPROVED METHOD.
13. ALL GRADED AREAS SHALL BE PERMANENTLY STABILIZED IMMEDIATELY FOLLOWING FINISHED GRADING.
14. STOCKPILES, BORROW AREAS AND SPOIL AREAS SHALL BE SHOWN ON THE PLANS AND SHALL BE SUBJECT TO THE PROVISIONS OF THIS STANDARD AND SPECIFICATION.

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	LANDGRADING SPECIFICATIONS

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.

<u>Time of Seeding:</u> 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.

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

<u>Mulching:</u> 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.

<u>Irrigation:</u> 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.

<u>80% Perennial Vegetative Cover</u>

<u>50% Perennial Vegetative Cover</u>

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 ANCHORED STABILIZATION MATTING

Definition and Scope

A **temporary** or **permanent** protective covering placed on a prepared, seeded planting area that is anchored in place by staples or other means to aid in controlling erosion by absorbing rain splash energy and withstand overland flow as well as provide a microclimate to protect and promote seed establishment.

Conditions Where Practice Applies

Anchored stabilization mats are required for seeded earthen slopes steeper than 3 horizontal to 1 vertical; in vegetated channels where the velocity of the design flow exceeds the allowable velocity for vegetation alone (usually greater than 5 feet per second); on streambanks and shorelines where moving water is likely to erode newly seeded or planted areas; and in areas where wind prevents standard mulching with straw. This standard does not apply to slopes stabilized with sod, rock riprap or hard armor material.

Design Criteria

Slope Applications - Anchored stabilization mats for use on slopes are primarily used as mulch blankets where the mesh material is within the blanket or as a netting over previously placed mulch. These stabilization mats are NOT effective in preventing slope failures.

1. Required on all slopes steeper than 3:1

2. Matting will be designed for proper longevity need and strength based on intended use.

3. All installation details and directions will be included on the site erosion and sediment control plan and will follow manufactures specifications.

Channel Applications - Anchored stabilization mats, for use in supporting vegetation in flow channels, are generally a non-degradable, three dimensional plastic structure which can be filled with soil prior to planting. This structure provides a medium for root growth where the matting and roots become intertwined forming a continuous anchor for the vegetated lining.

1. Channel stabilization shall be based on the tractive force method.

2. For maximum design shear stresses less than 2 pounds per square foot, a temporary or bio-degradable mat may be used.

3. The design of the final matting shall be based on the mats ability to resist the tractive shear stress at bank full flow.

4. The installation details and procedures shall be included on the site erosion and sediment control plan and will follow manufacturers specifications.

Construction Specifications

1. Prepare soil before installing matting by smoothing the surface, removing debris and large stone, and applying lime, fertilizer and seed. Refer to manufacturers installation details.

2. Begin at the top of the slope by anchoring the mat in a 6” deep x 6” wide trench. Backfill and compact the trench after stapling.

3. In channels or swales, begin at the downslope end, anchoring the mat at the bottom and top ends of the blanket. When another roll is needed, the upslope roll

should overlay the lower layer, shingle style, so that channel flows do not peel back the material.

4. Roll the mats down a slope with a minimum 4” overlap. Roll center mat in a channel in direction of water flow on bottom of the channel. Do not stretch blankets. Blankets shall have good continuous contact with the underlying soil throughout its entire length.

5. Place mats end over end (shingle style) with a 6” overlap, use a double row of staggered staples 4” apart to secure mats.

6. Full length edge of mats at top of side slopes must be anchored in 6” deep x 6” wide trench; backfill and compact the trench after stapling.

7. Mats on side slopes of a channel must be overlapped 4” over the center mat and stapled.

8. In high flow channel applications, a staple check slot is recommended at 30 to 40 foot intervals. Use a row of staples 4” apart over entire width of the channel. Place a second row 4” below the first row in a staggered pattern.

9. The terminal end of the mats must be anchored in a 6”x6” wide trench. Backfill and compact the trench after stapling.

10. Stapling and anchoring of blanket shall be done in accordance with the manufactures recommendations.

Maintenance

Blanketed areas shall be inspected weekly and after each runoff event until perennial vegetation is established to a minimum uniform 80% coverage throughout the blanketed area. Damaged or displaced blankets shall be restored or replaced within 2 calendar days.

STANDARD AND SPECIFICATIONS FOR LOOSE STABILIZATION BLANKETS

Definition and Scope

Blankets of various materials placed pneumatically, hydraulically, or other means on a prepared planting area or a critical area where existing vegetation can remain to reduce rain splash and sheet erosion and promote vegetative stabilization.

Conditions Where Practice Applies

Loose blankets are an appropriate stabilization practice for any soil surface that is rocky, frozen, flat, or steep. They can be used on streambanks, road cuts and embankments, and construction site areas where stormwater runoff occurs as sheet flow. They should not be used in areas of concentrated flow.

Design Criteria

Compost Blanket

Material: The compost infill shall be well decomposed (matured at least 3 months), weed-free, organic matter. It shall be aerobically composted, possess no objectionable odors, and contain less than 1%, by dry weight, of man-made foreign matter. The physical parameters of the compost shall meet the standards listed in Table 5.2 - Compost Standards Table. **Note: All biosolids composts produced in New York State (or approved for importation) must meet NYS DEC's 6 NYCRR Part 360 (Soild 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 metal content. When using compost blankets adjacent to surface waters, the compost should have a low nutrient value.**

Placement: The method of application and depth of compost depend upon site conditions. Vegetation of the compost blanket is generally archived by incorporating seed into the compost before it is applied. However, seeding may occur after the application if needed.

The compost application rate will be in accordance with the following table. Compost is not recommended for slopes steeper than 2H:1V. Slopes with problem soils and more runoff will require greater application rates.

Compost Application Rates		
Slope Length (ft)	<3H:1V Slopes	3H:1V to 2H:1V Slopes
20 or less	270 cy/acre (2" Layer)	540 cy/acre (4" Layer)
20 to 60	405 cy/acre (3" Layer)	675 cy/acre (5" Layer)
60 to 100	540 cy/acre (4" Layer)	810 cy/acre (6" Layer)*
* For slopes between 2H:1V and 1H:1V use this rate with a max. slope length of 40 ft.		

Construction Specifications

1. Compost shall be placed evenly and must provide 100% soil coverage (no soil visible). On highly unstable soils, use compost in conjunction with appropriate structural measures.

2. Spread the compost uniformly to the design thickness by hand or mechanically (e.g. with a manure spreader, front end loader, dozer, pneumatic blower, etc.) and then track (compact) the compost layer using a bulldozer or other appropriate equipment.

3. When using a pneumatic (blower) unit, shoot the compost directly at soil, to provide a tighter interface between the soil and compost and prevent water from moving between the two layers.

4. Apply compost layer approximately 3 feet beyond the top of the slope or overlap it into existing vegetation.

5. Follow by seeding or ornamental planting as specified.

6. When planting immediate grass, wildflower, or legume seeding or ornamental planting, use only a well composted product that contains no substances toxic to plants.

7. Very coarse composts should be avoided if the slope is to be landscaped or seeded, as it will make planting and crop establishment more difficult. Composts containing fibrous particles that range in size produce a more stable mat.

Hydraulically Applied Blankets

These blankets are formed by mixing different types of materials with water and are then applied using standard hydroseeding equipment. These blankets should not be used in areas of concentrated flow such as ditches and channels.

A. Bonded Fiber Matrix (BFM) - This method makes use of a cross-linked hydrocolloid tackifier to bond thermally processed wood fibers. Application rates vary according to site conditions. For slopes up to 3H:1V the BFM should be applied at a rate of 3,000 lb/ acre. Steeper slopes may need as much as 4,000 lb/ acre in accordance with the manufacturer's recommendations.

   BFMs should only be used when no rain is forecast for at least 48 hours following the application. This is to allow the tackifier sufficient time to cure properly. Once properly applied, a BFM is very effective in preventing accelerated erosion. **Bonded Fiber Matrix should not be applied between September 30 and April 1 to allow for proper curing of the polymer.**

B. Flexible Growth Medium (FGM) - This method has the added component of 1/2 inch long, crimped manmade fibers which add a mechanical bond to the chemical bond provided by BFMs. This increases the blanket's resistance to both raindrop impact and erosion due to runoff. Unlike BFMs, a flexible growth medium typically does not require a curing time to be effective. Properly applied, an FGM is also very effective.

   There is no need to smooth the slope prior to application. In fact some roughening of the surface (either natural or mechanically induced) is preferable. However, large rocks ($\geq$ 9 inches) and existing rills should be removed prior to application. Mixing and application rates should follow manufacturer's recommendations.

C. Polymer Stabilized Fiber Matrix (PSFM) - PSFMs make use of a linear soil stabilization tackifier that works directly on soil to maintain soil structure, maintain pore space capacity and flocculate dislodged sediment that will significantly reduce runoff turbidity. PSFMs can be used in re-vegetation applications and for site winterization and/or dormant seeding - fall planting for spring germination - applications. Application rates vary according to site conditions and should be in accordance with manufacturers recommendations.

Construction Specifications

BFMs, FGMs and PSFMs are typically applied in two stages. Unless specifically recommended to be applied in one application by the manufacturer, the seed mixture and soil amendments should be applied first. If the seed is applied at the same time as the hydraulically applied blankets, the bonded fibers may keep the seed from making sufficient contact with the soil to germinate. After the seed mixture is applied, the hydraulically applied blankets should be sprayed over the area at the required application rate, according to the manufactures recommendations.

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.

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 SOIL RESTORATION

Definition & Scope

The decompaction of areas of a development site or construction project where soils have been disturbed to recover the original properties and porosity of the soil; thus providing a sustainable growth medium for vegetation, reduction of runoff and filtering of pollutants from stormwater runoff.

Conditions Where Practice Applies

Soil restoration is to be applied to areas whose heavy construction traffic is done and final stabilization is to begin. This is generally applied in the cleanup, site restoration, and landscaping phase of construction followed by the permanent establishment of an appropriate ground cover to maintain the soil structure. Soil restoration measures should be applied over and adjacent to any runoff reduction practices to achieve design performance.

Design Criteria

1. Soil restoration areas will be designated on the plan views of areas to be disturbed.
2. Soil restoration will be completed in accordance with Table 4.6 on page 4.53.

Specification for Full Soil Restoration

During periods of relatively low to moderate subsoil moisture, the disturbed subsoils are returned to rough grade and the following Soil Restoration steps applied:

1. Apply 3 inches of compost over subsoil. The compost shall be well decomposed (matured at least 3 months), weed-free, organic matter. It shall be aerobically composted, possess no objectionable odors, and contain less than 1%, by dry weight, of man-made foreign matter. The physical parameters of the compost shall meet the standards listed in Table 5.2 - Compost Standards Table, except for "Particle Size" 100% will pass the 1/2" sieve. **Note: All biosolids compost produced in New York State (or approved for importation) must meet NYS DEC's 6 NYCRR Part 360 (Solid Waste Management Facilities) requirements. The Part 360 requirements are equal to or more stringent than 40 CFR Part 503 which ensure safe standards for pathogen reduction and heavy metals content.**

2. Till compost into subsoil to a depth of at least 12 inches using a cat-mounted ripper, tractor mounted disc, or tiller, to mix and circulate air and compost into the subsoil.
3. Rock-pick until uplifted stone/rock materials of four inches and larger size are cleaned off the site.
4. Apply topsoil to a depth of 6 inches.
5. Vegetate as required by the seeding plan. Use appropriate ground cover with deep roots to maintain the soil structure.
6. Topsoil may be manufactured as a mixture or a mineral component and organic material such as compost.

At the end of the project an inspector should be able to push a 3/8" metal bar 12 inches into the soil just with body weight. This should not be performed within the drip line of any existing trees or over utility installations that are within 24 inches of the surface.

Maintenance

Keep the site free of vehicular and foot traffic or other weight loads. Consider pedestrian footpaths.

Table 4.6
Soil Restoration Requirements

<table>
<tr><th>Type of Soil Disturbance</th><th colspan="2">Soil Restoration Requirement</th><th>Comments/Examples</th></tr>
<tr><td>No soil disturbance</td><td colspan="2">Restoration not permitted</td><td>Preservation of Natural Features</td></tr>
<tr><td>Minimal soil disturbance</td><td colspan="2">Restoration not required</td><td>Clearing and grubbing</td></tr>
<tr><td rowspan="2">Areas where topsoil is stripped only - no change in grade</td><td>HSG A&B</td><td>HSG C&D</td><td rowspan="2">Protect area from any ongoing construction activities.</td></tr>
<tr><td>Apply 6 inches of topsoil</td><td>Aerate* and apply 6 inches of topsoil</td></tr>
<tr><td rowspan="2">Areas of cut or fill</td><td>HSG A&B</td><td>HSG C&D</td><td rowspan="2"></td></tr>
<tr><td>Aerate* and apply 6 inches of topsoil</td><td>Apply full Soil Restoration**</td></tr>
<tr><td>Heavy traffic areas on site (especially in a zone 5-25 feet around buildings but not within a 5 foot perimeter around foundation walls)</td><td colspan="2">Apply full Soil Restoration (decompaction and compost enhancement)</td><td></td></tr>
<tr><td>Areas where Runoff Reduction and/or Infiltration practices are applied</td><td colspan="2">Restoration not required, but may be applied to enhance the reduction specified for appropriate practices.</td><td>Keep construction equipment from crossing these areas. To protect newly installed practice from any ongoing construction activities construct a single phase operation fence area</td></tr>
<tr><td>Redevelopment projects</td><td colspan="2">Soil Restoration is required on redevelopment projects in areas where existing impervious area will be converted to pervious area.</td><td></td></tr>
<tr><td colspan="4">* Aeration includes the use of machines such as tractor-drawn implements with coulters making a narrow slit in the soil, a roller with many spikes making indentations in the soil, or prongs which function like a mini-subsoiler.
** Per "Deep Ripping and De-compaction, DEC 2008".</td></tr>
</table>

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 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.

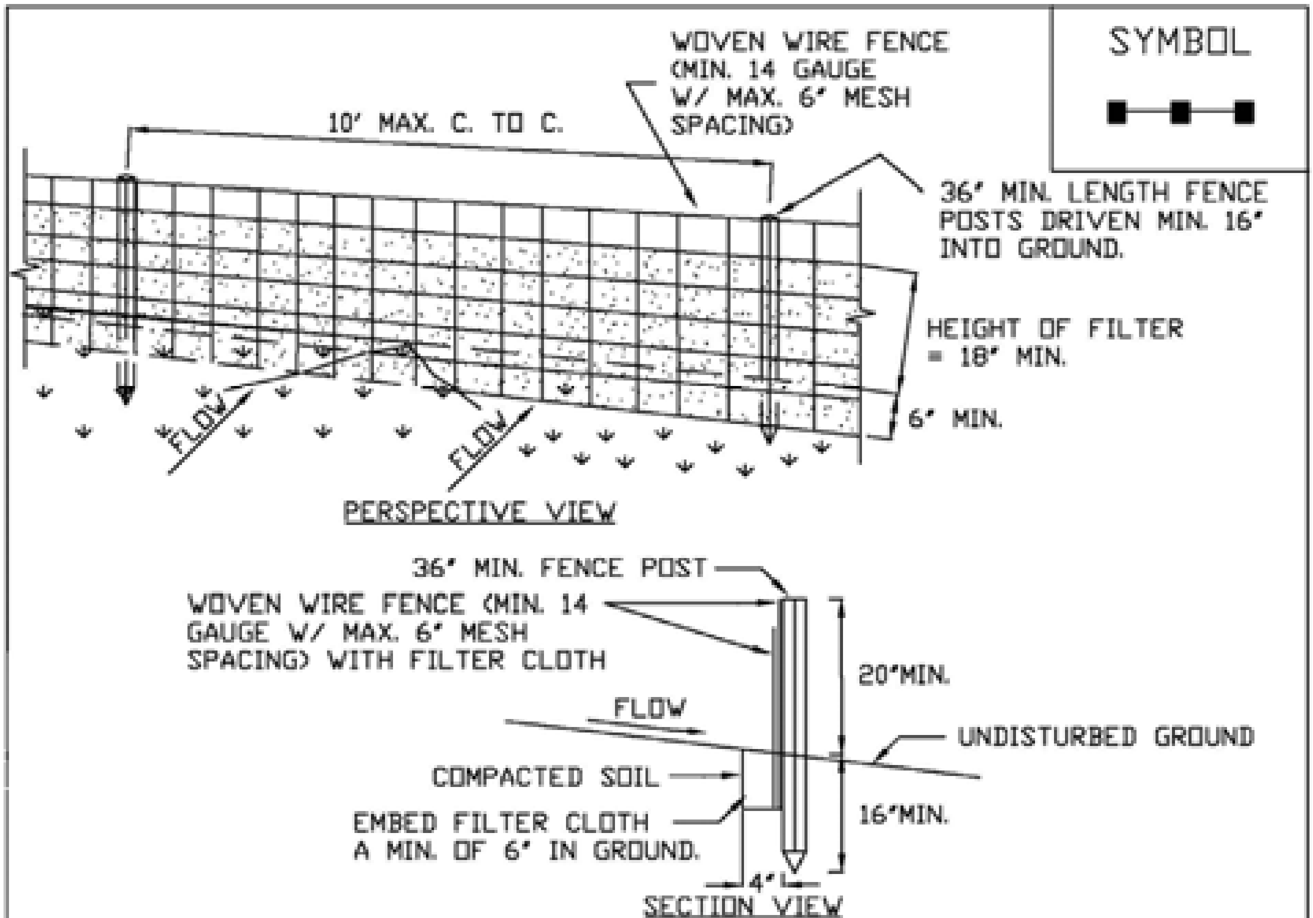
3. Wire Fence for reinforced silt fence: Wire fencing shall be a minimum 14 gage with a maximum 6 in. mesh opening, or as approved.

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 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.

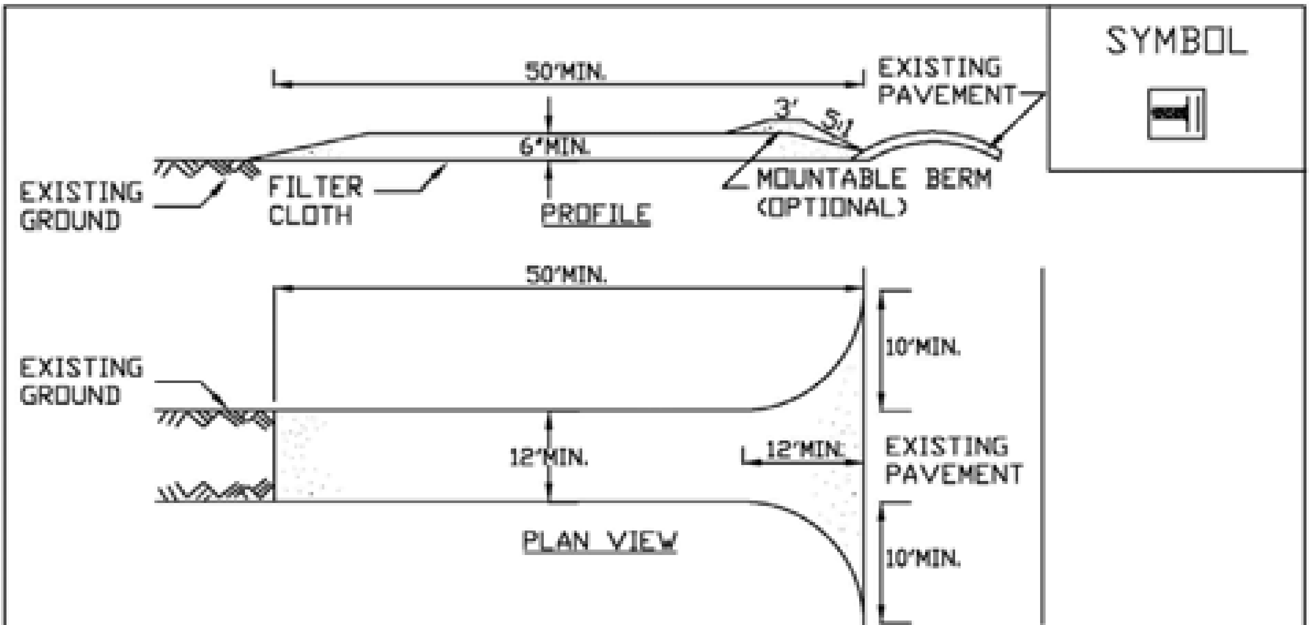
[3]Fabrics not meeting these specifications may be used only when design procedure and supporting documentation are supplied to determine aggregate depth and fabric strength.

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 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.

Appendix N

Construction Inspection Log Book

APPENDIX F
CONSTRUCTION SITE INSPECTION AND MAINTENANCE LOG BOOK

STATE POLLUTANT DISCHARGE ELIMINATION SYSTEM FOR CONSTRUCTION ACTIVITIES

SAMPLE CONSTRUCTION SITE LOG BOOK

Table of Contents

I. PRE-CONSTRUCTION MEETING DOCUMENTS

Project Name ____

Permit No. ____________________________________ **Date of Authorization** _______________

Name of Operator ____

Prime Contractor ____

a. Preamble to Site Assessment and Inspections

The Following Information To Be Read By All Person's Involved in The Construction of Stormwater Related Activities:

The Operator agrees to have a qualified inspector[1] conduct an assessment of the site prior to the commencement of construction[2] and certify in this inspection report that the appropriate erosion and sediment controls described in the SWPPP have been adequately installed or implemented to ensure overall preparedness of the site for the commencement of construction.

Prior to the commencement of construction, the Operator shall certify in this site logbook that the SWPPP has been prepared in accordance with the State's standards and meets all Federal, State and local erosion and sediment control requirements. A preconstruction meeting should be held to review all of the SWPPP requirements with construction personnel.

When construction starts, site inspections shall be conducted by the qualified inspector at least every 7 calendar days. The Operator shall maintain a record of all inspection reports in this site logbook. The site logbook shall be maintained on site and be made available to the permitting authorities upon request.

Prior to filing the Notice of Termination or the end of permit term, the Operator shall have a qualified inspector perform a final site inspection. The qualified inspector shall certify that the site has undergone final stabilization[3] using either vegetative or structural stabilization methods and that all temporary erosion and sediment controls (such as silt fencing) not needed for long-term erosion control have been removed. In addition, the Operator must identify and certify that all permanent structures described in the SWPPP have been constructed and provide the owner(s) with an operation and maintenance plan that ensures the structure(s) continuously functions as designed.

1 Refer to "Qualified Inspector" inspection requirements in the current SPDES General Permit for Stormwater Discharges from Construction Activity for complete list of inspection requirements.
2 "Commencement of construction" means the initial removal of vegetation and disturbance of soils associated with clearing, grading or excavating activities or other construction activities.
3 "Final stabilization" means that all soil-disturbing activities at the site have been completed and a uniform, perennial vegetative cover with a density of eighty (80) percent has been established or equivalent stabilization measures (such as the use of mulches or geotextiles) have been employed on all unpaved areas and areas not covered by permanent structures.

b. Pre-construction Site Assessment Checklist
(NOTE: Provide comments below as necessary)

1. Notice of Intent, SWPPP, and Contractors Certification:

Yes No NA

[ ] [ ] [ ] Has a Notice of Intent been filed with the NYS Department of Conservation?
[ ] [ ] [ ] Is the SWPPP on-site? Where?________________________________
[ ] [ ] [ ] Is the Plan current? What is the latest revision date?_______________
[ ] [ ] [ ] Is a copy of the NOI (with brief description) onsite? Where?_______________
[ ] [ ] [ ] Have all contractors involved with stormwater related activities signed a contractor's certification?

2. Resource Protection

Yes No NA

[ ] [ ] [ ] Are construction limits clearly flagged or fenced?
[ ] [ ] [ ] Important trees and associated rooting zones, on-site septic system absorption fields, existing vegetated areas suitable for filter strips, especially in perimeter areas, have been flagged for protection.
[ ] [ ] [ ] Creek crossings installed prior to land-disturbing activity, including clearing and blasting.

3. Surface Water Protection

Yes No NA

[ ] [ ] [ ] Clean stormwater runoff has been diverted from areas to be disturbed.
[ ] [ ] [ ] Bodies of water located either on site or in the vicinity of the site have been identified and protected.
[ ] [ ] [ ] Appropriate practices to protect on-site or downstream surface water are installed.
[ ] [ ] [ ] Are clearing and grading operations divided into areas <5 acres?

4. Stabilized Construction Access

Yes No NA

[ ] [ ] [ ] A temporary construction entrance to capture mud and debris from construction vehicles before they enter the public highway has been installed.
[ ] [ ] [ ] Other access areas (entrances, construction routes, equipment parking areas) are stabilized immediately as work takes place with gravel or other cover.
[ ] [ ] [ ] Sediment tracked onto public streets is removed or cleaned on a regular basis.

5. Sediment Controls

Yes No NA

[ ] [ ] [ ] Silt fence material and installation comply with the standard drawing and specifications.
[ ] [ ] [ ] Silt fences are installed at appropriate spacing intervals
[ ] [ ] [ ] Sediment/detention basin was installed as first land disturbing activity.
[ ] [ ] [ ] Sediment traps and barriers are installed.

6. Pollution Prevention for Waste and Hazardous Materials

Yes No NA

[ ] [ ] [ ] The Operator or designated representative has been assigned to implement the spill prevention avoidance and response plan.
[ ] [ ] [ ] The plan is contained in the SWPPP on page ______
[ ] [ ] [ ] Appropriate materials to control spills are onsite. Where? ___________________

II. CONSTRUCTION DURATION INSPECTIONS

a. Directions:

Inspection Forms will be filled out during the entire construction phase of the project.

Required Elements:

1) On a site map, indicate the extent of all disturbed site areas and drainage pathways. Indicate site areas that are expected to undergo initial disturbance or significant site work within the next 14-day period;
2) Indicate on a site map all areas of the site that have undergone temporary or permanent stabilization;
3) Indicate all disturbed site areas that have not undergone active site work during the previous 14-day period;
4) Inspect all sediment control practices and record the approximate degree of sediment accumulation as a percentage of sediment storage volume (for example, 10 percent, 20 percent, 50 percent);
5) Inspect all erosion and sediment control practices and record all maintenance requirements such as verifying the integrity of barrier or diversion systems (earthen berms or silt fencing) and containment systems (sediment basins and sediment traps). Identify any evidence of rill or gully erosion occurring on slopes and any loss of stabilizing vegetation or seeding/mulching. Document any excessive deposition of sediment or ponding water along barrier or diversion systems. Record the depth of sediment within containment structures, any erosion near outlet and overflow structures, and verify the ability of rock filters around perforated riser pipes to pass water; and
6) Immediately report to the Operator any deficiencies that are identified with the implementation of the SWPPP.

SITE PLAN/SKETCH

______________________________________ ______________________________________
Inspector (print name) **Date of Inspection**

______________________________________ ______________________________________
Qualified Inspector (print name) **Qualified Inspector Signature**

The above signed acknowledges that, to the best of his/her knowledge, all information provided on the forms is accurate and complete.

Maintaining Water Quality

Yes No NA
[ ] [ ] [ ] Is there an increase in turbidity causing a substantial visible contrast to natural conditions at the outfalls?
[ ] [ ] [ ] Is there residue from oil and floating substances, visible oil film, or globules or grease at the outfalls?
[ ] [ ] [ ] All disturbance is within the limits of the approved plans.
[ ] [ ] [ ] Have receiving lake/bay, stream, and/or wetland been impacted by silt from project?

Housekeeping

1. General Site Conditions

Yes No NA
[ ] [ ] [ ] Is construction site litter, debris and spoils appropriately managed?
[ ] [ ] [ ] Are facilities and equipment necessary for implementation of erosion and sediment control in working order and/or properly maintained?
[ ] [ ] [ ] Is construction impacting the adjacent property?
[ ] [ ] [ ] Is dust adequately controlled?

2. Temporary Stream Crossing

Yes No NA
[ ] [ ] [ ] Maximum diameter pipes necessary to span creek without dredging are installed.
[ ] [ ] [ ] Installed non-woven geotextile fabric beneath approaches.
[ ] [ ] [ ] Is fill composed of aggregate (no earth or soil)?
[ ] [ ] [ ] Rock on approaches is clean enough to remove mud from vehicles & prevent sediment from entering stream during high flow.

3. Stabilized Construction Access

Yes No NA
[ ] [ ] [ ] Stone is clean enough to effectively remove mud from vehicles.
[ ] [ ] [ ] Installed per standards and specifications?
[ ] [ ] [ ] Does all traffic use the stabilized entrance to enter and leave site?
[ ] [ ] [ ] Is adequate drainage provided to prevent ponding at entrance?

Runoff Control Practices

1. Excavation Dewatering

Yes No NA
[ ] [ ] [ ] Upstream and downstream berms (sandbags, inflatable dams, etc.) are installed per plan.
[ ] [ ] [ ] Clean water from upstream pool is being pumped to the downstream pool.
[ ] [ ] [ ] Sediment laden water from work area is being discharged to a silt-trapping device.
[ ] [ ] [ ] Constructed upstream berm with one-foot minimum freeboard.

Runoff Control Practices (continued)

2. Flow Spreader

Yes No NA

[ ] [ ] [ ] Installed per plan.
[ ] [ ] [ ] Constructed on undisturbed soil, not on fill, receiving only clear, non-sediment laden flow.
[ ] [ ] [ ] Flow sheets out of level spreader without erosion on downstream edge.

3. Interceptor Dikes and Swales

Yes No NA

[ ] [ ] [ ] Installed per plan with minimum side slopes 2H:1V or flatter.
[ ] [ ] [ ] Stabilized by geotextile fabric, seed, or mulch with no erosion occurring.
[ ] [ ] [ ] Sediment-laden runoff directed to sediment trapping structure

4. Stone Check Dam

Yes No NA

[ ] [ ] [ ] Is channel stable? (flow is not eroding soil underneath or around the structure).
[ ] [ ] [ ] Check is in good condition (rocks in place and no permanent pools behind the structure).
[ ] [ ] [ ] Has accumulated sediment been removed?.

5. Rock Outlet Protection

Yes No NA

[ ] [ ] [ ] Installed per plan.
[ ] [ ] [ ] Installed concurrently with pipe installation.

Soil Stabilization

1. Topsoil and Spoil Stockpiles

Yes No NA

[ ] [ ] [ ] Stockpiles are stabilized with vegetation and/or mulch.
[ ] [ ] [ ] Sediment control is installed at the toe of the slope.

2. Revegetation

Yes No NA

[ ] [ ] [ ] Temporary seedings and mulch have been applied to idle areas.
[ ] [ ] [ ] 4 inches minimum of topsoil has been applied under permanent seedings

Sediment Control Practices

1. Silt Fence and Linear Barriers

Yes No NA

[ ] [ ] [ ] Installed on Contour, 10 feet from toe of slope (not across conveyance channels).
[ ] [ ] [ ] Joints constructed by wrapping the two ends together for continuous support.
[ ] [ ] [ ] Fabric buried 6 inches minimum.
[ ] [ ] [ ] Posts are stable, fabric is tight and without rips or frayed areas.
Sediment accumulation is ___% of design capacity.

Sediment Control Practices (continued)

2. Storm Drain Inlet Protection (Use for Stone & Block; Filter Fabric; Curb; or, Excavated; Filter Sock or Manufactured practices)

Yes No NA
[ ] [ ] [ ] Installed concrete blocks lengthwise so open ends face outward, not upward.
[ ] [ ] [ ] Placed wire screen between No. 3 crushed stone and concrete blocks.
[ ] [ ] [ ] Drainage area is 1acre or less.
[ ] [ ] [ ] Excavated area is 900 cubic feet.
[ ] [ ] [ ] Excavated side slopes should be 2:1.
[ ] [ ] [ ] 2” x 4” frame is constructed and structurally sound.
[ ] [ ] [ ] Posts 3-foot maximum spacing between posts.
[ ] [ ] [ ] Fabric is embedded 1 to 1.5 feet below ground and secured to frame/posts with staples at max 8-inch spacing.
[ ] [ ] [ ] Posts are stable, fabric is tight and without rips or frayed areas.
[ ] [ ] [ ] Manufactured insert fabric is free of tears and punctures.
[ ] [ ] [ ] Filter Sock is not torn or flattened and fill material is contained within the mesh sock.
Sediment accumulation ___% of design capacity.

3. Temporary Sediment Trap

Yes No NA
[ ] [ ] [ ] Outlet structure is constructed per the approved plan or drawing.
[ ] [ ] [ ] Geotextile fabric has been placed beneath rock fill.
[ ] [ ] [ ] Sediment trap slopes and disturbed areas are stabilized.
Sediment accumulation is ___% of design capacity.

4. Temporary Sediment Basin

Yes No NA
[ ] [ ] [ ] Basin and outlet structure constructed per the approved plan.
[ ] [ ] [ ] Basin side slopes are stabilized with seed/mulch.
[ ] [ ] [ ] Drainage structure flushed and basin surface restored upon removal of sediment basin facility.
[ ] [ ] [ ] Sediment basin dewatering pool is dewatering at appropriate rate.
Sediment accumulation is ___% of design capacity.

Note: Not all erosion and sediment control practices are included in this listing. Add additional pages to this list as required by site specific design. All practices shall be maintained in accordance with their respective standards.

Construction inspection checklists for post-development stormwater management practices can be found in Appendix F of the New York Stormwater Management Design Manual.

CONSTRUCTION DURATION INSPECTIONS

b. Modifications to the SWPPP (To be completed as described below)

The Operator shall amend the SWPPP whenever:

1. There is a significant change in design, construction, operation, or maintenance which may have a significant effect on the potential for the discharge of pollutants to the waters of the United States and which has not otherwise been addressed in the SWPPP; or
2. The SWPPP proves to be ineffective in:
   a. Eliminating or significantly minimizing pollutants from sources identified in the SWPPP and as required by this permit; or
   b. Achieving the general objectives of controlling pollutants in stormwater discharges from permitted construction activity; and
3. Additionally, the SWPPP shall be amended to identify any new contractor or subcontractor that will implement any measure of the SWPPP.

Modification & Reason:

Construction Site Inspection Log Book for Temporary Erosion & Sediment Controls