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Storm Water Pollution Prevention Plan (SWPPP)

Bayside Development

NYS Route 9W & Purdy Avenue
Town of Marlborough, Ulster County, NY

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Prepared For

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TABLE OF CONTENTS

APPENDICES

I. EXECUTIVE SUMMARY

The applicant proposes to develop the vacant parcel west of NYS Route 9W, North of Marlboro Middle School, and South of Purdy Avenue; otherwise known as tax lot 109.1-4-29 in the Town of Marlborough, Ulster County, New York. The proposed improvement is a mixed use development with a commercial building along Route 9W and the residential component of rental units in the central portion of the project site. An aerial vicinity map has been provided below to identify a general location. The size and nature of the development will require coverage under the NYSDEC SPDES General Permit for Construction Activity (GP-0-15-002).

Herein, a hydrologic study revealed the need for post construction stormwater design, of which, is included within the Stormwater Pollution Prevention Plan (SWPPP) for the proposed development. Grass swales and bioretention have been utilized in the design to meet New York State Standards and requirements for runoff reduction, water quality, and peak attenuation of the required design storms. As the proposed SWPPP provides reductions in peak flows for all required design storms at the selected design points studied, and runoff reduction/water quality mitigation meeting the applicable standards, there should be no adverse impacts due to storm water, on-site or off-site, as a result of the proposed development.

II. INTRODUCTION

The partially developed subject parcel is approximately 1,102,335 square feet (±25.31 acres) in size, and is located within the Town's R1 (Residential) and BC (Business Corridor Overlay) zoning districts. The subject parcel is located North of the Marlboro Middle School, West of NYS Route 9W and South of Purdy Avenue, also known as SBL 109.1-4-29, in the Town of Marlborough, Ulster County, New York. Army Corps. of Engineers (ACOE) wetlands have been delineated along the western limits of the project site in the low lying areas totaling ±7.40 acres.

The Applicant proposes to develop the subject parcel with a mixed use including 12,600 sq. ft. of commercial retail space to the east along Route 9W and one hundred and four (104) total residential dwelling units among five (5) buildings in the central area of the subject parcel. The development will also include associated driveways, parking, sidewalks, water, sewer and drainage utilities as well as stormwater management areas. A one way entrance connection from the middle school is proposed to at the terminus of the Town roadway portion of the project.

The proposed development and site improvements on this site require a study of the impacts on watercourses in and around the site. This study reviews the existing drainage conditions, as well as the proposed improvements to provide measures that will be used to control potential impacts due to storm water runoff. Due to the size and type of the project, a State Pollutant Discharge Elimination System Permit (SPDES GP-0-15-002) is required from the New York State Department of Environmental Conservation (NYSDEC).

III. METHODOLOGY

1. The watersheds are divided into subareas, by topography, soils, and land use. A summary of the watershed areas, composite curve numbers, and travel times are shown in Table 1.
2. Rainfall depths used for this analysis are those published by the Northeast Regional Climate Center (NRCC) for the project location for each storm event as directed in the New York State Stormwater Management Design Manual (NYSSMDM).
3. Topographical mapping is taken from a survey entitled "Boundary and Topographic Survey of Lands N/F Bayside Construction, LLC, Tax Lot 109.1-4-29", prepared by Maser Consulting, P.A., dated May 13, 2016.
4. The required WQv was calculated in accordance with the Section 4.2 of the NYSSMDM. This is also the required RRv as per Section 4.3 of the NYSSMDM.
5. The provided RRv was calculated through the use of the Green Infrastructure (GI) Worksheets provided by NYSDEC. The worksheets are included in the Appendix.
6. The peak flows from the watersheds in the existing condition are computed using the runoff curve numbers taken from TR-55 to determine undeveloped peak runoff and runoff hydrographs at the design points. The existing peak flows are presented in the Table 2.
7. In the post-development condition, the peak flows from the proposed development are computed using the runoff curve numbers taken from TR-55. The watersheds are adjusted for the proposed improvements and grading of the site. The runoff flows are hydraulically routed

for updated travel times, diversions, and new storage structures as necessary. The resulting proposed peak flows at each design point are presented in Table 2.

8. A full Erosion & Sediment Control Plan (plans and construction sequencing) was designed in accordance with the New York State Standards and Specifications for Erosion and Sediment Control (aka the "bluebook") and is included in this report.
9. A long-term Operation & Maintenance Plan was developed for the proposed post-construction stormwater control practices and is included in this report.
10. Maps indicating the various drainage conditions are enclosed in this report. Schematic diagrams of the flow models in the existing and proposed conditions are included in the HydroCAD output included in the appendix of this report.
11. The methods used are those presented in the HydroCAD 10.00-13 computer program using a shortened printout for convenience. Soil types and hydrologic groups are based on soil maps from the NRCS online Web Soil Survey (output included in appendix).
12. A Notice of Intent (NOI) for GP-0-15-002 and an MS4 SWPPP Acceptance form was prepared and included in the appendix of this report.

IV. DISCUSSION

DESCRIPTION OF DESIGN POINTS

The design point evaluated in this report is described as follows:

Design Point 1 is located along the northern half of the eastern property boundary along NYS Route 9W and is a single point representative of the parallel flows from the site in this area. As the runoff from this watershed appears to ultimately collect along Route 9W and flows along and across, this pre-development analysis location was appropriate.

Design Point 2 is located at the southeast corner of the subject property, at the eastern exit of the middle school, along Route 9W. This study point is separated by Design Point 1 to the north by a ridgeline splitting flows between the two study locations.

Design Point 3 is located at the southwest corner of the subject parcel to the south westerly end of the school track. The track area is surrounded by a wetland to the north and west that discharges at this study point. The substantial westerly half of the project site discharges to this location. A portion of the project site in the existing condition appears to naturally direct runoff across the track and field location and will be routed around this offsite area of interest in the proposed condition.

The design point location, along with the pre- and post-development conditions, and watersheds are clearly identified on the watershed maps found in the appendix of this report. The pre-development (hereafter "existing") and post-development (hereafter "proposed") watershed characteristics can be found in Table 1 below.

Table 1: Watershed Characteristics

Existing Conditions			
Watershed	Area, Ac	CN	Tc, Min.
WS-1	4.860	68	12.7
WS-2	4.872	69	34.8
WS-3	18.961	74	34.0
Totals	**28.693**	**72**	**-**
Proposed Conditions			
Watershed	Area, Ac	CN	Tc, Min.
WS-1	0.193	63	6.0
WS-1A (1-1)	5.800	79	6.0
WS-1B (1-2)	0.871	76	6.0
WS-2	0.726	53	18.5
WS-3	10.591	75	34.0
WS-3A	8.922	86	19.4
WS-3B	1.590	74	21.6
Totals	**28.693**	**79**	**-**

Note: Watershed ( ) denotes NYSDEC GI infrastructure worksheet catchment number (see appendix); further Watersheds 3A and 3B are identified as WS 3-1 in the worksheets as 3B does not proposed new impervious areas.

The minimum Tc of 6 minutes, or 0.10 hours, is shown above and noted on the watershed maps in the catchment areas where the composite travel times did not meet this minimum, and are therefore not shown.

HYDROLOGIC SOILS:

The Web Soil Survey of Ulster County, New York shows the site situated in an area having primarily soil types, "BOD" (Bath-Nassau-Rock outcrop complex), "At" (Atherton Loam), "Re" (Red Hook gravelly Silt loam) and small areas of "CnB" (Chenango Gravelly Silt Loam), and "HgD" (Hoosic Gravelly Loam). The hydrologic soil type for these soils is hydrologic soil groups 'C', 'D', 'D', 'A', and 'A' respectively. Substantial portions of the proposed development are located within the 'HSG 'C' soils. The NRCS Soils report for the project specific site can be found in the Appendix of this report.

Project specific soil testing was conducted on October 20 & 21, 2016. Exploratory deep and infiltration testing results yielded fairly consistent results across the project site. All testing was conducted in the HSG 'C' soils found within the limits of the proposed development and disturbance area which yielded silty loam soils at higher elevations that transition into clay soils at deeper depths. Breakable angular shale was found as deep tests continued into deeper horizons. Infiltration testing throughout the site yielded negligible rates. Testing confirmed that infiltration design will not be utilized due to poor test rates and shallow rock throughout the site. The site specific soil test logs and testing location plan can be found in the Appendix of this report.

ZERO-NET INCREASE:

The proposed storm water improvements for the site provide the required channel protection (CPv), overbank flood protection (Qp), and extreme flood protection (Qf). Peak flows have been reduced at the selected design point in the proposed condition for the 100, 10, and 1-year storms. These peak flow reductions can also be found in Table 2 below.

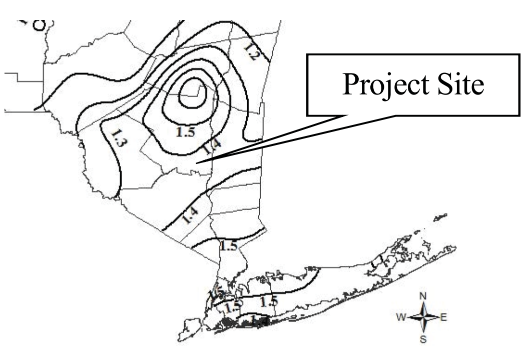
As is evident in the table below, attenuation of the peak flows by site planning, and implementation of standards SMPs with RRv capacity, have effectively reduced the peak discharge while providing the required runoff reduction which will be further discussed below.

Table 2: Present and Proposed Peak Flow Summary to the Design Points

Design Point	Storm Event (Yr)	Existing Peak Flow (Cfs)	Proposed Peak Flow (Cfs)	Net Change (Cfs)	Percent Change
DP-1	1	1	1.44	0.73	-0.71
	10	10	7.10	4.59	-2.51
	100	100	19.80	17.57	-2.23
DP-2	1	1	1.12	0.01	-1.11
	10	10	4.97	0.29	-4.68
	100	100	13.50	1.49	-12.01
DP-3	1	1	7.10	5.12	-1.98
	10	10	24.46	21.74	-2.72
	100	100	59.95	59.43	-0.52

WATER QUALITY VOLUME (WQV):

The Water Quality Volume (WQv) is designed to improve water quality sizing to capture and treat 90% of the average annual stormwater runoff volume. The WQv is directly related to the impervious cover created at a site. The 90% rainfall event value (P) used in the calculations (1.40") is shown below in the portion of Figure 4.1 from Section 4.2, page 4-3 in the NYSSMDM.



90% Rule:

$WQ_v = [(P)(R_v)(A)]\ /12$
$R_v = 0.05 + 0.009(I)$
I = Impervious Cover (Percent)
Minimum Rv = 0.2
P = 90% Rainfall Event Number (See Figure 4.1)
A = site area in acres

Maser Consulting (MC) determined the total impervious area for the project site and to each design point, as applicable. Only new impervious areas require water quality treatment but all impervious should be accounted for in sizing of the practices, when tributary to the system. The Runoff Coefficient "Rv" in the computation of Water Quality Volume WQv is dependent on the percent impervious cover. As per Section 4.2 of the NYSSMDM, 100% of the water quality volume shall be treated. Below is the breakdown of the entire proposed site, as applicable, for total required water quality volume before applying runoff reduction techniques per section 3.6 of the design manual.

Table 3: Required Water Quality Calculation

Design Point	Area (A) Acres	Impervious Area (A)	90% Rainfall Event Number (P) Inches	Percent Impervious (I) %	Runoff Coefficient Rv	Required WQv Cf
1	6.67	1.78	1.40	27	0.29	9,818
3	10.52	4.57		43	0.44	23,565
Total	17.19	6.35		-	-	33,383

Note: Watershed 2 does not propose new impervious and as such is not discussed in this section.
**A portion of the provided water quality was provided with Contech CDS units which are "rate based" practices; as such the 100% treatment volume was provided above.*

The total required water quality volume per NYSDEC standards based on the proposed impervious area of 6.35 acres for the proposed development is 33,383 cf or 0.766 Ac-ft. The proposed development requires the minimum runoff reduction of 9,366 cf (0.215 Ac Ft) be reduced and total water quality be treated for the proposed improvements. As the proposed development cannot reduce the entire water quality volume above, site planning and green infrastructures matrices are discussed below. The proposed design must reduce the minimum runoff reduction volume and treat the remaining water quality with standard management practices.

The application of site planning and green infrastructure to reduce water quality with runoff reduction practices can either reduce the required water quality volume to be treated or can completely account for the required water quality volume, which is recommended. When the entire water quality volume has not been reduced, the minimum must be met and an explanation provided discussing the limitations/shortfall which is often due to site constraints.

RUNOFF REDUCTION VOLUME (RRV) THROUGH SITE PLANNING:

The basic premise of runoff reduction is to recognize the water quality benefits of certain practices by allowing for a reduction in the water quality treatment volume. Runoff reduction is first achieved through better site design during the planning stages and has been implemented in the planning and design of this project as described in this report.

In accordance with Section 5.2 "Planning for Green Infrastructure: Reduction of Impervious Cover" of the NYSDEC Stormwater Management Design Manual, the proposed site plan has been designed to meet the planning techniques as follows:

Table 4: Site Planning

Preservation of undisturbed Areas	
Delineate and place into permanent conservation undisturbed forests, native vegetated areas, riparian corridors, wetlands, and natural terrain.	Although vegetation and wetland areas have been preserved to the west of the project area, they will not be placed into a permanent easement.
Preservations of Buffers	
Define, delineate and preserve naturally vegetated buffers along perennial streams, rivers, shorelines and wetlands.	The limit of construction has been contained to the maximum extent practical based on the development needs. Wetlands were not disturbed by the proposed development
Reduction of Clearing & Grading	
Limit clearing and grading to the minimum amount needed for roads, driveways, foundations, utilities and stormwater management facilities.	All grading has been minimized by utilizing 3:1 and 2:1 (H:V) slopes to meet existing grade and minimize the disturbance footprint. Further, the extents of the development have been greatly reduced from previous applications.
Locating Development in Less Sensitive Areas	
Avoid sensitive resource areas such as floodplains, steep slopes, erodible soils, wetlands, mature forests and critical habitats by locating development to fit the terrain in areas that will create the least impact.	The development is focused in the central portion of the site minimizing impact to the western portion of the project site.
Open Space Design	
Use clustering, conservation design or open space design to reduce impervious cover, preserve more open space and protect water resources.	Although a permanent easement has not been proposed, scope of development has been reduced since previous applications, creating additional undeveloped lands.
Soil Restoration	
Restore the original properties and porosity of the soil by deep till and amendment with compost to reduce the generation of runoff and enhance the runoff reduction performance of post construction practices.	The areas of the site not proposed to contain impervious surfaces will be landscaped or used for stormwater purposes. As part of the design plan, the disturbed soils compacted during construction will be restored in accordance with NYSDEC regulations set forth in Section 5.1.6 of the Stormwater Management Design Manual (NYSSMDM). Following restoration, the soil in the lawn/landscaping areas will have the ability to infiltrate rainfall similar to the existing conditions and will slow stormwater runoff.
Roadway Reduction	
Minimize roadway widths and lengths to reduce site impervious area	Roadways are kept at a width of 24’ as required by Town ordinance and 26’ width where fire access and egress will be required around the buildings. The proposed new layout reduced the total length of road required.
Sidewalk Reduction	
Minimize sidewalk lengths and widths to reduce site impervious area	Sidewalks have been minimized to areas required to protect pedestrian safety and minimum egress to/from buildings.

Driveway Reduction	
Minimize driveway lengths and widths to reduce site impervious area	Driveways have not been proposed on the plans, perpendicular parking spaces along building frontages have been proposed.
Cul-de-Sac Reduction	
Minimize the number of cul-de-sacs and incorporate landscaped areas to reduce their impervious cover.	Cul-de-Sacs were not proposed in this design.
Building Footprint Reduction	
Reduce the impervious footprint of residences and commercial buildings by using alternate or taller buildings while maintaining the same floor to area ratio.	Building footprint was minimized to the end user's needs.
Parking Reduction	
Reduce imperviousness on parking lots by eliminating unneeded spaces, providing compact car spaces and efficient parking lanes, minimizing stall dimensions, using porous pavement surfaces in overflow parking areas, and using multi-storied parking decks where appropriate.	Parking has been proposed at a rate of 2.0 spaces per residential unit as requested by the Town Board and minimum to meet zoning requirements for the commercial aspect of the project.

GREEN INFRASTRUCTURE TECHNIQUES (GITS):

After taking into account the reductions through Site Planning mentioned above, RRv remains to be treated through GITs and/or Standard SMPs. Chapter 5 of the NYSSMDM outlines the various Green Infrastructure Techniques which can be implemented on-site to achieve runoff reduction. The GI Worksheets included in the Appendix of this report provide the calculations for the green infrastructure techniques chosen to treat the Runoff Reduction Volume for this project. Below is a brief description of each Green Infrastructure Technique along with a discussion regarding the feasibility of each technique with respect to this project.

Table 5: Green Infrastructure Feasibility

Conservation of Natural Areas	
Retain the pre-development hydrologic and water quality characteristics of undisturbed natural areas, stream and wetland buffers by restoring and/or permanently conserving these areas on a site.	No natural areas exist within the project disturbance area delineated for the water quality calculation. Areas around the perimeter of the development were protected where possible.
Sheetflow to Riparian Buffers or Filter Strips	
Undisturbed natural areas such as forested conservation areas and stream buffers or vegetated filter strips and riparian buffers can be used to treat and control stormwater runoff from some areas of a development project.	The majority of the disturbed areas and all impervious areas within the drainage area discharge to the proposed stormwater management areas for treatment. Smaller perimeter areas not draining to stormwater management areas; grass swales have been utilized in multiple locations to provide a "level of quality improvement"
Vegetated Open Swale	

The natural drainage paths, or properly designed vegetated channels, can be used instead of constructing underground storm sewers or concrete open channels to increase time of concentration, reduce the peak discharge, and provide infiltration.	Wide grass swales have been proposed along the rear of the northern and eastern residential buildings to accept and convey surface and runoff from roof leaders. Credit was not incorporated into the water quality calculations for runoff reduction.
Tree Planting/Tree Box	
Plant or conserve trees to reduce stormwater runoff, increase nutrient uptake, and provide bank stabilization. Trees can be used for applications such as landscaping, stormwater management practice areas, conservation areas and erosion and sediment control.	Trees are proposed throughout the landscaped areas around the site and preservation/restoration of wooded areas has been protected west of the development on site but has not been quantified.
Disconnection of Rooftop Runoff	
Direct runoff from residential rooftop areas and upland overland runoff flow to designated pervious areas to reduce runoff volumes and rates.	Roof leaders will discharge to proposed swales on the northern and eastern buildings before reconnecting downstream to a basin practice.
Stream Daylighting for Redevelopment Projects	
Stream Daylight previously-culverted/piped streams to restore natural habitats, better attenuate runoff by increasing the storage size, promoting infiltration, and help reduce pollutant loads.	The project is not a redevelopment and does not have existing subsurface drainage to be daylighted; therefore this technique is not applicable.
Rain Garden	
Manage and treat small volumes of stormwater runoff using a conditioned planting soil bed and planting materials to filter runoff stored within a shallow depression.	Bioretention facilities have been proposed throughout the project site and receive runoff from the rooftops.
Green Roof	
Capture runoff by a layer of vegetation and soil installed on top of a conventional flat or sloped roof. The rooftop vegetation allows evaporation and evapotranspiration processes to reduce volume and discharge rate of runoff entering conveyance system.	The architectural design does not provide a feasible opportunity for this approach.
Stormwater Planter	
Small landscaped stormwater treatment devices that can be designed as infiltration or filtering practices. Stormwater planters use soil infiltration and biogeochemical processes to decrease stormwater quantity and improve quality.	Bioretention facilities have been proposed throughout the project site and receive runoff from the rooftops.
Rain Tank or Cistern	
Capture and store stormwater runoff to be used for irrigation systems or filtered and reused for non-contact activities.	Pump design and storage is not feasible with the architectural and mechanical design for the buildings on site.
Porous Pavement	
Pervious types of pavements that provide an alternative to conventional paved surfaces, designed to infiltrate rainfall through the surface, thereby reducing stormwater runoff from a site and providing some pollutant uptake in the underlying soils.	Pervious pavement is not proposed due to HSG ‘C’ and ‘D’ soils on site.

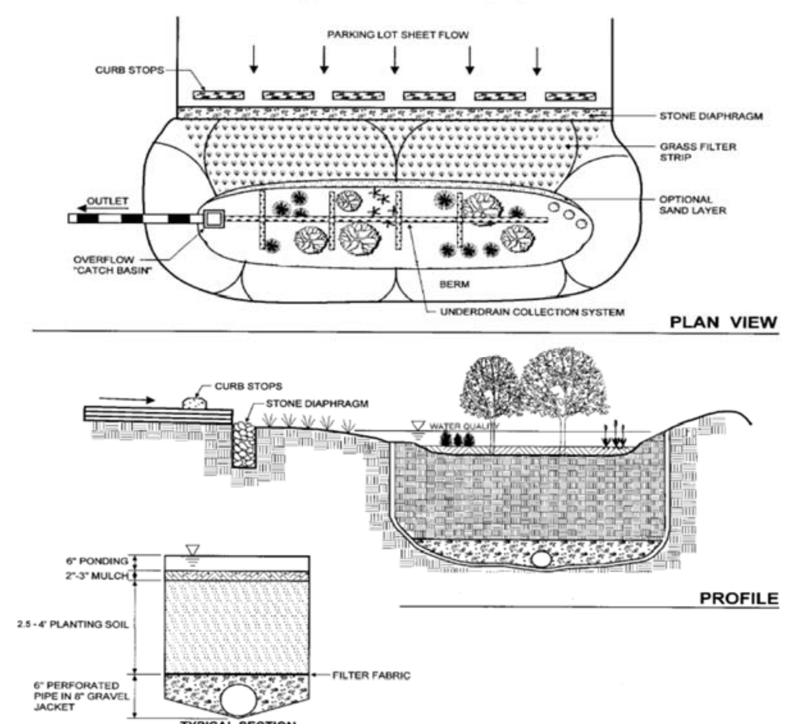
Soil restoration efforts, including mechanical decompaction and compost amendment in accordance with Section 5.1.6 and Table 5.3 of the NYSSMDM, are proposed for areas to be disturbed for improvements that will not be impervious at final buildout.

In summary, the above site planning implementation activities and utilization of practices discussed herein provide the required design discussion criteria per NYSSMDM for runoff reduction and water quality treatment. Refer to the tables above for the decision making matrices utilized herein. The design for the project proposed standard SMPs with RRV capacity to attain the required minimum runoff reduction volume and water quality. NYSDEC Green Infrastructure (GI) worksheets can be found in the appendix summarizing calculations.

<u>BIORETENTION BASINS WITH UNDERDRAIN:</u>

The proposed development causes an increase in impervious; as such the peak rate of runoff must be mitigated. One of the alternatives utilized in the proposed development is the use of bioretention with a proposed underdrain (F-5). Runoff from the development is proposed to be routed to a bioretention basin to provide runoff reduction capacity as well water quality treatment volume. The basins are proposed with a 3" mulch layer, 2.5 feet of soil media, and a 6-inch drainage layer with a 4-inch underdrain which ultimately connects to an outlet control structure and discharges downstream to a subsurface chamber system to attenuate peak flows. Bioretention soils shall meet the design criteria outlined in Appendix H of the NYSSMDM; soil deep ripping and decompaction shall be in accordance with the NYSDEC guidelines found in the appendix.

Figure 6.19 Bioretention (F-5)



The sizing calculation for the bioretention system was completed in accordance with design requirements set forth in Section 6.4.4 of the NYSSMDM. All bioretention areas have been designed to receive discharges with a forebay prior to runoff entering the bioretention portion of the design.

The stage/storage volume information of the bioretention areas can be found in the HydroCAD output within the appendix of this report. The NYSDEC GI worksheet for runoff reduction and water quality treatment can be found in the appendix for RRv capacity calculations (See NYSDEC GI worksheet).

Table 6: Provided Water Quality/Runoff Reduction Calculations

Watershed	Area (A) Acres	Impervious Area (A)	90% Rainfall Event Number (P) Inches	Percent Imp (I) %	Runoff Coef. Rv	Required WQv Cf	Provided WQv Cf
1A (1-1)	5.80	1.45	1.40	25	0.27	8,087	9,840
1B (1-2)	0.87	0.33		38	0.39	1,731	1,731
3A/3B (3-1)	10.52	4.57		43	0.44	23,565	23,580
Total	17.19	6.35		-	-	33,383	35,151

Note: Watershed 1, 2, and 3 do not propose new impervious area at this time; as such does not require water quality treatment and is not included in the above calculations. Watershed 3 land coverage totals are included within 3A in the above table.

The "Provided water quality volume" can be found in the NYSDEC Green Infrastructure worksheets within the appendix of the report. Note, the provided volume shown above is based on the actual volume provided found within the bioretention worksheets; the nature of the accounting within the NYSDEC sheets limits the volume provided to that which is required (in this case 33,383 sq. ft./0.766 ac) which is the values shown throughout the GI sheets and notice of intent. The actual volume is calculated by the following formula found in Section 6.4.4 of the NYSSMDM and is 35,151 sq. ft./0.807 ac-ft. The volume in the formula accounts for both the ponding volume within the basin as well as within the soil media.

$$Af = \frac{WQvdf}{k(hf+df)tf} \quad \text{or} \quad WQv = \frac{Af\mathrm{k(hf+df)tf}}{df}$$

<u>Where</u>

A_f	Surface area of filter bed (ft2)
WQv	Water Quality Volume(cf)
df	Filter bed depth (ft)
k	Coefficient of permeability of filter media (ft/day)
hf	Average height of water above filter bed (ft)
tf	Design filter bed drain time (days)

The proposed design exceeds the minimum required runoff reduction volume (RRv) by providing a total of 13,368 cf (0.307 Ac-ft) or 38% of the total provided water quality. A summary of the water quality provided in these facilities can be found in Table 6 above.

As was mentioned in the footnotes of the water quality tables "flow-based" structures have been used to capture runoff from portions of WS-1B along Route 9W to the east end of the project site. This is proposed as an alternative solution to capture runoff and treat water quality prior to discharge from the project site. The existing topography of the site and necessary access from Route 9W inherently creates a portion of impervious cover that cannot be captured for onsite standard treatment. Capture of this runoff was conducted to the maximum extent practical and the remainder has been directed to NYSDEC (NJCAT) approved Hydro-International First Defense ("First Defense") treatment units. Further discussion of the units is provided below.

DOWNSTREAM DEFENDER UNITS (ALTERNATIVE SMP FOR PRETREATMENT & ALONG ROUTE 9W):

The applicant shall install hydrodynamic separators at locations of the northern commercial lot and the north side of the proposed Town Road access to the site as shown on the plans and discussed herein. Hydrodynamic separators are proprietary devices approved by systematic testing as alternative SMPs for acceptable for pretreatment when properly sized. These devices move water in a circular, centrifugal manner to accelerate the separation and deposition of primarily sediment from the water. They are suitable for removal of coarse particles, oils, and fuels over small drainage areas. The NYSDEC refers to the New Jersey Department of Environmental Protection for a list of Stormwater Manufactured Treatment Devices which has received Certification (included in the Appendix). The Hydro International First Defense unit (hereafter "First Defense") is "an approved practice" by NJCAT standard testing and is certified as such.

Table 6: First Defense Manufacturer Treatment Sizing Chart

First Defense® High Capacity Model Number	Diameter	Typical TSS Treatment Flow Rates			Peak Online Flow Rate	Maximum Pipe Diameter[1]	Oil Storage Capacity	Typical Sediment Storage Capacity[2]	Minimum Distance from Outlet Invert to Top of Rim[3]	Standard Distance from Outlet Invert to Sump Floor
		NJDEP Certified	106µm	230µm						
	(ft / m)	(cfs / L/s)	(cfs / L/s)	(cfs / L/s)	(cfs / L/s)	(in / mm)	(gal / L)	(yd³ / m³)	(ft / m)	(ft / m)
FD-3HC	3 / 0.9	0.84 / 23.7	0.3 / 8.77	0.53 / 15.0	15 / 424	18 / 457	125 / 473	0.4 / 0.3	2.0 - 3.5 / 0.6 - 1.0	3.71 / 1.13
FD-4HC	4 / 1.2	1.50 / 42.4	0.7 / 20	1.2 / 34	18 / 510	24 / 600	191 / 723	0.7 / 0.5	2.3 - 3.9 / 0.7 - 1.2	4.97 / 1.5
FD-5HC	5 / 1.5	2.34 / 66.2	1.3 / 37.9	2.2 / 62.2	20 / 566	24 / 609	300 / 1135	1.1 / .84	2.5 - 4.5 / 0.7 - 1.3	5.19 / 1.5
FD-6HC	6 / 1.8	3.38 / 95.7	2.2 / 63	3.8 / 108	32 / 906	30 / 750	496 / 1,878	1.6 / 1.2	3.0 - 5.1 / 0.9 - 1.6	5.97 / 1.8
FD-8HC	8 / 2.4	6.00 / 169.9	5.1 / 144	8.6 / 243	50 / 1,415	48 / 1219	1120 / 4239	2.8 / 2.1	3.0 - 6.0 / 0.9 -1.8	7.40 / 2.2

[1]Contact Hydro International when larger pipe sizes are required.
[2]Contact Hydro International when custom sediment storage capacity is required.
[3]Minimum distance for models depends on pipe diameter.

Sizing of the First Defense unit requires the application of a "rate-based" sizing approach for water quality treatment (See Section 9.4 of the NYSSMDM). This is a derivation of the standard water quality volume (WQv) calculation generally used and found in chapters 4, 10, and Appendix B, which is a "volume-based" sizing approach. In the "rate-based" approach, the device should be sized to treat 100% of the peak rate of runoff from the WQv storm; utilizing the WQv storm precipitation depth, the peak runoff for each tributary area can then be determined, and the associated devices sized appropriately. HydroCAD was used to determine the water quality flow rate for treatment sizing of the First Defense. The table below lists the water quality storm event, its associated flowrate for the treatment structure, the tributary catchment, and the appropriately sized First Defense capacity which provides in excess of the required flow, for the location shown on the plans.

Table 7: First Defense Water Quality Treatment Calculations

Proposed CDS System	90% Rainfall Event Number (P) Inches	Tributary Catchment Areas (WS-#)	Required Water Quality Flow, cfs	Contech CDS Model	Treatment Capacity, cfs
FD-1A	1.40	WQ-1B1	0.06	FD-4HC	1.50
FD-1B		WQ-1B2	0.13	FD-4HC	1.50

The First Defense treatment system has the capacity of bypassing high flow rates internally as well as controlling flow through the treatment chamber so as to avoid wash-out of previously captured pollutants. 100-year flowrates were also confirmed to be less than the maximum allowable flow through specifications by the manufacturer. The HydroCAD output and specifications for the First Defense unit can also be found in the appendix of this report along with the NJCAT testing certification.

V. EROSION & SEDIMENT CONTROL

General Erosion Control Plan:

All work to be done in accordance with the New York Standards and Specifications for Erosion and Sediment Control. See the Erosion & Sediment Control Plan included in the appendix of this report which has general erosion and sediment control notes and a sequence of construction, which can also be found below.

The erosion control practices designed specifically for the site phasing to be implemented during construction include sediment traps, inlet protection, a stabilized construction entrance, staging areas, silt fence, temporary swales, temporary stockpiles, and temporary/permanent stabilization. The E&SC Plan and Details found in the appendix of this report depict the location and size of the proposed erosion control practices to be used during construction.

A sediment trap sizing criteria chart has been provided on the plan; this chart identifies overall required storage per the area of disturbance as well as sub-areas and dimensions of traps to be utilized within the proposed phases of construction; these areas are proposed and can be relocated as practicable by the Contractor but must be sized to provide 3,600 CF of storage per 1-acre of disturbance.

General Site Construction Sequence:

Total Disturbance area = 13.70

1. The applicant and the applicant's contractor shall attend a pre-construction meeting with representatives from the Town building department, highway department, engineers and any

other parties deemed necessary to review all protocols, bonding requirements, agreements and the sequence and scheduling of the work being undertaken, as applicable.

2. The contractor shall install construction entrances as shown on the plans, or as agreed upon.

3. The Contractor shall excavate Sediment Basins 1-A and 3-A, in advance of phase disturbance activities. Sediment Basin 3-A shall be accessed from the construction entrance off Purdy Avenue. The contractor should stabilize the slopes of each basin as soon as practical with slope stabilization matting to meet stabilization requirements. The contractor shall install the outlets for each sediment basin in accordance to NYSDEC Standards and Regulations.

4. Contractor shall clear existing vegetation, install silt fence, temporary sediment traps & basins, temporary swales and orange construction fence as shown on the erosion and sediment control plan. Orange construction fence is an acceptable alternative to silt fence to delineate work limits upstream of disturbance areas. Contractor to construct additional erosion control measures as needed to control sediment laden runoff throughout the life of the project. Construction of erosion control measures to be in accordance with New York State Department of Environmental Conservation Standards (Blue Book). Trees to remain shall be clearly identified and protected from damage.

5. The contractor shall clear and grub the existing vegetation for the remainder of the applicable phase. All existing site improvements as called out on the demolition plan and/or directed by designated representatives, shall be removed within the construction limits.

6. Excavated materials throughout the site shall be stockpiled at designated locations or removed in an organized fashion keeping all temporary swales, sediment basins and roadways clear of debris. The stockpile areas shall be cordoned off with silt fence per the appropriate specifications and details. The operator shall initiate stabilization measures as soon as practical in portions of the site where construction activities have temporarily or permanently ceased, but in no case more than (14) days after the construction activity in that portion of the site has temporarily or permanently ceased.

   a. *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). Stabilization shall be maintained per SPDES General Permit for stormwater runoff from construction activity, GP-0-15-002 or as amended.

7. Contractor shall install all utilities (sewer, water, and drainage) associated to each phase as outline on the Plan disturbance limits. All inverts shall be plugged and maintained throughout the construction process. Storm inlet sediment traps shall be installed on all drainage

structures, as identified on the plans or an acceptable alternative found in the NYSDEC "Blue Book".

8. Contractor shall install curbing, sidewalks, base course and building pads as soon as practical to stabilize impervious areas.

9. After completion of building exterior, grade and spread topsoil on all lawn areas and seed. Maintain all seeded and planted areas to insure a viable stabilized vegetative cover.

10. The project site must meet *final stabilization* criteria prior to removing all erosion and sediment control devices and closing out the project. Litter and construction debris shall be removed as practical throughout the life of the project.

    a. *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.

11. Additional erosion control measures shall be installed, as may be necessary, required and/or requested by authorities, to prevent the incidental discharge of silt laden runoff from entering a water course or a drainage system.

12. Upon final stabilization being met, contractor shall clear drainage pipes and structure of any sediment which may have accumulated, remove plugs, and commission the system.

13. The general permit for stormwater discharge from construction activities states this is unlawful for any person to cause or contribute to a violation of water quality standards.

Phase I Construction Sequence

Notes:
1. *The proposed two story commercial construction area is not part of this Phase.*
2. *A five (5) acre disturbance waiver will be required from the Town.*

Disturbance area = 8.20 acres
Temp Storage Required = 3,600 cf per acre disturbed = 29,520 cf
Temp Storage Provided = 55,440 cf. (3 Sediment traps)

This phase includes construction of Building 1, Road A, parking areas, associated utilities and construction of Bioretention Basins 1-A and 3-A. See plan for limit of Phase Disturbance.

1. Check dams and temporary swales shall be installed along Road A to minimize flow of runoff.

2. Contractor shall install the retaining wall south of proposed Road A.
3. Contractor shall tie into existing watermain in NY Route 9W.
4. Contractor shall tie into existing sewer manhole in NY Route 9W.
5. Contractor shall begin construction on proposed Building 1.
6. The bottom of the sediment basins 1-A and 3-A will be used as temporary sediment basins and will remain open soil till completion of Phase III.
7. Prior to beginning the next Phase, all areas of Phase I shall meet final stabilization requirements. Note that the bottom of Sediment Basins 1-A and 3-A will remain open soil to serve as temporary sediment traps for upcoming Phases.

Phase II Construction Sequence

Disturbance area = 2.99 acres (includes area of Sediment Basins 1-A & 3-A)
Temp Storage Required = 3,600 cf per acre disturbed = 10,764 cf
Temp Storage Provided = 12,000 cf (2 sediment traps)

This phase includes construction of Building 2, Road B, parking areas, associated utilities and amenities. See plan for limit of Phase Disturbance.

1. Contractor shall install temporary sediment basin 'B' in the area behind the proposed building. A pipe slope drain shall be installed to discharge water into Sediment Basin 3-A.
2. Contractor shall tie into existing watermain in Purdy Avenue.
3. Contractor shall begin construction on proposed Building 2.
4. Prior to beginning the next Phase, all areas of Phase II shall meet final stabilization. Note that the bottom of Sediment Basins 1-A and 3-A will remain open soil to serve as temporary sediment traps for upcoming Phases.

Phase III Construction Sequence

Disturbance area = 2.63 acres (includes area of Sediment Basins 1-A & 3-A)
Temp Storage Required = 3,600 cf per acre disturbed = 9,468 cf
Temp Storage Provided = 10,200 cf

Phase 3 includes construction of Building 3, Roads C & D, parking areas, associated utilities and amenities. See plan for limit of Phase Disturbance.

1. Contractor shall install temporary sediment basin 'E' in the southeast corner of Building 3.
2. Contractor shall begin construction on proposed Building 3.
3. Prior to beginning the next Phase, all areas of Phase III shall meet final stabilization requirements. Sediment Basins 1-A and 3-A will be completed as bioretention areas per the design plans and details.

Phase IV Construction Sequence

Disturbance area = 1.64 acres
Temp Storage Required = 3,600 cf per acre disturbed = 5,904 cf
Temp Storage Provided = 6,740 cf (2 sediment traps)

This phase includes construction of Buildings 4 & 5, the Clubhouse, associated utilities and amenities. See plan for limit of Phase Disturbance.

1. Contractor shall install temporary sediment basin 'C-1' nad 'C-2'located west of the proposed buildings.
2. Contractor shall begin construction on proposed Building 4 and Building 5 with attached Clubhouse.
3. By completion of Phase IV, the entire residential component of the development shall be fully stabilized and bioretention areas shall be fully constructed.

Phase V Construction Sequence

Disturbance area = 1.16 acres
Temp Storage Required = 3,600 cf per acre disturbed = 4,176 cf
Temp Storage Provided = 7,200 cf (1 sediment trap)

This phase includes construction of the Commercial Building, associated utilities and amenities. See plan for limit of Phase Disturbance.

1. Contractor shall install temporary sediment basin 'F' located south of the proposed commercial building.
2. Contractor shall install all retaining walls.
3. Contractor shall begin construction on the proposed building.

For additional, general Erosion and Sediment Control notes including seeding, please refer to the Erosion and Sediment Control Plans.

VI. CHEMICAL, LITTER & DEBRIS CONTROL MEASURES

All parties involved in the construction process, including but not limited to, truck drivers, laborers, foremen, and operators, will be informed of spill prevention and litter control practices and procedures herein prior to construction activity. The project superintendent will inspect the site daily, at a minimum for litter and debris throughout the site, and will specifically inspect storage areas prior to exiting site. Specific prevention and control measures on the site will be employed as follows:

Petroleum Products

All on-site vehicles will be monitored for leaks and will receive preventive maintenance to reduce the chance of leakage. Equipment and vehicles should be stored on impervious surfaces to manage spills where practical. No vehicle maintenance, handling, or storage of petroleum products will occur within 100 feet of a wetland, waterway, or drainage facility. Petroleum products will be stored in tightly sealed containers that are clearly labeled. Any asphalt substances used on-site will be applied according to manufacturer's recommendations. Storage facilities shall be located as far as practical from private residences, business, and public Right-of-Ways. Storage shall be located in an isolated location, where practical, and in accordance with all federal, state, and local regulations.

Hazardous Substances (Paints, Solvents, etc)

All parties involved in the construction process, including but not limited to, truck drivers, laborers, foremen, and operators, will be informed of spill prevention and litter control practices and procedures herein prior to construction activity. The project superintendent will inspect the site daily, at a minimum for litter and debris throughout the site, and will specifically inspect storage areas prior to exiting site. Specific prevention and control measures on the site will be employed as follows:

Petroleum Products

All on-site vehicles will be monitored for leaks and will receive preventive maintenance to reduce the chance of leakage. Equipment and vehicles should be stored on impervious surfaces to manage spills where practical. Petroleum products will be stored in tightly sealed containers that are clearly labeled. Any asphalt substances used on-site will be applied according to manufacturer's recommendations. Storage facilities shall be located as far as practical from private residences, business, and public Right-of-Ways. Storage shall be located in an isolated location, where practical, and in accordance with all federal, state, and local regulations. **No vehicle maintenance, handling, or storage of petroleum products will occur within 100 feet of a wetland, waterway, or drainage facility.**

Hazardous Substances (Paints, Solvents, etc)

All containers will be tightly sealed and stored when not required for use. Excess materials will not be discharged to the storm sewer system, buried onsite, or disposed of in any other inappropriate fashion; but will be properly disposed according to manufacturer's instructions and/or state and local regulations (whichever is more stringent). **No storage will occur within 100 feet of a wetland, waterway, or onsite drainage facility.**

Fertilizers

Fertilizer will be applied per NYS Law and only in the minimum amounts recommended by the manufacturer. Once applied, the fertilizer will be worked into the soil to limit exposure to storm runoff and wind. Storage will be in a covered shed, and the contents of any partially used bags will be transferred into a sealable, plastic bin to avoid spills. **No fertilizer storage shall occur within 100 feet of a wetland, waterway, or onsite drainage facility.**

Debris & Litter Control

The Contractor shall provide covered dumpsters onsite and be placed in practical locations to promote use by all parties; this location should not interfere with site activities, ingress, or egress. Debris and litter shall be managed and placed in the onsite dumpsters to minimize unintended transport by unintended construction efforts or weather conditions. This will reduce litter accumulation and improve worker safety and aesthetics in and around the project site. Dumpsters shall be emptied regularly by a licensed contractor to prevent overfilling and unsightly conditions and disposed of in accordance with federal, state, and local environmental regulations. All construction waste shall be placed in dumpsters following the completion of construction. No trash or construction waste will be buried onsite. No construction materials shall be stored for extended period's onsite, except for those to be used for construction taking place within a reasonable and practical time frame.

Concrete Washout

Concrete trucks will not be allowed to wash out or discharge surplus concrete or drum wash water within 100 feet of a wetland, waterway, or into any drainage structure already installed. A specific concrete washout location will be identified by the superintendent and will be relocated as appropriate to remain practical as the project is phased.

Trucking Management (Dust & Sediment Control)

Concrete trucks and other construction vehicles shall only leave the project site where directed. A stabilized construction entrance shall be installed and maintained at the specified entrance/exit location(s). The length of the stabilization blanket shall be extended if trucks leaving the site track sediment onto public Rights-of-Way. Crushed stone, as specified, shall be re-applied as necessary, and when directed in inspection reports, conducted immediately. A truck wash location shall be implemented and maintained, as necessary.

VII. OPERATION AND MAINTENANCE PLAN

Below is a summary of basic maintenance requirements associated to construction and ongoing activity. The site specific, operation and maintenance plan can be found in the Appendix of this report.

MAINTENANCE PLAN DURING CONSTRUCTION

During construction, the contractor is responsible for maintaining all permanent stormwater mitigation features including catch basins, pipes and systems as well as temporary measures including silt fence, construction entrances, and sediment traps. In addition, orange construction fence shall be installed along the wetlands/buffer areas to identify and protect necessary existing environmental features. Maintenance records should be kept identifying date and activity, at a minimum.

LONG-TERM OPERATION & MAINTENANCE

After construction is complete, the property owner shall be responsible for the maintenance of the proposed stormwater mitigation features, including catch basins, drain/yard inlets, pipes, swales, and subsurface chambers. A complete Operation & Maintenance Plan is included within the Appendix of this report that details the inspection and maintenance requirements for each stormwater mitigation feature. Records shall be retained for a minimum of 5-years and shall be provided to the Municipal Stormwater Manager annually.

Lastly, the owner of a post-construction stormwater management practice shall erect or post, in the immediate vicinity of the stormwater management practice, a conspicuous and legible sign as directed by section 3.5 of the NYSSMDM. The sign should read:

STORMWATER MANAGEMENT PRACTICE – (Type of Practice)
Project Identification – SPDES Permit # NYR _ _ _ _ _ _
Must Be Maintained In Accordance With O&M Plan
DO NOT REMOVE OR ALTER

VIII. SUMMARY OF PROPOSED STORMWATER IMPROVEMENTS

Mitigation for peak flow and water quality/runoff reduction benefits is achieved through the series of proposed bioretention areas, grass swales, and alternative SMPs for pre-treatment. The design utilizes practices that help maintain the existing hydrology.

Channel Protection Volume, Overbank Flooding, and Extreme Storm conditions have been alleviated via runoff reduction techniques, and above ground facilities throughout the site.

IX. CONCLUSION

As the proposed storm water pollution prevention plan provides reductions in peak flows for all required design storms at the selected design points studied, and runoff reduction/water quality mitigation meet the applicable standards, there should be no adverse impacts due to storm water, on-site or off-site, as a result of the proposed development.

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APPENDIX 1

WATERSHED MAPS

TOTAL DISTURBANCE AREA = 13.70

1. THE APPLICANT AND THE APPLICANT'S CONTRACTOR SHALL ATTEND A PRE-CONSTRUCTION MEETING WITH REPRESENTATIVES FROM THE TOWN BUILDING DEPARTMENT, HIGHWAY DEPARTMENT, ENGINEERS AND ANY OTHER PARTIES DEEMED NECESSARY TO REVIEW ALL PROTOCOLS, BONDING REQUIREMENTS, AGREEMENTS AND THE SEQUENCE AND SCHEDULING OF THE WORK BEING UNDERTAKEN, AS APPLICABLE.
2. THE CONTRACTOR SHALL INSTALL CONSTRUCTION ENTRANCES AS SHOWN ON THE PLANS, OR AS AGREED UPON.
3. THE CONTRACTOR SHALL EXCAVATE SEDIMENT BASINS 1-A AND 3-A IN ADVANCE OF PHASE DISTURBANCE ACTIVITIES. SEDIMENT BASIN 3-A SHALL BE ACCESSED FROM THE CONSTRUCTION ENTRANCE OFF PURDY AVENUE. THE CONTRACTOR SHOULD STABILIZE THE SLOPES OF EACH BASIN AS SOON AS PRACTICAL WITH SLOPE STABILIZATION MATTING TO MEET STABILIZATION REQUIREMENTS. THE CONTRACTOR SHALL INSTALL THE OUTLETS FOR EACH SEDIMENT BASIN IN ACCORDANCE TO NYSDEC STANDARDS AND REGULATIONS.
4. CONTRACTOR SHALL CLEAR EXISTING VEGETATION, INSTALL SILT FENCE, TEMPORARY SEDIMENT TRAPS & BASINS, TEMPORARY SWALES AND ORANGE CONSTRUCTION FENCE AS SHOWN ON THE EROSION AND SEDIMENT CONTROL PLAN. ORANGE CONSTRUCTION FENCE IS AN ACCEPTABLE ALTERNATIVE TO SILT FENCE TO DELINEATE WORK LIMITS UPSTREAM OF DISTURBANCE AREAS. CONTRACTOR TO CONSTRUCT ADDITIONAL EROSION CONTROL MEASURES AS NEEDED TO CONTROL SEDIMENT LADEN RUNOFF THROUGHOUT THE LIFE OF THE PROJECT. CONSTRUCTION OF EROSION CONTROL MEASURES TO BE IN ACCORDANCE WITH NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION STANDARDS (BLUE BOOK). TREES TO REMAIN SHALL BE CLEARLY IDENTIFIED AND PROTECTED FROM DAMAGE.
5. THE CONTRACTOR SHALL CLEAR AND GRUB THE EXISTING VEGETATION FOR THE REMAINDER OF THE APPLICABLE PHASE. ALL EXISTING SITE IMPROVEMENTS AS CALLED OUT ON THE DEMOLITION PLAN AND/OR DIRECTED BY DESIGNATED REPRESENTATIVES, SHALL BE REMOVED WITHIN THE CONSTRUCTION LIMITS.
6. EXCAVATED MATERIALS THROUGHOUT THE SITE SHALL BE STOCKPILED AT DESIGNATED LOCATIONS OR REMOVED IN AN ORGANIZED FASHION KEEPING ALL TEMPORARY SWALES, SEDIMENT BASINS AND ROADWAYS CLEAR OF DEBRIS. THE STOCKPILE AREAS SHALL BE CORDONED OFF WITH SILT FENCE PER THE APPROPRIATE SPECIFICATIONS AND DETAILS. THE OPERATOR SHALL INITIATE STABILIZATION MEASURES AS SOON AS PRACTICAL IN PORTIONS OF THE SITE WHERE CONSTRUCTION ACTIVITIES HAVE TEMPORARILY OR PERMANENTLY CEASED, BUT IN NO CASE MORE THAN (14) DAYS AFTER THE CONSTRUCTION ACTIVITY IN THAT PORTION OF THE SITE HAS TEMPORARILY OR PERMANENTLY CEASED.
   a. 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). STABILIZATION SHALL BE MAINTAINED PER SPDES GENERAL PERMIT FOR STORMWATER RUNOFF FROM CONSTRUCTION ACTIVITY, GP-0-15-002 OR AS AMENDED.
7. CONTRACTOR SHALL INSTALL ALL UTILITIES (SEWER, WATER, AND DRAINAGE) ASSOCIATED TO EACH PHASE AS OUTLINE ON THE PLAN DISTURBANCE LIMITS. ALL INVERTS SHALL BE PLUGGED AND MAINTAINED THROUGHOUT THE CONSTRUCTION PROCESS. STORM INLET SEDIMENT TRAPS SHALL BE INSTALLED ON ALL DRAINAGE STRUCTURES, AS IDENTIFIED ON THE PLANS OR AN ACCEPTABLE ALTERNATIVE FOUND IN THE NYSDEC "BLUE BOOK".
8. CONTRACTOR SHALL INSTALL CURBING, SIDEWALKS, BASE COURSE AND BUILDING PADS AS SOON AS PRACTICAL TO STABILIZE IMPERVIOUS AREAS.
9. AFTER COMPLETION OF BUILDING EXTERIOR, GRADE AND SPREAD TOPSOIL ON ALL LAWN AREAS AND SEED. MAINTAIN ALL SEEDED AND PLANTED AREAS TO INSURE A VIABLE STABILIZED VEGETATIVE COVER.
10. THE PROJECT SITE MUST MEET FINAL STABILIZATION CRITERIA PRIOR TO REMOVING ALL EROSION AND SEDIMENT CONTROL DEVICES AND CLOSING OUT THE PROJECT. LITTER AND CONSTRUCTION DEBRIS SHALL BE REMOVED AS PRACTICAL THROUGHOUT THE LIFE OF THE PROJECT.
   a. 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.
11. ADDITIONAL EROSION CONTROL MEASURES SHALL BE INSTALLED, AS MAY BE NECESSARY, REQUIRED AND/OR REQUESTED BY AUTHORITIES, TO PREVENT THE INCIDENTAL DISCHARGE OF SILT LADEN RUNOFF FROM ENTERING A WATER COURSE OR A DRAINAGE SYSTEM.
12. UPON FINAL STABILIZATION BEING MET, CONTRACTOR SHALL CLEAR DRAINAGE PIPES AND STRUCTURE OF ANY SEDIMENT WHICH MAY HAVE ACCUMULATED, REMOVE PLUGS, AND COMMISSION THE SYSTEM.
13. THE GENERAL PERMIT FOR STORMWATER DISCHARGE FROM CONSTRUCTION ACTIVITIES STATES THIS IS UNLAWFUL FOR ANY PERSON TO CAUSE OR CONTRIBUTE TO A VIOLATION OF WATER QUALITY STANDARDS.

NOTES
1. THE PROPOSED TWO STORY COMMERCIAL CONSTRUCTION AREA IS NOT PART OF THIS PHASE.
2. A FIVE (5) ACRE DISTURBANCE WAIVER WILL BE REQUIRED FROM THE TOWN.

DISTURBANCE AREA = 8.20 ACRES
TEMP STORAGE REQUIRED = 3,600 CF PER ACRE DISTURBED = 29,520 CF
TEMP STORAGE PROVIDED = 33,440 CF (3 SEDIMENT TRAPS)

THIS PHASE INCLUDES CONSTRUCTION OF BUILDING 1, ROAD A, PARKING AREAS, ASSOCIATED UTILITIES AND CONSTRUCTION OF BIORETENTION BASINS 1-A & 3-A. SEE PLAN FOR LIMIT OF PHASE DISTURBANCE.

1. CHECK DAMS AND TEMPORARY SWALES SHALL BE INSTALLED ALONG ROAD A TO MINIMIZE FLOW OF RUNOFF.
2. CONTRACTOR SHALL INSTALL THE RETAINING WALL SOUTH OF PROPOSED ROAD A.
3. CONTRACTOR SHALL TIE INTO EXISTING WATERMAIN IN NY ROUTE 9W.
4. CONTRACTOR SHALL TIE INTO EXISTING SEWER MANHOLE IN NY ROUTE 9W.
5. CONTRACTOR SHALL BEGIN CONSTRUCTION ON PROPOSED BUILDING 1.
6. THE BOTTOM OF SEDIMENT BASINS 1-A AND 3-A WILL BE USED AS TEMPORARY SEDIMENT BASINS AND WILL REMAIN OPEN SOIL TILL COMPLETION OF PHASE III.
7. PRIOR TO BEGINNING THE NEXT PHASE, ALL AREAS OF PHASE I SHALL MEET FINAL STABILIZATION REQUIREMENTS. NOTE THAT THE BOTTOM OF SEDIMENT BASINS 1-A AND 3-A WILL REMAIN OPEN SOIL TO SERVE AS TEMPORARY SEDIMENT TRAPS FOR UPCOMING PHASES.

DISTURBANCE AREA = 2.99 ACRES (INCLUDES AREA OF SEDIMENT BASINS 1-A & 3-A)
TEMP STORAGE REQUIRED = 3,600 CF PER ACRE DISTURBED = 10,764 CF
TEMP STORAGE PROVIDED = 13,000 CF

THIS PHASE INCLUDES CONSTRUCTION OF BUILDING 2, ROAD B, PARKING AREAS, ASSOCIATED UTILITIES AND AMENITIES. SEE PLAN FOR LIMIT OF PHASE DISTURBANCE.

1. CONTRACTOR SHALL INSTALL TEMPORARY SEDIMENT BASIN 'B' IN THE AREA BEHIND THE PROPOSED BUILDING. A PIPE SLOPE DRAIN SHALL BE INSTALLED TO DISCHARGE WATER INTO SEDIMENT BASIN 3-A.
2. CONTRACTOR SHALL TIE INTO EXISTING WATERMAIN IN PURDY AVENUE.
3. CONTRACTOR SHALL BEGIN CONSTRUCTION ON PROPOSED BUILDING 2.
4. PRIOR TO BEGINNING THE NEXT PHASE, ALL AREAS OF PHASE II SHALL MEET FINAL STABILIZATION. NOTE THAT THE BOTTOM OF SEDIMENT BASINS 1-A AND 3-A WILL REMAIN OPEN SOIL TO SERVE AS TEMPORARY SEDIMENT TRAPS FOR UPCOMING PHASES.

DISTURBANCE AREA = 2.63 ACRES (INCLUDES AREA OF SEDIMENT BASINS 1-A & 3-A)
TEMP STORAGE REQUIRED = 3,600 CF PER ACRE DISTURBED = 9,468 CF
TEMP STORAGE PROVIDED = 10,200 CF

PHASE 3 INCLUDES CONSTRUCTION OF BUILDING 3, ROADS C & D, PARKING AREAS, ASSOCIATED UTILITIES AND AMENITIES. SEE PLAN FOR LIMIT OF PHASE DISTURBANCE.

1. CONTRACTOR SHALL INSTALL TEMPORARY SEDIMENT BASIN 'E' IN THE SOUTHEAST CORNER OF BUILDING 3.
2. CONTRACTOR SHALL BEGIN CONSTRUCTION ON PROPOSED BUILDING 3.
3. PRIOR TO BEGINNING THE NEXT PHASE, ALL AREAS OF PHASE III SHALL MEET FINAL STABILIZATION. SEDIMENT BASINS 1-A AND 3-A WILL BE COMPLETED AS BIORETENTION AREAS PER THE DESIGN PLANS AND DETAILS.

DISTURBANCE AREA = 1.64 ACRES
TEMP STORAGE REQUIRED = 3,600 CF PER ACRE DISTURBED = 5,904 CF
TEMP STORAGE PROVIDED = 6,740 CF (2 SEDIMENT TRAPS)

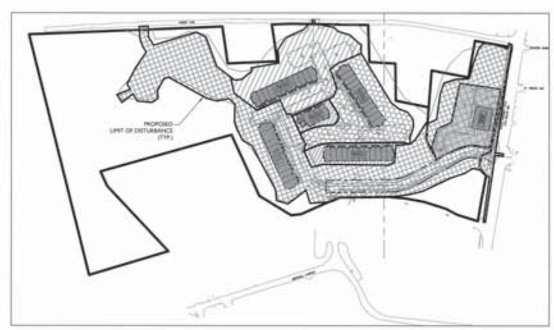
THIS PHASE INCLUDES CONSTRUCTION OF BUILDINGS 4 & 5, THE CLUBHOUSE, ASSOCIATED UTILITIES AND AMENITIES. SEE PLAN FOR LIMIT OF PHASE DISTURBANCE.

1. CONTRACTOR SHALL INSTALL TEMPORARY SEDIMENT BASIN 'C-1' AND 'C-2' LOCATED WEST OF THE PROPOSED BUILDINGS.
2. CONTRACTOR SHALL BEGIN CONSTRUCTION ON PROPOSED BUILDING 4 AND BUILDING 5 WITH ATTACHED CLUBHOUSE.
3. BY COMPLETION OF PHASE IV, THE ENTIRE RESIDENTIAL COMPONENT OF THE DEVELOPMENT SHALL BE FULLY STABILIZED AND BIORETENTION AREAS SHALL BE FULLY CONSTRUCTED.

DISTURBANCE AREA = 1.16 ACRES
TEMP STORAGE REQUIRED = 3,600 CF PER ACRE DISTURBED = 4,176 CF
TEMP STORAGE PROVIDED = 7,200 CF

THIS PHASE INCLUDES CONSTRUCTION OF THE COMMERCIAL BUILDING, ASSOCIATED UTILITIES AND AMENITIES. SEE PLAN FOR LIMIT OF PHASE DISTURBANCE.

1. CONTRACTOR SHALL INSTALL TEMPORARY SEDIMENT BASIN 'F' LOCATED SOUTH OF THE PROPOSED COMMERCIAL BUILDING.
2. CONTRACTOR SHALL INSTALL ALL RETAINING WALLS.
3. CONTRACTOR SHALL BEGIN CONSTRUCTION ON THE PROPOSED BUILDING.



PHASING PLAN
SCALE: 1" = 200'

PHASING LEGEND

PHASE I · PHASE II · PHASE III · PHASE IV · PHASE V

LEGEND FOR EROSION CONTROL DURING CONSTRUCTION

- CONSTRUCTION LIMIT LINE PER PHASE
- SILT FENCE
- STORM INLET SEDIMENT TRAP
- STABILIZED CONSTRUCTION ENTRANCE
- STONE OUTLET SEDIMENT TRAP
- TEMPORARY SWALE
- TEMPORARY SEDIMENT BASIN
- MATERIAL STOCKPILE
- CHECK DAM

THIS PLAN IS FOR EROSION CONTROL PURPOSES ONLY

SCALE: 1" = 60'

MASER CONSULTING P.A.

ANDREW B. FETHERSTON
NEW YORK LICENSED PROFESSIONAL ENGINEER - LICENSE NUMBER: 072555-1

PRELIMINARY SITE PLAN
FOR
BAYSIDE CONSTRUCTION

SECTION 109.1
BLOCK 4
LOT 29

TOWN OF MARLBOROUGH
COUNTY OF ULSTER
STATE OF NEW YORK

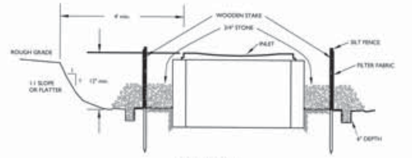
NEW WINDSOR OFFICE

SOIL EROSION & SEDIMENT CONTROL PLAN

12 of 21

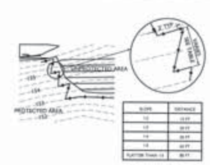
GENERAL SOIL EROSION AND SEDIMENT CONTROL NOTES

GENERAL SEEDING NOTES



STORM INLET SEDIMENT TRAP

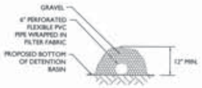
N.T.S.



SILT FENCE INSTALLATION

(WHEN NOT PARALLEL TO CONTOURS)

N.T.S.

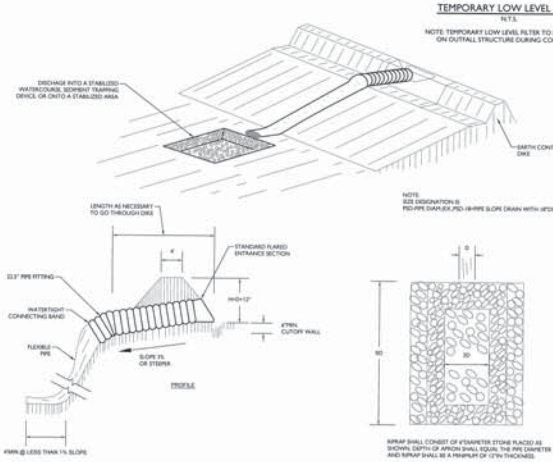


NOTE: FLEXIBLE PIPE TO BE MORTARED TO LOW LEVEL ORIFICE IN EACH DETENTION BASIN DURING CONSTRUCTION. PIPE TO BE REMOVED ONCE SITE IS STABILIZED.

TEMPORARY LOW LEVEL FILTER

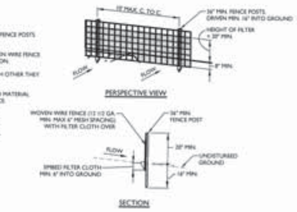
N.T.S.

NOTE: TEMPORARY LOW LEVEL FILTER TO BE CONSTRUCTED ON OUTFALL STRUCTURE DURING CONSTRUCTION



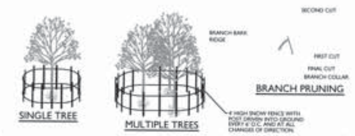
PIPE SLOPE DRAIN

N.T.S.



WIRE REINFORCED SILT FENCE

N.T.S.



SINGLE TREE

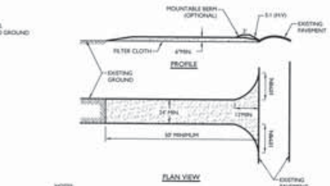
MULTIPLE TREES

BRANCH PRUNING

TEMPORARY TREE PROTECTION DETAIL

N.T.S.

TREE PROTECTION NOTES:



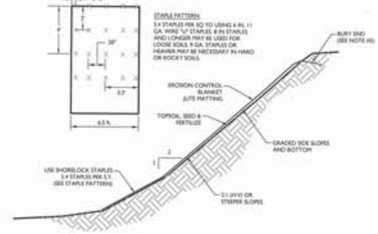
PROFILE

PLAN VIEW

STABILIZED CONSTRUCTION ENTRANCE

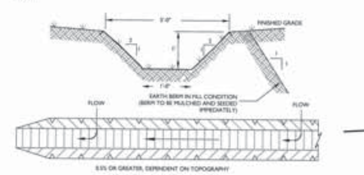
N.T.S.

SOIL STOCKPILE



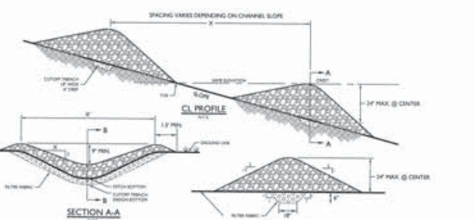
SLOPE STABILIZATION DETAIL (FINAL STABILIZATION)

N.T.S.



TEMPORARY SWALE

N.T.S.



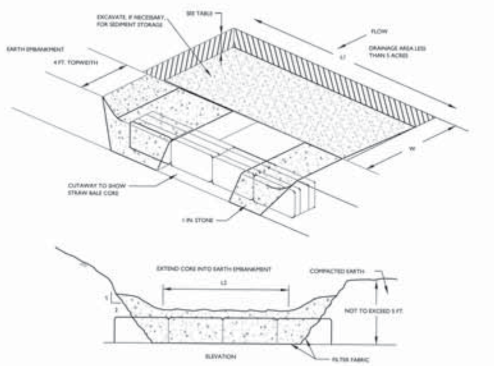
CL PROFILE

SECTION A-A

SECTION B-B

STONE CHECK DAM

N.T.S.



STONE OUTLET SEDIMENT TRAP

N.T.S.

STONE OUTLET SEDIMENT TRAP TABLE

SEDIMENT TRAP	DRAINAGE AREA	AREA (W X L1)	DEPTH (FT.)	VOLUME REQ'D (C.F.)	VOLUME PROVIDED (C.F.)	WEIR LENGTH (L2)
A	2.83 AC.	45' X 300'	2.0 FT.	10,188 C.F.	32,400 C.F.	4.0 FT.
B	2.99 AC.	30' X 100'	4.0 FT.	10,764 C.F.	12,000 C.F.	4.0 FT.
C-1	1.30 AC.	32' X 48'	3.5 FT.	4,680 C.F.	5,376 C.F.	4.0 FT.
C-2	0.34 AC.	11' X 31'	4.0 FT.	1,224 C.F.	1,364 C.F.	4.0 FT.
D	0.90 AC.	32' X 48'	2.5 FT.	3,240 C.F.	3,840 C.F.	4.0 FT.
E	2.63 AC.	30' X 85'	4.0 FT.	9,468 C.F.	10,200 C.F.	4.0 FT.
F	1.92 AC.	30' X 60'	4.0 FT.	6,912 C.F.	7,200 C.F.	4.0 FT.
G	3.07 AC.	80' X 135'	2.0 FT.	11,052 C.F.	16,200 C.F.	4.0 FT.

THIS PLAN IS FOR EROSION CONTROL PURPOSES ONLY

MASER CONSULTING P.A.

ANDREW B. FETHERSTON

PRELIMINARY SITE PLAN

FOR

BAYSIDE CONSTRUCTION

SECTION 109.1
BLOCK 4
LOT 29

TOWN OF MARLBOROUGH
COUNTY OF ULSTER
STATE OF NEW YORK

NEW WINDSOR OFFICE

SOIL EROSION & SEDIMENT CONTROL DETAILS

13 of 21

APPENDIX 2

NORTHEAST CLIMATE CENTER RAINFALL PRECIPITATION DATA

Extreme Precipitation Tables

Northeast Regional Climate Center

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

Smoothing	Yes
State	New York
Location	
Longitude	73.970 degrees West
Latitude	41.610 degrees North
Elevation	0 feet
Date/Time	Thu, 15 Dec 2016 19:10:51 -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	0.61	0.80	1.00	1.24	**1yr**	0.86	1.17	1.43	1.75	2.14	2.61	2.96	**1yr**	2.31	2.84	3.30	3.97	4.58	**1yr**
2yr	0.38	0.59	0.73	0.97	1.21	1.51	**2yr**	1.05	1.40	1.73	2.13	2.59	3.15	3.56	**2yr**	2.79	3.42	3.92	4.62	5.25	**2yr**
5yr	0.45	0.70	0.88	1.18	1.51	1.90	**5yr**	1.30	1.74	2.18	2.68	3.26	3.93	4.49	**5yr**	3.48	4.32	4.95	5.72	6.47	**5yr**
10yr	0.51	0.80	1.01	1.37	1.78	2.26	**10yr**	1.54	2.04	2.60	3.19	3.87	4.65	5.36	**10yr**	4.12	5.15	5.91	6.72	7.57	**10yr**
25yr	0.60	0.95	1.21	1.67	2.23	2.84	**25yr**	1.92	2.52	3.29	4.03	4.87	5.81	6.77	**25yr**	5.15	6.51	7.49	8.33	9.34	**25yr**
50yr	0.68	1.09	1.40	1.96	2.63	3.39	**50yr**	2.27	2.97	3.92	4.81	5.79	6.89	8.09	**50yr**	6.09	7.78	8.96	9.81	10.95	**50yr**
100yr	0.77	1.25	1.62	2.29	3.12	4.04	**100yr**	2.70	3.49	4.68	5.74	6.89	8.16	9.66	**100yr**	7.22	9.29	10.73	11.56	12.85	**100yr**
200yr	0.88	1.44	1.87	2.68	3.71	4.82	**200yr**	3.20	4.11	5.59	6.84	8.20	9.67	11.55	**200yr**	8.56	11.11	12.86	13.61	15.08	**200yr**
500yr	1.07	1.76	2.29	3.33	4.66	6.08	**500yr**	4.02	5.11	7.07	8.64	10.32	12.11	14.64	**500yr**	10.72	14.08	16.34	16.92	18.65	**500yr**

Lower Confidence Limits

	5min	10min	15min	30min	60min	120min		1hr	2hr	3hr	6hr	12hr	24hr	48hr		1day	2day	4day	7day	10day	
1yr	0.28	0.44	0.53	0.71	0.88	1.05	**1yr**	0.76	1.03	1.22	1.55	1.96	2.31	2.45	**1yr**	2.05	2.36	2.91	3.43	4.04	**1yr**
2yr	0.37	0.57	0.70	0.95	1.17	1.39	**2yr**	1.01	1.36	1.57	2.01	2.54	3.06	3.46	**2yr**	2.71	3.33	3.78	4.51	5.13	**2yr**
5yr	0.42	0.64	0.80	1.09	1.39	1.62	**5yr**	1.20	1.58	1.84	2.37	2.95	3.66	4.15	**5yr**	3.24	3.99	4.60	5.31	6.06	**5yr**
10yr	0.46	0.71	0.88	1.23	1.59	1.81	**10yr**	1.38	1.77	2.06	2.65	3.30	4.15	4.75	**10yr**	3.67	4.57	5.28	5.98	6.86	**10yr**
25yr	0.54	0.82	1.01	1.45	1.91	2.09	**25yr**	1.64	2.04	2.38	2.97	3.81	4.90	5.69	**25yr**	4.33	5.47	6.30	7.02	8.11	**25yr**
50yr	0.60	0.91	1.14	1.63	2.20	2.32	**50yr**	1.90	2.27	2.68	3.30	4.27	5.56	6.53	**50yr**	4.92	6.28	7.19	7.91	9.21	**50yr**
100yr	0.68	1.02	1.28	1.85	2.54	2.59	**100yr**	2.19	2.54	3.01	3.67	4.80	6.30	7.49	**100yr**	5.57	7.20	8.22	8.89	10.47	**100yr**
200yr	0.77	1.16	1.47	2.12	2.96	2.89	**200yr**	2.55	2.82	3.39	4.10	5.38	7.11	8.60	**200yr**	6.30	8.27	9.37	9.99	11.90	**200yr**
500yr	0.92	1.37	1.76	2.56	3.64	3.35	**500yr**	3.14	3.28	3.98	4.75	6.29	8.38	10.33	**500yr**	7.41	9.93	11.17	11.64	14.14	**500yr**

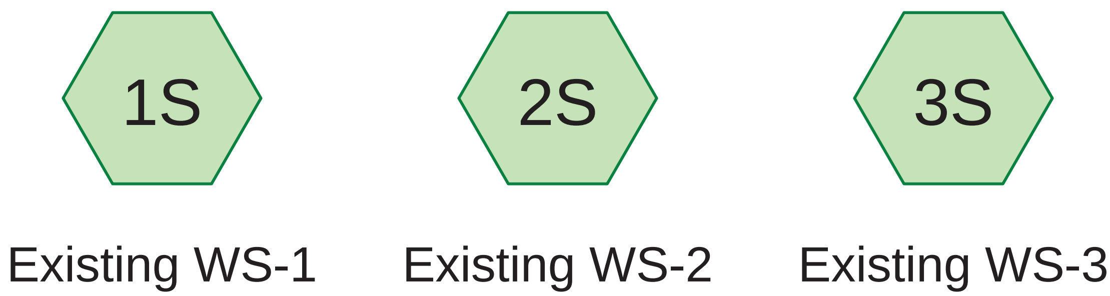
Upper Confidence Limits

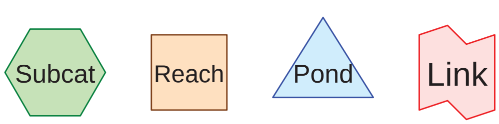
	5min	10min	15min	30min	60min	120min		1hr	2hr	3hr	6hr	12hr	24hr	48hr		1day	2day	4day	7day	10day	
1yr	0.35	0.54	0.67	0.89	1.10	1.33	**1yr**	0.95	1.30	1.50	1.92	2.39	2.87	3.22	**1yr**	2.54	3.09	3.65	4.24	4.94	**1yr**
2yr	0.40	0.62	0.76	1.03	1.26	1.52	**2yr**	1.09	1.48	1.72	2.22	2.77	3.28	3.68	**2yr**	2.90	3.54	4.09	4.76	5.39	**2yr**
5yr	0.49	0.76	0.94	1.29	1.64	1.94	**5yr**	1.41	1.89	2.23	2.85	3.61	4.22	4.86	**5yr**	3.74	4.67	5.32	6.17	6.90	**5yr**
10yr	0.58	0.89	1.11	1.55	2.00	2.35	**10yr**	1.72	2.30	2.72	3.50	4.42	5.17	6.01	**10yr**	4.58	5.78	6.56	7.52	8.33	**10yr**
25yr	0.73	1.10	1.37	1.96	2.58	3.05	**25yr**	2.23	2.98	3.57	4.73	5.80	6.78	7.96	**25yr**	6.00	7.66	8.70	9.82	10.71	**25yr**
50yr	0.86	1.31	1.63	2.34	3.15	3.72	**50yr**	2.71	3.64	4.38	5.85	7.11	8.32	9.87	**50yr**	7.36	9.50	10.79	12.02	12.96	**50yr**
100yr	1.02	1.54	1.93	2.79	3.83	4.55	**100yr**	3.30	4.45	5.37	7.25	8.73	10.22	12.24	**100yr**	9.05	11.77	13.40	14.74	15.69	**100yr**
200yr	1.21	1.82	2.30	3.33	4.65	5.54	**200yr**	4.01	5.42	6.60	8.97	10.71	12.56	15.17	**200yr**	11.12	14.58	16.66	18.12	18.99	**200yr**
500yr	1.52	2.26	2.91	4.23	6.02	7.22	**500yr**	5.19	7.06	8.66	11.92	14.05	16.52	20.17	**500yr**	14.62	19.40	22.28	23.82	24.46	**500yr**

Powered by ACIS

APPENDIX 3

HYDROCAD MODEL OUTPUT





Routing Diagram for 170915_Bayside

Prepared by Maser Consulting PA, Printed 9/21/2017

Time span=0.00-30.00 hrs, dt=0.05 hrs, 601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Existing WS-1 Runoff Area=4.860 ac 9.09% Impervious Runoff Depth=0.44"
Flow Length=90' Slope=0.0610 '/' Tc=12.7 min CN=68 Runoff=1.44 cfs 0.177 af

Subcatchment 2S: Existing WS-2 Runoff Area=4.872 ac 3.65% Impervious Runoff Depth=0.47"
Flow Length=880' Tc=34.8 min CN=69 Runoff=1.12 cfs 0.192 af

Subcatchment 3S: Existing WS-3 Runoff Area=18.961 ac 3.86% Impervious Runoff Depth=0.67"
Flow Length=969' Tc=34.0 min CN=74 Runoff=7.10 cfs 1.060 af

Total Runoff Area = 28.693 ac Runoff Volume = 1.429 af Average Runoff Depth = 0.60"
95.29% Pervious = 27.341 ac 4.71% Impervious = 1.352 ac

Summary for Subcatchment 1S: Existing WS-1

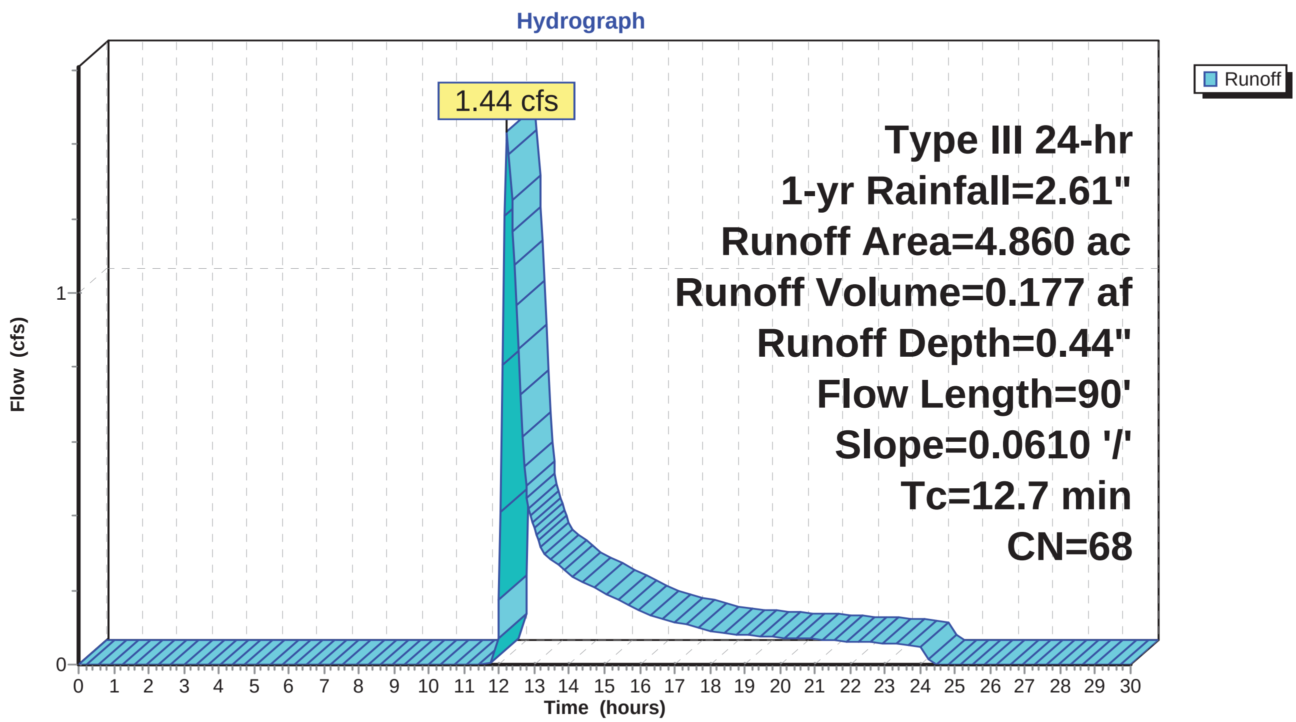
Runoff = 1.44 cfs @ 12.22 hrs, Volume= 0.177 af, Depth= 0.44"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 1-yr Rainfall=2.61"

Area (ac)	CN	Description
0.442	98	Paved parking, HSG C
0.653	30	Woods, Good, HSG A
3.162	70	Woods, Good, HSG C
0.603	79	50-75% Grass cover, Fair, HSG C
4.860	68	Weighted Average
4.418		90.91% Pervious Area
0.442		9.09% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.7	90	0.0610	0.12		**Sheet Flow, Sheet Flow Woods** Woods: Light underbrush n= 0.400 P2= 3.15"

Subcatchment 1S: Existing WS-1



Summary for Subcatchment 2S: Existing WS-2

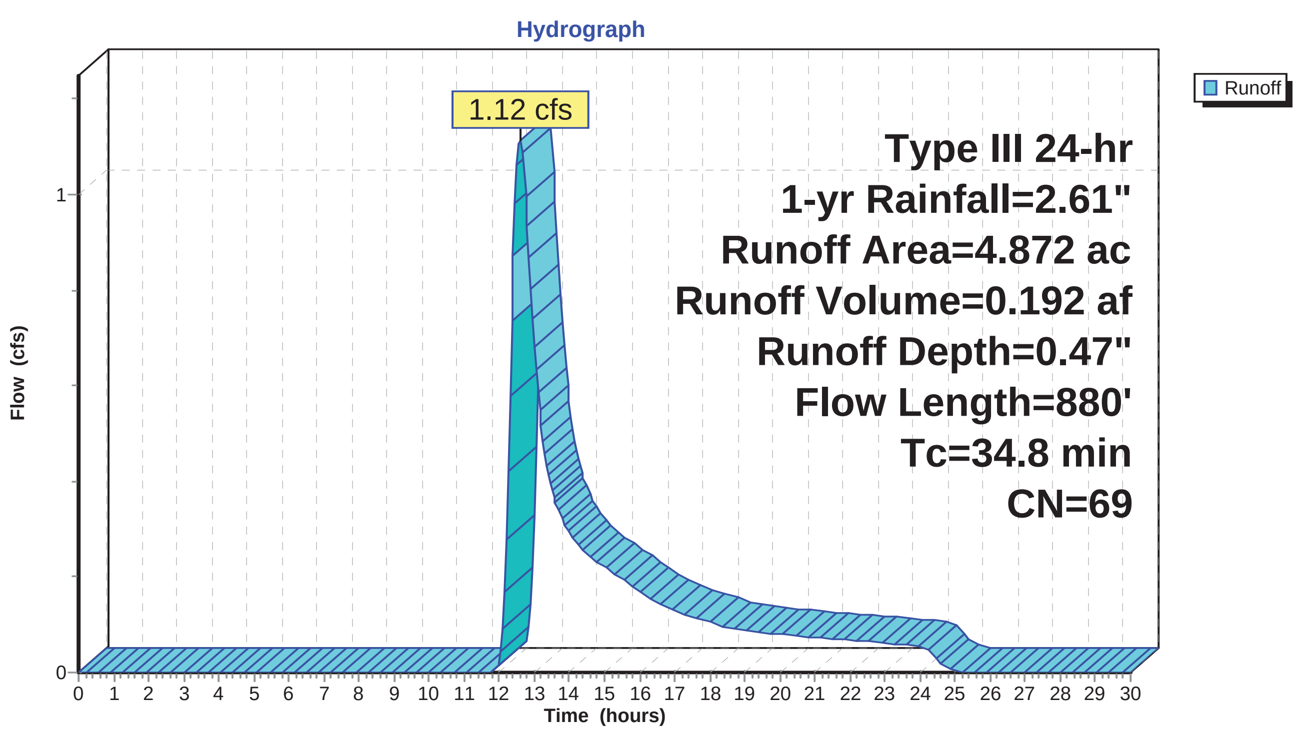
Runoff = 1.12 cfs @ 12.59 hrs, Volume= 0.192 af, Depth= 0.47"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 1-yr Rainfall=2.61"

Area (ac)	CN	Description
0.407	30	Woods, Good, HSG A
3.538	70	Woods, Good, HSG C
0.178	98	Paved parking, HSG C
0.749	79	50-75% Grass cover, Fair, HSG C
4.872	69	Weighted Average
4.694		96.35% Pervious Area
0.178		3.65% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
26.2	100	0.0124	0.06		**Sheet Flow, Sheet Flow** Woods: Light underbrush n= 0.400 P2= 3.15"
8.6	780	0.0907	1.51		**Shallow Concentrated Flow, Shallow** Woodland Kv= 5.0 fps
34.8	880	Total			

Subcatchment 2S: Existing WS-2



Summary for Subcatchment 3S: Existing WS-3

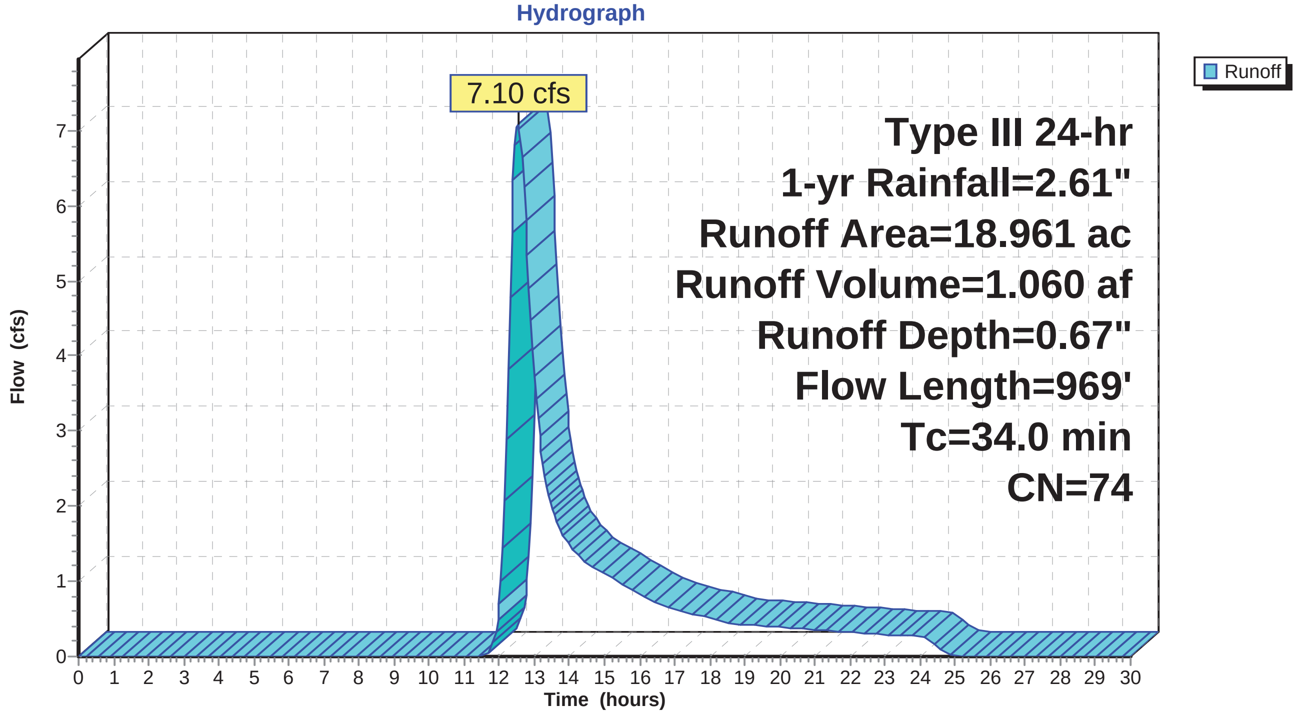
Runoff = 7.10 cfs @ 12.54 hrs, Volume= 1.060 af, Depth= 0.67"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 1-yr Rainfall=2.61"

Area (ac)	CN	Description
0.732	98	Paved parking, HSG D
0.593	70	Brush, Fair, HSG C
5.400	77	Brush, Fair, HSG D
9.929	70	Woods, Good, HSG C
0.931	77	Woods, Good, HSG D
1.237	79	50-75% Grass cover, Fair, HSG C
0.139	84	50-75% Grass cover, Fair, HSG D
18.961	74	Weighted Average
18.229		96.14% Pervious Area
0.732		3.86% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
25.7	100	0.0130	0.06		**Sheet Flow, Sheet flow** Woods: Light underbrush n= 0.400 P2= 3.15"
3.9	154	0.0176	0.66		**Shallow Concentrated Flow, Shallow Conc** Woodland Kv= 5.0 fps
4.4	715	0.0095	2.72	27.18	**Channel Flow, Wetland Channel** Area= 10.0 sf Perim= 11.0' r= 0.91' n= 0.050 Scattered brush, heavy weeds
34.0	969	Total			

Subcatchment 3S: Existing WS-3



Time span=0.00-30.00 hrs, dt=0.05 hrs, 601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Existing WS-1 Runoff Area=4.860 ac 9.09% Impervious Runoff Depth=1.63"
Flow Length=90' Slope=0.0610 '/' Tc=12.7 min CN=68 Runoff=7.10 cfs 0.662 af

Subcatchment 2S: Existing WS-2 Runoff Area=4.872 ac 3.65% Impervious Runoff Depth=1.71"
Flow Length=880' Tc=34.8 min CN=69 Runoff=4.97 cfs 0.693 af

Subcatchment 3S: Existing WS-3 Runoff Area=18.961 ac 3.86% Impervious Runoff Depth=2.09"
Flow Length=969' Tc=34.0 min CN=74 Runoff=24.46 cfs 3.300 af

Total Runoff Area = 28.693 ac Runoff Volume = 4.655 af Average Runoff Depth = 1.95"
95.29% Pervious = 27.341 ac 4.71% Impervious = 1.352 ac

Summary for Subcatchment 1S: Existing WS-1

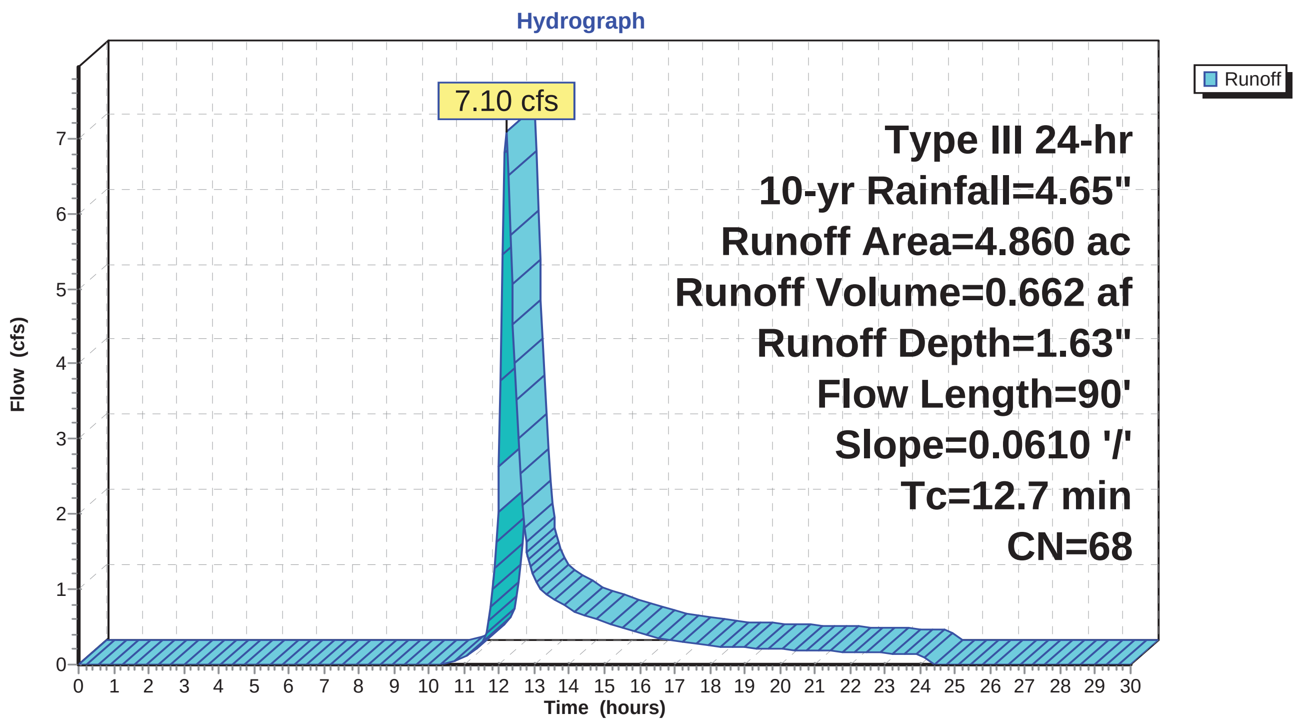
Runoff = 7.10 cfs @ 12.19 hrs, Volume= 0.662 af, Depth= 1.63"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Rainfall=4.65"

Area (ac)	CN	Description
0.442	98	Paved parking, HSG C
0.653	30	Woods, Good, HSG A
3.162	70	Woods, Good, HSG C
0.603	79	50-75% Grass cover, Fair, HSG C
4.860	68	Weighted Average
4.418		90.91% Pervious Area
0.442		9.09% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.7	90	0.0610	0.12		**Sheet Flow, Sheet Flow Woods** Woods: Light underbrush n= 0.400 P2= 3.15"

Subcatchment 1S: Existing WS-1



Summary for Subcatchment 2S: Existing WS-2

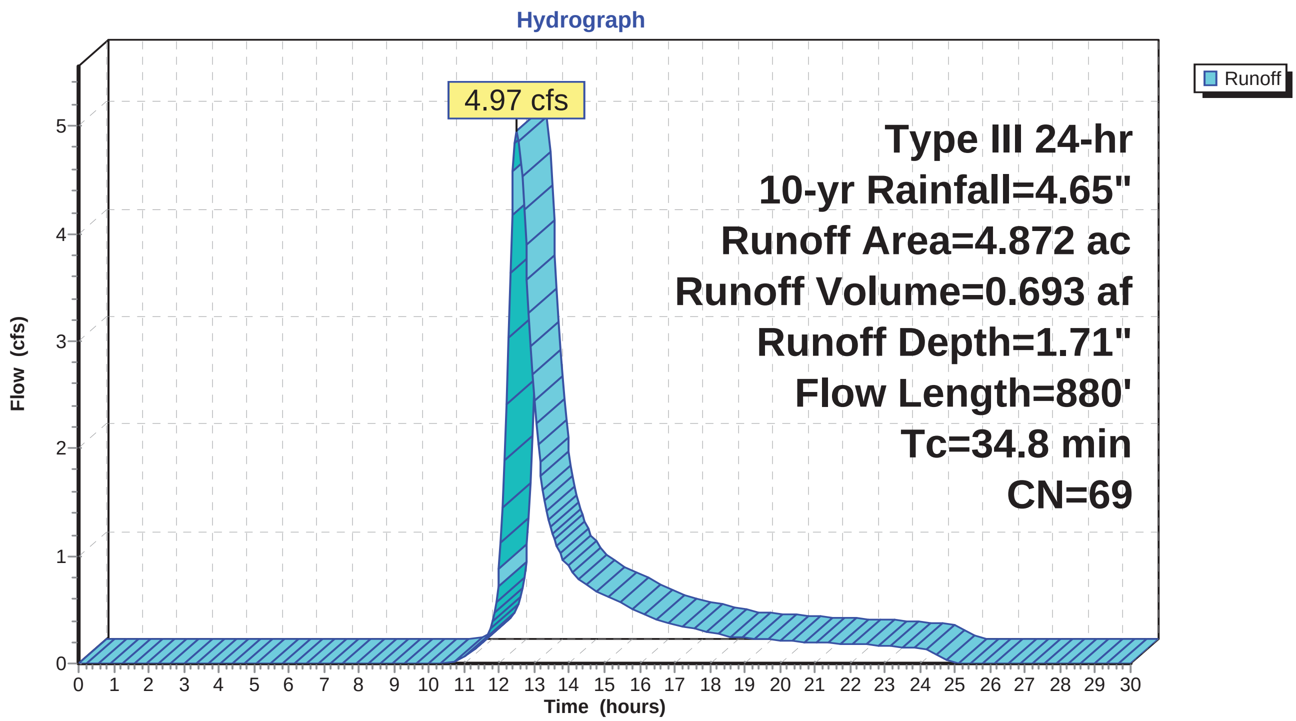
Runoff = 4.97 cfs @ 12.52 hrs, Volume= 0.693 af, Depth= 1.71"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Rainfall=4.65"

Area (ac)	CN	Description
0.407	30	Woods, Good, HSG A
3.538	70	Woods, Good, HSG C
0.178	98	Paved parking, HSG C
0.749	79	50-75% Grass cover, Fair, HSG C
4.872	69	Weighted Average
4.694		96.35% Pervious Area
0.178		3.65% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
26.2	100	0.0124	0.06		**Sheet Flow, Sheet Flow** Woods: Light underbrush n= 0.400 P2= 3.15"
8.6	780	0.0907	1.51		**Shallow Concentrated Flow, Shallow** Woodland Kv= 5.0 fps
34.8	880	Total			

Subcatchment 2S: Existing WS-2



Summary for Subcatchment 3S: Existing WS-3

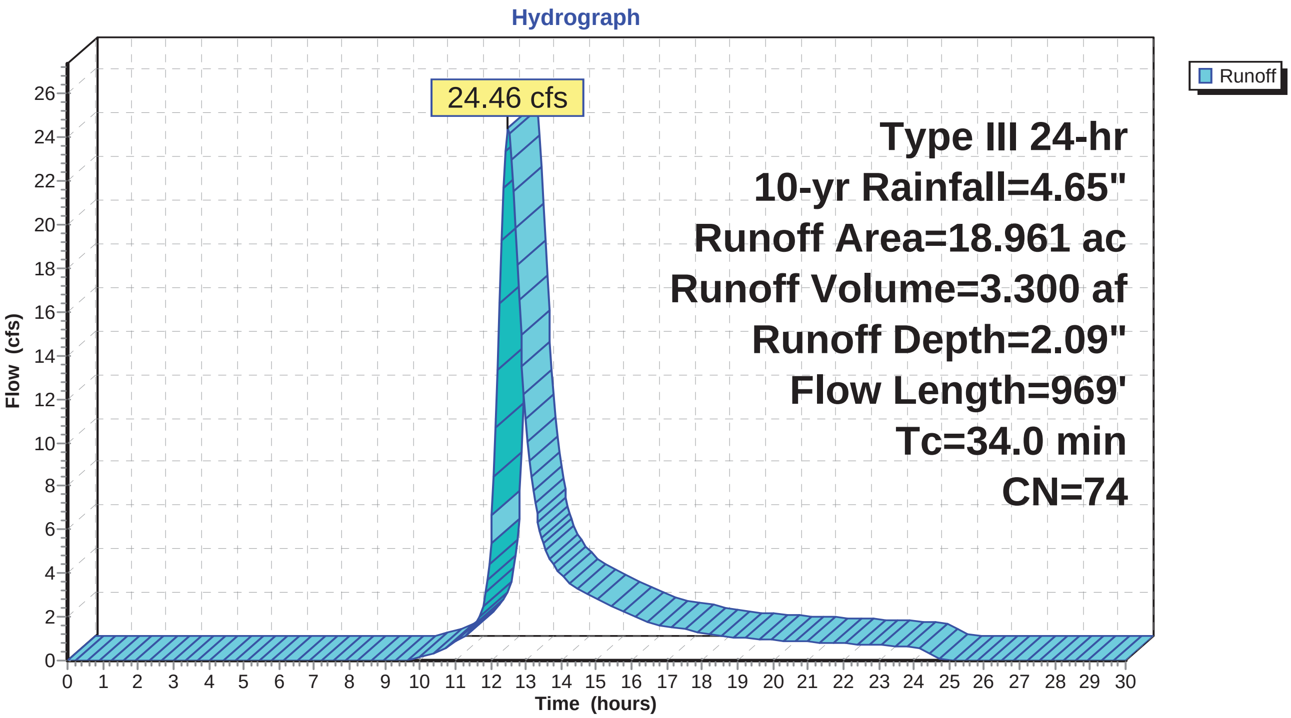
Runoff = 24.46 cfs @ 12.49 hrs, Volume= 3.300 af, Depth= 2.09"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Rainfall=4.65"

Area (ac)	CN	Description
0.732	98	Paved parking, HSG D
0.593	70	Brush, Fair, HSG C
5.400	77	Brush, Fair, HSG D
9.929	70	Woods, Good, HSG C
0.931	77	Woods, Good, HSG D
1.237	79	50-75% Grass cover, Fair, HSG C
0.139	84	50-75% Grass cover, Fair, HSG D
18.961	74	Weighted Average
18.229		96.14% Pervious Area
0.732		3.86% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
25.7	100	0.0130	0.06		**Sheet Flow, Sheet flow** Woods: Light underbrush n= 0.400 P2= 3.15"
3.9	154	0.0176	0.66		**Shallow Concentrated Flow, Shallow Conc** Woodland Kv= 5.0 fps
4.4	715	0.0095	2.72	27.18	**Channel Flow, Wetland Channel** Area= 10.0 sf Perim= 11.0' r= 0.91' n= 0.050 Scattered brush, heavy weeds
34.0	969	Total			

Subcatchment 3S: Existing WS-3



Time span=0.00-30.00 hrs, dt=0.05 hrs, 601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Existing WS-1 Runoff Area=4.860 ac 9.09% Impervious Runoff Depth=4.37"
Flow Length=90' Slope=0.0610 '/' Tc=12.7 min CN=68 Runoff=19.80 cfs 1.770 af

Subcatchment 2S: Existing WS-2 Runoff Area=4.872 ac 3.65% Impervious Runoff Depth=4.49"
Flow Length=880' Tc=34.8 min CN=69 Runoff=13.50 cfs 1.821 af

Subcatchment 3S: Existing WS-3 Runoff Area=18.961 ac 3.86% Impervious Runoff Depth=5.07"
Flow Length=969' Tc=34.0 min CN=74 Runoff=59.95 cfs 8.009 af

Total Runoff Area = 28.693 ac Runoff Volume = 11.601 af Average Runoff Depth = 4.85"
95.29% Pervious = 27.341 ac 4.71% Impervious = 1.352 ac

Summary for Subcatchment 1S: Existing WS-1

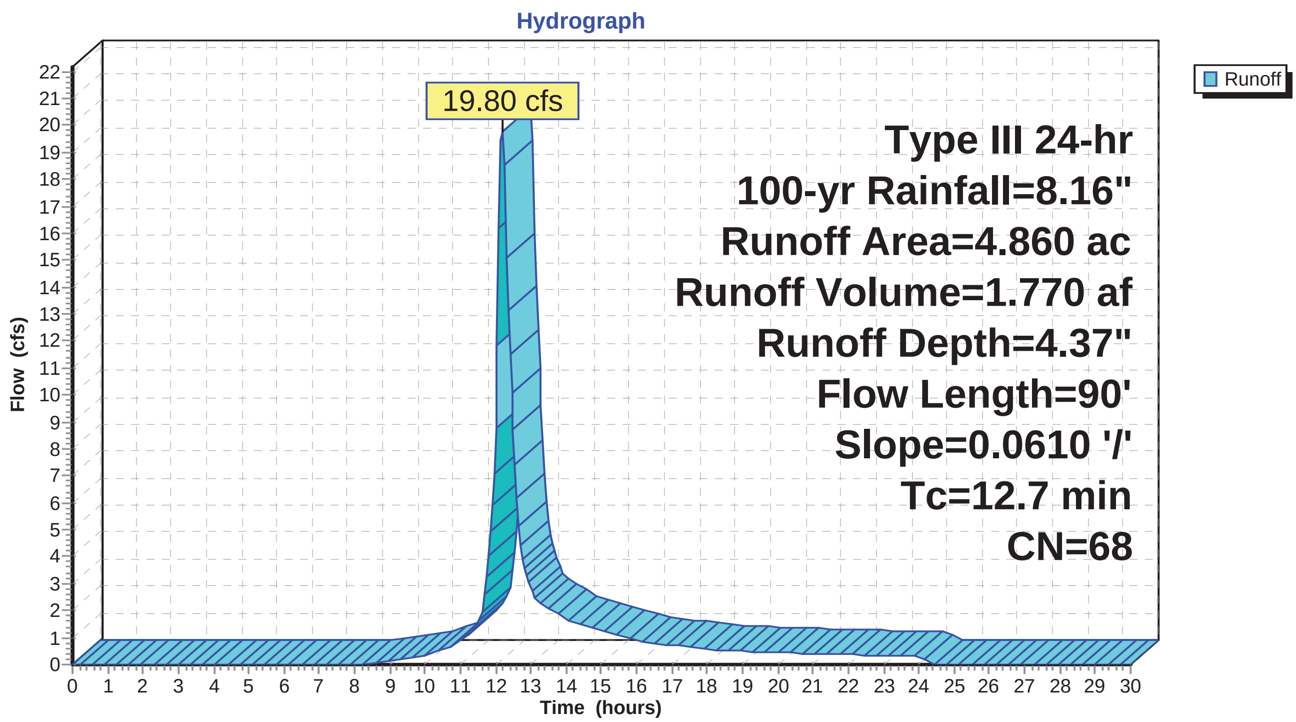
Runoff = 19.80 cfs @ 12.18 hrs, Volume= 1.770 af, Depth= 4.37"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-yr Rainfall=8.16"

Area (ac)	CN	Description
0.442	98	Paved parking, HSG C
0.653	30	Woods, Good, HSG A
3.162	70	Woods, Good, HSG C
0.603	79	50-75% Grass cover, Fair, HSG C
4.860	68	Weighted Average
4.418		90.91% Pervious Area
0.442		9.09% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.7	90	0.0610	0.12		**Sheet Flow, Sheet Flow Woods** Woods: Light underbrush n= 0.400 P2= 3.15"

Subcatchment 1S: Existing WS-1



Summary for Subcatchment 2S: Existing WS-2

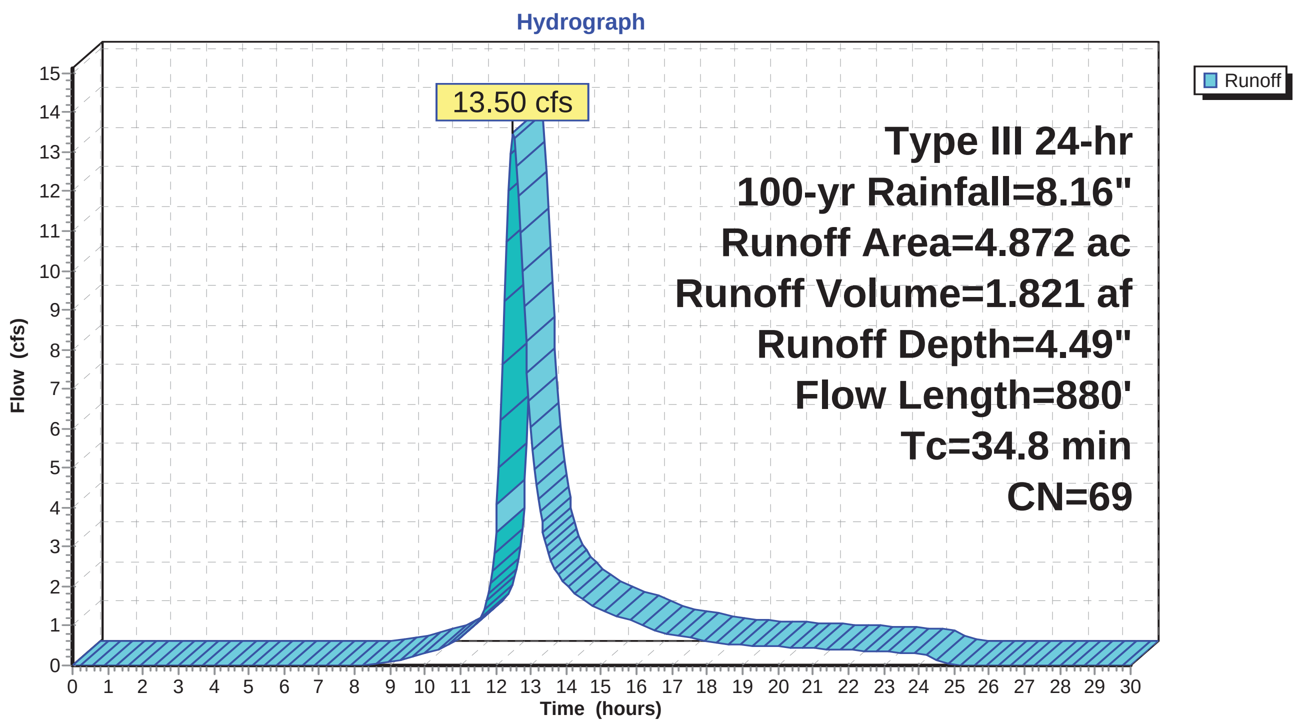
Runoff = 13.50 cfs @ 12.49 hrs, Volume= 1.821 af, Depth= 4.49"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-yr Rainfall=8.16"

Area (ac)	CN	Description
0.407	30	Woods, Good, HSG A
3.538	70	Woods, Good, HSG C
0.178	98	Paved parking, HSG C
0.749	79	50-75% Grass cover, Fair, HSG C
4.872	69	Weighted Average
4.694		96.35% Pervious Area
0.178		3.65% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
26.2	100	0.0124	0.06		**Sheet Flow, Sheet Flow** Woods: Light underbrush n= 0.400 P2= 3.15"
8.6	780	0.0907	1.51		**Shallow Concentrated Flow, Shallow** Woodland Kv= 5.0 fps
34.8	880	Total			

Subcatchment 2S: Existing WS-2



Summary for Subcatchment 3S: Existing WS-3

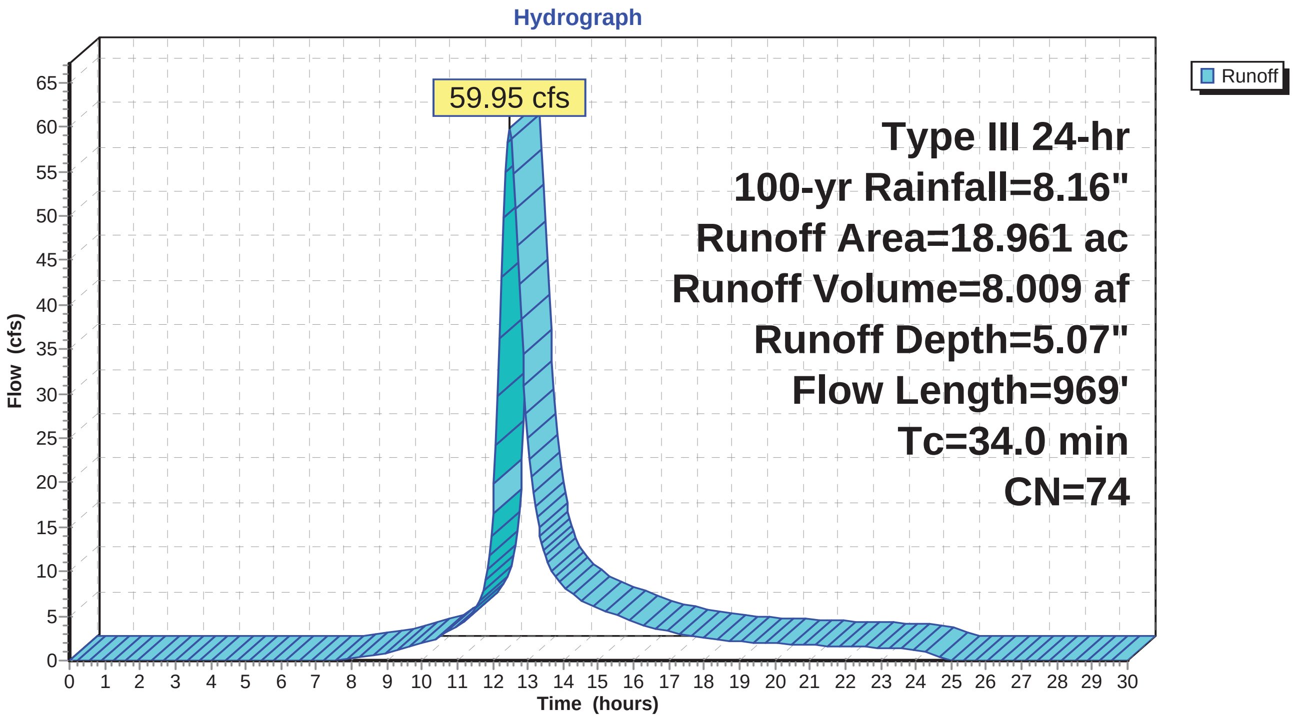
Runoff = 59.95 cfs @ 12.47 hrs, Volume= 8.009 af, Depth= 5.07"

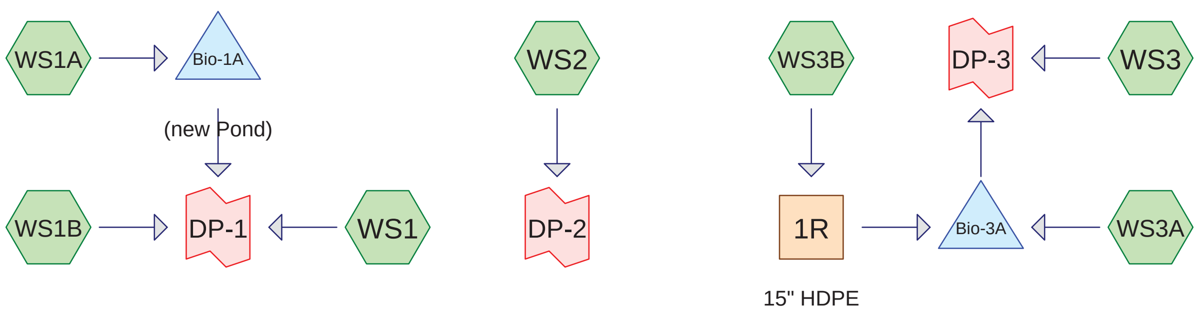
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-yr Rainfall=8.16"

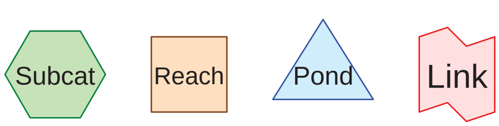
Area (ac)	CN	Description
0.732	98	Paved parking, HSG D
0.593	70	Brush, Fair, HSG C
5.400	77	Brush, Fair, HSG D
9.929	70	Woods, Good, HSG C
0.931	77	Woods, Good, HSG D
1.237	79	50-75% Grass cover, Fair, HSG C
0.139	84	50-75% Grass cover, Fair, HSG D
18.961	74	Weighted Average
18.229		96.14% Pervious Area
0.732		3.86% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
25.7	100	0.0130	0.06		**Sheet Flow, Sheet flow** Woods: Light underbrush n= 0.400 P2= 3.15"
3.9	154	0.0176	0.66		**Shallow Concentrated Flow, Shallow Conc** Woodland Kv= 5.0 fps
4.4	715	0.0095	2.72	27.18	**Channel Flow, Wetland Channel** Area= 10.0 sf Perim= 11.0' r= 0.91' n= 0.050 Scattered brush, heavy weeds
34.0	969	Total			

Subcatchment 3S: Existing WS-3







Routing Diagram for 170915_Bayside
Prepared by Maser Consulting PA, Printed 9/21/2017
HydroCAD® 10.00-19 s/n 09757 © 2016 HydroCAD Software Solutions LLC

Summary for Subcatchment WS1:

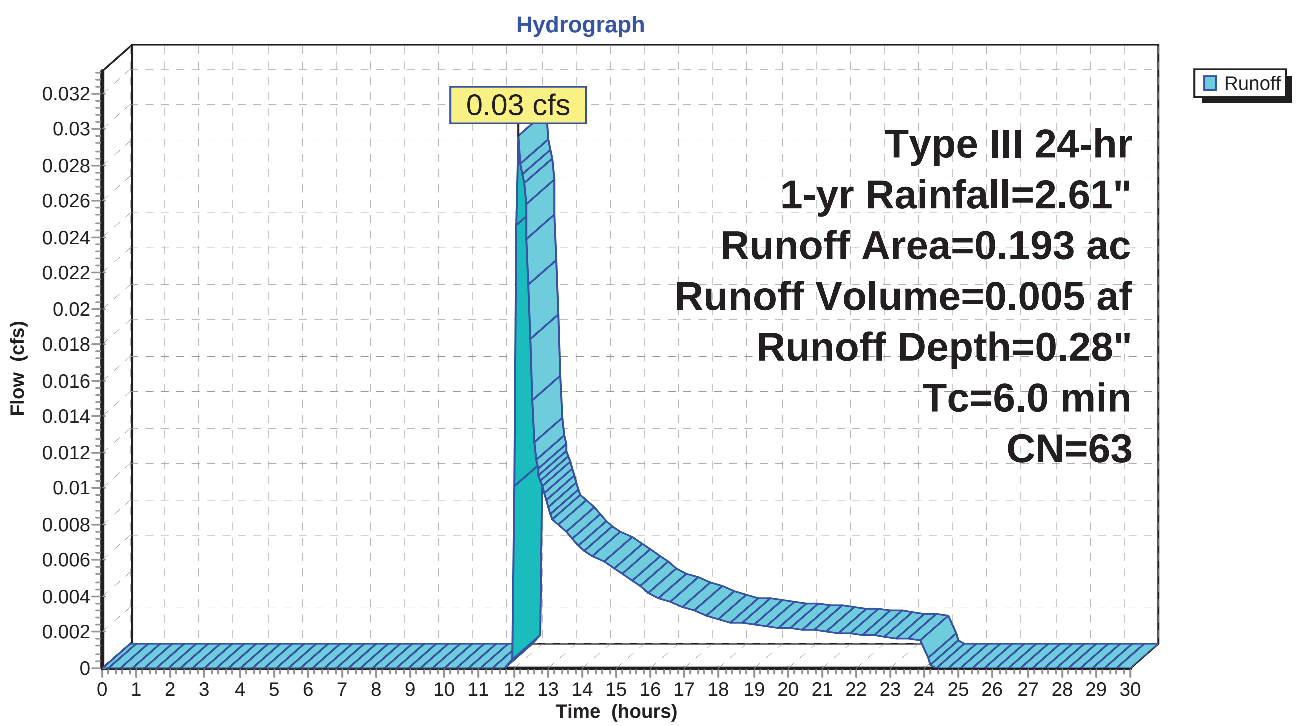
Runoff = 0.03 cfs @ 12.16 hrs, Volume= 0.005 af, Depth= 0.28"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 1-yr Rainfall=2.61"

Area (ac)	CN	Description
0.053	98	Paved parking, HSG C
0.099	39	>75% Grass cover, Good, HSG A
0.041	74	>75% Grass cover, Good, HSG C
0.193	63	Weighted Average
0.140		72.54% Pervious Area
0.053		27.46% Impervious Area

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

Subcatchment WS1:



Summary for Subcatchment WS1A:

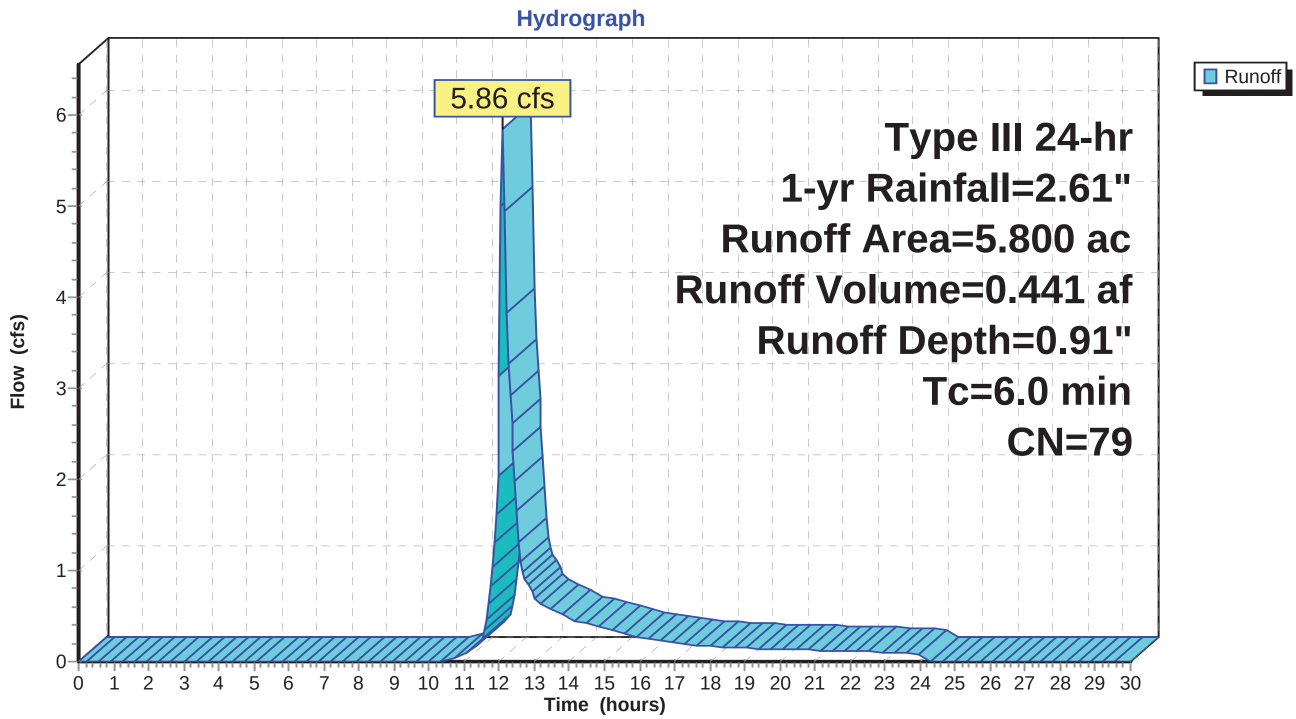
Runoff = 5.86 cfs @ 12.10 hrs, Volume= 0.441 af, Depth= 0.91"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 1-yr Rainfall=2.61"

Area (ac)	CN	Description
0.066	39	>75% Grass cover, Good, HSG A
3.153	74	>75% Grass cover, Good, HSG C
1.446	98	Paved parking, HSG C
1.135	70	Woods, Good, HSG C
5.800	79	Weighted Average
4.354		75.07% Pervious Area
1.446		24.93% Impervious Area

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

Subcatchment WS1A:



Summary for Subcatchment WS1B:

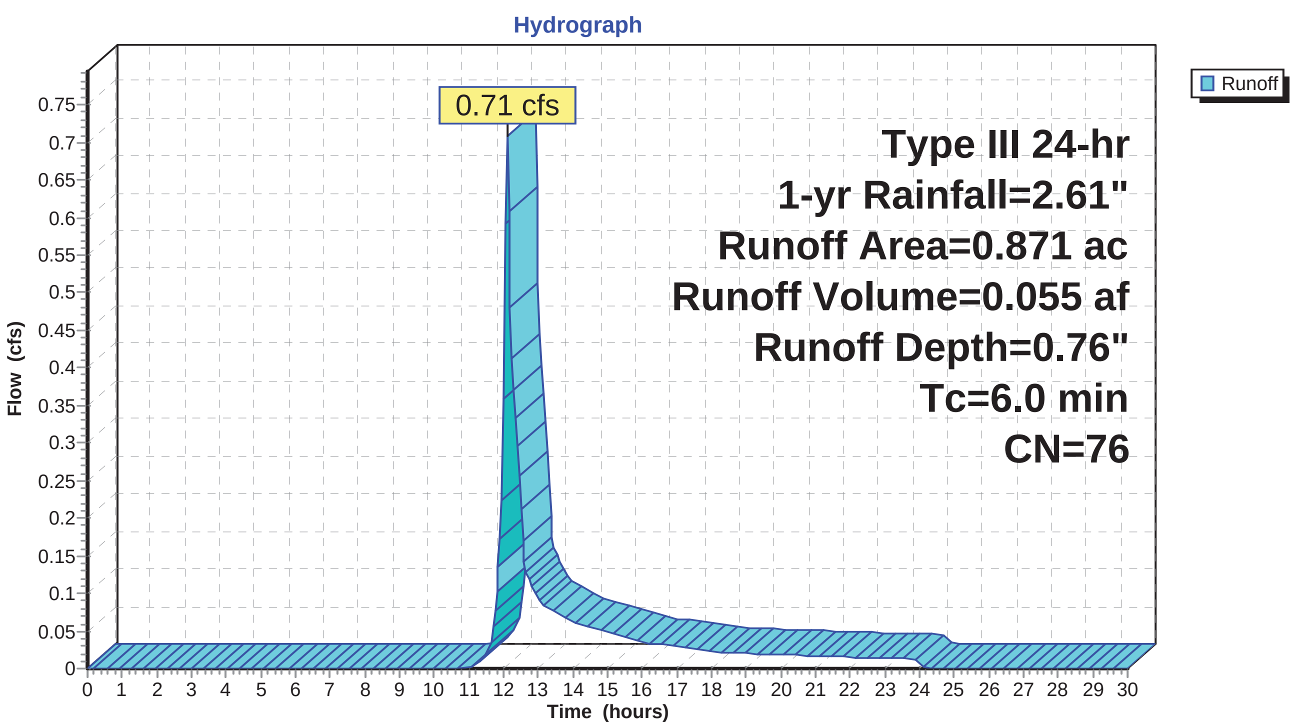
Runoff = 0.71 cfs @ 12.10 hrs, Volume= 0.055 af, Depth= 0.76"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 1-yr Rainfall=2.61"

Area (ac)	CN	Description
0.330	98	Paved parking, HSG C
0.181	39	>75% Grass cover, Good, HSG A
0.360	74	>75% Grass cover, Good, HSG C
0.871	76	Weighted Average
0.541		62.11% Pervious Area
0.330		37.89% Impervious Area

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

Subcatchment WS1B:



Summary for Subcatchment WS2:

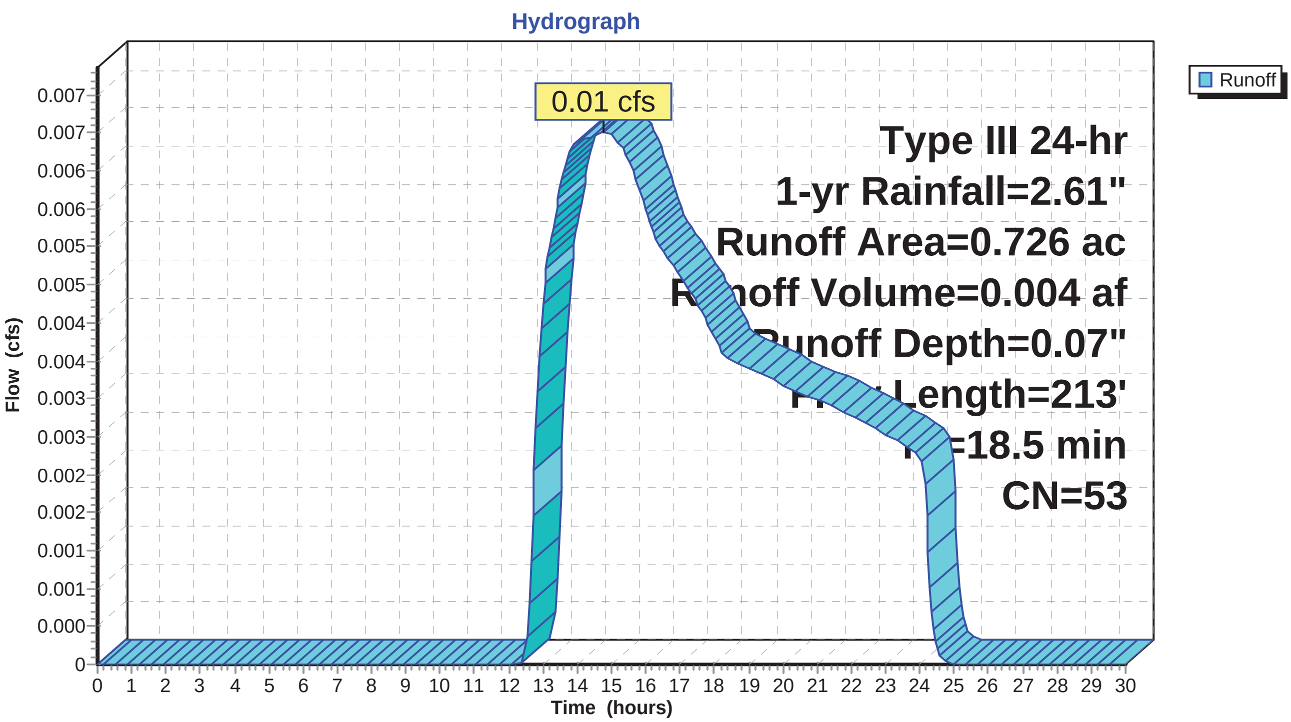
Runoff = 0.01 cfs @ 14.77 hrs, Volume= 0.004 af, Depth= 0.07"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 1-yr Rainfall=2.61"

Area (ac)	CN	Description
0.300	30	Woods, Good, HSG A
0.426	70	Woods, Good, HSG C
0.726	53	Weighted Average
0.726		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.5	73	0.0210	0.07		**Sheet Flow, Sheet Flow** Woods: Light underbrush n= 0.400 P2= 3.15"
2.0	140	0.0540	1.16		**Shallow Concentrated Flow, Shallow Conc** Woodland Kv= 5.0 fps
18.5	213	Total			

Subcatchment WS2:



Summary for Subcatchment WS3:

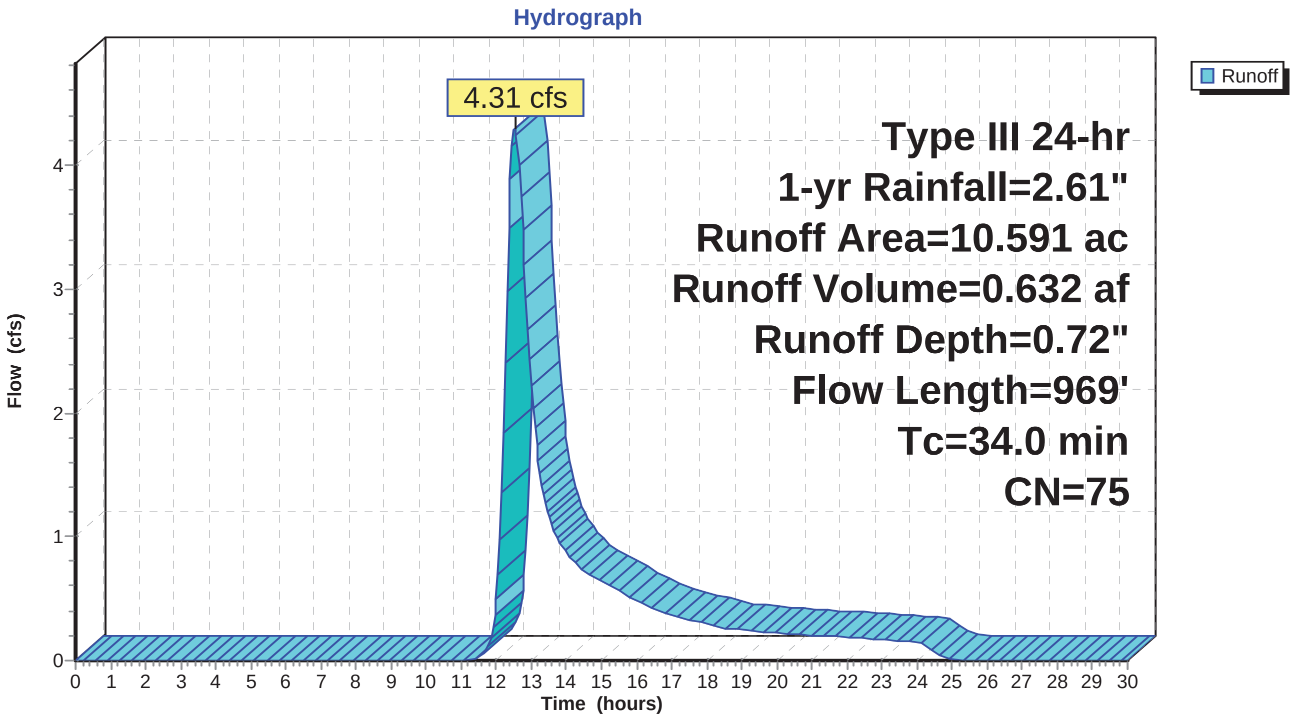
Runoff = 4.31 cfs @ 12.53 hrs, Volume= 0.632 af, Depth= 0.72"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 1-yr Rainfall=2.61"

Area (ac)	CN	Description
0.093	98	Paved parking, HSG C
2.413	70	Woods, Good, HSG C
0.973	77	Woods, Good, HSG D
0.488	70	Brush, Fair, HSG C
5.361	77	Brush, Fair, HSG D
1.125	74	>75% Grass cover, Good, HSG C
0.138	80	>75% Grass cover, Good, HSG D
10.591	75	Weighted Average
10.498		99.12% Pervious Area
0.093		0.88% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
25.7	100	0.0130	0.06		**Sheet Flow, Sheet flow** Woods: Light underbrush n= 0.400 P2= 3.15"
3.9	154	0.0176	0.66		**Shallow Concentrated Flow, Shallow Conc** Woodland Kv= 5.0 fps
4.4	715	0.0095	2.72	27.18	**Channel Flow, Wetland Channel** Area= 10.0 sf Perim= 11.0' r= 0.91' n= 0.050 Scattered brush, heavy weeds
34.0	969	Total			

Subcatchment WS3:



Summary for Subcatchment WS3A:

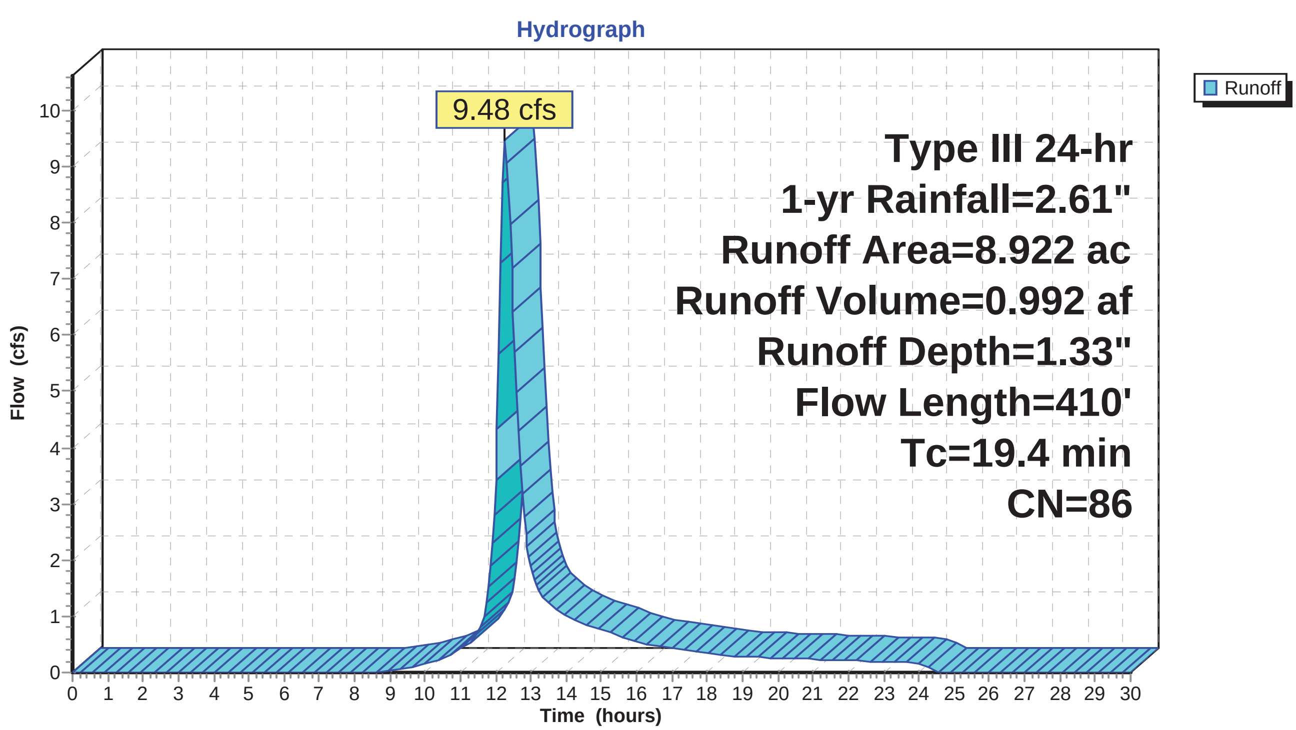
Runoff = 9.48 cfs @ 12.27 hrs, Volume= 0.992 af, Depth= 1.33"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 1-yr Rainfall=2.61"

Area (ac)	CN	Description
4.501	98	Paved parking, HSG C
3.794	74	>75% Grass cover, Good, HSG C
0.627	70	Woods, Good, HSG C
8.922	86	Weighted Average
4.421		49.55% Pervious Area
4.501		50.45% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.4	90	0.0290	0.13		**Sheet Flow, Sheet Flow** Grass: Dense n= 0.240 P2= 3.15"
8.0	320	0.0250	0.67	8.70	**Channel Flow, Grassed Swale** Area= 13.0 sf Perim= 23.0' r= 0.57' n= 0.240 Sheet flow over Dense Grass
19.4	410	Total			

Subcatchment WS3A:



Summary for Subcatchment WS3B:

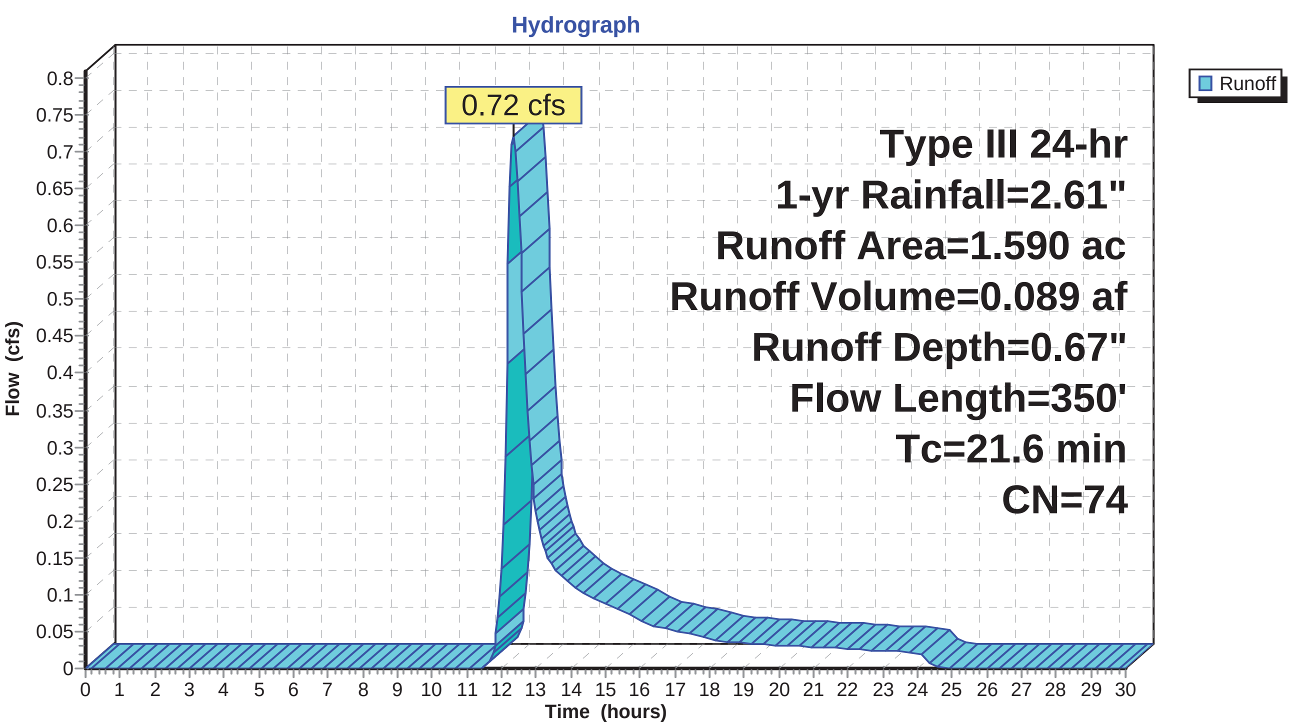
Runoff = 0.72 cfs @ 12.34 hrs, Volume= 0.089 af, Depth= 0.67"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 1-yr Rainfall=2.61"

Area (ac)	CN	Description
0.068	98	Paved parking, HSG C
0.300	70	Woods, Good, HSG C
1.222	74	>75% Grass cover, Good, HSG C
1.590	74	Weighted Average
1.522		95.72% Pervious Area
0.068		4.28% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.9	80	0.0100	0.08		**Sheet Flow, Sheet Flow - Grass** Grass: Dense n= 0.240 P2= 3.15"
5.7	270	0.0200	0.79	9.48	**Channel Flow, Channel Flow** Area= 12.0 sf Perim= 14.0' r= 0.86' n= 0.240 Sheet flow over Dense Grass
21.6	350	Total			

Subcatchment WS3B:



Summary for Reach 1R: 15" HDPE

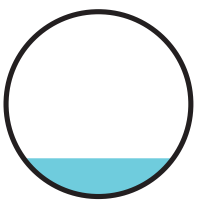
[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area = 1.590 ac, 4.28% Impervious, Inflow Depth = 0.67" for 1-yr event
Inflow = 0.72 cfs @ 12.34 hrs, Volume= 0.089 af
Outflow = 0.71 cfs @ 12.45 hrs, Volume= 0.089 af, Atten= 2%, Lag= 6.2 min

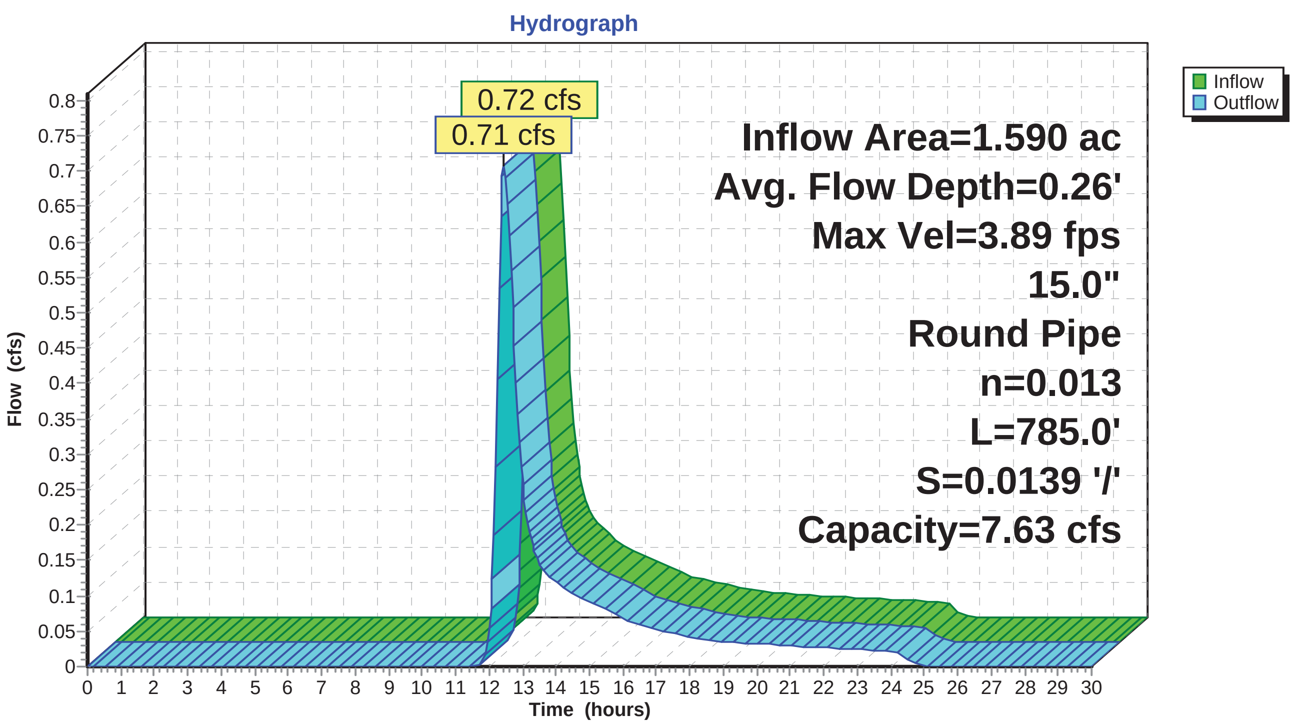
Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.89 fps, Min. Travel Time= 3.4 min
Avg. Velocity = 1.68 fps, Avg. Travel Time= 7.8 min

Peak Storage= 143 cf @ 12.39 hrs
Average Depth at Peak Storage= 0.26'
Bank-Full Depth= 1.25' Flow Area= 1.2 sf, Capacity= 7.63 cfs

15.0" Round Pipe
n= 0.013 Corrugated PE, smooth interior
Length= 785.0' Slope= 0.0139 '/'
Inlet Invert= 245.95', Outlet Invert= 235.00'



Reach 1R: 15" HDPE



Summary for Pond Bio-1A: (new Pond)

Inflow Area = 5.800 ac, 24.93% Impervious, Inflow Depth = 0.91" for 1-yr event
Inflow = 5.86 cfs @ 12.10 hrs, Volume= 0.441 af
Outflow = 0.26 cfs @ 16.01 hrs, Volume= 0.157 af, Atten= 95%, Lag= 234.5 min
Primary = 0.26 cfs @ 16.01 hrs, Volume= 0.157 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 185.62' @ 16.01 hrs Surf.Area= 12,200 sf Storage= 13,741 cf

Plug-Flow detention time= 437.1 min calculated for 0.156 af (35% of inflow)
Center-of-Mass det. time= 301.5 min (1,158.9 - 857.5)

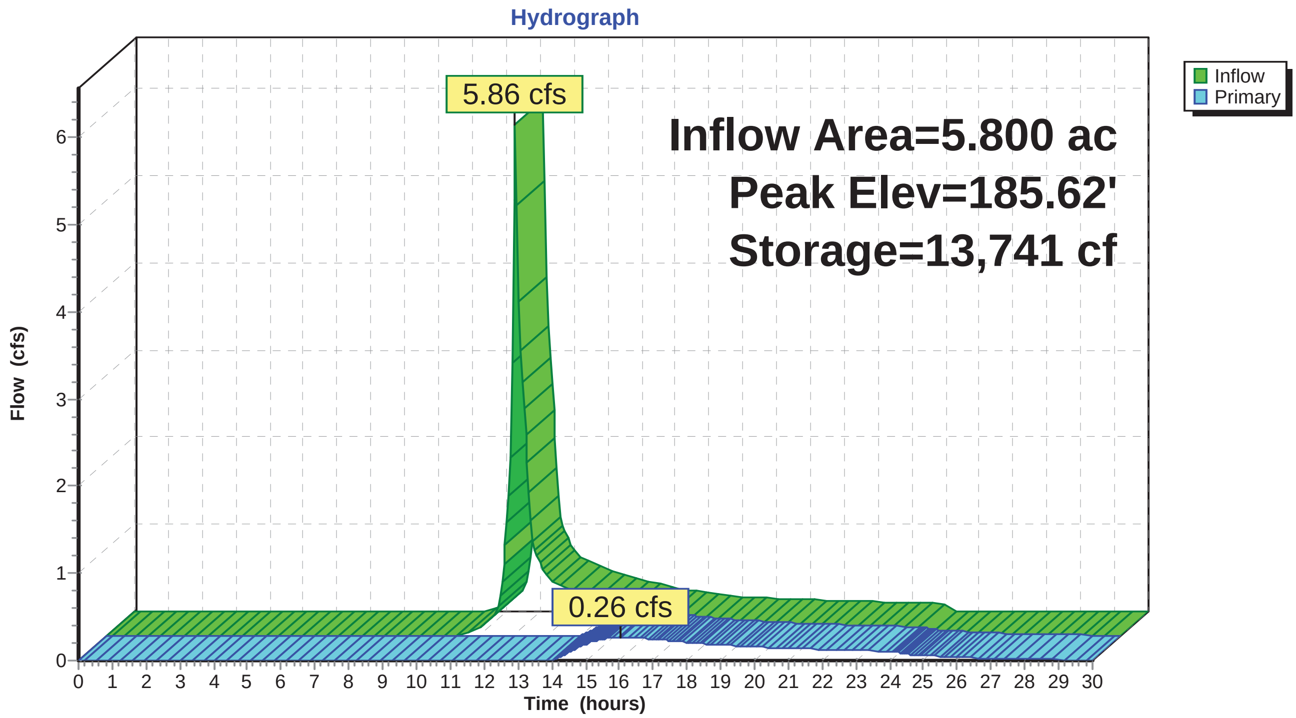
Volume	Invert	Avail.Storage	Storage Description
#1	184.00'	64,609 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
184.00	2,157	0	0
185.00	10,993	6,575	6,575
186.00	12,947	11,970	18,545
187.00	14,785	13,866	32,411
188.00	16,210	15,498	47,909
189.00	17,191	16,701	64,609

Device	Routing	Invert	Outlet Devices
#1	Primary	185.50'	**24.0" W x 6.0" H Vert. Orifice/Grate** C= 0.600
#2	Primary	186.70'	**2.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32
#3	Primary	187.80'	**14.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32
#4	Primary	188.00'	**12.0' long x 6.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.37 2.51 2.70 2.68 2.68 2.67 2.65 2.65 2.65 2.65 2.66 2.66 2.67 2.69 2.72 2.76 2.83

Primary OutFlow Max=0.26 cfs @ 16.01 hrs HW=185.62' (Free Discharge)
├─**1=Orifice/Grate** (Orifice Controls 0.26 cfs @ 1.10 fps)
├─**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)
├─**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)
└─**4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond Bio-1A: (new Pond)



Summary for Pond Bio-3A:

Inflow Area = 10.512 ac, 43.46% Impervious, Inflow Depth = 1.23" for 1-yr event
Inflow = 9.93 cfs @ 12.28 hrs, Volume= 1.081 af
Outflow = 1.82 cfs @ 13.13 hrs, Volume= 0.722 af, Atten= 82%, Lag= 50.8 min
Primary = 1.82 cfs @ 13.13 hrs, Volume= 0.722 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 229.29' @ 13.13 hrs Surf.Area= 31,427 sf Storage= 23,870 cf

Plug-Flow detention time= 271.3 min calculated for 0.722 af (67% of inflow)
Center-of-Mass det. time= 167.6 min (1,016.3 - 848.7)

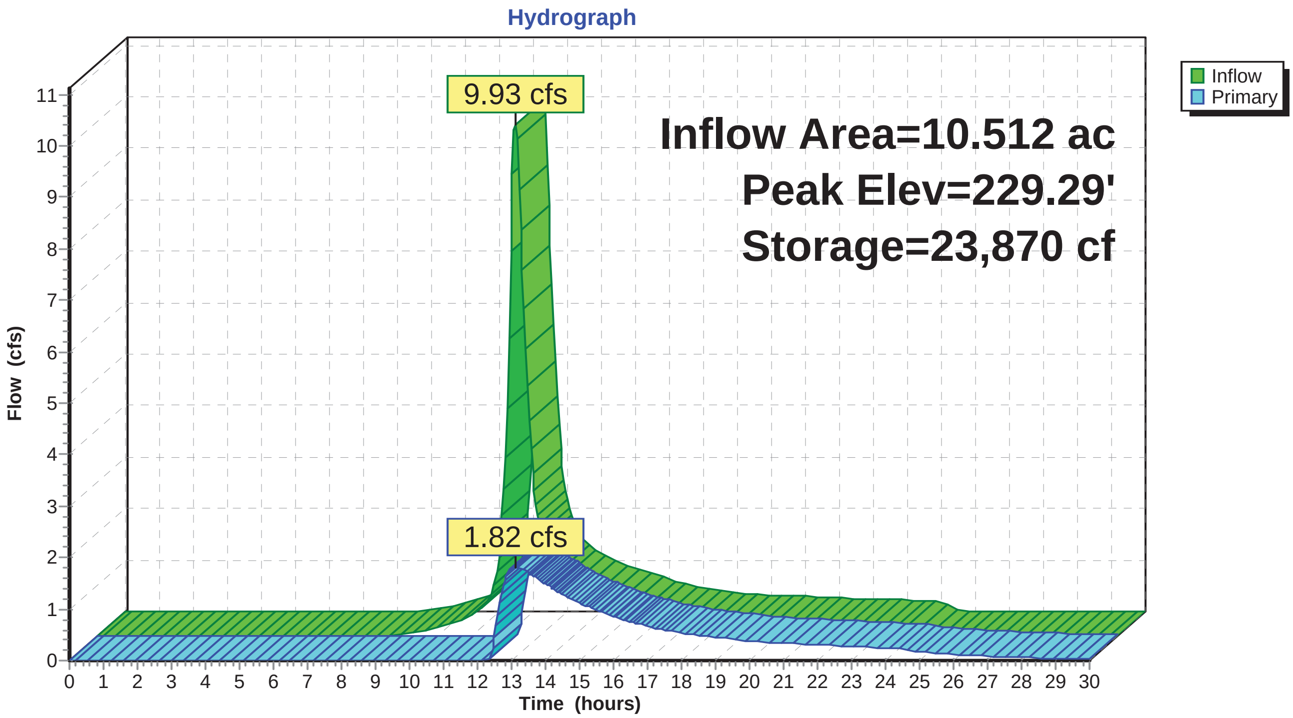
Volume	Invert	Avail.Storage	Storage Description
#1	228.50'	91,324 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
228.50	29,191	0	0
229.00	30,603	14,949	14,949
230.00	33,469	32,036	46,985
231.00	36,393	34,931	81,916
231.25	38,872	9,408	91,324

Device	Routing	Invert	Outlet Devices
#1	Primary	229.00'	**36.0" W x 4.0" H Vert. Orifice/Grate** C= 0.600
#2	Primary	229.15'	**24.0" W x 3.0" H Vert. Orifice/Grate** C= 0.600
#3	Primary	229.75'	**3.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32
#4	Primary	231.00'	**13.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Primary OutFlow Max=1.81 cfs @ 13.13 hrs HW=229.29' (Free Discharge)
—**1=Orifice/Grate** (Orifice Controls 1.49 cfs @ 1.72 fps)
—**2=Orifice/Grate** (Orifice Controls 0.33 cfs @ 1.19 fps)
—**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)
—**4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond Bio-3A:

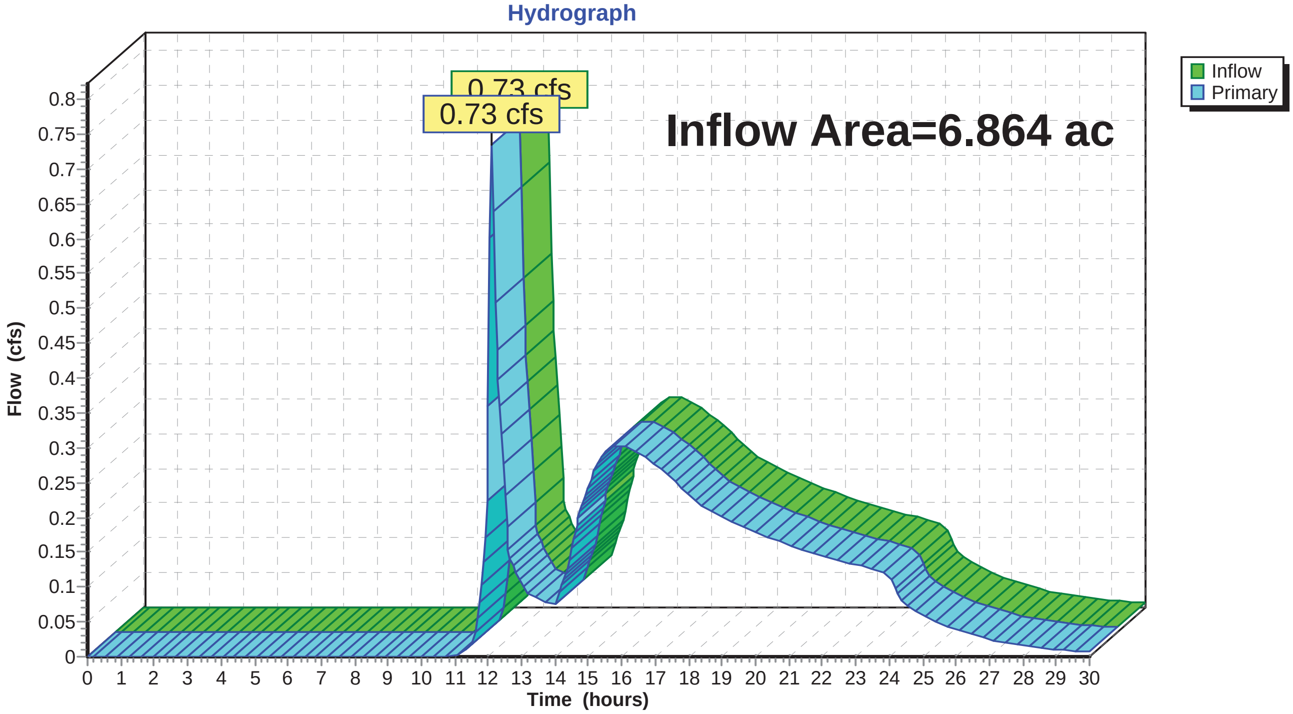

Hydrograph
9.93 cfs
1.82 cfs
Inflow Area=10.512 ac
Peak Elev=229.29'
Storage=23,870 cf
Inflow
Primary
Flow (cfs)
Time (hours)
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30

Summary for Link DP-1:

Inflow Area = 6.864 ac, 26.65% Impervious, Inflow Depth > 0.38" for 1-yr event
Inflow = 0.73 cfs @ 12.10 hrs, Volume= 0.217 af
Primary = 0.73 cfs @ 12.10 hrs, Volume= 0.217 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Link DP-1:

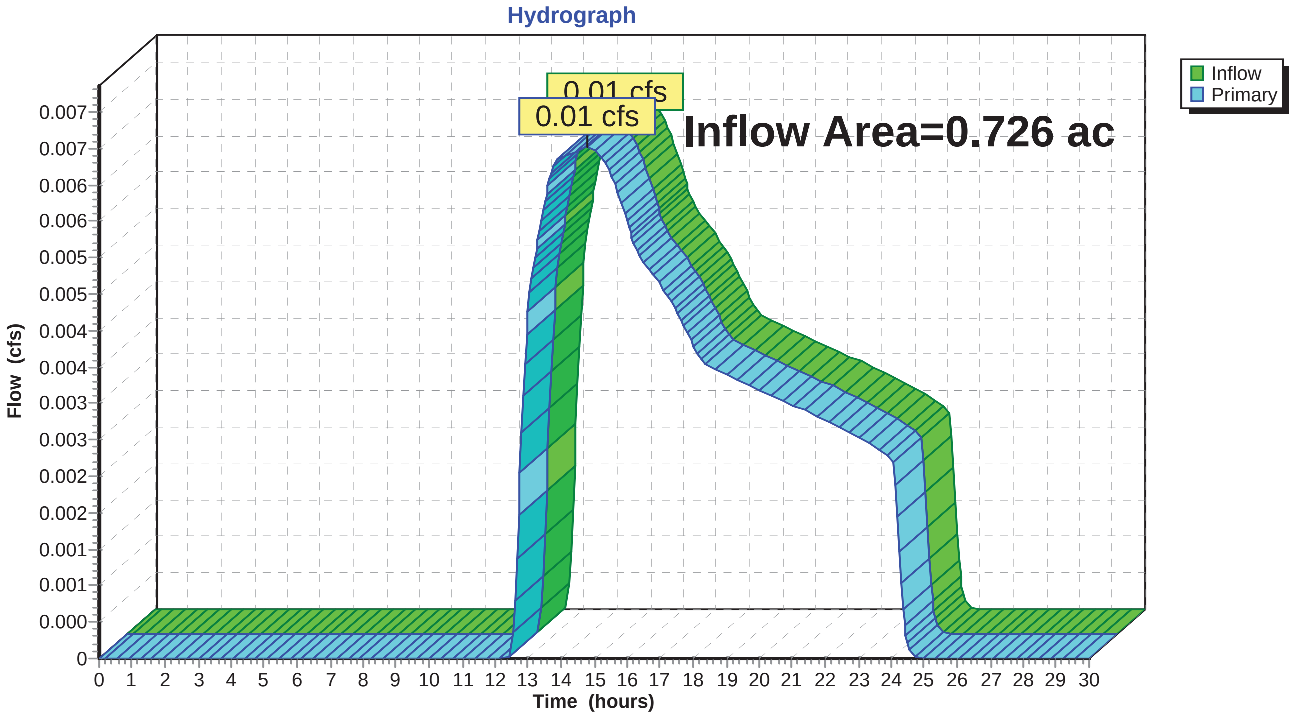


Summary for Link DP-2:

Inflow Area =	0.726 ac,	0.00% Impervious, Inflow Depth = 0.07"		for 1-yr event
Inflow =	0.01 cfs @	14.77 hrs, Volume=	0.004 af	
Primary =	0.01 cfs @	14.77 hrs, Volume=	0.004 af, Atten= 0%, Lag= 0.0 min	

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Link DP-2:

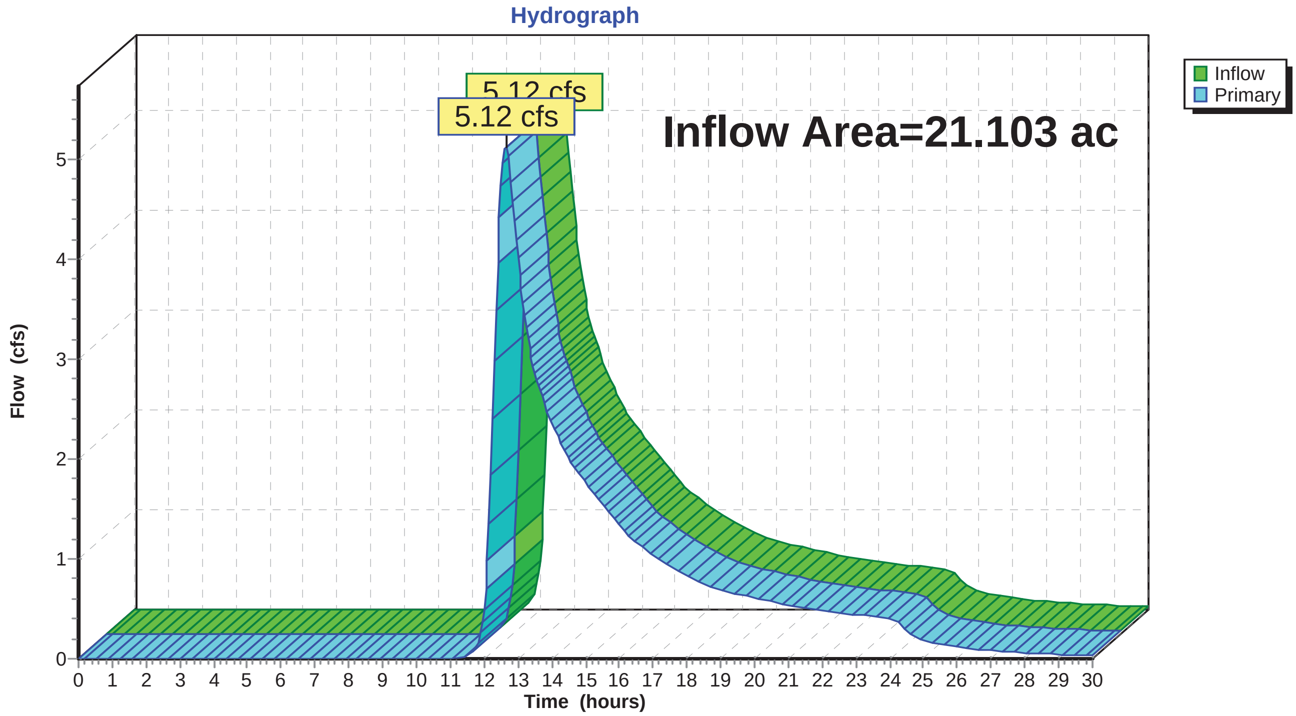


Summary for Link DP-3:

Inflow Area = 21.103 ac, 22.09% Impervious, Inflow Depth > 0.77" for 1-yr event
Inflow = 5.12 cfs @ 12.64 hrs, Volume= 1.354 af
Primary = 5.12 cfs @ 12.64 hrs, Volume= 1.354 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Link DP-3:



Summary for Subcatchment WS1:

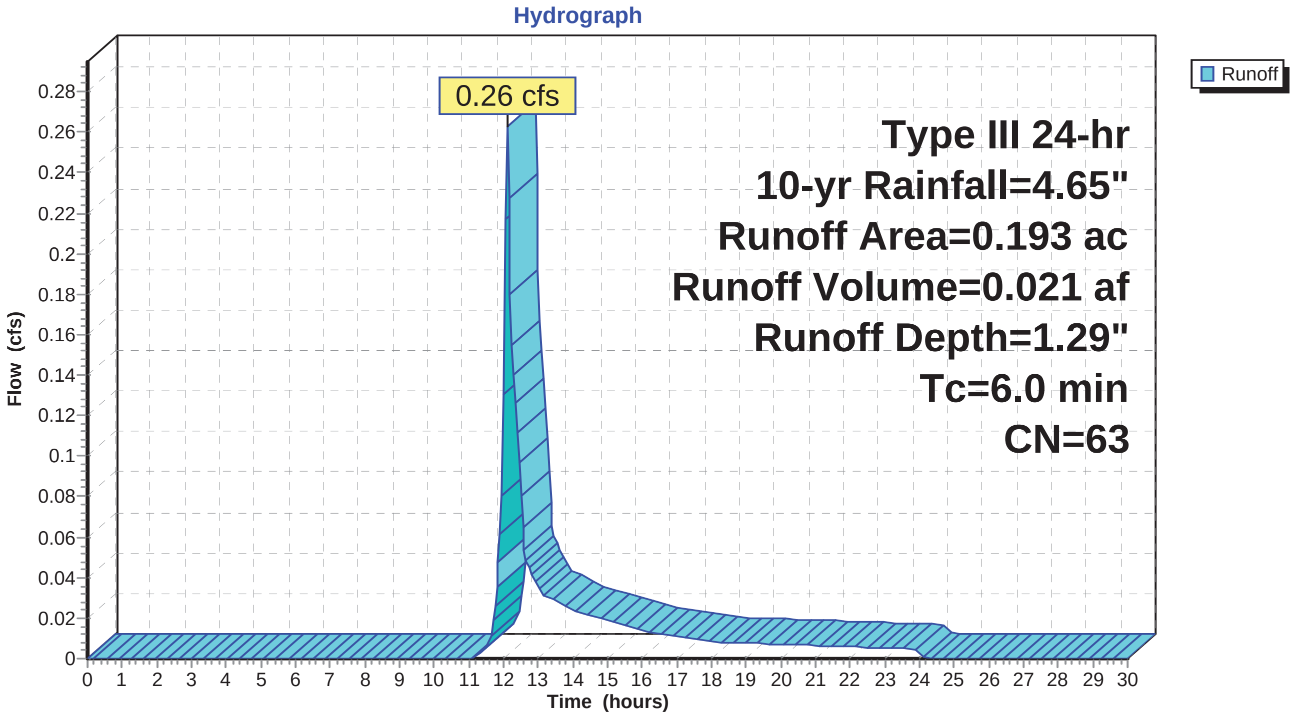
Runoff = 0.26 cfs @ 12.10 hrs, Volume= 0.021 af, Depth= 1.29"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Rainfall=4.65"

Area (ac)	CN	Description
0.053	98	Paved parking, HSG C
0.099	39	>75% Grass cover, Good, HSG A
0.041	74	>75% Grass cover, Good, HSG C
0.193	63	Weighted Average
0.140		72.54% Pervious Area
0.053		27.46% Impervious Area

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

Subcatchment WS1:



Summary for Subcatchment WS1A:

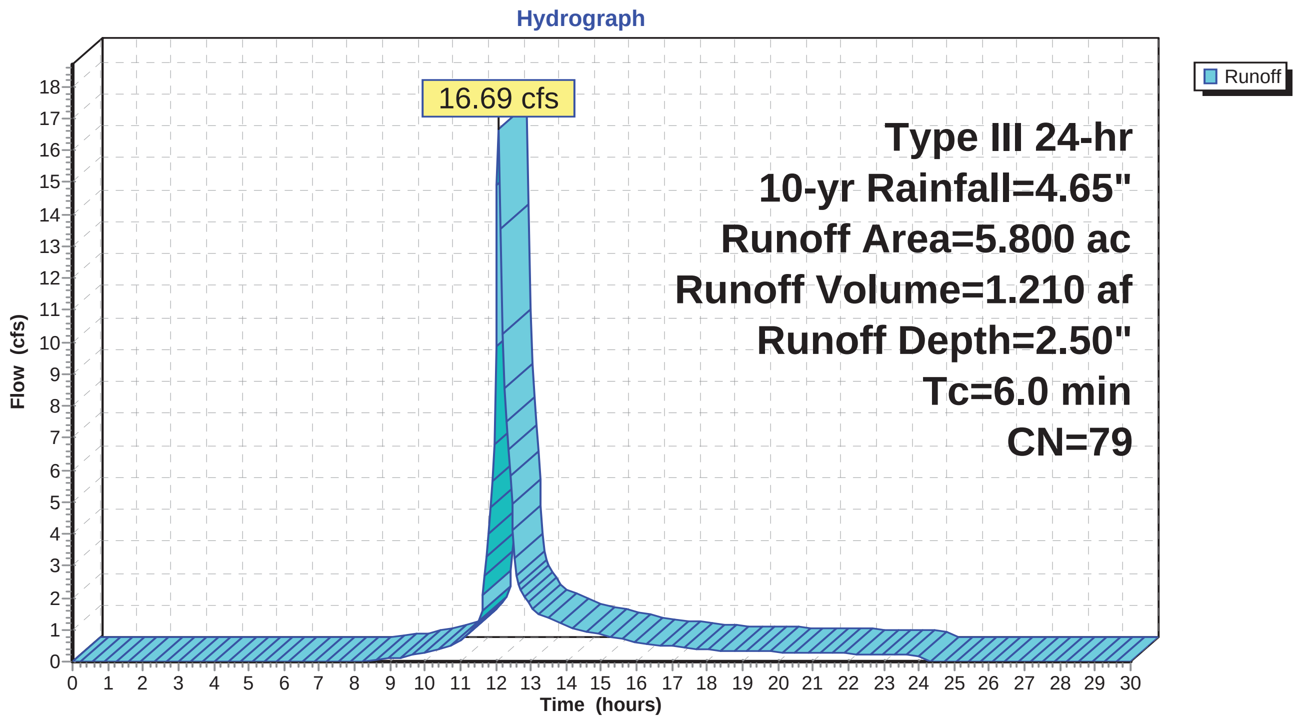
Runoff = 16.69 cfs @ 12.09 hrs, Volume= 1.210 af, Depth= 2.50"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Rainfall=4.65"

Area (ac)	CN	Description
0.066	39	>75% Grass cover, Good, HSG A
3.153	74	>75% Grass cover, Good, HSG C
1.446	98	Paved parking, HSG C
1.135	70	Woods, Good, HSG C
5.800	79	Weighted Average
4.354		75.07% Pervious Area
1.446		24.93% Impervious Area

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

Subcatchment WS1A:



Summary for Subcatchment WS1B:

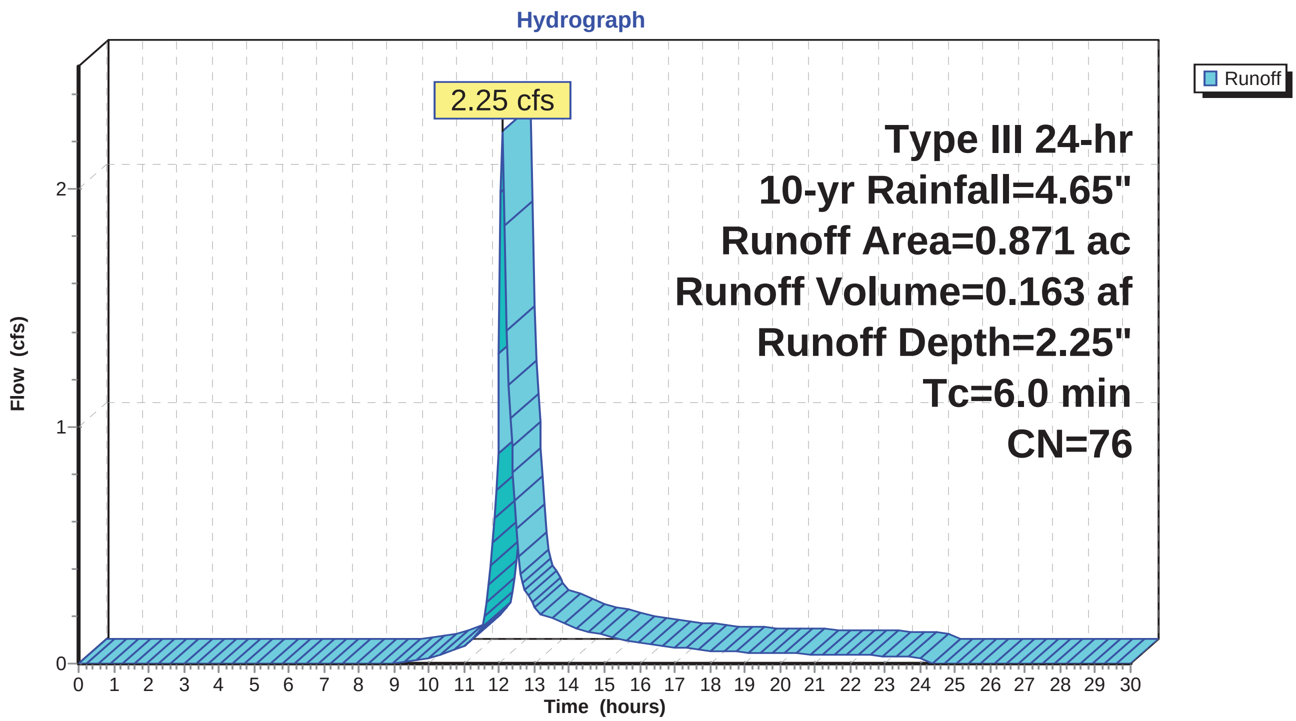
Runoff = 2.25 cfs @ 12.09 hrs, Volume= 0.163 af, Depth= 2.25"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Rainfall=4.65"

Area (ac)	CN	Description
0.330	98	Paved parking, HSG C
0.181	39	>75% Grass cover, Good, HSG A
0.360	74	>75% Grass cover, Good, HSG C
0.871	76	Weighted Average
0.541		62.11% Pervious Area
0.330		37.89% Impervious Area

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

Subcatchment WS1B:



Summary for Subcatchment WS2:

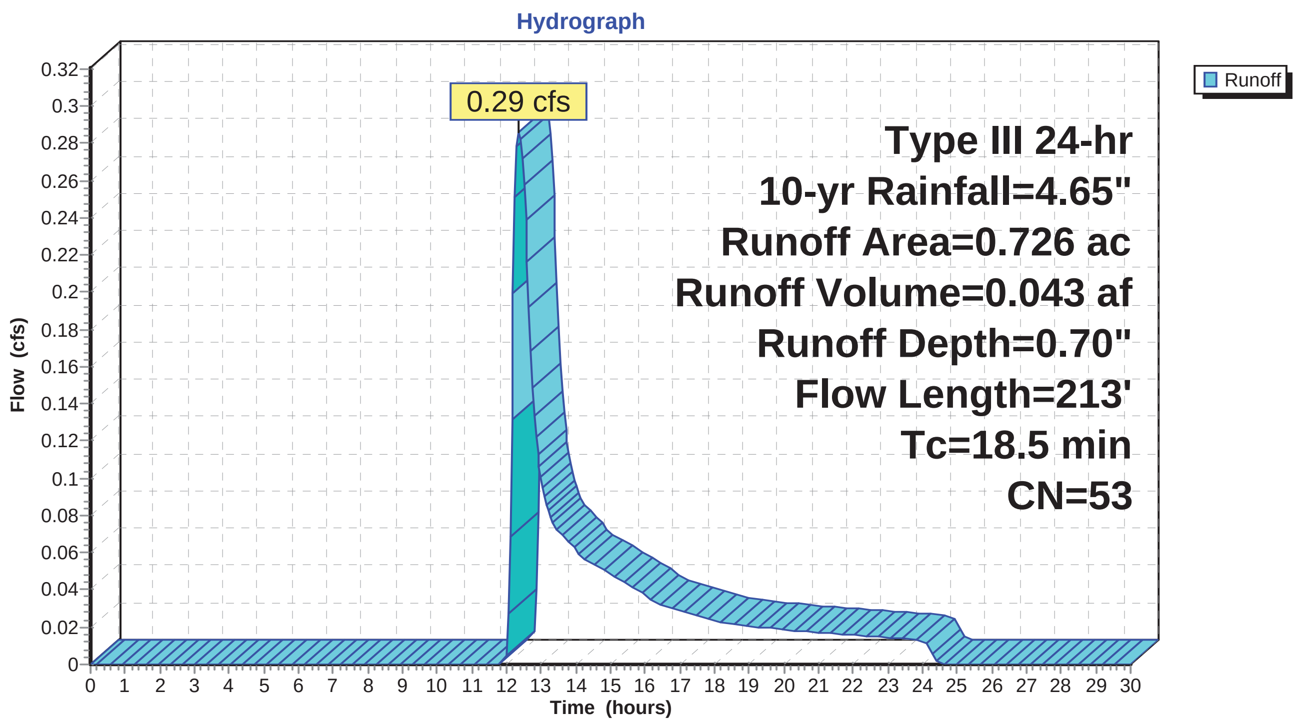
Runoff = 0.29 cfs @ 12.36 hrs, Volume= 0.043 af, Depth= 0.70"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Rainfall=4.65"

Area (ac)	CN	Description
0.300	30	Woods, Good, HSG A
0.426	70	Woods, Good, HSG C
0.726	53	Weighted Average
0.726		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.5	73	0.0210	0.07		**Sheet Flow, Sheet Flow** Woods: Light underbrush n= 0.400 P2= 3.15"
2.0	140	0.0540	1.16		**Shallow Concentrated Flow, Shallow Conc** Woodland Kv= 5.0 fps
18.5	213	Total			

Subcatchment WS2:



Summary for Subcatchment WS3:

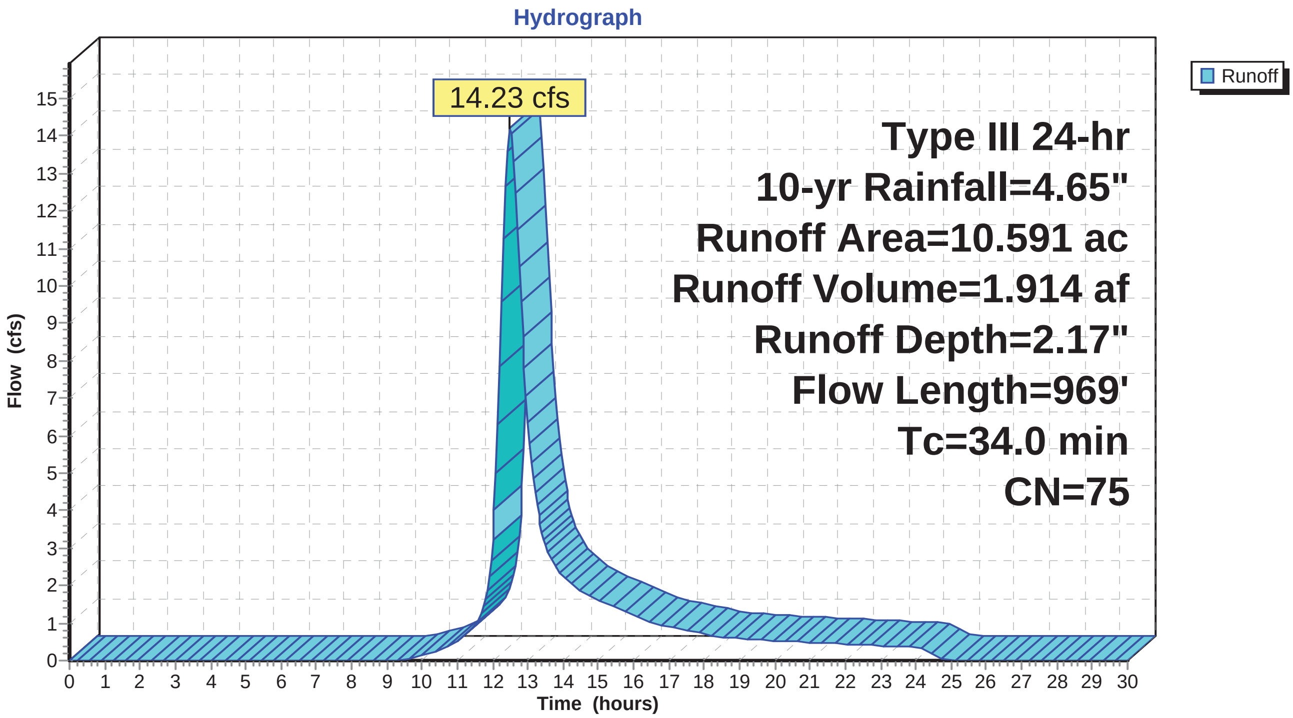
Runoff = 14.23 cfs @ 12.49 hrs, Volume= 1.914 af, Depth= 2.17"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Rainfall=4.65"

Area (ac)	CN	Description
0.093	98	Paved parking, HSG C
2.413	70	Woods, Good, HSG C
0.973	77	Woods, Good, HSG D
0.488	70	Brush, Fair, HSG C
5.361	77	Brush, Fair, HSG D
1.125	74	>75% Grass cover, Good, HSG C
0.138	80	>75% Grass cover, Good, HSG D
10.591	75	Weighted Average
10.498		99.12% Pervious Area
0.093		0.88% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
25.7	100	0.0130	0.06		**Sheet Flow, Sheet flow** Woods: Light underbrush n= 0.400 P2= 3.15"
3.9	154	0.0176	0.66		**Shallow Concentrated Flow, Shallow Conc** Woodland Kv= 5.0 fps
4.4	715	0.0095	2.72	27.18	**Channel Flow, Wetland Channel** Area= 10.0 sf Perim= 11.0' r= 0.91' n= 0.050 Scattered brush, heavy weeds
34.0	969	Total			

Subcatchment WS3:



Summary for Subcatchment WS3A:

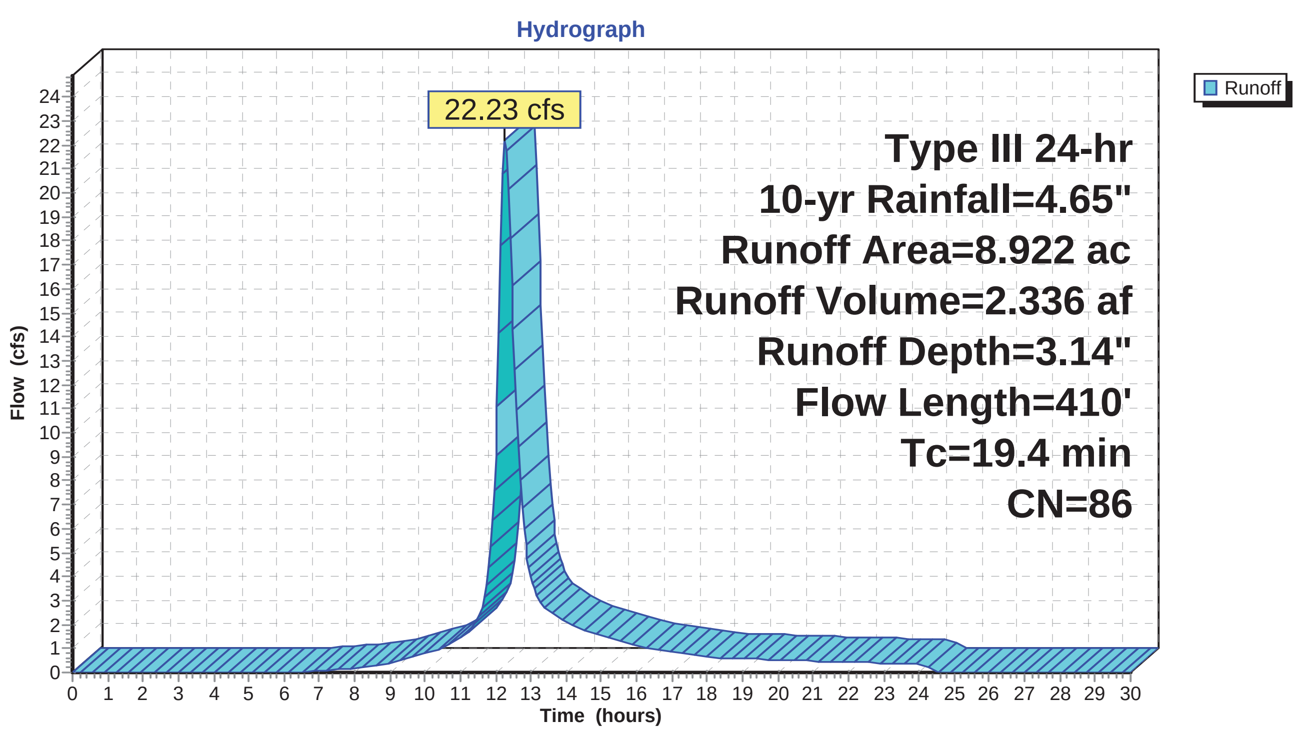
Runoff = 22.23 cfs @ 12.26 hrs, Volume= 2.336 af, Depth= 3.14"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Rainfall=4.65"

Area (ac)	CN	Description
4.501	98	Paved parking, HSG C
3.794	74	>75% Grass cover, Good, HSG C
0.627	70	Woods, Good, HSG C
8.922	86	Weighted Average
4.421		49.55% Pervious Area
4.501		50.45% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.4	90	0.0290	0.13		**Sheet Flow, Sheet Flow** Grass: Dense n= 0.240 P2= 3.15"
8.0	320	0.0250	0.67	8.70	**Channel Flow, Grassed Swale** Area= 13.0 sf Perim= 23.0' r= 0.57' n= 0.240 Sheet flow over Dense Grass
19.4	410	Total			

Subcatchment WS3A:



Summary for Subcatchment WS3B:

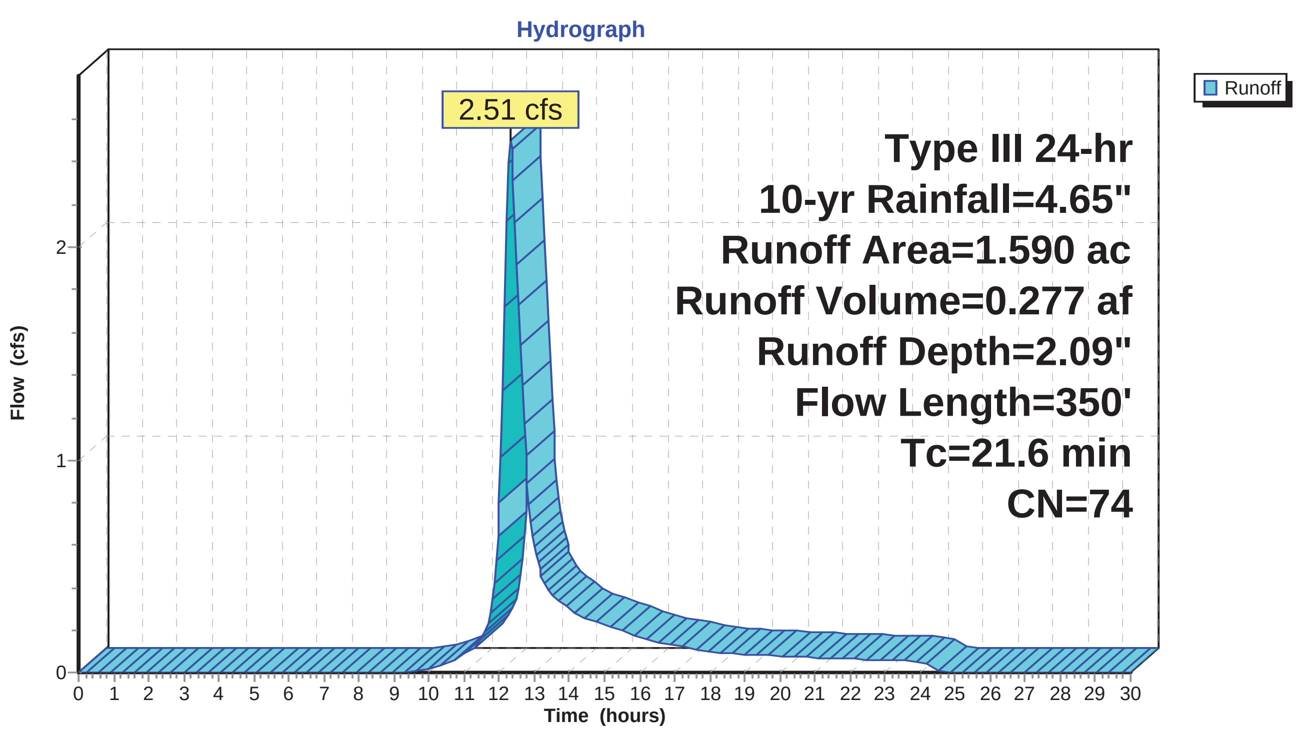
Runoff = 2.51 cfs @ 12.31 hrs, Volume= 0.277 af, Depth= 2.09"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Rainfall=4.65"

Area (ac)	CN	Description
0.068	98	Paved parking, HSG C
0.300	70	Woods, Good, HSG C
1.222	74	>75% Grass cover, Good, HSG C
1.590	74	Weighted Average
1.522		95.72% Pervious Area
0.068		4.28% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.9	80	0.0100	0.08		**Sheet Flow, Sheet Flow - Grass** Grass: Dense n= 0.240 P2= 3.15"
5.7	270	0.0200	0.79	9.48	**Channel Flow, Channel Flow** Area= 12.0 sf Perim= 14.0' r= 0.86' n= 0.240 Sheet flow over Dense Grass
21.6	350	Total			

Subcatchment WS3B:



Summary for Reach 1R: 15" HDPE

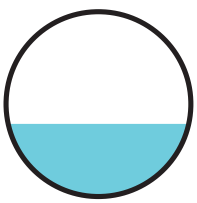
[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area = 1.590 ac, 4.28% Impervious, Inflow Depth = 2.09" for 10-yr event
Inflow = 2.51 cfs @ 12.31 hrs, Volume= 0.277 af
Outflow = 2.47 cfs @ 12.38 hrs, Volume= 0.277 af, Atten= 2%, Lag= 4.3 min

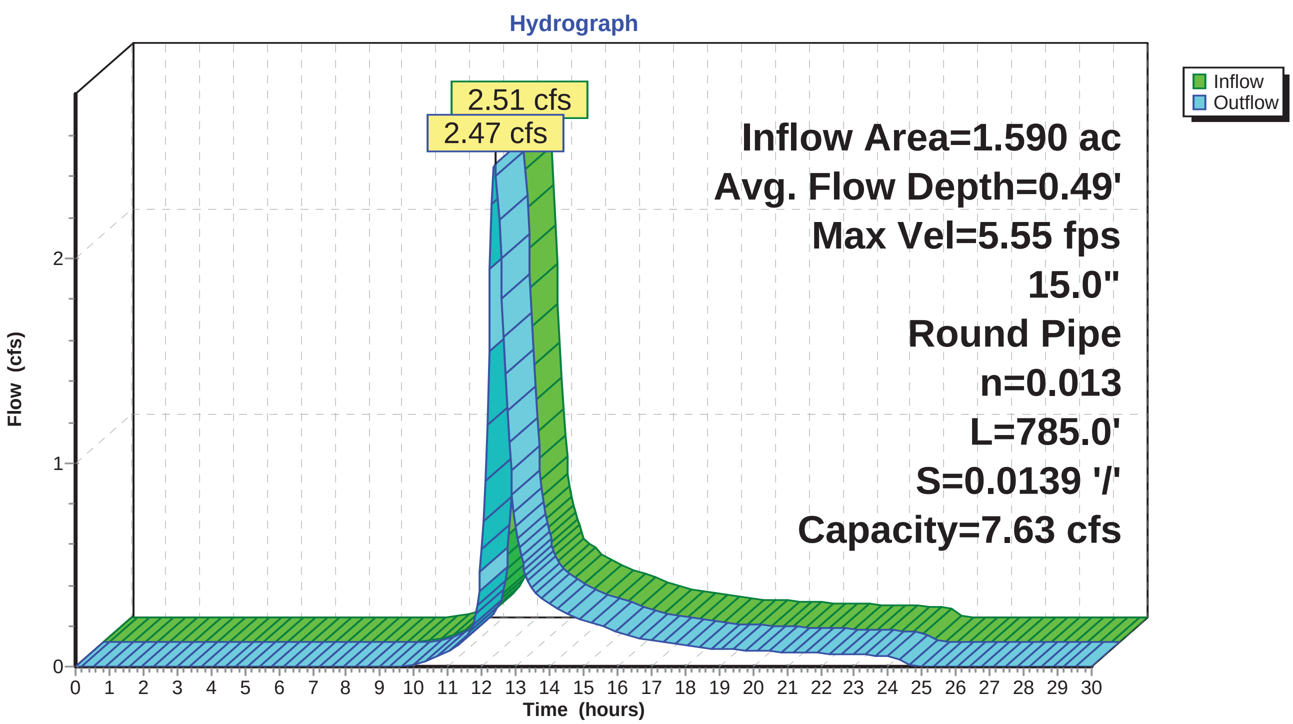
Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Max. Velocity= 5.55 fps, Min. Travel Time= 2.4 min
Avg. Velocity = 2.17 fps, Avg. Travel Time= 6.0 min

Peak Storage= 350 cf @ 12.34 hrs
Average Depth at Peak Storage= 0.49'
Bank-Full Depth= 1.25' Flow Area= 1.2 sf, Capacity= 7.63 cfs

15.0" Round Pipe
n= 0.013 Corrugated PE, smooth interior
Length= 785.0' Slope= 0.0139 '/'
Inlet Invert= 245.95', Outlet Invert= 235.00'



Reach 1R: 15" HDPE



Summary for Pond Bio-1A: (new Pond)

Inflow Area = 5.800 ac, 24.93% Impervious, Inflow Depth = 2.50" for 10-yr event
Inflow = 16.69 cfs @ 12.09 hrs, Volume= 1.210 af
Outflow = 3.76 cfs @ 12.52 hrs, Volume= 0.925 af, Atten= 77%, Lag= 25.6 min
Primary = 3.76 cfs @ 12.52 hrs, Volume= 0.925 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 186.37' @ 12.52 hrs Surf.Area= 13,627 sf Storage= 23,460 cf

Plug-Flow detention time= 186.1 min calculated for 0.925 af (76% of inflow)
Center-of-Mass det. time= 100.7 min (928.4 - 827.7)

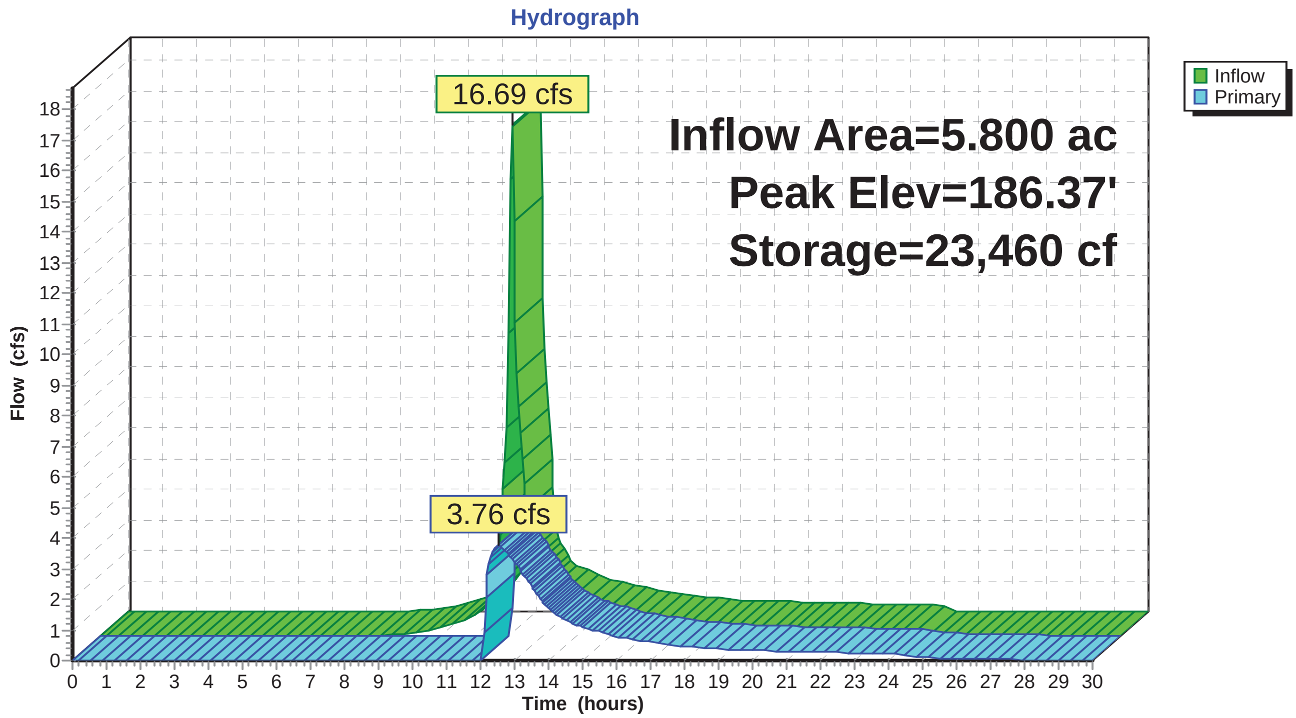
Volume	Invert	Avail.Storage	Storage Description
#1	184.00'	64,609 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
184.00	2,157	0	0
185.00	10,993	6,575	6,575
186.00	12,947	11,970	18,545
187.00	14,785	13,866	32,411
188.00	16,210	15,498	47,909
189.00	17,191	16,701	64,609

Device	Routing	Invert	Outlet Devices
#1	Primary	185.50'	**24.0" W x 6.0" H Vert. Orifice/Grate** C= 0.600
#2	Primary	186.70'	**2.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32
#3	Primary	187.80'	**14.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32
#4	Primary	188.00'	**12.0' long x 6.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.37 2.51 2.70 2.68 2.68 2.67 2.65 2.65 2.65 2.65 2.66 2.66 2.67 2.69 2.72 2.76 2.83

Primary OutFlow Max=3.76 cfs @ 12.52 hrs HW=186.37' (Free Discharge)
├─**1=Orifice/Grate** (Orifice Controls 3.76 cfs @ 3.76 fps)
├─**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)
├─**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)
└─**4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond Bio-1A: (new Pond)



Summary for Pond Bio-3A:

Inflow Area = 10.512 ac, 43.46% Impervious, Inflow Depth = 2.98" for 10-yr event
Inflow = 24.30 cfs @ 12.27 hrs, Volume= 2.613 af
Outflow = 8.50 cfs @ 12.74 hrs, Volume= 2.250 af, Atten= 65%, Lag= 27.9 min
Primary = 8.50 cfs @ 12.74 hrs, Volume= 2.250 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 230.09' @ 12.74 hrs Surf.Area= 33,731 sf Storage= 49,994 cf

Plug-Flow detention time= 167.3 min calculated for 2.250 af (86% of inflow)
Center-of-Mass det. time= 106.2 min (930.3 - 824.1)

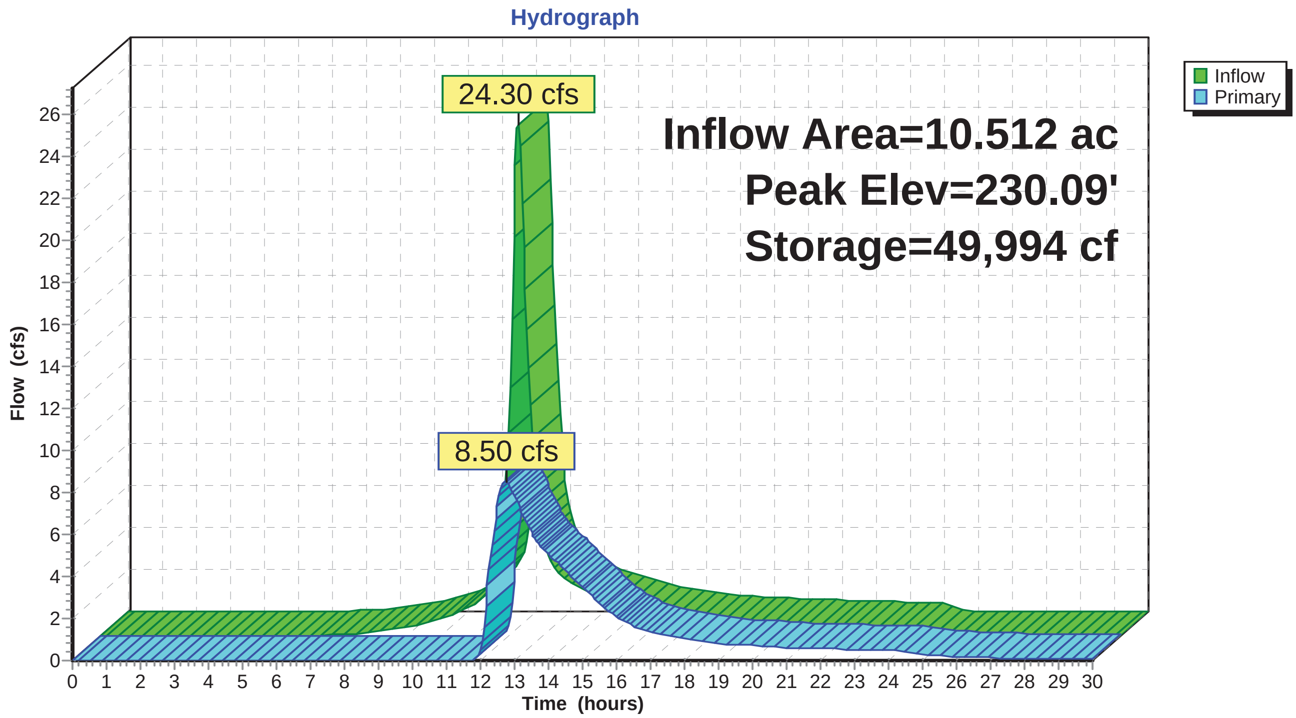
Volume	Invert	Avail.Storage	Storage Description
#1	228.50'	91,324 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
228.50	29,191	0	0
229.00	30,603	14,949	14,949
230.00	33,469	32,036	46,985
231.00	36,393	34,931	81,916
231.25	38,872	9,408	91,324

Device	Routing	Invert	Outlet Devices
#1	Primary	229.00'	**36.0" W x 4.0" H Vert. Orifice/Grate** C= 0.600
#2	Primary	229.15'	**24.0" W x 3.0" H Vert. Orifice/Grate** C= 0.600
#3	Primary	229.75'	**3.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32
#4	Primary	231.00'	**13.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Primary OutFlow Max=8.49 cfs @ 12.74 hrs HW=230.09' (Free Discharge)
1=Orifice/Grate (Orifice Controls 4.62 cfs @ 4.62 fps)
2=Orifice/Grate (Orifice Controls 2.17 cfs @ 4.34 fps)
3=Broad-Crested Rectangular Weir (Weir Controls 1.71 cfs @ 1.68 fps)
4=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Pond Bio-3A:

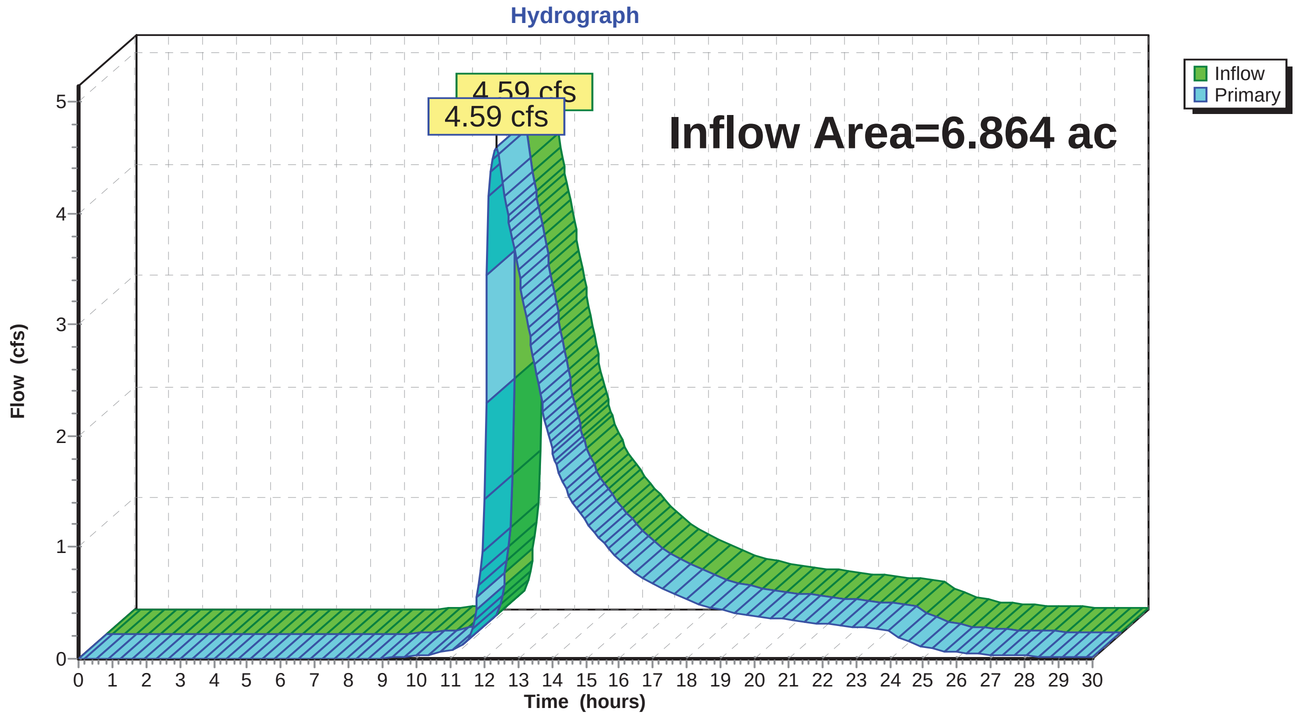

Hydrograph
24.30 cfs
8.50 cfs
Inflow Area=10.512 ac
Peak Elev=230.09'
Storage=49,994 cf
Inflow
Primary
Flow (cfs)
0
2
4
6
8
10
12
14
16
18
20
22
24
26
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
Time (hours)

Summary for Link DP-1:

Inflow Area = 6.864 ac, 26.65% Impervious, Inflow Depth > 1.94" for 10-yr event
Inflow = 4.59 cfs @ 12.36 hrs, Volume= 1.109 af
Primary = 4.59 cfs @ 12.36 hrs, Volume= 1.109 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Link DP-1:

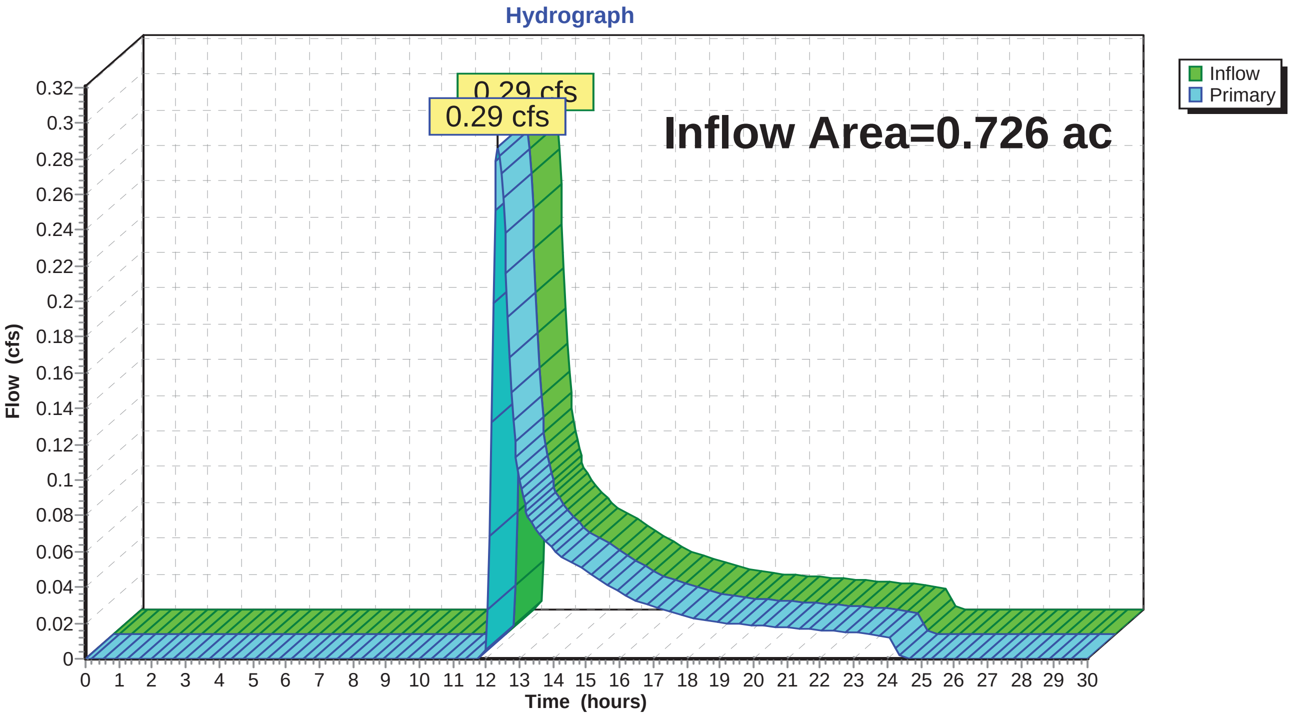


Summary for Link DP-2:

Inflow Area = 0.726 ac, 0.00% Impervious, Inflow Depth = 0.70" for 10-yr event
Inflow = 0.29 cfs @ 12.36 hrs, Volume= 0.043 af
Primary = 0.29 cfs @ 12.36 hrs, Volume= 0.043 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Link DP-2:

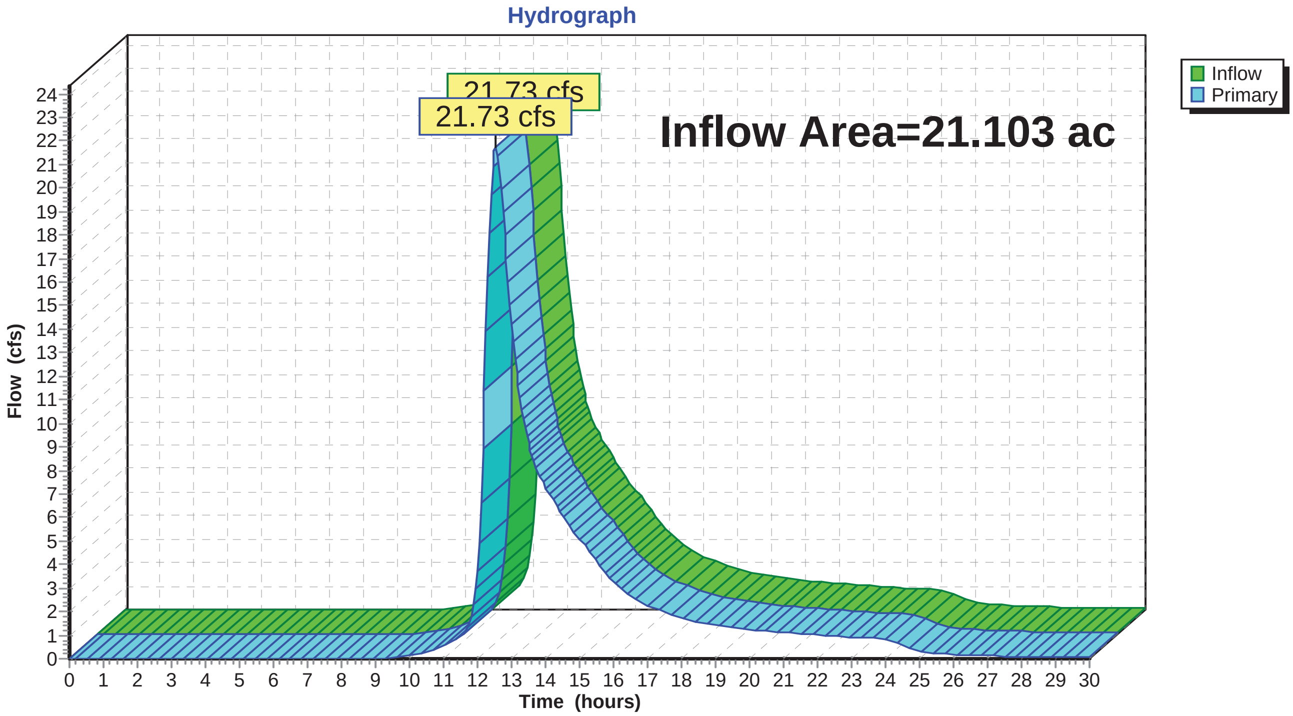


Summary for Link DP-3:

Inflow Area = 21.103 ac, 22.09% Impervious, Inflow Depth > 2.37" for 10-yr event
Inflow = 21.73 cfs @ 12.54 hrs, Volume= 4.164 af
Primary = 21.73 cfs @ 12.54 hrs, Volume= 4.164 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Link DP-3:



Summary for Subcatchment WS1:

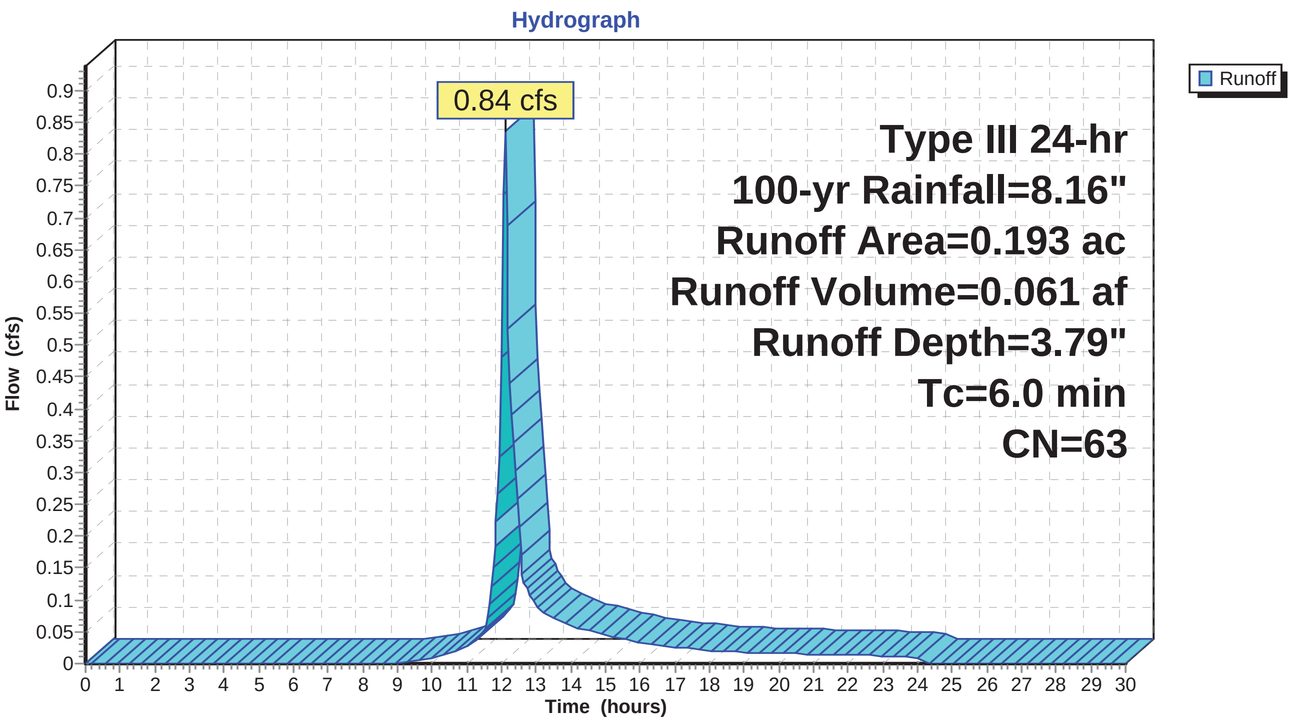
Runoff = 0.84 cfs @ 12.10 hrs, Volume= 0.061 af, Depth= 3.79"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-yr Rainfall=8.16"

Area (ac)	CN	Description
0.053	98	Paved parking, HSG C
0.099	39	>75% Grass cover, Good, HSG A
0.041	74	>75% Grass cover, Good, HSG C
0.193	63	Weighted Average
0.140		72.54% Pervious Area
0.053		27.46% Impervious Area

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

Subcatchment WS1:



Summary for Subcatchment WS1A:

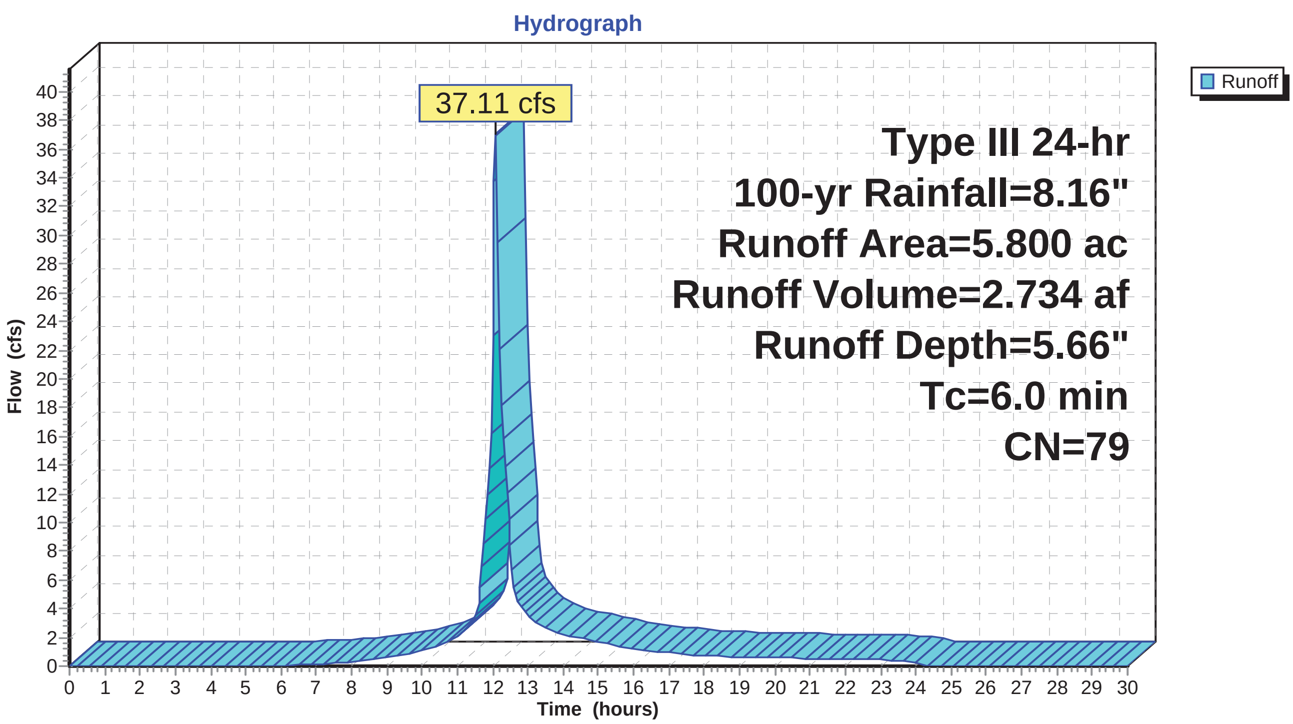
Runoff = 37.11 cfs @ 12.09 hrs, Volume= 2.734 af, Depth= 5.66"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-yr Rainfall=8.16"

Area (ac)	CN	Description
0.066	39	>75% Grass cover, Good, HSG A
3.153	74	>75% Grass cover, Good, HSG C
1.446	98	Paved parking, HSG C
1.135	70	Woods, Good, HSG C
5.800	79	Weighted Average
4.354		75.07% Pervious Area
1.446		24.93% Impervious Area

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

Subcatchment WS1A:



Summary for Subcatchment WS1B:

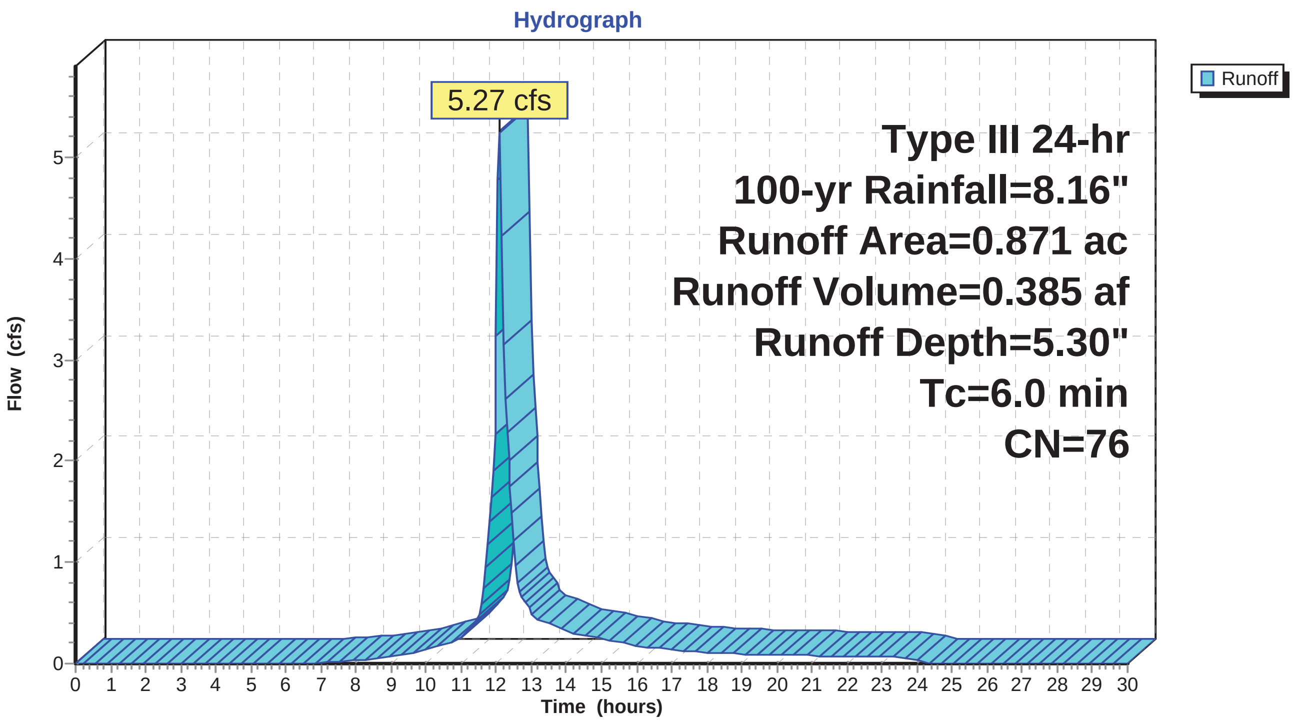
Runoff = 5.27 cfs @ 12.09 hrs, Volume= 0.385 af, Depth= 5.30"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-yr Rainfall=8.16"

Area (ac)	CN	Description
0.330	98	Paved parking, HSG C
0.181	39	>75% Grass cover, Good, HSG A
0.360	74	>75% Grass cover, Good, HSG C
0.871	76	Weighted Average
0.541		62.11% Pervious Area
0.330		37.89% Impervious Area

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

Subcatchment WS1B:



Summary for Subcatchment WS2:

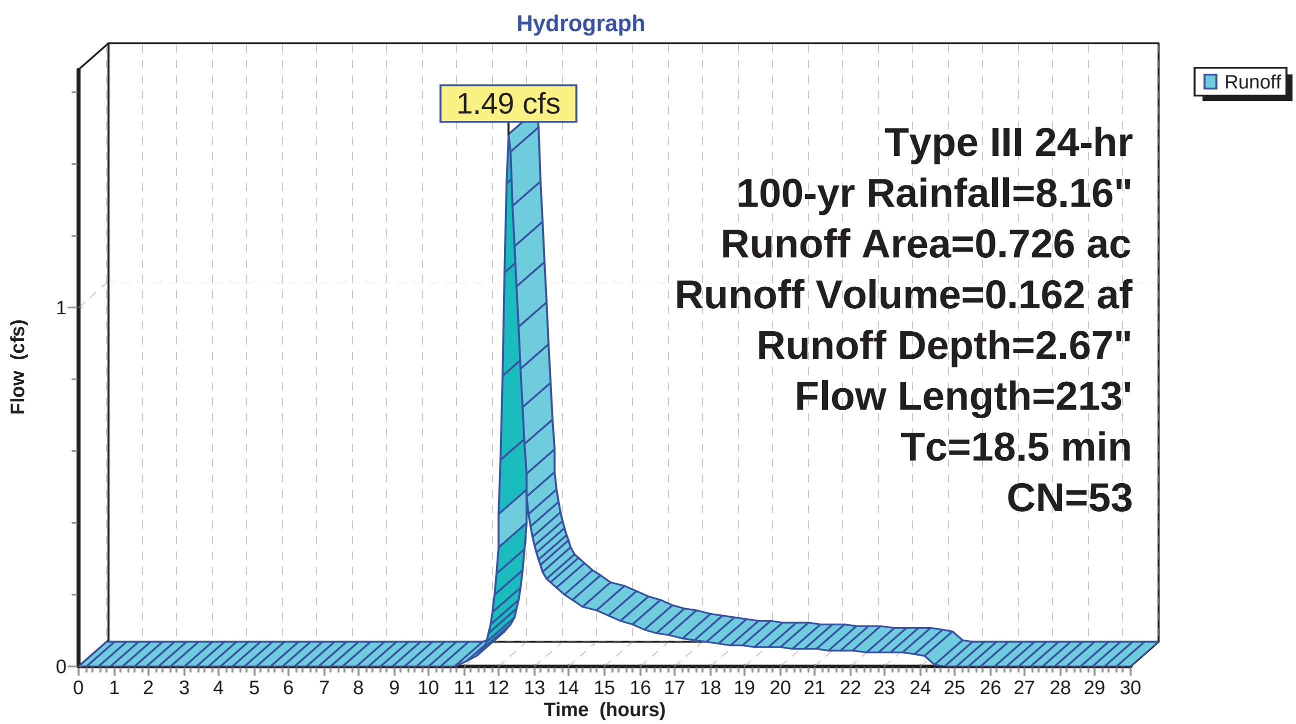
Runoff = 1.49 cfs @ 12.28 hrs, Volume= 0.162 af, Depth= 2.67"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-yr Rainfall=8.16"

Area (ac)	CN	Description
0.300	30	Woods, Good, HSG A
0.426	70	Woods, Good, HSG C
0.726	53	Weighted Average
0.726		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.5	73	0.0210	0.07		**Sheet Flow, Sheet Flow** Woods: Light underbrush n= 0.400 P2= 3.15"
2.0	140	0.0540	1.16		**Shallow Concentrated Flow, Shallow Conc** Woodland Kv= 5.0 fps
18.5	213	Total			

Subcatchment WS2:



Summary for Subcatchment WS3:

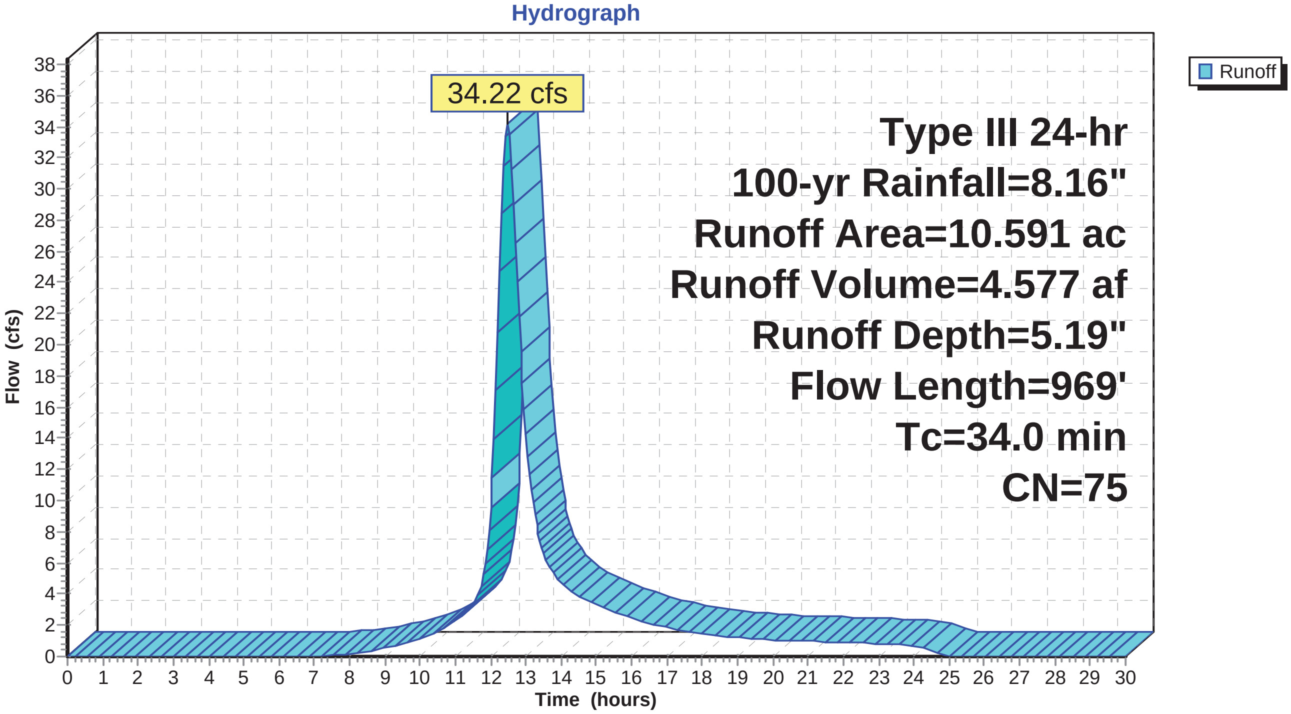
Runoff = 34.22 cfs @ 12.47 hrs, Volume= 4.577 af, Depth= 5.19"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-yr Rainfall=8.16"

Area (ac)	CN	Description
0.093	98	Paved parking, HSG C
2.413	70	Woods, Good, HSG C
0.973	77	Woods, Good, HSG D
0.488	70	Brush, Fair, HSG C
5.361	77	Brush, Fair, HSG D
1.125	74	>75% Grass cover, Good, HSG C
0.138	80	>75% Grass cover, Good, HSG D
10.591	75	Weighted Average
10.498		99.12% Pervious Area
0.093		0.88% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
25.7	100	0.0130	0.06		**Sheet Flow, Sheet flow** Woods: Light underbrush n= 0.400 P2= 3.15"
3.9	154	0.0176	0.66		**Shallow Concentrated Flow, Shallow Conc** Woodland Kv= 5.0 fps
4.4	715	0.0095	2.72	27.18	**Channel Flow, Wetland Channel** Area= 10.0 sf Perim= 11.0' r= 0.91' n= 0.050 Scattered brush, heavy weeds
34.0	969	Total			

Subcatchment WS3:



Summary for Subcatchment WS3A:

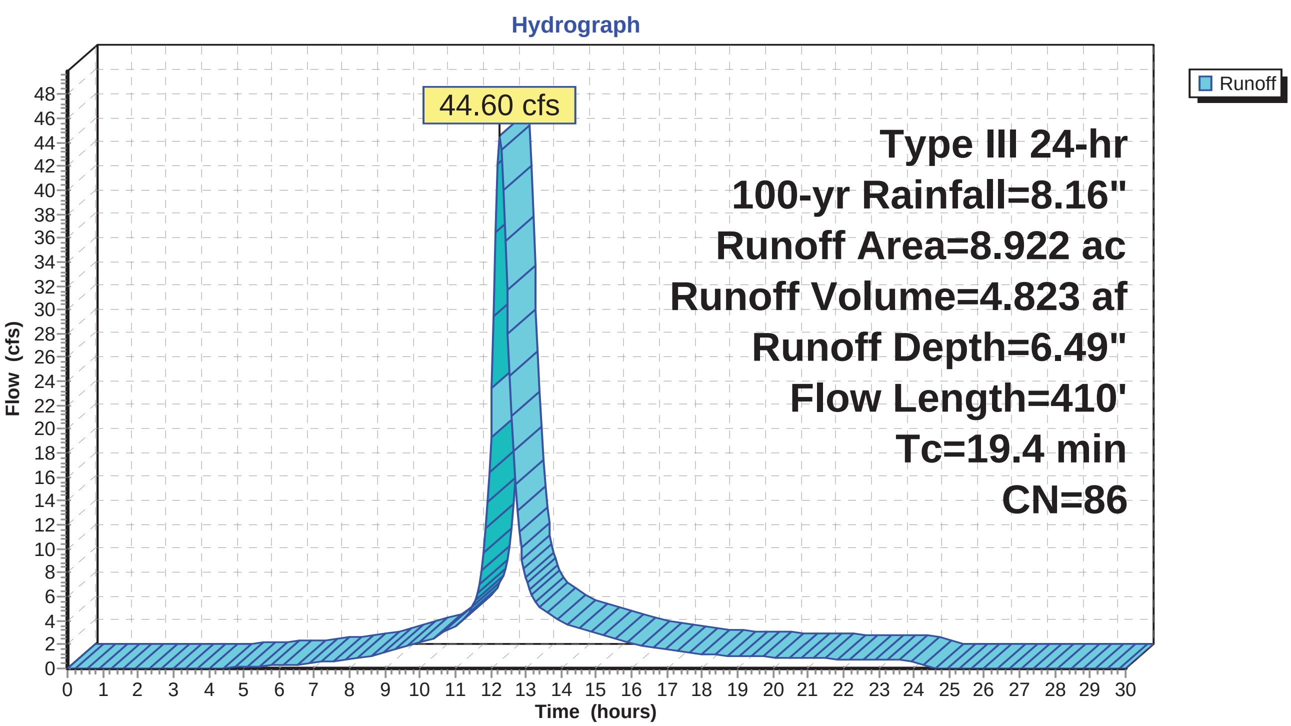
Runoff = 44.60 cfs @ 12.26 hrs, Volume= 4.823 af, Depth= 6.49"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-yr Rainfall=8.16"

Area (ac)	CN	Description
4.501	98	Paved parking, HSG C
3.794	74	>75% Grass cover, Good, HSG C
0.627	70	Woods, Good, HSG C
8.922	86	Weighted Average
4.421		49.55% Pervious Area
4.501		50.45% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.4	90	0.0290	0.13		**Sheet Flow, Sheet Flow** Grass: Dense n= 0.240 P2= 3.15"
8.0	320	0.0250	0.67	8.70	**Channel Flow, Grassed Swale** Area= 13.0 sf Perim= 23.0' r= 0.57' n= 0.240 Sheet flow over Dense Grass
19.4	410	Total			

Subcatchment WS3A:



Summary for Subcatchment WS3B:

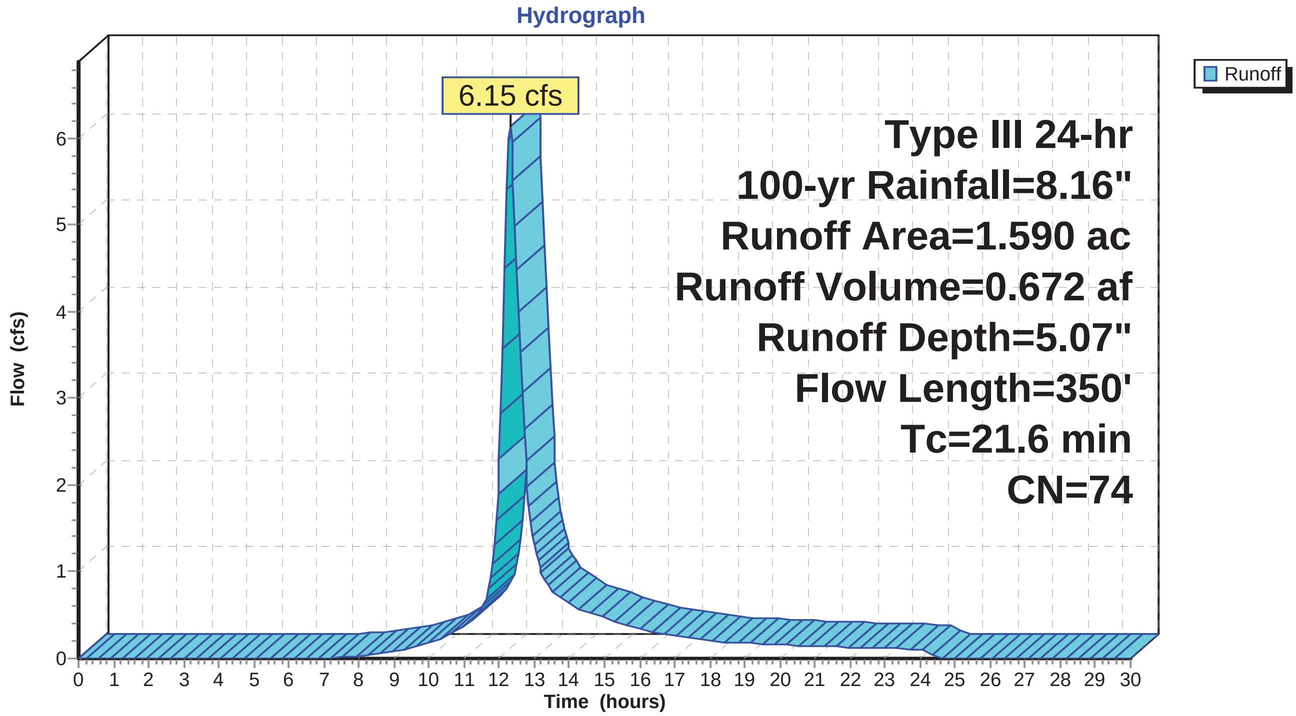
Runoff = 6.15 cfs @ 12.30 hrs, Volume= 0.672 af, Depth= 5.07"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-yr Rainfall=8.16"

Area (ac)	CN	Description
0.068	98	Paved parking, HSG C
0.300	70	Woods, Good, HSG C
1.222	74	>75% Grass cover, Good, HSG C
1.590	74	Weighted Average
1.522		95.72% Pervious Area
0.068		4.28% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.9	80	0.0100	0.08		**Sheet Flow, Sheet Flow - Grass** Grass: Dense n= 0.240 P2= 3.15"
5.7	270	0.0200	0.79	9.48	**Channel Flow, Channel Flow** Area= 12.0 sf Perim= 14.0' r= 0.86' n= 0.240 Sheet flow over Dense Grass
21.6	350	Total			

Subcatchment WS3B:



Summary for Reach 1R: 15" HDPE

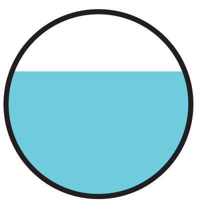
[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area = 1.590 ac, 4.28% Impervious, Inflow Depth = 5.07" for 100-yr event
Inflow = 6.15 cfs @ 12.30 hrs, Volume= 0.672 af
Outflow = 6.06 cfs @ 12.36 hrs, Volume= 0.672 af, Atten= 1%, Lag= 3.6 min

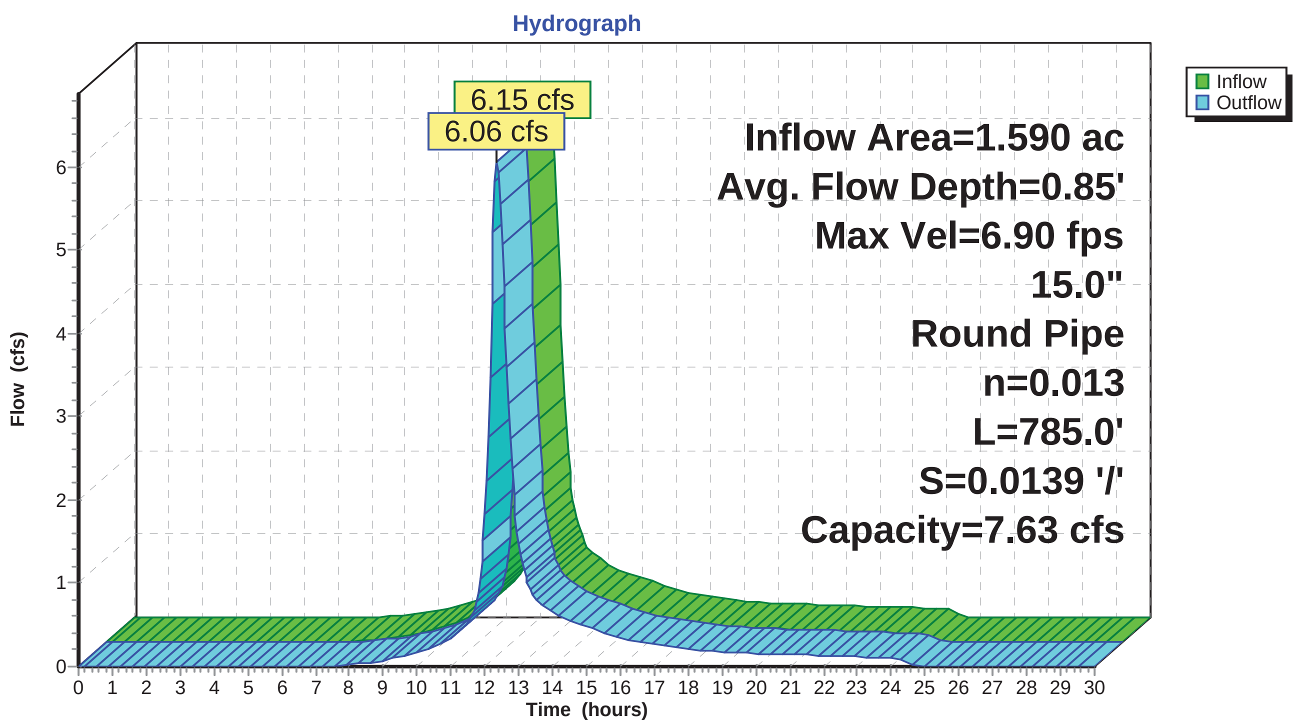
Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Max. Velocity= 6.90 fps, Min. Travel Time= 1.9 min
Avg. Velocity = 2.65 fps, Avg. Travel Time= 4.9 min

Peak Storage= 693 cf @ 12.32 hrs
Average Depth at Peak Storage= 0.85'
Bank-Full Depth= 1.25' Flow Area= 1.2 sf, Capacity= 7.63 cfs

15.0" Round Pipe
n= 0.013 Corrugated PE, smooth interior
Length= 785.0' Slope= 0.0139 '/'
Inlet Invert= 245.95', Outlet Invert= 235.00'



Reach 1R: 15" HDPE



Summary for Pond Bio-1A: (new Pond)

Inflow Area =	5.800 ac,	24.93% Impervious,	Inflow Depth = 5.66"	for 100-yr event
Inflow =	37.11 cfs @	12.09 hrs, Volume=	2.734 af	
Outflow =	14.94 cfs @	12.32 hrs, Volume=	2.449 af,	Atten= 60%, Lag= 14.0 min
Primary =	14.94 cfs @	12.32 hrs, Volume=	2.449 af	

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 187.82' @ 12.32 hrs Surf.Area= 15,952 sf Storage= 45,002 cf

Plug-Flow detention time= 123.5 min calculated for 2.445 af (89% of inflow)
Center-of-Mass det. time= 74.5 min (879.0 - 804.5)

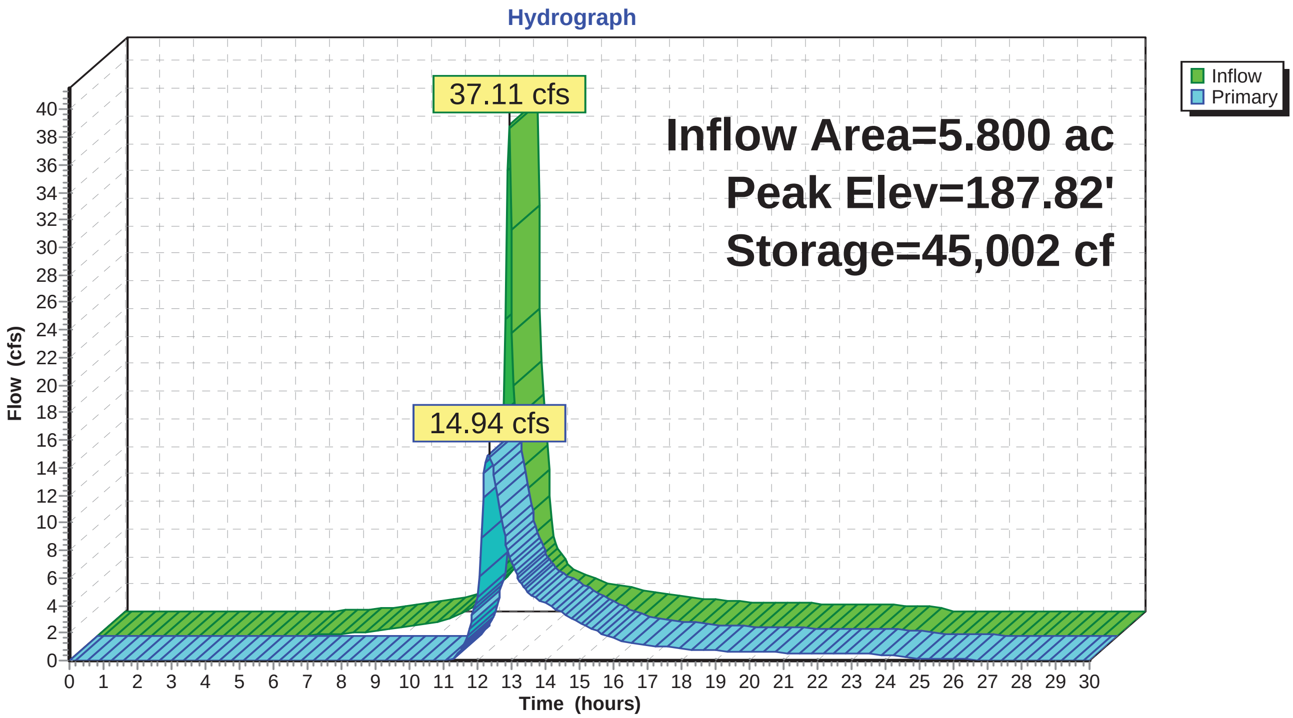
Volume	Invert	Avail.Storage	Storage Description
#1	184.00'	64,609 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
184.00	2,157	0	0
185.00	10,993	6,575	6,575
186.00	12,947	11,970	18,545
187.00	14,785	13,866	32,411
188.00	16,210	15,498	47,909
189.00	17,191	16,701	64,609

Device	Routing	Invert	Outlet Devices
#1	Primary	185.50'	**24.0" W x 6.0" H Vert. Orifice/Grate** C= 0.600
#2	Primary	186.70'	**2.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32
#3	Primary	187.80'	**14.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32
#4	Primary	188.00'	**12.0' long x 6.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.37 2.51 2.70 2.68 2.68 2.67 2.65 2.65 2.65 2.65 2.66 2.66 2.67 2.69 2.72 2.76 2.83

Primary OutFlow Max=14.82 cfs @ 12.32 hrs HW=187.82' (Free Discharge)
1=Orifice/Grate (Orifice Controls 6.92 cfs @ 6.92 fps)
2=Broad-Crested Rectangular Weir (Weir Controls 7.83 cfs @ 3.51 fps)
3=Broad-Crested Rectangular Weir (Weir Controls 0.08 cfs @ 0.35 fps)
4=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Pond Bio-1A: (new Pond)



Summary for Pond Bio-3A:

Inflow Area = 10.512 ac, 43.46% Impervious, Inflow Depth = 6.27" for 100-yr event
Inflow = 50.00 cfs @ 12.27 hrs, Volume= 5.494 af
Outflow = 26.35 cfs @ 12.59 hrs, Volume= 5.129 af, Atten= 47%, Lag= 19.2 min
Primary = 26.35 cfs @ 12.59 hrs, Volume= 5.129 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 231.09' @ 12.59 hrs Surf.Area= 37,283 sf Storage= 85,222 cf

Plug-Flow detention time= 118.0 min calculated for 5.120 af (93% of inflow)
Center-of-Mass det. time= 83.4 min (887.3 - 803.9)

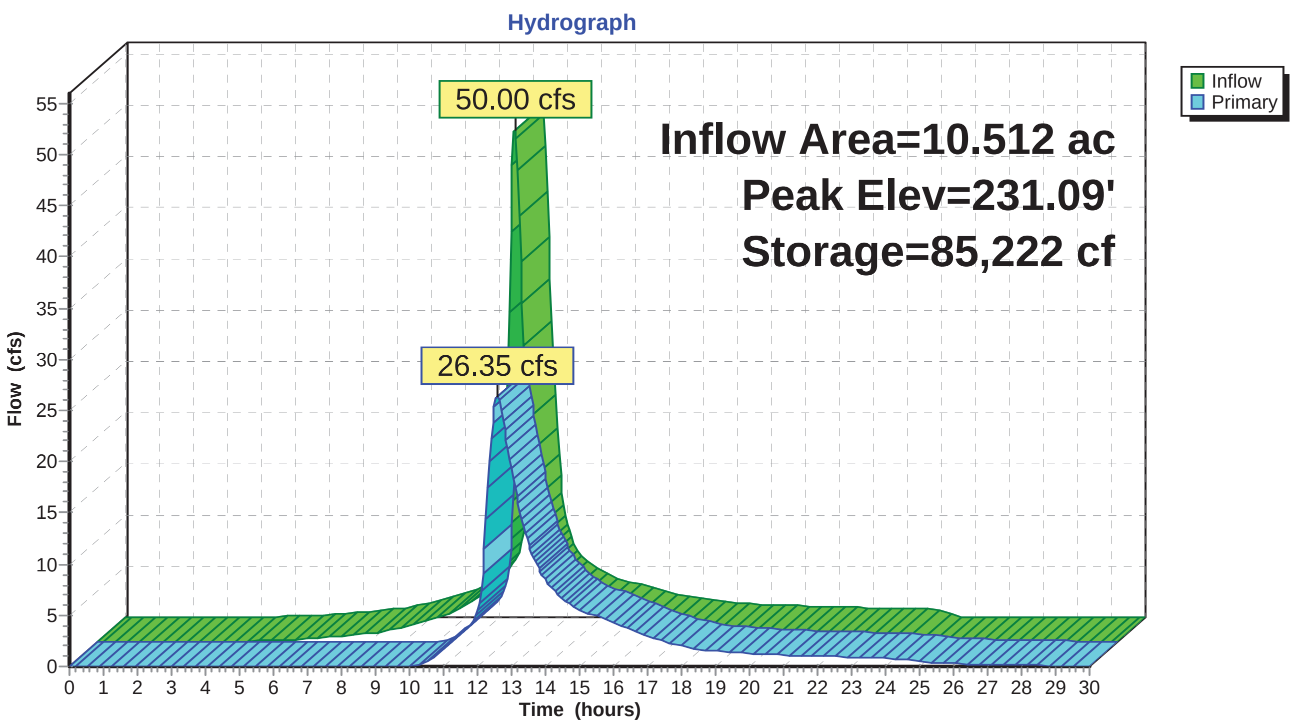
Volume	Invert	Avail.Storage	Storage Description
#1	228.50'	91,324 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
228.50	29,191	0	0
229.00	30,603	14,949	14,949
230.00	33,469	32,036	46,985
231.00	36,393	34,931	81,916
231.25	38,872	9,408	91,324

Device	Routing	Invert	Outlet Devices
#1	Primary	229.00'	**36.0" W x 4.0" H Vert. Orifice/Grate** C= 0.600
#2	Primary	229.15'	**24.0" W x 3.0" H Vert. Orifice/Grate** C= 0.600
#3	Primary	229.75'	**3.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32
#4	Primary	231.00'	**13.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Primary OutFlow Max=26.29 cfs @ 12.59 hrs HW=231.09' (Free Discharge)
—**1=Orifice/Grate** (Orifice Controls 6.67 cfs @ 6.67 fps)
—**2=Orifice/Grate** (Orifice Controls 3.24 cfs @ 6.48 fps)
—**3=Broad-Crested Rectangular Weir** (Weir Controls 15.42 cfs @ 3.84 fps)
—**4=Broad-Crested Rectangular Weir** (Weir Controls 0.95 cfs @ 0.83 fps)

Pond Bio-3A:

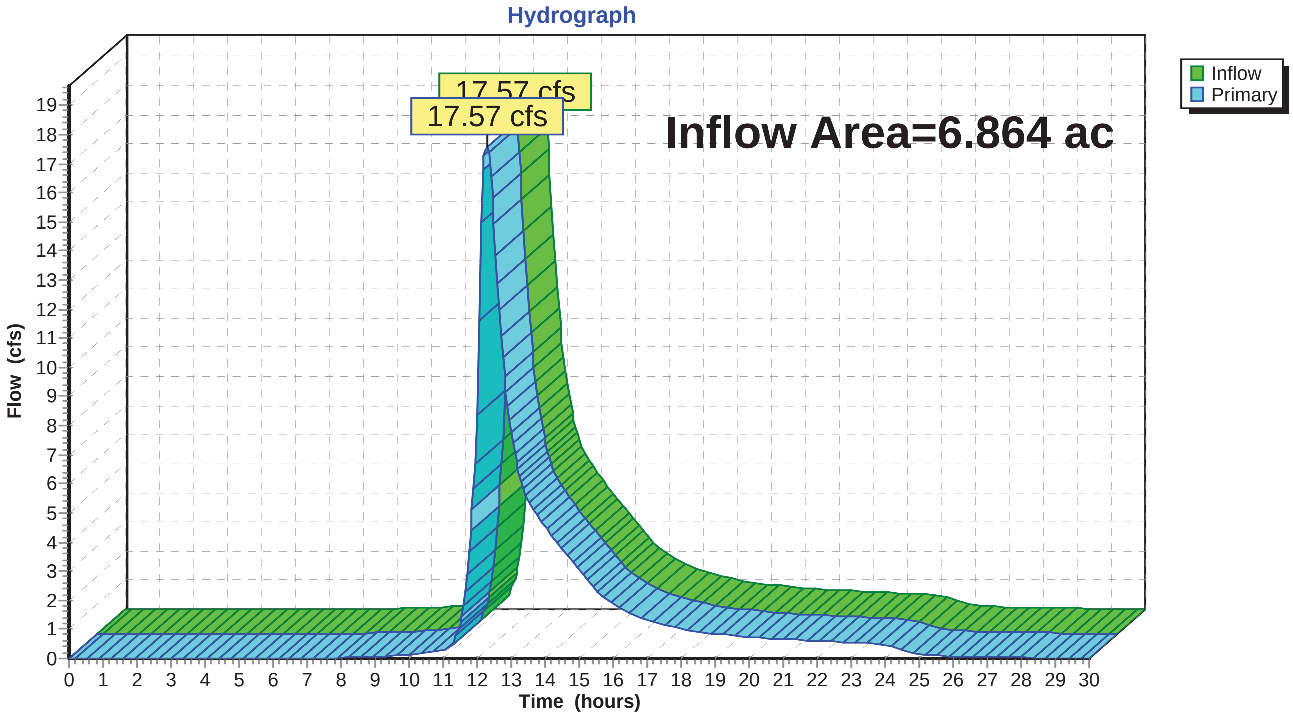

Hydrograph
Inflow
Primary
50.00 cfs
26.35 cfs
Inflow Area=10.512 ac
Peak Elev=231.09'
Storage=85,222 cf
Flow (cfs)
0
5
10
15
20
25
30
35
40
45
50
55
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
Time (hours)

Summary for Link DP-1:

Inflow Area = 6.864 ac, 26.65% Impervious, Inflow Depth > 5.06" for 100-yr event
Inflow = 17.57 cfs @ 12.28 hrs, Volume= 2.895 af
Primary = 17.57 cfs @ 12.28 hrs, Volume= 2.895 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Link DP-1:

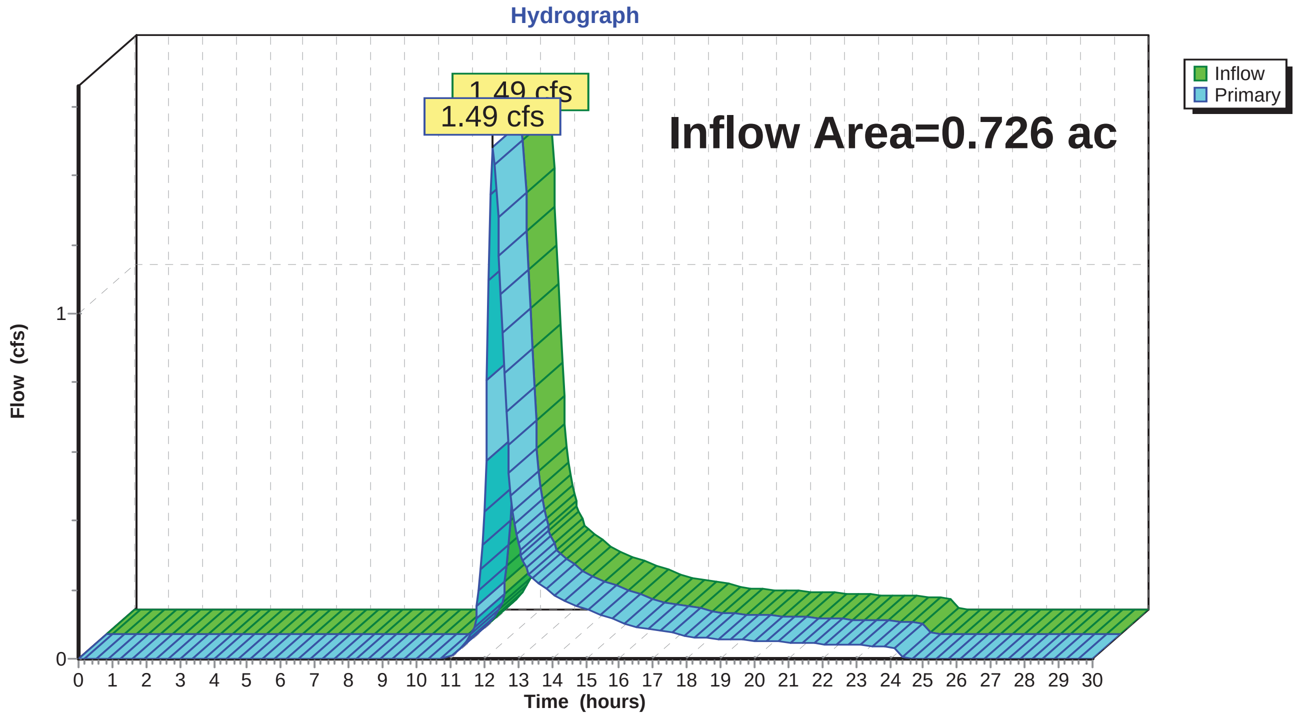


Summary for Link DP-2:

Inflow Area = 0.726 ac, 0.00% Impervious, Inflow Depth = 2.67" for 100-yr event
Inflow = 1.49 cfs @ 12.28 hrs, Volume= 0.162 af
Primary = 1.49 cfs @ 12.28 hrs, Volume= 0.162 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Link DP-2:

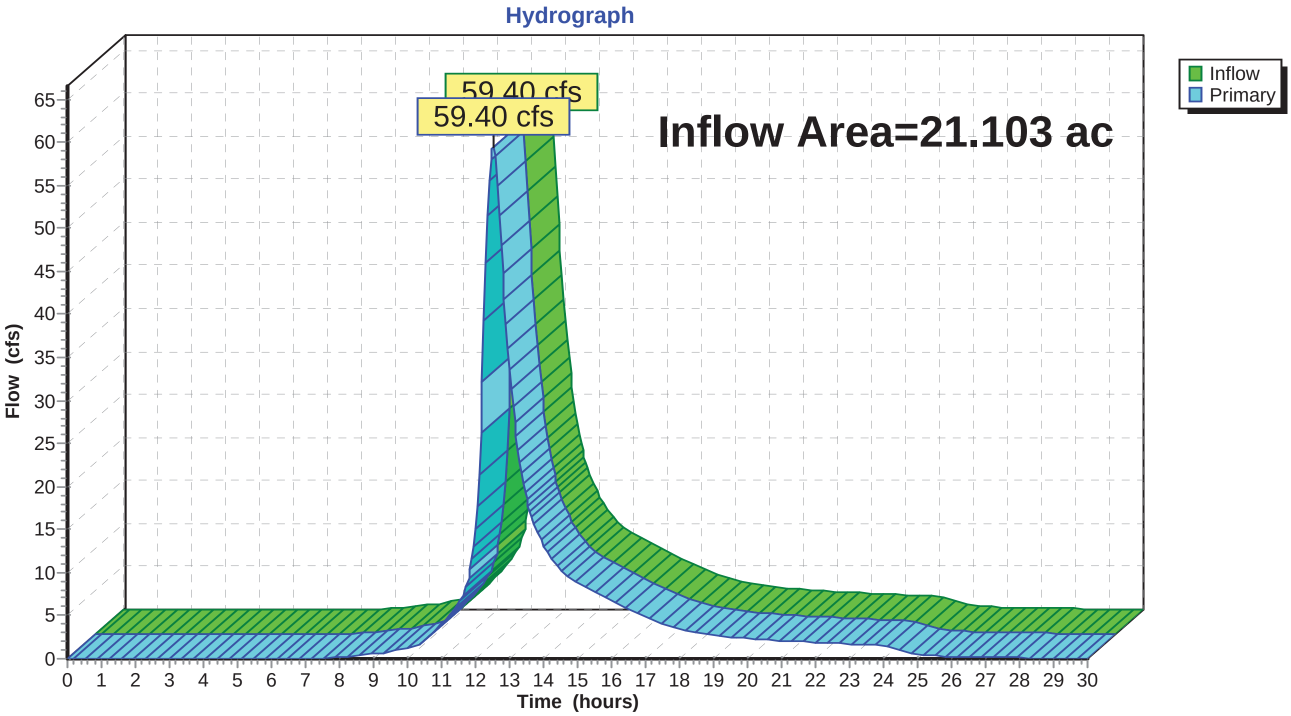


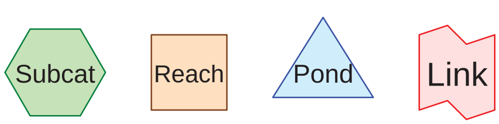
Summary for Link DP-3:

Inflow Area = 21.103 ac, 22.09% Impervious, Inflow Depth > 5.52" for 100-yr event
Inflow = 59.40 cfs @ 12.52 hrs, Volume= 9.706 af
Primary = 59.40 cfs @ 12.52 hrs, Volume= 9.706 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Link DP-3:





Routing Diagram for 170915_Bayside
Prepared by Maser Consulting PA, Printed 9/21/2017
HydroCAD® 10.00-19 s/n 09757 © 2016 HydroCAD Software Solutions LLC

Summary for Subcatchment WQ-1B1: South Structure

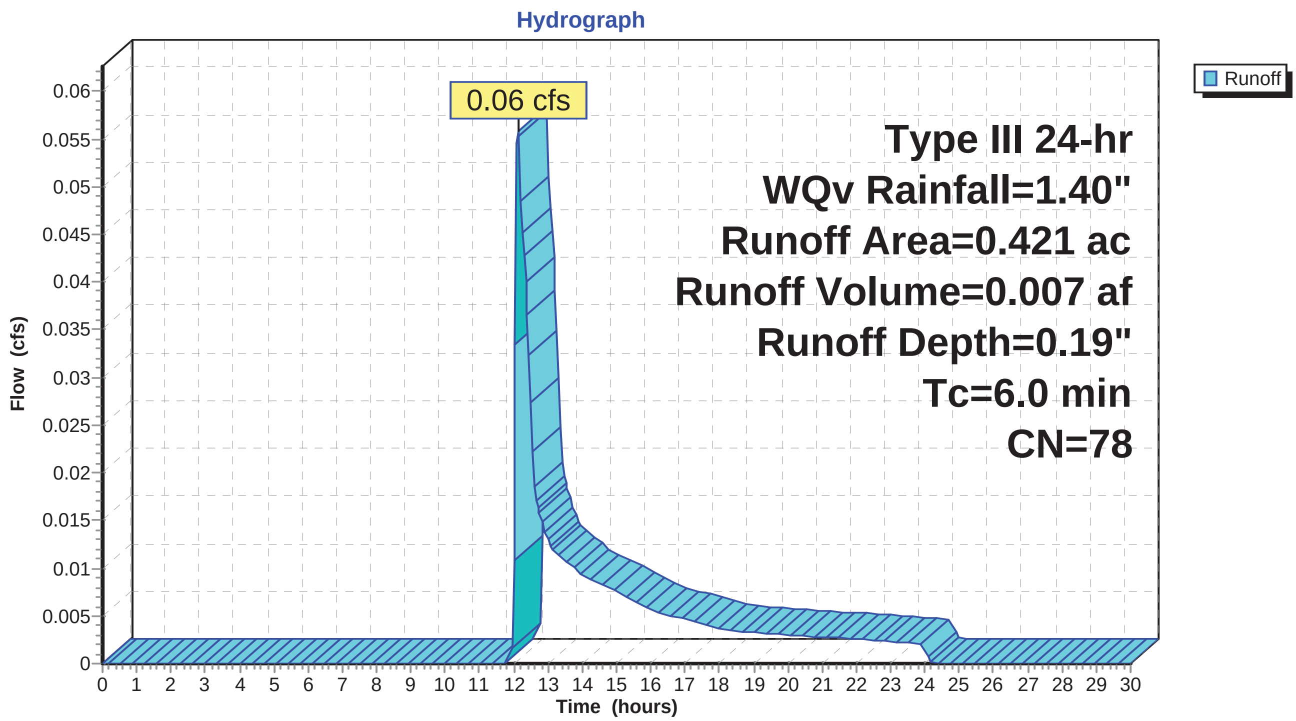
Runoff = 0.06 cfs @ 12.13 hrs, Volume= 0.007 af, Depth= 0.19"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr WQv Rainfall=1.40"

Area (ac)	CN	Description
0.129	98	Paved parking, HSG C
0.043	39	>75% Grass cover, Good, HSG A
0.249	74	>75% Grass cover, Good, HSG C
0.421	78	Weighted Average
0.292		69.36% Pervious Area
0.129		30.64% Impervious Area

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

Subcatchment WQ-1B1: South Structure



Summary for Subcatchment WQ-1B2: North Structure

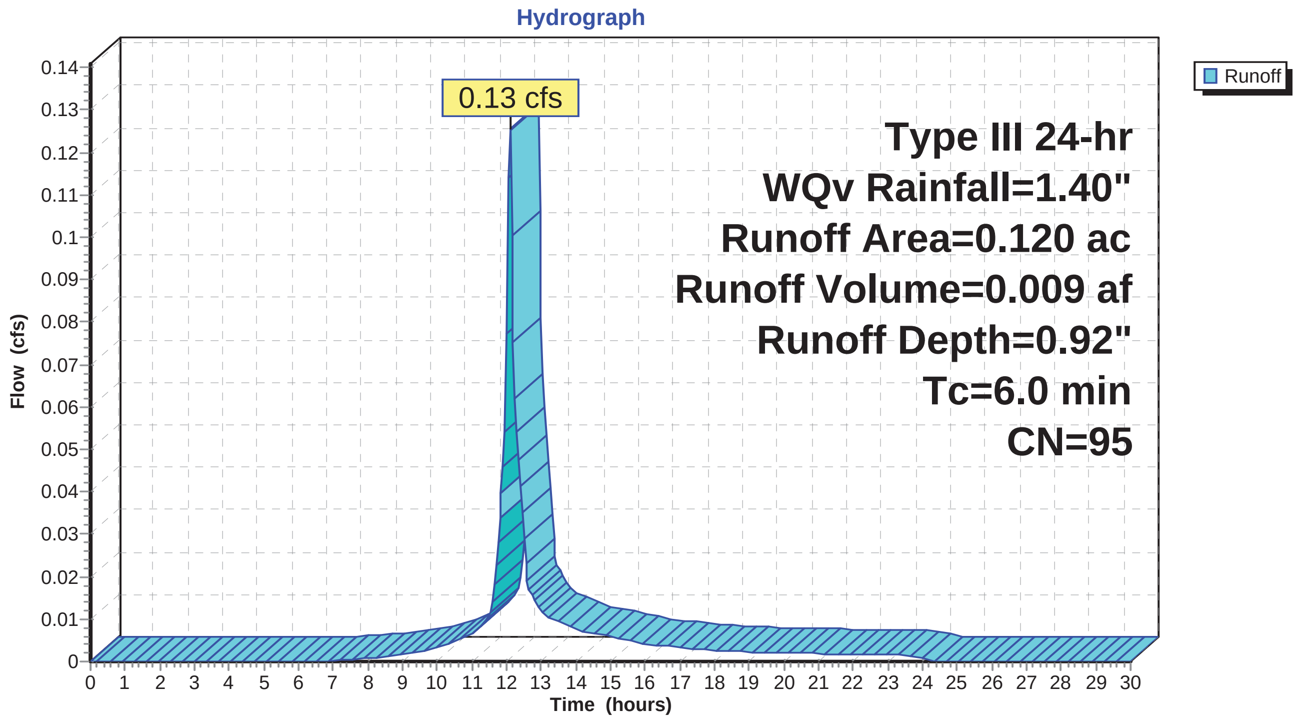
Runoff = 0.13 cfs @ 12.09 hrs, Volume= 0.009 af, Depth= 0.92"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr WQv Rainfall=1.40"

Area (ac)	CN	Description
0.114	98	Paved parking, HSG C
0.006	39	>75% Grass cover, Good, HSG A
0.120	95	Weighted Average
0.006		5.00% Pervious Area
0.114		95.00% Impervious Area

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

Subcatchment WQ-1B2: North Structure



APPENDIX 4

SPDES GENERAL PERMIT GP 0-15-002

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

From

CONSTRUCTION ACTIVITY

Permit No. GP-0-15-002

Issued Pursuant to Article 17, Titles 7, 8 and Article 70
of the Environmental Conservation Law

Effective Date: January 29, 2015　　　　Expiration Date: January 28, 2020

John J. Ferguson
Chief Permit Administrator

1 / 12 / 15

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's *State Pollutant Discharge Elimination System ("SPDES")* is a NPDES-approved program with permits issued in accordance with the *Environmental Conservation Law ("ECL").*

This general permit ("permit") is issued pursuant to Article 17, Titles 7, 8 and Article 70 of the ECL. An *owner or operator* may obtain coverage under this permit by submitting a Notice of Intent ("NOI") to the Department. Copies of this permit and the NOI for New York are available by calling (518) 402-8109 or at any New York State Department of Environmental Conservation ("the Department") regional office (see Appendix G).They are also available on the Department's website at:
http://www.dec.ny.gov/

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 Article 17-0505 of the ECL, the *owner or operator* must have coverage under a SPDES permit prior to *commencing construction activity*. They 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

Part I. 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 August 2005, 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 discharge*s;

(ii) Control stormwater *discharge*s 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 buffers 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; and

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

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 and other materials present on the site to precipitation and to stormwater. Minimization of exposure is not required in cases where the exposure to precipitation and to stormwater will not result in a *discharge* of *pollutants*, or where exposure of a specific material or product poses little risk of stormwater contamination (such as final products and materials intended for outdoor use) ; and

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

e. **Prohibited *Discharges*.** The following *discharges* 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 *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.

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 from *construction activities*.

3. Notwithstanding paragraphs E.1 and E.2 above, the following non-stormwater *discharges* may be authorized by this permit: *discharge*s from firefighting activities; fire hydrant flushings; waters to which cleansers or other components have not been added that are used to wash vehicles or control dust in accordance with the SWPPP, routine external building washdown which does not use detergents; pavement washwaters where spills or leaks of toxic or hazardous materials have not occurred (unless all spilled material has been removed) and where detergents are not used; air conditioning condensate; uncontaminated *groundwater* or spring water; uncontaminated *discharge*s from construction site de-watering operations; and foundation or footing drains where flows are not contaminated with process materials such as solvents. For those entities required to obtain coverage under this permit, and who *discharge* as noted in this paragraph, and with the exception of flows from firefighting activities, these *discharge*s must be identified in the SWPPP. Under all circumstances, the *owner or operator* must still comply with *water quality standards* in Part I.D of this permit.

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

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

All of the following are **<u>not</u>** authorized by this permit:

1. *Discharge*s after *construction activities* have been completed and the site has undergone *final stabilization*;

2. *Discharge*s that are mixed with sources of non-stormwater other than those expressly authorized under subsection E.3. of this Part and identified in the SWPPP required by this permit;

3. *Discharges* that are required to obtain an individual SPDES permit or another SPDES general permit pursuant to Part VII.K. of this permit;

4. *Construction activities* or *discharges* from *construction activities* that may adversely affect an endangered or threatened species unless the *owner or operator* has obtained a permit issued pursuant to 6 NYCRR Part 182 for the project or the Department has issued a letter of non-jurisdiction for the project. All documentation necessary to demonstrate eligibility shall be maintained on site in accordance with Part II.C.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 disturb one or more acres of land with no existing *impervious cover*; and

   c. Which are undertaken on land with a Soil Slope Phase that is identified as an E or F, or the map unit name is inclusive of 25% or greater slope, on the United States Department of Agriculture (“USDA”) Soil Survey for the County where the disturbance will occur.

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 disturb two or more acres of land with no existing *impervious cover*; and

   c. Which are undertaken on land with a Soil Slope Phase that is identified as an E or F, or the map unit name is inclusive of 25% or greater slope, on the USDA Soil Survey for the County where the disturbance will occur.

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.C.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. OBTAINING PERMIT COVERAGE

A. Notice of Intent (NOI) Submittal

1. An *owner or operator* of a *construction activity* that is <u>not</u> 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 NOI form to the Department in order to be authorized to *discharge* under this permit. 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. 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 its 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. An *owner or operator* shall use either the electronic (eNOI) or paper version of the NOI.

   The paper version of the NOI shall be signed in accordance with Part VII.H. of this permit and submitted to the address in Part II.A.1.

The requirement for an *owner or operator* to have its SWPPP reviewed and accepted by the *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.E. (Change of *Owner or Operator*) or where the *owner or operator* of the *construction activity* is the *regulated, traditional land use control MS4*.

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.

B. 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) 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.B.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. The Department may suspend or deny an *owner's or operator's* coverage

under this permit if the Department determines that the SWPPP does not meet the permit requirements. In accordance with statute, regulation, and the terms and conditions of this permit, the Department may deny coverage under this permit and require submittal of an application for an individual SPDES permit based on a review of the NOI or other information pursuant to Part II.

5. 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.B. of this permit.

C. 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-0-15-002), NOI, *NOI Acknowledgment Letter*, SWPPP, MS4 SWPPP Acceptance form, inspection reports, 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 August 2005.

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. 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*.

5. 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

D. Permit Coverage for Discharges Authorized Under GP-0-10-001

1. Upon renewal of SPDES General Permit for Stormwater Discharges from *Construction Activity* (Permit No. GP-0-10-001), an *owner or operator* of *a construction activity* with coverage under GP-0-10-001, as of the effective date of GP-0-15-002, shall be authorized to *discharge* in accordance with GP-0-15-002, 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-0-15-002.

E. Change of *Owner or Operator*

2. 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. 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.A.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.

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:

   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*; and

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

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.C.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 August 2005. 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 August 2005, 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 August 2005;

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 August 2005. 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.

IV. **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),
- Registered Landscape Architect, or
- someone working under the direct supervision of, and at the same company as, the licensed Professional Engineer or Registered Landscape Architect, provided they have received four (4) hours of Department endorsed training in proper erosion and sediment control principles from a Soil and Water Conservation District, or other Department endorsed entity].

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

   a. the construction of a single family residential subdivision with 25% or less *impervious cover* at total site build-out that involves a soil disturbance of one (1) or more acres of land but less than five (5) acres and is <u>not</u> located in one of the watersheds listed in Appendix C and <u>not</u> directly discharging to one of the 303(d) segments listed in Appendix E;

   b. the construction of a single family home that involves a soil disturbance of one (1) or more acres of land but less than five (5) acres and is <u>not</u> located in one of the watersheds listed in Appendix C and <u>not</u> directly discharging to one of the 303(d) segments listed in Appendix E;

   c. construction on agricultural property that involves a soil disturbance of one (1) or more acres of land but less than five (5) acres; and

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

2. Unless otherwise notified by the Department, the *qualified inspector* shall conduct site inspections in accordance with the following timetable:

   a. For construction sites where soil disturbance activities are on-going, the *qualified inspector* shall conduct a site inspection at least once every seven (7) calendar days.

   b. For construction sites where soil disturbance activities are on-going and the *owner or operator* has received authorization in accordance with Part II.C.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.A.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.C.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.A.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.E. 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.

(Part V.A.5)

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.

VI. Part VI. REPORTING AND RETENTION OF 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.A.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.

VII. 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 *discharge*r authorized by a general permit to apply for an individual SPDES permit, it shall notify the *discharge*r 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.

VIII. **APPENDIX A**

Definitions

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.

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.

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).

New Development – means any land disturbance that does meet the definition of Redevelopment Activity included in this appendix.

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*.

Owner or Operator - means the person, persons or legal entity which owns or leases the property on which the *construction activity* is occurring; and/or an entity that has operational control over the construction plans and specifications, including the ability to make modifications to the plans and specifications.

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.

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, 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 required to gain coverage under New York State DEC's SPDES General Permit For Stormwater Discharges from Municipal Separate Stormwater Sewer Systems (MS4s).

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,
- Stream bank restoration projects (does not include the placement of spoil material),
- 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 makes 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 with a Soil Slope Phase that is identified as an E or F, or the map unit name is inclusive of 25% or greater slope, on the United States Department of Agriculture ("USDA") Soil Survey for the County where the disturbance will occur.

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 sources. 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 sources, 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, 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.

IX. 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 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
- Bike paths and trails
- Sidewalk construction projects that are not part of a road/ highway construction or reconstruction project
- Slope stabilization projects
- Slope flattening that changes the grade of the site, but does not significantly change the runoff characteristics
- Spoil areas that will be covered with vegetation
- Land clearing and grading for the purposes of creating vegetated open space (i.e. recreational parks, lawns, meadows, fields), excluding projects that *alter hydrology from pre to post development* conditions
- Athletic fields (natural grass) that do not include the construction or reconstruction of *impervious area* and do not *alter hydrology from pre to post development* conditions
- Demolition project where vegetation will be established and no redevelopment is planned
- Overhead electric transmission line project that does not include the construction of permanent access roads or parking areas surfaced with *impervious cover*
- Structural practices as identified in Table II in the “Agricultural Management Practices Catalog for Nonpoint Source Pollution in New York State”, excluding projects that involve soil disturbances of less than five acres and construction activities that include the construction or reconstruction of impervious area

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.

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 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 townhomes, condominiums, senior housing complexes, apartment complexes, and mobile home parks
- Airports
- Amusement parks
- 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, includes hospitals, prisons, schools and colleges
- Industrial facilities, includes industrial parks
- Landfills
- Municipal facilities; includes highway garages, transfer stations, office buildings, POTW's and water treatment plants
- Office complexes
- Sports complexes
- Racetracks, includes racetracks with earthen (dirt) surface
- Road construction or reconstruction
- Parking lot construction or reconstruction
- 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
- 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

X. APPENDIX C

Watersheds Where Enhanced Phosphorus Removal Standards Are Required

Watersheds where *owners or operators* of construction activities identified in Table 2 of Appendix B must prepare a SWPPP that includes post-construction stormwater management practices designed in conformance with the Enhanced Phosphorus Removal Standards included in the technical standard, New York State Stormwater Management Design Manual ("Design Manual").

- Entire New York City Watershed located east of the Hudson River **-** Figure 1
- Onondaga Lake Watershed **-** Figure 2
- Greenwood Lake Watershed **-**Figure 3
- Oscawana Lake Watershed – Figure 4
- Kinderhook Lake Watershed – Figure 5

Figure 1 - New York City Watershed East of the Hudson

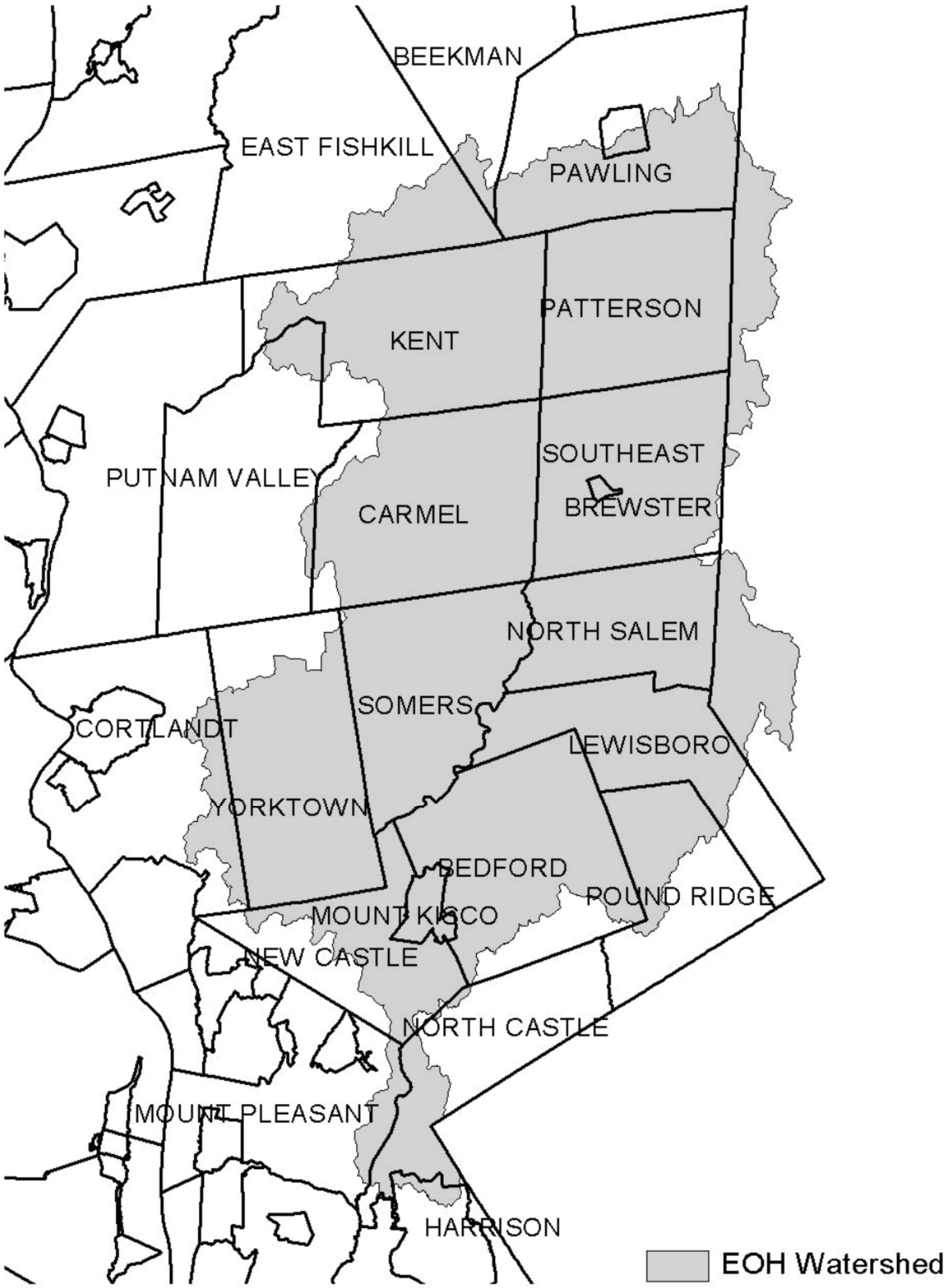


Figure 2 - Onondaga Lake Watershed

Figure 3 - Greenwood Lake Watershed

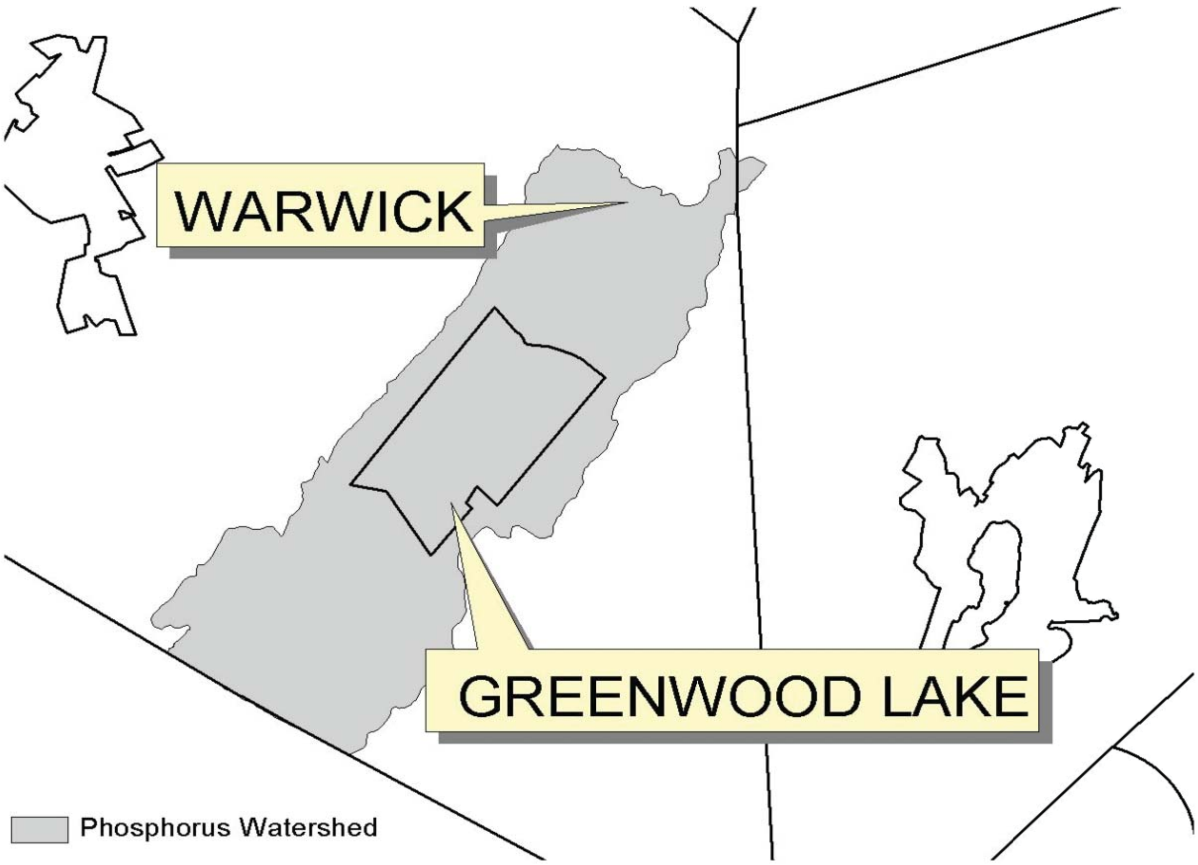


Figure 4 - Oscawana Lake Watershed

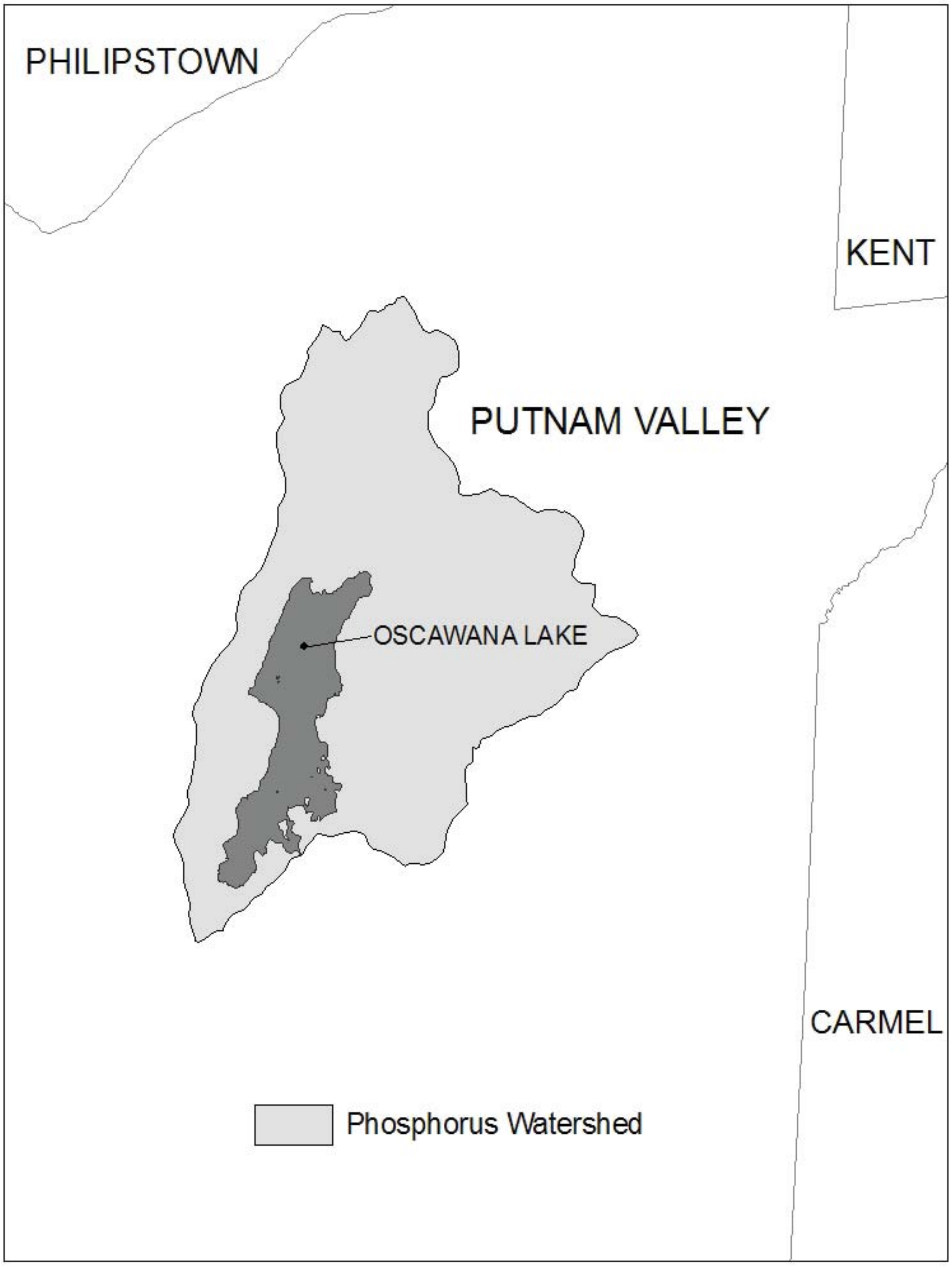
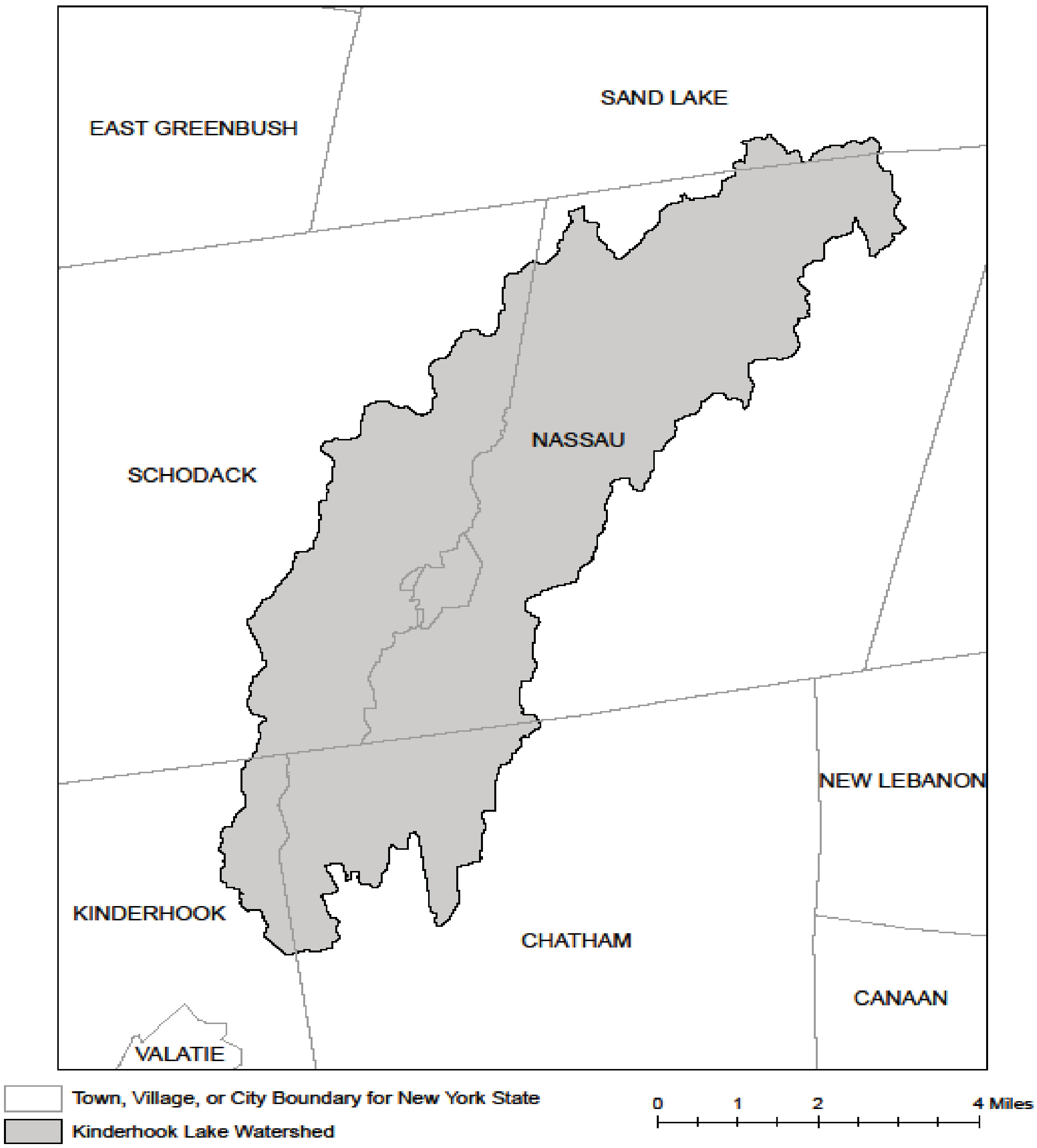


Figure 5: Kinderhook Lake Watershed



XI. APPENDIX D

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

XII. APPENDIX E

List of 303(d) segments impaired by pollutants related to *construction activity* (e.g. silt, sediment or nutrients). *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
Albany	Ann Lee (Shakers) Pond, Stump Pond
Albany	Basic Creek Reservoir
Allegheny	Amity Lake, Saunders Pond
Bronx	Van Cortlandt Lake
Broome	Whitney Point Lake/Reservoir
Broome	Fly Pond, Deer Lake
Broome	Minor Tribs to Lower Susquehanna (north)
Cattaraugus	Allegheny River/Reservoir
Cattaraugus	Case Lake
Cattaraugus	Linlyco/Club Pond
Cayuga	Duck Lake
Chautauqua	Chautauqua Lake, North
Chautauqua	Chautauqua Lake, South
Chautauqua	Bear Lake
Chautauqua	Chadakoin River and tribs
Chautauqua	Lower Cassadaga Lake
Chautauqua	Middle Cassadaga Lake
Chautauqua	Findley Lake
Clinton	Great Chazy River, Lower, Main Stem
Columbia	Kinderhook Lake
Columbia	Robinson Pond
Dutchess	Hillside Lake
Dutchess	Wappinger Lakes
Dutchess	Fall Kill and tribs
Erie	Green Lake
Erie	Scajaquada Creek, Lower, and tribs
Erie	Scajaquada Creek, Middle, and tribs
Erie	Scajaquada Creek, Upper, and tribs
Erie	Rush Creek and tribs
Erie	Ellicott Creek, Lower, and tribs
Erie	Beeman Creek and tribs
Erie	Murder Creek, Lower, and tribs
Erie	South Branch Smoke Cr, Lower, and tribs
Erie	Little Sister Creek, Lower, and tribs
Essex	Lake George (primary county: Warren)
Genesee	Black Creek, Upper, and minor tribs
Genesee	Tonawanda Creek, Middle, Main Stem
Genesee	Oak Orchard Creek, Upper, and tribs
Genesee	Bowen Brook and tribs
Genesee	Bigelow Creek and tribs
Genesee	Black Creek, Middle, and minor tribs
Genesee	LeRoy Reservoir
Greene	Schoharie Reservoir
Greene	Sleepy Hollow Lake
Herkimer	Steele Creek tribs
Kings	Hendrix Creek
Lewis	Mill Creek/South Branch and tribs
Livingston	Conesus Lake
Livingston	Jaycox Creek and tribs
Livingston	Mill Creek and minor tribs
Livingston	Bradner Creek and tribs
Livingston	Christie Creek and tribs
Monroe	Lake Ontario Shoreline, Western
Monroe	Mill Creek/Blue Pond Outlet and tribs
Monroe	Rochester Embayment - East
Monroe	Rochester Embayment - West
Monroe	Unnamed Trib to Honeoye Creek
Monroe	Genesee River, Lower, Main Stem
Monroe	Genesee River, Middle, Main Stem
Monroe	Black Creek, Lower, and minor tribs
Monroe	Buck Pond
Monroe	Long Pond
Monroe	Cranberry Pond
Monroe	Mill Creek and tribs
Monroe	Shipbuilders Creek and tribs
Monroe	Minor tribs to Irondequoit Bay
Monroe	Thomas Creek/White Brook and tribs
Nassau	Glen Cove Creek, Lower, and tribs
Nassau	LI Tribs (fresh) to East Bay
Nassau	East Meadow Brook, Upper, and tribs
Nassau	Hempstead Bay
Nassau	Hempstead Lake
Nassau	Grant Park Pond
Nassau	Beaver Lake
Nassau	Camaans Pond
Nassau	Halls Pond
Nassau	LI Tidal Tribs to Hempstead Bay
Nassau	Massapequa Creek and tribs
Nassau	Reynolds Channel, east
Nassau	Reynolds Channel, west
Nassau	Silver Lake, Lofts Pond
Nassau	Woodmere Channel
Niagara	Hyde Park Lake
Niagara	Lake Ontario Shoreline, Western
Niagara	Bergholtz Creek and tribs
Oneida	Ballou, Nail Creeks
Onondaga	Ley Creek and tribs
Onondaga	Onondaga Creek, Lower and tribs

APPENDIX E

List of 303(d) segments impaired by pollutants related to construction activity, cont'd.

COUNTY	WATERBODY	COUNTY	WATERBODY
Onondaga	Onondaga Creek, Middle and tribs	Suffolk	Great South Bay, West
Onondaga	Onondaga Creek, Upp, and minor tribs	Suffolk	Mill and Seven Ponds
Onondaga	Harbor Brook, Lower, and tribs	Suffolk	Moriches Bay, East
Onondaga	Ninemile Creek, Lower, and tribs	Suffolk	Moriches Bay, West
Onondaga	Minor tribs to Onondaga Lake	Suffolk	Quantuck Bay
Onondaga	Onondaga Creek, Lower, and tribs	Suffolk	Shinnecock Bay (and Inlet)
Ontario	Honeoye Lake	Sullivan	Bodine, Montgomery Lakes
Ontario	Hemlock Lake Outlet and minor tribs	Sullivan	Davies Lake
Ontario	Great Brook and minor tribs	Sullivan	Pleasure Lake
Orange	Monhagen Brook and tribs	Sullivan	Swan Lake
Orange	Orange Lake	Tompkins	Cayuga Lake, Southern End
Orleans	Lake Ontario Shoreline, Western	Tompkins	Owasco Inlet, Upper, and tribs
Oswego	Pleasant Lake	Ulster	Ashokan Reservoir
Oswego	Lake Neatahwanta	Ulster	Esopus Creek, Upper, and minor tribs
Putnam	Oscawana Lake		
Putnam	Palmer Lake	Ulster	Esopus Creek, Lower, Main Stem
Putnam	Lake Carmel	Ulster	Esopus Creek, Middle, and minor tribs
Queens	Jamaica Bay, Eastern, and tribs (Queens)		
Queens	Bergen Basin	Warren	Lake George
Queens	Shellbank Basin	Warren	Tribs to L.George, Village of L George
Rensselaer	Nassau Lake		
Rensselaer	Snyders Lake	Warren	Huddle/Finkle Brooks and tribs
Richmond	Grasmere, Arbutus and Wolfes Lakes	Warren	Indian Brook and tribs
Rockland	Congers Lake, Swartout Lake	Warren	Hague Brook and tribs
Rockland	Rockland Lake	Washington	Tribs to L.George, East Shr Lk George
Saratoga	Ballston Lake		
Saratoga	Round Lake	Washington	Cossayuna Lake
Saratoga	Dwaas Kill and tribs	Washington	Wood Cr/Champlain Canal, minor tribs
Saratoga	Tribs to Lake Lonely		
Saratoga	Lake Lonely	Wayne	Port Bay
Schenectady	Collins Lake	Wayne	Marbletown Creek and tribs
Schenectady	Duane Lake	Westchester	Lake Katonah
Schenectady	Mariaville Lake	Westchester	Lake Mohegan
Schoharie	Engleville Pond	Westchester	Lake Shenorock
Schoharie	Summit Lake	Westchester	Reservoir No.1 (Lake Isle)
Schuyler	Cayuta Lake	Westchester	Saw Mill River, Middle, and tribs
St. Lawrence	Fish Creek and minor tribs	Westchester	Silver Lake
St. Lawrence	Black Lake Outlet/Black Lake	Westchester	Teatown Lake
Steuben	Lake Salubria	Westchester	Truesdale Lake
Steuben	Smith Pond	Westchester	Wallace Pond
Suffolk	Millers Pond	Westchester	Peach Lake
Suffolk	Mattituck (Marratooka) Pond	Westchester	Mamaroneck River, Lower
Suffolk	Tidal tribs to West Moriches Bay	Westchester	Mamaroneck River, Upp, and tribs
Suffolk	Canaan Lake	Westchester	Sheldrake River and tribs
Suffolk	Lake Ronkonkoma	Westchester	Blind Brook, Lower
Suffolk	Beaverdam Creek and tribs	Westchester	Blind Brook, Upper, and tribs
Suffolk	Big/Little Fresh Ponds	Westchester	Lake Lincolndale
Suffolk	Fresh Pond	Westchester	Lake Meahaugh
Suffolk	Great South Bay, East	Wyoming	Java Lake
Suffolk	Great South Bay, Middle	Wyoming	Silver Lake

Note: The list above identifies those waters from the final New York State "2014 Section 303(d) List of Impaired Waters Requiring a TMDL/Other Strategy", dated January 2015, that are impaired by silt, sediment or nutrients.

XIII. 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 ROAD AVON, 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 AVE. BUFFALO, NY 14203-2999 TEL. (716) 851-7070

Appendix 5

DRAFT 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: Bayside Development
2. Contact Person: Asher Sussman
3. Street Address: 1451 47th Street
4. City/State/Zip: New York, NY 11219
II. Project Site Information
5. Project/Site Name: Bayside
6. Street Address: Corner of NYS Route 9W & Purdy Avenue
7. City/State/Zip: Marlboro, NY 12542
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 6

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-0-15-002

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)
BAYSIDE CONSTRUCTION

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

Owner/Operator Contact Person First Name
ASHER

Owner/Operator Mailing Address
1451 47TH STREET

City
BROOKLYN

State
NY

Zip
11219 -

Phone (Owner/Operator)
718 - 854 - 5813

Fax (Owner/Operator)
- -

Email (Owner/Operator)
ASHERSUSSMAN@YAHOO.COM

FED TAX ID
- (not required for individuals)

6401089828

Project Site Information

Project/Site Name

BAYSIDE DEVLOPMENT

Street Address (NOT P.O. BOX)

ROUTE 9W

Side of Street

○ North ○ South ○ East ● West

City/Town/Village (THAT ISSUES BUILDING PERMIT)

MARLBORO

State	Zip	County	DEC Region
NY	12542 -	UKSTER	3

Name of Nearest Cross Street

BIRDSALL AVE

Distance to Nearest Cross Street (Feet)

250

Project In Relation to Cross Street

● North ○ South ○ East ○ West

Tax Map Numbers
Section-Block-Parcel

109.1 4 29

Tax Map Numbers

109.1-4-29

1. Provide the Geographic Coordinates for the project site in NYTM Units. To do this you **must** go to the NYSDEC Stormwater Interactive Map on the DEC website at:

www.dec.ny.gov/imsmaps/stormwater/viewer.htm

Zoom into your Project Location such that you can accurately click on the centroid of your site. Once you have located your project site, go to the tool boxes on the top and choose "i"(identify). Then click on the center of your site and a new window containing the X, Y coordinates in UTM will pop up. Transcribe these coordinates into the boxes below. For problems with the interactive map use the help function.

X Coordinates (Easting)	Y Coordinates (Northing)
585752	4606973

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 — Number of Lots: 1
- ○ 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

***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
28.7	13.7	.6	6.3

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
6 %	11 %	71 %	12 %

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

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

Start Date 07/01/2017 - **End Date** 07/01/2019

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

Name

LATTINTOWN CREEK

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-0-15-002? ○ Yes ● No

11. Is this project located in one of the Watersheds identified in Appendix C of GP-0-15-002? ○ 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?

Town of Marlborough

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
MASER CONSULTING, P.A.

Contact Name (Last, Space, First)
ANDREW FETHERSTON

Mailing Address
555 HUDSON VALLEY AVE

City
NEW WINDSOR

State: NY Zip: 12553 -

Phone: 845 - 564 - 4495

Fax: 845 - 567 - 1025

Email
AFETHERSTON@MASERCONSULTING.COM

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-0-15-002. 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: ANDREW **MI**: B

Last Name: FETHERSTON

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

- [x] Check Dams
- [ ] Construction Road Stabilization
- [x] Dust Control
- [ ] Earth Dike
- [ ] Level Spreader
- [ ] Perimeter Dike/Swale
- [ ] Pipe Slope Drain
- [ ] Portable Sediment Tank
- [ ] Rock Dam
- [ ] Sediment Basin
- [x] Sediment Traps
- [x] Silt Fence
- [x] Stabilized Construction Entrance
- [x] Storm Drain Inlet Protection
- [ ] Straw/Hay Bale Dike
- [ ] Temporary Access Waterway Crossing
- [ ] Temporary Stormdrain Diversion
- [x] Temporary Swale
- [ ] Turbidity Curtain
- [ ] Water bars

Biotechnical

- [ ] Brush Matting
- [ ] Wattling

Vegetative Measures

- [x] Brush Matting
- [ ] Dune Stabilization
- [ ] Grassed Waterway
- [x] Mulching
- [x] Protecting Vegetation
- [ ] Recreation Area Improvement
- [x] Seeding
- [x] Sodding
- [ ] Straw/Hay Bale Dike
- [ ] Streambank Protection
- [x] Temporary Swale
- [x] Topsoiling
- [ ] Vegetating Waterways

Permanent Structural

- [ ] Debris Basin
- [x] Diversion
- [ ] Grade Stabilization Structure
- [x] Land Grading
- [ ] Lined Waterway (Rock)
- [ ] Paved Channel (Concrete)
- [ ] Paved Flume
- [x] Retaining Wall
- [ ] Riprap Slope Protection
- [x] 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

0.754 **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)

RR Techniques (Area Reduction)	Total Contributing Area (acres)		Total Contributing Impervious Area(acres)
○ 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	Total Contributing Impervious Area(acres)
○ Infiltration Trench (I-1)	.
○ Infiltration Basin (I-2)	.
○ Dry Well (I-3)	.
○ Underground Infiltration System (I-4)	.
● Bioretention (F-5)	5.91
○ 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)	.

0762089822

Table 2 - Alternative SMPs (DO NOT INCLUDE PRACTICES BEING USED FOR PRETREATMENT ONLY)

Alternative SMP	Total Contributing Impervious Area(acres)
☑ Hydrodynamic	0.32
○ 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 CDS UNITS

Manufacturer CONTECH

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

0.293 **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

0.211 **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

0.462 **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). 0.754

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	**CPv Provided**
0.961 **acre-feet**	1.539 **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	**Post-development**
36.53 **CFS**	29.9 **CFS**

Total Extreme Flood Control Criteria (Qf)

Pre-Development	**Post-development**
93.25 **CFS**	80.94 **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

BAYSIDE CONSTRUCTION

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.

A portion of runoff from the commercial development along NYS Route 9W could not be captured and treated with runoff reduction methods. To provide water quality for these areas, alternative SMP's have been proposed (Contech CDS unit) prior to discharging from the site. The proposed rooftop is shown to discharge is to be treated by the proposed bioretention area. Grad of the parking lots and sidewalk areas cannot be treated due to existing topography and limitations thereto. The maximum treatment possible has been provided in this area.

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

Asher

MI

Print Last Name

Sussman

Owner/Operator Signature

Date

__ __ / __ __ / __ __ __ __

APPENDIX 7

DRAFT NOTICE OF TERMINATION (NOT)

New York State Department of Environmental Conservation
Division of Water
625 Broadway, 4th Floor
Albany, New York 12233-3505
(NOTE: Submit completed form to address above)

NOTICE OF TERMINATION for Storm Water Discharges Authorized under the SPDES General Permit for Construction Activity

Please indicate your permit identification number: NYR ___ ___ ___ ___ ___ ___

I. Owner or Operator Information

1. Owner/Operator Name:	Bayside Construction, LLC
2. Street Address:	1451 47th Street
3. City/State/Zip:	New York, NY 11219
4. Contact Person: Asher Sussman	4a.Telephone: (718) 854-5806
4b. Contact Person E-Mail:	ashersussman@yahoo.com

II. Project Site Information

5. Project/Site Name:	Bayside
6. Street Address:	Corner of NYS Route 9W & Purdy Avenue
7. City/Zip:	Marlboro, NY 12542
8. County:	Ulster

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 8

CONTRACTOR CERTIFICATION FORM

CONTRACTOR'S CERTIFICATION
Pursuant to
NYS DEC GENERAL PERMIT GP-0-15-002

Pursuant to the SPDES General Permit for Stormwater Discharges from Construction Activity (Permit GP-0-15-002) Part III.a.6, all contractors and subcontractors implementing all, or a portion of the Stormwater Pollution Prevention Plan (SWPPP) shall sign a copy of the following certification statement before undertaking any construction activity at the site identification in the SWPPP:

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

___________________________	____________________________	_____________
Signature	Print Name	Date

Contracting Firm Information:

Contracting Firm Name:

Address:

Telephone Number:

Address of Site:

____

Name of trained individual responsible for SWPPP implementation, and who shall be on site on a daily basis when soil disturbance activities are being performed:

Name: ____________________________ Title: ____________________________

\\nbcad\reference\ny stormwater\swppp report template\gp-0-15-002 contractor certification.docx

Appendix 9

New York Standards and Specs for Erosion and Sediment Controls, Appendix H: Construction Site Log Book

STATE POLLUTANT DISCHARGE ELIMINATION SYSTEM FOR CONSTRUCTION ACTIVITIES

CONSTRUCTION SITE LOG BOOK

Table of Contents

Properly completing forms such as those contained in Appendix H meet the inspection requirement of NYS-DEC SPDES GP for Construction Activities. Completed forms shall be kept on site at all times and made available to authorities upon request.

I. PRE-CONSTRUCTION MEETING DOCUMENTS

Project Name ____

Permit No. ______________________________ **Date of Authorization** ______________

Name of Operator ____

Prime Contractor ____

a. Preamble to Site Assessment and Inspections

The Following Information To Be Read By All Person's Involved in The Construction of Stormwater Related Activities:

The Operator agrees to have a qualified professional[1] conduct an assessment of the site prior to the commencement of construction[2] and certify in this inspection report that the appropriate erosion and sediment controls described in the SWPPP have been adequately installed or implemented to ensure overall preparedness of the site for the commencement of construction.

Prior to the commencement of construction, the Operator shall certify in this site logbook that the SWPPP has been prepared in accordance with the State's standards and meets all Federal, State and local erosion and sediment control requirements.

When construction starts, site inspections shall be conducted by the qualified professional at least every 7 calendar days and within 24 hours of the end of a storm event of 0.5 inches or greater (Construction Duration Inspections). The Operator shall maintain a record of all inspection reports in this site logbook. The site logbook shall be maintained on site and be made available to the permitting authorities upon request. The Operator shall post at the site, in a publicly accessible location, a summary of the site inspection activities on a monthly basis (Monthly Summary Report).

The operator shall also prepare a written summary of compliance with this general permit at a minimum frequency of every three months (Operator's Compliance Response Form), while coverage exists. The summary should address the status of achieving each component of the SWPPP.

Prior to filing the Notice of Termination or the end of permit term, the Operator shall have a qualified professional perform a final site inspection. The qualified professional shall certify that the site has undergone final stabilization[3] using either vegetative or structural stabilization methods and that all temporary erosion and sediment controls (such as silt fencing) not needed for long-term erosion control have been removed. In addition, the Operator must identify and certify that all permanent structures described in the SWPPP have been constructed and provide the owner(s) with an operation and maintenance plan that ensures the structure(s) continuously functions as designed.

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

2 "Commencement of construction" means the initial removal of vegetation and disturbance of soils associated with clearing, grading or excavating activities or other construction activities.

3 "Final stabilization" means that all soil-disturbing activities at the site have been completed and a uniform, perennial vegetative cover with a density of eighty (80) percent has been established or equivalent stabilization measures (such as the use of mulches or geotextiles) have been employed on all unpaved areas and areas not covered by permanent structures.

b. Operators Certification

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

Name (please print): ______________________________

Title ______________________________ **Date:** ______________

Address: ______________________________

Phone: ______________ **Email:** ______________________________

Signature: ______________________________

c. Qualified Professional's Credentials & Certification

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

Name (please print): ______________________________

Title ______________________________ **Date:** ______________

Address: ______________________________

Phone: ______________ **Email:** ______________________________

Signature: ______________________________

d. Pre-construction Site Assessment Checklist
(NOTE: Provide comments below as necessary)

1. Notice of Intent, SWPPP, and Contractors Certification:

Yes No NA

[] [] [] Has a Notice of Intent been filed with the NYS Department of Conservation?
[] [] [] Is the SWPPP on-site? Where?______________________________
[] [] [] Is the Plan current? What is the latest revision date?_____________
[] [] [] Is a copy of the NOI (with brief description) onsite? Where?____________
[] [] [] Have all contractors involved with stormwater related activities signed a contractor's certification?

2. Resource Protection

Yes No NA

[] [] [] Are construction limits clearly flagged or fenced?
[] [] [] Important trees and associated rooting zones, on-site septic system absorption fields, existing vegetated areas suitable for filter strips, especially in perimeter areas, have been flagged for protection.
[] [] [] Creek crossings installed prior to land-disturbing activity, including clearing and blasting.

3. Surface Water Protection

Yes No NA

[] [] [] Clean stormwater runoff has been diverted from areas to be disturbed.
[] [] [] Bodies of water located either on site or in the vicinity of the site have been identified and protected.
[] [] [] Appropriate practices to protect on-site or downstream surface water are installed.
[] [] [] Are clearing and grading operations divided into areas <5 acres?

4. Stabilized Construction Entrance

Yes No NA

[] [] [] A temporary construction entrance to capture mud and debris from construction vehicles before they enter the public highway has been installed.
[] [] [] Other access areas (entrances, construction routes, equipment parking areas) are stabilized immediately as work takes place with gravel or other cover.
[] [] [] Sediment tracked onto public streets is removed or cleaned on a regular basis.

5. Perimeter Sediment Controls

Yes No NA

[] [] [] Silt fence material and installation comply with the standard drawing and specifications.
[] [] [] Silt fences are installed at appropriate spacing intervals
[] [] [] Sediment/detention basin was installed as first land disturbing activity.
[] [] [] Sediment traps and barriers are installed.

6. Pollution Prevention for Waste and Hazardous Materials

Yes No NA

[] [] [] The Operator or designated representative has been assigned to implement the spill prevention avoidance and response plan.
[] [] [] The plan is contained in the SWPPP on page ______
[] [] [] Appropriate materials to control spills are onsite. Where? _________________

II. CONSTRUCTION DURATION INSPECTIONS

a. Directions:
Inspection Forms will be filled out during the entire construction phase of the project.
Required Elements:

(1) On a site map, indicate the extent of all disturbed site areas and drainage pathways. Indicate site areas that are expected to undergo initial disturbance or significant site work within the next 14-day period;

(2) Indicate on a site map all areas of the site that have undergone temporary or permanent stabilization;

(3) Indicate all disturbed site areas that have not undergone active site work during the previous 14-day period;

(4) Inspect all sediment control practices and record the approximate degree of sediment accumulation as a percentage of sediment storage volume (for example, 10 percent, 20 percent, 50 percent);

(5) Inspect all erosion and sediment control practices and record all maintenance requirements such as verifying the integrity of barrier or diversion systems (earthen berms or silt fencing) and containment systems (sediment basins and sediment traps). Identify any evidence of rill or gully erosion occurring on slopes and any loss of stabilizing vegetation or seeding/mulching. Document any excessive deposition of sediment or ponding water along barrier or diversion systems. Record the depth of sediment within containment structures, any erosion near outlet and overflow structures, and verify the ability of rock filters around perforated riser pipes to pass water; and

(6) Immediately report to the Operator any deficiencies that are identified with the implementation of the SWPPP.

SITE PLAN/SKETCH

______________________________ ______________________________
Inspector (print name) **Date of Inspection**

______________________________ ______________________________
Qualified Professional (print name) **Qualified Professional Signature**

The above signed acknowledges that, to the best of his/her knowledge, all information provided on the forms is accurate and complete.

Maintaining Water Quality

Yes No NA
[ ] [ ] [ ] Is there an increase in turbidity causing a substantial visible contrast to natural conditions?
[ ] [ ] [ ] Is there residue from oil and floating substances, visible oil film, or globules or grease?
[ ] [ ] [ ] All disturbance is within the limits of the approved plans.
[ ] [ ] [ ] Have receiving lake/bay, stream, and/or wetland been impacted by silt from project?

Housekeeping

1. General Site Conditions
Yes No NA
[ ] [ ] [ ] Is construction site litter and debris appropriately managed?
[ ] [ ] [ ] Are facilities and equipment necessary for implementation of erosion and sediment control in working order and/or properly maintained?
[ ] [ ] [ ] Is construction impacting the adjacent property?
[ ] [ ] [ ] Is dust adequately controlled?

2. Temporary Stream Crossing
Yes No NA
[ ] [ ] [ ] Maximum diameter pipes necessary to span creek without dredging are installed.
[ ] [ ] [ ] Installed non-woven geotextile fabric beneath approaches.
[ ] [ ] [ ] Is fill composed of aggregate (no earth or soil)?
[ ] [ ] [ ] Rock on approaches is clean enough to remove mud from vehicles & prevent sediment from entering stream during high flow.

Runoff Control Practices

1. Excavation Dewatering
Yes No NA
[ ] [ ] [ ] Upstream and downstream berms (sandbags, inflatable dams, etc.) are installed per plan.
[ ] [ ] [ ] Clean water from upstream pool is being pumped to the downstream pool.
[ ] [ ] [ ] Sediment laden water from work area is being discharged to a silt-trapping device.
[ ] [ ] [ ] Constructed upstream berm with one-foot minimum freeboard.

2. Level Spreader
Yes No NA
[ ] [ ] [ ] Installed per plan.
[ ] [ ] [ ] Constructed on undisturbed soil, not on fill, receiving only clear, non-sediment laden flow.
[ ] [ ] [ ] Flow sheets out of level spreader without erosion on downstream edge.

3. Interceptor Dikes and Swales
Yes No NA
[ ] [ ] [ ] Installed per plan with minimum side slopes 2H:1V or flatter.
[ ] [ ] [ ] Stabilized by geotextile fabric, seed, or mulch with no erosion occurring.
[ ] [ ] [ ] Sediment-laden runoff directed to sediment trapping structure

Runoff Control Practices (continued)

4. Stone Check Dam

Yes No NA
[ ] [ ] [ ] Is channel stable? (flow is not eroding soil underneath or around the structure).
[ ] [ ] [ ] Check is in good condition (rocks in place and no permanent pools behind the structure).
[ ] [ ] [ ] Has accumulated sediment been removed?.

5. Rock Outlet Protection

Yes No NA
[ ] [ ] [ ] Installed per plan.
[ ] [ ] [ ] Installed concurrently with pipe installation.

Soil Stabilization

1. Topsoil and Spoil Stockpiles

Yes No NA
[ ] [ ] [ ] Stockpiles are stabilized with vegetation and/or mulch.
[ ] [ ] [ ] Sediment control is installed at the toe of the slope.

2. Revegetation

Yes No NA
[ ] [ ] [ ] Temporary seedings and mulch have been applied to idle areas.
[ ] [ ] [ ] 4 inches minimum of topsoil has been applied under permanent seedings

Sediment Control Practices

1. Stabilized Construction Entrance

Yes No NA
[ ] [ ] [ ] Stone is clean enough to effectively remove mud from vehicles.
[ ] [ ] [ ] Installed per standards and specifications?
[ ] [ ] [ ] Does all traffic use the stabilized entrance to enter and leave site?
[ ] [ ] [ ] Is adequate drainage provided to prevent ponding at entrance?

2. Silt Fence

Yes No NA
[ ] [ ] [ ] Installed on Contour, 10 feet from toe of slope (not across conveyance channels).
[ ] [ ] [ ] Joints constructed by wrapping the two ends together for continuous support.
[ ] [ ] [ ] Fabric buried 6 inches minimum.
[ ] [ ] [ ] Posts are stable, fabric is tight and without rips or frayed areas.
Sediment accumulation is ___% of design capacity.

Sediment Control Practices (continued)

3. Storm Drain Inlet Protection (Use for Stone & Block; Filter Fabric; Curb; or, Excavated practices)

Yes No NA

[ ] [ ] [ ] Installed concrete blocks lengthwise so open ends face outward, not upward.
[ ] [ ] [ ] Placed wire screen between No. 3 crushed stone and concrete blocks.
[ ] [ ] [ ] Drainage area is 1acre or less.
[ ] [ ] [ ] Excavated area is 900 cubic feet.
[ ] [ ] [ ] Excavated side slopes should be 2:1.
[ ] [ ] [ ] 2" x 4" frame is constructed and structurally sound.
[ ] [ ] [ ] Posts 3-foot maximum spacing between posts.
[ ] [ ] [ ] Fabric is embedded 1 to 1.5 feet below ground and secured to frame/posts with staples at max 8-inch spacing.
[ ] [ ] [ ] Posts are stable, fabric is tight and without rips or frayed areas.
Sediment accumulation ___% of design capacity.

4. Temporary Sediment Trap

Yes No NA

[ ] [ ] [ ] Outlet structure is constructed per the approved plan or drawing.
[ ] [ ] [ ] Geotextile fabric has been placed beneath rock fill.
Sediment accumulation is ___% of design capacity.

5. Temporary Sediment Basin

Yes No NA

[ ] [ ] [ ] Basin and outlet structure constructed per the approved plan.
[ ] [ ] [ ] Basin side slopes are stabilized with seed/mulch.
[ ] [ ] [ ] Drainage structure flushed and basin surface restored upon removal of sediment basin facility.
Sediment accumulation is ___% of design capacity.

<u>Note</u>: Not all erosion and sediment control practices are included in this listing. Add additional pages to this list as required by site specific design.
Construction inspection checklists for post-development stormwater management practices can be found in Appendix F of the New York Stormwater Management Design Manual.

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:

APPENDIX 10

NYSDEC CONSTRUCTION STORMWATER INSPECTION MANUAL

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

Construction Stormwater Inspection Manual

Primarily for Government Inspectors Evaluating Compliance with Construction Stormwater Control Requirements

New York State
Department of Environmental Conservation

TABLE OF CONTENTS

Version 1.05 (8/27/07)

ATTACHMENTS

1.0 INTRODUCTION AND PURPOSE

The New York State Department of Environmental Conservation Division of Water (DOW) considers there to be two types of inspections germane to construction stormwater; compliance inspections and self-inspections.

This manual is for use by DOW and other regulatory oversight construction stormwater inspectors in performing compliance inspections, as well as for site operators in performing self inspections. The manual should be used in conjunction with the *New York State Standards and Specifications for Erosion and Sediment Control*, August 2005.

1.1 Compliance Inspections

Regulatory compliance inspections are performed by regulatory oversight authorities such as DOW staff, or representatives of DOW and local municipal construction stormwater inspectors. These inspections are intended to determine compliance with the state or local requirements for control of construction stormwater through erosion and sediment control and post construction practices. Compliance inspections focus on determinations of compliance with legal and water quality standards. Typically, compliance inspections can be further sub-categorized to include comprehensive inspections, and follow-up or reconnaissance inspections.

Compliance inspectors will focus on determining whether:

- the project is causing water quality standard violations;
- the required Stormwater Pollution Prevention Plan (SWPPP) includes appropriate erosion and sediment controls and, to some extent, post construction controls;
- the owner/operator is complying with the SWPPP;
- where required, self-inspections are being properly performed; and
- where self-inspections are required, the owner/operator responds appropriately to the self-inspector's reports.

1.1.1 Comprehensive Inspection

Comprehensive inspections are designed to verify permittee compliance with all applicable regulatory requirements, effluent controls, and compliance schedules. This inspection involves records reviews, visual observations, and evaluations of management practices, effluents, and receiving waters.

Comprehensive inspections should be conducted according to a neutral or random inspection scheme, or in accordance with established priorities.   A neutral monitoring scheme provides some objective basis for scheduling inspections and sampling visits by establishing a system (whether complex factor-based, alphabetic, or geographic) for setting prioritiesto ensure that a particular facility is not unfairly selected for inspection or sampling. The selection of which facility to inspect must be made without bias to ensure that the regulatory oversight authority, if challenged for being arbitrary and capricious manner, can reasonably defend itself.

A neutral inspection scheme should set the criteria the inspector uses to choose which facilities to inspect, but the schedule for the actual inspection should remain confidential, and may be kept separate from the neutral plan.

A routine comprehensive compliance inspection is most effective when it is unannounced or conducted with very little advance warning.

1.1.2 Reconnaissance Inspection

A reconnaissance inspection is performed in lieu of, or following a comprehensive inspection to obtain a preliminary overview of an owner/operator's compliance program, to respond to a citizen complaint, or to assess a non-permitted site. The inspector performs a brief (generally about an hour) visual inspection of the site, discharges and receiving waters. A reconnaissance inspection uses the inspector's experience and judgement to summarize potential compliance problems, without conducting a full comprehensive inspection. The objective of a reconnaissance inspection is to expand inspection coverage without increasing inspection resource expenditures. The reconnaissance inspection is the shortest and least resource intensive of all inspections.

Reconnaissance inspections may be initiated in response to known or suspected violations, a public complaint, a violation of regulatory requirements, or as follow-up to verify that necessary actions were taken in response to a previous inspection.

1.2 Self-inspections

For some projects, the site owner/operator is required by their State Pollutant Discharge Elimination System (SPDES) Permit and/or local requirements to have a qualified professional[1] perform a "self-inspection" at the site. In self-inspections, the qualified professional determines whether the site is being managed in accordance with the SWPPP, and whether the SWPPP's recommended erosion and sediment controls are effective. If activities are not in accordance with the SWPPP, or if the SWPPP erosion and sediment controls are not effective, the qualified professional inspecting the site recommends corrections to the owner/operator.

[1] A "Qualified professional" is a person knowledgeable in the principles and practice of erosion and sediment controls, such as a licensed professional engineer, Certified Professional in Erosion and Sediment Control (CPESC), licensed landscape architect or soil scientist.

2.0 PRE-INSPECTION ACTIVITIES

2.1 Regulatory Oversight Authorities

This section is intended for inspectors with regulatory oversight authority such as agents of the DOW or a local municipality, or others acting on their behalf, such as county Soil and Water Conservation District staff. Examples of other regulatory oversight authorities include: the United States Environmental Protection Agency (EPA); New York City Department of Environmental Protection (DEP), Adirondack Park Agency (APA); the Lake George Park Commission (LGPC), and the Skaneateles Lake Watershed Authority (SLWA). Before arriving on-site to conduct the inspection, considerations concerning communication, documentation and equipment must be made.

Regulatory oversight authority is granted by state or local law to government agencies or, depending upon the particular law, an authorized representative of state or local government. SPDES rules 6 NYCRR 750-2.3 and Environmental Conservation Law 17-0303(6) and 17-0829(a) all allow for authorized representatives of the (NYSDEC) commissioner to perform all the duties of an inspector.

2.1.1 Communication

Coordination with Other Entities
Where appropriate, prior to selecting sites for inspection, compliance inspectors should communicate with other regulatory oversight authorities to avoid unnecessary duplication or to coordinate follow-up to inspections performed by other regulatory oversight authorities.

Announced vs. Unannounced Inspection
Inspections may be announced or unannounced. Each method has its own advantages and disadvantages. Unannounced inspections are preferred, however many job sites are not continuously manned, or not always staffed by someone who is familiar with the SWPPP, thus necessitating an announced inspection. As an alternative, when an announced inspection is necessary, inspectors should try to give as little advanced warning as possible (24 hours is suggested).

Itinerary
For obvious safety reasons, inspectors should be sure to inform someone in their office which site or sites they will be visiting prior to leaving the to perform inspections.

2.1.2 Documentation

Data Review
The inspector should review any available information such as:

- Notice of Intent
- Stormwater Pollution Prevention Plan
- Past inspection records
- Phasing plan

- Construction sequence
- Inspection and Maintenance schedules
- Site specific issues
- Consent Orders
- Access agreements

Inspection Form

The inspector should have copies of, and be familiar with, the inspection form used by their regulatory oversight authority (example in Attachment 1) before leaving the office. Static information such as name, location and permit number can be entered onto the inspection form prior to arriving at the inspection site.

Credentials

Inspectors should always carry proper identification to prove that they are employed by an entity with jurisdictional authority. Failure to display proper credentials may be legal grounds for denial of entry to a site.

2.1.3 Equipment

Personal Protective Equipment

DOW employees must conform to the DOW Health and Safety policy as it relates to personal protective equipment. Other regulatory oversight authorities should have their own safety policies or, if not, may wish to consult the OSHA health and safety tool at: www.osha.gov/dep/etools/ehasp/ to develop a health and safety plan.

The following is a list of some of the most common health and safety gear that may be needed:

- Hard hat (Class G, Type1 or better)
- Safety toe shoes
- Reflective vest
- Hearing protection (to achieve 85 dBA - 8 hr TWA)
- Safety glasses with side shields

If the construction is on an industrial site or a hazardous waste site, special training may be required prior to entering the site. The inspector should consult with OSHA or NYSDEC prior to entering such a site.

Monitoring Equipment

The following is a list of some equipment that may be helpful to document facts and verify compliance:

- Digital Camera
- Measuring tape or wheel
- Hand level or clinometer
- Turbidity meter (in limited circumstances)

2.2 Permittee's Self-inspection

This section is intended for qualified professionals who conduct site self-inspections on behalf of owner/operators. Self-inspectors are responsible for performing inspections in accordance with permit requirements and reporting to site owners and operators the results and any recommendations resulting from the inspection.

Prior to conducting inspections, qualified professionals should ensure familiarity with the Stormwater Pollution Prevention Plan and previous inspection reports.

3.0 ON-SITE INSPECTION PROCESS

3.1 Compliance Inspections

3.1.1 Professionalism

Don't Pretend to Possess Knowledge

Unless the inspector has experience with a particular management practice, do not pretend to possess knowledge. Inspectors cannot be expert in all areas; their job is to collect information, not to demonstrate superior wisdom. Site operators are often willing to talk to someone who is inquisitive and interested. Within reason, asking questions to obtain new information about a management practice, construction technique or piece of equipment is one of the inspector's main roles in an inspection.

Don't Recommend Solutions

The inspector should not recommend solutions or endorse products. The solution to a compliance problem may appear obvious based on the inspector's experience. However, the responsibility should be placed on the site owner to implement a workable solution to a compliance problem that meets NYSDEC standards. The inspector should refer the site operator to the New York Standards and Specifications for Erosion and Sediment Control (the Blue Book) or the New York State Stormwater Management Design Manual (the Design Manual).

Key advice must be offered carefully. One experienced stormwater inspector suggests saying: "I can't direct you or make recommendations, but what we've seen work in other situations is ..."

The way inspectors present themselves is important to the effectiveness of the inspection. An inspector cannot be overly familiar, but will be more effective if able to establish a minimum level of communication.

3.1.2 Safety

DOW employees must conform to Division health and safety policies when on a construction site. Other regulatory oversight authorities should have their own safety policies or, if not, may wish to consult the OSHA health and safety tool at:

www.osha.gov/dep/etools/ehasp to develop a health and safety plan.

Some general protections for construction sites are:

- Beware of heavy equipment, avoid operator blind spots and make sure of operator eye contact around heavy equipment.
- Avoid walking on rock rip-rap if possible. Loose rock presents a slip hazard.
- Stay out of confined spaces like tanks, trenches and foundation holes.
- Avoid lightning danger. Monitor weather conditions, get out of water, avoid open areas and high points, do not huddle in groups or near trees.
- Protect yourself from sun and heat exposure. Use sun screen or shading clothing. Remain hydrated by drinking water, watching for signs of heat cramps, exhaustion (fatigue, nausea, dizziness, headache, cool or moist skin), or stroke (high body temperature; red, hot and dry skin)
- Protect yourself from cold weather. Wear multiple layers of thin clothing. Wear a warm hat. Drink warm fluids or eat hot foods, and keep dry.
- Avoid scaffolding in excess of 4 feet above grade.
- Beware of ticks, stinging insects, snakes and poison ivy or sumac.

3.1.3 Legal access

DOW has general powers, set forth under ECL 17-0303, subparagraph 6, to enter premises for inspections. In addition, ECL 3-0301.2 conveys general statutory authority granting the DOW the power to access private property to fulfill DOW obligations under the law.

ECL 15-0305 gives the DOW the authority to enter at all times in or upon any property, public or private, for the purpose of inspecting or investigating conditions affecting the construction of improvements to or developments of water resources for the public health, safety or welfare.

ECL 17-0829 allows an authorized DOW representative, upon presentation of their credentials, to enter upon any premises where any effluent source is located, or in which records are required to be maintained. The representative may at reasonable times have access to, and sample discharges/pollutants to the waters or to publicly owned treatment plants where the effluent source is located. This subparagraph provides DOW representatives performing their duties authority to enter a site to pursue administrative violations. Pursuing criminal violations may require a warrant or the owner’s permission to enter the site.

For sites that are permitted, DOW has authority under the permit to enter the site.

If the owner/operator’s representatives onsite deny access, the inspector *should not* physically force entry. Under these circumstances the attorney representing the inspector should be immediately notified and consideration should be given to soliciting the aid of a law officer to obtain entry.

DOW staff have the right to enter at any reasonable time. If no one is available, and the site is fenced or posted, DOW staff should make all reasonable efforts to identify, contact and notify the owner that the DOW is entering the site. If the inspector has made all reasonable efforts to contact site owners, but was unable to do so, the site can then be accessed. All efforts should be taken not to cause any damage to the facility.

Other regulatory oversight authorities should seek advice on their legal authorities to enter a job site. Municipalities that have adopted Article 6 of the New York State Sample Local Law for Stormwater Management and Erosion and Sediment Control (NYSDEC, 2004, updated 2006) will have legal authority to enter sites in accordance with that chapter and any other existing municipal authority .

Agents of DOW have authority similar DOW staff authority to enter sites. However, DOW staff enjoy significant personal liability protections as state employees. That liability protection may not be the same for authorized representatives of DOW. For authorized representatives of DOW (or other regulatory oversight authorities), it is prudent to obtain permission to enter the site. If such permission is denied, the authorized representatives should inform the appropriate DOW contact, usually the regional water manager.

3.1.4 Find the Legally Responsible Party (Construction Manager, Self-inspector)

The first action a compliance inspector should take upon entering a construction site is to find the construction trailer or the construction or project manager if they are available. The inspector should present appropriate identification to the site's responsible party and state the reason for the inspection; construction stormwater complaint response or neutral construction stormwater inspection. If the inspection is initiated as a response to a complaint, frequently the responsible party will ask who made the complaint. DOW keeps private individual complainants confidential. If the complainant is another regulatory oversight authority, DOW tends to make that known to the site's responsible party.

3.1.5 On-site records review (NOI, SWPPP, Self-inspection Reports, Permit)

Generally, the compliance inspector should next review the on-site records. Verify that a copy of the construction stormwater permit and NOI are on-site. Verify that the acreage, site conditions, and receiving water listed on the NOI are accurate. Compare the on-site documentation with documentation already submitted to, or obtained by the compliance inspector.

If the SWPPP has not been reviewed in the office, verify that it exists and contains the minimum required components (16 for a basic plan and 22 for a full plan). On-site review of the SWPPP should determine if: there is an appropriate phasing plan; the acreage disturbed in each phase, construction sequence for each phase; proposed implementation of erosion and sediment control measures; and, where required, post construction controls. For each of the erosion and sediment control practices, the SWPPP must show design details in accordance with the NYS Standards for Erosion and Sediment Controls. The SWPPP must also include provisions for maintenance of practices during construction. On-site review of post construction controls is generally limited to verification that the proposed stormwater management practices are shown on the site plan.

Where self-inspections are required, self-inspection reports are a significant tool for the compliance inspector to determine the performance history of the site. The self-inspection reports should be done with the required frequency . Self-inspection reports must include all the details required by the permit. Generally, it is desirable for permit information to be shown on a site plan. The compliance inspector should become familiar with the report and use that familiarity to judge whether the self-inspections are being performed correctly and that the site operator is correcting deficiencies noted in the report.

3.1.6 Walk the Site

During wet weather conditions, it may be advantageous to observe the receiving waters prior to walking the rest of the site. At some point during the inspection, the receiving water conditions must be observed and noted. It is critical to note if there is a substantial visible contrast to natural conditions, or evidence of deposition, streambank erosion, construction debris or waste materials (e.g. concrete washdown) in the receiving stream.

Each inspector should evaluate actual implementation and maintenance of practices on-site compared to how implementation and maintenance is detailed in the SWPPP. At a minimum, the compliance inspector should observe all areas of active construction. Observing equipment or materials storage, recently stabilized areas, or stockpile areas is also appropriate to evaluate the effectiveness of management practices.

3.1.7 Taking Photographs

Evidence of poor receiving water conditions and poor or ineffective practices should be documented with digital photographs. Those photographs should be logged date stamped and stored on media that cannot be edited (e.g. write only CDs). Photos should also be appended to the site inspector's report.

It is also beneficial to take photographs of good practices for educational and technology transfer reasons.

3.1.8 Exit Interview

Clearly communicate expectations and consequences. If it is clear from the inspection that the owner/operator must modify the SWPPP, or modify management practices within an assigned period (e.g. 24 hours, 48 hours, one week, two weeks), then that finding should be communicated at the time of the exit interview. The inspector should assign the period based on factors such as how long it would reasonably take to complete such modifications and the level of risk to water quality associated with failure to make such modifications.

The inspector should make clear that NYSDEC reserves rights to future enforcement actions. If the inspector's supervisor or enforcement coordinator determines additional enforcement actions are necessary, the inspector *should not* reassure the owner/operator that the current situation is acceptable.

3.2 Non-permitted Site Inspections

For sites not authorized in accordance with state or local laws, the process will be abbreviated. First verify the need for authorization and observe receiving waters to detect water quality standard violations. If there is a violation, notify the owner of the violation or other compliance actions in response to their illicit activity. For DOW staff, Attachment 2 or a similar notice can be used to notify the site owner/operator that stormwater authorization is required.

3.3 Self-inspections

The role of the self-inspector is to verify that the site is complying with stormwater requirements. In particular, the self-inspector verifies that the SWPPP is being properly implemented. The self-inspector also documents SWPPP implementation so regulatory agencies can review implementation activities.

It is <u>not</u> the role of the self-inspector to report directly to regulatory authorities.

Appendix H of *The New York Standards and Specifications for Erosion and Sediment Control* - August 2005 (the Blue Book) includes a Construction Duration Inspection checklist that can be used by the owner/operators qualified professional for self-inspections. The Blue Book is available on the NYSDEC website.

3.3.1 Purpose

The self inspector should ensure that the project's SWPPP is being properly implemented. This includes ensuring that the erosion and sediment control practices are properly installed and being maintained in accordance with the SWPPP/Blue Book.

The project must be properly phased to limit the disturbance to less than five acres, and the construction sequence for each phase must be followed. The SWPPP must also be modified to address evolving circumstances. Finally, and most importantly, receiving waters must be protected.

If a soil disturbance will be greater than five acres at any given time, the site operator must obtain written permission from the DOW regional office.

3.3.2 Pre-construction Conference

The parties responsible for various aspects of stormwater compliance should be identified at the pre-construction conference. Responsible parties may include, but are not limited to, owner's engineer, owner/operator/permittee, contractors, and subcontractors.

Typical responsibilities include: installation of erosion and sediment control (E & SC) practices; maintenance of E & SC practices, inspection of E&SC practices, installation of post construction stormwater management practices (SMPs), inspection of post construction SMPs, SWPPP revisions, and contractor direction.

All parties should clearly know what is expected of them. Responsible parties should complete the Pre-construction Site Assessment Checklist provided in Appendix H of the Blue Book.

3.3.3 Inspection Preparation

The inspector should review the project's SWPPP (including the phasing plan, construction sequence and site specific issues) and the last few inspection reports (if the inspector has them available).

3.3.4 Self-inspection Components

<u>Inspect installation, performance and maintenance of all E&SC practices</u>

The self inspector should inspect all areas that are under active construction or disturbance and areas that are vulnerable to erosion. The self-inspector should also inspect areas that will be disturbed prior to the next inspection for measures required prior to construction (e.g. silt barriers, stabilized construction entrance, diversions). Finally, self-inspectors should inspect post-construction controls during and after installation.

<u>Identify site deficiencies and corrective measures</u>

The self-inspector's reports must be maintained in a log book on site and the log book must be made available to the regulatory authorities. Although the legal responsibility for filing a Notice of Termination lies with the owner/operator, the self-inspector may also be called upon to perform a final site inspection, including post construction SMPs, prior to filing the Notice of Termination.

4.0 POST-INSPECTION ACTIVITIES

4.1 Regulatory Oversight Authorities

This section is intended for inspectors with regulatory oversight authority such as agents of the DOW or a local municipality, or others acting on their behalf (such as County Soil and Water Conservation District staff.) Upon completion of an inspection, inspection results should be documented for the record.

4.1.1 Written Notification

The inspector should inform the permittee or the on-site representative of their inspection results in writing by sending the permittee a complete, signed copy of the inspection report. The inspection report should be transmitted under a cover letter which elaborates on any deficiencies noted in the inspection report. It is not a good idea to commend exceptional efforts by the owner/operator in a letter, because such letters tend to undermine enforcement efforts when compliance status at a site degrades.

The inspector should consider providing a copy of the cover letter and inspection report to other parties with including:

- Permittee
- Contractor(s)
- Other regulatory oversight authorities
- Other parties present during the inspection (e.g. SWPPP preparer, permittee's self-inspector, etc.)

For DOW staff, an example of the inspection cover letter is included as Attachment 3.

4.1.2 Inspection Tracking

DOW staff must enter their inspection results into the electronic *Water Compliance System*.

Local municipalities and other regulatory oversight authorities are encouraged to develop an electronic tracking system in which to record their inspections.

4.2 Permittee's Self-inspections

This section is intended for qualified professionals who conduct site inspections for permittees in accordance with a SPDES permit or local requirements.

4.2.1 Written Records

Inspection Reports
The inspector shall prepare a written report summarizing inspection results. The inspection report is then provided to the permittee, or the permittee's duly authorized representative, and to the contractor responsible for implementing stormwater controls on-site in order to correct deficiencies noted in the inspection report. Finally, the inspection report must be added to the site log book that is required to be maintained on-site, and be available to regulatory oversight authorities for review.

4.2.2 Stormwater Pollution Prevention Plan Revisions

The inspector must inform the permittee of his/her duty to amend the Stormwater Pollution Prevention Plan (SWPPP) whenever an inspection proves the SWPPP to be ineffective in:

- Eliminating or significantly minimizing pollutants from on-site sources
- Achieving the general objectives of controlling pollutants in stormwater discharges from permitted construction activity
- Eliminating discharges that cause a substantial visible contrast to natural conditions

ATTACHMENT 1

Construction Stormwater Compliance Inspection Report

Project Name and Location: Municipality: County:	Date:	Page 1 of 2
	Permit # (if any): **NYR**	
	Entry Time:	Exit Time:
On-site Representative(s) and contact information:	Weather Conditions:	
Name and Address of SPDES Permittee/Title/Phone/Fax Numbers: Contacted: Yes ☐ No ☐		

INSPECTION CHECKLIST

SPDES Authority

	Yes	No	N/A		Law, rule or permit citation
1.	☐	☐	☐	Is a copy of the NOI posted at the construction site for public viewing?	
2.	☐	☐	☐	Is an up-to-date copy of the signed SWPPP retained at the construction site?	
3.	☐	☐	☐	Is a copy of the SPDES General Permit retained at the construction site?	

SWPPP Content

	Yes	No	N/A		Law, rule or permit citation
4.	☐	☐	☐	Does the SWPPP describe and identify the erosion & sediment control measures to be employed?	
5.	☐	☐	☐	Does the SWPPP provide a maintenance schedule for the erosion & sediment control measures?	
6.	☐	☐	☐	Does the SWPPP describe and identify the post-construction SW control measures to be employed?	
7.	☐	☐	☐	Does the SWPPP identify the contractor(s) and subcontractor(s) responsible for each measure?	
8.	☐	☐	☐	Does the SWPPP include all the necessary 'CONTRACTOR CERTIFICATION' statements?	
9.	☐	☐	☐	Is the SWPPP signed/certified by the permittee?	

Recordkeeping

	Yes	No	N/A		Law, rule or permit citation
10.	☐	☐	☐	Are inspections performed as required by the permit (every 7 days and after ½" rain event)?	
11.	☐	☐	☐	Are the site inspections performed by a qualified professional?	
12.	☐	☐	☐	Are all required reports properly signed/certified?	
13.	☐	☐	☐	Does the SWPPP include copies of the monthly/quarterly written summaries of compliance status?	

Visual Observations

	Yes	No	N/A		Law, rule or permit citation
14.	☐	☐	☐	Are all erosion and sediment control measures installed/constructed?	
15.	☐	☐	☐	Are all erosion and sediment control measures maintained properly?	
16.	☐	☐	☐	Have all disturbances of 5 acres or more been approved prior to the disturbance?	
17.	☐	☐	☐	Are stabilization measures initiated in inactive areas?	
18.	☐	☐	☐	Are permanent stormwater control measures implemented?	
19.	☐	☐	☐	Was there a discharge into the receiving water on the day of inspection?	
20.	☐	☐	☐	Are receiving waters free of there evidence of turbidity, sedimentation, or oil ? (If no , complete Page 2)	

Overall Inspection Rating: ❑ Satisfactory ❑ Marginal ❑ Unsatisfactory	
Name/Agency of Lead Inspector:	**Signature of Lead Inspector:**
Names/Agencies of Other Inspectors:	

Water Quality Observations

Describe the discharge(s) [source(s), impact on receiving water(s), etc.] ____

____

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____

____

Describe the quality of the receiving water(s) both upstream and downstream of the discharge____________________________

____

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Describe any other water quality standards or permit violations ____

____

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Additional Comments:____

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☐ Photographs attached

ATTACHMENT 2

**** NOTICE ****

On March 10, 2003, provisions of the Federal Clean Water Act went into effect that apply to many construction operations.

If your construction operations result in the disturbance of one acre or greater and stormwater runoff from your site reaches surface waters (i.e., lake, stream, road side ditch, swale, storm sewer system, etc.), the stormwater runoff from your site must be covered by a State Pollutant Discharge Elimination System (SPDES) Permit issued by the New York State Department of Environmental Conservation (NYSDEC).

To facilitate your compliance with the law, NYSDEC has issued a General Permit which may be applicable to your project. To obtain coverage under this General Permit, you need to prepare a Stormwater Pollution Prevention Plan (SWPPP) and then file a Notice of Intent (NOI) to the NYSDEC headquarters in Albany. The NOI form is available on the DEC website. You may also obtain a copy of the NOI form at the nearest NYSDEC regional offices.

When you file your NOI you are certifying that you have developed a SWPPP and that it will be implemented prior to commencing construction. When you submit the NOI you need to indicate if your SWPPP is in conformance with published NYSDEC technical standards; if it is, your SPDES permit coverage will be effective in as few as five business days. If your SWPPP does not conform to the DEC technical standards, coverage will not be available for at least 60 business days.

Failure to have the required permit can result in legal actions which include Stop Work Orders and/or monetary penalties of up to $37,500/day

If your construction operations are already in progress and you are not covered by an appropriate NYSDEC permit contact the NYSDEC Regional Water Engineer as soon as possible. If your construction field operations have not yet commenced, review the NOI and the General Permit on the DEC's website or at the DEC regional office for your area. When you are comfortable that you understand and comply with the requirements, file your NOI.

The requirement to file an NOI does not replace any local requirements. Developers/Contractors are directed to contact the Local Code Enforcement Officer or Stormwater Management Officer for local requirements.

ATTACHMENT 3

<< Date >>

Mr. John Smith
123 Main Street
Ferracane, NY 12345

Re: Stormwater Inspection
SPDES Permit Identification No. NYR10Z000 (through SPDES No. GP-02-01)
Blowing Leaves Subdivision
Gasper (T), Eaton (Co.)

Dear Mr. Smith:

On the afternoon of << date >> I conducted an inspection of the construction activities associated with the Blowing Leaves Subdivision located on County Route 1 in the town of Gasper, Eaton County. The inspection was conducted in the presence of you and Mr. Samuel Siltfence of Acme Excavating Co., Inc. The purpose of the inspection was to verify compliance with the *State Pollutant Discharge Elimination System (SPDES) General Permit for Storm Water Discharges from Construction Activity* ("the general permit").

The overall rating for the project at the time of the inspection was ***unsatisfactory***. A copy of my inspection report is attached for your information. In addition to the report, I would like to elaborate on the following:

SPDES Authority

- In accordance with subdivision 750-2.1 (a) of Title 6 of the Official Compilation of Codes, Rules, and Regulations of the State of New York (6 NYCRR), a copy of your permit must be retained at the construction site. You did not have a copy of the general permit at the site. **Your failure to retain a copy of the general permit at the construction site is a violation of 6 NYCRR Part 750-2.1 (a).** Please retain a copy of the general permit at the site from this point forward.

SWPPP Content

- In accordance with Part III.E.2. of the general permit, contractors and subcontractors must certify that they understand the terms and conditions of the general permit and the SWPPP before undertaking any construction activity at the site. Your SWPPP does not include a certification statement from Acme Excavating Co., Inc. **The failure of your contractor to sign this certification before undertaking construction activity at the site is a violation of Part III.E.2. of the general permit.** Please obtain copies of all necessary certifications and provide copies of them to each party who holds a copy of your SWPPP.

- In accordance with Part V.H.2. of the general permit, SWPPP's must be certified by the permittee. Your SWPPP was not certified by you. **Your failure to certify your SWPPP is a**

violation of Part V.H.2. of the general permit. Please certify your SWPPP.

Recordkeeping

- In accordance with Parts III.D.3.a. and III.D.3.b. of the general permit, permittees must have a qualified professional conduct site inspections within 24 hours of the end of 0.5" or greater rain events and at least once per week. A review of your records revealed that your "self-inspections" are only being conducted about two or three times per month. **Your failure to have a qualified professional conduct inspections at the required frequency is a violation of Part III.D.3.b. of the general permit.** Please immediately direct your qualified professional to conduct your site inspections at the required frequency.

- Although the frequency of self-inspections does not meet rquirements, the quality of them is very good. Your qualified professional has accurately noted the same SWPPP deficiencies and necessary maintenance activities that I also observed, and prepared thorough sketches on the self-inspection site maps.

- In accordance with Part V.H.2. of the general permit, the permittee must certify all reports required by the permit. A review of your records showed that your self-inspection reports were not certified. **Your failure to certify your self-inspection reports is a violation of Part V.H.2. of the general permit.** Please sign and certify any and all existing and future self-inspection reports.

Visual Observations

- In accordance with Parts III.A.2. and III.A.3. of the general permit, all erosion and sediment controls (E&SC) measures must be installed (as detailed in the SWPPP) prior to the initiation of construction. During the inspection, I noted all of your E&SC measures have been correctly installed at the right times and locations.

- In accordance with Part V.L. of the general permit, all of the E&SC measures at your site must be maintained properly. While on site I observed that, among other things, the section of silt fence in place parallel to County Route 1 is in various stages of disrepair. **The failure of your contractor to adequately maintain the E&SC measures currently in place at your site is a violation of Part V.L of the general permit.** Please direct your contractor to repair this silt fence immediately and to diligently maintain all of the other required E&SC measures as they are brought to his attention by your qualified professional.

- This inspection was conducted during a rain event which resulted in a stormwater discharge to the municipal separate storm sewer system (MS4) being operated by the Eaton County Department of Public Works. Your discharge was visibly turbid whereas upstream water MS4 was clear. As a result, the discharge from the MS4 outfall into Karimipour Creek was causing slight turbidity. Please be advised that the narrative water quality standard for turbidity in Karimipour Creek is “no increase that will cause a substantial visible contrast to natural conditions.” I attribute the lack of maintenance of your E&SC measures to be the primary cause of the turbid discharge. Please be reminded that the general permit does not authorize you cause or contribute to a condition in contravention of any water quality standards.

If you have any questions or comments, please feel free to contact me at (999) 456-5432.

Sincerely,

Hector D. Inspector, CPESC
Environmental Program Specialist 2

HDI:ms
Attachment

cc w/att.: Chester Checkdam, (T) Gasper Code Enforcement Officer
Samuel Siltfence, Acme Excavating Co., Inc.

APPENDIX 11

NYSDEC DEEP-RIPPING & DECOMPACTION MANUAL

APRIL 2008

New York State
DEPARTMENT OF ENVIRONMENTAL CONSERVATION

Division of Water

Deep-Ripping and Decompaction

April 2008

New York State
Department of Environmental Conservation

Document Prepared by:

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

Alternative Stormwater Management
Deep-Ripping and Decompaction

Description

The two-phase practice of 1) "Deep Ripping;" and 2) "Decompaction" (deep subsoiling), of the soil material as a step in the cleanup and restoration/landscaping of a construction site, helps mitigate the physically induced impacts of soil compression; i.e.: soil compaction or the substantial increase in the bulk density of the soil material.

Deep Ripping and Decompaction are key factors which help in restoring soil pore space and permeability for water infiltration. Conversely, the physical actions of cut-and-fill work, land grading, the ongoing movement of construction equipment and the transport of building materials throughout a site alter the architecture and structure of the soil, resulting in: the mixing of layers (horizons) of soil materials, compression of those materials and diminished soil porosity which, if left unchecked, severely impairs the soil's water holding capacity and vertical drainage (rainfall infiltration), from the surface downward.

In a humid climate region, compaction damage on a site is virtually guaranteed over the duration of a project. Soil in very moist to wet condition when compacted, will have severely reduced permeability. Figure 1 displays the early stage of the deep-ripping phase (Note that all topsoil was stripped prior to construction access, and it remains stockpiled until the next phase – decompaction – is complete). A heavy-duty tractor is pulling a three-shank ripper on the first of several series of incrementally deepening passes through the construction access corridor's densely compressed subsoil material. Figure 2 illustrates the approximate volumetric composition of a loam surface soil when conditions are good for plant growth, with adequate natural pore space for fluctuating moisture conditions.

Fig. 1. A typical deep ripping phase of this practice, during the first in a series of progressively deeper "rips" through severely compressed subsoil.

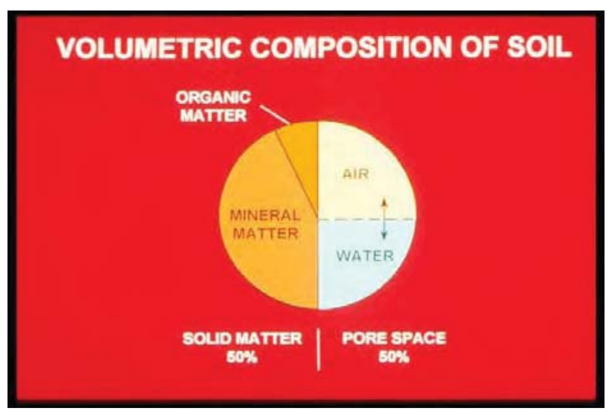

Fig. 2. About 50% of the volume of undisturbed loam surface soil is pore space, when soil is in good condition for plant growth. Brady, 2002.

Recommended Application of Practice

The objective of Deep Ripping and Decompaction is to effectively fracture (vertically and laterallly) through the thickness of the physically compressed subsoil material (see Figure 3), restoring soil porosity and permeability and aiding infiltration to help reduce runoff. Together with topsoil stripping, the "two-phase" practice of Deep Ripping and Decompaction first became established as a "best management practice" through ongoing success on commercial farmlands affected by heavy utility construction right-of-way projects (transmission pipelines and large power lines).

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

Soil permeability, soil drainage and cropland productivity were restored. For broader construction application, the two-phase practice of Deep Ripping and Decompaction is best adapted to areas impacted with significant soil compaction, on contiguous open portions of large construction sites and inside long, open construction corridors used as temporary access over the duration of construction. Each mitigation area should have minimal above-and-below-ground obstructions for the easy avoidance and maneuvering of a large tractor and ripping/decompacting implements. Conversely, the complete two-phase practice is not recommended in congested or obstructed areas due to the limitations on tractor and implement movement.

Benefits

Aggressive "deep ripping" through the compressed thickness of exposed subsoil before the replacement/respreading of the topsoil layer, followed by "decompaction," i.e.: "sub-soiling," through the restored topsoil layer down into the subsoil, offers the following benefits:

- Increases the project (larger size) area's direct surface infiltration of rainfall by providing the open site's mitigated soil condition and lowers the demand on concentrated runoff control structures

- Enhances direct groundwater recharge through greater dispersion across and through a broader surface than afforded by some runoff-control structural measures

- Decreases runoff volume generated and provides hydrologic source control

- May be planned for application in feasible open locations either alone or in conjunction with plans for structural practices (e.g., subsurface drain line or infiltration basin) serving the same or contiguous areas

- Promotes successful long-term revegetation by restoring soil permeability, drainage and water holding capacity for healthy (rather than restricted) root-system development of trees, shrubs and deep rooted ground cover, minimizing plant drowning during wet periods and burnout during dry periods.

Feasibility / Limitations

The effectiveness of Deep Ripping and Decompaction is governed mostly by site factors such as: the original (undisturbed) soil's hydrologic characteristics; the general slope; local weather/timing (soil moisture) for implementation; the space-related freedom of equipment/implement maneuverability (noted above in **Recommended Application of Practice**), and by the proper selection and operation of tractor and implements (explained below in **Design Guidance**). The more notable site-related factors include:

Soil
In the undisturbed condition, each identified soil type comprising a site is grouped into one of four categories of soil hydrology, Hydrologic Soil Group A, B, C or D, determined primarily by a range of characteristics including soil texture, drainage capability when thoroughly wet, and depth to water table. The natural rates of infiltration and transmission of soil-water through the undisturbed soil layers for Group A is "high" with a low runoff potential while soils in Group B are moderate in infiltration and the transmission of soil-water with a moderate runoff potential, depending somewhat on slope. Soils in Group C have slow rates of infiltration and transmission of soil-water and a moderately high runoff potential influenced by soil texture and slope; while soils in Group D have exceptionally slow rates of infiltration and transmission of soil-water, and high runoff potential.

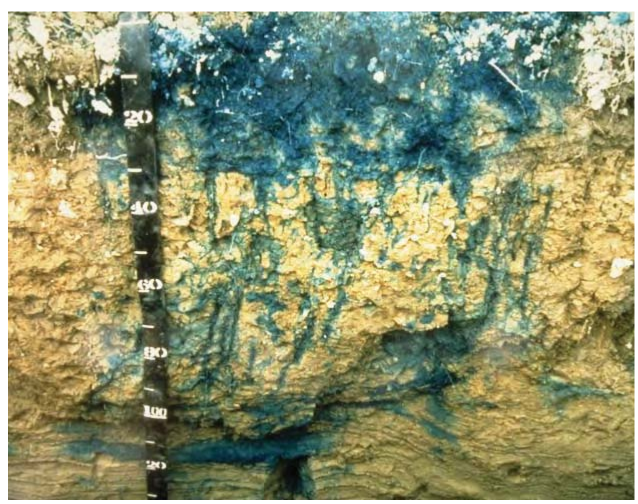

Fig. 4. Profile (in centimeters) displaying the infiltration test result of the natural undisturbed horizons of a soil in Hydrologic Soil Group C.

In Figure 4, the profile displays the undisturbed horizons of a soil in Hydrologic Soil Group C and the naturally slow rate of infiltration through the subsoil. The slow rate of infiltration begins immediately below the topsoil horizon (30 cm), due to the limited amount of macro pores, e.g.: natural subsoil fractures, worm holes and root channels. Infiltration after the construction-induced mixing and compression of such subsoil material is virtually absent; but can be restored back to this natural level with the two-phase practice of deep ripping and decompaction, followed by the permanent establishment of an appropriate, deep taproot lawn/ground cover to help maintain the restored subsoil structure. Infiltration after construction-induced mixing and compression of such subsoil material can be notably rehabilitated with the Deep Ripping and Decompaction practice, which prepares the site for the appropriate long-term lawn/ground cover mix including deep taproot plants such as clover, fescue or trefoil, etc. needed for all rehabilitated soils.

Generally, soils in Hydrologic Soil Groups A and B, which respectively may include deep, well-drained, sandy-gravelly materials or deep, moderately well-drained basal till materials, are among the easier ones to restore permeability and infiltration, by deep ripping and decompaction. Among the many different soils in Hydrologic Soil Group C are those unique glacial tills having a natural fragipan zone, beginning about 12 to 18 inches (30 – 45cm), below surface. Although soils in Hydrologic Soil Group C do require a somewhat more carefully applied level of the Deep Ripping and Decompaction practice, it can greatly benefit such affected areas by reducing the runoff and fostering infiltration to a level equal to that of pre-disturbance.

Soils in Hydrologic Soil Group D typically have a permanent high water table close to the surface, influenced by a clay or other highly impervious layer of material. In many locations with clay subsoil material, the bulk density is so naturally high that heavy trafficking has little or no added impact on infiltration; and structural runoff control practices rather than Deep Ripping and Decompaction should be considered.

The information about Hydrologic Soil Groups is merely a general guideline. Site-specific data such as limited depths of cut-and-fill grading with minimal removal or translocation of the inherent subsoil materials (as analyzed in the county soil survey) or, conversely, the excavation and translocation of deeper, unconsolidated substratum or consolidated bedrock materials (unlike the analyzed subsoil horizons' materials referred to in the county soil survey) should always be taken into account.

Sites made up with significant quantities of large rocks, or having a very shallow depth to bedrock, are not conducive to deep ripping and decompation (subsoiling); and other measures may be more practical.

Slope

The two-phase application of 1) deep ripping and 2) decompaction (deep subsoiling), is most practical on flat, gentle and moderate slopes. In some situations, such as but not limited to temporary construction access corridors, inclusion areas that are moderately steep along a project's otherwise gentle or moderate slope may also be deep ripped and decompacted. For limited instances of moderate steepness on other projects, however, the post-construction land use and the relative alignment of the potential ripping and decompaction work in relation to the lay of the slope should be reviewed for safety and practicality. In broad construction areas predominated by moderately steep or steep slopes, the practice is generally not used.

Local Weather/Timing/Soil Moisture

Effective fracturing of compressed subsoil material from the exposed work surface, laterally and vertically down through the affected zone is achieved only when the soil material is moderately dry to moderately moist. Neither one of the two-phases, deep ripping nor decompaction (deep subsoiling), can be effectively conducted when the soil material (subsoil or replaced topsoil) is in either a "plastic" or "liquid" state of soil consistency. Pulling the respective implements legs through the soil when it is overly moist only results in the "slicing and smearing" of the material or added "squeezing and compression" instead of the necessary fracturing. Ample drying time is needed for a "rippable" soil condition not merely in the material close to the surface, but throughout the material located down to the bottom of the physically compressed zone of the subsoil.

The "poor man's Atterberg field test" for soil plasticity is a simple "hand-roll" method used for quick, on-site determination of whether or not the moisture level of the affected soil material is low enough for: effective deep ripping of subsoil; respreading of topsoil in a friable state; and final decompaction (deep subsoiling). Using a sample of soil material obtained from the planned bottom depth of ripping, e.g.: 20 - 24 inches below exposed subsoil surface, the sample is hand rolled between the palms down to a 1/8-inch diameter thread. (Use the same test for stored topsoil material before respreading on the site.) If the respective soil sample crumbles apart in segments no greater than 3/8 of an inch long, by the time it is rolled down to 1/8 inch diameter, it is low enough in moisture for deep ripping (or topsoil replacement), and decompaction. Conversely, as shown in Figure 5, if the rolled sample stretches out in increments greater than 3/8 of an inch long before crumbling, it is in a "plastic" state of soil consistency and is too wet for subsoil ripping (as well as topsoil replacement) and final decompaction.

Fig. 5. Augered from a depth of 19 inches below the surface of the replaced topsoil, this subsoil sample was hand rolled to a 1/8-inch diameter. The test shows the soil at this site stretches out too far without crumbling; it indicates the material is in a plastic state of consistence, too wet for final decompaction (deep subsoiling) at this time.

Design Guidance

Beyond the above-noted site factors, a vital requirement for the effective Deep Ripping and Decompaction (deep subsoiling), is implementing the practice in its distinct, two-phase process:

1) Deep rip the affected thickness of exposed subsoil material (see Figure 10 and 11), aggressively fracturing it before the protected topsoil is reapplied on the site (see Figure 12); and

2) Decompact (deep subsoil), simultaneously through the restored topsoil layer and the upper half of the affected subsoil (Figure 13). The second phase, "decompaction," mitigates the partial recompaction which occurs during the heavy process of topsoil spreading/grading. Prior to deep ripping and decompacting the site, all construction activity, including construction equipment and material storage, site cleanup and trafficking (Figure 14), should be finished; and the site closed off to further disturbance. Likewise, once the practice is underway and the area's soil permeability and

rainfall infiltration are being restored, a policy limiting all further traffic to permanent travel lanes is maintained.

The other critical elements, outlined below, are: using the proper implements (deep, heavy-duty rippers and subsoilers), and ample pulling-power equipment (tractors); and conducting the practice at the appropriate speed, depth and pattern(s) of movement.

Note that an appropriate plan for the separate practice of establishing a healthy perennial ground cover, with deep rooting to help maintain the restored soil structure, should be developed in advance. This may require the assistance of an agronomist or landscape horticulturist.

Implements

Avoid the use of all undersize implements. The small-to-medium, light-duty tool will, at best, only "scarify" the uppermost surface portion of the mass of compacted subsoil material. The term "chisel plow" is commonly but incorrectly applied to a broad range of implements. While a few may be adapted for the moderate subsoiling of non-impacted soils, the majority are less durable and used for only lighter land-fitting (see Figure 6).

Fig. 6. A light duty chisel implement, not adequate for either the deep ripping or decompaction (deep subsoiling) phase.

Fig. 7. One of several variations of an agricultural ripper. This unit has long, rugged shanks mounted on a steel V-frame for deep, aggressive fracturing through Phase 1.

Use a "heavy duty" agricultural-grade, deep ripper (see Figures 7,9,10 and 11) for the first phase: the lateral and vertical fracturing of the mass of exposed and compressed subsoil, down and through, to the bottom of impact, prior to the replacement of the topsoil layer. (Any oversize rocks which are uplifted to the subsoil surface during the deep ripping phase are picked and removed.) Like the heavy-duty class of implement for the first phase, the decompaction (deep subsoiling) of Phase 2 is conducted with the heavy-duty version of the deep subsoiler. More preferable is the angled-leg variety of deep subsoiler (shown in Figures 8 and 13). It minimizes the inversion of the subsoil and topsoil layers while laterally and vertically fracturing the upper half of the previously ripped subsoil layer and all of the topsoil layer by delivering a momentary, wave-like "lifting and shattering" action up through the soil layers as it is pulled.

Pulling-Power of Equipment
Use the following rule of thumb for tractor horsepower (hp) whenever deep ripping and decompacting a significantly impacted site: For both types of implement, have at least 40 hp of tractor pull available for each mounted shank/ leg.

Using the examples of a 3-shank and a 5-shank implement, the respective tractors should have 120 and 200 hp available for fracturing down to the final depth of 20-to-24 inches per phase. Final depth for the deep ripping in Phase 1 is achieved incrementally by a progressive series of passes (see Depth and Patterns of Movement, below); while for Phase 2, the full operating depth of the deep subsoiler is applied from the beginning.

The operating speed for pulling both types of implement should not exceed 2 to 3 mph. At this slow and managed rate of operating speed, maximum functional performance is sustained by the tractor and the implement performing the soil fracturing. Referring to Figure 8, the implement is the 6-leg version of the deep angled-leg subsoiler. Its two outside legs are "chained up" so that only four legs will be engaged (at the maximum depth), requiring no less than 160 hp, (rather than 240 hp) of pull. The 4-wheel drive, articulated-frame tractor in Figure 8 is 174 hp. It will be decompacting this unobstructed, former construction access area simultaneously through 11 inches of replaced topsoil and the upper 12 inches of the previously deep-ripped subsoil. In constricted areas of Phase 1) Deep Ripping, a medium-size tractor with adequate hp, such as the one in Figure 9 pulling a 3-shank deep ripper, may be more maneuverable.


Fig. 8. A deep, angled-leg subsoiler, ideal for Phase 2 decompaction of after the topsoil layer is graded on top of the ripped subsoil.


Fig. 9. This medium tractor is pulling a 3-shank deep ripper. The severely compacted construction access corridor is narrow, and the 120 hp tractor is more maneuverable for Phase 1 deep ripping (subsoil fracturing), here.

Some industrial-grade variations of ripping implements are attached to power graders and bulldozers. Although highly durable, they are generally not recommended. Typically, the shanks or "teeth" of these rippers are too short and stout; and they are mounted too far apart to achieve the well-distributed type of lateral and vertical fracturing of the soil materials necessary to restore soil permeability and infiltration. In addition, the power graders and bulldozers, as pullers, are far less maneuverable for turns and patterns than the tractor.

Depth and Patterns of Movement
As previously noted both Phase 1 Deep Ripping through significantly compressed, exposed subsoil and Phase 2 Decompaction (deep subsoiling) through the replaced topsoil and upper subsoil need to be performed at maximum capable depth of each implement. With an implement's guide wheels attached, some have a "normal" maximum operating depth of 18 inches, while others may go deeper. In many situations, however, the tractor/implement operator must first remove the guide wheels and other non essential elements from the implement. This adapts the ripper or the deep subsoiler for skillful pulling with its frame only a few inches above surface, while the shanks or legs, fracture the soil material 20-to-24 inches deep.

There may be construction sites where the depth of the exposed subsoil's compression is moderate, e.g.: 12 inches, rather than deep. This can be verified by using a ¾ inch cone penetrometer and a shovel to test the subsoil for its level of compaction, incrementally, every three inches of increasing depth. Once the full thickness of the subsoil's compacted zone is finally "pieced" and there is a significant drop in the psi measurements of the soil penetrometer, the depth/thickness of compaction is determined. This is repeated at several representative locations of the construction site. If the thickness of the site's subsoil compaction is verified as, for example, ten inches, then the Phase 1 Deep Ripping can be correspondingly reduced to the implement's minimum operable depth of 12 inches. However, the Phase 2 simultaneous Decompation (subsoiling) of an 11 inch thick layer of replaced topsoil and the upper subsoil should run at the subsoiling implements full operating depth.

Fig. 10. An early pass with a 3-shank deep ripper penetrating only 8 inches into this worksite's severely compressed subsoil.

Fig. 11. A repeat run of the 3-shank ripper along the same patterned pass area as Fig. 9; here, incrementally reaching 18 of the needed 22 inches of subsoil fracture.

Typically, three separate series (patterns) are used for both the Phase 1 Deep Ripping and the Phase 2 Decompaction on significantly compacted sites. For Phase 1, each series begins with a moderate depth of rip and, by repeat-pass, continues until full depth is reached. Phase 2 applies the full depth of Decompation (subsoiling), from the beginning.

Every separate series (pattern) consists of parallel, forward-and-return runs, with each progressive pass of the implement's legs or shanks evenly staggered between those from the previous pass. This compensates for the shank or leg-spacing on the implement, e.g., with 24-to-30 inches between each shank or leg. The staggered return pass ensures lateral and vertical fracturing actuated every 12 to 15 inches across the densely compressed soil mass.

Large, Unobstructed Areas
For larger easy areas, use the standard patterns of movement:

- The first series (pattern) of passes is applied lengthwise, parallel with the longest spread of the site; gradually progressing across the site's width, with each successive pass.

- The second series runs obliquely, crossing the first series at an angle of about 45 degrees.

- The third series runs at right angle (or 90 degrees), to the first series to complete the fracturing and shattering on severely compacted sites, and avoid leaving large unbroken blocks of compressed soil material. (In certain instances, the third series may be optional, depending on how thoroughly the first two series loosen the material and eliminate large chunks/blocks of material as verified by tests with a ¾-inch cone penetrometer.)

Fig. 12. Moderately dry topsoil is being replaced on the affected site now that Phase 1 deep ripping of the compressed subsoil is complete.


Fig. 13. The same deep, angled-leg subsoiler shown in Fig. 7 is engaged at maximum depth for Phase 2, decompaction (deep soiling), of the replaced topsoil and the upper subsoil materials.

Corridors
In long corridors of limited width and less maneuverability than larger sites, e.g.: along compacted areas used as temporary construction access, a modified series of pattern passes are used.

- First, apply the same initial lengthwise, parallel series of passes described above.

● A second series of passes makes a broad “S” shaped pattern of rips, continually and gradually alternating the “S” curves between opposite edges inside the compacted corridor.

● The third and final series again uses the broad, alternating S pattern, but it is “flip-flopped” to continually cross the previous S pattern along the corridor’s centerline. This final series of the S pattern curves back along the edge areas skipped by the second series.

Maintenance and Cost

Once the two-phase practice of Deep Ripping and Decompation is completed, two items are essential for maintaining a site’s soil porosity and permeability for infiltration. They are: planting and maintaining the appropriate ground cover with deep roots to maintain the soil structure (see Figure 15); and keeping the site free of traffic or other weight loads.

Note that site-specific choice of an appropriate vegetative ground-cover seed mix, including the proper seeding ratio of one or more perennial species with a deep taproot system and the proper amount of lime and soil nutrients (fertilizer mix) adapted to the soil-needs, are basic to the final practice of landscaping, i.e: surface tillage, seeding/planting/fertilizing and culti-packing or mulching is applied. The "maintenance" of an effectively deep-ripped and decompacted area is generally limited to the successful perennial (long-term) landscape ground cover; as long as no weight-bearing force of soil compaction is applied.

Fig. 14. The severely compacted soil of a temporary construction yard used daily by heavy equipment for four months; shown before deep ripping, topsoil replacement, and decompaction.

Fig. 15. The same site as Fig. 14 after deep ripping of the exposed subsoil, topsoil replacement, decompaction through the topsoil and upper subsoil and final surface tillage and revegetation to maintain soil permeability and infiltration.

The Deep Ripping and Decompaction practice is, by necessity, more extensive than periodic subsoiling of farmland.The cost of deep ripping and decompacting (deep subsoiling), will vary according to the depth and severity of soil-material compression and the relative amount of tractor and implement time that is required. In some instances, depending on open maneuverability, two-to-three acres of compacted project area may be deep-ripped in one day. In other situations of more severe compaction and - or less maneuverability, as little as one acre may be fully ripped in a day. Generally, if the Phase 1) Deep Ripping is fully effective, the Phase 2) Decompaction should be completed in 2/3 to 3/4 of the time required for Phase 1.

Using the example of two acres of Phase 1) Deep Ripping in one day, at $1800 per day, the net cost is $900 per acre. If the Phase 2) Decompacting or deep subsoiling takes 3/4 the time as Phase 1, it costs $675 per acre for a combined total of $1575 per acre to complete the practice (these figures do not include the cost of the separate practice of topsoil stripping and replacement). Due to the many variables, it must be recognized that cost will be determined by the specific conditions or constraints of the site and the availability of proper equipment.

Resources

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- US Department of Agriculture in cooperation with Cornell University Agricultural Experiment Station. Various years. *Soil Survey of (various names) County, New York.* USDA.

Internet Access:

- Examples of implements:

V-Rippers. Access by internet search of *John Deere Ag -New Equipment for 915* (larger-frame model) *V-Rippe*; and, *for 913* (smaller-frame model) *V-Ripper*. Deep, angled-leg subsoiler. Access by internet search of: B*igham Brothers Shear Bolt Paratill-Subsoiler.* http://salesmanual.deere.com/sales/salesmanual/en_NA/primary_tillage/2008/feature/rippers/915v_pattern_frame.html?sbu=ag&link=prodcat Last visited March 08.

- Soils data of USDA Natural Resources Conservation Service. *NRCS Web Soil Survey.* http://websoilsurvey.nrcs.usda.gov/app/ and *USDA-NRCS Official Soil Series Descriptions; View by Name.* http://ortho.ftw.nrcs.usda.gov/cgi-bin/osd/osdname.cgi . *Last visited Jan. 08.*

- Soil penetrometer information. Access by internet searches of: *Diagnosing Soil Compaction using a Penetrometer (soil compaction tester), PSU Extension;* as well as *Dickey-john Soil Compaction Tester.* http://www.dickey-johnproducts.com/pdf/SoilCompactionTest.pdf and http://cropsoil.psu.edu/Extension/Facts/uc178pdf Last visited Sept. 07

APPENDIX 12

NRCS SOILS REPORT & SITE SOIL TEST LOGS

United States Department of Agriculture

NRCS

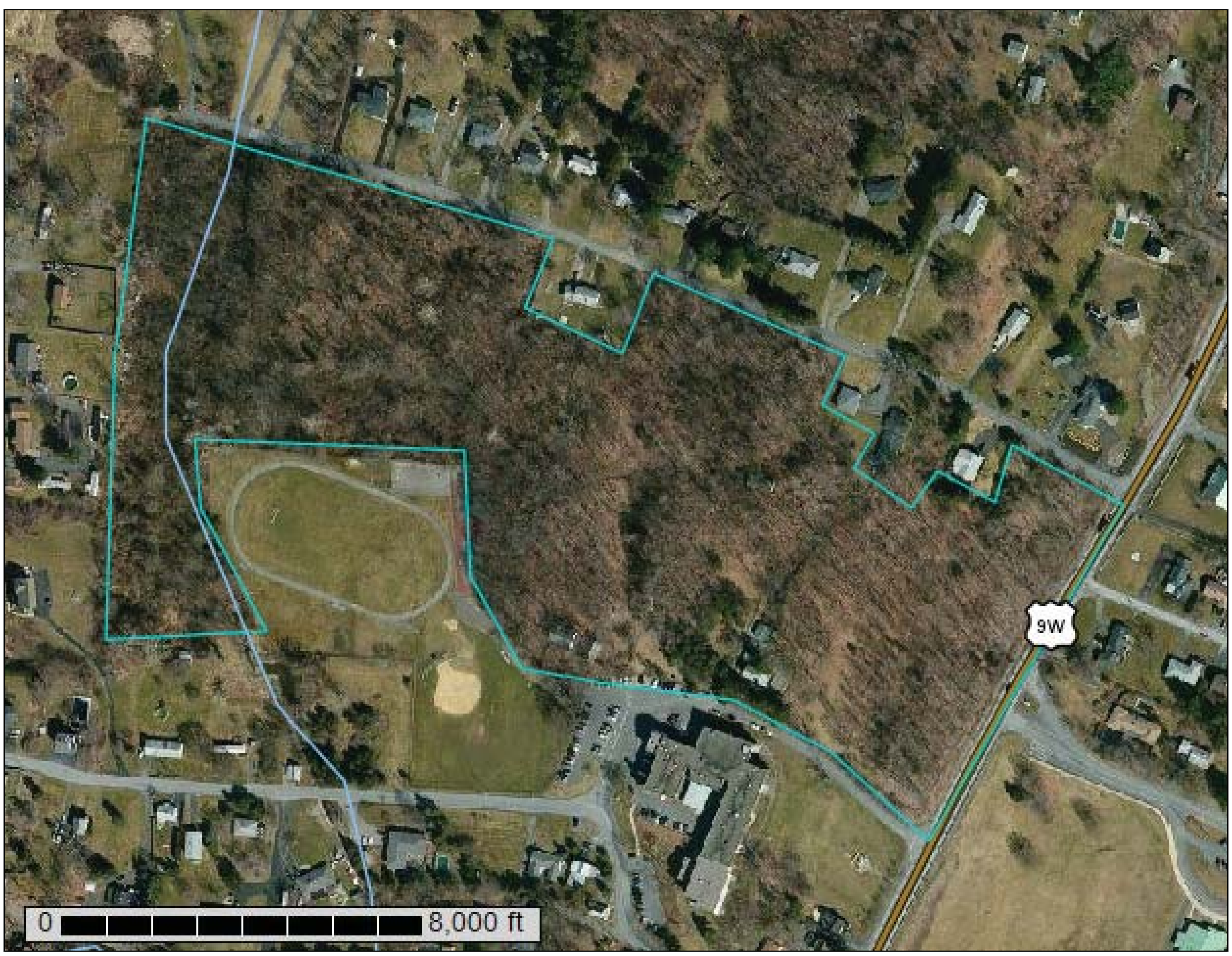
Natural Resources Conservation Service

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

Ulster County, New York

Bayside Development



November 22, 2016

Preface

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

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

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

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

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

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

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: 1:3,480 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0, 50, 100, 200, 300

Feet: 0, 150, 300, 600, 900

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 1:15,800.

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

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

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

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: Web Mercator (EPSG:3857)

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

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

Soil Survey Area: Ulster County, New York
Survey Area Data: Version 14, Sep 24, 2016

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

Date(s) aerial images were photographed: Mar 26, 2011—Apr 16, 2012

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.

Soil Information for All Uses

Suitabilities and Limitations for Use

The Suitabilities and Limitations for Use section includes various soil interpretations 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 interpretation.

Water Management

Water Management interpretations are tools for evaluating the potential of the soil in the application of various water management practices. Example interpretations include pond reservoir area, embankments, dikes, levees, and excavated ponds.

Storm Water Management - Infiltration (NY)

Proper management of storm water runoff from construction sites and developed areas is an issue of growing importance in New York State. During construction, exposed soil is subject to a greater risk of erosion, resulting in a greater potential for sedimentation in waterways. Storm water runoff increases on the rooftops of buildings, paved parking lots, and other impervious surfaces and thus increases the potential for flooding and discharge of polluted runoff into open water. Management of storm water runoff can prevent or reduce the availability, release, or transport of substances that can degrade surface and ground waters. Guidelines and design criteria for storm water management practices have been established by the New York State Department of Environmental Conservation (2008).

This interpretation is designed to evaluate the limitations of soils for storm water management through infiltration practices. Infiltration practices collect storm water runoff in basins (or trenches) for storage prior to filtration through undisturbed soil in the basin (or trench) floor and sides. Deep, well drained, and permeable soils are required for installation of infiltration practices. The purpose of this interpretation is to help decision makers use soil survey information in the selection and implementation of the storm water management practices best suited to a particular location. The information in this interpretation is intended for planning purposes and does not eliminate the need for onsite investigation of the soil.

Rating class terms indicate the extent to which the soils are limited by the soil features that influence the design, construction, and performance of infiltration practices. "Least limited" indicates that the soil has features that are very favorable for the specified practice. Good performance and low maintenance can be expected. "Somewhat limited" indicates that the soil has features that are moderately favorable for the practice. The limitations can be overcome or minimized by special planning, design, or construction. Fair performance and moderate maintenance can be expected. "Most limited" indicates that the soil has one or more features that are unfavorable for the practice. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive construction procedures. Poor performance and high maintenance can be expected.

The rating class is based on the maximum value of the rating indices generated for all soil features considered. Where the rating value is:

equal to 0.0, the rating class is "least limited."

> 0.0 and < 1.0, the rating class is "somewhat limited."

equal to 1.0, the rating class is "most limited."

Design criteria in the "New York State Stormwater Management Design Manual" (New York State Department of Environmental Conservation) were used to guide selection of potentially limiting soil properties. Additional limiting features incorporated into the interpretation are based on soil function for the specific practice. Following is a synopsis of the soil features considered in this interpretation.

Excessive permeability: Excessive permeability in one or more layers may allow storm water to move rapidly through the soil without sufficient filtering, resulting in a potential for ground-water contamination. Additional pretreatment or soil amendments may be required as part of an infiltration practice. The interpretation evaluates the range (low to high) of permeability values for the most transmissive layer in the soil. Where "excessive permability" is:

> 7.5 in/hr, the rating value is expressed as the number 1.0.

>= 5.0 in/hr and <= 7.5 in/hr, the rating value is expressed as the number 0.5.

< 5.0 in/hr, the rating value is expressed as the number 0.0.

Low permeability: Low permeability restricts movement of water through the soil, impeding the infiltration function. The interpretation evaluates the range (low to high) of permeability values for the least transmissive layer in the soil. Where "low permeability" is:

< 0.5 in/hr, the rating value is expressed as the number 1.0.

>= 0.5 in/hr and <= 1.0 in/hr, the rating value is expressed as the number 0.5.

> 1.0 in/hr, the rating value is expressed as the number 0.0.

Slope gradient: Excessive slope limits the functionality of an infiltration practice. The representative slope gradient percent for the soil component is the property evaluated. Where "slope gradient" is:

> 15 percent, the rating value is expressed as the number 1.0.

> 8 percent and <= 15 percent, the rating value is expressed as the number 0.5.

<= 8 percent, the rating value is expressed as the number 0.0.

Depth to bedrock: Limited depth to bedrock impedes excavation and restricts infiltration. The minimum depth to bedrock is the property evaluated. Where "depth to bedrock" is:

< 36 inches, the rating value is expressed as the number 1.0.

>= 36 inches and <= 48 inches, the rating value is expressed as the number 0.5.

> 48 inches, the rating value is expressed as the number 0.0.

Depth to human-manufactured materials: In urban areas, some anthropogenic (human-altered) soils have a restrictive layer, such as pavement, below the surface. Limited depth to this feature impedes excavation and restricts infiltration. The minimum depth to human-manufactured materials is the property evaluated. Where "depth to human-manufactured materials" is:

< 36 inches, the rating value is expressed as the number 1.0.

>= 36 inches and <= 48 inches, the rating value is expressed at the number 0.5.

> 48 inches, the rating value is expressed as the number 0.0.

Depth to saturation: A seasonal high water table in the upper part of the soil limits the storage capacity of an infiltration practice. The interpretation evaluates the minimum depth to a zone of saturation. Where the "depth to saturation" is:

< 36 inches, the rating value is expressed as the number 1.0.

>= 36 inches and <= 48 inches, the rating value is expressed as the number 0.5.

> 48 inches, the rating value is expressed as the number 0.0.

Excessive fines: Soils with a high content of silt and clay may become plugged with sediment from storm water, resulting in restricted infiltration. The interpretation evaluates the weighted average of the range (low to high values) of the percent passing the number 200 sieve, for depths > 36 inches, as follows:

all of range >= 40, the rating value is expressed as the number 1.0.

some of range >= 40, the rating value is expressed as the number 0.5.

all of range < 40, the rating value is expressed as the number 0.0.

In addition soil characteristics, other attributes of the site and the surrounding area are important factors in planning and implementing storm water management practices. For example, proximity and slope direction from the installation practice to a drinking water well are important considerations when sites for infiltration practices are selected.

The components listed for each map unit in the accompanying Summary by Map Unit table in Web Soil Survey or the Aggregation Report in Soil Data Viewer are determined by the aggregation method chosen, which is displayed in the report. An aggregated rating class is shown for each map unit. The components listed for each map unit are only those that have the same rating class as the one listed for the map unit. The percent composition of these components is described. As a result, the percentage of the rating class in the map unit is indicated.

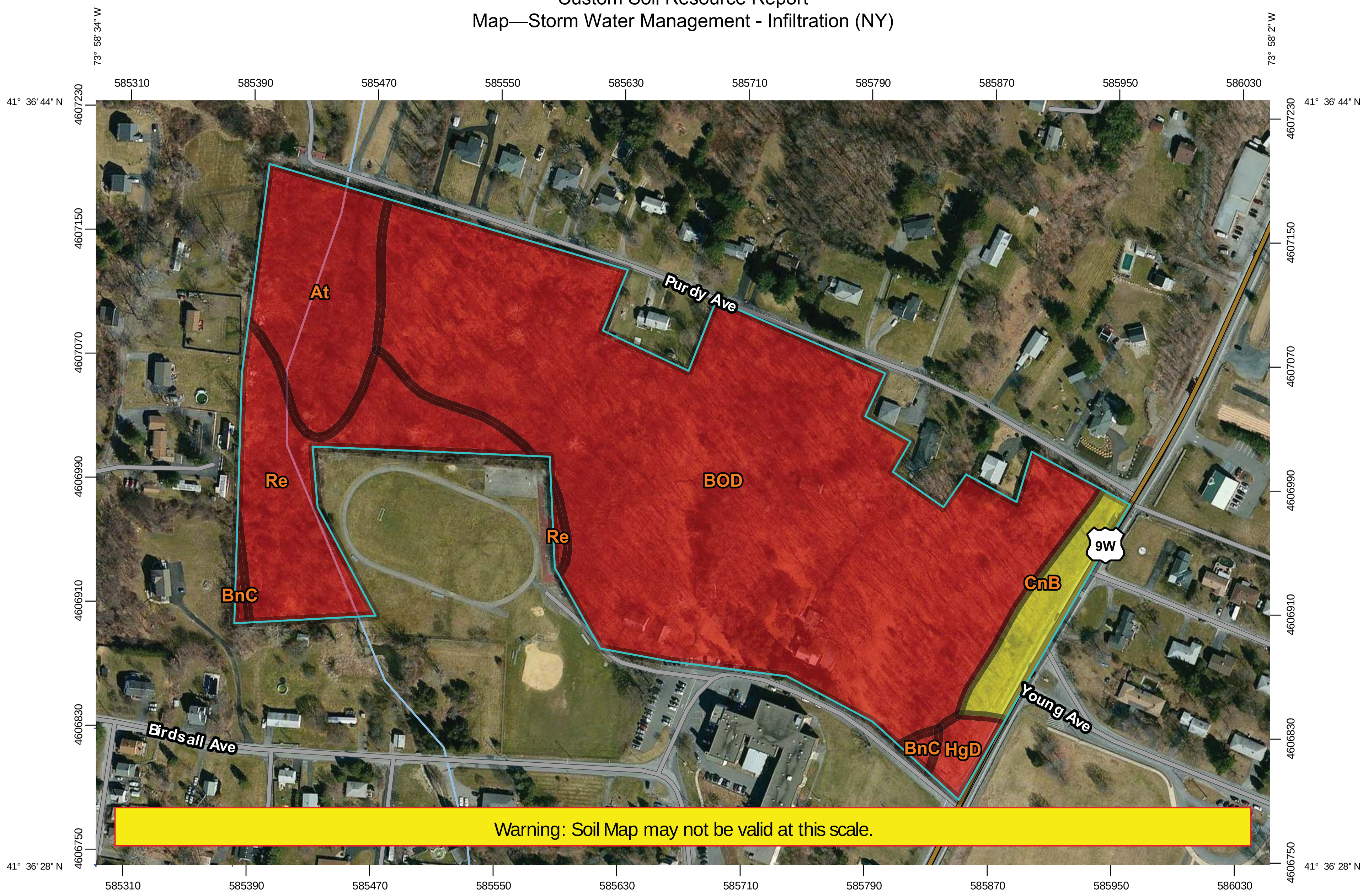
Other components with different ratings may occur in each map unit. The ratings for all components, regardless of the map unit aggregated rating, can be viewed by generating the Selected Soil Interpretations report with this interpretation included from the Soil Reports tab in Web Soil Survey or from the Soil Data Mart.

References:

New York State Department of Environmental Conservation. April 2008. New York State Stormwater Management Design Manual.

New York State Department of Environmental Conservation. June 2000. Urban/ Stormwater Runoff Management Practices Catalogue for Nonpoint Source Pollution Prevention in New York State.

Map—Storm Water Management - Infiltration (NY)



Map Scale: 1:3,480 if printed on A landscape (11" x 8.5") sheet.

Meters: 0, 50, 100, 200, 300

Feet: 0, 150, 300, 600, 900

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

- Most limited
- Somewhat limited
- Least limited
- Not rated or not available

Soil Rating Lines

- Most limited
- Somewhat limited
- Least limited
- Not rated or not available

Soil Rating Points

- Most limited
- Somewhat limited
- Least limited
- Not rated or not available

Water Features

- Streams and Canals

Transportation

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

Background

- Aerial Photography

MAP INFORMATION

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

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

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

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

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: Web Mercator (EPSG:3857)

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

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

Soil Survey Area: Ulster County, New York
Survey Area Data: Version 14, Sep 24, 2016

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

Date(s) aerial images were photographed: Mar 26, 2011—Apr 16, 2012

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.

Tables—Storm Water Management - Infiltration (NY)

Storm Water Management - Infiltration (NY)— Summary by Map Unit — Ulster County, New York (NY111)						
Map unit symbol	**Map unit name**	**Rating**	**Component name (percent)**	**Rating reasons (numeric values)**	**Acres in AOI**	**Percent of AOI**
At	Atherton silt loam	Most limited	Atherton (80%)	Depth to saturation (1.00)	2.8	10.5%
				Excessive fines (0.50)		
BnC	Bath-Nassau complex, 8 to 25 percent slopes	Most limited	Bath (50%)	Low permeability (1.00)	0.2	0.7%
				Depth to saturation (1.00)		
				Slope (1.00)		
				Depth to bedrock (0.50)		
				Excessive fines (0.50)		
			Nassau (30%)	Depth to bedrock (1.00)		
				Slope (1.00)		
BOD	Bath-Nassau-Rock outcrop complex, hilly	Most limited	Bath (40%)	Low permeability (1.00)	18.6	70.5%
				Depth to saturation (1.00)		
				Slope (1.00)		
				Depth to bedrock (0.50)		
				Excessive fines (0.50)		
			Nassau (25%)	Depth to bedrock (1.00)		
				Slope (1.00)		
CnB	Chenango gravelly silt loam, 3 to 8 percent slopes	Somewhat limited	Chenango (80%)	Excessive permeability (0.50)	1.1	4.3%
HgD	Hoosic gravelly loam, 15 to 25 percent slopes	Most limited	Hoosic (80%)	Excessive permeability (1.00)	0.4	1.4%
				Slope (1.00)		
Re	Red Hook gravelly silt loam	Most limited	Red Hook (80%)	Depth to saturation (1.00)	3.3	12.6%
				Excessive fines (0.50)		
Totals for Area of Interest					**26.4**	**100.0%**

Storm Water Management - Infiltration (NY)— Summary by Rating Value		
Rating	**Acres in AOI**	**Percent of AOI**
Most limited	25.3	95.7%
Somewhat limited	1.1	4.3%
Totals for Area of Interest	**26.4**	**100.0%**

Rating Options—Storm Water Management - Infiltration (NY)

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

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.

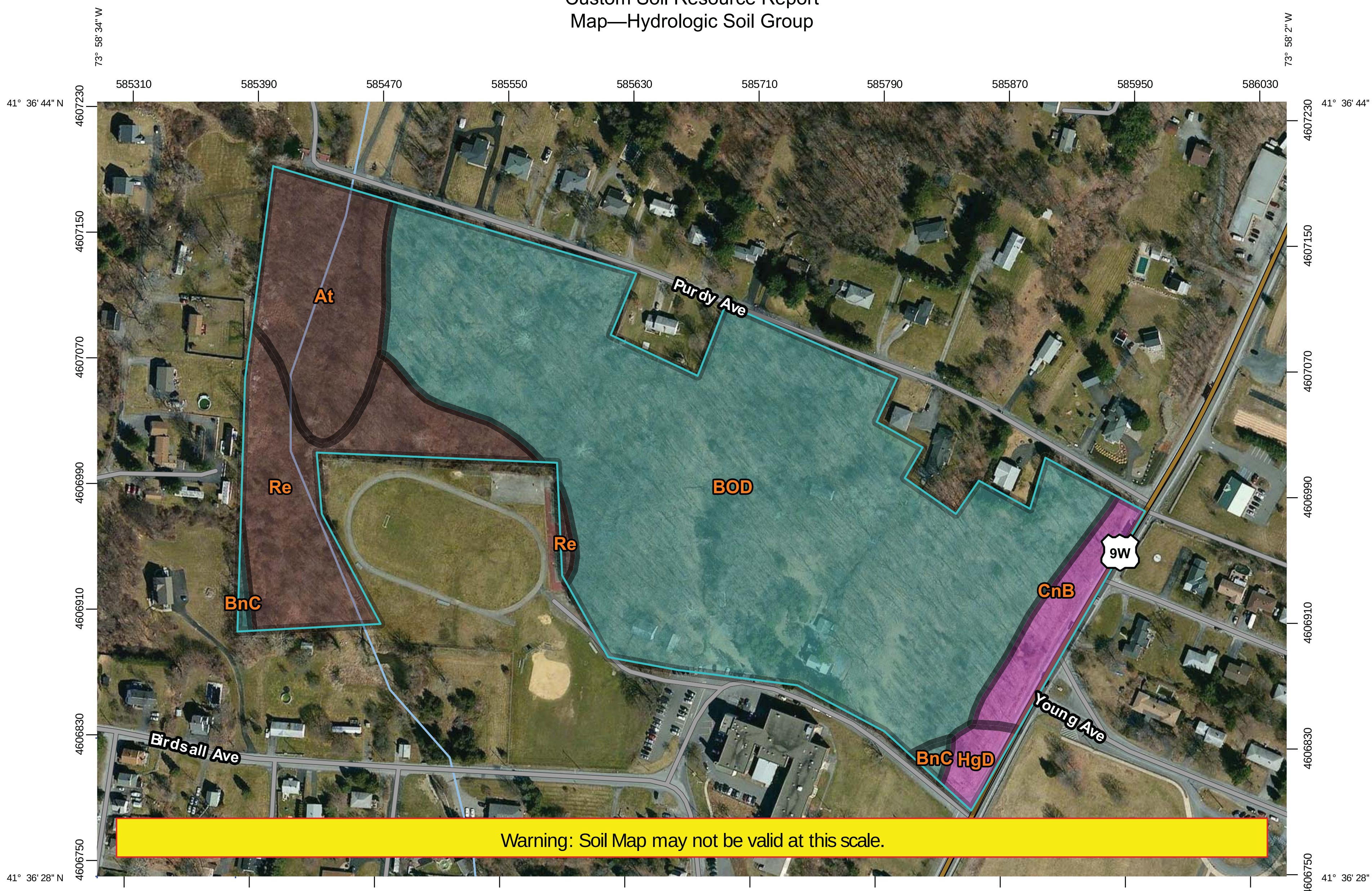
Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

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: 1:3,480 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0, 50, 100, 200, 300

Feet: 0, 150, 300, 600, 900

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 1:15,800.

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

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

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

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: Web Mercator (EPSG:3857)

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

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

Soil Survey Area: Ulster County, New York
Survey Area Data: Version 14, Sep 24, 2016

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

Date(s) aerial images were photographed: Mar 26, 2011—Apr 16, 2012

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

Table—Hydrologic Soil Group

Hydrologic Soil Group— Summary by Map Unit — Ulster County, New York (NY111)				
Map unit symbol	**Map unit name**	**Rating**	**Acres in AOI**	**Percent of AOI**
At	Atherton silt loam	B/D	2.8	10.5%
BnC	Bath-Nassau complex, 8 to 25 percent slopes	C	0.2	0.7%
BOD	Bath-Nassau-Rock outcrop complex, hilly	C	18.6	70.5%
CnB	Chenango gravelly silt loam, 3 to 8 percent slopes	A	1.1	4.3%
HgD	Hoosic gravelly loam, 15 to 25 percent slopes	A	0.4	1.4%
Re	Red Hook gravelly silt loam	B/D	3.3	12.6%
Totals for Area of Interest			**26.4**	**100.0%**

Rating Options—Hydrologic Soil Group

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

References

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

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

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<u>Bayside Construction, LLC</u> (MC Project # 05000787A): Soil Infiltration Testing Results

Performed on: October 20th and 21st, 2016
Performed by: Joseph Perruzza, Maser Consulting, P.A.

Test #	Depth (inches)	Soil Observations (At Depth)	Groundwater	Refusal*	Infiltration Test Invert (from E.G)	Infiltration Rate Trial #1 (In/Hr)	Infiltration Rate Trial #2 (In/Hr)	Infiltration Rate Trial #3 (In/Hr)	Infiltration Rate Trial #4 (In/Hr)	Final Infiltration Rate (In/Hr)**
1A	72”	8” Topsoil 8”- 42” Silty Loam with cobbles and boulders 42”- 66” Red Clay 66” – 72” Rippable Shale	No	Yes @ 72”	N/A	---	---	---	---	**N/A**
1B	72”	8” Topsoil 8”- 72” Silty Loam with cobbles and boulders throughout	No	Yes @ 72”	48”	SEE NOTE 1				**N/A**
2	60”	8” Topsoil 8”- 36” Silty Loam with cobbles and boulders throughout 36” – 48” Brown Clay 48” – 60” Rippable Shale	No	Yes @ 60”	N/A	---	---	---	---	**N/A**
3	36”	0”- 6” Topsoil 6” – 36” Silty Loam with cobbles and boulders throughout	No	Yes @ 36”	N/A	---	---	---	---	**N/A**
4	36”	0”- 6” Topsoil 6” – 36” Silty Loam with cobbles and boulders throughout	No	Yes @ 36”	N/A	---	---	---	---	**N/A**

Test #	Depth (inches)	Soil Observations (At Depth)	Groundwater	Refusal*	Infiltration Test Invert (from E.G)	Infiltration Rate Trial #1 (In/Hr)	Infiltration Rate Trial #2 (In/Hr)	Infiltration Rate Trial #3 (In/Hr)	Infiltration Rate Trial #4 (In/Hr)	Final Infiltration Rate (In/Hr)**
5	48”	0”- 24” Black organics (clay like clumps) 24” – 48” Gray Clay (wet) and rippable shale	No	Yes @ 48”	N/A	---	---	---	---	**N/A**
6	102”	6” Topsoil 6” – 102” Silty Loam with cobbles and boulders throughout	No	No	48”	0.5	0.5	0.5	0.5	**0.5**
8	60”	6” Topsoil 6” – 36” Fill material with boulders (non-native material) 36” – 60” Gray Clay	No	No	N/A	---	---	---	---	**N/A**
9	48”	6” Topsoil 6”- 12” Silty Loam with cobbles and boulders throughout 12” – 36” Brown Clay 36” – 48” Red Clay	No	Yes @48”	N/A	---	---	---	---	**N/A**
10	96”	8” Topsoil 8” – 36” Silty Loam with cobbles and boulders throughout 36” – 66” Brown Clay 66” – 96” Wet Silty Loam with cobbles and boulders throughout	No	No	N/A	---	---	---	---	**N/A**
11	78”	8” Topsoil 8” – 60” Silty Loam with cobbles and boulders throughout 60” – 78” Rippable Shale	No	Yes @ 78”	N/A	---	---	---	---	**N/A**
12	60”	8” Topsoil 8” – 60” Silty Loam with cobbles and boulders throughout	No	No	N/A	---	---	---	---	**N/A**

MASER CONSULTING P.A.

Test #	Depth (inches)	Soil Observations (At Depth)	Groundwater	Refusal*	Infiltration Test Invert (from E.G)	Infiltration Rate Trial #1 (In/Hr)	Infiltration Rate Trial #2 (In/Hr)	Infiltration Rate Trial #3 (In/Hr)	Infiltration Rate Trial #4 (In/Hr)	Final Infiltration Rate (In/Hr)**
13	72”	8” Topsoil 8” – 72” Silty Loam with cobbles and boulders throughout	No	No	N/A	SEE NOTE 1				**N/A**

Note 1 - Due to inconsistencies between the infiltration test and our quality control test measures, testing at this location was discontinued.

Note 2 - * **Refusal** indicates strong potential for Bedrock to be encountered at these depths.

Note 3 - **Infiltration testing was conducted with a 24-hour presoak; design rate was the rate of the final trial rather than the average.

Note 4 - All infiltration testing was conducted in accordance with the 2015 NYSDEC Stormwater Management Design Manual, Appendix D.

APPENDIX 13

NYSDEC GREEN INFRASTRUCTURE WORKSHEETS

Version 1.6 | Total Water Quality Volume Calculation
Last Updated: 03/28/2014 | WQv(acre-feet) = [(P)(Rv)(A)] /12

Is this project subject to Chapter 10 of the NYS Design Manual (i.e. WQv is equal to post-development 1 year runoff volume)?...	No

Design Point:	1	
P=	1.40	*inch*

Manually enter P, Total Area and Impervious Cover.

Breakdown of Subcatchments						
Catchment Number	**Total Area** *(Acres)*	**Impervious Area** *(Acres)*	**Percent Impervious** *%*	**Rv**	**WQv** *(ft ^{3})*	**Description**
1	5.80	1.45	25%	0.27	8,087	Bioretention
2	0.87	0.33	38%	0.39	1,731	Downstream Defender
3						
4						
5						
6						
7						
8						
9						
10						
Subtotal (1-30)	6.67	1.78	27%	0.29	**9,818**	**Subtotal 1**
Total	6.67	1.78	27%	0.29	**9,818**	**Initial WQv**

Identify Runoff Reduction Techniques By Area			
Technique	**Total Contributing Area** *(Acre)*	**Contributing Impervious Area** *(Acre)*	**Notes**
Conservation of Natural Areas	0.00	0.00	*minimum 10,000 sf*
Riparian Buffers	0.00	0.00	*maximum contributing length 75 feet to 150 feet*
Filter Strips	0.00	0.00	
Tree Planting	0.00	0.00	*Up to 100 sf directly connected impervious area may be subtracted per tree*
Total	**0.00**	**0.00**	

Recalculate WQv after application of Area Reduction Techniques					
	Total Area *(Acres)*	**Impervious Area** *(Acres)*	**Percent Impervious** *%*	**Runoff Coefficient Rv**	**WQv** *(ft ^{3})*
"<<Initial WQv"	6.67	1.78	27%	0.29	9,818
Subtract Area	0.00	0.00			
WQv adjusted after Area Reductions	**6.67**	**1.78**	27%	0.29	9,818
Disconnection of Rooftops		0.00			
Adjusted WQv after Area Reduction and Rooftop Disconnect	6.67	1.78	27%	0.29	**9,818**

Total Water Quality Volume Calculation

WQv(acre-feet) = [(P)(Rv)(A)] /12

All Subcatchments						
Catchment	**Total Area** *(Acres)*	**Impervious Cover** *(Acres)*	**Percent Impervious** *%*	**Runoff Coefficient** *Rv*	**WQv** *(ft^3)*	**Description**
1	5.80	1.45	0.25	0.27	8087.24	Bioretention
2	0.87	0.33	0.38	0.39	1,731	Downstream
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						
21						
22						
23						
24						
25						
26						
27						
28						
29						
30						

Runoff Reduction Volume and Treated volumes						
	Runoff Reduction Techiques/Standard SMPs		**Total Contributing Area**	**Total Contributing Impervious Area**	**WQv Reduced (RRv)**	**WQv Treated**
			(acres)	(acres)	cf	cf
Area/Volume Reduction	Conservation of Natural Areas	RR-1	0.00	0.00		
	Sheetflow to Riparian Buffers/Filter Strips	RR-2	0.00	0.00		
	Tree Planting/Tree Pit	RR-3	0.00	0.00		
	Disconnection of Rooftop Runoff	RR-4		0.00		
	Vegetated Swale	RR-5	0.00	0.00	0	
	Rain Garden	RR-6	0.00	0.00	0	
	Stormwater Planter	RR-7	0.00	0.00	0	
	Rain Barrel/Cistern	RR-8	0.00	0.00	0	
	Porous Pavement	RR-9	0.00	0.00	0	
	Green Roof (Intensive & Extensive)	RR-10	0.00	0.00	0	
Standard SMPs w/RRv Capacity	Infiltration Trench	I-1	0.00	0.00	0	0
	Infiltration Basin	I-2	0.00	0.00	0	0
	Dry Well	I-3	0.00	0.00	0	0
	Underground Infiltration System	I-4	0.00			
	Bioretention & Infiltration Bioretention	F-5	5.80	1.45	3936	4151
	Dry swale	O-1	0.00	0.00	0	0
Standard SMPs	Micropool Extended Detention (P-1)	P-1				
	Wet Pond (P-2)	P-2				
	Wet Extended Detention (P-3)	P-3				
	Multiple Pond system (P-4)	P-4				
	Pocket Pond (p-5)	P-5				
	Surface Sand filter (F-1)	F-1				
	Underground Sand filter (F-2)	F-2				
	Perimeter Sand Filter (F-3)	F-3				
	Organic Filter (F-4	F-4				
	Shallow Wetland (W-1)	W-1				
	Extended Detention Wetland (W-2	W-2				
	Pond/Wetland System (W-3)	W-3				
	Pocket Wetland (W-4)	W-4				
	Hydro-International First Defense	O-2	0.87	0.33		1731.000
Totals by Area Reduction		→	0.00	0.00	0	
Totals by Volume Reduction		→	0.00	0.00	0	
Totals by Standard SMP w/RRV		→	5.80	1.45	3936	4151
Totals by Standard SMP		→	0.87	0.33		1731
Totals (Area + Volume + all SMPs)		→	6.67	1.78	3,936	5,882
	Impervious Cover √	okay				
	Total Area √	error				

Minimum RRv

Enter the Soils Data for the site		
Soil Group	Acres	S
A	0.55	55%
B		40%
C	6.12	30%
D		20%
Total Area	6.671	
Calculate the Minimum RRv		
S =	**0.32**	
Impervious =	1.78	*acre*
Precipitation	1.4	*in*
Rv	0.95	
Minimum RRv	**2,750**	***ft3***
	0.06	af

NOI QUESTIONS

#	NOI Question	Reported Value	
		cf	af
28	Total Water Quality Volume (WQv) Required	9818	*0.225*
30	Total RRV Provided	3936	*0.090*
31	Is RRv Provided ≥WQv Required?	No	
32	Minimum RRv	2750	*0.063*
32a	Is RRv Provided ≥ Minimum RRv Required?	Yes	
33a	Total WQv Treated	5882	*0.135*
34	Sum of Volume Reduced & Treated	9818	*0.225*
34	Sum of Volume Reduced and Treated	9818	*0.225*
35	Is Sum RRv Provided and WQv Provided ≥WQv Required?	Yes	

Apply Peak Flow Attenuation			
36	Channel Protection	*Cpv*	
37	Overbank	*Qp*	
37	Extreme Flood Control	*Qf*	
	Are Quantity Control requirements met?	*Yes*	Plan Completed

Planning

Practice	Description	Application
Preservation of Undisturbed Areas	Delineate and place into permanent conservation undisturbed forests, native vegetated areas, riparian corridors, wetlands, and natural terrain.	Considered & Not Applied
Preservation of Buffers	Define, delineate and preserve naturally vegetated buffers along perennial streams, rivers, shorelines and wetlands.	Considered & Not Applied
Reduction of Clearing and Grading	Limit clearing and grading to the minimum amount needed for roads, driveways, foundations, utilities and stormwater management facilities.	Considered & Applied
Locating Development in Less Sensitive Areas	Avoid sensitive resource areas such as floodplains, steep slopes, erodible soils, wetlands, mature forests and critical habitats by locating development to fit the terrain in areas that will create the least impact.	Considered & Applied
Open Space Design	Use clustering, conservation design or open space design to reduce impervious cover, preserve more open space and protect water resources.	Considered & Applied
Soil Restoration	Restore the original properties and porosity of the soil by deep till and amendment with compost to reduce the generation of runoff and enhance the runoff reduction performance of post construction practices.	Considered & Applied
Roadway Reduction	Minimize roadway widths and lengths to reduce site impervious area	Considered & Applied
Sidewalk Reduction	Minimize sidewalk lengths and widths to reduce site impervious area	Considered & Applied
Driveway Reduction	Minimize driveway lengths and widths to reduce site impervious area	Considered & Applied
Cul-de-sac Reduction	Minimize the number of cul-de-sacs and incorporate landscaped areas to reduce their impervious cover.	N/A
Building Footprint Reduction	Reduce the impervious footprint of residences and commercial buildings by using alternate or taller buildings while maintaining the same floor to area ratio.	N/A
Parking Reduction	Reduce imperviousness on parking lots by eliminating unneeded spaces, providing compact car spaces and efficient parking lanes, minimizing stall dimensions, using porous pavement surfaces in overflow parking areas, and using multi-storied parking decks where appropriate.	Considered & Not Applied

Bioretention Worksheet

(For use on HSG C or D Soils with underdrains)

Af=WQv*(df)/[k*(hf+df)(tf)]

Af	Required Surface Area (ft2)
WQv	Water Quality Volume (ft3)
df	Depth of the Soil Medium (feet)
hf	Average height of water above the planter bed
tf	Volume Through the Filter Media (days)

k The hydraulic conductivity [ft/day], can be varied depending on the properties of the soil media. Some reported conductivity values are: ***Sand*** - 3.5 ft/day (City of Austin 1988); ***Peat*** - 2.0 ft/day (Galli 1990); ***Leaf Compost*** - 8.7 ft/day (Claytor and Schueler, 1996); ***Bioretention Soil*** (0.5 ft/day (Claytor &

Design Point:	**1**						
Enter Site Data For Drainage Area to be Treated by Practice							
Catchment Number	**Total Area** *(Acres)*	**Impervious Area** *(Acres)*	**Percent Impervious** *%*	**Rv**	**WQv** *(ft^3)*	**Precipitation** *(in)*	**Description**
1	5.80	1.45	0.25	0.27	8087.24	1.40	Bioretention
Enter Impervious Area Reduced by Disconnection of Rooftops		0.00	25%	0.27	8,087	<<WQv after adjusting for Disconnected Rooftops	
Enter the portion of the WQv that is not reduced for all practices routed to this practice.					0	*ft^3*	
Soil Information							
Soil Group		C					
Soil Infiltration Rate		0.00	*in/hour*	*Okay*			
Using Underdrains?		Yes	*Okay*				
Calculate the Minimum Filter Area							
				Value		Units	Notes
WQv				8,087		*ft^3*	
Enter Depth of Soil Media			*df*	2.5		*ft*	*2.5-4 ft*
Enter Hydraulic Conductivity			*k*	0.5		*ft/day*	
Enter Average Height of Ponding			*hf*	0.5		*ft*	*6 inches max.*
Enter Filter Time			*tf*	2		*days*	
Required Filter Area			***Af***	**6739**		***ft^2***	
Determine Actual Bio-Retention Area							
Filter Width		100	*ft*				
Filter Length		82	*ft*				
Filter Area		8200	*ft^2*				
Actual Volume Provided		9840	*ft^3*				
Determine Runoff Reduction							
Is the Bioretention contributing flow to another practice?			No	Select Practice			
RRv		3,936					
RRv applied		**3,936**	***ft^3***	***This is 40% of the storage provided or WQv whichever is less.***			
Volume Treated		4,151	*ft^3*	*This is the portion of the WQv that is not reduced in the practice.*			
Volume Directed		0	*ft^3*	This volume is directed another practice			
Sizing √		OK		*Check to be sure Area provided ≥ Af*			

Bioretention Worksheet

Total RRv Applied	3,936.00
Total Area	5.80
Total Impervious Area	1.45
Total Volume Treated	4,151.24
Rooftop Disconnect Impervious Area Total	0.00

Version 1.6
Last Updated: 03/28/2014

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

Is this project subject to Chapter 10 of the NYS Design Manual (i.e. WQv is equal to post-development 1 year runoff volume)?...	No

Design Point:	3	
P=	1.40	*inch*

Manually enter P, Total Area and Impervious Cover.

Breakdown of Subcatchments						
Catchment Number	**Total Area** *(Acres)*	**Impervious Area** *(Acres)*	**Percent Impervious** *%*	**Rv**	**WQv** *(ft^3)*	**Description**
1	10.52	4.57	43%	0.44	23,565	Bioretention
2						
3						
4						
5						
6						
7						
8						
9						
10						
Subtotal (1-30)	10.52	4.57	43%	0.44	**23,565**	**Subtotal 1**
Total	10.52	4.57	43%	0.44	**23,565**	**Initial WQv**

Identify Runoff Reduction Techniques By Area			
Technique	**Total Contributing Area** *(Acre)*	**Contributing Impervious Area** *(Acre)*	**Notes**
Conservation of Natural Areas	0.00	0.00	*minimum 10,000 sf*
Riparian Buffers	0.00	0.00	*maximum contributing length 75 feet to 150 feet*
Filter Strips	0.00	0.00	
Tree Planting	0.00	0.00	*Up to 100 sf directly connected impervious area may be subtracted per tree*
Total	**0.00**	**0.00**	

Recalculate WQv after application of Area Reduction Techniques					
	Total Area *(Acres)*	**Impervious Area** *(Acres)*	**Percent Impervious** *%*	**Runoff Coefficient Rv**	**WQv** *(ft^3)*
"<<Initial WQv"	10.52	4.57	43%	0.44	23,565
Subtract Area	0.00	0.00			
WQv adjusted after Area Reductions	**10.52**	**4.57**	43%	0.44	23,565
Disconnection of Rooftops		0.00			
Adjusted WQv after Area Reduction and Rooftop Disconnect	10.52	4.57	43%	0.44	**23,565**
WQv reduced by Area Reduction techniques					0

Total Water Quality Volume Calculation

WQv(acre-feet) = [(P)(Rv)(A)] /12

All Subcatchments						
Catchment	Total Area *(Acres)*	Impervious Cover *(Acres)*	Percent Impervious *%*	Runoff Coefficient *Rv*	WQv *(ft^3)*	Description
1	10.52	4.57	0.43	0.44	23565.23	Bioretention
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						
21						
22						
23						
24						
25						
26						
27						
28						
29						
30						

Runoff Reduction Volume and Treated volumes						
	Runoff Reduction Techiques/Standard SMPs		**Total Contributing Area**	**Total Contributing Impervious Area**	**WQv Reduced (RRv)**	**WQv Treated**
			(acres)	**(acres)**	**cf**	**cf**
Area/Volume Reduction	Conservation of Natural Areas	RR-1	0.00	0.00		
	Sheetflow to Riparian Buffers/Filter Strips	RR-2	0.00	0.00		
	Tree Planting/Tree Pit	RR-3	0.00	0.00		
	Disconnection of Rooftop Runoff	RR-4		0.00		
	Vegetated Swale	RR-5	0.00	0.00	0	
	Rain Garden	RR-6	0.00	0.00	0	
	Stormwater Planter	RR-7	0.00	0.00	0	
	Rain Barrel/Cistern	RR-8	0.00	0.00	0	
	Porous Pavement	RR-9	0.00	0.00	0	
	Green Roof (Intensive & Extensive)	RR-10	0.00	0.00	0	
Standard SMPs w/RRv Capacity	Infiltration Trench	I-1	0.00	0.00	0	0
	Infiltration Basin	I-2	0.00	0.00	0	0
	Dry Well	I-3	0.00	0.00	0	0
	Underground Infiltration System	I-4	0.00			
	Bioretention & Infiltration Bioretention	F-5	10.52	4.57	9432	14133
	Dry swale	O-1	0.00	0.00	0	0
Standard SMPs	Micropool Extended Detention (P-1)	P-1				
	Wet Pond (P-2)	P-2				
	Wet Extended Detention (P-3)	P-3				
	Multiple Pond system (P-4)	P-4				
	Pocket Pond (p-5)	P-5				
	Surface Sand filter (F-1)	F-1				
	Underground Sand filter (F-2)	F-2				
	Perimeter Sand Filter (F-3)	F-3				
	Organic Filter (F-4	F-4				
	Shallow Wetland (W-1)	W-1				
	Extended Detention Wetland (W-2	W-2				
	Pond/Wetland System (W-3)	W-3				
	Pocket Wetland (W-4)	W-4				
	Wet Swale (O-2)	O-2				
Totals by Area Reduction		→	0.00	0.00	0	
Totals by Volume Reduction		→	0.00	0.00	0	
Totals by Standard SMP w/RRV		→	10.52	4.57	9432	14133
Totals by Standard SMP		→	0.00	0.00		0
Totals (Area + Volume + all SMPs)		→	10.52	4.57	9,432	14,133
	Impervious Cover √	okay				
	Total Area √	okay				

Minimum RRv

Enter the Soils Data for the site		
Soil Group	Acres	S
A		55%
B		40%
C	10.52	30%
D		20%
Total Area	10.516	
Calculate the Minimum RRv		
S =	**0.30**	
Impervious =	4.57	*acre*
Precipitation	1.4	*in*
Rv	0.95	
Minimum RRv	**6,616**	***ft3***
	0.15	af

NOI QUESTIONS

#	NOI Question	Reported Value	
		cf	af
28	Total Water Quality Volume (WQv) Required	23565	*0.541*
30	Total RRV Provided	9432	*0.217*
31	Is RRv Provided ≥WQv Required?	No	
32	Minimum RRv	6616	*0.152*
32a	Is RRv Provided ≥ Minimum RRv Required?	Yes	
33a	Total WQv Treated	14133	*0.324*
34	Sum of Volume Reduced & Treated	23565	*0.541*
34	Sum of Volume Reduced and Treated	23565	*0.541*
35	Is Sum RRv Provided and WQv Provided ≥WQv Required?	Yes	

Apply Peak Flow Attenuation			
36	Channel Protection	*Cpv*	
37	Overbank	*Qp*	
37	Extreme Flood Control	*Qf*	
	Are Quantity Control requirements met?	*Yes*	Plan Completed

Planning

Practice	Description	Application
Preservation of Undisturbed Areas	Delineate and place into permanent conservation undisturbed forests, native vegetated areas, riparian corridors, wetlands, and natural terrain.	Considered & Not Applied
Preservation of Buffers	Define, delineate and preserve naturally vegetated buffers along perennial streams, rivers, shorelines and wetlands.	Considered & Not Applied
Reduction of Clearing and Grading	Limit clearing and grading to the minimum amount needed for roads, driveways, foundations, utilities and stormwater management facilities.	Considered & Applied
Locating Development in Less Sensitive Areas	Avoid sensitive resource areas such as floodplains, steep slopes, erodible soils, wetlands, mature forests and critical habitats by locating development to fit the terrain in areas that will create the least impact.	Considered & Applied
Open Space Design	Use clustering, conservation design or open space design to reduce impervious cover, preserve more open space and protect water resources.	Considered & Applied
Soil Restoration	Restore the original properties and porosity of the soil by deep till and amendment with compost to reduce the generation of runoff and enhance the runoff reduction performance of post construction practices.	Considered & Applied
Roadway Reduction	Minimize roadway widths and lengths to reduce site impervious area	Considered & Applied
Sidewalk Reduction	Minimize sidewalk lengths and widths to reduce site impervious area	Considered & Applied
Driveway Reduction	Minimize driveway lengths and widths to reduce site impervious area	Considered & Applied
Cul-de-sac Reduction	Minimize the number of cul-de-sacs and incorporate landscaped areas to reduce their impervious cover.	N/A
Building Footprint Reduction	Reduce the impervious footprint of residences and commercial buildings by using alternate or taller buildings while maintaining the same floor to area ratio.	N/A
Parking Reduction	Reduce imperviousness on parking lots by eliminating unneeded spaces, providing compact car spaces and efficient parking lanes, minimizing stall dimensions, using porous pavement surfaces in overflow parking areas, and using multi-storied parking decks where appropriate.	Considered & Not Applied

Bioretention Worksheet

(For use on HSG C or D Soils with underdrains)

Af=WQv*(df)/[k*(hf+df)(tf)]

Af	Required Surface Area (ft2)
WQv	Water Quality Volume (ft3)
df	Depth of the Soil Medium (feet)
hf	Average height of water above the planter bed
tf	Volume Through the Filter Media (days)

k — The hydraulic conductivity [ft/day], can be varied depending on the properties of the soil media. Some reported conductivity values are: ***Sand*** - 3.5 ft/day (City of Austin 1988); ***Peat*** - 2.0 ft/day (Galli 1990); ***Leaf Compost*** - 8.7 ft/day (Claytor and Schueler, 1996); ***Bioretention Soil*** (0.5 ft/day (Claytor &

Design Point:	**3**

Enter Site Data For Drainage Area to be Treated by Practice

Catchment Number	**Total Area** *(Acres)*	**Impervious Area** *(Acres)*	**Percent Impervious** *%*	**Rv**	**WQv** *(ft^3)*	**Precipitation** *(in)*	**Description**
1	10.52	4.57	0.43	0.44	23565.23	1.40	Bioretention
Enter Impervious Area Reduced by Disconnection of Rooftops		0.00	43%	0.44	23,565	<<WQv after adjusting for Disconnected Rooftops	
Enter the portion of the WQv that is not reduced for all practices routed to this practice.					0	*ft^3*	

Soil Information

Soil Group	D		
Soil Infiltration Rate	0.00	*in/hour*	*Okay*
Using Underdrains?	Yes	*Okay*	

Calculate the Minimum Filter Area

		Value	Units	Notes
WQv		23,565	*ft^3*	
Enter Depth of Soil Media	*df*	2.5	*ft*	*2.5-4 ft*
Enter Hydraulic Conductivity	*k*	0.5	*ft/day*	
Enter Average Height of Ponding	*hf*	0.5	*ft*	*6 inches max.*
Enter Filter Time	*tf*	2	*days*	
Required Filter Area	***Af***	**19638**	***ft^2***	

Determine Actual Bio-Retention Area

Filter Width	100	*ft*	
Filter Length	196.5	*ft*	
Filter Area	19650	*ft^2*	
Actual Volume Provided	23580	*ft^3*	

Determine Runoff Reduction

Is the Bioretention contributing flow to another practice?		No	Select Practice	
RRv	9,432			
RRv applied	**9,432**	***ft^3***	***This is 40% of the storage provided or WQv whichever is less.***	
Volume Treated	14,133	*ft^3*	*This is the portion of the WQv that is not reduced in the practice.*	
Volume Directed	0	*ft^3*	This volume is directed another practice	
Sizing √	OK		*Check to be sure Area provided ≥ Af*	

Bioretention Worksheet

Total RRv Applied	9,432.00
Total Area	10.52
Total Impervious Area	4.57
Total Volume Treated	14,133.23
Rooftop Disconnect Impervious Area Total	0.00

APPENDIX 14

CHANNEL PROTECTION VOLUME CALCULATIONS

Bayside Construction

Revised September 2017

Town of Marlborough, New York
Maser Consulting Project No. 05000787A

Channel Protection Voume Summary

Watershed	CPv Req	CPv Provided	Source of CPV
WS-1A	0.285	0.539	Bio storage
WS-3A	0.624	1.148	Bio storage
WS-3B	0.056	-	Bio storage
Total	0.965	1.686	
Is minimum CPv Provided:		**Yes**	

Note: WS-1, WS-1B, WS-2, and WS-3 do not have proposed impervious improvements and therefore continue to discharge without development changes and requirement for channel protection

WS-1A

Channel Protection Volume (CPv) Calculation

Area (A)	=	5.799	acres (taken from HydroCAD)
CN	=	79	Composite (taken from HydroCAD)
Time of Concentration	=	0.1	hours (taken from HydroCAD)
P, 1-year Design Storm	=	2.61	inches (taken from Fig 4.2 in NYSSMDM)
Q, runoff	=	5.86	cfs (taken from HydroCAD)
Q, runoff	=	0.9	inches

Ia = (200/CN) - 2

Ia = (200/CN) - 2 = 0.532

Ia/P = (Ia/P) = 0.204

q_u = 650 (taken from Exhibit 4-III in TR-55)

q_o/q_i = 0.025 (taken from Fig 8.5 in NYSSMDM)

Vs/Vr = 0.683 - 1.43(qo/qi) +1.69(qo/qi)^2 - 0.804(qo/qi)^3

Vs/Vr = 0.65

Solve for Vs (a.k.a CPv Required) = Vs/Vr * Q * A / 12

Vs = CPv = 0.285 acre-feet

CPv Provided equal to Volume provided at 10-year Storm Elevation within Basin

CPv = 0.539 acre-feet

WS-3A

Channel Protection Volume (CPv) Calculation

Area (A)	=	8.922	acres (taken from HydroCAD)
CN	=	86	Composite (taken from HydroCAD)
Time of Concentration	=	0.32	hours (taken from HydroCAD)
P, 1-year Design Storm	=	2.61	inches (taken from Fig 4.2 in NYSSMDM)
Q, runoff	=	9.48	cfs (taken from HydroCAD)
Q, runoff	=	1.3	inches

Ia = (200/CN) - 2

Ia	=	(200/CN) - 2	=	0.326
Ia/P	=	(Ia/P)	=	0.125
qu	=	480		(taken from Exhibit 4-III in TR-55)
qo/qi	=	0.038		(taken from Fig 8.5 in NYSSMDM)

Vs/Vr = 0.683 - 1.43(qo/qi) +1.69(qo/qi)^2 - 0.804(qo/qi)^3

Vs/Vr = 0.63

Solve for Vs (a.k.a CPv Required) = Vs/Vr * Q * A / 12

Vs = CPv = 0.624 acre-feet

CPv Provided equal to Volume provided at 10-year Storm Elevation within Basin

CPv = 1.148 acre-feet

WS-3B

Channel Protection Volume (CPv) Calculation

Area (A)	=	1.59	acres (taken from HydroCAD)
CN	=	74	Composite (taken from HydroCAD)
Time of Concentration	=	0.36	hours (taken from HydroCAD)
P, 1-year Design Storm	=	2.61	inches (taken from Fig 4.2 in NYSSMDM)
Q, runoff	=	0.72	cfs (taken from HydroCAD)
Q, runoff	=	0.7	inches

Ia = (200/CN) - 2

Ia	=	(200/CN) - 2	=	0.703
Ia/P	=	(Ia/P)	=	0.269
qu	=	410		(taken from Exhibit 4-III in TR-55)
qo/qi	=	0.042		(taken from Fig 8.5 in NYSSMDM)

Vs/Vr = 0.683 - 1.43(qo/qi) +1.69(qo/qi)^2 - 0.804(qo/qi)^3

Vs/Vr = 0.63

Solve for Vs (a.k.a CPv Required) = Vs/Vr * Q * A / 12

Vs = CPv = 0.056 acre-feet

CPv Provided equal to Volume provided at 10-year Storm Elevation within Basin

CPv = 0.000 acre-feet

APPENDIX 15

HYDRO INTERNATIONAL FIRST DEFENSE NJCAT CERTIFICATION & SPECIFICATIONS

State of New Jersey
DEPARTMENT OF ENVIRONMENTAL PROTECTION
Bureau of Nonpoint Pollution Control
Division of Water Quality
401-02B
Post Office Box 420
Trenton, New Jersey 08625-0420
609-633-7021 Fax: 609-777-0432
http://www.state.nj.us/dep/dwq/bnpc_home.htm

CHRIS CHRISTIE
Governor

KIM GUADAGNO
Lt. Governor

BOB MARTIN
Commissioner

April 4, 2016

Lisa Lemont, CPSWQ
Business Development Manager
Hydro International
94 Hutchins Drive
Portland, ME 04102

Re: MTD Lab Certification
First Defense® HC (FDHC) Stormwater Treatment Device by Hydro International

TSS Removal Rate 50%

Dear Ms. Lemont:

The Stormwater Management rules under N.J.A.C. 7:8-5.5(b) and 5.7 (c) allow the use of manufactured treatment devices (MTDs) for compliance with the design and performance standards at N.J.A.C. 7:8-5 if the pollutant removal rates have been verified by the New Jersey Corporation for Advanced Technology (NJCAT) and have been certified by the New Jersey Department of Environmental Protection (NJDEP). Hydro International has requested an MTD Laboratory Certification for the First Defense® HC Stormwater Treatment Device.

The projects falls under the "Procedure for Obtaining Verification of a Stormwater Manufactured Treatment Device from New Jersey Corporation for Advance Technology" dated January 25, 2013. The applicable protocol is the "New Jersey Laboratory Testing Protocol to Assess Total Suspended Solids Removal by a Hydrodynamic Sedimentation Manufactured Treatment Device" dated January 25, 2013.

NJCAT verification documents submitted to the NJDEP indicate that the requirements of the aforementioned protocol have been met or exceeded. The NJCAT letter also included a recommended certification TSS removal rate and the required maintenance plan. The NJCAT Verification Report with the Verification Appendix (dated February 2016) for this device is published online at http://www.njcat.org/verification-process/technology-verification-database.html.

The NJDEP certifies the use of the First Defense® HC Stormwater Treatment Device by Hydro International at a TSS removal rate of 50% when designed, operated and maintained in accordance with the information provided in the Verification Appendix and the following conditions:

1. The maximum treatment flow rate (MTFR) for the manufactured treatment device (MTD) is calculated using the New Jersey Water Quality Design Storm (1.25 inches in 2 hrs) in N.J.A.C. 7:8-5.5.

2. The First Defense® HC Stormwater Treatment Device shall be installed using the same configuration reviewed by NJCAT and shall be sized in accordance with the criteria specified in item 6 below.

3. This First Defense® HC Stormwater Treatment Device cannot be used in series with another MTD or a media filter (such as a sand filter) to achieve an enhanced removal rate for total suspended solids (TSS) removal under N.J.A.C. 7:8-5.5.

4. Additional design criteria for MTDs can be found in Chapter 9.6 of the New Jersey Stormwater Best Management Practices (NJ Stormwater BMP) Manual which can be found on-line at www.njstormwater.org.

5. The maintenance plan for a site using the First Defense® HC Stormwater Treatment Device shall incorporate, at a minimum, the maintenance requirements noted in the attached document. However, it is recommended to review the maintenance website at http://www.hydro-int.com/UserFiles/downloads/FD_O%2BM_F1512.pdf for any changes to the maintenance requirements.

6. Sizing Requirements:

   The example below demonstrates the sizing procedure for the First Defense® HC Stormwater Treatment Device:

   Example: A 0.25 acre impervious site is to be treated to 50% TSS removal using a First Defense® HC Stormwater Treatment Device. The impervious site runoff (Q) based on the New Jersey Water Quality Design Storm was determined to be 0.79 cfs.

   Maximum Treatment Flow Rate (MTFR) Evaluation:

   The site runoff (Q) was based on the following:
   time of concentration = 10 minutes
   i=3.2 in/hr (page 5-8, Fig. 5-3 of the NJ Stormwater BMP Manual)
   c=0.99 (curve number for impervious)
   Q=ciA=0.99x3.2x0.25=0.79 cfs

   Given the site runoff is 0.79 cfs and based on Table 1 below, the First Defense® HC Model 4-ft with a MTFR of 1.5 cfs would be the smallest model approved that could be used for this site that could remove 50% of the TSS from the impervious area without exceeding the MTFR.

   The sizing table corresponding to the available system models is noted below. Additional specifications regarding each model can be found in the Verification Appendix under Table A-1 and Table A-2 of the NJCAT Verification Report.

Table 1 First Defense® HC Models

First Defense® Model	Manhole Diameter (ft)	Maximum Treatment Flowrate, MTFR (cfs)
4-ft	4-ft	1.50
6-ft	6-ft	3.38
8-ft	8-ft	6.00

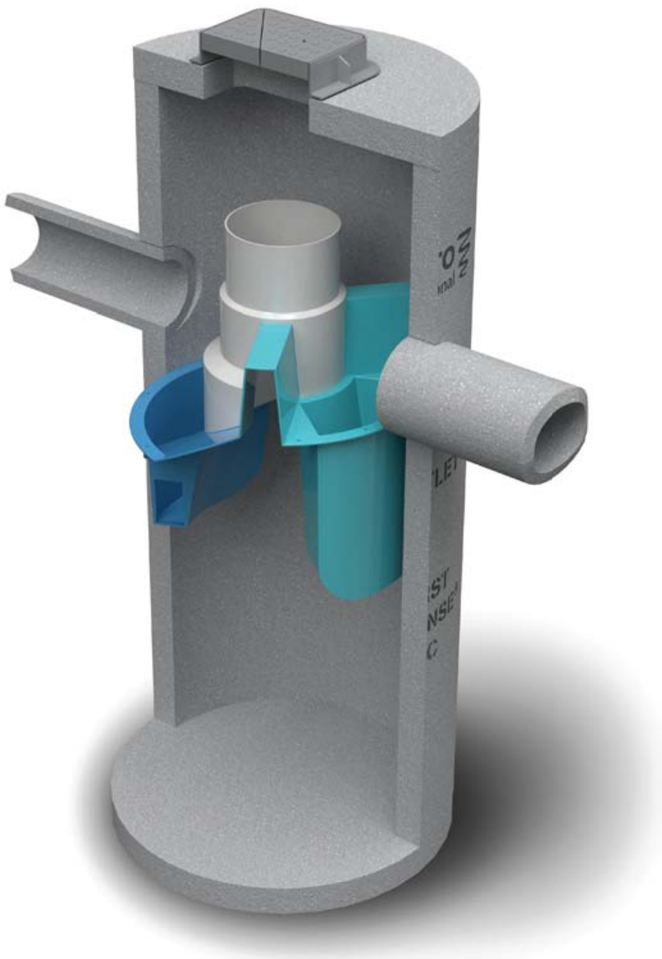
Be advised a detailed maintenance plan is mandatory for any project with a Stormwater BMP subject to the Stormwater Management Rules, N.J.A.C. 7:8. The plan must include all of the items identified in the Stormwater Management Rules, N.J.A.C. 7:8-5.8. Such items include, but are not limited to, the list of inspection and maintenance equipment and tools, specific corrective and preventative maintenance tasks, indication of problems in the system, and training of maintenance personnel. Additional information can be found in Chapter 8: Maintenance of the New Jersey Stormwater Best Management Practices Manual.

If you have any questions regarding the above information, please contact Mr. Titus Magnanao of my office at (609) 633-7021.

Sincerely,

James J. Murphy, Chief
Bureau of Nonpoint Pollution Control

Attachment: Maintenance Plan
C: Chron File
Richard Magee, NJCAT
Vince Mazzei, DLUR
Ravi Patraju, NJDEP
Gabriel Mahon, BNPC
Titus Magnanao, BNPC



Operation and Maintenance Manual

First Defense® and First Defense®-HC

Vortex Separator for Stormwater Treatment

Stormwater Solutions

Turning Water Around ...®

Table of Contents

Hydro International (Stormwater), 94 Hutchins Drive, Portland ME 04102
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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 (refer to *Section II. Model Sizes & Configurations*, page 4) to accommodate a wide range of pipe sizes, peak flows and depth constraints.

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
- Proven to prevent pollutant washout at up to 500% of its treatment flow
- 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

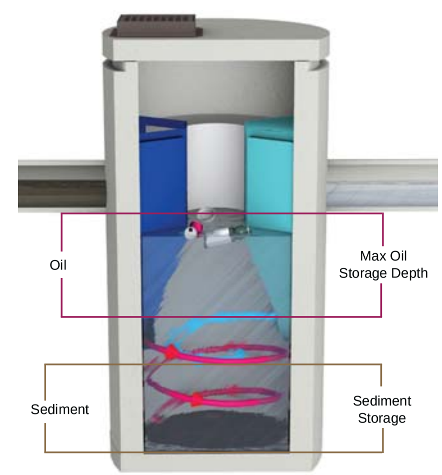

Fig.1 Pollutant storage volumes in the First Defense®.

II. Model Sizes & Configurations

The First Defense® inlet and internal bypass arrangements are available in several model sizes and configurations. The components of the First Defense®-4HC and First Defense®-6HC have modified geometries as to allow greater design flexibility needed 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.2a - 2b). First Defense® model parameters and design criteria are shown in Table 1.

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**

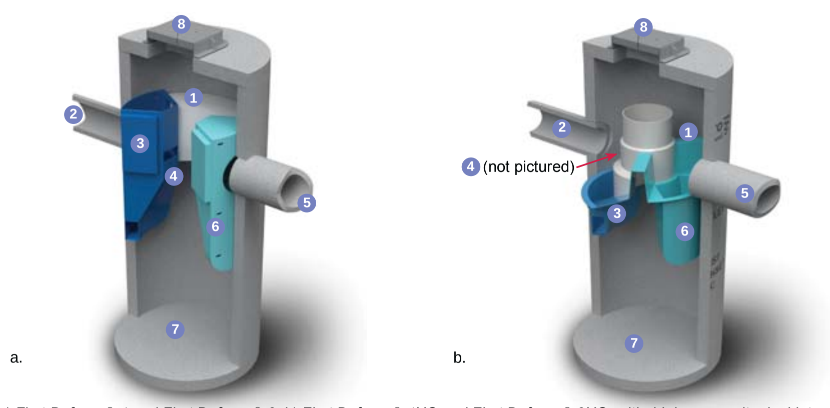

Fig.2a) First Defense®-4 and First Defense®-6; b) First Defense®-4HC and First Defense®-6HC, with higher capacity dual internal bypass and larger maximum pipe diameter.

Table 1. First Defense® Pollutant Storage Capacities and Maximum Clean out Depths

First Defense® Model Number	Diameter	Oil Storage Capacity	Oil Clean Out Depth	Maximum Sediment Storage Capacity[1]		Recommended Sediment Clean-out Capacity	
				Volume	Depth	Volume	Depth
	(ft / m)	(gal / L)	(in / cm)	(yd^3 / m^3)	(in / cm)	(yd^3 / m^3)	(in / cm)
FD-4	4 / 1.2	180 / 681	<23.5 / 60	1.3 / 1.0	33 / 84	0.7 / 0.5	18 / 46
FD-4HC		191 / 723	<24.4 / 62				
FD-6	6 / 1.8	420 / 1,590	<23.5 / 60	3.3 / 2.5	37.5 / 95	1.6 / 1.2	18 / 46
FD-6HC		496 / 1,878	<28.2 / 72				

NOTE

[1] Sediment storage capacity and clean out depth may vary, as larger sediment storage sump volumes are provided when required.

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III. Maintenance

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. Maximum pollutant storage capacities are provided in Table 1.

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®-HC 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.

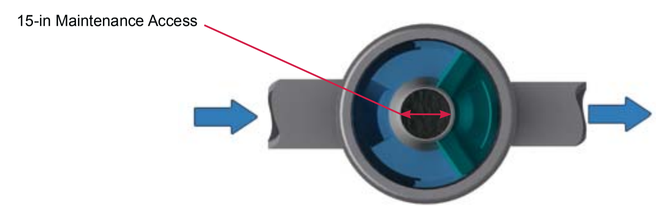

Fig.3 The central opening to the sump of the First Defense®-HC is 15 inches in diameter.

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 a 6-ft 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.

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.5).

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 and skimmer pole 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.

Fig.4 Floatables are removed with a vactor hose (First Defense model FD-4, shown).

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

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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 (Fig.5) or with the skimmer or net (not pictured).
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 (Fig.5).
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.

Fig.5 Sediment is removed with a vactor hose (First Defense model FD-4, shown).

Maintenance at a Glance

Activity	Frequency
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.

Hydro International®

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): **FD-4** **FD-4HC** **FD-6** **FD-6HC**

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

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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

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Notes

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What is HX?

HX is Hydro Experience, it is the essence of Hydro. It's interwoven into every strand of Hydro's story, from our products to our people, our engineering pedigree to our approach to business and problem-solving.

HX is a stamp of quality and a mark of our commitment to optimum process performance. A Hydro solution is tried, tested and proven.

There is no equivalent to Hydro HX.

Stormwater Solutions

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Portland, ME 04102

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stormwaterinquiry@hydro-int.com

www.hydro-int.com

Turning Water Around...®

FD_O+M_D1502

Appendix 16

Operation & Maintenance Plan

MASER
CONSULTING P.A.
Engineers
Planners
Surveyors
Landscape Architects
Environmental Scientists

STORMWATER OPERATION & MAINTENANCE PLAN

BAYSIDE DEVELOPMENT

Corner of NYS Route 9W & Purdy Avenue
Town of Marlborough, Ulster County, NY

Prepared For

Bayside Construction, LLC
1451 47th Street
Brooklyn, NY 11219

Prepared By

Maser Consulting P.A.
555 Hudson Valley Avenue, Suite 101
New Windsor, NY 12553

DECEMBER 2016
REVISED SEPTEMBER 2017

MC PROJECT NO. 05000787A

Project Description

The Applicant proposes to develop the subject parcel with a mixed use including 12,600 sq. ft. of commercial retail space to the east along Route 9W and one hundred and four (104) total residential dwelling units among five (5) buildings in the central area of the subject parcel. The development will also include associated driveways, parking, sidewalks, water, sewer and drainage utilities as well as stormwater management areas. The partially developed subject parcel is approximately 1,102,335 square feet (±25.31 acres) in size, and is located North of the Marlboro Middle School, West of NYS Route 9W and South of Purdy Avenue, also known as SBL 109.1-4-29, in the Town of Marlborough, Ulster County, New York.

Site Drainage

A State Pollutant Discharge Elimination System Permit (SPDES GP 0-15-002) is required from the New York State Department of Environmental Conservation (NYSDEC) and a Storm Water Pollution Prevention Plan (SWPPP) has been prepared for review/approval by the Town of Marlborough (an MS4 community). The site improvements made to the parcel required this study of impacts on watercourses in and around the site. The study provides reviews the existing drainage conditions as well as the proposed improvements to provide measures that will be used to control potential impacts due to storm water runoff.

Constructed Stormwater Control Practices

Catch Basins:

Catch basins on-site are utilized to collect stormwater run-off and melting snow from the paved parking areas, driveway and sidewalks. These are located along the centerline of roadside swales.

Drain/Yard Inlets:

Drain/yard inlets are located within the landscaped areas and are utilized to collect overland stormwater run-off and snow melt.

Roof leaders:

Roof leaders are utilized to collect stormwater run-off from the roof and discharge it into the subsurface chamber system.

First Defense System:

The First Defense system is a compact, below grade stormwater treatment system that provides water quality mitigation. These are located at two (2) locations on the eastern side of the project site (North commercial parking lot and the north side of proposed Entrance road). These systems receive overland flow through grated inlets as well as piped inlets from the various catch basins and drain/yard inlets located throughout the site.

Bio-retention Areas:

These are drainage facilities that capture runoff from surrounding areas and are sized to provide runoff reduction and water quality at shallow depths (six inch deep surface ponding area) and then utilize an engineered soil strata and vegetation for treatment. The systems have been designed to hold volume of larger rain events and are controlled by the outlet control structure; depth in excess of six inches is a short term condition.

See Design Plans and Details for these improvements.

Typical Maintenance for Stormwater Practices

As a consequence of its function, the stormwater conveyance system collects and transports runoff that may contain certain pollutants. Maintaining catch basins, stormwater inlets, and the basins on a regular basis will remove pollutants, prevent clogging of the downstream conveyance system, restore catch basins' sediment trapping capacity, and ensure the system functions properly to avoid flooding.

Catch Basins:

Catch basins should be inspected monthly and after heavy rain fall to ensure they are functioning properly. Typical maintenance of catch basins includes removal of debris from the grate and sump. This can be done manually or using a vehicle equipped with a vacuum pump. Catch basins should be cleaned out at least one (1) time per year. A good time to clean out catch basins is in the spring to remove the build-up of leaves, sand used for traction, dirt, and other debris that accumulates during winter months.

Drain/Yard Inlets:

Drain/yard inlets, similar to the catch basins, require typical maintenance which includes removal of debris from the grate and sump manually. For this site, use of a vac truck may cause damage to the lawn areas around these structures. Inspections of the structures should occur monthly and after heavy rain fall to ensure they are still functioning properly. These should be cleaned out at least one (1) time per year.

Roof leaders:

Roof leaders, similar to the catch basins, require typical maintenance which includes removal of debris manually. Inspections of the leaders should occur monthly and after heavy rain fall to ensure they are still functioning properly. These should be cleaned out at least one (1) time per year.

First Defense System:

The First Defense systems should be inspected at regular intervals and maintained when necessary to ensure optimum performance. The rate at which the system collects pollutants will depend more heavily on site activities than the size of the unit, i.e., unstable soils or heavy winter sanding will cause the treatment chamber to fill more quickly, but regular street sweeping will slow accumulation of said sediment and pollutants.

At a minimum, inspections should be performed twice per year (i.e. spring and fall) however more frequent inspections may be necessary in equipment wash down areas and in climates where winter sanding operations may lead to rapid accumulations of a large volume of sediment. The First Defense systems should be cleaned when the level of sediment has reached 75% of the capacity in the isolated sump or when significant level of hydrocarbons or trash has accumulated.

Cleaning of the First Defense systems should be done during dry weather conditions when no flow is entering the system. Cleanout of the First Defense system with a vacuum truck is generally the most effective and convenient method of excavating pollutants from the system. Disposal of all material removed from the First Defense systems should be done is accordance with local regulations. In many locations, disposal of evacuated sediments may be handled in the same manner as disposal of sediments removed from catch basins or deep sump manholes.

The Manufacturer's Operation and Maintenance Manual can be found in the appendix of the plan. The minimum requirements to maintain intended operation are set forth by the manufacturer and should be strictly adhered to.

Bio-retention Areas:

These areas should be inspected monthly and after heavy rain fall to ensure they are functioning properly. Typical maintenance of the bio-retention areas include removal of debris, weeding (especially in the first couple of years while the plants are establishing their root systems) and mulching. Any areas devoid of mulch shall be re-mulched on an annual basis. Dead or diseased plant material shall be replaced immediately.

Silt/Sediment removal from the filter bed shall be conducted when the accumulation exceeds one inch or every five to six years. If the filter bed ponds water at the surface for more than 48 hours, the top 4-6 inches (below the mulch) of material shall be removed and replaced with fresh material. Any plant material removed during clean-out shall be replaced in-kind.

See Design Plans and Details for the components of the soil mixture for the filter bed.

In addition to the above requirements, inspection and maintenance associated with general stormwater basins should also be evaluated.

Long-term Stormwater Basin maintenance requires the following:

- Mowing grass, at least twice yearly. Grass clippings and other debris must be removed from the basin area after each cutting. Removal of unwanted woody brush and trees. Reestablish good grass cover in areas where woody material has been removed.
- Leaves shall be removed as needed from the basin and outlet control structure.
- Restore and reseed eroded any areas and gullies along embankment areas. Reoccurring erosion should be inspected by a licensed professional engineer to determine probable cause and remedial action that may be necessary.
- General maintenance and repairs of the stormwater outlet and inlet structures.
- Sediment removal from forebay, where applicable, every five to six years or when 50% full.
- The emergency spillway must remain free of debris and maintain the design elevation in order to convey stormwater during a catastrophic storm event.

Summary

In general, any deficiencies identified during the regular inspections or otherwise for all the stormwater management facilities should be corrected immediately. See appendices for forms to record inspection and maintenance work for the stormwater facilities.

APPENDIX A

GENERAL INSPECTION FORMS

Stormwater Pond/Wetland Operation, Maintenance and Management Inspection Checklist

Project ______________________________
Location: ______________________________
Site Status: ______________________________

Date: ______________________________
Time: ______________________________

Inspector: ______________________________

Maintenance Item	Satisfactory/ Unsatisfactory	Comments
1. Embankment and emergency spillway (Annual, After Major Storms)		
1. Vegetation and ground cover adequate		
2. Embankment erosion		
3. Animal burrows		
4. Unauthorized planting		
5. Cracking, bulging, or sliding of dam		
a. Upstream face		
b. Downstream face		
c. At or beyond toe		
downstream		
upstream		
d. Emergency spillway		
6.Pond, toe & chimney drains clear and functioning		
7.Seeps/leaks on downstream face		
8.Slope protection or riprap failure		
9. Vertical/horizontal alignment of top of dam “As-Built”		

Maintenance Item	Satisfactory/ Unsatisfactory	Comments
10. Emergency spillway clear of obstructions and debris		
11. Other (specify)		
2. Riser and principal spillway (Annual)		
Type: Reinforced concrete ______ Corrugated pipe ______ Masonry ______ 1. Low flow orifice obstructed		
2. Low flow trash rack. a. Debris removal necessary		
b. Corrosion control		
3. Weir trash rack maintenance a. Debris removal necessary		
b. corrosion control		
4. Excessive sediment accumulation insider riser		
5. Concrete/masonry condition riser and barrels a. cracks or displacement		
b. Minor spalling (<1")		
c. Major spalling (rebars exposed)		
d. Joint failures		
e. Water tightness		
6. Metal pipe condition		
7. Control valve a. Operational/exercised		
b. Chained and locked		
8. Pond drain valve a. Operational/exercised		
b. Chained and locked		
9. Outfall channels functioning		
10. Other (specify)		

Maintenance Item	Satisfactory/ Unsatisfactory	Comments
3. Permanent Pool (Wet Ponds) (monthly)		
1. Undesirable vegetative growth		
2. Floating or floatable debris removal required		
3. Visible pollution		
4. Shoreline problem		
5. Other (specify)		
4. Sediment Forebays		
1.Sedimentation noted		
2. Sediment cleanout when depth < 50% design depth		
5. Dry Pond Areas		
1. Vegetation adequate		
2. Undesirable vegetative growth		
3. Undesirable woody vegetation		
4. Low flow channels clear of obstructions		
5. Standing water or wet spots		
6. Sediment and / or trash accumulation		
7. Other (specify)		
6. Condition of Outfalls (Annual , After Major Storms)		
1. Riprap failures		
2. Slope erosion		
3. Storm drain pipes		
4.Endwalls / Headwalls		
5. Other (specify)		
7. Other (Monthly)		
1. Encroachment on pond, wetland or easement area		

Maintenance Item	Satisfactory/ Unsatisfactory	Comments
2. Complaints from residents		
3.Aesthetics a. Grass growing required		
b. Graffiti removal needed		
c. Other (specify)		
4. Conditions of maintenance access routes.		
5. Signs of hydrocarbon build-up		
6. Any public hazards (specify)		
8. Wetland Vegetation (Annual)		
1. Vegetation healthy and growing Wetland maintaining 50% surface area coverage of wetland plants after the second growing season. (If unsatisfactory, reinforcement plantings needed)		
2. Dominant wetland plants: Survival of desired wetland plant species Distribution according to landscaping plan?		
3. Evidence of invasive species		
4. Maintenance of adequate water depths for desired wetland plant species		
5. Harvesting of emergent plantings needed		
6. Have sediment accumulations reduced pool volume significantly or are plants “choked” with sediment		
7. Eutrophication level of the wetland.		
8. Other (specify)		

Comments:

Actions to be Taken:

________________ Maintenance, and Management Inspection Checklist

Project:
Location:
Site Status:

Date:

Time:

Inspector:

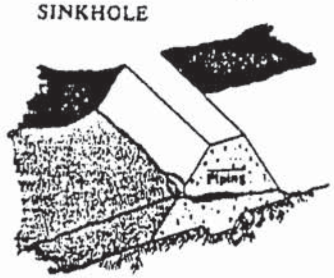
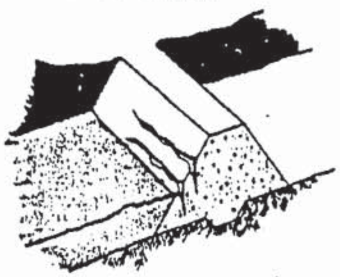
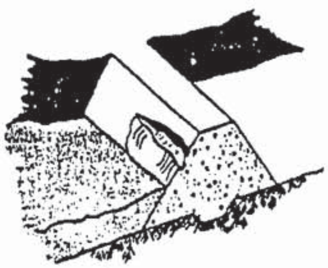
MAINTENANCE ITEM	SATISFACTORY/ UNSATISFACTORY	COMMENTS
1. Debris Cleanout (Monthly)		
Contributing areas clean of debris		
2. Check Dams or Energy Dissipators (Annual, After Major Storms)		
No evidence of flow going around structures		
No evidence of erosion at downstream toe		
Soil permeability		
Groundwater / bedrock		
3. Vegetation (Monthly)		
Mowing done when needed		
Minimum mowing depth not exceeded		
No evidence of erosion		
Fertilized per specification		
4. Dewatering (Monthly)		
Dewaters between storms		

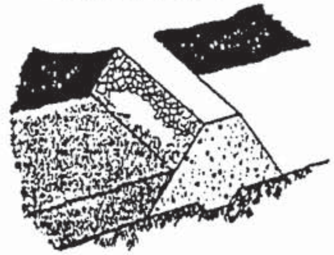
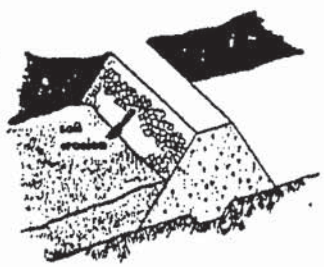
Maintenance Item	Satisfactory/ Unsatisfactory	Comments
5. Sediment deposition (Annual)		
Clean of sediment		
6. Outlet/Overflow Spillway (Annual)		
Good condition, no need for repairs		
No evidence of erosion		

Comments:

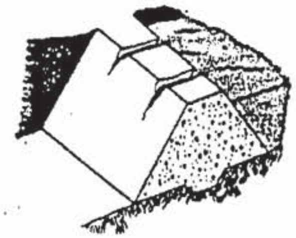
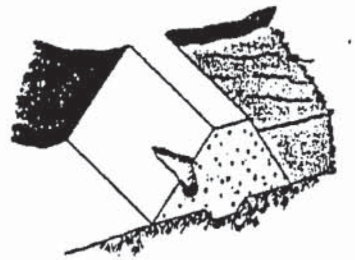
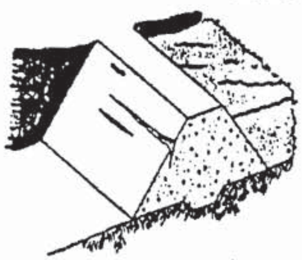
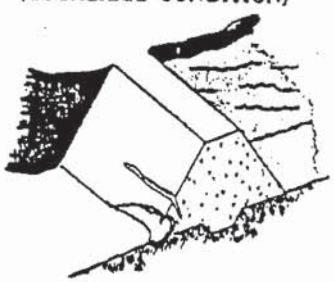
Actions to be Taken:

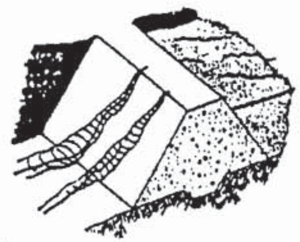
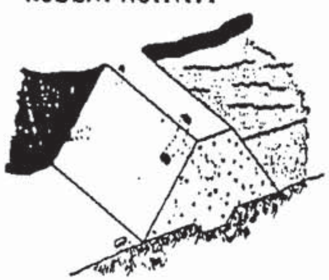
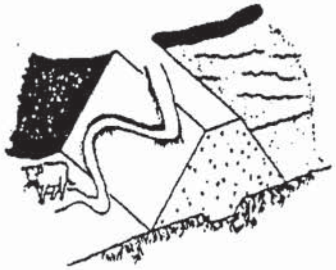
FIGURES 5.3.1
INSPECTION GUIDELINES - EMBANKMENT UPSTREAM SLOPE

PROBLEM	PROBABLE CAUSE	POSSIBLE CONSEQUENCES	RECOMMENDED ACTIONS
SINKHOLE 	Piping or internal erosion of embankment materials or foundation causes a sinkhole. The cave-in of an eroded cavern can result in a sink hole. A small hole in the wall of an outlet pipe can develop a sink hole. Dirty water at the exit indicates erosion of the dam.	HAZARDOUS Piping can empty a reservoir through a small hole in the wall or can lead to failure of a dam as soil pipes erode through the foundation or a pervious part of the dam.	Inspect other parts of the dam for seepage or more sink holes. Identify exact cause of sink holes. Check seepage and leakage outflows for dirty water. A qualified engineer should inspect the conditions and recommend further actions to be taken. ENGINEER REQUIRED
LARGE CRACKS 	A portion of the embankment has moved because of loss of strength, or the foundation may have moved, causing embankment movement.	HAZARDOUS Indicates onset of massive slide or settlement caused by foundation failure.	Depending on embankment involved, draw reservoir level down. A qualified engineer should inspect the conditions and recommend further actions to be taken. ENGINEER REQUIRED
SLIDE, SLUMP OR SLIP 	Earth or rocks move down the slope along a slippage surface because of too steep a slope, or the foundation moves. Also, look for slides movement in reservoir basin.	HAZARDOUS A series of slides can lead to obstruction of the outlet or failure of the dam.	Evaluate extent of the slide. Monitor slide. (See Chapter 6.) Draw the reservoir level down if safety of dam is threatened. A qualified engineer should inspect the conditions and recommend further actions to be taken. ENGINEER REQUIRED
SCARPS, BENCHES, OVERSTEEP AREAS	Wave action, local settlement, or ice action cause soil and rock to erode and slide to the lower part of the slope forming a bench.	Erosion lessens the width and possible height of the embankment and could lead to increased seepage or overtopping of the dam.	Determine exact cause of scarps. Do necessary earthwork, restore embankment to original slope and provide adequate protection (bedding and riprap). See Chapter 7.

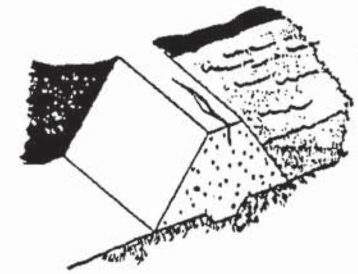
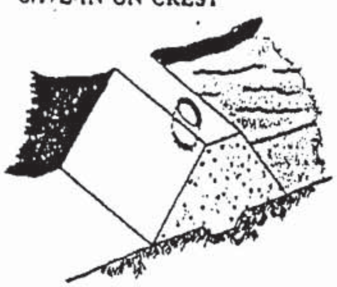
PROBLEM	PROBABLE CAUSE	POSSIBLE CONSEQUENCES	RECOMMEND ACTIONS
BROKEN DOWN MISSING RIPRAP 	Poor quality riprap has deteriorated. Wave action or ice action has displaced riprap. Round and similar-sized rocks have rolled downhill.	Wave action against these unprotected areas decreases embankment width.	Re-establish normal slope. Place bedding and competent riprap. (See Chapter 7.)
EROSION BEHIND POORLY GRADED RIPRAP 	Similar-sized rocks allow waves to pass between them and erode small gravel particles and soil.	Soil is eroded away from behind the riprap. This allows riprap to settle, providing less protection and decreased embankment width.	Re-establish effective slope protection. Place bedding material. ENGINEER REQUIRED for design for gradation and size for rock for bedding and riprap. A qualified engineer should inspect the conditions and recommend further actions to be taken.
SLIDE/SLOUGH 	1. Lack of or loss of strength of embankment material. 2. Loss of strength can be attributed to infiltration of water into the embankment or loss of support by the foundation.	HAZARDOUS Massive slide cuts through crest or upstream slope reducing freeboard and cross section. Structural collapse or overtopping can result.	1. Measure extent and displacement of slide. 2. If continued movement is seen, begin lowering water level until movement stops. 3. Have a qualified engineer inspect the condition and recommend further action. ENGINEER REQUIRED

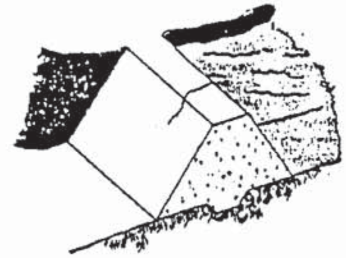
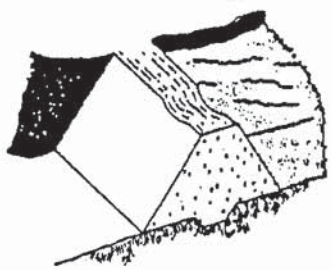
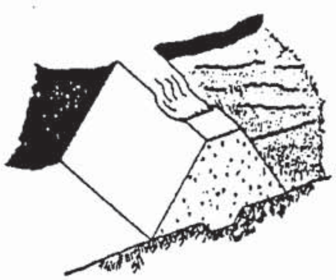
Figures 5.3.2
Inspection Guidelines - Downstream Slope

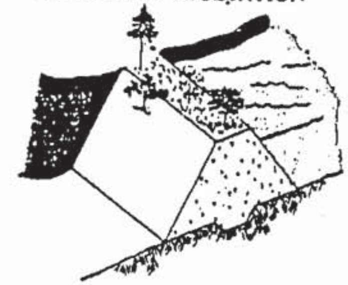
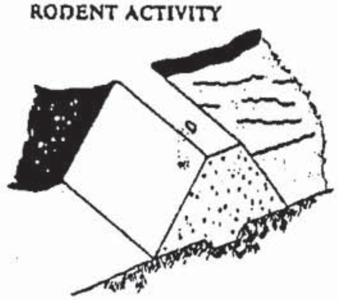
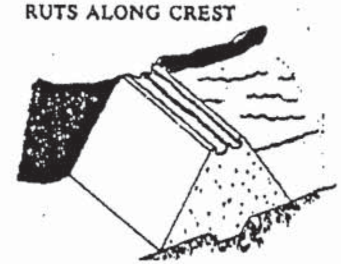
PROBLEM	PROBABLE CAUSE	POSSIBLE CONSEQUENCES	RECOMMENDED ACTIONS
TRANSVERSE CRACKING 	Differential settlement of the embankment also leads to tranverse cracking (e.g., center settles more than abutments).	HAZARDOUS Settlement or shrinkage cracks can lead to seepage of reservoir water through the dam. Shrinkage cracks allow water to enter the embankment. This promotes saturation and increases freeze-thaw action.	1. If necessary, plug upstream end of crack to prevent flows from the reservoir. 2. A qualified engineer should inspect the conditions and recommend further actions to be taken. ENGINEER REQUIRED
CAVE IN/COLLAPSE 	1. Lack of adequate compaction. 2. Rodent hole below. 3. Piping through embankment or foundation.	HAZARDOUS Indicates possible wash out of embankment.	1. Inspect for and immediately repair rodent holes. Control rodents to prevent future damage. 2. Have a qualified engineer inspect the condition and recommend further action. ENGINEER REQUIRED
LONGITUDINAL CRACKING 	1. Drying and shrinkage of surface material. 2. Downstream movement of settlement of embankment.	1. Can be an early warning of a potential slide. 2. Shrinkage cracks allow water to enter the embankment and freezing will further crack the embankment. 3. Settlement or slide showing loss of strength in embankment can lead to failure.	1. If cracks are from drying, dress area with well-compacted material to keep surface water out and natural moisture in. 2. If cracks are extensive, a qualified engineer should inspect the conditions and recommend further actions to be taken. ENGINEER REQUIRED
SLUMP (LOCALIZED CONDITION) 	Preceded by erosion undercutting a portion of the slope. Can also be found on steep slopes.	Can expose impervious zone to erosion and lead to further slumps.	1. Inspect area for seepage. 2. Monitor for progressive failure. 3. Have a qualified engineer inspect the condition and recommend further action. ENGINEER REQUIRED

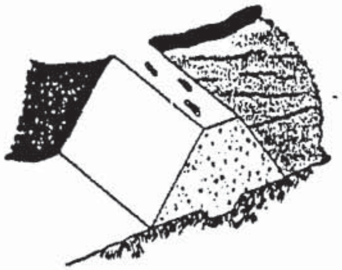
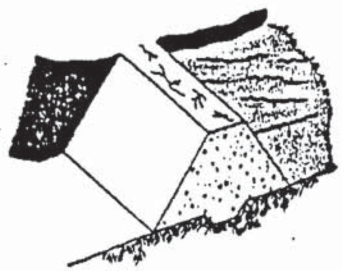
PROBLEM	PROBABLE CAUSE	POSSIBLE CONSEQUENCES	RECOMMENDED ACTIONS
EROSION 	Water from intense rainstorms or snow-melt carries surface material down the slope, resulting in continuous troughs.	Can be hazardous if allowed to continue. Erosion can lead to eventual deterioration of the downstream slope and failure of the structure.	1. The preferred method to protect eroded areas is rock or riprap. 2. Re-establishing protective grasses can be adequate if the problem is detected early.
TREES/OBSCURING BRUSH 	Natural vegetation in area.	Large tree roots can create seepage paths. Bushes can obscure visual inspection and harbor rodents.	1. Remove all large, deep-rooted trees and shrubs on or near the embankment. Properly backfill void. (See Chapter 7.) 2. Control vegetation on the embankment that obscures visual inspection. (See Chapter 7.)
RODENT ACTIVITY 	Over-abundance of rodents. Holes, tunnels and caverns are caused by animal burrowings. Certain habitats like cattail type plants and trees close to the reservoir encourage these animals.	Can reduce length of seepage path, and lead to piping failure. If tunnel exists through most of the dam, it can lead to failure of the dam.	1. Control rodents to prevent more damage. 2. Backfill existing rodent holes. 3. Remove rodents. Determine exact location of digging and extent of tunneling. Remove habitat and repair damages. (See Chapter 7.)
LIVESTOCK/CATTLE TRAFFIC 	Excessive travel by livestock especially harmful to slope when wet.	Creates areas bare of erosion protection and causes erosion channels. Allows water to stand. Area susceptible to drying cracks.	1. Fence livestock outside embankment area. 2. Repair erosion protection, i.e., riprap, grass.

Figures 5.3.3
Inspection Guidelines - Embankment Crest

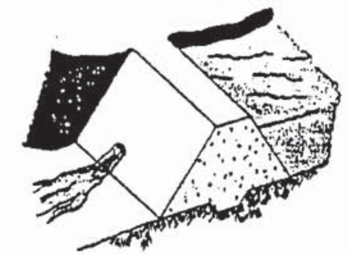
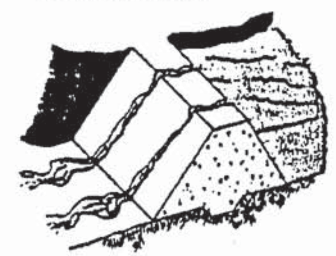
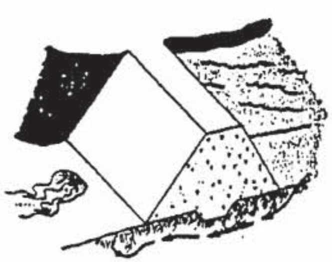
PROBLEM	PROBABLE CAUSE	POSSIBLE CONSEQUENCES	RECOMMENDED ACTIONS
LONGITUDINAL CRACK 	1. Uneven settlement between adjacent sections or zones within the embankment. 2. Foundation failure causing loss of support to embankment. 3. Initial stages of embankment slide.	HAZARDOUS 1. Creates local area of low strength within embankment. Could be the point of initiation of future structural movement, deformation, or failure. 2. Provides entrance point for surface run-off into embankment, allowing saturation of adjacent embankment area, and possible lubrication which could lead to localized failure.	1. Inspect crack and carefully record location, length, depth, width, alignment, and other pertinent physical features. Immediately stake out limits of cracking. Monitor frequently. 2. Engineer should determine cause of cracking and supervise steps necessary to reduce danger to dam and correct condition. 3. Effectively seal the cracks at the crest's surface to prevent infiltration by surface water. 4. Continue to routinely monitor crest for evidence of further cracking. ENGINEER REQUIRED
VERTICAL DISPLACEMENT 	1. Vertical movement between adjacent sections of the embankment. 2. Structural deformation or failure caused by structural stress or instability, or by failure of the foundation.	HAZARDOUS 1. Provides local area of low strength within embankment which could cause future movement. 2. Leads to structural instability or failure. 3. Provides entrance point for surface water that could further lubricate failure plane. 4. Reduces available embankment cross section.	1. Carefully inspect displacement and record its location, vertical and horizontal displacement, length, and other physical features. Immediately stake out limits of cracking. 2. Engineer should determine cause of displacement and supervise all steps necessary to reduce danger to dam and correct condition. 3. Excavate area to the bottom of the displacement. Backfill excavation using competent material and correct construction techniques, and under supervision of engineer. 4. Continue to monitor areas routinely for evidence of future cracking or movement. (See Chapter 6.) ENGINEER REQUIRED
CAVE-IN ON CREST 	1. Rodent activity. 2. Hole in outlet conduit is causing erosion of embankment material. 3. Internal erosion or piping of embankment material by seepage. 4. Breakdown of dispersive clays within embankment by seepage waters.	HAZARDOUS 1. Void within dam could cause localized caving, sloughing, instability, or reduced embankment cross section. 2. Entrance point for surface water.	1. Carefully inspect and record location and physical characteristics (depth, width, length) of cave in. 2. Engineer should determine cause of cave in and supervise all steps necessary to reduce threat to dam and correct condition. 3. Excavate cave in, slope sides of excavation, and backfill hole with competent material using proper construction techniques. (See Chapter 7.) This should be supervised by engineer. ENGINEER REQUIRED

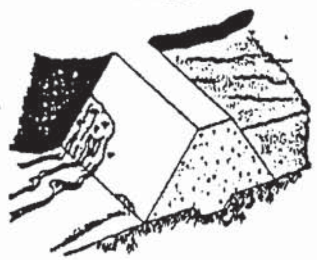
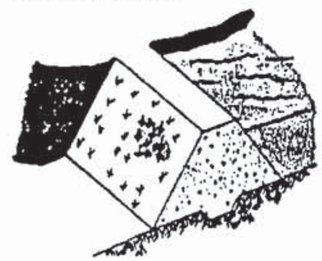
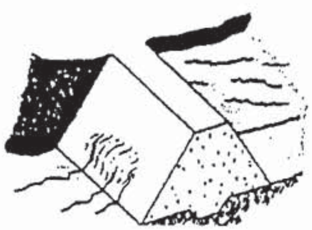
PROBLEM	PROBABLE CAUSE	POSSIBLE CONSEQUENCES	RECOMMENDED ACTIONS
TRANSVERSE CRACKING 	1. Uneven movement between adjacent segments of the embankment. 2. Deformation caused by structural stress or instability.	HAZARDOUS 1. Can provide a path for seepage through the embankment cross section. 2. Provides local area of low strength within embankment. Future structural movement, deformation or failure could begin. 3. Provides entrance point for surface runoff to enter embankment.	1. Inspect crack and carefully record crack location, length, depth, width, and other pertinent physical features. Stake out limits of cracking. 2. Engineer should determine cause of cracking and supervise all steps necessary to reduce danger to dam and correct condition. 3. Excavate crest along crack to a point below the bottom of the crack. Then backfilling excavation using competent material and correct construction techniques. This will seal the crack against seepage and surface runoff. (See Chapter 7.) This should be supervised by engineer. 4. Continue to monitor crest routinely for evidence of future cracking. (See Chapter 6.) ENGINEER REQUIRED
CREST MISALIGNMENT 	1. Movement between adjacent parts of the structure. 2. Uneven deflection of dam under loading by reservoir. 3. Structural deformation or failure near area of misalignment.	1. Area of misalignment is usually accompanied by low area in crest which reduces freeboard. 2. Can produce local areas of low embankment strength which may lead to failure.	1. Establish monuments across crest to determine exact amount, location, and extent of misalignment. 2. Engineer should determine cause of misalignment and supervise all steps necessary to reduce threat to dam and correct condition. 3. Monitor crest monuments on a scheduled basis following remedial action to detect possible future movement. (See Chapter 6.) ENGINEER REQUIRED
LOW AREA IN CREST OF DAM 	1. Excessive settlement in the embankment or foundation directly beneath the low area in the crest. 2. Internal erosion of embankment material. 3. Foundation spreading to upstream and/or downstream direction. 4. Prolonged wind erosion of crest area. 5. Improper final grading following construction.	Reduces freeboard available to pass flood flows safely through spillway.	1. Establish monuments along length of crest to determine exact amount, location, and extent of settlement in crest. 2. Engineer should determine cause of low area and supervise all steps necessary to reduce possible threat to the dam and correct condition. 3. Re-establish uniform crest elevation over crest length by placing fill in low area using proper construction techniques. This should be supervised by engineer. 4. Re-establish monuments across crest of dam and monitor monuments on a routine basis to detect possible future settlement. ENGINEER REQUIRED

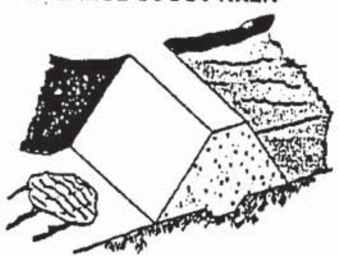
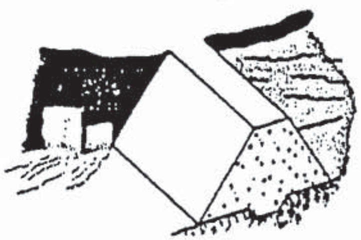
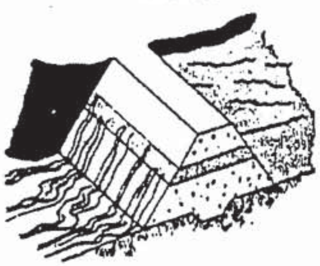
PROBLEM	PROBABLE CAUSE	POSSIBLE CONSEQUENCES	RECOMMENDED ACTIONS
OBSCURING VEGETATION 	Neglect of dam and lack of proper maintenance procedures.	1. Obscures large parts of the dam, preventing adequate, accurate visual inspection of all parts of the dam. Problems which threaten the integrity of the dam can develop and remain undetected until they progress to a point that threatens the dam's safety. 2. Associated root systems develop and penetrate into the dam's cross section. When the vegetation dies, the decaying root systems can provide paths for seepage. This reduces the effective seepage path through the embankment and could lead to possible piping situations. 3. Prevents easy access to all parts of the dam for operation, maintenance, and inspection. 4. Provides habitat for rodents.	1. Remove all damaging growth from the dam. This would include removal of trees, bushes, brush, conifers, and growth other than grass. Grass should be encouraged on all segments of the dam to prevent erosion by surface runoff. Root systems should also be removed to the maximum practical extent. The void which results from removing the root system should be backfilled with wellcompetent, well-compacted material. 2. Future undesirable growth should be removed by cutting or spraying, as part of an annual maintenance program. (See Chapter 7.) 3. All cutting or debris resulting from the vegetative removal should be immediately taken from the dam and properly disposed of outside the reservoir basin.
RODENT ACTIVITY 	Burrowing animals.	1. Entrance point for surface runoff to enter dam. Could saturate adjacent portions of the dam. 2. Especially dangerous if hole penetrates dam below phreatic line. During periods of high storage, seepage path through the dam would be greatly reduced and a piping situation could develop.	1. Completely backfill the hole with competent, well-compacted material. 2. Initate a rodent control program to reduce the burrowing animal population and to prevent future damage to the dam. (See Chapter 7.)
GULLY ON CREST 	1. Poor grading Xand improper drainage of crest. Improper drainage causes surface runoff to collect and drain of crest at low point in upstream or downstream shoulder. 2. Inadequate spillway capacity which has caused dam to overtop.	1. Can reduce available freeboard. 2. Reduces cross-sectional area of dam. 3. Inhibits access to all parts of the crest and dam. 4. Can result in a hazardous condition if due to overtopping.	1. Restore freeboard to dam by adding fill material in low area, using proper construction techniques. (See Chapter 7.) 2. Regrading crest to provide proper drainage of surface runoff. 3. If gully was caused by overtopping, provide adequate spillway which meets current design standards. This should be done by engineer. 4. Re-establish protective cover.
RUTS ALONG CREST 	Heavy vehicle traffic without adequate or proper maintenance or proper crest surfacing.	1. Inhibits easy access to all parts of crest. 2. Allows continued development of rutting. 3. Allows standing water to collect and saturate crest of dam. 4. Operating and maintenance vehicles can get stuck.	1. Drain standing water from ruts. 2. Regrade and recompact crest to restore integrity and provide proper drainage to upstream slope. (See Chapter 7.) 3. Provide gravel or roadbase material to accommodate traffic. 4. Do periodic maintenance and regrading to prevent reformation of ruts.

PROBLEM	PROBABLE CAUSE	POSSIBLE CONSEQUENCES	RECOMMENDED ACTIONS
PUDDLING ON CREST-POOR DRAINAGE 	1. Poor grading and improper drainage of crest. 2. Localized consolidation or settlement on crest allows puddles to develop.	1. Cause localized saturation of the crest. 2. Inhibits access to all parts of the dam and crest. 3. Becomes progressively worse if not corrected.	1. Drain standing water from puddles. 2. Regrade and recompact crest to restore integrity and provide proper drainage to upstream slope. (See Chapter 7.) 3. Provide gravel or roadbase material to accommodate traffic. 4. Do periodic maintenance and regrading to prevent reformation of low areas.
DRYING CRACKS 	Material on the crest of dam expands and contracts with alternate wetting and drying of weather cycles. Drying cracks are usually short, shallow, narrow, and many.	Provides point of entrance for surface runoff and surface moisture, causing staturation of adjacent embankment areas. This staturation, and later drying of the dam, could cause further cracking.	1. Seal surface of cracks with a tight, impervious material. (See Chapter 7.) 2. Routinely grade crest to provide proper drainage and fill cracks. -OR 3. Cover crest with non-plastic (not clay) material to prevent large moisture content variations.

Figures 5.3.4
Inspection Guidelines - Embankment Seepage Areas

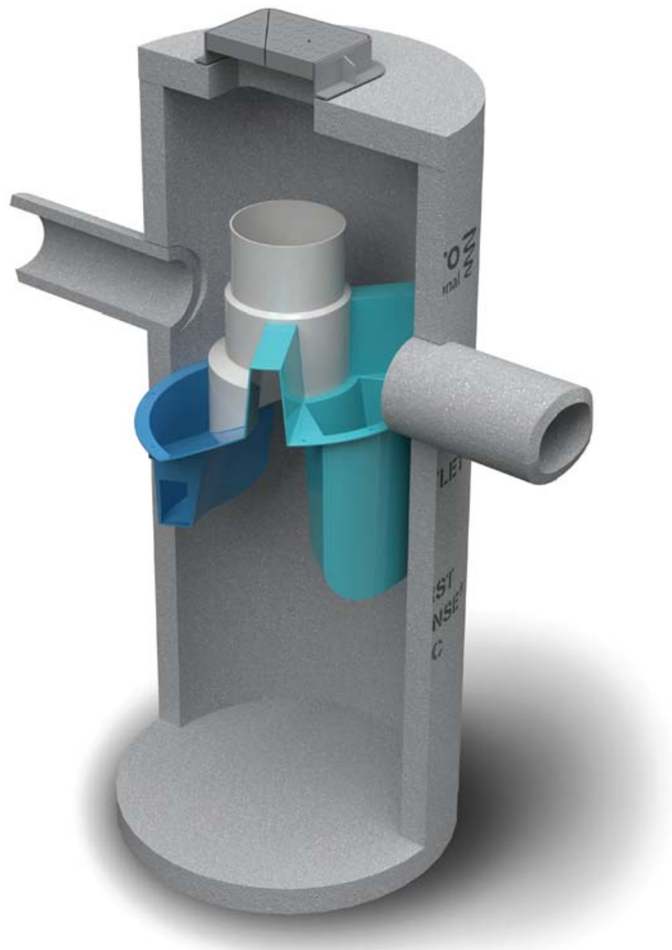
PROBLEM	PROBABLE CAUSE	POSSIBLE CONSEQUENCES	RECOMMENDED ACTIONS
EXCESSIVE QUANTITY AND/OR MUDDY WATER EXITING FROM A POINT 	1. Water has created an open pathway, channel, or pipe through the dam. The water is eroding and carrying embankment material. 2. Large amounts of water have accumulated in the downstream slope. Water and embankment materials are exiting at one point. Surface agitation may be causing the muddy water. 3. Rodents, frost action or poor construction have allowed water to create an open pathway or pipe through the embankment.	HAZARDOUS 1. Continued flows can saturate parts of the embankment and lead to slides in the area. 2. Continued flows can further erode embankment materials and lead to failure of the dam.	1. Begin measuring outflow quantity and establishing whether water is getting muddier, staying the same, or clearing up. 2. If quantity of flow is increasing the water level in the reservoir should be lowered until the flow stabilizes or stops. 3. Search for opening on upstream side and plug if possible. 4. A qualified engineer should inspect the condition and recommend further actions to be taken. ENGINEER REQUIRED
STREAM OF WATER EXITING THROUGH CRACKS NEAR THE CREST 	1. Severe drying has caused shrinkage of embankment material. 2. Settlement in the embankment or foundation is causing the transverse cracks.	HAZARDOUS Flow through the crack can cause failure of the dam.	1. Plug the upstream side of the crack to stop the flow. 2. The water level in he reservoir should be lowered until it is below the level of the cracks. 3. A qualified engineer should inspect the condition and recommend further actions to be taken.
SEEPAGE WATER EXITING AS A BOIL IN THE FOUNDATION 	Some part of the foundation material is supplying a flow path. This could be caused by a sand or gravel layer in the foundation.	HAZARDOUS Increased flows can lead to erosion of the foundation and failure of the dam.	1. Examine the boil for transportation of foundation materials. 2. If soil particles are moving downstream, sandbags or earth should be used to create a dike around the boil. The pressures created by the water level within the dike may control flow velocities and temporarily prevent further erosion. 3. If erosion is becoming greater, the reservoir level should be lowered. 4. A qualified engineer should inspect the condition and recommend further actions to be taken. ENGINEER REQUIRED

PROBLEM	PROBABLE CAUSE	POSSIBLE CONSEQUENCES	RECOMMENDED ACTIONS
SEEPAGE EXITING AT ABUTMENT CONTACT 	1. Water flowing through pathways in the abutment. 2. Water flowing through the embankment.	HAZARDOUS Can lead to erosion of embankment materials and failure of the dam.	1. Study leakage area to determine quantity of flow and extent of saturation. 2. Inspect daily for developing slides. 3. Water level in reservoir may need to be lowered to assure the safety of the embankment. 4. A qualified engineer should inspect the conditions and recommend further actions to be taken. ENGINEER REQUIRED
LARGE AREA WET OR PRODUCING FLOW 	A seepage path has developed through the abutment or embankment materials and failure of the dam can occur.	HAZARDOUS 1. Increased flows could lead to erosion of embankment material and failure of the dam. 2. Saturation of the embankment can lead to local slides which could cause failure of the dam.	1. Stake out the saturated area and monitor for growth or shrinking. 2. Measure any outflows as accurately as possible. 3. Reservoir level may need to be lowered if saturated areas increase in size at a fixed storage level or if flow increases. 4. A qualified engineer should inspect the condition and recommend further actions to be taken. ENGINEER REQUIRED
MARKED CHANGE IN VEGETATION 	1. Embankment material are supplying flows paths. 2. Natural seeding by wind. 3. Change in seed type during early post construction seeding.	Can show a saturated area.	1. Use probe and shovel to establish if the materials in this area are wetter than surrounding areas. 2. If areas shows wetness, when surrounding areas do not, a qualified engineer should inspect the condition and recommend further actions to be taken. ENGINEER REQUIRED
BULGE IN LARGE WET AREA 	Downstream embankment materials have begun to move.	HAZARDOUS Failure of the embankment result from massive sliding can follow these early movements.	1. Compare embankment cross section to the end of construction condition to see if observed condition may reflect end of construction. 2. Stake out affected area and accurately measure outflow. 3. A qualified engineer should inspect the condition and recommend further actions to be taken. ENGINEER REQUIRED

PROBLEM	PROBABLE CAUSE	POSSIBLE CONSEQUENCES	RECOMMENDED ACTIONS
TRAMPOLINE EFFECT IN LARGE SOGGY AREA 	1. Water moving rapidly through the embankment or foundation is being controlled or contained by a well-established turf root system.	Condition shows excessive seepage in the area. If control layer of turf is destroyed, rapid erosion of foundation materials could result in failure of the dam.	1. Carefully inspect the area for outflow quantity and any transported material. 2. A qualified engineer should inspect the condition and recommend further actions to be taken. ENGINEER REQUIRED
LEAKAGE FROM ABUTMENTS BEYOND THE DAM 	Water moving through cracks and fissures in the abutment materials.	Can lead to rapid erosion of abutment and evacuation of the reservoir. Can lead to massive slides near or downstream from the dam.	1. Carefully inspect the area to determine quantity of flow and amount of transported material. 2. A qualified engineer or geologist should inspect the condition and recommend further actions to be taken.
WET AREA IN HORIZONTAL BAND 	Frost layer or layer of sandy material in original construction.	HAZARDOUS 1. Wetting of areas below the area of excessive seepage can led to localized instability of the embankment. (SLIDES) 2. Excessive flows can lead to accelerated erosion of embankment materials and failure of the dam.	1. Determine as closely as possible the flow being produced. 2. If flow increases, reservoir level should be reduced until flow stabilizes or stops. 3. Stake out the exact area involved. 4. Using hand tools, try to identify the material allowing the flow. 5. A qualified engineer should inspect the condition and recommend further actions to be taken. ENGINEER REQUIRED
LARGE INCREASE IN FLOW OR SEDIMENT IN DRAIN OUTFALL 	A shortened seepage path or increased storage levels.	HAZARDOUS 1. Higher velocity flows can cause erosion of drain then embankment materials. 2. Can lead to piping failure.	1. Accurately measures outflow quantity and determine amount of increase over previous flow. 2. Collect jar samples to compare turbidity. 3. If either quantity or turbidity has increased by 25%, a qualified engineer should evaluate the condition and recommend further actions. ENGINEER REQUIRED

APPENDIX B

HYDRO INTERNATIONAL FIRST DEFENSE UNIT MAINTENANCE



Operation and Maintenance Manual

First Defense® and First Defense®-HC

Vortex Separator for Stormwater Treatment

Stormwater Solutions

Turning Water Around ...®

Table of Contents

Hydro International (Stormwater), 94 Hutchins Drive, Portland ME 04102
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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 (refer to *Section II. Model Sizes & Configurations*, page 4) to accommodate a wide range of pipe sizes, peak flows and depth constraints.

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
- Proven to prevent pollutant washout at up to 500% of its treatment flow
- 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

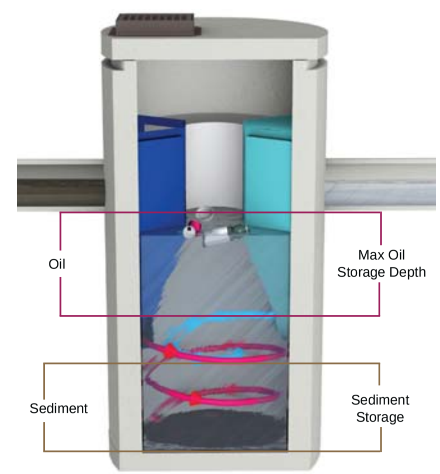


Fig.1 Pollutant storage volumes in the First Defense®.

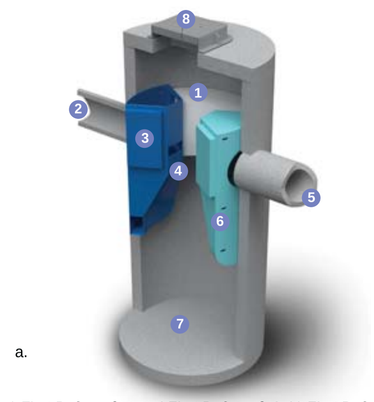
II. Model Sizes & Configurations

The First Defense® inlet and internal bypass arrangements are available in several model sizes and configurations. The components of the First Defense®-4HC and First Defense®-6HC have modified geometries as to allow greater design flexibility needed 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.2a - 2b). First Defense® model parameters and design criteria are shown in Table 1.

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**



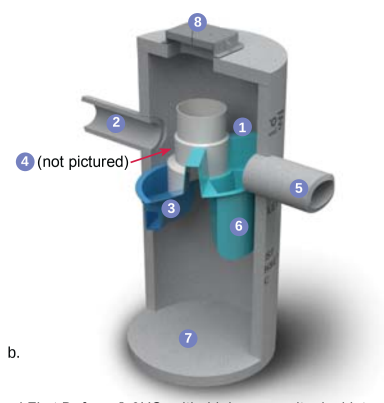


Fig.2a) First Defense®-4 and First Defense®-6; b) First Defense®-4HC and First Defense®-6HC, with higher capacity dual internal bypass and larger maximum pipe diameter.

Table 1. First Defense® Pollutant Storage Capacities and Maximum Clean out Depths

First Defense® Model Number	Diameter	Oil Storage Capacity	Oil Clean Out Depth	Maximum Sediment Storage Capacity[1]		Recommended Sediment Clean-out Capacity	
				Volume	Depth	Volume	Depth
	(ft / m)	(gal / L)	(in / cm)	(yd^3 / m^3)	(in / cm)	(yd^3 / m^3)	(in / cm)
FD-4	4 / 1.2	180 / 681	<23.5 / 60	1.3 / 1.0	33 / 84	0.7 / 0.5	18 / 46
FD-4HC		191 / 723	<24.4 / 62				
FD-6	6 / 1.8	420 / 1,590	<23.5 / 60	3.3 / 2.5	37.5 / 95	1.6 / 1.2	18 / 46
FD-6HC		496 / 1,878	<28.2 / 72				

NOTE

[1] Sediment storage capacity and clean out depth may vary, as larger sediment storage sump volumes are provided when required.

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III. Maintenance

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. Maximum pollutant storage capacities are provided in Table 1.

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®-HC 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.

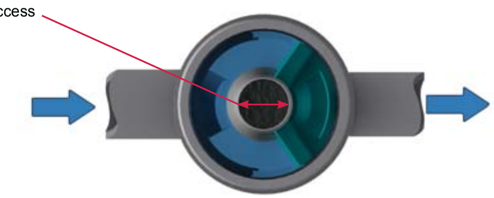

Fig.3 The central opening to the sump of the First Defense®-HC is 15 inches in diameter.

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 a 6-ft 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.

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.5).

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 and skimmer pole 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.

Fig.4 Floatables are removed with a vactor hose (First Defense model FD-4, shown).

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

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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 (Fig.5) or with the skimmer or net (not pictured).
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 (Fig.5).
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.

Fig.5 Sediment is removed with a vactor hose (First Defense model FD-4, shown).

Maintenance at a Glance

Activity	Frequency
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.	

Hydro International®

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): FD-4 FD-4HC FD-6 FD-6HC

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

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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

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Notes

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What is HX?

HX is Hydro Experience, it is the essence of Hydro. It's interwoven into every strand of Hydro's story, from our products to our people, our engineering pedigree to our approach to business and problem-solving.

HX is a stamp of quality and a mark of our commitment to optimum process performance. A Hydro solution is tried, tested and proven.

There is no equivalent to Hydro HX.

Stormwater Solutions

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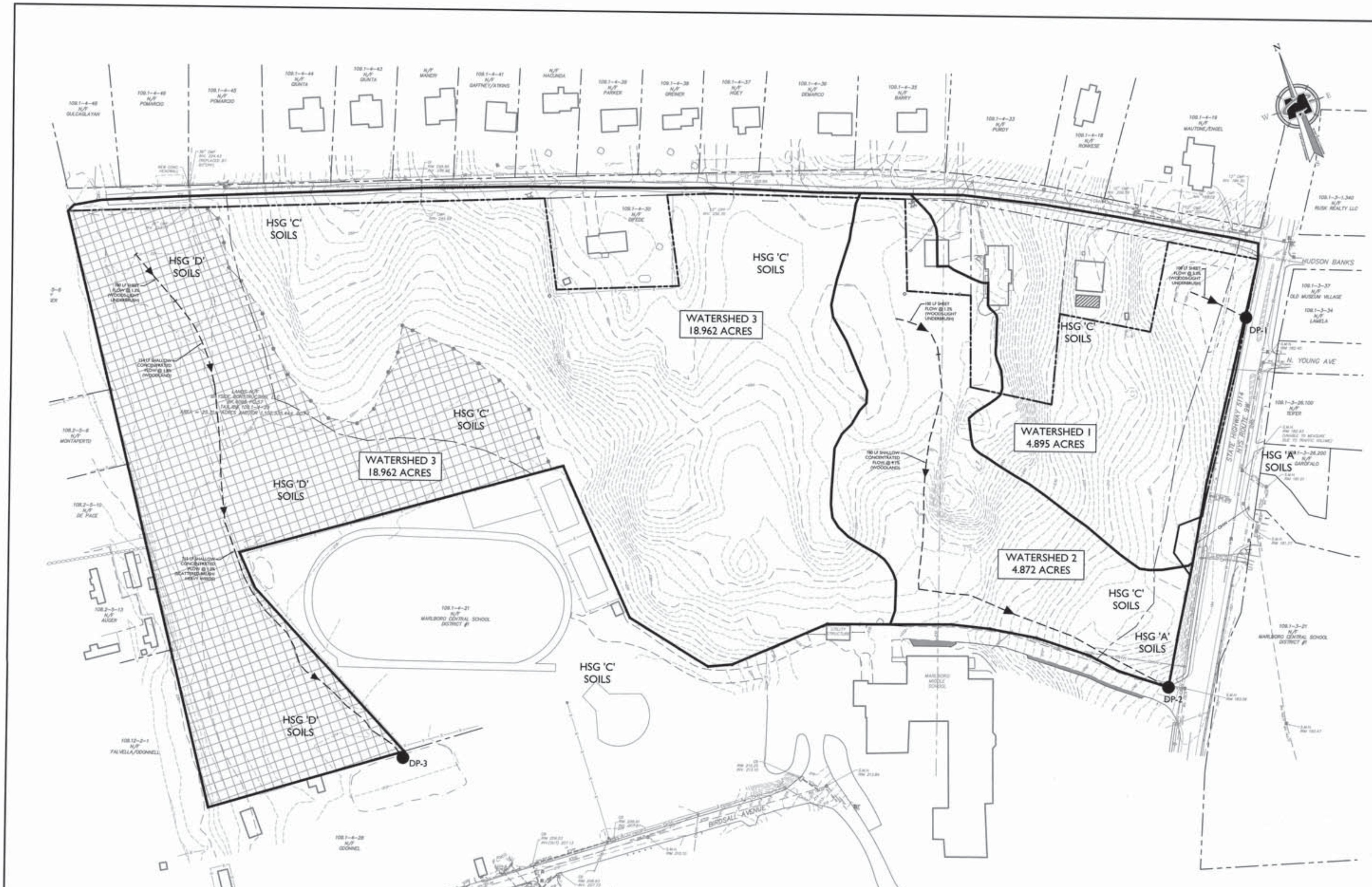
www.hydro-int.com

Turning Water Around...®

APPENDIX 17

EROSION & SEDIMENT CONTROL PLANS & DRAINAGE DETAILS



LEGEND

	EXISTING WATERSHED BOUNDARY
	ACOE WETLANDS
C-SOILS	HYDROLOGIC SOIL GROUP
	HYDROLOGIC SOIL GROUP BOUNDARY
DP-1	WATERSHED DESIGN POINT
	EXISTING TIME OF CONCENTRATION (TC)
323	EXISTING CONTOUR

NOTES:

1. BOUNDARY & TOPOGRAPHICAL INFORMATION IS TAKEN FROM A SURVEY ENTITLED "LANDS N/F BAYSIDE CONSTRUCTION, LLC TAX LOT 109.1-4-29", PREPARED BY MASER CONSULTING, P.A. DATED MAY 13, 2016.

SCALE: 1" = 60'

MASER CONSULTING P.A.

DEIS PROJECT PLANS

FOR

BAYSIDE CONSTRUCTION, LLC

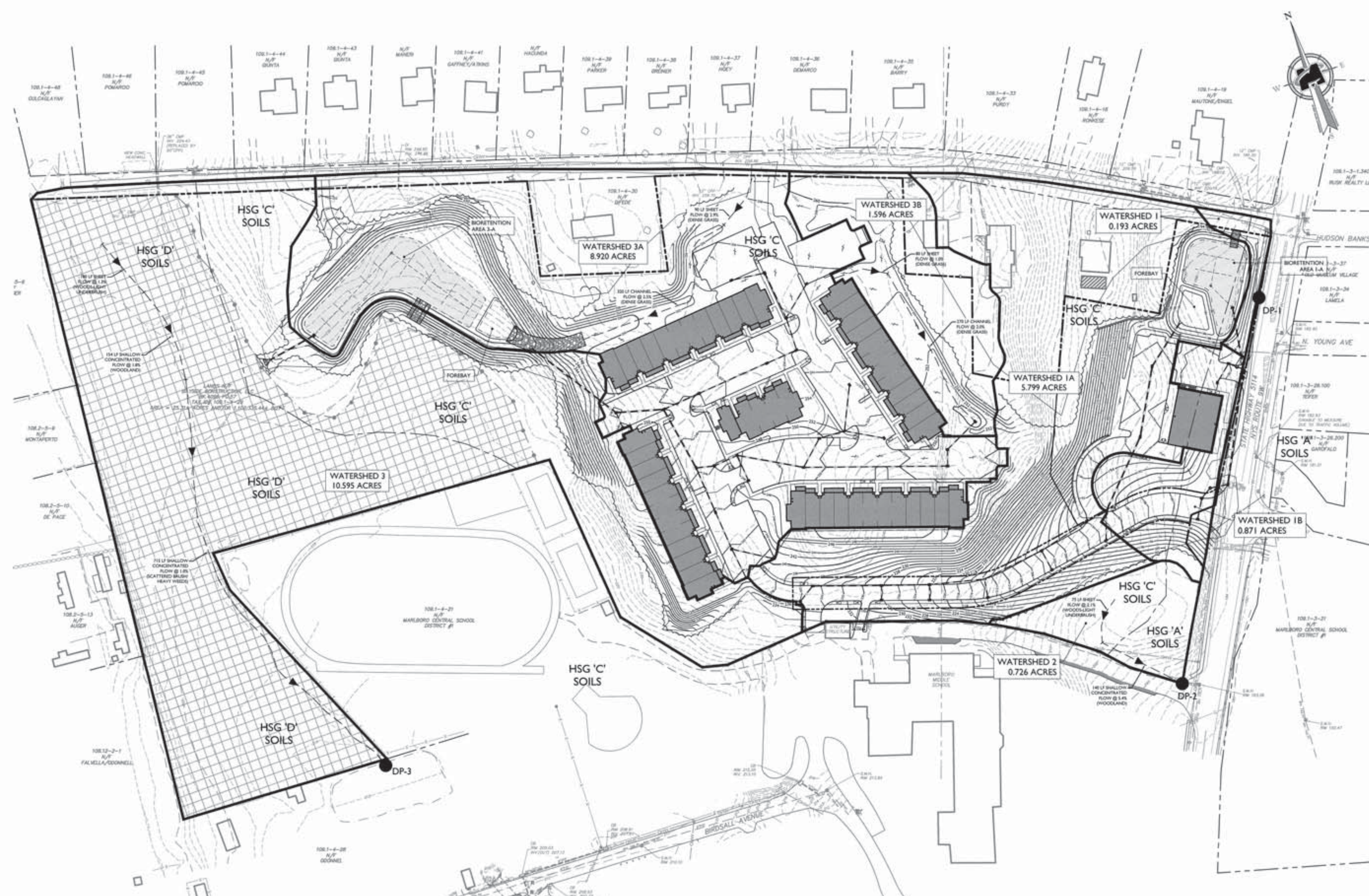
SECTION 109.1
BLOCK 4
LOT 29

TOWN OF MARLBOROUGH
COUNTY OF ULSTER
STATE OF NEW YORK

NEW WINDSOR OFFICE

PRE DEVELOPMENT WATERSHED MAP

01 of 2



LEGEND

- PROPOSED WATERSHED BOUNDARY
- ACOE WETLANDS
- HSG 'C' — HYDROLOGIC SOIL GROUP
- HYDROLOGIC SOIL GROUP BOUNDARY
- DP-1 — WATERSHED DESIGN POINT
- PROPOSED TIME OF CONCENTRATION (TC)

NOTES:

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2. WHERE A TIME OF CONCENTRATION (TC) HAS NOT BEEN SHOWN, THE MINIMUM TC (6.0 MINUTES) HAS BEEN APPLIED BECAUSE THE TC DID NOT MEET THIS REQUIREMENT FOR THAT CATCHMENT AREA.

MASER CONSULTING P.A.

SITE PLANS

FOR

BAYSIDE CONSTRUCTION, LLC

SECTION 109.1
BLOCK 4
LOT 29

TOWN OF MARLBOROUGH
COUNTY OF ULSTER
STATE OF NEW YORK

NEW WINDSOR OFFICE

POST-DEVLOPMENT WATERSHED MAP

2 of 2