The LA GROUP
Landscape Architecture & Engineering P.C.

40 Long Alley
Saratoga Springs
NY 12866

p: 518-587-8100
f: 518-587-0180
www.thelagroup.com

Stormwater Pollution Prevention Plan

Prepared in accordance with NYS DEC General Permit GP-0-20-001

for:

Terramor Catskills

Owner/Operator(s):

Terramor Outdoor Resorts
550N 31st Street
Billings, MT 59101

SWPPP Contact(s):

The LA Group, PC
40 Long Alley
Saratoga Springs, NY 12866
1-518-587-8100
1-518-587-0180

SWPPP Preparation Date:

July 1, 2022
Revised: December 2, 2022

Table of Contents

Appendices

A **Notice of Intent (NOI) & MS4 SWPPP Acceptance Form**

B **Stormwater Management Report and Hydro CAD**

C **Map Set** – Location Map and Construction Drawing

D **SWPPP Inspection Forms** –SWPPP Inspection Report

E **Other SWPPP Forms** – Construction Sequence, SWPPP Plan Changes, Spill Response Form, Stormwater Management Practice Maintenance Log

F **SPDES General Permit GP-0-20-001**

G **Historic Preservation/Endangered Species Documentation**

H **Deep Ripping and De-compaction (DEC, 2008)**

I **Stormwater Maintenance Agreement**

1.0 PERMIT OVERVIEW AND REQUIREMENTS

1.1 Permit Overview

This Stormwater Pollution Prevention Plan (SWPPP) is prepared to inform the landowner and construction personnel of the measures to be implemented for controlling runoff and pollutants from the site during and after construction activities. The objective of this plan is to comply with the New York Department of Environmental Conservation (NYSDEC) State Pollutant Discharge Elimination System (SPDES) General Permit for Stormwater Discharges from Construction Activities, Permit No. GP-0-20-001 requirements. Any material conflicts between this plan and the site plans, specification or instructions, must be brought to the attention of the design professional. The project may have other permits and it is the responsibility of the owner and contractor to know and understand all permits.

The operator will be issued a bill from New York State for a one hundred and ten dollar ($110.00) annual fee for the open GP-0-20-001 permit. The operator will also be billed by New York State for a one time one hundred and ten dollar ($110.00) per acre fee for the proposed disturbed soil area listed in the NOI, and finally a one time six hundred and seventy five ($675.00) per acre fee for the proposed increased impervious area listed in the NOI.

The operator is responsible to maintain onsite in a secure location that is accessible during normal working hours to an individual performing a compliance inspection, the following information:

- ✓ the Notice of Intent (NOI),
- ✓ the NYS Department of Environmental Conservation NOI Acknowledgement Letter,
- ✓ the SWPPP,
- ✓ a copy of the General Permit (included in the SWPPP),
- ✓ MS4 SWPPP Acceptance Form (where applicable), and
- ✓ All inspection reports.

Technical standards are detailed in the “New York State Standards and Specifications for Sediment and Erosion and Sediment Control (November 2016)”, as well as illustrated on the Construction Drawings included in **Appendix C**. The design of post-construction stormwater control practices follow the guidance provided by “New York State Stormwater Management Design Manual.”

2.0 SWPPP REVIEW, UPDATE

2.1 SWPPP Review

Applicable Federal, State, and local regulatory agencies that have jurisdiction may elect to review this SWPPP and notify the permittee in writing that the SWPPP does not meet the requirements of their regulations. If the SWPPP needs to be revised, the permittee and the site contractor will make the required modifications within seven days of such notification and submit written certification to the notifying agency that the changes have been implemented. A copy of the SWPPP will be kept available on site for review by regulatory agencies, engineers, and subcontractors.

2.2 SWPPP Update

The permittee identified in this SWPPP shall amend the SWPPP under the following conditions:

- ✓ Whenever the current provisions prove to be ineffective in minimizing pollutants in stormwater discharge from the site
- ✓ Whenever there is a change in design, construction or operation that could have an effect on the discharge of pollutants
- ✓ To address issues or deficiencies identified during an inspection by the qualified inspector, the Department or other regulatory authority
- ✓ To identify a new subcontractor that will implement any part of the SWPPP.

If modifications are required to the post-stormwater management practices and the Project is within a regulated, traditional land use control MS4, the owner or operator of the Project must notify the MS4 in writing of any planned amendments or modifications to the post-construction stormwater management practice component of the SWPPP. Unless otherwise notified by the MS4, the owner or operator shall have the SWPPP amendments or modifications reviewed and accepted by the MS4 prior to commencing construction of the post-construction stormwater management practice. The SWPPP PLAN CHANGES, AUTHORIZATION, AND CHANGE CERTIFICATION form (Appendix E) must be filled out and a copy retained onsite during construction.

If modifications are required to the post-stormwater management practices and the Project is not within a Regulated, Traditional Land Use Control MS4, the changes shall be documented in the SWPPP kept onsite.

3.0 SITE ASSESSMENT, EVALUATION AND PLANNING

3.1 Project Location

The Project is located on Saugerties-Woodstock Road (US RT-212), approximately 1,250 feet southwest of the intersection of Saugerties-Woodstock Road and Glasco

Turnpike, Catskills, Ulster County, NY 12477. Access to the site is off Saugerties-Woodstock Road.

See **Appendix C** for a general site location map.

3.2 Pre-Development Conditions

The existing cover present in the proposed area of disturbance is predominately forested. The site is bounded by residential properties.

3.3 Project Type

This project is a new development project and has been designed in accordance with Chapter 4 of the NYSDEC Stormwater Management Design Manual and NYSDEC's General Permit (GP-0-20-001) for construction activities.

3.4 Project Scope

The Project includes the construction of a camping facility. The remainder of the proposed site improvements includes construction of an access road, site lighting, landscaping, stormwater controls, and water and sewer infrastructure. The Project Site represents the area that will be disturbed as a result of the Project.

3.5 Historic Preservation Determination/Endangered Species

The project area is within an area that is shown on the OPRHP website that might possibly contain archeologically sensitive resources and therefore a Phase 1 Archaeological Investigation was completed in August 2007. The Phase 1 concluded that the Project site would have no impacts to archeologically sensitive resources. The SHPO no-effect letter can be found in Appendix G.

According to the NYSDEC Environmental Resource Mapper, the Project is not within an area of any listed, proposed to be listed, threatened or endangered species, or a critical habitat. The NYSDEC environmental resource map is provided in Appendix G.

3.6 Receiving Waters

The Project Site drains to multiple on-site wetland complexes.

3.7 Soils

According to the Natural Resources Conservation Service (NRCS) Web Soil Survey, the area including and surrounding the Project Site is comprised Arnot channery silt loam, Castile gravelly loam, Morris-Tuller-Rock outcrop complex, Oquaga-Arnot Rock Outcrop, Atherton silt loam, and Tunkhannock gravelly loam.

The hydrological soil group (HSG) classifications are 'D' except for Tunkhannock which has a HSG of 'A'.

Test pits and percolations tests were completed by Dente Engineering in August 2017 as part of a pervious proposed development on the property. Terracon completed additional test pits and infiltration tests in November 2022. Results of the tests are provided in Attachment A of the Stormwater Management Report (Appendix B).

4.0 EROSION AND SEDIMENT CONTROL

4.1 Erosion and Sediment Control Practices

Temporary Structural Practices

- ✓ Silt Fence
- ✓ Dust Control
- ✓ Stabilized Construction Entrance

Permanent Structural Controls

- ✓ Grading
- ✓ Rock Outlet Protection

Temporary Stabilization Practices (including vegetative practices)

- ✓ Seed and mulch bare soil areas within 14 days of disturbance unless construction will resume in that area within 21 days.

Permanent Stabilization Practices (including vegetative practices)

- ✓ Seed and mulch all disturbed areas. Slopes that are 3:1 or steeper should receive a Rolled Erosion Control Product (RECP), sodding, and or hydro-seeding a homogenous mixture of wood fiber mulch with tackifying agent.

Refer to Construction Drawings attached in **Appendix C** for detailed information on each practice.

4.2 Erosion and Sediment Control Drawings

Erosion and Sediment Control practices are shown on Construction Drawings included in **Appendix C**.

4.3 Construction Phasing Plan and Sequence of Operations

The project will be phased to disturb less than five acres at a single time.

- ✓ Temporary structural erosion controls will be installed prior to earthwork as per the attached plans.
- ✓ Areas to be undisturbed for more than 14 days will be temporarily stabilized by seeding.

- ✓ Disturbed areas will be reseeded and mulched immediately after final contours are re-established and no more than 14 days after the completion of construction at that site.
- ✓ Temporary erosion control devices will not be removed until the area served is stabilized by the growth of vegetation and the area is certified as being stabilized by the Erosion Control Superintendent.

Construction Activities	Reference Sheet Number	Start → Stop
Sequence must include major items such as, but not limited to, clearing and grubbing, excavation and grading, utility and infrastructure installation and any other activity resulting in soil disturbance. Include installation of erosion and sediment control practices and timing of installation.		
Install silt fence and construction entrance		Week 1
Clear site and rough grade		Weeks 2-5
Begin roadway construction		Weeks 5-12
Begin lodge construction		Weeks 9-completion
Begin tent site construction		Weeks 12-completion
Monitor/maintain erosion and sediment control measures		Ongoing
Remove erosion and sediment control measures upon stabilization of contributing areas		Ongoing

4.4 Erosion and Sediment Control Practice Maintenance

- ✓ Silt fence – maintenance shall be performed as needed and material removed when "bulges" develop in the silt fence.
- ✓ Stabilized construction entrance – entrance shall be maintained in a condition which shall prevent tracking. This may require periodic top dressing with additional aggregate. All sediment tracked onto or spilled on public rights of way shall be removed immediately. When necessary, wheels must be cleaned to remove sediment prior to entrance on public rights of way. When washing is required, it shall be done in an area stabilized with aggregate and wash water shall be directed away from streams or wetlands preferably to a broad grassed area or a stormwater pond.
- ✓ Rock outlet protection – once a riprap outlet has been installed, the maintenance needs are very low. It should be inspected after high flows for evidence of scour beneath the riprap. Repair should be immediate.
- ✓ Replace top-soil, mulch and seed where seeding has been disturbed.

4.5 Erosion and Sediment Control Inspection

- It is recommended that a rain gage be installed at the site.
- A qualified inspector shall conduct an assessment of the site prior to the commencement of construction and certify in an inspection report that the appropriate erosion and sediment controls described in the SWPPP and required by GP-0-20-001 have been adequately installed to ensure overall preparedness of the site for commencement of construction.
- This qualified inspector must 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 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 qualified inspector shall receive 4 hours of training every 3 years.
- The day-to-day erosion control activities on the site will be monitored by the construction manager. The qualified inspector (as defined by the NYS DEC SPDES regulations) and his crews will make ***at least one inspection every seven (7) days*** of erosion control devices, and non-stabilized areas during construction. A maintenance inspection report will be completed by the qualified inspector after each inspection. The report form to be completed by the inspector is attached in **Appendix D.** Reports should be compiled and maintained on-site in the SWPPP 3-ring binder.

- All measures will be maintained in good working order; if repair is necessary, it will be initiated within 24 hours of report. The qualified inspector shall take photographs of any needed repairs and also photograph when the repairs are completed. These photographs will be time and date stamped and attached to the weekly inspection report.
- Seeded and planted areas will be inspected for bare spots, washouts, and healthy growth. If necessary, spot reseeding or sodding will be implemented.
- A trained contractor will be an employee from the contracting company responsible for the implementation of the SWPPP. This person will be onsite when any soil disturbing activities are being conducted. The trained contractor must have received 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 qualified inspector shall receive 4 hours of training every 3 years. This trained contractor cannot conduct the regular SWPPP compliance inspections unless they meet the qualified inspector qualifications.

4.6 Contractor Sequence Form

The operator shall prepare a summary of construction status using the Construction Sequence Form (included in **Appendix E**) once every month. Significant deviations to the sequence and reasons for those deviations (i.e. weather, subcontractor availability, etc.), shall be noted by the contractor. The schedule shall be used to record the dates for initiation of construction, implementation of erosion control measures, stabilization, etc. A copy of this table will be maintained at the construction site and updated.

5.0 POST CONSTRUCTION STORMWATER MANAGEMENT PRACTICES

5.1 Stormwater Management Controls

The proposed Post Construction Stormwater Management controls on this project are listed below:

- ✓ Pocket Ponds
- ✓ Infiltration Basin
- ✓ Porous Asphalt/Porous Gravel Pavement

5.2 Green Infrastructure Practices/Runoff Reduction Techniques

The proposed Green Infrastructure practices or Standard Management practices with Runoff Reduction capabilities on this project are listed below:

- ✓ Bioretention Basin
- ✓ Porous Asphalt/ Porous Gravel Pavement

The provided runoff reduction volume is 0.220 ac-ft, which is greater than the minimum required runoff reduction volume, 0.131 ac-ft.

Soil Restoration

Excessively compacted areas and areas of cut and fill on the Project Site will have soil restoration applied as needed and as specified in the table below. Attached in Appendix H is "Deep Ripping and De-compaction, (DEC 2008)." This methodology should be followed for soil restoration as specified in the table below:

Type of Soil Disturbance	Soil Restoration Requirement		Comments/Examples
Minimal Soil Disturbance	Restoration not permitted		Preservation of Natural Features
Areas where topsoil is stripped only-no change in grade	Restoration not required		Clearing and Grubbing
Areas of cut and fill	HSG A& B	HSG C & D	
	apply 6 inches of topsoil	Aerate* and apply 6 inches of topsoil	
Heavy traffic areas onsite (especially in a zone 5-25 feet around buildings, but not within a 5 foot perimeter around foundation walls)	HSG A& B	HSG C & D	
	Aerate and apply 6 inches of topsoil	Apply full Soil Restoration**	
Areas where Runoff Reduction and/or infiltration practices are applied	Restoration not required, but may be applied to enhance the reduction specified for appropriate practices		Keep construction equipment from crossing these areas. To protect newly installed practice from any ongoing construction activities construct a single phase operation fence area.
*Aeration includes the use of machines such as tractor-drawn implements with coulters making a narrow slit in the soil, a roller with many spikes making indentations in the soil, or prongs which function like a mini-subsoiler			
**Per "Deep Ripping and Decopmpaction, DEC 2008"			

- If compost amendment is required, 2 to 4 inches of screened compost will be incorporated into the soil.
- Prior to application of the deep-ripping and de-compaction, the depth to bedrock or naturally occurring hardpan should be known so that the depth of tillage be adjusted according to those restrictive depths.
- Soils with a slope that exceeds 10% will not have full soil restoration with deep-ripping and de-compaction due to potential for erosion from tilled soil.
- Any soil tillage (deep or shallow) will not be done on soils that are excessively wet, as this will damage the soil.
- Any tillage will not be done within approximately 10' of the drip-line of any existing established trees.

- Any large stones that are unearthed during tillage should be removed from the surface prior to final surface preparation and vegetation establishment.

5.3 Post Construction Stormwater Management Drawings

Post construction stormwater management controls are shown on Construction Drawings included in **Appendix C**.

5.4 Hydraulic and Hydrologic Analysis

The program utilized for quantifying stormwater runoff rates and volumes was ***HydroCAD*** software, produced by Applied Microcomputer Systems of Chocorua, NH. The SCS 24-hour Type II design storms for 1, 10, and 100-year frequency rainfall were analyzed.

- ✓ Hydrologic/hydraulic analysis for all structural components of the stormwater control system for the applicable design storms (see **Appendix B**).
- ✓ Comparison of post-development stormwater runoff conditions with pre-development conditions (see **Appendix B**).
- ✓ Dimensions, material specifications and installation details for each post-construction stormwater control practice (see **Appendix B and C**).

5.5 Comparison of Pre and Post Construction Stormwater Runoff

Stormwater Quantity. These calculations are based on the HydroCAD analysis.

	Pre Development	Post Development
10 year, 24 hour storm (Qp)	272.05 CFS	250.63 CFS
100 year, 24 hour storm (Qf)	537.12 CFS	521.77 CFS

Water Quality Volume Calculations

The following was utilized to determine water quality volume:

$$WQ_V = \frac{(P)\,(R_V)(A)}{12}$$

Where:
WQ_V= Water Quality Volume (acre/feet)
P = 90% Rainfall Event
R_V = 0.05 + 0.009(I) where I is impervious cover in percent
A = Subcatchment area in acres

	Required	Provided
Water Quality Volume (WQv)	0.626 AC FT	0.683 AC FT

6.0 POST CONSTRUCTION STORMWATER MAINTENANCE

6.1 Maintenance to be Performed

Terramor Outdoor Resorts will be responsible for the continuous upkeep and maintenance of all post construction stormwater management facilities.

Post-construction maintenance for this project will consist of regular inspections of permanent stormwater management facilities and steep slopes. These maintenance procedures are essential to assure continual performance of the stormwater management practices on your site. During the inspection and any maintenance activity to the stormwater management practices, the responsible party should fill out an inspection and maintenance log (Appendix E) to record that it was done.

Infiltration Basins

- Clean sediment out of pretreatment portion of the system when it accumulates to a depth of three inches or more
- Clean trash and debris out of system as necessary
- When the infiltration capacity of the basin diminishes substantially (when water ponds for more than 48 hours), the top few inches of sediment shall be removed and be replaced with fresh material. The removed sediments shall be disposed of in an acceptable manner (i.e. landfill).
- Silt and sediment should be removed from the filter bed when the accumulation exceeds one inch.
- Areas devoid of mulch shall be re-mulched on an annual basis

Pocket Ponds

- Should be inspected twice a year and after heavy rain storms.
- Any erosion or scour occurring in the pond, forebay or outlets shall be repaired and revegetated as needed.
- Sediment removal in the forebay shall occur every five to six years or when 50% full.
- Regular litter control to be performed as needed.
- Mow grass when it reaches 4-6 inches in height as needed

Porous Asphalt/ Porous Gravel Pavement

- During the winter, the spreading of sand or other particles for traction cannot be done. If the area is to be plowed of snow, this should be done carefully so as not to upset the permeable pavement.
- Areas that receive high volumes of sediment will require frequent maintenance activities, and areas that experience high volumes of vehicular traffic will clog

more readily due to soil compaction. Typical maintenance activities for permeable paving are summarized in the table below:

Typical Maintenance Activities Associated with Permeable Pavers	
Activity	**Schedule**
Ensure paving area is free of debris	Monthly
Ensure paving dewaters between storms	Monthly and after storms >0.5”
Ensure area is clean of sediments	Monthly
Mow upland and adjacent areas and seed bare areas	As needed
Vacuum sweep frequently to keep surface free of sediments	Typically 3 to 4 times a year
Inspect the surface for deterioration or spalling	Annually

- Generally, routine vacuum sweeping and high-pressure washing (with proper disposal of removed material and wash water) can maintain infiltration rates when clogged or crusted material is removed. Signs can also be posted visibly within a permeable paving area to prevent such activities as resurfacing, the use of abrasives, and to restrict truck parking.

7.0 CONSTRUCTION WASTE

Waste Materials: All waste materials generated during construction will be disposed at a suitable landfill, or transfer station.

Hazardous Waste: The project will not be a generator of hazardous waste and it is not anticipated that any hazardous waste will be generated during construction. If there are any materials generated, a licensed hazardous waste carrier will be contracted to dispose the hazardous material at a suitable disposal site. If hazardous materials are discovered during construction, the work will be stopped until the issue is resolved.

Waste: Portable sanitary facilities will be made available to construction personnel and will be serviced regularly.

8.0 OFFSITE VEHICLE TRACKING

Excavation equipment involved with the construction will remain on the project site and will not regularly egress or ingress the site. Any trucks used to bring in materials or remove materials via municipal paved roads will do so over a stabilized construction entrance. If any off-site vehicle tracking occurs, the contractor will be directed to initiate, street sweeping program in the immediate vicinity of the site.

9.0 TEMPORARY STABILIZATION FOR FROZEN CONDITIONS

The following temporary stabilization measures **MUST** be performed when construction is occurring during winter/frozen ground conditions. The following requirements do not supersede any other requirements of this SWPPP as they apply to non-frozen ground conditions.

- Perimeter erosion control **MUST** still be installed prior to earthwork disturbance as per this SWPPP.
- Any areas that cannot be seeded to turf by October 1 or earlier will receive a temporary seeding. The temporary seeding will consist of winter rye seeded at the rate of 120 pounds per acre (2.5 pounds per 1,000 square feet) or stabilized as per the temporary stabilization for winter construction/frozen conditions.
- Any area of disturbance that will remain inactive for a period of 14 consecutive days **MUST** be mulched. This includes any previously disturbed areas that are covered with snow.
- Mulch **MUST** consist of loose straw applied at the rate of 2 to 3 bales (90 to 100 pounds) per thousand square feet.
- Mulch **MUST** be applied uniformly over the area of bare soil or bare soil that is covered with snow. For the latter condition, mulch **MUST** be applied on top of snow.
- Using a tracked vehicle, mulch **MUST** be crimped into the bare soil/snow. The tracked vehicle **MUST** be driven across the mulched areas in at least two directions to maximize crimping of mulch into the soil/snow.
- If mulch gets blown off an area to a significant degree, the site inspector **WILL** require that an area be re-mulched in accordance with Items 2 through 5 above, and this area **WILL** be included on the inspection checklist for the next inspection.
- If a particular area repeatedly experiences loss of mulch due to wind, then the inspector **WILL** require that an alternative method be used to secure the mulch in place. Such alternatives may include the use of netting, tackifier or other methods deemed appropriate by the inspector.
- During periods when snow is melting and/or surface soils are thawing during daytime hours, mulched areas **MUST** be re-tracked (crimped) as per Item 5 above at least once every seven days, more frequently if directed by the inspector. Additional mulch may be required to obtain complete coverage of an area. Biodegradable erosion control matting may be required on steeper slopes.
- Additional stabilization measures for non-frozen ground conditions described in this SWPPP **WILL** be implemented at the time deemed appropriate by the inspector.

During the winter season, if a site has been stabilized and soil disturbing activities have been suspended for the winter, weekly inspections can be suspended. However, monthly inspections must still be conducted. All normal weekly inspections must resume when soil disturbing activities resume.

10.0 SPILL PREVENTION PRACTICES

Good Housekeeping and Material Management Practices

The following good housekeeping and material management practices will be followed on site during the construction project to reduce the risk of spills or other accidental exposure of materials and substances to stormwater runoff.

- Materials will be brought on site in the minimum quantities required.
- All materials stored on site will be stored in a neat, orderly manner in their appropriate containers, and if possible, under a roof or other enclosure.
- Products will be kept in their original containers with the original manufacturer's label.
- Substances will not be mixed with one another unless recommended by the manufacturer.
- Whenever possible, all of a product will be used up before disposal.
- Manufacturer's recommendations for proper use and disposal will be followed.
- The construction manager or his designee will inspect regularly to ensure proper use and disposal of materials on site.
- The contractor shall prohibit washing of tools, equipment, and machinery in or within 100 feet of any watercourse or wetland.
- All above grade storage tanks are to be protected from vehicle damage by temporary barriers.

Inventory for Pollution Prevention Plan

The materials and substances listed below are expected to be on-site during construction.

- Petroleum for fueling vehicles will be stored in above ground storage tanks. Tanks will either be steel with an enclosure capable of holding 110% of the storage tank volume or of a Con-Store, concrete encased type typically employed by NYSDOT. Hydraulic oil and other oils will be stored in their original containers. Concrete and asphalt will be stored in the original delivery trucks.
- Fertilizer may be stored on site in its original container for a short period of time prior to seeding. Original containers will be safely piled on pallets or similar devices to protect from moisture.

- Paints and other similar materials will be stored in their original containers and all empty containers will be disposed of in accordance with label directions.
- Portable sanitary facilities, which contain chemical disinfectants (deodorants) will be located on-site, with the disinfectants held in the tank of the toilet.

Hazardous Products

These practices are used to reduce the risks associated with hazardous materials.

- Products will be kept in original containers unless they are not re-sealable.
- Original labels and material safety data sheets will be retained; they contain important product information.
- If surplus product must be disposed of, manufacturers' or local and State recommended methods for proper disposal will be followed.

Spill Prevention

The following product specific practices will be followed on site.

Petroleum Products:

- Construction personnel should be made aware that emergency telephone numbers are located in this SWPPP.
- The contractor shall immediately contact NYSDEC in the event of a spill, and shall take all appropriate steps to contain the spill, including construction of a dike around the spill and placing absorbent material over this spill.
- The contractor shall instruct personnel that spillage of fuels, oils, and similar chemicals must be avoided and will have arranged with a qualified spill remediation company to serve the site.
- Fuels, oils, and chemicals will be stored in appropriate and tightly capped containers. Containers shall not be disposed of on the project site.
- Fuels, oils, chemicals, material, equipment, and sanitary facilities will be stored/located away from trees and at least 100 feet from streams, wells, wet areas, and other environmentally sensitive sites.
- Dispose of chemical containers and surplus chemicals off the project site in accordance with label directions.
- Use tight connections and hoses with appropriate nozzles in all operations involving fuels, lubricating materials or chemicals.
- Use funnels when pouring fuels, lubricating materials or chemicals.
- Refueling and cleaning of construction equipment will take place in parking areas to provide rapid response to emergency situations.

- All on-site vehicles will be monitored for leaks and receive regular preventative maintenance to reduce the chance of leakage. Any vehicle leaking fuel or hydraulic fuel will be immediately scheduled for repairs and use will be discontinued until repairs are made.

Fertilizers:

- Fertilizer will be stored in its original containers on pallets with water resistant coverings.
- Proper delivery scheduling will minimize storage time.
- Any damaged containers will be repaired immediately upon discovery and any released fertilizer recovered to the fullest extent practicable.

Paints:

- All containers will be tightly sealed and stored when not required for use.
- Excess paint will not be discharged to the storm water system or wastewater system, but will be properly disposed of according to manufacturers' instructions or State and local regulations.

Concrete Trucks:

- Concrete trucks will be allowed to wash out or discharge surplus concrete or drum wash water only at designated locations on site.

Asphalt Trucks:

- Asphalt trucks shall not discharge surplus asphalt on the site.

Spill Control Practices

In addition to the good housekeeping and material management practices discussed in the previous sections of this plan, the following practices will be followed for spill prevention and cleanup. The construction manager or site superintendent responsible for the day-to-day site operations will be the spill prevention and cleanup coordinator. He will designate at least three other site personnel who will receive spill prevention and cleanup training. These individuals will each become responsible for a particular phase of prevention and cleanup. The names of responsible spill personnel will be posted in the material storage area and in the onsite construction office or trailer.

- Manufacturers' recommended methods for spill cleanup will be clearly posted and site personnel will be made aware of the procedures and the location of the information and cleanup supplies. Any spill in excess or suspected to be in excess of two gallons will be reported to the NYSDEC Regional Spill Response Unit. Notification to the

NYSDEC (1-800-457-7362) must be completed within two hours of the discovery of the spill.

- Materials and equipment necessary for spill cleanup will be kept in the material storage area onsite. Equipment and materials will include but not be limited to absorbent pads, brooms, dust pans, mops, rags, gloves, goggles, activated clay, sand, sawdust, and plastic and metal trash containers specifically for this purpose.
- All spills will be cleaned up immediately after discovery.
- The spill area will be kept well ventilated and personnel will wear appropriate protective clothing to prevent injury from contact with spilled substance.
- Spills of toxic or hazardous material will be reported to the appropriate State or local government agency, regardless of the size

11.0 CERTIFICATIONS

Preparer Certification of Compliance with Federal, State, and Local Regulations

This Stormwater Pollution Prevention Plan was prepared in accordance with the New York State Department of Environmental Conservation SPDES General Permit for Stormwater Discharges from Construction Activities (Permit No. GP-0-20-001), pursuant to Article 17, Titles 7, 8 and Article 70 of the Environmental Conservation Law. This SPDES General Permit implements the Federal Clean Water Act pertaining to stormwater discharges.

Name: Brett Strom Title: Civil Engineer

Signature: _____ Date: _____

Company Name: The LA Group, PC

Owner Pollution Prevention Plan Certification

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who are directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that false statements made herein are punishable as a Class A misdemeanor pursuant to Section 210.45 of the Penal Law.

I understand that GP-0-20-001 requires site inspections be conducted by a qualified professional once every seven (7) days and when approved in writing by the NYSDEC, disturbances of greater than five (5) acres at one time require site inspections two (2) times every seven (7) days. These inspections shall be performed by a qualified professional as defined by the General Permit.

The Owner/Operator will be held financially responsible for any and all fines related to work tasks that are not specified by the Contractor(s)/Subcontractor(s) below.

Name: Ahmed Helmi Title: _____

Signature: _____ Date: _____

Company Name: _____

Contractor and Subcontractor Certification

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

Name _____ Title _____

Signature _____ Date _____

Company Name _____
Address _____
City, State, Zip _____
Phone Number _____

SWPPP Components You Are Responsible For

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____

Name of Trained Individual Responsible for SWPPP Implementation _____ Title _____

Signature of Trained Individual Responsible for SWPPP Implementation _____ Date _____

Contractor and Subcontractor Certification

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

Name _____ Title _____

Signature _____ Date _____

Company Name _____
Address _____
City, State, Zip _____
Phone Number _____

SWPPP Components You Are Responsible For
1. _____
2. _____
3. _____
4. _____
5. _____
6. _____

Name of Trained Individual Responsible for SWPPP Implementation _____ Title _____

Signature of Trained Individual Responsible for SWPPP Implementation _____ Date _____

Contractor and Subcontractor Certification

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

Name _____ Title _____

Signature _____ Date _____

Company Name _____
Address _____
City, State, Zip _____
Phone Number _____

SWPPP Components You Are Responsible For
1. _____
2. _____
3. _____
4. _____
5. _____
6. _____

Name of Trained Individual Responsible for SWPPP Implementation _____ Title _____

Signature of Trained Individual Responsible for SWPPP Implementation _____ Date _____

Contractor and Subcontractor Certification

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

Name _____ Title _____

Signature _____ Date _____

Company Name _____
Address _____
City, State, Zip _____
Phone Number _____

SWPPP Components You Are Responsible For

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____

Name of Trained Individual Responsible for SWPPP Implementation _____ Title _____

Signature of Trained Individual Responsible for SWPPP Implementation _____ Date _____

12.0 DEFINITIONS

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, tree removal, stump removal and/or brush removal. Construction activity does not include routine maintenance that is performed to maintain the original line and grade, hydraulic capacity, or original purpose of a facility.

Construction Phasing Plan - a plan designed to construct particular portions of an individual project at different times. Phasing is often used when a project is very large to limit the disturbance at a single time to 5 acres per phase.

Erosion and Sediment Control Practices – temporary measures installed prior to construction and maintained during construction to temporarily treat any stormwater runoff. Once construction is completed and post-construction stormwater management practices are installed and the site is stabilized, the erosion and sediment control practices are removed from the site.

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 pavement.

Green Infrastructure – in the context of stormwater management, the term green infrastructure includes a wide array of practices at multiple scales to manage and treat stormwater, maintain and restore natural hydrology and ecological function by infiltration, evapotranspiration, capture and reuse of stormwater, and establishment of natural vegetative features. On a regional scale, green infrastructure is the preservation and restoration of natural landscape features, such as forests, floodplains and wetlands, coupled with policies such as infill and redevelopment that reduce overall imperviousness in a watershed or ecoregion. On the local scale green infrastructure consist of site and neighborhood specific practices and runoff reduction techniques. Such practices essentially result in runoff reduction and or establishment of habitat areas with significant utilization of soils, vegetation, and engineered media rather than traditional hardscape collection, conveyance and storage structures. Some examples include green roofs, trees and tree boxes, pervious pavement, rain gardens, vegetated swales, planters, reforestation and protection and enhancement of riparian buffers and floodplains.

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.

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
iv. Which is not part of a Publicly Owned Treatment Works (POTW) as defined at 40 CFR 122.2.

Notice of Intent – a standardized format notification sent to the NYSDEC to inform them of the proposed activity to be sent after the SWPPP has been completed.

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.

Post-Construction Stormwater Management Practices – permanent devices constructed or installed onsite to treat stormwater from a site when construction is completed.

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.

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 ot practice in the State of New York.

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).

Sequence of Operations – the individual steps and their specific order which are undertaken in order to construct a project or a given phase of a project from beginning to end. (i.e. clearing, grading, foundation work, landscaping, etc.)

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

Stormwater Pollution Prevention Plan (SWPPP) - a report that is compiled providing detailed information about the proposed activity and the specifics to how the stormwater will be managed during construction and after construction is completed.

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 or underground 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 800-941.

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).

Trained Contractor – means an employee from a contracting (construction) company responsible for the day to day implementation of the SWPPP. The trained contractor must have received 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 qualified inspector shall receive 4 hours of training every 3 years.

It can also mean an employee from the contracting (construction) company 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 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.

G:\Proj-2021\2021096_Terramor_Catskills\2021096Enviro\02SWPPP\2021096_SWPPP.docx

Appendix A

Notice of Intent (NOI) &
MS4 SWPPP Acceptance Form

NOI for coverage under Stormwater General Permit for Construction Activity

version 1.35

(Submission #: HPJ-36DK-GQ59N, version 1)

Details

Originally Started By	Brett Strom
Alternate Identifier	Terramor Catskills
Submission ID	HPJ-36DK-GQ59N
Submission Reason	New
Status	Draft

Form Input

Owner/Operator Information

Owner/Operator Name (Company/Private Owner/Municipality/Agency/Institution, etc.)
Terramor Outdoor Resorts

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

Owner/Operator Contact Person First Name
Ahmad

Owner/Operator Mailing Address
550N 31st Street

City
Billings

State
MT

Zip
59101

Phone
2026897771

Email
ahelmi@koa.net

Federal Tax ID
NONE PROVIDED

Project Location

Project/Site Name
Terramor Catskills

Street Address (Not P.O. Box)
Saugerties Woodstock Road

Side of Street
West

City/Town/Village (THAT ISSUES BUILDING PERMIT)
Saugerties

State
NY

Zip
12477

DEC Region
3

County
ULSTER

Name of Nearest Cross Street
Glasco Turnpike

Distance to Nearest Cross Street (Feet)
1250

Project In Relation to Cross Street
South

Tax Map Numbers Section-Block-Parcel
27.2-8-28, 27.2-8-32.110

Tax Map Numbers
NONE PROVIDED

1. Coordinates

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

Navigate to your location and click on the map to get the X,Y coordinates
42.04975410728642,-74.07447419814368

Project Details

2. What is the nature of this project?
New Construction

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

Pre-Development Existing Landuse
Forest

Post-Development Future Land Use
Commercial

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

---

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

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

Total Site Area (acres)
77.51

Total Area to be Disturbed (acres)
23.7

Existing Impervious Area to be Disturbed (acres)
0

Future Impervious Area Within Disturbed Area (acres)
4.9

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

---

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

A (%)
2.6

B (%)
0

C (%)
0

D (%)
97.3

7. Is this a phased project?
No

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

Start Date
4/1/2023

End Date
6/1/2024

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

9a. Type of waterbody identified in question 9?
Wetland/State Jurisdiction On Site (Answer 9b)

Other Waterbody Type Off Site Description
NONE PROVIDED

9b. If "wetland" was selected in 9A, how was the wetland identified?
Delineated by Consultant

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

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

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

If No, skip question 13.

13. Does this construction activity disturb land with no existing impervious cover and where the Soil Slope Phase is identified as D (provided the map unit name is inclusive of slopes greater than 25%), E or F on the USDA Soil Survey?
NONE PROVIDED

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

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

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

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

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

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

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

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

Required SWPPP Components

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

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

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

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

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

SWPPP Preparer
The LA Group

Contact Name (Last, Space, First)
Strom, Brett

Mailing Address
40 Long Alley

City
Saratoga Springs

State
New York

Zip
12866

Phone
5185878100

Email
bstrom@thelagroup.com

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

1) Click on the link below to download a blank certification form
2) The certified SWPPP preparer should sign this form
3) Scan the signed form
4) Upload the scanned document
Download SWPPP Preparer Certification Form

Please upload the SWPPP Preparer Certification
NONE PROVIDED
Comment
NONE PROVIDED

Erosion & Sediment Control Criteria

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

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

Temporary Structural
Check Dams
Silt Fence
Stabilized Construction Entrance
Storm Drain Inlet Protection

Biotechnical
None

Vegetative Measures
Mulching
Seeding

Permanent Structural
Rock Outlet Protection
Riprap Slope Protection

Other
NONE PROVIDED

Post-Construction Criteria

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

27. Identify all site planning practices that were used to prepare the final site plan/layout for the project.
Locating Development in Less Sensitive Areas

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

28. Provide the total Water Quality Volume (WQv) required for this project (based on final site plan/layout). (Acre-feet)
0.626

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

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

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

30. Indicate the Total RRv provided by the RR techniques (Area/Volume Reduction) and Standard SMPs with RRv capacity identified in question 29. (acre-feet)
0.220

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

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

32. Provide the Minimum RRv required based on HSG. [Minimum RRv Required = (P) (0.95) (Ai) / 12, Ai=(s) (Aic)] (acre-feet)
0.131

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

If Yes, go to question 33.
Note: Use the space provided in question #39 to summarize the specific site limitations and justification for not reducing 100% of WQv required (#28). A detailed evaluation of the specific site limitations and justification for not reducing 100% of the WQv required (#28) must also be included in the SWPPP.

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

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

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

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

33a. Indicate the Total WQv provided (i.e. WQv treated) by the SMPs identified in question #33 and Standard SMPs with RRv Capacity identified in question #29. (acre-feet)
0.463

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

34. Provide the sum of the Total RRv provided (#30) and the WQv provided (#33a).
0.683

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

If Yes, go to question 36.

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

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

CPv Required (acre-feet)
0.052

CPv Provided (acre-feet)
0.220

36a. The need to provide channel protection has been waived because:
NONE PROVIDED

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

Overbank Flood Control Criteria (Qp)

Pre-Development (CFS)
272.05

Post-Development (CFS)
250.63

Total Extreme Flood Control Criteria (Qf)

Pre-Development (CFS)
537.12

Post-Development (CFS)
521.77

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

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

If Yes, Identify the entity responsible for the long term Operation and Maintenance
Terramor Outdoor Resorts

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.
100% of the WQv was not reduced due to poor soils and shallow depth to groundwater.

Post-Construction SMP Identification

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

RR Techniques (Area Reduction)

Round to the nearest tenth

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

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

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

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

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

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

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

RR Techniques (Volume Reduction)

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

Total Contributing Impervious Acres for Vegetated Swale (RR-5)
NONE PROVIDED

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

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

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

Total Contributing Impervious Acres for Porous Pavement (RR-9)
0.5

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

Standard SMPs with RRv Capacity

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

Total Contributing Impervious Acres for Infiltration Basin (I-2)
0.9

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

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

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

Total Contributing Impervious Acres for Dry Swale (O-1)
NONE PROVIDED

Standard SMPs

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

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

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

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

Total Contributing Impervious Acres for Pocket Pond (P-5)
2.5

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

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

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

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

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

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

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

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

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

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

Total Contributing Impervious Area for Hydrodynamic
NONE PROVIDED

Total Contributing Impervious Area for Wet Vault
NONE PROVIDED

Total Contributing Impervious Area for Media Filter
NONE PROVIDED

"Other" Alternative SMP?
NONE PROVIDED

Total Contributing Impervious Area for "Other"
NONE PROVIDED

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

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

Manufacturer of Alternative SMP
NONE PROVIDED

Name of Alternative SMP
NONE PROVIDED

Other Permits

40. Identify other DEC permits, existing and new, that are required for this project/facility.
Freshwater Wetlands/Article 24

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

If Other, then identify
NONE PROVIDED

41. Does this project require a US Army Corps of Engineers Wetland Permit?
Yes

If "Yes," then indicate Size of Impact, in acres, to the nearest tenth
0.1

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

MS4 SWPPP Acceptance

43. Is this project subject to the requirements of a regulated, traditional land use control MS4?
Yes - Please attach the MS4 Acceptance form below

If No, skip question 44

44. Has the "MS4 SWPPP Acceptance" form been signed by the principal executive officer or ranking elected official and submitted along with this NOI?
Yes

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

MS4 Acceptance Form Upload
NONE PROVIDED
Comment
NONE PROVIDED

Owner/Operator Certification

Owner/Operator Certification Form Download
Download the certification form by clicking the link below. Complete, sign, scan, and upload the form.
Owner/Operator Certification Form (PDF, 45KB)

Upload Owner/Operator Certification Form
NONE PROVIDED
Comment
NONE PROVIDED

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

MS4 Stormwater Pollution Prevention Plan (SWPPP) Acceptance Form

for

Construction Activities Seeking Authorization Under SPDES General Permit

*(NOTE: Attach Completed Form to Notice Of Intent and Submit to Address Above)

I. Project Owner/Operator Information	
1. Owner/Operator Name:	Terramor Outdoor Resorts
2. Contact Person:	Ahmed Helmi
3. Street Address:	550N 31st Street
4. City/State/Zip:	Billings, MT 59101
II. Project Site Information	
5. Project/Site Name:	Terramor Catskills
6. Street Address:	Saugerties-Woodstock Road (US RT-212)
7. City/State/Zip:	Saugerties, NY 12498
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:	Town of Saugerties
12. MS4 SPDES Permit Identification Number: NYR20A	426
13. Contact Person:	Fred Costello
14. Street Address:	4 High Street
15. City/State/Zip:	Saugerties, NY 12477
16. Telephone Number:	(845) 246-2800

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: Fred Costello

Title/Position: Town Supervisor

Signature:

Date:

VI. Additional Information

(NYS DEC - MS4 SWPPP Acceptance Form - January 2015)

Appendix B

Stormwater Management Report
Hydro CAD

The LA GROUP
Landscape Architecture & Engineering P.C.

40 Long Alley
Saratoga Springs
NY 12866

p: 518-587-8100
f: 518-587-0180
www.thelagroup.com

Stormwater Management Report

for:

Terramor Catskills
at
Catskills-Woodstock Road
Catskills, NY 12477
Ulster County

Owner/Operator(s):

Terramor Outdoor Resort
550N 31st Street
Billings, MT 59101
Contact: Ahmed Helmi
(202) 689-7771

SWM Report Contact(s):

The LA Group, PC
40 Long Alley
Saratoga Springs, NY 12866
1-518-587-8100
Project No. 2020021

Preparation Date:
July 1, 2022
Revised: 12/2/2022

Table of Contents

Attachment

A Soil Investigations
Soil Survey
Natural Resource Map

B Existing Conditions Watershed Map and HydroCAD Calculations

C Proposed Conditions Watershed Map, HydroCAD Calculations

D Storm Data

1.0 INTRODUCTION

The following is a Stormwater Management Report (SWM Report) developed for the Operator, Terramor Outdoor Resort, Terramor Catskills, herein referred to as the "Project." It is prepared in accordance with the New York State Department of Environmental Conservation (NYSDEC) Stormwater Management Design Manual, dated January 2015.

The Project has been designed in accordance with Chapter 4 of the NYSDEC Stormwater Management Design Manual (SWMDM), and NYSDEC's General Permit GP-0-20-001 for construction activities. Stormwater calculations were performed utilizing widely accepted engineering methodologies, including TR-55, and the stormwater modeling computer program HydroCAD (version 10.00) produced by HydroCAD Software Solutions, LLC.

2.0 PROJECT DESCRIPTION

2.1 Site Location

The Project is located off Saugerties-Woodstock Road (NYS RT-212), Ulster County, NY 12477. Access to the site is off Saugerties-Woodstock Road.

2.2 Project Description

The Project includes the construction of a camping facility. The remainder of the proposed site improvements includes construction of a main access road, site lighting, landscaping, stormwater controls, and water and sewer infrastructure. The Project Site represents the area that will be disturbed as a result of the Project. The project is considered new development project per Chapter 4 of the SWMDM. The Project Site represents the area that will be disturbed as a result of the Project.

2.3 Soil Conditions/Soil Testing

According to the Natural Resources Conservation Service (NRCS) Web Soil Survey, the area including and surrounding the Project Site is comprised Arnot channery silt loam, Castile gravelly loam, Morris-Tuller-Rock outcrop complex, Oquaga-Arnot Rock Outcrop, Atherton silt loam, and Tunkhannock gravelly loam. The hydrological soil group (HSG) classifications are 'D' except for Tunkhannock which has a HSG of 'A'.

Test pits and percolations tests were completed by Dente Engineering in August 2017 as part of a pervious proposed development on the property. Additional test pits and infiltration tests were

completed by Terracon in October 2022. Results of the tests are provided in Attachment A of the Stormwater Management Report (Appendix B).

2.4 Curve Numbers and Rainfall Data

The surface cover for the project area is grass, meadow, woods, porous gravel and an impervious driveway/buildings. The curve numbers utilized in the modeling were assigned based on cover type and HSG soil classification.

The porous gravel CN number was calculated based on the following formula (TR-55: Eq. 2-4):

$$CN = \frac{1000}{S+10} \quad \text{where S is in inches}$$

The total depth of the porous gravel is 7" with 40% voids (S=2.8) resulting in a CN of 78.

The design storms used for the pre-development versus post-development comparison were the 1, 10, and 100-year, 24-hour duration, SCS Type II events. The rainfall amounts for these storms are 2.72, 5.35, and 8.48 inches, respectively.

3.0 EXISTING CONDITIONS

The Project area existing condition, for which this stormwater management plan is based, consists of undeveloped woodlands. Under the watershed's existing condition, runoff from the site flows to existing wetlands onsite (Analysis Points 1-4). Analysis Points 1-4 were utilized in comparing all pre- versus post-runoff conditions. Refer to drawing "W-1 Existing Conditions Watershed Map," located in Attachment B for more information.

Table 3-1 below provides a summary of the existing conditions peak discharge rates for the Project's watershed.

Table 3-1
Existing Conditions Peak Discharge Rates

Analysis Point	AP-1	AP-2	AP-3	AP-4
Design Storm	(cfs)	(cfs)	(cfs)	(cfs)
10-Year	73.14	133.73	46.08	18.83
100-Year	143.37	268.00	89.39	36.36

Refer to Attachment B for more information on the existing conditions watershed modeling.

4.0 PROPOSED CONDITIONS

Under the watershed's Proposed Condition, stormwater from the Project will continue to discharge to the same points as in the Existing Condition (Analysis Points 1-4). The total watershed has generally remained unchanged, as is shown on the drawing "W-2 Proposed Conditions Watershed Map" contained in Attachment C. To meet NYSDEC requirements (see Section 5.0 NYSDEC Design Criteria of this report) pocket ponds, porous asphalt and infiltration basins have been incorporated into the stormwater management design to mitigate the quality and quantity of stormwater runoff discharged from the Project Site.

Table 4-1 below provides a summary of the existing conditions versus proposed conditions peak discharge rates for the Project's watershed.

Table 4-1
Existing Conditions Versus Proposed Conditions Peak Discharge Rates

Analysis Point	AP-1		AP-2		AP-3		AP-4	
	Existing	Proposed	Existing	Proposed	Existing	Proposed	Existing	Proposed
Design Storm	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)
10-Year	73.41	70.06	133.73	117.41	46.08	44.34	18.83	18.83
100-Year	143.37	139.27	268.00	261.22	89.39	84.92	36.36	36.36

Refer to Attachment C for more information on the proposed conditions watershed modeling.

5.0 NYSDEC DESIGN CRITERIA

The New York State Stormwater Management Design Manual, dated January 2015 (The Manual) has been utilized to develop the stormwater management plan. The Manual includes a five-step process that involves site planning and stormwater management practice selection. The five steps include;

- Site planning to preserve natural features and reduce impervious cover,
- Calculation of the Water Quality Volume (WQv) for the Site,
- Incorporation of green infrastructure techniques and standard SMPs with Runoff Reduction Volume (RRv) capacity,
- Use of standard SMPs where applicable, to treat the portion of WQv not addressed by green infrastructure techniques and standard SMPs with RRv capacity, and
- Design of volume and peak rate control (where required)

The approach of the stormwater management plan was to address the stormwater requirements separately. The five steps were reduced to Site Planning to Preserve Natural Features, Water

Quality Volume, Runoff Reduction Volume, Channel Protection Volume, and Overbank Flood and Extreme Storm Attenuation, as discussed in the following sections.

Attachment D of this report contains detailed calculations for determining and summarizing the required and provided volumes for Water Quality and Runoff Reduction. In general, the required design criteria (WQv and RRv) were calculated for all areas where site disturbance or green infrastructure techniques are proposed.

5.1 Site Planning to Preserve Natural Features

Within Chapter 3 of The Manual, Table 3.1 Green Infrastructure Planning General Categories and Specific Practices includes a list of planning practices utilized in the planning and design of a project. There are two categories, Preservation of Natural Resources and Reduction of Imperious Cover.

Preservation of Natural Resources includes:

- Preservation of Undisturbed Areas
- Preservation of Buffers
- Reduction of Clearing and Grading
- Locating Development in Less Sensitive Areas
- Open Space Design
- Soil Restoration

Reduction of Impervious Cover includes:

- Roadway Reduction
- Sidewalk Reduction
- Driveway Reduction
- Cul-de-sac Reduction
- Building Footprint Reduction
- Parking Reduction

A Natural Resource Map for Green Infrastructure Planning has been developed which indicates natural resource areas and critical environmental areas to be protected (where feasible). As required in Section 3.6 of The Manual, the map includes (where applicable):

- Jurisdictional Wetlands
    - There are Army Corp jurisdictional wetlands located on the project site. The project has been designed to limit wetland impact
- Waterways
    - No waterways are impacted by the Project.

- Wetland Adjacent Area
  - There are no NYSDEC jurisdictional wetlands and associated buffers located on the project site.
- Floodplains
  - The project is not within the flood plain.
- Forest, vegetative cover
  - Project is designed to maintain as much of the woods as feasible.
- Topography/Steep slopes
  - There are steep slopes located throughout the project. The project has been designed to minimize development of these areas.
- Existing soils, including hydrologic soil groups and soil erodibility
  - See Section 2.3 of this Report.
- Drainage Patterns
  - See Section 3.0 of this Report.
- Bedrock/Significant geological features
  - See Section 2.3 of this Report.

The Natural Resource Plan indicates the areas to be avoided and depicts the area most suitable for development.

5.2 Water Quality Volume (WQv)

The Water Quality Volume (WQv) requirement is designed to improve water quality sizing to capture and treat 90% of the average annual stormwater runoff volumes. The WQv is directly related to the amount of impervious cover created at a site. The following equation is used to determine the water quality storage volume.

$$WQv = \frac{(P)(Rv)(A)}{12}$$

Where:

WQv = Water quality volume (acre/feet)
P = 90% Rainfall Event (1.60” for Saugerties)
Rv = 0.05 + 0.009(I) where I is percent impervious cover
A = Site area in acres

The required WQv will be provided by pocket ponds, porous asphalt and a bioretention basin designed in accordance with the SWMDM. The total required WQv for the project is 0.626 ac-ft. Refer to Table 5-1 for a summary of the provided water quality volumes for the Project.

Table 5-1 Water Quality Volume (WQv) Summary		
SMP	**Type**	**Provided**
		(ac-ft)
SMP1	Pocket Pond	0.033
SMP2	Infiltration Basin	0.066
SMP3	Porous Pavement	0.064
SMP4	Pocket Pond	0.203
SMP5	Pocket Pond	0.177
SMP6	Pocket Pond	0.027
SMP7	Infiltration Basin	0.090
TOTAL		**0.683**

Refer to Attachment D for detailed WQv calculations.

5.3 Runoff Reduction Volume (RRv)

Section 4.3 of the Manual states, "Runoff reduction shall be achieved by infiltration, groundwater recharge, reuse, recycle, evaporation/evapotranspiration of 100 percent of the post-development water quality volumes to replicate pre-development hydrology by maintaining pre-construction infiltration, peak runoff flow, discharge volume, as well as minimizing concentrated flow by using runoff control techniques to provide treatment in a distributed manner before runoff reaches the collection system."

The Project does not achieve 100% runoff reduction of the on-site WQv of the project due to poor soils and shallow depths to groundwater. Utilizing green infrastructure and stormwater management practices with RRv capabilities throughout the project an RRv of 0.220 acre-feet is provided which is greater than the minimum required RRv of 0.131 acre-feet. See Table 5-2 for a summary of the provided runoff reduction volumes for each green infrastructure practice.

Table 5-2 Runoff Reduction Volume (RRv) Summary	
SMP	**Provided**
	(unit)
5.3.1 Conservation of Natural Areas	-
5.3.2 Sheetflow to Riparian Buffers/Filter Strips	-
5.3.3 Vegetated Open Swales	-

5.3.4 Tree Planting/Tree Box	-
5.3.5 Disconnection of Rooftop Runoff	-
5.3.6 Stream Daylighting	-
5.3.7 Rain Garden	-
5.3.8 Green Roof	-
5.3.9 Stormwater Planters	-
5.3.10 Rain Tanks/Cisterns	-
5.3.11 Porous Pavement	0.064
Infiltration Basin (SMP-2)	0.066
Infiltration Basin (SMP-7)	0.090
TOTAL	**0.220 (ac-ft)**

Refer to Attachment D for detailed RRv calculations.

5.4 Channel Protection Volume (CPv)

The channel protection volume is reduced using green infrastructure practices (infiltration basins, porous pavement).

5.5 Overbank Flood (Qp) and Extreme Flood (Qf) Attenuation

The primary purpose of the Overbank Flood (Qp) control sizing criterion is to prevent an increase in the frequency and magnitude of out-of-bank flooding generated by urban development. It requires storage and attenuation of the 10-year, 24-hour storm to ensure post-development peak discharge rates do not exceed the pre-development condition.

The intent of the Extreme Flood (Qf) criteria is to (a) prevent the increased risk of flood damage from large storm events, (b) maintain the boundaries of the pre-development 100-year floodplain, and (c) protect the physical integrity of stormwater management practices. It requires storage and attenuation of the 100-year, 24-hour storm to ensure post-development peak discharge rates do not exceed the pre-development condition.

During the 10-year and 100-year 24-hour storm the post-development peak discharge rates do not exceed the pre-development rates. See Table 4-1 of this Report for detailed comparison of pre- and post-development peak rates.

6.0 PROPOSED STORMWATER FACILITIES

The Project is proposing the installation of pocket ponds, porous pavement and infiltration basins throughout the site to treat runoff for the asphalt roads and parking lots. The walking paths, tent sites will not be impervious surfaces and therefore do not require stormwater treatment.

6.1 Pretreatment

Pretreatment of runoff contributing to all stormwater management practices will be provided through the installation of sediment forebays.

6.2 Treatment

Treatment for runoff entering the pocket ponds will be treated within the permanent pool of the ponds. Treatment in the infiltration basins is provided by capturing and infiltrating the entire WQv though the underlying soils.

7.0 POST-CONSTRUCTION MAINTENANCE REQUIREMENTS

Terramor Outdoor Resorts will be responsible for the continuous upkeep and maintenance of all stormwater management facilities. Maintenance includes, but is not limited to, cleaning of sediment from drainage inlet sumps, removal of sediment from SMPs, cleaning conveyance piping and channels of obstructions, inspection and repair as required of any outlet control mechanisms, and repairing any other detriments in the design that is resulting in the facilities to not function as intended in the design.

8.0 REFERENCES

1. Urban Hydrology for Small Watersheds. Published by the U.S. Soil Conservation Service, Washington, D.C., June 1986.
2. HydroCAD 10.00 Computer Program, by HydroCAD Software Solutions, LLC.
3. NYSDEC Stormwater Management Design Manual. Published by the New York State Department of Environmental Conservation, Updated January 2015.

G:\Proj-2021\2021096_Terramor_Catskills\2021096Enviro\02SWPPP\2021096_SWM Report.doc

Attachment A

Soil Investigations
Soil Survey
Natural Resource Map

INFILTRATION TEST RESULTS (2022)

PROJECT: Terramor Catskills — **PROJECT NO.** JB225043

PROJECT LOCATION: Saugerties, New York — **TESTER:** JCH

Test Location	Test Depth (feet)	Trial No.	Water Drop (inches)	Elapsed Time (hours)	Infiltration Rate (inches/hour)
INF-1	5.5	1	8	1.0	8
		2	8	1.0	8
		3	8	1.0	8
		4	8	1.0	8
		NOTE: Rate of final trial: 8 in/hr. Average of four trials: 8 in/hr.			
INF-2	5.5	1	24	0.32	>24
		2	24	0.23	>24
		3	24	0.22	>24
		4	24	0.32	>24
		NOTE: Rate of final trial: >24 in/hr. Average of four trials: >24 in/hr.			
INF-10	6.0	1	24	0.08	>24
		2	24	0.12	>24
		3	24	0.13	>24
		4	24	0.15	>24
		NOTE: Rate of final trial: >24 in/hr. Average of four trials: >24 in/hr.			

DEEP TEST RESULTS - 02/16/06, 02/22/06, 06/06/06, 07/11/06 AND 01/17/07, 03/29/07, 06/13/07

LOT NO.	TEST PIT (TP) NO.	TOTAL DEPTH	ROCK DEPTH	WATER DEPTH	MOTTLING DEPTH	SOIL DEPTHS & DESCRIPTIONS
1	TP1-1	52"	52"	N/A	35"	0" - 6" TOPSOIL 6" - 34" CLAY LOAM 34" - 52" SANDY GRAVELLY LOAM
	TP2-1	48"	41"	N/A	33"	0" - 6" TOPSOIL 6" - 41" CLAY LOAM
2	TP1-2	34"	34"	N/A	N/A	0" - 4" TOPSOIL 4" - 34" CLAY LOAM
	TP2-2	24"	24"	N/A	N/A	0" - 4" TOPSOIL 4" - 24" CLAY LOAM
3	TP1-3	42"	42"	N/A	N/A	0" - 6" TOPSOIL 6" - 42" LOAM
	TP2-3	33"	33"	N/A	N/A	0" - 6" TOPSOIL 6" - 33" CLAY LOAM
	TP1-4	31"	31"	N/A	N/A	0" - 3" TOPSOIL 3" - 31" CLAY LOAM
	TP2-4	24"	24"	N/A	N/A	0" - 6" TOPSOIL 6" - 29" CLAY LOAM
	TP3-4	26"	26"	N/A	N/A	0" - 4" TOPSOIL 4" - 26" GRAVELLY SILT LOAM W/FRACTURED SHALE
	TP4-4	18"	18"	N/A	N/A	0" - 4" TOPSOIL 4" - 18" GRAVELLY SILT LOAM W/FRACTURED SHALE
	TP5-4	12"	12"	N/A	N/A	0" - 4" TOPSOIL 4" - 12" SILT LOAM W/FRACTURED SHALE
	TP6-4	12"	12"	N/A	N/A	0" - 4" TOPSOIL 4" - 12" SILT LOAM W/FRACTURED SHALE
	TP1-5	28"	28"	26"	N/A	0" - 8" TOPSOIL 8" - 28" CLAY LOAM
	TP2-5	28"	28"	N/A	N/A	0" - 10" TOPSOIL 10" - 28" CLAY LOAM
6	TP1-6	38"	38"	N/A	N/A	0" - 8" TOPSOIL 8" - 38" CLAY LOAM
	TP2-6	40"	40"	N/A	N/A	0" - 6" TOPSOIL 6" - 40" CLAY LOAM
	TP3-6	14"	14"	N/A	N/A	0" - 4" TOPSOIL 4" - 14" SILT LOAM
	TP4-6	10"	10"	N/A	N/A	0" - 4" TOPSOIL 4" - 10" SILT LOAM W/FRACTURED SHALE
	TP5-6	20"	20"	N/A	N/A	0" - 4" TOPSOIL 4" - 20" SILT LOAM
	TP6-6	16"	16"	N/A	N/A	0" - 4" TOPSOIL 4" - 16" SILT LOAM
	TP7-6	48"	24"	N/A	N/A	0" - 10" TOPSOIL 10" - 24" CLAY LOAM 24" - 48" FRACTURED SHALE
7	TP1-7	42"	42"	N/A	N/A	0" - 3" TOPSOIL 3" - 42" SANDY, CLAY LOAM
	TP2-7	30"	30"	N/A	N/A	0" - 3" TOPSOIL 3" - 30" SANDY, CLAY LOAM
	TP3-7	34"	34"	N/A	N/A	0" - 6" TOPSOIL 6" - 34" CLAY LOAM
8	TP1-8	32"	32"	N/A	N/A	0" - 8" TOPSOIL 8" - 32" CLAY LOAM
	TP2-8	28"	28"	N/A	N/A	0" - 4" TOPSOIL 4" - 28" CLAY LOAM
	TP3-8	42"	42"	N/A	N/A	0" - 6" TOPSOIL 6" - 42" CLAY LOAM
9	TP1-9	46"	46"	N/A	N/A	0" - 6" TOPSOIL 6" - 46" CLAY LOAM
	TP2-9	26"	26"	N/A	N/A	0" - 4" TOPSOIL 4" - 26" CLAY LOAM
10	TP1-10	28"	28"	N/A	N/A	0" - 6" TOPSOIL 6" - 28" CLAY LOAM
	TP2-10	30"	30"	N/A	N/A	0" - 3" TOPSOIL 3" - 30" CLAY LOAM
11	TP1-11	33"	33"	N/A	N/A	0" - 6" TOPSOIL 6" - 33" ROCKY CLAY LOAM
	TP2-11	34"	34"	N/A	N/A	0" - 8" TOPSOIL 8" - 34" GRITTY CLAY LOAM
	TP3-11	32"	32"	N/A	N/A	0" - 8" TOPSOIL 8" - 32" SANDY LOAM
12	TP1-12	54"	N/A	N/A	N/A	0" - 8" TOPSOIL 8" - 54" SANDY LOAM
	TP2-12	48"	N/A	N/A	N/A	0" - 4" TOPSOIL 4" - 48" SANDY LOAM
	TP3-12	54"	N/A	N/A	N/A	0" - 4" TOPSOIL 4" - 54" SANDY LOAM
	TP4-12	66"	N/A	N/A	N/A	0" - 4" TOPSOIL 4" - 66" SANDY LOAM
13	TP1-13	56"	N/A	40"	N/A	0" - 6" TOPSOIL 6" - 56" SANDY, GRAVELLY LOAM.
	TP2-13	56"	N/A	56"	N/A	0" - 8" TOPSOIL 8" - 56" SANDY, GRAVELLY LOAM
	TP3-13	36"	N/A	N/A	N/A	0" - 12" TOPSOIL 12" - 36" R.O.B.
	TP4-13	48"	N/A	48"	42"	0" - 12" TOPSOIL 12" - 41" CLAY LOAM

DEEP TEST RESULTS - 02/16/06, 02/22/06, 06/06/06, 07/11/06 AND 01/17/07, 03/29/07, 06/13/07

LOT NO.	TEST PIT (TP) NO.	TOTAL DEPTH	ROCK DEPTH	WATER DEPTH	MOTTLING DEPTH	SOIL DEPTHS & DESCRIPTIONS
14	TP1-14	24"	24"	N/A	N/A	0" - 12" TOPSOIL 12" - 24" CLAY LOAM
	TP2-14	28"	28"	N/A	N/A	0" - 28" CLAY LOAM
	TP3-14	30"	30"	24"	N/A	0" - 6" TOPSOIL 6" - 30" CLAY LOAM
15	TP1-15	36"	N/A	36"	24"	0" - 6" TOPSOIL 6" - 24" CLAY LOAM 24" - 36" MOTTLED CLAY
	TP2-15	24"	24"	N/A	N/A	0" - 6" TOPSOIL 6" - 24" CLAY LOAM
	TP3-15	30"	30"	24"	N/A	0" - 6" TOPSOIL 6" - 30" CLAY LOAM
16	TP1-16	30"	30"	N/A	N/A	0" - 6" TOPSOIL 6" - 30" CLAY LOAM
	TP2-16	24"	24"	N/A	N/A	0" - 3" TOPSOIL 3" - 24" CLAY LOAM
17	TP1-17	24"	24"	N/A	N/A	0" - 3" TOPSOIL 3" - 24" CLAY LOAM
	TP2-17	24"	24"	N/A	N/A	0" - 4" TOPSOIL 4" - 24" CLAY LOAM
18	TP1-18	30"	30"	N/A	N/A	0" - 4" TOPSOIL 4" - 30" GRITTY CLAY LOAM
	TP2-18	24"	24"	N/A	N/A	0" - 4" TOPSOIL 4" - 24" CLAY LOAM
19	TP1-19	24"	24"	N/A	N/A	0" - 4" TOPSOIL 4" - 24" CLAY LOAM
	TP2-19	35"	35"	N/A	N/A	0" - 5" TOPSOIL 5" - 35" CLAY LOAM
	TP3-19	24"	N/A	36"	24"	0" - 6" TOPSOIL 6" - 24" CLAY LOAM 24" - 36" MOTTLED CLAY
	TP4-19	24"	24"	N/A	N/A	0" - 6" TOPSOIL 6" - 24" CLAY LOAM
20	TP1-20	48"	48"	36"	24"	0" - 8" TOPSOIL 8" - 36" CLAY LOAM
	TP2-20	38"	38"	N/A	N/A	0" - 8" TOPSOIL 8" - 38" CLAY LOAM
21	TP1-21	48"	48"	N/A	N/A	0" - 12" TOPSOIL 12" - 48" GRITTY, CLAY LOAM
	TP2-21	30"	30"	N/A	N/A	0" - 12" TOPSOIL 12" - 30" LOAM
	TP3-21	42"	42"	N/A	N/A	0" - 12" TOPSOIL 12" - 42" GRITTY CLAY LOAM
22	TP1-22	34"	34"	N/A	N/A	0" - 12" TOPSOIL 12" - 42" GRITTY CLAY LOAM
	TP2-22	72"	72"	N/A	33"	0" - 12" TOPSOIL 12" - 33" LOAM 33" - 72" MOTTLED CLAY LOAM
	TP3-22	72"	72"	N/A	33"	0" - 12" TOPSOIL 12" - 72" LOAM
23	TP1-23	27"	24"*	N/A	N/A	0" - 12" TOPSOIL 12" - 27" CLAY LOAM W/PEBBLES * TO HARDPAN
	TP2-23	30"	30"	N/A	N/A	0" - 12" TOPSOIL 12" - 30" CLAY LOAM
	TP3-23	24"	24"	N/A	N/A	0" - 6" TOPSOIL 6" - 24" BONEY, SILT LOAM
	TP4-23	32"	32"	N/A	N/A	0" - 6" TOPSOIL 6" - 32" SILT LOAM
24	TP1-24	32"	32"	26"	N/A	0" - 12" TOPSOIL 12" - 32" CLAY LOAM
	TP2-24	48"	48"	26"	N/A	0" - 12" TOPSOIL 12" - 48" GRITTY CLAY LOAM
	TP3-24	60"	60"	41"	N/A	0" - 12" TOPSOIL 12" - 48" CLAY LOAM 48" - 60" CLAY

NOTE:

ALL SDS DESIGNS ARE FOR:
4-BEDROOM MAXIMUM; DAILY FLOW = 440 GPD
MIN. SEPTIC TANK SIZE = 1250 GALLONS

PERCOLATION TEST RESULTS

LOT NO.	PERC TEST (PT) NO.	HOLE DEPTH	SOIL TYPE	SOAKED	TEST RUNS 1	2	3	4
1	PT1-1	9"	CLAY LOAM	YES	3 MIN.	8 MIN.	9 MIN.	–
	PT2-1	9"	CLAY LOAM	YES	1 MIN.	1 MIN.	1 MIN.	–
	PT3-1	12"	LOAM	YES	6 MIN.	7 MIN.	7 MIN.	–
2	PT1-2	12"	CLAY LOAM	YES	1 MIN.	1 MIN.	1 MIN.	–
	PT2-2	12"	CLAY LOAM	YES	7 MIN.	8 MIN.	9 MIN.	–
3	PT1-3	12"	CLAY LOAM	YES	19 MIN.	20 MIN.	20 MIN.	–
	PT2-3	6"	LOAM	YES	1 MIN.	3 MIN.	2 MIN.	–
	PT1-4	12"	CLAY LOAM	YES	16 MIN.	19 MIN.	19 MIN.	–
	PT2-4	12"	CLAY LOAM	YES	26 MIN.	43 MIN.	44 MIN.	–
	–	–	–	–	–	–	–	–
	PT2-5	12"	CLAY LOAM	YES	1 MIN.	3 MIN.	4 MIN.	–
6	PT1-6	16"	CLAY ROCKY LOAM	YES	1 MIN.	1 MIN.	2 MIN.	–
	PT2-6	16"	CLAY ROCKY LOAM	YES	1 MIN.	2 MIN.	2 MIN.	–
	PT3-6	12"	CLAY ROCKY LOAM	YES	16 MIN.	17 MIN.	17 MIN.	–
7	PT1-7	12"	CLAY LOAM	YES	17 MIN.	22 MIN.	22 MIN.	22 MIN.
	PT2-7	7"	SANDY LOAM	YES	1 MIN.	2 MIN.	3 MIN.	
8	PT1-8	12"	SANDY LOAM	YES	1 MIN.	1 MIN.	1 MIN.	
	PT2-8	12"	SANDY LOAM	YES	4 MIN.	4 MIN.	5 MIN.	–
9	PT1-9	12"	SANDY LOAM	YES	1 MIN.	1 MIN.	2 MIN.	–
	PT2-9	12"	SANDY LOAM	YES	1 MIN.	1 MIN.	1 MIN.	–
10	PT1-10	12"	SANDY LOAM	YES	2 MIN.	3 MIN.	3 MIN.	–
	PT2-10	12"	SANDY LOAM	YES	1 MIN.	3 MIN.	3 MIN.	–
11	PT1-11	6"	GRITTY LOAM	YES	6 MIN.	8 MIN.	9 MIN.	–
	PT2-11	6"	GRITTY LOAM	YES	4 MIN.	6 MIN.	7 MIN.	–
	PT3-11	12"	LOAM	YES	8 MIN.	8 MIN.	8 MIN.	–
12	PT1-12	24"	GRITTY LOAM	YES	11 MIN.	11 MIN.	11 MIN.	–
	PT2-12	24"	GRITTY LOAM	YES	8 MIN.	9 MIN.	9 MIN.	–
13	PT1-13	24"	GRITTY LOAM	YES	12 MIN.	13 MIN.	13 MIN.	–
	PT2-13	24"	GRITTY LOAM	YES	13 MIN.	14 MIN.	14 MIN.	–
	PT3-13	8"	SANDY LOAM	YES	5 MIN.	17 MIN.	17 MIN.	16 MIN.
	PT4-13	8"	SANDY LOAM	YES	4 MIN.	7 MIN.	6 MIN.	–
14	PT1-14	12"	CLAY LOAM	YES	3 MIN.	7 MIN.	8 MIN.	–
	PT2-14	12"	CLAY LOAM	YES	5 MIN.	8 MIN.	9 MIN.	–
15	PT1-15	12"	CLAY LOAM	YES	13 MIN.	17 MIN.	18 MIN.	–
	PT2-15	12"	CLAY LOAM	YES	10 MIN.	13 MIN.	13 MIN.	–
16	PT1-16	12"	SANDY LOAM	YES	1 MIN.	2 MIN.	2 MIN.	–
	PT2-16	12"	SANDY LOAM	YES	1 MIN.	1 MIN.	1 MIN.	–
17	PT1-17	12"	SANDY LOAM	YES	1 MIN.	2 MIN.	2 MIN.	–
	PT2-17	12"	SANDY LOAM	YES	4 MIN.	5 MIN.	6 MIN.	–
18	PT1-18	12"	SANDY LOAM	YES	1 MIN.	2 MIN.	2 MIN.	–
	PT2-18	12"	SANDY LOAM	YES	1 MIN.	1 MIN.	2 MIN.	–
19	PT1-19	12"	SANDY LOAM	YES	6 MIN.	6 MIN.	6 MIN.	
	PT2-19	12"	SANDY LOAM	YES	1 MIN.	1 MIN.	1 MIN.	–
	PT3-19	12"	CLAY LOAM	YES	8 MIN.	8 MIN.	8 MIN.	
	PT4-19	12"	CLAY LOAM	YES	5 MIN.	6 MIN.	6 MIN.	–
20	PT1-20	12"	CLAY LOAM	YES	1 MIN.	1 MIN.	2 MIN.	–
	PT2-20	12"	CLAY LOAM	YES	1 MIN.	5 MIN.	6 MIN.	–
21	PT1-21	6"	CLAY LOAM	YES	12 MIN.	14 MIN.	15 MIN.	–
	PT2-21	6"	CLAY LOAM	YES	8 MIN.	9 MIN.	10 MIN.	–
	PT3-21	12"	LOAM	YES	12 MIN.	13 MIN.	13 MIN.	–
22	PT1-22	9"	LOAM	YES	43 MIN.	42 MIN.	40 MIN.	–
	PT2-22	9"	LOAM	YES	30 MIN.	40 MIN.	42 MIN.	–
	PT3-22	12"	CLAY LOAM	YES	35 MIN.	37 MIN.	37 MIN.	–
23	PT1-23	12"	CLAY LOAM	YES	27 MIN.	36 MIN.	38 MIN.	–
	PT2-23	12"	CLAY LOAM	YES	22 MIN.	24 MIN.	25 MIN.	–
	PT3-23	12"	CLAY LOAM W/PEBBLES	YES	15 MIN.	15 MIN.	15 MIN.	
	PT4-23	12"	CLAY LOAM	YES	10 MIN.	12 MIN.	12 MIN.	12 MIN.
24	PT1-24	12"	CLAY LOAM	YES	20 MIN.	30 MIN.	31 MIN.	–
	PT2-24	12"	CLAY LOAM	YES	17 MIN.	21 MIN.	22 MIN.	–

LEGEND

- PROPERTY LINE
- 2007 TEST PIT
- 2007 PERCOLATION TEST
- 2022 TEST PIT
- 2022 PERCOLATION TEST
- >25% SLOPES
- PREVIOUSLY DELINEATED WETLAND
- STREAM
- STONE WALL

NOTES

1. SOILS INFORMATION DATA FROM A PLAN TITLED "SEWAGE DISPOSAL SYSTEM TABLES," SOUTH PEAK SUBDIVISION, DATED MARCH 21, 2007, PREPARED BY ERDMAN ANTHONY.

Scale: 1" = 120' FOR 24X36 SHEET

The LA GROUP
Landscape Architecture & Engineering P.C.
People. Purpose. Place.
40 Long Alley
Saratoga Springs
NY 12866
p. 518-587-8100
f. 518-587-0180
www.thelagroup.com

Unauthorized alteration or addition to this document is a violation of Section 7209 of the New York State Education Law.

© the LA Group 2022

Prepared for:
TERRAMOR
550 N 31st Street
Billings, MT 59101

Civil Engineer:
C.T. Male Associates
50 Century Hill Drive
Latham, NY 12110

Architect:
DGC Architects
40 Church Street, Studio A
Ellsworth, ME 04605

Traffic Engineer:
GPI
80 Wolf Road, Suite 300,
Albany, NY 12205

Surveyor:
Ausfeld & Waldruff
323 Clinton Street
Schenectady, NY 12305

Project Title:
Terramor Catskills
NY ROUTE 212
Saugerties, NY 12477

ISSUED FOR:
SITE PLAN / SPECIAL USE APP.

Project No.:	2021096		
Design:	MJT/KAC		
Drawn:	BAS	Ch'k'd:	MJT
Date:	07/01/2022	Scale:	1"=120'

Rev:	Description:	Date:
1	RESPONSE TO COMMENTS	12/02/22

Drawing Title
Soils Inventory Plan

Drawing No.
L-1.1

EXPLORATION PLAN

Terramor Catskills ■ Saugerties, NY
October 7, 2022 ■ Terracon Project No. JB225043

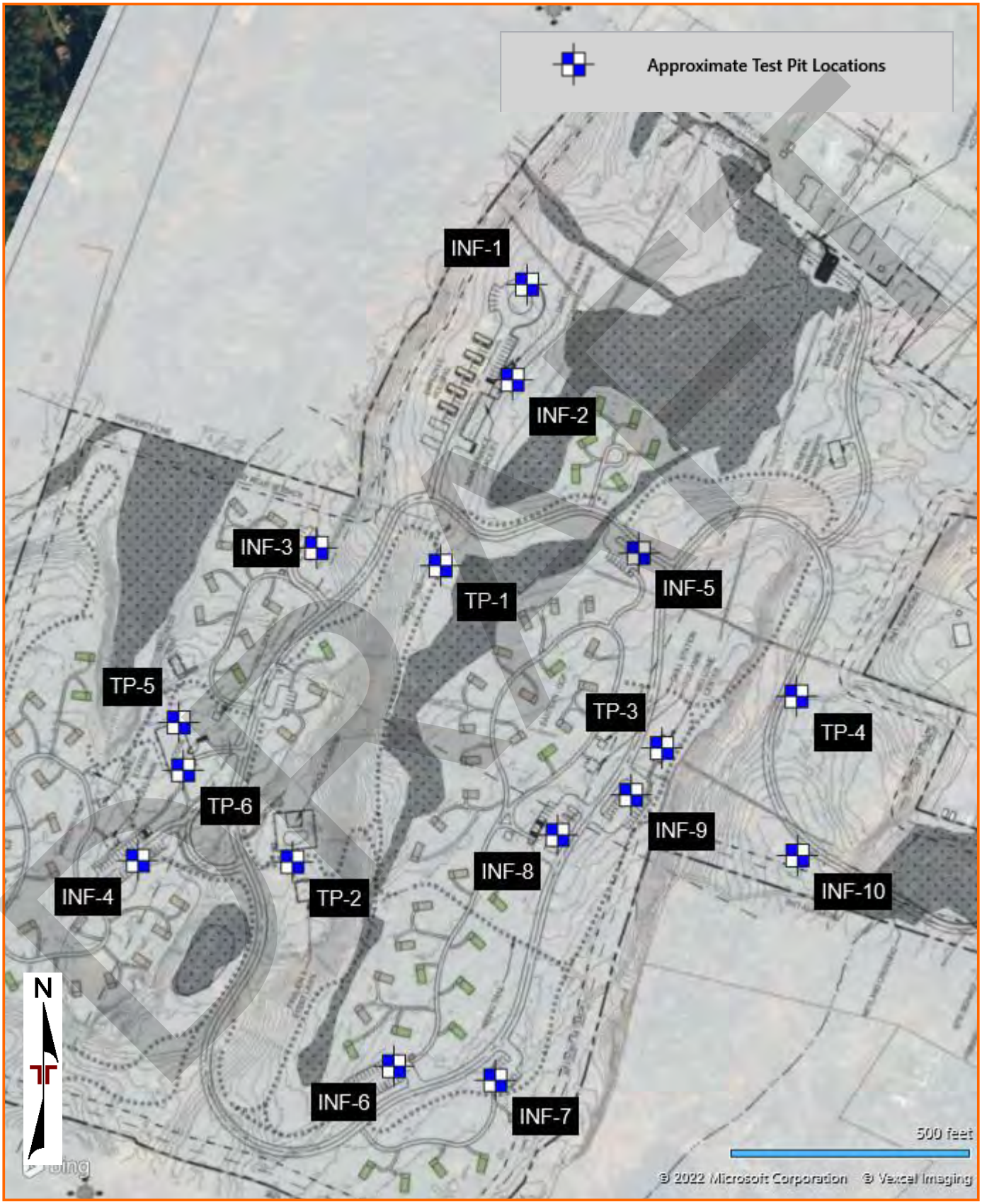


DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

AERIAL PHOTOGRAPHY PROVIDED BY MICROSOFT BING MAPS

INFILTRATION TEST RESULTS					
PROJECT: Terramor Catskills				**PROJECT NO.** JB225043	
PROJECT LOCATION: Saugerties, New York				**TESTER:** JCH	
Test Location	**Test Depth (feet)**	**Trial No.**	**Water Drop (inches)**	**Elapsed Time (hours)**	**Infiltration Rate (inches/hour)**
INF-1	5.5	1	8	1.0	8
		2	8	1.0	8
		3	8	1.0	8
		4	8	1.0	8
		NOTE: Rate of final trial: 8 in/hr. Average of four trials: 8 in/hr.			
INF-2	5.5	1	24	0.32	>24
		2	24	0.23	>24
		3	24	0.22	>24
		4	24	0.32	>24
		NOTE: Rate of final trial: >24 in/hr. Average of four trials: >24 in/hr.			
INF-10	6.0	1	24	0.08	>24
		2	24	0.12	>24
		3	24	0.13	>24
		4	24	0.15	>24
		NOTE: Rate of final trial: >24 in/hr. Average of four trials: >24 in/hr.			

Notes:

(1) Test pipes were installed in test pits adjacent to INF-1, INF-2, and INF-10

SOIL CLASSIFICATION AT TEST DEPTH

Test Location INF-1: Poorly Graded Sand with Silt (SP-SM).
Test Location INF-2: Poorly Graded Sand with Silt and Gravel (SP-SM).
Test Location INF-10: Silty Sand with Gravel (SM), brown.

DRAFT

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

May 31, 2022

Preface

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

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

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

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

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

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

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require

alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD). To file a complaint of discrimination, write to USDA, Director, Office of Civil Rights, 1400 Independence Avenue, S.W., Washington, D.C. 20250-9410 or call (800) 795-3272 (voice) or (202) 720-6382 (TDD). USDA is an equal opportunity provider and employer.

Contents

How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

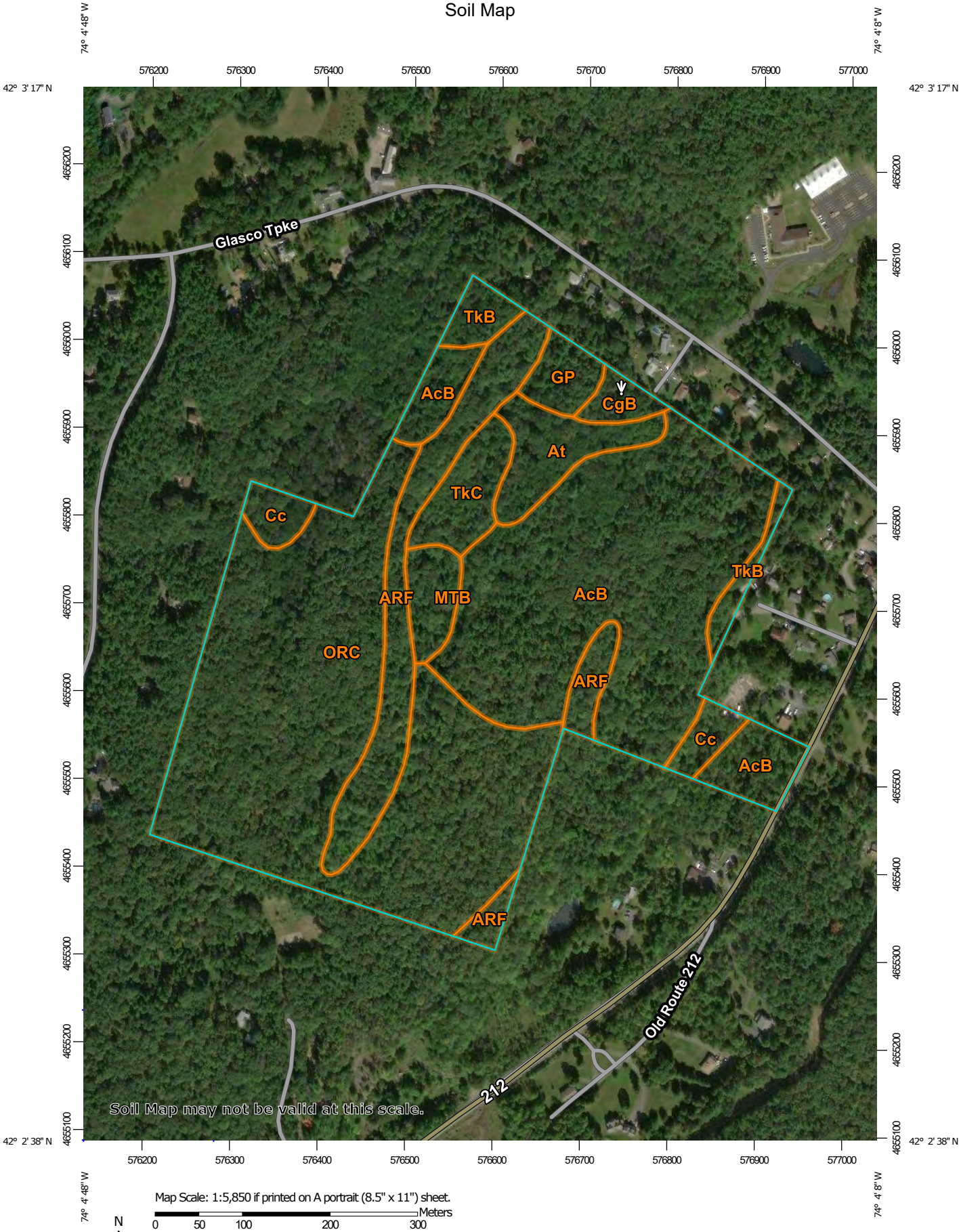
After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

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.

Custom Soil Resource Report
Soil Map



Map Scale: 1:5,850 if printed on A portrait (8.5" x 11") sheet.

N

Meters
0 50 100 200 300

Feet
0 250 500 1000 1500

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:
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 20, Aug 29, 2021

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

Date(s) aerial images were photographed: Oct 7, 2013—Sep 22, 2017

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

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
AcB	Arnot channery silt loam, 0 to 8 percent slopes	25.9	32.9%
ARF	Arnot-Oquaga-Rock outcrop complex, very steep	8.2	10.4%
At	Atherton silt loam	3.1	3.9%
Cc	Canandaigua silt loam	2.0	2.5%
CgB	Castile gravelly silt loam, 3 to 8 percent slopes	0.9	1.2%
GP	Gravel pit	1.5	1.8%
MTB	Morris-Tuller complex, gently sloping, very bouldery	1.7	2.1%
ORC	Oquaga-Arnot-Rock outcrop complex, sloping	31.2	39.6%
TkB	Tunkhannock gravelly loam, 3 to 8 percent slopes	1.9	2.4%
TkC	Tunkhannock gravelly loam, rolling	2.5	3.2%
Totals for Area of Interest		**78.8**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the

scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Ulster County, New York

AcB—Arnot channery silt loam, 0 to 8 percent slopes

Map Unit Setting

National map unit symbol: 2wbm7
Elevation: 330 to 2,460 feet
Mean annual precipitation: 31 to 70 inches
Mean annual air temperature: 39 to 52 degrees F
Frost-free period: 105 to 180 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Arnot and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Arnot

Setting

Landform: Hills, mountains
Landform position (two-dimensional): Summit, shoulder
Landform position (three-dimensional): Mountaintop, interfluve, crest
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loamy till derived mainly from acid sandstone, siltstone, and shale

Typical profile

Ap - 0 to 7 inches: channery silt loam
Bw1 - 7 to 12 inches: very channery silt loam
Bw2 - 12 to 17 inches: very channery silt loam
2R - 17 to 27 inches: bedrock

Properties and qualities

Slope: 0 to 8 percent
Surface area covered with cobbles, stones or boulders: 0.0 percent
Depth to restrictive feature: 10 to 20 inches to lithic bedrock
Drainage class: Somewhat excessively drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.14 to 1.42 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water supply, 0 to 60 inches: Very low (about 2.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3s
Hydrologic Soil Group: D
Ecological site: F140XY023NY - Shallow Till Uplands
Hydric soil rating: No

Minor Components

Oquaga

Percent of map unit: 10 percent
Landform: Mountains, hills
Landform position (two-dimensional): Shoulder, backslope
Landform position (three-dimensional): Upper third of mountainflank, nose slope, crest
Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: No

Tuller, somewhat poorly drained

Percent of map unit: 5 percent
Landform: Hills, ridges, benches
Landform position (two-dimensional): Summit, footslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: No

ARF—Arnot-Oquaga-Rock outcrop complex, very steep

Map Unit Setting

National map unit symbol: 2xp9p
Elevation: 330 to 2,460 feet
Mean annual precipitation: 31 to 70 inches
Mean annual air temperature: 39 to 52 degrees F
Frost-free period: 105 to 180 days
Farmland classification: Not prime farmland

Map Unit Composition

Arnot, very bouldery, and similar soils: 40 percent
Oquaga, very bouldery, and similar soils: 30 percent
Rock outcrop: 20 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Arnot, Very Bouldery

Setting

Landform: Hills, mountains
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Mountaintop, mountainflank, free face, nose slope, side slope, free face
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Loamy till derived mainly from acid sandstone, siltstone, and shale

Typical profile

Oe - 0 to 1 inches: moderately decomposed plant material
A - 1 to 3 inches: channery silt loam
Bw1 - 3 to 12 inches: very channery silt loam
Bw2 - 12 to 17 inches: very channery silt loam
2R - 17 to 27 inches: bedrock

Properties and qualities

Slope: 35 to 70 percent
Surface area covered with cobbles, stones or boulders: 1.6 percent
Depth to restrictive feature: 10 to 20 inches to lithic bedrock
Drainage class: Somewhat excessively drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.14 to 1.42 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water supply, 0 to 60 inches: Very low (about 2.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: D
Ecological site: F140XY023NY - Shallow Till Uplands
Hydric soil rating: No

Description of Oquaga, Very Bouldery

Setting

Landform: Hills, mountains
Landform position (two-dimensional): Shoulder, backslope
Landform position (three-dimensional): Upper third of mountainflank, nose slope, side slope, crest
Down-slope shape: Convex, linear
Across-slope shape: Linear
Parent material: Reddish loamy till derived from sandstone, siltstone, and shale

Typical profile

Oe - 0 to 1 inches: moderately decomposed plant material
A - 1 to 5 inches: channery highly organic silt loam
Bw1 - 5 to 15 inches: very channery silt loam
Bw2 - 15 to 24 inches: very channery silt loam
C - 24 to 30 inches: extremely channery loam
2R - 30 to 40 inches: bedrock

Properties and qualities

Slope: 35 to 70 percent
Surface area covered with cobbles, stones or boulders: 1.6 percent
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.14 to 1.42 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None

Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Low (about 3.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: C
Ecological site: F140XY027NY - Well Drained Till Uplands
Hydric soil rating: No

Description of Rock Outcrop

Setting

Landform: Hills, mountains
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Mountaintop, mountainflank, nose slope, side slope, crest
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Sedimentary rock

Properties and qualities

Slope: 35 to 70 percent
Depth to restrictive feature: 0 inches to lithic bedrock
Capacity of the most limiting layer to transmit water (Ksat): Very low to very high (0.00 to 14.17 in/hr)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8
Hydric soil rating: No

Minor Components

Lackawanna, very bouldery

Percent of map unit: 5 percent
Landform: Hills, mountains
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Nose slope, side slope
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Cadosia, very stony

Percent of map unit: 5 percent
Landform: Ridges
Landform position (two-dimensional): Backslope, footslope
Landform position (three-dimensional): Side slope
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: No

At—Atherton silt loam

Map Unit Setting

National map unit symbol: 9xfl
Elevation: 50 to 1,500 feet
Mean annual precipitation: 41 to 62 inches
Mean annual air temperature: 41 to 50 degrees F
Frost-free period: 110 to 200 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Atherton and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Atherton

Setting

Landform: Depressions
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Tread
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Loamy glaciofluvial deposits over stratified deposits

Typical profile

H1 - 0 to 7 inches: silt loam
H2 - 7 to 19 inches: silt loam
H3 - 19 to 34 inches: gravelly loam
H4 - 34 to 65 inches: stratified very gravelly sandy loam to sand

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: About 0 inches
Frequency of flooding: None
Frequency of ponding: Occasional
Calcium carbonate, maximum content: 1 percent
Available water supply, 0 to 60 inches: Moderate (about 6.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: B/D

Ecological site: F140XY016NY - Mineral Wetlands
Hydric soil rating: Yes

Minor Components

Red hook
Percent of map unit: 5 percent
Hydric soil rating: No

Canandaigua
Percent of map unit: 5 percent
Landform: Depressions
Hydric soil rating: Yes

Lamson
Percent of map unit: 5 percent
Landform: Depressions
Hydric soil rating: Yes

Raynham
Percent of map unit: 5 percent
Hydric soil rating: No

Cc—Canandaigua silt loam

Map Unit Setting
National map unit symbol: 9xfz
Elevation: 100 to 1,000 feet
Mean annual precipitation: 41 to 62 inches
Mean annual air temperature: 41 to 50 degrees F
Frost-free period: 110 to 200 days
Farmland classification: Farmland of statewide importance

Map Unit Composition
Canandaigua and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Canandaigua

Setting
Landform: Depressions
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Tread
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Silty and clayey glaciolacustrine deposits

Typical profile
H1 - 0 to 9 inches: silt loam
H2 - 9 to 37 inches: silt loam
H3 - 37 to 60 inches: silt loam

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Very poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.57 in/hr)
Depth to water table: About 0 inches
Frequency of flooding: None
Frequency of ponding: Frequent
Available water supply, 0 to 60 inches: High (about 12.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: C/D
Ecological site: F101XY010NY - Wet Lake Plain Depression
Hydric soil rating: Yes

Minor Components

Madalin

Percent of map unit: 5 percent
Landform: Depressions
Hydric soil rating: Yes

Lyons

Percent of map unit: 5 percent
Landform: Depressions
Hydric soil rating: Yes

Raynham

Percent of map unit: 5 percent
Hydric soil rating: No

Lamson

Percent of map unit: 5 percent
Landform: Depressions
Hydric soil rating: Yes

CgB—Castile gravelly silt loam, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: 9xg4
Elevation: 160 to 1,970 feet
Mean annual precipitation: 41 to 62 inches
Mean annual air temperature: 41 to 50 degrees F
Frost-free period: 110 to 200 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Castile and similar soils: 80 percent

Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Castile

Setting

Landform: Valley trains, terraces
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Tread
Down-slope shape: Concave
Across-slope shape: Convex
Parent material: Gravelly loamy glaciofluvial deposits over sandy and gravelly glaciofluvial deposits, derived mainly from sandstone, shale, and siltstone

Typical profile

H1 - 0 to 8 inches: gravelly silt loam
H2 - 8 to 19 inches: gravelly loam
H3 - 19 to 28 inches: very gravelly sandy loam
H4 - 28 to 60 inches: stratified very gravelly sand

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 5.95 in/hr)
Depth to water table: About 18 to 24 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Very low (about 2.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: A/D
Ecological site: F140XY022NY - Moist Outwash
Hydric soil rating: No

Minor Components

Chenango

Percent of map unit: 5 percent
Hydric soil rating: No

Hoosic

Percent of map unit: 5 percent
Hydric soil rating: No

Tunkhannock

Percent of map unit: 5 percent
Hydric soil rating: No

Red hook

Percent of map unit: 5 percent
Hydric soil rating: No

GP—Gravel pit

Map Unit Setting

National map unit symbol: 9xgh
Mean annual precipitation: 41 to 62 inches
Mean annual air temperature: 41 to 50 degrees F
Frost-free period: 110 to 200 days
Farmland classification: Not prime farmland

Map Unit Composition

Gravel pit: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Gravel Pit

Properties and qualities

Slope: 0 to 15 percent
Depth to restrictive feature: 40 to 80 inches to lithic bedrock
Drainage class: Somewhat excessively drained

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydric soil rating: Unranked

Minor Components

Hoosic

Percent of map unit: 5 percent
Hydric soil rating: No

Pompton

Percent of map unit: 5 percent
Hydric soil rating: No

Chenango

Percent of map unit: 5 percent
Hydric soil rating: No

Atherton

Percent of map unit: 5 percent
Landform: Depressions
Hydric soil rating: Yes

MTB—Morris-Tuller complex, gently sloping, very bouldery

Map Unit Setting

National map unit symbol: 2vxd2
Elevation: 330 to 2,460 feet
Mean annual precipitation: 31 to 70 inches
Mean annual air temperature: 39 to 52 degrees F
Frost-free period: 105 to 180 days
Farmland classification: Not prime farmland

Map Unit Composition

Morris, very bouldery, and similar soils: 45 percent
Tuller, poorly drained, very bouldery, and similar soils: 15 percent
Tuller, somewhat poorly drained, very bouldery, and similar soils: 15 percent
Minor components: 25 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Morris, Very Bouldery

Setting

Landform: Hills, mountains
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Interfluve, side slope
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Loamy till from reddish sandstone, siltstone, and shale

Typical profile

A - 0 to 4 inches: bouldery silt loam
Bw - 4 to 12 inches: flaggy silt loam
Eg - 12 to 16 inches: flaggy silt loam
Bx - 16 to 60 inches: channery silt loam
C - 60 to 72 inches: channery loam

Properties and qualities

Slope: 1 to 8 percent
Surface area covered with cobbles, stones or boulders: 1.6 percent
Depth to restrictive feature: 10 to 22 inches to fragipan
Drainage class: Somewhat poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.14 in/hr)
Depth to water table: About 6 to 18 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Very low (about 2.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: D

Hydric soil rating: No

Description of Tuller, Poorly Drained, Very Bouldery

Setting

Landform: Hills, ridges, benches
Landform position (two-dimensional): Summit, footslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Loamy till derived mainly from acid sandstone, siltstone, and shale

Typical profile

H1 - 0 to 7 inches: flaggy silt loam
H2 - 7 to 18 inches: very flaggy very fine sandy loam
H3 - 18 to 22 inches: unweathered bedrock

Properties and qualities

Slope: 0 to 8 percent
Surface area covered with cobbles, stones or boulders: 1.6 percent
Depth to restrictive feature: 10 to 20 inches to lithic bedrock
Drainage class: Poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)
Depth to water table: About 6 to 12 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Very low (about 1.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: D
Ecological site: F140XY016NY - Mineral Wetlands
Hydric soil rating: Yes

Description of Tuller, Somewhat Poorly Drained, Very Bouldery

Setting

Landform: Hills, ridges, benches
Landform position (two-dimensional): Summit, footslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Loamy till derived mainly from acid sandstone, siltstone, and shale

Typical profile

H1 - 0 to 7 inches: flaggy silt loam
H2 - 7 to 18 inches: very flaggy very fine sandy loam
H3 - 18 to 22 inches: unweathered bedrock

Properties and qualities

Slope: 0 to 8 percent
Surface area covered with cobbles, stones or boulders: 1.6 percent
Depth to restrictive feature: 10 to 20 inches to lithic bedrock
Drainage class: Somewhat poorly drained

Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)
Depth to water table: About 6 to 18 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Very low (about 1.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: D
Ecological site: F140XY016NY - Mineral Wetlands
Hydric soil rating: No

Minor Components

Scriba, very bouldery

Percent of map unit: 10 percent
Landform: Drumlins, till plains
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: No

Greene, very bouldery

Percent of map unit: 5 percent
Landform: Ridges, benches, hills
Landform position (two-dimensional): Footslope, summit
Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: No

Menlo, very bouldery

Percent of map unit: 5 percent
Landform: Depressions
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Wellsboro, very bouldery

Percent of map unit: 3 percent
Landform: Hills, mountains
Landform position (two-dimensional): Summit, shoulder
Landform position (three-dimensional): Interfluve, side slope
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

Rock outcrop

Percent of map unit: 2 percent
Hydric soil rating: No

ORC—Oquaga-Arnot-Rock outcrop complex, sloping

Map Unit Setting

National map unit symbol: 2xp9m
Elevation: 330 to 2,460 feet
Mean annual precipitation: 31 to 70 inches
Mean annual air temperature: 39 to 52 degrees F
Frost-free period: 105 to 180 days
Farmland classification: Not prime farmland

Map Unit Composition

Oquaga, very stony, and similar soils: 35 percent
Arnot, extremely stony, and similar soils: 25 percent
Rock outcrop: 15 percent
Minor components: 25 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Oquaga, Very Stony

Setting

Landform: Hills, ridges, benches
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Crest
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Reddish loamy till derived from sandstone, siltstone, and shale

Typical profile

Oe - 0 to 1 inches: moderately decomposed plant material
A - 1 to 5 inches: channery highly organic silt loam
Bw1 - 5 to 15 inches: very channery silt loam
Bw2 - 15 to 24 inches: very channery silt loam
C - 24 to 30 inches: extremely channery loam
2R - 30 to 40 inches: bedrock

Properties and qualities

Slope: 8 to 15 percent
Surface area covered with cobbles, stones or boulders: 1.6 percent
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.14 to 1.42 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Low (about 3.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: C
Ecological site: F140XY027NY - Well Drained Till Uplands
Hydric soil rating: No

Description of Arnot, Extremely Stony

Setting

Landform: Hills, ridges, benches
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Crest
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loamy till derived mainly from acid sandstone, siltstone, and shale

Typical profile

Oe - 0 to 1 inches: moderately decomposed plant material
A - 1 to 3 inches: channery silt loam
Bw1 - 3 to 12 inches: very channery silt loam
Bw2 - 12 to 17 inches: very channery silt loam
2R - 17 to 27 inches: bedrock

Properties and qualities

Slope: 8 to 15 percent
Surface area covered with cobbles, stones or boulders: 10.0 percent
Depth to restrictive feature: 10 to 20 inches to lithic bedrock
Drainage class: Somewhat excessively drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.14 to 1.42 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water supply, 0 to 60 inches: Very low (about 2.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: D
Ecological site: F140XY023NY - Shallow Till Uplands
Hydric soil rating: No

Description of Rock Outcrop

Setting

Landform: Hills, mountains
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Mountaintop, mountainflank, nose slope, side slope, crest
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Sedimentary rock

Properties and qualities

Slope: 3 to 15 percent
Depth to restrictive feature: 0 inches to lithic bedrock
Capacity of the most limiting layer to transmit water (Ksat): Very low to very high (0.00 to 14.17 in/hr)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8
Hydric soil rating: No

Minor Components

Wellsboro, very bouldery

Percent of map unit: 10 percent
Landform: Hills, mountains
Landform position (two-dimensional): Summit, shoulder
Landform position (three-dimensional): Interfluve, side slope
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

Cadosia, very stony

Percent of map unit: 10 percent
Landform: Ridges
Landform position (two-dimensional): Backslope, footslope
Landform position (three-dimensional): Side slope
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: No

Tuller, somewhat poorly drained, very bouldery

Percent of map unit: 5 percent
Landform: Benches, hills, ridges
Landform position (two-dimensional): Footslope, summit
Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: No

TkB—Tunkhannock gravelly loam, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: 9xjx
Elevation: 700 to 2,000 feet
Mean annual precipitation: 41 to 62 inches
Mean annual air temperature: 41 to 50 degrees F
Frost-free period: 110 to 200 days

Farmland classification: All areas are prime farmland

Map Unit Composition

Tunkhannock and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Tunkhannock

Setting

Landform: Valley trains, terraces
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Tread
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Gravelly loamy glaciofluvial deposits over sandy and gravelly glaciofluvial deposits, derived mainly from reddish sandstone, siltstone, and shale

Typical profile

H1 - 0 to 7 inches: gravelly loam
H2 - 7 to 23 inches: gravelly loam
H3 - 23 to 30 inches: very gravelly loam
H4 - 30 to 80 inches: Error

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): High (1.98 to 5.95 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 4.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2s
Hydrologic Soil Group: A
Hydric soil rating: No

Minor Components

Barbour

Percent of map unit: 5 percent
Hydric soil rating: No

Suncook

Percent of map unit: 5 percent
Hydric soil rating: No

Red hook

Percent of map unit: 5 percent
Hydric soil rating: No

Castile

Percent of map unit: 5 percent

Hydric soil rating: No

TkC—Tunkhannock gravelly loam, rolling

Map Unit Setting

National map unit symbol: 9xjy
Elevation: 700 to 2,000 feet
Mean annual precipitation: 41 to 62 inches
Mean annual air temperature: 41 to 50 degrees F
Frost-free period: 110 to 200 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Tunkhannock and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Tunkhannock

Setting

Landform: Valley trains, terraces
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Tread
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Gravelly loamy glaciofluvial deposits over sandy and gravelly glaciofluvial deposits, derived mainly from reddish sandstone, siltstone, and shale

Typical profile

H1 - 0 to 7 inches: gravelly loam
H2 - 7 to 23 inches: gravelly loam
H3 - 23 to 30 inches: very gravelly loam
H4 - 30 to 80 inches: Error

Properties and qualities

Slope: 5 to 16 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): High (1.98 to 5.95 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 4.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: A
Hydric soil rating: No

Minor Components

Castile

Percent of map unit: 5 percent
Hydric soil rating: No

Red hook

Percent of map unit: 5 percent
Hydric soil rating: No

Valois

Percent of map unit: 5 percent
Hydric soil rating: No

Chenango

Percent of map unit: 5 percent
Hydric soil rating: No

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.

Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. Classification of wetlands and deep-water habitats of the United States. U.S. Fish and Wildlife Service FWS/OBS-79/31.

Federal Register. July 13, 1994. Changes in hydric soils of the United States.

Federal Register. September 18, 2002. Hydric soils of the United States.

Hurt, G.W., and L.M. Vasilas, editors. Version 6.0, 2006. Field indicators of hydric soils in the United States.

National Research Council. 1995. Wetlands: Characteristics and boundaries.

Soil Survey Division Staff. 1993. Soil survey manual. Soil Conservation Service. U.S. Department of Agriculture Handbook 18. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_054262

Soil Survey Staff. 1999. Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys. 2nd edition. Natural Resources Conservation Service, U.S. Department of Agriculture Handbook 436. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053577

Soil Survey Staff. 2010. Keys to soil taxonomy. 11th edition. U.S. Department of Agriculture, Natural Resources Conservation Service. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053580

Tiner, R.W., Jr. 1985. Wetlands of Delaware. U.S. Fish and Wildlife Service and Delaware Department of Natural Resources and Environmental Control, Wetlands Section.

United States Army Corps of Engineers, Environmental Laboratory. 1987. Corps of Engineers wetlands delineation manual. Waterways Experiment Station Technical Report Y-87-1.

United States Department of Agriculture, Natural Resources Conservation Service. National forestry manual. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/home/?cid=nrcs142p2_053374

United States Department of Agriculture, Natural Resources Conservation Service. National range and pasture handbook. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/landuse/rangepasture/?cid=stelprdb1043084

United States Department of Agriculture, Natural Resources Conservation Service. National soil survey handbook, title 430-VI. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/scientists/?cid=nrcs142p2_054242

United States Department of Agriculture, Natural Resources Conservation Service. 2006. Land resource regions and major land resource areas of the United States, the Caribbean, and the Pacific Basin. U.S. Department of Agriculture Handbook 296. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053624

United States Department of Agriculture, Soil Conservation Service. 1961. Land capability classification. U.S. Department of Agriculture Handbook 210. http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_052290.pdf

Attachment B

Existing Conditions Watershed Map and HydroCAD Calculations

AP-4
AP-3
AP-2
AP-1
4
3
2
1
TOWN OF SAUGERTIES
COTTONTAIL LANE
OSNAS LANE

LEGEND

- PROPERTY LINE
- DELINEATED WETLANDS
- 1 SUBCATCHMENT NUMBER
- SUBCATCHMENT BOUNDARY
- TIME OF CONCENTRATION PATH
- AP-1 ANALYSIS POINT

100 50 0 20 40 60 80 100
Scale: 1" = 100'

The LA GROUP
Landscape Architecture & Engineering P.C.
People. Purpose. Place.
40 Long Alley
Saratoga Springs
NY 12866
p: 518-587-8100
f: 518-587-0180
www.thelagroup.com

Unauthorized alteration or addition to this document is a violation of Section 7209 of the New York State Education Law.

© the LA Group 2022

Prepared for:

TERRAMOR

550 N 31st Street
Billings, MT 59101

Civil Engineer:
C.T. Male Associates
50 Century Hill Drive
Latham, NY 12110

Architect:
DGC Architects
40 Church Street, Studio A
Ellsworth, ME 04605

Traffic Engineer:
GPI
80 Wolf Road, Suite 300,
Albany, NY 12205

Surveyor:
Ausfeld & Waldruff
323 Clinton Street
Schenectady, NY 12305

Project Title:

Terramor Catskills

NY ROUTE 212
Saugerties, NY 12477

ISSUED FOR:
SITE PLAN / SPECIAL USE APP.

Project No.:			2021096
Design:			BCS
Drawn:	BCS	Ch'k'd:	DBH
Date:	07/01/2022	Scale:	1"=100'

Rev:	Description:	Date:
1	TOWN COMMENTS	12/02/2022

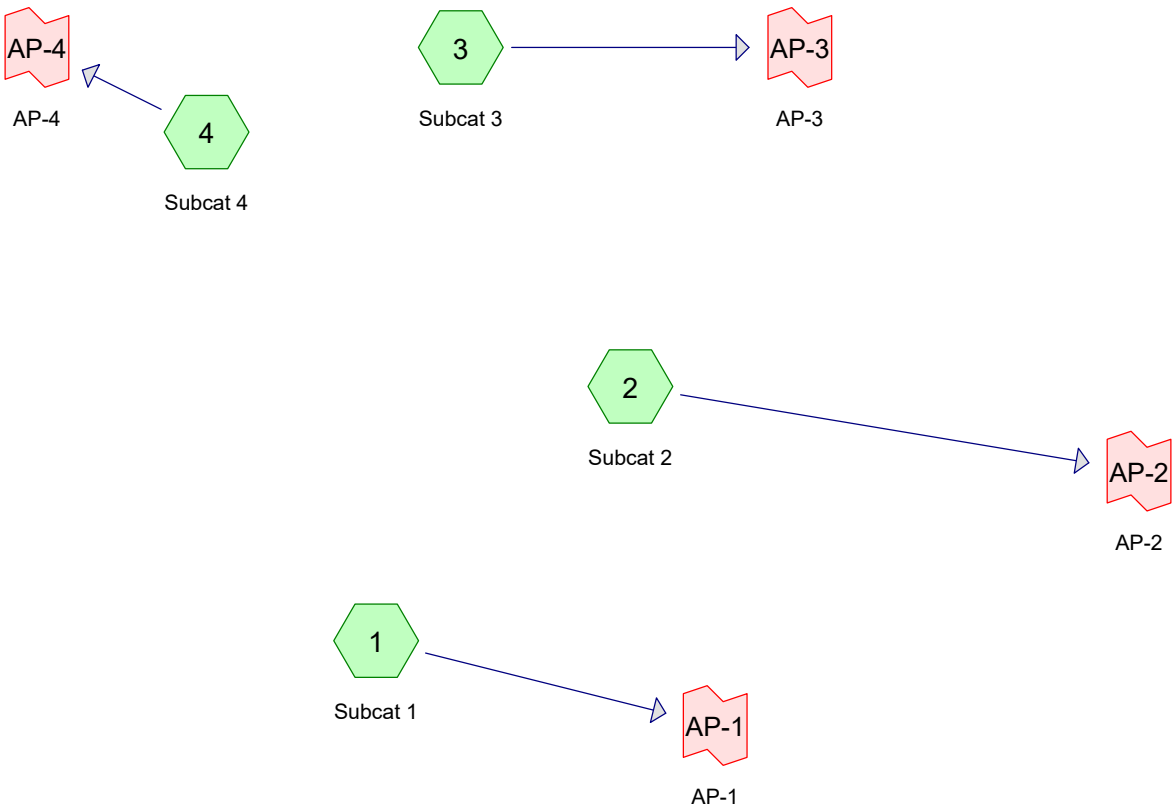
Drawing Title

Pre Development Watershed Map

Drawing No.

W-1

Plotted By: BRETT STROM
Date/Time: 12/2/2022 2:21:24 PM
File Name: C:\Proj-2021\2021096_Terramor_Saugerties\2021096WshdCadd\Pre Development.dwg



Subcat Reach Pond Link

Routing Diagram for Pre Development
Prepared by The LA Group, Printed 11/21/2022
HydroCAD® 10.00-26 s/n 00439 © 2020 HydroCAD Software Solutions LLC

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
2.589	30	Woods, Good, HSG A (1, 2)
97.317	77	Woods, Good, HSG D (1, 2, 3, 4)
99.907	**76**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
2.589	HSG A	1, 2
0.000	HSG B	
0.000	HSG C	
97.317	HSG D	1, 2, 3, 4
0.000	Other	
99.907		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
2.589	0.000	0.000	97.317	0.000	99.907	Woods, Good	1, 2, 3, 4
2.589	**0.000**	**0.000**	**97.317**	**0.000**	**99.907**	**TOTAL AREA**	

Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 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 1: Subcat 1 Runoff Area=28.657 ac 0.00% Impervious Runoff Depth>0.87"
Flow Length=825' Tc=29.3 min CN=77 Runoff=20.70 cfs 2.085 af

Subcatchment 2: Subcat 2 Runoff Area=52.384 ac 0.00% Impervious Runoff Depth>0.78"
Flow Length=2,756' Tc=26.5 min CN=75 Runoff=34.79 cfs 3.386 af

Subcatchment 3: Subcat 3 Runoff Area=13.894 ac 0.00% Impervious Runoff Depth>0.88"
Flow Length=590' Tc=19.1 min CN=77 Runoff=13.18 cfs 1.015 af

Subcatchment 4: Subcat 4 Runoff Area=4.972 ac 0.00% Impervious Runoff Depth>0.88"
Flow Length=376' Tc=14.7 min CN=77 Runoff=5.45 cfs 0.364 af

Link AP-1: AP-1 Inflow=20.70 cfs 2.085 af
Primary=20.70 cfs 2.085 af

Link AP-2: AP-2 Inflow=34.79 cfs 3.386 af
Primary=34.79 cfs 3.386 af

Link AP-3: AP-3 Inflow=13.18 cfs 1.015 af
Primary=13.18 cfs 1.015 af

Link AP-4: AP-4 Inflow=5.45 cfs 0.364 af
Primary=5.45 cfs 0.364 af

Total Runoff Area = 99.907 ac Runoff Volume = 6.849 af Average Runoff Depth = 0.82"
100.00% Pervious = 99.907 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment 1: Subcat 1

Runoff = 20.70 cfs @ 12.26 hrs, Volume= 2.085 af, Depth> 0.87"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 1 yr Rainfall=2.72"

Area (ac)	CN	Description
0.064	30	Woods, Good, HSG A
28.593	77	Woods, Good, HSG D
28.657	77	Weighted Average
28.657		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.7	100	0.0500	0.12		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.75"
15.6	725	0.0240	0.77		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
29.3	825	Total			

Summary for Subcatchment 2: Subcat 2

Runoff = 34.79 cfs @ 12.23 hrs, Volume= 3.386 af, Depth> 0.78"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 1 yr Rainfall=2.72"

Area (ac)	CN	Description
2.525	30	Woods, Good, HSG A
49.859	77	Woods, Good, HSG D
52.384	75	Weighted Average
52.384		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.7	100	0.0750	0.14		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.75"
5.3	553	0.1200	1.73		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
9.5	2,103	0.0600	3.67		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
26.5	2,756	Total			

Summary for Subcatchment 3: Subcat 3

Runoff = 13.18 cfs @ 12.13 hrs, Volume= 1.015 af, Depth> 0.88"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 1 yr Rainfall=2.72"

Area (ac)	CN	Description
13.894	77	Woods, Good, HSG D
13.894		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.7	100	0.0500	0.12		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.75"
5.4	490	0.0900	1.50		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
19.1	590	Total			

Summary for Subcatchment 4: Subcat 4

Runoff = 5.45 cfs @ 12.08 hrs, Volume= 0.364 af, Depth> 0.88"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 1 yr Rainfall=2.72"

Area (ac)	CN	Description
4.972	77	Woods, Good, HSG D
4.972		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.0	100	0.0700	0.14		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.75"
2.7	276	0.1200	1.73		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
14.7	376	Total			

Summary for Link AP-1: AP-1

Inflow Area = 28.657 ac, 0.00% Impervious, Inflow Depth > 0.87" for 1 yr event
Inflow = 20.70 cfs @ 12.26 hrs, Volume= 2.085 af
Primary = 20.70 cfs @ 12.26 hrs, Volume= 2.085 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Link AP-2: AP-2

Inflow Area = 52.384 ac, 0.00% Impervious, Inflow Depth > 0.78" for 1 yr event
Inflow = 34.79 cfs @ 12.23 hrs, Volume= 3.386 af
Primary = 34.79 cfs @ 12.23 hrs, Volume= 3.386 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Link AP-3: AP-3

Inflow Area = 13.894 ac, 0.00% Impervious, Inflow Depth > 0.88" for 1 yr event
Inflow = 13.18 cfs @ 12.13 hrs, Volume= 1.015 af
Primary = 13.18 cfs @ 12.13 hrs, Volume= 1.015 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Link AP-4: AP-4

Inflow Area = 4.972 ac, 0.00% Impervious, Inflow Depth > 0.88" for 1 yr event
Inflow = 5.45 cfs @ 12.08 hrs, Volume= 0.364 af
Primary = 5.45 cfs @ 12.08 hrs, Volume= 0.364 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 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 1: Subcat 1 Runoff Area=28.657 ac 0.00% Impervious Runoff Depth>2.90"
Flow Length=825' Tc=29.3 min CN=77 Runoff=73.41 cfs 6.918 af

Subcatchment 2: Subcat 2 Runoff Area=52.384 ac 0.00% Impervious Runoff Depth>2.72"
Flow Length=2,756' Tc=26.5 min CN=75 Runoff=133.73 cfs 11.861 af

Subcatchment 3: Subcat 3 Runoff Area=13.894 ac 0.00% Impervious Runoff Depth>2.90"
Flow Length=590' Tc=19.1 min CN=77 Runoff=46.08 cfs 3.363 af

Subcatchment 4: Subcat 4 Runoff Area=4.972 ac 0.00% Impervious Runoff Depth>2.91"
Flow Length=376' Tc=14.7 min CN=77 Runoff=18.83 cfs 1.205 af

Link AP-1: AP-1 Inflow=73.41 cfs 6.918 af
Primary=73.41 cfs 6.918 af

Link AP-2: AP-2 Inflow=133.73 cfs 11.861 af
Primary=133.73 cfs 11.861 af

Link AP-3: AP-3 Inflow=46.08 cfs 3.363 af
Primary=46.08 cfs 3.363 af

Link AP-4: AP-4 Inflow=18.83 cfs 1.205 af
Primary=18.83 cfs 1.205 af

Total Runoff Area = 99.907 ac Runoff Volume = 23.347 af Average Runoff Depth = 2.80"
100.00% Pervious = 99.907 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment 1: Subcat 1

Runoff = 73.41 cfs @ 12.24 hrs, Volume= 6.918 af, Depth> 2.90"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 10 yr Rainfall=5.35"

Area (ac)	CN	Description
0.064	30	Woods, Good, HSG A
28.593	77	Woods, Good, HSG D
28.657	77	Weighted Average
28.657		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.7	100	0.0500	0.12		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.75"
15.6	725	0.0240	0.77		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
29.3	825	Total			

Summary for Subcatchment 2: Subcat 2

Runoff = 133.73 cfs @ 12.21 hrs, Volume= 11.861 af, Depth> 2.72"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 10 yr Rainfall=5.35"

Area (ac)	CN	Description
2.525	30	Woods, Good, HSG A
49.859	77	Woods, Good, HSG D
52.384	75	Weighted Average
52.384		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.7	100	0.0750	0.14		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.75"
5.3	553	0.1200	1.73		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
9.5	2,103	0.0600	3.67		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
26.5	2,756	Total			

Summary for Subcatchment 3: Subcat 3

Runoff = 46.08 cfs @ 12.12 hrs, Volume= 3.363 af, Depth> 2.90"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 10 yr Rainfall=5.35"

Area (ac)	CN	Description
13.894	77	Woods, Good, HSG D
13.894		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.7	100	0.0500	0.12		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.75"
5.4	490	0.0900	1.50		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
19.1	590	Total			

Summary for Subcatchment 4: Subcat 4

Runoff = 18.83 cfs @ 12.07 hrs, Volume= 1.205 af, Depth> 2.91"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 10 yr Rainfall=5.35"

Area (ac)	CN	Description
4.972	77	Woods, Good, HSG D
4.972		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.0	100	0.0700	0.14		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.75"
2.7	276	0.1200	1.73		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
14.7	376	Total			

Summary for Link AP-1: AP-1

Inflow Area = 28.657 ac, 0.00% Impervious, Inflow Depth > 2.90" for 10 yr event
Inflow = 73.41 cfs @ 12.24 hrs, Volume= 6.918 af
Primary = 73.41 cfs @ 12.24 hrs, Volume= 6.918 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Link AP-2: AP-2

Inflow Area = 52.384 ac, 0.00% Impervious, Inflow Depth > 2.72" for 10 yr event
Inflow = 133.73 cfs @ 12.21 hrs, Volume= 11.861 af
Primary = 133.73 cfs @ 12.21 hrs, Volume= 11.861 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Link AP-3: AP-3

Inflow Area = 13.894 ac, 0.00% Impervious, Inflow Depth > 2.90" for 10 yr event
Inflow = 46.08 cfs @ 12.12 hrs, Volume= 3.363 af
Primary = 46.08 cfs @ 12.12 hrs, Volume= 3.363 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Link AP-4: AP-4

Inflow Area = 4.972 ac, 0.00% Impervious, Inflow Depth > 2.91" for 10 yr event
Inflow = 18.83 cfs @ 12.07 hrs, Volume= 1.205 af
Primary = 18.83 cfs @ 12.07 hrs, Volume= 1.205 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 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 1: Subcat 1 Runoff Area=28.657 ac 0.00% Impervious Runoff Depth>5.68"
Flow Length=825' Tc=29.3 min CN=77 Runoff=143.37 cfs 13.562 af

Subcatchment 2: Subcat 2 Runoff Area=52.384 ac 0.00% Impervious Runoff Depth>5.44"
Flow Length=2,756' Tc=26.5 min CN=75 Runoff=268.00 cfs 23.764 af

Subcatchment 3: Subcat 3 Runoff Area=13.894 ac 0.00% Impervious Runoff Depth>5.69"
Flow Length=590' Tc=19.1 min CN=77 Runoff=89.39 cfs 6.591 af

Subcatchment 4: Subcat 4 Runoff Area=4.972 ac 0.00% Impervious Runoff Depth>5.70"
Flow Length=376' Tc=14.7 min CN=77 Runoff=36.36 cfs 2.361 af

Link AP-1: AP-1 Inflow=143.37 cfs 13.562 af
Primary=143.37 cfs 13.562 af

Link AP-2: AP-2 Inflow=268.00 cfs 23.764 af
Primary=268.00 cfs 23.764 af

Link AP-3: AP-3 Inflow=89.39 cfs 6.591 af
Primary=89.39 cfs 6.591 af

Link AP-4: AP-4 Inflow=36.36 cfs 2.361 af
Primary=36.36 cfs 2.361 af

Total Runoff Area = 99.907 ac Runoff Volume = 46.279 af Average Runoff Depth = 5.56"
100.00% Pervious = 99.907 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment 1: Subcat 1

Runoff = 143.37 cfs @ 12.23 hrs, Volume= 13.562 af, Depth> 5.68"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 100 yr Rainfall=8.48"

Area (ac)	CN	Description
0.064	30	Woods, Good, HSG A
28.593	77	Woods, Good, HSG D
28.657	77	Weighted Average
28.657		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.7	100	0.0500	0.12		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.75"
15.6	725	0.0240	0.77		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
29.3	825	Total			

Summary for Subcatchment 2: Subcat 2

Runoff = 268.00 cfs @ 12.20 hrs, Volume= 23.764 af, Depth> 5.44"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 100 yr Rainfall=8.48"

Area (ac)	CN	Description
2.525	30	Woods, Good, HSG A
49.859	77	Woods, Good, HSG D
52.384	75	Weighted Average
52.384		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.7	100	0.0750	0.14		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.75"
5.3	553	0.1200	1.73		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
9.5	2,103	0.0600	3.67		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
26.5	2,756	Total			

Summary for Subcatchment 3: Subcat 3

Runoff = 89.39 cfs @ 12.11 hrs, Volume= 6.591 af, Depth> 5.69"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 100 yr Rainfall=8.48"

Area (ac)	CN	Description
13.894	77	Woods, Good, HSG D
13.894		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.7	100	0.0500	0.12		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.75"
5.4	490	0.0900	1.50		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
19.1	590	Total			

Summary for Subcatchment 4: Subcat 4

Runoff = 36.36 cfs @ 12.06 hrs, Volume= 2.361 af, Depth> 5.70"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 100 yr Rainfall=8.48"

Area (ac)	CN	Description
4.972	77	Woods, Good, HSG D
4.972		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.0	100	0.0700	0.14		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.75"
2.7	276	0.1200	1.73		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
14.7	376	Total			

Summary for Link AP-1: AP-1

Inflow Area = 28.657 ac, 0.00% Impervious, Inflow Depth > 5.68" for 100 yr event
Inflow = 143.37 cfs @ 12.23 hrs, Volume= 13.562 af
Primary = 143.37 cfs @ 12.23 hrs, Volume= 13.562 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Link AP-2: AP-2

Inflow Area = 52.384 ac, 0.00% Impervious, Inflow Depth > 5.44" for 100 yr event
Inflow = 268.00 cfs @ 12.20 hrs, Volume= 23.764 af
Primary = 268.00 cfs @ 12.20 hrs, Volume= 23.764 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Link AP-3: AP-3

Inflow Area = 13.894 ac, 0.00% Impervious, Inflow Depth > 5.69" for 100 yr event
Inflow = 89.39 cfs @ 12.11 hrs, Volume= 6.591 af
Primary = 89.39 cfs @ 12.11 hrs, Volume= 6.591 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

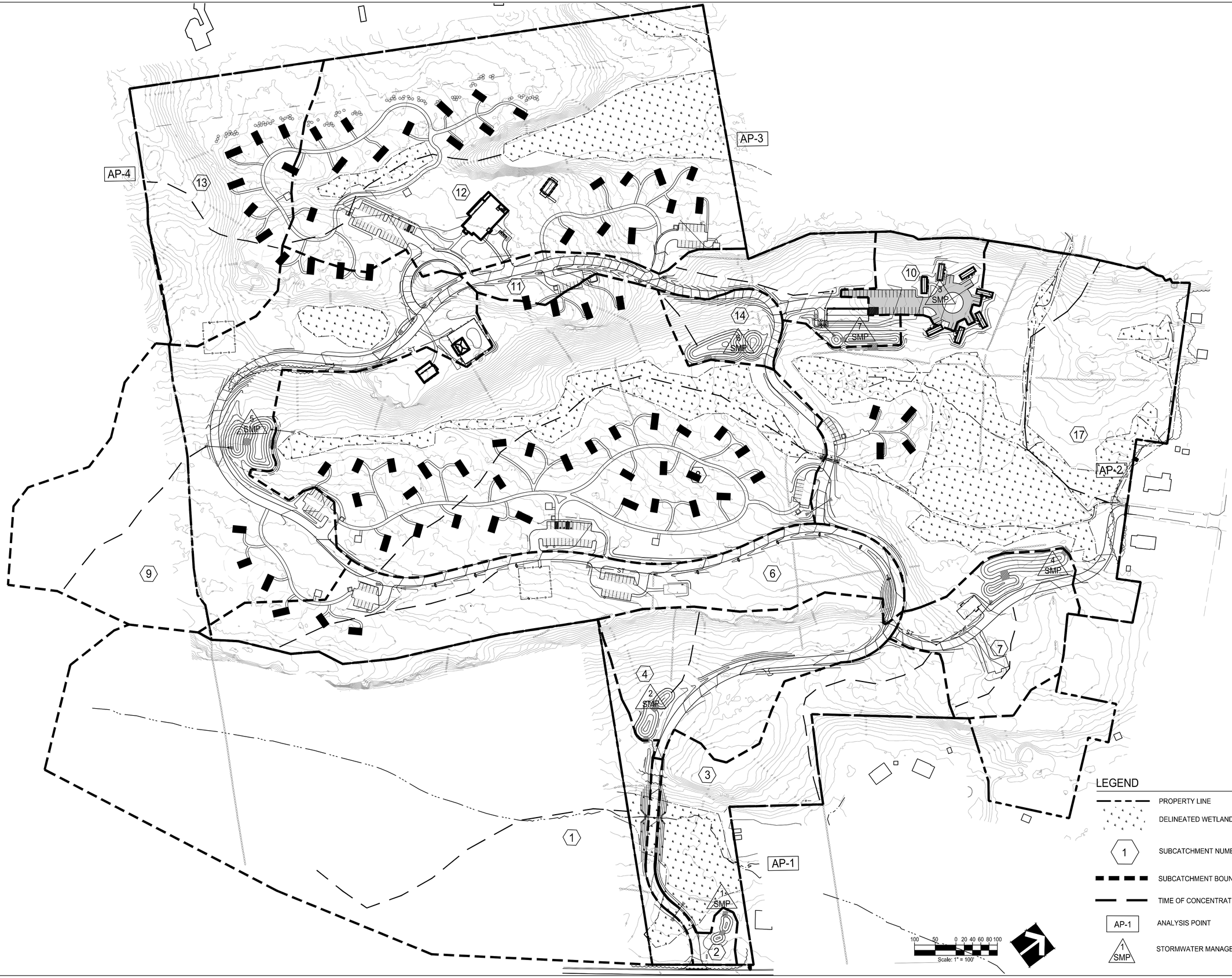
Summary for Link AP-4: AP-4

Inflow Area = 4.972 ac, 0.00% Impervious, Inflow Depth > 5.70" for 100 yr event
Inflow = 36.36 cfs @ 12.06 hrs, Volume= 2.361 af
Primary = 36.36 cfs @ 12.06 hrs, Volume= 2.361 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Attachment C

Proposed Conditions Watershed Map,
HydroCAD Calculations



The LA GROUP
Landscape Architecture & Engineering P.C.
People. Purpose. Place.
40 Long Alley
Saratoga Springs
NY 12866
p. 518-587-8100
f. 518-587-0180
www.thelagroup.com

Unauthorized alteration or addition to this document is a violation of Section 7209 of the New York State Education Law.

© the LA Group 2022

Prepared for:

TERRAMOR

550 N 31st Street
Billings, MT 59101

Civil Engineer:
C.T. Male Associates
50 Century Hill Drive
Latham, NY 12110

Architect:
DGC Architects
40 Church Street, Studio A
Ellsworth, ME 04605

Traffic Engineer:
GPI
80 Wolf Road, Suite 300,
Albany, NY 12205

Surveyor:
Ausfeld & Waldruff
323 Clinton Street
Schenectady, NY 12305

Project Title:

Terramor Catskills

NY ROUTE 212
Saugerties, NY 12477

ISSUED FOR:
SITE PLAN / SPECIAL USE APP.

Project No.:			2021096
Design:			BCS
Drawn:	BCS	Ch'k'd:	DBH
Date:	07/02/2022	Scale:	1"=100'

Rev:	Description:	Date:
1	TOWN COMMENTS	12/02/2022

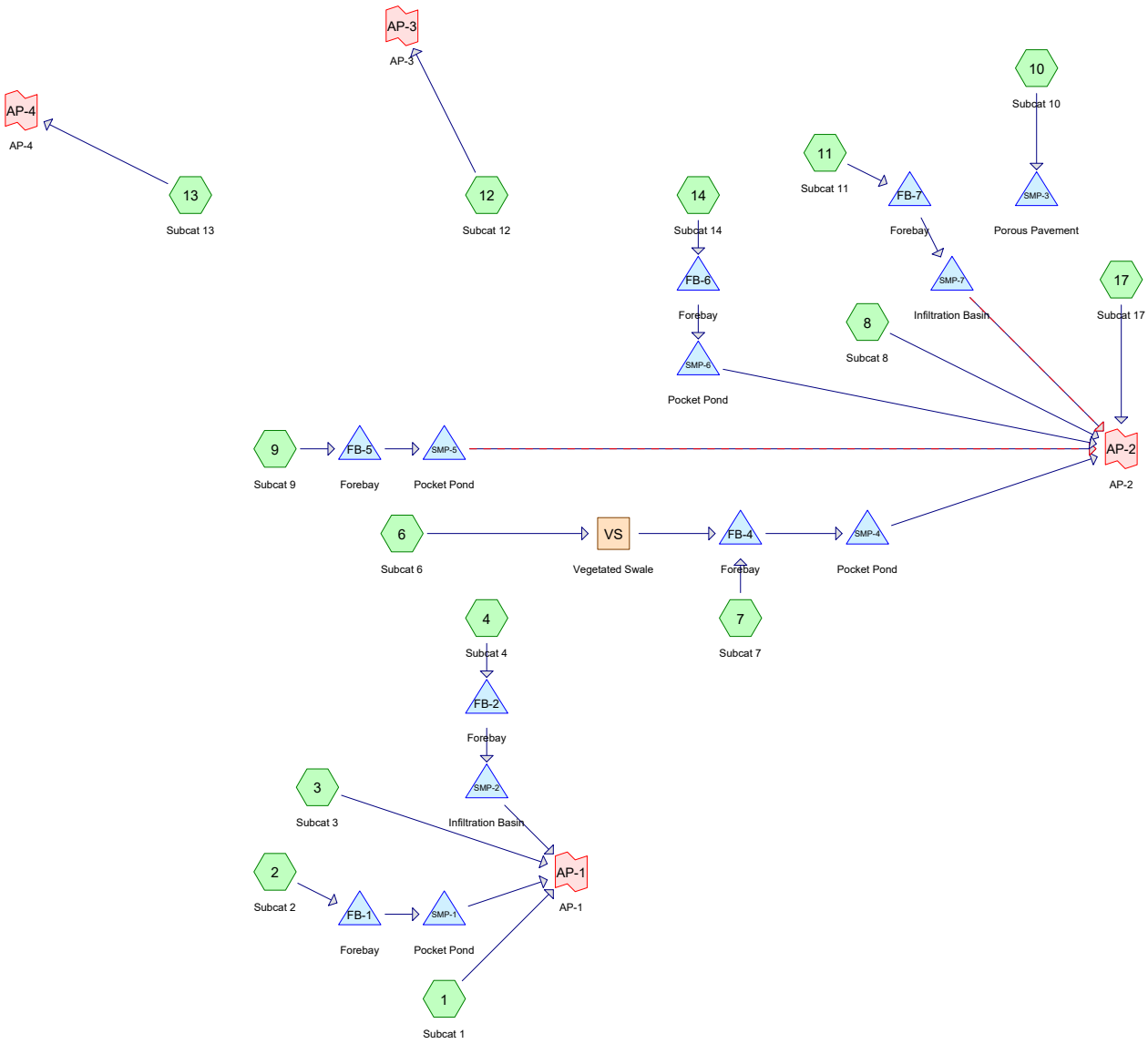
Drawing Title

Post Development Watershed Map

Drawing No.

W-2

Plotted By: BRETT STROM
Plot Date: 12/2/2022 9:56:56 AM
File Name: G:\Proj-2021\2021096_Terramor_Saugerties\2021096\Work\Civil\Post Development-12-2-2022.dwg



Subcat Reach Pond Link

Routing Diagram for Post Development
Prepared by The LA Group, Printed 12/2/2022
HydroCAD® 10.00-26 s/n 00439 © 2020 HydroCAD Software Solutions LLC

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.041	39	>75% Grass cover, Good, HSG A (10)
1.225	80	>75% Grass cover, Good, HSG D (1, 2, 3, 6, 7, 8, 9, 10, 12)
0.938	30	Meadow, non-grazed, HSG A (10, 11, 14, 17)
9.044	78	Meadow, non-grazed, HSG D (1, 2, 3, 4, 6, 7, 8, 9, 10, 11, 12, 13, 14, 17)
0.732	98	Paved parking, HSG A (10, 11, 14, 17)
4.209	98	Paved parking, HSG D (1, 2, 3, 4, 6, 7, 8, 9, 10, 11, 12, 14, 17)
1.536	78	Porous Gravel, HSG D (6, 8, 9, 11, 12, 13, 17)
0.877	30	Woods, Good, HSG A (3, 10, 11, 14, 17)
81.313	77	Woods, Good, HSG D (1, 2, 3, 4, 6, 7, 8, 9, 10, 11, 12, 13, 14, 17)
99.915	**77**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
2.588	HSG A	3, 10, 11, 14, 17
0.000	HSG B	
0.000	HSG C	
97.327	HSG D	1, 2, 3, 4, 6, 7, 8, 9, 10, 11, 12, 13, 14, 17
0.000	Other	
99.915		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.041	0.000	0.000	1.225	0.000	1.266	>75% Grass cover, Good	1, 2, 3, 6, 7, 8, 9, 10, 12
0.938	0.000	0.000	9.044	0.000	9.982	Meadow, non-grazed	1, 2, 3, 4, 6, 7, 8, 9, 10, 11, 12, 13, 14, 17
0.732	0.000	0.000	4.209	0.000	4.941	Paved parking	1, 2, 3, 4, 6, 7, 8, 9, 10, 11, 12, 14, 17
0.000	0.000	0.000	1.536	0.000	1.536	Porous Gravel	6, 8, 9, 11, 12, 13, 17
0.877	0.000	0.000	81.313	0.000	82.190	Woods, Good	1, 2, 3, 4, 6, 7, 8, 9, 10, 11, 12, 13, 14, 17
2.588	**0.000**	**0.000**	**97.327**	**0.000**	**99.915**	**TOTAL AREA**	

Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 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 1: Subcat 1 Runoff Area=20.569 ac 0.01% Impervious Runoff Depth>0.87"
Flow Length=825' Tc=29.3 min CN=77 Runoff=14.86 cfs 1.497 af

Subcatchment 2: Subcat 2 Runoff Area=0.500 ac 49.38% Impervious Runoff Depth>1.57"
Tc=6.0 min CN=88 Runoff=1.34 cfs 0.065 af

Subcatchment 3: Subcat 3 Runoff Area=3.964 ac 0.02% Impervious Runoff Depth>0.83"
Flow Length=591' Tc=17.7 min CN=76 Runoff=3.68 cfs 0.273 af

Subcatchment 4: Subcat 4 Runoff Area=3.872 ac 8.63% Impervious Runoff Depth>0.98"
Flow Length=205' Tc=11.6 min CN=79 Runoff=5.42 cfs 0.318 af

Subcatchment 6: Subcat 6 Runoff Area=5.982 ac 14.76% Impervious Runoff Depth>1.04"
Flow Length=664' Slope=0.0400 '/' Tc=24.4 min CN=80 Runoff=5.96 cfs 0.517 af

Subcatchment 7: Subcat 7 Runoff Area=2.646 ac 12.48% Impervious Runoff Depth>1.04"
Flow Length=316' Tc=18.8 min CN=80 Runoff=3.09 cfs 0.229 af

Subcatchment 8: Subcat 8 Runoff Area=15.238 ac 1.96% Impervious Runoff Depth>0.93"
Flow Length=885' Tc=26.0 min CN=78 Runoff=12.79 cfs 1.176 af

Subcatchment 9: Subcat 9 Runoff Area=11.231 ac 7.55% Impervious Runoff Depth>0.98"
Flow Length=494' Tc=18.3 min CN=79 Runoff=12.52 cfs 0.920 af

Subcatchment 10: Subcat 10 Runoff Area=1.233 ac 37.55% Impervious Runoff Depth>1.10"
Tc=6.0 min CN=81 Runoff=2.37 cfs 0.113 af

Subcatchment 11: Subcat 11 Runoff Area=2.804 ac 21.08% Impervious Runoff Depth>0.52"
Flow Length=378' Tc=11.2 min CN=69 Runoff=1.84 cfs 0.122 af

Subcatchment 12: Subcat 12 Runoff Area=12.958 ac 3.77% Impervious Runoff Depth>0.93"
Flow Length=590' Tc=19.1 min CN=78 Runoff=13.16 cfs 1.003 af

Subcatchment 13: Subcat 13 Runoff Area=4.972 ac 0.00% Impervious Runoff Depth>0.88"
Flow Length=376' Tc=14.7 min CN=77 Runoff=5.45 cfs 0.364 af

Subcatchment 14: Subcat 14 Runoff Area=0.986 ac 17.02% Impervious Runoff Depth>0.83"
Flow Length=138' Tc=7.4 min CN=76 Runoff=1.34 cfs 0.068 af

Subcatchment 17: Subcat 17 Runoff Area=12.961 ac 2.22% Impervious Runoff Depth>0.73"
Flow Length=558' Tc=8.8 min CN=74 Runoff=14.42 cfs 0.793 af

Reach VS: Vegetated Swale Avg. Flow Depth=0.37' Max Vel=4.24 fps Inflow=5.96 cfs 0.517 af
n=0.025 L=1,344.0' S=0.0286 '/' Capacity=184.69 cfs Outflow=5.55 cfs 0.512 af

Pond FB-1: Forebay Peak Elev=431.65' Storage=1,081 cf Inflow=1.34 cfs 0.065 af
Outflow=1.33 cfs 0.065 af

Pond FB-2: Forebay Peak Elev=439.36' Storage=3,109 cf Inflow=5.42 cfs 0.318 af
Outflow=5.34 cfs 0.317 af

Pond FB-4: Forebay Peak Elev=446.21' Storage=5,068 cf Inflow=7.12 cfs 0.741 af
Outflow=7.09 cfs 0.741 af

Pond FB-5: Forebay Peak Elev=492.39' Storage=10,115 cf Inflow=12.52 cfs 0.920 af
Outflow=12.37 cfs 0.918 af

Pond FB-6: Forebay Peak Elev=461.13' Storage=5,324 cf Inflow=1.34 cfs 0.068 af
Outflow=1.19 cfs 0.068 af

Pond FB-7: Forebay Peak Elev=457.18' Storage=1,266 cf Inflow=1.84 cfs 0.122 af
Outflow=1.77 cfs 0.122 af

Pond SMP-1: Pocket Pond Peak Elev=431.64' Storage=1,591 cf Inflow=1.33 cfs 0.065 af
Outflow=1.28 cfs 0.065 af

Pond SMP-2: Infiltration Basin Peak Elev=437.70' Storage=2,957 cf Inflow=5.34 cfs 0.317 af
Discarded=2.31 cfs 0.317 af Primary=0.00 cfs 0.000 af Outflow=2.31 cfs 0.317 af

Pond SMP-3: Porous Pavement Peak Elev=321.78' Storage=50 cf Inflow=2.37 cfs 0.113 af
Outflow=2.33 cfs 0.113 af

Pond SMP-4: Pocket Pond Peak Elev=446.28' Storage=23,082 cf Inflow=7.09 cfs 0.741 af
Outflow=6.75 cfs 0.737 af

Pond SMP-5: Pocket Pond Peak Elev=490.71' Storage=13,123 cf Inflow=12.37 cfs 0.918 af
Primary=8.34 cfs 0.902 af Secondary=0.00 cfs 0.000 af Outflow=8.34 cfs 0.902 af

Pond SMP-6: Pocket Pond Peak Elev=461.07' Storage=17,671 cf Inflow=1.19 cfs 0.068 af
Outflow=0.94 cfs 0.068 af

Pond SMP-7: Infiltration Basin Peak Elev=454.82' Storage=550 cf Inflow=1.77 cfs 0.122 af
Primary=1.02 cfs 0.122 af Secondary=0.00 cfs 0.000 af Outflow=1.02 cfs 0.122 af

Link AP-1: AP-1 Inflow=17.70 cfs 1.835 af
Primary=17.70 cfs 1.835 af

Link AP-2: AP-2 Inflow=31.32 cfs 3.798 af
Primary=31.32 cfs 3.798 af

Link AP-3: AP-3 Inflow=13.16 cfs 1.003 af
Primary=13.16 cfs 1.003 af

Link AP-4: AP-4 Inflow=5.45 cfs 0.364 af
Primary=5.45 cfs 0.364 af

Total Runoff Area = 99.915 ac Runoff Volume = 7.457 af Average Runoff Depth = 0.90"
95.06% Pervious = 94.975 ac 4.94% Impervious = 4.941 ac

Summary for Subcatchment 1: Subcat 1

Runoff = 14.86 cfs @ 12.26 hrs, Volume= 1.497 af, Depth> 0.87"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 1 yr Rainfall=2.72"

Area (ac)	CN	Description
0.070	80	>75% Grass cover, Good, HSG D
0.258	78	Meadow, non-grazed, HSG D
0.002	98	Paved parking, HSG D
20.239	77	Woods, Good, HSG D
20.569	77	Weighted Average
20.567		99.99% Pervious Area
0.002		0.01% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.7	100	0.0500	0.12		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.75"
15.6	725	0.0240	0.77		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
29.3	825	Total			

Summary for Subcatchment 2: Subcat 2

Runoff = 1.34 cfs @ 11.97 hrs, Volume= 0.065 af, Depth> 1.57"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 1 yr Rainfall=2.72"

Area (ac)	CN	Description
0.065	80	>75% Grass cover, Good, HSG D
0.150	78	Meadow, non-grazed, HSG D
0.247	98	Paved parking, HSG D
0.037	77	Woods, Good, HSG D
0.500	88	Weighted Average
0.253		50.62% Pervious Area
0.247		49.38% Impervious Area

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

Summary for Subcatchment 3: Subcat 3

Runoff = 3.68 cfs @ 12.12 hrs, Volume= 0.273 af, Depth> 0.83"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 1 yr Rainfall=2.72"

Area (ac)	CN	Description
0.017	80	>75% Grass cover, Good, HSG D
0.324	78	Meadow, non-grazed, HSG D
0.001	98	Paved parking, HSG D
0.064	30	Woods, Good, HSG A
3.559	77	Woods, Good, HSG D
3.964	76	Weighted Average
3.963		99.98% Pervious Area
0.001		0.02% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.4	100	0.1000	0.16		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.75"
7.3	491	0.0500	1.12		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
17.7	591	Total			

Summary for Subcatchment 4: Subcat 4

Runoff = 5.42 cfs @ 12.04 hrs, Volume= 0.318 af, Depth> 0.98"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 1 yr Rainfall=2.72"

Area (ac)	CN	Description
0.699	78	Meadow, non-grazed, HSG D
0.334	98	Paved parking, HSG D
2.839	77	Woods, Good, HSG D
3.872	79	Weighted Average
3.538		91.37% Pervious Area
0.334		8.63% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.4	100	0.1000	0.16		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.75"
1.2	105	0.0900	1.50		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
11.6	205	Total			

Summary for Subcatchment 6: Subcat 6

Runoff = 5.96 cfs @ 12.19 hrs, Volume= 0.517 af, Depth> 1.04"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 1 yr Rainfall=2.72"

	Area (ac)	CN	Description
	0.016	80	>75% Grass cover, Good, HSG D
	0.947	78	Meadow, non-grazed, HSG D
	0.883	98	Paved parking, HSG D
*	0.136	78	Porous Gravel, HSG D
	4.000	77	Woods, Good, HSG D
	5.982	80	Weighted Average
	5.099		85.24% Pervious Area
	0.883		14.76% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.0	100	0.0400	0.11		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.75"
9.4	564	0.0400	1.00		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
24.4	664	Total			

Summary for Subcatchment 7: Subcat 7

Runoff = 3.09 cfs @ 12.12 hrs, Volume= 0.229 af, Depth> 1.04"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 1 yr Rainfall=2.72"

Area (ac)	CN	Description
0.068	80	>75% Grass cover, Good, HSG D
0.782	78	Meadow, non-grazed, HSG D
0.330	98	Paved parking, HSG D
1.466	77	Woods, Good, HSG D
2.646	80	Weighted Average
2.315		87.52% Pervious Area
0.330		12.48% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.0	100	0.0400	0.11		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.75"
3.8	216	0.0350	0.94		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
18.8	316	Total			

Summary for Subcatchment 8: Subcat 8

Runoff = 12.79 cfs @ 12.21 hrs, Volume= 1.176 af, Depth> 0.93"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 1 yr Rainfall=2.72"

	Area (ac)	CN	Description
	0.300	80	>75% Grass cover, Good, HSG D
	1.535	78	Meadow, non-grazed, HSG D
	0.298	98	Paved parking, HSG D
*	0.552	78	Porous Gravel, HSG D
	12.553	77	Woods, Good, HSG D
	15.238	78	Weighted Average
	14.940		98.04% Pervious Area
	0.298		1.96% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.7	100	0.0500	0.12		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.75"
12.3	785	0.0450	1.06		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
26.0	885	Total			

Summary for Subcatchment 9: Subcat 9

Runoff = 12.52 cfs @ 12.12 hrs, Volume= 0.920 af, Depth> 0.98"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 1 yr Rainfall=2.72"

	Area (ac)	CN	Description
	0.148	80	>75% Grass cover, Good, HSG D
	1.643	78	Meadow, non-grazed, HSG D
	0.848	98	Paved parking, HSG D
*	0.160	78	Porous Gravel, HSG D
	8.432	77	Woods, Good, HSG D
	11.231	79	Weighted Average
	10.383		92.45% Pervious Area
	0.848		7.55% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.7	100	0.0750	0.14		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.75"
6.6	394	0.0400	1.00		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
18.3	494	Total			

Summary for Subcatchment 10: Subcat 10

Runoff = 2.37 cfs @ 11.98 hrs, Volume= 0.113 af, Depth> 1.10"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 1 yr Rainfall=2.72"

Area (ac)	CN	Description
0.041	39	>75% Grass cover, Good, HSG A
0.004	80	>75% Grass cover, Good, HSG D
0.058	30	Meadow, non-grazed, HSG A
0.165	78	Meadow, non-grazed, HSG D
0.356	98	Paved parking, HSG A
0.108	98	Paved parking, HSG D
0.001	30	Woods, Good, HSG A
0.500	77	Woods, Good, HSG D
1.233	81	Weighted Average
0.770		62.45% Pervious Area
0.463		37.55% Impervious Area

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

Summary for Subcatchment 11: Subcat 11

Runoff = 1.84 cfs @ 12.05 hrs, Volume= 0.122 af, Depth> 0.52"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 1 yr Rainfall=2.72"

	Area (ac)	CN	Description
	0.491	30	Meadow, non-grazed, HSG A
	0.407	78	Meadow, non-grazed, HSG D
	0.221	98	Paved parking, HSG A
	0.370	98	Paved parking, HSG D
*	0.023	78	Porous Gravel, HSG D
	0.259	30	Woods, Good, HSG A
	1.033	77	Woods, Good, HSG D
	2.804	69	Weighted Average
	2.213		78.92% Pervious Area
	0.591		21.08% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.9	100	0.2000	0.21		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.75"
3.3	278	0.0800	1.41		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
11.2	378	Total			

Summary for Subcatchment 12: Subcat 12

Runoff = 13.16 cfs @ 12.13 hrs, Volume= 1.003 af, Depth> 0.93"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 1 yr Rainfall=2.72"

	Area (ac)	CN	Description
	0.537	80	>75% Grass cover, Good, HSG D
	0.938	78	Meadow, non-grazed, HSG D
	0.488	98	Paved parking, HSG D
*	0.558	78	Porous Gravel, HSG D
	10.437	77	Woods, Good, HSG D
	12.958	78	Weighted Average
	12.470		96.23% Pervious Area
	0.488		3.77% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.7	100	0.0500	0.12		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.75"
5.4	490	0.0900	1.50		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
19.1	590	Total			

Summary for Subcatchment 13: Subcat 13

Runoff = 5.45 cfs @ 12.08 hrs, Volume= 0.364 af, Depth> 0.88"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 1 yr Rainfall=2.72"

	Area (ac)	CN	Description
	0.046	78	Meadow, non-grazed, HSG D
*	0.061	78	Porous Gravel, HSG D
	4.865	77	Woods, Good, HSG D
	4.972	77	Weighted Average
	4.972		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.0	100	0.0700	0.14		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.75"
2.7	276	0.1200	1.73		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
14.7	376	Total			

Summary for Subcatchment 14: Subcat 14

Runoff = 1.34 cfs @ 12.00 hrs, Volume= 0.068 af, Depth> 0.83"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 1 yr Rainfall=2.72"

Area (ac)	CN	Description
0.080	30	Meadow, non-grazed, HSG A
0.368	78	Meadow, non-grazed, HSG D
0.123	98	Paved parking, HSG A
0.045	98	Paved parking, HSG D
0.023	30	Woods, Good, HSG A
0.347	77	Woods, Good, HSG D
0.986	76	Weighted Average
0.818		82.98% Pervious Area
0.168		17.02% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.1	100	0.2600	0.23		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.75"
0.3	38	0.1600	2.00		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
7.4	138	Total			

Summary for Subcatchment 17: Subcat 17

Runoff = 14.42 cfs @ 12.01 hrs, Volume= 0.793 af, Depth> 0.73"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 1 yr Rainfall=2.72"

	Area (ac)	CN	Description
	0.308	30	Meadow, non-grazed, HSG A
	0.782	78	Meadow, non-grazed, HSG D
	0.032	98	Paved parking, HSG A
	0.256	98	Paved parking, HSG D
*	0.046	78	Porous Gravel, HSG D
	0.530	30	Woods, Good, HSG A
	11.007	77	Woods, Good, HSG D
	12.961	74	Weighted Average
	12.673		97.78% Pervious Area
	0.288		2.22% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.5	100	0.2300	0.22		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.75"
1.3	458	0.1600	6.00		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
8.8	558	Total			

Summary for Reach VS: Vegetated Swale

Inflow Area = 5.982 ac, 14.76% Impervious, Inflow Depth > 1.04" for 1 yr event
Inflow = 5.96 cfs @ 12.19 hrs, Volume= 0.517 af
Outflow = 5.55 cfs @ 12.35 hrs, Volume= 0.512 af, Atten= 7%, Lag= 9.3 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 4.24 fps, Min. Travel Time= 5.3 min
Avg. Velocity = 1.57 fps, Avg. Travel Time= 14.3 min

Peak Storage= 1,772 cf @ 12.26 hrs
Average Depth at Peak Storage= 0.37'
Bank-Full Depth= 2.00' Flow Area= 17.0 sf, Capacity= 184.69 cfs

2.50' x 2.00' deep channel, n= 0.025 Earth, clean & winding
Side Slope Z-value= 3.0 '/' Top Width= 14.50'
Length= 1,344.0' Slope= 0.0286 '/'
Inlet Invert= 496.00', Outlet Invert= 457.50'

‡

Summary for Pond FB-1: Forebay

Inflow Area = 0.500 ac, 49.38% Impervious, Inflow Depth > 1.57" for 1 yr event
Inflow = 1.34 cfs @ 11.97 hrs, Volume= 0.065 af
Outflow = 1.33 cfs @ 11.99 hrs, Volume= 0.065 af, Atten= 1%, Lag= 1.0 min
Primary = 1.33 cfs @ 11.99 hrs, Volume= 0.065 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Starting Elev= 431.50' Surf.Area= 648 sf Storage= 983 cf
Peak Elev= 431.65' @ 11.99 hrs Surf.Area= 689 sf Storage= 1,081 cf (99 cf above start)

Plug-Flow detention time= 173.1 min calculated for 0.043 af (65% of inflow)
Center-of-Mass det. time= 1.5 min (819.6 - 818.1)

Volume	Invert	Avail.Storage	Storage Description
#1	428.00'	2,296 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
428.00	33	25.0	0	0	33
430.00	300	63.0	288	288	313
432.00	793	101.0	1,054	1,342	836
433.00	1,124	119.0	954	2,296	1,169

Device	Routing	Invert	Outlet Devices
#1	Primary	431.50'	**10.0' long x 5.0' 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) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=1.28 cfs @ 11.99 hrs HW=431.64' (Free Discharge)
1=Broad-Crested Rectangular Weir (Weir Controls 1.28 cfs @ 0.89 fps)

Summary for Pond FB-2: Forebay

Inflow Area = 3.872 ac, 8.63% Impervious, Inflow Depth > 0.98" for 1 yr event
Inflow = 5.42 cfs @ 12.04 hrs, Volume= 0.318 af
Outflow = 5.34 cfs @ 12.06 hrs, Volume= 0.317 af, Atten= 2%, Lag= 1.0 min
Primary = 5.34 cfs @ 12.06 hrs, Volume= 0.317 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Starting Elev= 439.00' Surf.Area= 1,307 sf Storage= 2,612 cf
Peak Elev= 439.36' @ 12.06 hrs Surf.Area= 1,457 sf Storage= 3,109 cf (497 cf above start)

Plug-Flow detention time= 118.6 min calculated for 0.257 af (81% of inflow)
Center-of-Mass det. time= 2.2 min (857.1 - 854.9)

Volume	Invert	Avail.Storage	Storage Description
#1	434.00'	4,132 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
434.00	2	23.0	0	0	2
436.00	353	78.0	254	254	455
438.00	935	116.0	1,242	1,496	1,073
440.00	1,742	153.0	2,635	4,132	1,910

Device	Routing	Invert	Outlet Devices
#1	Primary	439.00'	**10.0' long x 5.0' 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) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=5.23 cfs @ 12.06 hrs HW=439.36' (Free Discharge)
1=Broad-Crested Rectangular Weir (Weir Controls 5.23 cfs @ 1.47 fps)

Summary for Pond FB-4: Forebay

Inflow Area = 8.628 ac, 14.06% Impervious, Inflow Depth > 1.03" for 1 yr event
Inflow = 7.12 cfs @ 12.30 hrs, Volume= 0.741 af
Outflow = 7.09 cfs @ 12.31 hrs, Volume= 0.741 af, Atten= 0%, Lag= 0.7 min
Primary = 7.09 cfs @ 12.31 hrs, Volume= 0.741 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 2

Starting Elev= 446.00' Surf.Area= 2,286 sf Storage= 4,573 cf
Peak Elev= 446.21' @ 12.31 hrs Surf.Area= 2,418 sf Storage= 5,068 cf (495 cf above start)

Plug-Flow detention time= 90.9 min calculated for 0.634 af (86% of inflow)
Center-of-Mass det. time= 1.3 min (868.2 - 866.8)

Volume	Invert	Avail.Storage	Storage Description
#1	442.00'	7,182 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
442.00	201	89.0	0	0	201
444.00	1,140	172.0	1,213	1,213	1,945
446.00	2,286	210.0	3,360	4,573	3,161
447.00	2,945	229.0	2,609	7,182	3,860

Device	Routing	Invert	Outlet Devices
#1	Primary	446.00'	**30.0' long x 8.0' 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) 2.43 2.54 2.70 2.69 2.68 2.68 2.66 2.64 2.64 2.64 2.65 2.65 2.66 2.66 2.68 2.70 2.74

Primary OutFlow Max=7.04 cfs @ 12.31 hrs HW=446.21' (Free Discharge)
1=Broad-Crested Rectangular Weir (Weir Controls 7.04 cfs @ 1.12 fps)

Summary for Pond FB-5: Forebay

Inflow Area = 11.231 ac, 7.55% Impervious, Inflow Depth > 0.98" for 1 yr event
Inflow = 12.52 cfs @ 12.12 hrs, Volume= 0.920 af
Outflow = 12.37 cfs @ 12.14 hrs, Volume= 0.918 af, Atten= 1%, Lag= 1.3 min
Primary = 12.37 cfs @ 12.14 hrs, Volume= 0.918 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Starting Elev= 492.00' Surf.Area= 3,065 sf Storage= 8,856 cf
Peak Elev= 492.39' @ 12.14 hrs Surf.Area= 3,319 sf Storage= 10,115 cf (1,258 cf above start)

Plug-Flow detention time= 133.9 min calculated for 0.714 af (78% of inflow)
Center-of-Mass det. time= 2.2 min (862.0 - 859.8)

Volume	Invert	Avail.Storage	Storage Description
#1	486.00'	16,334 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
486.00	248	100.0	0	0	248
488.00	961	137.0	1,131	1,131	985
490.00	1,899	175.0	2,807	3,939	1,979
492.00	3,065	213.0	4,918	8,856	3,214
494.00	4,456	251.0	7,478	16,334	4,692

Device	Routing	Invert	Outlet Devices
#1	Primary	492.00'	**20.0' long x 5.0' 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) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=12.22 cfs @ 12.14 hrs HW=492.39' (Free Discharge)
1=Broad-Crested Rectangular Weir (Weir Controls 12.22 cfs @ 1.56 fps)

Summary for Pond FB-6: Forebay

Inflow Area = 0.986 ac, 17.02% Impervious, Inflow Depth > 0.83" for 1 yr event
Inflow = 1.34 cfs @ 12.00 hrs, Volume= 0.068 af
Outflow = 1.19 cfs @ 12.04 hrs, Volume= 0.068 af, Atten= 11%, Lag= 2.4 min
Primary = 1.19 cfs @ 12.04 hrs, Volume= 0.068 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Starting Elev= 461.00' Surf.Area= 1,983 sf Storage= 5,062 cf
Peak Elev= 461.13' @ 12.04 hrs Surf.Area= 2,046 sf Storage= 5,324 cf (262 cf above start)

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= 4.3 min (866.7 - 862.5)

Volume	Invert	Avail.Storage	Storage Description
#1	456.00'	7,295 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
456.00	280	66.0	0	0	280
458.00	792	104.0	1,029	1,029	821
460.00	1,530	142.0	2,282	3,310	1,605
462.00	2,494	180.0	3,985	7,295	2,631

Device	Routing	Invert	Outlet Devices
#1	Primary	461.00'	**10.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=1.14 cfs @ 12.04 hrs HW=461.13' (Free Discharge)
1=Broad-Crested Rectangular Weir (Weir Controls 1.14 cfs @ 0.89 fps)

Summary for Pond FB-7: Forebay

Inflow Area = 2.804 ac, 21.08% Impervious, Inflow Depth > 0.52" for 1 yr event
Inflow = 1.84 cfs @ 12.05 hrs, Volume= 0.122 af
Outflow = 1.77 cfs @ 12.07 hrs, Volume= 0.122 af, Atten= 4%, Lag= 1.1 min
Primary = 1.77 cfs @ 12.07 hrs, Volume= 0.122 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 2

Starting Elev= 457.00' Surf.Area= 907 sf Storage= 1,099 cf
Peak Elev= 457.18' @ 12.07 hrs Surf.Area= 965 sf Storage= 1,266 cf (167 cf above start)

Plug-Flow detention time= 138.6 min calculated for 0.097 af (79% of inflow)
Center-of-Mass det. time= 1.8 min (895.4 - 893.6)

Volume	Invert	Avail.Storage	Storage Description
#1	454.00'	2,175 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
454.00	11	12.0	0	0	11
455.00	77	31.0	39	39	79
456.00	615	88.0	303	342	623
457.00	907	107.0	756	1,099	933
458.00	1,256	126.0	1,077	2,175	1,304

Device	Routing	Invert	Outlet Devices
#1	Primary	457.00'	**10.0' long x 5.0' 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) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=1.71 cfs @ 12.07 hrs HW=457.17' (Free Discharge)
1=Broad-Crested Rectangular Weir (Weir Controls 1.71 cfs @ 0.98 fps)

Summary for Pond SMP-1: Pocket Pond

Inflow Area = 0.500 ac, 49.38% Impervious, Inflow Depth > 1.57" for 1 yr event
Inflow = 1.33 cfs @ 11.99 hrs, Volume= 0.065 af
Outflow = 1.28 cfs @ 12.00 hrs, Volume= 0.065 af, Atten= 4%, Lag= 1.1 min
Primary = 1.28 cfs @ 12.00 hrs, Volume= 0.065 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Starting Elev= 431.50' Surf.Area= 913 sf Storage= 1,456 cf
Peak Elev= 431.64' @ 12.00 hrs Surf.Area= 964 sf Storage= 1,591 cf (135 cf above start)

Plug-Flow detention time= 240.0 min calculated for 0.032 af (49% of inflow)
Center-of-Mass det. time= 2.1 min (821.6 - 819.6)

Volume	Invert	Avail.Storage	Storage Description
#1	428.00'	3,247 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
428.00	46	34.0	0	0	46
430.00	467	86.0	440	440	557
432.00	1,095	123.0	1,518	1,958	1,207
433.00	1,494	142.0	1,289	3,247	1,629

Device	Routing	Invert	Outlet Devices
#1	Primary	431.50'	**10.0' long x 5.0' 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) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=1.26 cfs @ 12.00 hrs HW=431.64' (Free Discharge)
1=Broad-Crested Rectangular Weir (Weir Controls 1.26 cfs @ 0.88 fps)

Summary for Pond SMP-2: Infiltration Basin

Inflow Area = 3.872 ac, 8.63% Impervious, Inflow Depth > 0.98" for 1 yr event
Inflow = 5.34 cfs @ 12.06 hrs, Volume= 0.317 af
Outflow = 2.31 cfs @ 12.22 hrs, Volume= 0.317 af, Atten= 57%, Lag= 9.9 min
Discarded = 2.31 cfs @ 12.22 hrs, Volume= 0.317 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 437.70' @ 12.22 hrs Surf.Area= 1,662 sf Storage= 2,957 cf

Plug-Flow detention time= 10.0 min calculated for 0.317 af (100% of inflow)
Center-of-Mass det. time= 9.9 min (867.0 - 857.1)

Volume	Invert	Avail.Storage	Storage Description
#1	434.00'	8,430 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
434.00	169	63.0	0	0	169
436.00	808	120.0	898	898	1,019
438.00	1,843	179.0	2,581	3,479	2,454
440.00	3,168	231.0	4,952	8,430	4,200

Device	Routing	Invert	Outlet Devices
#1	Primary	439.00'	**10.0' long x 5.0' 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) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88
#2	Discarded	434.00'	**60.000 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=2.30 cfs @ 12.22 hrs HW=437.69' (Free Discharge)
2=Exfiltration (Exfiltration Controls 2.30 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=434.00' (Free Discharge)
1=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Summary for Pond SMP-3: Porous Pavement

Inflow Area = 1.233 ac, 37.55% Impervious, Inflow Depth > 1.10" for 1 yr event
Inflow = 2.37 cfs @ 11.98 hrs, Volume= 0.113 af
Outflow = 2.33 cfs @ 11.98 hrs, Volume= 0.113 af, Atten= 2%, Lag= 0.3 min
Discarded = 2.33 cfs @ 11.98 hrs, Volume= 0.113 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 321.78' @ 11.98 hrs Surf.Area= 18,932 sf Storage= 50 cf

Plug-Flow detention time= 0.4 min calculated for 0.113 af (100% of inflow)
Center-of-Mass det. time= 0.3 min (844.1 - 843.8)

Volume	Invert	Avail.Storage	Storage Description
#1	321.77'	7,573 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
321.77	18,932	0.0	0	0
322.77	18,932	40.0	7,573	7,573

Device	Routing	Invert	Outlet Devices
#1	Discarded	321.77'	**8.000 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=3.51 cfs @ 11.98 hrs HW=321.78' (Free Discharge)
1=Exfiltration (Exfiltration Controls 3.51 cfs)

Summary for Pond SMP-4: Pocket Pond

Inflow Area = 8.628 ac, 14.06% Impervious, Inflow Depth > 1.03" for 1 yr event
Inflow = 7.09 cfs @ 12.31 hrs, Volume= 0.741 af
Outflow = 6.75 cfs @ 12.38 hrs, Volume= 0.737 af, Atten= 5%, Lag= 4.3 min
Primary = 6.75 cfs @ 12.38 hrs, Volume= 0.737 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 3
Starting Elev= 446.00' Surf.Area= 8,770 sf Storage= 20,568 cf
Peak Elev= 446.28' @ 12.38 hrs Surf.Area= 9,168 sf Storage= 23,082 cf (2,514 cf above start)

Plug-Flow detention time= 348.5 min calculated for 0.265 af (36% of inflow)
Center-of-Mass det. time= 7.4 min (875.5 - 868.2)

Volume	Invert	Avail.Storage	Storage Description
#1	442.00'	30,060 cf	**Custom Stage Data (Irregular)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
442.00	1,925	377.0	0	0	1,925
444.00	5,146	427.0	6,812	6,812	5,224
446.00	8,770	478.0	13,756	20,568	9,006
447.00	10,232	497.0	9,492	30,060	10,559

Device	Routing	Invert	Outlet Devices
#1	Primary	446.00'	**18.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=6.70 cfs @ 12.38 hrs HW=446.28' (Free Discharge)
↑—**1=Broad-Crested Rectangular Weir** (Weir Controls 6.70 cfs @ 1.33 fps)

Summary for Pond SMP-5: Pocket Pond

Inflow Area = 11.231 ac, 7.55% Impervious, Inflow Depth > 0.98" for 1 yr event
Inflow = 12.37 cfs @ 12.14 hrs, Volume= 0.918 af
Outflow = 8.34 cfs @ 12.28 hrs, Volume= 0.902 af, Atten= 33%, Lag= 8.4 min
Primary = 8.34 cfs @ 12.28 hrs, Volume= 0.902 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 3
Starting Elev= 489.00' Surf.Area= 3,219 sf Storage= 6,394 cf
Peak Elev= 490.71' @ 12.28 hrs Surf.Area= 4,667 sf Storage= 13,123 cf (6,729 cf above start)

Plug-Flow detention time= 121.1 min calculated for 0.755 af (82% of inflow)
Center-of-Mass det. time= 13.7 min (875.6 - 862.0)

Volume	Invert	Avail.Storage	Storage Description
#1	486.00'	33,639 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
486.00	1,163	190.0	0	0	1,163
488.00	2,474	234.0	3,555	3,555	2,707
490.00	4,062	281.0	6,471	10,026	4,701
492.00	5,875	320.0	9,881	19,908	6,660
494.00	7,907	357.0	13,732	33,639	8,766

Device	Routing	Invert	Outlet Devices
#1	Secondary	493.00'	**20.0' long x 5.0' 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) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88
#2	Primary	489.00'	**18.0" Round Culvert** L= 25.0' Ke= 0.500 Inlet / Outlet Invert= 489.00' / 488.50' S= 0.0200 '/' Cc= 0.900 n= 0.012, Flow Area= 1.77 sf
#3	Device 2	489.00'	**24.0" W x 12.0" H Vert. Orifice/Grate** C= 0.600
#4	Device 2	492.00'	**30.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=8.30 cfs @ 12.28 hrs HW=490.70' (Free Discharge)
└**2=Culvert** (Inlet Controls 8.30 cfs @ 4.70 fps)
  └**3=Orifice/Grate** (Passes 8.30 cfs of 10.48 cfs potential flow)
  └**4=Orifice/Grate** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=489.00' (Free Discharge)
└**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond SMP-6: Pocket Pond

Inflow Area = 0.986 ac, 17.02% Impervious, Inflow Depth > 0.83" for 1 yr event
Inflow = 1.19 cfs @ 12.04 hrs, Volume= 0.068 af
Outflow = 0.94 cfs @ 12.11 hrs, Volume= 0.068 af, Atten= 21%, Lag= 4.1 min
Primary = 0.94 cfs @ 12.11 hrs, Volume= 0.068 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Starting Elev= 461.00' Surf.Area= 5,556 sf Storage= 17,302 cf
Peak Elev= 461.07' @ 12.11 hrs Surf.Area= 5,622 sf Storage= 17,671 cf (369 cf above start)

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= 6.6 min (873.4 - 866.7)

Volume	Invert	Avail.Storage	Storage Description
#1	454.00'	23,372 cf	**Custom Stage Data (Irregular)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
454.00	152	45.0	0	0	152
456.00	1,083	158.0	1,094	1,094	1,989
458.00	2,830	276.0	3,776	4,870	6,087
460.00	4,602	314.0	7,361	12,230	7,966
462.00	6,600	351.0	11,142	23,372	10,034

Device	Routing	Invert	Outlet Devices
#1	Primary	461.00'	**20.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=0.84 cfs @ 12.11 hrs HW=461.07' (Free Discharge)
└**1=Broad-Crested Rectangular Weir** (Weir Controls 0.84 cfs @ 0.64 fps)

Summary for Pond SMP-7: Infiltration Basin

Inflow Area = 2.804 ac, 21.08% Impervious, Inflow Depth > 0.52" for 1 yr event
Inflow = 1.77 cfs @ 12.07 hrs, Volume= 0.122 af
Outflow = 1.02 cfs @ 12.20 hrs, Volume= 0.122 af, Atten= 42%, Lag= 7.6 min
Primary = 1.02 cfs @ 12.20 hrs, Volume= 0.122 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 3

Peak Elev= 454.82' @ 12.20 hrs Surf.Area= 984 sf Storage= 550 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 2.7 min (898.0 - 895.4)

Volume	Invert	Avail.Storage	Storage Description
#1	454.00'	7,149 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
454.00	403	238.0	0	0	403
455.00	1,147	257.0	743	743	1,191
456.00	1,947	276.0	1,529	2,273	2,040
457.00	2,084	295.0	2,015	4,288	2,949
458.00	3,717	314.0	2,861	7,149	3,919

Device	Routing	Invert	Outlet Devices
#1	Primary	454.00'	**45.000 in/hr Exfiltration over Surface area**
#2	Secondary	456.50'	**25.0' long x 10.0' breadth Broad-Crested Rectangular Weir**
			Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60
			Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=1.02 cfs @ 12.20 hrs HW=454.82' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 1.02 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=454.00' (Free Discharge)
↑—**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Link AP-1: AP-1

Inflow Area = 28.904 ac, 2.02% Impervious, Inflow Depth > 0.76" for 1 yr event
Inflow = 17.70 cfs @ 12.22 hrs, Volume= 1.835 af
Primary = 17.70 cfs @ 12.22 hrs, Volume= 1.835 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Link AP-2: AP-2

Inflow Area = 51.848 ac, 6.57% Impervious, Inflow Depth > 0.88" for 1 yr event
Inflow = 31.32 cfs @ 12.23 hrs, Volume= 3.798 af
Primary = 31.32 cfs @ 12.23 hrs, Volume= 3.798 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Link AP-3: AP-3

Inflow Area = 12.958 ac, 3.77% Impervious, Inflow Depth > 0.93" for 1 yr event
Inflow = 13.16 cfs @ 12.13 hrs, Volume= 1.003 af
Primary = 13.16 cfs @ 12.13 hrs, Volume= 1.003 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Link AP-4: AP-4

Inflow Area = 4.972 ac, 0.00% Impervious, Inflow Depth > 0.88" for 1 yr event
Inflow = 5.45 cfs @ 12.08 hrs, Volume= 0.364 af
Primary = 5.45 cfs @ 12.08 hrs, Volume= 0.364 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 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 1: Subcat 1 Runoff Area=20.569 ac 0.01% Impervious Runoff Depth>2.90"
Flow Length=825' Tc=29.3 min CN=77 Runoff=52.69 cfs 4.965 af

Subcatchment 2: Subcat 2 Runoff Area=0.500 ac 49.38% Impervious Runoff Depth>4.00"
Tc=6.0 min CN=88 Runoff=3.26 cfs 0.166 af

Subcatchment 3: Subcat 3 Runoff Area=3.964 ac 0.02% Impervious Runoff Depth>2.81"
Flow Length=591' Tc=17.7 min CN=76 Runoff=13.27 cfs 0.930 af

Subcatchment 4: Subcat 4 Runoff Area=3.872 ac 8.63% Impervious Runoff Depth>3.10"
Flow Length=205' Tc=11.6 min CN=79 Runoff=17.21 cfs 0.999 af

Subcatchment 6: Subcat 6 Runoff Area=5.982 ac 14.76% Impervious Runoff Depth>3.18"
Flow Length=664' Slope=0.0400 '/' Tc=24.4 min CN=80 Runoff=18.85 cfs 1.586 af

Subcatchment 7: Subcat 7 Runoff Area=2.646 ac 12.48% Impervious Runoff Depth>3.19"
Flow Length=316' Tc=18.8 min CN=80 Runoff=9.69 cfs 0.703 af

Subcatchment 8: Subcat 8 Runoff Area=15.238 ac 1.96% Impervious Runoff Depth>2.99"
Flow Length=885' Tc=26.0 min CN=78 Runoff=43.47 cfs 3.799 af

Subcatchment 9: Subcat 9 Runoff Area=11.231 ac 7.55% Impervious Runoff Depth>3.09"
Flow Length=494' Tc=18.3 min CN=79 Runoff=40.55 cfs 2.894 af

Subcatchment 10: Subcat 10 Runoff Area=1.233 ac 37.55% Impervious Runoff Depth>3.29"
Tc=6.0 min CN=81 Runoff=6.89 cfs 0.338 af

Subcatchment 11: Subcat 11 Runoff Area=2.804 ac 21.08% Impervious Runoff Depth>2.21"
Flow Length=378' Tc=11.2 min CN=69 Runoff=9.01 cfs 0.516 af

Subcatchment 12: Subcat 12 Runoff Area=12.958 ac 3.77% Impervious Runoff Depth>3.00"
Flow Length=590' Tc=19.1 min CN=78 Runoff=44.34 cfs 3.237 af

Subcatchment 13: Subcat 13 Runoff Area=4.972 ac 0.00% Impervious Runoff Depth>2.91"
Flow Length=376' Tc=14.7 min CN=77 Runoff=18.82 cfs 1.205 af

Subcatchment 14: Subcat 14 Runoff Area=0.986 ac 17.02% Impervious Runoff Depth>2.82"
Flow Length=138' Tc=7.4 min CN=76 Runoff=4.64 cfs 0.232 af

Subcatchment 17: Subcat 17 Runoff Area=12.961 ac 2.22% Impervious Runoff Depth>2.64"
Flow Length=558' Tc=8.8 min CN=74 Runoff=54.49 cfs 2.853 af

Reach VS: Vegetated Swale Avg. Flow Depth=0.68' Max Vel=5.92 fps Inflow=18.85 cfs 1.586 af
n=0.025 L=1,344.0' S=0.0286 '/' Capacity=184.69 cfs Outflow=18.07 cfs 1.578 af

Pond FB-1: Forebay Peak Elev=431.76' Storage=1,164 cf Inflow=3.26 cfs 0.166 af
Outflow=3.25 cfs 0.166 af

Pond FB-2: Forebay Peak Elev=439.74' Storage=3,693 cf Inflow=17.21 cfs 0.999 af
Outflow=17.08 cfs 0.998 af

Pond FB-4: Forebay Peak Elev=446.46' Storage=5,690 cf Inflow=24.30 cfs 2.281 af
Outflow=24.20 cfs 2.279 af

Pond FB-5: Forebay Peak Elev=492.83' Storage=11,613 cf Inflow=40.55 cfs 2.894 af
Outflow=40.32 cfs 2.891 af

Pond FB-6: Forebay Peak Elev=461.31' Storage=5,700 cf Inflow=4.64 cfs 0.232 af
Outflow=4.38 cfs 0.232 af

Pond FB-7: Forebay Peak Elev=457.49' Storage=1,581 cf Inflow=9.01 cfs 0.516 af
Outflow=8.85 cfs 0.516 af

Pond SMP-1: Pocket Pond Peak Elev=431.76' Storage=1,707 cf Inflow=3.25 cfs 0.166 af
Outflow=3.20 cfs 0.166 af

Pond SMP-2: Infiltration Basin Peak Elev=439.59' Storage=7,202 cf Inflow=17.08 cfs 0.998 af
Discarded=3.99 cfs 0.813 af Primary=12.26 cfs 0.185 af Outflow=16.24 cfs 0.998 af

Pond SMP-3: Porous Pavement Peak Elev=321.98' Storage=1,592 cf Inflow=6.89 cfs 0.338 af
Outflow=3.51 cfs 0.337 af

Pond SMP-4: Pocket Pond Peak Elev=446.62' Storage=26,250 cf Inflow=24.20 cfs 2.279 af
Outflow=23.55 cfs 2.270 af

Pond SMP-5: Pocket Pond Peak Elev=493.48' Storage=29,692 cf Inflow=40.32 cfs 2.891 af
Primary=16.44 cfs 2.638 af Secondary=17.03 cfs 0.228 af Outflow=33.47 cfs 2.866 af

Pond SMP-6: Pocket Pond Peak Elev=461.18' Storage=18,326 cf Inflow=4.38 cfs 0.232 af
Outflow=3.90 cfs 0.231 af

Pond SMP-7: Infiltration Basin Peak Elev=456.70' Storage=3,679 cf Inflow=8.85 cfs 0.516 af
Primary=2.13 cfs 0.448 af Secondary=5.79 cfs 0.068 af Outflow=7.91 cfs 0.516 af

Link AP-1: AP-1 Inflow=70.06 cfs 6.246 af
Primary=70.06 cfs 6.246 af

Link AP-2: AP-2 Inflow=117.41 cfs 12.534 af
Primary=117.41 cfs 12.534 af

Link AP-3: AP-3 Inflow=44.34 cfs 3.237 af
Primary=44.34 cfs 3.237 af

Link AP-4: AP-4 Inflow=18.82 cfs 1.205 af
Primary=18.82 cfs 1.205 af

Total Runoff Area = 99.915 ac Runoff Volume = 24.423 af Average Runoff Depth = 2.93"
95.06% Pervious = 94.975 ac 4.94% Impervious = 4.941 ac

Summary for Subcatchment 1: Subcat 1

Runoff = 52.69 cfs @ 12.24 hrs, Volume= 4.965 af, Depth> 2.90"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 10 yr Rainfall=5.35"

Area (ac)	CN	Description
0.070	80	>75% Grass cover, Good, HSG D
0.258	78	Meadow, non-grazed, HSG D
0.002	98	Paved parking, HSG D
20.239	77	Woods, Good, HSG D
20.569	77	Weighted Average
20.567		99.99% Pervious Area
0.002		0.01% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.7	100	0.0500	0.12		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.75"
15.6	725	0.0240	0.77		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
29.3	825	Total			

Summary for Subcatchment 2: Subcat 2

Runoff = 3.26 cfs @ 11.97 hrs, Volume= 0.166 af, Depth> 4.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 10 yr Rainfall=5.35"

Area (ac)	CN	Description
0.065	80	>75% Grass cover, Good, HSG D
0.150	78	Meadow, non-grazed, HSG D
0.247	98	Paved parking, HSG D
0.037	77	Woods, Good, HSG D
0.500	88	Weighted Average
0.253		50.62% Pervious Area
0.247		49.38% Impervious Area

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

Summary for Subcatchment 3: Subcat 3

Runoff = 13.27 cfs @ 12.10 hrs, Volume= 0.930 af, Depth> 2.81"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 10 yr Rainfall=5.35"

Area (ac)	CN	Description
0.017	80	>75% Grass cover, Good, HSG D
0.324	78	Meadow, non-grazed, HSG D
0.001	98	Paved parking, HSG D
0.064	30	Woods, Good, HSG A
3.559	77	Woods, Good, HSG D
3.964	76	Weighted Average
3.963		99.98% Pervious Area
0.001		0.02% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.4	100	0.1000	0.16		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.75"
7.3	491	0.0500	1.12		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
17.7	591	Total			

Summary for Subcatchment 4: Subcat 4

Runoff = 17.21 cfs @ 12.03 hrs, Volume= 0.999 af, Depth> 3.10"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 10 yr Rainfall=5.35"

Area (ac)	CN	Description
0.699	78	Meadow, non-grazed, HSG D
0.334	98	Paved parking, HSG D
2.839	77	Woods, Good, HSG D
3.872	79	Weighted Average
3.538		91.37% Pervious Area
0.334		8.63% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.4	100	0.1000	0.16		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.75"
1.2	105	0.0900	1.50		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
11.6	205	Total			

Summary for Subcatchment 6: Subcat 6

Runoff = 18.85 cfs @ 12.18 hrs, Volume= 1.586 af, Depth> 3.18"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 10 yr Rainfall=5.35"

	Area (ac)	CN	Description
	0.016	80	>75% Grass cover, Good, HSG D
	0.947	78	Meadow, non-grazed, HSG D
	0.883	98	Paved parking, HSG D
*	0.136	78	Porous Gravel, HSG D
	4.000	77	Woods, Good, HSG D
	5.982	80	Weighted Average
	5.099		85.24% Pervious Area
	0.883		14.76% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.0	100	0.0400	0.11		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.75"
9.4	564	0.0400	1.00		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
24.4	664	Total			

Summary for Subcatchment 7: Subcat 7

Runoff = 9.69 cfs @ 12.11 hrs, Volume= 0.703 af, Depth> 3.19"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 10 yr Rainfall=5.35"

Area (ac)	CN	Description
0.068	80	>75% Grass cover, Good, HSG D
0.782	78	Meadow, non-grazed, HSG D
0.330	98	Paved parking, HSG D
1.466	77	Woods, Good, HSG D
2.646	80	Weighted Average
2.315		87.52% Pervious Area
0.330		12.48% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.0	100	0.0400	0.11		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.75"
3.8	216	0.0350	0.94		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
18.8	316	Total			

Summary for Subcatchment 8: Subcat 8

Runoff = 43.47 cfs @ 12.20 hrs, Volume= 3.799 af, Depth> 2.99"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 10 yr Rainfall=5.35"

	Area (ac)	CN	Description
	0.300	80	>75% Grass cover, Good, HSG D
	1.535	78	Meadow, non-grazed, HSG D
	0.298	98	Paved parking, HSG D
*	0.552	78	Porous Gravel, HSG D
	12.553	77	Woods, Good, HSG D
	15.238	78	Weighted Average
	14.940		98.04% Pervious Area
	0.298		1.96% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.7	100	0.0500	0.12		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.75"
12.3	785	0.0450	1.06		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
26.0	885	Total			

Summary for Subcatchment 9: Subcat 9

Runoff = 40.55 cfs @ 12.11 hrs, Volume= 2.894 af, Depth> 3.09"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 10 yr Rainfall=5.35"

	Area (ac)	CN	Description
	0.148	80	>75% Grass cover, Good, HSG D
	1.643	78	Meadow, non-grazed, HSG D
	0.848	98	Paved parking, HSG D
*	0.160	78	Porous Gravel, HSG D
	8.432	77	Woods, Good, HSG D
	11.231	79	Weighted Average
	10.383		92.45% Pervious Area
	0.848		7.55% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.7	100	0.0750	0.14		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.75"
6.6	394	0.0400	1.00		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
18.3	494	Total			

Summary for Subcatchment 10: Subcat 10

Runoff = 6.89 cfs @ 11.97 hrs, Volume= 0.338 af, Depth> 3.29"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 10 yr Rainfall=5.35"

Area (ac)	CN	Description
0.041	39	>75% Grass cover, Good, HSG A
0.004	80	>75% Grass cover, Good, HSG D
0.058	30	Meadow, non-grazed, HSG A
0.165	78	Meadow, non-grazed, HSG D
0.356	98	Paved parking, HSG A
0.108	98	Paved parking, HSG D
0.001	30	Woods, Good, HSG A
0.500	77	Woods, Good, HSG D
1.233	81	Weighted Average
0.770		62.45% Pervious Area
0.463		37.55% Impervious Area

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

Summary for Subcatchment 11: Subcat 11

Runoff = 9.01 cfs @ 12.04 hrs, Volume= 0.516 af, Depth> 2.21"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 10 yr Rainfall=5.35"

	Area (ac)	CN	Description
	0.491	30	Meadow, non-grazed, HSG A
	0.407	78	Meadow, non-grazed, HSG D
	0.221	98	Paved parking, HSG A
	0.370	98	Paved parking, HSG D
*	0.023	78	Porous Gravel, HSG D
	0.259	30	Woods, Good, HSG A
	1.033	77	Woods, Good, HSG D
	2.804	69	Weighted Average
	2.213		78.92% Pervious Area
	0.591		21.08% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.9	100	0.2000	0.21		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.75"
3.3	278	0.0800	1.41		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
11.2	378	Total			

Summary for Subcatchment 12: Subcat 12

Runoff = 44.34 cfs @ 12.12 hrs, Volume= 3.237 af, Depth> 3.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 10 yr Rainfall=5.35"

	Area (ac)	CN	Description
	0.537	80	>75% Grass cover, Good, HSG D
	0.938	78	Meadow, non-grazed, HSG D
	0.488	98	Paved parking, HSG D
*	0.558	78	Porous Gravel, HSG D
	10.437	77	Woods, Good, HSG D
	12.958	78	Weighted Average
	12.470		96.23% Pervious Area
	0.488		3.77% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.7	100	0.0500	0.12		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.75"
5.4	490	0.0900	1.50		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
19.1	590	Total			

Summary for Subcatchment 13: Subcat 13

Runoff = 18.82 cfs @ 12.07 hrs, Volume= 1.205 af, Depth> 2.91"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 10 yr Rainfall=5.35"

	Area (ac)	CN	Description
	0.046	78	Meadow, non-grazed, HSG D
*	0.061	78	Porous Gravel, HSG D
	4.865	77	Woods, Good, HSG D
	4.972	77	Weighted Average
	4.972		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.0	100	0.0700	0.14		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.75"
2.7	276	0.1200	1.73		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
14.7	376	Total			

Summary for Subcatchment 14: Subcat 14

Runoff = 4.64 cfs @ 11.99 hrs, Volume= 0.232 af, Depth> 2.82"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 10 yr Rainfall=5.35"

Area (ac)	CN	Description
0.080	30	Meadow, non-grazed, HSG A
0.368	78	Meadow, non-grazed, HSG D
0.123	98	Paved parking, HSG A
0.045	98	Paved parking, HSG D
0.023	30	Woods, Good, HSG A
0.347	77	Woods, Good, HSG D
0.986	76	Weighted Average
0.818		82.98% Pervious Area
0.168		17.02% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.1	100	0.2600	0.23		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.75"
0.3	38	0.1600	2.00		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
7.4	138	Total			

Summary for Subcatchment 17: Subcat 17

Runoff = 54.49 cfs @ 12.00 hrs, Volume= 2.853 af, Depth> 2.64"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 10 yr Rainfall=5.35"

	Area (ac)	CN	Description
	0.308	30	Meadow, non-grazed, HSG A
	0.782	78	Meadow, non-grazed, HSG D
	0.032	98	Paved parking, HSG A
	0.256	98	Paved parking, HSG D
*	0.046	78	Porous Gravel, HSG D
	0.530	30	Woods, Good, HSG A
	11.007	77	Woods, Good, HSG D
	12.961	74	Weighted Average
	12.673		97.78% Pervious Area
	0.288		2.22% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.5	100	0.2300	0.22		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.75"
1.3	458	0.1600	6.00		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
8.8	558	Total			

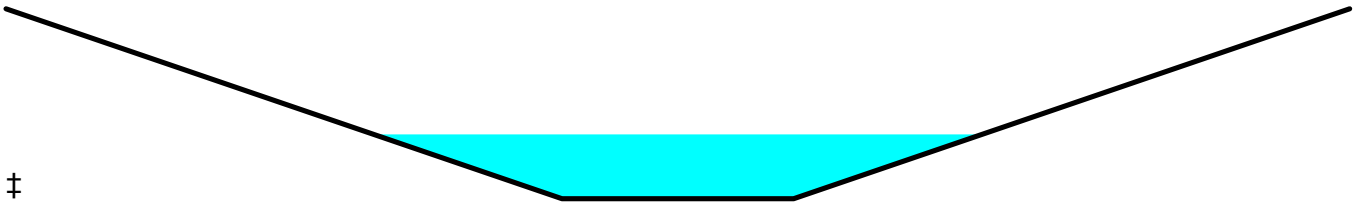
Summary for Reach VS: Vegetated Swale

Inflow Area = 5.982 ac, 14.76% Impervious, Inflow Depth > 3.18" for 10 yr event
Inflow = 18.85 cfs @ 12.18 hrs, Volume= 1.586 af
Outflow = 18.07 cfs @ 12.29 hrs, Volume= 1.578 af, Atten= 4%, Lag= 6.8 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 5.92 fps, Min. Travel Time= 3.8 min
Avg. Velocity = 2.04 fps, Avg. Travel Time= 11.0 min

Peak Storage= 4,131 cf @ 12.22 hrs
Average Depth at Peak Storage= 0.68'
Bank-Full Depth= 2.00' Flow Area= 17.0 sf, Capacity= 184.69 cfs

2.50' x 2.00' deep channel, n= 0.025 Earth, clean & winding
Side Slope Z-value= 3.0 '/' Top Width= 14.50'
Length= 1,344.0' Slope= 0.0286 '/'
Inlet Invert= 496.00', Outlet Invert= 457.50'



‡

Summary for Pond FB-1: Forebay

Inflow Area = 0.500 ac, 49.38% Impervious, Inflow Depth > 4.00" for 10 yr event
Inflow = 3.26 cfs @ 11.97 hrs, Volume= 0.166 af
Outflow = 3.25 cfs @ 11.98 hrs, Volume= 0.166 af, Atten= 0%, Lag= 0.8 min
Primary = 3.25 cfs @ 11.98 hrs, Volume= 0.166 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Starting Elev= 431.50' Surf.Area= 648 sf Storage= 983 cf
Peak Elev= 431.76' @ 11.98 hrs Surf.Area= 723 sf Storage= 1,164 cf (181 cf above start)

Plug-Flow detention time= 95.6 min calculated for 0.144 af (86% of inflow)
Center-of-Mass det. time= 1.3 min (793.0 - 791.7)

Volume	Invert	Avail.Storage	Storage Description
#1	428.00'	2,296 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
428.00	33	25.0	0	0	33
430.00	300	63.0	288	288	313
432.00	793	101.0	1,054	1,342	836
433.00	1,124	119.0	954	2,296	1,169

Device	Routing	Invert	Outlet Devices
#1	Primary	431.50'	**10.0' long x 5.0' 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) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=3.12 cfs @ 11.98 hrs HW=431.76' (Free Discharge)
1=Broad-Crested Rectangular Weir (Weir Controls 3.12 cfs @ 1.21 fps)

Summary for Pond FB-2: Forebay

Inflow Area = 3.872 ac, 8.63% Impervious, Inflow Depth > 3.10" for 10 yr event
Inflow = 17.21 cfs @ 12.03 hrs, Volume= 0.999 af
Outflow = 17.08 cfs @ 12.05 hrs, Volume= 0.998 af, Atten= 1%, Lag= 0.8 min
Primary = 17.08 cfs @ 12.05 hrs, Volume= 0.998 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Starting Elev= 439.00' Surf.Area= 1,307 sf Storage= 2,612 cf
Peak Elev= 439.74' @ 12.05 hrs Surf.Area= 1,623 sf Storage= 3,693 cf (1,081 cf above start)

Plug-Flow detention time= 48.0 min calculated for 0.936 af (94% of inflow)
Center-of-Mass det. time= 1.6 min (823.6 - 822.0)

Volume	Invert	Avail.Storage	Storage Description
#1	434.00'	4,132 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
434.00	2	23.0	0	0	2
436.00	353	78.0	254	254	455
438.00	935	116.0	1,242	1,496	1,073
440.00	1,742	153.0	2,635	4,132	1,910

Device	Routing	Invert	Outlet Devices
#1	Primary	439.00'	**10.0' long x 5.0' 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) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=16.97 cfs @ 12.05 hrs HW=439.74' (Free Discharge)
1=Broad-Crested Rectangular Weir (Weir Controls 16.97 cfs @ 2.31 fps)

Summary for Pond FB-4: Forebay

Inflow Area = 8.628 ac, 14.06% Impervious, Inflow Depth > 3.17" for 10 yr event
Inflow = 24.30 cfs @ 12.23 hrs, Volume= 2.281 af
Outflow = 24.20 cfs @ 12.24 hrs, Volume= 2.279 af, Atten= 0%, Lag= 0.5 min
Primary = 24.20 cfs @ 12.24 hrs, Volume= 2.279 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 2

Starting Elev= 446.00' Surf.Area= 2,286 sf Storage= 4,573 cf
Peak Elev= 446.46' @ 12.24 hrs Surf.Area= 2,578 sf Storage= 5,690 cf (1,117 cf above start)

Plug-Flow detention time= 37.8 min calculated for 2.174 af (95% of inflow)
Center-of-Mass det. time= 1.0 min (834.5 - 833.5)

Volume	Invert	Avail.Storage	Storage Description
#1	442.00'	7,182 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
442.00	201	89.0	0	0	201
444.00	1,140	172.0	1,213	1,213	1,945
446.00	2,286	210.0	3,360	4,573	3,161
447.00	2,945	229.0	2,609	7,182	3,860

Device	Routing	Invert	Outlet Devices
#1	Primary	446.00'	**30.0' long x 8.0' 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) 2.43 2.54 2.70 2.69 2.68 2.68 2.66 2.64 2.64 2.64 2.65 2.65 2.66 2.66 2.68 2.70 2.74

Primary OutFlow Max=24.08 cfs @ 12.24 hrs HW=446.46' (Free Discharge)
1=Broad-Crested Rectangular Weir (Weir Controls 24.08 cfs @ 1.75 fps)

Summary for Pond FB-5: Forebay

Inflow Area = 11.231 ac, 7.55% Impervious, Inflow Depth > 3.09" for 10 yr event
Inflow = 40.55 cfs @ 12.11 hrs, Volume= 2.894 af
Outflow = 40.32 cfs @ 12.12 hrs, Volume= 2.891 af, Atten= 1%, Lag= 0.9 min
Primary = 40.32 cfs @ 12.12 hrs, Volume= 2.891 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Starting Elev= 492.00' Surf.Area= 3,065 sf Storage= 8,856 cf
Peak Elev= 492.83' @ 12.12 hrs Surf.Area= 3,609 sf Storage= 11,613 cf (2,757 cf above start)

Plug-Flow detention time= 54.0 min calculated for 2.682 af (93% of inflow)
Center-of-Mass det. time= 1.7 min (828.8 - 827.1)

Volume	Invert	Avail.Storage	Storage Description
#1	486.00'	16,334 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
486.00	248	100.0	0	0	248
488.00	961	137.0	1,131	1,131	985
490.00	1,899	175.0	2,807	3,939	1,979
492.00	3,065	213.0	4,918	8,856	3,214
494.00	4,456	251.0	7,478	16,334	4,692

Device	Routing	Invert	Outlet Devices
#1	Primary	492.00'	**20.0' long x 5.0' 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) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=39.66 cfs @ 12.12 hrs HW=492.82' (Free Discharge)
1=Broad-Crested Rectangular Weir (Weir Controls 39.66 cfs @ 2.42 fps)

Summary for Pond FB-6: Forebay

Inflow Area = 0.986 ac, 17.02% Impervious, Inflow Depth > 2.82" for 10 yr event
Inflow = 4.64 cfs @ 11.99 hrs, Volume= 0.232 af
Outflow = 4.38 cfs @ 12.01 hrs, Volume= 0.232 af, Atten= 6%, Lag= 1.5 min
Primary = 4.38 cfs @ 12.01 hrs, Volume= 0.232 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Starting Elev= 461.00' Surf.Area= 1,983 sf Storage= 5,062 cf
Peak Elev= 461.31' @ 12.01 hrs Surf.Area= 2,135 sf Storage= 5,700 cf (639 cf above start)

Plug-Flow detention time= 243.2 min calculated for 0.115 af (50% of inflow)
Center-of-Mass det. time= 3.5 min (829.9 - 826.4)

Volume	Invert	Avail.Storage	Storage Description
#1	456.00'	7,295 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
456.00	280	66.0	0	0	280
458.00	792	104.0	1,029	1,029	821
460.00	1,530	142.0	2,282	3,310	1,605
462.00	2,494	180.0	3,985	7,295	2,631

Device	Routing	Invert	Outlet Devices
#1	Primary	461.00'	**10.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=4.26 cfs @ 12.01 hrs HW=461.31' (Free Discharge)
1=Broad-Crested Rectangular Weir (Weir Controls 4.26 cfs @ 1.40 fps)

Summary for Pond FB-7: Forebay

Inflow Area = 2.804 ac, 21.08% Impervious, Inflow Depth > 2.21" for 10 yr event
Inflow = 9.01 cfs @ 12.04 hrs, Volume= 0.516 af
Outflow = 8.85 cfs @ 12.04 hrs, Volume= 0.516 af, Atten= 2%, Lag= 0.5 min
Primary = 8.85 cfs @ 12.04 hrs, Volume= 0.516 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 2

Starting Elev= 457.00' Surf.Area= 907 sf Storage= 1,099 cf
Peak Elev= 457.49' @ 12.04 hrs Surf.Area= 1,070 sf Storage= 1,581 cf (483 cf above start)

Plug-Flow detention time= 37.5 min calculated for 0.489 af (95% of inflow)
Center-of-Mass det. time= 1.3 min (847.6 - 846.3)

Volume	Invert	Avail.Storage	Storage Description
#1	454.00'	2,175 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
454.00	11	12.0	0	0	11
455.00	77	31.0	39	39	79
456.00	615	88.0	303	342	623
457.00	907	107.0	756	1,099	933
458.00	1,256	126.0	1,077	2,175	1,304

Device	Routing	Invert	Outlet Devices
#1	Primary	457.00'	**10.0' long x 5.0' 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) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=8.74 cfs @ 12.04 hrs HW=457.49' (Free Discharge)
1=Broad-Crested Rectangular Weir (Weir Controls 8.74 cfs @ 1.80 fps)

Summary for Pond SMP-1: Pocket Pond

Inflow Area = 0.500 ac, 49.38% Impervious, Inflow Depth > 4.00" for 10 yr event
Inflow = 3.25 cfs @ 11.98 hrs, Volume= 0.166 af
Outflow = 3.20 cfs @ 11.99 hrs, Volume= 0.166 af, Atten= 2%, Lag= 0.8 min
Primary = 3.20 cfs @ 11.99 hrs, Volume= 0.166 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Starting Elev= 431.50' Surf.Area= 913 sf Storage= 1,456 cf
Peak Elev= 431.76' @ 11.99 hrs Surf.Area= 1,006 sf Storage= 1,707 cf (251 cf above start)

Plug-Flow detention time= 123.7 min calculated for 0.133 af (80% of inflow)
Center-of-Mass det. time= 1.9 min (794.9 - 793.0)

Volume	Invert	Avail.Storage	Storage Description
#1	428.00'	3,247 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
428.00	46	34.0	0	0	46
430.00	467	86.0	440	440	557
432.00	1,095	123.0	1,518	1,958	1,207
433.00	1,494	142.0	1,289	3,247	1,629

Device	Routing	Invert	Outlet Devices
#1	Primary	431.50'	**10.0' long x 5.0' 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) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=3.13 cfs @ 11.99 hrs HW=431.76' (Free Discharge)
1=Broad-Crested Rectangular Weir (Weir Controls 3.13 cfs @ 1.21 fps)

Summary for Pond SMP-2: Infiltration Basin

Inflow Area = 3.872 ac, 8.63% Impervious, Inflow Depth > 3.09" for 10 yr event
Inflow = 17.08 cfs @ 12.05 hrs, Volume= 0.998 af
Outflow = 16.24 cfs @ 12.09 hrs, Volume= 0.998 af, Atten= 5%, Lag= 2.4 min
Discarded = 3.99 cfs @ 12.09 hrs, Volume= 0.813 af
Primary = 12.26 cfs @ 12.09 hrs, Volume= 0.185 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 439.59' @ 12.09 hrs Surf.Area= 2,869 sf Storage= 7,202 cf

Plug-Flow detention time= 12.3 min calculated for 0.998 af (100% of inflow)
Center-of-Mass det. time= 12.2 min (835.7 - 823.6)

Volume	Invert	Avail.Storage	Storage Description
#1	434.00'	8,430 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
434.00	169	63.0	0	0	169
436.00	808	120.0	898	898	1,019
438.00	1,843	179.0	2,581	3,479	2,454
440.00	3,168	231.0	4,952	8,430	4,200

Device	Routing	Invert	Outlet Devices
#1	Primary	439.00'	**10.0' long x 5.0' 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) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88
#2	Discarded	434.00'	**60.000 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=3.97 cfs @ 12.09 hrs HW=439.58' (Free Discharge)
2=Exfiltration (Exfiltration Controls 3.97 cfs)

Primary OutFlow Max=11.86 cfs @ 12.09 hrs HW=439.58' (Free Discharge)
1=Broad-Crested Rectangular Weir (Weir Controls 11.86 cfs @ 2.04 fps)

Summary for Pond SMP-3: Porous Pavement

Inflow Area = 1.233 ac, 37.55% Impervious, Inflow Depth > 3.29" for 10 yr event
Inflow = 6.89 cfs @ 11.97 hrs, Volume= 0.338 af
Outflow = 3.51 cfs @ 11.90 hrs, Volume= 0.337 af, Atten= 49%, Lag= 0.0 min
Discarded = 3.51 cfs @ 11.90 hrs, Volume= 0.337 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 321.98' @ 12.07 hrs Surf.Area= 18,932 sf Storage= 1,592 cf

Plug-Flow detention time= 5.2 min calculated for 0.337 af (99% of inflow)
Center-of-Mass det. time= 2.1 min (814.5 - 812.5)

Volume	Invert	Avail.Storage	Storage Description
#1	321.77'	7,573 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
321.77	18,932	0.0	0	0
322.77	18,932	40.0	7,573	7,573

Device	Routing	Invert	Outlet Devices
#1	Discarded	321.77'	**8.000 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=3.51 cfs @ 11.90 hrs HW=321.80' (Free Discharge)
1=Exfiltration (Exfiltration Controls 3.51 cfs)

Summary for Pond SMP-4: Pocket Pond

Inflow Area = 8.628 ac, 14.06% Impervious, Inflow Depth > 3.17" for 10 yr event
Inflow = 24.20 cfs @ 12.24 hrs, Volume= 2.279 af
Outflow = 23.55 cfs @ 12.29 hrs, Volume= 2.270 af, Atten= 3%, Lag= 2.8 min
Primary = 23.55 cfs @ 12.29 hrs, Volume= 2.270 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 3
Starting Elev= 446.00' Surf.Area= 8,770 sf Storage= 20,568 cf
Peak Elev= 446.62' @ 12.29 hrs Surf.Area= 9,659 sf Storage= 26,250 cf (5,682 cf above start)

Plug-Flow detention time= 124.4 min calculated for 1.798 af (79% of inflow)
Center-of-Mass det. time= 5.3 min (839.8 - 834.5)

Volume	Invert	Avail.Storage	Storage Description
#1	442.00'	30,060 cf	**Custom Stage Data (Irregular)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
442.00	1,925	377.0	0	0	1,925
444.00	5,146	427.0	6,812	6,812	5,224
446.00	8,770	478.0	13,756	20,568	9,006
447.00	10,232	497.0	9,492	30,060	10,559

Device	Routing	Invert	Outlet Devices
#1	Primary	446.00'	**18.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=23.44 cfs @ 12.29 hrs HW=446.62' (Free Discharge)
↑—**1=Broad-Crested Rectangular Weir** (Weir Controls 23.44 cfs @ 2.12 fps)

Summary for Pond SMP-5: Pocket Pond

Inflow Area = 11.231 ac, 7.55% Impervious, Inflow Depth > 3.09" for 10 yr event
Inflow = 40.32 cfs @ 12.12 hrs, Volume= 2.891 af
Outflow = 33.47 cfs @ 12.22 hrs, Volume= 2.866 af, Atten= 17%, Lag= 5.9 min
Primary = 16.44 cfs @ 12.22 hrs, Volume= 2.638 af
Secondary = 17.03 cfs @ 12.22 hrs, Volume= 0.228 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 3
Starting Elev= 489.00' Surf.Area= 3,219 sf Storage= 6,394 cf
Peak Elev= 493.48' @ 12.22 hrs Surf.Area= 7,352 sf Storage= 29,692 cf (23,298 cf above start)

Plug-Flow detention time= 57.0 min calculated for 2.719 af (94% of inflow)
Center-of-Mass det. time= 13.7 min (842.5 - 828.8)

Volume	Invert	Avail.Storage	Storage Description
#1	486.00'	33,639 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
486.00	1,163	190.0	0	0	1,163
488.00	2,474	234.0	3,555	3,555	2,707
490.00	4,062	281.0	6,471	10,026	4,701
492.00	5,875	320.0	9,881	19,908	6,660
494.00	7,907	357.0	13,732	33,639	8,766

Device	Routing	Invert	Outlet Devices
#1	Secondary	493.00'	**20.0' long x 5.0' 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) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88
#2	Primary	489.00'	**18.0" Round Culvert** L= 25.0' Ke= 0.500 Inlet / Outlet Invert= 489.00' / 488.50' S= 0.0200 '/' Cc= 0.900 n= 0.012, Flow Area= 1.77 sf
#3	Device 2	489.00'	**24.0" W x 12.0" H Vert. Orifice/Grate** C= 0.600
#4	Device 2	492.00'	**30.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=16.37 cfs @ 12.22 hrs HW=493.45' (Free Discharge)
└**2=Culvert** (Inlet Controls 16.37 cfs @ 9.26 fps)
  └**3=Orifice/Grate** (Passes < 19.13 cfs potential flow)
  └**4=Orifice/Grate** (Passes < 28.49 cfs potential flow)

Secondary OutFlow Max=15.57 cfs @ 12.22 hrs HW=493.45' (Free Discharge)
└**1=Broad-Crested Rectangular Weir** (Weir Controls 15.57 cfs @ 1.72 fps)

Summary for Pond SMP-6: Pocket Pond

Inflow Area = 0.986 ac, 17.02% Impervious, Inflow Depth > 2.82" for 10 yr event
Inflow = 4.38 cfs @ 12.01 hrs, Volume= 0.232 af
Outflow = 3.90 cfs @ 12.06 hrs, Volume= 0.231 af, Atten= 11%, Lag= 2.8 min
Primary = 3.90 cfs @ 12.06 hrs, Volume= 0.231 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Starting Elev= 461.00' Surf.Area= 5,556 sf Storage= 17,302 cf
Peak Elev= 461.18' @ 12.06 hrs Surf.Area= 5,739 sf Storage= 18,326 cf (1,025 cf above start)

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= 5.7 min (835.6 - 829.9)

Volume	Invert	Avail.Storage	Storage Description
#1	454.00'	23,372 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
454.00	152	45.0	0	0	152
456.00	1,083	158.0	1,094	1,094	1,989
458.00	2,830	276.0	3,776	4,870	6,087
460.00	4,602	314.0	7,361	12,230	7,966
462.00	6,600	351.0	11,142	23,372	10,034

Device	Routing	Invert	Outlet Devices
#1	Primary	461.00'	**20.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=3.78 cfs @ 12.06 hrs HW=461.18' (Free Discharge)
└**1=Broad-Crested Rectangular Weir** (Weir Controls 3.78 cfs @ 1.05 fps)

Summary for Pond SMP-7: Infiltration Basin

Inflow Area = 2.804 ac, 21.08% Impervious, Inflow Depth > 2.21" for 10 yr event
Inflow = 8.85 cfs @ 12.04 hrs, Volume= 0.516 af
Outflow = 7.91 cfs @ 12.11 hrs, Volume= 0.516 af, Atten= 11%, Lag= 3.8 min
Primary = 2.13 cfs @ 12.11 hrs, Volume= 0.448 af
Secondary = 5.79 cfs @ 12.11 hrs, Volume= 0.068 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 3

Peak Elev= 456.70' @ 12.11 hrs Surf.Area= 2,043 sf Storage= 3,679 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 9.0 min (856.6 - 847.6)

Volume	Invert	Avail.Storage	Storage Description
#1	454.00'	7,149 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
454.00	403	238.0	0	0	403
455.00	1,147	257.0	743	743	1,191
456.00	1,947	276.0	1,529	2,273	2,040
457.00	2,084	295.0	2,015	4,288	2,949
458.00	3,717	314.0	2,861	7,149	3,919

Device	Routing	Invert	Outlet Devices
#1	Primary	454.00'	**45.000 in/hr Exfiltration over Surface area**
#2	Secondary	456.50'	**25.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=2.13 cfs @ 12.11 hrs HW=456.70' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 2.13 cfs)

Secondary OutFlow Max=5.45 cfs @ 12.11 hrs HW=456.70' (Free Discharge)
↑—**2=Broad-Crested Rectangular Weir** (Weir Controls 5.45 cfs @ 1.11 fps)

Summary for Link AP-1: AP-1

Inflow Area = 28.904 ac, 2.02% Impervious, Inflow Depth > 2.59" for 10 yr event
Inflow = 70.06 cfs @ 12.16 hrs, Volume= 6.246 af
Primary = 70.06 cfs @ 12.16 hrs, Volume= 6.246 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Link AP-2: AP-2

Inflow Area = 51.848 ac, 6.57% Impervious, Inflow Depth > 2.90" for 10 yr event
Inflow = 117.41 cfs @ 12.20 hrs, Volume= 12.534 af
Primary = 117.41 cfs @ 12.20 hrs, Volume= 12.534 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Link AP-3: AP-3

Inflow Area = 12.958 ac, 3.77% Impervious, Inflow Depth > 3.00" for 10 yr event
Inflow = 44.34 cfs @ 12.12 hrs, Volume= 3.237 af
Primary = 44.34 cfs @ 12.12 hrs, Volume= 3.237 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Link AP-4: AP-4

Inflow Area = 4.972 ac, 0.00% Impervious, Inflow Depth > 2.91" for 10 yr event
Inflow = 18.82 cfs @ 12.07 hrs, Volume= 1.205 af
Primary = 18.82 cfs @ 12.07 hrs, Volume= 1.205 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 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 1: Subcat 1 Runoff Area=20.569 ac 0.01% Impervious Runoff Depth>5.68"
Flow Length=825' Tc=29.3 min CN=77 Runoff=102.91 cfs 9.734 af

Subcatchment 2: Subcat 2 Runoff Area=0.500 ac 49.38% Impervious Runoff Depth>7.03"
Tc=6.0 min CN=88 Runoff=5.54 cfs 0.293 af

Subcatchment 3: Subcat 3 Runoff Area=3.964 ac 0.02% Impervious Runoff Depth>5.58"
Flow Length=591' Tc=17.7 min CN=76 Runoff=26.04 cfs 1.841 af

Subcatchment 4: Subcat 4 Runoff Area=3.872 ac 8.63% Impervious Runoff Depth>5.94"
Flow Length=205' Tc=11.6 min CN=79 Runoff=32.26 cfs 1.918 af

Subcatchment 6: Subcat 6 Runoff Area=5.982 ac 14.76% Impervious Runoff Depth>6.05"
Flow Length=664' Slope=0.0400 '/' Tc=24.4 min CN=80 Runoff=35.40 cfs 3.013 af

Subcatchment 7: Subcat 7 Runoff Area=2.646 ac 12.48% Impervious Runoff Depth>6.05"
Flow Length=316' Tc=18.8 min CN=80 Runoff=18.10 cfs 1.334 af

Subcatchment 8: Subcat 8 Runoff Area=15.238 ac 1.96% Impervious Runoff Depth>5.80"
Flow Length=885' Tc=26.0 min CN=78 Runoff=83.62 cfs 7.369 af

Subcatchment 9: Subcat 9 Runoff Area=11.231 ac 7.55% Impervious Runoff Depth>5.93"
Flow Length=494' Tc=18.3 min CN=79 Runoff=76.62 cfs 5.553 af

Subcatchment 10: Subcat 10 Runoff Area=1.233 ac 37.55% Impervious Runoff Depth>6.19"
Tc=6.0 min CN=81 Runoff=12.55 cfs 0.636 af

Subcatchment 11: Subcat 11 Runoff Area=2.804 ac 21.08% Impervious Runoff Depth>4.75"
Flow Length=378' Tc=11.2 min CN=69 Runoff=19.37 cfs 1.110 af

Subcatchment 12: Subcat 12 Runoff Area=12.958 ac 3.77% Impervious Runoff Depth>5.81"
Flow Length=590' Tc=19.1 min CN=78 Runoff=84.92 cfs 6.277 af

Subcatchment 13: Subcat 13 Runoff Area=4.972 ac 0.00% Impervious Runoff Depth>5.70"
Flow Length=376' Tc=14.7 min CN=77 Runoff=36.36 cfs 2.361 af

Subcatchment 14: Subcat 14 Runoff Area=0.986 ac 17.02% Impervious Runoff Depth>5.59"
Flow Length=138' Tc=7.4 min CN=76 Runoff=8.98 cfs 0.459 af

Subcatchment 17: Subcat 17 Runoff Area=12.961 ac 2.22% Impervious Runoff Depth>5.35"
Flow Length=558' Tc=8.8 min CN=74 Runoff=108.55 cfs 5.776 af

Reach VS: Vegetated Swale Avg. Flow Depth=0.93' Max Vel=7.04 fps Inflow=35.40 cfs 3.013 af
n=0.025 L=1,344.0' S=0.0286 '/' Capacity=184.69 cfs Outflow=34.43 cfs 3.003 af

Pond FB-1: Forebay Peak Elev=431.87' Storage=1,240 cf Inflow=5.54 cfs 0.293 af
Outflow=5.52 cfs 0.293 af

Pond FB-2: Forebay Peak Elev=440.13' Storage=4,132 cf Inflow=32.26 cfs 1.918 af
Outflow=32.23 cfs 1.916 af

Pond FB-4: Forebay Peak Elev=446.70' Storage=6,317 cf Inflow=47.12 cfs 4.337 af
Outflow=46.90 cfs 4.335 af

Pond FB-5: Forebay Peak Elev=493.27' Storage=13,291 cf Inflow=76.62 cfs 5.553 af
Outflow=76.29 cfs 5.548 af

Pond FB-6: Forebay Peak Elev=461.48' Storage=6,067 cf Inflow=8.98 cfs 0.459 af
Outflow=8.67 cfs 0.459 af

Pond FB-7: Forebay Peak Elev=457.80' Storage=1,928 cf Inflow=19.37 cfs 1.110 af
Outflow=19.06 cfs 1.109 af

Pond SMP-1: Pocket Pond Peak Elev=431.87' Storage=1,814 cf Inflow=5.52 cfs 0.293 af
Outflow=5.47 cfs 0.292 af

Pond SMP-2: Infiltration Basin Peak Elev=440.02' Storage=8,430 cf Inflow=32.23 cfs 1.916 af
Discarded=4.40 cfs 1.294 af Primary=27.71 cfs 0.620 af Outflow=32.11 cfs 1.914 af

Pond SMP-3: Porous Pavement Peak Elev=322.56' Storage=5,971 cf Inflow=12.55 cfs 0.636 af
Outflow=3.51 cfs 0.633 af

Pond SMP-4: Pocket Pond Peak Elev=446.96' Storage=29,702 cf Inflow=46.90 cfs 4.335 af
Outflow=45.76 cfs 4.321 af

Pond SMP-5: Pocket Pond Peak Elev=494.06' Storage=33,639 cf Inflow=76.29 cfs 5.548 af
Primary=17.66 cfs 4.175 af Secondary=58.08 cfs 1.336 af Outflow=75.74 cfs 5.510 af

Pond SMP-6: Pocket Pond Peak Elev=461.29' Storage=18,970 cf Inflow=8.67 cfs 0.459 af
Outflow=8.01 cfs 0.457 af

Pond SMP-7: Infiltration Basin Peak Elev=456.91' Storage=4,092 cf Inflow=19.06 cfs 1.109 af
Primary=2.16 cfs 0.751 af Secondary=16.61 cfs 0.352 af Outflow=18.76 cfs 1.103 af

Link AP-1: AP-1 Inflow=139.27 cfs 12.488 af
Primary=139.27 cfs 12.488 af

Link AP-2: AP-2 Inflow=261.22 cfs 24.538 af
Primary=261.22 cfs 24.538 af

Link AP-3: AP-3 Inflow=84.92 cfs 6.277 af
Primary=84.92 cfs 6.277 af

Link AP-4: AP-4 Inflow=36.36 cfs 2.361 af
Primary=36.36 cfs 2.361 af

Total Runoff Area = 99.915 ac Runoff Volume = 47.676 af Average Runoff Depth = 5.73"
95.06% Pervious = 94.975 ac 4.94% Impervious = 4.941 ac

Summary for Subcatchment 1: Subcat 1

Runoff = 102.91 cfs @ 12.23 hrs, Volume= 9.734 af, Depth> 5.68"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 100 yr Rainfall=8.48"

Area (ac)	CN	Description
0.070	80	>75% Grass cover, Good, HSG D
0.258	78	Meadow, non-grazed, HSG D
0.002	98	Paved parking, HSG D
20.239	77	Woods, Good, HSG D
20.569	77	Weighted Average
20.567		99.99% Pervious Area
0.002		0.01% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.7	100	0.0500	0.12		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.75"
15.6	725	0.0240	0.77		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
29.3	825	Total			

Summary for Subcatchment 2: Subcat 2

Runoff = 5.54 cfs @ 11.96 hrs, Volume= 0.293 af, Depth> 7.03"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 100 yr Rainfall=8.48"

Area (ac)	CN	Description
0.065	80	>75% Grass cover, Good, HSG D
0.150	78	Meadow, non-grazed, HSG D
0.247	98	Paved parking, HSG D
0.037	77	Woods, Good, HSG D
0.500	88	Weighted Average
0.253		50.62% Pervious Area
0.247		49.38% Impervious Area

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

Summary for Subcatchment 3: Subcat 3

Runoff = 26.04 cfs @ 12.10 hrs, Volume= 1.841 af, Depth> 5.58"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 100 yr Rainfall=8.48"

Area (ac)	CN	Description
0.017	80	>75% Grass cover, Good, HSG D
0.324	78	Meadow, non-grazed, HSG D
0.001	98	Paved parking, HSG D
0.064	30	Woods, Good, HSG A
3.559	77	Woods, Good, HSG D
3.964	76	Weighted Average
3.963		99.98% Pervious Area
0.001		0.02% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.4	100	0.1000	0.16		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.75"
7.3	491	0.0500	1.12		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
17.7	591	Total			

Summary for Subcatchment 4: Subcat 4

Runoff = 32.26 cfs @ 12.03 hrs, Volume= 1.918 af, Depth> 5.94"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 100 yr Rainfall=8.48"

Area (ac)	CN	Description
0.699	78	Meadow, non-grazed, HSG D
0.334	98	Paved parking, HSG D
2.839	77	Woods, Good, HSG D
3.872	79	Weighted Average
3.538		91.37% Pervious Area
0.334		8.63% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.4	100	0.1000	0.16		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.75"
1.2	105	0.0900	1.50		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
11.6	205	Total			

Summary for Subcatchment 6: Subcat 6

Runoff = 35.40 cfs @ 12.17 hrs, Volume= 3.013 af, Depth> 6.05"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 100 yr Rainfall=8.48"

	Area (ac)	CN	Description
	0.016	80	>75% Grass cover, Good, HSG D
	0.947	78	Meadow, non-grazed, HSG D
	0.883	98	Paved parking, HSG D
*	0.136	78	Porous Gravel, HSG D
	4.000	77	Woods, Good, HSG D
	5.982	80	Weighted Average
	5.099		85.24% Pervious Area
	0.883		14.76% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.0	100	0.0400	0.11		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.75"
9.4	564	0.0400	1.00		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
24.4	664	Total			

Summary for Subcatchment 7: Subcat 7

Runoff = 18.10 cfs @ 12.11 hrs, Volume= 1.334 af, Depth> 6.05"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 100 yr Rainfall=8.48"

Area (ac)	CN	Description
0.068	80	>75% Grass cover, Good, HSG D
0.782	78	Meadow, non-grazed, HSG D
0.330	98	Paved parking, HSG D
1.466	77	Woods, Good, HSG D
2.646	80	Weighted Average
2.315		87.52% Pervious Area
0.330		12.48% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.0	100	0.0400	0.11		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.75"
3.8	216	0.0350	0.94		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
18.8	316	Total			

Summary for Subcatchment 8: Subcat 8

Runoff = 83.62 cfs @ 12.19 hrs, Volume= 7.369 af, Depth> 5.80"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 100 yr Rainfall=8.48"

	Area (ac)	CN	Description
	0.300	80	>75% Grass cover, Good, HSG D
	1.535	78	Meadow, non-grazed, HSG D
	0.298	98	Paved parking, HSG D
*	0.552	78	Porous Gravel, HSG D
	12.553	77	Woods, Good, HSG D
	15.238	78	Weighted Average
	14.940		98.04% Pervious Area
	0.298		1.96% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.7	100	0.0500	0.12		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.75"
12.3	785	0.0450	1.06		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
26.0	885	Total			

Summary for Subcatchment 9: Subcat 9

Runoff = 76.62 cfs @ 12.10 hrs, Volume= 5.553 af, Depth> 5.93"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 100 yr Rainfall=8.48"

	Area (ac)	CN	Description
	0.148	80	>75% Grass cover, Good, HSG D
	1.643	78	Meadow, non-grazed, HSG D
	0.848	98	Paved parking, HSG D
*	0.160	78	Porous Gravel, HSG D
	8.432	77	Woods, Good, HSG D
	11.231	79	Weighted Average
	10.383		92.45% Pervious Area
	0.848		7.55% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.7	100	0.0750	0.14		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.75"
6.6	394	0.0400	1.00		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
18.3	494	Total			

Summary for Subcatchment 10: Subcat 10

Runoff = 12.55 cfs @ 11.97 hrs, Volume= 0.636 af, Depth> 6.19"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 100 yr Rainfall=8.48"

Area (ac)	CN	Description
0.041	39	>75% Grass cover, Good, HSG A
0.004	80	>75% Grass cover, Good, HSG D
0.058	30	Meadow, non-grazed, HSG A
0.165	78	Meadow, non-grazed, HSG D
0.356	98	Paved parking, HSG A
0.108	98	Paved parking, HSG D
0.001	30	Woods, Good, HSG A
0.500	77	Woods, Good, HSG D
1.233	81	Weighted Average
0.770		62.45% Pervious Area
0.463		37.55% Impervious Area

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

Summary for Subcatchment 11: Subcat 11

Runoff = 19.37 cfs @ 12.03 hrs, Volume= 1.110 af, Depth> 4.75"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 100 yr Rainfall=8.48"

	Area (ac)	CN	Description
	0.491	30	Meadow, non-grazed, HSG A
	0.407	78	Meadow, non-grazed, HSG D
	0.221	98	Paved parking, HSG A
	0.370	98	Paved parking, HSG D
*	0.023	78	Porous Gravel, HSG D
	0.259	30	Woods, Good, HSG A
	1.033	77	Woods, Good, HSG D
	2.804	69	Weighted Average
	2.213		78.92% Pervious Area
	0.591		21.08% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.9	100	0.2000	0.21		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.75"
3.3	278	0.0800	1.41		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
11.2	378	Total			

Summary for Subcatchment 12: Subcat 12

Runoff = 84.92 cfs @ 12.11 hrs, Volume= 6.277 af, Depth> 5.81"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 100 yr Rainfall=8.48"

	Area (ac)	CN	Description
	0.537	80	>75% Grass cover, Good, HSG D
	0.938	78	Meadow, non-grazed, HSG D
	0.488	98	Paved parking, HSG D
*	0.558	78	Porous Gravel, HSG D
	10.437	77	Woods, Good, HSG D
	12.958	78	Weighted Average
	12.470		96.23% Pervious Area
	0.488		3.77% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.7	100	0.0500	0.12		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.75"
5.4	490	0.0900	1.50		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
19.1	590	Total			

Summary for Subcatchment 13: Subcat 13

Runoff = 36.36 cfs @ 12.06 hrs, Volume= 2.361 af, Depth> 5.70"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 100 yr Rainfall=8.48"

	Area (ac)	CN	Description
	0.046	78	Meadow, non-grazed, HSG D
*	0.061	78	Porous Gravel, HSG D
	4.865	77	Woods, Good, HSG D
	4.972	77	Weighted Average
	4.972		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.0	100	0.0700	0.14		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.75"
2.7	276	0.1200	1.73		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
14.7	376	Total			

Summary for Subcatchment 14: Subcat 14

Runoff = 8.98 cfs @ 11.99 hrs, Volume= 0.459 af, Depth> 5.59"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 100 yr Rainfall=8.48"

Area (ac)	CN	Description
0.080	30	Meadow, non-grazed, HSG A
0.368	78	Meadow, non-grazed, HSG D
0.123	98	Paved parking, HSG A
0.045	98	Paved parking, HSG D
0.023	30	Woods, Good, HSG A
0.347	77	Woods, Good, HSG D
0.986	76	Weighted Average
0.818		82.98% Pervious Area
0.168		17.02% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.1	100	0.2600	0.23		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.75"
0.3	38	0.1600	2.00		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
7.4	138	Total			

Summary for Subcatchment 17: Subcat 17

Runoff = 108.55 cfs @ 12.00 hrs, Volume= 5.776 af, Depth> 5.35"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 100 yr Rainfall=8.48"

	Area (ac)	CN	Description
	0.308	30	Meadow, non-grazed, HSG A
	0.782	78	Meadow, non-grazed, HSG D
	0.032	98	Paved parking, HSG A
	0.256	98	Paved parking, HSG D
*	0.046	78	Porous Gravel, HSG D
	0.530	30	Woods, Good, HSG A
	11.007	77	Woods, Good, HSG D
	12.961	74	Weighted Average
	12.673		97.78% Pervious Area
	0.288		2.22% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.5	100	0.2300	0.22		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.75"
1.3	458	0.1600	6.00		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
8.8	558	Total			

Summary for Reach VS: Vegetated Swale

Inflow Area = 5.982 ac, 14.76% Impervious, Inflow Depth > 6.05" for 100 yr event
Inflow = 35.40 cfs @ 12.17 hrs, Volume= 3.013 af
Outflow = 34.43 cfs @ 12.26 hrs, Volume= 3.003 af, Atten= 3%, Lag= 5.7 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 7.04 fps, Min. Travel Time= 3.2 min
Avg. Velocity = 2.41 fps, Avg. Travel Time= 9.3 min

Peak Storage= 6,586 cf @ 12.21 hrs
Average Depth at Peak Storage= 0.93'
Bank-Full Depth= 2.00' Flow Area= 17.0 sf, Capacity= 184.69 cfs

2.50' x 2.00' deep channel, n= 0.025 Earth, clean & winding
Side Slope Z-value= 3.0 '/' Top Width= 14.50'
Length= 1,344.0' Slope= 0.0286 '/'
Inlet Invert= 496.00', Outlet Invert= 457.50'

‡

Summary for Pond FB-1: Forebay

Inflow Area = 0.500 ac, 49.38% Impervious, Inflow Depth > 7.03" for 100 yr event
Inflow = 5.54 cfs @ 11.96 hrs, Volume= 0.293 af
Outflow = 5.52 cfs @ 11.98 hrs, Volume= 0.293 af, Atten= 0%, Lag= 0.7 min
Primary = 5.52 cfs @ 11.98 hrs, Volume= 0.293 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Starting Elev= 431.50' Surf.Area= 648 sf Storage= 983 cf
Peak Elev= 431.87' @ 11.98 hrs Surf.Area= 753 sf Storage= 1,240 cf (258 cf above start)

Plug-Flow detention time= 68.9 min calculated for 0.269 af (92% of inflow)
Center-of-Mass det. time= 1.2 min (777.5 - 776.3)

Volume	Invert	Avail.Storage	Storage Description
#1	428.00'	2,296 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
428.00	33	25.0	0	0	33
430.00	300	63.0	288	288	313
432.00	793	101.0	1,054	1,342	836
433.00	1,124	119.0	954	2,296	1,169

Device	Routing	Invert	Outlet Devices
#1	Primary	431.50'	**10.0' long x 5.0' 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) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=5.30 cfs @ 11.98 hrs HW=431.86' (Free Discharge)
1=Broad-Crested Rectangular Weir (Weir Controls 5.30 cfs @ 1.48 fps)

Summary for Pond FB-2: Forebay

Inflow Area = 3.872 ac, 8.63% Impervious, Inflow Depth > 5.94" for 100 yr event
Inflow = 32.26 cfs @ 12.03 hrs, Volume= 1.918 af
Outflow = 32.23 cfs @ 12.03 hrs, Volume= 1.916 af, Atten= 0%, Lag= 0.0 min
Primary = 32.23 cfs @ 12.03 hrs, Volume= 1.916 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Starting Elev= 439.00' Surf.Area= 1,307 sf Storage= 2,612 cf
Peak Elev= 440.13' @ 12.03 hrs Surf.Area= 1,742 sf Storage= 4,132 cf (1,519 cf above start)

Plug-Flow detention time= 30.6 min calculated for 1.852 af (97% of inflow)
Center-of-Mass det. time= 1.4 min (805.0 - 803.6)

Volume	Invert	Avail.Storage	Storage Description
#1	434.00'	4,132 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
434.00	2	23.0	0	0	2
436.00	353	78.0	254	254	455
438.00	935	116.0	1,242	1,496	1,073
440.00	1,742	153.0	2,635	4,132	1,910

Device	Routing	Invert	Outlet Devices
#1	Primary	439.00'	**10.0' long x 5.0' 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) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=31.47 cfs @ 12.03 hrs HW=440.12' (Free Discharge)
1=Broad-Crested Rectangular Weir (Weir Controls 31.47 cfs @ 2.82 fps)

Summary for Pond FB-4: Forebay

Inflow Area = 8.628 ac, 14.06% Impervious, Inflow Depth > 6.03" for 100 yr event
Inflow = 47.12 cfs @ 12.21 hrs, Volume= 4.337 af
Outflow = 46.90 cfs @ 12.22 hrs, Volume= 4.335 af, Atten= 0%, Lag= 0.5 min
Primary = 46.90 cfs @ 12.22 hrs, Volume= 4.335 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 2

Starting Elev= 446.00' Surf.Area= 2,286 sf Storage= 4,573 cf
Peak Elev= 446.70' @ 12.22 hrs Surf.Area= 2,735 sf Storage= 6,317 cf (1,744 cf above start)

Plug-Flow detention time= 24.1 min calculated for 4.230 af (98% of inflow)
Center-of-Mass det. time= 0.9 min (815.7 - 814.8)

Volume	Invert	Avail.Storage	Storage Description
#1	442.00'	7,182 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
442.00	201	89.0	0	0	201
444.00	1,140	172.0	1,213	1,213	1,945
446.00	2,286	210.0	3,360	4,573	3,161
447.00	2,945	229.0	2,609	7,182	3,860

Device	Routing	Invert	Outlet Devices
#1	Primary	446.00'	**30.0' long x 8.0' 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) 2.43 2.54 2.70 2.69 2.68 2.68 2.66 2.64 2.64 2.64 2.65 2.65 2.66 2.66 2.68 2.70 2.74

Primary OutFlow Max=46.54 cfs @ 12.22 hrs HW=446.69' (Free Discharge)
1=Broad-Crested Rectangular Weir (Weir Controls 46.54 cfs @ 2.24 fps)

Summary for Pond FB-5: Forebay

Inflow Area = 11.231 ac, 7.55% Impervious, Inflow Depth > 5.93" for 100 yr event
Inflow = 76.62 cfs @ 12.10 hrs, Volume= 5.553 af
Outflow = 76.29 cfs @ 12.12 hrs, Volume= 5.548 af, Atten= 0%, Lag= 0.7 min
Primary = 76.29 cfs @ 12.12 hrs, Volume= 5.548 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Starting Elev= 492.00' Surf.Area= 3,065 sf Storage= 8,856 cf
Peak Elev= 493.27' @ 12.12 hrs Surf.Area= 3,920 sf Storage= 13,291 cf (4,435 cf above start)

Plug-Flow detention time= 34.8 min calculated for 5.345 af (96% of inflow)
Center-of-Mass det. time= 1.4 min (810.3 - 808.9)

Volume	Invert	Avail.Storage	Storage Description
#1	486.00'	16,334 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
486.00	248	100.0	0	0	248
488.00	961	137.0	1,131	1,131	985
490.00	1,899	175.0	2,807	3,939	1,979
492.00	3,065	213.0	4,918	8,856	3,214
494.00	4,456	251.0	7,478	16,334	4,692

Device	Routing	Invert	Outlet Devices
#1	Primary	492.00'	**20.0' long x 5.0' 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) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=75.25 cfs @ 12.12 hrs HW=493.26' (Free Discharge)
1=Broad-Crested Rectangular Weir (Weir Controls 75.25 cfs @ 2.98 fps)

Summary for Pond FB-6: Forebay

Inflow Area = 0.986 ac, 17.02% Impervious, Inflow Depth > 5.59" for 100 yr event
Inflow = 8.98 cfs @ 11.99 hrs, Volume= 0.459 af
Outflow = 8.67 cfs @ 12.00 hrs, Volume= 0.459 af, Atten= 3%, Lag= 1.1 min
Primary = 8.67 cfs @ 12.00 hrs, Volume= 0.459 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Starting Elev= 461.00' Surf.Area= 1,983 sf Storage= 5,062 cf
Peak Elev= 461.48' @ 12.00 hrs Surf.Area= 2,220 sf Storage= 6,067 cf (1,005 cf above start)

Plug-Flow detention time= 140.6 min calculated for 0.342 af (74% of inflow)
Center-of-Mass det. time= 3.1 min (810.1 - 807.0)

Volume	Invert	Avail.Storage	Storage Description
#1	456.00'	7,295 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
456.00	280	66.0	0	0	280
458.00	792	104.0	1,029	1,029	821
460.00	1,530	142.0	2,282	3,310	1,605
462.00	2,494	180.0	3,985	7,295	2,631

Device	Routing	Invert	Outlet Devices
#1	Primary	461.00'	**10.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=8.56 cfs @ 12.00 hrs HW=461.48' (Free Discharge)
1=Broad-Crested Rectangular Weir (Weir Controls 8.56 cfs @ 1.80 fps)

Summary for Pond FB-7: Forebay

Inflow Area = 2.804 ac, 21.08% Impervious, Inflow Depth > 4.75" for 100 yr event
Inflow = 19.37 cfs @ 12.03 hrs, Volume= 1.110 af
Outflow = 19.06 cfs @ 12.04 hrs, Volume= 1.109 af, Atten= 2%, Lag= 0.5 min
Primary = 19.06 cfs @ 12.04 hrs, Volume= 1.109 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 2

Starting Elev= 457.00' Surf.Area= 907 sf Storage= 1,099 cf
Peak Elev= 457.80' @ 12.04 hrs Surf.Area= 1,180 sf Storage= 1,928 cf (829 cf above start)

Plug-Flow detention time= 21.2 min calculated for 1.083 af (98% of inflow)
Center-of-Mass det. time= 1.1 min (825.5 - 824.5)

Volume	Invert	Avail.Storage	Storage Description
#1	454.00'	2,175 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
454.00	11	12.0	0	0	11
455.00	77	31.0	39	39	79
456.00	615	88.0	303	342	623
457.00	907	107.0	756	1,099	933
458.00	1,256	126.0	1,077	2,175	1,304

Device	Routing	Invert	Outlet Devices
#1	Primary	457.00'	**10.0' long x 5.0' 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) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=18.69 cfs @ 12.04 hrs HW=457.79' (Free Discharge)
↑—**1=Broad-Crested Rectangular Weir** (Weir Controls 18.69 cfs @ 2.38 fps)

Summary for Pond SMP-1: Pocket Pond

Inflow Area = 0.500 ac, 49.38% Impervious, Inflow Depth > 7.03" for 100 yr event
Inflow = 5.52 cfs @ 11.98 hrs, Volume= 0.293 af
Outflow = 5.47 cfs @ 11.99 hrs, Volume= 0.292 af, Atten= 1%, Lag= 0.7 min
Primary = 5.47 cfs @ 11.99 hrs, Volume= 0.292 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Starting Elev= 431.50' Surf.Area= 913 sf Storage= 1,456 cf
Peak Elev= 431.87' @ 11.99 hrs Surf.Area= 1,045 sf Storage= 1,814 cf (358 cf above start)

Plug-Flow detention time= 91.7 min calculated for 0.259 af (89% of inflow)
Center-of-Mass det. time= 1.7 min (779.3 - 777.5)

Volume	Invert	Avail.Storage	Storage Description
#1	428.00'	3,247 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
428.00	46	34.0	0	0	46
430.00	467	86.0	440	440	557
432.00	1,095	123.0	1,518	1,958	1,207
433.00	1,494	142.0	1,289	3,247	1,629

Device	Routing	Invert	Outlet Devices
#1	Primary	431.50'	**10.0' long x 5.0' 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) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=5.30 cfs @ 11.99 hrs HW=431.86' (Free Discharge)
1=Broad-Crested Rectangular Weir (Weir Controls 5.30 cfs @ 1.48 fps)

Summary for Pond SMP-2: Infiltration Basin

Inflow Area = 3.872 ac, 8.63% Impervious, Inflow Depth > 5.94" for 100 yr event
Inflow = 32.23 cfs @ 12.03 hrs, Volume= 1.916 af
Outflow = 32.11 cfs @ 12.05 hrs, Volume= 1.914 af, Atten= 0%, Lag= 1.3 min
Discarded = 4.40 cfs @ 12.05 hrs, Volume= 1.294 af
Primary = 27.71 cfs @ 12.05 hrs, Volume= 0.620 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 440.02' @ 12.05 hrs Surf.Area= 3,168 sf Storage= 8,430 cf

Plug-Flow detention time= 11.4 min calculated for 1.910 af (100% of inflow)
Center-of-Mass det. time= 10.8 min (815.8 - 805.0)

Volume	Invert	Avail.Storage	Storage Description
#1	434.00'	8,430 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
434.00	169	63.0	0	0	169
436.00	808	120.0	898	898	1,019
438.00	1,843	179.0	2,581	3,479	2,454
440.00	3,168	231.0	4,952	8,430	4,200

Device	Routing	Invert	Outlet Devices
#1	Primary	439.00'	**10.0' long x 5.0' 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) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88
#2	Discarded	434.00'	**60.000 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=4.40 cfs @ 12.05 hrs HW=440.02' (Free Discharge)
2=Exfiltration (Exfiltration Controls 4.40 cfs)

Primary OutFlow Max=27.50 cfs @ 12.05 hrs HW=440.02' (Free Discharge)
1=Broad-Crested Rectangular Weir (Weir Controls 27.50 cfs @ 2.70 fps)

Summary for Pond SMP-3: Porous Pavement

Inflow Area = 1.233 ac, 37.55% Impervious, Inflow Depth > 6.19" for 100 yr event
Inflow = 12.55 cfs @ 11.97 hrs, Volume= 0.636 af
Outflow = 3.51 cfs @ 11.75 hrs, Volume= 0.633 af, Atten= 72%, Lag= 0.0 min
Discarded = 3.51 cfs @ 11.75 hrs, Volume= 0.633 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 322.56' @ 12.12 hrs Surf.Area= 18,932 sf Storage= 5,971 cf

Plug-Flow detention time= 11.4 min calculated for 0.631 af (99% of inflow)
Center-of-Mass det. time= 7.8 min (802.4 - 794.6)

Volume	Invert	Avail.Storage	Storage Description
#1	321.77'	7,573 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
321.77	18,932	0.0	0	0
322.77	18,932	40.0	7,573	7,573

Device	Routing	Invert	Outlet Devices
#1	Discarded	321.77'	**8.000 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=3.51 cfs @ 11.75 hrs HW=321.78' (Free Discharge)
1=Exfiltration (Exfiltration Controls 3.51 cfs)

Summary for Pond SMP-4: Pocket Pond

Inflow Area = 8.628 ac, 14.06% Impervious, Inflow Depth > 6.03" for 100 yr event
Inflow = 46.90 cfs @ 12.22 hrs, Volume= 4.335 af
Outflow = 45.76 cfs @ 12.26 hrs, Volume= 4.321 af, Atten= 2%, Lag= 2.5 min
Primary = 45.76 cfs @ 12.26 hrs, Volume= 4.321 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 3
Starting Elev= 446.00' Surf.Area= 8,770 sf Storage= 20,568 cf
Peak Elev= 446.96' @ 12.26 hrs Surf.Area= 10,179 sf Storage= 29,702 cf (9,134 cf above start)

Plug-Flow detention time= 82.9 min calculated for 3.849 af (89% of inflow)
Center-of-Mass det. time= 4.6 min (820.3 - 815.7)

Volume	Invert	Avail.Storage	Storage Description
#1	442.00'	30,060 cf	**Custom Stage Data (Irregular)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
442.00	1,925	377.0	0	0	1,925
444.00	5,146	427.0	6,812	6,812	5,224
446.00	8,770	478.0	13,756	20,568	9,006
447.00	10,232	497.0	9,492	30,060	10,559

Device	Routing	Invert	Outlet Devices
#1	Primary	446.00'	**18.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=45.52 cfs @ 12.26 hrs HW=446.96' (Free Discharge)
↑—**1=Broad-Crested Rectangular Weir** (Weir Controls 45.52 cfs @ 2.63 fps)

Summary for Pond SMP-5: Pocket Pond

Inflow Area = 11.231 ac, 7.55% Impervious, Inflow Depth > 5.93" for 100 yr event
Inflow = 76.29 cfs @ 12.12 hrs, Volume= 5.548 af
Outflow = 75.74 cfs @ 12.15 hrs, Volume= 5.510 af, Atten= 1%, Lag= 1.9 min
Primary = 17.66 cfs @ 12.15 hrs, Volume= 4.175 af
Secondary = 58.08 cfs @ 12.15 hrs, Volume= 1.336 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 3
Starting Elev= 489.00' Surf.Area= 3,219 sf Storage= 6,394 cf
Peak Elev= 494.06' @ 12.15 hrs Surf.Area= 7,907 sf Storage= 33,639 cf (27,246 cf above start)

Plug-Flow detention time= 38.9 min calculated for 5.352 af (96% of inflow)
Center-of-Mass det. time= 11.0 min (821.2 - 810.3)

Volume	Invert	Avail.Storage	Storage Description
#1	486.00'	33,639 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
486.00	1,163	190.0	0	0	1,163
488.00	2,474	234.0	3,555	3,555	2,707
490.00	4,062	281.0	6,471	10,026	4,701
492.00	5,875	320.0	9,881	19,908	6,660
494.00	7,907	357.0	13,732	33,639	8,766

Device	Routing	Invert	Outlet Devices
#1	Secondary	493.00'	**20.0' long x 5.0' 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) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88
#2	Primary	489.00'	**18.0" Round Culvert** L= 25.0' Ke= 0.500 Inlet / Outlet Invert= 489.00' / 488.50' S= 0.0200 '/' Cc= 0.900 n= 0.012, Flow Area= 1.77 sf
#3	Device 2	489.00'	**24.0" W x 12.0" H Vert. Orifice/Grate** C= 0.600
#4	Device 2	492.00'	**30.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=17.65 cfs @ 12.15 hrs HW=494.05' (Free Discharge)
└**2=Culvert** (Inlet Controls 17.65 cfs @ 9.99 fps)
  └**3=Orifice/Grate** (Passes < 20.53 cfs potential flow)
  └**4=Orifice/Grate** (Passes < 33.85 cfs potential flow)

Secondary OutFlow Max=57.67 cfs @ 12.15 hrs HW=494.05' (Free Discharge)
└**1=Broad-Crested Rectangular Weir** (Weir Controls 57.67 cfs @ 2.74 fps)

Summary for Pond SMP-6: Pocket Pond

Inflow Area = 0.986 ac, 17.02% Impervious, Inflow Depth > 5.58" for 100 yr event
Inflow = 8.67 cfs @ 12.00 hrs, Volume= 0.459 af
Outflow = 8.01 cfs @ 12.04 hrs, Volume= 0.457 af, Atten= 8%, Lag= 2.3 min
Primary = 8.01 cfs @ 12.04 hrs, Volume= 0.457 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Starting Elev= 461.00' Surf.Area= 5,556 sf Storage= 17,302 cf
Peak Elev= 461.29' @ 12.04 hrs Surf.Area= 5,852 sf Storage= 18,970 cf (1,669 cf above start)

Plug-Flow detention time= 582.8 min calculated for 0.060 af (13% of inflow)
Center-of-Mass det. time= 5.1 min (815.2 - 810.1)

Volume	Invert	Avail.Storage	Storage Description
#1	454.00'	23,372 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
454.00	152	45.0	0	0	152
456.00	1,083	158.0	1,094	1,094	1,989
458.00	2,830	276.0	3,776	4,870	6,087
460.00	4,602	314.0	7,361	12,230	7,966
462.00	6,600	351.0	11,142	23,372	10,034

Device	Routing	Invert	Outlet Devices
#1	Primary	461.00'	**20.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=7.87 cfs @ 12.04 hrs HW=461.29' (Free Discharge)
└**1=Broad-Crested Rectangular Weir** (Weir Controls 7.87 cfs @ 1.36 fps)

Summary for Pond SMP-7: Infiltration Basin

Inflow Area = 2.804 ac, 21.08% Impervious, Inflow Depth > 4.74" for 100 yr event
Inflow = 19.06 cfs @ 12.04 hrs, Volume= 1.109 af
Outflow = 18.76 cfs @ 12.05 hrs, Volume= 1.103 af, Atten= 2%, Lag= 0.5 min
Primary = 2.16 cfs @ 12.05 hrs, Volume= 0.751 af
Secondary = 16.61 cfs @ 12.05 hrs, Volume= 0.352 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 3

Peak Elev= 456.91' @ 12.05 hrs Surf.Area= 2,071 sf Storage= 4,092 cf

Plug-Flow detention time= 11.0 min calculated for 1.103 af (100% of inflow)
Center-of-Mass det. time= 8.2 min (833.7 - 825.5)

Volume	Invert	Avail.Storage	Storage Description
#1	454.00'	7,149 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
454.00	403	238.0	0	0	403
455.00	1,147	257.0	743	743	1,191
456.00	1,947	276.0	1,529	2,273	2,040
457.00	2,084	295.0	2,015	4,288	2,949
458.00	3,717	314.0	2,861	7,149	3,919

Device	Routing	Invert	Outlet Devices
#1	Primary	454.00'	**45.000 in/hr Exfiltration over Surface area**
#2	Secondary	456.50'	**25.0' long x 10.0' breadth Broad-Crested Rectangular Weir**
			Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60
			Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=2.16 cfs @ 12.05 hrs HW=456.90' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 2.16 cfs)

Secondary OutFlow Max=16.44 cfs @ 12.05 hrs HW=456.90' (Free Discharge)
↑—**2=Broad-Crested Rectangular Weir** (Weir Controls 16.44 cfs @ 1.63 fps)

Summary for Link AP-1: AP-1

Inflow Area = 28.904 ac, 2.02% Impervious, Inflow Depth > 5.18" for 100 yr event
Inflow = 139.27 cfs @ 12.15 hrs, Volume= 12.488 af
Primary = 139.27 cfs @ 12.15 hrs, Volume= 12.488 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Link AP-2: AP-2

Inflow Area = 51.848 ac, 6.57% Impervious, Inflow Depth > 5.68" for 100 yr event
Inflow = 261.22 cfs @ 12.08 hrs, Volume= 24.538 af
Primary = 261.22 cfs @ 12.08 hrs, Volume= 24.538 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Link AP-3: AP-3

Inflow Area = 12.958 ac, 3.77% Impervious, Inflow Depth > 5.81" for 100 yr event
Inflow = 84.92 cfs @ 12.11 hrs, Volume= 6.277 af
Primary = 84.92 cfs @ 12.11 hrs, Volume= 6.277 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Link AP-4: AP-4

Inflow Area = 4.972 ac, 0.00% Impervious, Inflow Depth > 5.70" for 100 yr event
Inflow = 36.36 cfs @ 12.06 hrs, Volume= 2.361 af
Primary = 36.36 cfs @ 12.06 hrs, Volume= 2.361 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Attachment D

Storm Data

Job Name and # Terramor Catskills

Minimum Runoff Reduction Volume

7/1/2022 Revised: 11/21/22

RRv = [(P)(Rv*)(Ai)]/12

Where:

Ai = (S)(Aic)

Rv = 0.05 + 0.009(I) where I is 100% impervious

Ai = impervious cover targeted for runoff reduction

Aic = Total area of new impervious cover

P = 90% rainfall (see Figure 4.1 in NYS Stormwater Management Design Manual)

S = Hydrologic Soil Group (HSG) Specific Reduction Factor (S)

A=0.55, B=0.40, C=0.30, D=0.20

S (HSG A & D)	0.21	
Aic	4.94	acres
Rv	0.95	
90% Rainfall	1.60	
Ai	1.033	

RRv = **0.131** acre feet = 5,699 ft^3

Stormwater Practice Sizing

Job Name and # Terramor Catskills

Water Quality Volume Calculation
7/1/2022 Revised: 12/2/22
WQv = [(P)(Rv)(A)]/12

Where:
Rv = 0.05 + 0.009(I)
I = impervious cover in percent
P = 90% rainfall (see Figure 4.1 in NYS Stormwater Management Design Manual)
A = Area in acres

WQV Required:

New Impervious

% Impervious	100.00%		
Rv	0.95		
90% Rainfall	1.60		
Area in Square Feet	215230		
WQv Required =	**27262**	ft^3	**0.626** ac-ft

WQV Provided:

Pocket Pond (SMP-1)

% Impervious	49.38%		
Rv	0.49		
90% Rainfall	1.60		
Area in Square Feet	21780		
WQv Required =	**1436**	ft^3	**0.033** ac-ft

Infiltration Basin (SMP-2)

% Impervious	8.63%		
Rv	0.13		
90% Rainfall	1.60		
Area in Square Feet	168664		
WQv Required =	**2871**	ft^3	**0.066** ac-ft

Porous Pavement (SMP-3)

% Impervious	37.55%		
Rv	0.39		
90% Rainfall	1.60		
Area in Square Feet	53709		
WQv Required =	**2778**	ft^3	**0.064** ac-ft

Pocket Pond (SMP-4)

% Impervious	14.06%		
Rv	0.18		
90% Rainfall	1.60		
Area in Square Feet	375836		
WQv Required =	**8847**	ft^3	**0.203** ac-ft

Pocket Pond (SMP-5)

% Impervious	7.55%		
Rv	0.12		
90% Rainfall	1.60		
Area in Square Feet	489222		
WQv Required =	**7694**	ft^3	**0.177** ac-ft

Pocket Pond (SMP-6)

% Impervious	17.02%		
Rv	0.20		
90% Rainfall	1.60		
Area in Square Feet	42950		
WQv Required =	**1164**	ft^3	**0.027** ac-ft

Infiltration Basin (SMP-7)

% Impervious	21.08%		
Rv	0.24		
90% Rainfall	1.60		
Area in Square Feet	122142		
WQv Required =	**3904**	ft^3	**0.090** ac-ft

Job Name Terramor Catskills

Channel Protection Volume Calculation

7/1/2022 Revised: 12/2/22

Pre Development

Step 1: Determine Qu

P =	2.5	in. (1-yr. storm)
Area =	99.9	acres
CN =	76	
Ia =	0.632	
Ia/P =	0.25	
Tc =	0.5	Hrs.

Using Figure 4-II, TR-55 and Tc, determine Qu (csm/in)

Qu = 550 csm/in

475

Step 2: Determine Qo/Qi

Using Figure B-1, DEC Manual Appendix B for T = 24 hrs. and Qu, determine Qo/Qi

Qo/Qi = 0.04

Step 3: Determine Vs/Vr

Vs/Vr = 0.682 - 1.43(Qo/Qi) + 1.64 (Qo/Qi)^2 - 0.804 (Qo/Qi)^3

Vs/Vr = 0.627

Step 4: Determine Qd

Using Figure 2.1, TR-55 or SCS TR-16 and P, determine Qd (in of runoff)

Qd = 0.8 in

Step 5: Determine Cpv

Area = 99.90 acres

Cpv = Vs = (Vs/Vr) * Qd * A/12

Cpv =	4.178	ac-ft
Cpv =	182007	ft^3

Cpv Req.= 182007 ft^3

Job Name: Terramor Catskills

Channel Protection Volume Calculation

7/1/2022 Revised: 12/2/22

Step 1: Determine Qu

P =	2.5	in. (1-yr. storm)
Area =	99.9	acres
CN =	77	
Ia =	0.597	
Ia/P =	0.24	
Tc =	0.5	Hrs.

Using Figure 4-II, TR-55 and Tc, determine Qu (csm/in)

Qu =	475	csm/in

Step 2: Determine Qo/Qi

Using Figure B-1, DEC Manual Appendix B for T = 24 hrs. and Qu, determine Qo/Qi

Qo/Qi =	0.04	

Step 3: Determine Vs/Vr

Vs/Vr = 0.682 - 1.43(Qo/Qi) + 1.64 (Qo/Qi)^2 - 0.804 (Qo/Qi)^3

Vs/Vr =	0.627	

Step 4: Determine Qd

Using Figure 2.1, TR-55 or SCS TR-16 and P, determine Qd (in of runoff)

Qd =	0.81	in

Step 5: Determine Cpv

Area =	99.90	acres

Cpv = Vs = (Vs/Vr) * Qd * A/12

Cpv =	4.231	ac-ft	
Cpv =	184282	ft^3	
Pre Dev	182007	ft^3	
CPv Required=	**2275**	**ft^3**	0.052 ac-ft

Volume reduction achieved through green infrastructure

SMP 2 =	2871	ft^3	
SMP 3 =	2778	ft^3	
SMP 7 =	3904	ft^3	
Cpv Provided=	**9553**	**ft^3**	0.220 ac-ft

Appendix C

Map Set

Appendix D

SWPPP Inspection Form

Terramor – Catskills
WEEKLY SWPPP INSPECTION REPORT

Inspector Name:	Date:
Signature (required):	Time:
Weather:	Inspection #:
Soil Conditions (dry, saturated, etc):	

Note: Digital photos, with date stamp required for all practices requiring corrective action, before and after, to be attached to the inspection report.

	YES	NO	N/A		
1.	☐	☐	☐	Routine Inspection.	Date of last inspection:_____
2.	☐	☐	☐	Inspection following rain event.	Date/time of storm ending:_____ Rainfall amount:_____ Recorded by:_____
3.	☐	☐	☐	Is this a final site inspection?	
4.	☐	☐	☐	Has site undergone final stabilization?	
	☐	☐	☐	If so, have all temporary erosion and sediment controls been removed?	

Site Disturbance (Indicate Locations on Plan)

	YES	NO	N/A	
1.	☐	☐	☐	Areas previously disturbed, but have not undergone active site work in the last 14 days?
2.	☐	☐	☐	Areas disturbed within last 14 days?
3.	☐	☐	☐	Areas expected to be disturbed in next 14 days?
4.	☐	☐	☐	Do areas of steep slopes or complex stabilization issues exist? If "YES" explain:
5.	☐	☐	☐	Are there currently more than 5 acres of disturbed soil at the site? If so make sure there is an approval letter from NYS DEC.

Additional Comments:_____

Inspection of Erosion and Sediment Control Devices

	Type of Control Device	Accumulation (if any) in %	Repairs/Maintenance Needed
1.			
2.			
3.			
4.			
5.			
6.			

Stabilization/Runoff

	YES	NO	N/A	
1.	☐	☐	☐	Are all existing disturbed areas contained by control devices? Type of devices:
2.	☐	☐	☐	Are there areas that require stabilization within the next 14 days? Specify Area:
3.	☐	☐	☐	Have stabilization measures been initiated in inactive areas?
4.	☐	☐	☐	Is there current snow cover or frozen ground conditions?
5.	☐	☐	☐	Rills or gullies?
6.	☐	☐	☐	Slumping/deposition?
7.	☐	☐	☐	Loss of vegetation?
8.	☐	☐	☐	Lack of germination?
9.	☐	☐	☐	Loss of mulching?

Receiving Structures/Water Bodies (Indicate locations where runoff leaves the project site on the site plan)

	YES	NO	N/A	
1.	☐	☐	☐	Surface water swale or natural surface waterbody?

If natural waterbody:

Is waterbody located ☐ onsite, or ☐ adjacent to property boundary?

Description of condition:_____

2.	☐	☐	☐	Municipal or community system?

Inspect locations where runoff from project site enters the receiving waters and indicate if there is evidence of:

a.	☐	☐	☐	Rills or gullies?
b.	☐	☐	☐	Slumping/deposition?
c.	☐	☐	☐	Loss of vegetation?
d.	☐	☐	☐	Undermining of structures?
e.	☐	☐	☐	Was there a discharge into the receiving water on the day of inspection?
f.	☐	☐	☐	Is there evidence of turbidity, sedimentation, or oil in the receiving waters?

Additional Comments:_____

Inspection of Post-Construction Stormwater Management Control Devices

	Type of Control Device	Phase of Construction	Repairs/Maintenance Needed
1.	**Bioretention Basins**		
2.	**Pocket Ponds**		
3.			
4.			

General Site Condition

	YES	NO	N/A	
1.	☐	☐	☐	Have action items from previous reports been addressed?
2.	☐	☐	☐	Does routine maintenance of protection components occur on a regular basis?
3.	☐	☐	☐	Does cleaning and/or sweeping affected roadways occur, at minimum, daily?
4.	☐	☐	☐	Is debris and litter removed on a monthly basis, or as necessary?
5.	☐	☐	☐	Is the site maintained in an orderly manner?

Describe the condition of all natural waterbodies within or adjacent to the Project that receive runoff from the site:

Contractors progress over last 7 days:_____

Anticipated work to be begun in the next 7 days:_____

Additional Comments:_____

Visual Observations

	YES	NO	N/A	
1.	☐	☐	☐	All erosion and sediment control measures have been installed/constructed?
2.	☐	☐	☐	All erosion and sediment control measures are being maintained properly?

SUMMARY OF ACTION ITEMS TO REPAIR/REPLACE/MAINTAIN/CORRECT DEFICIENCIES

Action Reported To (no signature required): _____

Company: _____

Appendix E

Other SWPPP Forms

Construction Sequence
SWPPP Plan Changes
Spill Response Form
Stormwater Management Practice Maintenance Log

The operator shall prepare a summary of construction status using the Construction Sequence Form below once every month. Significant deviations to the sequence and reasons for those deviations (i.e. weather, subcontractor availability, etc.), shall be noted by the contractor. The schedule shall be used to record the dates for initiation of construction, implementation of erosion control measures, stabilization, etc. A copy of this table will be maintained at the construction site and updated in addition to the individual Inspection Reports completed for each inspection.

Construction Sequence Form

Construction Activities (Identify name of planned practices)	Date Complete
1.	
2.	
3.	
4.	
5.	
6.	
7.	
8.	
9.	
10.	
11.	
12.	

STORM WATER POLLUTION PREVENTION PLAN
PLAN CHANGES, AUTHORIZATION, AND CHANGE CERTIFICATION

CHANGES REQUIRED TO THE POLLUTION PREVENTION PLAN:

_____
_____
_____
_____
_____

REASONS FOR CHANGES:

_____
_____
_____
_____
_____

REQUESTED BY: _____

DATE: _____

AUTHORIZED BY: _____

DATE: _____

CERTIFICATION OF CHANGES:

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that false statements made herein are punishable as a Class A misdemeanor pursuant to Section 210.45 of the penal code.

SIGNATURE: _____

DATE: _____

SPILL RESPONSE REPORT

Within 1 hour of a spill discovery less than 2 gallons in volume the following must be notified:

Ahmed Hemli
(202) 689-7771

Within 1 hour of a spill discovery greater than 2 gallons the following must be notified:

Ahmed Hemli
NYSDEC Spill Response Hotline 1-800-457-7362
Spill Response Contractor

Material Spilled: _____

Approximate Volume: _____

Location: _____

Distance to nearest down gradient drainage: _____

Distance to nearest down gradient open water: _____

Temporary control measures in place: _____

Appendix F

SPDES General Permit GP-0-20-001

NEW YORK STATE OF OPPORTUNITY | Department of Environmental Conservation

NEW YORK STATE
DEPARTMENT OF ENVIRONMENTAL CONSERVATION

SPDES GENERAL PERMIT
FOR STORMWATER DISCHARGES

From

CONSTRUCTION ACTIVITY

Permit No. GP- 0-20-001

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

of the Environmental Conservation Law

Effective Date: January 29, 2020 Expiration Date: January 28, 2025

John J. Ferguson

Chief Permit Administrator

Authorized Signature 1-23-20 Date

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

PREFACE

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

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

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

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

Table of Contents

Part 1. PERMIT COVERAGE AND LIMITATIONS

A. Permit Application

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

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

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

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

B. Effluent Limitations Applicable to Discharges from Construction Activities

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

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

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

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

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

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

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

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

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

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

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

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

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

b. **Soil Stabilization**. In areas where soil disturbance activity has temporarily or permanently ceased, the application of soil stabilization measures must be initiated by the end of the next business day and completed within fourteen (14) days from the date the current soil disturbance activity ceased. For construction sites that *directly discharge* to one of the 303(d) segments

listed in Appendix E or is located in one of the watersheds listed in Appendix C, the application of soil stabilization measures must be initiated by the end of the next business day and completed within seven (7) days from the date the current soil disturbance activity ceased. See Appendix A for definition of *Temporarily Ceased*.

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

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

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

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

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

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

   (i) Wastewater from washout of concrete;

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

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

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

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

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

C. Post-construction Stormwater Management Practice Requirements

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

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

   a. Sizing Criteria for New Development

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

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

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

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

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

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

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

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

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

calculated in accordance with the criteria in Section 10.3 of the Design Manual.

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

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

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

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

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

c. Sizing Criteria for Redevelopment Activity

(i) Water Quality Volume (WQv): The WQv treatment objective for *redevelopment activity* shall be addressed by one of the following options. *Redevelopment activities* located in an Enhanced Phosphorus Removal Watershed (see Part III.B.3. and Appendix C of this permit) shall calculate the WQv in accordance with Section 10.3 of the Design Manual. All other *redevelopment activities* shall calculate the WQv in accordance with Section 4.2 of the Design Manual.
(1) Reduce the existing *impervious cover* by a minimum of 25% of the total disturbed, *impervious area*. The Soil Restoration criteria in Section 5.1.6 of the Design Manual must be applied to all newly created pervious areas, or
(2) Capture and treat a minimum of 25% of the WQv from the disturbed, *impervious area* by the application of standard SMPs; or reduce 25% of the WQv from the disturbed, *impervious area* by the application of RR techniques or standard SMPs with RRv capacity., or
(3) Capture and treat a minimum of 75% of the WQv from the disturbed, *impervious area* as well as any additional runoff from tributary areas by application of the alternative practices discussed in Sections 9.3 and 9.4 of the Design Manual., or
(4) Application of a combination of 1, 2 and 3 above that provide a weighted average of at least two of the above methods. Application of this method shall be in accordance with the criteria in Section 9.2.1(B) (IV) of the Design Manual.

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

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

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

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

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

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

D. Maintaining Water Quality

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

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

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

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

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

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

E. Eligibility Under This General Permit

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

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

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

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

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

All of the following are **not** authorized by this permit:

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

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

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

4. *Construction activities* or *discharges* from *construction activities* that may adversely affect an *endangered or threatened species* unless the *owner or*

operator has obtained a permit issued pursuant to 6 NYCRR Part 182 for the project or the Department has issued a letter of non-jurisdiction for the project. All documentation necessary to demonstrate eligibility shall be maintained on site in accordance with Part II.D.2 of this permit;

5. *Discharges* which either cause or contribute to a violation of *water quality standards* adopted pursuant to the *ECL* and its accompanying regulations;

6. *Construction activities* for residential, commercial and institutional projects:

   a. Where the *discharges* from the *construction activities* are tributary to waters of the state classified as AA or AA-s; and

   b. Which are undertaken on land with no existing *impervious cover*; and

   c. Which disturb one (1) or more acres of land designated on the current United States Department of Agriculture ("USDA") Soil Survey as Soil Slope Phase "D", (provided the map unit name is inclusive of slopes greater than 25%), or Soil Slope Phase "E" or "F" (regardless of the map unit name), or a combination of the three designations.

7. *Construction activities* for linear transportation projects and linear utility projects:

   a. Where the *discharges* from the *construction activities* are tributary to waters of the state classified as AA or AA-s; and

   b. Which are undertaken on land with no existing *impervious cover*; and

   c. Which disturb two (2) or more acres of land designated on the current USDA Soil Survey as Soil Slope Phase "D" (provided the map unit name is inclusive of slopes greater than 25%), or Soil Slope Phase "E" or "F" (regardless of the map unit name), or a combination of the three designations.

8. *Construction activities* that have the potential to affect an *historic property*, unless there is documentation that such impacts have been resolved. The following documentation necessary to demonstrate eligibility with this requirement shall be maintained on site in accordance with Part II.D.2 of this permit and made available to the Department in accordance with Part VII.F of this permit:

   a. Documentation that the *construction activity* is not within an archeologically sensitive area indicated on the sensitivity map, and that the *construction activity* is not located on or immediately adjacent to a property listed or determined to be eligible for listing on the National or State Registers of Historic Places, and that there is no new permanent building on the *construction site* within the following distances from a building, structure, or object that is more than 50 years old, or if there is such a new permanent building on the *construction site* within those parameters that NYS Office of Parks, Recreation and Historic Preservation (OPRHP), a Historic Preservation Commission of a Certified Local Government, or a qualified preservation professional has determined that the building, structure, or object more than 50 years old is not historically/archeologically significant.

      - 1-5 acres of disturbance - 20 feet
      - 5-20 acres of disturbance - 50 feet
      - 20+ acres of disturbance - 100 feet, or

   b. DEC consultation form sent to OPRHP, and copied to the NYS DEC Agency Historic Preservation Officer (APO), and
      (i) the State Environmental Quality Review (SEQR) Environmental Assessment Form (EAF) with a negative declaration or the Findings Statement, with documentation of OPRHP's agreement with the resolution; or
      (ii) documentation from OPRHP that the *construction activity* will result in No Impact; or
      (iii) documentation from OPRHP providing a determination of No Adverse Impact; or
      (iv) a Letter of Resolution signed by the owner/operator, OPRHP and the DEC APO which allows for this *construction activity* to be eligible for coverage under the general permit in terms of the State Historic Preservation Act (SHPA); or

   c. Documentation of satisfactory compliance with Section 106 of the National Historic Preservation Act for a coterminous project area:

      (i) No Affect
      (ii) No Adverse Affect
      (iii) Executed Memorandum of Agreement, or

   d. Documentation that:

      (i) SHPA Section 14.09 has been completed by NYS DEC or another state agency.

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

Part II. PERMIT COVERAGE

A. How to Obtain Coverage

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

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

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

B. Notice of Intent (NOI) Submittal

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

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

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

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

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

C. Permit Authorization

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

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

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

   b. where required, all necessary Department permits subject to the *Uniform Procedures Act ("UPA")* (see 6 NYCRR Part 621), or the equivalent from another New York State agency, have been obtained, unless otherwise notified by the Department pursuant to 6 NYCRR 621.3(a)(4). *Owners or operators* of *construction activities* that are required to obtain *UPA* permits

must submit a preliminary SWPPP to the appropriate DEC Permit Administrator at the Regional Office listed in Appendix F at the time all other necessary *UPA* permit applications are submitted. The preliminary SWPPP must include sufficient information to demonstrate that the *construction activity* qualifies for authorization under this permit,

   c. the final SWPPP has been prepared, and

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

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

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

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

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

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

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

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

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

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

D. General Requirements For Owners or Operators With Permit Coverage

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

F. Change of Owner or Operator

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

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

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

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

Part III. STORMWATER POLLUTION PREVENTION PLAN (SWPPP)

A. General SWPPP Requirements

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

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

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

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

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

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

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

   d. to document the final construction conditions.

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

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

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

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

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

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

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

B. Required SWPPP Contents

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

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

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

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

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

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

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

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

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

i. A maintenance inspection schedule for the contractor(s) identified in Part III.A.6. of this permit, to ensure continuous and effective operation of the erosion and sediment control practices. The maintenance inspection

schedule shall be in accordance with the requirements in the technical standard, New York State Standards and Specifications for Erosion and Sediment Control, dated November 2016;

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

e. Infiltration test results, when required; and

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

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

C. Required SWPPP Components by Project Type

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

Part IV. INSPECTION AND MAINTENANCE REQUIREMENTS

A. General Construction Site Inspection and Maintenance Requirements

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

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

B. Contractor Maintenance Inspection Requirements

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

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

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

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

C. Qualified Inspector Inspection Requirements

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

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

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

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

   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 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;

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

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

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

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

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

   b. For construction sites where soil disturbance activities are on-going and the *owner or operator* has received authorization in accordance with Part II.D.3 to disturb greater than five (5) acres of soil at any one time, the *qualified inspector* shall conduct at least two (2) site inspections every seven (7) calendar days. The two (2) inspections shall be separated by a minimum of two (2) full calendar days.

   c. For construction sites where soil disturbance activities have been temporarily suspended (e.g. winter shutdown) and *temporary stabilization* measures have been applied to all disturbed areas, the *qualified inspector* shall conduct a site inspection at least once every thirty (30) calendar days. The *owner or operator* shall notify the DOW Water (SPDES) Program contact at the Regional Office (see contact information in Appendix F) or, in areas under the jurisdiction of a *regulated, traditional land use control MS4,* the *regulated, traditional land use control MS4* (provided the *regulated, traditional land use control MS4* is not the *owner or operator* of the *construction activity*) in writing prior to reducing the frequency of inspections.

   d. For construction sites where soil disturbance activities have been shut down with partial project completion, the *qualified inspector* can stop conducting inspections if all areas disturbed as of the project shutdown date have achieved *final stabilization* and all post-construction stormwater management practices required for the completed portion of the project have been constructed in conformance with the SWPPP and are operational. The *owner or operator* shall notify the DOW Water (SPDES) Program contact at the Regional Office (see contact information in Appendix F) or, in areas under the jurisdiction of a *regulated, traditional land use control MS4,* the *regulated, traditional land use control MS4* (provided the *regulated, traditional land use control MS4* is not the *owner or operator* of the *construction activity*) in writing prior to the shutdown. If soil disturbance activities are not resumed within 2 years from the date of shutdown, the *owner or operator* shall have the *qualified inspector* perform a final inspection and certify that all disturbed areas have achieved *final stabilization,* and all temporary, structural erosion and sediment control measures have been removed*;* and that all post-construction stormwater management practices have been constructed in conformance with the SWPPP by signing the "*Final Stabilization*" and "Post-Construction Stormwater Management Practice" certification statements on the NOT. The *owner or operator* shall then submit the completed NOT form to the address in Part II.B.1 of this permit.

   e. For construction sites that directly *discharge* to one of the 303(d) segments listed in Appendix E or is located in one of the watersheds listed in Appendix C, the *qualified inspector* shall conduct at least two (2) site inspections every seven (7) calendar days. The two (2) inspections shall be separated by a minimum of two (2) full calendar days.

3. At a minimum, the *qualified inspector* shall inspect all erosion and sediment control practices and pollution prevention measures to ensure integrity and effectiveness, all post-construction stormwater management practices under construction to ensure that they are constructed in conformance with the SWPPP, all areas of disturbance that have not achieved *final stabilization,* all points of *discharge* to natural surface waterbodies located within, or immediately adjacent to, the property boundaries of the *construction site*, and all points of *discharge* from the *construction site*.

4. The *qualified inspector* shall prepare an inspection report subsequent to each and every inspection. At a minimum, the inspection report shall include and/or address the following:

   a. Date and time of inspection;

   b. Name and title of person(s) performing inspection;

   c. A description of the weather and soil conditions (e.g. dry, wet, saturated) at the time of the inspection;

   d. A description of the condition of the runoff at all points of *discharge* from the *construction site*. This shall include identification of any *discharges* of sediment from the *construction site*. Include *discharges* from conveyance systems (i.e. pipes, culverts, ditches, etc.) and overland flow;

   e. A description of the condition of all natural surface waterbodies located within, or immediately adjacent to, the property boundaries of the *construction site* which receive runoff from disturbed areas. This shall include identification of any *discharges* of sediment to the surface waterbody;

   f. Identification of all erosion and sediment control practices and pollution prevention measures that need repair or maintenance;

   g. Identification of all erosion and sediment control practices and pollution prevention measures that were not installed properly or are not functioning as designed and need to be reinstalled or replaced;

   h. Description and sketch of areas with active soil disturbance activity, areas that have been disturbed but are inactive at the time of the inspection, and areas that have been stabilized (temporary and/or final) since the last inspection;

   i. Current phase of construction of all post-construction stormwater management practices and identification of all construction that is not in conformance with the SWPPP and technical standards;

   j. Corrective action(s) that must be taken to install, repair, replace or maintain erosion and sediment control practices and pollution prevention measures; and to correct deficiencies identified with the construction of the post-construction stormwater management practice(s);

   k. Identification and status of all corrective actions that were required by previous inspection; and

l. Digital photographs, with date stamp, that clearly show the condition of all practices that have been identified as needing corrective actions. The *qualified inspector* shall attach paper color copies of the digital photographs to the inspection report being maintained onsite within seven (7) calendar days of the date of the inspection. The *qualified inspector* shall also take digital photographs, with date stamp, that clearly show the condition of the practice(s) after the corrective action has been completed. The *qualified inspector* shall attach paper color copies of the digital photographs to the inspection report that documents the completion of the corrective action work within seven (7) calendar days of that inspection.

5. Within one business day of the completion of an inspection, the *qualified inspector* shall notify the *owner or operator* and appropriate contractor or subcontractor identified in Part III.A.6. of this permit of any corrective actions that need to be taken. The contractor or subcontractor shall begin implementing the corrective actions within one business day of this notification and shall complete the corrective actions in a reasonable time frame.

6. All inspection reports shall be signed by the *qualified inspector.* Pursuant to Part II.D.2. of this permit, the inspection reports shall be maintained on site with the SWPPP.

Part V. TERMINATION OF PERMIT COVERAGE

A. Termination of Permit Coverage

1. An *owner or operator* that is eligible to terminate coverage under this permit must submit a completed NOT form to the address in Part II.B.1 of this permit. The NOT form shall be one which is associated with this permit, signed in accordance with Part VII.H of this permit.

2. An *owner or operator* may terminate coverage when one or more the following conditions have been met:

   a. Total project completion - All *construction activity* identified in the SWPPP has been completed; and all areas of disturbance have achieved *final stabilization*; and all temporary, structural erosion and sediment control measures have been removed; and all post-construction stormwater management practices have been constructed in conformance with the SWPPP and are operational;

   b. Planned shutdown with partial project completion - All soil disturbance activities have ceased; and all areas disturbed as of the project shutdown date have achieved *final stabilization*; and all temporary, structural erosion and sediment control measures have been removed; and all post-construction stormwater management practices required for the completed portion of the project have been constructed in conformance with the SWPPP and are operational;

   c. A new *owner or operator* has obtained coverage under this permit in accordance with Part II.F. of this permit.

   d. The *owner or operator* obtains coverage under an alternative SPDES general permit or an individual SPDES permit.

3. For *construction activities* meeting subdivision 2a. or 2b. of this Part, the *owner or operator* shall have the *qualified inspector* perform a final site inspection prior to submitting the NOT. The *qualified inspector* shall, by signing the "*Final Stabilization*" and "Post-Construction Stormwater Management Practice certification statements on the NOT, certify that all the requirements in Part V.A.2.a. or b. of this permit have been achieved.

4. For *construction activities* that are subject to the requirements of a *regulated, traditional land use control MS4* and meet subdivision 2a. or 2b. of this Part, the *owner or operator* shall have the *regulated, traditional land use control MS4* sign the "MS4 Acceptance" statement on the NOT in accordance with the requirements in Part VII.H. of this permit. The *regulated, traditional land use control MS4* official, by signing this statement, has determined that it is acceptable for the *owner or operator* to submit the NOT in accordance with the requirements of this Part. The *regulated, traditional land use control MS4* can make this determination by performing a final site inspection themselves or by accepting the *qualified inspector*'s final site inspection certification(s) required in Part V.A.3. of this permit.

5. For *construction activities* that require post-construction stormwater management practices and meet subdivision 2a. of this Part, the *owner or operator* must, prior to submitting the NOT, ensure one of the following:

   a. the post-construction stormwater management practice(s) and any right-of-way(s) needed to maintain such practice(s) have been deeded to the municipality in which the practice(s) is located,

   b. an executed maintenance agreement is in place with the municipality that will maintain the post-construction stormwater management practice(s),

   c. for post-construction stormwater management practices that are privately owned, the *owner or operator* has a mechanism in place that requires operation and maintenance of the practice(s) in accordance with the operation and maintenance plan, such as a deed covenant in the *owner or operator's* deed of record,

   d. for post-construction stormwater management practices that are owned by a public or private institution (e.g. school, university, hospital), government agency or authority, or public utility; the *owner or operator* has policy and procedures in place that ensures operation and maintenance of the practices in accordance with the operation and maintenance plan.

Part VI. REPORTING AND RETENTION RECORDS

A. Record Retention

The *owner or operator* shall retain a copy of the NOI, NOI Acknowledgment Letter, SWPPP, MS4 SWPPP Acceptance form and any inspection reports that were prepared in conjunction with this permit for a period of at least five (5) years from the date that the Department receives a complete NOT submitted in accordance with Part V. of this general permit.

B. Addresses

With the exception of the NOI, NOT, and MS4 SWPPP Acceptance form (which must be submitted to the address referenced in Part II.B.1 of this permit), all written correspondence requested by the Department, including individual permit applications, shall be sent to the address of the appropriate DOW Water (SPDES) Program contact at the Regional Office listed in Appendix F.

Part VII. STANDARD PERMIT CONDITIONS

A. Duty to Comply

The *owner or operator* must comply with all conditions of this permit. All contractors and subcontractors associated with the project must comply with the terms of the SWPPP. Any non-compliance with this permit constitutes a violation of the Clean Water

Act (CWA) and the ECL and is grounds for an enforcement action against the *owner or operator* and/or the contractor/subcontractor; permit revocation, suspension or modification; or denial of a permit renewal application. Upon a finding of significant non-compliance with this permit or the applicable SWPPP, the Department may order an immediate stop to all *construction activity* at the site until the non-compliance is remedied. The stop work order shall be in writing, shall describe the non-compliance in detail, and shall be sent to the *owner or operator*.

If any human remains or archaeological remains are encountered during excavation, the *owner or operator* must immediately cease, or cause to cease, all *construction activity* in the area of the remains and notify the appropriate Regional Water Engineer (RWE). *Construction activity* shall not resume until written permission to do so has been received from the RWE.

B. Continuation of the Expired General Permit

This permit expires five (5) years from the effective date. If a new general permit is not issued prior to the expiration of this general permit, an *owner or operator* with coverage under this permit may continue to operate and *discharge* in accordance with the terms and conditions of this general permit, if it is extended pursuant to the State Administrative Procedure Act and 6 NYCRR Part 621, until a new general permit is issued.

C. Enforcement

Failure of the *owner or operator,* its contractors, subcontractors, agents and/or assigns to strictly adhere to any of the permit requirements contained herein shall constitute a violation of this permit. There are substantial criminal, civil, and administrative penalties associated with violating the provisions of this permit. Fines of up to $37,500 per day for each violation and imprisonment for up to fifteen (15) years may be assessed depending upon the nature and degree of the offense.

D. Need to Halt or Reduce Activity Not a Defense

It shall not be a defense for an *owner or operator* in an enforcement action that it would have been necessary to halt or reduce the *construction activity* in order to maintain compliance with the conditions of this permit.

E. Duty to Mitigate

The *owner or operator* and its contractors and subcontractors shall take all reasonable steps to *minimize* or prevent any *discharge* in violation of this permit which has a reasonable likelihood of adversely affecting human health or the environment.

F. Duty to Provide Information

The *owner or operator* shall furnish to the Department, within a reasonable specified time period of a written request, all documentation necessary to demonstrate eligibility and any information to determine compliance with this permit or to determine whether cause exists for modifying or revoking this permit, or suspending or denying coverage under this permit, in accordance with the terms and conditions of this permit. The NOI, SWPPP and inspection reports required by this permit are public documents that the *owner or operator* must make available for review and copying by any person within five (5) business days of the *owner or operator* receiving a written request by any such person to review these documents. Copying of documents will be done at the requester's expense.

G. Other Information

When the *owner or operator* becomes aware that they failed to submit any relevant facts, or submitted incorrect information in the NOI or in any of the documents required by this permit , or have made substantive revisions to the SWPPP (e.g. the scope of the project changes significantly, the type of post-construction stormwater management practice(s) changes, there is a reduction in the sizing of the post-construction stormwater management practice, or there is an increase in the disturbance area or *impervious area*), which were not reflected in the original NOI submitted to the Department, they shall promptly submit such facts or information to the Department using the contact information in Part II.A. of this permit. Failure of the *owner or operator* to correct or supplement any relevant facts within five (5) business days of becoming aware of the deficiency shall constitute a violation of this permit.

H. Signatory Requirements

1. All NOIs and NOTs shall be signed as follows:

   a. For a corporation these forms shall be signed by a responsible corporate officer. For the purpose of this section, a responsible corporate officer means:

   (i) a president, secretary, treasurer, or vice-president of the corporation in charge of a principal business function, or any other person who performs similar policy or decision-making functions for the corporation; or

   (ii) the manager of one or more manufacturing, production or operating facilities, provided the manager is authorized to make management decisions which govern the operation of the regulated facility including having the explicit or implicit duty of making major capital investment recommendations, and initiating and directing other comprehensive measures to assure long term environmental compliance with environmental laws and regulations; the manager can ensure that the necessary systems are established or actions taken to gather complete and accurate information for permit application requirements; and where authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures;

   b. For a partnership or sole proprietorship these forms shall be signed by a general partner or the proprietor, respectively; or

   c. For a municipality, State, Federal, or other public agency these forms shall be signed by either a principal executive officer or ranking elected official. For purposes of this section, a principal executive officer of a Federal agency includes:

   (i) the chief executive officer of the agency, or

   (ii) a senior executive officer having responsibility for the overall operations of a principal geographic unit of the agency (e.g., Regional Administrators of EPA).

2. The SWPPP and other information requested by the Department shall be signed by a person described in Part VII.H.1. of this permit or by a duly authorized representative of that person. A person is a duly authorized representative only if:

   a. The authorization is made in writing by a person described in Part VII.H.1. of this permit;

   b. The authorization specifies either an individual or a position having responsibility for the overall operation of the regulated facility or activity, such as the position of plant manager, operator of a well or a well field,

   superintendent, position of *equivalent* responsibility, or an individual or position having overall responsibility for environmental matters for the company. (A duly authorized representative may thus be either a named individual or any individual occupying a named position) and,

   c. The written authorization shall include the name, title and signature of the authorized representative and be attached to the SWPPP.

3. All inspection reports shall be signed by the *qualified inspector* that performs the inspection.

4. The MS4 SWPPP Acceptance form shall be signed by the principal executive officer or ranking elected official from the *regulated, traditional land use control MS4,* or by a duly authorized representative of that person.

   It shall constitute a permit violation if an incorrect and/or improper signatory authorizes any required forms, SWPPP and/or inspection reports.

I. Property Rights

The issuance of this permit does not convey any property rights of any sort, nor any exclusive privileges, nor does it authorize any injury to private property nor any invasion of personal rights, nor any infringement of Federal, State or local laws or regulations. *Owners or operators* must obtain any applicable conveyances, easements, licenses and/or access to real property prior to *commencing construction activity*.

J. Severability

The provisions of this permit are severable, and if any provision of this permit, or the application of any provision of this permit to any circumstance, is held invalid, the application of such provision to other circumstances, and the remainder of this permit shall not be affected thereby.

K. Requirement to Obtain Coverage Under an Alternative Permit

1. The Department may require any owner or operator authorized by this permit to apply for and/or obtain either an individual SPDES permit or another SPDES general permit. When the Department requires any discharger authorized by a general permit to apply for an individual SPDES permit, it shall notify the discharger in writing that a permit application is required. This notice shall

   include a brief statement of the reasons for this decision, an application form, a statement setting a time frame for the owner or operator to file the application for an individual SPDES permit, and a deadline, not sooner than 180 days from owner or operator receipt of the notification letter, whereby the authorization to discharge under this general permit shall be terminated. Applications must be submitted to the appropriate Permit Administrator at the Regional Office. The Department may grant additional time upon demonstration, to the satisfaction of the Department, that additional time to apply for an alternative authorization is necessary or where the Department has not provided a permit determination in accordance with Part 621 of this Title.

2. When an individual SPDES permit is issued to a discharger authorized to *discharge* under a general SPDES permit for the same *discharge*(s), the general permit authorization for outfalls authorized under the individual SPDES permit is automatically terminated on the effective date of the individual permit unless termination is earlier in accordance with 6 NYCRR Part 750.

L. Proper Operation and Maintenance

The *owner or operator* shall at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the *owner or operator* to achieve compliance with the conditions of this permit and with the requirements of the SWPPP.

M. Inspection and Entry

The *owner or operator* shall allow an authorized representative of the Department, EPA, applicable county health department, or, in the case of a *construction site* which *discharges* through an *MS4*, an authorized representative of the *MS4* receiving the discharge, upon the presentation of credentials and other documents as may be required by law, to:

1. Enter upon the owner's or operator's premises where a regulated facility or activity is located or conducted or where records must be kept under the conditions of this permit;

2. Have access to and copy at reasonable times, any records that must be kept under the conditions of this permit; and

3. Inspect at reasonable times any facilities or equipment (including monitoring and control equipment), practices or operations regulated or required by this permit.

4. Sample or monitor at reasonable times, for purposes of assuring permit compliance or as otherwise authorized by the Act or ECL, any substances or parameters at any location.

N. Permit Actions

This permit may, at any time, be modified, suspended, revoked, or renewed by the Department in accordance with 6 NYCRR Part 621. The filing of a request by the *owner or operator* for a permit modification, revocation and reissuance, termination, a notification of planned changes or anticipated noncompliance does not limit, diminish and/or stay compliance with any terms of this permit.

O. Definitions

Definitions of key terms are included in Appendix A of this permit.

P. Re-Opener Clause

1. If there is evidence indicating potential or realized impacts on water quality due to any stormwater discharge associated with construction activity covered by this permit, the owner or operator of such discharge may be required to obtain an individual permit or alternative general permit in accordance with Part VII.K. of this permit or the permit may be modified to include different limitations and/or requirements.

2. Any Department initiated permit modification, suspension or revocation will be conducted in accordance with 6 NYCRR Part 621, 6 NYCRR 750-1.18, and 6 NYCRR 750-1.20.

Q. Penalties for Falsification of Forms and Reports

In accordance with 6NYCRR Part 750-2.4 and 750-2.5, any person who knowingly makes any false material statement, representation, or certification in any application, record, report or other document filed or required to be maintained under this permit, including reports of compliance or noncompliance shall, upon conviction, be punished in accordance with ECL §71-1933 and or Articles 175 and 210 of the New York State Penal Law.

R. Other Permits

Nothing in this permit relieves the *owner or operator* from a requirement to obtain any other permits required by law.

APPENDIX A – Acronyms and Definitions

Acronyms

APO – Agency Preservation Officer
BMP – Best Management Practice
CPESC – Certified Professional in Erosion and Sediment Control
Cpv – Channel Protection Volume
CWA – Clean Water Act (or the Federal Water Pollution Control Act, 33 U.S.C. §1251 et seq)
DOW – Division of Water
EAF – Environmental Assessment Form
ECL - Environmental Conservation Law
EPA – U. S. Environmental Protection Agency
HSG – Hydrologic Soil Group
MS4 – Municipal Separate Storm Sewer System
NOI – Notice of Intent
NOT – Notice of Termination
NPDES – National Pollutant Discharge Elimination System
OPRHP – Office of Parks, Recreation and Historic Places
Qf – Extreme Flood
Qp – Overbank Flood
RRv – Runoff Reduction Volume
RWE – Regional Water Engineer
SEQR – State Environmental Quality Review
SEQRA - State Environmental Quality Review Act
SHPA – State Historic Preservation Act
SPDES – State Pollutant Discharge Elimination System
SWPPP – Stormwater Pollution Prevention Plan
TMDL – Total Maximum Daily Load
UPA – Uniform Procedures Act
USDA – United States Department of Agriculture
WQv – Water Quality Volume

Definitions

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

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

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

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

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

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

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

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

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

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

and the first point of discharge from the separate storm sewer system is the specific surface waterbody.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Trained Contractor - means an employee from the contracting (construction) company, identified in Part III.A.6., that has received four (4) hours of Department endorsed

training in proper erosion and sediment control principles from a Soil and Water Conservation District, or other Department endorsed entity. After receiving the initial training, the *trained contractor* shall receive four (4) hours of training every three (3) years.

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

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

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

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

APPENDIX B – Required SWPPP Components by Project Type

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

The following construction activities that involve soil disturbances of one (1) or more acres of land, but less than five (5) acres:

- Single family home not located in one of the watersheds listed in Appendix C or not *directly discharging* to one of the 303(d) segments listed in Appendix E
- Single family residential subdivisions with 25% or less impervious cover at total site build-out and not located in one of the watersheds listed in Appendix C and not directly discharging to one of the 303(d) segments listed in Appendix E
- Construction of a barn or other *agricultural building*, silo, stock yard or pen.

The following construction activities that involve soil disturbances between five thousand (5000) square feet and one (1) acre of land:

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

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

- Installation of underground, linear utilities; such as gas lines, fiber-optic cable, cable TV, electric, telephone, sewer mains, and water mains
- Environmental enhancement projects, such as wetland mitigation projects, stormwater retrofits and stream restoration projects
- Pond construction
- Linear bike paths running through areas with vegetative cover, including bike paths surfaced with an impervious cover
- Cross-country ski trails and walking/hiking trails
- Sidewalk, bike path or walking path projects, surfaced with an impervious cover, that are not part of residential, commercial or institutional development;
- Sidewalk, bike path or walking path projects, surfaced with an impervious cover, that include incidental shoulder or curb work along an existing highway to support construction of the sidewalk, bike path or walking path.
- Slope stabilization projects
- Slope flattening that changes the grade of the site, but does not significantly change the runoff characteristics

Table 1 (Continued) CONSTRUCTION ACTIVITIES THAT REQUIRE THE PREPARATION OF A SWPPP THAT ONLY INCLUDES EROSION AND SEDIMENT CONTROLS

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

- Spoil areas that will be covered with vegetation
- Vegetated open space projects (i.e. recreational parks, lawns, meadows, fields, downhill ski trails) excluding projects that *alter hydrology from pre to post development* conditions,
- Athletic fields (natural grass) that do not include the construction or reconstruction of *impervious area* and do not *alter hydrology from pre to post development* conditions
- Demolition project where vegetation will be established, and no redevelopment is planned
- Overhead electric transmission line project that does not include the construction of permanent access roads or parking areas surfaced with *impervious cover*
- Structural practices as identified in Table II in the "Agricultural Management Practices Catalog for Nonpoint Source Pollution in New York State", excluding projects that involve soil disturbances of greater than five acres and construction activities that include the construction or reconstruction of impervious area
- Temporary access roads, median crossovers, detour roads, lanes, or other temporary impervious areas that will be restored to pre-construction conditions once the construction activity is complete

Table 2

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

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

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

Table 2 (Continued)

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

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

- Parking lot construction or reconstruction, including parking lots constructed as part of the construction activities listed in Table 1
- Athletic fields (natural grass) that include the construction or reconstruction of impervious area (>5% of disturbed area) or *alter the hydrology from pre to post development* conditions
- Athletic fields with artificial turf
- Permanent access roads, parking areas, substations, compressor stations and well drilling pads, surfaced with *impervious cover,* and constructed as part of an over-head electric transmission line project, wind-power project, cell tower project, oil or gas well drilling project, sewer or water main project or other linear utility project
- Sidewalk, bike path or walking path projects, surfaced with an impervious cover, that are part of a residential, commercial or institutional development
- Sidewalk, bike path or walking path projects, surfaced with an impervious cover, that are part of a highway construction or reconstruction project
- All other construction activities that include the construction or reconstruction of *impervious area* or *alter the hydrology from pre to post development* conditions, and are not listed in Table 1

APPENDIX C – Watersheds Requiring Enhanced Phosphorus Removal

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

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

Figure 1 - New York City Watershed East of the Hudson

Figure 2 - Onondaga Lake Watershed

Figure 3 - Greenwood Lake Watershed

Figure 4 - Oscawana Lake Watershed

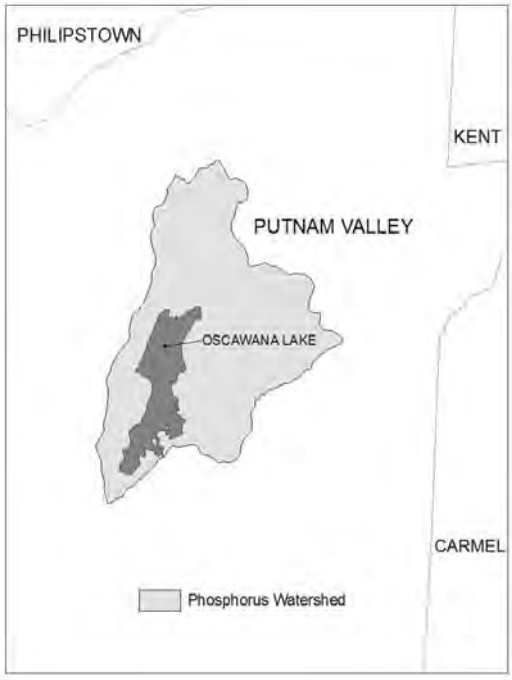
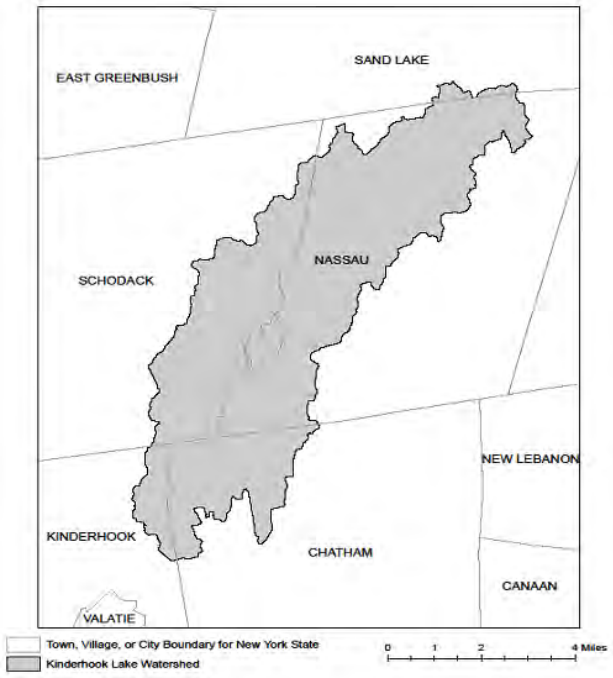


Figure 5 - Kinderhook Lake Watershed



APPENDIX D – Watersheds with Lower Disturbance Threshold

Watersheds where *owners or operators* of construction activities that involve soil disturbances between five thousand (5000) square feet and one (1) acre of land must obtain coverage under this permit.

Entire New York City Watershed that is located east of the Hudson River - See Figure 1 in Appendix C

APPENDIX E – 303(d) Segments Impaired by Construction Related Pollutant(s)

List of 303(d) segments impaired by pollutants related to *construction activity* (e.g. silt, sediment or nutrients). The list was developed using "The Final New York State 2016 Section 303(d) List of Impaired Waters Requiring a TMDL/Other Strategy" dated November 2016. *Owners or operators* of single family home and single family residential subdivisions with 25% or less total impervious cover at total site build-out that involve soil disturbances of one or more acres of land, but less than 5 acres, and *directly discharge* to one of the listed segments below shall prepare a SWPPP that includes post-construction stormwater management practices designed in conformance with the New York State Stormwater Management Design Manual ("Design Manual"), dated January 2015.

COUNTY	WATERBODY	POLLUTANT
Albany	Ann Lee (Shakers) Pond, Stump Pond	Nutrients
Albany	Basic Creek Reservoir	Nutrients
Allegany	Amity Lake, Saunders Pond	Nutrients
Bronx	Long Island Sound, Bronx	Nutrients
Bronx	Van Cortlandt Lake	Nutrients
Broome	Fly Pond, Deer Lake, Sky Lake	Nutrients
Broome	Minor Tribs to Lower Susquehanna (north)	Nutrients
Broome	Whitney Point Lake/Reservoir	Nutrients
Cattaraugus	Allegheny River/Reservoir	Nutrients
Cattaraugus	Beaver (Alma) Lake	Nutrients
Cattaraugus	Case Lake	Nutrients
Cattaraugus	Linlyco/Club Pond	Nutrients
Cayuga	Duck Lake	Nutrients
Cayuga	Little Sodus Bay	Nutrients
Chautauqua	Bear Lake	Nutrients
Chautauqua	Chadakoin River and tribs	Nutrients
Chautauqua	Chautauqua Lake, North	Nutrients
Chautauqua	Chautauqua Lake, South	Nutrients
Chautauqua	Findley Lake	Nutrients
Chautauqua	Hulburt/Clymer Pond	Nutrients
Clinton	Great Chazy River, Lower, Main Stem	Silt/Sediment
Clinton	Lake Champlain, Main Lake, Middle	Nutrients
Clinton	Lake Champlain, Main Lake, North	Nutrients
Columbia	Kinderhook Lake	Nutrients
Columbia	Robinson Pond	Nutrients
Cortland	Dean Pond	Nutrients

303(d) Segments Impaired by Construction Related Pollutant(s)

Dutchess	Fall Kill and tribs	Nutrients
Dutchess	Hillside Lake	Nutrients
Dutchess	Wappingers Lake	Nutrients
Dutchess	Wappingers Lake	Silt/Sediment
Erie	Beeman Creek and tribs	Nutrients
Erie	Ellicott Creek, Lower, and tribs	Silt/Sediment
Erie	Ellicott Creek, Lower, and tribs	Nutrients
Erie	Green Lake	Nutrients
Erie	Little Sister Creek, Lower, and tribs	Nutrients
Erie	Murder Creek, Lower, and tribs	Nutrients
Erie	Rush Creek and tribs	Nutrients
Erie	Scajaquada Creek, Lower, and tribs	Nutrients
Erie	Scajaquada Creek, Middle, and tribs	Nutrients
Erie	Scajaquada Creek, Upper, and tribs	Nutrients
Erie	South Branch Smoke Cr, Lower, and tribs	Silt/Sediment
Erie	South Branch Smoke Cr, Lower, and tribs	Nutrients
Essex	Lake Champlain, Main Lake, South	Nutrients
Essex	Lake Champlain, South Lake	Nutrients
Essex	Willsboro Bay	Nutrients
Genesee	Bigelow Creek and tribs	Nutrients
Genesee	Black Creek, Middle, and minor tribs	Nutrients
Genesee	Black Creek, Upper, and minor tribs	Nutrients
Genesee	Bowen Brook and tribs	Nutrients
Genesee	LeRoy Reservoir	Nutrients
Genesee	Oak Orchard Cr, Upper, and tribs	Nutrients
Genesee	Tonawanda Creek, Middle, Main Stem	Nutrients
Greene	Schoharie Reservoir	Silt/Sediment
Greene	Sleepy Hollow Lake	Silt/Sediment
Herkimer	Steele Creek tribs	Silt/Sediment
Herkimer	Steele Creek tribs	Nutrients
Jefferson	Moon Lake	Nutrients
Kings	Hendrix Creek	Nutrients
Kings	Prospect Park Lake	Nutrients
Lewis	Mill Creek/South Branch, and tribs	Nutrients
Livingston	Christie Creek and tribs	Nutrients
Livingston	Conesus Lake	Nutrients
Livingston	Mill Creek and minor tribs	Silt/Sediment
Monroe	Black Creek, Lower, and minor tribs	Nutrients
Monroe	Buck Pond	Nutrients
Monroe	Cranberry Pond	Nutrients

303(d) Segments Impaired by Construction Related Pollutant(s)

Monroe	Lake Ontario Shoreline, Western	Nutrients
Monroe	Long Pond	Nutrients
Monroe	Mill Creek and tribs	Nutrients
Monroe	Mill Creek/Blue Pond Outlet and tribs	Nutrients
Monroe	Minor Tribs to Irondequoit Bay	Nutrients
Monroe	Rochester Embayment - East	Nutrients
Monroe	Rochester Embayment - West	Nutrients
Monroe	Shipbuilders Creek and tribs	Nutrients
Monroe	Thomas Creek/White Brook and tribs	Nutrients
Nassau	Beaver Lake	Nutrients
Nassau	Camaans Pond	Nutrients
Nassau	East Meadow Brook, Upper, and tribs	Silt/Sediment
Nassau	East Rockaway Channel	Nutrients
Nassau	Grant Park Pond	Nutrients
Nassau	Hempstead Bay	Nutrients
Nassau	Hempstead Lake	Nutrients
Nassau	Hewlett Bay	Nutrients
Nassau	Hog Island Channel	Nutrients
Nassau	Long Island Sound, Nassau County Waters	Nutrients
Nassau	Massapequa Creek and tribs	Nutrients
Nassau	Milburn/Parsonage Creeks, Upp, and tribs	Nutrients
Nassau	Reynolds Channel, west	Nutrients
Nassau	Tidal Tribs to Hempstead Bay	Nutrients
Nassau	Tribs (fresh) to East Bay	Nutrients
Nassau	Tribs (fresh) to East Bay	Silt/Sediment
Nassau	Tribs to Smith/Halls Ponds	Nutrients
Nassau	Woodmere Channel	Nutrients
New York	Harlem Meer	Nutrients
New York	The Lake in Central Park	Nutrients
Niagara	Bergholtz Creek and tribs	Nutrients
Niagara	Hyde Park Lake	Nutrients
Niagara	Lake Ontario Shoreline, Western	Nutrients
Niagara	Lake Ontario Shoreline, Western	Nutrients
Oneida	Ballou, Nail Creeks and tribs	Nutrients
Onondaga	Harbor Brook, Lower, and tribs	Nutrients
Onondaga	Ley Creek and tribs	Nutrients
Onondaga	Minor Tribs to Onondaga Lake	Nutrients
Onondaga	Ninemile Creek, Lower, and tribs	Nutrients
Onondaga	Onondaga Creek, Lower, and tribs	Nutrients
Onondaga	Onondaga Creek, Middle, and tribs	Nutrients

303(d) Segments Impaired by Construction Related Pollutant(s)

Onondaga	Onondaga Lake, northern end	Nutrients
Onondaga	Onondaga Lake, southern end	Nutrients
Ontario	Great Brook and minor tribs	Silt/Sediment
Ontario	Great Brook and minor tribs	Nutrients
Ontario	Hemlock Lake Outlet and minor tribs	Nutrients
Ontario	Honeoye Lake	Nutrients
Orange	Greenwood Lake	Nutrients
Orange	Monhagen Brook and tribs	Nutrients
Orange	Orange Lake	Nutrients
Orleans	Lake Ontario Shoreline, Western	Nutrients
Orleans	Lake Ontario Shoreline, Western	Nutrients
Oswego	Lake Neatahwanta	Nutrients
Oswego	Pleasant Lake	Nutrients
Putnam	Bog Brook Reservoir	Nutrients
Putnam	Boyd Corners Reservoir	Nutrients
Putnam	Croton Falls Reservoir	Nutrients
Putnam	Diverting Reservoir	Nutrients
Putnam	East Branch Reservoir	Nutrients
Putnam	Lake Carmel	Nutrients
Putnam	Middle Branch Reservoir	Nutrients
Putnam	Oscawana Lake	Nutrients
Putnam	Palmer Lake	Nutrients
Putnam	West Branch Reservoir	Nutrients
Queens	Bergen Basin	Nutrients
Queens	Flushing Creek/Bay	Nutrients
Queens	Jamaica Bay, Eastern, and tribs (Queens)	Nutrients
Queens	Kissena Lake	Nutrients
Queens	Meadow Lake	Nutrients
Queens	Willow Lake	Nutrients
Rensselaer	Nassau Lake	Nutrients
Rensselaer	Snyders Lake	Nutrients
Richmond	Grasmere Lake/Bradys Pond	Nutrients
Rockland	Congers Lake, Swartout Lake	Nutrients
Rockland	Rockland Lake	Nutrients
Saratoga	Ballston Lake	Nutrients
Saratoga	Dwaas Kill and tribs	Silt/Sediment
Saratoga	Dwaas Kill and tribs	Nutrients
Saratoga	Lake Lonely	Nutrients
Saratoga	Round Lake	Nutrients
Saratoga	Tribs to Lake Lonely	Nutrients

303(d) Segments Impaired by Construction Related Pollutant(s)

Schenectady	Collins Lake	Nutrients
Schenectady	Duane Lake	Nutrients
Schenectady	Mariaville Lake	Nutrients
Schoharie	Engleville Pond	Nutrients
Schoharie	Summit Lake	Nutrients
Seneca	Reeder Creek and tribs	Nutrients
St.Lawrence	Black Lake Outlet/Black Lake	Nutrients
St.Lawrence	Fish Creek and minor tribs	Nutrients
Steuben	Smith Pond	Nutrients
Suffolk	Agawam Lake	Nutrients
Suffolk	Big/Little Fresh Ponds	Nutrients
Suffolk	Canaan Lake	Silt/Sediment
Suffolk	Canaan Lake	Nutrients
Suffolk	Flanders Bay, West/Lower Sawmill Creek	Nutrients
Suffolk	Fresh Pond	Nutrients
Suffolk	Great South Bay, East	Nutrients
Suffolk	Great South Bay, Middle	Nutrients
Suffolk	Great South Bay, West	Nutrients
Suffolk	Lake Ronkonkoma	Nutrients
Suffolk	Long Island Sound, Suffolk County, West	Nutrients
Suffolk	Mattituck (Marratooka) Pond	Nutrients
Suffolk	Meetinghouse/Terrys Creeks and tribs	Nutrients
Suffolk	Mill and Seven Ponds	Nutrients
Suffolk	Millers Pond	Nutrients
Suffolk	Moriches Bay, East	Nutrients
Suffolk	Moriches Bay, West	Nutrients
Suffolk	Peconic River, Lower, and tidal tribs	Nutrients
Suffolk	Quantuck Bay	Nutrients
Suffolk	Shinnecock Bay and Inlet	Nutrients
Suffolk	Tidal tribs to West Moriches Bay	Nutrients
Sullivan	Bodine, Montgomery Lakes	Nutrients
Sullivan	Davies Lake	Nutrients
Sullivan	Evens Lake	Nutrients
Sullivan	Pleasure Lake	Nutrients
Tompkins	Cayuga Lake, Southern End	Nutrients
Tompkins	Cayuga Lake, Southern End	Silt/Sediment
Tompkins	Owasco Inlet, Upper, and tribs	Nutrients
Ulster	Ashokan Reservoir	Silt/Sediment
Ulster	Esopus Creek, Upper, and minor tribs	Silt/Sediment
Warren	Hague Brook and tribs	Silt/Sediment

303(d) Segments Impaired by Construction Related Pollutant(s)

Warren	Huddle/Finkle Brooks and tribs	Silt/Sediment
Warren	Indian Brook and tribs	Silt/Sediment
Warren	Lake George	Silt/Sediment
Warren	Tribs to L.George, Village of L George	Silt/Sediment
Washington	Cossayuna Lake	Nutrients
Washington	Lake Champlain, South Bay	Nutrients
Washington	Tribs to L.George, East Shore	Silt/Sediment
Washington	Wood Cr/Champlain Canal and minor tribs	Nutrients
Wayne	Port Bay	Nutrients
Westchester	Amawalk Reservoir	Nutrients
Westchester	Blind Brook, Upper, and tribs	Silt/Sediment
Westchester	Cross River Reservoir	Nutrients
Westchester	Lake Katonah	Nutrients
Westchester	Lake Lincolndale	Nutrients
Westchester	Lake Meahagh	Nutrients
Westchester	Lake Mohegan	Nutrients
Westchester	Lake Shenorock	Nutrients
Westchester	Long Island Sound, Westchester (East)	Nutrients
Westchester	Mamaroneck River, Lower	Silt/Sediment
Westchester	Mamaroneck River, Upper, and minor tribs	Silt/Sediment
Westchester	Muscoot/Upper New Croton Reservoir	Nutrients
Westchester	New Croton Reservoir	Nutrients
Westchester	Peach Lake	Nutrients
Westchester	Reservoir No.1 (Lake Isle)	Nutrients
Westchester	Saw Mill River, Lower, and tribs	Nutrients
Westchester	Saw Mill River, Middle, and tribs	Nutrients
Westchester	Sheldrake River and tribs	Silt/Sediment
Westchester	Sheldrake River and tribs	Nutrients
Westchester	Silver Lake	Nutrients
Westchester	Teatown Lake	Nutrients
Westchester	Titicus Reservoir	Nutrients
Westchester	Truesdale Lake	Nutrients
Westchester	Wallace Pond	Nutrients
Wyoming	Java Lake	Nutrients
Wyoming	Silver Lake	Nutrients

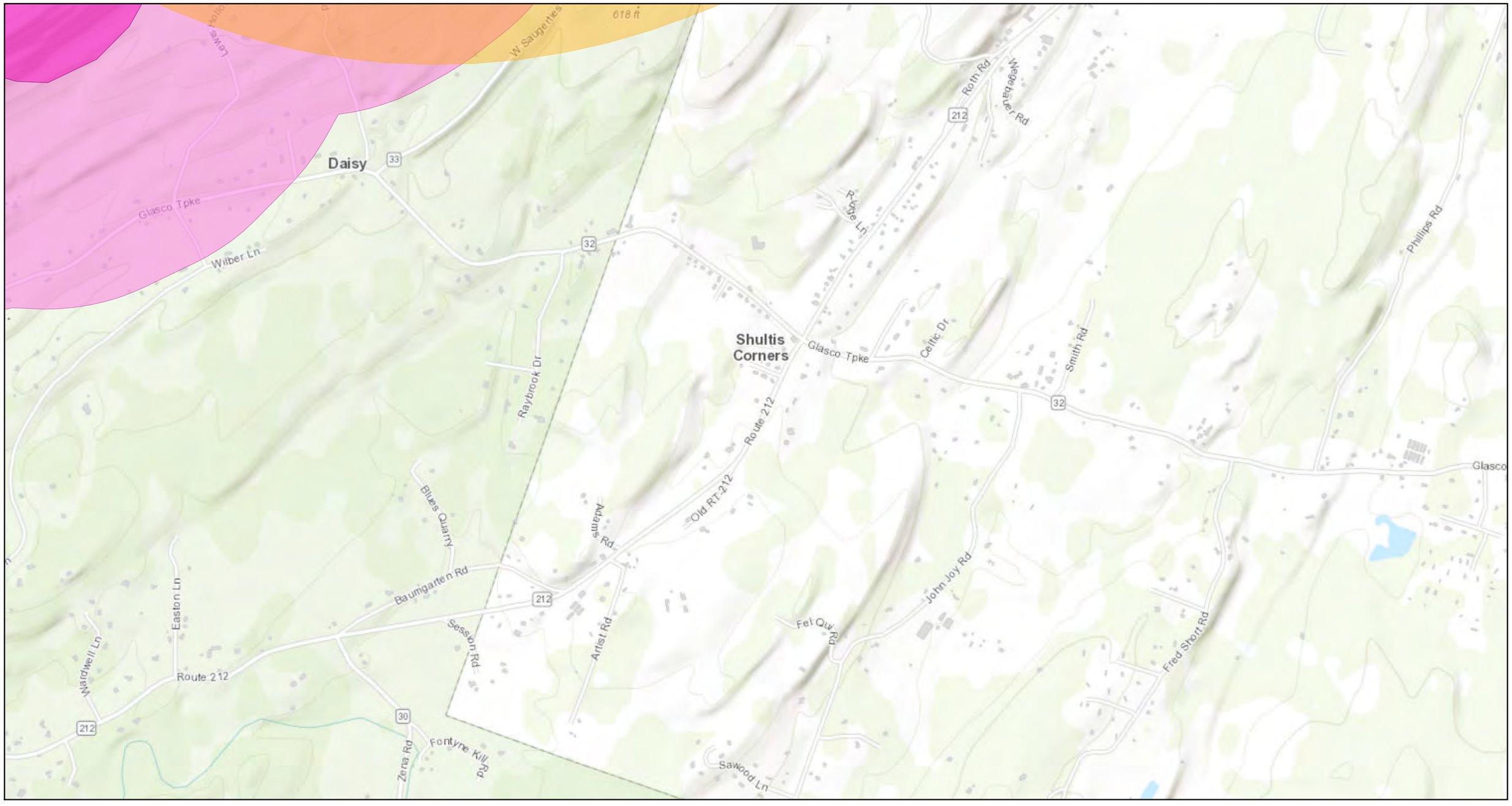
APPENDIX F – List of NYS DEC Regional Offices

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

Appendix G

Historic Preservation/Endangered Species Documentation

Terramore Saugerties



May 31, 2022

1:18,056

0 0.15 0.3 0.6 mi

0 0.28 0.55 1.1 km

Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community

Author: The LA Group
Not a legal document

NEW YORK STATE OF OPPORTUNITY. | Parks, Recreation, and Historic Preservation

KATHY HOCHUL
Governor

ERIK KULLESEID
Commissioner

February 10, 2022

Robert Fraser
The LA Group, P.C.
266 Locust Grove Road
Greenfield, NY 12833

Re: SEQRA
Terramor Camping Facility, Saugerties
Town of Saugerties, Ulster County, NY
22PR00774

Dear Robert Fraser:

Thank you for requesting the comments of the Office of Parks, Recreation and Historic Preservation (OPRHP). We have reviewed the project in accordance with the New York State Historic Preservation Act of 1980 (Section 14.09 of the New York Parks, Recreation and Historic Preservation Law). These comments are those of the OPRHP and relate only to Historic/Cultural resources. They do not include potential environmental impacts to New York State Parkland that may be involved in or near your project. Such impacts must be considered as part of the environmental review of the project pursuant to the State Environmental Quality Review Act (New York Environmental Conservation Law Article 8) and its implementing regulations (6 NYCRR Part 617).

Based upon this review, it is the opinion of OPRHP that no properties, including archaeological and/or historic resources, listed in or eligible for the New York State and National Registers of Historic Places will be impacted by this project.

If further correspondence is required regarding this project, please be sure to refer to the OPRHP Project Review (PR) number noted above.

Sincerely,

Roger Daniel Mackay

R. Daniel Mackay

Deputy Commissioner for Historic Preservation
Division for Historic Preservation

Appendix H

Deep Ripping and De-compaction (DEC, 2008)

New York State
DEPARTMENT OF ENVIRONMENTAL CONSERVATION

Division of Water

Deep-Ripping and Decompaction

April 2008

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)

New York State
Department of Environmental Conservation

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.

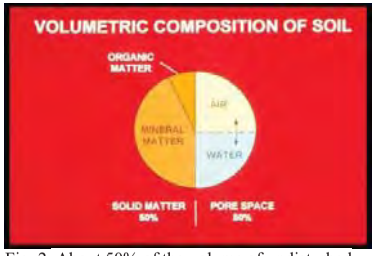


Fig. 2. About 50% of the volume of undisturbed loam surface soil is pore space, when soil is in good condition for plant growth. Brady, 2002.

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.

In Figure 4, the profile displays the undisturbed horizons of a soil in Hydrologic Soil Group C and the naturally slow rate of infiltration through the subsoil. The slow rate of infiltration begins immediately below the topsoil horizon (30 cm), due to the limited amount of macro pores, e.g.: natural subsoil fractures, worm holes and root channels. Infiltration after the construction-induced mixing and compression of such subsoil material is virtually absent; but can be restored back to this natural level with the two-phase practice of deep ripping and decompaction, followed by the permanent establishment of an appropriate, deep taproot

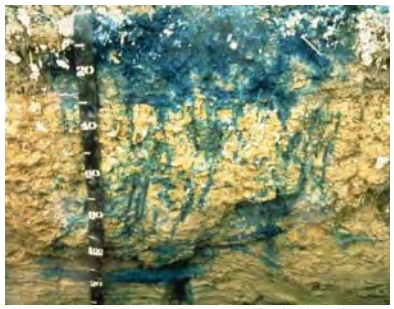


Fig. 4. Profile (in centimeters) displaying the infiltration test result of the natural undisturbed horizons of a soil in Hydrologic Soil Group C.

lawn/ground cover to help maintain the restored subsoil structure. Infiltration after construction-induced mixing and compression of such subsoil material can be notably rehabilitated with the Deep Ripping and Decompaction practice, which prepares the site for the appropriate long-term lawn/ground cover mix including deep taproot plants such as clover, fescue or trefoil, etc. needed for all rehabilitated soils.

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

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

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

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

Slope

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

Local Weather/Timing/Soil Moisture

Effective fracturing of compressed subsoil material from the exposed work surface, laterally and vertically down through the affected zone is achieved only when the soil material is moderately dry to moderately moist. Neither one of the two-phases, deep ripping nor decompaction (deep

subsoiling), can be effectively conducted when the soil material (subsoil or replaced topsoil) is in either a "plastic" or "liquid" state of soil consistency. Pulling the respective implements legs through the soil when it is overly moist only results in the "slicing and smearing" of the material or added "squeezing and compression" instead of the necessary fracturing. Ample drying time is needed for a "rippable" soil condition not merely in the material close to the surface, but throughout the material located down to the bottom of the physically compressed zone of the subsoil.

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

Publications:

- American Society of Agricultural Engineers. 1971. *Compaction of Agricultural Soils.* ASAE.
- Brady, N.C., and R.R. Weil. 2002. *The Nature and Properties of Soils. 13th ed.* Pearson Education, Inc.
- Baver, L.D. 1948. *Soil Physics.* John Wiley & Sons.
- Carpachi, N. 1987 (1995 fifth printing). *Excavation and Grading Handbook, Revised. 2nd ed.* Craftsman Book Company
- Ellis, B. (Editor). 1997. Safe & Easy Lawn Care: The Complete Guide to Organic Low Maintenance Lawn. Houghton Mifflin.
- Harpstead, M.I., T.J. Sauer, and W.F. Bennett. 2001. *Soil Science Simplified. 4th ed.* Iowa State University Press.
- Magdoff, F., and H. van Es. 2000. *Building Soils for Better Crops. 2nd ed.* Sustainable Agricultural Networks
- McCarthy, D.F. 1993. *Essentials of Soil Mechanics and Foundations, Basic Geotechnics 4th ed.* Regents/Prentice Hall.
- Plaster, E.J. 1992. *Soil Science & Management. 3rd ed.* Delmar Publishers.
- Union Gas Limited, Ontario, Canada. 1984. *Rehabilitation of Agricultural Lands, Dawn-Kerwood Loop Pipeline; Technical Report.* Ecological Services for Planning, Ltd.; Robinson, Merritt & Devries, Ltd. and Smith, Hoffman Associates, Ltd.
- US Department of Agriculture in cooperation with Cornell University Agricultural Experiment Station. Various years. *Soil Survey of (various names) County, New York.* USDA.

Internet Access:

- Examples of implements:

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

- Soils data of USDA Natural Resources Conservation Service. *NRCS Web Soil Survey.* http://websoilsurvey.nrcs.usda.gov/app/ and *USDA-NRCS Official Soil Series Descriptions; View by Name.* http://ortho.ftw.nrcs.usda.gov/cgi-bin/osd/osdname.cgi . *Last visited Jan. 08.*
- Soil penetrometer information. Access by internet searches of: *Diagnosing Soil Compaction using a Penetrometer (soil compaction tester), PSU Extension;* as well as *Dickey-john Soil Compaction Tester.* http://www.dickey-johnproducts.com/pdf/SoilCompactionTest.pdf and http://cropsoil.psu.edu/Extension/Facts/uc178pdf Last visited Sept. 07