QUACKENDERRY COMMONS
MIXED-USE SITE PLAN

TOWN OF NORTH GREENBUSH
RENSSELAER COUNTY, NEW YORK

STORMWATER POLLUTION PREVENTION PLAN

August 12, 2024

Prepared For:

Bloomingrove Properties Associates, LLC
1 Juniper Drive
Delmar, NY 12054

Prepared By:

LANSING ENGINEERING

2452 State Route 9, Suite 301
Malta, New York 12020

Table of Contents

APPENDICIES

1.0 EXECUTIVE SUMMARY

This Water Quality and Quantity Plan and Stormwater Pollution Prevention Plan (SWPPP) has been prepared pursuant to the Environmental Protection Agency's (EPA) and the New York State Department of Environmental Conservation's (NYSDEC) Phase II Storm Water Regulations. All responsible parties as defined below are responsible for executing the SWPPP and for complying with the requirements set forth in the EPA's National Pollution Discharge Elimination System (NPDES) General Permit, the NYSDEC's State Pollution Discharge Elimination System (SPDES) General Permit GP-0-20-001, and any local governing agencies having jurisdiction with regard to erosion and sediment control.

This SWPPP has been prepared in accordance with Stormwater Management Planning techniques and Green Infrastructure Practices required by the New York State Stormwater Management Design Manual (Design Manual). These planning techniques and practices emphasize a holistic approach to resource protection, water quality treatment, flow volume control, maintenance cost reduction, and the dynamics of stormwater science. According to the Design Manual, the green infrastructure approach for stormwater management reduces a site's impact on the aquatic ecosystem through the use of site planning techniques, runoff reduction techniques, and certain standard stormwater management practices.

The purpose of the Water Quality and Quantity Plan and the SWPPP described herein is to provide for the detention of high intensity storms (up to the 100-year storm) and the passive water quality treatment of low intensity storms. These controls and treatments will be achieved using appropriate temporary and permanent features such as; drainage ditches, conveyance channels, conveyance piping, green infrastructure, and earth formed stormwater management basins. The goal is to limit the post-development storm water discharge rate to that of the pre-development flows and prevent discharge of pollutants into receiving waters.

This SWPPP has been prepared in accordance with the most current effluent limitations applicable to discharges from construction activities. The stormwater discharges outlined in this report will achieve, at a minimum, the effluent limitations outlined in Part I.B.1 (a)-(f) of NYSDEC's SPDES GP-0-20-001.

Additionally, this Plan outlines methods that Owners and Contractors can use to adjust construction practices in a way that will retain surface water quality and prevent sediment laden runoff from entering wetlands, streams, rivers, lakes and then ultimately to estuaries or other sensitive environments. This plan describes methods for stormwater management and runoff management during the construction phase and summarizes responsible stormwater pollution prevention practices that can be phased into everyday activities post construction.

1.1 RESPONSIBILITIES OF THE PARTICIPANTS

All responsible parties shall comply with the measures set forth in this SWPPP and in accordance with the NYSDEC General Permit. The following outlines the responsibilities of all participants:

Owner/Operator/Permittee

The following is a summary of the Owner's responsibilities:

1. Satisfy the requirements of the State Environmental Quality Review Act when SEQR is applicable and where required, all necessary Department permits subject to the Uniform Procedures Act (UPA).

2. 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 develop a SWPPP in accordance with all applicable requirements of this permit and then submit a completed NOI form to the address below in order to be authorized to discharge under this permit. The NOI form shall be one which is associated with this permit, signed in accordance with Part VII.H. of GP-0-20-001.

3. An owner or operator of a construction activity that is subject to the requirements of a regulated, traditional land use control MS4 must first develop a SWPPP in accordance with all applicable requirements of this permit and then have its SWPPP reviewed and accepted by the MS4 prior to submitting the NOI to the Department. The owner or operator shall have the "MS4 SWPPP Acceptance" form 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, and then submit that form along with the NOI to the address referenced under "Notice of Intent (NOI) Submittal".

4. Read and understand the Notice of Intent (NOI) and the SWPPP to make sure they are in accordance with the requirements of the General Permit. Certify the NOI and the SWPPP by signing the Owner/Operator Certification statement contained in the NOI.

5. The owner shall have the SWPPP preparer sign the "SWPPP Preparer Certification" contained in the NOI. The NOI should then be submitted to:

   NYSDEC "Notice of Intent"
   Bureau of Water Permits
   625 Broadway
   Albany, New York 12233-3505

   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 NYSDEC online NOI.

6. 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.

7. Ensure the provisions of the SWPPP are implemented from the commencement of construction activity until final stabilization and the Notice of Termination (NOT) has been submitted to the NYSDEC.

8. Identify the contractor(s) and/or subcontractors(s) involved with construction activity that disturbs site soils prior to commencement of construction. Require all contractor(s) and/or subcontractor(s) fully implement the SWPPP and adhere to requirements set forth in the General Permit by having them sign the "contractor certification" in Appendix A. Each of these contractors and subcontractors shall have at least one trained individual from their company that will be responsible for implementation of the SWPPP and be on site when soil disturbing activities are occurring.

9. Maintain a copy of the General Permit (GP-0-20-001), NOI, NOI Acknowledgement Letter, SWPPP, MS4 SWPPP Acceptance form, Contractor Certification(s), and inspection reports for the duration of construction activity until a NOT is filed with the NYSDEC. These documents should be kept in a secure location on site accessible during normal working hours.

10. Obtain the services of a qualified inspector to conduct regular on-site inspections for general compliance with the SWPPP and the SPDES General permit at least once every seven (7) calendar days.

11. Obtain prior written authorization from the NYSDEC or MS4 if construction activity will disturb greater than five (5) acres of soil at any one time. A copy of this authorization should be kept on site. For as long as there is greater than five acres of soil disturbance, inspections shall be conducted twice every seven days with a minimum of two days separation. When soil disturbance has been temporarily or permanently suspended in these areas, stabilization measures shall be applied within seven days. A phasing plan defining maximum disturbance and required cuts and fills shall be developed as well as any additional site-specific practices needed to protect water quality.

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

13. Upon project completion and when the site has reached final stabilization, the Owner shall have the qualified inspector perform a final site assessment. If the project has been properly stabilized and has met all requirements, the qualified inspector shall sign the "Qualified Inspector Certification" of the NOT. The owner shall certify the NOT by signing the certification contained in the NOT. The NOT should then be submitted to:

    NYSDEC "Notice of Termination"
    Bureau of Water Permits
    625 Broadway
    Albany, New York 12233-3505

14. Retain all site records and documentation including project plans and reports, the SWPPP, SWPPP inspection reports and all records of data used to complete the NOI for a minimum of five (5) years from the date the site reached final stabilization.

15. It is the responsibility of the owner or operator to provide documentation supporting the determination of permit eligibility with regard to Park I.D.10 (Historic Places). At a minimum, the supporting documentation shall include: information on whether the stormwater discharge or construction activities would have an effect on a property that is listed or eligible for listing on the State or National Register of Historic Places, results of historic places screening determinations conducted, a description of measures necessary to avoid or minimize adverse impacts on places listed or eligible for listing, or where effects may occur, any written agreements that the owner or operator has made with the OPRHP or other governmental agency to mitigate those effects, or local land use approvals evidencing the same.

16. It is the responsibility of the owner or operator to provide documentation supporting the determination of permit eligibility with regard to construction activities that may adversely affect an endangered or threatened species unless the owner or (Part I.F.4) 10 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;

Notice to Purchaser and Developers

This SWPPP provides guidance to comply with the New York State Pollutant Discharge Elimination System (SPDES) for stormwater discharges associated with construction activities (GP-0-20-001). The Notice of Intent (NOI) submitted to New York State to obtain permit coverage identifies the owner/operator of the land who is responsible for compliance with the General Permit and the project SWPPP.

If a separate party (herein referred to as the Purchaser) purchases land from the permitted owner/operator, and disturbs soil as part of the residential subdivision, the owner/operator has the obligation to ensure that the Purchaser's construction complies with the General Permit and the project SWPPP. Any amendments made to this SWPPP due to alteration of the scope of the project, or needed amendments due to compliance with a New York State revision to the General Permit are also the responsibility of the owner/operator.

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.

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.

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 (Part II.F.3) 18 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.

Owner's Engineer

The following is a summary of the Engineer's responsibilities:

1. Prepare this SWPPP using good Engineering practices, best management practices, and in compliance with NYSDEC Stormwater Regulations under General Permit (GP-0-20-001) and the *"New York Standards and Specifications for Erosion and Sediment Control"*.
2. Prepare the NOI for the Owner to submit to the NYSDEC. The SWPPP preparer shall sign the "SWPPP Preparer Certification" contained in the NOI.
3. Update the SWPPP each time there is a significant modification to the design or construction which may have a significant effect on the potential for discharge of pollutants into receiving waters.

Contractors and Sub Contractors

The following is a summary of responsibilities for Contractors and/or subcontractors involved with construction activities that disturb soils on site:

1. Certify that the SWPPP has been read and understood by signing the Contractor Certification statement contained in Appendix A of this report.

2. 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.

3. Fully implement the SWPPP and the requirements set forth in the SPDES General Permit.

4. Conduct inspections on a regular basis of the erosion and sedimentation controls installed at the site. Responsible for installing, constructing, repairing, inspecting, and maintaining the erosion and sediment control practices. Each of these contractors and subcontractors shall have at least one trained individual from their company that will be responsible for implementation of the SWPPP and be on site when soil disturbing activities are occurring. 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 disturbances are being performed.

Site Inspector

The owner or operator shall have a qualified inspector conduct site inspections in conformance with the general permit.

The following is a summary of the Site Inspector's responsibilities:

1. Inspections should be completed only by a "qualified inspector". Definition of qualified inspector is:

   A 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.

2. Conduct on-site inspections at least once every seven (7) calendar days for general compliance with the SWPPP and the NYSDEC SPDES General Permit. Inspection reports will be provided to the Owner and all contractors and subcontractors involved with earth disturbing activities within one business day of the field inspection. The inspector shall sign the certifying statements contained at the end of the inspection reports. See section 9.2 of this SWPPP for further detail concerning inspections as well as winter shutdown inspection requirements. The inspection reports shall include and/or address the following:

- The date and time of the inspection
- Name and title of person(s) performing inspection;
- Description of the weather and soil conditions at the time of the inspection;
- Description of the condition of the runoff at all points of discharge from the construction site;
- Description of the condition of all natural surface waterbodies located within, or immediately adjacent to, the property boundaries of the construction site;
- Identification of all erosion and sediment control practices that need repair or maintenance;
- Identification of all erosion and sediment control practices that were not installed properly or are not functioning as designed and require reinstallation or replacement.
- Description and sketch of disturbed areas and areas which have been stabilized;
- 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.
- Corrective actions that must be taken to install, repair, replace or maintain erosion and sediment control practices; and to correct deficiencies identified with the construction of the post-construction stormwater management practices;
- 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.

3. At a minimum, the qualified inspector shall inspect all erosion and sediment control practices 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. Review the SWPPP logbook on a periodic basis to ensure compliance and update as necessary.

5. When construction is complete, provide the Owner with a final site assessment verifying that the site has undergone final stabilization and met all requirements of the SWPPP and the General Permit. When the site has undergone final stabilization, prepare the NOT and sign the "Final

Stabilization" and "Post-Construction Stormwater Management Practice" certification statement. The NOT must then be mailed to the Owner to sign and submit to the NYSDEC.

For construction activities that are subject to the requirements of a regulated, traditional land use control MS4, the owner or operator shall also have the MS4 sign the "MS4 Acceptance" statement on the NOT. The owner or operator shall have the principal executive officer, ranking elected official, or duly authorized representative from the regulated, traditional land use control MS4, sign the "MS4 Acceptance" statement. The 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 the general permit. The MS4 can make this determination by performing a final site inspection themselves or by accepting the qualified inspector's final site inspection certification(s).

1.2 PARTICIPANT CONTACT INFORMATION

Owner/Operator	Engineering Firm	Contractor's & Sub Contractors
Bloomingrove Properties Associates, LLC 1 Juniper Drive Delmar, NY 12054 (518) 475-9088	Lansing Engineering, P.C. 2452 State Route 9, Suite 301 Malta, New York 12020 (518) 899-5243	TBD

2.0 SITE DESCRIPTION

This section briefly describes existing and proposed hydrologic and hydraulic conditions at and around the project site as they relate to surface water management planning considerations. Subsequent sections contain a description of the manner in which site runoff will be managed to minimize effects on areas adjacent to the site.

2.1 LOCATION

The project site is located at 726-728 Bloomingrove Drive, approximately 240' north of the intersection of Bloomingrove Drive/North Greenbush Road/Agway Drive in the Town of North Greenbush. The project site is identified by tax parcel identification numbers 144.00-10-33.111 & 144.00-10-33.112 and includes approximately 24.53± acres in total. The parcels are located in the Quackenderry Commons Planned Development District.

2.2 TOPOGRAPHY

Based on topographic survey information, the project parcels include moderate and severely sloped topography directed towards the western parcel boundary.

2.3 SOILS AND GROUNDWATER

According to maps from the Natural Resources Conservation Service (NRCS) of Rensselaer County, the onsite soils are classified as follows.

- *Bernardston-Nassau complex (BnC/BnD):* This is a very deep, well drained and somewhat excessively drained soil. The surface topography is irregular and slopes in many directions due to underlying shale/bedrock. Permeability is slow to moderate and the soil has a moderate erosion hazard. (Hydrologic Soil Group C/D)

- *Castile Gravelly Silt Loam (CbA):* This is a very deep, moderately well drained soil formed in gravelly outwash deposits. They are nearly level to sloping soils found on outwash plains, valley trains, kames, and eskers. Permeability is moderately high to high. The potential for surface runoff is low and the erosion hazard is low. (Hydrologic Soil Group A/D)

- *Hudson Silt Loam (HuB/HuC/HuE):* This is a very deep, moderately well drained soil formed in water deposited material high in clay. The soil is found on old lake plains. Permeability is moderate to moderately to slow throughout. The potential for surface runoff is medium and the soil has a low erosion hazard. (Hydrologic Soil Group C/D)

- *Rhinebeck Silt Loam (RhB):* This is a very deep, gently sloping, somewhat poorly drained soil formed in water-deposited silt and clay. It is found on glacial lake plains and upland areas. Permeability is moderately slow to slow and the potential for surface runoff is medium. The soil has a slight erosion hazard. (Hydrologic Soil Group C/D)

Onsite soil tests have not been completed on the project site and as a result, the soils identified as A/D soils have been analyzed as A type soils and the C/D soils have been analyzed as C type soils for the purpose of the stormwater calculations.

2.4 LAND COVER

The existing cover consists of existing woods with small areas of lawn. The project site also includes the existing Stormwater Management Basin for the existing CVS commercial building.

2.5 WETLANDS

The project area includes approximately 1.13± acres of ACOE jurisdictional wetlands.

2.6 SURFACE WATERS

The project site contains approximately 2,090± linear feet of a stream consisting of 3 separate streams.

2.7 RAINFALL DATA

Rainfall data utilized in the modeling and the analysis was obtained from a joint venture between the Northeast Regional Climate Center (NRCC) and the Natural Resources Conservation Service (NRCS) and can be found at the website: precip@cornell.edu. The data used is specific to this project and various 24-hour storm events are presented below.

24-Hour Storm Event	24-hour rainfall
1 year	2.26
10 year	3.83
25 year	4.73
100 year	6.53

Data for the 90% average annual stormwater runoff volume (P) was obtained from Figure 4.1 of the "New York State Stormwater Management Design Manual" and is equal to 1.15".

2.8 EXISTING LAND USE

The parcel includes vacant wooded areas. A small portion of the project area includes the existing Stormwater Management Basin for the existing CVS commercial development site.

3.0 PROJECT DESCRIPTION

The project proposes two new 5-story mixed-use buildings consisting of retail/commercial space and residential apartment units. The two new buildings will consist of 105 apartments (Building #1) and 155 apartments (Building #2) and approximately 31,675 sf of commercial/retail/dining space on the first floor of the buildings. A portion of the lot including Building #1 will be subdivided and dedicated to the Town of North Greenbush for the construction of a new 7,022± sf ambulance corps building. The existing lot including Building #2 will also include a 3,000 sf maintenance building.

Stormwater from the impermeable surfaces will be directed towards green infrastructure practices as well as stormwater management systems. The project design will ensure that the soils and groundwater table will be protected.

Stormwater management areas will be constructed to treat and control stormwater runoff. The systems have been sized to ensure that adequate storage capacity exists to properly treat and store runoff associated with the 1, 10, 25, and 100-year design storm events.

4.0 METHODOLOGY

This SWPPP utilizes several Stormwater Management Planning techniques and Green Infrastructure Practices. This approach to stormwater management emphasizes a holistic approach to resource protection, water quality treatment, flow volume control, maintenance cost reduction, and the dynamics of stormwater science. The primary goal is to reduce a site's impact on the aquatic ecosystem through the use of site planning techniques, runoff reduction techniques, and certain standard stormwater management practices.

According to the New York State Stormwater Design Manual, 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, evapotransporation, capture and reuse of stormwater, and establishment of natural vegetative features. On the local scale, green infrastructure consists of site and neighborhood specific practices and runoff reduction techniques. When implemented throughout a development and watershed, green infrastructure can: reduce runoff volume, peak flow, and flow duration, slow down the flow to increase the time of concentration, improve groundwater recharge, protect downstream water resources, including wetlands, reduce downstream flooding and property damage, reduce incidence of combined sewer overflow, provide water quality improvements/reduced treatment costs, reduce thermal pollution, and improve wildlife habitat.

The methodology for implementing green infrastructure techniques as well as designing the stormwater management and erosion and sedimentation control structures for this project is summarized as follows:

The Six Step Process for Stormwater Site Planning and Practice Selection

1.0 Planning the site in accordance with local laws and ordinances to preserve natural resources, utilize site hydrology and reduce impervious cover.

2.0 Initial calculation of the water quality volume for the site.

3.0 Incorporation of green infrastructure techniques and standard stormwater management practices (SMPs) with Runoff Reduction Volume (RRv) capacity to reduce 100% of the WQv calculated in step 2. If this is not possible, an explanation as to why the green infrastructure techniques were not feasible and specific site limitations will be provided.

4.0 Determine the minimum Runoff Reduction Volume (RRv) required.

5.0 Use of standard SMPs, where applicable, to treat the portion of water quality volume not addressed by green infrastructure techniques and standard SMPs with RRv capacity,

6.0 Design of volume and peak rate control practices where required.

6.1 Evaluate the hydrologic condition of the tributary area using the USDA-SCS Technical Release No. 20 (June 1986) Methods.

6.2 Determine peak flows from each watershed, for various storm events, using the Autodesk Storm and Sanitary Analysis computer program.

6.3 Determine the water quality volume, channel protection volume, overbank flood protection volume and extreme storm flood protection volume for each drainage area that requires mitigation. Design the stormwater systems for each drainage area with structures that store and discharge the previously mentioned volumes at the required rates.

6.4 Perform stormwater system routings for the stormwater management using the Autodesk Storm and Sanitary Analysis computer program if necessary. Examine and compare the output for peak elevations and peak outflows for both pre and post-development conditions.

6.5 Design the stormwater system, in accordance with "New York State Stormwater Management Design Manual", August 2010, prepared by the Maryland's Center for Watershed Protection for the New York State Department of Environmental Conservation.

6.6 Design the erosion and sedimentation control structures and prepare engineering calculations for the design of channels and conveyance piping in accordance with the "New York Standards and Specifications for Erosion and Sediment Control.

5.0 NYSDEC GREEN INFRASTRUCTURE FIVE STEP APPROACH

5.1 SITE PLANNING

The first step in developing a comprehensive stormwater management plan using green infrastructure is to avoid or minimize land disturbance by preserving natural resources and utilizing the hydrology of the site. An existing conditions map was prepared identifying the natural resource areas and drainage patterns prior to designing the site layout. The map includes but is not limited to: wetlands (state and federally regulated), waterways (major, perennial, intermittent, or springs), buffer areas (stream, wetland and forest), floodplains, forest, critical areas, topography, soils (hydrologic soil group, highly erodible soils, etc.), and significant geologic features including bedrock. This map is shown in Appendix B and addressed in the Erosion and Sediment Control Plan.

Preservation of Natural Features

Utilizing the Natural Resource Areas and Drainage Pattern Map, a strategy for protecting and enhancing natural resources was created. This strategy involves preserving natural features prior to site layout, utilizing natural features to preserve the natural hydrology, maintaining natural drainage design points, maximizing retention of forest cover and undisturbed soils, avoiding erodible soils on steep slopes and limiting mass grading of sites. Preservation of natural features includes techniques to foster the identification and preservation of natural areas that can be used in the protection of water, habitat and vegetative resources. The following planning practices to protect natural features have been considered and where possible, applied to the proposed development.

Preservation of Undisturbed Areas: Preservation of undisturbed areas has been included within this project as a total of 7.90 acres will be included within a permanent deed restricted conservation area.

Preservation of Buffers: Preservation of buffers will not be applied to this project as the requirements for a buffer cannot be met.

Reduction of Clearing and Grading: Clearing shall be limited to only what is necessary for the construction of the buildings, parking lots and required stormwater management features. A limit of disturbance will be established based on the maximum disturbance zone for all development activities that considers equipment needs and construction techniques.

Locating Development in Less Sensitive Areas: Sensitive resource areas on the parcel are limited to forest and wetland areas. No critical habitats have been identified on the site. Careful attention has been made to design the project to disturb the least amount of sensitive natural resources as possible. Clearing will be limited to the areas only needed to construct the project. These planning techniques strive to create the least impact to sensitive natural resources and aid in preserving the natural hydrology of the site.

Open Space Design: Clustering, conservation design or open space design is not applicable to this project due to the type of project. However, by implementing other planning techniques to preserve natural features, several of the benefits of this approach have already been achieved. These include reducing overall limits of disturbance to preserve forested land. Additionally, open space areas for passive, active and buffering purposes have implemented into the parcel to the greatest extent possible.

Soil Restoration: Soil restoration will be completed in areas that require extensive grading and will be performed during the construction phase of the project. According to the New York State Stormwater Design Manual, soil restoration is a required practice applied across areas of a development site where soils have been disturbed and will be vegetated in order to recover the original properties and porosity of the soil. Soil restoration is applied in the cleanup, restoration, and landscaping phase of construction followed by the permanent establishment of an appropriate, deep-rooted groundcover to help maintain the restored soil structure. A simple maintenance agreement will be included identifying where this technique has been applied and will be conserved and who is responsible.

Soil restoration includes mechanical decompaction, compost amendment or both. The following table (from the New York State Stormwater Design Manual) describes various soil disturbance activities related to land development, soil types and the requirements for soil restoration for each activity.

Soil Restoration Requirements		
Type of Soil Disturbance	**Soil Restoration Requirement**	**Comments / Examples**
No Soil Disturbance	Restoration not permitted	Preservation of natural features
Minimal soil disturbance	Restoration not required	Clearing and Grubbing

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

*Aeration includes the use of machines such as tractor-drawn implements with coulters making a narrow slit in the soil, a roller with many spikes making indentations in the soil, or prongs which function like a mini-subsoiler.
** "Please see Deep Ripping and De-compaction, DEC 2008" which is found in Appendix M.
*** This project is situated on A type soils
(HSG = hydrologic soil group)

Soil restoration will help return the soil to its original state prior to development. This planning technique will increase rainwater absorption therefore increasing temporary water storage in the soil, filtering out water pollutants, reducing stormwater runoff through infiltration and evapotranspiration and promoting healthy plant growth with a reduced need for irrigation, pesticides, and fertilizers.

Reduction of Impervious Cover

The next step is to reduce the impacts of the development by reducing the impervious cover. This strategy involves reducing roadways, sidewalks, driveways, cul-de-sacs, building footprints and parking areas. Impervious surfaces can significantly disrupt the natural rhythm of the hydrologic cycle. Since they do not allow stormwater to percolate into the soil, infiltration, evapotranspiration, and groundwater recharge is decreased. These surfaces also increase the rate at which runoff and associated pollutants are conveyed to the nearest water body, which can compromise water quality and may result in a higher frequency of flooding and accelerated stream erosion. The following planning practices to reduce impervious cover have been considered and where possible, applied to the proposed development.

Roadway Reduction: Roadways/Drive Isles have been reduced to the minimum extent possible while still providing safe egress and compliance with the NYS fire codes.

Sidewalk Reduction: Sidewalks for this project have been reduced to the minimum extent possible allowed by the American with Disabilities Act.

Driveway Reduction: Driveways are not proposed as part of the project.

Building Reduction: This practice of reducing the building footprint was utilized to reduce the area of the buildings to the maximum extent possible while still making the project feasible.

Parking Reduction: Parking for this project has been reduced to the minimum extent possible allowed by the Town of North Greenbush.

By protecting natural resources and utilizing the hydrology of the site, every attempt has been made to preserve the natural conditions of the site, minimize runoff, and maintain the preconstruction hydrology. Careful consideration has been made to preserve undisturbed areas and buffers, reduce clearing and grading, locate development in less sensitive areas, and restore soils.

Impervious areas are limited to the buildings, required parking areas, and access roads. All reasonable opportunities for preserving natural conditions of the site have been employed by the project to preserve the natural conditions of the site to minimize the runoff and maintain the pre-construction hydrology.

5.2 DETERMINE THE WATER QUALITY VOLUME AND MINIMUM REDUCTION VOLUME

The total project site area is approximately 24.50-acres of which, 7.40 acres will be impervious development. Following a review of existing topography and site conditions, four drainage areas and three distinct design points were defined for the subject site and the stormwater management analysis. A detailed description of these design points can be found in section 6.1 & 6.2 of this report. The water quality volume (WQv) and Minimum Reduction Volume for the four design points have been calculated as follows:

Water Quality Volume:

$$WQv = \frac{P \times Rv \times A}{12}$$

Rv = 0.05 +0.009(I); I = percent impervious
P (inch) = 90% Rainfall Event
A = Site Area

$$WQv = \frac{1.15 \times 0.322 \times 24.50}{12} = 0.756 \text{ ac-ft}$$

The Water Quality Volume for the project is 0.756 ac-ft or 32,916 cf of stormwater.

Minimum RRv required:

RRv = (P × Rv × S × A(Total New Impervious Area))/12
Where:
P = 90% rainfall event (inches)
Rv = 0.05+0.09(I) where I is 100% impervious
S = 0.31 (weighted average of all soils)
A = 7.4 acres

$$\text{Minimum RRv required} = \frac{(1.15 \times 0.95 \times 0.31 \times 7.40)}{12} = 0.208 \text{ ac-ft}$$

Minimum RRv required = 0.208 acre-feet

The project requires the removal of the stormwater management basin associated with the CVC facility. The stormwater generated by the CVS facility will be re-directed to the proposed stormwater management systems associated with the Quackenderry Mixed-Use Site Plan. As a conservative approach, the existing conditions of the SWPPP have been analyzed based on the site conditions prior to the construction of the CVS facility. Additionally, the WQv and RRv calculations include that associated with the Quackenderry Mixed-Use Site Plan only as the CVS facility has been under operation since approximately 2010 and operates using an existing stormwater management system.

5.3 RUNOFF REDUCTION BY APPLYING GREEN INFRASTRUCTURE TECHNIQUES AND STANDARD SMPS WITH RRV CAPACITY

The Runoff Reduction Volume (RRv) results in a reduction of the total WQv through implementation of green infrastructure techniques. Runoff reduction shall be achieved by infiltration, groundwater recharge, reuse, recycle, evaporation/transpiration 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. Green infrastructure techniques shall be employed to reduce the required WQv. Green infrastructure techniques are grouped into two categories. They include:

- Practices resulting in a reduction of contributing area, and
- Practices resulting in a reduction of contributing volume

All of the green infrastructure planning and design options have been evaluated to determine the feasibility of the runoff reduction option for use on the project site. If the option is not feasible for the project site, a description has been provided indicating why the green infrastructure option was not feasible. Implementation of green infrastructure cannot be considered infeasible unless physical constraints, hydraulic conditions, soil testing, existing and proposed slopes (detailed contour), or other existing technical limitations are objectively documented.

The following chart (from the NYSDEC design manual) outlines the green infrastructure techniques that are acceptable for runoff reduction that must be evaluated for feasibility for the project.

Green Infrastructure Techniques Acceptable for Runoff Reduction		
Group	**Practice**	**Description**
	Conservation of natural areas	Retain the pre-development hydrologic and water quality characteristics of undisturbed natural areas, stream and wetland buffers by restoring and/or permanently conserving these areas on a site.
	Sheetflow to riparian buffers or filter strips	Undisturbed natural areas such as forested conservation areas and stream buffers or vegetated filter strips and riparian buffers can be used to treat and control stormwater runoff from some areas of a development project.
	Vegetated open swale	The natural drainage paths, or properly designed vegetated channels, can be used instead of constructing underground storm sewers or concrete open channels to increase time of concentration, reduce the peak discharge, and provide infiltration
	Tree planting/tree box	Plant or conserve trees to reduce stormwater runoff, increase nutrient uptake, and provide bank stabilization. Trees can be used for applications such as landscaping, stormwater management practice areas, conservation areas and erosion and sediment control.

Runoff Reduction Techniques	Disconnection of rooftop runoff	Direct runoff from residential rooftop areas and upland overland runoff flow to designated pervious areas to reduce runoff volumes and rates.
	Stream daylighting for redevelopment projects	Stream daylight previously culverted / piped streams to restore natural habitats, better attenuate runoff by increasing the storage size, promoting infiltration, and help reduce pollutant loads.
	Rain Garden	Manage and treat small volumes of stormwater runoff using a conditioned planting soil bed and planting materials to filter runoff stored within a shallow depression.
	Green roof	Capture runoff by a layer of vegetation and soil installed atop a conventional flat or sloped roof. The rooftop vegetation allows evaporation and evapotranspiration processes to reduce volume and discharge rate of runoff entering conveyance system.
	Stormwater planter	Small landscaped stormwater treatment devices that can be designed as infiltration or filtering practices. Stormwater planters use soil infiltration and biogeochemical processes to decrease stormwater quantity and improve water quality
	Rain tank / Cistern	Capture and store stormwater runoff to be used for irrigation systems or filtered and reused for non-contact activities
	Porous Pavement	Pervious types of pavements that provide an alternative to conventional paved surfaces, designed to infiltrate rainfall through the surface, thereby reducing stormwater runoff from a site and providing some pollutant uptake in the underlying soils.

Runoff Reduction Technique Evaluation

The runoff reduction techniques offered in the NYSDEC Stormwater Design Manual have been reviewed to determine the suitability of the site for use. The feasible runoff reduction practices are shown in the project plans. Additionally, a summary of the individual runoff reduction and total runoff reduction volume and the impact it will have on the total WQv is included after the description and evaluation of each practice.

Conservation of Natural Areas: Conservation of Natural Areas has been proposed for this project and includes approximately 7.90 acres that will be placed in a conservation easement.

Sheet Flow to Riparian Buffers or Filter Strips: This green infrastructure practice helps treat and control stormwater runoff from developed areas. Providing sheet flow to filter strips will promote groundwater recharge, reduce pollutant loading, increase infiltration, and help to maintain pre- and post-hydrologic conditions. Filter strips have not been proposed as the proposed project does not allow for the required minimum filter strip width.

Vegetated Swale: According to the New York State Stormwater Design Manual, a vegetative swale is a maintained, turf lined swale specifically designed to convey stormwater at a low velocity, promoting natural treatment and infiltration. Where drainage area, topography, soils, slope and safety issues permit, vegetated swales can be used in the street right-of-way and on developed sites to convey and treat stormwater from roadways and other impervious surfaces. Vegetated swales have not been proposed for this project due to site constraints.

Tree Planting / Tree Pit: A combination of new tree planting and conservation of existing trees shall be utilized by the project. This practice helps to reduce stormwater runoff through rainfall interception and evapotranspiration. Other benefits include providing wildlife habitat, promoting shade, creating natural

buffers, increasing nutrient uptake, and aiding infiltration. Credit for this practice will not be utilized for this project as the impervious surfaces will not be directed to the tree plantings.

Disconnection of Rooftop Runoff: Disconnection of Rooftop Runoff will not be proposed for this project as rooftop runoff will be treated by other green infrastructure practices.

Stream Daylighting: The stream daylighting technique is typically used for retrofit or redevelopment projects and therefore is not applicable to this project.

Rain Gardens: According to the New York State Stormwater Design Manual, the rain garden is a stormwater management practice intended to manage and treat small volumes of stormwater runoff from impervious surfaces using a conditioned planting soil bed and planting materials to filter runoff stored within a shallow depression. This practice is most commonly used in residential land use settings and is appropriate for townhomes and single-family homes. Rain gardens have not been proposed for this project as other more applicable Green Infrastructure techniques have been utilized.

Green Roofs: Green roofs are not considered to be feasible for the project based upon structural requirements that would be imposed upon the proposed building and due to safety concerns for the future owners / tenants. Also, extreme weather and potential heavy snow loads during winter months make this practice undesirable.

Stormwater Planters: According to the New York State Stormwater Design Manual, stormwater planters, much like rain gardens, use soil infiltration and biogeochemical processes to decrease stormwater quantity and improve stormwater quality. Stormwater planters are not feasible for the project due to the number of planters that would be required to treat the roofs of the proposed commercial buildings.

Rain Barrels and Cisterns: Cisterns have been proposed to capture and treat a portion of the stormwater runoff originating from rooftops and the impervious parking areas. This runoff will be stored in the cisterns where it will be used for lawn irrigation purposes, washing of equipment, dumpsters, and other non-potable uses as determined by the owners. The cistern has been designed to capture a minimum of 64,088 gallons. The cistern water volume will be stored below the outlet control structures within the proposed stone bed of the systems. The cisterns will be accessible by access manholes. Underdrain below the subsurface detention systems will convey the stormwater from the stone below the outlet structure to the access manholes. The systems will pre-treat the stormwater before being extracted from the cistern utilizing pumps.

Porous Pavement: According to the New York State Stormwater Design Manual, porous pavement provides an alternative to conventional paved surfaces. It is designed to infiltrate rainfall directly through the surface, thereby reducing stormwater runoff. In addition, porous pavement provides some pollutant uptake in the underlying soils thus improving the water quality. Porous pavement is not proposed for this project as the separation to groundwater cannot be met.

Bio-retention infiltration: According to the New York State Stormwater Design Manual, bio-retention is a stormwater management practice intended to manage and treat stormwater runoff from impervious surfaces using a conditioned planting soil bed and planting materials to filter runoff stored within a shallow depression. This practice is most commonly used in residential and commercial land use settings and is appropriate for townhomes, parking lots and commercial buildings. Bio-retention areas have not been proposed for this project due the presence of high groundwater.

The required WQv that shall be treated for the project is calculated in Section 5.2 and is approximately 0.756 ac-ft or 32,916 cf of stormwater for the project. The required minimum runoff reduction requirements

have also been calculated in Section 5.2 and is approximately 0.209 ac-ft. The proposed runoff reduction volumes utilizing green infrastructure techniques have been calculated and are shown in Appendix D at the end of this report. A summary of the calculation results are as follows:

The original WQv=	**0.756 ac-ft**
The minimum required RRv =	**0.208 ac-ft**
Area Reduction Practices	
Conservation of natural areas=	7.90 ac
Riparian buffers / filter strips =	N/A
Tree Planting/tree preservation=	N/A
Total Area Reduction=	7.90 ac
Runoff Reduction volume=	0.038 ac-ft
Rooftop Disconnection	
Runoff Reduction volume=	N/A
Volume Reduction Practices	
Porous Pavement=	N/A
Runoff Reduction volume=	N/A
Source Control Treatment Practices	
Standard Practices	
Infiltration	N/A
Green Infrastructure Practices	
Vegetated Swales	N/A
Green Roof	N/A
Rain Garden	N/A
Stormwater Planters	N/A
Cisterns/Rain Barrels	0.196 ac-ft
Bioretention	N/A
Infiltration Trenches	N/A
Total Runoff Reduction Volume	**0.234 ac-ft**
Total WQv Treated and Reduced	0.234 ac-ft
Total WQv to be Treated by Standard Practices	0.522 ac-ft

The total runoff reduction volume of 0.234 ac-ft for the project site is less than the water quality volume of 0.756 ac-ft; however, it is greater than or equal to the minimum required runoff reduction volume of 0.208 ac-ft. Approximately 30.6% of the water quality volume is treated by the runoff reduction requirements and green infrastructure practices. The remaining 0.522 ac-ft of the water quality volume is to be treated by the stormwater management systems.

Every effort has been made in attempt to reach the ultimate goal set forth by the NYSDEC of 100% WQv reduction. However, many of the green infrastructure practices require infiltration with the required 3 foot separation to groundwater. Therefore, a majority of green infrastructure practices are not applicable based on the results of the deep hole test pits that have been performed.

5.4 STANDARD STORMWATER MANAGEMENT PRACTICES TO TREAT WATER QUALITY VOLUME NOT ADDRESSED BY GREEN INFRASTRUCTURE TECHNIQUES

All of the green infrastructure practices have been evaluated and included in the design where possible. The green infrastructure practices have treated more than the required water quality volume. Therefore, no further practices are required. A description of the subsurface infiltration stormwater management systems that will treat the water quality volume is included in Section 6.3.

6.0 HYDROLOGIC AND HYDRAULIC ANALYSIS

The amount of stormwater runoff generated from the subject parcels after development is completed should not be greater than the stormwater runoff generated prior to development. To ensure the pre-development stormwater discharge is less than or equal to post-development stormwater discharge, the 1- year, 10-year, 25-year and 100-year storm events were considered for the design of the stormwater management plan.

The first step in completing the watershed model is to determine the contributing drainage areas for both the pre-development and post-development conditions. The times of concentration and runoff curve numbers (CN) were then calculated for each watershed area. This data was then entered into the HydroCAD computer program. HydroCAD, developed by Applied Microcomputer Systems of Chocorua, New Hampshire, is a Computer-Aided-Design (CAD) program for analyzing the hydrologic and hydraulic characteristics of a given watershed and associated stormwater management facilities. HydroCAD is used to calculate peak runoff flows and to create hydrographs for the four storms evaluated for both pre-development and post development conditions.

6.1 EXISTING PRE-DEVELOPMENT CONDITIONS

Following a review of existing topography and site conditions, four (4) subcatchments and three (3) design points have been defined for the subject site and the stormwater management analysis. The tributary areas that contribute stormwater runoff to the project site design points have been included in separate subcatchments to accurately depict the stormwater runoff generated by these areas in the existing and proposed conditions. The project site area includes approximately 24.50 acres and the total pre-development area analyzed is approximately 26.76 acres. The addition of 2.26 acres has been included to account for offsite contributing areas containing the existing CVS facility. The on-site soils with a A/D & C/D hydrological classification have been modeled using the A & C ratings.

Design Point 1 (DP1) consists of an existing drainage path located west of the project site area adjacent to the I-90 Connector. The drainage path ultimately leads to an existing culvert pipe that directs stormwater west under the I-90 Connector. The drainage to DP1 encompasses approximately 22.21 acres and is comprised of woods and small areas of field/meadow/grass. Stormwater currently flows overland from the to the west and south and ultimately away from the project site towards the south and west where it is directed to DP1.

Design Point 2 (DP2) consists of a drainage path located at the southwestern corner of the project site area adjacent to the I-90 Connector. The drainage path ultimately leads to an existing culvert pipe that directs stormwater west under the I-90 Connector. The drainage to DP2 encompasses approximately 2.21 acres and is comprised of woods. Stormwater currently flows overland from the east to the west to the existing drainage path where it is directed to DP2.

Design Point 3 (DP3) consists of an existing drainage pathway directed south to the adjacent parcel. The drainage area to DP3 encompasses approximately 0.08 acres and is comprised of woods. The stormwater currently flows overland to the south where it is collected by the adjacent parcels stormwater conveyance system (DP3) and directed to the stormwater management system on the adjacent parcel.

6.2 PROPOSED POST-DEVELOPMENT WATERSHED CONDITIONS

Under proposed conditions, the design points remain in the same locations. Due to the proposed development the site has been divided into multiple subcatchments to depict the developed condition most accurately. The post-development stormwater analysis included the identified subcatchments:

Subcatchment 1A encompasses approximately 13.19 acres and includes woods, lawn, and a small portion of impervious area not treated by the proposed stormwater management facilities. Stormwater originating from Subcatchment 1A will flow overland to the west and south and ultimately away from the project site where it is directed to DP1.

Subcatchment 1B encompasses approximately 3.47 acres and includes impervious access driveways, parking areas, rooftops, sidewalks, and lawn areas. Stormwater originating from Subcatchment 1B will flow overland and is collected and conveyed to Subsurface Stormwater Management System #1 where it will be treated and released to the existing drainage pathways and ultimately to DP1.

Subcatchment 1C encompasses approximately 8.43 acres and includes impervious access driveways, parking areas, rooftops, sidewalks, lawn areas, and small areas of woods. This subcatchment also includes the existing offsite development consisting of the CVS Pharmacy. Stormwater originating from Subcatchment 1C will flow over land and is collected and conveyed to Subsurface Stormwater Management System #2 where it will be treated and released to the existing drainage pathways and ultimately to DP1.

Subcatchment 2A encompasses approximately 1.59 acres and includes areas of woods and lawn. Stormwater originating from Subcatchment 2B will flow overland from the east to the west to the existing drainage pathway where it is directed to DP2.

Subcatchment 3A encompasses approximately 0.08 acres and includes wooded areas. Stormwater originating from Subcatchment 3A will flow overland to the south where it is collected by the adjacent parcels stormwater conveyance system (DP3) and directed to the stormwater management system on the adjacent parcel.

The pre-development and post-development peak discharge rates at Design Points 1, 2 and 3 for the 1, 10, 25, and 100-year storms **prior** to mitigation are as follows:

	1-YR	10-YR	25-YR	100-YR
PRE-DEVELOPMENT	**cfs**	**cfs**	**cfs**	**cfs**
DESIGN POINT 1	7.51	28.96	43.65	75.53
DESIGN POINT 2	0.78	3.01	4.55	7.87
DESIGN POINT 3	0.06	0.20	0.29	0.48
POST-DEVELOPMENT	**cfs**	**cfs**	**cfs**	**cfs**
DESIGN POINT 1	28.53	63.07	84.18	127.65
DESIGN POINT 2	0.69	2.60	3.90	6.71
DESIGN POINT 3	0.06	0.20	0.29	0.48

These post development volume and discharge values represent the post development condition without any designed stormwater management areas in relation to existing conditions. The post-development stormwater discharge must be mitigated.

6.3 PROPOSED WATER QUANTITY AND QUALITY CONTROLS

The post development runoff rates for the developed site are higher than the pre-development rates; therefore, mitigation is required to properly regulate post development runoff. The area that the post-development hydrograph exceeds the pre-development hydrograph equals the volume of water that needs to be mitigated by implementing stormwater management measures.

The proposed stormwater management systems for the site have been designed with provisions to store and infiltrate the water quality volume, channel protection volume, overbank flood protection volume and extreme storm flood protection volume for the developed portions of the project parcel. The proposed stormwater management systems have been included with the proposed development considering various site constraints and the Town of Glenville regulations.

Subsurface Stormwater Management System #1

In order to reduce post-development discharge rates below pre-development discharge rates and to provide water quality treatment, a subsurface stormwater detention system and associated pretreatment has been included in the design for the development located on the northern portion of the project parcel. The practice has been chosen due to site constraints that would not allow conventional stormwater management areas found in Chapter 6 of the NYSDEC Stormwater Design Manual be constructed and function properly within this portion of the project site. This stormwater detention facility collects and treats the stormwater from the developed portions on the northern half of the project parcel.

The subsurface detention system is located north of Building #1. The system collects and treats stormwater from approximately 3.47-acres of the developed portions of the site. This system will discharge to Design Point 1. The practices that will be utilized include a Cascade Separator Unit by Contech for pretreatment as well as a Jellyfish Stormwater Filter by Contech to treat the stormwater runoff for quality.

The water quality volume (WQv) is designed to improve water quality sizing to capture and treat 90% of the average annual stormwater runoff volume. The WQv is directly related to the amount of impervious cover created at a site. The WQv for the contributing area to the subsurface system is 0.225 ac-ft. The WQv that will be treated by the Jellyfish system is therefore, approximately 9,801 cf. Additional pre-treatement is provided by the Cascade Separator by Contech. Cascade Separator sizing can be found in Appendix D of this report. The Jellyfish in conjunction with the Cascade Separator and a subsurface storage system will provide the required water quality treatment for the proposed development.

During flow conditions, influent water enters the system via a series of catch basins and pipes. Storm events up to and including the 1-year storm event will enter the system through the Cascade Separator and all large events will be directed directly into the system via an internal bypass within the Cascade Separator. The flow will then be directed from the subsurface detention system through a 2.75" orifice to the Jellyfish and outlet control structure. During low flow conditions (up to and including the 1-year storm event) stormwater will drain from the subsurface system through the Jellyfish filter where it is to be treated and released to Design Point 1.

During storm events in excess of the 1-year storm event, the discharge capacity of the Jellyfish is exceeded and therefore, and outlet control structure is provided. The outlet control structure shall consist of a manhole that will include a 4"x22" outlet orifice that will control and regulate the storm events greater than the 1-

year storm. Once the stormwater reaches and exceeds an elevation difference of approximately 1.92' above the elevation of the 2.75" orifice it will begin to discharge through the 4"x22" orifice to the outlet culvert. The elevation of 1.92' above the invert of the 2.75" orifice was selected as this is the peak elevation of the 1-year storm event. This elevation for the first control orifice will force the entire 1-year storm event to flow through the Jellyfish filter.

A detail of the proposed system has been included in the project site plans.

The stream channel protection volume requirements are designed to protect stream channels from erosion. In New York State this goal is accomplished by providing 24-hour extended detention of the one-year, 24-hour storm event. The stream channel protection volume is 0.278 ac-ft for the system. For this system, the entire CPv will drain through the filter system through the 2.75" orifice. The orifice will slowly discharge the CPv at an average rate of 0.13 cfs. Therefore, the CPv will drain from the basin in approximately 24 hours (0.278 ac-ft x 43,560 sf/ac = 12,110 cf; 0.13 cfs = 468 cf/hr; 12,110/468 = 25.9 hours).

The primary purpose of the overbank flood control sizing is to prevent an increase in the frequency and magnitude of out-of-bank flooding generated by urban development. Overbank control requires storage to attenuate the post-development 10-year, 24-hour peak discharge rate to pre-development rates. The overbank flood control volume is 0.44 ac-ft for Subsurface Stormwater Management System #1. The system is designed to store in excess of the overbank flood control volume.

The intent of the extreme flood criterion is to prevent the increased risk of flood damage from large storm events, maintain the boundaries of the pre-development 100-year floodplain and protect the physical integrity of stormwater management practices. Extreme flood protection requires storage to attenuate the post-development 100-year, 24-hour peak discharge to pre-development rates. The extreme flood protection volume is 0.74 ac-ft for Subsurface Stormwater Management System #1. The system is designed to meet the required extreme flood criterion.

A rating table (stage/storage/discharge) was then developed for the proposed subsurface system based on the geometry of the system, outlet structure and characteristics of the water quality volume, channel protection volume, overbank flood protection volume and extreme storm flood protection volume for each drainage area. The proposed outlet structure for the subsurface system has been designed to include a 2.75" low flow orifice and a 4"x22" orifice. A detail of the outlet structure has been included with the site plans.

Subsurface Stormwater Management System #1:

Peak Inflows	Peak Infiltration	High Water Elevation	Freeboard
Q_1 = 8.09 cfs	Q_1 = 0.26 cfs	275.42'	4.15'
Q_{10} = 15.64 cfs	Q_{10} = 1.97 cfs	276.75'	2.82'
Q_{25} = 19.94 cfs	Q_{25} = 3.48 cfs	277.51'	2.06'
Q_{100} = 28.44 cfs	Q_{100} = 5.43 cfs	279.23'	0.34'

Bottom of Pipe Stone = 273.00', Bottom of Cistern Stone = 272.50', CMP Pipe Bottom = 273.50', 2.75" low flow orifice elevation (filter) = 273.50', 4"x22" orifice elevation = 275.42', Top of CMP Pipe = 280.50', Top of Pipe Stone = 281.00', Lowest Catch Basin Rim = 279.57'
*Freeboard measured from lowest catch basin rim elevation.

Subsurface Stormwater Management System #2

In order to reduce post-development discharge rates below pre-development discharge rates and to provide water quality treatment, a subsurface stormwater detention system and associated pretreatment has been included in the design for the development located on the northern portion of the project parcel. The practice has been chosen due to site constraints that would not allow conventional stormwater management areas found in Chapter 6 of the NYSDEC Stormwater Design Manual be constructed and function properly within this portion of the project site. This stormwater detention facility collects and treats the stormwater from the developed portions on the northern half of the project parcel.

The subsurface detention system is located along the west side of Building #2. The system collects and treats stormwater from approximately 8.43-acres of the developed portions of the site and the existing CVS Pharmacy to the east. This system will discharge to Design Point 1. The practices that will be utilized include a Cascade Separator Unit by Contech for pretreatment as well as a Jellyfish Stormwater Filter by Contech to treat the stormwater runoff for quality.

The water quality volume (WQv) is designed to improve water quality sizing to capture and treat 90% of the average annual stormwater runoff volume. The WQv is directly related to the amount of impervious cover created at a site. The WQv for the contributing area to the subsurface system is 0.614 ac-ft. The WQv that will be treated by the Jellyfish system is therefore, approximately 26,746 cf. Additional pre-treatement is provided by the Cascade Separator by Contech. Cascade Separator sizing can be found in Appendix D of this report. The Jellyfish in conjunction with the Cascade Separator and a subsurface storage system will provide the required water quality treatment for the proposed development.

During flow conditions, influent water enters the system via a series of catch basins and pipes. Storm events up to and including the 1-year storm event will enter the system through the Cascade Separator and all large events will be directed directly into the system via an internal bypass within the Cascade Separator. The flow will then be directed from the subsurface detention system through a 4.0" orifice to the Jellyfish and outlet control structure. During low flow conditions (up to and including the 1-year storm event) stormwater will drain from the subsurface system through the Jellyfish filter where it is to be treated and released to Design Point 1.

During storm events in excess of the 1-year storm event, the discharge capacity of the Jellyfish is exceeded and therefore, and outlet control structure is provided. The outlet control structure shall consist of a manhole that will include a 5" outlet weir that will control and regulate the storm events greater than the 1-year storm. Once the stormwater reaches and exceeds an elevation difference of approximately 2.74' above the elevation of the 4.0" orifice it will begin to discharge through the 5" outlet weir to the outlet culvert. The elevation of 2.74' above the invert of the 4.0" orifice was selected as this is the peak elevation of the 1-year storm event. This elevation for the first control orifice will force the entire 1-year storm event to flow through the Jellyfish filter.

A detail of the proposed system has been included in the project site plans.

The stream channel protection volume requirements are designed to protect stream channels from erosion. In New York State this goal is accomplished by providing 24-hour extended detention of the one-year, 24-hour storm event. The stream channel protection volume is 0.676 ac-ft for the system. For this system, the entire CPv will drain through the filter system through the 4.0" orifice. The orifice will slowly discharge the CPv at an average rate of 0.34 cfs. Therefore, the CPv will drain from the basin in approximately 24 hours (0.676 ac-ft x 43,560 sf/ac = 29,447 cf; 0.34 cfs = 1,224 cf/hr; 29,447/1,224 = 24.1 hours).

The primary purpose of the overbank flood control sizing is to prevent an increase in the frequency and magnitude of out-of-bank flooding generated by urban development. Overbank control requires storage to attenuate the post-development 10-year, 24-hour peak discharge rate to pre-development rates. The overbank flood control volume is 1.06 ac-ft for Subsurface Stormwater Management System #2. The system is designed to store in excess of the overbank flood control volume.

The intent of the extreme flood criterion is to prevent the increased risk of flood damage from large storm events, maintain the boundaries of the pre-development 100-year floodplain and protect the physical integrity of stormwater management practices. Extreme flood protection requires storage to attenuate the post-development 100-year, 24-hour peak discharge to pre-development rates. The extreme flood protection volume is 1.49 ac-ft for Subsurface Stormwater Management System #2. The system is designed to meet the required extreme flood criterion.

A rating table (stage/storage/discharge) was then developed for the proposed subsurface system based on the geometry of the system, outlet structure and characteristics of the water quality volume, channel protection volume, overbank flood protection volume and extreme storm flood protection volume for each drainage area. The proposed outlet structure for the subsurface system has been designed to include a 4.0" low flow orifice and a 5" outlet weir. A detail of the outlet structure has been included with the site plans.

Subsurface Stormwater Management System #2:

Peak Inflows	Peak Infiltration	High Water Elevation	Freeboard
Q_1 = 17.90 cfs	Q_1 = 0.67 cfs	276.37'	6.76'
Q_{10} = 34.73 cfs	Q_{10} = 4.46 cfs	278.29'	4.84'
Q_{25} = 44.32 cfs	Q_{25} = 8.04 cfs	279.40'	3.73'
Q_{100} = 63.31 cfs	Q_{100} = 18.74 cfs	281.99'	1.14'

Bottom of Pipe Stone = 273.13', Bottom of Cistern Stone = 272.63', CMP Pipe Bottom = 273.63', 4" low flow orifice elevation (filter) = 273.63', 5" outlet weir elevation = 276.37', Top of CMP Pipe = 281.63', Top of Pipe Stone = 282.13', Lowest Catch Basin Rim = 283.13'
*Freeboard measured from lowest catch basin rim elevation.

The proposed stormwater flows will not adversely affect the downstream receiving waters. A comparison of pre-and post-development discharge after installation of mitigation is shown below:

	1-YR	10-YR	25-YR	100-YR
PRE-DEVELOPMENT	**cfs**	**cfs**	**cfs**	**cfs**
DESIGN POINT 1	7.51	28.96	43.65	75.53
DESIGN POINT 2	0.78	3.01	4.55	7.87
DESIGN POINT 3	0.06	0.20	0.29	0.48
POST-DEVELOPMENT	**cfs**	**cfs**	**cfs**	**cfs**
DESIGN POINT 1	6.44	25.62	40.62	74.39
DESIGN POINT 2	0.69	2.60	3.90	6.71
DESIGN POINT 3	0.06	0.20	0.29	0.48

Post development peak stormwater discharge is less than or equal to pre-development peak stormwater discharge for all storm events analyzed. The stormwater management basins have been sized to provide sufficient capacity to treat up to the 100-year storm event.

Subsurface Cistern

A subsurface cistern is included and consists of stone bedding within each of the Subsurface Stormwater Management Systems. The typical stone bedding includes 0.5' of stone under the CMP piping within the system, however, the systems have been modified to include 1.0' of stone bedding to provide a storage volume of 64,088 gallons. Access to the cistern is provided by drainage manholes (DMH1 & DMH2) which include submersible pumps. The cistern volume will be utilized for non-potable water purposes including irrigation and site maintenance.

7.0 PERMANENT STORMWATER MANAGEMENT SYSTEM FEATURES

This section describes the permanent features of the Stormwater Management System for proposed development, including storm sewer piping and stormwater basins. In all instances, the structures associated with the stormwater management system have been sized to accommodate peak flows from the 10-year design storm event.

See the Construction Plans for the location, size, quantity and details of the permanent stormwater management features.

7.1 CONVEYANCE PIPING

Storm runoff from developed areas will be conveyed to the stormwater basin by means of storm sewers. In general, piping is designed such that:

- All conveyance piping is sized to accommodate the peak flow from the 10-year 24-hour design storm;
- Flow capacity is sufficient to convey runoff to the receiving basin or ditch without overflowing the ditch or drop inlet at the entrance of the culvert;
- All storm drainage pipes are designed such that the projected velocities from the design storm are greater than three feet per second, and
- Strength is sufficient to withstand the soil cover and vehicle loads.

7.2 STORMWATER MANAGEMENT SYSTEM

The following design criteria shall apply to the design of storm drainage facilities:

- All storm drainage facilities shall be designed based on a ten-year (10) storm frequency.
- Peak runoff rates from the project site after development shall not exceed pre-development peak runoff rates.
- Adequate storage facilities shall be provided for the site to store the additional runoff volume due to development of the project site for a ten-year, twenty-five-year and one-hundred-year storm frequency.
- Provisions, such as overflow studies shall be made for protection against property damage and loss

of life for more severe storms (100-year storm).

8.0 STORMWATER EROSION AND SEDIMENT CONTROLS

Several types of permanent and temporary storm water pollutant controls are required to be installed and implemented pre-construction, during construction and post-construction as shown on the Construction Plans and per the NYSDEC SPDES General Permit. Guidelines and recommendations can be found in the "New York Standards and Specifications for Urban Erosion and Sediment Control."

The permanent storm water management system has been designed to accommodate peak storm flows utilizing drainage ditches, conveyance channels, piping and a stormwater management basin. These permanent features should be installed and constructed as shown on the Construction Plans.

Selection of temporary storm water controls will be on an "as needed basis" and will depend on the specific conditions of the site. Since site characteristics can change significantly during construction, it is important to monitor the site regularly to ensure the proper selection and implementation of the necessary controls. These controls include, but are not limited to silt fence, drainage swales, hay bales, stone construction entrances, sediment traps and seed and mulch.

8.1 EROSION AND SEDIMENT CONTROLS

Temporary Stabilization

Silt fences, drainage swales, stabilized stone construction entrances, sediment traps and seed and mulch and other controls will be utilized as temporary surface water management features. Silt fence will be used as necessary to reduce the sediment load in the receiving drainage ditches. In addition, silt fencing will be placed on the downslope sides of all disturbed areas (5 ft.) from the toe of the slope until more permanent drainage and erosion control structures are established. See the Construction Plans for the location, size, quantity, and details of the temporary stormwater management features. Steep slopes and exposed soils should be stabilized with silt fences, mulching blankets, geotextiles, geosynthetic drainage netting, hay or any other stabilization measure shall be used that will significantly reduce the risk of erosion. Stabilization measures should be initiated as soon as practical in portions of the site where construction activities have temporarily or permanently ceased, but in no case more than 14 days. Where activities will resume within 14 days in that portion of the site, measures need not be initiated.

Permanent Stabilization

Permanent stormwater management features as described above include drainage ditches, conveyance channels, piping and stormwater management basin. In all instances, the structures associated with the stormwater management system have been sized to accommodate peak flows from the appropriate storm events as required by the Town of Glenville. All lawns, basins and swales will be permanently seeded and mulched and maintained as necessary to prevent over growth.

8.2 OTHER POLLUTANT CONTROLS

Paints and Solvents

During construction, temporary structures such as construction trailers may be moved on site to store items such as paints, solvents and gasoline pertinent to the continuation of construction activities. The intention

of these structures is to shelter potential contaminants from stormwater and reduce the potential of toxic chemicals from entering the stormwater runoff due to construction activities.

Solvents and detergents may be stored on-site that will be used for regular cleaning and maintenance of construction vehicles or temporary structures. Solvents shall be used in cleaning machinery pursuant to 6 NYCRR Part 750. After use, solvents shall be disposed of in approved containers and removed from site at scheduled intervals. Vehicle wash water that contains detergents must be disposed of into the sanitary sewer.

Fuels

Fuel for construction equipment shall either be obtained from a licensed distributor of petroleum products or from an approved above ground storage tank on site. A distributor may be contracted to arrive on site periodically and fill all equipment as necessary. All distributors of petroleum products must have adequate liability insurance to mitigate and clean up any spills that occur on site as well as obtain appropriate permits and licenses from the NYSDEC. All above ground storage tanks with a combined capacity of 1,100 gallons shall be installed pursuant to 6 NYCRR Part 614 Standards for New and Substantially Modified Petroleum Storage Facilities.

Fuel from construction vehicles may come into contact with stormwater when vehicles are stored outside. Good housekeeping and preventative maintenance procedures shall be implemented to ensure fuel spills and leaks are minimized during refueling and storage. Any small-scale fuel or oil spills must be remedied immediately, and contaminated soils shall be disposed of appropriately. The designated spill prevention and response team shall handle large-scale gasoline spills.

Oil and other petroleum products may be stored on site in limited quantities to ensure the continued operation of construction equipment in the event a scheduled delivery is unavailable. Items shall be stored in their original containers within temporary structures and shall not be exposed to stormwater. Used oil and petroleum products shall be stored in approved containers until recycled or disposed of at an approved disposal facility.

Temporary Facilities

Temporary sanitary facilities may be located on site for construction workers. This facility shall be located in an accessible and visible location. Such a facility shall be leak and tip proof. A waste management company may be contracted to arrive on site and provide the routine pumping and sanitization of the facility. Such a company shall have adequate liability insurance to mitigate and clean up any spills that occur on site as well as appropriate permits and licenses from the NYSDEC.

Dust Control

Construction traffic must enter and exit the site at the stabilized construction entrance. The purpose is to trap dust and mud that would otherwise be carried off-site by construction traffic. Water trucks will be used as needed during construction to reduce dust generated on the site. Dust control must be provided by the General Contractor to a degree that is acceptable to the Owner, and in compliance with applicable local and state dust control regulations.

Solid Waste

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

Thermal Pollution

Stormwater that comes in contact with roadways, driveways, parking lots or other impermeable surfaces may increase in temperature during warm weather. If stormwater is discharged into surface water bodies, the temperature of the water body may also increase, potentially threatening plant and animal species sensitive to temperature changes as well as providing an environment that may cause nuisance species to flourish.

After development is complete, impervious areas shall be graded to channel water to catch basins and culverts, which in turn convey stormwater to the stormwater management basins. All stormwater shall be stored and treated within the basin before it is released to downstream water bodies. Prior to release the stormwater will be retained in the stormwater management area and during the retention time the stormwater will be cooled by the ambient temperature of the earth. Treatment of the stormwater in the basin will reduce any threat of raising the temperature of any downstream waterbodies.

8.3 BEST MANAGEMENT PRACTICES

Throughout construction, care shall be taken to ensure sediment does not enter surface water bodies and chemicals do not enter stormwater, potentially contaminating surface and groundwater supplies. The following Best Management Practices (BMP) shall be observed to maintain responsible environmental practices on the construction site.

Good Housekeeping

Good housekeeping is essential to reducing the risk of contaminating runoff waters during every stage of construction. The General Contractor shall ensure supervisors train each employee in good housekeeping practices as they pertain to the implementation of this SWPPP.

Immediately following mobilization, the General Contractor shall take an inventory of all equipment and containers containing hazardous or toxic materials and submit this inventory to the Owner to keep on-site with this Stormwater Pollution Prevention Plan. This inventory shall be updated regularly to reflect changes in the quantity or type of hazardous and toxic materials stored on site. In the event of a spill, the Spill Response Team can refer to the inventory if the contents of the spill are unknown.

All equipment shall be operational while it is stored on site. Inspections shall be conducted regularly to ensure all equipment is free of leaks and that oil and grease are not in contact with soils or stormwater. Portable equipment such as chain saws, drills as well as hand tools must be placed within a trailer or under cover at the end of each workday.

A storage area shall be designated on-site where all hazardous or toxic materials are stored. Each employee shall return the materials to the designated storage area following use. Chemicals, including oil, grease, solvents, and detergents shall be stored on-site in approved containers only. Used chemicals shall be disposed of in refuse containers and removed periodically. Containers shall be regularly inspected to ensure the integrity of the container and seals to prevent leaks.

A scheduled clean-up shall occur at the end of each workweek. During this clean up, empty containers of solvents, oils, grease, paints and detergents shall be disposed of, containers of gasoline shall be placed in trailers where they are not in contact with stormwater and the inventory shall be updated. Empty containers shall not be permitted on the ground.

Preventative Maintenance

All on-site vehicles must be inspected regularly for oil and grease leaks. All leaks shall be repaired immediately upon obtaining the appropriate equipment. If the leak cannot be fixed immediately, it shall be temporarily mitigated to prevent the flow of contaminants onto the soil and potentially into the stormwater. If necessary, the reservoir will be drained to stop the flow of contaminants, or the vehicle will be moved under cover. Drip pans shall be used when performing any maintenance or cleaning on construction vehicles.

Spill Prevention and Response

The safety of employees and neighbors shall be of utmost concern when hazardous or toxic chemicals are stored or utilized on-site. Materials Safety Data Sheets (MSDS) shall be obtained for all toxic or hazardous substances that are stored on-site to provide employees with a valuable database in assessing risk in the event of a spill.

Any above ground storage tanks on site shall be installed pursuant to 6 NYCRR Part 614. According to the New York State "Minimum Standards for New and Substantially Modified Above Ground Storage Facilities", all tanks installed must meet or exceed the design criteria in one or more of the following design or manufacturing standards: UL No. 142, UL No. 58, API Standard No. 650, API Standard No. 620, CAN4-S601-M84 or CAN4-S630-M84. Tanks constructed of wood, concrete, aluminum, fiberglass reinforced plastic as well as riveted or bolted steel tanks are not permitted. All tanks must have installed leak detection systems, secondary containment, corrosion protection, and undergo periodic monitoring pursuant to all Part 614 requirements.

Should a spill occur, trained individuals shall be always on-call to mitigate the potential negative effects of a spill. The General Contractor shall have trained employees knowledgeable in the location of sorbent, brooms, rags, and mops in the event of a small-scale spill. An inventory of equipment and its location shall be posted in a visible location as well as kept in proximity to this Pollution Prevention Plan. If the General Contractor does not have Hazardous Materials trained employees on site, a firm that specializes in handling spills, soil and water contamination shall be called.

After a spill occurs, all personnel not trained in hazardous materials spill response shall be asked to evacuate the immediate area. The New York State NYSDEC of Environmental Conservation (NYSDEC) Spill Response Team shall be called to investigate the spill and determine if additional actions should be taken to ensure the safety of personnel and nearby residents. Should any employee have a suspected injury, a local emergency squad must be contacted immediately.

9.0 CONSTRUCTION SEQUENCE SCHEDULING

A phased construction sequence schedule of the project will limit the acreage of exposed soils at any given time to less than five (5) acres. A detailed project specific phasing plan may be found within the project plan, sheet ESC-1, Erosion & Sediment Control Plan. The construction phasing plan shall be updated as the project progresses.

Limiting the exposed soils will reduce the amount of sediments in runoff water and ultimately preserve the quality of surface waters. The construction phasing method selected is designed to combine development with responsible land management as well as protection of sensitive environments both within the proposed development and the surrounding area. Temporary and permanent stabilization methods will be implemented before construction begins and will be continuously modified throughout the project to provide the best methods for stormwater management and pollution prevention. For more details pertaining to construction sequence, please refer to the "NYSDEC Instruction Manual for Stormwater Construction Permit" pages 23-26.

Phasing of activities is as follows:

Pre-Construction Activities

- Identify all natural resources and mark and protect them as necessary i.e trees, vegetation, wetlands.
- Identify on-site and downstream surface water bodies and install controls to protect them from sedimentation.
- Establish temporary stone construction entrance pads to capture mud and debris from the tires of construction vehicles.
- Install perimeter sediment controls such as silt fence as shown on the project plans.
- All earth disturbance during this phase should be limited to work necessary to install erosion and sedimentation controls.

During Construction Activities

- Install principal sediment basin as shown on the project plans.
- Install runoff and drainage controls as shown on the project plans and as necessary. These controls should reduce run-off flow rates and velocities as well as divert off site and clean run-off.
- Stabilize the conveyance system i.e., ditches, swales, berms etc. by seeding and mulching
- Utilize practices to infiltrate the run-off as much as possible when applicable.
- Stabilize all run-off outlets as shown on the project plans and as necessary.
- Limit soil disturbance to small areas and preserve as much of the existing vegetation as practical.
- Earth disturbance should be limited to 5 acres without prior approval from the NYSDEC.
- All topsoil stockpiles should be staged in an area away from surface waters and storm drains and should be protected and stabilized.
- Earth disturbance is not allowed in established buffers, within any regulated distance from wetlands, within the high-water line of a body of water affected by tidal action or other such protected zones.
- At any location where surface run-off from disturbed or graded areas may flow off-site, sedimentation control measures must be installed to prevent sedimentation from being transported.
- Regular inspections and maintenance should be performed as described in the following section.
- The infiltration trenches shall not be utilized as sediment control devices during site construction and shall not be constructed until all the contributing drainage area has been completely stabilized.

Post-Construction Activities

- Identify the permanent structural or non-structural practices that will remain on the site.
- Provide an Operation & Maintenance (O&M) manual to the new Owner who is expected to conduct the necessary O&M over the life of the structures as described in Section 10.0 of this report.

10.0 IMPLEMENTING THE SWPPP

10.1 EMPLOYEE TRAINING

All employees on-site shall be aware of the stipulations outlined in this SWPPP as it pertains to their everyday activities. All employees must be able to recognize potential problems and have the ability to provide either temporary or permanent stabilization measures, as appropriate, to mitigate stormwater runoff before problems occur. The NYSDEC periodically holds workshops on erosion and sediment control. It is recommended that on-site personnel attend these workshops for training current and up to date. Contact the NYSDEC for more information.

10.2 SITE INSPECTIONS

The Owner must have a qualified professional 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 this SWPPP have been adequately installed or implemented to ensure overall preparedness of the site for the commencement of construction. A qualified professional is defined as a Professional Engineer or Landscape Architect licensed to practice in New York State or is a Certified Professional in Erosion and Sediment Control (CPESC). For sites where disturbances are limited to less than five acres, regular inspection of construction activities by the qualified professional are required at least once every 7 days to ensure deficiencies regarding erosion and sedimentation are reported and corrected. Inspection reports will be provided to the Owner and all contractors and subcontractors involved with earth disturbing activities within one business day of the field inspection. The inspector shall sign the certifying statements contained at the end of the inspection reports.
The inspection reports shall include and/or address the following:

- The date and time of the inspection;
- Name and title of person(s) performing inspection;
- Description of the weather and soil conditions at the time of the inspection;
- Description of the condition of the runoff at all points of discharge from the construction site;
- Description of the condition of all natural surface waterbodies located within, or immediately adjacent to, the property boundaries of the construction site;
- Identification of all erosion and sediment control practices that need repair or maintenance;
- Identification of all erosion and sediment control practices that were not installed properly or are not functioning as designed and require reinstallation or replacement.
- Description and sketch of disturbed areas and areas which have been stabilized;
- 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.

- Corrective actions that must be taken to install, repair, replace or maintain erosion and sediment control practices; and to correct deficiencies identified with the construction of the post-construction stormwater management practices;

- 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.

At a minimum, the *qualified inspector* shall inspect all erosion and sediment control practices 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.

For sites where disturbances are greater than five acres, regular inspection of construction activities by the qualified professional are required every 3 days to ensure deficiencies regarding erosion and sedimentation are reported and corrected. It is the responsibility of the Contractor to continuously monitor construction activities to ensure the measures outlined in this report are being implemented.

Areas which have not been fully stabilized, areas used for materials storage and all structural control measures must be inspected once every seven calendar days to monitor erosion and assess the risk of sedimentation. The Owner or Contractor shall be responsible for monitoring precipitation amounts. Precipitation must be obtained from a reliable meteorological data source, or a rain gauge can be installed on site. If a rain gauge is installed, it should be monitored after each storm event.

Each year, a thorough site evaluation shall be performed to determine the continued applicability of the permit, and assess the need to make any changes that have not already been reflected in this SWPPP. The SWPPP shall be reviewed to evaluate its overall effectiveness in preventing sediment laden stormwater runoff. Temporary and permanent stabilization methods shall be assessed, and new methods shall be established, should any method be determined to be inadequate.

A copy of the SWPPP must be maintained on site at all times in the field log book. The Owner must maintain a record of all inspection reports with the on-site SWPPP. The SWPPP and inspection reports must be maintained on-site and be made available to the permitting authority upon request.

10.3 MAINTENANCE

It shall be necessary to maintain all temporary controls installed as well as vegetative measures across the site. Maintenance shall also be necessary to ensure the permanent structural features, such as the stormwater management basins and conveyance piping remain optimally functional and continue to reduce the risk of sediment loading of surface water bodies. All controls shall be repaired or replaced as necessary and as noted on the inspection reports as prepared by the Owner's Engineer.

During construction, maintenance of these stabilization measures shall be the responsibility of the General Contractor or appropriate Sub Contractors. Vegetative plantings must not be allowed to become overgrown.

Vegetation shall be removed should it be ineffective and be replaced with a variety of grasses, trees and shrubs more suitable for preventing stormwater runoff. Silt fences must be inspected regularly to ensure that they are still effective and their capability to reduce stormwater runoff has not been reduced due to prolonged sun exposure.

Piping and catch basin sumps shall be cleaned out periodically to prevent the collection of sediment that will reduce the maximum flow. Sediment must be removed from sediment basins, infiltration basins or traps whenever their capacity has been reduced by 50 percent of their design capacity.

Guidelines and recommendations for installation and maintenance practices can be found in the "New York Standards and Specifications Erosion and Sediment Control" handbook.

10.4 PROGRESS REPORTS AND SUMMARIES

Progress reports shall be completed by the General Contractor and all Sub Contractors weekly to document any conditions, which may affect adherence to the construction schedule and may ultimately result in changes to the stormwater pollution prevention plan.

Each progress report must contain the project, date, weather conditions and a brief description of progress made throughout the week, including the use of temporary and permanent stabilization measures on all exposed soils. The progress reports shall be filed with this SWPPP in the on-site log book.

Additionally, as described in Section 1.1 of this report, the Owner's Engineer will prepare weekly inspection reports. These reports should be maintained in the on-site log book as well.

10.5 CERTIFICATION

Prior to starting construction, the Owner must certify that to the best of their knowledge this SWPPP was prepared in accordance with the requirements in the NYSDEC SPDES General Permit and that it meets all federal, state and local erosion and sediment control requirements. The certifying statement is presented in Appendix A of this report.

The General Contractor and all appropriate Sub Contractors are responsible for reading and understanding the SWPPP and are also required to certify the SWPPP by signing the certifying statement presented in Appendix A of this report.

All inspection reports and inspection quarterly summaries are to be certified by an authorized person who has responsibility for the overall operation of the site such as a project manager or site superintendent. Certification of these documents is executed by signing the certifying statements presented at the end of the inspection reports.

10.6 NYSDEC WINTER SITE STABILIZATION/SITE INSPECTIONS FOR CONSTRUCTION SITES UNDER SPDES GENERAL PERMIT FOR STORMWATER (GP-0-20-001)

The following temporary stabilization measures shall 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. No disturbance activities shall take place between November 15th and April 1st without the development of a temporary, site specific, enhanced erosion and sediment control plan.

- Perimeter erosion control shall 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 shall be mulched. This includes any previously disturbed areas that are covered with snow.

- Mulch shall consist of loose straw applied at the rate of 2 to 3 bales (90 to 100 pounds) per thousand square feet.

- Mulch should 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 should be crimped into the bare soil/snow. The tracked vehicle should 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 should 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 should 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 shall 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 shall 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 reduced to once a month. If the soil disturbance is completely suspended and the site is properly stabilized an owner/operator may reduce the self-inspection frequency, but shall maintain a minimum of monthly inspections in all situations (even when there is total winter shutdown).

To be allowed to reduce inspection frequencies, the operator must complete stabilization activities (perimeter controls, traps, barriers etc.) before proper installation is precluded by snow cover or frozen ground. If vegetation is desired, seeding, planting, and/or sodding must be scheduled to avoid die-off from fall frosts and allow for proper germination/establishment.

All erosion and sediment controls must be installed and maintained according to the NYS Standards and Specifications for Erosion and Sediment Control (aka Blue Book). The main items to consider are:

1. Site Stabilization - All bare/exposed soils must be stabilized by an established vegetation, straw or mulch, matting, rock or other approved product such as rolled erosion control product. Seeding of areas along with mulching is encouraged, however seeding alone is not considered acceptable for proper stabilization.

2. Sediment Barriers - Barriers must be properly installed at all necessary perimeter and sensitive locations.

3. Slopes - All slopes and grades must be properly stabilized with approved methods. Rolled erosion control products must be used on all slopes greater than 3/1, or where conditions for erosion dictate such measures.

4. Soil Stockpiles - Stockpiled soils must be protected by the use of established vegetation, an anchored-down straw or mulch, rolled erosion control product or other durable covering. A barrier must be installed around the pile to prevent erosion away from that location.

5. Construction Entrance - All entrance/exit locations to the site must be properly stabilized and must be maintained to accommodate snow management as set forth in the NYS Standards and Specifications for Erosion and Sediment Control.

6. Snow Management - Snow management must not destroy or degrade erosion and sediment control practices.

Frozen ground, winter conditions and equipment can affect erosion and sediment control practices. Check for damage during monthly inspections and repair as necessary. This is especially important during thaws and prior to spring rain events. Weekly inspections must resume no later than March 15 or as directed by the Department.

11.0 CONCLUSION

Lansing Engineering has designed a Stormwater Pollution Prevention Plan (SWPPP) for the Quackenderry Mixed-Use Site Plan that reduces and/or eliminates the impacts of the proposed development by controlling and treating stormwater through the use of drainage ditches and channels, storm sewer piping, and stormwater management systems. The stormwater management systems will function adequately and will not adversely affect adjacent or downstream properties provided it is constructed and maintained as outlined in this plan and as shown on the site plans.

Appendix A

Contractor Certification Forms

STORMWATER POLLUTION PREVENTION PLAN
CONTRACTOR CERTIFICATION

Signatory requirements as per NYSDEC SPDES General Permit for Stormwater Discharges from Construction Activities Permit No. GP-0-20-001 Part III.A.6

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

_____
Project Name and/or Address

_____
Contractor Company Name

_____
Address

_____ _____
Phone Number email

_____ _____
Trained Contractor * Title

_____ _____
Authorized Representative Title

_____ _____
Authorized Representative Signature Date

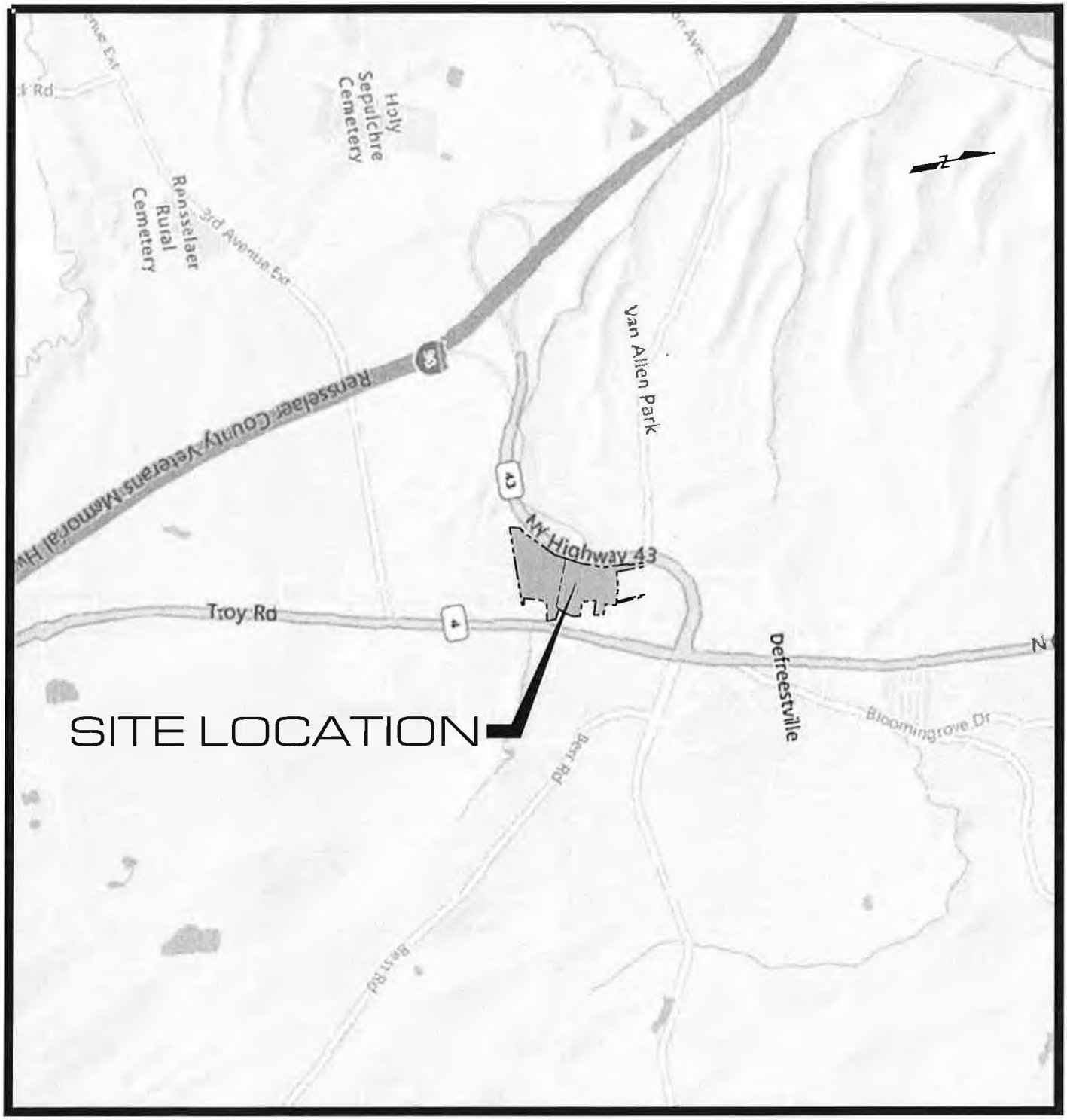
Please identify the specific elements of the SWPPP you will be responsible for: (Use additional sheets if required)

_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____

*A **Trained Contractor** as defined in Appendix A of the General Permit- 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.

Appendix B

Site Location/Drainage Area/Drainage Pattern Maps



SITE LOCATION MAP

SCALE: 1"=2,000'

PRELIMINARY / NOT FOR CONSTRUCTION

QUACKENDERRY COMMONS MIXED-USE SITE PLAN

BLOOMINGROVE DRIVE, TOWN OF NORTH GREENBUSH, RENSSELAER COUNTY, NEW YORK

LANSING ENGINEERING
CIVIL & ENVIRONMENTAL ENGINEERING
LAND SURVEYING
2452 STATE ROUTE 9 SUITE 301 - MALTA, NY 12020 - (518) 899-5243

SITE LOCATION MAP

PROJ. NO: 764.07
SCALE: AS SHOWN
DATE: 8/12/2024

SL-1
SHEET XX OF 1

LEGEND

- Project Boundary
- Subcatchment Boundary
- Flow Path
- Property Line
- Soil Type Boundary
- Subcatchment Information (Size (Acres) / Curve Number)

DESIGN POINT 2

DESIGN POINT 1

DESIGN POINT 3

I – 90 CONNECTOR

WASHINGTON AVENUE EXTENSION

BLOOMINGROVE DR

NORTH GREENBUSH ROAD – N.Y.S. ROU...

	Size (Acres)	Curve Number
1	22.21	73
2	2.21	73
3	0.08	73
4	2.26	73

Lands N/F Of
North Greenbush Associates, LLC
Book 103 Of Deeds At Page 2455

Lands N/F Of
AINTINY North Greenbush LLC
Book 6185 Of Deeds At Page 166

Lands N/F Of
Van Alen Properties, LLC
Book 90 Of Deeds At Page 1656

Lands N/F Of
Milligan
Book 9745 Of Deeds At Page 188

Lands N/F Of
Meadowbrook Realty, LLC
Book 105 Of Deeds At Page 2496

Lands N/F Of
Schoonhouse Realty, LLC
Book 1496 Of Deeds At Page 183

HuB: C/D Soil

HuE: C/D Soil

HuC: C/D Soil

RhB: C/D Soil

BnC: C/D Soil

BnD: C/D Soil

CbA: A/D Soil

EXISTING CONDITIONS PLAN

0 30 60 120 240

SCALE: 1"=60'

UNAUTHORIZED ALTERATION OR ADDITION TO THIS PLAN IS A VIOLATION OF THE NYS EDUCATION LAW ARTICLE 145 ENGINEERING P.C.

PRELIMINARY / NOT FOR CONSTRUCTION

QUACKENDERRY COMMONS MIXED-USE SITE PLAN

BLOOMINGROVE DRIVE, TOWN OF NORTH GREENBUSH RENSSELAER COUNTY, NEW YORK

DATE	REVISIONS RECORD DESCRIPTION

LANSING ENGINEERING
CIVIL & ENVIRONMENTAL ENGINEERING
LAND SURVEYING

2495 STATE ROUTE 9 SUITE 301 • MALTA, NY 12020 | (518) 899-9843

EXISTING CONDITIONS PLAN

PROJ. NO: 764.07
SCALE: AS SHOWN
DATE: 8/12/2024

EC-1
SHEET 1 OF 2

P:\PROJECTS\764.07-The Spinney Group-Quackenderry Commons\DESIGN REPORTS\SWPPP\SWPPP CURRENT\SWPPP MAP AND DETAILS\EXISTING CONDITIONS.dwg Aug 12, 2024 11:35AM

DESIGN POINT 2

DESIGN POINT 1

DESIGN POINT 3

I – 90 CONNECTOR

2A | 1.59 | 73

3A | 0.08 | 73

1A | 13.19 | 74

1B | 3.47 | 92

1C | 8.43 | 92

BUILDING #2
RELEASE OF FOOTPRINT
EASEMENT/RIGHT OF WAY
SHALL BE RETAIL SPACE
1 STORY APARTMENT UP ABLE

BUILDING #1
COMMERCIAL DEVELOPMENT LEASE
18,175 SF RETAIL SPACE
1 STORY APARTMENT UP ABLE

Lands N/F Of
North Greenbush Associates, LLC
Book 103 Of Deeds At Page 2455

Lands N/F Of
Van Alen Properties, LLC
Book 90 Of Deeds At Page 1656

Lands N/F Of
AIN11NY North Greenbush LLC
Book 6185 Of Deeds At Page 166

Lands N/F Of
Milligan
Book 9745 Of Deeds At Page 188

Lands N/F Of
Michael Mongiello
Book 305 Of Deeds At Page 2496

Lands N/F Of
Schenhouse Realty, LLC
Book 3100 Of Deeds At Page 193

Iron Rod Found
Corner

Pipe Found
Corner

BLOOMINGROVE DR

WASHINGTON AVENUE EXTENSION

NORTH GREENBUSH ROAD – N.Y.S. ROU

LEGEND

- Project Boundary
- Subcatchment Boundary
- Flow Path
- Property Line
- Soil Type Boundary
- Subcatchment Information (Subcatchment Number / Size (Acres) / Curve Number)

OPEN SPACE AREAS		
DEED RESTRICTED CONSERVATION AREA		7.90± AC

PROPOSED CONDITIONS PLAN

0 30 60 120 240

SCALE: 1"=60'

PRELIMINARY / NOT FOR CONSTRUCTION

QUACKENDERRY COMMONS MIXED-USE SITE PLAN
BLOOMINGROVE DRIVE, TOWN OF NORTH GREENBUSH, RENSSELAER COUNTY, NEW YORK

DATE	REVISIONS RECORD/DESCRIPTION

LANSING ENGINEERING
CIVIL & ENVIRONMENTAL ENGINEERING
LAND SURVEYING
8452 STATE ROUTE 9 SUITE 301 MALTA, NY 12020 (518) 899-5843

PROPOSED CONDITIONS PLAN

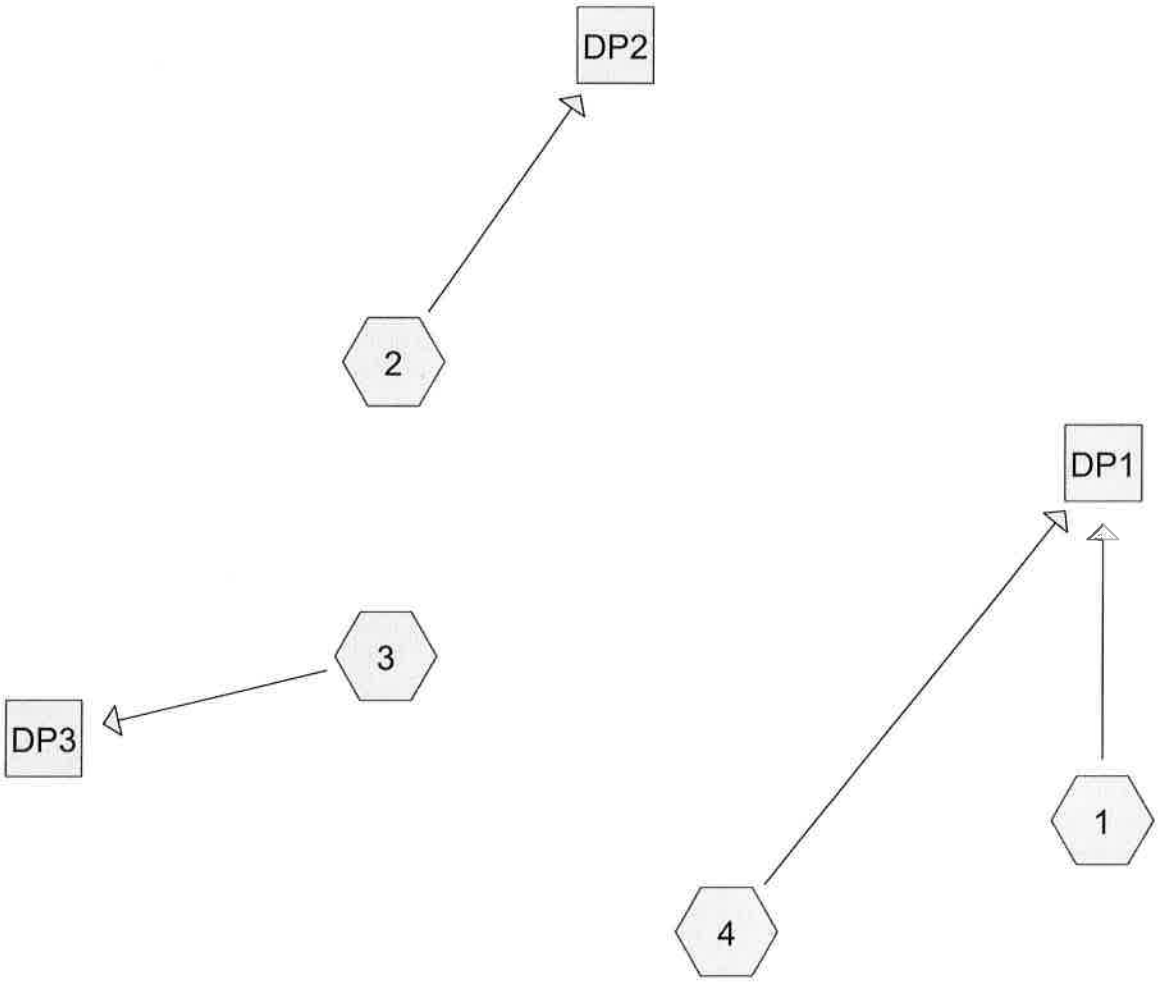
PROJ. NO: 764.07
SCALE: AS SHOWN
DATE: 8/12/2024

PC–1
SHEET 2 OF 2

P:\PROJECTS\764O7-The Spinney Group-Quackenderry Commons\DESIGN REPORTS\SWPPP\SWPPP CURRENT\SWPPP MAP AND DETAILS\PROPOSED CONDITIONS.dwg Aug 12, 2024 11:36AM,

Appendix C

Pre-Development and Post-Development Run-off Calculations



Subcat Reach Pond Link

Routing Diagram for EXISTING CONDITIONS
Prepared by Lansing Eng, Printed 8/12/2024

Rainfall Events Listing (selected events)

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	1yr	Type II 24-hr		Default	24.00	1	2.26	2
2	10yr	Type II 24-hr		Default	24.00	1	3.83	2
3	25yr	Type II 24-hr		Default	24.00	1	4.73	2
4	100yr	Type II 24-hr		Default	24.00	1	6.53	2

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.150	49	50-75% Grass cover, Fair, HSG A (1)
0.240	79	50-75% Grass cover, Fair, HSG C (1)
0.260	98	Water Surface, HSG C (1)
0.330	36	Woods, Fair, HSG A (1)
25.780	73	Woods, Fair, HSG C (1, 2, 3, 4)
26.760	**73**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.480	HSG A	1
0.000	HSG B	
26.280	HSG C	1, 2, 3, 4
0.000	HSG D	
0.000	Other	
26.760		**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
0.150	0.000	0.240	0.000	0.000	0.390	50-75% Grass cover, Fair	1
0.000	0.000	0.260	0.000	0.000	0.260	Water Surface	1
0.330	0.000	25.780	0.000	0.000	26.110	Woods, Fair	1, 2, 3, 4
0.480	**0.000**	**26.280**	**0.000**	**0.000**	**26.760**	**TOTAL AREA**	

Time span=0.00-26.00 hrs, dt=0.05 hrs, 521 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: Runoff Area=22.210 ac 1.17% Impervious Runoff Depth=0.44"
Flow Length=428' Tc=26.5 min CN=73 Runoff=7.22 cfs 0.820 af

Subcatchment 2: Runoff Area=2.210 ac 0.00% Impervious Runoff Depth=0.44"
Flow Length=615' Tc=23.5 min CN=73 Runoff=0.78 cfs 0.082 af

Subcatchment 3: Runoff Area=0.080 ac 0.00% Impervious Runoff Depth=0.44"
Tc=6.0 min CN=73 Runoff=0.06 cfs 0.003 af

Subcatchment 4: Runoff Area=2.260 ac 0.00% Impervious Runoff Depth=0.44"
Tc=6.0 min CN=73 Runoff=1.59 cfs 0.083 af

Reach DP1: Inflow=7.51 cfs 0.903 af
Outflow=7.51 cfs 0.903 af

Reach DP2: Inflow=0.78 cfs 0.082 af
Outflow=0.78 cfs 0.082 af

Reach DP3: Inflow=0.06 cfs 0.003 af
Outflow=0.06 cfs 0.003 af

Total Runoff Area = 26.760 ac Runoff Volume = 0.988 af Average Runoff Depth = 0.44"
99.03% Pervious = 26.500 ac 0.97% Impervious = 0.260 ac

Summary for Subcatchment 1:

Runoff = 7.22 cfs @ 12.25 hrs, Volume= 0.820 af, Depth= 0.44"
Routed to Reach DP1 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-26.00 hrs, dt= 0.05 hrs
Type II 24-hr 1yr Rainfall=2.26"

Area (ac)	CN	Description
0.240	79	50-75% Grass cover, Fair, HSG C
0.150	49	50-75% Grass cover, Fair, HSG A
0.260	98	Water Surface, HSG C
0.330	36	Woods, Fair, HSG A
21.230	73	Woods, Fair, HSG C
22.210	73	Weighted Average
21.950		98.83% Pervious Area
0.260		1.17% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
21.7	100	0.0250	0.08		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.62"
4.8	328	0.0520	1.14		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
26.5	428	Total			

Summary for Subcatchment 2:

Runoff = 0.78 cfs @ 12.21 hrs, Volume= 0.082 af, Depth= 0.44"
Routed to Reach DP2 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-26.00 hrs, dt= 0.05 hrs
Type II 24-hr 1yr Rainfall=2.26"

Area (ac)	CN	Description
2.210	73	Woods, Fair, HSG C
2.210		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.0	100	0.0400	0.09		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.62"
5.5	515	0.0970	1.56		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
23.5	615	Total			

Summary for Subcatchment 3:

Runoff = 0.06 cfs @ 11.99 hrs, Volume= 0.003 af, Depth= 0.44"
Routed to Reach DP3 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-26.00 hrs, dt= 0.05 hrs
Type II 24-hr 1yr Rainfall=2.26"

Area (ac)	CN	Description
0.080	73	Woods, Fair, HSG C
0.080		100.00% Pervious Area

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

Summary for Subcatchment 4:

Runoff = 1.59 cfs @ 11.99 hrs, Volume= 0.083 af, Depth= 0.44"
Routed to Reach DP1 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-26.00 hrs, dt= 0.05 hrs
Type II 24-hr 1yr Rainfall=2.26"

Area (ac)	CN	Description
2.260	73	Woods, Fair, HSG C
2.260		100.00% Pervious Area

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

Summary for Reach DP1:

Inflow Area = 24.470 ac, 1.06% Impervious, Inflow Depth = 0.44" for 1yr event
Inflow = 7.51 cfs @ 12.25 hrs, Volume= 0.903 af
Outflow = 7.51 cfs @ 12.25 hrs, Volume= 0.903 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-26.00 hrs, dt= 0.05 hrs

Summary for Reach DP2:

Inflow Area = 2.210 ac, 0.00% Impervious, Inflow Depth = 0.44" for 1yr event
Inflow = 0.78 cfs @ 12.21 hrs, Volume= 0.082 af
Outflow = 0.78 cfs @ 12.21 hrs, Volume= 0.082 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-26.00 hrs, dt= 0.05 hrs

Summary for Reach DP3:

Inflow Area = 0.080 ac, 0.00% Impervious, Inflow Depth = 0.44" for 1yr event
Inflow = 0.06 cfs @ 11.99 hrs, Volume= 0.003 af
Outflow = 0.06 cfs @ 11.99 hrs, Volume= 0.003 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-26.00 hrs, dt= 0.05 hrs

Time span=0.00-26.00 hrs, dt=0.05 hrs, 521 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: Runoff Area=22.210 ac 1.17% Impervious Runoff Depth=1.41"
Flow Length=428' Tc=26.5 min CN=73 Runoff=28.07 cfs 2.604 af

Subcatchment 2: Runoff Area=2.210 ac 0.00% Impervious Runoff Depth=1.41"
Flow Length=615' Tc=23.5 min CN=73 Runoff=3.01 cfs 0.259 af

Subcatchment 3: Runoff Area=0.080 ac 0.00% Impervious Runoff Depth=1.41"
Tc=6.0 min CN=73 Runoff=0.20 cfs 0.009 af

Subcatchment 4: Runoff Area=2.260 ac 0.00% Impervious Runoff Depth=1.41"
Tc=6.0 min CN=73 Runoff=5.52 cfs 0.265 af

Reach DP1: Inflow=28.96 cfs 2.868 af
Outflow=28.96 cfs 2.868 af

Reach DP2: Inflow=3.01 cfs 0.259 af
Outflow=3.01 cfs 0.259 af

Reach DP3: Inflow=0.20 cfs 0.009 af
Outflow=0.20 cfs 0.009 af

Total Runoff Area = 26.760 ac Runoff Volume = 3.137 af Average Runoff Depth = 1.41"
99.03% Pervious = 26.500 ac 0.97% Impervious = 0.260 ac

Summary for Subcatchment 1:

Runoff = 28.07 cfs @ 12.22 hrs, Volume= 2.604 af, Depth= 1.41"
Routed to Reach DP1 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-26.00 hrs, dt= 0.05 hrs
Type II 24-hr 10yr Rainfall=3.83"

Area (ac)	CN	Description
0.240	79	50-75% Grass cover, Fair, HSG C
0.150	49	50-75% Grass cover, Fair, HSG A
0.260	98	Water Surface, HSG C
0.330	36	Woods, Fair, HSG A
21.230	73	Woods, Fair, HSG C
22.210	73	Weighted Average
21.950		98.83% Pervious Area
0.260		1.17% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
21.7	100	0.0250	0.08		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.62"
4.8	328	0.0520	1.14		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
26.5	428	Total			

Summary for Subcatchment 2:

Runoff = 3.01 cfs @ 12.18 hrs, Volume= 0.259 af, Depth= 1.41"
Routed to Reach DP2 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-26.00 hrs, dt= 0.05 hrs
Type II 24-hr 10yr Rainfall=3.83"

Area (ac)	CN	Description
2.210	73	Woods, Fair, HSG C
2.210		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.0	100	0.0400	0.09		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.62"
5.5	515	0.0970	1.56		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
23.5	615	Total			

Summary for Subcatchment 3:

Runoff = 0.20 cfs @ 11.98 hrs, Volume= 0.009 af, Depth= 1.41"
Routed to Reach DP3 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-26.00 hrs, dt= 0.05 hrs
Type II 24-hr 10yr Rainfall=3.83"

Area (ac)	CN	Description
0.080	73	Woods, Fair, HSG C
0.080		100.00% Pervious Area

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

Summary for Subcatchment 4:

Runoff = 5.52 cfs @ 11.98 hrs, Volume= 0.265 af, Depth= 1.41"
Routed to Reach DP1 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-26.00 hrs, dt= 0.05 hrs
Type II 24-hr 10yr Rainfall=3.83"

Area (ac)	CN	Description
2.260	73	Woods, Fair, HSG C
2.260		100.00% Pervious Area

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

Summary for Reach DP1:

Inflow Area = 24.470 ac, 1.06% Impervious, Inflow Depth = 1.41" for 10yr event
Inflow = 28.96 cfs @ 12.21 hrs, Volume= 2.868 af
Outflow = 28.96 cfs @ 12.21 hrs, Volume= 2.868 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-26.00 hrs, dt= 0.05 hrs

Summary for Reach DP2:

Inflow Area = 2.210 ac, 0.00% Impervious, Inflow Depth = 1.41" for 10yr event
Inflow = 3.01 cfs @ 12.18 hrs, Volume= 0.259 af
Outflow = 3.01 cfs @ 12.18 hrs, Volume= 0.259 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-26.00 hrs, dt= 0.05 hrs

Summary for Reach DP3:

Inflow Area = 0.080 ac, 0.00% Impervious, Inflow Depth = 1.41" for 10yr event
Inflow = 0.20 cfs @ 11.98 hrs, Volume= 0.009 af
Outflow = 0.20 cfs @ 11.98 hrs, Volume= 0.009 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-26.00 hrs, dt= 0.05 hrs

Time span=0.00-26.00 hrs, dt=0.05 hrs, 521 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: Runoff Area=22.210 ac 1.17% Impervious Runoff Depth=2.07"
Flow Length=428' Tc=26.5 min CN=73 Runoff=42.36 cfs 3.833 af

Subcatchment 2: Runoff Area=2.210 ac 0.00% Impervious Runoff Depth=2.07"
Flow Length=615' Tc=23.5 min CN=73 Runoff=4.55 cfs 0.381 af

Subcatchment 3: Runoff Area=0.080 ac 0.00% Impervious Runoff Depth=2.07"
Tc=6.0 min CN=73 Runoff=0.29 cfs 0.014 af

Subcatchment 4: Runoff Area=2.260 ac 0.00% Impervious Runoff Depth=2.07"
Tc=6.0 min CN=73 Runoff=8.15 cfs 0.390 af

Reach DP1: Inflow=43.65 cfs 4.223 af
Outflow=43.65 cfs 4.223 af

Reach DP2: Inflow=4.55 cfs 0.381 af
Outflow=4.55 cfs 0.381 af

Reach DP3: Inflow=0.29 cfs 0.014 af
Outflow=0.29 cfs 0.014 af

Total Runoff Area = 26.760 ac Runoff Volume = 4.618 af Average Runoff Depth = 2.07"
99.03% Pervious = 26.500 ac 0.97% Impervious = 0.260 ac

Summary for Subcatchment 1:

Runoff = 42.36 cfs @ 12.21 hrs, Volume= 3.833 af, Depth= 2.07"
Routed to Reach DP1 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-26.00 hrs, dt= 0.05 hrs
Type II 24-hr 25yr Rainfall=4.73"

Area (ac)	CN	Description
0.240	79	50-75% Grass cover, Fair, HSG C
0.150	49	50-75% Grass cover, Fair, HSG A
0.260	98	Water Surface, HSG C
0.330	36	Woods, Fair, HSG A
21.230	73	Woods, Fair, HSG C
22.210	73	Weighted Average
21.950		98.83% Pervious Area
0.260		1.17% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
21.7	100	0.0250	0.08		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.62"
4.8	328	0.0520	1.14		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
26.5	428	Total			

Summary for Subcatchment 2:

Runoff = 4.55 cfs @ 12.17 hrs, Volume= 0.381 af, Depth= 2.07"
Routed to Reach DP2 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-26.00 hrs, dt= 0.05 hrs
Type II 24-hr 25yr Rainfall=4.73"

Area (ac)	CN	Description
2.210	73	Woods, Fair, HSG C
2.210		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.0	100	0.0400	0.09		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.62"
5.5	515	0.0970	1.56		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
23.5	615	Total			

Summary for Subcatchment 3:

Runoff = 0.29 cfs @ 11.98 hrs, Volume= 0.014 af, Depth= 2.07"
Routed to Reach DP3 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-26.00 hrs, dt= 0.05 hrs
Type II 24-hr 25yr Rainfall=4.73"

Area (ac)	CN	Description
0.080	73	Woods, Fair, HSG C
0.080		100.00% Pervious Area

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

Summary for Subcatchment 4:

Runoff = 8.15 cfs @ 11.98 hrs, Volume= 0.390 af, Depth= 2.07"
Routed to Reach DP1 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-26.00 hrs, dt= 0.05 hrs
Type II 24-hr 25yr Rainfall=4.73"

Area (ac)	CN	Description
2.260	73	Woods, Fair, HSG C
2.260		100.00% Pervious Area

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

Summary for Reach DP1:

Inflow Area = 24.470 ac, 1.06% Impervious, Inflow Depth = 2.07" for 25yr event
Inflow = 43.65 cfs @ 12.21 hrs, Volume= 4.223 af
Outflow = 43.65 cfs @ 12.21 hrs, Volume= 4.223 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-26.00 hrs, dt= 0.05 hrs

Summary for Reach DP2:

Inflow Area = 2.210 ac, 0.00% Impervious, Inflow Depth = 2.07" for 25yr event
Inflow = 4.55 cfs @ 12.17 hrs, Volume= 0.381 af
Outflow = 4.55 cfs @ 12.17 hrs, Volume= 0.381 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-26.00 hrs, dt= 0.05 hrs

Summary for Reach DP3:

Inflow Area = 0.080 ac, 0.00% Impervious, Inflow Depth = 2.07" for 25yr event
Inflow = 0.29 cfs @ 11.98 hrs, Volume= 0.014 af
Outflow = 0.29 cfs @ 11.98 hrs, Volume= 0.014 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-26.00 hrs, dt= 0.05 hrs

Time span=0.00-26.00 hrs, dt=0.05 hrs, 521 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: Runoff Area=22.210 ac 1.17% Impervious Runoff Depth=3.53"
Flow Length=428' Tc=26.5 min CN=73 Runoff=73.40 cfs 6.540 af

Subcatchment 2: Runoff Area=2.210 ac 0.00% Impervious Runoff Depth=3.53"
Flow Length=615' Tc=23.5 min CN=73 Runoff=7.87 cfs 0.651 af

Subcatchment 3: Runoff Area=0.080 ac 0.00% Impervious Runoff Depth=3.53"
Tc=6.0 min CN=73 Runoff=0.48 cfs 0.024 af

Subcatchment 4: Runoff Area=2.260 ac 0.00% Impervious Runoff Depth=3.53"
Tc=6.0 min CN=73 Runoff=13.69 cfs 0.665 af

Reach DP1: Inflow=75.53 cfs 7.205 af
Outflow=75.53 cfs 7.205 af

Reach DP2: Inflow=7.87 cfs 0.651 af
Outflow=7.87 cfs 0.651 af

Reach DP3: Inflow=0.48 cfs 0.024 af
Outflow=0.48 cfs 0.024 af

Total Runoff Area = 26.760 ac Runoff Volume = 7.879 af Average Runoff Depth = 3.53"
99.03% Pervious = 26.500 ac 0.97% Impervious = 0.260 ac

Summary for Subcatchment 1:

Runoff = 73.40 cfs @ 12.20 hrs, Volume= 6.540 af, Depth= 3.53"
Routed to Reach DP1 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-26.00 hrs, dt= 0.05 hrs
Type II 24-hr 100yr Rainfall=6.53"

Area (ac)	CN	Description
0.240	79	50-75% Grass cover, Fair, HSG C
0.150	49	50-75% Grass cover, Fair, HSG A
0.260	98	Water Surface, HSG C
0.330	36	Woods, Fair, HSG A
21.230	73	Woods, Fair, HSG C
22.210	73	Weighted Average
21.950		98.83% Pervious Area
0.260		1.17% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
21.7	100	0.0250	0.08		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.62"
4.8	328	0.0520	1.14		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
26.5	428	Total			

Summary for Subcatchment 2:

Runoff = 7.87 cfs @ 12.17 hrs, Volume= 0.651 af, Depth= 3.53"
Routed to Reach DP2 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-26.00 hrs, dt= 0.05 hrs
Type II 24-hr 100yr Rainfall=6.53"

Area (ac)	CN	Description
2.210	73	Woods, Fair, HSG C
2.210		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.0	100	0.0400	0.09		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.62"
5.5	515	0.0970	1.56		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
23.5	615	Total			

Summary for Subcatchment 3:

Runoff = 0.48 cfs @ 11.97 hrs, Volume= 0.024 af, Depth= 3.53"
Routed to Reach DP3 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-26.00 hrs, dt= 0.05 hrs
Type II 24-hr 100yr Rainfall=6.53"

Area (ac)	CN	Description
0.080	73	Woods, Fair, HSG C
0.080		100.00% Pervious Area

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

Summary for Subcatchment 4:

Runoff = 13.69 cfs @ 11.97 hrs, Volume= 0.665 af, Depth= 3.53"
Routed to Reach DP1 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-26.00 hrs, dt= 0.05 hrs
Type II 24-hr 100yr Rainfall=6.53"

Area (ac)	CN	Description
2.260	73	Woods, Fair, HSG C
2.260		100.00% Pervious Area

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

Summary for Reach DP1:

Inflow Area = 24.470 ac, 1.06% Impervious, Inflow Depth = 3.53" for 100yr event
Inflow = 75.53 cfs @ 12.20 hrs, Volume= 7.205 af
Outflow = 75.53 cfs @ 12.20 hrs, Volume= 7.205 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-26.00 hrs, dt= 0.05 hrs

Summary for Reach DP2:

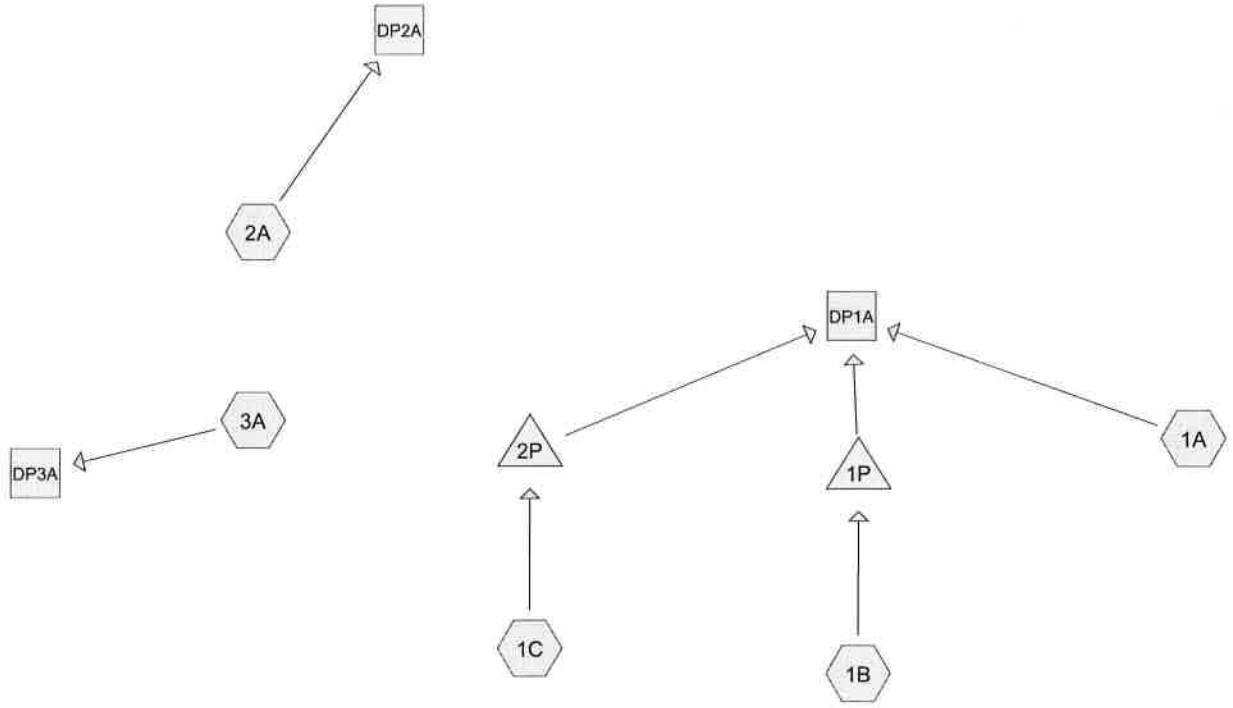
Inflow Area = 2.210 ac, 0.00% Impervious, Inflow Depth = 3.53" for 100yr event
Inflow = 7.87 cfs @ 12.17 hrs, Volume= 0.651 af
Outflow = 7.87 cfs @ 12.17 hrs, Volume= 0.651 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-26.00 hrs, dt= 0.05 hrs

Summary for Reach DP3:

Inflow Area = 0.080 ac, 0.00% Impervious, Inflow Depth = 3.53" for 100yr event
Inflow = 0.48 cfs @ 11.97 hrs, Volume= 0.024 af
Outflow = 0.48 cfs @ 11.97 hrs, Volume= 0.024 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-26.00 hrs, dt= 0.05 hrs



Subcat Reach Pond Link

Routing Diagram for PROPOSED CONDITIONS
Prepared by Lansing Eng, Printed 8/12/2024

Rainfall Events Listing (selected events)

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	1yr	Type II 24-hr		Default	24.00	1	2.26	2
2	10yr	Type II 24-hr		Default	24.00	1	3.83	2
3	25yr	Type II 24-hr		Default	24.00	1	4.73	2
4	100yr	Type II 24-hr		Default	24.00	1	6.53	2

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
9.480	98	(1A, 1B, 1C)
0.310	39	>75% Grass cover, Good, HSG A (1A, 1B, 1C)
7.250	74	>75% Grass cover, Good, HSG C (1A, 1B, 1C, 2A)
0.260	98	Water Surface, HSG C (1A)
0.020	36	Woods, Fair, HSG A (1A)
9.440	73	Woods, Fair, HSG C (1A, 1C, 2A, 3A)
26.760	**82**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.330	HSG A	1A, 1B, 1C
0.000	HSG B	
16.950	HSG C	1A, 1B, 1C, 2A, 3A
0.000	HSG D	
9.480	Other	1A, 1B, 1C
26.760		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.000	0.000	0.000	9.480	9.480		1A, 1B, 1C
0.310	0.000	7.250	0.000	0.000	7.560	>75% Grass cover, Good	1A, 1B, 1C, 2A
0.000	0.000	0.260	0.000	0.000	0.260	Water Surface	1A
0.020	0.000	9.440	0.000	0.000	9.460	Woods, Fair	1A, 1C, 2A, 3A
0.330	**0.000**	**16.950**	**0.000**	**9.480**	**26.760**	**TOTAL AREA**	

Pipe Listing (all nodes)

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Width (inches)	Diam/Height (inches)	Inside-Fill (inches)
1	1B	0.00	0.00	214.0	0.0100	0.013	0.0	12.0	0.0
2	1C	0.00	0.00	261.0	0.0050	0.013	0.0	12.0	0.0
3	1P	272.90	272.80	20.0	0.0050	0.013	0.0	18.0	0.0
4	2P	273.02	272.60	84.5	0.0050	0.013	0.0	24.0	0.0

Time span=0.00-26.00 hrs, dt=0.05 hrs, 521 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 1A: Runoff Area=13.190 ac 2.50% Impervious Runoff Depth=0.48"
Flow Length=518' Tc=21.2 min CN=74 Runoff=5.61 cfs 0.526 af

Subcatchment 1B: Runoff Area=3.470 ac 79.54% Impervious Runoff Depth=1.47"
Flow Length=352' Tc=8.3 min CN=92 Runoff=8.09 cfs 0.426 af

Subcatchment 1C: Runoff Area=8.430 ac 78.88% Impervious Runoff Depth=1.47"
Flow Length=476' Tc=10.9 min CN=92 Runoff=17.90 cfs 1.034 af

Subcatchment 2A: Runoff Area=1.590 ac 0.00% Impervious Runoff Depth=0.44"
Flow Length=640' Tc=17.4 min CN=73 Runoff=0.69 cfs 0.059 af

Subcatchment 3A: Runoff Area=0.080 ac 0.00% Impervious Runoff Depth=0.44"
Tc=6.0 min CN=73 Runoff=0.06 cfs 0.003 af

Reach DP1A: Inflow=6.44 cfs 1.508 af
Outflow=6.44 cfs 1.508 af

Reach DP2A: Inflow=0.69 cfs 0.059 af
Outflow=0.69 cfs 0.059 af

Reach DP3A: Inflow=0.06 cfs 0.003 af
Outflow=0.06 cfs 0.003 af

Pond 1P: Peak Elev=275.42' Storage=0.273 af Inflow=8.09 cfs 0.426 af
Outflow=0.26 cfs 0.273 af

Pond 2P: Peak Elev=276.37' Storage=0.649 af Inflow=17.90 cfs 1.034 af
Outflow=0.67 cfs 0.709 af

Total Runoff Area = 26.760 ac Runoff Volume = 2.047 af Average Runoff Depth = 0.92"
63.60% Pervious = 17.020 ac 36.40% Impervious = 9.740 ac

Summary for Subcatchment 1A:

Runoff = 5.61 cfs @ 12.17 hrs, Volume= 0.526 af, Depth= 0.48"
Routed to Reach DP1A :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-26.00 hrs, dt= 0.05 hrs
Type II 24-hr 1yr Rainfall=2.26"

	Area (ac)	CN	Description
	4.830	74	>75% Grass cover, Good, HSG C
	0.030	39	>75% Grass cover, Good, HSG A
	0.260	98	Water Surface, HSG C
	0.020	36	Woods, Fair, HSG A
	7.980	73	Woods, Fair, HSG C
*	0.070	98	
	13.190	74	Weighted Average
	12.860		97.50% Pervious Area
	0.330		2.50% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.4	100	0.0500	0.10		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.62"
4.8	418	0.0840	1.45		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
21.2	518	Total			

Summary for Subcatchment 1B:

Runoff = 8.09 cfs @ 11.99 hrs, Volume= 0.426 af, Depth= 1.47"
Routed to Pond 1P :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-26.00 hrs, dt= 0.05 hrs
Type II 24-hr 1yr Rainfall=2.26"

	Area (ac)	CN	Description
*	2.760	98	
	0.580	74	>75% Grass cover, Good, HSG C
	0.130	39	>75% Grass cover, Good, HSG A
	3.470	92	Weighted Average
	0.710		20.46% Pervious Area
	2.760		79.54% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.3	76	0.0790	0.17		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.62"
0.2	62	0.0650	5.18		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.8	214	0.0100	4.54	3.56	**Pipe Channel,** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.013
8.3	352	Total			

Summary for Subcatchment 1C:

Runoff = 17.90 cfs @ 12.02 hrs, Volume= 1.034 af, Depth= 1.47"
Routed to Pond 2P :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-26.00 hrs, dt= 0.05 hrs
Type II 24-hr 1yr Rainfall=2.26"

	Area (ac)	CN	Description
*	6.650	98	
	1.540	74	>75% Grass cover, Good, HSG C
	0.150	39	>75% Grass cover, Good, HSG A
	0.090	73	Woods, Fair, HSG C
	8.430	92	Weighted Average
	1.780		21.12% Pervious Area
	6.650		78.88% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.8	100	0.0850	0.19		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.62"
0.3	39	0.0850	2.04		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.4	76	0.0260	3.27		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
1.4	261	0.0050	3.21	2.52	**Pipe Channel,** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.013
10.9	476	Total			

Summary for Subcatchment 2A:

Runoff = 0.69 cfs @ 12.13 hrs, Volume= 0.059 af, Depth= 0.44"
Routed to Reach DP2A :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-26.00 hrs, dt= 0.05 hrs
Type II 24-hr 1yr Rainfall=2.26"

Area (ac)	CN	Description
1.290	73	Woods, Fair, HSG C
0.300	74	>75% Grass cover, Good, HSG C
1.590	73	Weighted Average
1.590		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.6	100	0.1200	0.14		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.62"
5.8	540	0.0950	1.54		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
17.4	640	Total			

Summary for Subcatchment 3A:

Runoff = 0.06 cfs @ 11.99 hrs, Volume= 0.003 af, Depth= 0.44"
Routed to Reach DP3A :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-26.00 hrs, dt= 0.05 hrs
Type II 24-hr 1yr Rainfall=2.26"

Area (ac)	CN	Description
0.080	73	Woods, Fair, HSG C
0.080		100.00% Pervious Area

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

Summary for Reach DP1A:

Inflow Area = 25.090 ac, 38.82% Impervious, Inflow Depth > 0.72" for 1yr event
Inflow = 6.44 cfs @ 12.17 hrs, Volume= 1.508 af
Outflow = 6.44 cfs @ 12.17 hrs, Volume= 1.508 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-26.00 hrs, dt= 0.05 hrs

Summary for Reach DP2A:

Inflow Area = 1.590 ac, 0.00% Impervious, Inflow Depth = 0.44" for 1yr event
Inflow = 0.69 cfs @ 12.13 hrs, Volume= 0.059 af
Outflow = 0.69 cfs @ 12.13 hrs, Volume= 0.059 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-26.00 hrs, dt= 0.05 hrs

Summary for Reach DP3A:

Inflow Area = 0.080 ac, 0.00% Impervious, Inflow Depth = 0.44" for 1yr event
Inflow = 0.06 cfs @ 11.99 hrs, Volume= 0.003 af
Outflow = 0.06 cfs @ 11.99 hrs, Volume= 0.003 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-26.00 hrs, dt= 0.05 hrs

Summary for Pond 1P:

Inflow Area = 3.470 ac, 79.54% Impervious, Inflow Depth = 1.47" for 1yr event
Inflow = 8.09 cfs @ 11.99 hrs, Volume= 0.426 af
Outflow = 0.26 cfs @ 14.18 hrs, Volume= 0.273 af, Atten= 97%, Lag= 131.1 min
Primary = 0.26 cfs @ 14.18 hrs, Volume= 0.273 af
Routed to Reach DP1A :

Routing by Stor-Ind method, Time Span= 0.00-26.00 hrs, dt= 0.05 hrs
Peak Elev= 275.42' @ 14.18 hrs Surf.Area= 0.185 ac Storage= 0.273 af

Plug-Flow detention time= 410.7 min calculated for 0.273 af (64% of inflow)
Center-of-Mass det. time= 305.9 min (1,115.9 - 810.0)

Volume	Invert	Avail.Storage	Storage Description
#1A	273.00'	0.309 af	**79.00'W x 102.00'L x 8.00'H Field A** 1.480 af Overall - 0.707 af Embedded = 0.773 af x 40.0% Voids
#2A	273.50'	0.707 af	**CMP Round 84** x 40 Inside #1 Effective Size= 84.0"W x 84.0"H => 38.48 sf x 20.00'L = 769.7 cf Overall Size= 84.0"W x 84.0"H x 20.00'L 40 Chambers in 8 Rows
		1.016 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	272.90'	**18.0" Round Culvert** L= 20.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 272.90' / 272.80' S= 0.0050 '/' Cc= 0.900 n= 0.013, Flow Area= 1.77 sf
#2	Device 1	273.50'	**2.7" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Device 1	275.42'	**4.0" W x 22.0" H Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.26 cfs @ 14.18 hrs HW=275.42' (Free Discharge)
└**1=Culvert** (Passes 0.26 cfs of 8.93 cfs potential flow)
├**2=Orifice/Grate** (Orifice Controls 0.26 cfs @ 6.47 fps)
└**3=Orifice/Grate** (Controls 0.00 cfs)

Summary for Pond 2P:

Inflow Area = 8.430 ac, 78.88% Impervious, Inflow Depth = 1.47" for 1yr event
Inflow = 17.90 cfs @ 12.02 hrs, Volume= 1.034 af
Outflow = 0.67 cfs @ 14.03 hrs, Volume= 0.709 af, Atten= 96%, Lag= 120.4 min
Primary = 0.67 cfs @ 14.03 hrs, Volume= 0.709 af
Routed to Reach DP1A :

Routing by Stor-Ind method, Time Span= 0.00-26.00 hrs, dt= 0.05 hrs
Peak Elev= 276.37' @ 14.03 hrs Surf.Area= 0.307 ac Storage= 0.649 af

Plug-Flow detention time= 399.5 min calculated for 0.709 af (69% of inflow)
Center-of-Mass det. time= 299.0 min (1,111.4 - 812.4)

Volume	Invert	Avail.Storage	Storage Description
#1A	273.13'	0.550 af	**131.00'W x 102.00'L x 9.00'H Field A** 2.761 af Overall - 1.385 af Embedded = 1.376 af x 40.0% Voids
#2A	273.63'	1.385 af	**CMP Round 96** x 60 Inside #1 Effective Size= 96.0"W x 96.0"H => 50.27 sf x 20.00'L = 1,005.3 cf Overall Size= 96.0"W x 96.0"H x 20.00'L 60 Chambers in 12 Rows
		1.935 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	273.02'	**24.0" Round Culvert** L= 84.5' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 273.02' / 272.60' S= 0.0050 '/' Cc= 0.900 n= 0.013, Flow Area= 3.14 sf
#2	Device 1	273.63'	**4.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Device 1	276.37'	**5.0" W x 63.0" H Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.67 cfs @ 14.03 hrs HW=276.37' (Free Discharge)
└**1=Culvert** (Passes 0.67 cfs of 18.31 cfs potential flow)
  ├**2=Orifice/Grate** (Orifice Controls 0.67 cfs @ 7.72 fps)
  └**3=Orifice/Grate** (Controls 0.00 cfs)

Time span=0.00-26.00 hrs, dt=0.05 hrs, 521 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 1A: Runoff Area=13.190 ac 2.50% Impervious Runoff Depth=1.47"
Flow Length=518' Tc=21.2 min CN=74 Runoff=20.25 cfs 1.619 af

Subcatchment 1B: Runoff Area=3.470 ac 79.54% Impervious Runoff Depth=2.95"
Flow Length=352' Tc=8.3 min CN=92 Runoff=15.64 cfs 0.854 af

Subcatchment 1C: Runoff Area=8.430 ac 78.88% Impervious Runoff Depth=2.95"
Flow Length=476' Tc=10.9 min CN=92 Runoff=34.73 cfs 2.075 af

Subcatchment 2A: Runoff Area=1.590 ac 0.00% Impervious Runoff Depth=1.41"
Flow Length=640' Tc=17.4 min CN=73 Runoff=2.60 cfs 0.186 af

Subcatchment 3A: Runoff Area=0.080 ac 0.00% Impervious Runoff Depth=1.41"
Tc=6.0 min CN=73 Runoff=0.20 cfs 0.009 af

Reach DP1A: Inflow=25.62 cfs 3.856 af
Outflow=25.62 cfs 3.856 af

Reach DP2A: Inflow=2.60 cfs 0.186 af
Outflow=2.60 cfs 0.186 af

Reach DP3A: Inflow=0.20 cfs 0.009 af
Outflow=0.20 cfs 0.009 af

Pond 1P: Peak Elev=276.75' Storage=0.470 af Inflow=15.64 cfs 0.854 af
Outflow=1.97 cfs 0.642 af

Pond 2P: Peak Elev=278.29' Storage=1.136 af Inflow=34.73 cfs 2.075 af
Outflow=4.46 cfs 1.595 af

Total Runoff Area = 26.760 ac Runoff Volume = 4.744 af Average Runoff Depth = 2.13"
63.60% Pervious = 17.020 ac 36.40% Impervious = 9.740 ac

Summary for Subcatchment 1A:

Runoff = 20.25 cfs @ 12.15 hrs, Volume= 1.619 af, Depth= 1.47"
Routed to Reach DP1A :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-26.00 hrs, dt= 0.05 hrs
Type II 24-hr 10yr Rainfall=3.83"

	Area (ac)	CN	Description
	4.830	74	>75% Grass cover, Good, HSG C
	0.030	39	>75% Grass cover, Good, HSG A
	0.260	98	Water Surface, HSG C
	0.020	36	Woods, Fair, HSG A
	7.980	73	Woods, Fair, HSG C
*	0.070	98	
	13.190	74	Weighted Average
	12.860		97.50% Pervious Area
	0.330		2.50% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.4	100	0.0500	0.10		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.62"
4.8	418	0.0840	1.45		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
21.2	518	Total			

Summary for Subcatchment 1B:

Runoff = 15.64 cfs @ 11.99 hrs, Volume= 0.854 af, Depth= 2.95"
Routed to Pond 1P :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-26.00 hrs, dt= 0.05 hrs
Type II 24-hr 10yr Rainfall=3.83"

	Area (ac)	CN	Description
*	2.760	98	
	0.580	74	>75% Grass cover, Good, HSG C
	0.130	39	>75% Grass cover, Good, HSG A
	3.470	92	Weighted Average
	0.710		20.46% Pervious Area
	2.760		79.54% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.3	76	0.0790	0.17		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.62"
0.2	62	0.0650	5.18		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.8	214	0.0100	4.54	3.56	**Pipe Channel,** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.013
8.3	352	Total			

Summary for Subcatchment 1C:

Runoff = 34.73 cfs @ 12.02 hrs, Volume= 2.075 af, Depth= 2.95"
Routed to Pond 2P :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-26.00 hrs, dt= 0.05 hrs
Type II 24-hr 10yr Rainfall=3.83"

	Area (ac)	CN	Description
*	6.650	98	
	1.540	74	>75% Grass cover, Good, HSG C
	0.150	39	>75% Grass cover, Good, HSG A
	0.090	73	Woods, Fair, HSG C
	8.430	92	Weighted Average
	1.780		21.12% Pervious Area
	6.650		78.88% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.8	100	0.0850	0.19		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.62"
0.3	39	0.0850	2.04		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.4	76	0.0260	3.27		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
1.4	261	0.0050	3.21	2.52	**Pipe Channel,** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.013
10.9	476	Total			

Summary for Subcatchment 2A:

Runoff = 2.60 cfs @ 12.11 hrs, Volume= 0.186 af, Depth= 1.41"
Routed to Reach DP2A :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-26.00 hrs, dt= 0.05 hrs
Type II 24-hr 10yr Rainfall=3.83"

Area (ac)	CN	Description
1.290	73	Woods, Fair, HSG C
0.300	74	>75% Grass cover, Good, HSG C
1.590	73	Weighted Average
1.590		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.6	100	0.1200	0.14		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.62"
5.8	540	0.0950	1.54		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
17.4	640	Total			

Summary for Subcatchment 3A:

Runoff = 0.20 cfs @ 11.98 hrs, Volume= 0.009 af, Depth= 1.41"
Routed to Reach DP3A :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-26.00 hrs, dt= 0.05 hrs
Type II 24-hr 10yr Rainfall=3.83"

Area (ac)	CN	Description
0.080	73	Woods, Fair, HSG C
0.080		100.00% Pervious Area

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

Summary for Reach DP1A:

Inflow Area = 25.090 ac, 38.82% Impervious, Inflow Depth > 1.84" for 10yr event
Inflow = 25.62 cfs @ 12.17 hrs, Volume= 3.856 af
Outflow = 25.62 cfs @ 12.17 hrs, Volume= 3.856 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-26.00 hrs, dt= 0.05 hrs

Summary for Reach DP2A:

Inflow Area = 1.590 ac, 0.00% Impervious, Inflow Depth = 1.41" for 10yr event
Inflow = 2.60 cfs @ 12.11 hrs, Volume= 0.186 af
Outflow = 2.60 cfs @ 12.11 hrs, Volume= 0.186 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-26.00 hrs, dt= 0.05 hrs

Summary for Reach DP3A:

Inflow Area = 0.080 ac, 0.00% Impervious, Inflow Depth = 1.41" for 10yr event
Inflow = 0.20 cfs @ 11.98 hrs, Volume= 0.009 af
Outflow = 0.20 cfs @ 11.98 hrs, Volume= 0.009 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-26.00 hrs, dt= 0.05 hrs

Summary for Pond 1P:

Inflow Area = 3.470 ac, 79.54% Impervious, Inflow Depth = 2.95" for 10yr event
Inflow = 15.64 cfs @ 11.99 hrs, Volume= 0.854 af
Outflow = 1.97 cfs @ 12.34 hrs, Volume= 0.642 af, Atten= 87%, Lag= 21.1 min
Primary = 1.97 cfs @ 12.34 hrs, Volume= 0.642 af
Routed to Reach DP1A :

Routing by Stor-Ind method, Time Span= 0.00-26.00 hrs, dt= 0.05 hrs
Peak Elev= 276.75' @ 12.34 hrs Surf.Area= 0.185 ac Storage= 0.470 af

Plug-Flow detention time= 264.4 min calculated for 0.642 af (75% of inflow)
Center-of-Mass det. time= 175.7 min (966.1 - 790.4)

Volume	Invert	Avail.Storage	Storage Description
#1A	273.00'	0.309 af	**79.00'W x 102.00'L x 8.00'H Field A** 1.480 af Overall - 0.707 af Embedded = 0.773 af x 40.0% Voids
#2A	273.50'	0.707 af	**CMP Round 84** x 40 Inside #1 Effective Size= 84.0"W x 84.0"H => 38.48 sf x 20.00'L = 769.7 cf Overall Size= 84.0"W x 84.0"H x 20.00'L 40 Chambers in 8 Rows
		1.016 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	272.90'	**18.0" Round Culvert** L= 20.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 272.90' / 272.80' S= 0.0050 '/' Cc= 0.900 n= 0.013, Flow Area= 1.77 sf
#2	Device 1	273.50'	**2.7" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Device 1	275.42'	**4.0" W x 22.0" H Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=1.97 cfs @ 12.34 hrs HW=276.75' (Free Discharge)
└**1=Culvert** (Passes 1.97 cfs of 11.82 cfs potential flow)
  ├**2=Orifice/Grate** (Orifice Controls 0.34 cfs @ 8.52 fps)
  └**3=Orifice/Grate** (Orifice Controls 1.63 cfs @ 3.70 fps)

Summary for Pond 2P:

Inflow Area = 8.430 ac, 78.88% Impervious, Inflow Depth = 2.95" for 10yr event
Inflow = 34.73 cfs @ 12.02 hrs, Volume= 2.075 af
Outflow = 4.46 cfs @ 12.44 hrs, Volume= 1.595 af, Atten= 87%, Lag= 25.2 min
Primary = 4.46 cfs @ 12.44 hrs, Volume= 1.595 af
Routed to Reach DP1A :

Routing by Stor-Ind method, Time Span= 0.00-26.00 hrs, dt= 0.05 hrs
Peak Elev= 278.29' @ 12.44 hrs Surf.Area= 0.307 ac Storage= 1.136 af

Plug-Flow detention time= 266.0 min calculated for 1.592 af (77% of inflow)
Center-of-Mass det. time= 180.8 min (973.6 - 792.8)

Volume	Invert	Avail.Storage	Storage Description
#1A	273.13'	0.550 af	**131.00'W x 102.00'L x 9.00'H Field A** 2.761 af Overall - 1.385 af Embedded = 1.376 af x 40.0% Voids
#2A	273.63'	1.385 af	**CMP Round 96** x 60 Inside #1 Effective Size= 96.0"W x 96.0"H => 50.27 sf x 20.00'L = 1,005.3 cf Overall Size= 96.0"W x 96.0"H x 20.00'L 60 Chambers in 12 Rows
		1.935 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	273.02'	**24.0" Round Culvert** L= 84.5' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 273.02' / 272.60' S= 0.0050 '/' Cc= 0.900 n= 0.013, Flow Area= 3.14 sf
#2	Device 1	273.63'	**4.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Device 1	276.37'	**5.0" W x 63.0" H Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=4.45 cfs @ 12.44 hrs HW=278.29' (Free Discharge)
└**1=Culvert** (Passes 4.45 cfs of 24.68 cfs potential flow)
├**2=Orifice/Grate** (Orifice Controls 0.89 cfs @ 10.21 fps)
└**3=Orifice/Grate** (Orifice Controls 3.56 cfs @ 4.45 fps)

Time span=0.00-26.00 hrs, dt=0.05 hrs, 521 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 1A: Runoff Area=13.190 ac 2.50% Impervious Runoff Depth=2.15"
Flow Length=518' Tc=21.2 min CN=74 Runoff=30.11 cfs 2.364 af

Subcatchment 1B: Runoff Area=3.470 ac 79.54% Impervious Runoff Depth=3.83"
Flow Length=352' Tc=8.3 min CN=92 Runoff=19.94 cfs 1.106 af

Subcatchment 1C: Runoff Area=8.430 ac 78.88% Impervious Runoff Depth=3.83"
Flow Length=476' Tc=10.9 min CN=92 Runoff=44.32 cfs 2.688 af

Subcatchment 2A: Runoff Area=1.590 ac 0.00% Impervious Runoff Depth=2.07"
Flow Length=640' Tc=17.4 min CN=73 Runoff=3.90 cfs 0.274 af

Subcatchment 3A: Runoff Area=0.080 ac 0.00% Impervious Runoff Depth=2.07"
Tc=6.0 min CN=73 Runoff=0.29 cfs 0.014 af

Reach DP1A: Inflow=40.62 cfs 5.407 af
Outflow=40.62 cfs 5.407 af

Reach DP2A: Inflow=3.90 cfs 0.274 af
Outflow=3.90 cfs 0.274 af

Reach DP3A: Inflow=0.29 cfs 0.014 af
Outflow=0.29 cfs 0.014 af

Pond 1P: Peak Elev=277.51' Storage=0.586 af Inflow=19.94 cfs 1.106 af
Outflow=3.48 cfs 0.878 af

Pond 2P: Peak Elev=279.40' Storage=1.410 af Inflow=44.32 cfs 2.688 af
Outflow=8.04 cfs 2.164 af

Total Runoff Area = 26.760 ac Runoff Volume = 6.446 af Average Runoff Depth = 2.89"
63.60% Pervious = 17.020 ac 36.40% Impervious = 9.740 ac

Summary for Subcatchment 1A:

Runoff = 30.11 cfs @ 12.15 hrs, Volume= 2.364 af, Depth= 2.15"
Routed to Reach DP1A :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-26.00 hrs, dt= 0.05 hrs
Type II 24-hr 25yr Rainfall=4.73"

	Area (ac)	CN	Description
	4.830	74	>75% Grass cover, Good, HSG C
	0.030	39	>75% Grass cover, Good, HSG A
	0.260	98	Water Surface, HSG C
	0.020	36	Woods, Fair, HSG A
	7.980	73	Woods, Fair, HSG C
*	0.070	98	
	13.190	74	Weighted Average
	12.860		97.50% Pervious Area
	0.330		2.50% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.4	100	0.0500	0.10		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.62"
4.8	418	0.0840	1.45		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
21.2	518	Total			

Summary for Subcatchment 1B:

Runoff = 19.94 cfs @ 11.99 hrs, Volume= 1.106 af, Depth= 3.83"
Routed to Pond 1P :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-26.00 hrs, dt= 0.05 hrs
Type II 24-hr 25yr Rainfall=4.73"

	Area (ac)	CN	Description
*	2.760	98	
	0.580	74	>75% Grass cover, Good, HSG C
	0.130	39	>75% Grass cover, Good, HSG A
	3.470	92	Weighted Average
	0.710		20.46% Pervious Area
	2.760		79.54% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.3	76	0.0790	0.17		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.62"
0.2	62	0.0650	5.18		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.8	214	0.0100	4.54	3.56	**Pipe Channel,** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.013
8.3	352	Total			

Summary for Subcatchment 1C:

Runoff = 44.32 cfs @ 12.02 hrs, Volume= 2.688 af, Depth= 3.83"
Routed to Pond 2P :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-26.00 hrs, dt= 0.05 hrs
Type II 24-hr 25yr Rainfall=4.73"

	Area (ac)	CN	Description
*	6.650	98	
	1.540	74	>75% Grass cover, Good, HSG C
	0.150	39	>75% Grass cover, Good, HSG A
	0.090	73	Woods, Fair, HSG C
	8.430	92	Weighted Average
	1.780		21.12% Pervious Area
	6.650		78.88% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.8	100	0.0850	0.19		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.62"
0.3	39	0.0850	2.04		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.4	76	0.0260	3.27		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
1.4	261	0.0050	3.21	2.52	**Pipe Channel,** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.013
10.9	476	Total			

Summary for Subcatchment 2A:

Runoff = 3.90 cfs @ 12.10 hrs, Volume= 0.274 af, Depth= 2.07"
Routed to Reach DP2A :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-26.00 hrs, dt= 0.05 hrs
Type II 24-hr 25yr Rainfall=4.73"

Area (ac)	CN	Description
1.290	73	Woods, Fair, HSG C
0.300	74	>75% Grass cover, Good, HSG C
1.590	73	Weighted Average
1.590		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.6	100	0.1200	0.14		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.62"
5.8	540	0.0950	1.54		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
17.4	640	Total			

Summary for Subcatchment 3A:

Runoff = 0.29 cfs @ 11.98 hrs, Volume= 0.014 af, Depth= 2.07"
Routed to Reach DP3A :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-26.00 hrs, dt= 0.05 hrs
Type II 24-hr 25yr Rainfall=4.73"

Area (ac)	CN	Description
0.080	73	Woods, Fair, HSG C
0.080		100.00% Pervious Area

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

Summary for Reach DP1A:

Inflow Area = 25.090 ac, 38.82% Impervious, Inflow Depth > 2.59" for 25yr event
Inflow = 40.62 cfs @ 12.16 hrs, Volume= 5.407 af
Outflow = 40.62 cfs @ 12.16 hrs, Volume= 5.407 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-26.00 hrs, dt= 0.05 hrs

Summary for Reach DP2A:

Inflow Area = 1.590 ac, 0.00% Impervious, Inflow Depth = 2.07" for 25yr event
Inflow = 3.90 cfs @ 12.10 hrs, Volume= 0.274 af
Outflow = 3.90 cfs @ 12.10 hrs, Volume= 0.274 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-26.00 hrs, dt= 0.05 hrs

Summary for Reach DP3A:

Inflow Area = 0.080 ac, 0.00% Impervious, Inflow Depth = 2.07" for 25yr event
Inflow = 0.29 cfs @ 11.98 hrs, Volume= 0.014 af
Outflow = 0.29 cfs @ 11.98 hrs, Volume= 0.014 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-26.00 hrs, dt= 0.05 hrs

Summary for Pond 1P:

Inflow Area = 3.470 ac, 79.54% Impervious, Inflow Depth = 3.83" for 25yr event
Inflow = 19.94 cfs @ 11.99 hrs, Volume= 1.106 af
Outflow = 3.48 cfs @ 12.24 hrs, Volume= 0.878 af, Atten= 83%, Lag= 14.8 min
Primary = 3.48 cfs @ 12.24 hrs, Volume= 0.878 af
Routed to Reach DP1A :

Routing by Stor-Ind method, Time Span= 0.00-26.00 hrs, dt= 0.05 hrs
Peak Elev= 277.51' @ 12.24 hrs Surf.Area= 0.185 ac Storage= 0.586 af

Plug-Flow detention time= 225.4 min calculated for 0.878 af (79% of inflow)
Center-of-Mass det. time= 144.5 min (927.8 - 783.3)

Volume	Invert	Avail.Storage	Storage Description
#1A	273.00'	0.309 af	**79.00'W x 102.00'L x 8.00'H Field A** 1.480 af Overall - 0.707 af Embedded = 0.773 af x 40.0% Voids
#2A	273.50'	0.707 af	**CMP Round 84** x 40 Inside #1 Effective Size= 84.0"W x 84.0"H => 38.48 sf x 20.00'L = 769.7 cf Overall Size= 84.0"W x 84.0"H x 20.00'L 40 Chambers in 8 Rows
		1.016 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	272.90'	**18.0" Round Culvert** L= 20.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 272.90' / 272.80' S= 0.0050 '/' Cc= 0.900 n= 0.013, Flow Area= 1.77 sf
#2	Device 1	273.50'	**2.7" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Device 1	275.42'	**4.0" W x 22.0" H Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=3.47 cfs @ 12.24 hrs HW=277.51' (Free Discharge)
└**1=Culvert** (Passes 3.47 cfs of 13.20 cfs potential flow)
├**2=Orifice/Grate** (Orifice Controls 0.38 cfs @ 9.51 fps)
└**3=Orifice/Grate** (Orifice Controls 3.10 cfs @ 5.07 fps)

Summary for Pond 2P:

Inflow Area = 8.430 ac, 78.88% Impervious, Inflow Depth = 3.83" for 25yr event
Inflow = 44.32 cfs @ 12.02 hrs, Volume= 2.688 af
Outflow = 8.04 cfs @ 12.32 hrs, Volume= 2.164 af, Atten= 82%, Lag= 17.9 min
Primary = 8.04 cfs @ 12.32 hrs, Volume= 2.164 af
Routed to Reach DP1A :

Routing by Stor-Ind method, Time Span= 0.00-26.00 hrs, dt= 0.05 hrs
Peak Elev= 279.40' @ 12.32 hrs Surf.Area= 0.307 ac Storage= 1.410 af

Plug-Flow detention time= 227.0 min calculated for 2.160 af (80% of inflow)
Center-of-Mass det. time= 149.2 min (934.9 - 785.7)

Volume	Invert	Avail.Storage	Storage Description
#1A	273.13'	0.550 af	**131.00'W x 102.00'L x 9.00'H Field A** 2.761 af Overall - 1.385 af Embedded = 1.376 af x 40.0% Voids
#2A	273.63'	1.385 af	**CMP Round 96** x 60 Inside #1 Effective Size= 96.0"W x 96.0"H => 50.27 sf x 20.00'L = 1,005.3 cf Overall Size= 96.0"W x 96.0"H x 20.00'L 60 Chambers in 12 Rows
		1.935 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	273.02'	**24.0" Round Culvert** L= 84.5' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 273.02' / 272.60' S= 0.0050 '/' Cc= 0.900 n= 0.013, Flow Area= 3.14 sf
#2	Device 1	273.63'	**4.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Device 1	276.37'	**5.0" W x 63.0" H Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=8.03 cfs @ 12.32 hrs HW=279.39' (Free Discharge)
↑—**1=Culvert** (Passes 8.03 cfs of 27.69 cfs potential flow)
↑—**2=Orifice/Grate** (Orifice Controls 0.99 cfs @ 11.39 fps)
—**3=Orifice/Grate** (Orifice Controls 7.03 cfs @ 5.58 fps)

Time span=0.00-26.00 hrs, dt=0.05 hrs, 521 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 1A: Runoff Area=13.190 ac 2.50% Impervious Runoff Depth=3.64"
Flow Length=518' Tc=21.2 min CN=74 Runoff=51.34 cfs 3.996 af

Subcatchment 1B: Runoff Area=3.470 ac 79.54% Impervious Runoff Depth=5.59"
Flow Length=352' Tc=8.3 min CN=92 Runoff=28.44 cfs 1.617 af

Subcatchment 1C: Runoff Area=8.430 ac 78.88% Impervious Runoff Depth=5.59"
Flow Length=476' Tc=10.9 min CN=92 Runoff=63.31 cfs 3.928 af

Subcatchment 2A: Runoff Area=1.590 ac 0.00% Impervious Runoff Depth=3.53"
Flow Length=640' Tc=17.4 min CN=73 Runoff=6.71 cfs 0.468 af

Subcatchment 3A: Runoff Area=0.080 ac 0.00% Impervious Runoff Depth=3.53"
Tc=6.0 min CN=73 Runoff=0.48 cfs 0.024 af

Reach DP1A: Inflow=74.39 cfs 8.718 af
Outflow=74.39 cfs 8.718 af

Reach DP2A: Inflow=6.71 cfs 0.468 af
Outflow=6.71 cfs 0.468 af

Reach DP3A: Inflow=0.48 cfs 0.024 af
Outflow=0.48 cfs 0.024 af

Pond 1P: Peak Elev=279.23' Storage=0.832 af Inflow=28.44 cfs 1.617 af
Outflow=5.43 cfs 1.370 af

Pond 2P: Peak Elev=281.99' Storage=1.918 af Inflow=63.31 cfs 3.928 af
Outflow=18.74 cfs 3.352 af

Total Runoff Area = 26.760 ac Runoff Volume = 10.032 af Average Runoff Depth = 4.50"
63.60% Pervious = 17.020 ac 36.40% Impervious = 9.740 ac

Summary for Subcatchment 1A:

Runoff = 51.34 cfs @ 12.14 hrs, Volume= 3.996 af, Depth= 3.64"
Routed to Reach DP1A :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-26.00 hrs, dt= 0.05 hrs
Type II 24-hr 100yr Rainfall=6.53"

	Area (ac)	CN	Description
	4.830	74	>75% Grass cover, Good, HSG C
	0.030	39	>75% Grass cover, Good, HSG A
	0.260	98	Water Surface, HSG C
	0.020	36	Woods, Fair, HSG A
	7.980	73	Woods, Fair, HSG C
*	0.070	98	
	13.190	74	Weighted Average
	12.860		97.50% Pervious Area
	0.330		2.50% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.4	100	0.0500	0.10		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.62"
4.8	418	0.0840	1.45		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
21.2	518	Total			

Summary for Subcatchment 1B:

Runoff = 28.44 cfs @ 11.99 hrs, Volume= 1.617 af, Depth= 5.59"
Routed to Pond 1P :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-26.00 hrs, dt= 0.05 hrs
Type II 24-hr 100yr Rainfall=6.53"

	Area (ac)	CN	Description
*	2.760	98	
	0.580	74	>75% Grass cover, Good, HSG C
	0.130	39	>75% Grass cover, Good, HSG A
	3.470	92	Weighted Average
	0.710		20.46% Pervious Area
	2.760		79.54% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.3	76	0.0790	0.17		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.62"
0.2	62	0.0650	5.18		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.8	214	0.0100	4.54	3.56	**Pipe Channel,** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.013
8.3	352	Total			

Summary for Subcatchment 1C:

Runoff = 63.31 cfs @ 12.02 hrs, Volume= 3.928 af, Depth= 5.59"
Routed to Pond 2P :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-26.00 hrs, dt= 0.05 hrs
Type II 24-hr 100yr Rainfall=6.53"

	Area (ac)	CN	Description
*	6.650	98	
	1.540	74	>75% Grass cover, Good, HSG C
	0.150	39	>75% Grass cover, Good, HSG A
	0.090	73	Woods, Fair, HSG C
	8.430	92	Weighted Average
	1.780		21.12% Pervious Area
	6.650		78.88% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.8	100	0.0850	0.19		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.62"
0.3	39	0.0850	2.04		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.4	76	0.0260	3.27		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
1.4	261	0.0050	3.21	2.52	**Pipe Channel,** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.013
10.9	476	Total			

Summary for Subcatchment 2A:

Runoff = 6.71 cfs @ 12.10 hrs, Volume= 0.468 af, Depth= 3.53"
Routed to Reach DP2A :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-26.00 hrs, dt= 0.05 hrs
Type II 24-hr 100yr Rainfall=6.53"

Area (ac)	CN	Description
1.290	73	Woods, Fair, HSG C
0.300	74	>75% Grass cover, Good, HSG C
1.590	73	Weighted Average
1.590		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.6	100	0.1200	0.14		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.62"
5.8	540	0.0950	1.54		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
17.4	640	Total			

Summary for Subcatchment 3A:

Runoff = 0.48 cfs @ 11.97 hrs, Volume= 0.024 af, Depth= 3.53"
Routed to Reach DP3A :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-26.00 hrs, dt= 0.05 hrs
Type II 24-hr 100yr Rainfall=6.53"

Area (ac)	CN	Description
0.080	73	Woods, Fair, HSG C
0.080		100.00% Pervious Area

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

Summary for Reach DP1A:

Inflow Area = 25.090 ac, 38.82% Impervious, Inflow Depth > 4.17" for 100yr event
Inflow = 74.39 cfs @ 12.16 hrs, Volume= 8.718 af
Outflow = 74.39 cfs @ 12.16 hrs, Volume= 8.718 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-26.00 hrs, dt= 0.05 hrs

Summary for Reach DP2A:

Inflow Area = 1.590 ac, 0.00% Impervious, Inflow Depth = 3.53" for 100yr event
Inflow = 6.71 cfs @ 12.10 hrs, Volume= 0.468 af
Outflow = 6.71 cfs @ 12.10 hrs, Volume= 0.468 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-26.00 hrs, dt= 0.05 hrs

Summary for Reach DP3A:

Inflow Area = 0.080 ac, 0.00% Impervious, Inflow Depth = 3.53" for 100yr event
Inflow = 0.48 cfs @ 11.97 hrs, Volume= 0.024 af
Outflow = 0.48 cfs @ 11.97 hrs, Volume= 0.024 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-26.00 hrs, dt= 0.05 hrs

Summary for Pond 1P:

Inflow Area = 3.470 ac, 79.54% Impervious, Inflow Depth = 5.59" for 100yr event
Inflow = 28.44 cfs @ 11.99 hrs, Volume= 1.617 af
Outflow = 5.43 cfs @ 12.22 hrs, Volume= 1.370 af, Atten= 81%, Lag= 13.6 min
Primary = 5.43 cfs @ 12.22 hrs, Volume= 1.370 af
Routed to Reach DP1A :

Routing by Stor-Ind method, Time Span= 0.00-26.00 hrs, dt= 0.05 hrs
Peak Elev= 279.23' @ 12.22 hrs Surf.Area= 0.185 ac Storage= 0.832 af

Plug-Flow detention time= 189.7 min calculated for 1.370 af (85% of inflow)
Center-of-Mass det. time= 121.3 min (894.7 - 773.3)

Volume	Invert	Avail.Storage	Storage Description
#1A	273.00'	0.309 af	**79.00'W x 102.00'L x 8.00'H Field A** 1.480 af Overall - 0.707 af Embedded = 0.773 af x 40.0% Voids
#2A	273.50'	0.707 af	**CMP Round 84** x 40 Inside #1 Effective Size= 84.0"W x 84.0"H => 38.48 sf x 20.00'L = 769.7 cf Overall Size= 84.0"W x 84.0"H x 20.00'L 40 Chambers in 8 Rows
		1.016 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	272.90'	**18.0" Round Culvert** L= 20.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 272.90' / 272.80' S= 0.0050 '/' Cc= 0.900 n= 0.013, Flow Area= 1.77 sf
#2	Device 1	273.50'	**2.7" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Device 1	275.42'	**4.0" W x 22.0" H Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=5.43 cfs @ 12.22 hrs HW=279.22' (Free Discharge)
└**1=Culvert** (Passes 5.43 cfs of 15.85 cfs potential flow)
├**2=Orifice/Grate** (Orifice Controls 0.45 cfs @ 11.40 fps)
└**3=Orifice/Grate** (Orifice Controls 4.97 cfs @ 8.14 fps)

Summary for Pond 2P:

Inflow Area = 8.430 ac, 78.88% Impervious, Inflow Depth = 5.59" for 100yr event
Inflow = 63.31 cfs @ 12.02 hrs, Volume= 3.928 af
Outflow = 18.74 cfs @ 12.22 hrs, Volume= 3.352 af, Atten= 70%, Lag= 12.2 min
Primary = 18.74 cfs @ 12.22 hrs, Volume= 3.352 af
Routed to Reach DP1A :

Routing by Stor-Ind method, Time Span= 0.00-26.00 hrs, dt= 0.05 hrs
Peak Elev= 281.99' @ 12.22 hrs Surf.Area= 0.307 ac Storage= 1.918 af

Plug-Flow detention time= 184.0 min calculated for 3.346 af (85% of inflow)
Center-of-Mass det. time= 118.1 min (893.8 - 775.7)

Volume	Invert	Avail.Storage	Storage Description
#1A	273.13'	0.550 af	**131.00'W x 102.00'L x 9.00'H Field A** 2.761 af Overall - 1.385 af Embedded = 1.376 af x 40.0% Voids
#2A	273.63'	1.385 af	**CMP Round 96** x 60 Inside #1 Effective Size= 96.0"W x 96.0"H => 50.27 sf x 20.00'L = 1,005.3 cf Overall Size= 96.0"W x 96.0"H x 20.00'L 60 Chambers in 12 Rows
		1.935 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	273.02'	**24.0" Round Culvert** L= 84.5' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 273.02' / 272.60' S= 0.0050 '/' Cc= 0.900 n= 0.013, Flow Area= 3.14 sf
#2	Device 1	273.63'	**4.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Device 1	276.37'	**5.0" W x 63.0" H Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=18.61 cfs @ 12.22 hrs HW=281.96' (Free Discharge)
└**1=Culvert** (Passes 18.61 cfs of 33.65 cfs potential flow)
  ├**2=Orifice/Grate** (Orifice Controls 1.20 cfs @ 13.76 fps)
  └**3=Orifice/Grate** (Orifice Controls 17.41 cfs @ 7.96 fps)

Appendix D

Calculations – Storm Management, Green Infrastructure , Pipe Sizing

Stormwater Management Basin Sizing Calculations

Project:	Quackenderry Commons	Basin ID:	Stormwater Basin #1 - North
Date:	8/12/2024		

Water Quality Volume, WQ_v			
$I = A_I/A$	Total Impervious Area (A_i):	2.76	Acres
	Total Contributing Area (A):	3.47	Acres
	Total Percentage of Impervious Cover (I):	**79.54**	**%**
$Rv = (0.05) + (I)(0.009)$	**Runoff Coefficient (R_v):**	**0.77**	
	90% Runoff Event Number (P):	1.15	
	From Table 4.1 of the NYS Stormwater Management Design Manual		
$WQ_v = (P)(R_v)(A)/12$	**Water Quality Volume (WQ_V):**	**0.255**	**Acre-ft**

Forebay/Permanent Pool Sizing					
			Practice Type:	P-5	
			Percolation Rate:		min/in
Required		**Provided**	**Forebay Size:**	**1,109.373**	**Ft^3**
1,109	≤	**1,109**			
Required		**Provided**	**Permanent Pool Size:**	**5,546.867**	**Ft^3**
5,547	≤	**5,547**			

Stream Channel Protection Volume, Cp_v			
CN = Curve Number	CN for Overall Developed Area:	92	
Ia = (200/CN)-2	**Initial Abstraction (Ia):**	**0.174**	
	1-Yr 24-Hr Design Storm Precipitation (P):	2.26	
csm/in = Cubic Feet of Discharge Per Second Per Square Mile of Watershed Per Inch of Runoff	**Ia/P =**	**0.077**	
	Time of Concentration (Tc):	0.138	Hour(s)
	Unit Peak Discharge (q_u):	**914.022**	**csm/in**
	Using TR-55 and Type II Rainfall Distribution (GPD Method)		
	Ratio of Outflow to Inflow (q_o/q_i):	0.02	
	Using q_u, T=24 Hrs and Figure 8.5 of the NYS Stormwater Management Design Manual		
$V_S/V_R = 0.683 - 1.43(q_o/q_i) + 1.64(q_o/q_i)^2 - 0.804(q_o/q_i)^3$	**Channel Protection Storage (V_S) / Volume of Runoff (V_R)**	**0.66**	
	Post Dev. 1-Yr 24-Hr Design Storm Runoff (Q):	1.47	Inches
	Using TR-55 and Type II Rainfall Distribution		
$Cp_V = ((V_S/V_R)(Q)(A))/12$	**Stream Channel Protection Volume (Cp_V):**	**0.278**	**Acre-ft**
cfs = Cubic Feet Per Second	**Required Average Release Rate (Cp_V Avg.):**	**0.140**	**cfs**
	Proposed Orifice Size:	2.00	Inches
	Proposed Average Release Rate (Cp_V Avg.):	0.130	cfs
	Proposed Cp_V Release Time:	**25.9**	**Hour(s)**

Stormwater Management Basin Sizing Calculations

Project:	Quackenderry Commons	Basin ID:	Stormwater Basin #1 - North
Date:	8/12/2024		

Overbank Flood Protection Volume, Qp_{10}			
Pre Development 10 Yr Qp	Peak Outflow Discharge (q_o):	1.97	cfs
Post Development 10 Yr Qp	Peak Inflow Discharge (q_i):	15.64	cfs
	Unit Peak Discharge (q_o/q_i):	**0.13**	
	Storage Volume/Runoff Volume (V_S/V_R):	0.51	
	Using Figure 8.6 of the NYS Stormwater Management Design Manual		
	Post Dev. 10-Yr 24-Hr Design Storm Runoff (Q):	2.95	Inches
	Using TR-55 and Type II Rainfall Distribution		
V=(Q)(A)	**Total Storm Runoff Volume (V):**	**37158.50**	**cf**
$Qp_{10} = ((V_S/V_R)(V))/43560$	**Overbank Flood Protection Volume (Qp_{10}):**	**0.44**	**Acre-ft**

Extreme Flood Protection Volume, Q_f			
Pre Development 100 Yr Qp	Peak Outflow Discharge (q_o):	5.43	cfs
Post Development 100 Yr Qp	Peak Inflow Discharge (q_i):	28.44	cfs
	Unit Peak Discharge (q_o/q_i):	**0.19**	
	Storage Volume/Runoff Volume (V_S/V_R):	0.46	
	Using Figure 8.6 of the NYS Stormwater Management Design Manual		
	Post Dev. 100-Yr 24-Hr Design Storm Runoff (Q):	5.59	Inches
	Using TR-55 and Type II Rainfall Distribution		
V=(Q)(A)	**Total Storm Runoff Volume (V):**	**70412.20**	**cf**
$Q_f = ((V_S/V_R)(V))/43560$	**Extreme Flood Protection Volume (Q_f):**	**0.74**	**Acre-ft**

Stormwater Management Basin Sizing Calculations

Project:	Quackenderry Commons	Basin ID:	Stormwater Basin #2
Date:	8/12/2024		

Water Quality Volume, WQ_v

$I = A_i/A$

$Rv = (0.05) + (I)(0.009)$

$WQ_v = (P)(R_v)(A)/12$

Total Impervious Area (A_i):	6.65	Acres
Total Contributing Area (A):	8.43	Acres
Total Percentage of Impervious Cover (I):	**78.88**	**%**
Runoff Coefficient (R_v):	**0.76**	
90% Runoff Event Number (P):	1.15	
From Table 4.1 of the NYS Stormwater Management Design Manual		
Water Quality Volume (WQ_V):	**0.614**	**Acre-ft**

Forebay/Permanent Pool Sizing

			Practice Type:	P-5	
			Percolation Rate:		min/in
Required		**Provided**	**Forebay Size:**	**2,674.393**	**Ft^3**
2,674	≤	**2,674**			
Required		**Provided**	**Permanent Pool Size:**	**13,371.967**	**Ft^3**
13,372	≤	**13,372**			

Stream Channel Protection Volume, Cp_v

CN = Curve Number

$Ia = (200/CN)-2$

csm/in = Cubic Feet of Discharge Per Second Per Square Mile of Watershed Per Inch of Runoff

$V_S/V_R = 0.683 - 1.43(q_o/q_i) + 1.64(q_o/q_i)^2 - 0.804(q_o/q_i)^3$

$Cp_V = ((V_S/V_R)(Q)(A))/12$

cfs = Cubic Feet Per Second

CN for Overall Developed Area:	92	
Initial Abstraction (Ia):	**0.174**	
1-Yr 24-Hr Design Storm Precipitation (P):	2.26	
Ia/P =	**0.077**	
Time of Concentration (Tc):	0.182	Hour(s)
Unit Peak Discharge (q_u):	**829.028**	**csm/in**
Using TR-55 and Type II Rainfall Distribution (GPD Method)		
Ratio of Outflow to Inflow (q_o/q_i):	0.02	
Using q_u, T=24 Hrs and Figure 8.5 of the NYS Stormwater Management Design Manual		
Channel Protection Storage (V_S) / Volume of Runoff (V_R)	**0.66**	
Post Dev. 1-Yr 24-Hr Design Storm Runoff (Q):	1.47	Inches
Using TR-55 and Type II Rainfall Distribution		
Stream Channel Protection Volume (Cp_V):	**0.676**	**Acre-ft**
Required Average Release Rate (Cp_V Avg.):	**0.341**	**cfs**
Proposed Orifice Size:	1.50	Inches
Proposed Average Release Rate (Cp_V Avg.):	0.340	cfs
Proposed Cp_V Release Time:	**24.1**	**Hour(s)**

Stormwater Management Basin Sizing Calculations

Project:	Quackenderry Commons	Basin ID:	Stormwater Basin #2
Date:	8/12/2024		

Overbank Flood Protection Volume, Qp_{10}			
Pre Development 10 Yr Qp	Peak Outflow Discharge (q_o):	4.45	cfs
Post Development 10 Yr Qp	Peak Inflow Discharge (q_i):	34.73	cfs
	Unit Peak Discharge (q_o/q_i):	**0.13**	
	Storage Volume/Runoff Volume (V_S/V_R):	0.51	
	Using Figure 8.6 of the NYS Stormwater Management Design Manual		
	Post Dev. 10-Yr 24-Hr Design Storm Runoff (Q):	2.95	Inches
	Using TR-55 and Type II Rainfall Distribution		
V=(Q)(A)	**Total Storm Runoff Volume (V):**	**90272.66**	**cf**
$Qp_{10} = ((V_S/V_R)(V))/43560$	**Overbank Flood Protection Volume (Qp_{10}):**	**1.06**	**Acre-ft**

Extreme Flood Protection Volume, Q_f			
Pre Development 100 Yr Qp	Peak Outflow Discharge (q_o):	18.74	cfs
Post Development 100 Yr Qp	Peak Inflow Discharge (q_i):	63.31	cfs
	Unit Peak Discharge (q_o/q_i):	**0.30**	
	Storage Volume/Runoff Volume (V_S/V_R):	0.38	
	Using Figure 8.6 of the NYS Stormwater Management Design Manual		
	Post Dev. 100-Yr 24-Hr Design Storm Runoff (Q):	5.59	Inches
	Using TR-55 and Type II Rainfall Distribution		
V=(Q)(A)	**Total Storm Runoff Volume (V):**	**171059.03**	**cf**
$Q_f = ((V_S/V_R)(V))/43560$	**Extreme Flood Protection Volume (Q_f):**	**1.49**	**Acre-ft**

LANSING ENGINEERING, PC

2452 STATE ROUTE 9
SUITE 310
MALTA NY 12020
T(518)899-5243
F(518)899-5245

CDS SIZING WORKSHEET

Project: Quackenderry Commons
CDS ID: CAS1

Date:

LEGEND	
Input-	
Output-	

PROPOSED CDS MODEL # CS-4
PROPOSED CDS TREATMENT CAPACITY 2.00 CFS

WATER QUALITY VOLUME, WQ_V

IMPERVIOUS COVER, I (%)

A_i= 0.89 acres impervious
A= 1.26 acres total

I= 70.63 %

RUNOFF COEFFICIENT, R_V

R_V= 0.05+(I)(0.009)
= 0.686

USE Rv = 0.686

90% RAINFALL EVENT NUMBER, P

P= 1.15 inches

WATER QUALITY VOLUME, WQ_V

WQ_V= (P)(R_V)(A)/12
WQ_V= 0.083 AC-FT

CN (COMPUTED)

90% RAINFALL EVENT NUMBER, P

P= 1.15 inches

RUNOFF VOLUME, Q

Q= (WQv/A) x12
Q= 0.788571 inches

CN (COMPUTED)

CN= 1000/[10+5P+10Q-10(Q2+1.25QP)1/2]
CN = 96.28

UNIT PEAK DISCHARGE, q_u

INITIAL ABSTRACTION, Ia

Ia = (200/CN-2)
Ia= 0.077

INITIAL ABSTRACTION / P

Ia/P = 0.067

TIME OF CONCENTRATION, t_c

t_c= 8.3 minutes

UNIT PEAK DISCHARGE, q_u

q_u= 913 csm/in

PEAK DISCHARGE, Q_p

DRAINAGE AREA, A

A= 0.00197 $miles^2$

PEAK DISCHARGE, Q_p

Q_p= q_u x A x Q
Q_p= 1.42 CFS

LANSING ENGINEERING, PC

2452 STATE ROUTE 9
SUITE 310
MALTA NY 12020
T(518)899-5243
F(518)899-5245

CDS SIZING WORKSHEET

Project: Quackenderry Commons
CDS ID: CAS2

Date:

LEGEND	
Input-	
Output-	

PROPOSED CDS MODEL # CS-5
PROPOSED CDS TREATMENT CAPACITY 3.50 CFS

WATER QUALITY VOLUME, WQ_V

IMPERVIOUS COVER, I (%)

A_i= 1.87 acres impervious
A= 2.21 acres total

I= 84.62 %

RUNOFF COEFFICIENT, R_V

R_V= 0.05+(I)(0.009)
= 0.812

USE Rv = 0.812

90% RAINFALL EVENT NUMBER, P

P= 1.15 inches

WATER QUALITY VOLUME, WQ_V

WQ_V= (P)(R_V)(A)/12
WQ_V= 0.172 AC-FT

CN (COMPUTED)

90% RAINFALL EVENT NUMBER, P

P= 1.15 inches

RUNOFF VOLUME, Q

Q= (WQv/A) x12
Q= 0.933269 inches

CN (COMPUTED)

CN= 1000/[10+5P+10Q-10(Q2+1.25QP)1/2]
CN = 97.96

UNIT PEAK DISCHARGE, q_u

INITIAL ABSTRACTION, Ia

Ia = (200/CN-2)
Ia= 0.042

INITIAL ABSTRACTION / P

Ia/P = 0.036

TIME OF CONCENTRATION, t_c

t_c= 8.3 minutes

UNIT PEAK DISCHARGE, q_u

q_u= 913 csm/in

PEAK DISCHARGE, Q_p

DRAINAGE AREA, A

A= 0.00345 $miles^2$

PEAK DISCHARGE, Q_p

Q_p= q_u x A x Q
Q_p= 2.94 CFS

LANSING ENGINEERING, PC

2452 STATE ROUTE 9
SUITE 310
MALTA NY 12020
T(518)899-5243
F(518)899-5245

CDS SIZING WORKSHEET

Project: Quackenderry Commons **Date:**

CDS ID: CAS3

LEGEND	
Input-	
Output-	

PROPOSED CDS MODEL # CS-8

PROPOSED CDS TREATMENT CAPACITY 12.00 CFS

WATER QUALITY VOLUME, WQ_V

IMPERVIOUS COVER, I (%)

A_i= 5.75 acres impervious

A= 7.2 acres total

I= 79.86 %

RUNOFF COEFFICIENT, R_V

R_V= 0.05+(I)(0.009)

= 0.769

USE Rv = 0.769

90% RAINFALL EVENT NUMBER, P

P= 1.15 inches

WATER QUALITY VOLUME, WQ_V

WQ_V= (P)(R_V)(A)/12

WQ_V= 0.530 AC-FT

CN (COMPUTED)

90% RAINFALL EVENT NUMBER, P

P= 1.15 inches

RUNOFF VOLUME, Q

Q= (WQv/A) x12

Q= 0.884063 inches

CN (COMPUTED)

CN= 1000/[10+5P+10Q-10(Q2+1.25QP)1/2]

CN = 97.42

UNIT PEAK DISCHARGE, q_u

INITIAL ABSTRACTION, Ia

Ia = (200/CN-2)

Ia= 0.053

INITIAL ABSTRACTION / P

Ia/P = 0.046

TIME OF CONCENTRATION, t_c

t_c= 10.9 minutes

UNIT PEAK DISCHARGE, q_u

q_u= 830 csm/in

PEAK DISCHARGE, Q_p

DRAINAGE AREA, A

A= 0.01125 $miles^2$

PEAK DISCHARGE, Q_p

Q_p= q_u x A x Q

Q_p= 8.25 CFS

LANSING ENGINEERING, PC

2452 STATE ROUTE 9
SUITE 310
MALTA NY 12020
T(518)899-5243
F(518)899-5245

CDS SIZING WORKSHEET

Project: Quackenderry Commons
CDS ID: CAS4

Date:

LEGEND	
Input-	
Output-	

PROPOSED CDS MODEL # CS-4
PROPOSED CDS TREATMENT CAPACITY 2.00 CFS

WATER QUALITY VOLUME, WQ_V

IMPERVIOUS COVER, I (%)

A_i= 0.9 acres impervious
A= 1.23 acres total

I= 73.17 %

RUNOFF COEFFICIENT, R_V

R_V= 0.05+(I)(0.009)
= 0.709

USE Rv = 0.709

90% RAINFALL EVENT NUMBER, P

P= 1.15 inches

WATER QUALITY VOLUME, WQ_V

WQ_V= (P)(R_V)(A)/12
WQ_V= 0.084 AC-FT

CN (COMPUTED)

90% RAINFALL EVENT NUMBER, P

P= 1.15 inches

RUNOFF VOLUME, Q

Q= (WQv/A) x12
Q= 0.814817 inches

CN (COMPUTED)

CN= 1000/[10+5P+10Q-10(Q2+1.25QP)1/2]
CN = 96.61

UNIT PEAK DISCHARGE, q_u

INITIAL ABSTRACTION, Ia

Ia = (200/CN-2)
Ia= 0.070

INITIAL ABSTRACTION / P

Ia/P = 0.061

TIME OF CONCENTRATION, t_c

t_c= 6 minutes

UNIT PEAK DISCHARGE, q_u

q_u= 1010 csm/in

PEAK DISCHARGE, Q_p

DRAINAGE AREA, A

A= 0.00192 $miles^2$

PEAK DISCHARGE, Q_p

Q_p= q_u x A x Q
Q_p= 1.58 CFS

Total WQv

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

P=	1.15	*inch*

Manually enter P, Total Area and Impervious Cover.

Breakdown of Subcatchments

GI Practice	Total Area *(Acres)*	Impervious Area *(Acres)*	Percent Impervious *%*	Rv	WQv *(ft^3)*	Description
1	7.90	0.00	0%	0.05	1,649	Conservation of Natural Areas
2	2.15	2.15	100%	0.95	8,526	Cistern-Rainbarrel
3						
4						
5						
6						
7						
8						
Non-GI Areas	14.45	5.25	36%	0.38	22,741	
Subtotal (1-29)	10.05	2.15	21%	0.24	**10,175**	**Subtotal 1**
Total	24.50	7.40	30%	0.32	**32,916**	**Initial WQv**

Identify Runoff Reduction Techniques By Area

Technique	Total Contributing Area *(Acre)*	Contributing Impervious Area *(Acre)*	Notes
Conservation of Natural Areas	7.90	0.00	*minimum 10,000 sf*
Riparian Buffers	0.00	0.00	*maximum contributing length 75 feet to 150 feet*
Filter Strips	0.00	0.00	
Tree Planting	0.00	0.00	*Up to 100 sf directly connected impervious area may be subtracted per tree*
Total	**7.90**	**0.00**	

Recalculate WQv after application of Area Reduction Techniques

	Total Area *(Acres)*	Impervious Area *(Acres)*	Percent Impervious *%*	Runoff Coefficient Rv	WQv *(ft^3)*
"<<Initial WQv"	24.50	7.40	30%	0.32	32,916
Subtract Area	-7.90	0.00			
WQv adjusted after Area Reductions	**16.60**	**7.40**	45%	0.45	31,267
Disconnection of Rooftops		0.00			
Adjusted WQv after Area Reduction and Rooftop Disconnect	16.60	7.40	45%	0.45	**31,267**
WQv reduced by Area Reduction techniques					1,649

Minimum RRv

Enter the Soils Data for the site		
Soil Group	Acres	S
A	0.80	55%
B		40%
C	23.70	30%
D		20%
Total Area	24.5	
Calculate the Minimum RRv		
S =	**0.31**	
Impervious =	7.40	*acre*
Precipitation	1.15	*in*
Rv	0.95	
Minimum RRv	**9,044**	***ft3***
	0.21	af

Green Infrastructure Summary Sheet

Minimum RRv Required		
S =	**0.31**	
Impervious =	7.40	*acre*
Precipitation	1.15	*in*
Rv	0.95	
Minimum RRv	**9,044**	***ft3***
	0.208	**af**

RRv Provided		
Reduction Technique	***ft3***	**af**
Area	1,649	0.038
Volume	8526	0.196
Infiltration	0	0.000
Total RRv Provided	**10,175**	**0.234**

RRv Summary		
RRv	***ft3***	**af**
Minimum Required	9,044	0.208
Provided	10,175	0.234
Is RRv Provided ≥ Minimum RRv Required?		**Yes**

WQv Summary		
WQv	***ft3***	**af**
Reduced/Treated	10,175	0.234
WQv to be Treated by Standard Practices	22,741	0.522

Conservation of Natural Areas

Enter Site Data For Drainage Area to be Treated by Practice							
GI Practice	Total Area (Acres)	Impervious Area (Acres)	Percent Impervious %	Rv	WQv (ft^3)	Precipitation (in)	Description
1	7.90	0.00	0.00	0.05	1648.93	1.15	Conservation of Natural Areas

Design Elements	
Is Contiguous Area ≥ 10,000 ft2?	*Yes*
Will limits of disturbance be clearly shown on all construction drawings and marked in field/project development site with structural barriers?	*Yes*
Is the Conservation area located in an acceptable conservation easement instrument that ensures perpetual protection of proposed area?	*Yes*
Does the easement specify how the natural area vegetation will be managed and boundaries will be marked?	*Yes*
Does the conservation area receive runoff from other contributing areas?	*No*
Does Conservation Area drain to a Design Point?	*Yes*
Is Sheet Flow to Riparian Buffer or another area based practice already being Used for this area?	*No*

Are All Criteria in Section 5.3.1 Met?	*Yes*

Area Reduction Adjustments		
Subtract	***7.90***	***Acres from Total Area***
Subtract	***0.00***	***Acres from Total Impervious Area***

Cistern or Rainbarrel Worksheet

Enter Site Data For Drainage Area to be Treated by Practice							
GI Practice	**Total Area** *(Acres)*	**Impervious Area** *(Acres)*	**Percent Impervious** *%*	**Rv**	**WQv** *(ft^3)*	**Precipitation** *(in)*	**Description**
2	2.15	2.15	1.00	0.95	8526.42	1.15	Cistern-Rainbarrel

Calculate Required Cistern/Rainbarrel Volume			
Required Cistern Storage Volume	63,948	*Gallons*	*(WQv*7.5)*
Number of Cisterns Proposed	1		
Volume per Unit	64,088	*Gallons*	
Actual Cistern Storage Volume	64,088	*Gallons*	
Water Use Plan?	*Yes*		

Determine Runoff Reduction			
Runoff Reduction	**8526**	*ft^3*	

Appendix E

Grading/Drainage/Sediment, Erosion Control, and Landscaping Plan

Appendix F

NYSDEC 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

1-23-20

Authorized Signature Date

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

PREFACE

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

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

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

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

Table of Contents

Part 1. PERMIT COVERAGE AND LIMITATIONS

A. Permit Application

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

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

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

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

B. Effluent Limitations Applicable to Discharges from Construction Activities

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

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

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

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

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