STORMWATER MANAGEMENT PLAN

Prepared for

Sandvoss Subdivision
1005 Hanover Street
Town of Yorktown, NY

Prepared by:

Site Design Consultants
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CPESC No. 2670
CPSWQ No. 0073

April 2017
Revised June 2017
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Revised December 2017

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Sandvoss Subdivision
1005 Hanover Street
Town of Yorktown, NY

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1.0 Project Description

The subject property is located at 1005 Hanover Street in the Town of Yorktown Heights, Westchester County, New York (see Figure 1.1 - Location Map and Figure 1-2 - Vicinity Map). There are three parcels totaling 18.62 acres and zoned R-4 Residential requiring a minimum lot size of 80,000 SF. The site is owned by Ms. Joyce Sandvoss. There have been no enforcement actions against the applicant for any violations of law relating to the proposed application. There is an existing common utility and access easement that runs from Hanover Street to the lot at the rear of the property. There is one existing residential structure on the site serviced by a common driveway. A majority of the site is woodland with lawn around the existing residence. Two small streams run through the center of the site and converge onsite. The streams are both shallow typically never exceeding 1 foot in depth. The banks are eroded in some areas within the site, but are generally in good condition. The streams beds run through the forested area with limited ground vegetation. Aside from an occasional tree in the vicinity of the streams, vegetation is sparse along the streambed within the limits of the site. Outside the limits of the site, the stream flows through an agricultural property, and a forested area downstream with denser ground cover. The site has rock in various locations. This has led to the streams beds to be rough with large boulders. These boulders slow velocity and cause small pools to form along the stream. The site slopes down towards the two streams in the center with moderate to steep slopes. The site has other improvements such as walls, patios, and parking areas, some of which will remain.

It is proposed to subdivide lots 6 and 7 into three lots which will conform to current zoning. Lot 8 will be unaltered, but will be developed with a new residence. One of the new lots will contain the existing residence, and the remaining lots will provide sites for the new homes. All of the lots will have frontage and gain access along a proposed private road that will run through the center of the site and cross the two streams. The stream crossings will be accomplished through the use of arch culverts. This will prevent any impact on the wetland and watercourse. The culverts have been sized to allow peak streams flows to safely travel through the site. The sizing for these are included in Appendix I of the SWPPP This road will be located in the existing access easement. The access from the existing site to Hanover Street will be removed and the driveway will be realigned to gain access from the new private road. The residences will be serviced by private wells and subsurface septic facilities for each individual lot. Stormwater will be managed by filtering and infiltration of the water quality volume and detention of flood storage volumes. The total disturbance expected for the project is 5.63 acres. The proposed start date for the project will be December 2017 and will be completed by December 2018.

As required by the NYSDEC SPDES General Permit for Stormwater Discharges from Construction Activity, GP-0-15-002, Part IIIA.8, an historic resource screening determination was conducted. This was done using the online tools at the NYS Office of Parks, Recreation and Historic Places (OPRHP) website. This screening determined that there are no areas with historic or archeological sensitivity near the site. Figure 1.3 - NYS OPRHP Historic Resource Map was created from the website showing sensitive areas in Yorktown Heights.

The following Report and Plans included in Appendix M describe, in detail, the design and implementation of the Stormwater Management Plan.

2.0 Stormwater Regulatory Requirements

2.1 Stormwater Impacts

Urban stormwater impacts relate to significant changes to stormwater quantity and quality as a result of land development. "Urban Development has a profound influence on the quality of New York's waters."[1] This proposed development will change the runoff characteristics of this site altering the quantity and quality of the surface stormwater. The impacts of this must be mitigated by managing the stormwater prior to discharge. This would be accomplished by the capture and treatment of surface runoff prior to discharge.

Development of a site alters the hydrology therefore changing the characteristics of the surface and groundwater discharge of runoff. Changing the surface conditions alters a site's natural ability to store, treat, or infiltrate runoff. The change also allows for the discharge of potentially damaging pollutants and sediments to adjoining water bodies. This can occur during the construction phase, and long-term after development. During the construction phase, graded, destabilized, areas are subject to erosion which can cause the displacement of sediment. After development, changes in the surface conditions, such as impervious surfaces, roofs and pavement, or lawn surfaces can generate pollutants which would be collected and discharged through runoff. Some of the pollutants of concern are: Total Suspended Solids (TSS); Biological Oxygen Demand (BOD); Total Phosphorus (TP); and Total Nitrogen (TN), as well as oil or grease, and chloride.

The most common sources of these pollutants from developed sites are atmospheric deposition, fertilizers, pesticides, and leaked discharges from vehicle. These pollutants would collect on these impervious surfaces and quickly wash off during even the smallest storm event.

In the planning and design of the development, stormwater will be managed to minimize potential impacts. A Stormwater Management and Pollution Prevention Plan will be prepared. This Plan will deal with all aspects of the stormwater management programs such as identifying potential pollutant sources, design of temporary and permanent features, implementation, and maintenance.

2.2 Regulatory Obligation

2.2.1 USEPA/NYSDEC

The Federal Government's Clean Water Act (CWA), Section 402 states "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 State is a NPDES delegated State. The necessary permitting is administered through the State Pollutant Discharge Elimination System (SPDES) under the General Permit, GP-0-15-002, for Stormwater Discharges from Construction Activity. The Permit requires that any development meeting the disturbance thresholds listed in Tables 1 and 2 of Appendix B of the General Permit must prepare a SWPPP. Activities listed in Table 1 requires preparation of only an Erosion and Sediment Control Plan. Those listed in Table 2 would additionally require post-

[1] New York State Stormwater Management Design Manual, January 2015, Page 2-1.

construction stormwater management practices. This project requires an E&SC and a SWPPP.

This project requires filing a Notice of Intent under the New York State Department of Environmental Conservation General Permit 0-15-002. This project has a disturbance which is more than one acre. It is not located in an Enhanced Phosphorous Watershed (EPW). Therefore this project requires the preparation of a full Stormwater Pollution Prevention Plan.

The Plan identifies the potential sources of pollution, and a design prepared and implemented to reduce pollutant loadings. This project will be required to prepare the following to be in compliance:

- Notice of Intent registered with the NYS DEC;
- MS4 SWPPP Acceptance Form signed by an authorized representative of the Municipality;
- Prepare an Erosion and Sediment Control Plan;
- Design and implement a stormwater quality treatment system to capture and treat the stormwater runoff volume generated by the 1 year rainfall event.
- Design and implement a stormwater management system to capture and attenuate all storm events up to the 100-year storm.

2.2.2 Local Municipality

In addition, this project requires approval under Chapter 248, Stormwater Management and Erosion and Sediment Control, of the Town of Yorktown Code. The Code requires compliance for projects with a land disturbance activity of 5,000 s.f. or more. The Code requires compliance with the NYS DEC GP-0-15-002

2.2.3 NYC DEP

This site is located within the limits of the New York City Watershed. This project is required, therefore, to comply with Chapter 18 of the "Rules and Regulations for the Protection from Contamination, Degradation, and Pollution of the NYC Watershed.

The technical standards providing guidance in the preparation of the E&SC and SWPPP are the latest revisions of the following:

- "New York Standards & Specifications for Erosion and Sediment Control" (NYSSESC) published by the Empire State Chapter of the Soil and Water Conservation Society; and;
- "New York State Stormwater Management Design Manual" prepared by the Center of Watershed Protection, for the NYS DEC;
- Town of Yorktown - Town Code Chapter 248 Stormwater Management and Erosion and Sediment Control;

- NYC DEP Watershed - Chapter 18 of Title 15 of the Rules of the City of New York - Rules and Regulations for the Protection from Contamination, Degradation and Pollution of the New York City Water Supply and Sources.

3.0 Reducing Pollutant Impacts

3.1 Sources of Impact

For this project, the potential for contamination of stormwater occurs both during construction and after the completion of development. The goal to achieve reduced impacts involves containment and treatment of the various pollutants.

Each phase will require temporary sediment and erosion control measures. The greatest source of pollutants during these phases is the potential of soil erosion. The nature of the construction plan is to have exposed soils which can erode and potentially discharge to sensitive areas. During construction, existing vegetation is removed exposing soils. Also, stockpiling of soils takes place. These conditions if not stabilized, are subject to erosion during rainfall events and wind conditions. Sediment discharged to a wetland can destroy vegetation and habitat affecting the function of the wetland. This degradation potential can be irreversible and eliminate its function in the ecosystem. Increases in turbidity to open water bodies such as streams, ponds, etc., are an additional environmental impact.

The implementation of proper erosion control measures and sediment containment along with a planned construction sequence can minimize or eliminate these potential impacts. The selection and implementation of erosion and sediment practices are described in a later section of this Report.

The post-development state of this project not only will yield a potential for sediment discharges or Total Suspended Solids (TSS), but also other pollutants which can impact the adjacent water bodies. The contaminants of highest concern are Total Phosphorus (TP), Total Nitrogen (TN), and Biochemical Oxygen Demand (BOD). Modification of the surface conditions of the site, specifically increasing the impervious nature of the ground cover, increases the concentration and potential discharge of these pollutants. The development of the site reduces native vegetative cover, and therefore affects the land's natural ability to store, treat or infiltrate runoff. This includes impervious surfaces, such as roads, buildings, and also landscaped areas, specifically lawns. These increases in imperviousness allow for greater concentrations or pollutants to collect and be carried off by runoff. Some of the pollutants are deposited by atmospheric conditions. However, other sources are applied or discharged to the surface of the site. The landscape areas are subject to fertilizers, weed control, and pesticide products. This too is a large potential for pollutants which if discharged untreated could have long term impacts. A full listing of the potential pollutants which can be considered in stormwater can be found in Table 2.1 of the New York State Stormwater Management Design Manual (NYS SMDM).

The concentrations are collected in stormwater runoff and rapidly discharge to the adjacent water bodies if not treated properly. The pollutants are collected and conveyed during the initial part of the storm event or the 90% rainfall. This is 90% of the average annual stormwater runoff volume. For this part of the State it is equivalent to approximately 1.2 inches. This is also commonly referred to as the "first flush." The requirement of the NYSDEC SPDES General Permit GP-0-15-002 requires that this volume of runoff is to be collected and treated by the means described in the NYS SMDM. The method to be used is the unified stormwater sizing criteria in which a water quality volume is determined and a practice is selected which best fits the criteria provided. This is described further in Section 6.0.

Further treatment is required to enhance the phosphorus removal since this project is located within the NYC Croton Reservoir East of Hudson which is a phosphorus enhanced watershed. As stated earlier, in order to comply with the NYS DEC Enhanced Phosphorus Removal Standards, the WQv to be treated to be the one-year, 24-hour storm.

3.2 Stormwater Management During Construction

The Erosion and Sediment Control plan will be implemented during all phases of construction until the completion of the project. This will minimize or eliminate the potential short-term adverse impacts which may occur during construction. After completion, the erosion and sediment control will become a maintenance plan to ensure that permanent erosion and sediment controls continue to function and prevent the transport of sediments.

The Erosion and Sediment Control plan includes the Sequence of Construction and designed measures to be installed, operated and maintained during all aspects of construction. The appropriate measures were selected and detailed in plan for implementation by the site contractor. The main objective of the plan is to prevent erosion from occurring by stabilization of the construction site where possible. Sediment controls are to be used as a containment system to allow the removal of sediment from runoff to the greatest extent possible before leaving the work site. Control methods and standards utilized are provided in the NYSSESC.

Potential sources of destabilization of the site have been determined so that proper measures will be used. The locations and methods designed for erosion and sediment control measures change as the construction sequence progresses. The priority is to stabilize disturbed areas subject to erosion and use containment and / or filtering practices where sediment may concentrate. Some of the practices and methods that will be used for this project are:

- Minimization of open disturbance by use of stabilizers such as seed, mulch, and erosion blankets, stone, etc. Areas not subject to construction traffic for extended periods will be temporarily stabilized.
- The work areas will be contained. Down grade perimeters will be lined with barriers such as silt fence, diversions, berms, etc.
- Where possible, clean stormwater will be diverted away or around the work site to reduce the amount of runoff requiring treatment.
- Sediment traps will be constructed where heavy concentrations of runoff may accumulate.
- Dust control measures will be maintained on-site such as water trucks.
- Runoff will be prevented from gaining erosive velocities on long slopes. This can be achieved with seed and mulch, erosion control blankets, curb dams and multiple rows of silt fence.
- Existing drainage structures will be protected from sediment-laden runoff.
- Regular weekly inspections and reports (see Appendix K for report form) to be filed with the Operator and Town.

Additional methods of practices may be employed dependent on the situation. The NYSSESC consists of NYS DEC accepted and recommended practices. The design requirements of temporary and permanent erosion and sediment control practices of this Manual have been followed.

Prior to completion of the project, all permanent structural features will be cleaned, restored, and re-vegetated as necessary. The erosion and sediment control phase of the project is complete when all work is done and all areas are stabilized. The post-construction Stormwater Management Inspection and Maintenance Agreement (Schedule "B" in Appendix L) will describe the long term inspection schedule, periodic maintenance requirements, and the responsible party.

3.3 Stormwater Management Post-Construction

The post-construction design of the project must be included in the Stormwater Pollution Prevention and Stormwater Management Plans to minimize or eliminate potential long-term adverse impacts which might be caused by surface runoff from the site. This will deal with the management of the stormwater upon completion and operation of the site. The plan will be an analysis of all potential impacts due to stormwater and the means of protecting adjoining water bodies.

The management plan begins with conceptual designs of the collection and conveyance system and the proposed treatment practices. The treatment practices are subject to different parameters and must be designed to best fit the site including green infrastructure planning. Some of the limitations that may be encountered include soil types and properties, depth to groundwater or bedrock, distance to structures, and maintenance. A list of acceptable practices can be found in Chapters 3, 5, and 10 of the NYS Stormwater Design Manual (SMDM). Chapter 3 states "The Practices on this list are selected based on the following criteria:

1. Can capture and treat the full water quality volume (WQV)
2. Are capable of 80% TSS removal and 40% TP removal
3. Have acceptable longevity in the field
4. Have a pre-treatment mechanism."

Green Infrastructure Practices include:

- I. Preservation of Natural Resources
- II. Reduction of Impervious Cover
- III. Runoff Reduction Techniques

The five broad groups of standard stormwater management practices are:

- I. Stormwater Ponds
- II. Stormwater Wetlands
- III. Infiltration Practices
- IV. Filtering Practices
- V. Open-channel Practices

These practices "are presumed to meet water quality requirements set forth in this manual if designed in accordance with the sizing criteria presented in Chapter 4 and constructed in accordance with the performance criteria in Chapter 6."[2] This however

[2] Pg. 3-7 NYS Stormwater Management Design Manual, January 2015.

is modified with the fact that the project must meet the enhanced phosphorus criteria in Chapter 10.

Green Infrastructure - Runoff Reduction

Chapter 3 of the NYS DEC introduces a planning process for site development which has "increased emphasis on a holistic approach" to urban stormwater runoff management. This is to be done by reducing pollutant-laden runoff by the use of green infrastructure which promotes replication of pre-development hydrology. This is done by designing selected practices which will allow for infiltration, ground water recharge, reuse, recycling and evaporation/evapotranspiration of surface runoff Water Quality Volumes from developed areas.

The implementation of this planning process is defined in a five step approach as follows:

1. Preservation of features and reduction of impervious surfaces.
2. Determination of the project's Water Quality Volume.
3. Incorporating green infrastructure and standard stormwater management practices that provide a Runoff Reduction Volume Capacity.
4. Use of standard stormwater management practices to treat Water Quality Volume not addressed by green infrastructure.
5. Design of storage facility for volume and peak rate volumes.

This methodology is provided in more detail in Chapter 3 of the SMDM as well as the Flow Chart at the end of Chapter 3 (see Figure 3.1).

This process is required for new and redevelopment projects. Chapter 4 Section 4.3 requires the calculation of Runoff Reduction Volume (RRv) and that 100% of post-development Water Quality Volume should be treated on-site using green infrastructure or standard SMP's. If this goal cannot be met, at a minimum, a specific reduction factor(s) based on the hydrologic soil group (HSG) can be applied but justification must be provided as to why the pre-construction condition cannot be met.

Enhanced Phosphorus Removal Standards

The enhanced phosphorus standards were developed for projects located in phosphorus limited watersheds in order to meet water quality objectives for these watersheds. Enhanced phosphorus removal is required. This will require the implementation of the criteria in Chapter 10 of SMDM where additional performance standards must be implemented. In these standards, the WQv is computed to be the entire one-year 24-hour design storm for the post-development watershed. The one-year storm volume is determined using the SCS Method. The developed volume becomes the basis for treating the WQv as per Chapter 4 of the SMDM including the five steps that apply to runoff reduction.

The design will meet enhanced phosphorous removal standards for achieving water quality standards. The guidelines and practices used in selecting and the sizing analyses are found in Chapters 5, 6 and 10 of the NYS DEC Stormwater Management Design Manual January 2015.

After the preliminary selection of treatment practices, the water quality volume size will be determined.

The treatment methods could be a single practice or a combination of practices. The previously described controlling factors will initially eliminate some treatment methods. The remaining practices will be selected based on feasible locations, functionability, maintenance factors, and cost. An additional factor is to try and select practices which will not only provide an environmental benefit, but also aesthetic value.

The practices selected for the project were chosen with these requirements in mind. The treatment practice selected is based off of the six steps enumerated in chapter 3 of the manual.

As stated above, the first step in this process is site planning and preservation of features. Due to the nature of this project, this step controlled a good deal of the placing of project infrastructure. On this site, there are two streams that converge and divide the site into two sections. It was important to limit any disturbance to these sensitive areas. To prevent disturbance, as much of the projects infrastructure as was possible was placed outside of the stream beds and the 100' buffer. In addition to this, impervious areas were limited to the greatest extent possible and meet minimum dimensional requirements. To further protect the existing surface features, areas within the 100' buffer shall be placed within a conservation easement to prevent any potential future development of these areas. All of the proposed site work has been limited to prevent the disturbance of sensitive features.

The second step was to assess the water quality volume for the the specific drainage areas of the project. This was done using the one year storm as opposed to the 90% storm event. As there is some existing impervious cover on the site, redeveloped impervious area was figured into the calculations. This is gone into greater detail in section 6.2 below.

The third step in the process is the application of runoff reducing techniques or standard practices with runoff reducing capabilities. The soils testing on the site revealed bedrock and groundwater at varying depths. In some tests, ground water was found as shallow as 24". As a result, the use of infiltration practices was infeasible. Rain Gardens with underdrains have been selected as the primary treatment practice. A pocket wetland is also proposed to provide treatment for the proposed private road. These practices are ideal due to the site constraints, their ability to treat runoff, and the runoff reducing capabilities of the rain gardens. All raingardens have been designed to maintain the minimum required separation from groundwater. All of the proposed stormwater treatment practices area listed in the 2015 NYS DEC SWDM as a standard practice that contributes towards the RRv.

Step four is to address the minimum Runoff Reduction Volume. This volume is based on the proposed site conditions and the existing soil on the site. Depending on the hydrologic soil group of the soil, the minimum runoff reduction will differ. This is provided for by the proposed stormwater treatment practices. The proposed rain gardens are listed in the 2015 NYS DEC SWDM as a Green Infrastructure practice that contributes towards the RRv. The calculations for determining this can be found in appendix H of this SWPPP.

Step five is the treatment of any of the remaining WQv with standard treatment techniques. This step did not apply to this project as the selected practices provided the full WQv.

The sixth and final step in the process is the design of a practice to attenuate peak runoff rates. This is achieved by the primary treatment practices. As such no additional practices are needed.

After applying these steps to the design process, the selected treatment practice will be Rain Gardens for the individual lots, and a pocket wetland for the proposed private road. They were chosen due to their capacity to hold and treat the water quality volume, and their additional runoff reducing capabilities. They also provide enough storage to attenuate peak flows. The Rain Gardens meet all of the requirements set forth in chapters 3, 5, and 10. They were chosen based on the characteristics and limitations of the site and to satisfy all of the requirements these chapters impose on the stormwater management of a project.

4.0 Site Characteristics

4.1 Soils

On-site soils were classified by using the USDA Natural Resources Conservation Service (NRCS) Websoil survey for Westchester County, NY, see Figure 4.1 - Soil Map.

The predominant soil types for this project are Charlton-Hollis complex, Charlton-Chatfield complex, Sutton loam, and Ridgebury loam. These soils are poor to well drained soils that are subject to seasonal groundwater. The Hydrologic classification of these soils are B or D. The erosion hazard level for these soils are slight to moderate. These soil properties are essential in the design and proper construction management of the site. Independent soil tests were performed and the results are located in the Appendix E of this Report.

Sect 4.1

- Charlton / Chatfield, CrC, Hydrologic Soil Group B - moderate to very deep, well to drained rocky soils; severe erosion hazard;
- Chatfield / Hollis, CtC, CuD, Hydrologic Soil Group B - moderate to very deep, well to drained rocky soils; severe erosion hazard;
- Ridgebury Loam, RgB, moderate slopes very stony; moderate erosion hazard
- Sutton Loam, SuB, Moderate slopes fine sandy loam.

Deep Test Soil Logs and soil percolation test data are included in Appendix E of this Report. The locations of these deep soil tests are indicated on the Construction Drawings. On-site soil investigation and knowledge of the soil groups facilitated the selection of coefficient values used for the pre- and post-development pollutant load scenarios. Additionally, curve numbers were determined for use in the analysis.

4.2 Hydrology

The proposed improvements will not significantly change the surface runoff patterns. Currently, the surface runoff pattern is towards the center of the site, toward the streams. The surface runoff pattern is a combination of sheet flow and concentrated flow. The majority of the site is woods with moderate to steep slope. Once it is beyond the surface, flow crosses the common driveway to a small wooded buffer area before entering the Brook.

The existing and proposed building sites are outside the 100-foot stream buffer. Under the proposed condition the general direction of the surface runoff will not be altered. Almost the entire amount of surface runoff from the impervious areas will be collected and treated. The proposed improvements as shown will result in an increase in the imperviousness of the drainage area. Therefore, there will be an increase in the volume of runoff as well as the pollutant loads generated by the site for a given rainfall event. This will be mitigated with stormwater management practices.

In the planning, design and construction of the development, stormwater will be managed to minimize or eliminate potential off-site impacts. The proper implementation of temporary sediment and erosion control measures are used to achieve this goal. An Erosion and Sediment Control Plan has been established and will be implemented during all phases of construction until the completion of the project. The Erosion and Sediment Control Plan incorporates the sequence of construction and designed measures to be installed, operated and maintained during all aspects of each phase. The erosion and sediment controls are designed in accordance with the NYS Standards and Specifications for Erosion and Sediment Control.

5.0 Hydrologic Analysis

The method used to compute project runoff was the Soil Conservation Service TR-55. The basis for the analysis was the Type III, 24-hour storm, for the 1 year, 2 year, 10 year, 25 year, and 100-year storm event. The rainfall depth for the respective storm events are 3.1, 3.5, 5.0, 6.0, and 7.5. The runoff coefficient "CN" and Time of Concentration for existing and post-development conditions were computed using Standard TR-55 criteria.

5.1 Pre-Development Condition

As stated, the portion of the site to be developed with new homes is wooded areas. Therefore, the only change in surface conditions will be the proposed impervious surfaces of the private road, the houses and driveways. The remainder will continue to be woods and lawn. Therefore, the analysis for stormwater increases has been done for these individual impervious components. The contributing watersheds are shown on Figure 5.1 - Pre-Development Watershed Map.

The site has been divided into three distinct watersheds. As was previously mentioned, the there are two streams that converge on the site. The three drainage areas have been divided to analyze the on-site impact on the streams before and after convergence. The majority of the area is woodlands, with some open space and impervious cover contributing to the stream from an existing residence and construction business.

The Drainage Basin sizes, curve numbers and travel times used in the analysis are summarized in the Table below:

Pre-Development Conditions Watershed Analysis Variables

Drainage Basin	Area (acres)	Curve Number CN	Travel Time, Tc (hrs)
DA-1	10.15	63	0.279
DA-2	5.60	68	0.241
DA-3	2.77	68	0.119

5.2 Post-Development Condition

A hydrologic analysis has been done for each of the new lots and the proposed parking area to determine the expected runoff depth for each storm event. The results of this analysis were used to calculate the Rain Garden sizes required for each lot. Additional detention basins were sized to accommodate the 100-year storm event. The contributing watersheds are shown on Figure 5.2 - Post-Development Watershed Map.

The hydrologic analysis assumes that full soil restoration as required in Chapter 5 (Table 5.3) of SMDM will be implemented. The areas of soil restoration will be shown on the E&SC Plan if required (See Figure 5.3).

The post developed watersheds have been further broken down into 8 drainage areas. The general path of runoff is the same with all areas draining to one of the two streams located on the site. The first three drainage areas are the same as they are in the predeveloped condition. They are the areas that flow unhindered towards the streams on site. Drainage areas 4 - 7 are the individual lots created by subdividing the site. Each lot will have its own rain garden for treatment of the water quality volume. On most lots, runoff will sheet flow into the rain garden and be treated therein. Lot 2 will have an additional swale to direct runoff into the rain garden. Each rain garden will have a riser pipe for overflow so that ponding will not exceed 6" in the rain garden. Lot 1 will overflow into the roadside swale that directs runoff into the proposed pocket wetland. Lots 2, 3, and 4 will overflow directly to the design lines. Drainage area 8 includes the proposed road, the existing residence, and any other adjacent areas that are captured. Runoff will sheet flow to the road, where it will travel along the curb until it reached a proposed swale which will direct it into the proposed pocket wetland. This will provide treatment as well as detention. The wetland will have a riser pipe outlet to provide controlled release of runoff exiting the pocket wetland. There will be no discharges associated with industrial activities other than construction as a result of the development.

The Drainage Basin sizes, curve numbers and travel times used in the analysis are summarized in the Table below:

Post-Development Conditions Watershed Analysis Variables

Drainage Basin	Area (acres)	Curve Number CN	Travel Time, Tc (hrs)
DA-1	7.22	65	0.295
DA-2	2.69	73	0.150
DA-3	2.70	69	0.102
DA-4	0.85	67	0.206
DA-5	1.43	62	0.261
DA-6	0.96	64	0.083
DA-7	0.72	68	0.141
DA-8	1.89	73	0.232

6.0 Unified Stormwater Sizing Criteria

6.1 Methodology

To satisfy the requirements of the NYS DEC General Permit and the Town of Yorktown a combination of Green Infrastructure Techniques and standard practices have been selected. These practices meet attenuation as well as stormwater quality goals.

The guidelines and practices used in selecting and the sizing analyses are found in Chapters 4, 5, and 6 of the NYS DEC Stormwater Management Design Manual.

6.2 Water Quality Volume (WQv)

The Treatment volumes are determined as prescribed by the standard methods as outlined in the NYS DEC SMDM. This Water Quality Volume WQv requirement is normally based on the 90% rainfall event. This equates to 90% of the average rainfall for the specific region. However, for this project the treatment volumes exceed that requirement by treating the 1-year storm event. This site is located in the Croton Watershed which is an enhanced phosphorous basin. This requires implementation of the enhanced phosphorus standards for the capture and treatment of the runoff from the 1-year, 24-hour rainfall event, which represents the water quality volume.

The 1-year, 24-hour runoff volume required to be captured and treated has been further defined as the runoff volume from the contributing drainage areas for the proposed project. The volume proposed to be captured will be that volume generated by a 1-year, 24-hour storm or greater. With the design provided, this entire volume will be captured and retained for an extended period of 24-hours for pollutants to settle out of the contained runoff. Excess stormwater above the water quality volume will be diverted to subsurface storage for the larger storm events. The volumes to be treated have been calculated as shown in the following table.

Water Quality Volume

Drainage Area	WQv based on 90% Rainfall Event	WQv based on 1-year Rainfall Event	Pretreatment Provided	WQv Provided Treatment	Storm Year Treated
DA-4	957 cf	1,524 cf	---	1,524 cf	1 year
DA-5	990 cf	1,524 cf	---	1,655 cf	1 year
DA-6	641 cf	1,350 cf	---	1,350 cf	1 year
DA-7	792 cf	1,350 cf	----	1,393 cf	1 year
DA-8	1,595 cf	3,467 cf	Forebay	3,423 cf	1 year

These volumes meet the requirements of the NYS DEC and Town of Yorktown Heights for the limitation of phosphorous export.

The water quality volume required to be captured and treated has been further defined as the runoff volume from the impervious surface that will result from the proposed project. The volume proposed to be captured will be that volume generated by the 1 year rainfall event or greater. With the design provided, this entire volume will be captured and detained for an extended period of 24-hours for pollutants to settle out of the contained runoff. Excess stormwater above the water quality volume will be released at a controlled rate providing attenuation of larger storm events. The volumes to be treated have been calculated as shown in the following table.

6.3 Runoff Reduction (RRv)

Green infrastructure design as part of the planning process enables the reduction of runoff from a project. These practices in turn reduce the requirements of water quality treatment and flood protection. The selection of green infrastructure practices is developed using a five-step process detailed in Section 3 of the SMDM. A flow chart of this process is included as Figure 3.1 of this Report. Design of the practices can be found in Appendix H of this Report. The selection and justification of green practices can be found in Appendix G of this Report.

6.4 Stream Channel Protection Volume Requirements (CPv)

This requirement is for the protection of stream channels from receiving erosive velocities. This goal is accomplished by providing 24-hour extended detention of the one-year, 24-hour storm event that remains after runoff reduction is applied to the project. Trout waters may be exempted to only provide 12-hour detention. It is also not required if the discharge is to a pipe or hardened channel. The detention time is measured by the center of mass method or plug flow calculation method. Further criteria for the application of the Cpv can be found in Section 4.4 of the SMDM.

6.5 Overbank Flood Control (Qp)

The purpose of this sizing criteria for overbank flood control is to avoid an increase in the frequency and magnitude of out-of-bank flooding that may be the result of development. These are flow events where channel capacity is exceeded and spill over to flood plains. To meet the criteria the proposed stormwater management system for the project must attenuate the 10-year, 24-hour storm event to pre-development peak discharge rate. Detailed criteria can be found in Section 4.5 of the SMDM.

6.6 Extreme Flood Control Criteria (Qf)

The purpose of the extreme flood analysis is to prevent flood damage from large storm events by maintaining predevelopment 100-year flood plain boundaries and protecting the integrity of stormwater management practices. The basis of the analysis is to maintain pre-development peak rates of runoff for the 100-year, 24-hour storm event with proper stormwater management. Detailed criteria can be found in Section 4.6 of the SMDM.

A summary of peak discharge rates at each design point for the pre and post-developed storm events analyzed for each drainage basin is summarized in the tables below:

Design Point 1:

Storm Event (year)	Pre-Developed Peak Flow (cfs)	Post-Developed Peak Flow (cfs)	Net Change of Peak Flow (cfs)	Percent Reduction
1	1.83	1.70	-0.13	-7.1%
2	3.55	3.05	-0.50	-14.1%
10	11.63	9.10	-2.53	-21.8%
25	19.85	18.62	-1.23	-6.2%
100	37.06	34.90	-2.16	-5.8%

Design Point 2:

Storm Event (year)	Pre-Developed Peak Flow (cfs)	Post-Developed Peak Flow (cfs)	Net Change of Peak Flow (cfs)	Percent Reduction
1	2.00	1.79	-0.21	-10.5%
2	3.33	2.65	-0.68	-20.4%
10	8.81	6.34	-2.47	-28.0%
25	13.98	11.93	-2.05	-14.7%
100	24.31	23.63	-0.68	-2.8%

Design Point 3:

Storm Event (year)	Pre-Developed Peak Flow (cfs)	Post-Developed Peak Flow (cfs)	Net Change of Peak Flow (cfs)	Percent Reduction
1	1.22	1.31	+0.09	+7.4%
2	1.96	2.09	+0.13	+6.6%
10	5.06	5.31	+0.25	+4.9%
25	8.04	8.31	+0.27	+3.4%
100	14.02	14.27	+0.25	+1.8%

As can be seen by the results, peak discharge rates are decreased for all scenarios. Slight increases for design point 3 are shown, but design points 1 and 2 are tributary to design point 3. Therefore, the overall post developed peak flow has been reduced.

7.0 Stormwater Management Practices Selection, Justification and Design

The stormwater management practices selection process detailed in Chapters 3 and 7 of the NYS Stormwater Management Design Manual was followed to help select the practices chosen. These Chapters provide a series of matrices which allows logical selection of treatment practices based on several factors. The factors are as follows:

1. Land Use - rural;
2. Physical Feasibility - location, slope, drainage area, groundwater table;
3. Watershed / Regional Factors - near Croton Reservoir;
4. Stormwater Management Capability - can meet all requirements;
5. Community and Environmental Factors - meets all requirements.

The matrices are provided in Appendix G of this Report. The matrices have been commented on or redacted to show elimination criteria through this stepped approach and eventual possible alternatives for treatment.

Thermal impacts are not a major concern on this project due to the lack of impervious surfaces. Surface water flows will travel mostly over or through vegetated cover whether through the woods or swales prior to discharge into the Water Quality Basins. Therefore, the stormwater collection and management will not contribute to the heating of stormwater where it will have a downstream thermal impact.

Permeable Pavers - NYSDEC SMDM:

The pavers are utilized on the private road in the wetland buffer. Pavers allow the rainfall to infiltrate through the surface and recharge into the groundwater. Some pollutant uptake is realized by passing through the underlying soils.

Stormwater Wetlands - (W-4) Pocket Wetland:

The pocket wetland is a practice that has a combination of a forebay, marsh areas, permanent pool and extended detention. It was chosen most suitable because of the five factors stated above. It is ideal for a low density development which is the case here. The location is at a low enough elevation where the improvements to the site are captured and treated. The drainage area is less than five acres. This location has a very manageable slope therefore the wetland layout works well with the topography. The groundwater table at this location was witnessed via a test hole at an elevation of 48" from the ground surface with seeping and mottling at 24" Therefore, the permanent pool elevation was set to coincide with this level insure stability of the permanent pool. The phosphorus removal rating is good and therefore meets design goals.

Thermal impacts are not a concern because the location chosen for the pocket wetland is already well shaded. To further improve on these conditions, addition plantings will be added to increase the shading on the pocket wetland.

Minimum Water Quality Volume (WQv): The required water volume as stated is 5,053 cf for a 1 year storm event. The volume provided is 15,064 cf, therefore exceeding the minimum. Of this volume, 5,944 cf is below the permanent water elevation, 9,120 cf is transient storage. The Channel Protection Volume (CPv) is equal to the WQv volume, which is detained for 24-hours.

Inlet Protection and Pre-Treatment: A forebay has been provided at the inflow point of the pocket wetland. The forebay will be stabilized with a rip-rap liner to prevent erosive conditions. The size of this is:

Required: 10% WQv = 5,053 cf x 10% = 505 cf
Provided: 1,728 cf in forebay

The forebay will be easily accessible for maintenance. A fixed vertical depth marker will be installed to measure depths of accumulated sediment.

Additional pre-treatment is provided at the drain inlets which provide sumps for collection of sediment.

Minimum Flow Path:

	Required	Provided
Minimum Length : Width Ratio	2:1	5:1
Minimum Surface Area : Drainage Area	1.0:100	6.3:100
Minimum Surface Area 6" or less - 35%	1,816 sf	2,166 sf
Minimum Surface Area 18" or less - 65%	3,372 sf	3,386 sf
Minimum 25% WQV in deepwater zones greater than 4' deep	1,263 cf	3,618 cf

Minimum 50% WQV in Permanent Pool	1,524 cf	5,944 cf
Forebay equal to 10% WQV	505 cf	1,728 cf
Minimum 10% WQV 4'-6' deep micropool at outlet	505 cf	1,890 cf

*Total surface area permanent pool - 5,189 sf

Microtopography: The bed of the stormwater wetlands has internal flow path.

Landscaping Plan and Buffers/Setbacks: Landscaping has been provided for basin interior and buffers. All setbacks are met.

Maintenance Access: the property owner will be responsible for maintenance of the stormwater practices and drainage collection. Therefore, access easements are not required. All stormwater improvements have clear and easy access to the property owner.

Non-clogging Low Flow Orifice: A low flow orifice has been provided in the form of a non-clogging outlet drain. This will allow slow release of water levels above the permanent pool.

Rise in Embankment: Not required.

Pond Drain: Not required. There is a small amount of permanent water volume in the wetland. If any maintenance is required, the water can be pumped out the outlet.

Adjustable Gate Valve: Not required.

Safety Features: The side slopes are designed to be less than the 3:1 maximum slope requirement. A safety bench is not required since the side slopes are 4:1.

Sizing Calculations: See water routing calculations in Appendix C

Rain Garden NYSDEC SMDM:

A Water Quality Volume was determined for each of the treatment areas and discharged into the associated Rain Garden. The Stormwater Management Practice selected is a Rain Garden as described in the NYS DEC SMDM. This design is a combination of an extended detention and peat/sand filter bed for the treatment of water. The basin is supplemented with plantings and blended into the landscape features of the project. The Basin has been located at the lowest possible hydraulic location to intercept and treat runoff. As described in earlier sections of this report, the required Water Quality Volume has been exceeded in the design. The Water Quality Volumes are summarized in Section 6.2. A typical cross section of the proposed Rain Garden can be found in the Plan Set.

The Rain Garden is designed to have runoff sheet flow directly into the system. The water quality volume is treated by providing extended detention to temporarily store the WQv and pass it through a filter bed of top soil, and a peat/sand mix. Filtered runoff is then collected in an underdrain system and discharged to the main collection system before reaching the discharge point. Partial exfiltration into the surrounding soils may also occur. This will provide the necessary storage for channel and flood protection. The bottom of the pond should maintain a 2 foot separation from the ground water table.

The soil logs noted above indicate that sufficient depth is available at the proposed location to provide the required separation.

The following is the size criteria for the practice as per Chapter 6 of the NYS SMDM:

- Typical length to width ratio of 1.5:1;
- Filter media shall be a peat/sand mix (reed-sedge hemic peat shall be used);
- Underdrain system;
- Provide the required minimum filter bed surface area;

The selection of the treatment practice was based on evaluating the site to determine what would best fit the conditions providing maximum benefits. The goal was to select practices which would meet treatment and attenuation standards and minimize the disturbance footprint. The selection of Stormwater Practices was based on the surface and subsurface conditions of the site. In addition, the site design concept is to create a natural and environmentally sensitive setting. The high groundwater table made practices with an underdrain a necessity.

See Routing Calculations in Appendix F and H for sizing calculations.

In General:

- Controls should be inspected periodically for the first few months after construction and on a semi-annual basis thereafter. They should also be inspected after major storm events (greater than 0.5 inches).
- All stormwater controls shall be inspected and cleaned of any debris or sediment.
- Any erosion shall be repaired and stabilized with seeding and mulch or stone.

Please note that additional notes regarding maintenance activities are contained on the project Construction Drawings and should be adhered to during and after construction.

The selection and justification of green practices can be found in Appendix G of this Report. The design of the practices can be found in Appendix H of this Report.

8.0 Erosion and Sediment Control

Erosion and sediment control practices were selected and designed in accordance with the NYSSESC. The practices proposed for this project are described below. Standard details and specifications are included in Appendix J as well as on the Construction Plans. Initial locations of each practice are shown on the Plans as construction progresses it may become necessary to repair, replace or relocate these practices as conditions warrant.

Stabilized Construction Entrance:

This has been specified for the entrance of the driveway. The installation will occur at the beginning of the project as described in the Suggested Construction Sequence. It will be maintained so as to prevent the tracking of sediment off-site.

Silt / Sediment Fence and Haybales:

Silt fence and haybales have been specified to control and contain sediment from leaving areas under disturbance to undisturbed areas. The fence shall be installed as best as possible following the contours and will be spaced in accordance with the NYSSESC. The fence will be inspected daily, repaired, and sediment removed as necessary.

Soil Stockpile:

Areas are provided for temporary stockpiling of delivered soil material for the construction. These areas will be contained with sediment fence to prevent the movement of sediment. The stockpiles, if not active for more than seven (7) days, will be seeded and mulched. The stockpile areas were placed to best suit the proposed construction activity. The stockpile will be installed as described in the Construction Sequence.

Temporary and Permanent Vegetative Cover:

This stabilization measure may be temporary and in other cases permanent vegetative cover is used. The vegetative cover specifications are based on the NYSSESC Manual. On the Constructions Plans are notes, locations, and specifications as to the vegetative cover requirements. In the notes, there are specific situations and time constraints related to stabilization of disturbed areas. The specifications give seed and fertilizer mixes as well as placement. Any disturbed area expected to remain exposed for more than seven (7) days shall receive temporary vegetative cover.

Storm Drain Inlet Protection:

The inlet protection is specified to provide a permeable barrier around drainage inlets to reduce sediment content in runoff before entering the storm drain system.

Erosion Blankets:

Erosion blankets and seeding shall be used for the stabilization of slopes 3:1 or greater or as otherwise specified. The blankets shall be installed as per the Plans and Details, and the manufacturer's specifications. They shall be stapled or staked in place as per the manufacturer's specifications. The blankets may be installed at locations other than those shown on the Plans as directed by the Town Engineer, Project Engineer, or other persons inspecting the site under the direction of the aforementioned.

Soil Restoration:

Soil restoration is a required practice for construction projects where soil compaction occurs to soils which will be permanently vegetated. This compaction is typically a result of heavy vehicle traffic, cutting or filling, and areas which may receive heavy surcharges. This becomes more pronounced in soils with greater fines content specifically when wet. These actions can change soil properties which affect its ability to drain or absorb surface water and will also affect the survivability of vegetation. In order to maintain the integrity of the stormwater management plan these areas must receive soil restoration. See Figure 8.1 taken from the NYSSMDM for requirements.

This project has soils which fall in the hydrologic soil group HSG "C." Therefore, for most instances, soil restorations are required for the development areas subject to permanent vegetation. Soil restoration can be done by tilling or aerating the soil to a depth of 12-inches. In heavy traffic areas, 3-inches of compost shall be placed over the compacted areas prior to the tilling. After the restoration, a 3/8" metal bar should be able to be hand pushed into the soil. Areas within the drip-line of trees should not be tilled.

Rock Outlet Protection:

Rock outlet protection is specified at discharge points of pipes and channels to reduce depth, velocity, and the energy of water to avoid downstream erosion. The sizing criteria used is from the NYSSESC Manual.

Water Bars:

Water bars shall be used for diversion of surface runoff to limit the accumulation of erosive velocities of water. The water bars shall be installed as per the Plans and Details. The water bars may be installed at locations other than those shown on the Plans as directed by the Town Engineer, Project Engineer, or other persons inspecting the site under the direction of the aforementioned.

Other Controls:

Waste Disposal:

Solid, sanitary and toxic waste must be disposed of in a proper manner in accordance with applicable local, state and federal regulations. It is prohibited to burn, bury or pour out onto ground or into the storm sewers any solvents, paints, stains, gasoline, diesel fuel, used motor oil, hydraulic fluid, anti-freeze, cement curing compounds, or other toxic or hazardous wastes. The Contractor shall be responsible for disposal of all waste off site.

Concrete Truck Washout:

Wash out of cement trucks should occur in a designated diked area where the washings can be collected and disposed of properly when they harden.

Dust Control:

Generation of dust shall be minimized by limiting the extent of exposed soils and re-establishing vegetative cover in these areas as soon as possible. Additional and/or temporary methods to minimize dust may include wetting, mulching, spray adhesives, stone covering and wind barriers.

Stabilization:

The Contractor shall initiate stabilization measures as soon as practicable in portions of the site where construction activities have temporarily or permanently ceased, but in no case more than seven (7) days after the construction activity in that portion of the site has temporarily or permanently ceased. This requirement does not apply in the following instance:

Where the initiation of stabilization measures by the 7th day after construction activity temporarily or permanently ceased is precluded by snow cover or frozen ground conditions, stabilization measures shall be initiated as soon as practicable.

All areas not designated as buildings, roads, driveways, parking lots, walks, or aprons shall be established as lawn or vegetative areas. Permanent planting and vegetation shall be provided per approved the landscaping plan.

9.0 Construction Sequence

A key objective of the SWPPP is to reduce erosion and sedimentation potentials for the project. As a means to accomplish this, a suggested construction sequence was developed to assist the developer with incorporating, into the project, various controls designed to reduce such potentials. The sequence considers the performance of development activities in a phased approach, in conjunction with the installation, construction and monitoring of erosion and sedimentation control devices prior to and during construction.

Appendix D contains the project specific Suggested Construction Sequence. Essentially, the sequence has been broken down into various activities designed to ensure that certain erosion/sedimentation controls are in place, prior to and during construction, in recognition of site development.

Prior to any construction activities, the Owner, Engineer and any Contactors to perform land-disturbing activities shall meet to review this SWPPP to insure a thorough understanding of its contents and overall intent. Certifications to this effect shall be signed by the Owner and Contractor. Certifications are provided on the Construction Plans and in Appendix C.

The Responsible Party during and after Construction is as follows:

Joyce Sandvoss
4165 Brown Mills Road
Alexander, NY 14005
914-318-7681

10.0 Inspection and Reporting

Unless notified by the NYSDEC, the Owner or Operator shall have a qualified inspector conduct site inspections in accordance with the Permit requirements; for a site with on-going soil disturbance activities, a qualified inspector shall conduct a site inspection at least once every seven (7) calendar days. If a project has received prior written approval by the NYSDEC for the disturbance of greater than five (5) acres of soils at any one time, the inspection frequency shall be increased to a minimum of two (2) per seven (7) calendar day period separated by two (2) calendar days for as long as the five (5) acre threshold is exceeded. The qualified inspector, as defined in SPEDES General Permit guidelines, shall prepare an inspection report subsequent to each and every inspection. At a minimum, the inspection report shall include and/or address the following:

1. Date and time of inspection.
2. Name and title of person(s) performing inspection.
3. A description of the weather and soil conditions (e.g. dry, wet, saturated) at the time of inspection.

4. A description of the condition of the runoff at all points of discharge from the construction site. This shall include identification of any discharges of sediment from the construction site. Include discharges from conveyance systems (i.e. pipes, culverts, ditches, etc.) and overland flow.

5. A description of the condition of all natural surface waterbodies located within, or immediately, adjacent to, the property boundaries of the construction site which receive runoff from disturbed areas. This shall include identification of any discharges of sediment to the surface waterbody.

6. Identification of all erosion and sediment control practices that need repair or maintenance.

7. Identification of all erosion and sediment control practice that were not installed properly or are not functioning as designed and need to be reinstalled or replaced.

8. Description and sketch of areas that are disturbed at the time of the inspection and areas that have been stabilized (temporary and/or final) since the last inspection.

9. 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.

10. Corrective action(s) 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.

11. Digital photographs, with date stamp, that clearly show the condition of all practices that have been identified as needing correction actions. 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.

Within one business day of the completion of an inspection, the qualified inspector shall notify the Owner or Operator and appropriate Contractor (or Subcontractor) of any corrective actions that need to be taken. The Contractor (or Subcontractor) shall begin implementing the corrective action within one business day of this notification and shall complete the corrective actions in a reasonable time frame. All inspection reports shall be signed by the qualified inspector. A sample inspection report is included in Appendix K.

The Owner or Operator shall maintain a record of all inspection reports in a site log book until all disturbed areas have achieved final stabilization and the N.O.T. has been submitted to the DEC. The site log book shall be maintained on site and be made available to the permitting authority upon request.

Prior to filing of the Notice of Termination or the end of permit term, the Owner or Operator shall have the qualified professional perform a final site inspection. The qualified professional shall be provided with a certified final asbuilt survey. The survey shall locate and provide detailed information for the permanent stormwater facilities. The information provided shall include and not be limited to the following: rim and invert elevations of all structures, outlets, weirs, etc.; pipe material and sizes; basin dimensions, elevations and topography; and any other pertinent information specific to the stormwater practice constructed.

Upon final review of the asbuilt survey and completed site improvements, the qualified professional shall certify that the site has undergone final stabilization using either vegetative or structural stabilization methods and that all temporary erosion and sediment controls (such as silt fencing) not needed for long-term erosion control have been removed.

The qualified professional shall then complete the Notice of Termination (NOT) to be signed by the Owner. The NOT with the required supporting documentation shall be submitted to the MS4 for signature of approval which will then be forwarded to the NYS DEC.

11.0 Installation and Maintenance of Stormwater Management Practices

11.1 During Construction

The Contractor shall be responsible for the installation and maintenance of all temporary erosion control measures. The Contractor shall also be responsible for the installation of permanent control measures. The Operator shall be responsible for the maintenance of all permanent control measures.

All temporary erosion control measures installed on the project site shall be observed and maintained to ensure that they are operating as intended as follows:

1. Temporary measures will be inspected by the trained Contractor daily. Any necessary repairs, replacements, or upgrades will be made immediately.

2. Accumulated sediments will be removed as required to keep the measures functional. In the case of silt fencing and haybales (if applicable), remove deposits where accumulations reach half the height of the fence or bale. In the case of sediment basins, remove deposits whenever their capacity has been reduced by fifty percent (50%) from the design capacity.

3. All erosion of the silt fence will be repaired immediately with compacted backfill materials.

4. Disturbed areas, stockpile areas, areas used for storage of materials that are exposed to precipitation shall be inspected for evidence of, or the potential for, pollutants entering the drainage system or downstream.

5. Where discharge locations or points are accessible, they shall be inspected to ascertain whether erosion control measures are effective in preventing significant impacts to receiving waters.

6. Locations where vehicles enter or exit the site shall be inspected for evidence of off-site sediment tracking.

7. The permanent storm drainage system shall be inspected and cleaned of all sediment prior to completion of project.

11.2 After Construction

The long-term operation and maintenance of the stormwater management system will be the responsibility of the Owner. A legally binding document will be signed detailing the responsible parties and required actions.

A sample of the Stormwater Management Inspection and Maintenance Agreement is included, as Schedule "B" in Appendix L.

The following is the proposed Inspection and Maintenance Schedule:

Control to be Inspected	Inspection Frequency	Maintenance Threshold Criteria	Maintenance Procedure
Swales and Channels	Semi-Annually	Debris and leaves and Sediment at 5%	Remove debris and sediment semi-annually
Pocket Wetland	Quarterly	Ponding for more than 48 hours above permanent pool	Remove Accumulated Sediment and debris. Weed and replace plants and mulch as needed. Clean outlet orifice of debris
Rain Garden	Quarterly	Ponding for more than 48 hours	Remove accumulated sediment and debris; weed and replace plants and mulch as needed.
Permeable Paver	Quarterly	Paving does not dewater between storms	Clean area of debris and sediment; vacuum sweep area.

<u>In General:</u>

- Controls should be inspected periodically for the first few months after construction and on a semi-annual basis thereafter. They should also be inspected after major storm events (greater than 0.5 inches).
- All stormwater controls shall be inspected and cleaned of any debris or sediment.
- Any erosion shall be repaired and stabilized with seeding and mulch or stone.
- Maintenance and access shall comply with all local, State and Federal safety codes and guidelines.

Please note that additional notes regarding maintenance activities are contained on the project Construction Drawings and should be adhered to during and after construction.

12.0 Owner / Contractor Responsibilities

12.1 Owner / Operator Certification Statement

The _______________ is the Owner/Operator of the project for the purpose of this Permit (see Appendix A). The Owner must sign a copy of the Owner's Certification Statement before construction commences (see Appendix C).

12.2 Contractor Certification Statement

The Owner is responsible for ensuring all Contractors and Subcontractors associated with site work construction activities identified within this SWPPP agree to implement applicable provisions of the SWPPP and sign a copy of the Contractor Certification Statement (see Appendix C) before construction commences.

In addition, the Owner/Operator is responsible to make sure that all Contractors and Subcontractors shall identify at least one person representing the Company at the site will be responsible for implementation of the SWPPP. This person will be known as the Trained Contractor and will have the required 4-hour Certification. This Certification is available through the NYS DEC. The listing of courses can be found at the NYS DEC Website.

12.3 Retention of Records

The Owner shall retain a copy of the most current SWPPP at the construction site from the date construction is initiated at the site until the date of construction at the site is completed and the N.O.T. has been filed.

Once work is completed, the Owner shall submit to the NYSDEC a Notice of Termination (see Appendix A).

The Owner shall retain copies of the N.O.I, N.O.T., Acknowledgement Letter, MS4 SWPPP Acceptance Form, SWPPP and all reports required by the General Permit for a period of five (5) years from the date that the site achieves final stabilization unless the NYSDEC specifies another time period in writing.

13.0 Conclusion

The Stormwater Management Plan has been established for this project in accordance with the requirements of NYS DEC GP-0-15-002 and the Town Code of Yorktown. This plan will effectively control stormwater generated by this project during and after construction. The management of the stormwater is based on controlling increases in peak runoff as well as water quality. The design of the water quality component not only will treat runoff due to the project, but also that which is currently not treated. Overall it would improve even the existing conditions.

The final design of the project will detail the proposed practices and will establish the method with which they will be constructed. The detail will include layout, grading, plantings, outlet structures, and any other component as required for the design based on the Erosion and Sediment Control established in this Report. These will be part of the project Construction Drawings. The Sequence of Construction and required maintenance will also be set forth as part of the final construction plan. The full Construction Plan shall be considered part of the Stormwater Management Plan or Stormwater Pollution Prevention Plan.

The effectiveness of the stormwater practices selected in design will be insured by implementing a maintenance plan. The maintenance plan details specific activities, safeguards and provisions to be monitored and performed by specified frequencies. By adhering to the maintenance plan, optimum performance of the stormwater practices can be expected.

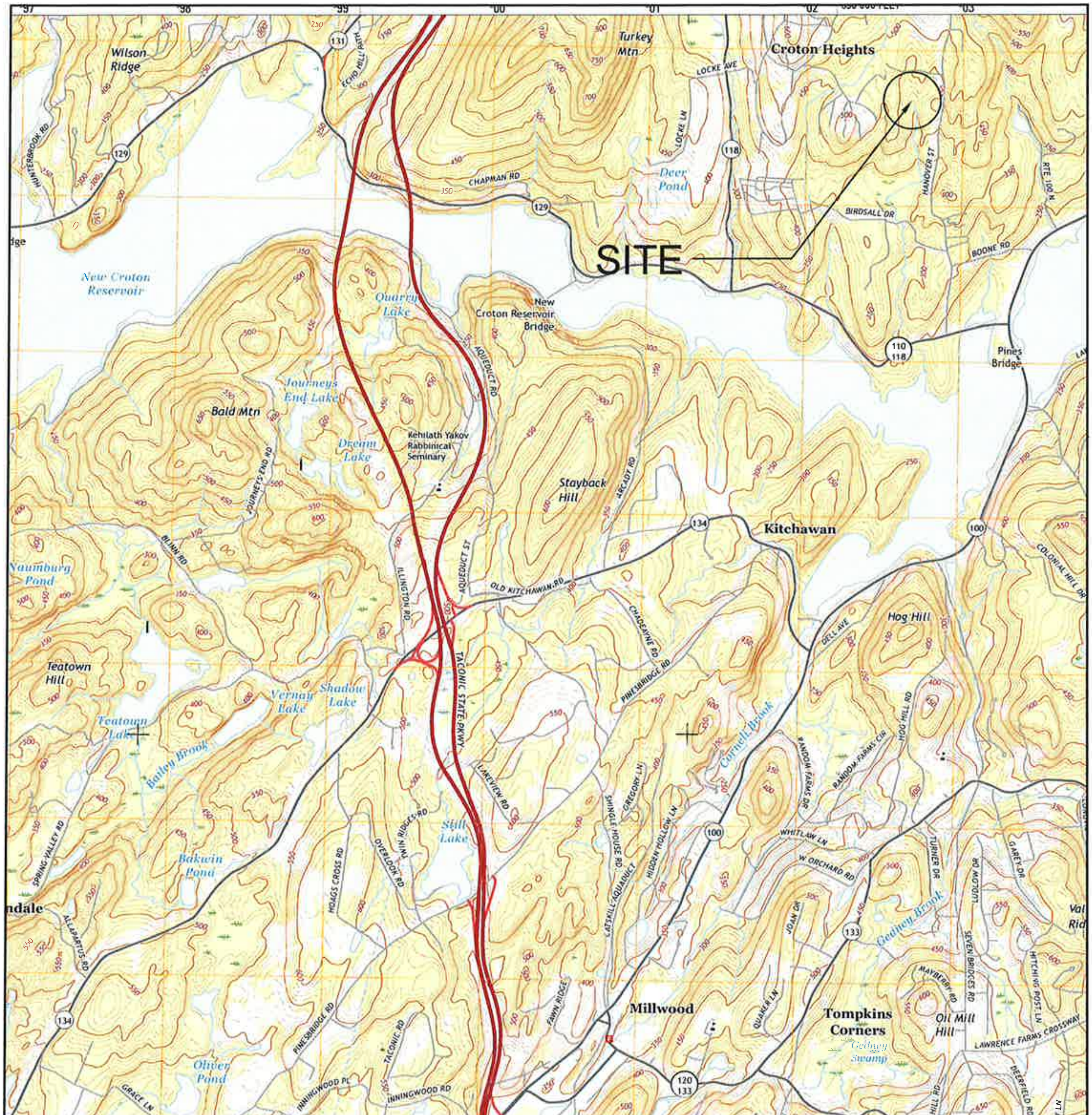
Based on the results of the analysis and recommended maintenance practices for the collection and treatment system, the proposed stormwater control designs will provide maximum control efficiency, high effectiveness for removal of pollutants of concern, and the best attainable post-development pollutant loading scenario.

In conclusion, the Stormwater Management Plan will not create negative downstream impacts as a result of this project.

Joseph C. Riina, P.E

November 16, 2017

FIGURES



NOTE:

1. Map Source: USGS 7.5 Minute Series Topographic Quadrangle Map (1:24,000 scale) for Yorktown Heights, Westchester County, New York.

FIGURE 1.1 - LOCATION MAP

PREPARED FOR

SANDVOSS SUBDIVISION

Town of Yorktown Heights — Westchester Co., New York

Site Design Consultants

Civil Engineers • Land Planners

251 F Underhill Avenue Yorktown Heights, NY 10598
(914) 962-4488 - Fax (914) 962-7386
www.sitedesignconsultants.com

NOT TO SCALE
DATE: 03/23/16

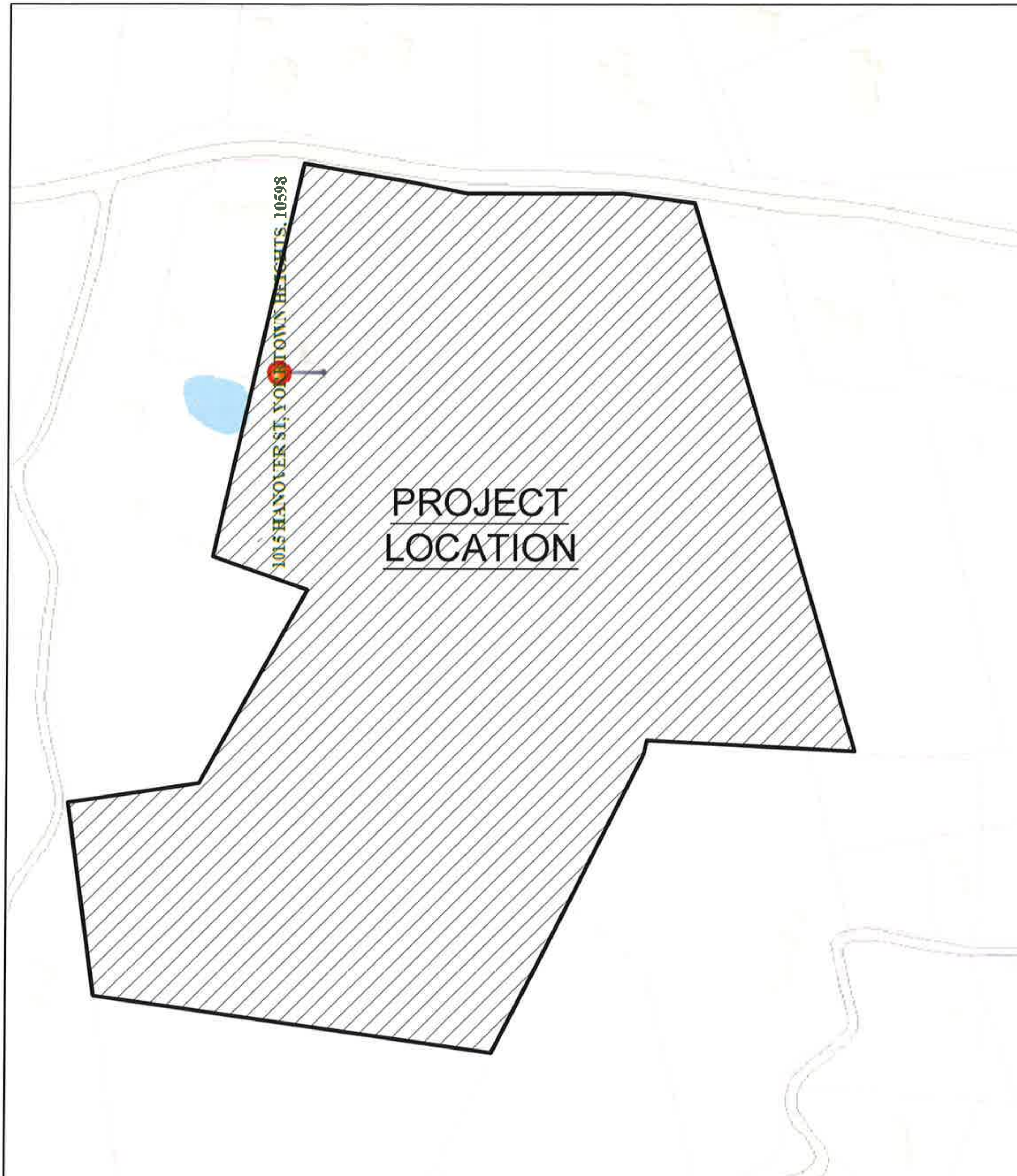


FIGURE 1.2 - VICINITY MAP

PREPARED FOR

SANDVOSS SUBDIVISION

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NOT TO SCALE
DATE: 03/23/16

Table 3.1 Green Infrastructure Planning General Categories and Specific Practices		
Group	**Practice**	**Description**
Preservation of Natural Resources	Preservation of Undisturbed Areas	Delineate and place into permanent conservation easement undisturbed forests, native vegetated areas, riparian corridors, wetlands, and natural terrain.
	Preservation of Buffers	Define, delineate and place in permanent conservation easement naturally vegetated buffers along perennial streams, rivers, shorelines and wetlands.
	Reduction of Clearing and Grading	Limit clearing and grading to the minimum amount needed for roads, driveways, foundations, utilities and stormwater management facilities.
	Locating Development in Less Sensitive Areas	Avoid sensitive resource areas such as floodplains, steep slopes, erodible soils, wetlands, mature forests and critical habitats by locating development to fit the terrain in areas that will create the least impact.
	Open Space Design	Use clustering, conservation design or open space design to reduce impervious cover, preserve more open space and protect water resources.
	Soil Restoration	Restore the original properties and porosity of the soil by deep till and amendment with compost to reduce the generation of runoff and enhance the runoff reduction performance of practices such as downspout disconnections, grass channels, filter strips, and tree clusters.
Reduction of Impervious Cover	Roadway Reduction	Minimize roadway widths and lengths to reduce site impervious area
	Sidewalk Reduction	Minimize sidewalk lengths and widths to reduce site impervious area
	Driveway Reduction	Minimize driveway lengths and widths to reduce site impervious area
	Cul-de-sac Reduction	Minimize the number of cul-de-sacs and incorporate landscaped areas to reduce their impervious cover.
	Building Footprint Reduction	Reduce the impervious footprint of residences and commercial buildings by using alternate or taller buildings while maintaining the same floor to area ratio.
	Parking Reduction	Reduce imperviousness on parking lots by eliminating unneeded spaces, providing compact car spaces and efficient parking lanes, minimizing stall dimensions, using porous pavement surfaces in overflow parking areas, and using multi-storied parking decks where appropriate.

NOTE:

1. Source: NYS DEC Stormwater Design Manual - August 2010

FIGURE 3.1 - STORMWATER SITE PLANNING AND PRACTICE SELECTION FLOW CHART

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DATE: 03/23/16

NOTE:

1. Map Source: USDA National Resources Conservation Service, National Cooperative Soil Survey, Web Soil Survey Map.

FIGURE 4.1.1 - SOIL MAP

PREPARED FOR

SANDVOSS SUBDIVISION

Town of Yorktown Heights — Westchester Co., New York

Site Design Consultants

Civil Engineers • Land Planners

251 F Underhill Avenue Yorktown Heights, NY 10598
(914) 962-4488 - Fax (914) 962-7386
www.sitedesignconsultants.com

NOT TO SCALE
DATE: 03/23/16

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

Soil Rating Polygons

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Lines

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Points

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Water Features

- Streams and Canals

Transportation

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

Background

- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:12,000.

> Warning: Soil Map may not be valid at this scale.
>
> Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

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

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

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

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

Soil Survey Area: Westchester County, New York
Survey Area Data: Version 11, Sep 25, 2015

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

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

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

NOTE:
1. Map Source: USDA National Resources Conservation Service, National Cooperative Soil Survey, Web Soil Survey Map.

FIGURE 4.1.2 - SOIL MAP

PREPARED FOR

SANDVOSS SUBDIVISION

Town of Yorktown Heights   Westchester Co., New York

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NOT TO SCALE
DATE: 03/23/16

Hydrologic Soil Group

Hydrologic Soil Group— Summary by Map Unit — Westchester County, New York (NY119)				
Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
CrC	Charlton-Chatfield complex, rolling, very rocky	B	1.9	5.1%
CtC	Chatfield-Hollis-Rock outcrop complex, rolling		19.6	52.3%
CuD	Chatfield-Hollis-Rock outcrop complex, hilly		4.4	11.6%
RgB	Ridgebury loam, 2 to 8 percent slopes, very stony	B/D	9.7	25.9%
SuB	Sutton loam, 3 to 8 percent slopes	B	1.9	5.2%
Totals for Area of Interest			**37.5**	**100.0%**

NOTE:

1. Map Source: USDA National Resources Conservation Service, National Cooperative Soil Survey, Web Soil Survey Map.

FIGURE 4.1.3 - SOIL MAP

PREPARED FOR

SANDVOSS SUBDIVISION

Town of Yorktown Heights Westchester Co., New York

Site Design Consultants

Civil Engineers • Land Planners

251 F Underhill Avenue Yorktown Heights, NY 10598
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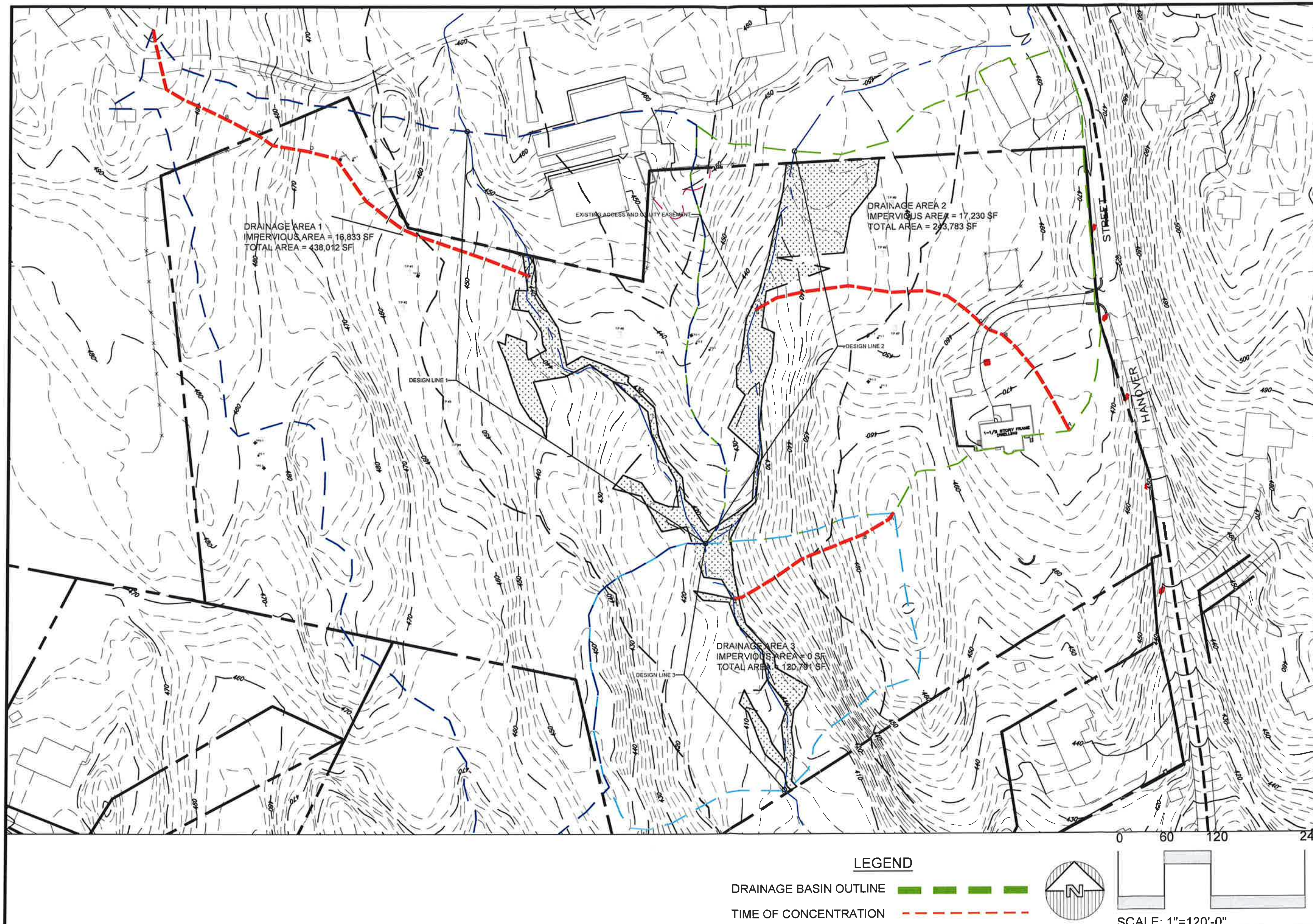
NOT TO SCALE
DATE: 03/23/16



NOTE: UNAUTHORIZED ALTERATIONS OR ADDITIONS TO THIS DRAWING IS A VIOLATION OF SECTION 7209 (2) OF THE NEW YORK STATE EDUCATION LAW.

DATE: 03/23/16

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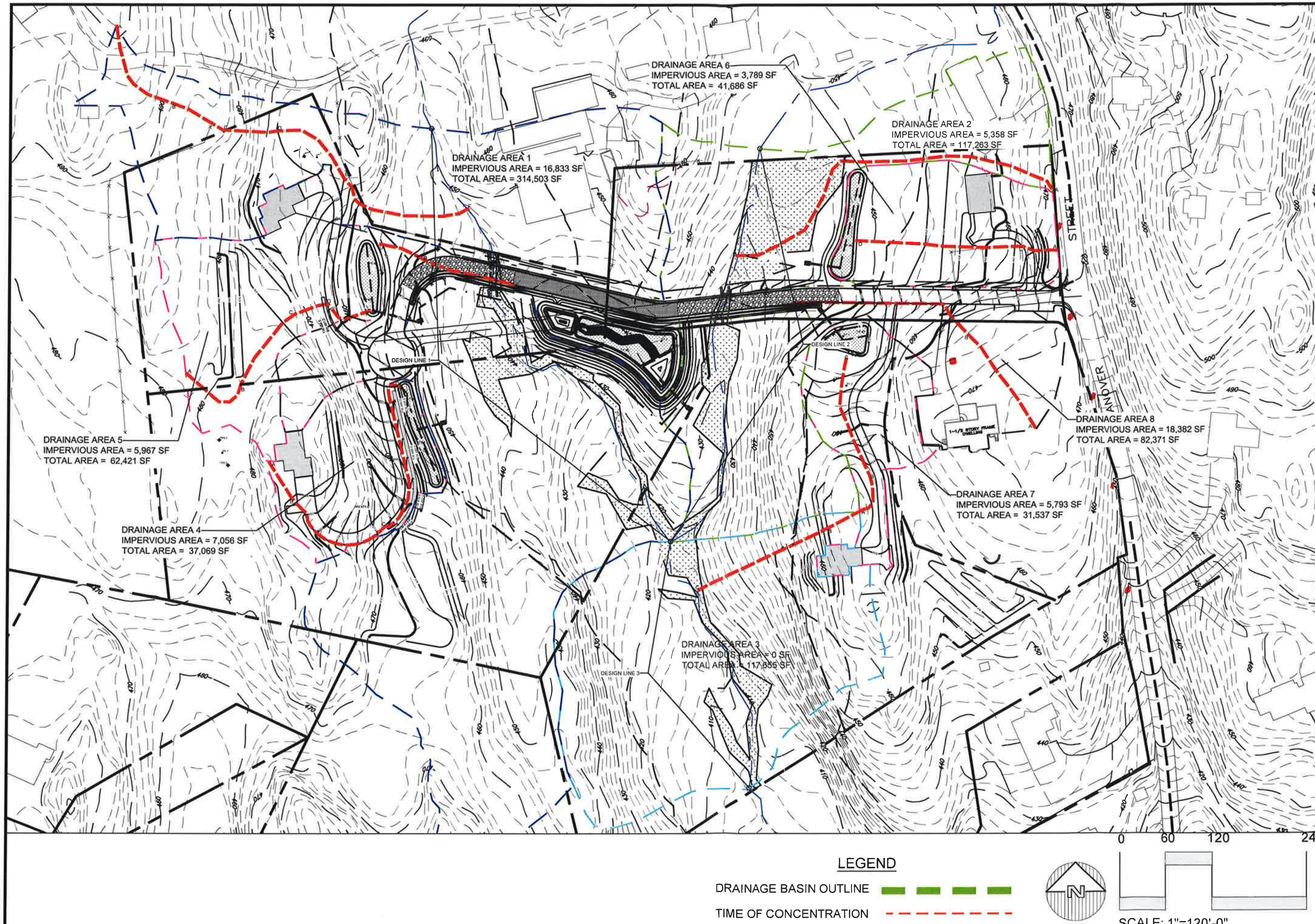
FIGURE 5.1 - PRE-DEVELOPMENT CONDITIONS WATERSHED MAP

PREPARED FOR

SANDVOSS SUBDIVISION

Town of Yorktown

Westchester Co., New York



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www.sitedesignconsultants.com

DATE: 03/23/16

FIGURE 5.2 - POST-DEVELOPMENT CONDITIONS WATERSHED MAP

PREPARED FOR

SANDVOSS SUBDIVISION

Town of Yorktown

Westchester Co., New York

NOTE: UNAUTHORIZED ALTERATIONS OR ADDITIONS TO THIS DRAWING IS A VIOLATION OF SECTION 7209 (2) OF THE NEW YORK STATE EDUCATION LAW.

Table 5.3 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: apply 6 inches of topsoil HSG C&D: Aerate* and apply 6 inches of topsoil	Protect area from any ongoing construction activities.
Areas of cut or fill	HSG A &B: Aerate and apply 6 inches of topsoil HSG C & D: 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 (de-compaction and compost enhancement)	
Areas where Runoff Reduction and/or Infiltration practices are applied	Restoration not required, but may be applied to enhance the reduction specified for appropriate practices.	Keep construction equipment from crossing these areas. To protect newly installed practice from any ongoing construction activities construct a single phase operation fence area
Redevelopment projects	Soil Restoration is required on redevelopment projects in areas where existing impervious area will be converted to pervious area.	

*Aeration includes the use of machines such as tractor-drawn implements with coulters making a narrow slit in the soil, a roller with many spikes making indentations in the soil, or prongs which function like a mini-subsoiler.

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

FIGURE 8.1 - SOIL RESTORATION REQUIREMENTS

PREPARED FOR

SANDVOSS SUBDIVISION

Town of Yorktown Heights Westchester Co., New York

Site Design Consultants

Civil Engineers • Land Planners

251 F Underhill Avenue Yorktown Heights, NY 10598
(914) 962-4488 - Fax (914) 962-7386
www.sitedesignconsultants.com

DATE: 7/20/11

APPENDIX A

List of Required Approvals and Applications:

Town of Yorktown Site Plan Approval - approval pending

Town of Yorktown Building Permit - approval pending

New York State Department of Environmental Conservation
General Permit GP-0-15-002 "Notice of Intent"

New York State Department of Environmental Conservation
SWPPP MS4 Acceptance Form

New York State Department of Environmental Conservation
"Notice of Termination"

New York City Department of Environmental Protection Application - approval pending

Westchester County Health Department Realty Subdivision Application - approval pending

0644089821

NOTICE OF INTENT

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

NYR ______ (for DEC use only)

Stormwater Discharges Associated with Construction Activity Under State Pollutant Discharge Elimination System (SPDES) General Permit # GP-0-15-002

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

-IMPORTANT-

RETURN THIS FORM TO THE ADDRESS ABOVE

OWNER/OPERATOR MUST SIGN FORM

Owner/Operator Information

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

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

Owner/Operator Contact Person First Name
Joyce

Owner/Operator Mailing Address
4165 Brown Mills Road

City
Alexander

State
NY

Zip
14005 -

Phone (Owner/Operator)
914-318-7681

Fax (Owner/Operator)
585-343-2789

Email (Owner/Operator)
jaycebarrie@gmail.com

FED TAX ID
 - (not required for individuals)

6401089828

Project Site Information

Project/Site Name
Sandvoss Subdivision

Street Address (NOT P.O. BOX)
1005 Hanover Street

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

City/Town/Village (THAT ISSUES BUILDING PERMIT)
Yorktown Heights

State: NY
Zip: 10598-
County: Westchester
DEC Region: 3

Name of Nearest Cross Street
Croton Heights Road

Distance to Nearest Cross Street (Feet)
3400

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

Tax Map Numbers
Section-Block-Parcel
59.07-1-7

Tax Map Numbers

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

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

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

X Coordinates (Easting)	**Y Coordinates (Northing)**
602837	4566973

2. What is the nature of this construction project?

○ **New Construction**

● **Redevelopment with increase in impervious area**

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

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

Pre-Development Existing Land Use

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

Post-Development Future Land Use

- ○ SINGLE FAMILY HOME
- ● SINGLE FAMILY SUBDIVISION — Number of Lots: 4
- ○ TOWN HOME RESIDENTIAL
- ○ MULTIFAMILY RESIDENTIAL
- ○ INSTITUTIONAL/SCHOOL
- ○ INDUSTRIAL
- ○ COMMERCIAL
- ○ MUNICIPAL
- ○ ROAD/HIGHWAY
- ○ RECREATIONAL/SPORTS FIELD
- ○ BIKE PATH/TRAIL
- ○ LINEAR UTILITY (water, sewer, gas, etc.)
- ○ PARKING LOT
- ○ CLEARING/GRADING ONLY
- ○ DEMOLITION, NO REDEVELOPMENT
- ○ WELL DRILLING ACTIVITY *(Oil, Gas, etc.)
- ○ OTHER

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

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

Total Site Area	**Total Area To Be Disturbed**	**Existing Impervious Area To Be Disturbed**	**Future Impervious Area Within Disturbed Area**
18.6	5.6	0.1	0.2

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

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

A	**B**	**C**	**D**
%	90 %	%	10 %

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

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

Start Date 06/01/2017 – **End Date** 06/01/2018

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

Name

Unclassified Streams

9a. Type of waterbody identified in Question 9?

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

9b. How was the wetland identified?

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

10. Has the surface waterbody(ies) in question 9 been identified as a 303(d) segment in Appendix E of GP-0-15-002? ○ **Yes** ● **No**

11. Is this project located in one of the Watersheds identified in Appendix C of GP-0-15-002? ○ **Yes** ● **No**

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

13. Does this construction activity disturb land with no existing impervious cover and where the Soil Slope Phase is identified as an E or F on the USDA Soil Survey? **If Yes, what is the acreage to be disturbed?** ○ **Yes** ● **No**

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

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

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

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

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

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

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

21. Has the required Erosion and Sediment Control component of the SWPPP been developed in conformance with the current NYS Standards and Specifications for Erosion and Sediment Control (aka Blue Book)? ● Yes ○ No

22. Does this construction activity require the development of a SWPPP that includes the post-construction stormwater management practice component (i.e. Runoff Reduction, Water Quality and Quantity Control practices/techniques)? ● Yes ○ No
If No, skip questions 23 and 27-39.

23. Has the post-construction stormwater management practice component of the SWPPP been developed in conformance with the current NYS Stormwater Management Design Manual? ● Yes ○ No

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

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

SWPPP Preparer
Joseph Riina

Contact Name (Last, Space, First)
Riina, Joseph

Mailing Address
251-F Underhill Ave

City
Yorktown Heights

State: NY Zip: 10598-

Phone: 914-962-4488 Fax: 914-962-7386

Email
jriina@sitedesignconsultants.com

SWPPP Preparer Certification

I hereby certify that the Stormwater Pollution Prevention Plan (SWPPP) for this project has been prepared in accordance with the terms and conditions of the GP-0-15-002. Furthermore, I understand that certifying false, incorrect or inaccurate information is a violation of this permit and the laws of the State of New York and could subject me to criminal, civil and/or administrative proceedings.

First Name: Joseph **MI**: C

Last Name: Riina

Signature

Date: 04/24/2017

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

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

Temporary Structural

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

Biotechnical

- ○ Brush Matting
- ○ Wattling

Vegetative Measures

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

Permanent Structural

- ○ Debris Basin
- ○ Diversion
- ○ Grade Stabilization Structure
- ○ Land Grading
- ● Lined Waterway (Rock)
- ○ Paved Channel (Concrete)
- ○ Paved Flume
- ● Retaining Wall
- ○ Riprap Slope Protection
- ○ Rock Outlet Protection
- ○ Streambank Protection

Other

Post-construction Stormwater Management Practice (SMP) Requirements

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

27. Identify all site planning practices that were used to prepare the final site plan/layout for the project.

- ● **Preservation of Undisturbed Areas**
- ○ **Preservation of Buffers**
- ● **Reduction of Clearing and Grading**
- ○ **Locating Development in Less Sensitive Areas**
- ● **Roadway Reduction**
- ○ **Sidewalk Reduction**
- ○ **Driveway Reduction**
- ○ **Cul-de-sac Reduction**
- ● **Building Footprint Reduction**
- ○ **Parking Reduction**

27a. Indicate which of the following soil restoration criteria was used to address the requirements in Section 5.1.6("Soil Restoration") of the Design Manual (2010 version).

● All disturbed areas will be restored in accordance with the Soil Restoration requirements in Table 5.3 of the Design Manual (see page 5-22).

○ Compacted areas were considered as impervious cover when calculating the **WQv Required**, and the compacted areas were assigned a post-construction Hydrologic Soil Group (HSG) designation that is one level less permeable than existing conditions for the hydrology analysis.

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

Total WQv Required

0.215 **acre-feet**

29. Identify the RR techniques (Area Reduction), RR techniques(Volume Reduction) and Standard SMPs with RRv Capacity in Table 1 (See Page 9) that were used to reduce the Total WQv Required(#28).

Also, provide in Table 1 the total impervious area that contributes runoff to each technique/practice selected. For the Area Reduction Techniques, provide the total contributing area (includes pervious area) and, if applicable, the total impervious area that contributes runoff to the technique/practice.

Note: Redevelopment projects shall use Tables 1 and 2 to identify the SMPs used to treat and/or reduce the WQv required. If runoff reduction techniques will not be used to reduce the required WQv, skip to question 33a after identifying the SMPs.

Table 1 - Runoff Reduction (RR) Techniques and Standard Stormwater Management Practices (SMPs)

RR Techniques (Area Reduction)	Total Contributing Area (acres)		Total Contributing Impervious Area (acres)
○ Conservation of Natural Areas (RR-1) ...	.	and/or	.
○ Sheetflow to Riparian Buffers/Filters Strips (RR-2)	.	and/or	.
○ Tree Planting/Tree Pit (RR-3)	.	and/or	.
○ Disconnection of Rooftop Runoff (RR-4) ..	.	and/or	.

RR Techniques (Volume Reduction)	Total Contributing Impervious Area (acres)
○ Vegetated Swale (RR-5)	.
● Rain Garden (RR-6)	0.710
○ Stormwater Planter (RR-7)	.
○ Rain Barrel/Cistern (RR-8)	.
○ Porous Pavement (RR-9)	.
○ Green Roof (RR-10)	.
Standard SMPs with RRv Capacity	
○ Infiltration Trench (I-1)	.
○ Infiltration Basin (I-2)	.
○ Dry Well (I-3)	.
○ Underground Infiltration System (I-4)	.
○ Bioretention (F-5)	.
○ Dry Swale (O-1)	.
Standard SMPs	
○ Micropool Extended Detention (P-1)	.
○ Wet Pond (P-2)	.
○ Wet Extended Detention (P-3)	.
○ Multiple Pond System (P-4)	.
○ Pocket Pond (P-5)	.
○ Surface Sand Filter (F-1)	.
○ Underground Sand Filter (F-2)	.
○ Perimeter Sand Filter (F-3)	.
○ Organic Filter (F-4)	.
○ Shallow Wetland (W-1)	.
○ Extended Detention Wetland (W-2)	.
○ Pond/Wetland System (W-3)	.
● Pocket Wetland (W-4)	0.422
○ Wet Swale (O-2)	.

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

Alternative SMP	Total Contributing Impervious Area (acres)
○ Hydrodynamic	.
○ Wet Vault	.
○ Media Filter	.
○ Other	.

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

Name

Manufacturer

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

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

Total RRv provided

0.063 **acre-feet**

31. Is the Total RRv provided (#30) greater than or equal to the total WQv required (#28).

○ **Yes** ● **No**

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

32. Provide the Minimum RRv required based on HSG.
[Minimum RRv Required = (P)(0.95)(Ai)/12, Ai=(S)(Aic)]

Minimum RRv Required

0.060 **acre-feet**

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

● **Yes** ○ **No**

If Yes, go to question 33.
Note: Use the space provided in question #39 to summarize the specific site limitations and justification for not reducing 100% of WQv required (#28). A detailed evaluation of the specific site limitations and justification for not reducing 100% of the WQv required (#28) must also be included in the SWPPP.
If No, sizing criteria has not been met, so NOI can not be processed. SWPPP preparer must modify design to meet sizing criteria.

33. Identify the Standard SMPs in Table 1 and, if applicable, the Alternative SMPs in Table 2 that were used to treat the remaining total WQv(=Total WQv Required in 28 - Total RRv Provided in 30).

Also, provide in Table 1 and 2 the total impervious area that contributes runoff to each practice selected.

Note: Use Tables 1 and 2 to identify the SMPs used on Redevelopment projects.

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

WQv Provided

0.152 **acre-feet**

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

34. Provide the sum of the Total RRv provided (#30) and the WQv provided (#33a). 0.215

35. Is the sum of the RRv provided (#30) and the WQv provided (#33a) greater than or equal to the total WQv required (#28)? ● **Yes** ○ **No**

If Yes, go to question 36.
If No, sizing criteria has not been met, so NOI can not be processed. SWPPP preparer must modify design to meet sizing criteria.

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

CPv Required 0.215 **acre-feet**

CPv Provided 0.215 **acre-feet**

36a. The need to provide channel protection has been waived because:

○ Site discharges directly to tidal waters or a fifth order or larger stream.

○ Reduction of the total CPv is achieved on site through runoff reduction techniques or infiltration systems.

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

Total Overbank Flood Control Criteria (Qp)

Pre-Development 28.48 **CFS**

Post-development 21.91 **CFS**

Total Extreme Flood Control Criteria (Qf)

Pre-Development 75.39 **CFS**

Post-development 74.37 **CFS**

37a. The need to meet the Qp and Qf criteria has been waived because:

○ Site discharges directly to tidal waters or a fifth order or larger stream.

○ Downstream analysis reveals that the Qp and Qf controls are not required

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

● Yes ○ No

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

Joyce Sandvoss

39. Use this space to summarize the specific site limitations and justification for not reducing 100% of WQv required(#28). (See question 32a) This space can also be used for other pertinent project information.

The entirety of the Site had very high groundwater. Rock was also found in some locations. As such it was impossible to implement a system that would meet the capacity of the WQv, and provided the full RRv.

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

- ○ Air Pollution Control
- ○ Coastal Erosion
- ○ Hazardous Waste
- ○ Long Island Wells
- ○ Mined Land Reclamation
- ○ Solid Waste
- ○ Navigable Waters Protection / Article 15
- ○ Water Quality Certificate
- ○ Dam Safety
- ○ Water Supply
- ○ Freshwater Wetlands/Article 24
- ○ Tidal Wetlands
- ○ Wild, Scenic and Recreational Rivers
- ○ Stream Bed or Bank Protection / Article 15
- ○ Endangered or Threatened Species(Incidental Take Permit)
- ○ Individual SPDES
- ○ SPDES Multi-Sector GP NYR
- ○ Other
- ○ None

41. Does this project require a US Army Corps of Engineers Wetland Permit? ○ Yes ● No
If Yes, Indicate Size of Impact. .

42. Is this project subject to the requirements of a regulated, traditional land use control MS4? ● Yes ○ No
(If No, skip question 43)

43. Has the "MS4 SWPPP Acceptance" form been signed by the principal executive officer or ranking elected official and submitted along with this NOI? ● Yes ○ No

44. If this NOI is being submitted for the purpose of continuing or transferring coverage under a general permit for stormwater runoff from construction activities, please indicate the former SPDES number assigned. NYR

Owner/Operator Certification

I have read or been advised of the permit conditions and believe that I understand them. I also understand that, under the terms of the permit, there may be reporting requirements. I hereby certify that this document and the corresponding documents were prepared under my direction or supervision. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations. I further understand that coverage under the general permit will be identified in the acknowledgment that I will receive as a result of submitting this NOI and can be as long as sixty (60) business days as provided for in the general permit. I also understand that, by submitting this NOI, I am acknowledging that the SWPPP has been developed and will be implemented as the first element of construction, and agreeing to comply with all the terms and conditions of the general permit for which this NOI is being submitted.

Print First Name

MI

Print Last Name

Owner/Operator Signature

Date

/ /

NEW YORK STATE OF OPPORTUNITY | Department of Environmental Conservation

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

MS4 Stormwater Pollution Prevention Plan (SWPPP) Acceptance Form

for

Construction Activities Seeking Authorization Under SPDES General Permit

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

I. Project Owner/Operator Information	
1. Owner/Operator Name:	Joyce Sandvoss
2. Contact Person:	Joseph Riina
3. Street Address:	251-F Underhill Ave
4. City/State/Zip:	Yorktown Heights, NY 10598
II. Project Site Information	
5. Project/Site Name:	Sandvoss Subdivision
6. Street Address:	1005 Hanover Street
7. City/State/Zip:	Yorktown Heights, NY 10598
III. Stormwater Pollution Prevention Plan (SWPPP) Review and Acceptance Information	
8. SWPPP Reviewed by:	
9. Title/Position:	
10. Date Final SWPPP Reviewed and Accepted:	
IV. Regulated MS4 Information	
11. Name of MS4:	
12. MS4 SPDES Permit Identification Number: NYR20A	
13. Contact Person:	
14. Street Address:	
15. City/State/Zip:	
16. Telephone Number:	

MS4 SWPPP Acceptance Form - continued
V. Certification Statement - MS4 Official (principal executive officer or ranking elected official) or Duly Authorized Representative
I hereby certify that the final Stormwater Pollution Prevention Plan (SWPPP) for the construction project identified in question 5 has been reviewed and meets the substantive requirements in the SPDES General Permit For Stormwater Discharges from Municipal Separate Storm Sewer Systems (MS4s). Note: The MS4, through the acceptance of the SWPPP, assumes no responsibility for the accuracy and adequacy of the design included in the SWPPP. In addition, review and acceptance of the SWPPP by the MS4 does not relieve the owner/operator or their SWPPP preparer of responsibility or liability for errors or omissions in the plan.
Printed Name:
Title/Position:
Signature:
Date:
VI. Additional Information

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

NYC Environmental Protection

APPENDIX B
NEW YORK CITY DEPARTMENT OF ENVIRONMENTAL PROTECTION
APPLICATION FOR REVIEW AND APPROVAL OF STORMWATER POLLUTION PREVENTION PLANS

Project Name: Sandvoss Subdivision

Applicant/Designated representative:
Name: Joyce Sandvoss
Address: 4165 Brown Mills Road
Alexander, NY
Phone: 914-318-7681
e-mail:

Design Professional:
Name: Joseph Riina
Address: 251-F Underhill Ave
Yorktown Heights, New York 10598
Phone: 914-962-4488
e-mail: jriina@sitedesignconsultants.com

Project Location: Address: 1005 Hanover Street
Town: Yorktown
Subdivision name: Sandvoss Subdivision
Reservoir Basin: Croton River

Tax Map Parcel: 59-07-1-7
County: Westchester
Lot number: 1-4

Submissions must include plans and supporting documents.

All applications must include narratives, plans, details, and specifications providing the following information:

- Project Description
- Description of Existing Conditions
- Description of Proposed Conditions
- Operations and Maintenance Plans

General Requirements for submission are set forth in Section 3 of the accompanying Guide. Supplemental required information for each type of approval is described in Section 4. Also see Appendix D for a checklist of items to be included in the submission. For additional detail, please see Appendixes E and F of this document, Sections 18-23 and 18-39 of the Watershed Regulations, and Part III of the New York State Department of Environmental Conservation (DEC) SPDES General Permit for Stormwater Discharges from Construction Activity, GP-0-10-001 ("General Permit").

Notice of Cost-Sharing Funds
Certain costs incurred in the design, implementation, and maintenance of Stormwater Pollution Prevention Plans may be eligible for DEP funding. Refer to Section 5.0 and Appendix H of the accompanying Guide.

I believe this application to be complete and in compliance with the Watershed Regulations.

(Signature)

4·30·2017
(Filing Date)

Joseph Riina
(Print Name)

APPENDIX B

Regulatory Ordinances:

NYS DEC General Permit No. GP-0-15-002

Local Ordinance

NYC DEP

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

From

CONSTRUCTION ACTIVITY

Permit No. GP-0-15-002

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

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

John J. Ferguson
Chief Permit Administrator

1 / 12 / 15

Authorized Signature | Date

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

PREFACE

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

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

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

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

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

(Part I)

Part I. PERMIT COVERAGE AND LIMITATIONS

A. Permit Application

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

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

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

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

B. Effluent Limitations Applicable to Discharges from Construction Activities

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

1. Erosion and Sediment Control Requirements - The *owner or operator* must select, design, install, implement and maintain control measures to *minimize* the *discharge* of *pollutants* and prevent a violation of the *water quality standards*. The selection, design, installation, implementation, and maintenance of these control measures must meet the non-numeric effluent limitations in Part I.B.1.(a) – (f) of this permit and be in accordance with the New York State Standards and Specifications for Erosion and Sediment Control, dated August 2005, using sound engineering judgment. Where control measures are not designed in conformance with the design criteria included in the technical standard, the *owner or operator* must include in the Stormwater Pollution Prevention Plan ("SWPPP") the reason(s) for the deviation or alternative design and provide information

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

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

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

(ii) Control stormwater *discharge*s to *minimize* channel and streambank erosion and scour in the immediate vicinity of the *discharge* points;

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

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

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

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

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

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

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

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

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

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

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

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

e. **Prohibited *Discharges*.** The following *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 *discharge*s directly to tidal waters, or fifth order or larger streams.

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

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

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

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

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

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

(iii) Channel Protection Volume (Cpv): Provide 24 hour extended detention of the post-developed 1-year, 24-hour storm event; remaining after runoff reduction. The Cpv requirement does not apply when:

(1) Reduction of the entire Cpv is achieved by application of runoff reduction techniques or infiltration systems, or

(2) The site *discharge*s directly to tidal waters, or fifth order or larger streams.

(iv) Overbank Flood Control Criteria (Qp): Requires storage to attenuate the post-development 10-year, 24-hour peak *discharge* rate (Qp) to predevelopment rates. The Qp requirement does not apply when:

(1) the site *discharge*s directly to tidal waters or fifth order or larger streams, or
(2) A downstream analysis reveals that overbank control is not required.

(v) Extreme Flood Control Criteria (Qf): Requires storage to attenuate the post-development 100-year, 24-hour peak *discharge* rate (Qf) to predevelopment rates. The Qf requirement does not apply when:

(1) the site *discharge*s directly to tidal waters or fifth order or larger streams, or
(2) A downstream analysis reveals that overbank control is not required.

c. ***Sizing Criteria* for *Redevelopment Activity***

(Part I.C.2.c.i)

(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* from *construction activities.*

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

5. *Discharges* which either cause or contribute to a violation of *water quality standards* adopted pursuant to the *ECL* and its accompanying regulations;

6. *Construction activities* for residential, commercial and institutional projects:

   a. Where the *discharges* from the *construction activities* are tributary to waters of the state classified as AA or AA-s; and

   b. Which disturb one or more acres of land with no existing *impervious cover*; and

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

7. *Construction activities* for linear transportation projects and linear utility projects:

   a. Where the *discharges* from the *construction activities* are tributary to waters of the state classified as AA or AA-s; and

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

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

8. *Construction activities* that have the potential to affect an *historic property*, unless there is documentation that such impacts have been resolved. The following documentation necessary to demonstrate eligibility with this requirement shall be maintained on site in accordance with Part II.C.2 of this permit and made available to the Department in accordance with Part VII.F of this permit:

   a. Documentation that the *construction activity* is not within an archeologically sensitive area indicated on the sensitivity map, and that the *construction activity* is not located on or immediately adjacent to a property listed or determined to be eligible for listing on the National or State Registers of Historic Places, and that there is no new permanent building on the construction site within the following distances from a building, structure, or object that is more than 50 years old, or if there is such a new permanent building on the construction site within those parameters that NYS Office of Parks, Recreation and Historic Preservation (OPRHP), a Historic Preservation Commission of a Certified Local Government, or a qualified preservation professional has determined that the building, structure, or object more than 50 years old is not historically/archeologically significant.

      - 1-5 acres of disturbance - 20 feet
      - 5-20 acres of disturbance - 50 feet
      - 20+ acres of disturbance - 100 feet, or

   b. DEC consultation form sent to OPRHP, and copied to the NYS DEC Agency Historic Preservation Officer (APO), and
      (i) the State Environmental Quality Review (SEQR) Environmental Assessment Form (EAF) with a negative declaration or the Findings Statement, with documentation of OPRHP's agreement with the resolution; or
      (ii) documentation from OPRHP that the *construction activity* will result in No Impact; or
      (iii) documentation from OPRHP providing a determination of No Adverse Impact; or
      (iv) a Letter of Resolution signed by the owner/operator, OPRHP and the DEC APO which allows for this *construction activity* to be eligible for coverage under the general permit in terms of the State Historic Preservation Act (SHPA); or

   c. Documentation of satisfactory compliance with Section 106 of the National Historic Preservation Act for a coterminous project area:
      (i) No Affect
      (ii) No Adverse Affect

(Part I.F.8.c.iii)

(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. OBTAINING PERMIT COVERAGE

A.Notice of Intent (NOI) Submittal

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 NOI form to the Department in order to be authorized to *discharge* under this permit. An *owner or operator* shall use either the electronic (eNOI) or paper version of the NOI that the Department prepared. Both versions of the NOI are located on the Department's website (http://www.dec.ny.gov/). The paper version of the NOI shall be signed in accordance with Part VII.H. of this permit and submitted to the following address.

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

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

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

(Part II.A.2)

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

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

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

B. Permit Authorization

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

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

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

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

   c. the final SWPPP has been prepared, and

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

3. An *owner or operator* that has satisfied the requirements of Part II.B.2 above

will be authorized to *discharge* stormwater from their *construction activity* in accordance with the following schedule:

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

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

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

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

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

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

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

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

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

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

C. General Requirements For Owners or Operators With Permit Coverage

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

2. The *owner or operator* shall maintain a copy of the General Permit (GP-0-15-002), NOI, *NOI Acknowledgment Letter*, SWPPP, MS4 SWPPP Acceptance form, inspection reports, and all documentation necessary to demonstrate eligibility with this permit at the construction site until all disturbed areas have achieved *final stabilization* and the NOT has been submitted to the Department. The documents must be maintained in a secure location, such as a job trailer, on-site construction office, or mailbox with lock. The secure location must be accessible during normal business hours to an individual performing a compliance inspection.

3. The *owner or operator* of a *construction activity* shall not disturb greater than five (5) acres of soil at any one time without prior written authorization from the Department or, in areas under the jurisdiction of a *regulated, traditional land use control MS4,* the *regulated, traditional land use control MS4* (provided the *regulated, traditional land use control MS4* is not the *owner or operator* of the *construction activity*). At a minimum, the *owner or operator* must comply with the following requirements in order to be authorized to disturb greater than five (5) acres of soil at any one time:
   a. The *owner or operator* shall

(Part II.C.3.a)

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

b. In areas where soil disturbance activity has temporarily or permanently ceased, the application of soil stabilization measures must be initiated by the end of the next business day and completed within seven (7) days from the date the current soil disturbance activity ceased. The soil stabilization measures selected shall be in conformance with the technical standard, New York State Standards and Specifications for Erosion and Sediment Control, dated August 2005.

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

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

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

4. In accordance with statute, regulations, and the terms and conditions of this permit, the Department may suspend or revoke an *owner's or operator's* coverage under this permit at any time if the Department determines that the SWPPP does not meet the permit requirements. Upon a finding of significant non-compliance with the practices described in the SWPPP or violation of this permit, the Department may order an immediate stop to all activity at the site until the non-compliance is remedied. The stop work order shall be in writing, describe the non-compliance in detail, and be sent to the *owner or operator*.

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

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

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

   An *owner or operator* may continue to implement the technical/design components of the post-construction stormwater management controls provided that such design was done in conformance with the technical standards in place at the time of initial project authorization. However, they must comply with the other, non-design provisions of GP-0-15-002.

E. Change of *Owner or Operator*

2. When property ownership changes or when there is a change in operational control over the construction plans and specifications, the original *owner or operator* must notify the new *owner or operator*, in writing, of the requirement to obtain permit coverage by submitting a NOI with the Department. Once the new *owner or operator* obtains permit coverage, the original *owner or operator* shall then submit a completed NOT with the name and permit identification number of the new *owner or operator* to the Department at the address in Part II.A.1. of this permit. If the original *owner or operator* maintains ownership of a portion of the *construction activity* and will disturb soil, they must maintain their coverage under the permit.

Permit coverage for the new *owner or operator* will be effective as of the date the Department receives a complete NOI, provided the original *owner or operator* was not subject to a sixty (60) business day authorization period that has not expired as of the date the Department receives the NOI from the new *owner or operator*.

Part III. STORMWATER POLLUTION PREVENTION PLAN (SWPPP)

A. General SWPPP Requirements

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

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

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

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

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

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

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

5. The Department may notify the *owner or operator* at any time that the

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

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

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

   > "I hereby certify under penalty of law that I understand and agree to comply with the terms and conditions of the SWPPP and agree to implement any corrective actions identified by the *qualified inspector* during a site inspection. I also understand that the *owner or operator* must comply with the terms and conditions of the most current version of the New York State Pollutant Discharge Elimination System ("SPDES") general permit for stormwater *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"

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

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

B. Required SWPPP Contents

1. Erosion and sediment control component - All SWPPPs prepared pursuant to this permit shall include erosion and sediment control practices designed in conformance with the technical standard, New York State Standards and Specifications for Erosion and Sediment Control, dated August 2005. Where erosion and sediment control practices are not designed in conformance with the design criteria included in the technical standard, the *owner or operator* must demonstrate *equivalence* to the technical standard. At a minimum, the erosion and sediment control component of the SWPPP shall include the following:

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

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

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

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

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

f. A temporary and permanent soil stabilization plan that meets the requirements of this general permit and the technical standard, New York State Standards and Specifications for Erosion and Sediment Control, dated August 2005, for each stage of the project, including initial land clearing and grubbing to project completion and achievement of *final stabilization*;

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

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

i. A maintenance inspection schedule for the contractor(s) identified in Part III.A.6. of this permit, to ensure continuous and effective operation of the erosion and sediment control practices. The maintenance inspection schedule shall be in accordance with the requirements in the technical standard, New York State Standards and Specifications for Erosion and Sediment Control, dated August 2005;

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

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

l. Identification of any elements of the design that are not in conformance with the design criteria in the technical standard, New York State Standards and Specifications for Erosion and Sediment Control, dated August 2005. Include the reason for the deviation or alternative design and provide information which demonstrates that the deviation or alternative design is *equivalent* to the technical standard.

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

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

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

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

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

   c. A Stormwater Modeling and Analysis Report that includes:

      (i) Map(s) showing pre-development conditions, including watershed/subcatchments boundaries, flow paths/routing, and design points;

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

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

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

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

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

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

e. Infiltration test results, when required; and

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

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

C. Required SWPPP Components by Project Type

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

Part IV. INSPECTION AND MAINTENANCE REQUIREMENTS

A. General Construction Site Inspection and Maintenance Requirements

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

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

B. Contractor Maintenance Inspection Requirements

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

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

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

C. Qualified Inspector Inspection Requirements

(Part IV.C)

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

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

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

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

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

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

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

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

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

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

   b. For construction sites where soil disturbance activities are on-going and the *owner or operator* has received authorization in accordance with Part II.C.3 to disturb greater than five (5) acres of soil at any one time, the *qualified inspector* shall conduct at least two (2) site inspections every seven (7) calendar days. The two (2) inspections shall be separated by a minimum of two (2) full calendar days.

c. For construction sites where soil disturbance activities have been temporarily suspended (e.g. winter shutdown) and *temporary stabilization* measures have been applied to all disturbed areas, the *qualified inspector* shall conduct a site inspection at least once every thirty (30) calendar days. The *owner or operator* shall notify the DOW Water (SPDES) Program contact at the Regional Office (see contact information in Appendix F) or, in areas under the jurisdiction of a *regulated, traditional land use control MS4,* the *regulated, traditional land use control MS4* (provided the *regulated, traditional land use control MS4* is not the *owner or operator* of the *construction activity*) in writing prior to reducing the frequency of inspections.

d. For construction sites where soil disturbance activities have been shut down with partial project completion, the *qualified inspector* can stop conducting inspections if all areas disturbed as of the project shutdown date have achieved *final stabilization* and all post-construction stormwater management practices required for the completed portion of the project have been constructed in conformance with the SWPPP and are operational. The *owner or operator* shall notify the DOW Water (SPDES) Program contact at the Regional Office (see contact information in Appendix F) or, in areas under the jurisdiction of a *regulated, traditional land use control MS4,* the *regulated, traditional land use control MS4* (provided the *regulated, traditional land use control MS4* is not the *owner or operator* of the *construction activity*) in writing prior to the shutdown. If soil disturbance activities are not resumed within 2 years from the date of shutdown, the *owner or operator* shall have the *qualified inspector* perform a final inspection and certify that all disturbed areas have achieved *final stabilization,* and all temporary, structural erosion and sediment control measures have been removed; and that all post-construction stormwater management practices have been constructed in conformance with the SWPPP by signing the "*Final Stabilization*" and "Post-Construction Stormwater Management Practice" certification statements on the NOT. The *owner or operator* shall then submit the completed NOT form to the address in Part II.A.1 of this permit.

e. For construction sites that directly *discharge* to one of the 303(d) segments listed in Appendix E or is located in one of the watersheds listed in Appendix C, the *qualified inspector* shall conduct at least two (2) site inspections every seven (7) calendar days. The two (2) inspections shall be separated by a minimum of two (2) full calendar days.

3. At a minimum, the *qualified inspector* shall inspect all erosion and sediment control practices and pollution prevention measures to ensure integrity and effectiveness, all post-construction stormwater management practices under construction to ensure that they are constructed in conformance with the SWPPP, all areas of disturbance that have not achieved *final stabilization,* all points of *discharge* to natural surface waterbodies located within, or immediately adjacent to, the property boundaries of the construction site, and all points of *discharge* from the construction site.

4. The *qualified inspector* shall prepare an inspection report subsequent to each and every inspection. At a minimum, the inspection report shall include and/or address the following:

   a. Date and time of inspection;

   b. Name and title of person(s) performing inspection;

   c. A description of the weather and soil conditions (e.g. dry, wet, saturated) at the time of the inspection;

   d. A description of the condition of the runoff at all points of *discharge* from the construction site. This shall include identification of any *discharges* of sediment from the construction site. Include *discharges* from conveyance systems (i.e. pipes, culverts, ditches, etc.) and overland flow;

   e. A description of the condition of all natural surface waterbodies located within, or immediately adjacent to, the property boundaries of the construction site which receive runoff from disturbed areas. This shall include identification of any *discharges* of sediment to the surface waterbody;

   f. Identification of all erosion and sediment control practices and pollution prevention measures that need repair or maintenance;

   g. Identification of all erosion and sediment control practices and pollution prevention measures that were not installed properly or are not functioning as designed and need to be reinstalled or replaced;

   h. Description and sketch of areas with active soil disturbance activity, areas that have been disturbed but are inactive at the time of the inspection, and areas that have been stabilized (temporary and/or final) since the last inspection;

(Part IV.C.4.i)

i. Current phase of construction of all post-construction stormwater management practices and identification of all construction that is not in conformance with the SWPPP and technical standards;

j. Corrective action(s) that must be taken to install, repair, replace or maintain erosion and sediment control practices and pollution prevention measures; and to correct deficiencies identified with the construction of the post-construction stormwater management practice(s);

k. Identification and status of all corrective actions that were required by previous inspection; and

l. Digital photographs, with date stamp, that clearly show the condition of all practices that have been identified as needing corrective actions. The *qualified inspector* shall attach paper color copies of the digital photographs to the inspection report being maintained onsite within seven (7) calendar days of the date of the inspection. The *qualified inspector* shall also take digital photographs, with date stamp, that clearly show the condition of the practice(s) after the corrective action has been completed. The *qualified inspector* shall attach paper color copies of the digital photographs to the inspection report that documents the completion of the corrective action work within seven (7) calendar days of that inspection.

5. Within one business day of the completion of an inspection, the *qualified inspector* shall notify the *owner or operator* and appropriate contractor or subcontractor identified in Part III.A.6. of this permit of any corrective actions that need to be taken. The contractor or subcontractor shall begin implementing the corrective actions within one business day of this notification and shall complete the corrective actions in a reasonable time frame.

6. All inspection reports shall be signed by the *qualified inspector.* Pursuant to Part II.C.2. of this permit, the inspection reports shall be maintained on site with the SWPPP.

Part V. TERMINATION OF PERMIT COVERAGE

A. Termination of Permit Coverage

1. An *owner or operator* that is eligible to terminate coverage under this permit must submit a completed NOT form to the address in Part II.A.1 of this permit. The NOT form shall be one which is associated with this permit, signed in accordance with Part VII.H of this permit.

(Part V.A.2)

2. An *owner or operator* may terminate coverage when one or more the following conditions have been met:

   a. Total project completion - All *construction activity* identified in the SWPPP has been completed; and all areas of disturbance have achieved *final stabilization*; and all temporary, structural erosion and sediment control measures have been removed; and all post-construction stormwater management practices have been constructed in conformance with the SWPPP and are operational;

   b. Planned shutdown with partial project completion - All soil disturbance activities have ceased; and all areas disturbed as of the project shutdown date have achieved *final stabilization*; and all temporary, structural erosion and sediment control measures have been removed; and all post-construction stormwater management practices required for the completed portion of the project have been constructed in conformance with the SWPPP and are operational;

   c. A new *owner or operator* has obtained coverage under this permit in accordance with Part II.E. of this permit.

   d. The *owner or operator* obtains coverage under an alternative SPDES general permit or an individual SPDES permit.

3. For *construction activities* meeting subdivision 2a. or 2b. of this Part, the *owner or operator* shall have the *qualified inspector* perform a final site inspection prior to submitting the NOT. The *qualified inspector* shall, by signing the "*Final Stabilization*" and "Post-Construction Stormwater Management Practice certification statements on the NOT, certify that all the requirements in Part V.A.2.a. or b. of this permit have been achieved.

4. For *construction activities* that are subject to the requirements of a *regulated, traditional land use control MS4* and meet subdivision 2a. or 2b. of this Part, the *owner or operator* shall have the *regulated, traditional land use control MS4* sign the "MS4 Acceptance" statement on the NOT in accordance with the requirements in Part VII.H. of this permit. The *regulated, traditional land use control MS4* official, by signing this statement, has determined that it is acceptable for the *owner or operator* to submit the NOT in accordance with the requirements of this Part. The *regulated, traditional land use control MS4* can make this determination by performing a final site inspection themselves or by accepting the *qualified inspector*'s final site inspection certification(s) required in Part V.A.3. of this permit.

5. For *construction activities* that require post-construction stormwater management practices and meet subdivision 2a. of this Part, the *owner or operator* must, prior to submitting the NOT, ensure one of the following:

   a. the post-construction stormwater management practice(s) and any right-of-way(s) needed to maintain such practice(s) have been deeded to the municipality in which the practice(s) is located,

   b. an executed maintenance agreement is in place with the municipality that will maintain the post-construction stormwater management practice(s),

   c. for post-construction stormwater management practices that are privately owned, the *owner or operator* has a mechanism in place that requires operation and maintenance of the practice(s) in accordance with the operation and maintenance plan, such as a deed covenant in the *owner or operator's* deed of record,

   d. for post-construction stormwater management practices that are owned by a public or private institution (e.g. school, university, hospital), government agency or authority, or public utility; the *owner or operator* has policy and procedures in place that ensures operation and maintenance of the practices in accordance with the operation and maintenance plan.

Part VI. REPORTING AND RETENTION OF RECORDS

A. Record Retention

The *owner or operator* shall retain a copy of the NOI, NOI Acknowledgment Letter, SWPPP, MS4 SWPPP Acceptance form and any inspection reports that were prepared in conjunction with this permit for a period of at least five (5) years from the date that the Department receives a complete NOT submitted in accordance with Part V. of this general permit.

B. Addresses

With the exception of the NOI, NOT, and MS4 SWPPP Acceptance form (which must be submitted to the address referenced in Part II.A.1 of this permit), all written correspondence requested by the Department, including individual permit applications, shall be sent to the address of the appropriate DOW Water (SPDES) Program contact at the Regional Office listed in Appendix F.

Part VII. STANDARD PERMIT CONDITIONS

A. Duty to Comply

The *owner or operator* must comply with all conditions of this permit. All contractors and subcontractors associated with the project must comply with the terms of the SWPPP. Any non-compliance with this permit constitutes a violation of the Clean Water Act (CWA) and the ECL and is grounds for an enforcement action against the *owner or operator* and/or the contractor/subcontractor; permit revocation, suspension or modification; or denial of a permit renewal application. Upon a finding of significant non-compliance with this permit or the applicable SWPPP, the Department may order an immediate stop to all *construction activity* at the site until the non-compliance is remedied. The stop work order shall be in writing, shall describe the non-compliance in detail, and shall be sent to the *owner or operator.*

If any human remains or archaeological remains are encountered during excavation, the *owner or operator* must immediately cease, or cause to cease, all *construction activity* in the area of the remains and notify the appropriate Regional Water Engineer (RWE). *Construction activity* shall not resume until written permission to do so has been received from the RWE.

B. Continuation of the Expired General Permit

This permit expires five (5) years from the effective date. If a new general permit is not issued prior to the expiration of this general permit, an *owner or operator* with coverage under this permit may continue to operate and *discharge* in accordance with the terms and conditions of this general permit, if it is extended pursuant to the State Administrative Procedure Act and 6 NYCRR Part 621, until a new general permit is issued.

C. Enforcement

Failure of the *owner or operator,* its contractors, subcontractors, agents and/or assigns to strictly adhere to any of the permit requirements contained herein shall constitute a violation of this permit. There are substantial criminal, civil, and administrative penalties associated with violating the provisions of this permit. Fines of up to $37,500 per day for each violation and imprisonment for up to fifteen (15) years may be assessed depending upon the nature and degree of the offense.

D. Need to Halt or Reduce Activity Not a Defense

It shall not be a defense for an *owner or operator* in an enforcement action that it would have been necessary to halt or reduce the *construction activity* in order to maintain compliance with the conditions of this permit.

E. Duty to Mitigate

The *owner or operator* and its contractors and subcontractors shall take all reasonable steps to *minimize* or prevent any *discharge* in violation of this permit which has a reasonable likelihood of adversely affecting human health or the environment.

F. Duty to Provide Information

The *owner or operator* shall furnish to the Department, within a reasonable specified time period of a written request, all documentation necessary to demonstrate eligibility and any information to determine compliance with this permit or to determine whether cause exists for modifying or revoking this permit, or suspending or denying coverage under this permit, in accordance with the terms and conditions of this permit. The NOI, SWPPP and inspection reports required by this permit are public documents that the *owner or operator* must make available for review and copying by any person within five (5) business days of the *owner or operator* receiving a written request by any such person to review these documents. Copying of documents will be done at the requester's expense.

G. Other Information

When the *owner or operator* becomes aware that they failed to submit any relevant facts, or submitted incorrect information in the NOI or in any of the documents required by this permit , or have made substantive revisions to the SWPPP (e.g. the scope of the project changes significantly, the type of post-construction stormwater management practice(s) changes, there is a reduction in the sizing of the post-construction stormwater management practice, or there is an increase in the disturbance area or *impervious area*), which were not reflected in the original NOI submitted to the Department, they shall promptly submit such facts or information to the Department using the contact information in Part II.A. of this permit. Failure of the *owner or operator* to correct or supplement any relevant facts within five (5) business days of becoming aware of the deficiency shall constitute a violation of this permit.

H. Signatory Requirements

1. All NOIs and NOTs shall be signed as follows:

   a. For a corporation these forms shall be signed by a responsible corporate officer. For the purpose of this section, a responsible corporate officer means:

      (i) a president, secretary, treasurer, or vice-president of the corporation in charge of a principal business function, or any other person who performs similar policy or decision-making functions for the corporation; or

(ii) the manager of one or more manufacturing, production or operating facilities, provided the manager is authorized to make management decisions which govern the operation of the regulated facility including having the explicit or implicit duty of making major capital investment recommendations, and initiating and directing other comprehensive measures to assure long term environmental compliance with environmental laws and regulations; the manager can ensure that the necessary systems are established or actions taken to gather complete and accurate information for permit application requirements; and where authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures;

b. For a partnership or sole proprietorship these forms shall be signed by a general partner or the proprietor, respectively; or

c. For a municipality, State, Federal, or other public agency these forms shall be signed by either a principal executive officer or ranking elected official. For purposes of this section, a principal executive officer of a Federal agency includes:

(i) the chief executive officer of the agency, or

(ii) a senior executive officer having responsibility for the overall operations of a principal geographic unit of the agency (e.g., Regional Administrators of EPA).

2. The SWPPP and other information requested by the Department shall be signed by a person described in Part VII.H.1. of this permit or by a duly authorized representative of that person. A person is a duly authorized representative only if:

a. The authorization is made in writing by a person described in Part VII.H.1. of this permit;

b. The authorization specifies either an individual or a position having responsibility for the overall operation of the regulated facility or activity, such as the position of plant manager, operator of a well or a well field, superintendent, position of *equivalent* responsibility, or an individual or position having overall responsibility for environmental matters for the company. (A duly authorized representative may thus be either a named individual or any individual occupying a named position) and,

c. The written authorization shall include the name, title and signature of the authorized representative and be attached to the SWPPP.

3. All inspection reports shall be signed by the *qualified inspector* that performs the inspection.

4. The MS4 SWPPP Acceptance form shall be signed by the principal executive officer or ranking elected official from the *regulated, traditional land use control MS4,* or by a duly authorized representative of that person.

   It shall constitute a permit violation if an incorrect and/or improper signatory authorizes any required forms, SWPPP and/or inspection reports.

I. Property Rights

The issuance of this permit does not convey any property rights of any sort, nor any exclusive privileges, nor does it authorize any injury to private property nor any invasion of personal rights, nor any infringement of Federal, State or local laws or regulations. *Owners or operators* must obtain any applicable conveyances, easements, licenses and/or access to real property prior to *commencing construction activity*.

J. Severability

The provisions of this permit are severable, and if any provision of this permit, or the application of any provision of this permit to any circumstance, is held invalid, the application of such provision to other circumstances, and the remainder of this permit shall not be affected thereby.

K. Requirement to Obtain Coverage Under an Alternative Permit

1. The Department may require any *owner or operator* authorized by this permit to apply for and/or obtain either an individual SPDES permit or another SPDES general permit. When the Department requires any *discharger* authorized by a general permit to apply for an individual SPDES permit, it shall notify the *discharger* in writing that a permit application is required. This notice shall include a brief statement of the reasons for this decision, an application form, a statement setting a time frame for the *owner or operator* to file the application for an individual SPDES permit, and a deadline, not sooner than 180 days from *owner or operator* receipt of the notification letter, whereby the authorization to

discharge under this general permit shall be terminated. Applications must be submitted to the appropriate Permit Administrator at the Regional Office. The Department may grant additional time upon demonstration, to the satisfaction of the Department, that additional time to apply for an alternative authorization is necessary or where the Department has not provided a permit determination in accordance with Part 621 of this Title.

2. When an individual SPDES permit is issued to a discharger authorized to *discharge* under a general SPDES permit for the same *discharge*(s), the general permit authorization for outfalls authorized under the individual SPDES permit is automatically terminated on the effective date of the individual permit unless termination is earlier in accordance with 6 NYCRR Part 750.

L. Proper Operation and Maintenance

The *owner or operator* shall at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the *owner or operator* to achieve compliance with the conditions of this permit and with the requirements of the SWPPP.

M. Inspection and Entry

The *owner or operator* shall allow an authorized representative of the Department, EPA, applicable county health department, or, in the case of a construction site which *discharges* through an *MS4*, an authorized representative of the *MS4* receiving the discharge, upon the presentation of credentials and other documents as may be required by law, to:

1. Enter upon the *owner's or operator's* premises where a regulated facility or activity is located or conducted or where records must be kept under the conditions of this permit;

2. Have access to and copy at reasonable times, any records that must be kept under the conditions of this permit; and

3. Inspect at reasonable times any facilities or equipment (including monitoring and control equipment), practices or operations regulated or required by this permit.

4. Sample or monitor at reasonable times, for purposes of assuring permit compliance or as otherwise authorized by the Act or ECL, any substances or parameters at any location.

N. Permit Actions

This permit may, at any time, be modified, suspended, revoked, or renewed by the Department in accordance with 6 NYCRR Part 621. The filing of a request by the *owner or operator* for a permit modification, revocation and reissuance, termination, a notification of planned changes or anticipated noncompliance does not limit, diminish and/or stay compliance with any terms of this permit.

O. Definitions

Definitions of key terms are included in Appendix A of this permit.

P. Re-Opener Clause

1. If there is evidence indicating potential or realized impacts on water quality due to any stormwater discharge associated with *construction activity* covered by this permit, the *owner or operator* of such discharge may be required to obtain an individual permit or alternative general permit in accordance with Part VII.K. of this permit or the permit may be modified to include different limitations and/or requirements.

2. Any Department initiated permit modification, suspension or revocation will be conducted in accordance with 6 NYCRR Part 621, 6 NYCRR 750-1.18, and 6 NYCRR 750-1.20.

Q. Penalties for Falsification of Forms and Reports

In accordance with 6NYCRR Part 750-2.4 and 750-2.5, any person who knowingly makes any false material statement, representation, or certification in any application, record, report or other document filed or required to be maintained under this permit, including reports of compliance or noncompliance shall, upon conviction, be punished in accordance with ECL §71-1933 and or Articles 175 and 210 of the New York State Penal Law.

R. Other Permits

Nothing in this permit relieves the *owner or operator* from a requirement to obtain any other permits required by law.

APPENDIX A

Definitions

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Municipal Separate Storm Sewer (MS4) - a conveyance or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters,

ditches, man-made
channels, or storm drains):

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

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

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

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

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

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

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

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

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

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

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

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

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

Regulated, Traditional Land Use Control MS4 - means a city, town or village with land use control authority that is required to gain coverage under New York State DEC's SPDES General Permit For Stormwater Discharges from Municipal Separate Stormwater Sewer Systems (MS4s).

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

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

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

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

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

Steep Slope – means land area with a Soil Slope Phase that is identified as an E or F, or the map unit name is inclusive of 25% or greater slope, on the United States Department of Agriculture ("USDA") Soil Survey for the County where the disturbance will occur.

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

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

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

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

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

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

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

Uniform Procedures Act (UPA) Permit - means a permit required under 6 NYCRR Part

621 of the Environmental Conservation Law (ECL), Article 70.

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

APPENDIX B

Required SWPPP Components by Project Type

Table 1
CONSTRUCTION ACTIVITIES THAT REQUIRE THE PREPARATION OF A SWPPP THAT ONLY INCLUDES EROSION AND SEDIMENT CONTROLS

The following construction activities that involve soil disturbances of one (1) or more acres of land, but less than five (5) acres: • Single family home <u>not</u> located in one of the watersheds listed in Appendix C or <u>not</u> *directly discharging* to one of the 303(d) segments listed in Appendix E • Single family residential subdivisions with 25% or less impervious cover at total site build-out and <u>not</u> located in one of the watersheds listed in Appendix C and <u>not</u> directly discharging to one of the 303(d) segments listed in Appendix E • Construction of a barn or other agricultural building, silo, stock yard or pen.
The following construction activities that involve soil disturbances of one (1) or more acres of land: • Installation of underground, linear utilities; such as gas lines, fiber-optic cable, cable TV, electric, telephone, sewer mains, and water mains • Environmental enhancement projects, such as wetland mitigation projects, stormwater retrofits and stream restoration projects • Bike paths and trails • Sidewalk construction projects that are not part of a road/ highway construction or reconstruction project • Slope stabilization projects • Slope flattening that changes the grade of the site, but does not significantly change the runoff characteristics • Spoil areas that will be covered with vegetation • Land clearing and grading for the purposes of creating vegetated open space (i.e. recreational parks, lawns, meadows, fields), excluding projects that *alter hydrology from pre to post development* conditions • Athletic fields (natural grass) that do not include the construction or reconstruction of *impervious area* <u>and</u> do not *alter hydrology from pre to post development* conditions • Demolition project where vegetation will be established and no redevelopment is planned • Overhead electric transmission line project that does not include the construction of permanent access roads or parking areas surfaced with *impervious cover* • Structural practices as identified in Table II in the "Agricultural Management Practices Catalog for Nonpoint Source Pollution in New York State", excluding projects that involve soil disturbances of less than five acres and construction activities that include the construction or reconstruction of impervious area
The following construction activities that involve soil disturbances between five thousand (5000) square feet and one (1) acre of land: • All construction activities located in the watersheds identified in Appendix D that involve soil disturbances between five thousand (5,000) square feet and one (1) acre of land.

Table 2
CONSTRUCTION ACTIVITIES THAT REQUIRE THE PREPARATION OF A SWPPP THAT INCLUDES POST-CONSTRUCTION STORMWATER MANAGEMENT PRACTICES

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

- Single family home located in one of the watersheds listed in Appendix C or *directly discharging* to one of the 303(d) segments listed in Appendix E
- Single family residential subdivisions located in one of the watersheds listed in Appendix C or *directly discharging* to one of the 303(d) segments listed in Appendix E
- Single family residential subdivisions that involve soil disturbances of between one (1) and five (5) acres of land with greater than 25% impervious cover at total site build-out
- Single family residential subdivisions that involve soil disturbances of five (5) or more acres of land, and single family residential subdivisions that involve soil disturbances of less than five (5) acres that are part of a larger common plan of development or sale that will ultimately disturb five or more acres of land
- Multi-family residential developments; includes townhomes, condominiums, senior housing complexes, apartment complexes, and mobile home parks
- Airports
- Amusement parks
- Campgrounds
- Cemeteries that include the construction or reconstruction of impervious area (>5% of disturbed area) or *alter the hydrology from pre to post development* conditions
- Commercial developments
- Churches and other places of worship
- Construction of a barn or other agricultural building(e.g. silo) and structural practices as identified in Table II in the "Agricultural Management Practices Catalog for Nonpoint Source Pollution in New York State" that include the construction or reconstruction of *impervious area*, excluding projects that involve soil disturbances of less than five acres.
- Golf courses
- Institutional, includes hospitals, prisons, schools and colleges
- Industrial facilities, includes industrial parks
- Landfills
- Municipal facilities; includes highway garages, transfer stations, office buildings, POTW's and water treatment plants
- Office complexes
- Sports complexes
- Racetracks, includes racetracks with earthen (dirt) surface
- Road construction or reconstruction
- Parking lot construction or reconstruction
- Athletic fields (natural grass) that include the construction or reconstruction of impervious area (>5% of disturbed area) or *alter the hydrology from pre to post development* conditions
- Athletic fields with artificial turf
- Permanent access roads, parking areas, substations, compressor stations and well drilling pads, surfaced with *impervious cover,* and constructed as part of an over-head electric transmission line project , wind-power project, cell tower project, oil or gas well drilling project, sewer or water main project or other linear utility project
- All other construction activities that include the construction or reconstruction of *impervious area* <u>or</u> *alter the hydrology from pre to post development* conditions, <u>and</u> are not listed in Table 1

APPENDIX C

Watersheds Where Enhanced Phosphorus Removal Standards Are Required

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

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

Figure 1 - New York City Watershed East of the Hudson

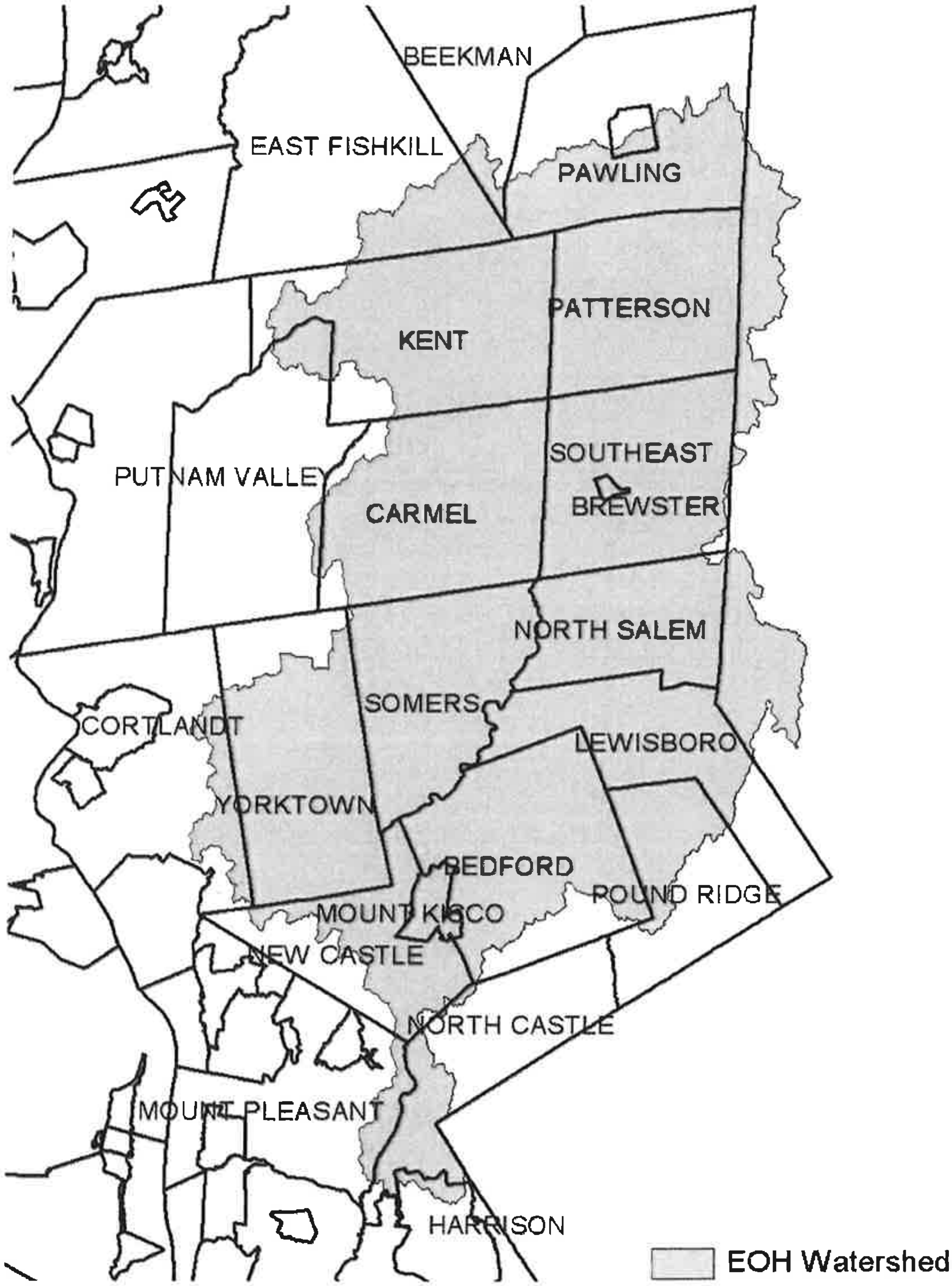


Figure 2 - Onondaga Lake Watershed

Figure 3 - Greenwood Lake Watershed

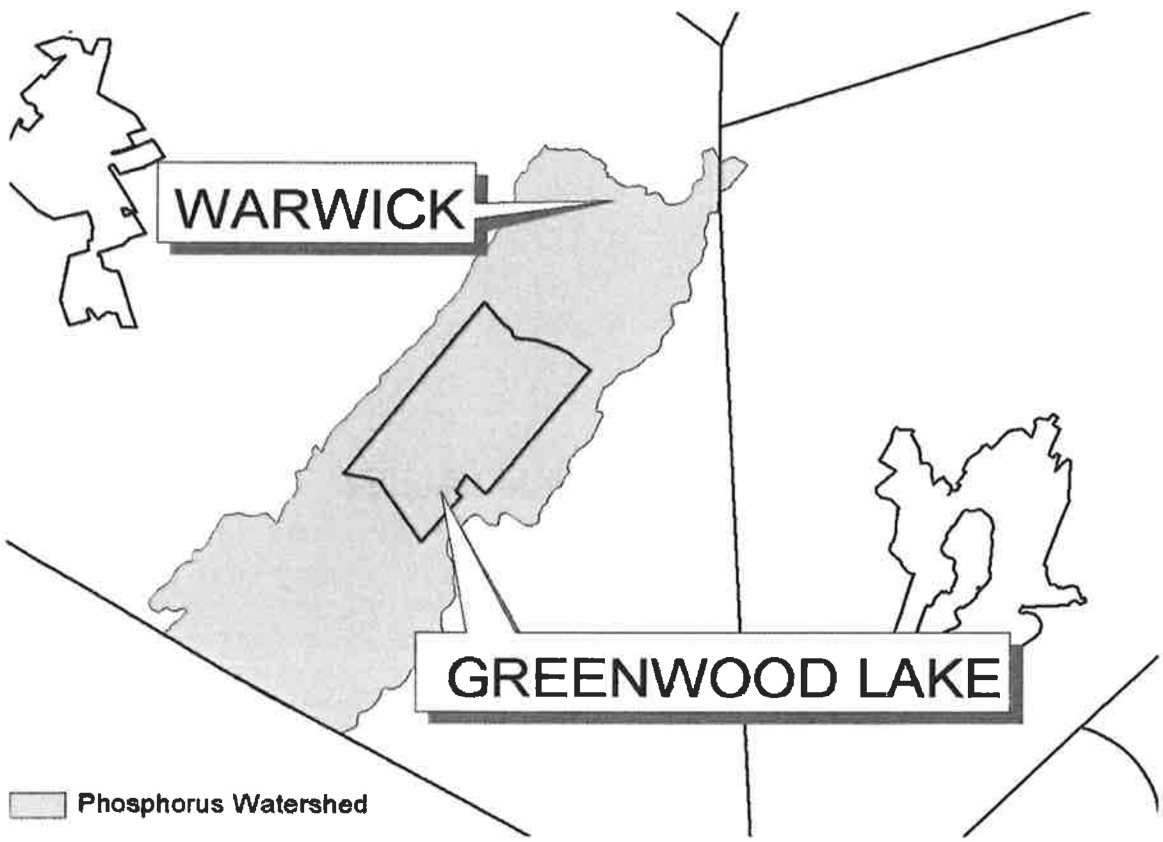


Figure 4 - Oscawana Lake Watershed

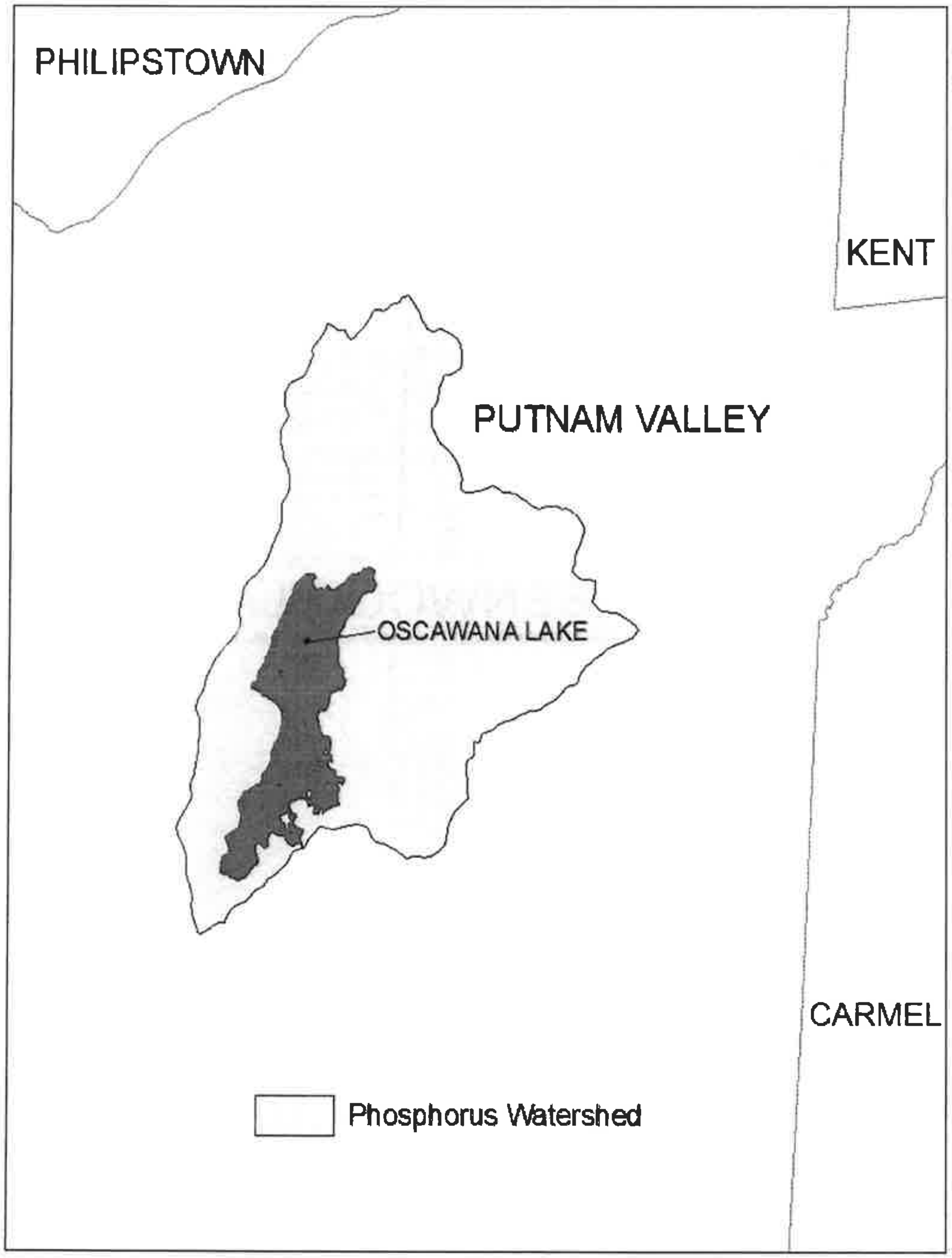
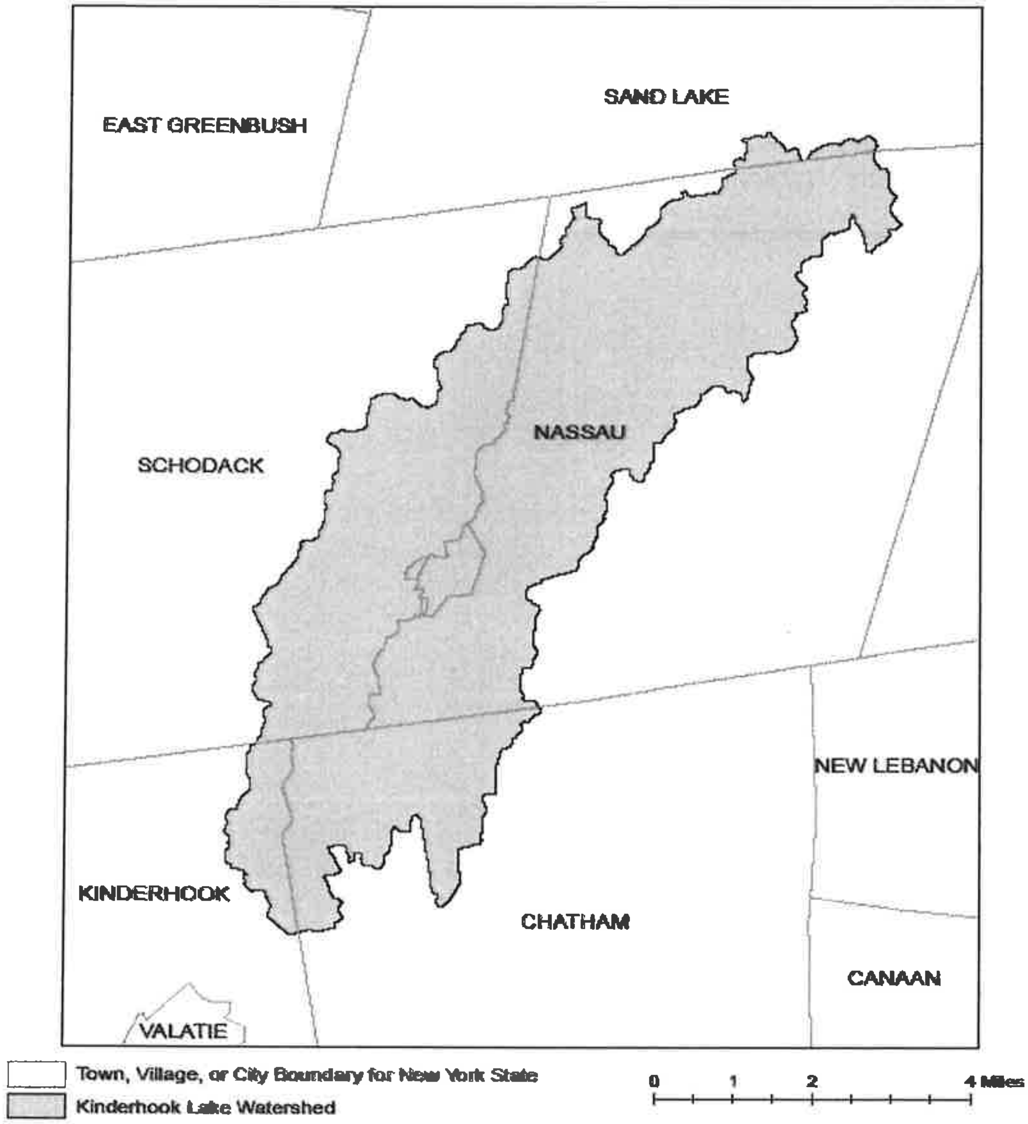


Figure 5: Kinderhook Lake Watershed



APPENDIX D

Watersheds where *owners or operators* of construction activities that involve soil disturbances between five thousand (5000) square feet and one (1) acre of land must obtain coverage under this permit.

Entire New York City Watershed that is located east of the Hudson River - See Figure 1 in Appendix C

APPENDIX E

List of 303(d) segments impaired by pollutants related to *construction activity* (e.g. silt, sediment or nutrients). *Owners or operators* of single family home and single family residential subdivisions with 25% or less total impervious cover at total site build-out that involve soil disturbances of one or more acres of land, but less than 5 acres, and *directly discharge* to one of the listed segments below shall prepare a SWPPP that includes post-construction stormwater management practices designed in conformance with the New York State Stormwater Management Design Manual ("Design Manual"), dated January 2015.

COUNTY	WATERBODY
Albany	Ann Lee (Shakers) Pond, Stump Pond
Albany	Basic Creek Reservoir
Allegheny	Amity Lake, Saunders Pond
Bronx	Van Cortlandt Lake
Broome	Whitney Point Lake/Reservoir
Broome	Fly Pond, Deer Lake
Broome	Minor Tribs to Lower Susquehanna (north)
Cattaraugus	Allegheny River/Reservoir
Cattaraugus	Case Lake
Cattaraugus	Linlyco/Club Pond
Cayuga	Duck Lake
Chautauqua	Chautauqua Lake, North
Chautauqua	Chautauqua Lake, South
Chautauqua	Bear Lake
Chautauqua	Chadakoin River and tribs
Chautauqua	Lower Cassadaga Lake
Chautauqua	Middle Cassadaga Lake
Chautauqua	Findley Lake
Clinton	Great Chazy River, Lower, Main Stem
Columbia	Kinderhook Lake
Columbia	Robinson Pond
Dutchess	Hillside Lake
Dutchess	Wappinger Lakes
Dutchess	Fall Kill and tribs
Erie	Green Lake
Erie	Scajaquada Creek, Lower, and tribs
Erie	Scajaquada Creek, Middle, and tribs
Erie	Scajaquada Creek, Upper, and tribs
Erie	Rush Creek and tribs
Erie	Ellicott Creek, Lower, and tribs
Erie	Beeman Creek and tribs
Erie	Murder Creek, Lower, and tribs
Erie	South Branch Smoke Cr, Lower, and tribs
Erie	Little Sister Creek, Lower, and tribs
Essex	Lake George (primary county: Warren)
Genesee	Black Creek, Upper, and minor tribs
Genesee	Tonawanda Creek, Middle, Main Stem
Genesee	Oak Orchard Creek, Upper, and tribs
Genesee	Bowen Brook and tribs
Genesee	Bigelow Creek and tribs
Genesee	Black Creek, Middle, and minor tribs
Genesee	LeRoy Reservoir
Greene	Schoharie Reservoir

COUNTY	WATERBODY
Greene	Sleepy Hollow Lake
Herkimer	Steele Creek tribs
Kings	Hendrix Creek
Lewis	Mill Creek/South Branch and tribs
Livingston	Conesus Lake
Livingston	Jaycox Creek and tribs
Livingston	Mill Creek and minor tribs
Livingston	Bradner Creek and tribs
Livingston	Christie Creek and tribs
Monroe	Lake Ontario Shoreline, Western
Monroe	Mill Creek/Blue Pond Outlet and tribs
Monroe	Rochester Embayment - East
Monroe	Rochester Embayment - West
Monroe	Unnamed Trib to Honeoye Creek
Monroe	Genesee River, Lower, Main Stem
Monroe	Genesee River, Middle, Main Stem
Monroe	Black Creek, Lower, and minor tribs
Monroe	Buck Pond
Monroe	Long Pond
Monroe	Cranberry Pond
Monroe	Mill Creek and tribs
Monroe	Shipbuilders Creek and tribs
Monroe	Minor tribs to Irondequoit Bay
Monroe	Thomas Creek/White Brook and tribs
Nassau	Glen Cove Creek, Lower, and tribs
Nassau	LI Tribs (fresh) to East Bay
Nassau	East Meadow Brook, Upper, and tribs
Nassau	Hempstead Bay
Nassau	Hempstead Lake
Nassau	Grant Park Pond
Nassau	Beaver Lake
Nassau	Camaans Pond
Nassau	Halls Pond
Nassau	LI Tidal Tribs to Hempstead Bay
Nassau	Massapequa Creek and tribs
Nassau	Reynolds Channel, east
Nassau	Reynolds Channel, west
Nassau	Silver Lake, Lofts Pond
Nassau	Woodmere Channel
Niagara	Hyde Park Lake
Niagara	Lake Ontario Shoreline, Western
Niagara	Bergholtz Creek and tribs
Oneida	Ballou, Nail Creeks
Onondaga	Ley Creek and tribs
Onondaga	Onondaga Creek, Lower and tribs

APPENDIX E

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

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

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

APPENDIX F

LIST OF NYS DEC REGIONAL OFFICES

Region	COVERING THE FOLLOWING COUNTIES:	DIVISION OF ENVIRONMENTAL PERMITS (DEP) PERMIT ADMINISTRATORS	DIVISION OF WATER (DOW) WATER (SPDES) PROGRAM
1	NASSAU AND SUFFOLK	50 CIRCLE ROAD STONY BROOK, NY 11790 TEL. (631) 444-0365	50 CIRCLE ROAD STONY BROOK, NY 11790-3409 TEL. (631) 444-0405
2	BRONX, KINGS, NEW YORK, QUEENS AND RICHMOND	1 HUNTERS POINT PLAZA, 47-40 21ST ST. LONG ISLAND CITY, NY 11101-5407 TEL. (718) 482-4997	1 HUNTERS POINT PLAZA, 47-40 21ST ST. LONG ISLAND CITY, NY 11101-5407 TEL. (718) 482-4933
3	DUTCHESS, ORANGE, PUTNAM, ROCKLAND, SULLIVAN, ULSTER AND WESTCHESTER	21 SOUTH PUTT CORNERS ROAD NEW PALTZ, NY 12561-1696 TEL. (845) 256-3059	100 HILLSIDE AVENUE, SUITE 1W WHITE PLAINS, NY 10603 TEL. (914) 428 - 2505
4	ALBANY, COLUMBIA, DELAWARE, GREENE, MONTGOMERY, OTSEGO, RENSSELAER, SCHENECTADY AND SCHOHARIE	1150 NORTH WESTCOTT ROAD SCHENECTADY, NY 12306-2014 TEL. (518) 357-2069	1130 NORTH WESTCOTT ROAD SCHENECTADY, NY 12306-2014 TEL. (518) 357-2045
5	CLINTON, ESSEX, FRANKLIN, FULTON, HAMILTON, SARATOGA, WARREN AND WASHINGTON	1115 STATE ROUTE 86, PO BOX 296 RAY BROOK, NY 12977-0296 TEL. (518) 897-1234	232 GOLF COURSE ROAD WARRENSBURG, NY 12885-1172 TEL. (518) 623-1200
6	HERKIMER, JEFFERSON, LEWIS, ONEIDA AND ST. LAWRENCE	STATE OFFICE BUILDING 317 WASHINGTON STREET WATERTOWN, NY 13601-3787 TEL. (315) 785-2245	STATE OFFICE BUILDING 207 GENESEE STREET UTICA, NY 13501-2885 TEL. (315) 793-2554
7	BROOME, CAYUGA, CHENANGO, CORTLAND, MADISON, ONONDAGA, OSWEGO, TIOGA AND TOMPKINS	615 ERIE BLVD. WEST SYRACUSE, NY 13204-2400 TEL. (315) 426-7438	615 ERIE BLVD. WEST SYRACUSE, NY 13204-2400 TEL. (315) 426-7500
8	CHEMUNG, GENESEE, LIVINGSTON, MONROE, ONTARIO, ORLEANS, SCHUYLER, SENECA, STEUBEN, WAYNE AND YATES	6274 EAST AVON-LIMA ROAD AVON, NY 14414-9519 TEL. (585) 226-2466	6274 EAST AVON-LIMA RD. AVON, NY 14414-9519 TEL. (585) 226-2466
9	ALLEGANY, CATTARAUGUS, CHAUTAUQUA, ERIE, NIAGARA AND WYOMING	270 MICHIGAN AVENUE BUFFALO, NY 14203-2999 TEL. (716) 851-7165	270 MICHIGAN AVE. BUFFALO, NY 14203-2999 TEL. (716) 851-7070

Chapter 248. Stormwater Management and Erosion and Sediment Control

[HISTORY: Adopted by the Town Board of the Town of Yorktown 10-19-2010 by L.L. No. 10-2010.[1] Amendments noted where applicable.]

GENERAL REFERENCES

Conservation Board — See Ch. **10**, Art. **II**.
Building construction administration — See Ch. **15**.
Blasting and explosives — See Ch. **124**.
Building construction and fire prevention — See Ch. **130**.
Conservation areas — See Ch. **140**.
Environmental quality review — See Ch. **161**.
Flood damage prevention — See Ch. **175**.
Freshwater wetlands — See Ch. **178**.
Land development — See Ch. **195**.
Illicit discharges, activities and connections — See Ch. **247**.
Zoning — See Ch. **300**.

[1] *Editor's Note: This local law also repealed former Ch. 248, Stormwater Management, adopted 5-4-2004 by L.L. No. 12-2004.*

§ 248-1. Findings of fact.

It is hereby determined that:

A. Land development activities and associated increases in site impervious cover often after the hydrologic response of local watersheds and increase stormwater runoff rates and volumes, flooding, stream channel erosion, or sediment transport and deposition;

B. This stormwater runoff contributes to increased quantities of waterborne pollutants, including siltation of aquatic habitat for fish and other desirable species:

C. Clearing and grading during construction tends to increase soil erosion and add to the loss of native vegetation necessary for terrestrial and aquatic habitats;

D. Improper design and construction of stormwater management practices can increase the velocity of stormwater ronoff, thereby increasing stream bank erosion and sedimentation;

E. Impervious surfaces allow less water to percolate into the soil, thereby decreasing groundwater recharge and stream base flow;

F. Substantial economic losses can result from these adverse impacts on the waters of the municipality;

G. Stormwater runoff, soil erosion and nonpoint source pollution can be controlled and minimized through the regulation of stormwater runoff from land development activities;

H. The regulation of stormwater runoff discharges from land development activities in order to control and minimize increases in stormwater runoff rates and volumes, soil erosion, stream channel erosion, and nonpoint source pollution associated with stormwater runoff is in the public interest and will minimize threats to public health and safety;

I. Regulation of land development activities by means of performance standards governing stormwater management and site design will produce development compatible with the natural functions of a particular site or an entire watershed and thereby mitigate the adverse effects of erosion and sedimentation from development.

§ 248-2. Intent and purpose.

It is the intent of the Town of Yorktown to establish minimum stormwater management requirements and controls to safeguard persons, protect property, prevent damage to the environment, and promote the public welfare by guiding, regulating, and controlling the design, use and maintenance of any development or other activity which disturbs or breaks the surface of soil or results in the movement of earth on land situated in the Town. This chapter seeks to meet those purposes by achieving the following objectives:

A. Meet the requirements of minimum measures 4 and 5 of the SPDES general permit for stormwater discharges from municipal separate stormwater sewer systems (MS4s), as amended or revised;

B. Require land development activities to conform to the substantive requirements of the New York State Department of Environmental Conservation State Pollutant Discharge Elimination System (SPDES) general permit for construction activities, as amended or revised;

C. Minimize increases in stormwater runoff from land development activities in order to reduce flooding, siltation, increases in stream temperature, and stream bank erosion and maintain the integrity of stream channels;

D. Minimize increases in pollution caused by stormwater runoff from land development activities which would otherwise degrade local water quality;

E. Minimize the total annual volume of stormwater runoff which flows from any specific site during and following development to the maximum extent practicable; and

F. Reduce stormwater runoff rates and volumes, soil erosion and nonpoint source pollution, wherever possible, through stormwater management practices and to ensure that these management practices are properly maintained and eliminate threats to public safety.

§ 248-3. Definitions.

A. Customary meanings. Except where specifically defined herein, all words used in this chapter shall carry their customary meanings. Certain words or phrases used in this chapter shall be interpreted as defined below, and where ambiguity exists, words or phrases shall be interpreted so as to give this chapter its most reasonable application in carrying out the regulatory goals as stated in § **248-2**.

B. Defined phrases. As used in this chapter, the following terms shall have the meanings indicated:

ADDITION

Any work on an existing structure that changes the external dimensions of such structure.

ADJACENT PARCEL

All parcels contiguous to the subject parcel, as well as all parcels downstream of the subject parcel within the natural or actual drainageway or watercourse.

AGENT

Any Town of Yorktown official who is designated to administer and enforce this chapter.

AGRICULTURAL ACTIVITY

The activity of an active farm, including grazing and watering livestock, irrigating crops, harvesting crops, using land for growing agricultural products, and cutting timber for sale, but shall not include the operation of a dude ranch, or similar operation, or the construction of new structures associated with agricultural activities.

ALTERATION

Any work on an existing structure that affects the interior of the structure but does not change its external dimensions.

APPLICANT

A property owner or agent of a property owner who has filed an application for a land development activity.

APPROVING AUTHORITY

The Planning Board, Town Board, Town Engineer or his/her authorized representative, or other approving authority to whom oversight of this chapter is given by the Town Board.

BUILDING

Any structure, either temporary or permanent, having walls and a roof, designed for the shelter of any person, animal, or property, and occupying more than 100 square feet.

BUILDING INSPECTOR

The Building Inspector of the Town of Yorktown, or his/her assistant.

BUILDING PERMIT

A permit issued by the municipality for the construction, erection, or alteration of a structure or building.

CERTIFICATION

A formal attestation that the specific inspections and tests, where required, have been performed and that such tests comply with applicable requirements of this chapter.

CERTIFIED CUBIC YARDS

The measurement used to determine the amount of material in excavation and/or fill measured by the method of average end areas.

CERTIFIED PROFESSIONAL IN EROSION AND SEDIMENT CONTROL (CPESC)

A person who has received training and is certified by CPESC Inc. to review, inspect, and/or maintain erosion and sediment control practices.

CHANNEL

A natural or artificial watercourse with a definite bed and banks that conducts continuously or periodically flowing water.

CLEARING

Any activity that removes the vegetative surface cover.

DEDICATION

The deliberate appropriation of property by its owner for general public use.

DESIGN MANUAL

The New York State Stormwater Management Design Manual, most recent version including applicable updates, that serves as the official guide for stormwater management principles, methods and practices.

DEVELOPER

A person who undertakes land development activities.

DEVELOPMENT

Any man-made change to unimproved real estate, including but not limited to the building of other structures, mining, dredging, filling, grading, paving, removal of vegetation, excavation, blasting or drilling operations.

DRAINAGEWAY

Any channel that conveys surface runoff throughout the site.

EROSION AND SEDIMENT CONTROL PERMIT

A permit issued by the Town of Yorktown for an approved erosion and sediment control plan which allows for the construction or alteration of ground improvements and structures for the control of erosion, runoff and grading.

EROSION AND SEDIMENT CONTROL PLAN

A plan or set of plans, prepared by a New York State licensed engineer, architect, landscape architect, or certified professional in erosion and sediment control (CPESC) or by the Westchester County Soil and Water Conservation District, indicating the specific measures and sequencing to be used to control sediment and erosion on a development site both during and after construction.

EROSION CONTROL

A measure that prevents erosion.

EROSION CONTROL MANUAL

The most recent version of the New York Standards and Specifications for Erosion and Sediment Control Manual, commonly known as the "Blue Book."

EXCAVATION

Any act by which organic matter, earth, sand, gravel, rock, or any other similar material is cut into, dug, quarried. uncovered, removed, displaced, or spread, and shall include the resulting conditions.

EXISTING GRADE

The elevation of the existing ground surface prior to excavation or filling.

FILL

Any act by which earth, sand, gravel, or other material is deposited, placed, replaced, dumped, transported, or moved by man to a new location.

FINAL GRADE

The elevation of the ground or pavement surface after the grading work is completed in accordance with the approved plan.

FLOODWAY

The channel of a river, stream, brook, or other watercourse and the adjacent areas that must he reserved in order to convey the one-hundred-year flood without cumulatively increasing the water surface elevation more than one foot, as shown on the Federal Emergency Management Agency Floodway Map.

GRADING

Excavation or fill or any combination thereof, and shall include the conditions resulting from any excavation or fill.

IMPERVIOUS COVER

Those surfaces, improvements and structures that cannot effectively infiltrate rainfall, snowmelt and water (e.g., building rooftops, pavement, sidewalks, driveways, etc.).

INDUSTRIAL STORMWATER PERMIT

A State Pollutant Discharge Elimination System permit issued to a commercial industry or group of industries which regulates the pollutant levels associated with industrial stormwater discharges or specifies on-site pollution control strategies.

INFILTRATION

The process of percolating stormwater into the subsoil.

JURISDICTIONAL WETLAND

An area identified pursuant to requirements of Chapter 178 of the Town of Yorktown Town Code.

LAND DEVELOPMENT ACTIVITY

Construction activity, including clearing, grading, excavation. soil disturbance or placement of fill, that results in land disturbance of equal to or greater than 5.000 square feet of total land area that is part of a larger common plan of development or sale, even though multiple separate and distinct land development activities may take place at different times on different schedules.

LANDOWNER

The legal or beneficial owner of land, including those holding the right to purchase or lease the land, or any other person holding proprietary rights in the land.

MAINTENANCE AGREEMENT

A legally recorded document that acts as a property deed restriction and which provides for long-term maintenance of stormwater management practices.

NATURAL DRAINAGE

Channels formed in the existing topography of the land prior to changes made by human activities.

NONPOINT SOURCE POLLUTION

Pollution from any source other than from any discernible, confined, and discrete conveyances and shall include, but not be limited to, pollutants from agricultural, silvicultural, mining, construction, subsurface disposal and urban runoff sources.

NYSDEC

New York State Department of Environmental Conservation.

PARCEL

All contiguous land under one ownership.

PERIMETER CONTROL

A barrier that prevents sediment from leaving a site by either filtering sediment-laden runoff or diverting the runoff to a sediment trap or basin.

PERMANENT VEGETATION
Mature ground cover to control soil erosion satisfactorily and to survive weather conditions.

PERMTTTEE
Any person to whom a permit is issued.

PERMITTING AUTHORITY
The administrative board or public official empowered to grant permits under this chapter.

PERSON
Any individual, firm, or corporation (public or private), the State of New York, and its agencies or political subdivisions, and the United States of America, its agencies and instrumentalities, and any agent, servant, or employee of the foregoing.

PHASING
Clearing a parcel of land in distinct pieces or parts, with the stabilization of each piece completed before the clearing of the next.

POLLUTANT OF CONCERN
Sediment or a water quality measurement that addresses sediment (such as total suspended solids, turbidity or siltation) and any other pollutant that has been identified as a cause of impairment of any water body that will receive a discharge from the land development activity.

PROJECT
Land development activity.

QUALIFIED INSPECTOR
A person who 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), or licensed landscape architect, or other New York State Department of Environmental Conservation (NYSDEC) endorsed individual(s). It also means someone working under the direct supervision of the licensed professional engineer or licensed 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 an individual performing a site inspection has received four hours of training, endorsed by the NYSDEC, from a soil and water conservation district, CPESC Inc. or other NYSDEC endorsed entity in proper erosion and sediment control principles every three years.

QUALIFLED PROFESSIONAL
A person who is knowledgeable in the principles and practices of stormwater management and treatment, such as a licensed professional engineer, registered landscape architect or other NYSDEC endorsed individual(s). Individuals preparing SWPPPs that require the post-construction stormwater management practice component must have an understanding of the principles of hydrology, water quality management practice design, water quantity control design, and, in many cases, the principles of hydraulics in order to prepare a SWPPP that conforms to the NYSDEC's technical standard. All components of the SWPPP that involve the practice of engineering, as defined by the New York State Education Law (see Article 145), shall be prepared by, or under the direct supervision of, a professional engineer licensed to practice in the State of New York.

RECHARGE

The replenishment of underground water reserves.

REMOVAL

Cutting vegetation to the ground or leaving it as stumpage; complete extraction or killing by spraying.

SEDIMENT CONTROL

Measures that prevent eroded sediment from leaving the site.

SENSITIVE AREAS

Cold-water fisheries, shellfish beds, swimming beaches, groundwater recharge areas, water supply reservoirs, wetlands, watercourses and water bodies, and habitats for threatened, endangered or special-concern species.

SITE

A parcel of land or a contiguous combination thereof, where grading work is performed as a single unified operation (would include all phases of a single development).

SITE DEVELOPMENT

Altering terrain and/or vegetation and any type of construction.

SOIL STABILIZATION

Measures that protect soil from the erosive forces of rain, flowing water, and wind, including, but not limited to, vegetative establishment, mulching, and the early application of gravel or stone base on areas to be paved.

SPDES GENERAL PERMIT FOR CONSTRUCTION ACTIVITIES

A permit under the New York State Pollutant Discharge Elimination System (SPDES) issued to developers of construction activities to regulate disturbance of one or more acres of land.

SPDES GENERAL PERMIT FOR STORMWATER DISCHARGES FROM MUNICIPAL SEPARATE STORMWATER SEWER SYSTEMS

A permit under the New York State Pollution Discharge Elimination System (SPDES) issued to municipalities to regulate discharges from municipal separate storm sewers for compliance with EPA-established water quality standards and/or to specify stormwater control standards.

STABILIZATION

The use of practices that prevent exposed soil from eroding.

START OF CONSTRUCTION

The first land-disturbing activity associated with a development, such as tree cutting, clearing, grading, and filling; installation of streets and walkways; excavation for basement, footings, piers, or foundations; erection of temporary forms; and installation of accessory buildings, such as garages.

STOP-WORK ORDER

An order issued which requires that all construction activity on a site be stopped.

STORMWATER

Rainwater, surface runoff, snowmelt and drainage.

STORMWATER HOTSPOT

A land use or activity that generates higher concentrations of hydrocarbons, trace metals or toxicants than are found in typical stormwater runoff, based on monitoring studies.

STORMWATER MANAGEMENT

The use of structural or nonstructural practices that are designed to reduce stormwater runoff and mitigate its adverse impacts on property, natural resources and the environment.

STORMWATER MANAGEMENT FACILITY

One or a series of stormwater management practices installed, stabilized and operating for the purpose of controlling stormwater runoff.

STORMWATER MANAGEMENT OFFICER

An employee or officer designated by the Town of Yorktown to accept and review stormwater pollution prevention plans, forward the plans to the applicable municipal board and inspect stormwater practices, and under this chapter, the duly appointed Town Engineer or his/her designated representative.

STORMWATER MANAGEMENT PRACTICES (SMPs)

Measures, either structural or nonstructural, that are determined to be the most effective, practical means of preventing flood damage and preventing or reducing point source or nonpoint source pollution inputs to stormwater runoff and water bodies.

STORMWATER POLLUTION PREVENTION PLAN (SWPPP)

A plan for controlling stormwater runoff and pollutants from a site during and after construction activities.

STORMWATER RUNOFF

Flow on the surface of the ground, resulting from precipitation.

STRIPPING

Any activity which removes the vegetative surface cover, including tree removal, clearing, and storage or removal of topsoil.

SURFACE WATERS OF THE STATE OF NEW YORK

Lakes, bays, sounds, ponds, impounding reservoirs, springs, wells, rivers, streams, creeks, estuaries, marches, inlets, canals, the Atlantic Ocean within the territorial seas of the State of New York and other bodies of surface water, natural or artificial, inland or coastal, fresh or salt, public or private (except those private waters that do not combine or effect a junction with natural surface or underground waters), which are wholly or partially within or bordering the state or within its jurisdiction.

TEMPORARY STREAM CROSSING

A temporary structural span installed across a watercourse for use by construction traffic. Structures may include, but are not limited to, bridges, pipes, culverts, or fords.

TOWN ENGINEER

The duly appointed Town Engineer or his/her designated representative, and under this chapter, an employee or officer designated by the Town of Yorktown to accept and review stormwater pollution prevention plans, forward the plans to the applicable municipal board and inspect stormwater practices.

VARIANCE

A grant of relief from the requirements of this chapter which permits a person to undertake construction in a manner otherwise prohibited by this chapter where specific enforcement would result in unnecessary hardship.

WATERCOURSE

A permanent or intermittent stream or other body of water, either natural or man-made, which gathers or carries surface water.

WATERWAY

A channel that directs surface runoff to a watercourse or to the public storm drain.

WET SEASON

The period from October 15 to April 15 or as determined by the Town Engineer.

§ 248-4. Applicability.

A. General applicability. The regulations established in this provision shall apply to all construction activities of 5,000 square feet and/or all construction activities that move 50 cubic yards or more of soil material within the Town of Yorktown, including any activity not physically completed prior to the effective date of this chapter. As used in this section, the term "physically completed" shall mean the actual completion of construction activities related to a regulated activity, including filling, erecting structures or other improvement or development activities.

B. Grandfathered projects. The provisions of this chapter shall not apply to any land use, improvement or development that has been physically completed prior to the effective date of this chapter.

C. Current projects.

(1) A regulated. activity that was approved prior to the effective date of this chapter but which is not in conformity with the provisions of this chapter may be continued subject to the following:

(a) All such activities shall continue to be governed by the present regulations of the Town of Yorktown.

(b) No such activity shall be expanded, changed, enlarged or altered without compliance with this chapter.

(c) If such activity is discontinued for 12 consecutive months, any resumption of the activity shall conform to this chapter.

(d) If any such use or activity is destroyed by human activities, a force of nature or an act of God, it shall not be resumed except in conformity with the provisions of this chapter.

(2) Activities or adjuncts thereof that are or become nuisances shall not be entitled to continue.

§ 248-5. Exempt activities; regulated activities.

No construction activity shall be conducted, unless identified in § **248-5A** as an exempt activity, without a written permit from the approval authority and full compliance with the terms of this chapter and other applicable regulations.

A. Exempt activities. The following uses shall be permitted as of right to the extent that they are not prohibited or regulated by any other law, ordinance, or regulation and to the extent that they do not constitute a pollution or erosion hazard:

(1) Normal lawn maintenance.

(2) Agricultural activity as defined in this chapter.

(3) Routine maintenance activities that are performed to maintain the original line and grade, hydraulic capacity or original purpose of a facility.

(4) Grading of land in a uniform manner or other land disturbance activity that is less than 5,000 square feet in area.

(5) Alteration of the exterior of a building and alteration of a building, provided that such exterior alteration does not increase land coverage.

(6) Installation, renovation, or replacement of a septic system to serve an existing dwelling or structure(s).

(7) Any emergency activity which is immediately necessary to the protection of life, property or natural resources.

(8) Repairs to any stormwater management practice or facility deemed necessary by the Stormwater Management Officer.

(9) Installation of fence, sign, telephone, and electric poles and other kinds of posts or poles.

(10) Activities of an individual engaging in home gardening by growing flowers, vegetables and other plants primarily for use by that person and his or her family.

(11) Landscaping and horticultural activities in connection with an existing structure.

B. Regulated activities subject to review of Planning Board. The Planning Board is the approval authority for stormwater management and erosion and sediment control applications in conjunction with the following:

(1) Site plan applications.

(2) Subdivision applications.

(3) Wetland applications, which require Planning Board review, in accordance with Chapter **178**.

C. Regulated activities subject to review of the Town Board. The Town Board is the approval authority for stormwater management and erosion and sediment control applications in conjunction with the following:

(1) Land disturbance greater than 20,000 square feet or activities in which greater than 200 cubic yards of fill will be deposited and/or removed from a parcel.

(2) Site plan applications not subject to Planning Board approval.

D. Regulated activities subject to administrative permit. The Town Engineer is the approval authority for any development that does not fall within Subsections **A** and **B** above and proposes to disturb 5,000 square feet or more in area or the movement of 50 cubic yards or more of material.

§ 248-6. Stormwater pollution prevention plans.

No application for approval of a land development activity shall be reviewed until the appropriate board had received a stormwater pollution prevention plan (SWPPP) prepared in accordance with the specifications in this chapter.

A. Contents of stormwater pollution prevention plans.

(1)

All SWPPPs shall provide the following background information and erosion and sediment controls:

(a) Background information about the scope of the project, including the location, type and size of project, the name(s), addresses(s) and phone number(s) of the owner(s) and/or developer(s).

(b) Site map/construction drawing(s) for the project, including a general location map. At a minimum, the site map should show the total site area; all improvements; area of disturbance; areas that will not be disturbed; existing vegetation; on-site and adjacent off-site surface water(s); wetlands and drainage patterns that could be affected by the construction activity; existing and final slopes; locations of different soil types with boundaries; material, waste, borrow or equipment storage areas located on adjacent properties; sensitive areas; and location(s) of the stormwater discharges(s). Site map should be at a scale no smaller than one inch equals 100 feet (e.g., one inch equals 500 feet is smaller than one inch equals 100 feet).

(c) Description of the soil(s) present at the site, including an identification of the hydrologic soil group (HSG).

(d) Construction phasing plan and sequence of operations describing the intended sequence of construction activities, including clearing and grubbing, excavation and grading, utility and infrastructure installation and any other activity at the site that results in soil disturbance. Consistent with the New York Standards and Specifications for Erosion and Sediment Control (Erosion Control Manual), not more than five acres shall be disturbed at any one time unless pursuant to an approved SWPPP.

(e) Description of the pollution prevention measures that will be used to control litter, construction chemicals and construction debris from becoming a pollutant source in stormwater runoff.

(f) Temporary and permanent soil stabilization plan that meets the requirements of the most current version of the technical standard, New York State Standards and Specifications for Erosion and Sediment Control, for each stage of the project, including initial land clearing and grubbing to project completion and achievement of final stabilization.

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

(h) Dimensions, material specifications, installation details, and operation and maintenance requirements for all erosion and sediment control practices, including the siting and sizing of any temporary sediment basins and structural practices that will be used to divert flows from exposed soils.

(i) Description and location of any stormwater discharges associated with industrial activity other than construction at the site, including, but not limited to, stormwater discharges from asphalt plants and concrete plants located on the construction site.

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

(k)

An inspection schedule for the developer or the contractor(s) that will be responsible for installing, constructing, repairing, inspecting and maintaining the erosion and sediment control practices included in the SWPPP to ensure continuous and effective operation of the practices. The inspection schedule shall be in accordance with the requirements in the most current version of the technical standard, New York State Standards and Specifications for Erosion and Sediment Control.

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

(2) Land development activities as defined in § **248-3** of this chapter that disturb one or more acres of land and are listed in § **248-6A(2)(a)** through **(w)** below shall also include water quantity and water quality controls (postconstruction stormwater runoff controls) designed in conformance with the enhanced phosphorus removal standards in the New York State Stormwater Management Design Manual.

(a) Single-family home construction;

(b) Single-family residential subdivisions;

(c) Multifamily residential developments, includes townhomes, condominiums, senior housing complexes, and apartment complexes;

(d) Airports;

(e) Amusement parks;

(f) Campgrounds;

(g) Commercial developments;

(h) Churches and other places of worship;

(i) Construction of a barn or other agricultural building (e.g., silo) and structural practices as identified in Table II in the Agricultural Management Practices Catalog for Nonpoint Source Pollution in New York State that include the construction or reconstruction of impervious area, excluding projects that involve soil disturbances of less than five acres;

(j) Golf courses;

(k) Institutional facilities; includes hospitals, prisons, schools and colleges;

(l) Industrial facilities; includes industrial parks;

(m) Landfills;

(n) Municipal facilities; includes highway garages, transfer stations, office buildings, POTWs and water treatment plants;

(o) Office complexes;

(p) Sports complexes;

(q) Racetracks; includes racetracks with earthen (dirt) surface;

(r) Road construction or reconstruction;

(s) Parking lot construction or reconstruction;

(t) Athletic fields (natural grass) that include the construction or reconstruction of impervious area (greater than 5% of disturbed area) or alter the hydrology from predevelopment to postdevelopment conditions;

(u) Athletic fields with artificial turf;

(v) Permanent access roads or parking areas surfaced with impervious cover, and substations constructed as part of an overhead electric transmission line project, wind power project or cell tower project; and

(w) All other construction activities, not listed above, that include the construction or reconstruction of impervious area and alter the hydrology from predevelopment to postdevelopment conditions.

(3) SWPPP requirements for land development activities that are subject to § **248-6A(2)**:

(a) All information in § **248-6A(1)** of this chapter;

(b) Description of each postconstruction stormwater management practice;

(c) Site map/construction drawing(s) showing the specific location(s) and size(s) of each postconstruction stormwater management practice;

(d) Hydrologic and hydraulic analysis for all structural components of the stormwater management system for the applicable design storms;

(e) A detailed summary (including calculations) of the sizing criteria that was used to design all postconstruction stormwater management practices. At a minimum, the summary shall address the required design criteria from the applicable chapter(s) of the New York State Stormwater Management Design Manual, including the identification of and justification for any deviations from the Design Manual, and identification of any design criteria that are not required based on the redevelopment criteria or waiver criteria included in the Design Manual;

(f) Dimensions, material specifications and installation details for each postconstruction stormwater management practice;

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

(h) Maintenance easements to ensure access to all stormwater management practices at the site for the purpose of inspection and repair. Easements shall be recorded on the plan and shall remain in effect with transfer of title to the property;

(i) Inspection and maintenance agreements binding on all subsequent landowners served by the on-site stormwater management measures in accordance with § **248-8** of this chapter.

B. Plan preparation and certification. For land development activities as defined in §§ **248-3** and **248-6A(2)** of this chapter, the SWPPP shall be prepared by a qualified professional as defined in this chapter and must be signed by the professional preparing the plan, who shall certify that the design of all stormwater management practices meet the requirements in this chapter.

C.

Other environmental permits. The applicant shall assure that all other applicable environmental permits have been or will be acquired for the land development activity prior to approval of the final SWPPP.

D. Contractor qualifications/certification.

(1) Each contractor and subcontractor identified in the SWPPP who will be responsible for installing, constructing, repairing, inspecting and maintaining the erosion and sediment control practices included in the SWPPP and the postconstruction stormwater management practice installation must sign and date a copy of the following contractor certification statement before undertaking any land development activity: "I certify under penalty of law that I understand and agree to comply with the terms and conditions of the Stormwater Pollution Prevention Plan; and that I, or one of my on-site staff, has received a minimum of four hours of acceptable training in erosion and sediment control within the last three years. I also understand that it is unlawful for any person to cause or contribute to a violation of water quality standards."

(2) The certification must include the name and title of the person providing the signature; address and telephone number of the contracting firm; the address (or other identifying description) of the site; and the date the certification is made.

(3) The certification statement(s) shall become part of the SWPPP for the land development activity.

E. A copy of the SWPPP shall be retained at the site of the land development activity during construction from the date of initiation of construction activities to the date of final stabilization.

F. Working in or crossing watercourses.

(1) Construction vehicles should be kept out of watercourses to the greatest extent possible. Where channel work is necessary, precautions must be taken to stabilize the work area during construction to minimize erosion. The channel (including bed and banks) must be restabilized at the end of each day once in-channel work has begun. Channel work is not permitted during the wet season or as may be prescribed by the approval authority.

(2) Where a watercourse must be crossed by construction vehicles regularly during construction, a temporary stream crossing, diversion, or dewatering plan must be provided. In the event that any work is conducted in wetlands, as the term is defined in Chapter **178** of the Code of the Town of Yorktown, those permit procedures shall apply.

G. Underground utility construction.

(1) The construction of underground utility lines involving installation, maintenance, or repair which disturbs more than 10,000 square feet shall be subject to the following criteria:

(a) No more than 300 feet of trench are to be opened at one time unless approval to open a greater length is granted by the Town Engineer.

(b) Where consistent with safety and space considerations, excavated material is to be placed on the uphill side of the trenches.

(c) Trench dewatering devices shall discharge in a manner which will not adversely affect flowing streams, drainage systems, or off-site property.

(2) Individual service connections, telephone, and electric lines and underground public utility lines under streets or sidewalks are exempt from the above requirements.

§ 248-7. Performance and design criteria.

A. Technical standards. For the purpose of this chapter, the following documents shall serve as the official guides and specifications for stormwater management. Stormwater management practices that are designed and constructed in accordance with these technical documents shall be presumed to meet the standards imposed by this chapter:

(1) The New York State Stormwater Management Design Manual (New York State Department of Environmental Conservation, most current version or its successor, referred to as the Design Manual), including the enhanced phosphorus removal standards.

(2) New York Standards and Specifications for Erosion and Sediment Control (Empire State Chapter of the Soil and Water Conservation Society, 2005, most current version or its successor, hereafter referred to as the "Erosion Control Manual").

B. Equivalence to technical standards. Where stormwater management practices are not designed in accordance with the technical standards referenced in § **248-7A**, the applicant or developer must demonstrate equivalence to these standards and the SWPPP shall be prepared by a licensed professional.

C. Water quality standards. Any land development activity shall not cause an increase in turbidity that will result in substantial visible contrast to natural conditions in surface waters of the State of New York.

§ 248-8. Maintenance, inspection and repair of stormwater facilities.

A. Maintenance and inspection during construction.

(1) The applicant or developer of the land development activity shall at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the applicant or developer to achieve compliance with the conditions of this chapter. Sediment shall be removed from sediment traps of sediment ponds whenever their design capacity has been reduced by 50%.

(2) For land development activities as defined in § **248-3** of this chapter that disturb one or more acres of land, the applicant shall have a qualified inspector conduct site inspections and document the effectiveness of all erosion and sediment control practices every seven days. Inspection reports shall be maintained in a site logbook and copies furnished to the Town Engineer within seven days of inspection.

B. Maintenance easement(s). Prior to the issuance of any approval that has a stormwater management facility as one of the requirements, the applicant or developer must execute a maintenance agreement that shall be binding on all subsequent landowners served by the stormwater management facility. The easement shall provide for access to the facility at reasonable times for periodic inspection by the Town of Yorktown to ensure that the facility is maintained in proper working condition to meet design standards and any other provisions established by this chapter. The easement shall be recorded by the grantor in the office of the County Clerk after approval by the counsel for the Town of Yorktown.

C. Maintenance after construction. The owner or operator of permanent stormwater management practice(s) installed in accordance with this chapter shall ensure that the practice(s) are operated and maintained to achieve the goals of this chapter. Proper operation and maintenance also includes, as a minimum, the following:

(1) A preventive/corrective maintenance program for all critical facilities and systems of treatment and control (or related appurtenances) which are installed or used by the owner or operator to achieve the goals of this chapter.

(2) Written procedures for operation and maintenance and training new maintenance personnel.

(3) Discharges from the SMPs shall not exceed design criteria or cause or contribute to water quality standard violations in accordance with § **248-7C**.

D. Maintenance agreements. The Town of Yorktown shall approve a formal maintenance agreement for stormwater management facilities binding on all subsequent landowners and recorded in the office of the County Clerk as a deed restriction on the property prior to final plan approval. The maintenance agreement shall be consistent with the terms and conditions of the Sample Stormwater Control Facility Maintenance Agreement as prepared by the New York State Department of Environmental Conservation and on file at the Town Clerk and Planning and Engineering offices. The Town of Yorktown, in lieu of a maintenance agreement, at its sole discretion, may accept dedication of any existing or future stormwater management facility, provided that such facility meets all the requirements of this chapter and includes adequate and perpetual access and sufficient area, by easement or otherwise, for inspection and regular maintenance.

§ 248-9. Procedures for permits.

A. Application required. Except as otherwise provided in this chapter, no person shall commence or perform any land-disturbing activity not exempted from this section, including but not limited to grading, stripping, excavating or filling, without first obtaining a stormwater management and erosion and sediment control permit from the permitting authority. Application for a permit shall be made to the approval authority on forms furnished by the Planning and Engineering Department. When a stormwater management and an erosion and sediment control permit is required for improvements associated with a subdivision, site plan or wetland application, a separate erosion and sediment control application form is not required; however, the required fee shall be submitted in accordance with a fee schedule adopted by the Town Board. The approval authority shall review the subdivision, site plan or wetland applications using the standards established by this chapter.

B. Coordination with other reviews. It is the intent of this chapter to incorporate the consideration of stormwater management, soil erosion and sediment control into the Town's extant land use and development approval procedures in conjunction with the procedures of the State Environmental Quality Review Act whenever applicable. To the maximum extent possible, the review, hearings and decision upon any application processed under this chapter shall be coincident with similar procedures that the approval authority may undertake in regard to other applications that are directly related.

C. Notice to agencies. Upon submission of a completed application, the Planning and Engineering Department or the Town Board shall notify all interested agencies required by applicable statutes, the Town Board, the Conservation Board and any agency so designated by resolution of the Town Board of an opportunity to provide comment.

D. Town of Yorktown Conservation Board review. The Conservation Board shall review the Planning Board and Town Board applications within 30 days of the date of the Planning and Engineering Department's or Town Board's transmittal letter and shall file a written report to the approval authority with its recommendations concerning the application. Such report shall evaluate the proposed operation or project in terms of the findings, intent and standards of this chapter.

E. Westchester County Soil and Water Conservation District review. The Westchester County Soil and Water Conservation District may be consulted for review and recommendations for all applications for any permits involving land-disturbing activity which involves construction on slopes in excess of 25%, excavation or fill of 20,000 cubic yards or more of material, is within 100 feet of a watercourse, as defined herein, or within 100 feet of wetlands as classified by the unified definition or for any applications for permits involving any land-disturbing activities in the Town of Yorktown. If the Westchester County Soil and Water Conservation District fails to make any recommendation within 30 days upon receipt of mailing, such referral shall be deemed to constitute no objection to the application.

F. SEQRA compliance. An application shall not be deemed complete until and unless the applicant has complied fully with the procedures of the State Environmental Quality Review Act.

G. Expiration of approval. All permits shall expire upon completion of the acts specified and, unless otherwise indicated, shall be valid for a period of one year from the date of issue. An extension of an original permit may be granted upon written request to the approval authority by the original permit holder or his/her legal agent. The approval authority may require a new application be filed if, in its judgment, the original intent of the permit is altered or extended by the renewal or if the applicant has failed to abide by the terms of the original permit in any way. The request for renewal of a permit shall follow the same form and procedure as the original application.

H. Administrative review. If the application is determined to require administrative review, the Town Engineer or his/her authorized representative has the authority to waive any requirement as listed under § **248-7**.

§ 248-10. Permit application.

An application for a stormwater management and an erosion and sediment control permit shall be made by the owner of the property or his authorized agent with the Planning and Engineering Department. Each application shall include an erosion and sediment control plan. Each application shall bear the name(s) and address(es) of the owner or developer of the site and of any consulting firm retained by the applicant, together with the name of the applicant's principal contact at such firm. Furthermore, each application shall include a certification that any land clearing, construction or development involving the movement of earth shall be in accordance with the plans approved by issuance of the permit.

§ 248-11. Required application submissions.

Each application for a permit hereunder shall be accompanied by the following information and/or items, except submittals and/or their substantial equivalents as in the case of the administrative permit application where required by the Town Engineer or his/her authorized representative.

A. An application form as provided by the Planning and Engineering Departments.

B. A completed stormwater pollution prevention plan as detailed in § **248-6**.

§ 248-12. Improvement security.

The applicant may be required to file with the Town of Yorktown a stormwater management and erosion and sediment control bond or other improvement security satisfactory to the Town Attorney in an amount deemed sufficient by the permitting authority to cover all costs of improvements, landscaping, maintenance of improvements, and landscaping for such period as specified by the Town, and engineering inspection costs to cover the cost of failure or repair of improvements installed on the site.

§ 248-13. Review of application; approval.

Each application for a stormwater management plan and an erosion and sediment control permit shall be reviewed and acted upon according to the following procedures:

A. The permitting authority will review each application for a stormwater management plan and an erosion and sediment control permit to determine its completeness and conformance with the provisions of this chapter. The permitting authority, within 31 days of receipt of the application, shall make a determination as to whether an application is complete.

B. Referrals. The permitting authority, upon receipt of a completed application or upon a determination of completion, may refer the completed application and supporting plans and documents to the Westchester County Soil and Water Conservation District on all applications meeting the criteria set forth in this chapter. All applications not handled by the Town Engineer administratively may be referred to the Conservation Board for review and comment. The Westchester County Soil and Conservation District or the Conservation Board, as applicable, shall be required to review the application within 30 days of receipt thereof and shall file a written report with the permitting authority with its recommendations concerning the application, including, but not limited to, an evaluation of the completeness of the application. Such report shall evaluate the proposed operation or project in terms of the management objectives and principles of this chapter and shall include the effect of such operation or project on the project area. The permitting authority may also refer any application, where applicable, to any other local governmental or public agency within whose jurisdiction the site is located, for review and comment.

C. No stormwater management and erosion and sediment control permit shall be issued for the proposed site plan, subdivision or wetland unless:

   (1) The development has been approved by the Town of Yorktown, where applicable;

   (2) Such permit is accompanied by or combined with a valid building permit issued by the Town of Yorktown; and

   (3) The proposed earthmoving is coordinated with any overall development previously approved by the Town of Yorktown for the area in which the site is situated.

D. Pending preparation and approval of a revised plan, development activities shall be allowed by the approval authority.

§ 248-14. Responsibility for damages.

The permittee shall not be relieved of responsibility for damage to persons or property otherwise imposed by law, and the Town of Yorktown or its officers will not be made liable for such damage by:

A. The issuance of a permit under this chapter;

B. Compliance with the provisions of that permit or with conditions attached thereto;

C. Failure of municipal officials to observe or recognize hazardous or unsightly conditions;

D. Failure of municipal officials to recommend denial of or to deny a permit; or

E. Exemptions from the permit requirements of this chapter.

§ 248-15. Erosion and sediment control inspection.

A. Required inspections; notification; violations.

(1) The Town of Yorktown Stormwater Management Officer may require such inspections as necessary to determine compliance with this chapter and may either approve that portion of the work completed or notify the applicant wherein the work fails to comply with the requirements of this chapter and the stormwater pollution prevention plan (SWPPP), as approved. To obtain inspections, the applicant shall notify the Town of Yorktown enforcement official at least 48 hours before any of the following as required by the Stormwater Management Officer:

(a) Start of construction.

(b) Installation of sediment and erosion control measures.

(c) Completion of site clearing.

(d) Completion of rough grading.

(e) Completion of final grading.

(f) Close of the construction season.

(g) Completion of final landscaping.

(h) Successful establishment of landscaping in public areas.

(2) If any violations are found, the applicant and developer shall be notified in writing of the nature of the violation and the required corrective actions. No further work shall be conducted except for site stabilization until any violations are corrected and all work previously completed has received approval by the Stormwater Management Officer or the Town Engineer or his/her authorized representative.

B. Stormwater management practice inspections. The Town of Yorktown Stormwater Management Officer is responsible for conducting inspections of stormwater management practices (SMPs). All applicants are required to submit as-built plans for any stormwater management practices located on site after final construction is completed. The plan must show the final design specifications for all stormwater management facilities and must be certified by a professional engineer.

C. Inspection of stormwater facilities after project completion. Inspection programs shall be established on any reasonable basis, including but not limited to routine inspections; random inspections; inspections based upon complaints or other notice of possible violations; inspection of drainage basins or areas identified as higher-than-typical sources of sediment or other contaminants or pollutants; inspections of businesses or industries of a type associated with higher-than-usual discharges of contaminants or pollutants or with discharges of a type which are more likely than the typical discharge to cause violations of state or federal water or sediment quality standards of the SPDES stormwater permit; and joint inspections with other agencies inspecting under environmental or safety laws. Inspections may include, but are not limited to, reviewing maintenance and repair records; sampling discharges, surface water, groundwater, and material or water in drainage control facilities; and evaluating the condition of drainage control facilities and other stormwater management practices.

D. Submission of reports. The Town of Yorktown Stormwater Management Officer may require monitoring and reporting from entities subject to this chapter as are necessary to determine compliance with this chapter.

E. Right-of-entry for inspection. When any new stormwater management facility is installed on private property or when any new connection is made between private property and the public stormwater system, the landowner shall grant to the Town of Yorktown the right to enter the property at reasonable times and in a reasonable manner for the purpose of inspection as specified in § **248-15C**.

F. Special precautions.

(1) If at any stage of the grading (at any development site), the Town Engineer or his/her authorized representative determines, by inspection, that the nature of the site is such that further work authorized by an existing permit is likely to imperil any property, public way, watercourse, or drainage structure, the Stormwater Management Officer, Town Engineer or his/her authorized representative may require as a condition of allowing the work to be done that such reasonable precautions be taken as are considered advisable to avoid the likelihood of such peril. Special precautions may include, but are not limited to, reducing the grade of exposed slope, construction of additional drainage facilities, berms, terracing, compaction or cribbing, installation of plant materials for erosion control, and recommendations to use a registered engineer, CPESC individual and/or geologist, which may make requirements for further work.

(2) Where it appears that storm damage may result from incomplete grading on any construction site, work may be stopped and the permittee may be required to install temporary structures or take such other measures as may be necessary to protect adjoining property or public safety. On large developments or where unusual site conditions prevail, the Town Engineer may specify the time of start for grading and time of completion or may require that the operations be conducted in specific stages to ensure completion of protective measures or devices prior to the advent of seasonal rains.

§ 248-16. Performance guarantee; recordkeeping.

A. Construction completion guarantee. In order to ensure the full and faithful completion of all land development activities related to compliance with all conditions set forth by the Town of Yorktown in its approval of the stormwater pollution prevention plan, the Town of Yorktown may require the applicant or developer to provide, prior to construction, a performance bond, cash escrow, or irrevocable letter of credit from an appropriate financial or surety institution which guarantees satisfactory completion of the project and names the Town of Yorktown as beneficiary. The security shall be in an amount to be determined by the Town of Yorktown based on submission of final design plans, with reference to actual construction and landscaping costs. The performance guarantee shall remain in force until the surety is released from liability by the Town of Yorktown, provided that such period shall not be less than one year from the date of final acceptance or such other certification that the facility(ies) have been constructed in accordance with the approved plans and specifications and that a one-year inspection has been conducted and the facilities have been found to be acceptable to the Town of Yorktown. Per annum interest on cash escrow deposits shall be reinvested in the account until the surety is released from liability.

B. Maintenance guarantee. Where stormwater management and erosion and sediment control facilities are to be operated and maintained by the developer or by a corporation that owns or

APPENDIX C

Owner/Operator Certification

Contractor Certification

OWNER/OPERATOR CERTIFICATION

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

Name (please print) ______________________________

Title ______________________________

Date ______________________________

Address ______________________________

Phone ______________________________

E-mail ______________________________

Signature ______________________________

Name of Trained Individual ______________________________

CONTRACTOR CERTIFICATION

Contractor Certification Statement - All contractors and subcontractors identified in a SWPPP in accordance with Part III.E.1 (SPDES General Permit for Stormwater Runoff from Construction Activity, GP-0-15-002, January 2015) of this permit shall sign a copy of the following certification statement before undertaking any construction activity at the site identified in the SWPPP:

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

Individual Contractor:

Name and Title (please print) ______________________________

Signature of Contractor ______________________________

Name of Trained Individual ______________________________

Company / Contracting Firm:

Name of Company ______________________________

Address of Company ______________________________

Telephone Number / Cell Number ______________________________

Site Information:

Address of Site ______________________________

____

Today's Date: ______________________________

APPENDIX D

Construction Sequence

General Notes

1. Prior to the beginning of any phase work the major features of the construction must be field staked by a licensed surveyor. These include the building, limits of disturbance, utility lines, and Stormwater practices. All stormwater practices shall be cordoned off to prevent disturbance and compaction of the existing soil.

2. Prior to commencement of work, an on-site preconstruction meeting will be held. This will be attended by the Owner responsible for any fines or penalties, the Operator responsible for complying with the approved construction drawings including the E&SC plan and details, the Environmental Planner responsible for E&SC monitoring during construction, a representative from the DEP, Town representatives from the Engineering Department and Code Enforcement.

Phase I: Project Infrastructure

1. Establish main road entrance and install the stabilized construction entrance.

2. Clear the area for the proposed road and lot 2 driveway and install perimeter erosion control practices. Silt Fencing shall be installed at the base of slopes parallel to contours as shown on the plan.

3. Install the sediment basin for the roadway as shown on the plan. Install the filtered outlets and the rock outlet protection for the sediment basin. The sediment basin shall remain in place until final stabilization of disturbed area's tributary to each sediment basin.

4. Begin excavation for the rough grade of the proposed roadway to the extents shown on the plans. Clear area of vegetation as needed to grade driveway. Clearing shall only occur within the limits of disturbance for phase 1. Establish the elevation for installation of road base. Erosion control measures shall be installed simultaneously with clearing and grading. When completed install erosion blankets on slopes exceeded 3H:1V. Install water bars along roadway and driveway as shown on the plans.

5. During site construction maintain and re-establish as required erosion control and stabilization measures as required by the site plan and details. Remove any sediment track on roadway from construction vehicles as needed.

6. Construct the swales where shown. On a daily basis as the swales are completed, fine grade, seed, and blanket the swale surface. Install stone check dams at spacing shown on plans.

7. Upon completion of the swales, install the asphalt pavement base course over the roadway and driveway. Backfill to grade, place final soil topping and put in place permanent vegetative cover over all disturbed areas, landscape beds, slopes, etc.

8. During site construction maintain and re-establish as required erosion control and stabilization measures as required by the site plan and details.

9. Once the access road has been completed and all disturbed area's tributary to

the sediment basin have reach final stabilization remove the sediment basin. Install pocket wetland.

10. Once all areas have achieved final grades, any remaining stockpiled material shall be removed from the site within 24 hrs.

11. Once site stabilization has taken place (An area shall be considered to have achieved final stabilization when it has a minimum uniform 80% perennial vegetative cover or other permanent non-vegetative cover with a density sufficient to resist accelerated surface erosion and subsurface characteristics sufficient to resist sliding and other movements), remove all temporary erosion and sediment controls, unplug the drainage system to allow runoff to enter the stormwater management system. This shall be done during optimum weather conditions if possible to avoid sediment transport. This work shall not occur if precipitation is forecasted during the work. During construction of lots 2-6, The infiltration chambers for the road shall be inspected monthly and after major storm events to ensure sediment from construction does not enter the system. Any sediment deposits will be removed.

12. Upon stabilization of all disturbed areas and approval from the Town representative remove all temporary erosion and sediment controls.

Phase 2: Individual Lots

Each lot will be constructed individually. The lots may be constructed in any particular order, with one exception. Lot 3 will be completed before work can begin on lot 2. This is to ensure the stormwater discharge pipe crossing the access road has been installed prior to the remainder of the access road is completed during the construction of lot 3.

1. Prepare the individual lot for construction by installing all temporary perimeter erosion and sediment controls (E&SCs) as shown on the approved construction drawings.

2. Establish the driveway entrance and install the stabilized construction entrance.

3. Remove existing vegetative cover and other surface features in the limit of construction only for work to be immediately done and within the limits of phase 2. Silt fencing should be installed at the base of slopes, and stockpiles shall be placed in the locations shown on the plan.

4. Rough grade driveway and install erosion and sediment controls as needed. Slopes in excess of 3:1 shall be stabilized using erosion blankets.

5. During site construction maintain and re-establish as required erosion control and stabilization measures as required by the site plan and details. Remove any sediment track on roadway from construction vehicles as needed.

6. Excavate for and install foundation. Upon completion of foundation walls backfill and grade the remainder of the lot.

7. Begin construction of the remainder of the building.

8. Once the necessary connections have been constructed within the building, begin the installation of the septic system and the well for the lots. These shall only be constructed in the locations shown on the plans.

9. Install all underground utilities. Install the drainage system and Rain Gardens. For the Rain Gardens excavate to elevation shown on plan and install base course of gravel. Install filter media and outlet structure and install outlet protection at all outlets. Backfill as needed. Entry points to drainage system shall be blocked until site is stable. All erosion controls shall remain in place.

10. Install base course material for driveway.

11. Topsoil, rake, seed and mulch all disturbed areas.

12. Install walks, fences, other site improvements and final plantings.0.

13. Install base and top course of asphalt to the driveway and remainder of roadway during lot 2 construction.

14. Once site stabilization has taken place (An area shall be considered to have achieved final stabilization when it has a minimum uniform 80% perennial vegetative cover or other permanent non-vegetative cover with a density sufficient to resist accelerated surface erosion and subsurface characteristics sufficient to resist sliding and other movements), remove all temporary erosion and sediment controls, unplug the drainage system to allow runoff to enter the stormwater management system. This shall be done during optimum weather conditions if possible to avoid sediment transport. This work shall not occur if precipitation is forecasted during the work.

15. Upon stabilization of all disturbed areas and approval from the Town representative remove all temporary erosion and sediment controls.

APPENDIX E

Soil Testing Data

TEST PIT DATA REQUIRED TO BE SUBMITTED WITH APPLICATION

DESCRIPTION OF SOILS ENCOUNTERED IN TEST HOLES

DEPTH	HOLE NO. 1	DEPTH	HOLE NO. 2	DEPTH	HOLE NO. 3	DEPTH	HOLE NO. 4
G.L.	Topsoil	G.L.	Topsoil	G.L.	Topsoil	G.L.	3" Topsoil
6"		8"		6"		6"	
12"		12"		12"		12"	Reddish Brown Sandy Clay, Mottle @ 1', Ledge @ 24"
18"	Reddish Brown Clay with Sand	18"		18"		18"	
24"		24"		20"	Reddish Brown Sandy Clay, Ledge @ 40"	24"	
30"		30"	Brown Sand with caly Mottle @ 30"	30"		28"	
36"		36"		36"		36"	
42"	Brown Sand trace silt	42"		40"		42"	
48"		48"		48"		48"	
54"		54"		54"		54"	
60"	Mottled Brown sand trace silt	60"	Grey Hard Clay	60"		60"	
66"		66"		66"		66"	
72"		72"		72"		72"	
78"		78"		78"		78"	
84"		84"		84"		84"	
90"		90"		90"		90"	
96"		96"		96"		96"	
	Total Depth = 5.5'		Total Depth = 6.0'		Total Depth = 3.3'		Total Depth = 2'

INDICATE LEVEL AT WHICH GROUND WATER IS ENCOUNTERED varies

INDICATE LEVEL FOR WHICH WATER LEVEL RISES AFTER BEING ENCOUNTERED varies

TESTS MADE BY Thomas Kerrigan, witnessed by Mary Galasso, NYC DEP DATE 11/28/2017

Sketch:

TEST PIT DATA REQUIRED TO BE SUBMITTED WITH APPLICATION

DESCRIPTION OF SOILS ENCOUNTERED IN TEST HOLES

DEPTH	HOLE NO. 5	DEPTH	HOLE NO. 6	DEPTH	HOLE NO. 7	DEPTH	HOLE NO. 8
G.L.	Topsoil	G.L.	Topsoil	G.L.	Topsoil	G.L.	Trace Topsoil
6"		4"		4"		4"	
12"		12"		12"	Reddish Brown Sandy Clay	12"	
18"		18"		18"		18"	
24"	Seep Below Topsoil Reddish Brown Sandy Clay Water @ 48"	24"		20"		24"	Reddish Brown Sandy Clay, Mottle @ 28"
28"		28"		28"		28"	
36"		36"		36"		36"	
42"		42"	Brown Sandy Clay with Mottle & Seep @ 24" water @ 6'	42"	Brown Hard Clay	42"	
48"		48"		48"		48"	
54"		54"		54"		54"	
60"		60"		60"		60"	
66"		66"		64"	Grey Hard Clay	66"	Brown Moist sand/clay, Water @ 6'
72"		72"		72"		72"	
78"		78"		76"		78"	
84"		84"		84"		80"	
90"		90"		90"		90"	
96"		96"		96"		96"	
	Total Depth = 4'		Total Depth = 6.5'		Total Depth = 6.25'		Total Depth = 6'

INDICATE LEVEL AT WHICH GROUND WATER IS ENCOUNTERED varies

INDICATE LEVEL FOR WHICH WATER LEVEL RISES AFTER BEING ENCOUNTERED varies

TESTS MADE BY Thomas Kerrigan, witnessed by Mary Galasso, NYC DEP DATE 11/28/2017

Sketch:

TEST PIT DATA REQUIRED TO BE SUBMITTED WITH APPLICATION

DESCRIPTION OF SOILS ENCOUNTERED IN TEST HOLES

DEPTH	HOLE NO. 9	DEPTH	HOLE NO.	DEPTH	HOLE NO.	DEPTH	HOLE NO.
G.L.		G.L.		G.L.		G.L.	
6"		4"		4"		4"	
12"		12"		12"		12"	
18"		18"		18"		18"	
24"		24"		20"		24"	
28"		28"		28"		28"	
36"	Brown Silty Sand	36"		36"		36"	
42"		42"		42"		42"	
48"		48"		48"		48"	
54"		54"		54"		54"	
60"		60"		60"		60"	
66"		66"		64"		66"	
72"		72"		72"		72"	
78"		78"		76"		78"	
84"		84"		84"		80"	
90"		90"		90"		90"	
96"		96"		96"		96"	
	Total Depth = 6'		Total Depth =		Total Depth =		Total Depth =

INDICATE LEVEL AT WHICH GROUND WATER IS ENCOUNTERED varies

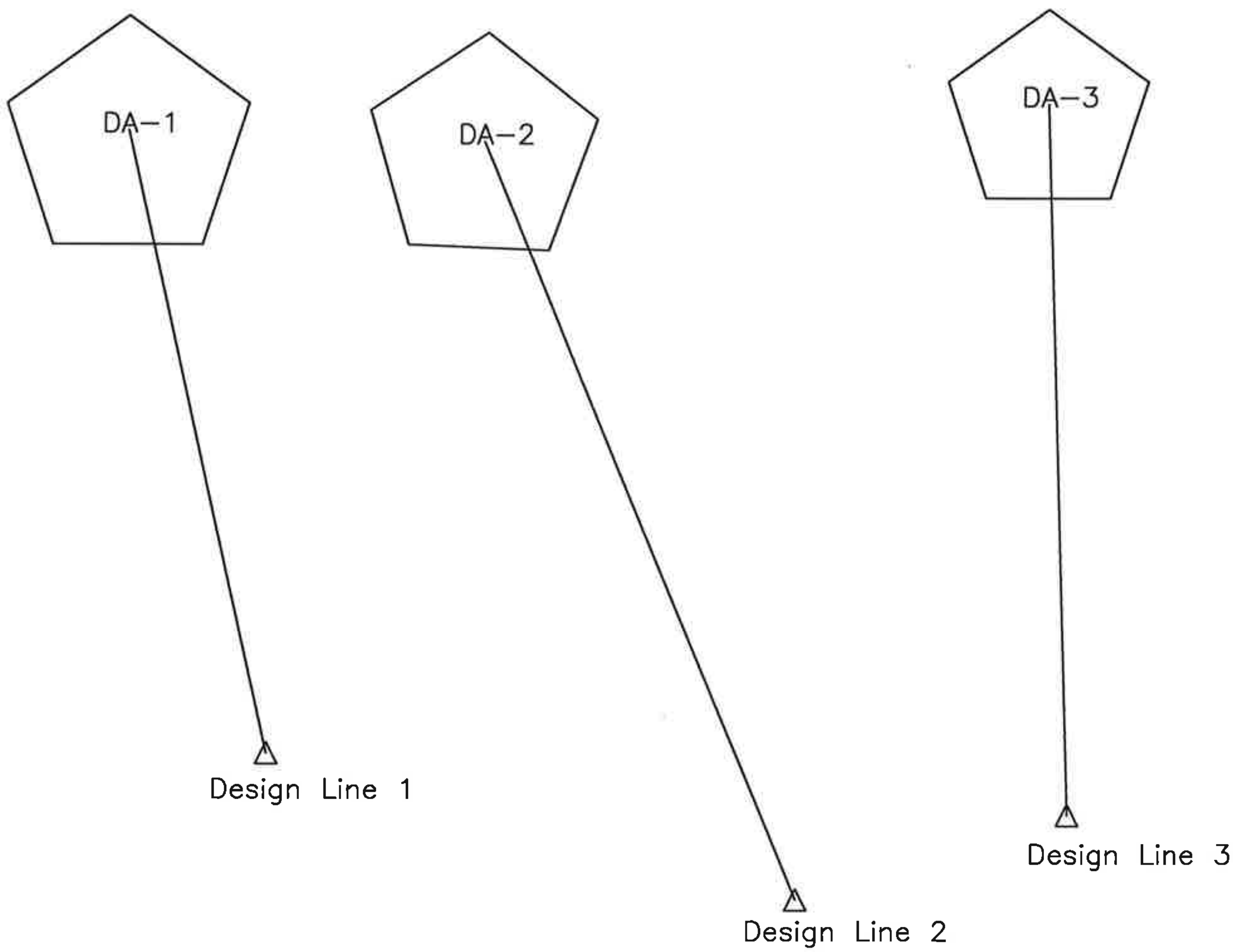
INDICATE LEVEL FOR WHICH WATER LEVEL RISES AFTER BEING ENCOUNTERED varies

TESTS MADE BY Thomas Kerrigan, witnessed by Mary Galasso, NYC DEP DATE 11/28/2017

Sketch:

APPENDIX F

Hydrologic Analysis



NOTE:
1. Model Schematic used for hydrologic study with Bentley PondPack Software.

PRE-DEVELOPED POND PACK MODEL SCHEMATIC
PREPARED FOR
SANDVOSS SUBDIVISION
Town of Yorktown Heights Westchester Co., New York

Site Design Consultants
Civil Engineers • Land Planners
251 F Underhill Avenue Yorktown Heights, NY 10598
(914) 962-4488 - Fax (914) 962-7386
www.sitedesignconsultants.com

NOT TO SCALE
DATE: 6/11/08

PRE DEVELOPED

Project Summary	
Title	16-43 Sandvoss Subdivision
Engineer	Jospeh Riina
Company	Site Design Consultants
Date	4/21/2017

Notes

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Table of Contents

DA-3

PRE DEVELOPED

Subsection: Master Network Summary

Catchments Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ac-ft)	Time to Peak (hours)	Peak Flow (ft³/s)
DA-1	Pre-Development 1 year	1	0.296	12.350	1.83
DA-1	Pre-Development 2 year	2	0.475	12.300	3.55
DA-1	Pre-Development 10 year	10	1.272	12.250	11.63
DA-1	Pre-Development 25 year	25	2.074	12.200	19.85
DA-1	Pre-Development 100 year	100	3.771	12.200	37.06
DA-2	Pre-Development 1 year	1	0.244	12.250	2.00
DA-2	Pre-Development 2 year	2	0.366	12.200	3.33
DA-2	Pre-Development 10 year	10	0.874	12.200	8.81
DA-2	Pre-Development 25 year	25	1.363	12.200	13.98
DA-2	Pre-Development 100 year	100	2.367	12.200	24.31
DA-3	Pre-Development 1 year	1	0.121	12.150	1.22
DA-3	Pre-Development 2 year	2	0.182	12.150	1.96
DA-3	Pre-Development 10 year	10	0.434	12.100	5.06
DA-3	Pre-Development 25 year	25	0.677	12.100	8.04
DA-3	Pre-Development 100 year	100	1.174	12.100	14.02

Node Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ac-ft)	Time to Peak (hours)	Peak Flow (ft³/s)
Design Line 1	Pre-Development 1 year	1	0.296	12.350	1.83
Design Line 1	Pre-Development 2 year	2	0.475	12.300	3.55
Design Line 1	Pre-Development 10 year	10	1.272	12.250	11.63
Design Line 1	Pre-Development 25 year	25	2.074	12.200	19.85
Design Line 1	Pre-Development 100 year	100	3.771	12.200	37.06

PRE DEVELOPED

Subsection: Master Network Summary

Node Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ac-ft)	Time to Peak (hours)	Peak Flow (ft^3/s)
Design Line 2	Pre-Development 1 year	1	0.244	12.250	2.00
Design Line 2	Pre-Development 2 year	2	0.366	12.200	3.33
Design Line 2	Pre-Development 10 year	10	0.874	12.200	8.81
Design Line 2	Pre-Development 25 year	25	1.363	12.200	13.98
Design Line 2	Pre-Development 100 year	100	2.367	12.200	24.31
Design Line 3	Pre-Development 1 year	1	0.121	12.150	1.22
Design Line 3	Pre-Development 2 year	2	0.182	12.150	1.96
Design Line 3	Pre-Development 10 year	10	0.434	12.100	5.06
Design Line 3	Pre-Development 25 year	25	0.677	12.100	8.04
Design Line 3	Pre-Development 100 year	100	1.174	12.100	14.02

PRE DEVELOPED

Subsection: Time-Depth Curve
Label: Westchester County 1-100 2015

Return Event: 1 years
Storm Event: 1 Year

Time-Depth Curve: 1 Year	
Label	1 Year
Start Time	0.000 hours
Increment	0.100 hours
End Time	24.000 hours
Return Event	1 years

CUMULATIVE RAINFALL (in)
Output Time Increment = 0.100 hours
Time on left represents time for first value in each row.

Time (hours)	Depth (in)	Depth (in)	Depth (in)	Depth (in)	Depth (in)
0.000	0.0	0.0	0.0	0.0	0.0
0.500	0.0	0.0	0.0	0.0	0.0
1.000	0.0	0.0	0.0	0.0	0.0
1.500	0.0	0.0	0.0	0.1	0.1
2.000	0.1	0.1	0.1	0.1	0.1
2.500	0.1	0.1	0.1	0.1	0.1
3.000	0.1	0.1	0.1	0.1	0.1
3.500	0.1	0.1	0.1	0.1	0.1
4.000	0.1	0.1	0.1	0.1	0.1
4.500	0.1	0.1	0.1	0.2	0.2
5.000	0.2	0.2	0.2	0.2	0.2
5.500	0.2	0.2	0.2	0.2	0.2
6.000	0.2	0.2	0.2	0.2	0.2
6.500	0.2	0.2	0.2	0.2	0.2
7.000	0.3	0.3	0.3	0.3	0.3
7.500	0.3	0.3	0.3	0.3	0.3
8.000	0.3	0.3	0.3	0.3	0.4
8.500	0.4	0.4	0.4	0.4	0.4
9.000	0.4	0.4	0.4	0.4	0.5
9.500	0.5	0.5	0.5	0.5	0.5
10.000	0.5	0.5	0.6	0.6	0.6
10.500	0.6	0.6	0.6	0.7	0.7
11.000	0.7	0.7	0.7	0.8	0.8
11.500	0.8	0.9	1.0	1.0	1.2
12.000	1.4	1.6	1.8	1.8	1.9
12.500	2.0	2.0	2.0	2.1	2.1
13.000	2.1	2.1	2.1	2.2	2.2
13.500	2.2	2.2	2.2	2.2	2.3
14.000	2.3	2.3	2.3	2.3	2.3
14.500	2.3	2.3	2.4	2.4	2.4
15.000	2.4	2.4	2.4	2.4	2.4
15.500	2.4	2.4	2.5	2.5	2.5
16.000	2.5	2.5	2.5	2.5	2.5
16.500	2.5	2.5	2.5	2.5	2.5

PRE DEVELOPED

Subsection: Time-Depth Curve
Label: Westchester County 1-100 2015

Return Event: 1 years
Storm Event: 1 Year

CUMULATIVE RAINFALL (in)
Output Time Increment = 0.100 hours
Time on left represents time for first value in each row.

Time (hours)	Depth (in)	Depth (in)	Depth (in)	Depth (in)	Depth (in)
17.000	2.5	2.6	2.6	2.6	2.6
17.500	2.6	2.6	2.6	2.6	2.6
18.000	2.6	2.6	2.6	2.6	2.6
18.500	2.6	2.6	2.6	2.6	2.6
19.000	2.6	2.6	2.6	2.7	2.7
19.500	2.7	2.7	2.7	2.7	2.7
20.000	2.7	2.7	2.7	2.7	2.7
20.500	2.7	2.7	2.7	2.7	2.7
21.000	2.7	2.7	2.7	2.7	2.7
21.500	2.7	2.7	2.7	2.7	2.7
22.000	2.7	2.7	2.8	2.8	2.8
22.500	2.8	2.8	2.8	2.8	2.8
23.000	2.8	2.8	2.8	2.8	2.8
23.500	2.8	2.8	2.8	2.8	2.8
24.000	2.8	(N/A)	(N/A)	(N/A)	(N/A)

Time-Depth Curve: 10 Year	
Label	10 Year
Start Time	0.000 hours
Increment	0.100 hours
End Time	24.000 hours
Return Event	10 years

CUMULATIVE RAINFALL (in)
Output Time Increment = 0.100 hours
Time on left represents time for first value in each row.

Time (hours)	Depth (in)	Depth (in)	Depth (in)	Depth (in)	Depth (in)
0.000	0.0	0.0	0.0	0.0	0.0
0.500	0.0	0.0	0.0	0.0	0.0
1.000	0.0	0.1	0.1	0.1	0.1
1.500	0.1	0.1	0.1	0.1	0.1
2.000	0.1	0.1	0.1	0.1	0.1
2.500	0.1	0.1	0.1	0.1	0.1
3.000	0.2	0.2	0.2	0.2	0.2
3.500	0.2	0.2	0.2	0.2	0.2
4.000	0.2	0.2	0.2	0.2	0.2
4.500	0.2	0.3	0.3	0.3	0.3
5.000	0.3	0.3	0.3	0.3	0.3
5.500	0.3	0.3	0.3	0.3	0.4
6.000	0.4	0.4	0.4	0.4	0.4
6.500	0.4	0.4	0.4	0.4	0.4
7.000	0.5	0.5	0.5	0.5	0.5
7.500	0.5	0.5	0.5	0.5	0.6
8.000	0.6	0.6	0.6	0.6	0.6
8.500	0.6	0.7	0.7	0.7	0.7
9.000	0.7	0.7	0.8	0.8	0.8
9.500	0.8	0.9	0.9	0.9	0.9
10.000	0.9	1.0	1.0	1.0	1.1
10.500	1.1	1.1	1.1	1.2	1.2
11.000	1.2	1.3	1.3	1.4	1.4
11.500	1.5	1.6	1.7	1.9	2.1
12.000	2.5	2.9	3.1	3.3	3.4
12.500	3.5	3.6	3.6	3.7	3.7
13.000	3.7	3.8	3.8	3.9	3.9
13.500	3.9	3.9	4.0	4.0	4.0
14.000	4.1	4.1	4.1	4.1	4.1
14.500	4.2	4.2	4.2	4.2	4.3
15.000	4.3	4.3	4.3	4.3	4.3
15.500	4.4	4.4	4.4	4.4	4.4
16.000	4.4	4.4	4.5	4.5	4.5
16.500	4.5	4.5	4.5	4.5	4.5

PRE DEVELOPED

Subsection: Time-Depth Curve
Label: Westchester County 1-100 2015

Return Event: 10 years
Storm Event: 10 Year

CUMULATIVE RAINFALL (in)
Output Time Increment = 0.100 hours
Time on left represents time for first value in each row.

Time (hours)	Depth (in)	Depth (in)	Depth (in)	Depth (in)	Depth (in)
17.000	4.5	4.6	4.6	4.6	4.6
17.500	4.6	4.6	4.6	4.6	4.6
18.000	4.6	4.6	4.7	4.7	4.7
18.500	4.7	4.7	4.7	4.7	4.7
19.000	4.7	4.7	4.7	4.7	4.7
19.500	4.8	4.8	4.8	4.8	4.8
20.000	4.8	4.8	4.8	4.8	4.8
20.500	4.8	4.8	4.8	4.8	4.8
21.000	4.8	4.9	4.9	4.9	4.9
21.500	4.9	4.9	4.9	4.9	4.9
22.000	4.9	4.9	4.9	4.9	4.9
22.500	4.9	4.9	4.9	4.9	4.9
23.000	5.0	5.0	5.0	5.0	5.0
23.500	5.0	5.0	5.0	5.0	5.0
24.000	5.0	(N/A)	(N/A)	(N/A)	(N/A)

Subsection: Time-Depth Curve | Return Event: 100 years
Label: Westchester County 1-100 2015 | Storm Event: 100 Year

Time-Depth Curve: 100 Year	
Label	100 Year
Start Time	0.000 hours
Increment	0.100 hours
End Time	24.000 hours
Return Event	100 years

CUMULATIVE RAINFALL (in)
Output Time Increment = 0.100 hours
Time on left represents time for first value in each row.

Time (hours)	Depth (in)	Depth (in)	Depth (in)	Depth (in)	Depth (in)
0.000	0.0	0.0	0.0	0.0	0.0
0.500	0.0	0.1	0.1	0.1	0.1
1.000	0.1	0.1	0.1	0.1	0.1
1.500	0.1	0.1	0.2	0.2	0.2
2.000	0.2	0.2	0.2	0.2	0.2
2.500	0.2	0.2	0.2	0.3	0.3
3.000	0.3	0.3	0.3	0.3	0.3
3.500	0.3	0.3	0.4	0.4	0.4
4.000	0.4	0.4	0.4	0.4	0.4
4.500	0.4	0.5	0.5	0.5	0.5
5.000	0.5	0.5	0.5	0.6	0.6
5.500	0.6	0.6	0.6	0.6	0.6
6.000	0.6	0.7	0.7	0.7	0.7
6.500	0.7	0.7	0.8	0.8	0.8
7.000	0.8	0.8	0.9	0.9	0.9
7.500	0.9	0.9	1.0	1.0	1.0
8.000	1.0	1.0	1.1	1.1	1.1
8.500	1.2	1.2	1.2	1.2	1.3
9.000	1.3	1.3	1.4	1.4	1.5
9.500	1.5	1.5	1.6	1.6	1.7
10.000	1.7	1.7	1.8	1.8	1.9
10.500	1.9	2.0	2.1	2.1	2.2
11.000	2.2	2.3	2.4	2.5	2.6
11.500	2.7	2.8	3.1	3.4	3.7
12.000	4.5	5.3	5.6	5.9	6.2
12.500	6.3	6.4	6.5	6.6	6.7
13.000	6.7	6.8	6.9	6.9	7.0
13.500	7.1	7.1	7.2	7.2	7.3
14.000	7.3	7.3	7.4	7.4	7.5
14.500	7.5	7.5	7.6	7.6	7.7
15.000	7.7	7.7	7.8	7.8	7.8
15.500	7.8	7.9	7.9	7.9	8.0
16.000	8.0	8.0	8.0	8.0	8.1
16.500	8.1	8.1	8.1	8.1	8.2

PRE DEVELOPED

Subsection: Time-Depth Curve
Label: Westchester County 1-100 2015

Return Event: 100 years
Storm Event: 100 Year

CUMULATIVE RAINFALL (in)
Output Time Increment = 0.100 hours
Time on left represents time for first value in each row.

Time (hours)	Depth (in)	Depth (in)	Depth (in)	Depth (in)	Depth (in)
17.000	8.2	8.2	8.2	8.2	8.3
17.500	8.3	8.3	8.3	8.3	8.3
18.000	8.4	8.4	8.4	8.4	8.4
18.500	8.4	8.4	8.4	8.5	8.5
19.000	8.5	8.5	8.5	8.5	8.5
19.500	8.6	8.6	8.6	8.6	8.6
20.000	8.6	8.6	8.6	8.6	8.7
20.500	8.7	8.7	8.7	8.7	8.7
21.000	8.7	8.7	8.7	8.8	8.8
21.500	8.8	8.8	8.8	8.8	8.8
22.000	8.8	8.8	8.8	8.9	8.9
22.500	8.9	8.9	8.9	8.9	8.9
23.000	8.9	8.9	8.9	8.9	9.0
23.500	9.0	9.0	9.0	9.0	9.0
24.000	9.0	(N/A)	(N/A)	(N/A)	(N/A)

PRE DEVELOPED

Subsection: Time-Depth Curve
Label: Westchester County 1-100 2015

Return Event: 2 years
Storm Event: 2 Year

Time-Depth Curve: 2 Year	
Label	2 Year
Start Time	0.000 hours
Increment	0.100 hours
End Time	24.000 hours
Return Event	2 years

CUMULATIVE RAINFALL (in)
Output Time Increment = 0.100 hours
Time on left represents time for first value in each row.

Time (hours)	Depth (in)	Depth (in)	Depth (in)	Depth (in)	Depth (in)
0.000	0.0	0.0	0.0	0.0	0.0
0.500	0.0	0.0	0.0	0.0	0.0
1.000	0.0	0.0	0.0	0.0	0.0
1.500	0.0	0.1	0.1	0.1	0.1
2.000	0.1	0.1	0.1	0.1	0.1
2.500	0.1	0.1	0.1	0.1	0.1
3.000	0.1	0.1	0.1	0.1	0.1
3.500	0.1	0.1	0.1	0.1	0.1
4.000	0.1	0.1	0.2	0.2	0.2
4.500	0.2	0.2	0.2	0.2	0.2
5.000	0.2	0.2	0.2	0.2	0.2
5.500	0.2	0.2	0.2	0.2	0.2
6.000	0.2	0.2	0.2	0.3	0.3
6.500	0.3	0.3	0.3	0.3	0.3
7.000	0.3	0.3	0.3	0.3	0.3
7.500	0.3	0.3	0.4	0.4	0.4
8.000	0.4	0.4	0.4	0.4	0.4
8.500	0.4	0.4	0.4	0.5	0.5
9.000	0.5	0.5	0.5	0.5	0.5
9.500	0.5	0.6	0.6	0.6	0.6
10.000	0.6	0.6	0.7	0.7	0.7
10.500	0.7	0.7	0.8	0.8	0.8
11.000	0.8	0.9	0.9	0.9	0.9
11.500	1.0	1.0	1.1	1.2	1.4
12.000	1.6	1.9	2.1	2.2	2.3
12.500	2.3	2.4	2.4	2.4	2.4
13.000	2.5	2.5	2.5	2.5	2.6
13.500	2.6	2.6	2.6	2.6	2.7
14.000	2.7	2.7	2.7	2.7	2.7
14.500	2.8	2.8	2.8	2.8	2.8
15.000	2.8	2.8	2.8	2.9	2.9
15.500	2.9	2.9	2.9	2.9	2.9
16.000	2.9	2.9	2.9	2.9	3.0
16.500	3.0	3.0	3.0	3.0	3.0

PRE DEVELOPED

Subsection: Time-Depth Curve
Label: Westchester County 1-100 2015

Return Event: 2 years
Storm Event: 2 Year

CUMULATIVE RAINFALL (in)
Output Time Increment = 0.100 hours
Time on left represents time for first value in each row.

Time (hours)	Depth (in)	Depth (in)	Depth (in)	Depth (in)	Depth (in)
17.000	3.0	3.0	3.0	3.0	3.0
17.500	3.0	3.0	3.0	3.1	3.1
18.000	3.1	3.1	3.1	3.1	3.1
18.500	3.1	3.1	3.1	3.1	3.1
19.000	3.1	3.1	3.1	3.1	3.1
19.500	3.1	3.1	3.1	3.1	3.2
20.000	3.2	3.2	3.2	3.2	3.2
20.500	3.2	3.2	3.2	3.2	3.2
21.000	3.2	3.2	3.2	3.2	3.2
21.500	3.2	3.2	3.2	3.2	3.2
22.000	3.2	3.2	3.2	3.2	3.3
22.500	3.3	3.3	3.3	3.3	3.3
23.000	3.3	3.3	3.3	3.3	3.3
23.500	3.3	3.3	3.3	3.3	3.3
24.000	3.3	(N/A)	(N/A)	(N/A)	(N/A)

PRE DEVELOPED

Subsection: Time-Depth Curve
Label: Westchester County 1-100 2015

Return Event: 25 years
Storm Event: 25 Year

Time-Depth Curve: 25 Year	
Label	25 Year
Start Time	0.000 hours
Increment	0.100 hours
End Time	24.000 hours
Return Event	25 years

CUMULATIVE RAINFALL (in)
Output Time Increment = 0.100 hours
Time on left represents time for first value in each row.

Time (hours)	Depth (in)	Depth (in)	Depth (in)	Depth (in)	Depth (in)
0.000	0.0	0.0	0.0	0.0	0.0
0.500	0.0	0.0	0.0	0.1	0.1
1.000	0.1	0.1	0.1	0.1	0.1
1.500	0.1	0.1	0.1	0.1	0.1
2.000	0.1	0.1	0.1	0.1	0.2
2.500	0.2	0.2	0.2	0.2	0.2
3.000	0.2	0.2	0.2	0.2	0.2
3.500	0.2	0.2	0.3	0.3	0.3
4.000	0.3	0.3	0.3	0.3	0.3
4.500	0.3	0.3	0.3	0.3	0.4
5.000	0.4	0.4	0.4	0.4	0.4
5.500	0.4	0.4	0.4	0.4	0.5
6.000	0.5	0.5	0.5	0.5	0.5
6.500	0.5	0.5	0.5	0.6	0.6
7.000	0.6	0.6	0.6	0.6	0.6
7.500	0.7	0.7	0.7	0.7	0.7
8.000	0.7	0.7	0.8	0.8	0.8
8.500	0.8	0.8	0.9	0.9	0.9
9.000	0.9	1.0	1.0	1.0	1.0
9.500	1.1	1.1	1.1	1.1	1.2
10.000	1.2	1.2	1.3	1.3	1.3
10.500	1.4	1.4	1.5	1.5	1.6
11.000	1.6	1.6	1.7	1.8	1.8
11.500	1.9	2.0	2.2	2.4	2.7
12.000	3.2	3.7	4.0	4.2	4.4
12.500	4.5	4.6	4.6	4.7	4.8
13.000	4.8	4.8	4.9	4.9	5.0
13.500	5.0	5.1	5.1	5.1	5.2
14.000	5.2	5.2	5.3	5.3	5.3
14.500	5.3	5.4	5.4	5.4	5.4
15.000	5.5	5.5	5.5	5.5	5.6
15.500	5.6	5.6	5.6	5.6	5.7
16.000	5.7	5.7	5.7	5.7	5.7
16.500	5.7	5.8	5.8	5.8	5.8

PRE DEVELOPED

Subsection: Time-Depth Curve | Return Event: 25 years
Label: Westchester County 1-100 2015 | Storm Event: 25 Year

CUMULATIVE RAINFALL (in)
Output Time Increment = 0.100 hours
Time on left represents time for first value in each row.

Time (hours)	Depth (in)	Depth (in)	Depth (in)	Depth (in)	Depth (in)
17.000	5.8	5.8	5.8	5.9	5.9
17.500	5.9	5.9	5.9	5.9	5.9
18.000	5.9	5.9	6.0	6.0	6.0
18.500	6.0	6.0	6.0	6.0	6.0
19.000	6.0	6.0	6.1	6.1	6.1
19.500	6.1	6.1	6.1	6.1	6.1
20.000	6.1	6.1	6.1	6.1	6.2
20.500	6.2	6.2	6.2	6.2	6.2
21.000	6.2	6.2	6.2	6.2	6.2
21.500	6.2	6.2	6.3	6.3	6.3
22.000	6.3	6.3	6.3	6.3	6.3
22.500	6.3	6.3	6.3	6.3	6.3
23.000	6.3	6.3	6.4	6.4	6.4
23.500	6.4	6.4	6.4	6.4	6.4
24.000	6.4	(N/A)	(N/A)	(N/A)	(N/A)

PRE DEVELOPED

Subsection: Time of Concentration Calculations
Label: DA-1

Return Event: 1 years
Storm Event: 1 Year

Time of Concentration Results

Segment #1: TR-55 Sheet Flow	
Hydraulic Length	150.00 ft
Manning's n	0.400
Slope	0.106 ft/ft
2 Year 24 Hour Depth	3.3 in
Average Velocity	0.17 ft/s
Segment Time of Concentration	0.250 hours

Segment #2: TR-55 Shallow Concentrated Flow	
Hydraulic Length	53.00 ft
Is Paved?	False
Slope	0.030 ft/ft
Average Velocity	2.79 ft/s
Segment Time of Concentration	0.005 hours

Segment #3: TR-55 Shallow Concentrated Flow	
Hydraulic Length	65.00 ft
Is Paved?	False
Slope	0.246 ft/ft
Average Velocity	8.00 ft/s
Segment Time of Concentration	0.002 hours

Segment #4: TR-55 Shallow Concentrated Flow	
Hydraulic Length	346.00 ft
Is Paved?	False
Slope	0.081 ft/ft
Average Velocity	4.59 ft/s
Segment Time of Concentration	0.021 hours

Time of Concentration (Composite)	
Time of Concentration (Composite)	0.279 hours

==== SCS Channel Flow

Tc =

R = Qa / Wp
V = (1.49 * (R**(2/3)) * (Sf**-0.5)) / n

(Lf / V) / 3600

Where:

R= Hydraulic radius
Aq= Flow area, square feet
Wp= Wetted perimeter, feet
V= Velocity, ft/sec
Sf= Slope, ft/ft
n= Manning's n
Tc= Time of concentration, hours
Lf= Flow length, feet

==== SCS TR-55 Shallow Concentration Flow

Tc =

Unpaved surface:
V = 16.1345 * (Sf**0.5)

Paved Surface:
V = 20.3282 * (Sf**0.5)

(Lf / V) / 3600

Where:

V= Velocity, ft/sec
Sf= Slope, ft/ft
Tc= Time of concentration, hours
Lf= Flow length, feet

Time of Concentration Results

Segment #1: TR-55 Sheet Flow	
Hydraulic Length	150.00 ft
Manning's n	0.240
Slope	0.052 ft/ft
2 Year 24 Hour Depth	3.3 in
Average Velocity	0.19 ft/s
Segment Time of Concentration	0.221 hours

Segment #2: TR-55 Shallow Concentrated Flow	
Hydraulic Length	16.40 ft
Is Paved?	False
Slope	0.078 ft/ft
Average Velocity	4.51 ft/s
Segment Time of Concentration	0.001 hours

Segment #3: TR-55 Shallow Concentrated Flow	
Hydraulic Length	12.00 ft
Is Paved?	True
Slope	0.108 ft/ft
Average Velocity	6.68 ft/s
Segment Time of Concentration	0.000 hours

Segment #4: TR-55 Shallow Concentrated Flow	
Hydraulic Length	311.98 ft
Is Paved?	False
Slope	0.088 ft/ft
Average Velocity	4.79 ft/s
Segment Time of Concentration	0.018 hours

Time of Concentration (Composite)	
Time of Concentration (Composite)	0.241 hours

==== SCS Channel Flow

Tc =

R = Qa / Wp
V = (1.49 * (R**(2/3)) * (Sf**-0.5)) / n

(Lf / V) / 3600

Where:

R= Hydraulic radius
Aq= Flow area, square feet
Wp= Wetted perimeter, feet
V= Velocity, ft/sec
Sf= Slope, ft/ft
n= Manning's n
Tc= Time of concentration, hours
Lf= Flow length, feet

==== SCS TR-55 Shallow Concentration Flow

Tc =

Unpaved surface:
V = 16.1345 * (Sf**0.5)

Paved Surface:
V = 20.3282 * (Sf**0.5)

(Lf / V) / 3600

Where:

V= Velocity, ft/sec
Sf= Slope, ft/ft
Tc= Time of concentration, hours
Lf= Flow length, feet

PRE DEVELOPED

Subsection: Time of Concentration Calculations
Label: DA-3

Return Event: 1 years
Storm Event: 1 Year

Time of Concentration Results

Segment #1: TR-55 Sheet Flow	
Hydraulic Length	47.55 ft
Manning's n	0.400
Slope	0.078 ft/ft
2 Year 24 Hour Depth	3.3 in
Average Velocity	0.12 ft/s
Segment Time of Concentration	0.113 hours

Segment #2: TR-55 Shallow Concentrated Flow	
Hydraulic Length	184.91 ft
Is Paved?	False
Slope	0.272 ft/ft
Average Velocity	8.41 ft/s
Segment Time of Concentration	0.006 hours

Time of Concentration (Composite)	
Time of Concentration (Composite)	0.119 hours

==== SCS Channel Flow

Tc = R = Qa / Wp
V = (1.49 * (R**(2/3)) * (Sf**-0.5)) / n

(Lf / V) / 3600

Where:
R= Hydraulic radius
Aq= Flow area, square feet
Wp= Wetted perimeter, feet
V= Velocity, ft/sec
Sf= Slope, ft/ft
n= Manning's n
Tc= Time of concentration, hours
Lf= Flow length, feet

==== SCS TR-55 Shallow Concentration Flow

Tc = Unpaved surface:
V = 16.1345 * (Sf**0.5)

Paved Surface:
V = 20.3282 * (Sf**0.5)

(Lf / V) / 3600

Where:
V= Velocity, ft/sec
Sf= Slope, ft/ft
Tc= Time of concentration, hours
Lf= Flow length, feet

PRE DEVELOPED

Subsection: Runoff CN-Area
Label: DA-1

Return Event: 1 years
Storm Event: 1 Year

Runoff Curve Number Data

Soil/Surface Description	CN	Area (acres)	C (%)	UC (%)	Adjusted CN
Impervious Areas - Paved parking lots, roofs, driveways, Streets and roads - Soil B	98.000	0.386	0.0	0.0	98.000
Open space (Lawns,parks etc.) - Good condition; grass cover > 75% - Soil B	61.000	0.451	0.0	0.0	61.000
Woods - good - Soil B	55.000	6.499	0.0	0.0	55.000
Woods - good - Soil D	77.000	2.818	0.0	0.0	77.000
COMPOSITE AREA & WEIGHTED CN --->	(N/A)	10.154	(N/A)	(N/A)	63.007

PRE DEVELOPED

Subsection: Runoff CN-Area
Label: DA-2

Return Event: 1 years
Storm Event: 1 Year

Runoff Curve Number Data

Soil/Surface Description	CN	Area (acres)	C (%)	UC (%)	Adjusted CN
Woods - good - Soil B	55.000	1.692	0.0	0.0	55.000
Woods - good - Soil D	77.000	2.015	0.0	0.0	77.000
Impervious Areas - Paved parking lots, roofs, driveways, Streets and roads - Soil B	98.000	0.396	0.0	0.0	98.000
Open space (Lawns,parks etc.) - Good condition; grass cover > 75% - Soil B	61.000	1.494	0.0	0.0	61.000
COMPOSITE AREA & WEIGHTED CN --->	(N/A)	5.597	(N/A)	(N/A)	67.564

PRE DEVELOPED

Subsection: Runoff CN-Area
Label: DA-3

Return Event: 1 years
Storm Event: 1 Year

Runoff Curve Number Data

Soil/Surface Description	CN	Area (acres)	C (%)	UC (%)	Adjusted CN
Woods - good - Soil B	55.000	1.103	0.0	0.0	55.000
Woods - good - Soil D	77.000	1.670	0.0	0.0	77.000
COMPOSITE AREA & WEIGHTED CN --->	(N/A)	2.773	(N/A)	(N/A)	68.249

Unit Hydrograph Method (Computational Notes)
Definition of Terms

At	Total area (acres): At = Ai+Ap
Ai	Impervious area (acres)
Ap	Pervious area (acres)
CNi	Runoff curve number for impervious area
CNp	Runoff curve number for pervious area
fLoss	f loss constant infiltration (depth/time)
gKs	Saturated Hydraulic Conductivity (depth/time)
Md	Volumetric Moisture Deficit
Psi	Capillary Suction (length)
hK	Horton Infiltration Decay Rate (time^-1)
fo	Initial Infiltration Rate (depth/time)
fc	Ultimate(capacity)Infiltration Rate (depth/time)
Ia	Initial Abstraction (length)
dt	Computational increment (duration of unit excess rainfall) Default dt is smallest value of 0.1333Tc, rtm, and th (Smallest dt is then adjusted to match up with Tp)
UDdt	User specified override computational main time increment (only used if UDdt is => .1333Tc)
D(t)	Point on distribution curve (fraction of P) for time step t
K	2 / (1 + (Tr/Tp)): default K = 0.75: (for Tr/Tp = 1.67)
Ks	Hydrograph shape factor = Unit Conversions * K: = ((1hr/3600sec) * (1ft/12in) * ((5280ft)**2/sq.mi)) * K Default Ks = 645.333 * 0.75 = 484
Lag	Lag time from center of excess runoff (dt) to Tp: Lag = 0.6Tc
P	Total precipitation depth, inches
Pa(t)	Accumulated rainfall at time step t
Pi(t)	Incremental rainfall at time step t
qp	Peak discharge (cfs) for 1in. runoff, for 1hr, for 1 sq.mi. = (Ks * A * Q) / Tp (where Q = 1in. runoff, A=sq.mi.)
Qu(t)	Unit hydrograph ordinate (cfs) at time step t
Q(t)	Final hydrograph ordinate (cfs) at time step t
Rai(t)	Accumulated runoff (inches) at time step t for impervious area
Rap(t)	Accumulated runoff (inches) at time step t for pervious area
Rii(t)	Incremental runoff (inches) at time step t for impervious area
Rip(t)	Incremental runoff (inches) at time step t for pervious area
R(t)	Incremental weighted total runoff (inches)
Rtm	Time increment for rainfall table
Si	S for impervious area: Si = (1000/CNi) - 10
Sp	S for pervious area: Sp = (1000/CNp) - 10
t	Time step (row) number
Tc	Time of concentration
Tb	Time (hrs) of entire unit hydrograph: Tb = Tp + Tr
Tp	Time (hrs) to peak of a unit hydrograph: Tp = (dt/2) + Lag
Tr	Time (hrs) of receding limb of unit hydrograph: Tr = ratio of Tp

Subsection: Unit Hydrograph Equations

Unit Hydrograph Method
Computational Notes
Precipitation

Column (1)	Time for time step t
Column (2)	D(t) = Point on distribution curve for time step t
Column (3)	Pi(t) = Pa(t) - Pa(t-1): Col.(4) - Preceding Col.(4)
Column (4)	Pa(t) = D(t) x P: Col.(2) x P

Pervious Area Runoff (using SCS Runoff CN Method)

Column (5)
Rap(t) = Accumulated pervious runoff for time step t
If (Pa(t) is <= 0.2Sp) then use: Rap(t) = 0.0
If (Pa(t) is > 0.2Sp) then use:

Rap(t) = (Col.(4)-0.2Sp)**2 / (Col.(4)+0.8Sp)

Column (6)
Rip(t) = Incremental pervious runoff for time step t
Rip(t) = Rap(t) - Rap(t-1)
Rip(t) = Col.(5) for current row - Col.(5) for preceding row.

Impervious Area Runoff

Column (7 & 8)... Did not specify to use impervious areas.

Incremental Weighted Runoff

Column (9)
R(t) = (Ap/At) x Rip(t) + (Ai/At) x Rii(t)
R(t) = (Ap/At) x Col.(6) + (Ai/At) x Col.(8)

SCS Unit Hydrograph Method

Column (10)
Q(t) is computed with the SCS unit hydrograph method using R(t) and Qu(t).

Storm Event	1 Year
Return Event	1 years
Duration	24.000 hours
Depth	2.8 in
Time of Concentration (Composite)	0.279 hours
Area (User Defined)	10.154 acres

Computational Time Increment	0.037 hours
Time to Peak (Computed)	12.334 hours
Flow (Peak, Computed)	1.84 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	12.350 hours
Flow (Peak Interpolated Output)	1.83 ft³/s

Drainage Area	
SCS CN (Composite)	63.000
Area (User Defined)	10.154 acres
Maximum Retention (Pervious)	5.9 in
Maximum Retention (Pervious, 20 percent)	1.2 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	0.4 in
Runoff Volume (Pervious)	0.298 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	0.296 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.279 hours
Computational Time Increment	0.037 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670

PRE DEVELOPED

Subsection: Unit Hydrograph Summary
Label: DA-1

Return Event: 1 years
Storm Event: 1 Year

SCS Unit Hydrograph Parameters	
Unit peak, qp	41.29 ft^3/s
Unit peak time, Tp	0.186 hours
Unit receding limb, Tr	0.743 hours
Total unit time, Tb	0.929 hours

Storm Event	2 Year
Return Event	2 years
Duration	24.000 hours
Depth	3.3 in
Time of Concentration (Composite)	0.279 hours
Area (User Defined)	10.154 acres

Computational Time Increment	0.037 hours
Time to Peak (Computed)	12.260 hours
Flow (Peak, Computed)	3.57 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	12.300 hours
Flow (Peak Interpolated Output)	3.55 ft³/s

Drainage Area

SCS CN (Composite)	63.000
Area (User Defined)	10.154 acres
Maximum Retention (Pervious)	5.9 in
Maximum Retention (Pervious, 20 percent)	1.2 in

Cumulative Runoff

Cumulative Runoff Depth (Pervious)	0.6 in
Runoff Volume (Pervious)	0.478 ac-ft

Hydrograph Volume (Area under Hydrograph curve)

Volume	0.475 ac-ft

SCS Unit Hydrograph Parameters

Time of Concentration (Composite)	0.279 hours
Computational Time Increment	0.037 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670

PRE DEVELOPED

Subsection: Unit Hydrograph Summary
Label: DA-1

Return Event: 2 years
Storm Event: 2 Year

SCS Unit Hydrograph Parameters	
Unit peak, qp	41.29 ft^3/s
Unit peak time, Tp	0.186 hours
Unit receding limb, Tr	0.743 hours
Total unit time, Tb	0.929 hours

PRE DEVELOPED

Subsection: Unit Hydrograph Summary
Label: DA-1

Return Event: 10 years
Storm Event: 10 Year

Storm Event	10 Year
Return Event	10 years
Duration	24.000 hours
Depth	5.0 in
Time of Concentration (Composite)	0.279 hours
Area (User Defined)	10.154 acres

Computational Time Increment	0.037 hours
Time to Peak (Computed)	12.222 hours
Flow (Peak, Computed)	11.77 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	12.250 hours
Flow (Peak Interpolated Output)	11.63 ft³/s

Drainage Area	
SCS CN (Composite)	63.000
Area (User Defined)	10.154 acres
Maximum Retention (Pervious)	5.9 in
Maximum Retention (Pervious, 20 percent)	1.2 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	1.5 in
Runoff Volume (Pervious)	1.277 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	1.272 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.279 hours
Computational Time Increment	0.037 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670

PRE DEVELOPED

Subsection: Unit Hydrograph Summary | Return Event: 10 years
Label: DA-1 | Storm Event: 10 Year

SCS Unit Hydrograph Parameters	
Unit peak, qp	41.29 ft³/s
Unit peak time, Tp	0.186 hours
Unit receding limb, Tr	0.743 hours
Total unit time, Tb	0.929 hours

Storm Event	25 Year
Return Event	25 years
Duration	24.000 hours
Depth	6.4 in
Time of Concentration (Composite)	0.279 hours
Area (User Defined)	10.154 acres

Computational Time Increment	0.037 hours
Time to Peak (Computed)	12.222 hours
Flow (Peak, Computed)	20.02 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	12.200 hours
Flow (Peak Interpolated Output)	19.85 ft³/s

Drainage Area	
SCS CN (Composite)	63.000
Area (User Defined)	10.154 acres
Maximum Retention (Pervious)	5.9 in
Maximum Retention (Pervious, 20 percent)	1.2 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	2.5 in
Runoff Volume (Pervious)	2.082 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	2.074 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.279 hours
Computational Time Increment	0.037 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670

PRE DEVELOPED

Subsection: Unit Hydrograph Summary
Label: DA-1

Return Event: 25 years
Storm Event: 25 Year

SCS Unit Hydrograph Parameters	
Unit peak, qp	41.29 ft^3/s
Unit peak time, Tp	0.186 hours
Unit receding limb, Tr	0.743 hours
Total unit time, Tb	0.929 hours

PRE DEVELOPED

Subsection: Unit Hydrograph Summary | Return Event: 100 years
Label: DA-1 | Storm Event: 100 Year

Storm Event	100 Year
Return Event	100 years
Duration	24.000 hours
Depth	9.0 in
Time of Concentration (Composite)	0.279 hours
Area (User Defined)	10.154 acres

Computational Time Increment	0.037 hours
Time to Peak (Computed)	12.222 hours
Flow (Peak, Computed)	37.11 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	12.200 hours
Flow (Peak Interpolated Output)	37.06 ft³/s

Drainage Area	
SCS CN (Composite)	63.000
Area (User Defined)	10.154 acres
Maximum Retention (Pervious)	5.9 in
Maximum Retention (Pervious, 20 percent)	1.2 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	4.5 in
Runoff Volume (Pervious)	3.783 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	3.771 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.279 hours
Computational Time Increment	0.037 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670

PRE DEVELOPED

Subsection: Unit Hydrograph Summary
Label: DA-1

Return Event: 100 years
Storm Event: 100 Year

SCS Unit Hydrograph Parameters	
Unit peak, qp	41.29 ft^3/s
Unit peak time, Tp	0.186 hours
Unit receding limb, Tr	0.743 hours
Total unit time, Tb	0.929 hours

PRE DEVELOPED

Subsection: Unit Hydrograph Summary
Label: DA-2

Return Event: 1 years
Storm Event: 1 Year

Storm Event	1 Year
Return Event	1 years
Duration	24.000 hours
Depth	2.8 in
Time of Concentration (Composite)	0.241 hours
Area (User Defined)	5.597 acres

Computational Time Increment	0.032 hours
Time to Peak (Computed)	12.226 hours
Flow (Peak, Computed)	2.02 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	12.250 hours
Flow (Peak Interpolated Output)	2.00 ft³/s

Drainage Area	
SCS CN (Composite)	68.000
Area (User Defined)	5.597 acres
Maximum Retention (Pervious)	4.7 in
Maximum Retention (Pervious, 20 percent)	0.9 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	0.5 in
Runoff Volume (Pervious)	0.245 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	0.244 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.241 hours
Computational Time Increment	0.032 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670

PRE DEVELOPED

Subsection: Unit Hydrograph Summary
Label: DA-2

Return Event: 1 years
Storm Event: 1 Year

SCS Unit Hydrograph Parameters	
Unit peak, qp	26.35 ft^3/s
Unit peak time, Tp	0.160 hours
Unit receding limb, Tr	0.642 hours
Total unit time, Tb	0.802 hours

PRE DEVELOPED

Subsection: Unit Hydrograph Summary
Label: DA-2

Return Event: 2 years
Storm Event: 2 Year

Storm Event	2 Year
Return Event	2 years
Duration	24.000 hours
Depth	3.3 in
Time of Concentration (Composite)	0.241 hours
Area (User Defined)	5.597 acres

Computational Time Increment	0.032 hours
Time to Peak (Computed)	12.194 hours
Flow (Peak, Computed)	3.33 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	12.200 hours
Flow (Peak Interpolated Output)	3.33 ft³/s

Drainage Area	
SCS CN (Composite)	68.000
Area (User Defined)	5.597 acres
Maximum Retention (Pervious)	4.7 in
Maximum Retention (Pervious, 20 percent)	0.9 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	0.8 in
Runoff Volume (Pervious)	0.367 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	0.366 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.241 hours
Computational Time Increment	0.032 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670

PRE DEVELOPED

Subsection: Unit Hydrograph Summary
Label: DA-2

Return Event: 2 years
Storm Event: 2 Year

SCS Unit Hydrograph Parameters	
Unit peak, qp	26.35 ft^3/s
Unit peak time, Tp	0.160 hours
Unit receding limb, Tr	0.642 hours
Total unit time, Tb	0.802 hours

PRE DEVELOPED

Subsection: Unit Hydrograph Summary — Return Event: 10 years
Label: DA-2 — Storm Event: 10 Year

Storm Event	10 Year
Return Event	10 years
Duration	24.000 hours
Depth	5.0 in
Time of Concentration (Composite)	0.241 hours
Area (User Defined)	5.597 acres

Computational Time Increment	0.032 hours
Time to Peak (Computed)	12.194 hours
Flow (Peak, Computed)	8.85 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	12.200 hours
Flow (Peak Interpolated Output)	8.81 ft³/s

Drainage Area	
SCS CN (Composite)	68.000
Area (User Defined)	5.597 acres
Maximum Retention (Pervious)	4.7 in
Maximum Retention (Pervious, 20 percent)	0.9 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	1.9 in
Runoff Volume (Pervious)	0.877 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	0.874 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.241 hours
Computational Time Increment	0.032 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670

Subsection: Unit Hydrograph Summary
Label: DA-2

Return Event: 10 years
Storm Event: 10 Year

SCS Unit Hydrograph Parameters	
Unit peak, qp	26.35 ft^3/s
Unit peak time, Tp	0.160 hours
Unit receding limb, Tr	0.642 hours
Total unit time, Tb	0.802 hours

PRE DEVELOPED

Subsection: Unit Hydrograph Summary
Label: DA-2

Return Event: 25 years
Storm Event: 25 Year

Storm Event	25 Year
Return Event	25 years
Duration	24.000 hours
Depth	6.4 in
Time of Concentration (Composite)	0.241 hours
Area (User Defined)	5.597 acres

Computational Time Increment	0.032 hours
Time to Peak (Computed)	12.194 hours
Flow (Peak, Computed)	14.07 ft^3/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	12.200 hours
Flow (Peak Interpolated Output)	13.98 ft^3/s

Drainage Area	
SCS CN (Composite)	68.000
Area (User Defined)	5.597 acres
Maximum Retention (Pervious)	4.7 in
Maximum Retention (Pervious, 20 percent)	0.9 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	2.9 in
Runoff Volume (Pervious)	1.367 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	1.363 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.241 hours
Computational Time Increment	0.032 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670

PRE DEVELOPED

Subsection: Unit Hydrograph Summary
Label: DA-2

Return Event: 25 years
Storm Event: 25 Year

SCS Unit Hydrograph Parameters	
Unit peak, qp	26.35 ft^3/s
Unit peak time, Tp	0.160 hours
Unit receding limb, Tr	0.642 hours
Total unit time, Tb	0.802 hours

PRE DEVELOPED

Subsection: Unit Hydrograph Summary
Label: DA-2

Return Event: 100 years
Storm Event: 100 Year

Storm Event	100 Year
Return Event	100 years
Duration	24.000 hours
Depth	9.0 in
Time of Concentration (Composite)	0.241 hours
Area (User Defined)	5.597 acres

Computational Time Increment	0.032 hours
Time to Peak (Computed)	12.161 hours
Flow (Peak, Computed)	24.52 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	12.200 hours
Flow (Peak Interpolated Output)	24.31 ft³/s

Drainage Area	
SCS CN (Composite)	68.000
Area (User Defined)	5.597 acres
Maximum Retention (Pervious)	4.7 in
Maximum Retention (Pervious, 20 percent)	0.9 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	5.1 in
Runoff Volume (Pervious)	2.373 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	2.367 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.241 hours
Computational Time Increment	0.032 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670

PRE DEVELOPED

Subsection: Unit Hydrograph Summary
Label: DA-2

Return Event: 100 years
Storm Event: 100 Year

SCS Unit Hydrograph Parameters	
Unit peak, qp	26.35 ft^3/s
Unit peak time, Tp	0.160 hours
Unit receding limb, Tr	0.642 hours
Total unit time, Tb	0.802 hours

PRE DEVELOPED

Subsection: Unit Hydrograph Summary | Return Event: 1 years
Label: DA-3 | Storm Event: 1 Year

Storm Event	1 Year
Return Event	1 years
Duration	24.000 hours
Depth	2.8 in
Time of Concentration (Composite)	0.119 hours
Area (User Defined)	2.773 acres

Computational Time Increment	0.016 hours
Time to Peak (Computed)	12.130 hours
Flow (Peak, Computed)	1.23 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	12.150 hours
Flow (Peak Interpolated Output)	1.22 ft³/s

Drainage Area	
SCS CN (Composite)	68.000
Area (User Defined)	2.773 acres
Maximum Retention (Pervious)	4.7 in
Maximum Retention (Pervious, 20 percent)	0.9 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	0.5 in
Runoff Volume (Pervious)	0.122 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	0.121 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.119 hours
Computational Time Increment	0.016 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670

PRE DEVELOPED

Subsection: Unit Hydrograph Summary — Return Event: 1 years
Label: DA-3 — Storm Event: 1 Year

SCS Unit Hydrograph Parameters	
Unit peak, qp	26.42 ft^3/s
Unit peak time, Tp	0.079 hours
Unit receding limb, Tr	0.317 hours
Total unit time, Tb	0.396 hours

PRE DEVELOPED

Subsection: Unit Hydrograph Summary
Label: DA-3

Return Event: 2 years
Storm Event: 2 Year

Storm Event	2 Year
Return Event	2 years
Duration	24.000 hours
Depth	3.3 in
Time of Concentration (Composite)	0.119 hours
Area (User Defined)	2.773 acres

Computational Time Increment	0.016 hours
Time to Peak (Computed)	12.130 hours
Flow (Peak, Computed)	2.01 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	12.150 hours
Flow (Peak Interpolated Output)	1.96 ft³/s

Drainage Area	
SCS CN (Composite)	68.000
Area (User Defined)	2.773 acres
Maximum Retention (Pervious)	4.7 in
Maximum Retention (Pervious, 20 percent)	0.9 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	0.8 in
Runoff Volume (Pervious)	0.182 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	0.182 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.119 hours
Computational Time Increment	0.016 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670

Subsection: Unit Hydrograph Summary
Label: DA-3

Return Event: 2 years
Storm Event: 2 Year

SCS Unit Hydrograph Parameters	
Unit peak, qp	26.42 ft^3/s
Unit peak time, Tp	0.079 hours
Unit receding limb, Tr	0.317 hours
Total unit time, Tb	0.396 hours

PRE DEVELOPED

Subsection: Unit Hydrograph Summary
Label: DA-3

Return Event: 10 years
Storm Event: 10 Year

Storm Event	10 Year
Return Event	10 years
Duration	24.000 hours
Depth	5.0 in
Time of Concentration (Composite)	0.119 hours
Area (User Defined)	2.773 acres

Computational Time Increment	0.016 hours
Time to Peak (Computed)	12.130 hours
Flow (Peak, Computed)	5.19 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	12.100 hours
Flow (Peak Interpolated Output)	5.06 ft³/s

Drainage Area	
SCS CN (Composite)	68.000
Area (User Defined)	2.773 acres
Maximum Retention (Pervious)	4.7 in
Maximum Retention (Pervious, 20 percent)	0.9 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	1.9 in
Runoff Volume (Pervious)	0.434 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	0.434 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.119 hours
Computational Time Increment	0.016 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670

PRE DEVELOPED

Subsection: Unit Hydrograph Summary
Label: DA-3

Return Event: 10 years
Storm Event: 10 Year

SCS Unit Hydrograph Parameters	
Unit peak, qp	26.42 ft^3/s
Unit peak time, Tp	0.079 hours
Unit receding limb, Tr	0.317 hours
Total unit time, Tb	0.396 hours

PRE DEVELOPED

Storm Event	25 Year
Return Event	25 years
Duration	24.000 hours
Depth	6.4 in
Time of Concentration (Composite)	0.119 hours
Area (User Defined)	2.773 acres

Computational Time Increment	0.016 hours
Time to Peak (Computed)	12.114 hours
Flow (Peak, Computed)	8.17 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	12.100 hours
Flow (Peak Interpolated Output)	8.04 ft³/s

Drainage Area	
SCS CN (Composite)	68.000
Area (User Defined)	2.773 acres
Maximum Retention (Pervious)	4.7 in
Maximum Retention (Pervious, 20 percent)	0.9 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	2.9 in
Runoff Volume (Pervious)	0.677 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	0.677 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.119 hours
Computational Time Increment	0.016 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670

PRE DEVELOPED

Subsection: Unit Hydrograph Summary
Label: DA-3

Return Event: 25 years
Storm Event: 25 Year

SCS Unit Hydrograph Parameters	
Unit peak, qp	26.42 ft^3/s
Unit peak time, Tp	0.079 hours
Unit receding limb, Tr	0.317 hours
Total unit time, Tb	0.396 hours

PRE DEVELOPED

Subsection: Unit Hydrograph Summary | Return Event: 100 years
Label: DA-3 | Storm Event: 100 Year

Storm Event	100 Year
Return Event	100 years
Duration	24.000 hours
Depth	9.0 in
Time of Concentration (Composite)	0.119 hours
Area (User Defined)	2.773 acres

Computational Time Increment	0.016 hours
Time to Peak (Computed)	12.114 hours
Flow (Peak, Computed)	14.17 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	12.100 hours
Flow (Peak Interpolated Output)	14.02 ft³/s

Drainage Area	
SCS CN (Composite)	68.000
Area (User Defined)	2.773 acres
Maximum Retention (Pervious)	4.7 in
Maximum Retention (Pervious, 20 percent)	0.9 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	5.1 in
Runoff Volume (Pervious)	1.176 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	1.174 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.119 hours
Computational Time Increment	0.016 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670

PRE DEVELOPED

Subsection: Unit Hydrograph Summary
Label: DA-3

Return Event: 100 years
Storm Event: 100 Year

SCS Unit Hydrograph Parameters	
Unit peak, qp	26.42 ft^3/s
Unit peak time, Tp	0.079 hours
Unit receding limb, Tr	0.317 hours
Total unit time, Tb	0.396 hours

PRE DEVELOPED

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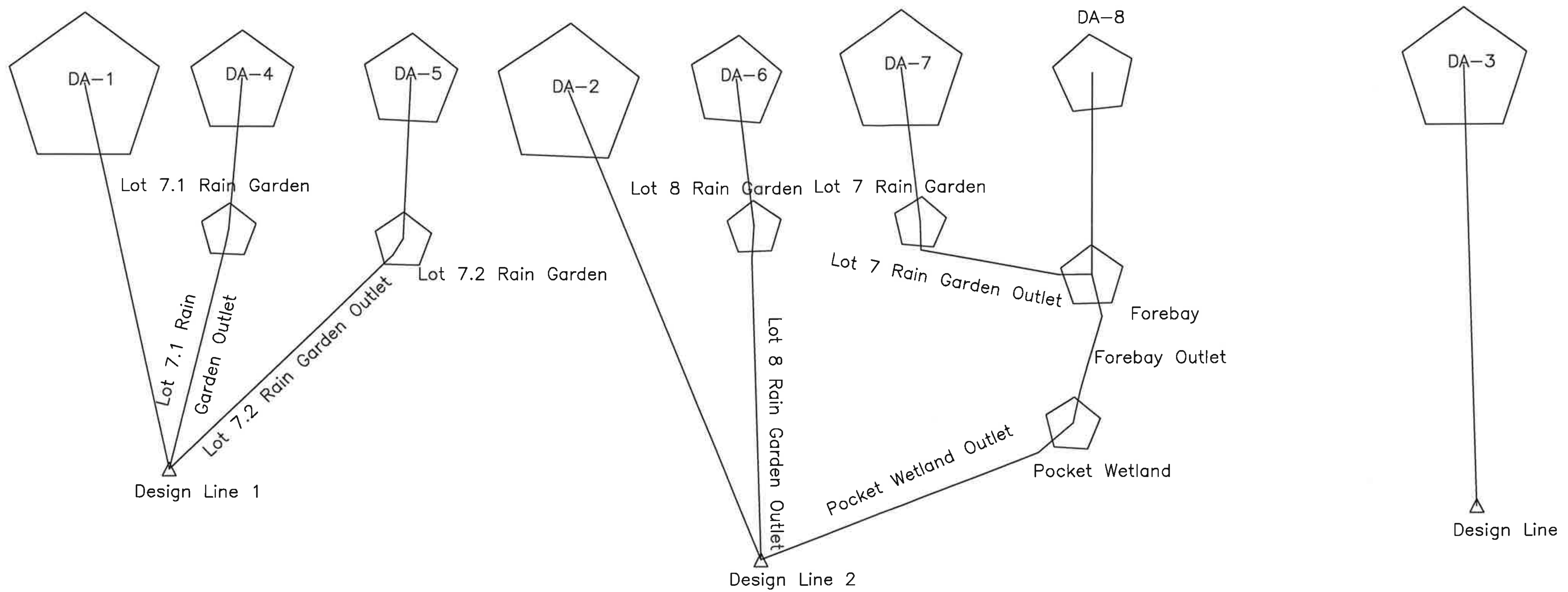
PRE DEVELOPED



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DATE: 03/23/16

POST-DEVELOPMED POND PACK MODEL SCHEMATIC

PREPARED FOR

SANDVOSS SUBDIVISION

Town of Yorktown

Westchester Co., New York

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POST DEVELOPED

Project Summary

Title	16-43 Sandvoss Subdivision
Engineer	Jospeh Riina
Company	Site Design Consultants
Date	4/21/2017

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Subsection: Master Network Summary

Catchments Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ac-ft)	Time to Peak (hours)	Peak Flow (ft^3/s)
DA-7	Post-Development 1 year	1	0.032	12.150	0.31
DA-7	Post-Development 2 year	2	0.047	12.150	0.50
DA-7	Post-Development 10 year	10	0.113	12.150	1.30
DA-7	Post-Development 25 year	25	0.177	12.150	2.04
DA-7	Post-Development 100 year	100	0.306	12.100	3.53
DA-4	Post-Development 1 year	1	0.035	12.200	0.29
DA-4	Post-Development 2 year	2	0.052	12.200	0.49
DA-4	Post-Development 10 year	10	0.128	12.150	1.33
DA-4	Post-Development 25 year	25	0.201	12.150	2.15
DA-4	Post-Development 100 year	100	0.351	12.150	3.81
DA-5	Post-Development 1 year	1	0.035	12.400	0.20
DA-5	Post-Development 2 year	2	0.056	12.300	0.39
DA-5	Post-Development 10 year	10	0.155	12.250	1.37
DA-5	Post-Development 25 year	25	0.256	12.250	2.36
DA-5	Post-Development 100 year	100	0.469	12.250	4.43
DA-6	Post-Development 1 year	1	0.031	12.150	0.26
DA-6	Post-Development 2 year	2	0.048	12.100	0.50
DA-6	Post-Development 10 year	10	0.126	12.100	1.53
DA-6	Post-Development 25 year	25	0.203	12.100	2.53
DA-6	Post-Development 100 year	100	0.366	12.100	4.58
DA-8	Post-Development 1 year	1	0.117	12.200	1.08
DA-8	Post-Development 2 year	2	0.169	12.200	1.64
DA-8	Post-Development 10 year	10	0.373	12.200	3.82

POST DEVELOPED

Subsection: Master Network Summary

Catchments Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ac-ft)	Time to Peak (hours)	Peak Flow (ft³/s)
DA-8	Post-Development 25 year	25	0.565	12.200	5.81
DA-8	Post-Development 100 year	100	0.949	12.150	9.74
DA-1	Post-Development 1 year	1	0.250	12.300	1.70
DA-1	Post-Development 2 year	2	0.389	12.250	3.05
DA-1	Post-Development 10 year	10	0.991	12.250	9.10
DA-1	Post-Development 25 year	25	1.586	12.200	14.98
DA-1	Post-Development 100 year	100	2.829	12.200	27.31
DA-2	Post-Development 1 year	1	0.165	12.150	1.76
DA-2	Post-Development 2 year	2	0.234	12.150	2.60
DA-2	Post-Development 10 year	10	0.511	12.150	5.86
DA-2	Post-Development 25 year	25	0.767	12.150	8.79
DA-2	Post-Development 100 year	100	1.278	12.150	14.46
DA-3	Post-Development 1 year	1	0.127	12.150	1.31
DA-3	Post-Development 2 year	2	0.188	12.100	2.09
DA-3	Post-Development 10 year	10	0.440	12.100	5.31
DA-3	Post-Development 25 year	25	0.681	12.100	8.31
DA-3	Post-Development 100 year	100	1.172	12.100	14.27

Node Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ac-ft)	Time to Peak (hours)	Peak Flow (ft³/s)
Design Line 1	Post-Development 1 year	1	0.250	12.300	1.70
Design Line 1	Post-Development 2 year	2	0.421	12.250	3.05
Design Line 1	Post-Development 10 year	10	1.197	12.250	9.10

POST DEVELOPED

Subsection: Master Network Summary

Node Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ac-ft)	Time to Peak (hours)	Peak Flow (ft³/s)
Design Line 1	Post-Development 25 year	25	1.965	12.250	18.62
Design Line 1	Post-Development 100 year	100	3.572	12.200	34.90
Design Line 2	Post-Development 1 year	1	0.253	12.150	1.79
Design Line 2	Post-Development 2 year	2	0.374	12.150	2.65
Design Line 2	Post-Development 10 year	10	0.967	12.150	6.34
Design Line 2	Post-Development 25 year	25	1.547	12.150	11.92
Design Line 2	Post-Development 100 year	100	2.730	12.150	23.63
Design Line 3	Post-Development 1 year	1	0.127	12.150	1.31
Design Line 3	Post-Development 2 year	2	0.188	12.100	2.09
Design Line 3	Post-Development 10 year	10	0.440	12.100	5.31
Design Line 3	Post-Development 25 year	25	0.681	12.100	8.31
Design Line 3	Post-Development 100 year	100	1.172	12.100	14.27

Pond Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ac-ft)	Time to Peak (hours)	Peak Flow (ft³/s)	Maximum Water Surface Elevation (ft)	Maximum Pond Storage (ac-ft)
Lot 7 Rain Garden (IN)	Post-Development 1 year	1	0.032	12.150	0.31	(N/A)	(N/A)
Lot 7 Rain Garden (OUT)	Post-Development 1 year	1	0.000	24.000	0.01	451.50	0.032
Lot 7 Rain Garden (IN)	Post-Development 2 year	2	0.047	12.150	0.50	(N/A)	(N/A)
Lot 7 Rain Garden (OUT)	Post-Development 2 year	2	0.016	15.200	0.04	451.51	0.032
Lot 7 Rain Garden (IN)	Post-Development 10 year	10	0.113	12.150	1.30	(N/A)	(N/A)

Subsection: Master Network Summary

Pond Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ac-ft)	Time to Peak (hours)	Peak Flow (ft^3/s)	Maximum Water Surface Elevation (ft)	Maximum Pond Storage (ac-ft)
Lot 7 Rain Garden (OUT)	Post-Development 10 year	10	0.082	12.350	0.73	451.62	0.036
Lot 7 Rain Garden (IN)	Post-Development 25 year	25	0.177	12.150	2.04	(N/A)	(N/A)
Lot 7 Rain Garden (OUT)	Post-Development 25 year	25	0.145	12.200	1.80	451.78	0.042
Lot 7 Rain Garden (IN)	Post-Development 100 year	100	0.306	12.100	3.53	(N/A)	(N/A)
Lot 7 Rain Garden (OUT)	Post-Development 100 year	100	0.275	12.150	3.41	451.93	0.048
Lot 7.1 Rain Garden (IN)	Post-Development 1 year	1	0.035	12.200	0.29	(N/A)	(N/A)
Lot 7.1 Rain Garden (OUT)	Post-Development 1 year	1	0.000	24.000	0.00	456.45	0.035
Lot 7.1 Rain Garden (IN)	Post-Development 2 year	2	0.052	12.200	0.49	(N/A)	(N/A)
Lot 7.1 Rain Garden (OUT)	Post-Development 2 year	2	0.015	15.950	0.04	456.51	0.037
Lot 7.1 Rain Garden (IN)	Post-Development 10 year	10	0.128	12.150	1.33	(N/A)	(N/A)
Lot 7.1 Rain Garden (OUT)	Post-Development 10 year	10	0.090	12.450	0.73	456.62	0.043
Lot 7.1 Rain Garden (IN)	Post-Development 25 year	25	0.201	12.150	2.15	(N/A)	(N/A)
Lot 7.1 Rain Garden (OUT)	Post-Development 25 year	25	0.163	12.250	1.80	456.78	0.050
Lot 7.1 Rain Garden (IN)	Post-Development 100 year	100	0.351	12.150	3.81	(N/A)	(N/A)
Lot 7.1 Rain Garden (OUT)	Post-Development 100 year	100	0.314	12.200	3.61	456.95	0.058

POST DEVELOPED

Subsection: Master Network Summary

Pond Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ac-ft)	Time to Peak (hours)	Peak Flow (ft³/s)	Maximum Water Surface Elevation (ft)	Maximum Pond Storage (ac-ft)
Lot 7.2 Rain Garden (IN)	Post-Development 1 year	1	0.035	12.400	0.20	(N/A)	(N/A)
Lot 7.2 Rain Garden (OUT)	Post-Development 1 year	1	0.000	24.000	0.00	457.40	0.035
Lot 7.2 Rain Garden (IN)	Post-Development 2 year	2	0.056	12.300	0.39	(N/A)	(N/A)
Lot 7.2 Rain Garden (OUT)	Post-Development 2 year	2	0.017	16.400	0.04	457.50	0.040
Lot 7.2 Rain Garden (IN)	Post-Development 10 year	10	0.155	12.250	1.37	(N/A)	(N/A)
Lot 7.2 Rain Garden (OUT)	Post-Development 10 year	10	0.115	12.500	0.93	457.60	0.044
Lot 7.2 Rain Garden (IN)	Post-Development 25 year	25	0.256	12.250	2.36	(N/A)	(N/A)
Lot 7.2 Rain Garden (OUT)	Post-Development 25 year	25	0.216	12.350	2.16	457.73	0.050
Lot 7.2 Rain Garden (IN)	Post-Development 100 year	100	0.469	12.250	4.43	(N/A)	(N/A)
Lot 7.2 Rain Garden (OUT)	Post-Development 100 year	100	0.429	12.300	4.30	457.91	0.059
Lot 8 Rain Garden (IN)	Post-Development 1 year	1	0.031	12.150	0.26	(N/A)	(N/A)
Lot 8 Rain Garden (OUT)	Post-Development 1 year	1	0.001	23.000	0.01	447.50	0.030
Lot 8 Rain Garden (IN)	Post-Development 2 year	2	0.048	12.100	0.50	(N/A)	(N/A)
Lot 8 Rain Garden (OUT)	Post-Development 2 year	2	0.019	14.900	0.05	447.51	0.030
Lot 8 Rain Garden (IN)	Post-Development 10 year	10	0.126	12.100	1.53	(N/A)	(N/A)

POST DEVELOPED

Subsection: Master Network Summary

Pond Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ac-ft)	Time to Peak (hours)	Peak Flow (ft³/s)	Maximum Water Surface Elevation (ft)	Maximum Pond Storage (ac-ft)
Lot 8 Rain Garden (OUT)	Post-Development 10 year	10	0.096	12.250	0.93	447.63	0.034
Lot 8 Rain Garden (IN)	Post-Development 25 year	25	0.203	12.100	2.53	(N/A)	(N/A)
Lot 8 Rain Garden (OUT)	Post-Development 25 year	25	0.174	12.150	2.35	447.80	0.039
Lot 8 Rain Garden (IN)	Post-Development 100 year	100	0.366	12.100	4.58	(N/A)	(N/A)
Lot 8 Rain Garden (OUT)	Post-Development 100 year	100	0.336	12.100	4.41	447.95	0.044
Pocket Wetland (IN)	Post-Development 1 year	1	0.112	12.250	0.91	(N/A)	(N/A)
Pocket Wetland (OUT)	Post-Development 1 year	1	0.087	15.450	0.10	441.28	0.171
Pocket Wetland (IN)	Post-Development 2 year	2	0.174	12.250	1.36	(N/A)	(N/A)
Pocket Wetland (OUT)	Post-Development 2 year	2	0.121	16.300	0.13	441.45	0.200
Pocket Wetland (IN)	Post-Development 10 year	10	0.439	12.300	3.50	(N/A)	(N/A)
Pocket Wetland (OUT)	Post-Development 10 year	10	0.360	12.650	1.73	441.76	0.253
Pocket Wetland (IN)	Post-Development 25 year	25	0.692	12.200	6.54	(N/A)	(N/A)
Pocket Wetland (OUT)	Post-Development 25 year	25	0.606	12.450	4.20	441.99	0.293
Pocket Wetland (IN)	Post-Development 100 year	100	1.205	12.200	11.90	(N/A)	(N/A)
Pocket Wetland (OUT)	Post-Development 100 year	100	1.116	12.450	6.60	442.65	0.407

POST DEVELOPED

Subsection: Master Network Summary

Pond Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ac-ft)	Time to Peak (hours)	Peak Flow (ft³/s)	Maximum Water Surface Elevation (ft)	Maximum Pond Storage (ac-ft)
Forebay (IN)	Post-Development 1 year	1	0.118	12.200	1.08	(N/A)	(N/A)
Forebay (OUT)	Post-Development 1 year	1	0.112	12.250	0.91	441.28	0.069
Forebay (IN)	Post-Development 2 year	2	0.184	12.200	1.64	(N/A)	(N/A)
Forebay (OUT)	Post-Development 2 year	2	0.174	12.250	1.36	441.45	0.075
Forebay (IN)	Post-Development 10 year	10	0.455	12.250	4.13	(N/A)	(N/A)
Forebay (OUT)	Post-Development 10 year	10	0.439	12.300	3.50	441.77	0.086
Forebay (IN)	Post-Development 25 year	25	0.710	12.200	7.62	(N/A)	(N/A)
Forebay (OUT)	Post-Development 25 year	25	0.692	12.200	6.54	442.01	0.094
Forebay (IN)	Post-Development 100 year	100	1.224	12.150	13.15	(N/A)	(N/A)
Forebay (OUT)	Post-Development 100 year	100	1.205	12.200	11.90	442.67	0.117

POST DEVELOPED

Subsection: Time-Depth Curve | Return Event: 1 years
Label: Westchester County 1-100 2015 | Storm Event: 1 Year

Time-Depth Curve: 1 Year	
Label	1 Year
Start Time	0.000 hours
Increment	0.100 hours
End Time	24.000 hours
Return Event	1 years

CUMULATIVE RAINFALL (in)
Output Time Increment = 0.100 hours
Time on left represents time for first value in each row.

Time (hours)	Depth (in)	Depth (in)	Depth (in)	Depth (in)	Depth (in)
0.000	0.0	0.0	0.0	0.0	0.0
0.500	0.0	0.0	0.0	0.0	0.0
1.000	0.0	0.0	0.0	0.0	0.0
1.500	0.0	0.0	0.0	0.1	0.1
2.000	0.1	0.1	0.1	0.1	0.1
2.500	0.1	0.1	0.1	0.1	0.1
3.000	0.1	0.1	0.1	0.1	0.1
3.500	0.1	0.1	0.1	0.1	0.1
4.000	0.1	0.1	0.1	0.1	0.1
4.500	0.1	0.1	0.1	0.2	0.2
5.000	0.2	0.2	0.2	0.2	0.2
5.500	0.2	0.2	0.2	0.2	0.2
6.000	0.2	0.2	0.2	0.2	0.2
6.500	0.2	0.2	0.2	0.2	0.2
7.000	0.3	0.3	0.3	0.3	0.3
7.500	0.3	0.3	0.3	0.3	0.3
8.000	0.3	0.3	0.3	0.3	0.4
8.500	0.4	0.4	0.4	0.4	0.4
9.000	0.4	0.4	0.4	0.4	0.5
9.500	0.5	0.5	0.5	0.5	0.5
10.000	0.5	0.5	0.6	0.6	0.6
10.500	0.6	0.6	0.6	0.7	0.7
11.000	0.7	0.7	0.7	0.8	0.8
11.500	0.8	0.9	1.0	1.0	1.2
12.000	1.4	1.6	1.8	1.8	1.9
12.500	2.0	2.0	2.0	2.1	2.1
13.000	2.1	2.1	2.1	2.2	2.2
13.500	2.2	2.2	2.2	2.2	2.3
14.000	2.3	2.3	2.3	2.3	2.3
14.500	2.3	2.3	2.4	2.4	2.4
15.000	2.4	2.4	2.4	2.4	2.4
15.500	2.4	2.4	2.5	2.5	2.5
16.000	2.5	2.5	2.5	2.5	2.5
16.500	2.5	2.5	2.5	2.5	2.5

POST DEVELOPED

Subsection: Time-Depth Curve
Label: Westchester County 1-100 2015

Return Event: 1 years
Storm Event: 1 Year

CUMULATIVE RAINFALL (in)
Output Time Increment = 0.100 hours
Time on left represents time for first value in each row.

Time (hours)	Depth (in)	Depth (in)	Depth (in)	Depth (in)	Depth (in)
17.000	2.5	2.6	2.6	2.6	2.6
17.500	2.6	2.6	2.6	2.6	2.6
18.000	2.6	2.6	2.6	2.6	2.6
18.500	2.6	2.6	2.6	2.6	2.6
19.000	2.6	2.6	2.6	2.7	2.7
19.500	2.7	2.7	2.7	2.7	2.7
20.000	2.7	2.7	2.7	2.7	2.7
20.500	2.7	2.7	2.7	2.7	2.7
21.000	2.7	2.7	2.7	2.7	2.7
21.500	2.7	2.7	2.7	2.7	2.7
22.000	2.7	2.7	2.8	2.8	2.8
22.500	2.8	2.8	2.8	2.8	2.8
23.000	2.8	2.8	2.8	2.8	2.8
23.500	2.8	2.8	2.8	2.8	2.8
24.000	2.8	(N/A)	(N/A)	(N/A)	(N/A)

Time-Depth Curve: 10 Year	
Label	10 Year
Start Time	0.000 hours
Increment	0.100 hours
End Time	24.000 hours
Return Event	10 years

CUMULATIVE RAINFALL (in)
Output Time Increment = 0.100 hours
Time on left represents time for first value in each row.

Time (hours)	Depth (in)	Depth (in)	Depth (in)	Depth (in)	Depth (in)
0.000	0.0	0.0	0.0	0.0	0.0
0.500	0.0	0.0	0.0	0.0	0.0
1.000	0.0	0.1	0.1	0.1	0.1
1.500	0.1	0.1	0.1	0.1	0.1
2.000	0.1	0.1	0.1	0.1	0.1
2.500	0.1	0.1	0.1	0.1	0.1
3.000	0.2	0.2	0.2	0.2	0.2
3.500	0.2	0.2	0.2	0.2	0.2
4.000	0.2	0.2	0.2	0.2	0.2
4.500	0.2	0.3	0.3	0.3	0.3
5.000	0.3	0.3	0.3	0.3	0.3
5.500	0.3	0.3	0.3	0.3	0.4
6.000	0.4	0.4	0.4	0.4	0.4
6.500	0.4	0.4	0.4	0.4	0.4
7.000	0.5	0.5	0.5	0.5	0.5
7.500	0.5	0.5	0.5	0.5	0.6
8.000	0.6	0.6	0.6	0.6	0.6
8.500	0.6	0.7	0.7	0.7	0.7
9.000	0.7	0.7	0.8	0.8	0.8
9.500	0.8	0.9	0.9	0.9	0.9
10.000	0.9	1.0	1.0	1.0	1.1
10.500	1.1	1.1	1.1	1.2	1.2
11.000	1.2	1.3	1.3	1.4	1.4
11.500	1.5	1.6	1.7	1.9	2.1
12.000	2.5	2.9	3.1	3.3	3.4
12.500	3.5	3.6	3.6	3.7	3.7
13.000	3.7	3.8	3.8	3.9	3.9
13.500	3.9	3.9	4.0	4.0	4.0
14.000	4.1	4.1	4.1	4.1	4.1
14.500	4.2	4.2	4.2	4.2	4.3
15.000	4.3	4.3	4.3	4.3	4.3
15.500	4.4	4.4	4.4	4.4	4.4
16.000	4.4	4.4	4.5	4.5	4.5
16.500	4.5	4.5	4.5	4.5	4.5

CUMULATIVE RAINFALL (in)
Output Time Increment = 0.100 hours
Time on left represents time for first value in each row.

Time (hours)	Depth (in)	Depth (in)	Depth (in)	Depth (in)	Depth (in)
17.000	4.5	4.6	4.6	4.6	4.6
17.500	4.6	4.6	4.6	4.6	4.6
18.000	4.6	4.6	4.7	4.7	4.7
18.500	4.7	4.7	4.7	4.7	4.7
19.000	4.7	4.7	4.7	4.7	4.7
19.500	4.8	4.8	4.8	4.8	4.8
20.000	4.8	4.8	4.8	4.8	4.8
20.500	4.8	4.8	4.8	4.8	4.8
21.000	4.8	4.9	4.9	4.9	4.9
21.500	4.9	4.9	4.9	4.9	4.9
22.000	4.9	4.9	4.9	4.9	4.9
22.500	4.9	4.9	4.9	4.9	4.9
23.000	5.0	5.0	5.0	5.0	5.0
23.500	5.0	5.0	5.0	5.0	5.0
24.000	5.0	(N/A)	(N/A)	(N/A)	(N/A)

POST DEVELOPED

Subsection: Time-Depth Curve | Return Event: 100 years
Label: Westchester County 1-100 2015 | Storm Event: 100 Year

Time-Depth Curve: 100 Year	
Label	100 Year
Start Time	0.000 hours
Increment	0.100 hours
End Time	24.000 hours
Return Event	100 years

CUMULATIVE RAINFALL (in)
Output Time Increment = 0.100 hours
Time on left represents time for first value in each row.

Time (hours)	Depth (in)	Depth (in)	Depth (in)	Depth (in)	Depth (in)
0.000	0.0	0.0	0.0	0.0	0.0
0.500	0.0	0.1	0.1	0.1	0.1
1.000	0.1	0.1	0.1	0.1	0.1
1.500	0.1	0.1	0.2	0.2	0.2
2.000	0.2	0.2	0.2	0.2	0.2
2.500	0.2	0.2	0.2	0.3	0.3
3.000	0.3	0.3	0.3	0.3	0.3
3.500	0.3	0.3	0.4	0.4	0.4
4.000	0.4	0.4	0.4	0.4	0.4
4.500	0.4	0.5	0.5	0.5	0.5
5.000	0.5	0.5	0.5	0.6	0.6
5.500	0.6	0.6	0.6	0.6	0.6
6.000	0.6	0.7	0.7	0.7	0.7
6.500	0.7	0.7	0.8	0.8	0.8
7.000	0.8	0.8	0.9	0.9	0.9
7.500	0.9	0.9	1.0	1.0	1.0
8.000	1.0	1.0	1.1	1.1	1.1
8.500	1.2	1.2	1.2	1.2	1.3
9.000	1.3	1.3	1.4	1.4	1.5
9.500	1.5	1.5	1.6	1.6	1.7
10.000	1.7	1.7	1.8	1.8	1.9
10.500	1.9	2.0	2.1	2.1	2.2
11.000	2.2	2.3	2.4	2.5	2.6
11.500	2.7	2.8	3.1	3.4	3.7
12.000	4.5	5.3	5.6	5.9	6.2
12.500	6.3	6.4	6.5	6.6	6.7
13.000	6.7	6.8	6.9	6.9	7.0
13.500	7.1	7.1	7.2	7.2	7.3
14.000	7.3	7.3	7.4	7.4	7.5
14.500	7.5	7.5	7.6	7.6	7.7
15.000	7.7	7.7	7.8	7.8	7.8
15.500	7.8	7.9	7.9	7.9	8.0
16.000	8.0	8.0	8.0	8.0	8.1
16.500	8.1	8.1	8.1	8.1	8.2

POST DEVELOPED

Subsection: Time-Depth Curve | Return Event: 100 years
Label: Westchester County 1-100 2015 | Storm Event: 100 Year

CUMULATIVE RAINFALL (in)
Output Time Increment = 0.100 hours
Time on left represents time for first value in each row.

Time (hours)	Depth (in)	Depth (in)	Depth (in)	Depth (in)	Depth (in)
17.000	8.2	8.2	8.2	8.2	8.3
17.500	8.3	8.3	8.3	8.3	8.3
18.000	8.4	8.4	8.4	8.4	8.4
18.500	8.4	8.4	8.4	8.5	8.5
19.000	8.5	8.5	8.5	8.5	8.5
19.500	8.6	8.6	8.6	8.6	8.6
20.000	8.6	8.6	8.6	8.6	8.7
20.500	8.7	8.7	8.7	8.7	8.7
21.000	8.7	8.7	8.7	8.8	8.8
21.500	8.8	8.8	8.8	8.8	8.8
22.000	8.8	8.8	8.8	8.9	8.9
22.500	8.9	8.9	8.9	8.9	8.9
23.000	8.9	8.9	8.9	8.9	9.0
23.500	9.0	9.0	9.0	9.0	9.0
24.000	9.0	(N/A)	(N/A)	(N/A)	(N/A)

Time-Depth Curve: 2 Year	
Label	2 Year
Start Time	0.000 hours
Increment	0.100 hours
End Time	24.000 hours
Return Event	2 years

CUMULATIVE RAINFALL (in)
Output Time Increment = 0.100 hours
Time on left represents time for first value in each row.

Time (hours)	Depth (in)	Depth (in)	Depth (in)	Depth (in)	Depth (in)
0.000	0.0	0.0	0.0	0.0	0.0
0.500	0.0	0.0	0.0	0.0	0.0
1.000	0.0	0.0	0.0	0.0	0.0
1.500	0.0	0.1	0.1	0.1	0.1
2.000	0.1	0.1	0.1	0.1	0.1
2.500	0.1	0.1	0.1	0.1	0.1
3.000	0.1	0.1	0.1	0.1	0.1
3.500	0.1	0.1	0.1	0.1	0.1
4.000	0.1	0.1	0.2	0.2	0.2
4.500	0.2	0.2	0.2	0.2	0.2
5.000	0.2	0.2	0.2	0.2	0.2
5.500	0.2	0.2	0.2	0.2	0.2
6.000	0.2	0.2	0.2	0.3	0.3
6.500	0.3	0.3	0.3	0.3	0.3
7.000	0.3	0.3	0.3	0.3	0.3
7.500	0.3	0.3	0.4	0.4	0.4
8.000	0.4	0.4	0.4	0.4	0.4
8.500	0.4	0.4	0.4	0.5	0.5
9.000	0.5	0.5	0.5	0.5	0.5
9.500	0.5	0.6	0.6	0.6	0.6
10.000	0.6	0.6	0.7	0.7	0.7
10.500	0.7	0.7	0.8	0.8	0.8
11.000	0.8	0.9	0.9	0.9	0.9
11.500	1.0	1.0	1.1	1.2	1.4
12.000	1.6	1.9	2.1	2.2	2.3
12.500	2.3	2.4	2.4	2.4	2.4
13.000	2.5	2.5	2.5	2.5	2.6
13.500	2.6	2.6	2.6	2.6	2.7
14.000	2.7	2.7	2.7	2.7	2.7
14.500	2.8	2.8	2.8	2.8	2.8
15.000	2.8	2.8	2.8	2.9	2.9
15.500	2.9	2.9	2.9	2.9	2.9
16.000	2.9	2.9	2.9	2.9	3.0
16.500	3.0	3.0	3.0	3.0	3.0

POST DEVELOPED

Subsection: Time-Depth Curve | Return Event: 2 years
Label: Westchester County 1-100 2015 | Storm Event: 2 Year

CUMULATIVE RAINFALL (in)
Output Time Increment = 0.100 hours
Time on left represents time for first value in each row.

Time (hours)	Depth (in)	Depth (in)	Depth (in)	Depth (in)	Depth (in)
17.000	3.0	3.0	3.0	3.0	3.0
17.500	3.0	3.0	3.0	3.1	3.1
18.000	3.1	3.1	3.1	3.1	3.1
18.500	3.1	3.1	3.1	3.1	3.1
19.000	3.1	3.1	3.1	3.1	3.1
19.500	3.1	3.1	3.1	3.1	3.2
20.000	3.2	3.2	3.2	3.2	3.2
20.500	3.2	3.2	3.2	3.2	3.2
21.000	3.2	3.2	3.2	3.2	3.2
21.500	3.2	3.2	3.2	3.2	3.2
22.000	3.2	3.2	3.2	3.2	3.3
22.500	3.3	3.3	3.3	3.3	3.3
23.000	3.3	3.3	3.3	3.3	3.3
23.500	3.3	3.3	3.3	3.3	3.3
24.000	3.3	(N/A)	(N/A)	(N/A)	(N/A)

POST DEVELOPED

Subsection: Time-Depth Curve | Return Event: 25 years
Label: Westchester County 1-100 2015 | Storm Event: 25 Year

Time-Depth Curve: 25 Year	
Label	25 Year
Start Time	0.000 hours
Increment	0.100 hours
End Time	24.000 hours
Return Event	25 years

CUMULATIVE RAINFALL (in)
Output Time Increment = 0.100 hours
Time on left represents time for first value in each row.

Time (hours)	Depth (in)	Depth (in)	Depth (in)	Depth (in)	Depth (in)
0.000	0.0	0.0	0.0	0.0	0.0
0.500	0.0	0.0	0.0	0.1	0.1
1.000	0.1	0.1	0.1	0.1	0.1
1.500	0.1	0.1	0.1	0.1	0.1
2.000	0.1	0.1	0.1	0.1	0.2
2.500	0.2	0.2	0.2	0.2	0.2
3.000	0.2	0.2	0.2	0.2	0.2
3.500	0.2	0.2	0.3	0.3	0.3
4.000	0.3	0.3	0.3	0.3	0.3
4.500	0.3	0.3	0.3	0.3	0.4
5.000	0.4	0.4	0.4	0.4	0.4
5.500	0.4	0.4	0.4	0.4	0.5
6.000	0.5	0.5	0.5	0.5	0.5
6.500	0.5	0.5	0.5	0.6	0.6
7.000	0.6	0.6	0.6	0.6	0.6
7.500	0.7	0.7	0.7	0.7	0.7
8.000	0.7	0.7	0.8	0.8	0.8
8.500	0.8	0.8	0.9	0.9	0.9
9.000	0.9	1.0	1.0	1.0	1.0
9.500	1.1	1.1	1.1	1.1	1.2
10.000	1.2	1.2	1.3	1.3	1.3
10.500	1.4	1.4	1.5	1.5	1.6
11.000	1.6	1.6	1.7	1.8	1.8
11.500	1.9	2.0	2.2	2.4	2.7
12.000	3.2	3.7	4.0	4.2	4.4
12.500	4.5	4.6	4.6	4.7	4.8
13.000	4.8	4.8	4.9	4.9	5.0
13.500	5.0	5.1	5.1	5.1	5.2
14.000	5.2	5.2	5.3	5.3	5.3
14.500	5.3	5.4	5.4	5.4	5.4
15.000	5.5	5.5	5.5	5.5	5.6
15.500	5.6	5.6	5.6	5.6	5.7
16.000	5.7	5.7	5.7	5.7	5.7
16.500	5.7	5.8	5.8	5.8	5.8

POST DEVELOPED

Subsection: Time-Depth Curve
Label: Westchester County 1-100 2015

Return Event: 25 years
Storm Event: 25 Year

CUMULATIVE RAINFALL (in)
Output Time Increment = 0.100 hours
Time on left represents time for first value in each row.

Time (hours)	Depth (in)	Depth (in)	Depth (in)	Depth (in)	Depth (in)
17.000	5.8	5.8	5.8	5.9	5.9
17.500	5.9	5.9	5.9	5.9	5.9
18.000	5.9	5.9	6.0	6.0	6.0
18.500	6.0	6.0	6.0	6.0	6.0
19.000	6.0	6.0	6.1	6.1	6.1
19.500	6.1	6.1	6.1	6.1	6.1
20.000	6.1	6.1	6.1	6.1	6.2
20.500	6.2	6.2	6.2	6.2	6.2
21.000	6.2	6.2	6.2	6.2	6.2
21.500	6.2	6.2	6.3	6.3	6.3
22.000	6.3	6.3	6.3	6.3	6.3
22.500	6.3	6.3	6.3	6.3	6.3
23.000	6.3	6.3	6.4	6.4	6.4
23.500	6.4	6.4	6.4	6.4	6.4
24.000	6.4	(N/A)	(N/A)	(N/A)	(N/A)

POST DEVELOPED

Subsection: Time of Concentration Calculations — Return Event: 1 years
Label: DA-1 — Storm Event: 1 Year

Time of Concentration Results

Segment #1: TR-55 Sheet Flow	
Hydraulic Length	150.00 ft
Manning's n	0.400
Slope	0.095 ft/ft
2 Year 24 Hour Depth	3.3 in
Average Velocity	0.16 ft/s
Segment Time of Concentration	0.261 hours

Segment #2: TR-55 Shallow Concentrated Flow	
Hydraulic Length	71.85 ft
Is Paved?	False
Slope	0.051 ft/ft
Average Velocity	3.64 ft/s
Segment Time of Concentration	0.005 hours

Segment #3: TR-55 Shallow Concentrated Flow	
Hydraulic Length	69.00 ft
Is Paved?	False
Slope	0.234 ft/ft
Average Velocity	7.80 ft/s
Segment Time of Concentration	0.002 hours

Segment #4: TR-55 Shallow Concentrated Flow	
Hydraulic Length	117.80 ft
Is Paved?	False
Slope	0.015 ft/ft
Average Velocity	1.98 ft/s
Segment Time of Concentration	0.017 hours

Segment #5: TR-55 Shallow Concentrated Flow	
Hydraulic Length	181.65 ft
Is Paved?	False
Slope	0.111 ft/ft
Average Velocity	5.38 ft/s
Segment Time of Concentration	0.009 hours

Time of Concentration (Composite)

POST DEVELOPED

Subsection: Time of Concentration Calculations
Label: DA-1

Return Event: 1 years
Storm Event: 1 Year

Time of Concentration (Composite)	0.295 hours

==== SCS Channel Flow

Tc =
R = Qa / Wp
V = (1.49 * (R**(2/3)) * (Sf**-0.5)) / n

(Lf / V) / 3600

Where:
R= Hydraulic radius
Aq= Flow area, square feet
Wp= Wetted perimeter, feet
V= Velocity, ft/sec
Sf= Slope, ft/ft
n= Manning's n
Tc= Time of concentration, hours
Lf= Flow length, feet

==== SCS TR-55 Shallow Concentration Flow

Tc =
Unpaved surface:
V = 16.1345 * (Sf**0.5)

Paved Surface:
V = 20.3282 * (Sf**0.5)

(Lf / V) / 3600

Where:
V= Velocity, ft/sec
Sf= Slope, ft/ft
Tc= Time of concentration, hours
Lf= Flow length, feet

POST DEVELOPED

Subsection: Time of Concentration Calculations
Label: DA-2

Return Event: 1 years
Storm Event: 1 Year

Time of Concentration Results

Segment #1: TR-55 Sheet Flow	
Hydraulic Length	100.00 ft
Manning's n	0.240
Slope	0.090 ft/ft
2 Year 24 Hour Depth	3.3 in
Average Velocity	0.22 ft/s
Segment Time of Concentration	0.128 hours

Segment #2: TR-55 Shallow Concentrated Flow	
Hydraulic Length	185.11 ft
Is Paved?	False
Slope	0.059 ft/ft
Average Velocity	3.92 ft/s
Segment Time of Concentration	0.013 hours

Segment #3: TR-55 Shallow Concentrated Flow	
Hydraulic Length	196.80 ft
Is Paved?	True
Slope	0.051 ft/ft
Average Velocity	4.59 ft/s
Segment Time of Concentration	0.012 hours

Time of Concentration (Composite)	
Time of Concentration (Composite)	0.153 hours

Subsection: Time of Concentration Calculations | Return Event: 1 years
Label: DA-2 | Storm Event: 1 Year

==== SCS Channel Flow

Tc = R = Qa / Wp
V = (1.49 * (R**(2/3)) * (Sf**-0.5)) / n

(Lf / V) / 3600

Where:
R= Hydraulic radius
Aq= Flow area, square feet
Wp= Wetted perimeter, feet
V= Velocity, ft/sec
Sf= Slope, ft/ft
n= Manning's n
Tc= Time of concentration, hours
Lf= Flow length, feet

==== SCS TR-55 Shallow Concentration Flow

Tc = Unpaved surface:
V = 16.1345 * (Sf**0.5)

Paved Surface:
V = 20.3282 * (Sf**0.5)

(Lf / V) / 3600

Where:
V= Velocity, ft/sec
Sf= Slope, ft/ft
Tc= Time of concentration, hours
Lf= Flow length, feet

POST DEVELOPED

Subsection: Time of Concentration Calculations
Label: DA-3

Return Event: 1 years
Storm Event: 1 Year

Time of Concentration Results

Segment #1: TR-55 Sheet Flow	
Hydraulic Length	46.42 ft
Manning's n	0.240
Slope	0.040 ft/ft
2 Year 24 Hour Depth	3.3 in
Average Velocity	0.13 ft/s
Segment Time of Concentration	0.096 hours

Segment #2: TR-55 Shallow Concentrated Flow	
Hydraulic Length	183.47 ft
Is Paved?	False
Slope	0.282 ft/ft
Average Velocity	8.57 ft/s
Segment Time of Concentration	0.006 hours

Time of Concentration (Composite)	
Time of Concentration (Composite)	0.102 hours

==== SCS Channel Flow

Tc =

R = Qa / Wp
V = (1.49 * (R**(2/3)) * (Sf**-0.5)) / n

(Lf / V) / 3600

Where:

R= Hydraulic radius
Aq= Flow area, square feet
Wp= Wetted perimeter, feet
V= Velocity, ft/sec
Sf= Slope, ft/ft
n= Manning's n
Tc= Time of concentration, hours
Lf= Flow length, feet

==== SCS TR-55 Shallow Concentration Flow

Tc =

Unpaved surface:
V = 16.1345 * (Sf**0.5)

Paved Surface:
V = 20.3282 * (Sf**0.5)

(Lf / V) / 3600

Where:

V= Velocity, ft/sec
Sf= Slope, ft/ft
Tc= Time of concentration, hours
Lf= Flow length, feet

Subsection: Time of Concentration Calculations | Return Event: 1 years
Label: DA-4 | Storm Event: 1 Year

Time of Concentration Results

Segment #1: TR-55 Sheet Flow	
Hydraulic Length	64.35 ft
Manning's n	0.240
Slope	0.047 ft/ft
2 Year 24 Hour Depth	3.3 in
Average Velocity	0.15 ft/s
Segment Time of Concentration	0.117 hours

Segment #2: TR-55 Shallow Concentrated Flow	
Hydraulic Length	145.40 ft
Is Paved?	True
Slope	0.070 ft/ft
Average Velocity	5.38 ft/s
Segment Time of Concentration	0.008 hours

Segment #3: TR-55 Channel Flow	
Flow Area	0.4 ft^2
Hydraulic Length	227.73 ft
Manning's n	0.120
Slope	0.070 ft/ft
Wetted Perimeter	3.82 ft
Average Velocity	0.78 ft/s
Segment Time of Concentration	0.081 hours

Time of Concentration (Composite)	
Time of Concentration (Composite)	0.206 hours

POST DEVELOPED

Subsection: Time of Concentration Calculations
Label: DA-4

Return Event: 1 years
Storm Event: 1 Year

==== SCS Channel Flow

Tc = R = Qa / Wp
V = (1.49 * (R**(2/3)) * (Sf**-0.5)) / n

(Lf / V) / 3600

Where:
R= Hydraulic radius
Aq= Flow area, square feet
Wp= Wetted perimeter, feet
V= Velocity, ft/sec
Sf= Slope, ft/ft
n= Manning's n
Tc= Time of concentration, hours
Lf= Flow length, feet

==== SCS TR-55 Shallow Concentration Flow

Tc = Unpaved surface:
V = 16.1345 * (Sf**0.5)

Paved Surface:
V = 20.3282 * (Sf**0.5)

(Lf / V) / 3600

Where:
V= Velocity, ft/sec
Sf= Slope, ft/ft
Tc= Time of concentration, hours
Lf= Flow length, feet

==== SCS TR-55 Sheet Flow

Tc = (0.007 * ((n * Lf)**0.8)) / ((P**0.5) * (Sf**0.4))

Where:
Tc= Time of concentration, hours
n= Manning's n
Lf= Flow length, feet
P= 2yr, 24hr Rain depth, inches
Sf= Slope, %

POST DEVELOPED

Subsection: Time of Concentration Calculations

Label: DA-5

Return Event: 1 years

Storm Event: 1 Year

Time of Concentration Results

Segment #1: TR-55 Sheet Flow	
Hydraulic Length	100.00 ft
Manning's n	0.400
Slope	0.032 ft/ft
2 Year 24 Hour Depth	3.3 in
Average Velocity	0.10 ft/s
Segment Time of Concentration	0.292 hours

Segment #2: TR-55 Shallow Concentrated Flow	
Hydraulic Length	115.81 ft
Is Paved?	False
Slope	0.035 ft/ft
Average Velocity	3.02 ft/s
Segment Time of Concentration	0.011 hours

Segment #3: TR-55 Shallow Concentrated Flow	
Hydraulic Length	43.00 ft
Is Paved?	False
Slope	0.186 ft/ft
Average Velocity	6.96 ft/s
Segment Time of Concentration	0.002 hours

Segment #4: TR-55 Shallow Concentrated Flow	
Hydraulic Length	23.37 ft
Is Paved?	True
Slope	0.020 ft/ft
Average Velocity	2.87 ft/s
Segment Time of Concentration	0.002 hours

Segment #5: TR-55 Shallow Concentrated Flow	
Hydraulic Length	18.29 ft
Is Paved?	False
Slope	0.144 ft/ft
Average Velocity	6.12 ft/s
Segment Time of Concentration	0.001 hours

Time of Concentration (Composite)

POST DEVELOPED

Subsection: Time of Concentration Calculations
Label: DA-5

Return Event: 1 years
Storm Event: 1 Year

Time of Concentration (Composite)	0.307 hours

==== SCS Channel Flow

Tc = R = Qa / Wp
V = (1.49 * (R**(2/3)) * (Sf**-0.5)) / n

(Lf / V) / 3600

Where:
R= Hydraulic radius
Aq= Flow area, square feet
Wp= Wetted perimeter, feet
V= Velocity, ft/sec
Sf= Slope, ft/ft
n= Manning's n
Tc= Time of concentration, hours
Lf= Flow length, feet

==== SCS TR-55 Shallow Concentration Flow

Tc = Unpaved surface:
V = 16.1345 * (Sf**0.5)

Paved Surface:
V = 20.3282 * (Sf**0.5)

(Lf / V) / 3600

Where:
V= Velocity, ft/sec
Sf= Slope, ft/ft
Tc= Time of concentration, hours
Lf= Flow length, feet

POST DEVELOPED

Subsection: Time of Concentration Calculations — Return Event: 1 years
Label: DA-6 — Storm Event: 1 Year

Time of Concentration Results

Segment #1: TR-55 Sheet Flow	
Hydraulic Length	27.79 ft
Manning's n	0.240
Slope	0.300 ft/ft
2 Year 24 Hour Depth	3.3 in
Average Velocity	0.27 ft/s
Segment Time of Concentration	0.028 hours

Segment #2: TR-55 Shallow Concentrated Flow	
Hydraulic Length	16.90 ft
Is Paved?	True
Slope	0.020 ft/ft
Average Velocity	2.87 ft/s
Segment Time of Concentration	0.002 hours

Segment #3: TR-55 Shallow Concentrated Flow	
Hydraulic Length	212.45 ft
Is Paved?	False
Slope	0.071 ft/ft
Average Velocity	4.30 ft/s
Segment Time of Concentration	0.014 hours

Time of Concentration (Composite)	
Time of Concentration (Composite)	0.083 hours

==== SCS Channel Flow

Tc =

R = Qa / Wp
V = (1.49 * (R**(2/3)) * (Sf**-0.5)) / n

(Lf / V) / 3600

Where:

R= Hydraulic radius
Aq= Flow area, square feet
Wp= Wetted perimeter, feet
V= Velocity, ft/sec
Sf= Slope, ft/ft
n= Manning's n
Tc= Time of concentration, hours
Lf= Flow length, feet

==== SCS TR-55 Shallow Concentration Flow

Tc =

Unpaved surface:
V = 16.1345 * (Sf**0.5)

Paved Surface:
V = 20.3282 * (Sf**0.5)

(Lf / V) / 3600

Where:

V= Velocity, ft/sec
Sf= Slope, ft/ft
Tc= Time of concentration, hours
Lf= Flow length, feet

POST DEVELOPED

Subsection: Time of Concentration Calculations | Return Event: 1 years
Label: DA-7 | Storm Event: 1 Year

Time of Concentration Results

Segment #1: TR-55 Sheet Flow	
Hydraulic Length	55.69 ft
Manning's n	0.240
Slope	0.070 ft/ft
2 Year 24 Hour Depth	3.3 in
Average Velocity	0.17 ft/s
Segment Time of Concentration	0.089 hours

Segment #2: TR-55 Channel Flow	
Flow Area	0.4 ft²
Hydraulic Length	157.69 ft
Manning's n	0.120
Slope	0.079 ft/ft
Wetted Perimeter	3.82 ft
Average Velocity	0.83 ft/s
Segment Time of Concentration	0.053 hours

Time of Concentration (Composite)	
Time of Concentration (Composite)	0.142 hours

POST DEVELOPED

Subsection: Time of Concentration Calculations
Label: DA-7

Return Event: 1 years
Storm Event: 1 Year

==== SCS Channel Flow

Tc =	R = Qa / Wp
	V = (1.49 * (R**(2/3)) * (Sf**-0.5)) / n
	(Lf / V) / 3600
Where:	R= Hydraulic radius
	Aq= Flow area, square feet
	Wp= Wetted perimeter, feet
	V= Velocity, ft/sec
	Sf= Slope, ft/ft
	n= Manning's n
	Tc= Time of concentration, hours
	Lf= Flow length, feet

==== SCS TR-55 Sheet Flow

Tc =	(0.007 * ((n * Lf)**0.8)) / ((P**0.5) * (Sf**0.4))
Where:	Tc= Time of concentration, hours
	n= Manning's n
	Lf= Flow length, feet
	P= 2yr, 24hr Rain depth, inches
	Sf= Slope, %

Time of Concentration Results

Segment #1: TR-55 Sheet Flow	
Hydraulic Length	150.00 ft
Manning's n	0.240
Slope	0.050 ft/ft
2 Year 24 Hour Depth	3.3 in
Average Velocity	0.19 ft/s
Segment Time of Concentration	0.225 hours

Segment #2: TR-55 Shallow Concentrated Flow	
Hydraulic Length	27.58 ft
Is Paved?	False
Slope	0.073 ft/ft
Average Velocity	4.36 ft/s
Segment Time of Concentration	0.002 hours

Segment #3: TR-55 Shallow Concentrated Flow	
Hydraulic Length	214.42 ft
Is Paved?	True
Slope	0.077 ft/ft
Average Velocity	5.64 ft/s
Segment Time of Concentration	0.011 hours

Time of Concentration (Composite)	
Time of Concentration (Composite)	0.237 hours

==== SCS Channel Flow

Tc =
R = Qa / Wp
V = (1.49 * (R**(2/3)) * (Sf**-0.5)) / n

(Lf / V) / 3600

Where:
R= Hydraulic radius
Aq= Flow area, square feet
Wp= Wetted perimeter, feet
V= Velocity, ft/sec
Sf= Slope, ft/ft
n= Manning's n
Tc= Time of concentration, hours
Lf= Flow length, feet

==== SCS TR-55 Shallow Concentration Flow

Tc =
Unpaved surface:
V = 16.1345 * (Sf**0.5)

Paved Surface:
V = 20.3282 * (Sf**0.5)

(Lf / V) / 3600

Where:
V= Velocity, ft/sec
Sf= Slope, ft/ft
Tc= Time of concentration, hours
Lf= Flow length, feet

POST DEVELOPED

Subsection: Runoff CN-Area | Return Event: 1 years
Label: DA-1 | Storm Event: 1 Year

Runoff Curve Number Data

Soil/Surface Description	CN	Area (acres)	C (%)	UC (%)	Adjusted CN
Impervious Areas - Paved parking lots, roofs, driveways, Streets and roads - Soil B	98.000	0.386	0.0	0.0	98.000
Open space (Lawns,parks etc.) - Good condition; grass cover > 75% - Soil B	61.000	0.737	0.0	0.0	61.000
Woods - good - Soil B	55.000	3.710	0.0	0.0	55.000
Woods - good - Soil D	77.000	2.299	0.0	0.0	77.000
Open space (Lawns,parks etc.) - Good condition; grass cover > 75% - Soil D	80.000	0.088	0.0	0.0	80.000
COMPOSITE AREA & WEIGHTED CN --->	(N/A)	7.220	(N/A)	(N/A)	65.221

POST DEVELOPED

Subsection: Runoff CN-Area | Return Event: 1 years
Label: DA-2 | Storm Event: 1 Year

Runoff Curve Number Data

Soil/Surface Description	CN	Area (acres)	C (%)	UC (%)	Adjusted CN
Woods - good - Soil B	55.000	0.493	0.0	0.0	55.000
Woods - good - Soil D	77.000	1.703	0.0	0.0	77.000
Impervious Areas - Paved parking lots, roofs, driveways, Streets and roads - Soil B	98.000	0.123	0.0	0.0	98.000
Open space (Lawns,parks etc.) - Good condition; grass cover > 75% - Soil B	61.000	0.123	0.0	0.0	61.000
Open space (Lawns,parks etc.) - Good condition; grass cover > 75% - Soil D	80.000	0.250	0.0	0.0	80.000
COMPOSITE AREA & WEIGHTED CN --->	(N/A)	2.692	(N/A)	(N/A)	73.478

POST DEVELOPED

Subsection: Runoff CN-Area | Return Event: 1 years
Label: DA-3 | Storm Event: 1 Year

Runoff Curve Number Data

Soil/Surface Description	CN	Area (acres)	C (%)	UC (%)	Adjusted CN
Woods - good - Soil B	55.000	0.875	0.0	0.0	55.000
Woods - good - Soil D	77.000	1.670	0.0	0.0	77.000
Open space (Lawns,parks etc.) - Good condition; grass cover > 75% - Soil B	61.000	0.156	0.0	0.0	61.000
COMPOSITE AREA & WEIGHTED CN --->	(N/A)	2.701	(N/A)	(N/A)	68.949

POST DEVELOPED

Subsection: Runoff CN-Area
Label: DA-4

Return Event: 1 years
Storm Event: 1 Year

Runoff Curve Number Data

Soil/Surface Description	CN	Area (acres)	C (%)	UC (%)	Adjusted CN
Impervious Areas - Paved parking lots, roofs, driveways, Streets and roads - Soil B	98.000	0.162	0.0	0.0	98.000
Open space (Lawns,parks etc.) - Good condition; grass cover > 75% - Soil B	61.000	0.540	0.0	0.0	61.000
Woods - good - Soil B	55.000	0.149	0.0	0.0	55.000
COMPOSITE AREA & WEIGHTED CN --->	(N/A)	0.851	(N/A)	(N/A)	66.993

POST DEVELOPED

Subsection: Runoff CN-Area — Return Event: 1 years
Label: DA-5 — Storm Event: 1 Year

Runoff Curve Number Data

Soil/Surface Description	CN	Area (acres)	C (%)	UC (%)	Adjusted CN
Open space (Lawns,parks etc.) - Good condition; grass cover > 75% - Soil B	61.000	0.588	0.0	0.0	61.000
Impervious Areas - Paved parking lots, roofs, driveways, Streets and roads - Soil B	98.000	0.137	0.0	0.0	98.000
Woods - good - Soil B	55.000	0.575	0.0	0.0	55.000
COMPOSITE AREA & WEIGHTED CN --->	(N/A)	1.300	(N/A)	(N/A)	62.245

POST DEVELOPED

Subsection: Runoff CN-Area
Label: DA-6

Return Event: 1 years
Storm Event: 1 Year

Runoff Curve Number Data

Soil/Surface Description	CN	Area (acres)	C (%)	UC (%)	Adjusted CN
Impervious Areas - Paved parking lots, roofs, driveways, Streets and roads - Soil B	98.000	0.087	0.0	0.0	98.000
Open space (Lawns,parks etc.) - Good condition; grass cover > 75% - Soil B	61.000	0.870	0.0	0.0	61.000
COMPOSITE AREA & WEIGHTED CN --->	(N/A)	0.957	(N/A)	(N/A)	64.364

POST DEVELOPED

Subsection: Runoff CN-Area
Label: DA-7

Return Event: 1 years
Storm Event: 1 Year

Runoff Curve Number Data

Soil/Surface Description	CN	Area (acres)	C (%)	UC (%)	Adjusted CN
Open space (Lawns,parks etc.) - Good condition; grass cover > 75% - Soil B	61.000	0.591	0.0	0.0	61.000
Impervious Areas - Paved parking lots, roofs, driveways, Streets and roads - Soil B	98.000	0.133	0.0	0.0	98.000
COMPOSITE AREA & WEIGHTED CN --->	(N/A)	0.724	(N/A)	(N/A)	67.797

POST DEVELOPED

Subsection: Runoff CN-Area
Label: DA-8

Return Event: 1 years
Storm Event: 1 Year

Runoff Curve Number Data

Soil/Surface Description	CN	Area (acres)	C (%)	UC (%)	Adjusted CN
Impervious Areas - Paved parking lots, roofs, driveways, Streets and roads - Soil B	98.000	0.399	0.0	0.0	98.000
Open space (Lawns,parks etc.) - Good condition; grass cover > 75% - Soil B	61.000	1.001	0.0	0.0	61.000
Woods - good - Soil B	55.000	0.310	0.0	0.0	55.000
Open space (Lawns,parks etc.) - Good condition; grass cover > 75% - Soil D	80.000	0.090	0.0	0.0	80.000
Impervious Areas - Gravel (w/ right-of-way) - Soil D	91.000	0.226	0.0	0.0	91.000
Impervious Areas - Paved parking lots, roofs, driveways, Streets and roads - Soil D	98.000	0.009	0.0	0.0	98.000
Impervious Areas - Gravel (w/ right-of-way) - Soil B	85.000	0.010	0.0	0.0	85.000
COMPOSITE AREA & WEIGHTED CN --->	(N/A)	2.045	(N/A)	(N/A)	71.741

Unit Hydrograph Method (Computational Notes)
Definition of Terms

At	Total area (acres): At = Ai+Ap
Ai	Impervious area (acres)
Ap	Pervious area (acres)
CNi	Runoff curve number for impervious area
CNp	Runoff curve number for pervious area
fLoss	f loss constant infiltration (depth/time)
gKs	Saturated Hydraulic Conductivity (depth/time)
Md	Volumetric Moisture Deficit
Psi	Capillary Suction (length)
hK	Horton Infiltration Decay Rate (time^-1)
fo	Initial Infiltration Rate (depth/time)
fc	Ultimate(capacity)Infiltration Rate (depth/time)
Ia	Initial Abstraction (length)
dt	Computational increment (duration of unit excess rainfall) Default dt is smallest value of 0.1333Tc, rtm, and th (Smallest dt is then adjusted to match up with Tp)
UDdt	User specified override computational main time increment (only used if UDdt is => .1333Tc)
D(t)	Point on distribution curve (fraction of P) for time step t
K	2 / (1 + (Tr/Tp)): default K = 0.75: (for Tr/Tp = 1.67)
Ks	Hydrograph shape factor = Unit Conversions * K: = ((1hr/3600sec) * (1ft/12in) * ((5280ft)**2/sq.mi)) * K Default Ks = 645.333 * 0.75 = 484
Lag	Lag time from center of excess runoff (dt) to Tp: Lag = 0.6Tc
P	Total precipitation depth, inches
Pa(t)	Accumulated rainfall at time step t
Pi(t)	Incremental rainfall at time step t
qp	Peak discharge (cfs) for 1in. runoff, for 1hr, for 1 sq.mi. = (Ks * A * Q) / Tp (where Q = 1in. runoff, A=sq.mi.)
Qu(t)	Unit hydrograph ordinate (cfs) at time step t
Q(t)	Final hydrograph ordinate (cfs) at time step t
Rai(t)	Accumulated runoff (inches) at time step t for impervious area
Rap(t)	Accumulated runoff (inches) at time step t for pervious area
Rii(t)	Incremental runoff (inches) at time step t for impervious area
Rip(t)	Incremental runoff (inches) at time step t for pervious area
R(t)	Incremental weighted total runoff (inches)
Rtm	Time increment for rainfall table
Si	S for impervious area: Si = (1000/CNi) - 10
Sp	S for pervious area: Sp = (1000/CNp) - 10
t	Time step (row) number
Tc	Time of concentration
Tb	Time (hrs) of entire unit hydrograph: Tb = Tp + Tr
Tp	Time (hrs) to peak of a unit hydrograph: Tp = (dt/2) + Lag
Tr	Time (hrs) of receding limb of unit hydrograph: Tr = ratio of Tp

Unit Hydrograph Method
Computational Notes
Precipitation

Column (1)	Time for time step t
Column (2)	D(t) = Point on distribution curve for time step t
Column (3)	Pi(t) = Pa(t) - Pa(t-1): Col.(4) - Preceding Col.(4)
Column (4)	Pa(t) = D(t) x P: Col.(2) x P

Pervious Area Runoff (using SCS Runoff CN Method)

Column (5)
Rap(t) = Accumulated pervious runoff for time step t
If (Pa(t) is <= 0.2Sp) then use: Rap(t) = 0.0
If (Pa(t) is > 0.2Sp) then use:

Rap(t) = (Col.(4)-0.2Sp)**2 / (Col.(4)+0.8Sp)

Column (6)
Rip(t) = Incremental pervious runoff for time step t
Rip(t) = Rap(t) - Rap(t-1)
Rip(t) = Col.(5) for current row - Col.(5) for preceding row.

Impervious Area Runoff

Column (7 & 8)... Did not specify to use impervious areas.

Incremental Weighted Runoff

Column (9)
R(t) = (Ap/At) x Rip(t) + (Ai/At) x Rii(t)
R(t) = (Ap/At) x Col.(6) + (Ai/At) x Col.(8)

SCS Unit Hydrograph Method

Column (10)
Q(t) is computed with the SCS unit hydrograph method using R(t) and Qu(t).

POST DEVELOPED

Subsection: Unit Hydrograph Summary — Return Event: 1 years
Label: DA-1 — Storm Event: 1 Year

Storm Event	1 Year
Return Event	1 years
Duration	24.000 hours
Depth	2.8 in
Time of Concentration (Composite)	0.295 hours
Area (User Defined)	7.220 acres

Computational Time Increment	0.039 hours
Time to Peak (Computed)	12.322 hours
Flow (Peak, Computed)	1.71 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	12.300 hours
Flow (Peak Interpolated Output)	1.70 ft³/s

Drainage Area	
SCS CN (Composite)	65.000
Area (User Defined)	7.220 acres
Maximum Retention (Pervious)	5.4 in
Maximum Retention (Pervious, 20 percent)	1.1 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	0.4 in
Runoff Volume (Pervious)	0.251 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	0.250 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.295 hours
Computational Time Increment	0.039 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670

POST DEVELOPED

Subsection: Unit Hydrograph Summary | Return Event: 1 years
Label: DA-1 | Storm Event: 1 Year

SCS Unit Hydrograph Parameters	
Unit peak, qp	27.71 ft^3/s
Unit peak time, Tp	0.197 hours
Unit receding limb, Tr	0.787 hours
Total unit time, Tb	0.984 hours

POST DEVELOPED

Subsection: Unit Hydrograph Summary — Return Event: 2 years
Label: DA-1 — Storm Event: 2 Year

Storm Event	2 Year
Return Event	2 years
Duration	24.000 hours
Depth	3.3 in
Time of Concentration (Composite)	0.295 hours
Area (User Defined)	7.220 acres

Computational Time Increment	0.039 hours
Time to Peak (Computed)	12.283 hours
Flow (Peak, Computed)	3.07 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	12.250 hours
Flow (Peak Interpolated Output)	3.05 ft³/s

Drainage Area	
SCS CN (Composite)	65.000
Area (User Defined)	7.220 acres
Maximum Retention (Pervious)	5.4 in
Maximum Retention (Pervious, 20 percent)	1.1 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	0.6 in
Runoff Volume (Pervious)	0.391 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	0.389 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.295 hours
Computational Time Increment	0.039 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670

POST DEVELOPED

Subsection: Unit Hydrograph Summary | Return Event: 2 years
Label: DA-1 | Storm Event: 2 Year

SCS Unit Hydrograph Parameters	
Unit peak, qp	27.71 ft^3/s
Unit peak time, Tp	0.197 hours
Unit receding limb, Tr	0.787 hours
Total unit time, Tb	0.984 hours

POST DEVELOPED

Subsection: Unit Hydrograph Summary | Return Event: 10 years
Label: DA-1 | Storm Event: 10 Year

Storm Event	10 Year
Return Event	10 years
Duration	24.000 hours
Depth	5.0 in
Time of Concentration (Composite)	0.295 hours
Area (User Defined)	7.220 acres

Computational Time Increment	0.039 hours
Time to Peak (Computed)	12.243 hours
Flow (Peak, Computed)	9.14 ft^3/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	12.250 hours
Flow (Peak Interpolated Output)	9.10 ft^3/s

Drainage Area	
SCS CN (Composite)	65.000
Area (User Defined)	7.220 acres
Maximum Retention (Pervious)	5.4 in
Maximum Retention (Pervious, 20 percent)	1.1 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	1.7 in
Runoff Volume (Pervious)	0.995 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	0.991 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.295 hours
Computational Time Increment	0.039 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670

POST DEVELOPED

Subsection: Unit Hydrograph Summary — Return Event: 10 years

Label: DA-1 — Storm Event: 10 Year

SCS Unit Hydrograph Parameters	
Unit peak, qp	27.71 ft^3/s
Unit peak time, Tp	0.197 hours
Unit receding limb, Tr	0.787 hours
Total unit time, Tb	0.984 hours

POST DEVELOPED

Subsection: Unit Hydrograph Summary
Label: DA-1

Return Event: 25 years
Storm Event: 25 Year

Storm Event	25 Year
Return Event	25 years
Duration	24.000 hours
Depth	6.4 in
Time of Concentration (Composite)	0.295 hours
Area (User Defined)	7.220 acres

Computational Time Increment	0.039 hours
Time to Peak (Computed)	12.204 hours
Flow (Peak, Computed)	15.06 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	12.200 hours
Flow (Peak Interpolated Output)	14.98 ft³/s

Drainage Area	
SCS CN (Composite)	65.000
Area (User Defined)	7.220 acres
Maximum Retention (Pervious)	5.4 in
Maximum Retention (Pervious, 20 percent)	1.1 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	2.6 in
Runoff Volume (Pervious)	1.592 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	1.586 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.295 hours
Computational Time Increment	0.039 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670

POST DEVELOPED

Subsection: Unit Hydrograph Summary — Return Event: 25 years

Label: DA-1 — Storm Event: 25 Year

SCS Unit Hydrograph Parameters	
Unit peak, qp	27.71 ft^3/s
Unit peak time, Tp	0.197 hours
Unit receding limb, Tr	0.787 hours
Total unit time, Tb	0.984 hours

POST DEVELOPED

Subsection: Unit Hydrograph Summary
Label: DA-1

Return Event: 100 years
Storm Event: 100 Year

Storm Event	100 Year
Return Event	100 years
Duration	24.000 hours
Depth	9.0 in
Time of Concentration (Composite)	0.295 hours
Area (User Defined)	7.220 acres

Computational Time Increment	0.039 hours
Time to Peak (Computed)	12.204 hours
Flow (Peak, Computed)	27.43 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	12.200 hours
Flow (Peak Interpolated Output)	27.31 ft³/s

Drainage Area	
SCS CN (Composite)	65.000
Area (User Defined)	7.220 acres
Maximum Retention (Pervious)	5.4 in
Maximum Retention (Pervious, 20 percent)	1.1 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	4.7 in
Runoff Volume (Pervious)	2.838 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	2.829 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.295 hours
Computational Time Increment	0.039 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670

POST DEVELOPED

Subsection: Unit Hydrograph Summary | Return Event: 100 years
Label: DA-1 | Storm Event: 100 Year

SCS Unit Hydrograph Parameters	
Unit peak, qp	27.71 ft^3/s
Unit peak time, Tp	0.197 hours
Unit receding limb, Tr	0.787 hours
Total unit time, Tb	0.984 hours

POST DEVELOPED

Subsection: Unit Hydrograph Summary
Label: DA-2

Return Event: 1 years
Storm Event: 1 Year

Storm Event	1 Year
Return Event	1 years
Duration	24.000 hours
Depth	2.8 in
Time of Concentration (Composite)	0.153 hours
Area (User Defined)	2.692 acres

Computational Time Increment	0.020 hours
Time to Peak (Computed)	12.146 hours
Flow (Peak, Computed)	1.77 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	12.150 hours
Flow (Peak Interpolated Output)	1.76 ft³/s

Drainage Area	
SCS CN (Composite)	73.000
Area (User Defined)	2.692 acres
Maximum Retention (Pervious)	3.7 in
Maximum Retention (Pervious, 20 percent)	0.7 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	0.7 in
Runoff Volume (Pervious)	0.165 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	0.165 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.153 hours
Computational Time Increment	0.020 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670

POST DEVELOPED

Subsection: Unit Hydrograph Summary
Label: DA-2

Return Event: 1 years
Storm Event: 1 Year

SCS Unit Hydrograph Parameters	
Unit peak, qp	19.89 ft^3/s
Unit peak time, Tp	0.102 hours
Unit receding limb, Tr	0.409 hours
Total unit time, Tb	0.511 hours

POST DEVELOPED

Subsection: Unit Hydrograph Summary — Return Event: 2 years
Label: DA-2 — Storm Event: 2 Year

Storm Event	2 Year
Return Event	2 years
Duration	24.000 hours
Depth	3.3 in
Time of Concentration (Composite)	0.153 hours
Area (User Defined)	2.692 acres

Computational Time Increment	0.020 hours
Time to Peak (Computed)	12.146 hours
Flow (Peak, Computed)	2.61 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	12.150 hours
Flow (Peak Interpolated Output)	2.60 ft³/s

Drainage Area	
SCS CN (Composite)	73.000
Area (User Defined)	2.692 acres
Maximum Retention (Pervious)	3.7 in
Maximum Retention (Pervious, 20 percent)	0.7 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	1.0 in
Runoff Volume (Pervious)	0.235 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	0.234 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.153 hours
Computational Time Increment	0.020 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670

SCS Unit Hydrograph Parameters	
Unit peak, qp	19.89 ft^3/s
Unit peak time, Tp	0.102 hours
Unit receding limb, Tr	0.409 hours
Total unit time, Tb	0.511 hours

POST DEVELOPED

Subsection: Unit Hydrograph Summary | Return Event: 10 years
Label: DA-2 | Storm Event: 10 Year

Storm Event	10 Year
Return Event	10 years
Duration	24.000 hours
Depth	5.0 in
Time of Concentration (Composite)	0.153 hours
Area (User Defined)	2.692 acres

Computational Time Increment	0.020 hours
Time to Peak (Computed)	12.146 hours
Flow (Peak, Computed)	5.90 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	12.150 hours
Flow (Peak Interpolated Output)	5.86 ft³/s

Drainage Area	
SCS CN (Composite)	73.000
Area (User Defined)	2.692 acres
Maximum Retention (Pervious)	3.7 in
Maximum Retention (Pervious, 20 percent)	0.7 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	2.3 in
Runoff Volume (Pervious)	0.512 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	0.511 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.153 hours
Computational Time Increment	0.020 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670

POST DEVELOPED

Subsection: Unit Hydrograph Summary
Label: DA-2

Return Event: 10 years
Storm Event: 10 Year

SCS Unit Hydrograph Parameters	
Unit peak, qp	19.89 ft^3/s
Unit peak time, Tp	0.102 hours
Unit receding limb, Tr	0.409 hours
Total unit time, Tb	0.511 hours

POST DEVELOPED

Subsection: Unit Hydrograph Summary | Return Event: 25 years
Label: DA-2 | Storm Event: 25 Year

Storm Event	25 Year
Return Event	25 years
Duration	24.000 hours
Depth	6.4 in
Time of Concentration (Composite)	0.153 hours
Area (User Defined)	2.692 acres

Computational Time Increment	0.020 hours
Time to Peak (Computed)	12.125 hours
Flow (Peak, Computed)	8.89 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	12.150 hours
Flow (Peak Interpolated Output)	8.79 ft³/s

Drainage Area	
SCS CN (Composite)	73.000
Area (User Defined)	2.692 acres
Maximum Retention (Pervious)	3.7 in
Maximum Retention (Pervious, 20 percent)	0.7 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	3.4 in
Runoff Volume (Pervious)	0.768 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	0.767 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.153 hours
Computational Time Increment	0.020 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670

Subsection: Unit Hydrograph Summary
Label: DA-2

Return Event: 25 years
Storm Event: 25 Year

SCS Unit Hydrograph Parameters	
Unit peak, qp	19.89 ft^3/s
Unit peak time, Tp	0.102 hours
Unit receding limb, Tr	0.409 hours
Total unit time, Tb	0.511 hours

POST DEVELOPED

Subsection: Unit Hydrograph Summary | Return Event: 100 years
Label: DA-2 | Storm Event: 100 Year

Storm Event	100 Year
Return Event	100 years
Duration	24.000 hours
Depth	9.0 in
Time of Concentration (Composite)	0.153 hours
Area (User Defined)	2.692 acres

Computational Time Increment	0.020 hours
Time to Peak (Computed)	12.125 hours
Flow (Peak, Computed)	14.71 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	12.150 hours
Flow (Peak Interpolated Output)	14.46 ft³/s

Drainage Area	
SCS CN (Composite)	73.000
Area (User Defined)	2.692 acres
Maximum Retention (Pervious)	3.7 in
Maximum Retention (Pervious, 20 percent)	0.7 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	5.7 in
Runoff Volume (Pervious)	1.280 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	1.278 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.153 hours
Computational Time Increment	0.020 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670

POST DEVELOPED

Subsection: Unit Hydrograph Summary | Return Event: 100 years
Label: DA-2 | Storm Event: 100 Year

SCS Unit Hydrograph Parameters	
Unit peak, qp	19.89 ft^3/s
Unit peak time, Tp	0.102 hours
Unit receding limb, Tr	0.409 hours
Total unit time, Tb	0.511 hours

POST DEVELOPED

Subsection: Unit Hydrograph Summary
Label: DA-3

Return Event: 1 years
Storm Event: 1 Year

Storm Event	1 Year
Return Event	1 years
Duration	24.000 hours
Depth	2.8 in
Time of Concentration (Composite)	0.102 hours
Area (User Defined)	2.701 acres

Computational Time Increment	0.014 hours
Time to Peak (Computed)	12.132 hours
Flow (Peak, Computed)	1.37 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	12.150 hours
Flow (Peak Interpolated Output)	1.31 ft³/s

Drainage Area	
SCS CN (Composite)	69.000
Area (User Defined)	2.701 acres
Maximum Retention (Pervious)	4.5 in
Maximum Retention (Pervious, 20 percent)	0.9 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	0.6 in
Runoff Volume (Pervious)	0.127 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	0.127 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.102 hours
Computational Time Increment	0.014 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670

Subsection: Unit Hydrograph Summary — Return Event: 1 years

Label: DA-3 — Storm Event: 1 Year

SCS Unit Hydrograph Parameters	
Unit peak, qp	30.00 ft^3/s
Unit peak time, Tp	0.068 hours
Unit receding limb, Tr	0.272 hours
Total unit time, Tb	0.340 hours

POST DEVELOPED

Subsection: Unit Hydrograph Summary
Label: DA-3

Return Event: 2 years
Storm Event: 2 Year

Storm Event	2 Year
Return Event	2 years
Duration	24.000 hours
Depth	3.3 in
Time of Concentration (Composite)	0.102 hours
Area (User Defined)	2.701 acres

Computational Time Increment	0.014 hours
Time to Peak (Computed)	12.119 hours
Flow (Peak, Computed)	2.17 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	12.100 hours
Flow (Peak Interpolated Output)	2.09 ft³/s

Drainage Area	
SCS CN (Composite)	69.000
Area (User Defined)	2.701 acres
Maximum Retention (Pervious)	4.5 in
Maximum Retention (Pervious, 20 percent)	0.9 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	0.8 in
Runoff Volume (Pervious)	0.188 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	0.188 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.102 hours
Computational Time Increment	0.014 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670

POST DEVELOPED

Subsection: Unit Hydrograph Summary
Label: DA-3

Return Event: 2 years
Storm Event: 2 Year

SCS Unit Hydrograph Parameters	
Unit peak, qp	30.00 ft^3/s
Unit peak time, Tp	0.068 hours
Unit receding limb, Tr	0.272 hours
Total unit time, Tb	0.340 hours

POST DEVELOPED

Subsection: Unit Hydrograph Summary
Label: DA-3

Return Event: 10 years
Storm Event: 10 Year

Storm Event	10 Year
Return Event	10 years
Duration	24.000 hours
Depth	5.0 in
Time of Concentration (Composite)	0.102 hours
Area (User Defined)	2.701 acres

Computational Time Increment	0.014 hours
Time to Peak (Computed)	12.119 hours
Flow (Peak, Computed)	5.39 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	12.100 hours
Flow (Peak Interpolated Output)	5.31 ft³/s

Drainage Area	
SCS CN (Composite)	69.000
Area (User Defined)	2.701 acres
Maximum Retention (Pervious)	4.5 in
Maximum Retention (Pervious, 20 percent)	0.9 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	2.0 in
Runoff Volume (Pervious)	0.441 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	0.440 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.102 hours
Computational Time Increment	0.014 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670

POST DEVELOPED

Subsection: Unit Hydrograph Summary — Return Event: 10 years
Label: DA-3 — Storm Event: 10 Year

SCS Unit Hydrograph Parameters	
Unit peak, qp	30.00 ft³/s
Unit peak time, Tp	0.068 hours
Unit receding limb, Tr	0.272 hours
Total unit time, Tb	0.340 hours

POST DEVELOPED

Subsection: Unit Hydrograph Summary — Return Event: 25 years
Label: DA-3 — Storm Event: 25 Year

Storm Event	25 Year
Return Event	25 years
Duration	24.000 hours
Depth	6.4 in
Time of Concentration (Composite)	0.102 hours
Area (User Defined)	2.701 acres

Computational Time Increment	0.014 hours
Time to Peak (Computed)	12.119 hours
Flow (Peak, Computed)	8.39 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	12.100 hours
Flow (Peak Interpolated Output)	8.31 ft³/s

Drainage Area	
SCS CN (Composite)	69.000
Area (User Defined)	2.701 acres
Maximum Retention (Pervious)	4.5 in
Maximum Retention (Pervious, 20 percent)	0.9 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	3.0 in
Runoff Volume (Pervious)	0.682 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	0.681 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.102 hours
Computational Time Increment	0.014 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670

POST DEVELOPED

Subsection: Unit Hydrograph Summary | Return Event: 25 years
Label: DA-3 | Storm Event: 25 Year

SCS Unit Hydrograph Parameters	
Unit peak, qp	30.00 ft^3/s
Unit peak time, Tp	0.068 hours
Unit receding limb, Tr	0.272 hours
Total unit time, Tb	0.340 hours

POST DEVELOPED

Subsection: Unit Hydrograph Summary
Label: DA-3

Return Event: 100 years
Storm Event: 100 Year

Storm Event	100 Year
Return Event	100 years
Duration	24.000 hours
Depth	9.0 in
Time of Concentration (Composite)	0.102 hours
Area (User Defined)	2.701 acres

Computational Time Increment	0.014 hours
Time to Peak (Computed)	12.105 hours
Flow (Peak, Computed)	14.33 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	12.100 hours
Flow (Peak Interpolated Output)	14.27 ft³/s

Drainage Area	
SCS CN (Composite)	69.000
Area (User Defined)	2.701 acres
Maximum Retention (Pervious)	4.5 in
Maximum Retention (Pervious, 20 percent)	0.9 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	5.2 in
Runoff Volume (Pervious)	1.173 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	1.172 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.102 hours
Computational Time Increment	0.014 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670

POST DEVELOPED

Subsection: Unit Hydrograph Summary
Label: DA-3

Return Event: 100 years
Storm Event: 100 Year

SCS Unit Hydrograph Parameters	
Unit peak, qp	30.00 ft^3/s
Unit peak time, Tp	0.068 hours
Unit receding limb, Tr	0.272 hours
Total unit time, Tb	0.340 hours

POST DEVELOPED

Subsection: Unit Hydrograph Summary
Label: DA-4

Return Event: 1 years
Storm Event: 1 Year

Storm Event	1 Year
Return Event	1 years
Duration	24.000 hours
Depth	2.8 in
Time of Concentration (Composite)	0.206 hours
Area (User Defined)	0.851 acres

Computational Time Increment	0.027 hours
Time to Peak (Computed)	12.204 hours
Flow (Peak, Computed)	0.29 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	12.200 hours
Flow (Peak Interpolated Output)	0.29 ft³/s

Drainage Area	
SCS CN (Composite)	67.000
Area (User Defined)	0.851 acres
Maximum Retention (Pervious)	4.9 in
Maximum Retention (Pervious, 20 percent)	1.0 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	0.5 in
Runoff Volume (Pervious)	0.035 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	0.035 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.206 hours
Computational Time Increment	0.027 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670

POST DEVELOPED

Subsection: Unit Hydrograph Summary | Return Event: 1 years
Label: DA-4 | Storm Event: 1 Year

SCS Unit Hydrograph Parameters	
Unit peak, qp	4.69 ft^3/s
Unit peak time, Tp	0.137 hours
Unit receding limb, Tr	0.548 hours
Total unit time, Tb	0.686 hours

Storm Event	2 Year
Return Event	2 years
Duration	24.000 hours
Depth	3.3 in
Time of Concentration (Composite)	0.206 hours
Area (User Defined)	0.851 acres

Computational Time Increment	0.027 hours
Time to Peak (Computed)	12.176 hours
Flow (Peak, Computed)	0.49 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	12.200 hours
Flow (Peak Interpolated Output)	0.49 ft³/s

Drainage Area	
SCS CN (Composite)	67.000
Area (User Defined)	0.851 acres
Maximum Retention (Pervious)	4.9 in
Maximum Retention (Pervious, 20 percent)	1.0 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	0.7 in
Runoff Volume (Pervious)	0.052 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	0.052 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.206 hours
Computational Time Increment	0.027 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670

POST DEVELOPED

Subsection: Unit Hydrograph Summary
Label: DA-4

Return Event: 2 years
Storm Event: 2 Year

SCS Unit Hydrograph Parameters	
Unit peak, qp	4.69 ft^3/s
Unit peak time, Tp	0.137 hours
Unit receding limb, Tr	0.548 hours
Total unit time, Tb	0.686 hours

POST DEVELOPED

Subsection: Unit Hydrograph Summary | Return Event: 10 years
Label: DA-4 | Storm Event: 10 Year

Storm Event	10 Year
Return Event	10 years
Duration	24.000 hours
Depth	5.0 in
Time of Concentration (Composite)	0.206 hours
Area (User Defined)	0.851 acres

Computational Time Increment	0.027 hours
Time to Peak (Computed)	12.176 hours
Flow (Peak, Computed)	1.34 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	12.150 hours
Flow (Peak Interpolated Output)	1.33 ft³/s

Drainage Area	
SCS CN (Composite)	67.000
Area (User Defined)	0.851 acres
Maximum Retention (Pervious)	4.9 in
Maximum Retention (Pervious, 20 percent)	1.0 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	1.8 in
Runoff Volume (Pervious)	0.128 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	0.128 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.206 hours
Computational Time Increment	0.027 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670

POST DEVELOPED

Subsection: Unit Hydrograph Summary
Label: DA-4

Return Event: 10 years
Storm Event: 10 Year

SCS Unit Hydrograph Parameters	
Unit peak, qp	4.69 ft^3/s
Unit peak time, Tp	0.137 hours
Unit receding limb, Tr	0.548 hours
Total unit time, Tb	0.686 hours

POST DEVELOPED

Subsection: Unit Hydrograph Summary
Label: DA-4

Return Event: 25 years
Storm Event: 25 Year

Storm Event	25 Year
Return Event	25 years
Duration	24.000 hours
Depth	6.4 in
Time of Concentration (Composite)	0.206 hours
Area (User Defined)	0.851 acres

Computational Time Increment	0.027 hours
Time to Peak (Computed)	12.176 hours
Flow (Peak, Computed)	2.15 ft^3/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	12.150 hours
Flow (Peak Interpolated Output)	2.15 ft^3/s

Drainage Area	
SCS CN (Composite)	67.000
Area (User Defined)	0.851 acres
Maximum Retention (Pervious)	4.9 in
Maximum Retention (Pervious, 20 percent)	1.0 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	2.8 in
Runoff Volume (Pervious)	0.201 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	0.201 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.206 hours
Computational Time Increment	0.027 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670

POST DEVELOPED

Subsection: Unit Hydrograph Summary | Return Event: 25 years
Label: DA-4 | Storm Event: 25 Year

SCS Unit Hydrograph Parameters	
Unit peak, qp	4.69 ft^3/s
Unit peak time, Tp	0.137 hours
Unit receding limb, Tr	0.548 hours
Total unit time, Tb	0.686 hours

POST DEVELOPED

Subsection: Unit Hydrograph Summary
Label: DA-4

Return Event: 100 years
Storm Event: 100 Year

Storm Event	100 Year
Return Event	100 years
Duration	24.000 hours
Depth	9.0 in
Time of Concentration (Composite)	0.206 hours
Area (User Defined)	0.851 acres

Computational Time Increment	0.027 hours
Time to Peak (Computed)	12.149 hours
Flow (Peak, Computed)	3.81 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	12.150 hours
Flow (Peak Interpolated Output)	3.81 ft³/s

Drainage Area	
SCS CN (Composite)	67.000
Area (User Defined)	0.851 acres
Maximum Retention (Pervious)	4.9 in
Maximum Retention (Pervious, 20 percent)	1.0 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	5.0 in
Runoff Volume (Pervious)	0.352 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	0.351 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.206 hours
Computational Time Increment	0.027 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670

POST DEVELOPED

Subsection: Unit Hydrograph Summary | Return Event: 100 years
Label: DA-4 | Storm Event: 100 Year

SCS Unit Hydrograph Parameters	
Unit peak, qp	4.69 ft^3/s
Unit peak time, Tp	0.137 hours
Unit receding limb, Tr	0.548 hours
Total unit time, Tb	0.686 hours

POST DEVELOPED

Subsection: Unit Hydrograph Summary — Return Event: 1 years
Label: DA-5 — Storm Event: 1 Year

Storm Event	1 Year
Return Event	1 years
Duration	24.000 hours
Depth	2.8 in
Time of Concentration (Composite)	0.307 hours
Area (User Defined)	1.300 acres

Computational Time Increment	0.041 hours
Time to Peak (Computed)	12.382 hours
Flow (Peak, Computed)	0.20 ft^3/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	12.400 hours
Flow (Peak Interpolated Output)	0.20 ft^3/s

Drainage Area	
SCS CN (Composite)	62.000
Area (User Defined)	1.300 acres
Maximum Retention (Pervious)	6.1 in
Maximum Retention (Pervious, 20 percent)	1.2 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	0.3 in
Runoff Volume (Pervious)	0.035 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	0.035 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.307 hours
Computational Time Increment	0.041 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670

POST DEVELOPED

Subsection: Unit Hydrograph Summary
Label: DA-5

Return Event: 1 years
Storm Event: 1 Year

SCS Unit Hydrograph Parameters	
Unit peak, qp	4.79 ft^3/s
Unit peak time, Tp	0.205 hours
Unit receding limb, Tr	0.820 hours
Total unit time, Tb	1.025 hours

POST DEVELOPED

Subsection: Unit Hydrograph Summary
Label: DA-5

Return Event: 2 years
Storm Event: 2 Year

Storm Event	2 Year
Return Event	2 years
Duration	24.000 hours
Depth	3.3 in
Time of Concentration (Composite)	0.307 hours
Area (User Defined)	1.300 acres

Computational Time Increment	0.041 hours
Time to Peak (Computed)	12.300 hours
Flow (Peak, Computed)	0.39 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	12.300 hours
Flow (Peak Interpolated Output)	0.39 ft³/s

Drainage Area	
SCS CN (Composite)	62.000
Area (User Defined)	1.300 acres
Maximum Retention (Pervious)	6.1 in
Maximum Retention (Pervious, 20 percent)	1.2 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	0.5 in
Runoff Volume (Pervious)	0.057 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	0.056 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.307 hours
Computational Time Increment	0.041 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670

POST DEVELOPED

Subsection: Unit Hydrograph Summary
Label: DA-5

Return Event: 2 years
Storm Event: 2 Year

SCS Unit Hydrograph Parameters	
Unit peak, qp	4.79 ft^3/s
Unit peak time, Tp	0.205 hours
Unit receding limb, Tr	0.820 hours
Total unit time, Tb	1.025 hours

POST DEVELOPED

Subsection: Unit Hydrograph Summary — Return Event: 10 years
Label: DA-5 — Storm Event: 10 Year

Storm Event	10 Year
Return Event	10 years
Duration	24.000 hours
Depth	5.0 in
Time of Concentration (Composite)	0.307 hours
Area (User Defined)	1.300 acres

Computational Time Increment	0.041 hours
Time to Peak (Computed)	12.259 hours
Flow (Peak, Computed)	1.37 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	12.250 hours
Flow (Peak Interpolated Output)	1.37 ft³/s

Drainage Area	
SCS CN (Composite)	62.000
Area (User Defined)	1.300 acres
Maximum Retention (Pervious)	6.1 in
Maximum Retention (Pervious, 20 percent)	1.2 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	1.4 in
Runoff Volume (Pervious)	0.156 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	0.155 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.307 hours
Computational Time Increment	0.041 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670

POST DEVELOPED

Subsection: Unit Hydrograph Summary | Return Event: 10 years
Label: DA-5 | Storm Event: 10 Year

SCS Unit Hydrograph Parameters	
Unit peak, qp	4.79 ft^3/s
Unit peak time, Tp	0.205 hours
Unit receding limb, Tr	0.820 hours
Total unit time, Tb	1.025 hours

Storm Event	25 Year
Return Event	25 years
Duration	24.000 hours
Depth	6.4 in
Time of Concentration (Composite)	0.307 hours
Area (User Defined)	1.300 acres

Computational Time Increment	0.041 hours
Time to Peak (Computed)	12.218 hours
Flow (Peak, Computed)	2.36 ft^3/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	12.250 hours
Flow (Peak Interpolated Output)	2.36 ft^3/s

Drainage Area	
SCS CN (Composite)	62.000
Area (User Defined)	1.300 acres
Maximum Retention (Pervious)	6.1 in
Maximum Retention (Pervious, 20 percent)	1.2 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	2.4 in
Runoff Volume (Pervious)	0.257 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	0.256 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.307 hours
Computational Time Increment	0.041 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670

POST DEVELOPED

Subsection: Unit Hydrograph Summary | Return Event: 25 years
Label: DA-5 | Storm Event: 25 Year

SCS Unit Hydrograph Parameters	
Unit peak, qp	4.79 ft^3/s
Unit peak time, Tp	0.205 hours
Unit receding limb, Tr	0.820 hours
Total unit time, Tb	1.025 hours

POST DEVELOPED

Subsection: Unit Hydrograph Summary — Return Event: 100 years
Label: DA-5 — Storm Event: 100 Year

Storm Event	100 Year
Return Event	100 years
Duration	24.000 hours
Depth	9.0 in
Time of Concentration (Composite)	0.307 hours
Area (User Defined)	1.300 acres

Computational Time Increment	0.041 hours
Time to Peak (Computed)	12.218 hours
Flow (Peak, Computed)	4.48 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	12.250 hours
Flow (Peak Interpolated Output)	4.43 ft³/s

Drainage Area	
SCS CN (Composite)	62.000
Area (User Defined)	1.300 acres
Maximum Retention (Pervious)	6.1 in
Maximum Retention (Pervious, 20 percent)	1.2 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	4.3 in
Runoff Volume (Pervious)	0.471 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	0.469 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.307 hours
Computational Time Increment	0.041 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670

POST DEVELOPED

Subsection: Unit Hydrograph Summary | Return Event: 100 years
Label: DA-5 | Storm Event: 100 Year

SCS Unit Hydrograph Parameters	
Unit peak, qp	4.79 ft³/s
Unit peak time, Tp	0.205 hours
Unit receding limb, Tr	0.820 hours
Total unit time, Tb	1.025 hours

Storm Event	1 Year
Return Event	1 years
Duration	24.000 hours
Depth	2.8 in
Time of Concentration (Composite)	0.083 hours
Area (User Defined)	0.957 acres

Computational Time Increment	0.011 hours
Time to Peak (Computed)	12.122 hours
Flow (Peak, Computed)	0.28 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	12.150 hours
Flow (Peak Interpolated Output)	0.26 ft³/s

Drainage Area	
SCS CN (Composite)	64.000
Area (User Defined)	0.957 acres
Maximum Retention (Pervious)	5.6 in
Maximum Retention (Pervious, 20 percent)	1.1 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	0.4 in
Runoff Volume (Pervious)	0.031 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	0.031 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.083 hours
Computational Time Increment	0.011 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670

POST DEVELOPED

Subsection: Unit Hydrograph Summary | Return Event: 1 years
Label: DA-6 | Storm Event: 1 Year

SCS Unit Hydrograph Parameters	
Unit peak, qp	13.01 ft^3/s
Unit peak time, Tp	0.056 hours
Unit receding limb, Tr	0.222 hours
Total unit time, Tb	0.278 hours

POST DEVELOPED

Subsection: Unit Hydrograph Summary
Label: DA-6

Return Event: 2 years
Storm Event: 2 Year

Storm Event	2 Year
Return Event	2 years
Duration	24.000 hours
Depth	3.3 in
Time of Concentration (Composite)	0.083 hours
Area (User Defined)	0.957 acres

Computational Time Increment	0.011 hours
Time to Peak (Computed)	12.122 hours
Flow (Peak, Computed)	0.52 ft^3/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	12.100 hours
Flow (Peak Interpolated Output)	0.50 ft^3/s

Drainage Area	
SCS CN (Composite)	64.000
Area (User Defined)	0.957 acres
Maximum Retention (Pervious)	5.6 in
Maximum Retention (Pervious, 20 percent)	1.1 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	0.6 in
Runoff Volume (Pervious)	0.048 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	0.048 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.083 hours
Computational Time Increment	0.011 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670

POST DEVELOPED

Subsection: Unit Hydrograph Summary | Return Event: 2 years
Label: DA-6 | Storm Event: 2 Year

SCS Unit Hydrograph Parameters	
Unit peak, qp	13.01 ft^3/s
Unit peak time, Tp	0.056 hours
Unit receding limb, Tr	0.222 hours
Total unit time, Tb	0.278 hours

POST DEVELOPED

Subsection: Unit Hydrograph Summary — Return Event: 10 years
Label: DA-6 — Storm Event: 10 Year

Storm Event	10 Year
Return Event	10 years
Duration	24.000 hours
Depth	5.0 in
Time of Concentration (Composite)	0.083 hours
Area (User Defined)	0.957 acres

Computational Time Increment	0.011 hours
Time to Peak (Computed)	12.111 hours
Flow (Peak, Computed)	1.55 ft^3/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	12.100 hours
Flow (Peak Interpolated Output)	1.53 ft^3/s

Drainage Area	
SCS CN (Composite)	64.000
Area (User Defined)	0.957 acres
Maximum Retention (Pervious)	5.6 in
Maximum Retention (Pervious, 20 percent)	1.1 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	1.6 in
Runoff Volume (Pervious)	0.126 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	0.126 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.083 hours
Computational Time Increment	0.011 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670

POST DEVELOPED

Subsection: Unit Hydrograph Summary | Return Event: 10 years
Label: DA-6 | Storm Event: 10 Year

SCS Unit Hydrograph Parameters	
Unit peak, qp	13.01 ft^3/s
Unit peak time, Tp	0.056 hours
Unit receding limb, Tr	0.222 hours
Total unit time, Tb	0.278 hours

POST DEVELOPED

Subsection: Unit Hydrograph Summary | Return Event: 25 years
Label: DA-6 | Storm Event: 25 Year

Storm Event	25 Year
Return Event	25 years
Duration	24.000 hours
Depth	6.4 in
Time of Concentration (Composite)	0.083 hours
Area (User Defined)	0.957 acres

Computational Time Increment	0.011 hours
Time to Peak (Computed)	12.111 hours
Flow (Peak, Computed)	2.56 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	12.100 hours
Flow (Peak Interpolated Output)	2.53 ft³/s

Drainage Area	
SCS CN (Composite)	64.000
Area (User Defined)	0.957 acres
Maximum Retention (Pervious)	5.6 in
Maximum Retention (Pervious, 20 percent)	1.1 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	2.6 in
Runoff Volume (Pervious)	0.204 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	0.203 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.083 hours
Computational Time Increment	0.011 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670

SCS Unit Hydrograph Parameters	
Unit peak, qp	13.01 ft^3/s
Unit peak time, Tp	0.056 hours
Unit receding limb, Tr	0.222 hours
Total unit time, Tb	0.278 hours

POST DEVELOPED

Subsection: Unit Hydrograph Summary
Label: DA-6

Return Event: 100 years
Storm Event: 100 Year

Storm Event	100 Year
Return Event	100 years
Duration	24.000 hours
Depth	9.0 in
Time of Concentration (Composite)	0.083 hours
Area (User Defined)	0.957 acres

Computational Time Increment	0.011 hours
Time to Peak (Computed)	12.111 hours
Flow (Peak, Computed)	4.60 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	12.100 hours
Flow (Peak Interpolated Output)	4.58 ft³/s

Drainage Area	
SCS CN (Composite)	64.000
Area (User Defined)	0.957 acres
Maximum Retention (Pervious)	5.6 in
Maximum Retention (Pervious, 20 percent)	1.1 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	4.6 in
Runoff Volume (Pervious)	0.366 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	0.366 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.083 hours
Computational Time Increment	0.011 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670

POST DEVELOPED

Subsection: Unit Hydrograph Summary — Return Event: 100 years
Label: DA-6 — Storm Event: 100 Year

SCS Unit Hydrograph Parameters	
Unit peak, qp	13.01 ft^3/s
Unit peak time, Tp	0.056 hours
Unit receding limb, Tr	0.222 hours
Total unit time, Tb	0.278 hours

POST DEVELOPED

Subsection: Unit Hydrograph Summary — Return Event: 1 years
Label: DA-7 — Storm Event: 1 Year

Storm Event	1 Year
Return Event	1 years
Duration	24.000 hours
Depth	2.8 in
Time of Concentration (Composite)	0.142 hours
Area (User Defined)	0.724 acres

Computational Time Increment	0.019 hours
Time to Peak (Computed)	12.155 hours
Flow (Peak, Computed)	0.31 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	12.150 hours
Flow (Peak Interpolated Output)	0.31 ft³/s

Drainage Area	
SCS CN (Composite)	68.000
Area (User Defined)	0.724 acres
Maximum Retention (Pervious)	4.7 in
Maximum Retention (Pervious, 20 percent)	0.9 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	0.5 in
Runoff Volume (Pervious)	0.032 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	0.032 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.142 hours
Computational Time Increment	0.019 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670

POST DEVELOPED

Subsection: Unit Hydrograph Summary
Label: DA-7

Return Event: 1 years
Storm Event: 1 Year

SCS Unit Hydrograph Parameters	
Unit peak, qp	5.79 ft^3/s
Unit peak time, Tp	0.095 hours
Unit receding limb, Tr	0.378 hours
Total unit time, Tb	0.473 hours

POST DEVELOPED

Subsection: Unit Hydrograph Summary | Return Event: 2 years
Label: DA-7 | Storm Event: 2 Year

Storm Event	2 Year
Return Event	2 years
Duration	24.000 hours
Depth	3.3 in
Time of Concentration (Composite)	0.142 hours
Area (User Defined)	0.724 acres

Computational Time Increment	0.019 hours
Time to Peak (Computed)	12.136 hours
Flow (Peak, Computed)	0.50 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	12.150 hours
Flow (Peak Interpolated Output)	0.50 ft³/s

Drainage Area	
SCS CN (Composite)	68.000
Area (User Defined)	0.724 acres
Maximum Retention (Pervious)	4.7 in
Maximum Retention (Pervious, 20 percent)	0.9 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	0.8 in
Runoff Volume (Pervious)	0.048 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	0.047 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.142 hours
Computational Time Increment	0.019 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670

POST DEVELOPED

Subsection: Unit Hydrograph Summary
Label: DA-7

Return Event: 2 years
Storm Event: 2 Year

SCS Unit Hydrograph Parameters	
Unit peak, qp	5.79 ft^3/s
Unit peak time, Tp	0.095 hours
Unit receding limb, Tr	0.378 hours
Total unit time, Tb	0.473 hours

Storm Event	10 Year
Return Event	10 years
Duration	24.000 hours
Depth	5.0 in
Time of Concentration (Composite)	0.142 hours
Area (User Defined)	0.724 acres

Computational Time Increment	0.019 hours
Time to Peak (Computed)	12.136 hours
Flow (Peak, Computed)	1.32 ft^3/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	12.150 hours
Flow (Peak Interpolated Output)	1.30 ft^3/s

Drainage Area	
SCS CN (Composite)	68.000
Area (User Defined)	0.724 acres
Maximum Retention (Pervious)	4.7 in
Maximum Retention (Pervious, 20 percent)	0.9 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	1.9 in
Runoff Volume (Pervious)	0.113 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	0.113 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.142 hours
Computational Time Increment	0.019 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670

POST DEVELOPED

Subsection: Unit Hydrograph Summary — Return Event: 10 years
Label: DA-7 — Storm Event: 10 Year

SCS Unit Hydrograph Parameters	
Unit peak, qp	5.79 ft^3/s
Unit peak time, Tp	0.095 hours
Unit receding limb, Tr	0.378 hours
Total unit time, Tb	0.473 hours

POST DEVELOPED

Subsection: Unit Hydrograph Summary
Label: DA-7

Return Event: 25 years
Storm Event: 25 Year

Storm Event	25 Year
Return Event	25 years
Duration	24.000 hours
Depth	6.4 in
Time of Concentration (Composite)	0.142 hours
Area (User Defined)	0.724 acres

Computational Time Increment	0.019 hours
Time to Peak (Computed)	12.136 hours
Flow (Peak, Computed)	2.08 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	12.150 hours
Flow (Peak Interpolated Output)	2.04 ft³/s

Drainage Area	
SCS CN (Composite)	68.000
Area (User Defined)	0.724 acres
Maximum Retention (Pervious)	4.7 in
Maximum Retention (Pervious, 20 percent)	0.9 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	2.9 in
Runoff Volume (Pervious)	0.177 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	0.177 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.142 hours
Computational Time Increment	0.019 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670

POST DEVELOPED

Subsection: Unit Hydrograph Summary
Label: DA-7

Return Event: 25 years
Storm Event: 25 Year

SCS Unit Hydrograph Parameters	
Unit peak, qp	5.79 ft^3/s
Unit peak time, Tp	0.095 hours
Unit receding limb, Tr	0.378 hours
Total unit time, Tb	0.473 hours

POST DEVELOPED

Subsection: Unit Hydrograph Summary
Label: DA-7

Return Event: 100 years
Storm Event: 100 Year

Storm Event	100 Year
Return Event	100 years
Duration	24.000 hours
Depth	9.0 in
Time of Concentration (Composite)	0.142 hours
Area (User Defined)	0.724 acres

Computational Time Increment	0.019 hours
Time to Peak (Computed)	12.136 hours
Flow (Peak, Computed)	3.60 ft^3/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	12.100 hours
Flow (Peak Interpolated Output)	3.53 ft^3/s

Drainage Area	
SCS CN (Composite)	68.000
Area (User Defined)	0.724 acres
Maximum Retention (Pervious)	4.7 in
Maximum Retention (Pervious, 20 percent)	0.9 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	5.1 in
Runoff Volume (Pervious)	0.307 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	0.306 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.142 hours
Computational Time Increment	0.019 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670

POST DEVELOPED

Subsection: Unit Hydrograph Summary | Return Event: 100 years
Label: DA-7 | Storm Event: 100 Year

SCS Unit Hydrograph Parameters	
Unit peak, qp	5.79 ft^3/s
Unit peak time, Tp	0.095 hours
Unit receding limb, Tr	0.378 hours
Total unit time, Tb	0.473 hours

POST DEVELOPED

Subsection: Unit Hydrograph Summary
Label: DA-8

Return Event: 1 years
Storm Event: 1 Year

Storm Event	1 Year
Return Event	1 years
Duration	24.000 hours
Depth	2.8 in
Time of Concentration (Composite)	0.237 hours
Area (User Defined)	2.045 acres

Computational Time Increment	0.032 hours
Time to Peak (Computed)	12.190 hours
Flow (Peak, Computed)	1.09 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	12.200 hours
Flow (Peak Interpolated Output)	1.08 ft³/s

Drainage Area	
SCS CN (Composite)	72.000
Area (User Defined)	2.045 acres
Maximum Retention (Pervious)	3.9 in
Maximum Retention (Pervious, 20 percent)	0.8 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	0.7 in
Runoff Volume (Pervious)	0.118 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	0.117 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.237 hours
Computational Time Increment	0.032 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670

POST DEVELOPED

Subsection: Unit Hydrograph Summary | Return Event: 1 years
Label: DA-8 | Storm Event: 1 Year

SCS Unit Hydrograph Parameters	
Unit peak, qp	9.78 ft^3/s
Unit peak time, Tp	0.158 hours
Unit receding limb, Tr	0.632 hours
Total unit time, Tb	0.790 hours

POST DEVELOPED

Subsection: Unit Hydrograph Summary
Label: DA-8

Return Event: 2 years
Storm Event: 2 Year

Storm Event	2 Year
Return Event	2 years
Duration	24.000 hours
Depth	3.3 in
Time of Concentration (Composite)	0.237 hours
Area (User Defined)	2.045 acres

Computational Time Increment	0.032 hours
Time to Peak (Computed)	12.190 hours
Flow (Peak, Computed)	1.65 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	12.200 hours
Flow (Peak Interpolated Output)	1.64 ft³/s

Drainage Area	
SCS CN (Composite)	72.000
Area (User Defined)	2.045 acres
Maximum Retention (Pervious)	3.9 in
Maximum Retention (Pervious, 20 percent)	0.8 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	1.0 in
Runoff Volume (Pervious)	0.169 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	0.169 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.237 hours
Computational Time Increment	0.032 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670

POST DEVELOPED

Subsection: Unit Hydrograph Summary — Return Event: 2 years
Label: DA-8 — Storm Event: 2 Year

SCS Unit Hydrograph Parameters	
Unit peak, qp	9.78 ft^3/s
Unit peak time, Tp	0.158 hours
Unit receding limb, Tr	0.632 hours
Total unit time, Tb	0.790 hours

POST DEVELOPED

Subsection: Unit Hydrograph Summary | Return Event: 10 years
Label: DA-8 | Storm Event: 10 Year

Storm Event	10 Year
Return Event	10 years
Duration	24.000 hours
Depth	5.0 in
Time of Concentration (Composite)	0.237 hours
Area (User Defined)	2.045 acres

Computational Time Increment	0.032 hours
Time to Peak (Computed)	12.190 hours
Flow (Peak, Computed)	3.86 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	12.200 hours
Flow (Peak Interpolated Output)	3.82 ft³/s

Drainage Area	
SCS CN (Composite)	72.000
Area (User Defined)	2.045 acres
Maximum Retention (Pervious)	3.9 in
Maximum Retention (Pervious, 20 percent)	0.8 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	2.2 in
Runoff Volume (Pervious)	0.375 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	0.373 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.237 hours
Computational Time Increment	0.032 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670

POST DEVELOPED

Subsection: Unit Hydrograph Summary
Label: DA-8

Return Event: 10 years
Storm Event: 10 Year

SCS Unit Hydrograph Parameters	
Unit peak, qp	9.78 ft^3/s
Unit peak time, Tp	0.158 hours
Unit receding limb, Tr	0.632 hours
Total unit time, Tb	0.790 hours

POST DEVELOPED

Subsection: Unit Hydrograph Summary

Label: DA-8

Return Event: 25 years

Storm Event: 25 Year

Storm Event	25 Year
Return Event	25 years
Duration	24.000 hours
Depth	6.4 in
Time of Concentration (Composite)	0.237 hours
Area (User Defined)	2.045 acres

Computational Time Increment	0.032 hours
Time to Peak (Computed)	12.190 hours
Flow (Peak, Computed)	5.88 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	12.200 hours
Flow (Peak Interpolated Output)	5.81 ft³/s

Drainage Area	
SCS CN (Composite)	72.000
Area (User Defined)	2.045 acres
Maximum Retention (Pervious)	3.9 in
Maximum Retention (Pervious, 20 percent)	0.8 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	3.3 in
Runoff Volume (Pervious)	0.566 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	0.565 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.237 hours
Computational Time Increment	0.032 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670

POST DEVELOPED

Subsection: Unit Hydrograph Summary

Label: DA-8

Return Event: 25 years

Storm Event: 25 Year

SCS Unit Hydrograph Parameters	
Unit peak, qp	9.78 ft^3/s
Unit peak time, Tp	0.158 hours
Unit receding limb, Tr	0.632 hours
Total unit time, Tb	0.790 hours

POST DEVELOPED

Subsection: Unit Hydrograph Summary — Return Event: 100 years
Label: DA-8 — Storm Event: 100 Year

Storm Event	100 Year
Return Event	100 years
Duration	24.000 hours
Depth	9.0 in
Time of Concentration (Composite)	0.237 hours
Area (User Defined)	2.045 acres

Computational Time Increment	0.032 hours
Time to Peak (Computed)	12.159 hours
Flow (Peak, Computed)	9.85 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	12.150 hours
Flow (Peak Interpolated Output)	9.74 ft³/s

Drainage Area	
SCS CN (Composite)	72.000
Area (User Defined)	2.045 acres
Maximum Retention (Pervious)	3.9 in
Maximum Retention (Pervious, 20 percent)	0.8 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	5.6 in
Runoff Volume (Pervious)	0.951 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	0.949 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.237 hours
Computational Time Increment	0.032 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670

POST DEVELOPED

Subsection: Unit Hydrograph Summary | Return Event: 100 years
Label: DA-8 | Storm Event: 100 Year

SCS Unit Hydrograph Parameters	
Unit peak, qp	9.78 ft^3/s
Unit peak time, Tp	0.158 hours
Unit receding limb, Tr	0.632 hours
Total unit time, Tb	0.790 hours

POST DEVELOPED

Subsection: Elevation-Area Volume Curve | Return Event: 1 years

Label: Forebay | Storm Event: 1 Year

Elevation (ft)	Planimeter (ft^2)	Area (acres)	A1+A2+sqr (A1*A2) (acres)	Volume (ac-ft)	Volume (Total) (ac-ft)
437.00	0.0	0.000	0.000	0.000	0.000
440.00	0.0	0.022	0.025	0.025	0.025
443.50	0.0	0.048	0.102	0.120	0.145

Subsection: Volume Equations | Return Event: 1 years
Label: Forebay | Storm Event: 1 Year

Pond Volume Equations

*** Incremental volume computed by the Conic Method for Reservoir Volumes.**

Volume = (1/3) * (EL2 - El1) * (Area1 + Area2 + sqr(Area1 * Area2))

where:	EL1, EL2	Lower and upper elevations of the increment
	Area1, Area2	Areas computed for EL1, EL2, respectively
	Volume	Incremental volume between EL1 and EL2

POST DEVELOPED

Subsection: Elevation vs. Volume Curve
Label: Lot 7 Rain Garden

Return Event: 1 years
Storm Event: 1 Year

Elevation-Volume

Pond Elevation (ft)	Pond Volume (ac-ft)
449.50	0.000
450.00	0.006
451.00	0.012
452.00	0.051

POST DEVELOPED

Subsection: Elevation vs. Volume Curve | Return Event: 1 years
Label: Lot 7.1 Rain Garden | Storm Event: 1 Year

Elevation-Volume

Pond Elevation (ft)	Pond Volume (ac-ft)
454.50	0.000
455.00	0.007
456.00	0.014
457.00	0.060

POST DEVELOPED

Subsection: Elevation vs. Volume Curve — Return Event: 1 years

Label: Lot 7.2 Rain Garden — Storm Event: 1 Year

Elevation-Volume

Pond Elevation (ft)	Pond Volume (ac-ft)
455.50	0.000
456.00	0.008
457.00	0.016
458.00	0.063

POST DEVELOPED

Subsection: Elevation vs. Volume Curve
Label: Lot 8 Rain Garden

Return Event: 1 years
Storm Event: 1 Year

Elevation-Volume

Pond Elevation (ft)	Pond Volume (ac-ft)
445.50	0.000
446.00	0.007
447.00	0.014
448.00	0.045

POST DEVELOPED

Subsection: Elevation-Area Volume Curve	Return Event: 1 years
Label: Pocket Wetland	Storm Event: 1 Year

Elevation (ft)	Planimeter (ft²)	Area (acres)	A1+A2+sqr (A1*A2) (acres)	Volume (ac-ft)	Volume (Total) (ac-ft)
436.00	0.0	0.000	0.000	0.000	0.000
438.00	0.0	0.007	0.008	0.006	0.006
439.50	0.0	0.022	0.041	0.020	0.026
440.00	0.0	0.037	0.088	0.015	0.040
440.40	0.0	0.047	0.126	0.017	0.057
440.50	0.0	0.111	0.230	0.008	0.065
441.00	0.0	0.122	0.349	0.058	0.123
443.50	0.0	0.227	0.516	0.430	0.553

Pond Volume Equations
* Incremental volume computed by the Conic Method for Reservoir Volumes.

Volume = (1/3) * (EL2 - El1) * (Area1 + Area2 + sqr(Area1 * Area2))

where:	EL1, EL2	Lower and upper elevations of the increment
	Area1, Area2	Areas computed for EL1, EL2, respectively
	Volume	Incremental volume between EL1 and EL2

Requested Pond Water Surface Elevations	
Minimum (Headwater)	438.00 ft
Increment (Headwater)	0.25 ft
Maximum (Headwater)	443.50 ft

Outlet Connectivity

Structure Type	Outlet ID	Direction	Outfall	E1 (ft)	E2 (ft)
Rectangular Weir	Weir - 1	Forward + Reverse	TW	441.00	443.50
Tailwater Settings	Tailwater			(N/A)	(N/A)

POST DEVELOPED

Subsection: Outlet Input Data | Return Event: 1 years
Label: Forebay Outlet | Storm Event: 1 Year

Structure ID: Weir - 1
Structure Type: Rectangular Weir

Number of Openings	1
Elevation	441.00 ft
Weir Length	20.00 ft
Weir Coefficient	3.00 (ft^0.5)/s

POST DEVELOPED

Subsection: Outlet Input Data | Return Event: 1 years
Label: Lot 7 Rain Garden Outlet | Storm Event: 1 Year

Requested Pond Water Surface Elevations	
Minimum (Headwater)	449.50 ft
Increment (Headwater)	0.25 ft
Maximum (Headwater)	452.00 ft

Outlet Connectivity

Structure Type	Outlet ID	Direction	Outfall	E1 (ft)	E2 (ft)
Stand Pipe	Riser - 1	Forward	Culvert - 1	451.50	452.00
Orifice-Circular	Orifice - 1	Forward	Culvert - 1	449.50	452.00
Culvert-Circular	Culvert - 1	Forward	TW	448.50	452.00
Tailwater Settings	Tailwater			(N/A)	(N/A)

POST DEVELOPED

Subsection: Outlet Input Data

Label: Lot 7 Rain Garden Outlet

Return Event: 1 years

Storm Event: 1 Year

Structure ID: Riser - 1
Structure Type: Stand Pipe

Number of Openings	1
Elevation	451.50 ft
Diameter	15.0 in
Orifice Area	1.2 ft^2
Orifice Coefficient	0.600
Weir Length	3.93 ft
Weir Coefficient	3.00 (ft^0.5)/s
K Reverse	1.000
Manning's n	0.000
Kev, Charged Riser	0.000
Weir Submergence	False
Orifice H to crest	False

POST DEVELOPED

Subsection: Outlet Input Data | Return Event: 1 years
Label: Lot 7 Rain Garden Outlet | Storm Event: 1 Year

Structure ID: Culvert - 1 Structure Type: Culvert-Circular	
Number of Barrels	1
Diameter	15.0 in
Length	42.67 ft
Length (Computed Barrel)	42.67 ft
Slope (Computed)	0.012 ft/ft

Outlet Control Data	
Manning's n	0.012
Ke	0.700
Kb	0.020
Kr	0.700
Convergence Tolerance	0.00 ft

Inlet Control Data	
Equation Form	Form 1
K	0.0210
M	1.3300
C	0.0463
Y	0.7500
T1 ratio (HW/D)	1.159
T2 ratio (HW/D)	1.499
Slope Correction Factor	0.700

Use unsubmerged inlet control 0 equation below T1 elevation.
Use submerged inlet control 0 equation above T2 elevation

In transition zone between unsubmerged and submerged inlet control,
interpolate between flows at T1 & T2...

T1 Elevation	449.95 ft	T1 Flow	4.80 ft³/s
T2 Elevation	450.37 ft	T2 Flow	5.49 ft³/s

POST DEVELOPED

Subsection: Outlet Input Data | Return Event: 1 years
Label: Lot 7 Rain Garden Outlet | Storm Event: 1 Year

Structure ID: Orifice - 1
Structure Type: Orifice-Circular

Number of Openings	1
Elevation	449.50 ft
Orifice Diameter	0.0 in
Orifice Coefficient	0.600

Structure ID: TW
Structure Type: TW Setup, DS Channel

Tailwater Type	Free Outfall

Convergence Tolerances

Maximum Iterations	30
Tailwater Tolerance (Minimum)	0.01 ft
Tailwater Tolerance (Maximum)	0.50 ft
Headwater Tolerance (Minimum)	0.01 ft
Headwater Tolerance (Maximum)	0.50 ft
Flow Tolerance (Minimum)	0.001 ft^3/s
Flow Tolerance (Maximum)	10.000 ft^3/s

POST DEVELOPED

Subsection: Outlet Input Data | Return Event: 1 years
Label: Lot 7.1 Rain Garden Outlet | Storm Event: 1 Year

Requested Pond Water Surface Elevations	
Minimum (Headwater)	454.50 ft
Increment (Headwater)	0.25 ft
Maximum (Headwater)	457.00 ft

Outlet Connectivity

Structure Type	Outlet ID	Direction	Outfall	E1 (ft)	E2 (ft)
Stand Pipe	Riser - 1	Forward	Culvert - 1	456.50	457.00
Orifice-Circular	Orifice - 1	Forward	Culvert - 1	454.50	457.00
Culvert-Circular	Culvert - 1	Forward	TW	453.00	457.00
Tailwater Settings	Tailwater			(N/A)	(N/A)

POST DEVELOPED

Subsection: Outlet Input Data | Return Event: 1 years
Label: Lot 7.1 Rain Garden Outlet | Storm Event: 1 Year

Structure ID: Riser - 1
Structure Type: Stand Pipe

Number of Openings	1
Elevation	456.50 ft
Diameter	15.0 in
Orifice Area	1.2 ft²
Orifice Coefficient	0.600
Weir Length	3.93 ft
Weir Coefficient	3.00 (ft^0.5)/s
K Reverse	1.000
Manning's n	0.000
Kev, Charged Riser	0.000
Weir Submergence	False
Orifice H to crest	False

POST DEVELOPED

Subsection: Outlet Input Data | Return Event: 1 years
Label: Lot 7.1 Rain Garden Outlet | Storm Event: 1 Year

Structure ID: Culvert - 1 Structure Type: Culvert-Circular	
Number of Barrels	1
Diameter	15.0 in
Length	27.20 ft
Length (Computed Barrel)	27.22 ft
Slope (Computed)	0.037 ft/ft

Outlet Control Data	
Manning's n	0.012
Ke	0.700
Kb	0.020
Kr	0.700
Convergence Tolerance	0.00 ft

Inlet Control Data	
Equation Form	Form 1
K	0.0210
M	1.3300
C	0.0463
Y	0.7500
T1 ratio (HW/D)	1.177
T2 ratio (HW/D)	1.517
Slope Correction Factor	0.700

Use unsubmerged inlet control 0 equation below T1 elevation.
Use submerged inlet control 0 equation above T2 elevation

In transition zone between unsubmerged and submerged inlet control,
interpolate between flows at T1 & T2...

T1 Elevation	454.47 ft	T1 Flow	4.80 ft^3/s
T2 Elevation	454.90 ft	T2 Flow	5.49 ft^3/s

POST DEVELOPED

Subsection: Outlet Input Data | Return Event: 1 years
Label: Lot 7.1 Rain Garden Outlet | Storm Event: 1 Year

Structure ID: Orifice - 1 Structure Type: Orifice-Circular	
Number of Openings	1
Elevation	454.50 ft
Orifice Diameter	0.0 in
Orifice Coefficient	0.600

Structure ID: TW Structure Type: TW Setup, DS Channel	
Tailwater Type	Free Outfall

Convergence Tolerances	
Maximum Iterations	30
Tailwater Tolerance (Minimum)	0.01 ft
Tailwater Tolerance (Maximum)	0.50 ft
Headwater Tolerance (Minimum)	0.01 ft
Headwater Tolerance (Maximum)	0.50 ft
Flow Tolerance (Minimum)	0.001 ft^3/s
Flow Tolerance (Maximum)	10.000 ft^3/s

POST DEVELOPED

Subsection: Outlet Input Data
Label: Lot 7.2 Rain Garden Outlet

Return Event: 1 years
Storm Event: 1 Year

Requested Pond Water Surface Elevations	
Minimum (Headwater)	455.50 ft
Increment (Headwater)	0.25 ft
Maximum (Headwater)	458.00 ft

Outlet Connectivity

Structure Type	Outlet ID	Direction	Outfall	E1 (ft)	E2 (ft)
Orifice-Circular	Orifice - 1	Forward	Culvert - 1	455.50	458.00
Stand Pipe	Riser - 1	Forward	Culvert - 1	457.50	458.00
Stand Pipe	Copy of Riser - 1	Forward	Culvert - 1	457.50	458.00
Culvert-Circular	Culvert - 1	Forward	TW	454.00	458.00
Tailwater Settings	Tailwater			(N/A)	(N/A)

POST DEVELOPED

Subsection: Outlet Input Data | Return Event: 1 years
Label: Lot 7.2 Rain Garden Outlet | Storm Event: 1 Year

Structure ID: Riser - 1
Structure Type: Stand Pipe

Number of Openings	1
Elevation	457.50 ft
Diameter	12.0 in
Orifice Area	0.8 ft^2
Orifice Coefficient	0.600
Weir Length	3.14 ft
Weir Coefficient	3.00 (ft^0.5)/s
K Reverse	1.000
Manning's n	0.000
Kev, Charged Riser	0.000
Weir Submergence	False
Orifice H to crest	False

Subsection: Outlet Input Data | Return Event: 1 years
Label: Lot 7.2 Rain Garden Outlet | Storm Event: 1 Year

Structure ID: Culvert - 1
Structure Type: Culvert-Circular

Number of Barrels	1
Diameter	15.0 in
Length	55.00 ft
Length (Computed Barrel)	55.00 ft
Slope (Computed)	0.009 ft/ft

Outlet Control Data

Manning's n	0.012
Ke	0.700
Kb	0.020
Kr	0.700
Convergence Tolerance	0.00 ft

Inlet Control Data

Equation Form	Form 1
K	0.0210
M	1.3300
C	0.0463
Y	0.7500
T1 ratio (HW/D)	1.158
T2 ratio (HW/D)	1.497
Slope Correction Factor	0.700

Use unsubmerged inlet control 0 equation below T1 elevation.
Use submerged inlet control 0 equation above T2 elevation

In transition zone between unsubmerged and submerged inlet control,
interpolate between flows at T1 & T2...

T1 Elevation	455.45 ft	T1 Flow	4.80 ft³/s
T2 Elevation	455.87 ft	T2 Flow	5.49 ft³/s

POST DEVELOPED

Subsection: Outlet Input Data | Return Event: 1 years
Label: Lot 7.2 Rain Garden Outlet | Storm Event: 1 Year

Structure ID: Orifice - 1 Structure Type: Orifice-Circular	
Number of Openings	1
Elevation	455.50 ft
Orifice Diameter	0.0 in
Orifice Coefficient	0.600

Structure ID: Copy of Riser - 1 Structure Type: Stand Pipe	
Number of Openings	1
Elevation	457.50 ft
Diameter	12.0 in
Orifice Area	0.8 ft^2
Orifice Coefficient	0.600
Weir Length	3.14 ft
Weir Coefficient	3.00 (ft^0.5)/s
K Reverse	1.000
Manning's n	0.000
Kev, Charged Riser	0.000
Weir Submergence	False
Orifice H to crest	False

Structure ID: TW Structure Type: TW Setup, DS Channel	
Tailwater Type	Free Outfall

Convergence Tolerances	
Maximum Iterations	30
Tailwater Tolerance (Minimum)	0.01 ft
Tailwater Tolerance (Maximum)	0.50 ft
Headwater Tolerance (Minimum)	0.01 ft
Headwater Tolerance (Maximum)	0.50 ft
Flow Tolerance (Minimum)	0.001 ft^3/s
Flow Tolerance (Maximum)	10.000 ft^3/s

POST DEVELOPED

Subsection: Outlet Input Data | Return Event: 1 years
Label: Lot 8 Rain Garden Outlet | Storm Event: 1 Year

Requested Pond Water Surface Elevations	
Minimum (Headwater)	445.50 ft
Increment (Headwater)	0.25 ft
Maximum (Headwater)	448.00 ft

Outlet Connectivity

Structure Type	Outlet ID	Direction	Outfall	E1 (ft)	E2 (ft)
Stand Pipe	Riser - 1	Forward	Culvert - 1	447.50	448.00
Orifice-Circular	Orifice - 1	Forward	Culvert - 1	445.50	448.00
Culvert-Circular	Culvert - 1	Forward	TW	444.50	448.00
Tailwater Settings	Tailwater			(N/A)	(N/A)

POST DEVELOPED

Subsection: Outlet Input Data	Return Event: 1 years
Label: Lot 8 Rain Garden Outlet	Storm Event: 1 Year

Structure ID: Riser - 1
Structure Type: Stand Pipe

Number of Openings	1
Elevation	447.50 ft
Diameter	18.0 in
Orifice Area	1.8 ft^2
Orifice Coefficient	0.600
Weir Length	4.71 ft
Weir Coefficient	3.00 (ft^0.5)/s
K Reverse	1.000
Manning's n	0.000
Kev, Charged Riser	0.000
Weir Submergence	False
Orifice H to crest	False

POST DEVELOPED

Subsection: Outlet Input Data | Return Event: 1 years
Label: Lot 8 Rain Garden Outlet | Storm Event: 1 Year

Structure ID: Culvert - 1
Structure Type: Culvert-Circular

Number of Barrels	1
Diameter	18.0 in
Length	37.60 ft
Length (Computed Barrel)	37.60 ft
Slope (Computed)	0.013 ft/ft

Outlet Control Data

Manning's n	0.012
Ke	0.700
Kb	0.016
Kr	0.700
Convergence Tolerance	0.00 ft

Inlet Control Data

Equation Form	Form 1
K	0.0210
M	1.3300
C	0.0463
Y	0.7500
T1 ratio (HW/D)	1.161
T2 ratio (HW/D)	1.500
Slope Correction Factor	0.700

Use unsubmerged inlet control 0 equation below T1 elevation.
Use submerged inlet control 0 equation above T2 elevation

In transition zone between unsubmerged and submerged inlet control,
interpolate between flows at T1 & T2...

T1 Elevation	446.24 ft	T1 Flow	7.58 ft^3/s
T2 Elevation	446.75 ft	T2 Flow	8.66 ft^3/s

POST DEVELOPED

Subsection: Outlet Input Data — Return Event: 1 years
Label: Lot 8 Rain Garden Outlet — Storm Event: 1 Year

Structure ID: Orifice - 1 Structure Type: Orifice-Circular	
Number of Openings	1
Elevation	445.50 ft
Orifice Diameter	0.0 in
Orifice Coefficient	0.600

Structure ID: TW Structure Type: TW Setup, DS Channel	
Tailwater Type	Free Outfall

Convergence Tolerances	
Maximum Iterations	30
Tailwater Tolerance (Minimum)	0.01 ft
Tailwater Tolerance (Maximum)	0.50 ft
Headwater Tolerance (Minimum)	0.01 ft
Headwater Tolerance (Maximum)	0.50 ft
Flow Tolerance (Minimum)	0.001 ft^3/s
Flow Tolerance (Maximum)	10.000 ft^3/s

POST DEVELOPED

Subsection: Outlet Input Data | Return Event: 1 years
Label: Pocket Wetland Outlet | Storm Event: 1 Year

Requested Pond Water Surface Elevations	
Minimum (Headwater)	436.00 ft
Increment (Headwater)	0.10 ft
Maximum (Headwater)	443.50 ft

Outlet Connectivity

Structure Type	Outlet ID	Direction	Outfall	E1 (ft)	E2 (ft)
Stand Pipe	Riser - 2	Forward	Culvert - 1	441.50	443.50
Orifice-Circular	Orifice - 1	Forward	Culvert - 1	441.00	443.50
Culvert-Circular	Culvert - 1	Forward	TW	434.00	443.50
Tailwater Settings	Tailwater			(N/A)	(N/A)

POST DEVELOPED

Subsection: Outlet Input Data | Return Event: 1 years
Label: Pocket Wetland Outlet | Storm Event: 1 Year

Structure ID: Riser - 2
Structure Type: Stand Pipe

Number of Openings	1
Elevation	441.50 ft
Diameter	15.0 in
Orifice Area	1.2 ft^2
Orifice Coefficient	0.600
Weir Length	3.93 ft
Weir Coefficient	3.00 (ft^0.5)/s
K Reverse	1.000
Manning's n	0.000
Kev, Charged Riser	0.000
Weir Submergence	False
Orifice H to crest	False

POST DEVELOPED

Subsection: Outlet Input Data | Return Event: 1 years
Label: Pocket Wetland Outlet | Storm Event: 1 Year

Structure ID: Culvert - 1 Structure Type: Culvert-Circular	
Number of Barrels	1
Diameter	18.0 in
Length	45.60 ft
Length (Computed Barrel)	45.63 ft
Slope (Computed)	0.035 ft/ft

Outlet Control Data	
Manning's n	0.012
Ke	0.700
Kb	0.016
Kr	0.700
Convergence Tolerance	0.00 ft

Inlet Control Data	
Equation Form	Form 1
K	0.0210
M	1.3300
C	0.0463
Y	0.7500
T1 ratio (HW/D)	1.176
T2 ratio (HW/D)	1.515
Slope Correction Factor	0.700

Use unsubmerged inlet control 0 equation below T1 elevation.
Use submerged inlet control 0 equation above T2 elevation

In transition zone between unsubmerged and submerged inlet control,
interpolate between flows at T1 & T2...

T1 Elevation	435.76 ft	T1 Flow	7.58 ft³/s
T2 Elevation	436.27 ft	T2 Flow	8.66 ft³/s

POST DEVELOPED

Subsection: Outlet Input Data — Return Event: 1 years
Label: Pocket Wetland Outlet — Storm Event: 1 Year

Structure ID: Orifice - 1
Structure Type: Orifice-Circular

Number of Openings	8
Elevation	441.00 ft
Orifice Diameter	1.0 in
Orifice Coefficient	0.600

Structure ID: TW
Structure Type: TW Setup, DS Channel

Tailwater Type	Free Outfall

Convergence Tolerances

Maximum Iterations	30
Tailwater Tolerance (Minimum)	0.01 ft
Tailwater Tolerance (Maximum)	0.50 ft
Headwater Tolerance (Minimum)	0.01 ft
Headwater Tolerance (Maximum)	0.50 ft
Flow Tolerance (Minimum)	0.001 ft^3/s
Flow Tolerance (Maximum)	10.000 ft^3/s

POST DEVELOPED

Subsection: Interconnected Pond Routing Summary — Return Event: 1 years
Label: Forebay — Storm Event: 1 Year

Infiltration	
Infiltration Method (Computed)	No Infiltration

Initial Conditions			Calculation Tolerances		
Elevation (Starting Water Surface Computed)	441.00	ft	Flow Tolerance (Minimum)	0.000	ft^3/s
Volume (Starting)	0.060	ac-ft	Maximum Iterations	35	
Outflow (Starting)	0.00	ft^3/s	ICPM Time Step	0.050	hours

	Maximum Storage	
Time to Peak (hours)	Elevation (ft)	Volume (ac-ft)
15.400	441.28	0.069

	Forward Flow Peaks		Reverse Flow Peaks	
	Time to Peak (hours)	Flow (Peak) (ft^3/s)	Time to Peak (hours)	Flow (Peak) (ft^3/s)
Pond Inflow....	12.250	0.91	0.000	0.00
Pond Outflow...	15.450	0.10	0.000	0.00

	Total Volume In		Total Volume Out	
	Volume (ac-ft)	Direction	Volume (ac-ft)	Direction
Pond Inflow....	0.112	Forward	0.000	Reverse
Pond Outflow...	0.000	Reverse	0.087	Forward

Mass Balance (ac-ft)	
Volume (Initial ICPM)	0.060 ac-ft
Volume (Total In ICPM)	0.118 ac-ft
Volume (Total Out ICPM)	0.112 ac-ft
Volume (Ending)	0.065 ac-ft
Elevation (Ending)	441.15 ft
Difference	0.000 ac-ft
Percent of Inflow Volume (Interconnected Pond Mass Balance)	0.1 %

POST DEVELOPED

Subsection: Interconnected Pond Routing Summary | Return Event: 2 years
Label: Forebay | Storm Event: 2 Year

Infiltration	
Infiltration Method (Computed)	No Infiltration

Initial Conditions			Calculation Tolerances		
Elevation (Starting Water Surface Computed)	441.00	ft	Flow Tolerance (Minimum)	0.000	ft^3/s
Volume (Starting)	0.060	ac-ft	Maximum Iterations	35	
Outflow (Starting)	0.00	ft^3/s	ICPM Time Step	0.050	hours

Time to Peak (hours)	Maximum Storage Elevation (ft)	Maximum Storage Volume (ac-ft)
16.300	441.45	0.075

	Forward Flow Peaks Time to Peak (hours)	Forward Flow Peaks Flow (Peak) (ft^3/s)	Reverse Flow Peaks Time to Peak (hours)	Reverse Flow Peaks Flow (Peak) (ft^3/s)
Pond Inflow....	12.250	1.36	0.000	0.00
Pond Outflow...	16.300	0.13	0.000	0.00

	Total Volume In Volume (ac-ft)	Total Volume In Direction	Total Volume Out Volume (ac-ft)	Total Volume Out Direction
Pond Inflow....	0.174	Forward	0.000	Reverse
Pond Outflow...	0.000	Reverse	0.121	Forward

Mass Balance (ac-ft)	
Volume (Initial ICPM)	0.060 ac-ft
Volume (Total In ICPM)	0.184 ac-ft
Volume (Total Out ICPM)	0.174 ac-ft
Volume (Ending)	0.070 ac-ft
Elevation (Ending)	441.31 ft
Difference	0.000 ac-ft
Percent of Inflow Volume (Interconnected Pond Mass Balance)	0.1 %

POST DEVELOPED

Subsection: Interconnected Pond Routing Summary | Return Event: 10 years
Label: Forebay | Storm Event: 10 Year

Infiltration	
Infiltration Method (Computed)	No Infiltration

Initial Conditions			Calculation Tolerances		
Elevation (Starting Water Surface Computed)	441.00	ft	Flow Tolerance (Minimum)	0.000	ft^3/s
Volume (Starting)	0.060	ac-ft	Maximum Iterations	35	
Outflow (Starting)	0.00	ft^3/s	ICPM Time Step	0.050	hours

	Maximum Storage	
Time to Peak (hours)	Elevation (ft)	Volume (ac-ft)
12.650	441.77	0.086

	Forward Flow Peaks		Reverse Flow Peaks	
	Time to Peak (hours)	Flow (Peak) (ft^3/s)	Time to Peak (hours)	Flow (Peak) (ft^3/s)
Pond Inflow....	12.300	3.50	0.000	0.00
Pond Outflow...	12.650	1.73	0.000	0.00

	Total Volume In		Total Volume Out	
	Volume (ac-ft)	Direction	Volume (ac-ft)	Direction
Pond Inflow....	0.439	Forward	0.000	Reverse
Pond Outflow...	0.000	Reverse	0.360	Forward

Mass Balance (ac-ft)	
Volume (Initial ICPM)	0.060 ac-ft
Volume (Total In ICPM)	0.455 ac-ft
Volume (Total Out ICPM)	0.439 ac-ft
Volume (Ending)	0.075 ac-ft
Elevation (Ending)	441.46 ft
Difference	0.000 ac-ft
Percent of Inflow Volume (Interconnected Pond Mass Balance)	0.0 %

POST DEVELOPED

Subsection: Interconnected Pond Routing Summary — Return Event: 25 years
Label: Forebay — Storm Event: 25 Year

Infiltration	
Infiltration Method (Computed)	No Infiltration

Initial Conditions			Calculation Tolerances		
Elevation (Starting Water Surface Computed)	441.00	ft	Flow Tolerance (Minimum)	0.000	ft³/s
Volume (Starting)	0.060	ac-ft	Maximum Iterations	35	
Outflow (Starting)	0.00	ft³/s	ICPM Time Step	0.050	hours

	Maximum Storage	
Time to Peak (hours)	Elevation (ft)	Volume (ac-ft)
12.500	442.01	0.094

	Forward Flow Peaks		Reverse Flow Peaks	
	Time to Peak (hours)	Flow (Peak) (ft³/s)	Time to Peak (hours)	Flow (Peak) (ft³/s)
Pond Inflow....	12.200	6.54	0.000	0.00
Pond Outflow...	12.450	4.20	0.000	0.00

	Total Volume In		Total Volume Out	
	Volume (ac-ft)	Direction	Volume (ac-ft)	Direction
Pond Inflow....	0.692	Forward	0.000	Reverse
Pond Outflow...	0.000	Reverse	0.606	Forward

Mass Balance (ac-ft)	
Volume (Initial ICPM)	0.060 ac-ft
Volume (Total In ICPM)	0.710 ac-ft
Volume (Total Out ICPM)	0.692 ac-ft
Volume (Ending)	0.077 ac-ft
Elevation (Ending)	441.50 ft
Difference	0.000 ac-ft
Percent of Inflow Volume (Interconnected Pond Mass Balance)	0.0 %

POST DEVELOPED

Subsection: Interconnected Pond Routing Summary | Return Event: 100 years
Label: Forebay | Storm Event: 100 Year

Infiltration	
Infiltration Method (Computed)	No Infiltration

Initial Conditions			Calculation Tolerances		
Elevation (Starting Water Surface Computed)	441.00	ft	Flow Tolerance (Minimum)	0.000	ft³/s
Volume (Starting)	0.060	ac-ft	Maximum Iterations	35	
Outflow (Starting)	0.00	ft³/s	ICPM Time Step	0.050	hours

	Maximum Storage	
Time to Peak (hours)	Elevation (ft)	Volume (ac-ft)
12.500	442.67	0.117

	Forward Flow Peaks		Reverse Flow Peaks	
	Time to Peak (hours)	Flow (Peak) (ft³/s)	Time to Peak (hours)	Flow (Peak) (ft³/s)
Pond Inflow....	12.200	11.90	0.000	0.00
Pond Outflow...	12.450	6.60	0.000	0.00

	Total Volume In		Total Volume Out	
	Volume (ac-ft)	Direction	Volume (ac-ft)	Direction
Pond Inflow....	1.205	Forward	0.000	Reverse
Pond Outflow...	0.000	Reverse	1.116	Forward

Mass Balance (ac-ft)	
Volume (Initial ICPM)	0.060 ac-ft
Volume (Total In ICPM)	1.224 ac-ft
Volume (Total Out ICPM)	1.205 ac-ft
Volume (Ending)	0.077 ac-ft
Elevation (Ending)	441.52 ft
Difference	0.000 ac-ft
Percent of Inflow Volume (Interconnected Pond Mass Balance)	0.0 %

Subsection: Level Pool Pond Routing Summary | Return Event: 1 years
Label: Lot 7 Rain Garden (IN) | Storm Event: 1 Year

Infiltration	
Infiltration Method (Computed)	No Infiltration

Initial Conditions	
Elevation (Water Surface, Initial)	449.50 ft
Volume (Initial)	0.000 ac-ft
Flow (Initial Outlet)	0.00 ft^3/s
Flow (Initial Infiltration)	0.00 ft^3/s
Flow (Initial, Total)	0.00 ft^3/s
Time Increment	0.050 hours

Inflow/Outflow Hydrograph Summary			
Flow (Peak In)	0.31 ft^3/s	Time to Peak (Flow, In)	12.150 hours
Flow (Peak Outlet)	0.01 ft^3/s	Time to Peak (Flow, Outlet)	24.000 hours

Elevation (Water Surface, Peak)	451.50 ft
Volume (Peak)	0.032 ac-ft

Mass Balance (ac-ft)	
Volume (Initial)	0.000 ac-ft
Volume (Total Inflow)	0.032 ac-ft
Volume (Total Infiltration)	0.000 ac-ft
Volume (Total Outlet Outflow)	0.000 ac-ft
Volume (Retained)	0.032 ac-ft
Volume (Unrouted)	0.000 ac-ft
Error (Mass Balance)	0.1 %

POST DEVELOPED

Subsection: Level Pool Pond Routing Summary — Return Event: 2 years
Label: Lot 7 Rain Garden (IN) — Storm Event: 2 Year

Infiltration	
Infiltration Method (Computed)	No Infiltration

Initial Conditions	
Elevation (Water Surface, Initial)	449.50 ft
Volume (Initial)	0.000 ac-ft
Flow (Initial Outlet)	0.00 ft³/s
Flow (Initial Infiltration)	0.00 ft³/s
Flow (Initial, Total)	0.00 ft³/s
Time Increment	0.050 hours

Inflow/Outflow Hydrograph Summary			
Flow (Peak In)	0.50 ft³/s	Time to Peak (Flow, In)	12.150 hours
Flow (Peak Outlet)	0.04 ft³/s	Time to Peak (Flow, Outlet)	15.200 hours

Elevation (Water Surface, Peak)	451.51 ft
Volume (Peak)	0.032 ac-ft

Mass Balance (ac-ft)	
Volume (Initial)	0.000 ac-ft
Volume (Total Inflow)	0.047 ac-ft
Volume (Total Infiltration)	0.000 ac-ft
Volume (Total Outlet Outflow)	0.016 ac-ft
Volume (Retained)	0.032 ac-ft
Volume (Unrouted)	0.000 ac-ft
Error (Mass Balance)	0.1 %

POST DEVELOPED

Subsection: Level Pool Pond Routing Summary
Label: Lot 7 Rain Garden (IN)

Return Event: 10 years
Storm Event: 10 Year

Infiltration	
Infiltration Method (Computed)	No Infiltration

Initial Conditions	
Elevation (Water Surface, Initial)	449.50 ft
Volume (Initial)	0.000 ac-ft
Flow (Initial Outlet)	0.00 ft³/s
Flow (Initial Infiltration)	0.00 ft³/s
Flow (Initial, Total)	0.00 ft³/s
Time Increment	0.050 hours

Inflow/Outflow Hydrograph Summary			
Flow (Peak In)	1.30 ft³/s	Time to Peak (Flow, In)	12.150 hours
Flow (Peak Outlet)	0.73 ft³/s	Time to Peak (Flow, Outlet)	12.350 hours

Elevation (Water Surface, Peak)	451.62 ft
Volume (Peak)	0.036 ac-ft

Mass Balance (ac-ft)	
Volume (Initial)	0.000 ac-ft
Volume (Total Inflow)	0.113 ac-ft
Volume (Total Infiltration)	0.000 ac-ft
Volume (Total Outlet Outflow)	0.082 ac-ft
Volume (Retained)	0.032 ac-ft
Volume (Unrouted)	0.000 ac-ft
Error (Mass Balance)	0.1 %

POST DEVELOPED

Subsection: Level Pool Pond Routing Summary
Label: Lot 7 Rain Garden (IN)

Return Event: 25 years
Storm Event: 25 Year

Infiltration	
Infiltration Method (Computed)	No Infiltration

Initial Conditions	
Elevation (Water Surface, Initial)	449.50 ft
Volume (Initial)	0.000 ac-ft
Flow (Initial Outlet)	0.00 ft³/s
Flow (Initial Infiltration)	0.00 ft³/s
Flow (Initial, Total)	0.00 ft³/s
Time Increment	0.050 hours

Inflow/Outflow Hydrograph Summary			
Flow (Peak In)	2.04 ft³/s	Time to Peak (Flow, In)	12.150 hours
Flow (Peak Outlet)	1.80 ft³/s	Time to Peak (Flow, Outlet)	12.200 hours

Elevation (Water Surface, Peak)	451.78 ft
Volume (Peak)	0.042 ac-ft

Mass Balance (ac-ft)	
Volume (Initial)	0.000 ac-ft
Volume (Total Inflow)	0.177 ac-ft
Volume (Total Infiltration)	0.000 ac-ft
Volume (Total Outlet Outflow)	0.145 ac-ft
Volume (Retained)	0.032 ac-ft
Volume (Unrouted)	0.000 ac-ft
Error (Mass Balance)	0.1 %

POST DEVELOPED

Subsection: Level Pool Pond Routing Summary — Return Event: 100 years
Label: Lot 7 Rain Garden (IN) — Storm Event: 100 Year

Infiltration	
Infiltration Method (Computed)	No Infiltration

Initial Conditions	
Elevation (Water Surface, Initial)	449.50 ft
Volume (Initial)	0.000 ac-ft
Flow (Initial Outlet)	0.00 ft³/s
Flow (Initial Infiltration)	0.00 ft³/s
Flow (Initial, Total)	0.00 ft³/s
Time Increment	0.050 hours

Inflow/Outflow Hydrograph Summary			
Flow (Peak In)	3.53 ft³/s	Time to Peak (Flow, In)	12.100 hours
Flow (Peak Outlet)	3.41 ft³/s	Time to Peak (Flow, Outlet)	12.150 hours

Elevation (Water Surface, Peak)	451.93 ft
Volume (Peak)	0.048 ac-ft

Mass Balance (ac-ft)	
Volume (Initial)	0.000 ac-ft
Volume (Total Inflow)	0.306 ac-ft
Volume (Total Infiltration)	0.000 ac-ft
Volume (Total Outlet Outflow)	0.275 ac-ft
Volume (Retained)	0.032 ac-ft
Volume (Unrouted)	0.000 ac-ft
Error (Mass Balance)	0.1 %

POST DEVELOPED

Subsection: Level Pool Pond Routing Summary | Return Event: 1 years
Label: Lot 7.1 Rain Garden (IN) | Storm Event: 1 Year

Infiltration	
Infiltration Method (Computed)	No Infiltration

Initial Conditions	
Elevation (Water Surface, Initial)	454.50 ft
Volume (Initial)	0.000 ac-ft
Flow (Initial Outlet)	0.00 ft³/s
Flow (Initial Infiltration)	0.00 ft³/s
Flow (Initial, Total)	0.00 ft³/s
Time Increment	0.050 hours

Inflow/Outflow Hydrograph Summary			
Flow (Peak In)	0.29 ft³/s	Time to Peak (Flow, In)	12.200 hours
Flow (Peak Outlet)	0.00 ft³/s	Time to Peak (Flow, Outlet)	24.000 hours

Elevation (Water Surface, Peak)	456.45 ft
Volume (Peak)	0.035 ac-ft

Mass Balance (ac-ft)	
Volume (Initial)	0.000 ac-ft
Volume (Total Inflow)	0.035 ac-ft
Volume (Total Infiltration)	0.000 ac-ft
Volume (Total Outlet Outflow)	0.000 ac-ft
Volume (Retained)	0.035 ac-ft
Volume (Unrouted)	0.000 ac-ft
Error (Mass Balance)	0.0 %

POST DEVELOPED

Subsection: Level Pool Pond Routing Summary
Label: Lot 7.1 Rain Garden (IN)

Return Event: 2 years
Storm Event: 2 Year

Infiltration	
Infiltration Method (Computed)	No Infiltration

Initial Conditions	
Elevation (Water Surface, Initial)	454.50 ft
Volume (Initial)	0.000 ac-ft
Flow (Initial Outlet)	0.00 ft³/s
Flow (Initial Infiltration)	0.00 ft³/s
Flow (Initial, Total)	0.00 ft³/s
Time Increment	0.050 hours

Inflow/Outflow Hydrograph Summary			
Flow (Peak In)	0.49 ft³/s	Time to Peak (Flow, In)	12.200 hours
Flow (Peak Outlet)	0.04 ft³/s	Time to Peak (Flow, Outlet)	15.950 hours

Elevation (Water Surface, Peak)	456.51 ft
Volume (Peak)	0.037 ac-ft

Mass Balance (ac-ft)	
Volume (Initial)	0.000 ac-ft
Volume (Total Inflow)	0.052 ac-ft
Volume (Total Infiltration)	0.000 ac-ft
Volume (Total Outlet Outflow)	0.015 ac-ft
Volume (Retained)	0.037 ac-ft
Volume (Unrouted)	0.000 ac-ft
Error (Mass Balance)	0.1 %

POST DEVELOPED

Subsection: Level Pool Pond Routing Summary
Label: Lot 7.1 Rain Garden (IN)

Return Event: 10 years
Storm Event: 10 Year

Infiltration	
Infiltration Method (Computed)	No Infiltration

Initial Conditions	
Elevation (Water Surface, Initial)	454.50 ft
Volume (Initial)	0.000 ac-ft
Flow (Initial Outlet)	0.00 ft³/s
Flow (Initial Infiltration)	0.00 ft³/s
Flow (Initial, Total)	0.00 ft³/s
Time Increment	0.050 hours

Inflow/Outflow Hydrograph Summary			
Flow (Peak In)	1.33 ft³/s	Time to Peak (Flow, In)	12.150 hours
Flow (Peak Outlet)	0.73 ft³/s	Time to Peak (Flow, Outlet)	12.450 hours

Elevation (Water Surface, Peak)	456.62 ft
Volume (Peak)	0.043 ac-ft

Mass Balance (ac-ft)	
Volume (Initial)	0.000 ac-ft
Volume (Total Inflow)	0.128 ac-ft
Volume (Total Infiltration)	0.000 ac-ft
Volume (Total Outlet Outflow)	0.090 ac-ft
Volume (Retained)	0.037 ac-ft
Volume (Unrouted)	0.000 ac-ft
Error (Mass Balance)	0.1 %

POST DEVELOPED

Subsection: Level Pool Pond Routing Summary — Return Event: 25 years
Label: Lot 7.1 Rain Garden (IN) — Storm Event: 25 Year

Infiltration	
Infiltration Method (Computed)	No Infiltration

Initial Conditions	
Elevation (Water Surface, Initial)	454.50 ft
Volume (Initial)	0.000 ac-ft
Flow (Initial Outlet)	0.00 ft³/s
Flow (Initial Infiltration)	0.00 ft³/s
Flow (Initial, Total)	0.00 ft³/s
Time Increment	0.050 hours

Inflow/Outflow Hydrograph Summary			
Flow (Peak In)	2.15 ft³/s	Time to Peak (Flow, In)	12.150 hours
Flow (Peak Outlet)	1.80 ft³/s	Time to Peak (Flow, Outlet)	12.250 hours

Elevation (Water Surface, Peak)	456.78 ft
Volume (Peak)	0.050 ac-ft

Mass Balance (ac-ft)	
Volume (Initial)	0.000 ac-ft
Volume (Total Inflow)	0.201 ac-ft
Volume (Total Infiltration)	0.000 ac-ft
Volume (Total Outlet Outflow)	0.163 ac-ft
Volume (Retained)	0.037 ac-ft
Volume (Unrouted)	0.000 ac-ft
Error (Mass Balance)	0.1 %

POST DEVELOPED

Subsection: Level Pool Pond Routing Summary | Return Event: 100 years
Label: Lot 7.1 Rain Garden (IN) | Storm Event: 100 Year

Infiltration	
Infiltration Method (Computed)	No Infiltration

Initial Conditions	
Elevation (Water Surface, Initial)	454.50 ft
Volume (Initial)	0.000 ac-ft
Flow (Initial Outlet)	0.00 ft³/s
Flow (Initial Infiltration)	0.00 ft³/s
Flow (Initial, Total)	0.00 ft³/s
Time Increment	0.050 hours

Inflow/Outflow Hydrograph Summary			
Flow (Peak In)	3.81 ft³/s	Time to Peak (Flow, In)	12.150 hours
Flow (Peak Outlet)	3.61 ft³/s	Time to Peak (Flow, Outlet)	12.200 hours

Elevation (Water Surface, Peak)	456.95 ft
Volume (Peak)	0.058 ac-ft

Mass Balance (ac-ft)	
Volume (Initial)	0.000 ac-ft
Volume (Total Inflow)	0.351 ac-ft
Volume (Total Infiltration)	0.000 ac-ft
Volume (Total Outlet Outflow)	0.314 ac-ft
Volume (Retained)	0.037 ac-ft
Volume (Unrouted)	0.000 ac-ft
Error (Mass Balance)	0.1 %

POST DEVELOPED

Infiltration	
Infiltration Method (Computed)	No Infiltration

Initial Conditions	
Elevation (Water Surface, Initial)	455.50 ft
Volume (Initial)	0.000 ac-ft
Flow (Initial Outlet)	0.00 ft³/s
Flow (Initial Infiltration)	0.00 ft³/s
Flow (Initial, Total)	0.00 ft³/s
Time Increment	0.050 hours

Inflow/Outflow Hydrograph Summary			
Flow (Peak In)	0.20 ft³/s	Time to Peak (Flow, In)	12.400 hours
Flow (Peak Outlet)	0.00 ft³/s	Time to Peak (Flow, Outlet)	24.000 hours

Elevation (Water Surface, Peak)	457.40 ft
Volume (Peak)	0.035 ac-ft

Mass Balance (ac-ft)	
Volume (Initial)	0.000 ac-ft
Volume (Total Inflow)	0.035 ac-ft
Volume (Total Infiltration)	0.000 ac-ft
Volume (Total Outlet Outflow)	0.000 ac-ft
Volume (Retained)	0.035 ac-ft
Volume (Unrouted)	0.000 ac-ft
Error (Mass Balance)	0.0 %

POST DEVELOPED

Subsection: Level Pool Pond Routing Summary — Return Event: 2 years
Label: Lot 7.2 Rain Garden (IN) — Storm Event: 2 Year

Infiltration	
Infiltration Method (Computed)	No Infiltration

Initial Conditions	
Elevation (Water Surface, Initial)	455.50 ft
Volume (Initial)	0.000 ac-ft
Flow (Initial Outlet)	0.00 ft³/s
Flow (Initial Infiltration)	0.00 ft³/s
Flow (Initial, Total)	0.00 ft³/s
Time Increment	0.050 hours

Inflow/Outflow Hydrograph Summary			
Flow (Peak In)	0.39 ft³/s	Time to Peak (Flow, In)	12.300 hours
Flow (Peak Outlet)	0.04 ft³/s	Time to Peak (Flow, Outlet)	16.400 hours

Elevation (Water Surface, Peak)	457.50 ft
Volume (Peak)	0.040 ac-ft

Mass Balance (ac-ft)	
Volume (Initial)	0.000 ac-ft
Volume (Total Inflow)	0.056 ac-ft
Volume (Total Infiltration)	0.000 ac-ft
Volume (Total Outlet Outflow)	0.017 ac-ft
Volume (Retained)	0.040 ac-ft
Volume (Unrouted)	0.000 ac-ft
Error (Mass Balance)	0.1 %

POST DEVELOPED

Subsection: Level Pool Pond Routing Summary | Return Event: 10 years
Label: Lot 7.2 Rain Garden (IN) | Storm Event: 10 Year

Infiltration	
Infiltration Method (Computed)	No Infiltration

Initial Conditions	
Elevation (Water Surface, Initial)	455.50 ft
Volume (Initial)	0.000 ac-ft
Flow (Initial Outlet)	0.00 ft³/s
Flow (Initial Infiltration)	0.00 ft³/s
Flow (Initial, Total)	0.00 ft³/s
Time Increment	0.050 hours

Inflow/Outflow Hydrograph Summary			
Flow (Peak In)	1.37 ft³/s	Time to Peak (Flow, In)	12.250 hours
Flow (Peak Outlet)	0.93 ft³/s	Time to Peak (Flow, Outlet)	12.500 hours

Elevation (Water Surface, Peak)	457.60 ft
Volume (Peak)	0.044 ac-ft

Mass Balance (ac-ft)	
Volume (Initial)	0.000 ac-ft
Volume (Total Inflow)	0.155 ac-ft
Volume (Total Infiltration)	0.000 ac-ft
Volume (Total Outlet Outflow)	0.115 ac-ft
Volume (Retained)	0.040 ac-ft
Volume (Unrouted)	0.000 ac-ft
Error (Mass Balance)	0.1 %

POST DEVELOPED

Subsection: Level Pool Pond Routing Summary
Label: Lot 7.2 Rain Garden (IN)

Return Event: 25 years
Storm Event: 25 Year

Infiltration	
Infiltration Method (Computed)	No Infiltration

Initial Conditions	
Elevation (Water Surface, Initial)	455.50 ft
Volume (Initial)	0.000 ac-ft
Flow (Initial Outlet)	0.00 ft^3/s
Flow (Initial Infiltration)	0.00 ft^3/s
Flow (Initial, Total)	0.00 ft^3/s
Time Increment	0.050 hours

Inflow/Outflow Hydrograph Summary			
Flow (Peak In)	2.36 ft^3/s	Time to Peak (Flow, In)	12.250 hours
Flow (Peak Outlet)	2.16 ft^3/s	Time to Peak (Flow, Outlet)	12.350 hours

Elevation (Water Surface, Peak)	457.73 ft
Volume (Peak)	0.050 ac-ft

Mass Balance (ac-ft)	
Volume (Initial)	0.000 ac-ft
Volume (Total Inflow)	0.256 ac-ft
Volume (Total Infiltration)	0.000 ac-ft
Volume (Total Outlet Outflow)	0.216 ac-ft
Volume (Retained)	0.040 ac-ft
Volume (Unrouted)	0.000 ac-ft
Error (Mass Balance)	0.1 %

POST DEVELOPED

Subsection: Level Pool Pond Routing Summary
Label: Lot 7.2 Rain Garden (IN)

Return Event: 100 years
Storm Event: 100 Year

Infiltration	
Infiltration Method (Computed)	No Infiltration

Initial Conditions	
Elevation (Water Surface, Initial)	455.50 ft
Volume (Initial)	0.000 ac-ft
Flow (Initial Outlet)	0.00 ft³/s
Flow (Initial Infiltration)	0.00 ft³/s
Flow (Initial, Total)	0.00 ft³/s
Time Increment	0.050 hours

Inflow/Outflow Hydrograph Summary			
Flow (Peak In)	4.43 ft³/s	Time to Peak (Flow, In)	12.250 hours
Flow (Peak Outlet)	4.30 ft³/s	Time to Peak (Flow, Outlet)	12.300 hours

Elevation (Water Surface, Peak)	457.91 ft
Volume (Peak)	0.059 ac-ft

Mass Balance (ac-ft)	
Volume (Initial)	0.000 ac-ft
Volume (Total Inflow)	0.469 ac-ft
Volume (Total Infiltration)	0.000 ac-ft
Volume (Total Outlet Outflow)	0.429 ac-ft
Volume (Retained)	0.040 ac-ft
Volume (Unrouted)	0.000 ac-ft
Error (Mass Balance)	0.1 %

POST DEVELOPED

Subsection: Level Pool Pond Routing Summary
Label: Lot 8 Rain Garden (IN)

Return Event: 1 years
Storm Event: 1 Year

Infiltration	
Infiltration Method (Computed)	No Infiltration

Initial Conditions	
Elevation (Water Surface, Initial)	445.50 ft
Volume (Initial)	0.000 ac-ft
Flow (Initial Outlet)	0.00 ft³/s
Flow (Initial Infiltration)	0.00 ft³/s
Flow (Initial, Total)	0.00 ft³/s
Time Increment	0.050 hours

Inflow/Outflow Hydrograph Summary			
Flow (Peak In)	0.26 ft³/s	Time to Peak (Flow, In)	12.150 hours
Flow (Peak Outlet)	0.01 ft³/s	Time to Peak (Flow, Outlet)	23.000 hours

Elevation (Water Surface, Peak)	447.50 ft
Volume (Peak)	0.030 ac-ft

Mass Balance (ac-ft)	
Volume (Initial)	0.000 ac-ft
Volume (Total Inflow)	0.031 ac-ft
Volume (Total Infiltration)	0.000 ac-ft
Volume (Total Outlet Outflow)	0.001 ac-ft
Volume (Retained)	0.030 ac-ft
Volume (Unrouted)	0.000 ac-ft
Error (Mass Balance)	0.1 %

POST DEVELOPED

Subsection: Level Pool Pond Routing Summary — Return Event: 2 years
Label: Lot 8 Rain Garden (IN) — Storm Event: 2 Year

Infiltration	
Infiltration Method (Computed)	No Infiltration

Initial Conditions	
Elevation (Water Surface, Initial)	445.50 ft
Volume (Initial)	0.000 ac-ft
Flow (Initial Outlet)	0.00 ft³/s
Flow (Initial Infiltration)	0.00 ft³/s
Flow (Initial, Total)	0.00 ft³/s
Time Increment	0.050 hours

Inflow/Outflow Hydrograph Summary			
Flow (Peak In)	0.50 ft³/s	Time to Peak (Flow, In)	12.100 hours
Flow (Peak Outlet)	0.05 ft³/s	Time to Peak (Flow, Outlet)	14.900 hours

Elevation (Water Surface, Peak)	447.51 ft
Volume (Peak)	0.030 ac-ft

Mass Balance (ac-ft)	
Volume (Initial)	0.000 ac-ft
Volume (Total Inflow)	0.048 ac-ft
Volume (Total Infiltration)	0.000 ac-ft
Volume (Total Outlet Outflow)	0.019 ac-ft
Volume (Retained)	0.030 ac-ft
Volume (Unrouted)	0.000 ac-ft
Error (Mass Balance)	0.1 %

POST DEVELOPED

Subsection: Level Pool Pond Routing Summary — Return Event: 10 years

Label: Lot 8 Rain Garden (IN) — Storm Event: 10 Year

Infiltration	
Infiltration Method (Computed)	No Infiltration

Initial Conditions	
Elevation (Water Surface, Initial)	445.50 ft
Volume (Initial)	0.000 ac-ft
Flow (Initial Outlet)	0.00 ft³/s
Flow (Initial Infiltration)	0.00 ft³/s
Flow (Initial, Total)	0.00 ft³/s
Time Increment	0.050 hours

Inflow/Outflow Hydrograph Summary			
Flow (Peak In)	1.53 ft³/s	Time to Peak (Flow, In)	12.100 hours
Flow (Peak Outlet)	0.93 ft³/s	Time to Peak (Flow, Outlet)	12.250 hours

Elevation (Water Surface, Peak)	447.63 ft
Volume (Peak)	0.034 ac-ft

Mass Balance (ac-ft)	
Volume (Initial)	0.000 ac-ft
Volume (Total Inflow)	0.126 ac-ft
Volume (Total Infiltration)	0.000 ac-ft
Volume (Total Outlet Outflow)	0.096 ac-ft
Volume (Retained)	0.030 ac-ft
Volume (Unrouted)	0.000 ac-ft
Error (Mass Balance)	0.1 %

POST DEVELOPED

Subsection: Level Pool Pond Routing Summary | Return Event: 25 years
Label: Lot 8 Rain Garden (IN) | Storm Event: 25 Year

Infiltration	
Infiltration Method (Computed)	No Infiltration

Initial Conditions	
Elevation (Water Surface, Initial)	445.50 ft
Volume (Initial)	0.000 ac-ft
Flow (Initial Outlet)	0.00 ft³/s
Flow (Initial Infiltration)	0.00 ft³/s
Flow (Initial, Total)	0.00 ft³/s
Time Increment	0.050 hours

Inflow/Outflow Hydrograph Summary			
Flow (Peak In)	2.53 ft³/s	Time to Peak (Flow, In)	12.100 hours
Flow (Peak Outlet)	2.35 ft³/s	Time to Peak (Flow, Outlet)	12.150 hours

Elevation (Water Surface, Peak)	447.80 ft
Volume (Peak)	0.039 ac-ft

Mass Balance (ac-ft)	
Volume (Initial)	0.000 ac-ft
Volume (Total Inflow)	0.203 ac-ft
Volume (Total Infiltration)	0.000 ac-ft
Volume (Total Outlet Outflow)	0.174 ac-ft
Volume (Retained)	0.030 ac-ft
Volume (Unrouted)	0.000 ac-ft
Error (Mass Balance)	0.1 %

POST DEVELOPED

Subsection: Level Pool Pond Routing Summary
Label: Lot 8 Rain Garden (IN)

Return Event: 100 years
Storm Event: 100 Year

Infiltration	
Infiltration Method (Computed)	No Infiltration

Initial Conditions	
Elevation (Water Surface, Initial)	445.50 ft
Volume (Initial)	0.000 ac-ft
Flow (Initial Outlet)	0.00 ft³/s
Flow (Initial Infiltration)	0.00 ft³/s
Flow (Initial, Total)	0.00 ft³/s
Time Increment	0.050 hours

Inflow/Outflow Hydrograph Summary			
Flow (Peak In)	4.58 ft³/s	Time to Peak (Flow, In)	12.100 hours
Flow (Peak Outlet)	4.41 ft³/s	Time to Peak (Flow, Outlet)	12.100 hours

Elevation (Water Surface, Peak)	447.95 ft
Volume (Peak)	0.044 ac-ft

Mass Balance (ac-ft)	
Volume (Initial)	0.000 ac-ft
Volume (Total Inflow)	0.366 ac-ft
Volume (Total Infiltration)	0.000 ac-ft
Volume (Total Outlet Outflow)	0.336 ac-ft
Volume (Retained)	0.030 ac-ft
Volume (Unrouted)	0.000 ac-ft
Error (Mass Balance)	0.0 %

POST DEVELOPED

Subsection: Interconnected Pond Routing Summary
Label: Pocket Wetland

Return Event: 1 years
Storm Event: 1 Year

Infiltration	
Infiltration Method (Computed)	No Infiltration

Initial Conditions			Calculation Tolerances		
Elevation (Starting Water Surface Computed)	441.00	ft	Flow Tolerance (Minimum)	0.000	ft³/s
Volume (Starting)	0.123	ac-ft	Maximum Iterations	35	
Outflow (Starting)	0.00	ft³/s	ICPM Time Step	0.050	hours

	Maximum Storage	
Time to Peak (hours)	Elevation (ft)	Volume (ac-ft)
15.400	441.28	0.171

	Forward Flow Peaks		Reverse Flow Peaks	
	Time to Peak (hours)	Flow (Peak) (ft³/s)	Time to Peak (hours)	Flow (Peak) (ft³/s)
Pond Inflow....	12.250	0.91	0.000	0.00
Pond Outflow...	15.450	0.10	0.000	0.00

	Total Volume In		Total Volume Out	
	Volume (ac-ft)	Direction	Volume (ac-ft)	Direction
Pond Inflow....	0.112	Forward	0.000	Reverse
Pond Outflow...	0.000	Reverse	0.087	Forward

Mass Balance (ac-ft)	
Volume (Initial ICPM)	0.123 ac-ft
Volume (Total In ICPM)	0.112 ac-ft
Volume (Total Out ICPM)	0.087 ac-ft
Volume (Ending)	0.149 ac-ft
Elevation (Ending)	441.15 ft
Difference	0.000 ac-ft
Percent of Inflow Volume (Interconnected Pond Mass Balance)	0.1 %

POST DEVELOPED

Subsection: Interconnected Pond Routing Summary
Label: Pocket Wetland

Return Event: 2 years
Storm Event: 2 Year

Infiltration	
Infiltration Method (Computed)	No Infiltration

Initial Conditions			Calculation Tolerances		
Elevation (Starting Water Surface Computed)	441.00	ft	Flow Tolerance (Minimum)	0.000	ft^3/s
Volume (Starting)	0.123	ac-ft	Maximum Iterations	35	
Outflow (Starting)	0.00	ft^3/s	ICPM Time Step	0.050	hours

	Maximum Storage	
Time to Peak (hours)	Elevation (ft)	Volume (ac-ft)
16.250	441.45	0.200

	Forward Flow Peaks		Reverse Flow Peaks	
	Time to Peak (hours)	Flow (Peak) (ft^3/s)	Time to Peak (hours)	Flow (Peak) (ft^3/s)
Pond Inflow....	12.250	1.36	0.000	0.00
Pond Outflow...	16.300	0.13	0.000	0.00

	Total Volume In		Total Volume Out	
	Volume (ac-ft)	Direction	Volume (ac-ft)	Direction
Pond Inflow....	0.174	Forward	0.000	Reverse
Pond Outflow...	0.000	Reverse	0.121	Forward

Mass Balance (ac-ft)	
Volume (Initial ICPM)	0.123 ac-ft
Volume (Total In ICPM)	0.174 ac-ft
Volume (Total Out ICPM)	0.121 ac-ft
Volume (Ending)	0.176 ac-ft
Elevation (Ending)	441.31 ft
Difference	0.000 ac-ft
Percent of Inflow Volume (Interconnected Pond Mass Balance)	0.1 %

POST DEVELOPED

Subsection: Interconnected Pond Routing Summary — Return Event: 10 years
Label: Pocket Wetland — Storm Event: 10 Year

Infiltration	
Infiltration Method (Computed)	No Infiltration

Initial Conditions			Calculation Tolerances		
Elevation (Starting Water Surface Computed)	441.00	ft	Flow Tolerance (Minimum)	0.000	ft^3/s
Volume (Starting)	0.123	ac-ft	Maximum Iterations	35	
Outflow (Starting)	0.00	ft^3/s	ICPM Time Step	0.050	hours

Time to Peak (hours)	Maximum Storage Elevation (ft)	Maximum Storage Volume (ac-ft)
12.650	441.76	0.253

	Forward Flow Peaks		Reverse Flow Peaks	
	Time to Peak (hours)	Flow (Peak) (ft^3/s)	Time to Peak (hours)	Flow (Peak) (ft^3/s)
Pond Inflow....	12.300	3.50	0.000	0.00
Pond Outflow...	12.650	1.73	0.000	0.00

	Total Volume In		Total Volume Out	
	Volume (ac-ft)	Direction	Volume (ac-ft)	Direction
Pond Inflow....	0.439	Forward	0.000	Reverse
Pond Outflow...	0.000	Reverse	0.360	Forward

Mass Balance (ac-ft)	
Volume (Initial ICPM)	0.123 ac-ft
Volume (Total In ICPM)	0.439 ac-ft
Volume (Total Out ICPM)	0.360 ac-ft
Volume (Ending)	0.202 ac-ft
Elevation (Ending)	441.46 ft
Difference	0.000 ac-ft
Percent of Inflow Volume (Interconnected Pond Mass Balance)	0.1 %

POST DEVELOPED

Subsection: Interconnected Pond Routing Summary — Return Event: 25 years
Label: Pocket Wetland — Storm Event: 25 Year

Infiltration	
Infiltration Method (Computed)	No Infiltration

Initial Conditions			Calculation Tolerances		
Elevation (Starting Water Surface Computed)	441.00	ft	Flow Tolerance (Minimum)	0.000	ft^3/s
Volume (Starting)	0.123	ac-ft	Maximum Iterations	35	
Outflow (Starting)	0.00	ft^3/s	ICPM Time Step	0.050	hours

	Maximum Storage	
Time to Peak (hours)	Elevation (ft)	Volume (ac-ft)
12.450	441.99	0.293

	Forward Flow Peaks		Reverse Flow Peaks	
	Time to Peak (hours)	Flow (Peak) (ft^3/s)	Time to Peak (hours)	Flow (Peak) (ft^3/s)
Pond Inflow....	12.200	6.54	0.000	0.00
Pond Outflow...	12.450	4.20	0.000	0.00

	Total Volume In		Total Volume Out	
	Volume (ac-ft)	Direction	Volume (ac-ft)	Direction
Pond Inflow....	0.692	Forward	0.000	Reverse
Pond Outflow...	0.000	Reverse	0.606	Forward

Mass Balance (ac-ft)	
Volume (Initial ICPM)	0.123 ac-ft
Volume (Total In ICPM)	0.692 ac-ft
Volume (Total Out ICPM)	0.606 ac-ft
Volume (Ending)	0.209 ac-ft
Elevation (Ending)	441.50 ft
Difference	0.000 ac-ft
Percent of Inflow Volume (Interconnected Pond Mass Balance)	0.0 %

POST DEVELOPED

Subsection: Interconnected Pond Routing Summary
Label: Pocket Wetland

Return Event: 100 years
Storm Event: 100 Year

Infiltration	
Infiltration Method (Computed)	No Infiltration

Initial Conditions			Calculation Tolerances		
Elevation (Starting Water Surface Computed)	441.00	ft	Flow Tolerance (Minimum)	0.000	ft^3/s
Volume (Starting)	0.123	ac-ft	Maximum Iterations	35	
Outflow (Starting)	0.00	ft^3/s	ICPM Time Step	0.050	hours

Time to Peak (hours)	Maximum Storage Elevation (ft)	Maximum Storage Volume (ac-ft)
12.450	442.65	0.407

	Forward Flow Peaks		Reverse Flow Peaks	
	Time to Peak (hours)	Flow (Peak) (ft^3/s)	Time to Peak (hours)	Flow (Peak) (ft^3/s)
Pond Inflow....	12.200	11.90	0.000	0.00
Pond Outflow...	12.450	6.60	0.000	0.00

	Total Volume In		Total Volume Out	
	Volume (ac-ft)	Direction	Volume (ac-ft)	Direction
Pond Inflow....	1.205	Forward	0.000	Reverse
Pond Outflow...	0.000	Reverse	1.116	Forward

Mass Balance (ac-ft)	
Volume (Initial ICPM)	0.123 ac-ft
Volume (Total In ICPM)	1.205 ac-ft
Volume (Total Out ICPM)	1.116 ac-ft
Volume (Ending)	0.212 ac-ft
Elevation (Ending)	441.52 ft
Difference	0.000 ac-ft
Percent of Inflow Volume (Interconnected Pond Mass Balance)	0.0 %

POST DEVELOPED

Index

D

POST DEVELOPED

APPENDIX G

SMP Selection

Green Infrastructure Planning Evaluation

Group	Practice	Description	Comments
Preservation of Natural Resources	Preservation of Undisturbed Areas	Delineate and place into permanent conservation easement undisturbed forests, native vegetated areas, riparian corridors, wetlands, and natural terrain.	Undisturbed portions of the site will be protected and remain in natural state.
	Preservation of Buffers	Define, delineate and place in permanent conservation easement naturally vegetated buffers along perennial streams, rivers, shorelines and wetlands.	5
	Reduction of Clearing and Grading	Limit clearing and grading to the minimum amount needed for roads, driveways, foundations, utilities and stormwater management facilities.	The project disturbance has been minimized to the greatest extent possible.
	Locating Development in Less Sensitive Areas	Avoid sensitive resource areas such as floodplains, steep slopes, erodible soils, wetlands, mature forests and critical habitats by locating development to fit the terrain in areas that will create the lease impact.	All sensitive areas have been avoided. Improvements within floodway either provide enhancement or will have no increased impacts.
	Open Space Design	Use clustering, conservation design or open space design to reduce impervious cover, preserve more open space and protect water resources.	5
	Soil Restoration	Restore the original properties and porosity of the soil by deep till and amendment with compost to reduce the generation of runoff and enhance the runoff reduction performance of practices such as downspout disconnections, grass channels, filter strips, and tree clusters.	Not applicable. "C" Soils.
Reduction of Impervious Cover	Roadway Reduction	Minimize roadway widths and lengths to reduce site impervious area.	1
	Sidewalk Reduction	Minimize sidewalk lengths and widths to reduce site	3

		impervious area.	
	Driveway Reduction	Minimize driveway lengths and widths to reduce site impervious area.	3
	Cul-de-sac Reduction	Minimize the number of cul-de-sacs and incorporate landscaped areas to reduce their impervious cover.	1

	Building Footprint Reduction	Reduce the impervious footprint of residences and commercial buildings by using alternate or taller buildings while maintaining the same floor to area ratio.	3
	Parking Reduction	Reduce imperviousness on parking lots by eliminating unneeded spaces, providing compact car spaces and efficient parking lanes, minimizing stall dimensions, using porous pavement surfaces in overflow parking areas, and using multi-storied parking decks where appropriate.	2
Runoff Reduction Techniques	Conservation of natural areas	Retain the pre-development hydrologic and water quality Conservation of characteristics of undisturbed natural areas, stream and wetland natural areas buffers by restoring and/or permanently conserving these areas on a site.	This has been done. The undisturbed natural areas are beyond the project boundaries will remain in its natural state.
	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.	5
	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	Vegetated swales have been utilized for the project.

		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.	2

	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	2
	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.	1
	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.	Rain Gardens are proposed for this project
	Green roof	Capture runoff by a layer of vegetation and soil installed on top of a conventional flat or sloped roof. The rooftop vegetation allows evaporation and evapotranspiration processes to reduce volume and discharge rate of runoff entering conveyance system.	2
	Stormwater planter	Small landscaped stormwater treatment devices that can be designed as infiltration or filtering practices. Stormwater planters use soil infiltration and	2

		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.	2
	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.	2
Pond	Micropool Extended Detention Pool (P-1)	Pond that treats the majority of the water quality volume through extended detention, and incorporates a micropool at the outlet of the pond to prevent sediment resuspension.	1

	Wet Pond (P-2)	Pond that provides storage for the entire water quality volume in the permanent pool.	1
	Wet Extended Detention (P-3)	Pond that treats a portion of the water quality volume by detaining storm flows above a permanent pool for a specified minimum detention time.	1
	Multiple Pond System (P-4) Pocket Pond (P-5)	A group of ponds that collectively treat the water quality volume. A stormwater wetland design adapted for the treatment of runoff from small drainage areas that has little or no baseflow available to maintain water elevations and relies on ground water to maintain a permanent pool.	1
Wetland	Shallow Wetland (W-1)	A wetland that provides water quality treatment entirely in a wet shallow marsh.	1

	Extended Detention Wetland (W-2)	A wetland system that provides some fraction of the water quality volume by detaining storm flows above the marsh surface.	1
	Pond/ Wetland System (W-3)	A wetland system that provides a portion of the water quality volume in the permanent pool of a wet pond that precedes the marsh for a specified minimum detention time.	1
	Pocket Wetland (W-4)	A shallow wetland design adapted for the treatment of runoff from small drainage areas that has variable water levels and relies on groundwater for its permanent pool.	Pocket Wetlands are proposed for this project
Infiltration	Infiltration Trench (I-1)	An infiltration practice that stores the water quality volume in the void spaces of a gravel trench before it is infiltrated into the ground.	1
	Infiltration Basin (I-2)	An infiltration practice that stores the water quality volume in a shallow depression, before it is infiltrated it into the ground.	1
	Dry Well (I-3)	An infiltration practice similar in design to the infiltration trench, and best suited for treatment of rooftop runoff.	1
Filtering Practices	Surface Sand Filter (F-1)	A filtering practice that treats stormwater by settling out larger particles in a sediment chamber, and then filtering stormwater through a sand matrix.	1
	Underground Sand Filter (F2)	A filtering practice that treats stormwater as it flows through underground settling and filtering chambers.	1
	Perimeter Sand Filter (F-3)	A filter that incorporates a sediment chamber and filer bed as parallel vaults adjacent to a parking lot.	1
	Organic Filter (F-4)	A filtering practice that uses an organic medium such as compost in the filter, in the place of sand.	1

	Bioretention (F-5)	A shallow depression that treats stormwater as it flows through a soil matrix, and is returned to the storm drain system.	1
Open Channels	Dry Swale (O-1)	An open drainage channel or depression explicitly designed to detain and promote the filtration of stormwater runoff into the soil media.	1
	Wet Swale (O-2)	An open drainage channel or depression designed to retain water or intercept groundwater for water quality treatment.	1

Comment Notes:

1. This improvement is not proposed for the project and does not apply.
2. This practice cannot be applied to this project. It is either deemed (a) inappropriate by the NYS DEC; (b) does not fit the type of project; or (c) cannot be engineered because of practical difficulties such as constructability, maintenance issues, durability, stability or other cause.
3. Minimized to the greatest extent possible within applicable codes.
4. Similar type of practice used.
5. Not applicable.

APPENDIX H

Stormwater Management Practices Design:

Rain Garden Sizing Calculations

Redevelopment Calculations

Runoff Reduction Calculations

90% Storm Volume Calculations

Rain Garden Sizing Calculations

NYS SMDM Section 6.4.4
Stormwater Management Practices
Bioretention - Description

The following is the sizing criteria for the Rain Garden as per Chapter 5 of the NYS Stormwater Management Design Manual:

Rain Garden Sizing

$WQv < V_{SM} + V_{DL} + (D_P * A_{RG})$

$V_{SM} = D_{SM} * n_{SM}$

$V_{DL} = D_{DL} * n_{DL}$

where:

A_f = Surface area of the filter bed (square feet)
WQ_V = Water Quality Volume (cubic feet), as defined in Chapter 4 of the New York
D_P = Depth of Ponding = 0.5 ft
V_{SM} = Volume of Soil Media
V_{DL} = Volume of Drainage Layer
D_{SM} = Depth of Soil Media = 1.5 ft
n_{SM} = Porosity of Soil Media = 20%
D_{DL} = Depth of Drainage Layer = 0.5 ft
n_{DL} = Porosity of Drainage Layer = 40%

Location	WQv (cf)	A_f Provided (sf)	V_{SM}	V_{DL}	Volume Provided (sf)
Lot 1	1,393 cf	1,550	417.9	278.6	1,410
Lot 2	1,524 cf	1,638	457.2	304.8	1,557
Lot 3	1,655 cf	1,767	496.5	331	1,660
Lot 4	1,350 cf	2,232	405	270	2,232

Redevelopment WQv Sizing: Chapter 9 NYS DEC SWDM

This project has areas of previously impervious area. These areas are being considered redevelopment under chapter 9 of the NYSDEC SWDM. From this, only 25% of the volume from these areas is being treated. The WQv used for sizing the stormwater treatment systems has been reduced using the calculation that follows.

WQv = $(P*A*R_v)/12$
Where:
WQv = Water Quality Volume of drainage area without redevelopment
P = 1 year storm rainfall amount (2.8 in)
A = Total drainage area less redeveloped impervious area
Rv = 0.05 + 0.009(I), where I = New Impervious Area / Total area (less Redeveloped impervious Area (A_{RE}) x 100)

WQv IMP = $((P*A_{RE}*R_V)/12) * 0.25$
Where:
WQv IMP = Volume generated by redeveloped impervious cover
A_{RE} = Area of redeveloped impervious cover
R_V = 0.95

Final WQv = WQv + WQv IMP
Where:
Final WQv = The volume used for sizing Stormwater treatment practices

Redevelopment Calculations

Drainage Area	Total Area (ac)	A (ac)	New Impervious Area (ac)	I (%)	Rv	WQv (ac-ft)	Redeveloped Impervious Area (ac) (A_{RE})	WQv Imp (ac-ft)	Final WQv (ac-ft)
DA-8	2.045	1.82	0.183	10.0	0.05	0.068	0.225	0.012	0.080

Runoff Reduction Volume:

RRv = Runoff Reduction Volume
Ai = Impervious Cover targeted for runoff reduction
(Aic) = total area of new impervious cover
Rv∗ = 0.05 + 0.009(I) Where I = 100% impervious = 0.95
S = Hydrologic Soil Group (HSG) reduction factor (S)
HSG A = 0.55
HSG B = 0.40
HSG C = 0.30
HSG D = 0.20

$$S = \frac{(Area\ A * 0.55) + (Area\ B * 0.40) + (Area\ C * 0.30) + (Area\ D * 0.20)}{Total\ Area}$$

P = Rainfall in inches = 2.8

Ai = (S)(Aic)

RRv = [(P)(Rv∗)(Ai)]/12

RRv Provided by each practice:
Practice = Total Volume Provided x % of reduction provided by practice type

DL-1:
Lot 2 Rain Garden: 1,524 cf x 0.40 = 609.6 cf = 0.014 ac-ft
Lot 3 Rain Garden: 1,655 cf x 0.40 = 662 cf = 0.015 sc-ft

DL-2:
Lot 1 Rain Garden: 1,393 cf x 0.40 = 557.2 cf = 0.013 ac-ft
Lot 4 Rain Garden: 2,232 cf x 0.40 = 893 cf = 0.021 ac-ft

Design Line 1

Drainage Area	Aic (ac)	S	Ai (ac)	Rv∗	Min. RRv Required (ac-ft)	Full RRv (ac-ft)	RRv Applied (ac-ft)
4	0.162	0.4	0.065	0.95	0.014	0.035	0.014
5	0.137	0.4	0.055	0.95	0.012	0.035	0.015
Total	0.299	0.4	0.119	0.95	0.026	0.070	0.029

Design Line 2

Drainage Area	Aic (ac)	S	Ai (ac)	Rv∗	Min. RRv Required (ac-ft)	Full RRv (ac-ft)	RRv Applied (ac-ft)
6	0.087	0.4	0.035	0.95	0.007	0.031	0.021
7	0.133	0.4	0.053	0.95	0.012	0.031	0.013
8	0.197	0.35	0.068	0.95	0.015	0.080	0
DL-2	0.411	0.38	0.156	0.95	0.034	0.142	0.034

90% WQv Sizing:

WQv = (P) (Rv) (A) / 12

Where:

P = 90% rainfall number - 1.4 in
Rv = 0.05 + 0.009 (I)
I = Percentage impervious area draining to site
A = Area draining to practice (treatment area)

Drainage Area	Total Area (ac)	Impervious Area (ac)	I %	Rv	WQv (cf)
4	0.851	0.162	19.0%	0.22	957
5	1.300	0.137	10.5%	0.14	956
6	0.957	0.087	9.1%	0.13	641
7	0.724	0.133	18.4%	0.22	792
8	2.045	0.408	19.9%	0.23	1,571*

* Drainage area 8 has 0.225 ac of redeveloped impervious area. Using the method indicated in the Redevelopment section of Appendix H the WQv is reduced to the value shown.

Culvert Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Wednesday, Aug 23 2017

Culvert 1

Invert Elev Dn (ft)	=	433.80
Pipe Length (ft)	=	33.00
Slope (%)	=	4.45
Invert Elev Up (ft)	=	435.27
Rise (in)	=	36.0
Shape	=	Arch
Span (in)	=	72.0
No. Barrels	=	1
n-Value	=	0.012
Culvert Type	=	Arch Corrugated Metal
Culvert Entrance	=	90D headwall (A)
Coeff. K,M,c,Y,k	=	0.0083, 2, 0.0379, 0.69, 0.5

Embankment

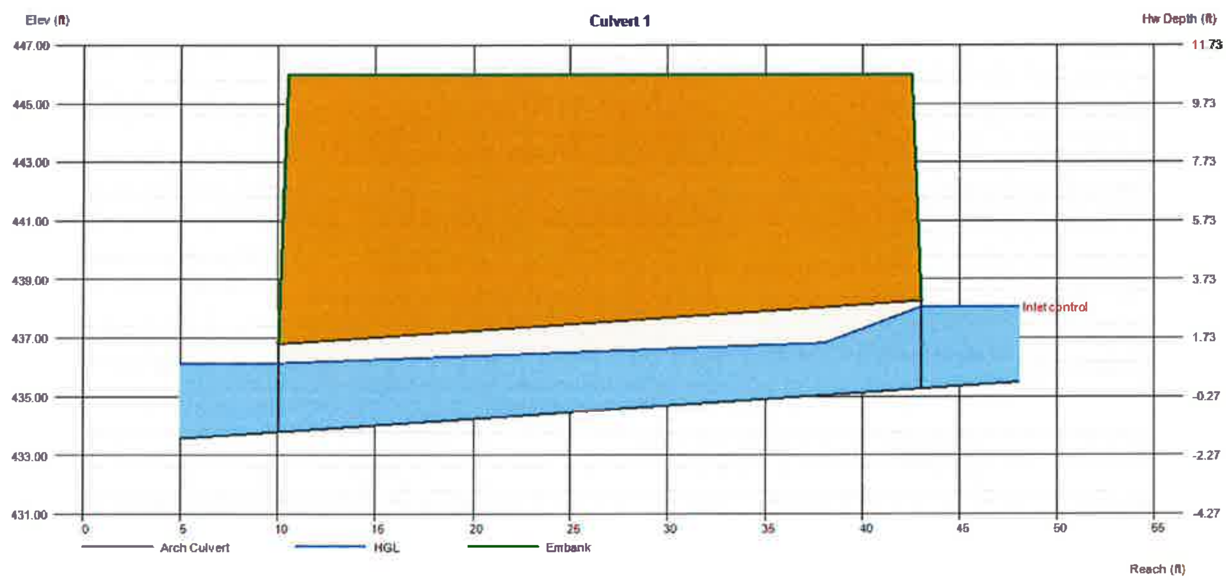
Top Elevation (ft)	=	446.00
Top Width (ft)	=	32.00
Crest Width (ft)	=	10.00

Calculations

Qmin (cfs)	=	9.50
Qmax (cfs)	=	80.00
Tailwater Elev (ft)	=	(dc+D)/2

Highlighted

Qtotal (cfs)	=	74.25
Qpipe (cfs)	=	74.25
Qovertop (cfs)	=	0.00
Veloc Dn (ft/s)	=	5.96
Veloc Up (ft/s)	=	7.79
HGL Dn (ft)	=	436.14
HGL Up (ft)	=	436.95
Hw Elev (ft)	=	438.06
Hw/D (ft)	=	0.93
Flow Regime	=	Inlet Control



Q			Veloc		Depth	
Total	Pipe	Over	Dn	Up	Dn	Up
(cfs)	(cfs)	(cfs)	(ft/s)	(ft/s)	(in)	(in)
9.50	9.50	0.00	0.98	3.55	20.69	5.38
22.45	22.45	0.00	2.13	4.91	22.63	9.25
35.40	35.40	0.00	3.18	5.78	24.26	12.51
48.35	48.35	0.00	4.15	6.51	25.67	15.33
61.30	61.30	0.00	5.08	7.16	26.94	17.89
74.25	74.25	0.00	5.96	7.79	28.09	20.18

HGL			
Dn	Up	Hw	Hw/D
(ft)	(ft)	(ft)	
435.52	435.72	435.85	0.19
435.69	436.04	436.37	0.37
435.82	436.31	436.82	0.52
435.94	436.55	437.24	0.66
436.05	436.76	437.65	0.79
436.14	436.95	438.06	0.93

Culvert Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Wednesday, Aug 23 2017

Culvert 2

Invert Elev Dn (ft)	=	439.79
Pipe Length (ft)	=	35.00
Slope (%)	=	2.89
Invert Elev Up (ft)	=	440.80
Rise (in)	=	36.0
Shape	=	Arch
Span (in)	=	72.0
No. Barrels	=	1
n-Value	=	0.012
Culvert Type	=	Arch Corrugated Metal
Culvert Entrance	=	90D headwall (A)
Coeff. K,M,c,Y,k	=	0.0083, 2, 0.0379, 0.69, 0.5

Embankment

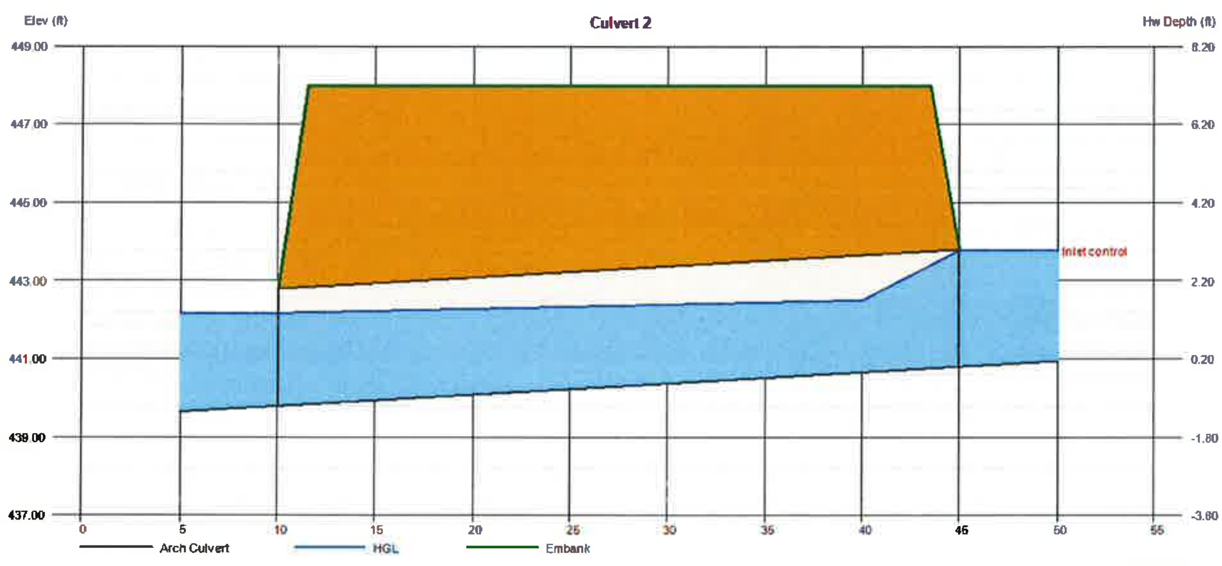
Top Elevation (ft)	=	448.00
Top Width (ft)	=	32.00
Crest Width (ft)	=	10.00

Calculations

Qmin (cfs)	=	9.50
Qmax (cfs)	=	83.01
Tailwater Elev (ft)	=	(dc+D)/2

Highlighted

Qtotal (cfs)	=	79.50
Qpipe (cfs)	=	79.50
Qovertop (cfs)	=	0.00
Veloc Dn (ft/s)	=	6.32
Veloc Up (ft/s)	=	8.03
HGL Dn (ft)	=	442.17
HGL Up (ft)	=	442.56
Hw Elev (ft)	=	443.78
Hw/D (ft)	=	0.99
Flow Regime	=	Inlet Control



Q			Veloc		Depth	
Total	Pipe	Over	Dn	Up	Dn	Up
(cfs)	(cfs)	(cfs)	(ft/s)	(ft/s)	(in)	(in)
9.50	9.50	0.00	0.98	3.55	20.69	5.38
19.50	19.50	0.00	1.88	4.70	22.19	8.38
29.50	29.50	0.00	2.71	5.38	23.58	11.15
39.50	39.50	0.00	3.50	6.06	24.68	13.35
49.50	49.50	0.00	4.24	6.60	25.75	15.50
59.50	59.50	0.00	4.95	7.06	26.79	17.57
69.50	69.50	0.00	5.64	7.54	27.71	19.43
79.50	79.50	0.00	6.32	8.03	28.53	21.06

HGL			
Dn	Up	Hw	Hw/D
(ft)	(ft)	(ft)	
441.51	441.25	441.40	0.20
441.64	441.50	441.81	0.34
441.75	441.73	442.17	0.46
441.85	441.91	442.50	0.57
441.94	442.09	442.83	0.68
442.02	442.26	443.14	0.78
442.10	442.42	443.46	0.89
442.17	442.56	443.78	0.99

APPENDIX I

Coliform Runoff Analysis

Light Blue cells require input values from the user.
Yellow cells are optional to override a default or calculated values.
Grey cells are calculated values and are not editable by the user.

Select Sources

- ☑ Primary Sources
- ☑ General Sewage and Stream Nutrient Concentrations
- ☐ On-site Sewage Disposal Systems
- ☐ SSO/CSO/Illicit Connections
- ☑ Urban Channel Erosion
- ☐ Livestock
- ☐ Marinas
- ☐ Road Sanding
- ☐ Non-Stormwater Point Sources

This worksheet includes both "Primary Sources" and "Secondary Sources" of pollutants. For a more detailed description of these sources, consult Chapters 3 (Primary Sources) and 4 (Secondary Sources) of the WTM Documentation. Use check boxes to the left to select sources you would like to model, and enter data in blue boxes below. More detailed guidance is provided in text above sources, as well as in pop-up boxes above some pollutant sources. To begin with, enter the watershed area, annual rainfall and approximate stream length below. For many of the sources below, "mouse over" guidance appears if you click on the source name.

Watershed Data

Watershed Area (acres)	7.31
Annual Rainfall (inches)	49.4
Stream Length (miles)	0

Loading rates from primary sources are calculated as a product of the loading rate for each pollutant and the land area. Fill in blue boxes for land area and distribution of soils to calculate loading rates. You may also override the default (calculated) loading rates by entering alternative loading rates or runoff rates (in lb/acre) to the right of the grey cells. While the annual runoff rate is reported in the grey boxes below, it cannot be altered here, and needs to be adjusted by adjusting data such as the runoff coefficients and turf/impervious cover associated with the land use on the "Defaults" tab. To alter the root data (pollutant concentrations and turf/impervious cover associated with each land use), or to add additional land use categories, go to the "Defaults" tab and select the "Primary Sources" check box. On the Defaults tab, you may add new land uses by typing a new description in blank "Detailed Description" boxes.

PRIMARY SOURCES - Land Use

Land Use Category	Detailed Description	Area	TN (lb/acre)	TP (lb/acre)	TSS (lbs/acre)	FC (# billion/acre)
		Annual Loading Rates (Calculated) - User can override this using the optional cells to the right.				
Residential	LDR (<1du/acre)		5.57	0.82	129.96	241.75
Residential	MDR (1-4 du/acre)	1.94	7.05	1.04	164.50	306.01
Residential	HDR (>4 du/acre)		9.02	1.33	210.56	391.69
Residential	Multifamily		10.83	1.60	252.78	470.23
Commercial	Commercial		15.44	1.62	316.15	670.16
Roadway	Roadway		18.35	1.99	1069.17	727.28
Industrial	Industrial		12.90	1.47	474.97	534.49
Forest	Forest	5.37	2.50	0.20	100.00	12.00
Rural	Rural		4.60	0.70	100.00	39.00
Open Water	Open Water		12.80	0.50	155.00	0.00
Active Construction	Active Construction		5.02	1.00	3416.31	0.00
Total	Total Acres	7				

	Annual Loading Rates - User Defined (Optional to override calculated value)			
Runoff (inches/year)	TN (lb/acre)	TP (lb/acre)	TSS (lbs/acre)	FC (# billion/acre)
11.74				
14.85				
19.01				
22.83				
32.53				
35.30				
25.95				
1.42				
1.42				
0.00				
22.23				

Soils Information

HYDROLOGIC SOIL GROUP	Soil Fraction(%)
A Soils	
B Soils	90%
C Soils	
D Soils	10%
DEPTH TO GROUNDWATER	
<3 Feet	100%
3-5 Feet	
>5 Feet	

Secondary Sources cannot be calculated solely based on land use. For more description of secondary sources, consult Chapter 4 of the WTM Documentation. Many of the Secondary Sources in the WTM require basic data on sewage treatment, as well as information regarding nutrient concentrations in stream channels (See Figures 4.1 and 4.2 of the WTM Documentation for maps of default data)

SECONDARY SOURCES

WWTP Efficiencies

	TN Efficiency	TP Efficiency	TSS Efficiency	Bacteria Log Reduction
WWTP Efficiency				

General Sewage Use Data

Dwelling Units	1
Individuals/Dwelling Unit	2.7
Water Use (gpcd)	70

Nutrient Concentration in Stream Channels

Soil P (%)	
Soil TN (%)	

Urban Channel Erosion (Applies only to Stream Reaches in Urban Portions of the Watershed)

Method (Select from List)	Method 1. Estimate based on typical estimates of channel erosion rates
Method 1. Estimate based on typical estimates of channel erosion rates	
Assessment of Channel Erosion	Moderate: 50% of watershed sediment load. Channels show signs of degradation, with some areas of severe channel erosion.
Method 2. Back calculate based on known watershed sediment loading	
Total Watershed Loading (including Channel Erosion) in tons/year	
Method 3. Estimate based on other sediment study results	
Sediment Load from Channel Erosion (tons/year)	

Light Blue cells require input values from the user.
Yellow cells are optional to override a default or calculated values.
Grey cells are calculated values and are not editable by the user.

Future Practices

Select Management Practices

- [ ] All Practices
- [ ] Residential Lawn Care Education and Turf Practices
- [ ] Erosion and Sediment Control
- [ ] Impervious Cover Disconnection Program
- [ ] Catch Basin Cleanouts
- [ ] Urban Downsizing/Redevelopment with Improvements
- [ ] Stream Restoration
- [ ] OSDS Education, Repair, Upgrade and Retirement
- [ ] Pet Waste Education
- [ ] Street Sweeping
- [ ] Riparian Buffers
- [ ] Marina Pumpouts
- [x] Stormwater Retrofit
- [ ] Illicit Connection Removal, CSO/SSO Repair
- [ ] Point Source Reduction

The practices on this sheet represent future implementation of management practices, including both structural BMPs and programmatic practices. Some of the practices are simply updates or enhancements of those on the "Existing Practices" tab, while others are new practices implemented only in the future condition. Chapter 5 of the WTM Documentation summarizes efficiencies for Structural Stormwater Management Practices, and Chapter 6 provides example data and documents assumptions for non-structural practices. Chapter 7 discusses application of practices "In Series" which may provide useful background for WTM Users. Many of the practices included in this section include the concept of a "Discount Factor," which reduces the effectiveness of practices to account for imperfect application in the field. All data necessary to calculate the benefits of these practices can be entered on this sheet, and underlying assumptions can be modified on the "Defaults" tab.

Stormwater Retrofit Options

Number of practices	5			
Design Storm (Inches)	2.8			
Water Quality Volumes	Provide Full WQv		100.00%	
Discount Factors				
Design	Same for all (Enter at the right)		Value (Fraction):	1%
Maintenance	Same for all (Enter at the right)		Value (Percent):	90%

The Stormwater Retrofit practice allows the user to enter individual stormwater practices. The grey cells at the top of the table represent the benefits of educational programs (entered under the "Residential Lawn Care Education" and "Impervious Cover Disconnection" practices). In the top of this section, enter general data for all practices. In the top section, enter general information for all practices (pop-up data included). Next, enter data for each retrofit in the rows below. Default data for each practice is included in the "BMP Effectiveness" section of the "Defaults" tab.

Basic Site Information. Make sure to Enter Data in Blue Cells

	Area Captured (acres)	Impervious Percentage	Is this a Retrofit of an Existing Facility?	What Practice Was the Original Facility?
Practices from Education Programs				
Rooftop Disconnection	0.0	100%	No	N/A
Soil Amendments	0.0	0%	No	N/A
Practice Type				
Wetland	1.9	25%	No	Dry Water Quantity Pond
Bioretention	4.0	12%	No	Dry Water Quantity Pond
Dry Water Quantity Pond			No	Dry Water Quantity Pond
Dry Water Quantity Pond			No	Dry Water Quantity Pond
Dry Water Quantity Pond			No	Dry Water Quantity Pond
Totals/averages	**5.9**	**16%**		

Stormwater Retrofits Summary

		Annual Practice Effectiveness		
BMP Type	**Total Area Captured (Acres)**	**TN**	**TP**	**TSS**
Dry Water Quantity Pond	0.0	0.00	0.00	0.00
Dry Extended Detention Pond	0.0	0.00	0.00	0.00
Wet Pond	0.0	0.00	0.00	0.00
Wetland	1.9	0.09	0.03	2.79
Filters	0.0	0.00	0.00	0.00
Green Roof	0.0	0.00	0.00	0.00
Rooftop Disconnection	0.0	0.00	0.00	0.00
Permeable Pavement	0.0	0.00	0.00	0.00
Grass (open) Channel	0.0	0.00	0.00	0.00
Dry Swale (bioswale, WQ swale)	0.0	0.00	0.00	0.00
Wet Swale	0.0	0.00	0.00	0.00
Raintanks and Cisterns	0.0	0.00	0.00	0.00
Soil Amendments	0.0	0.00	0.00	0.00
Sheetflow to Open Space (excluding riparian buffers)	0.0	0.00	0.00	0.00
Grassed Filter Strips	0.0	0.00	0.00	0.00
Bioretention	4.0	0.24	0.06	4.60
Infiltration Practices	0.0	0.00	0.00	0.00
User Defined	0.0	0.00	0.00	0.00
	0.0	0.00	0.00	0.00
Total	**5.9**	**0.34**	**0.10**	**7.39**

		Effectiveness and WQv of Retrofits		Discounts for Retrofits:	
		WQv (cf)		If no Value is Filled in, Effectiveness will be Zero!	
Dominant Soil Type in Drainage Area	Depth to Groundwater (from Practice Bottom)	Target WQv	WQv Provided	Design	Maintenance
B Soils	<3 Feet	0	0	100%	90%
C Soils	>5 Feet	0	0	100%	90%
B Soils	<3 Feet	7,419.0	7,419.0	1%	90%
B Soils	<3 Feet	11,535.9	11,535.9	1%	90%
C Soils	>5 Feet	0.0	0.0	1%	90%
C Soils	>5 Feet	0.0	0.0	1%	90%
C Soils	>5 Feet	0.0	0.0	1%	90%
		18,954.9	**18,954.9**		

Bacteria (billion/year)	Runoff Reduction (ac-ft/year)
0.00	0.00
0.00	0.00
0.00	0.00
4.89	0.00
0.00	0.00
0.00	0.00
0.00	0.00
0.00	0.00
0.00	0.00
0.00	0.00
0.00	0.00
0.00	0.00
0.00	0.00
0.00	0.00
0.00	0.00
8.55	0.03
0.00	0.00
0.00	0.00
0.00	0.00
13.44	**0.03**

Light Blue cells require input values from the user.	
Yellow cells are optional to override a default or calculated values.	
Grey cells are calculated values and are not editable by the user.	

New Development

	Land Use	Additional Development (Acres)
Residential	LDR (<1du/acre)	
Residential	MDR (1-4 du/acre)	5.633
Residential	HDR (>4 du/acre)	
Residential	Multifamily	
Commercial	Commercial	
Roadway	Roadway	
Industrial	Industrial	
Forest	Forest	
Rural	Rural	
Rural		
Active Construction	Active Construction	

The previous sheets ("Sources", "Existing Practices" and "Future Practices") provide enough information for the user to understand baseline loads (i.e., Existing Conditions) and the loads if a set of management practices were implemented throughout the watershed. This sheet allows the user to account for future growth or land conversion in the watershed. For a description of the elements of this sheet, consult Chapter 8 of the Model Documentation. Guidance for data entry is provided for each table in mouse-over comment boxes.

Stormwater Controls on New Development and Construction

Program Discounts	Fraction of New Development Regulated	Capture Discount	Design Discount	Maintenance Discount	
Existing	0%	0%	0	0	
User Defined	100%		1%	90%	
Program Option	Option 3: Show no increase on each parcel.				
	TN (lb/acre/year)	TP (lb/acre/year)	TSS (lb/acre/year)	FC(billion/acre/year)	Runoff Volume(in/year)
Is Channel Protection Required?	Yes				
	TN	TP	TSS	FC	Runoff Volume
Load Reduction (lb/year)	0.00	0.00	0.00	0.00	0.00
Load to GW	0.00	0.00	0.00	0.00	0.00

Data to Quantify Wastewater Loads

OSDSs

New OSDS Customers (households)		OSDS Failure Rate	OSDS Efficiency
0	5.00%		Same As Current

SSOs

Miles of Sewer Constructed	SSOs/Mile	User Defined SSOs/Mile (To Override Calculated)
0	140	

CSOs

% of Development on Combined Sewer	0%

Illicit Connections

% of new connections cross connected	0%

WWTP Dischargers: Only Report Discharges to WWTPs within the Watershed

New Wastewater Customers (Households)					
	N	N (User Defined to override)	P	P (User Defined to override)	TSS
Plant Efficiency	0%		0%		0%
Load	0		0		0

Active Construction

	Active Construction	Program Efficiency	User Defined Program Efficiency	Fraction Regulated	User Defined Fraction Regulated
	0	70%		0%	

TSS (User Defined to override)	**FC Log Reduction**	FC (User Defined to override)
	0.0	
	0	

Maintenance/Design	**User Defined Maintenance/Design**
0	

Show/Hide Results

- ☐ Source Loads
- ☐ Benefits of Existing Practices
- ☑ Benefits of Future Practices
- ☑ Loads With Existing Practices
- ☑ Loads With Future Practices
- ☑ Loads With New Development

This sheet provides a summary of results of the WTM model runs. The first table provides an overview of all loads (existing, with future practices and with new development). Use the check boxes to select more detailed descriptions of pollutant loads or practice benefits. Note that the cells in this sheet are locked. The "**Results-Unlocked**" tab has the same information, but unlocked so that the user can copy data from the model results.

This summary table summarizes pollutant loads and runoff volume in the Existing Condition, with Future Practices in place, and with New Development. The purple cells in this table represent final loads (or % change from Existing). The grey cells are interim calculations, such as the load reduction from practices (summarized). Surface water loads represents all loads during stormflow or during non-storm events that are delivered to surface waters, and Groundwater Loads include loads directly to groundwater from urban lawns, On-Site Sewage Disposal Systems, and BMPs that provide infiltration. While some of the loads to groundwater may ultimately be delivered to surface waters, the WTM does not make this calculation. To calculate loads to surface waters from groundwater, multiply the groundwater loads by a delivery ratio (known from local conditions), and add to surface water loads.

Summary Table

	TN (lb/year)	TP (lb/year)	TSS (lb/year)	Fecal Coliform (billion/year)	Runoff Volume (acre-feet/year)
Surface Water Loads					
Uncontrolled Load from Primary Sources	27.1	3.1	856.1	658.1	3.0
Uncontrolled Load from Secondary Sources	0.0	0.0	802.4	0.0	0.0
Load Reduction from Existing Practices	-2.1	-1.8	0.0	0.0	0.0
Existing Surface Water Load	**29.2**	**4.9**	**1,658.6**	**658.1**	**3.0**
Existing Load - Storm	**22.5**	**4.5**	**1,604.9**	**658.1**	**3.0**
Existing Load - Nonstorm	**28.8**	**4.8**	**1,651.2**	**644.7**	
Load Reduction from Future Practices	0.3	0.1	7.4	13.4	0.0
Surface Load with Future Practices in Place	**28.8**	**4.8**	**1,651.2**	**644.7**	**3.0**
Surface Load Change From Existing (%)	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
Surface Load with Future Practices - Storm	**22.1**	**4.4**	**1,597.5**	**644.7**	**3.0**
Surface Load with Future Practices - Nonstorm	**6.7**	**0.3**	**53.7**	**0.0**	
Load from New Development	45.8	11.0	3,256.5	1,723.7	7.0
Total Surface Load Including New Development	**74.6**	**15.8**	**4,907.7**	**2,368.4**	**10.0**
Surface Load Change From Existing (%)	**1.6**	**2.2**	**2.0**	**2.6**	**2.3**
Surface Load Including New Development - Storm	**67.9**	**15.4**	**4,854.0**	**2,368.4**	**9.3**
Surface Load Including New Development - Storm	**6.7**	**0.3**	**53.7**	**0.0**	**0.6**
Groundwater Loads					
Reductions to Groundwater Loads					
Turf Management	-75.1	-5.3	0.0	0.0	0.0
Riparian Buffers	0.0	0.0	0.0	0.0	0.0
Structural Stormwater Management Practices	0.0	0.0	0.0	0.0	0.0
Total Groundwater Reduction	**-75.1**	**-5.3**	**0.0**	**0.0**	**0.0**

This table summarizes the pollutant loads and runoff volumes in the Existing Condition, which includes the loads on the "**Sources**" tab, minus the benefits of the practices on the "**Existing Practices**" tab. The purple cells summarize loads from each broad category of sources. Note that, while the summary table presents only the Total Surface Water loads, this table also breaks out the difference between loads during storm events (i.e., the Storm Load) and the loads occurring during dry weather conditions (i.e., the Non-Stormwater Load) Also note that the "Urban Land" category represents a summary of all residential, commercial, industrial and transportation land uses included in the "**Sources**" tab, minus all practices that reduce the load from urban Primary Sources.

Loads with Existing Practices

	TN (lb/year)	TP (lb/year)	TSS (lb/year)	Fecal Coliform (billion/year)	Runoff Volume (acre-feet/year)
Loads to Surface Waters					
Urban Land	15.8	3.8	319.1	593.7	2.4
Active Construction	0.0	0.0	0.0	0.0	0.0
SSOs	0.0	0.0	0.0	0.0	0.0
CSOs	0.0	0.0	0.0	0.0	0.0
Channel Erosion	0.0	0.0	802.4	0.0	0.0
Road Sanding	0.0	0.0	0.0	0.0	0.0
Forest	13.4	1.1	537.0	64.4	0.6
Rural Land	0.0	0.0	0.0	0.0	0.0
Livestock	0.0	0.0	0.0	0.0	0.0
Illicit Connections	0.0	0.0	0.0	0.0	0.0
Marinas	0.0	0.0	0.0	0.0	0.0
Point Sources	0.0	0.0	0.0	0.0	0.0
OSDS - Surface	0.0	0.0	0.0	0.0	0.0

Open Water	0.0	0.0	0.0	0.0	0.0
Total Surface Water Load	29.2	4.9	1,658.6	658.1	3.0
Total Storm Load	22.5	4.5	1,604.9	658.1	3.0
Total Non-Storm Load	6.7	0.3	53.7	0.0	0.0
Groundwater Loads					
Urban Land	75.1	5.3	0.0	0.0	0.0
OSDS - Subsurface	0.0	0.0	0.0	0.0	0.0
Total Groundwater Load	75.1	5.3	0.0	0.0	0.0

Future Practices

This table summarizes the ***Net pollutant load and runoff reductions*** achieved by practices included in the **"Future Practices"** tab. The reductions presented in this table include only the benefits beyond the practices already in place in the Existing Conditions. So, for example, an improvement to an existing education program would include only the ***additional load reduction*** achieved by improving the program. The purple cells summarize the total load reduction from all practices, while the grey cells report the benefits of individual practices. Note that, while the summary table presents only the Total Surface Water loads, this table also breaks out the reductions from loads during storm events (i.e., the Storm Load) and the loads occurring during dry weather conditions (i.e., the Non-Stormwater Load). In some cases, a *negative load reduction* may be reported. This represents an *increase* in load, which would occur if a program or practice was made *less* effective in the future condition.

Net Benefit (Load Reductions) of Future Practices

	TN (lbs/year)	TP (lbs/year)	TSS (lbs/year)	Bacteria (billion/year)	Runoff Reduction (acre-ft/yr)
Reductions to Surface Water Loads					
Lawn Care Education Surface	0.0	0.0	0.0	0.0	0.0
Pet Waste Education	0.0	0.0	0.0	0.0	0.0
Erosion and Sediment Control	0.0	0.0	0.0	0.0	0.0
Street Sweeping	0.0	0.0	0.0	0.0	0.0
Street Sweeping - Sanding	0.0	0.0	0.0	0.0	0.0
Riparian Buffers	0.0	0.0	0.0	0.0	0.0
Catch Basin Cleanouts	0.0	0.0	0.0	0.0	0.0
Marina Pumpouts	0.0	0.0	0.0	0.0	0.0
Urban Downsizing	0.0	0.0	0.0	0.0	0.0
Redevelopment With Improvements	0.0	0.0	0.0	0.0	0.0
Stormwater Retrofits	0.3	0.1	7.4	13.4	0.0
Illicit Connection Removal	0.0	0.0	0.0	0.0	0.0
CSO Repair/ Abatement	0.0	0.0	0.0	0.0	0.0
SSO Repair/ Abatement	0.0	0.0	0.0	0.0	0.0
OSDS Programs - Surface	0.0	0.0	0.0	0.0	0.0
Stream Restoration	0.0	0.0	0.0	0.0	0.0
Point Source Reduction	0.0	0.0	0.0	0.0	0.0
Total Surface Water Reduction	**0.3**	**0.1**	**7.4**	**13.4**	**0.0**
Storm Load Reduction	**0.3**	**0.1**	**7.4**	**13.4**	**0.0**
Non-Storm Load Reduction	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
Reductions to Groundwater Loads					
Urban Turf	0.0	0.0	0.0	0.0	0.0
Riparian Buffers	0.0	0.0	0.0	0.0	0.0
Stormwater Retrofits	-0.1	0.0	0.0	0.0	0.0
OSDSs	0.0	0.0	0.0	0.0	0.0
Total Groundwater Load Reduction	**-0.1**	**0.0**	**0.0**	**0.0**	**0.0**

This table summarizes the pollutant loads and runoff volumes in the Future Condition, which includes the loads on the **"Sources"** tab, minus the benefits of the practices on the **"Existing Practices"** and **"Future Practices"** tabs. The purple cells summarize loads from each broad category of sources. Note that, while the summary table presents only the Total Surface Water loads, this table also breaks out the difference between loads during storm events (i.e., the Storm Load) and the loads occurring during dry weather conditions (i.e., the Non-Stormwater Load).Also note that the "Urban Land" category represents a summary of all residential, commercial, industrial and transportation land uses included in the **"Sources"** tab, minus all practices that reduce the load from urban Primary Sources.

Loads with Future Practices in Place

	TN (lb/year)	TP (lb/year)	TSS (lb/year)	Fecal Coliform (billion/year)	Runoff Volume (acre-feet/year)
Loads to Surface Waters					
Urban Land	15.4	3.7	311.7	580.2	2.4
Active Construction	0.0	0.0	0.0	0.0	0.0
SSOs	0.0	0.0	0.0	0.0	0.0
CSOs	0.0	0.0	0.0	0.0	0.0
Channel Erosion	0.0	0.0	802.4	0.0	0.0
Road Sanding	0.0	0.0	0.0	0.0	0.0
Forest	13.4	1.1	537.0	64.4	0.6
Rural Land	0.0	0.0	0.0	0.0	0.0
Livestock	0.0	0.0	0.0	0.0	0.0
Illicit Connections	0.0	0.0	0.0	0.0	0.0
Marinas	0.0	0.0	0.0	0.0	0.0
Point Sources	0.0	0.0	0.0	0.0	0.0
OSDS - Surface	0.0	0.0	0.0	0.0	0.0
Open Water	0.0	0.0	0.0	0.0	0.0
Total Surface Water Load	**28.8**	**4.8**	**1,651.2**	**644.7**	**3.0**
Total Storm Load	**22.1**	**4.4**	**1,597.5**	**644.7**	**3.0**

Total Non-Storm Load	**6.7**	**0.3**	**53.7**	**0.0**	**0.0**
Groundwater Loads					
Urban Land	75.2	5.3	0.0	0.0	0.0
OSDSs	0.0	0.0	0.0	0.0	0.0
Total Groundwater Load	**75.2**	**5.3**	**0.0**	**0.0**	**0.0**

Loads With New Development

This table summarizes the pollutant loads and runoff volumes in the Existing Condition, which includes the loads on the **"Sources"** tab, minus the benefits of the practices on the **"Existing Practices"** and **"Future Practices"** tabs. The purple cells summarize loads from each broad category of sources. Note that, while the summary table presents only the Total Surface Water loads, this table also breaks out the difference between loads during storm events (i.e., the Storm Load) and the loads occurring during dry weather conditions (i.e., the Non-Stormwater Load). Also note that the "Urban Land" category represents a summary of all residential, commercial, industrial and transportation land uses included in the **"Sources"** tab, minus all practices that reduce the load from urban Primary Sources.

Loads to Surface Waters with Projected New Development

	TN	TP	TSS	Fecal Coliform	Runoff Volume
Surface Water Loads					
Urban Land	61.2	14.7	1,238.4	2,304.0	9.3
Active Construction	0.0	0.0	0.0	0.0	0.0
SSOs	0.0	0.0	0.0	0.0	0.0
CSOs	0.0	0.0	0.0	0.0	0.0
Channel Erosion	0.0	0.0	3,132.3	0.0	0.0
Road Sanding	0.0	0.0	0.0	0.0	0.0
Forest	13.4	1.1	537.0	64.4	0.6
Rural Land	0.0	0.0	0.0	0.0	0.0
Livestock	0.0	0.0	0.0	0.0	0.0
Illicit Connections	0.0	0.0	0.0	0.0	0.0
Marinas	0.0	0.0	0.0	0.0	0.0
Point Sources	0.0	0.0	0.0	0.0	0.0
OSDSs	0.0	0.0	0.0	0.0	0.0
Open Water	0.0	0.0	0.0	0.0	0.0
Total Surface Water Load	74.6	15.8	4,907.7	2,368.4	10.0
Total Storm Load	67.9	15.4	4,854.0	2,368.4	9.3
Total Non-Storm Load	6.7	0.3	53.7	0.0	0.6
Groundwater Loads					
Urban Land	198.3	11.2	0.0	0.0	0.0
Septic Systems	0.0	0.0	0.0	0.0	0.0
Total Groundwater Load	198.3	11.2	0.0	0.0	0.0

APPENDIX J

Standard and Specifications for Erosion and Sediment Control Measures

STANDARD AND SPECIFICATIONS FOR CONSTRUCTION ROAD STABILIZATION

Definition & Scope

The stabilization of temporary construction access routes, on-site vehicle transportation routes, and construction parking areas to control erosion on temporary construction routes and parking areas.

Conditions Where Practice Applies

All traffic routes and parking areas for temporary use by construction traffic.

Design Criteria

Construction roads should be located to reduce erosion potential, minimize impact on existing site resources, and maintain operations in a safe manner. Highly erosive soils, wet or rocky areas, and steep slopes should be avoided. Roads should be routed where seasonal water tables are deeper than 18 inches. Surface runoff and control should be in accordance with other standards.

Road Grade – A maximum grade of 12% is recommended, although grades up to 15% are possible for short distances.

Road Width – 12 foot minimum for one-way traffic or 24 foot minimum for two-way traffic.

Side Slope of Road Embankment – 2:1 or flatter.

Ditch Capacity – On-site roadside ditch and culvert capacities shall be the 10 yr. peak runoff.

Composition – Use a 6-inch layer of NYS DOT sub-base Types 1,2,3, 4 or equivalent as specified in NYSDOT Standard Specifications.

Construction Specifications

1. Clear and strip roadbed and parking areas of all vegetation, roots, and other objectionable material.

2. Locate parking areas on naturally flat areas as available. Keep grades sufficient for drainage, but not more than 2 to 3 percent.

3. Provide surface drainage and divert excess runoff to stabilized areas.

4. Maintain cut and fill slopes to 2:1 or flatter and stabilized with vegetation as soon as grading is accomplished.

5. Spread 6-inch layer of sub-base material evenly over the full width of the road and smooth to avoid depressions.

6. Provide appropriate sediment control measures to prevent offsite sedimentation.

Maintenance

Inspect construction roads and parking areas periodically for condition of surface. Top dress with new gravel as needed. Check ditches for erosion and sedimentation after rainfall events. Maintain vegetation in a healthy, vigorous condition. Areas producing sediment should be treated immediately.

STANDARD AND SPECIFICATIONS FOR DUST CONTROL

Definition & Scope

The control of dust resulting from land-disturbing activities, to prevent surface and air movement of dust from disturbed soil surfaces that may cause off-site damage, health hazards, and traffic safety problems.

Conditions Where Practice Applies

On construction roads, access points, and other disturbed areas subject to surface dust movement and dust blowing where off-site damage may occur if dust is not controlled.

Design Criteria

Construction operations should be scheduled to minimize the amount of area disturbed at one time. Buffer areas of vegetation should be left where practical. Temporary or permanent stabilization measures shall be installed. No specific design criteria is given; see construction specifications below for common methods of dust control.

Water quality must be considered when materials are selected for dust control. Where there is a potential for the material to wash off to a stream, ingredient information must be provided to the NYSDEC.

No polymer application shall take place without written approval from the NYSDEC.

Construction Specifications

A. **Non-driving Areas** – These areas use products and materials applied or placed on soil surfaces to prevent airborne migration of soil particles.

Vegetative Cover – For disturbed areas not subject to traffic, vegetation provides the most practical method of dust control (see Section 3).

Mulch (including gravel mulch) – Mulch offers a fast effective means of controlling dust. This can also include rolled erosion control blankets.

Spray adhesives – These are products generally composed of polymers in a liquid or solid form that are mixed with water to form an emulsion that is sprayed on the soil surface with typical hydroseeding equipment. The mixing ratios and application rates will be in accordance with the manufacturer's recommendations for the specific soils on the site. In no case should the application of these adhesives be made on wet soils or if there is a probability of precipitation within 48 hours of its proposed use. Material Safety Data Sheets will be provided to all applicators and others working with the material.

B. **Driving Areas** – These areas utilize water, polymer emulsions, and barriers to prevent dust movement from the traffic surface into the air.

Sprinkling – The site may be sprayed with water until the surface is wet. This is especially effective on haul roads and access route to provide short term limited dust control.

Polymer Additives – These polymers are mixed with water and applied to the driving surface by a water truck with a gravity feed drip bar, spray bar or automated distributor truck. The mixing ratios and application rates will be in accordance with the manufacturer's recommendations. Incorporation of the emulsion into the soil will be done to the appropriate depth based on expected traffic. Compaction after incorporation will be by vibratory roller to a minimum of 95%. The prepared surface shall be moist and no application of the polymer will be made if there is a probability of precipitation within 48 hours of its proposed use. Material Safety Data Sheets will be provided to all applicators working with the material.

Barriers – Woven geo-textiles can be placed on the driving surface to effectively reduce dust throw and particle migration on haul roads. Stone can also be used for construction roads for effective dust control.

Windbreak – A silt fence or similar barrier can control air currents at intervals equal to ten times the barrier height. Preserve existing wind barrier vegetation as much as practical.

Maintenance

Maintain dust control measures through dry weather periods until all disturbed areas are stabilized.

STANDARD AND SPECIFICATIONS FOR PROTECTING VEGETATION DURING CONSTRUCTION

Definition & Scope

The protection of trees, shrubs, ground cover and other vegetation from damage by construction equipment. In order to preserve existing vegetation determined to be important for soil erosion control, water quality protection, shade, screening, buffers, wildlife habitat, wetland protection, and other values.

Conditions Where Practices Applies

On planned construction sites where valued vegetation exists and needs to be preserved.

Design Criteria

1. Planning Considerations

   A. Inventory:

   1) Property boundaries, topography, vegetation and soils information should be gathered. Identify potentially high erosion areas, areas with tree windthrow potential, etc. A vegetative cover type map should be made on a copy of a topographic map which shows other natural and manmade features. Vegetation that is desirable to preserve because of its value for screening, shade, critical erosion control, endangered species, aesthetics, etc., should be identified and marked on the map.

   2) Based upon this data, general statements should be prepared about the present condition, potential problem areas, and unique features of the property.

   B. Planning:

   1) After engineering plans (plot maps) are prepared, another field review should take place and recommendations made for the vegetation to be saved. Minor adjustments in location of roads, dwellings, and utilities may be needed. Construction on steep slopes, erodible soils, wetlands, and streams should be avoided. Clearing limits should be delineated (See "Determine Limits of Clearing and Grading" on page 2.2).

   2) Areas to be seeded and planted should be identified. Remaining vegetation should blend with their surroundings and/or provide special function such as a filter strip, buffer zone, or screen.

   3) Trees and shrubs of special seasonal interest, such as flowering dogwood, red maple, striped maple, serviceberry, or shadbush, and valuable potential shade trees should be identified and marked for special protective treatment as appropriate.

   4) Trees to be cut should be marked on the plans. If timber can be removed for salable products, a forester should be consulted for marketing advice.

   5) Trees that may become a hazard to people, personal property, or utilities should be removed. These include trees that are weak-wooded, disease-prone, subject to windthrow, or those that have severely damaged root systems.

   6) The vigor of remaining trees may be improved by a selective thinning. A forester should be consulted for implementing this practice.

2. Measures to Protect Vegetation

   A. Limit soil placement over existing tree and shrub roots to a maximum of 3 inches. Soils with loamy texture and good structure should be used.

   B. Use retaining walls and terraces to protect roots of trees and shrubs when grades are lowered. Lowered grades should start no closer than the dripline of the tree. For narrow-canopied trees and shrubs, the stem diameter in inches is converted to feet and doubled, such that a 10 inch tree should be protected to 20 feet.

   C. Trenching across tree root systems should be the same minimum distance from the trunk, as in "B". Tunnels under root systems for underground utilities should start 18 inches or deeper below the normal ground surface. Tree roots which must be severed should be cut clean. Backfill material that will be in contact with the roots should be topsoil or a prepared planting soil mixture.

   D. Construct sturdy fences, or barriers, of wood, steel, or other protective material around valuable vegetation for protection from construction equipment. Place barriers far enough away from trees, but not less than the specifications in "B", so that tall equipment such as backhoes and dump trucks do not contact tree branches.

E. Construction limits should be identified and clearly marked to exclude equipment.

F. Avoid spills of oil/gas and other contaminants.

G. Obstructive and broken branches should be pruned properly. The branch collar on all branches whether living or dead should not be damaged. The 3 or 4 cut method should be used on all branches larger than two inches at the cut. First cut about one-third the way through the underside of the limb (about 6-12 inches from the tree trunk). Then (approximately an inch further out) make a second cut through the limb from the upper side. When the branch is removed, there is no splintering of the main tree trunk. Remove the stub. If the branch is larger than 5-6 inches in diameter, use the four cut system. Cuts 1 and 2 remain the same and cut 3 should be from the underside of the limb, on the outside of the branch collar. Cut 4 should be from the top and in alignment with the 3rd cut. Cut 3 should be 1/4 to 1/3 the way through the limb. This will prevent the bark from peeling down the trunk. Do not paint the cut surface.

H. Penalties for damage to valuable trees, shrubs, and herbaceous plants should be clearly spelled out in the contract.

PROTECTING TREES IN HEAVY USE AREAS

The compaction of soil over the roots of trees and shrubs by the trampling of recreationists, vehicular traffic, etc., reduces oxygen, water, and nutrient uptake by feeder roots. This weakens and may eventually kill the plants. Table 2.6 rates the "Susceptibility of Tree Species to Compaction."

Where heavy compaction is anticipated, apply and maintain a 3 to 4 inch layer of undecayed wood chips or 2 inches of No. 2 washed, crushed gravel. In addition, use of a wooden or plastic mat may be used to lessen compaction, if applicable.

Table 2.6
Susceptibility of Tree Species to Compaction[1]

Resistant:

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

Intermediate:

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

Susceptible:

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

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

STANDARD AND SPECIFICATIONS FOR STABILIZED CONSTRUCTION ACCESS

Definition & Scope

A stabilized pad of aggregate underlain with geotextile located at any point where traffic will be entering or leaving a construction site to or from a public right-of-way, street, alley, sidewalk, or parking area. The purpose of stabilized construction access is to reduce or eliminate the tracking of sediment onto public rights-of-way or streets.

Conditions Where Practice Applies

A stabilized construction access shall be used at all points of construction ingress and egress.

Design Criteria

See Figure 2.1 on page 2.31 for details.

Aggregate Size: Use a matrix of 1-4 inch stone, or reclaimed or recycled concrete equivalent.

Thickness: Not less than six (6) inches.

Width: 12-foot minimum but not less than the full width of points where ingress or egress occurs. 24-foot minimum if there is only one access to the site.

Length: As required, but not less than 50 feet (except on a single residence lot where a 30 foot minimum would apply).

Geotextile: To be placed over the entire area to be covered with aggregate. Filter cloth will not be required on a single-family residence lot. Piping of surface water under entrance shall be provided as required. If piping is impossible, a mountable berm with 5:1 slopes will be permitted.

Criteria for Geotextile: The geotextile shall be woven or nonwoven fabric consisting only of continuous chain polymeric filaments or yarns of polyester. The fabric shall be inert to commonly encountered chemicals, hydro-carbons, mildew, rot resistant, and conform to the fabric properties as shown:

Fabric Properties[3]	Light Duty[1] Roads Grade Subgrade	Heavy Duty[2] Haul Roads Rough Graded	Test Method
Grab Tensile Strength (lbs)	200	220	ASTM D1682
Elongation at Failure (%)	50	60	ASTM D1682
Mullen Burst Strength (lbs)	190	430	ASTM D3786
Puncture Strength (lbs)	40	125	ASTM D751 Modified
Equivalent	40-80	40-80	US Std Sieve
Opening Size			CW-02215
Aggregate Depth	6	10	-

[1]Light Duty Road: Area sites that have been graded to subgrade and where most travel would be single axle vehicles and an occasional multi-axle truck. Acceptable materials are Trevira Spunbond 1115, Mirafi 100X, Typar 3401, or equivalent.

[2]Heavy Duty Road: Area sites with only rough grading, and where most travel would be multi-axle vehicles. Acceptable materials are Trevira Spunbond 1135, Mirafi 600X, or equivalent.

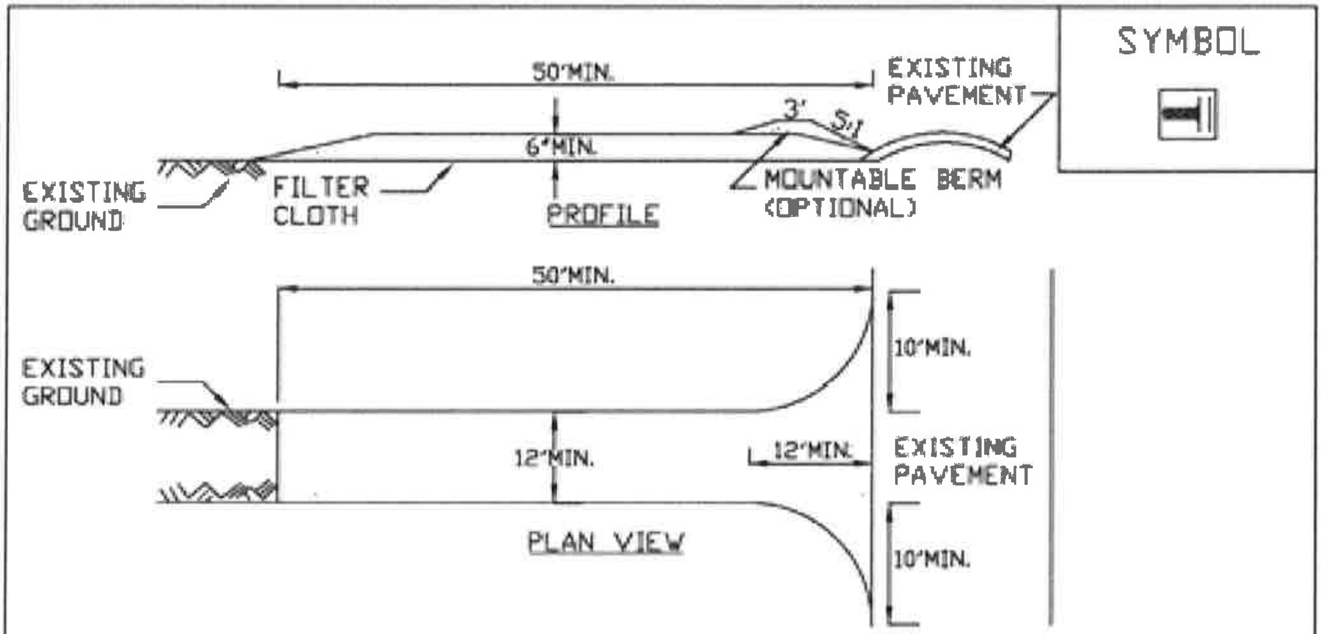
[3]Fabrics not meeting these specifications may be used only when design procedure and supporting documentation are supplied to determine aggregate depth and fabric strength.

Maintenance

The access shall be maintained in a condition which will prevent tracking of sediment onto public rights-of-way or streets. This may require periodic top dressing with additional aggregate. All sediment spilled, dropped, or washed onto public rights-of-way must be removed immediately.

When necessary, wheels must be cleaned to remove sediment prior to entrance onto public rights-of-way. When washing is required, it shall be done on an area stabilized with aggregate, which drains into an approved sediment-trapping device. All sediment shall be prevented from entering storm drains, ditches, or watercourses.

Figure 2.1
Stabilized Construction Access



CONSTRUCTION SPECIFICATIONS

1. STONE SIZE - USE 1-4 INCH STONE, OR RECLAIMED OR RECYCLED CONCRETE EQUIVALENT.
2. LENGTH - NOT LESS THAN 50 FEET (EXCEPT ON A SINGLE RESIDENCE LOT WHERE A 30 FOOT MINIMUM LENGTH WOULD APPLY).
3. THICKNESS - NOT LESS THAN SIX (6) INCHES.
4. WIDTH - TWELVE (12) FOOT MINIMUM, BUT NOT LESS THAN THE FULL WIDTH AT POINTS WHERE INGRESS OR EGRESS OCCURS. TWENTY-FOUR (24) FOOT IF SINGLE ENTRANCE TO SITE.
5. GEOTEXTILE - WILL BE PLACED OVER THE ENTIRE AREA PRIOR TO PLACING OF STONE.
6. SURFACE WATER - ALL SURFACE WATER FLOWING OR DIVERTED TOWARD CONSTRUCTION ACCESS SHALL BE PIPED BENEATH THE ENTRANCE. IF PIPING IS IMPRACTICAL, A MOUNTABLE BERM WITH 5:1 SLOPES WILL BE PERMITTED.
7. MAINTENANCE - THE ENTRANCE SHALL BE MAINTAINED IN A CONDITION WHICH WILL PREVENT TRACKING OR FLOWING OF SEDIMENT ONTO PUBLIC RIGHTS-OF-WAY. ALL SEDIMENT SPILLED, DROPPED, WASHED OR TRACKED ONTO PUBLIC RIGHTS-OF-WAY MUST BE REMOVED IMMEDIATELY.
8. WHEN WASHING IS REQUIRED, IT SHALL BE DONE ON A AREA STABILIZED WITH STONE AND WHICH DRAINS INTO AN APPROVED SEDIMENT TRAPPING DEVICE.
9. PERIODIC INSPECTION AND NEEDED MAINTENANCE SHALL BE PROVIDED AFTER EACH RAIN.

ADAPTED FROM DETAILS PROVIDED BY: USDA - NRCS, NEW YORK STATE DEPARTMENT OF TRANSPORTATION, NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION, NEW YORK STATE SOIL & WATER CONSERVATION COMMITTEE	STABILIZED CONSTRUCTION ACCESS

STANDARD AND SPECIFICATIONS FOR WINTER STABILIZATION

Definition & Scope

A temporary site specific, enhanced erosion and sediment control plan to manage runoff and sediment at the site during construction activities in the winter months to protect off-site water resources.

Conditions Where Practice Applies

This standard applies to all construction activities involved with ongoing land disturbance and exposure between November 15th to the following April 1st.

Design Criteria

1. Prepare a snow management plan with adequate storage for snow and control of melt water, requiring cleared snow to be stored in a manner not affecting ongoing construction activities.

2. Enlarge and stabilize access points to provide for snow management and stockpiling. Snow management activities must not destroy or degrade installed erosion and sediment control practices.

3. A minimum 25 foot buffer shall be maintained from all perimeter controls such as silt fence. Mark silt fence with tall stakes that are visible above the snow pack.

4. Edges of disturbed areas that drain to a waterbody within 100 feet will have 2 rows of silt fence, 5 feet apart, installed on the contour.

5. Drainage structures must be kept open and free of snow and ice dams. All debris, ice dams, or debris from plowing operations, that restrict the flow of runoff and meltwater, shall be removed.

6. Sediment barriers must be installed at all appropriate perimeter and sensitive locations. Silt fence and other practices requiring earth disturbance must be installed before the ground freezes.

7. Soil stockpiles must be protected by the use of established vegetation, anchored straw mulch, rolled stabilization matting, or other durable covering. A barrier must be installed at least 15 feet from the toe of the stockpile to prevent soil migration and to capture loose soil.

8. In areas where soil disturbance activity has temporarily or permanently ceased, the application of soil stabilization measures should be initiated by the end of the next business day and completed within three (3) days. Rolled erosion control blankets must be used on all slopes 3 horizontal to 1 vertical or steeper.

9. If straw mulch alone is used for temporary stabilization, it shall be applied at double the standard rate of 2 tons per acre, making the application rate 4 tons per acre. Other manufactured mulches should be applied at double the manufacturer's recommended rate.

10. To ensure adequate stabilization of disturbed soil in advance of a melt event, areas of disturbed soil should be stabilized at the end of each work day unless:

    a. work will resume within 24 hours in the same area and no precipitation is forecast or;

    b. the work is in disturbed areas that collect and retain runoff, such as open utility trenches, foundation excavations, or water management areas.

11. Use stone paths to stabilize access perimeters of buildings under construction and areas where construction vehicle traffic is anticipated. Stone paths should be a minimum 10 feet in width but wider as necessary to accommodate equipment.

Maintenance

The site shall be inspected frequently to ensure that the erosion and sediment control plan is performing its winter stabilization function. If the site will not have earth disturbing activities ongoing during the "winter season", **all** bare exposed soil must be stabilized by established vegetation, straw or other acceptable mulch, matting, rock, or other approved material such as rolled erosion control products. Seeding of areas with mulch cover is preferred but seeding alone is not acceptable for proper stabilization.

Compliance inspections must be performed and reports filed properly in accordance with the SWPPP for all sites under a winter shutdown.

References

1. Northeastern Illinois Soil and Sedimentation Control Steering Committee. October 1981. Procedures and Standards for Urban Soil Erosion and Sediment Control in Illinois.
2. J.F. Rushing, V.M. Moore, J.S. Tingle, Q. Mason, and T. McCaffery, 2005. Dust Abatement Methods for Lines of Communication and Base Camps in Temperate Climates. ERDC/GSL TR-05-23, October 2005.

STANDARD AND SPECIFICATIONS FOR ROCK OUTLET PROTECTION

Definition & Scope

A **permanent** section of rock protection placed at the outlet end of the culverts, conduits, or channels to reduce the depth, velocity, and energy of water, such that the flow will not erode the receiving downstream reach.

Conditions Where Practice Applies

This practice applies where discharge velocities and energies at the outlets of culverts, conduits, or channels are sufficient to erode the next downstream reach. This applies to:

1. Culvert outlets of all types.
2. Pipe conduits from all sediment basins, dry storm water ponds, and permanent type ponds.
3. New channels constructed as outlets for culverts and conduits.

Design Criteria

The design of rock outlet protection depends entirely on the location. Pipe outlet at the top of cuts or on slopes steeper than 10 percent, cannot be protected by rock aprons or riprap sections due to re-concentration of flows and high velocities encountered after the flow leaves the apron.

Many counties and state agencies have regulations and design procedures already established for dimensions, type and size of materials, and locations where outlet protection is required. Where these requirements exist, they shall be followed.

Tailwater Depth

The depth of tailwater immediately below the pipe outlet must be determined for the design capacity of the pipe. If the tailwater depth is less than half the diameter of the outlet pipe, and the receiving stream is wide enough to accept divergence of the flow, it shall be classified as a Minimum Tailwater Condition; see Figure 3.16 on page 3.42 as an example. If the tailwater depth is greater than half the pipe diameter and the receiving stream will continue to confine the flow, it shall be classified as a Maximum Tailwater Condition; see Figure 3.17 on page 3.43 as an example. Pipes which outlet onto flat areas with no defined channel may be assumed to have a Minimum Tailwater Condition; see Figure 3.16 on page 3.42 as an example.

Apron Size

The apron length and width shall be determined from the curves according to the tailwater conditions:

Minimum Tailwater – Use Figure 3.16 on page 3.42
Maximum Tailwater – Use Figure 3.17 on page 3.43

If the pipe discharges directly into a well defined channel, the apron shall extend across the channel bottom and up the channel banks to an elevation one foot above the maximum tailwater depth or to the top of the bank, whichever is less.

The upstream end of the apron, adjacent to the pipe, shall have a width two (2) times the diameter of the outlet pipe, or conform to pipe end section if used.

Bottom Grade

The outlet protection apron shall be constructed with no slope along its length. There shall be no overfall at the end of the apron. The elevation of the downstream end of the apron shall be equal to the elevation of the receiving channel or adjacent ground.

Alignment

The outlet protection apron shall be located so that there are no bends in the horizontal alignment.

Materials

The outlet protection may be done using rock riprap, grouted riprap, or gabions. Outlets constructed on the bank of a stream or wetland shall not use grouted rip-rap, gabions or concrete.

Riprap shall be composed of a well-graded mixture of rock size so that 50 percent of the pieces, by weight, shall be larger than the d_{50} size determined by using the charts. A well-graded mixture, as used herein, is defined as a mixture composed primarily of larger rock sizes, but with a sufficient mixture of other sizes to fill the smaller voids between the rocks. The diameter of the largest rock size in such a mixture shall be 1.5 times the d_{50} size.

Thickness

The minimum thickness of the riprap layer shall be 1.5 times the maximum rock diameter for d_{50} of 15 inches or less; and 1.2 times the maximum rock size for d_{50} greater than 15 inches. The following chart lists some examples:

D_{50} (inches)	d_{max} (inches)	Minimum Blanket Thickness (inches)
4	6	9
6	9	14
9	14	20
12	18	27
15	22	32
18	27	32
21	32	38
24	36	43

Rock Quality

Rock for riprap shall consist of field rock or rough unhewn quarry rock. The rock shall be hard and angular and of a quality that will not disintegrate on exposure to water or weathering. The specific gravity of the individual rocks shall be at least 2.5.

Filter

A filter is a layer of material placed between the riprap and the underlying soil surface to prevent soil movement into and through the riprap. Riprap shall have a filter placed under it in all cases.

A filter can be of two general forms: a gravel layer or a plastic filter cloth. The plastic filter cloth can be woven or non-woven monofilament yarns, and shall meet these base requirements: thickness 20-60 mils, grab strength 90-120 lbs; and shall conform to ASTM D-1777 and ASTM D-1682.

Gravel filter blanket, when used, shall be designed by comparing particle sizes of the overlying material and the base material. Design criteria are available in Standard and Specification for Anchored Slope and Channel Stabilization on page 4.7.

Gabions

Gabions shall be made of hexagonal triple twist mesh with heavily galvanized steel wire. The maximum linear dimension of the mesh opening shall not exceed 4 ½ inches and the area of the mesh opening shall not exceed 10 square inches.

Gabions shall be fabricated in such a manner that the sides, ends, and lid can be assembled at the construction site into a rectangular basket of the specified sizes. Gabions shall be of single unit construction and shall be installed according to manufacturer's recommendations.

The area on which the gabion is to be installed shall be graded as shown on the drawings. Foundation conditions shall be the same as for placing rock riprap, and filter cloth shall be placed under all gabions. Where necessary, key, or tie, the structure into the bank to prevent undermining of the main gabion structure.

Maintenance

Once a riprap outlet has been installed, the maintenance needs are very low. It should be inspected after high flows for evidence of scour beneath the riprap or for dislodged rocks. Repairs should be made immediately.

Design Procedure

1. Investigate the downstream channel to assure that nonerosive velocities can be maintained.

2. Determine the tailwater condition at the outlet to establish which curve to use.

3. Use the appropriate chart with the design discharge to determine the riprap size and apron length required. It is noted that references to pipe diameters in the charts are based on full flow. For other than full pipe flow, the parameters of depth of flow and velocity must be used to adjust the design discharges.

4. Calculate apron width at the downstream end if a flare section is to be employed.

Design Examples are demonstrated in Appendix B.

Construction Specifications

1. The subgrade for the filter, riprap, or gabion shall be prepared to the required lines and grades. Any fill required in the subgrade shall be compacted to a density of approximately that of the surrounding undisturbed material.

2. The rock or gravel shall conform to the specified grad-

ing limits when installed respectively in the riprap or filter.

3. Filter cloth shall be protected from punching, cutting, or tearing. Any damage other than an occasional small hole shall be repaired by placing another piece of cloth over the damaged part or by completely replacing the cloth. All overlaps, whether for repairs or for joining two pieces of cloth shall be a minimum of one foot.

4. Rock for the riprap or gabion outlets may be placed by equipment. Both shall each be constructed to the full course thickness in one operation and in such a manner as to avoid displacement of underlying materials. The rock for riprap or gabion outlets shall be delivered and placed in a manner that will ensure that it is reasonably homogenous with the smaller rocks and spalls filling the voids between the larger rocks. Riprap shall be placed in a manner to prevent damage to the filter blanket or filter cloth. Hand placement will be required to the extent necessary to prevent damage to the permanent works.

Figure 3.16
Outlet Protection Design—Minimum Tailwater Condition Chart (Design of Outlet Protection from a Round Pipe Flowing Full, Minimum Tailwater Condition: $T_w < 0.5D_o$) (USDA - NRCS)

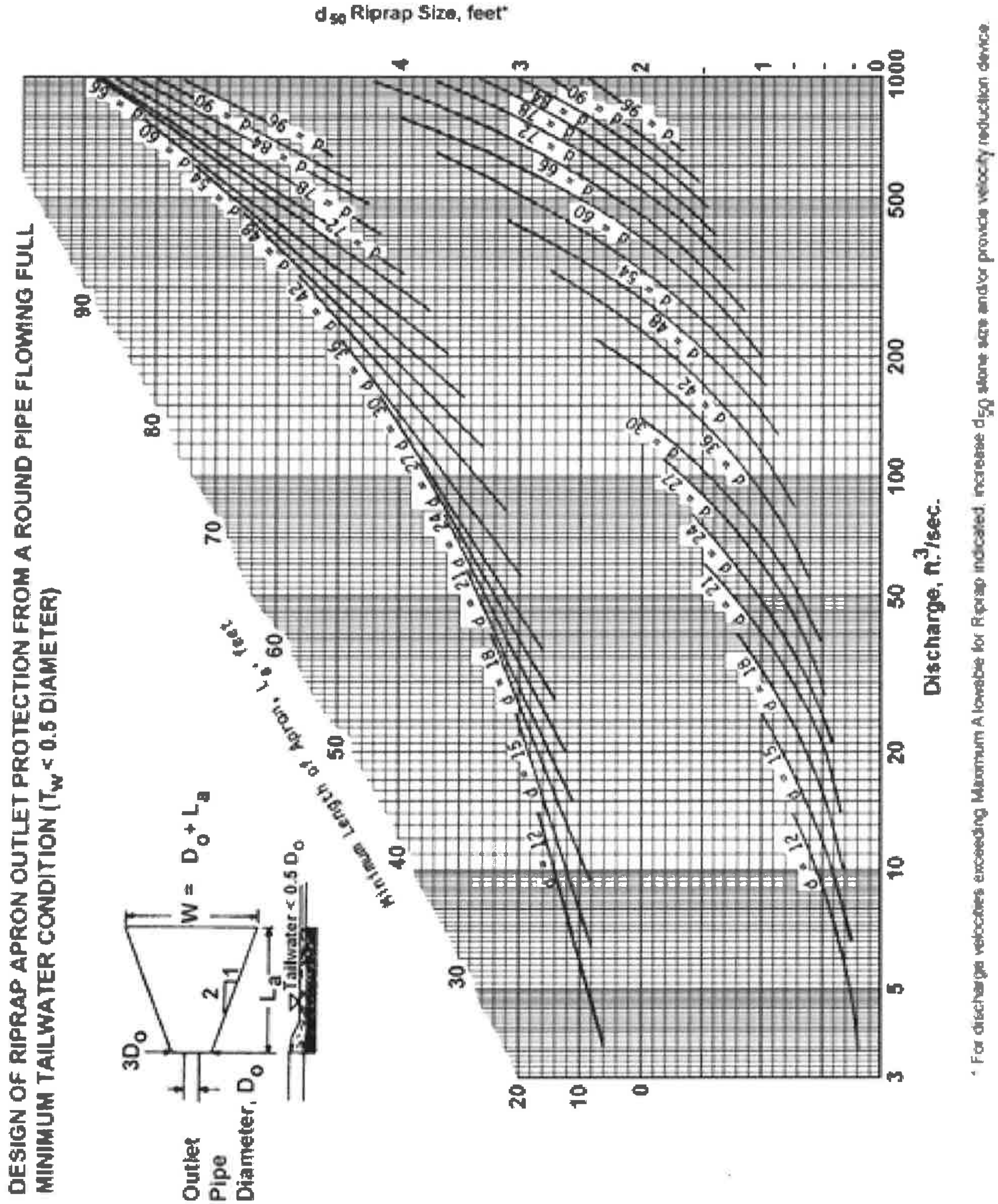


Figure 3.17
Outlet Protection Design—Maximum Tailwater Condition Chart (Design of Outlet Protection from a Round Pipe Flowing Full, Maximum Tailwater Condition: $T_w \geq 0.5D_o$) (USDA - NRCS)

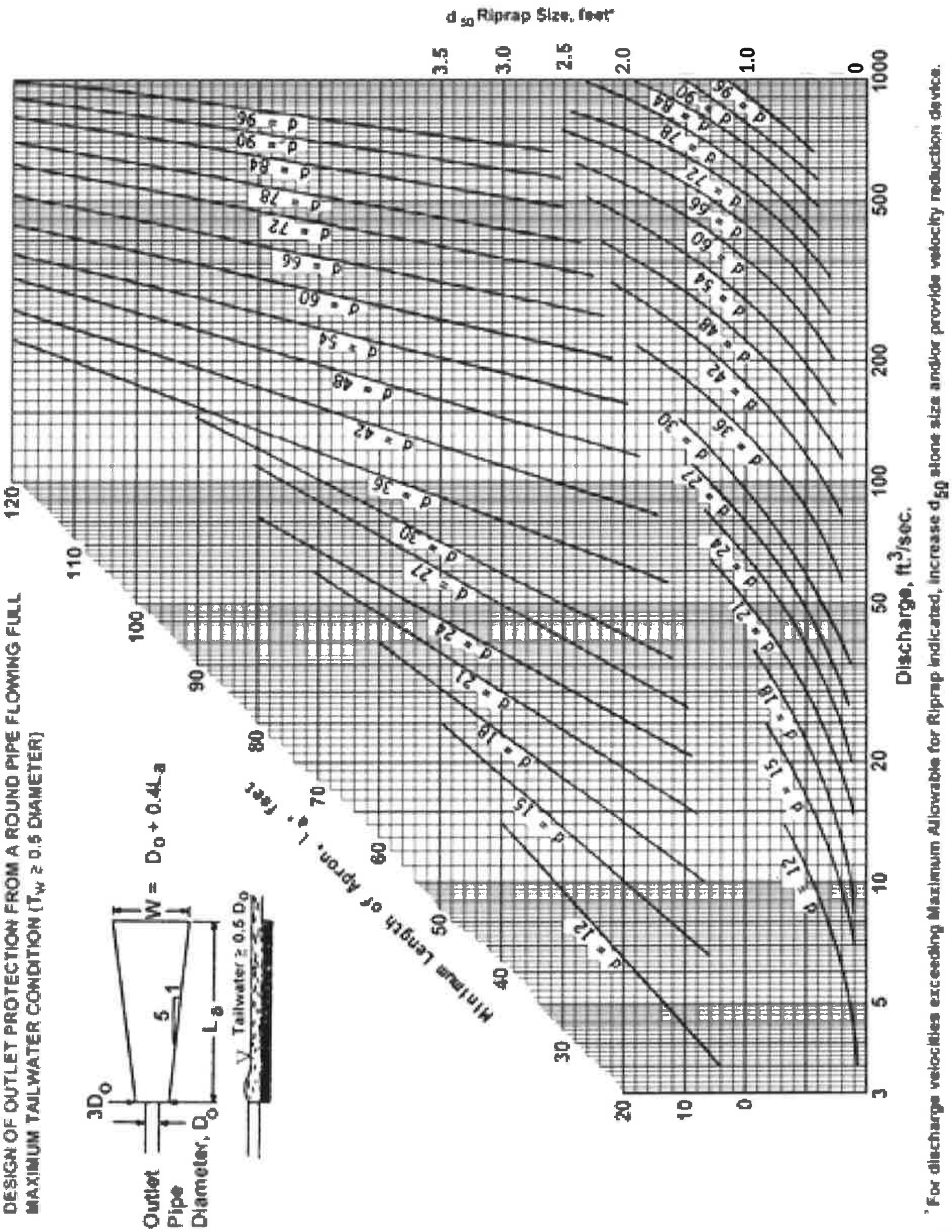


Figure 3.18
Riprap Outlet Protection Detail (1)

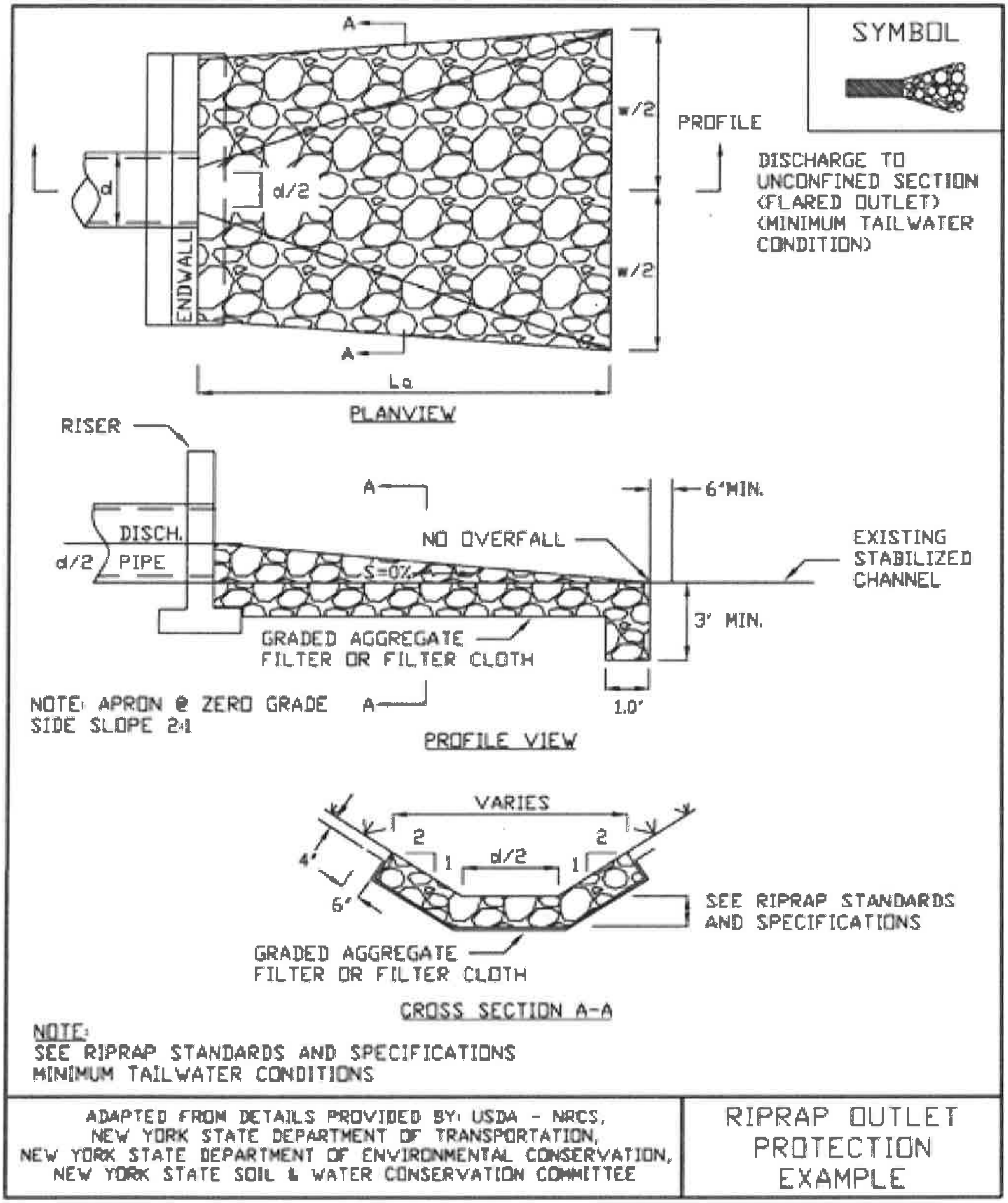


Figure 3.19
Riprap Outlet Protection Detail (2)

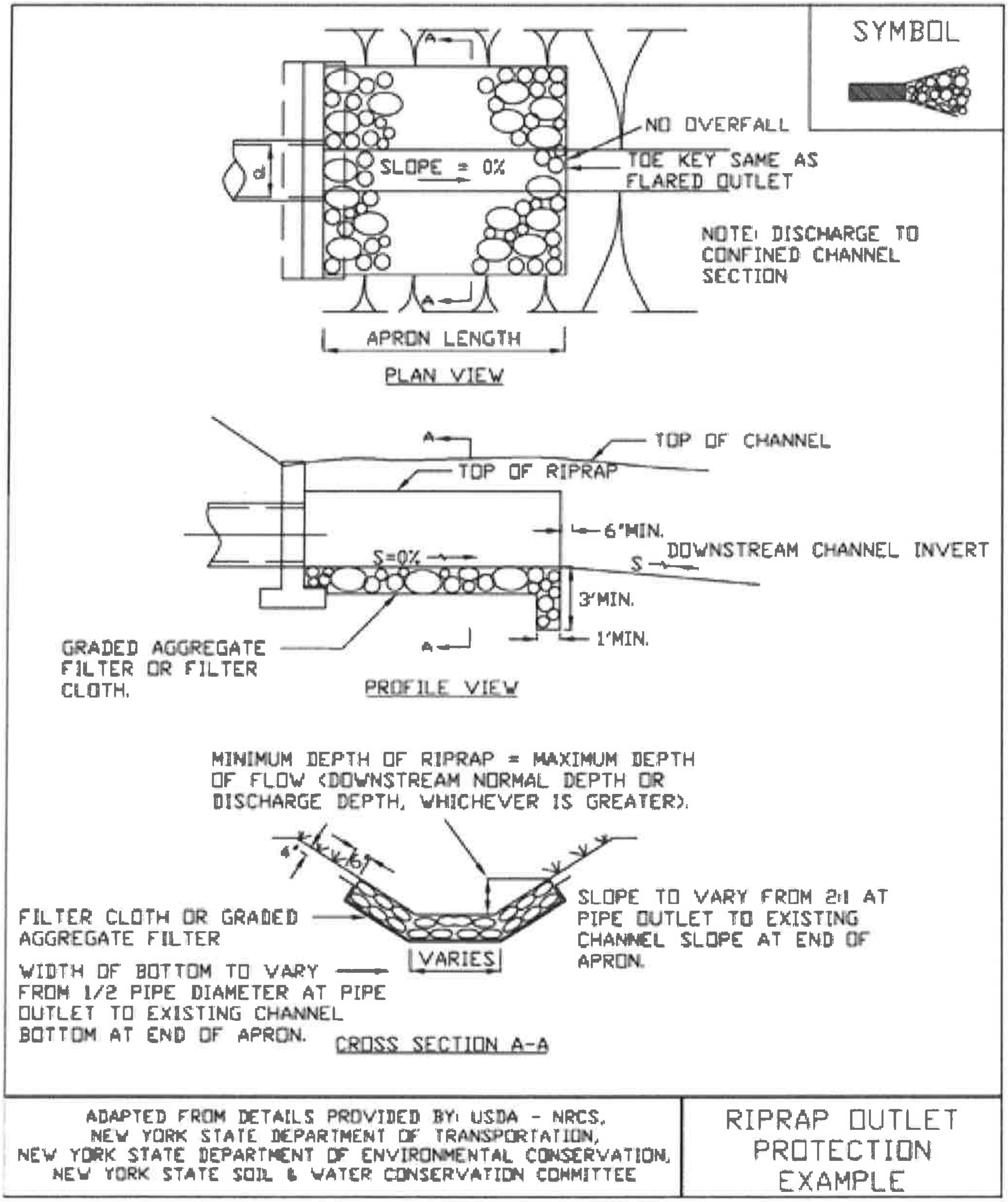
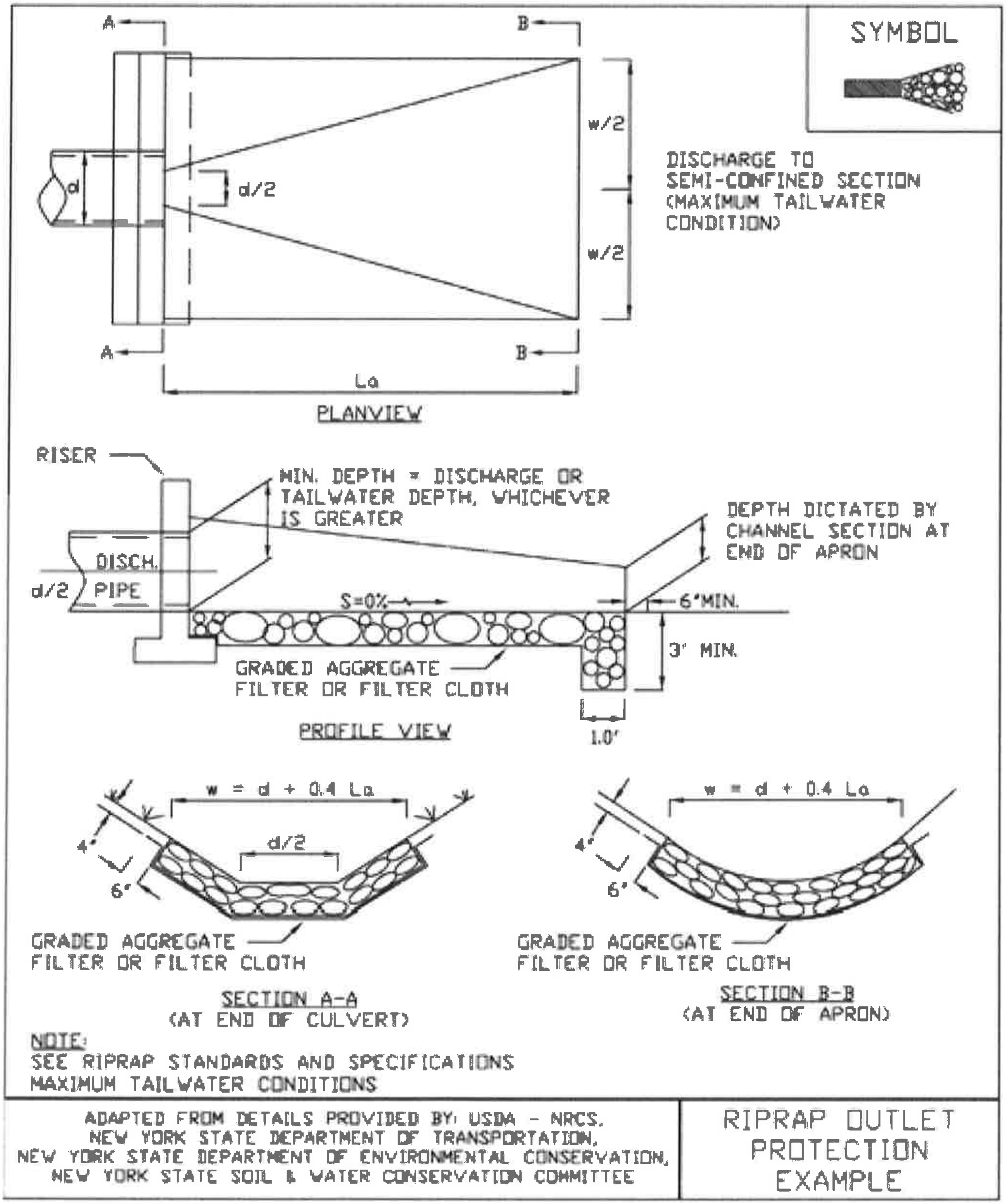


Figure 3.20
Riprap Outlet Protection Detail (3)



STANDARD AND SPECIFICATIONS FOR WATER BAR

Definition & Scope

A **permanent** or **temporary** ridge, ridge and channel, a structural channel, or flow deflector, constructed diagonally across a sloping road or utility right-of-way that is subject to erosion to limit the accumulation of erosive velocity of water by diverting surface runoff at pre-designed intervals.

Conditions Where Practice Applies

Where runoff protection is needed to prevent erosion from increased concentrated flow on narrow, steep access roads, driveways, and entrance ways to lot parcels as well as utility access right-of-ways generally up to 100 feet in width

Design Criteria

Design computations are not required.

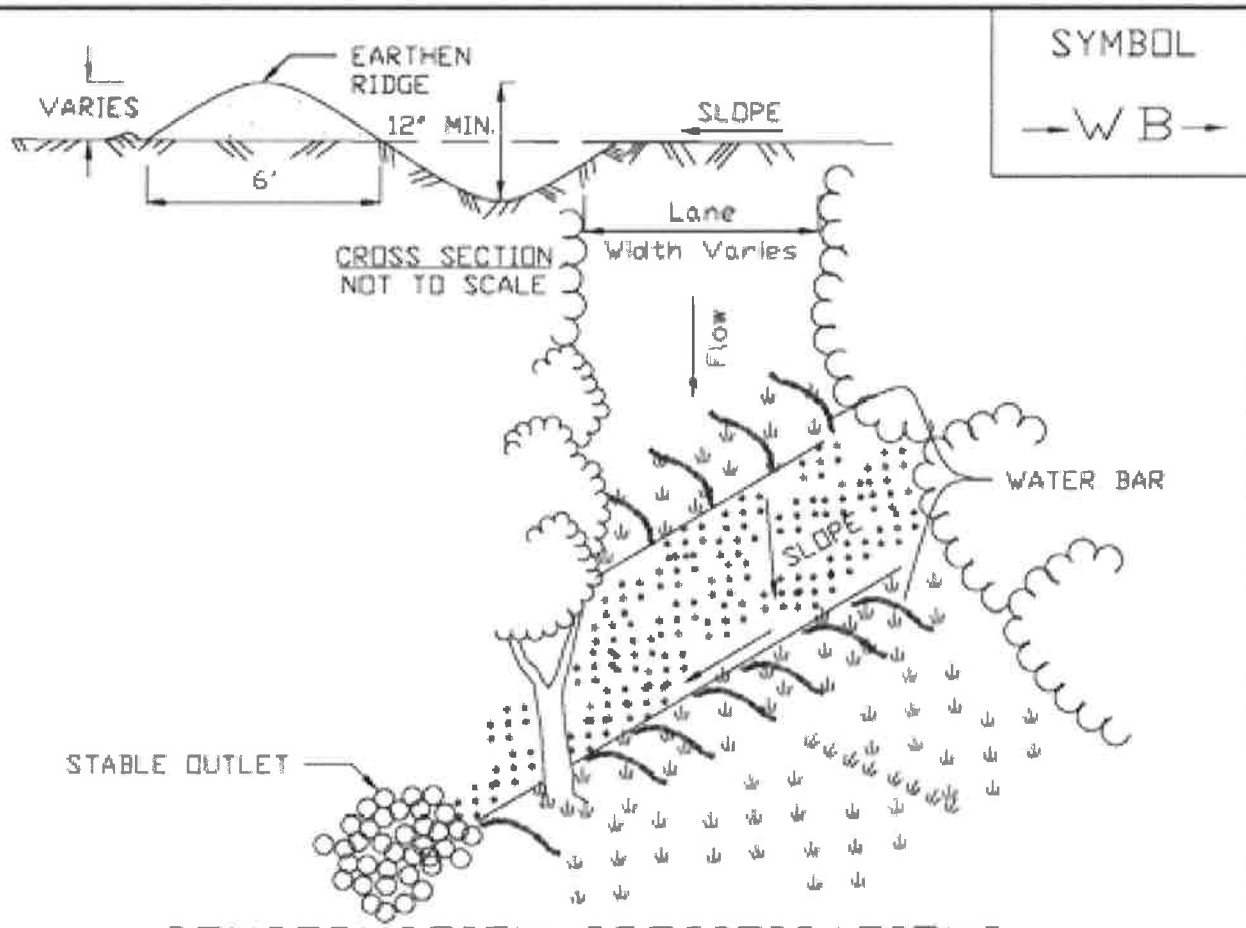
1. The design height shall be minimum of 12 inches measured from channel bottom to ridge top.
2. The side slopes shall be 2:1 or flatter, a minimum of 4:1 where vehicles cross.
3. The base width of the ridge shall be six feet minimum.
4. The spacing of the water bars shall be as follows (Site spacing may need to be adjusted for field conditions to use the most suitable areas for water disposal):

Slope (%)	Spacing (ft.)
<5	125
5 TO 10	100
10 TO 20	75
20 TO 35	50
>35	25

5. The positive grade of the water bar shall not exceed 2%. A crossing angle of approximately 60 degrees is preferred.
6. Once diverted, water must be conveyed to a stable system (i.e. vegetated swale or storm sewer system). Water bars should have stable, unrestricted outlets, either natural or constructed.

See Figure 3.22 on page 3.53 for details.

Figure 3.22
Water Bar Detail



CONSTRUCTION SPECIFICATIONS

1. INSTALL THE WATER BAR AS SOON AS THE RIGHT OF WAY IS CLEARED AND GRADED.

2. DISK OR STRIP THE SOD FROM THE BASE FOR THE CONSTRUCTED RIDGE BEFORE PLACING FILL.

3. TRACK THE RIDGE TO COMPACT IT TO THE DESIGN CROSS SECTION.

4. THE UNRESTRICTED OUTLET SHALL BE LOCATED ON AN UNDISTURBED AREA. FIELD SPACING WILL BE ADJUSTED TO USE THE MOST STABLE OUTLET AREAS. OUTLET PROTECTION WILL BE PROVIDED WHEN NATURAL AREAS ARE NOT ADEQUATE.

5. VEHICLE CROSSING SHALL BE STABILIZED WITH GRAVEL. EXPOSED AREAS SHALL BE SEEDED AND MULCHED WITHIN 2 DAYS.

6. PERIODICALLY INSPECT WATER BARS FOR EROSION DAMAGE AND SEDIMENT. CHECK OUTLET AREAS AND MAKE REPAIRS AS NEEDED TO RESTORE OPERATION.

ADAPTED FROM DETAILS PROVIDED BY: USDA - NRCS, NEW YORK STATE DEPARTMENT OF TRANSPORTATION, NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION, NEW YORK STATE SOIL & WATER CONSERVATION COMMITTEE	WATER BARS

STANDARD AND SPECIFICATIONS FOR ANCHORED STABILIZATION MATTING

Definition and Scope

A **temporary** or **permanent** protective covering placed on a prepared, seeded planting area that is anchored in place by staples or other means to aid in controlling erosion by absorbing rain splash energy and withstand overland flow as well as provide a microclimate to protect and promote seed establishment.

Conditions Where Practice Applies

Anchored stabilization mats are required for seeded earthen slopes steeper than 3 horizontal to 1 vertical; in vegetated channels where the velocity of the design flow exceeds the allowable velocity for vegetation alone (usually greater than 5 feet per second); on streambanks and shorelines where moving water is likely to erode newly seeded or planted areas; and in areas where wind prevents standard mulching with straw. This standard does not apply to slopes stabilized with sod, rock riprap or hard armor material.

Design Criteria

Slope Applications - Anchored stabilization mats for use on slopes are primarily used as mulch blankets where the mesh material is within the blanket or as a netting over previously placed mulch. These stabilization mats are NOT effective in preventing slope failures.

1. Required on all slopes steeper than 3:1
2. Matting will be designed for proper longevity need and strength based on intended use.
3. All installation details and directions will be included on the site erosion and sediment control plan and will follow manufactures specifications.

Channel Applications - Anchored stabilization mats, for use in supporting vegetation in flow channels, are generally a non-degradable, three dimensional plastic structure which can be filled with soil prior to planting. This structure provides a medium for root growth where the matting and roots become intertwined forming a continuous anchor for the vegetated lining.

1. Channel stabilization shall be based on the tractive force method.
2. For maximum design shear stresses less than 2 pounds per square foot, a temporary or bio-degradable mat may be used.
3. The design of the final matting shall be based on the mats ability to resist the tractive shear stress at bank full flow.
4. The installation details and procedures shall be included on the site erosion and sediment control plan and will follow manufacturers specifications.

Construction Specifications

1. Prepare soil before installing matting by smoothing the surface, removing debris and large stone, and applying lime, fertilizer and seed. Refer to manufacturers installation details.
2. Begin at the top of the slope by anchoring the mat in a 6" deep x 6" wide trench. Backfill and compact the trench after stapling.
3. In channels or swales, begin at the downslope end, anchoring the mat at the bottom and top ends of the blanket. When another roll is needed, the upslope roll

should overlay the lower layer, shingle style, so that channel flows do not peel back the material.

4. Roll the mats down a slope with a minimum 4" overlap. Roll center mat in a channel in direction of water flow on bottom of the channel. Do not stretch blankets. Blankets shall have good continuous contact with the underlying soil throughout its entire length.

5. Place mats end over end (shingle style) with a 6" overlap, use a double row of staggered staples 4" apart to secure mats.

6. Full length edge of mats at top of side slopes must be anchored in 6" deep x 6" wide trench; backfill and compact the trench after stapling.

7. Mats on side slopes of a channel must be overlapped 4" over the center mat and stapled.

8. In high flow channel applications, a staple check slot is recommended at 30 to 40 foot intervals. Use a row of staples 4" apart over entire width of the channel. Place a second row 4" below the first row in a staggered pattern.

9. The terminal end of the mats must be anchored in a 6"x6" wide trench. Backfill and compact the trench after stapling.

10. Stapling and anchoring of blanket shall be done in accordance with the manufactures recommendations.

Maintenance

Blanketed areas shall be inspected weekly and after each runoff event until perennial vegetation is established to a minimum uniform 80% coverage throughout the blanketed area. Damaged or displaced blankets shall be restored or replaced within 2 calendar days.

STANDARD AND SPECIFICATIONS FOR MULCHING

Definition and Scope

Applying coarse plant residue or chips, or other suitable materials, to cover the soil surface to provide initial erosion control while a seeding or shrub planting is establishing. Mulch will conserve moisture and modify the surface soil temperature and reduce fluctuation of both. Mulch will prevent soil surface crusting and aid in weed control. Mulch can also be used alone for temporary stabilization in non-growing months. Use of stone as a mulch could be more permanent and should not be limited to non-growing months.

Conditions Where Practice Applies

On soils subject to erosion and on new seedings and shrub plantings. Mulch is useful on soils with low infiltration rates by retarding runoff.

Criteria

Site preparation prior to mulching requires the installation of necessary erosion control or water management practices and drainage systems.

Slope, grade and smooth the site to fit needs of selected mulch products.

Remove all undesirable stones and other debris to meet the needs of the anticipated land use and maintenance required.

Apply mulch after soil amendments and planting is accomplished or simultaneously if hydroseeding is used.

Select appropriate mulch material and application rate or material needs. Hay mulch shall not be used in wetlands or in areas of permanent seeding. Clean straw mulch is preferred alternative in wetland application. Determine local availability.

Select appropriate mulch anchoring material.

NOTE: The best combination for grass/legume establishment is straw (cereal grain) mulch applied at 2 ton/acre (90 lbs./1000sq.ft.) and anchored with wood fiber mulch (hydromulch) at 500 – 750 lbs./acre (11 – 17 lbs./1000 sq. ft.). The wood fiber mulch must be applied through a hydroseeder immediately after mulching.

Table 4.2
Guide to Mulch Materials, Rates, and Uses

Mulch Material	Quality Standards	per 1000 Sq. Ft.	per Acre	Depth of Application	Remarks
Wood chips or shavings	Air-dried. Free of objectionable coarse material	500-900 lbs.	10-20 tons	2-7”	Used primarily around shrub and tree plantings and recreation trails to inhibit weed competition. Resistant to wind blowing. Decomposes slowly.
Wood fiber cellulose (partly digested wood fibers)	Made from natural wood usually with green dye and dispersing agent	50 lbs.	2,000 lbs.	—	Apply with hydromulcher. No tie down required. Less erosion control provided than 2 tons of hay or straw.
Gravel, Crushed Stone or Slag	Washed; Size 2B or 3A—1 1/2”	9 cu. yds.	405 cu. yds.	3”	Excellent mulch for short slopes and around plants and ornamentals. Use 2B where subject to traffic. (Approximately 2,000 lbs./cu. yd.). Frequently used over filter fabric for better weed control.
Hay or Straw	Air-dried; free of undesirable seeds & coarse materials	90-100 lbs. 2-3 bales	2 tons (100-120 bales)	cover about 90% surface	Use small grain straw where mulch is maintained for more than three months. Subject to wind blowing unless anchored. Most commonly used mulching material. Provides the best micro-environment for germinating seeds.
Jute twisted yarn	Undyed, unbleached plain weave. Warp 78 ends/yd., Weft 41 ends/yd. 60-90 lbs./roll	48” x 50 yds. or 48” x 75 yds.	—	—	Use without additional mulch. Tie down as per manufacturers specifications. Good for center line of concentrated water flow.
Excelsior wood fiber mats	Interlocking web of excelsior fibers with photodegradable plastic netting	4’ x 112.5’ or 8’ x 112.5’.	—	—	Use without additional mulch. Excellent for seeding establishment. Anchor as per manufacturers specifications. Approximately 72 lbs./roll for excelsior with plastic on both sides. Use two sided plastic for centerline of waterways.
Straw or coconut fiber, or combination	Photodegradable plastic net on one or two sides	Most are 6.5 ft. x 3.5 ft.	81 rolls	—	Designed to tolerate higher velocity water flow, centerlines of waterways, 60 sq. yds. per roll.

Table 4.3
Mulch Anchoring Guide

Anchoring Method or Material	Kind of Mulch to be Anchored	How to Apply
1. Peg and Twine	Hay or straw	After mulching, divide areas into blocks approximately 1 sq. yd. in size. Drive 4-6 pegs per block to within 2" to 3" of soil surface. Secure mulch to surface by stretching twine between pegs in criss-cross pattern on each block. Secure twine around each peg with 2 or more tight turns. Drive pegs flush with soil. Driving stakes into ground tightens the twine.
2. Mulch netting	Hay or straw	Staple the light-weight paper, jute, wood fiber, or plastic nettings to soil surface according to manufacturer's recommendations. Should be biodegradable. Most products are not suitable for foot traffic.
3. Wood cellulose fiber	Hay or straw	Apply with hydroseeder immediately after mulching. Use 500 lbs. wood fiber per acre. Some products contain an adhesive material ("tackifier"), possibly advantageous.
4. Mulch anchoring tool	Hay or straw	Apply mulch and pull a mulch anchoring tool (blunt, straight discs) over mulch as near to the contour as possible. Mulch material should be "tucked" into soil surface about 3".
5. Tackifier	Hay or straw	Mix and apply polymeric and gum tackifiers according to manufacturer's instructions. Avoid application during rain. A 24-hour curing period and a soil temperature higher than 45^0 Fahrenheit are required.

STANDARD AND SPECIFICATIONS FOR SOIL RESTORATION

Definition & Scope

The decompaction of areas of a development site or construction project where soils have been disturbed to recover the original properties and porosity of the soil; thus providing a sustainable growth medium for vegetation, reduction of runoff and filtering of pollutants from stormwater runoff.

Conditions Where Practice Applies

Soil restoration is to be applied to areas whose heavy construction traffic is done and final stabilization is to begin. This is generally applied in the cleanup, site restoration, and landscaping phase of construction followed by the permanent establishment of an appropriate ground cover to maintain the soil structure. Soil restoration measures should be applied over and adjacent to any runoff reduction practices to achieve design performance.

Design Criteria

1. Soil restoration areas will be designated on the plan views of areas to be disturbed.
2. Soil restoration will be completed in accordance with Table 4.6 on page 4.53.

Specification for Full Soil Restoration

During periods of relatively low to moderate subsoil moisture, the disturbed subsoils are returned to rough grade and the following Soil Restoration steps applied:

1. Apply 3 inches of compost over subsoil. The compost shall be well decomposed (matured at least 3 months), weed-free, organic matter. It shall be aerobically composted, possess no objectionable odors, and contain less than 1%, by dry weight, of man-made foreign matter. The physical parameters of the compost shall meet the standards listed in Table 5.2 - Compost Standards Table, except for "Particle Size" 100% will pass the 1/2" sieve. **Note: All biosolids compost produced in New York State (or approved for importation) must meet NYS DEC's 6 NYCRR Part 360 (Solid Waste Management Facilities) requirements. The Part 360 requirements are equal to or more stringent than 40 CFR Part 503 which ensure safe standards for pathogen reduction and heavy metals content.**

2. Till compost into subsoil to a depth of at least 12 inches using a cat-mounted ripper, tractor mounted disc, or tiller, to mix and circulate air and compost into the subsoil.
3. Rock-pick until uplifted stone/rock materials of four inches and larger size are cleaned off the site.
4. Apply topsoil to a depth of 6 inches.
5. Vegetate as required by the seeding plan. Use appropriate ground cover with deep roots to maintain the soil structure.
6. Topsoil may be manufactured as a mixture or a mineral component and organic material such as compost.

At the end of the project an inspector should be able to push a 3/8" metal bar 12 inches into the soil just with body weight. This should not be performed within the drip line of any existing trees or over utility installations that are within 24 inches of the surface.

Maintenance

Keep the site free of vehicular and foot traffic or other weight loads. Consider pedestrian footpaths.

Table 4.6
Soil Restoration Requirements

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

* Aeration includes the use of machines such as tractor-drawn implements with coulters making a narrow slit in the soil, a roller with many spikes making indentations in the soil, or prongs which function like a mini-subsoiler.
** Per "Deep Ripping and De-compaction, DEC 2008".

STANDARD AND SPECIFICATIONS FOR TOPSOILING

Definition & Scope

Spreading a specified quality and quantity of topsoil materials on graded or constructed subsoil areas to provide acceptable plant cover growing conditions, thereby reducing erosion; to reduce irrigation water needs; and to reduce the need for nitrogen fertilizer application.

Conditions Where Practice Applies

Topsoil is applied to subsoils that are droughty (low available moisture for plants), stony, slowly permeable, salty or extremely acid. It is also used to backfill around shrub and tree transplants. This standard does not apply to wetland soils.

Design Criteria

1. Preserve existing topsoil in place where possible, thereby reducing the need for added topsoil.
2. Conserve by stockpiling topsoil and friable fine textured subsoils that must be stripped from the excavated site and applied after final grading where vegetation will be established. Topsoil stockpiles must be stabilized. Stockpile surfaces can be stabilized by vegetation, geotextile or plastic covers. This can be aided by orientating the stockpile lengthwise into prevailing winds.
3. Refer to USDA Natural Resource Conservation Service soil surveys or soil interpretation record sheets for further soil texture information for selecting appropriate design topsoil depths.

Site Preparation

1. As needed, install erosion and sediment control practices such as diversions, channels, sediment traps, and stabilizing measures, or maintain if already installed.
2. Complete rough grading and final grade, allowing for depth of topsoil to be added.
3. Scarify all compact, slowly permeable, medium and fine textured subsoil areas. Scarify at approximately right angles to the slope direction in soil areas that are steeper than 5 percent. Areas that have been overly compacted shall be decompacted in accordance with the Soil Restoration Standard.
4. Remove refuse, woody plant parts, stones over 3 inches in diameter, and other litter.

Topsoil Materials

1. Topsoil shall have at least 6 percent by weight of fine textured stable organic material, and no greater than 20 percent. Muck soil shall not be considered topsoil.
2. Topsoil shall have not less than 20 percent fine textured material (passing the NO. 200 sieve) and not more than 15 percent clay.
3. Topsoil treated with soil sterilants or herbicides shall be so identified to the purchaser.
4. Topsoil shall be relatively free of stones over 1 1/2 inches in diameter, trash, noxious weeds such as nut sedge and quackgrass, and will have less than 10 percent gravel.
5. Topsoil containing soluble salts greater than 500 parts per million shall not be used.
6. Topsoil may be manufactured as a mixture of a mineral component and organic material such as compost.

Application and Grading

1. Topsoil shall be distributed to a uniform depth over the area. It shall not be placed when it is partly frozen, muddy, or on frozen slopes or over ice, snow, or standing water puddles.
2. Topsoil placed and graded on slopes steeper than 5 percent shall be promptly fertilized, seeded, mulched, and stabilized by "tracking" with suitable equipment.
3. Apply topsoil in the amounts shown in Table 4.7 below:

Table 4.7 - Topsoil Application Depth		
Site Conditions	**Intended Use**	**Minimum Topsoil Depth**
1. Deep sand or loamy sand	Mowed lawn	6 in.
	Tall legumes, unmowed	2 in.
	Tall grass, unmowed	1 in.
2. Deep sandy loam	Mowed lawn	5 in.
	Tall legumes, unmowed	2 in.
	Tall grass, unmowed	none
3. Six inches or more: silt loam, clay loam, loam, or silt	Mowed lawn	4 in.
	Tall legumes, unmowed	1 in.
	Tall grass, unmowed	1 in.

STANDARD AND SPECIFICATIONS FOR SILT FENCE

Definition & Scope

A **temporary** barrier of geotextile fabric installed on the contours across a slope used to intercept sediment laden runoff from small drainage areas of disturbed soil by temporarily ponding the sediment laden runoff allowing settling to occur. The maximum period of use is limited by the ultraviolet stability of the fabric (approximately one year).

Conditions Where Practice Applies

A silt fence may be used subject to the following conditions:

1. Maximum allowable slope length and fence length will not exceed the limits shown in the Design Criteria for the specific type of silt fence used ; and
2. Maximum ponding depth of 1.5 feet behind the fence; and
3. Erosion would occur in the form of sheet erosion; and
4. There is no concentration of water flowing to the barrier; and
5. Soil conditions allow for proper keying of fabric, or other anchorage, to prevent blowouts.

Design Criteria

1. Design computations are not required for installations of 1 month or less. Longer installation periods should be designed for expected runoff.
2. All silt fences shall be placed as close to the disturbed area as possible, but at least 10 feet from the toe of a slope steeper than 3H:1V, to allow for maintenance and roll down. The area beyond the fence must be undisturbed or stabilized.
3. The type of silt fence specified for each location on the plan shall not exceed the maximum slope length and maximum fence length requirements shown in the following table:

		Slope Length/Fence Length (ft.)		
Slope	Steepness	Standard	Reinforced	Super
<2%	< 50:1	300/1500	N/A	N/A
2-10%	50:1 to 10:1	125/1000	250/2000	300/2500
10-20%	10:1 to 5:1	100/750	150/1000	200/1000
20-33%	5:1 to 3:1	60/500	80/750	100/1000
33-50%	3:1 to 2:1	40/250	70/350	100/500
>50%	> 2:1	20/125	30/175	50/250

Standard Silt Fence (SF) is fabric rolls stapled to wooden stakes driven 16 inches in the ground.
Reinforced Silt Fence (RSF) is fabric placed against welded wire fabric with anchored steel posts driven 16 inches in the ground.
Super Silt Fence (SSF) is fabric placed against chain link fence as support backing with posts driven 3 feet in the ground.

4. Silt fence shall be removed as soon as the disturbed area has achieved final stabilization.

The silt fence shall be installed in accordance with the appropriate details. Where ends of filter cloth come together, they shall be overlapped, folded and stapled to prevent sediment bypass. Butt joints are not acceptable. A detail of the silt fence shall be shown on the plan. See Figure 5.30 on page 5.56 for Reinforced Silt Fence as an example of details to be provided.

Criteria for Silt Fence Materials

1. Silt Fence Fabric: The fabric shall meet the following specifications unless otherwise approved by the appropriate erosion and sediment control plan approval authority. Such approval shall not constitute statewide acceptance.

Fabric Properties	Minimum Acceptable Value	Test Method
Grab Tensile Strength (lbs)	110	ASTM D 4632
Elongation at Failure (%)	20	ASTM D 4632
Mullen Burst Strength (PSI)	300	ASTM D 3786
Puncture Strength (lbs)	60	ASTM D 4833
Minimum Trapezoidal Tear Strength (lbs)	50	ASTM D 4533
Flow Through Rate (gal/ min/sf)	25	ASTM D 4491
Equivalent Opening Size	40-80	US Std Sieve ASTM D 4751
Minimum UV Residual (%)	70	ASTM D 4355

2. Fence Posts (for fabricated units): The length shall be a minimum of 36 inches long. Wood posts will be of sound quality hardwood with a minimum cross sectional area of 3.5 square inches. Steel posts will be standard T and U section weighing not less than 1.00 pound per linear foot. Posts for super silt fence shall be standard chain link fence posts.

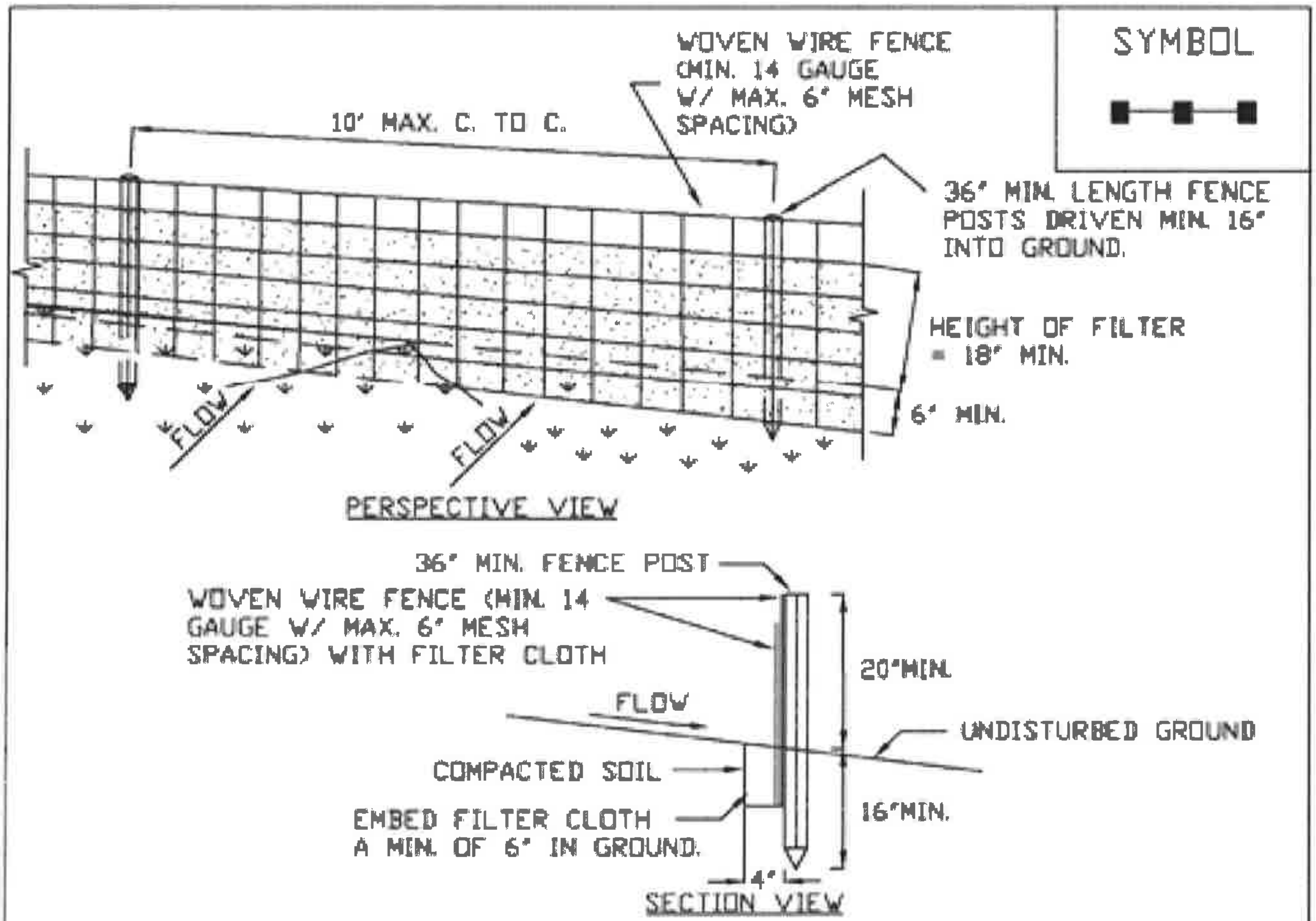
3. Wire Fence for reinforced silt fence: Wire fencing shall be a minimum 14 gage with a maximum 6 in. mesh opening, or as approved.

4. Prefabricated silt fence is acceptable as long as all material specifications are met.

Reinforced Silt Fence

Super Silt Fence

Figure 5.30
Reinforced Silt Fence



CONSTRUCTION SPECIFICATIONS

1. WOVEN WIRE FENCE TO BE FASTENED SECURELY TO FENCE POSTS WITH WIRE TIES OR STAPLES. POSTS SHALL BE STEEL EITHER "T" OR "U" TYPE OR HARDWOOD.
2. FILTER CLOTH TO BE FASTENED SECURELY TO WOVEN WIRE FENCE WITH TIES SPACED EVERY 24" AT TOP AND MID SECTION. FENCE SHALL BE WOVEN WIRE, 6" MAXIMUM MESH OPENING.
3. WHEN TWO SECTIONS OF FILTER CLOTH ADJOIN EACH OTHER THEY SHALL BE OVER-LAPPED BY SIX INCHES AND FOLDED. FILTER CLOTH SHALL BE EITHER FILTER X, MIRAFI 100X, STABILINKA T140N, OR APPROVED EQUIVALENT.
4. PREFABRICATED UNITS SHALL MEET THE MINIMUM REQUIREMENTS SHOWN.
5. MAINTENANCE SHALL BE PERFORMED AS NEEDED AND MATERIAL REMOVED WHEN "BULGES" DEVELOP IN THE SILT FENCE.

ADAPTED FROM DETAILS PROVIDED BY: USDA - NRCS, NEW YORK STATE DEPARTMENT OF TRANSPORTATION, NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION, NEW YORK STATE SOIL & WATER CONSERVATION COMMITTEE	REINFORCED SILT FENCE

APPENDIX K

Sample Inspection Reports

Pre-Construction Site Assessment Checklist Page 1 of 2

Name of Permitted Facility:	Permit Identification #: NYR	Date of Authorization:
Location:	SDC Project No.:	
Name and Telephone Number of Owner/Operator:	Name and Telephone Number of Site Inspector:	
Today's date: Day: S M T W T F S AM or PM	Weather / Temp:	

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

Yes	No	NA	Observations
			Has a Notice of Intent been filed with the NYS Department of Conservation?
			Is the SWPPP on-site? Where? ________________
			Is the Plan current? What is the latest revision date? ________________
			Is a copy of the NOI (with brief description) on-site? Where? ________________
			Have all contractors involved with stormwater-related activities signed a contractor's certification?

2. Resource Protection:

Yes	No	NA	Observations
			Are construction limits clearly flagged or fenced?
			Important trees and associated rooting zones, on-site septic system absorption fields, existing vegetated areas suitable for filter strips, especially in perimeter areas, have been flagged for protection.
			Creek crossings installed prior to land-disturbing activity, including clearing and blasting.

3. Surface Water Protection:

Yes	No	NA	Observations
			Clean stormwater runoff has been diverted from areas to be disturbed.
			Bodies of water located either on-site, or in the vicinity of the site, have been identified or protected.
			Appropriate practices to protect on-site or downstream surface water are installed.
			Are clearing and grading operations divided into areas < 5 acres?

Pre-Construction Site Assessment Checklist Page 2 of 2

4. Stabilized Construction Entrance:

Yes	No	NA	Observations
			A temporary construction entrance to capture mud and debris from construction vehicles before they enter the public highway has been installed.
			Other access areas (entrances, construction routes, equipment parking areas) are stabilized immediately as work takes place with gravel or other cover.
			Sediment tracked onto public streets is removed or cleaned on a regular basis.

5. Perimeter Sediment Controls:

Yes	No	NA	Observations
			Silt fence material and installation comply with the standard drawing and specifications.
			Silt fences are installed at appropriate spacing intervals.
			Sediment/detention basin was installed as first hand disturbing activity.
			Sediment traps and barriers are installed.

6. Pollution Prevention for Waste and Hazardous Materials:

Yes	No	NA	Observations
			The Operator or designated representative has been assigned to implement the spill prevention avoidance and response plan.
			The plan is contained in the SWPPP on page ________________.
			Appropriate materials to control spills are on-site. Where?______________________________.

Note: Provide comments below as necessary:

____
____
____
____
____
____

Construction Duration Inspections: Page 1 of 6

Name of Permitted Facility:	Permit Identification #: NYR	Date of Authorization:
Location:	SDC Project No.:	
Name and Telephone Number of Owner/Operator:	Name and Telephone Number of Site Inspector:	
Today's date: Day: S M T W T F S AM or PM	Weather / Temp:	

Permit Reference: Part IV.C.2.a (page 17):

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

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

Required Elements:

(1) On a site map, indicate the extent of all disturbed site areas and drainage pathways. Indicate site areas that are expected to undergo initial disturbance or significant site work within the next 14-day period;
(2) Indicate on a site map all areas of the site that have undergone temporary or permanent stabilization;
(3) Indicate all disturbed site areas that have not undergone active site work during the previous 14-day period;
(4) Inspect all sediment control practices and record the approximate degree of sediment accumulation as a percentage of sediment storage volume (for example, 10 percent, 20 percent, 50 percent);
(5) Inspect all erosion and sediment control practices and record all maintenance requirements such as verifying the integrity of barrier or diversion systems (earthen berms or silt fencing) and containment systems (sediment basins and sediment traps). Identify any evidence of rill or gully erosion occurring on slopes and any loss of stabilizing vegetation or seeding/mulching. Document any excessive deposition of sediment or ponding water along barrier or diversion systems. Record the depth of sediment within containment structures, any erosion near outlet and overflow structures, and verify the ability of rock filters around perforated riser pipes to pass water; and

Immediate report to the Operator any deficiencies that are identified with the implementation of the SWPPP.

Construction Duration Inspections: Page 2 of 6

Identify location, nature of work, by contractor and subcontractors for each operation:

PLAN / SKETCH

Inspector (print name) Date of Inspection

Qualified Professional (print name) Qualified Professional Signature

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

Construction Duration Inspections: Page 3 of 6

Maintaining Water Quality

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

Housekeeping

1. General Site Conditions

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

2. Temporary Stream Crossing

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

Runoff Control Practices

1. Excavation Dewatering

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

2. Level Spreader

Yes	No	NA	Observations
			Installed per plan.
			Constructed on undisturbed soil, not on fill, receiving only clean, non-sediment laden flow.
			Flow sheets out of level spreader without erosion on downstream edge.

Construction Duration Inspections: Page 4 of 6

3. Interceptor Dikes and Swales

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

4. Stone Check Dam

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

5. Rock Outlet Protection

Yes	No	NA	Observations
			Installed as per Plan
			Installed concurrently with pipe installation.

Soil Stabilization

1. Topsoil and Spoil Stockpiles

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

2. Revegetation

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

Sediment Control Practices

1. Stabilized Construction Entrance

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

Construction Duration Inspections: Page 5 of 6

2. Silt Fence - Sediment accumulation is _____ % of design capacity.

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

3. Storm Drain Inlet Protection (Use for Stone & Block; Filter Fabric; Curb; or, Excavated practices) -
Sediment accumulation ____% of design capacity.

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

4. Temporary Sediment Trap - Sediment accumulation is _____% of design capacity.

Yes	No	NA	Observations
			Outlet structure is constructed per the approved plan or drawing.
			Geotextile fabric has been placed beneath rock fill.

5. Temporary Sediment Trap - Sediment accumulation is _____% of design capacity.

Yes	No	NA	Observations
			Basin and outlet structure constructed per the approved plan.
			Basin side slopes are stabilized with seed/mulch.
			Drainage structure flushed and basin surface restored upon removal of sediment basin facility.

Recommended maintenance or additional measures:

____

____

____

____

____

Notes or Comments: 914-318-7681

____

____

____

Construction Duration Inspections: Page 6 of 6

Modifications to the SWPPP
(To be completed as described below)

The Operator shall amend the SWPPP whenever:

1. There is a significant change in design, construction, operation, or maintenance which may have a significant effect on the potential for the discharge of pollutants to the waters of the United States and which has not otherwise been addressed in the SWPPP; or
2. The SWPP proves to be ineffective in:
   a. Eliminating or significantly minimizing pollutants from sources identified in the SWPPP and as required by this Permit; or
   b. Achieving the general objectives of controlling pollutants in stormwater discharges from permitted construction activity; and
3. Additionally, the SWPPP shall be amended to identify any new contractor or subcontractor that will implement any measure of the SWPPP.

Modification and Reason:

Stormwater Management Pond/Wetland Construction Inspection Checklist Page 1 of 8

Name of Permitted Facility:	Permit Identification #: NYR	Date of Authorization:
Location:	SDC Project No.:	
Name and Telephone Number of Owner/Operator:	Name and Telephone Number of Site Inspector:	
Today's date: Day: S M T W T F S AM or PM	Weather / Temp:	

Permit Reference: Part IV.C.2.a (page 17):

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

Construction Sequence	Satisfactory/ Unsatisfactory	Comments
1. Pre-Construction / Materials and Equipment		
Pre-Construction Meeting		
Pipe and appurtenances on-site prior to construction and dimensions checked.		
1. Material (including protective coating, if specified).		
2. Diameter.		
3. Dimensions of metal riser or pre-cast concrete outlet structure.		
4. Required dimensions between water control structures (orifices, weirs, etc.) are in accordance with approved plans.		
5. Barrel stub for prefabricated pipe structures at proper angle for design barrel slope.		

Post-Development Stormwater Management Practice Construction Inspection Checklist Page 2 of 8

Construction Sequence	Satisfactory/ Unsatisfactory	Comments
6. Number and dimensions of prefabricated anti-seep collars.		
7. Watertight connectors and gaskets.		
8. Outlet drain valve.		
Project benchmark near pond site.		
Equipment for temporary de-watering.		
2. Subgrade Preparation		
Area beneath embankment stripped of all vegetation, topsoil and organic matter.		
3. Pipe Spillway Installation		
Method of installation details on plans.		
A. Bed Preparation		
Installation trench excavated with specified side slopes.		
Stable, uniform, dry subgrade of relatively impervious material. (If subgrade is wet, contractor shall have defined steps before proceeding with installation.)		
Invert at proper elevation and grade.		
B. **Pipe Placement - Metal / Plastic**		
1. Watertight connectors and gaskets properly installed.		
2. Anti-seep collars properly spaced and having watertight connections to pipe.		
3. Backfill placed and tamped by hand under "haunches" of pipe.		

Post-Development Stormwater Management Practice Construction Inspection Checklist

Construction Sequence	Satisfactory/ Unsatisfactory	Comments
4. Remaining backfill placed in max. 8 inch lifts using small power tamping equipment until 2-feet of cover over pipe is reached.		
Pipe Placement - Concrete Pipe		
1. Pipe set on blocks or concrete slab for pouring of low cradle.		
2. Pipe installed with rubber gasket joints with no spalling in gasket interface area.		
3. Excavation for lower half of anti-seep collars(s) with reinforcing steel set.		
4. Entire area where anti-seep collars(s) will come in contact with pipe coated with mastic or other approved waterproof sealant.		
5. Low cradle and bottom half of anti-seep collar installed as monolithic pour and of an approved mix.		
6. Upper half of anti-seep collars(s) formed with reinforcing steel set.		
7. Concrete for collar of an approved mix and vibrated into place (protected from freezing while curing, if necessary).		
8. Forms stripped and collar inspected for honeycomb prior to		

backfilling. Purge if necessary.		

Post-Development Stormwater Management Practice Construction Inspection Checklist Page 4 of 8

Construction Sequence	Satisfactory/ Unsatisfactory	Comments
C. Backfilling		
Fill placed in maximum 8-inch lifts.		
Backfill taken minimum 2-feet above top of anti-seep collar elevation before traversing with heavy equipment.		
4. Riser / Outlet /Structure Installation		
Riser located within embankment.		
A. Metal riser		
1. Rise base excavated or formed on stable subgrade to design dimensions.		
2. Set on blocks to design elevations and plumbed.		
3. Reinforcing bars placed at right angles and projecting into sides of riser.		
4. Concrete poured as to fill inside of riser to invert of barrel.		
B. Pre-Cast Concrete Structure		
1. Dry and stable elevation.		
2. Riser base set to design elevation.		
3. If more than one section, no spalling in gasket interface area; gasket or approved caulking material placed securely.		
4. Watertight and structurally sound collar or gasket joint where structure connects to pipe spillway.		

Post-Development Stormwater Management Practice Construction Inspection Checklist Page 5 of 8

Construction Sequence	Satisfactory/ Unsatisfactory	Comments
C. Poured Concrete Structure		
Footing excavated or formed on stable subgrade, to design dimensions with reinforcing steel set.		
Structure formed to design dimensions, with reinforcing steel set as per Plan.		
Concrete of an approved mix and vibrated into place (protect from freezing while curing, if necessary).		
Forms stripped and inspected for "honeycomb" prior to backfilling; parge if necessary.		
5. Embankment Construction		
Fill Material		
Compaction		
Embankment		
1. Fill placed in specified lifts and compacted with appropriate equipment.		
2. Constructed to design cross-section , side slopes and top width.		
3. Constructed to design elevation plus allowance for settlement.		
6. Impounded Area Construction		
Excavated / graded to design contours and side slopes.		
Inlet pipes have adequate outfall protection.		
Forebay(s).		
Pond benches.		

Post-Development Stormwater Management Practice Construction Inspection Checklist Page 6 of 8

Construction Sequence	Satisfactory/ Unsatisfactory	Comments
7. Earth Emergency Spillway Construction		
Spillway located in cur or structurally stabilized with riprap, gabions, concrete, etc.		
Excavated to proper cross-section, side slopes and bottom width.		
Entrance channel, crest, and exit channel constructed to design grades and elevations.		
8. Outlet Protection		
A. End Section		
Securely in place and properly backfilled.		
B. Endwall		
Footing excavated or formed on stable subgrade, to design dimensions and reinforcing steel set, if specified.		
Endwall formed to design dimensions with reinforcing steel set as per Plan.		
Concrete of an approved mix and vibrated into place (protected from freezing, if necessary).		
Forms stripped and structure inspected for “honeycomb” prior to backfilling; parge if necessary.		
C. Riprap Apron / Channel		
Apron / Channel excavated to design cross-section with proper transition to existing ground.		

Post-Development Stormwater Management Practice Construction Inspection Checklist

Construction Sequence	Satisfactory/ Unsatisfactory	Comments
Filter fabric in place.		
Stone sized as per Plan and uniformly placed at the thickness specified.		
9. Vegetative Stabilization		
Approved seed mixture or sod.		
Proper surface preparation and required soil amendments.		
Excelsior mat or other stabilization, as per Plan.		
10. Miscellaneous		
Drain for ponds having a permanent pool.		
Trash rack / anti-vortex device secured to outlet structure.		
Trash protection for low flow pipes, orifices, etc.		
Fencing (when required).		
Access road.		
Set aside for clean-out maintenance.		
11. Stormwater Wetlands		
Adequate water balance.		
Variety of depth zones present.		
Approved pondscaping plan in place. Reinforcement budget for additional plantings.		
Plants and materials ordered 6 months prior to construction.		
Construction planned to allow for adequate planting and establishment of plant community (April-June planting window).		

Wetland buffer area preserved to maximum extent possible.		

Post-Development Stormwater Management Practice Construction Inspection Checklist

Comments:

Actions to be Taken:

APPENDIX L

Schedule "B"

DECLARATION OF COVENANTS, CONDITIONS, AND RESTRICTIONS FOR

1005 Hanover Street

DECLARATION made as of the ___ day of _____, 2017, by the property owner with an address at 4165 Browns Mill Road, Alexander, NY 14005 (hereinafter referred to as the "Declarant").

W I T N E S S E T H:

WHEREAS, Declarant is the owner of all that certain lot, piece or parcel of land situate, lying and being in the Town of Yorktown Heights, County of Westchester and State of New York, being designated as Section 59.07, Block 1 and Lot 7 as shown on that certain map entitled "[filed map name]" which was filed in the Office of the County Clerk of Westchester County on [________] as Filed Map No. [_________] and which is more accurately bounded and described in the deed attached hereto as Exhibit 1 (the "Property"); and

WHEREAS, Declarant plans to undertake or is undertaking plans for the development or sale of land that will result in construction of an impervious surface in the East of Hudson Watershed as referenced in the *Rules and Regulations for the Protection from Contamination, Degradation and Pollution of the New York City Water Supply and Its Sources*, Title 10 New York Codes, Rules and Regulations Part 128-3.9(b)(3)(x); Title 15 Rules of the City of New York Chapter 18-39(b)(3)(x) ("Watershed Regulations"); and

WHEREAS, the Watershed Regulations require Declarant to prepare a Stormwater Pollution Prevention Plan ("SWPPP") and submit the SWPPP to the New York City Department of Environmental Protection ("DEP") for its review and approval so that stormwater generated by precipitation during and after soil disturbing activities and runoff from newly created impervious surfaces is captured and treated, thus reducing or eliminating a pollution discharge; and

WHEREAS, Declarant has submitted a SWPPP application to DEP for the Property described above, 1005 Hanover Street (number TBD), and received an approval from DEP for such SWPPP, dated ________, such SWPPP approval and the maintenance obligations being attached hereto as Exhibit 2; and

WHEREAS, Declarant desires to declare the following covenants, conditions and restrictions to govern the future development, use and maintenance of any lots that are part of the Property that may be conveyed to future owners, including the Declarant's respective heirs, successors, and assigns, and to subject any deed of conveyance of any such lots to this Declaration, by reference thereto, to the covenants, conditions and restrictions described herein,

NOW, THEREFORE, Declarant hereby declares that the Property shall be held, sold, conveyed, transferred and occupied subject to the following covenants, conditions, and restrictions which are for the benefit of the City of New York as well as for the owners of the Property and which shall be perpetual so long as the provisions of the SWPPP continue to be required by the Watershed Regulations, shall run with the Property and be binding on the Declarant, its heirs, successors and assigns and be binding upon each successive owner of any Property parcel or lot described in the subdivision plan and the heirs, successors and assigns of each subsequent party having or acquiring any right, title or interest in the Property or any part thereof.

1. Declarant hereby acknowledges, covenants, warrants, and represents that it shall install and maintain any and all erosion and sediment controls and stormwater management practices on the Property in accordance with the SWPPP approved by DEP, dated _______, and any and all amendments to the SWPPP that may be required and that DEP may approve.

2. Declarant's installation and maintenance of the erosion and sediment controls and stormwater management practices shall be for the benefit of the City of New York as well as for the owners of the Property.

3. Declarant's obligation to install and maintain any and all erosion and sediment controls and stormwater management practices on the Property in accordance with the DEP-approved SWPPP and any and all amendments to the SWPPP that DEP may approve shall be perpetual so long as the provisions of the SWPPP continue to be required by the Watershed Regulations.

4. Declarant hereby acknowledges, covenants and warrants that this Property shall be subject to the maintenance obligations set forth and described in the SWPPP, with respect to any stormwater management practices or treatment of runoff located on areas commonly owned by multiple property owners or a homeowners' association in the subdivision.

5. Declarant hereby covenants, warrants, and represents that any lease, mortgage, subdivision, or other transfer of the Property, or any interest therein, shall be subject to the restrictive covenants contained herein pertaining to the installation and maintenance of erosion and sediment control and stormwater management practices, and any deed, mortgage, or other instrument of conveyance shall be subject to and, specifically refer to, the attached SWPPP approval and shall specifically state that the interest thereby conveyed is subject to the covenants and restrictions contained herein and therein.

6. These covenants, conditions and restrictions shall be recorded at the Office of the County Clerk, shall run with the land and shall apply to, inure to the benefit of, and bind the Declarant and all subsequent heirs, executors, administrators, successors and assigns.

IN WITNESS WHEREOF, Declarant has executed this document on the date first above written.

____

Signature

STATE OF NEW YORK)
)
COUNTY OF ____________)

On ________________, 20__, before me, the undersigned, a Notary Public in and for said State, personally appeared __________________, personally known to me or proved to me on the basis of satisfactory evidence to be the individual whose name is subscribed to the within instrument and acknowledged to me that he executed the same in his/her capacity, and that by his/her capacity, and that by his/her signature on the instrument, the individual, or the person upon behalf of which the individual acted, executed the instrument.

____

Notary Public

Exhibit 1

Exhibit 2

Control to be Inspected	Inspection Frequency	Maintenance Threshold Criteria	Maintenance Procedure
Rain garden	Quarterly	Ponding for more than 48 hrs	Remove Accumulated sediment and debris; weed and replace plants and mulch as needed.
Porous Pavers	Annually	Paving does no dewater between storms	Pavers shall be swept and vacuumed annually. When pavers stop dewatering, clean area of debris and sediment; vacuum sweep area.
Pocket Wetland	Quarterly	Ponding for more than 48 hours above permanent pool	Remove Accumulated Sediment and debris. Weed and replace plants and mulch as needed. Clean outlet orifice of debris.
Swales	Semi-Annually	Debris and leaves and sediment at 5%	Remove debris and sediment Semi-Annually

APPENDIX M

Project Plans