# APPENDIX A

# STORMWATER POLLUTION PREVENTION PLAN

# WARWICK VIEWS

## CLUSTER SUBDIVISION

TOWN OF WARWICK
ORANGE COUNTY, NY

## STORMWATER POLLUTION PREVENTION PLAN

August 2008
Rev. June 2009

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Warwick, NY 10990
845-988-0620

# Warwick Views
# Blooms Corners Road, Town of Warwick
# Orange County, New York

## Owner's Certification Statement

(To be signed by Project Owner)

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information including the possibilities of fine and imprisonment for knowing violations.

_____
Owner Name Print

_____

_____
Owner Address

_____
Contact #

X_____
Owner Signature

# Warwick Views
# Blooms Corners Road, Town of Warwick
# Orange County, New York

## Contractor's Certification Statement

(To be signed by all Contractors and Sub-Contractors performing earthwork)

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

X_____
Contractor's Name

_____ _____
Contractor's Address Phone #

_____ _____
Responsible Agent's Name (Print) Responsible Agent's Title

_____ _____
Responsible Agent's Signature Date

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X_____
Contractor's Name

_____ _____
Contractor's Address Phone #

_____ _____
Responsible Agent's Name (Print) Responsible Agent's Title

_____ _____
Responsible Agent's Signature Date

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X_____
Contractor's Name

_____ _____
Contractor's Address Phone #

_____ _____
Responsible Agent's Name (Print) Responsible Agent's Title

_____ _____
Responsible Agent's Signature Date

## TABLE OF CONTENTS



### APPENDICES

## SECTION I. SUMMARY

This Storm Water Pollution Prevention Plan shall serve to accompany maps entitled "Warwick Views", a proposed 53 lot cluster subdivision comprising approximately 249 +/- acres of land situated on the west side of Bloom Corners Road approximately 2000 feet south of the intersection with County Route 1A. The parcel is identified as Section 27, Block 1, Lots 41.131, 47 and 48.1 on current Town of Warwick Tax Maps. The parcel lies entirely within the Town of Warwick "RU" Zoning District.

The site is currently a mix of woodland, agricultural fields using for the growing of hay and a Class III NYS DEC Freshwater wetland. Included within the wetlands is an unnamed class "C" tributary to Quaker Creek. Areas of rock outcrops can be found in the woodlands lying in the northern and western portions of the site with several former agricultural structures situated in the north eastern extremity.

The Warwick Views subdivision is proposed as a cluster subdivision which places 52 single family residential lots on approximately 89 acres of the 249 acre holding. Of the 89 acres slated to be either individual lots or associated infrastructure, total disturbance is limited to approximately 41 acres. Access to the proposed lots will be by proposed roadways, some of which are slated for dedication to the Town for use as public streets and others which will remain as private roads. The total length of proposed 24 ft. wide Town road is computed at approximately 6,020 LF with the proposed 20 ft wide private roads adding an additional 1,033 feet. Roadways have been designed to interconnect with adjacent properties where practical. Dead end roadways will terminate in cul-de-sacs having vegetated islands. A 53$^{rd}$ lot is proposed as a parcel slated for potential continuation of former agricultural activities in combination with one single family dwelling.

A Yield Subdivision Plan has been prepared and reviewed by the Town of Warwick Planning Board for the purpose of determining the maximum potential development of the site per current Town of Warwick Zoning. In accordance with the Town's Zoning

Ordinance, the applicant and the Town of Warwick Planning Board have determined that a cluster subdivision would be pursued to preserve the scenic and rural qualities of the Town, preserve open space promote continued agricultural activities and preserve and protect environmentally sensitive areas such as freshwater wetlands and steep slopes. Cluster development creates the added benefit of minimizing impacts from stormwater run-off by decreasing imperviousness and reducing disturbance during construction. Areas of natural of woodlands and meadows are also permanently preserved post construction. 49 Lots are depicted on the Warwick Views Yield Subdivision Plan. Four additional lots are mandated by the Town of Warwick Zoning Law as affordable housing, resulting in a total of 53 Lots.

The Warwick Views cluster subdivision design was completed utilizing the principles of low impact development wherever possible. Included is the preservation of approximately 173 acres of the site, or approximately 70%, as open space. Decreased impervious areas are accomplished by shortening of roadways and driveway lengths. Proposed roadway lengths have been reduced by over 50% when compared to a conventional subdivision design. Avoidance of wetlands to the greatest extent possible has been accomplished by placing one wetland crossing at the narrowest point of the wetland system, which also lies at the wetlands headwater thereby minimizing fragmentation of the wetland. Road and lot layout has been done in such a manner as to work with the existing terrain and existing treelines to the greatest extent possible thereby decreasing the site grading and preserving vegetative cover and wildlife corridors. Practices identified in the NYS Department of Environmental supplemental document entitled "Better Site Design" have also considered with the majority of the identified practices having been incorporated into the project which include the preservation of undisturbed areas and buffers, a reduction of clearing and grading, the placement of homes in less environmentally sensitive areas, open space preservation, roadway, driveway and cul-de-sac reduction and the use of vegetated channels and bio-retention (rain garden) water quality measures.

A full Stormwater Analysis has been performed and Stormwater quantity and quality measures shall be implemented in accordance with New York State Department of

Environmental Conservation SPDES Permit #GP-OO8-OO1 guidelines for general construction activities. Stormwater management is accomplished via an open storm drain infrastructure which will convey stormwater runoff into multiple wet stormwater management ponds. Conveyance to the wet ponds will primarily accomplished by a system of vegetated channels and culverts. Where feasible, water quality measures will also be implemented on individual lots by means of bio retention facilities, or rain gardens, with the layering of these multi stormwater management techniques resulting in a 'stormwater treatment train' which enhances the effects of the individual measures.

Ponds have been designed in accordance with NYS DEC Design Guidelines as Type "P2" wet ponds which have been chosen for their "good" capability class for residential subdivisions and their ability to provide for 100% of the Water Quality Volume. Detention is provided to limit peak post developed flow rates to pre developed levels. A TR-20 Hydrologic Stormwater Analysis has been performed for the 1, 2, 10, 25, 50 and 100-year storm events as requested by the Town of Warwick Planning Board, although the stormwater management design is based on the design storms established by the New York State Department of Environmental Conservation SPDES permit, namely the 1, 10 and 100 year storms. Attenuation of the peak discharge rates for the aforementioned storms will satisfy the New York State Department of Environmental Conservation SPDES permit criteria for Channel Protection ($Cp_v$, 1 year storm), Over bank Flood Control ($Q_p$, 10 year storm) and Extreme Flood Control ($Q_f$, 100 year storm). A detailed site description can be found in Section II of this report and a detailed stormwater quantity description found in Section III. Supporting TR-20 hydrologic data located in Appendix "C" with Drainage Basin Maps depicting the pre & post developed conditions located in Appendix "H". Stormwater conveyance infrastructure has been sized to safely accommodate flow rates for the 10 year storm per Department of Environmental Conservation Design Guidelines, as well as the 25 year storm per Town of Warwick requirements.

Water quality permanent pools within the Type "P2" ponds have been sized in accordance with guidelines for Water Quality Volume ($WQ_v$) as required for treatment of first flush from all impervious areas for sediment and pollutant removal. A more detailed discussion

of water quality can be found in Section IV of this report. Water quality sizing calculations can be found in Appendix "B".

Erosion control will be accomplished via means of temporary and permanent erosion control measures which are discussed in more detail in Section V of this report. The design and placement of the erosion control practices can be found on the "Erosion Control Plan" of the Warwick Views Subdivision Plan set with associated construction details included. Erosion control measures shall be inspected by a qualified professional at least once every seven days. Defects noted shall be repaired immediately. Weekly inspection logs shall be kept at the project site and made available for review by the Regulatory Agency having jurisdiction.

Maintenance of erosion control measures will be the responsibility of the owner-operator during the construction phase of the project. Permanent erosion control measures, as well as the permanent stormwater management facilities will be maintained by either the Town of Warwick or the Warwick Views Homeowners association. It is proposed that the primary roads be dedicated to the Town of Warwick for use as public streets. Maintenance of the drainage infrastructure within the right of way of those areas of proposed town roads will be the responsibility of the Town of Warwick, Department of Public Works. Maintenance of drainage infrastructure associated with secondary roads including private roads and common driveways, as well as the stormwater management facilities lying outside of the proposed Town road right of ways, which includes the management ponds and on lot rain gardens, will be the responsibility of the homeowner's within the subdivision through the homeowners association. Deeded declarations alerting the homeowners within the subdivision to the maintenance requirements will be recorded with the Town of Warwick and Orange County Clerk. A backup drainage district will also be created giving the Town of Warwick the right to perform the required stormwater maintenance in the event the Homeowner's Association defaults.

A "Notice of Intent" will be completed and filed with the New York State Department of Environmental Conservation prior to construction to obtain general permit coverage. A

copy of the Notice of Intent can be found in Appendix "A". Permit coverage will commence after five business days of filing the Notice.

All contractors and subcontractors involved in activities which will result in site disturbance, or effect stormwater runoff, shall familiarize themselves with both this written "Stormwater Pollution Prevention Plan Narrative" and the water quality, quantity and erosion control measures shown on the approved Subdivision Plan. Said parties shall attest to their familiarity with the Stormwater Pollution Prevention Plan by signing of the written certification found herein. A copy of the approved Subdivision Plan, this written Storm Water Pollution Prevention Plan Narrative, signed Contractor Certification Statement, completed Notice of Intent, Department of Environmental Conservation acknowledgement of receipt of the Notice of Intent and Maintenance Inspection Checklists shall be kept at the construction site and made available for review to regulatory agencies. Upon completion of construction activities, a "Notice of Termination" shall be filed with the New York State Department of Environmental Conservation to terminate General Permit coverage.

Utilizing the above best management practices, storm water quality objectives shall meet or exceed those required by the New York State Department of Environmental Conservation SPDES Permit while also satisfying some of the enhanced stormwater management objectives associated with low impact development and "Better Site Design"

## SECTION II. PROJECT DESCRIPTION

The Warwick Views subdivision proposes a 53 lot cluster subdivision on approximately 249 +/- acres of land situated on Blooms Corners Road within the Town of Warwick. The site is currently a mix of woodland, agricultural fields using for the growing of hay and a Class III NYS DEC Freshwater wetland. Included within the wetlands is an unnamed class "C" tributary to Quaker Creek. Areas of rock outcrops can be found in the woodlands lying in the northern and western portions of the site with several former agricultural structures situated in the north eastern extremity.

This site is currently comprised of approximately 68 acres of farmland, 110 acres of wood land and 72 acres of freshwater wetland and associated buffer areas. Of these 72 acres, approximately 47 acres are the wetland feature with approximately 25 additional acres being the 100 ft. buffer area. The wetlands are identified as inventory #PI-21 and were delineated by Douglas Gaugler of the NYS Department of Environmental Conservation in June of 2005 All wetlands are deemed to be under the jurisdiction of the NYS Department of Environmental Conservation. Proposed wetland disturbance includes permanent disturbance for the creation of a roadway and temporary disturbance for the installation of a water service line from a production well. Computed areas of permanent disturbance are 9840 s.f. of fill in wetlands due to roadway construction with an additional 30,390 s.f. of disturbance to the buffer area due to roadway construction. Temporary disturbance for the water line installation are computed as 8,670 s.f. of temporary disturbance to wetland and 17,820 s.f. of temporary disturbance to buffer.

The existing unnamed tributary to Quaker Creek is a manmade ditch which traverses the wetlands and discharges off site to the north with the southern extents of the project being the head waters of the "stream". The ditch was created to serve prior agricultural activities which include the growing of crops such as corn and onions with these crops consuming the majority of the area currently designed as wetland. The stream has a length of approximately 2560' from the start to its discharge point on the northern property bounds. Based on a review of FEMA Flood Insurance Rate Maps, Warwick, NY Community Panel, there are no mapped floodplains associated with the stream. There is no proposed disturbance to the stream.

A natural gas transmission line easement traverses the property to serve an existing gas transmission line owned by Millennium Pipeline Co. The gas line generally runs through the property in a northwesterly direction from Bloom Corners Road and has a total length of approximately 4280'. It is proposed that the line be crossed in multiple locations with both the town road as well as individual residential driveways. The gas company has been contacted and a Letter of Permission for the proposed crossings has been issued.

USDA Soil Maps depict nine primary soils groups within the entire 249 acre parcel. These complexes include those of the Bath-Nassau soil complex, Canandaigua soil series, Erie soil series, Farmington soil series, Madalin soil series, Mardin soil series, Pittsfield soil series and Rock Outcrop – Farmington soil complex and Swartswood soil series with all soil groups being of Hydrologic Soil Group "C" with the exception of Pittsfield which is of Hydrologic Soil Group B and Madalin of Hydrologic Soil Group D. Within the area to be disturbed are some Class II and Class IV agricultural soils per the NYS Land Classification System, namely soil types PtB and MdB respectively. The computed areas of disturbance are found to be 10.2 acres to the Class II PtB soils with an additional 7.7 acres of disturbance to the Class IV MdB soils.

Slopes within the project vary widely from relatively flat terrain in the wetland areas to steeply sloping undulating ridgelines in the western portions of the site. Based on a 2' Aerial Topographic Survey of the site, approximately 74% of the site contains slopes of less than 15%. 16% of the site has slopes ranging from 15% - 25%, and 10% of the site contains slopes greater than 25%. The 1% discrepancy is due to rounding.

For the purpose of hydrologic analysis, the pre-developed site was divided into several subcatchments. The overall stormwater patterns reveal to distinct watersheds within the parcel. The majority of the site discharges toward the centrally located wetlands to then flow off site to the north via the unnamed tributary to Quaker Creek. Those areas not tributary to the wetlands discharge off site to the west.

Overall site hydrology is not significantly altered in the post developed condition. Prior to discharge into the Quaker Creek tributary, stormwater management including quality and quantity will be accomplished via means of multiple stormwater management measures including rain gardens, vegetated channels, and several wet stormwater management ponds. Changes to vegetative cover conditions will include the removal of vegetation to be replaced by impervious surfaces and other areas such as lawns and landscaping.

## SECTION III. STORMWATER QUANTITY

For the purpose of quantitative stormwater analysis, A TR-20 hydrologic analysis has been completed for all subcatchment areas for the design storms specified. On Site and downstream flood control is accomplished thru the multiple stormwater ponds which have been designed to capture and detain stormwater run-off. Attenuation of run-off from the 1, 10 and 100 year storm events will meet or exceed New York State Department of Environmental Conservation SPDES permit requirements for Channel Protection (Cpv, 1 year storm), Over bank Flood Control (Qp, 10 year storm) and Extreme Flood Control (Qf, 100 year storm). Given the site is comprised on a ridgeline, future discharge from offsite improvements will not be directed toward the Warwick Views stormwater management system so the Ultimate design storm (Qu) is not applicable.

The project was found to contain several sub-catchments as identified on the Pre-developed Drainage Analysis Plan located in Appendix H. The majority of the site lies in a sub-catchment identified as Basin E having an area of approximately 163.4 acres with this sub-catchment encompassing the entire freshwater wetland system, the tributary to Quaker Creek and much of the upland area and discharging offsite to the north. Additional acreage tributary to Basin E include Basin S, containing approximately 31 acres and Basin SE, containing approximately 9.7 acres. Given that the flow paths of these two subcatchments contain slight depressions that allow for the temporary storage of run-off, they were modeled as separate subcatchments. The analysis point of the cumulative effect of the three subcatchments identified above is taken as the discharge point of the unnamed tributary to Quaker Creek at the northern property line. This point is identified as Analysis Point E. A forth subcatchment, identified as Basin NE and containing approximately 16.8 acres also discharges off site to the north with it's discharge point coinciding with the unnamed Quaker creek tributary approximately 400 feet north of the northerly property bounds. The discharge point at the property line is identified as Analysis Point NE.

The balance of the site is primarily comprised of two additional subcatchments identified as Basin N, containing approximately 28.1 acres which includes some off site tributary areas, and Basin W containing approximately 36.7 acres. Basin N discharges off site to the

north with its discharge point being identified as Analysis Point N. Basin W discharges off site to the west with its' discharge point at the westerly property line identified as Analysis Point W. A couple of other small pockets of land not directly tributary to the primary subcatchments identified above also exist, however, given their size and unchanged condition in the post developed state, in depth discussion is not warranted. For the purposes of stormwater analysis all vegetative cover conditions were deemed to be in good hydrologic condition.

As mentioned previously, stormwater management will primarily be accomplished via several type "P2" wet stormwater management ponds. The wet ponds provide for attenuation of peak flow rates for the respective design storms by incorporating outlet control structures which control the rate of release of stormwater run-off. A TR-20 hydrologic analysis has been completed for all subcatchment areas for the design storms specified. A table summarizing the peak flow rates at the analysis points for the 1-,2-, 10-, 25-, 50- and 100- year storms for both the pre and post developed conditions in the subcatchments that are affected by the proposed improvements follows;

**Pre Developed Peak Flow Rates**

| Analysis Point | Design Year Flowrate, cfs | | | | | |
|---|---|---|---|---|---|---|
| | 1 Year | 2 Year | 10 Year | 25 Year | 50 Year | 100 Year |
| AP E | 86.5 | 134 | 319 | 419 | 471 | 575 |
| AP NE | 12.6 | 18 | 40 | 52 | 57 | 69 |
| AP N | 21.1 | 31 | 70 | 90 | 100 | 121 |
| AP W | 19.5 | 30 | 72 | 95 | 106 | 130 |

**Post Developed Peak Flow Rates**

| Analysis Point | Design Year Flowrate, cfs | | | | | |
|---|---|---|---|---|---|---|
| | 1 Year | 2 Year | 10 Year | 25 Year | 50 Year | 100 Year |
| AP E | 71± | 118± | 294± | 390± | 456± | 569± |
| AP NE | 12± | 18± | 39± | 51± | 57± | 69± |
| AP N | 19± | 29± | 67± | 87± | 97± | 120± |
| AP W | 18± | 27± | 66± | 89± | 102± | 127± |

When compared to the pre developed peak flow rates, the post developed flow rates are found to be below pre developed levels for all analyzed storm events. The above post developed figures are based on a preliminary hydrologic analysis of the post developed site and may change as the final subdivision plans are developed. Given the decrease in peak flow rates for the post developed storm, site receiving waters can be expected to adequately assimilate the stormwater discharge from the proposed subdivision.

## SECTION IV. STORMWATER QUALITY

The Best Management practices incorporated into the Warwick Views subdivision for management of post developed stormwater quality include infrastructure comprised of multiple stormwater management devices consisting of on lot rain gardens, vegetated open channel conveyance systems and multiple wet stormwater management ponds. Pre treatment of sediment and pollutants will occur at the source through the use of rain gardens on some of the individual lots followed by vegetated or rip rap lined roadside swales. Further water quality will occur at the major stormwater management facilities consisting primarily of type "P-2" wet stormwater management ponds which provide for 100% of the water quality volume within the permanent pool. The layering of these various treatment mechanisms result in a 'stormwater treatment train' which enhances the effects of individual treatment methods.

Wet storm water management ponds are rated "good" in the capability class matrix found in the *"NYS Stormwater Design Manual"* and were chosen as the primary means of meeting the water quality objectives given their performance. Of the various pond types available, Type "P-2" ponds accommodate 100% of the water quality volume within the permanent pool. Alternate pond choices allow for partial provision of the water quality volume requirement, however, the more conservative type P-2 pond design was incorporated into the subdivision partially because of the site's direct discharge into State Wetlands and the unnamed tributary to Quaker Creek. Within the ponds themselves, pre-treatment for sediment pollutants will be accomplished by means of a sediment forebay located at each pond in-fall. A deep pool is to be constructed at the outlet of the pond to further promote settling of suspended solids and avoid clogging of the low flow orifice within the Outlet Control Structure.

The aforementioned practices have been sized in accordance with the requirements set forth in the aforementioned design manual for Water Quality Volume ($WQ_v$) in which a properly designed and maintained water quality measure can be expected to adequately meet sediment and pollutant removal objectives for 90% of the average annual stormwater runoff volume

Details depicted the construction of the ponds can be found within the Warwick Views Subdivision Plan set. Additional criteria regarding the construction and maintenance of the above can be found in Appendices "D" & "E" of this report.

In addition to the analysis typically required by the SPDES general permit, a pollutant-loading analysis utilizing the Simple Method as outlined in a publication entitled *"Controlling Urban Runoff: A Practical Manual for Planning and Designing Urban BMPs"* has been prepared per a request by the Town of Warwick Planning Board. The analysis studies the potential pollutant loads from the subdivision as relates to the following pollutants: BOD, COD, TSS, TDS, total phosphorous, total nitrogen, lead, copper, and zinc (data for cadmium could not be found). For the purpose of the analysis, the area of the proposed disturbance, computed as approximately 41.2, acres was used as

the comparative acreage given that the remaining project acreage is to remain undisturbed. For the existing condition, values published for the various pollutants under the use classification of "Hardwood Forrest" were used, with post developed pollutant loading values for the various pollutants being taken from the use classification "New Suburban" site. The values used can be found in the publication entitled "*Reducing the Impacts of Stormwater Runoff from New Development*", as published by the NYS Department of Environmental Conservation. A table summarizing the results of the Simple Method analysis follows;

| EXISTING CONDITIONS | TSS mg/l | TP mg/L | TN mg/l | Cu mg/l | Pb mg/l | Zn mg/l | COD mg/l | BOD mg/l | TDS |
|---|---|---|---|---|---|---|---|---|---|
| "C" Value | 51 | 0.15 | 0.78 | 0 | 0 | 0 | 40 | - | 415 |
| Area (acres) | 41.2 | 41.2 | 41.2 | 41.2 | 41.2 | 41.2 | 41.2 | 41.2 | 41.2 |
| Run off (inches) | 4.32 | 4.32 | 4.32 | 4.32 | 4.32 | 4.32 | 4.32 | 4.32 | 4.32 |
| Unit Conv. Factor | 0.226 | 0.226 | 0.226 | 0.226 | 0.226 | 0.226 | 0.226 | 0.226 | 0.226 |
| Annual Load (lbs) | 2,051 | 6 | 31 | 0 | 0 | 0 | 1,609 | 0 | 16,693 |

| NEW SUBURB SITE | TSS mg/l | TP mg/L | TN mg/l | Cu mg/l | Pb mg/l | Zn mg/l | COD mg/l | BOD mg/l | TDS |
|---|---|---|---|---|---|---|---|---|---|
| "C" Value | 70 | 0.26 | 2 | - | 0.018 | 0.037 | 35.6 | 5.1 | 144 |
| Area (acres) | 41.2 | 41.2 | 41.2 | 41.2 | 41.2 | 41.2 | 41.2 | 41.2 | 41.2 |
| Run off (inches) | 4.32 | 4.32 | 4.32 | 4.32 | 4.32 | 4.32 | 4.32 | 4.32 | 4.32 |
| Unit Conv. Factor | 0.226 | 0.226 | 0.226 | 0.226 | 0.226 | 0.226 | 0.226 | 0.226 | 0.226 |
| Annual Load (lbs) | 2,816 | 10 | 80 | 0 | 1 | 1 | 1,432 | 205 | 5,792 |

The above calculations do not take into account the sediment and pollutant removal rates accomplished by current stormwater management techniques such as those proposed on the Warwick Views Subdivision.

Storm water management practices shall be inspected and maintained in accordance with the maintenance inspection checklist found in Appendix "E". Per this checklist, the facility shall be inspected and maintained on a monthly basis after completion of construction activities and establishment of all permanent stormwater management measures.

Maintenance measures shall include the removal of undesirable vegetative growth, cleaning of rubbish and debris, mowing and maintenance of vegetation, cleaning and re-grading of open channels, relining of rip-rap, and reseeding and stabilization of vegetative wash-outs. Sedimentation within the ponds shall be removed when the available depth of storage within said basin becomes less than 50% of the design depth or at a minimum once every five years.

## SECTION V. EROSION CONTROL

Proposed erosion control measures are in accordance with New York State Department of Environmental Conservation guidelines set forth in a publication entitled "*New York State Standards and Specifications for Erosion and Sediment Control*". This document supercedes a prior guiding document entitled "*New York Guidelines for Urban Erosion and Sediment Control*". Erosion control will accomplished by means of temporary and permanent measures with said items being installed in accordance with the construction sequence found later in this report and within the Warwick Views Subdivision plans.

Temporary erosion control measures shall include installation of stabilized construction entrances, silt fence, multiple temporary sediment traps, temporary diversion swales and stone check dams. Areas to be disturbed shall have the area of disturbance delineated and topsoil shall be stripped and temporary topsoil stockpiles stabilized. Temporary seeding shall be placed in all areas that are expected to remain disturbed for a period of 14 days. Dust control by means of spraying water shall be incorporated.

Permanent erosion control measures shall include rock outlet protection, grass and rock lined waterways, permanent seeding and landscaping, land grading, mulching and slope and channel stabilization. Slope and channel stabilization will be accomplished utilizing rolled erosion control matting in areas of slopes steeper than two horizontal to one vertical or in drainage channels having slopes in excess of 5% or computed velocities in excess of 8 ft/sec for the 10 year storm.

The implementation of temporary erosion control measures shall be performed prior to commencement of construction activities. Upon completion of improvements, and stabilization of the disturbed areas, the temporary erosion control measures may be removed. The locations of the proposed erosion control practices, with associated construction details, can be found on the Warwick Views Erosion Control Plan.

Erosion control measures shall be inspected by a qualified professional at least once every seven days. Defects noted shall be repaired immediately. Weekly inspection logs shall be kept at the project site and made available for review by the Regulatory Agency having jurisdiction. It shall be the responsibility of the owner-operator to ensure said inspections and maintenance are performed.

## SECTION VI. CONSTRUCTION SEQUENCE

Construction of the proposed Warwick Views Cluster Subdivision shall meet the following construction sequence as relates to erosion control and storm water management. This construction sequence can also be found on the approved subdivision plans.

### Phase I. Road "A" Construction Station 0+00 to Sta 24 + 60

1. Pre-construction meeting with applicable regulatory agencies.
2. Delineation of limits of clearing and disturbance. Trees to be saved shall be protected with perimeter snow fence.
3. Install stabilized construction entrance at intersection of Road "A" and Blooms Corners Road.
4. Install silt fence down gradient of Road "A" right of way and wet detention ponds; Ponds to be utilized as temporary sediment traps during construction as shown on Erosion Control Plan.
5. Install temporary sediment trap. Install diversion swales, culvert and rip rap outlets as shown on the Erosion Control Plan.

6. Perform clearing and grubbing activities as required for construction of Road "A". Site disturbance shall not exceed beyond the disturbance limit line depicted on the subdivision plans. At no time shall the total area under disturbance exceed 5 (five) acres. Areas which will remain disturbed for a period of more than 20 days shall be stabilized with Rye Grass in accordance with the temporary seeding schedule shown on the Subdivision Plan.
7. Strip and stockpile topsoil, stabilize with rye grass seed and perimeter silt fence.
8. Complete rough-grading of roadways.
9. Complete proposed storm water conveyance systems, consisting of open channels and drainage culverts at road crossings. Install rip-rap and lined outlet protection. Stabilize drainage ditches with appropriate channels protection measures such as rip-rap grass and or hydro seed.
10. Install roadway sub base.
11. Complete fine-grading of disturbed areas and right-of-way embankments, amend soils as required and seed. Stabilize with mulch, jute netting or hydro seed.
12. Review wet pond construction checklists. Construct wet detention ponds to permanent size and geometry. Remove trapped sediment and fines from bottom of basin and discard offsite. Ensure conformance with checklists.
13. Complete surfacing of roadway.
14. Upon final grading, placement of rip-rap line channels and establishment of vegetative slope stabilization, remove erosion control measures beginning at the most upstream points, and then working downstream.
15. Perform any fine-grading and seeding as required, maintain and repair wash-outs as required and after each storm event, until all erosion control and water quality treatment measures are fully established.

**Phase 11 - Road "B" Construction Station Sta 24+60 to End**

1. Pre-construction meeting with applicable regulatory agencies.
2. Delineation of limits of clearing and disturbance. Trees to be saved shall be protected with perimeter snow fence.
3. Install stabilized construction entrance at intersection of end of Phase I Road "A" construction.
4. Install silt fence down gradient of Road "A" right of way and wet detention ponds; Ponds to be utilized as temporary sediment traps during construction as shown on Erosion Control Plan.

5. Excavate temporary sediment trap. Install diversion swales, culvert and rip rap outlets as shown on the Erosion Control Plan.
6. Perform clearing and grubbing activities as required for construction of Road "A". Site disturbance shall not exceed beyond the disturbance limit line depicted on the subdivision plans. At no time shall the total area under disturbance exceed 5 (five) acres. Areas which will remain disturbed for a period of more than 20 days shall be stabilized with Rye Grass in accordance with the temporary seeding schedule shown on the Subdivision Plan.
7. Strip and stockpile topsoil, stabilize with rye grass seed and perimeter silt fence.
8. Complete rough-grading of roadways.
9. Complete proposed storm water conveyance systems, consisting of open channels, water quality swale and drainage culverts at road crossings. Install rip-rap and lined outlet protection. Stabilize drainage ditches with appropriate channels protection measures such as rip-rap grass and or hydro seed.
10. Install roadway sub base.
11. Complete fine-grading of disturbed areas and right-of-way embankments, amend soils as required and seed. Stabilize with mulch, jute netting or hydro seed.
12. Review wet detention pond construction checklists. Construct wet detention ponds E4 to permanent size and geometry. Remove trapped sediment and fines from bottom of basin and discard offsite. Ensure conformance with checklists.
13. Complete surfacing of roadway.
14. Upon final grading, placement of rip-rap line channels and establishment of vegetative slope stabilization, remove erosion control measures beginning at the most upstream points, and then working downstream.
15. Perform any fine-grading and seeding as required, maintain and repair wash-outs as required and after each storm event, until all erosion control and water quality treatment measures are fully established.

**Phase III - Road "B" Construction Station**

1. Pre-construction meeting with applicable regulatory agencies.
2. Delineation of limits of clearing and disturbance. Trees to be saved shall be protected with perimeter snow fence.
3. Install stabilized construction entrance at intersection of start of Road "B".
4. Install silt fence down gradient of Road "B" right of way.

5. Excavate temporary sediment trap. Install diversion swales, culvert and rip rap outlets as shown on the Erosion Control Plan.
6. Perform clearing and grubbing activities as required for construction of Road "B". Site disturbance shall not exceed beyond the disturbance limit line depicted on the subdivision plans. At no time shall the total area under disturbance exceed 5 (five) acres. Areas which will remain disturbed for a period of more than 20 days shall be stabilized with Rye Grass in accordance with the temporary seeding schedule shown on the Subdivision Plan.
7. Strip and stockpile topsoil, stabilize with rye grass seed and perimeter silt fence.
8. Complete rough-grading of roadways.
9. Complete proposed storm water conveyance systems, consisting of open channels, water quality swale and drainage culverts at road crossings. Install rip-rap and lined outlet protection. Stabilize drainage ditches with appropriate channels protection measures such as rip-rap grass and or hydro seed.
10. Install roadway sub base.
11. Complete fine-grading of disturbed areas and right-of-way embankments, amend soils as required and seed. Stabilize with mulch, jute netting or hydro seed.
12. Review wet detention pond construction checklists. Construct wet detention ponds W to permanent size and geometry. Remove trapped sediment and fines from bottom of basin and discard offsite. Ensure conformance with checklists.
13. Complete surfacing of roadway.
14. Upon final grading, placement of rip-rap line channels and establishment of vegetative slope stabilization, remove erosion control measures beginning at the most upstream points, and then working downstream.
15. Perform any fine-grading and seeding as required, maintain and repair wash-outs as required and after each storm event, until all erosion control and water quality treatment measures are fully established.

**Phase IV - Individual Lots**

The following shall be the general construction sequence for the individual lot as they are developed.

1. Install stabilized construction entrances at proposed driveway locations.

2. Install silt fence at downstream portions of the lot as shown on the subdivision plans. Silt fence to be installed parallel to contours down gradient of disturbed areas such as house and driveway, septic and well.
3. Perform clearing and grubbing activities not to exceed the limits of disturbance shown on the subdivision plan.
4. Strip topsoil and stockpile. Seed with rye grass and install perimeter silt fence.
5. Perform rough-grading of lot and install house, well, septic and driveway. Areas to remain disturbed for a period of more than 20 days shall be seeded with a temporary mixture of rye grass in accordance with the temporary seeding schedule shown on the subdivision plans, Rough Grade Water Quality Rain Gardens.
6. Fine-grade and amend soils, as required, and seed in accordance with permanent seeding schedule, complete grading of rain gardens. Remove sediment and fines before planting of vegetation.
7. Upon establishing permanent vegetative cover, remove erosion control measures beginning at the most upstream point, and then working downstream.
8. Maintain and repair vegetative cover as required, and after each storm event, until permanent vegetative cover conditions are firmly established.

# APPENDIX A

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# 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-0-08-001**

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

## -IMPORTANT-

## RETURN THIS FORM TO THE ADDRESS ABOVE

OWNER/OPERATOR **MUST SIGN FORM**

**Owner/Operator Information**

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

Owner/Operator Contact Person Last Name (NOT CONSULTANT)

Owner/Operator Contact Person First Name

Owner/Operator Mailing Address

City

State ☐☐ Zip ☐☐☐☐☐ - ☐☐☐☐

Phone (Owner/Operator) ☐☐☐ - ☐☐☐ - ☐☐☐☐

Fax (Owner/Operator) ☐☐☐ - ☐☐☐ - ☐☐☐☐

Email (Owner/Operator)

FED TAX ID ☐☐ - ☐☐☐☐☐☐☐ (not required for individuals)

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## Project Site Information

Project/Site Name

Street Address (NOT P.O. BOX)

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

City/Town/Village (THAT ISSUES BUILDING PERMIT)

State N Y  Zip  -  County  DEC Region

Name of Nearest Cross Street

Distance to Nearest Cross Street (Feet)

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

Tax Map Numbers
Section-Block-Parcel

Tax Map Numbers

1. Provide the Geographic Coordinates for the project site 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 dropdown menu on the left and choose "Get Coordinates". Click on the center of your site and a small 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)**  4

2. What is the nature of this construction project?

○ **New Construction**

○ **Redevelopment with increase in imperviousness**

○ **Redevelopment with no increase in imperviousness**

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

**Pre-Development Existing Land Use**

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

**Post-Development Future Land Use**

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

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

5. Is this a project which does not require coverage under the General Permit (e.g. Project done under an Individual SPDES Permit, or department approved remediation)? O **Yes** O **No**

6. Is this property owned by a state authority, state agency or local government? O **Yes** O **No**

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

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

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

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

| **A** | **B** | **C** | **D** |
|---|---|---|---|
| % | % | % | % |

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10. Is this a phased project? ○ Yes ○ No

11. Enter the planned start and end dates of the disturbance activities. **Start Date** ☐☐/☐☐/☐☐☐☐ - **End Date** ☐☐/☐☐/☐☐☐☐

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

Name

12a. Type of waterbody identified in Question 12?

- ○ Wetland / State Jurisdiction On Site (Answer 12b)
- ○ Wetland / State Jurisdiction Off Site
- ○ Wetland / Federal Jurisdiction On Site (Answer 12b)
- ○ 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

12b. How was the wetland identified?

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

13. Has the surface waterbody(ies) in question 12 been identified as a 303(d) segment in Appendix E of GP-0-08-001? ○ Yes ○ No

14. Is this project located in one of the Watersheds identified in Appendix C of GP-0-08-001? ○ Yes ○ No

15. Is the project located in one of the watershed areas associated with AA and AA-S classified waters? **If no, skip question 16.** ○ Yes ○ No

16. 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? **Yes** **No**
**If Yes, what is the acreage to be disturbed?**
[ ][ ][ ][ ].[ ]

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

18. Does the site runoff enter a separate storm sewer system (including roadside drains, swales, ditches, culverts, etc)? **Yes** **No** **Unknown**
**(If No, skip question 19)**

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

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

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 Water Quality and Quantity Control components (Post-Construction Stormwater Management Practices) **Yes** **No**
**(If No, skip questions 23 and 27-35)**

23. Have the Water Quality and Quantity Control components of the SWPPP been developed in comformance with the current NYS Stormwater Management Design Manual ? **Yes** **No**

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

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

SWPPP Preparer

Contact Name (Last, Space, First)

Mailing Address

City

State Zip -

Phone - - Fax - -

Email

**SWPPP Preparer Certification**

I hereby certify that the Stormwater Pollution Prevention Plan (SWPPP) for this project has been prepared in accordance with the terms and conditions of the GP-0-08-001. Furthermore, I understand that certifying false, incorrect or inaccurate information is a violation of this permit and the laws of the State of New York and could subject me to criminal, civil and/or administrative proceedings.

**First Name** **MI**

**Last Name**

**Signature**

**Date** / /

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

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

## Temporary Structural

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

## Biotechnical

- ○ Brush Matting
- ○ Wattling

## Vegetative Measures

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

## Permanent Structural

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

Other

## Water Quality and Quantity Control

**Important:** **Completion of Questions 27-35 is not required if response to Question 22 is No.**

### Post-Construction Stormwater Management Practices

27. Indicate **all** Stormwater Management Practice(s) that will be installed/constructed on this site:

Ponds
- ○ **Micropool Extended Detention (P-1)**
- ○ **Wet Pond (P-2)**
- ○ **Wet Extended Detention (P-3)**
- ○ **Multiple Pond System (P-4)**
- ○ **Pocket Pond (P-5)**

Filtering
- ○ **Surface Sand Filter (F-1)**
- ○ **Underground Sand Filter (F-2)**
- ○ **Perimeter Sand Filter (F-3)**
- ○ **Organic Filter (F-4)**
- ○ **Bioretention (F-5)**
- ○ **Other**

Alternative Practice
- ○ **Rain Garden**
- ○ **Cistern**
- ○ **Green Roof**
- ○ **Stormwater Planters**
- ○ **Permeable Paving (Modular Block)**

Wetlands
- ○ **Shallow Wetland (W-1)**
- ○ **Extended Detention Wetland (W-2)**
- ○ **Pond/Wetland System (W-3)**
- ○ **Pocket Wetland (W-4)**

Infiltration
- ○ **Infiltration Trench (I-1)**
- ○ **Infiltration Basin (I-2)**
- ○ **Dry Well (I-3)**
- ○ **Underground Infiltration System**

Open Channels
- ○ **Dry Swale (O-1)**
- ○ **Wet Swale (O-2)**

Verified Proprietary Practice
- ○ **Hydrodynamic**
- ○ **Wet Vault**
- ○ **Media Filter**

28. Describe other stormwater management practices not listed above or explain any deviations from the technical standards.

29. 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

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30. Provide the total water quality volume required and the total provided for the site.

**WQv Required** ☐☐☐.☐☐☐ **acre-feet**

**WQv Provided** ☐☐☐.☐☐☐ **acre-feet**

31. Provide the following Unified Stormwater Sizing Criteria for the site.

**Total Channel Protection Storage Volume (CPv)** - Extended detention of post-developed 1 year, 24 hour storm event

**CPv Required** ☐☐☐.☐☐☐ **acre-feet**

**CPv Provided** ☐☐☐.☐☐☐ **acre-feet**

31a. The need to provide for channel protection has been waived because:

O **Site discharges directly to fourth order stream or larger**

**Total Overbank Flood Control Criteria (Qp)** - Peak discharge rate for the 10 year storm

**Pre-Development** ☐☐☐.☐☐☐ **CFS**

**Post-development** ☐☐☐.☐☐☐ **CFS**

**Total Extreme Flood Control Criteria (Qf)** - Peak discharge rate for the 100 year storm

**Pre-Development** ☐☐☐.☐☐☐ **CFS**

**Post-development** ☐☐☐.☐☐☐ **CFS**

31b. The need to provide for flood control has been waived because:

O **Site discharges directly to fourth order stream or larger**

O **Downstream analysis reveals that flood control is not required**

**IMPORTANT: For questions 31 and 32, impervious area should be calculated considering the project site and all offsite areas that drain to the post-construction stormwater management practice(s). (Total Drainage Area = Project Site + Offsite areas)**

32. Pre-Construction Impervious Area - As a percent of the Total Drainage Area enter the percentage of the existing impervious areas before construction begins. ☐☐☐ %

33. Post-Construction Impervious Area - As a percent of the Total Drainage Area, enter the percentage of the future impervious areas that will be created/remain on the site after completion of construction. ☐☐☐ %

34. Indicate the total number of post-construction stormwater management practices to be installed/constructed. ☐☐

35. Provide the total number of stormwater discharge points from the site. (include discharges to either surface waters or to separate storm sewer systems) ☐☐

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36. Identify other DEC permits that are required for this project.

**DEC Permits**

| | |
|---|---|
| O Air Pollution Control | O Navigable Waters Protection / Article 15 |
| O Coastal Erosion | O Water Quality Certificate |
| O Hazardous Waste | O Dam Safety |
| O Long Island Wells | O Water Supply |
| O Mined Land Reclamation | O Freshwater Wetlands/Article 24 |
| O Other SPDES | O Tidal Wetlands |
| O Solid Waste | O Wild, Scenic and Recreational Rivers |
| O None | O Stream Bed or Bank Protection / Article 15 |

O Other

37. Does this project require a US Army Corps of Engineers Wetland Permit? O **Yes** O **No**
If Yes, Indicate Size of Impact. [ ][ ][ ][ ][ ].[ ]

38. Is this project subject to the requirements of a regulated, traditional land use control MS4? O **Yes** O **No**
**(If No, skip question 39)**

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

40. If this NOI is being submitted for the purpose of continuing coverage under a general permit for stormwater runoff from construction activities, please indicate the former SPDES number assigned. [N][Y][R][ ][ ][ ][ ][ ][ ]

**Owner/Operator Certification**

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

**Print First Name** [ ][ ][ ][ ][ ][ ][ ][ ][ ][ ][ ][ ][ ][ ][ ][ ][ ][ ] **MI** [ ]

**Print Last Name** [ ][ ][ ][ ][ ][ ][ ][ ][ ][ ][ ][ ][ ][ ][ ][ ][ ][ ]

**Owner/Operator Signature**

**Date** [ ][ ] / [ ][ ] / [ ][ ][ ][ ]

# APPENDIX B

# "Warwick View Estates"
# Town of Warwick, Orange County, NY

## Impervious Area and Water Quality (WQv) Calculations

### Basin E4 (Wet Pond E4)

| | |
|---|---|
| 4 – 2,080 S.F. Residential Dwellings | = 0.19 AC. |
| Driveways | = 0.21 AC. |
| Approx. 1,050 LF paved road | = 0.72 AC. |

**Total Impervious Area** Tributary to Pond E4 = **1.12 acre**
**Total Site Area** Tributary to Pond E4 = **8.02 acre**

**I,** % Impervious Area = 0.98 / 8.02 **=14%**
**P**, Orange Cty = 1.2 in. = **0.10 ft.**
**Rv** = 0.05+0.009 I = 0.05 + (0.009)(14) = **0.18**
**Impervious cover < 17% so use 0.20 for Rv**

**WQv1** = (P)(Rv)(A) = (.1)(.2)(8.02) = 0.1604 acre-ft = **6,987 c.f. = WQv required**
**WQv Permanent Pool Volume Provided = 22,240 c.f.**

Minimum Forebay Volume = 10% of WQv = .10(6,987 c.f.) = 699 c.f.
Forebay Volume Provided = 4,900 c.f.

### Basin E3 (Water Quality Swale)

| | |
|---|---|
| Approx. 1,410 LF 24' wide paved road | = 0.97 AC. |

**Total Impervious Area** Tributary to WQ Swale = **0.97 acre**
**Total Site Area** Tributary to WQ Swale = **1.65 acre**

**I,** % Impervious Area = 0.97 / 1.65 = **59%**
**P**, Orange Cty = 1.2 in. = **0.10 ft.**
**Rv** = 0.05+0.009 I = 0.05 + (0.009)(59) = **0.58**

**WQv1** = (P)(Rv)(A) = (.1)(.58)(1.65) = 0.0957 acre-ft = 4,169 **c.f. = WQv required**
**WQv Provided = 5,120 c.f.**

## Basin SE (Wet Pond SE)

| | |
|---|---|
| 3 – 2,080 S.F. Residential Dwellings | = 0.14 AC. |
| Driveways | = 0.28 AC. |
| Approx. 880 LF 24' wide paved road | = 0.61 AC. |

**Total Impervious Area** Tributary to Pond SE = **1.03 acre**
**Total Site Area** Tributary to Pond SE = **7.84 acre**

**I,** % Impervious Area = 1.03 / 7.84 **=13%**
**P**, Orange Cty = 1.2 in. = **0.10 ft.**
**Rv** = 0.05+0.009 I = 0.05 + (0.009)(13) = **0.17**
**Impervious cover < 17% so use 0.20 for Rv**

**WQv1** = (P)(Rv)(A) = (.1)(.2)(7.64) = 0.1528 acre-ft = **6,656 c.f. = WQv required**
**WQv Permanent Pool Volume Provided = 17,500 c.f.**

Minimum Forebay Volume = 10% of WQv = .10(6,656 c.f.) = 665 c.f.
Forebay Volume Provided = 2,875 c.f.

## Basin S (Wet Pond S)

| | |
|---|---|
| 17 – 2,080 S.F. Residential Dwellings | = 0.81 AC. |
| Driveways | = 0.76 AC. |
| Approx. 2,000 LF 24' wide paved road | |
| Approx. 1,100 LF 20' wide paved road | = 2.08 AC. |

**Total Impervious Area** Tributary to Pond S = **3.65 acre**
**Total Site Area** Tributary to Pond S = **35.16 acre**

**I,** % Impervious Area = 3.65 / 35.16 **=10%**
**P**, Orange Cty = 1.2 in. = **0.10 ft.**
**Rv** = 0.05+0.009 I = 0.05 + (0.009)(10) = **0.14**
**Impervious cover < 17% so use 0.20 for Rv**

**WQv1** = (P)(Rv)(A) = (.1)(.2)(35.16) = 0.7032 acre-ft = **30,631 c.f. = WQv required**
**WQv Permanent Pool Volume Provided = 83,760 c.f.**

Minimum Forebay Volume = 10% of WQv = .10(30,631 c.f.) = 3,063 c.f.
Forebay Volume Provided = 20,585 c.f.

## Basin W (Wet Pond W)

| | |
|---|---|
| 18 – 2,080 S.F. Residential Dwellings | = 0.86 AC. |
| Driveways | = 1.00 AC. |
| Approx. 1,395 LF 24' wide paved road | = 1.16 AC. |

**Total Impervious Area** Tributary to Pond W = **3.02 acre**
**Total Site Area** Tributary to Pond W = **42.55 acre**
**Impervious cover < 17% so use 0.20 for Rv**

**I,** % Impervious Area = 3.02 / 42.55 = **7%**
**P**, Orange Cty = 1.2 in. = **0.10 ft.**
**Rv** = 0.05+0.009 I = 0.05 + (0.009)(7) = **11**

**WQv1** = (P)(Rv)(A) = (.1)(.2)(42.55) = 0.851 acre-ft = **37,070 c.f. = WQv required**
**WQv Permanent Pool Volume Provided = 63,100 c.f.**

Minimum Forebay Volume = 10% of WQv = .10(37,070 c.f.) = 3,707 c.f.
Forebay Volume Provided = 17,560 c.f.

## Typical Residential Lot (Rain Garden)

| | |
|---|---|
| 1 – 1,600 S.F. Residential Dwelling | = 0.05 AC. |
| Driveways | = 0.06 AC. |

**Typical Impervious Area** Tributary to Rain Garden = **0.11 acre**
**Typical Site Area** Tributary to Rain Garden = **1.00 acre**

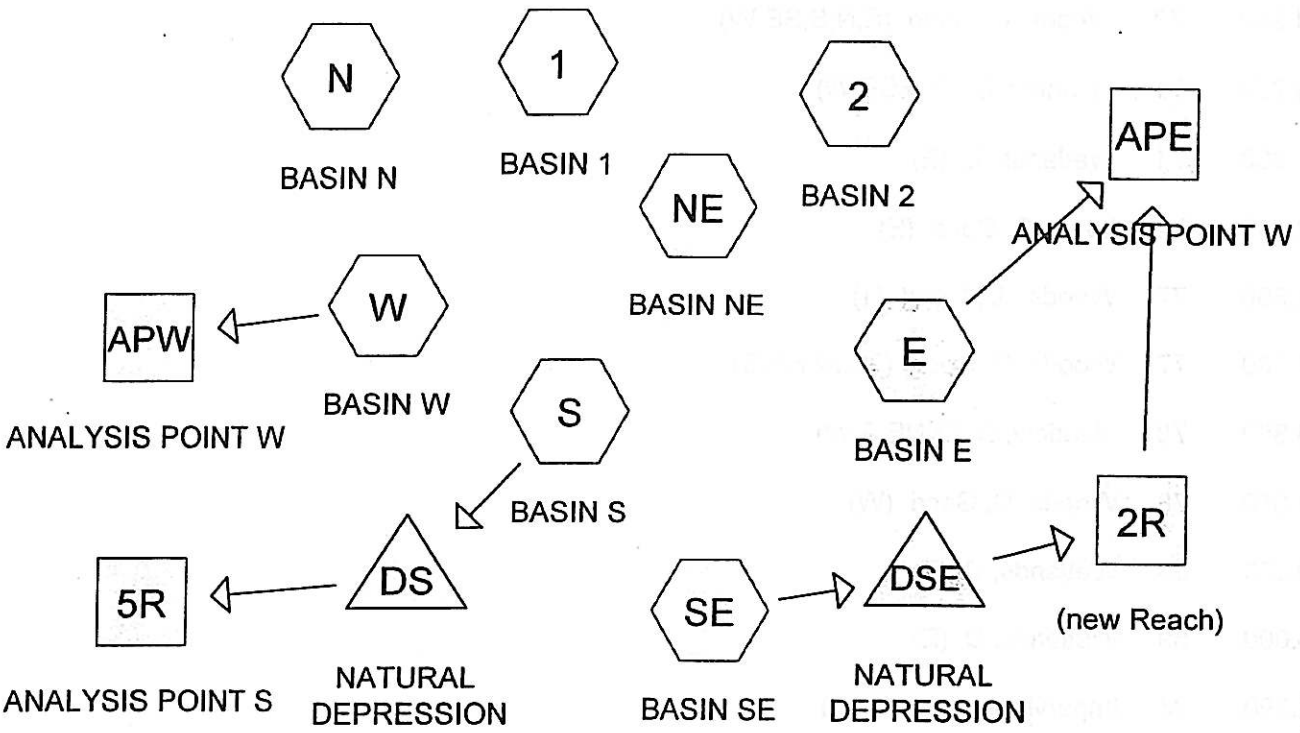
**I,** % Impervious Area = 0.11 / 1.00 = **11%**
**P**, Orange Cty = 1.2 in. = **0.10 ft.**
**Rv** = 0.05+0.009 I = 0.05 + (0.009)(11) = **0.15**
**Impervious cover < 17% so use 0.20 for Rv**

**WQv1** = (P)(Rv)(A) = (.1)(.2)(1.00) = 0.02 acre-ft = **871 c.f. = WQv required**
**WQv Provided = 1,050 c.f.**

# APPENDIX C

## Area Listing (all nodes)

| Area (acres) | CN | Description (subcats) |
|---|---|---|
| 21.040 | 55 | Woods, B, Good (E,S,SE) |
| 30.880 | 58 | Meadow, B (E,S,SE) |
| 3.750 | 61 | Lawn, B, Good (E) |
| 44.240 | 70 | Woods, C, Good (E,N,S,SE,W) |
| 44.750 | 71 | Meadow, C (E,S,SE,W) |
| 5.330 | 71 | Wetlands, B (E) |
| 3.480 | 74 | Lawn, C, Good (E) |
| 1.390 | 77 | Woods , D, Good (1) |
| 67.580 | 77 | Woods, D, Good (2,E,N,NE,S) |
| 3.380 | 78 | Meadow, D (E,NE,S,W) |
| 14.060 | 78 | Woods, D, Good (W) |
| 9.350 | 81 | Wetlands, C (E) |
| 35.000 | 89 | Wetlands, D (E) |
| 3.290 | 98 | Impervious Areas (E,N) |
| 287.520 | | |




Subcat Reach Pond Link

**Drainage Diagram for WAR VIEWS PRE**
Prepared by Kirk Rother, PE, PLLC

Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

**Subcatchment 1: BASIN 1** Runoff Area=1.390 ac Runoff Depth>0.91"
Flow Length=410' Tc=14.9 min CN=77 Runoff=1.18 cfs 0.106 af

**Subcatchment 2: BASIN 2** Runoff Area=0.390 ac Runoff Depth>0.92"
Flow Length=175' Tc=8.4 min CN=77 Runoff=0.39 cfs 0.030 af

**Subcatchment E: BASIN E** Runoff Area=163.480 ac Runoff Depth>0.71"
Flow Length=4,495' Tc=23.8 min CN=73 Runoff=86.52 cfs 9.739 af

**Subcatchment N: BASIN N** Runoff Area=28.130 ac Runoff Depth>0.86"
Flow Length=1,120' Tc=17.1 min CN=76 Runoff=21.09 cfs 2.018 af

**Subcatchment NE: BASIN NE** Runoff Area=16.850 ac Runoff Depth>0.91"
Flow Length=2,170' Tc=20.4 min CN=77 Runoff=12.58 cfs 1.279 af

**Subcatchment S: BASIN S** Runoff Area=30.900 ac Runoff Depth>0.55"
Flow Length=1,935' Tc=24.3 min CN=69 Runoff=11.54 cfs 1.406 af

**Subcatchment SE: BASIN SE** Runoff Area=9.680 ac Runoff Depth>0.28"
Flow Length=655' Tc=13.1 min CN=61 Runoff=1.57 cfs 0.227 af

**Subcatchment W: BASIN W** Runoff Area=36.700 ac Runoff Depth>0.71"
Flow Length=1,675' Tc=23.5 min CN=73 Runoff=19.52 cfs 2.187 af

**Reach 2R: (new Reach)** Inflow=0.00 cfs 0.000 af
Outflow=0.00 cfs 0.000 af

**Reach 5R: ANALYSIS POINT S** Inflow=3.28 cfs 1.043 af
Outflow=3.28 cfs 1.043 af

**Reach APE: ANALYSIS POINT E** Inflow=86.52 cfs 9.739 af
Outflow=86.52 cfs 9.739 af

**Reach APW: ANALYSIS POINT W** Inflow=19.52 cfs 2.187 af
Outflow=19.52 cfs 2.187 af

**Pond DS: NATURAL DEPRESSION** Peak Elev=468.37' Storage=23,548 cf Inflow=11.54 cfs 1.406 af
Outflow=3.28 cfs 1.043 af

**Pond DSE: NATURAL DEPRESSION** Peak Elev=470.61' Storage=9,880 cf Inflow=1.57 cfs 0.227 af
Outflow=0.00 cfs 0.000 af

**Total Runoff Area = 287.520 ac Runoff Volume = 16.992 af Average Runoff Depth = 0.71"**
**98.86% Pervious Area = 284.230 ac 1.14% Impervious Area = 3.290 ac**

## Subcatchment 1: BASIN 1

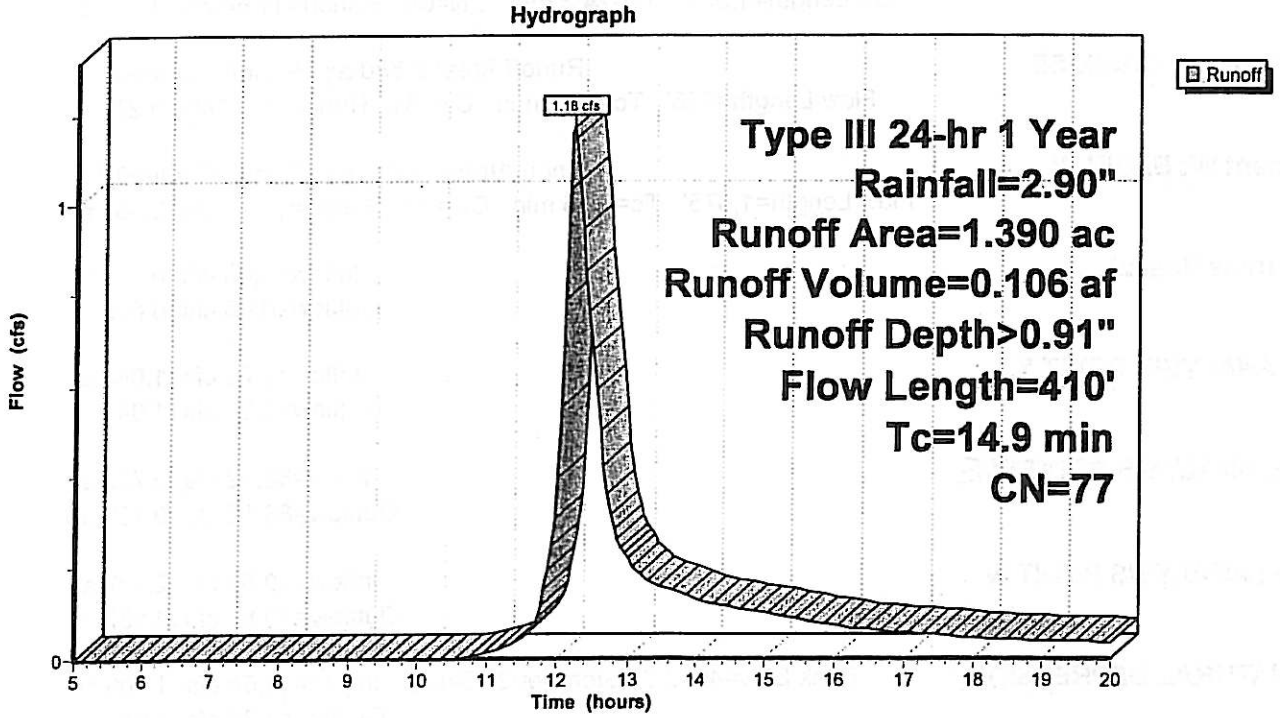
Runoff = 1.18 cfs @ 12.22 hrs, Volume= 0.106 af, Depth> 0.91"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 1 Year Rainfall=2.90"

| Area (ac) | CN | Description |
|---|---|---|
| 1.390 | 77 | Woods , D, Good |
| 1.390 | | Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 12.4 | 100 | 0.0700 | 0.13 | | **Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.50" |
| 2.5 | 310 | 0.0160 | 2.04 | | **Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps |
| 14.9 | 410 | Total | | | |

## Subcatchment 1: BASIN 1



## Subcatchment 2: BASIN 2

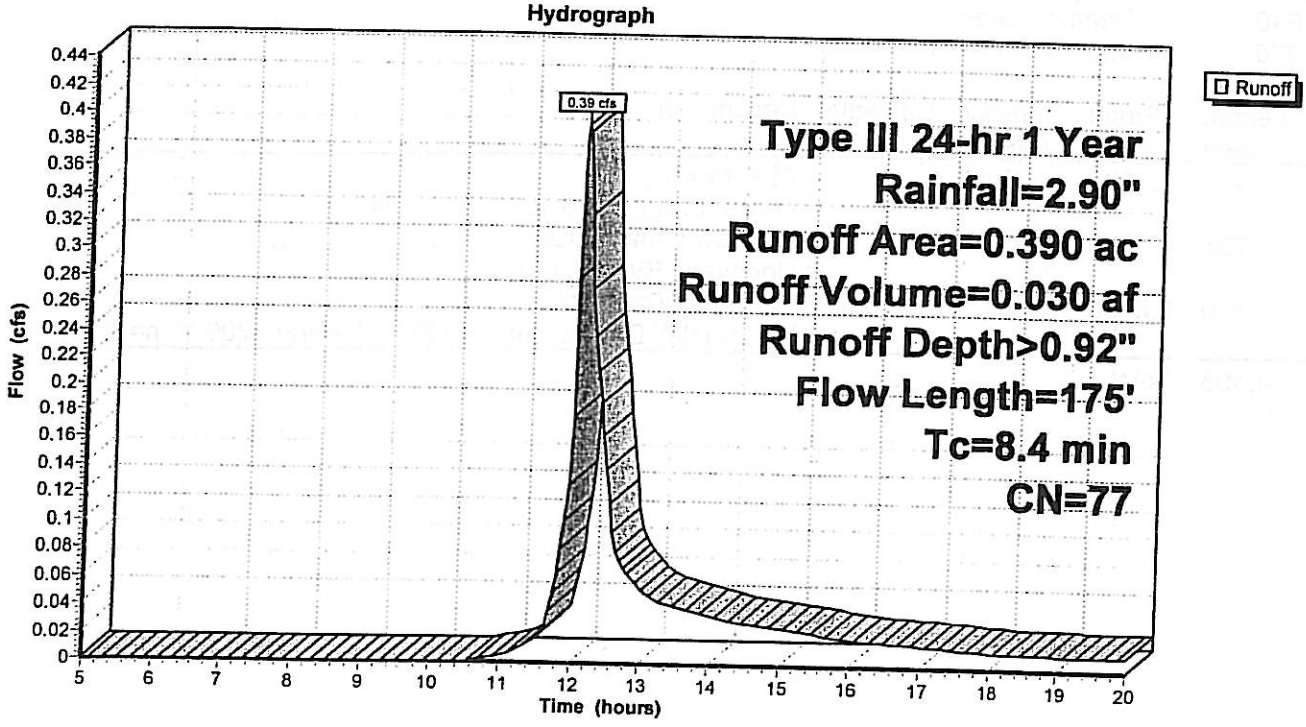
Runoff = 0.39 cfs @ 12.13 hrs, Volume= 0.030 af, Depth> 0.92"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 1 Year Rainfall=2.90"

| Area (ac) | CN | Description |
|---|---|---|
| 0.390 | 77 | Woods, D, Good |
| 0.390 | | Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 8.2 | 100 | 0.2000 | 0.20 | | **Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.50" |
| 0.2 | 75 | 0.1300 | 5.80 | | **Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps |
| 8.4 | 175 | Total | | | |

## Subcatchment 2: BASIN 2



## Subcatchment E: BASIN E

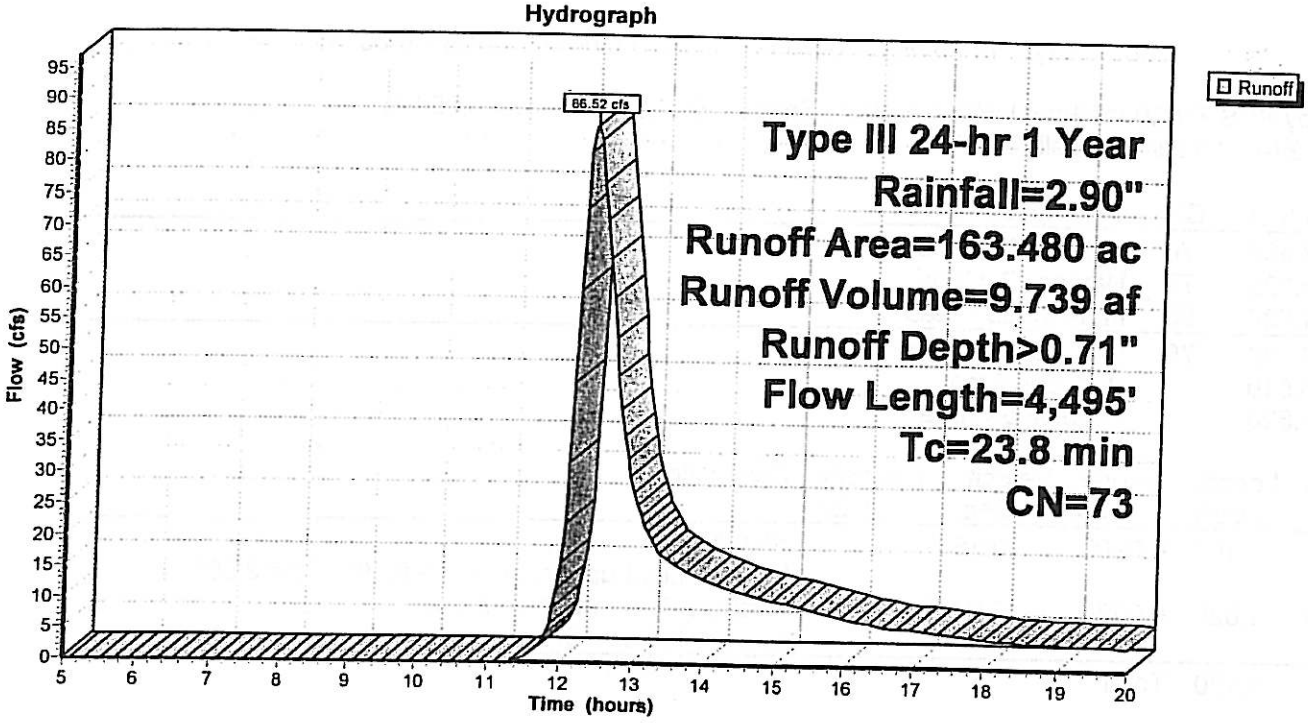
Runoff = 86.52 cfs @ 12.37 hrs, Volume= 9.739 af, Depth> 0.71"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 1 Year Rainfall=2.90"

| Area (ac) | CN | Description |
|---|---|---|
| 3.750 | 61 | Lawn, B, Good |
| 3.480 | 74 | Lawn, C, Good |
| 19.000 | 58 | Meadow, B |
| 41.450 | 71 | Meadow, C |
| 2.850 | 78 | Meadow, D |
| 14.900 | 55 | Woods, B, Good |
| 10.900 | 70 | Woods, C, Good |
| 15.800 | 77 | Woods, D, Good |
| 5.330 | 71 | Wetlands, B |
| 9.350 | 81 | Wetlands, C |
| 35.000 | 89 | Wetlands, D |
| 1.670 | 98 | Impervious Areas |
| 163.480 | 73 | Weighted Average |
| 161.810 | | Pervious Area |
| 1.670 | | Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 4.0 | 100 | 0.1700 | 0.42 | | **Sheet Flow,** Grass: Short n= 0.150 P2= 3.50" |
| 3.1 | 735 | 0.0600 | 3.94 | | **Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps |
| 16.7 | 3,660 | 0.0030 | 3.65 | 973.64 | **Parabolic Channel,** W=200.00' D=2.00' Area=266.7 sf Perim=200.1' n= 0.027 |
| 23.8 | 4,495 | Total | | | |

## Subcatchment E: BASIN E



## Subcatchment N: BASIN N

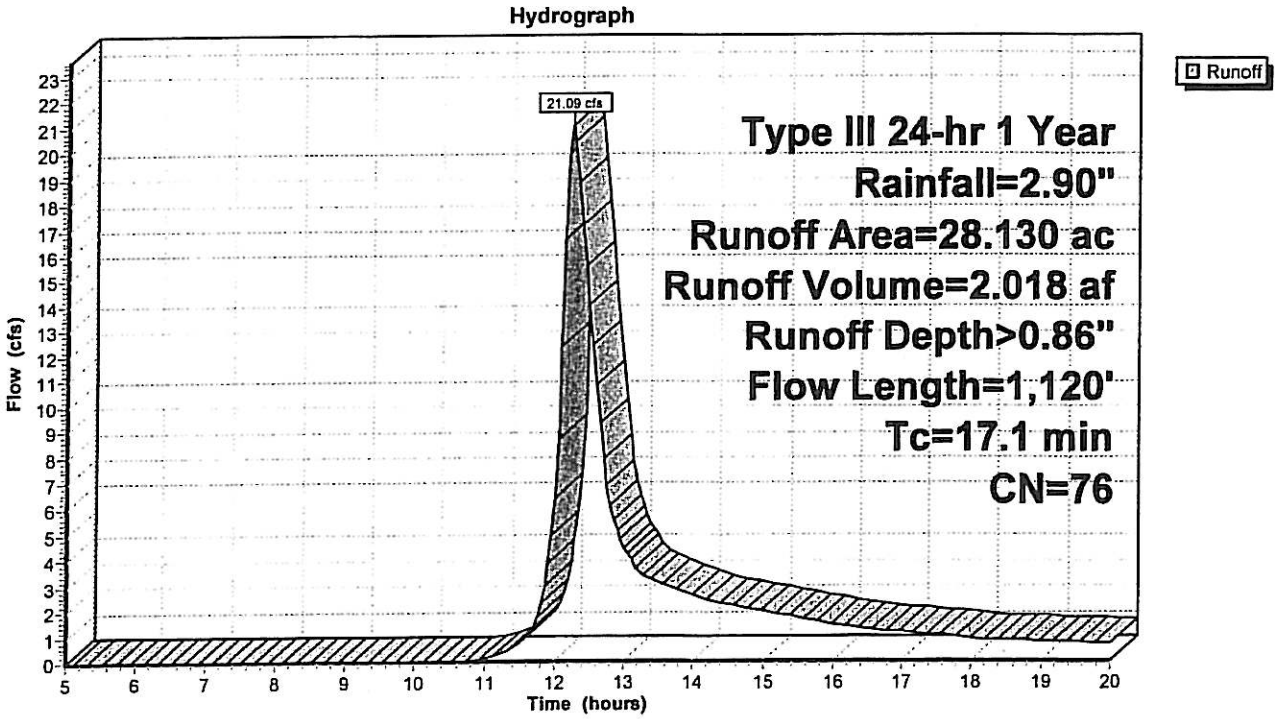
Runoff = 21.09 cfs @ 12.26 hrs, Volume= 2.018 af, Depth> 0.86"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 1 Year Rainfall=2.90"

| Area (ac) | CN | Description |
|---|---|---|
| 7.490 | 70 | Woods, C, Good |
| 19.020 | 77 | Woods, D, Good |
| 1.620 | 98 | Impervious Areas |
| 28.130 | 76 | Weighted Average |
| 26.510 | | Pervious Area |
| 1.620 | | Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 11.3 | 100 | 0.0900 | 0.15 | | **Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.50" |
| 5.8 | 1,020 | 0.0330 | 2.92 | | **Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps |
| 17.1 | 1,120 | Total | | | |

## Subcatchment N: BASIN N



## Subcatchment NE: BASIN NE

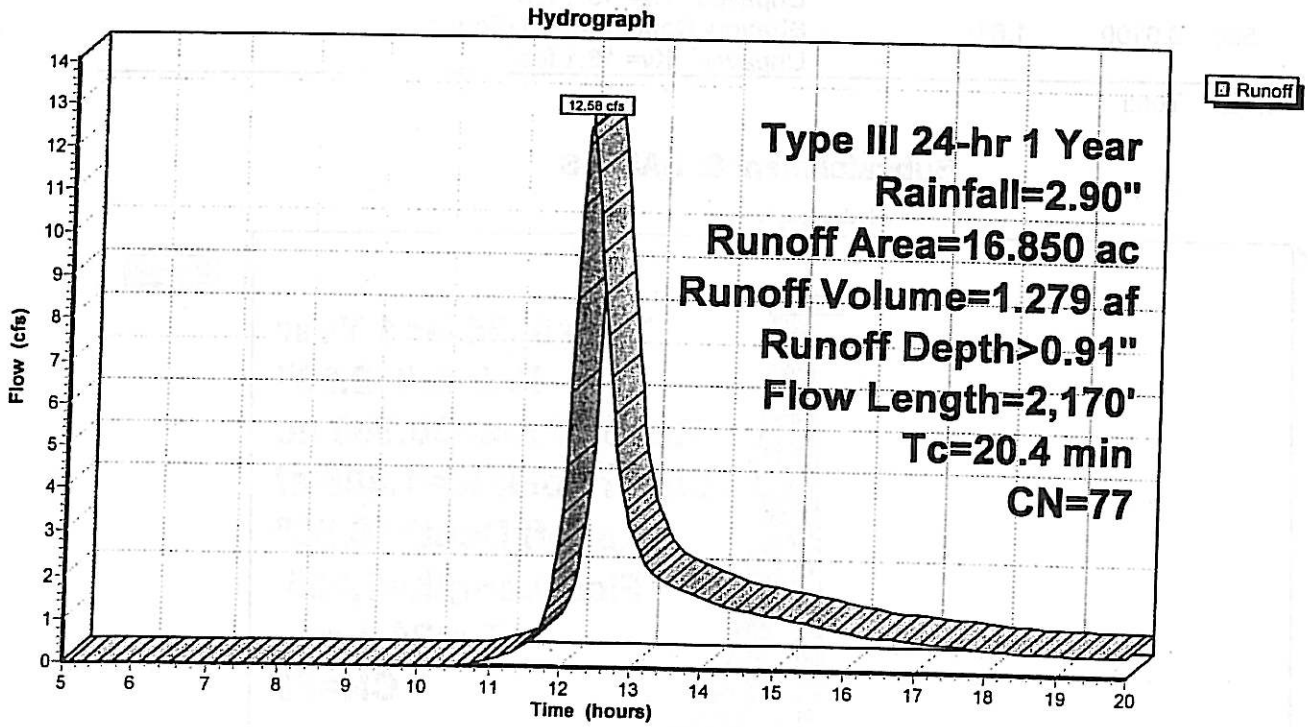
Runoff = 12.58 cfs @ 12.30 hrs, Volume= 1.279 af, Depth> 0.91"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 1 Year Rainfall=2.90"

| Area (ac) | CN | Description |
|---|---|---|
| 0.100 | 78 | Meadow, D |
| 16.750 | 77 | Woods, D, Good |
| 16.850 | 77 | Weighted Average |
| 16.850 | | Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 10.8 | 100 | 0.1000 | 0.15 | | **Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.50" |
| 9.6 | 2,070 | 0.0500 | 3.60 | | **Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps |
| 20.4 | 2,170 | Total | | | |

## Subcatchment NE: BASIN NE



## Subcatchment S: BASIN S

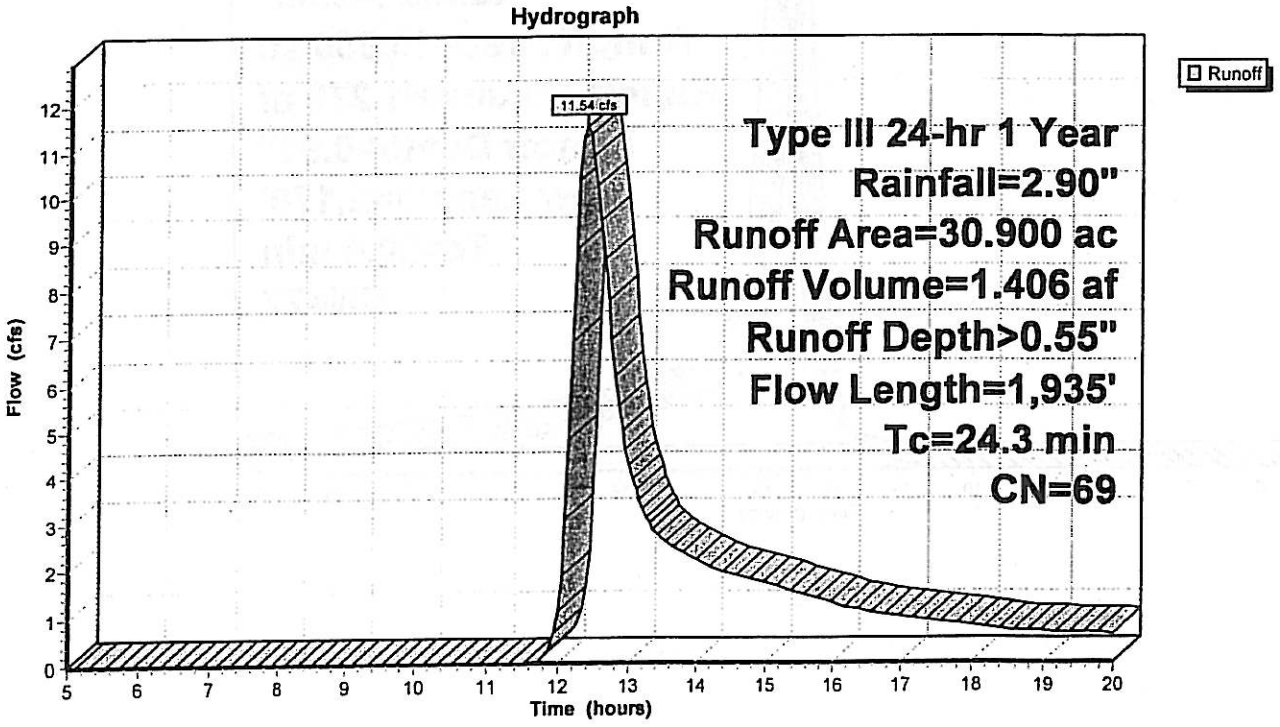
Runoff = 11.54 cfs @ 12.41 hrs, Volume= 1.406 af, Depth> 0.55"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 1 Year Rainfall=2.90"

| Area (ac) | CN | Description |
|---|---|---|
| 7.110 | 58 | Meadow, B |
| 0.600 | 71 | Meadow, C |
| 0.280 | 78 | Meadow, D |
| 4.140 | 55 | Woods, B, Good |
| 3.150 | 70 | Woods, C, Good |
| 15.620 | 77 | Woods, D, Good |
| 30.900 | 69 | Weighted Average |
| 30.900 | | Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 13.2 | 100 | 0.0600 | 0.13 | | **Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.50" |
| 5.9 | 1,335 | 0.0550 | 3.78 | | **Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps |
| 5.2 | 500 | 0.0100 | 1.61 | | **Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps |
| 24.3 | 1,935 | Total | | | |

## Subcatchment S: BASIN S



## Subcatchment SE: BASIN SE

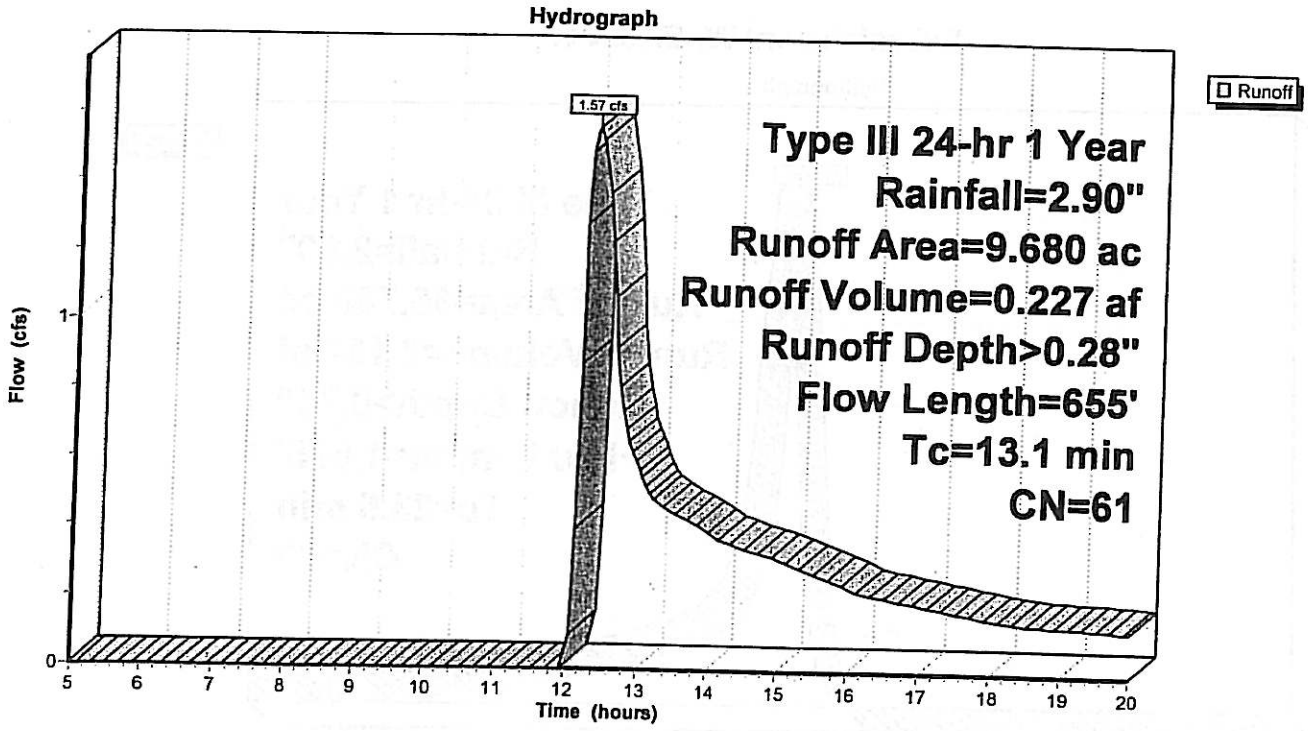
Runoff = 1.57 cfs @ 12.34 hrs, Volume= 0.227 af, Depth> 0.28"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 1 Year Rainfall=2.90"

| Area (ac) | CN | Description |
|---|---|---|
| 4.770 | 58 | Meadow, B |
| 2.200 | 71 | Meadow, C |
| 2.000 | 55 | Woods, B, Good |
| 0.710 | 70 | Woods, C, Good |
| 9.680 | 61 | Weighted Average |
| 9.680 | | Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 8.8 | 100 | 0.0600 | 0.19 | | **Sheet Flow,** Grass: Dense n= 0.240 P2= 3.50" |
| 4.3 | 555 | 0.0180 | 2.16 | | **Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps |
| 13.1 | 655 | Total | | | |

## Subcatchment SE: BASIN SE



## Subcatchment W: BASIN W

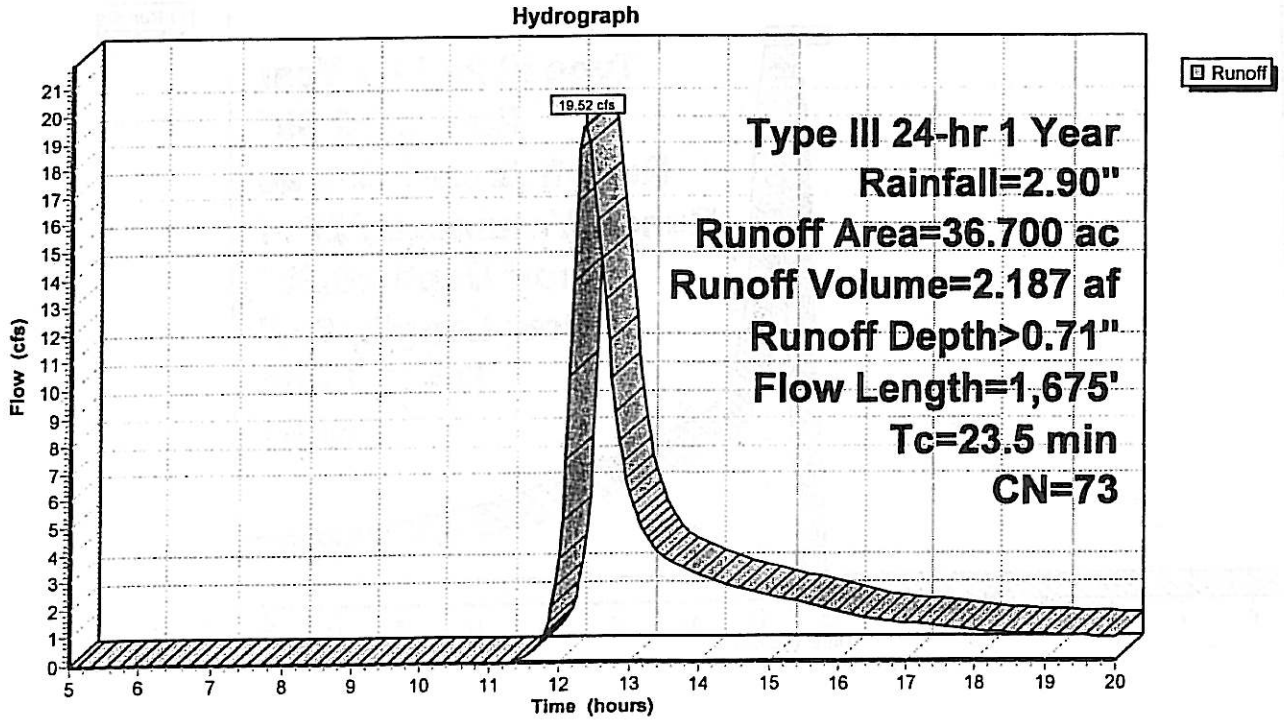
Runoff = 19.52 cfs @ 12.37 hrs, Volume= 2.187 af, Depth> 0.71"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 1 Year Rainfall=2.90"

| Area (ac) | CN | Description |
|---|---|---|
| 0.500 | 71 | Meadow, C |
| 0.150 | 78 | Meadow, D |
| 21.990 | 70 | Woods, C, Good |
| 14.060 | 78 | Woods, D, Good |
| 36.700 | 73 | Weighted Average |
| 36.700 | | Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 15.6 | 100 | 0.0400 | 0.11 | | **Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.50" |
| 5.3 | 1,135 | 0.0500 | 3.60 | | **Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps |
| 2.6 | 440 | 0.0300 | 2.79 | | **Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps |
| 23.5 | 1,675 | Total | | | |

## Subcatchment W: BASIN W

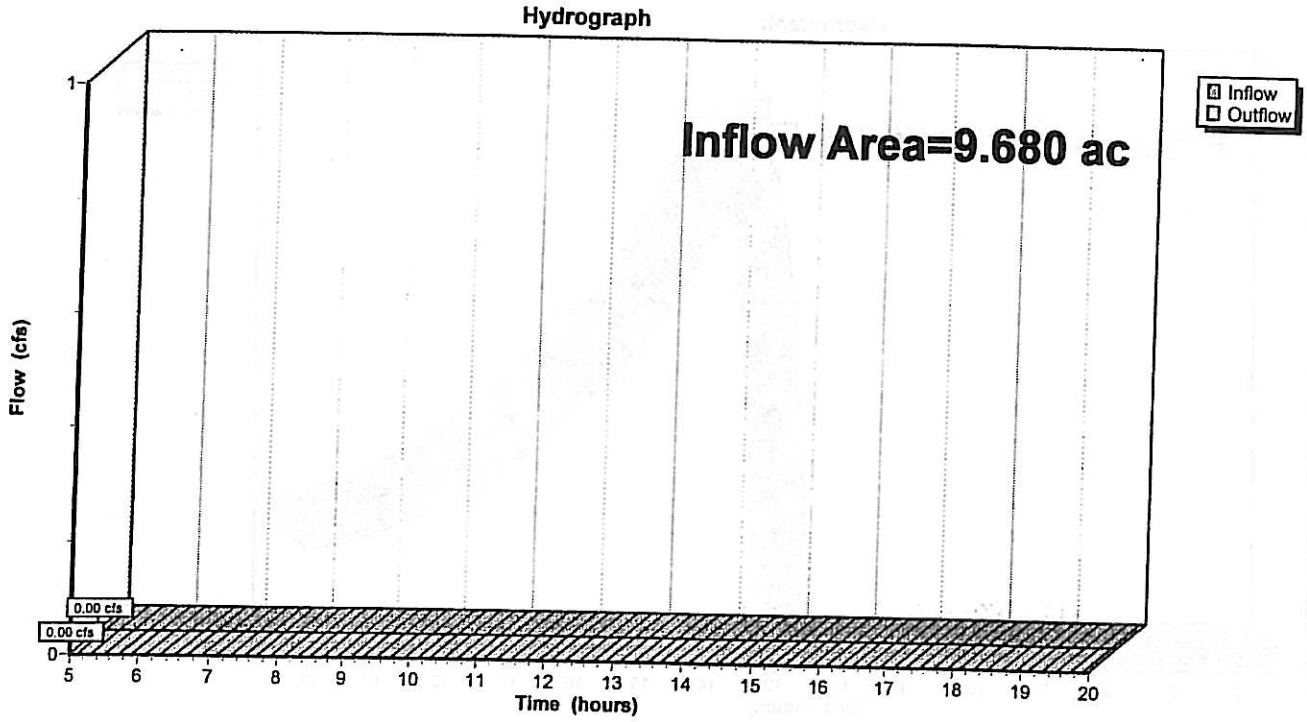


## Reach 2R: (new Reach)

Inflow Area = 9.680 ac, Inflow Depth = 0.00" for 1 Year event
Inflow = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

## Reach 2R: (new Reach)

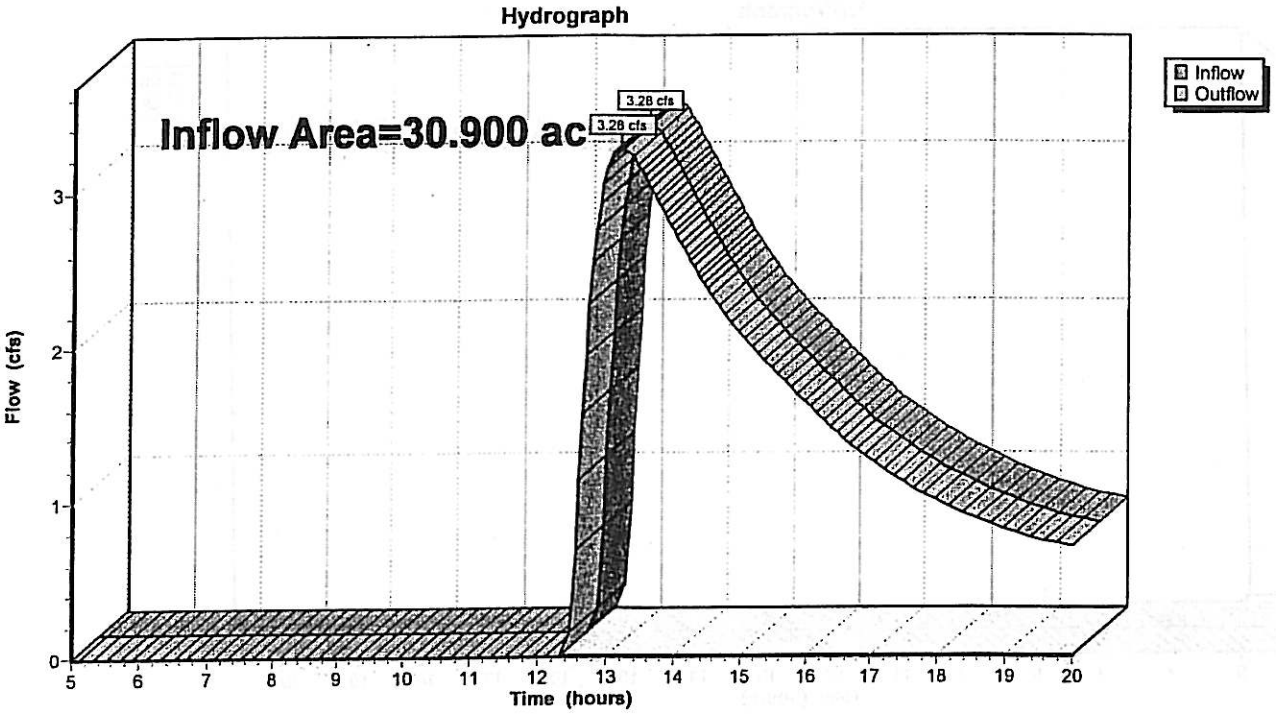


## Reach 5R: ANALYSIS POINT S

Inflow Area = 30.900 ac, Inflow Depth > 0.41" for 1 Year event
Inflow = 3.28 cfs @ 13.20 hrs, Volume= 1.043 af
Outflow = 3.28 cfs @ 13.20 hrs, Volume= 1.043 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

## Reach 5R: ANALYSIS POINT S

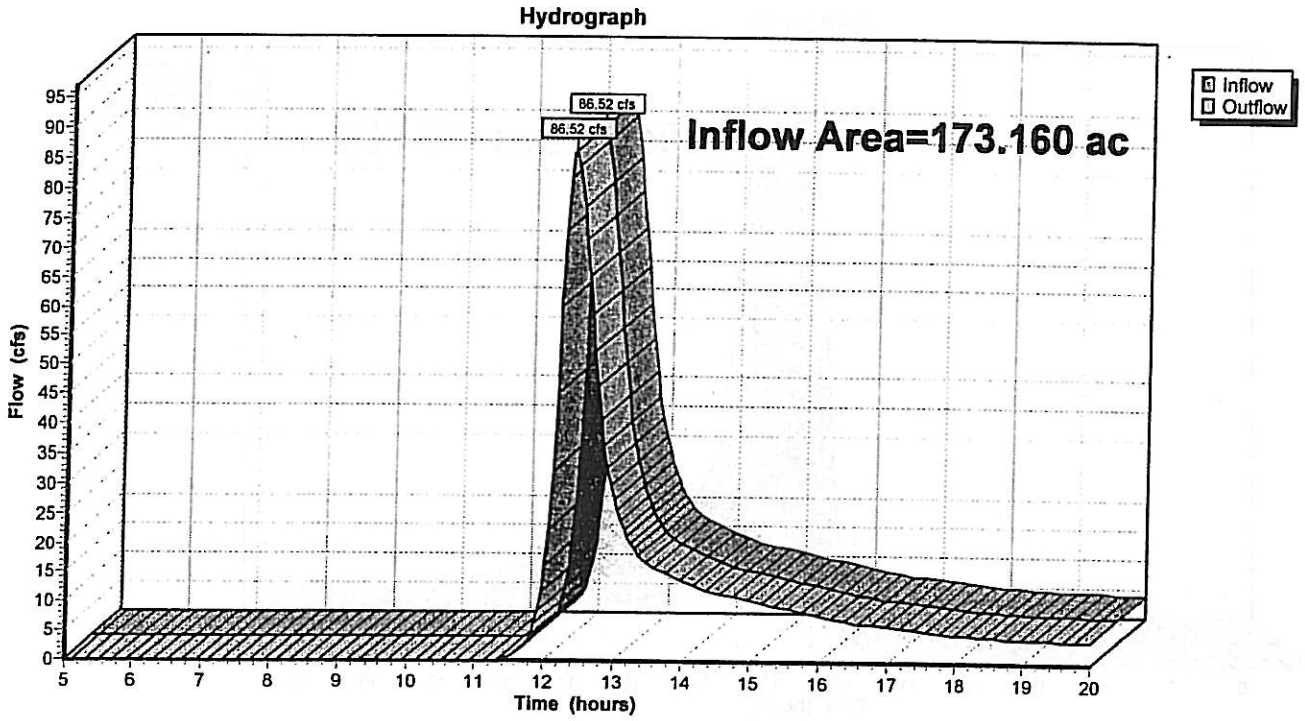


## Reach APE: ANALYSIS POINT W

Inflow Area = 173.160 ac, Inflow Depth > 0.67" for 1 Year event
Inflow = 86.52 cfs @ 12.37 hrs, Volume= 9.739 af
Outflow = 86.52 cfs @ 12.37 hrs, Volume= 9.739 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

## Reach APE: ANALYSIS POINT W

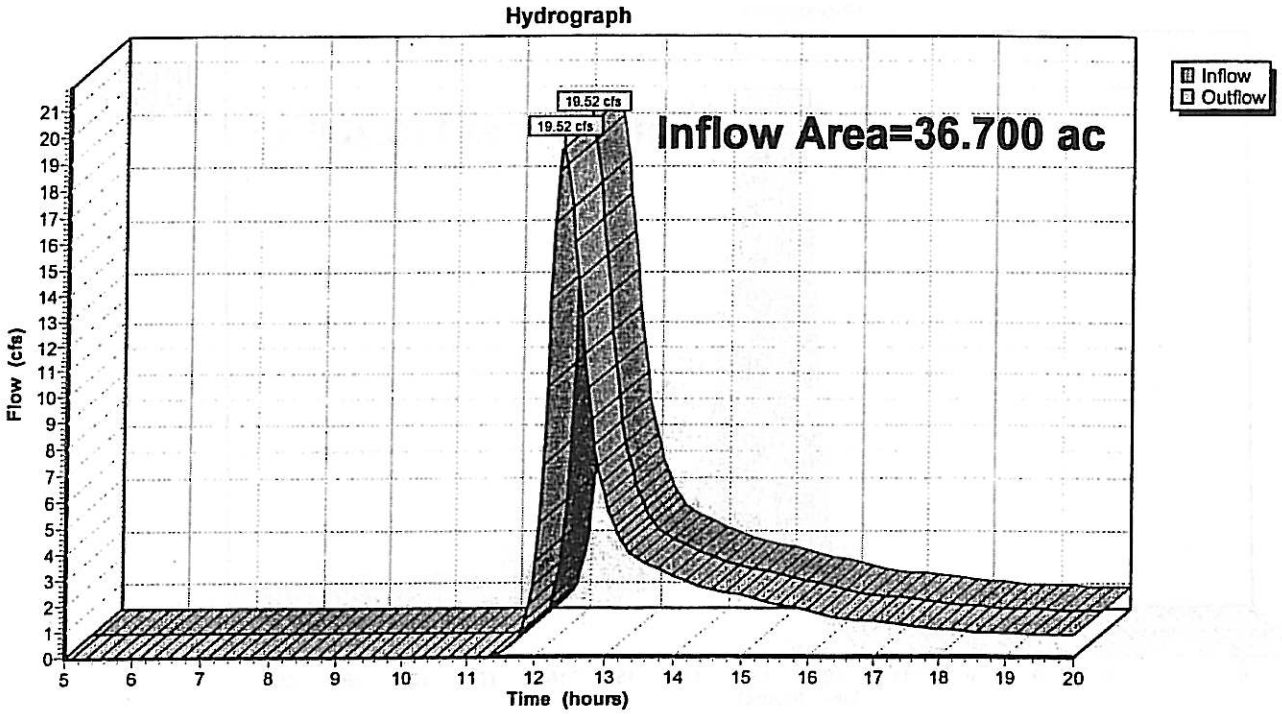


## Reach APW: ANALYSIS POINT W

Inflow Area = 36.700 ac, Inflow Depth > 0.71" for 1 Year event
Inflow = 19.52 cfs @ 12.37 hrs, Volume= 2.187 af
Outflow = 19.52 cfs @ 12.37 hrs, Volume= 2.187 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

## Reach APW: ANALYSIS POINT W



## Pond DS: NATURAL DEPRESSION

Inflow Area = 30.900 ac, Inflow Depth > 0.55" for 1 Year event
Inflow = 11.54 cfs @ 12.41 hrs, Volume= 1.406 af
Outflow = 3.28 cfs @ 13.20 hrs, Volume= 1.043 af, Atten= 72%, Lag= 47.9 min
Primary = 3.28 cfs @ 13.20 hrs, Volume= 1.043 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 468.37' @ 13.20 hrs Surf.Area= 73,722 sf Storage= 23,548 cf

Plug-Flow detention time= 134.0 min calculated for 1.043 af (74% of inflow)
Center-of-Mass det. time= 69.7 min ( 920.1 - 850.4 )

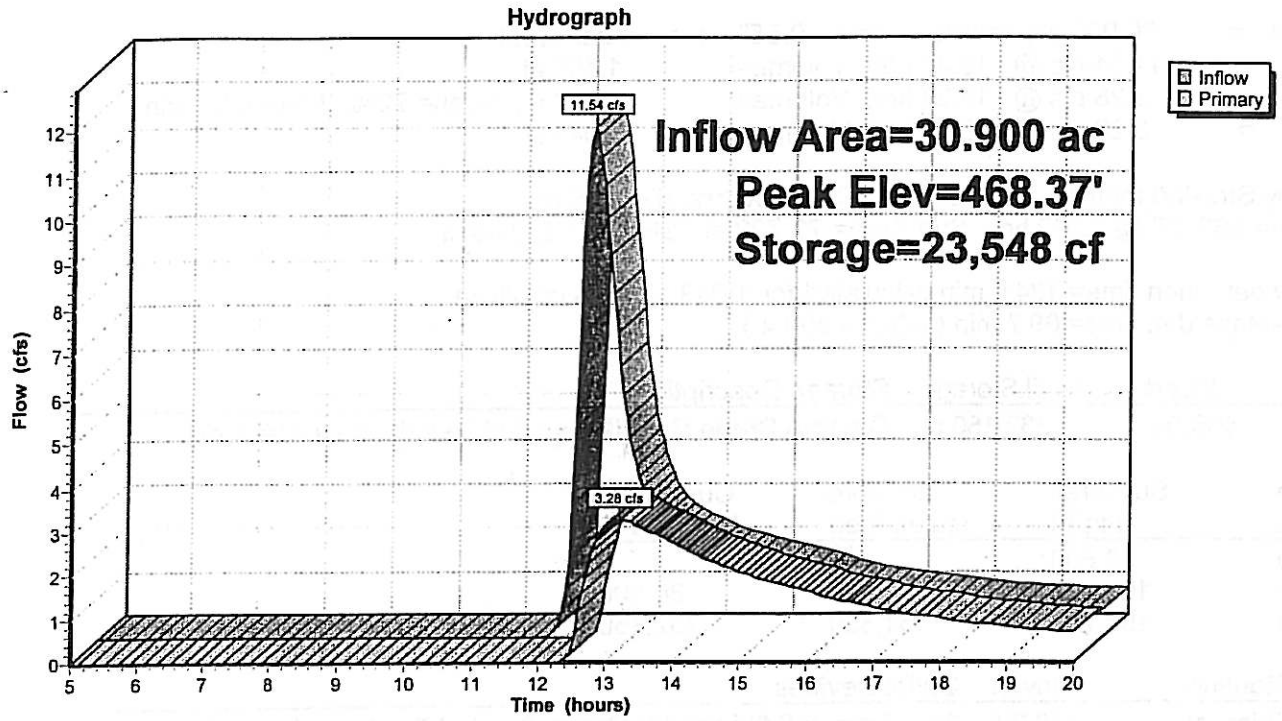
| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 468.00' | 232,150 cf | **Custom Stage Data (Prismatic)** Listed below (Recalc) |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 468.00 | 53,600 | 0 | 0 |
| 469.00 | 108,000 | 80,800 | 80,800 |
| 470.00 | 194,700 | 151,350 | 232,150 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 468.20' | **20.0' long x 5.0' breadth Broad-Crested Rectangular Weir**<br>Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50<br>Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88 |

**Primary OutFlow** Max=3.28 cfs @ 13.20 hrs HW=468.37' (Free Discharge)
↑—**1=Broad-Crested Rectangular Weir** (Weir Controls 3.28 cfs @ 0.96 fps)

## Pond DS: NATURAL DEPRESSION



## Pond DSE: NATURAL DEPRESSION

Inflow Area = 9.680 ac, Inflow Depth > 0.28" for 1 Year event
Inflow = 1.57 cfs @ 12.34 hrs, Volume= 0.227 af
Outflow = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min
Primary = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 470.61' @ 20.00 hrs Surf.Area= 22,562 sf Storage= 9,880 cf

Plug-Flow detention time= (not calculated: initial storage excedes outflow)
Center-of-Mass det. time= (not calculated: no outflow)

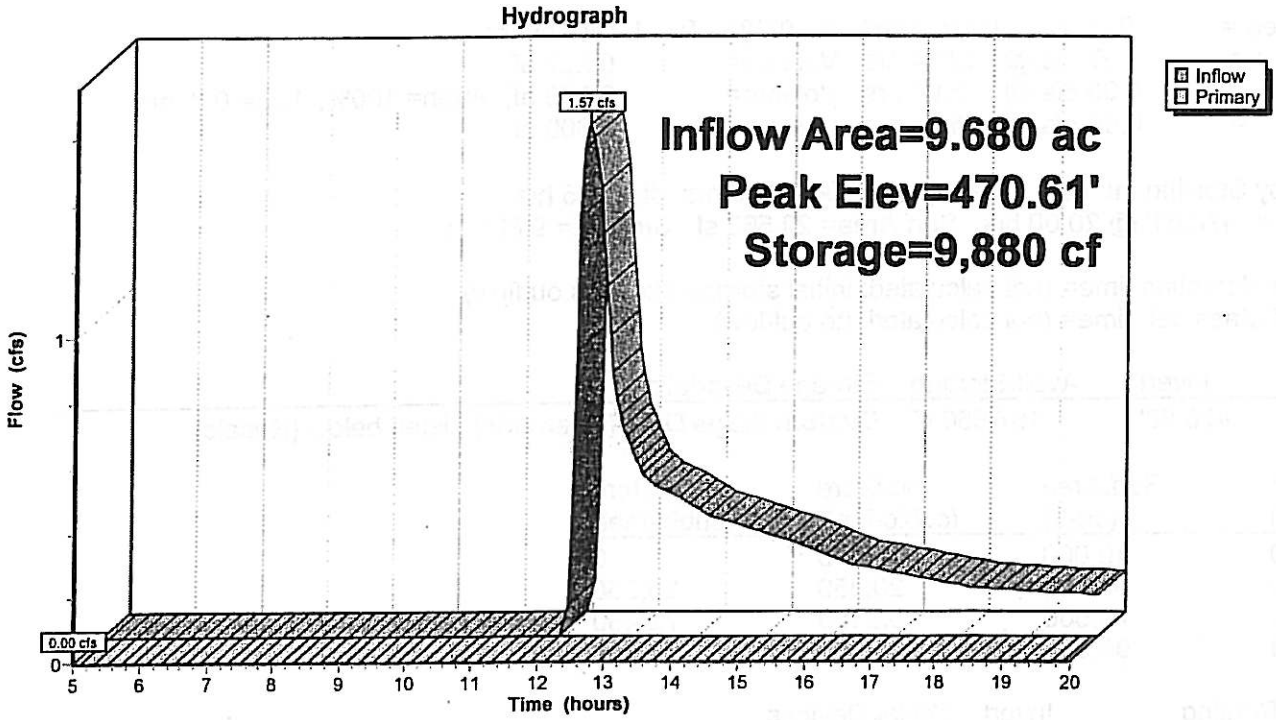
| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 470.00' | 157,650 cf | **Custom Stage Data (Prismatic)** Listed below (Recalc) |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 470.00 | 10,000 | 0 | 0 |
| 471.00 | 30,700 | 20,350 | 20,350 |
| 472.00 | 73,500 | 52,100 | 72,450 |
| 473.00 | 96,900 | 85,200 | 157,650 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 472.20' | **30.0' long x 10.0' breadth Broad-Crested Rectangular Weir** |
| | | | Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 |
| | | | Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64 |

**Primary OutFlow** Max=0.00 cfs @ 5.00 hrs HW=470.00' (Free Discharge)
↑—**1=Broad-Crested Rectangular Weir** ( Controls 0.00 cfs)

## Pond DSE: NATURAL DEPRESSION



Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

**Subcatchment 1: BASIN 1** Runoff Area=1.390 ac Runoff Depth>2.83"
Flow Length=410' Tc=14.9 min CN=77 Runoff=3.75 cfs 0.328 af

**Subcatchment 2: BASIN 2** Runoff Area=0.390 ac Runoff Depth>2.84"
Flow Length=175' Tc=8.4 min CN=77 Runoff=1.27 cfs 0.092 af

**Subcatchment E: BASIN E** Runoff Area=163.480 ac Runoff Depth>2.47"
Flow Length=4,495' Tc=23.8 min CN=73 Runoff=319.03 cfs 33.634 af

**Subcatchment N: BASIN N** Runoff Area=28.130 ac Runoff Depth>2.74"
Flow Length=1,120' Tc=17.1 min CN=76 Runoff=69.56 cfs 6.422 af

**Subcatchment NE: BASIN NE** Runoff Area=16.850 ac Runoff Depth>2.83"
Flow Length=2,170' Tc=20.4 min CN=77 Runoff=40.08 cfs 3.970 af

**Subcatchment S: BASIN S** Runoff Area=30.900 ac Runoff Depth>2.13"
Flow Length=1,935' Tc=24.3 min CN=69 Runoff=51.37 cfs 5.490 af

**Subcatchment SE: BASIN SE** Runoff Area=9.680 ac Runoff Depth>1.52"
Flow Length=655' Tc=13.1 min CN=61 Runoff=13.98 cfs 1.228 af

**Subcatchment W: BASIN W** Runoff Area=36.700 ac Runoff Depth>2.47"
Flow Length=1,675' Tc=23.5 min CN=73 Runoff=72.00 cfs 7.551 af

**Reach 2R: (new Reach)** Inflow=0.00 cfs 0.000 af
Outflow=0.00 cfs 0.000 af

**Reach 5R: ANALYSIS POINT S** Inflow=30.91 cfs 5.035 af
Outflow=30.91 cfs 5.035 af

**Reach APE: ANALYSIS POINT E** Inflow=319.03 cfs 33.634 af
Outflow=319.03 cfs 33.634 af

**Reach APW: ANALYSIS POINT W** Inflow=72.00 cfs 7.551 af
Outflow=72.00 cfs 7.551 af

**Pond DS: NATURAL DEPRESSION** Peak Elev=468.89' Storage=69,337 cf Inflow=51.37 cfs 5.490 af
Outflow=30.91 cfs 5.035 af

**Pond DSE: NATURAL DEPRESSION** Peak Elev=471.72' Storage=53,438 cf Inflow=13.98 cfs 1.228 af
Outflow=0.00 cfs 0.000 af

**Total Runoff Area = 287.520 ac Runoff Volume = 58.715 af Average Runoff Depth = 2.45"**
**98.86% Pervious Area = 284.230 ac 1.14% Impervious Area = 3.290 ac**

## Subcatchment 1: BASIN 1

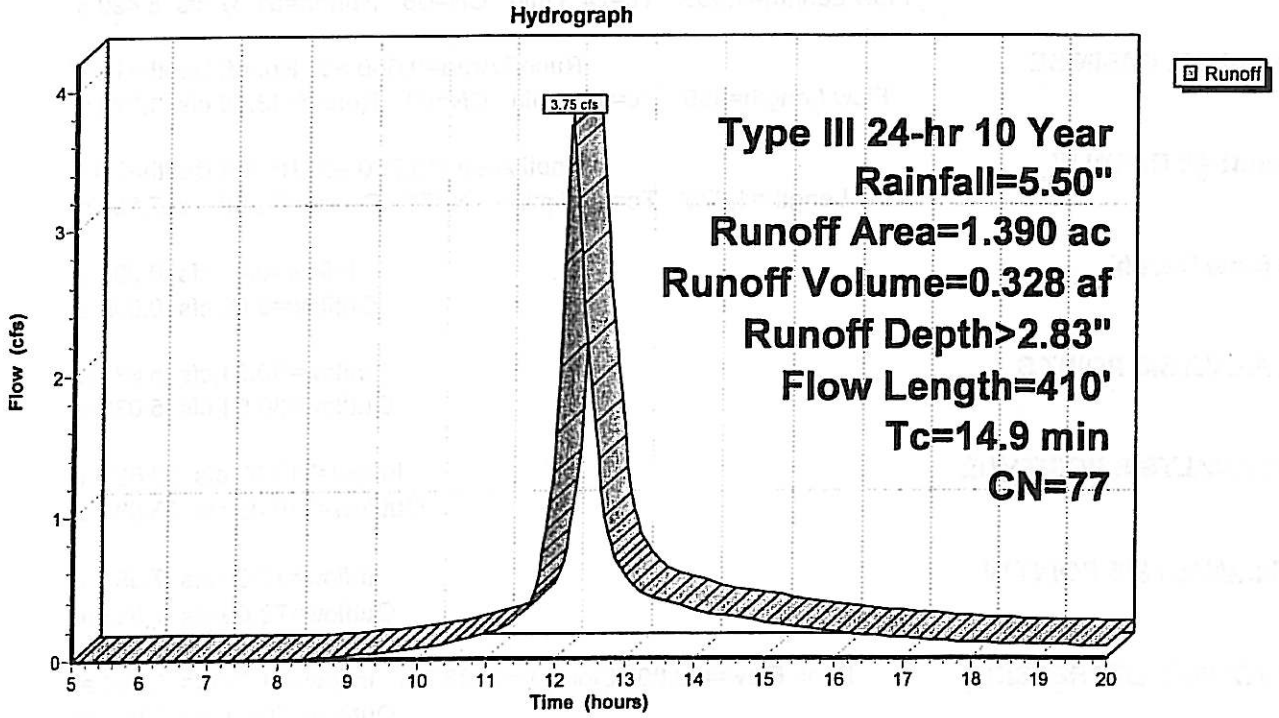
Runoff = 3.75 cfs @ 12.21 hrs, Volume= 0.328 af, Depth> 2.83"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 Year Rainfall=5.50"

| Area (ac) | CN | Description |
|---|---|---|
| 1.390 | 77 | Woods , D, Good |
| 1.390 | | Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 12.4 | 100 | 0.0700 | 0.13 | | **Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.50" |
| 2.5 | 310 | 0.0160 | 2.04 | | **Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps |
| 14.9 | 410 | Total | | | |

## Subcatchment 1: BASIN 1



## Subcatchment 2: BASIN 2

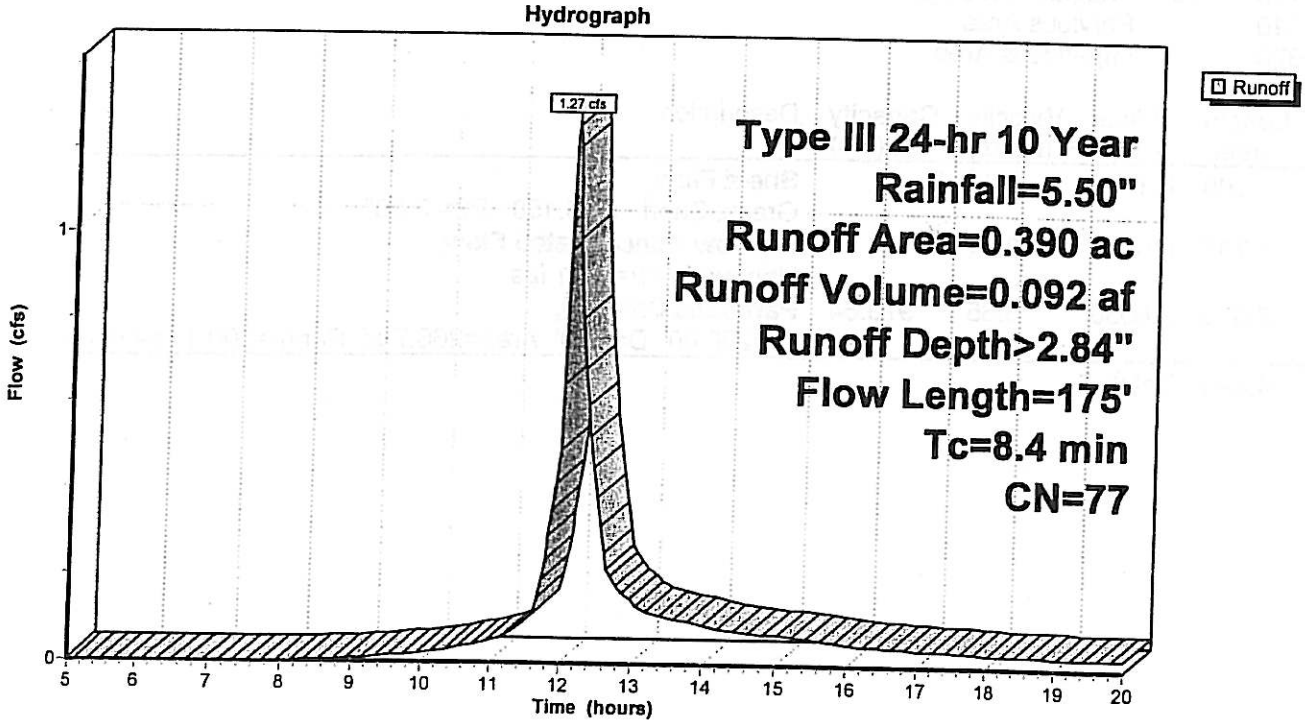
Runoff = 1.27 cfs @ 12.12 hrs, Volume= 0.092 af, Depth> 2.84"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 Year Rainfall=5.50"

| Area (ac) | CN | Description |
|---|---|---|
| 0.390 | 77 | Woods, D, Good |
| 0.390 | | Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 8.2 | 100 | 0.2000 | 0.20 | | **Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.50" |
| 0.2 | 75 | 0.1300 | 5.80 | | **Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps |
| 8.4 | 175 | Total | | | |

## Subcatchment 2: BASIN 2



## Subcatchment E: BASIN E

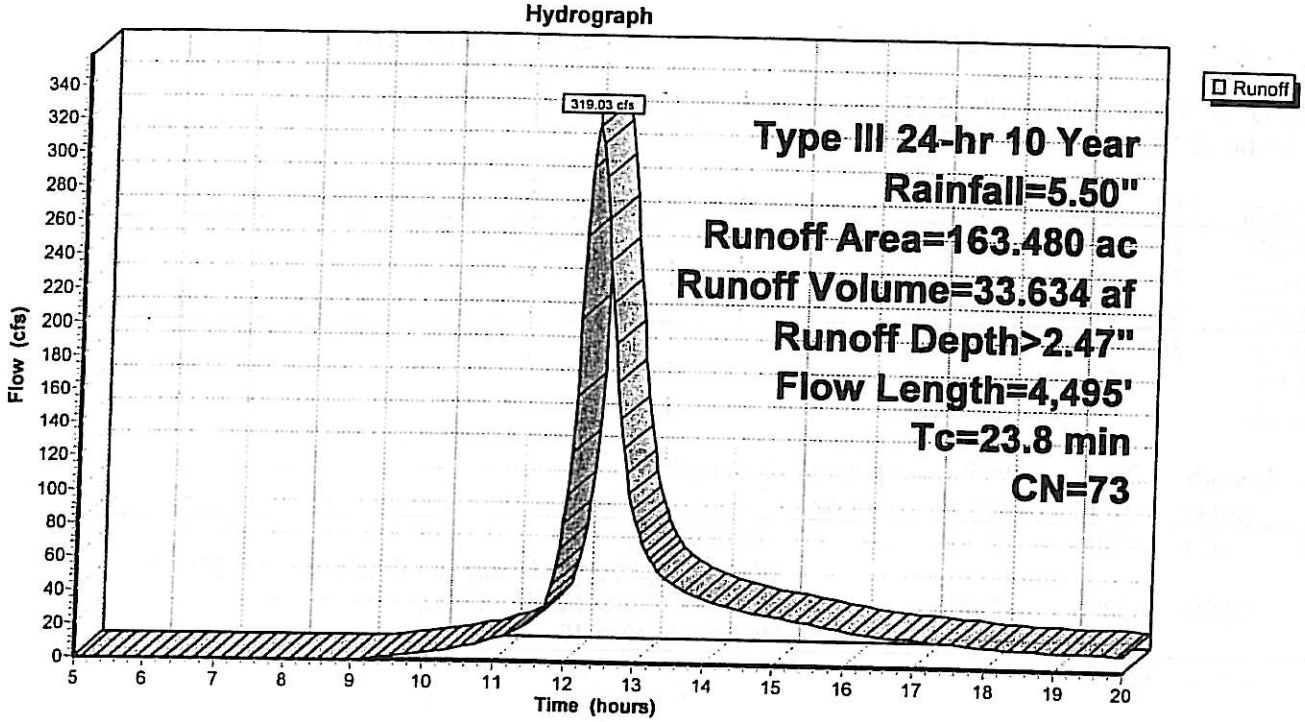
Runoff = 319.03 cfs @ 12.34 hrs, Volume= 33.634 af, Depth> 2.47"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 Year Rainfall=5.50"

| Area (ac) | CN | Description |
|---|---|---|
| 3.750 | 61 | Lawn, B, Good |
| 3.480 | 74 | Lawn, C, Good |
| 19.000 | 58 | Meadow, B |
| 41.450 | 71 | Meadow, C |
| 2.850 | 78 | Meadow, D |
| 14.900 | 55 | Woods, B, Good |
| 10.900 | 70 | Woods, C, Good |
| 15.800 | 77 | Woods, D, Good |
| 5.330 | 71 | Wetlands, B |
| 9.350 | 81 | Wetlands, C |
| 35.000 | 89 | Wetlands, D |
| 1.670 | 98 | Impervious Areas |
| 163.480 | 73 | Weighted Average |
| 161.810 | | Pervious Area |
| 1.670 | | Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 4.0 | 100 | 0.1700 | 0.42 | | **Sheet Flow,** Grass: Short n= 0.150 P2= 3.50" |
| 3.1 | 735 | 0.0600 | 3.94 | | **Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps |
| 16.7 | 3,660 | 0.0030 | 3.65 | 973.64 | **Parabolic Channel,** W=200.00' D=2.00' Area=266.7 sf Perim=200.1' n= 0.027 |
| 23.8 | 4,495 | Total | | | |

## Subcatchment E: BASIN E



## Subcatchment N: BASIN N

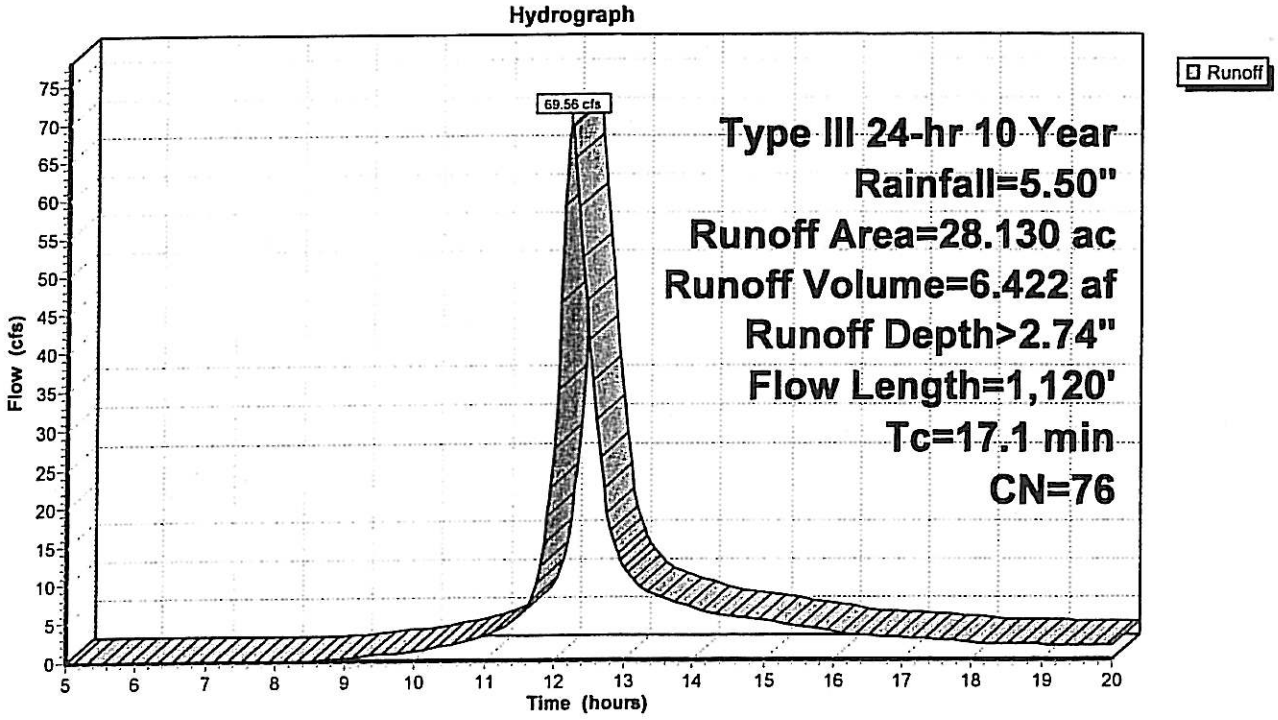
Runoff = 69.56 cfs @ 12.24 hrs, Volume= 6.422 af, Depth> 2.74"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 Year Rainfall=5.50"

| Area (ac) | CN | Description |
|---|---|---|
| 7.490 | 70 | Woods, C, Good |
| 19.020 | 77 | Woods, D, Good |
| 1.620 | 98 | Impervious Areas |
| 28.130 | 76 | Weighted Average |
| 26.510 | | Pervious Area |
| 1.620 | | Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 11.3 | 100 | 0.0900 | 0.15 | | **Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.50" |
| 5.8 | 1,020 | 0.0330 | 2.92 | | **Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps |
| 17.1 | 1,120 | Total | | | |

## Subcatchment N: BASIN N



## Subcatchment NE: BASIN NE

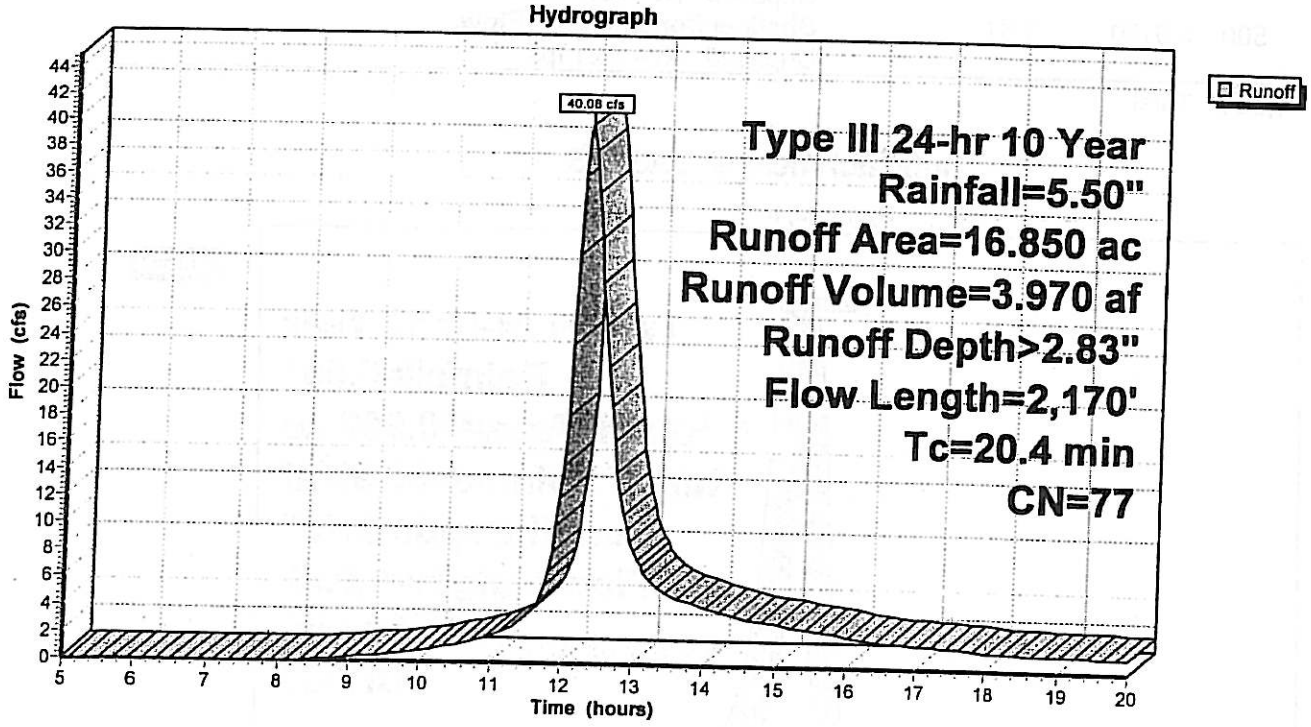
Runoff = 40.08 cfs @ 12.28 hrs, Volume= 3.970 af, Depth> 2.83"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 Year Rainfall=5.50"

| Area (ac) | CN | Description |
|---|---|---|
| 0.100 | 78 | Meadow, D |
| 16.750 | 77 | Woods, D, Good |
| 16.850 | 77 | Weighted Average |
| 16.850 | | Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 10.8 | 100 | 0.1000 | 0.15 | | **Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.50" |
| 9.6 | 2,070 | 0.0500 | 3.60 | | **Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps |
| 20.4 | 2,170 | Total | | | |

## Subcatchment NE: BASIN NE



## Subcatchment S: BASIN S

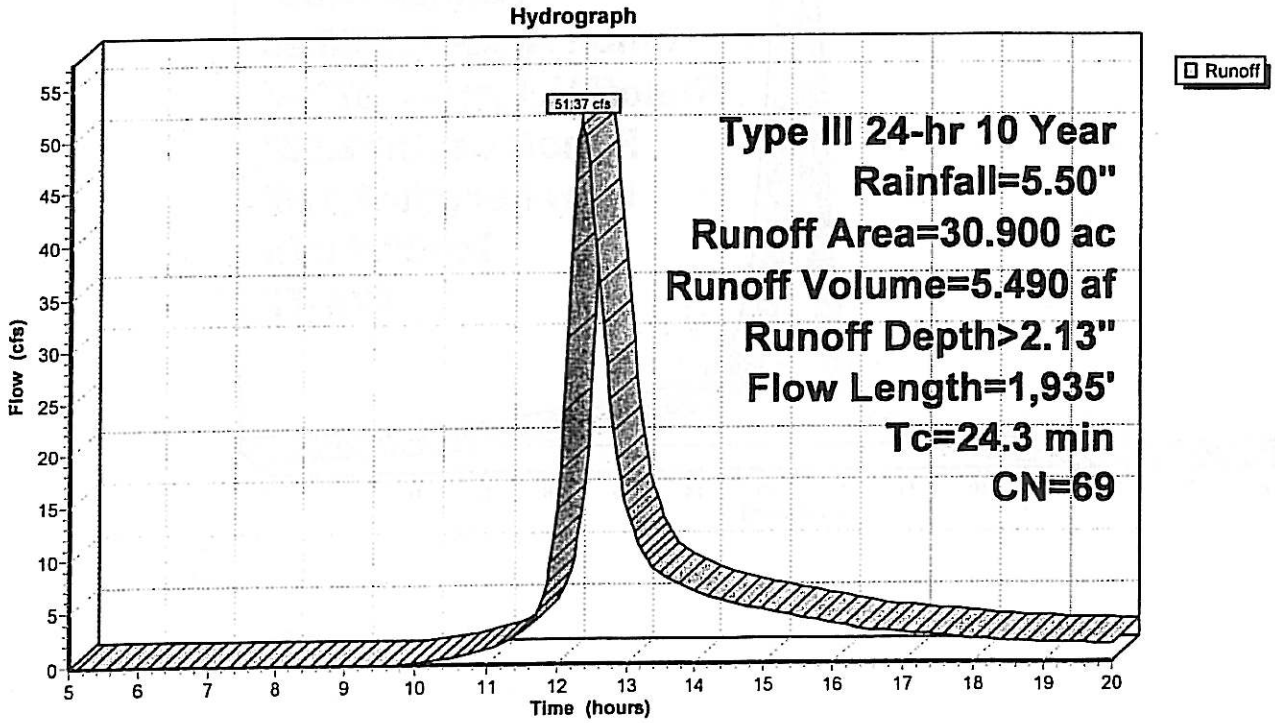
Runoff = 51.37 cfs @ 12.35 hrs, Volume= 5.490 af, Depth> 2.13"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 Year Rainfall=5.50"

| Area (ac) | CN | Description |
|---|---|---|
| 7.110 | 58 | Meadow, B |
| 0.600 | 71 | Meadow, C |
| 0.280 | 78 | Meadow, D |
| 4.140 | 55 | Woods, B, Good |
| 3.150 | 70 | Woods, C, Good |
| 15.620 | 77 | Woods, D, Good |
| 30.900 | 69 | Weighted Average |
| 30.900 | | Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 13.2 | 100 | 0.0600 | 0.13 | | **Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.50" |
| 5.9 | 1,335 | 0.0550 | 3.78 | | **Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps |
| 5.2 | 500 | 0.0100 | 1.61 | | **Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps |
| 24.3 | 1,935 | Total | | | |

## Subcatchment S: BASIN S



## Subcatchment SE: BASIN SE

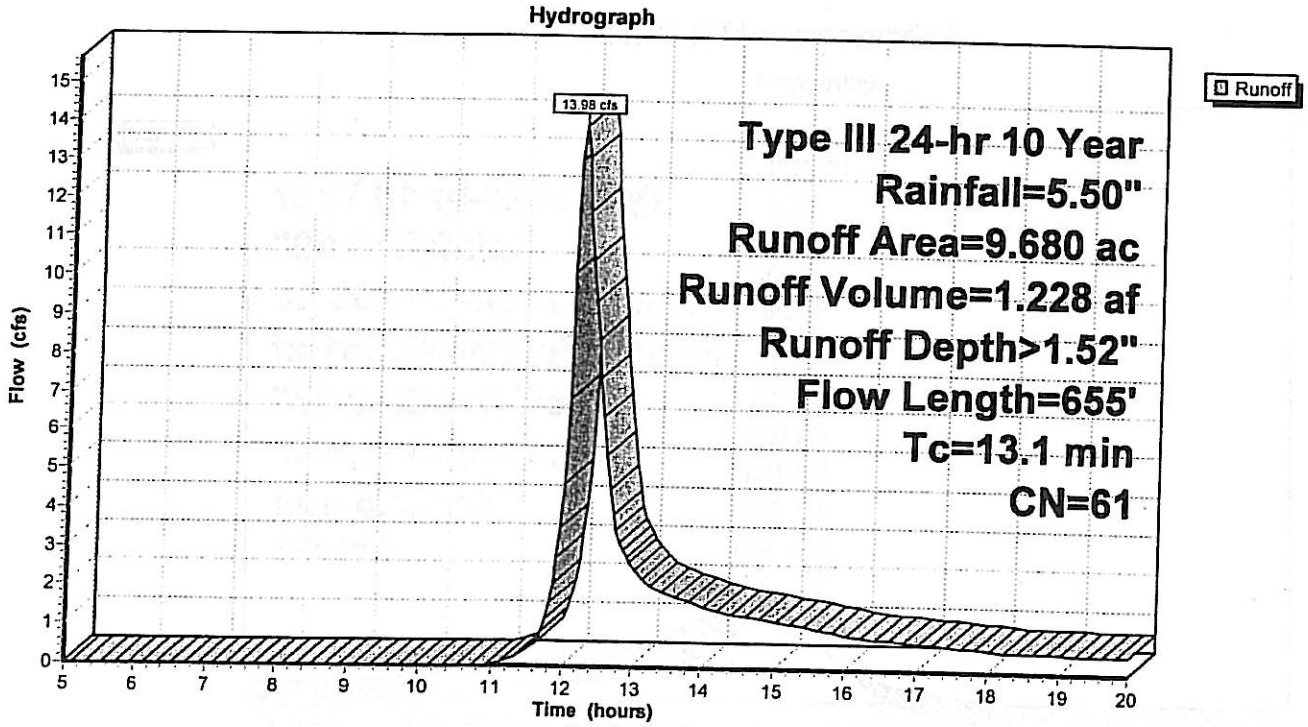
Runoff = 13.98 cfs @ 12.20 hrs, Volume= 1.228 af, Depth> 1.52"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 Year Rainfall=5.50"

| Area (ac) | CN | Description |
|---|---|---|
| 4.770 | 58 | Meadow, B |
| 2.200 | 71 | Meadow, C |
| 2.000 | 55 | Woods, B, Good |
| 0.710 | 70 | Woods, C, Good |
| 9.680 | 61 | Weighted Average |
| 9.680 | | Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 8.8 | 100 | 0.0600 | 0.19 | | **Sheet Flow,** Grass: Dense n= 0.240 P2= 3.50" |
| 4.3 | 555 | 0.0180 | 2.16 | | **Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps |
| 13.1 | 655 | Total | | | |

## Subcatchment SE: BASIN SE



## Subcatchment W: BASIN W

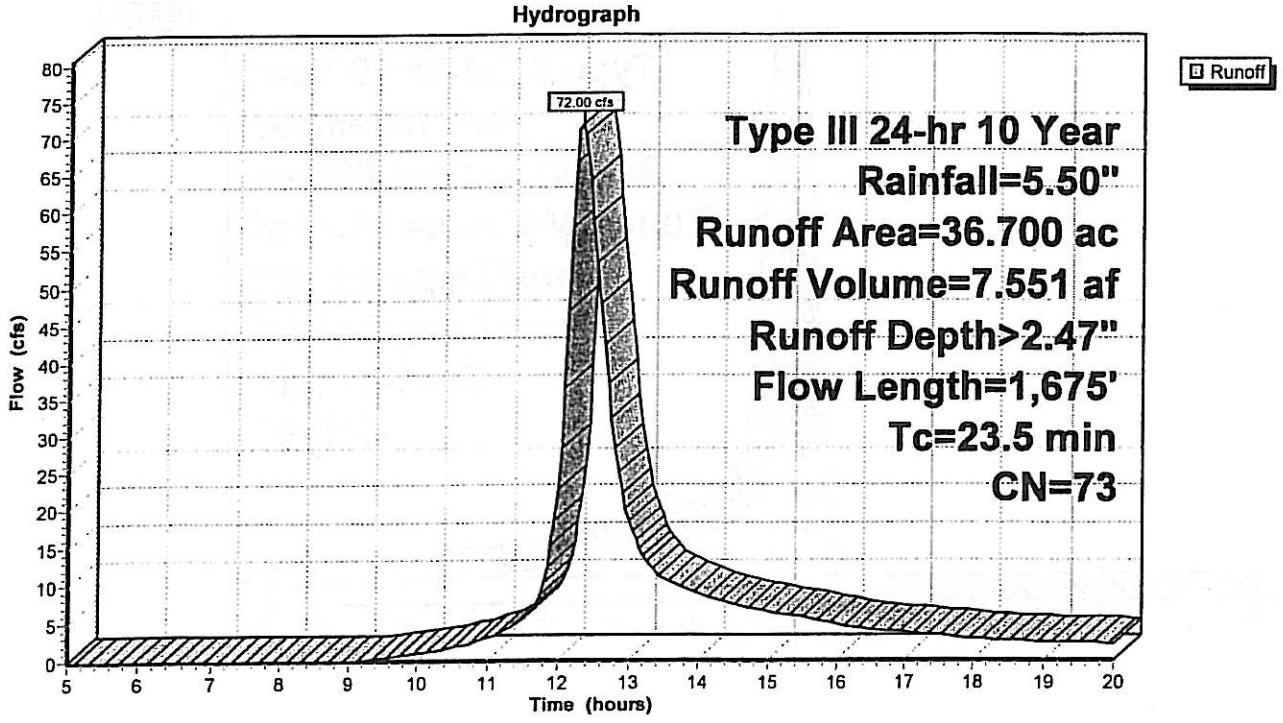
Runoff = 72.00 cfs @ 12.33 hrs, Volume= 7.551 af, Depth> 2.47"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 Year Rainfall=5.50"

| Area (ac) | CN | Description |
|---|---|---|
| 0.500 | 71 | Meadow, C |
| 0.150 | 78 | Meadow, D |
| 21.990 | 70 | Woods, C, Good |
| 14.060 | 78 | Woods, D, Good |
| 36.700 | 73 | Weighted Average |
| 36.700 | | Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 15.6 | 100 | 0.0400 | 0.11 | | **Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.50" |
| 5.3 | 1,135 | 0.0500 | 3.60 | | **Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps |
| 2.6 | 440 | 0.0300 | 2.79 | | **Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps |
| 23.5 | 1,675 | Total | | | |

## Subcatchment W: BASIN W

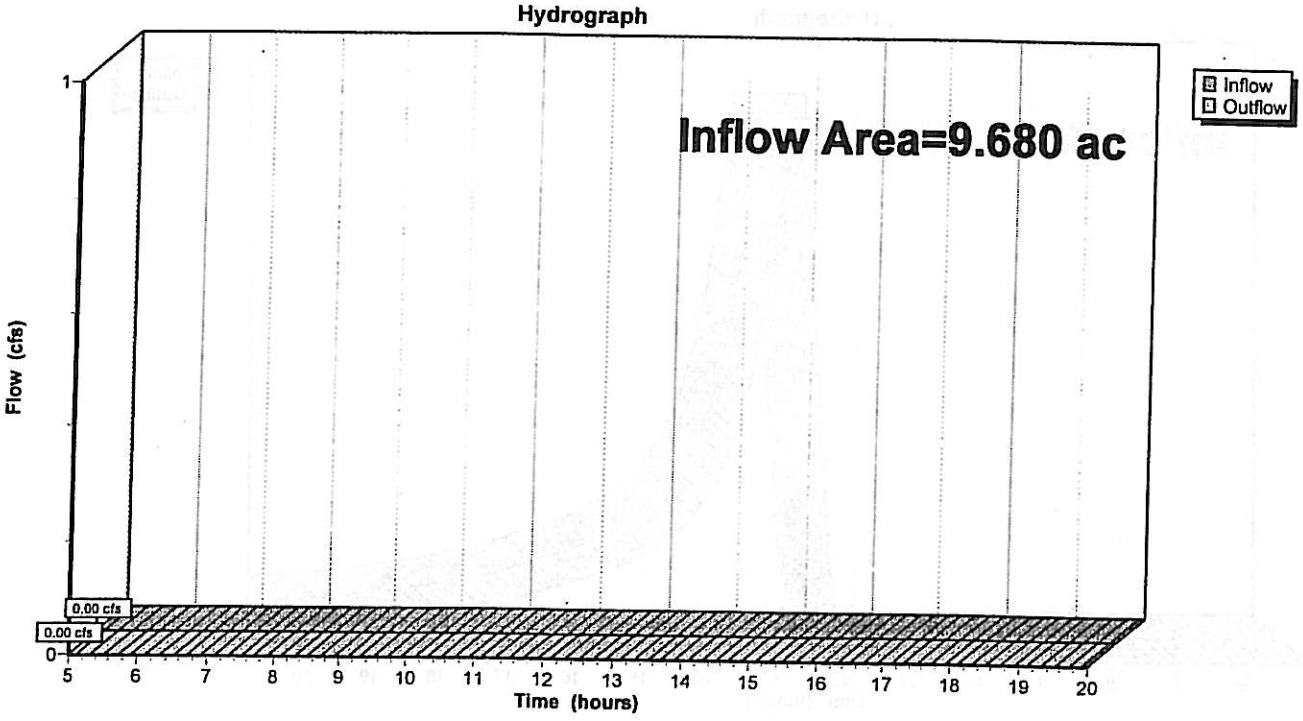


## Reach 2R: (new Reach)

Inflow Area = 9.680 ac, Inflow Depth = 0.00" for 10 Year event
Inflow = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

## Reach 2R: (new Reach)

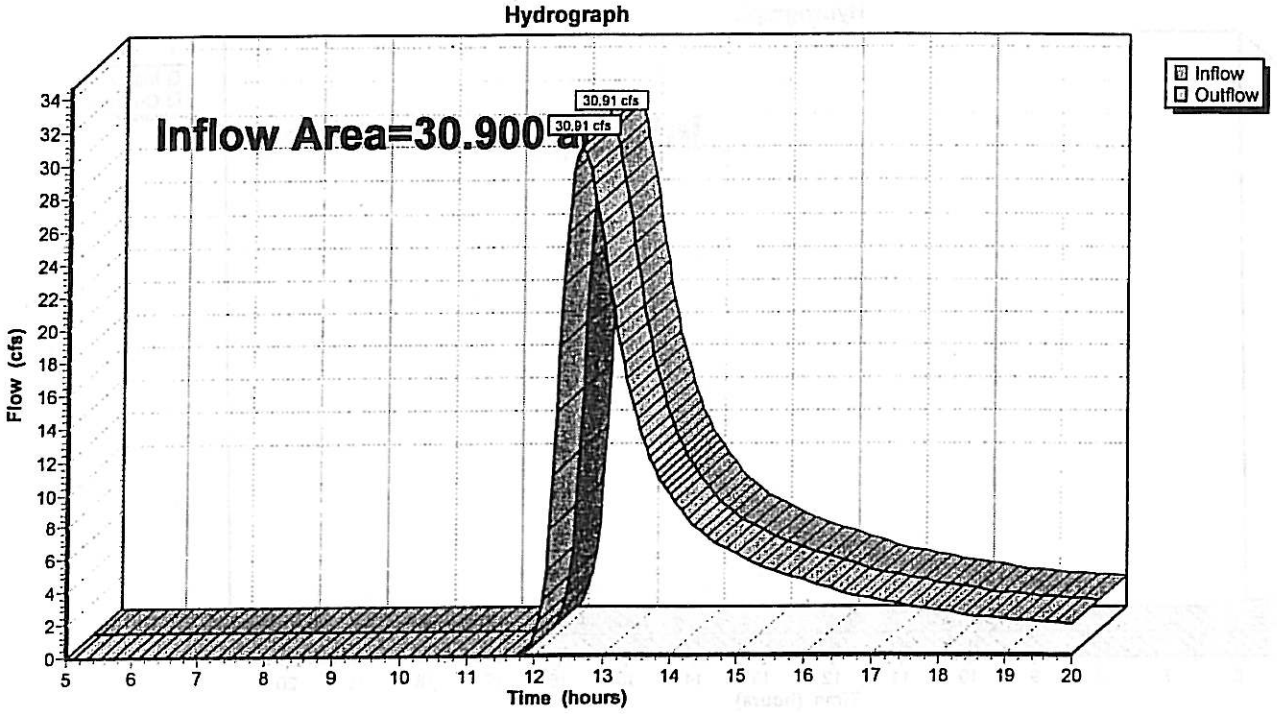


## Reach 5R: ANALYSIS POINT S

Inflow Area = 30.900 ac, Inflow Depth > 1.96" for 10 Year event
Inflow = 30.91 cfs @ 12.67 hrs, Volume= 5.035 af
Outflow = 30.91 cfs @ 12.67 hrs, Volume= 5.035 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

## Reach 5R: ANALYSIS POINT S

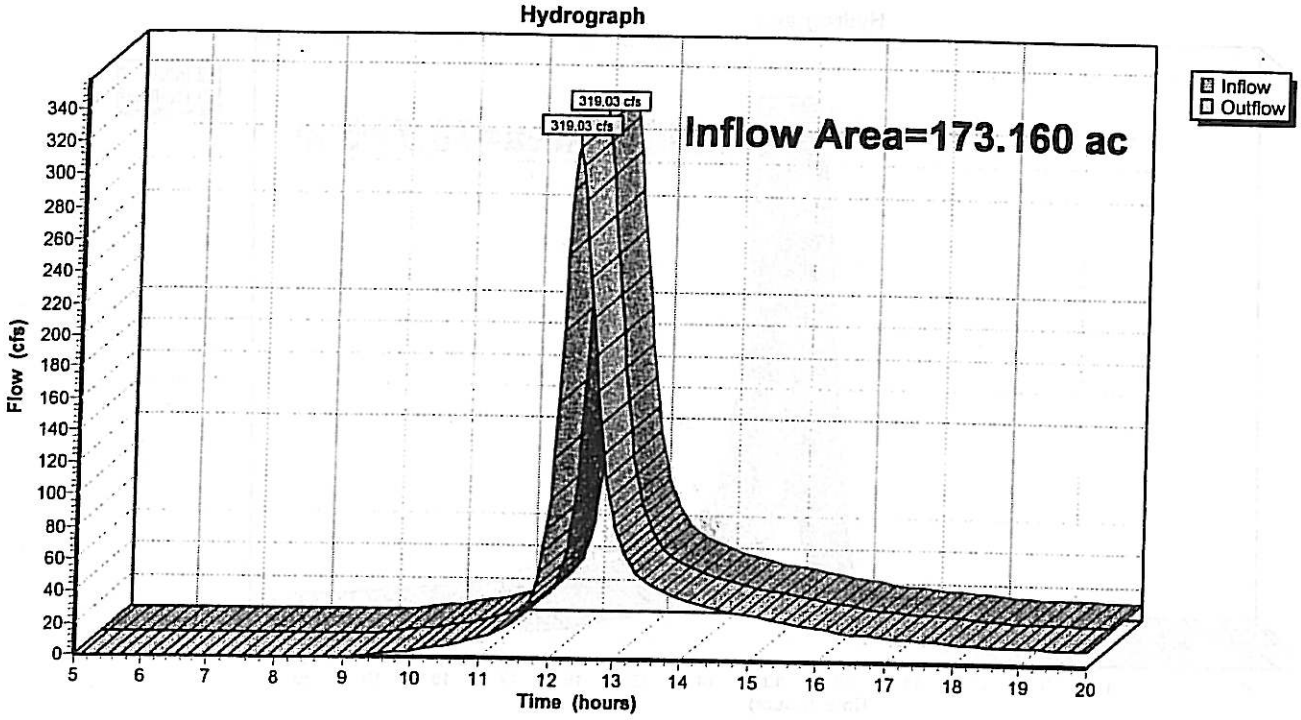


## Reach APE: ANALYSIS POINT W

Inflow Area = 173.160 ac, Inflow Depth > 2.33" for 10 Year event
Inflow = 319.03 cfs @ 12.34 hrs, Volume= 33.634 af
Outflow = 319.03 cfs @ 12.34 hrs, Volume= 33.634 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

## Reach APE: ANALYSIS POINT W

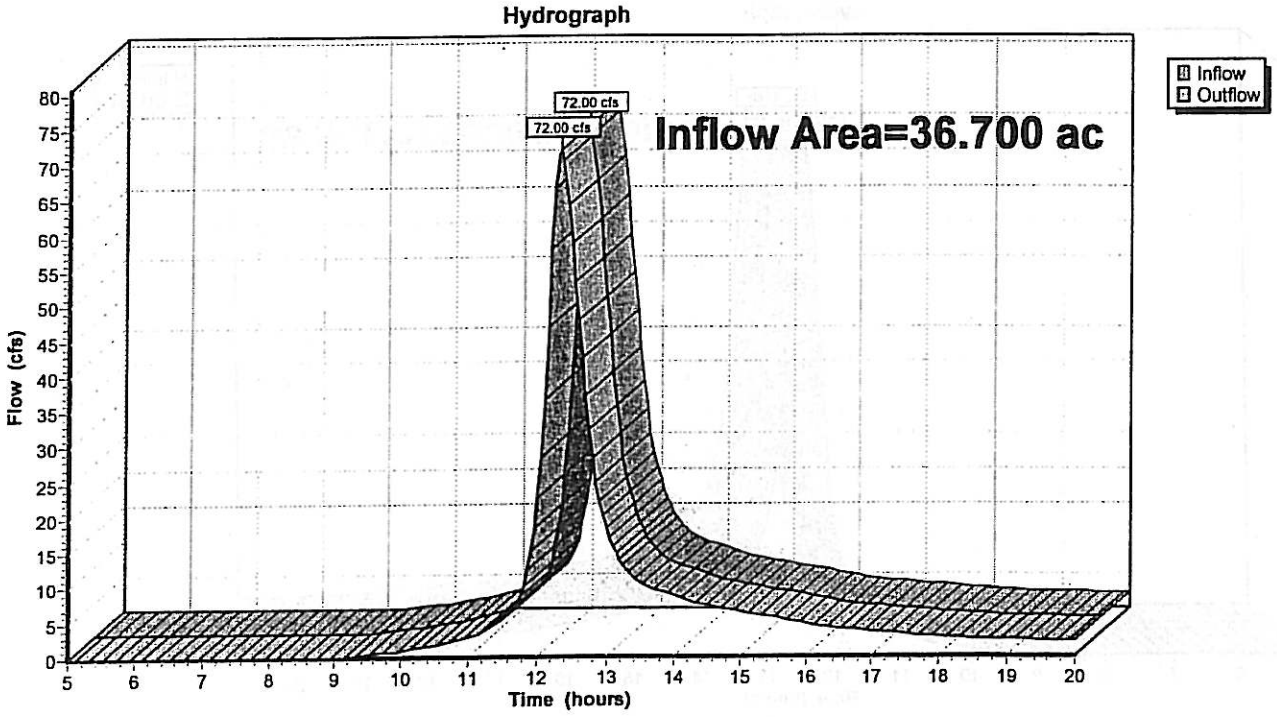


## Reach APW: ANALYSIS POINT W

Inflow Area = 36.700 ac, Inflow Depth > 2.47" for 10 Year event
Inflow = 72.00 cfs @ 12.33 hrs, Volume= 7.551 af
Outflow = 72.00 cfs @ 12.33 hrs, Volume= 7.551 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

## Reach APW: ANALYSIS POINT W



## Pond DS: NATURAL DEPRESSION

Inflow Area = 30.900 ac, Inflow Depth > 2.13" for 10 Year event
Inflow = 51.37 cfs @ 12.35 hrs, Volume= 5.490 af
Outflow = 30.91 cfs @ 12.67 hrs, Volume= 5.035 af, Atten= 40%, Lag= 19.0 min
Primary = 30.91 cfs @ 12.67 hrs, Volume= 5.035 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 468.89' @ 12.67 hrs Surf.Area= 102,063 sf Storage= 69,337 cf

Plug-Flow detention time= 62.7 min calculated for 5.018 af (91% of inflow)
Center-of-Mass det. time= 36.5 min ( 856.1 - 819.6 )

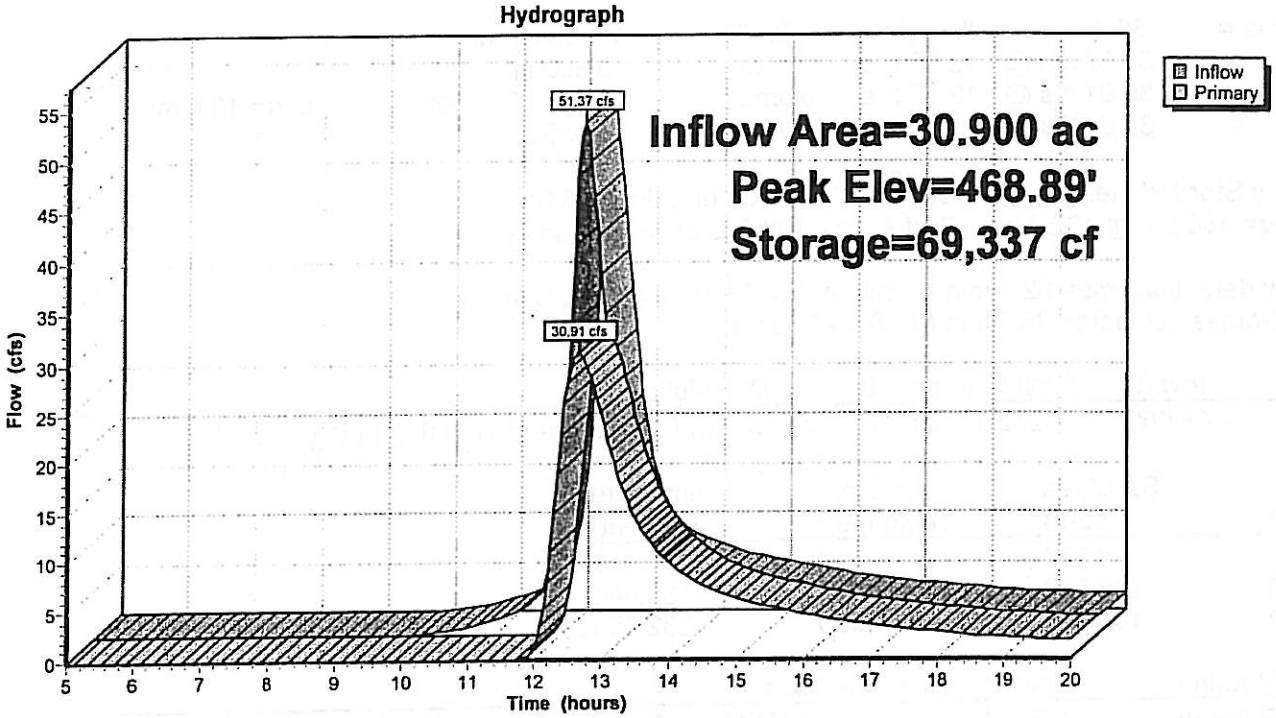
| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 468.00' | 232,150 cf | **Custom Stage Data (Prismatic)** Listed below (Recalc) |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 468.00 | 53,600 | 0 | 0 |
| 469.00 | 108,000 | 80,800 | 80,800 |
| 470.00 | 194,700 | 151,350 | 232,150 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 468.20' | **20.0' long x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88 |

**Primary OutFlow** Max=30.85 cfs @ 12.67 hrs HW=468.89' (Free Discharge)
↑—**1=Broad-Crested Rectangular Weir** (Weir Controls 30.85 cfs @ 2.24 fps)

## Pond DS: NATURAL DEPRESSION



## Pond DSE: NATURAL DEPRESSION

Inflow Area = 9.680 ac, Inflow Depth > 1.52" for 10 Year event
Inflow = 13.98 cfs @ 12.20 hrs, Volume= 1.228 af
Outflow = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min
Primary = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 471.72' @ 20.00 hrs Surf.Area= 61,440 sf Storage= 53,438 cf

Plug-Flow detention time= (not calculated: initial storage excedes outflow)
Center-of-Mass det. time= (not calculated: no outflow)

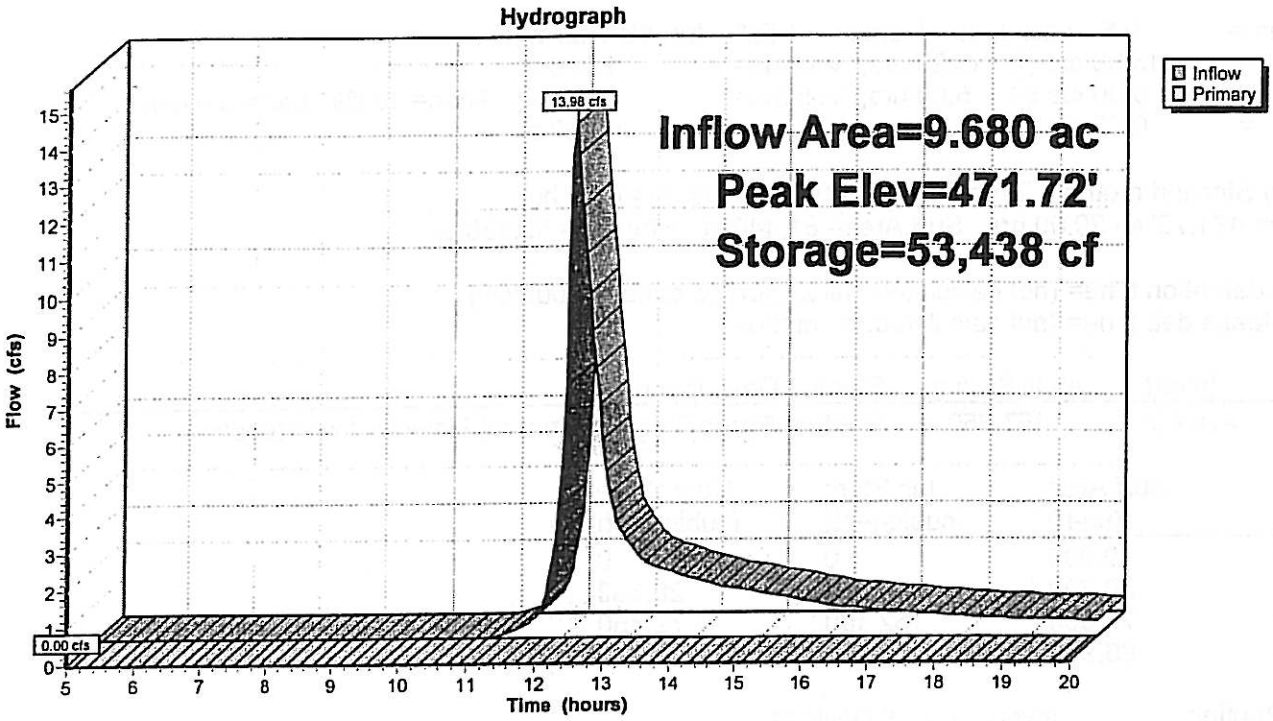
| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 470.00' | 157,650 cf | **Custom Stage Data (Prismatic)** Listed below (Recalc) |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 470.00 | 10,000 | 0 | 0 |
| 471.00 | 30,700 | 20,350 | 20,350 |
| 472.00 | 73,500 | 52,100 | 72,450 |
| 473.00 | 96,900 | 85,200 | 157,650 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 472.20' | **30.0' long x 10.0' breadth Broad-Crested Rectangular Weir** |
| | | | Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 |
| | | | Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64 |

**Primary OutFlow** Max=0.00 cfs @ 5.00 hrs HW=470.00' (Free Discharge)
↑—**1=Broad-Crested Rectangular Weir** ( Controls 0.00 cfs)

## Pond DSE: NATURAL DEPRESSION



Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

**Subcatchment 1: BASIN 1** Runoff Area=1.390 ac Runoff Depth>4.94"
Flow Length=410' Tc=14.9 min CN=77 Runoff=6.46 cfs 0.572 af

**Subcatchment 2: BASIN 2** Runoff Area=0.390 ac Runoff Depth>4.95"
Flow Length=175' Tc=8.4 min CN=77 Runoff=2.18 cfs 0.161 af

**Subcatchment E: BASIN E** Runoff Area=163.480 ac Runoff Depth>4.47"
Flow Length=4,495' Tc=23.8 min CN=73 Runoff=575.49 cfs 60.955 af

**Subcatchment N: BASIN N** Runoff Area=28.130 ac Runoff Depth>4.82"
Flow Length=1,120' Tc=17.1 min CN=76 Runoff=121.11 cfs 11.306 af

**Subcatchment NE: BASIN NE** Runoff Area=16.850 ac Runoff Depth>4.93"
Flow Length=2,170' Tc=20.4 min CN=77 Runoff=69.04 cfs 6.925 af

**Subcatchment S: BASIN S** Runoff Area=30.900 ac Runoff Depth>4.03"
Flow Length=1,935' Tc=24.3 min CN=69 Runoff=97.59 cfs 10.371 af

**Subcatchment SE: BASIN SE** Runoff Area=9.680 ac Runoff Depth>3.17"
Flow Length=655' Tc=13.1 min CN=61 Runoff=30.37 cfs 2.558 af

**Subcatchment W: BASIN W** Runoff Area=36.700 ac Runoff Depth>4.47"
Flow Length=1,675' Tc=23.5 min CN=73 Runoff=130.10 cfs 13.685 af

**Reach 2R: (new Reach)** Inflow=1.38 cfs 0.455 af
Outflow=1.38 cfs 0.455 af

**Reach 5R: ANALYSIS POINT S** Inflow=62.12 cfs 9.841 af
Outflow=62.12 cfs 9.841 af

**Reach APE: ANALYSIS POINT E** Inflow=575.49 cfs 61.410 af
Outflow=575.49 cfs 61.410 af

**Reach APW: ANALYSIS POINT W** Inflow=130.10 cfs 13.685 af
Outflow=130.10 cfs 13.685 af

**Pond DS: NATURAL DEPRESSION** Peak Elev=469.31' Storage=117,943 cf Inflow=97.59 cfs 10.371 af
Outflow=62.12 cfs 9.841 af

**Pond DSE: NATURAL DEPRESSION** Peak Elev=472.27' Storage=93,085 cf Inflow=30.37 cfs 2.558 af
Outflow=1.38 cfs 0.455 af

**Total Runoff Area = 287.520 ac Runoff Volume = 106.532 af Average Runoff Depth = 4.45"**
**98.86% Pervious Area = 284.230 ac 1.14% Impervious Area = 3.290 ac**

## Subcatchment 1: BASIN 1

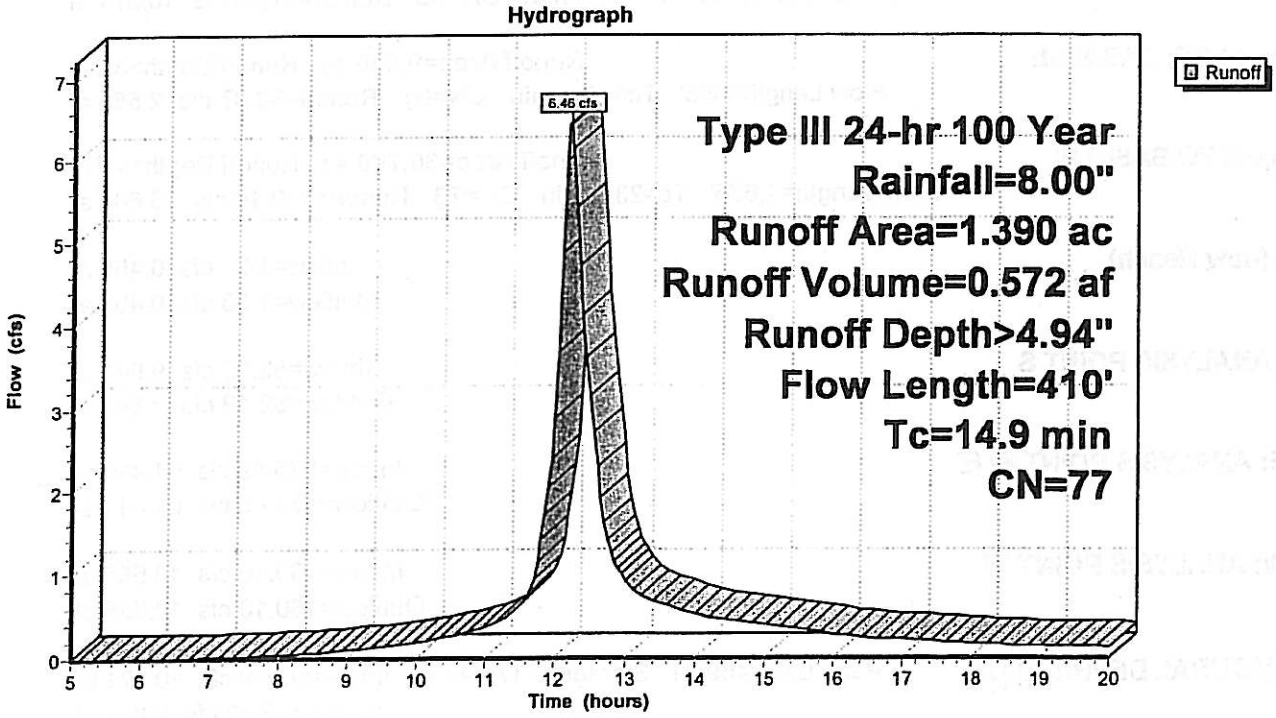
Runoff = 6.46 cfs @ 12.20 hrs, Volume= 0.572 af, Depth> 4.94"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 Year Rainfall=8.00"

| Area (ac) | CN | Description |
|---|---|---|
| 1.390 | 77 | Woods , D, Good |
| 1.390 | | Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 12.4 | 100 | 0.0700 | 0.13 | | **Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.50" |
| 2.5 | 310 | 0.0160 | 2.04 | | **Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps |
| 14.9 | 410 | Total | | | |

## Subcatchment 1: BASIN 1



## Subcatchment 2: BASIN 2

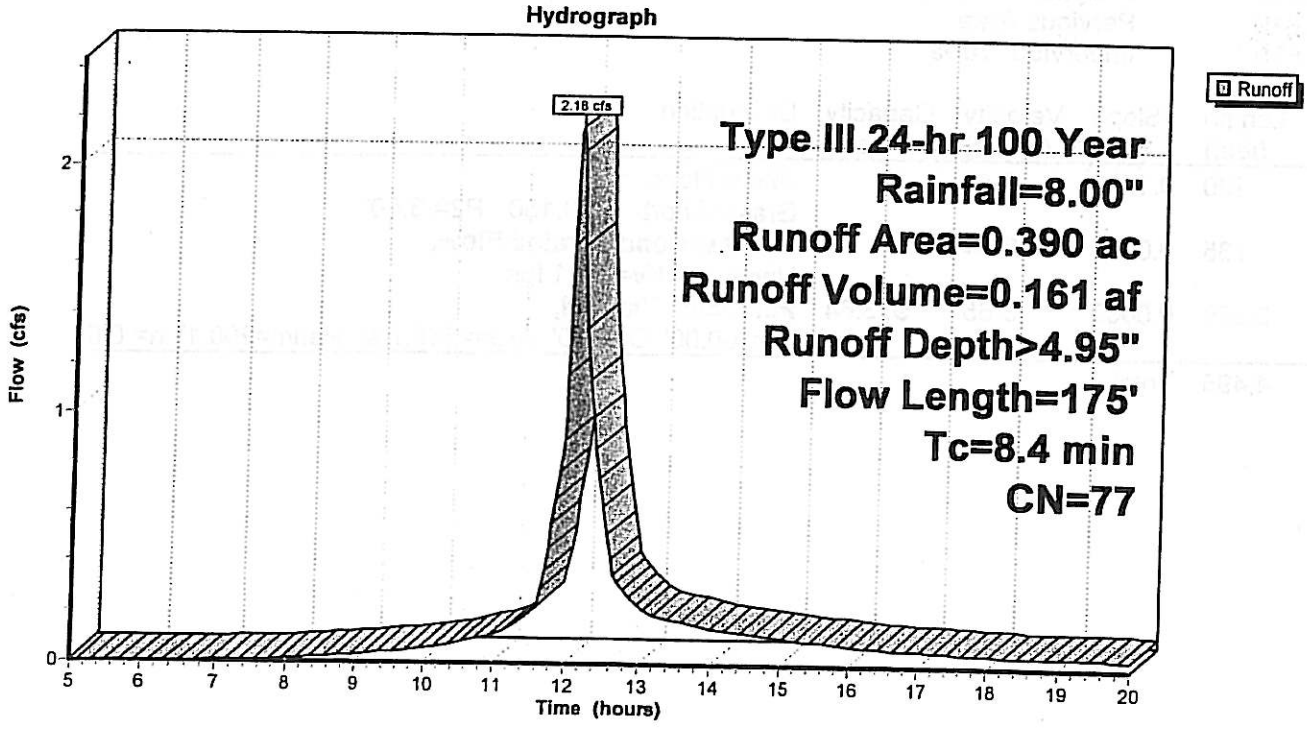
Runoff = 2.18 cfs @ 12.12 hrs, Volume= 0.161 af, Depth> 4.95"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 Year Rainfall=8.00"

| Area (ac) | CN | Description |
|---|---|---|
| 0.390 | 77 | Woods, D, Good |
| 0.390 | | Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 8.2 | 100 | 0.2000 | 0.20 | | **Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.50" |
| 0.2 | 75 | 0.1300 | 5.80 | | **Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps |
| 8.4 | 175 | Total | | | |

## Subcatchment 2: BASIN 2



## Subcatchment E: BASIN E

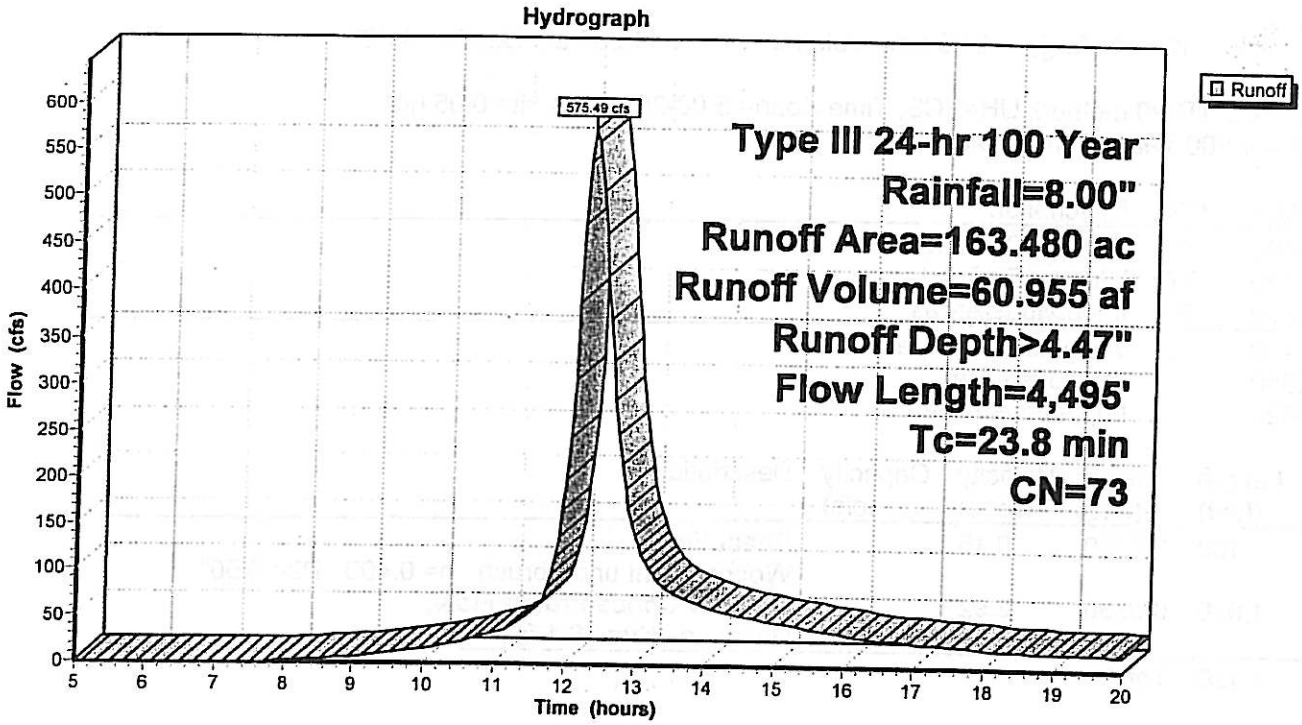
Runoff = 575.49 cfs @ 12.33 hrs, Volume= 60.955 af, Depth> 4.47"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 Year Rainfall=8.00"

| Area (ac) | CN | Description |
|---|---|---|
| 3.750 | 61 | Lawn, B, Good |
| 3.480 | 74 | Lawn, C, Good |
| 19.000 | 58 | Meadow, B |
| 41.450 | 71 | Meadow, C |
| 2.850 | 78 | Meadow, D |
| 14.900 | 55 | Woods, B, Good |
| 10.900 | 70 | Woods, C, Good |
| 15.800 | 77 | Woods, D, Good |
| 5.330 | 71 | Wetlands, B |
| 9.350 | 81 | Wetlands, C |
| 35.000 | 89 | Wetlands, D |
| 1.670 | 98 | Impervious Areas |
| 163.480 | 73 | Weighted Average |
| 161.810 | | Pervious Area |
| 1.670 | | Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 4.0 | 100 | 0.1700 | 0.42 | | **Sheet Flow,** Grass: Short n= 0.150 P2= 3.50" |
| 3.1 | 735 | 0.0600 | 3.94 | | **Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps |
| 16.7 | 3,660 | 0.0030 | 3.65 | 973.64 | **Parabolic Channel,** W=200.00' D=2.00' Area=266.7 sf Perim=200.1' n= 0.027 |
| 23.8 | 4,495 | Total | | | |

## Subcatchment E: BASIN E



## Subcatchment N: BASIN N

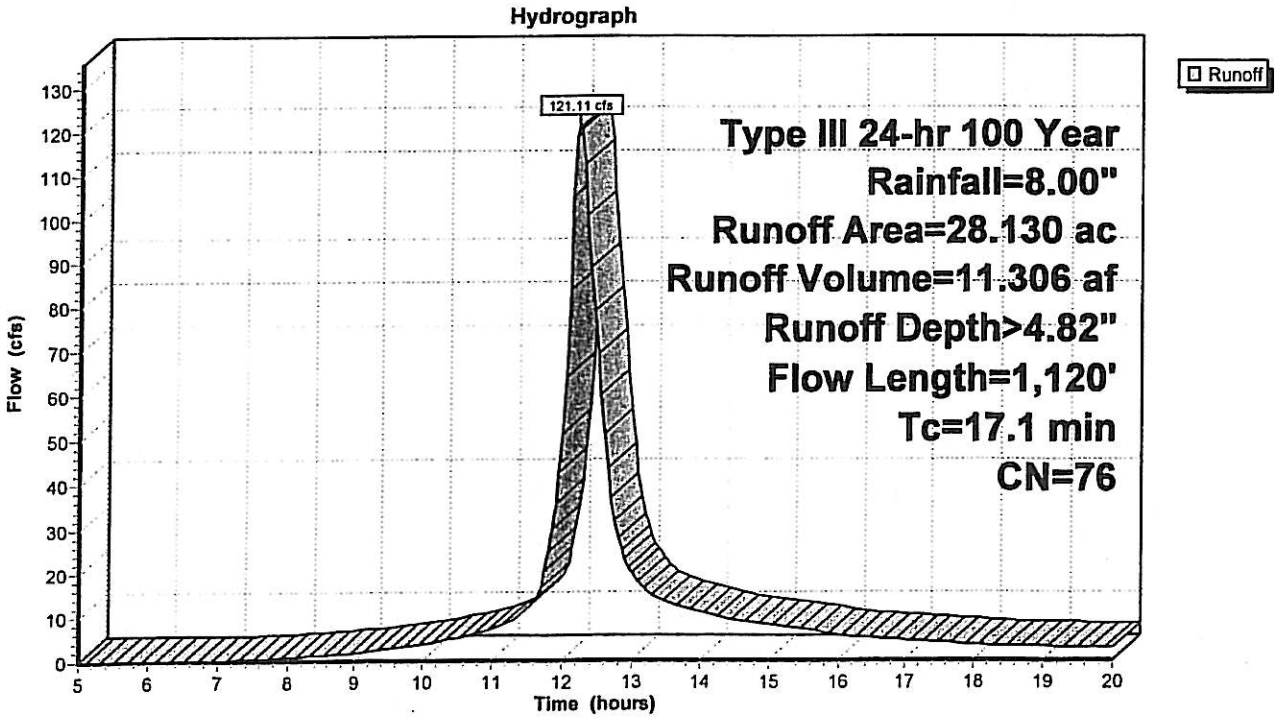
Runoff = 121.11 cfs @ 12.23 hrs, Volume= 11.306 af, Depth> 4.82"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 Year Rainfall=8.00"

| Area (ac) | CN | Description |
|---|---|---|
| 7.490 | 70 | Woods, C, Good |
| 19.020 | 77 | Woods, D, Good |
| 1.620 | 98 | Impervious Areas |
| 28.130 | 76 | Weighted Average |
| 26.510 | | Pervious Area |
| 1.620 | | Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 11.3 | 100 | 0.0900 | 0.15 | | **Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.50" |
| 5.8 | 1,020 | 0.0330 | 2.92 | | **Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps |
| 17.1 | 1,120 | Total | | | |

## Subcatchment N: BASIN N



## Subcatchment NE: BASIN NE

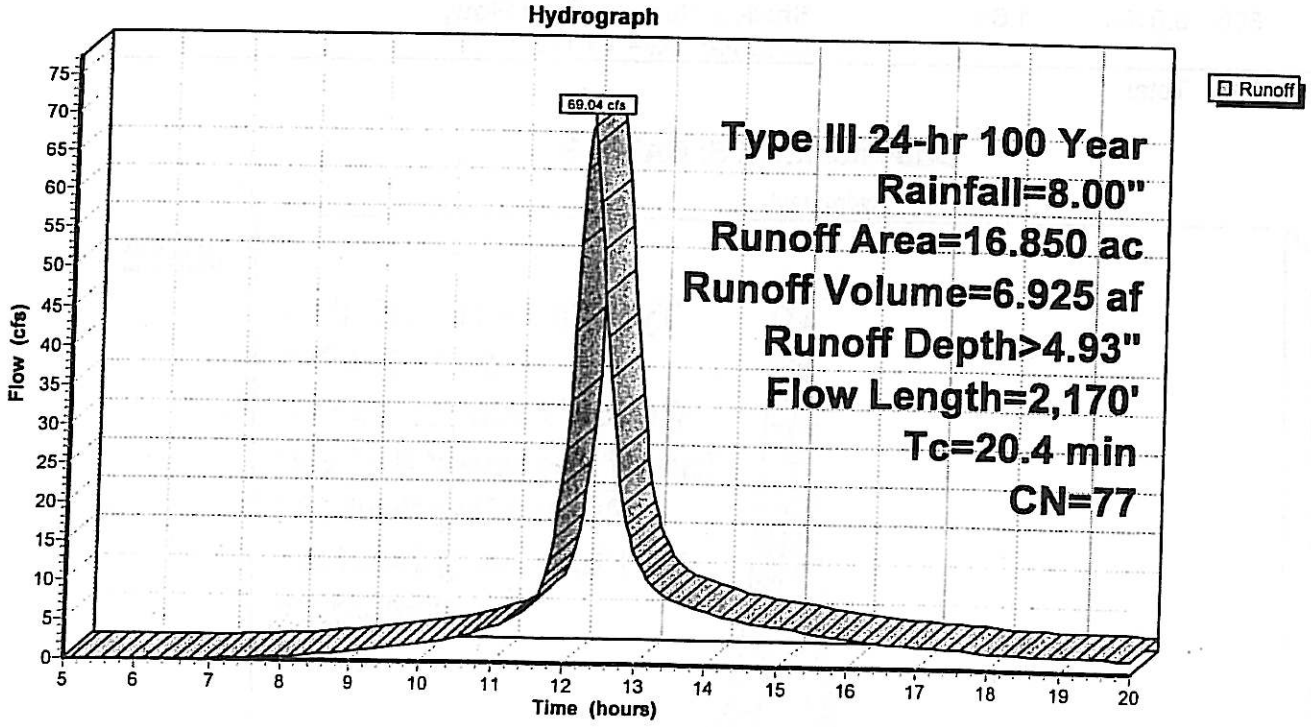
Runoff = 69.04 cfs @ 12.28 hrs, Volume= 6.925 af, Depth> 4.93"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 Year Rainfall=8.00"

| Area (ac) | CN | Description |
|---|---|---|
| 0.100 | 78 | Meadow, D |
| 16.750 | 77 | Woods, D, Good |
| 16.850 | 77 | Weighted Average |
| 16.850 | | Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 10.8 | 100 | 0.1000 | 0.15 | | **Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.50" |
| 9.6 | 2,070 | 0.0500 | 3.60 | | **Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps |
| 20.4 | 2,170 | Total | | | |

## Subcatchment NE: BASIN NE



## Subcatchment S: BASIN S

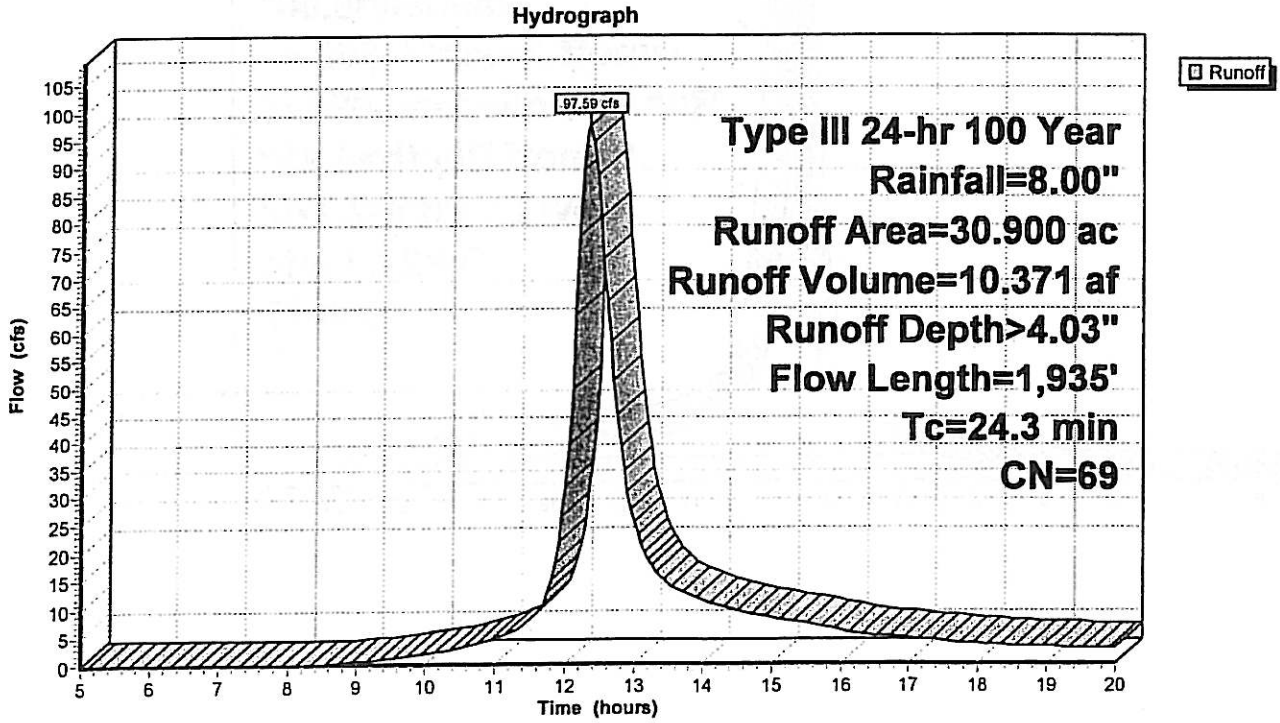
Runoff = 97.59 cfs @ 12.34 hrs, Volume= 10.371 af, Depth> 4.03"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 Year Rainfall=8.00"

| Area (ac) | CN | Description |
|---|---|---|
| 7.110 | 58 | Meadow, B |
| 0.600 | 71 | Meadow, C |
| 0.280 | 78 | Meadow, D |
| 4.140 | 55 | Woods, B, Good |
| 3.150 | 70 | Woods, C, Good |
| 15.620 | 77 | Woods, D, Good |
| 30.900 | 69 | Weighted Average |
| 30.900 | | Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 13.2 | 100 | 0.0600 | 0.13 | | **Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.50" |
| 5.9 | 1,335 | 0.0550 | 3.78 | | **Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps |
| 5.2 | 500 | 0.0100 | 1.61 | | **Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps |
| 24.3 | 1,935 | Total | | | |

## Subcatchment S: BASIN S



## Subcatchment SE: BASIN SE

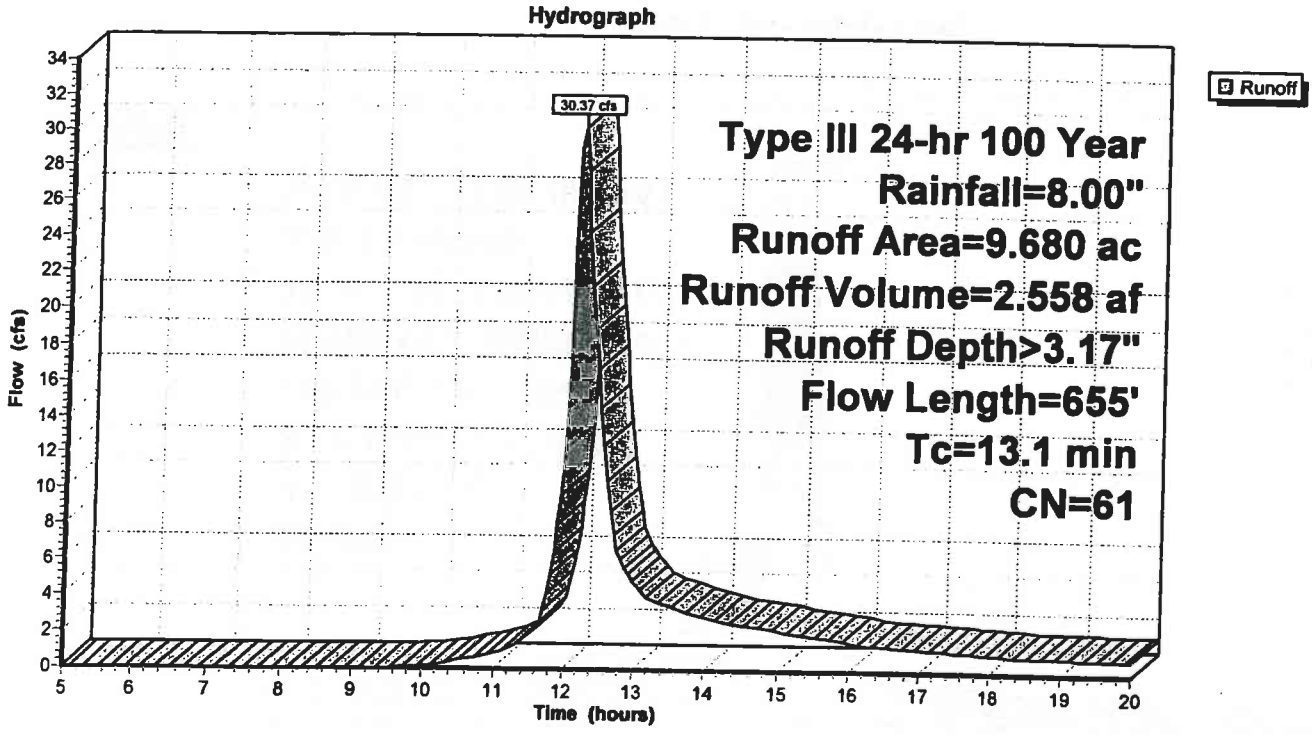
Runoff = 30.37 cfs @ 12.19 hrs, Volume= 2.558 af, Depth> 3.17"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 Year Rainfall=8.00"

| Area (ac) | CN | Description |
|---|---|---|
| 4.770 | 58 | Meadow, B |
| 2.200 | 71 | Meadow, C |
| 2.000 | 55 | Woods, B, Good |
| 0.710 | 70 | Woods, C, Good |
| 9.680 | 61 | Weighted Average |
| 9.680 | | Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 8.8 | 100 | 0.0600 | 0.19 | | **Sheet Flow,** Grass: Dense n= 0.240 P2= 3.50" |
| 4.3 | 555 | 0.0180 | 2.16 | | **Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps |
| 13.1 | 655 | Total | | | |

## Subcatchment SE: BASIN SE



## Subcatchment W: BASIN W

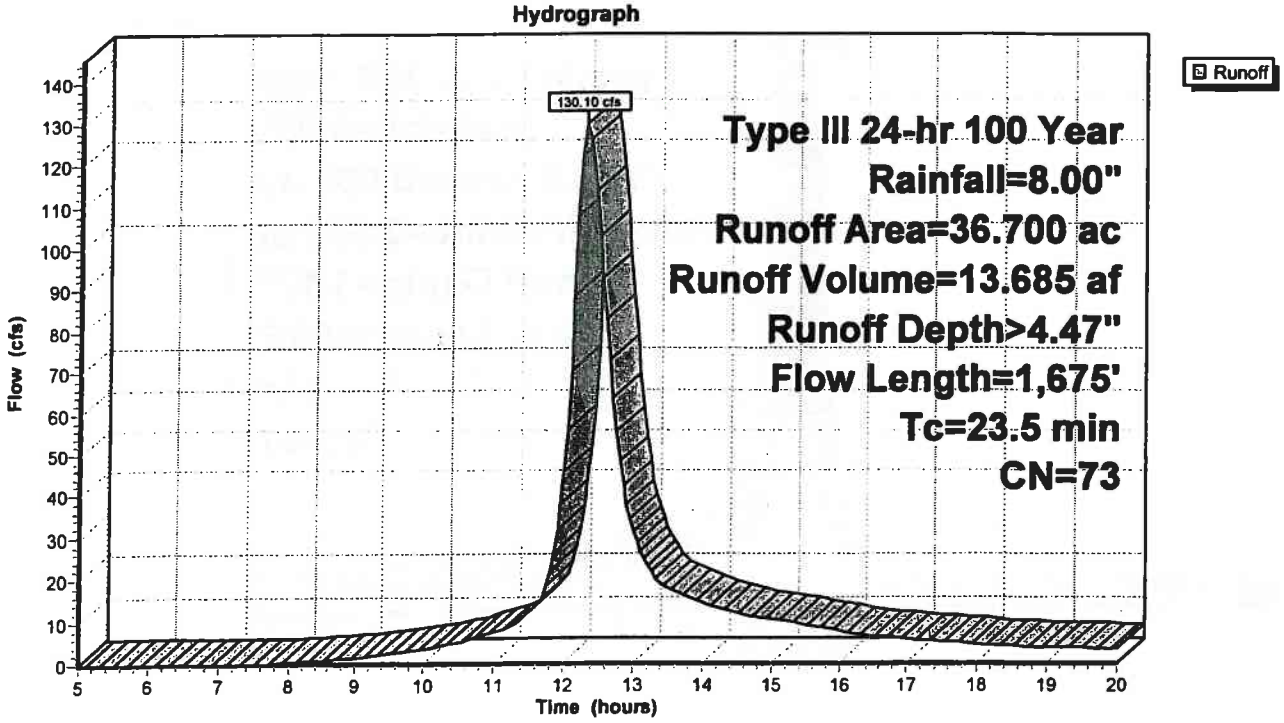
Runoff = 130.10 cfs @ 12.32 hrs, Volume= 13.685 af, Depth> 4.47"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 Year Rainfall=8.00"

| Area (ac) | CN | Description |
|---|---|---|
| 0.500 | 71 | Meadow, C |
| 0.150 | 78 | Meadow, D |
| 21.990 | 70 | Woods, C, Good |
| 14.060 | 78 | Woods, D, Good |
| 36.700 | 73 | Weighted Average |
| 36.700 | | Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 15.6 | 100 | 0.0400 | 0.11 | | **Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.50" |
| 5.3 | 1,135 | 0.0500 | 3.60 | | **Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps |
| 2.6 | 440 | 0.0300 | 2.79 | | **Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps |
| 23.5 | 1,675 | Total | | | |

## Subcatchment W: BASIN W

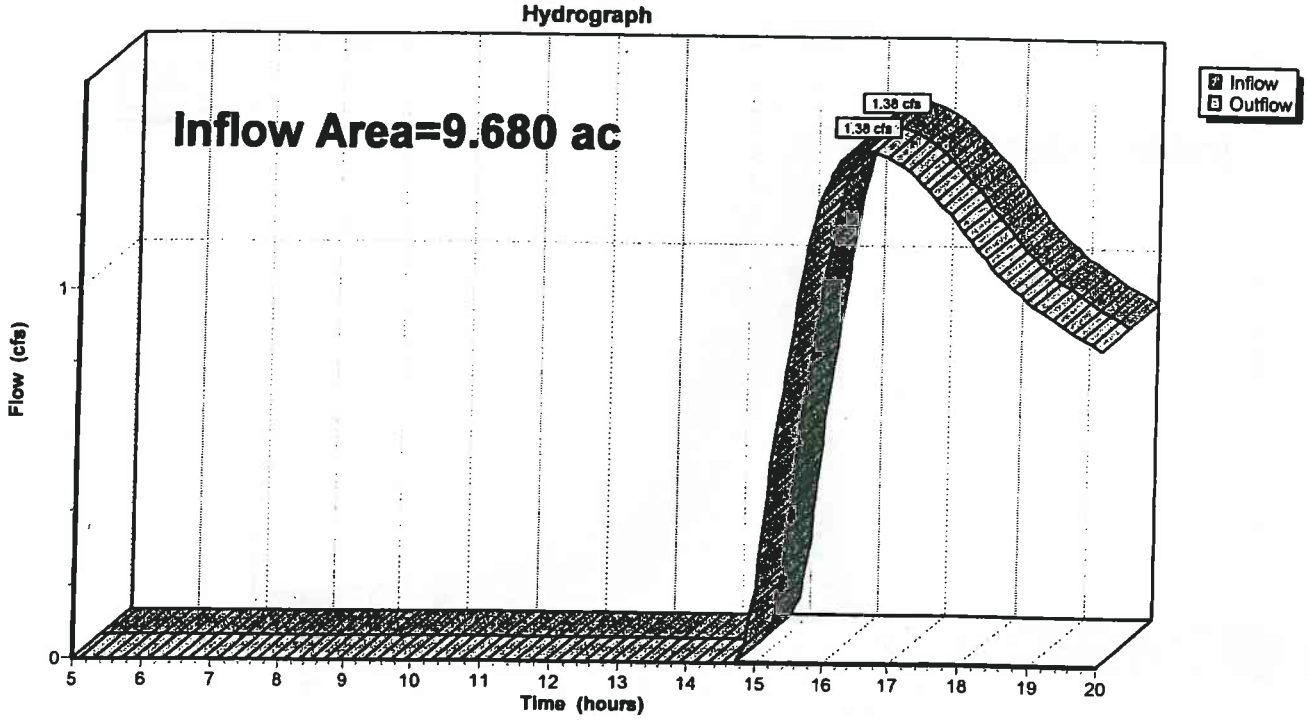


## Reach 2R: (new Reach)

Inflow Area = 9.680 ac, Inflow Depth > 0.56" for 100 Year event
Inflow = 1.38 cfs @ 16.54 hrs, Volume= 0.455 af
Outflow = 1.38 cfs @ 16.54 hrs, Volume= 0.455 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

## Reach 2R: (new Reach)

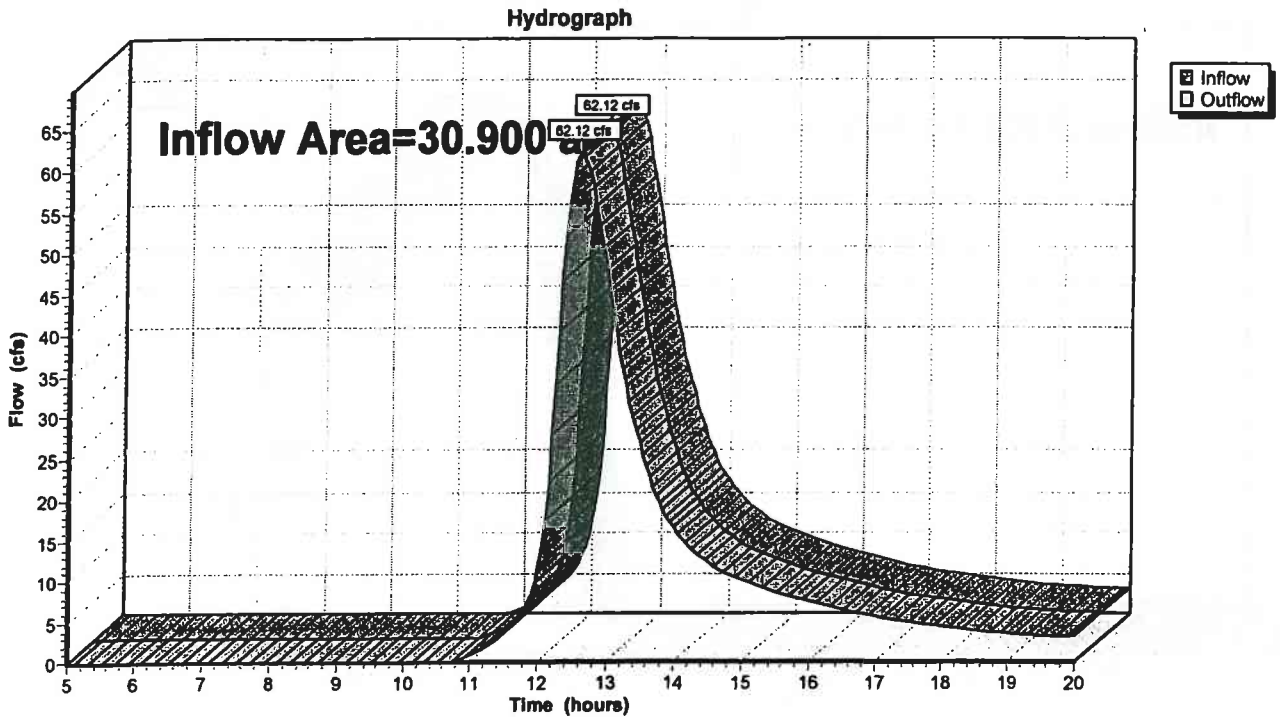


## Reach 5R: ANALYSIS POINT S

Inflow Area = 30.900 ac, Inflow Depth > 3.82" for 100 Year event
Inflow = 62.12 cfs @ 12.63 hrs, Volume= 9.841 af
Outflow = 62.12 cfs @ 12.63 hrs, Volume= 9.841 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

## Reach 5R: ANALYSIS POINT S

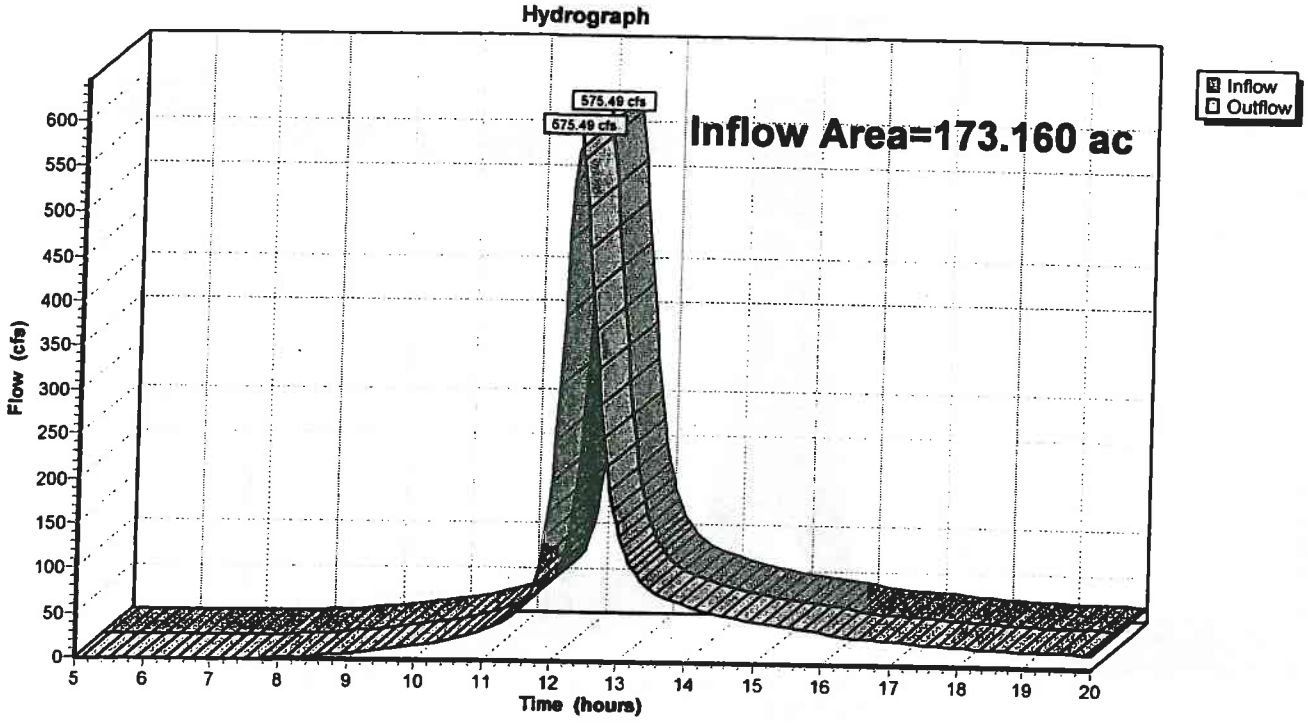


## Reach APE: ANALYSIS POINT W

Inflow Area = 173.160 ac, Inflow Depth > 4.26" for 100 Year event
Inflow = 575.49 cfs @ 12.33 hrs, Volume= 61.410 af
Outflow = 575.49 cfs @ 12.33 hrs, Volume= 61.410 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

## Reach APE: ANALYSIS POINT W

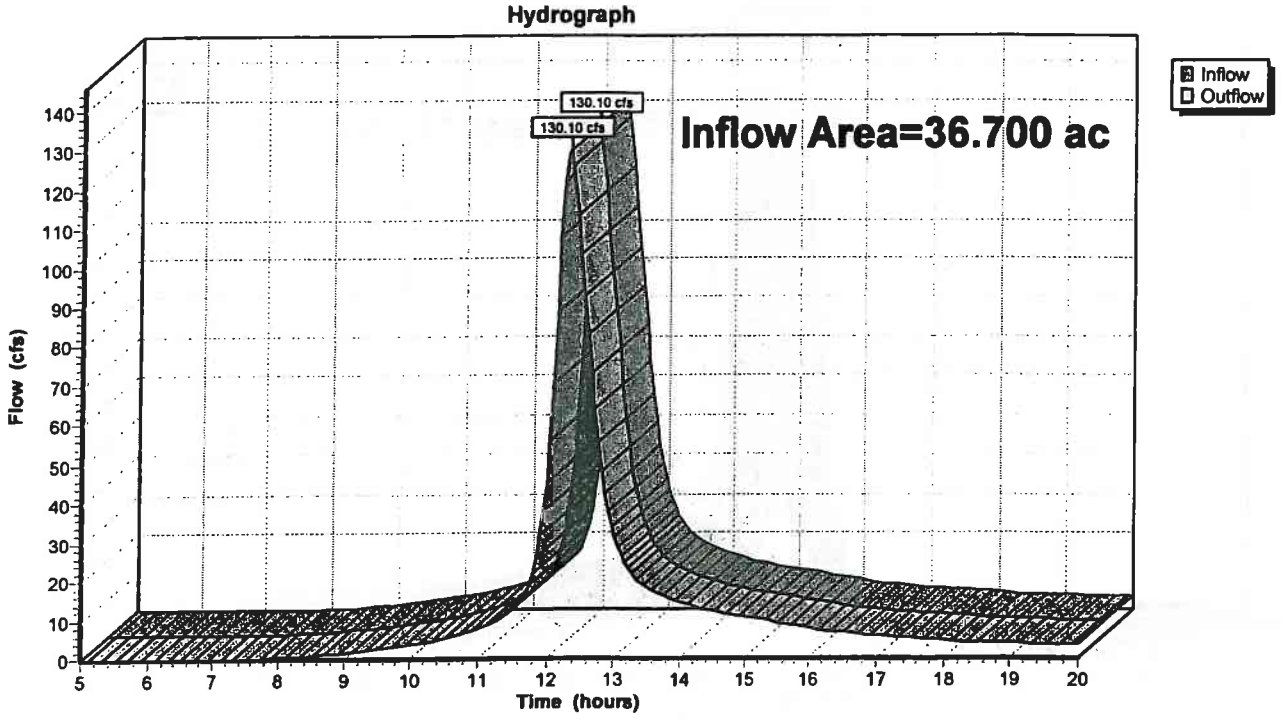


## Reach APW: ANALYSIS POINT W

Inflow Area = 36.700 ac, Inflow Depth > 4.47" for 100 Year event
Inflow = 130.10 cfs @ 12.32 hrs, Volume= 13.685 af
Outflow = 130.10 cfs @ 12.32 hrs, Volume= 13.685 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

## Reach APW: ANALYSIS POINT W



## Pond DS: NATURAL DEPRESSION

Inflow Area = 30.900 ac, Inflow Depth > 4.03" for 100 Year event
Inflow = 97.59 cfs @ 12.34 hrs, Volume= 10.371 af
Outflow = 62.12 cfs @ 12.63 hrs, Volume= 9.841 af, Atten= 36%, Lag= 17.1 min
Primary = 62.12 cfs @ 12.63 hrs, Volume= 9.841 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 469.31' @ 12.63 hrs Surf.Area= 134,554 sf Storage= 117,943 cf

Plug-Flow detention time= 49.7 min calculated for 9.841 af (95% of inflow)
Center-of-Mass det. time= 32.1 min ( 837.6 - 805.6 )

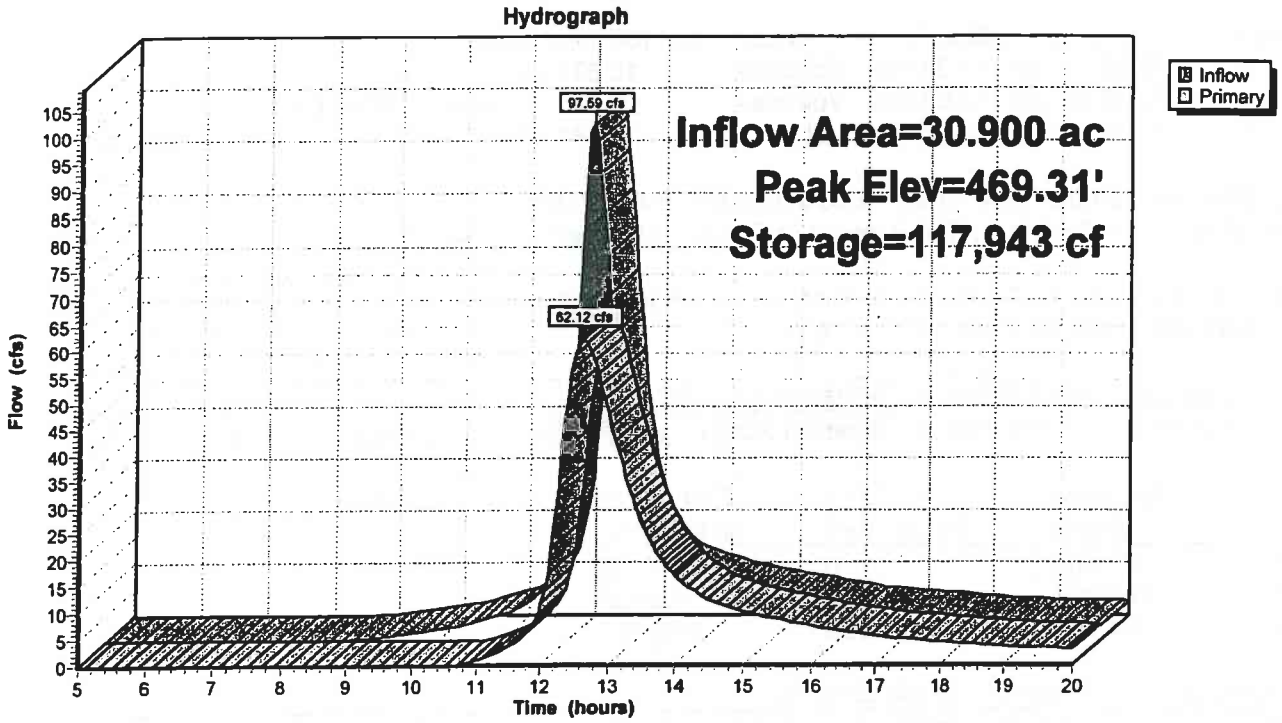
| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 468.00' | 232,150 cf | **Custom Stage Data (Prismatic)** Listed below (Recalc) |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 468.00 | 53,600 | 0 | 0 |
| 469.00 | 108,000 | 80,800 | 80,800 |
| 470.00 | 194,700 | 151,350 | 232,150 |

| evice | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 468.20' | **20.0' long x 5.0' breadth Broad-Crested Rectangular Weir**<br>Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50<br>Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88 |

**Primary OutFlow** Max=62.03 cfs @ 12.63 hrs HW=469.31' (Free Discharge)
↑—**1=Broad-Crested Rectangular Weir** (Weir Controls 62.03 cfs @ 2.81 fps)

## Pond DS: NATURAL DEPRESSION



## Pond DSE: NATURAL DEPRESSION

Inflow Area = 9.680 ac, Inflow Depth > 3.17" for 100 Year event
Inflow = 30.37 cfs @ 12.19 hrs, Volume= 2.558 af
Outflow = 1.38 cfs @ 16.54 hrs, Volume= 0.455 af, Atten= 95%, Lag= 261.1 min
Primary = 1.38 cfs @ 16.54 hrs, Volume= 0.455 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 472.27' @ 16.54 hrs Surf.Area= 79,799 sf Storage= 93,085 cf

Plug-Flow detention time= 344.4 min calculated for 0.455 af (18% of inflow)
Center-of-Mass det. time= 238.1 min ( 1,048.2 - 810.1 )

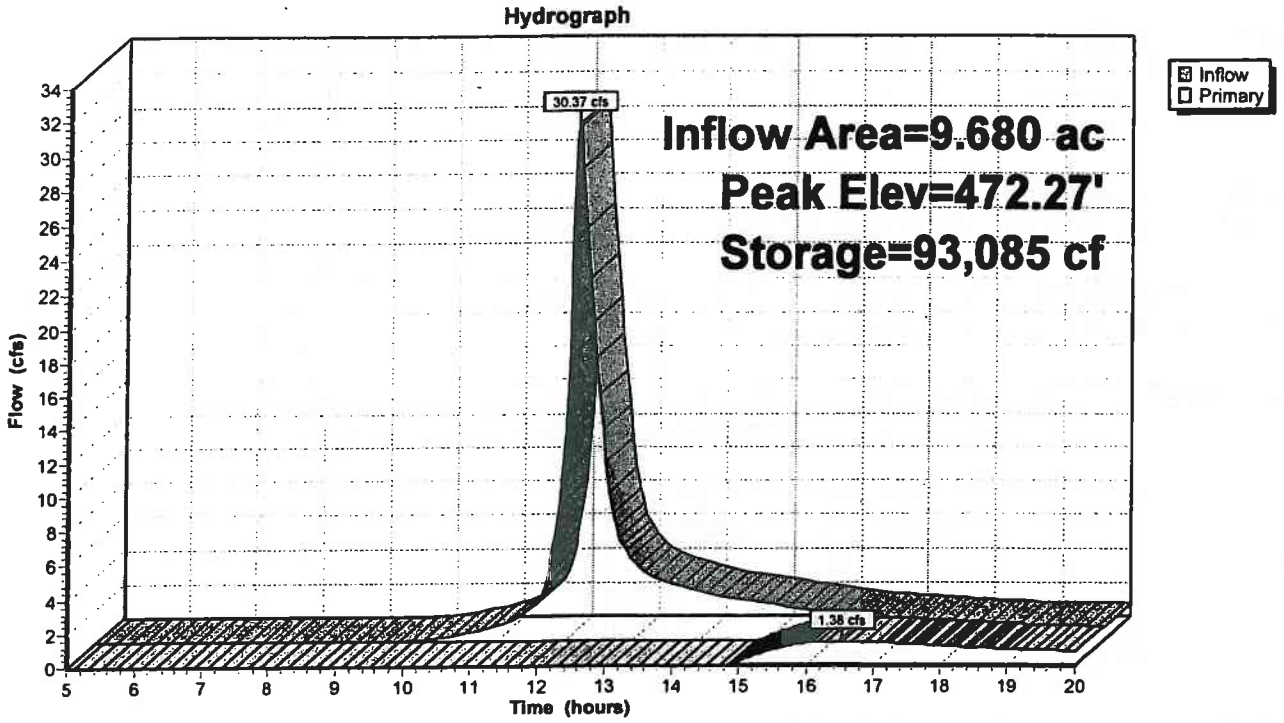
| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 470.00' | 157,650 cf | **Custom Stage Data (Prismatic)** Listed below (Recalc) |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 470.00 | 10,000 | 0 | 0 |
| 471.00 | 30,700 | 20,350 | 20,350 |
| 472.00 | 73,500 | 52,100 | 72,450 |
| 473.00 | 96,900 | 85,200 | 157,650 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 472.20' | **30.0' long x 10.0' breadth Broad-Crested Rectangular Weir** |
| | | | Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 |
| | | | Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64 |

**Primary OutFlow** Max=1.36 cfs @ 16.54 hrs HW=472.27' (Free Discharge)
↑—**1=Broad-Crested Rectangular Weir** (Weir Controls 1.36 cfs @ 0.66 fps)

## Pond DSE: NATURAL DEPRESSION



# APPENDIX D

# Appendix C: Construction Standards and Specifications

## C.1 Pond Construction Standards/Specifications

These specifications are generally appropriate to all earthen ponds, and are adapted from NRCS Pond Code 378. Practitioners should always consult the New York State Department of Environmental Conservation – Dam Safety Division for the most recent guidance. All references to ASTM and AASHTO specifications apply to the most recent version.

### Site Preparation

Areas designated for borrow areas, embankment, and structural works shall be cleared, grubbed and stripped of topsoil. All trees, vegetation, roots and other objectionable material shall be removed. Channel banks and sharp breaks shall be sloped to no steeper than 1:1. All trees shall be cleared and grubbed within 15 feet of the toe of the embankment.

Areas to be covered by the reservoir will be cleared of all trees, brush, logs, fences, rubbish and other objectionable material unless otherwise designated on the plans. Trees, brush, and stumps shall be cut approximately level with the ground surface. For dry stormwater management ponds, a minimum of a 25-foot radius around the outlet structure shall be cleared.

All cleared and grubbed material shall be disposed of outside and below the limits of the dam and reservoir as directed by the owner or his representative. When specified, a sufficient quantity of topsoil will be stockpiled in a suitable location for use on the embankment and other designated areas.

### Earth Fill

*Material* - The fill material shall be taken from approved designated borrow areas. It shall be free of roots, stumps, wood, rubbish, stones greater than 6", frozen or other objectionable materials. Fill material for the center of the embankment, and cut off trench shall conform to Unified Soil Classification GC, SC, CH, or CL and must have at least 30% passing the #200 sieve. Consideration may be given to the use of other materials in the embankment if designed by a geotechnical engineer. Such special designs must have construction supervised by a geotechnical engineer.

Materials used in the outer shell of the embankment must have the capability to support vegetation of the quality required to prevent erosion of the embankment.

*Placement* - Areas on which fill is to be placed shall be scarified prior to placement of fill. Fill materials shall be placed in maximum 8 inch thick (before compaction) layers which are to be continuous over the entire length of the fill. The most permeable borrow material shall be placed in the downstream portions of the embankment. The principal spillway must be installed concurrently with fill placement and not excavated into the embankment.

*Compaction* - The movement of the hauling and spreading equipment over the fill shall be controlled so that the entire surface of each lift shall be traversed by not less than one tread track of heavy equipment or compaction shall be achieved by a minimum of four complete passes of a sheepsfoot, rubber tired or vibratory roller. Fill material shall contain sufficient moisture such that the required degree of compaction will be obtained with the equipment used. The fill material shall contain sufficient moisture so that if formed into a ball it will not crumble, yet not be so wet that water can be squeezed out.

When required by the reviewing agency the minimum required density shall not be less than 95% of maximum dry density with a moisture content within 2% of the optimum. Each layer of fill shall be compacted as necessary to obtain that density, and is to be certified by the Engineer at the time of construction. All compaction is to be determined by AASHTO Method T-99 (Standard Proctor).

*Cut-Off Trench* - The cutoff trench shall be excavated into impervious material along or parallel to the centerline of the embankment as shown on the plans. The bottom width of the trench shall be governed by the equipment used for excavation, with the minimum width being four feet. The depth shall be at least four feet below existing grade or as shown on the plans. The side slopes of the trench shall be 1 to 1 or flatter. The backfill shall be compacted with construction equipment, rollers, or hand tampers to assure maximum density and minimum permeability.

*Embankment Core* - The core shall be parallel to the centerline of the embankment as shown on the plans. The top width of the core shall be a minimum of four feet. The height shall extend up to at least the 10 year water elevation or as shown on the plans. The side slopes shall be 1 to 1 or flatter. The core shall be compacted with construction equipment, rollers, or hand tampers to assure maximum density and minimum permeability. In addition, the core shall be placed concurrently with the outer shell of the embankment.

Structure Backfill

Backfill adjacent to pipes or structures shall be of the type and quality conforming to that specified for the adjoining fill material. The fill shall be placed in horizontal layers not to exceed four inches in thickness and compacted by hand tampers or other manually directed compaction equipment. The material needs to fill completely all spaces under and adjacent to the pipe. At no time during the backfilling operation shall driven equipment be allowed to operate closer than four feet, measured horizontally, to any part of a structure. Under no circumstances shall equipment be driven over any part of a concrete structure or pipe, unless there is a compacted fill of 24" or greater over the structure or pipe.

Structure backfill may be flowable fill meeting the requirements of the New York State Department of Transportation. The mixture shall have a 100-200 psi; 28 day unconfined compressive strength. The flowable fill shall have a minimum pH of 4.0 and a minimum resistivity of 2,000 ohm-cm. Material shall be placed such that a minimum of 6" (measured perpendicular to the outside of the pipe) of flowable fill shall be under (bedding), over and, on the sides of the pipe. It only needs to extend up to the spring line for rigid conduits. Average slump of the fill shall be 7" to assure flowability of the material. Adequate measures shall be taken (sand bags, etc.) to prevent floating the pipe. When using flowable fill, all metal pipe shall be bituminous coated. Any adjoining soil fill shall be placed in horizontal layers not to exceed four inches in thickness and compacted by hand tampers or other manually directed compaction equipment. The material shall completely fill all voids adjacent to the flowable fill zone. At no time during the backfilling operation shall driven equipment be allowed to operate closer than four feet, measured horizontally, to any part of a structure. Under no circumstances shall equipment be driven over any part of a structure or pipe unless there is a compacted fill of 24" or greater over the structure or pipe. Backfill material outside the structural backfill (flowable fill) zone shall be of the type and quality conforming to that specified for the core of the embankment or other embankment materials.

## Pipe Conduits

All pipes shall be circular in cross section.

Corrugated Metal Pipe - All of the following criteria shall apply for corrugated metal pipe:

**Materials** - (Polymer Coated steel pipe) - Steel pipes with polymeric coatings shall have a minimum coating thickness of 0.01 inch (10 mil) on both sides of the pipe. This pipe and its appurtenances shall conform to the requirements of AASHTO Specifications M-245 & M-246 with watertight coupling bands or flanges.

**Materials** - (Aluminum Coated Steel Pipe) - This pipe and its appurtenances shall conform to the requirements of AASHTO Specification M-274 with watertight coupling bands or flanges. Aluminum Coated Steel Pipe, when used with flowable fill or when soil and/or water conditions warrant the need for increased durability, shall be fully bituminous coated per requirements of AASHTO Specification M-190 Type A. Any aluminum coating damaged or otherwise removed shall be replaced with cold applied bituminous coating compound. Aluminum surfaces that are to be in contact with concrete shall be painted with one coat of zinc chromate primer or two coats of asphalt.

**Materials** - (Aluminum Pipe) - This pipe and its appurtenances shall conform to the requirements of AASHTO Specification M-196 or M-211 with watertight coupling bands or flanges. Aluminum Pipe, when used with flowable fill or when soil and/or water conditions warrant for increased durability, shall be fully bituminous coated per requirements of AASHTO Specification M-190 Type A. Aluminum surfaces that are to be in contact with concrete shall be painted with one coat of zinc chromate primer or two coats of asphalt. Hot dip galvanized bolts may be used for connections. The pH of the surrounding soils shall be between 4 and 9.

Coupling bands, anti-seep collars, end sections, etc., must be composed of the same material and coatings as the pipe. Metals must be insulated from dissimilar materials with use of rubber or plastic insulating materials at least 24 mils in thickness.

Connections - All connections with pipes must be completely watertight. The drain pipe or barrel connection to the riser shall be welded all around when the pipe and riser are metal. Anti-seep collars shall be connected to the pipe in such a manner as to be completely watertight. Dimple bands are not considered to be watertight.All connections shall use a rubber or neoprene gasket when joining pipe sections. The end of each pipe shall be re-rolled an adequate number of corrugations to accommodate the bandwidth. The following type connections are acceptable for pipes less than 24 inches in diameter: flanges on both ends of the pipe with a circular 3/8 inch closed cell neoprene gasket, pre-punched to the flange bolt circle, sandwiched between adjacent flanges; a 12-inch wide standard lap type band with 12-inch wide by 3/8-inch thick closed cell circular neoprene gasket; and a 12-inch wide hugger type band with o-ring gaskets having a minimum diameter of 1/2 inch greater than the corrugation depth. Pipes 24 inches in diameter and larger shall be connected by a 24 inch long annular corrugated band using a minimum of 4 (four) rods and lugs, 2 on each connecting pipe end. A 24-inch wide by 3/8-inch thick closed cell circular neoprene gasket will be installed with 12 inches on the end of each pipe. Flanged joints with 3/8 inch closed cell gaskets the full width of the flange is also acceptable.

Helically corrugated pipe shall have either continuously welded seams or have lock seams with internal caulking or a neoprene bead.

Bedding - The pipe shall be firmly and uniformly bedded throughout its entire length. Where rock or soft, spongy or other unstable soil is encountered, all such material shall be removed and replaced with suitable earth compacted to provide adequate support.

Backfilling shall conform to Structure Backfill requirements.

Other details (anti-seep collars, valves, etc.) shall be as shown on the drawings.

***Reinforced Concrete Pipe*** - All of the following criteria shall apply for reinforced concrete pipe:

Materials - Reinforced concrete pipe shall have bell and spigot joints with rubber gaskets and shall equal or exceed ASTM C-361.

Bedding - Reinforced concrete pipe conduits shall be laid in a concrete bedding / cradle for their entire length. This bedding / cradle shall consist of high slump concrete placed under the pipe and up the sides of the pipe at least 50% of its outside diameter with a minimum thickness of 6 inches. Where a concrete cradle is not needed for structural reasons, flowable fill may be used as described in the Structure Backfill section of this standard. Gravel bedding is not permitted.

Laying pipe - Bell and spigot pipe shall be placed with the bell end upstream. Joints shall be made in accordance with recommendations of the manufacturer of the material. After the joints are sealed for the entire line, the bedding shall be placed so that all spaces under the pipe are filled. Care shall be exercised to prevent any deviation from the original line and grade of the pipe. The first joint must be located within 4 feet from the riser.

Backfilling shall conform to Structure Backfill requirements.

Other details (anti-seep collars, valves, etc.) shall be as shown on the drawings.

***Plastic Pipe*** - The following criteria shall apply for plastic pipe:

1. Materials - PVC pipe shall be PVC-1120 or PVC-1220 conforming to ASTM D-1785 or ASTM D-2241. Corrugated High Density Polyethylene (HDPE) pipe, couplings and fittings shall conform to the following: 4" through 10" pipe shall meet the requirements of AASHTO M252 Type S, and 12" through 24" pipe shall meet the requirements of AASHTO M294 Type S.
2. Joints and connections to anti-seep collars shall be completely watertight.
3. Bedding -The pipe shall be firmly and uniformly bedded throughout its entire length. Where rock or soft, spongy or other unstable soil is encountered, all such material shall be removed and replaced with suitable earth compacted to provide adequate support.
4. Backfilling shall conform to Structure Backfill requirements.
5. Other details (anti-seep collars, valves, etc.) shall be as shown on the drawings.

*Drainage Diaphragms* - When a drainage diaphragm is used, a registered professional engineer will supervise the design and construction inspection.

Concrete

Concrete shall meet the requirements of the New York State Department of Transportation.

**Rock Riprap**

Rock riprap shall meet the requirements of the New York State Department of Transportation.

Geotextile shall be placed under all riprap and shall meet the requirements of the New York State Department of Transportation.

**Care of Water During Construction**

All work on permanent structures shall be carried out in areas free from water. The Contractor shall construct and maintain all temporary dikes, levees, cofferdams, drainage channels, and stream diversions necessary to protect the areas to be occupied by the permanent works. The contractor shall also furnish, install, operate, and maintain all necessary pumping and other equipment required for removal of water from various parts of the work and for maintaining the excavations, foundation, and other parts of the work free from water as required or directed by the engineer for constructing each part of the work. After having served their purpose, all temporary protective works shall be removed or leveled and graded to the extent required to prevent obstruction in any degree whatsoever of the flow of water to the spillway or outlet works and so as not to interfere in any way with the operation or maintenance of the structure. Stream diversions shall be maintained until the full flow can be passed through the permanent works. The removal of water from the required excavation and the foundation shall be accomplished in a manner and to the extent that will maintain stability of the excavated slopes and bottom required excavations and will allow satisfactory performance of all construction operations. During the placing and compacting of material in required excavations, the water level at the locations being refilled shall be maintained below the bottom of the excavation.

**Stabilization**

All borrow areas shall be graded to provide proper drainage and left in a sightly condition. All exposed surfaces of the embankment, spillway, spoil and borrow areas, and berms shall be stabilized by seeding, liming, fertilizing and mulching in accordance with local Natural Resources Conservation Service Standards and Specifications.

**Erosion and Sediment Control**

Construction operations will be carried out in such a manner that erosion will be controlled and water and air pollution minimized. Federal, State and local laws concerning pollution abatement will be followed. Construction plans shall detail erosion and sediment control measures.

**Operation and Maintenance**

An operation and maintenance plan in accordance with Local or State Regulations will be prepared for all ponds. As a minimum, a dam inspection checklist shall be included as part of the operation and maintenance plan and performed at least annually. Written records of maintenance and major repairs need to be retained in a file.

Supplemental Stormwater Pond and Wetland Specifications

1. It is preferred to use the same material in the embankment as is being installed for the core trench. If this is not possible, a dam core with a shell may be used. The cross-section of the stormwater facility should show the limits of the dam core (up to the 10-year water surface elevation) as well as the acceptable materials for the shell. The shape of the dam core and the material to be used in the shell should be provided by the geotechnical engineer.

2. If the compaction tests for the remainder of the site improvements is using Modified Proctor (AASHTO T-180), then to maintain consistency on-site, modified proctor may be used in lieu of standard proctor (AASHTO T-99) for checking embankment compaction. The minimum required density using the modified proctor test method shall be at least 92% of maximum dry density with a moisture content of 2% of the optimum.

3. For all stormwater management facilities, a geotechnical engineer must be present to verify compaction in accordance with the selected test method. This information needs to be provided in a report to the design engineer, so that as-built certification of the facility can be made.

4. A 4-inch layer of topsoil shall be placed on all disturbed areas of the dam embankment. Seeding, liming, fertilizing, mulching, etc. shall be in accordance with NRCS Soil Standards and Specifications or New York State Standards and Specifications for Soil Erosion and Sediment Control. The purpose of the topsoil is to establish a good growth of grass which is not always possible with some of the materials that may be placed for the embankment fill.

5. Filter fabric placed beneath the rip-rap shall meet state or local department of transportation requirements for a Class "C" filter fabric. Some acceptable filter fabrics that meet the Class "C" criteria include:

   Mirafi 180-N

   Amoco 4552

   Webtec N07

   Geolon N70

   Carthage FX-70S

   This is only a partial listing of available filter fabrics based on information provided by the manufacturers to the 1997 Specifier's Guide dated December 1996. It is the responsibility of the engineer to verify the adequacy of the material, as there are changes in the manufacturing process and the type of fabric used, which may affect the continued acceptance.

6. The design engineer and geotechnical engineer should make the determination that the settlement of the pond will not cause excessive joint extension. For further information on joint extension analysis, see NRCS Publication TR-18.

7. Fill placement shall not exceed a maximum of 8-inch lift thickness. Each lift shall be continuous for the entire length of the embankment.

8. The embankment fill shall not be placed higher than the centerline of the principle spillway until after the principle spillway has been installed.

9. The side slopes of a cut to repair a dam, install a principle spillway for an excavated pond, or other repair work, shall be stepped and on an average slope of 2:1 or flatter.

# Stormwater/Wetland Pond Construction Inspection Checklist

Project:
Location:
Site Status:

Date:

Time:

Inspector:

| CONSTRUCTION SEQUENCE | SATISFACTORY/ UNSATISFACTORY | COMMENTS |
|---|---|---|
| **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 | | |
| 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 | | |

| CONSTRUCTION SEQUENCE | SATISFACTORY/ UNSATISFACTORY | COMMENTS |
|---|---|---|
| **2. Subgrade Preparation** | | |
| Area beneath embankment stripped of all vegetation, topsoil, and organic matter | | |
| **3. Pipe Spillway Installation** | | |
| Method of installation detailed 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 pipe | | |
| 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 | | |
| 4. Remaining backfill placed in max. 8 inch lifts using small power tamping equipment until 2 feet cover over pipe is reached | | |

| CONSTRUCTION SEQUENCE | SATISFACTORY/ UNSATISFACTORY | COMMENTS |
|---|---|---|
| **3. Pipe Spillway Installation** | | |
| 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 collar(s) with reinforcing steel set | | |
| 4. Entire area where anti-seep collar(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 collar(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. Parge if necessary. | | |
| 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 | | |

| CONSTRUCTION SEQUENCE | SATISFACTORY/ UNSATISFACTORY | COMMENTS |
|---|---|---|
| **4. Riser / Outlet Structure Installation** | | |
| Riser located within embankment | | |
| A. Metal riser | | |
| Riser base excavated or formed on stable subgrade to design dimensions | | |
| Set on blocks to design elevations and plumbed | | |
| Reinforcing bars placed at right angles and projecting into sides of riser | | |
| Concrete poured so as to fill inside of riser to invert of barrel | | |
| B. Pre-cast concrete structure | | |
| Dry and stable subgrade | | |
| Riser base set to design elevation | | |
| If more than one section, no spalling in gasket interface area; gasket or approved caulking material placed securely | | |
| Watertight and structurally sound collar or gasket joint where structure connects to pipe spillway | | |
| 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 (protected from freezing while curing, if necessary) | | |
| Forms stripped & inspected for "honeycomb" prior to backfilling; parge if necessary | | |

| CONSTRUCTION SEQUENCE | SATISFACTORY/ UNSATISFACTORY | COMMENTS |
|---|---|---|
| **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 | | |
| **7. Earth Emergency Spillway Construction** | | |
| Spillway located in cut 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 | | |

| CONSTRUCTION SEQUENCE | SATISFACTORY / UNSATISFACTORY | COMMENTS |
|---|---|---|
| 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 | | |
| Filter fabric in place | | |
| Stone sized as per plan and uniformly place 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 | | |

| CONSTRUCTION SEQUENCE | SATISFACTORY/ UNSATISFACTORY | COMMENTS |
|---|---|---|
| **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<br>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<br>(April-June planting window) | | |
| Wetland buffer area preserved to maximum extent possible | | |

Comments:

## Actions to be Taken:

# Open Channel System Construction Inspection Checklist

Project:
Location:
Site Status:

Date:

Time:

Inspector:

| CONSTRUCTION SEQUENCE | SATISFACTORY / UNSATISFACTORY | COMMENTS |
|---|---|---|
| **1. Pre-Construction** | | |
| Pre-construction meeting | | |
| Runoff diverted | | |
| Facility location staked out | | |
| **2. Excavation** | | |
| Size and location | | |
| Side slope stable | | |
| Soil permeability | | |
| Groundwater / bedrock | | |
| Lateral slopes completely level | | |
| Longitudinal slopes within design range | | |
| Excavation does not compact subsoils | | |
| 3. Check dams | | |
| Dimensions | | |
| Spacing | | |
| Materials | | |

| CONSTRUCTION SEQUENCE | SATISFACTORY / UNSATISFACTORY | COMMENTS |
|---|---|---|
| **4. Structural Components** | | |
| Underdrain installed correctly | | |
| Inflow installed correctly | | |
| Pretreatment devices installed | | |
| **5. Vegetation** | | |
| Complies with planting specifications | | |
| Topsoil adequate in composition and placement | | |
| Adequate erosion control measures in place | | |
| **6. Final Inspection** | | |
| Dimensions | | |
| Check dams | | |
| Proper outlet | | |
| Effective stand of vegetation and stabilization | | |
| Contributing watershed stabilized before flow is routed to the factility | | |

Comments:

## Actions to be Taken:

# APPENDIX E

# NYSDEC SPDES General Permit for Stormwater Discharges from Construction Activity

**Permit Number GP-02-01**

## Quarterly Summary of SWPPP Status with Permit Compliance

| Name of Permitted Facility: | Permit Identification #: | Today's Date: | |
|---|---|---|---|
| Location (Town and County): | Reporting Period: | Acres Disturbed: | Acres Stabilized: |

***Permit Reference; Part IV.D (page 18):***

*"The operator shall also prepare a written summary of its status with respect to compliance with this general permit at a minimum frequency of every three months during which coverage under this permit exists. The summary should address the status of achieving each component of the SWPPP. This summary shall be handled in the same manner as prescribed for SWPPPs under Part III, subsection B (see Page 9)."*

| Component of SWPPP (All SWM and E&SC Practices) | Compliant (Yes / No) | Comments on achieving each component of the SWPPP (Issues related to installation, maintenance, or use of practices) |
|---|---|---|
| Permanent EC Measures | | *EXAMPLE* |
| Exposed Slope Stabilization: | Yes | As construction is completed in area 2, slopes have been stabilized with mulch and seed. Grass germination is at 60%. This work has been detailed in the regular inspection reports as to the extent and schedule of completion. |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |

***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. I am aware that false statements made herein are punishable as a class A misdemeanor pursuant to Section 210.45 of the Penal Law."*

_____ _____ _____

Signature of Permittee or Duly Authorized Representative | Name of Permittee or Duly Authorized Representative | Date

Duly authorized representatives of the Permittee must have written authorization, submitted to DEC, to sign

# Stormwater Pond/Wetland Operation, Maintenance and Management Inspection Checklist

Project: _____
Location: _____
Site Status: _____

Date: _____
Time: _____

Inspector: _____

| Maintenance Item | Satisfactory/ Unsatisfactory | Comments |
|---|---|---|
| **1. Embankment and emergency spillway (Annual, After Major Storms)** | | |
| 1. Vegetation and ground cover adequate | | |
| 2. Embankment erosion | | |
| 3. Animal burrows | | |
| 4. Unauthorized planting | | |
| 5. Cracking, bulging, or sliding of dam | | |
| a. Upstream face | | |
| b. Downstream face | | |
| c. At or beyond toe | | |
| downstream | | |
| upstream | | |
| d. Emergency spillway | | |
| 6.Pond, toe & chimney drains clear and functioning | | |
| 7.Seeps/leaks on downstream face | | |
| 8.Slope protection or riprap failure | | |
| 9. Vertical/horizontal alignment of top of dam "As-Built" | | |

| Maintenance Item | Satisfactory/ Unsatisfactory | Comments |
|---|---|---|
| 10. Emergency spillway clear of obstructions and debris | | |
| 11. Other (specify) | | |
| **2. Riser and principal spillway (Annual)** | | |
| Type: Reinforced concrete ____<br>Corrugated pipe ____<br>Masonry ____<br>1. Low flow orifice obstructed | | |
| 2. Low flow trash rack.<br>a. Debris removal necessary | | |
| b. Corrosion control | | |
| 3. Weir trash rack maintenance<br>a. Debris removal necessary | | |
| b. corrosion control | | |
| 4. Excessive sediment accumulation insider riser | | |
| 5. Concrete/masonry condition riser and barrels<br>a. cracks or displacement | | |
| b. Minor spalling (<1") | | |
| c. Major spalling (rebars exposed) | | |
| d. Joint failures | | |
| e. Water tightness | | |
| 6. Metal pipe condition | | |
| 7. Control valve<br>a. Operational/exercised | | |
| b. Chained and locked | | |
| 8. Pond drain valve<br>a. Operational/exercised | | |
| b. Chained and locked | | |
| 9. Outfall channels functioning | | |
| 10. Other (specify) | | |

| Maintenance Item | Satisfactory/ Unsatisfactory | Comments |
|---|---|---|
| **3. Permanent Pool (Wet Ponds)** (monthly) | | |
| 1. Undesirable vegetative growth | | |
| 2. Floating or floatable debris removal required | | |
| 3. Visible pollution | | |
| 4. Shoreline problem | | |
| 5. Other (specify) | | |
| **4. Sediment Forebays** | | |
| 1.Sedimentation noted | | |
| 2. Sediment cleanout when depth < 50% design depth | | |
| **5. Dry Pond Areas** | | |
| 1. Vegetation adequate | | |
| 2. Undesirable vegetative growth | | |
| 3. Undesirable woody vegetation | | |
| 4. Low flow channels clear of obstructions | | |
| 5. Standing water or wet spots | | |
| 6. Sediment and / or trash accumulation | | |
| 7. Other (specify) | | |
| **6. Condition of Outfalls (Annual , After Major Storms)** | | |
| 1. Riprap failures | | |
| 2. Slope erosion | | |
| 3. Storm drain pipes | | |
| 4.Endwalls / Headwalls | | |
| 5. Other (specify) | | |
| 7. Other ( Monthly) | | |
| 1. Encroachment on pond, wetland or easement area | | |

| Maintenance Item | Satisfactory/ Unsatisfactory | Comments |
|---|---|---|
| 2. Complaints from residents | | |
| 3.Aesthetics<br>a. Grass growing required | | |
| b. Graffiti removal needed | | |
| c. Other (specify) | | |
| 4. Conditions of maintenance access routes. | | |
| 5. Signs of hydrocarbon build-up | | |
| 6. Any public hazards (specify) | | |
| **8. Wetland Vegetation (Annual)** | | |
| 1. Vegetation healthy and growing<br>Wetland maintaining 50% surface area coverage of wetland plants after the second growing season.<br>(If unsatisfactory, reinforcement plantings needed) | | |
| 2. Dominant wetland plants:<br>Survival of desired wetland plant species<br>Distribution according to landscaping plan? | | |
| 3. Evidence of invasive species | | |
| 4. Maintenance of adequate water depths for desired wetland plant species | | |
| 5. Harvesting of emergent plantings needed | | |
| 6. Have sediment accumulations reduced pool volume significantly or are plants "choked" with sediment | | |
| 7. Eutrophication level of the wetland. | | |
| 8. Other (specify) | | |

Comments:

## Actions to be Taken:

# Infiltration Trench Operation, Maintenance, and Management Inspection Checklist

Project:
Location:
Site Status:

Date:

Time:

Inspector:

| MAINTENANCE ITEM | SATISFACTORY / UNSATISFACTORY | COMMENTS |
|---|---|---|
| **1. Debris Cleanout (Monthly)** | | |
| Trench surface clear of debris | | |
| Inflow pipes clear of debris | | |
| Overflow spillway clear of debris | | |
| Inlet area clear of debris | | |
| **2. Sediment Traps or Forebays (Annual)** | | |
| Obviously trapping sediment | | |
| Greater than 50% of storage volume remaining | | |
| **3. Dewatering (Monthly)** | | |
| Trench dewaters between storms | | |
| 4. Sediment Cleanout of Trench (Annual) | | |
| No evidence of sedimentation in trench | | |
| Sediment accumulation doesn't yet require cleanout | | |
| 5. Inlets (Annual) | | |

# Open Channel Operation, Maintenance, and Management Inspection Checklist

Project:
Location:
Site Status:

Date:

Time:

Inspector:

| MAINTENANCE ITEM | SATISFACTORY/ UNSATISFACTORY | COMMENTS |
|---|---|---|
| **1. Debris Cleanout (Monthly)** | | |
| Contributing areas clean of debris | | |
| **2. Check Dams or Energy Dissipators (Annual, After Major Storms)** | | |
| No evidence of flow going around structures | | |
| No evidence of erosion at downstream toe | | |
| Soil permeability | | |
| Groundwater / bedrock | | |
| **3. Vegetation (Monthly)** | | |
| Mowing done when needed | | |
| Minimum mowing depth not exceeded | | |
| No evidence of erosion | | |
| Fertilized per specification | | |
| **4. Dewatering (Monthly)** | | |
| Dewaters between storms | | |

| MAINTENANCE ITEM | SATISFACTORY/ UNSATISFACTORY | COMMENTS |
|---|---|---|
| **5. Sediment deposition (Annual)** | | |
| Clean of sediment | | |
| **6. Outlet/Overflow Spillway (Annual)** | | |
| Good condition, no need for repairs | | |
| No evidence of erosion | | |

**Comments:**

**Actions to be Taken:**

# APPENDIX F

## H.1 Ponds and Wetlands

For areas that are to be planted within a stormwater pond, it is necessary to determine what type of hydrologic zones will be created within the pond. The following six zones describe the different conditions encountered in stormwater management facilities. Every facility does not necessarily reflect all of these zones. The hydrologic zones designate the degree of tolerance the plant exhibits to differing degrees of inundation by water.

Table H.5 at the end of this appendix designates appropriate zones for each plant. There may be other zones listed outside of these brackets. The plant materials may occur within these zones, but are not typically found in them. Plants suited for specific hydrologic conditions may perish when those conditions change, exposing the soil, and therefore, increasing the chance for erosion.

Each zone has its own set of plant selection criteria based on the hydrology of the zone, the stormwater functions required of the plant and the desired landscape effect. The hydrologic zones are as follows:

**Table H.1 Hydrologic Zones**

| Zone # | Zone Description | Hydrologic Conditions |
|---|---|---|
| Zone 1 | Deep Water Pool | 1-6 feet deep Permanent Pool |
| Zone 2 | Shallow Water Bench | 6 inches to 1 foot deep |
| Zone 3 | Shoreline Fringe | Regularly inundated |
| Zone 4 | Riparian Fringe | Periodically inundated |
| Zone 5 | Floodplain Terrace | Infrequently inundated |
| Zone 6 | Upland Slopes | Seldom or never inundated |

### Zone 1: Deep Water Area *(1- 6 Feet)*

Ponds and wetlands both have deep pool areas that comprise Zone 1. These pools range from one to six feet in depth, and are best colonized by submergent plants, if at all.

This pondscaping zone has not been routinely planted for several reasons. First, the availability of plant materials that can survive and grow in this zone is limited, and it is also feared that plants could clog the stormwater facility outlet structure. In many cases, these plants will gradually become established through natural recolonization (e.g., transport of plant fragments from other ponds via the feet and legs of waterfowl). If submerged plant material becomes more commercially available and clogging concerns are addressed, this area can be planted. The function of the planting is to reduce resedimentation and improve oxidation while creating a greater aquatic habitat.

- Plant material must be able to withstand constant inundation of water of one foot or greater in depth.
- Plants may be submerged partially or entirely.
- Plants should be able to enhance pollutant uptake.
- Plants may provide food and cover for waterfowl, desirable insects, and other aquatic life.

### Zone 2: Shallow Water Bench *(Normal Pool To 1 Foot)*

Zone 2 includes all areas that are inundated below the normal pool to a depth of one foot, and is the primary area where emergent plants will grow in a stormwater wetlands. Zone 2 also coincides with the aquatic bench found in stormwater ponds. This zone offers ideal conditions for the growth of many emergent wetland species. These areas may be located at the edge of the pond or on low mounds of earth located below the surface of the water within the pond. When planted, Zone 2 can be an important habitat for many aquatic and nonaquatic animals, creating a diverse food chain. This food chain includes predators, allowing a natural regulation of mosquito populations, thereby reducing the need for insecticidal applications.

- Plant material must be able to withstand constant inundation of water to depths between six inches and one foot deep.
- Plants will be partially submerged.
- Plants should be able to enhance pollutant uptake.
- Plants may provide food and cover for waterfowl, desirable insects and other aquatic life.

Plants will stabilize the bottom of the pond, as well as the edge of the pond, absorbing wave impacts and reducing erosion, when water level fluctuates. Plant also slow water velocities and increase sediment deposition rates. Plants can reduce resuspension of sediments caused by the wind. Plants can also soften the engineered contours of the pond, and can conceal drawdowns during dry weather.

### Zone 3: Shoreline Fringe *(Regularly Inundated)*

Zone 3 encompasses the shoreline of a pond or wetland, and extends vertically about one foot in elevation from the normal pool. This zone includes the safety bench of a pond, and may also be periodically inundated if storm events are subject to extended detention. This zone occurs in a wet pond or shallow marsh and can be the most difficult to establish since plants must be able to withstand inundation of water during storms, when wind might blow water into the area, or the occasional drought during the summer. In order to stabilize the soil in this zone, Zone 3 must have a vigorous cover.

- Plants should stabilize the shoreline to minimize erosion caused by wave and wind action or water fluctuation.
- Plant material must be able to withstand occasional inundation of water. Plants will be partially submerged at this time.
- Plant material should, whenever possible, shade the shoreline, especially the southern exposure. This will help to reduce the water temperature.

- Plants should be able to enhance pollutant uptake.
- Plants may provide food and cover for waterfowl, songbirds, and wildlife. Plants could also be selected and located to control overpopulation of waterfowl.
- Plants should be located to reduce human access, where there are potential hazards, but should not block the maintenance access.
- Plants should have very low maintenance requirements, since they may be difficult or impossible to reach.
- Plants should be resistant to disease and other problems which require chemical applications (since chemical application is not advised in stormwater ponds).

**Zone 4: Riparian Fringe** ***(Periodically Inundated)***

Zone 4 extends from one to four feet in elevation above the normal pool. Plants in this zone are subject to periodic inundation after storms, and may experience saturated or partly saturated soil conditions. Nearly all of the temporary ED area is included within this zone.

- Plants must be able to withstand periodic inundation of water after storms, as well as occasional drought during the warm summer months.
- Plants should stabilize the ground from erosion caused by run-off.
- Plants should shade the low flow channel to reduce the pool warming whenever possible.
- Plants should be able to enhance pollutant uptake.
- Plant material should have very low maintenance, since they may be difficult or impossible to access.
- Plants may provide food and cover for waterfowl, songbirds and wildlife. Plants may also be selected and located to control overpopulation of waterfowl.
- Plants should be located to reduce pedestrian access to the deeper pools.

**Zone 5: Floodplain Terrace** ***(Infrequently Inundated)***

Zone 5 is periodically inundated by flood waters that quickly recedes in a day or less. Operationally, Zone 5 extends from the maximum two year or Cpv water surface elevation up to the 10 or 100 year maximum water surface elevation. Key landscaping objectives for Zone 5 are to stabilize the steep slopes characteristic of this zone, and establish a low maintenance, natural vegetation.

- Plant material should be able to withstand occasional but brief inundation during storms, although typical moisture conditions may be moist, slightly wet, or even swing entirely to drought conditions during the dry weather periods.
- Plants should stabilize the basin slopes from erosion.
- Ground cover should be very low maintenance, since they may be difficult to access on steep slopes or if frequency of mowing is limited. A dense tree cover may help reduce maintenance and discourage resident geese.
- Plants may provide food and cover for waterfowl, songbirds, and wildlife.

- Placement of plant material in Zone 5 is often critical, as it often creates a visual focal point and provides structure and shade for a greater variety of plants.

### Zone 6: Upland Slopes *(Seldom or Never Inundated)*

The last zone extends above the maximum 100 year water surface elevation, and often includes the outer buffer of a pond or wetland. Unlike other zones, this upland area may have sidewalks, bike paths, retaining walls, and maintenance access roads. Care should be taken to locate plants so they will not overgrow these routes or create hiding places that might make the area unsafe.

- Plant material is capable of surviving the particular conditions of the site. Thus, it is not necessary to select plant material that will tolerate any inundation. Rather, plant selections should be made based on soil condition, light, and function within the landscape.
- Ground covers should emphasize infrequent mowing to reduce the cost of maintaining this landscape.
- Placement of plants in Zone 6 is important since they are often used to create a visual focal point, frame a desirable view, screen undesirable views, serve as a buffer, or provide shade to allow a greater variety of plant materials. Particular attention should be paid to seasonal color and texture of these plantings.

**Table II.5 Native Plant Guide for Stormwater Management Areas (NY)**

| Plant Name | Zone | Form | Available | Inundation Tolerance | Wildlife Value | Notes |
|---|---|---|---|---|---|---|
| **Trees and Shrubs** | | | | | | |
| American Elm *(Ulmus americana)* | 4,5,6 | Dec. Tree | yes | Irregular-seasonal saturation | High. Food (seeds,browsing), cover, nesting for birds & mammals | Susceptible to diesease (short-lived). Sun to full shade, tolerates drought and wind/ice damage. |
| Arrowwood Viburnium *(Viburrium dentatum)* | 3,4 | Dec. Shrub | yes | yes | High. Songbirds and mammals | Grows best in sun to partial shade |
| Bald Cypress *(Taxodium distichum)* | 3,4 | Dec. Tree | yes | yes | Little food value, but good perching site for waterfowl | Forested Coastal Plain. North of normal range. Tolerates drought. |
| Bayberry *(Myrica pensylvanica)* | 4,5,6 | Dec. Shrub | yes | yes | High. Nesting, food, cover. Berries last into winter | Coastal Plain only. Roots fix $N_2$. Tolerates slightly acidic soils. |
| Black Ash *(Fraxinus nigra)* | 3,4,5 | Dec. Tree | yes | Irregular-seasonal saturation | High. Food (seeds, spp), cover, nesting for birds & mammals. Fruit persisis in winter | Rapid growth. Requires full sun. Susceptible to wind/ice damage & disease. Tolerates drought and infrequent flooding by salt water. |
| Black Cherry *(Prunus serotina)* | 5,6 | Dec. Tree | yes | no | High. Food | Moist soils or wet bottomland areas |
| Blackgum or Sourgum *(Nyssa sylvatica)* | 4,5,6 | Dec. Tree | yes | yes | High. Songbirds, egrets, herons, raccoons, owls | Can be difficult to transplant. Prefers sun to partial shade |
| Black Willow *(Salix nigra)* | 3,4,5 | Dec. Tree | yes | yes | High. Browsing and cavity nesters. | Rapid growth, stabilizes stream-banks. Full sun |
| Buttonbush *(Cephalanthus occidentalis)* | 2,3,4,5 | Dec. Shrub | yes | yes | High. Ducks and shorebirds. Seeds, nectar and nesting. | Full sun to partial shade. Will grow in dry areas. |
| Common Spice Bush *(Lindera benzoin)* | 3,4,5 | Dec. Shrub | yes | yes | Very high. Songbirds | Shade and rich soils. Tolerates acidic soils. Good understory species |

**Table H.5 Native Plant Guide for Stormwater Management Areas (NY)**

| Plant Name | Zone | Form | Available | Inundation Tolerance | Wildlife Value | Notes |
|---|---|---|---|---|---|---|
| Eastern Cottonwood *(Populus deltoides)* | 4,5 | Dec Tree | yes | yes | Moderate. Cover, food. | Shallow rooted, subject to windthrow. Invasive roots. Rapid growth. |
| Eastern Hemlock *(Tsuga canadensis)* | 5,6 | Conif Tree | yes | yes | Moderate. Mostly cover and some food | Tolerates all sun/shade conditions. Tolerates acidic soil. |
| Eastern Red Cedar *(Juniperus virginiana)* | 4,5,6 | Conif Tree | yes | no | High. Fruit for birds. Some cover. | Full sun to partial shade. Common in wetlands, shrub bogs and edge of stream |
| Elderberry *(Sambucus canadensis)* | 3,4,5,6 | Dec Shrub | yes | yes | Extremely high. Food and cover, birds and mammals. | Full sun to partial shade. |
| Green Ash, Red Ash *(Fraxinus pennsylvania)* | 4,5 | Dec Tree | yes | yes | Moderate. Songbirds. | Rapid growing streambank stabilizer. Full sun to partial shade. |
| Hackenberry *(Celtis occidentalis)* | 5,6 | Dec Tree | yes | some | High. Food and cover | Full sun to partial shade. |
| Larch, Tamarack *(Larix laricina)* | 3,4 | Conif Tree | no | yes | Low. Nest tree and seeds. | Rapid initial growth. Full sun, acidic boggy soil. |
| Pin Oak *(Quercus palustris)* | 3,4,5,6 | Dec Tree | yes | yes | High. Tolerates acidic soil | Gypsy moth target. Prefers well drained, sandy soils. |
| Red Choke Berry *(Pyrus arbutifolia)* | 3,4,5 | Dec Shrub | no | yes | Moderate. Songbirds. | Bank stabilizer. Partial sun. |
| Red Maple *(Acer rubrum)* | 3,4,5,6 | Dec Tree | yes | yes | High seeds and browse. Tolerates acidic soil. | Rapid growth. |
| River Birch *(Betula nigra)* | 3,4,5 | Dec Tree | yes | yes | Low. Good for cavity nesters. | Bank erosion control. Full sun. |
| Shadowbush, Serviceberry *(Amelanchier* | 4,5,6 | Dec Shrub | yes | yes | High. Nesting, cover, food. Birds and | Prefers partial shade. Common in forested |

**Table H.5 Native Plant Guide for Stormwater Management Areas (NY)**

| Plant Name | Zone | Form | Available | Inundation Tolerance | Wildlife Value | Notes |
|---|---|---|---|---|---|---|
| *canadensis)* | | | | | mammals. | wetlands and upland woods. |
| Silky Dogwood *(Cornus amomium)* | 3,4,5 | Dec Shrub | yes | yes | High. Songbirds, mammals. | Shade and drought tolerant. Good bank stabilizer. |
| Slippery Elm *(Ulmus rubra)* | 3,4,5 | Dec Tree | rare | yes | High. Food (seeds, buds) for birds & mammals (browse). Nesting | Rapid growth, no salinity tolerance. Tolerant to shade and drought. |
| Smooth Alder *(Alnus serrulata)* | 3,4,5 | Dec Tree | no | yes | High. Food, cover. | Rapid growth. Stabilizes streambanks. |
| Speckled Alder *(Alnus rugosa)* | 3,4 | Dec Shrub | yes | yes | High. Cover, browse for deer, seeds for bird. | |
| Swamp White Oak *(Quercus bicolor)* | 3,4,5 | Dec Tree | yes | yes | High. Mast | Full sun to partial shade. Good bottomland tree. |
| Swamp Rose *(Rosa Palustrus)* | 3,4 | Dec Shrub | | Irregular, seasonal, or regularly saturated | High. Food (hips) for birds including turkey, ruffed grouse and mammals. Fox cover. | Prefers full sun. Easy to establish. Low salt tolerance. |
| Sweetgum *(Liquidambar styraciflua)* | 4,5,6 | Dec Tree | yes | yes | Moderate. Songbirds | Tolerates acid or clay soils. Sun to partial shade. |
| Sycamore *(Platanus occidentalis)* | 4,5,6, | Dec Tree | yes | yes | Low. Food, cavities for nesting. | Rapid growth. Common in floodplains and alluvial woodlands. |
| Tulip Tree *(Liriodendron tulipifera)* | 5,6 | Dec Tree | yes | no | Moderate. Seeds and nest sites | Full sun to partial shade. Well drained soils. Rapid growth. |
| Tupelo *(Nyssa sylvatica vari biflora)* | 3,4,5 | Dec Tree | yes | yes | High. Seeds and nest sites | Ornamental |

**Table H.5 Native Plant Guide for Stormwater Management Areas (NY)**

| Plant Name | Zone | Form | Available | Inundation Tolerance | Wildlife Value | Notes |
|---|---|---|---|---|---|---|
| White Ash *(Fraxinus americana)* | 5,6 | Dec Tree | yes | no | High. Food | All sunlight conditions. Well drained soils. |
| Winterberry *(Ilex verticillata)* | 3,4,5 | Dec Shrub | yes | yes | High Cover and fruit for birds. Holds berries into winter | Full sun to partial shade. Seasonally flooded areas. |
| Witch Hazel *(Hamamelis virginiana)* | 4,5 | Dec Shrub | yes | no | Low. Food for squirrels, deer, and ruffed grouse. | Prefers shade. Ornamental. |
| **Herbaceous Plants** | | | | | | |
| Arrow arum *(Peltandra virginica)* | 2,3 | Emergent | yes | up to 1 ft. | High. Berries are eaten by wood ducks. | Full sun to partial shade. |
| Arrowhead, Duck Potato *(Sagittaria latifolia)* | 2,3 | Emergent | yes | up to 1 ft. | Moderate. Tubers and seeds eaten by ducks. | Aggressive colonizer. |
| Big Bluestem *(Andropogon gerardi)* | 4,5 | Perimeter | yes | Irregular or seasonal inundation. | High. Seeds for songbirds. Food for deer | Requires full sun. |
| Birdfoot deervetch *(Lotus Corniculatus)* | 4,5,6 | Perimeter | yes | Infrequent inundation | High. Food for birds. | Full sun. Nitrogen fixer. |
| Blue Flag Iris *(Iris versicolor)* | 2,3 | Emergent | yes | Regular or permanently, up to ½ ft or saturated | Moderate. Food muskrat and wildfowl. Cover, marshbirds | Slow growth. Full sun to partial shade. Tolerates clay. Fresh to moderately brackish water. |
| Blue Joint *(Calamagrotis canadensis)* | 2,3,4 | Emergent | yes | Regular or permanent inundation up to 0.5 ft. | Moderate. Food for game birds and moose. | Tolerates partial shade |
| Broomsedge *(Andropogon virginicus)* | 2,3 | Perimeter | yes | up to 3 in. | High. Songbirds and browsers. Winter food and cover. | Tolerant of fluctuation water levels & partial shade. |
| Bushy Beardgrass *(Andropogon glomeratus)* | 2,3 | Emergent | yes | up to 1 ft. | | Requires full sun. |
| Cardinal flower *(Lobelia cardinalis)* | 4,5,6 | Perimeter | yes | Some. Tolerates saturation up to 100% of season. | High. Nectar for hummingbird, oriole, butterflies. | Tolerates partial shade |

**Table H.5 Native Plant Guide for Stormwater Management Areas (NY)**

| Plant Name | Zone | Form | Available | Inundation Tolerance | Wildlife Value | Notes |
|---|---|---|---|---|---|---|
| Cattail *(Typha sp.)* | 2,3 | Emergent | yes | up to 1 ft. | Low. Except as cover | Aggressive. May eliminate other species. Volunteer. High pollutant treatment |
| Coontail *(Ceratophyllum demersum)* | 1 | Submergent | no | yes | Low food value. Good habitat and shelter for fish and invertebrates. | Free floating SAV. Shade tolerant. Rapid growth. |
| Common Three-Square *(Scirpus pungens)* | 2 | Emergent | yes | up to 6 in. | High. Seeds, cover. Waterfowl and fish. | High metal removal. |
| Duckweed *(Lemma sp.)* | 1,2 | Submergent/ Emergent | yes | yes | High. Food for waterfowl and fish. | High metal removal. |
| Fowl mannagrass *(Glyceria striata)* | 4,5 | Perimeter | yes | Irregular or seasonal inundation | High. Food for waterfowl, muskrat, and deer. | Partial to full shade. |
| Hardstem Bulrush *(Scirpus acutus)* | 2 | Emergent | yes | up to 3 ft. | High. Cover, food (achenes, rhizomes) ducks, geese, muskrat, fish. Nesting for bluegill and bass. | Quick to establish, fresh to brackish. Good for sediment stabilization and erosion control. |
| Giant Burreed *(Sparganium eurycarpum)* | 2,3 | Emergent | rare | Regular to permanently inundated, up to 1 ft. | High. Food (seeds, plant) waterfowl, beaver & other mammals. Cover for marshbirds, waterfowl. | Rapid spreading. Tolerates partial sun. Good for shoreline stabilization.. Salinity <0.5 ppt |
| Lizard's Tail *(Saururus cernuus)* | 2 | Emergent | yes | up to 1 ft. | Low, except wood ducks. | Rapid growth. Shade tolerant |
| Long-leaved Pond Weed *(Potamogeton nodosus)* | 1,2 | Rooted submerged aquatic | yes | up to 1-6 ft. depending on turbidity | High. Food (seeds, roots) waterfowl, aquatic fur-bearers, deer, moose. Habitat for fish | Rapid spread. Salinity <0.5 ppt. Flowers float on surface, Aug.-Sept. |

**Table II.5 Native Plant Guide for Stormwater Management Areas (NY)**

| Plant Name | Zone | Form | Available | Inundation Tolerance | Wildlife Value | Notes |
|---|---|---|---|---|---|---|
| Marsh Hibiscus *(Hibiscus moscheutos)* | 2,3 | Emergent | yes | up to 3 in. | Low. Nectar. | Full sun. Can tolerate periodic dryness. |
| Pickerelweed *(Pontederia cordata)* | 2,3 | Emergent | yes | up to 1 ft. | Moderate. Ducks. Nectar for butterflies. | Full sun to partial shade. |
| Pond Weed, Sago *(Potamogeton pectinatus* | 1 | Submergent | yes | yes | Extremely high. Waterfowl, marsh and shorebirds. | Removes heavy metals. |
| Redtop *(Agrostis alba)* | 3,4,5 | Perimeter | yes | Up to 25% of season | Moderate. Rabbits and some birds. | Quickly established but not highly competitive. |
| Rice Cutgrass *(Leersia oryzoides)* | 2,3 | Emergent | yes | up to 3 in. | High. Food and cover. | Full sun although tolerant of shade. Shoreline stabilization. |
| Sedges *(Carex spp.)* | 2,3 | Emergent | yes | up to 3 in. | High waterfowl, songbirds. | Many wetland and upland species. |
| Tufted Hairgrass *(Deschampsia caespitosa)* | 3,4,5 | Perimeter | yes | Regular to irregular inundation. | High. | Full sun. May become invasive. |
| Soft-stem Bulrush *(Scirpus validus)* | 2,3 | Emergent | yes | up to 1 ft. | Moderate. Good cover and food. | Full sun. Aggressive colonizer. High pollutant removal. |
| Smartweed *(Polygonum spp.)* | 2,3,4 | Emergent | yes | up to 1 ft. | High. Waterfowl, songbirds. Seeds and cover. | Fast colonizer. Avoid weedy aliens such as *P. perfoliatum.* |
| Soft Rush *(Juncus effusus)* | 2,3,4 | Emergent | yes | up to 3 in. | Moderate. | Tolerates wet or dry conditions. |
| Spatterdock *(Nuphar luteum)* | 2 | Emergent | yes | up to 3 ft. | Moderate for food but high for cover. | Fast colonizer. Tolerant of fluctuating water levels. |
| Switchgrass *(Panicum virgatum)* | 2,3,4,5,6 | Perimeter | yes | up to 3 in. | High. Seeds, cover for waterfowl, songbirds. | Tolerates wet/dry conditions. |

**Table H.5 Native Plant Guide for Stormwater Management Areas (NY)**

| Plant Name | Zone | Form | Available | Inundation Tolerance | Wildlife Value | Notes |
|---|---|---|---|---|---|---|
| Sweet Flag *(Acorus calamus)* | 2,3 | Herbaceous | yes | up to 3 in. | Low. | Tolerant of dry periods. Not a rapid colonizer. Tolerates acidic conditions. |
| Waterweed *(Elodea canadensis)* | 1 | Submergent | yes | yes | Low. | Good water oxygenator. High nutrient, copper, manganese and chromium removal. |
| Wild Celery *(Vallisneria americana)* | 1 | Submergent | yes | yes | High. Food for waterfowl. Habitat for fish and invertebrates. | Tolerant of murkey water and high nutrient loads. |
| Wild Rice *(Zizania aquatica)* | 2 | Emergent | yes | up to 1 ft. | High. Food for birds. | Prefers full sun |
| Wool Grass *(Scirpus cyperinus)* | 2,3 | Emergent | yes | Irregularly to seasonally indundated | Moderate. Cover, Food. | Requires full sun. Can tolerate acidic soils, drought. Colonizes disturbed areas, moderate growth. |

# APPENDIX G

**Figure 4.4 One-Year Design Storm**

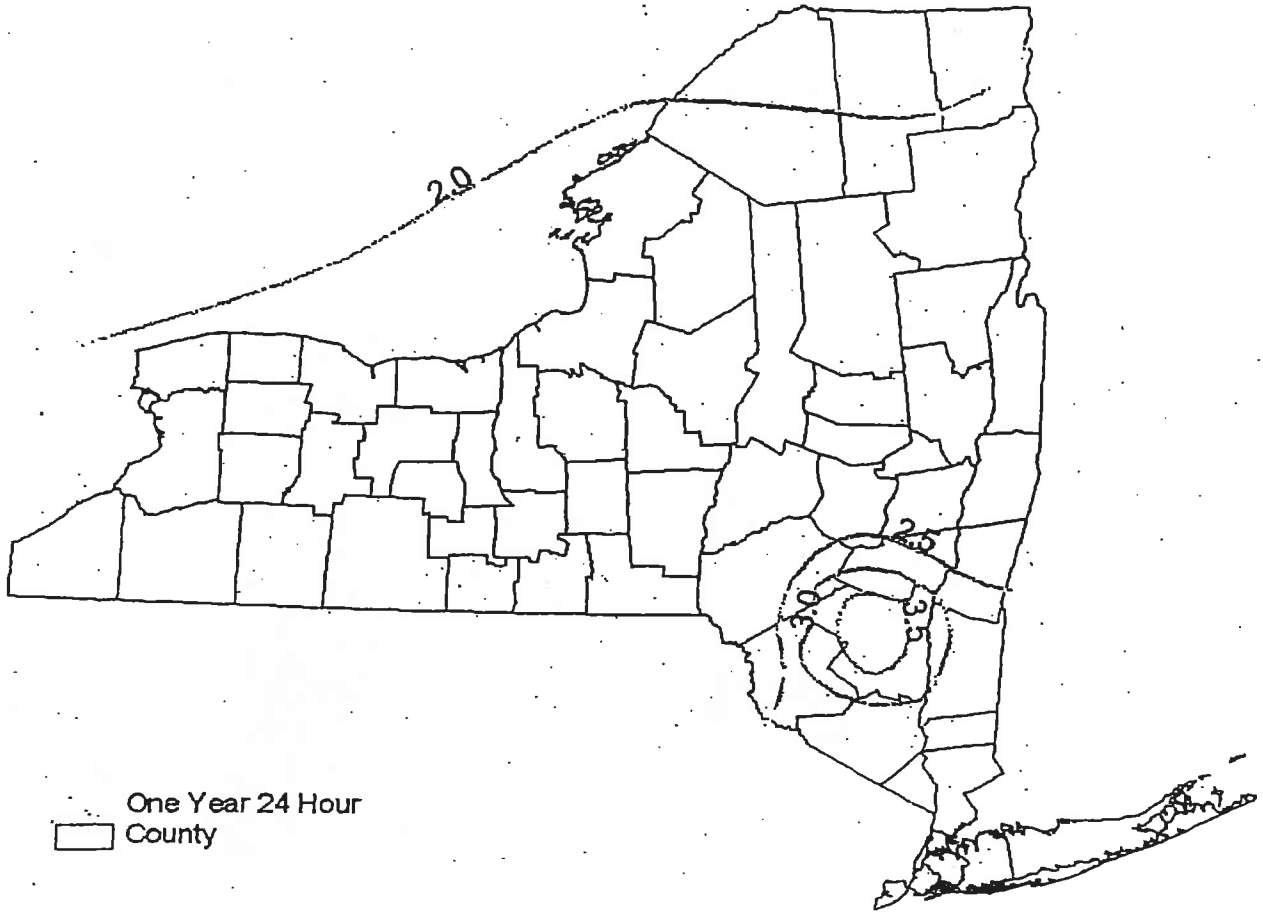


Figure 4.7. Two-Year Design Storm

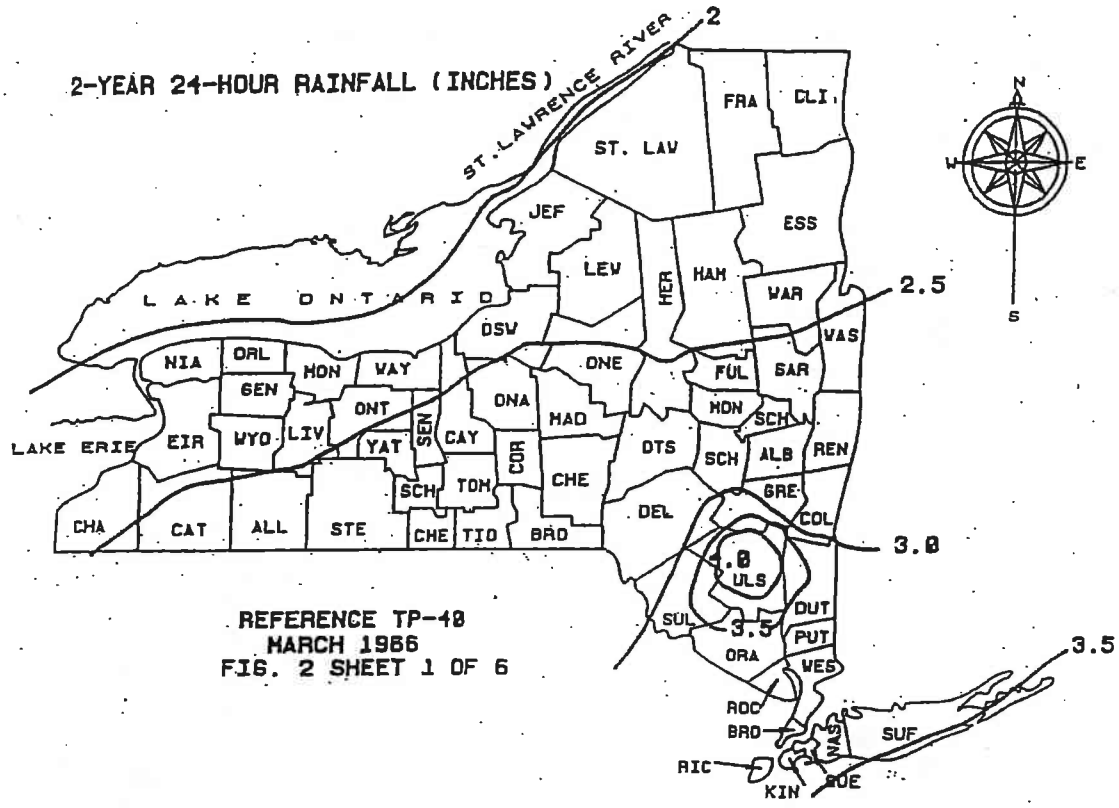


**Figure 4.5 10-Year Design Storm**

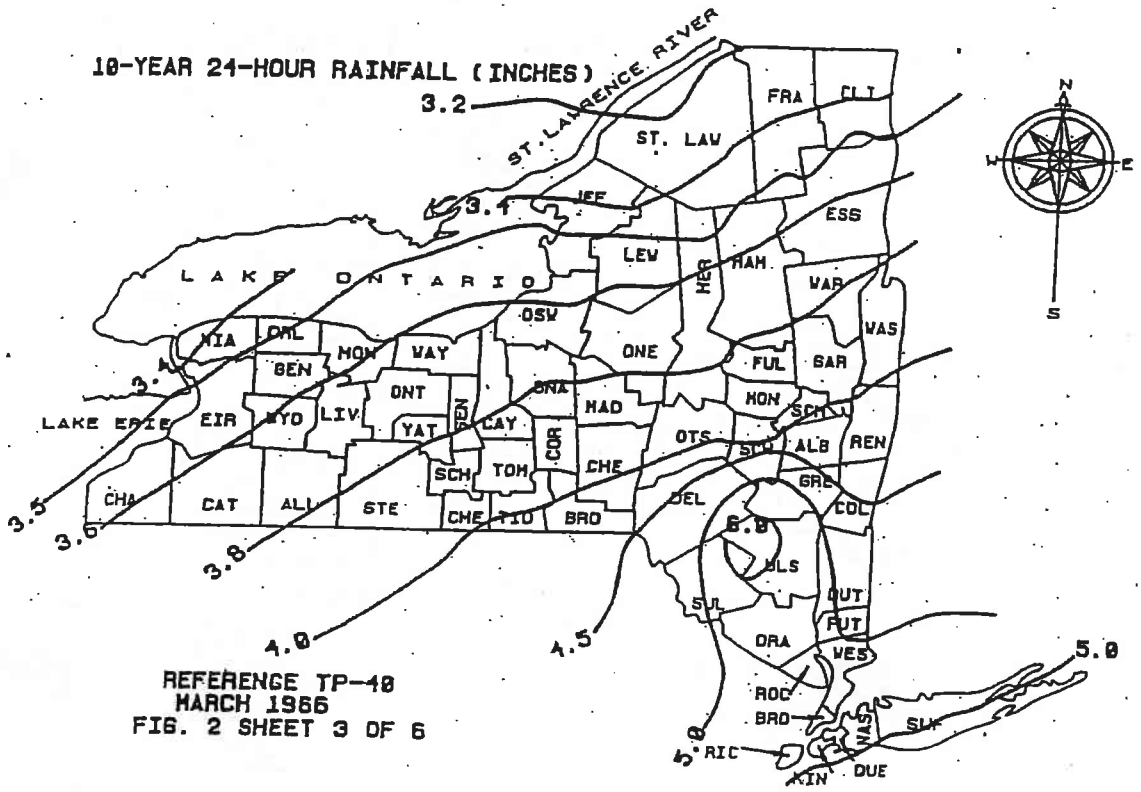
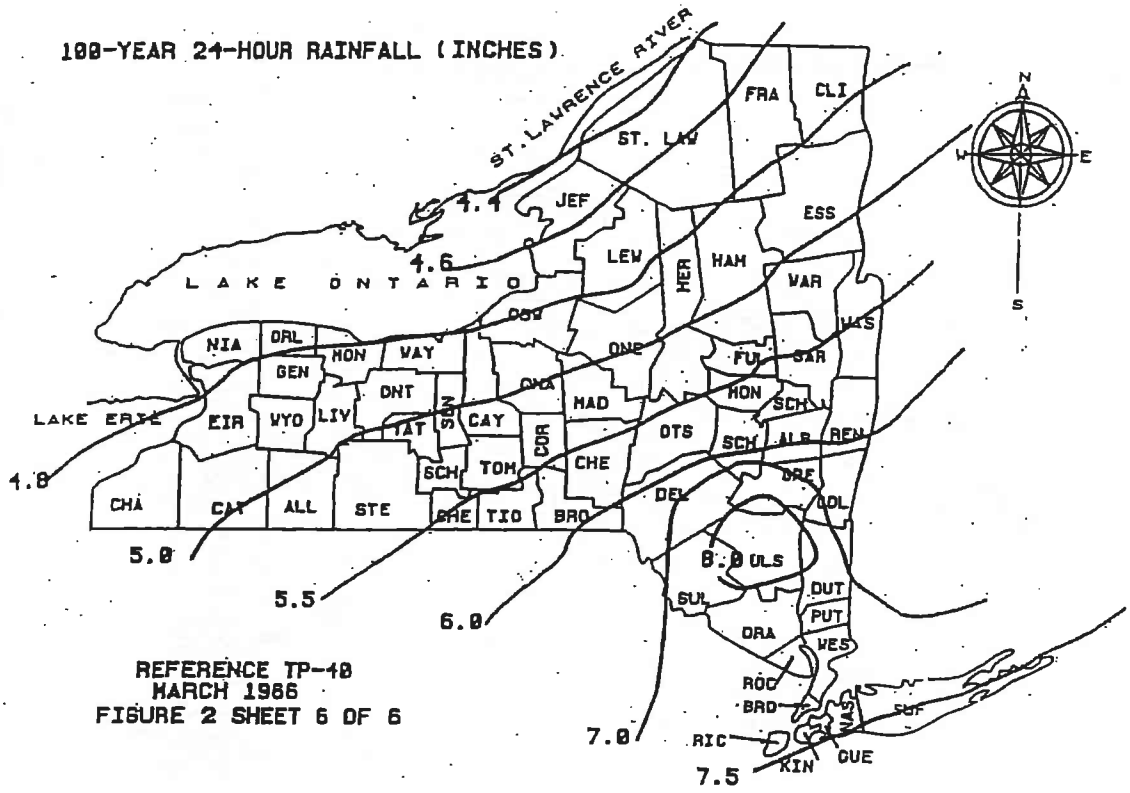
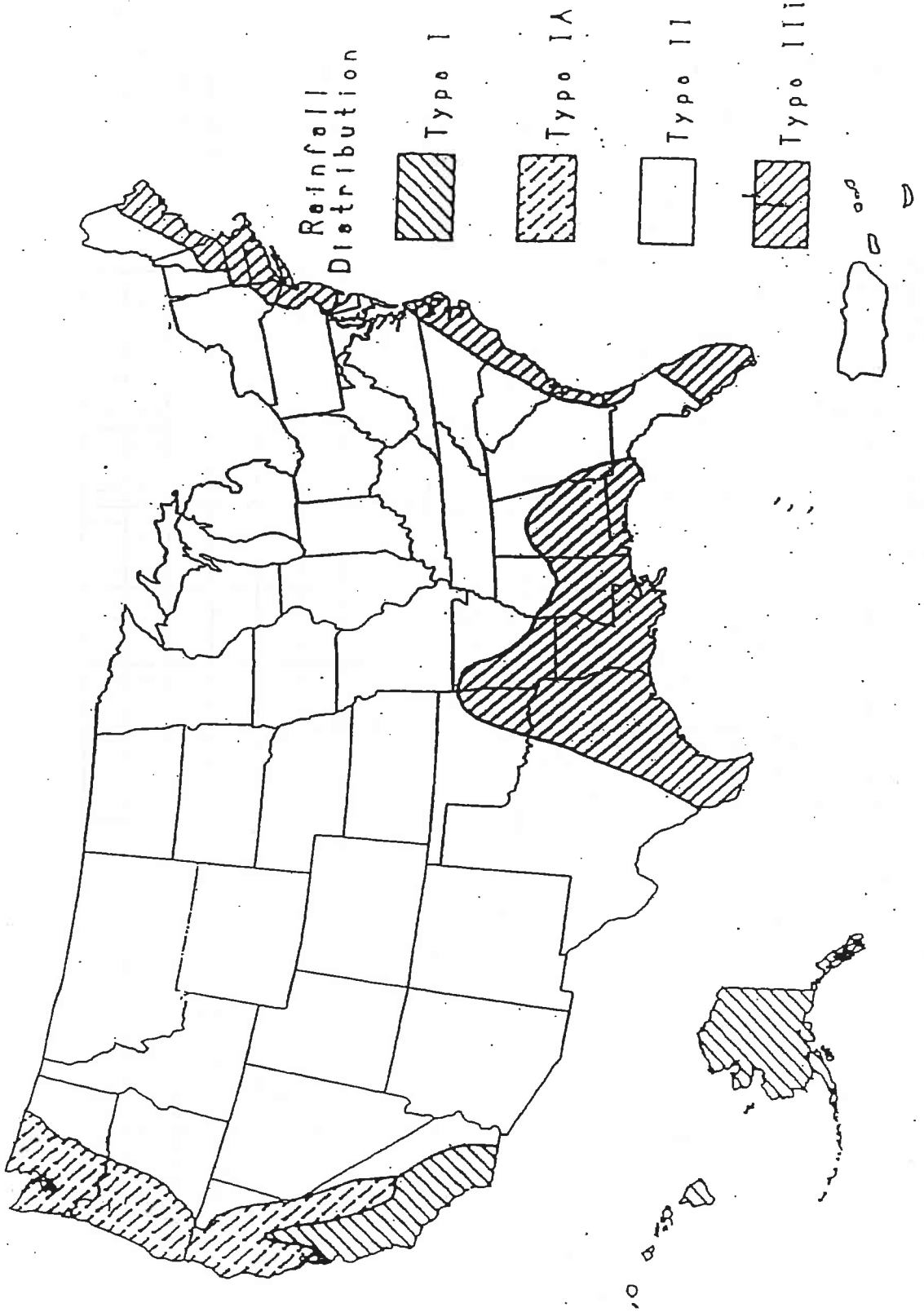


Figure 4.6 100-Year Design Storm



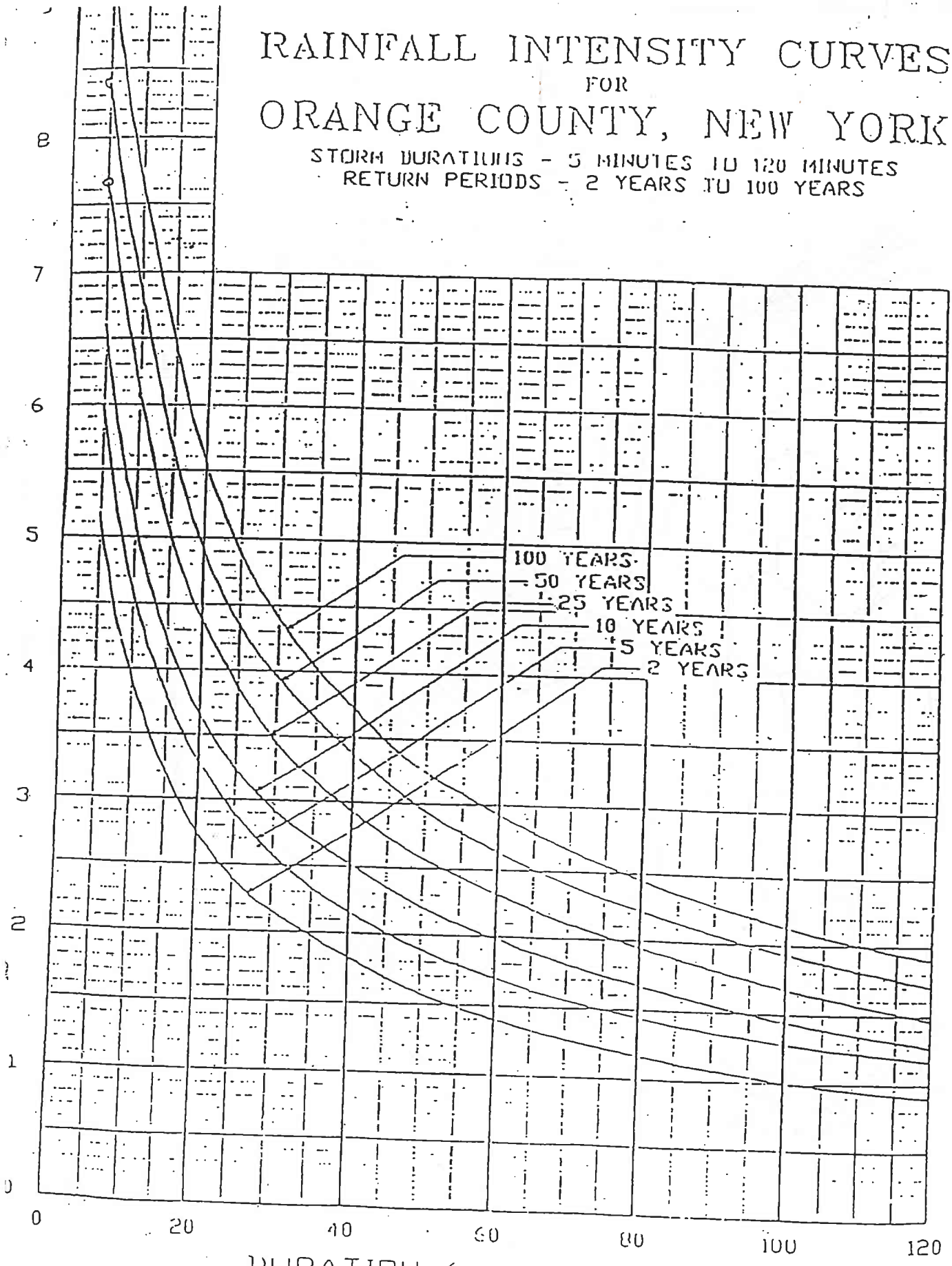

REFERENCE TP-40
MARCH 1966
FIGURE 2 SHEET 6 OF 6




Approximate geographic boundaries for SCS rainfall distributions.

# RAINFALL INTENSITY CURVES
FOR
# ORANGE COUNTY, NEW YORK

STORM DURATIONS - 5 MINUTES TO 120 MINUTES
RETURN PERIODS - 2 YEARS TO 100 YEARS



NORTH


SCALE: 1" = 500'

TIME OF CONCENTRATION KEY

| SYMBOL | TYPE | LENGTH | SLOPE |
|---|---|---|---|
| A | SHEET FLOW | 100' | 7% |
| B | SHALLOW CONC. | 310' | 16% |
| C | SHEET FLOW | 100' | 20% |
| D | SHALLOW CONC. | 75' | 13% |
| E | SHEET FLOW | 100' | 10% |
| F | SHALLOW CONC. | 2,070' | 5% |
| G | SHEET FLOW | 100' | 9% |
| H | SHALLOW CONC. | 1,020' | 3.3% |
| I | SHEET FLOW | 100' | 4% |
| J | SHALLOW CONC. | 1,135' | 3% |
| K | SHALLOW CONC. | 440' | 3% |
| L | SHEET FLOW | 100' | 6% |
| M | SHALLOW CONC. | 1,335' | 5.5% |
| N | SHALLOW CONC. | 500' | 1% |
| O | SHEET FLOW | 100' | 6% |
| P | SHALLOW CONC. | 555' | 1.8% |
| Q | SHEET FLOW | 100' | 17% |
| R | SHALLOW CONC. | 735' | 6% |
| S | CHANNEL FLOW | 3,660' | 3% |

# WARWICK VIEWS

PROJECT TITLE

## PRE DEVELOPED DRAINAGE ANALYSIS MAP

DRAWING TITLE


KIRK ROTHER, P.E.
CONSULTING ENGINEER, PLLC
206 Pine Island Turnpike, Warwick, NY 10990
(845) 988-0620


| DATE | REVISIONS |
|---|---|
| 03-28-08 | INITIAL PREPARATION |

KIRK ROTHER, P.E. N.Y.S. LIC. NO. 079053 DATE



| D.O.T. SHEET # | D.E.C. SHEET # | O.C.H.D. SHEET # | SHEET # |
|---|---|---|---|
| N.A. | N.A. | N.A. | 1 OF 1 |
| CAD # 03143.0 | PROJECT # 03143.0 | SCALE AS NOTED | |

NORTH


SCALE: 1" = 500'

# WARWICK VIEWS

PROJECT TITLE

## POST DEVELOPED DRAINAGE ANALYSIS MAP

DRAWING TITLE


KIRK ROTHER, P.E.
CONSULTING ENGINEER, PLLC
206 Pine Island Turnpike, Warwick, NY 10990
(845) 988-0620


| DATE | REVISIONS |
|---|---|
| 03-28-08 | INITIAL PREPARATION |

KIRK ROTHER, P.E. N.Y.S. LIC. NO. 079053 DATE



| D.O.T. SHEET # | D.E.C. SHEET # | O.C.H.D. SHEET # | SHEET # |
|---|---|---|---|
| N.A. | N.A. | N.A. | 1 OF 1 |
| CAD # 03143.0 | PROJECT # 03143.0 | SCALE AS NOTED | |