NOTICE OF INTENT
AND ACCOMPANYING STORMWATER MANAGEMENT REPORT

ACTON BOXBOROUGH REGIONAL HIGH SCHOOL
LOWER FIELDS RENOVATIONS PROJECT
ACTON, MASSACHUSETTS

April 5, 2012

Prepared for:

Acton Boxborough Regional School District
16 Charter Road
Acton, Massachusetts 01720

Prepared by:

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COMMONWEALTH OF MASSACHUSETTS
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4-5-12

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1.0 PROJECT DESCRIPTION

The Acton Boxborough Regional School District (ABRSD) is proposing renovations to The Lower Fields athletic facilities which are located at the Acton Boxborough Regional High School (ABRHS). The renovation project will consist of the reconstruction of one natural turf multipurpose field, the construction of two synthetic turf multipurpose fields with athletic lighting, expansion of existing parking area, improvements to the adjacent T.J. O'Grady Skate Park, improvements to stormwater management system and related site utilities and appurtenances. A portion of this work shall be within the 100-foot wetlands buffer for bordering vegetated wetlands.

A Notice of Intent (NOI) is being filed with the Town of Acton Conservation Commission for work within the 100-foot buffer. No direct disturbance of wetlands is proposed. The resources at the site are discussed below and are shown on the accompanying plan set and supporting information.

1.1 Request for Waiver

Although the majority of the proposed improvements to the project site are in compliance with the intent and purpose Town's Wetland Protection Bylaw, the ABRSD is requesting a waiver to the Bylaw Rules and Regulations §3.2 (3) *"75-foot setback to the edge of driveways, roadways, and structures"* for approximately 63 square feet of new impervious area that will fall within this setback as a result of the proposed parking lot expansion. The amount of proposed impervious area within this setback is approximately 1/3 of the area of one standard parking stall.

The proposed parking lot expansion includes the parking area that will need to be relocated due to the proposed improvements at the Skate Park and accommodates additional parking spaces for the users. These site improvements increase the public benefit from the property.

Stormwater runoff from the proposed parking lot will sheet flow towards the proposed bio-retention area where it will be treated and the peak flows attenuated before being allowed to either recharge or overflow towards the adjacent wetlands. Additionally, the existing parking lot and entrance drive to the Skate Park are currently non-compliant, as they are already located within with a 75-foot setback.

1.2 Existing Conditions

The majority of the project site is a grassy, open space area, currently maintained by ABRHS for use as athletic fields. Three (3) rectangular, multipurpose fields (known as "The Lower Fields") are currently laid out within the project site's footprint. The area is predominantly flat, with a gradual slope running from west to east. The T.J. O'Grady Skate Park (Skate Park) is located along Hayward Road at the northeast

portion of the project site. There are natural wooded areas to the northwestern and eastern portions of the site.

The project site is approximately 17 acres of mostly-cleared, undeveloped land and is bounded by Hayward Road to the north, Massachusetts Highway Route 2 to the east, additional ABRHS athletic fields to the west and a residential area to the south.

2.0 WETLANDS AND ENVRONMENTAL RESOURCE AREAS

According to MassGIS data and the Town's Wetland's Map (see Attachment); Bordering Vegetative Wetlands (BVW) are located within the wooded areas to the northwest, east and south of the project site. The BVW areas have a 100-foot jurisdictional buffer that extends well into the project site. Bordering vegetated wetlands (BVW) adjacent to proposed work were flagged by Ecosystem Solutions, Inc. in November 2011 (Refer to attachments). The wetlands to the north drain towards Hayward Road. The wetlands to the east and south drain towards an existing basin located to the south of the project site.

Given the time of year and the significant amount of rainfall the area had received, a conservative approach was taken with the flagging. In February of 2012 and again in March, Gale and the Town's Conservation Director re-surveyed and confirmed the wetland delineation as shown in the plans.

According to the latest FEMA Flood Insurance Rate Map, the proposed site is located outside of flood hazard area "Zone A", commonly referred to as the 100-year flood plane (see Attachment). However, the entire site is within flood hazard area "Zone X", commonly referred to as the 500-year flood plane. Although this area may become inundated by 500-year flooding, there are no jurisdictional requirements for Zone X.

According to the latest NHESP Atlas, there are no Priority Habitats of Rare Species, no Estimated Habitats of Rare Wildlife and no Certified Vernal Pools in the vicinity of the site. However, according to the Town GIS Map, there is a Potential Vernal Pool within the wetlands. It is located between the northern portion of the existing fields and the Route 2 right-of-way (see Attachment).

There are no areas within one mile of the site mapped as Areas of Critical Environmental Concern (ACEC), according to the ACEC Program Guide (June 1993, Executive Office of Environmental Affairs).

Soils information was taken from the USDA Natural Resources Conservation Service (NRCS) Soil Survey Report for Middlesex County, as well as MassGIS data. The NRCS soils mapping indicates that the northern half of the site's soil type is Deerfield Loamy Sand (DeA), with 0-3% slopes; the southern half of the site is Freetown Muck (Fm), with 0-1% slopes.

Common attributes of DeA soils include moderate to rapid permeability (Hydrologic Group B), seasonal high water table (between 1.5-ft to 3-ft below surface), and a depth to bedrock greater than 60-inches. Common attributes of Fm soils include moderate permeability (Hydrologic Group D), seasonal high water table (approximately 1.5-ft below surface), and a depth to bedrock greater than 60-inches. Observation test pits were performed on the site by Gale Associates, Inc. Loamy sand exists as the top soil profile from 0-10" followed by a loamy sand substratum of 10-48". Seasonal high groundwater is estimated to be approximately 4-ft below existing grade.

3.0 STORMWATER MANAGEMENT CONCEPT

To protect the wetlands and waters of the Commonwealth from the adverse impacts of stormwater runoff, DEP issued a Stormwater Management Policy, concurrently with its Guidance for the Rivers Protection Act. DEP developed the policy to address stormwater impacts through implementation of performance standards under existing environmental protection programs. The Stormwater Management Standards establish guidelines for stormwater management in Massachusetts.

The Standards address both water quality (pollutants) and water quantity (flood control) by establishing the level of required controls that can be achieved through the use of site planning, nonstructural measures, and Best Management Practices (BMPs). BMPs reduce or prevent pollutants from reaching water bodies and control the quantity of runoff from a site.

The project is designed to comply with the Massachusetts Stormwater Management Standards (the Standards). No direct disturbance of wetlands is proposed. Work is proposed within the 100' wetland buffer and the Town's 75-foot setback.

The majority of the work pertains to the redevelopment of the existing natural turf fields that already encroach on the buffers. In general, synthetic turf fields drain stormwater runoff vertically, as opposed to natural turf fields, which tend to sheet flow runoff. The proposed synthetic turf fields will be designed with an engineered stone base (8-inch min. depth with 35% voids) and be drained via flat panel drains. The time required for stormwater to travel through the stone base and fill the voids, before reaching the underdrain system, will enable the synthetic turf fields to release stormwater at a controlled rate and provide storage to attenuate flows and promote additional recharge. The complex has been designed so that post-development peak rates of runoff do not exceed pre-development peak rates for the 2, 10, and 100 year storm events.

3.1 Pre-Development Condition Hydrologic Sub Area

The site, as analyzed by Gale Associates, is broken down into two (2) hydrologic sub areas:

Northern Drainage Area (DA-N):

This drainage area consists mainly of natural grass (athletic field) in fair-to-good condition with some bituminous concrete pavement. As documented in the soil reports attached, the soils consist of loamy-sand with drainage conductivity categorized as Hydrologic Soil Group B. This area contains flat slopes. The area considered is 2.25 acres, consisting of 10.2% impervious cover. Runoff from this area of the site flows overland then concentrates into the form of shallow concentrated flow before discharging directly into the wetland areas. All of the runoff generated in this area contributes to Analysis Point (DP-1).

Southern Drainage Area (DA-S):

This drainage area consists mainly of natural grass (athletic fields) in fair-to-good condition. As documented in the soil reports attached, the soils consist of loamy-sand with drainage conductivity categorized as Hydrologic Soil Group B. This area contains flat slopes. The area considered is 5.33 acres, consisting of an insignificant amount of impervious cover. Runoff from this area of the site flows overland then concentrates into the form of shallow concentrated flow before discharging directly into the wetland areas. All of the runoff generated in this area contributes to Analysis Point (DP-2).

3.2 Post-Development Condition Hydrologic Sub Area

The site, as analyzed by Gale Associates, would be broken down into four (4) hydrologic sub areas:

Drainage Area 1 (DA-1):

DA-1 has been analyzed for post-development conditions, incorporating the benefits of replacing the natural turf field with an engineered root zone natural turf field and adding a minimally sloped water quality swale. DA-1 will consist of a re-established natural turf field in good-condition, groomed lawn areas and impervious areas resulting from site buildings and travel ways. Soil classification remains the same as existing, and drainage patterns are minimally changed. The resultant area considered encompasses 1.97 acres and would be 6.6% impervious in the post-development condition. All of the runoff generated in this area also contributes to Analysis Point (DP-1).

Drainage Area 2 (DA-2):

This drainage area consists mainly of bituminous concrete pavement with some groomed lawns and a bio-retention area. The underlying soils present consist of loamy-sand with drainage conductivity categorized as Hydrologic Soil Group B. This area contains moderate slopes and will mostly drain to the bio-retention area before reaching the wetlands. The area considered is 1.37 acres, consisting of 66.4% impervious cover. All of the runoff generated in this area contributes to Analysis Point (DP-2).

Drainage Area 3 (DA-3):

This drainage area will consist mainly of synthetic turf athletic fields with some bituminous concrete pavement. As documented in the soil reports attached, the underlying soils consist of loamy-sand with drainage conductivity categorized as Hydrologic Soil Group B. This area contains very flat slopes given that it will be designed per typical slopes carried over a synthetic turf field (0.5%). The area considered is 4.17 acres, consisting of 7.2% impervious cover. Runoff from this area of the site vertically drains through the sand and rubber infill material as well as the 1" top stone layer before reaching the base stone of the field. After permeating through the base stone, the runoff will either infiltrate into the well drained soils beneath the field or collect and drain via flat panel under drains and collector pipes. All of the runoff generated in this area contributes to Analysis Point (DP-2).

Drainage Area 4 (DA-4):

This drainage area will consist mainly of the expanded T.J. O'Grady Skate Park and some bituminous concrete pavement. As documented in the soil reports attached, the underlying soils consist of loamy-sand with drainage conductivity categorized as Hydrologic Soil Group B. This area contains relatively flat slopes. The area considered is 0.07 acres, consisting of 42.9% impervious cover. Runoff from this area of the site will be collected via new nyloplast catch basins and flow through closed drainage outfalling near the northern wetlands. All of the runoff generated in this area contributes to Analysis Point (DP-1).

4.0 COMPLIANCE WITH STORMWATER STANDARDS (MASWMS)

4.1 Untreated Stormwater (Standard 1)

The project is designed so that new stormwater conveyances (outfalls/discharges) do not discharge untreated stormwater into, or cause erosion to, wetlands.

4.2 Post-Development Peak Rates (Standard 2)

A hydrologic study was performed to determine the rate of runoff for the 2, 10, and 100-year storm events under pre-development (existing) conditions. Unmitigated post-development rates were then computed in a similar manner. The study points where the peak rates were compared were taken at points within the wetlands to the north and to the south of the existing athletic fields. From these analyses it was determined that the proposed project and its stormwater management system would not increase the peak runoff rates above existing levels. It is the intent of the stormwater management system to minimize impacts to drainage patterns, downstream property, and wetlands while simultaneously providing water quality treatment to runoff prior to its release from the site or discharge to wetlands.

The U.S.D.A. Soil Conservation Service (SCS) Technical Release 55 (TR-55), 1986, was used as the procedure for estimating runoff. A SCS TR-20-based computer program was used for estimating peak discharges. TR-55 is a generally accepted model for use on small sites that begins with a rainfall amount uniformly imposed on the watershed over a specified time distribution. Mass rainfall is converted to mass runoff by using a runoff curve number (CN). CN is based on soils, plant cover, impervious areas, interception, and surface storage. Runoff is then transformed into a hydrograph that depends on runoff travel time through segments of the watershed.

Development in a watershed changes its response to precipitation. The most common effects are reduced infiltration and decreased travel time, which result in significantly higher peak rates of runoff. The volume of runoff is determined primarily by the amount of precipitation and by infiltration characteristics related to soil type, antecedent rainfall, type of vegetal cover, impervious surfaces, and surface retention. Travel time is determined primarily by slope, flow length, depth of flow, and roughness of flow surfaces. Peak rates of discharge are based on the relationship of the above parameters as well as the total drainage area of the watershed, the location of the development in relation to the total drainage area, and the effect of any flood control works or other manmade storage. Peak rates of discharge are also influenced by the distribution of rainfall within a given storm event.

Stormwater management computations for the full-build were performed using SCS based HydroCAD and for existing and proposed conditions curve numbers, time of concentrations and unit hydrograph computations.

4.2.1 Existing Conditions

Table 6.2.1 shows the curve numbers, areas and times of concentration used to develop the pre-development hydrologic model of the site.

Table 6.2.1 – Existing Conditions					
Area	**Surface Cover**	**Curve Number (CN)**	**Area (Acres)**	**Tc (Hours)**	**Remarks**
DA-N				0.212	
	Impervious	98*	2.02		
	Grass	61*	0.23		Natural Turf Field
DA-S				0.235	
	Grass	61*	5.33		Natural Turf Field
Total			7.58		
*CN based on Class B soils					

4.2.2 Proposed Conditions

There will be three main areas of alteration of the ground surface cover in the proposed development; (1) expanded pavement for additional parking; (2) the proposed synthetic turf fields; (3) the additional imperviousness related to site travel ways and structures. These modifications will generate a net increase in site impervious area, though it proves to be insignificant in the net stormwater calculations for the site. The bio-retention area will not only serve as a stormwater treatment tool, but will also be used as a teaching tool for the School and community. The synthetic turf field serves to collect, detain and control the release of the majority of the stormwater runoff so as to not increase the peak rates of runoff in the full build condition.

Table 6.2.2 shows the curve numbers, areas and times of concentration used to develop the post-development hydrologic model of the site.

Table 6.2.2 – Proposed Conditions					
Area	**Surface Cover**	**Curve Number (CN)**	**Area (Acres)**	**Tc (Hours)**	**Remarks**
DA-1				0.240	
	Impervious	98*	0.13		
	Grass	61*	1.84		Natural Turf Field
DA-2				0.115	
	Grass	61*	0.33		
	Impervious	98*	0.91		
	Bio-Retention	48*	0.13		
DA-3				0.083	

	Impervious	98*	0.30		
	Grass	61*	0.01		
	Syn. Turf	98**	3.86		**Synthetic Turf Field
DA-4				0.083	
	Grass	61*	0.04		
	Impervious	98*	0.03		
Total			7.58		
* CN based on Class B soils ** Modeled as impervious to simulate direct flow into engineered stone base					

4.2.3 Peak Rate Summary

Table 6.2.3 shows the peak rate of runoff for the existing site as well as for the developed site at 2, 10, and 100-year design storms.

Analysis Point	Design Storm	Existing Runoff (CFS)	Proposed Runoff (CFS)
DP-1	2-yr	0.66	0.54
	10-yr	2.25	1.87
	100-yr	5.15	4.34
DP-2	2-yr	1.16	0.05
	10-yr	4.47	0.88
	100-yr	10.82	5.32

4.3 Recharge to Groundwater (Standard 3)

The project controls the stormwater runoff from the proposed parking lot by attenuating and treating the runoff by the use of the proposed bio-retention area. The project also mitigates the runoff from the synthetic turf fields by sending the storm water vertically through the engineered stone base of the fields. After permeating through the engineered stone base, the runoff will either infiltrate into the soils beneath the fields or collect and drain via flat panel under drains and collector pipes.

Loss of annual recharge to groundwater should be mitigated through the use of the above described infiltration measures. The annual recharge from the full build should approximate or exceed the annual recharge from the pre-development or existing site, based on the soil types present and the implementation of the proposed synthetic turf fields.

Required Recharge Volume for the entire site was calculated in accordance with the Standards:

Rv = F * impervious area
Rv = (0.60/12) * 1.21 = 0.061 Ac-ft = 2635 CF

Rv = Required Recharge Volume
F = Target Depth Factor (0.60 in for soils of Hydrologic Soil Group A)
Impervious area = pavement area on site (1.21 Ac.)

Required minimum Surface Area of the bottom of the infiltration structure was calculated in accordance with the Simple Dynamic Method as outlined in the Massachusetts Stormwater management Standards:

A = Rv / (D + KT)
A = 2635 CF / (0.26 ft + 0.20 ft/h * 2h) = 3992 SF

A = minimum required surface area of the bottom of the infiltration structure
Rv = Required Recharge Volume
D = depth of the infiltration facility (only void spaces are considered in stone facilities, so D = n*d = 0.35*(9/12) = 0.26 ft)
K = saturated hydraulic conductivity (2.41 in/h = 0.20 ft/h Loamy-Sand Soils Hydrologic Soil Group A)
T = allowable drawdown during the peak of the storm (2h)

The area of the proposed synthetic turf field to be used as an infiltration structure is over **100,000 SF** and is sufficient to assure recharge per the Standards.

$Time_{drawdown}$ = Rv / [(K)*(Bottom Area)]
= (26,250 ft^3) / [(0.20 ft/hr)*(100,000 ft^2)]
= 1.31 hrs

Rv = Storage Volume (ft^3)
K = Saturated Hydraulic Conductivity (ft/hr)
Bottom Area = Bottom Area of Recharge Structure (ft^2)

The drawdown time for the stone base is less than two (2) hours, well below the required drawdown time of 72 hours.

4.4 Water Quality (Standard 4)

The proposed synthetic turf athletic fields have low potential for accumulation of total suspended solids (TSS). Unlike the existing natural turf, synthetic turf is not subject to fertilization, sedimentation, irrigation or rigorous maintenance thus lessening the ability to acquire TSS. Runoff generated by the synthetic turf field will travel vertically through approximately 9-inches of engineered stone base, then laterally through the

stone base and into the flat drains leading to the collector pipe (perforated pipe embedded within stone trench).

Runoff from the proposed parking lot expansion will drain to the proposed bio-retention area. During conveyance, the runoff will first pass through a gravel filter strip which acts as pretreatment prior to reaching the bio-retention area. Runoff from impervious areas from the rest of the site that are not subject to vehicular traffic is considered "clean" and should not require treatment prior to discharge. Refer to attachments for applicable TSS removal calculations.

Bio-retention Area (collection of runoff from DA-2 or the proposed parking lot)

V_{WQ} = (D_{QW} / 12 in/ft) * Aimp * 43,560 SF/Ac
V_{WQ} = (1.0 in / 12 in/ft) * 0.76 Ac * 43,560 SF/Ac = 2760 CF

V_{WQ} = Required Water Quality Volume
D_{WQ} = Water Quality Depth (1.0 in)
Aimp = Impervious area (0.76 Ac)

The proposed bio-retention area contains **3700 CF** of storage volume within the treatment media and an additional **5000** CF of storage volume for the ponding of the stormwater above the media which exceeds the required water quality volume shown in the calculation above.

4.5 Land Uses with Higher Potential Pollutant Loads (Standard 5)

The proposed project does not qualify for a LUHPPL and does not differ from the current use of the space. No untreated runoff will leave the site or discharge into the adjacent wetlands as various perimeter treatment techniques are proposed including a bio-retention area.

4.6 Critical Areas (Standard 6)

This site does not lie within any critical areas.

4.7 Redevelopment (Standard 7)

This project is not a redevelopment project. Compliance with the Standards is described within this narrative.

4.8 Erosion and Sedimentation Controls (Standard 8)

An Erosion and Sedimentation Control Plan is provided as part of the Notice of Intent application to the Conservation Commission.

4.9 Operation and Maintenance Plan (Standard 9)

An Operation and Maintenance Plan is provided as part of the Notice of Intent application to the Conservation Commission. See attachments for Operation and Maintenance & Erosion and Sediment Control Plan.

4.10 Prohibition of Illicit Discharges (Standard 10)

There are no illicit discharges to proposed stormwater management system. A template for an illicit discharge compliance statement has been provided as part of the Notice of Intent application to the Conservation Commission. A completed statement will be submitted prior to the discharge of stormwater to the post-construction stormwater management system.

5.0 RESTORATION OF WETLAND BUFFER

An important component to any project near environmentally sensitive areas is the demonstration of impact mitigation. The majority of the existing project site within the 100-ft wetlands buffer is currently a maintained lawn area for athletic use. In some instances, the maintenance practices occur right up to the wetlands and restricts the buffer's use as a wildlife habitat. Other areas within the buffer are littered with debris. Mitigation measures may include the use of best management practices and low-impact development techniques.

Mitigation measures associated with the proposed project include:

a) Restoring approximately 60,000 square feet of the 100-ft wetlands buffer to adjacent wetlands. Buffer will be cleared of debris and deleterious material and invasive species will be removed. The area will no longer be maintained and allowed to be restored.

b) Elimination of fertilizers, pesticides, herbicides or any other chemical application that could increase pollutant and nutrient in the proposed synthetic fields area.

c) Elimination in water use related to the irrigation of the natural turf fields in the proposed synthetic fields area.

d) Increased groundwater recharge opportunities presented by the engineered stone base of the proposed synthetic turf fields.

e) LID site planning and design by incorporating the use of a bioretention area for the treatment and attenuation of stormwater runoff associated with the proposed parking area. In addition, the proposed bio-retention area will be used as a teaching tool for ABRHS and the community.

6.0 SUMMARY

Despite ABRHS's efforts to maintain the field in a safe and playable manner, by the end of each playing season, it is broken down and the root-zone is essentially destroyed. Additionally, it becomes compacted and poorly draining. As a result, the majority of the stormwater flow is surface runoff, carrying a significant sediment burden, and limiting the amount of groundwater recharge taking place.

The project, as proposed, is the "best fit" for this site. It simply replaces high-maintenance, dysfunctional, natural turf athletic fields with state-of-the-art synthetic turf fields. The new fields will satisfy the school's and the community's athletic educational requirements. Through design and approach, the fields will actually reduce the site's environmental impact by reducing nutrient and pesticide loading associated with natural turf maintenance. Other benefits include the reduction of groundwater withdrawals for irrigation and reduced air pollution from weekly mowing operations.

The proposed project will increase groundwater recharge opportunities. The net result from this renovation project is a reduction in stormwater peak rate runoff resulting in no negative impacts to downstream and off-site conditions.

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ATTACHMENT A

VICINITY/ZONING MAP

ZONING MAP

Town of

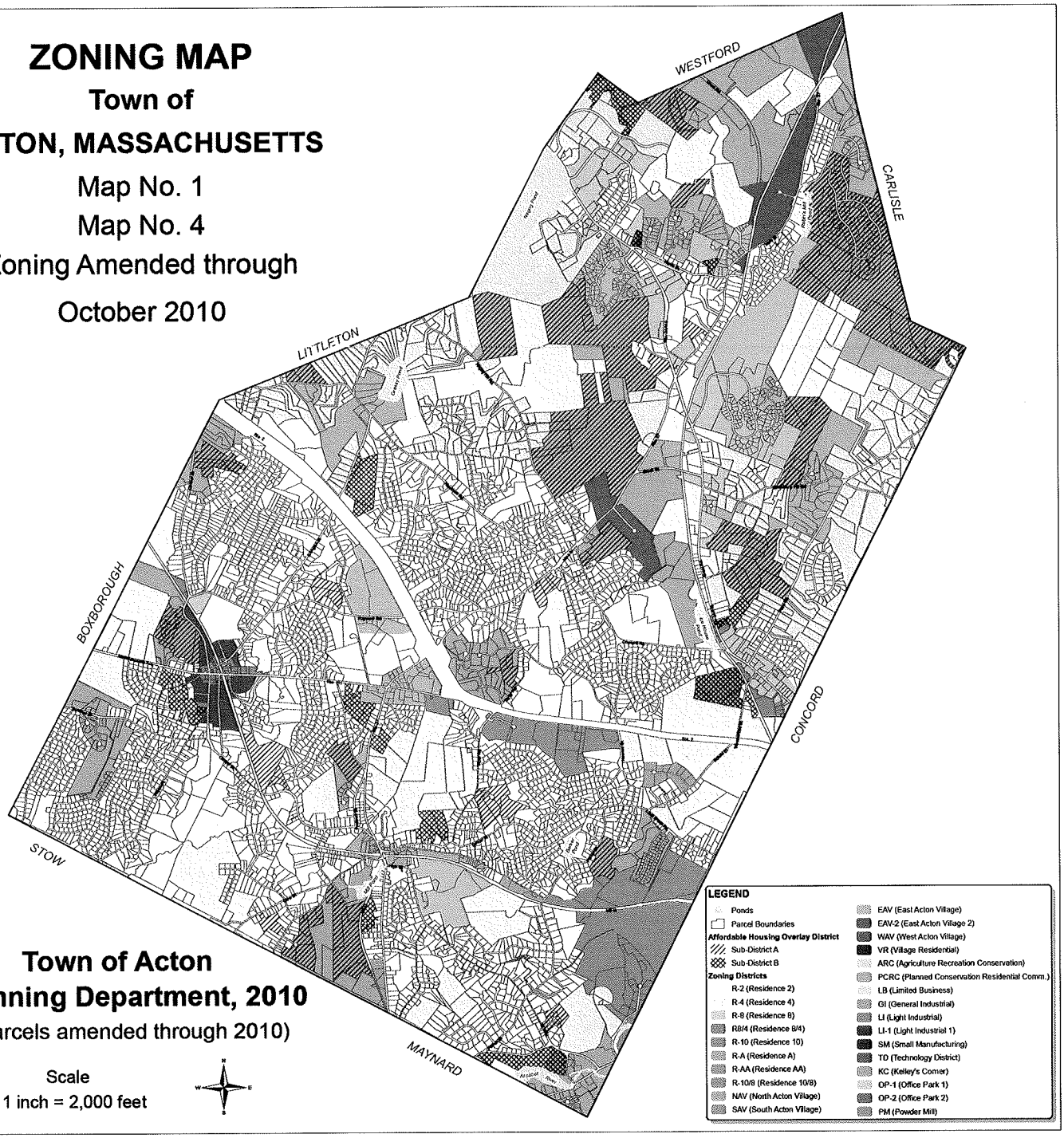
ACTON, MASSACHUSETTS

Map No. 1

Map No. 4

Zoning Amended through

October 2010



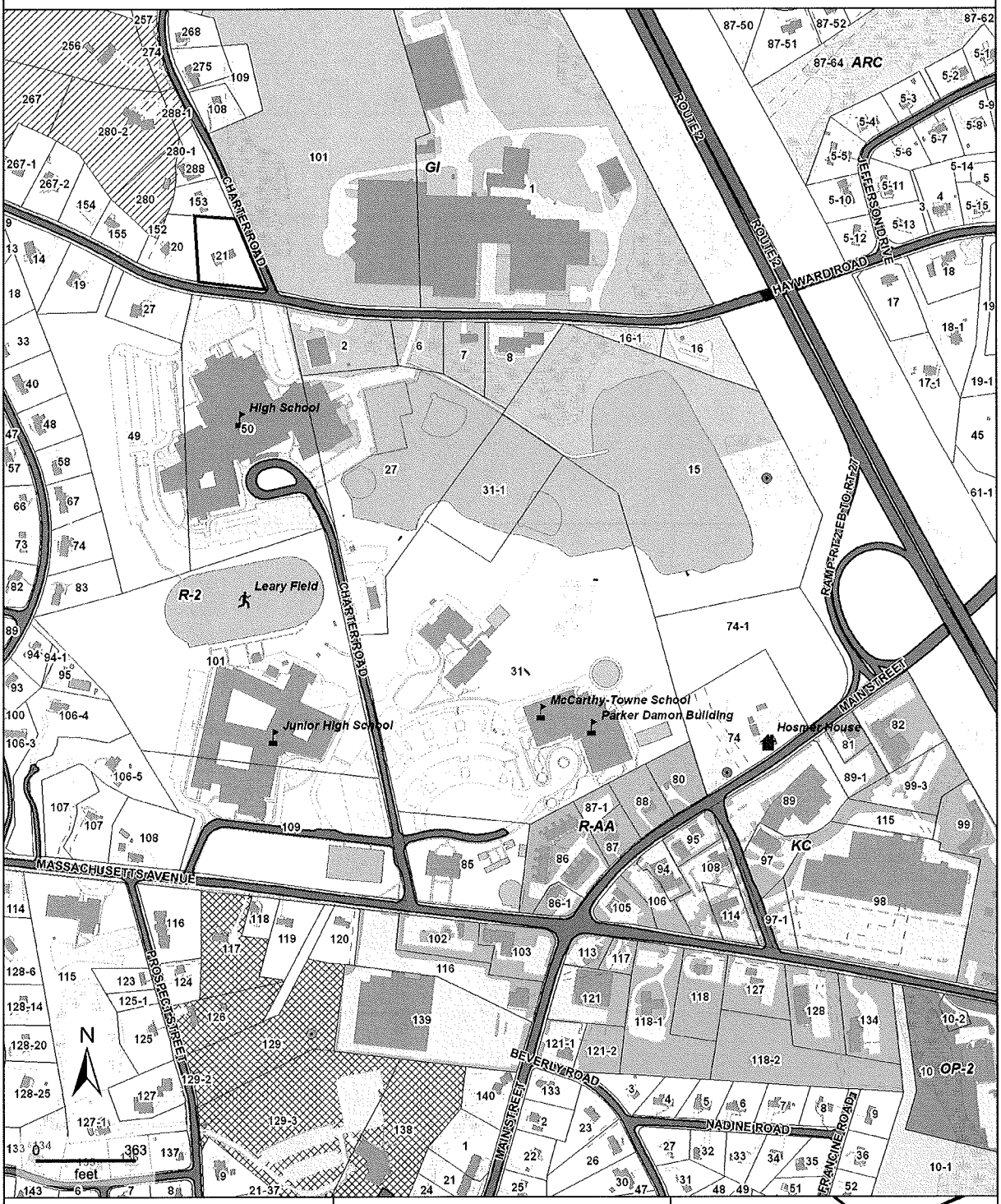
Town of Acton
Planning Department, 2010
(parcels amended through 2010)

Scale
1 inch = 2,000 feet

ATTACHMENT B

TOWN GIS MAP

Acton Boxborough HS

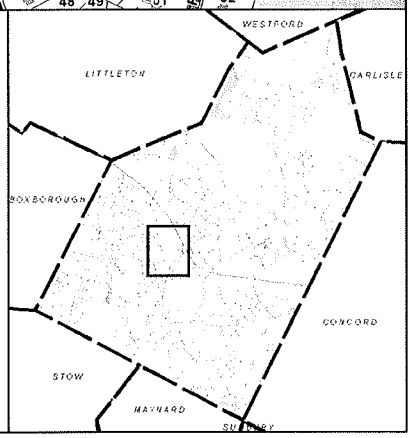


Property Information

Property ID F2-21
Location 97 HAYWARD RD

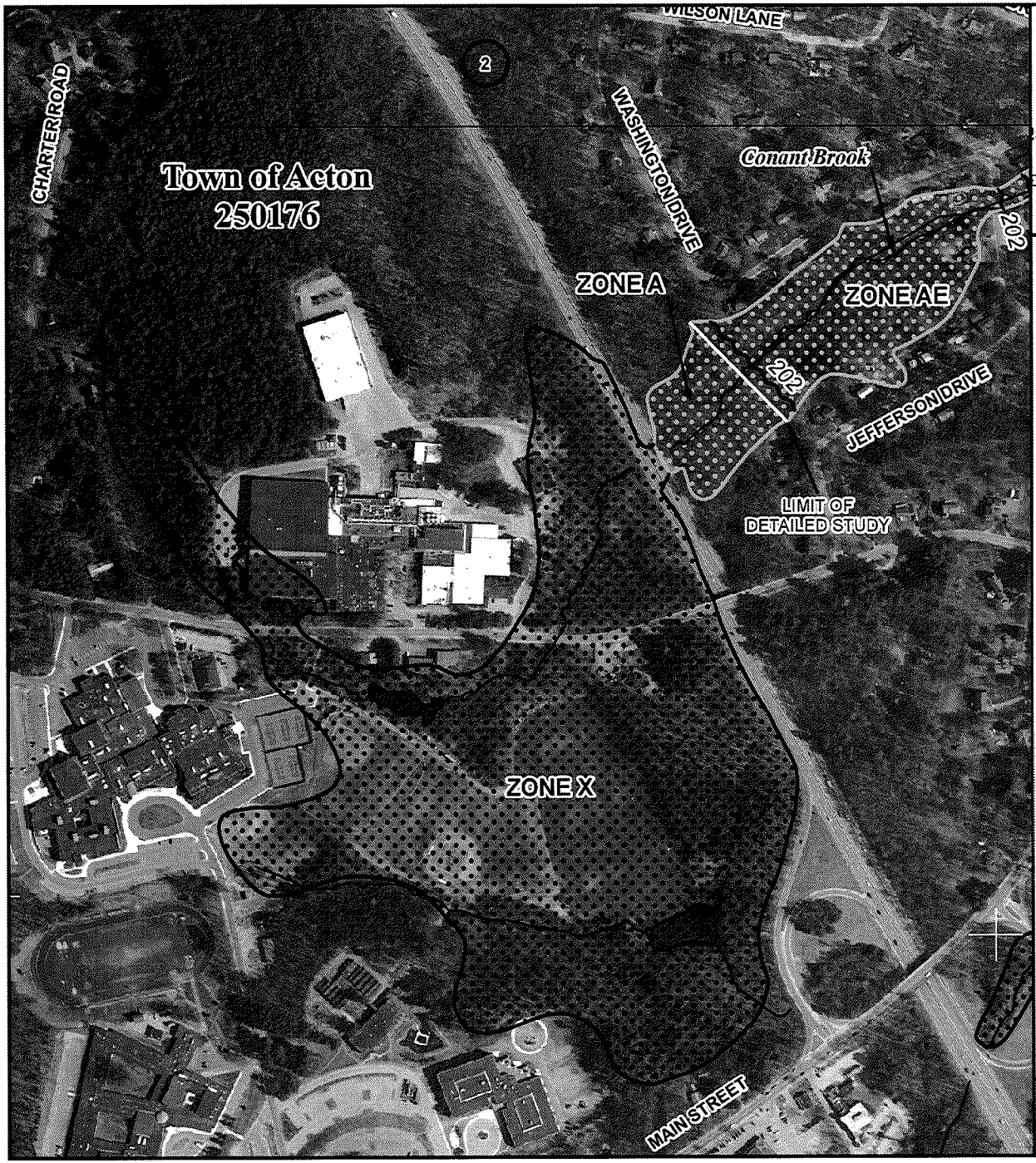
MAP FOR REFERENCE ONLY
NOT A LEGAL DOCUMENT

This data set/map is for planning purposes only and should not be used for larger scale analysis. The Town of Acton shall not be held liable for any use of the data or images shown on this map, nor is any warranty of accuracy expressed. All uses of this data set/map are subject to field verification.



ATTACHMENT C

FEMA FLOOD Map



MAP SCALE 1" = 500'

50 0 500 1000 FEET

METER

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0352E

FIRM

FLOOD INSURANCE RATE MAP

MIDDLESEX COUNTY, MASSACHUSETTS
(ALL JURISDICTIONS)

PANEL 352 OF 656

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
ACTON, TOWN OF	250176	0352	E

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
25017C0352E

EFFECTIVE DATE
JUNE 4, 2010

Federal Emergency Management Agency

This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov

ATTACHMENT D

NOTIC OF INTENT (WPA FORM 3)

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands

WPA Form 3 – Notice of Intent

Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

Provided by MassDEP:
MassDEP File Number
Document Transaction Number
Acton
City/Town

Important: When filling out forms on the computer, use only the tab key to move your cursor - do not use the return key.

Note: Before completing this form consult your local Conservation Commission regarding any municipal bylaw or ordinance.

A. General Information

1. Project Location (**Note:** electronic filers will click on button to locate project site):

36 Charter Road — a. Street Address
Acton — b. City/Town
01720 — c. Zip Code

Latitude and Longitude:
71.452 (deg) W — d. Latitude
42.48 (deg) N — e. Longitude

F3 — f. Assessors Map/Plat Number
1,7,8,15,16,16-1,27,31,31-1,74,81,82,89,89-1 — g. Parcel /Lot Number

2. Applicant:

John — a. First Name
Head — b. Last Name
Acton Boxborough Regional School District — c. Organization
16 Charter Road — d. Street Address
Acton — e. City/Town
MA — f. State
01720 — g. Zip Code
(978) 264-4700 — h. Phone Number
(978) 264-8409 — i. Fax Number
jdhead@mail.ab.mec.edu — j. Email Address

3. Property owner (required if different from applicant): ☐ Check if more than one owner

a. First Name
b. Last Name
c. Organization
d. Street Address
e. City/Town
f. State
g. Zip Code
h. Phone Number
i. Fax Number
j. Email address

4. Representative (if any):

Peter — a. First Name
Spanos — b. Last Name
Gale Associates, Inc. — c. Company
163 Libbey Parkway, P.O. Box 890189 — d. Street Address
Weymouth — e. City/Town
MA — f. State
02189-0004 — g. Zip Code
781-335-6465 — h. Phone Number
781-335-6467 — i. Fax Number
ps@gainc.com — j. Email address

5. Total WPA Fee Paid (from NOI Wetland Fee Transmittal Form):

MUNICIPAL — a. Total Fee Paid
$0 — b. State Fee Paid
$0 — c. City/Town Fee Paid

A. General Information (continued)

6. General Project Description:

The proposed project is a renovation of existing natural turf athletic fields to include resurfacing of two (2) of the fields with synthetic turf fields, restoring one (1) natural turf field and expanding the existing parking lot and site access ways.

7a. Project Type Checklist:

1. ☐ Single Family Home
2. ☐ Residential Subdivision
3. ☐ Limited Project Driveway Crossing
4. ☐ Commercial/Industrial
5. ☐ Dock/Pier
6. ☐ Utilities
7. ☐ Coastal Engineering Structure
8. ☐ Agriculture (e.g., cranberries, forestry)
9. ☐ Transportation
10. ☒ Other

7b. Is any portion of the proposed activity eligible to be treated as a limited project subject to 310 CMR 10.24 (coastal) or 310 CMR 10.53 (inland)?

1. ☐ Yes ☒ No If yes, describe which limited project applies to this project:

2. Limited Project

8. Property recorded at the Registry of Deeds for:

a. County
b. Certificate # (if registered land)
c. Book
d. Page Number

B. Buffer Zone & Resource Area Impacts (temporary & permanent)

1. ☒ Buffer Zone Only – Check if the project is located only in the Buffer Zone of a Bordering Vegetated Wetland, Inland Bank, or Coastal Resource Area.
2. ☐ Inland Resource Areas (see 310 CMR 10.54-10.58; if not applicable, go to Section B.3, Coastal Resource Areas).

Check all that apply below. Attach narrative and any supporting documentation describing how the project will meet all performance standards for each of the resource areas altered, including standards requiring consideration of alternative project design or location.

For all projects affecting other Resource Areas, please attach a narrative explaining how the resource area was delineated.

Resource Area	Size of Proposed Alteration	Proposed Replacement (if any)
a. ☐ Bank	1. linear feet	2. linear feet
b. ☒ Bordering Vegetated Wetland	0 1. square feet	0 2. square feet
c. ☐ Land Under Waterbodies and Waterways	1. linear feet 3. cubic yards dredged	2. linear feet

B. Buffer Zone & Resource Area Impacts (temporary & permanent) (cont'd)

Resource Area	Size of Proposed Alteration	Proposed Replacement (if any)
d. ☐ Bordering Land Subject to Flooding	1. square feet	2. square feet
	3. cubic feet of flood storage lost	4. cubic feet replaced
e. ☐ Isolated Land Subject to Flooding	1. square feet	
	2. cubic feet of flood storage lost	3. cubic feet replaced
f. ☐ Riverfront Area	1. Name of Waterway (if available)	

2. Width of Riverfront Area (check one):

☐ 25 ft. - Designated Densely Developed Areas only

☐ 100 ft. - New agricultural projects only

☐ 200 ft. - All other projects

3. Total area of Riverfront Area on the site of the proposed project: n/a square feet

4. Proposed alteration of the Riverfront Area:

a. total square feet | b. square feet within 100 ft. | c. square feet between 100 ft. and 200 ft.

5. Has an alternatives analysis been done and is it attached to this NOI? ☐ Yes ☐ No

6. Was the lot where the activity is proposed created prior to August 1, 1996? ☐ Yes ☐ No

3. ☐ Coastal Resource Areas: (See 310 CMR 10.25-10.35)

Check all that apply below. Attach narrative and supporting documentation describing how the project will meet all performance standards for each of the resource areas altered, including standards requiring consideration of alternative project design or location.

Online Users: Include your document transaction number (provided on your receipt page) with all supplementary information you submit to the Department.

Resource Area	Size of Proposed Alteration	Proposed Replacement (if any)
a. ☐ Designated Port Areas	Indicate size under Land Under the Ocean, below	
b. ☐ Land Under the Ocean	1. square feet	
	2. cubic yards dredged	
c. ☐ Barrier Beach	Indicate size under Coastal Beaches and/or Coastal Dunes below	
d. ☐ Coastal Beaches	1. square feet	2. cubic yards beach nourishment
e. ☐ Coastal Dunes	1. square feet	2. cubic yards dune nourishment

B. Buffer Zone & Resource Area Impacts (temporary & permanent) (cont'd)

		Size of Proposed Alteration	Proposed Replacement (if any)
f. ☐	Coastal Banks	1. linear feet	
g. ☐	Rocky Intertidal Shores	1. square feet	
h. ☐	Salt Marshes	1. square feet	2. sq ft restoration, rehab., creation
i. ☐	Land Under Salt Ponds	1. square feet 2. cubic yards dredged	
j. ☐	Land Containing Shellfish	1. square feet	
k. ☐	Fish Runs	Indicate size under Coastal Banks, inland Bank, Land Under the Ocean, and/or inland Land Under Waterbodies and Waterways, above 1. cubic yards dredged	
l. ☐	Land Subject to Coastal Storm Flowage	1. square feet	

4. ☐ Restoration/Enhancement
If the project is for the purpose of restoring or enhancing a wetland resource area in addition to the square footage that has been entered in Section B.2.b or B.3.h above, please enter the additional amount here.

a. square feet of BVW _____ b. square feet of Salt Marsh _____

C. Other Applicable Standards and Requirements

Streamlined Massachusetts Endangered Species Act/Wetlands Protection Act Review

1. Is any portion of the proposed project located in **Estimated Habitat of Rare Wildlife** as indicated on the most recent Estimated Habitat Map of State-Listed Rare Wetland Wildlife published by the Natural Heritage and Endangered Species Program (NHESP)? To view habitat maps, see the *Massachusetts Natural Heritage Atlas* or go to http://www.mass.gov/dfwele/dfw/nhesp/nhregmap.htm.

a. ☐ Yes ☒ No **If yes, include proof of mailing or hand delivery of NOI to:**

Natural Heritage and Endangered Species Program
Division of Fisheries and Wildlife
Route 135, North Drive
Westborough, MA 01581

Oct. 2008
b. Date of map

If *yes*, the project is also subject to Massachusetts Endangered Species Act (MESA) review (321 CMR 10.18). To qualify for a streamlined, 30-day, MESA/Wetlands Protection Act review, please complete Section C.1.C, and include requested materials with this Notice of Intent (NOI); *OR* complete Section C.1.d, if applicable. *If MESA supplemental information is not included with the NOI, by completing Section 1 of this form, the NHESP will require a separate MESA filing which may take up to 90 days to review (unless noted exceptions in Section 2 apply, see below).*

C. Other Applicable Standards and Requirements (cont'd)

1. c. Submit Supplemental Information for Endangered Species Review *

   1. ☐ Percentage/acreage of property to be altered:

      (a) within wetland Resource Area _____ percentage/acreage

      (b) outside Resource Area _____ percentage/acreage

   2. ☐ Assessor's Map or right-of-way plan of site

   3. ☐ Project plans for entire project site, including wetland resource areas and areas outside of wetlands jurisdiction, showing existing and proposed conditions, existing and proposed tree/vegetation clearing line, and clearly demarcated limits of work **

      (a) ☐ Project description (including description of impacts outside of wetland resource area & buffer zone)

      (b) ☐ Photographs representative of the site

      (c) ☐ MESA filing fee (fee information available at: http://www.mass.gov/dfwele/dfw/nhesp/nhenvmesa.htm)
      Make check payable to "Natural Heritage & Endangered Species Fund" and ***mail to NHESP*** at above address

      *Projects altering **10 or more acres** of land, also submit:*

      (d) ☐ Vegetation cover type map of site

      (e) ☐ Project plans showing Priority & Estimated Habitat boundaries

d. OR Check One of the Following

   1. ☐ Project is exempt from MESA review.
   Attach applicant letter indicating which MESA exemption applies. (See 321 CMR 10.14, http://www.mass.gov/dfwele/dfw/nhesp/nhenvexemptions.htm; the NOI must still be sent to NHESP if the project is within estimated habitat pursuant to 310 CMR 10.37 and 10.59.)

   2. ☐ Separate MESA review ongoing.

      a. NHESP Tracking Number _____ b. Date submitted to NHESP _____

   3. ☐ Separate MESA review completed.
   Include copy of NHESP "no Take" determination or valid Conservation & Management Permit with approved plan.

* Some projects **not** in Estimated Habitat may be located in Priority Habitat, and require NHESP review (see www.nhesp.org regulatory review tab). Priority Habitat includes habitat for state-listed plants and strictly upland species not protected by the Wetlands Protection Act.

** MESA projects may not be segmented (321 CMR 10.16). The applicant must disclose full development plans even if such plans are not required as part of the Notice of Intent process.

C. Other Applicable Standards and Requirements (cont'd)

2. For coastal projects only, is any portion of the proposed project located below the mean high water line or in a fish run?

   a. ☒ Not applicable – project is in inland resource area only

   b. ☐ Yes ☐ No If yes, include proof of mailing or hand delivery of NOI to either:

   South Shore - Cohasset to Rhode Island, and the Cape & Islands:

   Division of Marine Fisheries - Southeast Marine Fisheries Station
   Attn: Environmental Reviewer
   838 South Rodney French Blvd.
   New Bedford, MA 02744

   North Shore - Hull to New Hampshire:

   Division of Marine Fisheries - North Shore Office
   Attn: Environmental Reviewer
   30 Emerson Avenue
   Gloucester, MA 01930

   Also if yes, the project may require a Chapter 91 license. For coastal towns in the Northeast Region, please contact MassDEP's Boston Office. For coastal towns in the Southeast Region, please contact MassDEP's Southeast Regional Office.

3. Is any portion of the proposed project within an Area of Critical Environmental Concern (ACEC)?

   a. ☐ Yes ☒ No If yes, provide name of ACEC (see instructions to WPA Form 3 or MassDEP Website for ACEC locations). **Note:** electronic filers click on Website.

   b. ACEC

Online Users: Include your document transaction number (provided on your receipt page) with all supplementary information you submit to the Department.

4. Is any portion of the proposed project within an area designated as an Outstanding Resource Water (ORW) as designated in the Massachusetts Surface Water Quality Standards, 314 CMR 4.00?

   a. ☐ Yes ☒ No

5. Is any portion of the site subject to a Wetlands Restriction Order under the Inland Wetlands Restriction Act (M.G.L. c. 131, § 40A) or the Coastal Wetlands Restriction Act (M.G.L. c. 130, § 105)?

   a. ☐ Yes ☒ No

6. Is this project subject to provisions of the MassDEP Stormwater Management Standards?

   a. ☒ Yes. Attach a copy of the Stormwater Report as required by the Stormwater Management Standards per 310 CMR 10.05(6)(k)-(q) and check if:

      1. ☐ Applying for Low Impact Development (LID) site design credits (as described in Stormwater Management Handbook Vol. 2, Chapter 3)

      2. ☒ A portion of the site constitutes redevelopment

      3. ☒ Proprietary BMPs are included in the Stormwater Management System.

   b. ☐ No. Check why the project is exempt:

      1. ☐ Single-family house

      2. ☐ Emergency road repair

      3. ☐ Small Residential Subdivision (less than or equal to 4 single-family houses or less than or equal to 4 units in multi-family housing project) with no discharge to Critical Areas.

D. Additional Information

Applicants must include the following with this Notice of Intent (NOI). See instructions for details.

Online Users: Attach the document transaction number (provided on your receipt page) for any of the following information you submit to the Department.

1. ☒ USGS or other map of the area (along with a narrative description, if necessary) containing sufficient information for the Conservation Commission and the Department to locate the site. (Electronic filers may omit this item.)

2. ☒ Plans identifying the location of proposed activities (including activities proposed to serve as a Bordering Vegetated Wetland [BVW] replication area or other mitigating measure) relative to the boundaries of each affected resource area.

3. ☒ Identify the method for BVW and other resource area boundary delineations (MassDEP BVW Field Data Form(s), Determination of Applicability, Order of Resource Area Delineation, etc.), and attach documentation of the methodology.

4. ☒ List the titles and dates for all plans and other materials submitted with this NOI.

Acton Boxborough Regional High School Lower Fields Renovations Project
a. Plan Title

B. Tyson Catlett, E.I.T.
b. Prepared By

Peter Spanos, P.E.
c. Signed and Stamped by

April 5, 2012
d. Final Revision Date

1"=50'-0"
e. Scale

f. Additional Plan or Document Title

g. Date

5. ☒ If there is more than one property owner, please attach a list of these property owners not listed on this form.

6. ☐ Attach proof of mailing for Natural Heritage and Endangered Species Program, if needed.

7. ☐ Attach proof of mailing for Massachusetts Division of Marine Fisheries, if needed.

8. ☒ Attach NOI Wetland Fee Transmittal Form

9. ☒ Attach Stormwater Report, if needed.

E. Fees

1. ☐ Fee Exempt: No filing fee shall be assessed for projects of any city, town, county, or district of the Commonwealth, federally recognized Indian tribe housing authority, municipal housing authority, or the Massachusetts Bay Transportation Authority.

Applicants must submit the following information (in addition to pages 1 and 2 of the NOI Wetland Fee Transmittal Form) to confirm fee payment:

MUNICIPAL
2. Municipal Check Number

3. Check date

4. State Check Number

5. Check date

6. Payor name on check: First Name

7. Payor name on check: Last Name

Provided by MassDEP:

MassDEP File Number

Document Transaction Number

Acton
City/Town

F. Signatures and Submittal Requirements

I hereby certify under the penalties of perjury that the foregoing Notice of Intent and accompanying plans, documents, and supporting data are true and complete to the best of my knowledge. I understand that the Conservation Commission will place notification of this Notice in a local newspaper at the expense of the applicant in accordance with the wetlands regulations, 310 CMR 10.05(5)(a).

I further certify under penalties of perjury that all abutters were notified of this application, pursuant to the requirements of M.G.L. c. 131, § 40. Notice must be made by Certificate of Mailing or in writing by hand delivery or certified mail (return receipt requested) to all abutters within 100 feet of the property line of the project location.

1. Signature of Applicant	2. Date 4/3/12
3. Signature of Property Owner (if different)	4. Date
5. Signature of Representative (if any)	6. Date 4-3-12

For Conservation Commission:
Two copies of the completed Notice of Intent (Form 3), including supporting plans and documents, two copies of the NOI Wetland Fee Transmittal Form, and the city/town fee payment, to the Conservation Commission by certified mail or hand delivery.

For MassDEP:
One copy of the completed Notice of Intent (Form 3), including supporting plans and documents, one copy of the NOI Wetland Fee Transmittal Form, and a **copy** of the state fee payment to the MassDEP Regional Office (see Instructions) by certified mail or hand delivery.

Other:
If the applicant has checked the "yes" box in any part of Section C, Item 3, above, refer to that section and the Instructions for additional submittal requirements.

The original and copies must be sent simultaneously. Failure by the applicant to send copies in a timely manner may result in dismissal of the Notice of Intent.

ATTACHMENT E

NOI WETLAND FEE TRANSMITTAL FORM

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands

NOI Wetland Fee Transmittal Form

Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

Important: When filling out forms on the computer, use only the tab key to move your cursor - do not use the return key.

A. Applicant Information

1. Applicant:

John	Head
a. First Name	b. Last Name

Acton Boxborough Regional School District
c. Organization

16 Charter Road
d. Mailing Address

Acton	MA	01720
e. City/Town	f. State	g. Zip Code

(978) 264-4700	(978) 263-8409	jdhead@mail.ab.mec.edu
h. Phone Number	i. Fax Number	j. Email Address

2. Property Owner (if different):

a. First Name	b. Last Name

c. Organization

d. Mailing Address

e. City/Town	f. State	g. Zip Code

h. Phone Number	i. Fax Number	j. Email Address

3. Project Location:

36 Charter Road	Acton
a. Street Address	b. City/Town

To calculate filing fees, refer to the category fee list and examples in the instructions for filling out WPA Form 3 (Notice of Intent).

B. Fees

The fee should be calculated using the following six-step process and worksheet. **Please see Instructions before filling out worksheet.**

Step 1/Type of Activity: Describe each type of activity that will occur in wetland resource area and buffer zone.

Step 2/Number of Activities: Identify the number of each type of activity.

Step 3/Individual Activity Fee: Identify each activity fee from the six project categories listed in the instructions.

Step 4/Subtotal Activity Fee: Multiply the number of activities (identified in Step 2) times the fee per category (identified in Step 3) to reach a subtotal fee amount. Note: If any of these activities are in a Riverfront Area in addition to another Resource Area or the Buffer Zone, the fee per activity should be multiplied by 1.5 and then added to the subtotal amount.

Step 5/Total Project Fee: Determine the total project fee by adding the subtotal amounts from Step 4.

Step 6/Fee Payments: To calculate the state share of the fee, divide the total fee in half and subtract $12.50. To calculate the city/town share of the fee, divide the total fee in half and add $12.50.

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands

NOI Wetland Fee Transmittal Form

Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

B. Fees (continued)

Step 1/Type of Activity	Step 2/Number of Activities	Step 3/Individual Activity Fee	Step 4/Subtotal Activity Fee
MUNICIPAL	0	$0	$0

Step 5/Total Project Fee: $0

Step 6/Fee Payments:

Total Project Fee:	$0 a. Total Fee from Step 5
State share of filing Fee:	$0 b. 1/2 Total Fee **less** $12.50
City/Town share of filling Fee:	$0 c. 1/2 Total Fee **plus** $12.50

C. Submittal Requirements

a.) Complete pages 1 and 2 and send with a check or money order for the state share of the fee, payable to the Commonwealth of Massachusetts.

Department of Environmental Protection
Box 4062
Boston, MA 02211

b.) **To the Conservation Commission:** Send the Notice of Intent or Abbreviated Notice of Intent; a **copy** of this form; and the city/town fee payment.

To MassDEP Regional Office (see Instructions): Send a copy of the Notice of Intent or Abbreviated Notice of Intent; a **copy** of this form; and a **copy** of the state fee payment. (E-filers of Notices of Intent may submit these electronically.)

ATTACHMENT F

WETLAND DELINEATION

MassDEP Bordering Vegetated Wetland (310 CMR 10.55) Delineation Field Data Form

Applicant: Prepared by: **Ecosystem Solutions** Project Location: **Acton/Boxborough High** DEP File #:

Check all that apply:

- ☐ Vegetation alone presumed adequate to delineate BVW boundary: fill out Section I only
- ☑ Vegetation and other indicators of hydrology used to delineate BVW boundary: fill out Sections I and II
- ☐ Method other than dominance test used (attach additional information)

Section I.

Observation Plot Number: **U** Transect #: **A-19** Date: **10/5/2011**

	Common Name	Scientific Name	Percent Cover	Percent Dominance	Dominant Plant?	Wetland Indicator Plant?	Wetland Indicator Category
Shrubs	American hazelnut	*Crataegus crus-galli*	20.5	22	YES	NO	FACU
	Crab apple	*Malus sp.*	20.5	22	YES	NO	FACU
	Silky dogwood*	*Cornus amomum*	20.5	22	YES	YES	FACW
	Allegheny blackberry	*Rubus allegheniensis*	20.5	22	YES	NO	FACU-
	Staghorn sumac	*Rhus typhina*	10.5	11	NO	NO	NI
Trees	Red maple*	*Acer rubrum*	10.5	100	YES	YES	FAC

** Use an asterisk to mark wetland indicator plants: plant species listed in the Wetlands Protection Act (MGL c.131, s.40); plants in the genus Sphagnum; plants listed as FAC, FAC+, FACW-, FACW, FACW+, or OBL; or plants with physiological or morphological adaptations. If any plants are identified as wetland indicator plants due to physiological or morphological adaptations, describe the adaptation next to the asterisk*

Vegetation conclusion:

Number of dominant wetland indicator plants: **2** Number of dominant non-wetland indicator plants: **3**

Is the number of dominant wetland plants equal to or greater than the number of dominant non-wetland plants? **NO**

If vegetation alone is presumed adequate to delineate the BVW boundary, submit this form with the Request for Determination of Applicability or Notice of Intent

Upland @ A-19

Section II. Indicators of Hydrology

Hydric Soil Interpretation

1. Soil Survey

Is there a published soil survey for this site? **Yes**
Title/date: **Middlesex County**
Map number: **Accessed via GIS**
Soil type mapped: **Deerfield ls, 0-3% slopes**
Hydric soil inclusions: **Wareham**

Are field observations consistent with soil survey? No-this is fill material

Remarks:

2. Soil Description

Horizon	Depth	Color	Redox
^A	**0-20**	**10YR 2/2**	**-**

Remarks: Soil texture vfsl

This is old fill material, as it appears that most of the field consists of.

3. Other:

Conclusion: Is soil hydric?

Other Indicators of Hydrology: (check all that apply & describe)

- ☐ Site Inundated:
- ☐ Depth to free water in observation hole:
- ☐ Depth to soil saturation in observation hole:
- ☐ Water marks:
- ☐ Drift lines:
- ☐ Sediment Deposits:
- ☐ Drainage patterns in BVW:
- ☐ Oxidized rhizospheres:
- ☐ Water-stained leaves:
- ☐ Recorded Data (streams, lake, or tidal gauge; aerial photo):
- ☐ Other:

Vegetation & Hydrology Conclusion

	YES	NO
Number of wetland indicator plants ≥ # of non-wetland indicator plants	☐	☑
Wetland hydrology present		
Hydric soil	☐	☑
Other indicators of hydrology	☐	☑

Sample location is in a BVW NO

MassDEP Bordering Vegetated Wetland (310 CMR 10.55) Delineation Field Data Form

Applicant: Prepared by: **Ecosystem Solutions** Project Location: **Acton/Boxborough High** DEP File #:

Check all that apply:

- ☐ Vegetation alone presumed adequate to delineate BVW boundary: fill out Section I only
- ☑ Vegetation and other indicators of hydrology used to delineate BVW boundary: fill out Sections I and II
- ☐ Method other than dominance test used (attach additional information)

Section I.

Observation Plot Number: **W** Transect #: **A-19** Date: **10/5/2011**

	Common Name	Scientific Name	Percent Cover	Percent Dominance	Dominant Plant?	Wetland Indicator Plant?	Wetland Indicator Category
Ground	Sensitive fern*	*Onoclea sensibilis*	10.5	78	YES	YES	FACW
	Garlic mustard	*Alliaria petiolata*	3	22	YES	NO	FACU-
Shrubs	Staghorn sumac	*Rhus typhina*	38	28	YES	NO	NI
	Honeysuckle*	*Lonicera spp.*	38	28	YES	YES	FAC
	Northern arrow-wood*	*Viburnum recognitum*	38	28	YES	YES	FACW-
	Multiflora rose	*Rosa multiflora*	10.5	8	NO	NO	FACU
	Staghorn sumac	*Cornus amomum*	10.5	8	NO	NO	NI
Vines	Fox grape	*Vitis labrusca*	38	100	YES	NO	FACU

** Use an asterisk to mark wetland indicator plants: plant species listed in the Wetlands Protection Act (MGL c.131, s.40); plants in the genus Sphagnum; plants listed as FAC, FAC+, FACW-, FACW, FACW+, or OBL; or plants with physiological or morphological adaptations. If any plants are identified as wetland indicator plants due to physiological or morphological adaptations, describe the adaptation next to the asterisk*

Vegetation conclusion:

Number of dominant wetland indicator plants: **3** Number of dominant non-wetland indicator plants: **3**

Is the number of dominant wetland plants equal to or greater than the number of dominant non-wetland plants? **YES**

Wetland @ A-19

Section II. Indicators of Hydrology

Hydric Soil Interpretation

1. Soil Survey

Is there a published soil survey for this site? **Yes**

Title/date: **Middlesex County**

Map number: **Accessed via GIS**

Soil type mapped: **52A-Freetown muck, 0-1% slopes**

Hydric soil inclusions:

Are field observations consistent with soil survey? NO-this is fill material

Remarks:

2. Soil Description

Horizon	Depth	Color	Redox
^A	**0-20**	**10YR 2/1**	**-**

Remarks: Texture vfsl

This is old fill material, as it appears that most of the field consists of.

3. Other:

Conclusion: Is soil hydric?

Other Indicators of Hydrology: (check all that apply & describe)

- ☐ Site Inundated:
- ☐ Depth to free water in observation hole:
- ☐ Depth to soil saturation in observation hole:
- ☐ Water marks:
- ☐ Drift lines:
- ☐ Sediment Deposits:
- ☐ Drainage patterns in BVW:
- ☐ Oxidized rhizospheres:
- ☐ Water-stained leaves:
- ☐ Recorded Data (streams, lake, or tidal gauge; aerial photo):
- ☐ Other:

Vegetation & Hydrology Conclusion

	YES	NO
Number of wetland indicator plants ≥ # of non-wetland indicator plants	☑	☐
Wetland hydrology present		
Hydric soil	☐	☐
Other indicators of hydrology	☐	☐
Sample location is in a BVW	**YES**	

MassDEP Bordering Vegetated Wetland (310 CMR 10.55) Delineation Field Data Form

Applicant: Prepared by: **Ecosystem Solutions** Project Location: **Acton/Boxborough High** DEP File #:

Check all that apply:

- ☐ Vegetation alone presumed adequate to delineate BVW boundary: fill out Section I only
- ☑ Vegetation and other indicators of hydrology used to delineate BVW boundary: fill out Sections I and II
- ☐ Method other than dominance test used (attach additional information)

Section I.

Observation Plot Number: **U** Transect #: **B-5** Date: **10/5/2011**

	Common Name	Scientific Name	Percent Cover	Percent Dominance	Dominant Plant?	Wetland Indicator Plant?	Wetland Indicator Category
Ground	Eastern hayscented fern	*Dennstaedtia punctilobula*	10.5	78	YES	NO	NI
	Tree clubmoss	*Lycopodium obscurum*	3	22	YES	NO	FACU
Shrubs	Highbush blueberry*	*Vaccinium corymbosum*	63	48	YES	YES	FACW-
	Black cherry	*Prunus serotina*	38	29	YES	NO	FACU
	Black huckleberry	*Gaylussacia baccata*	20.5	16	NO	NO	FACU
	Highbush blueberry*	*Vaccinium corymbosum*	10.5	8	NO	YES	FACW-
Trees	Northern Red Oak	*Quercus rubra*	85.5	80	YES	NO	FACU-
	Red maple*	*Acer rubrum*	10.5	10	NO	YES	FAC
	Eastern white pine	*Pinus strobus*	10.5	10	NO	NO	FACU

** Use an asterisk to mark wetland indicator plants: plant species listed in the Wetlands Protection Act (MGL c.131, s.40); plants in the genus Sphagnum; plants listed as FAC, FAC+, FACW-, FACW, FACW+, or OBL; or plants with physiological or morphological adaptations. If any plants are identified as wetland indicator plants due to physiological or morphological adaptations, describe the adaptation next to the asterisk*

Vegetation conclusion:

Number of dominant wetland indicator plants: **1** Number of dominant non-wetland indicator plants: **4**

Is the number of dominant wetland plants equal to or greater than the number of dominant non-wetland plants? **NO**

If vegetation alone is presumed adequate to delineate the BVW boundary, submit this form with the Request for Determination of Applicability or Notice of Intent

Upland @ B-5

Section II. Indicators of Hydrology

Hydric Soil Interpretation

1. Soil Survey

Is there a published soil survey for this site? **Yes**
Title/date: **Middlesex County**
Map number: **Accessed via GIS**
Soil type mapped: **256A-Deerfield loamy sand, 0-3% slopes**
Hydric soil inclusions: **Wareham**

Are field observations consistent with soil survey? YES

Remarks:

2. Soil Description

Horizon	Depth	Color	Redox
Oe	**0.5-0**	**2.5YR 2.5/3**	**-**
A	**0-2**	**10YR 2/1**	**-**
Bw1	**2-18**	**5YR 3/3**	**-**
Bw2	**18-20**	**10YR 3/4**	**-**

Remarks: Loess cap present

3. Other:

Conclusion: Is soil hydric? NO

Other Indicators of Hydrology: (check all that apply & describe)

- ☐ Site Inundated:
- ☐ Depth to free water in observation hole:
- ☐ Depth to soil saturation in observation hole:
- ☐ Water marks:
- ☐ Drift lines:
- ☐ Sediment Deposits:
- ☐ Drainage patterns in BVW:
- ☐ Oxidized rhizospheres:
- ☐ Water-stained leaves:
- ☐ Recorded Data (streams, lake, or tidal gauge; aerial photo):
- ☐ Other:

Vegetation & Hydrology Conclusion

	YES	NO
Number of wetland indicator plants ≥ # of non-wetland indicator plants	☐	☑
Wetland hydrology present		
Hydric soil	☐	☑
Other indicators of hydrology	☐	☑
Sample location is in a BVW		**NO**

MassDEP Bordering Vegetated Wetland (310 CMR 10.55) Delineation Field Data Form

Applicant: Prepared by: **Ecosystem Solutions** Project Location: **Acton/Boxborough High** DEP File #:

Check all that apply:

- ☐ Vegetation alone presumed adequate to delineate BVW boundary: fill out Section I only
- ☑ Vegetation and other indicators of hydrology used to delineate BVW boundary: fill out Sections I and II
- ☐ Method other than dominance test used (attach additional information)

Section I.

Observation Plot Number: **W** Transect #: **B-5** Date: **10/5/2011**

	Common Name	Scientific Name	Percent Cover	Percent Dominance	Dominant Plant?	Wetland Indicator Plant?	Wetland Indicator Category
Ground	Cinnamon fern*	*Osmunda cinnamomea*	63	75	YES	YES	FACW
	Northern Red Oak	*Quercus rubra*	20.5	25	YES	NO	FACU-
Shrubs	Highbush blueberry*	*Vaccinium corymbosum*	63	75	YES	YES	FACW-
	Northern arrow-wood*	*Viburnum recognitum*	20.5	25	YES	YES	FACW-
Trees	Red maple*	*Acer rubrum*	85.5	73	YES	YES	FAC
	Northern Red Oak	*Quercus rubra*	20.5	18	NO	NO	FACU-
	Eastern white pine	*Pinus strobus*	10.5	9	NO	NO	FACU

** Use an asterisk to mark wetland indicator plants: plant species listed in the Wetlands Protection Act (MGL c.131, s.40); plants in the genus Sphagnum; plants listed as FAC, FAC+, FACW-, FACW, FACW+, or OBL; or plants with physiological or morphological adaptations. If any plants are identified as wetland indicator plants due to physiological or morphological adaptations, describe the adaptation next to the asterisk*

Vegetation conclusion:

Number of dominant wetland indicator plants: **4** Number of dominant non-wetland indicator plants: **1**

Is the number of dominant wetland plants equal to or greater than the number of dominant non-wetland plants? **YES**

If vegetation alone is presumed adequate to delineate the BVW boundary, submit this form with the Request for Determination of Applicability or Notice of Intent

Wetland @ B-5

Section II. Indicators of Hydrology

Hydric Soil Interpretation

1. Soil Survey

Is there a published soil survey for this site? **Yes**
Title/date: **Middlesex County**
Map number: **Accessed via GIS**
Soil type mapped: **52A-Freetown muck, 0-1% slopes**
Hydric soil inclusions:

Are field observations consistent with soil survey? Yes

Remarks:

2. Soil Description

Horizon	Depth	Color	Redox
Oe	**2-0**	**2.5YR 2.5/3**	**-**
A	**0-16**	**10YR 2/1**	**-**
Cg	**16-20**	**2.5Y 6/1**	**-**

Remarks: The north and south side of this wetland are natural; the western end was filled in to create the athletic fields.

3. Other:

Conclusion: Is soil hydric? YES

Other Indicators of Hydrology: (check all that apply & describe)

- ☐ Site Inundated:
- ☑ Depth to free water in observation hole: 6"
- ☑ Depth to soil saturation in observation hole: 16"
- ☐ Water marks:
- ☐ Drift lines:
- ☐ Sediment Deposits:
- ☐ Drainage patterns in BVW:
- ☐ Oxidized rhizospheres:
- ☐ Water-stained leaves:
- ☐ Recorded Data (streams, lake, or tidal gauge; aerial photo):
- ☐ Other:

Vegetation & Hydrology Conclusion

	YES	NO
Number of wetland indicator plants ≥ # of non-wetland indicator plants	☑	☐
Wetland hydrology present		
Hydric soil	☑	☐
Other indicators of hydrology	☑	☐
Sample location is in a BVW	**YES**	

MassDEP Bordering Vegetated Wetland (310 CMR 10.55) Delineation Field Data Form

Applicant: Prepared by: **Ecosystem Solutions** Project Location: **Acton/Boxborough High** DEP File #:

Check all that apply:

- ☐ Vegetation alone presumed adequate to delineate BVW boundary: fill out Section I only
- ☑ Vegetation and other indicators of hydrology used to delineate BVW boundary: fill out Sections I and II
- ☐ Method other than dominance test used (attach additional information)

Section I.

Observation Plot Number: **U** Transect #: **C-17** Date: **10/5/2011**

	Common Name	Scientific Name	Percent Cover	Percent Dominance	Dominant Plant?	Wetland Indicator Plant?	Wetland Indicator Category
Ground	Grass	*Grass spp.*	85.5	89	YES	NO	FACU
	Golden-rod	*Solidago spp.*	10.5	11	NO	NO	FACU

** Use an asterisk to mark wetland indicator plants: plant species listed in the Wetlands Protection Act (MGL c.131, s.40); plants in the genus Sphagnum; plants listed as FAC, FAC+, FACW-, FACW, FACW+, or OBL; or plants with physiological or morphological adaptations. If any plants are identified as wetland indicator plants due to physiological or morphological adaptations, describe the adaptation next to the asterisk*

Vegetation conclusion:

Number of dominant wetland indicator plants: **0** Number of dominant non-wetland indicator plants: **1**

Is the number of dominant wetland plants equal to or greater than the number of dominant non-wetland plants? **NO**

If vegetation alone is presumed adequate to delineate the BVW boundary, submit this form with the Request for Determination of Applicability or Notice of Intent

Upland @ C-17

Section II. Indicators of Hydrology

Hydric Soil Interpretation

1. Soil Survey

Is there a published soil survey for this site? **Yes**
Title/date: **Middlesex County**
Map number: **Accessed via GIS**
Soil type mapped: **52A-Freetown muck, 0-1% slopes**
Hydric soil inclusions:

Are field observations consistent with soil survey? No-this is fill material

Remarks: A large portion of the athletic fields are mapped as Freetown muck.

2. Soil Description

Horizon	Depth	Color	Redox
^A	0-16	10YR 3/2	-
C	16-20	-	-

Remarks: Two subdrains discharge between flags C-20 & C-21

Transect performed at the edge of field

3. Other:

Conclusion: Is soil hydric? NO

Other Indicators of Hydrology: (check all that apply & describe)

- ☐ Site Inundated:
- ☐ Depth to free water in observation hole:
- ☐ Depth to soil saturation in observation hole:
- ☐ Water marks:
- ☐ Drift lines:
- ☐ Sediment Deposits:
- ☐ Drainage patterns in BVW:
- ☐ Oxidized rhizospheres:
- ☐ Water-stained leaves:
- ☐ Recorded Data (streams, lake, or tidal gauge; aerial photo):
- ☐ Other:

Vegetation & Hydrology Conclusion

	YES	NO
Number of wetland indicator plants ≥ # of non-wetland indicator plants	☐	☑
Wetland hydrology present		
Hydric soil	☐	☑
Other indicators of hydrology	☐	☑
Sample location is in a BVW		**NO**

MassDEP Bordering Vegetated Wetland (310 CMR 10.55) Delineation Field Data Form

Applicant: Prepared by: **Ecosystem Solutions** Project Location: **Acton/Boxborough High** DEP File #:

Check all that apply:

- ☐ Vegetation alone presumed adequate to delineate BVW boundary: fill out Section I only
- ☑ Vegetation and other indicators of hydrology used to delineate BVW boundary: fill out Sections I and II
- ☐ Method other than dominance test used (attach additional information)

Section I.

Observation Plot Number: **W** Transect #: **C-17** Date: **10/5/2011**

	Common Name	Scientific Name	Percent Cover	Percent Dominance	Dominant Plant?	Wetland Indicator Plant?	Wetland Indicator Category
Ground	Spotted touch-me-not*	*Impatiens capensis*	38	100	YES	YES	FACW
Shrubs	Speckled alder*	*Alnus rugosa*	63	100	YES	YES	FACW+
Trees	Red maple*	*Acer rubrum*	38	100	YES	YES	FAC

** Use an asterisk to mark wetland indicator plants: plant species listed in the Wetlands Protection Act (MGL c.131, s.40); plants in the genus Sphagnum; plants listed as FAC, FAC+, FACW-, FACW, FACW+, or OBL; or plants with physiological or morphological adaptations. If any plants are identified as wetland indicator plants due to physiological or morphological adaptations, describe the adaptation next to the asterisk*

Vegetation conclusion:

Number of dominant wetland indicator plants: **3** Number of dominant non-wetland indicator plants: **0**

Is the number of dominant wetland plants equal to or greater than the number of dominant non-wetland plants? **YES**

If vegetation alone is presumed adequate to delineate the BVW boundary, submit this form with the Request for Determination of Applicability or Notice of Intent

Wetland @ C-17

Section II. Indicators of Hydrology

Hydric Soil Interpretation

1. Soil Survey

Is there a published soil survey for this site? **Yes**
Title/date: **Middlesex County**
Map number: **Accessed via GIS**
Soil type mapped: **52A-Freetown muck**
Hydric soil inclusions:

Are field observations consistent with soil survey? NO

Remarks: This is a drainage ditch that receives water from subdrains.

2. Soil Description

Horizon	Depth	Color	Redox
^A	**0-20**	**10YR 2/2**	**-**
C	**20+**	**10YR 3/4**	**-**

Remarks: Mucky A

10' from ditch.
The pond present is a 'run of the river' pond. The ditch feeds into the main stream at C-16

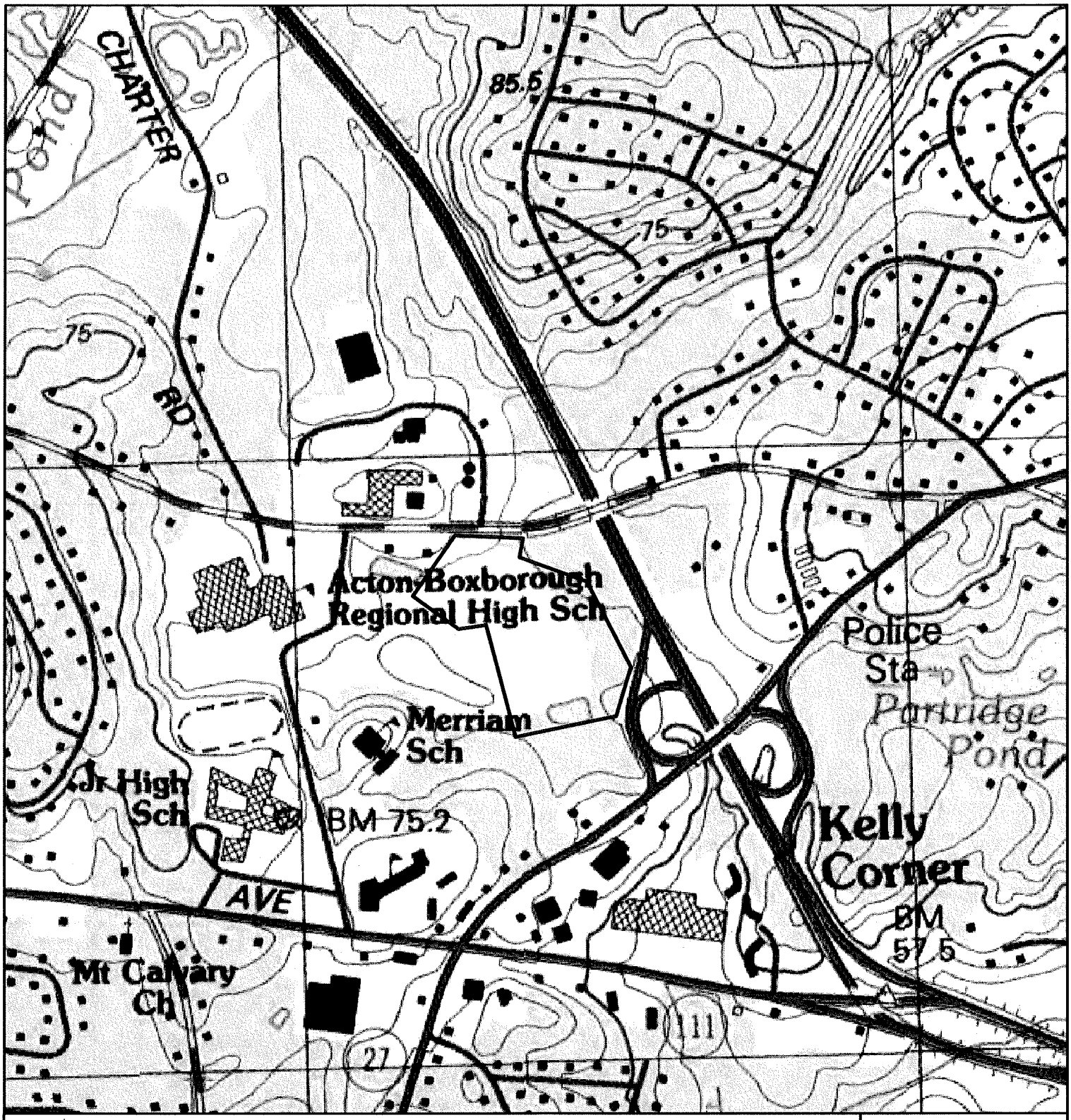
3. Other:
Conclusion: Is soil hydric? Yes

Other Indicators of Hydrology: (check all that apply & describe)

- ☐ Site Inundated:
- ☑ Depth to free water in observation hole: 0"
- ☑ Depth to soil saturation in observation hole: 6"
- ☐ Water marks:
- ☐ Drift lines:
- ☐ Sediment Deposits:
- ☐ Drainage patterns in BVW:
- ☐ Oxidized rhizospheres:
- ☐ Water-stained leaves:
- ☐ Recorded Data (streams, lake, or tidal gauge; aerial photo):
- ☐ Other:

Vegetation & Hydrology Conclusion

	YES	NO
Number of wetland indicator plants ≥ # of non-wetland indicator plants	☑	☐
Wetland hydrology present		
Hydric soil	☑	☐
Other indicators of hydrology	☑	☐
Sample location is in a BVW	**YES**	



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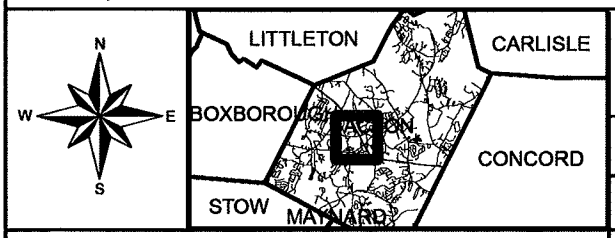
P.O. Box 469 West Warwick, RI 02893

FIGURE 1



USGS Topographic Map
Acton-Boxborough High School Athletic Fields
Acton, Massachusetts

DATE:	11-11-11	PROJECT #:	W11-176
CREATED BY:	BF	SCALE:	1 inch = 700 feet

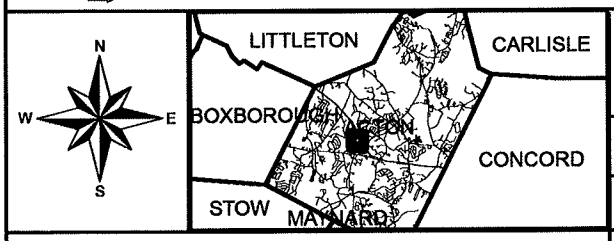
Concord & Maynard Quadrants

MASS GIS

Feet
0 350 700 1,400 2,100

Ecosystem Solutions, Inc.
P.O. Box 469 West Warwick, RI 02893

FIGURE 2



NHESP Potential Vernal Pools & NRCS Soils Overlay
Acton-Boxborough High School Athletic Fields
Acton, Massachusetts

DATE:	11-11-11	PROJECT #:	W11-176
CREATED BY:	BF	SCALE:	1 inch = 200 feet

2008 Color Aerial Orthophotos

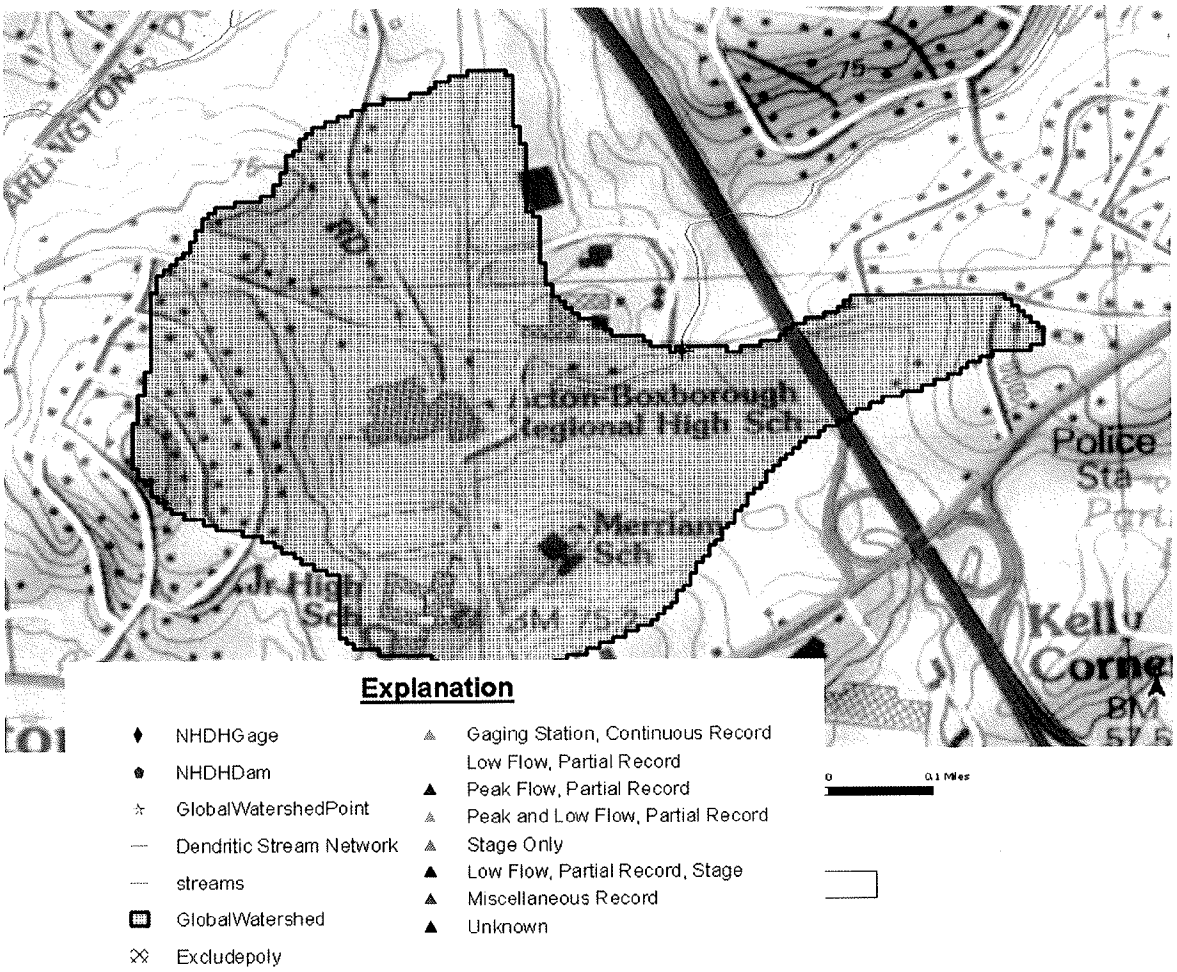
MASS GIS

Feet
0 100 200 400 600

USGS
Massachusetts StreamStats

StreamStats Print Page

Acton-Boxborough High School



U.S. Department of the Interior | U.S. Geological Survey
URL: http://streamstatsags.cr.usgs.gov/ma_ss/default.aspx
Page Contact Information: StreamStats Help
Page Last Modified: 01/01/1970 00:00:00

USA.gov
TAKE PRIDE IN AMERICA

USGS
Massachusetts StreamStats

Streamstats Ungaged Site Report

Date: Sun Nov 13 2011 08:11:08 Mountain Standard Time
Site Location: Massachusetts
NAD27 Latitude: 42.4809 (42 28 51)
NAD27 Longitude: -71.4534 (-71 27 12)
NAD83 Latitude: 42.4810 (42 28 52)
NAD83 Longitude: -71.4529 (-71 27 10)
ReachCode: 01070005000412
Measure: 93.66
Drainage Area: 0.28 mi2

Low Flows Basin Characteristics

100% Statewide Low Flow (0.28 mi2)

Parameter	Value	Regression Equation Valid Range	
		Min	Max
Drainage Area (square miles)	0.28 (below min value 1.61)	1.61	149
Mean Basin Slope from 250K DEM (percent)	1.78	0.32	24.6
Stratified Drift per Stream Length (square mile per mile)	0.59	0	1.29
Massachusetts Region (dimensionless)	0	0	1

Warning: Some parameters are outside the suggested range. Estimates will be extrapolations with unknown errors.

Probability of Perennial Flow Basin Characteristics

100% Perennial Flow Probability (0.28 mi2)

Parameter	Value	Regression Equation Valid Range	
		Min	Max
Drainage Area (square miles)	0.28	0.01	1.99
Percent Underlain By Sand And Gravel (percent)	32.42	0	100
Percent Forest (percent)	40.80	0	100
Massachusetts Region (dimensionless)	0	0	1

Low Flows Streamflow Statistics

Statistic	Flow (ft^3/s)	Prediction Error (percent)	Equivalent years of record	90-Percent Prediction Interval	
				Minimum	Maximum
D50	0.26				
D60	0.19				
D70	0.14				
D75	0.11				
D80	0.11				
D85	0.0811				
D90	0.0725				
D95	0.0369				
D98	0.0238				
D99	0.0162				
M7D2Y	0.0349				
AUGD50	0.0887				
M7D10Y	0.0157				

The equation for estimating the probability of perennial flow is applicable for most areas of Massachusetts except eastern Buzzards Bay, Cape Cod, and the Island regions. The estimate obtained from the equation assumes natural flow conditions at the site. The equation also is best used for sites with drainage areas between 0.01 to 1.99 mi2, as errors beyond for basins beyond these bounds are unknown.

Probability of Perennial Flow Statistics

Statistic	Value	Standard Error (percent)
PROBPEREN	0.72	0.2

ATTACHMENT G

ILLICIT DISCHARGE COMPLIANCE STATEMENT

Delegation of Authority

I, _____ (name), hereby designate the person or specifically described position below to be a duly authorized representative for the purpose of overseeing compliance and verifying that no illicit discharges exist on the site and that the site includes the pollution prevention plan measures to prevent illicit discharges to the stormwater management system, including wastewater discharges and discharges of stormwater contaminated by contact with process wastes, raw materials, toxic pollutants, hazardous substances, oil, or grease. The designee is authorized to sign any reports, stormwater pollution prevention plans and all other documents required by the permit.

_____ (name of site)
_____ (name of person or position)
_____ (company)
_____ (address)
_____ (city, state, zip)
_____ (phone)

By signing this authorization, I confirm that I meet the requirements to make such a designation as set forth in Standard 10 of the Massachusetts Stormwater Management Standards, and that the designee above meets the definition of a "duly authorized representative" as set forth in the Massachusetts Stormwater Management Standards.

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 possibility of fine and imprisonment for knowing violations.

Name: _____

Company: _____

Title: _____

Signature: _____

Date: _____

ATTACHMENT H

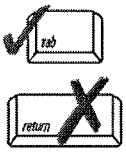
DEP CHECKLIST FOR STORMWATER REPORT

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands Program

Checklist for Stormwater Report

A. Introduction

Important: When filling out forms on the computer, use only the tab key to move your cursor - do not use the return key.



A Stormwater Report must be submitted with the Notice of Intent permit application to document compliance with the Stormwater Management Standards. The following checklist is NOT a substitute for the Stormwater Report (which should provide more substantive and detailed information) but is offered here as a tool to help the applicant organize their Stormwater Management documentation for their Report and for the reviewer to assess this information in a consistent format. As noted in the Checklist, the Stormwater Report must contain the engineering computations and supporting information set forth in Volume 3 of the Massachusetts Stormwater Handbook. The Stormwater Report must be prepared and certified by a Registered Professional Engineer (RPE) licensed in the Commonwealth.

The Stormwater Report must include:

- The Stormwater Checklist completed and stamped by a Registered Professional Engineer (see page 2) that certifies that the Stormwater Report contains all required submittals.[1] This Checklist is to be used as the cover for the completed Stormwater Report.
- Applicant/Project Name
- Project Address
- Name of Firm and Registered Professional Engineer that prepared the Report
- Long-Term Pollution Prevention Plan required by Standards 4-6
- Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan required by Standard 8[2]
- Operation and Maintenance Plan required by Standard 9

In addition to all plans and supporting information, the Stormwater Report must include a brief narrative describing stormwater management practices, including environmentally sensitive site design and LID techniques, along with a diagram depicting runoff through the proposed BMP treatment train. Plans are required to show existing and proposed conditions, identify all wetland resource areas, NRCS soil types, critical areas, Land Uses with Higher Potential Pollutant Loads (LUHPPL), and any areas on the site where infiltration rate is greater than 2.4 inches per hour. The Plans shall identify the drainage areas for both existing and proposed conditions at a scale that enables verification of supporting calculations.

As noted in the Checklist, the Stormwater Management Report shall document compliance with each of the Stormwater Management Standards as provided in the Massachusetts Stormwater Handbook. The soils evaluation and calculations shall be done using the methodologies set forth in Volume 3 of the Massachusetts Stormwater Handbook.

To ensure that the Stormwater Report is complete, applicants are required to fill in the Stormwater Report Checklist by checking the box to indicate that the specified information has been included in the Stormwater Report. If any of the information specified in the checklist has not been submitted, the applicant must provide an explanation. The completed Stormwater Report Checklist and Certification must be submitted with the Stormwater Report.

[1] The Stormwater Report may also include the Illicit Discharge Compliance Statement required by Standard 10. If not included in the Stormwater Report, the Illicit Discharge Compliance Statement must be submitted prior to the discharge of stormwater runoff to the post-construction best management practices.

[2] For some complex projects, it may not be possible to include the Construction Period Erosion and Sedimentation Control Plan in the Stormwater Report. In that event, the issuing authority has the discretion to issue an Order of Conditions that approves the project and includes a condition requiring the proponent to submit the Construction Period Erosion and Sedimentation Control Plan before commencing any land disturbance activity on the site.

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands Program

Checklist for Stormwater Report

B. Stormwater Checklist and Certification

The following checklist is intended to serve as a guide for applicants as to the elements that ordinarily need to be addressed in a complete Stormwater Report. The checklist is also intended to provide conservation commissions and other reviewing authorities with a summary of the components necessary for a comprehensive Stormwater Report that addresses the ten Stormwater Standards.

Note: Because stormwater requirements vary from project to project, it is possible that a complete Stormwater Report may not include information on some of the subjects specified in the Checklist. If it is determined that a specific item does not apply to the project under review, please note that the item is not applicable (N.A.) and provide the reasons for that determination.

A complete checklist must include the Certification set forth below signed by the Registered Professional Engineer who prepared the Stormwater Report.

Registered Professional Engineer's Certification

I have reviewed the Stormwater Report, including the soil evaluation, computations, Long-term Pollution Prevention Plan, the Construction Period Erosion and Sedimentation Control Plan (if included), the Long-term Post-Construction Operation and Maintenance Plan, the Illicit Discharge Compliance Statement (if included) and the plans showing the stormwater management system, and have determined that they have been prepared in accordance with the requirements of the Stormwater Management Standards as further elaborated by the Massachusetts Stormwater Handbook. I have also determined that the information presented in the Stormwater Checklist is accurate and that the information presented in the Stormwater Report accurately reflects conditions at the site as of the date of this permit application.

Registered Professional Engineer Block and Signature

4-5-12
Signature and Date

Checklist

Project Type: Is the application for new development, redevelopment, or a mix of new and redevelopment?

☐ New development

☒ Redevelopment

☐ Mix of New Development and Redevelopment

Checklist for Stormwater Report

Checklist (continued)

LID Measures: Stormwater Standards require LID measures to be considered. Document what environmentally sensitive design and LID Techniques were considered during the planning and design of the project:

- ☒ No disturbance to any Wetland Resource Areas
- ☐ Site Design Practices (e.g. clustered development, reduced frontage setbacks)
- ☐ Reduced Impervious Area (Redevelopment Only)
- ☒ Minimizing disturbance to existing trees and shrubs
- ☐ LID Site Design Credit Requested:
  - ☐ Credit 1
  - ☐ Credit 2
  - ☐ Credit 3
- ☒ Use of "country drainage" versus curb and gutter conveyance and pipe
- ☒ Bioretention Cells (includes Rain Gardens)
- ☐ Constructed Stormwater Wetlands (includes Gravel Wetlands designs)
- ☐ Treebox Filter
- ☒ Water Quality Swale
- ☒ Grass Channel
- ☐ Green Roof
- ☐ Other (describe): _____

Standard 1: No New Untreated Discharges

- ☒ No new untreated discharges
- ☒ Outlets have been designed so there is no erosion or scour to wetlands and waters of the Commonwealth
- ☒ Supporting calculations specified in Volume 3 of the Massachusetts Stormwater Handbook included.

Checklist for Stormwater Report

Checklist (continued)

Standard 2: Peak Rate Attenuation

☐ Standard 2 waiver requested because the project is located in land subject to coastal storm flowage and stormwater discharge is to a wetland subject to coastal flooding.

☒ Evaluation provided to determine whether off-site flooding increases during the 100-year 24-hour storm.

☒ Calculations provided to show that post-development peak discharge rates do not exceed pre-development rates for the 2-year and 10-year 24-hour storms. If evaluation shows that off-site flooding increases during the 100-year 24-hour storm, calculations are also provided to show that post-development peak discharge rates do not exceed pre-development rates for the 100-year 24-hour storm.

Standard 3: Recharge

☒ Soil Analysis provided.

☒ Required Recharge Volume calculation provided.

☐ Required Recharge volume reduced through use of the LID site Design Credits.

☒ Sizing the infiltration, BMPs is based on the following method: Check the method used.

☐ Static ☒ Simple Dynamic ☐ Dynamic Field[1]

☒ Runoff from all impervious areas at the site discharging to the infiltration BMP.

☐ Runoff from all impervious areas at the site is *not* discharging to the infiltration BMP and calculations are provided showing that the drainage area contributing runoff to the infiltration BMPs is sufficient to generate the required recharge volume.

☒ Recharge BMPs have been sized to infiltrate the Required Recharge Volume.

☐ Recharge BMPs have been sized to infiltrate the Required Recharge Volume *only* to the maximum extent practicable for the following reason:

- ☐ Site is comprised solely of C and D soils and/or bedrock at the land surface
- ☐ M.G.L. c. 21E sites pursuant to 310 CMR 40.0000
- ☐ Solid Waste Landfill pursuant to 310 CMR 19.000
- ☐ Project is otherwise subject to Stormwater Management Standards only to the maximum extent practicable.

☒ Calculations showing that the infiltration BMPs will drain in 72 hours are provided.

☐ Property includes a M.G.L. c. 21E site or a solid waste landfill and a mounding analysis is included.

[1] 80% TSS removal is required prior to discharge to infiltration BMP if Dynamic Field method is used.

Checklist for Stormwater Report

Checklist (continued)

Standard 3: Recharge (continued)

☐ The infiltration BMP is used to attenuate peak flows during storms greater than or equal to the 10-year 24-hour storm and separation to seasonal high groundwater is less than 4 feet and a mounding analysis is provided.

☐ Documentation is provided showing that infiltration BMPs do not adversely impact nearby wetland resource areas.

Standard 4: Water Quality

The Long-Term Pollution Prevention Plan typically includes the following:

- Good housekeeping practices;
- Provisions for storing materials and waste products inside or under cover;
- Vehicle washing controls;
- Requirements for routine inspections and maintenance of stormwater BMPs;
- Spill prevention and response plans;
- Provisions for maintenance of lawns, gardens, and other landscaped areas;
- Requirements for storage and use of fertilizers, herbicides, and pesticides;
- Pet waste management provisions;
- Provisions for operation and management of septic systems;
- Provisions for solid waste management;
- Snow disposal and plowing plans relative to Wetland Resource Areas;
- Winter Road Salt and/or Sand Use and Storage restrictions;
- Street sweeping schedules;
- Provisions for prevention of illicit discharges to the stormwater management system;
- Documentation that Stormwater BMPs are designed to provide for shutdown and containment in the event of a spill or discharges to or near critical areas or from LUHPPL;
- Training for staff or personnel involved with implementing Long-Term Pollution Prevention Plan;
- List of Emergency contacts for implementing Long-Term Pollution Prevention Plan.

☐ A Long-Term Pollution Prevention Plan is attached to Stormwater Report and is included as an attachment to the Wetlands Notice of Intent.

☐ Treatment BMPs subject to the 44% TSS removal pretreatment requirement and the one inch rule for calculating the water quality volume are included, and discharge:

- ☐ is within the Zone II or Interim Wellhead Protection Area
- ☐ is near or to other critical areas
- ☐ is within soils with a rapid infiltration rate (greater than 2.4 inches per hour)
- ☐ involves runoff from land uses with higher potential pollutant loads.

☐ The Required Water Quality Volume is reduced through use of the LID site Design Credits.

☒ Calculations documenting that the treatment train meets the 80% TSS removal requirement and, if applicable, the 44% TSS removal pretreatment requirement, are provided.

Checklist for Stormwater Report

Checklist (continued)

Standard 4: Water Quality (continued)

☒ The BMP is sized (and calculations provided) based on:

- ☒ The ½" or 1" Water Quality Volume or
- ☐ The equivalent flow rate associated with the Water Quality Volume and documentation is provided showing that the BMP treats the required water quality volume.

☐ The applicant proposes to use proprietary BMPs, and documentation supporting use of proprietary BMP and proposed TSS removal rate is provided. This documentation may be in the form of the propriety BMP checklist found in Volume 2, Chapter 4 of the Massachusetts Stormwater Handbook and submitting copies of the TARP Report, STEP Report, and/or other third party studies verifying performance of the proprietary BMPs.

☐ A TMDL exists that indicates a need to reduce pollutants other than TSS and documentation showing that the BMPs selected are consistent with the TMDL is provided.

Standard 5: Land Uses With Higher Potential Pollutant Loads (LUHPPLs)

☐ The NPDES Multi-Sector General Permit covers the land use and the Stormwater Pollution Prevention Plan (SWPPP) has been included with the Stormwater Report.

☐ The NPDES Multi-Sector General Permit covers the land use and the SWPPP will be submitted ***prior to*** the discharge of stormwater to the post-construction stormwater BMPs.

☐ The NPDES Multi-Sector General Permit does ***not*** cover the land use.

☐ LUHPPLs are located at the site and industry specific source control and pollution prevention measures have been proposed to reduce or eliminate the exposure of LUHPPLs to rain, snow, snow melt and runoff, and been included in the long term Pollution Prevention Plan.

☐ All exposure has been eliminated.

☐ All exposure has ***not*** been eliminated and all BMPs selected are on MassDEP LUHPPL list.

☐ The LUHPPL has the potential to generate runoff with moderate to higher concentrations of oil and grease (e.g. all parking lots with >1000 vehicle trips per day) and the treatment train includes an oil grit separator, a filtering bioretention area, a sand filter or equivalent.

Standard 6: Critical Areas

☐ The discharge is near or to a critical area and the treatment train includes only BMPs that MassDEP has approved for stormwater discharges to or near that particular class of critical area.

☐ Critical areas and BMPs are identified in the Stormwater Report.

Checklist for Stormwater Report

Checklist (continued)

Standard 7: Redevelopments and Other Projects Subject to the Standards only to the maximum extent practicable

☐ The project is subject to the Stormwater Management Standards only to the maximum Extent Practicable as a:

- ☐ Limited Project
- ☐ Small Residential Projects: 5-9 single family houses or 5-9 units in a multi-family development provided there is no discharge that may potentially affect a critical area.
- ☐ Small Residential Projects: 2-4 single family houses or 2-4 units in a multi-family development with a discharge to a critical area
- ☐ Marina and/or boatyard provided the hull painting, service and maintenance areas are protected from exposure to rain, snow, snow melt and runoff
- ☐ Bike Path and/or Foot Path
- ☐ Redevelopment Project
- ☐ Redevelopment portion of mix of new and redevelopment.

☐ Certain standards are not fully met (Standard No. 1, 8, 9, and 10 must always be fully met) and an explanation of why these standards are not met is contained in the Stormwater Report.

☐ The project involves redevelopment and a description of all measures that have been taken to improve existing conditions is provided in the Stormwater Report. The redevelopment checklist found in Volume 2 Chapter 3 of the Massachusetts Stormwater Handbook may be used to document that the proposed stormwater management system (a) complies with Standards 2, 3 and the pretreatment and structural BMP requirements of Standards 4-6 to the maximum extent practicable and (b) improves existing conditions.

Standard 8: Construction Period Pollution Prevention and Erosion and Sedimentation Control

A Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan must include the following information:

- Narrative;
- Construction Period Operation and Maintenance Plan;
- Names of Persons or Entity Responsible for Plan Compliance;
- Construction Period Pollution Prevention Measures;
- Erosion and Sedimentation Control Plan Drawings;
- Detail drawings and specifications for erosion control BMPs, including sizing calculations;
- Vegetation Planning;
- Site Development Plan;
- Construction Sequencing Plan;
- Sequencing of Erosion and Sedimentation Controls;
- Operation and Maintenance of Erosion and Sedimentation Controls;
- Inspection Schedule;
- Maintenance Schedule;
- Inspection and Maintenance Log Form.

☐ A Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan containing the information set forth above has been included in the Stormwater Report.

Checklist for Stormwater Report

Checklist (continued)

Standard 8: Construction Period Pollution Prevention and Erosion and Sedimentation Control (continued)

☐ The project is highly complex and information is included in the Stormwater Report that explains why it is not possible to submit the Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan with the application. A Construction Period Pollution Prevention and Erosion and Sedimentation Control has ***not*** been included in the Stormwater Report but will be submitted ***before*** land disturbance begins.

☐ The project is ***not*** covered by a NPDES Construction General Permit.

☐ The project is covered by a NPDES Construction General Permit and a copy of the SWPPP is in the Stormwater Report.

☒ The project is covered by a NPDES Construction General Permit but no SWPPP been submitted. The SWPPP will be submitted BEFORE land disturbance begins.

Standard 9: Operation and Maintenance Plan

☒ The Post Construction Operation and Maintenance Plan is included in the Stormwater Report and includes the following information:

- ☒ Name of the stormwater management system owners;
- ☒ Party responsible for operation and maintenance;
- ☒ Schedule for implementation of routine and non-routine maintenance tasks;
- ☒ Plan showing the location of all stormwater BMPs maintenance access areas;
- ☐ Description and delineation of public safety features;
- ☐ Estimated operation and maintenance budget; and
- ☒ Operation and Maintenance Log Form.

☐ The responsible party is ***not*** the owner of the parcel where the BMP is located and the Stormwater Report includes the following submissions:

- ☐ A copy of the legal instrument (deed, homeowner's association, utility trust or other legal entity) that establishes the terms of and legal responsibility for the operation and maintenance of the project site stormwater BMPs;
- ☐ A plan and easement deed that allows site access for the legal entity to operate and maintain BMP functions.

Standard 10: Prohibition of Illicit Discharges

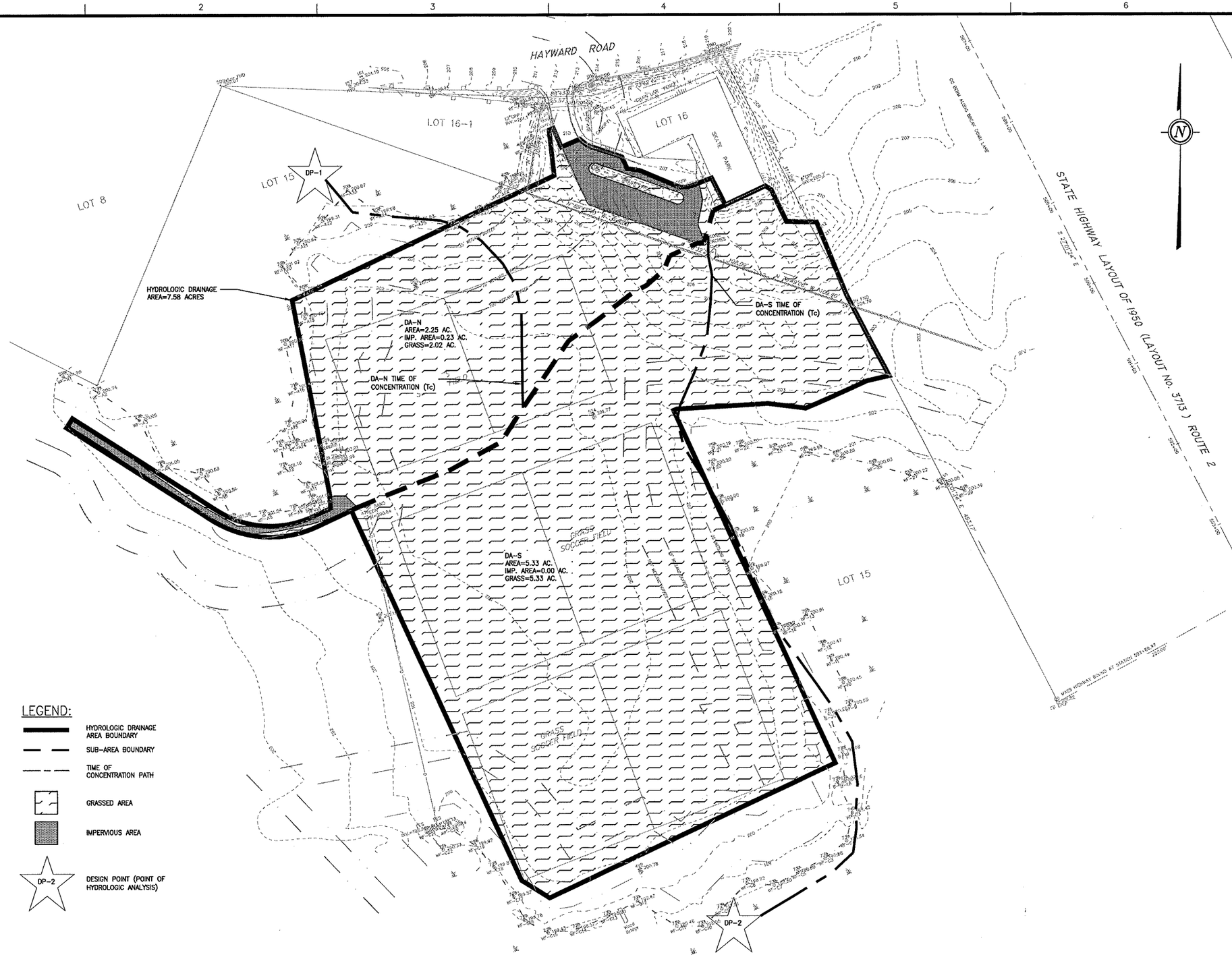
☐ The Long-Term Pollution Prevention Plan includes measures to prevent illicit discharges;

☒ An Illicit Discharge Compliance Statement is attached;

☐ NO Illicit Discharge Compliance Statement is attached but will be submitted ***prior to*** the discharge of any stormwater to post-construction BMPs.

ATTACHMENT I

PRE & POST DEVELOPMENT HYDROLOGY MAP



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PROJECT
ACTON BOXBOROUGH REGIONAL HIGH SCHOOL
LOWER FIELDS RENOVATIONS PROJECT
36 CHARTER ROAD
ACTON, MA

OWNER
ACTON BOXBOROUGH REGIONAL SCHOOL DISTRICT
16 CHARTER ROAD
ACTON, MA

REVISIONS

NO.	DATE	DESCRIPTION

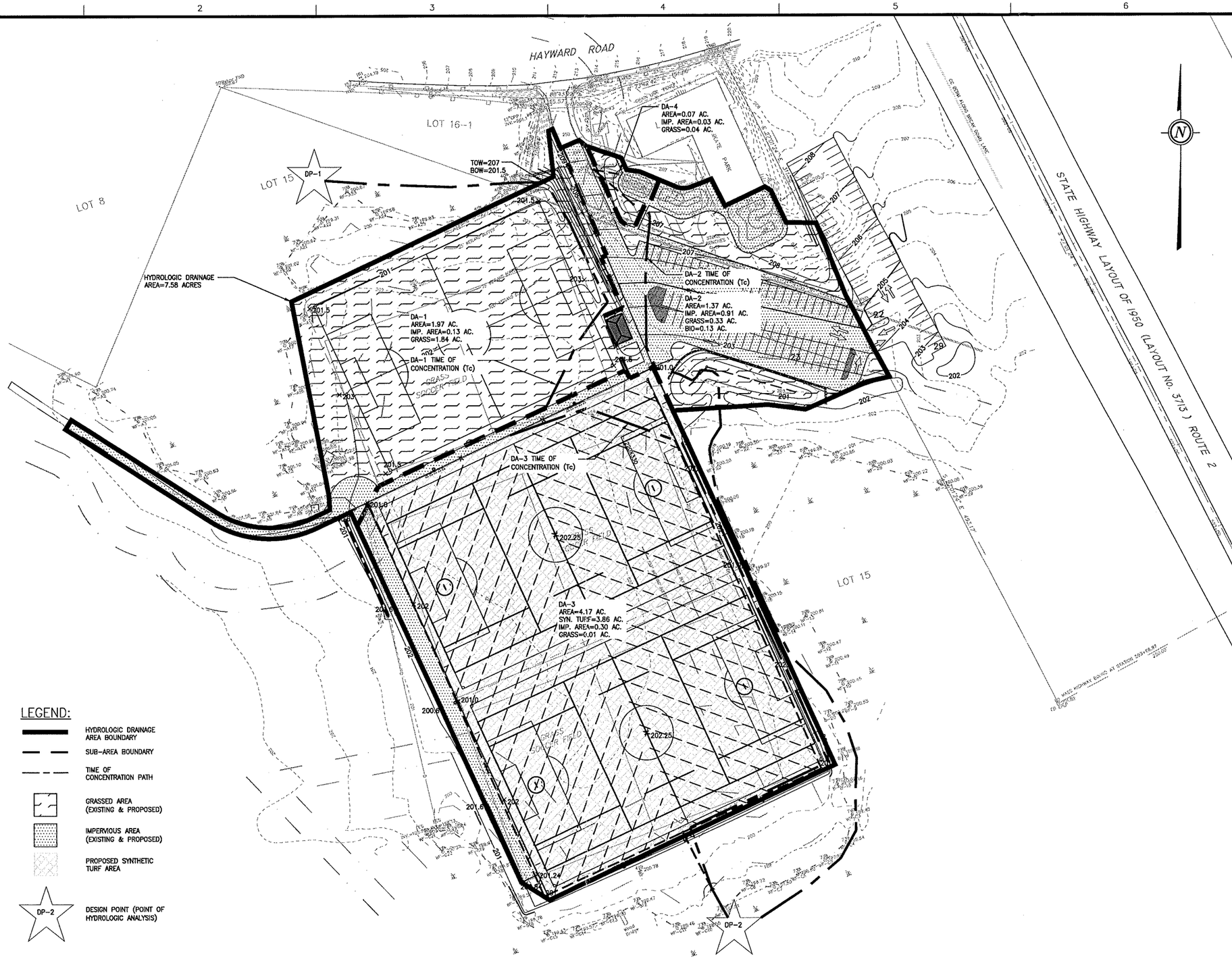
CADD FILE	715260_PRE_HYD
DESIGNED BY	PS
DRAWN BY	BTC
CHECKED BY	WJS/JMP
DATE	4-5-12
DRAWING SCALE	1"=50'-0"

GRAPHIC SCALE
0 50' 100'

SHEET TITLE
PRE DEVELOPMENT HYDROLOGY MAP

DRAWING NO.

PROJECT NO. 715260



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PROJECT

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ACTON, MA

REVISIONS

NO.	DATE	DESCRIPTION

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DESIGNED BY	PS
DRAWN BY	BTC
CHECKED BY	WJS/JMP
DATE	4-5-12
DRAWING SCALE	1"=50'-0"

GRAPHIC SCALE

0 50' 100'

SHEET TITLE

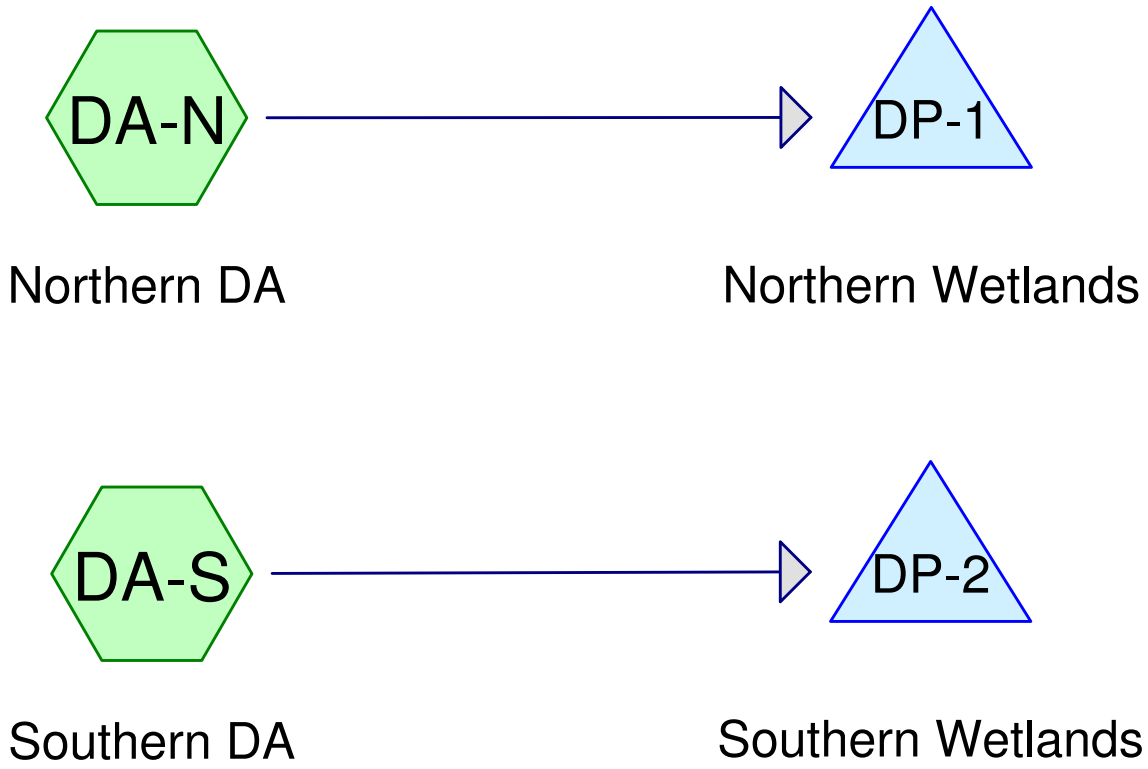
POST DEVELOPMENT HYDROLOGY MAP

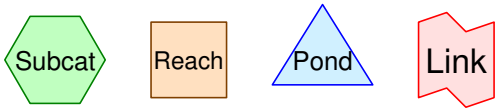
DRAWING NO.

PROJECT NO. 715260

ATTACHMENT J

PRE & POST DEVELOPMENT HYDROLOGY CALCULATIONS





Drainage Diagram for 715260_PRE_040312
Prepared by Microsoft, Printed 4/3/2012
HydroCAD® 9.10 s/n 02120 © 2010 HydroCAD Software Solutions LLC

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
7.350	61	>75% Grass cover, Good, HSG B (DA-N, DA-S)
0.230	98	Unconnected pavement, HSG B (DA-N)
7.580	62	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
7.580	HSG B	DA-N, DA-S
0.000	HSG C	
0.000	HSG D	
0.000	Other	
7.580		**TOTAL AREA**

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 DA-N: Northern DA Runoff Area=2.250 ac 10.22% Impervious Runoff Depth>0.41"
Flow Length=400' Slope=0.0100 '/' Tc=12.7 min UI Adjusted CN=63 Runoff=0.66 cfs 0.077 af

Subcatchment DA-S: Southern DA Runoff Area=5.330 ac 0.00% Impervious Runoff Depth>0.35"
Flow Length=490' Tc=14.2 min CN=61 Runoff=1.16 cfs 0.155 af

Pond DP-1: Northern Wetlands Inflow=0.66 cfs 0.077 af
Primary=0.66 cfs 0.077 af

Pond DP-2: Southern Wetlands Inflow=1.16 cfs 0.155 af
Primary=1.16 cfs 0.155 af

Total Runoff Area = 7.580 ac Runoff Volume = 0.233 af Average Runoff Depth = 0.37"
96.97% Pervious = 7.350 ac 3.03% Impervious = 0.230 ac

Summary for Subcatchment DA-N: Northern DA

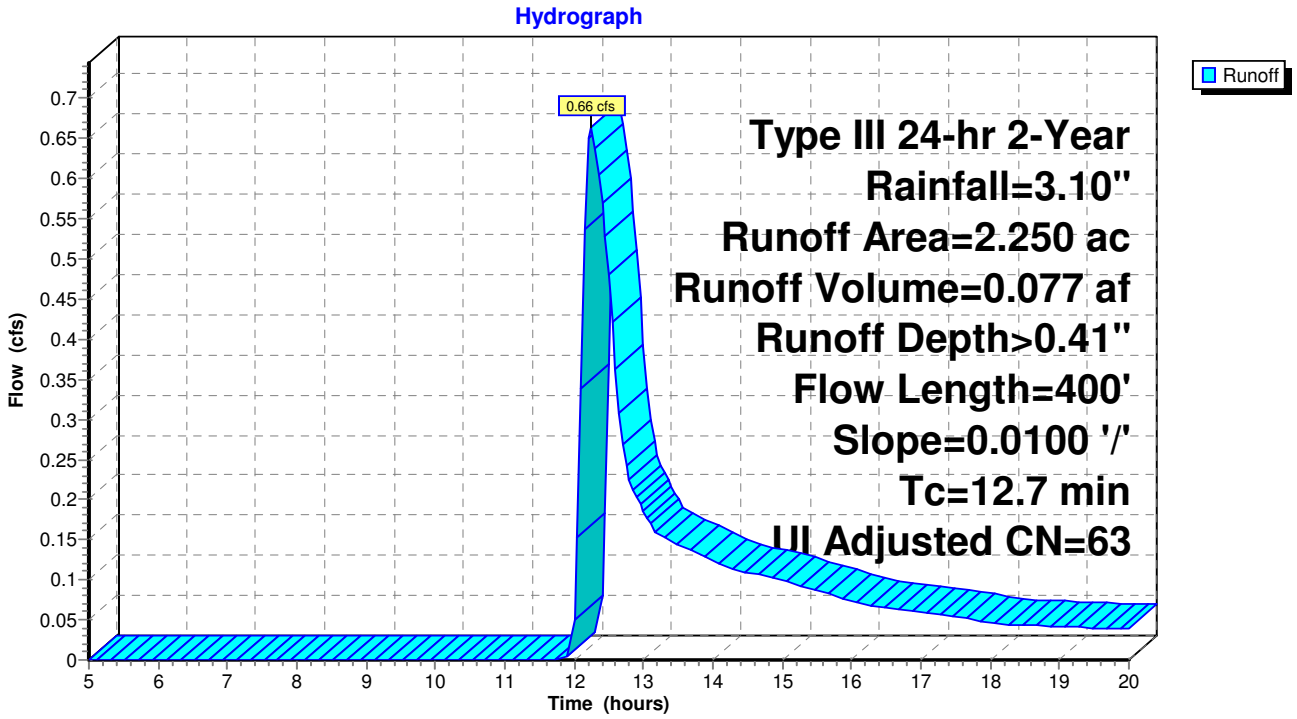
Runoff = 0.66 cfs @ 12.24 hrs, Volume= 0.077 af, Depth> 0.41"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.10"

Area (ac)	CN	Description
2.020	61	>75% Grass cover, Good, HSG B
0.230	98	Unconnected pavement, HSG B
2.250	65	Weighted Average, UI Adjusted CN = 63
2.020		89.78% Pervious Area
0.230		10.22% Impervious Area
0.230		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.5	50	0.0100	0.11		**Sheet Flow, Natural Turf Field** Grass: Short n= 0.150 P2= 3.10"
2.4	100	0.0100	0.70		**Shallow Concentrated Flow, Natural Turf** Short Grass Pasture Kv= 7.0 fps
2.8	250	0.0100	1.50		**Shallow Concentrated Flow, Grassed Waterway** Grassed Waterway Kv= 15.0 fps
12.7	400	Total			

Subcatchment DA-N: Northern DA



Summary for Subcatchment DA-S: Southern DA

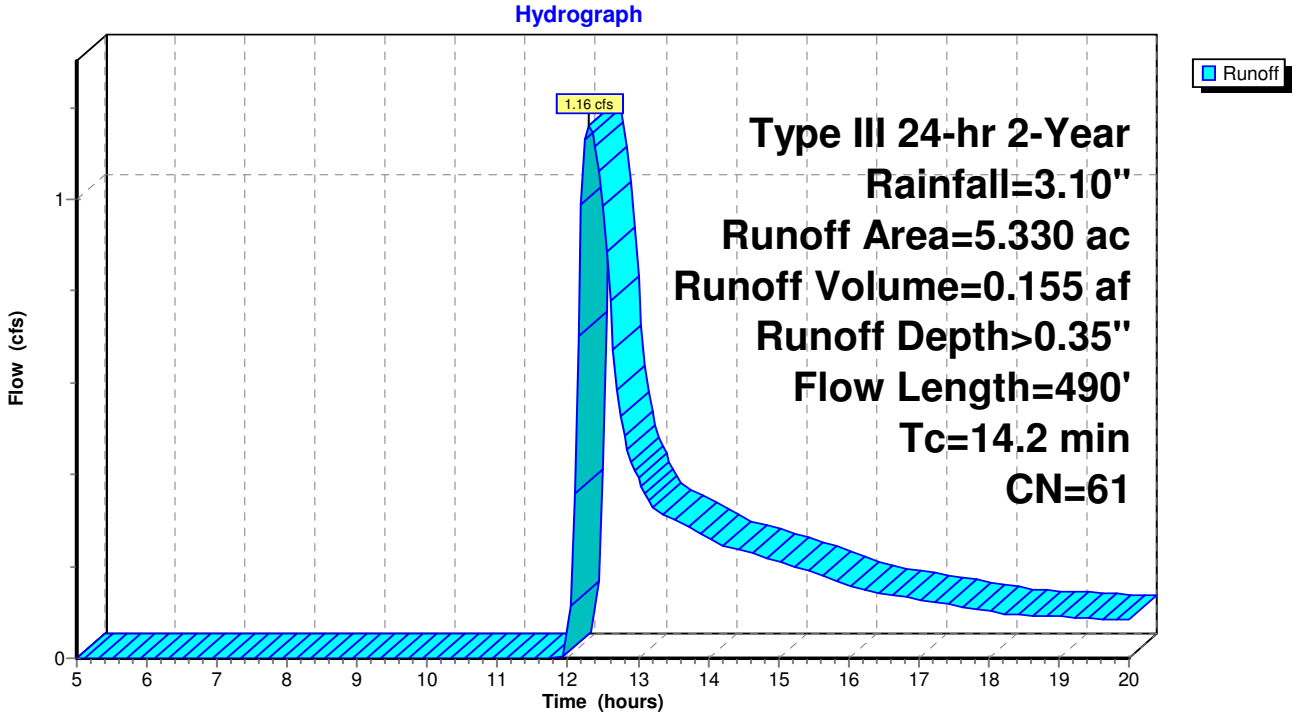
Runoff = 1.16 cfs @ 12.31 hrs, Volume= 0.155 af, Depth> 0.35"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.10"

Area (ac)	CN	Description
5.330	61	>75% Grass cover, Good, HSG B
5.330		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.5	50	0.0100	0.11		**Sheet Flow, Natural Turf Field** Grass: Short n= 0.150 P2= 3.10"
4.0	170	0.0100	0.70		**Shallow Concentrated Flow, Natural Turf Field** Short Grass Pasture Kv= 7.0 fps
2.6	270	0.0070	1.70		**Shallow Concentrated Flow, French Drain** Paved Kv= 20.3 fps
14.2	490	Total			

Subcatchment DA-S: Southern DA



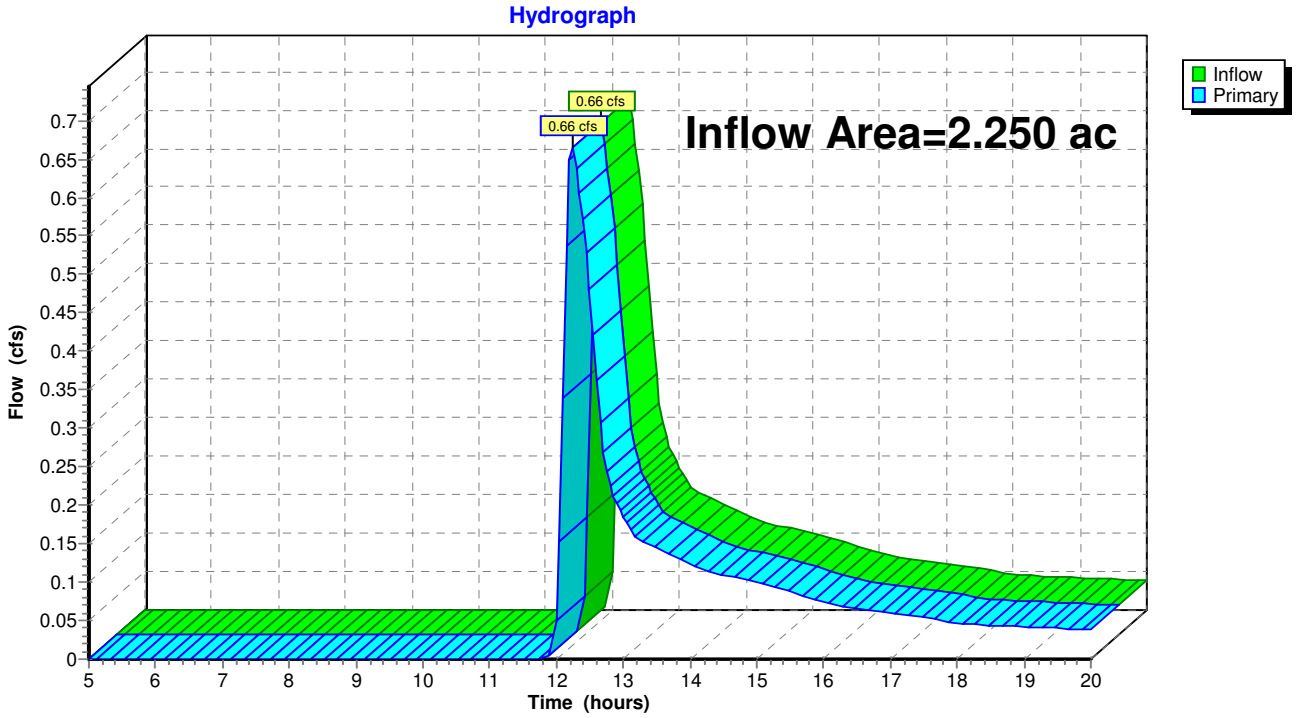
Summary for Pond DP-1: Northern Wetlands

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 2.250 ac, 10.22% Impervious, Inflow Depth > 0.41" for 2-Year event
Inflow = 0.66 cfs @ 12.24 hrs, Volume= 0.077 af
Primary = 0.66 cfs @ 12.24 hrs, Volume= 0.077 af, Atten= 0%, Lag= 0.0 min

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

Pond DP-1: Northern Wetlands



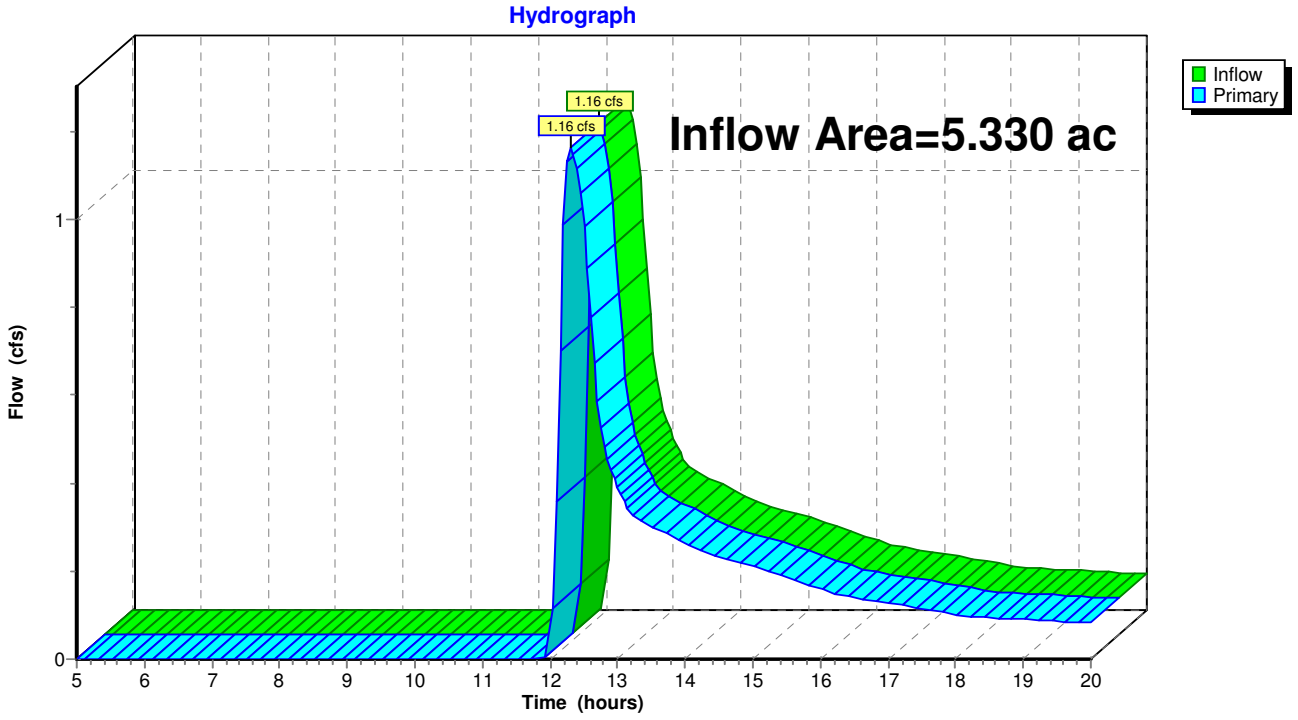
Summary for Pond DP-2: Southern Wetlands

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area =	5.330 ac,	0.00% Impervious,	Inflow Depth >	0.35"	for 2-Year event
Inflow =	1.16 cfs @	12.31 hrs,	Volume=	0.155 af	
Primary =	1.16 cfs @	12.31 hrs,	Volume=	0.155 af,	Atten= 0%, Lag= 0.0 min

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

Pond DP-2: Southern Wetlands



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 DA-N: Northern DA Runoff Area=2.250 ac 10.22% Impervious Runoff Depth>1.08"
Flow Length=400' Slope=0.0100 '/' Tc=12.7 min UI Adjusted CN=63 Runoff=2.25 cfs 0.202 af

Subcatchment DA-S: Southern DA Runoff Area=5.330 ac 0.00% Impervious Runoff Depth>0.97"
Flow Length=490' Tc=14.2 min CN=61 Runoff=4.47 cfs 0.429 af

Pond DP-1: Northern Wetlands Inflow=2.25 cfs 0.202 af
Primary=2.25 cfs 0.202 af

Pond DP-2: Southern Wetlands Inflow=4.47 cfs 0.429 af
Primary=4.47 cfs 0.429 af

Total Runoff Area = 7.580 ac Runoff Volume = 0.631 af Average Runoff Depth = 1.00"
96.97% Pervious = 7.350 ac 3.03% Impervious = 0.230 ac

Summary for Subcatchment DA-N: Northern DA

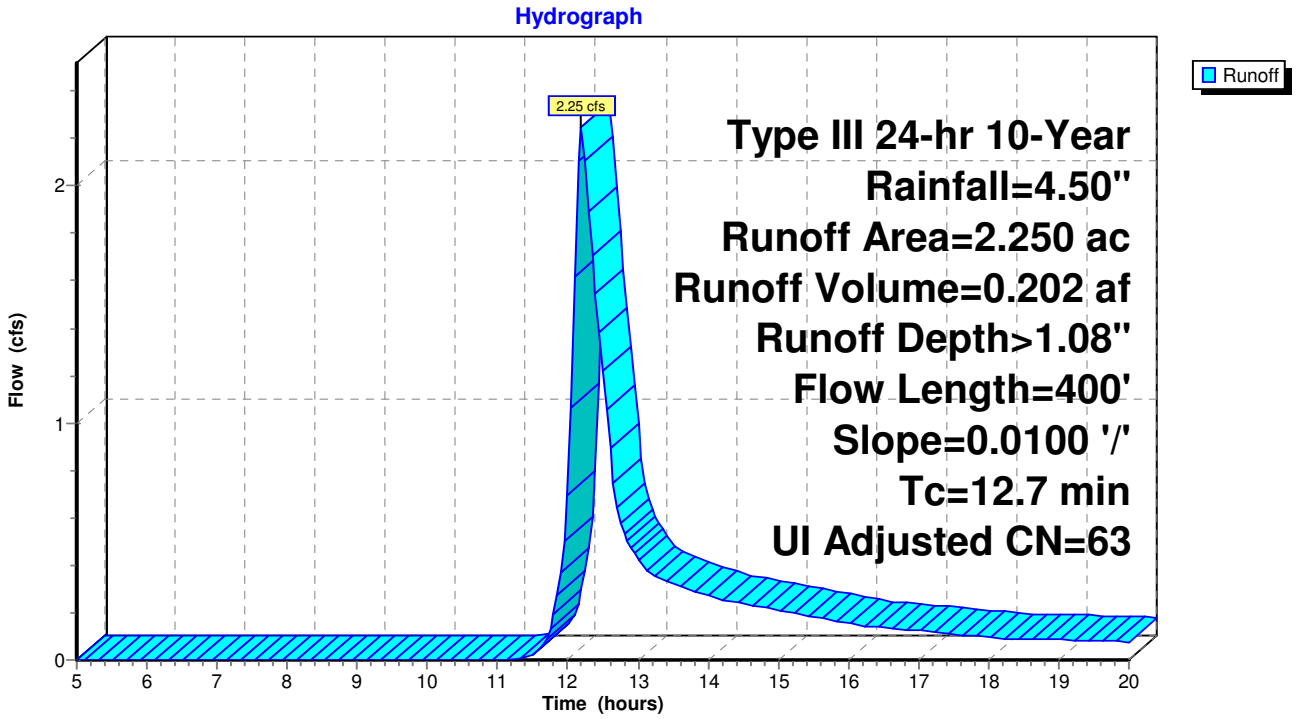
Runoff = 2.25 cfs @ 12.20 hrs, Volume= 0.202 af, Depth> 1.08"

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=4.50"

Area (ac)	CN	Description
2.020	61	>75% Grass cover, Good, HSG B
0.230	98	Unconnected pavement, HSG B
2.250	65	Weighted Average, UI Adjusted CN = 63
2.020		89.78% Pervious Area
0.230		10.22% Impervious Area
0.230		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.5	50	0.0100	0.11		**Sheet Flow, Natural Turf Field** Grass: Short n= 0.150 P2= 3.10"
2.4	100	0.0100	0.70		**Shallow Concentrated Flow, Natural Turf** Short Grass Pasture Kv= 7.0 fps
2.8	250	0.0100	1.50		**Shallow Concentrated Flow, Grassed Waterway** Grassed Waterway Kv= 15.0 fps
12.7	400	Total			

Subcatchment DA-N: Northern DA



Summary for Subcatchment DA-S: Southern DA

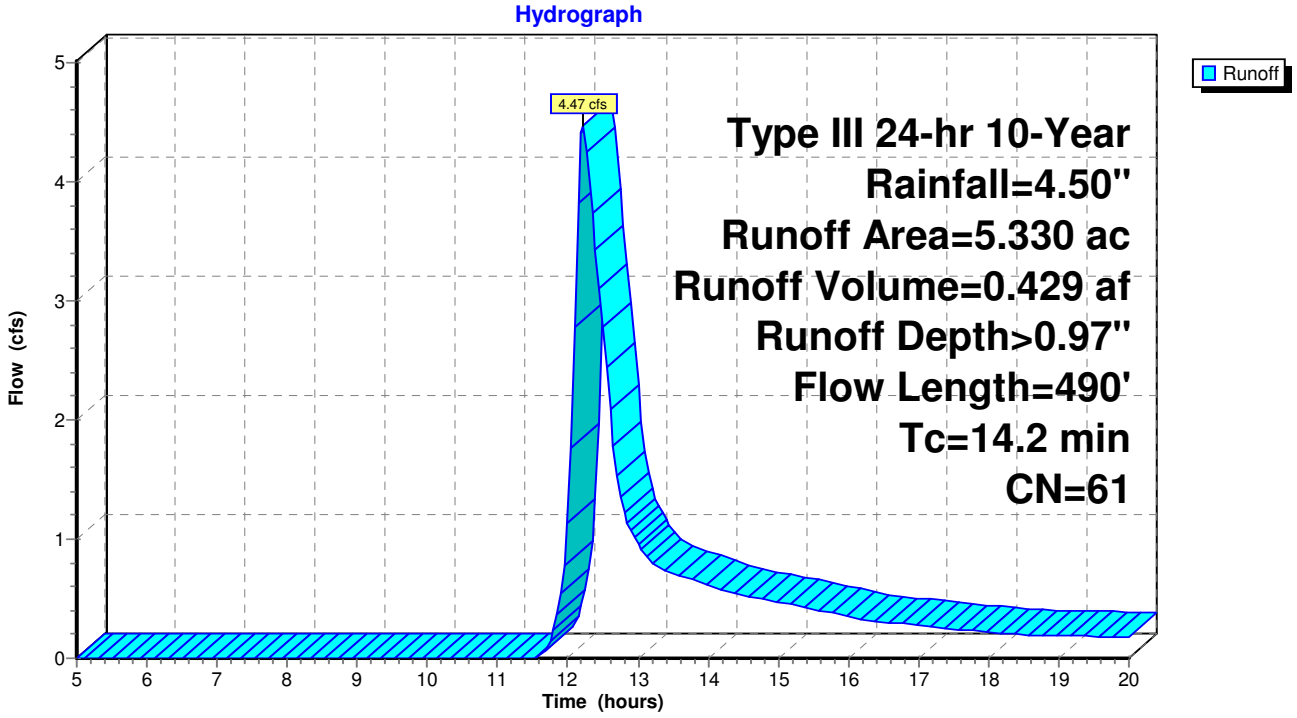
Runoff = 4.47 cfs @ 12.22 hrs, Volume= 0.429 af, Depth> 0.97"

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=4.50"

Area (ac)	CN	Description
5.330	61	>75% Grass cover, Good, HSG B
5.330		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.5	50	0.0100	0.11		**Sheet Flow, Natural Turf Field** Grass: Short n= 0.150 P2= 3.10"
4.0	170	0.0100	0.70		**Shallow Concentrated Flow, Natural Turf Field** Short Grass Pasture Kv= 7.0 fps
2.6	270	0.0070	1.70		**Shallow Concentrated Flow, French Drain** Paved Kv= 20.3 fps
14.2	490	Total			

Subcatchment DA-S: Southern DA



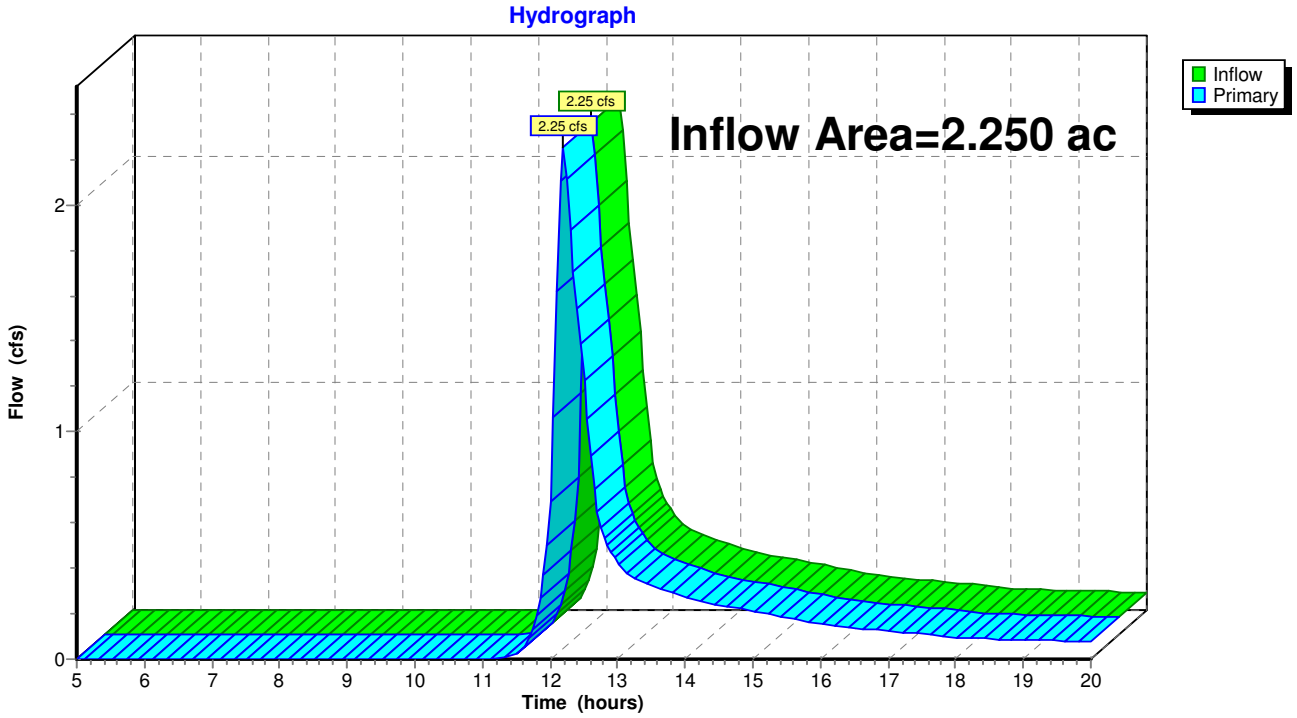
Summary for Pond DP-1: Northern Wetlands

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 2.250 ac, 10.22% Impervious, Inflow Depth > 1.08" for 10-Year event
Inflow = 2.25 cfs @ 12.20 hrs, Volume= 0.202 af
Primary = 2.25 cfs @ 12.20 hrs, Volume= 0.202 af, Atten= 0%, Lag= 0.0 min

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

Pond DP-1: Northern Wetlands



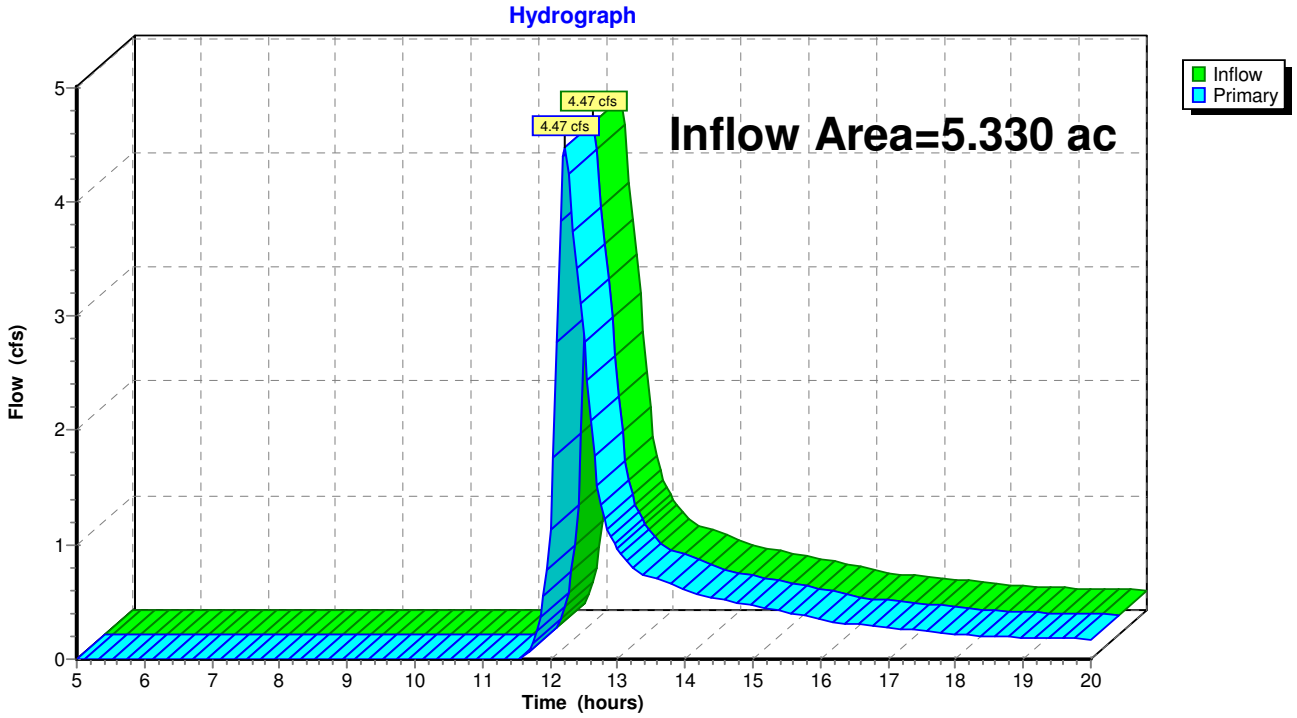
Summary for Pond DP-2: Southern Wetlands

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area =	5.330 ac,	0.00% Impervious,	Inflow Depth >	0.97"	for 10-Year event
Inflow =	4.47 cfs @	12.22 hrs,	Volume=	0.429 af	
Primary =	4.47 cfs @	12.22 hrs,	Volume=	0.429 af,	Atten= 0%, Lag= 0.0 min

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

Pond DP-2: Southern Wetlands



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 DA-N: Northern DA Runoff Area=2.250 ac 10.22% Impervious Runoff Depth>2.31"
Flow Length=400' Slope=0.0100 '/' Tc=12.7 min UI Adjusted CN=63 Runoff=5.15 cfs 0.433 af

Subcatchment DA-S: Southern DA Runoff Area=5.330 ac 0.00% Impervious Runoff Depth>2.14"
Flow Length=490' Tc=14.2 min CN=61 Runoff=10.82 cfs 0.952 af

Pond DP-1: Northern Wetlands Inflow=5.15 cfs 0.433 af
Primary=5.15 cfs 0.433 af

Pond DP-2: Southern Wetlands Inflow=10.82 cfs 0.952 af
Primary=10.82 cfs 0.952 af

Total Runoff Area = 7.580 ac Runoff Volume = 1.385 af Average Runoff Depth = 2.19"
96.97% Pervious = 7.350 ac 3.03% Impervious = 0.230 ac

Summary for Subcatchment DA-N: Northern DA

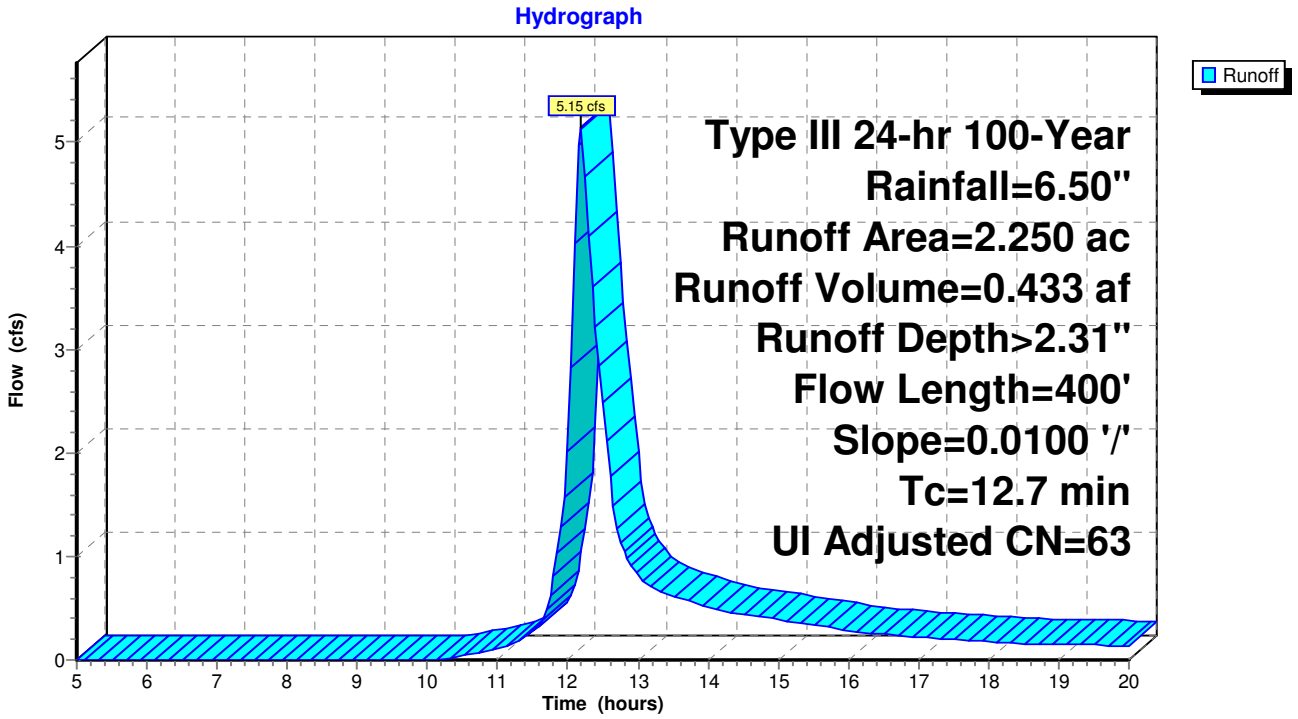
Runoff = 5.15 cfs @ 12.19 hrs, Volume= 0.433 af, Depth> 2.31"

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=6.50"

Area (ac)	CN	Description
2.020	61	>75% Grass cover, Good, HSG B
0.230	98	Unconnected pavement, HSG B
2.250	65	Weighted Average, UI Adjusted CN = 63
2.020		89.78% Pervious Area
0.230		10.22% Impervious Area
0.230		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.5	50	0.0100	0.11		**Sheet Flow, Natural Turf Field** Grass: Short n= 0.150 P2= 3.10"
2.4	100	0.0100	0.70		**Shallow Concentrated Flow, Natural Turf** Short Grass Pasture Kv= 7.0 fps
2.8	250	0.0100	1.50		**Shallow Concentrated Flow, Grassed Waterway** Grassed Waterway Kv= 15.0 fps
12.7	400	Total			

Subcatchment DA-N: Northern DA



Summary for Subcatchment DA-S: Southern DA

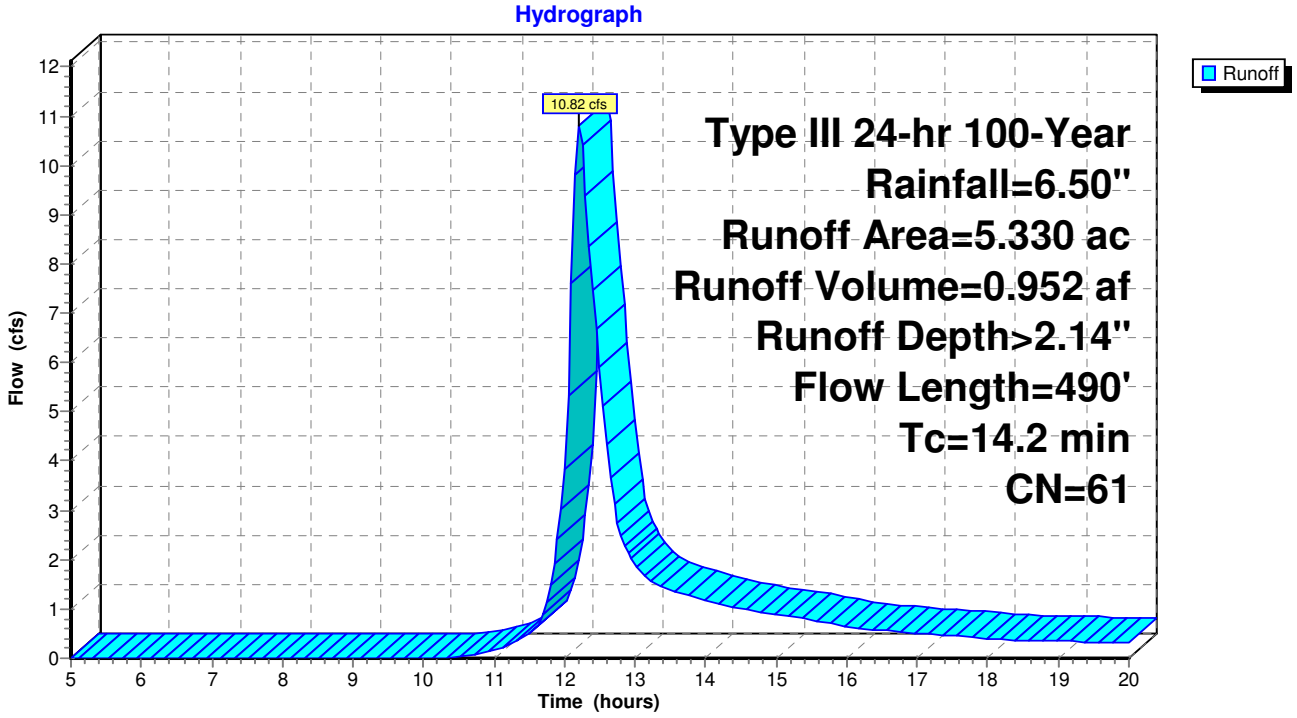
Runoff = 10.82 cfs @ 12.21 hrs, Volume= 0.952 af, Depth> 2.14"

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=6.50"

Area (ac)	CN	Description
5.330	61	>75% Grass cover, Good, HSG B
5.330		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.5	50	0.0100	0.11		**Sheet Flow, Natural Turf Field** Grass: Short n= 0.150 P2= 3.10"
4.0	170	0.0100	0.70		**Shallow Concentrated Flow, Natural Turf Field** Short Grass Pasture Kv= 7.0 fps
2.6	270	0.0070	1.70		**Shallow Concentrated Flow, French Drain** Paved Kv= 20.3 fps
14.2	490	Total			

Subcatchment DA-S: Southern DA



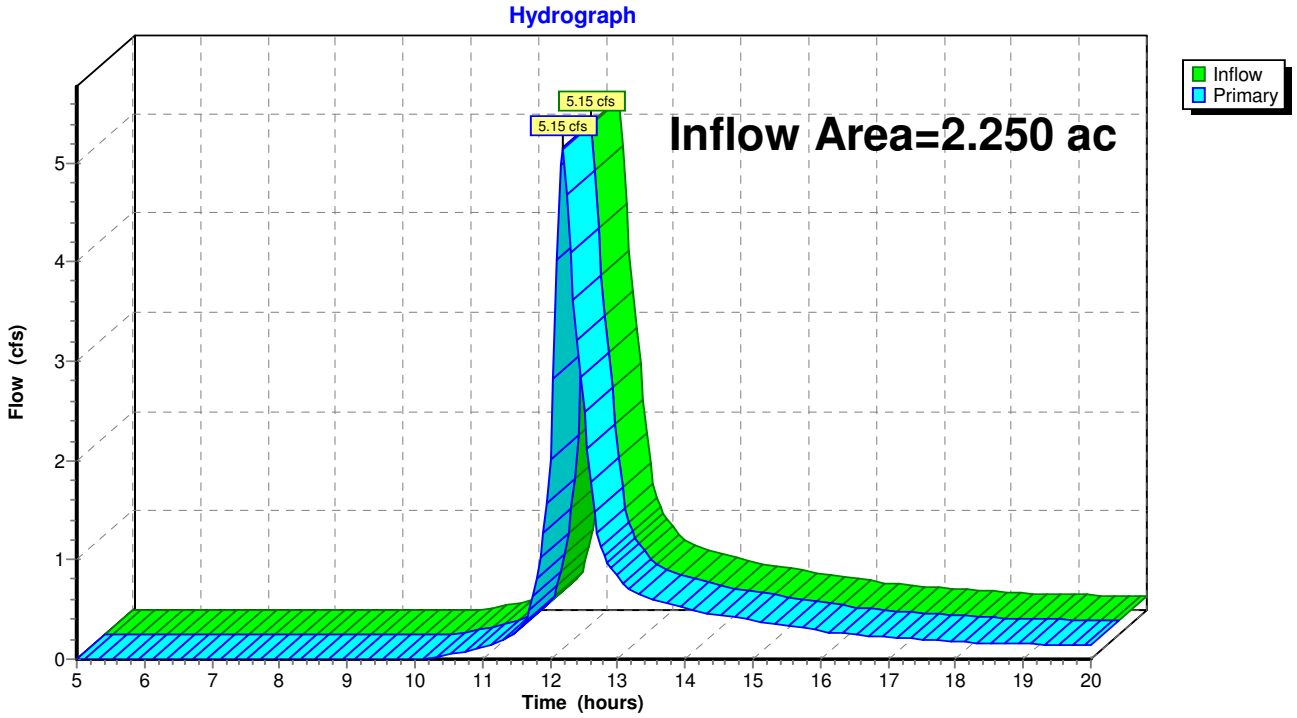
Summary for Pond DP-1: Northern Wetlands

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 2.250 ac, 10.22% Impervious, Inflow Depth > 2.31" for 100-Year event
Inflow = 5.15 cfs @ 12.19 hrs, Volume= 0.433 af
Primary = 5.15 cfs @ 12.19 hrs, Volume= 0.433 af, Atten= 0%, Lag= 0.0 min

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

Pond DP-1: Northern Wetlands



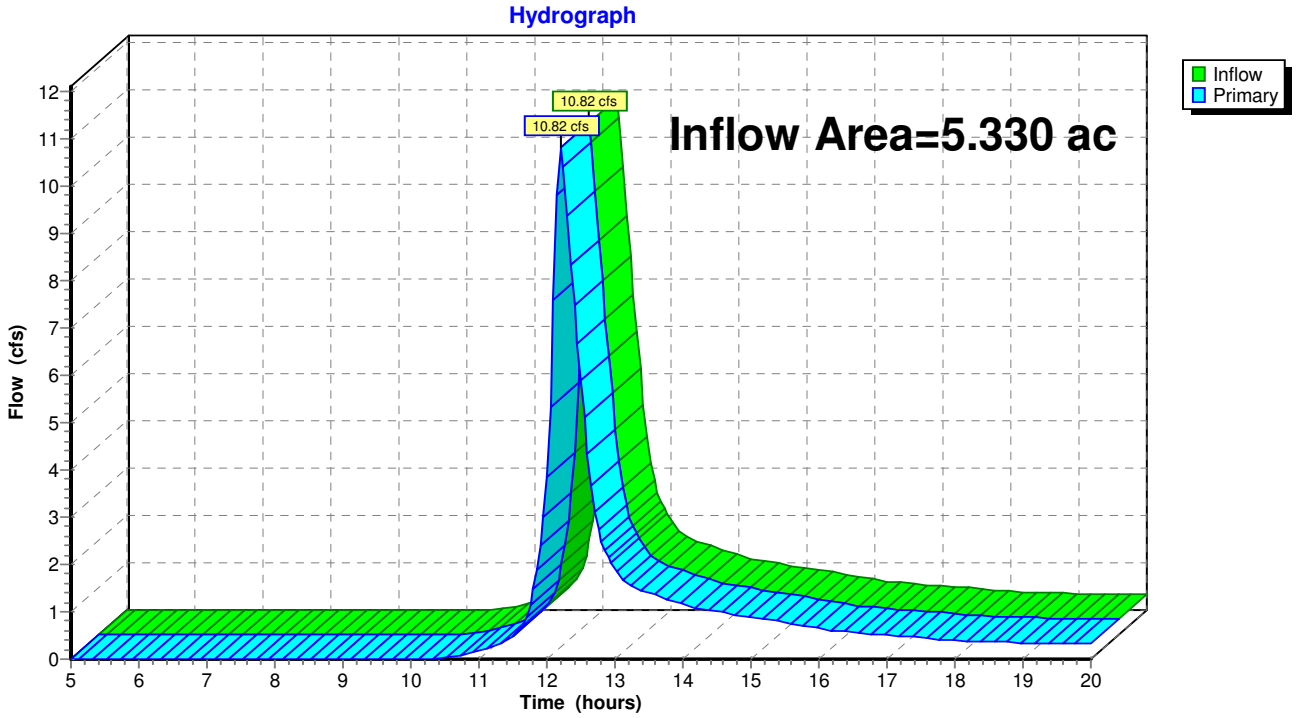
Summary for Pond DP-2: Southern Wetlands

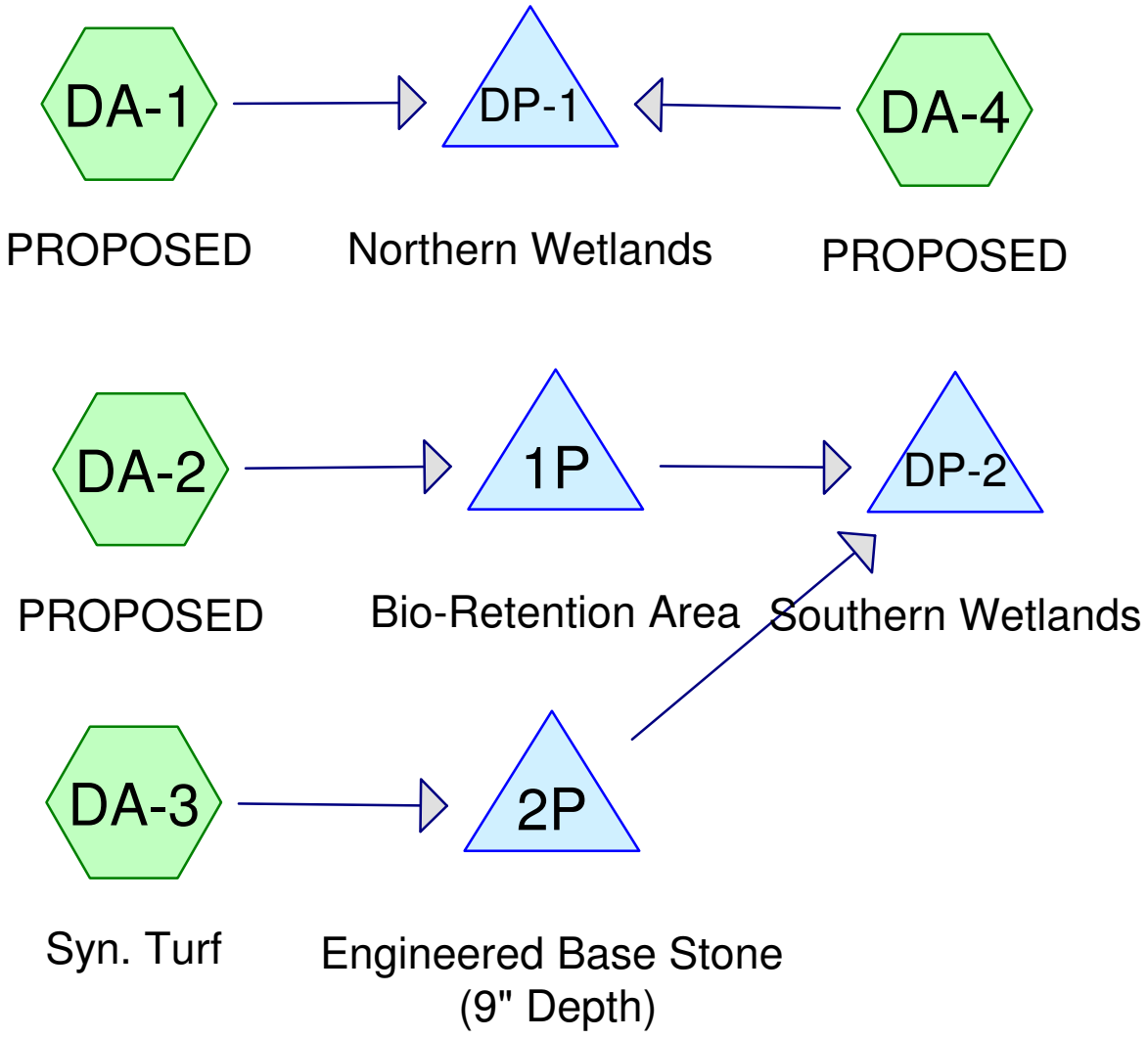
[40] Hint: Not Described (Outflow=Inflow)

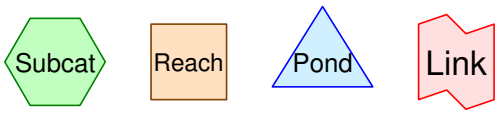
Inflow Area = 5.330 ac, 0.00% Impervious, Inflow Depth > 2.14" for 100-Year event
Inflow = 10.82 cfs @ 12.21 hrs, Volume= 0.952 af
Primary = 10.82 cfs @ 12.21 hrs, Volume= 0.952 af, Atten= 0%, Lag= 0.0 min

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

Pond DP-2: Southern Wetlands







Drainage Diagram for 715260_POST_040312
Prepared by Microsoft, Printed 4/3/2012
HydroCAD® 9.10 s/n 02120 © 2010 HydroCAD Software Solutions LLC

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.130	48	Bio-Retention, Good, HSG B (DA-2)
2.220	61	>75% Grass cover, Good, HSG B (DA-1, DA-2, DA-3, DA-4)
3.860	98	Syn. Turf Field* (DA-3)
1.370	98	Unconnected pavement, HSG B (DA-1, DA-2, DA-3, DA-4)
7.580	86	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
3.720	HSG B	DA-1, DA-2, DA-3, DA-4
0.000	HSG C	
0.000	HSG D	
3.860	Other	DA-3
7.580		**TOTAL AREA**

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 DA-1: PROPOSED Runoff Area=1.970 ac 6.60% Impervious Runoff Depth>0.38"
Flow Length=536' Tc=14.4 min UI Adjusted CN=62 Runoff=0.50 cfs 0.063 af

Subcatchment DA-2: PROPOSED Runoff Area=1.370 ac 66.42% Impervious Runoff Depth>1.49"
Flow Length=224' Tc=6.9 min CN=84 Runoff=2.46 cfs 0.170 af

Subcatchment DA-3: Syn. Turf Runoff Area=4.170 ac 99.76% Impervious Runoff Depth>2.68"
Tc=5.0 min CN=98 Runoff=12.62 cfs 0.932 af

Subcatchment DA-4: PROPOSED Runoff Area=0.070 ac 42.86% Impervious Runoff Depth>1.05"
Tc=5.0 min CN=77 Runoff=0.09 cfs 0.006 af

Pond 1P: Bio-Retention Area Peak Elev=3.10' Storage=0.092 af Inflow=2.46 cfs 0.170 af
Discarded=0.17 cfs 0.096 af Primary=0.00 cfs 0.000 af Outflow=0.17 cfs 0.096 af

Pond 2P: Engineered Base Stone (9" Depth) Peak Elev=0.11' Storage=0.154 af Inflow=12.62 cfs 0.932 af
Discarded=3.97 cfs 0.929 af Primary=0.05 cfs 0.003 af Outflow=4.02 cfs 0.931 af

Pond DP-1: Northern Wetlands Inflow=0.54 cfs 0.069 af
Primary=0.54 cfs 0.069 af

Pond DP-2: Southern Wetlands Inflow=0.05 cfs 0.003 af
Primary=0.05 cfs 0.003 af

Total Runoff Area = 7.580 ac Runoff Volume = 1.171 af Average Runoff Depth = 1.85"
31.00% Pervious = 2.350 ac 69.00% Impervious = 5.230 ac

Summary for Subcatchment DA-1: PROPOSED

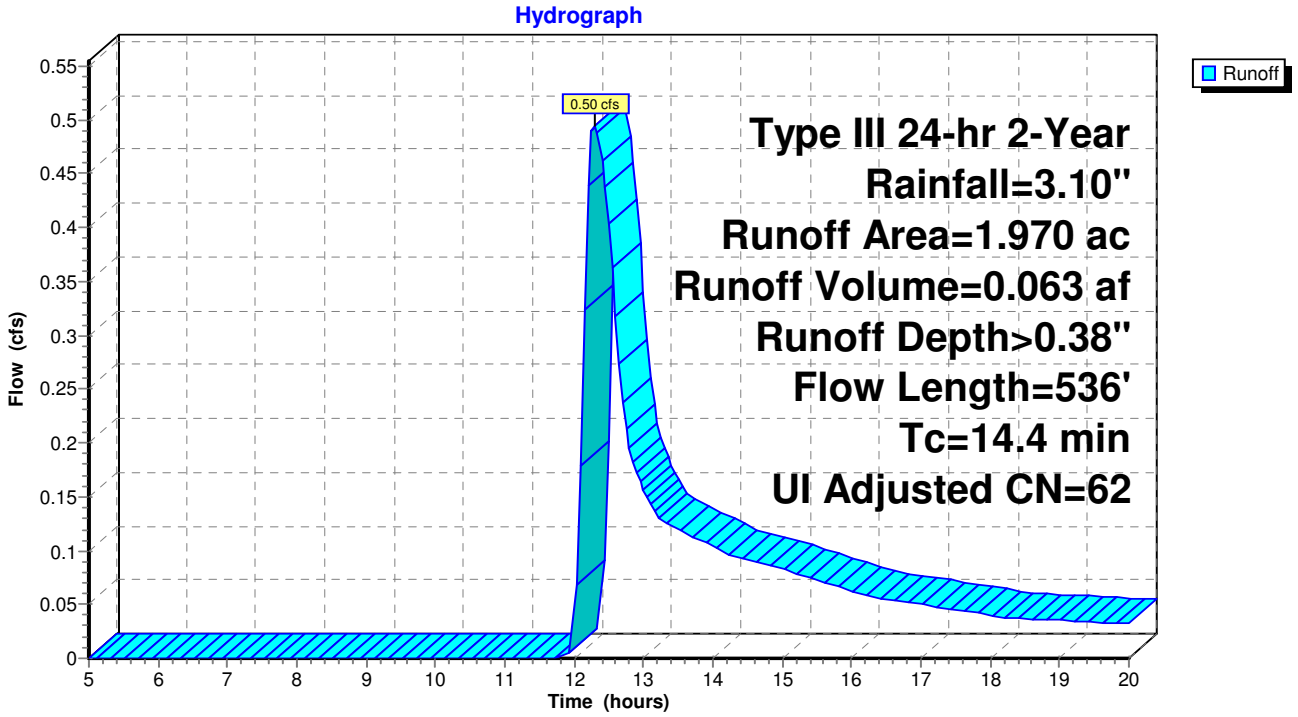
Runoff = 0.50 cfs @ 12.29 hrs, Volume= 0.063 af, Depth> 0.38"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.10"

Area (ac)	CN	Description
1.840	61	>75% Grass cover, Good, HSG B
0.130	98	Unconnected pavement, HSG B
1.970	63	Weighted Average, UI Adjusted CN = 62
1.840		93.40% Pervious Area
0.130		6.60% Impervious Area
0.130		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.5	50	0.0100	0.11		**Sheet Flow, Natural Turf Field** Grass: Short n= 0.150 P2= 3.10"
2.0	86	0.0100	0.70		**Shallow Concentrated Flow, Natural Turf Field** Short Grass Pasture Kv= 7.0 fps
2.2	200	0.0100	1.50		**Shallow Concentrated Flow, Grass Ditch** Grassed Waterway Kv= 15.0 fps
2.7	200	0.0050	1.22	30.48	**Channel Flow, Wetlands** Area= 25.0 sf Perim= 20.0' r= 1.25' n= 0.100 Very weedy reaches w/pools
14.4	536	Total			

Subcatchment DA-1: PROPOSED



Summary for Subcatchment DA-2: PROPOSED

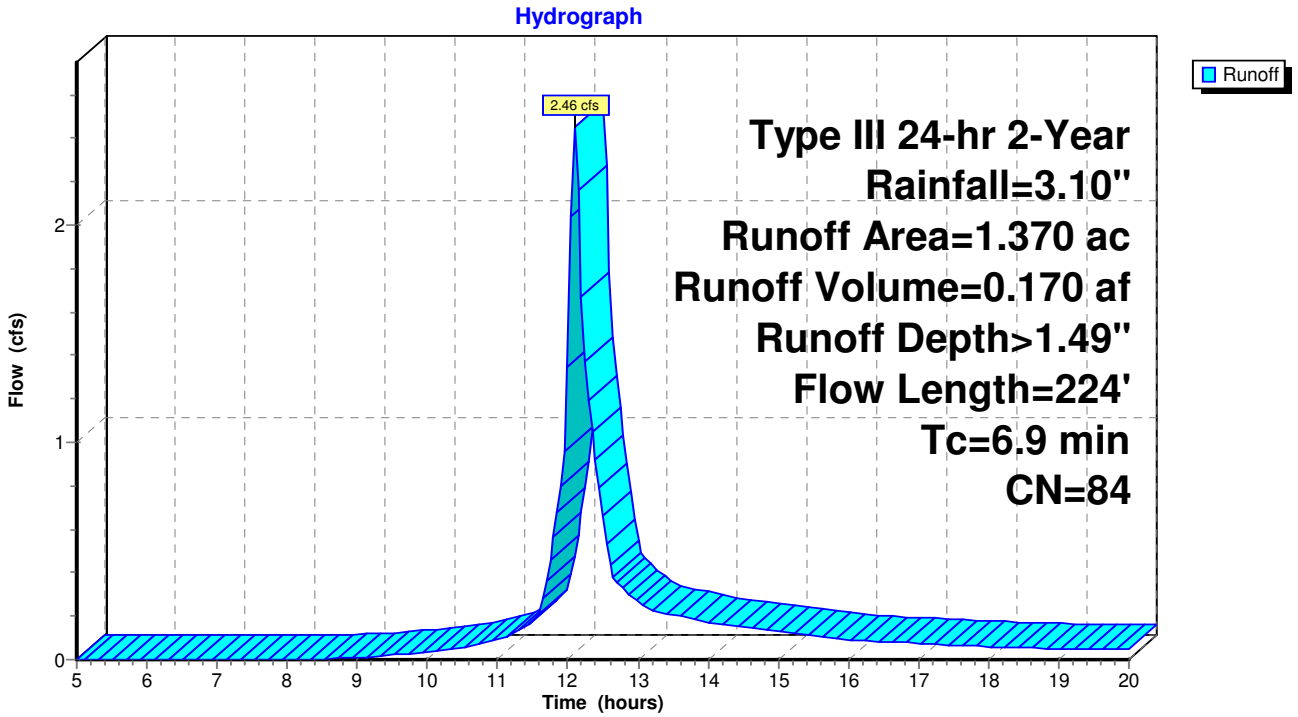
Runoff = 2.46 cfs @ 12.10 hrs, Volume= 0.170 af, Depth> 1.49"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.10"

	Area (ac)	CN	Description
	0.910	98	Unconnected pavement, HSG B
	0.330	61	>75% Grass cover, Good, HSG B
*	0.130	48	Bio-Retention, Good, HSG B
	1.370	84	Weighted Average
	0.460		33.58% Pervious Area
	0.910		66.42% Impervious Area
	0.910		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.2	50	0.0250	0.16		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.10"
0.5	124	0.0400	4.06		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
1.2	50	0.0100	0.70		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
6.9	224	Total			

Subcatchment DA-2: PROPOSED



Summary for Subcatchment DA-3: Syn. Turf

*Syn. Turf Field is Modeled as Impervious Area to Accurately Depict the Amount of Runoff Which Infiltrates Into the Base Stone

[49] Hint: Tc<2dt may require smaller dt

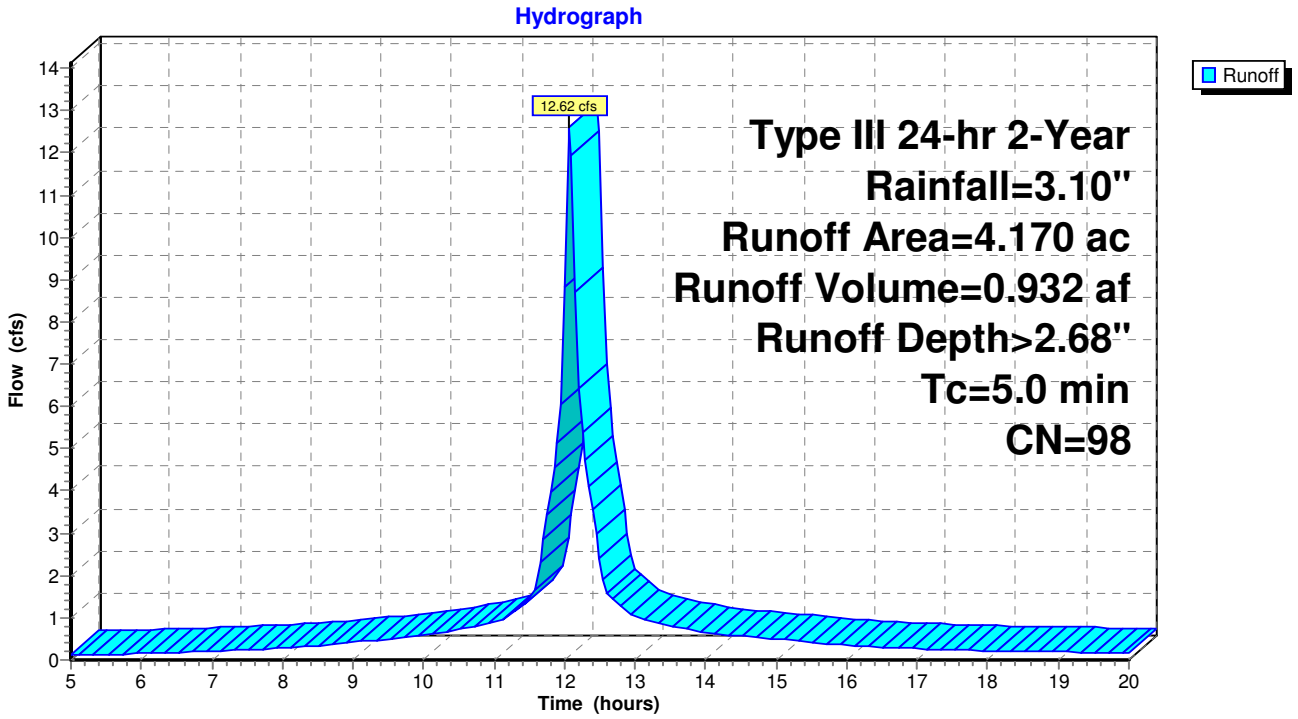
Runoff = 12.62 cfs @ 12.07 hrs, Volume= 0.932 af, Depth> 2.68"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.10"

	Area (ac)	CN	Description
	0.010	61	>75% Grass cover, Good, HSG B
	0.300	98	Unconnected pavement, HSG B
*	3.860	98	Syn. Turf Field*
	4.170	98	Weighted Average
	0.010		0.24% Pervious Area
	4.160		99.76% Impervious Area
	0.300		7.21% Unconnected

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

Subcatchment DA-3: Syn. Turf



Summary for Subcatchment DA-4: PROPOSED

[49] Hint: Tc<2dt may require smaller dt

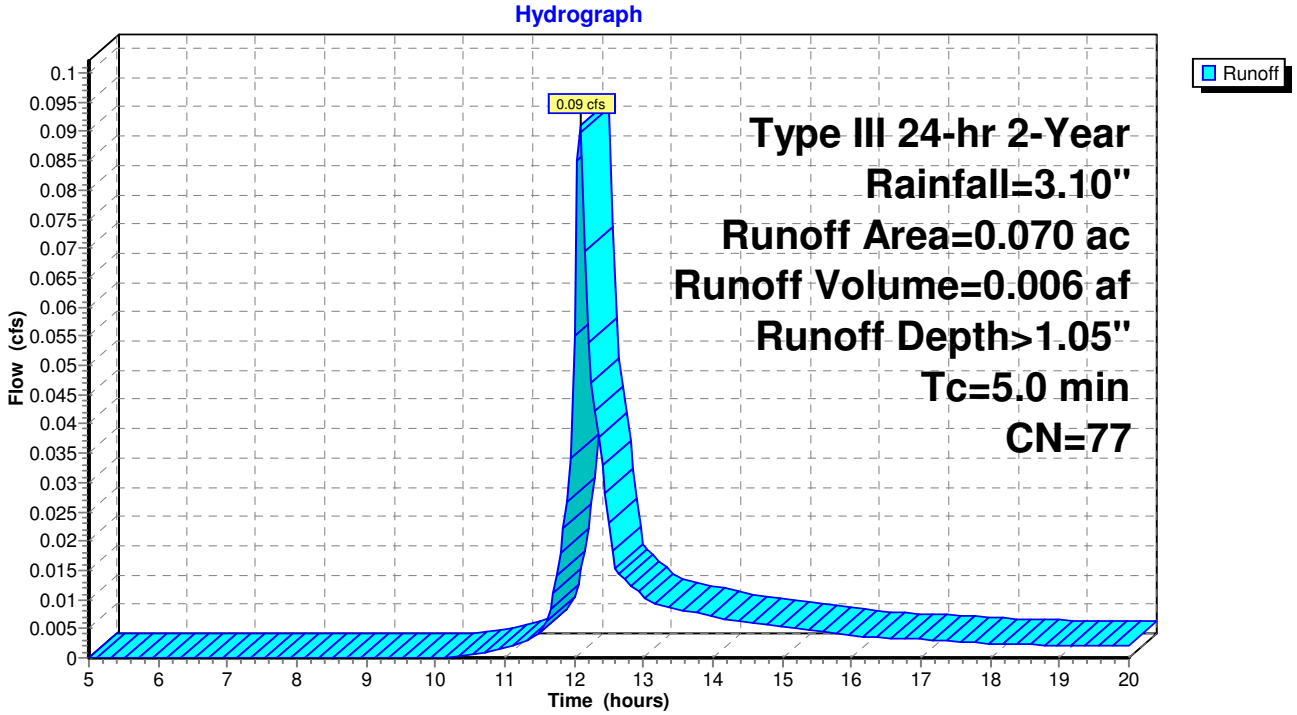
Runoff = 0.09 cfs @ 12.08 hrs, Volume= 0.006 af, Depth> 1.05"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.10"

Area (ac)	CN	Description
0.040	61	>75% Grass cover, Good, HSG B
0.030	98	Unconnected pavement, HSG B
0.070	77	Weighted Average
0.040		57.14% Pervious Area
0.030		42.86% Impervious Area
0.030		100.00% Unconnected

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

Subcatchment DA-4: PROPOSED



Summary for Pond 1P: Bio-Retention Area

Inflow Area =	1.370 ac, 66.42% Impervious, Inflow Depth > 1.49" for 2-Year event				
Inflow =	2.46 cfs @	12.10 hrs,	Volume=	0.170 af	
Outflow =	0.17 cfs @	14.03 hrs,	Volume=	0.096 af,	Atten= 93%, Lag= 115.6 min
Discarded =	0.17 cfs @	14.03 hrs,	Volume=	0.096 af	
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= 3.10' @ 14.03 hrs Surf.Area= 0.164 ac Storage= 0.092 af

Plug-Flow detention time= 186.6 min calculated for 0.096 af (57% of inflow)
Center-of-Mass det. time= 107.5 min (902.7 - 795.2)

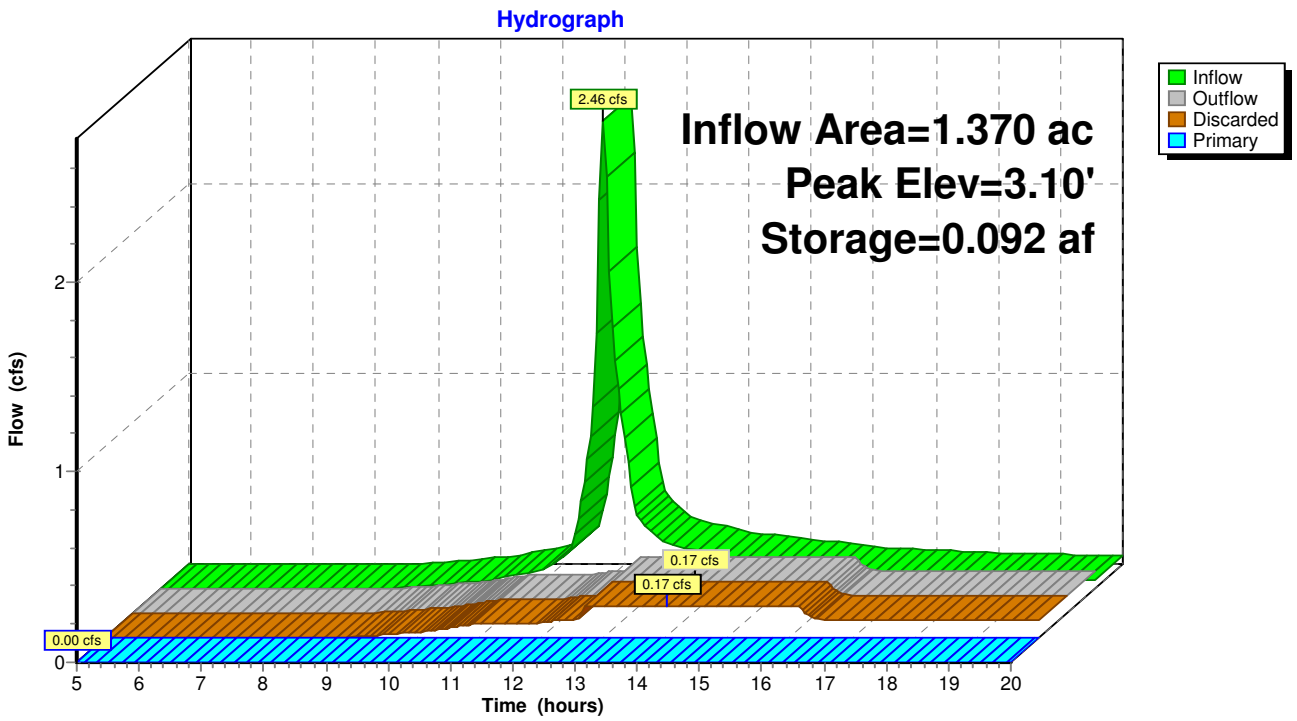
Volume	Invert	Avail.Storage	Storage Description
#1	0.00'	0.085 af	**20.00'W x 150.00'L x 3.00'H Prismatoid Z=1.0**
			0.243 af Overall x 35.0% Voids
#2	3.00'	0.117 af	**20.00'W x 150.00'L x 1.37'H Prismatoid Z=3.0**
		0.202 af	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Primary	3.75'	**10.0' long x 10.0' breadth Broad-Crested Rectangular Weir**
			Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60
			Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64
#2	Discarded	0.00'	**1.020 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.17 cfs @ 14.03 hrs HW=3.10' (Free Discharge)
└─**2=Exfiltration** (Exfiltration Controls 0.17 cfs)

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

Pond 1P: Bio-Retention Area



Summary for Pond 2P: Engineered Base Stone (9" Depth)

[82] Warning: Early inflow requires earlier time span

Inflow Area =	4.170 ac,	99.76% Impervious,	Inflow Depth >	2.68"	for 2-Year event
Inflow =	12.62 cfs @	12.07 hrs,	Volume=	0.932 af	
Outflow =	4.02 cfs @	12.36 hrs,	Volume=	0.931 af,	Atten= 68%, Lag= 17.3 min
Discarded =	3.97 cfs @	11.85 hrs,	Volume=	0.929 af	
Primary =	0.05 cfs @	12.36 hrs,	Volume=	0.003 af	

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 0.11' @ 12.36 hrs Surf.Area= 3.857 ac Storage= 0.154 af

Plug-Flow detention time= 9.1 min calculated for 0.928 af (100% of inflow)
Center-of-Mass det. time= 8.7 min (746.8 - 738.1)

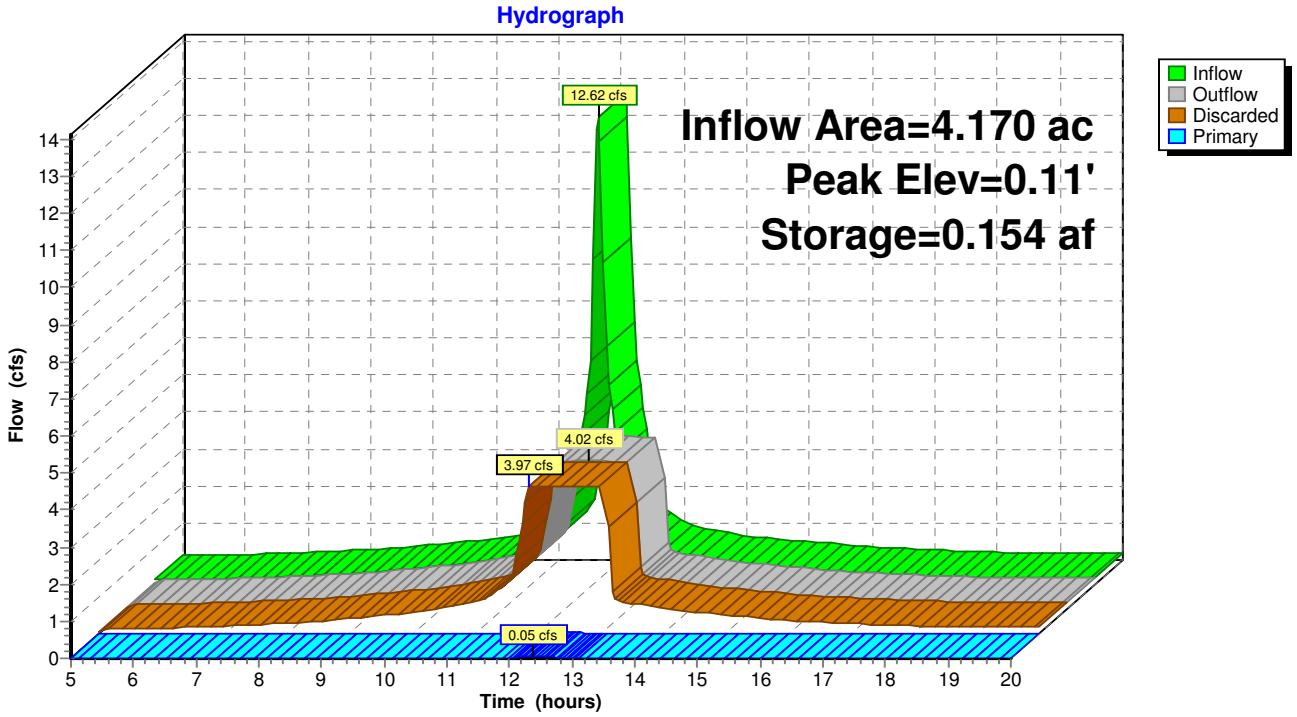
Volume	Invert	Avail.Storage	Storage Description
#1	0.00'	1.012 af	**350.00'W x 480.00'L x 0.75'H 9" Stone Base** 2.893 af Overall x 35.0% Voids
#2	0.75'	0.337 af	**350.00'W x 480.00'L x 0.25'H Top Stone + Infill Material** 0.964 af Overall x 35.0% Voids
		1.350 af	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	0.00'	**1.020 in/hr Exfiltration over Surface area**
#2	Primary	0.00'	**10.0" Vert. F.E.S.** C= 0.600

Discarded OutFlow Max=3.97 cfs @ 11.85 hrs HW=0.01' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 3.97 cfs)

Primary OutFlow Max=0.05 cfs @ 12.36 hrs HW=0.11' (Free Discharge)
└─**2=F.E.S.** (Orifice Controls 0.05 cfs @ 1.15 fps)

Pond 2P: Engineered Base Stone (9" Depth)



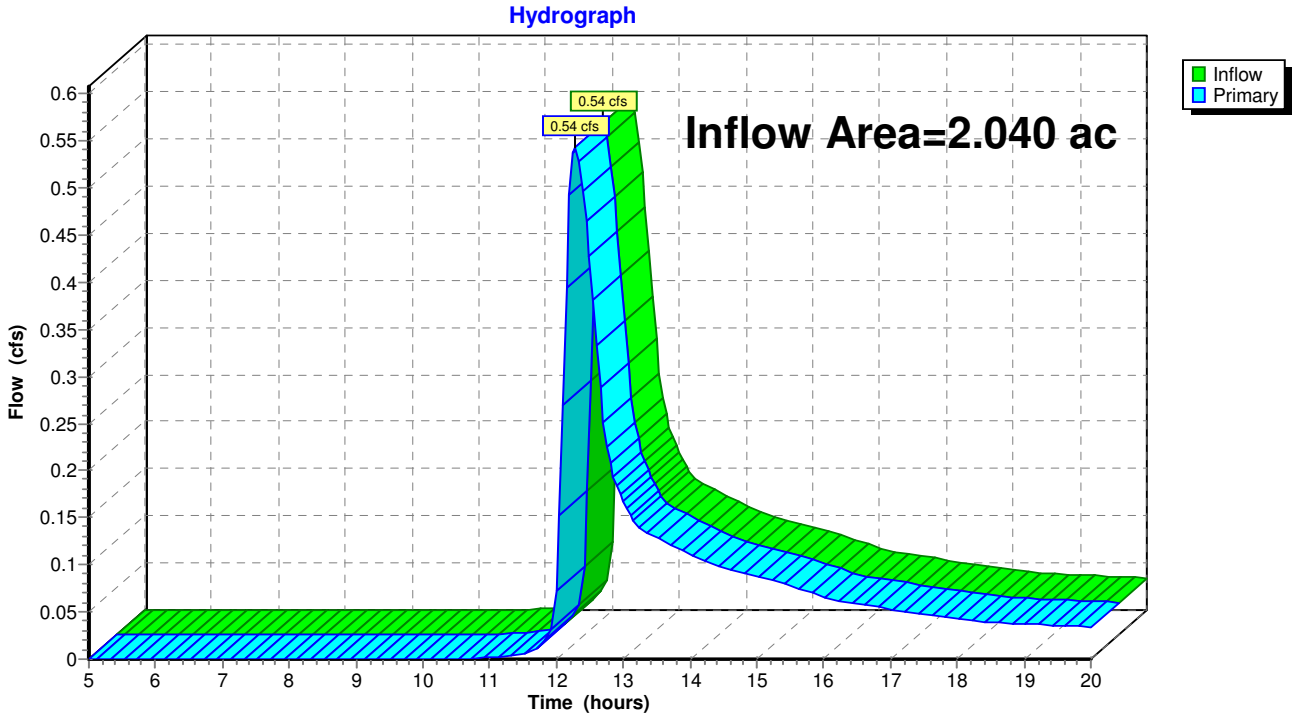
Summary for Pond DP-1: Northern Wetlands

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area =	2.040 ac,	7.84% Impervious,	Inflow Depth >	0.40"	for 2-Year event
Inflow =	0.54 cfs @	12.27 hrs,	Volume=	0.069 af	
Primary =	0.54 cfs @	12.27 hrs,	Volume=	0.069 af,	Atten= 0%, Lag= 0.0 min

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

Pond DP-1: Northern Wetlands



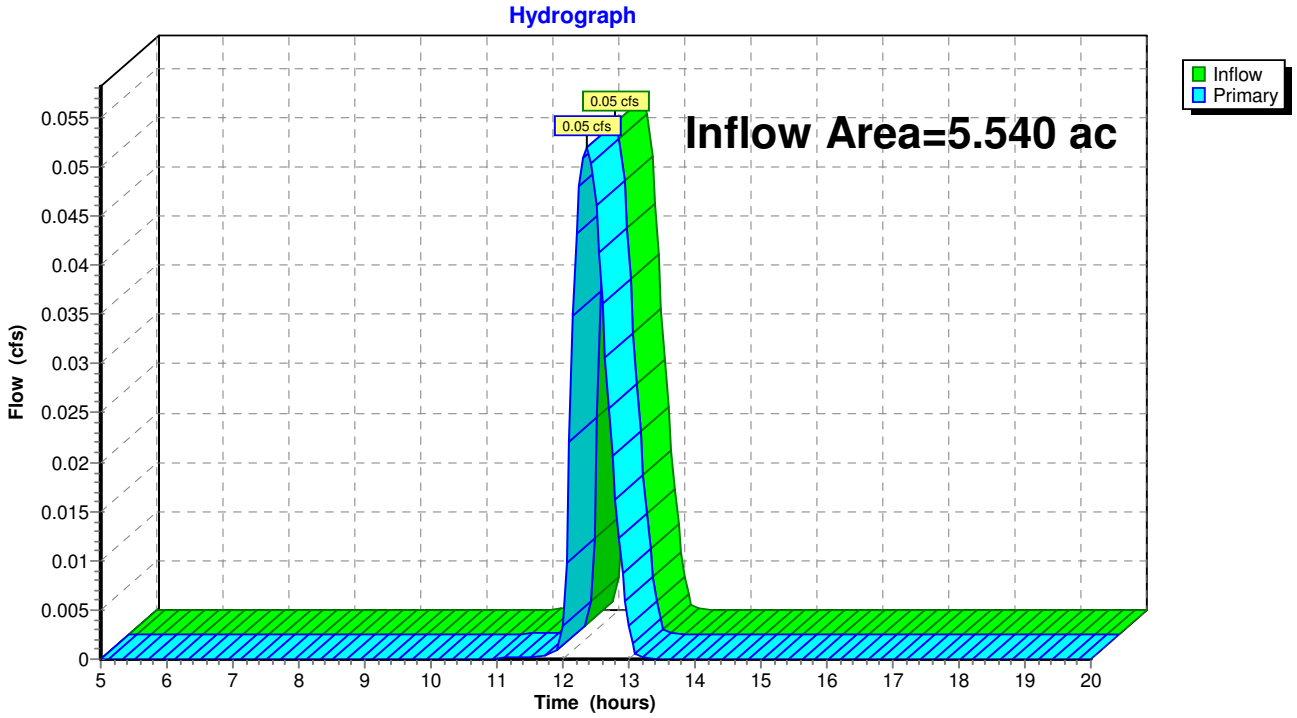
Summary for Pond DP-2: Southern Wetlands

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 5.540 ac, 91.52% Impervious, Inflow Depth > 0.01" for 2-Year event
Inflow = 0.05 cfs @ 12.36 hrs, Volume= 0.003 af
Primary = 0.05 cfs @ 12.36 hrs, Volume= 0.003 af, Atten= 0%, Lag= 0.0 min

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

Pond DP-2: Southern Wetlands



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 DA-1: PROPOSED Runoff Area=1.970 ac 6.60% Impervious Runoff Depth>1.02"
Flow Length=536' Tc=14.4 min UI Adjusted CN=62 Runoff=1.77 cfs 0.168 af

Subcatchment DA-2: PROPOSED Runoff Area=1.370 ac 66.42% Impervious Runoff Depth>2.64"
Flow Length=224' Tc=6.9 min CN=84 Runoff=4.31 cfs 0.301 af

Subcatchment DA-3: Syn. Turf Runoff Area=4.170 ac 99.76% Impervious Runoff Depth>3.96"
Tc=5.0 min CN=98 Runoff=18.45 cfs 1.377 af

Subcatchment DA-4: PROPOSED Runoff Area=0.070 ac 42.86% Impervious Runoff Depth>2.05"
Tc=5.0 min CN=77 Runoff=0.18 cfs 0.012 af

Pond 1P: Bio-Retention Area Peak Elev=3.84' Storage=0.151 af Inflow=4.31 cfs 0.301 af
Discarded=0.19 cfs 0.141 af Primary=0.68 cfs 0.045 af Outflow=0.86 cfs 0.186 af

Pond 2P: Engineered Base Stone (9" Depth) Peak Elev=0.24' Storage=0.318 af Inflow=18.45 cfs 1.377 af
Discarded=3.97 cfs 1.360 af Primary=0.21 cfs 0.016 af Outflow=4.18 cfs 1.376 af

Pond DP-1: Northern Wetlands Inflow=1.87 cfs 0.180 af
Primary=1.87 cfs 0.180 af

Pond DP-2: Southern Wetlands Inflow=0.88 cfs 0.061 af
Primary=0.88 cfs 0.061 af

Total Runoff Area = 7.580 ac Runoff Volume = 1.858 af Average Runoff Depth = 2.94"
31.00% Pervious = 2.350 ac 69.00% Impervious = 5.230 ac

Summary for Subcatchment DA-1: PROPOSED

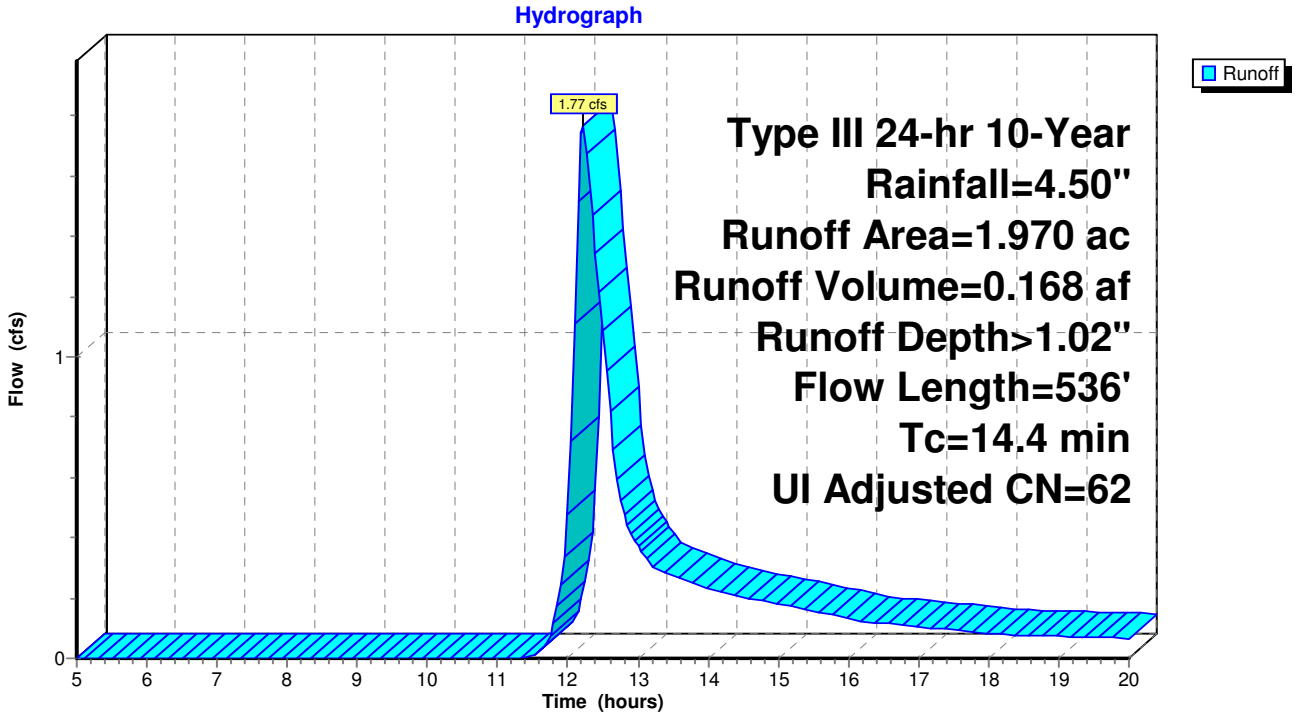
Runoff = 1.77 cfs @ 12.22 hrs, Volume= 0.168 af, Depth> 1.02"

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=4.50"

Area (ac)	CN	Description
1.840	61	>75% Grass cover, Good, HSG B
0.130	98	Unconnected pavement, HSG B
1.970	63	Weighted Average, UI Adjusted CN = 62
1.840		93.40% Pervious Area
0.130		6.60% Impervious Area
0.130		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.5	50	0.0100	0.11		**Sheet Flow, Natural Turf Field** Grass: Short n= 0.150 P2= 3.10"
2.0	86	0.0100	0.70		**Shallow Concentrated Flow, Natural Turf Field** Short Grass Pasture Kv= 7.0 fps
2.2	200	0.0100	1.50		**Shallow Concentrated Flow, Grass Ditch** Grassed Waterway Kv= 15.0 fps
2.7	200	0.0050	1.22	30.48	**Channel Flow, Wetlands** Area= 25.0 sf Perim= 20.0' r= 1.25' n= 0.100 Very weedy reaches w/pools
14.4	536	Total			

Subcatchment DA-1: PROPOSED



Summary for Subcatchment DA-2: PROPOSED

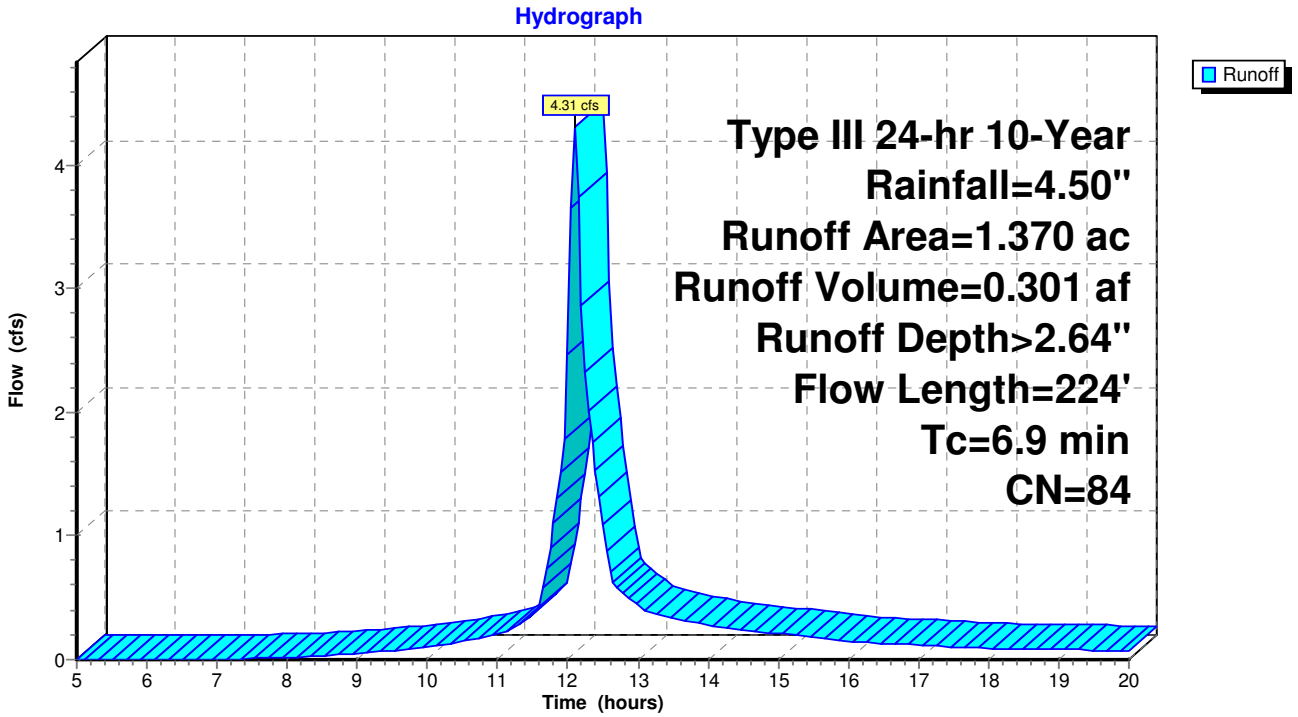
Runoff = 4.31 cfs @ 12.10 hrs, Volume= 0.301 af, Depth> 2.64"

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=4.50"

	Area (ac)	CN	Description
	0.910	98	Unconnected pavement, HSG B
	0.330	61	>75% Grass cover, Good, HSG B
*	0.130	48	Bio-Retention, Good, HSG B
	1.370	84	Weighted Average
	0.460		33.58% Pervious Area
	0.910		66.42% Impervious Area
	0.910		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.2	50	0.0250	0.16		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.10"
0.5	124	0.0400	4.06		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
1.2	50	0.0100	0.70		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
6.9	224	Total			

Subcatchment DA-2: PROPOSED



Summary for Subcatchment DA-3: Syn. Turf

*Syn. Turf Field is Modeled as Impervious Area to Accurately Depict the Amount of Runoff Which Infiltrates Into the Base Stone

[49] Hint: Tc<2dt may require smaller dt

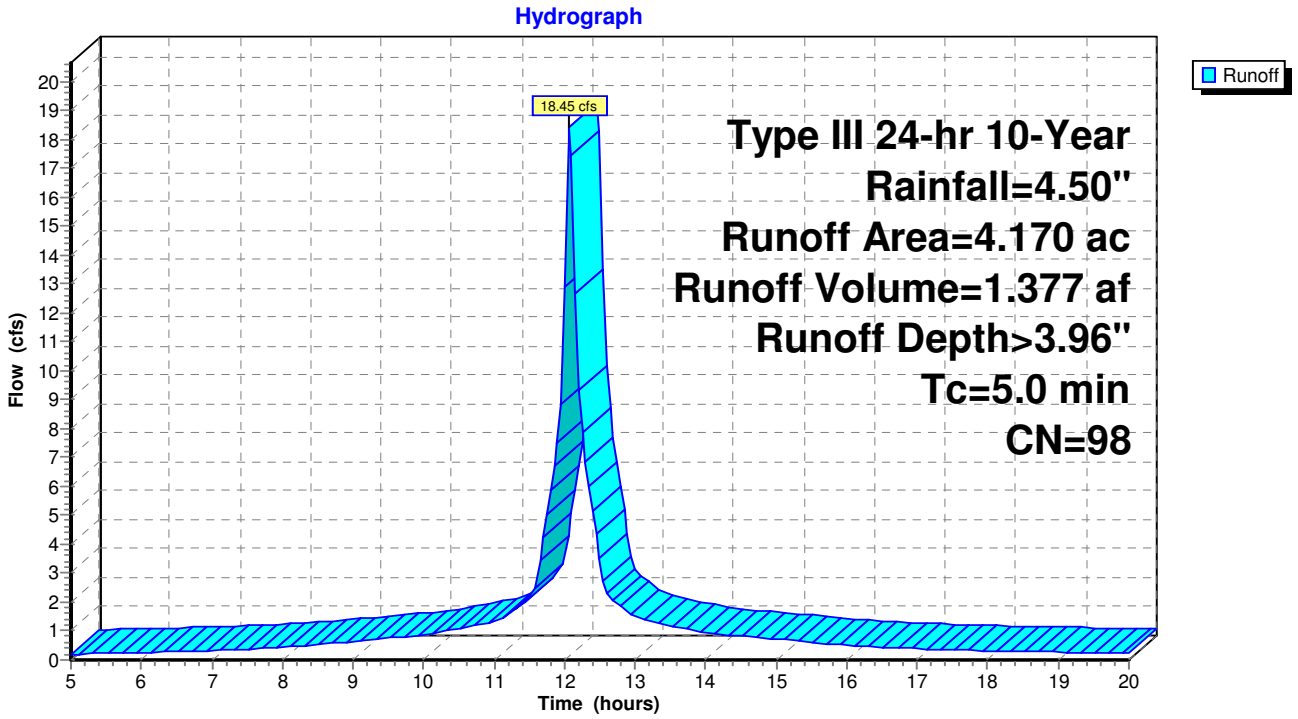
Runoff = 18.45 cfs @ 12.07 hrs, Volume= 1.377 af, Depth> 3.96"

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=4.50"

	Area (ac)	CN	Description
	0.010	61	>75% Grass cover, Good, HSG B
	0.300	98	Unconnected pavement, HSG B
*	3.860	98	Syn. Turf Field*
	4.170	98	Weighted Average
	0.010		0.24% Pervious Area
	4.160		99.76% Impervious Area
	0.300		7.21% Unconnected

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

Subcatchment DA-3: Syn. Turf



Summary for Subcatchment DA-4: PROPOSED

[49] Hint: Tc<2dt may require smaller dt

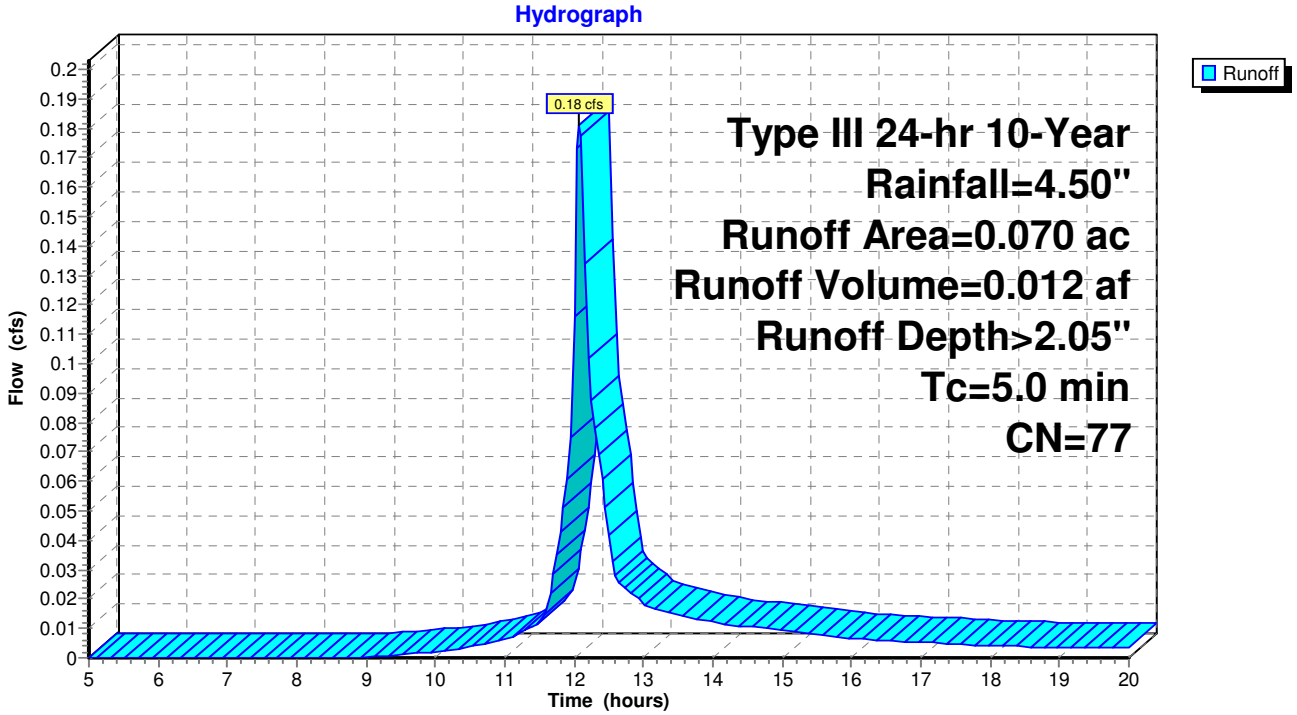
Runoff = 0.18 cfs @ 12.08 hrs, Volume= 0.012 af, Depth> 2.05"

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=4.50"

Area (ac)	CN	Description
0.040	61	>75% Grass cover, Good, HSG B
0.030	98	Unconnected pavement, HSG B
0.070	77	Weighted Average
0.040		57.14% Pervious Area
0.030		42.86% Impervious Area
0.030		100.00% Unconnected

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

Subcatchment DA-4: PROPOSED



Summary for Pond 1P: Bio-Retention Area

Inflow Area =	1.370 ac, 66.42% Impervious, Inflow Depth > 2.64" for 10-Year event				
Inflow =	4.31 cfs @	12.10 hrs,	Volume=	0.301 af	
Outflow =	0.86 cfs @	12.56 hrs,	Volume=	0.186 af,	Atten= 80%, Lag= 27.7 min
Discarded =	0.19 cfs @	12.56 hrs,	Volume=	0.141 af	
Primary =	0.68 cfs @	12.56 hrs,	Volume=	0.045 af	

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 3.84' @ 12.56 hrs Surf.Area= 0.182 ac Storage= 0.151 af

Plug-Flow detention time= 173.9 min calculated for 0.185 af (61% of inflow)
Center-of-Mass det. time= 100.8 min (882.8 - 781.9)

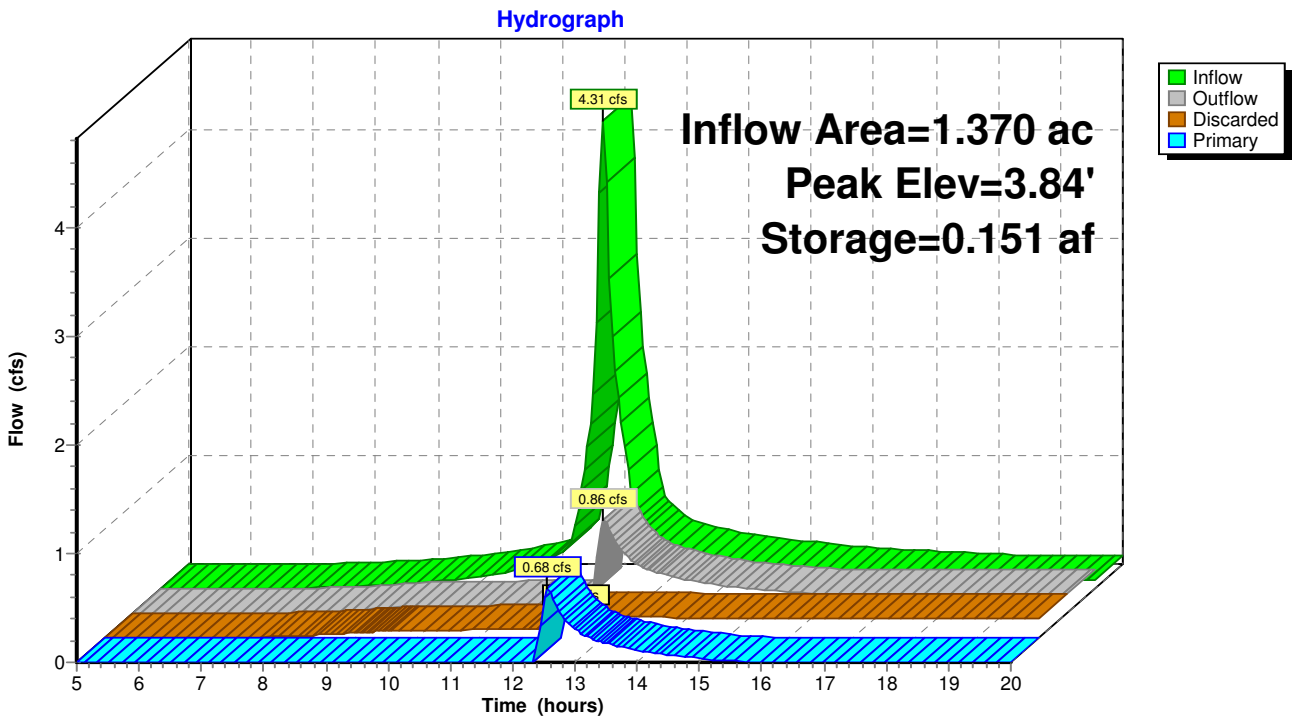
Volume	Invert	Avail.Storage	Storage Description
#1	0.00'	0.085 af	**20.00'W x 150.00'L x 3.00'H Prismatoid Z=1.0**
			0.243 af Overall x 35.0% Voids
#2	3.00'	0.117 af	**20.00'W x 150.00'L x 1.37'H Prismatoid Z=3.0**
		0.202 af	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Primary	3.75'	**10.0' long x 10.0' breadth Broad-Crested Rectangular Weir**
			Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60
			Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64
#2	Discarded	0.00'	**1.020 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.19 cfs @ 12.56 hrs HW=3.84' (Free Discharge)
└─**2=Exfiltration** (Exfiltration Controls 0.19 cfs)

Primary OutFlow Max=0.66 cfs @ 12.56 hrs HW=3.84' (Free Discharge)
└─**1=Broad-Crested Rectangular Weir** (Weir Controls 0.66 cfs @ 0.74 fps)

Pond 1P: Bio-Retention Area



Summary for Pond 2P: Engineered Base Stone (9" Depth)

[82] Warning: Early inflow requires earlier time span

Inflow Area =	4.170 ac, 99.76% Impervious, Inflow Depth > 3.96" for 10-Year event				
Inflow =	18.45 cfs @	12.07 hrs,	Volume=	1.377 af	
Outflow =	4.18 cfs @	12.46 hrs,	Volume=	1.376 af,	Atten= 77%, Lag= 23.4 min
Discarded =	3.97 cfs @	11.75 hrs,	Volume=	1.360 af	
Primary =	0.21 cfs @	12.46 hrs,	Volume=	0.016 af	

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 0.24' @ 12.46 hrs Surf.Area= 3.857 ac Storage= 0.318 af

Plug-Flow detention time= 18.7 min calculated for 1.371 af (100% of inflow)
Center-of-Mass det. time= 18.2 min (753.2 - 735.0)

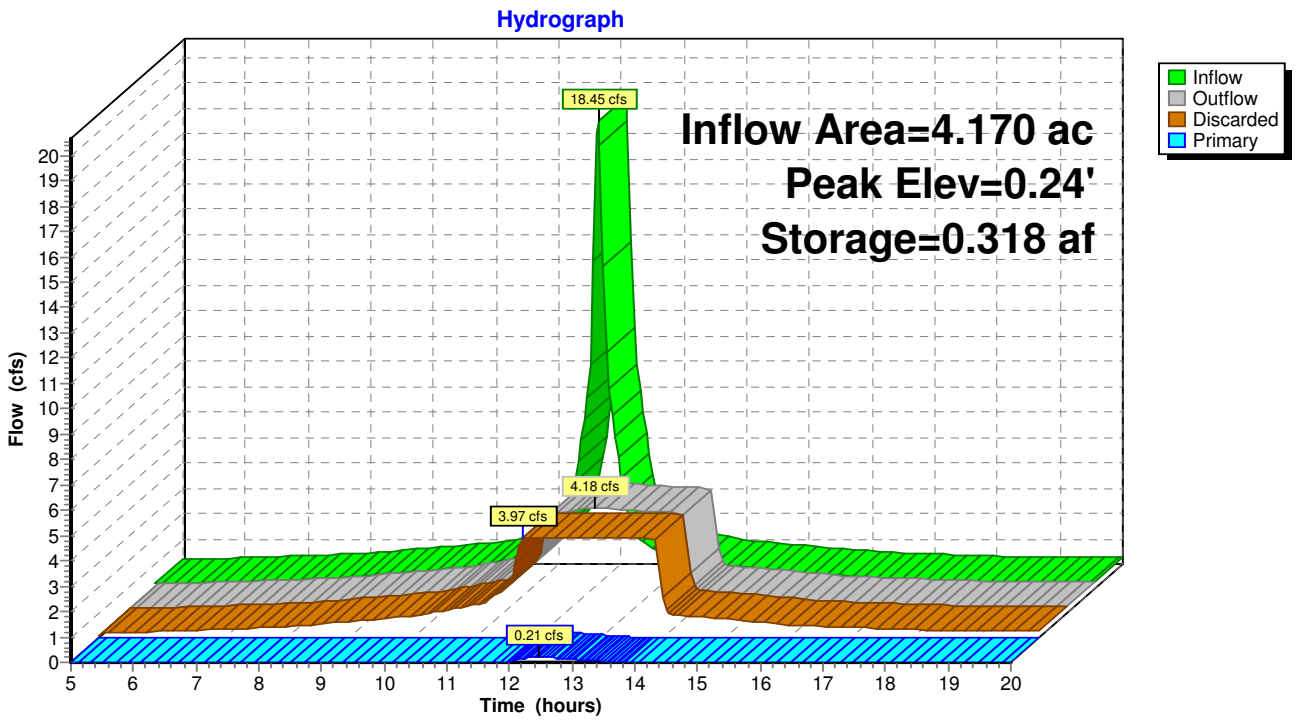
Volume	Invert	Avail.Storage	Storage Description
#1	0.00'	1.012 af	**350.00'W x 480.00'L x 0.75'H 9" Stone Base** 2.893 af Overall x 35.0% Voids
#2	0.75'	0.337 af	**350.00'W x 480.00'L x 0.25'H Top Stone + Infill Material** 0.964 af Overall x 35.0% Voids
		1.350 af	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	0.00'	**1.020 in/hr Exfiltration over Surface area**
#2	Primary	0.00'	**10.0" Vert. F.E.S.** C= 0.600

Discarded OutFlow Max=3.97 cfs @ 11.75 hrs HW=0.01' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 3.97 cfs)

Primary OutFlow Max=0.21 cfs @ 12.46 hrs HW=0.24' (Free Discharge)
└─**2=F.E.S.** (Orifice Controls 0.21 cfs @ 1.65 fps)

Pond 2P: Engineered Base Stone (9" Depth)



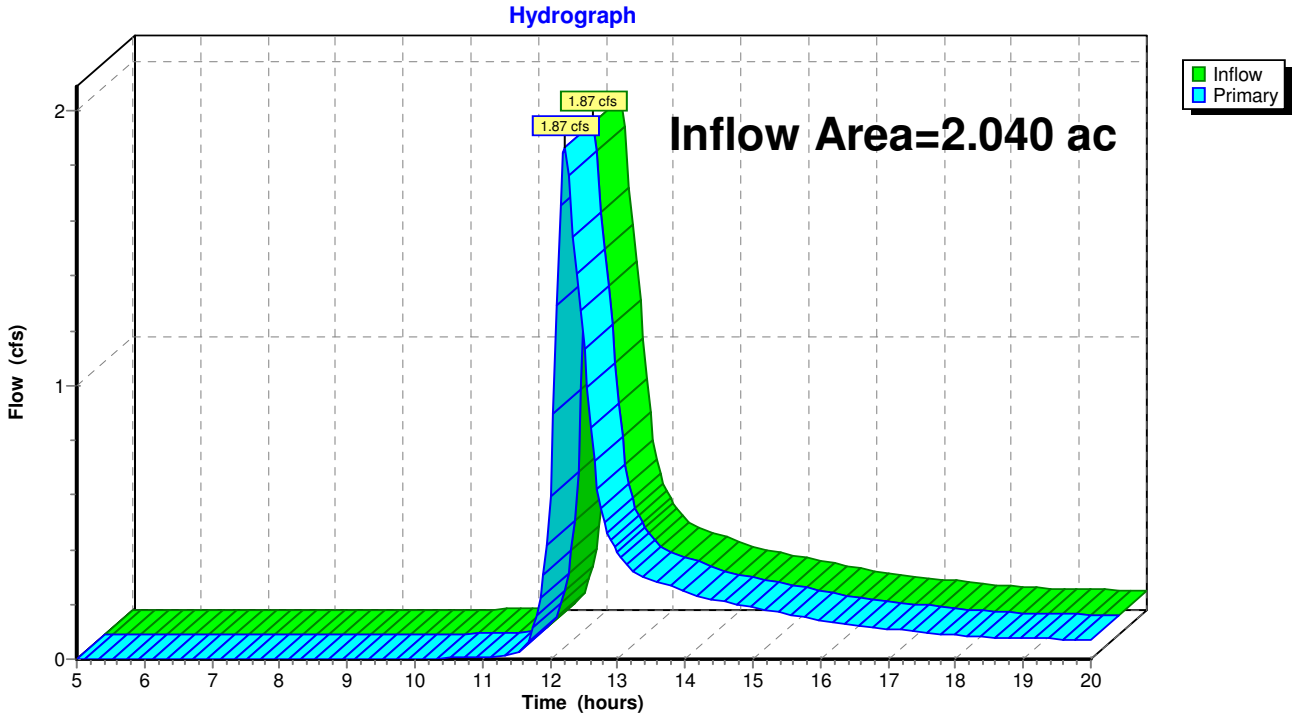
Summary for Pond DP-1: Northern Wetlands

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area =	2.040 ac,	7.84% Impervious,	Inflow Depth >	1.06"	for 10-Year event
Inflow =	1.87 cfs @	12.22 hrs,	Volume=	0.180 af	
Primary =	1.87 cfs @	12.22 hrs,	Volume=	0.180 af,	Atten= 0%, Lag= 0.0 min

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

Pond DP-1: Northern Wetlands



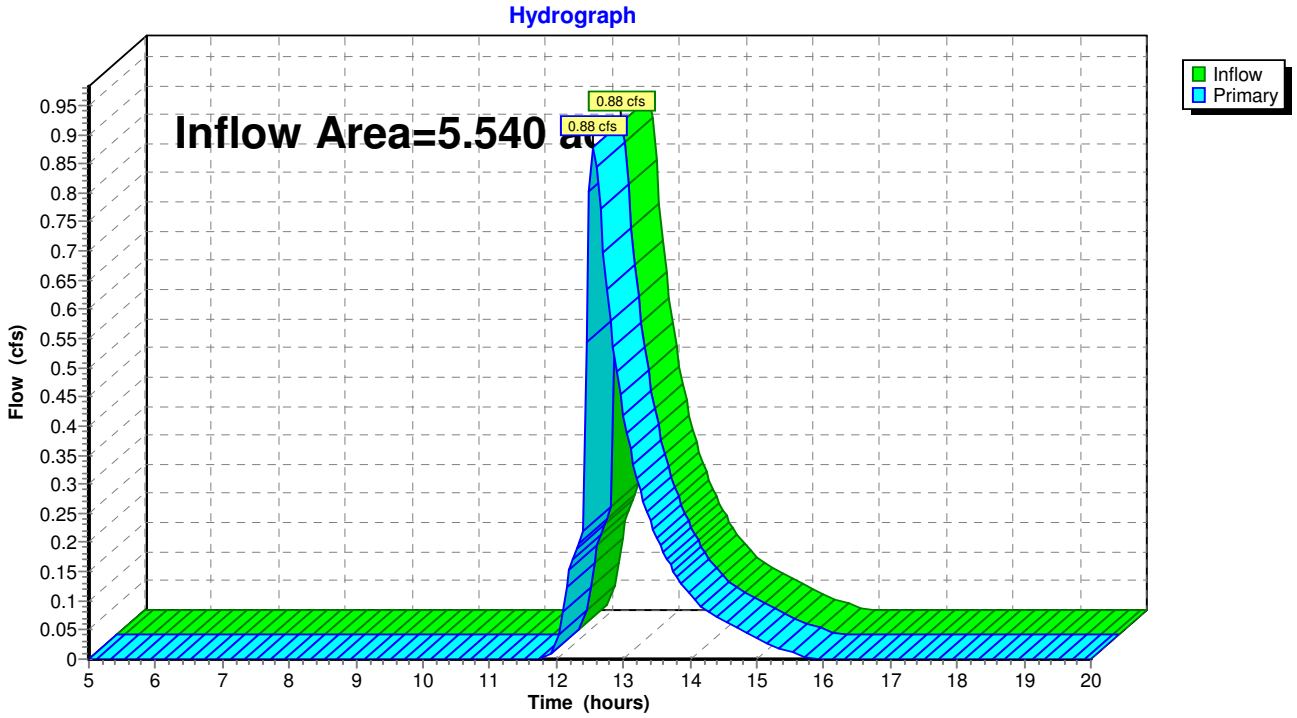
Summary for Pond DP-2: Southern Wetlands

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 5.540 ac, 91.52% Impervious, Inflow Depth = 0.13" for 10-Year event
Inflow = 0.88 cfs @ 12.56 hrs, Volume= 0.061 af
Primary = 0.88 cfs @ 12.56 hrs, Volume= 0.061 af, Atten= 0%, Lag= 0.0 min

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

Pond DP-2: Southern Wetlands



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 DA-1: PROPOSED Runoff Area=1.970 ac 6.60% Impervious Runoff Depth>2.23"
Flow Length=536' Tc=14.4 min UI Adjusted CN=62 Runoff=4.17 cfs 0.366 af

Subcatchment DA-2: PROPOSED Runoff Area=1.370 ac 66.42% Impervious Runoff Depth>4.40"
Flow Length=224' Tc=6.9 min CN=84 Runoff=7.03 cfs 0.502 af

Subcatchment DA-3: Syn. Turf Runoff Area=4.170 ac 99.76% Impervious Runoff Depth>5.78"
Tc=5.0 min CN=98 Runoff=26.75 cfs 2.010 af

Subcatchment DA-4: PROPOSED Runoff Area=0.070 ac 42.86% Impervious Runoff Depth>3.67"
Tc=5.0 min CN=77 Runoff=0.32 cfs 0.021 af

Pond 1P: Bio-Retention Area Peak Elev=4.08' Storage=0.174 af Inflow=7.03 cfs 0.502 af
Discarded=0.19 cfs 0.154 af Primary=4.90 cfs 0.216 af Outflow=5.10 cfs 0.371 af

Pond 2P: Engineered Base Stone (9" Depth) Peak Elev=0.42' Storage=0.572 af Inflow=26.75 cfs 2.010 af
Discarded=3.97 cfs 1.933 af Primary=0.62 cfs 0.076 af Outflow=4.58 cfs 2.009 af

Pond DP-1: Northern Wetlands Inflow=4.34 cfs 0.388 af
Primary=4.34 cfs 0.388 af

Pond DP-2: Southern Wetlands Inflow=5.32 cfs 0.292 af
Primary=5.32 cfs 0.292 af

Total Runoff Area = 7.580 ac Runoff Volume = 2.899 af Average Runoff Depth = 4.59"
31.00% Pervious = 2.350 ac 69.00% Impervious = 5.230 ac

Summary for Subcatchment DA-1: PROPOSED

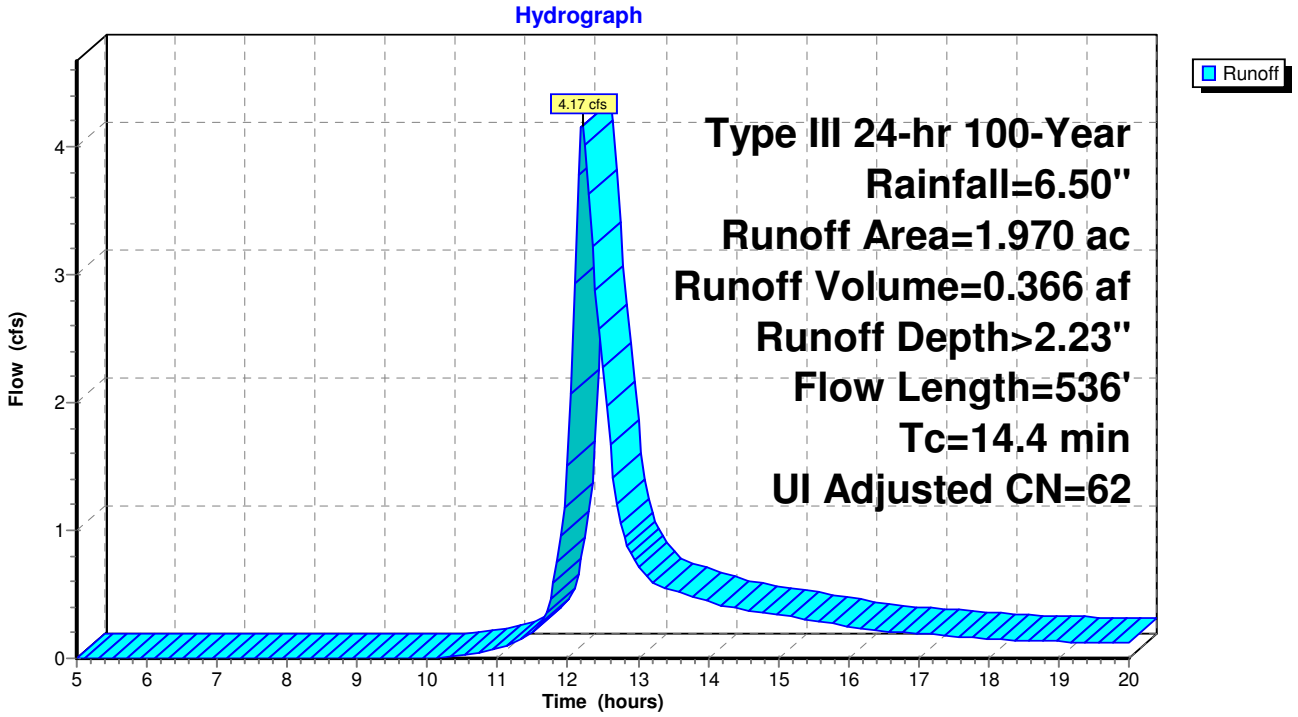
Runoff = 4.17 cfs @ 12.21 hrs, Volume= 0.366 af, Depth> 2.23"

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=6.50"

Area (ac)	CN	Description
1.840	61	>75% Grass cover, Good, HSG B
0.130	98	Unconnected pavement, HSG B
1.970	63	Weighted Average, UI Adjusted CN = 62
1.840		93.40% Pervious Area
0.130		6.60% Impervious Area
0.130		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.5	50	0.0100	0.11		**Sheet Flow, Natural Turf Field** Grass: Short n= 0.150 P2= 3.10"
2.0	86	0.0100	0.70		**Shallow Concentrated Flow, Natural Turf Field** Short Grass Pasture Kv= 7.0 fps
2.2	200	0.0100	1.50		**Shallow Concentrated Flow, Grass Ditch** Grassed Waterway Kv= 15.0 fps
2.7	200	0.0050	1.22	30.48	**Channel Flow, Wetlands** Area= 25.0 sf Perim= 20.0' r= 1.25' n= 0.100 Very weedy reaches w/pools
14.4	536	Total			

Subcatchment DA-1: PROPOSED



Summary for Subcatchment DA-2: PROPOSED

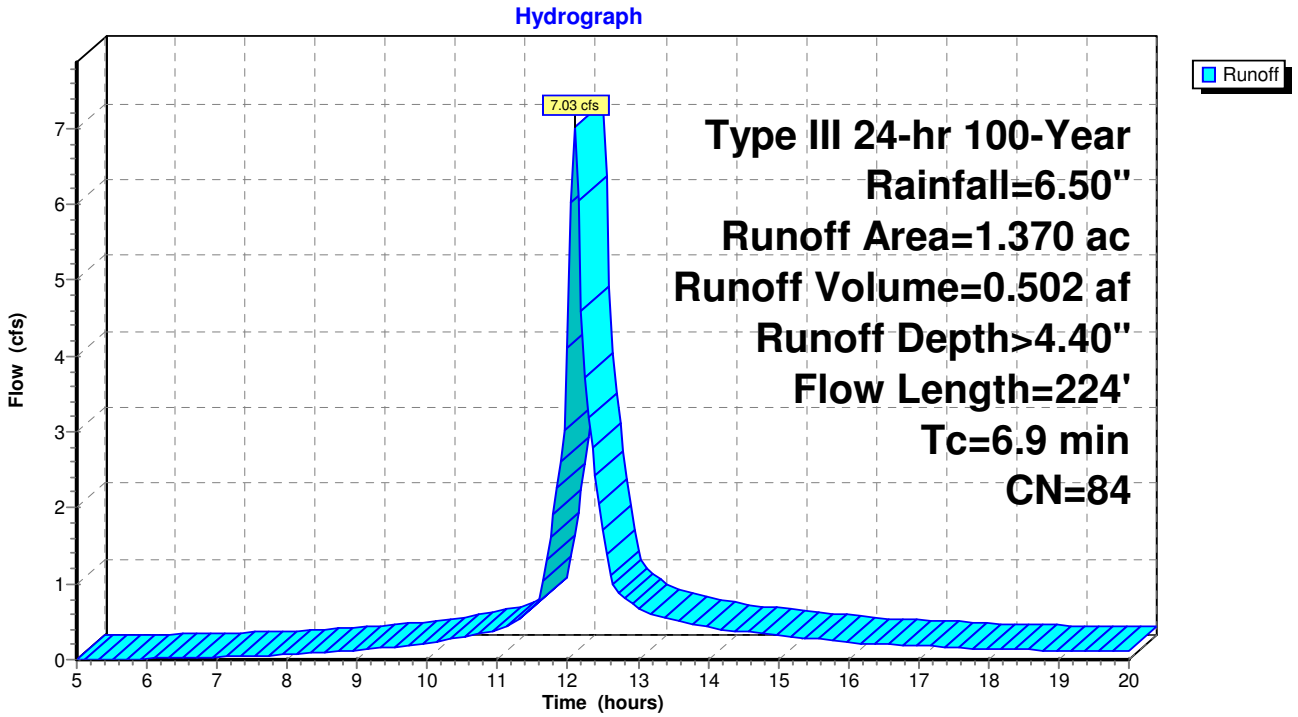
Runoff = 7.03 cfs @ 12.10 hrs, Volume= 0.502 af, Depth> 4.40"

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=6.50"

	Area (ac)	CN	Description
	0.910	98	Unconnected pavement, HSG B
	0.330	61	>75% Grass cover, Good, HSG B
*	0.130	48	Bio-Retention, Good, HSG B
	1.370	84	Weighted Average
	0.460		33.58% Pervious Area
	0.910		66.42% Impervious Area
	0.910		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.2	50	0.0250	0.16		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.10"
0.5	124	0.0400	4.06		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
1.2	50	0.0100	0.70		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
6.9	224	Total			

Subcatchment DA-2: PROPOSED



Summary for Subcatchment DA-3: Syn. Turf

*Syn. Turf Field is Modeled as Impervious Area to Accurately Depict the Amount of Runoff Which Infiltrates Into the Base Stone

[49] Hint: Tc<2dt may require smaller dt

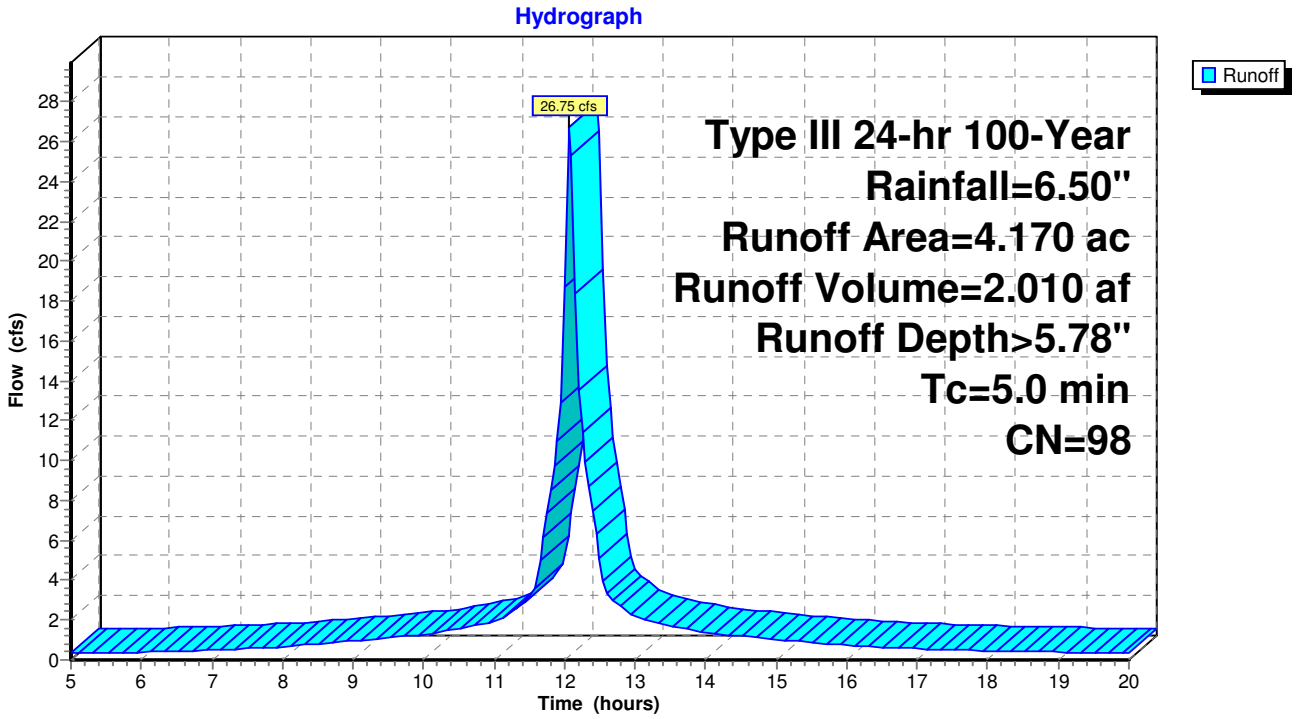
Runoff = 26.75 cfs @ 12.07 hrs, Volume= 2.010 af, Depth> 5.78"

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=6.50"

	Area (ac)	CN	Description
	0.010	61	>75% Grass cover, Good, HSG B
	0.300	98	Unconnected pavement, HSG B
*	3.860	98	Syn. Turf Field*
	4.170	98	Weighted Average
	0.010		0.24% Pervious Area
	4.160		99.76% Impervious Area
	0.300		7.21% Unconnected

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

Subcatchment DA-3: Syn. Turf



Summary for Subcatchment DA-4: PROPOSED

[49] Hint: Tc<2dt may require smaller dt

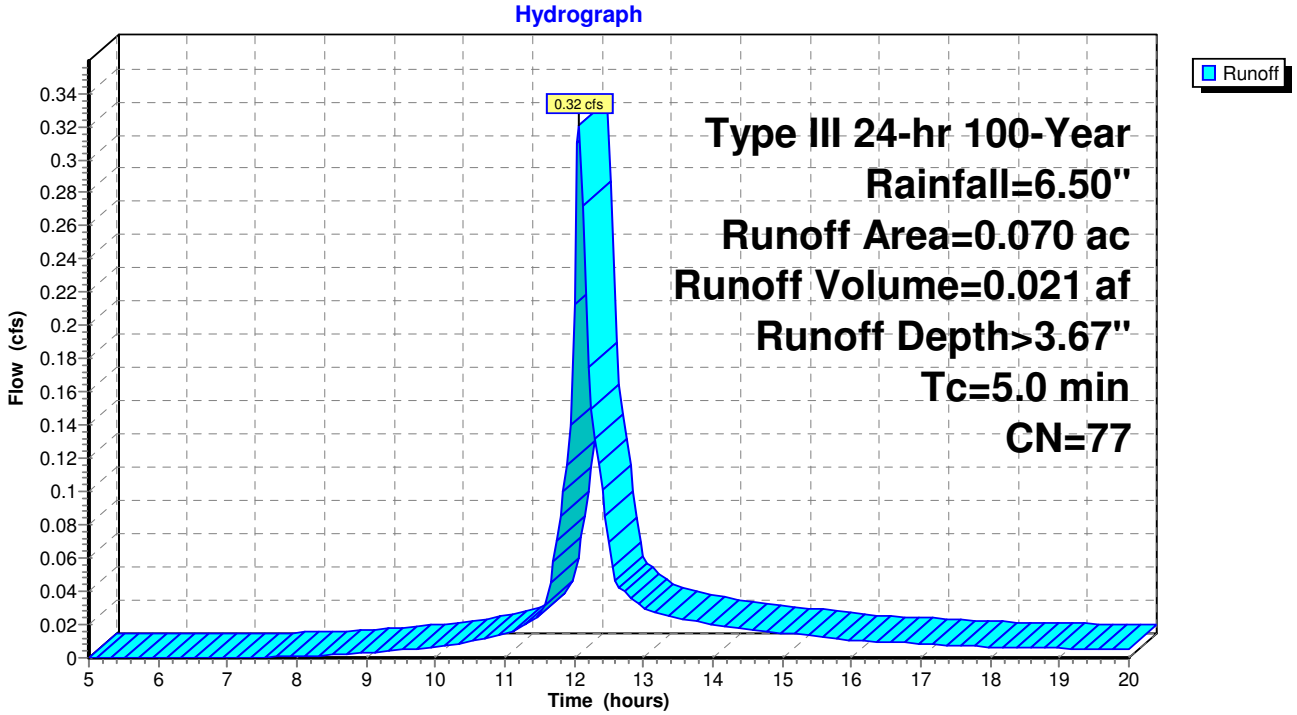
Runoff = 0.32 cfs @ 12.08 hrs, Volume= 0.021 af, Depth> 3.67"

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=6.50"

Area (ac)	CN	Description
0.040	61	>75% Grass cover, Good, HSG B
0.030	98	Unconnected pavement, HSG B
0.070	77	Weighted Average
0.040		57.14% Pervious Area
0.030		42.86% Impervious Area
0.030		100.00% Unconnected

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

Subcatchment DA-4: PROPOSED



Summary for Pond 1P: Bio-Retention Area

Inflow Area =	1.370 ac, 66.42% Impervious, Inflow Depth > 4.40" for 100-Year event				
Inflow =	7.03 cfs @	12.10 hrs,	Volume=	0.502 af	
Outflow =	5.10 cfs @	12.20 hrs,	Volume=	0.371 af,	Atten= 28%, Lag= 5.7 min
Discarded =	0.19 cfs @	12.20 hrs,	Volume=	0.154 af	
Primary =	4.90 cfs @	12.20 hrs,	Volume=	0.216 af	

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 4.08' @ 12.20 hrs Surf.Area= 0.188 ac Storage= 0.174 af

Plug-Flow detention time= 110.0 min calculated for 0.371 af (74% of inflow)
Center-of-Mass det. time= 48.2 min (818.0 - 769.8)

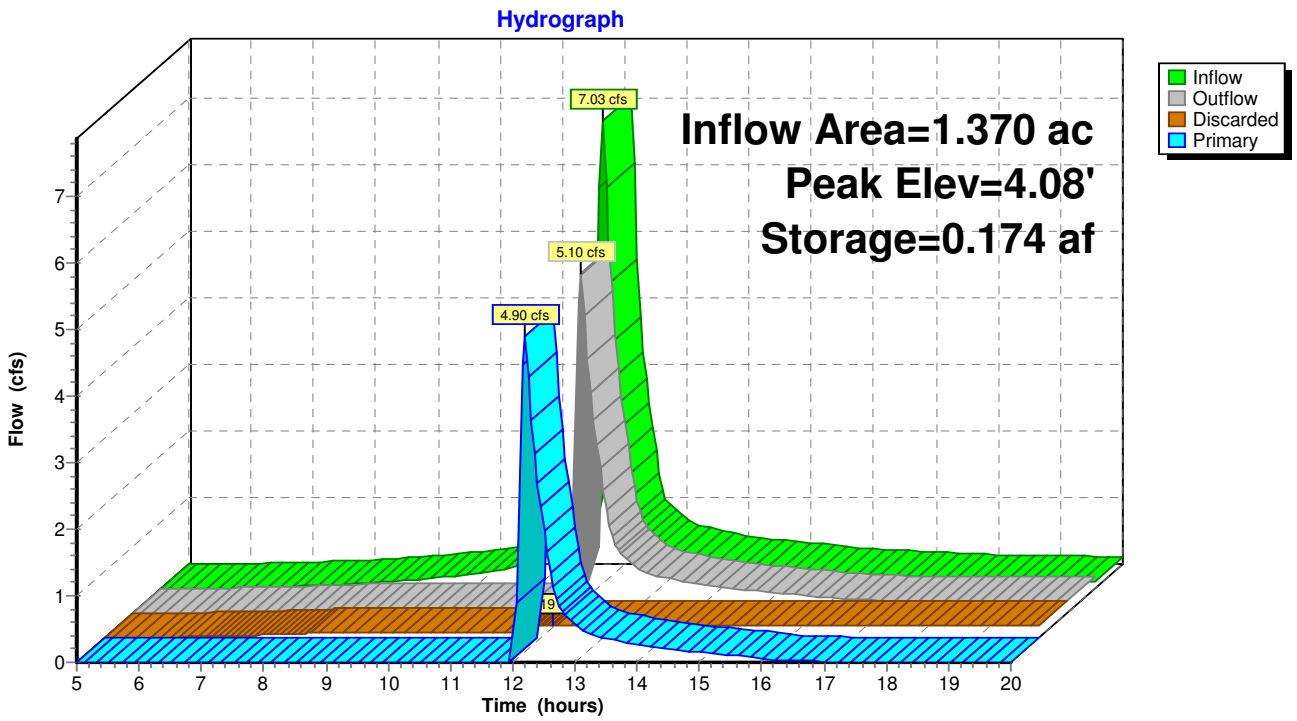
Volume	Invert	Avail.Storage	Storage Description
#1	0.00'	0.085 af	**20.00'W x 150.00'L x 3.00'H Prismatoid Z=1.0**
			0.243 af Overall x 35.0% Voids
#2	3.00'	0.117 af	**20.00'W x 150.00'L x 1.37'H Prismatoid Z=3.0**
		0.202 af	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Primary	3.75'	**10.0' long x 10.0' breadth Broad-Crested Rectangular Weir**
			Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60
			Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64
#2	Discarded	0.00'	**1.020 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.19 cfs @ 12.20 hrs HW=4.08' (Free Discharge)
└─**2=Exfiltration** (Exfiltration Controls 0.19 cfs)

Primary OutFlow Max=4.85 cfs @ 12.20 hrs HW=4.08' (Free Discharge)
└─**1=Broad-Crested Rectangular Weir** (Weir Controls 4.85 cfs @ 1.46 fps)

Pond 1P: Bio-Retention Area



Summary for Pond 2P: Engineered Base Stone (9" Depth)

[82] Warning: Early inflow requires earlier time span

Inflow Area =	4.170 ac, 99.76% Impervious, Inflow Depth > 5.78" for 100-Year event				
Inflow =	26.75 cfs @	12.07 hrs,	Volume=	2.010 af	
Outflow =	4.58 cfs @	12.52 hrs,	Volume=	2.009 af,	Atten= 83%, Lag= 27.2 min
Discarded =	3.97 cfs @	11.65 hrs,	Volume=	1.933 af	
Primary =	0.62 cfs @	12.52 hrs,	Volume=	0.076 af	

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 0.42' @ 12.52 hrs Surf.Area= 3.857 ac Storage= 0.572 af

Plug-Flow detention time= 34.4 min calculated for 2.008 af (100% of inflow)
Center-of-Mass det. time= 34.0 min (767.0 - 733.1)

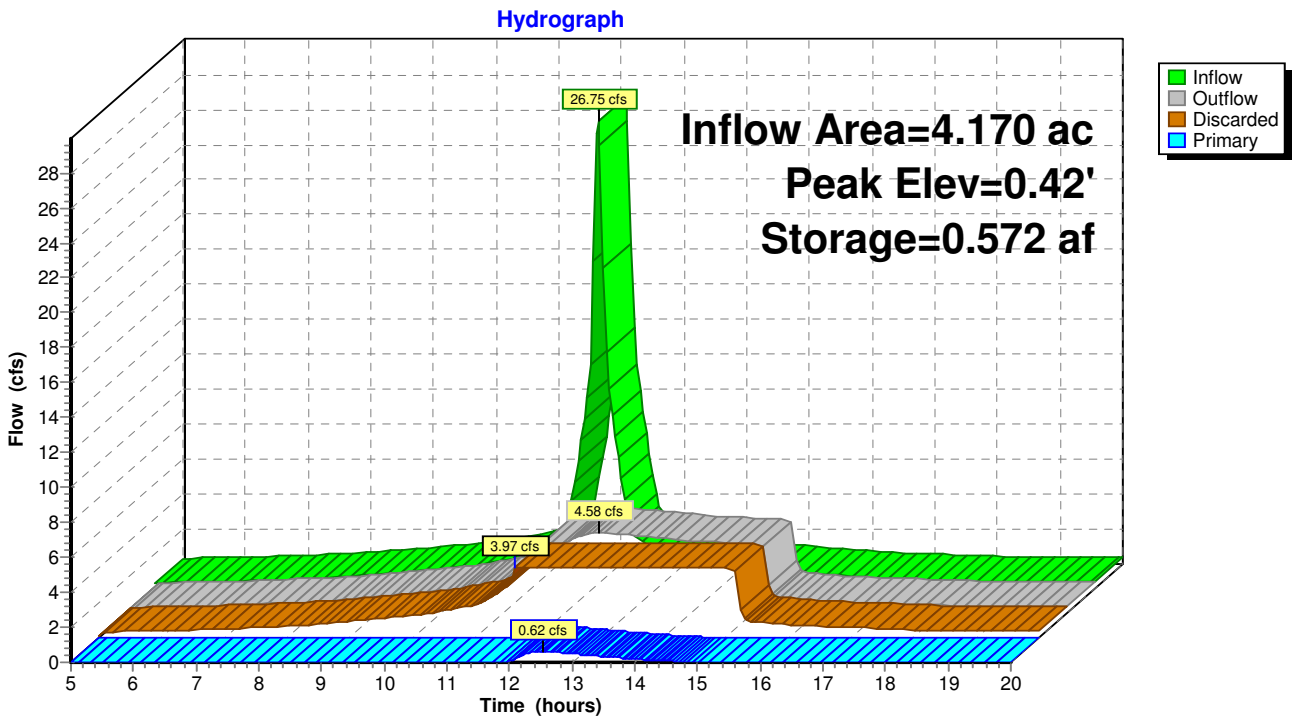
Volume	Invert	Avail.Storage	Storage Description
#1	0.00'	1.012 af	**350.00'W x 480.00'L x 0.75'H 9" Stone Base** 2.893 af Overall x 35.0% Voids
#2	0.75'	0.337 af	**350.00'W x 480.00'L x 0.25'H Top Stone + Infill Material** 0.964 af Overall x 35.0% Voids
		1.350 af	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	0.00'	**1.020 in/hr Exfiltration over Surface area**
#2	Primary	0.00'	**10.0" Vert. F.E.S.** C= 0.600

Discarded OutFlow Max=3.97 cfs @ 11.65 hrs HW=0.01' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 3.97 cfs)

Primary OutFlow Max=0.62 cfs @ 12.52 hrs HW=0.42' (Free Discharge)
└─**2=F.E.S.** (Orifice Controls 0.62 cfs @ 2.22 fps)

Pond 2P: Engineered Base Stone (9" Depth)



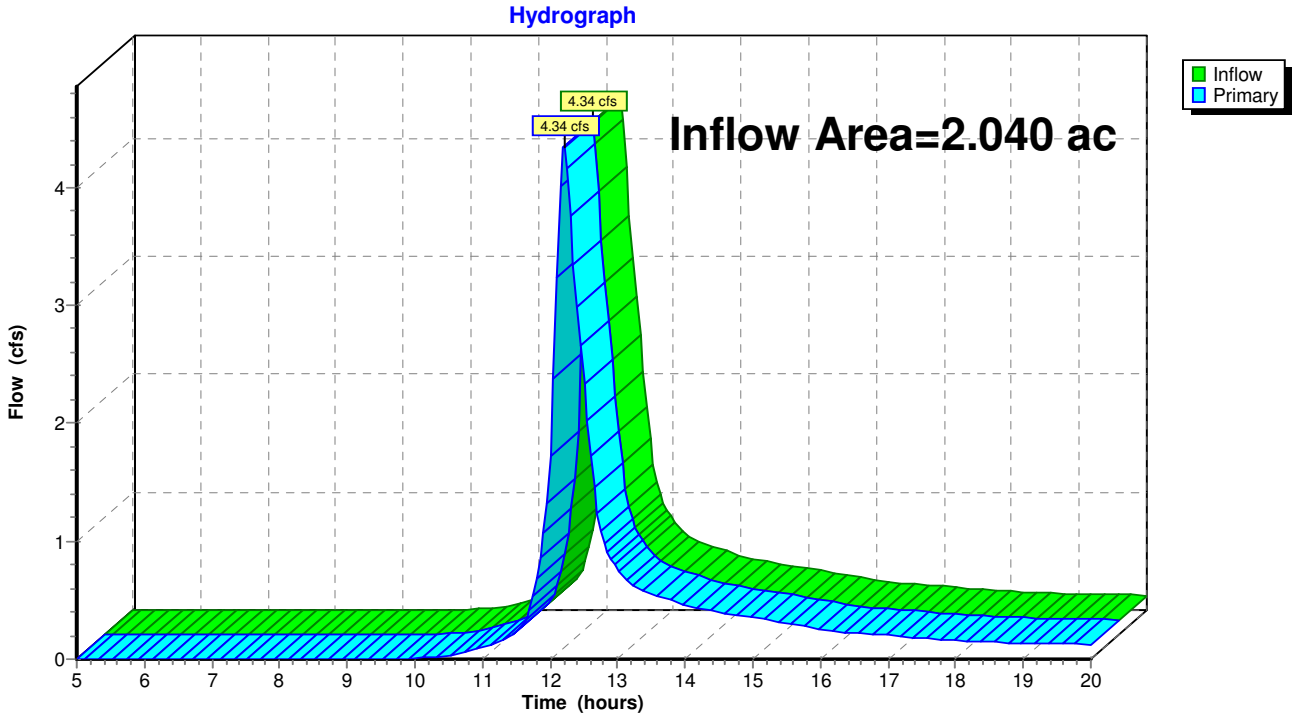
Summary for Pond DP-1: Northern Wetlands

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area =	2.040 ac,	7.84% Impervious,	Inflow Depth >	2.28"	for 100-Year event
Inflow =	4.34 cfs @	12.21 hrs,	Volume=	0.388 af	
Primary =	4.34 cfs @	12.21 hrs,	Volume=	0.388 af,	Atten= 0%, Lag= 0.0 min

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

Pond DP-1: Northern Wetlands



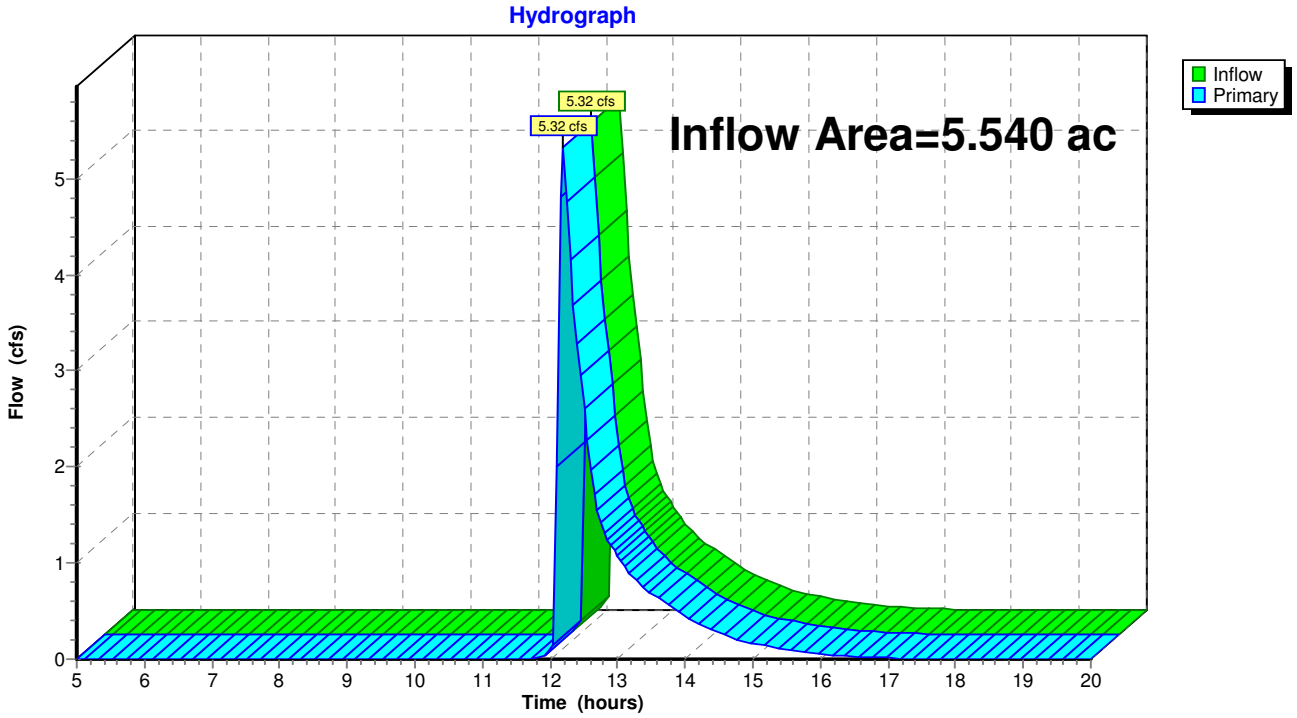
Summary for Pond DP-2: Southern Wetlands

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 5.540 ac, 91.52% Impervious, Inflow Depth = 0.63" for 100-Year event
Inflow = 5.32 cfs @ 12.20 hrs, Volume= 0.292 af
Primary = 5.32 cfs @ 12.20 hrs, Volume= 0.292 af, Atten= 0%, Lag= 0.0 min

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

Pond DP-2: Southern Wetlands



ATTACHMENT K

TSS REMOVAL CALCULATIONS

INSTRUCTIONS:

Non-automated: Mar. 4, 2008

1. Sheet is nonautomated. Print sheet and complete using hand calculations. Column A and B: See MassDEP Structural BMP Table
2. The calculations must be completed using the Column Headings specified in Chart and Not the Excel Column Headings
3. To complete Chart Column D, multiple Column B value within Row x Column C value within Row
4. To complete Chart Column E value, subtract Column D value within Row from Column C within Row
5. Total TSS Removal = Sum All Values in Column D

Location: Parking Lot (DA-2)

TSS Removal Calculation Worksheet

A BMP[1]	B TSS Removal Rate[1]	C Starting TSS Load*	D Amount Removed (B*C)	E Remaining Load (C-D)
Gravel filter Strip	0.25	1.00	0.25	0.75
Bio-Retention Area	0.80	0.75	0.60	0.15

Total TSS Removal = 85%

Separate Form Needs to be Completed for Each Outlet or BMP Train

Project: 715260
Prepared By: BTC
Date: 3/21/12

*Equals remaining load from previous BMP (E) which enters the BMP

Non-automated TSS Calculation Sheet must be used if Proprietary BMP Proposed
1. From MassDEP Stormwater Handbook Vol. 1

Mass. Dept. of Environmental Protection

ATTACHMENT L

OPERATION AND MAINTENANCE & EROSION AND SEDIMENT CONTROL PLAN

Operation and Maintenance
&
Erosion and Sediment Control Plan

ACTON BOXBOROUGH REGIONAL HIGH SCHOOL
LOWER FIELDS RENOVATIONS PROJECT
ACTON, MA

PART 1 – STORMWATER MANAGEMENT SYSTEM DESCRIPTION

1A. OWNER:

Acton Boxborough Regional School District
16 Charter Road
Acton, MA 01720

1B. OPERATION:

Stormwater carries pollutants and, by law, must be treated before its discharge to wetlands and water bodies. The site plans which accompany these instructions show the components of the treatment systems, the direction of flow and nearby resource areas.

Runoff generated by the parking lot and entrance drive will be routed through a gravel filter strip where suspended solids and oils/gases will be filtered, prior to its outfall to a bio-retention area. Once the runoff reaches the bio-retention area, it will then filter vertically through 30" of engineered media. This further treats the runoff prior to infiltration into the groundwater table and/or discharge to the adjacent wetlands. Runoff from large or intense storm events will exit the bio-retention through the rip-rap weir, which leads to a rip-rap area prior to release to the wetlands.

Clean runoff from the site walkways and athletic fields will flow via overland flow or "country drainage" before entering the adjacent wetlands.

Runoff from the synthetic turf fields will send storm water vertically through the sand and rubber infill material as well as the 1" top stone layer before reaching the base stone of the field. After permeating through the base stone, the runoff will either infiltrate into the well drained soils beneath the field or collect and drain via flat panel under drains and collector pipes. As a result of installing the base stone directly on the filter fabric separation layer, all of the stormwater that drains

from the field has the opportunity to infiltrate or recharge into the ground.

1C. NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES):

Because the total area proposed to be disturbed is more than one (1) acre, the project must conform to a Stormwater Pollution Prevention Plan (SWPPP) that shall be prepared in conformance with the National Pollutant Discharge Elimination System General Permit for stormwater discharge from construction activities (Federal Register, Part 2, February 17, 1998). A SWPPP will be submitted as part of the construction general permit, prior to commencement of any land disturbing activities.

PART 2 – RESPONSIBILITY FOR OPERATION AND MAINTENANCE

2A. PARTY RESPONSIBLE DURING CONSTRUCTION:

General Contractor - To Be Determined.

2B. PARTY RESPONSIBLE FOR POST-CONSTRUCTION:

Acton Boxborough Regional School District
16 Charter Road
Acton, MA 01720

PART 3 – INSPECTION AND MAINTENANCE SCHEDULE

3A. CONSTRUCTION SCHEDULE:

3A.1 CONSTRUCTION PERIOD POLLUTION CONTROL

Erosion and sedimentation control measures will be implemented prior to and during construction activities to minimize impacts from land disturbance activities. Erosion and sedimentation control measures implemented on the site will include, at a minimum, dust control measures, the installation of silt fence barriers on the up-gradient side of resource areas, catch basin inlet protection and temporary sediment basins. Controls may also include temporary seeding. The erosion and sedimentation controls will be inspected at the end of the day, if precipitation is forecast, and after each rainfall event of 0.5 inches or more. Should construction occur during the winter months, seasonally appropriate stabilization measures will be utilized.

Below is a summary of the minimum construction period pollution control requirements. These topics are presented as a means of demonstrating understanding of pollution control, but are not meant to supplant preparation of the SWPPP, as required in the NPDES permit. Please refer to the SWPPP, to be completed by the contractor, for complete construction activity details.

a. Dust Control

Mitigation measures will be implemented to control fugitive dust during construction activities. Dust control measure may include seeding, wet suppression, application of soil stabilization agents, or other measures to control dust generated by construction activities. The Contractor shall confirm with state and local regulations to see if the use of calcium chloride for dust suppression is allowed.

b. Erosion Control Barriers

Prior to any ground disturbance, erosion control barriers will be installed at the limit of work, at down-gradient positions on the site. The barriers will consist of silt fence and/or staked hay bales and will be entrenched in the soil to prevent underflow. Temporary diversion dikes shall also be used to prevent sediment discharge during construction.

c. Catch Basin Inlet Protection

All existing and newly installed catch basins shall be protected during construction with silt sacks or haybale filters. These sedimentation control measures will be regularly maintained until the drainage area tributary to the catch basin has been stabilized.

d. Temporary Sedimentation Basins and Diversion Swales

Temporary sedimentation basins will be constructed, after silt fencing and haybales have been installed, to prevent the transportation of fine-grained sediment into wetland resource areas and other off-site areas. These temporary basins will be located where appropriate, as determined by the contractor. Temporary diversion swales or berms shall be used, if deemed necessary by the contractor, to convey runoff from construction areas to temporary or previously constructed basins.

e. Temporary Seeding

Temporary seeding will be used where vegetative cover is required, for less than one year, on disturbed soil areas. Such areas will be seeded if the soils will be exposed without construction activity for more than 14 days. Rapidly growing annual grasses, such as annual rye grass, oats, perennial rye grass or winter rye will be uniformly applied. Depending on the slope, the soil may be covered with a layer of straw mulch, an erosion control blanket or a bonded fiber matrix.

f. Permanent Seeding

Upon completion of the final grading, any areas not covered by pavement or other forms of stabilization, including landscaping, will be seeded with rapidly growing annual rye grass/red fescue seed mix.

3B. POST-CONSTRUCTION SCHEDULE:

3B.1 ROUTINE SCHEDULE:

The property's stormwater handling facilities must be inspected on a regular basis. Routine inspections must be made during the months of April and October of each calendar year, as follows:

Inspect all pipes, structures and bio-retention areas at the locations shown on site plans. Look for settling around the structure and repair, as required. Look at the level of sand/silt in the bottom. If the level of sand/silt is greater than or equal to one-half the depth from the bottom of the invert of the lowest pipe in the basin, then the sediment shall be removed. Have the bottom cleaned if the outlet pipe appears blocked.

Look for signs of erosion at the edges of the pavement. Severe erosion may be caused by pipe blockage and result in overflows out of the culverts. Where surface erosion is evident, inspect all downstream structures and look for blockages.

Segmental Block Retaining Walls (if any)

Look for erosion at the top and bottom of all retaining walls. Repair as required.

Vegetation

Inspect for diseased/dying trees, shrubs, ground cover and grass. Remove/repair as required.

Flared End Sections

Inspect stone slope protection. Cut vegetation growing in the stones and remove all debris.

Bio-Retention Areas

Inspect in accordance with the Massachusetts Stormwater Management Standards (MASWMS), but no less than twice per year following installation and no less than once a year thereafter.

Inspect soil and repair eroded areas monthly. Re-mulch void areas, as needed. Replace mulch every two years, in the early spring.

Treat diseased vegetation, as needed. Remove and replace dead vegetation twice per year (spring and fall).

Upon failure, excavate the bio-retention area, scarify the bottom and sides, replace the filter fabric and soil, replant and mulch.

3B.2 NON-ROUTINE SCHEDULE:

Vegetation

Inspect after each significant rainfall (1" or more), for the first six (6)-months after construction, to ensure that surface vegetation is healthy, discharge devices are not blocked and banks are not eroding.

Check all components after each major storm (more than 2" rainfall in 24 hours). Clean and/or repair, as required.

3B.3 EMERGENCIES:

In the event of an emergency, spill release or other unexpected contamination event, all contaminated runoff from pavement must be prevented from leaving the property by performing the following:

1. At the discharge pipe to the wetlands, place layers of sand bags to block the pipe end at the wetlands.

2. The contractor must have ready at all times, filled sandbags (or equal) to accomplish containment throughout the construction activity.

PART 4 – DOCUMENTATION

The Owner shall perform inspections in accordance with the "Operation & Maintenance and Erosion Control Plan", as described in this document. A written inspection record should document all areas of concern and identify names of inspectors and dates of inspection (*see attached Operation & Maintenance Log*).

Erosion Control Notes

1. Prior to large or intense rainfall/runoff events, the Contractor shall apply mulch to stabilize disturbed areas not stabilized by vegetation.

2. All drainage and erosion control construction shall be located as depicted on the plan, and as required by the Engineer in the field, dependent on the actual progress and sequence of construction.

3. A silt fence shall be installed around all stockpiled material.

4. All disturbed areas are to be temporarily or permanently stabilized within fourteen (14) days of disturbance.

5. All disturbed areas not under current construction shall be stabilized by rough grading to minimize slopes and then mulched. Following the final grading of any portion of the site, the Contractor shall loam, seed and mulch within forty-eight (48) hours. In areas where the seed and mulch do not take root, erosion control blankets shall be utilized.

6. Erosion control measures shall be monitored and maintained throughout construction and removed after the project area and drainage courses are fully established and stable.

7. Siltation fence shall be installed according to the manufacturer's recommendations. Where possible, silt fences shall be aligned parallel to slope contours, with the ends curved uphill.

8. Inspection and Maintenance: Inspect erosion and sediment control measures frequently. Pay careful attention to weather predictions. Watch for predicted thaws or heavy rains. Before such events, check all control measures to be sure that the structures will manage the potentially heavy and intense runoff and sediment.

As early as is practical, install permanent vegetative controls, such as loaming, seeding, sodding, mulching and planting trees.

9. Any slopes greater than 3:1 shall be matted with an erosion control mat, such as North American Green or an approved equal.

10. In loose soil conditions, the use of staple or stake lengths greater than 6" (15cm) may be necessary to properly secure the blankets.

11. If not otherwise noted on the plans, use North American Green SCI50 on slopes less than 2H:1V and C125 matting on slopes greater than 2H:1V and less than 1.5H:1V.

Operation & Maintenance Log

Project Name: Acton Boxborough Regional School District Lower Fields Renovations Project
Contact Person:

Inspection Date	Inspector Name(s)	Description of BMP Deficiency	Corrective Action Needed (including planned date/responsible person)	Date Action Taken/Responsible person

ATTACHMENT M

ABUTTER NOTIFICATION

AFFIDAVIT OF SERVICE

Under the Massachusetts Wetlands Protection Act

(to be submitted to the Massachusetts Department of Environmental Protection and the Conservation Commission when filing a Notice of Intent)

I, Peter Spanos, hereby certify under the pains and penalties of perjury that on April 5, 2012 (*date*) I gave notification to abutters in compliance with the second paragraph of Massachusetts General Laws Chapter 131, Section 40, and the DEP Guide to Abutter Notification dated April 8, 1994, in connection with the following matter:

A Notice of Intent filed under the Massachusetts Wetlands Protection Act by Acton Boxborough Regional School District with the Acton Conservation Commission on April 5, 2012 (*date*) for property located at 16 Charter Road (*project location*), Acton.

The form of the notification, and a list of the abutters to whom it was given and their addresses, are attached to this Affidavit of Service.

Name

April 5, 2012
Date

Town of Acton
472 Main Street
Acton, MA 01720
Telephone (978) 929-6621
Fax (978) 264-9630

Brian McMullen
Assessor

Locus: **66 HAYWARD RD**
Parcel ID: **F3-16 F3-16-1**

Location	Parcel ID	Owner	Co-Owner	Mailing Address	City	ST	Zip
87 HAYWARD RD	F3-1	HAARTZ AUTO FABRICS CO		87 MAIN ST	ACTON	MA	01720
70 HAYWARD RD REAR	F3-15	ACTON BOXBORO REG SCHOOL		472 MAIN ST	ACTON	MA	01720

The owner of land sharing a common boundary or corner with the site of the proposed activity (100 feet) in any direction, including land located directly across a street, way, creek, river, stream, brook or canal. The above are as they appear on the most recent applicable taxes.

Marty Abbott

MARTY ABBOTT MARCH 12,2012

Acton Assessors Office

Town of Acton
472 Main Street
Acton, MA 01720
Telephone (978) 929-6621
Fax (978) 264-9630

Brian McMullen
Assessor

Locus: **70 HAYWARD RD REAR**
Parcel ID: **F3-15 F3-74-1**

Location	Parcel ID	Owner	Co-Owner	Mailing Address	City	ST	Zip
68 HAYWARD RD	**F3-16-1**	ACTON TOWN OF		742 MAIN ST	ACTON	MA	01720
23 CHARTER RD REAR	**F3-31-1**	ACTON BOXBORO REG SCHOOL		472 MAIN ST	ACTON	MA	01720
23 CHARTER RD	**F3-27**	ACTON BOXBORO REG SCHOOL		472 MAIN ST	ACTON	MA	01720
82 HAYWARD RD	**F3-8**	ROBERTSON REALTY TRUST	C/O DONALD ROBERTSON	133 SAND HILL RD	GROTON	MA	01450
86 HAYWARD RD	**F3-7**	HAARTZ AUTO FABRICS CO		86 HAYWARD RD	ACTON	MA	01720
66 HAYWARD RD	**F3-16**	ACTON TOWN OF		472 MAIN ST	ACTON	MA	01720
9 CHARTER RD	**F3-31**	TOWN OF ACTON		472 MAIN ST	ACTON	MA	01720
300 MAIN ST	**F3-74**	ACTON HISTORICAL SOCIETY INC		PO BOX 2389	ACTON	MA	01720
321 MAIN ST	**F3-82**	ACTON CROSSROADS INC		321 MAIN ST	ACTON	MA	01720
315 MAIN ST	**F3-81**	E +A NORTHEAST LIMITED PARTNERSHIP		PO BOX 528	COLUMBIA	SC	29202
313 MAIN ST	**F3-89-1**	ACTON CROSSROADS INC		321 MAIN ST	ACTON	MA	01720
295 MAIN ST	**F3-89**	E +A NORTHEAST LIMITED PARTNERSHIP	C/O EDENS + AVENT	PO BOX 528	COLUMBIA	SC	29202

The owner of land sharing a common boundary or corner with the site of the proposed activity (100 feet) in any direction, including land located directly across a street, way, creek, river, stream, brook or canal.
The above are as they appear on the most recent applicable taxes.

Marty Abbott

MARTY ABBOTT MARCH 12,2012

Acton Assessors Office

NOTIFICATION TO ABUTTERS
UNDER THE MASSACHUSETTS WETLANDS PROTECTION ACT
AND THE TOWN OF ACTON WETLANDS BYLAW

In accordance with the second paragraph of Massachusetts General Laws Chapter 131, Section 40 and the Town of Acton Bylaws, you are hereby notified of the following:

The Applicant: Acton Boxborough Regional School District

Address 16 Charter Road, Acton, MA Phone (978) 264-3300

has filed a Notice of Intent with the Acton Conservation Commission seeking permission to remove, fill, dredge or alter an Area Subject to Protection under the Wetlands Protection Act.

Applicant's Representative: Gale Associates, Inc.

Address 163 Libbey Parkway, Weymouth, MA 01289 Phone (781) 335-6465

The address of the property where the activity is proposed 16 Charter Road, Acton, MA 01720

Town Atlas Plate/Map F3-15, F3-16 Parcel/Lot

Project Description The Acton Boxborough Regional School District (ABRSD) is proposing to renovate The Lower Fields athletic facilities which are located at the Acton Boxborough Regional High School. The renovation project will consist of the construction of one (1) natural turf multipurpose field, two (2) synthetic turf multipurpose fields, new athletic lighting, improvements to the adjacent T.J. O'Grady Skate Park, expansion of existing parking area, improved stormwater management and related site improvements.

For more information please contact the Conservation Office at 978-929-6634 or email NR@acton-ma.gov. Copies of the Notice of Intent may be examined at the Conservation Office, Acton Town Hall, 472 Main Street, Acton between the hours of 9:00 A.M. and 4:30 P.M. Monday through Friday.

A Public Hearing will be held at the Acton Town Hall, 472 Main Street, on Wednesday,
April 18, 2012 at 7:00 P.M.
(date)

The notice of the public hearing will be published at least five (5) days in advance in the Acton edition of the *Beacon* newspaper or *Metrowest Daily News*.

NOTE: You may also contact your local conservation commission or the nearest Department of Environmental Protection Regional Office* for the information about this application or, the Wetlands Protection Act. Acton is in the Central Region. To contact DEP, call:

***DEP Central Region: 508-792-7650**
627 Main Street, Worcester, MA 01608