

**NOTICE OF INTENT**

**IMPROVEMENT OF A RESOURCE AREA**

**WEATHERBEE PLAZA LLC PROPERTY  
GREAT ROAD/ROUTES 2A & 119  
ACTON, MA**

**PREPARED BY:**

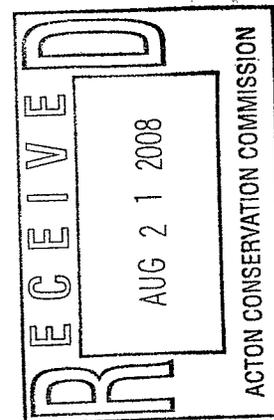
Caron Environmental Consulting  
PO Box 417  
170 State Road East  
Westminster, MA 01473

**SUBMITTED TO:**

Town of Acton Conservation Commission  
Acton Town Hall  
472 Main Street  
Acton, MA 01720

**SUBMITTED ON BEHALF OF:**

Weatherbee Plaza LLC  
6 Proctor Street  
Acton, MA 01720



August 2008

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## **INTRODUCTION:**

It is proposed to improve and restore a small, disturbed bordering vegetated wetland, which is dominated by exotic invasive plants, at 107 to 111 Great Road/Route 2A & 119 in Acton. The proposed improvement will alter approximately 6,173 square feet (SF) of bordering vegetated wetland and 6,689 SF of upland within the 100-foot buffer zone. The altered wetland will be improved and restored to wetland; 2482 SF of the altered upland will be improved and restored to upland; and 1,520 SF of the altered upland will be converted to wetland as part of the improvement.

The purpose of the wetland improvement is to increase the aesthetic quality of the area, and at the same time maximize the capacity of the wetland to protect the interests identified in the Wetlands Protection Act (M.G.L. c. 131, § 40). According to 310 CMR 10.53(4), "*the issuing authority may issue an Order of Conditions for projects which will improve the natural capacity of a resource area(s) to protect the interests identified in M.G.L. c. 131, § 40. Such projects include, but are not limited to, the removal of aquatic nuisance vegetation to retard pond and lake eutrophication and the thinning or planting of vegetation to improve habitat value.*" The above-mentioned "interests," which we intend to improve upon, consider that bordering vegetated wetlands are likely to be significant to public or private water supply, ground water supply, flood control, storm damage prevention, prevention of pollution, protection of fisheries, and wildlife habitat.

## **EXISTING CONDITIONS:**

The wetland system that runs through the site includes an intermittent stream, a narrow strip of bordering vegetated wetland (BVW) along the stream, and a small BVW connected to the stream by a narrow wetland corridor. The intermittent stream begins just inside of abutting property to the north, in a moderately flat wooded area. It continues about 420 linear feet across the site to a Great Road. The narrow strip of BVW along the stream is dominated by European Buckthorn\*, Morrow's Honeysuckle\*, Swamp Dogwood, Jewelweed, and Sensitive Fern. The small adjoining BVW is connected to the intermittent stream by a narrow wetland corridor, which acts as a spillway during high water flow. The adjoining BVW is about 6,100 square feet in size and is dominated by Morrow's Honeysuckle\*, Purple Loosestrife\*, Smooth Alder, Jewelweed, and Common Reed\*. It appears to hold water through at least part of the growing season and dries up by mid summer in most years. The forested uplands adjacent to the stream and wetlands are dominated by Quaking Aspen, European Buckthorn\*, Morrow's Honeysuckle\*, Japanese Knotweed\*, and Fox Grape. The adjacent non-forested uplands contain lawn and commercial development. In some areas the wetlands are immediately bordered by lawn. The dominant vegetation in all non-developed areas is composed of state-listed invasive plants. The attached site plan shows the existing site conditions.

### **Interests of the Wetlands Protection Act**

**Public or Private Water Supply:** A wetland may be important to a public or private water supply if it drains into that water supply. The wetland can act to filter pollutants (such as sediment, excessive nutrients, and toxins) before they enter the water supply and it can also act as a steady source of water for the water supply. The intermittent stream adjacent to the wetland to be improved may eventually drain into Ice House Pond and Warner's Pond, and may drain into private water supplies, but the wetland appears to have little to no influence on water entering those water bodies. Some water from the stream may flow into the wetland during heavy rain events, but the wetland does not have an outlet that would return water to the stream channel. Even though water from the wetland does not directly enter the stream through an outlet, it could percolate through the ground and into the stream. This does not seem likely, however, as the wetland appears to be underlined with bedrock, which would severely limit a connection to groundwater.

\*State-listed invasive plants.

Ground Water Supply: Bordering vegetated wetlands usually have potential to serve as ground water recharge and/or discharge areas. As mentioned above, this wetland appears to be underlined with bedrock, which would limit the amount of water exchange to and from groundwater. It appears that water entering this wetland mostly comes from up-gradient surface water flow, and partly from water spilling over the stream banks during high water flow. The main export of water from the wetland appears to be from evaporation and transpiration from plants, not from percolation into the groundwater. Therefore, this wetland appears to have little to no significant influence on the groundwater supply.

Flood Control: Wetlands may have the ability to reduce flood damage by slowing, retaining, and gradually releasing water flow. This is important to the stability of an ecosystem and areas of social or economic value where erosion and flooding is likely. The area around the wetland to be improved does not seem very prone to flooding; the stream is very ephemeral and the wetland appears to rarely fill with water. In the absence of the wetland, it seems possible that water could flow into nearby developed areas and cause flooding problems during extreme water flow events.

Storm Damage Prevention: Wetlands along major waterbodies can protect the adjacent shorelines during storm events. This is accomplished primarily by dissipating the energy of flood waters and flowage ice. This wetland is not subject to these types of events, and therefore, this interest is not relevant here.

Prevention of Pollution: Wetlands can be important to the prevention of pollution as they can capture and/or treat a wide variety of potential pollutants. This often occurs through the biochemical treatment of pollutants, such as petrochemicals, within the active soil layer and within the plants. In addition, the irregular topography of many wetlands can entrap particulate pollutants such as sediments, before they can enter waterbodies or waterways. This wetland area has the potential to be important to the prevention of pollution. Its capacity to do so, however, is not fully realized due to the type of vegetation it contains. In most instances, native wetland species have been found to better treat runoff than invasive species, such as common reed.

Protection of Fisheries: Some wetlands and waterways provide important fish and/or shellfish habitat. This wetland and stream do not contain permanent water and are not connected to habitat containing permanent water, so they contain no fish or potential fishery habitat.

Wildlife Habitat: No Important Habitat Features or Activities described in the *Wildlife Habitat Protection Guidance, Appendix A: Simplified Wildlife Habitat Evaluation* were found on the site. In order to more fully examine the area we also evaluated it based on the *Wildlife Habitat Protection Guidance, Appendix B: Detailed Wildlife Habitat Evaluation*. Few of the habitat characteristics described in the *Detailed Wildlife Habitat Evaluation* were found on the site. The habitat characteristics encountered were: the presence of upland and wetland food plants; dense herbaceous cover; branches overhanging standing water; a depression that may serve as a seasonal pool; standing water during at least part of the growing season; and emergent vegetation at least seasonally flooded during the growing season. All of these habitat characteristics occur in minimal quantity and/or quality on the site, and do not appear to be very important to wetland wildlife. The 12<sup>th</sup> Edition of the Natural Heritage Atlas does not indicate any Certified Vernal Pools or Estimated Habitat areas for state-listed wetlands wildlife species on or near the property.

### **RECOMMENDED IMPROVEMENT MEASURES:**

As stated above, the wetlands on the site appear to have been disturbed in the past and are dominated by exotic invasive plants. We propose to improve the worst section of wetland, which is the wetland area not immediately adjacent to the stream. It provides low quality wetland wildlife habitat and is also visually unappealing. The purpose of the wetland improvement is to increase the aesthetic quality of the area, and at the same time maximize the capacity of the wetland to protect the interests identified in the Wetlands Protection Act. The project as currently designed includes several improvement measures that not only ensure compliance with the required performance standards, but also increase the capability of the area to support wetlands wildlife, to prevent pollution and to protect public and private water supplies. The details of the proposed improvement measures are on the attached site plan.

## **Removal of Invasive Plants**

The main concern for improving this area is in removing the invasive plants. These invasive plants tend to out-compete native plants and grow incredibly dense, which upsets the natural ecosystem. Invasive plants will be cut and removed from the improvement area. Invasive species in the adjacent area should also be cut and removed to the maximum extent practical. Because of extensive seed and root systems in the soil, it will be necessary to remove all of the topsoil in the area to be improved. The topsoil will be replaced with loam that is as free of weed seed as possible. This loam should not be obtained from on-site, as it likely contains propagules from invasive species.

## **Wetland and Upland Alteration**

After the removal of invasive plants and soil we propose to expand the wetland area by converting some of the adjacent uplands into wetland. The outlet from the area will be constructed in such a way that it only releases water at high water levels, so that the wetland can continue to retain and store as much water as possible, as it does now.

In addition to the expanded wetland area, we propose to create a deeper pool of water within the improved wetland. This pool would potentially offer a longer duration of standing water within the wetland and better, more diverse habitat for wetland wildlife. Due to the potential for shallow bedrock in the improvement area, it may not be possible to create a deeper pool without blasting. If this is the case, the pool will not be constructed since bedrock may be a major contributing factor to the hydroperiod of the wetland.

## **Vegetation Replacement**

The improvement area will be planted with native wetland herbs, trees and shrubs and seeded with a wetland seed mix. We recommend that the wetland be seeded extra densely to minimize the risk of re-establishment of invasive species occurring near the site or weeds that may be present in the loam. The dense seeding will also provide thick herbaceous cover that is beneficial to wetland wildlife. The herbaceous plantings will be made in the wettest portion of the area, below elevation 145. The species and placement of the trees and shrubs is detailed on the site plan. These species are recommended because they are among the species already found on or near the site and/or they can provide quality food and cover for wetland wildlife.

## **Addition of Habitat Structure**

Finally, large woody debris should be placed in the improvement area to provide cover and nesting habitat for small mammals, reptiles, and amphibians. Also, a porous stone or log check dam should be placed along the stream to provide cover and regulate water flow rates. These additions will further improve habitat for wetland wildlife.

## **CONCLUSION:**

The wetland proposed to be improved appears to contain habitat of low suitability for wetland wildlife species, so therefore does not contain important wetland wildlife habitat. The suitability of the site to support important wetland habitat should be significantly increased if the wetland is properly reconstructed. The wetlands ability to protect the other interests of the Act should also be significantly increased.

Considering its apparent history of disturbance and the dominance of invasive plants, combined with its lack of suitability for wetland wildlife, the improvement of the wetland, following correct procedures, could only benefit its ability to protect the interest of the Act. The proper and timely restoration of the wetland is of utmost importance in improving the quality of the site. It is the opinion of this office that the proposed alteration will increase the capacity of the wetland to protect the interests identified in the Wetlands Protection Act and will not result in an impairment of important wetland wildlife habitat functions.



# WPA Form 3 – Notice of Intent

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

MassDEP File Number

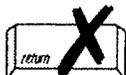
Document Transaction Number

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):

<u>107-111 Great Road</u>	<u>Acton</u>	<u>01720</u>
a. Street Address	b. City/Town	c. Zip Code
Latitude and Longitude:		
<u>G-4</u>	<u>42-28-43 N</u>	<u>71-24-48 W</u>
f. Assessors Map/Plat Number	d. Latitude	e. Longitude
	<u>28</u>	
	g. Parcel /Lot Number	

2. Applicant:

<u>Leo</u>	<u>Bertolami</u>	
a. First Name	b. Last Name	
<u>Wetherbee Plaza, LLC</u>		
c. Organization		
<u>6 Proctor Street</u>		
d. Street Address		
<u>Acton</u>	<u>MA</u>	<u>01720</u>
e. City/Town	f. State	g. Zip Code
<u>978-263-2000</u>		
h. Phone Number	i. Fax Number	j. Email Address

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

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

4. Representative (if any):

<u>Charles</u>	<u>Caron</u>	
a. First Name	b. Last Name	
<u>Caron Environmental Consulting</u>		
c. Company		
<u>P.O. Box 417</u>		
d. Street Address		
<u>Westminster</u>	<u>MA</u>	<u>01473</u>
e. City/Town	f. State	g. Zip Code
<u>978-874-5469</u>	<u>978-874-1790</u>	<u>caronenv@aol.com</u>
h. Phone Number	i. Fax Number	j. Email address

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

<u>\$110.00</u>	<u>\$42.50</u>	<u>\$67.50</u>
a. Total Fee Paid	b. State Fee Paid	c. City/Town Fee Paid



# WPA Form 3 – Notice of Intent

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

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## A. General Information (continued)

6. General Project Description:

Restoration of a degraded bordering vegetated wetland.

7a. Project Type Checklist:

- |   |   |
|---|---|
| 1. <input type="checkbox"/> Single Family Home                | 2. <input type="checkbox"/> Residential Subdivision                   |
| 3. <input type="checkbox"/> Limited Project Driveway Crossing | 4. <input type="checkbox"/> Commercial/Industrial                     |
| 5. <input type="checkbox"/> Dock/Pier                         | 6. <input type="checkbox"/> Utilities                                 |
| 7. <input type="checkbox"/> Coastal Engineering Structure     | 8. <input type="checkbox"/> Agriculture (e.g., cranberries, forestry) |
| 9. <input type="checkbox"/> Transportation                    | 10. <input checked="" type="checkbox"/> 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:

310 CMR 10.53 (4)

2. Limited Project

8. Property recorded at the Registry of Deeds for:

Middlesex South

a. County

42747

c. Book

b. Certificate # (if registered land)

373

d. Page Number

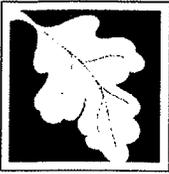
## B. Buffer Zone & Resource Area Impacts (temporary & permanent)

- 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.
- 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. <input type="checkbox"/> Bank	1. linear feet	2. linear feet
b. <input type="checkbox"/> Bordering Vegetated Wetland	1. square feet	2. square feet
c. <input type="checkbox"/> Land Under Waterbodies and Waterways	1. linear feet 3. cubic yards dredged	2. linear feet



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

<u>Resource Area</u>	<u>Size of Proposed Alteration</u>	<u>Proposed Replacement (if any)</u>
d. <input type="checkbox"/> Bordering Land Subject to Flooding	1. square feet _____ 3. cubic feet of flood storage lost _____	2. square feet _____ 4. cubic feet replaced _____
e. <input type="checkbox"/> Isolated Land Subject to Flooding	1. square feet _____ 2. cubic feet of flood storage lost _____	3. cubic feet replaced _____
f. <input type="checkbox"/> 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: \_\_\_\_\_ 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.

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



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

Table with 3 columns: Description, Size of Proposed Alteration, Proposed Replacement (if any). Rows include Coastal Banks, Rocky Intertidal Shores, Salt Marshes, Land Under Salt Ponds, Land Containing Shellfish, Fish Runs, Land Subject to Coastal Storm Flowage, and Restoration/Enhancement.

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)?

a. [ ] Yes [X] 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

12 Edition

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.



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## 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.nhosp.org](http://www.nhosp.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.



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## 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:

North Shore - Hull to New Hampshire:

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

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

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?

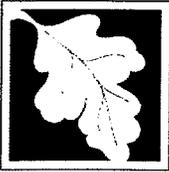
a.  Yes. Attach a copy of the Stormwater Report as required by the Stormwater Management Standards per 310 CMR 10.05(6)(k)-(q) and check if:

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.

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



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## 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.

Wetherbee Plaza Extension

a. Plan Title

Acton Survey and Engineering

b. Prepared By

August 5, 2008

d. Final Revision Date

Mark Donohoe

c. Signed and Stamped by

1"=20'

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:

2534

2. Municipal Check Number

7/28/08

3. Check date

2535

4. State Check Number

7/28/08

5. Check date

Wetherbee Plaza, LLC

6. Payor name on check: First Name

7. Payor name on check: Last Name



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## 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.

*Paul E. Curran - As Agent*

*8/19/08*

1. Signature of Applicant

2. Date

3. Signature of Property Owner (if different)

4. Date

*Paul E. Curran*

*8/19/08*

5. Signature of Representative (if any)

6. Date

### 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.

**WETHERBEE PLAZA LLC**  
97-115 GREAT ROAD  
ACTON MA 01720

2534

DATE 7/28/08

5-7017/2110  
301

PAY TO THE ORDER OF  
Town of Acton

\$ 95.00

Ninety Five Dollars and no/100 \* \* \* \* \* DOLLARS

Security Features  
Check on Back

**Citizens Bank**  
Massachusetts

FOR [Redacted] Leo Bertalan

**WETHERBEE PLAZA LLC**  
97-115 GREAT ROAD  
ACTON MA 01720

2535

DATE 7/28/08

5-7017/2110  
301

PAY TO THE ORDER OF  
Commonwealth of Massachusetts

\$ 42.50

Forty Two Dollars and 50/100 \* \* \* \* \* DOLLARS

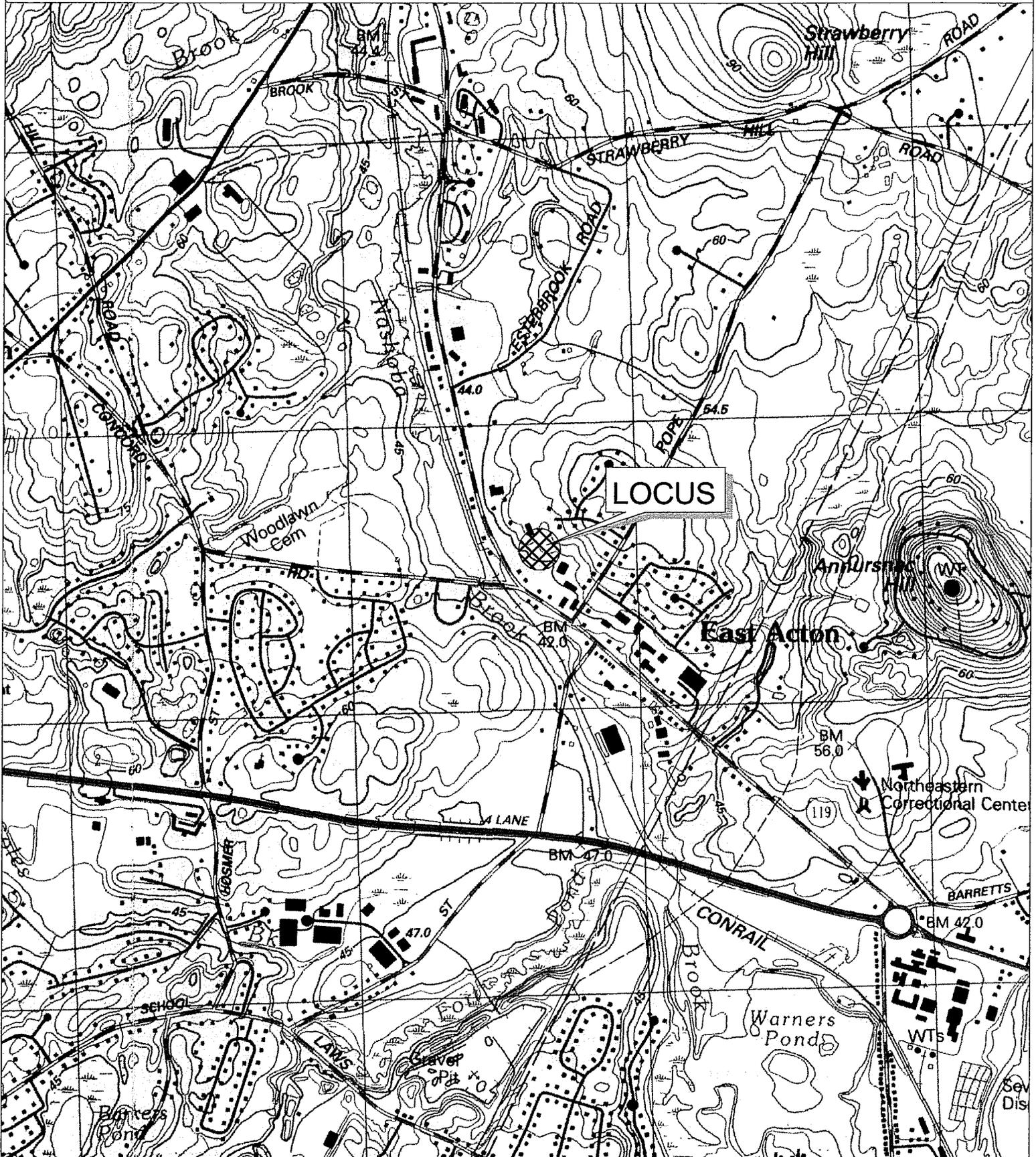
Security Features  
Check on Back

**Citizens Bank**  
Massachusetts

FOR [Redacted] Leo Bertalan

# LOCUS MAP

## 107-111 GREAT ROAD, ACTON, MA



0.25 0 0.25 0.5 0.75 Miles

SCALE: 1:24,000



**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:

Leo Bertolami  
 a. First Name b. Last Name  
 Wetherbee Plaza, LLC  
 c. Organization  
 6 Proctor Street  
 d. Mailing Address  
 Acton MA 01720  
 e. City/Town f. State g. Zip Code  
 978-263-2000  
 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:

107-111 Great Road Acton  
 a. Street Address b. City/Town

**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.

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



**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
Resource Area Improvement	1	\$110	\$110

**Step 5/Total Project Fee:** \$110.00

**Step 6/Fee Payments:**

Total Project Fee:	<u>\$110.00</u>
State share of filing Fee:	<u>\$42.50</u>
City/Town share of filling Fee:	<u>\$67.50</u>
	a. Total Fee from Step 5
	b. 1/2 Total Fee less \$12.50
	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.)



**Town of Acton**  
 472 Main Street  
 Acton, MA 01720  
 Telephone (978) 264-9622  
 Fax (978) 264-9630

Brian McMullen  
 Assistant Assessor

**Locus:** 111 GREAT RD  
**Parcel:** G4-28

Location	Parcel ID	Owner	Co-Owner	Mailing Address	City	ST	Zip
128 GREAT RD	F4-104	ATLANTIC HOLDINGS, INC.	C/O WOODSHIRE MANAGEMENT	C 132 GREAT ROAD	ACTON	MA	01720
121 GREAT RD	F4-105	FEDERAL INVESTMENT TRUST NO 1		PO BOX 393	BEDFORD	MA	01730
124 GREAT RD	G4-10	MADISON GROUP LLC		4 BREEZY POINT RD	ACTON	MA	01720
120 CONCORD RD	G4-27	TOWN OF ACTON		472 MAIN STREET	ACTON	MA	01720
107 GREAT RD	G4-28-1	WETHERBEE PLAZA LLC		6 PROCTOR STREET	ACTON	MA	01720
127 CONCORD RD	G4-49	JOHNSON ROBERT A		127 CONCORD RD	ACTON	MA	01720
129 CONCORD RD	G4-49-7	TORODE NANCY		129 CONCORD RD	ACTON	MA	01720
103 GREAT RD	G4-50	WETHERBEE PLAZA LLC		6 PROCTOR STREET	ACTON	MA	01720
93 GREAT RD	G4-93	MORRILL EDWARD L	MORSTEIN	PO BOX 2350	ACTON	MA	01720
94 GREAT RD	G4-122	BURSAW JEFFREY W		27 MILLBROOK LANE	BOLTON	MA	01740
128 CONCORD RD	G4-211	TOWN OF ACTON		472 MAIN STREET	ACTON	MA	01720
108 GREAT RD	G4-212	TOWN OF ACTON		472 MAIN STREET	ACTON	MA	01720
10 BRAEBROOK RD	G5-1	IANDOLI BRYAN P	ADAMS DEBBY H	10 BRAEBROOK RD	ACTON	MA	01720
8 BRAEBROOK RD	G5-2	SCHNEIDER ROBERT J	BARBARA	8 BRAEBROOK RD	ACTON	MA	01720
83 GREAT RD REAR	G5-8	MORRILL EDWARD L ETA	MORSTEIN	PO BOX 2350	ACTON	MA	01720

**MBTA**

C/O TRANSIT REALTY ASSOCIATES, LLC ATTN: VANESSA MERRITT

77 FRANKLIN ST 9TH FLOOR

BOSTON MA 02110

Abutters and owners of land directly opposite on any public or private street or way and abutters to the abutters within three hundred feet of the property line all as they appear on the most recent applicable tax list.

**HEARING NOTICES FOR ALL SPECIAL PERMITS MUST BE SENT TO THE PLANNING BOARD, TOWN HALL IN THE FOLLOWING TOWNS:**

Boxborough, MA 01729  
 Carlisle, MA 01741  
 Maynard, MA 01754  
 Stow, MA 01775  
 Concord, MA 01742  
 Westford, MA 01886  
 Littleton, MA 01460  
 Sudbury, MA 01776

*Kimberly Hoyt*  
 3-Jul-08

Kimberly Hoyt  
 Assessing Clerk  
 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: Wetherbee Plaza, LLC

Address 6 Proctor Street, Acton MA 01720 Phone (978) 263-2000

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: CARON ENVIRONMENTAL CONSULTING

Address: 170 STATE ROAD EAST / PO BOX 417 Phone (978) 874-5469  
WESTMINSTER, MA 01473

The address of the property where the activity is proposed \_\_\_\_\_

107-111 Great Road

Town Atlas Plate/Map G-4 Parcel/Lot 28

Project Description Restoration/improvement of a degraded wetland.

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. For more information please call the Conservation Office at 978-264-9631.

A Public Hearing will be held at the Acton Town Hall, 472 Main Street, on Wednesday,  
September 3, 2008 at 7:40 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**

**SIMPLIFIED AND DETAILED  
WILDLIFE HABITAT EVALUATIONS**

**SIMPLIFIED AND DETAILED  
WILDLIFE HABITAT EVALUATIONS**

Project Location (from NOI): 107 & 111 Great Road, Acton

Person Completing Form: Charles E. Caron

Date: August 2008

**APPENDIX A**  
**Simplified Wildlife Habitat Evaluation**

**\* IMPORTANT HABITAT FEATURES:** Direct alterations to the following important habitat features in resource areas may be permitted only if they will have no adverse effect (Refer to Section V)

- habitat for state-listed animal species (receipt of a positive opinion or permit from MNHESP shall be presumed to be correct. Do not refer to Section V).
- sphagnum hummocks and pools suitable to serve as nesting habitat for four-toed salamanders
- trees with large cavities ( $\geq 18$ " tree diameter at cavity entrance)
- existing beaver, mink or otter dens
- Areas within 100 feet of existing beaver, mink or otter dens (if significant disturbance)
- existing nest trees for birds that traditionally reuse nests (bald eagle, osprey, great blue heron)
- land containing freshwater mussel beds
- wetlands and waterbodies known to contain open water in winter with the capacity to serve as waterfowl winter habitat
- turtle nesting areas
- vertical sandy banks (bank swallows, rough-winged swallows or kingfishers)

The following habitat characteristics when not commonly encountered in the surrounding area:

- stream bed riffle zones (e.g. in eastern MA)
- springs
- gravel stream bottoms (trout and salmon nesting substrate)
- plunge pools (deep holes) in rivers or streams
- medium to large, flat rock substrates in streams

**\* ACTIVITIES:** When any one of the following activities are proposed within resource areas, applicants should complete a Detailed Wildlife Habitat Evaluation (Refer to Appendix B).

- activities located in mapped "Habitat of Potential Regional or Statewide Importance"
- activities affecting certified or documented vernal pool habitat, including habitat within 100' of a certified or documented vernal pool when within a resource area
- activities in bank, land under water, bordering land subject to flooding (presumed significant) where alterations are more than twice the size of thresholds.
- activities affecting vegetated wetlands >5000 sq. ft. occurring in resource areas other than Bordering Vegetated Wetland
- activities affecting the sole connector between habitats >50 acres in size
- Installation of structures that prevent animal movement
- Activities for the purpose of bank stabilization using hard structure solutions that significantly affect ability of stream channel to shift and meander, or disrupt continuity in cover that would inhibit animal passage.
- dredging (greater than 5,000 sf)

*\* None of the above-listed Important Habitat Features or Activities appear to occur on this site.*

**Appendix B: Detailed Wildlife Habitat Evaluation**

**Part 1: Summary Sheet**

Project Name: \_\_\_\_\_

Location: 107 + 111 Great Road, Acton

Date: \_\_\_\_\_

Size of Area Being Impacted: 6,100 ft<sup>2</sup>

Impact Areas (linear feet, square feet, or acres for each of the impact areas within the site)

	Name	Waterbody/Waterway	Wetland	Upland*	Total Area
1.	<u>BVW</u>	<u>∅</u>	<u>6,100ft<sup>2</sup></u>	<u>∅</u>	<u>6,100ft<sup>2</sup></u>
2.	_____	_____	_____	_____	_____
3.	_____	_____	_____	_____	_____
4.	_____	_____	_____	_____	_____
5.	_____	_____	_____	_____	_____
6.	_____	_____	_____	_____	_____
7.	_____	_____	_____	_____	_____

\*Riverfront Area/BLSF

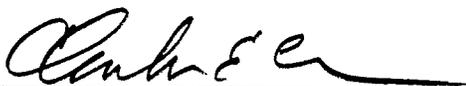
**Attach Sketch map and/or photos of the Impact Areas**

**Narrative Description of Site (attach separate page if necessary)**

*The entire site, including uplands and wetlands, has been historically disturbed and contains a predominance of exotic invasive species. The surrounding upland area mostly contains landscaped lawn and developed areas.*

**Certification**

I hereby Certify that this project has been designed to avoid, minimize, and mitigate adverse effects on wildlife habitat, and that it will not, following two growing seasons of project completion and thereafter, substantially reduce its capacity to provide important wildlife habitat functions.



Signature of Wildlife Specialist (per 310 CMR 10.60 (1) (b))



**Appendix B: Detailed Wildlife Habitat Evaluation**

**Part 2: Field Data Form**

(For each wetland or non-wetland resource area)

**I. GENERAL INFORMATION**

Project Location (from NOI page 1): Great Road, Acton

Impact Area (number/name): \_\_\_\_\_

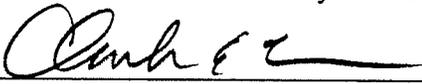
Date(s) of site visit(s) and data collection: Various 2005-2008

Weather Conditions During Site Visit (if snow cover, include depth): \_\_\_\_\_

Date this form was completed: August 2008

Person completing form per 310 CMR 10.60(1)(b): Charles E. Caron

The information on this data sheet is based on my observations unless otherwise indicated

Signature: 

**II. SITE DESCRIPTION (complete A or B under Classification -See instructions for full description)**

**A. Classification**

1. For Wetland Resource Areas, complete the following:

System: Palustrine  
Subsystem: N/A  
Class: Scrub-Shrub  
Subclass: Broad-Leaved Deciduous

Hydrology/Water Regime:

- Permanently flooded
- Intermittently exposed
- Semi-permanently flooded
- Seasonally flooded
- Saturated
- Temporarily flooded
- Intermittently flooded
- Artificially flooded

2. For Riverfront or Bordering Land Subject to Flooding Resource Areas, complete the following:

Use a terrestrial classification system such as one of the two listed below:

a. "Classification of the Natural Communities of Massachusetts (Draft)" by Patricia C. Swain and Jennifer B. Kearsley, MA DFW NHESP, Westborough, MA. July 2000. ([www.mass.gov/dfwele/dfw/nhsep/nhclass.htm](http://www.mass.gov/dfwele/dfw/nhsep/nhclass.htm))

b. "New England Wildlife: Habitat, Natural History, and Distribution" by Richard M. DeGraaf and Deborah D. Rudis, USDA Forest Service, Northeastern Forest Experiment Station. General Technical Report NE-108. August 1992. 491 pages.

Community Name \_\_\_\_\_

Vegetation Description \_\_\_\_\_

Physical Description \_\_\_\_\_

**B. Inventory (Plant community)**

%Cover: 10 Trees (>20') 35 Shrubs (<20') 4 Woody Vines 3 Mosses  
55 Herbaceous

Plant Lists (species that comprise 10% or more of the vegetative cover in each strata; "\*" designates a dominant plant species for the strata):

Strata	Plant Species	Strata	Plant Species
Herbaceous - *	<u>Purple loosestrife</u> <u>(Lythrum salicaria)</u>	Shrub -	<u>* Speckled Alder</u> <u>(Alnus rugosa)</u>
	<u>* Common Reed</u> <u>(Phragmites australis)</u>		<u>Morrow's Honeysuckle</u> <u>(Lonicera morrowii)</u>

**C. Inventory (Soils)**

Soil Survey Unit: \_\_\_\_\_  
 Drainage Class: \_\_\_\_\_  
 Texture (upper part): very fine sandy loam  
 Depth: \_\_\_\_\_  
 Depth to Water Table \_\_\_\_\_

**III. IMPORTANT HABITAT FEATURES (Complete for all resource areas)**

*If the following habitat characteristics are present, describe & quantify them on a separate sheet & attach*

**Wildlife Food**

Important Wetland/Aquatic Food Plants (smartweeds, pondweeds, wild rice, bulrush, wild celery)

Abundant                       Present                       Absent

Important Upland/Wetland Food Plants (hard mast and fruit/berry producers)

Abundant                       Present                       Absent

Shrub thickets or streambeds with abundant earthworms (American woodcock)

Present                       Absent

Shrub and/or herbaceous vegetation suitable for veery nesting  Present                       Absent

Number of trees (live or dead) > 30" DBH: 0

Number (or density) of Standing Dead Trees (potential for cavities and perches):

0 6-12" dbh      0 12-18" dbh      0 18-24" dbh      0 >24" dbh

Number of Tree Cavities in trunks or limbs of:

- 0   6-12" diameter (e.g., tree swallow, saw whet owl, screech owl, bluebird, other songbirds)
- 0   12-18" diameter (e.g., hooded merganser, wood duck, common goldeneye, mink)
- 0   >18" diameter (e.g., hooded merganser, wood duck, common goldeneye, common merganser, barred owl, mink, raccoon, fisher)

Small mammal burrows  Abundant  Present  Absent

Cover/Perches/Basking/Denning/Nesting Habitat

- Dense herbaceous cover (voles, small mammals, amphibians & reptiles)
- Large woody debris on the ground (small mammals, mink, amphibians & reptiles)
- Rocks, crevices, logs, tree roots or hummocks under water's surface (turtles, snakes, frogs)
- Rocks, crevices, fallen logs, overhanging branches or hummocks at, or within 1m above the water's surface (turtles, snakes, frogs, wading birds, wood duck, mink, raccoon)
- Rock piles, crevices or hollow logs suitable for:
  - otter  mink  porcupine  bear  bobcat  turkey vulture
- Live or dead standing vegetation overhanging water or offering good visibility of open water (e.g., osprey, kingfisher, flycatchers, cedar waxwings)
- Depressions that may serve as seasonal (vernal/autumnal) pools:  present  absent
- Standing water present at least part of the growing season, suitable for use by:
  - breeding amphibians  non-breeding amphibians (foraging, rehydration)
  - turtles  foraging waterfowl
- Sphagnum hummocks or mats, moss covered logs or saturated logs, overhanging or directly adjacent to pools of standing water in spring (four-toed salamander):  present  absent

IMPORTANT HABITAT CHARACTERISTICS (If present, describe & quantify them on a separate sheet)

- Medium to large (> 6"), flat rocks within a stream (cover for stream salamanders and nesting habitat for spring & two-lined salamanders)  present  absent
- Flat rocks and logs on banks or within exposed portions of streambeds (cover for stream salamanders and nesting habitat for dusky salamanders)  present  absent
- Underwater banks of fine silt and/or clay (beaver, muskrat, otter)  present  absent
- Undercut or overhanging banks (small mammals, mink, weasels)  present  absent
- Vertical sandy banks (bank swallow, kingfisher)  present  absent
- Areas of ice-free open water in winter  present  absent
- Mud flats  present  absent
- Exposed areas of well-drained, sandy soil suitable for turtle nesting  present  absent

WILDLIFE DENS/NESTS (If present, describe & quantify them on the back of this sheet)

- Turtle nesting sites:  present  absent
- Bank swallow colony:  present  absent



- Nest(s) present of:       Bald Eagle       Osprey       Great Blue Heron  
 Den(s) present of:       Otter       Mink       Beaver

Project area is within:

- 100' of beaver, mink or otter den, bank swallow colony or turtle nesting area
- 200' of Great blue heron or osprey nest(s)
- 1400' of a bald eagle nest<sup>8</sup>

EMERGENT WETLANDS (If present, describe & quantify them on a separate sheet)

- Emergent wetland vegetation at least seasonally flooded during the growing season (wood duck, green heron, black-crowned night heron, king rail, virginia rail, coot etc.)

- Flooded > 5 cm       present       absent
- Flooded > 25 cm (pied-billed grebe)       present       absent

- Persistent emergent wetland vegetation at least seasonally flooded during the growing season (mallard, American bittern, sora, common snipe, red-winged blackbird, swamp sparrow, marsh wren)

- Flooded > 5 cm       present       absent
- Flooded > 25 cm (least bittern, common moorhen)       present       absent

- Cattail emergent wetland vegetation at least seasonally flooded during the growing season

- Flooded > 5 cm (marsh wren)       present       absent
- Flooded > 25 cm (least bittern, common moorhen)       present       absent

- Fine-leaved emergent wetland vegetation (grasses and sedges) at least seasonally flooded during the growing season (common snipe, spotted sandpiper, sedge wren)

- Flooded > 5 cm       present       absent
- Flooded > 25 cm (least bittern, common moorhen)       present       absent

**IV. LANDSCAPE CONTEXT**

**A. Habitat Continuity (If present, describe the landscape context on a separate sheet and its importance for area-sensitive species)**

- Is the impact area part of an emergent marsh at least (marsh and waterbirds)
  - 1.0 acre in size?       yes       no
  - 2.0 acres in size?       yes       no
  - 5.0 acres in size?       yes       no
  - 10.0 acres in size?       yes       no
- Is the impact area part of a wetland complex at least (turtles, frogs, waterfowl, mammals)
  - 2.5 acres in size?       yes       no
  - 5.0 acres in size?       yes       no
  - 10.0 acres in size?       yes       no
  - 25.0 acres in size?       yes       no

<sup>8</sup> 1400 feet is the distance used by NHESP for evaluating potential disturbance impacts on eagle nests under MESA. Keep in mind, however, that this doesn't give jurisdiction within 1400' of an eagle's nest; it only identifies it on the checklist so that adverse effects can be avoided if work in a resource area is within 1400 feet.

DRAINAGE CALCULATIONS

DRAINAGE CALCULATIONS

**DRAINAGE CALCS - 8/5/08**

**ONSITE AREA ONLY**

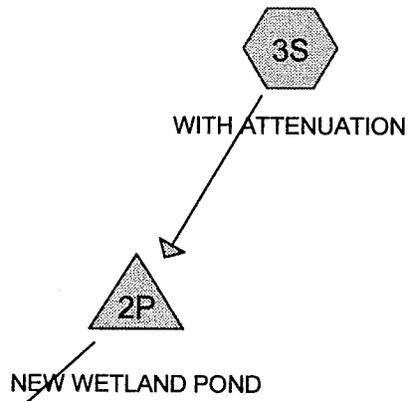
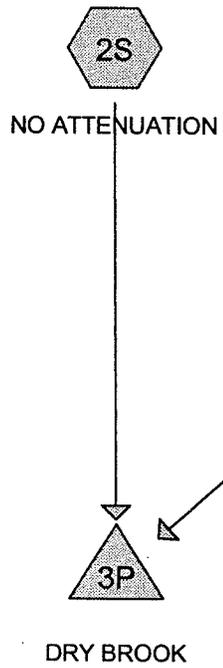
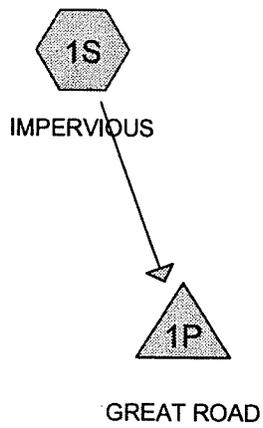
STORM FREQ	PRE Q (cfs)	POST Q (cfs)	$\Delta Q$ (cfs)	PRE Vol (acre-ft)	POST Vol (acre-ft)	$\Delta Vol$ (acre-ft)
2	1.35	1.1	-0.25	0.139	0.153	0.014
10	3.03	2.77	-0.26	0.296	0.36	0.064
25	4.11	4.48	0.37	0.397	0.488	0.091
100	5.81	6.56	0.75	0.56	0.687	0.127

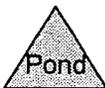
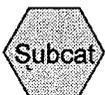
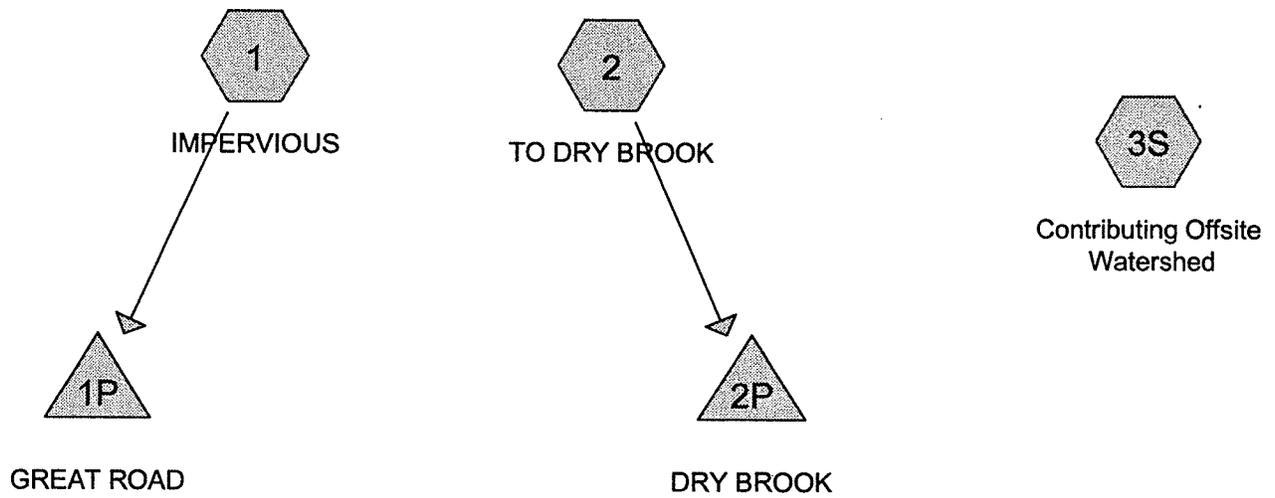
**INCLUDES OFFSITE AREA CONTRIBUTING TO POND**

STORM FREQ	PRE Q (cfs)	POST Q (cfs)	$\Delta Q$ (cfs)	PRE Vol (acre-ft)	POST Vol (acre-ft)	$\Delta Vol$ (acre-ft)
2	8.35	6.18	-2.17	0.944	0.931	-0.013
10	15.71	24.5	8.79	1.765	2.135	0.37
25	20.14	17.43	-2.71	2.271	2.092	-0.179
100	26.92	32.02	5.1	3.058	3.458	0.4



*Mark Donohoe*  
 8/5/08





**Subcatchment 1: IMPERVIOUS**

Runoff = 0.83 cfs @ 12.14 hrs, Volume= 0.071 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 Middlesex 002 yr Rainfall=3.10"

Area (ac)	CN	Description
0.320	98	Roofs and pavement
0.320		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0	160		0.27		Direct Entry,

**Pond 1P: GREAT ROAD**

Inflow Area = 0.320 ac, Inflow Depth > 2.68" for Middlesex 002 yr event  
Inflow = 0.83 cfs @ 12.14 hrs, Volume= 0.071 af  
Primary = 0.83 cfs @ 12.14 hrs, Volume= 0.071 af, Atten= 0%, Lag= 0.0 min

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

**Subcatchment 2: TO DRY BROOK**

Runoff = 1.35 cfs @ 12.30 hrs, Volume= 0.139 af, Depth> 0.78"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type III 24-hr Middlesex 002 yr Rainfall=3.10"

Area (ac)	CN	Description
0.420	77	Wetlands (brush, fair, D)
1.200	77	Brush, Fair, HSG D
0.510	56	Brush, Fair, HSG B
2.130	72	Weighted Average
2.130		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.6	100	0.0650	0.12		Sheet Flow, Brush Woods: Light underbrush n= 0.400 P2= 3.10"
5.6	350	0.0440	1.05		Shallow Concentrated Flow, Brush, wetlands Woodland Kv= 5.0 fps
19.2	450	Total			

**Pond 2P: DRY BROOK**

Inflow Area = 2.130 ac, Inflow Depth > 0.78" for Middlesex 002 yr event  
 Inflow = 1.35 cfs @ 12.30 hrs, Volume= 0.139 af  
 Primary = 1.35 cfs @ 12.30 hrs, Volume= 0.139 af, Atten= 0%, Lag= 0.0 min

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

**Subcatchment 3S: Contributing Offsite Watershed**

Runoff = 7.12 cfs @ 12.40 hrs, Volume= 0.805 af, Depth> 1.34"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
 Type III 24-hr Middlesex 002 yr Rainfall=3.10"

Area (ac)	CN	Description
6.260	79	1 acre lots, 20% imp, HSG C
0.950	98	pavement
7.210	82	Weighted Average
5.008		Pervious Area
2.202		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.5	100	0.0560	0.12		<b>Sheet Flow,</b>
					Woods: Light underbrush n= 0.400 P2= 3.10"
13.5	1,000	0.0610	1.23		<b>Shallow Concentrated Flow,</b>
					Woodland Kv= 5.0 fps
28.0	1,100	Total			

**Subcatchment 1: IMPERVIOUS**

Runoff = 1.22 cfs @ 12.14 hrs, Volume= 0.106 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 Middlesex 010 yr Rainfall=4.50"

Area (ac)	CN	Description
0.320	98	Roofs and pavement
0.320		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0	160		0.27		Direct Entry,

**Pond 1P: GREAT ROAD**

Inflow Area = 0.320 ac, Inflow Depth > 3.96" for Middlesex 010 yr event  
Inflow = 1.22 cfs @ 12.14 hrs, Volume= 0.106 af  
Primary = 1.22 cfs @ 12.14 hrs, Volume= 0.106 af, Atten= 0%, Lag= 0.0 min

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

**Subcatchment 2: TO DRY BROOK**

Runoff = 3.03 cfs @ 12.28 hrs, Volume= 0.296 af, Depth> 1.67"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type III 24-hr Middlesex 010 yr Rainfall=4.50"

Area (ac)	CN	Description
0.420	77	Wetlands (brush, fair, D)
1.200	77	Brush, Fair, HSG D
0.510	56	Brush, Fair, HSG B
2.130	72	Weighted Average
2.130		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.6	100	0.0650	0.12		Sheet Flow, Brush
5.6	350	0.0440	1.05		Woods: Light underbrush n= 0.400 P2= 3.10"
					Shallow Concentrated Flow, Brush, wetlands
					Woodland Kv= 5.0 fps
19.2	450	Total			

**Pond 2P: DRY BROOK**

Inflow Area = 2.130 ac, Inflow Depth > 1.67" for Middlesex 010 yr event  
 Inflow = 3.03 cfs @ 12.28 hrs, Volume= 0.296 af  
 Primary = 3.03 cfs @ 12.28 hrs, Volume= 0.296 af, Atten= 0%, Lag= 0.0 min

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

**Subcatchment 3S: Contributing Offsite Watershed**

Runoff = 12.97 cfs @ 12.39 hrs, Volume= 1.470 af, Depth> 2.45"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
 Type III 24-hr Middlesex 010 yr Rainfall=4.50"

Area (ac)	CN	Description
6.260	79	1 acre lots, 20% imp, HSG C
0.950	98	pavement
7.210	82	Weighted Average
5.008		Pervious Area
2.202		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.5	100	0.0560	0.12		<b>Sheet Flow,</b>
13.5	1,000	0.0610	1.23		Woods: Light underbrush n= 0.400 P2= 3.10" <b>Shallow Concentrated Flow,</b>
28.0	1,100	Total			Woodland Kv= 5.0 fps

**Subcatchment 1: IMPERVIOUS**

Runoff = 1.44 cfs @ 12.14 hrs, Volume= 0.125 af, Depth> 4.69"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type III 24-hr Middlesex 025 yr Rainfall=5.30"

Area (ac)	CN	Description
0.320	98	Roofs and pavement
0.320		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0	160		0.27		Direct Entry,

**Pond 1P: GREAT ROAD**

Inflow Area = 0.320 ac, Inflow Depth > 4.69" for Middlesex 025 yr event  
Inflow = 1.44 cfs @ 12.14 hrs, Volume= 0.125 af  
Primary = 1.44 cfs @ 12.14 hrs, Volume= 0.125 af, Atten= 0%, Lag= 0.0 min

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

**Subcatchment 2: TO DRY BROOK**

Runoff = 4.11 cfs @ 12.27 hrs, Volume= 0.397 af, Depth> 2.24"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type III 24-hr Middlesex 025 yr Rainfall=5.30"

Area (ac)	CN	Description
0.420	77	Wetlands (brush, fair, D)
1.200	77	Brush, Fair, HSG D
0.510	56	Brush, Fair, HSG B
2.130	72	Weighted Average
2.130		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.6	100	0.0650	0.12		Sheet Flow, Brush
5.6	350	0.0440	1.05		Woods: Light underbrush n= 0.400 P2= 3.10" Shallow Concentrated Flow, Brush, wetlands Woodland Kv= 5.0 fps
19.2	450	Total			

**Pond 2P: DRY BROOK**

Inflow Area = 2.130 ac, Inflow Depth > 2.24" for Middlesex 025 yr event  
 Inflow = 4.11 cfs @ 12.27 hrs, Volume= 0.397 af  
 Primary = 4.11 cfs @ 12.27 hrs, Volume= 0.397 af, Atten= 0%, Lag= 0.0 min

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

**Subcatchment 3S: Contributing Offsite Watershed**

Runoff = 16.44 cfs @ 12.38 hrs, Volume= 1.873 af, Depth> 3.12"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
 Type III 24-hr Middlesex 025 yr Rainfall=5.30"

Area (ac)	CN	Description
6.260	79	1 acre lots, 20% imp, HSG C
0.950	98	pavement
7.210	82	Weighted Average
5.008		Pervious Area
2.202		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.5	100	0.0560	0.12		<b>Sheet Flow,</b> Woods: Light underbrush n= 0.400 P2= 3.10"
13.5	1,000	0.0610	1.23		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
28.0	1,100	Total			

**Subcatchment 1: IMPERVIOUS**

Runoff = 1.77 cfs @ 12.14 hrs, Volume= 0.154 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 Middlesex 100 yr Rainfall=6.50"

Area (ac)	CN	Description
0.320	98	Roofs and pavement
0.320		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0	160		0.27		Direct Entry,

**Pond 1P: GREAT ROAD**

Inflow Area = 0.320 ac, Inflow Depth > 5.78" for Middlesex 100 yr event  
Inflow = 1.77 cfs @ 12.14 hrs, Volume= 0.154 af  
Primary = 1.77 cfs @ 12.14 hrs, Volume= 0.154 af, Atten= 0%, Lag= 0.0 min

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

**Subcatchment 2: TO DRY BROOK**

Runoff = 5.81 cfs @ 12.27 hrs, Volume= 0.560 af, Depth> 3.16"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type III 24-hr Middlesex 100 yr Rainfall=6.50"

Area (ac)	CN	Description
0.420	77	Wetlands (brush, fair, D)
1.200	77	Brush, Fair, HSG D
0.510	56	Brush, Fair, HSG B
2.130	72	Weighted Average
2.130		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.6	100	0.0650	0.12		Sheet Flow, Brush
5.6	350	0.0440	1.05		Woods: Light underbrush n= 0.400 P2= 3.10" Shallow Concentrated Flow, Brush, wetlands Woodland Kv= 5.0 fps
19.2	450	Total			

**Pond 2P: DRY BROOK**

Inflow Area = 2.130 ac, Inflow Depth > 3.16" for Middlesex 100 yr event  
 Inflow = 5.81 cfs @ 12.27 hrs, Volume= 0.560 af  
 Primary = 5.81 cfs @ 12.27 hrs, Volume= 0.560 af, Atten= 0%, Lag= 0.0 min

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

**Subcatchment 3S: Contributing Offsite Watershed**

Runoff = 21.71 cfs @ 12.38 hrs, Volume= 2.498 af, Depth> 4.16"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
 Type III 24-hr Middlesex 100 yr Rainfall=6.50"

Area (ac)	CN	Description
6.260	79	1 acre lots, 20% imp, HSG C
0.950	98	pavement
7.210	82	Weighted Average
5.008		Pervious Area
2.202		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.5	100	0.0560	0.12		<b>Sheet Flow,</b>
					Woods: Light underbrush n= 0.400 P2= 3.10"
13.5	1,000	0.0610	1.23		<b>Shallow Concentrated Flow,</b>
					Woodland Kv= 5.0 fps
28.0	1,100	Total			

**Pond 1P: GREAT ROAD**

Inflow Area = 0.081 ac, Inflow Depth > 2.68" for Middlesex 002 yr event  
 Inflow = 0.21 cfs @ 12.14 hrs, Volume= 0.018 af  
 Primary = 0.21 cfs @ 12.14 hrs, Volume= 0.018 af, Atten= 0%, Lag= 0.0 min

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

**Subcatchment 1S: IMPERVIOUS**

Runoff = 0.21 cfs @ 12.14 hrs, Volume= 0.018 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 Middlesex 002 yr Rainfall=3.10"

Area (sf)	CN	Description
3,512	98	Pavement
3,512		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0	95		0.16		Direct Entry, Pavement sheet flow

**Pond 2P: NEW WETLAND POND**

Inflow Area = 1.290 ac, Inflow Depth > 1.10" for Middlesex 002 yr event  
 Inflow = 1.29 cfs @ 12.23 hrs, Volume= 0.118 af  
 Outflow = 0.12 cfs @ 14.62 hrs, Volume= 0.038 af, Atten= 91%, Lag= 143.4 min  
 Primary = 0.12 cfs @ 14.62 hrs, Volume= 0.038 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs / 2  
 Peak Elev= 145.04' @ 14.62 hrs Surf.Area= 4,935 sf Storage= 3,590 cf

Plug-Flow detention time= 255.3 min calculated for 0.038 af (32% of inflow)  
 Center-of-Mass det. time= 160.5 min ( 978.1 - 817.6 )

Volume	Invert	Avail.Storage	Storage Description
#1	144.00'	9,342 cf	Custom Stage Data (Irregular) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
144.00	2,102	184.8	0	0	2,102
145.00	4,844	285.1	3,379	3,379	5,860
146.00	7,158	333.0	5,963	9,342	8,236

Device	Routing	Invert	Outlet Devices
#1	Primary	145.00'	1.00' x 1.00' Horiz. Orifice/Grate Limited to weir flow C= 0.600
#2	Primary	146.00'	10.0' long x 5.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50

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Type III 24-hr Middlesex 002 yr Rainfall=3.10"

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Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65  
 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=0.12 cfs @ 14.62 hrs HW=145.04' (Free Discharge)

1=Orifice/Grate (Weir Controls 0.12 cfs @ 0.68 fps)

2=Broad-Crested Rectangular Weir ( Controls 0.00 cfs)

**Subcatchment 2S: NO ATTENUATION**

Runoff = 1.10 cfs @ 12.33 hrs, Volume= 0.115 af, Depth> 1.28"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
 Type III 24-hr Middlesex 002 yr Rainfall=3.10"

Area (ac)	CN	Description
0.370	98	Roofs, pavement
0.140	80	>75% Grass cover, Good, HSG D
0.400	77	Wetlands (brush, fair, D)
0.170	56	Wetlands (brush, fair, B)
1.080	81	Weighted Average
0.710		Pervious Area
0.370		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.5	50	0.0400	0.09		<b>Sheet Flow, Wetlands</b>
8.1	50	0.0600	0.10		Woods: Light underbrush n= 0.400 P2= 3.10" <b>Sheet Flow, Wetlands</b>
2.4	173	0.0580	1.20		Woods: Light underbrush n= 0.400 P2= 3.10" <b>Shallow Concentrated Flow, Wetlands</b>
3.2	137	0.0210	0.72		Woodland Kv= 5.0 fps <b>Shallow Concentrated Flow, Wetlands</b>
23.2	410	Total			Woodland Kv= 5.0 fps

**Pond 3P: DRY BROOK**

Inflow Area = 2.370 ac, Inflow Depth > 0.78" for Middlesex 002 yr event

Inflow = 1.10 cfs @ 12.33 hrs, Volume= 0.153 af

Primary = 1.10 cfs @ 12.33 hrs, Volume= 0.153 af, Atten= 0%, Lag= 0.0 min

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

**Subcatchment 3S: WITH ATTENUATION**

Runoff = 1.29 cfs @ 12.23 hrs, Volume= 0.118 af, Depth> 1.10"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
 Type III 24-hr Middlesex 002 yr Rainfall=3.10"

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Type III 24-hr Middlesex 002 yr Rainfall=3.10"

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Area (ac)	CN	Description
0.420	98	Roofs, pavement
0.170	61	>75% Grass cover, Good, HSG B
0.490	77	Brush, Fair, HSG D (includes wetlands)
0.210	56	Brush, Fair, HSG B (includes wetlands)
1.290	78	Weighted Average
0.870		Pervious Area
0.420		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.0	100	0.0610	0.12		<b>Sheet Flow, Brush</b> Woods: Light underbrush n= 0.400 P2= 3.10"
1.7	114	0.0520	1.14		<b>Shallow Concentrated Flow, Wetlands</b> Woodland Kv= 5.0 fps
0.2	26	0.1500	1.94		<b>Shallow Concentrated Flow, Wetlands</b> Woodland Kv= 5.0 fps
15.9	240	Total			

**Subcatchment 4S: Contributing Offsite Watershed**

Runoff = 7.12 cfs @ 12.40 hrs, Volume= 0.805 af, Depth> 1.34"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type III 24-hr Middlesex 002 yr Rainfall=3.10"

Area (ac)	CN	Description
6.260	79	1 acre lots, 20% imp, HSG C
0.950	98	Pavement
7.210	82	Weighted Average
5.008		Pervious Area
2.202		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.5	100	0.0560	0.12		<b>Sheet Flow,</b> Woods: Light underbrush n= 0.400 P2= 3.10"
13.5	1,000	0.0610	1.23		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
28.0	1,100	Total			

**Pond 1P: GREAT ROAD**

Inflow Area = 0.081 ac, Inflow Depth > 3.96" for Middlesex 010 yr event  
 Inflow = 0.31 cfs @ 12.14 hrs, Volume= 0.027 af  
 Primary = 0.31 cfs @ 12.14 hrs, Volume= 0.027 af, Atten= 0%, Lag= 0.0 min

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

**Subcatchment 1S: IMPERVIOUS**

Runoff = 0.31 cfs @ 12.14 hrs, Volume= 0.027 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 Middlesex 010 yr Rainfall=4.50"

Area (sf)	CN	Description
3,512	98	Pavement
3,512		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0	95		0.16		Direct Entry, Pavement sheet flow

**Pond 2P: NEW WETLAND POND**

Inflow Area = 1.290 ac, Inflow Depth > 2.12" for Middlesex 010 yr event  
 Inflow = 2.55 cfs @ 12.22 hrs, Volume= 0.228 af  
 Outflow = 1.18 cfs @ 12.57 hrs, Volume= 0.147 af, Atten= 54%, Lag= 20.7 min  
 Primary = 1.18 cfs @ 12.57 hrs, Volume= 0.147 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs / 2  
 Peak Elev= 145.20' @ 12.57 hrs Surf.Area= 5,273 sf Storage= 4,395 cf

Plug-Flow detention time= 134.3 min calculated for 0.147 af (65% of inflow)  
 Center-of-Mass det. time= 62.4 min ( 865.4 - 803.0 )

Volume	Invert	Avail.Storage	Storage Description		
#1	144.00'	9,342 cf	<b>Custom Stage Data (Irregular) Listed below (Recalc)</b>		
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
144.00	2,102	184.8	0	0	2,102
145.00	4,844	285.1	3,379	3,379	5,860
146.00	7,158	333.0	5,963	9,342	8,236

Device	Routing	Invert	Outlet Devices										
#1	Primary	145.00'	<b>1.00' x 1.00' Horiz. Orifice/Grate</b> Limited to weir flow C= 0.600										
#2	Primary	146.00'	<b>10.0' long x 5.0' breadth Broad-Crested Rectangular Weir</b>										
			Head (feet)	0.20	0.40	0.60	0.80	1.00	1.20	1.40	1.60	1.80	2.00
				2.50	3.00	3.50	4.00	4.50	5.00	5.50			

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Type III 24-hr Middlesex 010 yr Rainfall=4.50"

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Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65  
 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

**Primary OutFlow** Max=1.17 cfs @ 12.57 hrs HW=145.20' (Free Discharge)

1=Orifice/Grate (Weir Controls 1.17 cfs @ 1.46 fps)

2=Broad-Crested Rectangular Weir ( Controls 0.00 cfs)

**Subcatchment 2S: NO ATTENUATION**

Runoff = 2.04 cfs @ 12.32 hrs, Volume= 0.213 af, Depth> 2.36"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
 Type III 24-hr Middlesex 010 yr Rainfall=4.50"

Area (ac)	CN	Description
0.370	98	Roofs, pavement
0.140	80	>75% Grass cover, Good, HSG D
0.400	77	Wetlands (brush, fair, D)
0.170	56	Wetlands (brush, fair, B)
1.080	81	Weighted Average
0.710		Pervious Area
0.370		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.5	50	0.0400	0.09		<b>Sheet Flow, Wetlands</b>
					Woods: Light underbrush n= 0.400 P2= 3.10"
8.1	50	0.0600	0.10		<b>Sheet Flow, Wetlands</b>
					Woods: Light underbrush n= 0.400 P2= 3.10"
2.4	173	0.0580	1.20		<b>Shallow Concentrated Flow, Wetlands</b>
					Woodland Kv= 5.0 fps
3.2	137	0.0210	0.72		<b>Shallow Concentrated Flow, Wetlands</b>
					Woodland Kv= 5.0 fps
23.2	410	Total			

**Pond 3P: DRY BROOK**

Inflow Area = 2.370 ac, Inflow Depth > 1.82" for Middlesex 010 yr event  
 Inflow = 2.77 cfs @ 12.46 hrs, Volume= 0.360 af  
 Primary = 2.77 cfs @ 12.46 hrs, Volume= 0.360 af, Atten= 0%, Lag= 0.0 min

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

**Subcatchment 3S: WITH ATTENUATION**

Runoff = 2.55 cfs @ 12.22 hrs, Volume= 0.228 af, Depth> 2.12"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
 Type III 24-hr Middlesex 010 yr Rainfall=4.50"

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Type III 24-hr Middlesex 010 yr Rainfall=4.50"

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Area (ac)	CN	Description
0.420	98	Roofs, pavement
0.170	61	>75% Grass cover, Good, HSG B
0.490	77	Brush, Fair, HSG D (includes wetlands)
0.210	56	Brush, Fair, HSG B (includes wetlands)
1.290	78	Weighted Average
0.870		Pervious Area
0.420		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.0	100	0.0610	0.12		<b>Sheet Flow, Brush</b> Woods: Light underbrush n= 0.400 P2= 3.10"
1.7	114	0.0520	1.14		<b>Shallow Concentrated Flow, Wetlands</b> Woodland Kv= 5.0 fps
0.2	26	0.1500	1.94		<b>Shallow Concentrated Flow, Wetlands</b> Woodland Kv= 5.0 fps
15.9	240	Total			

**Subcatchment 4S: Contributing Offsite Watershed**

Runoff = 12.97 cfs @ 12.39 hrs, Volume= 1.470 af, Depth> 2.45"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type III 24-hr Middlesex 010 yr Rainfall=4.50"

Area (ac)	CN	Description
6.260	79	1 acre lots, 20% imp, HSG C
0.950	98	Pavement
7.210	82	Weighted Average
5.008		Pervious Area
2.202		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.5	100	0.0560	0.12		<b>Sheet Flow,</b> Woods: Light underbrush n= 0.400 P2= 3.10"
13.5	1,000	0.0610	1.23		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
28.0	1,100	Total			

**Pond 1P: GREAT ROAD**

Inflow Area = 0.081 ac, Inflow Depth > 4.69" for Middlesex 025 yr event  
 Inflow = 0.36 cfs @ 12.14 hrs, Volume= 0.032 af  
 Primary = 0.36 cfs @ 12.14 hrs, Volume= 0.032 af, Atten= 0%, Lag= 0.0 min

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

**Subcatchment 1S: IMPERVIOUS**

Runoff = 0.36 cfs @ 12.14 hrs, Volume= 0.032 af, Depth> 4.69"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
 Type III 24-hr Middlesex 025 yr Rainfall=5.30"

Area (sf)	CN	Description
3,512	98	Pavement
3,512		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0	95		0.16		Direct Entry, Pavement sheet flow

**Pond 2P: NEW WETLAND POND**

Inflow Area = 1.290 ac, Inflow Depth > 2.76" for Middlesex 025 yr event  
 Inflow = 3.31 cfs @ 12.22 hrs, Volume= 0.297 af  
 Outflow = 2.08 cfs @ 12.45 hrs, Volume= 0.215 af, Atten= 37%, Lag= 13.7 min  
 Primary = 2.08 cfs @ 12.45 hrs, Volume= 0.215 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs / 2  
 Peak Elev= 145.29' @ 12.45 hrs Surf.Area= 5,475 sf Storage= 4,890 cf

Plug-Flow detention time= 111.2 min calculated for 0.215 af (72% of inflow)  
 Center-of-Mass det. time= 49.3 min ( 846.3 - 797.0 )

Volume	Invert	Avail.Storage	Storage Description
#1	144.00'	9,342 cf	Custom Stage Data (Irregular) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
144.00	2,102	184.8	0	0	2,102
145.00	4,844	285.1	3,379	3,379	5,860
146.00	7,158	333.0	5,963	9,342	8,236

Device	Routing	Invert	Outlet Devices
#1	Primary	145.00'	1.00' x 1.00' Horiz. Orifice/Grate Limited to weir flow C= 0.600
#2	Primary	146.00'	10.0' long x 5.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50

Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65  
 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=2.07 cfs @ 12.45 hrs HW=145.29' (Free Discharge)

1=Orifice/Grate (Weir Controls 2.07 cfs @ 1.77 fps)

2=Broad-Crested Rectangular Weir ( Controls 0.00 cfs)

**Subcatchment 2S: NO ATTENUATION**

Runoff = 2.60 cfs @ 12.32 hrs, Volume= 0.273 af, Depth> 3.03"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
 Type III 24-hr Middlesex 025 yr Rainfall=5.30"

Area (ac)	CN	Description
0.370	98	Roofs, pavement
0.140	80	>75% Grass cover, Good, HSG D
0.400	77	Wetlands (brush, fair, D)
0.170	56	Wetlands (brush, fair, B)
1.080	81	Weighted Average
0.710		Pervious Area
0.370		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.5	50	0.0400	0.09		<b>Sheet Flow, Wetlands</b> Woods: Light underbrush n= 0.400 P2= 3.10"
8.1	50	0.0600	0.10		<b>Sheet Flow, Wetlands</b> Woods: Light underbrush n= 0.400 P2= 3.10"
2.4	173	0.0580	1.20		<b>Shallow Concentrated Flow, Wetlands</b> Woodland Kv= 5.0 fps
3.2	137	0.0210	0.72		<b>Shallow Concentrated Flow, Wetlands</b> Woodland Kv= 5.0 fps
23.2	410	Total			

**Pond 3P: DRY BROOK**

Inflow Area = 2.370 ac, Inflow Depth > 2.47" for Middlesex 025 yr event

Inflow = 4.48 cfs @ 12.39 hrs, Volume= 0.488 af

Primary = 4.48 cfs @ 12.39 hrs, Volume= 0.488 af, Atten= 0%, Lag= 0.0 min

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

**Subcatchment 3S: WITH ATTENUATION**

Runoff = 3.31 cfs @ 12.22 hrs, Volume= 0.297 af, Depth> 2.76"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
 Type III 24-hr Middlesex 025 yr Rainfall=5.30"

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Type III 24-hr Middlesex 025 yr Rainfall=5.30"

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Area (ac)	CN	Description
0.420	98	Roofs, pavement
0.170	61	>75% Grass cover, Good, HSG B
0.490	77	Brush, Fair, HSG D (includes wetlands)
0.210	56	Brush, Fair, HSG B (includes wetlands)
1.290	78	Weighted Average
0.870		Pervious Area
0.420		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.0	100	0.0610	0.12		<b>Sheet Flow, Brush</b> Woods: Light underbrush n= 0.400 P2= 3.10"
1.7	114	0.0520	1.14		<b>Shallow Concentrated Flow, Wetlands</b> Woodland Kv= 5.0 fps
0.2	26	0.1500	1.94		<b>Shallow Concentrated Flow, Wetlands</b> Woodland Kv= 5.0 fps
15.9	240	Total			

**Subcatchment 4S: Contributing Offsite Watershed**

Runoff = 16.44 cfs @ 12.38 hrs, Volume= 1.873 af, Depth> 3.12"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type III 24-hr Middlesex 025 yr Rainfall=5.30"

Area (ac)	CN	Description
6.260	79	1 acre lots, 20% imp, HSG C
0.950	98	Pavement
7.210	82	Weighted Average
5.008		Pervious Area
2.202		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.5	100	0.0560	0.12		<b>Sheet Flow,</b> Woods: Light underbrush n= 0.400 P2= 3.10"
13.5	1,000	0.0610	1.23		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
28.0	1,100	Total			

**Pond 1P: GREAT ROAD**

Inflow Area = 0.081 ac, Inflow Depth > 5.78" for Middlesex 100 yr event  
 Inflow = 0.44 cfs @ 12.14 hrs, Volume= 0.039 af  
 Primary = 0.44 cfs @ 12.14 hrs, Volume= 0.039 af, Atten= 0%, Lag= 0.0 min

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

**Subcatchment 1S: IMPERVIOUS**

Runoff = 0.44 cfs @ 12.14 hrs, Volume= 0.039 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 Middlesex 100 yr Rainfall=6.50"

Area (sf)	CN	Description
3,512	98	Pavement
3,512		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0	95		0.16		Direct Entry, Pavement sheet flow

**Pond 2P: NEW WETLAND POND**

Inflow Area = 1.290 ac, Inflow Depth > 3.76" for Middlesex 100 yr event  
 Inflow = 4.48 cfs @ 12.22 hrs, Volume= 0.404 af  
 Outflow = 3.16 cfs @ 12.39 hrs, Volume= 0.322 af, Atten= 29%, Lag= 10.5 min  
 Primary = 3.16 cfs @ 12.39 hrs, Volume= 0.322 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs / 2  
 Peak Elev= 145.43' @ 12.39 hrs Surf.Area= 5,785 sf Storage= 5,665 cf

Plug-Flow detention time= 92.4 min calculated for 0.321 af (79% of inflow)  
 Center-of-Mass det. time= 40.8 min ( 830.8 - 789.9 )

Volume	Invert	Avail.Storage	Storage Description
#1	144.00'	9,342 cf	Custom Stage Data (Irregular) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
144.00	2,102	184.8	0	0	2,102
145.00	4,844	285.1	3,379	3,379	5,860
146.00	7,158	333.0	5,963	9,342	8,236

Device	Routing	Invert	Outlet Devices
#1	Primary	145.00'	1.00' x 1.00' Horiz. Orifice/Grate Limited to weir flow C= 0.600
#2	Primary	146.00'	10.0' long x 5.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50

Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65  
 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=3.16 cfs @ 12.39 hrs HW=145.43' (Free Discharge)

1=Orifice/Grate (Orifice Controls 3.16 cfs @ 3.16 fps)

2=Broad-Crested Rectangular Weir ( Controls 0.00 cfs)

**Subcatchment 2S: NO ATTENUATION**

Runoff = 3.46 cfs @ 12.32 hrs, Volume= 0.365 af, Depth> 4.06"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
 Type III 24-hr Middlesex 100 yr Rainfall=6.50"

Area (ac)	CN	Description
0.370	98	Roofs, pavement
0.140	80	>75% Grass cover, Good, HSG D
0.400	77	Wetlands (brush, fair, D)
0.170	56	Wetlands (brush, fair, B)
1.080	81	Weighted Average
0.710		Pervious Area
0.370		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.5	50	0.0400	0.09		<b>Sheet Flow, Wetlands</b>
					Woods: Light underbrush n= 0.400 P2= 3.10"
8.1	50	0.0600	0.10		<b>Sheet Flow, Wetlands</b>
					Woods: Light underbrush n= 0.400 P2= 3.10"
2.4	173	0.0580	1.20		<b>Shallow Concentrated Flow, Wetlands</b>
					Woodland Kv= 5.0 fps
3.2	137	0.0210	0.72		<b>Shallow Concentrated Flow, Wetlands</b>
					Woodland Kv= 5.0 fps
23.2	410	Total			

**Pond 3P: DRY BROOK**

Inflow Area = 2.370 ac, Inflow Depth > 3.48" for Middlesex 100 yr event  
 Inflow = 6.56 cfs @ 12.33 hrs, Volume= 0.687 af  
 Primary = 6.56 cfs @ 12.33 hrs, Volume= 0.687 af, Atten= 0%, Lag= 0.0 min

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

**Subcatchment 3S: WITH ATTENUATION**

Runoff = 4.48 cfs @ 12.22 hrs, Volume= 0.404 af, Depth> 3.76"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
 Type III 24-hr Middlesex 100 yr Rainfall=6.50"

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Type III 24-hr Middlesex 100 yr Rainfall=6.50"

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Area (ac)	CN	Description
0.420	98	Roofs, pavement
0.170	61	>75% Grass cover, Good, HSG B
0.490	77	Brush, Fair, HSG D (includes wetlands)
0.210	56	Brush, Fair, HSG B (includes wetlands)
1.290	78	Weighted Average
0.870		Pervious Area
0.420		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.0	100	0.0610	0.12		<b>Sheet Flow, Brush</b> Woods: Light underbrush n= 0.400 P2= 3.10"
1.7	114	0.0520	1.14		<b>Shallow Concentrated Flow, Wetlands</b> Woodland Kv= 5.0 fps
0.2	26	0.1500	1.94		<b>Shallow Concentrated Flow, Wetlands</b> Woodland Kv= 5.0 fps
15.9	240	Total			

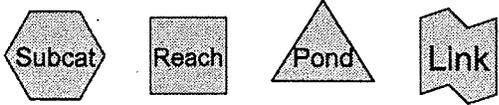
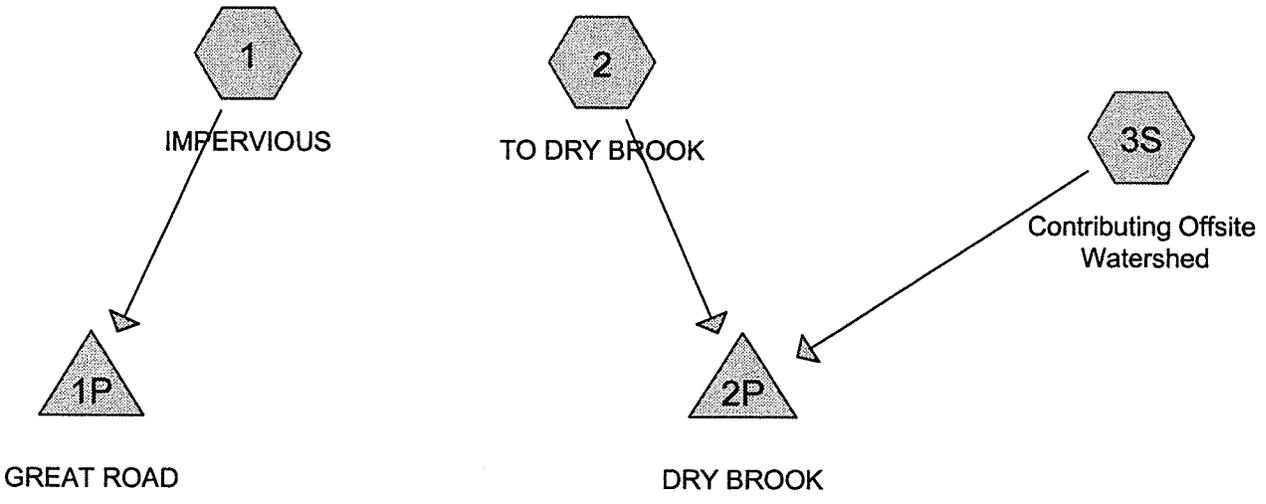
**Subcatchment 4S: Contributing Offsite Watershed**

Runoff = 21.71 cfs @ 12.38 hrs, Volume= 2.498 af, Depth> 4.16"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type III 24-hr Middlesex 100 yr Rainfall=6.50"

Area (ac)	CN	Description
6.260	79	1 acre lots, 20% imp, HSG C
0.950	98	Pavement
7.210	82	Weighted Average
5.008		Pervious Area
2.202		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.5	100	0.0560	0.12		<b>Sheet Flow,</b> Woods: Light underbrush n= 0.400 P2= 3.10"
13.5	1,000	0.0610	1.23		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
28.0	1,100	Total			



**Drainage Diagram for 5180B26\_PRE**  
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**Subcatchment 1: IMPERVIOUS**

Runoff = 0.83 cfs @ 12.14 hrs, Volume= 0.071 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 Middlesex 002 yr Rainfall=3.10"

Area (ac)	CN	Description
0.320	98	Roofs and pavement
0.320		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0	160		0.27		Direct Entry,

**Pond 1P: GREAT ROAD**

Inflow Area = 0.320 ac, Inflow Depth > 2.68" for Middlesex 002 yr event  
 Inflow = 0.83 cfs @ 12.14 hrs, Volume= 0.071 af  
 Primary = 0.83 cfs @ 12.14 hrs, Volume= 0.071 af, Atten= 0%, Lag= 0.0 min

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

**Subcatchment 2: TO DRY BROOK**

Runoff = 1.35 cfs @ 12.30 hrs, Volume= 0.139 af, Depth> 0.78"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
 Type III 24-hr Middlesex 002 yr Rainfall=3.10"

Area (ac)	CN	Description
0.420	77	Wetlands (brush, fair, D)
1.200	77	Brush, Fair, HSG D
0.510	56	Brush, Fair, HSG B
2.130	72	Weighted Average
2.130		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.6	100	0.0650	0.12		Sheet Flow, Brush
5.6	350	0.0440	1.05		Woods: Light underbrush n= 0.400 P2= 3.10" Shallow Concentrated Flow, Brush, wetlands Woodland Kv= 5.0 fps
19.2	450	Total			

**Pond 2P: DRY BROOK**

Inflow Area = 9.340 ac, Inflow Depth > 1.21" for Middlesex 002 yr event  
 Inflow = 8.35 cfs @ 12.38 hrs, Volume= 0.944 af  
 Primary = 8.35 cfs @ 12.38 hrs, Volume= 0.944 af, Atten= 0%, Lag= 0.0 min

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

**Subcatchment 3S: Contributing Offsite Watershed**

Runoff = 7.12 cfs @ 12.40 hrs, Volume= 0.805 af, Depth> 1.34"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
 Type III 24-hr Middlesex 002 yr Rainfall=3.10"

Area (ac)	CN	Description
6.260	79	1 acre lots, 20% imp, HSG C
0.950	98	pavement
7.210	82	Weighted Average
5.008		Pervious Area
2.202		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.5	100	0.0560	0.12		<b>Sheet Flow,</b>
13.5	1,000	0.0610	1.23		Woods: Light underbrush n= 0.400 P2= 3.10"
					<b>Shallow Concentrated Flow,</b>
					Woodland Kv= 5.0 fps
28.0	1,100	Total			

**Subcatchment 1: IMPERVIOUS**

Runoff = 1.22 cfs @ 12.14 hrs, Volume= 0.106 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 Middlesex 010 yr Rainfall=4.50"

Area (ac)	CN	Description
0.320	98	Roofs and pavement
0.320		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0	160		0.27		Direct Entry,

**Pond 1P: GREAT ROAD**

Inflow Area = 0.320 ac, Inflow Depth > 3.96" for Middlesex 010 yr event  
Inflow = 1.22 cfs @ 12.14 hrs, Volume= 0.106 af  
Primary = 1.22 cfs @ 12.14 hrs, Volume= 0.106 af, Atten= 0%, Lag= 0.0 min

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

**Subcatchment 2: TO DRY BROOK**

Runoff = 3.03 cfs @ 12.28 hrs, Volume= 0.296 af, Depth> 1.67"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type III 24-hr Middlesex 010 yr Rainfall=4.50"

Area (ac)	CN	Description
0.420	77	Wetlands (brush, fair, D)
1.200	77	Brush, Fair, HSG D
0.510	56	Brush, Fair, HSG B
2.130	72	Weighted Average
2.130		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.6	100	0.0650	0.12		Sheet Flow, Brush
5.6	350	0.0440	1.05		Woods: Light underbrush n= 0.400 P2= 3.10" Shallow Concentrated Flow, Brush, wetlands Woodland Kv= 5.0 fps
19.2	450	Total			

**Pond 2P: DRY BROOK**

Inflow Area = 9.340 ac, Inflow Depth > 2.27" for Middlesex 010 yr event  
 Inflow = 15.71 cfs @ 12.37 hrs, Volume= 1.765 af  
 Primary = 15.71 cfs @ 12.37 hrs, Volume= 1.765 af, Atten= 0%, Lag= 0.0 min

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

**Subcatchment 3S: Contributing Offsite Watershed**

Runoff = 12.97 cfs @ 12.39 hrs, Volume= 1.470 af, Depth> 2.45"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
 Type III 24-hr Middlesex 010 yr Rainfall=4.50"

Area (ac)	CN	Description
6.260	79	1 acre lots, 20% imp, HSG C
0.950	98	pavement
7.210	82	Weighted Average
5.008		Pervious Area
2.202		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.5	100	0.0560	0.12		<b>Sheet Flow,</b>
					Woods: Light underbrush n= 0.400 P2= 3.10"
13.5	1,000	0.0610	1.23		<b>Shallow Concentrated Flow,</b>
					Woodland Kv= 5.0 fps
28.0	1,100	Total			

**Subcatchment 1: IMPERVIOUS**

Runoff = 1.44 cfs @ 12.14 hrs, Volume= 0.125 af, Depth> 4.69"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type III 24-hr Middlesex 025 yr Rainfall=5.30"

Area (ac)	CN	Description
0.320	98	Roofs and pavement
0.320		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0	160		0.27		Direct Entry,

**Pond 1P: GREAT ROAD**

Inflow Area = 0.320 ac, Inflow Depth > 4.69" for Middlesex 025 yr event  
Inflow = 1.44 cfs @ 12.14 hrs, Volume= 0.125 af  
Primary = 1.44 cfs @ 12.14 hrs, Volume= 0.125 af, Atten= 0%, Lag= 0.0 min

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

**Subcatchment 2: TO DRY BROOK**

Runoff = 4.11 cfs @ 12.27 hrs, Volume= 0.397 af, Depth> 2.24"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type III 24-hr Middlesex 025 yr Rainfall=5.30"

Area (ac)	CN	Description
0.420	77	Wetlands (brush, fair, D)
1.200	77	Brush, Fair, HSG D
0.510	56	Brush, Fair, HSG B
2.130	72	Weighted Average
2.130		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.6	100	0.0650	0.12		Sheet Flow, Brush
5.6	350	0.0440	1.05		Woods: Light underbrush n= 0.400 P2= 3.10" Shallow Concentrated Flow, Brush, wetlands Woodland Kv= 5.0 fps
19.2	450				Total

**Pond 2P: DRY BROOK**

Inflow Area = 9.340 ac, Inflow Depth > 2.92" for Middlesex 025 yr event  
 Inflow = 20.14 cfs @ 12.36 hrs, Volume= 2.271 af  
 Primary = 20.14 cfs @ 12.36 hrs, Volume= 2.271 af, Atten= 0%, Lag= 0.0 min

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

**Subcatchment 3S: Contributing Offsite Watershed**

Runoff = 16.44 cfs @ 12.38 hrs, Volume= 1.873 af, Depth> 3.12"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
 Type III 24-hr Middlesex 025 yr Rainfall=5.30"

Area (ac)	CN	Description
6.260	79	1 acre lots, 20% imp, HSG C
0.950	98	pavement
7.210	82	Weighted Average
5.008		Pervious Area
2.202		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.5	100	0.0560	0.12		<b>Sheet Flow,</b>
13.5	1,000	0.0610	1.23		Woods: Light underbrush n= 0.400 P2= 3.10"
					<b>Shallow Concentrated Flow,</b>
					Woodland Kv= 5.0 fps
28.0	1,100	Total			

**Subcatchment 1: IMPERVIOUS**

Runoff = 1.77 cfs @ 12.14 hrs, Volume= 0.154 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 Middlesex 100 yr Rainfall=6.50"

Area (ac)	CN	Description
0.320	98	Roofs and pavement
0.320		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0	160		0.27		Direct Entry,

**Pond 1P: GREAT ROAD**

Inflow Area = 0.320 ac, Inflow Depth > 5.78" for Middlesex 100 yr event  
Inflow = 1.77 cfs @ 12.14 hrs, Volume= 0.154 af  
Primary = 1.77 cfs @ 12.14 hrs, Volume= 0.154 af, Atten= 0%, Lag= 0.0 min

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

**Subcatchment 2: TO DRY BROOK**

Runoff = 5.81 cfs @ 12.27 hrs, Volume= 0.560 af, Depth> 3.16"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type III 24-hr Middlesex 100 yr Rainfall=6.50"

Area (ac)	CN	Description
0.420	77	Wetlands (brush, fair, D)
1.200	77	Brush, Fair, HSG D
0.510	56	Brush, Fair, HSG B
2.130	72	Weighted Average
2.130		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.6	100	0.0650	0.12		Sheet Flow, Brush
5.6	350	0.0440	1.05		Woods: Light underbrush n= 0.400 P2= 3.10" Shallow Concentrated Flow, Brush, wetlands Woodland Kv= 5.0 fps
19.2	450	Total			

**Pond 2P: DRY BROOK**

Inflow Area = 9.340 ac, Inflow Depth > 3.93" for Middlesex 100 yr event  
 Inflow = 26.92 cfs @ 12.35 hrs, Volume= 3.058 af  
 Primary = 26.92 cfs @ 12.35 hrs, Volume= 3.058 af, Atten= 0%, Lag= 0.0 min

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

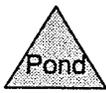
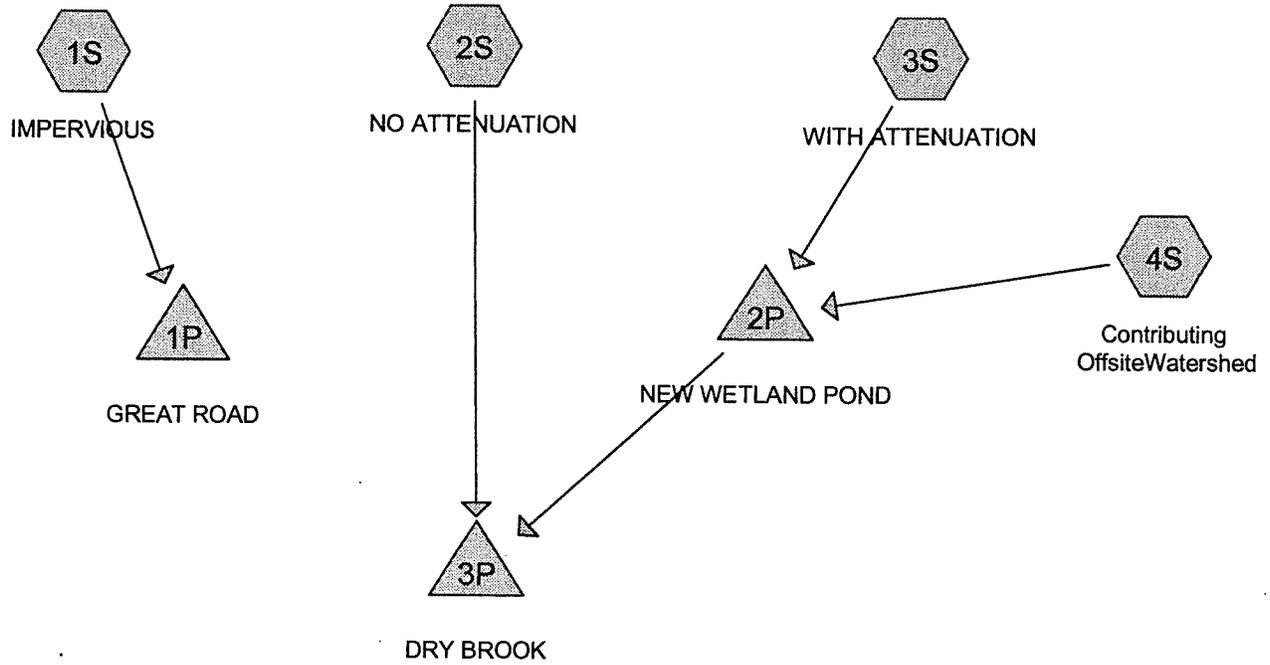
**Subcatchment 3S: Contributing Offsite Watershed**

Runoff = 21.71 cfs @ 12.38 hrs, Volume= 2.498 af, Depth> 4.16"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
 Type III 24-hr Middlesex 100 yr Rainfall=6.50"

Area (ac)	CN	Description
6.260	79	1 acre lots, 20% imp, HSG C
0.950	98	pavement
7.210	82	Weighted Average
5.008		Pervious Area
2.202		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.5	100	0.0560	0.12		<b>Sheet Flow,</b>
					Woods: Light underbrush n= 0.400 P2= 3.10"
13.5	1,000	0.0610	1.23		<b>Shallow Concentrated Flow,</b>
					Woodland Kv= 5.0 fps
28.0	1,100	Total			



**Drainage Diagram for 5180B26\_POST**  
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Type III 24-hr Middlesex 002 yr Rainfall=3.10"

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**Pond 1P: GREAT ROAD**

Inflow Area = 0.081 ac, Inflow Depth > 2.68" for Middlesex 002 yr event  
 Inflow = 0.21 cfs @ 12.14 hrs, Volume= 0.018 af  
 Primary = 0.21 cfs @ 12.14 hrs, Volume= 0.018 af, Atten= 0%, Lag= 0.0 min

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

**Subcatchment 1S: IMPERVIOUS**

Runoff = 0.21 cfs @ 12.14 hrs, Volume= 0.018 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 Middlesex 002 yr Rainfall=3.10"

Area (sf)	CN	Description
3,512	98	Pavement
3,512		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0	95		0.16		Direct Entry, Pavement sheet flow

**Pond 2P: NEW WETLAND POND**

Inflow Area = 8.500 ac, Inflow Depth > 1.30" for Middlesex 002 yr event  
 Inflow = 8.11 cfs @ 12.38 hrs, Volume= 0.923 af  
 Outflow = 5.36 cfs @ 12.55 hrs, Volume= 0.816 af, Atten= 34%, Lag= 10.2 min  
 Primary = 5.36 cfs @ 12.55 hrs, Volume= 0.816 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs / 2  
 Peak Elev= 146.07' @ 12.55 hrs Surf.Area= 7,158 sf Storage= 9,342 cf

Plug-Flow detention time= 61.8 min calculated for 0.816 af (88% of inflow)  
 Center-of-Mass det. time= 27.0 min ( 844.1 - 817.0 )

Volume	Invert	Avail.Storage	Storage Description
#1	144.00'	9,342 cf	Custom Stage Data (Irregular) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
144.00	2,102	184.8	0	0	2,102
145.00	4,844	285.1	3,379	3,379	5,860
146.00	7,158	333.0	5,963	9,342	8,236

Device	Routing	Invert	Outlet Devices
#1	Primary	145.00'	1.00' x 1.00' Horiz. Orifice/Grate Limited to weir flow C= 0.600
#2	Primary	146.00'	10.0' long x 5.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50

Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65  
 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=5.35 cfs @ 12.55 hrs HW=146.06' (Free Discharge)

1=Orifice/Grate (Orifice Controls 4.97 cfs @ 4.97 fps)

2=Broad-Crested Rectangular Weir (Weir Controls 0.39 cfs @ 0.60 fps)

**Subcatchment 2S: NO ATTENUATION**

Runoff = 1.10 cfs @ 12.33 hrs, Volume= 0.115 af, Depth> 1.28"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
 Type III 24-hr Middlesex 002 yr Rainfall=3.10"

Area (ac)	CN	Description
0.370	98	Roofs, pavement
0.140	80	>75% Grass cover, Good, HSG D
0.400	77	Wetlands (brush, fair, D)
0.170	56	Wetlands (brush, fair, B)
1.080	81	Weighted Average
0.710		Pervious Area
0.370		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.5	50	0.0400	0.09		<b>Sheet Flow, Wetlands</b>
					Woods: Light underbrush n= 0.400 P2= 3.10"
8.1	50	0.0600	0.10		<b>Sheet Flow, Wetlands</b>
					Woods: Light underbrush n= 0.400 P2= 3.10"
2.4	173	0.0580	1.20		<b>Shallow Concentrated Flow, Wetlands</b>
					Woodland Kv= 5.0 fps
3.2	137	0.0210	0.72		<b>Shallow Concentrated Flow, Wetlands</b>
					Woodland Kv= 5.0 fps
23.2	410	Total			

**Pond 3P: DRY BROOK**

Inflow Area = 9.580 ac, Inflow Depth > 1.17" for Middlesex 002 yr event

Inflow = 6.18 cfs @ 12.55 hrs, Volume= 0.931 af

Primary = 6.18 cfs @ 12.55 hrs, Volume= 0.931 af, Atten= 0%, Lag= 0.0 min

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

**Subcatchment 3S: WITH ATTENUATION**

Runoff = 1.29 cfs @ 12.23 hrs, Volume= 0.118 af, Depth> 1.10"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
 Type III 24-hr Middlesex 002 yr Rainfall=3.10"

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Type III 24-hr Middlesex 002 yr Rainfall=3.10"

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Area (ac)	CN	Description
0.420	98	Roofs, pavement
0.170	61	>75% Grass cover, Good, HSG B
0.490	77	Brush, Fair, HSG D (includes wetlands)
0.210	56	Brush, Fair, HSG B (includes wetlands)
1.290	78	Weighted Average
0.870		Pervious Area
0.420		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.0	100	0.0610	0.12		<b>Sheet Flow, Brush</b> Woods: Light underbrush n= 0.400 P2= 3.10"
1.7	114	0.0520	1.14		<b>Shallow Concentrated Flow, Wetlands</b> Woodland Kv= 5.0 fps
0.2	26	0.1500	1.94		<b>Shallow Concentrated Flow, Wetlands</b> Woodland Kv= 5.0 fps
15.9	240	Total			

**Subcatchment 4S: Contributing Offsite Watershed**

Runoff = 7.12 cfs @ 12.40 hrs, Volume= 0.805 af, Depth> 1.34"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type III 24-hr Middlesex 002 yr Rainfall=3.10"

Area (ac)	CN	Description
6.260	79	1 acre lots, 20% imp, HSG C
0.950	98	Pavement
7.210	82	Weighted Average
5.008		Pervious Area
2.202		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.5	100	0.0560	0.12		<b>Sheet Flow,</b> Woods: Light underbrush n= 0.400 P2= 3.10"
13.5	1,000	0.0610	1.23		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
28.0	1,100	Total			

**Pond 1P: GREAT ROAD**

Inflow Area = 0.081 ac, Inflow Depth > 3.96" for Middlesex 010 yr event  
 Inflow = 0.31 cfs @ 12.14 hrs, Volume= 0.027 af  
 Primary = 0.31 cfs @ 12.14 hrs, Volume= 0.027 af, Atten= 0%, Lag= 0.0 min

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

**Subcatchment 1S: IMPERVIOUS**

Runoff = 0.31 cfs @ 12.14 hrs, Volume= 0.027 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 Middlesex 010 yr Rainfall=4.50"

Area (sf)	CN	Description
3,512	98	Pavement
3,512		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0	95		0.16		Direct Entry, Pavement sheet flow

**Pond 2P: NEW WETLAND POND**

Inflow Area = 8.500 ac, Inflow Depth > 2.40" for Middlesex 010 yr event  
 Inflow = 14.90 cfs @ 12.36 hrs, Volume= 1.698 af  
 Outflow = 22.49 cfs @ 12.36 hrs, Volume= 1.922 af, Atten= 0%, Lag= 0.0 min  
 Primary = 22.49 cfs @ 12.36 hrs, Volume= 1.922 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs / 2  
 Peak Elev= 146.71' @ 12.36 hrs Surf.Area= 7,158 sf Storage= 9,342 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)  
 Center-of-Mass det. time= 7.3 min ( 810.8 - 803.5 )

Volume	Invert	Avail.Storage	Storage Description
#1	144.00'	9,342 cf	Custom Stage Data (Irregular) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
144.00	2,102	184.8	0	0	2,102
145.00	4,844	285.1	3,379	3,379	5,860
146.00	7,158	333.0	5,963	9,342	8,236

Device	Routing	Invert	Outlet Devices
#1	Primary	145.00'	1.00' x 1.00' Horiz. Orifice/Grate Limited to weir flow C= 0.600
#2	Primary	146.00'	10.0' long x 5.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50

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Type III 24-hr Middlesex 010 yr Rainfall=4.50"

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Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65  
2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

**Primary OutFlow** Max=22.44 cfs @ 12.36 hrs HW=146.71' (Free Discharge)

1=Orifice/Grate (Orifice Controls 6.30 cfs @ 6.30 fps)

2=Broad-Crested Rectangular Weir (Weir Controls 16.14 cfs @ 2.27 fps)

**Subcatchment 2S: NO ATTENUATION**

Runoff = 2.04 cfs @ 12.32 hrs, Volume= 0.213 af, Depth> 2.36"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type III 24-hr Middlesex 010 yr Rainfall=4.50"

Area (ac)	CN	Description
0.370	98	Roofs, pavement
0.140	80	>75% Grass cover, Good, HSG D
0.400	77	Wetlands (brush, fair, D)
0.170	56	Wetlands (brush, fair, B)
1.080	81	Weighted Average
0.710		Pervious Area
0.370		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.5	50	0.0400	0.09		<b>Sheet Flow, Wetlands</b>
					Woods: Light underbrush n= 0.400 P2= 3.10"
8.1	50	0.0600	0.10		<b>Sheet Flow, Wetlands</b>
					Woods: Light underbrush n= 0.400 P2= 3.10"
2.4	173	0.0580	1.20		<b>Shallow Concentrated Flow, Wetlands</b>
					Woodland Kv= 5.0 fps
3.2	137	0.0210	0.72		<b>Shallow Concentrated Flow, Wetlands</b>
					Woodland Kv= 5.0 fps
23.2	410	Total			

**Pond 3P: DRY BROOK**

Inflow Area = 9.580 ac, Inflow Depth > 2.67" for Middlesex 010 yr event

Inflow = 24.50 cfs @ 12.36 hrs, Volume= 2.135 af

Primary = 24.50 cfs @ 12.36 hrs, Volume= 2.135 af, Atten= 0%, Lag= 0.0 min

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

**Subcatchment 3S: WITH ATTENUATION**

Runoff = 2.55 cfs @ 12.22 hrs, Volume= 0.228 af, Depth> 2.12"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Type III 24-hr Middlesex 010 yr Rainfall=4.50"

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Type III 24-hr Middlesex 010 yr Rainfall=4.50"

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Area (ac)	CN	Description
0.420	98	Roofs, pavement
0.170	61	>75% Grass cover, Good, HSG B
0.490	77	Brush, Fair, HSG D (includes wetlands)
0.210	56	Brush, Fair, HSG B (includes wetlands)
1.290	78	Weighted Average
0.870		Pervious Area
0.420		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.0	100	0.0610	0.12		<b>Sheet Flow, Brush</b> Woods: Light underbrush n= 0.400 P2= 3.10"
1.7	114	0.0520	1.14		<b>Shallow Concentrated Flow, Wetlands</b> Woodland Kv= 5.0 fps
0.2	26	0.1500	1.94		<b>Shallow Concentrated Flow, Wetlands</b> Woodland Kv= 5.0 fps
15.9	240	Total			

**Subcatchment 4S: Contributing Offsite Watershed**

Runoff = 12.97 cfs @ 12.39 hrs, Volume= 1.470 af, Depth> 2.45"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type III 24-hr Middlesex 010 yr Rainfall=4.50"

Area (ac)	CN	Description
6.260	79	1 acre lots, 20% imp, HSG C
0.950	98	Pavement
7.210	82	Weighted Average
5.008		Pervious Area
2.202		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.5	100	0.0560	0.12		<b>Sheet Flow,</b> Woods: Light underbrush n= 0.400 P2= 3.10"
13.5	1,000	0.0610	1.23		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
28.0	1,100	Total			

**Pond 1P: GREAT ROAD**

Inflow Area = 0.081 ac, Inflow Depth > 4.69" for Middlesex 025 yr event  
 Inflow = 0.36 cfs @ 12.14 hrs, Volume= 0.032 af  
 Primary = 0.36 cfs @ 12.14 hrs, Volume= 0.032 af, Atten= 0%, Lag= 0.0 min

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

**Subcatchment 1S: IMPERVIOUS**

Runoff = 0.36 cfs @ 12.14 hrs, Volume= 0.032 af, Depth> 4.69"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
 Type III 24-hr Middlesex 025 yr Rainfall=5.30"

Area (sf)	CN	Description
3,512	98	Pavement
3,512		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0	95		0.16		Direct Entry, Pavement sheet flow

**Pond 2P: NEW WETLAND POND**

Inflow Area = 8.500 ac, Inflow Depth > 3.06" for Middlesex 025 yr event  
 Inflow = 18.94 cfs @ 12.36 hrs, Volume= 2.170 af  
 Outflow = 14.87 cfs @ 12.36 hrs, Volume= 1.819 af, Atten= 21%, Lag= 0.0 min  
 Primary = 14.87 cfs @ 12.36 hrs, Volume= 1.819 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs / 2  
 Peak Elev= 146.49' @ 12.36 hrs Surf.Area= 7,158 sf Storage= 9,342 cf

Plug-Flow detention time= 70.3 min calculated for 1.813 af (84% of inflow)  
 Center-of-Mass det. time= 26.6 min ( 824.5 - 797.9 )

Volume	Invert	Avail.Storage	Storage Description
#1	144.00'	9,342 cf	Custom Stage Data (Irregular) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
144.00	2,102	184.8	0	0	2,102
145.00	4,844	285.1	3,379	3,379	5,860
146.00	7,158	333.0	5,963	9,342	8,236

Device	Routing	Invert	Outlet Devices
#1	Primary	145.00'	1.00' x 1.00' Horiz. Orifice/Grate Limited to weir flow C= 0.600
#2	Primary	146.00'	10.0' long x 5.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50

Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65  
 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=14.81 cfs @ 12.36 hrs HW=146.49' (Free Discharge)

1=Orifice/Grate (Orifice Controls 5.88 cfs @ 5.88 fps)

2=Broad-Crested Rectangular Weir (Weir Controls 8.93 cfs @ 1.82 fps)

**Subcatchment 2S: NO ATTENUATION**

Runoff = 2.60 cfs @ 12.32 hrs, Volume= 0.273 af, Depth> 3.03"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
 Type III 24-hr Middlesex 025 yr Rainfall=5.30"

Area (ac)	CN	Description
0.370	98	Roofs, pavement
0.140	80	>75% Grass cover, Good, HSG D
0.400	77	Wetlands (brush, fair, D)
0.170	56	Wetlands (brush, fair, B)
1.080	81	Weighted Average
0.710		Pervious Area
0.370		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.5	50	0.0400	0.09		<b>Sheet Flow, Wetlands</b>
					Woods: Light underbrush n= 0.400 P2= 3.10"
8.1	50	0.0600	0.10		<b>Sheet Flow, Wetlands</b>
					Woods: Light underbrush n= 0.400 P2= 3.10"
2.4	173	0.0580	1.20		<b>Shallow Concentrated Flow, Wetlands</b>
					Woodland Kv= 5.0 fps
3.2	137	0.0210	0.72		<b>Shallow Concentrated Flow, Wetlands</b>
					Woodland Kv= 5.0 fps
23.2	410	Total			

**Pond 3P: DRY BROOK**

Inflow Area = 9.580 ac, Inflow Depth > 2.62" for Middlesex 025 yr event

Inflow = 17.43 cfs @ 12.35 hrs, Volume= 2.092 af

Primary = 17.43 cfs @ 12.35 hrs, Volume= 2.092 af, Atten= 0%, Lag= 0.0 min

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

**Subcatchment 3S: WITH ATTENUATION**

Runoff = 3.31 cfs @ 12.22 hrs, Volume= 0.297 af, Depth> 2.76"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
 Type III 24-hr Middlesex 025 yr Rainfall=5.30"

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Type III 24-hr Middlesex 025 yr Rainfall=5.30"

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Area (ac)	CN	Description
0.420	98	Roofs, pavement
0.170	61	>75% Grass cover, Good, HSG B
0.490	77	Brush, Fair, HSG D (includes wetlands)
0.210	56	Brush, Fair, HSG B (includes wetlands)
1.290	78	Weighted Average
0.870		Pervious Area
0.420		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.0	100	0.0610	0.12		<b>Sheet Flow, Brush</b> Woods: Light underbrush n= 0.400 P2= 3.10"
1.7	114	0.0520	1.14		<b>Shallow Concentrated Flow, Wetlands</b> Woodland Kv= 5.0 fps
0.2	26	0.1500	1.94		<b>Shallow Concentrated Flow, Wetlands</b> Woodland Kv= 5.0 fps
15.9	240	Total			

**Subcatchment 4S: Contributing Offsite Watershed**

Runoff = 16.44 cfs @ 12.38 hrs, Volume= 1.873 af, Depth> 3.12"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type III 24-hr Middlesex 025 yr Rainfall=5.30"

Area (ac)	CN	Description
6.260	79	1 acre lots, 20% imp, HSG C
0.950	98	Pavement
7.210	82	Weighted Average
5.008		Pervious Area
2.202		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.5	100	0.0560	0.12		<b>Sheet Flow,</b> Woods: Light underbrush n= 0.400 P2= 3.10"
13.5	1,000	0.0610	1.23		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
28.0	1,100	Total			

**Pond 1P: GREAT ROAD**

Inflow Area = 0.081 ac, Inflow Depth > 5.78" for Middlesex 100 yr event  
 Inflow = 0.44 cfs @ 12.14 hrs, Volume= 0.039 af  
 Primary = 0.44 cfs @ 12.14 hrs, Volume= 0.039 af, Atten= 0%, Lag= 0.0 min

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

**Subcatchment 1S: IMPERVIOUS**

Runoff = 0.44 cfs @ 12.14 hrs, Volume= 0.039 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 Middlesex 100 yr Rainfall=6.50"

Area (sf)	CN	Description
3,512	98	Pavement
3,512		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0	95		0.16		Direct Entry, Pavement sheet flow

**Pond 2P: NEW WETLAND POND**

Inflow Area = 8.500 ac, Inflow Depth > 4.10" for Middlesex 100 yr event  
 Inflow = 25.08 cfs @ 12.35 hrs, Volume= 2.902 af  
 Outflow = 28.62 cfs @ 12.35 hrs, Volume= 3.093 af, Atten= 0%, Lag= 0.0 min  
 Primary = 28.62 cfs @ 12.35 hrs, Volume= 3.093 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs / 2  
 Peak Elev= 146.88' @ 12.35 hrs Surf.Area= 7,158 sf Storage= 9,342 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)  
 Center-of-Mass det. time= 10.8 min ( 801.9 - 791.1 )

Volume	Invert	Avail.Storage	Storage Description
#1	144.00'	9,342 cf	Custom Stage Data (Irregular) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
144.00	2,102	184.8	0	0	2,102
145.00	4,844	285.1	3,379	3,379	5,860
146.00	7,158	333.0	5,963	9,342	8,236

Device	Routing	Invert	Outlet Devices
#1	Primary	145.00'	1.00' x 1.00' Horiz. Orifice/Grate Limited to weir flow C= 0.600
#2	Primary	146.00'	10.0' long x 5.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50

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Type III 24-hr Middlesex 100 yr Rainfall=6.50"

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Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65  
2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=28.58 cfs @ 12.35 hrs HW=146.88' (Free Discharge)

1=Orifice/Grate (Orifice Controls 6.60 cfs @ 6.60 fps)

2=Broad-Crested Rectangular Weir (Weir Controls 21.98 cfs @ 2.51 fps)

**Subcatchment 2S: NO ATTENUATION**

Runoff = 3.46 cfs @ 12.32 hrs, Volume= 0.365 af, Depth> 4.06"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type III 24-hr Middlesex 100 yr Rainfall=6.50"

Area (ac)	CN	Description
0.370	98	Roofs, pavement
0.140	80	>75% Grass cover, Good, HSG D
0.400	77	Wetlands (brush, fair, D)
0.170	56	Wetlands (brush, fair, B)
1.080	81	Weighted Average
0.710		Pervious Area
0.370		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.5	50	0.0400	0.09		<b>Sheet Flow, Wetlands</b>
					Woods: Light underbrush n= 0.400 P2= 3.10"
8.1	50	0.0600	0.10		<b>Sheet Flow, Wetlands</b>
					Woods: Light underbrush n= 0.400 P2= 3.10"
2.4	173	0.0580	1.20		<b>Shallow Concentrated Flow, Wetlands</b>
					Woodland Kv= 5.0 fps
3.2	137	0.0210	0.72		<b>Shallow Concentrated Flow, Wetlands</b>
					Woodland Kv= 5.0 fps
23.2	410	Total			

**Pond 3P: DRY BROOK**

Inflow Area = 9.580 ac, Inflow Depth > 4.33" for Middlesex 100 yr event

Inflow = 32.02 cfs @ 12.35 hrs, Volume= 3.458 af

Primary = 32.02 cfs @ 12.35 hrs, Volume= 3.458 af, Atten= 0%, Lag= 0.0 min

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

**Subcatchment 3S: WITH ATTENUATION**

Runoff = 4.48 cfs @ 12.22 hrs, Volume= 0.404 af, Depth> 3.76"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type III 24-hr Middlesex 100 yr Rainfall=6.50"

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Type III 24-hr Middlesex 100 yr Rainfall=6.50"

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Area (ac)	CN	Description
0.420	98	Roofs, pavement
0.170	61	>75% Grass cover, Good, HSG B
0.490	77	Brush, Fair, HSG D (includes wetlands)
0.210	56	Brush, Fair, HSG B (includes wetlands)
1.290	78	Weighted Average
0.870		Pervious Area
0.420		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.0	100	0.0610	0.12		<b>Sheet Flow, Brush</b> Woods: Light underbrush n= 0.400 P2= 3.10"
1.7	114	0.0520	1.14		<b>Shallow Concentrated Flow, Wetlands</b> Woodland Kv= 5.0 fps
0.2	26	0.1500	1.94		<b>Shallow Concentrated Flow, Wetlands</b> Woodland Kv= 5.0 fps
15.9	240	Total			

**Subcatchment 4S: Contributing Offsite Watershed**

Runoff = 21.71 cfs @ 12.38 hrs, Volume= 2.498 af, Depth> 4.16"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type III 24-hr Middlesex 100 yr Rainfall=6.50"

Area (ac)	CN	Description
6.260	79	1 acre lots, 20% imp, HSG C
0.950	98	Pavement
7.210	82	Weighted Average
5.008		Pervious Area
2.202		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.5	100	0.0560	0.12		<b>Sheet Flow,</b> Woods: Light underbrush n= 0.400 P2= 3.10"
13.5	1,000	0.0610	1.23		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
28.0	1,100	Total			