FARLAND CORP.

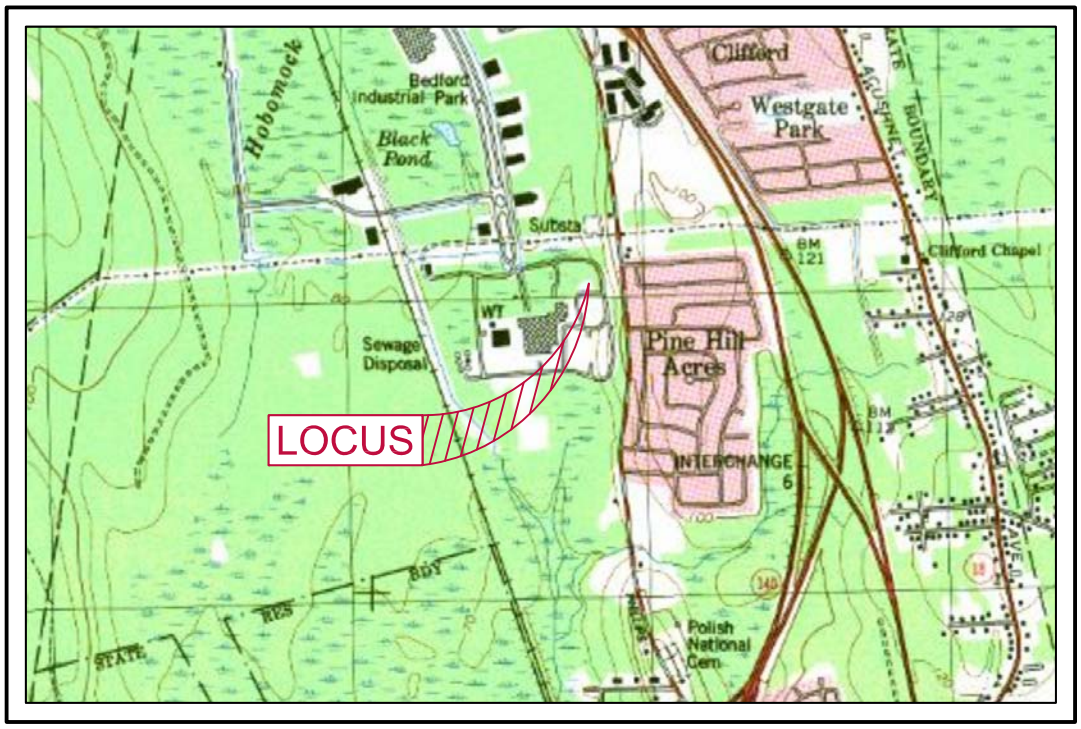
ENGINEERING A BETTER TOMORROW

ENGINEERING | SITE WORK | LAND SURVEYING

NOTICE OF INTENT

SITE PLAN

ASSESSORS MAP 134 - LOT 5
100 DUCHAINE BOULEVARD
NEW BEDFORD, MASSACHUSETTS



PREPARED FOR:

ERIC DECOSTA
LOGAL, LLC
100 DUCHAINE BOULEVARD
NEW BEDFORD, MA 02745

TABLE OF CONTENTS

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands

WPA Form 3 – Notice of Intent

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

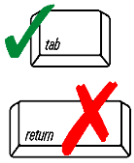
Provided by MassDEP:

MassDEP File Number

Document Transaction Number

New Bedford
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):

100 Duchaine Boulevard — a. Street Address
New Bedford — b. City/Town
02745 — c. Zip Code

Latitude and Longitude:
41° 43' 00.83" — d. Latitude
70° 56' 59.21" — e. Longitude

Map 134 — f. Assessors Map/Plat Number
Lot 5 — g. Parcel /Lot Number

2. Applicant:

Eric — a. First Name
Decosta — b. Last Name
LOGAL, LLC — c. Organization
100 Duchaine Boulevard — d. Street Address
New Bedford — e. City/Town
MA — f. State
02745 — g. Zip Code
h. Phone Number
i. Fax Number
j. Email Address

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

a. First Name
b. Last Name
LOGAL, LLC — c. Organization
100 Duchaine Boulevard — d. Street Address
New Bedford — e. City/Town
MA — f. State
02745 — g. Zip Code
h. Phone Number
i. Fax Number
j. Email address

4. Representative (if any):

Christian — a. First Name
Farland — b. Last Name
Farland Corp. — c. Company
401 County Street — d. Street Address
New Bedford — e. City/Town
MA — f. State
02740 — g. Zip Code
(508) 717-3479 — h. Phone Number
i. Fax Number
cfarland@farlandcorp.com — j. Email address

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

$1,050.00 — a. Total Fee Paid
$512.50 — b. State Fee Paid
$537.50 — c. City/Town Fee Paid

A. General Information (continued)

6. General Project Description:

Site improvements to developed land including: new building construction, parking spaces for company vehicles, additional trailer parking and expansion of the existing employee parking spaces.

7a. Project Type Checklist: (Limited Project Types see Section A. 7b.)

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

7b. Is any portion of the proposed activity eligible to be treated as a limited project (including Ecological Restoration 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. (See 310 CMR 10.24 and 10.53 for a complete list and description of limited project types)

2. Limited Project Type

If the proposed activity is eligible to be treated as an Ecological Restoration Limited Project (310 CMR10.24(8), 310 CMR 10.53(4)), complete and attach Appendix A: Ecological Restoration Limited Project Checklist and Signed Certification.

8. Property recorded at the Registry of Deeds for:

a. County	b. Certificate # (if registered land)
Bristol	23339
c. Book	d. Page Number

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

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

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

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

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

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

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

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)

Note: for coastal riverfront areas, please complete **Section B.2.f**. above.

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

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

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

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

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

4. ☐ Restoration/Enhancement

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

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

5. ☐ Project Involves Stream Crossings

a. number of new stream crossings | b. number of replacement stream crossings

C. Other Applicable Standards and Requirements

☐ This is a proposal for an Ecological Restoration Limited Project. Skip Section C and complete Appendix A: Ecological Restoration Limited Project Checklists – Required Actions (310 CMR 10.11).

Streamlined Massachusetts Endangered Species Act/Wetlands Protection Act Review

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

   a. ☐ Yes ☒ No

   If yes, include proof of mailing or hand delivery of NOI to:

   Natural Heritage and Endangered Species Program
   Division of Fisheries and Wildlife
   1 Rabbit Hill Road
   Westborough, MA 01581

   October 1, 2008
   b. Date of map

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

   c. 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

2. ☐ 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

* Some projects **not** in Estimated Habitat may be located in Priority Habitat, and require NHESP review (see http://www.mass.gov/eea/agencies/dfg/dfw/natural-heritage/regulatory-review/). Priority Habitat includes habitat for state-listed plants and strictly upland species not protected by the Wetlands Protection Act.

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

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

(c) ☐ MESA filing fee (fee information available at http://www.mass.gov/dfwele/dfw/nhesp/regulatory_review/mesa/mesa_fee_schedule.htm). Make check payable to "Commonwealth of Massachusetts - NHESP" 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

(f) 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/regulatory_review/mesa/mesa_exemptions.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 # 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.

3. 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, hand delivery, or electronic delivery of NOI to either:

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

Division of Marine Fisheries -
Southeast Marine Fisheries Station
Attn: Environmental Reviewer
1213 Purchase Street – 3rd Floor
New Bedford, MA 02740-6694
Email: DMF.EnvReview-South@state.ma.us

North Shore - Hull to New Hampshire border:

Division of Marine Fisheries -
North Shore Office
Attn: Environmental Reviewer
30 Emerson Avenue
Gloucester, MA 01930
Email: DMF.EnvReview-North@state.ma.us

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.

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

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

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

b. ACEC

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

5. 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

6. 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

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

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

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

2. ☒ A portion of the site constitutes redevelopment

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

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

1. ☐ Single-family house

2. ☐ Emergency road repair

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

D. Additional Information

☐ This is a proposal for an Ecological Restoration Limited Project. Skip Section D and complete Appendix A: Ecological Restoration Notice of Intent – Minimum Required Documents (310 CMR 10.12).

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.

D. Additional Information (cont'd)

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.

Site Plan - 100 Duchaine Boulevard
a. Plan Title

Farland Corp.
b. Prepared By

Christian A. Farland P.E.
c. Signed and Stamped by

d. Final Revision Date

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:

5592
2. Municipal Check Number

2/22/17
3. Check date

5593
4. State Check Number

2/22/17
5. Check date

Farland Corp.
6. Payor name on check: First Name

7. Payor name on check: Last Name

F. Signatures and Submittal Requirements

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

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

1. Signature of Applicant	2. Date: 2/14/17
3. Signature of Property Owner (if different)	4. Date
5. Signature of Representative (if any)	6. Date: 2-22-17

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.

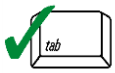
The original and copies must be sent simultaneously. Failure by the applicant to send copies in a timely manner may result in dismissal of the Notice of Intent.

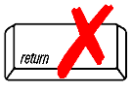
Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands

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. Location of Project:

100 Duchaine Boulevard	New Bedford
a. Street Address	b. City/Town
5593	$512.50
c. Check number	d. Fee amount

2. Applicant Mailing Address:

Eric		DeCosta	
a. First Name		b. Last Name	
LOGAL, LLC			
c. Organization			
100 Duchaine Boulevard			
d. Mailing Address			
New Bedford	MA	02740	
e. City/Town	f. State	g. Zip Code	
h. Phone Number	i. Fax Number	j. Email Address	

3. 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	

B. Fees

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

Fee should be calculated using the following process & worksheet. ***Please see Instructions before filling out worksheet.***

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

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

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

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

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

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

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands

NOI Wetland Fee Transmittal Form

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

B. Fees (continued)

Step 1/Type of Activity	Step 2/Number of Activities	Step 3/Individual Activity Fee	Step 4/Subtotal Activity Fee
Category 3b.) Building	1	$1,050.00	$1,050.00

Step 5/Total Project Fee: $1,050.00

Step 6/Fee Payments:

Total Project Fee:	$1,050.00 (a. Total Fee from Step 5)
State share of filing Fee:	$512.50 (b. 1/2 Total Fee **less $**12.50)
City/Town share of filling Fee:	$537.50 (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.)

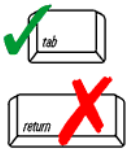
STORMWATER REPORT CHECKLIST

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

Checklist for Stormwater Report

A. Introduction

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



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

The Stormwater Report must include:

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

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

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

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

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

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

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

Checklist for Stormwater Report

B. Stormwater Checklist and Certification

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

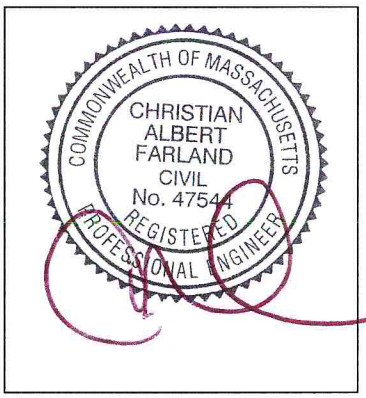
Note: Because stormwater requirements vary from project to project, it is possible that a complete Stormwater Report may not include information on some of the subjects specified in the Checklist. If it is determined that a specific item does not apply to the project under review, please note that the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

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

Registered Professional Engineer's Certification

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

Registered Professional Engineer Block and Signature



2/14/17

Signature and Date

Checklist

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

☐ New development

☐ Redevelopment

☒ Mix of New Development and Redevelopment

Checklist for Stormwater Report

Checklist (continued)

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

☒ No disturbance to any Wetland Resource Areas

☐ Site Design Practices (e.g. clustered development, reduced frontage setbacks)

☐ Reduced Impervious Area (Redevelopment Only)

☒ Minimizing disturbance to existing trees and shrubs

☐ LID Site Design Credit Requested:

- ☐ Credit 1
- ☐ Credit 2
- ☐ Credit 3

☐ Use of "country drainage" versus curb and gutter conveyance and pipe

☐ Bioretention Cells (includes Rain Gardens)

☐ Constructed Stormwater Wetlands (includes Gravel Wetlands designs)

☐ Treebox Filter

☐ Water Quality Swale

☐ Grass Channel

☐ Green Roof

☐ Other (describe): _____

Standard 1: No New Untreated Discharges

☒ No new untreated discharges

☒ Outlets have been designed so there is no erosion or scour to wetlands and waters of the Commonwealth

☐ Supporting calculations specified in Volume 3 of the Massachusetts Stormwater Handbook included.

Checklist for Stormwater Report

Checklist (continued)

Standard 2: Peak Rate Attenuation

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

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

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

Standard 3: Recharge

☒ Soil Analysis provided.

☒ Required Recharge Volume calculation provided.

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

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

☒ Static ☐ Simple Dynamic ☐ Dynamic Field[1]

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

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

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

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

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

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

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

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

Checklist for Stormwater Report

Checklist (continued)

Standard 3: Recharge (continued)

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

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

Standard 4: Water Quality

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

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

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

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

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

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

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

Checklist for Stormwater Report

Checklist (continued)

Standard 4: Water Quality (continued)

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

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

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

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

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

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

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

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

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

☐ All exposure has been eliminated.

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

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

Standard 6: Critical Areas

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

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

Checklist for Stormwater Report

Checklist (continued)

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

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

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

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

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

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

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

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

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

Checklist for Stormwater Report

Checklist (continued)

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

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

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

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

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

Standard 9: Operation and Maintenance Plan

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

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

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

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

Standard 10: Prohibition of Illicit Discharges

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

☒ An Illicit Discharge Compliance Statement is attached;

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

STORMWATER MANAGEMENT REPORT

(MAIN OFFICE) 401 COUNTY STREET, NEW BEDFORD, MA 02740 **P** 508.717.3479 **F** 508.717.3481
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STORMWATER MANAGEMENT REPORT AND HYDROLOGIC ANALYSIS

Proposed Site Plan
100 Duchaine Boulevard (Assessors Map 134 Lot 5)
New Bedford, Massachusetts 02745

Project Summary

The project area associated with this proposed development is located at the southern terminus of Duchaine Boulevard in the New Bedford Business Park in northern New Bedford. The site is comprised tax parcel Lot 5 on Assessor's Map 134, and consists of approximately 7.26+/- acres. The proposed project area is comprised of the majority of the total parcel area, but does not include the steeply inclined portion of land leading to the western side of Phillips Road. Much of the parcel area, including the entire proposed project area, is located in the city's Industrial C zoning district. The site currently contains a large concrete foundation that is the remains of a warehouse style building with associated parking, loading, and landscaped areas. Access to the site is gained from a looped road off of Duchaine Boulevard, over which access easements have been provided.

The applicant is seeking permission to provide parking, loading, and drainage improvements to the project site, in addition to a newly constructed 28,000 S.F. warehouse and distribution building. The applicant is proposing to install sixteen (16) loading docks on the east side of the proposed building, and to provide an additional forty (40) trailer parking spaces throughout the site. Proposed improvements also include twenty-seven (27) new employee parking spaces. In order to attenuate the increased stormwater runoff generated by the proposed impervious site coverage and to provide the appropriate level of water quality treatment, additional stormwater management practices have been proposed. Proposed structural BMP's include sediment forebays, detention basin and subsurface recharge system.

Methodology

Drainage computations were performed using the Natural Resources Conservation Services (NRCS) TR-20 method and HydroCAD® Drainage Calculation Software to determine the change in the existing and post-development runoff rates from each drainage area for the 2-, 10-, and 100-year 24 hour storm events. The limits of the work proposed to complete the project fall within an area subject to protection by the Wetlands Protection Act, therefor, compliance with DEP Stormwater Management Standards is required. Sketches of the existing and proposed watershed areas, HydroCAD® Report, and copies of the calculation sheets are included as appendices to this report.

Existing Conditions

The soils underlying the site are identified in the Natural Resources Conservation Service (NRCS) Soil Survey of Bristol County ***(see Exhibit D)***. The site soils are classified as 306C (Paxton fine sandy loam, 8-15 percent slopes, very stony, Hydrologic Soil Group: "C") and 602 (Urban Land, HSG: "Unranked")

Stormwater Management Overview

Existing Conditions:

The project site has been divided into eleven existing subcatchment drainage areas, which discharge to three design points. The design points chosen for this site are the limit of the bordering vegetated wetlands located within the east central portion of the site and the BVW to the northern edge of the site. A number of depressions located inside the site parking lot, which discharge runoff through culverts either directly toward the BVW or toward an existing stormwater "wet basin" at the south end of the site via a piped drainage system, have been incorporated into the existing drainage model. Although these basins are wetland resource areas, they do provide peak rate attenuation for runoff which is directed to them. Existing outlet controls within the wet basin have been incorporated into the model, and the outflow from the pond is combined with the runoff toward the BVW to provide a total flow to the design points.

Proposed Conditions:

Under proposed conditions, eleven subcatchment areas have been included in the drainage model. New paved areas to be added to the existing parking area direct runoff towards two proposed infiltration basins, located between the existing driveway and the proposed paved area. The runoff from the new building will be recharged through a subsurface infiltration cultec system.

The proposed infiltration basins have been designed in accordance with the DEP Stormwater Handbook. In accordance with the Stormwater Handbook, the rate mitigation facilities have been engineered to reduce post-development runoff rates from pre-development conditions.

Stormwater Management Standards

Standard 1:

- Under proposed conditions, there will be no new untreated discharges or erosion in wetland areas. Drainage outfalls from the two infiltration basins which discharge toward the existing BVW are provided with rip-rap spillways to help control velocity and erosion at the outlet. Stormwater discharges have been held below erodible velocities. This standard has been met.

Standard 2:

- The design of the stormwater system was designed for the post-development conditions to handle all storms' peak discharges and runoff

volume to include the 2 and 10-year storm events. An evaluation of peak discharges from the 100-year storm 24-hour storm event demonstrates that although a small increase in the peak discharge rate occurs, the discharge will not result in increased off-site flooding due to the short duration of increased rate and the overall reduced volume of runoff. The site drainage system was designed in consideration of the structural standards and techniques of the Best Management Practices (BMP) and Low Impact Development (LID) outlined in the "Stormwater Management Handbook".

The results of site drainage calculations are presented in the following Tables. The results are based upon evaluation of Pre-development conditions and the design of proposed surface drainage systems for the Post-development condition. These results show the Post-Development offsite runoff rates are reduced to less than the Pre-development conditions for the two-year and ten-year storm events, thus meeting the BMP guidelines for this site development.

Table 1 - Comparison of Pre- versus Post-Development Offsite Runoff toward Southerly BVW

Frequency Storm	2-Year		10-Year		100-Year	
	Rate (cfs)	Volume (af)	Rate (cfs)	Volume (af)	Rate (cfs)	Volume (af)
Pre-Development	6.84	1.028	11.01	1.671	18.01	2.748
Post-Development	5.26	0.918	7.64	1.512	13.86	2.564

Table 2 - Comparison of Pre- versus Post-Development Offsite Runoff toward Northerly BVW

Frequency Storm	2-Year		10-Year		100-Year	
	Rate (cfs)	Volume (af)	Rate (cfs)	Volume (af)	Rate (cfs)	Volume (af)
Pre-Development	3.29	0.242	5.31	0.392	8.56	0.639
Post-Development	2.99	0.222	4.84	0.360	7.84	0.587

Table 3 - Comparison of Pre- versus Post-Development Offsite Runoff

Frequency Storm	2-Year		10-Year		100-Year	
	Rate (cfs)	Volume (af)	Rate (cfs)	Volume (af)	Rate (cfs)	Volume (af)
Pre-Development	2.43	0.186	3.49	0.274	5.16	0.412
Post-Development	1.12	0.087	1.60	0.127	2.35	0.190

*See ***Exhibit F*** for supporting hydrologic calculations

Standard 3:

- The proposed infiltration basins have been designed to recharge some of the anticipated stormwater runoff from all of the new impervious area and from some of the existing impervious area. The required Recharge Volume has been calculated using the Static Method and calculations are provided in ***Exhibit G***. We note that the required Recharge Volume was calculated for the entire impervious area on-site, including existing paved areas as well as the newly proposed paved and roof areas. As a partial re-development project, this Standard is required to be met to the maximum extent practicable for these existing areas. The proposed design, however, provides the required recharge volume within the proposed basins. Drawdown Calculations have also been provided in ***Exhibit H***. This standard has been met.

Standard 4:

- The proposed stormwater management systems for this project have been designed to remove 80% of the average annual post construction load of Total Suspended Solids in accordance with this standard, as shown in calculations provided in ***Exhibit J***. Suitable practices for source control and pollution prevention have been identified in a long-term pollution prevention plan in ***Exhibit M***. Structural BMPs have been designed to capture the required water quality volume (***Exhibit I***) determined in accordance with the Stormwater Handbook. We again note that a significant amount of the total on-site post-development impervious area is from existing impervious ground cover. As a partial redevelopment project, runoff from these areas is required to be treated to the maximum extent practicable. Although the water quality volume provided in the proposed infiltration BMPs exceeds the required volume based upon the new impervious area, it does not fully comply with the required volume based on the total impervious site area. Given the existing drainage system elevation and the groundwater conditions on-site, providing additional water quality volume for the runoff from the existing impervious areas is not practicable. This standard has been met.

Standard 5:

- Stormwater discharges are proposed to be treated by the specific structural BMPs determined to be suitable for treating runoff from such land uses. Sediment Forebays and Infiltration Basins are appropriate BMPs for use with Land Uses with Higher Potential Pollutant Load. Stormwater treatment has been designed to provide 44% TSS removal prior to discharge to the infiltration BMPs, and BMPs have been designed to treat 1.0 inch of runoff times the total new impervious are at the post-development site. This standard has been met

Standard 6:

- The site does not discharge within the Zone II or IWPA of a public water supply, nor does it discharge near or to any critical areas. This standard does not apply.

Standard 7:

- This project is a partial re-development project. Much of the site is currently paved or covered with impervious cover. Those areas where new impervious coverage is proposed have been designed to meet all of the required Stormwater Standards. Those areas where existing impervious is proposed to remain will be allowed to maintain existing drainage patterns, where much of the runoff from the existing parking lot area is directed through an existing piped drainage system to several existing stormwater basin resource areas throughout the site, which attenuates the runoff prior to discharge to the BVW. Due to the water table present on-site, it is not feasible to fully meet all Standards for the existing impervious conditions.

Standard 8:

- We have provided for Construction Period Pollution in accordance with the regulations. A formal Construction Period Pollution Prevention Plan will be submitted prior to construction.

Standard 9:

- A long-term operation and maintenance plan has been prepared to ensure that stormwater management systems function as designed. ***(Exhibit L)***

Standard 10:

- We are not proposing any illicit discharges as defined in the Stormwater Management Regulations. See attached letter in ***Exhibit N***

EXHIBIT "A"

TOPO! VERSION 2.1.0

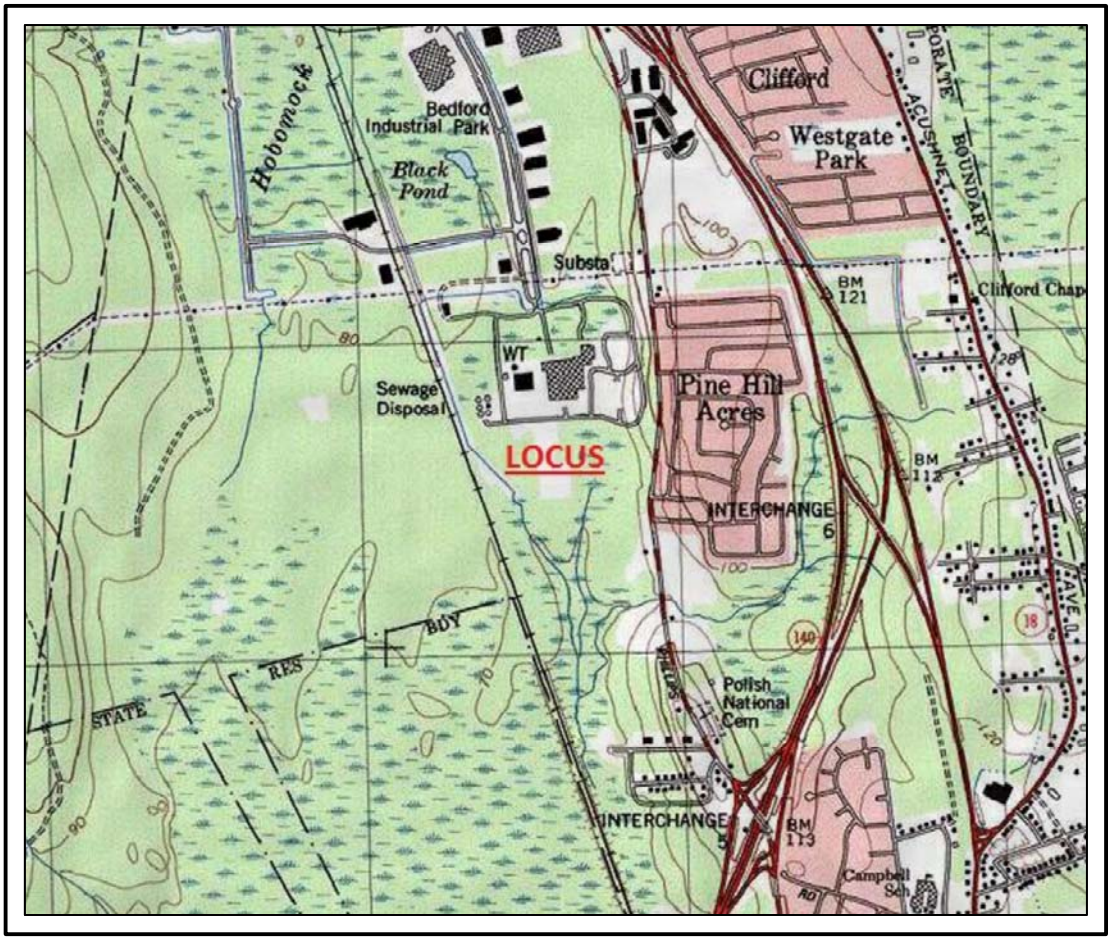

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EXHIBIT "B"

FIRM MAP
PANEL # 25005C0379F

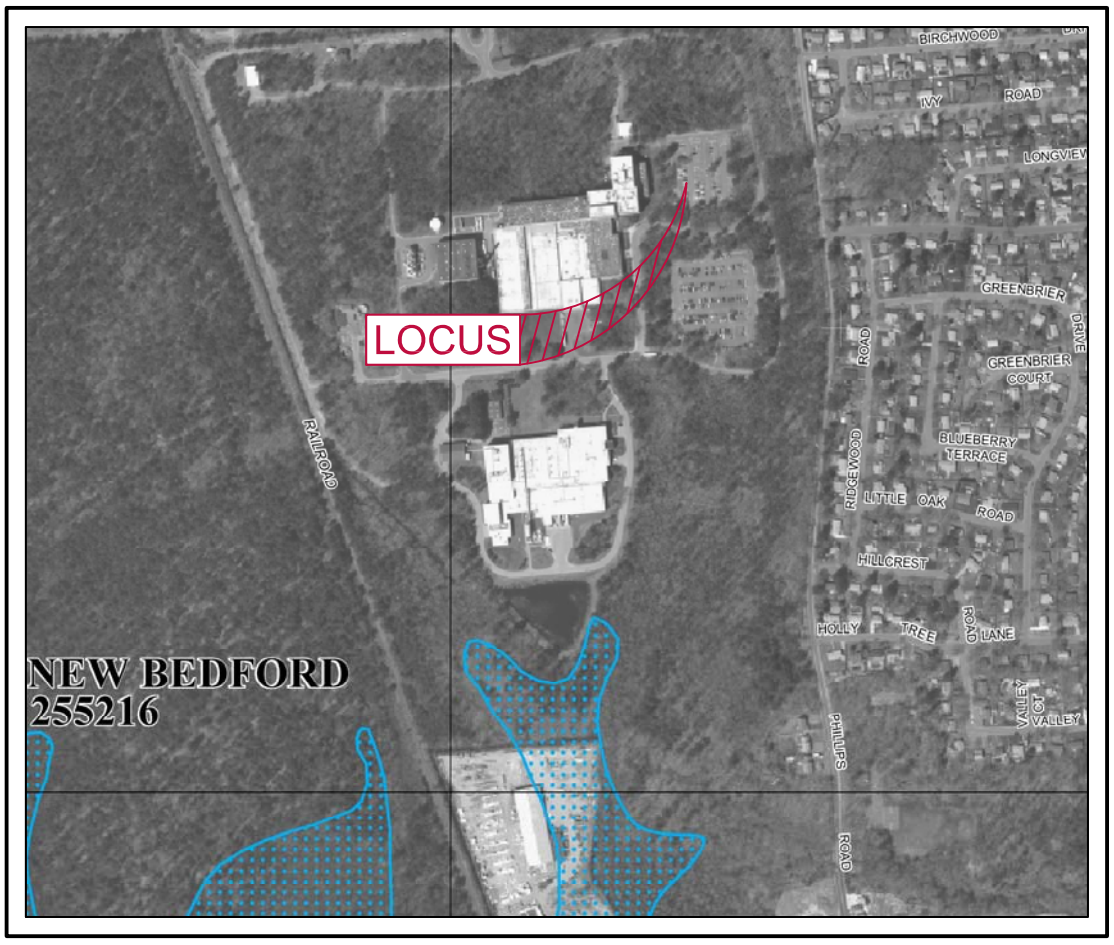
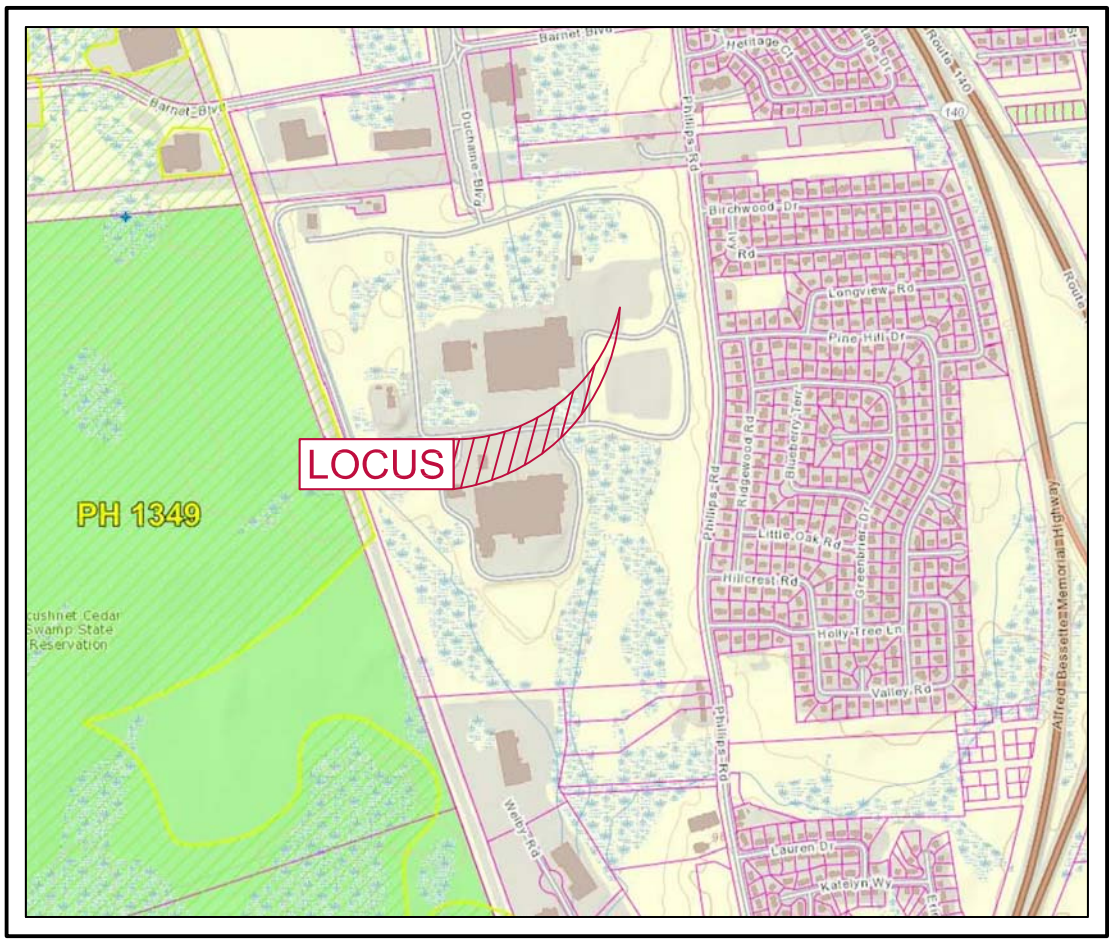


EXHIBIT "C"

NHESP PRIORITY & ESTIMATED HABITAT MAP 2008



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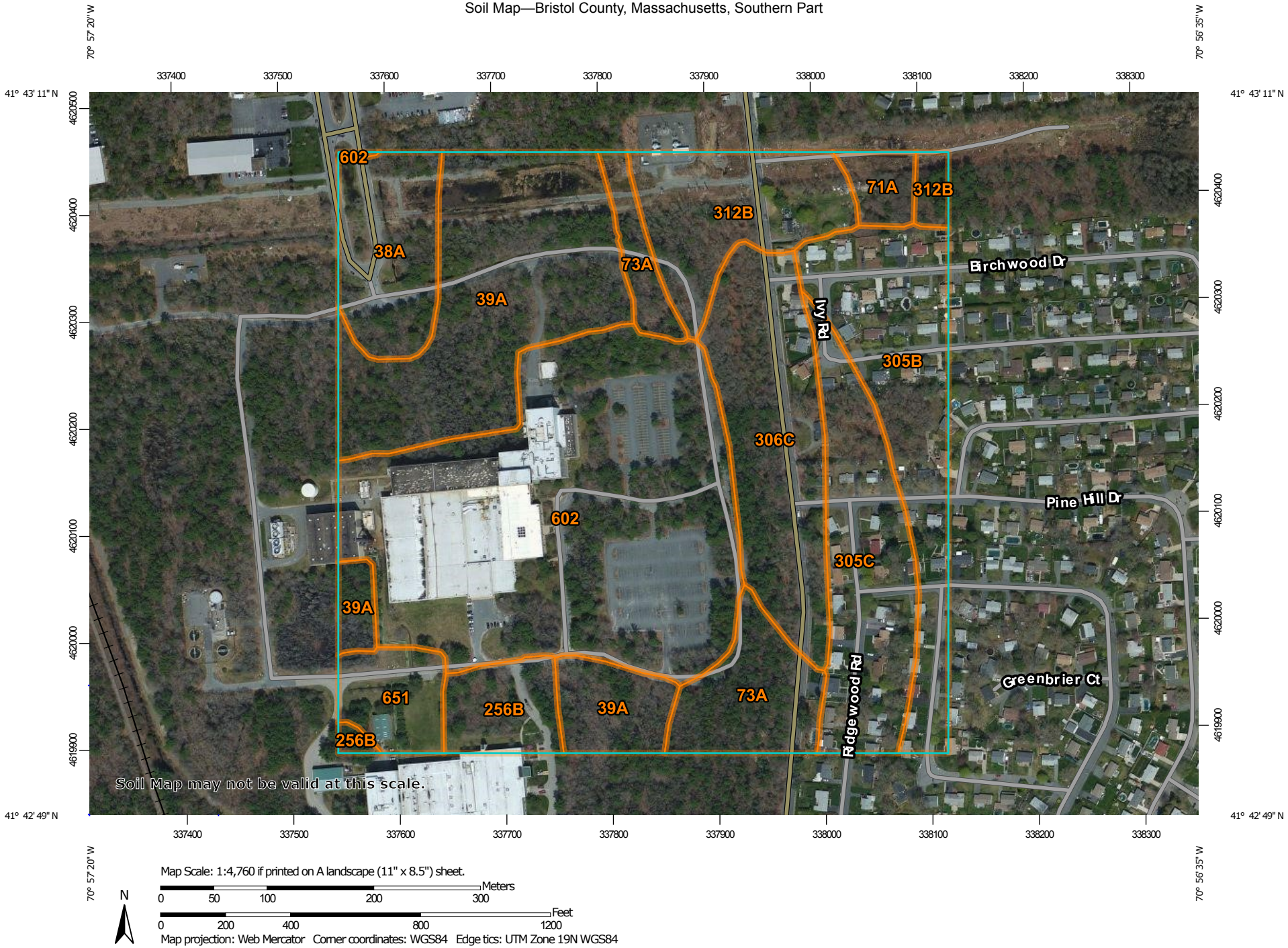
NRCS SOIL MAP



Map Scale: 1:4,760 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 50 100 200 300

Feet: 0 200 400 800 1200

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 19N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

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

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

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

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

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

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

Soil Survey Area: Bristol County, Massachusetts, Southern Part
Survey Area Data: Version 10, Sep 14, 2016

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

Date(s) aerial images were photographed: Mar 30, 2011—Oct 8, 2011

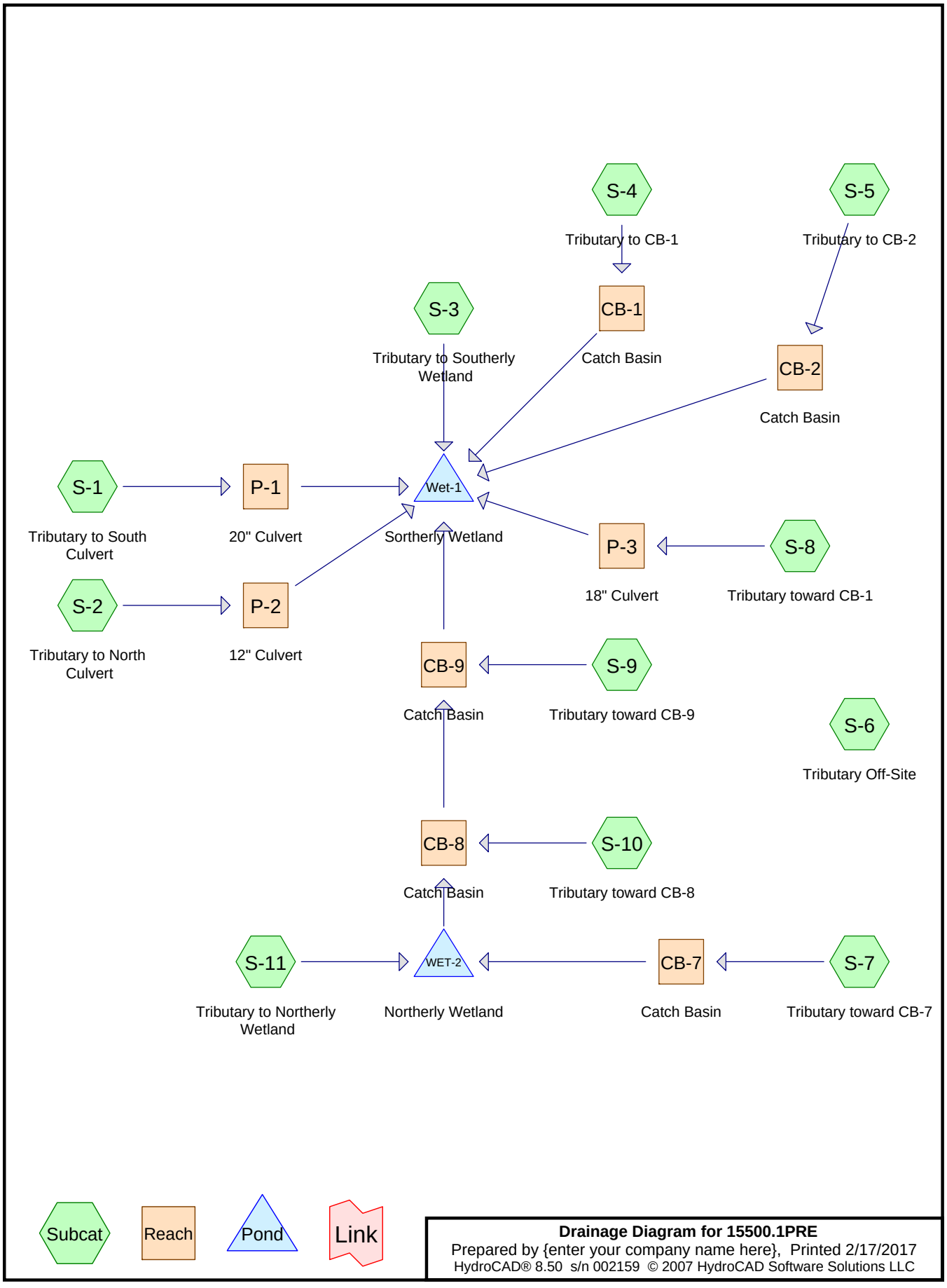
The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Bristol County, Massachusetts, Southern Part (MA603)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
38A	Pipestone loamy sand, 0 to 3 percent slopes	4.2	5.3%
39A	Scarboro mucky fine sandy loam, 0 to 3 percent slopes	14.1	17.7%
71A	Ridgebury fine sandy loam, 0 to 3 percent slopes, extremely stony	1.0	1.3%
73A	Whitman fine sandy loam, 0 to 3 percent slopes, extremely stony	4.8	6.0%
256B	Deerfield loamy sand, 0 to 5 percent slopes	2.4	3.0%
305B	Paxton fine sandy loam, 3 to 8 percent slopes	7.9	9.9%
305C	Paxton fine sandy loam, 8 to 15 percent slopes	6.8	8.5%
306C	Paxton fine sandy loam, 8 to 15 percent slopes, very stony	7.8	9.8%
312B	Woodbridge fine sandy loam, 0 to 8 percent slopes, extremely stony	5.8	7.2%
602	Urban land	22.8	28.5%
651	Udorthents, smoothed	2.2	2.7%
Totals for Area of Interest		**79.8**	**100.0%**

EXHIBIT "E"

HYDROLOGIC CALCULATIONS & WATERSHED PLANS



Drainage Diagram for 15500.1PRE

Prepared by {enter your company name here}, Printed 2/17/2017

Summary for Subcatchment S-1: Tributary to South Culvert

Runoff = 0.75 cfs @ 12.14 hrs, Volume= 0.064 af, Depth= 1.06"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-yr Rainfall=3.40"

	Area (sf)	CN	Description
	25,975	70	Woods, Good, HSG C
	3,300	74	>75% Grass cover, Good, HSG C
*	2,300	98	Roadway
	31,575	72	Weighted Average
	29,275		Pervious Area
	2,300		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.6	50	0.1360	0.15		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.40"
3.5	220	0.0430	1.04		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
9.1	270	Total			

Summary for Subcatchment S-10: Tributary toward CB-8

Runoff = 2.43 cfs @ 12.08 hrs, Volume= 0.194 af, Depth= 3.17"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-yr Rainfall=3.40"

	Area (sf)	CN	Description
*	31,200	98	Paved Parking
	850	86	<50% Grass cover, Poor, HSG C
	32,050	98	Weighted Average
	850		Pervious Area
	31,200		Impervious Area

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

Summary for Subcatchment S-11: Tributary to Northerly Wetland

Runoff = 1.95 cfs @ 12.09 hrs, Volume= 0.139 af, Depth= 1.63"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-yr Rainfall=3.40"

	Area (sf)	CN	Description
*	1,175	98	Roadway
*	15,750	98	Wetland
	27,675	70	Woods, Good, HSG C
	44,600	81	Weighted Average
	27,675		Pervious Area
	16,925		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.2	14	0.0200	0.96		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.40"
4.7	36	0.1100	0.13		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.40"
1.1	70	0.0420	1.02		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
6.0	120	Total			

Summary for Subcatchment S-2: Tributary to North Culvert

Runoff = 0.81 cfs @ 12.12 hrs, Volume= 0.065 af, Depth= 1.11"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-yr Rainfall=3.40"

	Area (sf)	CN	Description
	24,350	70	Woods, Good, HSG C
	3,875	74	>75% Grass cover, Good, HSG C
*	2,425	98	Roadway
	30,650	73	Weighted Average
	28,225		Pervious Area
	2,425		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.1	50	0.1100	0.14		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.40"
1.8	170	0.0940	1.53		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
7.9	220	Total			

Summary for Subcatchment S-3: Tributary to Southerly Wetland

Runoff = 1.80 cfs @ 12.14 hrs, Volume= 0.146 af, Depth= 1.56"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-yr Rainfall=3.40"

	Area (sf)	CN	Description
*	9,475	98	Wetland
*	7,775	98	Roadway
	31,750	70	Woods, Good, HSG C
	49,000	80	Weighted Average
	31,750		Pervious Area
	17,250		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.4	30	0.0360	1.41		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.40"
2.1	20	0.2450	0.16		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.40"
7.1	300	0.0200	0.71		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
9.6	350	Total			

Summary for Subcatchment S-4: Tributary to CB-1

Runoff = 0.15 cfs @ 12.08 hrs, Volume= 0.012 af, Depth= 3.17"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-yr Rainfall=3.40"

	Area (sf)	CN	Description
*	1,950	98	Roadway
	1,950		Impervious Area

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

Summary for Subcatchment S-5: Tributary to CB-2

Runoff = 0.08 cfs @ 12.08 hrs, Volume= 0.006 af, Depth= 3.17"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-yr Rainfall=3.40"

	Area (sf)	CN	Description
	1,000	98	Paved parking & roofs
	1,000		Impervious Area

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

Summary for Subcatchment S-6: Tributary Off-Site

Runoff = 2.43 cfs @ 12.08 hrs, Volume= 0.186 af, Depth= 2.95"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-yr Rainfall=3.40"

	Area (sf)	CN	Description
*	28,050	98	Paved Parking
	4,125	86	<50% Grass cover, Poor, HSG C
	825	89	Gravel roads, HSG C
	33,000	96	Weighted Average
	4,950		Pervious Area
	28,050		Impervious Area

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

Summary for Subcatchment S-7: Tributary toward CB-7

Runoff = 1.35 cfs @ 12.08 hrs, Volume= 0.103 af, Depth= 2.95"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-yr Rainfall=3.40"

	Area (sf)	CN	Description
*	15,000	98	Paved Parking
	3,350	86	<50% Grass cover, Poor, HSG C
	18,350	96	Weighted Average
	3,350		Pervious Area
	15,000		Impervious Area

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

Summary for Subcatchment S-8: Tributary toward CB-1

Runoff = 1.70 cfs @ 12.09 hrs, Volume= 0.121 af, Depth= 1.70"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-yr Rainfall=3.40"

	Area (sf)	CN	Description
*	1,050	98	Paved Parking
	20,000	86	<50% Grass cover, Poor, HSG C
	16,100	77	Woods, Poor, HSG C
	37,150	82	Weighted Average
	36,100		Pervious Area
	1,050		Impervious Area

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

Summary for Subcatchment S-9: Tributary toward CB-9

Runoff = 2.78 cfs @ 12.08 hrs, Volume= 0.217 af, Depth= 3.06"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-yr Rainfall=3.40"

	Area (sf)	CN	Description
*	33,416	98	Paved Parking
	3,684	86	<50% Grass cover, Poor, HSG C
	37,100	97	Weighted Average
	3,684		Pervious Area
	33,416		Impervious Area

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

Summary for Subcatchment S-1: Tributary to South Culvert

Runoff = 1.54 cfs @ 12.13 hrs, Volume= 0.124 af, Depth= 2.05"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-yr Rainfall=4.80"

	Area (sf)	CN	Description
	25,975	70	Woods, Good, HSG C
	3,300	74	>75% Grass cover, Good, HSG C
*	2,300	98	Roadway
	31,575	72	Weighted Average
	29,275		Pervious Area
	2,300		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.6	50	0.1360	0.15		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.40"
3.5	220	0.0430	1.04		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
9.1	270	Total			

Summary for Subcatchment S-10: Tributary toward CB-8

Runoff = 3.45 cfs @ 12.08 hrs, Volume= 0.280 af, Depth= 4.56"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-yr Rainfall=4.80"

	Area (sf)	CN	Description
*	31,200	98	Paved Parking
	850	86	<50% Grass cover, Poor, HSG C
	32,050	98	Weighted Average
	850		Pervious Area
	31,200		Impervious Area

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

Summary for Subcatchment S-11: Tributary to Northerly Wetland

Runoff = 3.37 cfs @ 12.09 hrs, Volume= 0.240 af, Depth= 2.81"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-yr Rainfall=4.80"

	Area (sf)	CN	Description
*	1,175	98	Roadway
*	15,750	98	Wetland
	27,675	70	Woods, Good, HSG C
	44,600	81	Weighted Average
	27,675		Pervious Area
	16,925		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.2	14	0.0200	0.96		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.40"
4.7	36	0.1100	0.13		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.40"
1.1	70	0.0420	1.02		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
6.0	120	Total			

Summary for Subcatchment S-2: Tributary to North Culvert

Runoff = 1.62 cfs @ 12.12 hrs, Volume= 0.125 af, Depth= 2.12"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-yr Rainfall=4.80"

	Area (sf)	CN	Description
	24,350	70	Woods, Good, HSG C
	3,875	74	>75% Grass cover, Good, HSG C
*	2,425	98	Roadway
	30,650	73	Weighted Average
	28,225		Pervious Area
	2,425		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.1	50	0.1100	0.14		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.40"
1.8	170	0.0940	1.53		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
7.9	220	Total			

Summary for Subcatchment S-3: Tributary to Southerly Wetland

Runoff = 3.18 cfs @ 12.13 hrs, Volume= 0.255 af, Depth= 2.72"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-yr Rainfall=4.80"

	Area (sf)	CN	Description
*	9,475	98	Wetland
*	7,775	98	Roadway
	31,750	70	Woods, Good, HSG C
	49,000	80	Weighted Average
	31,750		Pervious Area
	17,250		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.4	30	0.0360	1.41		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.40"
2.1	20	0.2450	0.16		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.40"
7.1	300	0.0200	0.71		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
9.6	350	Total			

Summary for Subcatchment S-4: Tributary to CB-1

Runoff = 0.21 cfs @ 12.08 hrs, Volume= 0.017 af, Depth= 4.56"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-yr Rainfall=4.80"

	Area (sf)	CN	Description
*	1,950	98	Roadway
	1,950		Impervious Area

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

Summary for Subcatchment S-5: Tributary to CB-2

Runoff = 0.11 cfs @ 12.08 hrs, Volume= 0.009 af, Depth= 4.56"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-yr Rainfall=4.80"

	Area (sf)	CN	Description
	1,000	98	Paved parking & roofs
	1,000		Impervious Area

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

Summary for Subcatchment S-6: Tributary Off-Site

Runoff = 3.49 cfs @ 12.08 hrs, Volume= 0.274 af, Depth= 4.33"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-yr Rainfall=4.80"

	Area (sf)	CN	Description
*	28,050	98	Paved Parking
	4,125	86	<50% Grass cover, Poor, HSG C
	825	89	Gravel roads, HSG C
	33,000	96	Weighted Average
	4,950		Pervious Area
	28,050		Impervious Area

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

Summary for Subcatchment S-7: Tributary toward CB-7

Runoff = 1.94 cfs @ 12.08 hrs, Volume= 0.152 af, Depth= 4.33"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-yr Rainfall=4.80"

	Area (sf)	CN	Description
*	15,000	98	Paved Parking
	3,350	86	<50% Grass cover, Poor, HSG C
	18,350	96	Weighted Average
	3,350		Pervious Area
	15,000		Impervious Area

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

Summary for Subcatchment S-8: Tributary toward CB-1

Runoff = 2.90 cfs @ 12.09 hrs, Volume= 0.206 af, Depth= 2.90"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-yr Rainfall=4.80"

	Area (sf)	CN	Description
*	1,050	98	Paved Parking
	20,000	86	<50% Grass cover, Poor, HSG C
	16,100	77	Woods, Poor, HSG C
	37,150	82	Weighted Average
	36,100		Pervious Area
	1,050		Impervious Area

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

Summary for Subcatchment S-9: Tributary toward CB-9

Runoff = 3.97 cfs @ 12.08 hrs, Volume= 0.316 af, Depth= 4.45"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-yr Rainfall=4.80"

	Area (sf)	CN	Description
*	33,416	98	Paved Parking
	3,684	86	<50% Grass cover, Poor, HSG C
	37,100	97	Weighted Average
	3,684		Pervious Area
	33,416		Impervious Area

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

Summary for Subcatchment S-1: Tributary to South Culvert

Runoff = 2.93 cfs @ 12.13 hrs, Volume= 0.231 af, Depth= 3.83"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-yr Rainfall=7.00"

	Area (sf)	CN	Description
	25,975	70	Woods, Good, HSG C
	3,300	74	>75% Grass cover, Good, HSG C
*	2,300	98	Roadway
	31,575	72	Weighted Average
	29,275		Pervious Area
	2,300		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.6	50	0.1360	0.15		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.40"
3.5	220	0.0430	1.04		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
9.1	270	Total			

Summary for Subcatchment S-10: Tributary toward CB-8

Runoff = 5.05 cfs @ 12.08 hrs, Volume= 0.415 af, Depth= 6.76"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-yr Rainfall=7.00"

	Area (sf)	CN	Description
*	31,200	98	Paved Parking
	850	86	<50% Grass cover, Poor, HSG C
	32,050	98	Weighted Average
	850		Pervious Area
	31,200		Impervious Area

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

Summary for Subcatchment S-11: Tributary to Northerly Wetland

Runoff = 5.70 cfs @ 12.09 hrs, Volume= 0.410 af, Depth= 4.81"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-yr Rainfall=7.00"

	Area (sf)	CN	Description
*	1,175	98	Roadway
*	15,750	98	Wetland
	27,675	70	Woods, Good, HSG C
	44,600	81	Weighted Average
	27,675		Pervious Area
	16,925		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.2	14	0.0200	0.96		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.40"
4.7	36	0.1100	0.13		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.40"
1.1	70	0.0420	1.02		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
6.0	120	Total			

Summary for Subcatchment S-2: Tributary to North Culvert

Runoff = 3.04 cfs @ 12.11 hrs, Volume= 0.231 af, Depth= 3.94"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-yr Rainfall=7.00"

	Area (sf)	CN	Description
	24,350	70	Woods, Good, HSG C
	3,875	74	>75% Grass cover, Good, HSG C
*	2,425	98	Roadway
	30,650	73	Weighted Average
	28,225		Pervious Area
	2,425		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.1	50	0.1100	0.14		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.40"
1.8	170	0.0940	1.53		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
7.9	220	Total			

Summary for Subcatchment S-3: Tributary to Southerly Wetland

Runoff = 5.44 cfs @ 12.13 hrs, Volume= 0.440 af, Depth= 4.69"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-yr Rainfall=7.00"

	Area (sf)	CN	Description
*	9,475	98	Wetland
*	7,775	98	Roadway
	31,750	70	Woods, Good, HSG C
	49,000	80	Weighted Average
	31,750		Pervious Area
	17,250		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.4	30	0.0360	1.41		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.40"
2.1	20	0.2450	0.16		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.40"
7.1	300	0.0200	0.71		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
9.6	350	Total			

Summary for Subcatchment S-4: Tributary to CB-1

Runoff = 0.31 cfs @ 12.08 hrs, Volume= 0.025 af, Depth= 6.76"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-yr Rainfall=7.00"

	Area (sf)	CN	Description
*	1,950	98	Roadway
	1,950		Impervious Area

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

Summary for Subcatchment S-5: Tributary to CB-2

Runoff = 0.16 cfs @ 12.08 hrs, Volume= 0.013 af, Depth= 6.76"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-yr Rainfall=7.00"

	Area (sf)	CN	Description
	1,000	98	Paved parking & roofs
	1,000		Impervious Area

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