Notice of Intent

Conway Community Swimming Pool Repairs and Improvements

Conway Community Swimming Pool, Inc.
Conway, Massachusetts

February 13, 2013
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Notice of Intent
Conway Community Swimming Pool Repairs and Improvements

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## Notice of Intent

**Conway Community Swimming Pool Repairs and Improvements**

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<td>C3.02</td>
<td>Site Construction Details</td>
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<td>Site Construction Details</td>
</tr>
<tr>
<td>C3.04</td>
<td>Site Construction Details</td>
</tr>
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<td>NOI Impacts Plan</td>
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<td>Wildlife Habitat Assessment Report (includes Site Photographs)</td>
</tr>
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<td></td>
<td>Turtle Protection Plan</td>
</tr>
<tr>
<td>D</td>
<td>Stormwater Report (includes Post Construction Operation and Maintenance Plan)</td>
</tr>
<tr>
<td>E</td>
<td>Abutters List and Assessor’s Maps</td>
</tr>
</tbody>
</table>
WPA Form 3 - Notice of Intent
**A. General Information**

1. **Project Location** *(Note: electronic filers will click on button to locate project site):*
   - 332 Whately Road
   - Conway 01341
   - a. Street Address
   - b. City/Town
   - c. Zip Code
   - Latitude and Longitude:
     - 42° 29’ 50” N
     - 72° 41’ 52” W
   - d. Latitude
   - e. Longitude
   - f. Assessors Map/Plat Number
   - g. Parcel /Lot Number

2. **Applicant:**
   - James Recore
   - a. First Name
   - b. Last Name
   - Conway Community Swimming Pool, Inc.
   - c. Organization
   - 309 Whately Road
   - d. Street Address
   - Conway MA 01341
   - e. City/Town
   - f. State
   - g. Zip Code
   - (413) 768-9939
   - h. Phone Number
   - N/A
   - i. Fax Number
   - N/A
   - j. Email Address

3. **Property owner (required if different from applicant):**
   - a. First Name
   - b. Last Name
   - c. Organization
   - d. Street Address
   - e. City/Town
   - f. State
   - g. Zip Code
   - h. Phone Number
   - i. Fax Number
   - j. Email address

4. **Representative (if any):**
   - Eric Bernardin
   - a. First Name
   - b. Last Name
   - Fuss & O’Neill, Inc.
   - c. Company
   - 78 Interstate Drive
   - d. Street Address
   - West Springfield MA 01089
   - e. City/Town
   - f. State
   - g. Zip Code
   - (413) 452-0445  x4430
   - h. Phone Number
   - (413) 846-0497
   - i. Fax Number
   - EBernardin@fando.com
   - j. Email address

5. **Total WPA Fee Paid (from NOI Wetland Fee Transmittal Form):**
   - a. Total Fee Paid $4,125
   - b. State Fee Paid $2,050
   - c. City/Town Fee Paid $2,075
A. General Information (continued)

6. General Project Description:
   The proposed project involves dam embankment repairs, dam spillway and outlet structure replacement, pond dredging (3,000 c.y.), and other improvements to access roadways and the beach and recreation area at the Conway Community Swimming Pool. See details in Report, Section 2.

7a. Project Type Checklist:

   1. [ ] Single Family Home
   2. [x] Residential Subdivision
   3. [ ] Limited Project Driveway Crossing
   4. [ ] Commercial/Industrial
   5. [ ] Dock/Pier
   6. [ ] Utilities
   7. [ ] Coastal Engineering Structure
   8. [ ] Agriculture (e.g., cranberries, forestry)
   9. [ ] Transportation
   10. [x] 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  [x] No  If yes, describe which limited project applies to this project:

8. Property recorded at the Registry of Deeds for:

   Franklin
   a. County
   133
   b. Certificate # (if registered land)
   29
   c. Book

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. [x] 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.

   Resource Area              | Size of Proposed Alteration | Proposed Replacement (if any)
   a. [x] Bank                | 325                         | 215
       1. linear feet          |                            | 2. linear feet
   b. [x] Bordering Vegetated Wetland
       1. square feet          | 230                         | 2. square feet
   c. [x] Land Under Waterbodies and Waterways
       1. square feet          | 83,890                      | 81,855
       2. square feet          |                            | 2. square feet
       3. cubic yards dredged  |                            |
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

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

<table>
<thead>
<tr>
<th>Resource Area</th>
<th>Size of Proposed Alteration</th>
<th>Proposed Replacement (if any)</th>
</tr>
</thead>
<tbody>
<tr>
<td>d. ☐ Bordering Land Subject to Flooding</td>
<td>1. square feet</td>
<td>2. square feet</td>
</tr>
<tr>
<td>e. ☐ Isolated Land Subject to Flooding</td>
<td>1. square feet</td>
<td>2. cubic feet of flood storage lost</td>
</tr>
<tr>
<td>f. ☒ Riverfront Area</td>
<td>2. cubic feet of flood storage lost</td>
<td>3. cubic feet replaced</td>
</tr>
</tbody>
</table>

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: 41,487 sf

4. Proposed alteration of the Riverfront Area:

   - a. total square feet: 4,018 sf
   - b. square feet within 100 ft.: 2,100 sf
   - c. square feet between 100 ft. and 200 ft.: 1,918 sf

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.

<table>
<thead>
<tr>
<th>Resource Area</th>
<th>Size of Proposed Alteration</th>
<th>Proposed Replacement (if any)</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. ☐ Designated Port Areas</td>
<td>Indicate size under Land Under the Ocean, below</td>
<td></td>
</tr>
<tr>
<td>b. ☐ Land Under the Ocean</td>
<td>1. square feet</td>
<td>2. cubic yards dredged</td>
</tr>
<tr>
<td>c. ☐ Barrier Beach</td>
<td>Indicate size under Coastal Beaches and/or Coastal Dunes below</td>
<td></td>
</tr>
<tr>
<td>d. ☐ Coastal Beaches</td>
<td>1. square feet</td>
<td>2. cubic yards beach nourishment</td>
</tr>
<tr>
<td>e. ☐ Coastal Dunes</td>
<td>1. square feet</td>
<td>2. cubic yards dune nourishment</td>
</tr>
</tbody>
</table>
## B. Buffer Zone & Resource Area Impacts (temporary & permanent) (cont’d)

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

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

### 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](http://www.mass.gov/dfwele/dfw/nhesp/regulatory_review/priority_habitat/online_viewer.htm) or go to

   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  
   100 Hartwell Street, Suite 230  
   West Boylston, MA 01583

   October 2008  
   b. Date of map
C. Other Applicable Standards and Requirements (cont’d)

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

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

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

   (a) within wetland Resource Area 53%
   (b) outside Resource Area 47%

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/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

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/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

∗ Some projects not in Estimated Habitat may be located in Priority Habitat, and require NHESP review (see http://www.mass.gov/dfwele/dfw/nhesp/nhesp.htm, regulatory review tab). Priority Habitat includes habitat for state-listed plants and strictly upland species not protected by the Wetlands Protection Act.

** MESA projects may not be segmented (321 CMR 10.16). The applicant must disclose full development plans even if such plans are not required as part of the Notice of Intent process.
C. Other Applicable Standards and Requirements (cont’d)

2. For coastal projects only, is any portion of the proposed project located below the mean high water line or in a fish run?
   a. ❑ Not applicable – project is in inland resource area only
   b. ❑ Yes ❑ No  If yes, include proof of mailing or hand delivery of NOI to either:
      South Shore - Cohasset to Rhode Island, and the Cape & Islands:
      Division of Marine Fisheries - Southeast Marine Fisheries Station
      Attn: Environmental Reviewer
      1213 Purchase Street – 3rd Floor
      New Bedford, MA  02740-6694
      North Shore - Hull to New Hampshire:
      Division of Marine Fisheries - North Shore Office
      Attn: Environmental Reviewer
      30 Emerson Avenue
      Gloucester, MA 01930

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

3. Is any portion of the proposed project within an Area of Critical Environmental Concern (ACEC)?
   a. ❑ Yes ❑ No  If yes, provide name of ACEC (see instructions to WPA Form 3 or MassDEP Website for ACEC locations). Note: electronic filers click on Website.
   b. ACEC

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, §
   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
C. Other Applicable Standards and Requirements (cont’d)

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

D. Additional Information

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

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

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

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

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

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

Conway Community Swimming Pool – Site Improvements (18 Sheets)

a. Plan Title
Fuss & O'Neill, Inc.
b. Prepared By
Eric M. Bernardin, PE, LEED AP
c. Signed and Stamped by
February 7, 2013
1” = 40’
d. Final Revision Date
1” = 40’
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

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:

- 383163
- 2. Municipal Check Number 393179
- 4. State Check Number Fuss & O'Neill, Inc.
- 6. Payor name on check: First 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 2/10/13

3. Signature of Property Owner (if different)

4. Date 2/5/13

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.
FUSS & O'NEILL, INC.
146 Hartford Road, Manchester, CT 06040

PAY
Three Hundred and 00/100 Dollars

TO
Commonwealth of Massachusetts - NHESP
100 Hartwell Street, Suite 230
West Boylston, MA 01583

First Niagara
51-7044/2223

February 11, 2013

AMOUNT
300.00

AUTHORIZED SIGNATURE

---

FUSS & O'NEILL, INC.
146 Hartford Road, Manchester, CT 06040

PAY
Two Thousand Seventy Five and 00/100 Dollars

TO
Town of Conway
Conservation Commission
P.O. Box 240
Conway, MA 01341

First Niagara
51-7044/2223

February 7, 2013

AMOUNT
2,075.00

AUTHORIZED SIGNATURE

---

FUSS & O'NEILL, INC.
146 Hartford Road, Manchester, CT 06040

PAY
Two Thousand Fifty and 00/100 Dollars

TO
Commonwealth of Massachusetts
Department of Environmental Protection
P.O. Box 4062
Boston, MA 02211

First Niagara
51-7044/2223

February 7, 2013

AMOUNT
2,050.00

AUTHORIZED SIGNATURE
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

A. Applicant Information

1. Location of Project:

   332 Whately Road
   a. Street Address
   b. City/Town
   c. Check number
   d. Fee amount

2. Applicant Mailing Address:

   James
   a. First Name
   b. Last Name
   Conway Community Swimming Pool, Inc.
   c. Organization
   309 Whately Road
   d. Mailing Address
   Conway
   e. City/Town
   f. State
   g. Zip Code
   (413) 768-9939
   h. Phone Number
   i. Fax Number
   N/A
   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

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)

<table>
<thead>
<tr>
<th>Step 1/Type of Activity</th>
<th>Step 2/Number of Activities</th>
<th>Step 3/Individual Activity Fee</th>
<th>Step 4/Subtotal Activity Fee</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water Level Variation</td>
<td>1</td>
<td>$500</td>
<td>$500</td>
</tr>
<tr>
<td>Dredging</td>
<td>1</td>
<td>$1,450</td>
<td>$1,450</td>
</tr>
<tr>
<td>Dam Work (in Riverfront)</td>
<td>1</td>
<td>$1,450</td>
<td>$2,175</td>
</tr>
</tbody>
</table>

Step 5/Total Project Fee: $4,125

**Step 6/Fee Payments:**

- Total Project Fee: $4,125  
  a. Total Fee from Step 5  
  b. 1/2 Total Fee less $12.50
- State share of filing Fee: $2,050  
  b. 1/2 Total Fee less $12.50
- City/Town share of filing Fee: $2,075  
  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 Management Form
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. 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
- 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.

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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.
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

[Signature and Date]

**Checklist**

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

- [ ] New development
- [x] Redevelopment
- [ ] Mix of New Development and Redevelopment
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

☐ 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.

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

The project is subject to the Stormwater Management Standards only to the maximum Extent Practicable as a 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 (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 Plan 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.
1 **Introduction**

Pursuant to the Massachusetts Wetlands Protection Act, M.G.L. c. 131 40, 310 CMR §10.00, this Notice of Intent (NOI) describes proposed work associated with proposed dam maintenance and pond dredging at the Conway Community Swimming Pool at 332 Whately Road in Conway, Massachusetts. The location of the site is shown on the Site Location Map, Figure 1, and the proposed work is shown on the Site Plans provided as Appendix A.

Pursuant to 310 CMR 10.02 (2), filing of a WPA Form 3 Notice of Intent permit application in accordance with the Massachusetts Wetlands Protection Act is required because of proposed alterations to Bordering Vegetated Wetlands (BVW), Land Under Water Bodies and Waterways (LUWW), Bank, and Riverfront Area (RA).

In addition to an Order of Conditions from the Conway Conservation Commission, the following additional permits and approvals are required for the project:

- An Environmental Notification Form (ENF) in accordance with the Massachusetts Environmental Policy Act (MEPA)
- A 401 Water Quality Certification
- An Army Corps Permit under Section 404 of the Clean Water Act
- A Chapter 253 Dam Safety Permit from Massachusetts Department of Conservation and Recreation (DCR) Office of Dam Safety (ODS)
- Massachusetts Natural Heritage and Endangered Species Program (NHESP) Massachusetts Endangered Species Act (MESA) approval
- National Pollutant Discharge Elimination System (NDPES) permit for stormwater discharges from a construction site of over one acre from the U.S. Environmental Protection Agency (USEPA)

The work is expected to begin in the summer of 2013 following the issuance of the required permits and be completed by the fall of 2013.

2 **Project Description**

2.1 **Existing Conditions**

The project is located at the Conway Community Swimming Pool at 332 Whately Road in Conway, Massachusetts at approximately Latitude: 42° 29' 50” N; Longitude: 72° 41’ 52” W. The majority of the project area is owned or has easements by the Conway Community Swimming Pool, Inc. (CCSPI). A small portion of the land near the emergency spillway and the downstream channel is owned by Mary Parker, who has given CCSPI permission to conduct construction and improvements on her property.

To reach the Conway Community Swimming Pool from Interstate 91 north:

1. Take exit 24 for US-5/MA-10 toward Deerfield
2. Turn right off of the ramp onto MA-10 N/US-5 N and continue to follow MA-10 N/US-5 N for 1.1 miles
3. Turn left onto MA-116 N/Conway Road/S. Deerfield Road for 5.6 miles  
4. Turn left onto Whately Road, destination will be on the right in 0.7 miles

The Conway Community Swimming Pool is a man-made pond built in 1949 for the residents of Conway located at 332 Whately Road along Pumpkin Hollow Brook in the South River subwatershed of the Deerfield Subbasin in Conway, Massachusetts. Pumpkin Hollow Brook is a Coldwater Fishery Resource (#3313700) that flows from south to north through the Town of Conway. The swimming pool is located on a 7.3 acre parcel owned by CCSPI, a non-profit organization that oversees the Conway Community Swimming Pool. The approximately 2.5 acre pool is impounded by an earthen dam approximately 200 feet in length and 21 feet high. The profile of the dam is approximately 16 feet at the top sloping to approximately 80 feet at the base and includes a 30” horizontal spillway through the dam with a mechanical gate and a vertical standpipe gloryhole for overflow. An existing conditions site plan is provided in Appendix B.

Routine maintenance of the dam and recreational area around the pool has been conducted by CCSPI and has consisted of regular water quality testing, mowing and trimming of the dam crest and embankment slopes, general maintenance of the upland features of the site and minor repairs of the dam spillway structure. The DCR Office of Dam Safety has provided oversight for the dam in more recent years. The pond has been drawn down for a period of two to four weeks annually, usually in April or May, for vegetation control, pond dredging, and beach sand nourishment. The creation of a settling area near the pond inlet and the annual dredging plan were established in 1957. Sediment was dredged to the gravel base of the pool using local volunteers, usually farmers or local contractors using tractors, dozers, excavators, and trucks. There have reportedly been three major floods which resulted in more than the usual amount of sediment, in 1986, 1987, and most recently in 2011 due to Hurricane Irene. The sediment that was deposited from the 1980s floods was previously removed while the sediment accumulation from the 2011 flood remains in place in the pond. The most recent dredging event occurred prior to 2010.

A significant sinkhole was found on the top of the dam above the 30” spillway pipe during a routine inspection of the dam by CCSPI in the fall of 2010. For this reason, the committee made the determination that the pond would be drawn down and remain empty until repairs could be made. Fuss & O’Neill was hired in the summer of 2012 to execute permitting and repairs of the facility and to develop a maintenance and operation plan for future pool maintenance.

The dam is classified by the ODS as an “Intermediate” size structure with a “Significant” hazard classification. The most recent Phase I Inspection/Evaluation Report was completed by the ODS in 2000. The dam was reported to be in “fair” condition and was classified as an Intermediate sized structure with a Low hazard classification. A Phase I Inspection/Evaluation Report was scheduled to be completed in 2006, however at the time of the inspection, the pool was dewatered as part of the annual dewatering schedule which resulted in a Jurisdictional Verification Form instead of a Phase I Inspection/Evaluation Report. The Jurisdictional Verification Form identified the dam as non-jurisdictional since it did not impound water at the time of the site visit. Subsequent correspondence with ODS in 2012 confirmed that the dam is jurisdictional and is considered a “Significant” hazard classification. A Phase Inspection/Evaluation Report is pending; however, the known deficiencies in the dam would require the dam owners to repair the dam.
Project Purpose & Need
The earthen dam is in need of repairs due to structural issues with the 30” spillway pipe which has caused sinkholes and washouts along the earthen dam crest and slopes. Other long-term maintenance needs of the dam structure include repairing the spillway gate, gears, and standpipe. The pond currently has an estimated 0.5 to 3 feet of sediment depth to gravel across the area of the pond (approx. 2.5 acres) and requires dredging to maintain the volume of the swimming pool and remove sediment from around the area of the low-level outlet structure.

Other necessary site improvements are needed to insure the long-term maintenance and accessibility of the Conway Swimming Pool. These improvements include:

1. An improved access way for pond maintenance and future dredging from the parking area to the south side of the pond.
2. Beach nourishment to replenish lost sand from the beach and regrading to prevent future sand erosion due to existing steep slope of the beach (±17%).
3. Maintenance access will be expanded from the recreation area to the dam crest so that heavy equipment can access the dam for repairs or maintenance when necessary.
4. Improved handicap-accessibility and safety features are needed to comply with current recreational standards for Accessible Design, including a reconfigured parking lot, accessible pathways from the parking area to the picnic area beach area, and an accessible dock area along the shore.
5. Improved amenities are necessary to provide additional recreational benefits and safety features, including a picnic area, playground, reconfigured parking lot, and accessible stone dust pathways around the beach area. Safety features will include the installation of lighting along the parking area and walkways.

2.2 Proposed Conditions

The project area is considered the area within the limits of work, consisting of approximately 3.71 acres that consist of the Conway Swimming Pool dam, pool, beach area, and access roadways. The proposed action consists of the following activities, which are shown on the site plans in Appendix A:

1. **Dam Embankment Repairs**
   Repair dam sinkholes and washouts and any other necessary embankment repairs along the dam. Brush and vegetation will be trimmed in the Emergency Spillway.

2. **Spillway/Outlet Structure Replacement**
   The spillway structure, including the steel riser pipe, concrete collar, gate valve and concrete headwalls, or standpipe (gloryhole) will be replaced with a new 8 foot by 12 foot concrete riser structure, new headwall and a 48” outlet pipe. A new low-level outlet structure will be installed at 55.20 feet (local datum) elevation. The elevation of the spillway will remain at 70.37 feet. A mid-level valve for winter drawdown will be installed at 64.00 feet. The wooden diving board on the spillway will be removed. The existing 30” outlet culvert is undersized and will be replaced with a 96 feet long 48” High Density Polyethylene (HDPE) outlet culvert. The downstream concrete headwall at the stream outlet will be replaced. Dam upgrades were designed based on standards in 302 CMR 10.14 which include by reference methods of the U.S. Army Corps of Engineers, the U.S. Bureau of Reclamation, and the U.S. National Resource Conservation. Design calculations for the
primary and emergency spillway and other dam repairs are included in the Stormwater Report in Appendix D.

3. Sediment Dredging and Removal
The pond will be dredged as shown on the Proposed Conditions plan in Appendix A, removing a total of 3,000 cy of sediment. Dredged materials will be dewatered within the limits of the proposed dredging, as discussed in the “Construction” section below prior to transport to the offsite upland disposal area. If offsite disposal/re-use is determined to be the best option, several alternative locations are being considered:

- Land owned by Mary Parker (adjacent to project area)
  Off of Fields Hill Road, Conway, MA

- Land owned by Michael Kurkulonis
  2077 Roaring Brook Road, Conway, MA

- Land owned by the Town of Conway
  Map 102, Parcel 44 - Approx. 40 Shelburne Falls Rd, Conway, MA

- Delta Sand and Gravel, Inc.
  562 Amherst Rd, Sunderland, MA

4. Beach Area Improvements
The beach area sand will be replaced due to sand erosion that has occurred. A concrete block groin will be installed to help protect the sand in the swimming area from washing into the main pond of the pool. The grade on the beach will be decreased from approximately 17% to approximately 9%.

5. Upper Recreation Area Improvements
The improvements in the upper recreation area are outside of wetland resource areas. Proposed activities in the upper recreation area include:

- Improved handicap accessibility and safety features, including a reconfigured parking lot, pathways from the parking area to the picnic area, and the handicap accessible dock area along the shore.
- Safety features will include the installation of lighting along the parking area and walkways, and associated underground utilities.
- Re-grading an approximately 500 square foot (sf) area where the charcoal grills are now located. The grills, benches and other structures will be replaced in the same picnic area location.
- A playground will be constructed southwest of the picnic area.
- Portable sanitary facilities and a maintenance shed will be constructed on the south side of the parking lot.
- Stormwater improvements will be made including a parking lot rain garden and reinforced turf parking area to minimize impervious surfaces and increase infiltration. The rain garden is designed to infiltrate the first 1-inch of rainfall from the parking area and paved entrance roadway.
- A retaining wall will be constructed on the north side of the upper recreation area to accommodate a future pavilion.
A stormwater treatment device will be installed on an existing 12” culvert to reduce sediment in the stormwater runoff from Whately Road.

6. Pond Maintenance Access Roadway
A gravel roadway will be constructed from the existing paved parking area, along the south property line, extending to the pond inlet for future dredging access. This will include the removal of necessary vegetation and grading.

7. Dam Maintenance Assessment Roadway
The maintenance access roadway from the upper recreation area will be repaired and laid with gravel for access to the dam, including grading and drainage improvements. The existing stormwater drainage culverts from the roadway to the pond will be removed, with the exception of the 15” CMP that extends from the roadway, which will be replaced and a stormwater treatment unit will be installed.

2.2.1 Construction Period Impacts & Mitigation

Construction sequencing is included in the Stormwater Report, Appendix D. Construction period mitigation for sedimentation and erosion controls includes the following, as shown on the Site Plans in Appendix A:

- Adequate sedimentation and erosion control management measures, practices and devices, such as phased construction, installation of sediment control barriers (including silt fence and straw bales) downhill of all exposed areas, retention of existing vegetated buffers, application of temporary mulching during construction, and permanent seeding and stabilization shall be installed and properly maintained to reduce erosion and retain sediment on-site during and after construction.
- Temporary sediment control barriers shall be removed upon completion of work but not until all disturbed areas are permanently stabilized. The sediment collected by these sediment barriers shall be removed and placed at an upland location and stabilized to prevent its later erosion into a waterway or wetland.
- All exposed soil and other fills shall be permanently stabilized at the earliest practicable date.
- A National Pollutant Discharge Elimination System (NPDES) General Permit “General Permit” for Discharges from Construction Activities will be obtained since the construction site is greater than 1 acre. A Stormwater Pollution Prevention Plan (SWPPP) will be developed prior to submitting the Notice of Intent (NOI) for registration under the NPDES General Permit in accordance with the conditions of the General Permit.

2.2.2 Routine Maintenance Dredging and Winter Drawdown

The CCSPI proposes winter drawdown of the pond for vegetation control, pond dredging, and beach sand nourishment. A mid-level valve for drawdown will be installed at 64.00 feet. An Operation & Maintenance (O&M) Plan is included in Appendix D.
The O&M Plan was prepared in accordance with the Department of Conservation and Recreation M.G.L. Chapter 253, the MassDEP Massachusetts Stormwater Handbook, and the 2004 Eutrophication and Aquatic Plan Management in Massachusetts Final Generic Environmental Impact Report (GEIR) with “The Practical Guide to Lake Management in Massachusetts” (A Companion to the Final GEIR).

The winter drawdown will be in accordance with the 2004 Eutrophication and Aquatic Plant Management in Massachusetts Final GEIR. The Massachusetts Department of Fish and Game (MDFG) guidelines referenced in the GEIR include:

- Limit drawdown to 3 feet or contact the MDFG for assistance in evaluating impacts of greater drawdown; however, exceeding this level may meet DFG guidelines if justified in the NOI or lake management plan. The DFG policy is to review drawdowns in excess of 3 feet.
- Commence drawdown after the beginning of November.
- Achieve the target drawdown depth by the beginning of December.
- Achieve full lake level by the beginning of April.
- Keep outflow during drawdown below a discharge equivalent to 4 cfs per square mile of watershed. Once the target water level is achieved, match outflow to inflow to the greatest extent possible, maintaining a stable water level.
- Keep outflow during refill above a discharge equivalent to 0.5 cfs per square mile of watershed.

Drawdown will be conducted in three (3) phases:

- Phase 1: Open the mid-level orifice 2 inches for seven (7) days;
- Phase 2: On day 7 open the mid-level orifice another 4 inches for a total of 6 inches open;
- Phase 3: On day 8 open the mid-level orifice the full 12 inches.

On day 9 the water elevation in the pond should be at approximately 64.0 feet. During the time of drawdown, the outlet structure and outflow will be monitored to ensure discharge flows do not exceed 3.32 cfs (equivalent to 4.0 cfs per square mile of watershed area). Once the pond has reached a water elevation of approximately 64.0 feet, the mid-level orifice will remain open to maintain a stable water level. In the event of a large storm during this time the low-level orifice may be opened to accommodate additional flow that will accumulate within the pond. After the water level has been stabilized the low-level orifice must be closed. When the pond is required to be filled to the 70.37 water elevation, the mid-level orifice will be closed to an opening of 0.5 inches to allow the pond to refill. This should take approximately 19 days. As the pond is refilling, monitoring must be completed to ensure outflow velocity will be above the required 0.42 cfs (equivalent to 0.5 cfs per watershed area). Once the pond is filled to the 70.37 feet water elevation the mid-level outlet will be closed.

3 Wetland Resource Areas and Impacts

Emily Stockman, PWS of Stockman Associates LLC performed wetland boundary delineations within the proposed work areas on September 7 and 12, 2012. The wetland was delineated using methodology presented in the Massachusetts DEP Handbook: Delineating Bordering Vegetated Wetlands, March 1995, the 1987 ACOE Wetland Delineation Manual, and the Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Northcentral and Northeast Region, January 2012. A Wetland Delineation
Report is included as Appendix B. The surveyed wetland boundaries are shown on the proposed site plan in Appendix A.

There is a total of 230 sf of delineated Bordering Vegetated Wetlands (BVW), 84,500 sf of delineated Land Under Water Bodies and Waterways (LUWW), and 325 linear feet (lf) of delineated Bank within the project area (work limits). Approximately 41,487 sf of Riverfront Area (RA) is located on the project site (within the parcel boundary) associated with Pumpkin Hollow Brook, with 1,610 sf of previously developed area (impervious surfaces from existing structures or pavement, absence of topsoil).

A summary of the wetland resource area impacts and proposed replication is included in Table 1. The total area of wetland impacts is estimated to be 230 sf BVW impacts, 325 lf of Bank impacts, and 83,890 sf LUWW impacts. The majority of the wetland impact areas will be replaced via in-situ replication, which will result in no permanent BVW loss, 110 lf of Bank loss, and 2,035 sf of LUWW loss. There is 2,100 sf of proposed development within 100 ft and 1,918 sf of proposed development between 100 and 200 ft, totaling 4,018 sf of existing and proposed development within the RA associated with the pond maintenance access roadway and dam repairs.

**Table 1. Wetland Resource Area Impact Summary**

<table>
<thead>
<tr>
<th>Resource Area</th>
<th>Proposed Activity within Resource Area</th>
<th>Length/Area of Impact</th>
<th>Proposed Resource Replication</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bank</td>
<td>Installation of handicapped-accessible dock along the beach front; replacement of spillway outlet pipe in downstream channel</td>
<td>325 lf</td>
<td>215 lf (In-situ)</td>
</tr>
<tr>
<td>Bordering Vegetated Wetland (BVW)</td>
<td>Installation of the concrete block retaining wall, the removal of three (3) existing drainage culverts, and the removal and replacement of an existing 15” CMP</td>
<td>230 sf</td>
<td>230 sf (In-situ)</td>
</tr>
<tr>
<td>Land Under Water Bodies and Waterways (LUWW)</td>
<td>Installation of handicapped-accessible dock along the beach front; replacement of spillway outlet pipe in downstream channel; installation of groin; and fill on the dam embankment associated with spillway reconstruction</td>
<td>83,890 sf (3,000 cy dredged)</td>
<td>81,855 (In-situ)</td>
</tr>
<tr>
<td>Riverfront Area (RA)</td>
<td>Pond maintenance access roadway and dam repairs</td>
<td>Previously developed area: 1,610 sf (3.8% of parcel) Total Proposed developed area: 4,018 sf (9.7% of parcel)</td>
<td>N/A</td>
</tr>
</tbody>
</table>
4  **Threatened and Endangered Species**

4.1 **Federal Endangered Species**

There are no Federally-listed endangered and threatened species in Conway, Massachusetts according to the U.S Fish & Wildlife Service, New England Field Office ([http://www.fws.gov/newengland/EndangeredSpec-Consultation_Project_Review.htm](http://www.fws.gov/newengland/EndangeredSpec-Consultation_Project_Review.htm)).

4.2 **State-listed Rare Species**

The project area is located within an area of Natural Heritage and Endangered Species Program (NHESP) Priority Habitat of Rare Species (“Priority Habitat”). The project site is located within Priority Habitat 1337 (PH 1337) and Estimated Habitat 76 (EH 76) as indicated in the Massachusetts Natural Heritage Atlas (13th Edition). The NHESP indicates that the Wood Turtle (*Glyptemys insculpta*), a state-listed rare species of Special Concern, has been found in the vicinity of the site. In accordance with Massachusetts Endangered Species Act (MESA) Regulations at 321 CMR 10, coordination with NHESP is required and if NHESP determines that a “take” will occur due to the proposed project, a Conservation and Management Plan will be required.

Coordination with NHESP has been conducted throughout the project design and species-specific mitigation measures were incorporated into the project. The NHESP Tracking Number is 12-31442. A detailed habitat evaluation is provided in a “Wildlife Habitat Assessment Report” in Appendix C. The report follows the Mass DEP Wildlife Habitat Protection Guidance and provides certification that with the minimization of impacts via reduced footprint, time of year restrictions, monitoring, and proposed in-situ mitigation, as well as habitat improvement through stormwater improvements, beach stabilization, and revised drawdown procedures, and incorporation of any comments or conditions provided by NHESP and Massachusetts Division of Fisheries and Wildlife, the proposed project will not substantially reduce the capacity to provide important wildlife habitat functions. A formal Project Review will be submitted to NHESP with this Wetlands Protection Act Notice of Intent.

4.3 **Cold Water Fisheries**

Coldwater fisheries are waters in which the mean of the maximum daily temperature over a seven day period generally does not exceed 68°F (20°C) and, when other ecological factors are favorable (such as habitat), are capable of supporting a year round population of cold-water stenothermal aquatic life. Pumpkin Hollow Brook is a Coldwater Fishery Resource (#3313700) that flows from south to north through the Town of Conway designated by MassWildlife. A Cold Water Fishery evaluation is provided in the “Wildlife Habitat Assessment Report” in Appendix C.

4.4 **Mitigation**

A formal Information Request was submitted to NHESP and species specific details for the minimization of impacts to Wood Turtle Habitat are being incorporated into the proposed project. Conditions such as monitoring sweeps, time of year restrictions, and limiting work areas shall be applied. Additional conditions
5 Post-Construction Wetland Performance Standards

5.1 Bordering Vegetated Wetlands

Alteration of 230 sf of BVW associated with the installation of the concrete block retaining wall, the removal of three (3) existing drainage culverts, and the removal and replacement of an existing 15” CMP will be replicated at a 1:1 ratio. Mitigation measures and the sequence of work for temporary impacts & in-situ replication are as follows to meet the Performance Standards in 310 CMR 10.55(4):

a) Wetland flagging shall been maintained throughout the project and subsequent BVW monitoring period.

b) Color photos shall be taken from an established reference point(s) prior to the commencement of work.

c) Erosion controls shall be installed prior to the commencement of work. To reduce the amount of cutting/pruning silt fence and straw wattles or a double row of straw wattles shall be installed. Tree protection shall be installed on the nearby 26” and 40” maple trees as indicated on the site plan.

d) An environmental monitor shall oversee the installation of erosion controls to ensure that impacts to woody vegetation are minimized. While woody plants may need to be pruned to facilitate the installation of erosion controls, stumpng should be avoided. The dominant woody species are shrubs that will stump sprout after any cutting thus re-establishing over time. Should stumping/removal be necessary, woody plants shall be tallied (Genus species and number) and an in-kind planting will take place once work within the area is complete and erosion controls have been removed.

e) The section of access road closest to BVW shall be completed and stabilized prior to sections to the north.

f) No equipment shall enter the BVW.

g) No stockpiles of soils or materials shall be placed within the BVW. Vegetation and excess soils removed from the nearby Buffer Zone will be transported to a staging area away from BVW or off-site.

h) The BVW adjacent dam access road work shall be completed as follows:

- Remove existing culverts and replace 15” CMP;
- Install stormwater quality structure;
- Install retaining wall;
- Grade and replace surface of the access roadway.

i) Once the adjacent section of the dam access road is complete the area will be closely inspected by an environmental monitor to assess the extent re-grading necessary within BVW. Any temporary fill within BVW shall be removed to expose the indigenous wetland surface soil. Any temporary cuts shall be brought to pre-impact grades using organic-rich surface soil from the site.
j) Sedimentation within the BVW has historically occurred due to undertreated stormwater associated with the existing 15” CMP. Hand tools shall be used to remove sections of historic sedimentation. Note, a complete removal is not recommended as several sections have maintained wetland hydrology and vegetation despite historic impacts. Hand removal is limited to more recently deposited and easily accessible sediment and may occur within BVW beyond the erosion control line under the supervision of an environmental monitor.

k) Disturbed areas within nearby Buffer Zone shall be seeded with a shade tolerate native conservation mix (New England Wetland Plants, Inc. New England Semi-Shade Grass and Forbs Mix or similar mix).

l) Once the adjacent Buffer Zone is stable erosion controls shall be removed from within the nearby BVW to facilitate in-situ replication.

m) Under the supervision of an environmental monitor, the BVW shall be graded to pre-impact conditions by hand. Replacement native shrubs or saplings (at least 4 ft tall) shall be planted, and the area shall be seeded with a native wetland seedmix (New England Wetland Plants, Inc. New England Wetmix or similar mix) and mulched with straw.

n) Color photos shall be taken from established reference point(s) upon the completion of the in-situ replication work.

o) The in-situ BVW replication area shall be monitored by a qualified environmental monitor for two consecutive growing seasons beginning on the first full growing season after the implementation of the replication.

p) A yearly inspection shall be made and yearly monitoring reports with color photographs shall be submitted to the Conway Conservation Commission. Reports shall include an account of the relative success or failure of the replication area. If necessary, a corrective plan of action shall be submitted to the Conway Conservation Commission for review and approval.

5.2 Land Under Water Bodies and Waterways

The alteration of 83,890 sf of LUWW associated with the installation of handicapped-accessible dock along the beach front, replacement of spillway outlet pipe in downstream channel, installation of groin, and fill on the dam embankment associated with spillway reconstruction is proposed. Approximately 81,855 sf of LUWW will be replicated in-situ. The construction sequencing and erosion and sedimentation controls have been designed to meet the following General Performance Standards of 310 CMR 10.56(4) for the alteration of LUWW to not impair:

1. The water carrying capacity within the defined channel, which is provided by said land in conjunction with the banks;
2. Ground and surface water quality;
3. The capacity of said land to provide breeding habitat, escape cover and food for fisheries; and
4. The capacity of said land to provide important wildlife habitat functions.

5.3 Bank

Approximately 325 linear feet (lf) of Bank will be altered associated with the installation of handicapped accessible dock along the beach front and the replacement of spillway outlet pipe in downstream channel.
Approximately 215 lf of the Bank will be replicated in-situ in accordance with the General Performance Standards of 310 CMR 10.54(4):

Any proposed work on a Bank shall not impair the following:

1. the physical stability of the Bank;
2. the water carrying capacity of the existing channel within the Bank;
3. ground water and surface water quality;
4. the capacity of the Bank to provide breeding habitat, escape cover and food for fisheries;
5. the capacity of the Bank to provide important wildlife habitat functions.

5.4 Riverfront

Approximately 41,487 sf of Riverfront Area (RA) is located on the project site (within the parcel boundary) associated with Pumpkin Hollow Brook, with approximately 1,610 sf of previously developed area (impervious surfaces from existing structures or pavement, absence of topsoil), qualifying this project as “Redevelopment within Previously Developed Riverfront Areas” in accordance with 310 CMR 10.58 (5) of the Wetland Protection Act.

There is 2,100 sf of proposed development within 100 ft and 1,918 sf of proposed development between 100 and 200 ft, totaling 4,018 sf of existing and proposed development within the RA associated with the pond maintenance access roadway and dam repairs.

Proposed work will result in an improvement over existing conditions of the capacity of the RA to protect the interests identified in M.G.L. c. 131 § 40. In addition, stormwater will be managed according to standards established by the Department in its Stormwater Policy. Construction equipment entrance and egress will occur via existing roadways and through the beach area and existing pathway to the dam crest.

The proposed redevelopment of the site follows the criteria in 310 CMR 10.58 (5), Redevelopment within Previously Developed Riverfront Areas; Restoration and Mitigation. The site conforms to each of the criterion as follows:

(a) – Proposed work shall result in an improvement over existing conditions.

Improvements to the stormwater will include the construction of a rain garden to the west of the paved parking area to treat and collect stormwater runoff from the driveway and parking area. A stormwater treatment system will be installed in the existing 12 inch culvert located under the driveway. This will treat stormwater runoff collected by the culvert prior to discharge to the site. Site improvements are shown on the plans provided in Appendix A.

(b) – Stormwater management is provided according to standards established by the Department.

The project is considered a redevelopment project. The proposed work consists of dredging of the existing pond, replacement of the outlet structure, repair and reconstruction of the existing emergency spillway, repair of the existing dam and site improvements to the existing recreational and beach area. The redevelopment will result in a reduction in impervious area and pretreatment of stormwater runoff from impervious area. Pretreatment of stormwater runoff from impervious areas will be accomplished
through the installation of a rain garden to collect runoff from the paved parking area and a stormwater treatment system to treat water collected by the existing 12 inch culvert located under the driveway. In accordance with the Stormwater Handbook, being a redevelopment project, the project will meet the standards to the maximum extent possible, as described in the Stormwater Report in Appendix D.

(c) – Within 200 foot riverfront areas, proposed work shall not be located closer to the river than existing conditions or 100 feet, whichever is less, or not closer than existing conditions within 25 foot riverfront areas, except in accordance with 310 CMR 10.58(5)(f) or (g).

The existing developed area is located less than 1 foot from the Bank associated with the RA, which contains the dam embankment and outlet structure. The area of proposed work is not be any closer than existing conditions.

(d) – Proposed work, including expansion of existing structures, shall be located outside the riverfront area or toward the riverfront area boundary and away from the river, except in accordance with 310 CMR 10.58(5)(f) or (g).

The proposed work in the Riverfront area includes the construction of the pond maintenance access roadway, the repaving of a portion of the parking lot, the rain garden, and a small area of the dam spillway repairs and emergency spillway improvements. All work is within previously disturbed areas on the existing site with the exception of the pond access roadway, which is being located no closer than existing disturbed areas within the RA.

(e) – The area of proposed work shall not exceed the amount of degraded area, provided that the proposed work may alter up to 10% if the degraded area is less than 10% of the riverfront area, except in accordance with 310 CMR 10.58(5)(f) or (g).

The percentage of currently degraded area within the RA is 3.9%. The proposed project will result in the degraded RA within the parcel boundary to be a total of 9.7%, which is less than 10% of the RA.

(f) – When an applicant proposes restoration on-site of degraded riverfront area…

Since the conditions of 310 CMR 10.58(5)(a) through (e) are met, no RA restoration is required.

(g) – When an applicant proposes mitigation either on-site or in the riverfront area…

Since the conditions of 310 CMR 10.58(5)(a) through (e) are met, no RA mitigation is required.

(h) – The issuing authority shall include a continuing condition in the Certificate of Compliance for projects under 310 CMR 10.58(5)(f) or (g) prohibiting further alteration within the restoration or mitigation area, except as may be required to maintain the area in its restored or mitigated condition. Prior to requesting the issuance of the Certificate of Compliance, the applicant shall demonstrate the restoration or mitigation has been successfully completed for at least two growing seasons.

Since the conditions of 310 CMR 10.58(5)(a) through (e) are met, no restoration or mitigation is required.
6 Alternatives Analysis

The proposed project to rehabilitate an existing recreational swimming pond and dam is considered “water-dependent” according to 314 CMR 9.06 since the swimming pond requires direct access to inland waters for recreational purposes and therefore cannot be located away from those waters. The dam and impoundment was constructed in 1949 for public swimming.

The proposed site improvements, including dredging are necessary to improve safety and accessibility at the site and to continue to use the beach area as a public recreation area. The Town Of Conway Draft Open Space and Recreation Plan Update 2012-2019 states that the Conway Pool is one of the Town’s most popular recreational resources. The proposed project will improve the Conway Community Swimming Pool for continued recreational use.

Alternatives to the proposed project which meet the project purpose were considered in the design process. These alternatives were determined to have greater impacts to wetland areas, priority habitat areas, and/or stormwater management. Other alternatives which were impractical due to cost considerations, existing technology, or logistics were dismissed without further consideration in the alternatives analysis. Justification for the selection of the project elements that were considered and modified to reduce the impacts are discussed in the following sections.

6.1 Alternatives to Dam Repairs and Improvements

The project objective is to improve the condition of the Conway Community Swimming Pool Dam by replacing the spillway structure and appurtenances. The dam is classified as an “Intermediate” size structure and has a “Significant” hazard classification. “Significant” hazard classification is for dams located where failure may cause loss of life and damage home(s), industrial or commercial facilities, secondary highway(s) or railroad(s) or cause interruption of use or service of relatively important facilities. The structural problems caused by the cracked spillway pipe have been identified as a potentially serious condition. A Chapter 253 Permit will be obtained from the DCR ODS prior to the start of construction.

6.2 Alternatives to Temporarily Filling Bordering Vegetated Wetlands

The proposed project includes 230 sf of temporary fill of BVW on the western side of the dam access roadway are associated with the installation of the concrete block retaining wall, the removal of three (3) existing drainage culverts, and the removal and replacement of an existing 15” CMP. No modification is proposed for the existing roadway alignment to move the roadway away from the wetland area due to the steep slope on the eastern side of the road and encroachment on the neighboring property. The concrete block retaining wall is proposed adjacent to the roadway, outside of the BVW; however, there will be temporary construction impacts to the BVW since the substrate of the BVW will need to be temporarily removed and stockpiled for construction. In-situ wetland mitigation is proposed to return the BVW to pre-
construction conditions following the completion of construction, as described in Section 3.4, Mitigation Measures.

### 6.3 Alternatives to Filling Land Under Water Bodies and Waterways

Impacts to wetland resource areas cannot be completely avoided since the project is water-dependent and LUWW exist within areas proposed for dam repair and dredging. There are four (4) areas of proposed permanent fill in LUWW, totaling 1,115 sf:

1. **Beach groin (415 sf)** – A concrete block groin will be installed to help protect the sand in the swimming area from washing into the main pond of the pool. The grade on the beach will be decreased from approximately 17% to approximately 9%. The groin will minimize future impacts to wetland resource areas by reducing the need for dredging beach sand that would otherwise migrate into the pond and to reduce the velocity of the inflow from the inlet stream and direct sediment away from the swimming area.

2. **Handicapped accessible dock (140 sf)** – The original design did not have handicapped accessible walkways, however, it was decided by the Conway Community Swimming Pool committee that handicapped accessibility was a priority for the project. The dock at the end of the handicapped accessible pathway will allow individuals in wheelchairs swimming access from the dock.

3. **Dam outlet structure (spillway) (1,055 sf) and Dam outlet pipe in the downstream channel (425 sf)** – The spillway structure, including the steel riser pipe, concrete collar, gate valve and concrete headwalls, or standpipe (gloryhole) will be replaced with a new 8 foot by 12 foot concrete riser structure, new headwall and a 48” outlet pipe. A new low-level outlet structure will be installed. The existing 30” outlet culvert is undersized and will be replaced with a 96 feet long 48” High Density Polyethylene (HDPE) outlet culvert. The downstream concrete headwall at the stream outlet will be replaced. Dam upgrades were designed based on standards in 302 CMR 10.14 which include by reference methods of the U.S Army Corps of Engineers, the U.S. Bureau of Reclamation, and the U.S. National Resource Conservation.

### 6.4 Alternatives to Dredging

The proposed project involves dredging approximately 2 acres of the pond at depths ranging from approximately 6 inches to 3 feet, removing a total of 3,000 cy of sediment. Approximately 78% of the pond is proposed to be dredged since the entire pond is used for swimming. Maintenance dredging has been performed inconsistently since the construction of the pond in 1949, resulting in sediment retention in all areas of the pond. The pond must be dredged to depths of up to 10 feet in certain locations to allow adequate depths for swimming and diving off of the platform located in the center of the pond. The deep channel located on the western edge of the pond will be moved slightly more westerly and deepened to maintain a cold water channel within the pond. In addition, dredging was minimized in certain areas of the pond to within 25 feet of the Bank to avoid impacts to wildlife.
7 MassDEP Stormwater Management Guidelines

The proposed project complies with the Stormwater Handbook guidelines, as presented in the Stormwater Report, Appendix D.
Figures

Site Location Map
NHESP Habitats Map
Legend

Project Area (Work Limits)
Appendix A

Site Plans
(Plans under separate cover)
CONWAY COMMUNITY SWIMMING POOL INC.

EXISTING CONDITIONS

SITE IMPROVEMENTS

CONWAY MASSACHUSETTS

1" = 40'

EXISTING POND VOLUMES

<table>
<thead>
<tr>
<th>POND OUTLET</th>
<th>ELEV = 70.37</th>
<th>2.46 ACRES</th>
<th>14.55 ACRE FT</th>
</tr>
</thead>
<tbody>
<tr>
<td>FEND</td>
<td>143279 SF</td>
<td>1089226 CF</td>
<td></td>
</tr>
</tbody>
</table>

SUMMER WATER ELEVATION = 70.37

WINTER WATER ELEVATION = 64.012

LEGEND:

- Existing Pond
- Existing Conditions
- Site Improvements
- Pond Outlet
- Elevation
- Water Level
- Existing Trees
- New Trees
- Proposed Trees
- Existing Fences
- New Fences
- Proposed Fences
- Existing Designated Area
- New Designated Area
- Proposed Designated Area

Sheet: OF 17
CONWAY COMMUNITY SWIMMING POOL INC.

POND PROFILE 1
SITE IMPROVEMENTS
CONWAY MASSACHUSETTS

1" = 10'
CONWAY COMMUNITY SWIMMING POOL INC.

DAM &ROSS SECTIONS
SITE IMPROVEMENTS
CONWAY MASSACHUSETTS

1" = 10'

SECTION A

SECTION B
1. TIMBER/CRUSHED STONE STAIRS - TYPICAL SECTION

2. STORMWATER TREATMENT SYSTEM (STS)

3. 15" CULVERT TRENCH

4. 48" HOPE OUTLET PIPE TRENCH

5. RAIN GARDEN

NOTE TO USER:

* Unit may be fabricated for clockwise or counter-clockwise flow direction.

Concrete
Gravel Backfill
Paving

1/2" 3/8" Typ.

Bollards shall be placed around access riser(s) in non-traffic areas to prevent inadvertent loading by maintenance vehicles.

For Non-Traffic Areas Only

For H-20 Traffic Loading Areas

If traffic loading (H-20) is required or anticipated, a concrete pad must be placed over the entire Stormwater Treatment System. Sample details of concrete pad available upon request.

* Unit may be fabricated for clockwise or counter-clockwise flow direction.

AS-12 Drawing Available on Request

Max. Weight (lbs.)
760
1600
2215
2365
3120
3805
4905
5635
6800
8850

SITE CONSTRUCTION DETAILS

CONWAY COMMUNITY SWIMMING POOL INC.
CONWAY MASSACHUSETTS

OUTLET STRUCTURE & CONCRETE WING WALL

File Path: J:\DWG\P2012\0989\A10\Civil\Details\20120989A10_DET01.dwg
Layout: C3.03
Plotted: Tue, February 12, 2013 - 3:16 PM
User: abell
Appendix B

Wetland Delineation Report
Property:
Conway Pool
Whately Road
Conway, MA

Prepared for:
Fuss & O’Neill
78 Interstate Drive
West Springfield, MA 01089

Prepared by:
Stockman Associates LLC
107 West Street
Plainfield, MA 01070

Date:
October 2012
Mr. Eric Bernardin, P.E.
Fuss & O’Neill
78 Interstate Drive
West Springfield, MA 01089

Re: Wetland Resource Area Delineation
Conway Pool
Whately Road
Conway, MA

Dear Mr. Bernardin:

Per your request, Stockman Associates LLC performed a wetland resource area delineation within the Conway Pool Association property located on Whately Road in the town of Conway, MA. It is our understanding that the delineation was performed as part of a larger project involving the dredging and maintenance of the Conway Pool, a dam repair, and overall site improvements. Based on observations made during the site visit and reference maps retrieved from MassGIS the evaluated area contains the following resource areas subject to protection under the Massachusetts Wetland Protect Act: Bordering Vegetated Wetlands (BVW), Bank, Land Under Water Bodies and Waterways (LUWW), Riverfront Area, and Buffer Zone. The property is also mapped as MA Natural Heritage Endangered Species Program (NHESP) Priority Habitat for Rare Species and Estimated Habitat for Rare Wildlife and contains areas subject to protection under federal regulations.

**Resource Area Descriptions**

**Bordering Vegetated Wetland (BVW)**

As stated in 310 CMR 10.55 (2) (a), “Bordering Vegetated Wetlands are freshwater wetlands which border on creeks, rivers, streams, ponds and lakes. The types of freshwater wetlands are wet meadows, marshes, swamps and bogs. Bordering
Vegetated Wetlands are areas where the soils are saturated and/or inundated such that they support a predominance of wetland indicator plants..."

The delineated wetlands border on a pond within the property and a perennial stream, Pumpkin Hollow Brook, which flows through the property. As such, the wetland is jurisdictional based on 310 CMR 10.02 Statement of Jurisdiction. (1) Areas Subject to Protection under M.G.L. c. 131 § 40. The BVW within the property is classified as a Palustrine wetland. As stated in the Classification of Wetlands and Deepwater Habitats of the United States, 1979, “The Palustrine System includes all nontidal wetlands dominated by trees, shrubs, persistent emergents, emergent mosses or lichens...” More specifically, the B and C-series BVWs are commonly known as shrub wetlands. The F-series BVW contains sections of emergent, shrub, and forested wetland. Portions of the C-series BVW have been impacted by sediment deposition from upgradient runoff and erosion associated with drainage along Whately Road.

Stockman Associates LLC visited the site on September 7th and 12th 2012. The wetland was delineated using methodology presented in the Massachusetts DEP Handbook: Delineating Bordering Vegetated Wetlands, March 1995, the 1987 ACOE Wetland Delineation Manual, and the Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Northcentral and Northeast Region, January 2012. Consecutively numbered flags B1-B3 were placed in the field to demarcate a small shrub wetland located on the east side of the inlet stream. Consecutively numbered flags C1 to C17 were placed in the field to delineate a predominantly shrub wetland along the easterly and northeasterly portion of the pond. Flags F1 to F9END were placed to demarcate the BVW along the southwest portion of the pond. In addition, data were collected on the vegetation, soils, and hydrology to complete the required data forms, which have been enclosed.

Vegetation

The delineated BVWs are comprised of plant species such as: jewelweed, Impatiens capensis (FACW); New England Aster, Symphyotrichum novae-angliae (FACW); sensitive fern, Onoclea sensibilis (FACW); tussock sedge, Carex stricta (OBL); horsetail, Equisetum arvense (FAC); arrow-wood, Viburnum dentatum (FAC); silky willow, Salix sericea (OBL); tearthump, Polygonum perfoliatum; soft rush, Juncus effusus (OBL); late goldenrod, Solidago gigantea (FACW); reed canary grass, Phalaris arundinacea (FACW); and rough goldenrod, Solidago rugosa (FAC).

Hydrology

The hydrology that maintains the delineated BVWs is supplied primarily from direct precipitation, surface water runoff, seasonal high ground water, and the perennial stream pond complex. Observed indicators of hydrology include: blackened leaves, saturated soils, standing water, drainage patterns, seeps, drift patterns, and hydric soils. The majority of water exits the wetland system by evaporation and transpiration and through the perennial stream, Pumpkin Hollow Brook, to the north.
Soils

The mapped soil types within the property are the Rumney, fine sandy loam; the Buckland fine sandy loam, 8 to 15 percent slopes; and the Colrain, fine sandy loam, 15 to 25 percent slopes (Soil Survey of Franklin County, 1967).

The Rumney soils are mapped within the northerly portion of the property. Rumney soils are poorly drained fine sandy loams that are formed in recently deposited materials along major swift-flowing streams. They are frequently flooded and located in nearly level or depressional areas near streams. Included with this mapped soil type are areas of well drained Ondawa and moderately well drained Podunk soils.

Buckland soils are mapped within the easterly portion of the property. The Buckland soils are moderately well drained fine sandy loam formed in compact glacial deposits derived mainly from dark-gray schistose material and some impure limestone. These soils are located in the nearly level to moderately steep foothills of the western highlands. Included with this mapped soil type are areas of well drained Shelburne and poorly drained and very poorly drained Cabot soils.

The Colrain soils are mapped within the western and southern portions of the property. Colrain soils are well drained fine sandy loams that formed in glacial deposits derived principally from dark-gray schistose material and some impure limestone. They are located on gently sloping to very steep foothills of the western highlands. Included with this mapped soil type are areas of shallow Westminster, moderately well drained Buckland, and the poorly drained and very poorly drained Cabot soils.

Bank

Bank, as stated in 310 CMR 10.54(2) (a), is “the portion of the land surface, which normally abuts and confines a water body. It occurs between a water body and a vegetated bordering wetland and adjacent floodplain, or, in the absence of these, it occurs between a water body and an upland”.

The Bank within the evaluated area confines Pumpkin Hollow Brook and the Conway Pool pond. The perennial brook, Pumpkin Hollow Brook, enters the property from the south and flows northerly, through the Conway Pool pond, exiting the pond and the property to the north via an outlet downfall and culvert.

As defined under 310 CMR 10.54(2)(c), “The upper boundary of a Bank is the first observable break in slope or the mean annual flood level, whichever is lower”. Per request, Stockman Associates LLC performed a Bank delineation within the property. Consecutively numbered flags A1 to A35END were placed in the field to demarcate the Bank of the perennial inlet stream and the pond. For the most part, Bank was defined by the first observable break in topography, which coincided with the Mean Annual High Water Line and Ordinary High Water. Bank of pond was further assessed based on the outlet structure elevation. The surveyed elevation was utilized in the Bank determination of the pond due to long-term drawdown conditions, which have permitted significant vegetative growth and reduced the Bank indicators.
Consecutively numbered flag D1 to D3 and E1 to E3 were placed to delineate the easterly and westerly Banks, respectively, of the perennial stream outlet. Pumpkin Hollow Brook continues to flow to the north, outside of the property bounds.

**Riverfront Area**

As stated in 310 CMR 10.58 (2) (a), “A Riverfront Area is the area of land between a river's mean annual high water line and a parallel line measured horizontally. The riverfront area may include or overlap other resource areas or their buffer zones. The Riverfront Area does not have a buffer zone.” In this case the parallel line is located 200-feet away from the Mean Annual High Water Line (MAHWL).

As previously described, the perennial stream, Pumpkin Hollow Brook, flows through the property from south to north and through the Conway Pool pond. As stated in 310 CMR 10.58(2)(a)1.h. “Where rivers flow through lakes or ponds, the riverfront area stops at the inlet and begins again at the outlet. A water body identified as a lake, pond, or reservoir on the current U.S.G.S. map or more recent map provided by the Department, is a lake or pond, unless the issuing authority determines that the water body has primarily riverine characteristics. When a water body is not identified as a lake, pond, or reservoir on the current U.S.G.S. map or more recent map provided by the Department, the water body is a river if it has primarily riverine characteristics. Riverine characteristics may include, but are not limited to, unidirectional flow that can be visually observed or measured in the field. In addition, rivers are characterized by horizontal zonation as opposed to the vertical stratification that is typically associated with lakes and ponds. Great Ponds (i.e., any pond which contained more than ten acres in its natural state, as calculated based on the surface area of lands lying below the natural high water mark; a list is available from the Department) are never rivers.”

The extent of unidirectional flow and riverine characteristic during normal conditions could not be assessed as the pond was in a drawdown. With that said the pond inlet is fairly well-defined and the outlet consists of man-made structures (low-flow culvert and downfall). Based on the inlet and outlet, the Riverfront Area extents as a parallel line just north of the flag A33 and then starts again as a parallel line at the outlet.

The Riverfront Area within the property contains the previously described BVWs, Buffer Zone, an easterly beach area, picnic area, walking path, open field, sections of upland forest, and the dam. The Riverfront Area contains moderately to steep slopes, towards to the Conway Pool pond.

**Land Under Water Bodies and Waterways**

As stated in 310 CMR 10.56(2)(a), “Land Under Water Bodies and Waterways is the land beneath any creek, river, stream, pond or lake. Said land may be composed of organic muck or peat, fine sediments, rocks or bedrock.”

The perennial stream, Pumpkin Hollow Brook and the Conway Pool pond have associated Land Under Water Bodies and Waterways. Per request, LUWW was not delineated in the field.
**Estimated Habitats of Rare Wildlife (for inland wetlands)**

Based on the 2008 NHESP Map retrieved using MassGIS, the evaluated area is located within Priority Habitats of State-Listed Rare Species and Estimated Habitats of Rare Wildlife.

**Buffer Zone**

Buffer Zone as defined in 310 CMR 10.04 is “that area of land extending 100 feet horizontally outward from the boundary of any areas specified in 310 CMR 10.02(1)(a).”

More specifically, Buffer Zone within the property is associated with BVW and Bank. The Buffer Zone contains upland forest, open field, a beach, picnic areas, a walking path, and the dam. The Buffer Zone is located within the previously described Riverfront Area. Buffer Zone vegetation includes: white ash, *Fraxinus americana* (FACU); sugar maple, *Acer saccharum* (FACU); red maple, *Acer rubrum* (FAC); black cherry, *Prunus serotina* (FACU); white pine, *Pinus strobus* (FACU); hemlock, *Tsuga canadensis* (FACU); black birch, *Betula lenta* (FACU); red oak, *Quercus rubra* (FACU); sumac, *Rhus typhina* (NL); multifloral rose, *Rosa multiflora* (FACU); honeysuckle, *Lonicera tatarica* (FACU); flowering raspberry, *Rubus odoratus* (NL); Christmas fern, *Polystichum acrostichoides* (FACU); lady fern, *Athyrium filix-femina* (FAC); graceful sedge, *Carex gracillima* (FACU); white wood aster, *Eurybia divaricata* (NL); herb Robert, *Geranium robertianum* (NL); orchard grass, *Dactylis glomerata* (FACU); broad dock *Rumex obtusifolius* (FAC); wild raspberry, *Rubus idaeus* (FACU); Virginia creeper, *Parthenocissus quinquefolia* (FACU); poison ivy, *Toxicodendron radicans* (FAC); and bittersweet, *Celastrus orbiculatus* (NL).

The Wetland Indicator Status for each species contained in the previous plant species descriptions was determined using the updated Army Corps of Engineers 2012 STATE OF MASSACHUSETTS - National Wetland Plants List (NWPL) FINAL DRAFT. The Wetland Indicator Status classifies a plant based on its frequency of being found in a wetland versus an upland ecosystem. The following five categories are used in the classification system.

- An Obligate Wetland (OBL) plant is almost always found in wetlands with a frequency of >99%.
- A Facultative Wetland (FACW) plant is usually found in wetlands with a frequency of 67-99%.
- A Facultative (FAC) plant is equally likely to occur in wetlands and uplands with a frequency of 34-66%.
- A Facultative Upland (FACU) plant is seldom found in wetlands with a frequency of 1-33%.
- An Upland (UPL) plant is rarely found in wetlands with a frequency of < 1%.

**Conclusion**

In conclusion, Stockman Associates LLC delineated the BVW, Bank, and MAHWL within the previously described property. Based on 310 CMR 10.02(1), Statement of Jurisdiction, the Bordering Vegetated Wetlands (BVW), Bank, Land under Water Bodies
and Waterways (LUWW), Riverfront Area located within the property are subject to protection under M.G.L. c. 131. § 40. Any non-exempt proposed work within protected resource areas and associated Buffer Zone requires the submittal of a Request for Determination of Applicability and/or a Notice of Intent to the Conway Conservation Commission and the Massachusetts Department of Environmental Protection.

Regulatory approval of the boundaries delineated by Stockman Associates LLC requires the submittal of a Request for Determination of Applicability (RDA), a Notice of Intent (NOI), or an Abbreviated Notice of Resource Area Delineation (ANRAD) to the Conway Conservation Commission and the Massachusetts Department of Environmental Protection.

The Conway Pool pond is not indicated on the FEMA Map. Based on the mapping, 100-year floodplain appears to be located to the north of the pond. The detailed study should be reviewed to confirm the location of floodplain and confirm the presence/absence of Bordering Land Subject to Flooding (BLSF) within the project area.

Based on the 2008 NHESP Map retrieved using MassGIS, the evaluated area is located within Priority Habitats of State-Listed Rare Species and Estimated Habitats of Rare Wildlife. As such, any non-exempt work will require the submittal of a Massachusetts Endangered Species Act (MESA) filing to NHESP.

The evaluated area also contains resource areas subject to protection under federal regulations. Any project not qualifying as Category 1 would require a Category 2 or an Individual Permit application filing with the Army Corps of Engineers.

Should you have any questions please do not hesitate to contact me at 413-743-1372 or emily@stockmanassociates.com.

Sincerely,

Emily Stockman, M.S., P.W.S
Senior Scientist/Owner
Stockman Associates LLC
HYDROLOGY

Wetland Hydrology Indicators:

<table>
<thead>
<tr>
<th>Primary Indicators (minimum of one is required; check all that apply)</th>
<th>Secondary Indicators (minimum of two required)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surface Water (A1)</td>
<td>Surface Soil Cracks (B6)</td>
</tr>
<tr>
<td>High Water Table (A2)</td>
<td>Drainage Patterns (B10)</td>
</tr>
<tr>
<td>Saturation (A3)</td>
<td>Aquatic Fauna (B13)</td>
</tr>
<tr>
<td>Water Marks (B1)</td>
<td>Marl Deposits (B15)</td>
</tr>
<tr>
<td>Sediment Deposits (B2)</td>
<td>Hydrogen Sulfide Odor (C1)</td>
</tr>
<tr>
<td>Drift Deposits (B3)</td>
<td>Oxidized Rhizospheres on Living Roots (C3)</td>
</tr>
<tr>
<td>Algal Mat or Crust (B4)</td>
<td>Presence of Reduced Iron (C4)</td>
</tr>
<tr>
<td>Iron Deposits (B5)</td>
<td>Recent Iron Reduction in Tilled Soils (C6)</td>
</tr>
<tr>
<td>Inundation Visible on Aerial Imagery (B7)</td>
<td>Thin Muck Surface (C7)</td>
</tr>
<tr>
<td>Sparsely Vegetated Concave Surface (B8)</td>
<td>Other (Explain in Remarks)</td>
</tr>
</tbody>
</table>

Field Observations:

- Surface Water Present? Yes ____ No X Depth (inches): ________
- Water Table Present? Yes ____ No X Depth (inches): ________
- Saturation Present? Yes ____ No X Depth (inches): ________

Wetland Hydrology Present? Yes ____ No X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

- No indicator observed.
### VEGETATION - Use scientific names of plants.

**Sampling Point:** C1-U

<table>
<thead>
<tr>
<th>Tree Stratum (Plot size: 30’ radius)</th>
<th>Absolute % Cover</th>
<th>Dominant Species?</th>
<th>Indicator Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Pinus strobus (Pine, eastern white)</td>
<td>63</td>
<td>Y</td>
<td>FACU</td>
</tr>
<tr>
<td>2. Acer saccharum (Maple, sugar)</td>
<td>38</td>
<td>Y</td>
<td>FACU</td>
</tr>
<tr>
<td>3. Betula lenta (Birch, sweet)</td>
<td>10.5</td>
<td></td>
<td>FACU</td>
</tr>
<tr>
<td>4. Tsuga canadensis (Hemlock, eastern)</td>
<td>10.5</td>
<td></td>
<td>FACU</td>
</tr>
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<td>5.</td>
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<tr>
<td>6.</td>
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<tr>
<td>7.</td>
<td></td>
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<td></td>
</tr>
<tr>
<td><strong>122</strong> = Total Cover</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sapling/Shrub Stratum (Plot size: 15’ radius)</th>
<th>Absolute % Cover</th>
<th>Dominant Species?</th>
<th>Indicator Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Acer saccharum (Maple, sugar)</td>
<td>38</td>
<td>Y</td>
<td>FACU</td>
</tr>
<tr>
<td>2. Fagus grandifolia (Beech)</td>
<td>10.5</td>
<td></td>
<td>FAC</td>
</tr>
<tr>
<td>3. Fraxinus americana (Ash, white)</td>
<td>10.5</td>
<td></td>
<td>FACU</td>
</tr>
<tr>
<td>4. Prunus serotina (Cherry, black)</td>
<td>3</td>
<td></td>
<td>FACU</td>
</tr>
<tr>
<td>5. Quercus rubra (Oak, northern red)</td>
<td>3</td>
<td></td>
<td>FACU</td>
</tr>
<tr>
<td>6. Tilia americana (Basswood, american)</td>
<td></td>
<td></td>
<td>FACU</td>
</tr>
<tr>
<td>7.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>65</strong> = Total Cover</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Herb Stratum (Plot size: 5’ radius)</th>
<th>Absolute % Cover</th>
<th>Dominant Species?</th>
<th>Indicator Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Acer saccharum (Maple, sugar)</td>
<td>63</td>
<td>Y</td>
<td>FACU</td>
</tr>
<tr>
<td>2. Fraxinus americana (Ash, white)</td>
<td>38</td>
<td>Y</td>
<td>FACU</td>
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<td>3.</td>
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<td>8.</td>
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<td>9.</td>
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<td>10.</td>
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<tr>
<td>11.</td>
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<tr>
<td>12.</td>
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</tr>
<tr>
<td><strong>101</strong> = Total Cover</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Woody Vine Stratum (Plot size:)</th>
<th>Absolute % Cover</th>
<th>Dominant Species?</th>
<th>Indicator Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>2.</td>
<td></td>
<td></td>
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<tr>
<td>3.</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>4.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>0</strong> = Total Cover</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Dominance Test worksheet:

- Number of Dominant Species That Are OBL, FACW, or FAC: **0** (A)
- Total Number of Dominant Species Across All Strata: **5** (B)
- Percent of Dominant Species That Are OBL, FACW, or FAC: **0** (A/B)

### Prevalence Index worksheet:

- Total % Cover of: Multiply by:
  - OBL species 0 x 1 = 0
  - FACW species 0 x 2 = 0
  - FAC species 10.5 x 3 = 31.5
  - FACU species 277.5 x 4 = 1110
  - UPL species 0 x 5 = 0
- Column Totals: **288** (A) **1141** (B)

- Prevalence Index = B/A = **3.96**

### Hydrophytic Vegetation Indicators:

- Rapid Test for Hydrophytic Vegetation
  - Dominance Test is > 50%
  - Prevalence Test is ≤ 3.0
- Morphological Adaptations¹ (Provide supporting data in Remarks or on a separate sheet)
- Problematic Hydrophytic Vegetation¹ (Explain)

¹Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

**Hydrophytic Vegetation Present?** Yes ____ No X ____
### Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

<table>
<thead>
<tr>
<th>Depth (inches)</th>
<th>Matrix</th>
<th>Redox Features</th>
<th>Texture</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Color (moist)</td>
<td>%</td>
<td>Color (moist)</td>
<td>%</td>
</tr>
<tr>
<td>0-2</td>
<td>10YR3/3</td>
<td>100</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>2-23+</td>
<td>10YR4/4</td>
<td>100</td>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>

1. Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains.
2. Location: PL=Pore Lining, M=Matrix.

### Hydric Soil Indicators:
- Histosol (A1)
- Histic Epipedon (A2)
- Black Histic (A3)
- Hydrogen Sulfide (A4)
- Stratified Layers (A5)
- Depleted Below Dark Surface (A11)
- Thick Dark Surface (A12)
- Sandy Mucky Mineral (S1)
- Sandy Gleyed Matrix (S4)
- Sandy Redox (S5)
- Stripped Matrix (S6)
- Dark Surface (S7)

### Indicators for Problematic Hydric Soils:
- Polyvalue Below Surface (S8) (LRR R, MLRA 149B)
- Thin Dark Surface (S9) (LRR R, MLRA 149B)
- Loamy Mucky Mineral (F1) (LRR K, L)
- Loamy Gleyed Matrix (F2)
- Depleted Matrix (F3)
- Redox Dark Surface (F6)
- Depleted Dark Surface (F7)
- Redox Depressions (F8)
- Iron-Manganese Masses (F12) (LRR K, L, R)
- Piedmont Floodplain Soils (F19) (MLRA 149B)
- Mesic Spodic (TA6) (MLRA 144A, 145, 149B)
- Red Parent Material (TF2)
- Very Shallow Dark Surface (TF12)
- Other (Explain in Remarks)

3. Indicators of Hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

### Hydric Soil Present? Yes ______ No X

### Remarks:
WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Conway Pool
City/County: Franklin
Applicant/Owner: Conway Pool Association
State: Massachusetts
Sampling Date: Sep 12, 2012
Sampling Point: C1-W

Investigator(s): Emily Stockman
Landform (hillslope, terrace, etc.): toe of slope
Local relief (concave, convex, none): none

Slope (%): 0-3
Lat: 42°29'50.7" N
Long: 72°41'51.8" W
Datum:

Soil Map Unit Name: Buckland fsl
NWI Classification:

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ___ No ___ X (If no, explain in Remarks.)

Are Vegetation, Soil, or Hydrology significantly disturbed? Are “Normal Circumstances” present? Yes ___ No ___ X

Are Vegetation, Soil, or Hydrology naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

<table>
<thead>
<tr>
<th>Hydrophytic Vegetation Present?</th>
<th>Yes ___ X ___ No ___</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydric Soil Present?</td>
<td>Yes ___ X ___ No ___</td>
</tr>
<tr>
<td>Wetland Hydrology Present?</td>
<td>Yes ___ X ___ No ___</td>
</tr>
</tbody>
</table>

Is the Sampled Area within a Wetland? Yes ___ X ___ No ___
If yes, optional Wetland Site ID: ______________________

Remarks:
Moderate drought conditions. Transect located near wetland flag C7

HYDROLOGY

Wetland Hydrology Indicators:

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<th>Primary Indicators (minimum of one is required; check all that apply)</th>
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<td>Drinking Patterns (B10)</td>
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<td>Aquatic Fauna (B13)</td>
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<td>Marl Deposits (B15)</td>
</tr>
<tr>
<td>X Sediment Deposits (B2)</td>
<td>Hydrogen Sulfide Odor (C1)</td>
</tr>
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<td>Other (Explain in Remarks)</td>
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</tbody>
</table>

Field Observations:

<table>
<thead>
<tr>
<th>Surface Water Present?</th>
<th>Yes ___ X ___ No ___ Depth (inches): ________</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water Table Present?</td>
<td>Yes ___ X ___ No ___ Depth (inches): ________</td>
</tr>
<tr>
<td>Saturation Present?</td>
<td>Yes ___ X ___ No ___ Depth (inches): ________</td>
</tr>
</tbody>
</table>

Water Table Present? Yes ___ X ___ No ___ Depth (inches): 20
Saturation Present? Yes ___ X ___ No ___ Depth (inches): 18

Wetland Hydrology Present? Yes ___ X ___ No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:
### VEGETATION - Use scientific names of plants.

**Sampling Point:** C1-W

<table>
<thead>
<tr>
<th>Tree Stratum (Plot size: _____)</th>
<th>Absolute % Cover</th>
<th>Dominant Species?</th>
<th>Indicator Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td></td>
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<tr>
<td>2.</td>
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<td>6.</td>
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<tr>
<td>7.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

0 = Total Cover

<table>
<thead>
<tr>
<th>Sapling/Shrub Stratum (Plot size: 15’ radius)</th>
<th>1. Salix sericea (Willow, silky)</th>
<th>38</th>
<th>Y</th>
<th>OBL</th>
</tr>
</thead>
<tbody>
<tr>
<td>2. Lonicera tatarica (Honeysuckle, tartarian)</td>
<td>20.5</td>
<td>Y</td>
<td>FACU</td>
<td></td>
</tr>
<tr>
<td>3. Spiraea alba (Meadow-sweet, narrow-leaf)</td>
<td>20.5</td>
<td>Y</td>
<td>FACW</td>
<td></td>
</tr>
<tr>
<td>4. Viburnum dentatum (Arrow-wood)</td>
<td>20.5</td>
<td>Y</td>
<td>FAC</td>
<td></td>
</tr>
<tr>
<td>5. Rubus idaeus (Raspberry, common red)</td>
<td>10.5</td>
<td>OBL</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

110 = Total Cover

<table>
<thead>
<tr>
<th>Herb Stratum (Plot size: 5’ radius)</th>
<th>1. Impatiens capensis (Touch-me-not, spotted)</th>
<th>63</th>
<th>Y</th>
<th>FACW</th>
</tr>
</thead>
<tbody>
<tr>
<td>2. Carex stricta (Sedge, uptight)</td>
<td>10.5</td>
<td>OBL</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Solidago rugosa (Golden-rod, wrinkled)</td>
<td>10.5</td>
<td>FAC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Equisetum arvense (Horsetail, field)</td>
<td>3</td>
<td>FAC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

87 = Total Cover

<table>
<thead>
<tr>
<th>Woody Vine Stratum (Plot size: _____)</th>
<th>1.</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>2.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

0 = Total Cover

#### Dominance Test worksheet:

- Number of Dominant Species That Are OBL, FACW, or FAC: 4 (A)
- Total Number of Dominant Species Across All Strata: 5 (B)
- Percent of Dominant Species That Are OBL, FACW, or FAC: 80 (A/B)

#### Prevalence Index worksheet:

- Total % Cover of: Multiply by:
  - OBL species 48.5 x 1 = 48.5
  - FACW species 83.5 x 2 = 167
  - FAC species 44.5 x 3 = 133.5
  - FACU species 20.5 x 4 = 82
  - UPL species X 5 =

Column Totals: 197 (A) 431 (B)

Prevalence Index = B/A = 2.2

#### Hydrophytic Vegetation Indicators:

- [X] Rapid Test for Hydrophytic Vegetation
- [X] Dominance Test is > 50%
- [X] Prevalence Test is ≤ 3.0
  - Morphological Adaptations¹ (Provide supporting data in Remarks or on a separate sheet)
  - Problematic Hydrophytic Vegetation¹ (Explain)

¹Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Remarks: (Include photo numbers here or on a separate sheet.)
### Profile Description:

(Describe to the depth needed to document the indicator or confirm the absence of indicators.)

<table>
<thead>
<tr>
<th>Depth (inches)</th>
<th>Color (moist)</th>
<th>%</th>
<th>Redox Features</th>
<th>Color (moist)</th>
<th>%</th>
<th>Type</th>
<th>Loc</th>
<th>Texture</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-6</td>
<td>10YR3/2</td>
<td>95</td>
<td></td>
<td>7.5YR4/6</td>
<td>5</td>
<td>C</td>
<td>PL</td>
<td>sl</td>
<td>A</td>
</tr>
<tr>
<td>6-11</td>
<td>2.5Y4/2</td>
<td>93</td>
<td></td>
<td>7.5YR4/6</td>
<td>5</td>
<td>C</td>
<td>M</td>
<td>sl</td>
<td>C1</td>
</tr>
<tr>
<td>11-20</td>
<td>2.5Y3/2</td>
<td>95</td>
<td></td>
<td>7.5YR4/6</td>
<td>5</td>
<td>C</td>
<td>M</td>
<td>Sand</td>
<td>Ab mucky gravelly sand</td>
</tr>
<tr>
<td>20-24</td>
<td>2.5Y3/2</td>
<td>100</td>
<td></td>
<td>N/A</td>
<td>N/A</td>
<td></td>
<td></td>
<td>Sand</td>
<td>C2</td>
</tr>
</tbody>
</table>

1 Type: C = Concentration, D = Depletion, RM = Reduced Matrix, CS = Covered or Coated Sand Grains.

2 Location: PL = Pore Lining, M = Matrix.

### Hydric Soil Indicators:

- Histosol (A1)
- Histic Epipedon (A2)
- Black Histic (A3)
- Hydrogen Sulfide (A4)
- Stratified Layers (A5)
- Depleted Below Dark Surface (A11)
- Thick Dark Surface (A12)
- Sandy Mucky Mineral (S1)
- Sandy Gleyed Matrix (S4)
- Sandy Redox (S5)
- Stripped Matrix (S6)

Hydric Soil Indicators: Polyvalue Below Surface (S8) (LRR R, MLRA 149B)

Indicators for Problematic Hydric Soils³:

- 2 cm Muck (A10) (LRR K, L, MLRA 149B)
- Coast Prairie Redox (A16) (LRR K, L, R)
- 5 cm Mucky Peat or Peat (S3) (LRR K, L, R)
- Dark Surface (S7) (LRR K, L)
- Polyvalue Below Surface (S8) (LRR K, L)
- Thin Dark Surface (S9) (LRR K, L)
- Iron-Manganese Masses (F12) (LRR K, L, R)
- Piedmont Floodplain Soils (F19) (MLRA 149B)
- Mesic Spodic (TA6) (MLRA 144A, 144B, 145, 149B)
- Red Parent Material (TF2)
- Very Shallow Dark Surface (TF12)
- Other (Explain in Remarks)

³ Indicators of Hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

### Restrictive Layer (if observed):

- Type: 
- Depth (inches): 
- Hydric Soil Present? Yes X No 

Remarks:
Photo #1
Conway Pool pond taken from the beach area facing northwesterly. The pond has been in a drawdown condition for a few years.

Photo #2
The Conway Pool pond taken facing northerly towards the outlet structures and dam.

Photo #3.
The beach area and small shrub wetland near the inlet.
Photo #4

The southwesterly BVW.

---

Photo #5

The perennial inlet stream, Pumpkin Hollow Brook. Taken facing southerly.

---

Photo #6

The existing walking path along the easterly BVW. Taken facing northerly near the data collection transect.
Figure #1. MassGIS USGS Topographic Map
Figure #2. MassGIS NHESP Map
Figure #3. MassGIS DEP Wetlands Map
Figure #4. MassGIS 2009 Color Ortho with Assessor’s Parcel Map
Figure #5. FEMA Map
Appendix C

Wildlife Habitat Assessment Report (includes Site Photographs)
Turtle Protection Plan
WILDLIFE HABITAT ASSESSMENT REPORT

Conway Community Swimming Pool Repairs and Improvements

Property:

Conway Pool
332 Whately Road
Conway, MA

Prepared for:

Fuss & O’Neill, Inc.
78 Interstate Drive
West Springfield, MA 01089

Prepared by:

Stockman Associates LLC
107 West Street
Plainfield, MA 01070

Date:

February 12, 2013
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Introduction

The Conway Pool is a man-made pool constructed in 1949 and located at 332 Whately Road in Conway, MA on a 7.3 acre parcel privately-owned by Conway Community Swimming Pool, Inc. The Conway Pool was constructed along Pumpkin Hollow Brook, a perennial stream and Cold Water Fisheries Resource (#3313700). The property and the proposed work area consist of a number of protected wetland resources including: Land Under Water Bodies and Waterways (LUWW); Riverfront Area, Bordering Vegetated Wetlands (BVW); Bank; and Buffer Zone. The property is also mapped as NHESP Priority Habitat for State-Listed Rare Species; NHESP Estimated Habitat for Rare Wildlife; and is mapped as a Habitat of Potential Regional or Statewide Importance. For more information about the site and the protected resource areas please refer to the Notice of Intent prepared by Fuss & O’Neill and the Wetland Delineation Report prepared by Stockman Associates LLC dated October 4, 2012.

Emily Stockman, P.W.S. inspected the site on September 7th and 12th 2012 to collect data and perform a delineation of wetland resource area boundaries. After preliminary project design by Fuss & O’Neill, Inc., an additional site visit was made by Ms. Stockman on October 16, 2012 to perform a wildlife habitat evaluation as required under 310 CMR10.00. A Simplified Wildlife Habitat Evaluation (Appendix A) was completed and it was concluded that a Detailed Wildlife Habitat Evaluation (Appendix B) was required to assess project impacts. The following detailed wildlife habitat evaluation has been performed following methodology presented in the March 2006 Massachusetts Wildlife Habitat Protection Guidance for Inland Wetlands.

The following materials were reviewed to assess project impacts to wildlife habitat:

- DRAFT Site Plan “CONWAY COMMUNITY SWIMMING POOL INC. SITE IMPACT OVERVIEW PLAN” prepared by Fuss & O’Neill, Inc. dated February 7, 2012
- DRAFT Notice of Intent Site Plans, “SITE IMPROVEMENTS CONWAY COMMUNITY SWIMMING POOL” (SHEETS: C0.00; C1.00; C1.10; C1.11; C1.12; C1.13; C1.20; C1.30; C2.00 –C2.03 C3.00-C3.04), prepared by Fuss & O’Neill, Inc. dated February 7, 2012
Conway Community Swimming Pool Repairs and Improvements 332 Whately Road Conway, MA

Project Location (from NOI)
Emily Stockman
Name of Person Completing Form
10/16/2012
Date

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 (>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
Wildlife Habitat Protection Guidance
Appendix A: Simplified Wildlife Habitat Evaluation

Activities

When any one of the following activities is 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)
### Part 1. Summary Sheet

<table>
<thead>
<tr>
<th>Name</th>
<th>Waterbody/Waterway</th>
<th>Wetland</th>
<th>Upland*</th>
<th>Total Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Dredging Area</td>
<td></td>
<td></td>
<td></td>
<td>83,465-SF; 20-LF Total</td>
</tr>
<tr>
<td></td>
<td>83,465-SF</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>55-SF; 20-LF</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Permanent</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1480-SF; 90-LF</td>
<td></td>
<td></td>
<td>1480-SF</td>
</tr>
<tr>
<td></td>
<td>Permanent</td>
<td></td>
<td></td>
<td>Total</td>
</tr>
<tr>
<td></td>
<td>215-LF</td>
<td></td>
<td></td>
<td>305-LF</td>
</tr>
<tr>
<td></td>
<td>Temporary</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Outlet Structure Area</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Dam Access Road Area</td>
<td></td>
<td>230-SF</td>
<td></td>
<td>230-SF</td>
</tr>
<tr>
<td></td>
<td>Temporary</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Riverfront Area/BLSF

Attach Sketch map and/or photos of the Impact Areas

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

The Conway Pool is a man-made pool constructed in 1949 and located at 332 Whately Road in Conway, MA on a 7.3 acre parcel privately-owned by Conway Community Swimming Pool, Inc. The Conway Pool was constructed along Pumpkin Hollow Brook, a perennial stream and Cold Water Fisheries Resource (#3313700). The property and the proposed work area consist of a number of protected wetland resources including: Land Under Water Bodies and Waterways (LUWW); Riverfront Area, Bordering Vegetated Wetlands (BVW); Bank; and Buffer Zone. The property is also mapped as NHESP Priority Habitat for State-Listed Rare Species; NHESP Estimated Habitat for Rare Wildlife; and is mapped as a Habitat of Potential Regional or Statewide Importance. For more information about the site and the protected resource areas please refer to the Notice of Intent prepared by Fuss & O’Neill and the delineation report prepared by Stockman Associates LLC dated October 4, 2012.

**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**

Emily Stockman

Typed or Printed Name
# Detailed Wildlife Habitat Evaluation Page 4

**Massachusetts Department of Environmental Protection**  
**Bureau of Resource Protection - Wetlands Program**  
**Wildlife Habitat Protection Guidance**  
**Appendix B: Detailed Wildlife Habitat Evaluation**  
**Part 2. Field Data Form** (for each wetland or non-wetland resource area)

## I. General Information

Conway Pool 332 Whately Road Conway, MA  
Project Location (from NOI page 1)  
Impact Area #1-Dredging Area  
Impact Area (number/name)  
10/16/2012  
Date(s) of Site Visit(s) and Data Collection  
Cloudy, windy  
Weather Conditions During Site Visit (if snow cover, include depth)  
Emily Stockman  
Person completing form per 310 CMR 10.60(1)(b)  
10/16/2012  
Date this form was completed

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:** Emergent Wetland  
   **Subclass:** Persistent  
   **Hydrology/Water Regime**
   - [ ] Permanently flooded  
   - [ ] Saturated  
   - [x] Intermittently exposed  
   - [ ] Temporarily flooded  
   - [ ] Semi-permanently flooded  
   - [ ] Intermittently flooded  
   - [ ] Seasonally 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. ([Department of Fish & Game Website](http://example.com))

   **Community Name**
   **Vegetation Description**
   **Physical Description**
B. Inventory (Plant community)

<table>
<thead>
<tr>
<th>% Cover</th>
<th>Trees (&gt; 20')</th>
<th>Shrubs (&lt; 20')</th>
<th>Woody vines</th>
<th>Mosses</th>
<th>Herbaceous</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>30</td>
<td>0</td>
<td>0</td>
<td>5</td>
<td>95</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Strata</th>
<th>Plant Species</th>
<th>Strata</th>
<th>Plant Species</th>
</tr>
</thead>
<tbody>
<tr>
<td>H</td>
<td>Eupatorium perfoliatum**</td>
<td>H</td>
<td>Solidago rugosa**</td>
</tr>
<tr>
<td>H</td>
<td>Salix lucida**</td>
<td>H</td>
<td>Juncus effusus**</td>
</tr>
<tr>
<td>H</td>
<td>Symphyotrichum lateriflorum</td>
<td>H</td>
<td>Typha latifolia</td>
</tr>
<tr>
<td>H</td>
<td>Scirpus polyphyllus</td>
<td>H</td>
<td>Populus tremula**</td>
</tr>
<tr>
<td>H</td>
<td>Juncus canadensis</td>
<td>SH</td>
<td>Populus deltoides**</td>
</tr>
<tr>
<td>H</td>
<td>Myosotis scorpioides**</td>
<td>H</td>
<td>Leersia oryzoides**</td>
</tr>
<tr>
<td>H</td>
<td>Epilobium sp.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

C. Inventory (Soils)

<table>
<thead>
<tr>
<th>Colrain fine sandy loam</th>
<th>well drained</th>
<th>Soil Survey Unit</th>
<th>fsl</th>
<th>Drainage Class</th>
<th>14-36 inches</th>
<th>Texture (upper part)</th>
<th>fsl</th>
<th>Depth</th>
<th>SHW 3-5+ FT; on-site intermittently exposed</th>
</tr>
</thead>
</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):

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

Number of Tree Cavities in trunks or limbs of:

- 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): 0

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, re-hydration)
- □ 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 and 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  [x] Absent

Flat rocks and logs on banks or within exposed portions of streambeds (cover for stream salamanders and nesting habitat for dusky salamanders)

- [] Present  [x] Absent

Underwater banks of fine silt and/or clay (beaver, muskrat, otter)

- [] Present  [x] Absent

Undercut or overhanging banks (small mammals, mink, weasels)

- [] Present  [x] Absent

Vertical sandy banks (bank swallow, kingfisher)

- [x] Present  [ ] Absent

Areas of ice-free open water in winter

- [ ] Present  [x] Absent

Mud flats

- [x] Present  [ ] Absent

Exposed areas of well-drained, sandy soil suitable for turtle nesting

- [ ] Present  [x] Absent

Wildlife dens/nests (if present, describe & quantify them on the back of this sheet)

Turtle nesting sites

- [ ] Present  Possible Attempts  [ ] Absent

Bank swallow colony

- [ ] Present  [x] Absent

Nest(s) present of

- [ ] Bald Eagle
- [ ] Osprey
- [x] Great Blue Heron

Den(s) present of

- [ ] Otter
- [ ] Mink
- [x] 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

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-leafed emergent 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 1.0 acre in size?  □ Yes  □ No

(marsh and waterbirds)

- 2.0 acres in size?  □ Yes  □ No
- 5.0 acres in size?  □ Yes  □ No
- 10.0 acres in size?  □ Yes  □ No

1 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.
Is the impact area part of a wetland complex at least 2.5 acres in size? □ Yes □ No  
(turtles, frogs, waterfowl, mammals) 5.0 acres in size? □ Yes □ No  
10.0 acres in size? □ Yes □ No  
25.0 acres in size? □ Yes □ No  
For upland resource areas is the impact area part of contiguous forested habitat at least (forest interior nesting birds) 50 acres in size? □ Yes □ No  
100 acres in size? □ Yes □ No  
250 acres in size? □ Yes □ No  
500 acres in size? □ Yes □ No  
(grassland nesting birds) > 1.0 acre in size? □ Yes □ No  
(special habitat such as gallery floodplain forest, alder thicket, etc.) > 1.0 acre in size? □ Yes □ No  
B. Connectivity with adjoining natural habitats  
☐ No direct connections to adjacent areas of wildlife habitat (little connectivity function)  
☐ Connectors numerous or impact area is embedded in a large area of natural habitat (limited connectivity function)  
☐ Impact area contributes to a limited number of connectors to adjacent areas of habitat (somewhat important for connectivity function)  
☐ Impact area serves as part of a sole connector to adjacent areas of habitat (important for connectivity function)  
☒ Impact area serves as only connector to adjacent areas of habitat (very important for connectivity function)  
V. Habitat Degradation (describe degradation and wildlife impacts on the back of the sheet)  
☐ Evidence of significant chemical contamination  
☐ Evidence of significant levels of dumping  
☒ Evidence of significant erosion or sedimentation problems  
☐ Significant invasion of exotic plants (e.g., purple loosestrife, Phragmites, glossy buckthorn)  
☐ Disturbance from roads or highways ☒ Other human disturbance  
☐ Is the site the only resource area in the vicinity of an otherwise developed area  
Note: These are not the only important habitat features that may be observed on a site. If the wildlife specialist identifies other features they should be noted in the application.
### VI. Quantification Table for Important Habitat Characteristics

<table>
<thead>
<tr>
<th>Habitat Characteristic</th>
<th>Amount Impacted in Impact Area</th>
<th>Current (entire site)</th>
<th>Post-Construction (entire site)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Example: standing dead trees 6-12” dbh</td>
<td>4</td>
<td>12</td>
<td>8</td>
</tr>
<tr>
<td>Dense herbaceous cover within LUW</td>
<td>Absent during normal pool. ±80,250-SF under current conditions</td>
<td>±119,000-SF within LUW, Bank, BVW, and sections of inner Buffer Zone</td>
<td>0-SF within LUW during normal pool; BVW, Bank, and inner Buffer Zone vegetation will remain except for the outlet structure-pond side</td>
</tr>
<tr>
<td>Rocks, crevices and overhanging branches under, at, and above 1m of the water's surface</td>
<td>0</td>
<td>Absent/minimal during current drawdown condition; perimeter sections during normal pool</td>
<td>Absent/minimal during current drawdown condition; perimeter sections during normal pool</td>
</tr>
<tr>
<td>Standing water during the growing season</td>
<td>0</td>
<td>106,994 during normal summer pool</td>
<td>106,994 during normal summer pool</td>
</tr>
<tr>
<td>Mudflats</td>
<td>Sections along low flow channel within Conway Pool</td>
<td>Sections along low flow channel within Conway Pool</td>
<td>Absent during normal summer and winter pool</td>
</tr>
<tr>
<td>Potential Turtle Nesting Sites</td>
<td>LUW downgradient from beach</td>
<td>2 potential attempts; Area not suitable during normal summer and winter</td>
<td>Area not suitable during normal summer and winter pool</td>
</tr>
<tr>
<td>Flooded emergent, persistent emergent, &amp; cattail emergent wetland</td>
<td>Small internal sections during current drawdown</td>
<td>Small internal sections during current drawdown</td>
<td>Perimeter sections during normal summer and winter pool</td>
</tr>
<tr>
<td>Important Wetland/Aquatic Foods</td>
<td>±53,497 within LUW</td>
<td>±62,000-SF within LUW and adjacent Bank and BVW</td>
<td>±62,000-SF within LUW and adjacent Bank and BVW. Under normal pool Foods sources will change from wetland to aquatic</td>
</tr>
</tbody>
</table>
I. General Information

Conway Pool 332 Whately Road Conway, MA

Project Location (from NOI page 1)

Impact Area #2-Outlet Structure Area Pond Side

Impact Area (number/name)

10/16/2012

Date(s) of Site Visit(s) and Data Collection

Cloudy, windy

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

Emily Stockman

Person completing form per 310 CMR 10.60(1)(b)

10/16/2012

Date this form was completed

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: Emergent Wetland Subclass: Persistent

Hydrology/Water Regime

☐ Permanently flooded ☐ Saturated

☒ Intermittently exposed ☐ Temporarily flooded

☐ Semi-permanently flooded ☐ Intermittently flooded

☐ Seasonally 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. (Department of Fish & Game Website)


Community Name

Vegetation Description

Physical Description
B. Inventory (Plant community)

% Cover:  

<table>
<thead>
<tr>
<th></th>
<th>Trees (&gt; 20')</th>
<th>0</th>
<th>Shrubs (&lt; 20')</th>
<th>0</th>
<th>Woody vines</th>
<th>0</th>
<th>Mosses</th>
<th>95</th>
<th>Herbaceous</th>
</tr>
</thead>
</table>

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

<table>
<thead>
<tr>
<th>Strata</th>
<th>Plant Species</th>
<th>Strata</th>
<th>Plant Species</th>
</tr>
</thead>
<tbody>
<tr>
<td>H</td>
<td>Eupatorium perfoliatum*</td>
<td>H</td>
<td>Solidago rugosa**</td>
</tr>
<tr>
<td>SH</td>
<td>Lonicera tatarica*</td>
<td>H</td>
<td>Juncus effusus</td>
</tr>
<tr>
<td>H</td>
<td>Symphyotrichum lateriflorum</td>
<td>SH</td>
<td>Frangula alnus</td>
</tr>
<tr>
<td>H</td>
<td>Solidago altissima &amp; canadensis*</td>
<td>SH</td>
<td>Populus tremula*</td>
</tr>
<tr>
<td>H</td>
<td>Juncus canadensis</td>
<td>SH</td>
<td>Populus deltoides*</td>
</tr>
<tr>
<td>H</td>
<td>Myosotis scorpioides*</td>
<td>H</td>
<td>Epilobium sp.</td>
</tr>
</tbody>
</table>

C. Inventory (Soils)

<table>
<thead>
<tr>
<th>Colrain fine sandy loam</th>
<th>well drained</th>
</tr>
</thead>
<tbody>
<tr>
<td>Soil Survey Unit</td>
<td>Drainage Class</td>
</tr>
<tr>
<td>fsl</td>
<td>14-36 inches</td>
</tr>
<tr>
<td>Texture (upper part)</td>
<td>Depth</td>
</tr>
<tr>
<td>SHW 3-5+ FT; on-site intermittently exposed</td>
<td>Depth to Water Table</td>
</tr>
</tbody>
</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
### Part 2. Field Data Form (continued)

<table>
<thead>
<tr>
<th>Feature Description</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of trees (live or dead) &gt; 30” DBH:</td>
<td>0</td>
</tr>
<tr>
<td>Number (or density) of Standing Dead Trees (potential for cavities and perches):</td>
<td></td>
</tr>
<tr>
<td>0-12” dbh</td>
<td>0</td>
</tr>
<tr>
<td>12-18” dbh</td>
<td>0</td>
</tr>
<tr>
<td>18-24” dbh</td>
<td>0</td>
</tr>
<tr>
<td>&gt;24” dbh</td>
<td>0</td>
</tr>
<tr>
<td>Number of Tree Cavities in trunks or limbs of:</td>
<td></td>
</tr>
<tr>
<td>0-12” diameter (e.g., tree swallow, saw whet owl, screech owl, bluebird, other songbirds)</td>
<td>0</td>
</tr>
<tr>
<td>12-18” diameter (e.g., hooded merganser, wood duck, common goldeneye, mink)</td>
<td>0</td>
</tr>
<tr>
<td>&gt;18” diameter (e.g., hooded merganser, wood duck, common goldeneye, common merganser, barred owl, mink, raccoon, fisher)</td>
<td>0</td>
</tr>
<tr>
<td>Small mammal burrows</td>
<td></td>
</tr>
<tr>
<td>☐ Abundant</td>
<td>☐ Present</td>
</tr>
<tr>
<td>Cover/Perches/Basking/Denning/Nesting Habitat</td>
<td></td>
</tr>
<tr>
<td>☒ Dense herbaceous cover (voles, small mammals, amphibians &amp; reptiles)</td>
<td></td>
</tr>
<tr>
<td>☐ Large woody debris on the ground (small mammals, mink, amphibians &amp; reptiles)</td>
<td></td>
</tr>
<tr>
<td>☐ Rocks, crevices, logs, tree roots or hummocks under water’s surface (turtles, snakes, frogs)</td>
<td></td>
</tr>
<tr>
<td>☐ 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)</td>
<td></td>
</tr>
<tr>
<td>☐ Rock piles, crevices, or hollow logs suitable for:</td>
<td></td>
</tr>
<tr>
<td>☐ otter</td>
<td>☐ mink</td>
</tr>
<tr>
<td>☐ Live or dead standing vegetation overhanging water or offering good visibility of open water (e.g., osprey, kingfisher, flycatchers, cedar waxwings)</td>
<td></td>
</tr>
<tr>
<td>Depressions that may serve as seasonal (vernal/autumnal) pools</td>
<td>☐ Present</td>
</tr>
<tr>
<td>Standing water present at least part of the growing season, suitable for use by</td>
<td></td>
</tr>
<tr>
<td>☒ Breeding amphibians</td>
<td>☒ Non-breeding amphibians (foraging, re-hydration)</td>
</tr>
<tr>
<td>☒ Turtles</td>
<td>☒ Foraging waterfowl</td>
</tr>
<tr>
<td>Sphagnum hummucks or mats, moss-covered logs or saturated logs, overhanging or directly adjacent to pools of standing water in spring (four-toed salamander)</td>
<td>☐ Present</td>
</tr>
</tbody>
</table>
Important habitat characteristics (if present, describe and 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
Part 2. Field Data Form (continued)

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

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 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

- 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

---

1 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.
Is the impact area part of a wetland complex at least 2.5 acres in size? □ Yes □ No
(turtles, frogs, waterfowl, mammals) 5.0 acres in size? □ Yes □ No
10.0 acres in size? □ Yes □ No
25.0 acres in size? □ Yes □ No

For upland resource areas is the impact area part of contiguous forested habitat at least
(forest interior nesting birds) 50 acres in size? □ Yes □ No
100 acres in size? □ Yes □ No
250 acres in size? □ Yes □ No
500 acres in size? □ Yes □ No
(grassland nesting birds) > 1.0 acre in size? □ Yes □ No
(special habitat such as gallery floodplain forest, alder thicket, etc.) > 1.0 acre in size? □ Yes □ No

B. **Connectivity with adjoining natural habitats**

☐ No direct connections to adjacent areas of wildlife habitat (little connectivity function)
☐ Connectors numerous or impact area is embedded in a large area of natural habitat (limited connectivity function)
☐ Impact area contributes to a limited number of connectors to adjacent areas of habitat (somewhat important for connectivity function)
☐ Impact area serves as part of a sole connector to adjacent areas of habitat (important for connectivity function)
☒ Impact area serves as only connector to adjacent areas of habitat (very important for connectivity function)

V. **Habitat Degradation** (describe degradation and wildlife impacts on the back of the sheet)

☐ Evidence of significant chemical contamination
☐ Evidence of significant levels of dumping
☐ Evidence of significant erosion or sedimentation problems
☐ Significant invasion of exotic plants (e.g., purple loosestrife, Phragmites, glossy buckthorn)
☐ Disturbance from roads or highways ☒ Other human disturbance
☐ Is the site the only resource area in the vicinity of an otherwise developed area

Note: These are not the only important habitat features that may be observed on a site. If the wildlife specialist identifies other features they should be noted in the application.
### VI. Quantification Table for Important Habitat Characteristics

<table>
<thead>
<tr>
<th>Habitat Characteristic</th>
<th>Amount Impacted in Impact Area</th>
<th>Current (entire site)</th>
<th>Post-Construction (entire site)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Example: standing dead trees 6-12” dbh</td>
<td>4</td>
<td>12</td>
<td>8</td>
</tr>
<tr>
<td>Dense herbaceous cover</td>
<td>outlet structure pond side</td>
<td>119,000 within LUW, Bank, BVW, and sections of inner Buffer Zone</td>
<td>0-SF within LUW during normal pool; BVW, Bank, and inner Buffer Zone vegetation will remain except for the outlet structure-pond side</td>
</tr>
<tr>
<td>Standing water during the growing season</td>
<td>0</td>
<td>106,994-SF normal summer pool</td>
<td>106,994-SF normal summer pool</td>
</tr>
</tbody>
</table>
I. General Information

Conway Pool 332 Whately Road Conway, MA

Project Location (from NOI page 1)
Impact Area #2 - Outlet Structure Area Brook Side

Impact Area (number/name)
10/16/2012

Date(s) of Site Visit(s) and Data Collection
Cloudy, windy

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

Emily Stockman

Person completing form per 310 CMR 10.60(1)(b)

10/16/2012

Date this form was completed

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: Riverine
   Subsystem: Upper Perennial

   Class: Rock Bottom
   Subclass: Rubbles

   Hydrology/Water Regime
   - Permanently flooded
   - Saturated
   - Intermittently exposed
   - Temporarily flooded
   - Semi-permanently flooded
   - Intermittently flooded
   - Seasonally 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. ([Department of Fish & Game Website](http://www.mass.gov/difw/nhesp/documents/c/natcomattxt.pdf))

Community Name

Vegetation Description

Physical Description
Part 2. Field Data Form (continued)

B. Inventory (Plant community)

<table>
<thead>
<tr>
<th>% Cover: 50 Trees (&gt;20')</th>
<th>50 Shrubs (&lt;20')</th>
<th>0 Woody vines</th>
<th>90 Mosses</th>
<th>5 Herbaceous</th>
</tr>
</thead>
</table>

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

<table>
<thead>
<tr>
<th>Strata</th>
<th>Plant Species</th>
<th>Strata</th>
<th>Plant Species</th>
</tr>
</thead>
<tbody>
<tr>
<td>M</td>
<td>Moss covered stones*</td>
<td>T</td>
<td>Populus deltoides</td>
</tr>
<tr>
<td>SH</td>
<td>Lonicera tatarica*</td>
<td>T</td>
<td>Acer saccharum</td>
</tr>
</tbody>
</table>

C. Inventory (Soils)

<table>
<thead>
<tr>
<th>Soil Survey Unit</th>
<th>well drained</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Drainage Class</td>
</tr>
<tr>
<td>Colrain fine sandy loam</td>
<td>14-36 inches</td>
</tr>
<tr>
<td>fsl</td>
<td>Depth</td>
</tr>
<tr>
<td>SHW 3-5+ FT; on-site intermittently exposed</td>
<td></td>
</tr>
</tbody>
</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):

<table>
<thead>
<tr>
<th>Diameter (dbh)</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>6-12”</td>
<td>0</td>
</tr>
<tr>
<td>12-18”</td>
<td>0</td>
</tr>
<tr>
<td>18-24”</td>
<td>0</td>
</tr>
<tr>
<td>&gt;24”</td>
<td>0</td>
</tr>
</tbody>
</table>

Number of Tree Cavities in trunks or limbs of:

<table>
<thead>
<tr>
<th>Diameter</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>6-12”</td>
<td>0</td>
</tr>
<tr>
<td>12-18”</td>
<td>0</td>
</tr>
<tr>
<td>&gt;18”</td>
<td>0</td>
</tr>
</tbody>
</table>

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, re-hydration)
- 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 and 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)

<table>
<thead>
<tr>
<th>Present</th>
<th>Absent</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Flat rocks and logs on banks or within exposed portions of streambeds (cover for stream salamanders and nesting habitat for dusky salamanders)

<table>
<thead>
<tr>
<th>Present</th>
<th>Absent</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Underwater banks of fine silt and/or clay (beaver, muskrat, otter)

<table>
<thead>
<tr>
<th>Present</th>
<th>Absent</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Undercut or overhanging banks (small mammals, mink, weasels)

<table>
<thead>
<tr>
<th>Present</th>
<th>Absent</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Vertical sandy banks (bank swallow, kingfisher)

<table>
<thead>
<tr>
<th>Present</th>
<th>Absent</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Areas of ice-free open water in winter

<table>
<thead>
<tr>
<th>Present</th>
<th>Absent</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Mud flats

<table>
<thead>
<tr>
<th>Present</th>
<th>Absent</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Exposed areas of well-drained, sandy soil suitable for turtle nesting

<table>
<thead>
<tr>
<th>Present</th>
<th>Absent</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Wildlife dens/nests (if present, describe & quantify them on the back of this sheet)**

Turtle nesting sites

<table>
<thead>
<tr>
<th>Present</th>
<th>Absent</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Bank swallow colony

<table>
<thead>
<tr>
<th>Present</th>
<th>Absent</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Nest(s) present of

<table>
<thead>
<tr>
<th>Bald Eagle</th>
<th>Osprey</th>
<th>Great Blue Heron</th>
</tr>
</thead>
<tbody>
<tr>
<td>Present</td>
<td>Absent</td>
<td></td>
</tr>
</tbody>
</table>

Den(s) present of

<table>
<thead>
<tr>
<th>Otter</th>
<th>Mink</th>
<th>Beaver</th>
</tr>
</thead>
<tbody>
<tr>
<td>Present</td>
<td>Absent</td>
<td></td>
</tr>
</tbody>
</table>
Massachusetts Department of Environmental Protection  
Bureau of Resource Protection - Wetlands Program  

Wildlife Habitat Protection Guidance  
Appendix B: Detailed Wildlife Habitat Evaluation  
Part 2. Field Data Form  
(continued)

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

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 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 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

---

1 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.
Is the impact area part of a wetland complex at least 2.5 acres in size?  □ Yes  □ No
(turtles, frogs, waterfowl, mammals)
5.0 acres in size?  □ Yes  □ No
10.0 acres in size?  □ Yes  □ No
25.0 acres in size?  □ Yes  □ No

For upland resource areas is the impact area part of contiguous forested habitat at least
(forest interior nesting birds) 50 acres in size?  □ Yes  □ No
100 acres in size?  □ Yes  □ No
250 acres in size?  □ Yes  □ No
500 acres in size?  □ Yes  □ No
(grassland nesting birds) > 1.0 acre in size?  □ Yes  □ No
(special habitat such as gallery floodplain forest, alder thicket, etc.) > 1.0 acre in size?  □ Yes  □ No

B. Connectivity with adjoining natural habitats
□ No direct connections to adjacent areas of wildlife habitat (little connectivity function)
□ Connectors numerous or impact area is embedded in a large area of natural habitat (limited connectivity function)
□ Impact area contributes to a limited number of connectors to adjacent areas of habitat (somewhat important for connectivity function)
□ Impact area serves as part of a sole connector to adjacent areas of habitat (important for connectivity function)
☒ Impact area serves as only connector to adjacent areas of habitat (very important for connectivity function)

V. Habitat Degradation (describe degradation and wildlife impacts on the back of the sheet)
□ Evidence of significant chemical contamination
□ Evidence of significant levels of dumping
□ Evidence of significant erosion or sedimentation problems
☒ Significant invasion of exotic plants (e.g., purple loosestrife, Phragmites, glossy buckthorn)
□ Disturbance from roads or highways  ☒ Other human disturbance
□ Is the site the only resource area in the vicinity of an otherwise developed area

Note: These are not the only important habitat features that may be observed on a site. If the wildlife specialist identifies other features they should be noted in the application.
VI. Quantification Table for Important Habitat Characteristics

<table>
<thead>
<tr>
<th>Habitat Characteristic</th>
<th>Amount Impacted in Impact Area</th>
<th>Current (entire site)</th>
<th>Post-Construction (entire site)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Example: standing dead trees 6-12” dbh</td>
<td>4</td>
<td>12</td>
<td>8</td>
</tr>
<tr>
<td>Rocks, crevices and overhanging branches under, at, and above 1m of the water’s surface</td>
<td>53-LF (Both sides of outlet stream impacted by replacement culvert)</td>
<td>± 420-LF</td>
<td>± 367-LF</td>
</tr>
</tbody>
</table>
I. General Information

Conway Pool Whately Road Conway, MA
Project Location (from NOI page 1)
Impact Area #3 Dam Maintenance Access Roadway
Impact Area (number/name)
10/16/2012
Date(s) of Site Visit(s) and Data Collection
Cloudy, windy
Weather Conditions During Site Visit (if snow cover, include depth)

Emily Stockman
Person completing form per 310 CMR 10.60(1)(b)
10/16/2012
Date this form was completed

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

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
   ☒ Saturated
   ☐ Intermittently exposed
   ☐ Temporarily flooded
   ☐ Semi-permanently flooded
   ☐ Intermittently flooded
   ☐ Seasonally 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. (Department of Fish & Game Website)

   Community Name
   Vegetation Description
   Physical Description
Appendix B: Detailed Wildlife Habitat Evaluation

Part 2. Field Data Form (continued)

B. Inventory (Plant community)

<table>
<thead>
<tr>
<th>% Cover</th>
<th>Trees (&gt; 20')</th>
<th>Shrubs (&lt; 20')</th>
<th>Woody vines</th>
<th>Mosses</th>
<th>Herbaceous</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>50</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>50</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Strata</th>
<th>Plant Species</th>
<th>Strata</th>
<th>Plant Species</th>
</tr>
</thead>
<tbody>
<tr>
<td>T</td>
<td>Ulmus americana</td>
<td>H</td>
<td>Phalaris arundinacea*</td>
</tr>
<tr>
<td>SH</td>
<td>Spiraea alba*</td>
<td>H</td>
<td>Equisetum arvense*</td>
</tr>
<tr>
<td>SH</td>
<td>Salix sericea*</td>
<td>H</td>
<td>Epilobium sp.</td>
</tr>
<tr>
<td>SH</td>
<td>Viburnum dentatum*</td>
<td>H</td>
<td>Carex stricta</td>
</tr>
<tr>
<td>SH</td>
<td>Rubus idaeus</td>
<td>H</td>
<td>Impatiens capensis*</td>
</tr>
<tr>
<td>H</td>
<td>Eupatorium perfoliatum*</td>
<td>H</td>
<td>Solidago rugosa*</td>
</tr>
<tr>
<td>H</td>
<td>Scirpus polyphyllus</td>
<td>H</td>
<td></td>
</tr>
</tbody>
</table>

C. Inventory (Soils)

Buckland fine sandly loam

<table>
<thead>
<tr>
<th>Soil Survey Unit</th>
<th>Drainage Class</th>
</tr>
</thead>
<tbody>
<tr>
<td>fsl</td>
<td>20-36 inches</td>
</tr>
</tbody>
</table>

Texture (upper part)

SHW 1.5 FT; on-site 20-inches

<table>
<thead>
<tr>
<th>Depth to Water Table</th>
</tr>
</thead>
<tbody>
<tr>
<td>Depth</td>
</tr>
</tbody>
</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):

<table>
<thead>
<tr>
<th>Diameter (dbh)</th>
<th>0</th>
<th>0</th>
<th>0</th>
<th>0</th>
</tr>
</thead>
<tbody>
<tr>
<td>6-12&quot;</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12-18&quot;</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18-24&quot;</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;24&quot;</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Number of Tree Cavities in trunks or limbs of:

<table>
<thead>
<tr>
<th>Diameter (diameter)</th>
<th>0</th>
</tr>
</thead>
<tbody>
<tr>
<td>6-12&quot; (e.g., tree swallow, saw whet owl, screech owl, bluebird, other songbirds)</td>
<td>0</td>
</tr>
<tr>
<td>12-18&quot; (e.g., hooded merganser, wood duck, common goldeneye, mink)</td>
<td>0</td>
</tr>
<tr>
<td>&gt;18&quot; (e.g., hooded merganser, wood duck, common goldeneye, common merganser, barred owl, mink, raccoon, fisher)</td>
<td>0</td>
</tr>
</tbody>
</table>

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, re-hydration)
- 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 and 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
Massachusetts Department of Environmental Protection  
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Part 2. Field Data Form (continued)

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

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-leafed emergent 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 1.0 acre in size? ☐ Yes ☒ No
(marsh and waterbirds)
2.0 acres in size? ☐ Yes ☒ No
5.0 acres in size? ☐ Yes ☒ No
10.0 acres in size? ☐ Yes ☒ No

1 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.
Is the impact area part of a wetland complex at least 2.5 acres in size? □ Yes ☒ No
(turtles, frogs, waterfowl, mammals) 5.0 acres in size? □ Yes ☒ No
10.0 acres in size? □ Yes ☒ No
25.0 acres in size? □ Yes ☒ No
For upland resource areas is the impact area part of contiguous forested habitat at least (forest interior nesting birds) 50 acres in size? □ Yes ☒ No
100 acres in size? □ Yes ☒ No
250 acres in size? □ Yes ☒ No
500 acres in size? □ Yes ☒ No
(grassland nesting birds) > 1.0 acre in size? □ Yes ☒ No
(special habitat such as gallery floodplain forest, alder thicket, etc.) > 1.0 acre in size? □ Yes ☒ No

B. Connectivity with adjoining natural habitats
□ No direct connections to adjacent areas of wildlife habitat (little connectivity function)
□ Connectors numerous or impact area is embedded in a large area of natural habitat (limited connectivity function)
☒ Impact area contributes to a limited number of connectors to adjacent areas of habitat (somewhat important for connectivity function)
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V. Habitat Degradation (describe degradation and wildlife impacts on the back of the sheet)
□ Evidence of significant chemical contamination
□ Evidence of significant levels of dumping
☒ Evidence of significant erosion or sedimentation problems
□ Significant invasion of exotic plants (e.g., purple loosestrife, Phragmites, glossy buckthorn)
□ Disturbance from roads or highways ☒ Other human disturbance
□ Is the site the only resource area in the vicinity of an otherwise developed area

Note: These are not the only important habitat features that may be observed on a site. If the wildlife specialist identifies other features they should be noted in the application.
### VI. Quantification Table for Important Habitat Characteristics

<table>
<thead>
<tr>
<th>Habitat Characteristic</th>
<th>Amount Impacted in Impact Area</th>
<th>Current (entire site)</th>
<th>Post-Construction (entire site)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Example: standing dead trees 6-12” dbh</td>
<td>4</td>
<td>12</td>
<td>8</td>
</tr>
<tr>
<td>Important Wetland Food Plants</td>
<td>0</td>
<td>Sections of 6,740-SF BVW</td>
<td>Section of 6,740-SF BVW</td>
</tr>
<tr>
<td>Shrub vegetation suitable for veery nesting</td>
<td>230-SF Temporary impact with in-situ replication</td>
<td>Sections of 6,740-SF BVW</td>
<td>Sections of 6,740-SF BVW</td>
</tr>
<tr>
<td>Standing dead trees 6-12” dbh</td>
<td>0</td>
<td>Group of standing dead elm saplings</td>
<td>Group of standing dead elm saplings</td>
</tr>
<tr>
<td>&gt;5cm flooded emergent, persistent emergent, fine-leaf emergent</td>
<td>0</td>
<td>Westerly section of 6,740-SF BVW</td>
<td>Westerly section of 6,740-SF BVW</td>
</tr>
<tr>
<td>Rocks, crevices and overhanging branches under, at, and above 1m of the</td>
<td>0</td>
<td>Westerly section of 6,740-SF BVW; 9” dbh overhanging cottonwood</td>
<td>Westerly section of 6,740-SF BVW; 9” dbh overhanging cottonwood</td>
</tr>
</tbody>
</table>
Part 2. Important Habitat Features Narrative to Accompany Field Data Forms

IMPACT AREA #1-Dredge Area

Impact area #1 consists of the Conway Pool. Proposed work within this area is located within Land Under Water Bodies and Bank. Cumulative impacts exceed thresholds for both LUW and Bank; therefore, a wildlife habitat evaluation was performed for this area. Proposed impacts (both temporary and permanent) include the following:

1) Dredging-including the installation of temporary bypass pipe and coffer dam, construction of a temporary access, the re-grading of steep side-slopes and subsequent installation of reinforced turf matting, the re-grading of a low-flow channel, temporary stockpiling of dredge material

83,465-SF temporary impact (LUW)

2) The construction of an ADA accessible dock

140-SF permanent impact (LUW and Bank)

3) The construction of a concrete beach groin

415-SF permanent impact (LUW)

At the time of the evaluation the Conway Pool was in a low level drawdown for two consecutive years. As a result, a significant amount of both herbaceous and woody plant growth has been established within LUW. During the data collection process, features were described to reflect current conditions as well as those most likely to be present during normal summer pool conditions.

IMPORTANT WILDLIFE HABITAT FEATURES

Important Wetland/Aquatic Food Plants

Under the existing conditions Polyginum sp., Scirpus ssp. and other wetland food plants are growing within both LUW and sections of Bank and BVW along the pond. This wildlife habitat feature is absent during normal pool, when an open water habitat is present.

Dense Herbaceous Vegetation

Under the current prolonged drawdown conditions, sections of dense herbaceous vegetation included plants species such as: New England Aster, Symphyotrichum novae-angliae (FACW); sensitive fern, Onoclea sensibilis (FACW); tussock sedge, Carex stricta (OBL); horsetail, Equisetum arvense (FAC); tearthump, Polygonum perfoliatum; soft rush, Juncus effusus (OBL); Canadian rush, Juncus canadensis (OBL); forget-me-not, Myosotis scorpioides (OBL); Agrostis sp.; late goldenrod, Solidago gigantea (FACW); reed canary grass, Phalaris arundinacea (FACW); and rough goldenrod, Solidago rugosa (FAC); broad dock, Rumex obtusifolius (FAC); and Queen Anne’s lace, Daucus carota (UPL), have established within LUW, along the majority of the Bank (excluding the beach area). Dense herbaceous vegetation is also located within nearby BVW.
This wildlife habitat feature is absent during normal pool, when an open water habitat is present.

**Rocks, crevices and overhanging branches under, at, and above 1m of the water’s surface**

Habitat features such as rocks, crevices, and overhanging branches were observed along the pond’s edge (primarily along the easterly shrub BVW). During normal full pool conditions these features are under, at, or above the water’s surface.

**Standing Water During the Growing Season**

Under the current drawdown condition, the pool only contains a few sections of very shallow (less than 2-inches) standing water. Under normal summer pool a substantial area of open water will provide shelter and breeding habitat as well as migratory habitat.

**Mudflats**

Under the current drawdown conditions the pool area contains a few sections of mudflats. The areas are associated with the low flow channel of Pumpkin Hollow Brook within the Conway Pool. Under normal summer and proposed winter pool conditions these areas will be inundated.

**Potential Turtle Nesting Attempts**

At the time of the assessment two potential turtle nesting attempts were observed within a section of LUW near the existing beach. Due to beach erosion, the easterly portion of Land Under Water Bodies is comprised of a sandy layer overlaying a more coarse, dense, gravelly-stony matrix. Two depressions contained standing water at the time of the inspection were observed, but may have been dry earlier in the season during the typical nesting period due to the low level drawdown and drier than normal season. The observed depressions were fairly shallow, with less than 4 inches of loose sandy material prior to a dense stony layer. There was no evidence of loose material within the depressions that would typically have been placed to secure eggs. It is possible that the two depressions were nesting attempts that were abandoned due to the underlying dense stony layer and saturation. However, one might expect to see additional nesting sites in the deeper loose well-drained material upgradient further to the west if the observed lower sites were abandoned. No additional nesting sites were observed.

During a normal June (full summer pool conditions), the observed sites would be located under water and; therefore, would not be suitable for nesting.

**Flooded emergent, persistent emergent, & cattail emergent wetland**

Under the current drawdown conditions, there are a few sections of flooded (> 5cm) emergent vegetation (Typha sp., Carex sp., Juncus sp., Scirpus sp.) within interior
sections of LUW. Under normal summer pool conditions the perimeter sections of LUW will contain flooded emergent vegetation (*Typha sp.*), particularly where the pool is adjacent to BVW (southwest and easterly sections).

**Sole connector (Pumpkin Hollow Brook)**

LUW located within the Conway Pool connects the adjacent habitats (upstream and downstream sections) of Pumpkin Hollow Brook. This connection is currently maintained by a low-flow channel that flows across the pool from south to north. Flow enters the pool via an unaltered stream channel, traverses the pool and exits through a 30” horizontal spillway through the dam with a mechanical gate and a vertical standpipe gloryhole for overflow.

**IMPACT AREA #2-Outlet Structure Area**

Impact Area #2 is consists of the outlet structure area. Cumulative impacts exceed thresholds for both LUWW and Bank; therefore a wildlife habitat evaluation was performed for these resource areas. Proposed work within this area is located within Land Under Water Bodies and Waterways, Bank, and Riverfront Area. Proposed impacts (both temporary and permanent) include the following:

1) The construction of a new outlet control structure & outlet culvert and removal of the existing structure.

   1,480-SF permanent impact (LUW)
   90-LF permanent impact (Bank)

2) Re-grading to address steep slopes and sinkholes created by failed outlet

   215-LF temporary impact (Bank)

At the time of the evaluation the Conway Pool was in a low level drawdown for two consecutive years. As a result, a significant amount of both herbaceous and woody plant growth has been established within both upper and lower portion of Bank. During the data collection process, features were described to reflect current conditions as well as those most likely to be present during normal summer pool conditions. Habitat features associated with Pumpkin Hollow Brook Bank, LUWW, and Riverfront Area have also been provided. A description of these habitat features is provided below.

**IMPORTANT WILDLIFE HABITAT FEATURES**

**Rocks, crevices and overhanging branches under, at, and above 1m of the water's surface**

The outlet stream contains a very stony streambed and stony, well cut banks. Due to the abundance of stones, vegetation is limited to moss and overhanging branches from the adjacent upland. A shrub zone is closest to the water’s edge and is dominated by an invasive honeysuckle, *Lonicera tatarica*. A small plunge pool is located at the current culvert outlet, which is undersized. Saplings and trees further inland, have branches that span the stream providing significant shade as well as perching habitat.
In particular, there is a mature cottonwood (±24” dbh) located on the westerly upland slope with a substantial shade producing canopy.

**Sole connector (Pumpkin Hollow Brook)**

LUWW and Bank located within the Conway Pool outlet area connects the adjacent habitats (upstream and downstream sections) of Pumpkin Hollow Brook. This connection is currently maintained by a low-flow channel that flows across the pool from south to north. Flow enters the pool via an unaltered stream channel, traverses the pool and exists through a 30” horizontal spillway through the dam with a mechanical gate and a vertical standpipe gloryhole for overflow.

**Dense Herbaceous Vegetation**

Under the current prolonged drawdown conditions, sections of dense herbaceous vegetation (*Solidago spp.*, *Symphyotrichum spp.*, *Eutrochium maculatum*, *Phalaris arundinacea*; *Rumex sp.*, *Polygonum sp.*, *Carex sp.*) have established along and adjacent to the northerly Bank of the Conway Pool. During normal full pond conditions the lower sections of Bank will be replaced with an open water habitat and sections of dense herbaceous vegetation will remain along higher sections of Bank and nearby BVW.

**IMPACT AREA #3-Dam Access Road**

Impact Area #3 is consists of the dam access road. A wildlife habitat evaluation was performed for this area based on a proposed impact to BVW. Proposed work within this area is located within BVW and Buffer Zone. Proposed impacts (both temporary and permanent) include the following:

1) The construction of a new dam access road & improved stormwater feature.  
   230-SF temporary impact (BVW)

A description of the important C-series BVW habitat features is provided below.

**IMPORTANT WILDLIFE HABITAT FEATURES**

**Important Wetland Food Plants**

*Polygonum sp.*, *Scirpus sp.*, *Viburnum sp.*, and *Rubus sp.* are growing within the C-series BVW. While not abundant, these plants are providing some food source.

**Shrub vegetation suitable for veery nesting**

The C-series BVW is a shrub wetland dominated by *Salix spp.*, *Spiraea latifolia*, and *Viburnum dentatum*. There are fairly dense shrubs zones and or near the water surface of Conway Pool.
**Standing dead trees 6-12” dbh**

There is a group of standing dead elm sapling within the westerly portion of the C-series BVW providing potential perching and small cavity habitat.

**>5cm flooded emergent, persistent emergent, fine-leaf emergent**

The westerly most portion of the C-series BVW contains sections of emergent vegetation (sedges, cattail) that may be flooded wet periods when the Conway Pool is at normal pool.

**Rocks, crevices and overhanging branches under, at, and above 1m of the water’s surface**

The westerly most portion of the C-series BVW contains shrubs along Conway Pool that will provide branches overhanging open water during normal pool. There is a 9” dbh cottonwood that overhangs the Conway Pool, its root system is stabilizing a portion of bank and providing crevices for cover habitat.
Part 3. Conceptual Wildlife Habitat Assessment Plan
(Depicting Impact Areas and Habitat Features)
Photo Documentation
Photo #1
Conway Pool taken from the beach area facing the dam to the north. Note the dense herbaceous cover that has developed within LUW due to the prolonged drawdown.

Photo #2
The Conway Pool taken from the dam facing the inlet to the south.
Photo #3
Taken from the dam facing southwesterly (C-series BVW)
Note the woody vegetation that will provide shade, cover, and perching habitat during normal pool.

Photo #4
A northerly portion of Conway Pool with flooded emergent vegetation during drawdown. This area will be inundated during normal pool.
Photo #5
A easterly portion of Conway Pool that will have flooded emergent vegetation during normal pool.

Photo #6
Overhanging tree on the easterly bank of Conway Pool that will not be impacted by the project
Photo #7
Pumpkin Hollow Brook just upstream on the Conway Pool inlet, taken facing upstream. Note the downed tree spanning the brook, stony streambed, and bank cuts. This area will not be impacted by the project.

Photo #8
Pumpkin Hollow Brook at the inlet to the Conway Pool taken facing downstream. Note the stony streambed and cut banks. This area (forefront) will not be impacted by the project.
Photo #9
A significant cut located on the easterly bank of Pumpkin Hollow Brook upstream of the proposed work area.

Photo #10
Cut along the westerly bank of Pumpkin Hollow Brook near the inlet to the Conway Pool. This area will not be impacted by the project.
Photo #11
An interior section of Pumpkin Hollow Brook within the Conway Pool taken facing upstream. This area will be dredged and will be inundated during normal pool.

Photo #12
An interior section of Pumpkin Hollow Brook within the Conway Pool taken facing downstream. Note interior sections of the streambed transition from stony to predominantly sand and gravel with some adjacent mudflats during low flow associated with the current drawdown. This area will be dredged and will be inundated during normal pool.
Photo #13
The existing outlet culvert taken from the adjacent wooded upland facing easterly. A significant cut is located on the easterly bank of Pumpkin Hollow Brook downstream of the outlet. This area will be impacted by the replacement culvert.

Photo #14
The existing undersized, perched culvert outlet. Note there is a small plunge pool associated with the existing undersized culvert. The streambed and banks are very stony. The predominant overhanging vegetation is an invasive honeysuckle. Mature trees and sapling further from the bank also provide shade canopy. This area will be impacted by the replacement culvert.
Photo #15
Standing dead elm saplings within the C-series BVW near the bank Conway Pool. This area will not be impacted.

Photo #16
One of two possible turtle nesting attempts observed within LUWW downgradient from the existing beach. Note that the area is not well-drained. This area is inundated during normal pool.
Photo #17
The second of two possible turtle nesting attempts observed within LUWW downgradient from the existing beach. Note the area is not well drained. This area is inundated during normal pool.

Photo #18
Conway Pool taken from the beach facing northerly. The arrow indicated the area of the proposed ADA dock. The dock and access avoid woody vegetation to the east.
Part 4. Reducing the Alteration

Land Under Water Bodies and Waterways

Based on the existing conditions plan, the property contains approximately 2.5-acres of LUW associated within Conway Pool, and 1,480-SF of LUW associated with the inlet and outlet areas of Pumpkin Hollow Brook.

No work is proposed within the inlet area of Pumpkin Hollow Brook, thus preserving the stony streambed, crevices at and below the water surface, large cuts along the Bank, downed sapling spanning the brook, and the associated perching, cover, and basking habitat.

Work proposed within the LUW associated with the dredging has been reduced to from approximately 2.5-acres (106,994-SF) to 83,465 -SF to avoid areas of LUW adjacent to Bank, reducing impacts to littoral zones. Impacts to LUW adjacent to Bank have been limited to the beach area, where past erosion from the beach has resulting in deposition within LUW; the northerly beach area where a handicap accessible dock area is being constructed; and a section of LUW along the dam, where accumulated sediment needs to be removed and grading needs to be performed to facilitate repairs to the dam outlet structure and emergency spillway.

The majority of the outlet stream within the property is culverted by an approximately 70-FT long 30-inch culvert. Proposed work within the Pumpkin Hollow Brook culverts an additional 53-LF of Bank and 425-SF of LUW. The project Proponent proposes to reduce this impact to the maximum extent possible pending the outcome of the DCR 253 Dam construction permit.

Bank

As previous described the majority of the Bank surrounding Conway Pool has been avoided. This avoidance preserves a littoral zone and habitat features such as cuts, stones and cobbles within and near open water, and overhanging branches for perching, cover, and shade. Preservation includes the 9" dbh cottonwood that overhangs Conway Pool along the C-series BVW and provide stabilization and cover via is root system.

Proposed impacts to Bank surrounding Conway Pool associated with the beach area have been reduced to beach enhancement and the construction of a handicap accessible dock. The beach enhancement is limited to areas already impacted by the creation of beach. The location of the handicap accessible dock is within a portion of Bank along existing beach, avoiding impacts the woody vegetation (further to the northeast), which provides perching, cover, and nesting habitat.

Impacts to Bank associated with the outlet structure and headwalls have been reduced by utilizing the footprint of existing structures and limiting the expansion to areas required for dam safety.
No work is proposed within the inlet area of Pumpkin Hollow Brook, thus preserving the rocks, crevices, cuts, downed sapling, overhanging vegetation and the associated shade, perching, cover, and basking habitat.

The majority of the outlet stream within the property is culverted by an approximately 70-FT long 30-inch culvert. Proposed work within the Pumpkin Hollow Brook culverts an additional 53-LF of Bank and 425-SF of LUW. The project Proponent proposes to reduce this impact to the maximum extent possible pending the outcome of the DCR 253 Dam construction permit.

**BVW**

Based on the existing conditions plan, the property contains 15,911-SF of Bordering Vegetated Wetlands. Impacts to the B and F-series BVW have been avoided. Sections of dense herbaceous vegetation along the pond (particularly within the southwest F-series BVW) have been avoided. Permanent impacts to shrubs suitable for nesting, flooded emergent vegetation and standing dead elm saplings within the C-series BVW have been avoided.

Permission from the abutter was obtained to located the dam access road to the east of the C-series BVW, thus reducing impacts to BVW. The proposed 230-SF temporary impacts are associated with the installation of erosion controls, the installation of improved stormwater structure, and the removal of existing culverts. The proposed concrete block retaining wall also reduces impacts to the BVW by reducing fill need to stabilize the shoulder of the dam access road. Furthermore, the dam access road has been located to the east of the BVW within an area previously developed by the installation of culverts and creation of an access path (Buffer Zone).
Part 5. Adverse Effect Analysis and Certification

**Land Under Water Bodies and Waterways- Adverse Effect Analysis**

Based on 310 CMR 10.56(4)(a)4., “4. The capacity of said land to provide important wildlife habitat functions. A project or projects on a single lot, for which Notice(s) of intent is filed on or after November 1, 1987, that (cumulatively) alter(s) up to 10% or 5,000 square feet (whichever is less) of land in this resource area found to be significant to the protection of wildlife habitat, shall not be deemed to impair its capacity to provide important wildlife habitat functions. Additional alterations beyond the above threshold may be permitted if they will have no adverse effects on wildlife habitat, as determined by procedures established under 310 CMR 10.60.”

Based on calculations provided by Fuss & O’Neill, Inc., proposed permanent impacts to LUWW total 2,035-SF and proposed temporary impacts total 81,855. As such a wildlife habitat assessment was performed to evaluate the potential for adverse impacts associated with work within LUWW.

**Dredging**

The most recent dredging event occurred in 2010. Subsequently, Hurricane Irene caused flooding and significant sediment deposition in 2011. The proposed project will remove an estimated 0.5 to 3 feet of sediment depth to restore swimming depths and remove sediment at the outlet structure.

Erosion controls and phasing have been proposed to reduce sediment discharge and avoid adverse impacts to the Pumpkin Hollow Brook. Water temperate considerations need to be made to ensure that the Cold Water Fishery Resource is not impaired. This is challenging as the preferred time of year from a low-flow perspective is July 1 to September 30, when water temperatures are typically at there warmest. (The July 1 to September 30th timeframe is also preferred as it is the active period for the Wood Turtle, thus avoiding concerns regarding hibernation within the project area and permitting monitoring via turtle sweeps). The Conway Pool is currently in a drawdown condition, reducing concerns regarding water temperature. Maintaining flow and reducing the amount of standing water will help to prevent a rise in water temperature. Coffer dams and have been proposed in areas that should be shaded by the westerly woods during the afternoon high temperatures. Large stones should be avoided in areas with standing water to reduce heat capture and transfer into the water column.

A proposed construction schedule of 6-8 weeks conducted during low-flow conditions will permit a normal summer pool refill in the spring following construction.

The project includes a winter drawdown with maintenance dredging. The November 1st to December 1st drawdown will provide time for amphibians, reptiles, and other aquatic species to locate hibernation and overwintering sites without the threat of sudden exposure and fatality due to freezing temperatures. Dredging during winter
month should be limited to areas within the defined dredging footprint and above the approximate 64.0 winter drawdown elevation (where hibernating wildlife are absent). Dredging removes detritus and other lower food chain organism. The limited dredging area preserves a littoral shelf with associated food sources. It is recommended that the operations and maintenance schedule include an assessment of the beach and swimming area to determine whether maintenance dredging is required. The concrete groin and the re-grading of the beach area should reduce the frequency of maintenance dredging.

Wetland food plants within LUW will either be removed during the dredging process or will be eliminated under inundated conditions. Normal summer pool conditions will provide open water habitat. No work is being proposed within Polyginum sp., Scirpus ssp. and other wetland food plant populations within nearby BVWs, preserving some of this food source. An increase in aquatic food plants is anticipated as the pool is returned to normal summer pool and managed to a deeper winter pool level.

The dense herbaceous plant community within LUW will either be removed during the dredging process or will be eliminated under inundated conditions. During normal summer full pool conditions the area will be replaced with an open water habitat. The dense herbaceous plant community along the Bank of Conway Pool and the Pumpkin Hollow Brook inlet will be preserved.

The majority of the proposed dredge avoids the perimeter of the pond, thus preserving rocks, crevices, and overhanging branches surrounding portions of the Conway Pool. Proposed dredging adjacent to Bank is limited to the beach area and northwesterly section near the dam. Rock, crevices, and overhanging branches were not observed within these areas.

The revised Conway Pool drawdown elevations will provide standing water during the growing season and will eliminate the extreme drawdown levels historically implemented, which greatly diminished the amount open water during various seasons.

The loss of mudflats along the low flow channel of Pumpkin Hollow Brook within the Conway Pool is primarily due to the change in water level associated with normal summer and winter pool conditions. Normal pool conditions will replace mudflats with the previously described standing water during the growing season habitat, which represents historical conditions rather than the recent prolonged drawdown. The proposed project includes an improved plan to manage the water level within the pond to avoid prolong drawdown conditions, to reduce the depth of the drawdown, and to improve water quality/temperature for Cold Water Fishery Resource.

Under normal summer and winter pool condition, the area does not provide turtle nesting habitat. Possible nesting attempts observed in October would have been attributed to the extreme drawdown conditions and drier than normal conditions earlier in the season. The possible nesting attempts may have been abandoned attempts due to compact subsoils and saturation. The potential nesting attempts were inundated during the October site inspection.
Under the current drawdown conditions, there are a few sections of flooded (> 5cm) emergent vegetation (Typha sp., Carex sp., Juncus sp., Scirpus sp.) within interior sections of LUW. Under normal pool conditions the perimeter sections of LUW will contain flooded emergent vegetation (Typha sp.), particularly where the pool is adjacent to BVW (southwest and easterly sections).

**ADA Accessible Dock**

The proposed dock has been located to the west of the C-series BVW in an area previously impacted by sediment deposition associated with upgradient beach erosion. The location avoids impacts to existing vegetation to the east. The dock will add cover habitat. Although more likely to be outside of Conway Pool operating hours, the dock will also provide perching habitat.

Natural wood (locust, cedar or cypress) and certain wood composites are preferred for use in aquatic systems over chemically treated wood.

**Concrete Groin**

The concrete groin has been proposed to help protect the sand in the swimming area from washing into the main pond of the pool. This is an attempt to reduce the frequency of maintenance dredging; however, sediment inputs associated with Pumpkin Hollow Brook will remain a contributing factor.

The concrete groin (height ranging from 1.5 to 6.5 feet) will act as a partial barrier to aquatic species, but will not entrap species as movement around the structure is possible. There is little wildlife habitat value associated with concrete as compared to large stones and boulders that would also provide cover habitat such as underwater crevices. During drawdown the groin may provide some perching habitat adjacent to open water.

**Reinforced Turf Matting**

Plastic reinforced turf matting has been proposed for sections of LUW (and elsewhere on the site). Plastic netting may entangle wildlife leading to injury or fatality. In addition, plastic netting will not leave the environment. While some plastics may photodegrade (break down into smaller pieces of plastic) the plastic does not leave the environment. To avoid a potential adverse impact to wildlife habitat plastic netting should not be utilized. If stabilization is required, small stones may be substituted in sections (providing cover and other habitat for aquatic species such as crayfish and insects).

**Outlet Culvert**

The proposed outlet culvert is a sole connector for Pumpkin Hollow Brook. The culvert has been increased to 48” to replace the existing undersized 30” culvert. The current undersized culvert has created a small plunge pool that will be eliminated with the proposed replacement culvert, which has a stone revetment at the end of the culvert transitioning to grade. The proposed culvert replacement impacts an additional 545-LF
of LUW that is currently comprised of a stony, shaded streambed. It is recommended that the length of the culvert be reduced to the maximum extent possible pending the outcome of the DCR 253 Dam construction permit.

Bank-Adverse Effect Analysis

Based on 310 CMR 10.54(4)(a)5., “the capacity of the Bank to provide important wildlife habitat functions. A project or projects on a single lot, for which Notice(s) of Intent is filed on or after November 1, 1987, that (cumulatively) alter(s) up to 10% or 50 feet (whichever is less) of the length of the bank found to be significant to the protection of wildlife habitat, shall not be deemed to impair its capacity to provide important wildlife habitat functions. Additional alterations beyond the above threshold may be permitted if they will have no adverse effects on wildlife habitat, as determined by procedures contained in 310 CMR 10.60.”

Based on calculations provided by Fuss & O’Neill, Inc., proposed permanent impacts to Bank total 110-LF and proposed temporary impacts total 215-LF. As such a wildlife habitat assessment was performed to address potential for adverse impacts associated with work within Bank.

Outlet Structure

Dams in general act as a barrier to wildlife passage, particularly fish. The proposed outlet structure will at times provide 6-inch openings associated with the trash racks installed over the outlet structure low flow and winter drawdown openings. The trash rack openings will allow for small fish passage. However, grates will need to be maintained otherwise debris will prevent passage. The proposed outlet structure mimics the vertical standpipe for overflow, which is an existing impeding factor for fish passage.

Little habitat value is associated with concrete headwalls; however, the headwalls serve to stabilize the outlet structure and side slopes.

The new outlet structure permits an improved drawdown procedure, which greatly reduces the depth of the historic drawdown. Historically the Conway Pool has undergone an annual drawdown of approximately 15.17 feet. The new outlet structure provides a mechanism for a mid-level winter drawdown of approximately 6.37 feet. While this is a vast improvement over the historical drawdown, the proposed winter drawdown exceeds 3-FT; therefore, the project Proponent must contact Massachusetts Division of Fisheries and Wildlife for a site-specific review. Drawdowns should be performed in compliance with the 2002 Massachusetts Division of Fisheries and Wildlife Drawdown Performance Standards for the Protection of Fish and Wildlife Resources. Time of year restrictions and drawdown rates should be incorporated to ensure a steady controlled drawdown that minimizes adverse impacts from temperate stress, low dissolved oxygen levels, and sediment transport.
Outlet Culvert

The proposed outlet culvert is a sole connector for Pumpkin Hollow Brook. The culvert has been increased to 48” to replace the existing undersized 30” culvert. The current undersized culvert has created a small plunge pool that will be eliminated with the proposed replacement culvert, which has a stone revetment at the end of the culvert transitioning to grade. The proposed culvert replacement impacts an addition 53-LF of Bank (both sides of Pumpkin Hollow Brook) that is currently comprised of a stony, shaded stream bank with a large cut located along the easterly Bank. It is recommended that the length of the culvert be reduced to the maximum extent possible pending the outcome of the DCR 253 Dam construction permit.

Reinforced Turf Matting

Plastic reinforced turf matting has been proposed for slopes adjacent to the culvert outlet. Plastic netting may entangle wildlife leading to injury or fatality. In addition, plastic netting will not leave the environment. While some plastics may photodegrade (break down into smaller pieces of plastic) the plastic does not leave the environment. To avoid a potential adverse impact to wildlife habitat plastic netting should not be utilized. If stabilization is required, stones, loam and seeding and/or biodegradable erosion controls are recommended.

BVW- Adverse Effect Analysis

Based on 310 CMR 10.55(4)(b), “Notwithstanding the provisions of 310 CMR 10.55(4)(a), the issuing authority may issue an Order of Conditions permitting work which results in the loss of up to 5000 square feet of Bordering Vegetated Wetland when said area is replaced in accordance with the following general conditions and any additional, specific conditions the issuing authority deems necessary to ensure that the replacement area will function in a manner similar to the area that will be lost...”

Based on calculations provided by Fuss & O’Neill, Inc., 230-SF of BVW will be temporarily impacted by the proposed project. An in-situ replication has been proposed to ensure that there is no net loss the BVW and function. Wildlife habitat is one of interest protected by the Act that must be provided for.

Erosion Controls

The proposed project minimizes the cutting/removal of woody plants during the erosion controls process. The dominant woody wetland species are shrubs (Salix sp. and Viburnum dentatum) that will stump sprout after any cutting thus re-establishing habitat over time. Should stumping/removal be necessary, woody plants shall be tallied and an in-kind planting will take place once work within the area is complete and erosion controls have been removed. After work is completed the area will be graded to pre-impact conditions. These measures will avoid and/or replace the shrub habitat features (cover, perching and nesting) within the BVW. Historical sedimentation associated with untreated stormwater will be removed where feasible to improve wetland function. A
new stormwater treatment structure has been proposed to replace the existing southerly culvert, which historically recent untreated flows from Whately Road that adversely impacted the BVW.

**Access Road to Dam**

The proposed access road to the dam has been located within inner Buffer Zone within close proximity (adjacent to) the BVW. Soil disturbances are associated with removal of three (3) existing drainage culverts, the removal and replacement of an existing 15” CMP, and the access road construction and associated grading. Erosion controls have been proposed to define the limit of work closest to and within the nearby BVW. The in-situ BVW replication plan will address any temporary impacts to BVW habitat. Once the area has been stabilized and vegetated to the maximum extent possible the potential for an adverse impact to habitat will be avoided. Given the minimum use of the access road (as compared to nearby roads and driveways) the access way will not substantially reduce the capacity of the nearby BVW to provide wildlife habitat functions.

**Retaining Wall**

The concrete retaining was has been proposed to stabilize a section of the dam access road. The length of the retaining has been reduced to approximately 100 feet long and avoids impacts to BVW.

The concrete retaining (height ranging from 1.5 to 2.5 feet) will act as a partial barrier to wildlife but will not entrap species as movement around the structure is possible. There is little wildlife habitat value associated with concrete as compared to large stones and boulders that would also provide cover habitat such as crevices.

**Reinforced Turf Matting**

Plastic reinforced turf matting has been proposed for slopes within Buffer Zone to BVW and other upland areas. Plastic netting may entangle wildlife leading to injury or fatality. In addition, plastic netting will not leave the environment. While some plastics may photodegrade (break down into smaller pieces of plastic) the plastic does not leave the environment. To avoid a potential adverse impact to wildlife habitat plastic netting should not be utilized. If stabilization is required, stones, loam and seeding and/or biodegradable erosion controls are recommended.

**Stormwater Treatment Structure**

Historical sedimentation associated with untreated stormwater will be removed from the C-series BVW where feasible to improve wetland function. A new stormwater treatment structure has been proposed to replace the existing southerly culvert, which historically received untreated flows from Whately Road, which adversely impacted the BVW. This will result in an improvement to the wildlife habitat and water quality within the BVW and the Conway Pool.
Priority Habitats for Rare Species & Estimated Habitat for Rare Wildlife- Adverse Effect Analysis

The project site is located within Priority and Estimated Habitats as indicated in the 13th Edition of the MA Natural Heritage Atlas. Based on an Information Request previously submitted the MA Natural Heritage Endangered Species Program (NHESP) the area is mapped as habitat for the Wood Turtle (Glyptemys insculpta), which is a state-listed species of special concern. Based on preliminary discussions with MA NHESP the Proponent must consult with NHESP to design and implement a Wood Turtle Protection Plan that will avoid impacts to the Wood Turtle from the proposed project. Ms. Emily Stockman (Stockman Associates LLC) has received approval from MA NHESP to design the Wood Turtle Protection Plan. The Wood Turtle Protection Plan will be submitted with the simultaneous NOI/MESA filing for review and approval. Any additional comments or conditions provided by NHESP will be incorporated into the plant to ensure that there is no adverse impact to the Wood Turtle.

Cold Water Fishery Resource- Adverse Effect Analysis

Pumpkin Hollow Brook is a Coldwater Fishery Resource (#3313700). Pumpkin Hollow Brook enters the project site from the south, flows through the Conway Pool, and enters the site to the north. During normal summer and winter pool, the riverine habitat characteristics of Pumpkin Hollow Brook are limited to sections upstream and downstream of the Conway Pool. Important habitat features within these areas include: a downed tree and overhanging branches which provide cover habitat, forested sections of Riverfront Area that provide excellent shade and stony streambeds with moderate to fast flowing riffle zones.

As defined in 310 CMR 10.04, “Cold-water Fishery means waters in which the mean of the maximum daily temperature over a seven day period generally does not exceed 68°F (20°C) and, when other ecological factors are favorable (such as habitat) are capable of supporting a year round population of cold-water stenothermal aquatic life such as trout. Waters designated as cold-water fisheries by the Department in 314 CMR 4.00 and waters designated as cold-water fishery resources by the Division of Fisheries and Wildlife are cold-water fisheries. Waters where there is evidence based on a fish survey that a cold-water fish population and habitat exist are also cold-water fisheries. Cold-water fish include but are not limited to brook trout (Salvelinus fontanilis), rainbow trout (Oncorhynchus mykiss), brown trout (Salmo trutta), creek chubsucker (Erimyzon oblongus) and fallfish (Semotilus corporalis)."

As previously discussed, dams in general act as a barrier to wildlife passage, particularly fish. The proposed outlet structure will at times provide 6-inch openings associated with the trash racks installed over the outlet structure low flow and winter drawdown openings. While these openings may be sufficient for several cold-water fish species, upstream movement into the Conway Pool is likely minimal due to the current and proposed outlet culvert and the lack of prime cold water habitat associated with the Conway Pool during normal summer pool. Similarly, cold water fish activity within the
Conway Pool during normal summer pool is likely minimal with upstream movement into the stony, shaded, protected sections of Pumpkin Hollow Brook.

Erosion controls have been proposed along the open channel within the Conway Pool and the dredging activity has been phased to reduce the amount excavation occurring at one time. This will assist in reducing the potential for downstream sedimentation.

The project narrative states that the existing outlet pipe and headwalls will be demolished. More detail should be provided for this phase to ensure that downstream sections of Pumpkin Hollow Brook are protected from potential sediment transport associated with the demolition of the outlet pipe and headwalls.

At this time a dewatering plan for residual water within work areas has not been provided for review. Based on discussion with Fuss and O’Neill, additional dewatering of the work area beyond the drawdown is not anticipated. Should additional dewatering be deemed necessary during the construction process a dewatering plan should be drafted to address residual water ensuring that sediment laden waters will not be discharged into Pumpkin Hollow Brook.

Impacts to water temperature are a concern for Cold Water Fishery Resources. The Conway Pool is currently within a low flow drawdown that has been established for some time. As such the current dredge project does not involve a drawdown. Water temperate considerations need to be made to ensure that the Cold Water Fishery Resource is not impaired. Maintaining flow and reducing the amount of standing water will help to prevent a rise in water temperature. Cofferdams and have been proposed in areas that should be shaded by the westerly woods during the afternoon high temperatures. Large stones should be avoided in areas with standing water to reduce heat capture and transfer into the water column. Re-grading placed the low flow channel within the Conway Pool at or to the west of the existing channel, closer to the adjacent forest canopy.

The proposed project includes an improved plan to manage the water level within the pond to avoid prolong drawdown condition, to reduce the depth of the drawdown, and to improve water quality/temperature of the Cold Water Fishery Resource. The project Proponent must contact Massachusetts Division of Fisheries and Wildlife for a site-specific review and incorporate any comments or conditions to ensure the final drawdown plan protects the Cold Water Fishery Resource habitat. Time of year restrictions and drawdown rates should be incorporated to ensure a steady controlled drawdown that minimizes adverse impacts from temperate stress, low dissolved oxygen levels, and sediment transport.

Impacts to the unaltered portion of Pumpkin Hollow Brook associated with the proposed outlet culvert should be minimized to the maximum extent possible pending the outcome of the DCR 253 Dam construction permit.
Cutting of vegetation within riparian zones should be minimized to ensure that shade cover over Pumpkin Hollow Brook is preserved.

**Certification**

With the incorporation of the wildlife habitat recommendations provided in this report and any comments or conditions provided by MANHESP and Massachusetts Division of Fisheries and Wildlife the proposed project will not substantially reduce the capacity to provide important wildlife habitat functions. This certification has been provided based on the avoidance of impacts to important wildlife features; minimization of impacts via reduced footprint, time of year restrictions, monitoring, and proposed in-situ mitigation. In addition, several aspects of the project (stormwater improvements, beach stabilization, and revised drawdown procedures) improve the habitat value within the site.
Wood Turtle (*Glyptemys insculpta*) Protection Plan

For
Conway Community Swimming Pool Repairs & Improvements Project
332 Whately Road
Conway, MA
MA NHESP Tracking Number 12-31442
EEA Number 14991

Introduction

The project site, 332 Whately Road in the town of Conway, MA, is located within Priority and Estimated Habitats as indicated in the 13th Edition of the MA Natural Heritage Atlas. Based on an Information Request previously submitted the MA Natural Heritage Endangered Species Program (NHESP) the area is mapped as habitat for the Wood Turtle (*Glyptemys insculpta*), which is a state-listed species of special concern. The project Proponent will follow this turtle protection plan to minimize adverse impacts to the state-listed species during and after construction of the proposed project.

The project, Conway Community Swimming Pool Repairs & Improvements, is comprised of the following components:

- Dam Embankment Repairs
- Spillway/Outlet Structure Replacement
- Sediment Dredging and Removal
- Beach Area Improvements
- Recreation Area Improvements
- Pond Maintenance Access Roadway
- Dam Maintenance Assess Roadway

The development of the Wood Turtle Protection Plan (“Plan”) included site inspections, preliminary communications with MA NHESP review biologist, Ms. Misty-Anne Marold, and the review of the: DRAFT Notice of Intent for Conway Community Swimming Pool Repairs and Improvements, prepared by Fuss & O’Neill, Inc. dated February 7, 2012; DRAFT Site Plan “CONWAY COMMUNITY SWIMMING POOL INC. SITE IMPACT OVERVIEW PLAN” prepared by Fuss & O’Neill, Inc. dated February 7, 2012; and, DRAFT Notice of Intent Site Plans, “SITE IMPROVEMENTS CONWAY COMMUNITY SWIMMING POOL” (SHEETS: C0.00; C1.00; C1.10; C1.11; C1.12; C1.13; C1.20; C1.30; C2.00 –C2.03 C3.00-C3.04), prepared by Fuss & O’Neill, Inc. dated February 7, 2012. Ms. Emily Stockman (Stockman Associates LLC) has received approval from MA NHESP to design the Wood Turtle Protection Plan.
This Wood Turtle Protection Plan is designed and will be implemented to protect turtles during work:

- Within the Conway Pool, Pumpkin Hollow Brook, and associated Bordering Vegetated Wetlands and Riverfront Area;
- Within the beach area;
- Within additional areas of disturbance/alteration within 100 feet of the Conway Pool and Pumpkin Hollow Brook including areas of soil and vegetation alteration or impacts from equipment travel/storage;
- Work associated with improvements to the pre-existing paved driveway may be subject to this “Plan” if deemed necessary by MA NHESP.

**Turtle Protection Plan**

Due to project constraints two possible protection protocols are being proposed. Turtle Protection Protocol A requires the installation of a turtle barrier around the work site. Turtle Protection Protocol B acknowledges that site constraints may prohibit the installation of an adequate turtle barrier in some areas and; therefore, active daily sweeps by an approved turtle monitor would be required. Details are provided below:

**Turtle Protection Protocol A - Installation of Turtle Protection Barrier**

1) Activity associated with the proposed project within Priority and Estimated Habitat will take place during the Wood Turtle active period, from July 1\textsuperscript{st} to September 30\textsuperscript{th}. This schedule will avoid potential adverse impacts to hibernating Wood Turtles.

2) Prior to the start of work the name(s), contact information, and qualifications of a turtle monitor will be provided to MA NHESP for approval. The turtle monitor may be an approved professional turtle biologist or a volunteer who demonstrates sufficient experience with the Wood Turtle.

3) A MA NHESP collection permit shall be obtained by the approved turtle monitor.

4) Prior to any soil excavation and heavy equipment traffic a double silt fence will be installed around the work area. This silt fence will delineate the work area as well as act as a barrier to prevent turtles from entering the work site.

5) The silt fence turtle barrier may be installed around the entire project area or, if work areas are being phased, the silt fence may be installed around phased work areas. Work cannot proceed in phased areas until the silt fence barrier has been installed and a turtle sweep has been performed by the approved turtle monitor.

6) The silt fence should be one continuous piece of fabric when possible. If the silt fence fabric needs to be joined then a wrapped stake/fabric methodology should be utilized so no gaps exist between posts. To prevent possible burrowing and movement under the fence, a minimum of 6 inches of silt fence will be buried in the soil. At the close of each work day, the double silt fence will be inspected by construction personnel and the access opening in the silt fences shall be re-established to prevent turtle movement into the work area. Following
each inspection, any silt fence found in need of repair or replacement will be repaired or replaced immediately.

7) Prior to the start of work the approved turtle monitor will perform a turtle sweep within the silt fenced work area, including the space between the two silt fences for the presence of Wood Turtles. Land used to access the work area will be inspected ahead of machinery for the presence of turtles. Depending on the time of year, the inspection will be conducted during warm sunny days when turtles are most active and basking is likely to occur.

8) Once the work site has been enclosed, inspections along the barrier shall occur 2 times per week during July and August and 3 times per week during September. Inspections may be performed by trained construction personnel and/or a volunteer crew.

9) A pre-construction meeting with construction personnel and an approved turtle monitor will be conducted. The meeting will review the Wood Turtle Protection Plan protocols, proper Wood Turtle handling, Wood Turtle release sites, and the responsibilities of the construction company, their employees, and/or a volunteer crew. Construction personnel and/or a volunteer crew will be provided with a copy of the Wood Turtle Protection Plan, Wood Turtle identification guidance and instructions for reporting Wood Turtle observations.

10) In the event that a Wood Turtle is located it will be carefully removed from the work area to a comparable habitat. MA NHESP will be notified and the encounter will be documented in the monitoring log and with color photographs. Any turtles encounter within aquatic areas will be carefully collected via submerging a bucket to facilitate capture with water. This procedure will aid in avoiding adverse impacts associated with thermal shock. Once captured turtles will be released in an accessible, comparable stream environment outside of the work site. Any overland captures will be gently placed in a closed box and released in an accessible comparable habitat either upstream or downstream of the work site. All turtles will be handled as little as possible and released as soon as possible.

11) If Wood Turtles are encountered during the construction process, the construction personnel or volunteer crew will be instructed to notify the approved turtle monitor immediately. Contact information will be onsite at all times. Resources for injured turtles include: Tufts Cummings School of Veterinary Medicine – Wildlife Medicine Program at (508)839-7918 or Mass Wildlife – Western District Office at (413) 684-1646

12) A significant threat to the Wood Turtle is mortality associated with the mowing of hayfields and open meadows. The proposed project includes cutting and mowing along northerly sections of the dam access road and the dam. Any mowing required during the initial site preparation phase may take place during the active season after areas have been swept by an approved turtle monitor.

13) All maintenance mowing along northerly sections of the dam access road and the dam shall be limited to the Wood Turtle inactive period from October 15th to April 15th. Mowing within and near recreational and parking areas may take place during the Wood Turtle active period. Mowing crews will be provided with a copy of the Wood Turtle Protection Plan and Wood Turtle identification guidance.
14) At the conclusion of the project, the approved turtle monitor will submit a final Wood Turtle protection report to the Natural Heritage & Endangered Species Program and the Conway Conservation Commission. If Wood Turtles are encountered during the monitoring period MA NHESP Rare Species Observation Forms will be submitted with the report and/or via the MA NHESP online reporting system.

**Turtle Protection Protocol B- Daily Active Turtle Sweeps (No Turtle Barrier)**

1) Activity associated with the proposed project within Priority and Estimated Habitat will take place during the Wood Turtle active period, from July 1st to September 30th. This schedule will avoid potential adverse impacts to hibernating Wood Turtles.

2) Prior to the start of work the name(s), contact information, and qualifications of a turtle monitor will be provided to MA NHESP for approval. The turtle monitor may be an approved professional turtle biologist or a volunteer who demonstrates sufficient experience with the Wood Turtle.

3) A MA NHESP collection permit shall be obtained by an approved turtle monitor.

4) Daily turtle sweeps shall be performed by a MA NHESP approved turtle monitor prior to the commencement of work within the work areas previously described in the Introduction section of the plan.

5) Daily monitoring sweeps shall be performed when work involves: the disturbances of soils (i.e. dredging, excavation, grading, removal of topsoil); the disturbance of vegetation (i.e. the initial site preparation mowing, tree/sapling/shrub clearing, stumping); beach improvements; and, heavy equipment traffic (i.e. excavator, trucks, tractors).

6) In the event that a Wood Turtle is located it will be carefully removed from the work area to a comparable habitat. MA NHESP will be notified and the encounter will be documented in the daily monitoring log and with color photographs. Any turtles encountered within aquatic areas will be carefully collected via submerging a bucket to facilitate capture with water. This procedure will aid in avoiding adverse impacts associated with thermal shock. Once captured turtles will be released in an accessible, comparable stream environment outside of the work site. Any overland captures will be gently placed in a closed box and released in an accessible comparable habitat either upstream or downstream of the work site. All turtles will be handled as little as possible and released as soon as possible.

7) A significant threat to the Wood Turtle is mortality associated with the mowing of hayfields and open meadows. The proposed project includes cutting and mowing along northerly sections of the dam access road and the dam. Any mowing required during the initial site preparation phase may take place during the active season after areas have been swept by an approved turtle monitor.

8) All maintenance mowing along northerly sections of the dam access road and the dam shall be limited to the Wood Turtle inactive period from October 15th to April 15th. Mowing within and near recreational and parking areas may take place during the Wood Turtle active period. Mowing crews will be provided with
a copy of the Wood Turtle Protection Plan and Wood Turtle identification guidance.

9) At the conclusion of the project, the approved turtle monitor will submit a final Wood Turtle protection report to the Natural Heritage & Endangered Species Program and the Conway Conservation Commission. If Wood Turtles are encountered during the monitoring period MA NHESP Rare Species Observation Forms will be submitted with the report and/or via the MA NHESP online reporting system.
Appendix D

Stormwater Report
(includes Post Construction Operation and Maintenance Plan)
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Conway Community Swimming Pool Inc.

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1 Executive Summary

Pursuant to the Massachusetts Wetlands Protection Act, M.G.L. c. 131 40, 310 CMR §10.00, this Drainage and Stormwater Management Report describes the proposed work and stormwater management associated with the repair and improvements to the Conway Community Swimming Pool. Proposed work will include the dredging of the existing pond, replacement of the existing outlet structure, the repair and reconstruction of the emergency spillway, the repair of the dam, and site improvements to the recreational and beach area. Proposed work is shown on the Site Plans located in Appendix L.

2 Project Description

The project is located at the Conway Community Swimming Pool at 332 Whately Road in Conway, Massachusetts. The majority of the project area is owned or has easements by Conway Community Swimming Pool, Inc. (CCSPI), a non-profit organization. A small portion of the land near the emergency spillway, downstream channel and a portion of the maintenance road to the dam are owned by Mary Parker, who has given CCSPI permission to conduct construction and improvements on her property.

2.1 Existing Condition

The Conway Community Swimming Pool is a man-made pond built in 1949 for the residents of the Town of Conway. The swimming pool is located on a 7.3 acre parcel owned by CCSPI, the organization that oversees the Conway Community Swimming Pool. The approximately 2.5 acre pool is impounded by an earthen dam approximately 200 feet in length and 21 feet high. The basic section of the dam includes an approximately 16 foot crest sloping to a base width of approximately 80 feet. The dam includes a horizontal 30” RCP spillway/outlet culvert through the dam with a low level mechanical gate and a vertical standpipe gloryhole serving as the primary outlet control.

Pumpkin Hollow Brook flows from south to north into the pond, through the outlet structure and continues to the north. Resource areas on site include bank associated with Pumpkin Hollow Brook and the pond; land under water associated with the pond; and bordering vegetated wetlands located along the east bank and the southwest bank of the pond.

The water from the pond is controlled by the existing outlet structure which is non-functional and in need of replacement. The emergency spillway is in need of redesign and is currently overgrown with vegetation. In 2010 a significant sinkhole was found on top of the dam above the 30 inch outlet culvert. For this reason, the pond has been drawn down and remains empty until repairs can be made.

Access to the site is provided by a paved driveway located off Whately Road. There is a small paved parking area, overgrown beach area, a swing set, planter and picnic area located to the east of the pond. An existing maintenance road starts at the paved parking area and follows along the east property line to the dam and along the dam to the outlet structure. There is an existing dock located...
off the beach area and a platform located in the pond. Existing conditions are shown on the Site Plans located in Appendix L.

### 2.2 Proposed Conditions

Proposed work will include the dredging of the existing pond, repair of the dam, repair and reconstruction of the emergency spillway, replacement of the existing outlet structure, and site improvements to the beach and to the upper recreational area.

Approximately 3,000 cubic feet of dredged material will be removed from the pond. This will improve the capacity of the pond and restore the pond to its original storage volume to the maximum extent possible. The removal of sediment from the pond will lower the pond elevation to its original elevation and allow access to the outlet structure.

Dam embankment repairs will include repairs to sinkholes and washouts. Re-grading a portion of the dam to restore crest of dam elevation to 74 feet across the full length of the dam. The existing emergency spillway will be reconstructed to meet current regulations and vegetation will be trimmed and removed as required.

The existing outlet structure will be replaced by an 8 foot by 12 foot concrete riser structure. This structure will serve as the primary outlet to the pond. The structure will contain four (4) weirs, one in each face of the riser at elevation 70.37, a 12 inch by 12 inch mid-level (drawdown) orifice with slide gate, a 12 inch by 12 inch low-level orifice with slide gate. A 48 inch HDPE outlet culvert will be installed from the riser structure to a headwall adjacent to the existing 30” outlet culvert. The existing 30” outlet culvert will be removed as part of this project. Details of the outlet structure can be found on the Site Plans located in Appendix L.

The beach area sand will be replaced due to sand erosion that has occurred. A concrete block groin will be installed to help protect the sand in the swimming area from washing into the main portion of the pool. The grade on the beach will be decreased from approximately 17% to approximately 9%.

Improvements to the upper recreational area will include the reconstruction of the existing paved driveway and parking area, construction of pathways, a picnic area, a playground area, a pavilion, a pad site for portable sanitary facilities, a maintenance shed, maintenance access path to the pond and the dam, and a handicap-accessible dock area along the shore at the north end of the beach.

Stormwater Quality improvements will include the construction of a rain garden to the west of the paved parking area to collect and treat stormwater runoff from driveway and parking area. A stormwater treatment unit will be installed in the existing 12 inch culvert located under the driveway. This will treat stormwater runoff collected by the culvert prior to discharge to the site. Site improvements are shown on the plans provided in Appendix L.
3 Soil Erosion & Sedimentation Control

Erosion and sedimentation controls will be installed prior to construction. The project will be constructed in phases. All sedimentation and erosion controls will be installed for each phase as shown on the Site Plans provided in Appendix L. Erosion and sedimentation control will be maintained for the duration of the project, until disturbed slopes have been stabilized or as instructed on the phasing.

4 Construction Sequence

The construction sequencing is as follows:

1. Install site erosion and sedimentation (E&S) controls, including anti-tracking pad at edge of paved parking area.

2. Re-build existing access road from parking area to the top of the dam:
   a. Remove and replace existing culverts;
   b. Install stormwater quality structure;
   c. Install retaining wall;
   d. Grade and replace surface of the access roadway.

3. Dredging and outlet structure replacement:
   a. Set up haul road from pool over the beach area to the anti-tracking apron adjacent to the parking area;
   b. Pool Phase 1:
      i. Install cofferdam and temporary bypass pipe. Tie bypass pipe into existing outlet pipe. Install erosion control along existing channel within pool;
      ii. Demolish existing gloryhole outlet structure and appurtenances;
      iii. Excavate dam in area of the new outlet structure, and stockpile material on west side of outlet structure;
      iv. Install new outlet pipe and outlet structure;
      v. Backfill dam and outlet structure;
      vi. Dredge west side of existing channel, cast material to east side of channel;
      vii. Excavate channel west of existing channel;
      viii. Dredge east side of existing channel;
      ix. Stockpile dredged material in area west of existing beach.
   c. Pool Phase 2:
      i. Move temporary bypass from old outlet to new outlet structure;
      ii. Install second cofferdam;
      iii. Demolish existing outlet pipe and headwall;
      iv. Install wingwall for new outlet structure;
      v. Complete dredging in area of outlet structure;
      vi. Stabilize area of dam around new outlet structure;
      vii. Remove debris and make improvements to emergency spillway.
d. Pool Phase 3:
   i. Remove erosion control along existing channel;
   ii. Close new low level outlet on outlet structure;
   iii. Remove cofferdam and temporary bypass piping;
   iv. Excavate and dredge area of existing channel, working from south to north;
   v. Allow flow to impound during dredging operation up to mid-level outlet;
   vi. Install new emergency spillway west of the outlet structure.

e. Removal of dredged material:
   i. Dredged material will be stockpiled west of the existing beach area for dewatering;
   ii. Once the material is dry, it will be loaded into trucks to be hauled offsite;
   iii. Trucks will utilize the haul road from the parking area to the stockpile, crossing the anti-tracking apron;
   iv. Once material removal is complete, the area will be re-graded and restored.

4. Beach Area Improvements:
   a. Install new beach wall;
   b. Install and grade new beach surface;
   c. Re-install dock and swim platform.

5. Access Road to north side of beach:
   a. Install site E&S controls;
   b. Perform clearing and grubbing operations;
   c. Rough grade access road alignment;
   d. Install and compact gravel roadway surface;
   e. Stabilize disturbed areas;
   f. Remove E&S controls.

6. Recreation Area Improvements:
   a. Install E&S measures along down gradient edge of the recreation area, along edge of beach;
   b. Perform clearing and earthwork operations;
   c. Install rain garden at edge of parking lot;
   d. Install proposed recreation improvements;
   e. Stabilize disturbed areas;
   f. Remove E&S controls.

7. Site closeout:
   a. Upon completion of site improvements, begin filling the pool by closing low and mid-level outlets in the outlet structure. Additional Massachusetts Division of Fisheries and Wildlife (MassWildlife) protocols will need to be followed based upon agency reviews.
   b. Once site is fully stabilized, remove site wide E&S controls.
5 Hydrologic Analysis

5.1 Watershed Area

The approximately 532 acre watershed area was determined by overlaying a United States Geological Survey (USGS) Quadrangle Map onto the site and using the contours to delineate the contributing area to Pumpkin Hollow Brook and the pond. This watershed area was then compared to the drainage area calculated by USGS Massachusetts StreamStats and found to be similar. Land use characteristics within the contributing watershed include forested areas, fields and scattered rural residential. Forested areas accounted for approximately 82.4% of the overall watershed, as provided by USGS Massachusetts StreamStats. Agricultural fields were determined to be approximately 10% of the overall watershed based on the USGS Quadrangle Map. The remaining watershed area was assumed to be developed area and a land use characteristic of a typical TR-55 2 acre residential land use was used. Runoff curve numbers were assigned based on a combination of land use and existing site soil types acquired from Natural Resources Conservation Service (NRCS) website. The time of concentration was computed using methods outlined in the NRCS TR-55 manual. A copy of the report generated from USGS Massachusetts StreamStats and watershed map can be found in Appendix A.

5.1.1 Watershed Soils

The NRCS Soil Report was used to approximate the watershed soils. The soil report listed soil types A, B, C and D within the watershed. The majority of the soils are a type B soil. Approximate percentage of each land use characteristics was broken into each soil type. A copy of the NRCS Soil Report can be found in Appendix B.

5.1.2 Rainfall Depths

Flows for the 2, 25, 50, and 100-year frequency storm events were determined by using the 24-hour type III storm standard for the New England area. Rainfall depths were obtained from published rainfall records for the Franklin County.

5.2 2-year Bypass Pipe

During the dredging of the pond and the reconstruction of the outlet structure, a bypass culvert was designed to maintain the flow of Pumpkin Hollow Brook through the site. The bypass pipe was designed to accommodate a 2-year storm. Calculations determined that a 24 inch bypass pipe would be needed, and would extend from the existing outlet southerly into the pond and to a temporary cofferdam system, thus maintaining existing flow characteristics through the outlet structure. The HydroCAD computer program was used to conduct watershed modeling to determine the required flow capacity for a 2-year storm. The watershed perimeters listed above were entered into the model to determine the bypass pipe would need to accommodate an approximate flow velocity of 13 cubic feet per second (cfs). This flow was entered into the Bentley CulvertMaster computer program to calculate the required pipe size. It was determined a 24 inch HDPE pipe would adequately convey
the 13 cfs flow. Copies of the HydroCAD watershed modeling and the Bentley CulvertMaster pipe sizing calculations can be found in Appendix C.

## 5.3 Spillway/Outlet Structure

The proposed outlet structure has been designed in accordance with the Massachusetts Department of Conservation and Recreation (DCR) 302 CMR 10.00, Dam Safety. DCR Office of Dam Safety (ODS) has classified the dam as an “Intermediate” size structure with a “Significant” hazard classification. Per 302 CMR 10.06 the outlet structure is required to have the capacity to pass a flow resulting from a 100-year storm. Calculations described below show that the outlet structure is properly designed based on the pertinent regulations. The outlet structure is designed as an 8 foot by 12 foot rectangular concrete riser structure with four (4) weirs (one on each face of the riser) at elevation 70.37, a 12 inch by 12 inch mid-level orifice with slide gate, a 12 inch by 12 inch low-level orifice with slide gate and a 48 inch HDPE outlet culvert. Details of the outlet structure can be found on the Site Plans located in Appendix L.

The HydroCAD computer program was used to model the outlet structure and determine it is adequately designed to pass the flow resulting from a 100-year storm. The watershed parameters listed above were modeled; the pond was modeled with a starting water elevation of 70.37, assuming the pond is at the normal summer water elevation. The outlet structure was modeled to include the four (4) weirs and the 48 inch outlet pipe, while both mid and low level orifices were closed for this scenario. The HydroCAD model was run for the 100-year storm. The output calculations demonstrate that the outlet structure was appropriately designed to have the capacity to pass a flow resulting from a 100-year storm. The HydroCAD model can be found in Appendix D.

In addition, the proposed outlet structure has been designed to provide winter drawdown in general conformance with 2004 Eutrophication and Aquatic Plant Management in Massachusetts Final Generic Environmental Impact Report (GEIR). The maximum velocity of the water during drawdown will be 3.32 cfs (equivalent to 4 cfs per square mile of watershed area). The elevation of the pond will be lowered to elevation 64.0 feet in the winter months. Lowering of the water level will dry and freeze vegetation to control vegetation growth. During drawdown maintenance will be performed in the beach area to restore eroded beach sand.

Winter drawdown will be completed by opening the 12 inch by 12 inch mid-level orifice in phases. In the first phase the mid-level orifice will be opened two (2) inches, which will result in an outlet velocity of 2.03 cfs. In the second phase, on day seven (7) of drawdown, the mid-level orifice will be opened an additional four (4) inches for a total vertical opening of six (6) inches. This will result in an outlet velocity of 2.89 cfs. In the third phase, on day eight (8) of the drawdown, the mid-level orifice will be opened the full 12 inches. This will result in an outlet velocity of 0.97 cfs. The pond will take a total of nine (9) days to fully drawdown. HydroCAD was used to confirm that the orifice was designed properly. The ponds full starting elevation of 70.37’ was used in the computer model calculations to determine the maximum drawdown velocity will be 2.89 cfs. In addition, when the pond is being restored from the drawdown elevation of 64.00’ to the full depth water elevation of 70.37, the mid-level orifice will be opened 0.5 inches resulting in an outflow 0.79 cfs. This meets the required minimum of 0.42 cfs (equivalent to 0.5 cfs per square mile of watershed area), to protect the
downstream area. This will allow the pond to fill in approximately 19 days. Calculations can be found in Appendix E.

For emergency purposes the outlet structure has been designed to include a 12 inch by 12 inch low-level orifice with slide gate to provide additional capacity to lower the pond elevation in the event of a large storm. In addition, the low level orifice will allow the pond to be drained completely in the event of an emergency or if the need to perform significant repairs on the outlet structure or dam arises. A detail of the outlet structure can be found on the Site Plans located in Appendix L.

Buoyancy computations have been performed on the outlet structure to ensure the structure will maintain its integrity during varying water levels. The buoyancy computations can be found in Appendix F.

5.4 Emergency Spillway

The emergency spillway has been redesigned in accordance with the DCR 302 CMR 10.00, Dam Safety. ODS has classified the dam as an “Intermediate” size structure with a “Significant” hazard classification. Per 302 CMR 10.06 the emergency spillway is required to be sized so that the emergency spillway average frequency of use is predicted to be no more than the 25-year storm. The emergency spillway is designed with a width of 24 foot wide with a crest length of 15 feet, at an elevation of 71.7 feet. Details of the emergency spillway can be found on the Site Plans located in Appendix L.

The HydroCAD computer program was used to determine that the emergency spillway was adequately designed. The watershed perimeters listed above were utilized; the pond was modeled as a basin with the designed outlet structure having a water elevation of 70.37, assuming the pond is at the summer water elevation. Proposed design perimeters for the emergency spillway were modeled in the calculations as the primary outlet for the pond. As demonstrated from the calculations, there will be no flow through the emergency spillway during the 25-year storm. Flow through the emergency spillway will begin with the 50-year storm. The emergency spillway has been adequately designed; the emergency spillway will not flow during the 25-year storm. The HydroCAD model can be found in Appendix G.

In the event of the outlet structure failing the emergency spillway has been designed to allow the pond to safely convey a 25-year storm. The HydroCAD model was setup as described above with the exception that the primary outlet was non-functioning. The 25-year storm was computed and the output calculation determined the peak pond elevation would be 73.64 feet, which is below the dam elevation of 74 feet. The emergency spillway was adequately designed to allow the pond and outlet system to safely convey a 25-year storm in the event that the primary outlet becomes obstructed. The HydroCAD model can be found in Appendix G.
6 MassDEP Stormwater Management Guidelines

The project is considered a redevelopment project under the wetlands protection act. The proposed work consists of dredging of the existing pond, replacement of the outlet structure, repair and reconstruction of the existing emergency spillway, repair of the existing dam and site improvements to the existing recreational and beach area. The redevelopment will result in a reduction in overall impervious area and will include pretreatment of stormwater runoff from impervious area. Runoff will also be directed away from the beach area to reduce the erosion of beach sand into the pond. Pretreatment of stormwater runoff from impervious areas will be accomplished through the installation of a rain garden to collect runoff from the paved parking area and a stormwater treatment system to treat offsite runoff from the adjacent roadway conveyed by the existing 12 inch culvert located under the driveway. In accordance with the Stormwater Handbook, being a redevelopment project, the project will meet the following standards to the maximum extent possible.

LID Measures
As required in the stormwater management standards, Low Impact Development (LID) measures were considered with the proposed site redevelopment to enhance stormwater quality. The project includes the following practices as outlined in the policy:

- Reduction in Impervious Areas;
- Installation of a rain garden;
- Re-grading drainage flow patterns;
- Reducing the slope of the beach area.

Standard #1
There are no new conveyances proposed. Untreated stormwater will not discharge into the existing bordering vegetated wetland. Stormwater treatment will be provided by way of a rain garden and a stormwater treatment system.

Standard #2
It is anticipated that post-development discharge rates will not increase as a result of the redevelopment. Proposed work will include the dredging of the existing pond which will restore the pond to approximately its original storage volume. In addition the existing outlet structure is proposed to be replaced by a more efficient outlet structure.

Standard #3
It is anticipated that there will be a positive change in the annual recharge of the groundwater due to the use of LID practices. The proposed redevelopment will reduce the size of impervious area within the site, therefore naturally promoting additional infiltration.

Standard #4
A rain garden will be constructed to collect stormwater runoff from the paved parking area and driveway. The rain garden has been designed in accordance with the Massachusetts Stormwater Handbook and will provide treatment for the one (1) inch water quality volume (WQV). The
required WQV is approximately 762.3 cubic feet. The rain garden has been designed to accommodate approximately 1,416 cubic feet of storage volume which is greater than the required WQV. WQV and pond storage calculations can be found in Appendix H.

A stormwater treatment system will be installed on the existing 12 inch culvert located in the driveway access. The stormwater treatment system will treat stormwater runoff from Whately Road prior to discharge to the site. The stormwater treatment system has been sized to accommodate the one (1) inch WQV. A CDF Aqua-Swirl model number AS-3 has been proposed for the stormwater treatment system. WQV calculations and Aqua-Swirl product specification can be found in Appendix I.

Standard #5
The project will not contain any area of higher pollutant loads as defined in the Massachusetts Stormwater Handbook.

Standard #7
This is a redevelopment project and will comply with the standards set forth by the Massachusetts Stormwater Handbook.

Standard #8
It is anticipated that there will be no proposed pollution created during the construction of the proposed redevelopment. General erosion and sedimentation controls will be implemented and maintained during construction and/or until all disturbed areas have been stabilized. This will be done in accordance with local, state, and federal requirements. Details of these erosion and sedimentation control measures are shown on the Site Plan located in Appendix L. The construction phasing and sequencing is outlined on the Site Plans and in this document. The contractor will be responsible to ensure the correct implementation of the erosion and sedimentation controls. The operation and maintenance for the erosion and sedimentation controls are included in the construction operation and maintenance plan described in Standard #9 below. An example Inspection and Maintenance Report Form is located in Appendix J.

Standard #9
A construction operation and maintenance plan is to be implemented during construction for stormwater controls and is described as follows:

- The owner shall be responsible for all operation and maintenance of the site.
- No earthwork activities shall commence until erosion control has been installed as shown on the site plans or required due to field conditions.
- Areas left exposed to erosion for more than seven (7) days shall be rough graded and temporarily stabilized. Areas disturbed but inactive for more than thirty (30) days shall be temporarily seeded.
- Erosion control measures shall be maintained until successful establishment of ground cover, unless otherwise noted in the project phasing.
- Paved areas shall be kept free of sediment and shall be cleaned periodically as required by construction activities.
- Culverts shall be periodically inspected for the accumulation of sediment. All catch basins within the project shall be cleaned at the end of the project.
- The contractor is responsible to inspect and repair erosion and silt fence as required to prevent damage or sedimentation.

An operation and maintenance plan for post construction can be found in Appendix K.

**Standard #10**
This project does not contain illicit discharges to Stormwater Management Systems as defined in the Massachusetts Stormwater Handbook.
Appendix A

USGS Massachusetts StreamStats
Streamstats Ungaged Site Report

Date: Tue Oct 2 2012 14:11:25 Mountain Daylight Time
Site Location: Massachusetts
NAD27 Latitude: 42.4982 (42 29 53)
NAD27 Longitude: -72.6985 (-72 41 55)
NAD83 Latitude: 42.4983 (42 29 54)
NAD83 Longitude: -72.6980 (-72 41 53)
ReachCode: 01080203001750
Measure: 36.19
Drainage Area: 0.83 mi²

Low Flows Basin Characteristics

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
<th>Regression Equation Valid Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drainage Area (square miles)</td>
<td>0.83 (below min value 1.61)</td>
<td>1.61 149</td>
</tr>
<tr>
<td>Mean Basin Slope from 250K DEM (percent)</td>
<td>13.4</td>
<td>0.32 24.6</td>
</tr>
<tr>
<td>Stratified Drift per Stream Length (square mile per mile)</td>
<td>0.0478</td>
<td>0 1.29</td>
</tr>
<tr>
<td>Massachusetts Region (dimensionless)</td>
<td>1</td>
<td>0 1</td>
</tr>
</tbody>
</table>

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

Probability of Perennial Flow Basin Characteristics

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
<th>Regression Equation Valid Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drainage Area (square miles)</td>
<td>0.83</td>
<td>0.01 1.99</td>
</tr>
<tr>
<td>Percent Underlain By Sand And Gravel (percent)</td>
<td>8.46</td>
<td>0 100</td>
</tr>
<tr>
<td>Percent Forest (percent)</td>
<td>82.49</td>
<td>0 100</td>
</tr>
<tr>
<td>Massachusetts Region (dimensionless)</td>
<td>1</td>
<td>0 1</td>
</tr>
</tbody>
</table>

Low Flows Streamflow Statistics

<table>
<thead>
<tr>
<th>Statistic</th>
<th>Flow (ft³/s)</th>
<th>Prediction Error (percent)</th>
<th>Equivalent years of record</th>
<th>90-Percent Prediction Interval</th>
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<tbody>
<tr>
<td>D50</td>
<td>0.79</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>D60</td>
<td>0.5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>D70</td>
<td>0.33</td>
<td></td>
<td></td>
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<tr>
<td>D75</td>
<td>0.26</td>
<td></td>
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<td></td>
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<tr>
<td>D80</td>
<td>0.25</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>D85</td>
<td>0.2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>D90</td>
<td>0.17</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>D95</td>
<td>0.1</td>
<td></td>
<td></td>
<td></td>
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<td>D98</td>
<td>0.0675</td>
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<td></td>
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<td>D99</td>
<td>0.0483</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M7D2Y</td>
<td>0.087</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AUGD50</td>
<td>0.2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M7D10Y</td>
<td>0.0466</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

Probability of Perennial Flow Statistics

<table>
<thead>
<tr>
<th>Statistic</th>
<th>Value</th>
<th>Standard Error (percent)</th>
</tr>
</thead>
</table>

http://streamstatsags.cr.usgs.gov/gising/Reports/FlowStatsReport14286...
| PROPEREN | 0.82 | 0.3 |
Basin Characteristics Report

Date: Tue Oct 2 2012 14:10:16 Mountain Daylight Time
NAD27 Latitude: 42.4982 (42 29 53)
NAD27 Longitude: -72.6985 (-72 41 55)
NAD83 Latitude: 42.4983 (42 29 54)
NAD83 Longitude: -72.6980 (-72 41 53)
Reach Code: 01080203001750
Measure: 36.19

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>X coordinate of the outlet in Massachusetts State Plane (meters)</td>
<td>101525.0</td>
</tr>
<tr>
<td>Y coordinate of the outlet in Massachusetts State Plane (meters)</td>
<td>917105.0</td>
</tr>
<tr>
<td>X coordinate of the centroid in Massachusetts State Plane (meters)</td>
<td>101124.7</td>
</tr>
<tr>
<td>Y coordinate of the centroid in Massachusetts State Plane (meters)</td>
<td>916169.8</td>
</tr>
<tr>
<td>Area in square miles</td>
<td>0.83</td>
</tr>
<tr>
<td>Mean annual precipitation in the Conn River basin, in inches</td>
<td>50.011</td>
</tr>
<tr>
<td>Average area slope in percent</td>
<td>13.3</td>
</tr>
<tr>
<td>square mile area covered by stratified drift</td>
<td>0.64</td>
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<tr>
<td>Total stream length in miles</td>
<td>1.47</td>
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<tr>
<td>stratified drift per unit stream length</td>
<td>0.44</td>
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<tr>
<td>low flow region indicator for Massachusetts</td>
<td>1</td>
</tr>
<tr>
<td>Area of forest land (percent)</td>
<td>82.40</td>
</tr>
<tr>
<td>Area of sand and gravel deposits (percent)</td>
<td>8.56</td>
</tr>
<tr>
<td>Coarse-grained stratified drift - SYE</td>
<td>8.69</td>
</tr>
</tbody>
</table>
Appendix B

NRC S Soil Report
Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://soils.usda.gov/sqi/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (http://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://soils.usda.gov/contact/state_offices/).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Soil Data Mart Web site or the NRCS Web Soil Survey. The Soil Data Mart is the data storage site for the official soil survey information.

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  260B—Sudbury sandy loam, 3 to 8 percent slopes...................................................................50
  275B—Agawam fine sandy loam, 3 to 8 percent slopes...........................................................52
  275C—Agawam fine sandy loam, 8 to 15 percent slopes..........................................................54
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  305C—Paxton fine sandy loam, 8 to 15 percent slopes.............................................................56
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How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the
individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.
Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.
Custom Soil Resource Report

MAP LEGEND

Area of Interest (AOI)

Soils

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

Gully
Short Steep Slope
Other

Political Features

Cities

Water Features

Streams and Canals

Transportation

Rails
Interstate Highways
US Routes
Major Roads
Local Roads

MAP INFORMATION

Map Scale: 1:19,900 if printed on A size (8.5" × 11") sheet.

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

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

Source of Map: Natural Resources Conservation Service
Coordinate System: UTM Zone 18N NAD83

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

Soil Survey Area: Franklin County, Massachusetts
Survey Area Data: Version 6, Sep 21, 2012

Date(s) aerial images were photographed: 7/30/2003

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

Franklin County, Massachusetts (MA011)

<table>
<thead>
<tr>
<th>Map Unit Symbol</th>
<th>Map Unit Name</th>
<th>Acres in AOI</th>
<th>Percent of AOI</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Water</td>
<td>5.1</td>
<td>0.4%</td>
</tr>
<tr>
<td>50A</td>
<td>Wonsqueak woody peat, 0 to 1 percent slopes</td>
<td>4.4</td>
<td>0.3%</td>
</tr>
<tr>
<td>51A</td>
<td>Swansea peat, 0 to 1 percent slopes</td>
<td>5.3</td>
<td>0.4%</td>
</tr>
<tr>
<td>53A</td>
<td>Freetown woody peat, 0 to 1 percent slopes, ponded</td>
<td>0.6</td>
<td>0.0%</td>
</tr>
<tr>
<td>71B</td>
<td>Ridgebury gravelly fine sandy loam, 0 to 5 percent slopes, extremely stony</td>
<td>7.6</td>
<td>0.5%</td>
</tr>
<tr>
<td>75B</td>
<td>Pillsbury stony sandy loam, 0 to 5 percent slopes, extremely stony</td>
<td>11.9</td>
<td>0.8%</td>
</tr>
<tr>
<td>109B</td>
<td>Chatfield-Hollis complex, 3 to 8 percent slopes, rocky</td>
<td>23.7</td>
<td>1.7%</td>
</tr>
<tr>
<td>109C</td>
<td>Chatfield-Hollis complex, 8 to 15 percent slopes, rocky</td>
<td>90.4</td>
<td>6.3%</td>
</tr>
<tr>
<td>109D</td>
<td>Chatfield-Hollis complex, 15 to 25 percent slopes, rocky</td>
<td>235.2</td>
<td>16.4%</td>
</tr>
<tr>
<td>109F</td>
<td>Chatfield-Hollis complex, 25 to 60 percent slopes, rocky</td>
<td>149.5</td>
<td>10.4%</td>
</tr>
<tr>
<td>114C</td>
<td>Hollis-Chatfield complex, 8 to 15 percent slopes, very rocky</td>
<td>24.8</td>
<td>1.7%</td>
</tr>
<tr>
<td>116B</td>
<td>Millsite-Westminster complex, 3 to 8 percent slopes, rocky</td>
<td>74.0</td>
<td>5.2%</td>
</tr>
<tr>
<td>116C</td>
<td>Millsite-Westminster complex, 8 to 15 percent slopes, rocky</td>
<td>134.7</td>
<td>9.4%</td>
</tr>
<tr>
<td>116D</td>
<td>Millsite-Westminster complex, 15 to 25 percent slopes, rocky</td>
<td>174.3</td>
<td>12.2%</td>
</tr>
<tr>
<td>116F</td>
<td>Millsite-Westminster complex, 25 to 50 percent slopes, rocky</td>
<td>239.2</td>
<td>16.7%</td>
</tr>
<tr>
<td>118C</td>
<td>Colrain-Millsite complex, 8 to 15 percent slopes, rocky</td>
<td>2.3</td>
<td>0.2%</td>
</tr>
<tr>
<td>120C</td>
<td>Millsite-Westminster complex, 8 to 15 percent slopes, very rocky</td>
<td>12.1</td>
<td>0.8%</td>
</tr>
<tr>
<td>125B</td>
<td>Charlton-Chatfield-Hollis complex, 3 to 8 percent slopes, rocky</td>
<td>2.7</td>
<td>0.2%</td>
</tr>
<tr>
<td>245B</td>
<td>Hinckley sandy loam, 3 to 8 percent slopes</td>
<td>11.5</td>
<td>0.8%</td>
</tr>
<tr>
<td>245C</td>
<td>Hinckley sandy loam, 8 to 15 percent slopes</td>
<td>15.9</td>
<td>1.1%</td>
</tr>
<tr>
<td>254B</td>
<td>Merrimac fine sandy loam, 3 to 8 percent slopes</td>
<td>3.7</td>
<td>0.3%</td>
</tr>
<tr>
<td>260B</td>
<td>Sudbury sandy loam, 3 to 8 percent slopes</td>
<td>0.7</td>
<td>0.1%</td>
</tr>
<tr>
<td>275B</td>
<td>Agawam fine sandy loam, 3 to 8 percent slopes</td>
<td>6.0</td>
<td>0.4%</td>
</tr>
<tr>
<td>275C</td>
<td>Agawam fine sandy loam, 8 to 15 percent slopes</td>
<td>8.8</td>
<td>0.6%</td>
</tr>
<tr>
<td>305B</td>
<td>Paxton fine sandy loam, 3 to 8 percent slopes</td>
<td>5.4</td>
<td>0.4%</td>
</tr>
<tr>
<td>305C</td>
<td>Paxton fine sandy loam, 8 to 15 percent slopes</td>
<td>15.6</td>
<td>1.1%</td>
</tr>
</tbody>
</table>
Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different
management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a soil series. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into soil phases. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A complex consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An association is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An undifferentiated group is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include miscellaneous areas. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.
Franklin County, Massachusetts

1—Water

**Map Unit Setting**
- **Elevation:** 0 to 1,970 feet
- **Mean annual precipitation:** 32 to 50 inches
- **Mean annual air temperature:** 45 to 50 degrees F
- **Frost-free period:** 120 to 200 days

**Map Unit Composition**
- **Water:** 100 percent

50A—Wonsqueak woody peat, 0 to 1 percent slopes

**Map Unit Setting**
- **Elevation:** 970 to 2,050 feet
- **Mean annual precipitation:** 39 to 53 inches
- **Mean annual air temperature:** 33 to 56 degrees F
- **Frost-free period:** 129 to 174 days

**Map Unit Composition**
- **Wonsqueak and similar soils:** 85 percent
- **Minor components:** 15 percent

**Description of Wonsqueak**

**Setting**
- **Landform:** Ground moraines
- **Landform position (two-dimensional):** Toeslope
- **Landform position (three-dimensional):** Dip
- **Down-slope shape:** Concave
- **Across-slope shape:** Concave
- **Parent material:** Organic material over till derived from schist and/or gneiss

**Properties and qualities**
- **Slope:** 0 to 1 percent
- **Depth to restrictive feature:** More than 80 inches
- **Drainage class:** Very poorly drained
- **Capacity of the most limiting layer to transmit water (Ksat):** Moderately high to high (0.20 to 6.00 in/hr)
- **Depth to water table:** About 0 to 2 inches
- **Frequency of flooding:** None
- **Frequency of ponding:** Frequent
- **Available water capacity:** Very high (about 18.1 inches)

**Interpretive groups**
- **Land capability (nonirrigated):** 7w

**Typical profile**
- **0 to 2 inches:** Woody peat
- **2 to 5 inches:** Muck
5 to 19 inches: Muck
19 to 29 inches: Muck
29 to 38 inches: Silt loam
38 to 48 inches: Silt loam
48 to 52 inches: Sandy loam
52 to 65 inches: Silt loam

Minor Components

Bucksport
Percent of map unit: 13 percent
Landform: Ground moraines
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave

Peacham
Percent of map unit: 2 percent
Landform: Depressions on ground moraines
Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Concave

51A—Swansea peat, 0 to 1 percent slopes

Map Unit Setting
Elevation: 160 to 1,070 feet
Mean annual precipitation: 37 to 52 inches
Mean annual air temperature: 35 to 59 degrees F
Frost-free period: 127 to 182 days

Map Unit Composition
Swansea and similar soils: 75 percent
Minor components: 25 percent

Description of Swansea

Setting
Landform: Outwash plains, ground moraines, outwash terraces
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Tread, dip
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Organic material over till derived from gneiss and/or schist

Properties and qualities
Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Very poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)
Depth to water table: About 0 to 2 inches
Frequency of flooding: None
Frequency of ponding: Frequent
Available water capacity: Very high (about 21.2 inches)

Interpretive groups
Land capability (nonirrigated): 5w

Typical profile
0 to 6 inches: Peat
6 to 18 inches: Muck
18 to 30 inches: Mucky peat
30 to 38 inches: Muck
38 to 45 inches: Muck
45 to 65 inches: Very cobbly loamy sand

Minor Components

Freetown
Percent of map unit: 10 percent
Landform: Ground moraines, outwash plains, outwash terraces
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Tread, dip
Down-slope shape: Concave
Across-slope shape: Concave

Whitman
Percent of map unit: 10 percent
Landform: Depressions on ground moraines
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Concave

Scarboro
Percent of map unit: 5 percent
Landform: Outwash terraces, deltas, outwash plains
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Tread, dip
Down-slope shape: Concave
Across-slope shape: Concave

53A—Freetown woody peat, 0 to 1 percent slopes, ponded

Map Unit Setting
Elevation: 140 to 990 feet
Mean annual precipitation: 37 to 52 inches
Mean annual air temperature: 35 to 59 degrees F
Frost-free period: 127 to 182 days
Map Unit Composition

Freetown, ponded, and similar soils: 93 percent
Minor components: 7 percent

Description of Freetown, Ponded

Setting
Landform: Ground moraines, outwash plains, outwash terraces
Landform position (two-dimensional): toeslope
Landform position (three-dimensional): Tread, dip
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Organic material

Properties and qualities
Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Very poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)
Depth to water table: About 0 inches
Frequency of flooding: None
Frequency of ponding: Frequent
Available water capacity: Very high (about 24.6 inches)

Interpretive groups
Land capability (nonirrigated): 5w

Typical profile
0 to 3 inches: Woody peat
3 to 11 inches: Muck
11 to 20 inches: Muck
20 to 32 inches: Muck
32 to 55 inches: Muck
55 to 65 inches: Muck

Minor Components

Swansea, ponded
Percent of map unit: 5 percent
Landform: Outwash plains, ground moraines, outwash terraces
Landform position (two-dimensional): toeslope
Landform position (three-dimensional): Tread, dip
Down-slope shape: Concave
Across-slope shape: Concave

Whitman, ponded
Percent of map unit: 2 percent
Landform: Depressions on ground moraines
Landform position (two-dimensional): toeslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Concave
71B—Ridgebury gravelly fine sandy loam, 0 to 5 percent slopes, extremely stony

Map Unit Setting
- **Elevation:** 290 to 1,220 feet
- **Mean annual precipitation:** 38 to 52 inches
- **Mean annual air temperature:** 35 to 58 degrees F
- **Frost-free period:** 127 to 178 days

Map Unit Composition
- **Ridgebury, extremely stony, and similar soils:** 78 percent
- **Minor components:** 22 percent

Description of Ridgebury, Extremely Stony

Setting
- **Landform:** Depressions on ground moraines, depressions on drumlins
- **Landform position (two-dimensional):** Footslope
- **Landform position (three-dimensional):** Side slope
- **Down-slope shape:** Concave
- **Across-slope shape:** Linear, convex
- **Parent material:** Loamy lodgment till derived from gneiss and/or schist

Properties and qualities
- **Slope:** 0 to 5 percent
- **Surface area covered with cobbles, stones or boulders:** 9.5 percent
- **Depth to restrictive feature:** 14 to 20 inches to densic material
- **Drainage class:** Poorly drained
- **Capacity of the most limiting layer to transmit water (Ksat):** Very low to moderately high (0.00 to 0.20 in/hr)
- **Depth to water table:** About 4 to 12 inches
- **Frequency of flooding:** None
- **Frequency of ponding:** None
- **Available water capacity:** Very low (about 2.3 inches)

Interpretive groups
- **Land capability (nonirrigated):** 7s

Typical profile
- **0 to 6 inches:** Gravelly fine sandy loam
- **6 to 9 inches:** Cobbly fine sandy loam
- **9 to 19 inches:** Cobbly fine sandy loam
- **19 to 28 inches:** Gravelly sandy loam
- **28 to 43 inches:** Gravelly sandy loam
- **43 to 65 inches:** Loam

Minor Components

Woodbridge, extremely stony
- **Percent of map unit:** 10 percent
Landform: Drumlins, moraines  
Landform position (two-dimensional): Backslope  
Landform position (three-dimensional): Side slope  
Down-slope shape: Linear  
Across-slope shape: Linear

**Scituate, extremely stony**  
Percent of map unit: 10 percent  
Landform: Drumlins, moraines  
Landform position (two-dimensional): Backslope  
Landform position (three-dimensional): Side slope  
Down-slope shape: Linear  
Across-slope shape: Linear

**Whitman, extremely stony**  
Percent of map unit: 2 percent  
Landform: Depressions on ground moraines  
Landform position (two-dimensional): Toeslope  
Landform position (three-dimensional): Base slope  
Down-slope shape: Concave  
Across-slope shape: Concave

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75B—Pillsbury stony sandy loam, 0 to 5 percent slopes, extremely stony

**Map Unit Setting**

- **Elevation:** 890 to 2,120 feet  
- **Mean annual precipitation:** 39 to 53 inches  
- **Mean annual air temperature:** 33 to 56 degrees F  
- **Frost-free period:** 129 to 174 days

**Map Unit Composition**

- **Pillsbury, extremely stony, and similar soils:** 80 percent  
- **Minor components:** 20 percent

**Description of Pillsbury, Extremely Stony**

**Setting**

- **Landform:** Drumlins, ground moraines  
- **Landform position (two-dimensional):** Backslope  
- **Landform position (three-dimensional):** Base slope  
- **Down-slope shape:** Concave  
- **Across-slope shape:** Concave  
- **Parent material:** Loamy lodgment till derived from schist and/or gneiss

**Properties and qualities**

- **Slope:** 0 to 5 percent  
- **Surface area covered with cobbles, stones or boulders:** 9.5 percent  
- **Depth to restrictive feature:** 11 to 20 inches to densic material  
- **Drainage class:** Poorly drained  
- **Capacity of the most limiting layer to transmit water (Ksat):** Very low to moderately high (0.00 to 0.20 in/hr)
Depth to water table: About 4 to 8 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Low (about 3.9 inches)

Interpretive groups
Land capability (nonirrigated): 7s

Typical profile
0 to 3 inches: Moderately decomposed plant material
3 to 6 inches: Stony sandy loam
6 to 13 inches: Stony sandy loam
13 to 20 inches: Stony fine sandy loam
20 to 26 inches: Loamy sand
26 to 32 inches: Sandy loam
32 to 37 inches: Gravelly sandy loam
37 to 42 inches: Sandy loam
42 to 50 inches: Sandy loam
50 to 65 inches: Loamy sand

Minor Components
Lyme, extremely stony
Percent of map unit: 7 percent
Landform: Ground moraines
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Base slope
Down-slope shape: Linear
Across-slope shape: Convex

Peacham, extremely stony
Percent of map unit: 6 percent
Landform: Depressions on ground moraines
Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Concave

Metacomet, extremely stony
Percent of map unit: 4 percent
Landform: Ground moraines, drumlins
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Convex

Ashfield, extremely stony
Percent of map unit: 3 percent
Landform: Drumlins, ground moraines
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope, talf
Down-slope shape: Convex, linear
Across-slope shape: Linear
109B—Chatfield-Hollis complex, 3 to 8 percent slopes, rocky

Map Unit Setting
- **Elevation:** 180 to 1,070 feet
- **Mean annual precipitation:** 38 to 52 inches
- **Mean annual air temperature:** 35 to 58 degrees F
- **Frost-free period:** 127 to 178 days

Map Unit Composition
- **Chatfield, rocky, and similar soils:** 55 percent
- **Hollis, rocky, and similar soils:** 25 percent
- **Minor components:** 20 percent

Description of Chatfield, Rocky

Setting
- **Landform:** Ground moraines
- **Landform position (two-dimensional):** Backslope
- **Landform position (three-dimensional):** Side slope
- **Down-slope shape:** Convex
- **Across-slope shape:** Linear
- **Parent material:** Loamy supraglacial till derived from gneiss and/or schist

Properties and qualities
- **Slope:** 3 to 8 percent
- **Surface area covered with cobbles, stones or boulders:** 2.1 percent
- **Depth to restrictive feature:** 20 to 40 inches to lithic bedrock
- **Drainage class:** Well drained
- **Capacity of the most limiting layer to transmit water (Ksat):** Moderately low to high (0.14 to 6.00 in/hr)
- **Depth to water table:** More than 80 inches
- **Frequency of flooding:** None
- **Frequency of ponding:** None
- **Available water capacity:** Low (about 5.9 inches)

Interpretive groups
- **Land capability (nonirrigated):** 6s

Typical profile
- **0 to 1 inches:** Moderately decomposed plant material
- **1 to 4 inches:** Fine sandy loam
- **4 to 9 inches:** Gravelly fine sandy loam
- **9 to 19 inches:** Cobbly fine sandy loam
- **19 to 30 inches:** Sandy loam
- **30 to 34 inches:** Gravelly sandy loam
- **34 to 37 inches:** Gravelly sandy loam
- **37 to 65 inches:** Bedrock
Description of Hollis, Rocky

Setting
Landform: Upland slopes
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Crest
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Loamy supraglacial till derived from gneiss and/or schist

Properties and qualities
Slope: 3 to 8 percent
Surface area covered with cobbles, stones or boulders: 2.1 percent
Depth to restrictive feature: 10 to 20 inches to lithic bedrock
Drainage class: Somewhat excessively drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.14 to 0.60 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Very low (about 2.8 inches)

Interpretive groups
Land capability (nonirrigated): 6s

Typical profile
0 to 1 inches: Slightly decomposed plant material
1 to 3 inches: Highly decomposed plant material
3 to 4 inches: Fine sandy loam
4 to 15 inches: Cobbly fine sandy loam
15 to 65 inches: Bedrock

Minor Components

Canton, rocky
Percent of map unit: 4 percent
Landform: Ground moraines, valley sides, hillslopes
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Convex

Charlton, rocky
Percent of map unit: 4 percent
Landform: Valley sides on moraines, toes on moraines
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear

Montauk, very stony
Percent of map unit: 4 percent
Landform: Drumlins, ground moraines
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear
Paxton, very stony
Percent of map unit: 4 percent
Landform: Drumlins, ground moraines
Landform position (two-dimensional): Shoulder, summit
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear

Rock outcrop
Percent of map unit: 1 percent

Newfields, very stony
Percent of map unit: 1 percent
Landform: Depressions on ground moraines, swales on ground moraines
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Base slope
Down-slope shape: Linear
Across-slope shape: Concave

Ridgebury, very stony
Percent of map unit: 1 percent
Landform: Depressions on ground moraines, depressions on drumlins
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Side slope
Down-slope shape: Concave
Across-slope shape: Linear, convex

Swansea
Percent of map unit: 1 percent
Landform: Outwash plains, ground moraines, outwash terraces
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Tread, dip
Down-slope shape: Concave
Across-slope shape: Concave

109C—Chatfield-Hollis complex, 8 to 15 percent slopes, rocky

Map Unit Setting
Elevation: 170 to 1,080 feet
Mean annual precipitation: 38 to 52 inches
Mean annual air temperature: 35 to 58 degrees F
Frost-free period: 127 to 178 days

Map Unit Composition
Chatfield, rocky, and similar soils: 60 percent
Hollis, rocky, and similar soils: 20 percent
Minor components: 20 percent
Description of Chatfield, Rocky

Setting
Landform: Ground moraines
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Loamy supraglacial till derived from gneiss and/or schist

Properties and qualities
Slope: 8 to 15 percent
Surface area covered with cobbles, stones or boulders: 2.1 percent
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high (0.14 to 6.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Low (about 5.9 inches)

Interpretive groups
Land capability (nonirrigated): 6s

Typical profile
0 to 1 inches: Moderately decomposed plant material
1 to 4 inches: Fine sandy loam
4 to 9 inches: Gravelly fine sandy loam
9 to 19 inches: Cobbly fine sandy loam
19 to 30 inches: Sandy loam
30 to 34 inches: Gravelly sandy loam
34 to 37 inches: Gravelly sandy loam
37 to 65 inches: Bedrock

Description of Hollis, Rocky

Setting
Landform: Upland slopes
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Crest
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Loamy supraglacial till derived from gneiss and/or schist

Properties and qualities
Slope: 8 to 15 percent
Surface area covered with cobbles, stones or boulders: 2.1 percent
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Drainage class: Somewhat excessively drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.14 to 0.60 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Very low (about 2.8 inches)
Interpretive groups

Land capability (nonirrigated): 6s

Typical profile

0 to 1 inches: Slightly decomposed plant material
1 to 3 inches: Highly decomposed plant material
3 to 4 inches: Fine sandy loam
4 to 15 inches: Cobbly fine sandy loam
15 to 65 inches: Bedrock

Minor Components

Canton, rocky

Percent of map unit: 5 percent
Landform: Ground moraines, valley sides, hillslopes
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Convex

Charlton, rocky

Percent of map unit: 5 percent
Landform: Valley sides on moraines, toes on moraines
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear

Paxton, very stony

Percent of map unit: 4 percent
Landform: Drumlins, ground moraines
Landform position (two-dimensional): Shoulder, backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear

Montauk, very stony

Percent of map unit: 4 percent
Landform: Drumlins, ground moraines
Landform position (two-dimensional): Summit, backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear

Ridgebury, very stony

Percent of map unit: 1 percent
Landform: Depressions on ground moraines, depressions on drumlins
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Side slope
Down-slope shape: Concave
Across-slope shape: Linear, convex

Rock outcrop

Percent of map unit: 1 percent
109D—Chatfield-Hollis complex, 15 to 25 percent slopes, rocky

Map Unit Setting
-Elevation: 190 to 1,130 feet
-Mean annual precipitation: 38 to 52 inches
-Mean annual air temperature: 35 to 58 degrees F
-Frost-free period: 127 to 178 days

Map Unit Composition
-Chatfield, rocky, and similar soils: 60 percent
-Hollis, rocky, and similar soils: 34 percent
-Minor components: 6 percent

Description of Chatfield, Rocky

Setting
-Landform: Ground moraines
-Landform position (two-dimensional): Backslope
-Landform position (three-dimensional): Side slope
-Down-slope shape: Convex
-Across-slope shape: Linear
-Parent material: Loamy supraglacial till derived from gneiss and/or schist

Properties and qualities
-Slope: 15 to 25 percent
-Surface area covered with cobbles, stones or boulders: 2.1 percent
-Depth to restrictive feature: 20 to 40 inches to lithic bedrock
-Drainage class: Well drained
-Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high (0.14 to 6.00 in/hr)
-Depth to water table: More than 80 inches
-Frequency of flooding: None
-Frequency of ponding: None
-Available water capacity: Low (about 5.9 inches)

Interpretive groups
-Land capability (nonirrigated): 6s

Typical profile
-0 to 1 inches: Moderately decomposed plant material
-1 to 4 inches: Fine sandy loam
-4 to 9 inches: Gravelly fine sandy loam
-9 to 19 inches: Cobbly fine sandy loam
-19 to 30 inches: Sandy loam
-30 to 34 inches: Gravelly sandy loam
-34 to 37 inches: Gravelly sandy loam
-37 to 65 inches: Bedrock
Description of Hollis, Rocky

Setting

Landform: Upland slopes
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Loamy supraglacial till derived from gneiss and/or schist

Properties and qualities

Slope: 15 to 25 percent
Surface area covered with cobbles, stones or boulders: 2.1 percent
Depth to restrictive feature: 10 to 20 inches to lithic bedrock
Drainage class: Somewhat excessively drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.14 to 0.60 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Very low (about 2.8 inches)

Interpretive groups

Land capability (nonirrigated): 6s

Typical profile

0 to 1 inches: Slightly decomposed plant material
1 to 3 inches: Highly decomposed plant material
3 to 4 inches: Fine sandy loam
4 to 15 inches: Cobbly fine sandy loam
15 to 65 inches: Bedrock

Minor Components

Charlton, rocky

Percent of map unit: 2 percent
Landform: Valley sides on moraines, toes on moraines
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear

Canton, rocky

Percent of map unit: 1 percent
Landform: Ground moraines, valley sides, hillslopes
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Convex

Montauk, very stony

Percent of map unit: 1 percent
Landform: Drumlins, ground moraines
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear
Paxton, very stony
Percent of map unit: 1 percent
Landform: Drumlins, ground moraines
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear

Rock outcrop
Percent of map unit: 1 percent

109F—Chatfield-Hollis complex, 25 to 60 percent slopes, rocky

Map Unit Setting
Elevation: 170 to 1,140 feet
Mean annual precipitation: 38 to 52 inches
Mean annual air temperature: 35 to 58 degrees F
Frost-free period: 127 to 178 days

Map Unit Composition
Chatfield, rocky, and similar soils: 47 percent
Hollis, rocky, and similar soils: 41 percent
Minor components: 12 percent

Description of Chatfield, Rocky
Setting
Landform: Ground moraines
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Loamy supraglacial till derived from gneiss and/or schist

Properties and qualities
Slope: 25 to 60 percent
Surface area covered with cobbles, stones or boulders: 2.1 percent
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high (0.14 to 6.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Low (about 5.9 inches)

Interpretive groups
Land capability (nonirrigated): 7s
Typical profile
0 to 1 inches: Moderately decomposed plant material
1 to 4 inches: Fine sandy loam
4 to 9 inches: Gravelly fine sandy loam
9 to 19 inches: Cobbly fine sandy loam
19 to 30 inches: Sandy loam
30 to 34 inches: Gravelly sandy loam
34 to 37 inches: Gravelly sandy loam
37 to 65 inches: Bedrock

Description of Hollis, Rocky

Setting
Landform: Upland slopes
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Loamy supraglacial till derived from gneiss and/or schist

Properties and qualities
Slope: 25 to 60 percent
Surface area covered with cobbles, stones or boulders: 2.1 percent
Depth to restrictive feature: 10 to 20 inches to lithic bedrock
Drainage class: Somewhat excessively drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.14 to 0.60 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Very low (about 2.8 inches)

Interpretive groups
Land capability (nonirrigated): 7s

Typical profile
0 to 1 inches: Slightly decomposed plant material
1 to 3 inches: Highly decomposed plant material
3 to 4 inches: Fine sandy loam
4 to 15 inches: Cobbly fine sandy loam
15 to 65 inches: Bedrock

Minor Components

Charlton, rocky
Percent of map unit: 8 percent
Landform: Valley sides on moraines, toes on moraines
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear

Ridgebury, very stony
Percent of map unit: 2 percent
Landform: Depressions on ground moraines, depressions on drumlins
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Side slope
114C—Holli Chatfield complex, 8 to 15 percent slopes, very rocky

Map Unit Setting

- **Elevation**: 240 to 1,100 feet
- **Mean annual precipitation**: 38 to 52 inches
- **Mean annual air temperature**: 35 to 58 degrees F
- **Frost-free period**: 127 to 178 days

Map Unit Composition

- **Hollis, very rocky, and similar soils**: 53 percent
- **Chatfield, very rocky, and similar soils**: 37 percent
- **Minor components**: 10 percent

Description of Hollis, Very Rocky

Setting

- **Landform**: Upland slopes
- **Landform position (two-dimensional)**: Shoulder
- **Landform position (three-dimensional)**: Crest
- **Down-slope shape**: Linear
- **Across-slope shape**: Convex
- **Parent material**: Loamy supraglacial till derived from gneiss and/or schist

Properties and qualities

- **Slope**: 8 to 15 percent
- **Surface area covered with cobbles, stones or boulders**: 2.1 percent
- **Depth to restrictive feature**: 10 to 20 inches to lithic bedrock
- **Drainage class**: Somewhat excessively drained
- **Capacity of the most limiting layer to transmit water (Ksat)**: Moderately low to moderately high (0.14 to 0.60 in/hr)
- **Depth to water table**: More than 80 inches
- **Frequency of flooding**: None
- **Frequency of ponding**: None
- **Available water capacity**: Very low (about 2.8 inches)

Interpretive groups

- **Land capability (nonirrigated)**: 6s

Typical profile

- **0 to 1 inches**: Slightly decomposed plant material
- **1 to 3 inches**: Highly decomposed plant material
- **3 to 4 inches**: Fine sandy loam
- **4 to 15 inches**: Cobbly fine sandy loam
- **15 to 65 inches**: Bedrock
Description of Chatfield, Very Rocky

Setting
- **Landform:** Ground moraines
- **Landform position (two-dimensional):** Backslope
- **Landform position (three-dimensional):** Side slope
- **Down-slope shape:** Convex
- **Across-slope shape:** Linear
- **Parent material:** Loamy supraglacial till derived from gneiss and/or schist

Properties and qualities
- **Slope:** 8 to 15 percent
- **Surface area covered with cobbles, stones or boulders:** 2.1 percent
- **Depth to restrictive feature:** 20 to 40 inches to lithic bedrock
- **Drainage class:** Well drained
- **Capacity of the most limiting layer to transmit water (Ksat):** Moderately low to high (0.14 to 6.00 in/hr)
- **Depth to water table:** More than 80 inches
- **Frequency of flooding:** None
- **Frequency of ponding:** None
- **Available water capacity:** Low (about 5.9 inches)

Interpretive groups
- **Land capability (nonirrigated):** 6s

Typical profile
- **0 to 1 inches:** Moderately decomposed plant material
- **1 to 4 inches:** Fine sandy loam
- **4 to 9 inches:** Gravelly fine sandy loam
- **9 to 19 inches:** Cobbly fine sandy loam
- **19 to 30 inches:** Sandy loam
- **30 to 34 inches:** Gravelly sandy loam
- **34 to 37 inches:** Gravelly sandy loam
- **37 to 65 inches:** Bedrock

Minor Components

**Rock outcrop**
- **Percent of map unit:** 5 percent

**Canton, very rocky**
- **Percent of map unit:** 3 percent
- **Landform:** Ground moraines, valley sides, hillslopes
- **Landform position (two-dimensional):** Backslope
- **Landform position (three-dimensional):** Side slope
- **Down-slope shape:** Linear
- **Across-slope shape:** Convex

**Charlton, very rocky**
- **Percent of map unit:** 2 percent
- **Landform:** Valley sides on moraines, toes on moraines
- **Landform position (two-dimensional):** Backslope
- **Landform position (three-dimensional):** Side slope
- **Down-slope shape:** Linear
- **Across-slope shape:** Linear
116B—Millsite-Westminster complex, 3 to 8 percent slopes, rocky

Map Unit Setting

- **Elevation**: 890 to 2,080 feet
- **Mean annual precipitation**: 40 to 53 inches
- **Mean annual air temperature**: 33 to 55 degrees F
- **Frost-free period**: 129 to 170 days

Map Unit Composition

- Millsite, rocky, and similar soils: 65 percent
- Westminster, rocky, and similar soils: 20 percent
- Minor components: 15 percent

Description of Millsite, Rocky

Setting

- **Landform**: Hills
- **Landform position (two-dimensional)**: Backslope
- **Landform position (three-dimensional)**: Mountainflank, side slope
- **Down-slope shape**: Convex
- **Across-slope shape**: Linear
- **Parent material**: Loamy supraglacial till derived from schist

Properties and qualities

- **Slope**: 3 to 8 percent
- **Surface area covered with cobbles, stones or boulders**: 2.1 percent
- **Depth to restrictive feature**: 20 to 40 inches to lithic bedrock
- **Drainage class**: Well drained
- **Capacity of the most limiting layer to transmit water (Ksat)**: Very low to moderately low (0.00 to 0.14 in/hr)
- **Depth to water table**: More than 80 inches
- **Frequency of flooding**: None
- **Frequency of ponding**: None
- **Available water capacity**: Low (about 5.8 inches)

Interpretive groups

- **Land capability (nonirrigated)**: 6s

Typical profile

- **0 to 1 inches**: Slightly decomposed plant material
- **1 to 3 inches**: Moderately decomposed plant material
- **3 to 5 inches**: Fine sandy loam
- **5 to 9 inches**: Fine sandy loam
- **9 to 15 inches**: Fine sandy loam
- **15 to 26 inches**: Fine sandy loam
- **26 to 33 inches**: Sandy loam
- **33 to 65 inches**: Bedrock
Description of Westminster, Rocky

Setting
Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Mountain flank, side slope
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Loamy supraglacial till derived from schist

Properties and qualities
Slope: 3 to 8 percent
Surface area covered with cobbles, stones or boulders: 2.1 percent
Depth to restrictive feature: 10 to 20 inches to lithic bedrock
Drainage class: Somewhat excessively drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.14 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Low (about 3.1 inches)

Interpretive groups
Land capability (nonirrigated): 6s

Typical profile
0 to 1 inches: Moderately decomposed plant material
1 to 5 inches: Loam
5 to 19 inches: Fine sandy loam
19 to 65 inches: Bedrock

Minor Components
Ashfield, very stony
Percent of map unit: 4 percent
Landform: Drumlins, ground moraines
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope, talf
Down-slope shape: Convex, linear
Across-slope shape: Linear

Colrain, very stony
Percent of map unit: 4 percent
Landform: Ground moraines, valley sides
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope, rise
Down-slope shape: Convex
Across-slope shape: Linear

Shelburne, very stony
Percent of map unit: 4 percent
Landform: Drumlins, ground moraines
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear
Pillsbury, very stony

Percent of map unit: 2 percent

Landform: Drumlins, ground moraines

Landform position (two-dimensional): Backslope

Landform position (three-dimensional): Base slope

Down-slope shape: Concave

Across-slope shape: Concave

Rock outcrop

Percent of map unit: 1 percent

116C—Millsite-Westminster complex, 8 to 15 percent slopes, rocky

Map Unit Setting

Elevation: 890 to 2,110 feet

Mean annual precipitation: 40 to 53 inches

Mean annual air temperature: 33 to 55 degrees F

Frost-free period: 129 to 170 days

Map Unit Composition

Millsite, rocky, and similar soils: 60 percent

Westminster, rocky, and similar soils: 25 percent

Minor components: 15 percent

Description of Millsite, Rocky

Setting

Landform: Hills

Landform position (two-dimensional): Backslope

Landform position (three-dimensional): Mountainflank, side slope

Down-slope shape: Convex

Across-slope shape: Linear

Parent material: Loamy supraglacial till derived from schist

Properties and qualities

Slope: 8 to 15 percent

Surface area covered with cobbles, stones or boulders: 2.1 percent

Depth to restrictive feature: 20 to 40 inches to lithic bedrock

Drainage class: Well drained

Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.14 in/hr)

Depth to water table: More than 80 inches

Frequency of flooding: None

Frequency of ponding: None

Available water capacity: Low (about 5.8 inches)

Interpretive groups

Land capability (nonirrigated): 6s
Typical profile

0 to 1 inches: Slightly decomposed plant material
1 to 3 inches: Moderately decomposed plant material
3 to 5 inches: Fine sandy loam
5 to 9 inches: Fine sandy loam
9 to 15 inches: Fine sandy loam
15 to 26 inches: Fine sandy loam
26 to 33 inches: Sandy loam
33 to 65 inches: Bedrock

Description of Westminster, Rocky

Setting

Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Mountain flank, side slope
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Loamy supraglacial till derived from schist

Properties and qualities

Slope: 8 to 15 percent
Surface area covered with cobbles, stones or boulders: 2.1 percent
Depth to restrictive feature: 10 to 20 inches to lithic bedrock
Drainage class: Somewhat excessively drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.14 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Low (about 3.1 inches)

Interpretive groups

Land capability (nonirrigated): 6s

Typical profile

0 to 1 inches: Moderately decomposed plant material
1 to 5 inches: Loam
5 to 19 inches: Fine sandy loam
19 to 65 inches: Bedrock

Minor Components

Colrain, very stony

Percent of map unit: 8 percent
Landform: Ground moraines, valley sides
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope, rise
Down-slope shape: Convex
Across-slope shape: Linear

Shelburne, very stony

Percent of map unit: 5 percent
Landform: Drumlins, ground moraines
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear

**Pillsbury, very stony**

- Percent of map unit: 1 percent
- Landform: Drumlins, ground moraines
- Landform position (two-dimensional): Backslope
- Landform position (three-dimensional): Base slope
- Down-slope shape: Concave
- Across-slope shape: Concave

**Rock outcrop**

- Percent of map unit: 1 percent

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**116D—Millsite-Westminster complex, 15 to 25 percent slopes, rocky**

**Map Unit Setting**

- Elevation: 850 to 2,040 feet
- Mean annual precipitation: 40 to 53 inches
- Mean annual air temperature: 33 to 55 degrees F
- Frost-free period: 129 to 170 days

**Map Unit Composition**

- Millsite, rocky, and similar soils: 55 percent
- Westminster, rocky, and similar soils: 35 percent
- Minor components: 10 percent

**Description of Millsite, Rocky**

**Setting**

- Landform: Hills
- Landform position (two-dimensional): Backslope
- Landform position (three-dimensional): Mountainflank, side slope
- Down-slope shape: Convex
- Across-slope shape: Linear
- Parent material: Loamy supraglacial till derived from schist

**Properties and qualities**

- Slope: 15 to 25 percent
- Surface area covered with cobbles, stones or boulders: 2.1 percent
- Depth to restrictive feature: 20 to 40 inches to lithic bedrock
- Drainage class: Well drained
- Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.14 in/hr)
- Depth to water table: More than 80 inches
- Frequency of flooding: None
- Frequency of ponding: None
- Available water capacity: Low (about 5.8 inches)

**Interpretive groups**

- Land capability (nonirrigated): 6s
Typical profile

0 to 1 inches: Slightly decomposed plant material
1 to 3 inches: Moderately decomposed plant material
3 to 5 inches: Fine sandy loam
5 to 9 inches: Fine sandy loam
9 to 15 inches: Fine sandy loam
15 to 26 inches: Fine sandy loam
26 to 33 inches: Sandy loam
33 to 65 inches: Bedrock

Description of Westminster, Rocky

Setting

Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Mountain flank, side slope
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Loamy supraglacial till derived from schist

Properties and qualities

Slope: 15 to 25 percent
Surface area covered with cobbles, stones or boulders: 2.1 percent
Depth to restrictive feature: 10 to 20 inches to lithic bedrock
Drainage class: Somewhat excessively drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.14 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Low (about 3.1 inches)

Interpretive groups

Land capability (nonirrigated): 6s

Typical profile

0 to 1 inches: Moderately decomposed plant material
1 to 5 inches: Loam
5 to 19 inches: Fine sandy loam
19 to 65 inches: Bedrock

Minor Components

Colrain, very stony

Percent of map unit: 5 percent
Landform: Ground moraines, valley sides
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope, rise
Down-slope shape: Convex
Across-slope shape: Linear

Shelburne, very stony

Percent of map unit: 4 percent
Landform: Drumlins, ground moraines
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear

Rock outcrop
Percent of map unit: 1 percent

116F—Millsite-Westminster complex, 25 to 50 percent slopes, rocky

Map Unit Setting
Elevation: 830 to 2,200 feet
Mean annual precipitation: 40 to 53 inches
Mean annual air temperature: 33 to 55 degrees F
Frost-free period: 129 to 170 days

Map Unit Composition
Millsite, rocky, and similar soils: 55 percent
Westminster, rocky, and similar soils: 35 percent
Minor components: 10 percent

Description of Millsite, Rocky

Setting
Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Mountainflank, side slope
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Loamy supraglacial till derived from schist

Properties and qualities
Slope: 25 to 50 percent
Surface area covered with cobbles, stones or boulders: 2.1 percent
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.14 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Low (about 5.8 inches)

Interpretive groups
Land capability (nonirrigated): 7s

Typical profile
0 to 1 inches: Slightly decomposed plant material
1 to 3 inches: Moderately decomposed plant material
3 to 5 inches: Fine sandy loam
5 to 9 inches: Fine sandy loam
9 to 15 inches: Fine sandy loam
15 to 26 inches: Fine sandy loam
26 to 33 inches: Sandy loam
33 to 65 inches: Bedrock

Description of Westminster, Rocky

Setting
Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Mountainflank, side slope
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Loamy supraglacial till derived from schist

Properties and qualities
Slope: 25 to 50 percent
Surface area covered with cobbles, stones or boulders: 2.1 percent
Depth to restrictive feature: 10 to 20 inches to lithic bedrock
Drainage class: Somewhat excessively drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.14 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Low (about 3.1 inches)

Interpretive groups
Land capability (nonirrigated): 7s

Typical profile
0 to 1 inches: Moderately decomposed plant material
1 to 5 inches: Loam
5 to 19 inches: Fine sandy loam
19 to 65 inches: Bedrock

Minor Components
Colrain, very stony
Percent of map unit: 9 percent
Landform: Ground moraines, valley sides
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope, rise
Down-slope shape: Convex
Across-slope shape: Linear

Rock outcrop
Percent of map unit: 1 percent

118C—Colrain-Millsite complex, 8 to 15 percent slopes, rocky

Map Unit Setting
Elevation: 900 to 2,120 feet
Mean annual precipitation: 40 to 53 inches
Mean annual air temperature: 33 to 55 degrees F
Frost-free period: 129 to 170 days

Map Unit Composition
Colrain, rocky, and similar soils: 55 percent
Millsite, rocky, and similar soils: 35 percent
Minor components: 10 percent

Description of Colrain, Rocky
Setting
Landform: Ground moraines, valley sides
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope, rise
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Loamy supraglacial till derived from schist

Properties and qualities
Slope: 8 to 15 percent
Surface area covered with cobbles, stones or boulders: 2.1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 6.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Moderate (about 8.6 inches)

Interpretive groups
Land capability (nonirrigated): 6s

Typical profile
0 to 1 inches: Slightly decomposed plant material
1 to 3 inches: Fine sandy loam
3 to 10 inches: Fine sandy loam
10 to 17 inches: Sandy loam
17 to 28 inches: Gravelly sandy loam
28 to 40 inches: Gravelly sandy loam
40 to 65 inches: Cobbly sandy loam

Description of Millsite, Rocky
Setting
Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Mountainflank, side slope
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Loamy supraglacial till derived from schist

Properties and qualities
Slope: 8 to 15 percent
Surface area covered with cobbles, stones or boulders: 2.1 percent
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.14 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Low (about 5.8 inches)

Interpretive groups
Land capability (nonirrigated): 6s

Typical profile
0 to 1 inches: Slightly decomposed plant material
1 to 3 inches: Moderately decomposed plant material
3 to 5 inches: Fine sandy loam
5 to 9 inches: Fine sandy loam
9 to 15 inches: Fine sandy loam
15 to 26 inches: Fine sandy loam
26 to 33 inches: Sandy loam
33 to 65 inches: Bedrock

Minor Components
Westminster, rocky
Percent of map unit: 5 percent
Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Mountainflank, side slope
Down-slope shape: Convex
Across-slope shape: Linear

Shelburne, very stony
Percent of map unit: 4 percent
Landform: Drumlins, ground moraines
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear

Rock outcrop
Percent of map unit: 1 percent

120C—Millsite-Westminster complex, 8 to 15 percent slopes, very rocky

Map Unit Setting
Elevation: 890 to 1,960 feet
Mean annual precipitation: 40 to 53 inches
Mean annual air temperature: 33 to 55 degrees F
Frost-free period: 129 to 170 days
Map Unit Composition

*Millsite, very rocky, and similar soils:* 60 percent  
*Westminster, very rocky, and similar soils:* 35 percent  
*Minor components:* 5 percent

Description of Millsite, Very Rocky

Setting

*Landform:* Hills  
*Landform position (two-dimensional):* Backslope  
*Landform position (three-dimensional):* Mountainflank, side slope  
*Down-slope shape:* Convex  
*Across-slope shape:* Linear

*Parent material:* Loamy supraglacial till derived from schist

Properties and qualities

*Slope:* 8 to 15 percent  
*Surface area covered with cobbles, stones or boulders:* 2.1 percent  
*Depth to restrictive feature:* 20 to 40 inches to lithic bedrock  
*Drainage class:* Well drained  
*Capacity of the most limiting layer to transmit water (Ksat):* Very low to moderately low (0.00 to 0.14 in/hr)  
*Depth to water table:* More than 80 inches  
*Frequency of flooding:* None  
*Frequency of ponding:* None  
*Available water capacity:* Low (about 5.8 inches)

Interpretive groups

*Land capability (nonirrigated):* 6s

Typical profile

0 to 1 inches: Slightly decomposed plant material  
1 to 3 inches: Moderately decomposed plant material  
3 to 5 inches: Fine sandy loam  
5 to 9 inches: Fine sandy loam  
9 to 15 inches: Fine sandy loam  
15 to 26 inches: Fine sandy loam  
26 to 33 inches: Sandy loam  
33 to 65 inches: Bedrock

Description of Westminster, Very Rocky

Setting

*Landform:* Hills  
*Landform position (two-dimensional):* Backslope  
*Landform position (three-dimensional):* Mountainflank, side slope  
*Down-slope shape:* Convex  
*Across-slope shape:* Linear  
*Parent material:* Loamy supraglacial till derived from schist

Properties and qualities

*Slope:* 8 to 15 percent  
*Surface area covered with cobbles, stones or boulders:* 2.1 percent  
*Depth to restrictive feature:* 10 to 20 inches to lithic bedrock  
*Drainage class:* Somewhat excessively drained
**Capacity of the most limiting layer to transmit water (Ksat):** Very low to moderately low (0.00 to 0.14 in/hr)

**Depth to water table:** More than 80 inches

**Frequency of flooding:** None

**Frequency of ponding:** None

**Available water capacity:** Low (about 3.1 inches)

**Interpretive groups**

*Land capability (nonirrigated):* 6s

**Typical profile**

- *0 to 1 inches:* Moderately decomposed plant material
- *1 to 5 inches:* Loam
- *5 to 19 inches:* Fine sandy loam
- *19 to 65 inches:* Bedrock

**Minor Components**

*Rock outcrop*

*Percent of map unit: 5 percent*

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**125B—Charlton-Chatfield-Hollis complex, 3 to 8 percent slopes, rocky**

**Map Unit Setting**

- *Elevation:* 270 to 1,050 feet
- *Mean annual precipitation:* 39 to 52 inches
- *Mean annual air temperature:* 35 to 57 degrees F
- *Frost-free period:* 130 to 176 days

**Map Unit Composition**

- *Charlton, rocky, and similar soils:* 50 percent
- *Chatfield, rocky, and similar soils:* 28 percent
- *Hollis, rocky, and similar soils:* 15 percent
- *Minor components:* 7 percent

**Description of Charlton, Rocky**

**Setting**

- *Landform:* Valley sides on moraines, toes on moraines
- *Landform position (two-dimensional):* Backslope
- *Landform position (three-dimensional):* Side slope
- *Down-slope shape:* Linear
- *Across-slope shape:* Linear
- *Parent material:* Loamy supraglacial till derived from schist

**Properties and qualities**

- *Slope:* 3 to 8 percent
- *Surface area covered with cobbles, stones or boulders:* 2.1 percent
- *Depth to restrictive feature:* More than 80 inches
- *Drainage class:* Well drained
**Capacity of the most limiting layer to transmit water (Ksat):** Moderately high to high (0.60 to 6.00 in/hr)

**Depth to water table:** More than 80 inches

**Frequency of flooding:** None

**Frequency of ponding:** None

**Available water capacity:** High (about 9.1 inches)

**Interpretive groups**

*Land capability (nonirrigated):* 6s

**Typical profile**

- 0 to 8 inches: Fine sandy loam
- 8 to 15 inches: Fine sandy loam
- 15 to 22 inches: Fine sandy loam
- 22 to 31 inches: Fine sandy loam
- 31 to 37 inches: Stony fine sandy loam
- 37 to 43 inches: Fine sandy loam
- 43 to 49 inches: Gravelly sandy loam
- 49 to 65 inches: Gravelly sandy loam

**Description of Chatfield, Rocky**

**Setting**

*Landform:* Ground moraines

*Landform position (two-dimensional):* Backslope

*Landform position (three-dimensional):* Side slope

*Down-slope shape:* Convex

*Across-slope shape:* Linear

*Parent material:* Loamy supraglacial till derived from schist

**Properties and qualities**

*Slope:* 3 to 8 percent

*Surface area covered with cobbles, stones or boulders:* 2.1 percent

*Depth to restrictive feature:* 20 to 40 inches to lithic bedrock

*Drainage class:* Well drained

**Capacity of the most limiting layer to transmit water (Ksat):** Moderately low to high (0.14 to 6.00 in/hr)

**Depth to water table:** More than 80 inches

**Frequency of flooding:** None

**Frequency of ponding:** None

**Available water capacity:** Low (about 5.9 inches)

**Interpretive groups**

*Land capability (nonirrigated):* 6s

**Typical profile**

- 0 to 1 inches: Moderately decomposed plant material
- 1 to 4 inches: Fine sandy loam
- 4 to 9 inches: Gravelly fine sandy loam
- 9 to 19 inches: Cobbly fine sandy loam
- 19 to 30 inches: Sandy loam
- 30 to 34 inches: Gravelly sandy loam
- 34 to 37 inches: Gravelly sandy loam
- 37 to 65 inches: Bedrock
Description of Hollis, Rocky

Setting
Landform: Upland slopes
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Crest
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Loamy supraglacial till derived from schist

Properties and qualities
Slope: 3 to 8 percent
Surface area covered with cobbles, stones or boulders: 2.1 percent
Depth to restrictive feature: 10 to 20 inches to lithic bedrock
Drainage class: Somewhat excessively drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.14 to 0.60 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Very low (about 2.8 inches)

Interpretive groups
Land capability (nonirrigated): 6s

Typical profile
0 to 1 inches: Slightly decomposed plant material
1 to 3 inches: Highly decomposed plant material
3 to 4 inches: Fine sandy loam
4 to 15 inches: Cobbly fine sandy loam
15 to 65 inches: Bedrock

Minor Components

Paxton, very stony
Percent of map unit: 3 percent
Landform: Drumlins, ground moraines
Landform position (two-dimensional): Shoulder, summit
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear

Canton, rocky
Percent of map unit: 2 percent
Landform: Ground moraines, valley sides, hillslopes
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Convex

Rock outcrop
Percent of map unit: 2 percent
245B—Hinckley sandy loam, 3 to 8 percent slopes

Map Unit Setting
- **Elevation:** 120 to 1,140 feet
- **Mean annual precipitation:** 37 to 52 inches
- **Mean annual air temperature:** 35 to 59 degrees F
- **Frost-free period:** 127 to 182 days

Map Unit Composition
- **Hinckley and similar soils:** 85 percent
- **Agawam and similar soils:** 5 percent
- **Minor components:** 10 percent

Description of Hinckley

Setting
- **Landform:** Outwash plains, eskers, kames, deltas
- **Landform position (two-dimensional):** Summit, shoulder, backslope
- **Landform position (three-dimensional):** Nose slope, side slope, crest, head slope, rise
- **Down-slope shape:** Convex
- **Across-slope shape:** Linear, convex
- **Parent material:** Sandy and gravelly glaciofluvial deposits

Properties and qualities
- **Slope:** 3 to 8 percent
- **Depth to restrictive feature:** More than 80 inches
- **Drainage class:** Excessively drained
- **Capacity of the most limiting layer to transmit water (Ksat):** High to very high (2.00 to 20.00 in/hr)
- **Depth to water table:** More than 80 inches
- **Frequency of flooding:** None
- **Frequency of ponding:** None
- **Available water capacity:** Low (about 3.6 inches)

Interpretive groups
- **Land capability (nonirrigated):** 3s

Typical profile
- **0 to 2 inches:** Slightly decomposed plant material
- **2 to 9 inches:** Sandy loam
- **9 to 17 inches:** Very gravelly loamy sand
- **17 to 26 inches:** Very gravelly loamy sand
- **26 to 65 inches:** Extremely gravelly sand
Description of Agawam

Setting

Landform: Outwash plains, terraces
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Tread, rise
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Loamy over sandy glaciofluvial deposits

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Low (about 3.0 inches)

Interpretive groups

Land capability (nonirrigated): 2e

Typical profile

0 to 2 inches: Highly decomposed plant material
2 to 4 inches: Fine sandy loam
4 to 9 inches: Fine sandy loam
9 to 21 inches: Fine sandy loam
21 to 33 inches: Fine sand
33 to 65 inches: Fine sand

Minor Components

Windsor

Percent of map unit: 5 percent
Landform: Outwash plains, terraces
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Tread, rise
Down-slope shape: Convex
Across-slope shape: Convex

Merrimac

Percent of map unit: 5 percent
Landform: Deltas, outwash plains, kame terraces
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Tread, rise
Down-slope shape: Linear
Across-slope shape: Linear
245C—Hinckley sandy loam, 8 to 15 percent slopes

Map Unit Setting

_Elevation:_ 150 to 1,150 feet  
_Mean annual precipitation:_ 37 to 52 inches  
_Mean annual air temperature:_ 35 to 59 degrees F  
_Frost-free period:_ 127 to 182 days

Map Unit Composition

_Hinckley and similar soils:_ 90 percent  
_Minor components:_ 10 percent

Description of Hinckley

Setting

_Landform:_ Outwash plains, eskers, kames, deltas  
_Landform position (two-dimensional):_ Summit, shoulder, backslope  
_Landform position (three-dimensional):_ Nose slope, side slope, crest, head slope, rise  
_Down-slope shape:_ Convex  
_Across-slope shape:_ Linear, convex  
_Parent material:_ Sandy and gravelly glaciofluvial deposits

Properties and qualities

_Slope:_ 8 to 15 percent  
_Depth to restrictive feature:_ More than 80 inches  
_Drainage class:_ Excessively drained  
_Capacity of the most limiting layer to transmit water (Ksat):_ High to very high (2.00 to 20.00 in/hr)  
_Depth to water table:_ More than 80 inches  
_Frequency of flooding:_ None  
_Frequency of ponding:_ None  
_Available water capacity:_ Low (about 3.6 inches)

Interpretive groups

_Land capability (nonirrigated):_ 4s

Typical profile

0 to 2 inches: Slightly decomposed plant material  
2 to 9 inches: Sandy loam  
9 to 17 inches: Very gravelly loamy sand  
17 to 26 inches: Very gravelly loamy sand  
26 to 65 inches: Extremely gravelly sand

Minor Components

Windsor

_Percent of map unit:_ 5 percent  
_Landform:_ Outwash plains, terraces
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Tread, rise
Down-slope shape: Convex
Across-slope shape: Convex

Merrimac
Percent of map unit: 5 percent
Landform: Deltas, outwash plains, kame terraces
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Tread, rise
Down-slope shape: Linear
Across-slope shape: Linear

254B—Merrimac fine sandy loam, 3 to 8 percent slopes

Map Unit Setting
Elevation: 130 to 1,380 feet
Mean annual precipitation: 37 to 52 inches
Mean annual air temperature: 35 to 59 degrees F
Frost-free period: 127 to 182 days

Map Unit Composition
Merrimac and similar soils: 80 percent
Minor components: 20 percent

Description of Merrimac
Setting
Landform: Deltas, outwash plains, kame terraces
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Tread, rise
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Loamy over sandy and gravelly glaciofluvial deposits

Properties and qualities
Slope: 3 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat excessively drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to very high (0.60 to 20.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Low (about 4.2 inches)

Interpretive groups
Land capability (nonirrigated): 2s

Typical profile
0 to 10 inches: Fine sandy loam
10 to 15 inches: Fine sandy loam
15 to 22 inches: Gravelly sandy loam
22 to 26 inches: Gravelly loamy sand
26 to 65 inches: Very gravelly sand

Minor Components

Windsor
Percent of map unit: 10 percent
Landform: Outwash plains, terraces
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Tread, rise
Down-slope shape: Convex
Across-slope shape: Convex

Agawam
Percent of map unit: 5 percent
Landform: Outwash plains, terraces
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Tread, rise
Down-slope shape: Linear
Across-slope shape: Convex

Hinckley
Percent of map unit: 5 percent
Landform: Outwash plains, eskers, kames, deltas
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Nose slope, side slope, crest, head slope, rise
Down-slope shape: Convex
Across-slope shape: Linear, convex

260B—Sudbury sandy loam, 3 to 8 percent slopes

Map Unit Setting
Elevation: 40 to 1,300 feet
Mean annual precipitation: 37 to 52 inches
Mean annual air temperature: 35 to 59 degrees F
Frost-free period: 127 to 182 days

Map Unit Composition
Sudbury and similar soils: 80 percent
Minor components: 20 percent

Description of Sudbury
Setting
Landform: Outwash plains, terraces, deltas
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Tread, dip
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Sandy glaciofluvial deposits

Properties and qualities
Slope: 3 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)
Depth to water table: About 6 to 24 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Low (about 5.4 inches)

Interpretive groups
Land capability (nonirrigated): 2e

Typical profile
0 to 2 inches: Highly decomposed plant material
2 to 8 inches: Sandy loam
8 to 15 inches: Fine sandy loam
15 to 21 inches: Loamy fine sand
21 to 55 inches: Stratified fine sand to sand
55 to 65 inches: Stratified fine sand to very fine sand

Minor Components

Walpole
Percent of map unit: 5 percent
Landform: Outwash terraces, deltas, outwash plains
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Tread, dip
Down-slope shape: Concave
Across-slope shape: Concave

Ninigret
Percent of map unit: 5 percent
Landform: Outwash plains, outwash terraces
Landform position (three-dimensional): Tread, dip
Down-slope shape: Linear
Across-slope shape: Linear

Deerfield
Percent of map unit: 5 percent
Landform: Outwash plains, terraces, deltas
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Tread, talf
Down-slope shape: Linear
Across-slope shape: Linear

Merrimac
Percent of map unit: 5 percent
Landform: Deltas, outwash plains, kame terraces
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Tread, rise
Down-slope shape: Linear
Across-slope shape: Linear
275B—Agawam fine sandy loam, 3 to 8 percent slopes

Map Unit Setting

Elevation: 110 to 1,040 feet
Mean annual precipitation: 37 to 52 inches
Mean annual air temperature: 35 to 59 degrees F
Frost-free period: 127 to 182 days

Map Unit Composition

Agawam and similar soils: 75 percent
Minor components: 25 percent

Description of Agawam

Setting

Landform: Outwash plains, terraces
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Tread, rise
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Loamy over sandy glaciofluvial deposits

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Low (about 3.0 inches)

Interpretive groups

Land capability (nonirrigated): 2e

Typical profile

0 to 2 inches: Highly decomposed plant material
2 to 4 inches: Fine sandy loam
4 to 9 inches: Fine sandy loam
9 to 21 inches: Fine sandy loam
21 to 33 inches: Fine sand
33 to 65 inches: Fine sand

Minor Components

Scio

Percent of map unit: 5 percent
Landform: Plains, terraces
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear

Unadilla
Percent of map unit: 5 percent
Landform: Plains, terraces
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear

Windsor
Percent of map unit: 5 percent
Landform: Outwash plains, terraces
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Tread, rise
Down-slope shape: Convex
Across-slope shape: Convex

Ninigret
Percent of map unit: 2 percent
Landform: Outwash plains, outwash terraces
Landform position (three-dimensional): Tread, dip
Down-slope shape: Linear
Across-slope shape: Linear

Occum, occasionally flooded
Percent of map unit: 2 percent
Landform: Flood plains, terraces
Landform position (three-dimensional): Tread, rise
Down-slope shape: Linear
Across-slope shape: Linear

Amstown
Percent of map unit: 2 percent
Landform: Deltas, terraces, lake plains
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Riser, talf
Down-slope shape: Linear
Across-slope shape: Linear, convex

Hinckley
Percent of map unit: 2 percent
Landform: Outwash plains, eskers, kames, deltas
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Nose slope, side slope, crest, head slope, rise
Down-slope shape: Convex
Across-slope shape: Linear, convex

Merrimac
Percent of map unit: 2 percent
Landform: Deltas, outwash plains, kame terraces
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Tread, rise
Down-slope shape: Linear
Across-slope shape: Linear
275C—Agawam fine sandy loam, 8 to 15 percent slopes

Map Unit Setting
- **Elevation**: 100 to 1,260 feet
- **Mean annual precipitation**: 37 to 52 inches
- **Mean annual air temperature**: 35 to 59 degrees F
- **Frost-free period**: 127 to 182 days

Map Unit Composition
- **Agawam and similar soils**: 82 percent
- **Minor components**: 18 percent

Description of Agawam

Setting
- **Landform**: Outwash plains, terraces
- **Landform position (two-dimensional)**: Summit, shoulder, backslope
- **Landform position (three-dimensional)**: Tread, rise
- **Down-slope shape**: Linear
- **Across-slope shape**: Convex
- **Parent material**: Loamy over sandy glaciofluvial deposits

Properties and qualities
- **Slope**: 8 to 15 percent
- **Depth to restrictive feature**: More than 80 inches
- **Drainage class**: Well drained
- **Capacity of the most limiting layer to transmit water (Ksat)**: Moderately high (0.20 to 0.60 in/hr)
- **Depth to water table**: More than 80 inches
- **Frequency of flooding**: None
- **Frequency of ponding**: None
- **Available water capacity**: Low (about 3.0 inches)

Interpretive groups
- **Land capability (nonirrigated)**: 3e

Typical profile
- **0 to 2 inches**: Highly decomposed plant material
- **2 to 4 inches**: Fine sandy loam
- **4 to 9 inches**: Fine sandy loam
- **9 to 21 inches**: Fine sandy loam
- **21 to 33 inches**: Fine sand
- **33 to 65 inches**: Fine sand

Minor Components

Unadilla
- **Percent of map unit**: 5 percent
- **Landform**: Plains, terraces
- **Landform position (three-dimensional)**: Tread
Down-slope shape: Linear
Across-slope shape: Linear

Ninigret
Percent of map unit: 5 percent
Landform: Outwash plains, outwash terraces
Landform position (three-dimensional): Tread, dip
Down-slope shape: Linear
Across-slope shape: Linear

Merrimac
Percent of map unit: 5 percent
Landform: Deltas, outwash plains, kame terraces
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Tread, rise
Down-slope shape: Linear
Across-slope shape: Linear

Windsor
Percent of map unit: 3 percent
Landform: Outwash plains, terraces
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Tread, rise
Down-slope shape: Convex
Across-slope shape: Convex

305B—Paxton fine sandy loam, 3 to 8 percent slopes

Map Unit Setting
Elevation: 240 to 1,060 feet
Mean annual precipitation: 39 to 52 inches
Mean annual air temperature: 35 to 57 degrees F
Frost-free period: 130 to 176 days

Map Unit Composition
Paxton and similar soils: 78 percent
Minor components: 22 percent

Description of Paxton
Setting
Landform: Drumlins, ground moraines
Landform position (two-dimensional): Shoulder, summit
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Coarse-loamy lodgment till derived from schist

Properties and qualities
Slope: 3 to 8 percent
Surface area covered with cobbles, stones or boulders: 0.0 percent
Depth to restrictive feature: 20 to 40 inches to densic material
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately high (0.00 to 0.20 in/hr)
Depth to water table: About 15 to 65 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Low (about 4.5 inches)

Interpretive groups
Land capability (nonirrigated): 2e

Typical profile
0 to 11 inches: Fine sandy loam
11 to 22 inches: Fine sandy loam
22 to 27 inches: Fine sandy loam
27 to 35 inches: Stony fine sandy loam
35 to 44 inches: Gravelly fine sandy loam
44 to 65 inches: Loam

Minor Components
Woodbridge
Percent of map unit: 15 percent
Landform: Drumlins, moraines
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear

Montauk
Percent of map unit: 5 percent
Landform: Drumlins, ground moraines
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear

Charlton
Percent of map unit: 2 percent
Landform: Valley sides on moraines, toes on moraines
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear

305C—Paxton fine sandy loam, 8 to 15 percent slopes

Map Unit Setting
Elevation: 230 to 1,060 feet
Mean annual precipitation: 39 to 52 inches
Mean annual air temperature: 35 to 57 degrees F
Frost-free period: 130 to 176 days

Map Unit Composition
Paxton and similar soils: 78 percent
Minor components: 22 percent

Description of Paxton

Setting
Landform: Drumlins, ground moraines
Landform position (two-dimensional): Shoulder, backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Coarse-loamy lodgment till derived from schist

Properties and qualities
Slope: 8 to 15 percent
Surface area covered with cobbles, stones or boulders: 0.0 percent
Depth to restrictive feature: 20 to 40 inches to densic material
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately high (0.00 to 0.20 in/hr)
Depth to water table: About 15 to 65 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Low (about 4.5 inches)

Interpretive groups
Land capability (nonirrigated): 3e

Typical profile
0 to 11 inches: Fine sandy loam
11 to 22 inches: Fine sandy loam
22 to 27 inches: Fine sandy loam
27 to 35 inches: Stony fine sandy loam
35 to 44 inches: Gravelly fine sandy loam
44 to 65 inches: Loam

Minor Components

Charlton
Percent of map unit: 10 percent
Landform: Valley sides on moraines, toes on moraines
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear

Montauk
Percent of map unit: 5 percent
Landform: Drumlins, ground moraines
Landform position (two-dimensional): Summit, backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear
Woodbridge

Percent of map unit: 5 percent
Landform: Drumlins, moraines
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear

Canton

Percent of map unit: 2 percent
Landform: Ground moraines, valley sides, hillslopes
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Convex

305D—Paxton fine sandy loam, 15 to 25 percent slopes

Map Unit Setting

Elevation: 280 to 1,090 feet
Mean annual precipitation: 39 to 52 inches
Mean annual air temperature: 35 to 57 degrees F
Frost-free period: 130 to 176 days

Map Unit Composition

Paxton and similar soils: 85 percent
Minor components: 15 percent

Description of Paxton

Setting

Landform: Drumlins, ground moraines
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Coarse-loamy lodgment till derived from schist

Properties and qualities

Slope: 15 to 25 percent
Surface area covered with cobbles, stones or boulders: 0.0 percent
Depth to restrictive feature: 20 to 40 inches to densic material
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately high (0.00 to 0.20 in/hr)
Depth to water table: About 15 to 65 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Low (about 4.5 inches)
Interpretive groups

Land capability (nonirrigated): 4e

Typical profile

0 to 11 inches: Fine sandy loam
11 to 22 inches: Fine sandy loam
22 to 27 inches: Fine sandy loam
27 to 35 inches: Stony fine sandy loam
35 to 44 inches: Gravelly fine sandy loam
44 to 65 inches: Loam

Minor Components

Charlton

Percent of map unit: 5 percent
Landform: Valley sides on moraines, toes on moraines
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear

Woodbridge

Percent of map unit: 5 percent
Landform: Drumlins, moraines
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear

Montauk

Percent of map unit: 3 percent
Landform: Drumlins, ground moraines
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear

Canton

Percent of map unit: 2 percent
Landform: Ground moraines, valley sides, hillslopes
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Convex

306C—Paxton fine sandy loam, 8 to 15 percent slopes, very stony

Map Unit Setting

Elevation: 290 to 1,060 feet
Mean annual precipitation: 39 to 52 inches
Mean annual air temperature: 35 to 57 degrees F
Frost-free period: 130 to 176 days

Map Unit Composition

Paxton, very stony, and similar soils: 80 percent
Minor components: 20 percent

Description of Paxton, Very Stony

Setting

Landform: Drumlins, ground moraines
Landform position (two-dimensional): Shoulder, backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Coarse-loamy lodgment till derived from schist

Properties and qualities

Slope: 8 to 15 percent
Surface area covered with cobbles, stones or boulders: 2.1 percent
Depth to restrictive feature: 20 to 40 inches to densic material
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately high (0.00 to 0.20 in/hr)
Depth to water table: About 15 to 65 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Low (about 4.5 inches)

Interpretive groups

Land capability (nonirrigated): 6s

Typical profile

0 to 11 inches: Fine sandy loam
11 to 22 inches: Fine sandy loam
22 to 27 inches: Fine sandy loam
27 to 35 inches: Stony fine sandy loam
35 to 44 inches: Gravelly fine sandy loam
44 to 65 inches: Loam

Minor Components

Charlton, very stony

Percent of map unit: 5 percent
Landform: Valley sides on moraines, toes on moraines
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear

Montauk, very stony

Percent of map unit: 5 percent
Landform: Drumlins, ground moraines
Landform position (two-dimensional): Summit, backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear
Woodbridge, very stony
Percent of map unit: 5 percent
Landform: Drumlins, moraines
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear

Canton, very stony
Percent of map unit: 3 percent
Landform: Ground moraines, valley sides, hillslopes
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Convex

Ridgebury, very stony
Percent of map unit: 2 percent
Landform: Depressions on ground moraines, depressions on drumlins
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Side slope
Down-slope shape: Concave
Across-slope shape: Linear, convex

306D—Paxton fine sandy loam, 15 to 25 percent slopes, very stony

Map Unit Setting
Elevation: 220 to 1,080 feet
Mean annual precipitation: 39 to 52 inches
Mean annual air temperature: 35 to 57 degrees F
Frost-free period: 130 to 176 days

Map Unit Composition
Paxton, very stony, and similar soils: 90 percent
Minor components: 10 percent

Description of Paxton, Very Stony

Setting
Landform: Drumlins, ground moraines
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Coarse-loamy lodgment till derived from schist

Properties and qualities
Slope: 15 to 25 percent
Surface area covered with cobbles, stones or boulders: 2.1 percent
Depth to restrictive feature: 20 to 40 inches to densic material
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately high (0.00 to 0.20 in/hr)
Depth to water table: About 15 to 65 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Low (about 4.5 inches)

Interpretive groups
Land capability (nonirrigated): 6s

Typical profile
0 to 11 inches: Fine sandy loam
11 to 22 inches: Fine sandy loam
22 to 27 inches: Fine sandy loam
27 to 35 inches: Stony fine sandy loam
35 to 44 inches: Gravelly fine sandy loam
44 to 65 inches: Loam

Minor Components
Woodbridge, very stony
Percent of map unit: 5 percent
Landform: Drumlins, moraines
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear

Charlton, very stony
Percent of map unit: 3 percent
Landform: Valley sides on moraines, toes on moraines
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear

Montauk, very stony
Percent of map unit: 2 percent
Landform: Drumlins, ground moraines
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear

310B—Woodbridge loam, 3 to 8 percent slopes

Map Unit Setting
Elevation: 220 to 1,040 feet
Mean annual precipitation: 39 to 52 inches
Mean annual air temperature: 35 to 57 degrees F
Frost-free period: 130 to 176 days

Map Unit Composition
Woodbridge and similar soils: 80 percent
Minor components: 20 percent

Description of Woodbridge
Setting
Landform: Drumlins, moraines
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Loamy lodgment till derived from schist

Properties and qualities
Slope: 3 to 8 percent
Surface area covered with cobbles, stones or boulders: 0.0 percent
Depth to restrictive feature: 20 to 28 inches to densic material
Drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately high (0.00 to 0.20 in/hr)
Depth to water table: About 8 to 24 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Low (about 4.1 inches)

Interpretive groups
Land capability (nonirrigated): 2e

Typical profile
0 to 2 inches: Highly decomposed plant material
2 to 6 inches: Loam
6 to 10 inches: Loam
10 to 15 inches: Loam
15 to 24 inches: Loam
24 to 31 inches: Gravelly loam
31 to 65 inches: Gravelly loam

Minor Components
Paxton
Percent of map unit: 15 percent
Landform: Drumlins, ground moraines
Landform position (two-dimensional): Shoulder, summit
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear

Scituate
Percent of map unit: 3 percent
Landform: Drumlins, moraines
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear, convex
Ridgebury
Percent of map unit: 2 percent
Landform: Depressions on ground moraines, depressions on drumlins
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Side slope
Down-slope shape: Concave
Across-slope shape: Linear, convex

370B—Shelburne fine sandy loam, 3 to 8 percent slopes

Map Unit Setting
Elevation: 950 to 2,120 feet
Mean annual precipitation: 40 to 53 inches
Mean annual air temperature: 33 to 55 degrees F
Frost-free period: 129 to 170 days

Map Unit Composition
Shelburne and similar soils: 85 percent
Minor components: 15 percent

Description of Shelburne
Setting
Landform: Drumlins, ground moraines
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Loamy lodgment till derived from schist

Properties and qualities
Slope: 3 to 8 percent
Surface area covered with cobbles, stones or boulders: 0.0 percent
Depth to restrictive feature: 20 to 30 inches to densic material
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately high (0.00 to 0.20 in/hr)
Depth to water table: About 15 to 25 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Low (about 4.0 inches)

Interpretive groups
Land capability (nonirrigated): 2e

Typical profile
0 to 8 inches: Fine sandy loam
8 to 17 inches: Fine sandy loam
17 to 24 inches: Sandy loam
24 to 26 inches: Sandy loam
26 to 41 inches: Sandy loam
41 to 47 inches: Sandy loam
47 to 65 inches: Loam

Minor Components

**Ashfield**
Percent of map unit: 10 percent
Landform: Drumlins, ground moraines
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope, talf
Down-slope shape: Convex, linear
Across-slope shape: Linear

**Pillsbury**
Percent of map unit: 5 percent
Landform: Drumlins, ground moraines
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Concave

370C—Shelburne fine sandy loam, 8 to 15 percent slopes

Map Unit Setting
**Elevation:** 950 to 2,040 feet
**Mean annual precipitation:** 40 to 53 inches
**Mean annual air temperature:** 33 to 55 degrees F
**Frost-free period:** 129 to 170 days

Map Unit Composition
Shelburne and similar soils: 82 percent
Minor components: 18 percent

Description of Shelburne

Setting
Landform: Drumlins, ground moraines
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Loamy lodgment till derived from schist

Properties and qualities
Slope: 8 to 15 percent
Surface area covered with cobbles, stones or boulders: 0.0 percent
Depth to restrictive feature: 20 to 30 inches to densic material
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately high (0.00 to 0.20 in/hr)
Depth to water table: About 15 to 25 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Low (about 4.0 inches)

Interpretive groups
Land capability (nonirrigated): 3e

Typical profile
0 to 8 inches: Fine sandy loam
8 to 17 inches: Fine sandy loam
17 to 24 inches: Sandy loam
24 to 26 inches: Sandy loam
26 to 41 inches: Sandy loam
41 to 47 inches: Sandy loam
47 to 65 inches: Loam

Minor Components
Ashfield
Percent of map unit: 10 percent
Landform: Drumlins, ground moraines
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope, talf
Down-slope shape: Convex, linear
Across-slope shape: Linear

Pillsbury
Percent of map unit: 5 percent
Landform: Drumlins, ground moraines
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Concave

Millsite
Percent of map unit: 3 percent
Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Mountainflank, side slope
Down-slope shape: Convex
Across-slope shape: Linear

370D—Shelburne fine sandy loam, 15 to 25 percent slopes

Map Unit Setting
Elevation: 940 to 1,850 feet
Mean annual precipitation: 40 to 53 inches
Mean annual air temperature: 33 to 55 degrees F
Frost-free period: 129 to 170 days
Map Unit Composition
- *Shelburne and similar soils:* 92 percent
- *Minor components:* 8 percent

Description of Shelburne

Setting
- *Landform:* Drumlins, ground moraines
- *Landform position (two-dimensional):* Backslope
- *Landform position (three-dimensional):* Side slope
- *Down-slope shape:* Convex
- *Across-slope shape:* Linear
- *Parent material:* Loamy lodgment till derived from schist

Properties and qualities
- *Slope:* 15 to 25 percent
- *Surface area covered with cobbles, stones or boulders:* 0.0 percent
- *Depth to restrictive feature:* 20 to 30 inches to densic material
- *Drainage class:* Well drained
- *Capacity of the most limiting layer to transmit water (Ksat):* Very low to moderately high (0.00 to 0.20 in/hr)
- *Depth to water table:* About 15 to 25 inches
- *Frequency of flooding:* None
- *Frequency of ponding:* None
- *Available water capacity:* Low (about 4.0 inches)

Interpretive groups
- *Land capability (nonirrigated):* 4e

Typical profile
- *0 to 8 inches:* Fine sandy loam
- *8 to 17 inches:* Fine sandy loam
- *17 to 24 inches:* Sandy loam
- *24 to 26 inches:* Sandy loam
- *26 to 41 inches:* Sandy loam
- *41 to 47 inches:* Sandy loam
- *47 to 65 inches:* Loam

Minor Components

Ashfield
- *Percent of map unit:* 5 percent
- *Landform:* Drumlins, ground moraines
- *Landform position (two-dimensional):* Backslope
- *Landform position (three-dimensional):* Side slope, talf
- *Down-slope shape:* Convex, linear
- *Across-slope shape:* Linear

Colrain
- *Percent of map unit:* 3 percent
- *Landform:* Ground moraines, valley sides
- *Landform position (two-dimensional):* Backslope
- *Landform position (three-dimensional):* Side slope, rise
- *Down-slope shape:* Convex
- *Across-slope shape:* Linear
371C—Shelburne fine sandy loam, 8 to 15 percent slopes, very stony

Map Unit Setting

Elevation: 950 to 2,250 feet
Mean annual precipitation: 40 to 53 inches
Mean annual air temperature: 33 to 55 degrees F
Frost-free period: 129 to 170 days

Map Unit Composition

Shelburne, very stony, and similar soils: 82 percent
Minor components: 18 percent

Description of Shelburne, Very Stony

Setting

Landform: Drumlins, ground moraines
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Loamy lodgment till derived from schist

Properties and qualities

Slope: 8 to 15 percent
Surface area covered with cobbles, stones or boulders: 2.1 percent
Depth to restrictive feature: 20 to 30 inches to densic material
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately high (0.00 to 0.20 in/hr)
Depth to water table: About 15 to 25 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Low (about 4.0 inches)

Interpretive groups

Land capability (nonirrigated): 6s

Typical profile

0 to 8 inches: Fine sandy loam
8 to 17 inches: Fine sandy loam
17 to 24 inches: Sandy loam
24 to 26 inches: Sandy loam
26 to 41 inches: Sandy loam
41 to 47 inches: Sandy loam
47 to 65 inches: Loam

Minor Components

Ashfield, very stony
Percent of map unit: 10 percent
Landform: Drumlins, ground moraines
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope, talf
Down-slope shape: Convex, linear
Across-slope shape: Linear

Pillsbury, very stony
Percent of map unit: 5 percent
Landform: Drumlins, ground moraines
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Concave

Millsite, very stony
Percent of map unit: 3 percent
Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Mountainflank, side slope
Down-slope shape: Convex
Across-slope shape: Linear

371D—Shelburne fine sandy loam, 15 to 25 percent slopes, very stony

Map Unit Setting
Elevation: 870 to 2,180 feet
Mean annual precipitation: 40 to 53 inches
Mean annual air temperature: 33 to 55 degrees F
Frost-free period: 129 to 170 days

Map Unit Composition
Shelburne, very stony, and similar soils: 92 percent
Minor components: 8 percent

Description of Shelburne, Very Stony

Setting
Landform: Drumlins, ground moraines
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Loamy lodgment till derived from schist

Properties and qualities
Slope: 15 to 25 percent
Surface area covered with cobbles, stones or boulders: 2.1 percent
Depth to restrictive feature: 20 to 30 inches to densic material
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately high (0.00 to 0.20 in/hr)
Depth to water table: About 15 to 25 inches  
Frequency of flooding: None  
Frequency of ponding: None  
Available water capacity: Low (about 4.0 inches)

**Interpretive groups**  
*Land capability (nonirrigated): 6s*

**Typical profile**  
- 0 to 8 inches: Fine sandy loam  
- 8 to 17 inches: Fine sandy loam  
- 17 to 24 inches: Sandy loam  
- 24 to 26 inches: Sandy loam  
- 26 to 41 inches: Sandy loam  
- 41 to 47 inches: Sandy loam  
- 47 to 65 inches: Loam

**Minor Components**

**Ashfield, very stony**  
- Percent of map unit: 5 percent  
- *Landform:* Drumlins, ground moraines  
- *Landform position (two-dimensional):* Backslope  
- *Landform position (three-dimensional):* Side slope, talf  
- *Down-slope shape:* Convex, linear  
- *Across-slope shape:* Linear

**Colrain, very stony**  
- Percent of map unit: 3 percent  
- *Landform:* Ground moraines, valley sides  
- *Landform position (two-dimensional):* Backslope  
- *Landform position (three-dimensional):* Side slope, rise  
- *Down-slope shape:* Convex  
- *Across-slope shape:* Linear

**405C—Charlton fine sandy loam, 8 to 15 percent slopes**

**Map Unit Setting**  
- *Elevation:* 160 to 1,080 feet  
- *Mean annual precipitation:* 39 to 52 inches  
- *Mean annual air temperature:* 35 to 57 degrees F  
- *Frost-free period:* 130 to 176 days

**Map Unit Composition**  
- *Charlton and similar soils:* 85 percent  
- *Minor components:* 15 percent

**Description of Charlton**

**Setting**  
- *Landform:* Valley sides on moraines, toes on moraines
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Loamy supraglacial till derived from schist

Properties and qualities
Slope: 8 to 15 percent
Surface area covered with cobbles, stones or boulders: 0.0 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 6.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: High (about 9.1 inches)

Interpretive groups
Land capability (nonirrigated): 3e

Typical profile
0 to 8 inches: Fine sandy loam
8 to 15 inches: Fine sandy loam
15 to 22 inches: Fine sandy loam
22 to 31 inches: Fine sandy loam
31 to 37 inches: Stony fine sandy loam
37 to 43 inches: Fine sandy loam
43 to 49 inches: Gravelly sandy loam
49 to 65 inches: Gravelly sandy loam

Minor Components
Canton
Percent of map unit: 10 percent
Landform: Ground moraines, valley sides, hillslopes
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Convex

Paxton
Percent of map unit: 5 percent
Landform: Drumlins, ground moraines
Landform position (two-dimensional): Shoulder, backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear
405D—Charlton fine sandy loam, 15 to 25 percent slopes

Map Unit Setting
- **Elevation:** 280 to 1,030 feet
- **Mean annual precipitation:** 39 to 52 inches
- **Mean annual air temperature:** 35 to 57 degrees F
- **Frost-free period:** 130 to 176 days

Map Unit Composition
- **Charlton and similar soils:** 76 percent
- **Minor components:** 24 percent

Description of Charlton

Setting
- **Landform:** Valley sides on moraines, toes on moraines
- **Landform position (two-dimensional):** Backslope
- **Landform position (three-dimensional):** Side slope
- **Down-slope shape:** Linear
- **Across-slope shape:** Linear
- **Parent material:** Loamy supraglacial till derived from schist

Properties and qualities
- **Slope:** 15 to 25 percent
- **Surface area covered with cobbles, stones or boulders:** 0.0 percent
- **Depth to restrictive feature:** More than 80 inches
- **Drainage class:** Well drained
- **Capacity of the most limiting layer to transmit water (Ksat):** Moderately high to high (0.60 to 6.00 in/hr)
- **Depth to water table:** More than 80 inches
- **Frequency of flooding:** None
- **Frequency of ponding:** None
- **Available water capacity:** High (about 9.1 inches)

Interpretive groups
- **Land capability (nonirrigated):** 4e

Typical profile
- **0 to 8 inches:** Fine sandy loam
- **8 to 15 inches:** Fine sandy loam
- **15 to 22 inches:** Fine sandy loam
- **22 to 31 inches:** Fine sandy loam
- **31 to 37 inches:** Stony fine sandy loam
- **37 to 43 inches:** Fine sandy loam
- **43 to 49 inches:** Gravelly sandy loam
- **49 to 65 inches:** Gravelly sandy loam
Minor Components

Canton
- Percent of map unit: 10 percent
- Landform: Ground moraines, valley sides, hillslopes
- Landform position (two-dimensional): Backslope
- Landform position (three-dimensional): Side slope
- Down-slope shape: Linear
- Across-slope shape: Convex

Paxton
- Percent of map unit: 10 percent
- Landform: Drumlins, ground moraines
- Landform position (two-dimensional): Backslope
- Landform position (three-dimensional): Side slope
- Down-slope shape: Convex
- Across-slope shape: Linear

Chatfield
- Percent of map unit: 2 percent
- Landform: Ground moraines
- Landform position (two-dimensional): Backslope
- Landform position (three-dimensional): Side slope
- Down-slope shape: Convex
- Across-slope shape: Linear

Hollis
- Percent of map unit: 2 percent
- Landform: Upland slopes
- Landform position (two-dimensional): Backslope
- Landform position (three-dimensional): Side slope
- Down-slope shape: Linear
- Across-slope shape: Convex

406F—Charlton fine sandy loam, 25 to 45 percent slopes, very stony

Map Unit Setting
- Elevation: 290 to 1,180 feet
- Mean annual precipitation: 39 to 52 inches
- Mean annual air temperature: 35 to 57 degrees F
- Frost-free period: 130 to 176 days

Map Unit Composition
- Charlton, very stony, and similar soils: 68 percent
- Minor components: 32 percent

Description of Charlton, Very Stony

Setting
- Landform: Valley sides on moraines, toes on moraines
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Loamy supraglacial till derived from schist

Properties and qualities
Slope: 25 to 45 percent
Surface area covered with cobbles, stones or boulders: 2.1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 6.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: High (about 9.1 inches)

Interpretive groups
Land capability (nonirrigated): 7s

Typical profile
0 to 8 inches: Fine sandy loam
8 to 15 inches: Fine sandy loam
15 to 22 inches: Fine sandy loam
22 to 31 inches: Fine sandy loam
31 to 37 inches: Stony fine sandy loam
37 to 43 inches: Fine sandy loam
43 to 49 inches: Gravelly sandy loam
49 to 65 inches: Gravelly sandy loam

Minor Components

Paxton, very stony
Percent of map unit: 10 percent
Landform: Drumlins, ground moraines
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear

Canton, very stony
Percent of map unit: 10 percent
Landform: Ground moraines, valley sides, hillslopes
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Convex

Hollis, very stony
Percent of map unit: 5 percent
Landform: Upland slopes
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Convex
Chatfield, very stony
- **Percent of map unit:** 5 percent
- **Landform:** Ground moraines
- **Landform position (two-dimensional):** Backslope
- **Landform position (three-dimensional):** Side slope
- **Down-slope shape:** Convex
- **Across-slope shape:** Linear

Woodbridge, very stony
- **Percent of map unit:** 2 percent
- **Landform:** Drumlins, moraines
- **Landform position (two-dimensional):** Backslope
- **Landform position (three-dimensional):** Side slope
- **Down-slope shape:** Linear
- **Across-slope shape:** Linear

### 600—Pits, gravel

**Map Unit Setting**
- **Elevation:** 100 to 1,870 feet
- **Mean annual precipitation:** 32 to 52 inches
- **Mean annual air temperature:** 35 to 59 degrees F
- **Frost-free period:** 127 to 182 days

**Map Unit Composition**
- **Pits, gravel:** 96 percent
- **Minor components:** 4 percent

**Description of Pits, Gravel**

**Setting**
- **Landform position (two-dimensional):** Footslope
- **Landform position (three-dimensional):** Base slope
- **Down-slope shape:** Concave
- **Across-slope shape:** Concave
- **Parent material:** Loose sandy and gravelly glaciofluvial deposits

**Interpretive groups**
- **Land capability (nonirrigated):** 8s

**Typical profile**
- 0 to 65 inches: Extremely gravelly sand

**Minor Components**

**Water**
- **Percent of map unit:** 1 percent

**Hinckley**
- **Percent of map unit:** 1 percent
- **Landform:** Outwash plains, eskers, kames, deltas
**Landform position (two-dimensional):** Summit, shoulder, backslope
**Landform position (three-dimensional):** Nose slope, side slope, crest, head slope, rise
**Down-slope shape:** Convex
**Across-slope shape:** Linear, convex

**Windsor**
**Percent of map unit:** 1 percent
**Landform:** Outwash plains, terraces
**Landform position (two-dimensional):** Toeslope
**Landform position (three-dimensional):** Tread, rise
**Down-slope shape:** Convex
**Across-slope shape:** Convex

**Urban land**
**Percent of map unit:** 1 percent
Soil Information for All Uses

Soil Properties and Qualities

The Soil Properties and Qualities section includes various soil properties and qualities displayed as thematic maps with a summary table for the soil map units in the selected area of interest. A single value or rating for each map unit is generated by aggregating the interpretive ratings of individual map unit components. This aggregation process is defined for each property or quality.

Soil Qualities and Features

Soil qualities are behavior and performance attributes that are not directly measured, but are inferred from observations of dynamic conditions and from soil properties. Example soil qualities include natural drainage, and frost action. Soil features are attributes that are not directly part of the soil. Example soil features include slope and depth to restrictive layer. These features can greatly impact the use and management of the soil.

Hydrologic Soil Group

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.
Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.
Custom Soil Resource Report

MAP LEGEND

Area of Interest (AOI)

Soils

Soil Map Units

Soil Ratings

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

Political Features

Cities

Water Features

Streams and Canals

Transportation

Rails
Interstate Highways
US Routes
Major Roads
Local Roads

MAP INFORMATION

Map Scale: 1:19,900 if printed on A size (8.5" × 11") sheet.

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

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

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

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

Source of Map: Natural Resources Conservation Service
Coordinate System: UTM Zone 18N NAD83

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

Soil Survey Area: Franklin County, Massachusetts
Survey Area Date: Version 6, Sep 21, 2012

Date(s) aerial images were photographed: 7/30/2003

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.
## Table—Hydrologic Soil Group

<table>
<thead>
<tr>
<th>Map unit symbol</th>
<th>Map unit name</th>
<th>Rating</th>
<th>Acres in AOI</th>
<th>Percent of AOI</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Water</td>
<td>B/D</td>
<td>5.1</td>
<td>0.4%</td>
</tr>
<tr>
<td>50A</td>
<td>Wonsqueak woody peat, 0 to 1 percent slopes</td>
<td>B/D</td>
<td>4.4</td>
<td>0.3%</td>
</tr>
<tr>
<td>51A</td>
<td>Swansea peat, 0 to 1 percent slopes</td>
<td>C/D</td>
<td>5.3</td>
<td>0.4%</td>
</tr>
<tr>
<td>53A</td>
<td>Freetown woody peat, 0 to 1 percent slopes, ponded</td>
<td>C/D</td>
<td>0.6</td>
<td>0.0%</td>
</tr>
<tr>
<td>71B</td>
<td>Ridgebury gravelly fine sandy loam, 0 to 5 percent slopes, extremely stony</td>
<td>D</td>
<td>7.6</td>
<td>0.5%</td>
</tr>
<tr>
<td>75B</td>
<td>Pillsbury stony sandy loam, 0 to 5 percent slopes, extremely stony</td>
<td>D</td>
<td>11.9</td>
<td>0.8%</td>
</tr>
<tr>
<td>109B</td>
<td>Chatfield-Hollis complex, 3 to 8 percent slopes, rocky</td>
<td>B</td>
<td>23.7</td>
<td>1.7%</td>
</tr>
<tr>
<td>109C</td>
<td>Chatfield-Hollis complex, 8 to 15 percent slopes, rocky</td>
<td>B</td>
<td>90.4</td>
<td>6.3%</td>
</tr>
<tr>
<td>109D</td>
<td>Chatfield-Hollis complex, 15 to 25 percent slopes, rocky</td>
<td>B</td>
<td>235.2</td>
<td>16.4%</td>
</tr>
<tr>
<td>109F</td>
<td>Chatfield-Hollis complex, 25 to 60 percent slopes, rocky</td>
<td>B</td>
<td>149.5</td>
<td>10.4%</td>
</tr>
<tr>
<td>114C</td>
<td>Hollis-Chatfield complex, 8 to 15 percent slopes, very rocky</td>
<td>D</td>
<td>24.8</td>
<td>1.7%</td>
</tr>
<tr>
<td>116B</td>
<td>Millsite-Westminster complex, 3 to 8 percent slopes, rocky</td>
<td>B</td>
<td>74.0</td>
<td>5.2%</td>
</tr>
<tr>
<td>116C</td>
<td>Millsite-Westminster complex, 8 to 15 percent slopes, rocky</td>
<td>B</td>
<td>134.7</td>
<td>9.4%</td>
</tr>
<tr>
<td>116D</td>
<td>Millsite-Westminster complex, 15 to 25 percent slopes, rocky</td>
<td>B</td>
<td>174.3</td>
<td>12.2%</td>
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<tr>
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<td>Millsite-Westminster complex, 25 to 50 percent slopes, rocky</td>
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<td>239.2</td>
<td>16.7%</td>
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<tr>
<td>118C</td>
<td>Colrain-Millsite complex, 8 to 15 percent slopes, rocky</td>
<td>A</td>
<td>2.3</td>
<td>0.2%</td>
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<tr>
<td>120C</td>
<td>Millsite-Westminster complex, 8 to 15 percent slopes, very rocky</td>
<td>B</td>
<td>12.1</td>
<td>0.8%</td>
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<tr>
<td>125B</td>
<td>Charlton-Chatfield-Hollis complex, 3 to 8 percent slopes, very rocky</td>
<td>A</td>
<td>2.7</td>
<td>0.2%</td>
</tr>
<tr>
<td>245B</td>
<td>Hinckley sandy loam, 3 to 8 percent slopes</td>
<td>A</td>
<td>11.5</td>
<td>0.8%</td>
</tr>
<tr>
<td>245C</td>
<td>Hinckley sandy loam, 8 to 15 percent slopes</td>
<td>A</td>
<td>15.9</td>
<td>1.1%</td>
</tr>
<tr>
<td>254B</td>
<td>Merrimac fine sandy loam, 3 to 8 percent slopes</td>
<td>A</td>
<td>3.7</td>
<td>0.3%</td>
</tr>
<tr>
<td>260B</td>
<td>Sudbury sandy loam, 3 to 8 percent slopes</td>
<td>C/D</td>
<td>0.7</td>
<td>0.1%</td>
</tr>
<tr>
<td>275B</td>
<td>Agawam fine sandy loam, 3 to 8 percent slopes</td>
<td>C</td>
<td>6.0</td>
<td>0.4%</td>
</tr>
<tr>
<td>Map unit symbol</td>
<td>Map unit name</td>
<td>Rating</td>
<td>Acres in AOI</td>
<td>Percent of AOI</td>
</tr>
<tr>
<td>----------------</td>
<td>-------------------------------------------------</td>
<td>--------</td>
<td>--------------</td>
<td>----------------</td>
</tr>
<tr>
<td>275C</td>
<td>Agawam fine sandy loam, 8 to 15 percent slopes</td>
<td>C</td>
<td>8.8</td>
<td>0.6%</td>
</tr>
<tr>
<td>305B</td>
<td>Paxton fine sandy loam, 3 to 8 percent slopes</td>
<td>B</td>
<td>5.4</td>
<td>0.4%</td>
</tr>
<tr>
<td>305C</td>
<td>Paxton fine sandy loam, 8 to 15 percent slopes</td>
<td>B</td>
<td>15.6</td>
<td>1.1%</td>
</tr>
<tr>
<td>305D</td>
<td>Paxton fine sandy loam, 15 to 25 percent slopes</td>
<td>B</td>
<td>29.2</td>
<td>2.0%</td>
</tr>
<tr>
<td>306C</td>
<td>Paxton fine sandy loam, 8 to 15 percent slopes, very stony</td>
<td>B</td>
<td>5.5</td>
<td>0.4%</td>
</tr>
<tr>
<td>306D</td>
<td>Paxton fine sandy loam, 15 to 25 percent slopes, very stony</td>
<td>B</td>
<td>11.8</td>
<td>0.8%</td>
</tr>
<tr>
<td>310B</td>
<td>Woodbridge loam, 3 to 8 percent slopes</td>
<td>C/D</td>
<td>5.8</td>
<td>0.4%</td>
</tr>
<tr>
<td>370B</td>
<td>Shelburne fine sandy loam, 3 to 8 percent slopes</td>
<td>B/D</td>
<td>28.4</td>
<td>2.0%</td>
</tr>
<tr>
<td>370C</td>
<td>Shelburne fine sandy loam, 8 to 15 percent slopes</td>
<td>B/D</td>
<td>0.8</td>
<td>0.1%</td>
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<tr>
<td>370D</td>
<td>Shelburne fine sandy loam, 15 to 25 percent slopes</td>
<td>B/D</td>
<td>7.6</td>
<td>0.5%</td>
</tr>
<tr>
<td>371C</td>
<td>Shelburne fine sandy loam, 8 to 15 percent slopes, very stony</td>
<td>B/D</td>
<td>3.0</td>
<td>0.2%</td>
</tr>
<tr>
<td>371D</td>
<td>Shelburne fine sandy loam, 15 to 25 percent slopes, very stony</td>
<td>B/D</td>
<td>11.5</td>
<td>0.8%</td>
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<tr>
<td>405C</td>
<td>Charlton fine sandy loam, 8 to 15 percent slopes</td>
<td>A</td>
<td>4.8</td>
<td>0.3%</td>
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<tr>
<td>405D</td>
<td>Charlton fine sandy loam, 15 to 25 percent slopes</td>
<td>A</td>
<td>42.7</td>
<td>3.0%</td>
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<tr>
<td>406F</td>
<td>Charlton fine sandy loam, 25 to 45 percent slopes, very stony</td>
<td>A</td>
<td>15.3</td>
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<tr>
<td>600</td>
<td>Pits, gravel</td>
<td></td>
<td>2.9</td>
<td>0.2%</td>
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<tr>
<td><strong>Totals for Area of Interest</strong></td>
<td></td>
<td></td>
<td><strong>1,434.2</strong></td>
<td><strong>100.0%</strong></td>
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</table>

**Rating Options—Hydrologic Soil Group**

*Aggregation Method:* Dominant Condition  
*Component Percent Cutoff:* None Specified  
*Tie-break Rule:* Higher
References


Appendix C

Bypass Pipe Sizing Calculations
## Culvert Calculator Report
### By-Pass Pipe-2 year storm

Solve For: Section Size

<table>
<thead>
<tr>
<th>Culvert Summary</th>
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<th></th>
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<tbody>
<tr>
<td>Allowable HW Elevation</td>
<td>61.70 ft</td>
<td>Headwater Depth/Height</td>
</tr>
<tr>
<td>Computed Headwater Elevation</td>
<td>61.67 ft</td>
<td>Discharge</td>
</tr>
<tr>
<td>Inlet Control HW Elev.</td>
<td>61.60 ft</td>
<td>Tailwater Elevation</td>
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<tr>
<td>Outlet Control HW Elev.</td>
<td>61.67 ft</td>
<td>Control Type</td>
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</table>

<table>
<thead>
<tr>
<th>Grades</th>
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<th></th>
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<tbody>
<tr>
<td>Upstream Invert</td>
<td>59.70 ft</td>
<td>Downstream Invert</td>
</tr>
<tr>
<td>Length</td>
<td>115.00 ft</td>
<td>Constructed Slope</td>
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<table>
<thead>
<tr>
<th>Hydraulic Profile</th>
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<tbody>
<tr>
<td>Profile</td>
<td>S2</td>
<td>Depth, Downstream</td>
</tr>
<tr>
<td>Slope Type</td>
<td>Steep</td>
<td>Normal Depth</td>
</tr>
<tr>
<td>Flow Regime</td>
<td>Supercritical</td>
<td>Critical Depth</td>
</tr>
<tr>
<td>Velocity Downstream</td>
<td>12.99 ft/s</td>
<td>Critical Slope</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Section</th>
<th></th>
<th></th>
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</thead>
<tbody>
<tr>
<td>Section Shape</td>
<td>Circular</td>
<td>Mannings Coefficient</td>
</tr>
<tr>
<td>Section Material</td>
<td>HDPE (Smooth Interior)</td>
<td>Span</td>
</tr>
<tr>
<td>Section Size</td>
<td>24 inch</td>
<td>Rise</td>
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<tr>
<td>Number Sections</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Outlet Control Properties</th>
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<th></th>
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</thead>
<tbody>
<tr>
<td>Outlet Control HW Elev.</td>
<td>61.67 ft</td>
<td>Upstream Velocity Head</td>
</tr>
<tr>
<td>Ke</td>
<td>0.20</td>
<td>Entrance Loss</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Inlet Control Properties</th>
<th></th>
<th></th>
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</thead>
<tbody>
<tr>
<td>Inlet Control HW Elev.</td>
<td>61.60 ft</td>
<td>Flow Control</td>
</tr>
<tr>
<td>Inlet Type</td>
<td>Groove end projecting</td>
<td>Area Full</td>
</tr>
<tr>
<td>K</td>
<td>0.00450</td>
<td>HDS 5 Chart</td>
</tr>
<tr>
<td>M</td>
<td>2.00000</td>
<td>HDS 5 Scale</td>
</tr>
<tr>
<td>C</td>
<td>0.03170</td>
<td>Equation Form</td>
</tr>
<tr>
<td>Y</td>
<td>0.69000</td>
<td></td>
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</tbody>
</table>
Time span=0.00-90.00 hrs, dt=0.05 hrs, 1801 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 6S: E01
Runoff Area=532.030 ac  0.93% Impervious  Runoff Depth=0.17"
Flow Length=5,705’  Tc=111.3 min  CN=55  Runoff=13.00 cfs  7.495 af

Total Runoff Area = 532.030 ac  Runoff Volume = 7.495 af  Average Runoff Depth = 0.17"
99.07% Pervious = 527.087 ac  0.93% Impervious = 4.943 ac
Summary for Subcatchment 6S: E01

Tc 1

Runoff = 13.00 cfs @ 14.48 hrs, Volume= 7.495 af, Depth= 0.17"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-90.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-YR Rainfall=2.90"

<table>
<thead>
<tr>
<th>Area (ac)</th>
<th>CN</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>109.430</td>
<td>30</td>
<td>Woods, Good, HSG A</td>
</tr>
<tr>
<td>218.860</td>
<td>55</td>
<td>Woods, Good, HSG B</td>
</tr>
<tr>
<td>43.780</td>
<td>70</td>
<td>Woods, Good, HSG C</td>
</tr>
<tr>
<td>65.650</td>
<td>77</td>
<td>Woods, Good, HSG D</td>
</tr>
<tr>
<td>13.280</td>
<td>39</td>
<td>Pasture/grassland/range, Good, HSG A</td>
</tr>
<tr>
<td>26.560</td>
<td>61</td>
<td>Pasture/grassland/range, Good, HSG B</td>
</tr>
<tr>
<td>5.310</td>
<td>74</td>
<td>Pasture/grassland/range, Good, HSG C</td>
</tr>
<tr>
<td>7.970</td>
<td>80</td>
<td>Pasture/grassland/range, Good, HSG D</td>
</tr>
<tr>
<td>10.900</td>
<td>46</td>
<td>2 acre lots, 12% imp, HSG A</td>
</tr>
<tr>
<td>20.190</td>
<td>65</td>
<td>2 acre lots, 12% imp, HSG B</td>
</tr>
<tr>
<td>4.040</td>
<td>77</td>
<td>2 acre lots, 12% imp, HSG C</td>
</tr>
<tr>
<td>6.060</td>
<td>82</td>
<td>2 acre lots, 12% imp, HSG D</td>
</tr>
<tr>
<td>532.030</td>
<td>55</td>
<td>Weighted Average</td>
</tr>
<tr>
<td>527.087</td>
<td></td>
<td>99.07% Pervious Area</td>
</tr>
<tr>
<td>4.943</td>
<td></td>
<td>0.93% Impervious Area</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Tc (min)</th>
<th>Length (feet)</th>
<th>Slope (ft/ft)</th>
<th>Velocity (ft/sec)</th>
<th>Capacity (cfs)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>30.5</td>
<td>200</td>
<td>0.1500</td>
<td>0.11</td>
<td></td>
<td><strong>Sheet Flow,</strong> Woods: Dense underbrush  n= 0.800  P2= 2.90&quot;</td>
</tr>
<tr>
<td>25.9</td>
<td>1,735</td>
<td>0.2000</td>
<td>1.12</td>
<td></td>
<td><strong>Shallow Concentrated Flow,</strong> Forest w/Heavy Litter  Kv= 2.5 fps</td>
</tr>
<tr>
<td>38.7</td>
<td>1,740</td>
<td>0.0900</td>
<td>0.75</td>
<td></td>
<td><strong>Shallow Concentrated Flow,</strong> Forest w/Heavy Litter  Kv= 2.5 fps</td>
</tr>
<tr>
<td>16.2</td>
<td>2,030</td>
<td>0.0400</td>
<td>2.08</td>
<td>5.25</td>
<td><strong>Trap/Vee/Rect Channel Flow, Pumpkin Hollow Bk</strong>  Bot.W=10.00'  D=0.25'  Z= 0.3 '/'  Top.W=10.15'  n= 0.055  Mountain streams w/large boulders</td>
</tr>
</tbody>
</table>

111.3 5,705 Total
Subcatchment 6S: E01

Type III 24-hr 2-YR Rainfall=2.90"
Runoff Area=532.030 ac
Runoff Volume=7.495 af
Runoff Depth=0.17"
Flow Length=5,705'
Tc=111.3 min
CN=55
Appendix D

Outlet Structure 100-year Storm
PROPOSED OUTLET

E01

6S

2P
Time span = 0.00-90.00 hrs, dt = 0.05 hrs, 1801 points
Runoff by SCS TR-20 method, UH = SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 6S: E01

- Runoff Area = 532.030 ac
- 0.93% Impervious
- Runoff Depth = 1.63"
- Flow Length = 5,705'
- Tc = 111.3 min
- CN = 55
- Runoff = 236.27 cfs
- 72.447 af

Pond 2P: PROPOSED OUTLET

- Peak Elev = 72.21'
- Storage = 21.628 af
- Inflow = 237.06 cfs
- Outflow = 216.70 cfs
- 78.260 af

Total Runoff Area = 532.030 ac
Runoff Volume = 72.447 af
Average Runoff Depth = 1.63"
99.07% Pervious = 527.087 ac
0.93% Impervious = 4.943 ac
Summary for Subcatchment 6S: E01

Runoff = 236.27 cfs @ 13.62 hrs, Volume= 72.447 af, Depth= 1.63"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-90.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-YR Rainfall=6.20"

<table>
<thead>
<tr>
<th>Area (ac)</th>
<th>CN</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>109.430</td>
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<td>Woods, Good, HSG A</td>
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</tr>
<tr>
<td>7.970</td>
<td>80</td>
<td>Pasture/grassland/range, Good, HSG D</td>
</tr>
<tr>
<td>10.900</td>
<td>46</td>
<td>2 acre lots, 12% imp, HSG A</td>
</tr>
<tr>
<td>20.190</td>
<td>65</td>
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</tr>
<tr>
<td>4.040</td>
<td>77</td>
<td>2 acre lots, 12% imp, HSG C</td>
</tr>
<tr>
<td>6.060</td>
<td>82</td>
<td>2 acre lots, 12% imp, HSG D</td>
</tr>
<tr>
<td>532.030</td>
<td>55</td>
<td>Weighted Average</td>
</tr>
<tr>
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<td></td>
<td>99.07% Pervious Area</td>
</tr>
<tr>
<td>4.943</td>
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<td>0.93% Impervious Area</td>
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<table>
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<th>Tc</th>
<th>Length</th>
<th>Slope</th>
<th>Velocity</th>
<th>Capacity</th>
<th>Description</th>
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<tr>
<td>30.5</td>
<td>200</td>
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<td>Sheet Flow, Woods: Dense underbrush n= 0.800 P2= 2.90&quot;</td>
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<tr>
<td>25.9</td>
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<td>Shallow Concentrated Flow, Forest w/Heavy Litter Kv= 2.5 fps</td>
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<tr>
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<td>16.2</td>
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<td>2.08</td>
<td>5.25</td>
<td>Trap/Vee/Rect Channel Flow, Pumpkin Hollow Bk Bot.W=10.00' D=0.25' Z= 0.3 '/ Top.W=10.15' n= 0.055 Mountain streams w/large boulders</td>
</tr>
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111.3 5,705 Total
Subcatchment 6S: E01

Hydrograph

Type III 24-hr 100-YR Rainfall=6.20”

Runoff Area=532.030 ac
Runoff Volume=72.447 af
Runoff Depth=1.63”
Flow Length=5,705'
Tc=111.3 min
CN=55

236.27 cfs
Summary for Pond 2P: PROPOSED OUTLET

Inflow Area = 532.030 ac, 0.93% Impervious, Inflow Depth > 1.77" for 100-YR event
Inflow = 237.06 cfs @ 13.62 hrs, Volume= 78.326 af, Incl. 0.79 cfs Base Flow
Outflow = 216.70 cfs @ 14.01 hrs, Volume= 78.260 af, Atten= 9%, Lag= 23.0 min
Primary = 216.70 cfs @ 14.01 hrs, Volume= 78.260 af

Routing by Stor-Ind method, Time Span= 0.00-90.00 hrs, dt= 0.05 hrs
Starting Elev= 70.37' Surf.Area= 2.435 ac Storage= 16.772 af
Peak Elev= 72.21' @ 14.01 hrs Surf.Area= 2.849 ac Storage= 21.628 af (4.856 af above start)

Plug-Flow detention time = 319.1 min calculated for 61.453 af (78% of inflow)
Center-of-Mass det. time= 19.4 min (1,121.3 - 1,101.9)

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<th>Invert</th>
<th>Avail.Storage</th>
<th>Storage Description</th>
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<tr>
<td>#1 55.00'</td>
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<tr>
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<tr>
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<td>0.045</td>
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<td>0.598</td>
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<td>0.869</td>
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<td>1.213</td>
<td>1.045</td>
<td>3.390</td>
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<tr>
<td>64.00</td>
<td>1.441</td>
<td>1.327</td>
<td>4.717</td>
</tr>
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Device Routing Invert Outlet Devices

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<tr>
<td></td>
<td>6.0' long x 0.7' breadth OUTLET STRUCTURE X 2.00</td>
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<tr>
<td></td>
<td>Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50</td>
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<tr>
<td></td>
<td>Coef. (English) 2.76 2.82 2.93 3.09 3.18 3.22 3.27 3.30 3.32 3.31 3.32</td>
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<table>
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<tr>
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<tr>
<td></td>
<td>Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50</td>
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<tr>
<td></td>
<td>Coef. (English) 2.76 2.82 2.93 3.09 3.18 3.22 3.27 3.30 3.32 3.31 3.31</td>
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</table>
#3 Primary 55.20’ 3.32 48.0” Round Culvert

L= 98.0’ RCP, square edge headwall, Ke= 0.500
Inlet / Outlet Invert= 55.20’ / 53.00’ S= 0.0224 '/' Cc= 0.900
n= 0.025 Corrugated metal, Flow Area= 12.57 sf

Primary OutFlow  Max=216.70 cfs @ 14.01 hrs  HW=72.21’ (Free Discharge)

3=Culvert (Barrel Controls 216.70 cfs @ 17.24 fps)
1=OUTLET STRUCTURE (Passes < 99.01 cfs potential flow)
2=OUTLET STRUCTURE (Passes < 165.02 cfs potential flow)

Pond 2P: PROPOSED OUTLET

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<td>90</td>
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Inflow Area=532.030 ac  
Peak Elev=72.21'  
Storage=21.628 af
Appendix E

Outlet Structure Drawdown
PROPOSED POND (DRAWDOWN PH1)

PROPOSED POND (DRAWDOWN PH2)

PROPOSED POND (DRAWDOWN PH3)

PROPOSED POND (FILL UP)
```
| Pond 9P: PROPOSED POND  (FILL UP) | Peak Elev=70.38'  Storage=16.796 af  Inflow=0.79 cfs  48.578 af  Outflow=0.79 cfs  31.783 af |
| Pond 16P: PROPOSED POND  (DRAWDOWN) | Peak Elev=70.37'  Storage=16.774 af  Inflow=0.79 cfs  48.578 af  Outflow=2.03 cfs  59.060 af |
| Pond 17P: PROPOSED POND  (DRAWDOWN) | Peak Elev=65.69'  Storage=7.316 af  Inflow=0.79 cfs  48.578 af  Outflow=2.89 cfs  50.609 af |
| Pond 18P: PROPOSED POND  (DRAWDOWN) | Peak Elev=64.45'  Storage=5.378 af  Inflow=0.79 cfs  48.578 af  Outflow=0.97 cfs  48.667 af |
```
Summary for Pond 9P: PROPOSED POND (FILL UP)

Inflow = 0.79 cfs @ 0.00 hrs, Volume= 48.578 af, Incl. 0.79 cfs Base Flow
Outflow = 0.79 cfs @ 456.15 hrs, Volume= 31.783 af, Atten= 0%, Lag= 27,369.0 min
Primary = 0.79 cfs @ 456.15 hrs, Volume= 31.783 af

Routing by Stor-Ind method, Time Span= 0.00-744.00 hrs, dt= 0.05 hrs
Peak Elev= 70.38' @ 456.10 hrs Surf.Area= 2.437 ac Storage= 16.796 af

Plug-Flow detention time = 14,042.3 min calculated for 31.781 af (65% of inflow)
Center-of-Mass det. time = 6,322.7 min (28,642.7 - 22,320.0 )

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<td>#1</td>
<td>55.00'</td>
<td>23.943 af</td>
<td>Custom Stage Data (Prismatic) Listed below (Recalc)</td>
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</table>

<table>
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<tr>
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<td>0.877</td>
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<td>1.441</td>
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<td>2.575</td>
<td>1.578</td>
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<th>Outlet Devices</th>
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<tr>
<td>#1</td>
<td>Device 3</td>
<td>70.37'</td>
<td>6.0' long x 0.7&quot; breadth Broad-Crested Rectangular Weir X 2.00</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50</td>
</tr>
<tr>
<td></td>
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<td>Coef. (English) 2.76 2.82 2.93 3.09 3.18 3.22 3.27 3.30 3.32 3.31 3.32</td>
</tr>
<tr>
<td>#2</td>
<td>Device 3</td>
<td>70.37'</td>
<td>10.0' long x 0.7&quot; breadth Broad-Crested Rectangular Weir X 2.00</td>
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<td></td>
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<td>Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50</td>
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</tr>
<tr>
<td>#3</td>
<td>Primary</td>
<td>55.20'</td>
<td>48.0&quot; Round Culvert</td>
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</table>
L = 98.0' RCP, square edge headwall, Ke = 0.500
Inlet / Outlet Invert= 55.20'/ 53.00' S = 0.0224 '/ Cc = 0.900
n = 0.025 Corrugated metal, Flow Area = 12.57 sf

#4 Device 3 64.00' 12.0" W x 0.5" H Vert. Orifice  C = 0.600

Primary OutFlow Max = 0.59 cfs @ 456.15 hrs HW = 70.38' (Free Discharge)

- 3=Culvert (Passes 0.59 cfs of 203.27 cfs potential flow)
- 1=Broad-Crested Rectangular Weir (Weir Controls 0.03 cfs @ 0.27 fps)
- 2=Broad-Crested Rectangular Weir (Weir Controls 0.05 cfs @ 0.27 fps)
- 4=Orifice (Orifice Controls 0.51 cfs @ 12.14 fps)

Pond 9P: PROPOSED POND (FILL UP)

Storage = 16.796 af
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<td><strong>16.796</strong></td>
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<td><strong>0.79</strong></td>
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Summary for Pond 16P: PROPOSED POND (DRAWDOWN PH1)

Inflow = 0.79 cfs @ 0.00 hrs, Volume= 48.578 af, Incl. 0.79 cfs Base Flow
Outflow = 2.03 cfs @ 0.00 hrs, Volume= 59.060 af, Atten= 0%, Lag= 0.0 min
Primary = 2.03 cfs @ 0.00 hrs, Volume= 59.060 af

Routing by Stor-Ind method, Time Span= 0.00-744.00 hrs, dt= 0.05 hrs
Starting Elev= 70.37'  Surf.Area= 2.435 ac  Storage= 16.772 af
Peak Elev= 70.37' @ 0.00 hrs  Surf.Area= 2.435 ac  Storage= 16.774 af  (0.002 af above start)

Plug-Flow detention time= 5,986.0 min calculated for 42.286 af (87% of inflow)
Center-of-Mass det. time= (not calculated: outflow precedes inflow)

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<th>Storage Description</th>
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Device Routing Invert Outlet Devices

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<tr>
<th>Device</th>
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<th>Invert</th>
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<tr>
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<td>Device 3</td>
<td>70.37'</td>
<td>Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50</td>
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<td>Coef. (English) 2.76 2.82 2.93 3.09 3.18 3.22 3.27 3.30 3.32 3.31 3.32</td>
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<td>#2</td>
<td>Device 3</td>
<td>70.37'</td>
<td>10.0' long x 0.7' breadth Broad-Crested Rectangular Weir X 2.00</td>
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<td></td>
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<td>Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50</td>
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<td>Coef. (English) 2.76 2.82 2.93 3.09 3.18 3.22 3.27 3.30 3.32 3.31 3.32</td>
</tr>
</tbody>
</table>
#3 Primary 55.20’ **48.0” Round Culvert**
L= 98.0’  RCP, square edge headwall, Ke= 0.500
Inlet / Outlet Invert= 55.20’ / 53.00’  S=  0.0224 ”/”  Cc= 0.900
n= 0.025  Corrugated metal,  Flow Area= 12.57 sf

#4 Device 3 64.00’ **12.0” W x 2.0” H Vert. Orifice**  C= 0.600

**Primary OutFlow**  Max=2.01 cfs @ 0.00 hrs  HW=70.37’ (Free Discharge)

- **3=Culvert** (Passes 2.01 cfs of 203.21 cfs potential flow)
- **1=Broad-Crested Rectangular Weir**  (Weir Controls 0.00 cfs @ 0.07 fps)
- **2=Broad-Crested Rectangular Weir**  (Weir Controls 0.00 cfs @ 0.07 fps)
- **4=Orifice**  (Orifice Controls 2.01 cfs @ 12.07 fps)

**Pond 16P: PROPOSED POND (DRAWDOWN PH1)**

Hydrograph

Peak Elev=70.37'
Storage=16.774 af
### Hydrograph for Pond 16P: PROPOSED POND (DRAWDOWN PH1)

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<tr>
<th>Time (hours)</th>
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<th>Storage (acre-feet)</th>
<th>Elevation (feet)</th>
<th>Primary (cfs)</th>
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<td>6.295</td>
<td>65.05</td>
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</table>
Summary for Pond 17P: PROPOSED POND (DRAWDOWN PH2)

Inflow = 0.79 cfs @ 0.00 hrs, Volume= 48.578 af, Incl. 0.79 cfs Base Flow
Outflow = 2.89 cfs @ 0.00 hrs, Volume= 50.609 af, Attenu= 0%, Lag= 0.0 min
Primary = 2.89 cfs @ 0.00 hrs, Volume= 50.609 af

Routing by Stor-Ind method, Time Span= 0.00-744.00 hrs, dt= 0.05 hrs
Starting Elev= 65.69' Surf.Area= 1.646 ac Storage= 7.314 af
Peak Elev= 65.69' @ 0.00 hrs Surf.Area= 1.646 ac Storage= 7.316 af (0.002 af above start)

Plug-Flow detention time= 4,857.0 min calculated for 43.290 af (89% of inflow)
Center-of-Mass det. time= (not calculated: outflow precedes inflow)

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</tr>
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<tbody>
<tr>
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Device Routing Invert Outlet Devices

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<td>6.0' long x 0.7' breadth Broad-Crested Rectangular Weir X 2.00</td>
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<tr>
<td></td>
<td></td>
<td>Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50</td>
</tr>
<tr>
<td></td>
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<td>Coef. (English) 2.76 2.82 2.93 3.09 3.18 3.22 3.27 3.30 3.32 3.31 3.32</td>
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<td>Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50</td>
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<td>Coef. (English) 2.76 2.82 2.93 3.09 3.18 3.22 3.27 3.30 3.32 3.31 3.32</td>
</tr>
</tbody>
</table>
#3 Primary 55.20’ 48.0” Round Culvert
L= 98.0’ RCP, square edge headwall, Ke= 0.500
Inlet / Outlet Invert= 55.20’ / 53.00’ S= 0.0224 ’/’ Cc= 0.900
n= 0.025 Corrugated metal, Flow Area= 12.57 sf

#4 Device 3 64.00’ 12.0” W x 6.0” H Vert. Orifice C= 0.600

Primary OutFlow  Max=2.89 cfs @ 0.00 hrs  HW=65.69’ (Free Discharge)
3=Culvert (Passes 2.89 cfs of 163.83 cfs potential flow)
1=Broad-Crested Rectangular Weir (Controls 0.00 cfs)
2= Broad-Crested Rectangular Weir (Controls 0.00 cfs)
4=Orifice (Orifice Controls 2.89 cfs @ 5.77 fps)

Pond 17P: PROPOSED POND (DRAWDOWN PH2)

Peak Elev=65.69’
Storage=7.316 af
### Hydrograph for Pond 17P: PROPOSED POND (DRAWDOWN PH2)

<table>
<thead>
<tr>
<th>Time (hours)</th>
<th>Inflow (cfs)</th>
<th>Storage (acre-feet)</th>
<th>Elevation (feet)</th>
<th>Primary (cfs)</th>
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<td>64.39</td>
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</table>
Summary for Pond 18P: PROPOSED POND (DRAWDOWN PH3)

Inflow = 0.79 cfs @ 0.00 hrs, Volume= 48.578 af, Incl. 0.79 cfs Base Flow
Outflow = 0.97 cfs @ 0.00 hrs, Volume= 48.667 af, Atten= 0%, Lag= 0.0 min
Primary = 0.97 cfs @ 0.00 hrs, Volume= 48.667 af

Routing by Stor-Ind method, Time Span= 0.00-744.00 hrs, dt= 0.05 hrs
Starting Elev= 64.45' Surf.Area= 1.490 ac Storage= 5.376 af
Peak Elev= 64.45' @ 0.00 hrs Surf.Area= 1.490 ac Storage= 5.378 af (0.002 af above start)

Plug-Flow detention time= 4,860.7 min calculated for 43.289 af (89% of inflow)
Center-of-Mass det. time= (not calculated: outflow precedes inflow)

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Device Routing Invert Outlet Devices

#1 Device 3 70.37° 6.0' long x 0.7' breadth Broad-Crested Rectangular Weir X 2.00
Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50
Coef. (English) 2.76 2.82 2.93 3.09 3.18 3.22 3.27 3.30 3.32 3.31 3.32

#2 Device 3 70.37° 10.0' long x 0.7' breadth Broad-Crested Rectangular Weir X 2.00
Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50
Coef. (English) 2.76 2.82 2.93 3.09 3.18 3.22 3.27 3.30 3.32 3.31 3.32
#3 Primary 55.20’ *48.0”“ Round Culvert
L = 98.0’ RCP, square edge headwall, Ke = 0.500
Inlet / Outlet Invert = 55.20’ / 53.00’ S = 0.0224 " Cc = 0.900
n = 0.025 Corrugated metal, Flow Area = 12.57 sf

#4 Device 3 64.00’ *12.0” W x 12.0” H Vert. Orifice C = 0.600

Primary OutFlow Max = 0.97 cfs @ 0.00 hrs HW = 64.45’ (Free Discharge)
3 = Culvert (Passes 0.97 cfs of 151.69 cfs potential flow)
1 = Broad-Crested Rectangular Weir (Controls 0.00 cfs)
2 = Broad-Crested Rectangular Weir (Controls 0.00 cfs)
4 = Orifice (Orifice Controls 0.97 cfs @ 2.16 fps)

Pond 18P: PROPOSED POND (DRAWDOWN PH3)

Hydrograph

Peak Elev = 64.45’
Hydrograph for Pond 18P: PROPOSED POND (DRAWDOWN PH3)

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<th>Time (hours)</th>
<th>Inflow (cfs)</th>
<th>Storage (acre-feet)</th>
<th>Elevation (feet)</th>
<th>Primary (cfs)</th>
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Appendix F

Outlet Structure Buoyancy Computations
# Rectangular Tank Buoyancy Calculations

## Job Information

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<td>January 15, 2012</td>
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<tr>
<td>Job Description:</td>
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<td>Job Number:</td>
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## Rectangular Tank Dimensions

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<td>Tank Width 1 (Inside Dimension)</td>
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<td>Tank Width 2 (Inside Dimension)</td>
<td>6.7 ft</td>
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<tr>
<td>Tank Height (Outside Dimension)</td>
<td>17.4 ft</td>
</tr>
<tr>
<td>Soil Cover Over Tank</td>
<td>0.0 ft</td>
</tr>
<tr>
<td>Tank Buoyancy Force (1)</td>
<td>104,353 lbs</td>
</tr>
<tr>
<td>Tank Restraining Force</td>
<td>69,741 lbs</td>
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## Manholes Attached to Tank

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<tr>
<td>Number of Manholes</td>
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<tr>
<td>Diameter / Width 1 (Inner Dimension)</td>
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<td>Width 2 [for Rectangular only] (Inner Dimension)</td>
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<td>Wall Thickness</td>
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<tr>
<td>Material Density</td>
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<tr>
<td>Extension Length from Tank to Ground</td>
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<tr>
<td>Extension Length from Ground to Rim</td>
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<tr>
<td>Frame and Cover Weight</td>
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<tr>
<td>Manhole Buoyancy Force</td>
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<td>Manhole Restraining Force</td>
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## Soil Overburden Forces on Concrete Hold Down Pad

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<tr>
<td>Height of Soil</td>
<td>17.4 ft</td>
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<tr>
<td>Overburden Soil Buoyancy Force</td>
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<td>Overburden Soil Restraining Force</td>
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## Miscellaneous Tank Accessories (Interior)

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<tr>
<td>lbs</td>
<td>lbs</td>
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<tr>
<td>lbs Tank Accessory Weight</td>
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## Hold Down Concrete Pad

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## Tank Buoyancy Calculation Results

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<tr>
<td>Buoyancy Force</td>
<td>104,353 lbs</td>
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<tr>
<td>Overburden Soil</td>
<td>100,586 lbs</td>
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<tr>
<td>Manhole Weight</td>
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<tr>
<td>Concrete Anti-Flotation Perimeter Collar</td>
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<td>Hold Down Concrete Pad</td>
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<tr>
<td>Total</td>
<td>183,861 lbs</td>
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<td>1.24 Factor of Safety</td>
<td>Exceeds 1.15 FOS</td>
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1) Calculations assumes empty tank completely backfilled with water table at grade per [PEI RP 100 97] Petroleum Equipment Institute (Recommended Practices 100) "Installation of Underground Liquid Storage Systems"

2) This calculation based on the burial depth and restraint method indicated in the construction documents.

3) If actual conditions vary from design specifications, this calculation is void.

4) Soil at 120 lbs/ft³, Concrete at 145 lbs/ft³
Appendix G

Emergency Spillway Design
Routing Diagram for 20120989A10_REV
Prepared by Fuss & O'Neill, Printed 2/7/2013
HydroCAD® 10.00 s/n 05127 © 2012 HydroCAD Software Solutions LLC

6S -> E01 -> SPILLWAY -> 4P
Time span=0.00-90.00 hrs, dt=0.05 hrs, 1801 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 6S: E01
Runoff Area=532.030 ac  0.93% Impervious  Runoff Depth=1.03"
Flow Length=5,705'  Tc=111.3 min  CN=55  Runoff=137.26 cfs  45.673 af

Pond 4P: SPILLWAY
Peak Elev=73.65'  Storage=23.943 af  Inflow=138.05 cfs  51.553 af
Outflow=172.46 cfs  47.981 af

Total Runoff Area = 532.030 ac  Runoff Volume = 45.673 af  Average Runoff Depth = 1.03"
99.07% Pervious = 527.087 ac  0.93% Impervious = 4.943 ac
Summary for Subcatchment 6S: E01

Tc 1

Runoff = 137.26 cfs @ 13.72 hrs, Volume = 45.673 af, Depth = 1.03"

Runoff by SCS TR-20 method, UH=SCS, Time Span = 0.00-90.00 hrs, dt = 0.05 hrs
Type III 24-hr 25-YR Rainfall = 5.10"

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<td>Woods, Good, HSG D</td>
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<td>0.93% Impervious Area</td>
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</table>

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<tr>
<th>Tc (min)</th>
<th>Length (feet)</th>
<th>Slope (ft/ft)</th>
<th>Velocity (ft/sec)</th>
<th>Capacity (cfs)</th>
<th>Description</th>
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<tr>
<td>30.5</td>
<td>200</td>
<td>0.1500</td>
<td>0.11</td>
<td></td>
<td><strong>Sheet Flow,</strong> Woods: Dense underbrush n = 0.800 P2 = 2.90&quot;</td>
</tr>
<tr>
<td>25.9</td>
<td>1,735</td>
<td>0.2000</td>
<td>1.12</td>
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<tr>
<td>38.7</td>
<td>1,740</td>
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<tr>
<td>16.2</td>
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<td>2.08</td>
<td>5.25</td>
<td><strong>Trap/Vee/Rect Channel Flow, Pumpkin Hollow Bk</strong> Bot.W=10.00' D=0.25' Z= 0.3 '/' Top.W=10.15' n= 0.055 Mountain streams w/large boulders</td>
</tr>
</tbody>
</table>

111.3 5,705 Total
Subcatchment 6S: E01

Type III 24-hr
25-YR Rainfall=5.10"
Runoff Area=532.030 ac
Runoff Volume=45.673 af
Runoff Depth=1.03"
Flow Length=5,705'
Tc=111.3 min
CN=55

137.26 cfs
Summary for Pond 4P: SPILLWAY

Inflow Area = 532.030 ac, 0.93% Impervious, Inflow Depth > 1.16" for 25-YR event
Inflow = 138.05 cfs @ 13.72 hrs, Volume= 51.553 af, Incl. 0.79 cfs Base Flow
Outflow = 172.46 cfs @ 13.70 hrs, Volume= 47.981 af, Atten= 0%, Lag= 0.0 min
Primary = 172.46 cfs @ 13.70 hrs, Volume= 47.981 af

Routing by Stor-Ind method, Time Span= 0.00-90.00 hrs, dt= 0.05 hrs
Starting Elev= 70.37' Surf.Area= 2.435 ac Storage= 16.772 af
Peak Elev= 73.65' @ 13.70 hrs Surf.Area= 2.982 ac Storage= 23.943 af (7.171 af above start)

Plug-Flow detention time= 606.5 min calculated for 31.190 af (61% of inflow)
Center-of-Mass det. time= 67.1 min (1,250.6 - 1,183.6)

Volume Invert Avail.Storage Storage Description
#1 55.00' 23.943 af Custom Stage Data (Prismatic) Listed below (Recalc)

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<td>73.00</td>
<td>2.982</td>
<td>2.898</td>
<td>23.943</td>
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Device Routing Invert Outlet Devices
#1 Primary 71.70' 24.0' long x 15.0' breadth SPILLWAY
Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60
Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=172.34 cfs @ 13.70 hrs HW=73.65' (Free Discharge)
↑1=SPILLWAY (Weir Controls 172.34 cfs @ 3.68 fps)
**Pond 4P: SPILLWAY**

**Inflow Area=532.030 ac**

**Peak Elev=73.65'**

**Storage=23.943 af**
Time span = 0.00-90.00 hrs, dt = 0.05 hrs, 1801 points
Runoff by SCS TR-20 method, UH = SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 6S: E01
Runoff Area = 532.030 ac  0.93% Impervious  Runoff Depth = 1.03"
Flow Length = 5,705’  Tc = 111.3 min  CN = 55  Runoff = 137.26 cfs  45.673 af

Pond 6P: PROPOSED POND
Peak Elev = 71.56’  Storage = 19.834 af  Inflow = 138.05 cfs  51.553 af
Outflow = 133.97 cfs  51.487 af

Total Runoff Area = 532.030 ac  Runoff Volume = 45.673 af  Average Runoff Depth = 1.03"
99.07% Pervious = 527.087 ac  0.93% Impervious = 4.943 ac
Summary for Subcatchment 6S: E01

Runoff = 137.26 cfs @ 13.72 hrs, Volume = 45.673 af, Depth = 1.03"

Runoff by SCS TR-20 method, UH=SCS, Time Span = 0.00-90.00 hrs, dt = 0.05 hrs
Type III 24-hr 25-YR Rainfall = 5.10"

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<thead>
<tr>
<th>Area (ac)</th>
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<th>Description</th>
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<td>20.190</td>
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<td>0.93% Impervious Area</td>
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111.3  5,705  Total
Subcatchment 6S: E01

Type III 24-hr 25-YR Rainfall = 5.10"

Runoff Area = 532.030 ac
Runoff Volume = 45.673 af
Runoff Depth = 1.03"
Flow Length = 5,705'
Tc = 111.3 min
CN = 55

Flow (cfs)

Time (hours)
Summary for Pond 6P: PROPOSED POND

Inflow Area = 532.030 ac, 0.93% Impervious, Inflow Depth > 1.16" for 25-YR event

Inflow = 138.05 cfs @ 13.72 hrs, Volume= 51.553 af, Incl. 0.79 cfs Base Flow

Outflow = 133.97 cfs @ 13.92 hrs, Volume= 51.487 af, Atten= 3%, Lag= 12.1 min

Primary = 133.97 cfs @ 13.92 hrs, Volume= 51.487 af

Routing by Stor-Ind method, Time Span= 0.00-90.00 hrs, dt= 0.05 hrs
Starting Elev= 70.37' Surf.Area= 2.435 ac Storage= 16.772 af
Peak Elev= 71.56' @ 13.92 hrs Surf.Area= 2.709 ac Storage= 19.834 af (3.062 af above start)

Plug-Flow detention time= 520.9 min calculated for 34.694 af (67% of inflow)
Center-of-Mass det. time= 22.0 min (1,205.6 - 1,183.6)

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<thead>
<tr>
<th>Device</th>
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<th>Invert</th>
<th>Outlet Devices</th>
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<tbody>
<tr>
<td>#1</td>
<td>Device 3</td>
<td>70.37&quot;</td>
<td>6.0' long x 0.7' breadth OUTLET STRUCTURE X 2.00</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>Coef. (English) 2.76 2.82 2.93 3.09 3.18 3.22 3.27 3.30 3.32 3.31 3.32</td>
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<tr>
<td>#2</td>
<td>Device 3</td>
<td>70.37&quot;</td>
<td>10.0' long x 0.7' breadth OUTLET STRUCTURE X 2.00</td>
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<td></td>
<td></td>
<td></td>
<td>Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50</td>
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<td>Coef. (English) 2.76 2.82 2.93 3.09 3.18 3.22 3.27 3.30 3.32 3.31 3.31</td>
</tr>
</tbody>
</table>
#3 Primary 55.20’ 3.32
48.0” Round Culvert
L = 98.0’ RCP, square edge headwall, Ke= 0.500
Inlet / Outlet Invert= 55.20’ / 53.00’ S= 0.0224 ‘/’ Cc= 0.900
n= 0.025 Corrugated metal, Flow Area= 12.57 sf

#4 Primary 71.70’
24.0’ long x 15.0’ breadth Broad-Crested Rectangular Weir
Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60
Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow
Max=133.90 cfs @ 13.92 hrs HW=71.56’ (Free Discharge)
3=Culvert (Passes 133.90 cfs of 212.06 cfs potential flow)
1=OUTLET STRUCTURE (Weir Controls 50.21 cfs @ 3.51 fps)
2=OUTLET STRUCTURE (Weir Controls 83.69 cfs @ 3.51 fps)
4=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Pond 6P: PROPOSED POND

Inflow Area=532.030 ac
Peak Elev=71.56'
Storage=19.834 af
Time span=0.00-90.00 hrs, dt=0.05 hrs, 1801 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 6S: E01
Runoff Area=532.030 ac  0.93% Impervious  Runoff Depth=1.40"
Flow Length=5,705’  Tc=111.3 min  CN=55  Runoff=198.19 cfs  62.258 af

Pond 6P: PROPOSED POND
Peak Elev=71.86’  Storage=20.647 af  Inflow=198.98 cfs  68.137 af
Outflow=195.47 cfs  68.071 af

Total Runoff Area = 532.030 ac  Runoff Volume = 62.258 af  Average Runoff Depth = 1.40"
99.07% Pervious = 527.087 ac  0.93% Impervious = 4.943 ac
Summary for Subcatchment 6S: E01

<table>
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<tr>
<th>Tc 1</th>
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</table>

Runoff = 198.19 cfs @ 13.68 hrs, Volume = 62.258 af, Depth = 1.40"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-90.00 hrs, dt= 0.05 hrs
Type III 24-hr 50-YR Rainfall=5.80"

<table>
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<tr>
<th>Area (ac)</th>
<th>CN</th>
<th>Description</th>
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<tbody>
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<td></td>
<td>Shallow Concentrated Flow, Forest w/Heavy Litter Kv= 2.5 fps</td>
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<tr>
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<td>Trap/Vee/Rect Channel Flow, Pumpkin Hollow Bk Bot.W=10.00' D=0.25' Z= 0.3 'Top.W=10.15' n= 0.055 Mountain streams w/large boulders</td>
</tr>
</tbody>
</table>

111.3  5,705 Total
Subcatchment 6S: E01

Hydrograph

Type III 24-hr 50-YR Rainfall=5.80"
Runoff Area=532.030 ac
Runoff Volume=62.258 af
Runoff Depth=1.40"
Flow Length=5,705'
Tc=111.3 min
CN=55
Summary for Pond 6P: PROPOSED POND

Inflow Area = 532.030 ac, 0.93% Impervious, Inflow Depth > 1.54" for 50-YR event

Inflow = 198.98 cfs @ 13.68 hrs, Volume = 68.137 af, Incl. 0.79 cfs Base Flow
Outflow = 195.47 cfs @ 13.82 hrs, Volume = 68.071 af, Atten= 2%, Lag= 8.4 min
Primary = 195.47 cfs @ 13.82 hrs, Volume = 68.071 af

Routing by Stor-Ind method, Time Span= 0.00-90.00 hrs, dt= 0.05 hrs
Starting Elev= 70.37’ Surf.Area= 2.435 ac Storage= 16.772 af
Peak Elev= 71.86’ @ 13.82 hrs Surf.Area= 2.780 ac Storage= 20.647 af (3.875 af above start)

Plug-Flow detention time = 372.8 min calculated for 51.269 af (75% of inflow)
Center-of-Mass det. time = 20.0 min (1,146.0 - 1,126.0)

Volume Invert Avail.Storage Storage Description
#1 55.00’ 23.943 af Custom Stage Data (Prismatic) Listed below (Recalc)

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<td>73.00</td>
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<td>2.898</td>
<td>23.943</td>
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</tbody>
</table>

Device Routing Invert Outlet Devices
#1 Device 3 70.37' 6.0' long x 0.7' breadth OUTLET STRUCTURE X 2.00
Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50
Coef. (English) 2.76 2.82 2.93 3.09 3.18 3.22 3.27 3.30 3.32 3.32 3.32

#2 Device 3 70.37' 10.0' long x 0.7' breadth OUTLET STRUCTURE X 2.00
Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50
Coef. (English) 2.76 2.82 2.93 3.09 3.18 3.22 3.27 3.30 3.32 3.32 3.32
#3 Primary 55.20’

### 3.32 48.0” Round Culvert
L= 98.0’ RCP, square edge headwall, Ke= 0.500
Inlet / Outlet Invert= 55.20’ / 53.00’ S= 0.0224 '/' Cc= 0.900
n= 0.025 Corrugated metal, Flow Area= 12.57 sf

#4 Primary 71.70’

### 24.0’ long x 15.0’ breadth Broad-Crested Rectangular Weir
Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60
Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

**Primary OutFlow**
Max=194.63 cfs @ 13.82 hrs HW=71.86’ (Free Discharge)

3=Culvert (Passes 190.60 cfs of 214.21 cfs potential flow)
1=OUTLET STRUCTURE (Weir Controls 71.48 cfs @ 4.00 fps)
2=OUTLET STRUCTURE (Weir Controls 119.13 cfs @ 4.00 fps)
4=Broad-Crested Rectangular Weir (Weir Controls 4.02 cfs @ 1.06 fps)

**Pond 6P: PROPOSED POND**

Inflow Area=532.030 ac
Peak Elev=71.86'
Storage=20.647 af
Time span=0.00-90.00 hrs, dt=0.05 hrs, 1801 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 6S: E01
Runoff Area=532.030 ac  0.93% Impervious  Runoff Depth=1.63"
Flow Length=5,705’  Tc=111.3 min  CN=55  Runoff=236.27 cfs  72.447 af

Pond 6P: PROPOSED POND
Peak Elev=72.05’ Storage=21.183 af  Inflow=237.06 cfs  78.326 af
Outflow=229.02 cfs  78.260 af

Total Runoff Area = 532.030 ac  Runoff Volume = 72.447 af  Average Runoff Depth = 1.63"
99.07% Pervious = 527.087 ac  0.93% Impervious = 4.943 ac
Summary for Subcatchment 6S: E01

Runoff = 236.27 cfs @ 13.62 hrs, Volume= 72.447 af, Depth= 1.63"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-90.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-YR Rainfall=6.20"

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<th>Description</th>
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<tr>
<td>218.860</td>
<td>55</td>
<td>Woods, Good, HSG B</td>
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<td>43.780</td>
<td>70</td>
<td>Woods, Good, HSG C</td>
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<td>65.650</td>
<td>77</td>
<td>Woods, Good, HSG D</td>
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<tr>
<td>26.560</td>
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<td>Pasture/grassland/range, Good, HSG B</td>
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<td>46</td>
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<td>6.060</td>
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<td>2 acre lots, 12% imp, HSG D</td>
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<td>532.030</td>
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<td>Weighted Average</td>
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<td>527.087</td>
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<td>99.07% Pervious Area</td>
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<tr>
<td>4.943</td>
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<td>0.93% Impervious Area</td>
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<table>
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<tr>
<th>Tc (min)</th>
<th>Length (feet)</th>
<th>Slope (ft/ft)</th>
<th>Velocity (ft/sec)</th>
<th>Capacity (cfs)</th>
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<td><strong>Sheet Flow,</strong> Woods: Dense underbrush n= 0.800 P2= 2.90&quot;</td>
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<td>16.2</td>
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<td>0.0400</td>
<td>2.08</td>
<td>5.25</td>
<td><strong>Trap/Vee/Rect Channel Flow, Pumpkin Hollow Bk</strong> Bot.W=10.00' D=0.25' Z= 0.3 ' Top.W=10.15' n= 0.055 Mountain streams w/large boulders</td>
</tr>
</tbody>
</table>

111.3 5,705 Total
Subcatchment 6S: E01

Type III 24-hr
100-YR Rainfall=6.20"
Runoff Area=532.030 ac
Runoff Volume=72.447 af
Runoff Depth=1.63"
Flow Length=5,705'
Tc=111.3 min
CN=55
Summary for Pond 6P: PROPOSED POND

Inflow Area = 532.030 ac, 0.93% Impervious, Inflow Depth > 1.77" for 100-YR event
Inflow = 237.06 cfs @ 13.62 hrs, Volume= 78.326 af, Incl. 0.79 cfs Base Flow
Outflow = 229.02 cfs @ 13.86 hrs, Volume= 78.260 af, Atten= 3%, Lag= 14.3 min
Primary = 229.02 cfs @ 13.86 hrs, Volume= 78.260 af

Routing by Stor-Ind method, Time Span= 0.00-90.00 hrs, dt= 0.05 hrs
Starting Elev= 70.37' Surf.Area= 2.435 ac Storage= 16.772 af
Peak Elev= 72.05' @ 13.86 hrs Surf.Area= 2.822 ac Storage= 21.183 af (4.411 af above start)

Plug-Flow detention time= 320.9 min calculated for 61.487 af (79% of inflow)
Center-of-Mass det. time= 19.1 min (1,121.0 - 1,101.9)

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<tr>
<td>56.00</td>
<td>0.024</td>
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<th>Outlet Devices</th>
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<td>Device 3</td>
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<td>0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50</td>
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<td>2.76 2.82 2.93 3.09 3.18 3.22 3.27 3.30 3.32 3.31 3.31</td>
</tr>
</tbody>
</table>
#3 Primary 55.20' 48.0' Round Culvert  
L= 98.0' RCP, square edge headwall, Ke= 0.500  
Inlet / Outlet Invert= 55.20' / 53.00' S= 0.0224 '/' Cc= 0.900  
n= 0.025 Corrugated metal, Flow Area= 12.57 sf  

#4 Primary 71.70' 24.0' long x 15.0' breadth Broad-Crested Rectangular Weir  
Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60  
Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63  

Primary OutFlow  Max=228.88 cfs @ 13.86 hrs HW=72.05' (Free Discharge)  
3=Culvert (Barrel Controls 215.58 cfs @ 17.16 fps)  
1=OUTLET STRUCTURE (Passes < 86.32 cfs potential flow)  
2=OUTLET STRUCTURE (Passes < 143.86 cfs potential flow)  
4=Broad-Crested Rectangular Weir (Weir Controls 13.30 cfs @ 1.59 fps)  

Pond 6P: PROPOSED POND  

Inflow Area=532.030 ac  
Peak Elev=72.05'  
Storage=21.183 af
Appendix H

Rain Garden – WQV and Pond Storage
**RAIN GARDEN**

**REQUIRED WATER QUALITY VOLUME (V\(_{WQ}\))**

Contributing Impervious Area = 0.21 acres

\[ V_{WQ} = \frac{1 \text{ inches}}{12 \text{ inches/foot}} \times (\text{Impervious Area} \times 43560 \text{ SF/ACRE}) \]

**REQUIRED V\(_{WQ}\) = 762.3 CF**

**VOLUME CALCULATIONS**

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<th>Stage (ft)</th>
<th>Elev (FT)</th>
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<th>Inc Storage (CF)</th>
<th>Total Storage (CF)</th>
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**RAIN GARDEN PROVIDES A STORAGE VOLUME OF = 1416 CF**
Appendix I

Aqua Swirl – WQV and Product Specifications
Aqua-Swirl™ Specifications

GENERAL

This specification shall govern the performance, materials and fabrication of the Stormwater Treatment System.

SCOPE OF WORK

The Aqua-Swirl™ shall be provided by AquaShield™, Inc., 2733 Kanasita Drive, Chattanooga, TN (888-344-9044), and shall adhere to the following material and performance specifications at the specified design flows and storage capacities.

MATERIALS

A. Stormwater Treatment System shall be made from High-Density Polyethylene (HDPE) resins meeting the following requirements:

1) HDPE Material - The HDPE material supplied under this specification shall be high density, high molecular weight as supplied by manufacturer. The HDPE material shall conform to ASTM D3350-02 with minimum cell classification values of 345464C.

2) PHYSICAL PROPERTIES OF HDPE COMPOUND
   a) Density - the density shall be no less than 0.955 g/cm^3 as referenced in ASTM D 1505.
   b) Melt Index - the melt index shall be no greater than 0.15 g/10 minutes when tested in accordance with ASTM D 1238- Condition 190/2.16.
   c) Flex Modulus - flexural modulus shall be 110,000 to less than 160,000 psi as referenced in ASTM D 790.
   d) Tensile Strength at Yield - tensile strength shall be 3,000 to less than 3,500 psi as referenced in ASTM D 638.
   e) Slow Crack Growth Resistance shall be greater than 100 hours (PENT Test) as referenced in ASTM F 1473 or greater than 5,000 hours (ESCR) as referenced in ASTM D 1693 (condition C).
f) Hydrostatic Design Basis shall be 1,600 psi at 23 degrees C when tested in accordance with ASTM D 2837.
g) Color – black with minimum 2% carbon black.

B. REJECTION - The Stormwater Treatment System may be rejected for failure to meet any of the requirements of this specification.

PERFORMANCE

A. The Stormwater Treatment System shall include a ___-inch inner diameter (ID) circular hydrodynamic flow-through treatment chamber to treat the incoming water. A tangential inlet shall be provided to induce a swirling flow pattern that will cause sedimentary solids to accumulate in the bottom center of the chamber in such a way as to prevent re-suspension of captured particles. An arched baffle wall shall be provided in such a way as to prevent floatable liquid oils and solids from exiting the treatment chamber while enhancing the swirling action of the stormwater.

B. The Stormwater Treatment System shall have a sediment storage capacity of ___ cubic feet and be capable of capturing ____ gallons of petroleum hydrocarbons. The Stormwater Treatment System shall have a treatment capacity of _____ cubic feet per second (cfs). The Stormwater Treatment System shall be capable of removing floating trash and debris, floatable oils and 80% of total suspended solids from stormwater entering the treatment chamber.

C. Service access to the Stormwater Treatment System shall be provided via 30-inch inner diameter (ID) access riser(s) over the treatment chamber such that no confined space entry is required to perform routine inspection and maintenance functions.

TREATMENT CHAMBER CONSTRUCTION

A. The treatment chamber shall be constructed from solid wall HDPE ASTM F 714 cell class 345464C. For sizes above 63-inch OD, the treatment chamber shall be constructed from profile wall HDPE ASTM F 894 RSC 250 pipe or solid wall HDPE.

B. The bottom thickness of the treatment chamber will be determined in accordance with ASTM F 1759. Calculations must be provided to justify the thickness of the bottom.
C. The inlets and outlets shall be extrusion welded on the inside and outside of the structure using accepted welding methods.

D. The arched baffle wall shall be constructed from HDPE and shall be extrusion welded to the interior of the treatment chamber using accepted welding methods with connections made at 180 degrees of each end.

E. HDPE lifting supports may be provided on the exterior of the Stormwater Treatment System in such a way as to allow the prevention of undue stress to critical components of the Stormwater Treatment System during loading, off-loading, and moving operations. The lifting supports shall be constructed as an integral part of the treatment chamber and extrusion welded using accepted welding methods.

F. The top of the treatment chamber shall be built to the requirements of the drawings. Deep burial applications shall require a reinforced HDPE top.

Reinforced concrete pads spanning the treatment chamber will be required with traffic rated frames and covers when the Stormwater Treatment System is used in traffic areas. A professional engineer shall approve the design of the concrete pad and the calculations must be included in the submittal.

The manufacturer, upon request, can supply anti-flotation/buoyancy calculations. In addition, typical drawings of the AquaShield™ Stormwater Treatment System with concrete anti-flotation structures can also be provided. Anti-flotation structure design and approval are ultimately the responsibility of the specifying engineer. The contractor shall provide the anti-flotation structures.

**INSTALLATION**

A. **Excavation and Bedding**

The trench and trench bottom shall be constructed in accordance with ASTM D 2321, Section 6, Trench Excavation, and Section 7, Installation. The Stormwater Treatment System shall be installed on a stable base consisting of 12 inches of Class I stone materials (angular, crushed stone or rock, crushed gravel; large void content, containing little or no fines) as defined by ASTM D 2321, Section 5, Materials, and compacted to 95% proctor density.
All required safety precautions for the Stormwater Treatment System installation are the responsibility of the contractor.

**B. Backfill Requirements**

Backfill materials shall be Class I or II stone materials (well graded gravels, gravelly sands; containing little or no fines) as defined by ASTM D 2321, Section 5, Materials, and compacted to 90% proctor density. Class I materials are preferred. Backfill and bedding materials shall be free of debris. Backfilling shall conform to ASTM F 1759, Section 4.2, “Design Assumptions.” Backfill shall extend at least 3.5 feet beyond the edge of the Stormwater Treatment System for the full height to sub grade and extend laterally into undisturbed soils.

**C. Pipe Couplings**

Pipe couplings to and from the Stormwater Treatment System shall be Fernco®, Mission™ or an equal type flexible boot with stainless steel tension bands. A metal sheer guard shall be used to protect the flexible boot.

**DIVISION OF RESPONSIBILITY**

**A. Stormwater Treatment System Manufacturer**

The manufacturer shall be responsible for delivering the Stormwater Treatment System to the site. The system includes the treatment chamber with debris baffle, inlet and outlet stub-outs, lifting supports, 30-inch ID service access riser(s) to grade with temporary cover(s), and manhole frame(s) and cover(s).

**B. Contractor**

The contractor shall be responsible for preparing the site for the system installation including, but not limited to, temporary shoring, excavation, cutting and removing pipe, new pipe, bedding, and compaction. The contractor shall be responsible for furnishing the means to lift the system components off the delivery trucks. The contractor shall be responsible for providing any concrete anti-floatation/anti-creep restraints, anchors, collars, etc. with any straps or connection devices required. The contractor shall be responsible for field cutting, if necessary, and HDPE service access risers to grade. The contractor shall be responsible for sealing the pipe connections to the Stormwater Treatment System, backfilling and furnishing all labor, tools, and materials needed.
SUBMITTALS

The contractor shall be provided with dimensional drawings; and when specified, utilize these drawings as the basis for preparation of shop drawings showing details for construction and reinforcing. Shop drawings shall be annotated to indicate all materials to be used and all applicable standards for materials, required tests of materials, and design assumptions for structural analysis. Shop drawings shall be prepared at a scale of not less than ¼ inch per foot. Three (3) hard copies of said shop drawings shall be submitted to the specifying engineer for review and approval.

QUALITY CONTROL INSPECTION

A. Materials
The quality of materials, the process of manufacturing, and the finished sections shall be subject to inspection by the specifying engineer. Such inspection may be made at the place of construction, on the work site after delivery, or at both places. The sections shall be subject to rejection at any time if material conditions fail to meet any of the specification requirements, even though sample sections may have been accepted as satisfactory at the place of manufacture. Sections rejected after delivery to the site shall be marked for identification and shall be removed from the site at once. All sections, which are damaged beyond repair after delivery will be rejected; and, if already installed, shall be repaired to the specifying engineer's acceptance level, if permitted, or removed and replaced entirely at the contractor's expense.

B. Inspection
All sections shall be inspected for general appearance, dimensions, soundness, etc.

C. Defects
Structural defects may be repaired (subject to the acceptance of the specifying engineer) after demonstration by the manufacturer that strong and permanent repairs will be made. The specifying engineer, before final acceptance of the components, shall carefully inspect repairs.
### Aqua-Swirl™ Sizing Chart (English)

<table>
<thead>
<tr>
<th>Aqua-Swirl™ Model</th>
<th>Swirl Chamber Diameter (ft.)</th>
<th>Maximum Stub-Out Pipe Outer Diameter (in.)</th>
<th>Water Quality Treatment Flow² (cfs)</th>
<th>Oil/Debris Storage Capacity (gal)</th>
<th>Sediment Storage Capacity (ft³)</th>
</tr>
</thead>
<tbody>
<tr>
<td>AS-2</td>
<td>2.50</td>
<td>8</td>
<td>1.1</td>
<td>37</td>
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<td>AS-3</td>
<td>3.25</td>
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<td>1.8</td>
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<td>4.25</td>
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<td>AS-6</td>
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<td>14</td>
<td>6.3</td>
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<td>Custom</td>
<td>--</td>
<td>&gt;26</td>
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</table>

*Higher water quality treatment flow rates can be designed with multiple swirls.

1) The **Aqua-Swirl™ Conveyance Flow Diversion (CFD)** provides full treatment of the "first flush," while the peak design storm is diverted and channeled through the main conveyance pipe. Please refer to your local representative for more information.

2) Many regulatory agencies are establishing "water quality treatment flow rates" for their areas based on the initial movement of pollutants into the storm drainage system. The treatment flow rate of the Aqua-Swirl™ system is engineered to meet or exceed the local water quality treatment criteria. This "water quality treatment flow rate" typically represents approximately 90% to 95% of the total annual runoff volume.

The design and orientation of the Aqua-Filter™ generally entails some degree of customization. For assistance in design and specific sizing using historical rainfall data, please refer to an AquaShield™ representative or visit our website at www.AquaShieldInc.com. CAD details and specifications are available upon request.
## Water Quality Volume (WQV)

<table>
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<tr>
<th>Input</th>
<th>Value</th>
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<td>Impervious</td>
<td>10 (%)</td>
</tr>
<tr>
<td>Area</td>
<td>28.08494 (ac)</td>
</tr>
<tr>
<td>P</td>
<td>1</td>
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</table>

<table>
<thead>
<tr>
<th>Equations</th>
<th>Value</th>
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<tr>
<td>WQV</td>
<td>0.327658</td>
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</table>
Appendix J

Inspection and Maintenance Report Form
INPECTION & MAINTENANCE REPORT FORM

Conway Community Swimming Pool

To be completed every 14 calendar days and within 24 hours of the end of a storm event of 0.5 inches or greater

Inspector: ___________________________ Date: ___________________________

Current Construction Phase: ___________________________

Inspector’s Title and Qualifications: ___________________________

Summary of Previous 14-day Rainfall:

<table>
<thead>
<tr>
<th>Date</th>
<th>Friday Date</th>
<th>Saturday Date</th>
<th>Sunday Date</th>
<th>Monday Date</th>
<th>Tuesday Date</th>
<th>Wednesday Date</th>
<th>Thursday Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Daily Rainfall (in.)</td>
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<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Total Daily Rainfall (in.)</td>
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<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
</tbody>
</table>

Source of rainfall amounts: ___________________________

Condition of Pond:

<table>
<thead>
<tr>
<th>Location</th>
<th>Condition</th>
<th>Maintenance Required</th>
</tr>
</thead>
</table>

Stabilization Measures:

| Area | Disturbed (Yes/No) | Stabilized (Yes/No) | Stabilized With | Condition |
|------|--------------------|---------------------|-----------------|-----------|-----------|
|      |                    |                     |                 |           |           |
**INPECTION & MAINTENANCE REPORT FORM**

Conway Community Swimming Pool

<table>
<thead>
<tr>
<th>Construction Site &amp; Adjacent Areas:</th>
</tr>
</thead>
<tbody>
<tr>
<td>General condition: ____________________</td>
</tr>
<tr>
<td></td>
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<tr>
<td></td>
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<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

| Is sediment being tracked on to road?: ________________ |
|                                                     |
|                                                     |
|                                                     |

| Maintenance required? ____________________ |
|                                       |
|                                       |
|                                       |

<table>
<thead>
<tr>
<th>Changes Required to the Construction Phasing and Erosion Control Plan:</th>
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</thead>
<tbody>
<tr>
<td></td>
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<tr>
<td></td>
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<td></td>
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<tr>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Reasons for Changes:</th>
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</thead>
<tbody>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
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<td></td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>
INPSECTION & MAINTENANCE REPORT FORM

Conway Community Swimming Pool

General Remarks

Certification:

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

Signature: ____________________________ Date: ________________
Operation and Maintenance Plan
Conway Community Swimming Pool Repairs and Improvements

Conway Community Swimming Pool, Inc.
Conway, Massachusetts

February 12, 2013

FUSS & O’NEILL
78 Interstate Drive
West Springfield, MA  01089
# Table of Contents

Operation and Maintenance Plan  
Conway Community Swimming Pool Repairs and Improvements

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2 Site Description .................................................................... 1
3 Dam Operation and Maintenance ........................................... 1
4 Site Operation and Maintenance ............................................. 2
5 Winter Drawdown ................................................................... 3

Appendices

A Site Operation and Maintenance Log

End of Report
1 Executive Summary

This Operation and Maintenance Schedule (O&M) is for the repairs and improvements performed at the Conway Community Swimming Pool located at 332 Whately Road in Conway, Massachusetts. The swimming pool is located on a 7.3 acre parcel owned by Conway Community Swimming Pool, Inc. (CCSPI). C C S P I will be responsible for all operation and maintenance of the Conway Community Swimming Pool.

This O&M has been prepared in accordance with the Department of Conservation and Recreation MGL Chapter 253, the MassDEP Massachusetts Stormwater Handbook, and the 2004 Eutrophication and Aquatic Plan Management in Massachusetts Final Generic Environmental Impact Report.

This O&M is to outline the proper maintenance of the dam; maintenance of the site stormwater management to ensure that it functions properly; and the operations required for the yearly winter drawdown of the swimming pool to provide maintenance to the beach area.

2 Site Description

The Conway Community Swimming Pool is a man-made pond built for the residents of Conway. The site contains a paved parking area with reinforced turf overflow parking, handicap accessible stone dust paths, stone dust paths with timber and crushed stone stairs, a play equipment area, a picnic area, a pavilion, a beach area, a handicap accessible beach ramp and dock, a stone dust maintenance access to the pond for maintenance, and a stone dust maintenance access to the dam for maintenance.

The swimming pool is located along Pumpkin Hollow Brook and is impounded by an earthen dam. The pond contains an 8 foot by 12 foot concrete outlet structure to maintain water elevations, a 27 foot by 30 foot emergency spillway, and a concrete block j-hook (groin) to help protect the sand in the swimming area from washing into the main pool area. The outlet structure contains four (4) weirs, a mid-level orifice and slide gate for drawdown, and a low-level orifice and slide gate to help lower pond water elevations during high storm events.

For the purposes of stormwater management, the pool contains a rain garden located to the west of the paved parking area and a stormwater treatment system located on the discharge side of the 12 inch culvert under the main access driveway.

3 Dam Operation and Maintenance

Operation and maintenance of the dam must be in accordance with the Massachusetts Department of Conservation and Recreation (DCR) Office of Dam Safety (ODS). ODS has classified the dam as an “Intermediate” size structure with a “Significant” hazard classification. Per 302 CMR 10.07 the dam is required to be inspected a minimum of every five (5) years. The dam must be inspected by a registered professional engineer experienced in the design, construction and inspection of dams.
CCSPI must provide an inspection report to the Commissioner within 30 days of inspection. The report must be stamped by a register professional engineer.

4 Site Operation and Maintenance

Operation and maintenance of stormwater components must comply will the Massachusetts Stormwater Handbook. The post construction operation and maintenance plan outlined hereafter provides inspection and maintenance of the site and stormwater BMPs. This O&M will minimize pollutant discharge and keep the stormwater components functioning properly.

- CCSIPI will be responsible for the operation and maintenance of the stormwater components.
- Refer to the attached Site Plan for the location of the stormwater components and their access areas. (Located in the attached Drainage and Stormwater Report, Appendix L)
- Paved surfaces will be swept twice annually, April and October, to remove sand and debris following winter and summer months.
- After major storm events, stone dust paths and access roads shall be inspect for evidence of erosion. Any erosion shall be cleaned up and repaired.
- All culverts will be inspected at a minimum of four (4) times per year to maintain proper operation. Remove accumulated sediment and debris from inlet area, outlet area and culvert.
- At least twice per year, during the spring (April) and fall (November), the outlet structure will be examined and cleaned, and all floatables and solids trapped will be removed.
- The pond shall be inspected at least twice a year and after major storm events. The outlet structure shall be inspected for evidence of clogging or outflow release velocities that are greater than the design flow. All upper-stage, side slopes, embankments and emergency spillway shall be mowed at least twice a year. Additional pond maintenance is described below in Section 6, Winter Drawdown.
- The emergency spillway shall be inspected at least twice a year and after major storm events. Accumulated sediment, debris and trash shall be removed. Inspect for evidence of erosion, any erosion shall be repaired.
- The rain garden shall be inspected monthly for soil erosion and repaired as required. Liter and trash shall be removed monthly. Mowing must be completed 2 to 12 times per year as required. Mulching, fertilizing and pruning shall be completed annually. Dead vegetation shall be removed and replaced twice a year (spring and fall).
- The stormwater treatment system shall be inspected in accordance with manufactures recommendations.

An operation and maintenance log must be kept for at least three (3) years. This log must include inspections conducted, repairs made, and replacements of any of the site and the stormwater components. In addition the log must include materials that need to be disposed and their disposal locations. The log must be made available to MassDEP and the Conservation Commission upon request. Members of the MassDEP and Conservation Commission must be allowed access to the
site to enter and inspect the premises to evaluate and ensure the O&M is being followed. An example Site Operation and Maintenance Log can be found in Appendix A.

5 Winter Drawdown

The winter drawdown will be in accordance with the 2004 Eutrophication and Aquatic Plant Management in Massachusetts Final Generic Environmental Impact Report (GEIR). The Massachusetts Department of Fish and Game (MDFG) have offered the following guidelines to meet fish and wildlife management goals where drawdowns have been determined to have desired benefits:

- Limit drawdown to 3 ft or contact the MDFG for assistance in evaluating impacts of greater drawdown; however, exceeding this level may meet DFG guidelines if justified in the NOI or lake management plan. The DFG policy is to review drawdowns in excess of three (3) feet.
- Commence drawdown after the beginning of November.
- Achieve the target drawdown depth by the beginning of December.
- Achieve full lake level by the beginning of April.
- Keep outflow during drawdown below a discharge equivalent to 4 cfs per square mile of watershed. Once the target water level is achieved, match outflow to inflow to the greatest extent possible, maintaining a stable water level.
- Keep outflow during refill above a discharge equivalent to 0.5 cfs per square mile of watershed.

Drawdown will be conducted in three (3) phases:

- Phase 1: Open the mid-level orifice 2 inches for seven day
- Phase 2: On day 7 open the mid-level orifice another 4 inches for a total of 6 inches open
- Phase 3: On day 8 open the mid-level orifice the full 12 inches

On day 9 the water elevation in the pond should be at approximately 64.0 feet. During the time of drawdown, the outlet structure and outflow will be monitored to ensure discharge flows do not exceed 3.32 cfs (equivalent to 4.0 cfs per square mile of watershed area). Once the pond has reached a water elevation of approximately 64.0 feet, the mid-level orifice will remain open to maintain a stable water level. In the event of a large storm during this time the low-level orifice may be opened to accommodate additional flow that will accumulate within the pond. After the water level has been stabilized the low-level orifice must be closed. When the pond is required to be filled to the 70.37 water elevation, the mid-level orifice will closed to an opening of 0.5 inches to allow the pond to refill. This should take approximately 19 days. As the pond is refilling monitoring must be completed to ensure outflow velocity will be above the required 0.42 cfs (equivalent to 0.5 cfs per watershed area). Once the pond is filled to the 70.37 feet water elevation the mid-level outlet will be closed.
Appendix A

Sample Site Operation & Maintenance Log
Site Operation and Maintenance Log Form

Project/Location: ________________________________

“As Built” Plans Available? ________________________________

Date/Time: ________________________________

Days Since Previous Rainfall and Rainfall Amount: ________________________________

Inspector: ________________________________

<table>
<thead>
<tr>
<th>Maintenance Item</th>
<th>Satisfactory</th>
<th>Unsatisfactory</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Driveway and Parking Sweeping</td>
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<td></td>
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</tr>
<tr>
<td>- Sand and debris been removed</td>
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<td></td>
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<tr>
<td>2. Aqua-Swirl Stormwater Treatment System</td>
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</tr>
<tr>
<td>- Location</td>
<td></td>
<td></td>
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<tr>
<td>- Sediment depth greater then 15% capacity</td>
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<td>3. Rain Garden</td>
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<tr>
<td>- Vegetation coverage adequate</td>
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<tr>
<td>- Undesirable vegetative growth</td>
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</tr>
<tr>
<td>- Undesirable woody vegetation</td>
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</tr>
<tr>
<td>- Mowing performed as necessary</td>
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</tr>
<tr>
<td>- Embankment in good repair</td>
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</tr>
<tr>
<td>- No evidence of erosion</td>
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<tr>
<td>- Low flow channels clear of obstructions</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>- Standing water or wet spots</td>
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<td></td>
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<tr>
<td>- Sediment and/or trash accumulation</td>
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<td>- Other (specify)</td>
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<td>4. Emergency Spillway</td>
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<td>- Undesirable woody vegetation</td>
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<td>- Low flow channels clear of obstructions</td>
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<tr>
<td>5. Dam Embankment</td>
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<tr>
<td>• Vegetation coverage adequate</td>
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<tr>
<td>• Undesirable vegetative growth</td>
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<td>6. Outlet Structure</td>
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<td>General Conditions</td>
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<tr>
<td>Weirs obstructed with debris</td>
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</tr>
<tr>
<td>Mid-level trash rack obstructed with debris</td>
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<td>Low-level orifice obstructed</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Low-level trash rack obstructed with debris</td>
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<tr>
<td>Accumulation of sediment inside structure</td>
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<td>Concrete conditions</td>
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<tr>
<td>Mid-level orifice control valve condition</td>
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<tr>
<td>Low-level orifice control valve condition</td>
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<td>Other (specify)</td>
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<td>7. Culvert Crossings</td>
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</tr>
<tr>
<td>• Location ________________________________</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A. Inlet:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• General Condition</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Sump clean of all sedimentation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Other (specify)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>B. Outlet (if applicable):</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• General Condition</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Rip rap protection condition</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Slope condition</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• No Evidence of erosion</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Endwall/Headwall Condition (if applicable)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Flared end condition (if applicable)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Other (specify)</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

Appendix L

Site Plans

(for purposes of the NOI, Site Plans are located in Appendix A of the Notice of Intent)
Appendix E

Abutters List and Assessor’s Maps
**Abutters List**

Abutters within 100 feet of the project work limits and CCSPI parcel from Level 3 GIS Data, MassGIS.

<table>
<thead>
<tr>
<th>Site Address</th>
<th>Owner</th>
<th>Owner Address</th>
</tr>
</thead>
<tbody>
<tr>
<td>149 Old Cricket Hill Rd</td>
<td>Jason A. Parker</td>
<td>149 Old Cricket Hill Rd Conway, MA 01341</td>
</tr>
<tr>
<td>266 Whately Rd</td>
<td>Phyllis R. Ostrowski Perry</td>
<td>266 Whately Rd Conway, MA 01341</td>
</tr>
<tr>
<td>309 Whately Rd</td>
<td>Mary B. Parker</td>
<td>309 Whately Rd Conway, MA 01341</td>
</tr>
<tr>
<td>Old Cricket Hill Rd</td>
<td>Mary B. Parker</td>
<td>309 Whately Rd Conway, MA 01341</td>
</tr>
<tr>
<td>244 Whately Rd</td>
<td>Thomas C. O'Brien</td>
<td>244 Whately Rd Conway, MA 01341</td>
</tr>
</tbody>
</table>
Mary B. Parker
Deed Bk. 5797, Pg. 201

Conway Community Swimming Pool, Inc.
Deed Bk. 955, Pg. 419
Total Area = 8.1 Acres
(Inserts Parcels A & C)

Whately Road

Parcel A
10,474 Sq. Ft.
Being a portion of Deed Bk. 5797, Pg. 201
and is to be conveyed to and combined
with land of Conway Community Swimming
Pool, Inc.

Parcel B
4,730 Sq. Ft.
Being a portion of Deed Bk. 955, Pg. 419
and is to be conveyed to and combined
with land of Mary B. Parker

Parcel C
1,680 Sq. Ft.
Being a portion of Deed Bk. 5797, Pg. 201
and is to be conveyed to and combined
with land of Conway Community Swimming
Pool, Inc.

Note
Subdivision control is not in
effect in Conway at this time

Plan of Land
prepared for
Conway Community Swimming Pool, Inc.
located in
Conway, Massachusetts

Daniel L. Werner, P.L.S., 225 Shelburne Line Road
Colrain, Massachusetts
Scale: 1" = 60'
Date: May 2, 2012