



Notice of Intent Application

July 21, 2016

Subject Property

Willow Avenue
Assessor's Parcel ID: 768-780-20-2
Haverhill, Massachusetts

Applicant

Lodestar Energy LLC
3 Ellsworth Place, Suite 122
Avon, CT 06001

Property Owner

Bradford Holdings, LLC
15 Dartmouth Drive, Suite 102
Auburn, NH 03032

LEC Environmental Consultants, Inc.

380 Lowell Street
Suite 101
Wakefield, MA 01880
781-245-2500
781-245-6677 fax

www.lecenvironmental.com



July 21, 2016

Hand Delivery

Haverhill Conservation Commission
City Hall, Room 300
4 Summer Street
Haverhill, MA 01830

**Re: Notice of Intent Application
Interconnection Access Driveway
Willow Avenue
Assessor’s Parcel ID: 768-780-20-2
Haverhill, Massachusetts**

[LEC File #: BHLLC\14-258.02]

Dear Commission Members:

On behalf of the Applicant, Lodestar Energy LLC, LEC Environmental Consultants, Inc., (LEC) has prepared this Notice of Intent (NOI) Application for the installation of three utility poles and construction of a gravel maintenance driveway according to the National Grid requirements for an electrical interconnection at the above-referenced property. The proposed work will occur within the Buffer Zone to Bordering Vegetated Wetlands (BVW) and within 100-feet of Certified Vernal Pool (CVP) #3624.

Enclosed please find two checks made payable to the City of Haverhill in the amounts of Two Hundred, Sixty-Two Dollars and Fifty Cents (\$262.50) for the city portion of the state filing fees and Three-Thousand, Nine Hundred Four Dollars and Thirty Cents (\$3,904.30) for local filing fees and legal advertisement. Also attached is a copy of the check made payable to the Commonwealth of Massachusetts in the amount of Two-Hundred, Thirty-Seven Dollars and Fifty Cents (\$237.50) sent to the DEP Lockbox, as well as the WPA Form 3 – NOI Form, HCC Form 3 – Notice of Intent Local Application Form, and abutter notification documents (Appendix A).

General Site Description

The gravel maintenance driveway and three interconnection utility poles are proposed within a very small portion of the 27+/- acre parcel afforded frontage on Willow Avenue in the Bradford section of Haverhill. A BVW containing CVP #3624 is located west of the gravel maintenance driveway, and a second separate BVW is located east of the gravel maintenance driveway. The boundaries of these two BVWs and mapping of the CVP were reviewed and approved by the Commission under DEP File #: 33-1346 through issuance of an Order of Conditions on September 4, 2015. These same boundaries have been transferred to the Site plan (attached).

LEC Environmental Consultants, Inc.

www.lecenvironmental.com

12 Resnik Road
Suite 1
Plymouth, MA 02360
508-746-9491
508-746-9492 (Fax)

PLYMOUTH, MA

380 Lowell Street
Suite 101
Wakefield, MA 01880
781-245-2500
781-245-6677 (Fax)

WAKEFIELD, MA

100 Grove Street
Suite 302
Worcester, MA 01605
508-753-3077
508-753-3177 (Fax)

WORCESTER, MA

P. O. Box 590
Rindge, NH 03461
603-899-6726
603-899-6726 (Fax)

RINDGE, NH



Natural Heritage and Endangered Species Program Designation

According to the 2008 edition of the NHESP *Massachusetts Natural Atlas* – South Groveland Quadrangle, the property is not located within Priority Habitat of Rare Species or Estimated Habitat of Rare Wildlife (see Appendix B, Figure 1).

FEMA Floodplain Designation

According to the July 3, 2012 Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM), Community Panel 226, Map Number 25009C0226F, the property is located within Areas determined to be outside the 0.2% annual chance floodplain and not within the 100-year floodplain (see Appendix B, Figure 2).

Proposed Project

An 18-foot wide, 180 linear foot long, gravel maintenance driveway and turnaround will be constructed and three utility poles installed for an electrical interconnection and emergency shutoff. The gravel driveway has been designed within the same footprint as the previously approved gravel access road (DEP File #: 33-1346), except the prior gravel road extended further into the site and contributed approximately 600 linear feet of roadway runoff (7,200 +/- s.f.), and the new gravel driveway only contributes runoff from 4,000 +/- s.f., resulting in a 3,200 s.f. reduction. In an effort to reduce site grading and protect the 35-foot Buffer Zone to the greatest extent feasible, a 2-foot high boulder wall and maximum 5-foot high gravity block wall have been incorporated into the design as shown on the plans (attached).

To mitigate runoff from the gravel driveway, a 600 s.f. bio-retention area will be constructed with a 12-inch culvert (see Stormwater Calculations, attached) beneath the gravel maintenance driveway to receive minimal flows for the eastern side of the driveway. The driveway is slightly cross pitched westerly towards a stone swale along the edge of the driveway that infiltrates runoff and/or directs flows toward the bio-retention area. The bio-retention areas will be seeded with New England Wetland Seed Mix, the same seed mix as previously approved by the Commission. The remaining graded areas will be loamed and seeded with 40% Dutch White Clover, 40% Creeping Red Fescue, and 20% Rough Bentgrass as previously approved by the Commission. An erosion control barrier comprised of 12-inch diameter straw wattles will be established along the limit-of-work and remain in place until construction is complete and graded areas are stabilized.

Thank you for your consideration of this Application. We look forward to presenting this project to the Commission at the August 4, 2016 Public Hearing. Meanwhile, should you have any questions or require additional information, I may be contacted at 781-245-2500 or amarton@lecenvironmental.com.

Sincerely,

LEC Environmental Consultants, Inc.

Ann M. Marton, President
Director of Ecological Services

cc: DEP, Northeast Region; Lodestar Energy LLC; Bradford Holdings, LLC; Design Consultants, Inc.

Appendix A

WPA Form 3 – Notice of Intent

WPA Appendix B – Wetland Fee Transmittal Form

HCC Form 3 – Notice of Intent Local Application

Copy of Filing Fees

Affidavit of Service

Letter to Abutters

Abutter Notification Form

List of Abutters



WPA Form 3 – Notice of Intent

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

Provided by MassDEP:

MassDEP File Number

Document Transaction Number

Haverhill

City/Town

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



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

A. General Information

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

Willow Avenue
a. Street Address

Haverhill
b. City/Town

01835
c. Zip Code

Latitude and Longitude:
N42 44' 45"
d. Latitude

W 71 5' 44"
e. Longitude

768-780-20-2
f. Assessors Map/Plat Number

g. Parcel /Lot Number

2. Applicant:

Jordan
a. First Name

Belknap
b. Last Name

Lodestar Energy LLC
c. Organization

3 Ellsworth Place, Suite 122
d. Street Address

Avon
e. City/Town

CT
f. State

06001
g. Zip Code

617-982-3201
h. Phone Number

215-207-9793
i. Fax Number

jbelknap@lodestarenergy.com
j. Email Address

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

Susan
a. First Name

Mesiti, Manager
b. Last Name

Bradford Holdings, LLC
c. Organization

15 Dartmouth Drive, Suite 102
d. Street Address

Auburn
e. City/Town

NH
f. State

03032
g. Zip Code

603-490-7178
h. Phone Number

i. Fax Number

susan@re-results.com
j. Email address

4. Representative (if any):

Ann M.
a. First Name

Marton
b. Last Name

LEC Environmental Consultants, Inc.
c. Company

380 Lowell Street, Suite 101
d. Street Address

Wakefield
e. City/Town

MA
f. State

01880
g. Zip Code

781-245-2500
h. Phone Number

781-245-6677
i. Fax Number

amarton@lecenvironmental.com
j. Email address

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

\$500.00
a. Total State Fee Paid

\$237.50
b. State Fee Paid

\$262.50
c. City/Town Fee Paid

\$3,904.30
d. Total Local Fee Paid



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A. General Information (continued)

6. General Project Description:

Installation of three utility poles and construction of a gravel access drive to access an electrical interconnection.

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

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

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

- 1. Yes No If yes, describe which limited project applies to this project. (See 310 CMR 10.24 and 10.53 for a complete list and description of limited project types)

2. Limited Project Type

If the proposed activity is eligible to be treated as an Ecological Restoration Limited Project (310 CMR 10.24(8), 310 CMR 10.53(4)), complete and attach Appendix A: Ecological Restoration Limited Project Checklist and Signed Certification.

8. Property recorded at the Registry of Deeds for:

Essex South

a. County

20342

c. Book

b. Certificate # (if registered land)

325

d. Page Number

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

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

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



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

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

Resource Area	Size of Proposed Alteration	Proposed Replacement (if any)
a. <input type="checkbox"/> Bank	1. linear feet	2. linear feet
b. <input type="checkbox"/> Bordering Vegetated Wetland	1. square feet	2. square feet
c. <input type="checkbox"/> Land Under Waterbodies and Waterways	1. square feet	2. square feet
	3. cubic yards dredged	

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

2. Width of Riverfront Area (check one):

- 25 ft. - Designated Densely Developed Areas only
- 100 ft. - New agricultural projects only
- 200 ft. - All other projects

3. Total area of Riverfront Area on the site of the proposed project: _____ square feet

4. Proposed alteration of the Riverfront Area:

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

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

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

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

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



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

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

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

<u>Resource Area</u>	<u>Size of Proposed Alteration</u>	<u>Proposed Replacement (if any)</u>
a. <input type="checkbox"/> Designated Port Areas	Indicate size under Land Under the Ocean, below	
b. <input type="checkbox"/> Land Under the Ocean	_____	
	1. square feet	

	2. cubic yards dredged	
c. <input type="checkbox"/> Barrier Beach	Indicate size under Coastal Beaches and/or Coastal Dunes below	
d. <input type="checkbox"/> Coastal Beaches	_____	_____
	1. square feet	2. cubic yards beach nourishment
e. <input type="checkbox"/> Coastal Dunes	_____	_____
	1. square feet	2. cubic yards dune nourishment
	<u>Size of Proposed Alteration</u>	<u>Proposed Replacement (if any)</u>
f. <input type="checkbox"/> Coastal Banks	_____	
	1. linear feet	
g. <input type="checkbox"/> Rocky Intertidal Shores	_____	
	1. square feet	
h. <input type="checkbox"/> Salt Marshes	_____	_____
	1. square feet	2. sq ft restoration, rehab., creation
i. <input type="checkbox"/> Land Under Salt Ponds	_____	
	1. square feet	

	2. cubic yards dredged	
j. <input type="checkbox"/> Land Containing Shellfish	_____	
	1. square feet	
k. <input type="checkbox"/> Fish Runs	Indicate size under Coastal Banks, inland Bank, Land Under the Ocean, and/or inland Land Under Waterbodies and Waterways, above	

	1. cubic yards dredged	
l. <input type="checkbox"/> Land Subject to Coastal Storm Flowage	_____	
	1. square feet	
4. <input type="checkbox"/> 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. <input type="checkbox"/> Project Involves Stream Crossings		
	_____	_____
	a. number of new stream crossings	b. number of replacement stream crossings



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C. Other Applicable Standards and Requirements

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

Streamlined Massachusetts Endangered Species Act/Wetlands Protection Act Review

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

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

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

- 2008 _____
b. Date of map

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

- c. Submit Supplemental Information for Endangered Species Review*

1. Percentage/acreage of property to be altered:
 - (a) within wetland Resource Area _____ percentage/acreage
 - (b) outside Resource Area _____ percentage/acreage
2. Assessor's Map or right-of-way plan of site

2. Project plans for entire project site, including wetland resource areas and areas outside of wetlands jurisdiction, showing existing and proposed conditions, existing and proposed tree/vegetation clearing line, and clearly demarcated limits of work **
 - (a) Project description (including description of impacts outside of wetland resource area & buffer zone)
 - (b) Photographs representative of the site

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

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



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

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

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

- (d) Vegetation cover type map of site
- (e) Project plans showing Priority & Estimated Habitat boundaries
- (f) OR Check One of the Following

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

- 2. Separate MESA review ongoing. a. NHESP Tracking # _____ b. Date submitted to NHESP _____

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

- 3. For coastal projects only, is any portion of the proposed project located below the mean high water line or in a fish run?
 - a. Not applicable – project is in inland resource area only
 - b. Yes No

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

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

North Shore - Hull to New Hampshire border:

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

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

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



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

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

4. Is any portion of the proposed project within an Area of Critical Environmental Concern (ACEC)?
- a. Yes No If yes, provide name of ACEC (see instructions to WPA Form 3 or MassDEP Website for ACEC locations). **Note:** electronic filers click on Website.
- b. ACEC
5. Is any portion of the proposed project within an area designated as an Outstanding Resource Water (ORW) as designated in the Massachusetts Surface Water Quality Standards, 314 CMR 4.00?
- a. Yes No
6. Is any portion of the site subject to a Wetlands Restriction Order under the Inland Wetlands Restriction Act (M.G.L. c. 131, § 40A) or the Coastal Wetlands Restriction Act (M.G.L. c. 130, § 105)?
- a. Yes No
7. Is this project subject to provisions of the MassDEP Stormwater Management Standards?
- a. Yes. Attach a copy of the Stormwater Report as required by the Stormwater Management Standards per 310 CMR 10.05(6)(k)-(q) and check if:
1. Applying for Low Impact Development (LID) site design credits (as described in Stormwater Management Handbook Vol. 2, Chapter 3)
 2. A portion of the site constitutes redevelopment
 3. Proprietary BMPs are included in the Stormwater Management System.
- b. No. Check why the project is exempt:
1. Single-family house
 2. Emergency road repair
 3. Small Residential Subdivision (less than or equal to 4 single-family houses or less than or equal to 4 units in multi-family housing project) with no discharge to Critical Areas.

D. Additional Information

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

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

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

1. USGS or other map of the area (along with a narrative description, if necessary) containing sufficient information for the Conservation Commission and the Department to locate the site. (Electronic filers may omit this item.)
2. Plans identifying the location of proposed activities (including activities proposed to serve as a Bordering Vegetated Wetland [BVW] replication area or other mitigating measure) relative to the boundaries of each affected resource area.



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

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D. Additional Information (cont'd)

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

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

Driveway Plan and Construction Details Sheet C-1 and Construction Detail Sheet C-2

a. Plan Title

Design Consultants, Inc.

Stephen B. Sawyer

b. Prepared By

c. Signed and Stamped by

July 20, 2016

1" = 40'

d. Final Revision Date

e. Scale

f. Additional Plan or Document Title

g. Date

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

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

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

8. Attach NOI Wetland Fee Transmittal Form

9. Attach Stormwater Report, if needed.

E. Fees

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

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

0000012

2. Municipal Check Number

7-18-16

3. Check date

0000013

4. State Check Number

7-18-16

5. Check date

Bradford Solar, LLC

6. Payor name on check: First Name

7. Payor name on check: Last Name



WPA Form 3 – Notice of Intent

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

MassDEP File Number

Document Transaction Number

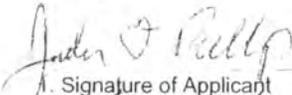
Haverhill

City/Town

F. Signatures and Submittal Requirements

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

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

	<i>Jessica Dr. Balkany</i> Director, Ludlow Energy, LLC	<u>7/20/16</u>
1. Signature of Applicant		2. Date
	<i>Anthony Mesiti</i> Manager Bradford Holdings, LLC	<u>7/7/2016</u>
3. Signature of Property Owner (if different)		4. Date
		<u>7-19-16</u>
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.



Massachusetts Department of Environmental Protection
 Bureau of Resource Protection - Wetlands
NOI Wetland Fee Transmittal Form
 Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

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



A. Applicant Information

1. Location of Project:

<u>Willow Avenue</u>	<u>Haverhill</u>
a. Street Address	b. City/Town
<u>0000013</u>	<u>\$237.50</u>
c. Check number	d. Fee amount

2. Applicant Mailing Address:

<u>Jordan</u>	<u>Belknap</u>	
a. First Name	b. Last Name	
<u>Lodestar Energy LLC</u>		
c. Organization		
<u>3 Ellsworth Place, Suite 122</u>		
d. Mailing Address		
<u>Avon</u>	<u>CT</u>	<u>06001</u>
e. City/Town	f. State	g. Zip Code
<u>617-982-3201</u>	<u>781-245-6677</u>	<u>jbelknap@lodestarenergy.com</u>
h. Phone Number	i. Fax Number	j. Email Address

3. Property Owner (if different):

<u>Susan</u>	<u>Mesiti, Manager</u>	
a. First Name	b. Last Name	
<u>Bradford Holdings, LLC</u>		
c. Organization		
<u>15 Dartmouth Drive, Suite #102</u>		
d. Mailing Address		
<u>Auburn</u>	<u>NH</u>	<u>03032</u>
e. City/Town	f. State	g. Zip Code
<u>603-490-7178</u>		<u>susan@re-results.com</u>
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.

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



Massachusetts Department of Environmental Protection
 Bureau of Resource Protection - Wetlands
NOI Wetland Fee Transmittal Form
 Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

B. Fees (continued)

Step 1/Type of Activity	Step 2/Number of Activities	Step 3/Individual Activity Fee	Step 4/Subtotal Activity Fee
Category 2J-gravel driveway	1	1	\$500.00
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
Step 5/Total Project Fee:			\$500.00
Step 6/Fee Payments:			
Total Project Fee:			\$500.00
			a. Total Fee from Step 5
State share of filing Fee:			\$237.50
			b. 1/2 Total Fee less \$12.50
City/Town share of filing Fee:			\$262.50
			c. 1/2 Total Fee plus \$12.50

C. Submittal Requirements

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

Department of Environmental Protection
 Box 4062
 Boston, MA 02211

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

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



City of Haverhill Conservation Commission

HCC Form 3 – Notice of Intent Local Application Form

A. STATUTE APPLICABILITY

This application is being filed with the Commission in accordance with the following (check all that apply):

- Massachusetts Wetlands Protection Act, M.G.L. Chapter 131, Section 40
- Haverhill Municipal Ordinance Chapter 253

B. GENERAL INFORMATION

Applicant Lodestar Energy LLC
Property Owner Bradford Holdings LLC
Representative Ann M. Marton, LEC Environmental Consultants, Inc.
Location (Street Address) 380 Lowell Street, Suite 101, Wakefield, MA 01880
Assessor's Parcel Identification 768-780-20-2

C. APPLICATION CHECKLIST

The Commission requires the submittal of this original, completed Form; ten (10) paper copies of site plans; and one (1) paper copy of all other materials. Additionally, the Commission requires the submittal of individual PDFs of this Form and all listed application materials. If practical, related items may be combined into a single PDF. PDFs should not mix larger format sheets (e.g. site plans) with smaller sheets (e.g. letters). These submittal requirements also apply to supplemental information provided during the public hearing. The following materials shall be submitted with this form (check all that apply):

- Completed, current WPA Form 3, 3A, or 4 and NOI Wetland Fee Transmittal Form
- Project Narrative with description of resource areas & delineation methodology and demonstration of compliance with pertinent Performance Standards
- Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan
- Site Plans clearly describing the location and nature of the work, including such information as site boundaries, wetlands, topography, existing and proposed conditions, vegetation cover, soils, erosion & sedimentation controls, Title 5 compliance, flood storage calculations... (24" x 36" max. sheet size)
- MassDEP Bordering Vegetated Wetland Delineation Field Data Forms, as appropriate
- Wetland Resource Area Impact Mitigation Plan prepared in accordance with MA Inland Wetland Replication Guidelines, if applicable
- Demonstration of compliance with MA River & Stream Crossing Standards, if applicable (The HCC applies the General Standards to all resource area crossings for wildlife passage.)
- Simplified or Detailed Wildlife Habitat Evaluation (Appendix A or B), if applicable (See "MA Wildlife Habitat Protection Guidance for Inland Wetlands")
- Demonstration of compliance with MA Stormwater Management Standards, including but not limited to
 - Stormwater Report with pertinent calculations based on NOAA Atlas 14 rainfall data
 - Checklist for Stormwater Report
 - Long-Term Pollution Prevention Plan
 - Operation and Maintenance Plan
 - Illicit Discharge Compliance Statement

City Hall Room 300 • 4 Summer Street • Haverhill, MA 01830 • www.cityofhaverhill.org



City of Haverhill Conservation Commission

HCC Form 3 – Notice of Intent Local Application Form

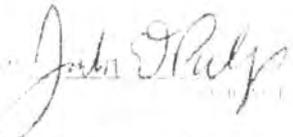
- 8½” x 11” sections of the following maps with project location clearly identified
 - USGS Quadrangle
 - MassGIS Orthophoto
 - City of Haverhill Parcel ID Map, also identifying properties within 300’ of subject property
 - NRCS Soils Map and Resource Report
 - FEMA Flood Insurance Rate Map, if applicable
 - MA NHESP Estimated Habitats of Rare Wildlife and Priority Habitats of Rare Species, if applicable
 - MassDEP/UMass-Amherst Habitat of Potential Regional or Statewide Importance, if applicable
- Proof of NOI filing with the MA Natural Heritage & Endangered Species Program, if applicable
- Appropriate Filing Fees, payable to the City of Haverhill, under the Act and Ordinance
- Other: _____

D. LOCAL PERMIT DOCUMENTATION

In accordance with 310 CMR 10.05(4)(e), list all obtainable permits, variances, and approvals required by local ordinance with respect to the proposed activity and status of same: none

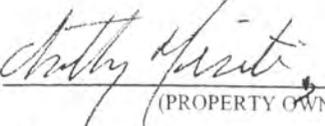
E. APPLICATION CERTIFICATION

I have read the Department of Environmental Protection’s “Instructions for Completing Application” and the City’s Municipal Ordinance under Chapter 253, with all applicable regulations and policies, for the filing of this application with the Haverhill Conservation Commission and agree to its terms and conditions, as amended. I understand the submitted NOI, its plans, and all its supporting materials are public records and may be uploaded to the City’s website for public review. As required by the Commission, the wetland resource area(s) are flagged, the corners of proposed structures are staked, and the centerline of proposed roadway(s) and/or driveway(s) are marked, as appropriate, to facilitate site inspections by Commissioners and Conservation Staff.


 Jonathan D. Bellonop
 Director
 Zoltan Energy, LLC
 7/2/16

F. SITE ACCESS ACKNOWLEDGEMENT

I hereby grant the Haverhill Conservation Commission and its officials permission to enter upon my property at Willow Avenue (Parcel ID 768-780-20-2) to review the filed Notice of Intent and (STREET ADDRESS AND ASSESSOR’S PARCEL ID) future site conditions for compliance with the issued Order of Conditions. The sole purpose of this acknowledgement is to allow the Commission and its officials to perform their duties under the Massachusetts Wetlands Protection Act and the City’s wetlands protection ordinance.

Signed:  Anthony Hesity
 Manager Bradford Holdings, LLC (DATE)
 (PROPERTY OWNER)

City Hall Room 300 • 4 Summer Street • Haverhill, MA 01830 • www.cityofhaverhill.org



City of Haverhill Conservation Commission

HCC Form 3 – Notice of Intent Local Application Form

I. LOCAL ORDINANCE FEE CALCULATION FORM

ACTIVITY	LOCAL ORDINANCE FEE	# of Activities or Measurement	Subtotal
*Abbrev. Notice of Resource Area Delineation (ANRAD)			
Single Family House Project	\$1/linear foot, first 100'; \$0.50/lf, second 100'; \$0.10/lf, each additional foot		
All Other Projects	***\$1/linear foot, first 1000'; \$0.50/lf, second 1000'; \$0.10/lf, each additional foot		
***Notices of Intent (NOI)			
Category 1 Activity	\$100		
Category 2 Activity	\$250	1	\$250.00
Category 3 Activity	\$525		
Category 4 Activity	\$725		
Category 5 Activity	\$2/foot		
Category 6 Activity - If no ANRAD was filed for the project site, then a local Cat. 6 fee must be paid in accordance with the ANRAD fee schedule	See ANRAD fee schedule		
Resource Area Alterations			
Buffer Zone, 75'-100' from resource area boundary	\$0.05 / square foot	500	\$25.00
Buffer Zone, 35'-75' from resource area boundary	\$0.10 / square foot	7,513	\$751.30
Buffer Zone, 0'-35' from resource area boundary	\$0.25 / square foot	2,012	\$503.00
Bordering Vegetated Wetland	\$0.50 / square foot		
Bank	\$5 / linear foot		
Land Under Water	\$0.50 / square foot		
Land Subject to Flooding	\$0.05 / square foot		
Riverfront Area	\$0.05 / square foot		
Riverfront Area with the watershed of a potable water supply	\$0.50 / square foot		
Land within 100' of a Certified Vernal Pool	\$0.25 / square foot	9,320	\$2,330.00
Local-only Jurisdictional Resource Area	\$0.25 / square foot		
Land within 200' of a potable water supply	\$0.50 / square foot		
ADVERTISING FEE*			\$45.00
LOCAL ORDINANCE FEE TOTAL			
For filings resulting from enforcement action, double the Local Ordinance Fee Total			\$3,904.30
NOTES:			
*Application is subject to an additional \$45 Local Advertising Fee payable to the City of Haverhill prior to EACH advertising			
***Local Ordinance Fee maximum of \$100, if, when determined necessary by Commission, applicant agrees to ANRAD review by outside consultant under M.G.L. Ch. 44, sec. 53G			
%Local Ordinance Fees for RDA, NOI, & RMOC increase 50% when project is also proposed within a Riverfront Area			
Local Ordinance Fees passed by a 7 – 0 vote of the Commission on October 28, 2010, effective January 1, 2011			

Copy of Filing Fees

THE FACE OF THIS DOCUMENT HAS A COLORED BACKGROUND ON WHITE PAPER

Bradford Solar, LLC
PO Box 543
Londonderry NH 03053
603-232-7444

Enterprise Bank & Trust
8 High Street
Andover, MA 01810

53-274
113

000012

7/18/2016

PAY TO THE ORDER OF City of Haverhill, MA \$ *\$262.50
Two Hundred Sixty-Two and 50/100***** DOLLARS

City of Haverhill, MA
4 Summer Street
Haverhill, MA 01830

Suma Yesite

MEMO city share of the Wetlands Protection Act Filing

THE BACK OF THIS DOCUMENT CONTAINS AN ARTIFICIAL WATERMARK—HOLD AT AN ANGLE TO VIEW

⑈00000⑈ ⑆2⑈ ⑆0⑆ ⑆⑆302742⑆ 834 ⑆79⑈

THE FACE OF THIS DOCUMENT HAS A COLORED BACKGROUND ON WHITE PAPER

Bradford Solar, LLC
PO Box 543
Londonderry NH 03053
603-232-7444

Enterprise Bank & Trust
8 High Street
Andover, MA 01810

53-274
113

000014

7/18/2016

PAY TO THE ORDER OF City of Haverhill, MA \$ *\$3,904.30
Three Thousand Nine Hundred Four and 30/100***** DOLLARS

City of Haverhill, MA
4 Summer Street
Haverhill, MA 01830

Suma Yesite

MEMO city filing fee under the Haverhill Wetland Ordi

THE BACK OF THIS DOCUMENT CONTAINS AN ARTIFICIAL WATERMARK—HOLD AT AN ANGLE TO VIEW

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Copy of Filing Fees

THE FACE OF THIS DOCUMENT HAS A COLORED BACKGROUND ON WHITE PAPER

Bradford Solar, LLC
PO Box 543
Londonderry NH 03053
603-232-7444

Enterprise Bank & Trust
8 High Street
Andover, MA 01810

53-274
113

000013

7/18/2016

PAY TO THE ORDER OF Commonwealth of Massachusetts \$ *\$237.50
Two Hundred Thirty-Seven and 50/100***** DOLLARS

Commonwealth of Massachusetts

Diana Jeseli

MEMO state share of the Wetlands Protection Act filin

THE BACK OF THIS DOCUMENT CONTAINS AN ARTIFICIAL WATERMARK—HOLD AT AN ANGLE TO VIEW

⑈0000013⑈ ⑆011302742⑆ 834 179⑈



City of Haverhill Conservation Commission

HCC Form 3 – Notice of Intent Local Application Form

A. AFFIDAVIT OF SERVICE FOR ABUTTER NOTIFICATION

I, Sharon A. Sullivan, hereby certify under the pains and penalties of perjury that on
(NAME OF PERSON MAKING AFFIDAVIT)
July 21, 2016 I gave notification to all abutters pursuant to the requirements of the second
(DATE)
paragraph of Massachusetts General Laws Chapter 131, Section 40, the DEP Guide to Abutter Notification dated April 8, 1994, and Haverhill Municipal Ordinance Chapter 253, Section 5 in connection with the following matter:

A Notice of Intent filed under the Massachusetts Wetlands Protection Act and said ordinance by
Lodestar Energy LLC with the Haverhill Conservation Commission on
(NAME OF APPLICANT)
July 21, 2016 for property located at Willow Avenue (Assessor's Parcel ID 768-780-20-2).
(DATE) (STREET ADDRESS AND ASSESSOR'S PARCEL ID)

The list of the abutters to whom the Abutter Notification Form sent, with their addresses and Assessor's parcel identification information that corresponds with the submitted map section, are attached to this application.

Signed: Sharon A. Sullivan 7/21/2016
(NAME OF PERSON MAKING AFFIDAVIT) (DATE)

July 21, 2016

CERTIFIED MAIL

«Name»

«Name2»

«Address»

«City», «State» «Zip»

**Re: Notice of Intent Application
Willow Avenue
Assessor's Parcel ID 768-780-20-2
Haverhill, Massachusetts**

[LEC File #: BHLLC\14-258.02]

Dear Abutter:

On behalf of the Applicant, Lodestar Energy LLC, LEC Environmental Consultants, Inc. (LEC) has filed a Notice of Intent (NOI) Application with the Haverhill Conservation Commission to install three utility poles and construct a gravel maintenance driveway for an electrical interconnection at the above-referenced property. The proposed work will occur within the Buffer Zone to Bordering Vegetated Wetlands and within 100-feet of Certified Vernal Pool #3624.

The report entitled *Notice of Intent Application and Wetland Resource Area Analysis* and accompanying site plans are available for review by the public at the Haverhill Conservation Commission located in City Hall, 4 Summer Street, Room 210. A Public Hearing will be held at City Hall on August 4, 2016, in accordance with the provisions of the *Massachusetts Wetlands Protection Act* (M.G.L. Ch. 131, s. 40, as amended), its implementing Regulations (310CMR 10.00), and the *City of Haverhill Wetlands Protection Ordinance* (Chapter 253), respectively. Notice of the Public Hearing, including its date, time, and place, will also be published at least five (5) days in advance in the *Haverhill Gazette*. Notice of the Public Hearing will also be posted at the Haverhill City Hall at least 48 hours in advance.

Please do not hesitate to review the materials and/or attend the public hearing should you have questions or concerns about the proposed project.

Sincerely,

LEC Environmental Consultants, Inc.

Ann M. Marton, President
Director of Ecological Services

enclosure



City of Haverhill Conservation Commission

HCC Form 3 – Notice of Intent Local Application Form

B. ABUTTER NOTIFICATION FORM

In accordance with the second paragraph of Massachusetts General Laws Chapter 131, Section 40 (the Wetlands Protection Act) and Haverhill Municipal Ordinance Chapter 253, Section 5, you are hereby notified of the following:

1. The name of the applicant is Lodestar Energy LLC, 3 Ellsworth Place, Suite 122, Avon, CT 06001
2. Brief Project Description: Installation of three utility poles and construction of a gravel maintenance driveway for an electrical interconnection located within the Buffer Zone to Bordering Vegetated Wetlands and within 100-feet of a Certified Vernal Pool.
3. The applicant has filed a Notice of Intent (“NOI”) with the Haverhill Conservation Commission seeking permission to remove, fill, dredge or alter an Area Subject to Protection Under the Wetlands Protection Act and/or Haverhill Municipal Ordinance Chapter 253 and/or to perform work within the buffer zone of such an Area.
4. The address of the lot where the activity is proposed is Willow Avenue (Assessors ID 768-780-20-2).
(INCLUDE ASSESSOR’S MAP/BLOCK/LOT)
5. Copies of the NOI may be examined at *the Haverhill Conservation Department Office* between the hours of *8am and 4pm* from *Monday through Friday*. Contact information is below. You may also find helpful application materials on the “Projects Under Review” section of the Commission’s website.
6. Copies of the NOI may be obtained from either (check one) the applicant _____, or the applicant’s representative X, by calling this telephone number (781) 245-2500 between the hours of 8:00 a.m. and 5:00 p.m., Monday thru Friday.
7. Information regarding the *date, time, and place* of the public hearing may be obtained from the *Haverhill Conservation Department Office* between the hours of *8am and 4pm* from *Monday through Friday*. Contact information is below. You may also consult the “Agenda” section of the Commission’s website.

NOTE: Notice of the public hearing, including its date, time and place, will be published at least five (5) days in advance in the *Haverhill Gazette newspaper*.

NOTE: Notice of the public hearing, including its date, time, and place, will be posted in Haverhill City Hall not less than forty-eight (48) hours in advance.

NOTE: You may contact the Haverhill Conservation Department for more information about this application, the Wetlands Protection Act, and Haverhill Municipal Ordinance Chapter 253. Please note the Department has only one staff person; every effort will be made to assist you in a timely manner.

Website: http://www.cityofhaverhill.org/departments/conservation_commission/index.php.

Email: conservation@cityofhaverhill.com

Phone: 978.374.2334

NOTE: For additional information about this application and the Act, you may contact the MA Department of Environmental Protection Northeast Regional Office Service Center.

Website: <http://www.mass.gov/eea/agencies/massdep/about/contacts/northeast-region.html>

Phone: 978.694.3200

City Hall Room 300 • 4 Summer Street • Haverhill, MA 01830 • www.cityofhaverhill.org

774-32-7 - 28 Dorian Drive

Brendan Ghee
28 Dorian Drive
Haverhill, MA 01835

771-780-35 - 279 Willow Avenue

Dianne A. Luz
279 Willow Avenue
Haverhill, MA 01835

768-779-13 - 226 Willow Avenue

Christie A. Sardella
226 Willow Avenue
Haverhill, MA 01835

768-780-41A - 195 Willow Avenue

Scot August, etux
Carol D. August
3017 Heartwood Crossing
Toano, VA 23168

771-780-38 - 243 Willow Avenue

The Lisa J. Coe Trust
Lisa J. Coe, Trustee
243 Willow Avenue
Bradford, MA 01835

768-780-42C - 193 Willow Avenue

Kevin B. Donovan
2 Morris Road
Bradford, MA 01835

771-32-6 - 27 Dorian Drive

Twenty-Seven Dorian Drive Nominee
Realty Trust
Brian D. Marquis, etal
27 Dorian Drive
Haverhill, MA 01835

768-779-26 - 260 Willow Avenue

Robert R. DelRosso etux
Karen J. DelRosso
260 Willow Avenue
Haverhill, MA 01835

768-779-13A - Maiden Hill Road

Charles K. Adams, etux
Sandra P. Adams
25 Cross Road
Ward Hill, MA 01835

768-780-42B - 167 Willow Avenue

Dawn Jablonski
167 Willow Avenue
Bradford, MA 01835

770-779-23 - Willow Avenue

Wallyworld Trust
Michael C. Davidowicz, Trustee
75 Willow Avenue
Bradford, MA 01835

771-780-35A - 295 Willow Avenue

Nicholas J. Molloy, etux Life Estate
Molloy Family Realty Trust
295 Willow Avenue
Haverhill, MA 01835

768-779-12-4 - 196 Willow Avenue

Pamela T. Landry
196 Willow Avenue
Haverhill, MA 01835

768-779-12 - 192 Willow Avenue

Eric J. Soucey
192 Willow Avenue
Bradford, MA 01835

771-780-37 - 275 Willow Avenue

Janice S. Ryan
275 Willow Avenue
Bradford, MA 01835

768-779-25 - Willow Avenue

Wallyworld Trust
Michael C. Davidowicz, Trustee
75 Willow Avenue
Bradford, MA 01835

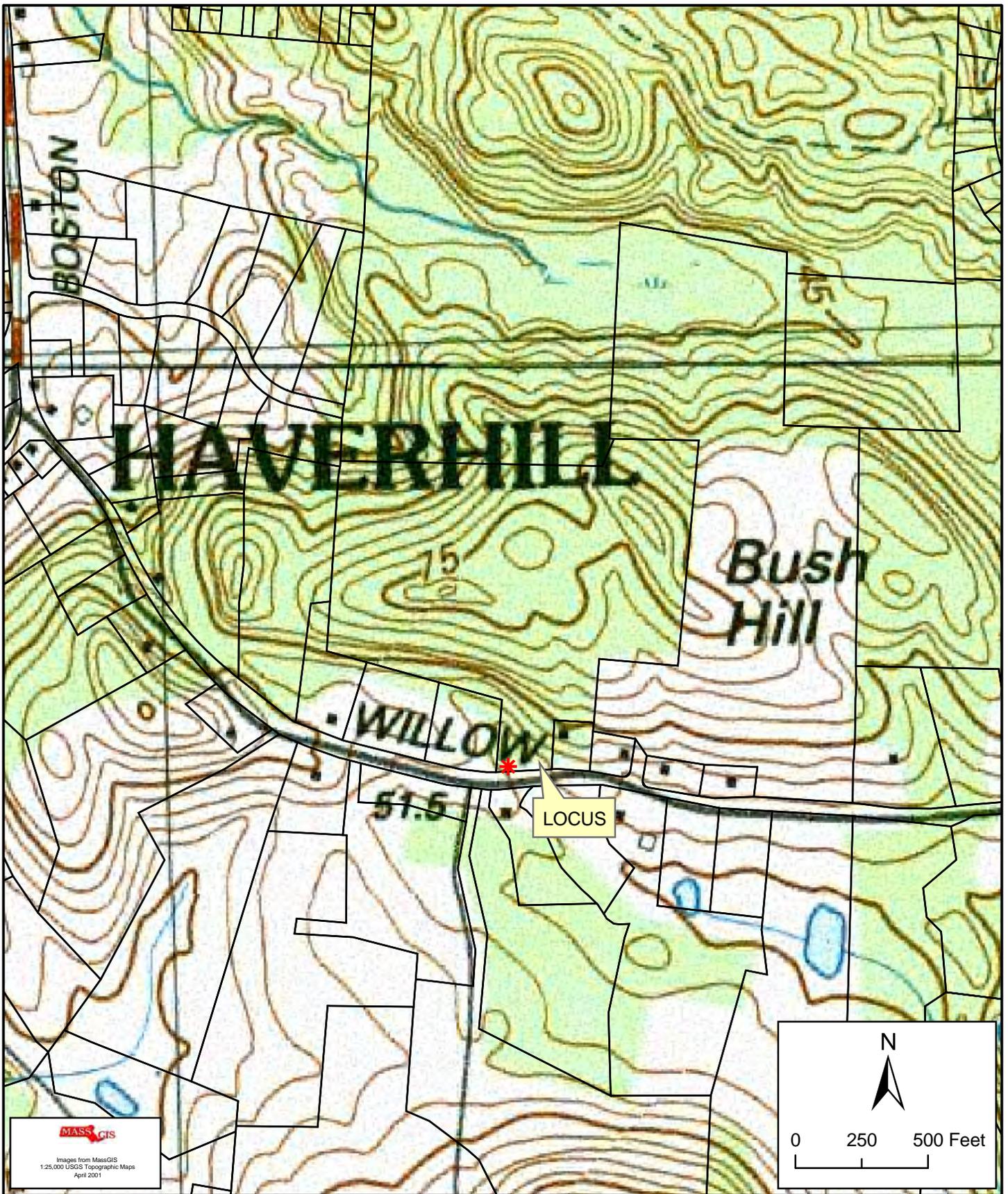
Appendix B

Locus Maps

Figure 1: USGS Topographic Quadrangle & NHESP Estimated Habitat Map

Figure 2: FEMA Flood Insurance Rate Map

Figure 3: MassGIS Orthophoto



LEC

Environmental Consultants, Inc.
Wakefield, MA
781.245.2500

www.lecenvironmental.com

Figure 1: USGS Topographic Map
Willow Avenue
(Assessor's Parcel ID: 768-780-20-2)
Haverhill, MA

July 20, 2016

Legend

-  Certified Vernal Pool
-  NHESP Estimated Habitat
-  NHESP Priority Habitat

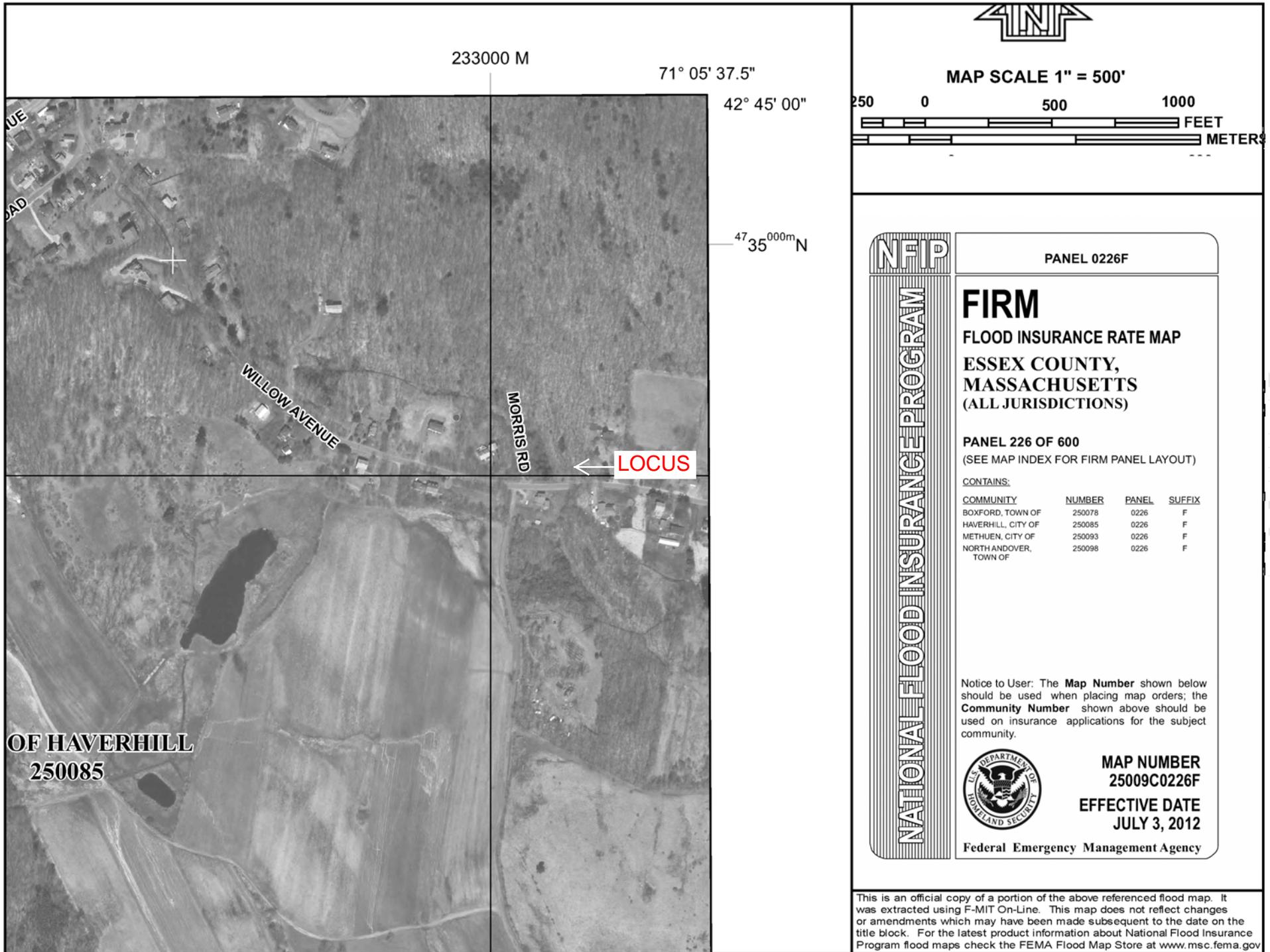


Figure 2: FEMA Flood Insurance Rate Map

LEGEND

SPECIAL FLOOD HAZARD AREAS (SFHAs) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

- ZONE A** No Base Flood Elevations determined.
- ZONE AE** Base Flood Elevations determined.
- ZONE AH** Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
- ZONE AO** Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
- ZONE AR** Special Flood Hazard Areas formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
- ZONE A99** Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
- ZONE V** Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
- ZONE VE** Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

- ZONE X** Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

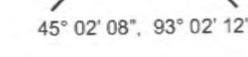
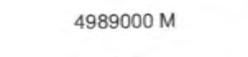
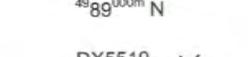
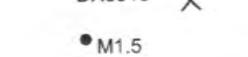
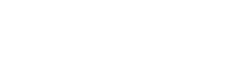
- ZONE X** Areas determined to be outside the 0.2% annual chance floodplain.
- ZONE D** Areas in which flood hazards are undetermined, but possible.

-  COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS
-  OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

-  1% Annual Chance Floodplain Boundary
-  0.2% Annual Chance Floodplain Boundary
-  Floodway boundary
-  Zone D boundary
-  CBRS and OPA boundary
-  Boundary dividing Special Flood Hazard Area Zones and boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths, or flood velocities.
-  Base Flood Elevation line and value; elevation in feet*
-  Base Flood Elevation value where uniform within zone; elevation in feet*

*Referenced to the North American Vertical Datum of 1988

-  Cross section line
-  Transect line
-  Culvert
-  Bridge
-  Geographic coordinates referenced to the North American Datum of 1983 (NAD 83) Western Hemisphere
-  1000-meter ticks: Massachusetts State Plane Mainland Zone (FIPS Zone 2001), Lambert Conformal Conic projection
-  1000-meter Universal Transverse Mercator grid values, zone 19N
-  Bench mark (see explanation in Notes to Users section of this FIRM panel)
-  River Mile

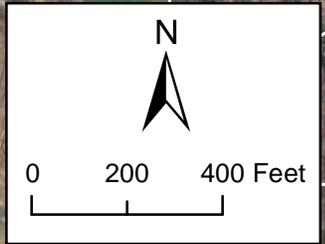
MAP REPOSITORIES
Refer to Map Repositories list on Map Index

EFFECTIVE DATE OF COUNTYWIDE
FLOOD INSURANCE RATE MAP
July 3, 2012

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL




 Office of Geographic and Environmental Information
 (MassGIS), Commonwealth of Massachusetts,
 Executive Office of Environmental Affairs
 MassGIS USGS Ortho Imagery (2013)





Environmental Consultants, Inc.

Wakefield, MA
781.245.2500

www.lecenvironmental.com

Figure 3: MassGIS Orthophoto
 Willow Avenue
 (Assessor's Parcel ID: 768-780-20-2)
 Haverhill, MA

July 20, 2016

DRAINAGE CALCULATIONS & NARRATIVE

FOR

**INTERCONNECTION ACCESS DRIVEWAY
WILLOW AVENUE
HAVERHILL, MASSACHUSETTS**

Prepared for:
LODESTAR ENERGY LLC

Prepared by:
Design Consultants, Inc.
120 Middlesex Avenue, Suite 20
Somerville, Massachusetts 02145-1104

Project 2015-083
July 20, 2016

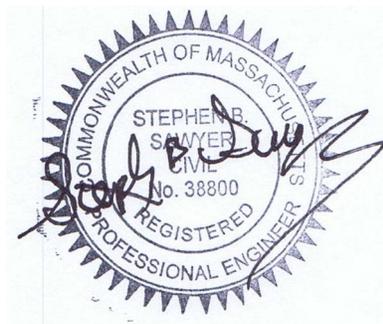


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1.0 PROJECT DESCRIPTION 1

2.0 EXISTING CONDITIONS 1

3.0 PROPOSED CONDITIONS 1

4.0 MASSACHUSETTS STORMWATER STANDARDS.....2

5.0 ANALYSIS.....2

6.0 CONCLUSION 2

APPENDICES

- Appendix A: Stormwater Calculations
- Appendix B: Drainage Areas
- Appendix C: Soils Data
- Appendix D: Operation and Maintenance Plan

1.0 PROJECT DESCRIPTION

The applicant is proposing construction of a 18ft wide 180 ft long gravel drive to support the interconnection of the new solar array project located to the north of the proposed driveway.

The project will disturb approximately only 9,990 square feet of land and is expected to begin in the late summer of 2016, and take approximately 2-3 weeks to construct.

2.0 EXISTING CONDITIONS:

The site is a large, wooded parcel that is currently undeveloped. There is a Bordering Vegetated Wetland and Vernal pool to the west of the entry drive. There are additional wetland areas and an intermittent stream to the west.

Soils on the site where work is proposed are primarily classified as Scarboro mucky fine sandy loams and Paxton Fine Sandy Loam (Hydrologic Group C) with varying slopes, according to the Natural Resources Conservation Service soil maps (see attached in Appendix C).

The site, in respect to drainage patterns, drains down to the wetland area located along Willow Ave.

3.0 PROPOSED CONDITIONS:

The project proposes to build an 18ft wide 180 ft long gravel drive. A road side infiltration ditch and bio retention area are proposed to mitigate the added runoff caused by the gravel drive surface. There will be three utility poles with overhead wire to the interconnection point located at the gravel turn-around. A RCP drain pipe is proposed at the entry to maintain the gutter flow along the edge of Willow Ave. Also some small walls are proposed to minimize the grading work associated with the driveway construction.

4.0 MASSACHUSETTS STORMWATER STANDARDS:

Standard 1: *No new storm water conveyances (e.g. outfalls) may discharge untreated storm water directly or to cause erosion in wetlands or waters of the Commonwealth.*

No storm water outfalls that discharge untreated storm water are being proposed.

Standard 2: *Storm water Management systems shall be designed so that the post-development peak discharge rates do not exceed pre-development peak discharge rates.*

The project's storm water system is designed not to exceed pre-development peak discharge rates.

Standard 3: *Loss of annual recharge to groundwater shall be eliminated or minimized through the use of environmentally sensitive site design, low impact development techniques, storm water best management practices, and good operation and maintenance. At a minimum, the annual recharge from the post development site shall approximate annual recharge from pre-development conditions based on soil type.*

The project's does not propose any impervious surfaces. The areas other the gravel road will be vegetated and annual recharge will approximate pre-development conditions. The swale and bio retention area will also hold and re-introduce runoff back into the ground.

Standard 4: *Storm water management systems shall be designed to remove 80% of the average post-construction load of Total Suspended Solids (TSS).*

The proposed site conditions should not create any runoff requiring TSS removal. The gravel drive is pervious and is directed to a roadside swale and then to a bio retention area prior to discharging into the adjacent wetland. If the driveway were paved the required water quality volume for 1" of rainfall is 340 cf. The bio retention area provides 500 cf for WQV.

Standard 5: *For land uses with higher potential pollutant loads, source control and pollution prevention shall be implemented in accordance with the Massachusetts Stormwater Handbook.*

The proposed project, a ground-based photovoltaic array, does not represent a land use with a higher potential pollutant load

Standard 6: *Storm water discharges within the Zone II or Interim Wellhead Protection Area of a public water supply, and storm water discharges near or to any other critical area, require the use of the specific source control and pollution prevention measures and the specific structural storm water best management practices determined by the Department to be suitable for managing discharges to such areas, as provided in the Massachusetts Stormwater Handbook.*

The proposed project is located and a local watershed protection district and as such 1" water quality volume is provided in the bio retention area..

Standard 7: *A redevelopment project is required to meet the following Stormwater Management Standards only to the maximum extent practicable: Standard 2, Standard 3, and the pretreatment and structural best management requirements of Standard 4, 5, and 6. Existing storm water discharges shall comply with Standard 1 only to the maximum extent practicable. A redevelopment project shall also comply with all other requirements of the Storm water Management Standards and improve existing conditions.*

This project is designed to be in compliance with all storm water management standards.

Standard 8: *A plan to control construction-related impacts including erosion, sedimentation and other pollutant sources during construction and land disturbance activities (construction period erosion, sedimentation, and pollution prevention control plan) shall be developed and implemented.*

An Operation and Maintenance plan has been prepared for the site, with Erosion/Sedimentation Control measures which are to be implemented during construction.

Standard 9: *A long-term operation and maintenance plan shall be developed and implemented to ensure that storm water management systems function as designed.*

Long-term maintenance measures are described in the Operation and Maintenance plan.

Standard 10: *All illicit discharges to the storm water management systems are prohibited.*

No illicit discharges are being created as a result of this project.

5.0 ANALYSIS:

The proposed drainage system was analyzed for the 2, 10, & 100-year storm events (see included calculations) to ensure that with even the most extreme storm, the proposed project would not have a negative impact on downstream surrounding areas. The project area was analyzed in both the pre-development and the post-development conditions at the design point located on Willow Ave.

	<u>Pre-Const. Runoff (cfs)</u>	<u>Post-Const. Runoff (cfs)</u>
2-yr	0.18	0.05
10-yr	0.44	0.14
100-yr	0.84	0.52

6.0 CONCLUSION:

The proposed project will disturb approximately only 9,990 square feet of land. The design and analysis of the project and stormwater management plan has been consistent with storm water treatment and groundwater recharge techniques and guidelines. The proposed design utilizes LID measures such as the stone swale and bio retention area. The proposed project provides reduced stormwater runoff rates with the implementation of these LID techniques along with water quality treatment measures.

Appendix A - Calculations



EXIST WOODS



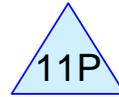
DESIGN POINT EXIST.
CONDITION



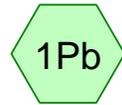
GRAVEL RD AND UP
GRADE TO SWALE



ROADSIDE DITCH



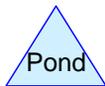
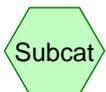
BIO RETENTION AREA



Southwest towards
wetlands



DESIGN POINT PROP.
CONDITION



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Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.136	65	Brush, Good, HSG C (1Pa, 1Pb)
0.229	70	Woods, Good, HSG C (1E)
0.093	87	Gravel roads, HSG C (1Pa)

Summary for Subcatchment 1E: EXIST WOODS

Runoff = 0.18 cfs @ 12.10 hrs, Volume= 0.015 af, Depth> 0.77"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv. UI as Pervious, Time Span= 2.00-24.00 hrs, dt= 0.02
Type III 24-hr 2-yr Rainfall=3.10"

Area (sf)	CN	Description
9,990	70	Woods, Good, HSG C
9,990	70	100.00% Pervious Area

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

Summary for Subcatchment 1Pa: GRAVEL RD AND UP GRADE TO SWALE

Runoff = 0.21 cfs @ 12.09 hrs, Volume= 0.015 af, Depth> 1.39"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv. UI as Pervious, Time Span= 2.00-24.00 hrs, dt= 0.02
Type III 24-hr 2-yr Rainfall=3.10"

Area (sf)	CN	Description
1,562	65	Brush, Good, HSG C
* 4,061	87	Gravel roads, HSG C
5,623	81	Weighted Average
5,623	81	100.00% Pervious Area

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

Summary for Subcatchment 1Pb: Southwest towards wetlands

Runoff = 0.05 cfs @ 12.11 hrs, Volume= 0.005 af, Depth> 0.55"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv. UI as Pervious, Time Span= 2.00-24.00 hrs, dt= 0.02
Type III 24-hr 2-yr Rainfall=3.10"

Area (sf)	CN	Description
4,367	65	Brush, Good, HSG C
4,367	65	100.00% Pervious Area

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

Summary for Pond 2P: ROADSIDE DITCH

Inflow Area = 0.129 ac, 0.00% Impervious, Inflow Depth > 1.39" for 2-yr event
 Inflow = 0.21 cfs @ 12.09 hrs, Volume= 0.015 af
 Outflow = 0.07 cfs @ 12.42 hrs, Volume= 0.009 af, Atten= 66%, Lag= 20.0 min
 Discarded = 0.00 cfs @ 12.42 hrs, Volume= 0.003 af
 Primary = 0.07 cfs @ 12.42 hrs, Volume= 0.005 af

Routing by Stor-Ind method, Time Span= 2.00-24.00 hrs, dt= 0.02 hrs
 Peak Elev= 168.92' @ 12.42 hrs Surf.Area= 0.012 ac Storage= 0.006 af

Plug-Flow detention time= 203.9 min calculated for 0.009 af (59% of inflow)
 Center-of-Mass det. time= 90.2 min (930.6 - 840.4)

Volume	Invert	Avail.Storage	Storage Description
#1	168.00'	0.015 af	1.00'W x 105.00'L x 1.50'H Prismatic Z=2.0

Device	Routing	Invert	Outlet Devices
#1	Discarded	168.00'	0.270 in/hr Exfiltration over Surface area
#2	Primary	168.90'	10.0' long x 1.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31 3.30 3.31 3.32

Discarded OutFlow Max=0.00 cfs @ 12.42 hrs HW=168.92' (Free Discharge)
 ↑**1=Exfiltration** (Exfiltration Controls 0.00 cfs)

Primary OutFlow Max=0.06 cfs @ 12.42 hrs HW=168.92' (Free Discharge)
 ↑**2=Broad-Crested Rectangular Weir** (Weir Controls 0.06 cfs @ 0.36 fps)

Summary for Pond 11P: BIO RETENTION AREA

Inflow Area = 0.129 ac, 0.00% Impervious, Inflow Depth = 0.51" for 2-yr event
 Inflow = 0.07 cfs @ 12.42 hrs, Volume= 0.005 af
 Outflow = 0.00 cfs @ 17.22 hrs, Volume= 0.003 af, Atten= 95%, Lag= 287.8 min
 Discarded = 0.00 cfs @ 17.22 hrs, Volume= 0.003 af
 Primary = 0.00 cfs @ 2.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 2.00-24.00 hrs, dt= 0.02 hrs
 Peak Elev= 165.35' @ 17.22 hrs Surf.Area= 497 sf Storage= 164 cf

Plug-Flow detention time= 320.7 min calculated for 0.003 af (54% of inflow)
 Center-of-Mass det. time= 237.8 min (1,092.2 - 854.3)

Volume	Invert	Avail.Storage	Storage Description
#1	165.00'	577 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

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Type III 24-hr 2-yr Rainfall=3.10"

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Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
165.00	450	0	0
166.10	600	577	577

Device	Routing	Invert	Outlet Devices
#1	Discarded	165.00'	0.270 in/hr Exfiltration over Surface area
#2	Primary	166.00'	10.0' long x 1.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31 3.30 3.31 3.32

Discarded OutFlow Max=0.00 cfs @ 17.22 hrs HW=165.35' (Free Discharge)
↳1=Exfiltration (Exfiltration Controls 0.00 cfs)

Primary OutFlow Max=0.00 cfs @ 2.00 hrs HW=165.00' (Free Discharge)
↳2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Summary for Pond DP1: DESIGN POINT EXIST. CONDITION

Inflow Area = 0.229 ac, 0.00% Impervious, Inflow Depth > 0.77" for 2-yr event
Inflow = 0.18 cfs @ 12.10 hrs, Volume= 0.015 af
Primary = 0.18 cfs @ 12.10 hrs, Volume= 0.015 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 2.00-24.00 hrs, dt= 0.02 hrs

Summary for Pond DP2: DESIGN POINT PROP. CONDITION

Inflow Area = 0.229 ac, 0.00% Impervious, Inflow Depth > 0.24" for 2-yr event
Inflow = 0.05 cfs @ 12.11 hrs, Volume= 0.005 af
Primary = 0.05 cfs @ 12.11 hrs, Volume= 0.005 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 2.00-24.00 hrs, dt= 0.02 hrs

Summary for Subcatchment 1E: EXIST WOODS

Runoff = 0.44 cfs @ 12.09 hrs, Volume= 0.032 af, Depth> 1.67"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv. UI as Pervious, Time Span= 2.00-24.00 hrs, dt= 0.02
Type III 24-hr 10-yr Rainfall=4.50"

Area (sf)	CN	Description
9,990	70	Woods, Good, HSG C
9,990	70	100.00% Pervious Area

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

Summary for Subcatchment 1Pa: GRAVEL RD AND UP GRADE TO SWALE

Runoff = 0.39 cfs @ 12.09 hrs, Volume= 0.027 af, Depth> 2.55"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv. UI as Pervious, Time Span= 2.00-24.00 hrs, dt= 0.02
Type III 24-hr 10-yr Rainfall=4.50"

Area (sf)	CN	Description
1,562	65	Brush, Good, HSG C
* 4,061	87	Gravel roads, HSG C
5,623	81	Weighted Average
5,623	81	100.00% Pervious Area

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

Summary for Subcatchment 1Pb: Southwest towards wetlands

Runoff = 0.14 cfs @ 12.10 hrs, Volume= 0.011 af, Depth> 1.33"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv. UI as Pervious, Time Span= 2.00-24.00 hrs, dt= 0.02
Type III 24-hr 10-yr Rainfall=4.50"

Area (sf)	CN	Description
4,367	65	Brush, Good, HSG C
4,367	65	100.00% Pervious Area

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

Summary for Pond 2P: ROADSIDE DITCH

Inflow Area = 0.129 ac, 0.00% Impervious, Inflow Depth > 2.55" for 10-yr event
 Inflow = 0.39 cfs @ 12.09 hrs, Volume= 0.027 af
 Outflow = 0.38 cfs @ 12.11 hrs, Volume= 0.021 af, Atten= 2%, Lag= 1.2 min
 Discarded = 0.00 cfs @ 12.11 hrs, Volume= 0.003 af
 Primary = 0.37 cfs @ 12.11 hrs, Volume= 0.018 af

Routing by Stor-Ind method, Time Span= 2.00-24.00 hrs, dt= 0.02 hrs
 Peak Elev= 168.96' @ 12.11 hrs Surf.Area= 0.012 ac Storage= 0.007 af

Plug-Flow detention time= 124.1 min calculated for 0.021 af (77% of inflow)
 Center-of-Mass det. time= 41.3 min (864.3 - 822.9)

Volume	Invert	Avail.Storage	Storage Description
#1	168.00'	0.015 af	1.00'W x 105.00'L x 1.50'H Prismatic Z=2.0

Device	Routing	Invert	Outlet Devices
#1	Discarded	168.00'	0.270 in/hr Exfiltration over Surface area
#2	Primary	168.90'	10.0' long x 1.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31 3.30 3.31 3.32

Discarded OutFlow Max=0.00 cfs @ 12.11 hrs HW=168.96' (Free Discharge)
 ↑**1=Exfiltration** (Exfiltration Controls 0.00 cfs)

Primary OutFlow Max=0.37 cfs @ 12.11 hrs HW=168.96' (Free Discharge)
 ↑**2=Broad-Crested Rectangular Weir** (Weir Controls 0.37 cfs @ 0.64 fps)

Summary for Pond 11P: BIO RETENTION AREA

Inflow Area = 0.129 ac, 0.00% Impervious, Inflow Depth > 1.64" for 10-yr event
 Inflow = 0.37 cfs @ 12.11 hrs, Volume= 0.018 af
 Outflow = 0.02 cfs @ 14.31 hrs, Volume= 0.006 af, Atten= 95%, Lag= 131.9 min
 Discarded = 0.00 cfs @ 14.31 hrs, Volume= 0.004 af
 Primary = 0.02 cfs @ 14.31 hrs, Volume= 0.003 af

Routing by Stor-Ind method, Time Span= 2.00-24.00 hrs, dt= 0.02 hrs
 Peak Elev= 166.01' @ 14.31 hrs Surf.Area= 587 sf Storage= 522 cf

Plug-Flow detention time= 290.1 min calculated for 0.006 af (35% of inflow)
 Center-of-Mass det. time= 189.6 min (1,020.9 - 831.3)

Volume	Invert	Avail.Storage	Storage Description
#1	165.00'	577 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

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Type III 24-hr 10-yr Rainfall=4.50"

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Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
165.00	450	0	0
166.10	600	577	577

Device	Routing	Invert	Outlet Devices
#1	Discarded	165.00'	0.270 in/hr Exfiltration over Surface area
#2	Primary	166.00'	10.0' long x 1.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31 3.30 3.31 3.32

Discarded OutFlow Max=0.00 cfs @ 14.31 hrs HW=166.01' (Free Discharge)

↑1=Exfiltration (Exfiltration Controls 0.00 cfs)

Primary OutFlow Max=0.01 cfs @ 14.31 hrs HW=166.01' (Free Discharge)

↑2=Broad-Crested Rectangular Weir (Weir Controls 0.01 cfs @ 0.20 fps)

Summary for Pond DP1: DESIGN POINT EXIST. CONDITION

Inflow Area = 0.229 ac, 0.00% Impervious, Inflow Depth > 1.67" for 10-yr event
Inflow = 0.44 cfs @ 12.09 hrs, Volume= 0.032 af
Primary = 0.44 cfs @ 12.09 hrs, Volume= 0.032 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 2.00-24.00 hrs, dt= 0.02 hrs

Summary for Pond DP2: DESIGN POINT PROP. CONDITION

Inflow Area = 0.229 ac, 0.00% Impervious, Inflow Depth > 0.72" for 10-yr event
Inflow = 0.14 cfs @ 12.10 hrs, Volume= 0.014 af
Primary = 0.14 cfs @ 12.10 hrs, Volume= 0.014 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 2.00-24.00 hrs, dt= 0.02 hrs

Summary for Subcatchment 1E: EXIST WOODS

Runoff = 0.84 cfs @ 12.09 hrs, Volume= 0.060 af, Depth> 3.12"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv. UI as Pervious, Time Span= 2.00-24.00 hrs, dt= 0.02
Type III 24-hr 100-yr Rainfall=6.40"

Area (sf)	CN	Description
9,990	70	Woods, Good, HSG C
9,990	70	100.00% Pervious Area

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

Summary for Subcatchment 1Pa: GRAVEL RD AND UP GRADE TO SWALE

Runoff = 0.64 cfs @ 12.09 hrs, Volume= 0.046 af, Depth> 4.25"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv. UI as Pervious, Time Span= 2.00-24.00 hrs, dt= 0.02
Type III 24-hr 100-yr Rainfall=6.40"

Area (sf)	CN	Description
1,562	65	Brush, Good, HSG C
* 4,061	87	Gravel roads, HSG C
5,623	81	Weighted Average
5,623	81	100.00% Pervious Area

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

Summary for Subcatchment 1Pb: Southwest towards wetlands

Runoff = 0.31 cfs @ 12.09 hrs, Volume= 0.022 af, Depth> 2.64"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv. UI as Pervious, Time Span= 2.00-24.00 hrs, dt= 0.02
Type III 24-hr 100-yr Rainfall=6.40"

Area (sf)	CN	Description
4,367	65	Brush, Good, HSG C
4,367	65	100.00% Pervious Area

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

Summary for Pond 2P: ROADSIDE DITCH

Inflow Area = 0.129 ac, 0.00% Impervious, Inflow Depth > 4.25" for 100-yr event
 Inflow = 0.64 cfs @ 12.09 hrs, Volume= 0.046 af
 Outflow = 0.63 cfs @ 12.10 hrs, Volume= 0.039 af, Atten= 1%, Lag= 0.8 min
 Discarded = 0.00 cfs @ 12.10 hrs, Volume= 0.004 af
 Primary = 0.63 cfs @ 12.10 hrs, Volume= 0.036 af

Routing by Stor-Ind method, Time Span= 2.00-24.00 hrs, dt= 0.02 hrs
 Peak Elev= 168.98' @ 12.10 hrs Surf.Area= 0.012 ac Storage= 0.007 af

Plug-Flow detention time= 88.5 min calculated for 0.039 af (86% of inflow)
 Center-of-Mass det. time= 28.6 min (837.0 - 808.4)

Volume	Invert	Avail.Storage	Storage Description
#1	168.00'	0.015 af	1.00'W x 105.00'L x 1.50'H Prismatic Z=2.0

Device	Routing	Invert	Outlet Devices
#1	Discarded	168.00'	0.270 in/hr Exfiltration over Surface area
#2	Primary	168.90'	10.0' long x 1.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31 3.30 3.31 3.32

Discarded OutFlow Max=0.00 cfs @ 12.10 hrs HW=168.98' (Free Discharge)
 ↑**1=Exfiltration** (Exfiltration Controls 0.00 cfs)

Primary OutFlow Max=0.62 cfs @ 12.10 hrs HW=168.98' (Free Discharge)
 ↑**2=Broad-Crested Rectangular Weir** (Weir Controls 0.62 cfs @ 0.77 fps)

Summary for Pond 11P: BIO RETENTION AREA

Inflow Area = 0.129 ac, 0.00% Impervious, Inflow Depth > 3.32" for 100-yr event
 Inflow = 0.63 cfs @ 12.10 hrs, Volume= 0.036 af
 Outflow = 0.35 cfs @ 12.24 hrs, Volume= 0.024 af, Atten= 45%, Lag= 8.1 min
 Discarded = 0.00 cfs @ 12.24 hrs, Volume= 0.004 af
 Primary = 0.34 cfs @ 12.24 hrs, Volume= 0.020 af

Routing by Stor-Ind method, Time Span= 2.00-24.00 hrs, dt= 0.02 hrs
 Peak Elev= 166.05' @ 12.24 hrs Surf.Area= 594 sf Storage= 550 cf

Plug-Flow detention time= 135.4 min calculated for 0.024 af (67% of inflow)
 Center-of-Mass det. time= 51.9 min (872.0 - 820.1)

Volume	Invert	Avail.Storage	Storage Description
#1	165.00'	577 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

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Type III 24-hr 100-yr Rainfall=6.40"

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Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
165.00	450	0	0
166.10	600	577	577

Device	Routing	Invert	Outlet Devices
#1	Discarded	165.00'	0.270 in/hr Exfiltration over Surface area
#2	Primary	166.00'	10.0' long x 1.0' breadth Broad-Crested Rectangular Weir
Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00			
2.50 3.00			
Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31			
3.30 3.31 3.32			

Discarded OutFlow Max=0.00 cfs @ 12.24 hrs HW=166.05' (Free Discharge)

↳ **1=Exfiltration** (Exfiltration Controls 0.00 cfs)

Primary OutFlow Max=0.34 cfs @ 12.24 hrs HW=166.05' (Free Discharge)

↳ **2=Broad-Crested Rectangular Weir** (Weir Controls 0.34 cfs @ 0.63 fps)

Summary for Pond DP1: DESIGN POINT EXIST. CONDITION

Inflow Area = 0.229 ac, 0.00% Impervious, Inflow Depth > 3.12" for 100-yr event
 Inflow = 0.84 cfs @ 12.09 hrs, Volume= 0.060 af
 Primary = 0.84 cfs @ 12.09 hrs, Volume= 0.060 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 2.00-24.00 hrs, dt= 0.02 hrs

Summary for Pond DP2: DESIGN POINT PROP. CONDITION

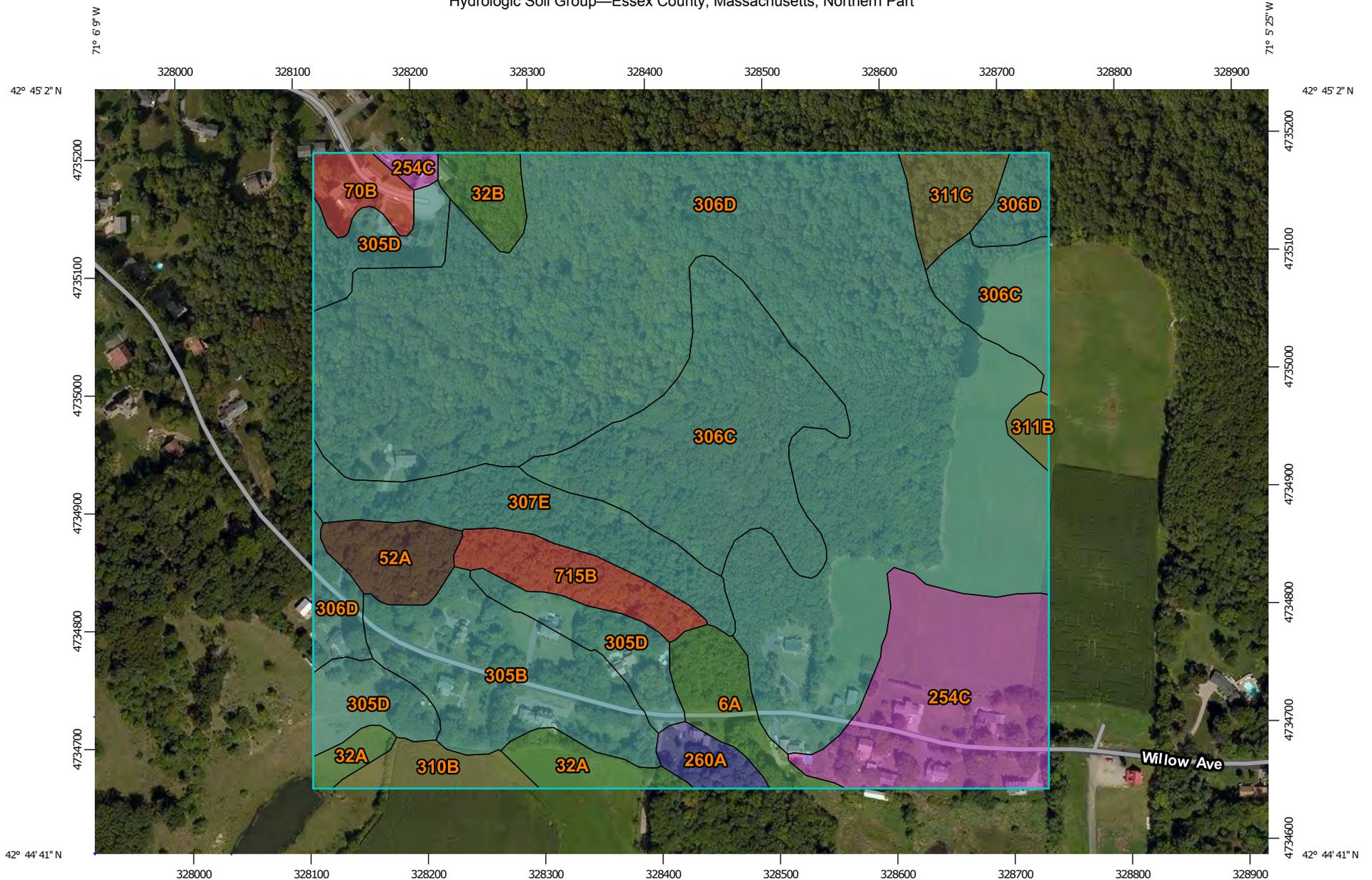
Inflow Area = 0.229 ac, 0.00% Impervious, Inflow Depth > 2.21" for 100-yr event
 Inflow = 0.52 cfs @ 12.23 hrs, Volume= 0.042 af
 Primary = 0.52 cfs @ 12.23 hrs, Volume= 0.042 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 2.00-24.00 hrs, dt= 0.02 hrs

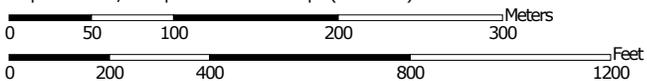
Appendix B - Drainage Areas

Appendix C - Soils Data

Hydrologic Soil Group—Essex County, Massachusetts, Northern Part



Map Scale: 1:4,570 if printed on A landscape (11" x 8.5") sheet.



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



MAP LEGEND

Area of Interest (AOI)

 Area of Interest (AOI)

Soils

Soil Rating Polygons

 A
 A/D
 B
 B/D
 C
 C/D
 D
 Not rated or not available

Soil Rating Lines

 A
 A/D
 B
 B/D
 C
 C/D
 D
 Not rated or not available

Soil Rating Points

 A
 A/D
 B
 B/D

 C
 C/D
 D
 Not rated or not available

Water Features

 Streams and Canals

Transportation

 Rails
 Interstate Highways
 US Routes
 Major Roads
 Local Roads

Background

 Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:15,800.

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

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

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

Source of Map: Natural Resources Conservation Service
 Web Soil Survey URL: <http://websoilsurvey.nrcs.usda.gov>
 Coordinate System: Web Mercator (EPSG:3857)

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

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

Soil Survey Area: Essex County, Massachusetts, Northern Part
 Survey Area Data: Version 11, Sep 28, 2015

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

Date(s) aerial images were photographed: Aug 29, 2014—Sep 19, 2014

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.

Hydrologic Soil Group

Hydrologic Soil Group— Summary by Map Unit — Essex County, Massachusetts, Northern Part (MA605)				
Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
6A	Scarboro mucky fine sandy loam, 0 to 3 percent slopes	A/D	1.8	2.2%
32A	Wareham loamy sand, 0 to 3 percent slopes	A/D	1.6	2.0%
32B	Wareham loamy sand, 3 to 8 percent slopes	A/D	1.1	1.3%
52A	Freetown muck, 0 to 1 percent slopes	B/D	1.6	1.9%
70B	Ridgebury fine sandy loam, 3 to 8 percent slopes	D	1.1	1.3%
254C	Merrimac fine sandy loam, 8 to 15 percent slopes	A	7.1	8.5%
260A	Sudbury fine sandy loam, 0 to 3 percent slopes	B	0.8	1.0%
305B	Paxton fine sandy loam, 3 to 8 percent slopes	C	5.6	6.7%
305D	Paxton fine sandy loam, 15 to 25 percent slopes	C	4.8	5.7%
306C	Paxton fine sandy loam, 8 to 15 percent slopes, very stony	C	10.2	12.2%
306D	Paxton fine sandy loam, 15 to 25 percent slopes, very stony	C	39.0	46.5%
307E	Paxton fine sandy loam, 25 to 35 percent slopes, extremely stony	C	4.0	4.8%
310B	Woodbridge fine sandy loam, 3 to 8 percent slopes	C/D	1.2	1.4%
311B	Woodbridge fine sandy loam, 0 to 8 percent slopes, very stony	C/D	0.4	0.5%
311C	Woodbridge fine sandy loam, 8 to 15 percent slopes, very stony	C/D	1.4	1.7%

Hydrologic Soil Group— Summary by Map Unit — Essex County, Massachusetts, Northern Part (MA605)				
Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
715B	Ridgebury and Leicester fine sandy loams, 3 to 8 percent slopes, extremely stony	D	2.0	2.4%
Totals for Area of Interest			83.9	100.0%

Description

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.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

Appendix D - Operation & Maintenance Plan

STORMWATER MANAGEMENT OPERATION AND MAINTENANCE PLAN

Interconnect Driveway
Willow Avenue
Haverhill, Massachusetts

The following Stormwater Management Operation and Maintenance (O&M) Plan has been prepared to operate and maintain the stormwater management system for the photovoltaic solar array project in Haverhill, MA.

Owner/Operator: **Verizon of New England Inc.**

Long-Term Inspection and Maintenance Schedule

Facility personnel will inspect the stormwater management system on a routine basis not less than once per month for the first 6 months of operation and annually thereafter. Refer to the project's grading plans stone swale and bio retention locations. Inspection and maintenance shall be performed as follows:

1. Stormwater Stone Swale and Bioretention Area shall be inspected for accumulation of silt, sediment, standing water, or debris on a semi-annual basis at a minimum, and after every rainfall event of 1-inch or more. Maintenance of the detention areas shall be the responsibility of the project operator. Vegetation shall be inspected monthly for disease or pest problems. If treatment is warranted, a non-toxic approach is the only allowed method. Promptly replace any vegetation that is beyond treatment to avoid erosion. Detention areas shall be weeded and mowed at least twice a year as required. Inspect soil and repair eroded areas monthly. Re-plant void areas as needed. Remove leaf litter and sediment monthly. Inspect riprap areas and replenish stone as needed.

2. Filter Berms: Inspect berms quarterly to remove any accumulated sediment on uphill sides of berms. Remove any weeds that may have encroached on limit of stone in berm. If sediment is accumulated in the berm, remove the top 3-inch layer of stone and replenish with clean material. If filter fabric is showing, replenish any necessary material to restore section of berm to proper configuration.

3. Landscaped Areas shall be inspected and maintained on a monthly basis. Areas which may be subject to erosion will be stabilized and reseeded immediately. These operations will be performed as part of ongoing routine grounds maintenance.

Stormwater System Inspection Report

General Information			
Location: Willow Ave, Haverhill, MA Verizon Driveway			
Date of Inspection		Start/End Time	
Inspector's Name(s)			
Inspector's Title(s)			
Inspector's Contact Information			
Purpose of Inspection			
Weather Information			
Has it rained since the last inspection? <input type="checkbox"/> Yes <input type="checkbox"/> No			
Weather at time of this inspection?			

Site-Specific Stormwater Devices

	Description	Installed and Operating Properly?	Corrective Action Needed	Date for Corrective Action/Responsible Person
1		<input type="checkbox"/> Yes <input type="checkbox"/> No		
2		<input type="checkbox"/> Yes <input type="checkbox"/> No		
3		<input type="checkbox"/> Yes <input type="checkbox"/> No		
4		<input type="checkbox"/> Yes <input type="checkbox"/> No		
5		<input type="checkbox"/> Yes <input type="checkbox"/> No		
6		<input type="checkbox"/> Yes <input type="checkbox"/> No		
7		<input type="checkbox"/> Yes <input type="checkbox"/> No		
8		<input type="checkbox"/> Yes <input type="checkbox"/> No		
9		<input type="checkbox"/> Yes <input type="checkbox"/> No		
10		<input type="checkbox"/> Yes <input type="checkbox"/> No		

	Description	Installed and Operating Properly?	Corrective Action Needed	Date for Corrective Action/Responsible Person
11		<input type="checkbox"/> Yes <input type="checkbox"/> No		
12		<input type="checkbox"/> Yes <input type="checkbox"/> No		
13		<input type="checkbox"/> Yes <input type="checkbox"/> No		
14		<input type="checkbox"/> Yes <input type="checkbox"/> No		
15		<input type="checkbox"/> Yes <input type="checkbox"/> No		
16		<input type="checkbox"/> Yes <input type="checkbox"/> No		
17		<input type="checkbox"/> Yes <input type="checkbox"/> No		
18		<input type="checkbox"/> Yes <input type="checkbox"/> No		
19		<input type="checkbox"/> Yes <input type="checkbox"/> No		
20		<input type="checkbox"/> Yes <input type="checkbox"/> No		
21		<input type="checkbox"/> Yes <input type="checkbox"/> No		
22		<input type="checkbox"/> Yes <input type="checkbox"/> No		
23		<input type="checkbox"/> Yes <input type="checkbox"/> No		
24		<input type="checkbox"/> Yes <input type="checkbox"/> No		
25		<input type="checkbox"/> Yes <input type="checkbox"/> No		
26		<input type="checkbox"/> Yes <input type="checkbox"/> No		
27		<input type="checkbox"/> Yes <input type="checkbox"/> No		
28		<input type="checkbox"/> Yes <input type="checkbox"/> No		
29		<input type="checkbox"/> Yes <input type="checkbox"/> No		

	Description	Installed and Operating Properly?	Corrective Action Needed	Date for Corrective Action/Responsible Person
30		<input type="checkbox"/> Yes <input type="checkbox"/> No		

Overall Site Issues

	Description		Corrective Action	Date for Corrective Action/Responsible Person
1	Are all slopes properly stabilized?	<input type="checkbox"/> Yes <input type="checkbox"/> No		
2	Are natural resource areas (e.g., streams, wetlands, etc.) being subjected to erosion?	<input type="checkbox"/> Yes <input type="checkbox"/> No		
3	Are discharge points free of sediment deposits?	<input type="checkbox"/> Yes <input type="checkbox"/> No		

Certification Statement:

“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.”

Print name: _____

Signature: _____

Date: _____

