Notice of Intent

Millis Solar

Off Main Street
Assessor's Map 32 Lot 002
Millis, Massachusetts

Prepared for:

Clean Energy Collective
146 West Boylston Drive
Worcester, MA 01606

Prepared by:

BEALS + THOMAS
BEALS AND THOMAS, INC.
Reservoir Corporate Center
144 Turnpike Road
Southborough, MA 01772-2104

Submitted in Compliance with the Massachusetts Wetlands Protection Act, the Millis Wetlands Protection Bylaw, and the Millis Wetlands Rules & Regulations

August 28, 2015

258800NI001

B E A L S + T H O M A S
BEALS AND THOMAS, INC.
Reservoir Corporate Center
144 Turnpike Road
Southborough, MA 01772-2104

T 508.366.0560
F 508.366.4391
www.bealsandthomas.com
Regional Office: Plymouth, MA

August 28, 2015

Dr. James Lederer, Chair
Millis Conservation Commission
900 Main Street
Millis, Massachusetts 02054

Via: Hand Delivery

Reference: Notice of Intent
Millis Solar
Off Main Street (Assessor's Map 32 Lot 002)
Millis, Massachusetts
B+T Project No. 2588.00

Dear Chairperson Lederer and Members of the Commission:

On behalf of the Applicant, Clean Energy Collective, Beals and Thomas, Inc. respectfully submits this Notice of Intent (NOI) for work within the Resource Areas of Bordering Vegetated Wetlands, Land under Water Bodies and Waterways, Riverfront Area, Bordering Land Subject to Flooding and the Buffer Zone of BVW. The proposed development includes the installation of a ground-mounted solar photovoltaic array and related appurtenances, including a security fence and gravel access road off Main Street in Millis, Massachusetts. This filing is submitted in accordance with the Massachusetts Wetlands Protection Act, MGL, Chapter 131, Section 40 and associated Regulations at 310 CMR 10.00 (collectively referred to as the Act) and the Millis Wetlands Protection Bylaw (the Bylaw) and the Millis Wetlands Rules & Regulations (the Regulations).

As required, enclosed are eight (8) copies plus the original of the NOI submission package. The following information is included for your review:

Section 1.0: Notice of Intent Forms
Section 2.0: Project Narrative
Section 3.0: Abutter Information
Section 4.0: Stormwater Management Information
Section 5.0: Wetland Boundary Documentation
Section 6.0: Plans

As required, a copy of this filing has been provided to the Central Regional Office of the Department of Environmental Protection (DEP). Pursuant to requirements of the Act and the Regulations, abutters within 300 feet of the subject property have been notified via certified mail concurrent with the date of this submission that this NOI has been filed with the Millis Conservation Commission. Enclosed are two checks payable to the Town of Millis in the amounts of $262.50 for the appropriate filing fee as required by the Act and $75.00 as required by the Town for advertisement. A separate check in the amount of $237.50 has been forwarded to the DEP Lock Box to cover the state portion of the filing fee. We understand that this Project will be included as part of the September 14, 2015 Millis Conservation Commission hearing.

Should you have any questions regarding this matter or require additional information, please contact us at (508) 366-0560. We thank you for your consideration of this Notice of Intent and look forward to meeting with the Commission at the September 14th hearing.

Very truly yours,

BEALS AND THOMAS, INC.

Daniel M. Feeney, PE
Principal

Enclosures

cc: Millis Town Clerk (1 Copy via hand delivery)
DEP Central Regional Office (1 copy via Certified Mail)
Colleen DeBenedetto, Clean Energy Collective (1 copy via USPS Mail)
Peter Harcovitz, A H Cedar LLC (1 Copy via USPS Mail)
Francis K. Farricy (1 Copy via USPS Mail)

TABLE OF CONTENTS

Section 1.0
Notice of Intent Forms

Notice of Intent (WPA Form 3)
Wetland Fee Transmittal Form

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands

WPA Form 3 – Notice of Intent

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

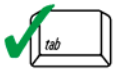
Provided by MassDEP:

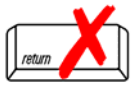
MassDEP File Number

Document Transaction Number

Millis
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):

Off Main Street — a. Street Address
Millis — b. City/Town
02054 — c. Zip Code
Latitude and Longitude:
42° 9' 22.5" N — d. Latitude
71° 22' 56" W — e. Longitude
Map 32 Lot 002 — f. Assessors Map/Plat Number
ID#0032-0002-0000 — g. Parcel /Lot Number

2. Applicant:

Colleen — a. First Name
DeBenedetto — b. Last Name
Clean Energy Collective — c. Organization
146 West Boylston Drive — d. Street Address
Worcester — e. City/Town
MA — f. State
01606 — g. Zip Code
(508) 451-9093 — h. Phone Number
i. Fax Number
colleen.debenedetto@easycleanenergy.com — j. Email Address

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

Peter — a. First Name
Harcovitz — b. Last Name
A H Cedar LLC — c. Organization
256 Orchard Street — d. Street Address
Millis — e. City/Town
MA — f. State
02054 — g. Zip Code
(508) 560-3762 — h. Phone Number
i. Fax Number
j. Email address

4. Representative (if any):

Daniel — a. First Name
Feeney, PE — b. Last Name
Beals & Thomas, Inc. — c. Company
144 Turnpike Road — d. Street Address
Southborough — e. City/Town
MA — f. State
01772 — g. Zip Code
(508) 366-0560 — h. Phone Number
(508) 366-4391 — i. Fax Number
dfeeney@bealsandthomas.com — j. Email address

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

$500 — a. Total Fee Paid
$237.50 — b. State Fee Paid
$262.50 — c. City/Town Fee Paid

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

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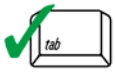

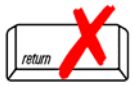

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MA — f. State
01606 — g. Zip Code
(508) 451-9093 — h. Phone Number
i. Fax Number
colleen.debenedetto@easycleanenergy.com — j. Email Address

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

Francis — a. First Name
Farricy — b. Last Name
N/A — c. Organization
15 Alma Road — d. Street Address
Millis — e. City/Town
MA — f. State
02054 — g. Zip Code
(508) 376-8812 — h. Phone Number
i. Fax Number
j. Email address

4. Representative (if any):

Daniel — a. First Name
Feeney, PE — b. Last Name
Beals & Thomas, Inc. — c. Company
144 Turnpike Road — d. Street Address
Southborough — e. City/Town
MA — f. State
01772 — g. Zip Code
(508) 366-0560 — h. Phone Number
(508) 366-4391 — i. Fax Number
dfeeney@bealsandthomas.com — j. Email address

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

$500 — a. Total Fee Paid
$237.50 — b. State Fee Paid
$262.50 — c. City/Town Fee Paid

A. General Information (continued)

6. General Project Description:
Installation and operation of a ±950 kilowatt (KW) solar facility on ±6.1 acres of an approximately 28.5-acre property.

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

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

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

1. ☐ Yes ☑ No

If yes, describe which limited project applies to this project. (See 310 CMR 10.24 and 10.53 for a complete list and description of limited project types)

2. Limited Project Type

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

8. Property recorded at the Registry of Deeds for:

a. County	b. Certificate # (if registered land)
Norfolk	
c. Book	d. Page Number
25371	420

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

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

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

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

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

Resource Area	Size of Proposed Alteration	Proposed Replacement (if any)
a. ☐ Bank	1. linear feet	2. linear feet
b. ☑ Bordering Vegetated Wetland	1. square feet: <1,000	2. square feet
c. ☐ Land Under Waterbodies and Waterways	1. square feet 3. cubic yards dredged	2. square feet

Resource Area	Size of Proposed Alteration	Proposed Replacement (if any)
d. ☑ Bordering Land Subject to Flooding	1. square feet: <1,000 3. cubic feet of flood storage lost: n/a	2. square feet 4. cubic feet replaced
e. ☐ Isolated Land Subject to Flooding	1. square feet 2. cubic feet of flood storage lost	3. cubic feet replaced
f. ☐ Riverfront Area	1. Name of Waterway (if available) - **specify coastal or inland**	

2. Width of Riverfront Area (check one):

☐ 25 ft. - Designated Densely Developed Areas only

☐ 100 ft. - New agricultural projects only

☐ 200 ft. - All other projects

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

4. Proposed alteration of the Riverfront Area:

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

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

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

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

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

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

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

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

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

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

4. ☐ Restoration/Enhancement

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

a. square feet of BVW

b. square feet of Salt Marsh

5. ☐ Project Involves Stream Crossings

a. number of new stream crossings

b. number of replacement stream crossings

C. Other Applicable Standards and Requirements

☐ This is a proposal for an Ecological Restoration Limited Project. Skip Section C and complete Appendix A: Ecological Restoration 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

   b. Date of map

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

   c. Submit Supplemental Information for Endangered Species Review*

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

         (a) within wetland Resource Area _____ percentage/acreage

         (b) outside Resource Area _____ percentage/acreage

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

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

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

   (b) ☐ Photographs representative of the site

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

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

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

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

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

(d) ☐ Vegetation cover type map of site

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

(f) OR Check One of the Following

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

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

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

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

a. ☑ Not applicable – project is in inland resource area only b. ☐ Yes ☐ No

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

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

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

North Shore - Hull to New Hampshire border:

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

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

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

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

4. Is any portion of the proposed project within an Area 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.

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.

Solar Array in Millis, Massachusetts (Norfolk County) Permit Plan Set
a. Plan Title

Beals and Thomas, Inc.
b. Prepared By

Daniel M. Feeney, PE
c. Signed and Stamped by

08/27/2015
d. Final Revision Date

As noted
e. Scale

NOI Narrative and attachments, including stormwater report
f. Additional Plan or Document Title

08/27/2015 and as noted
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:

1053
2. Municipal Check Number

August 25, 2015
3. Check date

1054
4. State Check Number

August 25, 2015
5. Check date

Clean Energy Collective LLC
6. Payor name on check: First Name

Massachusetts Account
7. Payor name on check: Last Name

F. Signatures and Submittal Requirements

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

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

1. Signature of Applicant — 2. Date: 8-26-2015

3. Signature of Property Owner (if different): Peter Hanley A.H. CEDAR LLC — 4. Date: 8.26.15

5. Signature of Representative (if any) — 6. Date: 8/27/2015

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.

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1. Signature of Applicant	2. Date: 8-26-2015
3. Signature of Property Owner (if different)	4. Date: 8/26/2015
5. Signature of Representative (if any)	6. Date: 8/27/2015

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Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands

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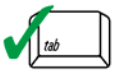
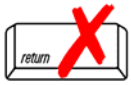




A. Applicant Information

1. Location of Project:

a. Street Address	b. City/Town
Off Main Street	Millis

c. Check number	d. Fee amount
1054	$237.50

2. Applicant Mailing Address:

a. First Name	b. Last Name
Colleen	DeBenedetto

c. Organization: Clean Energy Collective

d. Mailing Address: 146 West Boylston Drive

e. City/Town	f. State	g. Zip Code
Worcester	MA	01606

h. Phone Number	i. Fax Number	j. Email Address
(508) 451-9093		colleen.debenedetto@easycleanenergy.com

3. Property Owner (if different):

a. First Name	b. Last Name
Peter	Harcovitz

c. Organization: A H Cedar LLC

d. Mailing Address: 256 Orchard Street

e. City/Town	f. State	g. Zip Code
Millis	MA	02054

h. Phone Number	i. Fax Number	j. Email Address
(508) 560-3762		

B. Fees

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

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

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

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

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

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

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

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

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands

NOI Wetland Fee Transmittal Form

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

B. Fees (continued)

Step 1/Type of Activity	Step 2/Number of Activities	Step 3/Individual Activity Fee	Step 4/Subtotal Activity Fee
2j.) any other activity not in Category 1, 3, 4, 5, or 6	1	$500	$500

Step 5/Total Project Fee: $500

Step 6/Fee Payments:

Total Project Fee: $500
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 filling 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.)

CLEAN ENERGY COLLECTIVE LLC
MASSACHUSETTS ACCOUNT
361 CENTENNIAL PARKWAY SUITE 300
LOUISVILLE, CO 80027

82-123
1070

1052

DATE August 25, 2015

PAY TO THE ORDER OF Town of Millis — $ 75.00

Seventy-five + 00/100 — DOLLARS

Security Features Included Details on Back

ANB Bank www.anbbank.com Telephone 1-866-433-0282

MEMO Millis AB - adv. fee.

MP

⑆107001232⑆ 200000205⑆ 01052

SPECIALTY BLUE

CLEAN ENERGY COLLECTIVE LLC
MASSACHUSETTS ACCOUNT
361 CENTENNIAL PARKWAY SUITE 300
LOUISVILLE, CO 80027

82-123
1070

1053

DATE August 25, 2015

PAY TO THE ORDER OF Town of Millis — $ 262.50

Two hundred sixty-two + 50/100 — DOLLARS

Security Features Included Details on Back

ANB Bank www.anbbank.com Telephone 1-866-433-0282

MEMO Millis AB - townshare DEP costs

MP

⑆107001232⑆ 200000205⑆ 01053

SPECIALTY BLUE

CLEAN ENERGY COLLECTIVE LLC
MASSACHUSETTS ACCOUNT
361 CENTENNIAL PARKWAY SUITE 300
LOUISVILLE, CO 80027

82-123
1070

1054

DATE August 25, 2015

PAY TO THE ORDER OF Commonwealth of Massachusetts — $ 237.50

Two hundred thirty seven + 50/100 — DOLLARS

Security Features Included Details on Back

ANB Bank www.anbbank.com Telephone 1-866-433-0282

MEMO Millis AB - State share DEP fee

MP

⑆107001232⑆ 200000205⑆ 01054

SPECIALTY BLUE

Section 2.0
Project Narrative

2.0 PROJECT NARRATIVE

2.1 Introduction

The Subject Property (the Property) is located south of Main Street (Route 109) in Millis, Massachusetts. The 950 kilowatt solar array installation is proposed on a ±6.1 acre portion of the larger ±28.5 acre Property, located off Main Street, according to the Millis Assessor's Department. Refer to Figure 1, Locus Map and Figure 2, Aerial Map. A significant portion of the work associated with the solar array installation will take place outside of the jurisdictional buffer zones and resource areas. Work proposed within the 100 foot buffer zone to Bordering Vegetated Wetlands (BVW), Inland Bank (Bank), and Bordering Land Subject to Flooding (BLSF) includes clearing of vegetation, installation of solar array panels, installation of the security fence, construction of a gravel access road, pollarding, and impact mitigation. Additionally, pollarding is anticipated to take place within a portion of the BVW and BLSF in order to avoid shading impacts to the array.

2.2 Existing Conditions

The Site is located off of Main Street (Route 109). It is bounded to the north, east and south by private property owners. To the west, the Site is bounded by the Millis/Medway town line. The Site lies south of Main Street. The larger Property within which the Site lies is identified as Millis Assessor's Map 32 Lot 002 (Parcel ID 0032-0002-0000). Pollarding is anticipated to occur on the following additional lots: Map 32 Lot 44 (Parcel ID 0032-0044-0000) and Map 32 Lot 51 (Parcel ID 0032-0051-0000). The proposed gravel access road is anticipated to be constructed on the following additional lots: Map 21 Lot 029 (Parcel ID 0021-0029-0000) and Map 21 Lot 030 (Parcel ID 0021-0030-0000).

The Site is currently undeveloped, wooded land which contains wetlands. The land immediately north of the Site is a mix of undeveloped wooded land, gravel parking which serves as space for vehicle storage, a vacant paved lot with two apparent abandoned structures, a construction company, a garden equipment supply store and a lumber supply company. To the east, south, and west of the Site is undeveloped wooded land and single-family residences.

According to the Massachusetts Cultural Resource Information System (MACRIS), there are no historical resources located on the Site. Additionally, the proposed work is not anticipated to involve activities that would adversely impact potential historic resources. According to the Massachusetts Natural Heritage Atlas 13th Edition, dated October 1, 2008, and confirmed current with MassGIS information on June 2, 2015, the Site is not located within the Natural Heritage and Endangered Habitat of Rare Wildlife. There are no potential or certified vernal pools identified by Natural Heritage and Endangered Species Program within the Site.

Refer to Section 2.0 Pre-Development Conditions of the Stormwater Management Report included in Section 4 of this NOI for detailed topographic and soils information.

2.2.1 Wetland Resource Area Defined by 310 CMR 10.00

The wetland resource areas located on the Property are composed of BVW, Land Under Water Bodies and Waterways (LUW), Bank, and Bordering Land Subject to Flooding.

Resource area delineations were performed by Applied Ecological Services (AES), utilizing definitions and criteria promulgated under the *Massachusetts Wetlands Protection Act* (M.G.L. c. 131, §40), the implementing Regulations (310 CMR 10.55(2), 310 CMR 10.5(2), 310 CMR 10.58(2)), and the Town of Millis *Wetlands Protection Bylaw* (Article XIX). The extent of vegetated wetland was determined through observations of the existing plant communities while verifying wetland hydrology through interpretation of soil characteristics and other indications of surface hydrology. Soils were analyzed for texture and color to determine soil morphology in accordance with the most up to date standards including *Field Indicators for Identifying Hydric Soils in New England* (2004). Evidence of surface hydrology was determined through visual inspection of existing site conditions, including typical indicators such as water marks, drift-lines, water-stained leaves, sediment deposits and drainage patterns.

Bank (310 CMR 10.54)

The statutory Bank is defined at 310 CMR 10.54(2)(a) as:

The portion of land surface which normally abuts and confines a water body or waterway. The upper boundary of a Bank is first observable break in the slope or the mean annual flood level, whichever is lower. The lower boundary of a Bank is the mean annual low flow level (310 CMR 10.54(2)(c)).

Inland Bank located on or adjacent to the Site is associated with an unnamed, mapped intermittent stream. The banks of the stream are approximately one to three feet high, generally distinct and well defined, and vegetated with wetland plant species. Two additional, intermittent channels are located within the abandoned railroad right-of-way in the southern portion of the Site. The Top of Inland Bank to the mapped stream located on or adjacent to the site is delineated in the field with flagging stations TOB-1 through TOB-15.

The unnamed stream is plotted on US Geological Survey (USGS) maps; however AES documented a dry streambed on four separate dates within a 12-month period. Please refer to Section 5.0 for wetland documentation.

Bordering Vegetated Wetland (310 CMR 10.55)
BVW is defined in 310 CMR 10.55(2)(a) as:

Freshwater wetlands that border on creeks, rivers, streams, ponds and lakes. Bordering Vegetated Wetlands are areas where the soils are saturated and/or inundated such that they support a predominance of wetland indicator plants.

The boundary of BVW is defined in 310 CMR 10.55(2)(c) as:

The line within which 50% or more of the vegetative community consists of wetland plants and saturated or inundated conditions exist.

Seasonally saturated to seasonally flooded Forested Swamp (PFO1E/E-C) (Cowardin et al 1979) is located within or adjacent to the western, southern and eastern portions of the site. Topography within the BVW is generally flat with distinct pit and mound micro-topography, drainage patterns and leaf staining evident throughout. A moderately dense canopy of red maple (*Acer rubrum*), and black gum (*Nyssa sylvatica*), with slippery elm (*Ulmas rubra*), northern red oak (*Quercus rubra*), and eastern white pine (*Pinus strobus*) dominates vegetation within the wetland. The shrub layer consists of saplings from the canopy, highbush blueberry (*Vaccinium corymbosum*), southern arrowwood (*Viburnum dentatum*), winterberry (*Ilex verticillata*), silky dogwood (*Cornus amomum*), riverbank grape (*Vitis riparia*), swamp rose (*Rosa palustris*), poison ivy (*Toxicodendron radicans*), and swamp azalea (*Rhododendron viscosum*). Ground cover species include seedlings from the canopy and shrub layers, cinnamon fern, royal fern (*Osmunda regalis*), sensitive fern (*Onoclea sensibilis*), New York fern (*Thelypteris noveboracensis*), marsh fern (*Theylpteris thelypteroides*), skunk cabbage (*Symplocarpus foetidus*), sphagnum moss (*Sphagnum* spp.), jewel weed (*Impatiens capensis*), Alaskan gold thread (*Coptis trifolia*), star flower (*Trientalis borealis*), and various sedges (*Carex* spp.) and grasses (Family *Poaceae* spp.*)* The upland/wetland boundary to BVW#l located on or adjacent to the site is delineated in the field with flagging stations #1 though #86.

Land under Water Bodies and Waterways (310 CMR 10.56)
Land under Water Bodies and Waterways is defined at 310 CMR 10.56(2)(a) as:

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 boundary of LUW is the mean annual low water level.

LUW located on or adjacent to the Site is associated with an unnamed, mapped perennial stream. The stream flows northerly through the eastern portions of the Site. A well-defined channel, approximately four to eight feet wide and one to three feet deep, with a mud/cobble streambed characterizes the stream. No flow was observed within the channel at the time of the site evaluations. The stream was later determined to be intermittent based on field observations.

Bordering Land Subject to Flooding (310 CMR 10.57)
Bordering Land Subject to Flooding (BLSF) is defined at 310 CMR 10.57(1)(a)1 as:

An area that floods from a rise in a bordering waterway or water body.

Based on the Federal Emergency Management Agency Flood Insurance Rate Map for the Town of Millis, Massachusetts (Map No. 25021C0142E), a portion of the Site is located within Zone A, *Areas of 100-year flood; base flood elevations and flood hazard/actors not determined*. Analysis of the BLSF on-site per Federal Emergency Management Administration (FEMA) Flood Insurance Rate Maps (FIRM) show a digitized line demarcating the Zone A boundary that partially follows the 142 foot contour line west of the array, and towards the northwest corner of the Site, climbing in elevation to the 144 foot contour, crossing the Site boundary, before decreasing in elevation to approximately 140 feet on the adjacent property to the northwest of the Site. Due to the inherent inaccuracy of the large-scale FIRM mapping, this increase in elevation does not appear to accurately represent actual flood patterns in the area. As such, it appears the logical boundary of the BLSF to follow the 142 foot contour line.

Riverfront Area (310 CMR 10.58)
Riverfront Area is defined at 310 CMR I 0.58(2)(a)3 as:

The area of land between a river's mean annual high waterline, measured horizontally outward from the river and a parallel line located 200 feet away, except that the parallel line is located:

a. 25 feet away in Boston, Brockton, Cambridge, Chelsea, Everett, Fall River, Lawrence, Malden, New Bedford, Somerville, Springfield, Winthrop, and Worcester.

b. 25 feet away in densely developed areas, as designated by the Secretary of the Executive Office of Environmental Affairs; and

c. *100 feet away for new agricultural and aquacultural activities.*

The Mean Annual High Water Line, as defined at 310 CMR 10.58(2)(a) 2, is:

The line that is apparent from visible markings or changes in the character of soils or vegetation due to prolonged presence of water and that distinguishes between predominantly aquatic and predominantly terrestrial land. Field indicators of bankfull conditions shall be used to determine the mean annual high water line. Bankfull indicators include but are not limited to: changes in slope, changes in vegetation, stain lines, top of point bars, changes in bank materials, or bank undercuts.

a. In most rivers, the first observable break in slope is coincident with bankfull conditions and the mean annual high-water line.

b. In some river reaches, the mean annual high-water line is represented by bankfull field indicators that occur above the first observable break in slope, or if no observable break in slope exists, by other bankfull field indicators. These river reaches are characterized by at least two of the following features: low gradient, meanders, oxbows, histosols, a low-flow channel, or poorly defined or nonexistent banks.

c. In tidal rivers, the mean annual high-water line is coincident with the mean high water line determined under 310 CMR 10.23.

AES documented four dates within a 12-month period where the streambed was dry during non-drought conditions, therefore determining that this stream is intermittent. As such, there is no RFA located on the Site.

2.2.2 Local Buffer Zone

In addition to the previously described resource areas, Millis also maintains jurisdiction of "land within 100 feet of any freshwater wetland, marsh, wet meadow, bog or swamp; land within 100 feet of any bank, beach, dune or flat; any lake, river, pond, stream or estuary or any land under said waters." The Bylaw designates these buffer zones as resource areas.

2.3 Proposed Conditions

2.3.1 Description of Work

The Project consists of the installation of a ground-mounted solar photovoltaic system and the associated site work to clear and prepare the ground surface. The installation of portions of the proposed array and associated appurtenances are located partially within the 100 foot buffer zone to BVW, Bank, and BLSF and pollarding will be required in the buffer zone and BVW (described in more detail herein).

The photovoltaic system will encompass approximately ±4.9 acres (fenced area) and will connect to the electrical grid at Main Street. The solar array has been laid out such that significant grading is not anticipated to be necessary to accommodate the Project. Formal stormwater management areas (basins) are proposed to mitigate impacts generated by the Project. See Section 4.0 of this NOI for additional stormwater information.

The Site is anticipated to be surrounded by a seven-foot high (minimum) galvanized chain-link fence with a top tension wire and braced corners. The fence will also have a 16 foot gate.

The access drive is anticipated to be 18 feet wide, constructed to be flush with existing grade, composed of a gravel surface. The access road is anticipated to connect to Main Street from the northern boundary of the Site and continues partially along the eastern boundary of the Site. A crushed stone trench will be installed at the edge of the access road to assist in stormwater management by providing storage for peak flow attenuation.

Anticipated erosion controls will include silt fencing and use of straw wattles. Stormwater controls are anticipated to include basins, swales, and trenches, designed to attenuate peak flows. Refer to Section 4.0 herein for more information regarding stormwater management.

The proposed construction sequence is provided below:

- Contractor shall have the limit of all erosion control barriers staked prior to any construction activities.
- Erosion control and stone construction entrance shall be installed and inspected prior to initiating earthwork.
- All greater than 3:1 slopes, shall be stabilized with an erosion control blanket.
- Install the solar panel support posts and racks.
- Install the solar panels and electrical conduits.
- Loam and seed all disturbed areas as construction progresses.
- Provide ongoing maintenance of disturbed areas until disturbed areas are 100% stabilized.
- Construction sequence may vary to minimize disturbance on-site and all erosion controls will be maintained until full stabilization.
- All material modifications as determined by the Building Inspector for the Large Scale Solar Energy System made after the issuance of the required building permit shall require approval by the Conservation Commission.
- All construction activity shall occur between the hours of 7:00 AM and 5:00 PM on Monday through Saturday, only. Construction activity includes staging, deliveries, equipment warm up, or other supporting construction activities.
- Once the Project is complete, there will be no outside storage of equipment or solar panels on the Site.
- An as-built plan shall be submitted and approved by the Millis Building Inspector and Millis Conservation Commission prior to the issuance of an occupancy permit.
- Vegetation control on the Site shall be mechanical only and no pesticides or other chemical products shall be used.

Refer to Post-Development Conditions of the Stormwater Management Report included in Section 4.0 of this NOI for information on existing and proposed hydrology and compliance with DEP Stormwater Management Policy.

2.3.2 Impacts to Wetland Resource Areas

As previously described, work within the buffer zone includes installation of the solar panels and associated appurtenances, including inverters gravel access roads, and fencing. Additionally, tree and sapling pollarding is necessary within the BVW and buffer zone to address shading impacts. The proposed work is described in greater detail in the following sections.

2.3.2.1 Tree and Sapling Pollarding

A majority of the Site is wooded or vegetated with herbaceous material. The Site is anticipated to be cleared of vegetation where the solar array is proposed. Trees are anticipated to be pollarded by hand with the vegetative material removed from the Site, chipped and left on-site to aid in stabilization and/or to be left in place. The trees to be pollarded and the height of the pollarding will be determined by pollarding at a 13-degree gradient moving away from the outermost panel, set above ground surface at panel height. To the extent necessary, potential future re-growth of the pollarded trees will be managed.

The proposed pollarding is essential as most, if not all, of the solar field would otherwise be shaded, making the project economically unfeasible.

2.3.2.2 Solar Array Installation

Work associated with the installation of the solar array is proposed within the 50 foot No-Touch Buffer Zone of Bank and BVW. This work will include minimal grading where needed, construction of gravel access roads, and installation and location of solar panels. This work will take place in undeveloped wooded land. The extent of access roads has been minimized to the extent possible with consideration of emergency and maintenance access.

2.3.2.3 Stormwater Management Facilities

Two stormwater basins are proposed along the fencing surrounding the proposed solar array. Refer to the Plan Set for further information regarding the location of these basins.

The proposed stormwater basins are anticipated to mitigate effects of stormwater runoff during storm events by collecting runoff into swales along the edge of the area of clearing. These swales will direct the runoff into one of the proposed basins, which will allow for gradual infiltration back into the ground and wetlands, preventing impacts to the wetlands due to the proposed clearing and associated runoff. The proposed access road will have a crushed stone edge to assist in stormwater management, by reducing the speed of runoff and providing peak flow attenuation.

2.3.2.4 Access Road

The proposed access road is anticipated to connect the Site to Main Street through the adjacent lots north of the Subject Site. The access road is anticipated to be gravel and run along the eastern boundary of Parcels 21-010 and 21-018. The access road is anticipated to access the Subject Site at the north-center boundary to form a "T" shape. The road is anticipated to extend west approximately 100 feet and to follow the Site boundary eastward for approximately 400 feet.

2.3.2.5 Wildlife Habitat Evaluation

A wildlife habitat evaluation will be conducted to determine what impacts, if any, the proposed work may have on the habitat of native wildlife. Should the Simplified Wildlife Habitat Evaluation (Appendix A) require a more detailed review, a Detailed Wildlife Habitat Evaluation (Appendix B) will be conducted.

2.3.3 Mitigation for Impacts to Wetland Resource Areas

Impacts have been minimized to the extent practicable with consideration of the area of solar array needed in order to make the Project economically viable.

Tree and sapling pollarding has been minimized as described in Section 2.3.2.1. The proposed access road will be pervious (gravel) to minimize impacts while avoiding potential erosion concerns associated with vegetated access ways. The edge of the access road will have a crushed stone trench, assisting in stormwater management by reducing the speed of runoff and providing peak flow attenuation.

Mitigation proposed for work within jurisdictional areas includes planting of high-habitat value native shrubs and plantings within the areas with proposed pollarding, planting of New England Conservation/Wildlife Seed Mix within the inner 50 foot buffer zone, raising of the security fence approximately six inches to facilitate wildlife access and maintaining a minimum height of vegetative cover surrounding the panels. These proposed mitigation measures will be subject to oversight by a Professional Wetland Scientist or Registered Landscape Architect and in coordination with the Conservation Office.

State Jurisdictional Resource Areas and Buffer Zone

Bordering Vegetated Wetland (310 CMR 10.55)
Proposed work in BVW is anticipated to be pollarding to reduce shade impacts to the solar array.

This pollarding is anticipated to impact less than 1,000 square feet of basal area within the BVW. This impact is anticipated to be mitigated through planting of high-habitat value native species within areas subject to pollarding. These species are anticipated to include native shrubs and other plantings and will be determined in conjunction with the Conservation Office and the Conservation Commission.

Pollarding, as previously described, includes the trimming of certain species of trees, allowing these trees to sprout from the place of the cut. The work proposed to take place within the BVW is not anticipated to destroy or impair the BVW, as the re-growth will allow for healthier and stronger trees. The proposed pollarding is anticipated to impact less than 1,000 square feet of BVW.

It has been determined that the BVW on the Site does not contain any rare or endangered species habitat. The Subject Site has also been determined to not be located within an Area of Critical Environmental Concern (ACEC).

Bordering Land Subject to Flooding (310 CMR 10.57)
As described herein, the boundary for the BLSF is determined from a large-scale, digitized town-wide FIRM, which may have inherently illogical flood boundaries due to the scale of the map. As such, it appears that the BLSF boundary, in reality, closely follows the 142 foot contour line, as it does on a majority of the Property, and does not climb in elevation at the northwest corner of the Site, to an elevation of 144 feet, to then decrease in elevation to 142 feet on the adjacent property, as shown on the FIRM.

The stormwater basin proposed for the northwest corner of the Site has an elevation of 144 feet, assumed to be outside of the BLSF, and is not anticipated to impact this resource area.

Pollarding is anticipated to be conducted within the BLSF along the western boundary of the Site. The pollarding is not anticipated to impact stormwater management or wildlife habitat. The proposed pollarding is anticipated to impact less than 1,000 square feet of BLSF.

Buffer Zone

Proposed work in the Buffer Zone is anticipated to be: pollarding to reduce shade impacts to the solar array, clearing and grading of land, construction of a gravel access road, and installation and operation of solar photovoltaic arrays. The clearing of trees, grading, access road and installation of arrays are anticipated to be located within the buffer zone to BVW, Bank, and BLSF. The BVW and Bank buffer areas overlap along the eastern and northeastern boundaries of the Site, with the BVW boundary serving as the more conservative boundary. The BVW and BLSF buffer zones overlap along the western boundary of the Site.

The site preparation, access road construction, and installation activities are anticipated to impact ±109,000 square feet of the 100 foot BVW buffer area. Approximately 32,000 square feet of this is anticipated to take place within the Inner 50 foot Buffer Zone and approximately 77,000 square feet is anticipated to take place within the Outer 50 foot Buffer Zone. Approximately 30% of the Outer 50 foot Buffer Zone of the site is anticipated to be covered by the solar panels.

The pollarding of trees to reduce shade impacts is anticipated to take place within the Buffer Zone. This pollarding is anticipated to impact less than 1,000 square feet of basal area within the Buffer Zone. This impact is anticipated to be mitigated through planting of high-habitat value native shrubs and other plantings, the species to be determined through discussions with the Conservation Office and the Conservation Commission. The work proposed to take place within the Buffer Zone is not anticipated to destroy or impair the Buffer Zone, as the re-growth will allow for healthier and stronger trees.

A chain-link security fence is anticipated to be installed surrounding the Site and will be located within the Inner 50 foot Buffer Zone in some areas of the Site. The security fence is not anticipated to be located within the BVW resource area at any location on the Site. The Applicant proposes raising the bottom of the fence to approximately six inches above the ground to facilitate passage of wildlife between the fenced area and the surrounding area.

Additional proposed mitigation includes utilization of New England Conservation/Wildlife Seed Mix in the inner 50 foot buffer zone; and maintaining a minimum vegetation height of 12 inches within the array.

2.4 Interests of the Massachusetts Wetlands Protection Act and the Millis Wetlands Protection Bylaw

The following is a discussion of the relationship of the project Site to the interests of the Massachusetts Wetlands Protection Act (Act) as defined by 310 CMR 10.01(2) and the Millis Wetlands Protection Bylaw.

2.4.1 Protection of Public and Private Water Supply and Ground Water Supply

The Project Site is not located within a Zone II or Zone III Wellhead Protection Area, however, a portion of the overall Property is located in a Zone II Wellhead Protection Area.

The Site is not located within an Aquifer; however, the northwestern corner of the Property is located within a Medium Yield Aquifer.

The proposed work is not anticipated to impact the water quality of the Zone II wellhead area or Aquifer, as there is no impervious surfaces associated with the proposed Project and will not generate pollutants. Anticipated runoff is proposed to be collected in swales and stormwater basins, allowing for the gradual infiltration into the ground. Therefore the public and private water supply and groundwater supply protection interests of the Act and Bylaw will be upheld.

2.4.2 Flood Control and Storm Damage Prevention

The Site contains Bordering Lands Subject to Flooding. The proposed stormwater system is anticipated to mitigate runoff from the proposed area to be cleared, allowing for the collection and gradual infiltration of the stormwater into the ground. Therefore, the flood control and storm damage prevention interests of the Act and the Bylaw will be maintained. See Section 4.0 for a table summarizing pre- and post-development discharge rates.

2.4.3 Prevention of Pollution

Erosion control measures, including silt fencing, will be installed prior to any soil disturbance. Straw wattles will be limited to areas of greater concern for soil erosion. Regular maintenance of these measures will be conducted. The proposed solar array is not anticipated to generate pollution, and there will be no use of pesticides or other chemical products for vegetation control. The Site will be in compliance with the Standards of the DEP Stormwater Management Policy. Therefore, the pollution interests of the Act and the Bylaw will be upheld.

2.4.4 Protection of Fisheries, Shellfisheries and Wildlife Habitat

The Site does not contain mapped NHESP designated areas or vernal pools and is not anticipated to adversely impact wildlife habitat; however, a wildlife habitat evaluation will be conducted to confirm. Therefore, it is anticipated that the fisheries, shellfisheries and wildlife habitat interests of the Act and Bylaw will be protected.

2.5 Wetlands Regulations Waiver Request

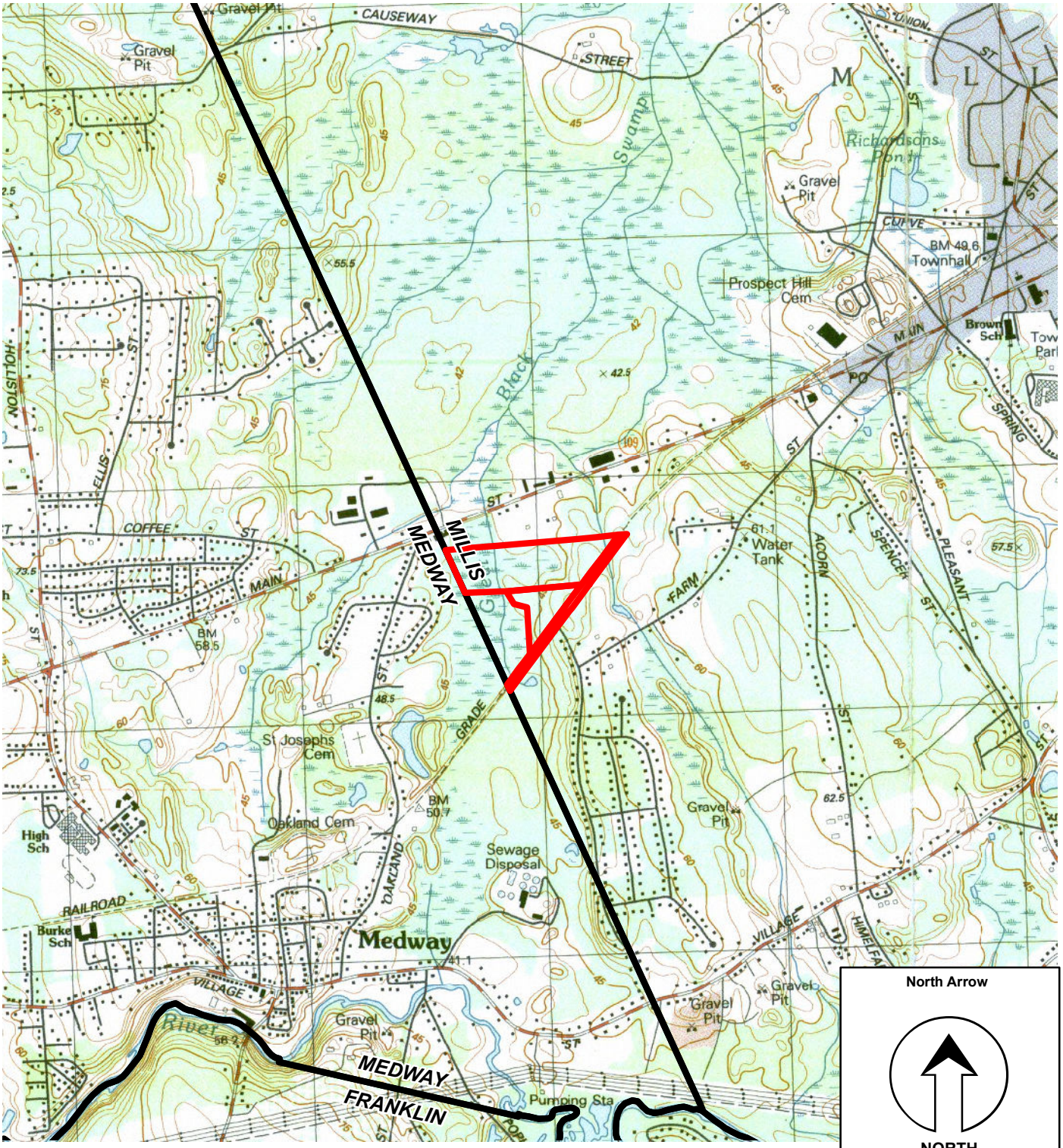
The following waivers are requested to accommodate the Project:

1. Section 1.3 of the Town of Millis Wetlands Protection Rules and Regulations, to allow for pollarding within BVW and BLSF, and impacts to Buffer Zone to BVW, Bank, and BLSF to clear, prepare, install and maintain the proposed solar array.

2. Section 1.4.1 (1) of the Town of Millis Wetlands Protection Rules and Regulations, to waive the requirement for the demarcation railing with stone granite bounds, as the Site condition does not warrant this type of demarcation.

2.6 Summary

The proposed 950 kilowatt solar array installation is proposed on a ±6.1 acre portion of the larger ±28.5 acre Property. A significant portion of the work associated with the solar array installation is anticipated to take place outside of the jurisdictional buffer zones and resource areas. Work proposed within the 100 foot buffer zone to BVW, Bank and BLSF includes clearing of vegetation, installation of solar array panels, installation of the security fence, construction of a gravel access road, pollarding and construction of replacement wetlands. Clearing, grading, and installation of the ground-mounted solar array are anticipated to take place within the 50 foot No-Touch Buffer Zone of the BVW, Bank and BLSF. Additionally, pollarding is anticipated to take place within a portion of the BVW and Bank resource area in order to avoid shading impacts to the array. Erosion mitigation measures, including silt fencing and straw wattles are proposed where appropriate.



Digital USGS Map of Holliston, MA, dated 1987, provided by the Office of Geographic and Environmental Information (MassGIS), Commonwealth of Massachusetts Executive Office of Energy and Environmental Affairs.

Millis Solar

Millis, Massachusetts

Clean Energy Collective

146 West Boylston Drive
Worcester, Massachusetts

Locus Map

Figure 1

Scale: 1" = 2,000'

Date: 08/27/2015

Source File 258800P004

B+T Project No. 2588.00

BEALS+THOMAS

Digital orthophotograph, dated 2014, provided by the Office of Geographic and Environmental Information (MassGIS), Commonwealth of Massachusetts Executive Office of Energy and Environmental Affairs.

0 200 400 800
FEET

North Arrow

NORTH

Millis Solar
Millis, Massachusetts

Clean Energy Collective
146 West Boylston Drive
Worcester, Massachusetts

Aerial Map
Figure 2

Scale: 1" = 400'

Date: 08/27/2015

Source File 258800P004

B+T Project No. 2588.00

BEALS+THOMAS

Section 3.0
Abutter Information

Certified List of Abutters
Affidavit of Service
Notification to Abutters

300' Abutters List Report

Millis, MA
August 20, 2015

CERTIFIED COPY by the TOWN OF MILLIS

Assessors Office JMD 8/20/15

Subject Property:

Parcel Number:	0032-0002-0000	Mailing Address:	A H CEDAR LLC 256 ORCHARD ST MILLIS, MA 02054
CAMA Number:	0032-0002-0000		
Property Address:	CEDAR ST		

Abutters:

Parcel Number:	0021-0009-0000	Mailing Address:	A H CEDAR LLC 256 ORCHARD ST MILLIS, MA 02054
CAMA Number:	0021-0009-0000		
Property Address:	1486 MAIN ST		
Parcel Number:	0021-0011-0000	Mailing Address:	NEAS LLC C/O VALCHUIS REALTY TRUST 547 BOSTON POST RD EAST STE 1 MARLBOROUGH, MA 01752
CAMA Number:	0021-0011-0000		
Property Address:	1372 MAIN ST		
Parcel Number:	0021-0013-0000	Mailing Address:	U S ARMY CORPS OF ENGINEERS REAL ESTATE DIVISION WEST HILL DAM UXBRIDGE, MA 01569
CAMA Number:	0021-0013-0000		
Property Address:	1590 MAIN ST TRACT 916		
Parcel Number:	0021-0014-0000	Mailing Address:	RTH LLC 22 MYRTLE ST NORFOLK, MA 02056
CAMA Number:	0021-0014-0000		
Property Address:	1494-1504 MAIN ST		
Parcel Number:	0021-0018-0000	Mailing Address:	LONGOBARDI PETER B & PAUL A TR PETER-PAUL NOMINEE TRUST 1400 MAIN ST MILLIS, MA 02054
CAMA Number:	0021-0018-0000		
Property Address:	1400 MAIN ST		
Parcel Number:	0021-0019-0000	Mailing Address:	LONGOBARDI PETER B & PAUL A TR PETER-PAUL NOMINEE TRUST 1400 MAIN ST MILLIS, MA 02054
CAMA Number:	0021-0019-0000		
Property Address:	MAIN ST		
Parcel Number:	0021-0025-0000	Mailing Address:	VALCHUIS R J & GOODALE W H TRS M M S REALTY TRUST PO BOX 351 MILLIS, MA 02054
CAMA Number:	0021-0025-0000		
Property Address:	MAIN ST		
Parcel Number:	0021-0026-0000	Mailing Address:	HARCOVITZ HELEN R 256 ORCHARD ST MILLIS, MA 02054
CAMA Number:	0021-0026-0000		
Property Address:	MAIN ST		
Parcel Number:	0021-0030-0000	Mailing Address:	HARCOVITZ ALEXANDER H TR HARKEY REALTY TRUST 256 ORCHARD ST MILLIS, MA 02054
CAMA Number:	0021-0030-0000		
Property Address:	MAIN ST		
Parcel Number:	0021-0037-0000	Mailing Address:	LUCAS ROBERT J TRUSTEE ROBMAR REALTY TRUST 1590 MAIN ST - P O BOX 95 MILLIS, MA 02054
CAMA Number:	0021-0037-0000		
Property Address:	1590 MAIN ST		

300' Abutters List Report

Millis, MA
August 20, 2015

Parcel Number:	0021-0050-0000	Mailing Address:	ROUTE 109 SELF STORAGE INC.
CAMA Number:	0021-0050-0000		730 MAIN ST
Property Address:	1575 MAIN ST		MILLIS, MA 02054
Parcel Number:	0022-0025-0000	Mailing Address:	BERRY BRUCE A TR J&B RLTY TR
CAMA Number:	0022-0025-0000		1380 MAIN ST
Property Address:	MAIN ST		MILLIS, MA 02054
Parcel Number:	0032-0003-0000	Mailing Address:	CUNNINGHAM MARY E
CAMA Number:	0032-0003-0000		32 CEDAR ST
Property Address:	32 CEDAR ST		MILLIS, MA 02054
Parcel Number:	0032-0010-0000	Mailing Address:	JARVIS ANTHONY W & ELINOR F
CAMA Number:	0032-0010-0000		133 FARM ST
Property Address:	133 FARM ST		MILLIS, MA 02054
Parcel Number:	0032-0010-0000	Mailing Address:	JARVIS ANTHONY W & ELINOR F
CAMA Number:	0032-0010-000H		133 FARM ST
Property Address:	FARM ST		MILLIS, MA 02054
Parcel Number:	0032-0012-0000	Mailing Address:	MATARAZZO CHARLES R
CAMA Number:	0032-0012-0000		151 FARM ST
Property Address:	151 FARM ST		MILLIS, MA 02054
Parcel Number:	0032-0041-0000	Mailing Address:	BERRY BRUCE A & JANET N
CAMA Number:	0032-0041-0000		25 CEDAR ST
Property Address:	25 CEDAR ST		MILLIS, MA 02054
Parcel Number:	0032-0044-0000	Mailing Address:	FARRICY FRANCIS K FARRICY LINDA R
CAMA Number:	0032-0044-0000		15 ALMA RD
Property Address:	CEDAR ST		MILLIS, MA 02054
Parcel Number:	0032-0050-0000	Mailing Address:	U S ARMY CORPS OF ENGINEERS
CAMA Number:	0032-0050-0000		REAL ESTATE DIVISION
Property Address:	CEDAR ST TRACT 918		WEST HILL DAM
			UXBRIDGE, MA 01569
Parcel Number:	0032-0051-0000	Mailing Address:	FARRICY FRANCIS K
CAMA Number:	0032-0051-0000		15 ALMA RD
Property Address:	15 ALMA RD		MILLIS, MA 02054

300' Abutters List Report

Millis, MA
August 24, 2015

Subject Property:

Parcel Number:	0032-0044-0000	Mailing Address:	FARRICY FRANCIS K FARRICY LINDA R
CAMA Number:	0032-0044-0000		15 ALMA RD
Property Address:	CEDAR ST		MILLIS, MA 02054

Abutters:

Parcel Number:	0021-0011-0000	Mailing Address:	NEAS LLC C/O VALCHUIS REALTY TRUST
CAMA Number:	0021-0011-0000		547 BOSTON POST RD EAST STE 1
Property Address:	1372 MAIN ST		MARLBOROUGH, MA 01752
Parcel Number:	0021-0018-0000	Mailing Address:	LONGOBARDI PETER B & PAUL A TR
CAMA Number:	0021-0018-0000		PETER-PAUL NOMINEE TRUST
Property Address:	1400 MAIN ST		1400 MAIN ST
			MILLIS, MA 02054
Parcel Number:	0021-0019-0000	Mailing Address:	LONGOBARDI PETER B & PAUL A TR
CAMA Number:	0021-0019-0000		PETER-PAUL NOMINEE TRUST
Property Address:	MAIN ST		1400 MAIN ST
			MILLIS, MA 02054
Parcel Number:	0022-0025-0000	Mailing Address:	BERRY BRUCE A TR J&B RLTY TR
CAMA Number:	0022-0025-0000		1380 MAIN ST
Property Address:	MAIN ST		MILLIS, MA 02054
Parcel Number:	0032-0002-0000	Mailing Address:	A H CEDAR LLC
CAMA Number:	0032-0002-0000		256 ORCHARD ST
Property Address:	CEDAR ST		MILLIS, MA 02054
Parcel Number:	0032-0003-0000	Mailing Address:	CUNNINGHAM MARY E
CAMA Number:	0032-0003-0000		32 CEDAR ST
Property Address:	32 CEDAR ST		MILLIS, MA 02054
Parcel Number:	0032-0010-0000	Mailing Address:	JARVIS ANTHONY W & ELINOR F
CAMA Number:	0032-0010-0000		133 FARM ST
Property Address:	133 FARM ST		MILLIS, MA 02054
Parcel Number:	0032-0010-0000	Mailing Address:	JARVIS ANTHONY W & ELINOR F
CAMA Number:	0032-0010-000H		133 FARM ST
Property Address:	FARM ST		MILLIS, MA 02054
Parcel Number:	0032-0012-0000	Mailing Address:	MATARAZZO CHARLES R
CAMA Number:	0032-0012-0000		151 FARM ST
Property Address:	151 FARM ST		MILLIS, MA 02054
Parcel Number:	0032-0014-0000	Mailing Address:	HANSEN KATHLEEN B
CAMA Number:	0032-0014-0000		7 ALMA RD
Property Address:	7 ALMA RD		MILLIS, MA 02054

300' Abutters List Report

Millis, MA
August 24, 2015

Parcel Number:	0032-0015-0000	Mailing Address:	WARD THOMAS C MCDONOUGH-WARD TESS 16 ALMA RD MILLIS, MA 02054
CAMA Number:	0032-0015-0000		
Property Address:	16 ALMA RD		
Parcel Number:	0032-0016-0000	Mailing Address:	CHIAVARINI CATHERINE E & EARNEST J TTEES EARNEST&CATHERINE CHIAVARINI REVOC TRST 12 ALMA RD MILLIS, MA 02054
CAMA Number:	0032-0016-0000		
Property Address:	12 ALMA RD		
Parcel Number:	0032-0017-0000	Mailing Address:	WALSH BRIAN P & DONNA J 10 ALMA RD MILLIS, MA 02054
CAMA Number:	0032-0017-0000		
Property Address:	10 ALMA RD		
Parcel Number:	0032-0021-0000	Mailing Address:	TRUDEAU BARBARA O & JAMES 163 FARM ST MILLIS, MA 02054
CAMA Number:	0032-0021-0000		
Property Address:	163 FARM ST		
Parcel Number:	0032-0041-0000	Mailing Address:	BERRY BRUCE A & JANET N 25 CEDAR ST MILLIS, MA 02054
CAMA Number:	0032-0041-0000		
Property Address:	25 CEDAR ST		
Parcel Number:	0032-0050-0000	Mailing Address:	U S ARMY CORPS OF ENGINEERS REAL ESTATE DIVISION WEST HILL DAM UXBRIDGE, MA 01569
CAMA Number:	0032-0050-0000		
Property Address:	CEDAR ST TRACT 918		
Parcel Number:	0032-0051-0000	Mailing Address:	FARRICY FRANCIS K 15 ALMA RD MILLIS, MA 02054
CAMA Number:	0032-0051-0000		
Property Address:	15 ALMA RD		
Parcel Number:	0032-0052-0000	Mailing Address:	BYRNE EDWARD J & CHARLOTTE M 11 ALMA RD MILLIS, MA 02054
CAMA Number:	0032-0052-0000		
Property Address:	ALMA RD		
Parcel Number:	0032-0053-0000	Mailing Address:	BYRNE EDWARD J & CHARLOTTE M 11 ALMA RD MILLIS, MA 02054
CAMA Number:	0032-0053-0000		
Property Address:	11 ALMA RD		
Parcel Number:	0032-0063-0000	Mailing Address:	WRIGHT ROBERT D & DONNA J 149 FARM ST MILLIS, MA 02054
CAMA Number:	0032-0063-0000		
Property Address:	149 FARM ST		
Parcel Number:	0033-0001-0000	Mailing Address:	MCQUILLAN JAMES W & JENNETT PAMELA 177 FARM ST MILLIS, MA 02054
CAMA Number:	0033-0001-0000		
Property Address:	177 FARM ST		

Parcel ID: 33-016
LAWSON BARBARA (DELORM)
106 OAKLAND ST.
MEDWAY, MA 02053

Parcel ID: 33-017
LYNN DANIEL E. III
LYNN BETH A.
1 MAIN ST.
MEDWAY, MA 02053

Parcel ID: 33-018
ROBMAR REALTY TRUST
ROBERT LUCAS, TR.
P.O. BOX 95
MILLIS, MA 02054

Parcel ID: 33-019
NORTH AVE INCORPORATED
C/O JULIE CHAPMAN
4 BROOK ST
SCITUATE, MA 02066

Parcel ID: 33-020
U.S. ARMY CORPS OF
(BLAKE)
424 TRAPELO RD
WALTHAM, MA 02154

Parcel ID: 33-021
LONDO MATTHEW P
GLEASON STEPHANIE J
20 OAKVIEW CIR.
MEDWAY, MA 02053

Parcel ID: 33-022
CHILER BARRY
CHILER NANCY
22 OAKVIEW CIR.
MEDWAY, MA 02053

Parcel ID: 33-028
O`BRIEN WILLIAM TRUSTEE
O`BRIEN IRENE TRUSTEE
102 OAKLAND ST.
MEDWAY, MA 02053

Parcel ID: 33-029
DOUGHTY DEANNA K
DOUGHTY PAULA C
104 OAKLAND ST.
MEDWAY, MA 02053

Parcel ID: 42-052
U.S. ARMY CORPS OF
424 TRAPELLO RD.
WALTHAM, MA 02154

Parcel ID: 42-060
UNKNOWN OWNER
TOWN HALL
155 VILLAGE ST.
MEDWAY, MA 02053

Parcel ID: 51-026
MEDWAY TOWN OF
MUNICIPAL
TOWN HALL
155 VILLAGE ST.
MEDWAY, MA 02053

THIS IS A CERTIFIED ABUTTERS LIST FROM THE TOWN OF MEDWAY.
WE CERTIFY THAT AT TIME OF LAST ASSESSMENT, THE NAMES AND
ADDRESSES OF ALL PROPERTY OWNERS, ARE ACCURATE.

Office of the Board of Assessors

8/25/15
Date

AFFIDAVIT OF SERVICE

Under the Massachusetts Wetlands Protection Act
And the Millis Wetlands Protection Bylaw

I, John P. Gelcich, AICP, hereby certify under the pains and penalties of perjury that on August 28, 2015, I gave notification to abutters in compliance with the second paragraph of Massachusetts General Laws Chapter 131, Section 40, and the DEP Guide to Abutter Notification dated April 8, 1994, in connection with the following matter:

> A Notice of Intent filed under the Massachusetts Wetlands Protection Act by Clean Energy Collective with the Millis Conservation Commission on August 28, 2015 for property located off Main Street.

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

John P Gelcich
Name

8/28/15
Date

Notification to Abutters Under the
Massachusetts Wetlands Protection Act
And the Millis Wetlands Protection Bylaw

In accordance with the second paragraph of Massachusetts General Laws Chapter 131, Section 40, you are hereby notified of the following.

A. The name of the applicant is Clean Energy Collective

B. The applicant has filed a Notice of Intent with the Conservation Commission for the municipality of Millis seeking permission to remove, fill, dredge, or alter an Area Subject to Protection Under the Wetlands Protection Act (General Laws Chapter 131, Section 40).

C. The address of the lot where the activity is proposed is Off Main Street, Millis, MA

D. Copies of the Notice of Intent may be examined at Millis Conservation Commission, 900 Main Street, Millis MA at the following days and times: Monday: 8:30 a.m. - 7:30 p.m.; Tuesday - Thursday: 8:30 a.m. - 4:30 p.m.; Friday: 8:30 a.m. - 12:30 p.m.. For more information call: 508-376-7045.
Check one: This is the applicant ☐, representative ☐, or other ☒ (specify): Millis Conservation Commission

E. Copies of the Notice of Intent may be obtained from either (check one) the applicant ☐, or the applicant's representative ☒, by calling this telephone number (508) 366-0560 between the hours of 8:00 and 5:00 on the following days of the week:
Monday - Friday

F. Information regarding the date, time, and place of the public hearing may be obtained from Millis Conservation Commission by calling this telephone number (508-376-7045) at the following days and times: Monday: 8:30 a.m. - 7:30 p.m.; Tuesday - Thursday: 8:30 a.m. - 4:30 p.m.; Friday: 8:30 a.m. - 12:30 p.m.
Check one: This is the applicant ☐, representative ☐ , or other ☒ (specify):
Millis Conservation Commission

Note: Notice of the public hearing, including its date, time, and place, will be published at least five (5) days in advance in the Milford Daily News.

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

Note: You may also contact your local Conservation Commission or the nearest Department of Environmental Protection Regional Office for more information about this application or the Wetlands Protection Act. To contact DEP, call:

Central Region: 508-792-7650
Northeast Region: 978-694-3200
Southeast Region: 508-946-2700
Western Region: 413-784-1100

JPG/2588.00

Section 4.0
Stormwater Management Information

Checklist for Stormwater Report
Stormwater Management Report

STORMWATER MANAGEMENT REPORT

Solar Array

Off Main Street
Millis, Massachusetts

Prepared for:

Clean Energy Collective
146 West Boylston Drive
Worcester, MA 01606

Presented by:

BEALS + THOMAS
BEALS AND THOMAS, INC.
Reservoir Corporate Center
144 Turnpike Road
Southborough, MA 01772-2104

August 27, 2015

Calculated by: **Christopher Taylor, EIT**

Checked by: **Daniel M. Feeney, PE**

Approved by:

DANIEL M. FEENEY CIVIL No. 41422 REGISTERED PROFESSIONAL ENGINEER COMMONWEALTH OF MASSACHUSETTS

Daniel M. Feeney, PE 8/27/2015

258800RP001

TABLE OF CONTENTS

LIST OF APPENDICES

1.0 INTRODUCTION

The proposed solar array project includes a stormwater management system designed to mitigate potential impacts on the existing watershed. Stormwater controls have been proposed to control peak runoff rates and promote groundwater recharge. The proposed system has been designed to comply with:

- The 2008 Massachusetts Department of Environmental Protection (DEP) Stormwater Management Handbook,
- The Massachusetts Wetland Protection Act (310 CMR 10.00), and
- Town of Millis Wetland Protection Rules and Regulations

The pre- and post-development hydrologic conditions were modeled using HydroCAD™ version 10.00 to demonstrate that post-development stormwater runoff rates will be less than or equal to the pre-development rates. Watershed maps with soil types as well as detailed analysis of the model results are also included. The following table summarizes the peak runoff rates for the pre- and post-development conditions.

Table 1: Pre- & Post-development Peak Runoff Rate Comparison, units are in cubic feet per second (cfs).

Storm Event	2 Year		10 Year		100 Year	
	Pre	Post	*Pre*	Post	*Pre*	Post
Design Point 1	*0.00*	0.00	*0.01*	0.01	*0.30*	0.26
Design Point 2	*0.61*	0.28	*1.22*	0.54	*2.24*	0.98
Design Point 3	*0.00*	0.00	*0.00*	0.00	*0.06*	0.06
Design Point 4	*0.00*	0.00	*0.00*	0.00	*0.00*	0.00

2.0 PRE-DEVELOPMENT CONDITIONS

2.1 Site Conditions

The proposed solar array site is located off Main Street to the south near the Medway town border. The site is currently undeveloped and primarily wooded. Wetlands border the proposed solar array site to the south, east, and west. Abandoned Cedar Street is the northern limit of the site.

Access to the proposed solar array will come from Main Street and consist of an 18-foot wide gravel road. The gravel access road will be located on a separate lot in common ownership.

Runoff from the site currently drains to the wetlands located to the south, east and west of the site. The wetlands have been separated into 3 design points and named correspondingly in the hydrologic analyses. All runoff from the site is tributary to the Great Black Swamp located to the north. A Zone II of a public water supply is located within the wetland to the west of the site.

2.2 Soil Description

The Natural Resources Conservation Service (NRCS) lists the on-site soils as primarily Canton fine sandy loam, an excessively well drained soil. NRCS classifies this type of soil as hydrologic class A soil.

The eastern portion of the site is classified as Ridgebury fine sandy loam. NRCS classifies this type of soil as hydrologic class D soil. Class D soils typically have a very slow infiltration rate and a swallow depth to the water table.

2.3 Hydrologic Analysis

Sub-catchment areas were delineated based on existing runoff patterns and topographic information. This information is shown on the *Pre-Development Conditions Hydrologic Areas Map* included in Appendix B. Summaries of each area with respect to Curve Number and Time of Concentration calculations can be found in the model results also in Appendix B.

3.0 POST-DEVELOPMENT CONDITIONS

3.1 Design Strategy

A stormwater management system has been designed to control peak runoff rates from the post development site. During the design phase of the site layout, consideration was given to minimizing impact on the existing hydrology. To achieve this, extensive grading was avoided and the site was designed to match the existing terrain where feasible. Minimizing earthwork helps to maintain the existing drainage patterns to the maximum extent practicable under post-development conditions.

To mitigate increased stormwater flow rates associated with the project, two stormwater basins have been proposed. The basins have been sited to capture the majority of the stormwater runoff from the proposed gravel road while maintaining existing drainage patterns and reducing channelized flow. Basin 1 has been designed as an infiltration basin and is located in the Canton (Class A) soils. Basin 2 has been designed as strictly a detention basin with a piped dewatering system as it is location within the Ridgebury (Class D) soils.

3.2 Hydrologic Analysis

The established design points used in the pre-development conditions analysis were used in the post-development analysis for direct comparison. The tributary areas and flow paths were modified to reflect post-development conditions. See Appendix C for the *Post- Development Conditions Hydrologic Areas Map*. Summaries of each area with respect to Curve Number and Time of Concentration calculations can be found in the model results in Appendix C.

3.3 Stormwater Management Controls Sizing

Infiltration Basin

The infiltration basin (Basin 1) has been designed to reduce post-development runoff up to the 100-year storm event. The outlet of the basin consists of a riprap spillway that will direct stormwater towards the Bordering Vegetated Wetlands (BVW). The bottom of the spillway is located 1-foot above the bottom of the basin. No infiltration was modeled in the hydrologic analysis and is not required to meet peak runoff rates. The basin has been designed with a sand bottom so that it will fully dewater within 72 hours. A conservative Rawl's exfiltration rate of 1.02 inches per hours was assumed based on the NRCS soil classification.

Detention Basin

The detention basin (Basin 2) has been designed to reduce post-development runoff up to the 100-year storm event. The outlet of the basin consists of a 4-inch pipe located at the bottom of basin and will direct stormwater towards the Bordering Vegetated Wetlands (BVW). A plunge pool has been designed around the outlet to prevent debris from

clogging the outlet. In the event of overtopping, an emergency spillway has been provided to direct the excess flow towards the BVW, consistent with the existing drainage pattern.

3.4 Compliance with DEP Stormwater Management Standards

The proposed stormwater management system was designed in compliance with the ten (10) DEP Stormwater Management Standards. The following summary provides key information related to the proposed stormwater management system, its design elements, and mitigation measures for potential impacts.

STANDARD 1: **No new stormwater conveyance (e.g. outfalls) may discharge untreated stormwater directly to or cause erosion in wetlands or waters of the Commonwealth.**

Existing drainage patterns will be maintained as very little grading is proposed. No impervious surfaces area proposed as part of this project. Two small stormwater basins have been designed to mitigate the increase in stormwater runoff rates from the proposed project. Outlets from the basins have been designed to prevent erosion.

STANDARD 2: **Stormwater management systems shall be designed so that post-development peak discharge rates do not exceed pre-development peak discharge rates.**

The stormwater management design will control post-development peak discharge rates for the 2-, 10-, and 100-year, 24-hour storms so as to maintain pre-development peak discharge rates. Refer to Section 1.0 Introduction for a summary of the peak runoff 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, stormwater management practices and good operation and maintenance. At a minimum, the annual recharge from the post-development site shall approximate the annual recharge from pre-development conditions based on soil types. This Standard is met when the stormwater management system is designed to infiltrate the required recharge volume as determined in accordance with the Massachusetts Stormwater Handbook.**

Groundwater recharge will be maintained as no impervious surfaces are proposed as part of this project. The stormwater management system includes an infiltration basin that will promote additional groundwater recharge on-site but is not required as part of the Stormwater Handbook. As a result, annual recharge from the post-development site will approximate the annual recharge from the site under pre-development conditions.

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

The project does not include any proposed impervious surfaces, and therefore 80% TSS removal requirement does not apply.

The Site Owner's Manual complies with the Long-Term Pollution Prevention Plan (Standard 4) and the Long-Term Operation and Maintenance Plan (Standard 9) requirements of the 2008 Massachusetts Department of Environmental Protection (MassDEP) Stormwater Management Standards. The Manual outlines source control and pollution prevention measures and maintenance requirements of stormwater best management practices (BMPs) associated with the proposed development.

STANDARD 5: **For land uses with higher potential pollutant loads (LUHPPLs), source control and pollution prevention shall be implemented in accordance with the Massachusetts Stormwater Handbook to eliminate or reduce the discharge of stormwater runoff from such land uses to the maximum extent practicable.**

The proposed project is not associated with stormwater discharges from land uses with higher potential pollutant loads.

STANDARD 6: **Stormwater discharges to critical areas must utilize certain stormwater management BMPs approved for critical areas. Critical areas are Outstanding Resource Waters, shellfish beds, swimming beaches, coldwater fisheries and recharge areas for public water supplies.**

There are no stormwater discharges to critical areas associated with this project.

STANDARD 7: **Redevelopment of previously developed sites must meet the Stormwater Management Standards to the maximum extent practicable. However, if it is not practicable to meet all the Standards, new (retrofitted or expanded) stormwater management systems must be designed to improve existing conditions.**

The proposed project is new development, and therefore this standard does not apply.

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

A draft Stormwater Pollution Prevention Plan (SWPPP) has been developed to comply with Section 3 of the NPDES Construction General Permit for Stormwater Discharges; therefore the requirements of Standard 8 are fulfilled.

STANDARD 9: A Long-Term Operation and Maintenance (O&M) Plan shall be developed and implemented to ensure that stormwater management systems function as designed.

The Site Owner's Manual complies with the Long-Term Pollution Prevention Plan (Standard 4) and the Long-Term Operation and Maintenance Plan (Standard 9) requirements of the 2008 Massachusetts Department of Environmental Protection (MassDEP) Stormwater Management Standards. The Manual outlines source control and pollution prevention measures and maintenance requirements of the stormwater best management practices (BMPs) associated with the proposed development.

STANDARD 10: All illicit discharges to the stormwater management system are prohibited.

There will be no illicit discharges to the proposed stormwater management system associated with the proposed project. An Illicit Discharge Compliance Statement is provided on the following page.

3.5 Illicit Discharge Compliance Statement

An illicit discharge is any discharge to a municipal separate storm sewer that is not comprised entirely of stormwater, discharges from fire-fighting activities, and certain non-designated non-stormwater discharges.

To the best of my knowledge, no detectable illicit discharge exists on site. The site plans included with this report detail the storm sewers that convey stormwater on the site and demonstrate that these systems do not include the entry of an illicit discharge. A Site Owner's Manual is also included, which contains the Long Term Pollution Plan that outlines measures to prevent future illicit discharges. As the Site Owner, I will ultimately be responsible for implementing the Long Term Pollution Prevention Plan.

Signature: _____

Owner's Name

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

Checklist for Stormwater Report

A. Introduction

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

The Stormwater Report must include:

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

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

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

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

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

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

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

Checklist for Stormwater Report

B. Stormwater Checklist and Certification

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

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

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

Registered Professional Engineer's Certification

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

Registered Professional Engineer Block and Signature

8/27/2015
Signature and Date

Checklist

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

☒ New development

☐ Redevelopment

☐ Mix of New Development and Redevelopment

Checklist for Stormwater Report

Checklist (continued)

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

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

Standard 1: No New Untreated Discharges

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

Checklist for Stormwater Report

Checklist (continued)

Standard 2: Peak Rate Attenuation

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

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

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

Standard 3: Recharge

☐ Soil Analysis provided.

☐ Required Recharge Volume calculation provided.

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

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

☐ Static ☐ Simple Dynamic ☐ Dynamic Field[1]

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

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

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

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

☐ Site is comprised solely of C and D soils and/or bedrock at the land surface

☐ M.G.L. c. 21E sites pursuant to 310 CMR 40.0000

☐ Solid Waste Landfill pursuant to 310 CMR 19.000

☐ Project is otherwise subject to Stormwater Management Standards only to the maximum extent practicable.

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

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

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

Checklist for Stormwater Report

Checklist (continued)

Standard 3: Recharge (continued)

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

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

Standard 4: Water Quality

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

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

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

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

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

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

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

Checklist for Stormwater Report

Checklist (continued)

Standard 4: Water Quality (continued)

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

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

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

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

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

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

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

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

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

☐ All exposure has been eliminated.

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

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

Standard 6: Critical Areas

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

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

Checklist for Stormwater Report

Checklist (continued)

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

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

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

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

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

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

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

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

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

Checklist for Stormwater Report

Checklist (continued)

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

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

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

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

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

Standard 9: Operation and Maintenance Plan

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

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

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

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

Standard 10: Prohibition of Illicit Discharges

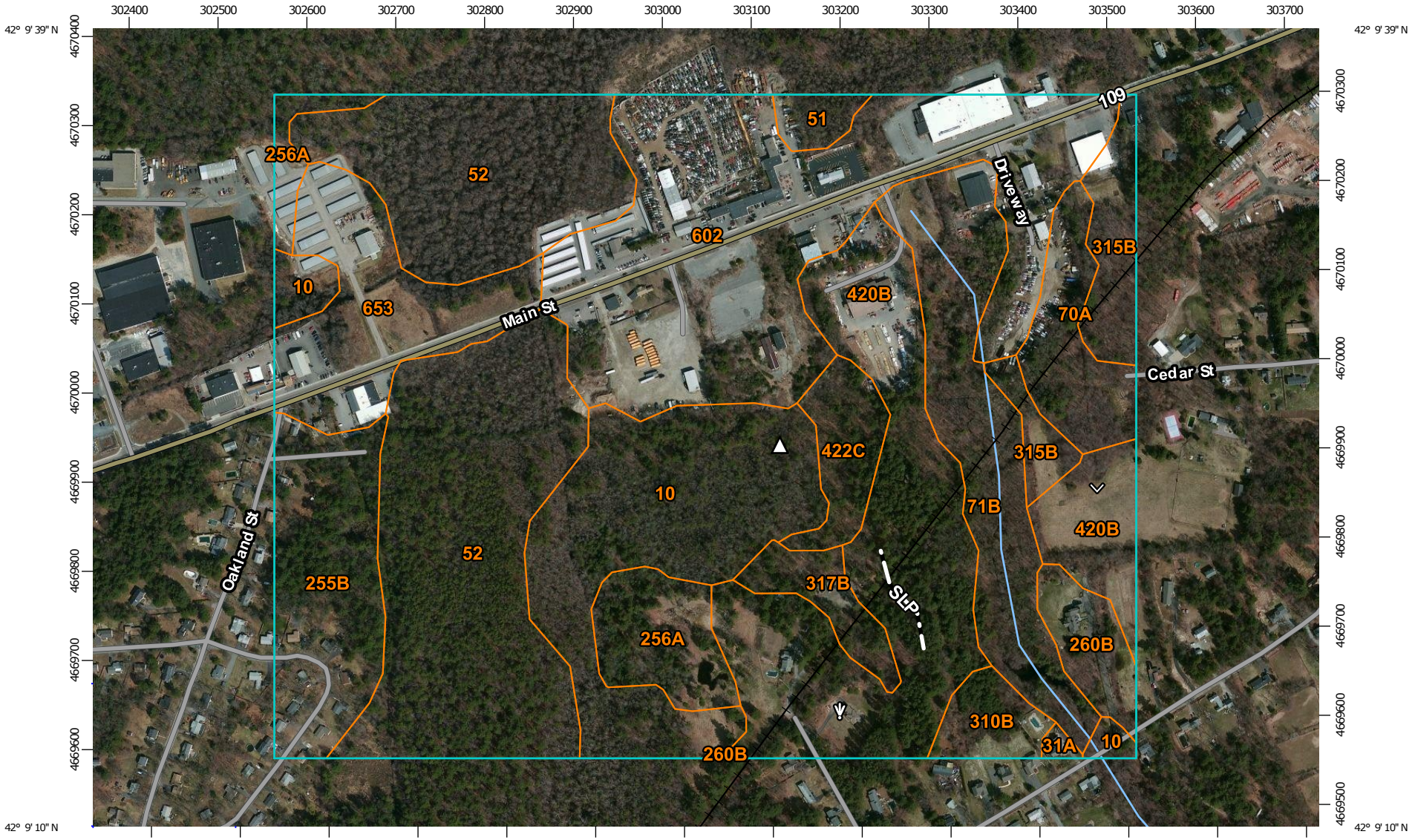
☒ The Long-Term Pollution Prevention Plan includes measures to prevent illicit discharges;

☒ An Illicit Discharge Compliance Statement is attached;

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

Appendix A
Soil Data

Soil Map—Norfolk and Suffolk Counties, Massachusetts



MAP LEGEND

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

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

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

Water Features
- Streams and Canals

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

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:25,000.

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

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

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

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: 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: Norfolk and Suffolk Counties, Massachusetts
Survey Area Data: Version 10, Sep 19, 2014

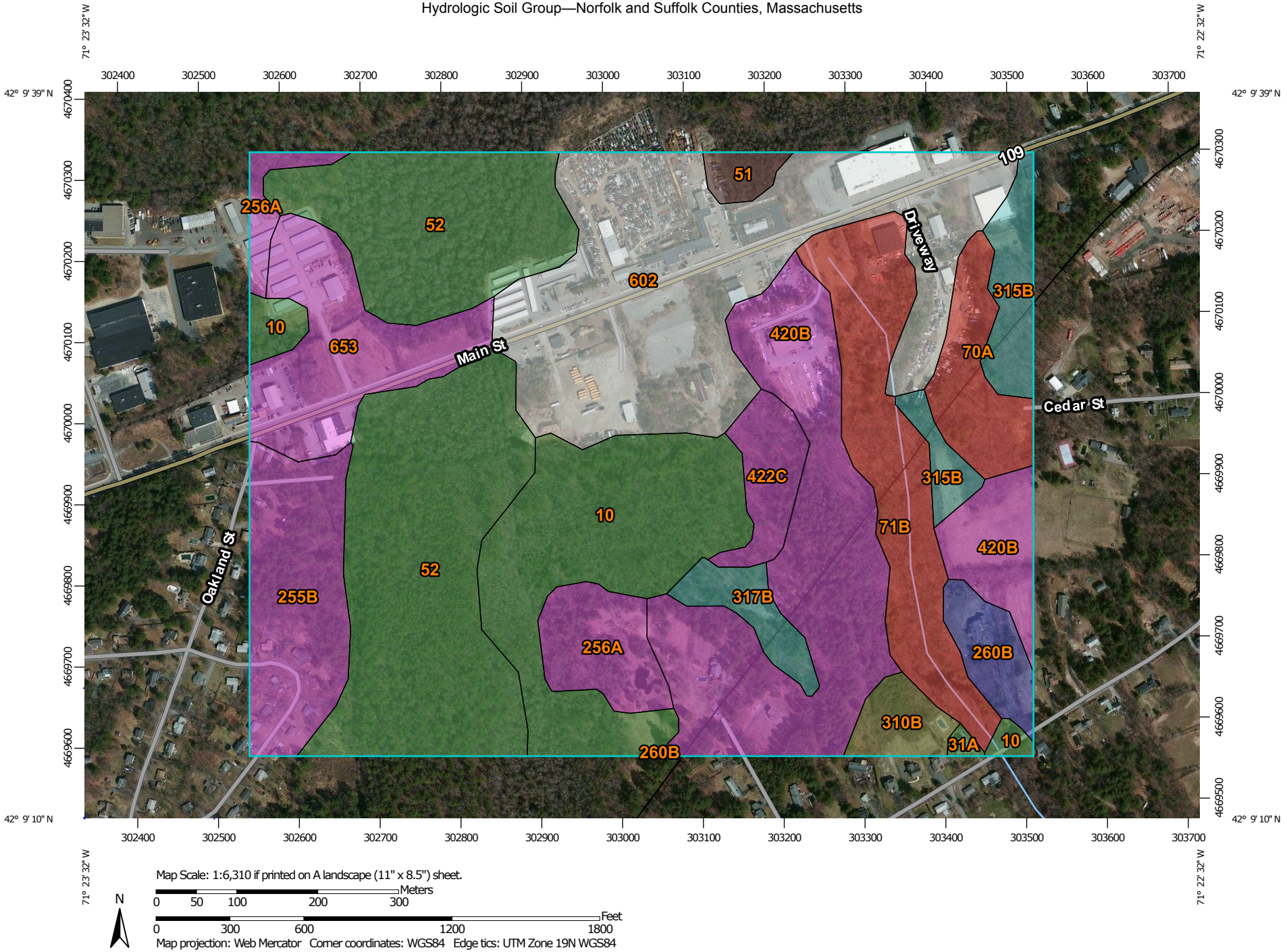
Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Apr 8, 2011—Apr 9, 2011

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

Map Unit Legend

Norfolk and Suffolk Counties, Massachusetts (MA616)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
10	Scarboro and Birdsall soils, 0 to 3 percent slopes	19.7	11.0%
31A	Walpole sandy loam, 0 to 3 percent slopes	0.3	0.2%
51	Swansea muck, 0 to 1 percent slopes	1.3	0.7%
52	Freetown muck, 0 to 1 percent slopes	37.7	21.0%
70A	Ridgebury fine sandy loam, 0 to 5 percent slopes	5.2	2.9%
71B	Ridgebury fine sandy loam, 2 to 8 percent slopes, extremely stony	13.0	7.3%
255B	Windsor loamy sand, 3 to 8 percent slopes	10.5	5.9%
256A	Deerfield loamy sand, 0 to 3 percent slopes	6.2	3.5%
260B	Sudbury fine sandy loam, 2 to 8 percent slopes	3.0	1.7%
310B	Woodbridge fine sandy loam, 3 to 8 percent slopes	2.4	1.3%
315B	Scituate fine sandy loam, 3 to 8 percent slopes	5.1	2.8%
317B	Scituate fine sandy loam, 3 to 8 percent slopes, extremely stony	2.7	1.5%
420B	Canton fine sandy loam, 3 to 8 percent slopes	25.5	14.2%
422C	Canton fine sandy loam, 8 to 15 percent slopes, extremely stony	3.5	1.9%
602	Urban land, 0 to 15 percent slopes	32.6	18.2%
653	Udorthents, sandy	10.7	6.0%
Totals for Area of Interest		**179.2**	**100.0%**


71° 23' 32" W
71° 22' 32" W
42° 9' 39" N
42° 9' 10" N
302400
302500
302600
302700
302800
302900
303000
303100
303200
303300
303400
303500
303600
303700
4670400
4670300
4670200
4670100
4670000
4669900
4669800
4669700
4669600
4669500
109
Driveway
Main St
Cedar St
Oakland St
51
256A
52
602
315B
10
653
420B
70A
422C
71B
255B
317B
260B
310B
31A
Map Scale: 1:6,310 if printed on A landscape (11" x 8.5") sheet.
N
Meters
0 50 100 200 300
Feet
0 300 600 1200 1800
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 1:25,000.

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Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: Web Mercator (EPSG:3857)

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Soil Survey Area: Norfolk and Suffolk Counties, Massachusetts
Survey Area Data: Version 10, Sep 19, 2014

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

Date(s) aerial images were photographed: Apr 8, 2011—Apr 9, 2011

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

Hydrologic Soil Group

Hydrologic Soil Group— Summary by Map Unit — Norfolk and Suffolk Counties, Massachusetts (MA616)				
Map unit symbol	**Map unit name**	**Rating**	**Acres in AOI**	**Percent of AOI**
10	Scarboro and Birdsall soils, 0 to 3 percent slopes	A/D	19.7	11.0%
31A	Walpole sandy loam, 0 to 3 percent slopes	A/D	0.3	0.2%
51	Swansea muck, 0 to 1 percent slopes	B/D	1.3	0.7%
52	Freetown muck, 0 to 1 percent slopes	A/D	37.7	21.0%
70A	Ridgebury fine sandy loam, 0 to 5 percent slopes	D	5.2	2.9%
71B	Ridgebury fine sandy loam, 2 to 8 percent slopes, extremely stony	D	13.0	7.3%
255B	Windsor loamy sand, 3 to 8 percent slopes	A	10.5	5.9%
256A	Deerfield loamy sand, 0 to 3 percent slopes	A	6.2	3.5%
260B	Sudbury fine sandy loam, 2 to 8 percent slopes	B	3.0	1.7%
310B	Woodbridge fine sandy loam, 3 to 8 percent slopes	C/D	2.4	1.3%
315B	Scituate fine sandy loam, 3 to 8 percent slopes	C	5.1	2.8%
317B	Scituate fine sandy loam, 3 to 8 percent slopes, extremely stony	C	2.7	1.5%
420B	Canton fine sandy loam, 3 to 8 percent slopes	A	25.5	14.2%
422C	Canton fine sandy loam, 8 to 15 percent slopes, extremely stony	A	3.5	1.9%
602	Urban land, 0 to 15 percent slopes		32.6	18.2%
653	Udorthents, sandy	A	10.7	6.0%
Totals for Area of Interest			**179.2**	**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 B
Pre-Development Hydrologic Analysis

BEALS + THOMAS
BEALS AND THOMAS, INC.
Reservoir Corporate Center
144 Turnpike Road
Southborough, MA 01772-2104

CALCULATION SUMMARY

T 508.366.0560
F 508.366.4391
www.bealsandthomas.com
Regional Office: Plymouth, MA

JOB NO./LOCATION:

2588.00
Millis, MA

CLIENT/PROJECT:

Clean Energy Collective
Solar Arrays

SUBJECT/TITLE:

Existing Conditions Hydrology Design

OBJECTIVE OF CALCULATION:

- To determine the pre-development peak rates and volumes of runoff from the site for the 2, 10 & 100-year storm events at the design point.

CALCULATION METHOD(S):

- Runoff curve numbers (CN), time-of-concentration (Tc), and runoff rates were calculated based on TR-55 methodology.
- AutoCAD 2014 computer program was utilized for digitizing ground cover areas.
- Peak runoff rates were computed using HydroCAD version 10.00.

ASSUMPTIONS:

- Stormwater runoff from areas outside the limit of work has been excluded from the hydrologic model.
- PDA-4 is the in the location of the proposed access road. Due to the linear nature this catchment area has been modeled as a typical 100 foot long section.

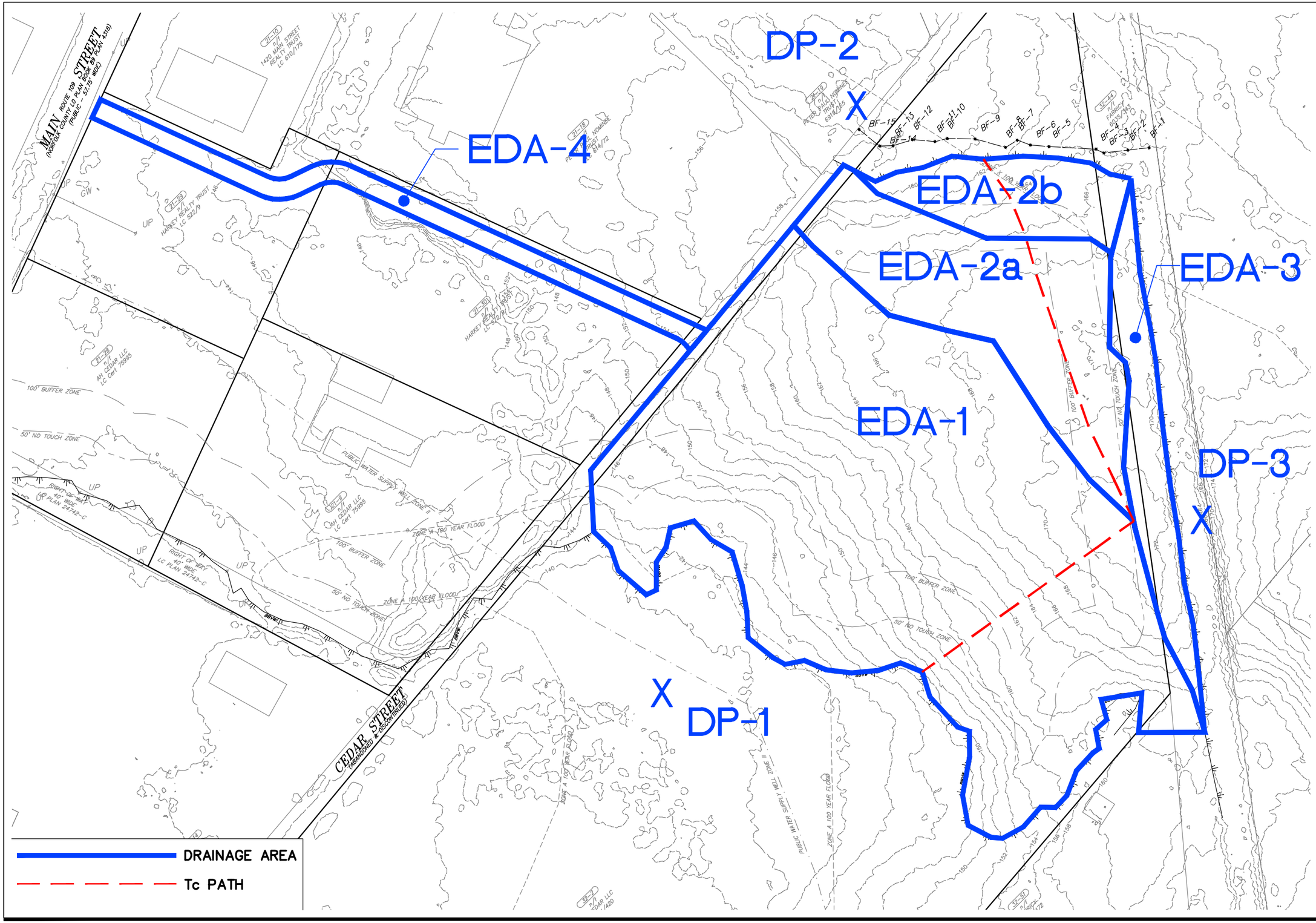
SOURCES OF DATA/EQUATIONS:

- Pre-Development Conditions Hydrologic Areas Map prepared by Beals and Thomas, Inc. File No. 258800P002A-001.
- NRCS Soil Survey for Norfolk County, hydrologic soil group report, downloaded from Web Soil Survey on 06/02/2015.
- TR-55 urban Hydrology for Small Watersheds, SCS, 1986.
- Massachusetts DEP Stormwater Management Handbook, February 2008.

CONCLUSIONS:

Storm Event	Peak Runoff Rates DP-1 (CFS)	Peak Runoff Rates DP-2 (CFS)	Peak Runoff Rates DP-3 (CFS)	Peak Runoff Rates DP-4 (CFS)
2-Year	0.00	0.61	0.00	0.00
10-Year	0.01	1.22	0.00	0.00
100-Year	0.30	2.24	0.06	0.00

REV	CALC. BY	DATE	CHECKED BY	DATE	APPROVED BY	DATE
0	C. Taylor	6/26/15	DMF	8/27/2015	DMF	8/27/2015



Pre-Development Conditions
Hydrologic Areas Map
Figure Number 001

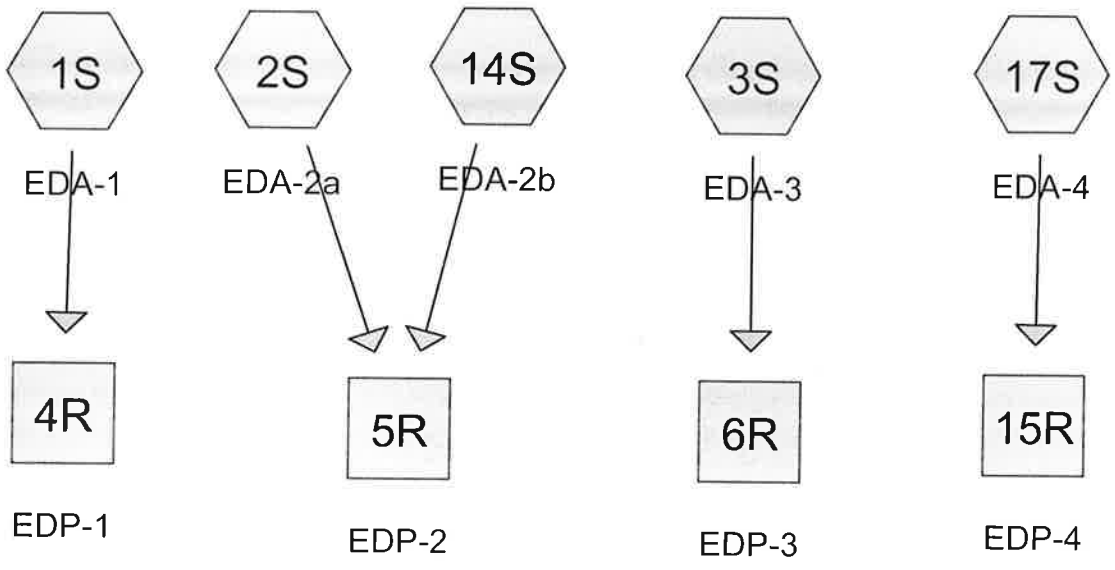
Scale: 1" = 100'
Date: 08/27/2015
Plan No. 25880OP002A-001
B+T Project No. 2588.00

Solar Array
Millis, Massachusetts

Clean Energy Collective
146 West Boylston Drive, 3rd Floor
Worcester, Massachusetts

North Arrow

EXISTING CONDITIONS



Subcat Reach Pond Link

Routing Diagram for 258800HC001
Prepared by Beals and Thomas, Printed 8/27/2015
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Area Listing (selected nodes)

Area (acres)	CN	Description (subcatchment-numbers)
6.344	30	Woods, Good, HSG A (1S, 2S, 3S, 17S)
0.212	70	Woods, Good, HSG C (1S)
0.482	77	Woods, Good, HSG D (3S, 14S)
7.039	**34**	**TOTAL AREA**

Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: EDA-1
Runoff Area=214,054 sf 0.00% Impervious Runoff Depth=0.00"
Flow Length=283' Tc=14.8 min CN=32 Runoff=0.00 cfs 0.000 af

Subcatchment 2S: EDA-2a
Runoff Area=51,880 sf 0.00% Impervious Runoff Depth=0.00"
Flow Length=429' Tc=17.9 min CN=30 Runoff=0.00 cfs 0.000 af

Subcatchment 3S: EDA-3
Runoff Area=19,341 sf 0.00% Impervious Runoff Depth=0.00"
Tc=6.0 min CN=34 Runoff=0.00 cfs 0.000 af

Subcatchment 14S: EDA-2b
Runoff Area=19,536 sf 0.00% Impervious Runoff Depth>1.21"
Tc=6.0 min CN=77 Runoff=0.61 cfs 0.045 af

Subcatchment 17S: EDA-4
Runoff Area=1,800 sf 0.00% Impervious Runoff Depth=0.00"
Tc=6.0 min CN=30 Runoff=0.00 cfs 0.000 af

Reach 4R: EDP-1
Inflow=0.00 cfs 0.000 af
Outflow=0.00 cfs 0.000 af

Reach 5R: EDP-2
Inflow=0.61 cfs 0.045 af
Outflow=0.61 cfs 0.045 af

Reach 6R: EDP-3
Inflow=0.00 cfs 0.000 af
Outflow=0.00 cfs 0.000 af

Reach 15R: EDP-4
Inflow=0.00 cfs 0.000 af
Outflow=0.00 cfs 0.000 af

Total Runoff Area = 7.039 ac Runoff Volume = 0.045 af Average Runoff Depth = 0.08"
100.00% Pervious = 7.039 ac 0.00% Impervious = 0.000 ac

Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: EDA-1
Runoff Area=214,054 sf 0.00% Impervious Runoff Depth>0.01"
Flow Length=283' Tc=14.8 min CN=32 Runoff=0.01 cfs 0.004 af

Subcatchment 2S: EDA-2a
Runoff Area=51,880 sf 0.00% Impervious Runoff Depth>0.00"
Flow Length=429' Tc=17.9 min CN=30 Runoff=0.00 cfs 0.000 af

Subcatchment 3S: EDA-3
Runoff Area=19,341 sf 0.00% Impervious Runoff Depth>0.03"
Tc=6.0 min CN=34 Runoff=0.00 cfs 0.001 af

Subcatchment 14S: EDA-2b
Runoff Area=19,536 sf 0.00% Impervious Runoff Depth>2.37"
Tc=6.0 min CN=77 Runoff=1.22 cfs 0.089 af

Subcatchment 17S: EDA-4
Runoff Area=1,800 sf 0.00% Impervious Runoff Depth>0.00"
Tc=6.0 min CN=30 Runoff=0.00 cfs 0.000 af

Reach 4R: EDP-1
Inflow=0.01 cfs 0.004 af
Outflow=0.01 cfs 0.004 af

Reach 5R: EDP-2
Inflow=1.22 cfs 0.089 af
Outflow=1.22 cfs 0.089 af

Reach 6R: EDP-3
Inflow=0.00 cfs 0.001 af
Outflow=0.00 cfs 0.001 af

Reach 15R: EDP-4
Inflow=0.00 cfs 0.000 af
Outflow=0.00 cfs 0.000 af

Total Runoff Area = 7.039 ac Runoff Volume = 0.094 af Average Runoff Depth = 0.16"
100.00% Pervious = 7.039 ac 0.00% Impervious = 0.000 ac

Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: EDA-1
Runoff Area=214,054 sf 0.00% Impervious Runoff Depth>0.31"
Flow Length=283' Tc=14.8 min CN=32 Runoff=0.30 cfs 0.128 af

Subcatchment 2S: EDA-2a
Runoff Area=51,880 sf 0.00% Impervious Runoff Depth>0.21"
Flow Length=429' Tc=17.9 min CN=30 Runoff=0.03 cfs 0.021 af

Subcatchment 3S: EDA-3
Runoff Area=19,341 sf 0.00% Impervious Runoff Depth>0.43"
Tc=6.0 min CN=34 Runoff=0.06 cfs 0.016 af

Subcatchment 14S: EDA-2b
Runoff Area=19,536 sf 0.00% Impervious Runoff Depth>4.36"
Tc=6.0 min CN=77 Runoff=2.24 cfs 0.163 af

Subcatchment 17S: EDA-4
Runoff Area=1,800 sf 0.00% Impervious Runoff Depth>0.21"
Tc=6.0 min CN=30 Runoff=0.00 cfs 0.001 af

Reach 4R: EDP-1
Inflow=0.30 cfs 0.128 af
Outflow=0.30 cfs 0.128 af

Reach 5R: EDP-2
Inflow=2.24 cfs 0.184 af
Outflow=2.24 cfs 0.184 af

Reach 6R: EDP-3
Inflow=0.06 cfs 0.016 af
Outflow=0.06 cfs 0.016 af

Reach 15R: EDP-4
Inflow=0.00 cfs 0.001 af
Outflow=0.00 cfs 0.001 af

Total Runoff Area = 7.039 ac Runoff Volume = 0.328 af Average Runoff Depth = 0.56"
100.00% Pervious = 7.039 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment 1S: EDA-1

Runoff = 0.30 cfs @ 12.59 hrs, Volume= 0.128 af, Depth> 0.31"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr Norfolk-100yr Rainfall=7.00"

Area (sf)	CN	Description
204,819	30	Woods, Good, HSG A
9,235	70	Woods, Good, HSG C
214,054	32	Weighted Average
214,054		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.3	50	0.0200	0.07		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.20"
2.5	233	0.0944	1.54		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
14.8	283	Total			

Summary for Subcatchment 2S: EDA-2a

Runoff = 0.03 cfs @ 13.96 hrs, Volume= 0.021 af, Depth> 0.21"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr Norfolk-100yr Rainfall=7.00"

Area (sf)	CN	Description
51,880	30	Woods, Good, HSG A
51,880		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.5	50	0.0300	0.08		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.20"
7.4	379	0.0290	0.85		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
17.9	429	Total			

Summary for Subcatchment 3S: EDA-3

Runoff = 0.06 cfs @ 12.38 hrs, Volume= 0.016 af, Depth> 0.43"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr Norfolk-100yr Rainfall=7.00"

Area (sf)	CN	Description
17,860	30	Woods, Good, HSG A
1,481	77	Woods, Good, HSG D
19,341	34	Weighted Average
19,341		100.00% Pervious Area

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

Summary for Subcatchment 14S: EDA-2b

Runoff = 2.24 cfs @ 12.09 hrs, Volume= 0.163 af, Depth> 4.36"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr Norfolk-100yr Rainfall=7.00"

Area (sf)	CN	Description
19,536	77	Woods, Good, HSG D
19,536		100.00% Pervious Area

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

Summary for Subcatchment 17S: EDA-4

Runoff = 0.00 cfs @ 13.77 hrs, Volume= 0.001 af, Depth> 0.21"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr Norfolk-100yr Rainfall=7.00"

Area (sf)	CN	Description
1,800	30	Woods, Good, HSG A
1,800		100.00% Pervious Area

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

Summary for Reach 4R: EDP-1

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

Inflow Area = 4.914 ac, 0.00% Impervious, Inflow Depth > 0.31" for Norfolk-100yr event
Inflow = 0.30 cfs @ 12.59 hrs, Volume= 0.128 af
Outflow = 0.30 cfs @ 12.59 hrs, Volume= 0.128 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Reach 5R: EDP-2

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

Inflow Area = 1.639 ac, 0.00% Impervious, Inflow Depth > 1.35" for Norfolk-100yr event
Inflow = 2.24 cfs @ 12.09 hrs, Volume= 0.184 af
Outflow = 2.24 cfs @ 12.09 hrs, Volume= 0.184 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Reach 6R: EDP-3

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

Inflow Area = 0.444 ac, 0.00% Impervious, Inflow Depth > 0.43" for Norfolk-100yr event
Inflow = 0.06 cfs @ 12.38 hrs, Volume= 0.016 af
Outflow = 0.06 cfs @ 12.38 hrs, Volume= 0.016 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Reach 15R: EDP-4

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

Inflow Area =	0.041 ac,	0.00% Impervious,	Inflow Depth >	0.21"	for Norfolk-100yr event
Inflow =	0.00 cfs @	13.77 hrs,	Volume=	0.001 af	
Outflow =	0.00 cfs @	13.77 hrs,	Volume=	0.001 af,	Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Appendix C
Post-Development Hydrologic Analysis

BEALS + THOMAS
BEALS AND THOMAS, INC.
Reservoir Corporate Center
144 Turnpike Road
Southborough, MA 01772-2104

CALCULATION SUMMARY

T 508.366.0560
F 508.366.4391
www.bealsandthomas.com
Regional Office: Plymouth, MA

JOB NO./LOCATION:

2588.00
Millis, MA

CLIENT/PROJECT:

Clean Energy Collective
Solar Arrays

SUBJECT/TITLE:

Proposed Conditions Hydrology Design

OBJECTIVE OF CALCULATION:

- To determine the post-development peak rates and volumes of runoff from the site for the 2, 10 & 100-year storm events at the design point.

CALCULATION METHOD(S):

- Runoff curve numbers (CN), time-of-concentration (Tc), and runoff rates were calculated based on TR-55 methodology.
- AutoCAD 2014 computer program was utilized for digitizing ground cover areas.
- Peak runoff rates were computed using HydroCAD version 10.00.

ASSUMPTIONS:

- Grass within the fence line will only be mowed periodically and maintain at a tall height.
- Stormwater runoff from areas outside the limit of work has been excluded from the hydrologic model.
- PDA-4 is the proposed access road. Due to the linear nature this catchment area has been modeled as a typical 100 foot long section of roadway.

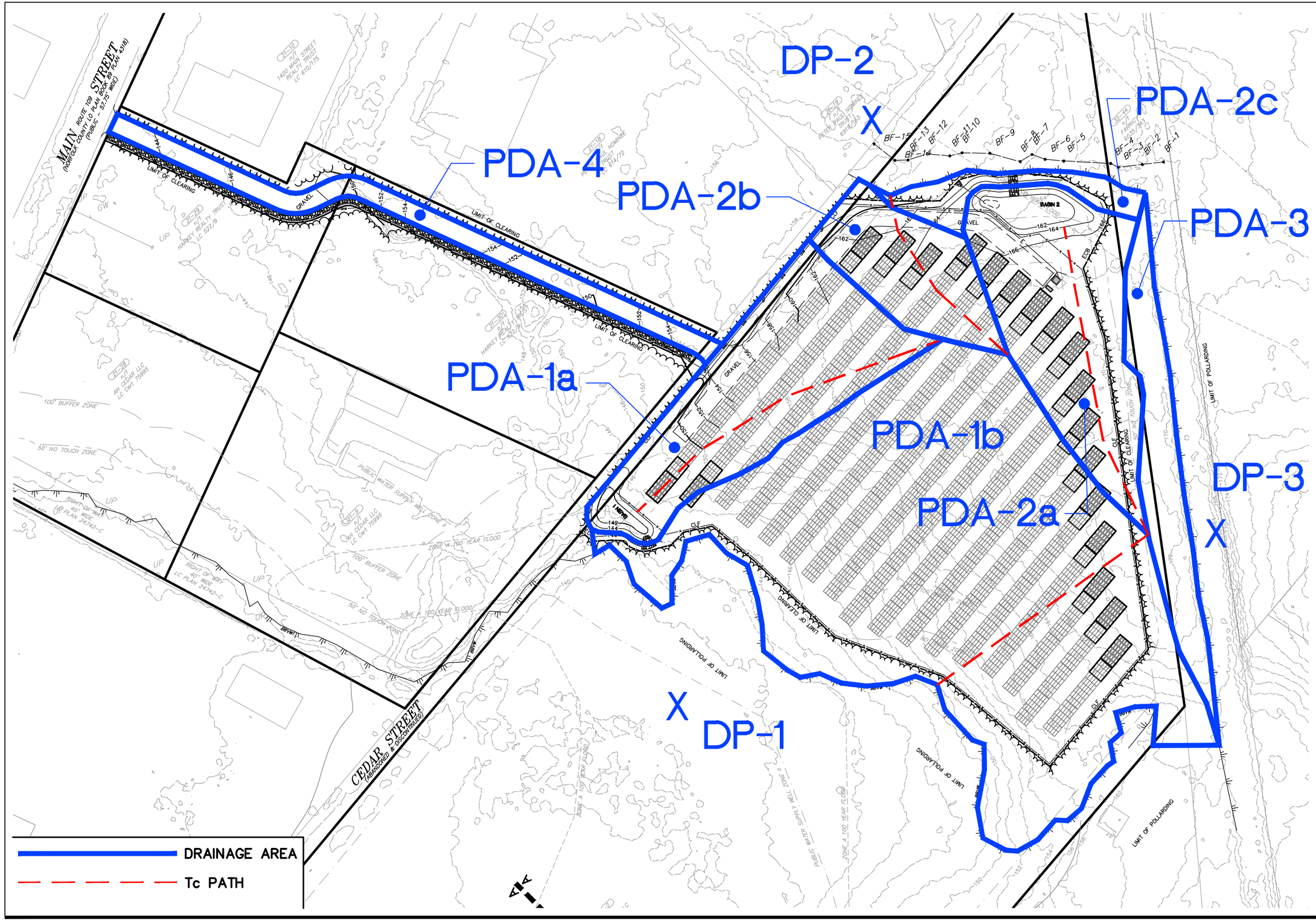
SOURCES OF DATA/EQUATIONS:

- Post-Development Conditions Hydrologic Areas Map prepared by Beals and Thomas, Inc. File No. 258800P002A-002.
- NRCS Soil Survey for Norfolk County, hydrologic soil group report, downloaded from Web Soil Survey on 06/02/2015.
- TR-55 urban Hydrology for Small Watersheds, SCS, 1986.
- Massachusetts DEP Stormwater Management Handbook, February 2008.

CONCLUSIONS:

Storm Event	Peak Runoff Rates DP-1 (CFS)	Peak Runoff Rates DP-2 (CFS)	Peak Runoff Rates DP-3 (CFS)	Peak Runoff Rates DP-4 (CFS)
2-Year	0.00	0.28	0.00	0.00
10-Year	0.01	0.54	0.00	0.00
100-Year	0.26	0.98	0.06	0.00

REV	CALC. BY	DATE	CHECKED BY	DATE	APPROVED BY	DATE
0	C. Taylor	8/26/15	DMF	8/27/2015	DMF	8/27/2015



Post-Development Conditions Hydrologic Areas Map
Figure Number 002

Scale: 1" = 100' Date: 08/27/2015

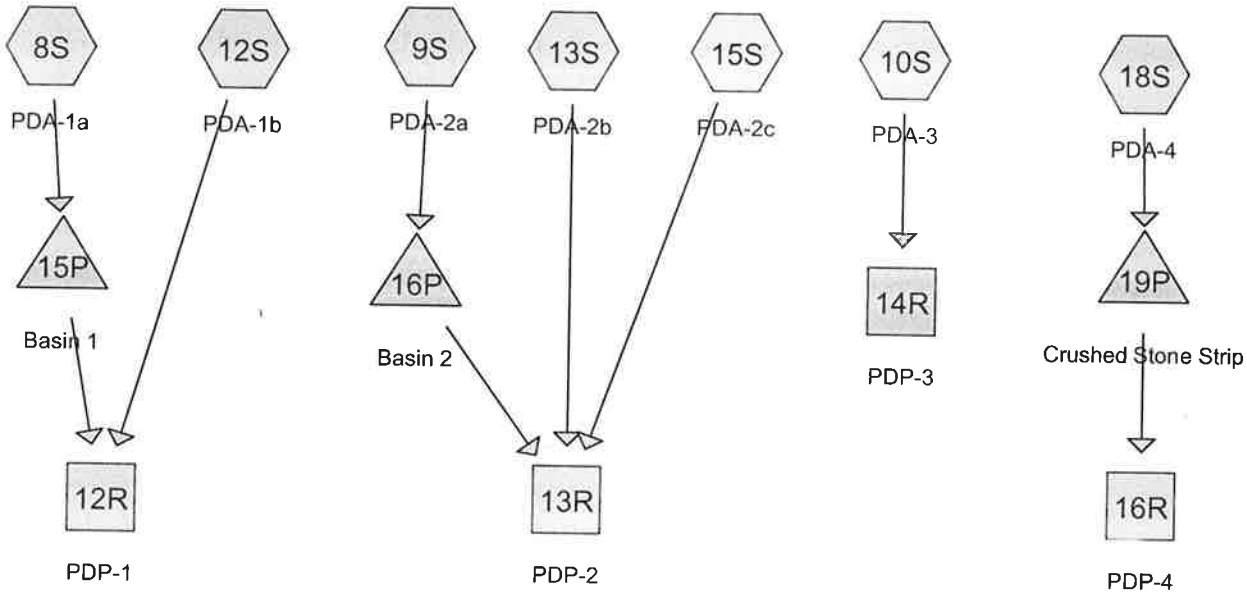
Plan No. 25880OP002A-002

B+T Project No. 2588.00

Solar Array
Millis, Massachusetts

Clean Energy Collective
146 West Boylston Drive, 3rd Floor
Worcester, Massachusetts

PROPOSED
CONDITIONS



Subcat Reach Pond Link

Routing Diagram for 258800HC001
Prepared by Beals and Thomas, Printed 8/27/2015
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Area Listing (selected nodes)

Area (acres)	CN	Description (subcatchment-numbers)
4.814	30	Meadow, non-grazed, HSG A (8S, 9S, 12S, 13S)
1.324	30	Woods, Good, HSG A (9S, 10S, 12S, 13S)
0.212	70	Woods, Good, HSG C (12S)
0.165	77	Woods, Good, HSG D (9S, 10S, 15S)
0.271	78	Meadow, non-grazed, HSG D (9S, 15S)
0.281	96	Gravel surface, HSG A (8S, 9S, 13S, 15S, 18S)
7.066	**37**	**TOTAL AREA**

Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 8S: PDA-1a
Runoff Area=45,551 sf 0.00% Impervious Runoff Depth=0.00"
Flow Length=283' Tc=13.1 min CN=38 Runoff=0.00 cfs 0.000 af

Subcatchment 9S: PDA-2a
Runoff Area=43,092 sf 0.00% Impervious Runoff Depth>0.04"
Flow Length=351' Tc=14.9 min CN=45 Runoff=0.01 cfs 0.004 af

Subcatchment 10S: PDA-3
Runoff Area=0.444 ac 0.00% Impervious Runoff Depth=0.00"
Tc=6.0 min CN=34 Runoff=0.00 cfs 0.000 af

Subcatchment 12S: PDA-1b
Runoff Area=169,717 sf 0.00% Impervious Runoff Depth=0.00"
Flow Length=390' Tc=10.2 min CN=32 Runoff=0.00 cfs 0.000 af

Subcatchment 13S: PDA-2b
Runoff Area=20,307 sf 0.00% Impervious Runoff Depth=0.00"
Flow Length=218' Tc=9.8 min CN=37 Runoff=0.00 cfs 0.000 af

Subcatchment 15S: PDA-2c
Runoff Area=7,980 sf 0.00% Impervious Runoff Depth>1.34"
Tc=6.0 min CN=79 Runoff=0.28 cfs 0.020 af

Subcatchment 18S: PDA-4
Runoff Area=1,800 sf 0.00% Impervious Runoff Depth>2.75"
Tc=6.0 min CN=96 Runoff=0.12 cfs 0.009 af

Reach 12R: PDP-1
Inflow=0.00 cfs 0.000 af
Outflow=0.00 cfs 0.000 af

Reach 13R: PDP-2
Inflow=0.28 cfs 0.022 af
Outflow=0.28 cfs 0.022 af

Reach 14R: PDP-3
Inflow=0.00 cfs 0.000 af
Outflow=0.00 cfs 0.000 af

Reach 16R: PDP-4
Inflow=0.00 cfs 0.000 af
Outflow=0.00 cfs 0.000 af

Pond 15P: Basin 1
Peak Elev=142.00' Storage=0 cf Inflow=0.00 cfs 0.000 af
Outflow=0.00 cfs 0.000 af

Pond 16P: Basin 2
Peak Elev=162.04' Storage=102 cf Inflow=0.01 cfs 0.004 af
Outflow=0.00 cfs 0.001 af

Pond 19P: Crushed Stone Strip
Peak Elev=0.75' Storage=0.003 af Inflow=0.12 cfs 0.009 af
Discarded=0.01 cfs 0.009 af Primary=0.00 cfs 0.000 af Outflow=0.01 cfs 0.009 af

Total Runoff Area = 7.066 ac Runoff Volume = 0.033 af Average Runoff Depth = 0.06"
100.00% Pervious = 7.066 ac 0.00% Impervious = 0.000 ac

Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 8S: PDA-1a
Runoff Area=45,551 sf 0.00% Impervious Runoff Depth>0.12"
Flow Length=283' Tc=13.1 min CN=38 Runoff=0.02 cfs 0.010 af

Subcatchment 9S: PDA-2a
Runoff Area=43,092 sf 0.00% Impervious Runoff Depth>0.35"
Flow Length=351' Tc=14.9 min CN=45 Runoff=0.13 cfs 0.029 af

Subcatchment 10S: PDA-3
Runoff Area=0.444 ac 0.00% Impervious Runoff Depth>0.03"
Tc=6.0 min CN=34 Runoff=0.00 cfs 0.001 af

Subcatchment 12S: PDA-1b
Runoff Area=169,717 sf 0.00% Impervious Runoff Depth>0.01"
Flow Length=390' Tc=10.2 min CN=32 Runoff=0.01 cfs 0.003 af

Subcatchment 13S: PDA-2b
Runoff Area=20,307 sf 0.00% Impervious Runoff Depth>0.09"
Flow Length=218' Tc=9.8 min CN=37 Runoff=0.01 cfs 0.004 af

Subcatchment 15S: PDA-2c
Runoff Area=7,980 sf 0.00% Impervious Runoff Depth>2.54"
Tc=6.0 min CN=79 Runoff=0.54 cfs 0.039 af

Subcatchment 18S: PDA-4
Runoff Area=1,800 sf 0.00% Impervious Runoff Depth>4.23"
Tc=6.0 min CN=96 Runoff=0.18 cfs 0.015 af

Reach 12R: PDP-1
Inflow=0.01 cfs 0.003 af
Outflow=0.01 cfs 0.003 af

Reach 13R: PDP-2
Inflow=0.54 cfs 0.065 af
Outflow=0.54 cfs 0.065 af

Reach 14R: PDP-3
Inflow=0.00 cfs 0.001 af
Outflow=0.00 cfs 0.001 af

Reach 16R: PDP-4
Inflow=0.00 cfs 0.000 af
Outflow=0.00 cfs 0.000 af

Pond 15P: Basin 1
Peak Elev=142.35' Storage=437 cf Inflow=0.02 cfs 0.010 af
Outflow=0.00 cfs 0.000 af

Pond 16P: Basin 2
Peak Elev=162.14' Storage=406 cf Inflow=0.13 cfs 0.029 af
Outflow=0.03 cfs 0.023 af

Pond 19P: Crushed Stone Strip
Peak Elev=1.33' Storage=0.006 af Inflow=0.18 cfs 0.015 af
Discarded=0.01 cfs 0.015 af Primary=0.00 cfs 0.000 af Outflow=0.01 cfs 0.015 af

Total Runoff Area = 7.066 ac Runoff Volume = 0.100 af Average Runoff Depth = 0.17"
100.00% Pervious = 7.066 ac 0.00% Impervious = 0.000 ac

Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 8S: PDA-1a
Runoff Area=45,551 sf 0.00% Impervious Runoff Depth>0.69"
Flow Length=283' Tc=13.1 min CN=38 Runoff=0.33 cfs 0.060 af

Subcatchment 9S: PDA-2a
Runoff Area=43,092 sf 0.00% Impervious Runoff Depth>1.23"
Flow Length=351' Tc=14.9 min CN=45 Runoff=0.81 cfs 0.101 af

Subcatchment 10S: PDA-3
Runoff Area=0.444 ac 0.00% Impervious Runoff Depth>0.43"
Tc=6.0 min CN=34 Runoff=0.06 cfs 0.016 af

Subcatchment 12S: PDA-1b
Runoff Area=169,717 sf 0.00% Impervious Runoff Depth>0.31"
Flow Length=390' Tc=10.2 min CN=32 Runoff=0.26 cfs 0.102 af

Subcatchment 13S: PDA-2b
Runoff Area=20,307 sf 0.00% Impervious Runoff Depth>0.62"
Flow Length=218' Tc=9.8 min CN=37 Runoff=0.13 cfs 0.024 af

Subcatchment 15S: PDA-2c
Runoff Area=7,980 sf 0.00% Impervious Runoff Depth>4.58"
Tc=6.0 min CN=79 Runoff=0.96 cfs 0.070 af

Subcatchment 18S: PDA-4
Runoff Area=1,800 sf 0.00% Impervious Runoff Depth>6.52"
Tc=6.0 min CN=96 Runoff=0.27 cfs 0.022 af

Reach 12R: PDP-1
Inflow=0.26 cfs 0.128 af
Outflow=0.26 cfs 0.128 af

Reach 13R: PDP-2
Inflow=0.98 cfs 0.186 af
Outflow=0.98 cfs 0.186 af

Reach 14R: PDP-3
Inflow=0.06 cfs 0.016 af
Outflow=0.06 cfs 0.016 af

Reach 16R: PDP-4
Inflow=0.00 cfs 0.000 af
Outflow=0.00 cfs 0.000 af

Pond 15P: Basin 1
Peak Elev=143.02' Storage=1,514 cf Inflow=0.33 cfs 0.060 af
Outflow=0.06 cfs 0.026 af

Pond 16P: Basin 2
Peak Elev=162.44' Storage=1,349 cf Inflow=0.81 cfs 0.101 af
Outflow=0.17 cfs 0.092 af

Pond 19P: Crushed Stone Strip
Peak Elev=2.41' Storage=0.011 af Inflow=0.27 cfs 0.022 af
Discarded=0.01 cfs 0.017 af Primary=0.00 cfs 0.000 af Outflow=0.01 cfs 0.017 af

Total Runoff Area = 7.066 ac Runoff Volume = 0.396 af Average Runoff Depth = 0.67"
100.00% Pervious = 7.066 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment 8S: PDA-1a

Runoff = 0.33 cfs @ 12.39 hrs, Volume= 0.060 af, Depth> 0.69"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr Norfolk-100yr Rainfall=7.00"

Area (sf)	CN	Description
5,370	96	Gravel surface, HSG A
40,181	30	Meadow, non-grazed, HSG A
45,551	38	Weighted Average
45,551		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.9	20	0.0200	0.06		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.20"
5.4	30	0.0200	0.09		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.20"
1.8	233	0.0940	2.15		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
13.1	283	Total			

Summary for Subcatchment 9S: PDA-2a

Runoff = 0.81 cfs @ 12.26 hrs, Volume= 0.101 af, Depth> 1.23"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr Norfolk-100yr Rainfall=7.00"

Area (sf)	CN	Description
2,042	96	Gravel surface, HSG A
22,981	30	Meadow, non-grazed, HSG A
8,639	78	Meadow, non-grazed, HSG D
7,724	30	Woods, Good, HSG A
1,706	77	Woods, Good, HSG D
43,092	45	Weighted Average
43,092		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.5	50	0.0300	0.08		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.20"
4.4	301	0.0266	1.14		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
14.9	351	Total			

Summary for Subcatchment 10S: PDA-3

Runoff = 0.06 cfs @ 12.38 hrs, Volume= 0.016 af, Depth> 0.43"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr Norfolk-100yr Rainfall=7.00"

Area (ac)	CN	Description
0.410	30	Woods, Good, HSG A
0.034	77	Woods, Good, HSG D
0.444	34	Weighted Average
0.444		100.00% Pervious Area

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

Summary for Subcatchment 12S: PDA-1b

Runoff = 0.26 cfs @ 12.52 hrs, Volume= 0.102 af, Depth> 0.31"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr Norfolk-100yr Rainfall=7.00"

Area (sf)	CN	Description
128,945	30	Meadow, non-grazed, HSG A
31,552	30	Woods, Good, HSG A
9,220	70	Woods, Good, HSG C
169,717	32	Weighted Average
169,717		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.0	50	0.0300	0.12		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.20"
3.2	340	0.0647	1.78		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
10.2	390	Total			

Summary for Subcatchment 13S: PDA-2b

Runoff = 0.13 cfs @ 12.36 hrs, Volume= 0.024 af, Depth> 0.62"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr Norfolk-100yr Rainfall=7.00"

Area (sf)	CN	Description
2,178	96	Gravel surface, HSG A
17,579	30	Meadow, non-grazed, HSG A
550	30	Woods, Good, HSG A
20,307	37	Weighted Average
20,307		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.2	50	0.0200	0.10		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.20"
1.6	168	0.0595	1.71		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
9.8	218	Total			

Summary for Subcatchment 15S: PDA-2c

Runoff = 0.96 cfs @ 12.09 hrs, Volume= 0.070 af, Depth> 4.58"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr Norfolk-100yr Rainfall=7.00"

Area (sf)	CN	Description
849	96	Gravel surface, HSG A
3,144	78	Meadow, non-grazed, HSG D
3,987	77	Woods, Good, HSG D
7,980	79	Weighted Average
7,980		100.00% Pervious Area

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

Summary for Subcatchment 18S: PDA-4

Runoff = 0.27 cfs @ 12.09 hrs, Volume= 0.022 af, Depth> 6.52"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr Norfolk-100yr Rainfall=7.00"

Area (sf)	CN	Description
1,800	96	Gravel surface, HSG A
1,800		100.00% Pervious Area

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

Summary for Reach 12R: PDP-1

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

Inflow Area = 4.942 ac, 0.00% Impervious, Inflow Depth > 0.31" for Norfolk-100yr event
Inflow = 0.26 cfs @ 12.52 hrs, Volume= 0.128 af
Outflow = 0.26 cfs @ 12.52 hrs, Volume= 0.128 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Reach 13R: PDP-2

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

Inflow Area = 1.639 ac, 0.00% Impervious, Inflow Depth > 1.36" for Norfolk-100yr event
Inflow = 0.98 cfs @ 12.10 hrs, Volume= 0.186 af
Outflow = 0.98 cfs @ 12.10 hrs, Volume= 0.186 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Reach 14R: PDP-3

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

Inflow Area = 0.444 ac, 0.00% Impervious, Inflow Depth > 0.43" for Norfolk-100yr event
Inflow = 0.06 cfs @ 12.38 hrs, Volume= 0.016 af
Outflow = 0.06 cfs @ 12.38 hrs, Volume= 0.016 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Reach 16R: PDP-4

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

Inflow Area =	0.041 ac,	0.00% Impervious,	Inflow Depth = 0.00"	for Norfolk-100yr event
Inflow =	0.00 cfs @	0.00 hrs,	Volume= 0.000 af	
Outflow =	0.00 cfs @	0.00 hrs,	Volume= 0.000 af,	Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Pond 15P: Basin 1

Inflow Area =	1.046 ac,	0.00% Impervious,	Inflow Depth > 0.69"	for Norfolk-100yr event
Inflow =	0.33 cfs @	12.39 hrs,	Volume= 0.060 af	
Outflow =	0.06 cfs @	15.72 hrs,	Volume= 0.026 af,	Atten= 81%, Lag= 199.9 min
Primary =	0.06 cfs @	15.72 hrs,	Volume= 0.026 af	

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 143.02' @ 15.72 hrs Surf.Area= 1,843 sf Storage= 1,514 cf

Plug-Flow detention time= 362.2 min calculated for 0.026 af (43% of inflow)
Center-of-Mass det. time= 192.7 min (1,134.4 - 941.7)

Volume	Invert	Avail.Storage	Storage Description
#1	142.00'	3,660 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
142.00	1,132	0	0
144.00	2,528	3,660	3,660

Device	Routing	Invert	Outlet Devices
#1	Primary	143.00'	**10.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=0.06 cfs @ 15.72 hrs HW=143.02' (Free Discharge)
↑—1=Broad-Crested Rectangular Weir (Weir Controls 0.06 cfs @ 0.34 fps)

Summary for Pond 16P: Basin 2

Inflow Area =	0.989 ac,	0.00% Impervious,	Inflow Depth > 1.23"	for Norfolk-100yr event
Inflow =	0.81 cfs @	12.26 hrs,	Volume= 0.101 af	
Outflow =	0.17 cfs @	13.28 hrs,	Volume= 0.092 af,	Atten= 78%, Lag= 61.2 min
Primary =	0.17 cfs @	13.28 hrs,	Volume= 0.092 af	

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 162.44' @ 13.28 hrs Surf.Area= 3,233 sf Storage= 1,349 cf

Plug-Flow detention time= 126.5 min calculated for 0.092 af (91% of inflow)
Center-of-Mass det. time= 82.7 min (987.5 - 904.8)

Volume	Invert	Avail.Storage	Storage Description
#1	162.00'	7,430 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
162.00	2,848	0	0
164.00	4,582	7,430	7,430

Device	Routing	Invert	Outlet Devices
#1	Primary	163.00'	**10.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64
#2	Primary	162.00'	**4.0" Round Culvert** L= 20.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 162.00' / 161.00' S= 0.0500 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.09 sf

Primary OutFlow Max=0.17 cfs @ 13.28 hrs HW=162.44' (Free Discharge)
↑—**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)
└—**2=Culvert** (Inlet Controls 0.17 cfs @ 2.00 fps)

Summary for Pond 19P: Crushed Stone Strip

Inflow Area =	0.041 ac,	0.00% Impervious,	Inflow Depth > 6.52"	for Norfolk-100yr event
Inflow =	0.27 cfs @	12.09 hrs, Volume=	0.022 af	
Outflow =	0.01 cfs @	9.80 hrs, Volume=	0.017 af, Atten= 96%, Lag= 0.0 min	
Discarded =	0.01 cfs @	9.80 hrs, Volume=	0.017 af	
Primary =	0.00 cfs @	0.00 hrs, Volume=	0.000 af	

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 2.41' @ 14.82 hrs Surf.Area= 0.011 ac Storage= 0.011 af

Plug-Flow detention time= 252.2 min calculated for 0.017 af (74% of inflow)
Center-of-Mass det. time= 165.6 min (920.2 - 754.5)

Volume	Invert	Avail.Storage	Storage Description
#1	0.00'	0.014 af	**5.00'W x 100.00'L x 3.00'H Prismatoid** 0.034 af Overall x 40.0% Voids

Device	Routing	Invert	Outlet Devices
#1	Discarded	0.00'	**1.020 in/hr Exfiltration over Horizontal area**
#2	Primary	2.90'	**10.0' long x 2.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32

Discarded OutFlow Max=0.01 cfs @ 9.80 hrs HW=0.03' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.01 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=0.00' (Free Discharge)
↑—**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

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Riprap Apron Sizing

Median Stone Sizing:

$$D_{50} = 0.2 D_0 \left(\frac{Q}{\sqrt{g} D_0^{2.5}} \right)^{\frac{4}{3}} \left(\frac{D_0}{TW} \right)$$

Where:

D_0 = Maximum Inside Pipe Diameter (ft)

D_{50} = Median Riprap Diameter (ft)

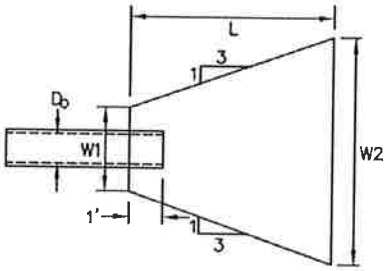
Q = Peak Discharge Rate from Hydraulic Design (cfs)

TW = Tailwater Depth (ft); (Use $0.4D_0$ if TW is unknown, max $1.0D_0$)

g = Gravitational Acceleration Constant = 32.2 ft/s^2

Apron Sizing:

D_{50} [In]	Apron Length (L) [ft]	Apron Depth [In]	Apron Width At Beginning	Apron Width At End
5	$4D_0$	$3.5D_{50}$	$3D_0$	$3D_0 + \frac{2}{3}L$
6	$4D_0$	$3.3D_{50}$	$3D_0$	$3D_0 + \frac{2}{3}L$
10	$5D_0$	$2.4D_{50}$	$3D_0$	$3D_0 + \frac{2}{3}L$
14	$6D_0$	$2.2D_{50}$	$3D_0$	$3D_0 + \frac{2}{3}L$
20	$7D_0$	$2.0D_{50}$	$3D_0$	$3D_0 + \frac{2}{3}L$
22	$8D_0$	$2.0D_{50}$	$3D_0$	$3D_0 + \frac{2}{3}L$



FLARED END SECTION	PIPE DIAMETER (D_0) (FEET)	100-YEAR STORM FLOW (Q) (CFS)	TAILWATER (TW) [ft]	MEDIAN STONE DIAMETER (D_{50}) (INCHES)	APRON LENGTH (L) (FEET)	APRON DEPTH [In]	APRON WIDTH AT BEGINING (W_1) [ft]	APRON WIDTH AT END (W_2) [ft]
Basin 2	0.3	0.17	0.12	5	1.20	17.5	0.9	1.7

Notes

[1] Calculations performed in accordance with Hydraulic Engineering Circular No. 14, Third Edition; Hydraulic Design of Energy Dissipaters for Culverts and Channels, dated July 2006.

[2] Pipe shall extend 1 foot into riprap.

[3] For maximum pipe size of 60".

JOB NO. 2588.00

JOB: Solar Array

COMPUTED BY: CPT

DATE: 8/26/15

CHECKED BY: DMF

DATE: 8/26/2015

BEALS + THOMAS

Standard 3: Drawdown

$$\text{Drawdown Time} = \frac{Rv}{(K)\,(\text{Bottom Area})}$$

where:

Rv = Storage Volume Below Outlet [Ac-ft]
K= Infiltration Rate [in/hr]
Bottom Area= Bottom Area of Recharge System [Ac]

Infiltration System X

Rv =	1,481	ft^3
K =	1.020	in/hr
Bottom Area =	1,132	ft^2
Drawdown Time =	**15.4 Hours**	*< 72 Hours, Design is in compliance with the standard.*

Note:

1. The infiltration BMPs have been designed to fully drain within 72 hours, therefore the proposed stormwater management design is in compliance with Standard 3 .

2. Infiltration Rate based on Volume 3, Chapter 1, Table 2.3.3 *Rawls Rates* from the 2008 MA DEP Stormwater Management Handbook.

JOB NO. 2258.00
JOB: Solar Array

COMPUTED BY: CPT
DATE: 8/26/15

CHECKED BY: DMF
DATE: 8/26/2015

Stage-Area-Storage for Pond 15P: Basin 1

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
142.00	1,132	0
142.02	1,146	23
142.04	1,160	46
142.06	1,174	69
142.08	1,188	93
142.10	1,202	117
142.12	1,216	141
142.14	1,230	165
142.16	1,244	190
142.18	1,258	215
142.20	1,272	240
142.22	1,286	266
142.24	1,300	292
142.26	1,313	318
142.28	1,327	344
142.30	1,341	371
142.32	1,355	398
142.34	1,369	425
142.36	1,383	453
142.38	1,397	481
142.40	1,411	509
142.42	1,425	537
142.44	1,439	566
142.46	1,453	595
142.48	1,467	624
142.50	1,481	653
142.52	1,495	683
142.54	1,509	713
142.56	1,523	743
142.58	1,537	774
142.60	1,551	805
142.62	1,565	836
142.64	1,579	867
142.66	1,593	899
142.68	1,607	931
142.70	1,621	963
142.72	1,635	996
142.74	1,649	1,029
142.76	1,662	1,062
142.78	1,676	1,095
142.80	1,690	1,129
142.82	1,704	1,163
142.84	1,718	1,197
142.86	1,732	1,232
142.88	1,746	1,266
142.90	1,760	1,301
142.92	1,774	1,337
142.94	1,788	1,372
142.96	1,802	1,408
142.98	1,816	1,445
143.00	1,830	1,481
143.02	1,844	1,518
143.04	1,858	1,555
143.06	1,872	1,592
143.08	1,886	1,630
143.10	1,900	1,667
143.12	1,914	1,706
143.14	1,928	1,744
143.16	1,942	1,783
143.18	1,956	1,822
143.20	1,970	1,861
143.22	1,984	1,900
143.24	1,998	1,940
143.26	2,011	1,980
143.28	2,025	2,021
143.30	2,039	2,061
143.32	2,053	2,102
143.34	2,067	2,144
143.36	2,081	2,185
143.38	2,095	2,227
143.40	2,109	2,269
143.42	2,123	2,311
143.44	2,137	2,354
143.46	2,151	2,397
143.48	2,165	2,440
143.50	2,179	2,483
143.52	2,193	2,527
143.54	2,207	2,571
143.56	2,221	2,615
143.58	2,235	2,660
143.60	2,249	2,705
143.62	2,263	2,750
143.64	2,277	2,795
143.66	2,291	2,841
143.68	2,305	2,887
143.70	2,319	2,933
143.72	2,333	2,980
143.74	2,347	3,026
143.76	2,360	3,073
143.78	2,374	3,121
143.80	2,388	3,168
143.82	2,402	3,216
143.84	2,416	3,264
143.86	2,430	3,313
143.88	2,444	3,362
143.90	2,458	3,411
143.92	2,472	3,460
143.94	2,486	3,510
143.96	2,500	3,559
143.98	2,514	3,610
144.00	**2,528**	**3,660**

Volume below outlet

Appendix D
Site Owner's Manual

SITE OWNER'S MANUAL

Solar Array

Off Main Street
Millis, Massachusetts

Prepared for:

Clean Energy Collective
146 West Boylston Drive
Worcester, MA 01606

Presented by:

B E A L S + T H O M A S
BEALS AND THOMAS, INC.
Reservoir Corporate Center
144 Turnpike Road
Southborough, MA 01772-2104

August 2015

258800RP002

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FIGURES

APPENDICES

1.0 INTRODUCTION

The Site Owner's Manual complies with the Long-Term Pollution Prevention Plan (Standard 4) and the Long-Term Operation and Maintenance Plan (Standard 9) requirements of the 2008 Massachusetts Department of Environmental Protection (DEP) Stormwater Handbook. The Manual outlines source control and pollution prevention measures and maintenance requirements of stormwater best management practices (BMPs) associated with the proposed development.

2.0 SITE OWNER'S AGREEMENT

2.1 Operation and Maintenance Compliance Statement

Site Owner: Clean Energy Collective
146 West Boylston Drive
3rd Floor
Worcester, MA 01606

Responsible Party: Name of Responsible Party

Clean Energy Collective or their successors shall maintain ownership of the on-site stormwater management system as well as the responsibility for operation and maintenance during the post-development stages of the project. The site has been inspected for erosion and appropriate measures have been taken to permanently stabilize any eroded areas. All aspects of stormwater best management practices (BMPs) have been inspected for damage, wear and malfunction, and appropriate steps have been taken to repair or replace the system or portions of the system so that the stormwater at the site may be managed in accordance with the Stormwater Management Standards. Future responsible parties shall be notified of their continuing legal responsibility to operate and maintain the BMPs. The operation and maintenance plan for the stormwater BMPs is being implemented.

_____ _____
Responsible Party Signature Date

2.2 Stormwater Maintenance Easements

The Site Owner will have access to all stormwater practices for inspection and maintenance, including direct maintenance access by heavy equipment to structures requiring regular maintenance.

2.3 Record Keeping

The Site Owner shall maintain a rolling log in which all inspections and maintenance activities for the past three years shall be recorded. The Operation and Maintenance Log includes information pertaining to inspections, repairs, and disposal relevant to the project's stormwater management system. The Log is located in Appendix A.

The Operation and Maintenance Log shall be made available to the Conservation Commission and the DEP upon request. The Conservation Commission and the DEP shall be allowed to enter and inspect the premises to evaluate and ensure that the responsible party complies with the maintenance requirements for each BMP.

3.0 LONG-TERM POLLUTION PREVENTION PLAN

In compliance with Standard 4 of the 2008 DEP Stormwater Management Handbook, this section outlines source control and pollution prevention measures to be employed on-site after construction.

3.1 Storage of Materials and Waste

The site shall be kept clear of trash and debris at all times. Certain materials and waste products shall be stored inside or outside upon an impervious surface and covered, as required by local and state regulations.

3.2 Vehicle Washing

No commercial vehicle washing shall take place on site.

3.3 Routine Inspections and Maintenance of Stormwater BMPs

See Section 4.0 Long-Term Operation and Maintenance Plan, for routine inspection and maintenance requirements for all proposed stormwater BMPs.

3.4 Spill Prevention and Response

A contingency plan shall be implemented to address the spill or release of petroleum products and hazardous materials and will include the following measures:

1. Equipment necessary to quickly attend to inadvertent spills or leaks shall be stored on-site in a secure but accessible location. Such equipment shall include but not be limited to the following: safety goggles, chemically resistant gloves and overshoe boots, water and chemical fire extinguishers, sand and shovels, suitable absorbent materials, storage containers and first aid equipment (i.e. Indian Valley Industries, Inc. 55-gallon Spill Containment kit or approved equivalent).

2. Spills or leaks shall be treated properly according to material type, volume of spillage and location of spill. Mitigation shall include preventing further spillage, containing the spilled material in the smallest practical area, removing spilled material in a safe and environmentally-friendly manner, and remediation of any damage to the environment.

3. For large spills, Massachusetts DEP Hazardous Waste Incident Response Group shall be notified immediately at (617) 792-7653 and an emergency response contractor shall be consulted.

3.5 Maintenance of Lawns, Gardens, and other Landscaped Areas

Lawns, gardens, and other landscaped areas shall be maintained regularly by the site owner. Vegetated and landscaped BMPs will be maintained as outlined in Section 4.0.

3.6 Storage and Use of Fertilizers, Herbicides, and Pesticides

All fertilizers, herbicides, and pesticides shall be stored in accordance with local, state, and federal regulations. The application rate and use of fertilizers, herbicides, and pesticides on the site shall at no time exceed local, state, or federal specifications.

3.7 Snow and Deicing Chemical Management

Snow removal and use of deicing chemicals at the proposed development shall comply with the following requirements:

- Plowed snow shall be placed in areas outside of wetland boundaries and stormwater best management practices. The following maintenance measures shall be undertaken at all snow disposal sites:
    - Debris shall be cleared from an area prior to using it for snow disposal.
    - Debris and accumulated sediments shall be cleared from the site and properly disposed of at the end of the snow season and no later than May 15.
- In accordance with the Massachusetts General Laws, Chapter 85, Section 7A, salt and other de-icing chemicals will be stored at an indoor location. Salt and other deicing chemicals shall be stored in accordance with Massachusetts General Law.
- Sand piles shall be contained and stabilized to prevent the discharge of sand to wetlands or water bodies, and, where feasible, covered.
- Salt storage piles shall be located outside of the 100-year floodplain.
- The application of salt on the proposed access road shall at no time exceed state or local requirements.

4.0 LONG-TERM OPERATION AND MAINTENANCE PLAN

This section outlines the stormwater best management practices (BMPs) associated with the proposed stormwater management system and identifies the long-term inspection and maintenance requirements for each BMP.

4.1 Stormwater Management System Components

The following table outlines the type and quantity of the BMPs and their general location. Please reference the site plans provided in the Figures section for exact location. All basins are accessible for maintenance from the access driveway.

BMP Type	Quantity	Location
Infiltration Basin	1	Northwest corner of the site.
Detention Basin	1	Southeast corner of the site, adjacent to access road.

4.2 Inspection and Maintenance Schedules

4.2.1 Dry Detention Basins

Dry detention basins shall be inspected at least once per year to ensure they are operating as intended, and during and after major storm events (rainfall totals greater than 2.5 inches in 24 hours) to determine if each basin is meeting the expected detention times. Inspections shall include observations of the following:

- Outlet structures for evidence of clogging.
- Subsidence, erosion, cracking or tree growth within the basin and on the embankments.
- Damage to the emergency spillway.
- Sediment accumulation around the outlet.
- Changes in the condition of the low-flow channel.
- Adequacy of the inlet/outlet channel erosion control measures.

Maintenance activities shall include:

- Mowing the upper-stage, side slopes, embankment, and emergency spillway at least twice per year.
- Removing trash and debris at least twice per year.
- Removing accumulated sediment from the basin as necessary, and at least once every 10 years or when the basin is 50% full.

4.2.2 Infiltration Basins

Infiltration basins shall be inspected and maintained after major storm events (rainfall totals greater than 2.5 inches in 24 hours) during the first three months of operation and twice a year and when there are discharges through the outlet control structure thereafter. Additionally, all pretreatment BMPs shall be inspected in accordance with the minimal requirements specified for those practices and after all major storm events. Inspections shall include the following measures:

- During and after major storm events, the length of time standing water remains in the basin shall be recorded.
    - If the time is greater than 72 hours, thoroughly inspect the basin for signs of clogging.
    - A corrective action plan shall be developed by a qualified professional to restore infiltrative function. The Site Owner shall take immediate action to implement these corrective measures.
- Examine the outlet structure for evidence of clogging or outflow release velocities that are greater than the design velocity.
- Identify areas of sediment accumulation, differential settlement, cracking, and erosion within the basin.
- Inspect embankments for leakage and tree growth.
- Examine the health of the vegetation within the basin and on the embankments.

Corrective measures shall be taken immediately as warranted by the inspections. If any evidence of hydrocarbons is found during inspection, the material shall be immediately removed using absorbent pads or other suitable measures and legally disposed.

Preventative maintenance shall include the following activities:

- Mow the buffer area and basin bottom and side slopes, if vegetated.
- Remove trash, debris, and accumulated organic matter.
- Remove clippings after mowing.

4.2.3 Stormwater Outfalls

Flared end sections and associated riprap spillways shall be inspected at least once per year and after major storm events (rainfall totals greater than 2.5 inches in 24 hours) to ensure that the stability of the outlet area is maintained. The outfall area shall be kept clear of debris such as trash, branches, and sediment. Repairs shall be made immediately if riprap displacement or downstream channel scour is observed.

4.3 Estimated Operation and Maintenance Budget

An operations and maintenance budget was prepared to approximate the annual cost of the inspections required in compliance with the DEP Stormwater Management Policy. The table below estimates the annual cost to inspect and maintain each proposed BMP, based on the requirements in Section 4.2.

BMP Type	# of BMPS	Annual O&M Cost (per BMP)[1]	Total Cost
Dry Detention Basin	1	$200 - $400	$200 - $400
Infiltration Basin	1	$200 - $400	$200 - $400
Riprap Spillway	2	$50-$100	$100 - $200
		Total	$500 - $1,000

4.4 Public Safety Features

A chain-link fence will be placed around the solar array to prevent unintended vehicles and people from entering the site.

[1] Annual maintenance cost is based on estimate of the cost to complete all inspection and maintenance measures outlined in Section 4.2. For BMPs that require sediment removal at regular intervals (i.e. every 5 or 10 years), the annual cost includes the annual percentage of that cost.

Figures

Appendices

Appendix A

Operation and Maintenance Log

OPERATION AND MAINTENANCE LOG

This template is intended to comply with the operation and maintenance log requirements of the 2008 DEP Stormwater Management Handbook. Copies of this log should be made for all inspections and kept on file for three years from the inspection date.

Name/Company of Inspector:
Date/Time of Inspection:
Weather Conditions: (Note current weather and any recent precipitation events)

Stormwater BMP	Inspection Observations	Actions Required

Appendix B

List of Emergency Contacts

Appendix E
Stormwater Pollution Prevention Plan

EPA Construction General Permit

Solar Array

Off Main Street
Millis, Massachusetts

Prepared for:

Clean Energy Collective
146 West Boylston Drive
Worcester, MA 01606

Presented by:

BEALS + THOMAS
Beals and Thomas, Inc.
Reservoir Corporate Center
144 Turnpike Road (Route 9)
Southborough, MA 01772-2104

August 2015

258800RP003

TABLE OF CONTENTS

LIST OF APPENDICES

1.0 CONTACT INFORMATION/RESPONSIBLE PARTIES

1.1 OPERATOR(S)/ SUBCONTRACTORS

Operator(s)

Company:	Owner Name				
Name:	Text				
Address:	Text				
City:	Text	State:	Text	ZIP Code:	Text
Telephone:	Text	Email:	Text		

Company:	Contractor Name				
Name:	Text				
Address:	Text				
City:	Text	State:	Text	ZIP Code:	Text
Telephone:	Text	Email:	Text		

Subcontractor(s)

Company:	Subcontractor Name				
Name:	Text				
Address:	Text				
City:	Text	State:	Text	ZIP Code:	Text
Telephone:	Text	Email:	Text		
Area of Control:		Site Work Contractor			

24-Hour Emergency Contact

Company:	Text
Name:	Text
Telephone:	Text

1.2 STORMWATER TEAM

SWPPP Preparer

Company:	Beals and Thomas, Inc.				
Name:	Chris Taylor				
Address:	144 Turnpike Road				
City:	Southborough	State:	MA	ZIP Code:	01772
Telephone:	508-366-0560	Email:	ctaylor@bealsandthomas.com		

Personnel Responsible for Installation & Maintenance of Stormwater BMPs

Company:	Text				
Name:	Text				
Address:	Text				
City:	Text	State:	Text	ZIP Code:	Text
Telephone:	Text	Email:	Text		

Inspection Personnel

Company:	Text				
Name:	Text				
Address:	Text				
City:	Text	State:	Text	ZIP Code:	Text
Telephone:	Text	Email:	Text		

Personnel Responsible for Taking Corrective Actions

Company:	Text				
Name:	Text				
Address:	Text				
City:	Text	State:	Text	ZIP Code:	Text
Telephone:	Text	Email:	Text		

2.0 SITE EVALUATION, ASSESSMENT AND PLANNING

2.1 PROJECT/SITE INFORMATION

Project/Site Name:	Solar Array				
Project Street/Location:	Off Main Street				
City:	Millis	State:	MA	ZIP Code:	Text
County or Similar Subdivision:		Norfolk			

Latitude:	42.156630	Longitude:	-71.381328
Method for Determining Latitude/Longitude: ☐ USGS Topographic Map (specify scale: _____) ☐ EPA Website ☐ GPS ☒ Other (please specify): Google Maps			
Horizontal Reference Datum: ☐ NAD 27 ☐ WGS 84 ☐ NAD 83 ☒ Unknown			

Is the project located on Indian country lands, or located on a property of religious of cultural significance to an Indian tribe? ☐ Yes ☒ No

If yes, provide the name of the Indian tribe associated with the area of Indian country (including the name of Indian reservation if applicable), or if not in Indian country, provide the name of the Indian tribe associated with the property:

_____

Is this project considered a federal facility? ☐ Yes ☒ No

Are you applying for permit coverage as a "federal operator" as defined in Appendix A of the 2012 CGP? ☐ Yes ☒ No

NPDES project or permit tracking number: Text

2.1.1 Emergency-Related Projects

Is this project in response to a public emergency? ☐ Yes ☒ No

If yes, document the cause of the public emergency *(e.g., natural disaster, extreme flooding conditions)*, information substantiating its occurrence *(e.g., state disaster declaration)*, and a description of the construction necessary to reestablish effective public services:

2.2 NATURE AND SEQUENCE OF CONSTRUCTION ACTIVITY

2.2.1 Function of the Construction Activity

Solar array construction with access road and electrical utility connection.

Function of the construction activity:

☐ Residential ☐ Commercial
☒ Industrial ☒ Road Construction
☐ Linear Utility ☐ Other (please specify):_____

2.2.2 Estimated Project Dates

Estimated Project Start Date: Text
Estimated Project Completion Date: Text

Estimated Timeline of Activity	Construction Activity and BMP Descriptions
Date Start –Date End	***Before any site grading activities begin*** 1. Stake Limit of Construction. Workers shall be informed that no construction activity is to occur beyond this limit at any time. 2. Delineate the limit of the natural buffer to be maintained with flags, tape or other similar device. 3. Clear vegetation as necessary within the limits of construction. 4. Grub the areas where silt fence is required, removing stumps and roots as necessary. The existing ground surface shall be disturbed as little as possible prior to the start of construction. 5. Install silt fence and straw bales as shown on the plans. An adequate stockpile of erosion control materials shall be on site at all times for emergency or routine replacement and shall include materials to repair silt fences, straw bales, or any other devices planned for use during construction. 6. Construct stabilized construction exits. 7. Construct staging and materials storage area. 8. Install temporary sanitary facilities and dumpsters.
Date Start –Date End	***Site grading*** 1. Begin site clearing and grubbing operations. 2. Commence excavation of stormwater management basins to act as temporary sedimentation basins during construction. 3. Commence construction of temporary drainage channels to direct runoff to sedimentation basin(s) during construction. Check dams shall be installed along the temporary drainage channels to reduce velocities and collect sediment. 4. Begin overall site grading and topsoil stripping. 5. Establish topsoil stockpile. 6. Install silt fences around stockpile and cover stockpiles. 7. Disturbed areas where construction will cease for more than 14 days shall be stabilized with erosion controls.
Date Start –Date End	***Infrastructure (utilities, solar pannels, etc.)*** 1. Install utilities, and storm drains. 2. Install solar panels and racking.
Date Start –Date End	***Final stabilization and landscaping*** 1. Remove all temporary control BMPs and stabilize any

	areas disturbed by their removal with erosion controls 2. Prepare final seeding and landscaping. 3. Monitor stabilized areas until final stabilization is reached.

2.3 SOILS, SLOPES, VEGETATION, AND CURRENT DRAINAGE PATTERNS

Soil type(s): The Natural Resources Conservation Service (NRCS) lists the on-site soils as primarily Canton fine sandy loam, an excessively well drained soil. NRCS classifies this type of soil as hydrologic class A soil.

The eastern portion of the site is classified as Ridgebury fine sandy loam. NRCS classifies this type of soil as hydrologic class D soil. Class D soils typically have a very slow infiltration rate and a swallow depth to the water table.

Slopes: The site contains one high point located in the southeast portion of the proposed solar array. The topography slopes off in all directions from the high point.

Drainage Patterns: Runoff from the site currently drains from the high point to the wetlands located to the south, east and west of the site. All runoff from the site is ultimately tributary to the Great Black Swamp located to the north.

Vegetation: A moderately dense canopy of red maple, and black gum, with slippery elm, northern red oak, and eastern white pine dominates vegetation onsite.

2.4 CONSTRUCTION SITE ESTIMATES

Total property area:	28.5 acres
Total construction site area to be disturbed:	6.1 acres
Maximum area to be disturbed at one time:	6.1 acres
Percentage impervious area before construction:	0 %
Runoff coefficient before construction:	35
Percentage impervious area after construction:	0 %
Runoff coefficient after construction:	36

2.5 DISCHARGE INFORMATION

2.5.1 Description of Receiving Storm Sewer Systems

Does your project/site discharge stormwater into a Municipal Separate Storm Sewer System (MS4)? ☐ Yes ☒ No

2.5.2 Receiving Waters

List the name of the first surface water of the United States that receives runoff from your site. If your site discharges to more than one surface water of the United States list all applicable surface waters. For discharges that enter a storm sewer system prior to discharge, the first surface water is the water body that receives the stormwater discharge from the storm sewer system. *Great Black Swamp*

2.5.3 Impaired Waters/ TMDLs

Has the surface water been listed as "impaired?" ☐ Yes ☒ No

If yes, list the pollutant(s) causing the impairment:

Describe the method(s) used to determine whether or not your project site discharges to an impaired water: *Mass GIS layer for DEP 2012 Integrated River List.*

2.5.4 Tier 2, 2.5, or 3 Waters

Is this surface water designated as a Tier 2, 2.5 or 3 water? ☐ Yes ☒ No

2.6 UNIQUE SITE FEATURES AND SENSITIVE AREAS

Wetlands are location to the south, east and west of the site.

2.7 CONSTRUCTION SUPPORT ACTIVITIES

Construction support activities are not required for the project.

2.8 POTENTIAL SOURCES OF POLLUTION

2.8.1 Potential Sources of Sediment

- Clearing and grubbing operations
- Grading and site excavation operations
- Vehicle tracking
- Topsoil stripping and stockpiling
- Landscaping operations

2.8.2 Potential Sources of Non-Sediment Pollutants

- Combined Staging Area — small fueling activities, minor equipment maintenance, sanitary facilities, and hazardous waste storage.
- Materials Storage Area — general building materials, solvents, adhesives, paints, aggregates, trash, and so on.
- Concrete Washout Area

Material/ Chemical	Physical Description	Stormwater Pollutants	Location[1]
Pesticides	Various colored to colorless liquid, powder, pellets, or grains	Chlorinated hydrocarbons, organophosphates, carbamates, arsenic	Herbicides used for noxious weed control
[2]Fertilizer	Liquid or solid grains	Nitrogen, phosphorous	Newly seeded areas
Cleaning solvents	Colorless, blue, or yellow-green liquid	Perchloroethylene, methylene chloride, trichloroethylene, petroleum distillates	No equipment cleaning allowed in project limits
Glue/ adhesives	White or yellow liquid	Polymers, epoxies	Building construction
Curing compounds	Creamy white liquid	Naphtha	Curb and gutter, walkways
Hydraulic oil/fluids	Brown oily petroleum hydrocarbon	Mineral oil	Leaks or broken hoses from equipment
Gasoline	Colorless, pale brown or pink petroleum hydrocarbon	Benzene, ethyl benzene, toluene, xylene, MTBE	Secondary containment/staging area
Diesel Fuel	Clear, blue-green to yellow liquid	Petroleum distillate, oil & grease, naphthalene, xylenes	Secondary containment/staging area
Kerosene	Pale yellow liquid petroleum hydrocarbon	Coal oil, petroleum distillates	Secondary containment/staging area
Antifreeze/ coolant	Clear green/yellow liquid	Ethylene glycol, propylene glycol, heavy metals (copper, lead, zinc)	Leaks or broken hoses from equipment
Sanitary toilets	Various colored liquid	Bacteria, parasites, and viruses	Staging area

[1] Area where material/chemical is used on-site.
[2] Use of fertilizers containing nitrogen and/ or phosphorus in ratios greater than recommended by the manufacture must be documented.

2.9 SITE PLANS

The Topographic Plan shows the undeveloped site and its current features. The Site Plans show the developed site.

These Site Plans include:

- ☐ Delineation of construction phasing, if applicable
- ☒ Areas of soil disturbance and areas that will not be disturbed
- ☒ Direction(s) of stormwater flow and approximate slopes before and after major grading activities
- ☒ Natural features to be preserved
- ☒ Locations of major structural and non-structural BMPs identified in the SWPPP
- ☒ Location(s) of sediment, soil or other construction materials will be stockpiled
- ☒ Locations of stabilization measures
- ☐ Locations of off-site material, waste, borrow, or equipment storage areas
- ☒ Location of all waters of the U.S., including wetlands on or near the site. Indicate if water bodies are listed as impaired, or are identified as Tier 2, 2.5 or 3 waters.
- ☒ Boundary lines of any natural buffers,
- ☒ Locations where stormwater discharges or allowable non-stormwater to surface water(s)
- ☒ Locations of storm drain inlets and stormwater control measures on the site and in the immediate vicinity of the site
- ☒ Locations of all pollutant-generating activities
- ☐ Locations where polymers, flocculants, or other treatment chemicals will be used and stored
- ☒ Areas of federally-listed critical habitat for endangered or threatened species

See Appendix B: Site Plans

3.0 COMPLIANCE WITH APPLICABLE FEDERAL & STATE REQUIREMENTS

3.1 ENDANGERED SPECIES CERTIFICATION

Are endangered or threatened species and critical habitats on or near the project area?
☐ Yes ☒ No

Describe how this determination was made: *Massachusetts Natural Heritage Atlas 13th Edition, dated October 1, 2008, and confirmed current with MassGIS information on June 2, 2015, the Site is not located within the Natural Heritage and Endangered Habitat of Rare Wildlife.*

3.2 HISTORIC PRESERVATION

Step 1
Will stormwater controls that require subsurface earth disturbance be installed on the site? ☒ Yes ☐ No

Step 2
If you answered yes in Step 1, have prior surveys or evaluations conducted on the site already determined that historic properties do not exist, or that prior disturbances at the site have precluded the existence of historic properties?
☒ Yes ☐ No

According to the Massachusetts Cultural Resource Information System (MACRIS), there are no historical resources located on the Site. Additionally, the proposed work is not anticipated to involve activities that would adversely impact potential historic resources.

3.3 SAFE DRINKING WATER ACT UNDERGROUND INJECTION CONTROL REQUIREMENTS

Do you plan to install any of the following controls? *No subsurface stormwater controls will be installed.*

3.4 APPLICABLE STATE OR LOCAL PROGRAMS

This SWPPP complies with the requirements of Standard 8 of the Massachusetts Department of Environmental Protection Stormwater Handbook, which states:

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 plans) shall be developed and implemented.

4.0 EROSION AND SEDIMENT CONTROL BMPS

This SWPPP contains a listing of the erosion and sediment control best management practices (BMPs) that will be implemented to control pollutants in stormwater discharges. The BMPs are categorized under one of the areas of BMP activity as described below:

- Natural Buffers or Equivalent Sediment Controls
- Minimize disturbed area and protect natural features and soil
- Phased construction activity
- Control stormwater flowing onto and through the project
- Stabilize soils
- Protect slopes
- Protect storm drain inlets
- Establish perimeter controls and sediment barriers
- Retain sediment on-site and control dewatering practices
- Establish stabilized construction exits

4.1 NATURAL BUFFERS OR EQUIVALENT SEDIMENT CONTROLS

Are there any surface waters located within 50 feet of your construction disturbances that receive stormwater discharges from the site? ☒ Yes ☐ No

If yes, check the compliance alternative that applies:

☐ A 50-foot undisturbed natural buffer will be maintained. The 50-foot buffer is shown on the attached site plans and will be clearly marked off with flags, tape, or a similar marking device prior to the commencement of earth disturbing activities.

☒ An undisturbed natural buffer of varying legths will be provided along with supplemental erosion and sediment controls, which in combination achieves the sediment load reduction equivalent to a 50-foot undisturbed natural buffer.

Description of Controls:
An erosion control barrier consisting of an entrenched silt fence and staked straw wattles will be installed at the limit of disturbance on areas of the site with less than a 50-foot undisturbed natural buffer. In addition, temporary sediment basins will be installed up gradient of the erosion control barrier on areas of the site with less than a 25-foot undisturbed natural buffer.

☐ It is infeasible to provide and maintain an undisturbed natural buffer of any size, therefore erosion and sediment controls will be implemented that achieve the sediment load reduction equivalent to a 50-foot undisturbed natural buffer.

☐ The project qualifies for one of the exceptions in Part 2.1.2.1.e. of the 2012 Construction General Permit.

4.2 MINIMIZE DISTURBED AREA AND PROTECT NATURAL FEATURES AND SOIL

4.2.1 Preserve Existing Vegetation

Description:	The preserved area of existing vegetation shall be as identified on the Site Plans and Sitework Specifications.
Installation Schedule:	The preserved area of existing vegetation shall be surrounded with the orange-colored plastic mesh fence, and trees shall be marked before construction begins at the site.
Maintenance and Inspection:	The area shall be inspected weekly to ensure the temporary fence is intact and the trees are clearly marked. During construction, preserved areas of existing vegetation shall be surrounded by the orange-colored mesh fence and clearly marked at all times.

4.2.2 Stockpiling Topsoil

Description:	Topsoil stripped from the immediate construction area shall be stockpiled as identified on the Site Plans and Sitework Specifications or as approved by the SWPPP preparer.
Installation Schedule:	Topsoil stockpiles shall be established during grading activities. The silt fence and temporary erosion controls shall be installed immediately after the stockpile has been established. When practical provide cover over the stockpile or temporary stabilization to avoid direct contract with precipitation and wind.
Maintenance and Inspection:	The area shall be inspected weekly for erosion and immediately after storm events. Areas on or around the stockpile that have eroded shall be stabilized immediately with erosion controls. See following Silt Fence section for Maintenance and inspection procedures.

4.3 PHASED CONSTRUCTION ACTIVITY

The proposed site is too small for phased grading to be practical. To minimize erosion during grading activities, grading and site work shall be conducted after snowmelt and during periods of predicted dry weather. The areas of the site that will remain vegetated after construction shall be stabilized with hydromulch or seeding immediately after grading activities are completed. All other areas of the construction site shall be stabilized if site work is not planned for more than 14 days. To minimize potential erosion from the site, only areas necessary to construct the grass drainage channels, sediment basin, and construction entrances/exits shall be disturbed initially. These areas

shall be cleared, grubbed, and graded and the above measures shall be installed. These areas shall be stabilized immediately after construction but no later than 14 days after construction ceases.

For a timeline of construction activity, see the Estimated Project Dates section of this report.

4.4 CONTROL STORMWATER FLOWING ONTO AND THROUGH THE PROJECT

4.4.1 Grass Drainage Channels

Description:	Grass drainage channel shall be installed as required to control and convey stormwater runoff. The channel shall convey runoff to temporary sediment basins as required. Some grass drainage channels shall remain as a permanent stormwater structure after construction is complete.
Installation Schedule:	The grass drainage channel shall be installed after clearing and grubbing operations are completed at the site.
Maintenance and Inspection:	The channel shall be inspected weekly and immediately after storm events for erosion and structural failures. Before vegetation has been established in the channel, inspect erosion control blankets, embankments, and beds for erosion and accumulation of debris and sediment. Remove debris, sediment, and repair erosion control blankets, fiber rolls and embankments immediately.

Design Specifications

1. The channel shall have a positive drainage to convey runoff to temporary sediment basins.

4.5 STABILIZE SOIL

4.5.1 Temporary Stabilization

Description:	Initiation of temporary vegetative cover shall occur immediately where construction will cease for more that 14 days. It shall be established using hydroseeding for areas of exposed soil (including stockpiles).
Installation Schedule:	Temporary stabilization measures shall be initiated immediately where construction activities will temporarily cease for more than 14 days.

Maintenance and Inspection:	Stabilized areas shall be inspected weekly and after storm events until a dense cover of vegetation has become established. If failure is noticed at the seeded area, the area shall be reseeded, fertilized, and mulched immediately.

4.5.2 Mulching

Description:	Hydromulching shall provide immediate protection to exposed soils during short periods of disturbance. Hydromulch shall also be applied in areas that have been seeded for temporary or permanent stabilization.
Installation Schedule:	Hydromulch shall be applied to exposed soils during short periods of construction and seeded areas.
Maintenance and Inspection:	Mulched areas shall be inspected weekly and after storm events to check for movement of mulch or erosion. If washout, breakage, or erosion occurs, the surface shall be repaired, and new mulch shall be applied to the damaged area.

4.5.3 Permanent Stabilization

Description:	Initiation of permanent stabilization measures shall occur immediately after the final design grades are achieved and earth moving activities cease. Native species of plants shall be used to establish vegetative cover on exposed soils. Permanent stabilization shall be completed in accordance with the procedures outlined in the Final Stabilization section of this report.
Installation Schedule:	Portions of the site where construction activities have permanently ceased shall be stabilized, as soon as possible.
Maintenance and Inspection:	All seeded areas shall be inspected weekly during construction activities and after storm events until a dense cover of vegetation has been established. If failure is noticed at the seeded area, the area shall be reseeded, fertilized, and mulched immediately. Care shall be taken to avoid compacting newly placed topsoil. After construction is completed at the site, permanently stabilized areas shall be monitored until final stabilization is reached.

4.5.4 Dust Control

Description:	Dust from the site shall be controlled by using a mobile pressure-type distributor truck to apply potable water to disturbed areas. The mobile unit shall apply water at a rate of 300 gallons per acre and minimized as necessary to prevent runoff and ponding.
Installation Schedule:	Dust control shall be implemented as needed once site grading has been initiated and during windy conditions (forecasted or actual wind conditions of 20 mph or greater) while site grading is occurring. Spraying of potable water shall be performed no more than three times a day during the months of May–September and once per day during the months of October–April or whenever the dryness of the soil warrants it.
Maintenance and Inspection:	At least one mobile unit shall be available at all times to distribute potable water to control dust on the project area. Each mobile unit shall be equipped with a positive shutoff valve to prevent over watering of the disturbed area.

4.6 PROTECT SLOPES

4.6.1 Erosion Control Blanket

Description:	Erosion control blankets shall be used to provide stabilization for the slopes in the grass drainage channels and sediment basins, and on slopes greater than 3:1 throughout the site.
Installation Schedule:	The erosion control blankets shall be installed once the slopes of the grass drainage channel and sediment basin have reached final grade.
Maintenance and Inspection:	The erosion control blanket shall be inspected weekly and immediately after storm events to determine if cracks, tears, or breaches have formed in the fabric; if so, the blanket shall be repaired or replaced immediately. Good contact with the soil shall be maintained and erosion shall not occur under the blanket. Any areas where the blanket is not in close contact with the ground shall be repaired or replaced.

4.7 ESTABLISH PERIMETER CONTROLS AND SEDIMENT BARRIERS

4.7.1 Erosion Control Barrier

☐ Permanent ☒ Temporary

Description:	An erosion control barrier, consisting of entrenched straw wattles and siltation fencing, shall be installed along the downgradient side of the proposed project to decrease the velocity of sheet flows and intercept and detain small amounts of sediment from disturbed areas.
Installation Schedule:	Erosion Control Barrier shall be installed prior to clearing and grubbing.
Maintenance and Inspection:	Erosion Control Barrier shall be inspected weekly, following storms, and daily during rainy periods. Damaged fencing shall be replaced. Concentrated flows shall be intercepted and rerouted. Sediment accumulations shall be removed when reaching a depth of 6-inches, or one-half of the above ground height of the barrier, whichever is less. Deteriorated fencing material shall be replaced. Used fencing shall be properly disposed of.

4.7.2 Silt Fence

☐ Permanent ☒ Temporary

Description:	Entrenched silt fence shall be installed to decrease the velocity of sheet flows and intercept and detain small amounts of sediment from disturbed areas.
Installation Schedule:	Silt fence shall be installed prior to clearing and grubbing.
Maintenance and Inspection:	Silt fence shall be inspected weekly, following storms, and daily during rainy periods. Damaged fencing shall be replaced. Concentrated flows shall be intercepted and rerouted. Sediment accumulations shall be removed when reaching a depth of 6-inches. Deteriorated fencing material shall be replaced. Used fencing shall be properly disposed of.

4.8 PREVENT SOIL COMPACTION

4.8.1 Protect Proposed Infiltration Areas

☐ Permanent ☒ Temporary

Description:	An erosion control barrier, consisting of entrenched siltation fencing, shall be installed around the perimeter of all proposed infiltration areas to prevent construction vehicles from impacting the area, to decrease the velocity of sheet flows and intercept, and detain small amounts of sediment from disturbed areas.
Installation Schedule:	The erosion control barrier shall be installed after clearing and grubbing.
Maintenance and Inspection:	Silt fence shall be inspected weekly, following storms, and daily during rainy periods. Damaged fencing shall be replaced. Concentrated flows shall be intercepted and rerouted. Sediment accumulations shall be removed when reaching a depth of 6-inches. Deteriorated fencing material shall be replaced. Used fencing shall be properly disposed of.

4.9 RETAIN SEDIMENT ON-SITE

4.9.1 Temporary Sediment Basins

☒ Permanent ☒ Temporary

Description:	Temporary sediment basins are located throughout the site between construction and wetland resource areas. These basins provide 3,600 cubic feet of storage per acre drained, as required by the EPA. Refer to the Temporary Sediment Basin Sizing Calculation located in Appendix K. Several temporary sediment basins will be utilized as sediment forebays following construction.
Installation Schedule:	Temporary Sediment Basins shall be installed during grading activities.
Maintenance and Inspection:	Temporary Sediment Basins shall be inspected weekly and following storms. Sediment shall be removed when it reaches a depth of one foot, or half the design capacity whichever is less. Damage to basin embankments and slopes shall be repaired.

4.10 ESTABLISH STABILIZED CONSTRUCTION ENTRANCE/EXIT

☒ Permanent ☐ Temporary

Description:	Temporary gravel or crushed stone construction entrances/exits or other means shall be used to minimize off-site movement of soil with vehicles. Construction access points shall be maintained to minimize tracking of soil onto public roads and existing parking lots to remain. If the rock entrance is not working to keep streets clean, then install wheel wash, sweep streets, or wash streets if wash water can be collected.
Installation Schedule:	Stabilized construction entrance shall be installed prior to clearing and grubbing.
Maintenance and Inspection:	Stabilized construction entrances shall be inspected daily. Gravel or crushed stone shall be added if the pad is no longer in accordance with the specifications. If the rock entrance is not working to keep streets clean, then install wheel wash, sweep streets, or wash streets if wash water can be collected. When sediment has been tracked off of the site, it shall be removed by the end of the same working day, or by the end of the next working day if track-out occurs on a non work day. Remove sediment by sweeping, shoveling or vacuuming roadways were sediment has been tracked-out.

4.11 DEWATERING PRACTICES

Description:	All groundwater or stormwater discharged from excavations, trenches, foundations, vaults, or other similar point shall be treated by sediment basins, sediment traps, sediment socks, dewatering tanks, tube settlers or filtration systems specifically designed to remove sediment from the excavations. All dewatering practices shall conform to the following: • Visible floating solids or foam shall not be discharged; • An oil-water separator or suitable filtration device (such as a cartridge filter) that is designed to remove oil, grease, or other products if dewatering water is found to contain these materials shall be used; • To the extent feasible, utilize vegetated, upland areas

	of the site to infiltrate dewatering water before discharge. In no case will surface waters be considered part of the treatment area; • Velocity dissipaters shall be installed at all points where dewatering activities are discharged to the surface. • With backwash water, either haul it away for disposal or return it to the beginning of the treatment process; and • Replace and clean the filter media used in dewatering devices when the pressure differential equals or exceeds the manufacturer's specifications.
Installation Schedule:	Install settling or filtration methods prior to commencing dewatering. Engineer is required to approve settling of filtration method design prior to installation.
Maintenance and Inspection:	Settling of filtration controls shall be inspected weekly and following storms. Sediment shall be removed when it reaches a depth of one foot, or half the design capacity whichever is less.

5.0 GOOD HOUSEKEEPING BMPS

This SWPPP contains a listing of the good housekeeping best management practices (BMPs) that shall be implemented to control pollutants in stormwater discharges during construction-related work. The BMPs are categorized below:

- Material Handling and Waste Management
- Establish Proper Building Material Staging Areas
- Designate Washout Areas
- Establish Proper Equipment/Vehicle Fueling and Maintenance Practices
- Allowable Non-Stormwater Discharges and Control Equipment/Vehicle Washing
- Spill Prevention and Control Plan

5.1 MATERIAL HANDLING AND WASTE MANAGEMENT

Several management procedures and practices are proposed to prevent and/or reduce the discharge of pollutants to stormwater from solid or liquid wastes that will be generated at the site. These measures are grouped into the following categories: (1) solid or construction waste disposal, (2) recycling, (3) sanitary and septic waste, and (4) hazardous materials.

5.1.1 Solid or Construction Waste Disposal

Description:	All waste materials shall be collected and disposed of into metal trash dumpsters in the materials storage area. Dumpsters shall have a secure watertight lid, be placed away from stormwater conveyances and drains, and meet all federal, state, and municipal regulations. Only trash and construction debris from the site shall be deposited in the dumpster. No construction materials shall be buried on-site unless authorized by a program for recycling/beneficial use. All personnel shall be instructed regarding the correct disposal of trash and construction debris. Notices that state these practices shall be posted in the office trailer and the individual who manages day-today site operations shall be responsible for seeing that these practices are followed.
Installation Schedule:	Trash dumpsters shall be installed once the materials storage area has been established.
Maintenance and Inspection:	The dumpsters shall be inspected weekly and immediately after storm events. The dumpsters shall be emptied weekly and taken to an approved landfill or recycling facility. If trash and construction debris are exceeding the dumpsters' capacity, the dumpsters shall be emptied more frequently.

5.1.2 Recycling

Description:	Wood pallets, cardboard boxes, and other recyclable construction scraps shall be disposed of in a designated dumpster for recycling. The dumpster shall have a secure watertight lid, be placed away from stormwater conveyances and drains and meet all local and state solid-waste management regulations. Only solid recyclable construction scraps from the site shall be deposited in the dumpster. All personnel shall be instructed regarding the correct procedure for disposal of recyclable construction scraps. Notices that state these procedures shall be posted in the office trailer, and the individual who manages day-to-day site operations shall be responsible for seeing that these procedures are followed.
Installation Schedule:	Designated recycling dumpsters shall be installed once the area has been established.
Maintenance and Inspection:	The recycling dumpster shall be inspected weekly and immediately after storm events. The recycling dumpster shall be emptied weekly and taken to an approved recycling center. If recyclable construction wastes are exceeding the dumpsters' capacity, the dumpsters shall be emptied more frequently.

5.1.3 Sanitary and Septic Waste

Description:	Temporary sanitary facilities (portable toilets) shall be provided at the site throughout the construction phase. The portable toilets shall be located in the staging area, away from concentrated flow paths and traffic flow.
Installation Schedule:	The portable toilets shall be brought to the site once the staging area has been established.
Maintenance and Inspection:	All sanitary waste shall be collected from the portable facilities on a regular basis. The portable toilets shall be inspected weekly for evidence of leaking holding tanks. Toilets with leaking holding tanks shall be removed from the site and replaced with new portable toilets.

5.1.4 Hazardous Materials and Waste

Description:	All hazardous waste materials such as oil filters, petroleum products, paint, and equipment maintenance fluids shall be stored in structurally sound and sealed shipping containers, within the hazardous materials storage area. Hazardous waste materials shall be stored in appropriate and clearly marked containers and segregated from other non-waste materials. Secondary containment shall be provided for all waste materials in the hazardous materials storage area and shall consist of commercially available spill pallets. Additionally, all hazardous waste materials shall be disposed of in accordance with federal, state, and municipal regulations. Hazardous waste materials shall not be disposed of into the on-site dumpsters. All personnel shall be instructed regarding proper procedures for hazardous waste disposal. Notices that state these procedures shall be posted in the office trailer and the individual who manages day-to-day site operations shall be responsible for seeing that these procedures are followed.
Installation Schedule:	Shipping containers used to store hazardous waste materials shall be installed once the site materials storage area has been installed.
Maintenance and Inspection:	The hazardous waste material storage areas shall be inspected weekly and after storm events. The storage areas shall be kept clean, well organized, and equipped with ample cleanup supplies as appropriate for the materials being stored. Material safety data sheets, material inventory, and emergency contact numbers shall be maintained in the office trailer.

5.2 ESTABLISH PROPER BUILDING MATERIAL STAGING AREAS

Description:	Construction equipment and maintenance materials shall be stored at the combined staging area and materials storage areas. A watertight shipping container shall be used to store hand tools, small parts, and other construction materials. Nonhazardous building materials such as packaging material (wood, plastic, and glass), and construction scrap material (brick, wood, steel, metal scraps, and pipe cuttings) shall be stored in a separate covered storage facility adjacent to the shipping container. All hazardous-waste materials such as oil filters, petroleum products, paint, and equipment maintenance fluids shall be stored in structurally sound and sealed containers under cover within the storage area. All fertilizers, herbicides, insecticides and pesticides shall be stored in accordance with local, state, and federal regulations. At a minimum these materials shall be covered with plastic sheeting or a temporary roof to prevent contact with rainwater. Very large items, such as framing materials and stockpiled lumber, shall be stored in the open in the materials storage area. Such materials shall be elevated on wood blocks to minimize contact with runoff.
Installation	The materials storage area shall be installed after grading and before any

Schedule:	infrastructure is constructed at the site.
Maintenance and Inspection:	The storage area shall be inspected weekly and after storm events. The storage area shall be kept clean, well organized, and equipped with ample cleanup supplies as appropriate for the materials being stored. Perimeter controls, containment structures, covers, and liners shall be repaired or replaced as needed to maintain proper function.

5.3 DESIGNATE WASHOUT AREAS

5.3.1 Concrete Washout

Description:	A designated temporary, above-grade concrete washout area shall be constructed as detailed on the site plan. The temporary concrete washout area shall be constructed with a recommended minimum length and minimum width of 10 feet, but with sufficient quantity and volume to contain all liquid and concrete waste generated by washout operations. The washout area shall be lined with plastic sheeting at least 10 mils thick and free of any holes or tears. Signs shall be posted marking the location of the washout area to ensure that concrete equipment operators use the proper facility. Concrete pours shall not be conducted during or before an anticipated storm event. Concrete mixer trucks and chutes shall be washed in the designated area or concrete wastes shall be properly disposed of off-site. When the temporary washout area is no longer needed for the construction project, the hardened concrete and materials used to construct the area shall be removed and disposed of according to the maintenance section below, and the area shall be stabilized.
Installation Schedule:	The washout area shall be constructed before concrete pours occur at the site.
Maintenance and Inspection:	The washout areas shall be inspected daily to ensure that all concrete washing is being discharged into the washout area, no leaks or tears are present, and to identify when concrete wastes need to be removed. The washout areas shall be cleaned out once the area is filled to 75 percent of the holding capacity. Once the area's holding capacity has been reached, the concrete wastes shall be allowed to harden; the concrete shall be broken up, removed, and taken to an approved landfill for disposal or recycled on-site or off-site in accordance with applicable laws. The plastic sheeting shall be replaced if tears occur during removal of concrete wastes from the washout area.

Design Specifications:

1. Temporary concrete washout type Above Grade shall be constructed as shown above, with a recommended minimum length and minimum width of 10 feet.
2. The washout shall be a minimum of 50 feet from storm drain inlets.
3. Plastic lining shall be free of holes, tears, or other defects that compromise the impermeability of the material.

5.4 ESTABLISH PROPER EQUIPMENT/VEHICLE FUELING AND MAINTENANCE PRACTICES

Description:	Several types of vehicles and equipment will likely be used on-site throughout the project, including graders, scrapers, excavators, loaders, paving equipment, rollers, trucks and trailers, backhoes, and forklifts. All major equipment/vehicle fueling and maintenance shall be performed outside of wetland buffer zones. When vehicle fueling must occur on-site, the fueling activity shall occur in the staging area. Only minor equipment maintenance shall occur on-site. All equipment fluids generated from maintenance activities shall be disposed of into designated drums stored on spill pallets in accordance with the Material Handling and Waste Management Section. Absorbent, spill-cleanup materials and spill kits shall be available at the combined staging and materials storage area. Drip pans shall be placed under all equipment receiving maintenance and vehicles and equipment parked overnight.
Installation Schedule:	BMPs implemented for equipment and vehicle maintenance and fueling activities shall begin at the start of the project.
Maintenance and Inspection:	Inspect equipment/vehicle storage areas weekly and after storm events. Vehicles and equipment shall be inspected on each day of use. Leaks shall be repaired immediately, using dry cleanup measures where possible and eliminating the source of the discharge. Problem vehicle(s) or equipment shall be removed from the project site. Keep ample supply of spill-cleanup materials on-site and immediately clean up spills and dispose of materials properly. Do not clean surfaces by hosing-down the area

5.5 ALLOWABLE NON-STORMWATER DISCHARGES AND CONTROL EQUIPMENT / VEHICLE WASHING

Description:	All equipment and vehicle washing shall be performed off-site, except as required for wheel washes and concrete washout areas.
Installation Schedule:	N/A
Maintenance and Inspection:	N/A

5.6 SPILL PREVENTION AND CONTROL PROCEDURES

Description:	i. Employee Training: All employees shall be trained as detailed in the Inspection and Maintenance section of this report. ii. Vehicle Maintenance: Vehicles and equipment shall be maintained off-site. All vehicles and equipment including subcontractor vehicles shall be checked for leaking oil and fluids. Vehicles leaking fluids shall not be allowed on-site. iii. Hazardous Material Storage: Hazardous materials shall be stored in accordance with this report and federal and municipal regulations. iv. Spill Kits: Spill kits shall be kept within the materials storage area. Spills: All spills shall be cleaned up immediately upon discovery. Spent absorbent materials and rags shall be hauled off-site immediately after the spill is cleaned up for disposal at an approved landfill. Spills large enough to discharge to surface water shall be reported to the National Response Center at 1-800-424-8802 and MA DEP at 617-792-7653. v. Material safety data sheets: A material inventory and emergency contact information shall be maintained at the on-site project trailer.
Installation Schedule:	The spill prevention and control procedures shall be implemented once construction begins on-site.
Maintenance and Inspection:	All personnel shall be instructed the correct procedures for spill prevention and control. Notices that state these practices shall be posted in the office trailer, and the individual who manages day-to-day site operations shall be responsible for seeing that these procedures are followed.

5.7 FERTILIZER DISCHARGE RESTRICTIONS

Description:	Discharges from fertilizers containing nitrogen and phosphorus shall be minimized. Fertilizers shall be applied at rates and amounts consistent with the manufacture's specification, and shall at no time exceed local, state, or federal specifications. See project landscape specifications for acceptable fertilizers that can be used for the project.
Installation Schedule:	Fertilizers shall be applied at an appropriate time of year, timed to coincide as closely as possible to the period of maximum vegetation uptake and growth. Avoid applying fertilizers before heavy rains. Do not apply fertilizers to frozen ground or stormwater conveyance channels flowing with water.
Maintenance and	N/A

Inspection:

5.8 ALLOWABLE NON-STORMWATER DISCHARGE MANAGEMENT

Any changes in construction activities that produce other allowable non-stormwater discharges shall be identified, and the SWPPP shall be amended and the appropriate erosion and sediment control shall be implemented.

The following is a list of allowable non-stormwater discharges:

- Water Used to Control Dust
- Uncontaminated Excavation Dewatering
- Landscape Irrigation
- Fire Hydrant Flushing
- Firefighting
- Waterline Flushing
- Building/Pavement Wash-Down
- Non-Detergent Laden Vehicle Wash Water
- Foundation or Footing Drains

6.0 POST-CONSTRUCTION BMPS

6.1 DETENTION BASIN

Description:	During the final stabilization phase of construction, temporary sediment basins in at detention basins shall be converted to permanent detention basins. Riprap spillways and outlet structures shall be constructed as detailed on the site plans.
Design Specifications:	Install according to sitework specifications and details.
Installation Schedule:	Temporary sediment basins at detention basins shall be converted to permanent detention basins during the final stabilization phase of construction.
Maintenance and Inspection:	The basins shall be inspected weekly and after storm events greater than 0.5 inches during construction. The area shall be checked for signs of erosion, seepage, and structural damage. Erosion, seepage, and structural damage shall be repaired immediately. The temporary sediment riser shall be checked for any damage or obstructions and any damage found shall be repaired and obstructions removed. Immediately after the completion of construction, the plant material shall be watered for 14 consecutive days unless there is sufficient natural rainfall. The area shall be monitored until final stabilization is reached. Following completion of site construction and final stabilization, maintenance and inspection responsibilities shall be taken over by the Owner in accordance with the Long-Term Pollution Prevention Plan and Long-Term Operation & Maintenance Plan.

6.2 INFILTRATION BASIN

Description:	Infiltration basins shall be protected from stormwater runoff from the disturbed site during construction. Riprap spillways shall be constructed as detailed on the site plan.
Design Specifications:	Install according to sitework specifications and details.
Installation Schedule:	Infiltration basins shall be excavated during earthwork construction.
Maintenance and Inspection:	The basins shall be inspected weekly and after storm events greater than 0.5 inches during construction. The area shall be checked for signs of erosion, seepage, and structural damage. Erosion, seepage, and structural damage shall be repaired immediately. The temporary sediment riser shall be checked for any damage or obstructions and any damage found shall be repaired and obstructions removed. Immediately after the completion of construction, the plant material shall be watered for 14

	consecutive days unless there is sufficient natural rainfall. The area shall be monitored until final stabilization is reached. Following completion of site construction and final stabilization, maintenance and inspection responsibilities shall be taken over by the Owner in accordance with the Long-Term Pollution Prevention Plan and Long-Term Operation & Maintenance Plan.

7.0 FINAL STABILIZATION

In compliance with the Construction General Permit, soil stabilization measures must be implemented immediately whenever earth-disturbing activities are temporarily or permanently ceased on any portion of the site. Earth-disturbing activities are temporarily ceased when clearing, grading, and excavation within any area of a site that will not include a permanent structure will not resume for a period of 14 or more calendar days, but such activities will resume in the future.

In the context of this provision, "immediately" means as soon as practicable, but no later than the end of the next work day, following the day when the earth-disturbing activities have temporarily or permanently ceased. The following activities constitute the initiation of stabilization:

- Preparing the soil for vegetative or non-vegetative stabilization;
- applying mulch or other non-vegetative product to the exposed area;
- seeding or planting the exposed area;
- starting any of the activities in listed above on a portion of the area to be stabilized, but not on the entire area; and
- finalizing arrangements to have stabilization product fully installed in compliance with the applicable deadline for completing stabilization.

As soon as practicable, but no later than 14 calendar days after the initiation of soil stabilization measures the following activities are required to be completed:

- For vegetative stabilization, all activities necessary to initially seed or plant the area to be stabilized; and/or
- For non-vegetative stabilization, the installation or application of all such non-vegetative measures.

The following sections detail the management practices proposed to achieve final stabilization of the site.

7.1 PERMANENT SEEDING

Description:	Permanent seeding shall be applied immediately after the final design grades are achieved on portions of the site but no later than 14 days after construction activities have permanently ceased. After the entire site is stabilized, any sediment that has accumulated shall be removed and hauled off-site for disposal. Construction debris, trash and temporary BMPs (including silt fences, material storage areas, sanitary toilets, and inlet protection) shall also be removed and any areas disturbed during removal shall be seeded immediately. Seeding shall be performed in accordance to the Site Plans and Landscape Specifications for the project.
Installation Schedule:	Seeding shall occur at portions of the site where construction activities have permanently ceased shall be stabilized, as soon as possible but no later than 14 days after construction ceases.
Maintenance and Inspection:	All seeded areas shall be inspected weekly during construction activities for failure and after storm events until a dense cover of vegetation has been established. If failure is noticed at the seeded area, the area shall be reseeded, fertilized, and mulched immediately. After construction is completed at the site, permanently stabilized areas shall be monitored until final stabilization is reached.

8.0 INSPECTIONS AND MAINTENANCE

8.1 INSPECTIONS

8.1.1 Inspection Schedule and Procedures

Inspections of the site will be performed once every 7 days or 14 days and within 24 hours of the end of a storm event of 0.25-inch or greater unless otherwise specified. The inspections will verify that all BMPs required are implemented, maintained, and effectively minimizing erosion and preventing stormwater contamination from construction materials.

Inspections shall include all areas of the site disturbed by construction activity and areas used for storage of materials that are exposed to precipitation. Inspectors shall look for evidence of, or the potential for, pollutants entering the storm water conveyance system. Sedimentation and erosion control measures identified in the SWPPP shall be observed to ensure proper operation. Discharge locations shall be inspected to ascertain whether erosion control measures are effective in preventing significant impacts to waters of the United States, where accessible. Where discharge locations are inaccessible, nearby downstream locations shall be inspected to the extent that such inspections are practicable. Locations where vehicles enter or exit the site shall be inspected for evidence of off-site sediment tracking.

Utility line installation, pipeline construction, and other examples of long, narrow, linear construction activities may limit the access of inspection personnel to the areas described in the above paragraph. Inspection of these areas could require that vehicles compromise temporarily or even permanently stabilized areas, cause additional disturbance of soils, and increase the potential for erosion. In these circumstances, controls shall be inspected on the same frequencies as other construction projects, but representative inspections may be performed. For representative inspections, personnel shall inspect controls along the construction site for 0.25 mile above and below each access point where a roadway, undisturbed right-of-way, or other similar feature intersects the construction site and allows access to the areas described above. The conditions of the controls along each inspected 0.25 mile segment may be considered as representative of the condition of controls along that reach extending from the end of the 0.25 mile segment to either the end of the next 0.25 mile inspected segment, or to the end of the project, whichever occurs first.

For detailed inspection procedures, see Sections 4 and 5.

All inspections shall be coordinated with a representative of Clean Energy Collective. An Owner's representative shall accompany the inspector, when possible, during inspections.

Inspection reports are required to be completed within 24-hours of an inspection. If corrective actions are identified by the Inspector during the inspection, he/she shall notify and submit a copy of the inspection report to the Operator(s). For corrective actions identified, the project managers shall be responsible for initiating the corrective action within 24 hours of the report and completing maintenance as soon as possible or before the next storm event. For any corrective actions requiring a SWPPP amendment or change to a stormwater conveyance or control design, the project manager shall notify Owner, as soon as possible, before initiating the corrective action.

For a copy of the inspection report template, see Appendix E.

8.2 REDUCTIONS IN INSPECTION FREQUENCY

Once an area is stabilized, inspections may be reduced to once per month. If construction resumes at the stabilized area the inspection frequency shall increase as outlined in section 8.1.

If earth-disturbing activities are suspended due to frozen conditions inspections can be temporarily suspended until a thaw occurs.

8.3 CORRECTIVE ACTION LOG

The corrective action log describes repairs, replacements, and maintenance of BMPs undertaken as a result of the inspections and maintenance procedures. Additionally remedies of permit violations and clean and proper disposal of spills, releases other deposits should be recorded.

If it is determined the stormwater controls have not been installed as required, or that they are not functioning adequately corrective action is required within 7 calendar days.

See Appendix F – Corrective Action Log.

9.0 RECORDKEEPING AND TRAINING

9.1 RECORDKEEPING

A copy of the SWPPP, along with all inspection reports and corrective action logs are required to be stored at an accessible location at the site, and shall be made available upon request of the EPA, or state or local agency approving stormwater management plans.

The following records shall be kept at the project site and shall be available for inspectors to review. These records shall be retained for a minimum period of at least 3 years after the permit is terminated.

Date(s) when major grading activities occur:
See Appendix I – Grading and Stabilization Activities Log

Date(s) when construction activities temporarily or permanently cease on a portion of the site:
See Appendix I – Grading and Stabilization Activities Log

Date(s) when an area is either temporarily or permanently stabilized:
See Appendix I – Grading and Stabilization Activities Log

9.2 LOG OF CHANGES TO THE SWPPP

The log of changes to the SWPPP is maintained in Appendix G and includes additions of new BMPs, replacement of failed BMPs, significant changes in the activities or their timing on the project, changes in personnel, changes in inspection and maintenance procedures and update to site plans.

9.3 TRAINING

Prior to the commencement of earth-disturbing activities or pollutant-generating activities, whichever occurs first, training on the pollution prevention measures outlined in this SWPPP shall be provided to staff and subcontractors.

9.3.1 Individual(s) Responsible for Training

Company/Organization: Text

Name: Text

9.3.2 Description of Training Conducted

Informal training shall be conducted for all staff, including subcontractors, on the site. The training shall be conducted primarily via tailgate sessions and shall focus on avoiding damage to stormwater BMPs and preventing illicit discharges. The tailgate sessions shall be conducted biweekly and shall address the following topics: Erosion Control BMPs, Sediment Control BMPs, Non-Stormwater BMPs, Waste Management and Materials Storage BMPs, and Emergency Procedures specific to the construction site. (See Appendix J – Training Log)

Formal training shall be provided to all staff and subcontractors with specific stormwater responsibilities, such as installing and maintaining BMPs. The formal training shall cover all design and construction specifications for installing the BMPs and proper procedures for maintaining each BMP. Formal training shall occur before any BMPs are installed on the site. (See Appendix J – Training Log)

10.0 CERTIFICATION AND NOTIFICATION

10.1 SIGNATURE, PLAN REVIEW, AND MAKING PLANS AVAILABLE

A copy of the SWPPP (including a copy of the Construction General Permit, NOI, and acknowledgement letter from EPA shall be retained at the construction site (or other location easily accessible during normal business hours to EPA, a state, tribal or local agency approving sediment and erosion plans, grading plans, or storm water management plans; local government officials; the operator of a municipal separate storm sewer receiving discharges from the site; and representatives of the U.S. Fish and Wildlife Service or the National Marine Fisheries Service) from the date of commencement of construction activities to the date of final stabilization. A copy of the SWPPP shall be available at a central location on-site for the use of all those identified as having responsibilities under the SWPPP. If an on-site location is unavailable to store the SWPPP when no personnel are present, notice of the plan's location shall be posted near the main entrance at the construction site.

A sign or other notice shall be posted conspicuously near the main entrance of the construction site. If displaying near the main entrance is infeasible, the notice will be posted in a local public building such as the town hall or public library. The sign or other notice shall contain the following information:

1. A copy of the completed Notice of Intent as submitted to the EPA Storm Water Notice Processing Center; and

2. If the location of the SWPPP or the name and telephone number of the contact person for scheduling SWPPP viewing times has changed (i.e., is different than that submitted to EPA in the NOI), the current location of the SWPPP and name and telephone number of a contact person for scheduling viewing times.

SWPPPs shall be made available upon request by EPA; a state, trial or local agency approving sediment and erosion plans, grading plans, or storm water management plans; local government officials; the operator of a municipal separate storm sewer receiving discharges from the site; and representative of the U.S. Fish and Wildlife Service or the National Marine Fisheries Service to the requestor. The copy of the SWPPP that is required to be kept on-site or locally available shall be made available, in its entirety, to the EPA staff for review and copying at the time of an on-site inspection.

10.2 OWNER 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.

Name:_____ Title:_____

Signature:_____ Date:_____

10.3 OPERATOR 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.

Name:_____ Title:_____

Signature:_____ Date:_____

APPENDICES

Appendix A

General Location Map

Appendix B

Site Plans

Appendix C

Construction General Permit

Appendix D

NOI and Acknowledgement Letter from EPA

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Appendix E

Inspection Reports

Inspections under this SWPPP shall be conducted in accordance with each installed BMPs recommended maintenance requirements. This inspection frequency may be reduced to at least once every month if: a) the entire site is temporarily stabilized, b) runoff is unlikely due to winter conditions (e.g. site is covered with snow, ice, or the ground is frozen), or c) construction is occurring during seasonal arid periods in arid areas and semi-arid areas. If an inspection report is filed according to this modified schedule it shall be noted at the end of the report under the "NOTES" section.

The following five pages should be copied and completed for each inspection. All inspection forms should be compiled in a binder to prove compliance with this SWPPP.

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Stormwater Pollution Prevention Plan: Inspection Checklist

General Information			
Project Name			
NPDES Tracking No.		**Location**	
Date of Inspection		**Start/End Time**	
Inspector's Name(s)			
Inspector's Title(s)			
Inspector's Contact Information			
Inspector's Qualifications			
Describe present phase of construction			
Type of Inspection: ❑ Regular ❑ Pre-storm event ❑ During storm event ❑ Post-storm event			
Weather Information			
Has there been a storm event since the last inspection? ❑Yes ❑No **If yes, provide:** Storm Start Date & Time: Storm Duration (hrs): Approx. Amount of Precipitation (in):			
Weather at time of this inspection? ❑ Clear ❑Cloudy ❑ Rain ❑ Sleet ❑ Fog ❑ Snowing ❑ High Winds ❑ Other: Temperature:			
Have any discharges occurred since the last inspection? ❑Yes ❑No **If yes, describe:**			
Are there any discharges at the time of inspection? ❑Yes ❑No **If yes, describe:**			

Site-specific BMPs

- *Number the structural and non-structural BMPs identified in your SWPPP on your site map and list them below (add as many BMPs as necessary). Carry a copy of the numbered site map with you during your inspections. This list will ensure that you are inspecting all required BMPs at your site.*
- *Describe corrective actions initiated, date completed, and note the person that completed the work in the Corrective Action Log.*

BMP	BMP Installed?	BMP Maintenance Required?	Corrective Action Needed and Notes
	❑Yes ❑No	❑Yes ❑No	
	❑Yes ❑No	❑Yes ❑No	
	❑Yes ❑No	❑Yes ❑No	
	❑Yes ❑No	❑Yes ❑No	
	❑Yes ❑No	❑Yes ❑No	
	❑Yes ❑No	❑Yes ❑No	
	❑Yes ❑No	❑Yes ❑No	
	❑Yes ❑No	❑Yes ❑No	
	❑Yes ❑No	❑Yes ❑No	
	❑Yes ❑No	❑Yes ❑No	
	❑Yes ❑No	❑Yes ❑No	
	❑Yes ❑No	❑Yes ❑No	
	❑Yes ❑No	❑Yes ❑No	
	❑Yes ❑No	❑Yes ❑No	
	❑Yes ❑No	❑Yes ❑No	
	❑Yes ❑No	❑Yes ❑No	
	❑Yes ❑No	❑Yes ❑No	
	❑Yes ❑No	❑Yes ❑No	
	❑Yes ❑No	❑Yes ❑No	

Overall Site Issues

Below are some general site issues that should be assessed during inspections. Customize this list as needed for conditions at your site.

BMP/activity	Implemented?	Maintenance Required?	Corrective Action Needed and Notes
Are all slopes and disturbed areas not actively being worked properly stabilized?	❑Yes ❑No	❑Yes ❑No	
Are natural resource areas (e.g., streams, wetlands, mature trees, etc.) protected with barriers or similar BMPs?	❑Yes ❑No	❑Yes ❑No	
Are perimeter controls and sediment barriers adequately installed (keyed into substrate) and maintained?	❑Yes ❑No	❑Yes ❑No	
Are discharge points and receiving waters free of any sediment deposits?	❑Yes ❑No	❑Yes ❑No	
Are storm drain inlets properly protected?	❑Yes ❑No	❑Yes ❑No	
Is the construction exit preventing sediment from being tracked into the street?	❑Yes ❑No	❑Yes ❑No	
Is trash/litter from work areas collected and placed in covered dumpsters?	❑Yes ❑No	❑Yes ❑No	
Are washout facilities (e.g., paint, stucco, concrete) available, clearly marked, and maintained?	❑Yes ❑No	❑Yes ❑No	
Are vehicle and equipment fueling, cleaning, and maintenance areas free of spills, leaks, or any other deleterious material?	❑Yes ❑No	❑Yes ❑No	

BMP/activity	Implemented?	Maintenance Required?	Corrective Action Needed and Notes
Are materials that are potential stormwater contaminants stored inside or under cover?	❑Yes ❑No	❑Yes ❑No	
Are non-stormwater discharges (e.g., wash water, dewatering) properly controlled?	❑Yes ❑No	❑Yes ❑No	
(Other)	❑Yes ❑No	❑Yes ❑No	

Non-Compliance

Describe any incidents of non-compliance not described above:

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 and title:

_____

Signature:_____

Date:_____

Appendix F

Corrective Action Log

Corrective Action Log

Use this form to note the date and activity for accurate record keeping (make additional copies as necessary). Examples include the restaking or reinforcement of the erosion control barrier, site watering to prevent dust erosion, street sweeping, equipment and machinery repair, etc.

Date	Activity Description	Additional Action Items

Appendix G

SWPPP Amendment Log

The SWPPP, including the site plans, shall be amended whenever there is a change in design, construction, operation, or maintenance at the construction site that has or could have a significant effect on the discharge of pollutants to the waters of the United States that has not been previously addressed in the SWPPP.

The SWPPP shall be amended if during inspections or investigations by site staff, or by local, state, tribal or federal officials, it is determined that the SWPPP is ineffective in eliminating or significantly minimizing pollutants in storm water discharges from the construction site.

Based on the results of an inspection, the SWPPP shall be modified as necessary to include additional or modified BMPs designed to correct problems identified. Revisions to the SWPPP shall be completed within seven (7) calendar days following the inspection. Implementation of these additional or modified BMPs shall be accomplished as described in Subpart 3.6B of the Construction General Permit (located in Appendix C).

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SWPPP Amendment Log

Amendment No.	Description of the Amendment	Date of Amendment	Amendment Prepared by (Name(s) and Title)

Appendix H

Subcontractor Certifications/Agreements

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Sample Subcontractor Certifications/Agreements

SUBCONTRACTOR CERTIFICATION
STORMWATER POLLUTION PREVENTION PLAN

Project Number: _____

Project Title: _____

Operator(s): _____

As a subcontractor, you are required to comply with the Stormwater Pollution Prevention Plan (SWPPP) for any work that you perform on-site. Any person or group who violates any condition of the SWPPP may be subject to substantial penalties or loss of contract. You are encouraged to advise each of your employees working on this project of the requirements of the SWPPP. A copy of the SWPPP is available for your review at the office trailer.

Each subcontractor engaged in activities at the construction site that could impact stormwater must be identified and sign the following certification statement:

I certify under the penalty of law that I have read and understand the terms and conditions of the SWPPP for the above designated project and agree to follow the practices described in the SWPPP.

This certification is hereby signed in reference to the above named project:

Company: _____

Address: _____

Telephone Number: _____

Type of construction service to be provided: _____

_____

_____

Signature: _____

Title: _____

Date: _____

Appendix I

Grading and Stabilization Activities Log

Site Plans in Appendix B should be annotated to indicate areas where final stabilization has been accomplished and no further construction-phase permit requirements apply.

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The following records are to be kept by each Site Operator throughout the construction period and maintained in the SWPPP. Insert additional documentation for record keeping as necessary.

Grading and Stabilization Activities Log

Date	Location on Property	Description

Appendix J

Training Log

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Training Log

Date	Training Topic	Attendee	Signature of Training Coordinator

Appendix K

Delegation of Authority

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Sample Delegation of Authority Form

Delegation of Authority

I, _____ (name), hereby designate the person or specifically described position below to be a duly authorized representative for the purpose of overseeing compliance with environmental requirements, including the Construction General Permit, at the _____ construction site. The designee is authorized to sign any reports, stormwater pollution prevention plans and all other documents required by the permit.

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

By signing this authorization, I confirm that I meet the requirements to make such a designation as set forth in Appendix I of EPA's Construction General Permit (CGP), and that the designee above meets the definition of a "duly authorized representative" as set forth in Appendix I.

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Name: _____

Company: _____

Title: _____

Signature: _____

Date: _____

Appendix L

Natural Buffer Equivalency Calculations

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Section 5.0
Wetland Boundary Documentation

Applied Ecological Sciences Site Evaluation & Wetland Delineation
DEP Transect Forms
Applied Ecological Sciences Stream Documentation
Applied Ecological Services Stream Documentation with Photos

AES

Site Evaluation & Wetland Delineation

August 14, 2015

1480 Main Street
Millis, Massachusetts 02054

Prepared for

Clean Energy Collective
146 West Boylston Drive
Worcester, MA 01606

Prepared by

Applied Ecological Sciences

P.O. Box 184
Norfolk, MA 02056
(508) 528-2866 phone/fax
(508) 740-0438 cell
email: rwaldron@earthlink.net

AES Applied Ecological Sciences
P.O. Box 184
Norfolk, MA 02056

August 14, 2015

Electronic Mail

Ms. Colleen DeBenedetto
Clean Energy Collective
146 West Boylston Drive
Worcester, MA 01606

RE: Site Evaluation and Wetland Delineation
1480 Main Street
Millis, Massachusetts 02054

Dear Ms. DeBenedetto,

In response to your request, Applied Ecological Sciences (AES) conducted site evaluations at the above referenced property during June and July 2015. Wetland resource areas protectable under the *Massachusetts Wetlands Protection Act* (M.G.L. c. 131, s. 40), the implementing *Regulations* (310 CMR 10.00), and the Town of Millis *Wetlands Protection Bylaw* (Article XIX) were identified and characterized. Additionally, the upland/wetland boundary to Bordering Vegetated Wetland (BVW) and Top of Inland Bank (TOB) to a mapped perennial stream was delineated in the field with red and blue flagging tape respectively. The enclosed *Site Evaluation and Wetland Delineation Report* details the results of the field evaluation.

I am pleased to be of assistance in this matter. Should you have any questions or require additional information please do not hesitate to contact me at (508) 528-2866.

Sincerely,

Russell E. Waldron

Russell E. Waldron

(508) 528-2866 phone/fax
(508) 740-0438 cell
email: rwaldron@earthlink.net

Table of Contents

Site Evaluation & Wetland Delineation
1480 Main Street
Millis, MA 02054

Introduction

Site evaluations were conducted at the above referenced property during June and July 2015. The upland/wetland boundary to Bordering Vegetated Wetland (BVW) and top of Inland Bank to a mapped perennial stream was delineated in the field. The following narrative provides a general site description, wetland resource delineation methodology, and wetland resource descriptions.

General Site Description

The subject property encompasses a commercial and forested parcel of land located southerly of Main Street (Route 109) in Millis, Massachusetts. Topography of the site is flat to gently rolling. Two vacant buildings and associated paved parking lot occupy the northern portions of the site. The central and southern portion is forested. Commercial development abuts the property to the east and west. Residential development abuts the site to the south.

Forested Upland

A moderately dense canopy of northern red oak *(Quercus rubra)*, white oak *(Quercus alba)*, eastern white pine *(Pinus strobus)*, red maple *(Acer rubrum)*, shagbark hickory *(Carya ovata)*, and slippery elm *(Ulmus rubra)* dominates vegetation within the forested upland. The shrub layer is comprised of saplings from the canopy, black huckleberry *(Gaylussacia baccata)*, late lowbush blueberry (*Vaccinium angustifolium*), beaked hazelnut *(Corylus cornuta)*, poison ivy *(Toxicodendron radicans)*, highbush blueberry *(Vaccinium corymbosum)*, witch-hazel *(Hamamelis virginiana)*, and common greenbrier *(Smilax rotundifolia)*. Ground cover species include seedlings from the canopy and shrub layers, Canada mayflower *(Maianthemum canadense)*, tree clubmoss *(Lycopodium obscurum)*, starflower *(Trientalis borealis)*, Indian pipe *(Monotropa uniflora)*, partridgeberry *(Mitchella repens)*, Pennsylvania sedge *(Carex pensylvanica)*, early lowbush blueberry *(Vaccinium vacillans)*, bracken fern *(Pteridium aquilinum)*, wild sarsaparilla *(Aralia nudicaulis)*, cinnamon fern *(Osmunda cinnamomea)*, New York fern *(Thelypteris noveboracensis)*, and striped wintergreen *(Chimaphila maculata)*.

Soils

Soils underlying the uplands consist of Urban land (Ur), 0% to 15% slopes; moderately well drained Scituate (StB) fine sandy loam, 3% to 8% slopes; moderately well drained Deerfield (DeA) loamy sand, 0% to 3% slopes; and well-drained Canton (CaC, CbC) fine sandy loam, 8% to 15% slopes. The wetlands are underlain by poorly drained Ridgebury (RgB) fine sandy loam, 2% to 8% slopes; very poorly drained, nearly level Scarboro and Birdsall soils (Sb); and very poorly drained, nearly level Freetown muck (Fm) (USDA SCS 1989, Map #27).

Wetland Resource Delineation Methodology

Resource area delineations were performed utilizing definitions and criteria promulgated under the *Massachusetts Wetlands Protection Act* (M.G.L. c. 131, § 40), the implementing *Regulations* (310 CMR 10.55(2), 310 CMR 10.54(2), 310 CMR 10.58(2)), and the Town of Millis *Wetlands Protection Bylaw* (Article XIX). The extent of vegetated wetland was determined through observations of the existing plant communities while verifying wetland hydrology through interpretation of soil characteristics and other indications of surface hydrology. Soils were analyzed for texture and color to determine soil morphology in accordance with the most up to date standards including *Field Indicators for Identifying Hydric Soils in New England* (2004). Evidence of surface hydrology was determined through visual inspection of existing site conditions, including typical indicators such as water marks, drift-lines, water-stained leaves, sediment deposits, and drainage patterns.

Wetland Resource Description

Wetland resources associated with the site include Bordering Vegetated Wetland (BVW), Land Under Water Bodies and Waterways (LUW), and Inland Bank, Riverfront Area, and Bordering Land Subject to Flooding (BLSF).

Bordering Vegetated Wetland (BVW)

Bordering Vegetated Wetland (BVW) is defined at 310 CMR 10.55(2)(a) as:

> *Freshwater wetlands that border on creeks, rivers, streams, ponds, and lakes. Bordering Vegetated Wetlands are areas where the soils are saturated and/or inundated such that they support a predominance of wetland indicator plants.*

The boundary of Bordering Vegetated Wetland is defined at 310 CMR 10.55(2)(c) as:

> *The line within which 50% or more of the vegetative community consists of wetland plants and saturated or inundated conditions exist.*

Seasonally saturated to seasonally flooded Forested Swamp (PFO1E/E-C) (Cowardin et al 1979) is located within or adjacent to the western, southern, and eastern portions of the site. Topography within the BVW is generally flat with distinct pit and mound micro-topography, drainage patterns, and leaf staining evident throughout. A moderately dense canopy of red maple, and black gum *(Nyssa sylvatica)*, with slippery elm, northern red oak, and eastern white pine dominates vegetation within the wetland. The shrub layer consists of saplings from the canopy, highbush blueberry, southern arrowwood *(Viburnum dentatum)*, winterberry *(Ilex verticillata)*, silky dogwood *(Cornus amomum)*, riverbank grape *(Vitis riparia)*, swamp rose *(Rosa palustris)*, poison ivy, and swamp azalea *(Rhododendron viscosum)*. Ground cover species include seedlings from the canopy and shrub layers, cinnamon fern, royal fern *(Osmunda regalis)*, sensitive fern *(Onoclea sensibilis)*, New York fern, marsh fern *(Theylpteris thelypteroides)*, skunk cabbage *(Symplocarpus foetidus)*, sphagnum moss

(Sphagnum spp.*)*, jewelweed *(Impatiens capensis)*, Alaskan gold thread *(Coptis trifolia)*, star flower, and various sedges *(Carex* spp.*)* and grasses (Family *Poaceae* spp.)

The upland/wetland boundary to BVW#1 located on or adjacent to the site is delineated in the field with AES flagging stations #1 though #86.

Land Under Water Bodies & Waterways (LUW)

Land Under Water Bodies and Waterways is defined at 310 CMR 10.56(2)(a) as:

> *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 boundary of LUW is the mean annual low water level.*

LUW located on or adjacent to the site is associated with an un-named, mapped perennial stream. The stream flows northerly through the eastern portions of the site. A well-defined channel, approximately four to eight feet wide and one to three feet deep, with a mud/cobble streambed characterizes the stream. No flow was observed within the channel at the time of the site evaluations.

Inland Bank

The statutory Bank is defined at 310 CMR 10.54(2)(a) as:

> *The portion of land surface which normally abuts and confines a water body or waterway. The upper boundary of a Bank is first observable break in the slope or the mean annual flood level, whichever is lower. The lower boundary of a Bank is the mean annual low flow level* (10 CMR 10.54(2)(c)).

Inland Bank located on or adjacent to the site is associated with the aforementioned stream. The banks of the stream are approximately one to three feet high, generally distinct and well defined, and vegetated wetland plant species. Two additional, intermittent channels are located within the abandoned railroad right-of-way in the southern portion of the site.

The Top of Inland Bank to the mapped stream located on or adjacent to the site is delineated in the field with AES flagging stations TOB-1 through TOB-15.

Riverfront Area

Riverfront Area is defined at 310 CMR 10.58(2)(a) 3 as:

The area of land between a river's mean annual high waterline, measured horizontally outward from the river and a parallel line located 200 feet away, except that the parallel line is located:

a. *25 feet away in Boston, Brockton, Cambridge, Chelsea, Everett, Fall River, Lawrence, Malden, New Bedford, Somerville, Springfield, Winthrop, and Worcester.*

b. *25 feet away in densely developed areas, as designated by the Secretary of the Executive Office of Environmental Affairs; and*

c. *100 feet away for new agricultural and aquacultural activities.*

The Mean Annual High Water Line, as defined at 310 CMR 10.58(2)(a) 2, is:

The line that is apparent from visible markings or changes in the character of soils or vegetation due to prolonged presence of water and that distinguishes between predominantly aquatic and predominantly terrestrial land. Field indicators of bankfull conditions shall be used to determine the mean annual high water line. Bankfull indicators include but are not limited to: changes in slope, changes in vegetation, stain lines, top of point bars, changes in bank materials, or bank undercuts.

a. *In most rivers, the first observable break in slope is coincident with bankfull conditions and the mean annual high-water line.*

b. *In some river reaches, the mean annual high-water line is represented by bankfull field indicators that occur above the first observable break in slope, or if no observable break in slope exists, by other bankfull field indicators. These river reaches are characterized by at least two of the following features: low gradient, meanders, oxbows, histosols, a low-flow channel, or poorly defined or nonexistent banks.*

c. *In tidal rivers, the mean annual high-water line is coincident with the mean high water line determined under 310 CMR 10.23.*

Riverfront Area located on the site is associated with the aforementioned mapped perennial stream. As previously described, the banks of the stream are generally distinct and well defined. Therefore, the Riverfront Area is measured from the first observable break in topography i.e. the Top of Inland Bank. The eastern portions of the site are contained within the Riverfront Area.

Note: At the Applicants request, I photo documented the subject stream dry on July 21, 23, 24, and 27, 2015.

Bordering Land Subject to Flooding (BLSF)

Bordering Land Subject to Flooding (BLSF) is defined at 310 CMR 10.57(1)(a) 1. as:

> *An area that floods from a rise in a bordering waterway or water body.*

Based on the *Federal Emergency Management Agency Flood Insurance Rate Map* for the Town of Millis, Massachusetts (Map No. 25021C0142E), the site is located within Zone X (non-shaded), *Areas determined to be outside the 0.2% annual chance floodplain; and Zone A, Areas of 100-year flood; base flood elevations and flood hazard factors not determined.*

NHESP Estimated & Priority Habitat

According to the *Massachusetts Natural Heritage and Endangered Species Program* habitat map (http://maps.massgis.state.ma.us/map_ol/oliver.php), the site is not located within an "Estimated Habitat of Rare Wildlife" or a "Priority Habitat of Rare Species."

Water Supply Protection Areas

According to the Massachusetts Geographic Information Systems (MA GIS) *Water Supply Protection Map*, the site is located within a Zone II ground water recharge area but not within an Interim Wellhead Protection Area (IWPA).

Outstanding Resource Water (ORW)

According to the Massachusetts Geographic Information Systems (MA GIS) *Outstanding Resource Waters Map*, *Map* the site is not located within a contributing watershed to an ORW.

Buffer Zones to BVW & Bank

Buffer Zone, as defined at 310 CMR 10.04, means:

> *The area of land extending 100 feet horizontally outward from the boundary of any area specified in 310 CMR 10.02(1)(a)*

Under Section 1.4 of the Town of Millis *Wetlands Protection Rules and Regulations* Adjacent Upland Resource Area Performance Standards:

1.4.1 To protect the interests and values of the Adjacent Upland Resource Area(s) (or Buffer Zone(s)), construction activities and placement of permanent structures within said Resource Area(s) are regulated.

(1) No structures shall be placed within the inner 50-foot of the Buffer Zone(s) from the edge of a wetland resource area. A strip of continuous, undisturbed vegetative cover shall be maintained. Permanently placed stone granite bounds, 6" x 6" x 4'- 0" long mounted with a single railing of pressure treated timber at 2'- 0" above ground surface, shall be placed to delineate and demarcate this undisturbed protected zone. Mounting details will be provided by the Commission.

If site condition warrants, as determined by the Commission, the Commission may waive the requirement for the demarcation railing with stone granite bounds or allow for an alternative method of delineation and demarcation.

(2) For new lots formed and/or new subdivision roads approved after the effective date of these rules and regulations, it is presumed that alteration to the outer 50- foot of the Buffer Zone area(s) can be avoided. If a project proposes alteration within this buffer, the Applicant must present a vigorous Alternatives Analysis showing that the proposed project avoids alteration to the fullest extent and has minimized impacts. Any permanent structure so placed within this outer 50-foot portion of the Buffer Zone(s) would cover an area no greater than 30 percent of the calculated area of this outer 50-foot of the Buffer Zone(s) that is within the subject individual property. Mitigation for any and all Buffer Zone Alteration is required.

(3) For projects on undeveloped lots in existence prior to the effective date of these rules and regulations, the Applicant must present strong evidence that a reasonable effort has been made to avoid and minimize impacts to the outer 50- foot area of the buffer. Any permanent structure so placed within this outer 50- foot portion of the Buffer Zone(s) would cover an area no greater than 30 percent of the calculated area of this outer 50-foot of the Buffer Zone(s) that is within the subject individual property. Mitigation for any and all Buffer Zone Alteration may be required.

(4) For projects on lots with existing structures, the Applicant must minimize work within the Buffer Zone and present strong evidence that a larger intrusion into the Buffer Zone will still secure the protection of the interests and values of the Bylaw. Addition of any permanent structure within the outer 50-foot of the Buffer Zone, combined with the existing structure(s), would cover an area no greater than 35 percent of the calculated area of this outer 50-foot of the Buffer Zone(s) that is within the subject individual property. Addition of any new permanent structure within the inner 50-foot of the Buffer Zone is not permitted.

(a) Maintenance of existing structure(s) within the Buffer Zone is permitted as long as the activities will not cause degradation or diminish the interests and values of the resources that are protected by the Bylaw.

(b) Prior to commencement of maintenance work to existing structure(s) within the Buffer Zone, the property owner shall contact the Commission to ensure that proposed maintenance activities would not violate the Bylaw.

The northwestern, southern, central, and eastern portions of the site are contained within the Buffer Zone to BVW and/or Bank.

References

Cowardin et al. 1979. *A Classification of Wetlands and Deepwater Habitats of the United States.* United States Department of the Interior, Fish and Wildlife Service. FWS/OBS-79/31.

Federal Emergency Management Agency, FEMA Map Service Center, www.fema.gov.

Massachusetts Division of Fisheries and Wildlife, Natural Heritage and Endangered Species Program, *Natural Heritage and Endangered Species Habitat Map* (http://maps.massgis.state.ma.us/map_ol/oliver.php).

Massachusetts Geographic Information Systems, www.massgis.ma.state.us.

New England Hydric Soils Technical Committee. 2004, 3rd ed., *Field Indicators for Identifying Hydric Soils in New England*, New England Interstate Water Pollution Control Commission. Lowell, MA.

United States Department of Agriculture, Soil Conservation Service. 1989. *Soil Survey of Norfolk and Suffolk Counties, Massachusetts.*

Appendix A

DEP Bordering Vegetated Wetland (310 CMR 10.55)
Delineation Field Data Forms

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

Applicant: **Clean Energy Collective** Prepared by: **Applied Ecological Sciences (AES)** Project location: **1480 Main Street Millis, MA** DEP File #: _____

Check all that apply:

☐ Vegetation alone presumed adequate to delineate BVW boundary: fill out Section I only

☒ Vegetation and other indicators of hydrology used to delineate BVW boundary: fill out Sections I and II

☐ Method other than dominance test used (attach additional information)

T-1 @ AES flag #67

Section I. Vegetation Observation Plot Number: **1 WET** Transect Number: **T-1** Date of Delineation: **6/9/15**

A. Sample Layer and Plant Species (by common/scientific name)	B. Percent Cover (or dominance ratio)	C. Percent Dominance	D. Dominant Plant (yes or no)	E. Wetland Indicator Category
Canopy:				
red maple *(Acer rubrum)*	63.0	86%	yes	FAC*
eastern white pine *(Pinus strobus)*	10.5	14%	no	FACU
TOTAL COVER =	73.5			
Shrubs/Saplings:				
glossy buckthorn *(Rhamnus frangula)*	63.0	75%	yes	FAC*
winterberry *(Ilex verticillata)*	20.5	25%	yes	FACW+*
TOTAL COVER =	83.5			
Herbs:				
skunk cabbage *(Symplocarpus foetidus)*	63.0	28%	yes	OBL*
jewelweed *(Impatiens capensis)*	63.0	28%	yes	FACW*
Canada mayflower *(Maianthemum canadense)*	63.0	28%	yes	FAC-
hay-scented fern *(Dennstaedtia punctilobula)*	38.0	17%	no	UPL
TOTAL COVER =	227.0			

Vegetation conclusion:

Number of dominant wetland indicator plants: **5** Number of dominant non-wetland indicator plants: **1**

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

Section II. Indicators of Hydrology
Hydric Soil Interpretation
T-1, 1 WET

1. Soil Survey

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

title/date: **Soil Survey of Norfolk & Suffolk Counties, MA, 1989.**

map number: **27**

soil type mapped: **Ridgebury (RgB), PD, fsl, 2% to 8% slopes.**

hydric soil inclusions: **Whitman**

Are field observations consistent with soil survey? **Yes**

Remarks: **Roots: common fine-medium to 6"**
Consistence: vfr throughout
Structure: 1/f/sbk throughout
Coarse frag.: common, stony

2. Soil Description

Horizon	Depth	Matrix color		Redoximorphic features
A	**0"-12"**	**10YR 3/2**	**fsl**	
Bw1	**12"+**	**2.5Y 5/2**	**fsl**	**2.5Y 7/1 c/1/f (10%)**

Remarks: **Landscape position: toe slope, 0% - 3%**
Refusal at 12"

3. Other: **Cloudy, dry**

Conclusion: Is soil hydric? Yes
Field Indicators for Identifying Hydric Soils in New England, VCR 3, April 2004. Hydric soil criteria VII.

Other indicators of Hydrology: (check all that apply)

- [ ] Site inundated:
- [ ] Depth to free water in observation hole:
- [X] Depth to soil saturation in observation hole: **Surface**
- [ ] Water marks:
- [ ] Drift lines:
- [ ] Sediment deposits:
- [X] Drainage patterns in BVW: **Distinct**
- [ ] Oxidized rhizospheres:
- [X] Water-stained leaves: **Moderately distinct**
- [ ] Recorded data (stream, lake, or tidal gauge; aerial photo; other)
- [ ] Other:

Vegetation and Hydrology Conclusion:

	yes	no
Number of wetland indicator plants greater than or equal to non-wetland indicator plants?	X	
Wetland hydrology present?		
hydric soil present?	X	
other indicators of hydrology present?	X	
Sample location is in a BVW	X	

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

Applicant: **Clean Energy Collective** Prepared by: **Applied Ecological Sciences (AES)** Project location: **1480 Main Street Millis, MA** DEP File #: _____

Check all that apply:

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

T-1 @ AES flag #67

Section I. Vegetation Observation Plot Number: **2 UPL** Transect Number: **T-1** Date of Delineation: **6/9/15**

A. Sample Layer and Plant Species (by common/scientific name)	B. Percent Cover (or dominance ratio)	C. Percent Dominance	D. Dominant Plant (yes or no)	E. Wetland Indicator Category
Canopy:				
red maple *(Acer rubrum)*	63.0	75%	yes	FAC*
eastern white pine *(Pinus strobus)*	10.5	13%	no	FACU
shagbark hickory *(Carya ovata)*	10.5	13%	no	FAC-
TOTAL COVER =	84.0			
Shrubs/Saplings:				
beaked hazelnut *(Corylus cornuta)*	10.5	100%	yes	FACU-
TOTAL COVER =	10.5			
Herbs:				
hay-scented fern *(Dennstaedtia punctilobula)*	63.0	50%	yes	UPL
Canada mayflower *(Maianthemum canadense)*	63.0	50%	yes	FAC-
TOTAL COVER =	126.0			

Vegetation conclusion:

Number of dominant wetland indicator plants: **3** Number of dominant non-wetland indicator plants: **1**

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

Section II. Indicators of Hydrology
Hydric Soil Interpretation
T-1, 2 UPL

1. Soil Survey

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

title/date: **Soil Survey of Norfolk & Suffolk Counties, MA, 1989.**

map number: **27**

soil type mapped: **Canton (CaB), WD, fsl, 3% to 8% slopes.**

hydric soil inclusions: **None**

Are field observations consistent with soil survey? **No**

Remarks: **Roots: common fine-medium to 12" ; common, very course to 8"**
Consistence: vfr throughout
Structure: 1/f/sbk throughout
Coarse frag.: many, stony

2. Soil Description

Horizon	Depth	Matrix color	Redoximorphic features
A	**0"-12"**	**10YR 3/2 fsl**	
AB	**12"-16"**	**10YR 4/4 fsl**	

Remarks: **Landscape position: toe slope, 0% - 3%**
Refusal at 16"

3. Other: **Cloudy, dry**

Conclusion: Is soil hydric? No
Field Indicators for Identifying Hydric Soils in New England, VCR 3, April 2004.

Other indicators of Hydrology: (check all that apply)

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

Vegetation and Hydrology Conclusion:

	yes	no
Number of wetland indicator plants greater than or equal to non-wetland indicator plants?	☐	☒
Wetland hydrology present?		
hydric soil present?	☐	☒
other indicators of hydrology present?	☐	☒
Sample location is in a BVW	☐	☒

Appendix B

U.S.G.S. Topographic Map

FEMA Map

N.H.E.S.P. Map

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

Applicant: **Clean Energy Collective** Prepared by: **Applied Ecological Sciences (AES)** Project location: **1480 Main Street Millis, MA** DEP File #: _____

Check all that apply:

☐ Vegetation alone presumed adequate to delineate BVW boundary: fill out Section I only

☒ Vegetation and other indicators of hydrology used to delineate BVW boundary: fill out Sections I and II

☐ Method other than dominance test used (attach additional information)

T-2 @ AES flag #38

Section I. Vegetation Observation Plot Number: **1 UPL** Transect Number: **T-2** Date of Delineation: **6/9/15**

A. Sample Layer and Plant Species (by common/scientific name)	B. Percent Cover (or dominance ratio)	C. Percent Dominance	D. Dominant Plant (yes or no)	E. Wetland Indicator Category
Canopy:				
red maple *(Acer rubrum)*	20.5	16%	no	FAC*
eastern white pine *(Pinus strobus)*	20.5	16%	no	FACU
northern red oak *(Quercus rubra)*	63.0	51%	yes	FAC-
slippery elm *(Ulmus rubra)*	20.5	16%	no	FACW-*
TOTAL COVER =	124.5			
Shrubs/Saplings:				
TOTAL COVER =	0.0			
Herbs:				
cinnamon fern *(Osmunda cinamomea)*	63.0	34%	yes	FACW*
New York Fern *(Thelypteris noveboracensis)*	38.0	21%	yes	FAC*
Canada mayflower *(Maianthemum canadense)*	63.0	34%	yes	FAC-
sessile-leaf bellwort *(Uvularia sessilifolia)*	20.5	11%	no	FACU-
TOTAL COVER =	184.5			

Vegetation conclusion:

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

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

Section II. Indicators of Hydrology
Hydric Soil Interpretation
T-2, 1 UPL

1. Soil Survey

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

title/date: **Soil Survey of Norfolk & Suffolk Counties, MA, 1989.**

map number: **27**

soil type mapped: **Canton (CbC), WD, fsl, 8% - 15% slopes.**

hydric soil inclusions: **None**

Are field observations consistent with soil survey? **No**

Remarks: **Roots: common fine-medium to 14" "**
Consistence: vfr throughout
Structure: 1/f/sbk throughout
Coarse frag.:

2. Soil Description

Horizon	Depth	Matrix color		Redoximorphic features
A	**0"-12"**	**10YR 3/1**	**sl**	
AB	**12"-16"**	**10YR 4/4**	**sl**	
Bw1	**16"-20"+**	**10YR 5/6**	**sl**	

Remarks: **Landscape position: foot slope, 3% - 8%**

3. Other: **Cloudy, dry**

Conclusion: Is soil hydric? No
Field Indicators for Identifying Hydric Soils in New England, VCR 3, April 2004.

Other indicators of Hydrology: (check all that apply)

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

Vegetation and Hydrology Conclusion:

	yes	no
Number of wetland indicator plants greater than or equal to non-wetland indicator plants?	X	
Wetland hydrology present?		
hydric soil present?		X
other indicators of hydrology present?		X
Sample location is in a BVW		X

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

Applicant: **Clean Energy Collective** Prepared by: **Applied Ecological Sciences (AES)** Project location: **1480 Main Street Millis, MA** DEP File #: _____

Check all that apply:

☐ Vegetation alone presumed adequate to delineate BVW boundary: fill out Section I only

☒ Vegetation and other indicators of hydrology used to delineate BVW boundary: fill out Sections I and II

☐ Method other than dominance test used (attach additional information)

T-2 @ AES flag #38

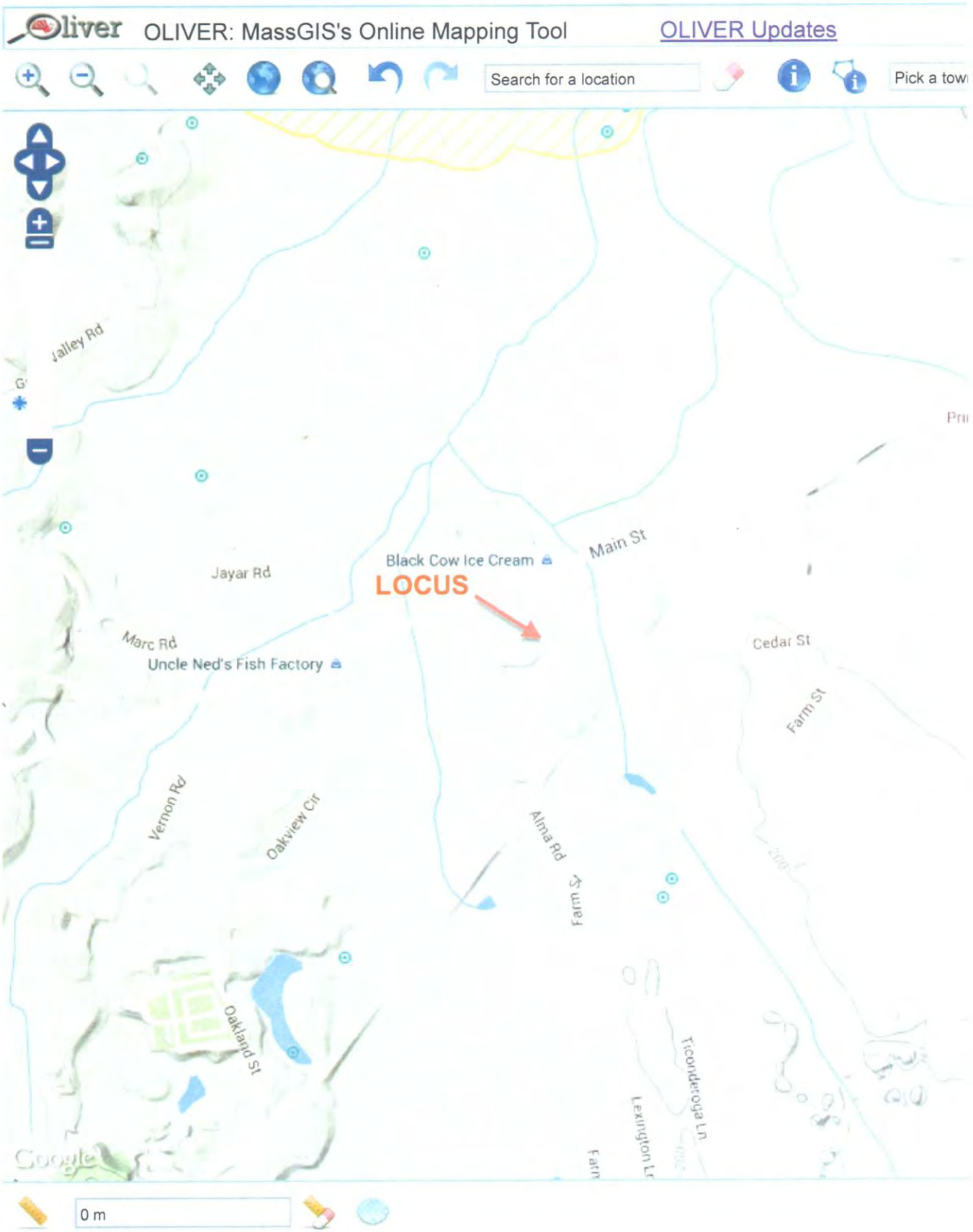
Section I. Vegetation Observation Plot Number: **2 WET** Transect Number: **T-2** Date of Delineation: **6/9/15**

A. Sample Layer and Plant Species (by common/scientific name)	B. Percent Cover (or dominance ratio)	C. Percent Dominance	D. Dominant Plant (yes or no)	E. Wetland Indicator Category
Canopy:				
red maple *(Acer rubrum)*	63.0	44%	yes	FAC*
eastern white pine *(Pinus strobus)*	38.0	27%	yes	FACU
northern red oak *(Quercus rubra)*	20.5	14%	no	FAC-
black gum *(Nyssa sylvatica)*	20.5	14%	no	FAC*
TOTAL COVER =	142.0			
Shrubs/Saplings:				
black gum *(Nyssa sylvatica)*	38.0	55%	yes	FAC*
sweet pepperbush *(Clethra alnifolia)*	20.5	30%	yes	FAC*
eastern white pine *(Pinus strobus)*	10.5	15%	no	FACU
TOTAL COVER =	69.0			
Herbs:				
cinnamon fern *(Osmunda cinamomea)*	63.0	62%	yes	FACW*
skunk cabbage *(Symplocarpus foetidus)*	38.0	38%	yes	OBL*
TOTAL COVER =	101.0			

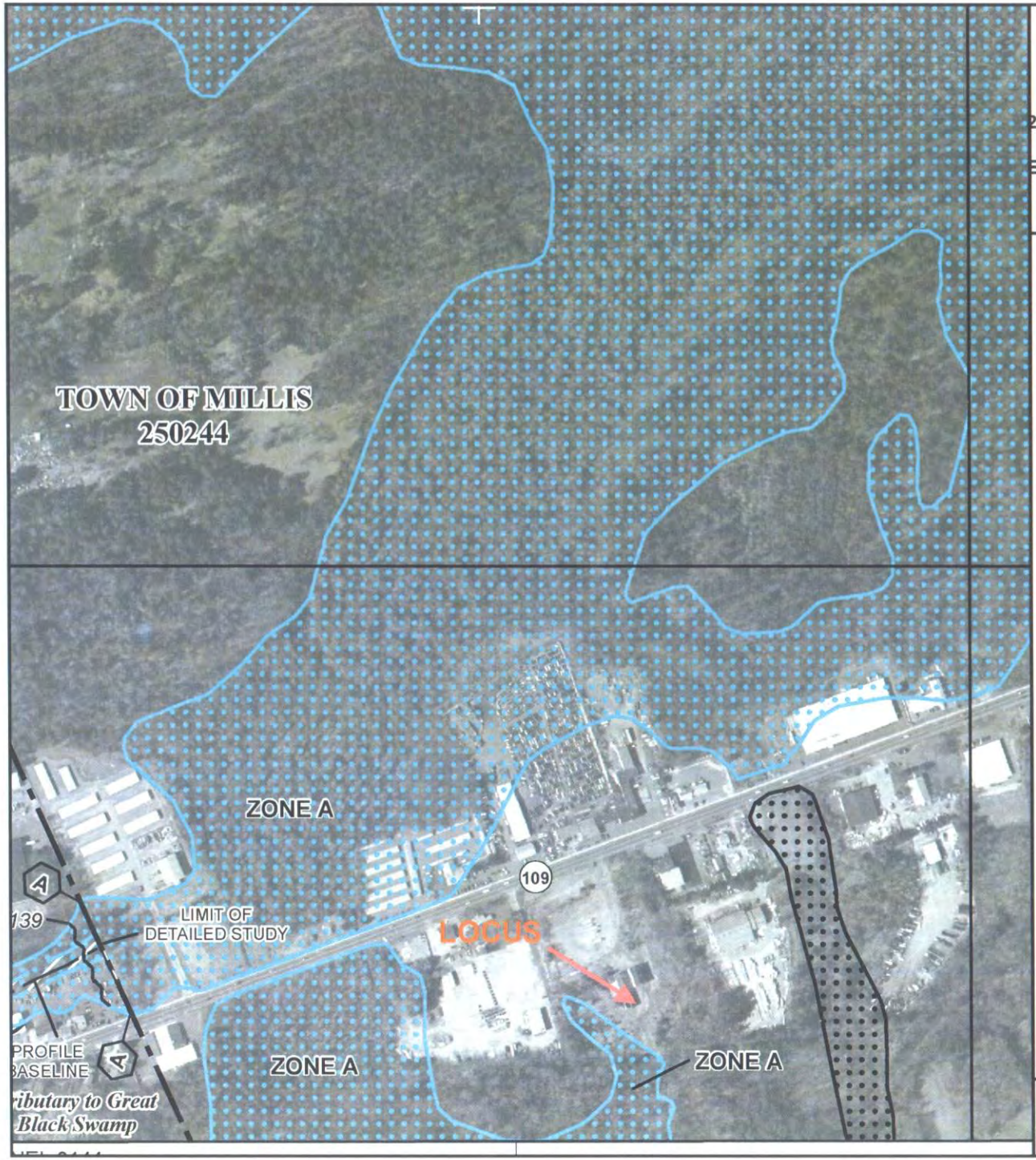
Vegetation conclusion:

Number of dominant wetland indicator plants: **5** Number of dominant non-wetland indicator plants: **1**

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


Oliver
OLIVER: MassGIS's Online Mapping Tool
OLIVER Updates
Search for a location
Pick a tow
Valley Rd
Jayar Rd
Black Cow Ice Cream
LOCUS
Main St
Marc Rd
Uncle Ned's Fish Factory
Cedar St
Farm St
Vernon Rd
Oakview Cir
Alma Rd
Farm St
Oakland St
Ticonderoga Ln
Lexington Ln
Google
0 m


LOCUS
CAUSEWAY
STREET
Bogastow
Swamp
Great Black
ISLAND
UNION
ST
M I L L I S
Clicquot
Richardsons Pond
Gravel Pit
CURVE
BM 49.6
Townhall
Prospect Hill Cem
MAIN
PO
Brown Sch
Town Park
High Sch
FOREST
PLAIN
SPRING
109
115
61.1
Water Tank
FARM
ACORN
SPENCER
PLEASANT
57.5
54
GRADE
OAKLAND
48.5
BM 50.7
Sewage Disposal
Gravel Pit
62.5
McCarthy Pond
BALTIMORE
NORFOLK
RD
42.5
46.5
47.0



MAP SCALE 1" = 500'

250 0 500 1000

FEET

METERS

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0142E

FIRM

FLOOD INSURANCE RATE MAP

NORFOLK COUNTY, MASSACHUSETTS (ALL JURISDICTIONS)

PANEL 142 OF 430

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
MEDWAY, TOWN OF	250243	0142	E
MILLIS, TOWN OF	250244	0142	E

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

MAP NUMBER
25021C0142E

EFFECTIVE DATE
JULY 17, 2012

Federal Emergency Management Agency

Section II. Indicators of Hydrology
Hydric Soil Interpretation
T-2, 2 WET

1. Soil Survey

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

title/date: **Soil Survey of Norfolk & Suffolk Counties, MA, 1989.**

map number: **27**

soil type mapped: **Scarboro & Birdsall (Sb), VPD, nearly level..**

hydric soil inclusions: **Raynham, Swansea, Walpole**

Are field observations consistent with soil survey? **No**

Remarks: **Roots: common fine-medium to 8"**
Consistence: Oa = sapric; Bg = fr; Cg = vfr
Structure: Oa = sapric; Bg = 1/m/sbk; Cg = 1/f/gr
Coarse frag.:

2. Soil Description

Horizon	Depth	Matrix color		Redoximorphic features
Oa	**0"-10"**	**10YR 2/1**		
Bg	**10"-20"**	**10YR 5/1**	**sl**	
Cg	**20"+**	**10YR 4/1**	**ls**	

Remarks: **Landscape position: toe slope, 0% - 3%**

3. Other: **Cloudy, dry**

Conclusion: Is soil hydric? Yes
Field Indicators for Identifying Hydric Soils in New England, VCR 3, April 2004. Hydric soil indicator IV.

Other indicators of Hydrology: (check all that apply)

- [ ] Site inundated:
- [ ] Depth to free water in observation hole:
- [X] Depth to soil saturation in observation hole: **Surface**
- [ ] Water marks:
- [ ] Drift lines:
- [ ] Sediment deposits:
- [X] Drainage patterns in BVW: **Distinct**
- [ ] Oxidized rhizospheres:
- [X] Water-stained leaves: **Faint**
- [ ] Recorded data (stream, lake, or tidal gauge; aerial photo; other)
- [ ] Other:

Vegetation and Hydrology Conclusion:

	yes	no
Number of wetland indicator plants greater than or equal to non-wetland indicator plants?	X	
Wetland hydrology present?		
hydric soil present?	X	
other indicators of hydrology present?	X	
Sample location is in a BVW	X	

AES Applied Ecological Sciences
P.O. Box 184
Norfolk, MA 02056

July 27, 2015

Electronic Mail

Ms. Colleen DeBenedetto
Clean Energy Collective
146 West Boylston Drive
Worcester, MA 01606

RE: Stream Documentation
1480 Main Street
Millis, Massachusetts 02054

Dear Ms. Benedetto,

In response to your request, Applied Ecological Sciences (AES) conducted a stream evaluation at the above referenced property on July 21, 22, 23, and 27, 2015. Specifically, an onsite, un-named, mapped perennial stream was photo documented dry four separate times on the above referenced dates.

Under 310 CMR 10.58(2)(a) 1. d.:

> *Notwithstanding 310 CMR 10.58(2)(a)1.a. through c., the issuing authority shall find that any stream is intermittent based upon a documented field observation that the stream is not flowing. A documented field observation shall be made by a competent source and shall be based upon an observation made at least once per day, over four days in any consecutive 12 month period, during a non-drought period on a stream not significantly affected by draw-down from withdrawals of water supply wells, direct withdrawals, impoundment's, or other man-made flow reductions or diversions. Field observations made after December 20, 2002 shall be documented by field notes and by dated photographs or video. Field observations made prior to December 20, 2002 shall be documented by credible evidence. All field observations shall be submitted to the issuing authority with a statement signed under the penalties of perjury attesting to the authenticity and veracity of the field notes, photographs or video and other credible evidence. Department staff, conservation commissioners, and conservation commission staff are competent sources; issuing authorities may consider evidence from other sources that are determined to be competent.*

(508) 528-2866 phone/fax
(508) 740-0438 cell
email: rwaldron@earthlink.net

Under 310 CMR 10.58(2)(a) 1. f:

> *Rivers include perennial streams that cease to flow during periods of extended drought. Periods of extended drought for purposes of 310 CMR 10.00 shall be those periods, in those specifically identified geographic locations, determined to be at the "Advisory" or more severe drought level by the Massachusetts Drought Management Task Force, as established by the Executive Office of Environmental Affairs and the Massachusetts Emergency Management Agency in 2001, in accordance with the Massachusetts Drought Management Plan (MDMP).*

According to the Massachusetts Department of Conservation and Recreation Drought Management Task Force *Drought Status Report* for July 2015 (Attached), eastern Massachusetts was not experiencing drought conditions prior to the stream documentation period. Based on a review of available maps, the stream does not appear to be dammed, diverted, or affected by withdrawals from municipal drinking water wells.

Results

I visited the site four times on the aforementioned dates. During each visit I traversed the stream on foot and photographed the channel proximate to AES flagging stations TOB-2, TOB-5, TOB-7, and TOB-14. The direction of view and observed stream conditions were noted at each photograph location. There was no flowing or standing water within the stream channel at the time of the evaluation.

I am pleased to be of assistance in this matter. Should you have any questions or require additional information please do not hesitate to contact me at (508) 528-2866.

Sincerely,

Russell E. Waldron

Russell E. Waldron

AFFIDAVIT OF SERVICE

Under 310 CMR 10.58(2)(a) 1. d.

1480 Main Street
Millis, MA

(To be submitted to the Town of Millis Conservation Commission)

I, Russell E. Waldron, hereby certify under the pains and penalties of perjury that the enclosed photographs and field notes were recorded by me on the dates specified and that they are representative of the field conditions at the time. Additional supporting documentation was compiled from the MA Dept. of Conservation and Recreation (DCR) www.mass.gov/dcr/waterSupply/rainfall/drought.htm

Signed: *Russell E. Waldron*

Dated: July 27, 2015

Stream Photo Log
1480 Main Street
Millis, Massachusetts

July 21, 2015

Photo File No.	Stream Flag No.	Direction of View	Stream Condition
_DSC10402	TOB-14	North	Dry
_DSC10404	"	South	"
_DSC10406	TOB-2	North	"
_DSC10407	"	South	"

July 23, 2015

Photo File No.	Stream Flag No.	Direction of View	Stream Condition
_DSC10412	TOB-4	North	Dry
_DSC10413	TOB-6	"	"
_DSC10416	TOB-2	"	"

July 24, 2015

Photo File No.	Stream Flag No.	Direction of View	Stream Condition
_DSC10419	TOB-14	North	Dry
_DSC10423	TOB-7	South	"
_DSC10426	TOB-2	"	"

July 27, 2015

Photo File No.	Stream Flag No.	Direction of View	Stream Condition
_DSC10428	TOB-14	North	Dry
_DSC10429	TOB-7	South	"
_DSC10430	TOB-5	North	"

AES Applied Ecological Sciences
P.O. Box 184
Norfolk, MA 02056

July 27, 2015

Electronic Mail

Ms. Colleen DeBenedetto
Clean Energy Collective
146 West Boylston Drive
Worcester, MA 01606

RE: Stream Documentation
1480 Main Street
Millis, Massachusetts 02054

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Sincerely,

Russell E. Waldron

Russell E. Waldron

July 21, 2015

July 22, 2015

July 23, 2015

July 27, 2015

Section 6.0
Plans

Entitled Solar Array in Millis, Massachusetts Permit Plan Set
Prepared by Beals and Thomas, Inc.
In 5 Sheets
Dated August 27, 2015

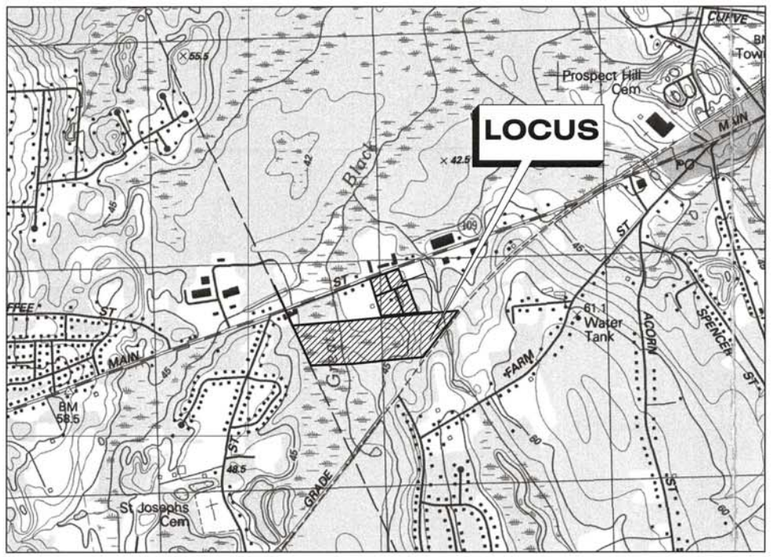
SOLAR ARRAY
IN
MILLIS, MASSACHUSETTS
(Norfolk County)

APPLICANT

Clean Energy Collective
146 West Boylston Drive, 3rd Floor
Worcester, Massachusetts 01606

CIVIL ENGINEER/SURVEYOR AND LANDSCAPE ARCHITECT

Beals and Thomas, Inc.
Reservoir Corporate Center
144 Turnpike Road
Southborough, Massachusetts 01772



Locus Map
Scale: 1" = 1000'

NORTH

SHEET INDEX

Permit Plan Set - August 27, 2015

Job No.: 2588.00
Plan No.: 258800P006A-001
Sheet 1 of 7

NOTES

1) UNDERGROUND UTILITIES ARE NOT SHOWN.
2) ASSESSORS PARCEL INFORMATION TAKEN FROM MASSGIS AND IS APPROXIMATE.
3) TOPOGRAPHIC LIDAR INFORMATION TAKEN FROM NOAA DIGITAL COAST DATA VIEWER. DATA SET ENTITLED "2010 FEMA LIDAR: MA & RI REGION 1"
TESTED 16.6 CM FUNDAMENTAL VERTICAL ACCURACY AT 95 PERCENT CONFIDENCE LEVEL IN OPEN TERRAIN USING RMSEz X 1.96.
TESTED 18.6 CM CONSOLIDATED VERTICAL ACCURACY AT 95 PERCENT CONFIDENCE LEVEL IN OPEN TERRAIN (PAVEMENT, OPEN DIRT, SHORT GRASS), HIGH GRASS AND CROPS, BRUSH AND LOW TREES, FOREST, URBAN.
4) ALL ELEVATIONS REFER TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88).
5) NAD83 HORIZONTAL COORDINATE SYSTEM ESTABLISHED BY GPS-VRS METHODS, NAD_83(2011)(EPOCH2010).
6) THIS PLAN IS NOT INTENDED TO BE USED FOR PROPERTY LINE PURPOSES.
7) EASEMENTS OF RECORD ARE SHOWN IN SO FAR AS DISCLOSED BY THE CURRENT DEED.
8) THE POSITIONAL ACCURACY OF THE DATA AND PHYSICAL IMPROVEMENTS ON THIS PLAN MAY BE APPROXIMATE. ANY USE OF ELECTRONIC DATA CONTAINED IN AUTOCAD VERSIONS OF THIS PLAN TO GENERATE COORDINATES OR DIMENSIONS NOT SHOWN ON THE PLAN IS NOT AUTHORIZED.
9) WETLAND RESOURCE AREAS DELINEATED BY APPLIED ECOLOGICAL SCIENCES.
10) WETLAND RESOURCE AREA FLAGS LOCATED BY TOTAL STATION METHODS BY BEALS AND THOMAS, INC. BETWEEN JUNE 4, 2015 AND AUGUST 14, 2015.
11) A PORTION OF THE PREMISES IS LOCATED IN 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.) AS SHOWN ON "FLOOD INSURANCE RATE MAP, NORFOLK COUNTY, MASSACHUSETTS (ALL JURISDICTIONS) PANEL 144 OF 430", MAP NUMBER 25021C0144E, EFFECTIVE DATE JULY 17, 2012.
12) A PORTION OF THE PREMISES IS LOCATED IN ZONE A (SPECIAL FLOOD HAZARD AREAS SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD; NO BASE FLOOD ELEVATIONS DETERMINED), AS SHOWN ON "FLOOD INSURANCE RATE MAP, NORFOLK COUNTY, MASSACHUSETTS (ALL JURISDICTIONS) PANEL 142 OF 430", MAP NUMBER 25012C0142E, EFFECTIVE DATE JULY 17, 2015.

LEGEND

- MINOR CONTOUR
- MAJOR CONTOUR
- LAYOUT
- MILLIS/MEDWAY ASSESSORS MAP-LOT
- OVERHEAD WIRE
- UTILITY POLE
- GUY WIRE
- BUILDING
- BOUNDARY OF BORDERING VEGETATED WETLAND
- BANK/BANK FLAG

PREPARED FOR:

Clean Energy COLLECTIVE

146 WEST BOYLSTON DRIVE
3RD FLOOR
WORCESTER, MA
01606

RECORD OWNER:

AH CEDAR LLC
ASSESSORS PARCELS
21-28 & 21-9
LC CERT 175995
ASSESSORS PARCEL 32-2
LC CERT 78155

HARKEY REALTY TRUST
ASSESSORS PARCELS
21-29 & 21-30
LC CERT 104209

5			
4			
3			
2			
1			
0	08/27/2015	INITIAL ISSUE	
ISSUE DATE		DESCRIPTION	
JJ/JBC	ICW	ICW	ICW
FLD	CALC	DWN	CHK'D

IAN C. WISURI No. 47403 PROFESSIONAL LAND SURVEYOR COMMONWEALTH OF MASSACHUSETTS

8/27/2015

LIMITED BOUNDARY AND TOPOGRAPHIC PLAN

SOLAR ARRAY
MILLIS, MA
(NORFOLK COUNTY)

PREPARED BY:

BEALS + THOMAS
Civil Engineers + Landscape Architects + Land Surveyors + Planners + Environmental Specialists

BEALS AND THOMAS, INC.
Reservoir Corporate Center
144 Turnpike Road
Southborough, Massachusetts 01772-2104
T 508.366.0560 | www.bealsandthomas.com

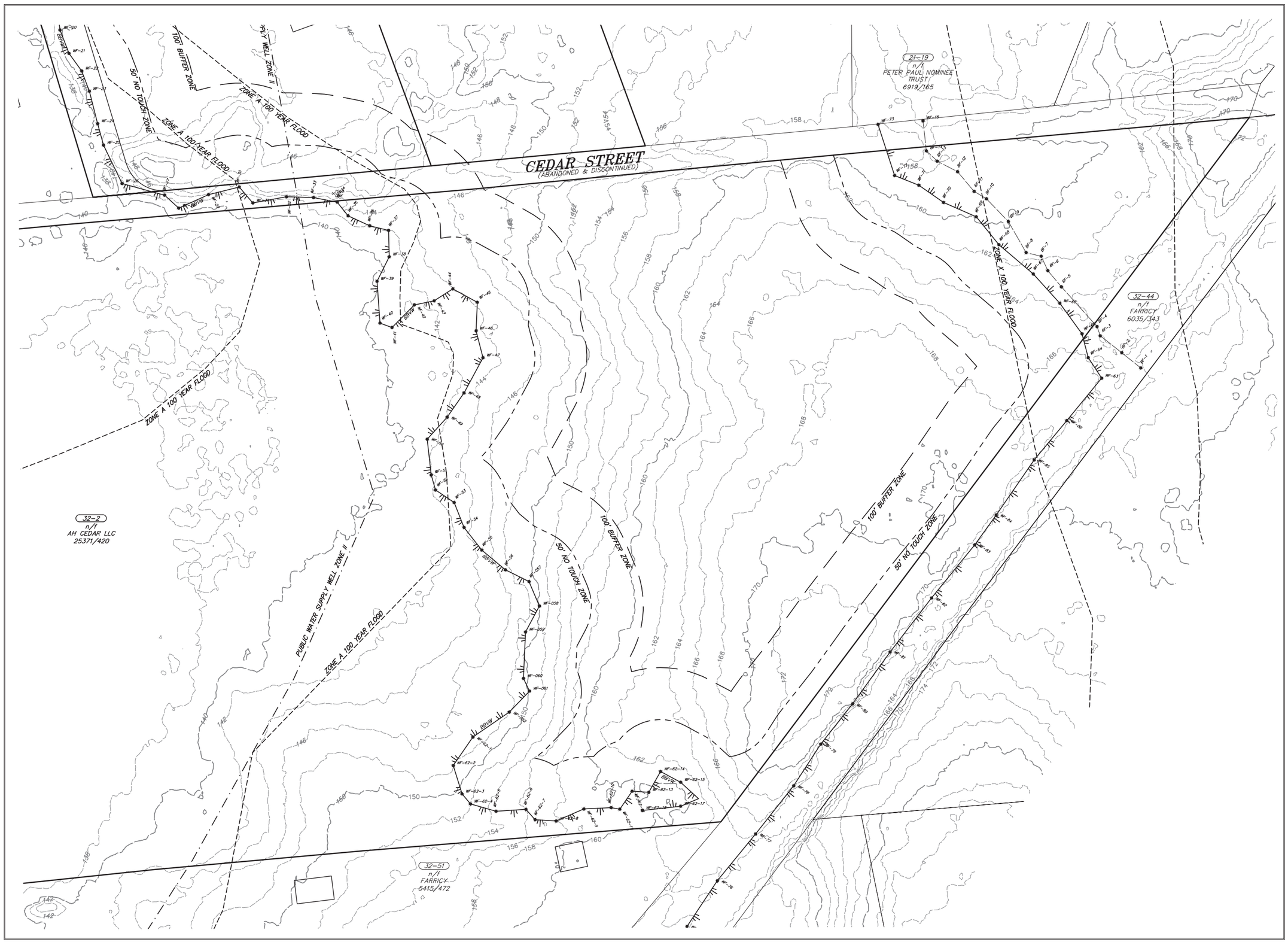
DATE: AUGUST 27, 2015
SCALE: 1"=40'
METERS: 0 5 10 25
FEET: 0 20 40 80 120

B+T JOB NO. 2588.00

B+T PLAN NO. 2588P007A-001

SHEET 1 OF 2

TP-1



PREPARED FOR:

Clean Energy COLLECTIVE

146 WEST BOYLSTON DRIVE
3RD FLOOR
WORCESTER, MA
01606

RECORD OWNER:

AH CEDAR LLC
ASSESSORS PARCELS
21-28 & 21-9
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LC CERT 78155

HARKEY REALTY TRUST
ASSESSORS PARCELS
21-29 & 21-30
LC CERT 104209

5		
4		
3		
2		
1		
0	08/27/2015	INITIAL ISSUE
ISSUE DATE		DESCRIPTION
JJ/JBC	ICW	ICW	ICW
FLD	CALC	DWN	CHK'D

COMMONWEALTH OF MASSACHUSETTS
IAN C WISURI
No. 47403
PROFESSIONAL LAND SURVEYOR

8/27/2015

LIMITED BOUNDARY AND TOPOGRAPHIC PLAN

SOLAR ARRAY
MILLIS, MA
(NORFOLK COUNTY)

PREPARED BY:

BEALS+THOMAS
Civil Engineers + Landscape Architects + Land Surveyors + Planners + Environmental Specialists

BEALS AND THOMAS, INC.
Reservoir Corporate Center
144 Turnpike Road
Southborough, Massachusetts 01772-2104
T 508.366.0560 | www.bealsandthomas.com

DATE: AUGUST 27, 2015

SCALE: 1"=40'

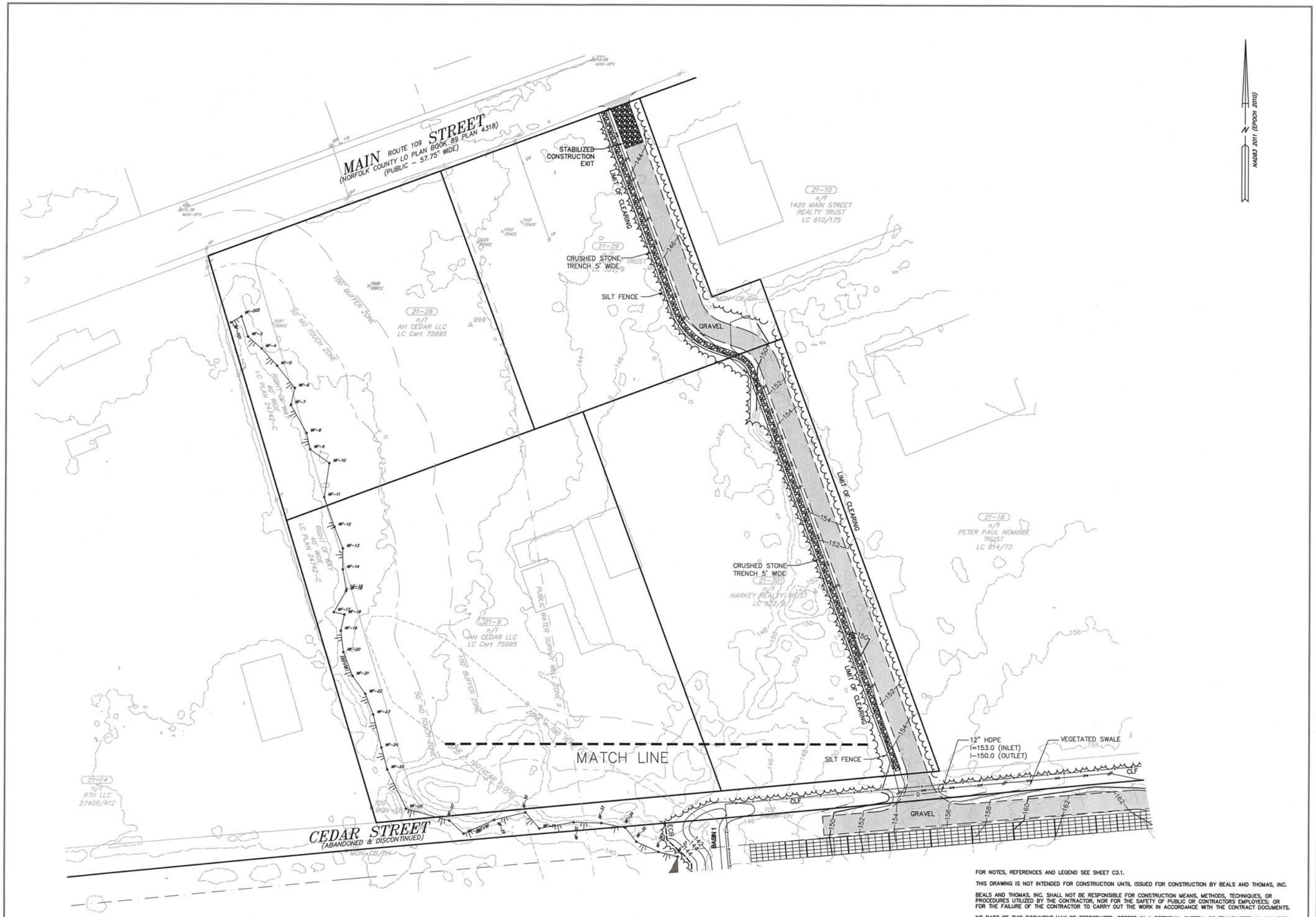
METERS: 0 5 10 25
FEET: 0 20 40 80 120

B+T JOB NO. 2588.00

B+T PLAN NO. 2588P007A-001

SHEET 2 OF 2

TP-2



FOR NOTES, REFERENCES AND LEGEND SEE SHEET C3.1.

THIS DRAWING IS NOT INTENDED FOR CONSTRUCTION UNTIL ISSUED FOR CONSTRUCTION BY BEALS AND THOMAS, INC.

BEALS AND THOMAS, INC. SHALL NOT BE RESPONSIBLE FOR CONSTRUCTION MEANS, METHODS, TECHNIQUES, OR PROCEDURES UTILIZED BY THE CONTRACTOR, NOR FOR THE SAFETY OF PUBLIC OR CONTRACTORS EMPLOYEES; OR FOR THE FAILURE OF THE CONTRACTOR TO CARRY OUT THE WORK IN ACCORDANCE WITH THE CONTRACT DOCUMENTS.

PREPARED FOR:

Clean Energy COLLECTIVE
146 WEST BOYLSTON DRIVE
3RD FLOOR
WORCESTER, MA
01606

RECORD OWNER:

AH CEDAR LLC
ASSESSORS PARCELS
21–28 & 21–9
LC CERT 175995
ASSESSORS PARCEL 32–2
LC CERT 78155

HARKEY REALTY TRUST
ASSESSORS PARCELS
21–29 & 21–30
LC CERT 104209

No. 41422

8/27/2015

PREPARED BY:

BEALS+THOMAS
Civil Engineers + Landscape Architects + Land Surveyors + Planners + Environmental Specialists

BEALS AND THOMAS, INC.
Reservoir Corporate Center
144 Turnpike Road
Southborough, Massachusetts 01772-2104
T 508.366.0560 | www.btiweb.com

5		
4		
3		
2		
1		
0	08/27/2015	FIRST ISSUE
	ISSUE DATE	DESCRIPTION

CPT	CPT/JRA	DMF	DMF
DES	DWN	CHK'D	APP'D

PROJECT:

SOLAR ARRAY

MILLIS, MASSACHUSETTS
(NORFOLK COUNTY)

SCALE: 1" = 40' DATE: AUGUST 27, 2015

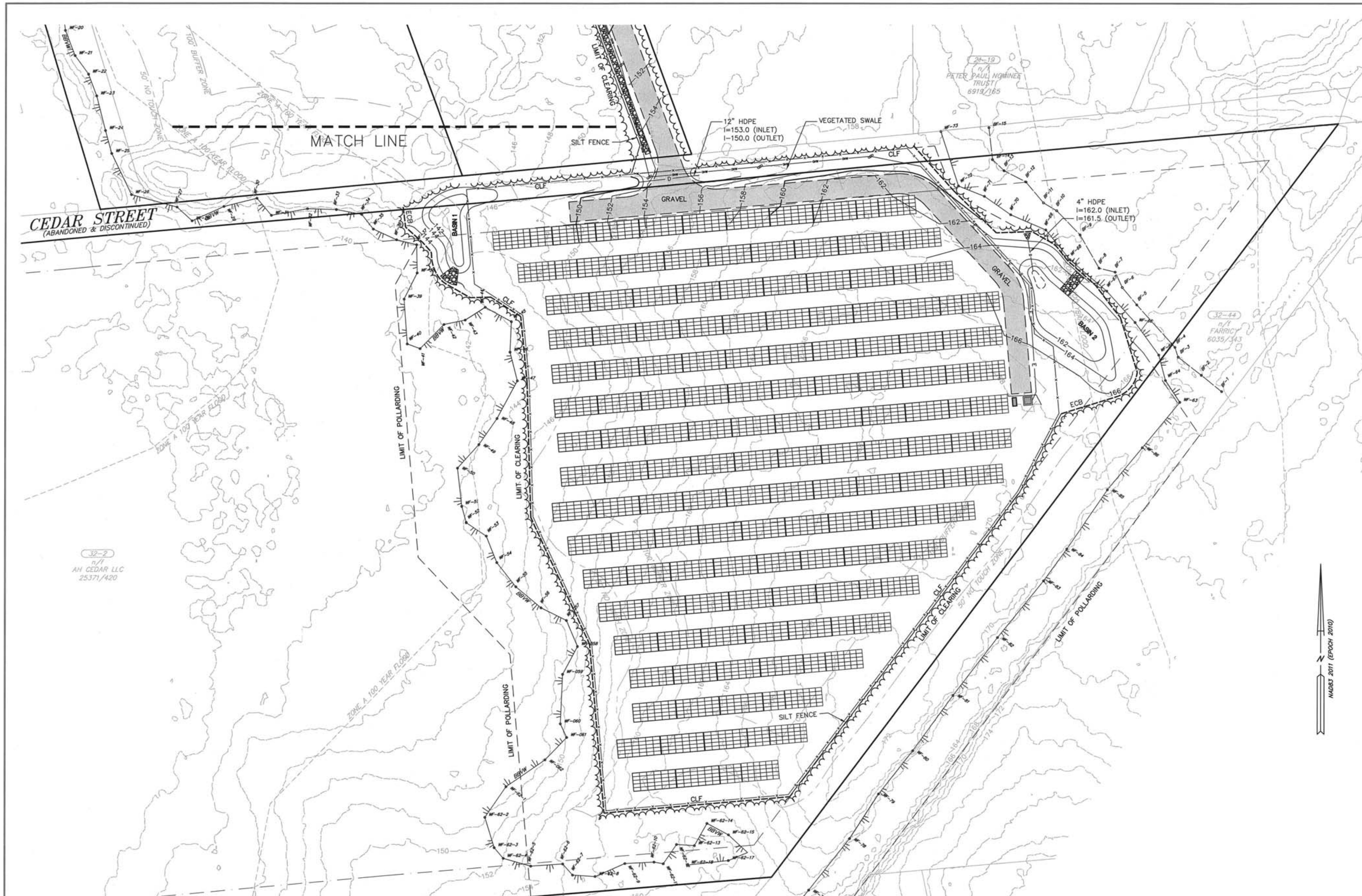
METERS 0 5 10 25
FEET 0 20 40 80 120

SITE PLAN

B+T JOB NO. 2588.00

B+T PLAN NO.
258800P003A–001

C2.1



FOR NOTES, REFERENCES AND LEGEND SEE SHEET C3.1.

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PREPARED FOR:

Clean Energy COLLECTIVE

146 WEST BOYLSTON DRIVE
3RD FLOOR
WORCESTER, MA
01606

RECORD OWNER:

AH CEDAR LLC
ASSESSORS PARCELS
21-28 & 21-9
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8/27/2015

PREPARED BY:

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Civil Engineers + Landscape Architects + Land Surveyors + Planners + Environmental Specialists

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	ISSUE DATE	DESCRIPTION
5		
4		
3		
2		
1		
0	08/27/2015	FIRST ISSUE

DES	DWN	CHK'D	APP'D
CPT	CPT/JRA	DMF	DMF

PROJECT:

SOLAR ARRAY

MILLIS, MASSACHUSETTS
(NORFOLK COUNTY)

SCALE: 1" = 40' DATE: AUGUST 27, 2015

METERS 0 5 10 25
FEET 0 20 40 80 120

SITE PLAN

B+T JOB NO. 2588.00

B+T PLAN NO. 258800P003A-002

C2.2

GENERAL NOTES

THE CONTRACTOR SHALL MAKE ALL NECESSARY CONSTRUCTION NOTIFICATIONS AND APPLY FOR AND OBTAIN ALL NECESSARY CONSTRUCTION PERMITS. THE CONTRACTOR SHALL ALSO PAY ALL FEES AND POST ALL BONDS ASSOCIATED WITH THE SAME, AND COORDINATE WITH THE ENGINEER AND ARCHITECT AS REQUIRED.

CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR JOB SITE SAFETY AND ALL CONSTRUCTION MEANS AND METHODS.

LIMIT OF WORK SHALL BE EROSION CONTROL BARRIERS, LIMIT OF GRADING AND SITE PROPERTY LINES AND/OR AS INDICATED ON DRAWINGS.

PORTIONS OF THE ROADWAY, SIDEWALK AND ROADSIDE AREA DISTURBED BY THE CONTRACTOR'S OPERATIONS SHALL BE RESTORED TO THEIR CONDITIONS PRIOR TO DISTURBANCE.

CONTRACTOR TO VERIFY ELEVATIONS IN THE FIELD PRIOR TO COMMENCING WORK.

ANY ALTERATION TO THESE DRAWINGS MADE IN THE FIELD DURING CONSTRUCTION SHALL BE RECORDED BY THE CONTRACTOR ON RECORD DOCUMENTS.

ANY AREA OUTSIDE THE LIMIT OF WORK THAT IS DISTURBED SHALL BE RESTORED TO ITS ORIGINAL CONDITION AT NO COST TO OWNER.

EXISTING TREES AND SHRUBS OUTSIDE THE LIMITS OF GRADING SHALL BE REMOVED ONLY UPON PRIOR APPROVAL OF THE OWNER.

FOR DRAWING LEGIBILITY, ALL EXISTING TOPOGRAPHIC FEATURES, EXISTING UTILITIES, PROPERTY BOUNDARIES, EASEMENTS, ETC. MAY NOT BE SHOWN ON ALL DRAWINGS. REFER TO ALL REFERENCED DRAWINGS AND OTHER DRAWINGS IN THIS SET FOR ADDITIONAL INFORMATION.

NEW EXCAVATION AND TRENCH SAFETY REGULATIONS ARE IN EFFECT AS OF MARCH 1, 2015. (REFER TO 520 CMR 14.00) ALL EXCAVATORS OR CONTRACTORS MUST OBTAIN A TRENCH PERMIT PRIOR TO ANY CONSTRUCTION RELATED TRENCHES ON SITE.

LAYOUT AND MATERIALS NOTES

ALL LINES AND DIMENSIONS ARE PARALLEL OR PERPENDICULAR TO THE LINES FROM WHICH THEY ARE MEASURED UNLESS OTHERWISE INDICATED.

COORDINATE THE LOCATION OF ALL SITE LIGHT STANDARDS WITH IMPROVEMENTS SHOWN ON THESE DRAWINGS.

CONTRACTOR SHALL REPORT SIGNIFICANT CONFLICTS TO THE OWNER AND THE ENGINEER FOR RESOLUTION.

THE CONTRACTOR SHALL NOTIFY THE ENGINEER OF ANY DISCREPANCIES BETWEEN SITE PLAN DIMENSIONS AND BUILDING PLANS BEFORE PROCEEDING WITH ANY PORTION OF SITE WORK WHICH MAY BE AFFECTED SO THAT PROPER ADJUSTMENTS TO THE SITE LAYOUT CAN BE MADE IF NECESSARY.

PROTECT EXISTING PROPERTY MONUMENTS AND ABUTTING PROPERTIES DURING CONSTRUCTION ACTIVITIES.

GRADING, DRAINAGE AND UTILITY NOTES

UNDERGROUND UTILITIES WERE COMPILED FROM AVAILABLE RECORD PLANS OF UTILITY COMPANIES AND PUBLIC AGENCIES, ARE APPROXIMATE AND ASSUMED. BEFORE COMMENCING SITE WORK IN ANY AREA, CONTACT "DIG SAFE" AT 1-888-344-7233 TO ACCURATELY LOCATE UNDERGROUND UTILITIES. ANY DAMAGE TO EXISTING UTILITIES OR STRUCTURES SHALL BE THE CONTRACTOR'S RESPONSIBILITY. NO EXCAVATION SHALL BE DONE UNTIL UTILITY COMPANIES ARE PROPERLY NOTIFIED IN ADVANCE.

THE CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFYING THAT THE PROPOSED IMPROVEMENTS SHOWN ON THE PLANS DO NOT CONFLICT WITH ANY KNOWN EXISTING OR OTHER PROPOSED IMPROVEMENTS. IF ANY CONFLICTS ARE DISCOVERED, THE CONTRACTOR SHALL NOTIFY THE OWNER AND THE ENGINEER PRIOR TO INSTALLATION OF ANY PORTION OF THE SITE WORK WHICH WOULD BE AFFECTED.

ALL WORK PERFORMED AND ALL MATERIALS FURNISHED SHALL CONFORM WITH THE LINES, GRADES AND OTHER SPECIFIC REQUIREMENTS OR SPECIFICATIONS OF THE TOWN OF MILLIS DPW.

AT ALL LOCATIONS WHERE EXISTING CURBING OR PAVEMENT ABUTS NEW CONSTRUCTION, THE EDGE OF THE EXISTING CURB OR PAVEMENT SHALL BE SAW CUT TO A CLEAN, SMOOTH EDGE, BLEND EARTHWORK SMOOTHLY INTO EXISTING BY MATCHING LINES, GRADES AND JOINTS. PITCH EVENLY BETWEEN SPOT GRADES. GRADE ALL AREAS TO DRAIN.

ALL UTILITY COVERS, GRATES, ETC. SHALL BE ADJUSTED TO BE FLUSH WITH THE PAVEMENT FINISH GRADE UNLESS OTHERWISE NOTED. RIM ELEVATIONS OF DRAINAGE STRUCTURES AND SANITARY SEWER MANHOLES ARE APPROXIMATE.

INSTALL ALL UTILITIES (INCLUDING CONCRETE PADS) PER UTILITY COMPANY AND DPW STANDARDS.

AN EROSION CONTROL BARRIER SHALL BE INSTALLED ALONG THE EDGE OF PROPOSED DEVELOPMENT AS SHOWN ON THE PLAN PRIOR TO THE COMMENCEMENT OF CONSTRUCTION OPERATIONS.

ALL DRAINAGE PIPES SHALL BE SMOOTH WALLED CORRUGATED POLYETHYLENE PIPE (ADS N-12 OR APPROVED EQUAL) EXCEPT WHERE NOTED OTHERWISE.

CONTRACTOR SHALL PROTECT ALL UNDERGROUND DRAINAGE AND UTILITY FACILITIES FROM EXCESSIVE VEHICULAR LOADS DURING CONSTRUCTION. ANY DAMAGE TO THESE FACILITIES RESULTING FROM CONSTRUCTION LOADS WILL BE RESTORED TO ORIGINAL CONDITION.

ELECTRIC CONNECTION LOCATION AND ROUTING ARE SUBJECT TO REVIEW AND APPROVAL BY APPROPRIATE UTILITY COMPANY.

THE CONTRACTOR SHALL REMOVE ALL EROSION CONTROL BARRIERS AFTER REVEGETATION OF DISTURBED AREAS AND AFTER APPROVAL OF THE CONSERVATION COMMISSION AND WETLAND SPECIALIST.

RIP RAP APRONS SHALL BE INSTALLED AT THE OUTLETS FOR ALL CULVERTS.

REFER TO DRAINAGE CALCULATIONS FOR PIPE SLOPES.

EXCAVATION REQUIRED WITHIN THE PROXIMITY OF EXISTING UTILITY LINES SHALL BE DONE BY HAND. CONTRACTOR SHALL REPAIR ANY DAMAGE TO EXISTING UTILITY LINES OR STRUCTURES INCURRED DURING CONSTRUCTION OPERATIONS AT NO COST TO THE OWNER.

STOCKPILED TOPSOIL SHALL BE PLACED NEATLY IN AN AREA INDICATED BY THE OWNER.

PITCH EVENLY BETWEEN SPOT GRADES. ALL PAVED AREAS MUST PITCH TO DRAIN AT A MINIMUM OF 1/8" PER FOOT UNLESS SPECIFIED. ANY DISCREPANCIES NOT ALLOWING THIS MINIMUM PITCH SHALL BE REPORTED TO THE ENGINEER PRIOR TO CONTINUING WORK.

THE CONTRACTOR SHALL SCHEDULE HIS WORK TO ALLOW THE FINISHED SUBGRADE ELEVATIONS TO DRAIN PROPERLY WITHOUT PUDDLING. PROVIDE TEMPORARY POSITIVE DRAINAGE AS REQUIRED.

EROSION CONTROL AND SEDIMENTATION NOTES

AN EROSION CONTROL BARRIER SHALL BE INSTALLED ALONG THE EDGE OF PROPOSED DEVELOPMENT AS INDICATED IN THE PLAN PRIOR TO THE COMMENCEMENT OF DEMOLITION OR CONSTRUCTION OPERATIONS.

CONTRACTOR SHALL MAINTAIN ALL EROSION CONTROL MEASURES DURING ENTIRE CONSTRUCTION PERIOD.

ANY SEDIMENT TRACKED ONTO PUBLIC RIGHT-OF-WAYS SHALL BE SWEPT AT THE END OF EACH WORKING DAY.

ALL STOCKPILE AREAS SHALL BE LOCATED WITHIN LIMIT OF WORK LINE AND STABILIZED TO PREVENT EROSION.

ALL DEBRIS GENERATED DURING SITE PREPARATION ACTIVITIES SHALL BE LEGALLY DISPOSED OF OFF SITE.

PROVIDE CRIBBING AS NECESSARY TO PROTECT EXISTING UTILITY LINES DURING CONSTRUCTION.

SITE ELEMENTS TO REMAIN MUST BE PROTECTED FOR DURATION OF PROJECT.

ALL TOPSOIL ENCOUNTERED WITHIN WORK AREA SHALL BE STRIPPED TO ITS FULL DEPTH AND STOCKPILED FOR REUSE. EXCESS TOPSOIL SHALL BE DISPOSED OF ON SITE AS DIRECTED BY OWNER. TOPSOIL PILES SHALL REMAIN SEGREGATED FROM EXCAVATED SUBSURFACE SOIL MATERIALS.

ADDITIONAL EROSION CONTROL MEASURES SHALL BE IMPLEMENTED AS CONDITIONS WARRANT OR AS DIRECTED BY THE OWNER OR OWNER'S REPRESENTATIVE.

ALL POINTS OF CONSTRUCTION EGRESS OR INGRESS SHALL BE MAINTAINED TO PREVENT TRACKING OR FLOWING OF SEDIMENT ONTO PUBLIC ROADS.

ALL AREAS IDENTIFIED AS CRITICAL AREA SEEDING SHALL BE STABILIZED DURING CONSTRUCTION BY SEEDING WITH ANNUAL RYE GRASS AT THE RATE OF FORTY (40) LBS/ACRE.

TEMPORARY DIVERSION DITCHES, PERMANENT DITCHES, CHANNELS, EMBANKMENTS AND ANY DENUDED SURFACE WHICH WILL BE EXPOSED FOR A PERIOD OF ONE MONTH OR MORE SHALL BE CONSIDERED CRITICAL VEGETATION AREAS. THESE AREAS SHALL BE MULCHED WITH STRAW. MULCH SHALL BE SPREAD UNIFORMLY IN A CONTINUOUS BLANKET OF SUFFICIENT THICKNESS TO COMPLETELY HIDE THE SOIL FROM VIEW.

SOIL EROSION AND SEDIMENTATION CONTROL MEASURES SHALL BE INSPECTED AND MAINTAINED ON A DAILY BASIS DURING CONSTRUCTION TO INSURE THAT CHANNELS, DITCHES AND PIPES ARE CLEAR OF DEBRIS AND THAT THE EROSION CONTROL BARRIERS ARE INTACT.

CONTRACTOR SHALL PROVIDE DUST CONTROL FOR CONSTRUCTION OPERATIONS AS APPROVED BY OWNER.

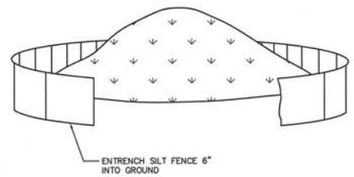
DUST SHALL BE CONTROLLED BY SPRINKLING OR OTHER APPROVED METHODS AS NECESSARY, OR AS DIRECTED BY THE OWNER OR HIS REPRESENTATIVE.

RIP RAP SPLASH PADS SHALL BE INSTALLED AT THE OUTLETS FOR ALL CULVERTS DISCHARGING ADJACENT TO A WATERWAY.

EXTREME CARE SHALL BE EXERCISED SO AS TO PREVENT ANY UNSUITABLE MATERIAL FROM ENTERING THE WETLANDS.

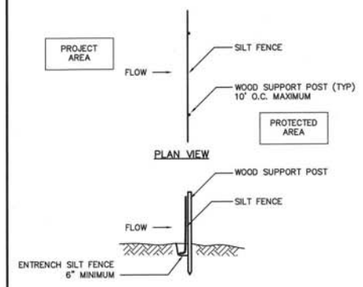
ADDITIONAL STRAW BALES SHALL BE LOCATED AS CONDITIONS WARRANT OR AS DIRECTED BY THE OWNER OR HIS REPRESENTATIVE.

CLEAN AND MAINTAIN EROSION CONTROL BARRIER AS REQUIRED DURING CONSTRUCTION OPERATIONS TO ENSURE ITS CONTINUED FUNCTIONALITY.

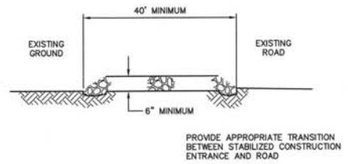


NOTE: CHOOSE DRY AND STABLE AREA FOR STOCKPILE.

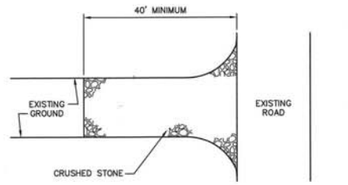
SOIL STOCKPILE
NOT TO SCALE



SILT FENCE
NOT TO SCALE



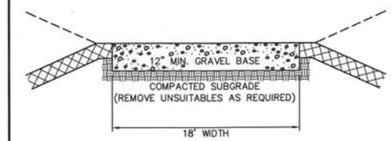
PROFILE VIEW



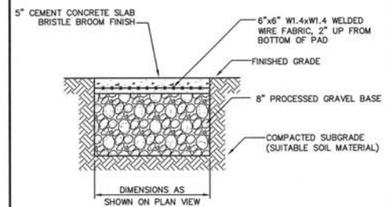
PLAN VIEW

THE ENTRANCE SHALL BE MAINTAINED IN A CONDITION WHICH WILL PREVENT TRACKING OR FLOWING OF SEDIMENT ONTO EXISTING ROAD. THIS MAY REQUIRE PERIODIC TOP DRESSING WITH ADDITIONAL STONE OR ADDITIONAL LENGTH AS CONDITIONS DEMAND AND REPAIR AND/OR CLEANOUT OF ANY MEASURES USED TO TRAP SEDIMENT. ALL SEDIMENT SPILLED, DROPPED, WASHED OR TRACKED ONTO EXISTING ROAD SHALL BE REMOVED IMMEDIATELY.

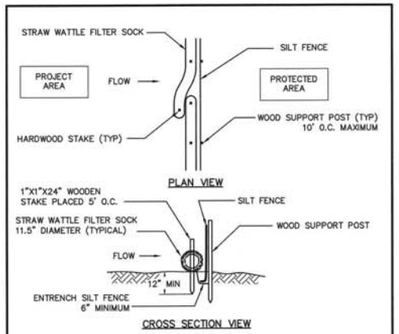
STABILIZED CONSTRUCTION ENTRANCE
NOT TO SCALE



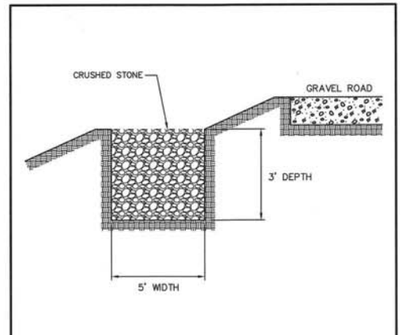
GRAVEL DRIVE CROSS SECTION
NOT TO SCALE



CEMENT CONCRETE PAD
NOT TO SCALE



EROSION CONTROL BARRIER
NOT TO SCALE



CRUSHED STONE TRENCH
NOT TO SCALE

LEGEND AND ABBREVIATIONS

EXISTING	PROPOSED	
D DMH	D DMH	DRAIN LINE/MANHOLE
CB FE/INV	CB FE	CATCH BASIN FLARED END/INVERT
E EMH	E EMH	ELECTRIC LINE/MANHOLE
OHW UP	OHW UP	OVERHEAD WIRE UTILITY POLE GUY WIRE
124	124	MINOR CONTOUR
130	130	MAJOR CONTOUR
x125.4	x125.4	SPOT ELEVATION
CLF	CLF	CHAIN LINK FENCE
		TREE LINE
		STONE WALL
		RIPRAP
		BUILDING
		100' BUFFER ZONE
BVW		BOUNDARY OF BORDERING VEGETATED WETLAND
		BANK/BANK FLAG
100-YEAR FLOOD		100-YEAR FLOOD LINE
	CLF	EROSION CONTROL BARRIER
		SILT FENCE

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JAMES M. FERRY CIVIL No. 41422 REGISTERED PROFESSIONAL ENGINEER

8/27/2015

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PROJECT:

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MILLIS, MASSACHUSETTS
(NORFOLK COUNTY)

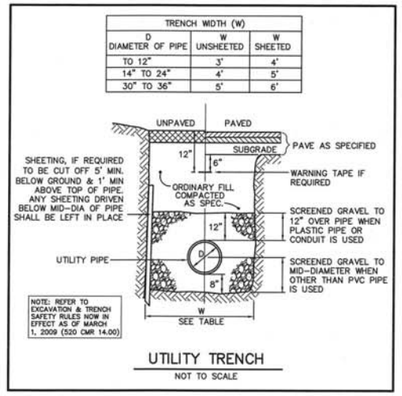
SCALE: AS NOTED DATE: AUGUST 27, 2015

NOTES, LEGEND AND DETAILS

B+T JOB NO. 2588.00

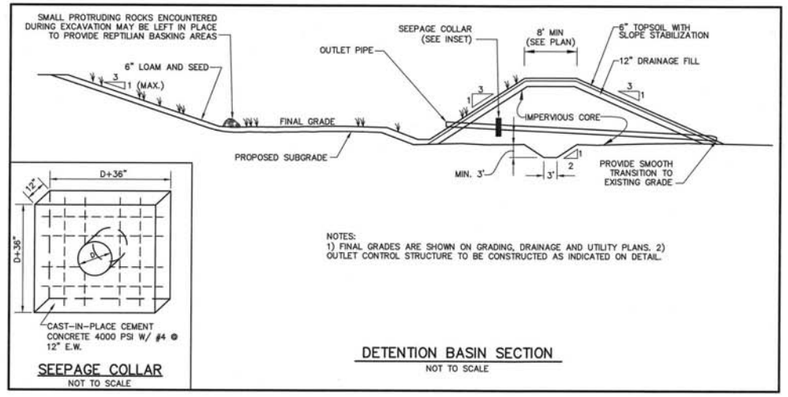
B+T PLAN NO. 258800P006A-002

C3.1



UTILITY TRENCH

NOT TO SCALE



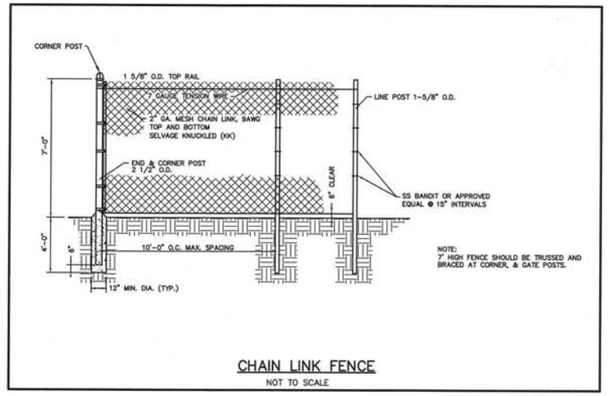
NOTES:
1) FINAL GRADES ARE SHOWN ON GRADING, DRAINAGE AND UTILITY PLANS. 2) OUTLET CONTROL STRUCTURE TO BE CONSTRUCTED AS INDICATED ON DETAIL.

SEEPAGE COLLAR

NOT TO SCALE

DETENTION BASIN SECTION

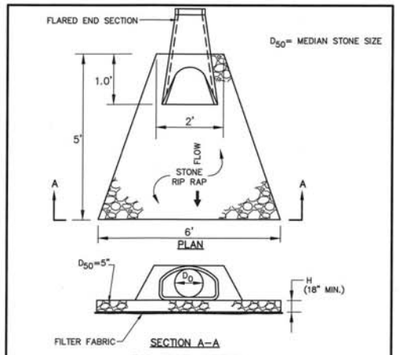
NOT TO SCALE



NOTE:
7' HIGH FENCE SHOULD BE TRUSSED AND BRACED AT CORNER, & GATE POSTS.

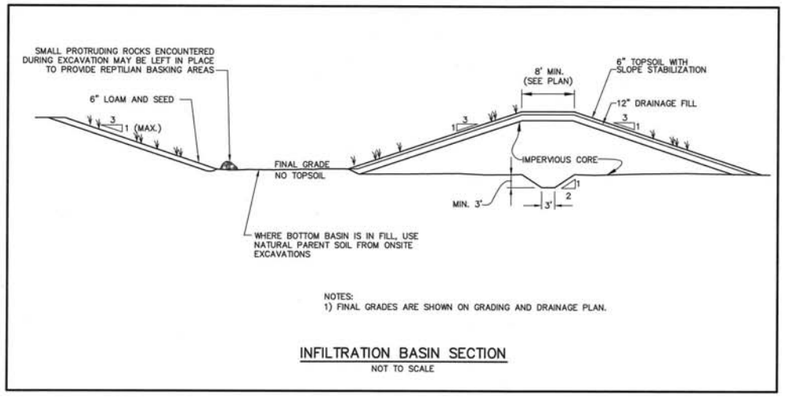
CHAIN LINK FENCE

NOT TO SCALE



RIP RAP APRON

NOT TO SCALE

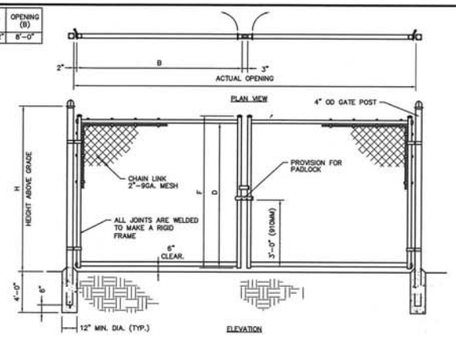


NOTES:
1) FINAL GRADES ARE SHOWN ON GRADING AND DRAINAGE PLAN.

INFILTRATION BASIN SECTION

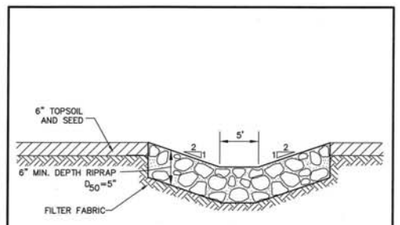
NOT TO SCALE

NOMINAL HEIGHT (H)	ACTUAL (F)	ACTUAL (D)	OPENING (B)
7'-0"	6'-4"	6'-2 1/2"	8'-0"



CHAIN LINK FENCE – DOUBLE GATE

NOT TO SCALE



RIPRAP SPILLWAY

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DETAILS

B+T JOB NO. 2588.00

B+T PLAN NO. 258800P006A-003

C3.2