SCOPING APPLICATION FOR LIMITED DEVELOPMENT OF REGIONAL IMPACT

PROJECT NAME

Canal Community Solar
Tupper Road
Sandwich, Massachusetts

APPLICANT

NRG Renew Canal 1 LLC
9 Freezer Road
Sandwich, Massachusetts 02563

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Limited DRI Application

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Application Cover Sheet, pictures of site, existing condition plans, proposed site plans and
Figures: USGS; Aerial; Potential Public Water Supply; Wellhead Protection Areas (Zone II); Marine Water Recharge; Water Quality Impaired Area; Flood Zone; Wetlands; Prime Farmland Soil; Significant Natural Resource Area; NHESP; Economic Center (from LUVM)

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Appendix K

Easement Memo

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1. INTRODUCTION

NRG Renew Canal 1 LLC ("NRG") seeks to permit, construct and operate an approximately 1.476- MWac state-of-the-art solar photovoltaic community solar array at the existing Canal Generating Station ("Canal"), hereinafter referred to as Canal Community Solar ("CCS").

The CCS project includes installation of two areas of solar panels arrays with an approximate net nominal generating capacity of 1.476 MWac. It is proposed on a 20.6 acre site, consisting of two lots and located to the south of the existing Canal oil storage tanks and west of the Eversource electrical transmission right-of-way ("ROW"). Panels will be installed based on existing grading and require clearing of vegetation of approximately 10.6 acres for installation, maintenance, shading clearance, transformers, and underground and overhead 22.8 kilovolt (kV) three-phase circuits. The two solar arrays will be connected to the existing Eversource 22.18-kV overhead distribution circuit located along Route 6A, south of the CCS site. Access to the site will be provided from an existing gravel access drive off of Tupper Road.

CCS offers significant benefits in terms of both making clean, renewable energy available to residents of Cape Cod and Massachusetts and offsetting carbon emissions from fossil fuel generation units. Further, in order to make economic sense, CCS needs to be able to take advantage of the Federal Investment Tax credit (ITC), which is set to expire at the end of 2016. The Investment Tax Credit was designed to support the widespread deployment of solar energy, and was created as part of the Energy Policy Act of 2005 and extended for eight years in the Emergency Economic Stabilization Act of 2008. It is the principle federal policy mechanism supporting the solar industry. Specifically, the ITC allows companies and individuals that install, develop, or finance solar systems to claim a tax credit in the amount of 30% of the investment cost of the project.

The 30% credit has been instrumental in jump-starting and growing the United States solar industry but is only in effect until December 31, 2016, at which point the credit will drop to 10% for third-party owned systems and to 0% for residentially owned systems. To qualify for the 30% credit, projects must be placed in service prior to December 31, 2016. The economic and growth impacts of the ITC "cliff" across the solar industry will be significant and widespread; it is a widely held belief that the market will experience an ensuing dramatic slowdown in growth due to infeasibility of project economics.

The expiration of the ITC will increase solar arrays' corresponding power purchase agreement (PPA)[1] rates by 20 to 40% between projects placed in service in 2016 versus the same project placed in service in 2017. Community solar arrays today, such as CCA, are marketable to residential subscribers because the Year 1 PPA rate can provide homeowners with a cost savings in comparison with what they would otherwise be paying on their current electricity bill. The cost savings occur when the homeowner buys electricity generated from the solar project at a lower dollar per kilowatt-hour ($/kWh) PPA rate than the $/kWh rate at which they buy electricity from the grid via their current electricity supplier. However, without the ITC, the Year 1 PPA rate would likely come at a significant premium to prevailing electricity rates. The completion of the CCA thus becomes highly unlikely if not economically unfeasible due to lack

[1] A PPA is a contract between two parties, one who generates electricity (the seller) and one who purchases the electricity (the buyer).

of interest from homeowners who may not save money on their electricity bill by subscribing as a power subscriber. Without subscribers to the power generation, there is no project to build. Accordingly a Limited DRI review is essential for allowing the project to proceed in a timely manner and facilitate successful project completion.

2. LAND USE

The Town of Sandwich has adopted a Land Use Vision map (LUVM) and the site has been designated an Economic Center. Accordingly the project site meets the requirements of MPSLU1.1. The zoning classification is BL-1. While large scale ground mounted solar arrays are presently not permitted in the BL-1 zone, a Planning Board and Board of Selectmen sponsored zoning amendment will be considered for adoption at the Town of Sandwich November 16, 2015 Special Town Meeting.
See Appendix D.

3. WATER RESOURCES

The project site lies outside of nitrogen impaired wetlands and protective areas, potential water supply areas, fresh water recharge areas, and water quality improvement areas, as defined by the Cape Cod Commission Regional Policy Plan (RPP).[2] Therefore, the project is not subject to MPS, WR2 (drinking Water Quality and Quantity), WR3 (Marine Water Employment and Estuaries, WR4 (Freshwater Ponds and beaches) and WR5 (Water Quality Improvement Plan. Further because no wastewater will be generated from this site , standards under WR6 (Public and Private Wastewater Treatment Facility do not apply. (See letter from Patty Daly, Deputy Director of Cape Cod Commission to Secretary of Energy and Environmental Office dated September 11, 2015. See Appendix E).

4. COASTAL RESOURCES

The CCS site is not located proximate to any coastal or marine reserve. A small portion of the site is located in the Flood Plain. (See 5 below).

5. WETLANDS

While wetlands exist on the parcel no disturbance is proposed within the 100' buffer of any wetland resource except for a small portion of the storm water facility for the project which will be located within land subject to coastal storm flowage (flood plain). (See Site Plan Appendix A).

6. WILDLIFE AND PLANT HABITAT

The CCS site is not located in an area designated as Endangered or Protected Rare Species Habitat by the Massachusetts National Heritage and Endangered Species Program

[2] However, see letter from Atlantic Design Engineers, Inc. regarding the South Sagamore Supply Well. (Appendix F).

(NHESP). See Appendix G. Applicant is undertaking a natural reserve inventory of the project site which will be part of applicant's limited DRI submittal.

7. OPEN SPACE AND RECREATION

NRG will provide Open Space to meet the requirements of MPS 051.1. For the purpose of this calculation, it is believed the project is not located in a Significant Natural Resource Area (SNRA). See discussion under Water Resource Item 3 and Appendix E and F.

8. ENERGY

NRG believes that the Energy MPS in the RPP do not apply to the CCS. Nevertheless, the renewable energy project serves to promote the goals of the RPP.

9. ECONOMIC DEVELOPMENT

The CCS as proposed is in an Economic Center and is therefore in compliance with MPS ED1.1. The project can be classified as infrastructure by the Cape Cod Commission. There is a demonstrated need for the project as evidenced by the Summary of NRG Community Solar Program attached as Appendix I. Accordingly the project complies with the MPS ED4.1.

10. AFFORDABLE HOUSING

No housing is proposed under this project. Future operation and maintenance of the CCS will require fewer than the equivalent of one contracted employee. For these reasons, Affordable Housing standards do not apply to the project.

11. TRANSPORTATION

According to the Traffic Review prepared by Atlantic Design Engineers, Inc., attached as Appendix I, the CCS will result in little traffic generation especially post construction. Further, considering the low traffic volume and safe access to the site off Tupper Road the project will meet the MPS for trip generated and traffic safety to the extent applicable.

12. HERITAGE PRESERVATION AND CHARACTER

The CCS site is located in the Old Kings Highway Historic District (OKH) and will need a Certificate of Appropriateness from the Town of Sandwich Historic District Committee. The applicant has notified Mass. Historic Commission (MHC) of the project. MHC had no comments on the project except the need to obtain the aforementioned Certificate of Appropriateness from the OKH. See Appendix H.

13. PUBLIC BENEFITS

The CCS provides significant public benefits as set forth in Summary of NRG Community Solar Program attached as Appendix J.

14. EASEMENT RIGHTS

See memo from Law Office of Michael D. Ford inAppendix K.

15. HAZARDOUS MATERIALS & WASTE

There are no hazardous materials to be permanently introduced or stored on the site as part of the solar panel installation. The solar panels are to be mounted on stationary racking systems with no movable parts and the panels themselves do not contain any hazardous materials.

In addition, the electrical transformers proposed for the site will contain a non-toxic, biodegradable, vegetable-based coolant known as Envirotemp FR3 fluid which is not classified as a hazardous material according to the EPA, OSHA, and the product MSDS sheets (See Appendix L).

During the construction phase of the CCS, particularly during earthwork operations, hazardous materials in the form of limited quantities of fuel (gasoline or diesel), lubricating and hydraulic oil, and coolants, will be temporary introduced on the site within the construction vehicles and equipment. Plans for spill prevention and hazardous materials/hazardous waste management will be provided with the Limited DRI Application.

A

Application Cover Sheet

Cape Cod Commission
3225 Main Street, PO Box 226
Barnstable, MA 02630
Tel: (508) 362-3828 • Fax: (508) 362-3136

Date Received:
Fee ($):
Check No:
File No:

Type of Application (check all that apply)

- [ ] Development of Regional Impact (DRI)
- [ ] Hardship Exemption
- [x] Limited DRI Review
- [ ] Jurisdictional Determination
- [ ] DRI Exemption
- [ ] Request for Joint MEPA/DRI Review

Project Information

Project Name: Canal Community Solar ("CCS")

Total Site Acreage: Approx. 20.6 acres

Project/Property Location: Tupper Road Sandwich

Zoning: BL-1 (zoning change pending to create Solar Array Overlay district)

Brief Project Description:

Include total square footage of proposed and existing development, gross floor area, number of lots existing or to be created, specific uses, description of existing conditions, as applicable (attach additional sheets if necessary).

See Attached

Owner(s) of Record

List the following information for all involved parcels. Provide copies of each Deed and Purchase and Sale Agreement and/or evidence of leasehold interest, if applicable, for all involved parcels. Proof of ownership/legal rights for Applicant(s) to proceed with the proposed development must be documented prior to the Commission deeming any application complete (attach additional sheets if necessary).

Map/Parcel	Owner's Name	Lot & Plan	Land Court Certificate of Title #	Registry of Deeds Book/Page #
Map 86 Parcels: 13,14,15,16	NRG Canal LLC formerly Southern Energy Canal LLC	Deed Book 11961, Page 226, Plan Book 546, Page 42		

There **ARE/ARE NOT** (circle one) court claims, pending or completed, involving this property (if yes, please attach relevant information).

Certification

I hereby certify that all information provided on this application form and in the required attachments is true and accurate to the best of my knowledge. I agree to notify the Cape Cod Commission of any changes on the information provided in this application, in writing, as soon as is practicable. I understand failure to provide the required information and any fees may result in a procedural denial of my project.
NOTE: For wireless communication facilities, a licensed carrier should be either an applicant or a co-applicant.

APPLICANT
Applicant(s) Name: NRG Renew Canal 1 LLC Tel: _____ Fax: _____
Address: 100 California St., San Francisco, CA 94111
Signature: _____ Date: _____

CO-APPLICANT
Co-Applicant(s) Name: _____ Tel: _____ Fax: _____
Address: _____
Signature: _____ Date: _____

CONTACT
Contact: Shawn Konary Tel: 617-529-3874 Fax: _____
Address: 9 Freezer Rd., Sandwich, MA
Signature: _____ Date: _____

PROPERTY OWNER
Property Owner: NRG Canal LLC formerly Southern Energy Canal LLC Tel: 609-524-4657 Fax: _____
Address: 9 Freezer Road, Sandwich, MA
Signature: _____ Date: _____

BILLABLE ENTITY
Name: NRG Energy, Inc. Tel: 617-529-3874 Fax: _____
Address: 211 Carnegie Center, Princeton, N.J. 08540

Project Description

NRG Renew Canal 1 LLC ("NRG") seeks to permit, construct and operate an approximately 1.476-MWac state-of-the-art solar photovoltaic community solar array at the existing Canal Generating Station ("Canal"), hereinafter referred to as Canal Community Solar ("CCS").

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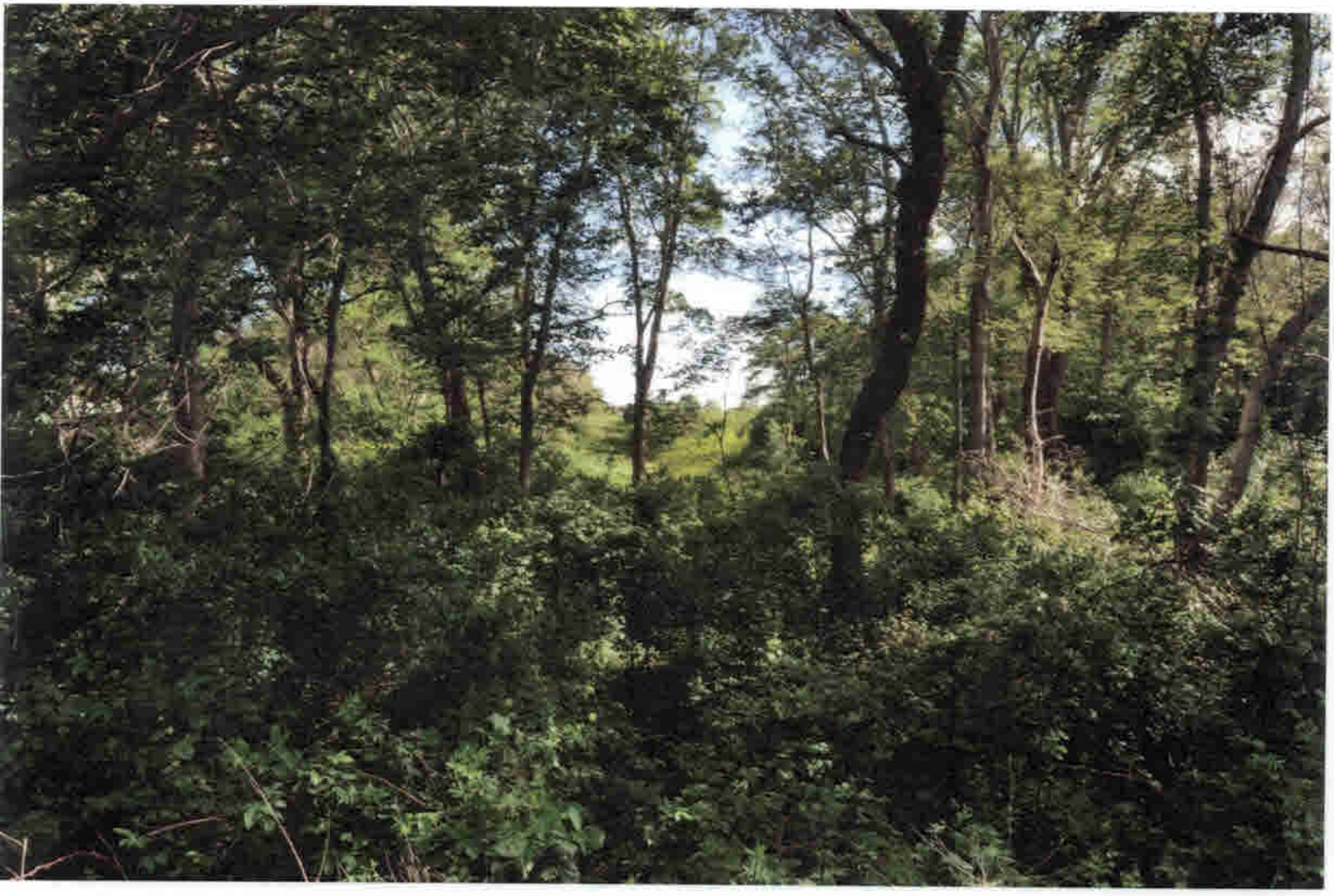


SPEED LIMIT
40

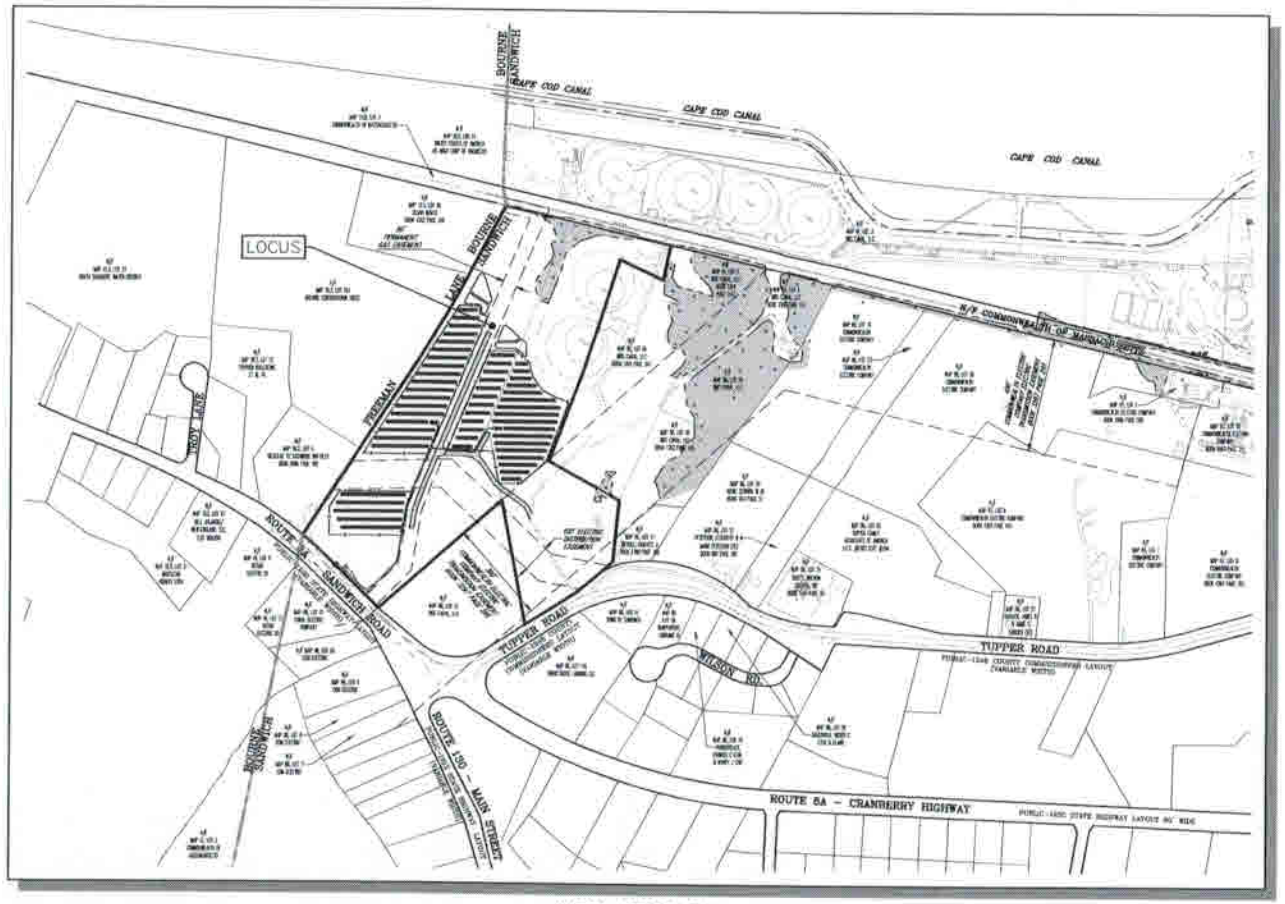
PRELIMINARY SITE PLANS

FOR THE

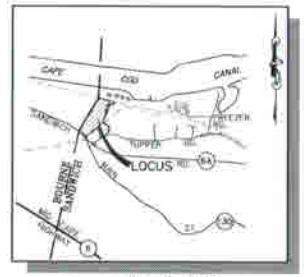
CANAL COMMUNITY SOLAR PROJECT

SANDWICH, MASSACHUSETTS

DATE: OCTOBER 9, 2015



OVERALL LOCATION PLAN
SCALE: 1" = 300'



LOCUS MAP
1" = 2,083'±

INDEX OF PLANS		
SHEET NO.	TITLE	SCALE
1	COVER SHEET	1" = 200'
2	OVERALL EXISTING CONDITIONS PLAN	1" = 100'
3	EXISTING CONDITIONS PLAN	1" = 40'
4	EXISTING CONDITIONS PLAN	1" = 40'
5	EXISTING CONDITIONS PLAN	1" = 40'
6	OVERALL SITE PLAN	1" = 100'
7	SITE VICINITY PLAN	1" = 40'
8	SITE VICINITY PLAN	1" = 40'

OWNER:
NRG CANAL, LLC
211 CARNEGIE CENTER
PRINCETON, NJ 08540

APPLICANT:
NRG RENEW CANAL 1, LLC
9 FREEZER ROAD
SANDWICH, MA 02563

nrg
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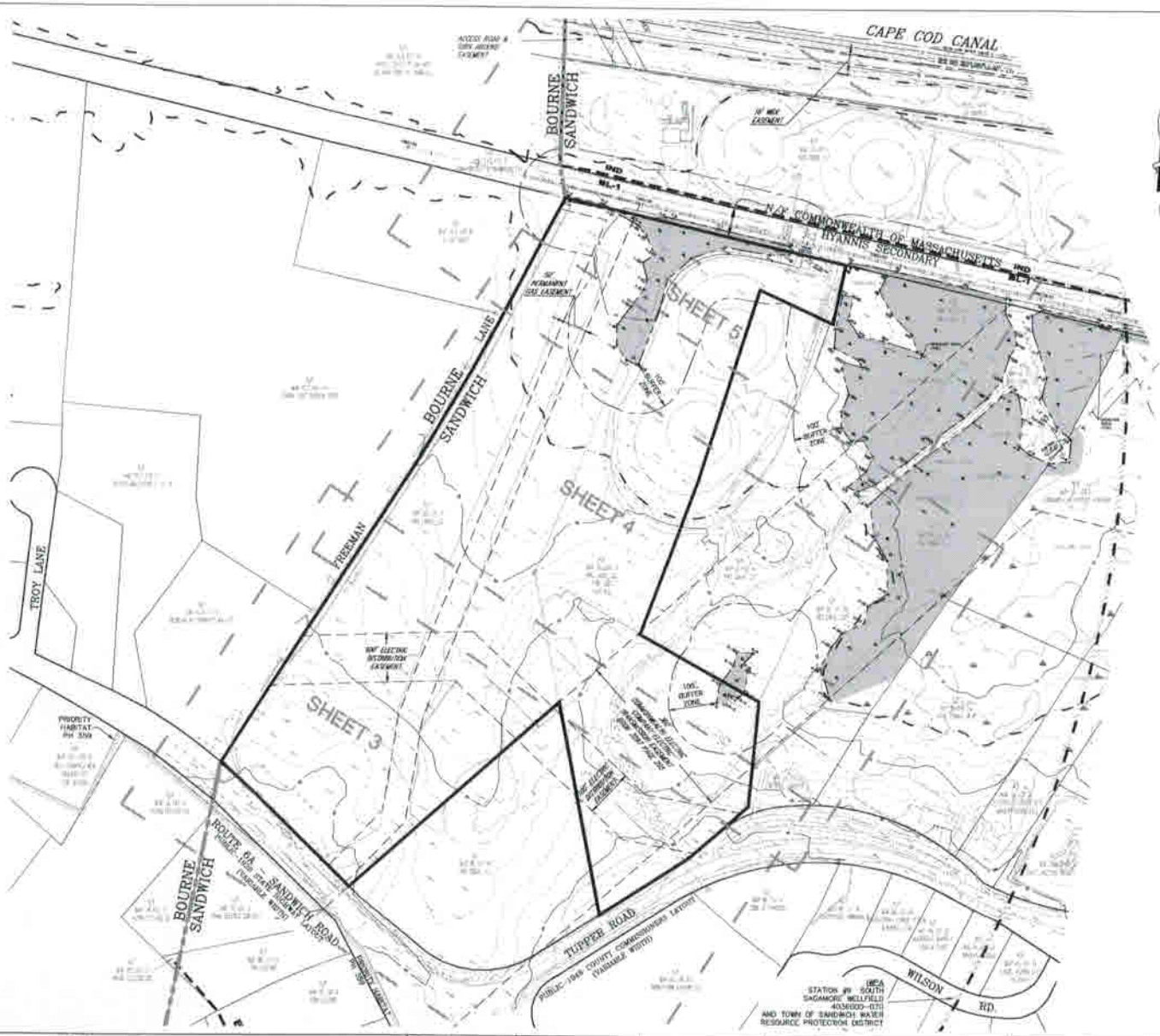
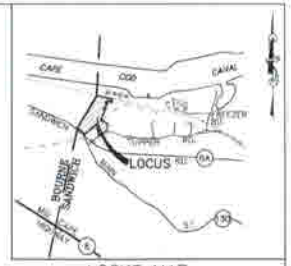
ENGINEER:
Atlantic DESIGN ENGINEERS, INC.
P.O. Box 1051, Sandwich, MA 02563 (508) 888 - 9282

Sheet	of
1	8

JOB NUMBER
2796.01





LOCUS MAP
1" = 2,083.3'±

LEGEND

- EXISTING CONTOUR LINE
- EDGE OF BORDERING VEGETATED WETLANDS W/WETLAND FLAG BASED UPON A TESLA DELINEATION
- 100' BUFFER ZONE
- EDGE OF WATER PER MASSGIS
- TOP OF COASTAL BANK
- 100' TOP OF COASTAL BANK BUFFER
- MEPA AND TOWN OF SANDWICH WATER RESOURCE PROTECTION DISTRICT
- NHESP PRIORITY HABITAT OF RARE SPECIES
- FEMA FLOOD ZONE
- ZONING LINE
- EX. EASEMENT
- EX. UTILITY POLE
- EX. CHAIN LINK FENCE
- EX. POST AND RAIL FENCE
- EX. GUARD RAIL
- EX. STONE WALL
- EX. TREE LINE
- EX. PREVIOUSLY CLEARED/PARTIALLY OVERGROWN AREA
- EX. GUY WIRE ANCHOR
- EX. UTILITY POLE
- EX. CATCHBASIN
- EX. BENCHMARK
- EX. TREE
- EX. TRANSMISSION TOWER
- EX. LIGHT
- EX. MANHOLE
- EX. SIGN
- EX. POST
- EX. CONTROL STATION
- EX. SWAMP
- EX. BOUND
- EX. SPOT ELEVATION
- EX. HYDRANT
- EX. WATER GATE
- EX. DIRT ROAD

GENERAL NOTES:

1. OWNERS OF RECORD:
   ATTN: TAX DEPARTMENT
   NRG CANAL, LLC
   211 CARNEGIE CENTER
   PRINCETON, NJ 08540
2. LOCUS IS COMPRISED OF:
   MAP 88 LOT 13 (±11.75 ACRES) AND 15 (±8.84 ACRES).
3. PROPERTY LINES AND EXISTING CONDITIONS FROM PLANS ENTITLED LAND TITLE SURVEY PREPARED BY SURVEYING AND MAPPING CONSULTANTS, DATED SEPTEMBER 15, 1998 AND SUPPLEMENTED BY ATLANTIC DESIGN ENGINEERS, INC. IN 2015.
4. THE WETLAND RESOURCE AREAS SHOWN HEREON ARE BASED UPON A FIELD DELINEATION AND FIELD LOCATION BY TRC ENVIRONMENTAL CORP. AND CONFIRMED BY ATLANTIC DESIGN ENGINEERS, INC. IN MAY, 2015.
5. THE PROPERTY LIES MOSTLY WITHIN ZONE X, OTHER AREAS, AREAS DETERMINED TO BE OUTSIDE THE 0.2% ANNUAL CHANCE FLOODPLAIN (NAVD88) AND PARTIALLY WITHIN FLOOD ZONE AE14, BASED UPON A REVIEW OF THE FEDERAL EMERGENCY MANAGEMENT AGENCY (FEMA) FLOOD INSURANCE RATE MAP (FIRM) MAP NUMBER 25001C0319J, DATED JULY 16, 2014.
6. THE PROPERTY LIES WITHIN AN INTERIM WELLHEAD PROTECTION AREA (IWPA) (STATION #9, SOUTH SAGAMORE WELLFIELD- 4036000-070) BASED UPON A REVIEW OF THE MASSACHUSETTS GEOGRAPHIC INFORMATION SYSTEM.
7. THE PROPERTY IS NOT LOCATED WITHIN A ZONE II BASED UPON A REVIEW OF THE MASSACHUSETTS GEOGRAPHIC INFORMATION SYSTEM.
8. HORIZONTAL COORDINATES BASED ON NAD 27 PER SURVEYING AND MAPPING CONSULTANTS AND EXISTING CONTOURS ARE BASED UPON THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88).
9. THE PROPERTY LIES WITHIN THE TOWN OF SANDWICH WATER RESOURCE PROTECTION DISTRICT, AND DOES NOT LIE WITHIN SURFACE WATER PROTECTION DISTRICT, BASED UPON A REVIEW OF THE TOWN OF SANDWICH ZONING MAP, DATED MAY 2013.
10. THE PROPERTY DOES NOT LIE WITHIN AN ESTIMATED HABITAT OF RARE WILDLIFE AND A PRIORITY HABITAT OF RARE SPECIES BASED UPON A REVIEW OF THE NATURAL HERITAGE AND ENDANGERED SPECIES PROGRAM MAPS OBSERVED ON THE MASSACHUSETTS GEOGRAPHIC INFORMATION SYSTEM.
11. THE PROPERTY DOES NOT LIE WITHIN AN AREA OF CRITICAL ENVIRONMENTAL CONCERN (ACEC) BASED UPON A REVIEW OF THE MASSACHUSETTS GEOGRAPHIC INFORMATION SYSTEM.
12. MEAN LOW WATER AND MEAN HIGH WATER ELEVATIONS ARE BASED UPON "TIDAL FLOOD PROFILES, NEW ENGLAND COASTLINE" PREPARED BY THE HYDRAULICS AND WATER QUALITY SECTION, NEW ENGLAND DIVISION, U.S. ARMY CORPS OF ENGINEERS, DATED SEPTEMBER 1988

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Atlantic® DESIGN ENGINEERS, INC.
P.O. Box 1051, Sandwich, MA 02563 (508) 888 - 9262

Designed by:
Drawn by:
Checked by:
Surveyed by:
Approved by:

SCALE
SCALE 1" = 100'
0 50 100 200

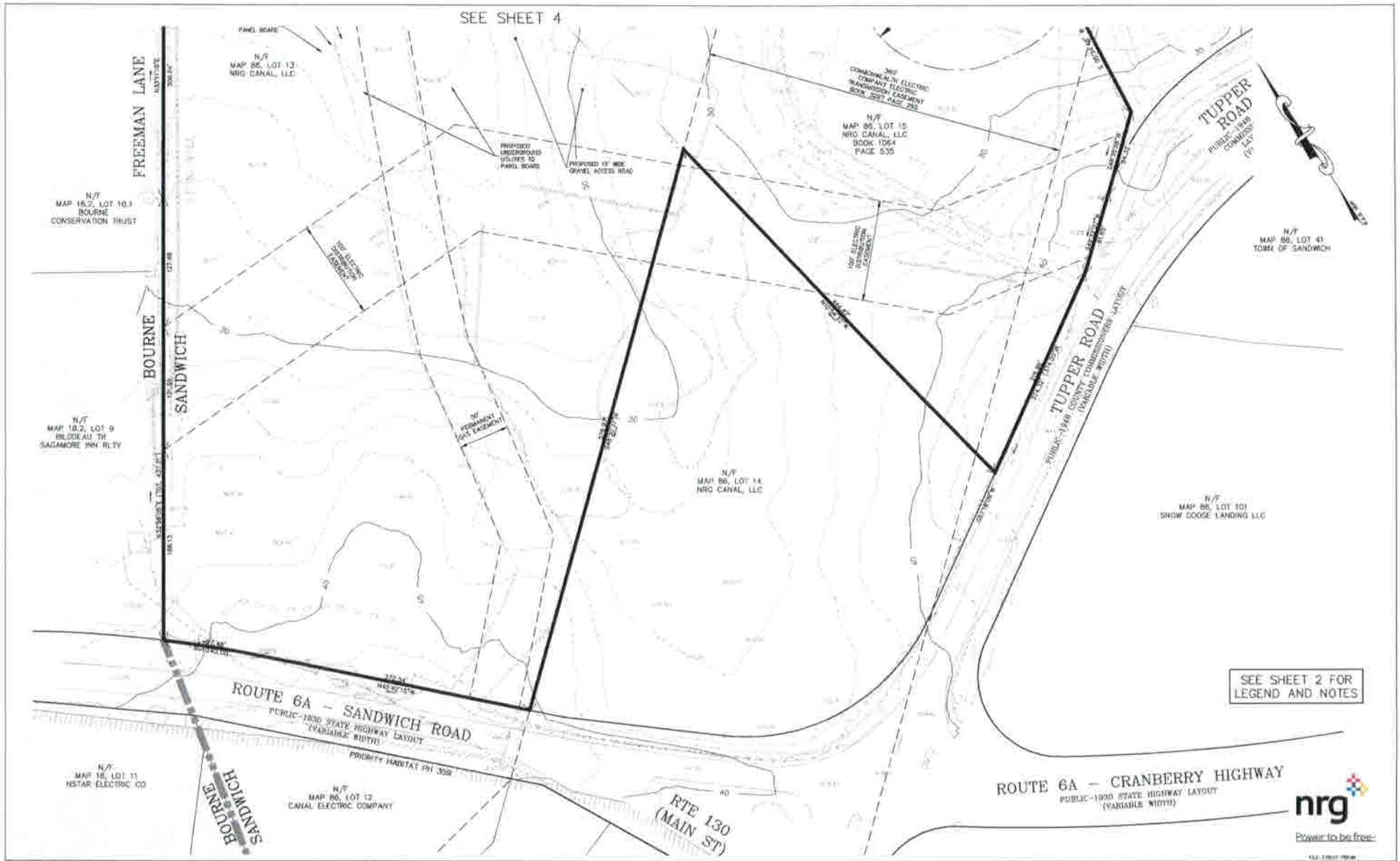
DATE

NO.	BY	DATE	REVISION

APPLICANT:
NRG RENEW CANAL 1, LLC
9 FREEZER ROAD
SANDWICH, MA 02563

OVERALL EXISTING CONDITIONS PLAN
for
CANAL COMMUNITY SOLAR PROJECT
SANDWICH, MASSACHUSETTS 02563
OCTOBER 9, 2015

Sheet 2 of 8
JOB NUMBER 2796.01



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P.O. Box 1051, Sandwich, MA 02563 (508) 888 – 9282

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Drawn by
Checked by
Survey chk. by
Approved by

SCALE
SCALE 1" = 40'

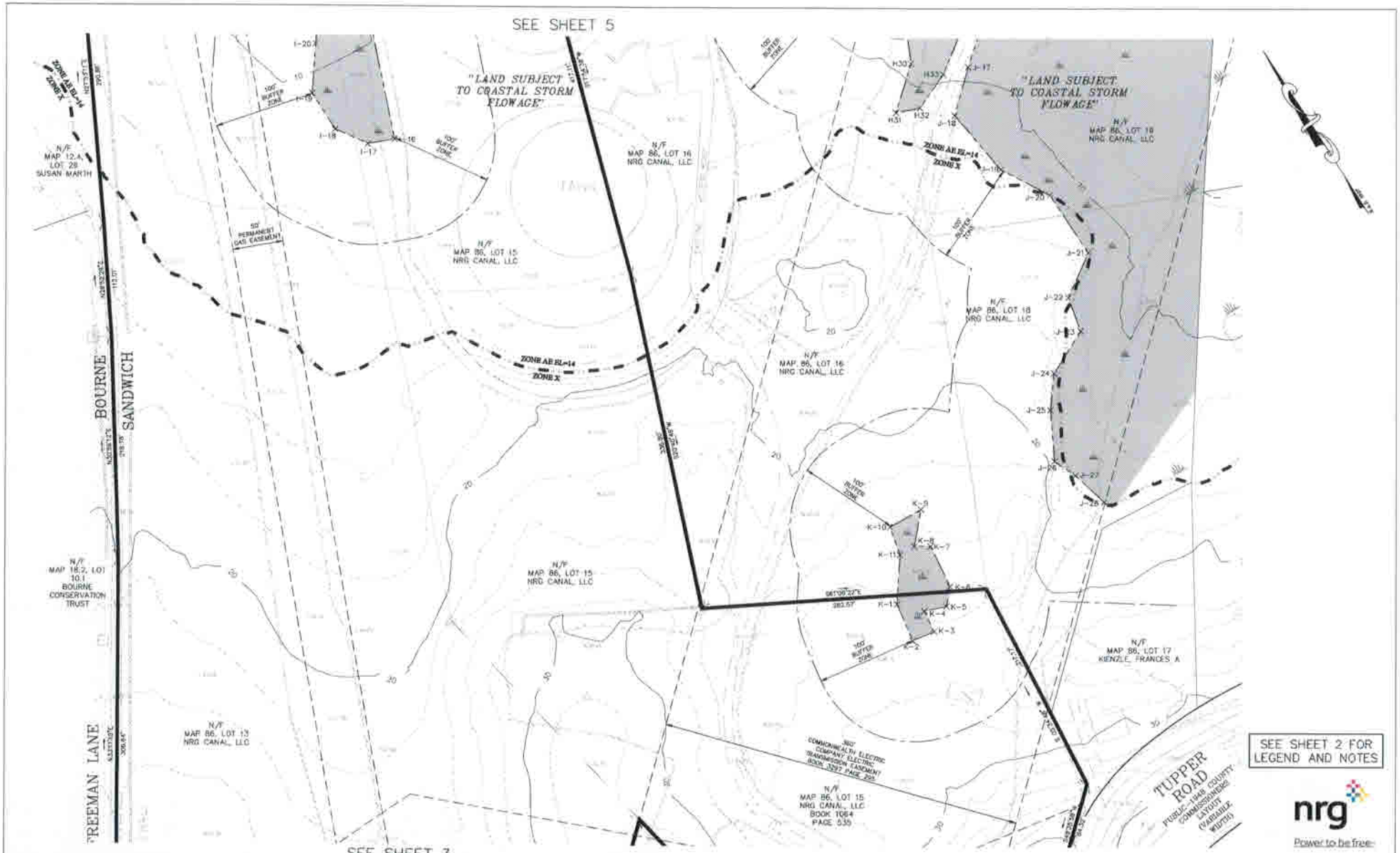
DATE

NO.	BY	DATE	REVISION

APPLICANT
NRG RENEW CANAL 1, LLC
9 FREEZER ROAD
SANDWICH, MA 02563

EXISTING CONDITIONS PLAN
FOR
CANAL COMMUNITY SOLAR PROJECT
SANDWICH, MASSACHUSETTS 02563
OCTOBER 9, 2015

Sheet 3 of 8
JOB NUMBER 2796.01



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P.O. Box 1051, Sandwich, MA 02563 (508) 888 - 9282

Designed by:
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Checked by:
Survey chk. by:
Approved by:

SCALE
SCALE 1" = 40'

DATE

NO.	BY	DATE	REVISION

APPLICANT:
NRG RENEW CANAL 1, LLC
9 FREEZER ROAD
SANDWICH, MA 02563

EXISTING CONDITIONS PLAN
FOR
CANAL COMMUNITY SOLAR PROJECT
SANDWICH, MASSACHUSETTS 02563
OCTOBER 9, 2015

Sheet 4 of 8
JOB NUMBER 2796.01

nrg
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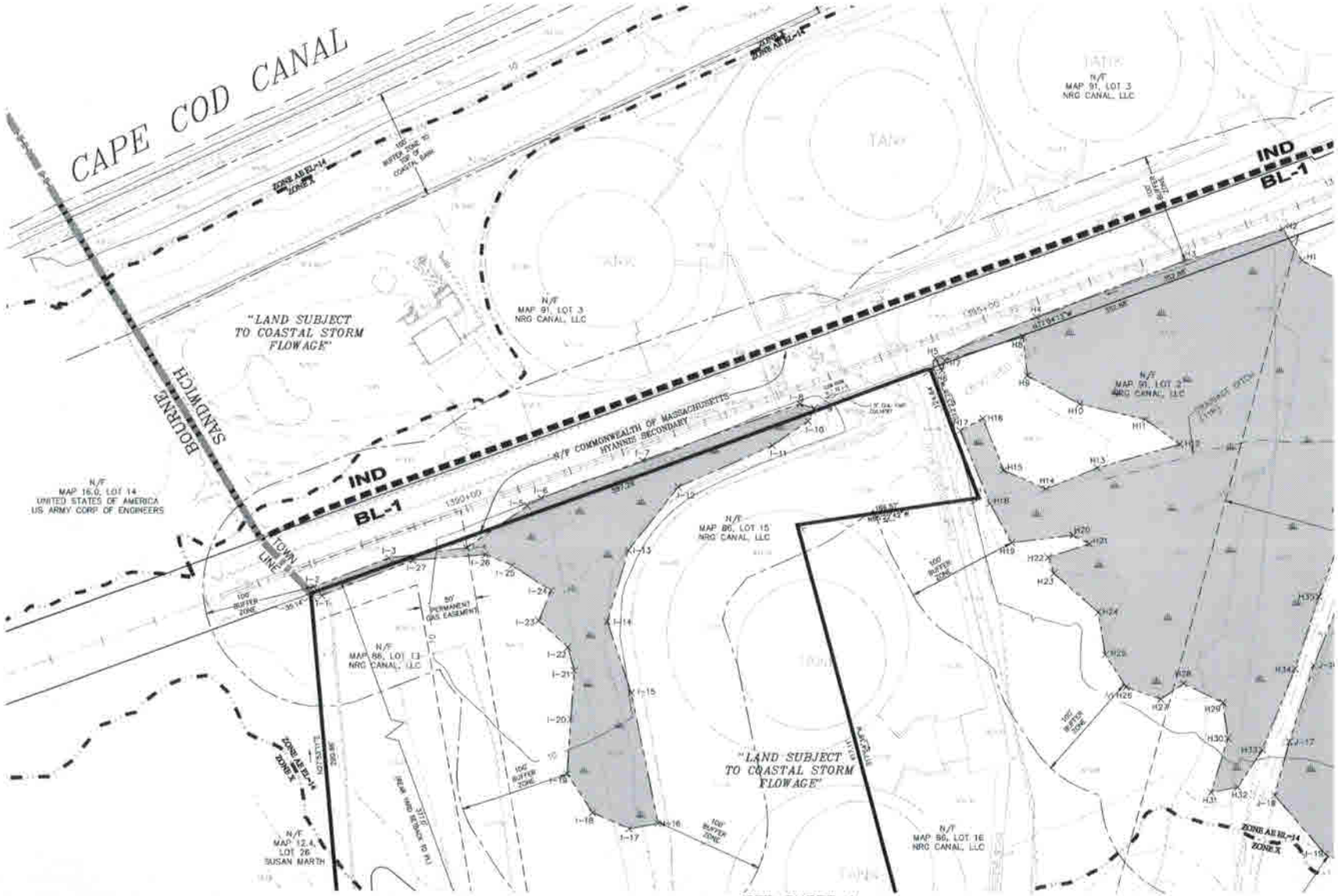


Atlantic® DESIGN ENGINEERS, INC.
P.O. Box 1051, Sandwich, MA 02563 (508) 888 - 9282

Designed by:
Drawn by:
Checked by:
Survey chk. by:
Approved by:

SCALE
SCALE 1" = 40'

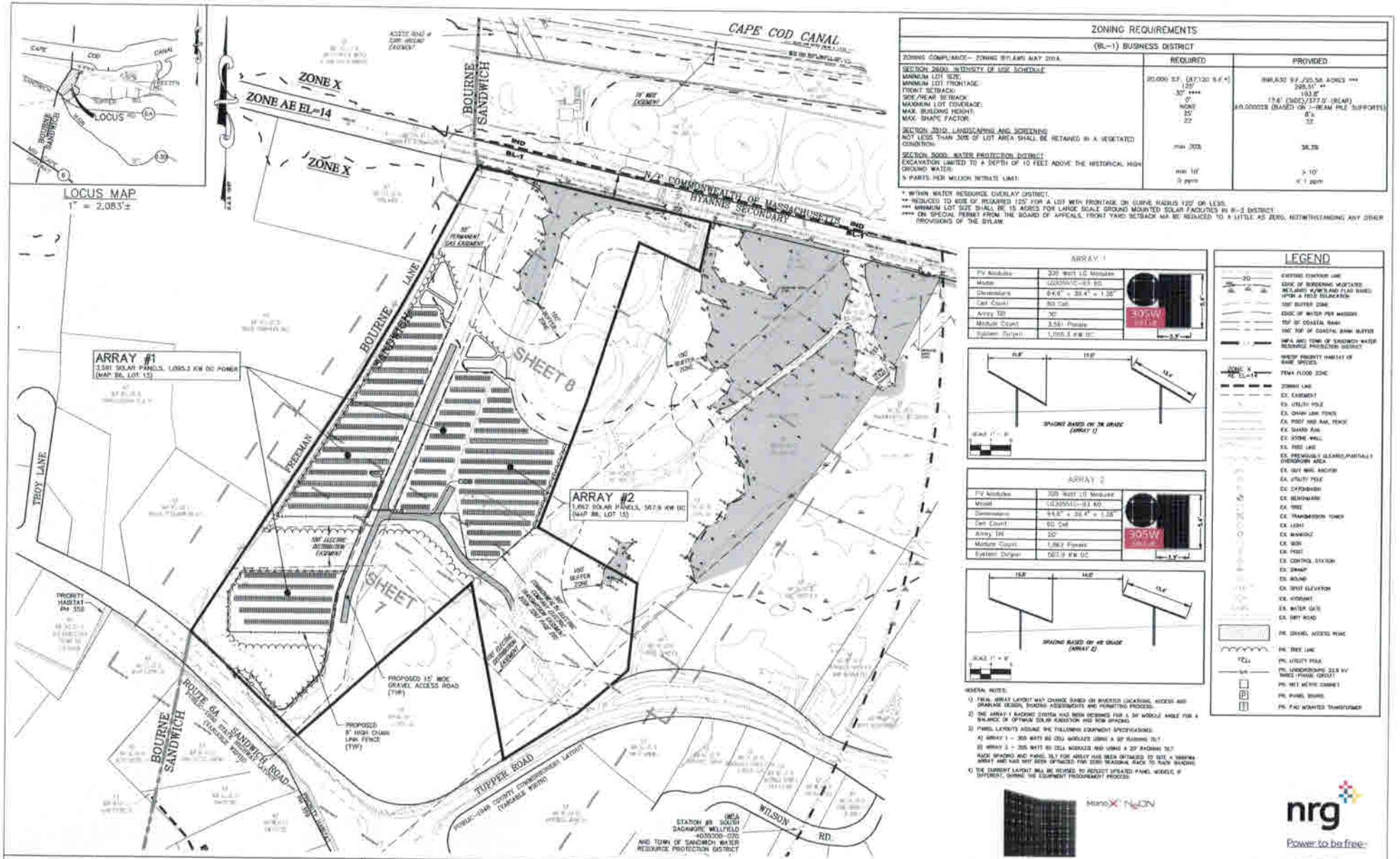
DATE

NO	BY	DATE	REVISION

APPLICANT:
NRG RENEW CANAL 1, LLC
9 FREEZER ROAD
SANDWICH, MA 02563

EXISTING CONDITIONS PLAN
for
CANAL COMMUNITY SOLAR PROJECT
SANDWICH, MASSACHUSETTS 02563
OCTOBER 9, 2015

Sheet 5 of 8
JOB NUMBER 2796.01



ZONING REQUIREMENTS

(BL-1) BUSINESS DISTRICT

ZONING COMPLIANCE- ZONING BYLAWS MAY 2014	REQUIRED	PROVIDED
SECTION 2600: INTENSITY OF USE SCHEDULE		
MINIMUM LOT SIZE:	20,000 S.F. (87,120 S.F.*)	898,630 S.F./20.58 ACRES ***
MINIMUM LOT FRONTAGE:	125'	298.51' **
FRONT SETBACK:	30' ****	183.8'
SIDE/REAR SETBACK	0'	17.4' (SIDE)/377.0' (REAR)
MAXIMUM LOT COVERAGE:	NONE	±0.000028 (BASED ON I-BEAM PILE SUPPORTS)
MAX. BUILDING HEIGHT:	35'	8'±
MAX. SHAPE FACTOR:	22	12
SECTION 3510: LANDSCAPING AND SCREENING		
NOT LESS THAN 30% OF LOT AREA SHALL BE RETAINED IN A VEGETATED CONDITION:	min 30%	38.3%
SECTION 5000: WATER PROTECTION DISTRICT		
EXCAVATION LIMITED TO A DEPTH OF 10 FEET ABOVE THE HISTORICAL HIGH GROUND WATER:	min 10'	> 10'
5 PARTS PER MILLION NITRATE LIMIT:	5 ppm	< 1 ppm

* WITHIN WATER RESOURCE OVERLAY DISTRICT.
** REDUCED TO 80% OF REQUIRED 125' FOR A LOT WITH FRONTAGE ON CURVE RADIUS 120' OR LESS.
*** MINIMUM LOT SIZE SHALL BE 15 ACRES FOR LARGE SCALE GROUND MOUNTED SOLAR FACILITIES IN R-3 DISTRICT.
**** ON SPECIAL PERMIT FROM THE BOARD OF APPEALS, FRONT YARD SETBACK MAY BE REDUCED TO A LITTLE AS ZERO, NOTWITHSTANDING ANY OTHER PROVISIONS OF THE BYLAW.

ARRAY 1

PV Modules	305 Watt LG Modules
Model	LG305N1C-G3 BG
Dimensions	64.6" x 39.4" x 1.38"
Cell Count	60 Cell
Array Tilt	30°
Module Count	3,591 Panels
System Output	1,095.3 KW DC

ARRAY 2

PV Modules	305 Watt LG Modules
Model	LG305N1C-G3 BG
Dimensions	64.6" x 39.4" x 1.38"
Cell Count	60 Cell
Array Tilt	20°
Module Count	1,857 Panels
System Output	567.9 KW DC

GENERAL NOTES:
1) FINAL ARRAY LAYOUT MAY CHANGE BASED ON WHERVER LOCATIONS, ACCESS AND DRAINAGE DESIGN, SHADING ASSESSMENTS AND PERMITTING PROCESS.
2) THE ARRAY 1 RACKING SYSTEM HAS BEEN DESIGNED FOR A 30° MODULE ANGLE FOR A BALANCE OF OPTIMUM SOLAR RADIATION AND ROW SPACING.
3) PANEL LAYOUTS ASSUME THE FOLLOWING EQUIPMENT SPECIFICATIONS:
A) ARRAY 1 – 305 WATT 60 CELL MODULES USING A 30° RACKING TILT
B) ARRAY 2 – 305 WATT 60 CELL MODULES AND USING A 20° RACKING TILT
RACK SPACING AND PANEL TILT FOR ARRAY HAS BEEN OPTIMIZED TO SIZE X SHADING ARRAY AND HAS NOT BEEN OPTIMIZED FOR ZERO SEASONAL RACK TO RACK SHADING
4) THE CURRENT LAYOUT WILL BE REVISED TO REFLECT UPDATED PANEL MODELS IF DIFFERENT, DURING THE EQUIPMENT PROCUREMENT PROCESS.

LEGEND

- EXISTING CONTOUR LINE
- EDGE OF BORDERING VEGETATED WETLAND W/WETLAND FLAG BASED UPON A FIELD DELINEATION
- 100' BUFFER ZONE
- EDGE OF WATER PER MASSGIS
- TOP OF COASTAL BANK
- 100' TOP OF COASTAL BANK BUFFER
- MEA ARC TOWN OF SANDWICH WATER RESOURCE PROTECTION DISTRICT
- PRIORITY HABITAT OF RARE SPECIES
- ZONE X / AE EL=14 FEMA FLOOD ZONE
- ZONING LINE
- EX. EASEMENT
- EX. UTILITY POLE
- EX. CHAIN LINK FENCE
- EX. POST AND RAIL FENCE
- EX. GUARD RAIL
- EX. STONE WALL
- EX. TREE LINE
- EX. PREVIOUSLY CLEARED/PARTIALLY OVERGROWN AREA
- EX. GUY WIRE ANCHOR
- EX. UTILITY POLE
- EX. CATCHBASIN
- EX. BENCHMARK
- EX. TREE
- EX. TRANSMISSION TOWER
- EX. LIGHT
- EX. MANHOLE
- EX. SIGN
- EX. POST
- EX. CONTROL STATION
- EX. DRAINAGE
- EX. BOUND
- EX. SPOT ELEVATION
- EX. HYDRANT
- EX. WATER GATE
- EX. DIRT ROAD
- PR. GRAVEL ACCESS ROAD
- PR. TREE LINE
- PR. UTILITY POLE
- PR. UNDERGROUND 23.9 kV THREE-PHASE CIRCUIT
- PR. NET METER CABINET
- PR. PANEL BOARD
- PR. PAD MOUNTED TRANSFORMER

MaxeonX N-type

nrg
Power to be free

Atlantic® DESIGN ENGINEERS, INC.
P.O. Box 1051, Sandwich, MA 02563 (508) 888 - 9282

Designed by:
Drawn by:
Checked by:
Survey crk. by:
Approved by:

SCALE
SCALE 1" = 100'

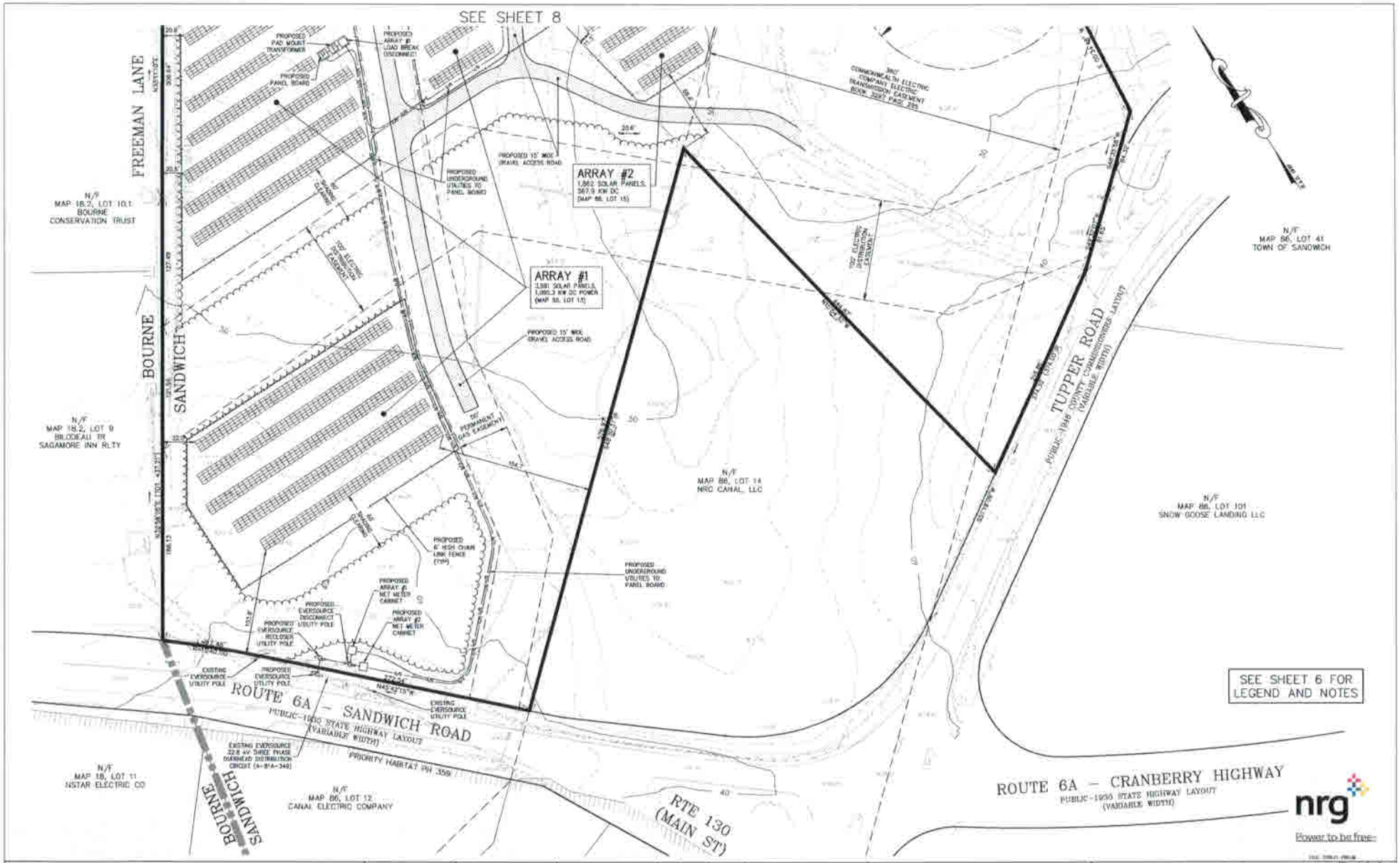
NO.	BY	DATE	REVISION

DATE

APPLICANT:
NRG RENEW CANAL 1, LLC
9 FREEZER ROAD
SANDWICH, MA 02563

OVERALL SITE DEVELOPMENT PLAN
FOR
CANAL COMMUNITY SOLAR PROJECT
SANDWICH, MASSACHUSETTS 02563
OCTOBER 9, 2015

Sheet 6 of 8
JOB NUMBER 2796.01



Atlantic® DESIGN ENGINEERS, INC.
P.O. Box 1051, Sandwich, MA 02563 (508) 888 – 9282

Designed by
Drawn by
Checked by
Survey rev. by
Approved by

SCALE
SCALE 1" = 40'

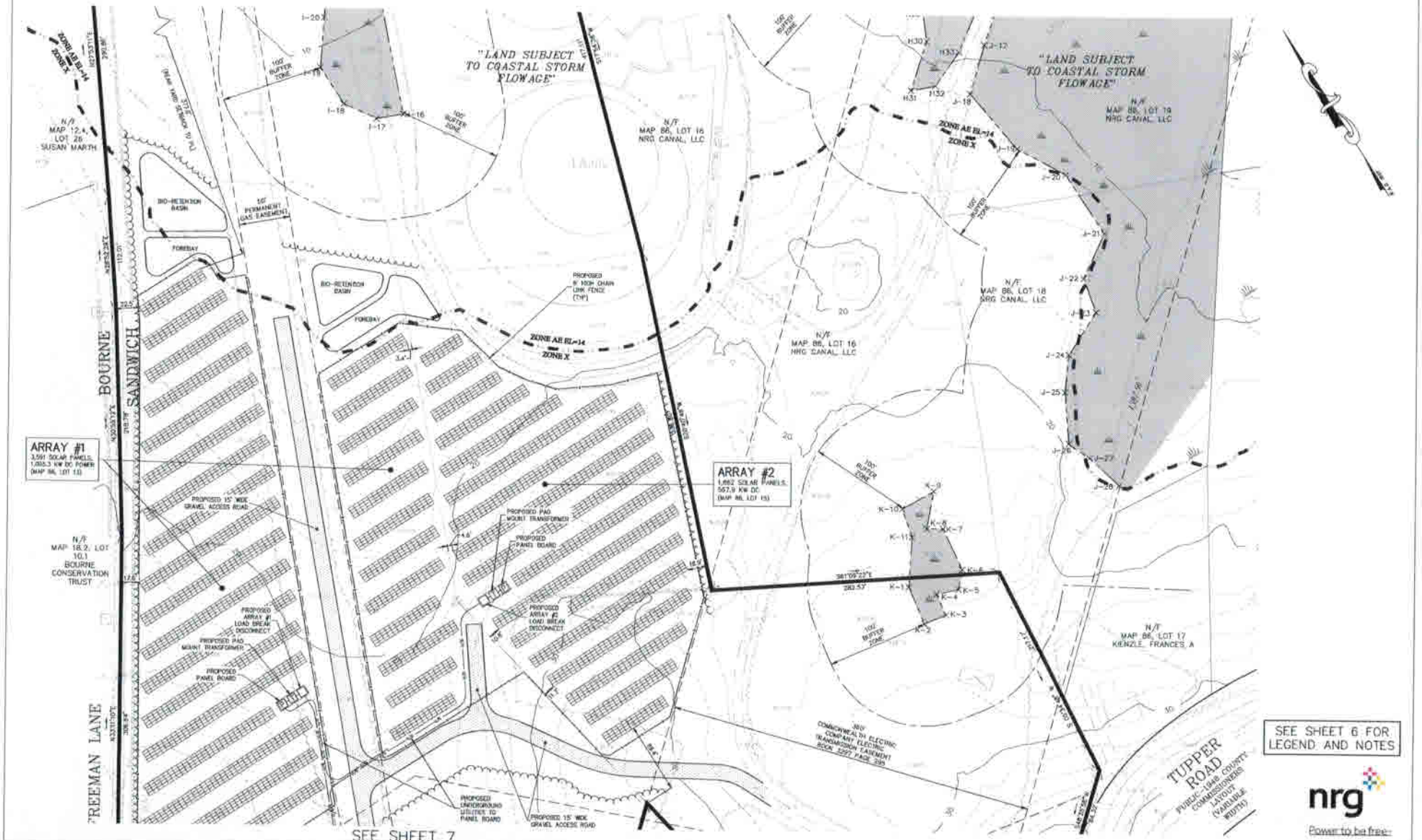
DATE

NO.	BY	DATE	REVISION

APPLICANT:
NRG RENEW CANAL 1, LLC
9 FREEZER ROAD
SANDWICH, MA 02563

SITE VICINITY PLAN
FOR
CANAL COMMUNITY SOLAR PROJECT
SANDWICH, MASSACHUSETTS 02563
OCTOBER 9, 2015

Sheet 7 of 8
JOB NUMBER 2796.01



Atlantic® DESIGN ENGINEERS, INC.
P.O. Box 1051, Sandwich, MA 02563 (508) 888 - 9282

Designed by:
Drawn by:
Checked by:
Survey info. by:
Approved by:

SCALE
SCALE 1" = 40'
0 20 40 80

DATE

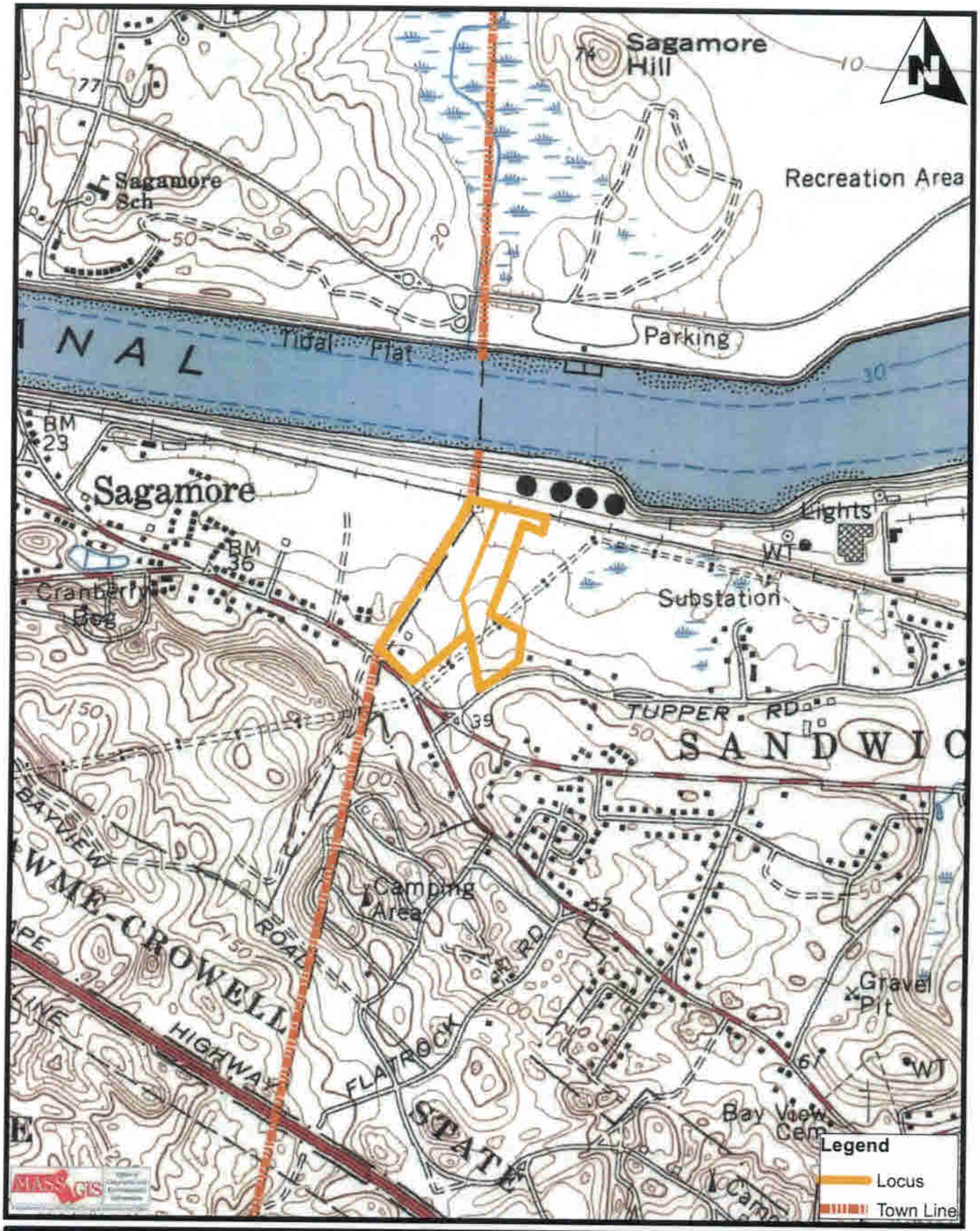
NO.	BY	DATE	REVISION

APPLICANT:
NRG RENEW CANAL 1, LLC
9 FREEZER ROAD
SANDWICH, MA 02563

SITE VICINITY PLAN
FOR
CANAL COMMUNITY SOLAR PROJECT
SANDWICH, MASSACHUSETTS 02563
OCTOBER 9, 2015

Sheet 8 of 8
JOB NUMBER 2796.01

nrg
Power to be free



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508-888-9282

USGS Map

Canal Community Solar Project
Sandwich, Massachusetts

Approx. Scale
1 "=1,000 '
1:12,000

September 24, 2015

Figure

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Aerial Map

Canal Community Solar Project
Sandwich, Massachusetts

Approx. Scale
1 "=400 '
1:4,800

September 24, 2015

Figure

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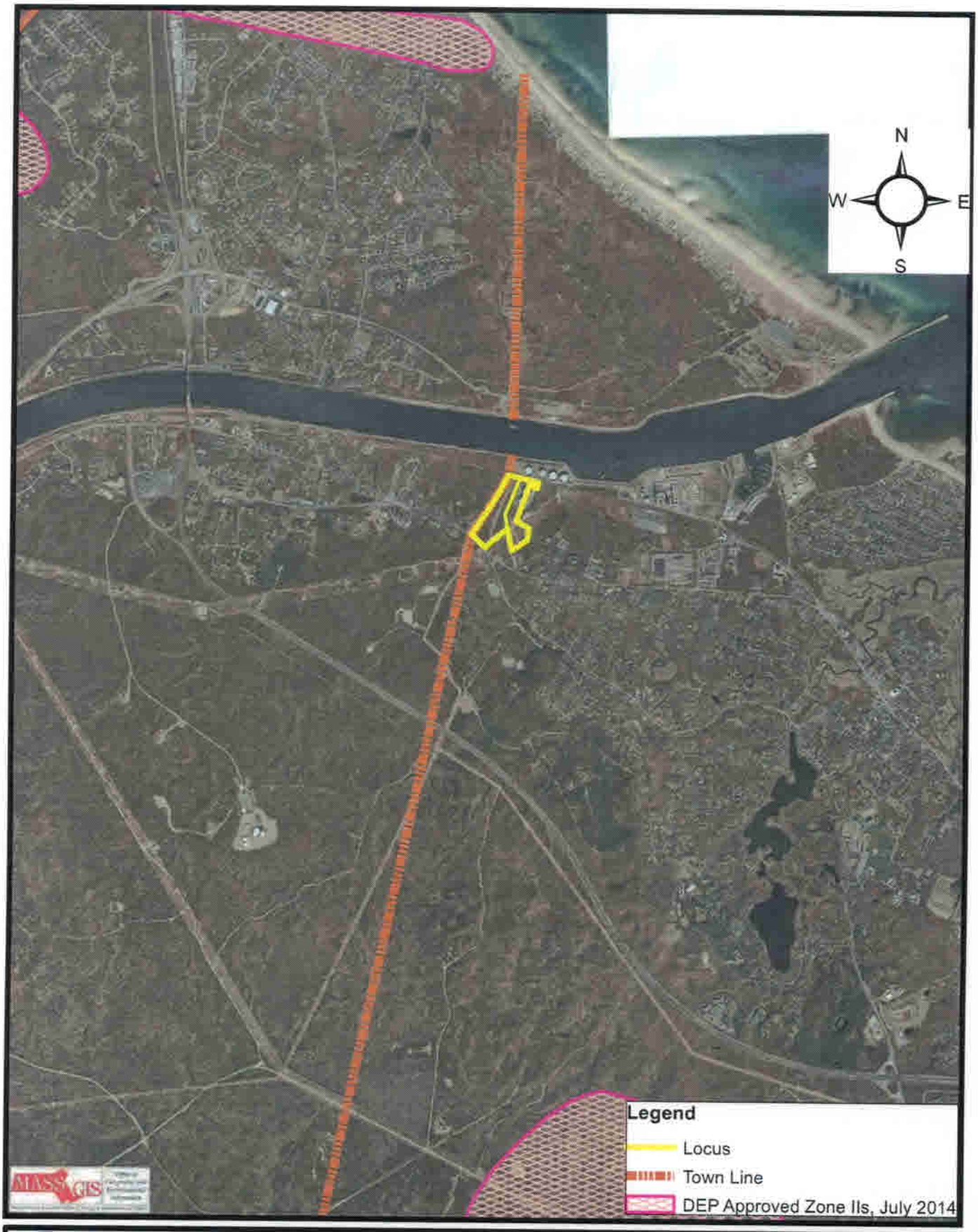
Potential Public Water Supply Areas

Canal Community Solar Project
Sandwich, Massachusetts

Approx. Scale
1 "=1,000 '
1:12,000

September 24, 2015

Figure



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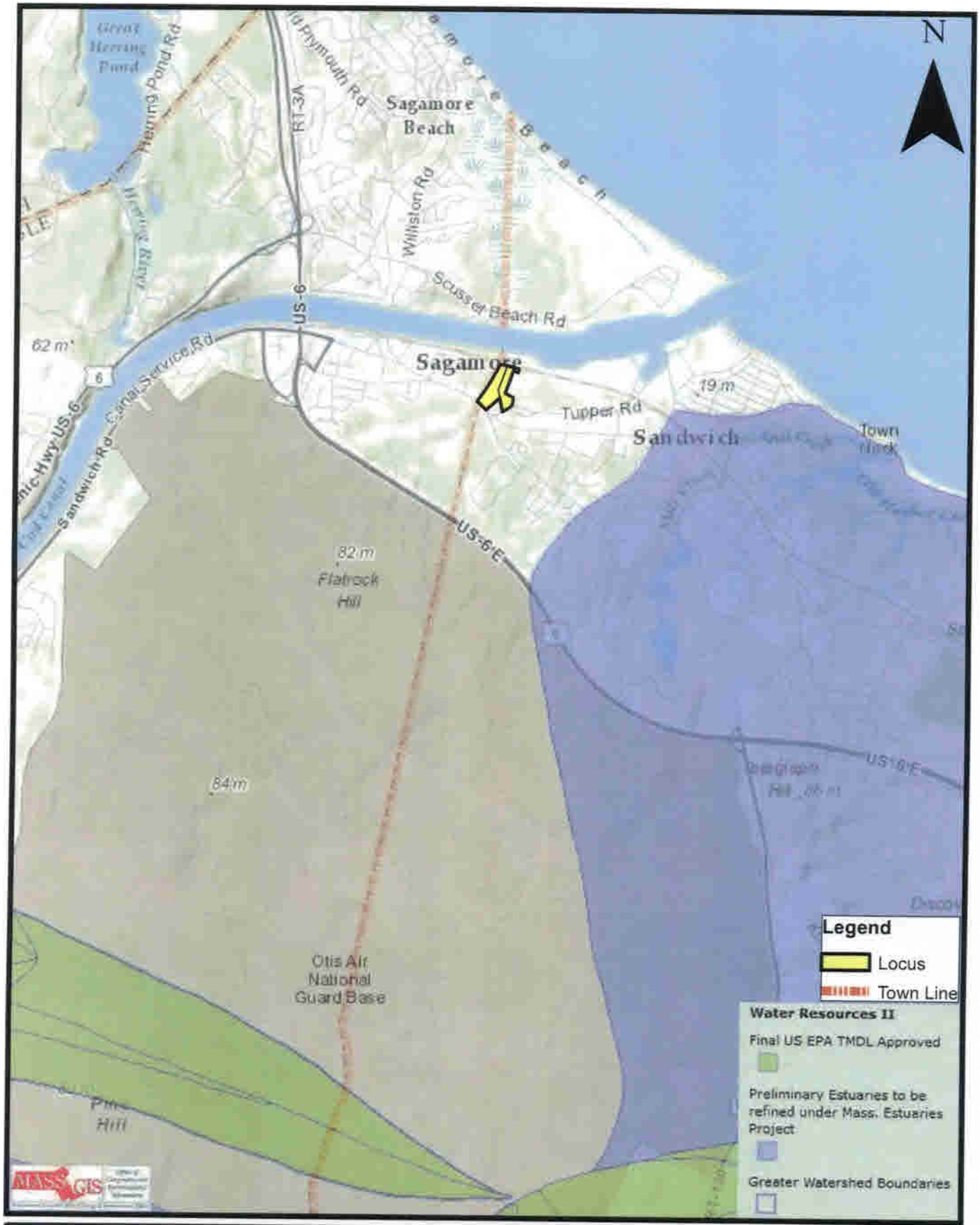
Wellhead Protection Areas (Zone II)

Canal Community Solar Project
Sandwich, Massachusetts

Approx. Scale
1 "=2,500 '
1:30,000

September 24, 2015

Figure



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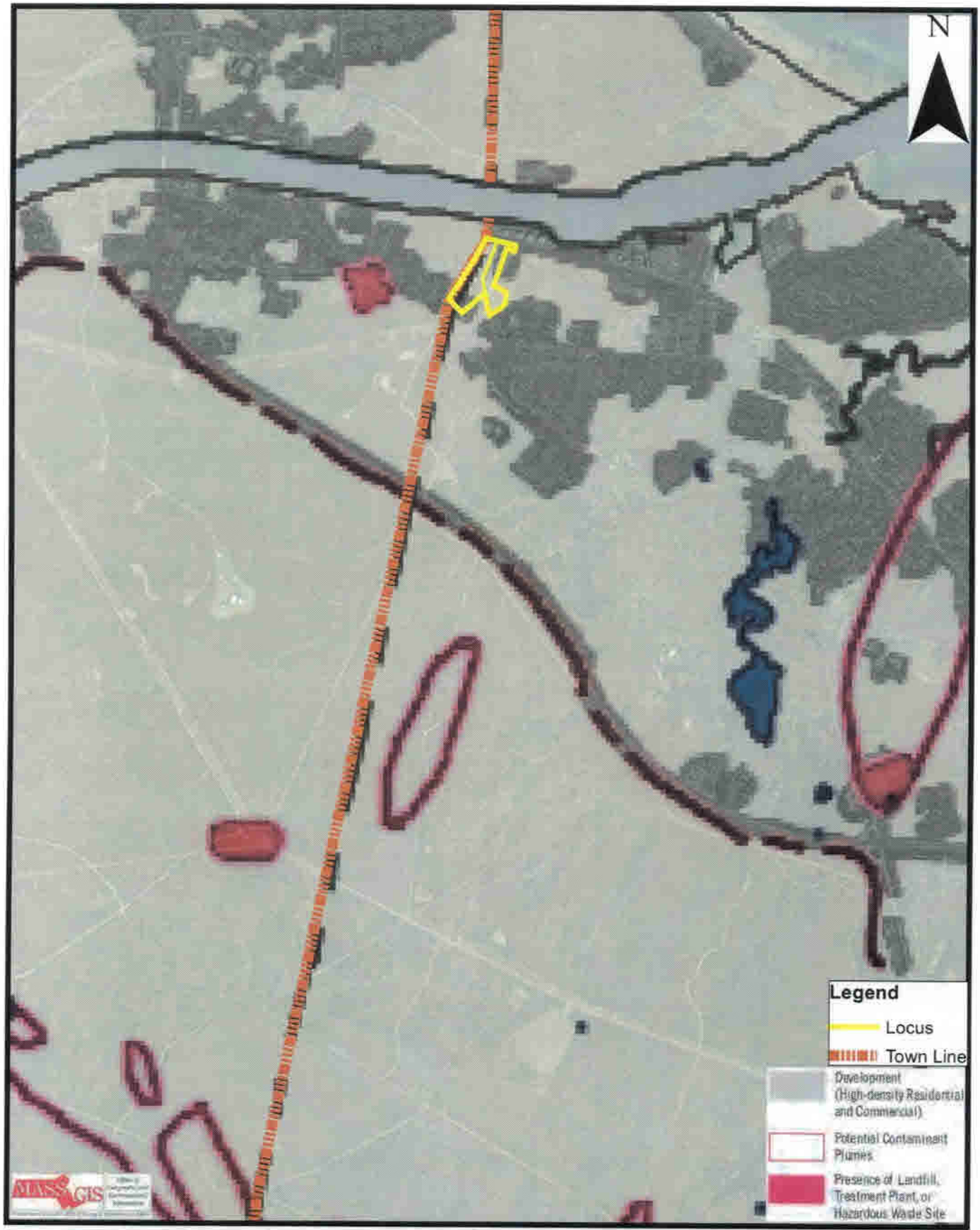
Marine Water Recharge Areas

Canal Community Solar Project
Sandwich, Massachusetts

Approx. Scale
1 "=4,000 '
1:48,000

September 24, 2015

Figure



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Design Engineers, Inc.
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508-888-9282

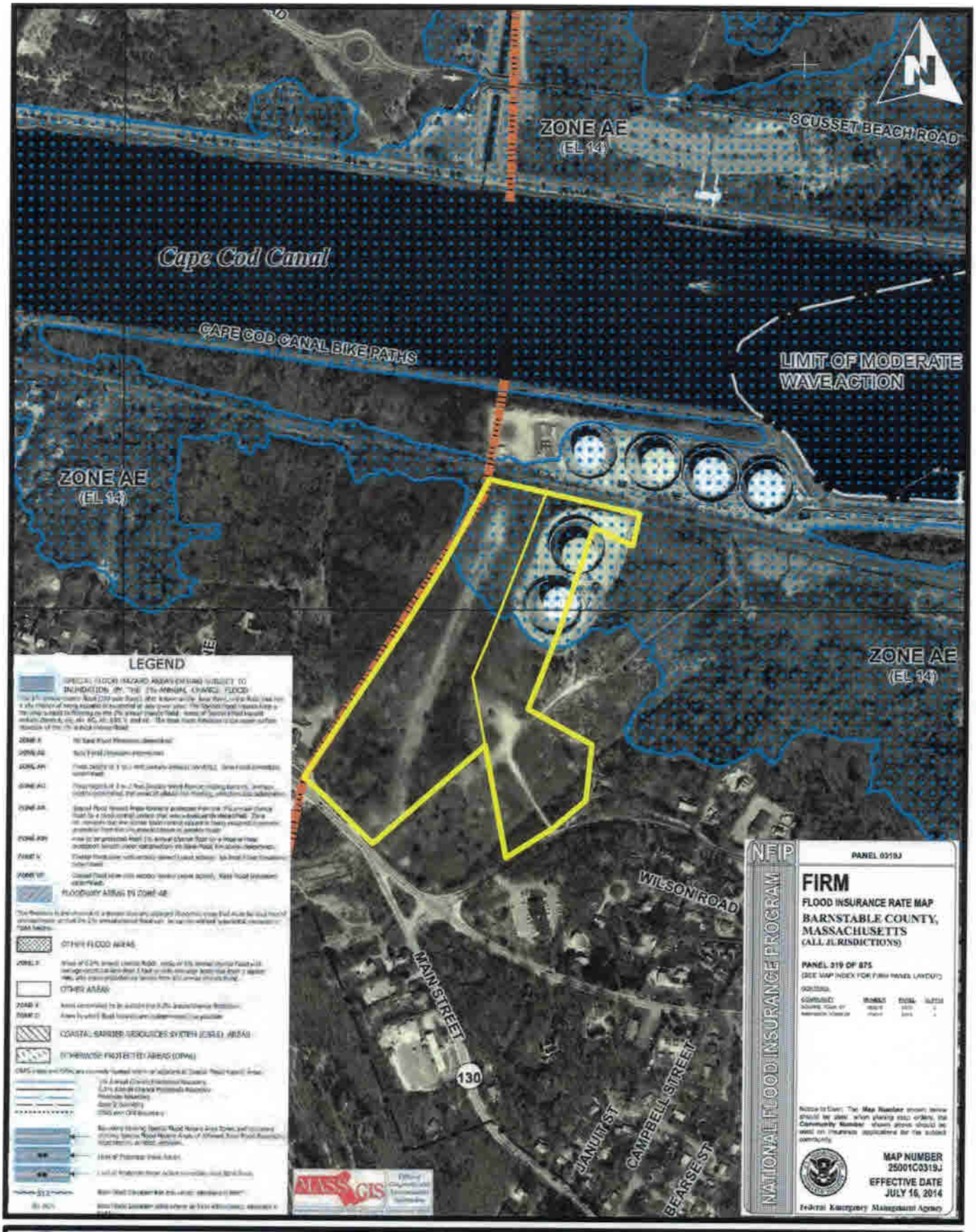
Water Quality Impaired Areas

Canal Community Solar Project
Sandwich, Massachusetts

Approx. Scale
1 "=2,500 '
1:30,000

September 24, 2015

Figure



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Flood Zones

Canal Community Solar Project
Sandwich, Massachusetts

Approx. Scale
1 "=500 '
1:6,000

September 24, 2015

Figure

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Wetlands

Canal Community Solar Project
Sandwich, Massachusetts

Approx. Scale
1 "=500 '
1:6,000

September 24, 2015

Figure

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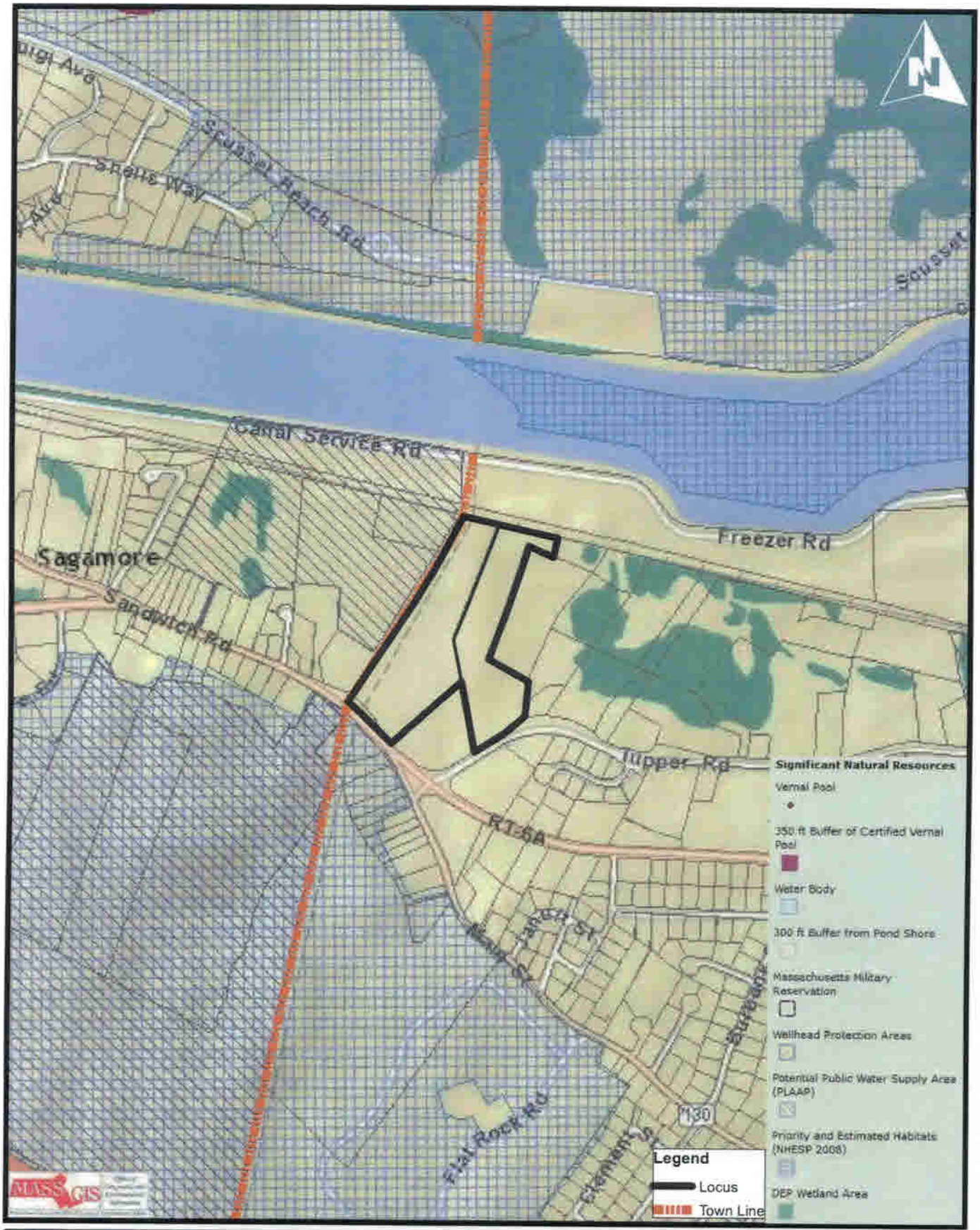
Prime Farmland Soil

Canal Community Solar Project
Sandwich, Massachusetts

Approx. Scale
1 "=500 '
1:6,000

September 24, 2015

Figure



Atlantic Design Engineers, Inc.
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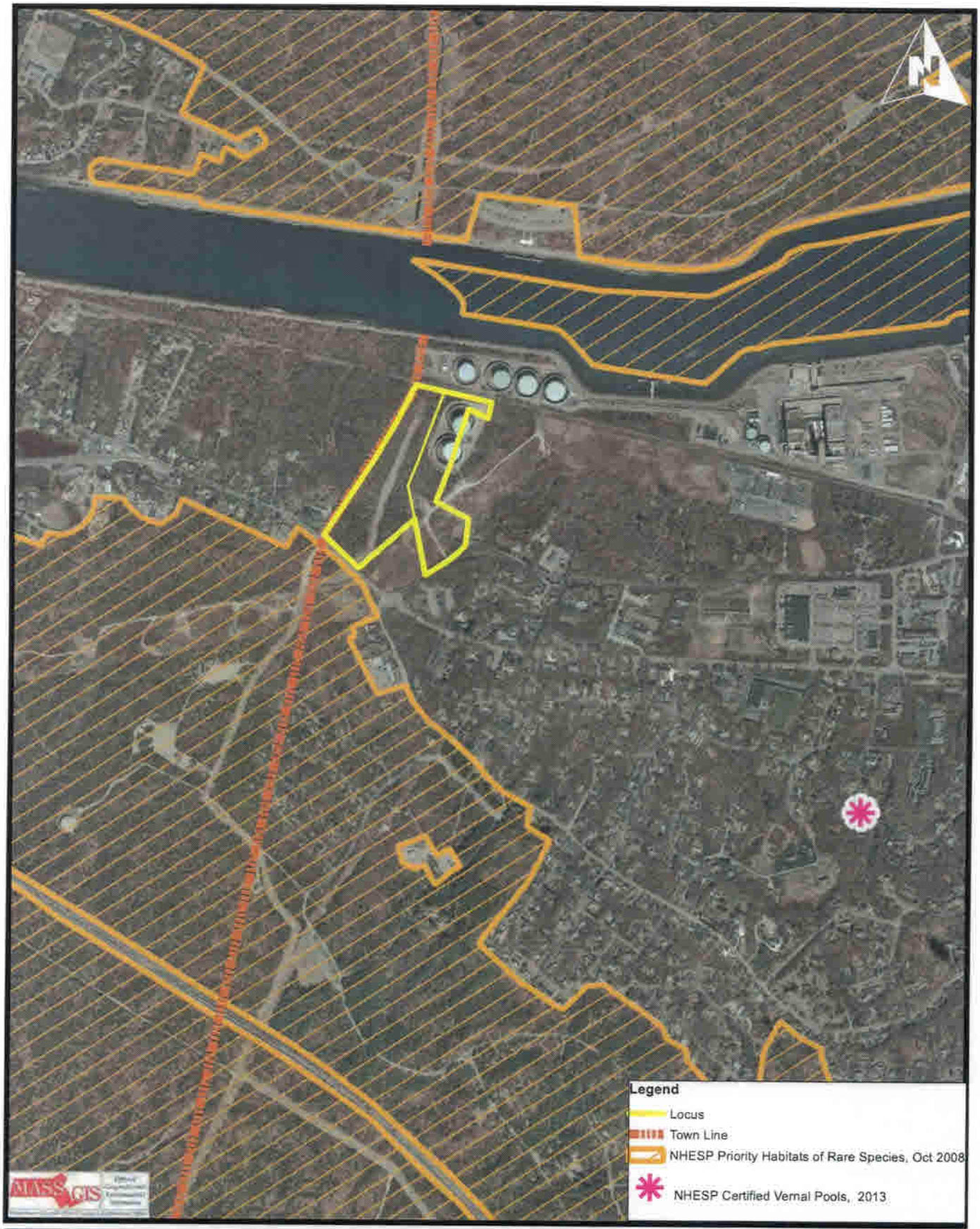
Significant Natural Resource Areas

Canal Community Solar Project
Sandwich, Massachusetts

Approx. Scale
1 "=800 '
1:9,600

September 24, 2015

Figure



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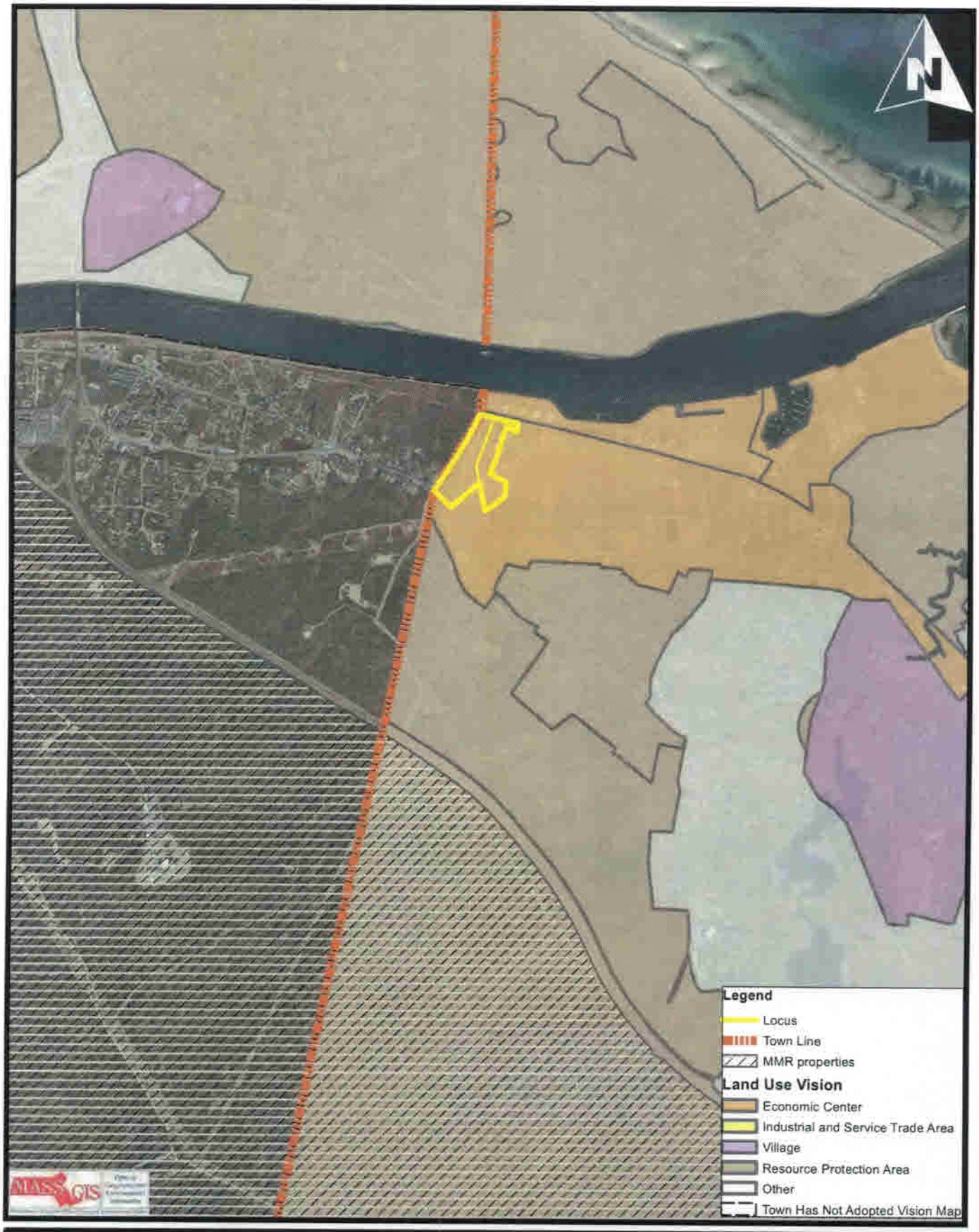
NHESP Priority Habitats of Rare Species and Certified Vernal Pools

Canal Community Solar Project
Sandwich, Massachusetts

Approx. Scale
1 "=1,000 '
1:12,000

September 24, 2015

Figure



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508-888-9282

Economic Center
(From Land Use Vision Map)

Canal Community Solar Project
Sandwich, Massachusetts

Approx. Scale
1 "=2,000 '
1:24,000

September 24, 2015

Figure

B

LIMITED DRI REVIEW - SCOPING CHECKLIST
NEW DEVELOPMENT

Land Use	Question	Required Info	Yes	No
Compact Growth and Resource Protection	Is the project consistent with the land use categories and their characteristics? (check "Yes" if Town has not adopted a Land Use Vision Map)	RPP Regional Land Use Vision Map which shows project site	☒	☐
Compact Growth and Resource Protection	Is the development clustered on the site?	Preliminary project plans, Local zoning	☒	☐
Capital Facilities and Infrastructure	Does the project create new infrastructure?	Preliminary project plans	☐	☒
Capital Facilities and Infrastructure	Does the project propose to construct a new wireless facility?	Preliminary project plans	☐	☒
Rural Lands	Is the project site adjacent to rural landscapes or land under active agricultural production?	Staff consultation/Preliminary project plans showing prime agricultural lands	☐	☒
Rural Lands	Is the land capable of sustained agricultural production as evidenced by recent use, soils, or adjacent land use?	Staff consultation/Preliminary project plans showing prime agricultural lands	☐	☒
Water Resources	**Question**	**Required Info**	**Yes**	**No**
Drinking Water Quality and Quantity, Marine Water Embayments and Estuaries, Freshwater Ponds and Lakes	Is the project located in a Wellhead Protection Area, Potential Public Water Supply Area, Marine Water Recharge Area, or Fresh Water Recharge Area?	Site locus map showing watersheds described by Water Resources Classifications Maps I & II	☐	☒
Public and Private Sewage Treatment Facilities	Is the project's wastewater facility an on-site septic system or private treatment plant?	Preliminary project plans	☐	☒
General Aquifer Protection	Does the project's nitrogen load from wastewater, stormwater and turf exceed 5 parts per million?	Nitrogen loading calculations per Technical Bulletin 91-001	☐	☒
Stormwater Management	Does the project incorporate Low Impact Design stormwater treatment to the greatest extent possible?	Engineered grading, drainage, and erosion control plans that show existing and proposed conditions and stormwater design details	☒	☐
Stormwater Management	Does the project have a comprehensive engineer-certified Operations and Maintenance Plan (Plan) that 1) demonstrates compliance with the Massachusetts Stormwater Policy & Guidelines 2) provides a schedule for inspection, monitoring and maintenance 3) identifies the parties responsible for Plan implementation and 4) includes an inspection and maintenance log	Copy of project's Stormwater Operation and Maintenance Plan	☒	☐
Coastal Resources	**Question**	**Required Info**	**Yes**	**No**
Protecting Maritime Industry, Character and Public Access	Does the project involve a new or expanded non-water dependent use within a working waterfront or within 250 feet of the mean high water line?	Preliminary project plans	☐	☒
Protecting Maritime Industry, Character and Public Access	Does the project restrict or impede public access to the shoreline?	Preliminary project plans	☐	☒
Protecting Maritime Industry, Character and Public Access	Does the project limit views of the ocean and/or shoreline from public ways, waterways, access points, and existing development relative to existing conditions?	Preliminary project plans	☐	☒
Coastal Hazard Mitigation	Does the project involve any new construction or site disturbance in or within 100 feet of: land subject to coastal storm flowage, barrier beach, coastal dune, or coastal bank?	Preliminary project plans indicting flood zone boundary, and Resource Area Delineation through local Conservation Commission	☒	☐
Preserving Coastal Water Quality and Habitat	Does the project involve any alteration of or propose new development in a coastal wetland or its 100 foot buffer zone?	Resource Area Delineation through local Conservation Commission	☒	☐

See discussion of Water Resources Item 3 & Appendix E & F.

See discussion of Coastal Resources & Wetlands Items 4 & 5 and Appendix A Site Plan.

Responses in the shaded boxes may be included in the scope of Commission review. Consultation with Commission staff recommended.

LIMITED DRI REVIEW - SCOPING CHECKLIST
NEW DEVELOPMENT

Wetlands/Wildlife & Plant Habitat	Question	Required Info	Yes	No	
Wetlands	Does the project involve any alteration of a wetland that is greater than 500 square feet in size or to a vernal pool?	Resource Area Delineation through local Conservation Commission	☐	☒	
Wetlands	Does the project involve any alteration of a 100 foot buffer to a wetland that is greater than 500 square feet in size?	Resource Area Delineation through local Conservation Commission	☐	☒	
Wetlands	Does the project involve any alteration of a 350 foot buffer to a vernal pool?	Resource Area Delineation through local Conservation Commission	☐	☒	
Wetlands	Will the project result in any direct stormwater discharge within 100 feet of a wetland or waterbody of 500 square feet in size or a vernal pool?.	Preliminary project plans	☐	☒	
Wildlife & Plant Habitat	Will the project disturb or alter naturally vegetated areas?	Existing Conditions Plan	☒	☐	
Wildlife & Plant Habitat	Is the project site mapped as Estimated or Priority rare species habitat by the Massachusetts Natural Heritage & Endangered Species Program (NHESP)?	NHESP Atlas	☐	☒	See Appendix G.
Open Space Protection & Recreation	**Question**	**Required Info**	**Yes**	**No**	
Open Space & Recreation	Is the project located outside an Economic Center? (Check "Yes" if Town has not adopted a Land Use Vision Map)	RPP Regional Land Use Vision map	☐	☒	See discussion Open Space Item 7 and Appendix D & E.
Open Space & Recreation	Is the project located within a Significant Natural Resource Area (SNRA)?	SNRA Map, Preliminary project plans	☐	☒	
Open Space & Recreation	Outside of SNRA, will the project disturb or alter more than 2 acres of land?	SNRA Map, Preliminary project plans	☒	☐	
Energy	**Question**	**Required Info**	**Yes**	**No**	
Energy	Has the project been designed to meet LEED Certification?	Design information or LEED Certification Checklist	☐	☐	N/A
Energy	Is the project Mixed Use as defined by the Regional Policy Plan?	Project description, RPP definition of Mixed Use	☐	☒	
Energy	Is the project located in an Economic Center? (check "No" if Town has not adopted a Land Use Vision Map)	RPP Regional Land Use Vision Map which shows project site	☒	☐	
Economic Development	**Question**	**Required Info**	**Yes**	**No**	
Low Impact and Compatible Development	Is the project located outside an Economic Center or an Industrial Service & Trade Area? (check "Yes" if Town has not adopted a Land Use Vision Map)	RPP Regional Land Use Vision Map which shows project site	☐	☒	
Low Impact and Compatible Development	If located in an Industrial Service & Trade Area, will this project accommodate non-industrial uses as defined in the Regional Policy Plan? (check "Yes" if Town has not adopted a Land Use Vision Map)	Statement from Applicant	☐	☐	N/A
Low Impact and Compatible Development	Is the project located in a resource-based economically productive area?	Existing Conditions Plan, Assessors Data	☐	☒	
Balanced Economy	Does the development involve Class III gaming?	Preliminary project plans	☐	☒	
Infrastructure Capacity	Will the project develop new infrastructure as defined in the Regional Policy Plan?	Preliminary project plans	☐	☒	
Affordable Housing	**Question**	**Required Info**	**Yes**	**No**	
Affordable Housing (Residential Projects)	Does the project include 10 or more units/lots in a Town that has an affordable housing bylaw under which this project will be permitted?	Project affordable housing narrative, Local affordable housing bylaw	☐	☒	
Equal Opportunity	Does the project include 10 or more units/lots in a Town that has an affordable housing bylaw under which this project will be permitted?	Project affordable housing narrative, Local affordable housing bylaw	☐	☒	
Community Participation (Commercial Projects)	Does the project involve additional commercial development?	Preliminary project plans	☐	☒	

Responses in the shaded boxes may be included in the scope of Commission review. Consultation with Commission staff recommended.

LIMITED DRI REVIEW - SCOPING CHECKLIST
NEW DEVELOPMENT

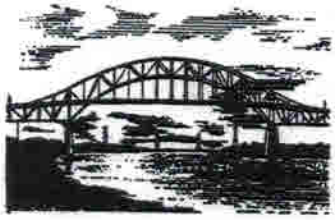
Transportation	Question	Required Info	Yes	No	
Congestion Management	Will the project generate more than 250 new daily trips?	ITE Trip Generation Manual	☐	☒	See Discussion Transportation Items 11 and Appendix I.
Transportation Balance & Efficiency	Will the project generate more than 250 new daily trips?	ITE Trip Generation Manual	☐	☒	
Safety	Does the project have direct access on or does the project directly abut a regional roadway?	Cape Cod Metropolitan Planning Organization functional classification	☒	☐	
Safety	Will the project generate more than 25 new peak hour trips at a high crash location?	State / Local crash data	☐	☒	
Heritage Preservation & Community Character	**Question**	**Required Info**	**Yes**	**No**	
Historic Structures / Cultural & Archaeological Resources	Is the building and/or site listed on the National Register of Historic Places or within a National or Local Historic District?	Historic District Map	☒	☐	Site located in OKH
Historic Structures / Cultural & Archaeological Resources	Is any part of the site known to be archaeologically significant or archaeologically sensitive, including areas within 100 feet of a wetland or water body?	Massachusetts Historical Commission consultation, Resource Area Delineation through local Conservation Commission	☐	☒	
Historic Structures / Cultural & Archaeological Resources	Is there a building or structure on the property, which is more than 75 years old or known to be historically significant?	Local Historical Commission / staff consultation	☐	☒	
Site & Building Design	Is the development proposed within a distinctive area, such as a historic district, along a scenic road, cultural landscape, regional road or shoreline?	Staff consultation	☒	☐	See discussion of Historic Preservation Item 12, Appendix H.
Site & Building Design	Outside of distinctive areas, does the project consist of a single mass greater than 15,000 square feet?	Preliminary project plans	☒	☐	
Site & Building Design	Does the project incorporate site design and building design features consistent with the Commission's Design Manual and Design Manual Addendum guidelines?	Staff consultation	☐	☐	N/A
Landscape Design	Is the project subject to habitat restoration requirements resulting from on or off-site disturbance of significant wildlife or plant habitat?	SNRA Map, Preliminary project plans	☐	☒	
Landscape Design	Is the project's landscape design consistent with MPS HPCC2.10 and does it include the use of site appropriate, non-invasive plantings to reduce water use and maintenance needs?	Preliminary project plans	☒	☐	
Exterior Lighting Design	Is the project's exterior lighting design consistent with MPS HPCC2.11 and the Exterior Lighting Technical Bulletin?	Exterior lighting information including fixture cut sheets and foot-candle plans	☒	☐	
Hazardous Materials & Waste	**Question**	**Required Info**	**Yes**	**No**	
Hazardous Materials and Waste Management	Does the project involve greater than household quantities of hazardous materials or hazardous wastes in an existing Wellhead Protection Area or Potential Public Water Supply	Project Inventory, RPP Map	☐	☒	During construction hazardous materials will be used in construction equipment. See Item 15.
Hazardous Materials and Waste Management	Does the project use, handle, generate, treat or store hazardous waste?	Project Inventory	☐	☒	
Solid Waste	Does the project involve greater than 25,000 square feet of new development?	Preliminary project plans	☐	☒	
Solid Waste	Does the project involve a significant amount of land clearing wastes or construction and demolition debris?	Estimate of amounts of land clearing and construction/demo wastes, Plan to address recycling and disposal of wastes	☒	☐	
Local Concerns	**Question**	**Required Info**	**Yes**	**No**	
Town Concerns	Has the Town identified issues or concerns that should be addressed through DRI review?		☐	☒	
Public Comment / Concerns	Has the public identified issues or concerns?		☐	☒	

Responses in the shaded boxes may be included in the scope of Commission review. Consultation with Commission staff recommended.

C

TOWN OF BOURNE
Board of Assessors
24 Perry Avenue
Buzzards Bay, MA 02532
(508) 759-0600 Ext. 1510 ♦ Fax (508) 759-8026

Anne Ekstrom, Chairman
Priscilla A. Koleshis, Clerk



Donna L. Barakauskas, MAA,
Director of Assessing

October 7, 2015

Jeffrey M. Ford, Esq.
72 Main St. PO Box 485
W. Harwich, MA 02671

Re: Abutters List for Map 86 Parcel 013
1 Route 6A, Sandwich, MA

As required by the Cape Cod Commission, Chapter 716, Section 5, paragraph 2D this is to certify that the attached list of names and addresses constitutes all of the parties in interest as shown on the most recent tax list of the Town of Bourne.

Abutting properties are: Map 12.4 Parcel 26; Map 16 Parcel 14; Map 18 Parcels 11 & 12; Map 18.2 Parcels 8, 9, 10, 10.1 & 22; Map 23 Parcel 3.

Please remit $10.00 to the Bourne Assessor's Office, 24 Perry Avenue, Buzzards Bay, MA 02532.

See enclosed for abutters mailing addresses.

Board of Assessors

Anne Ekstrom
Priscilla Koleshis

List Enclosed

Extract: 1 Abutters List
Database: LIVE
Filter: Key IN 3059,4376,2367,3286,3287,3288,3289,3301,3230,3231
Sort:

Report #24: Owner Listing Report

Fiscal Year 2016

Bourne MA

Key	Parcel ID	Owner	Location	LCt/Cl	Bk-Pg(Cert) /Dt	Mailing Street	Mailing City	ST	Zip Cd/County
2367	12.4-26-0	MARTH SUSAN	0 FREEMAN LN	N 1300	27881/59 12/13/2013	229 LADY BUG DRIVE	AIKEN	SC	29801
3059	16.0-14-0	UNITED STATES OF AMERICA U S ARMY CORP OF ENGINEERS	231 SANDWICH RD	N 9000	00453/0287	PO BOX 1555	BUZZARDS BAY	MA	02532-1555
3230	18.0-11-0	NSTAR ELECTRIC CO	1109 ROUTE 6A	N 4230	NA/NA 1/3/2007	PO BOX 270	HARTFORD	CT	06141-0270
3231	18.0-12-0	NSTAR ELECTRIC CO	90 ROUTE 6A	N 4230	NA/NA 1/3/2007	PO BOX 270	HARTFORD	CT	06141-0270
3286	18.2-8-0	CALDWELL MARY D	1105 SANDWICH RD	N 1010	23701/19 5/14/2009	PO BOX 283	SAGAMORE	MA	02561-0283
3287	18.2-9-0	BILODEAU SUZANNE L & MICHAEL K BILODEAU TR SAGAMORE INN RLTY	1131 SANDWICH RD	N 0310	25948/101+2 12/22/2011	PO BOX 166	SAGAMORE	MA	02561
3288	18.2-10-0	SULLIVAN WILLIAM R & JOANNE HALEY SULLIVAN	1107 SANDWICH RD	N 1010	13744/189 4/20/2001	P O BOX 353	SAGAMORE	MA	02561-0353
3289	18.2-10-1	STEPHEN BALLENTINE ET AL TR BOURNE CONSERVATION TRUST	0 FREEMAN LN	N 9500	20589/27 12/20/2005	P O BOX 203	CATAUMET	MA	02534
3301	18.2-22-0	BELL ATLANTIC/NEW ENGLAND TELE C/O DUFF AND PHELPS	1106 SANDWICH RD	N 4300	01143/0254	PO BOX 2749	ADDISON	TX	75001
4376	23.0-3-0	COMMONWEALTH OF MASSACHUSETTS	0 SANDWICH RD	N 9240	N/A/N/A	10 PARK PLAZA	BOSTON	MA	02116

Total Records 10

Town Of Sandwich

THE OLDEST TOWN ON CAPE COD

OFFICE OF THE BOARD OF ASSESSORS
ASSESSING DEPARTMENT

16 Jan Sebastian Drive
Sandwich, MA 02563-2319
TEL: 508-888-0157
FAX: 508-833-8098
E-mail: assessing@townofsandwich.net

TO: CAPE COD COMMISSION

SUBJECT: CERTIFIED LIST OF ABUTTERS AS REQUESTED BY:
JEFFREY FORD, ESQ. FOR NRG
MAP 86 PARCEL 13
1 ROUTE 6A, SANDWICH, MA 02563

DATE: OCTOBER 1, 2015

THE ATTACHED LIST OF ABUTTERS REQUESTED BY NRG (MAP 86 PARCEL 13) HAS BEEN CERTIFIED BY THE BOARD OF ASSESSORS AS PER RECORDS IN THE TOWN OF SANDWICH ASSESSOR'S OFFICE AS OF FISCAL 2016.

BOARD OF ASSESSORS

N.E. FERNANDES, JR.

LAWRENCE B. HARRINGTON

Robert G. James

Certified list is good for 6 months from the above certification date.

TOWN OF SANDWICH
THE OLDEST TOWN ON CAPE COD
OFFICE OF THE BOARD OF ASSESSORS

16 JAN SEBASTIAN DRIVE
SANDWICH, MASSACHUSETTS 02563-2319
TELEPHONE (508) 888-0157
FAX (508) 833-8098

LIST OF ABUTTERS
REQUEST FOR CERTIFICATION

NOTE: PLEASE ALLOW TEN BUSINESS DAYS FOR A LIST TO BE CERTIFIED BY ASSESSORS, PER M.G.L. CH. 66, S.10 LISTS ARE CERTIFIED ON A "FIRST COME, FIRST SERVE" BASIS PLEASE PLAN YOUR TIME FRAME ACCORDINGLY

Date of Request 9/29/2015

Person Requesting Certification Jeffrey Ford, Esq

Address 72 Main Street, West Harwich, MA 02671

Contact Person Telephone 5084301900

Contact Person Email jford21@verizon.net

Signature _____

Name of Applicant NRG

Address 1 Route 6A, Sandwich, MA

Street Location of Property 1 ROUTE 6A

Parcel Id 86-013-

Number of Abutters on List 8 + owner of record + 4 Towns

The application is for:

_____ Board of Appeals (Variance, Special Permit, Comprehensive Permit)
_____ Planning Board (Special Permit)
_____ Selectmen (Road Taking)
_____ Selectmen (Utility/Pole Location)
_____ Selectmen (Gasoline/Oil Storage Tank)
_____ Selectmen (Liquor License)
_____ Conservation Commission (Notice of Intent)
_____ Historic District (Certificate of Appropriateness)
_____ Board of Health (Site Assignment)
X Other (Specify)

Cape Cod Commission requires 300 foot radius

For Use by Assessors

✓ The attached list has more than three errors. Please submit corrected list
_____ The attached list is certified to be a correct listing of abutters for the described application, based on the most recent tax list

Certified by J. Varney
Title _____
Fee $50-

Signature J Rumul
Date Paid 10/6/15 ck # 11589

Parcel ID		
86-008-	Name:	COM ELECTRIC
	Name 2:	PROPERTY TAX DEPARTMENT
	Address:	PO BOX 270
	Town:	HARTFORD CT 06141-0270
	Property Loc:	4 MAIN STREET

Parcel ID		
86-012-	Name:	CANAL ELECTRIC COMPANY
	Name 2:	PROPERTY TAX DEPARTMENT
	Address:	PO BOX 270
	Town:	HARTFORD CT 06141-0270
	Property Loc:	2 ROUTE 6A

Parcel ID		
86-015-	Name:	SOUTHERN ENERGY CANAL L L C
	Name 2:	ATTN. TAX DEPARTMENT
	Address:	211 CARNEGIE CENTER
	Town:	PRINCETON NJ 08540
	Property Loc:	0 ROUTE 6A

Parcel ID		
86-009-	Name:	COM ELECTRIC
	Name 2:	PROPERTY TAX DEPARTMENT
	Address:	PO BOX 270
	Town:	HARTFORD CT 06141-0270
	Property Loc:	0 ROUTE 6A

Parcel ID		
86-010-	Name:	COM ELECTRIC
	Name 2:	PROPERTY TAX DEPARTMENT
	Address:	PO BOX 270
	Town:	HARTFORD CT 06141-0270
	Property Loc:	0 ROUTE 6A

Parcel ID		
86-014-	Name:	SOUTHERN ENERGY CANAL L L C
	Name 2:	ATTN. TAX DEPARTMENT
	Address:	211 CARNEGIE CENTER
	Town:	PRINCETON NJ 08540
	Property Loc:	1 TUPPER ROAD

Parcel ID		
86-016-	Name:	SOUTHERN ENERGY CANAL L L C
	Name 2:	ATTN. TAX DEPARTMENT
	Address:	211 CARNEGIE CENTER
	Town:	PRINCETON NJ 08540
	Property Loc:	0 TUPPER ROAD

Parcel ID		
91-003-	Name:	SOUTHERN ENERGY CANAL L L C
	Name 2:	ATTN. TAX DEPARTMENT
	Address:	211 CARNGIE CENTER
	Town:	PRINCETON NJ 08540
	Property Loc:	0 TUPPER ROAD

Parcel ID		
86-013-	Name:	SOUTHERN ENERGY CANAL L L C
	Name 2:	ATTN. TAX DEPARTMENT
	Address:	211 CARNEGIE CENTER
	Town:	PRINCETON NJ 08540
	Property Loc:	1 ROUTE 6A

DO NOT SUBMIT A NON-CERTIFIED LIST TO TOWN BOARD, IT WILL ADVERSELY AFFECT YOUR TIMETABLE.

Town of Bourne
Planning Board
24 Perry Avenue
Buzzards Bay, MA 02532

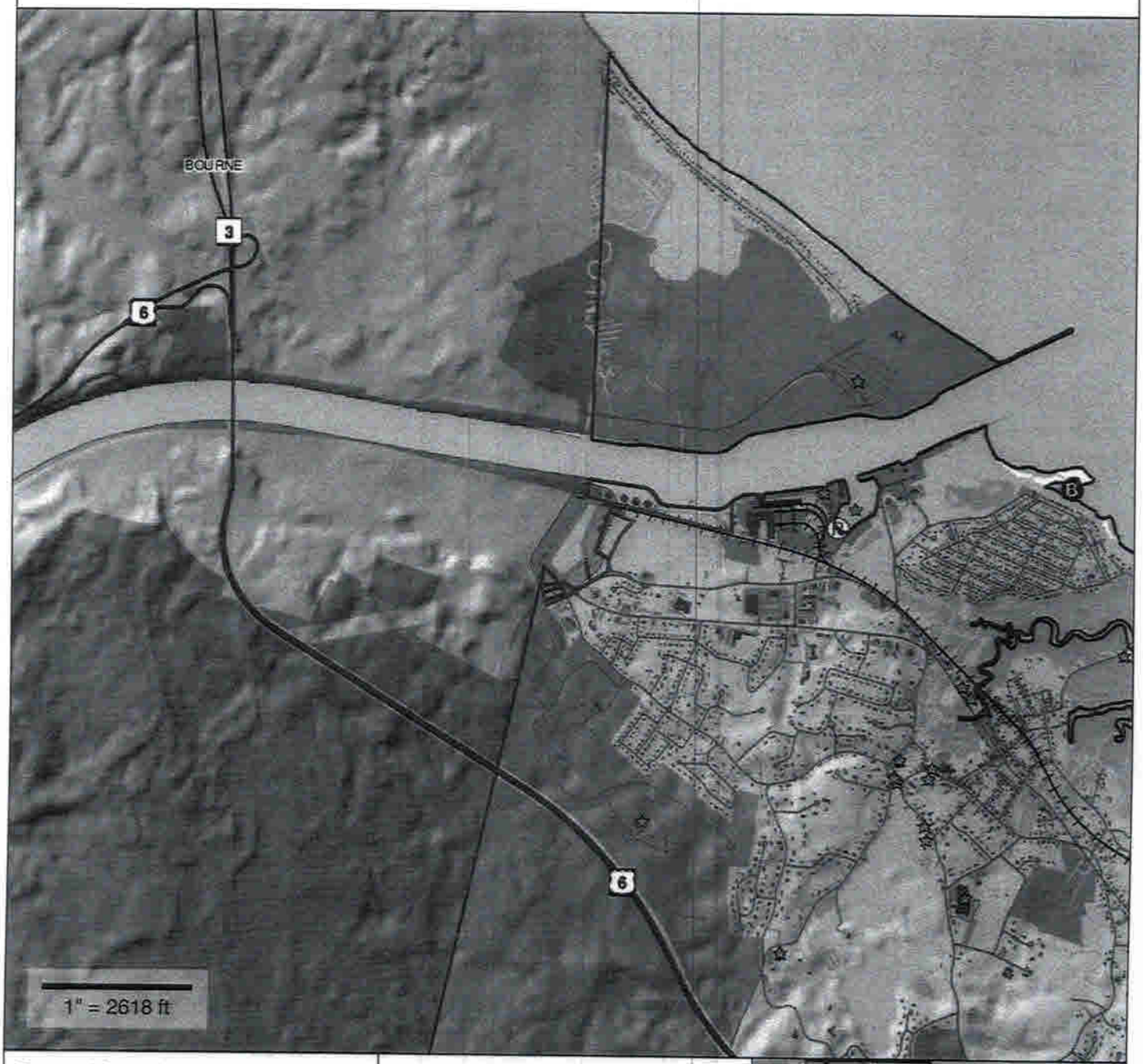
Town of Barnstable
Planning Board
200 Main Street
Hyannis, MA 02601

Town of Falmouth
Planning Board
59 Town Hall Square
Falmouth, MA 02540

Town of Mashpee
Planning Board
16 Great Neck Road North
Mashpee, MA 02649

Town of Sandwich

October 1, 2015



Property Information

Property ID 86-013-
Location 1 ROUTE 6A
Owner SOUTHERN ENERGY CANAL L L

300 ft. Abutters

MAP FOR REFERENCE ONLY
NOT A LEGAL DOCUMENT

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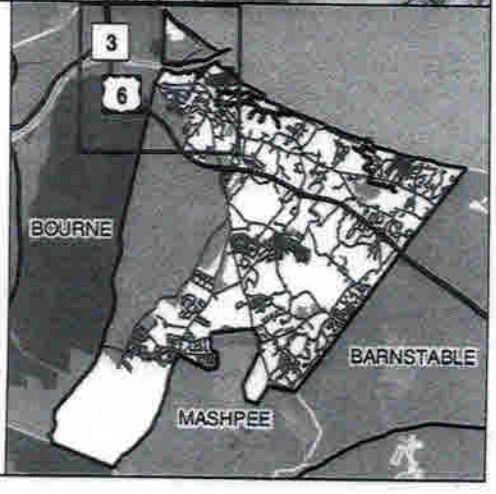
Parcels updated January 1, 2014



Town Of Sandwich

THE OLDEST TOWN ON CAPE COD

OFFICE OF THE BOARD OF ASSESSORS
ASSESSING DEPARTMENT

16 Jan Sebastian Drive
Sandwich, MA 02563-2319
TEL: 508-888-0157
FAX: 508-833-8098
E-mail: assessing@townofsandwich.net

TO: CAPE COD COMMISSION

SUBJECT: CERTIFIED LIST OF ABUTTERS AS REQUESTED BY:
JEFFREY FORD, ESQ. FOR NRG
MAP 86 PARCEL 14
1 TUPPER ROAD, SANDWICH, MA 02563

DATE: OCTOBER 1, 2015

THE ATTACHED LIST OF ABUTTERS REQUESTED BY NRG (MAP 86 PARCEL 14) HAS BEEN CERTIFIED BY THE BOARD OF ASSESSORS AS PER RECORDS IN THE TOWN OF SANDWICH ASSESSOR'S OFFICE AS OF FISCAL 2016.

BOARD OF ASSESSORS

N.E. FERNANDES, JR.

LAWRENCE B. HARRINGTON

Robert G. James

Certified list is good for 6 months from the above certification date.

TOWN OF SANDWICH
THE OLDEST TOWN ON CAPE COD
OFFICE OF THE BOARD OF ASSESSORS

16 JAN SEBASTIAN DRIVE
SANDWICH, MASSACHUSETTS 02563-2319
TELEPHONE (508) 888-0157
FAX (508) 833-8098

LIST OF ABUTTERS
REQUEST FOR CERTIFICATION

NOTE: PLEASE ALLOW TEN BUSINESS DAYS FOR A LIST TO BE CERTIFIED BY ASSESSORS, PER M.G.L. CH. 66, S.10 LISTS ARE CERTIFIED ON A "FIRST COME, FIRST SERVE" BASIS PLEASE PLAN YOUR TIME FRAME ACCORDINGLY

Date of Request 9/29/2015

Person Requesting Certification Jeffrey Ford, Esq.

Address 72 Main Street , West Harwich, MA 02671

Contact Person Telephone 5084301900

Contact Person Email jford21@verizon.net

Signature _____

Name of Applicant NRG

Address _____

Street Location of Property 1 TUPPER ROAD

Parcel Id 86-014-

Number of Abutters on List 14 + owner of record + 4 Towns

The application is for:

_____ Board of Appeals (Variance, Special Permit, Comprehensive Permit)
_____ Planning Board (Special Permit)
_____ Selectmen (Road Taking)
_____ Selectmen (Utility/Pole Location)
_____ Selectmen (Gasoline/Oil Storage Tank)
_____ Selectmen (Liquor License)
_____ Conservation Commission (Notice of Intent)
_____ Historic District (Certificate of Appropriateness)
_____ Board of Health (Site Assignment)
X Other (Specify)

Cape Cod Commission - requires 300 foot radius for filing

For Use by Assessors

_____ The attached list has more than three errors. Please submit corrected list
✓ The attached list is certified to be a correct listing of abutters for the described application, based on the most recent tax list

Certified by J. Varney
Title _____
Fee $50-

Signature _____
Date Paid 10/6/15 ck # 11589

Parcel ID		
86-005-	Name:	ANCHORAGE REALTY TRUST, BRIAN DOHERTY, TRUSTEE
	Name 2:	10 MAIN STREET
	Address:	
	Town:	SANDWICH MA 02563
	Property Loc:	10 MAIN STREET

Parcel ID		
86-008-	Name:	COM ELECTRIC
	Name 2:	PROPERTY TAX DEPARTMENT
	Address:	PO BOX 270
	Town:	HARTFORD CT 06141-0270
	Property Loc:	4 MAIN STREET

Parcel ID		
86-007-	Name:	COM ELECTRIC
	Name 2:	PROPERTY TAX DEPARTMENT
	Address:	PO BOX 270
	Town:	HARTFORD CT 06141-0270
	Property Loc:	6 MAIN STREET

Parcel ID		
86-006-001	Name:	SRT INVESTORS GROUP, LLC
	Name 2:	P O BOX 89
	Address:	
	Town:	SANDWICH MA 02563
	Property Loc:	8 MAIN STREET

Parcel ID		
86-006-002	Name:	EDRONICA REALTY TRUST, SANTOS, N E JR & V H,TRUSTE
	Name 2:	P O BOX 935
	Address:	
	Town:	SANDWICH MA 02563
	Property Loc:	8 MAIN STREET

Parcel ID		
86-013-	Name:	SOUTHERN ENERGY CANAL L L C
	Name 2:	ATTN. TAX DEPARTMENT
	Address:	211 CARNEGIE CENTER
	Town:	PRINCETON NJ 08540
	Property Loc:	1 ROUTE 6A

Parcel ID		
86-012-	Name:	CANAL ELECTRIC COMPANY
	Name 2:	PROPERTY TAX DEPARTMENT
	Address:	PO BOX 270
	Town:	HARTFORD CT 06141-0270
	Property Loc:	2 ROUTE 6A

Parcel ID		
86-087-	Name:	SANDWICH TOWN OF
	Name 2:	130 MAIN ST
	Address:	
	Town:	SANDWICH MA 02563-2208
	Property Loc:	6 ROUTE 6A

Parcel ID		
86-009-	Name:	COM ELECTRIC
	Name 2:	PROPERTY TAX DEPARTMENT
	Address:	PO BOX 270
	Town:	HARTFORD CT 06141-0270
	Property Loc:	0 ROUTE 6A

DO NOT SUBMIT A NON-CERTIFIED LIST TO TOWN BOARD, IT WILL ADVERSELY AFFECT YOUR TIMETABLE.

Parcel ID				
86-015-	Name:	SOUTHERN ENERGY CANAL L L C		
	Name 2:	ATTN. TAX DEPARTMENT		
	Address:	211 CARNEGIE CENTER		
	Town:	PRINCETON	NJ	08540
	Property Loc:	0 ROUTE 6A		

Parcel ID				
86-010-	Name:	COM ELECTRIC		
	Name 2:	PROPERTY TAX DEPARTMENT		
	Address:	PO BOX 270		
	Town:	HARTFORD	CT	06141-0270
	Property Loc:	0 ROUTE 6A		

Parcel ID				
86-101-	Name:	SNOW GOOSE LANDING LLC		
	Name 2:	PO BOX 1534		
	Address:			
	Town:	SANDWICH	MA	02563
	Property Loc:	4 TUPPER ROAD		

Parcel ID				
86-041-	Name:	SANDWICH TOWN OF		
	Name 2:	130 MAIN ST		
	Address:			
	Town:	SANDWICH	MA	02563-2208
	Property Loc:	6 TUPPER ROAD		

Parcel ID				
86-016-	Name:	SOUTHERN ENERGY CANAL L L C		
	Name 2:	ATTN. TAX DEPARTMENT		
	Address:	211 CARNEGIE CENTER		
	Town:	PRINCETON	NJ	08540
	Property Loc:	0 TUPPER ROAD		

Parcel ID				
86-014-	Name:	SOUTHERN ENERGY CANAL L L C		
	Name 2:	ATTN. TAX DEPARTMENT		
	Address:	211 CARNEGIE CENTER		
	Town:	PRINCETON	NJ	08540
	Property Loc:	1 TUPPER ROAD		

Parcel ID		
0	Name:	
	Name 2:	
	Address:	
	Town:	
	Property Loc:	

Parcel ID		
0	Name:	
	Name 2:	
	Address:	
	Town:	
	Property Loc:	

Parcel ID		
0	Name:	
	Name 2:	
	Address:	
	Town:	
	Property Loc:	

DO NOT SUBMIT A NON-CERTIFIED LIST TO TOWN BOARD, IT WILL ADVERSELY AFFECT YOUR TIMETABLE.

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Planning Board
24 Perry Avenue
Buzzards Bay, MA 02532

Town of Barnstable
Planning Board
200 Main Street
Hyannis, MA 02601

Town of Falmouth
Planning Board
59 Town Hall Square
Falmouth, MA 02540

Town of Mashpee
Planning Board
16 Great Neck Road North
Mashpee, MA 02649

Property Information

Property ID 86-014-
Location 1 TUPPER ROAD
Owner SOUTHERN ENERGY CANAL L L

300 ft. Abutters

MAP FOR REFERENCE ONLY
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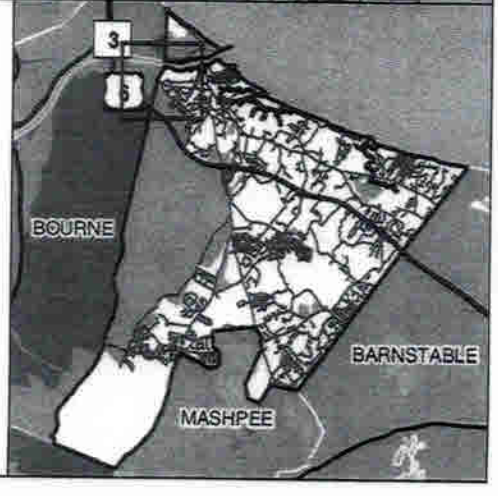
Parcels updated January 1, 2014



Town Of Sandwich

THE OLDEST TOWN ON CAPE COD

OFFICE OF THE BOARD OF ASSESSORS
ASSESSING DEPARTMENT

16 Jan Sebastian Drive
Sandwich, MA 02563-2319
TEL: 508-888-0157
FAX: 508-833-8098
E-mail: assessing@townofsandwich.net

TO: CAPE COD COMMISSION

SUBJECT: CERTIFIED LIST OF ABUTTERS AS REQUESTED BY:
JEFFREY FORD, ESQ. FOR NRG
MAP 86 PARCEL 15
0 ROUTE 6A, SANDWICH, MA 02563

DATE: OCTOBER 1, 2015

THE ATTACHED LIST OF ABUTTERS REQUESTED BY NRG (MAP 86 PARCEL 15) HAS BEEN CERTIFIED BY THE BOARD OF ASSESSORS AS PER RECORDS IN THE TOWN OF SANDWICH ASSESSOR'S OFFICE AS OF FISCAL 2016.

BOARD OF ASSESSORS

N.E. FERNANDES, JR.

LAWRENCE B. HARRINGTON

Robert G. James

Certified list is good for 6 months from the above certification date.

TOWN OF SANDWICH
THE OLDEST TOWN ON CAPE COD
OFFICE OF THE BOARD OF ASSESSORS

16 JAN SEBASTIAN DRIVE
SANDWICH, MASSACHUSETTS 02563-2319
TELEPHONE (508) 888-0157
FAX (508) 833-8098

LIST OF ABUTTERS
REQUEST FOR CERTIFICATION

NOTE: PLEASE ALLOW TEN BUSINESS DAYS FOR A LIST TO BE CERTIFIED BY ASSESSORS, PER M.G.L. CH. 66, S.10 LISTS ARE CERTIFIED ON A "FIRST COME, FIRST SERVE" BASIS PLEASE PLAN YOUR TIME FRAME ACCORDINGLY

Date of Request 9/29/2015

Person Requesting Certification Jeffrey Ford, Esq.

Address 72 Main Street , West Harwich, MA 02671

Contact Person Telephone 5084301900

Contact Person Email jford21@verizon.net

Signature _____

Name of Applicant NRG

Address _____

Street Location of Property 0 ROUTE 6A

Parcel Id 86-015-

Number of Abutters on List 13 + owner of record + 4 Towns

The application is for:

_____ Board of Appeals (Variance, Special Permit, Comprehensive Permit)
_____ Planning Board (Special Permit)
_____ Selectmen (Road Taking)
_____ Selectmen (Utility/Pole Location)
_____ Selectmen (Gasoline/Oil Storage Tank)
_____ Selectmen (Liquor License)
_____ Conservation Commission (Notice of Intent)
_____ Historic District (Certificate of Appropriateness)
_____ Board of Health (Site Assignment)
X Other (Specify)

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Certified by J. Varney
Title _____
Fee $50.00

Signature J Rumrill
Date Paid 10/6/15 ck# 11589

Parcel ID		
91-001-	Name:	SOUTHERN ENERGY CANAL L L C
	Name 2:	ATTN. TAX DEPARTMENT
	Address:	211 CARNEGIE CENTER
	Town:	PRINCETON NJ 08540
	Property Loc:	0 FREEZER ROAD

Parcel ID		
86-013-	Name:	SOUTHERN ENERGY CANAL L L C
	Name 2:	ATTN. TAX DEPARTMENT
	Address:	211 CARNEGIE CENTER
	Town:	PRINCETON NJ 08540
	Property Loc:	1 ROUTE 6A

Parcel ID		
86-014-	Name:	SOUTHERN ENERGY CANAL L L C
	Name 2:	ATTN. TAX DEPARTMENT
	Address:	211 CARNEGIE CENTER
	Town:	PRINCETON NJ 08540
	Property Loc:	1 TUPPER ROAD

Parcel ID		
86-020-	Name:	HOXIE, EDWARD W JR
	Name 2:	11 TUPPER RD
	Address:	
	Town:	SANDWICH MA 02563-1810
	Property Loc:	11 TUPPER ROAD

Parcel ID		
86-101-	Name:	SNOW GOOSE LANDING LLC
	Name 2:	PO BOX 1534
	Address:	
	Town:	SANDWICH MA 02563
	Property Loc:	4 TUPPER ROAD

Parcel ID		
86-041-	Name:	SANDWICH TOWN OF
	Name 2:	130 MAIN ST
	Address:	
	Town:	SANDWICH MA 02563-2208
	Property Loc:	6 TUPPER ROAD

Parcel ID		
86-017-	Name:	KIENZLE, FRANCES A
	Name 2:	7 TUPPER ROAD
	Address:	
	Town:	SANDWICH MA 02563
	Property Loc:	7 TUPPER ROAD

Parcel ID		
91-003-	Name:	SOUTHERN ENERGY CANAL L L C
	Name 2:	ATTN. TAX DEPARTMENT
	Address:	211 CARNGIE CENTER
	Town:	PRINCETON NJ 08540
	Property Loc:	0 TUPPER ROAD

Parcel ID		
86-019-	Name:	SOUTHERN ENERGY CANAL L L C
	Name 2:	ATTN. TAX DEPARTMENT
	Address:	211 CARNEGIE CENTER
	Town:	PRINCETON NJ 08540
	Property Loc:	0 TUPPER ROAD

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Parcel ID		
86-018-	Name:	SOUTHERN ENERGY CANAL L L C
	Name 2:	ATTN. TAX DEPARTMENT
	Address:	211 CARNEGIE CENTER
	Town:	PRINCETON NJ 08540
	Property Loc:	0 TUPPER ROAD

Parcel ID		
86-016-	Name:	SOUTHERN ENERGY CANAL L L C
	Name 2:	ATTN. TAX DEPARTMENT
	Address:	211 CARNEGIE CENTER
	Town:	PRINCETON NJ 08540
	Property Loc:	0 TUPPER ROAD

Parcel ID		
91-002-	Name:	SOUTHERN ENERGY CANAL L L C
	Name 2:	ATTN. TAX DEPARTMENT
	Address:	211 CARNEGIE CENTER
	Town:	PRINCETON NJ 08540
	Property Loc:	0 TUPPER ROAD

Parcel ID		
86-036-	Name:	RAPPAPORT, LORRAINE B
	Name 2:	11 WILSON RD
	Address:	
	Town:	SANDWICH MA 02563-1825
	Property Loc:	11 WILSON ROAD

Parcel ID		
86-015-	Name:	SOUTHERN ENERGY CANAL L L C
	Name 2:	ATTN. TAX DEPARTMENT
	Address:	211 CARNEGIE CENTER
	Town:	PRINCETON NJ 08540
	Property Loc:	0 ROUTE 6A

Parcel ID		
0	Name:	
	Name 2:	
	Address:	
	Town:	
	Property Loc:	

Parcel ID		
0	Name:	
	Name 2:	
	Address:	
	Town:	
	Property Loc:	

Parcel ID		
0	Name:	
	Name 2:	
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	Name 2:	
	Address:	
	Town:	
	Property Loc:	

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Planning Board
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Town of Mashpee
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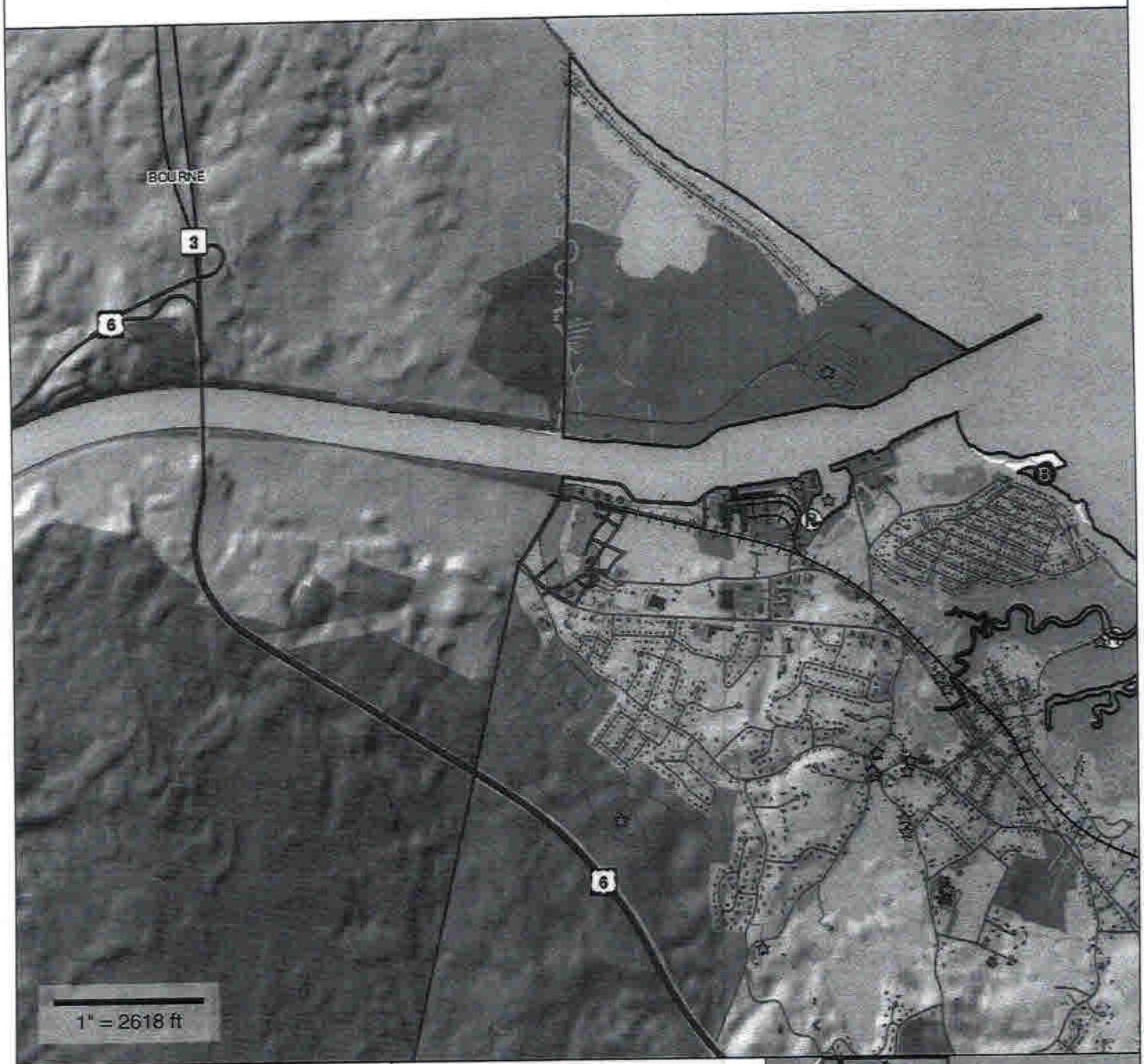
Town of Sandwich

October 1, 2015



Property Information

Property ID 86-015-
Location 0 ROUTE 6A
Owner SOUTHERN ENERGY CANAL L L

300 ft. Abutters

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NOT A LEGAL DOCUMENT

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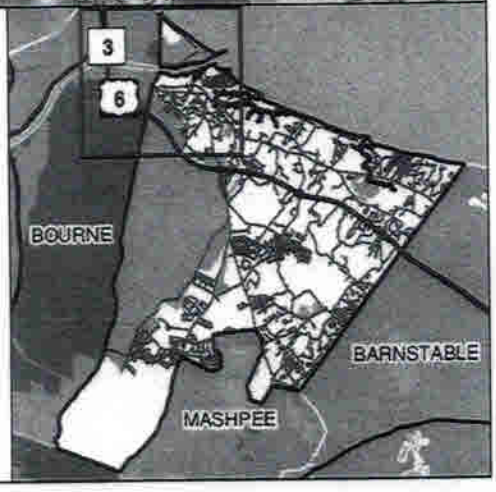
Parcels updated January 1, 2014



n Of Sandwich
OLDEST TOWN ON CAPE COD

OF THE BOARD OF ASSESSORS
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E-mail: assessing@townofsandwich.net

TO: CAPE COD COMMISSION

SUBJECT: CERTIFIED LIST OF ABUTTERS AS REQUESTED BY:
JEFFREY FORD, ESQ. FOR NRG
MAP 86 PARCEL 16
0 TUPPER ROAD, SANDWICH, MA 02563

DATE: OCTOBER 1, 2015

THE ATTACHED LIST OF ABUTTERS REQUESTED BY NRG (MAP 86 PARCEL 16) HAS BEEN CERTIFIED BY THE BOARD OF ASSESSORS AS PER RECORDS IN THE TOWN OF SANDWICH ASSESSOR'S OFFICE AS OF FISCAL 2016.

BOARD OF ASSESSORS

N.E. FERNANDES, JR.

LAWRENCE B. HARRINGTON

Robert G. James

Certified list is good for 6 months from the above certification date.

TOWN OF SANDWICH
THE OLDEST TOWN ON CAPE COD
OFFICE OF THE BOARD OF ASSESSORS

16 JAN SEBASTIAN DRIVE
SANDWICH, MASSACHUSETTS 02563-2319
TELEPHONE (508) 888-0157
FAX (508) 833-8098

LIST OF ABUTTERS
REQUEST FOR CERTIFICATION

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Date of Request 9/29/2015

Person Requesting Certification Jeffrey Ford, Esq.

Address 72 Main Street, West harwich, MA 02671

Contact Person Telephone 5084301900

Contact Person Email jford21@VERIZON.NET

Signature _____

Name of Applicant NRG

Address _____

Street Location of Property 0 TUPPER ROAD

Parcel Id 86-016-

Number of Abutters on List 11 + owner of record and 4 Towns

The application is for:

_____ Board of Appeals (Variance, Special Permit, Comprehensive Permit)
_____ Planning Board (Special Permit)
_____ Selectmen (Road Taking)
_____ Selectmen (Utility/Pole Location)
_____ Selectmen (Gasoline/Oil Storage Tank)
_____ Selectmen (Liquor License)
_____ Conservation Commission (Notice of Intent)
_____ Historic District (Certificate of Appropriateness)
_____ Board of Health (Site Assignment)
X Other (Specify)

Cape Cod Commission - requires 300 foot radius for filing

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Certified by J. Varney
Title _____
Fee $50-

Signature J Rumrill
Date Paid 10/6/15 ck# 11589

Parcel ID		
91-001-	Name:	SOUTHERN ENERGY CANAL L L C
	Name 2:	ATTN. TAX DEPARTMENT
	Address:	211 CARNEGIE CENTER
	Town:	PRINCETON NJ 08540
	Property Loc:	0 FREEZER ROAD

Parcel ID		
86-013-	Name:	SOUTHERN ENERGY CANAL L L C
	Name 2:	ATTN. TAX DEPARTMENT
	Address:	211 CARNEGIE CENTER
	Town:	PRINCETON NJ 08540
	Property Loc:	1 ROUTE 6A

Parcel ID		
86-015-	Name:	SOUTHERN ENERGY CANAL L L C
	Name 2:	ATTN. TAX DEPARTMENT
	Address:	211 CARNEGIE CENTER
	Town:	PRINCETON NJ 08540
	Property Loc:	0 ROUTE 6A

Parcel ID		
86-014-	Name:	SOUTHERN ENERGY CANAL L L C
	Name 2:	ATTN. TAX DEPARTMENT
	Address:	211 CARNEGIE CENTER
	Town:	PRINCETON NJ 08540
	Property Loc:	1 TUPPER ROAD

Parcel ID		
86-020-	Name:	HOXIE, EDWARD W JR
	Name 2:	11 TUPPER RD
	Address:	
	Town:	SANDWICH MA 02563-1810
	Property Loc:	11 TUPPER ROAD

Parcel ID		
86-017-	Name:	KIENZLE, FRANCES A
	Name 2:	7 TUPPER ROAD
	Address:	
	Town:	SANDWICH MA 02563
	Property Loc:	7 TUPPER ROAD

Parcel ID		
91-003-	Name:	SOUTHERN ENERGY CANAL L L C
	Name 2:	ATTN. TAX DEPARTMENT
	Address:	211 CARNGIE CENTER
	Town:	PRINCETON NJ 08540
	Property Loc:	0 TUPPER ROAD

Parcel ID		
86-018-	Name:	SOUTHERN ENERGY CANAL L L C
	Name 2:	ATTN. TAX DEPARTMENT
	Address:	211 CARNEGIE CENTER
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	Property Loc:	0 TUPPER ROAD

Parcel ID		
86-019-	Name:	SOUTHERN ENERGY CANAL L L C
	Name 2:	ATTN. TAX DEPARTMENT
	Address:	211 CARNEGIE CENTER
	Town:	PRINCETON NJ 08540
	Property Loc:	0 TUPPER ROAD

DO NOT SUBMIT A NON-CERTIFIED LIST TO TOWN BOARD, IT WILL ADVERSELY AFFECT YOUR TIMETABLE.

Parcel ID		
86-021-	Name:	COMMONWEALTH ELECTRIC COMPANY
	Name 2:	PROPERTY TAX DEPARTMENT
	Address:	PO BOX 270
	Town:	HARTFORD CT 06141-0270
	Property Loc:	0 TUPPER ROAD

Parcel ID		
91-002-	Name:	SOUTHERN ENERGY CANAL L L C
	Name 2:	ATTN. TAX DEPARTMENT
	Address:	211 CARNEGIE CENTER
	Town:	PRINCETON NJ 08540
	Property Loc:	0 TUPPER ROAD

Parcel ID		
86-016-	Name:	SOUTHERN ENERGY CANAL L L C
	Name 2:	ATTN. TAX DEPARTMENT
	Address:	211 CARNEGIE CENTER
	Town:	PRINCETON NJ 08540
	Property Loc:	0 TUPPER ROAD

Parcel ID		
0	Name:	
	Name 2:	
	Address:	
	Town:	
	Property Loc:	

Parcel ID		
0	Name:	
	Name 2:	
	Address:	
	Town:	
	Property Loc:	

Parcel ID		
0	Name:	
	Name 2:	
	Address:	
	Town:	
	Property Loc:	

Parcel ID		
0	Name:	
	Name 2:	
	Address:	
	Town:	
	Property Loc:	

Parcel ID		
0	Name:	
	Name 2:	
	Address:	
	Town:	
	Property Loc:	

Parcel ID		
0	Name:	
	Name 2:	
	Address:	
	Town:	
	Property Loc:	

DO NOT SUBMIT A NON-CERTIFIED LIST TO TOWN BOARD, IT WILL ADVERSELY AFFECT YOUR TIMETABLE.

To Be Used for Bd. of Appeals

Town of Bourne
Planning Board
24 Perry Avenue
Buzzards Bay, MA 02532

Town of Barnstable
Planning Board
200 Main Street
Hyannis, MA 02601

Town of Falmouth
Planning Board
59 Town Hall Square
Falmouth, MA 02540

Town of Mashpee
Planning Board
16 Great Neck Road North
Mashpee, MA 02649

Property Information

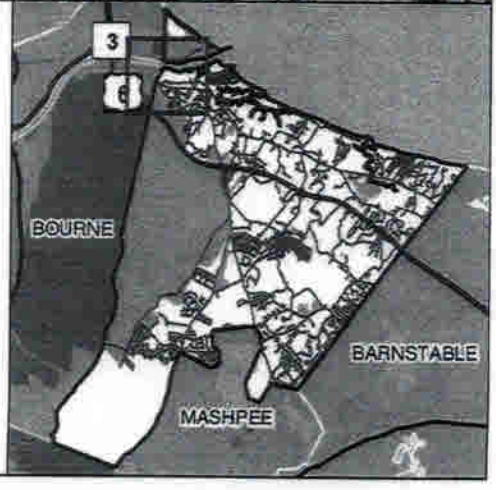
Property ID 86-016-
Location 0 TUPPER ROAD
Owner SOUTHERN ENERGY CANAL L L

300 ft. Abutters

MAP FOR REFERENCE ONLY
NOT A LEGAL DOCUMENT

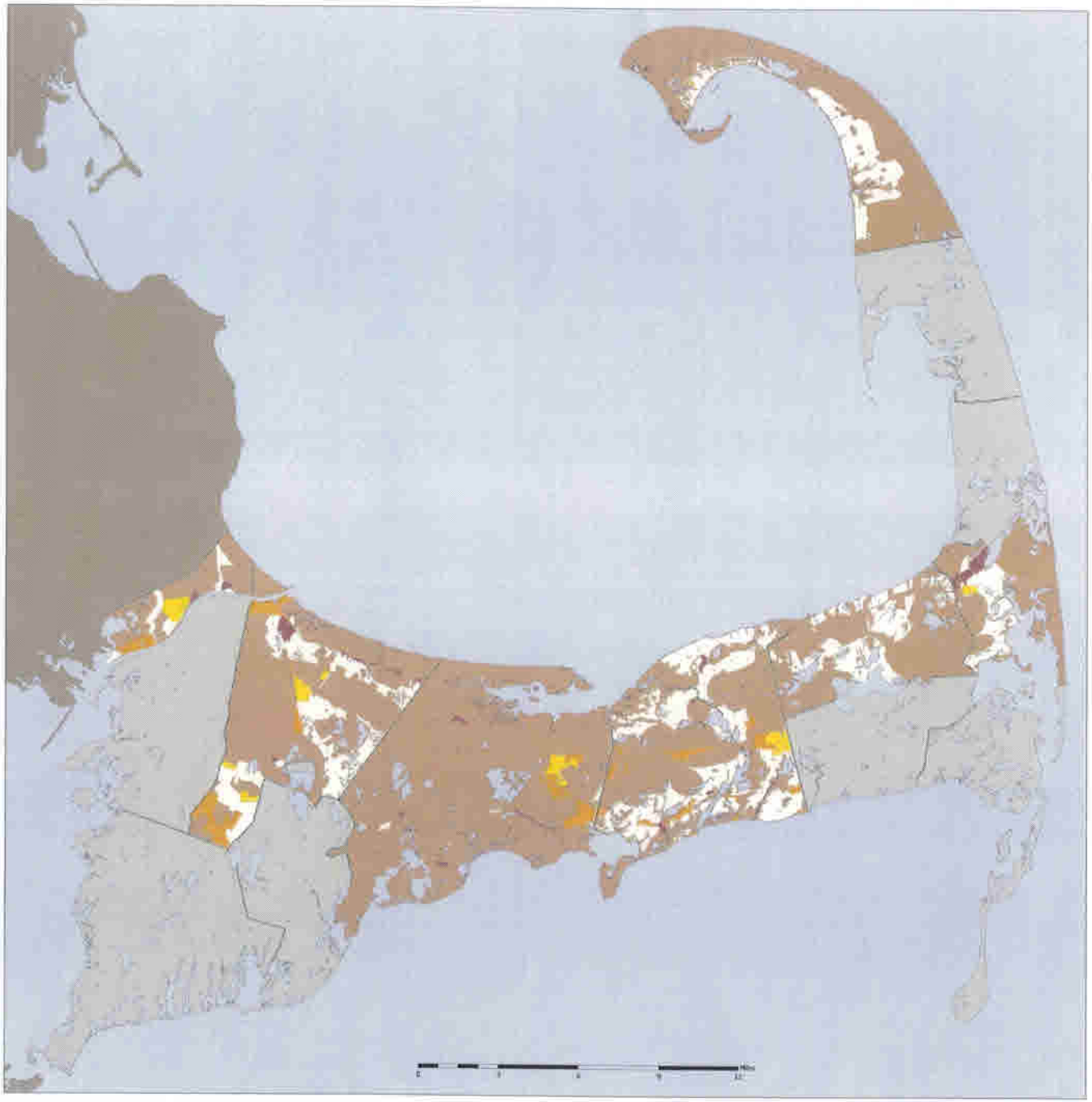
The Town makes no claims and no warranties, expressed or implied, concerning the validity or accuracy of the GIS data presented on this map.

Parcels updated January 1, 2014



D

Cape Cod Regional Land Use Vision Map



Regional Policy Plan (Effective January 16, 2009)
Amended -- Effective June 19, 2009
Amended -- Effective June 18, 2010
Amended -- Effective March 4, 2011
Cape Cod Regional Land Use Vision Map

Explanation and Data Sources:
The Regional Land Use Vision Map expresses a vision for the future of Cape Cod. The Cape Cod Commission is working collaboratively with all 15 towns in Barnstable County to develop this vision. The land uses are categorized as Economic Centers, Villages, Industrial and Service Trade Areas, Resource Protection Areas, and Other Areas. Towns where the planning board has endorsed the vision map for their community are included on the Regional Land Use Vision Map.

Land Use Categories:
Economic Centers – Areas designated as appropriate for growth and redevelopment. These areas serve the region or sub-region and could include characteristics such as civic and institutional uses, retail, and mixed use. Economic Centers are defined by parcel data and/or zoning district boundaries, shown in detail on individual town maps. Developments of Regional Impact (DRI) proposed within Economic Centers may benefit from some reduced minimum performance standards during DRI review under the RPP.
Industrial and Service Trade Areas – Areas designated for industrial uses, construction trades, and/or public works facilities. Areas are intended for uses that are incompatible with residential and village settings, with a high square-footage-to-employee ratio.
Resource Protection Areas – Areas designated as not appropriate for additional growth due to the presence of one or more sensitive resources. These resources shall include at a minimum Wellhead Protection Areas, Land Subject to Coastal Storm Flowage or Sea, Lake, and Overland Surges by Hurricanes (SLOSH) zones, historic districts, and the Cape Cod National Seashore. Resource Protection Areas may also include but not be limited to wetlands, vernal pools, protected open space, and designated Districts of Critical Planning Concern (DCPCs).
Villages – Areas designated to preserve historic and/or community character. Consist of small, compact areas with development at a local scale. Characteristics could include civic uses, mixed use, and/or home occupations.
Other – Areas remaining after the other areas have been identified.

The land use category boundaries are based on digital data obtained from MassGIS, Army Corps of Engineers, NHESP, and Town GIS Departments, including town-based zoning and parcel information.

Regional Land Use Vision Categories

- ECONOMIC CENTER
- INDUSTRIAL AND SERVICE TRADE AREA
- VILLAGE
- OTHER
- RESOURCE PROTECTION AREA
- Areas without adopted Vision Map

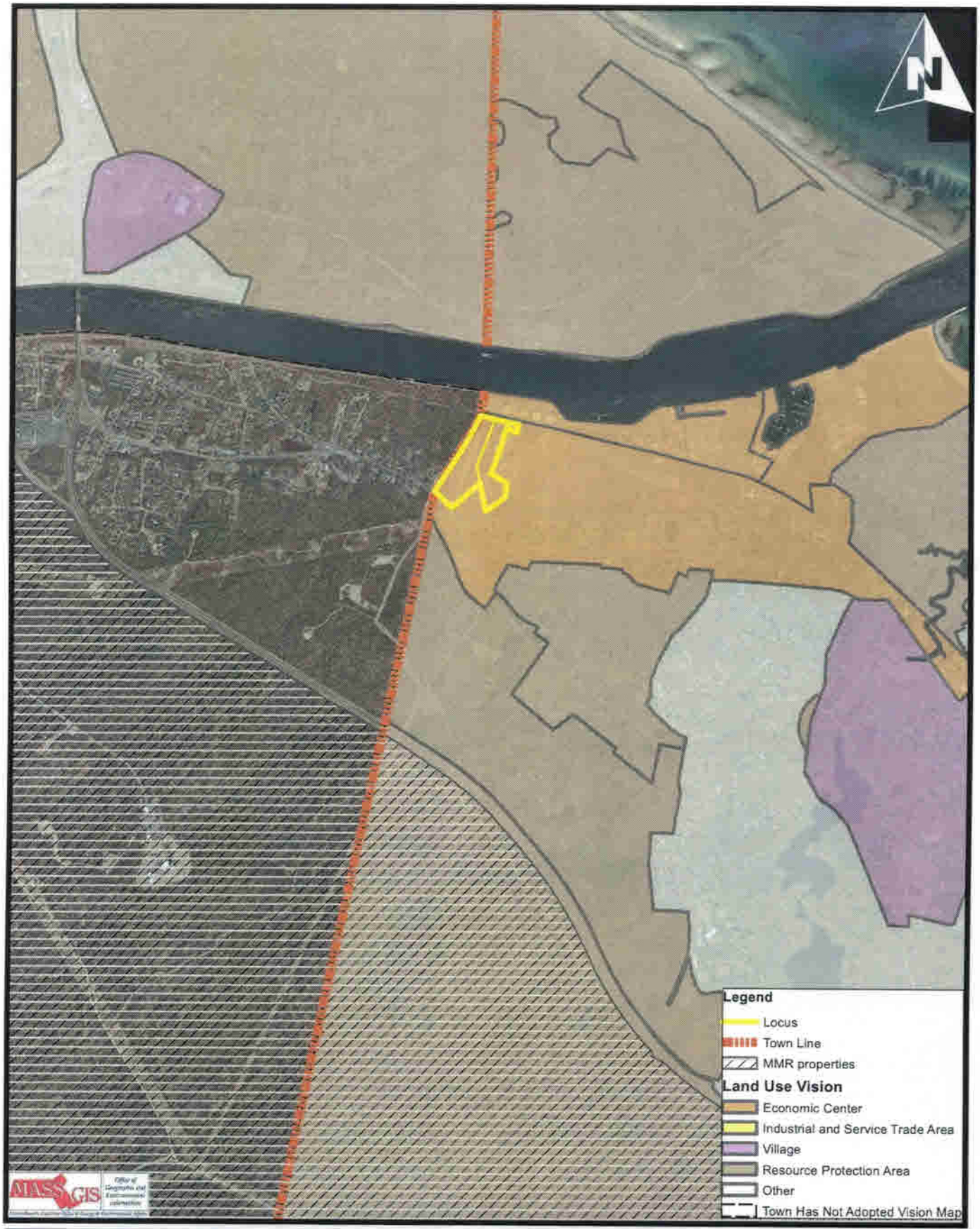
This Map was produced by the Cape Cod Commission's Geographic Information System Department for the Regional Policy Plan update, effective January 16, 2009, with any amendments listed below:
Amended to include Barnstable June10, 2009.
Amended to include revisions Sandwich June 18, 2010.
Amended to include Bourne and Dennis March 4, 2011.

The Cape Cod Commission is a division of Barnstable County. Corrections are welcome at the Cape Cod Commission office or contact gis@capecodcommission.org.

This map is illustrative and all depicted boundaries are approximate. It is intended for planning purposes only - - not site specific purposes.

N

CAPE COD COMMISSION



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Design Engineers, Inc.
www.atlanticcompanies.com
508-888-9282

Economic Center
(From Land Use Vision Map)

Canal Community Solar Project
Sandwich, Massachusetts

Approx. Scale
1 "=2,000 '
1:24,000

September 24, 2015

Figure

Town of Sandwich
Special Town Meeting

WARRANT

Monday, November 16, 2015
7:00 p.m. – Sandwich High School

BOARD OF SELECTMEN
Frank Pannorfi, Chair
Susan James, Vice-Chair
Peter Beauchemin
R. Patrick Ellis
Ralph A. Vitacco

MODERATOR
Garry N. Blank

FINANCE COMMITTEE
Linell M. Grundman, Chair
Robert Guerin, Vice-Chair
Michael Dwyer
Thomas R. Hickey
James Lehane
Gene Parini
Richard Reilly
Mark Snyder
Matthew Terry

ARTICLE 3

To see if the Town will vote in accordance with the provisions of M.G.L. c.44, §53F½ to raise and appropriate or transfer from available funds a sum of $70,000.00, or any other amount, from the Golf Enterprise Fund to be expended under the direction of the Board of Selectmen, for the purpose of completing extraordinary repairs and improvements to the Sandwich Hollows Golf Club clubhouse and golf course and for replacing maintenance and capital equipment for Sandwich Hollows Golf Club operations, or take any action relative thereto.

Recommended by the Board of Selectmen, Finance Committee, and Capital Improvement Planning Committee.

ARTICLE 4

To see if the Town will vote to amend the Sandwich Protective Zoning By-laws to create a Ground Mounted Solar Overlay District, by amending Article II, Use and Intensity Regulations, Section 2100, Establishment of Districts by adding a new subsection p. to Section 2110 and the additional language to the end of Section 2110, as follows:

p. Ground Mounted Solar Overlay District. See Section 4180.

Ground Mounted Solar Overlay District, as described in Section 4180 is herein established as an overlay district, shall be considered to be superimposed over any other district established by this by-law. Land in the Ground Mounted Solar Overlay District shall be subject to the requirements of Section 4180.

AND FURTHER,

To see if the Town will vote to amend the Sandwich Protective Zoning By-laws Section 2210, Use Regulation Schedule, by adding Note 25 highlighted in bold, as follows:

Industrial/Utility Uses, Solar Photovoltaic Installation, Large-Scale Ground-Mounted (22)

R-1	R-2	VIL (2,3)	BL-1	B-2 (2,3)	FLEX	IND	MAR	RD (2,3)	S	GD
N	S	N	N **(25)**	N	Y	Y	N	S	N	S

25. Y - permitted by-right if in Ground Mounted Solar Overlay District.

AND FURTHER,

To see if the Town will vote to amend the Sandwich Protective Zoning By-laws Section 4180, Large Scale Ground Mounted Solar Photovoltaic Installations, by adding the language highlighted below in bold, as follows:

4180 LARGE SCALE GROUND MOUNTED SOLAR PHOTOVOLTAIC INSTALLATIONS

The Planning Board shall be the Special Permit Granting Authority for applications pertaining to sites outside the Industrial Limited District and the Ground Mounted Solar Overlay District.

The Ground Mounted Solar Overlay District is herein established as an overlay district and shall be superimposed over any other district established by this by-law. A plan entitled "Solar Overlay District" dated July 1, 2015 is on file in the Planning and Development Office delineating this district and is hereby made a part of this By-Law.

AND FURTHER,

To see if the Town will vote to amend the Sandwich Protective Zoning By-laws Section 4182, Procedure, by adding the language below in bold, as follows:

4182 Procedure
Large scale ground-mounted solar photovoltaic installations located within the Industrial Limited District **and the Ground Mounted Solar Overlay District** are allowed by right subject to compliance with sections 4180 through 4196 and other applicable sections of this bylaw.

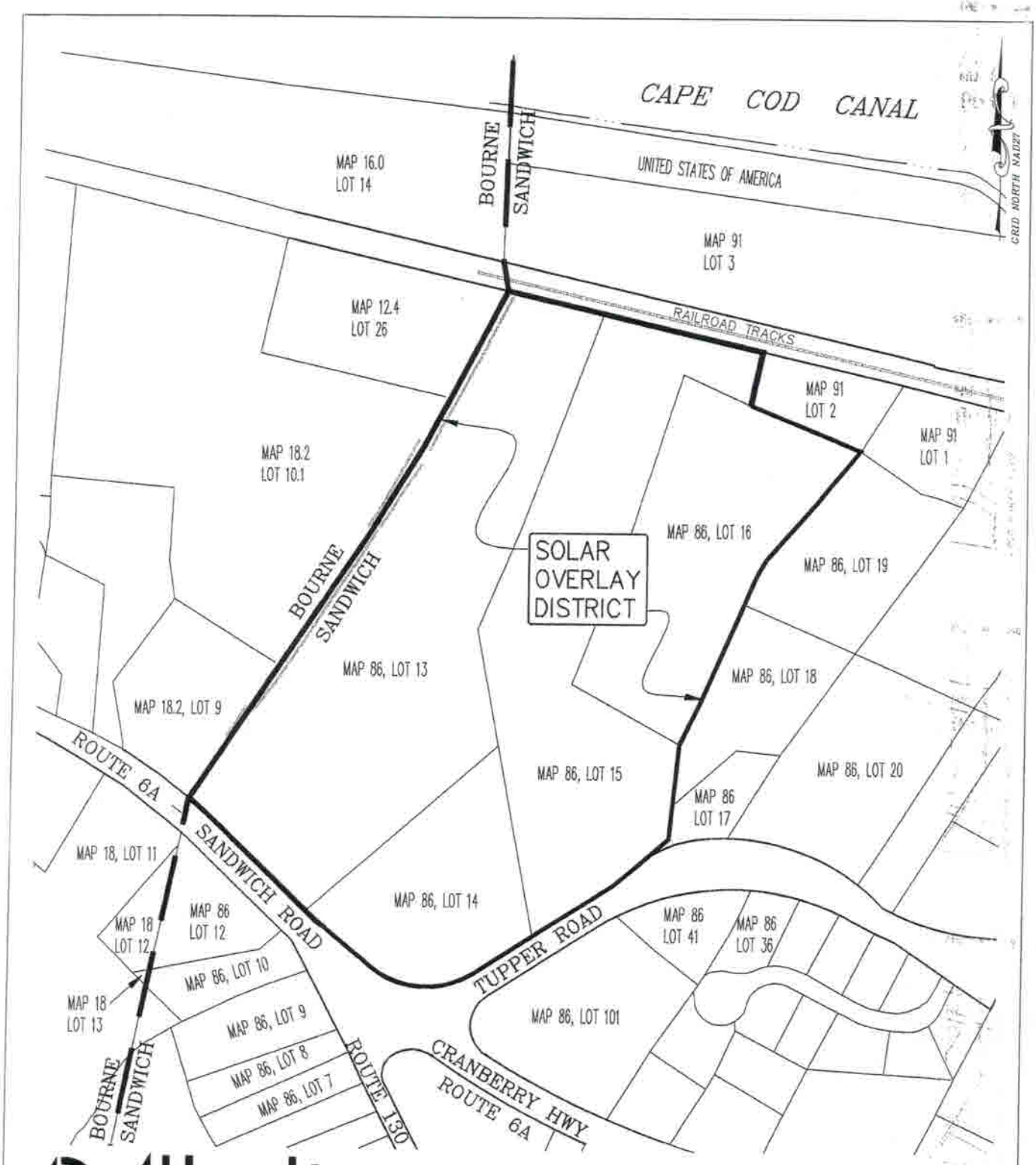
or take any action relative thereto.

Recommended by the Board of Selectmen.

ARTICLE 5
To see of the Town will vote to proclaim as follows:

At its meeting on April 23, 2014, the Sandwich Historic District Committee (the "Committee") considered an application ("Application") for a certificate of appropriateness ("COA") for an aerial adventure park (the "Project") at 0 Shame Road and 0 Pocasset Road. Abutters to 0 Shawme Road were not notified of that meeting, nor were they previously notified of the Application. At that meeting the Committee voted to approve a "motion to accept the plans as presented" and issued a corresponding COA that Project proponents claim authorize the Project. Many or all of the aforementioned abutters had no knowledge of the COA until after the relevant appeal period had passed.

For these and other reasons, the construction and operation of the Project constitutes a violation of Chapter 470 of the Acts of 1973, as amended (the Old King's Highway Regional Historic District Act, or the "Act"). Under Section 12 of the Act, the Inspector of



Atlantic® DESIGN ENGINEERS, INC.
P.O. Box 1051, Sandwich, MA 02563
(508) 888 - 9282

SCALE 1" = 300'
0 100 150 300

FILE : 2796 Fig_Solar Overlay1

SOLAR OVERLAY DISTRICT

SANDWICH, MASSACHUSETTS
JULY 1, 2015

Sheet	of
1	1

JOB NUMBER
2796.00

E

3225 MAIN STREET • P.O. BOX 226
BARNSTABLE, MASSACHUSETTS 02630

(508) 362-3828 • Fax (508) 362-3136 • www.capecodcommission.org

CAPE COD
COMMISSION

Via Email
September 11, 2015

Matthew A. Beaton, Secretary
Secretary of Energy and Environmental Affairs
Executive Office of Energy and Environmental Affairs (EEA)
Attn: MEPA Office, Holly Johnson, Project Analyst
100 Cambridge Street, Suite 900
Boston MA 02114

Re: ***EENF/ Phase 1 Waiver Request- EEA No. 15407***
Canal Unit 3 and Canal Community Solar
NRG Canal Plant, Sandwich
(Commission Project No. 15016)

Dear Secretary Beaton:

Thank you for the opportunity to provide comments on the above-referenced matter, which follow and are arranged by the applicable issue areas from Barnstable County's Regional Policy Plan (RPP). Cape Cod Commission staff supports the NRG's request for a Phase 1 Waiver from preparation of an EIR for the community solar portion of the above-referenced project.

Cape Cod Commission staff is available to answer any questions about the comments.

Sincerely,

Patty Daley
Deputy Director

Cc: Project File
NRG c/o Michael D. Ford, Esq. via email
Sandwich Cape Cod Commission Representative via email
Blair Haney, Sandwich Town Planner via email

As discussed in the relevant issue areas below, Commission staff recommends granting a Phase 1 Waiver to the solar portion of the project discussed in the EENF. The Commission reserves the right to provide additional comments pertaining to the following and other RPP issue areas in future regulatory review procedures.

Community Character

Commission community design staff supports a Phase 1 waiver for the solar portion of the project. During DRI review of the solar project, the Applicant will need to address, among other things, the visibility of the solar arrays from Route 6A and whether there are any archaeological resources that could be disturbed during solar array installation.

Natural Resources

Both the Canal Unit 3 and Canal Community Solar project components will undergo DRI review by the Commission. Natural Resources staff reserves comment on Canal Unit 3 until later stages of MEPA review (it is the Commission's understanding that Canal Unit 3 will undergo full EIR review and certification prior to the Commission's DRI review).

Staff supports the Phase I waiver request for the solar portion, which would allow this portion of the project to undergo DRI review prior to Canal Unit 3, with the understanding that the solar project will undergo DRI review and address RPP performance standards during DRI review. The RPP natural resources issue areas that the project would need to address include potential wetland and floodplain impacts, and open space mitigation.

Water Resources

The entirety of NRG's 88-acre site in Sandwich, Massachusetts lies outside of nitrogen impaired watersheds, wellhead protection areas, potential water supply areas, freshwater recharge areas, and water quality improvement areas, as defined by the Cape Cod Commission's Regional Policy Plan (RPP). Therefore, both the Canal Unit 3 and Canal Community Solar project are not subject to minimum performance standards (MPS) under WR2 (Drinking Water Quality and Quantity), WR3 (Marine Water Embayments and Estuaries), WR4 (Freshwater Ponds and Lakes), and WR5 (Water Quality Improvement Areas). Because no wastewater treatment facility is proposed, standards under WR6 (Public and Private Wastewater Treatment Facilities) also do not apply.

Both the Canal Unit 3 and Canal Community Solar projects are subject only to MPSs under Water Resource Goals WR1 (General Aquifer Protection) and WR7 (Stormwater Quality).

The NRG site lies within the marine water recharge area to the Cape Cod Canal, which is included in the Buzzards Bay Bacteria TMDL established in March 2009. Though the RPP has standards to accommodate nitrogen mitigation, there are currently no standards that specifically address bacteria.

Both the Canal Unit 3 site and the Canal Community Solar site are subject to a 5ppm nitrogen loading standard Under Water Resource Goal WR1 (General Aquifer Protection). Because a nitrogen TMDL has not been established for the Cape Cod Canal watershed, nor is a nitrogen

loading study planned for the watershed by the Massachusetts Estuaries Project, a stricter nitrogen loading standard is not applicable in this case.

a. Canal Unit 3

Unit 3 will generate 2,673 gpd of wastewater, which will either be recycled in a near-zero liquid discharge system or trucked off site. Future design plans should specify how exactly wastewater will be handled and include a nitrogen loading calculation showing conformance with the 5ppm standard.

Unit 3 will withdraw 125,129 gpd of groundwater for operation. Because Unit 3 will withdraw more than 20,000 gpd, water resources standard WR1.3 requires that a groundwater study show that the project will not adversely impact groundwater levels or adjacent waters and wetlands.

During design of NRG's Unit 1 and Unit 2, over 100 borings were installed to provide subsurface data, with additional borings installed in 2001. The proposed well for the groundwater withdrawal, Well No. 4, is located on site and thus extensive hydrogeological information is already known about the well site and surrounding vicinity. A pumping test of Well No. 4 was conducted in April 2001, showing that it has a safe yield in excess of 400 gpm (or 576,000 gpd), which far exceeds the project's demand.

The EENF indicates withdrawals will not impact any municipal supply, but it is less clear on impacts to private wells. Additionally, the EENF mentions that at one time, a recommendation was made to monitor water quality to confirm that any shift in the position of the fresh water-salt water interface would not degrade water quality in the supply wells. Staff recommends that past hydrogeological efforts be compiled into a groundwater study report specific for Well No. 4, with explicit findings regarding impacts to private wells within 400 feet of the site and water quality monitoring data mentioned above.

MPS WR1.5 requires adoption of best management practices for turf and landscape management, which has yet to be addressed in the 15% design plans submitted for Unit 3.

Unit 3 will add 4.5 acres of impervious area, increasing the total stormwater generated onsite. Water resources standards under WR7 Stormwater Quality, require stormwater to be infiltrated on-site, encourage minimization of impervious area, and require the use of bioinfiltration practices for roadways and parking areas. Staff looks forward to reviewing the stormwater management design plans, once submitted.

b. Canal Community Solar

As mentioned in the EENF, water resources impacts by the Canal Community Solar project will likely be minimal. The Canal Community Solar project will not require operational water use nor generate any wastewater.

The Canal Community Solar project will, however, alter 8.2 acres of land, most of which is undeveloped and comprised of a mix of open fields, scrub/shrub, and wooded vegetation. This vegetation will be cleared, graded, and seeded with a grass mixture. Staff recommend that consideration be given to using shade-tolerant and low-lying native plantings, in accordance with WR1.7.

A gravel access road will add 0.4 acres of impervious area to the site, which will flow into two vegetated bio-retention stormwater areas on the northeastern part of the site, which total approximately 0.3 acres. Runoff from the panels will either recharge through the seeded ground or flow to the bioretention area. Though detailed stormwater plans need to be reviewed, management appears to be consistent with the onsite infiltration and bioinfiltration practices required by the stormwater minimum performance standards. Erosion and sedimentation plans need to be considered during construction and a stormwater maintenance and operation plans should be submitted for review.

Due to the minimal water resources impacts of the Canal Community Solar project, and the fact that the project will undergo DRI review, water resources staff support granting a Phase 1 Waiver.

F

Atlantic
DESIGN ENGINEERS, INC.

October 20, 2015

Mr. Thomas E. Atkins
NRG Renew Canal 1, LLC
9 Freezer Road
Sandwich, MA 02563

RE: South Sagamore Supply Well

Dear Mr. Atkins:

We have investigated the status at the South Sagamore Supply Well, (Public Water Supply ID 4036000-07G), an existing water supply well in the Town of Bourne, just west of the Canal Community Solar Project. (See attached Figure from Mass GIS database.)

Well Site Status

According to Robert E. Prophett, the Bourne Water District Superintendent, the well has been inactive for many years due to contamination from a release that occurred at a nearby gas station on Rte. 6A. It is presently inactive as a public water supply and the Water District has no plans to bring it back into service in the near or long term, as the contamination cleanup is costly and not under their control and water supply needs of this area of Bourne is adequately served by other wells in the District. The existing pump and piping system is still being used for emergency firefighting purposes, in conjunction with an interconnection agreement with the Town of Sandwich, but the well is not used as a source for drinking water. This emergency use is perhaps the reason the well still shows up on DEP records as a water supply.

Cleanup Status

We investigated, through a MassDEP records search, the status of the cleanup of this release and found that the source of release was detected from former underground storage tanks (USTs) located at the 1030 Sandwich Road property (Sagamore Irving Station), approximately 800 feet away and up-gradient of the South Sagamore Supply Well. According to environmental reports dating back as far as May of 1984, the Irving property was listed by MassDEP as a Location To Be Investigated (LTBI) and issued Release Tracking Number (RTN) 4-576. The property was later listed as a confirmed priority disposal site on July 15, 1990.

P.O. Box 1051
Sandwich, MA 02563
(508) 888-9282 · FAX 888-5859
email: ade@atlanticcompanies.com
www.atlanticcompanies.com

Response actions completed at the Irving site include excavation of gasoline impacted soils, operation of a soil vapor extraction system, chemical oxidation remedial additives, application of bio-remedial additives and air sparging. Migration of gasoline extending from the Irving site has been monitored through multiple Phase II CSA's, a Release Abatement Measure, an Immediate Response Action and within a partial Response Action Outcome submitted for a portion of the Site in 2004.

The migration of contamination towards the South Sagamore Supply Well has not been discussed within recent reports and testing of the supply well doesn't seem to be required as part of the status reports. Also note that per MassDEP drinking water supply well regulations, water quality testing is required to be completed along with annual water quality reports at any active supply water supply well. The Bourne Water Superintendent has indicated that they are no longer testing the South Sagamore Well.

Based upon this review of MassDEP records, it is likely that concentrations of contaminates will remain above Drinking Water standards for a considerable period of time unless extensive and potentially costly remediation is implemented. Currently the only remediation that is underway is being completed under an Immediate Response Action to address indoor air concerns at nearby cottages across the street from the Irving site. The remaining areas of the Irving site are in Remedy Operation Status (ROS), requiring only annual monitoring of specific contaminants of concern (COCs) in the area..

As the natural breakdown of the COCs in question depend on many factors it would be difficult to accurately predict the amount of time for natural attenuation to degrade the COC's to levels below groundwater standards in the area. It should be noted that in a recent 2015 Remedy Operating Status Report, recently sampled groundwater monitoring wells located approximately 450 feet away from the South Sagamore Well still contained the highest concentrations of COCs, over 25 years since the original reported release. Based upon this and our experience on other cleanup sites, it is likely that a considerable period of time would be needed to naturally break down these contamination compounds to acceptable levels.

Therefore, with no remediation plans in place now or for the foreseeable future, in our opinion, there is a strong possibility of the well contamination (and therefore the inactive status of the well) lasting longer than 20 to 25 years.

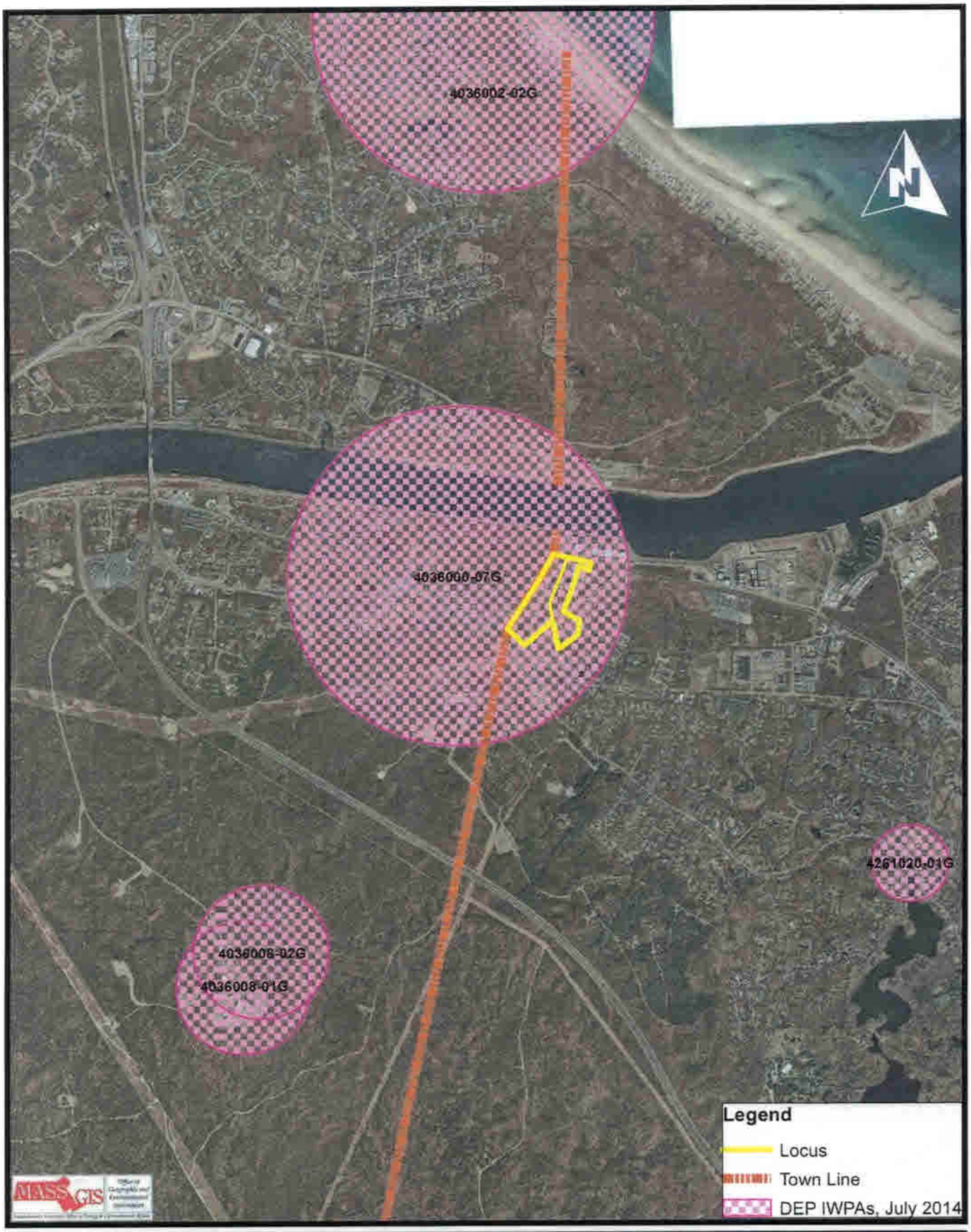
Please call me at (508) 888-9282 if you should have any questions.

Sincerely,

ATLANTIC DESIGN ENGINEERS, INC.

Richard J. Tabaczynski, P.E.
Vice-President

RJT/rp



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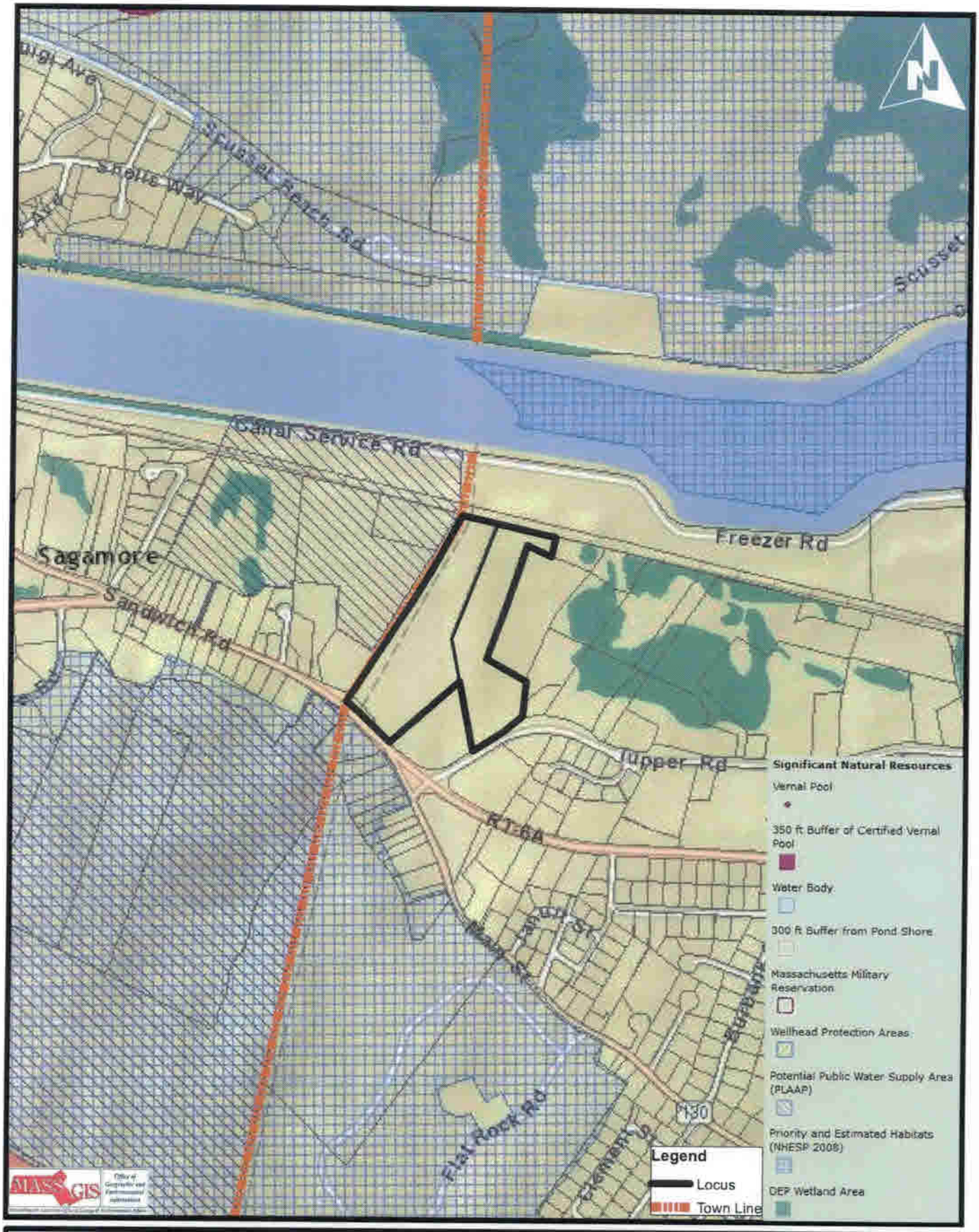
Interim Wellhead Protection Areas (IWPA)

Canal Community Solar Project
Sandwich, Massachusetts

Approx. Scale
1 "=2,000 '
1:24,000

September 24, 2015

Figure



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Significant Natural Resource Areas

Canal Community Solar Project
Sandwich, Massachusetts

Approx. Scale
1 "=800 '
1:9,600

September 24, 2015

Figure

G

Commonwealth of Massachusetts

Division of Fisheries & Wildlife

MassWildlife

Jack Buckley, *Director*

August 28, 2015

Jackie Bruce
Tetra Tech, Inc.
238 Littleton Road
Suite 201B
Westford MA 01886

RE: Project Location: 9 Freezer Road
Town: SANDWICH
NHESP Tracking No.: 15-34696

To Whom It May Concern:

Thank you for contacting the Natural Heritage and Endangered Species Program of the MA Division of Fisheries & Wildlife (the "Division") for information regarding state-listed rare species in the vicinity of the above referenced site. Based on the information provided, this project site, or a portion thereof, is located **within** *Priority Habitat 15* (PH 15) and *Estimated Habitat 79* (EH 79) as indicated in the *Massachusetts Natural Heritage Atlas* (13th Edition). Our database indicates that the following state-listed rare species have been found in the vicinity of the site:

Scientific name	Common Name	Taxonomic Group	State Status
Sternula antillarum	Least Tern	Bird	Special Concern
Sterna hirundo	Common Tern	Bird	Special Concern

The species listed above are protected under the Massachusetts Endangered Species Act (MESA) (M.G.L. c. 131A) and its implementing regulations (321 CMR 10.00). State-listed wildlife are also protected under the state's Wetlands Protection Act (WPA) (M.G.L. c. 131, s. 40) and its implementing regulations (310 CMR 10.00). Fact sheets for most state-listed rare species can be found on our website (www.mass.gov/nhesp).

Please note that projects and activities located within Priority and/or Estimated Habitat **must** be reviewed by the Division for compliance with the state-listed rare species protection provisions of MESA (321 CMR 10.00) and/or the WPA (310 CMR 10.00).

Wetlands Protection Act (WPA)

If the project site is within Estimated Habitat and a Notice of Intent (NOI) is required, then a copy of the NOI must be submitted to the Division so that it is received at the same time as the local conservation commission. If the Division determines that the proposed project will adversely affect the actual Resource Area habitat of state-protected wildlife, then the proposed project may not be permitted (310 CMR 10.37, 10.58(4)(b) & 10.59). In such a case, the project proponent may request a consultation with the Division to discuss potential project design modifications that would avoid adverse effects to rare wildlife habitat.

A streamlined joint MESA/WPA review process is available. When filing a Notice of Intent (NOI), the applicant may file concurrently under the MESA on the same NOI form and qualify for a 30-day streamlined joint review. For a copy of the NOI form, please visit the MA Department of Environmental Protection's website: http://www.mass.gov/dep/water/approvals/wpaform3.doc.

MA Endangered Species Act (MESA)

If the proposed project is located within Priority Habitat and is not exempt from review (see 321 CMR 10.14), then project plans, a fee, and other required materials must be sent to Natural Heritage Regulatory Review to determine whether a probable "take" under the MA Endangered Species Act would occur (321 CMR 10.18). Please note that all proposed and anticipated development must be disclosed, as MESA does not allow project segmentation (321 CMR 10.16). For a MESA filing checklist and additional information please see our website: www.mass.gov/nhesp ("Regulatory Review" tab).

We recommend that rare species habitat concerns be addressed during the project design phase prior to submission of a formal MESA filing, as avoidance and minimization of impacts to rare species and their habitats is likely to expedite endangered species regulatory review.

This evaluation is based on the most recent information available in the Natural Heritage database, which is constantly being expanded and updated through ongoing research and inventory. If you have any questions regarding this letter please contact Lauren Glorioso, Endangered Species Review Assistant, at (508) 389-6361.

Sincerely,

Thomas W. French

Thomas W. French, Ph.D.
Assistant Director

Bruce, Jackie

From: Glorioso, Lauren (FWE) <lauren.glorioso@state.ma.us>
Sent: Monday, September 14, 2015 4:11 PM
To: Bruce, Jackie
Subject: RE: Info. request, Sandwich, NHESP 15-34696

Jackie,

Thank you for sending the figure which depicts both proposed projects on property (north and south of the rail tracks). The proposed work does not appear to be within Priority Habitat for rare species, therefore no review pursuant to the MA Endangered Species Act (MESA) is required. If there are future changes to the proposed project to include areas of Priority Habitat, please contact our office.

Sincerely,

Lauren Glorioso
Endangered Species Review Assistant
Natural Heritage & Endangered Species Program | Division of Fisheries & Wildlife | 1 Rabbit Hill Road | Westborough, MA 01581 | ph: 508-389-6361 | fax: 508-389-7890 | lauren.glorioso@state.ma.us | **www.mass.gov/nhesp**

From: Bruce, Jackie [mailto:Jackie.Bruce@tetratech.com]
Sent: Monday, September 14, 2015 2:43 PM
To: Glorioso, Lauren (FWE)
Subject: RE: Info. request, Sandwich, NHESP 15-34696

Hi Lauren,

Per our discussion, I have attached a figure which shows the limits of disturbance for the two projects proposed on the property previously reviewed by NHESP. As you can see, the Solar Site (pink) is located on the southern portion (orange), away from the Cape Cod Canal. We are hoping to get your confirmation that work in this area should not impact any known RTE species.

The Simple-Cycle Site (**black**), is proposed on the northern portion (**red**), with interconnection corridors (**aqua**, **yellow**, and **purple**) extending across the Property. A new ULSD pipe (**blue**) is proposed on the existing dock. While a Ch. 91 Permit Minor Modification will be pursued for this work, no 'in water' work is proposed in association with this project.

Please let me know if you have any questions. I greatly appreciate your insight on this matter.

Sincerely,
Jackie Bruce

Jackie G Bruce | Environmental Planner
Direct **(978) 212-3284** | Fax **(978) 692-4592** | Mobile **(860) 748-8745** | Jackie.Bruce@tetratech.com

Tetra Tech | Complex World, Clear Solutions™
238 Littleton Road, Suite 201B, Westford, MA 01886 | tetratech.com

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From: Glorioso, Lauren (FWE) [mailto:lauren.glorioso@state.ma.us]
Sent: Friday, August 28, 2015 7:11 PM

To: Bruce, Jackie <Jackie.Bruce@tetratech.com>
Subject: Info. request, Sandwich, NHESP 15-34696

Jackie,

Please see the attached letter regarding the Information Request form submitted to NHESP. Please note that the request area provided with the Information Request form included area over the Cape Cod Canal which our letter reflects, however, based on the project description it sounds like the project may be proposed entirely outside of Priority Habitat (not extending into thte waters of the canal), thus a MESA filing would not be required. If you have questions or require a hard copy, please contact our office.

Sincerely,

Lauren Glorioso
Endangered Species Review Assistant
Natural Heritage & Endangered Species Program | Division of Fisheries & Wildlife |1 Rabbit Hill Road | Westborough, MA 01581 | ph: 508-389-6361 | fax: 508-389-7890 | lauren.glorioso@state.ma.us | **www.mass.gov/nhesp**

H

The Commonwealth of Massachusetts
William Francis Galvin, Secretary of the Commonwealth
Massachusetts Historical Commission

October 2, 2015

Jackie Bruce
238 Littleton Road, Suite 201-B
Westford, MA 01886

RE: Canal Unit 3, Canal Community Solar, 9 Freezer Road, Sandwich, MA; MHC# RC.21954

Dear Ms. Bruce:

Thank you for your inquiry to the Massachusetts Historical Commission (MHC) for the project referenced above. The staff of the MHC have reviewed the information submitted and have the following comments.

The proposed project consists of the demolition of several warehouse structures, the construction of an exhaust stack, and the installation of two solar arrays at 9 Freezer Road in Sandwich. The information provided indicates that the project will require permits from the US Environmental Protection Agency (EPA), the Massachusetts Department of Transportation (MassDOT), and the Massachusetts Department of Environmental Protection (MassDEP).

Review of MHC files indicates that project information was received at this office on July 29, 2015. MHC did not issue comment or a determination of effect for the project within 30 days (36 CFR 800.3(c)(4); (950 CMR 71.07(2)(f)). Please obtain a Certificate of Appropriateness from the Sandwich Old Kings Highway Historic District Commission.

These comments are provided to assist in compliance with Section 106 of the National Historic Preservation Act of 1966, as amended (36 CFR 800) and M.G.L. Chapter 9, sections 26-27C, (950 CMR 71.00). If you have further questions or require additional information please contact Linda Santoro at this office.

Sincerely,

Brona Simon

Brona Simon
State Historic Preservation Officer
Executive Director
Massachusetts Historical Commission

220 Morrissey Boulevard, Boston, Massachusetts 02125
(617) 727-8470 • Fax: (617) 727-5128
www.sec.state.ma.us/mhc

I

Atlantic
DESIGN ENGINEERS, INC.

October 9, 2016

Cape Cod Commission
3225 Main Street
Barnstable, MA 02630

RE: Traffic Review
Canal Community Solar Project
Sandwich, MA

Dear Commission Members:

Atlantic Design Engineers, Inc. has completed a review of traffic-related matters for the Canal Community Solar Project in Sandwich, MA. This letter summarizes the results of our review.

The project has frontage on both Tupper Road and Sandwich Road (Rte. 6A) but access to the site for construction, as well as future maintenance, will be solely off of Tupper Road via an existing gravel access drive approximately 500 feet north of the intersection of Rte. 6A and Tupper Road. This existing gravel drive presently provides access to the existing electric transmission lines transecting the property and is rarely utilized except for an occasional utility maintenance vehicle.

Proposed vehicle trips during construction are estimated to be 10 trips per day for an approximate 5-month construction period.

After construction and throughout the life of the project, proposed vehicle trips will be minimal, primarily for maintenance of the solar array, and are estimated to be 1 trip per month.

Tupper Road is classified as a rural major collector per the Cape Cod Commission's Functional Classification of Cape Cod Roadways Map. Speed limits are not posted in the vicinity of the site access drive but were observed to be 30 to 35 mph. Sight distance to the south were measured to be in excess of 500 feet and to the north were measured to be approximately 400 feet, both within MDOT and AASHTO limits, thereby affording safe vehicular access to the site.

A 5 foot paved apron, in good condition, exists across the entire 35-foot width of the driveway opening on Tupper Road, providing more than ample radii and driveway width for vehicles entering and exiting the site. Therefore, improvements to this site access drive are not proposed or warranted.

P.O. Box 1051
Sandwich, MA 02563
(508) 888-9282 · FAX 888-5859
email: ade@atlanticcompanies.com
www.atlanticcompanies.com

Please call me at (508) 888-9282 if you should have any questions.

Sincerely,

ATLANTIC DESIGN ENGINEERS, INC.

Richard J. Tabaczynski, P.E.
Vice-President

cc. Attorney Michael D. Ford
NRG Renew Canal 1 LLC

J

SUMMARY OF NRG COMMUNITY SOLAR PROGRAM

Members join NRG's community solar program through signing up for an allocation from the Canal Community Solar array based on their current annual electricity consumption (for example, 5 kW dc). As many members can sign up as it takes for all the kW of Canal Community Solar to be fully subscribed (for example, if each homeowner member averages a 5 kW dc subscription, 332 members may sign up based on Canal Community Solar's 1,663 kW dc capacity.)

Canal Community Solar members sign up for a subscription to Canal Community Solar at a price below current retail electricity rates. Once Canal Community Solar is operational, members pay NRG a monthly charge for their allocation of the solar facility. The monthly charge is a predictable amount, protecting members from volatile prices of traditional fossil fuels, and requires no upfront capital expenditure on behalf of each member.

As Canal Community Solar provides clean energy to the Eversource power grid, Eversource provides each Canal Community Solar member with a dollar credit ("net metering credit") on their monthly electric utility bill based on the energy their allocation of Canal Community Solar produces.

Members subscribe to Canal Community Solar for 20 years, and receive and promote all the benefits of solar energy throughout:

- Clean sustainable energy
- More solar energy on the power grid
- Helps curb greenhouse gas emissions; helps decrease dependence on fossil fuels
- More predictable rates for every community solar member
- Decreased use of fossil fuels

While also receiving additional benefits:

- No equipment on members' property.
- Professional offsite maintenance and no installers to deal with.
- Price certainty – predictable monthly payments.
- Production guaranty – if the community solar facility under-produces, members are protected through an NRG guarantee. If it overproduces, members benefit from higher net metering credits on their bill.
- Flexible terms – if a member move outside of the Canal Community Solar service address, the member can transfer their agreement to an eligible replacement customers

K

LAW OFFICES OF MICHAEL FORD
ATTORNEYS AT LAW
72 MAIN STREET, P.O. BOX 485
WEST HARWICH, MA 02671
TEL. (508)430-1900 FAX (508)430-9979
lawofficeofmichaelford@verizon.net

MICHAEL D. FORD
JEFFREY M. FORD

Re: Review of Easements in the Solar Overlay District

The project site is subject to the following easements:

1) An easement from Canal Electric Company to New Bedford Gas & Edison Light Company, dated August 5, 1966 and recorded in the Barnstable Registry of Deeds in Book 1343 Page 1007. The easement grants "the perpetual right and easement to enter upon, to survey and to construct...a line or lines of poles, H-Frames, towers and combinations thereof, with wires and cables above and underground … for the transmission and distribution supply of electric energy … (which line or lines may be erected at the same or different times) over, across, under and upon strips of land …. The right of way and easement is 360 feet in width and is shown on plan recorded in Barnstable Plan Book 206 Page 97-99 (4 sheets). The easement area on the locus is shown on Plan Book 206 Page 97. The easement includes the perpetual right and easement to clear and keep said strips cleared of trees and underbrush by mechanical, chemical or other means (the first clearing may for less than the full width and may be widened from time to time to the full width) and to remove buildings or other structures therefrom which may, in the judgment of the Grantee, interfere with the operation of said line or lines, … together, also, with the right to install, maintain and replace anchors and guy wires on the land of the Grantor adjacent to and lying outside of said strips as my be needed to strengthen or support said line or lines at angle points; to change and/or maintain the present grade of said strips and to prevent the change of grade, filling or excavation thereof.

2) An easement from Canal Electric Company to Commonwealth Electric Company dated December 30, 1998 and recorded in Book 11961 Page 222. The easement area is shown on Plan Book 546 Page 42 delineated "Commonwealth Electric Company Proposed 100' Wide Distribution Easement." The easement is included in the Title Report Sheet 475-476 (scanned copy attached). As shown on Plan Book 546 Page 42 the 100' easement crosses Assessor's Map 86, Lot 13, Map 86, Lot 14 and Map 86 Lot 15. The easement grants "the perpetual right and exclusive right and easement to enter upon to survey and to construct...a line or lines of poles, H-Frames, towers and combinations thereof, with wires and cables above and underground … for the transmission and distribution supply of electric energy … (which line or lines may be erected at the same or different times) over, along, across, under and upon a strip of land100.00 feet in width … The easement includes the perpetual right and easement to clear and keep said strip cleared of trees and underbrush by mechanical, chemical or other means (the first clearing may for less than

the full width and may be widened from time to time to the full width) and to remove structures or other obstructions therefrom which may in the sole judgment of the Grantee interfere with the operation of said line or lines, … and to enter upon and pass along said strip to and from the adjoining premises for all of the above purposes and the removal of said line or lines, and to reach said strip in any reasonable manner over other land of which said strip is a part; together, also, with the right to install, maintain and replace anchors and guy wires on the land adjacent to and lying outside of said strip as needed to strengthen or support said line or lines at angle points; to change and/or maintain the present grade of said strip and to prevent the change of grade, filling or excavation thereof; and to remove, tip or trim, anytime and from time to time, trees on the remaining land of the Grantor adjacent to said strip which may in the judgment of the Grantee, its successors and assigns, be advisable for the safe operation of said line or lines.

3) An easement from Mirant Canal, LLC to Algonquin Gas Transmission, LLC dated April 29, 2008 and recorded in Book 23023 Page 215 (the easement also includes registered land is filed in the Barnstable Registry District as Document No. 1,093,377). This Easement is Sheet 421-441 in the Title Report (scanned copy attached). The Solar Overlay District does not include any Registered Land. This 50' wide easement is shown on the plans attached to the easement (see Title Report Sheet 438 which is Book 23023 Page 232). The easement is located on Assessor's Map 86 Lot 13 and crosses over (under) the 100' wide Commonwealth Electric Easement. The easement is for an underground pipeline. The Easement includes the following language:

   The Grantee shall have such other rights and benefits as are necessary for the full enjoyment and use of the rights herein granted, including, but not limited to, the right, to be exercised at any time in Grantee's sole and absolute discretion, to remove, clear and to keep clear all buildings (including, but not limited to, sheds, garages, and other structures, whether on foundations or not), walls or similar structures, rocks, trees, brush, limbs, and other obstructions, and the free and full right of ingress and egress, over and across said Right-of-Way.

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Dielectric Fluids

Envirotemp FR3 Fluid

DESCRIPTION

Envirotemp FR3 fluid is a bio-based, sustainable, natural ester dielectric coolant for use in distribution and power class transformers where its unique fire safety, environmental, electrical, and chemical properties are advantageous. Acceptance limits for new fluid are shown in Table 1. More than dozen years of field experience (with over 300,000 transformers in service) confirms excellent performance.

Envirotemp FR3 fluid is formulated from seed oils and performance enhancing additives. It does **not** contain petroleum, halogens, silicones, corrosive sulfur, or any other questionable material. It quickly and thoroughly biodegrades[1] in the environment. The fluid is non-toxic in acute aquatic[2] and oral toxicity tests[3]. The Color Green tint reflects its favorable environmental profile (See Table 2) and readily distinguishes it from petroleum based oils.

Envirotemp FR3 fluid has exceptionally high flash/fire points of approximately 330/360 °C - the highest ignition resistance of any high fire point dielectric fluid currently available. It qualifies as a "high-fire-point", "less-flammable", "IEC Class K", and "non-propagating" fluid. Envirotemp FR3 fluid is Approved[4] by FM Global and Classified[5] by Underwriters Laboratories as a Less-Flammable Dielectric Liquid for use in complying with the National Electric Code[6] (NEC) and insurance listing requirements[7].

Envirotemp FR3 fluid is compatible with standard transformer construction materials and components. Envirotemp FR3 fluid should be stored, handled, and processed in a similar meticulous manner as transformer mineral oil, see CPS document S900-20-1, Envirotemp FR3 Fluid Storage and Handling Guide for additional information.

In addition to new distribution and power class transformers, a variety

TABLE 1
Envirotemp FR3 Fluid Recommended Acceptance Limits

Property	Specification Limits IEEE C57.147	Specification Limits ASTM D6871	Test Method
Electrical			
Dielectric Breakdown, 2mm [kV]		≥35	ASTM D1816
Sampled from Bulk	≥35		
Sampled from Totes/Drums	≥60		
Dissipation Factor [%]			ASTM D924
25 °C	≤ 0.20	≤ 0.20	
100 °C	≤4	≤ 4	
Gassing Tendency [µl/min]		≤ 0	ASTM D2300
Physical			
Color [ASTM units]	≤1.0	≤ 1.0	ASTM D1500
Appearance		bright & clear	ASTM D1524
Kinematic Viscosity [mm2/s]			ASTM D445
40 °C	≤50	≤ 50	
100 °C	≤15	≤ 15	
Pour Point [°C]	≤-10	≤ -10	ASTM D97
Fire Point [°C]	≥300	≥ 300	ASTM D92
Flash Point (open cup) [°C]	≥275	≥ 275	ASTM D92
Relative Density [15 °C/15 °C]	≤0.96	≤ 0.96	ASTM D1298
Chemical			
Water Content [mg/kg]			
Sampled from Bulk	≤200	≤200	ASTM D1533
Sampled from Totes/Drums	≤100	≤200	ASTM D1533
Acid Number [mg KOH/g]	≤ 0.06	≤ 0.06	ASTM D974
Corrosive Sulfur	not corrosive	not corrosive	ASTM D1275B
PCB Content [ppm]	not detectable	not detectable	ASTM D4059

[1] Per OPPTS 835.3110
[2] Per OECD 203, Method B
[3] Per OECD 420
[4] Less-Flammable Transformer Fluids, Approval Guide – Electrical Equipment, FM Approvals, FM Global, Norwood, MA, USA
[5] EOVK.MH10678, Transformer Fluids, UL Listed and Classified Products, Underwriters Laboratories, Northbrook, IL, USA
EOUV.MH10678, Dielectric Mediums, UL Listed and Classified Products, Underwriters Laboratories, Northbrook, IL, USA;
[6] National Electrical Code, NFPA 70, National Fire Protection Association, Quincy, MA, USA
[7] Transformers, 5-4, Property Loss Prevention Sheets, FM Global, Norwood, MA, USA

of other equipment, including voltage regulators, sectionalizing switches, transformer rectifiers, and electromagnets use Envirotemp FR3 fluid. The fluid is also used in retrofill applications for transformers and other fluid-filled distribution and power equipment.

ENVIRONMENTAL AND HEALTH

Envirotemp FR3 fluid is specifically formulated to minimize health and environmental risks. The base oils come from renewable resources - commodity seeds - and are recyclable and reusable. Envirotemp FR3 fluid does not require genetically altered vegetable oils.

The US and California Environmental Protection Agencies published Envirotemp FR3 fluid's Environmental Technology Verification Report in 2003. The verification process includes biodegradation and toxicity testing. Results from the aquatic biodegradation test confirm that Envirotemp FR3 fluid's rate of biodegradation is the same as that of the standard reference material. FR3 fluid meets the "ultimately biodegradable" criteria (Figure 1). When tested for acute oral toxicity, Envirotemp FR3 fluid is not toxic.

The Edible Oil Regulatory Reform Act (US Public Law 104-55, 1995) makes Envirotemp FR3 fluid eligible for current and future regulatory relief. The options of alternative spill response procedures, such as natural bio-remediation, are now more viable. The fluid's inherent viscosity and tendency of thin layers to polymerize help prevent migration along the surface and into subsurface soils.

The EPA, OSHA, and the Department of Transportation (DOT) do not list Envirotemp FR3 fluid as hazardous. Its Hazardous Material Information System (HMIS) rating is 0 for both health and reactivity. Envirotemp FR3 fluid is not classified as bio-accumulating or mutagenic. It is not listed as a carcinogen by National Toxicology Program (NTP), in International Agency for Research on Cancer (IARC) monographs, or by OSHA Regulation. The products of complete combustion of Envirotemp FR3 fluid are essentially carbon dioxide and water.

TABLE 2
Envirotemp FR3 fluid's Environmental Attributes

Attribute	Results	Method
Aquatic Biodegradation [%]	>99	EPA OPPTS 835.3100
Ready Biodegradation [%]	>99	EPA OPPTS 835.3110
Acute Aquatic Toxicity	Non-toxic	OECD 203
Acute Oral Toxicity	Non-toxic	OECD 420
Biobased Material Content	>95%	USDA Biopreferred Program
Total Life Cycle Carbon Footprint	Carbon Neutral	Department of Commerce NIST BEES V4.0
Overall Environmental impact	1/4th impact of mineral oil	Department of Commerce NIST BEES V4.0

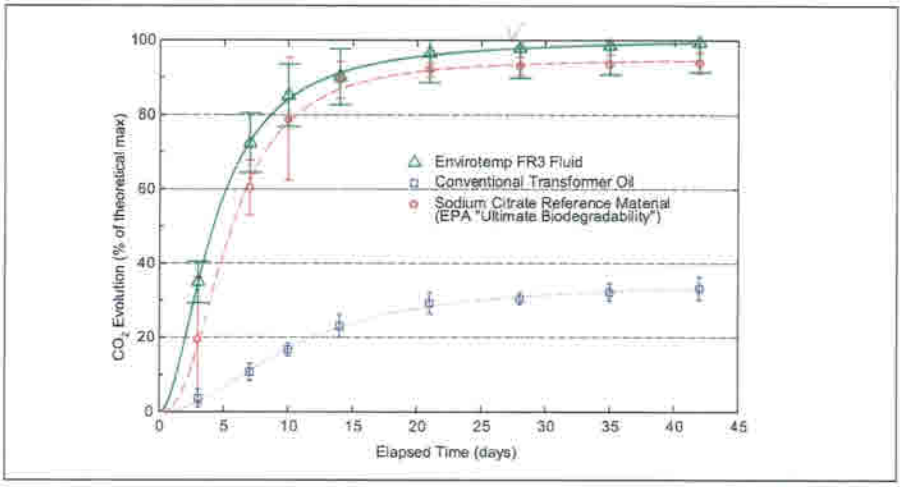

Figure 1.
Aerobic Aquatic Biodegradation Graph EPA Test OPPTS 835.3100

TABLE 3
Greenhouse gases[a] attributed to transformer fluid for its complete life cycle.

	Grams Per Unit[b]		Tons Per 1000 Gallons	
Catagory	Mineral Oil	FR3 Fluid	Mineral Oil	FR3 Fluid
Raw Materials	1,048,184	-381,590	2.306	-0.839
Manufacturing	544,363	160,212	1.198	0.352
Transportation	122,478	71,498	0.269	0.157
Use	154,124	153,450	0.339	0.338
End of Life	30,825	30,690	0.068	0.068
Total	1,899,973	34,260	4.180	0.075

a carbon dioxide equivalents
b In BEES 4.0e, one unit is a 1000 kVA transformer containing 500 gallons of fluid

SUSTAINABILITY

Building for Environmental and Economic Sustainability (BEES) software[8], available from the National Institute of Standards and Technology, uses a life-cycle assessment approach, analyzing raw material acquisition, manufacture, transportation, installation, use, and recycling and waste management, to determine a product's global warming potential.

Table 3 shows the BEES amounts of greenhouse gas generated from raw materials through end of life for mineral oil and Envirotemp FR3 fluid. The cost of mineral oil, in terms of carbon emissions, is expensive. Meanwhile, FR3 fluid is relatively inexpensive,

[8] BEES, Version 4.0e, Building and Fire Research Laboratory, National Institute of Standards and Technology, August 2007. http://www.bfrl.nist.gov/oae/software/bees/

about 8.2 lb/gal less green house gas emitted to produce it. Additionally, the study reports that FR3 fluid's overall environmental performance impact score is 1/4th that reported for mineral oil (and that's without consideration for FR3 fluid's transformer insulation life extending properties). This cumulative score results from adding the impacts of water intake, smog, ozone depletion, indoor air, human health, habitat alteration, global warming, fossil fuel depletion, eutrophication, ecological toxicity, critical air pollutants, and acidification.

Envirotemp FR3 fluid, and transformers filled with Envirotemp FR3 fluid are listed in the US Federal BioPreferred℠ Program, making them readily identifiable as BioPreferred to all applicable Federal agencies. FR3 fluid is an excellent option for ISO 14000, Green Build, and other similar environmental programs that promote the use of alternative, environmentally preferable and sustainable materials and procedures.

FIRE SAFETY

Envirotemp FR3 fluid has a fire point of approximately 360°C, well above the minimum of 300°C required for high fire point fluid classifications. Its flash point (approximately 330°C) is higher than the fire point of most other ignition resistant dielectric fluids in use today (Figure 2).

In laboratory and full-scale ignition tests, Envirotemp FR3 fluid has demonstrated greater fire resistance than other dielectric fluid types. Based on large-scale arc ignition testing, FM Global concluded that the probability of a pool fire evolving from Envirotemp FR3 fluid was so low that heat release rate need not be determined or considered for FM Global approval.

Based on large-scale arc ignition and hot metal ignition tests, FM Global recognizes Envirotemp FR3 fluid as an equivalent safeguard to space separation, fire barriers, and fire suppression systems for most installations.

FM Global recognizes Envirotemp FR3 fluid as a component of Approved transformers per FM Global Standard 3990. When used in transformers containing 10,000 gallons of fluid or less, transformers separation distance to buildings and other equipment may be up to 1/10th the distance required for mineral oil filled transformers, without fire walls or deluge systems.

Occupational Safety & Health Administration (OSHA) recognizes this FM Global standard as fitting the definition of a Listed and Labeled Product per NEC Section 110-3(b). The standard permits Envirotemp FR3 fluid-filled transformers to be installed indoors, typically without sprinklers or vaults, with a minimum clearance to walls of just 3 feet (0.9M).

UL Standard 340 compares the fire hazard ratings of various fluids. Figure 3 shows the favorable rating assigned to Envirotemp FR3 fluid.

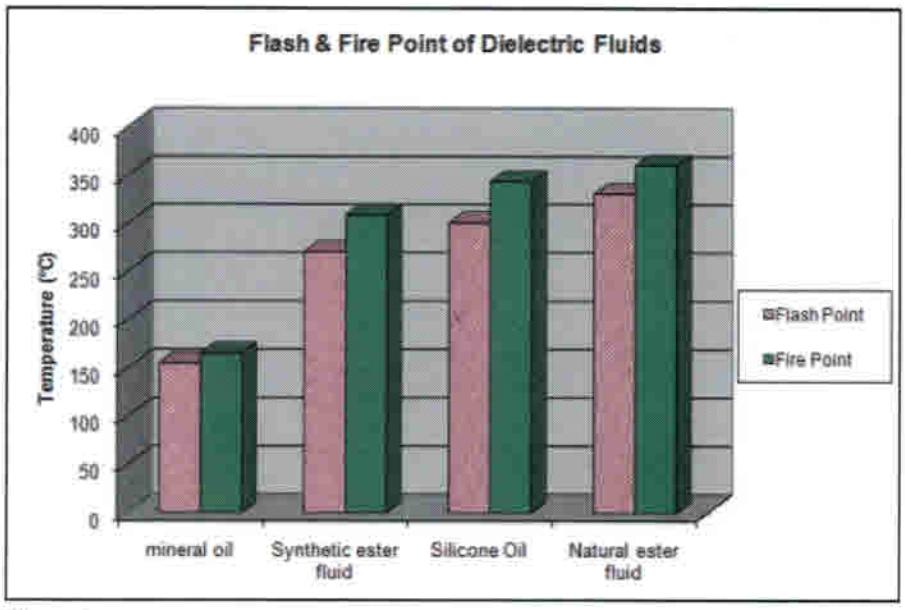

Figure 2.
Flash & Fire Point of Dielectric Fluids (°C).

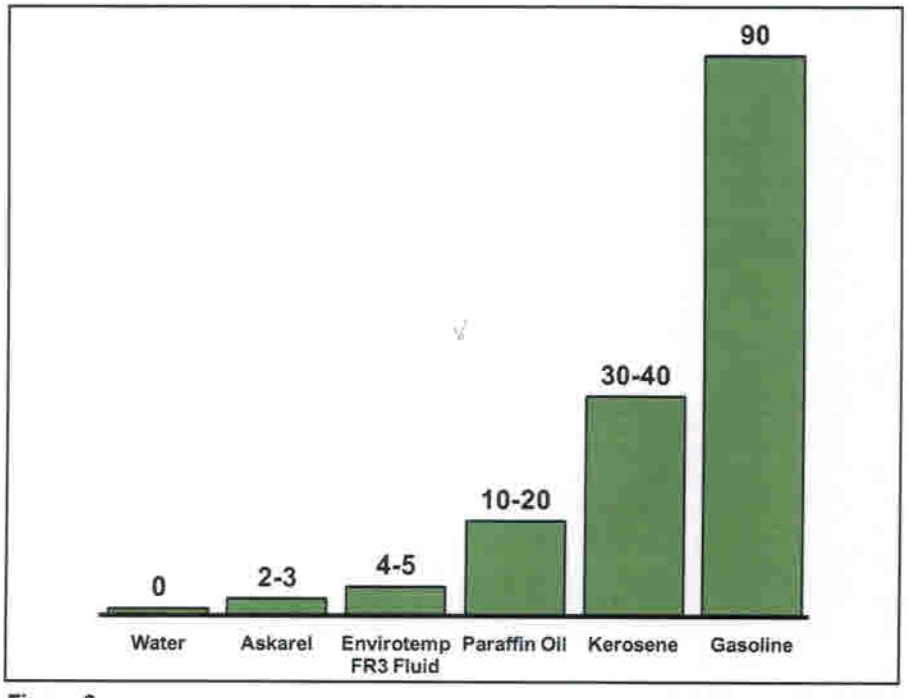

Figure 3.
Fire Hazard Rating UL Standard 340.

TABLE 4
Transformer Insulating Paper End-of-Life (Hours)

End-of-Life Basis	150°C Mineral Oil	150°C Envirotemp FR3 Fluid	150°C IEEE Basis	170°C Mineral Oil	170°C Envirotemp FR3 Fluid	170°C IEEE Basis
Retained Tensile Strength						
50%	3100	>4000*	1602	240	1300	323
25%	4000	>4000*	3327	490	4000	671
Degree of Polymerization						
200	3200	>4000*	3697	480	3400	746

* Paper did not reach end-of-life over the duration of the test. To be conservative, extrapolation was not employed.

There are no known reports of dielectric pool fires involving FR3 fluid filled transformers.

MEETING THE CODES

Less-Flammable fluids are recognized as a fire safeguard in Section 15 of the National Electrical Safety Code (Accredited Standards Committee C2) for generation and distribution substations. Envirotemp FR3 fluid meets the National Electrical Code Section 450-23 requirements as a listed less-flammable liquid. It is covered by OSHA Article §1910.305, Section 5(v).

Envirotemp FR3 fluid is FM Global Approved and Underwriters Laboratories Classified "Less-Flammable" per NEC Article 450-23, fitting the definition of a Listed Product per NEC. For additional information, request CPS Bulletin R900-20-13, NEC Requirement Guidelines 2008 Code Options for the Installation of Listed Less-Flammable Liquid Filled Transformers.

FLUID/PAPER INSULATION SYSTEM

The unique chemical structure of Envirotemp FR3 fluid provides superior insulation system performance compared to other types of dielectric fluids. The thermal properties of Envirotemp FR3 fluid make it a more efficient coolant than higher molecular weight silicone and hydrocarbon dielectric coolants.

Envirotemp FR3 fluid has an exceptional ability to remove water generated by aging paper . This enables the fluid to significantly reduce the aging rate of transformer insulating paper. Per IEEE C57.100, accelerated aging tests show that Thermally Upgraded Paper (TUK) paper insulation aged in Envirotemp FR3 fluid takes 5-8 times longer to reach the same end-of-life points as TUK paper insulation aged in conventional mineral oil.

Table 4 compares the time to reach insulation end-of-life for TUK paper aged in Envirotemp FR3 fluid and conventional transformer oil. The time to insulation end-of-life calculated using the IEEE C57.91 loading guide is included for comparison. Accelerated aging tests show similar thermal aging improvement for non-thermally upgraded Kraft paper.

APPLICATIONS

NOTE: The suitability of each application of Envirotemp FR3 fluid is the responsibility of the user. Contact CPS Dielectric Fluids group for application guidelines.

New Transformers

Distribution and Power class transformers filled with Envirotemp FR3 fluid for indoor, submersible and outdoor applications are available from manufacturers worldwide.

For indoor applications, Envirotemp FR3 fluid-filled transformers provide the proven technical and performance advantages of liquid-filled designs over dry types as well as a lower total life cycle cost when compared to all other transformer types.

Many types of Envirotemp FR3 transformers are in service: pole-mounted, pad-mounted, networks, reactors, small, medium and large substations, transmission substations, and generator step-ups. Envirotemp FR3 fluid-filled transformers are accepted in both industry and government. Contact CPS Dielectric Fluids group for a copy of the Envirotemp FR3 Fluid User's List, Bulletin B900-99020.

Retrofilling Transformers

Envirotemp FR3 fluid is especially suited for upgrading the environmental and fire safety of mineral oil-filled transformers. It is miscible with conventional transformer oil, high molecular weight hydrocarbons, PCB (Askarel) and most PCB substitutes except silicone. Envirotemp FR3 fluid is not miscible with silicone and should not be applied in transformers previously containing silicone.

Unlike most other fluid types, the residual transformer oil in a properly retrofilled transformer should not reduce the fire point of Envirotemp FR3 fluid below the NEC minimum of 300°C (Figure 4). This is true even after full equilibrium has been achieved between the replacement fluid and the residual mineral oil in the paper.

Additional advantages of retrofilling with Envirotemp FR3 fluid include high dielectric strength, better match of dielectric constant to Kraft paper insulation, excellent lubricity, material compatibility, and a coefficient of expansion similar to conventional transformer oil. Envirotemp FR3 fluid has superior resistance to coking and sludge formation when compared to conventional transformer oil. In addition to passing the Power Factor Valued Oxidation (PFVO) test, Doble Laboratories' Sludge-Free Life tests resulted in no measurable sludge. The fluid also acts as a drying agent for transformer insulation that has become wet from aging, extending the useful life of the transformer insulation system.

Switching Devices

With excellent dielectric strength retention (Figure 5), lubricity, and gassing tendencies, Envirotemp FR3 fluid is an excellent switching medium at normal operating temperatures. Proven applications include new and retrofilled sectionalizing switches and transformers with load break accessories such as Bay-O-Net and current-limiting fusing, on-off and four position switches, and Vacuum Fault Interruption protection devices.

Accelerated life tests confirm stationary contacts are most stable in Envirotemp FR3 fluid[9]. In coking tests, Envirotemp FR3 fluid produced less than 1/20th

[9] P.J. Hopkinson, L. Dix, "Tapchangers for De-energized Operation in Natural Ester Fluid, Mineral Oil, and Silicone" IEEE/PES Transmission & Distribution Conference & Exposition, July 26-30, 2009, Calgary Canada

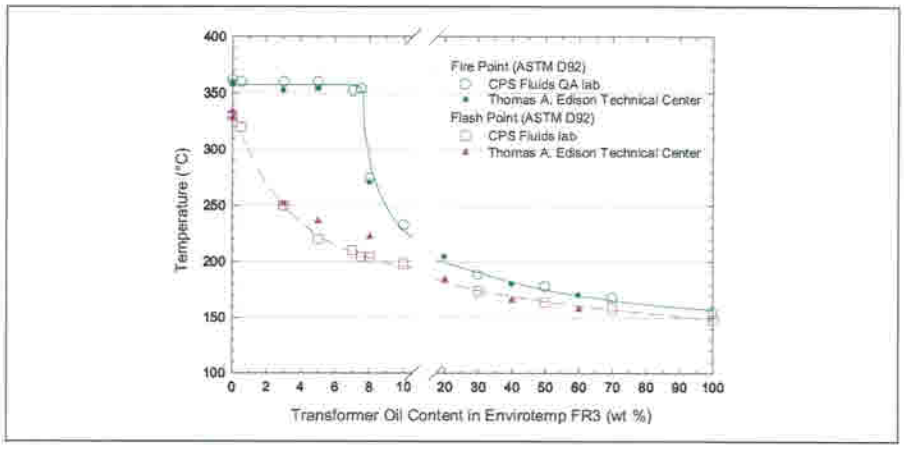

Figure 4.
Envirotemp FR3 fluid Flash & Fire Point Variation with Conventional Transformer Oil Content.

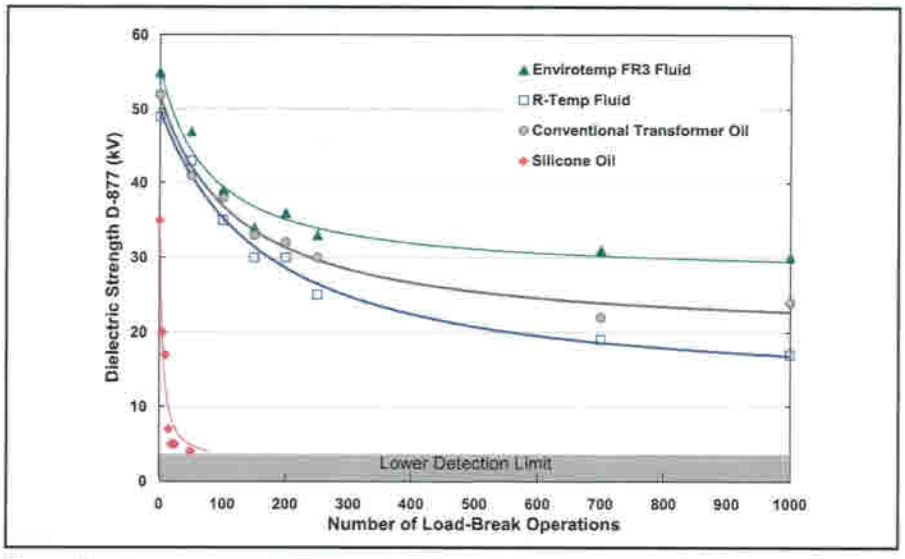

Figure 5.
Fluid loadbreak dielectric strength retention comparison.

of the deposits that were produced in conventional mineral oil.

Due to the low temperature viscosity difference of Envirotemp FR3 fluid compared to conventional transformer oil, the equipment manufacturer should verify applications at low ambient temperatures.

Other Applications

The inherent safety and performance properties of Envirotemp FR3 fluid have led to its application in electrical equipment other than transformers, including industrial electromagnets, superconducting motors, klystron modulators, transformer/rectifier sets, and heat transfer applications. Envirotemp FR3 fluid has excellent lubricity, an important characteristic for application in equipment with moving parts. High voltage bushing applications also appear promising due to the fluid's excellent ability to minimize insulating paper degradation and its low gassing tendency value of approximately -79 µl/min.

STORAGE AND HANDLING

Similar meticulous procedures for storing and handling conventional transformer mineral oil should be followed with Envirotemp FR3 fluid. To help maintain the extremely low percent moisture saturation at time of fluid manufacture, exposure time to air should be minimized. Drum and tote storage should be indoors or outdoors protected from the elements, including sunlight. Refer to the CPS Bulletin S900-20-1, Envirotemp FR3 Fluid Storage and Handling Guide.

Note: To maintain the optimal fluid properties for its intended use as an electrical insulating fluid, exposure to oxygen, moisture, and other contaminants must be minimized. Except for short storage periods, material that has been immersed in Envirotemp FR3 fluid should not be exposed to air. Thin films of natural esters tend to polymerize much faster than conventional transformer oil. For equipment drained of Envirotemp FR3 fluid, it is recommended that the equipment be placed in an inert gas environment, be re-immersed in fluid, or rinsed with mineral oil. Where the transformer power factor is a concern, hot air drying is an unacceptable process for assemblies already impregnated with a natural ester fluid. For impregnated assemblies that require additional drying, a method of drying that does not expose the impregnated insulation to air is required to avoid excessive oxidation of the dielectric fluid.

FLUID MAINTENANCE

Periodic preventive maintenance tests for Envirotemp FR3 fluid-filled equipment should follow the same schedule used for transformers filled with conventional transformer oil. Key tests on fluid samples include:

1. Dielectric Strength: The IEEE C57.147 minimum acceptable ASTM D1816, 2mm gap limits for continued use of service-aged Envirotemp FR3 fluid are 40 kV (≤ 69 kV), 47 kV (69 ≤ kV < 230), and 50 kV (≥ 230 kV).
2. Flash Point and Fire Point. Small amounts of mineral oil will not significantly reduce the fire point of Envirotemp FR3 fluid. Contamination above 7% may lower the fire point below 300°C. If contamination is suspected, the flash and fire points should be measured.
3. Dissolved gas analysis of Envirotemp FR3 fluid is particularly useful for high value equipment or equipment servicing critical loads.

Figure 6.
Prior to shipment, Envirotemp FR3 fluid undergoes extensive quality assurance testing. The facility where Envirotemp FR3 fluid is produced is ISO 9001 Certified.

4. Color and appearance, dissipation factor, acid number, resistivity, viscosity, and interfacial tension are indicators of possible fluid contamination or unusual degradation.

For fluid that cannot be reconditioned, disposal options include selling to lube oil recyclers, rendering companies, or providers of fuel for industrial boilers and furnaces. Used fluid uncontaminated by controlled hazardous materials does not fall under the jurisdiction of the Federal Used Oil Regulation (CFR Title 40 Part 279).

FUNCTIONAL SPECIFICATION FOR NEW ENVIROTEMP FR3 NATURAL ESTER LESS-FLAMMABLE TRANSFORMER DIELECTRIC COOLANT

1.0 Scope

1.1. This specification describes a non-toxic (in acute aquatic[10], and oral toxicity[11] tests), biodegradable[12], fire resistant, bio-based[13] natural ester dielectric fluid. It is intended for use in electrical equipment as an environmentally preferred, less-flammable insulating and cooling medium.

2.0 Requirements

2.1 Fluid Manufacturer

Fluid manufacturer shall have a minimum of ten (10) years experience producing and testing dielectric coolants. Manufacturer upon request shall provide AC withstand and impulse withstand for both gap and creep from 3mm to 150mm.

2.2 Dielectric Coolant

The dielectric coolant shall be a biobased biodegradable, be FM Global Approved, UL® Classified as a less-flammable fluid. It shall meet the property limits listed below. The base fluid shall be 100% derived from seed oils.

2.3 Acceptable values for receipt of shipments of new FR3 fluid are shown in Table 1

2.4 Environmental and Health Third Party Validations

The fluid shall have a US EPA Environmental Technology Verification (ETV) Statement published. The fluid shall meet the test limits shown in Table 2

2.5 Packaging

The electrical insulating fluid shall be furnished in sealed vessels suitable for the purpose, including 5-gallon containers, 55-gallon drums, 330-gallon totes, or in bulk. Each vessel shall have tampering indicating devices.

3.0 Recommended Customer Receiving Quality Control

3.1 Inspection

Each lot received shall be visibly inspected for container integrity. Verify that tamper proof seals are intact and no leaks are visible.

3.2 Receiving Tests

Samples shall be taken from containers per ASTM D 923

Lot Size (gallons)	Number of Containers Sampled
600 or less	1
601 - 3000	2-6
3001 or more	6 minimum (10% of quantity of containers recommended)

Section 2.2, as follows:

When material will be combined for production, samples may be mixed together in equal proportions to create a composite sample for testing. Minimum tests required are dielectric strength and visual inspection. Dissipation factor test is highly recommended, although not essential.

4.0 Important information

4.1. Storage

Avoid storing drums and totes outdoors. Extreme temperature variations can stress the integrity of container protective seals. Exposure of totes to sunlight can cause fluid discoloration

4.2 Intended Use

The use of electrical insulating and cooling fluid is generally dictated by the engineering design of the electrical apparatus. The electrical insulating fluid covered by this specification is intended for use as an insulating and cooling medium in electrical equipment.

[10] Per OECD 203, Method B
[11] Per OECD 420
[12] Per US EPA OPPTS 835.3100 and US EPA OPPTS 835.8110 (ii)
[13] Per USDA Biopreferred minimum biobased content for Fluid-Filled Transformers - Vegetable Oil-Based

4.3 Fluid Transfer

When transferring electrical insulating fluid from its original container, take care to prevent contamination with moisture, dust, and foreign matter. These impurities can cause deterioration of the dielectric strength and electrical performance.

4.4 Partial Containers

Provide nitrogen blanket for partially filled containers, and properly seal to prevent contamination.

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MATERIAL SAFETY DATA SHEET

1. IDENTIFICATION

Envirotemp® FR3® fluid

Envirotemp FR3 fluid is a dielectric fluid intended for use as an insulation and cooling medium in electrical apparatus such as electrical distribution and power transformers.

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2. COMPOSITION/INFORMATION ON INGREDIENTS

Envirotemp FR3 fluid is a proprietary formulation using food-grade vegetable oils combined with performance-enhancing additives. All components are listed in the EINECS inventory.

Component	Proportion (wt%)
Vegetable oil	> 98.5
Antioxidant additive	< 1.0
Cold flow additive	< 1.0
Colorant	< 1.0

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3. HAZARDS IDENTIFICATION

Envirotemp FR3 fluid is a preparation not classified as dangerous according to Directive 1999/45/EC. Not expected to cause a severe emergency hazard.

Routes of entry

Eyes: Contact may occur as a result of splash or exposure to mist conditions. May cause irritation and redness.

Skin: Typically non-irritating. In some case, a sensitization to vegetable oils may cause localized redness

Ingestion: May cause gastric irritation.

Inhalation: Exposure may occur as a result of mist exposure. May cause respiratory irritation.

Signs and symptoms of exposure: none known

Medical conditions generally aggravated by exposure: There is a very small risk for an allergic reaction to soybean oil in persons allergic to soybeans themselves.

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4. FIRST AID MEASURES

Inhalation: If inhaled, remove affected person from exposure to mists.

Eye contact: For eye contact, flush the eyes immediately with large amounts of water with the eyelids held away from the eye to ensure thorough rinsing.

Skin contact: For skin contact, remove by washing with soap and water. Get medical attention if irritation persists.

Ingestion: If swallowed, observe for signs of stomach discomfort or nausea. If symptoms persist, seek medical help. Do not induce vomiting.

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5. FIRE-FIGHTING MEASURES

Extinguishing media: CO_2 or dry chemical foam

Special fire fighting procedures: Use approved self-contained breathing apparatus with full facemask and full protective equipment in confined areas. Use water to keep fire-exposed containers cool. Water spray may be used to flush spills away from source of ignition. Application of water to flaming oil can cause spreading.

Unusual fire and explosion hazards: Slight when exposed to flame. Can react with oxidizing materials. Clay materials (Fuller's earth, oil dry products) saturated with Envirotemp FR3 fluid can, under certain conditions, undergo a slow oxidation that releases heat. If the heat so released cannot escape, it is possible that the temperature may increase and ignite combustible materials in close contact.

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6. ACCIDENTAL RELEASE MEASURES

Steps to take in case material is released or spilled: Contain and control the leaks or spills with non-combustible absorbent materials such as sand, earth, vermiculite, or diatomaceous earth in drums for waste disposal. Prevent any material from entering drains or waterways. If the product contaminates waterways, rivers or drains, alert the relevant authorities in accordance with statutory procedures.

In the USA, spills into navigable waters must be reported to the National Response Center, 800-424-8802

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7. HANDLING AND STORAGE

Precautions to take in handling and storage: Avoid extremes of temperature in storage. Store Envirotemp FR3 fluid in labeled, tightly closed containers in cool, dry, isolated and well-ventilated areas, away from sources of ignition or heat. To maintain fluid for intended use as an electrical insulating fluid, eliminate exposure to oxygen and moisture.

Intermediate bulk storage container (tote): Prolonged exposure to ultraviolet radiation (sunlight) may affect color.

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8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Exposure limit values:

	TWA (mg/m^3)	
	OSHA[1] PEL	ACGIH[2] TLV
Vegetable oil mists	–	10
Vegetable oil mists: total dust	15	–
Vegetable oil mists: respirable fraction	5	–

Hazardous Materials Identification System (HMIS):	**Health**	**Flammability**	**Physical Hazard**
	0	1	0

Respiratory protection: Vaporization is not expected at ambient temperature. Therefore, the need for respiratory protection is not anticipated under normal use conditions and with adequate ventilation. If elevated airborne concentrations above applicable workplace exposure levels are anticipated, a NIOSH-approved organic vapor respirator equipped with a dust/mist prefilter should be used. Protection factors vary depending upon the type of respirator used. Respirators should be used in accordance with OSHA requirements (29 CFR 1910.134). For extreme cases, use of approved supplied-air respiratory protection may be necessary.

Ventilation: General mechanical ventilation can be used to control or reduce airborne concentrations of oil.

Protective gloves: Use gloves constructed of chemical resistant materials such as neoprene or heavy nitrile rubber if frequent or prolonged contact is expected. Use heat-protective gloves when handling product at elevated temperatures.

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[1] U.S. Occupational Health and Safety Administration

[2] American Conference of Governmental Industrial Hygienists

Eye protection: Wear safety glasses or goggles to prevent eye contact. Eye baths should be readily available in the area of handling Envirotemp FR3 fluid.

Other protective clothing or equipment: Wear regularly laundered coveralls or lab coat to minimize skin exposure.

Workplace hygienic practices: Wash with soap and water after contact. Avoid exposure to mists.

Environmental exposure controls: Have oil-absorbent materials easily available.

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9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance and odor: clear light-green liquid with slight vegetable oil odor **pH:** neutral

Closed cup flash point: 310 – 320°C

Autoignition temperature: 401 – 404°C

Boiling point: >360°C

Relative density (H_2O = 1): 0.92

Vapor pressure (mm Hg): < 0.01 @ 20°C

Pour point: -18 to -24°C

Vapor density (air = 1): n/a

Evaporation rate (butyl acetate = 1): nil

Solubility in water: negligible; < 0.1%

Volatile organic compounds: < 0.001 g/L

Viscosity: 33 – 35 mm^2/s at 40°C

Miscibility: mixes with other dielectric fluids except silicone

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10. STABILITY AND REACTIVITY

Stability: Envirotemp FR3 fluid is stable under normal conditions of use.

Incompatibility (materials to avoid): Avoid contact with strong oxidizing agents.

Hazardous decomposition products: none

Hazardous Polymerization: will not occur

Stabilizers: not required

Hazardous exothermic reaction: Slight when exposed to flame; can react with oxidizing materials. Class III B liquid. Clay materials (Fuller's earth, oil dry products) saturated with Envirotemp FR3 fluid can, under certain conditions, undergo a slow oxidation that releases heat. If the heat so released cannot escape, it is possible that the temperature may increase and ignite combustible materials in close contact.

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11. TOXICOLOGICAL INFORMATION

Carcinogenicity: none **NTP:** no **IARC monographs:** no **OSHA regulated:** no

Envirotemp FR3 fluid base oils are "generally recognized as safe" (GRAS) by the U.S. Food and Drug Administration and allowed for human consumption as a food and as a component that is allowed in contact with human food.

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12. ECOLOGICAL INFORMATION

Acute oral toxicity (OECD 420 - rats): LD_{50} >2000 mg/kg

Acute aquatic toxicity (OECD 203 - trout): LC_{50} >1000 mg/kg; NOAEC >1000 mg/kg

Aquatic biodegradation (OPPTS 835.3110): readily biodegradable, >99%

Biological oxidation demand (5-Day SM5210B): 250 ppm

Chemical oxygen demand (SM5220D): 560 ppm **BOD/COD ratio:** 45%

Petroleum hydrocarbon content: none

Environmental physical hazard: Envirotemp FR3 fluid shares physical hazards common to all oils such as coating feathers, fur, and gills.

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13. DISPOSAL CONSIDERATIONS

Recycling: Consult with local used oil recyclers, restaurant grease recyclers, fat rendering companies, or biodiesel producers.

Hazardous Waste: Envirotemp FR3 fluid itself, when discarded or disposed of, is not a hazardous waste. Envirotemp FR3 fluid from retrofilled electrical equipment may contain residues of earlier fluid(s) in such quantity as to qualify as a hazardous waste.

Disposal: Incinerate or landfill in accordance with local regulations. Do not pour into drains or waterways.

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14. TRANSPORT INFORMATION

Harmonized System Tariff Classification (Schedule B): 1518.00.0000

National Motor Freight Classification (NMFC): 155250

Euro Tariff: 15 18 00 00 00

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15. REGULATORY INFORMATION

Envirotemp FR3 fluid itself, when discarded or disposed of, is not listed as a hazardous waste per 40 CFR 261 and is not a used oil per 40 CFR 279. Envirotemp FR3 fluid is a preparation not classified as dangerous according to Directive 1999/45/EC.

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16. OTHER INFORMATION

Technical information available at the Cooper Power Systems website: www.cooperpower.com

This Material Safety Data Sheet has been prepared in order to help the users of Envirotemp FR3 fluid. The data contained herein is, to the best of our knowledge, accurate as of the date of preparation of this sheet.

Effective Date: June 19, 2008

Patrick McShane
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