



Appendix 6:

Correspondence and Project
Coordination





Engineers
Scientists
Consultants

April 13, 2010

Natural Heritage Endangered Species Program
MA Division of Fisheries & Wildlife
North Drive
Westborough, MA 01581

888 Worcester Street
Suite 240
Wellesley
Massachusetts
02482
p 781.431.0500
f 781.431.7434

**Re: Data Request for State-listed Species
Brewster and Harwich, Massachusetts
ESS Project Number W279-000.01**

To Whom It May Concern:

ESS Group, Inc. is requesting information on the occurrence and distribution of state-listed, proposed or candidate endangered species, threatened, or special concern species that may occur in the vicinity of two sites located in the Towns of Brewster, MA and Harwich, MA. The sites are being evaluated as potential locations for the placement of two 1.65 megawatt (MW) wind turbines in Brewster and two 1.5 MW wind turbines in Harwich. The site locations are identified on the attached USGS site locus figures. We are particularly interested in the distribution of any state-listed avian species that may occur on or in the vicinity of the sites.

This request is being made to identify any species of concern and to support the preparation of environmental reports and any permit applications that may be required for the project.

Please feel free to contact me at (781) 489-1123 if you have any questions or require any additional information. Thank you in advance for your assistance with this matter.

Sincerely,

ESS GROUP, INC.

Mark D. Driscoll
Senior Scientist

Enclosures: Site Locus Figures

C: File



www.essgroup.com

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Project Descriptions

Cape & Vineyard Electric Cooperative, Inc. ("CVEC") is a Massachusetts energy cooperative whose members are certain Towns and governmental entities in Barnstable and Dukes County.

CVEC's purposes include developing and/or owning renewable electric generation facilities and procuring and/or selling long-term electric supply or other energy-related goods or services to its member communities and governmental entities. CVEC has proposed the development of a community scale wind energy project (Project) consisting of four (4) land-based wind turbines on municipally-owned land at two separate locations in the member towns of Brewster and Harwich, Massachusetts. The Project will consist of two wind turbines in Brewster and two wind turbines in Harwich.

CVEC intends to net meter each of the wind turbines, with the intent of allowing Brewster and Harwich to net meter all of their electric loads and other members to also receive net metering benefits. The wind turbines will interconnect to the NSTAR distribution system for which CVEC will file an Interconnection Application.

Brewster Commerce Park Site

The Project in the Town of Brewster is proposed on the Commerce Park site which was affirmed by the voters of Brewster at an October 2009 Special Town Meeting. The Commerce Park site is located in an industrially zoned area. The land is owned by a CVEC member community, the Town of Brewster. CVEC and the Town of Brewster are negotiating an Intergovernmental Host Community Agreement to lease the land for twenty (20) years with possible five (5)-year extensions for the Project. The land is undeveloped and wooded with the nearest residence over 1,300 feet away. The two Brewster turbines, sized at least 1.65 megawatts ("MW") each, are proposed as typical three bladed, upwind rotor horizontal axis design and are expected to be approximately 400 feet tall and developed through a public procurement process.

Harwich Water Department Site

The Project in the Town of Harwich is proposed on the Water Department site which was affirmed by Harwich voters at a November 2009 Special Town Meeting. The Water Department site is owned by a CVEC member community, the Town of Harwich. CVEC and the Town of Harwich are negotiating an Intergovernmental Host Community Agreement to lease the land for twenty (20) years with possible five (5)-year extensions the Project. The land is located in an undeveloped wooded area with the nearest residence over 1,000 feet away. The two Harwich turbines, sized at least 1.5 megawatts ("MW") each, are proposed as typical three bladed, upwind rotor horizontal axis design and are expected to be approximately 400 feet tall and developed through a public procurement process.

MESA Information Request Form

Please complete this form to request site-specific information from the Natural Heritage & Endangered Species Program
(Please submit only one project per request form).

Please include a check for \$50.00 made out to the Comm. of MA - NHESP

Requestor Information

Name: Mark Driscoll

Affiliation: Senior Water Resources Scientist, ESS Group, Inc.

Address: 888 Worcester Street, Suite 240

City: Wellesley State: MA Zip Code: 02482

Daytime Phone: 781.489.1123 Ext. Email address: madriscoll@essgroup.com

Project Information

Project or Site Name: Cape & Vineyard Electric Cooperative Brewster & Harwich Wind Turbine Project

Location: Please see attached site locus figures. Town: Brewster and Harwich, MA

Name of Landowner or Project Proponent: Cape & Vineyard Electric Cooperative

Acreage of the Property: Brewster site 98.5 acres, Harwich site 150.5 acres

Description of Proposed Project and Current Site Conditions: (If necessary attach additional sheet)

Please see attached sheet.



Will this project be reviewed as a Notice of Intent by the local Conservation Commission?



Will this project be undergoing MEPA review for reasons other than rare species?



Have you enclosed the required copy of a USGS topographic map in the scale 1:24,000 or 1:25,000 (not copy reduced) with the site location clearly marked and centered on the copy page? (Copies of Natural Heritage Atlas pages are not accepted)

Please mail this completed form and topographic map to:

Regulatory Review

Natural Heritage and Endangered Species Program

MA Division of Fisheries and Wildlife

1 Rabbit Hill Road

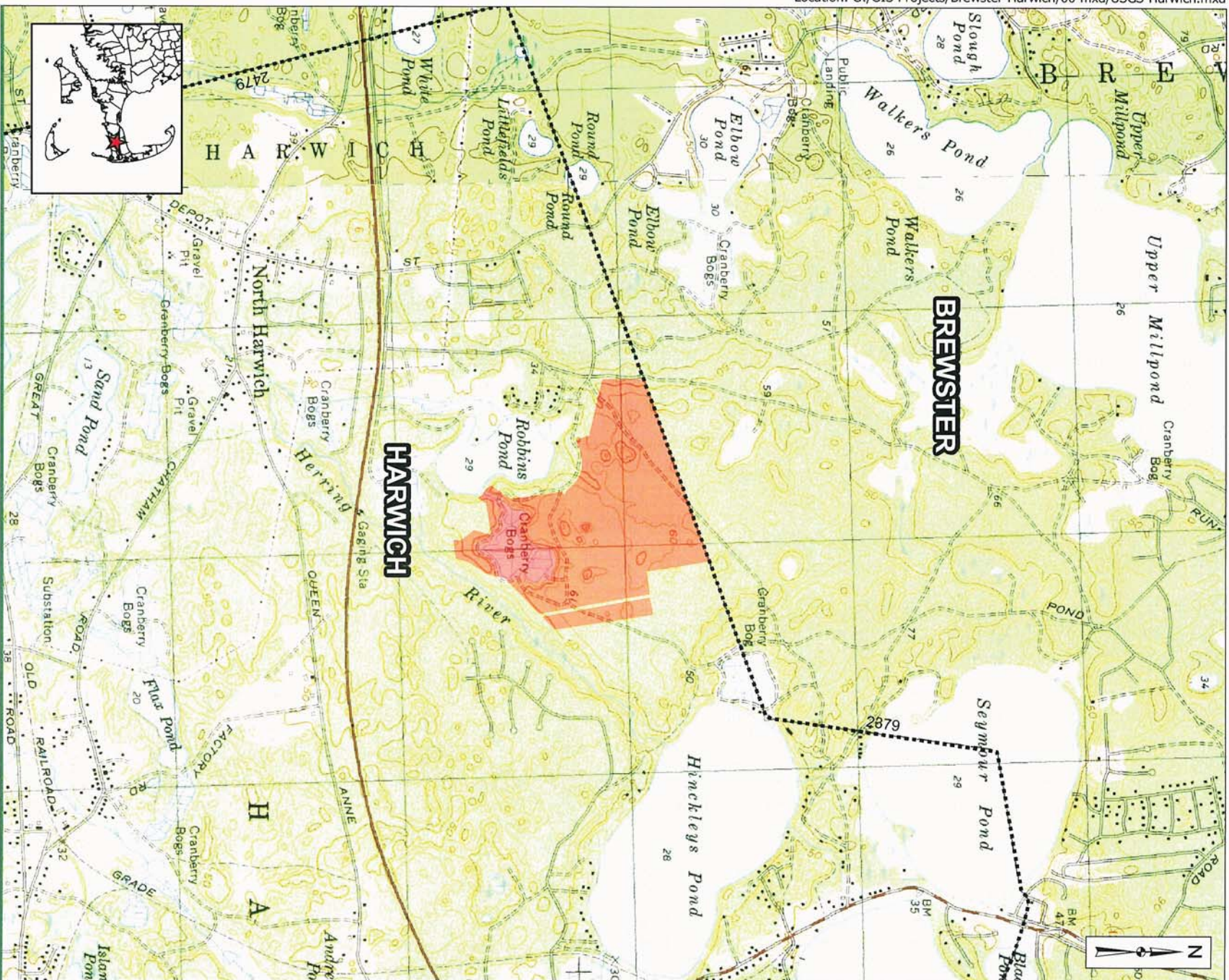
Westborough, MA 01581

Questions regarding this form should be directed according to the county that the property is located:

Berkshire, Essex, Franklin, Hampshire, Hampden, Middlesex & Worcester Counties call: 508-389-6361

Barnstable, Bristol, Dukes, Nantucket, Norfolk, Plymouth & Suffolk Counties call: 508-389-6364

Persons requesting information will receive a written response within 30 days of receipt of all information required. Please do not ask for an expedited review. *If you are requesting information for habitat management or conservation purposes and you are a non-profit conservation group, government agency or working with a government agency please fill out a Data Release Form.



C/VEC WIND ENERGY FACILITY
 Harwich, Massachusetts

Legend
 Town Boundaries
 ■ Town-Owned Property of Interest

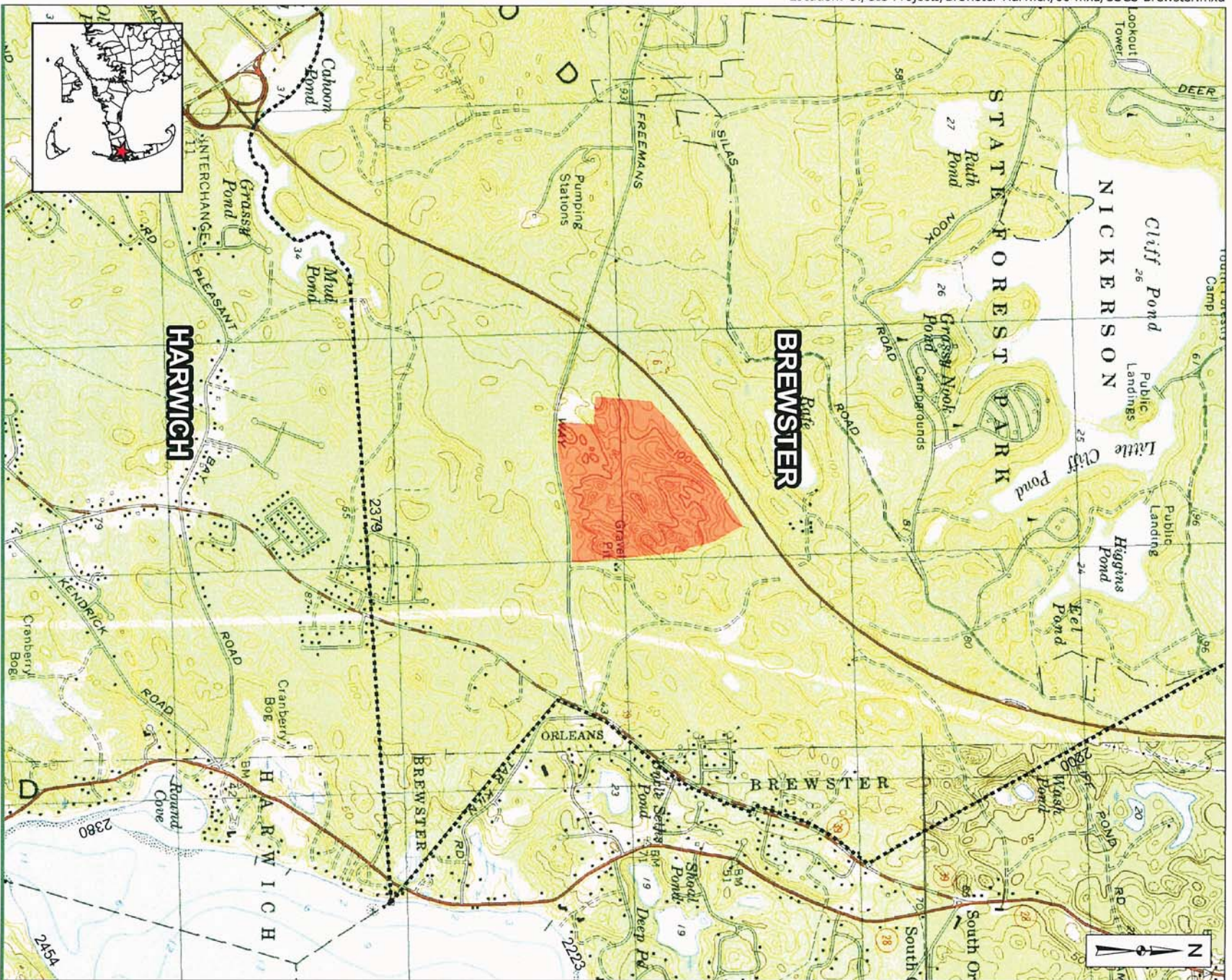
Water Department
 Locus Map

Scale: 1" = 2,000'
 0 2,000 Feet

Engineers
 Scientists
 Consultants

Source: 1) MassGIS, USGS, 1972-79
 2) Weston & Sampson, Turbines & Parcel Map, 2010

Figure 1



Engineers
Scientists
Consultants

C/VEC WIND ENERGY FACILITY
Brewster, Massachusetts

Legend
 Town Boundaries
 Town-Owned Property of Interest

Brewster
Commerce Park
Locus Map

Scale: 1" = 2,000'
 0 2,000 Feet

Source: 1) MassGIS, USGS, 1972-79
 2) Weston & Sampson, Turbines & Parcel Map, 2010

Figure 2

52502^{MR}

ESS Group, Inc.
401 WAMPANOAG TRAIL, SUITE 400
EAST PROVIDENCE, RI 02915

ROCKLAND TRUST COMPANY
ROCKLAND, MA 02370

53-447-113

Fifty and 00/100 Dollars

DATE
4/12/2010

AMOUNT
50.00

PAY
TO THE
ORDER
OF

NATURAL HERITAGE & ENDANGERED


AUTHORIZED SIGNATURE

Security features. Details on back.

⑈052502⑈ ⑆011304478⑆ 17158627⑈

April 23, 2010

U.S. Fish and Wildlife Service
New England Field Office
70 Commercial Street, Suite 300
Concord, New Hampshire 03301-5087

**Re: *Federally-listed Proposed or Candidate Rare Species and Habitats
Brewster and Harwich, Massachusetts
ESS Project Number W279-000.01***

To Whom It May Concern:

ESS Group, Inc. is requesting information on the occurrence and distribution of federally-listed, proposed or candidate endangered species, threatened, or special concern species that may occur in the vicinity of two sites located in the Towns of Brewster, MA and Harwich, MA.

The sites are being evaluated as potential locations for the placement of two 1.65 megawatt (MW) wind turbines in Brewster and two 1.5 MW wind turbines in Harwich. The site locations are identified on the attached site locus figures. We are particularly interested in the distribution of any listed avian species that may occur on or in the vicinity of the sites.

This request is being made to identify any species of concern and to support the preparation of environmental reports and any permit applications that may be required for the project.

Please feel free to contact me at (781) 489-1123 if you have any questions or require any additional information. Thank you in advance for your assistance with this matter.

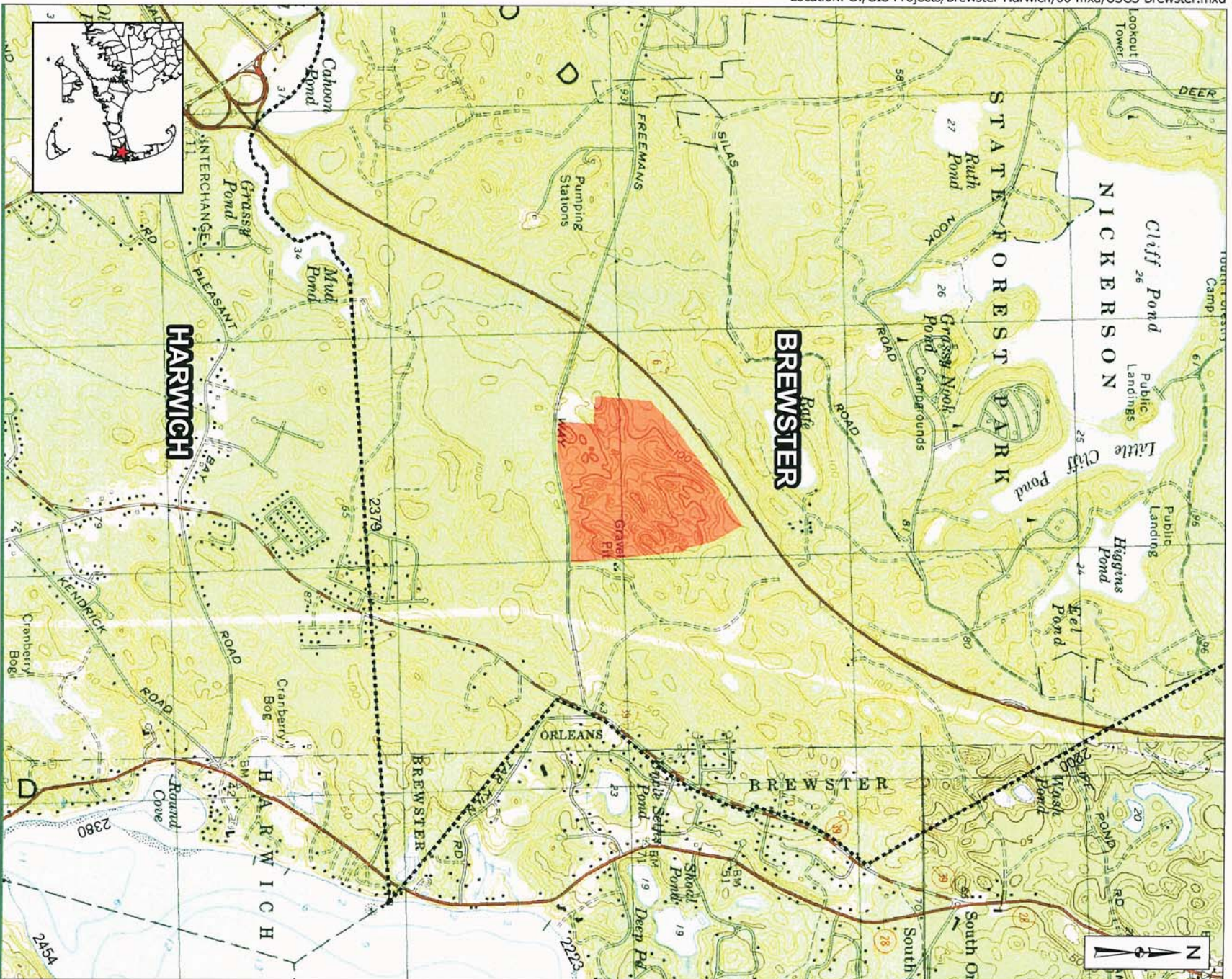
Sincerely,

ESS GROUP, INC.



Mark D. Driscoll
Senior Water Resources Scientist





Engineers
Scientists
Consultants

CVEC WIND ENERGY FACILITY
Brewster, Massachusetts

Scale: 1" = 2,000'

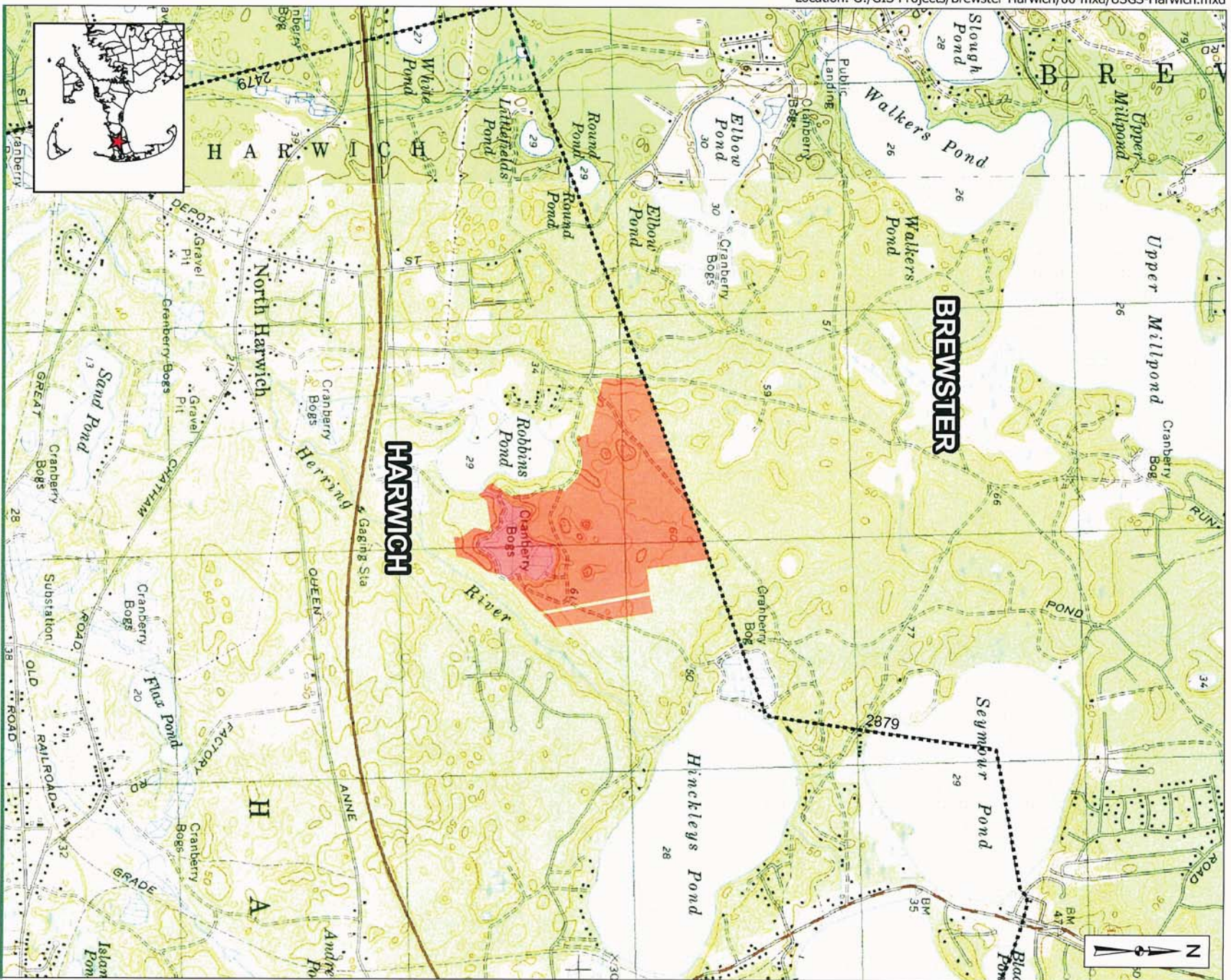
0 2,000 Feet

Source: 1) MassGIS, USGS, 1972-79
2) Weston & Sampson, Turbines & Parcel Map, 2010

Legend
..... Town Boundaries
Town-Owned Property of Interest

Brewster
Commerce Park
Locus Map

Figure 2



Engineers
Scientists
Consultants

CVEC WIND ENERGY FACILITY
Harwich, Massachusetts

Legend
..... Town Boundaries
■ Town-Owned Property of Interest

Water Department Locus Map

Source: 1) MassGIS, USGS, 1972-79
2) Weston & Sampson, Turbines & Parcel Map, 2010

Figure 1



Commonwealth of Massachusetts

Division of Fisheries & Wildlife

Mass Wildlife

Wayne F. MacCallum, *Director*

May 07, 2010

Mark Driscoll
ESS Group, Inc
888 Worcester Street, Suite 240
Wellesley MA 02482

RE: Project Location: Freemans Way, Brewster & North Westgate Road, Harwich
Town: BREWSTER, HARWICH
NHESP Tracking No.: 10-28122

To Whom It May Concern:

Thank you for contacting the Natural Heritage and Endangered Species Program ("NHESP") of the MA Division of Fisheries & Wildlife 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 near or **within Priority Habitat (PH)** and *Estimated Habitat (EH)* 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:

Freemans Way, Brewster <i>Near Priority Habitats 15, 278 (PH 15, 278) and Estimated Habitats 79, 174 (EH 79, 174)</i>			
Scientific name	Common Name	Taxonomic Group	State Status
<i>Enallagma laterale</i>	New England Bluet	Damselfly	Special Concern
<i>Enallagma recurvatum</i>	Pine Barrens Bluet	Damselfly	Threatened
<i>Terrapene carolina</i>	Eastern Box Turtle	Reptile	Special Concern

North Westgate Road, Harwich
Within Priority Habitat 15 (PH 15) and Estimated Habitat 624 (EH 624)

Scientific name	Common Name	Taxonomic Group	State Status
<i>Enallagma laterale</i>	New England Bluet	Damselfly	Special Concern
<i>Enallagma recurvatum</i>	Pine Barrens Bluet	Damselfly	Threatened
<i>Terrapene carolina</i>	Eastern Box Turtle	Reptile	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.nhesp.org).

We advise that potential impacts to birds and bats be considered during the design and permitting process for all wind turbines. Our recommendation is that all wind turbines be monitored for bird and bat mortality and all observed mortalities be saved and reported to NaturalHeritage@state.ma.us.

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

www.masswildlife.org

Division of Fisheries and Wildlife

Field Headquarters, North Drive, Westborough, MA 01581 (508) 389-6300 Fax (508) 389-7891

An Agency of the Department of Fish and Game

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 NHESP so that it is received at the same time as the local conservation commission. If the NHESP 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 NHESP 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 revised NOI form, please visit the MA Department of Environmental Protection's website: <http://www.mass.gov/dep/water/approvals/wpainform3.doc>.

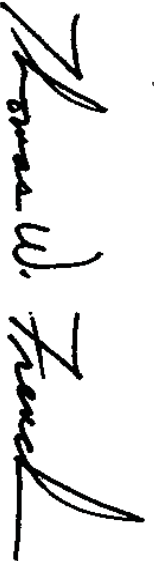
MA Endangered Species Act (MESA)

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 NHESP 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.nhesp.org ("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 Amy Coman, Endangered Species Review Assistant, at (508) 389-6364.

Sincerely,

A handwritten signature in black ink that reads "Thomas W. French". The signature is written in a cursive, flowing style.

Thomas W. French, Ph.D.
Assistant Director



EXPEDITED/STANDARD PROCESS INTERCONNECTION APPLICATION INSTRUCTIONS

General Information

If you wish to submit an application to interconnect your generating facility using the Expedited or Standard Process, please fill out all pages of the attached application form. Once complete, please sign and attach the supporting documentation requested.

Contact Information: You must provide as a minimum the contact information of the legal applicant. If another party is responsible for interfacing with the Company (utility), you may optionally provide their contact information as well.

Ownership Information: Please enter the legal names of the owner or owners of the generating facility. Include the percentage ownership (if any) by any electric service company (utility) or public utility holding company, or by any entity owned by either.

Confidentiality Statement: In an ongoing effort to improve the interconnection process for Interconnecting Customer-owned generating facilities, the information you provide and the results of the application process will be aggregated with the information of other applicants and periodically reviewed by a DG Collaborative of industry participants that has been organized by the Massachusetts Department of Telecommunications and Energy (DTE). The aggregation process mixes the data together so that specific details for one Interconnecting Customer are not revealed. In addition to this process, you may choose to allow the information specific to your application to be shared with the Collaborative by answering “Yes” to the Confidentiality Statement question on the first page. Please note that even in this case your identification information (contact data) and specific generating facility location will not be shared.

Generating Facility Information – IEEE 1547 / UL1741 Listed? This standard (“Inverters, Converters, and Controllers for Use in Independent Power Systems”) addresses the electrical interconnection design of various forms of generating equipment. Many manufacturers choose to submit their equipment to a Nationally Recognized Testing Laboratory (NRTL) that verifies compliance with UL1741. This “listing” is then marked on the equipment and supporting documentation.

DEP Air Quality Permit Needed? A generating facility may be considered a point source of emissions of concern by the Massachusetts Department of Environmental Protection (DEP). Therefore, when submitting this application please indicate whether your generating facility will require an Air Quality Permit. You must answer these questions, however, your specific answers will not affect whether your application is deemed complete. Please contact the DEP to determine whether the generating technology planned for your facility qualifies for a DEP waiver or requires a permit.



**EXPEDITED/STANDARD PROCESS INTERCONNECTION
APPLICATION**

Date Prepared: 5/25/2010

Contact Information:

Legal Name and address of Interconnecting Customer applicant (or, if an Individual, Individual's Name)
Company Name: Cape and Vineyard Electric Cooperative

Contact Person: Margaret Downey, Clerk

Mailing Address: PO Box 427, 3195 Main Street

City: Barnstable State: MA Zip Code: 02630

Telephone (Daytime): (508) 375-6636 (Evening): _____

Facsimile Number: _____ E-Mail Address: mdowney@barnstablecounty.org

Alternative Contact Information (if different from Applicant)

Name: David J. Colombo, P.E.

Mailing Address: Power Engineers LLC – PO Box 608

City: Shrewsbury State: MA Zip Code: 01545

Telephone (Daytime): 508-612-0382 (Evening): _____

Facsimile Number: 508-845-5220 E-Mail Address: Dave@PowerEngineersLLC.com

Ownership (include % ownership by any electric utility): 100% CVEC

Confidentiality Statement: "I agree to allow information regarding the processing of my application (without my name and address) to be reviewed by the Massachusetts DG Collaborative that is exploring ways to further expedite future interconnections." Yes No

Generating Facility Information

Location (if different from above): Town of Brewster, Commerce Park Road (off of Freemans Way)

Turbine 1: 41.740703°N, 70.013522°W Turbine 2: 41.738369°N, 70.012699°W

Electric Service Company: NStar Electric Account Number (if available): _____

Type of Generating Unit: Synchronous _____ Induction Inverter _____

Manufacturer: Vestas Model: V90 – 2 Turbines

Nameplate Rating: 3600 (KW) 0 (KVAR) 690 (Volts) Single _____ or Three Phase

Prime Mover: Fuel Cell _____ Recip Engine _____ Gas Turb _____ Steam Turb _____ Microturbine _____ PV _____ Other

Energy Source: Solar _____ Wind Hydro _____ Diesel _____ Natural Gas _____ Fuel Oil _____ Other _____
(Specify)

IEEE 1547.1 (UL 1741) Yes No _____

Need an air quality permit from DEP? Yes _____ No Not Sure _____

If "yes", have you applied for it? Yes _____ No _____



MSTAR
ELECTRIC

GAS

Planning to Export Power? Yes No

A Cogeneration Facility? Yes No

Anticipated Export Power Purchaser: CVEC

Export Form? Simultaneous Purchase/Sale Net Purchase/Sale Net Metering Other

(Specify)

Est. Install Date: Summer 2011 Est. In-Service Date: Summer 2011 Agreement Needed By: Fall 2010



Application Process

I hereby certify that, to the best of my knowledge, all of the information provided in this application is true:

Interconnecting Customer Signature: _____ Title: _____ Date: _____

The information provided in this application is complete:

Company Signature: _____ Title: _____ Date: _____

Generating Facility Technical Detail

List components of the generating facility that are currently certified and/or listed to national standards

Equipment Type	Manufacturer	Model	National Standard
1. Turbine DG Relay	SEL	547	ANSI C37
2. Padmount Switch Relay	SEL	351A	ANSI C37
3. _____	_____	_____	_____
4. _____	_____	_____	_____
5. _____	_____	_____	_____
6. _____	_____	_____	_____

Total Number of Generating Units in Facility? Two (2)

Generator Unit Power Factor Rating: 1.0 unity

Max Adjustable Leading Power Factor? 1.00 Max Adjustable Lagging Power Factor? 0.91

Generator Characteristic Data (for all inverter-based machines)

Max Design Fault Contribution Current? 8.7kA at 600V (5pu) Instantaneous X or RMS? _____

Harmonics Characteristics: THD below limits of IEEE 519 for PCC voltage (see Vestas tech info)

Start-up power requirements: - _____

Generator Characteristic Data (for all rotating machines)

Rotating Frequency: 1200 (rpm) Neutral Grounding Resistor (If Applicable): _____

Additional Information for Synchronous Generating Units

Synchronous Reactance, Xd: _____ (PU) Transient Reactance, X'd: _____ (PU)

Subtransient Reactance, X''d: _____ (PU) Neg Sequence Reactance, X2: _____ (PU)

Zero Sequence Reactance, Xo: _____ (PU) KVA Base: _____

Field Voltage: _____ (Volts) Field Current: _____ (Amps)

Additional information for Induction Generating Units (see attached Vestas info.)

Rotor Resistance, Rr: 0.0020 ohm Stator Resistance, Rs: 0.0008 ohm

Rotor Reactance, Xr: 0.0143 ohm Stator Reactance, Xs: 0.0173 ohm

Magnetizing Reactance, Xm: 0.7783 ohm Short Circuit Reactance, Xd'': 0.018 ohm

Exciting Current: _____ Temperature Rise: _____



Total Rotating Inertia, H: _____

Per Unit on KVA Base: _____

4.87 _____

Reactive Power Required In Vars (No Load): _____

445kvar _____

Reactive Power Required In Vars (Full Load): _____

750kvar _____

Additional information for Induction Generating Units that are started by motoring

Motoring Power: _____ (KW) Design Letter: _____

Interconnection Equipment Technical Detail

Will a transformer be used between the generator and the point of interconnection? Yes No _____

Will the transformer be provided by Interconnecting Customer? Yes No _____

Transformer Data (if applicable, for Interconnecting Customer-Owned Transformer):

Nameplate Rating: 2000 (kVA) Single _____ or Three Phase

Transformer Impedance: 5.75 (%) on a 2000 KVA Base

If Three Phase:

Transformer Primary: 22800 (Volts) Delta _____ Wye _____ Wye Grounded _____ Other _____

Transformer Secondary: 690 (Volts) _____ Delta _____ Wye _____ Wye Grounded _____ Other _____

Transformer Fuse Data (if applicable, for Interconnecting Customer-Owned Fuse):

(Attach copy of fuse manufacturer's Minimum Melt & Total Clearing Time-Current Curves)

Manufacturer: Cooper Type: bay-o-net Size: 65A Speed: C14

Interconnecting Circuit Breaker (if applicable):

Manufacturer: ABB Type: SACE EMAX E3 (PR111 LSG Trip Unit) Load Rating: 2000 amps

Int Rating: 42kA min Trip Speed: 70ms

Interconnection Protective Relays (if applicable):

(If microprocessor-controlled)

List of Functions and Adjustable Setpoints for the protective equipment or software:

<u>Setpoint Function</u>	<u>Setting</u>	<u>Time Delay</u>
1. Under-Voltage (27-step 1)	< 88% base voltage,	Clearing time 2.0 sec
2. Under-Voltage (27-step 2)	< 50% base voltage,	Clearing time 0.16 sec
3. Over-Voltage (59-step 1)	> 110% base voltage,	Clearing time 1.0 sec
4. Over-Voltage (59 step2)	> 120% base voltage,	Clearing time 0.16 sec
5. Under-Frequency (81U)	< 59.8hz,	Clearing time 0.16 sec
6. Over-Frequency (81O)	> 60.5hz,	Clearing time 0.16 sec

Protective Features to be provided with SEL-547 Relay installed in turbine base

(If discrete components)

(Enclose copy of any proposed Time-Overcurrent Coordination Curves)

Manufacturer: _____ Type: _____ Style/Catalog No.: _____ Proposed Setting: _____

Manufacturer: _____ Type: _____ Style/Catalog No.: _____ Proposed Setting: _____

Revised March 15, 2007

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Expedited/Standard Interconnection Application



Manufacturer: _____ Type: _____ Style/Catalog No.: _____ Proposed Setting: _____
Manufacturer: _____ Type: _____ Style/Catalog No.: _____ Proposed Setting: _____
Manufacturer: _____ Type: _____ Style/Catalog No.: _____ Proposed Setting: _____
Manufacturer: _____ Type: _____ Style/Catalog No.: _____ Proposed Setting: _____
Current Transformer Data (if applicable): _____

(Enclose copy of Manufacturer's Excitation & Ratio Correction Curves)

Manufacturer: _____ Type: _____ Accuracy Class: _____ Proposed Ratio Connection: _____
Manufacturer: _____ Type: _____ Accuracy Class: _____ Proposed Ratio Connection: _____

Potential Transformer Data (if applicable):

Manufacturer: Flex-core Type: 460-660I Accuracy Class: 0.6W, 1.2X
Proposed Ratio Connection: 6:1, 660V:115V

General Technical Detail

Enclose 3 copies of site electrical One-Line Diagram showing the configuration of all generating facility equipment, current and potential circuits, and protection and control schemes with a Massachusetts-registered professional engineer (PE) stamp.

Enclose 3 copies of any applicable site documentation that indicates the precise physical location of the proposed generating facility (e.g., USGS topographic map or other diagram or documentation).

Proposed Location of Protective Interface Equipment on Property:
(Include Address if Different from Application Address)

See attached Electrical One-Line (by Power Engineers, LLC)

Enclose copy of any applicable site documentation that describes and details the operation of the protection and control schemes.

Enclose copies of applicable schematic drawings for all protection and control circuits, relay current circuits, relay potential circuits, and alarm/monitoring circuits (if applicable).

Please enclose any other information pertinent to this installation.



Certificate of Completion for Expedited/Standard Process Interconnections

Installation Information:

E Check if owner-installed

Customer or Company Name (print): Cape & Vineyard Elec Coop

Contact Person, if Company: Margaret Downey, Clerk

Mailing Address: PO Box 427, 3195 Main Street

City: Barnstable State: MA Zip Code: 02630

Telephone (Daytime): 508-375-6636 (Evening): _____

Facsimile Number: _____ E-Mail Address: mdowney@barnstablecounty.org

Address of Facility (if different from above): Commerce Park Road (off of Freemans Way)

Electrical Contractor's Name (if appropriate): _____

Mailing Address: _____

City: _____ State: _____ Zip Code: _____

Telephone (Daytime): _____ (Evening): _____

Facsimile Number: _____ E-Mail Address: _____

License number: _____

Date of approval to install Facility granted by the Company: _____

Application ID number: _____

Inspection:
The system has been installed and inspected in compliance with the local Building/Electrical Code of _____
(City/County)

Signed (Local Electrical Wiring Inspector, or attach signed electrical inspection): _____

Name (printed): _____

Date: _____

As a condition of interconnection you are required to send/fax a copy of this form along with a copy of the signed electrical permit to the person listed below at NSTAR Electric:

Name: Joe Ferraci
Company: NSTAR Electric
Mail 1: One NSTAR Way
Mail 2: SUMSW360
City, State ZIP: Westwood, MA 02090
Fax No.: 781-441-8721

CAPE & VINEYARD ELECTRIC COOPERATIVE
TOWN OF BREWSTER – WIND TURBINE PROJECT
COMMERCE PARK ROAD, BREWSTER
Utility Interconnection

ELECTRICAL FUNCTIONAL DESCRIPTION

April 19, 2010

1.0 Engineering and Interconnection Requirements

1.0.0 Existing Electrical Infrastructure

The existing property owned by the Town of Brewster (hereafter referred to as the “facility”) is located off of Commerce Park Drive, near Freemans Way in Brewster, MA. The site is presently is supplied power from a 23kV NStar Electric distribution line (22,800V) located along Freemans Way. This three-phase circuit is connected to a NStar line in adjacent right-of-way, located approx. 1/2 mile east of the proposed site.

1.0.1 Electrical Interconnection Plan

There are a number of possible options that have been reviewed to connect the proposed two (2) 1.8MW proposed Vestas V90 (or equal) wind turbines to the existing utility distribution system. The proposed option minimizes the amount of new equipment required, while satisfying the utility interconnection requirements. The proposed interconnection is detailed in the attached Drawing E-2, dated April 2010.

The proposed interconnection will include a connection to the existing overhead three-phase NStar 23kV primary system in two separate locations, based on the proposed turbine locations.

The northern turbine (designated Turbine#1 or Turbine A) will connect to the distribution system at the end of Commerce Park Drive. Presently there are 9 poles on this road, with the last pole supplying the recently installed Town Water Department facility. The existing three-phase pole line would be extended with two more poles, to contain primary metering, and a disconnect switch located on the new underground riser pole. From the riser pole the connection would be underground to the wind turbine site. At the site there would be a padmount disconnect switch and transformer to step-down the voltage to the turbine voltage of 690V.

The southern turbine (designated Turbine#2 or Turbine B) will connect to the distribution system at the end of the cellular tower driveway, located east of

Commerce Park Drive. Presently there are 3 poles on this road, with the last 2 poles having only single-phase primary for the cellular tower equipment. This driveway feed is tapped on of existing Pole #118/61 on Freemans Way. The existing three-phase pole line would be extended with two new poles, to contain primary metering, and a disconnect switch located on the new underground riser pole. From the riser pole the connection would be underground to the wind turbine site. At the site there would be a padmount disconnect switch and transformer to step-down the voltage to the turbine voltage of 690V.

At each turbine the proposed interconnection would be to step-up the low-voltage (690V) output of the wind turbine to a higher voltage for connection with the distribution system (23kV), which is appropriate for 1.8MW turbine. A new 25kV class three-phase power cable would be installed in a new conduit ductbank to the new riser pole

The interconnection option also include the installation of a new pad mounted disconnect switch near the existing equipment, to provide protection for the underground primary cable, via a vacuum interrupter installed in the switch. The padmount switch would be equipped with a utility-grade distribution relay (SEL-351 or equal) to provide overcurrent and ground fault protection of the utility 23kV feeder.

The proposed interconnection also includes the installation of polemount primary metering to record the energy produced by the project. A new polemount metering cluster would be installed for each turbine to allow NStar to meter the each turbine. These metering locations will be the Point of Common Coupling (PCC), which is the ownership demarcation point between the utility and the customer.

The proposed interconnection would provide redundant utility-grade relaying to protect the NStar system from any negative effects of the wind turbines, should there be a problem, along with protecting their workers from the turbines exporting power into a “dead” line during an outage; which can be a safety issue. These types of protective device would be typical for a project of this size, and would allow protection for variations in voltage, frequency, etc. caused by the turbine. A relay would be included in the proposed padmount interrupter switch, with a redundant relay (for voltage & frequency protection) installed in each turbine.

The underground primary cables to interconnect the turbines would be three, single conductor, 25 kV class, #1/0 AWG, aluminum cables to carry the expected maximum 1,800kW from each turbine. New 25kV class cables should be installed in an underground conduit for physical protection rather than being directly buried.

1.0.2 Electrical Interconnection Details

1.0.2.1 - NStar Interconnection Requirements

NStar has specific standards and requirements for the interconnection of distributed generation such as the proposed wind turbine generator project. The interconnection requirements address electrical system protection, revenue metering, operation, and the configuration of the primary interconnection equipment. NStar will review the proposed design of the electrical interconnection facilities and will perform analyses to determine the impact of the proposed generation on their electrical distribution system.

Based on the results of NStar’s analysis, certain modifications may be needed within the NStar distribution system and/or to the interconnection facilities.

1.0.2.2 - Electrical Interconnection Equipment Details

The technical details of the major power system components associated with the electrical interconnection of the wind turbine generator are described in this section.

1.0.2.2.1 Generator Step-up Transformers

The generator step-up transformers are described by specifying the transformer voltage rating (primary and secondary), power rating (kilovolt-amperes or kVA), winding configuration (primary and secondary), and construction type. All transformers shall be three phase, padmount type, oil-filled, self-cooled transformers.

The primary voltage rating of the step-up transformer shall be consistent with the nominal voltage of the NStar distribution supply circuit to the facility which is 22.8 kV phase-to-phase for all three phase transformers. To allow flexibility for local voltage deviations that may exist on the NStar distribution system or within the 22.8 kV interconnection circuitry, the transformer primary winding shall be equipped with five (5) fixed taps to change the primary voltage rating +/- 5% from nominal voltage in 2-½ % increments. For the generator step-up transformer, the secondary voltage rating shall be consistent with the wind turbine generator voltage which is typically 690 volts.

The transformers shall be mineral oil-filled and the owner may prefer less flammable oil or environmentally safe, seed-based, oil at a price premium.

The three phase power rating of the generator step-up transformer (expressed in kVA) shall be consistent with the wind turbine generator power rating (expressed in kW) and increased for the allowable generator power factor. A 1.8MW (1500kW) wind turbine generator operating at a slightly lagging power factor requires a padmount transformer with a minimum continuous rating of 2000 kVA. Two transformers total will be required.

The transformers will each be connected to the 2000A, main low voltage circuit breaker of the wind turbine via secondary cabling. This cabling should consist of a minimum of 5 sets of 4-wire, 500mm copper conductor secondary cable with ground. This will provide 2000A of capacity. For 690V turbines, secondary cables should be type RHW-2 2000V cables.

1.0.2.2.2 - Interconnection Circuit 25 KV Class Cables

The proposed wind turbine generator interconnection option requires the use of 25 kV class interconnection circuit cables. A three phase interconnection circuit of is required between each of the two generator step-up transformers, through any necessary intermediate manholes, through the proposed padmount disconnect switch and to the primary metering.

The power cables shall be specified for 25 kV class insulation and consist of three, single conductor cables with either aluminum or copper conductors. For this project and two 1800kW turbines, the size of the power cables shall be a minimum of #1/0 AWG Aluminum.

The power cable between turbines and from the closest wind turbine generator step-up transformer to the 22.8 kV interconnection point shall be installed in underground

conduit. The conduit shall be Schedule 40 PVC that is encased in concrete. At least one (1) additional conduit for communications and control of the wind turbine generator should also be included in the conduit system. It is recommended that the primary cable ductbank be 2-5" conduits. Additional communications conduits (2-2") shall also be installed from the turbines to a riser poles for remote monitoring.

1.0.2.2.3 - Main 22.8 kV Disconnect Switch

The main 22.8 kV disconnect switch specified for the proposed generator interconnection shall be a combination manual load-break switch with relay-operated vacuum interrupter, three pole, switch. The switch shall be rated 200 amperes continuous current with a momentary rating of 25,000 amperes. The main 22.8 kV disconnect switch provides an open point between the wind turbine generator and the NStar 22.8 kV supply circuit. The operating handle of the main 22.8 kV disconnect switch (load-break) shall be capable of being padlocked by NStar's lock in the open position. The 22.8 kV padmount switch shall be equipped with a utility-grade protective relay (SEL-351 or equal) that provides overcurrent (51), ground over-voltage 3V0 (59I), under-voltage (27), overvoltage (59), under-frequency (81U) and over-frequency (81O) protection. For the wind turbines, underground primary cable, padmount transformers, etc.

1.0.2.2.4 - Protective Relay Scheme

The required protective relays for the selected generator interconnection option will be specified by NStar based on the results of their system impact study. Based on a review of the NStar Interconnection Requirements, it is anticipated that the protective features the wind turbine shall be able to detect are over/under frequency and over/under voltage and overcurrent (via the turbine main low-voltage circuit breaker) Upon sensing conditions that exceed allowable operating limits, the protective features shall disconnect the wind turbine generator from the rest of the distribution system. Redundant utility-grade protection is proposed at the turbine low-voltage main breaker and at the padmount vacuum interrupter switch. The relaying at the turbines shall be SEL-547 distributed generation relays for 27, 59, and 81O/U protection.

1.0.3 Revenue Metering Modifications

As mentioned, the proposed interconnection will need to be metered to measure energy produced by the wind turbines. The proposed interconnection will create a new primary metered point at the facility, for each turbine. A polemount primary metering cluster is proposed where the wind turbine circuit will connect to existing overhead 23kV NStar-owned primary infrastructure. This would be the ownership point and the PCC onto the 23kV primary system.

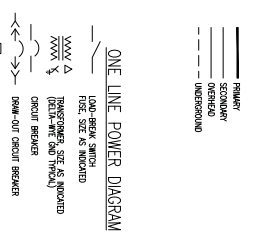
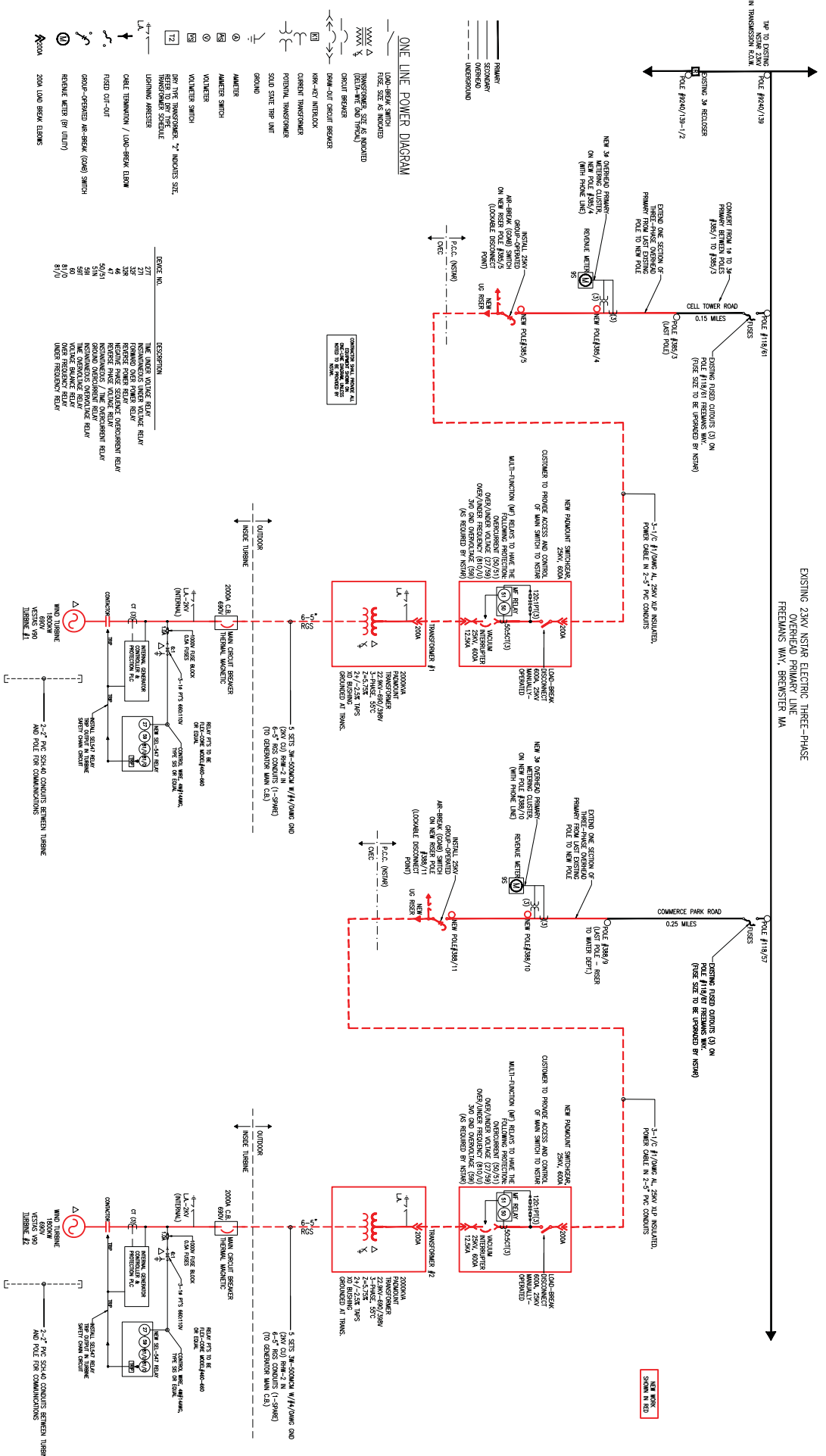
END OF SECTION

**CAPE & VINEYARD ELECTRIC COOPERATIVE
COMMERCE PARK ROAD, BREWSTER—PROPOSED 2 WIND TURBINE PROJECT**

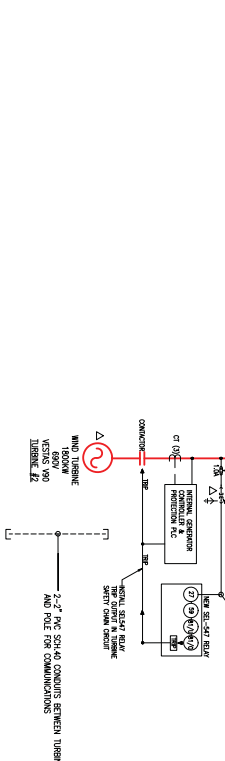


- Proposed
Brewster Wind
Turbine Site #1
41.740703°N
70.013522°W
- Proposed
Brewster Wind
Turbine Site #2
41.738369°N
70.012699°W

EXISTING 23KV NSTAR ELECTRIC THREE-PHASE
OVERHEAD PRIMARY LINE
FREMANS WAY, BREWSTER VA



DEVICE NO.	DESCRIPTION
271	INSENSITIVE UNDER VOLTAGE RELAY
270	SENSITIVE UNDER VOLTAGE RELAY
326	UNDER VOLTAGE RELAY
325	REVERSE POWER RELAY
4	REVERSE POWER RELAY
50/24	REVERSE POWER RELAY
59	INSENSITIVE OVERCURRENT RELAY
58	SENSITIVE OVERCURRENT RELAY
81/0	THE OVERCURRENT RELAY
81/1	OVERCURRENT RELAY
81/2	UNDER FREQUENCY RELAY



NO.	DATE	REVISION	DESCRIPTION
4	4/20/2010	REVISED FOR REVIEW & FINAL APPROVAL	

NO.	DATE	REVISION	DESCRIPTION

SCALE: HORIZONTAL
VERTICAL

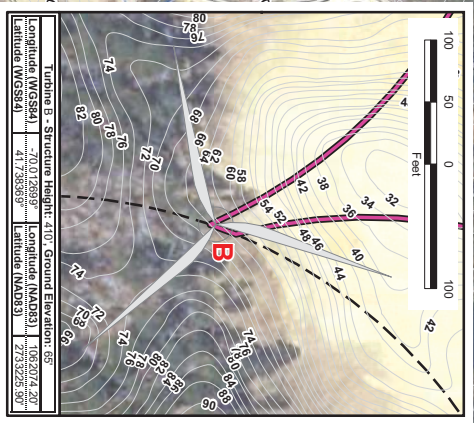
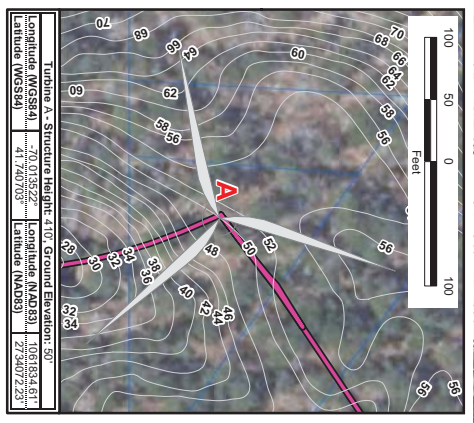
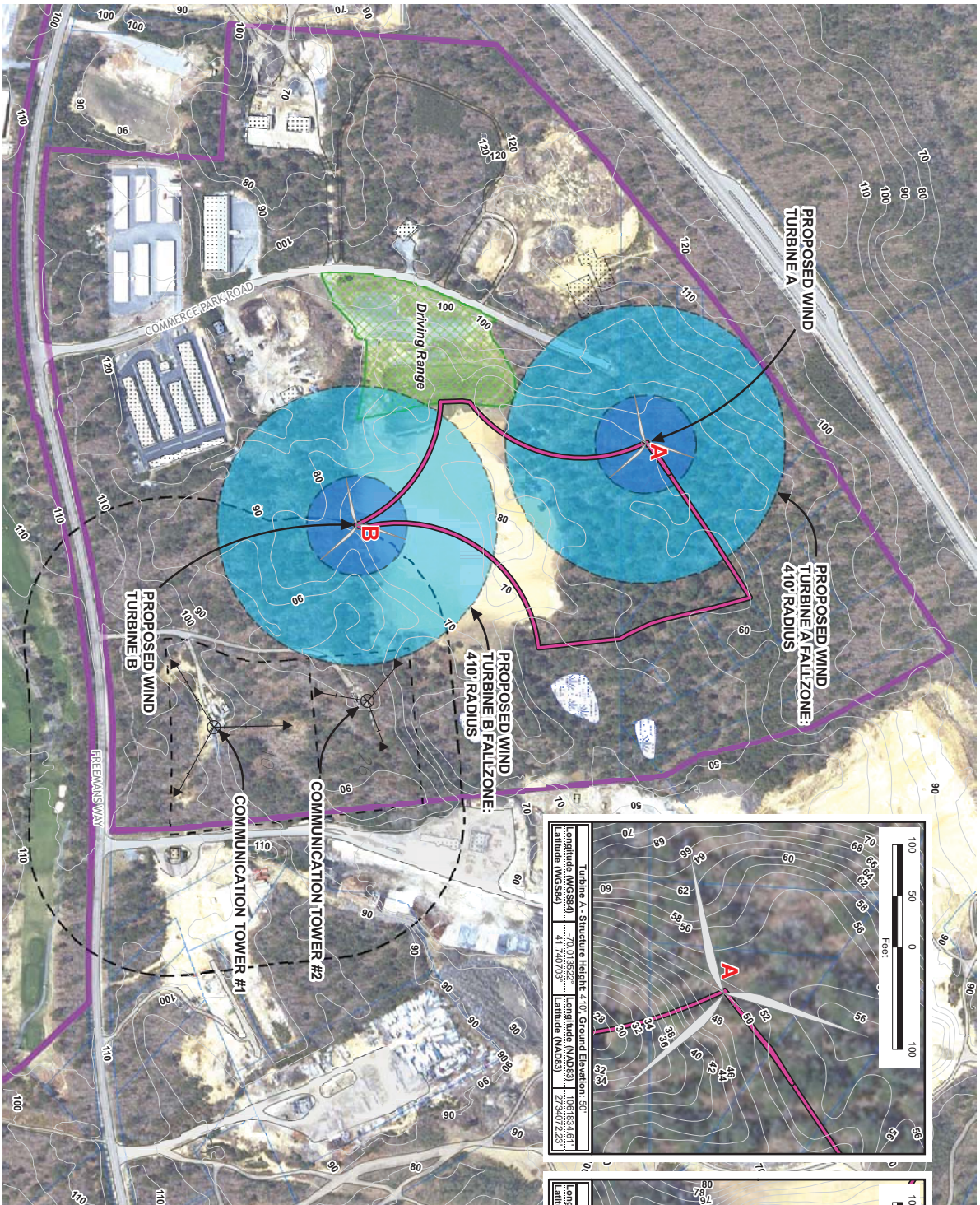
GRAPHIC SCALE

POWER ENGINEERS, LLC
Professional Engineers, Power, Lighting, Industrial Facilities and Utility Consulting

CAPE & VINEYARD ELECTRIC COOP
BREWSTER WIND TURBINE PROJECT
PROPOSED ONE-LINE DIAGRAM

MEMBER: HANNOCHUERTT

DATE: APRIL 2010
E-2
SIZE: D | REV: 0



- Legend**
- Setback Area - Available for Turbines
 - Town-Owned Property
 - Communication Tower
 - Road
 - Guy Wire Anchor
 - Trails
 - Guy Wire
 - Building
 - Driveway
 - Parcel
 - Wetlands
 - Town Boundary

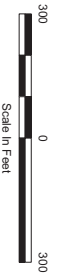


FIGURE 9

CVEC / TOWN OF BREWSTER, MA

WIND ENERGY FACILITY

CONCEPTUAL SITE PLAN

OPTION B - ALTERNATE 2

MAY 2010

SCALE: NOTED

Weston & Sampson