EXHIBIT K

Transportation
Land Development
Environmental
Services

VHB imagination | innovation | energy Creating results for our clients and benefits for our communities

October 22, 2010

Vanasse Hangen Brustlin, Inc.

Ref: 41604.01

Ms. Julie Victoria
Wildlife Biologist
Department of Environmental Protection
Franklin Wildlife Management Area
391 Route 32
N. Franklin, Connecticut 06254

Re: Eastern Box Turtle Habitat Survey
Proposed Wind Prospect – Wind Energy Facility
NDDB - 17982
178 New Haven Road
Prospect, CT

Dear Ms. Victoria:

Vanasse Hangen Brustlin Inc. (VHB) has been retained by BNE Energy, Inc. ("BNE") to review environmental resource information, including threatened or endangered species or designated critical habitats on property located at 178 New Haven Road in Prospect, Connecticut ("Property"). A Property Location Map is enclosed for reference. BNE proposes to construct a wind energy facility on the aforementioned Site. The proposed facility includes construction of two 1.6 megawatt GE wind turbines, associated access roads, and utility interconnection to the existing electrical grid. Access to the Property will be from Kluge Road. Proposed activities associated with the proposed wind energy facility include construction of a new access road and installation of associated ground equipment including an electrical collector yard and associated utility infrastructure so that the turbines can be interconnected to the electrical grid. Please see attached Site Plan with Aerial Imagery, Sheet C-002.

A habitat survey was performed on the Property prior to your response letter of August 31, 2010 (enclosed). A summary of this inspection is provided below along with recommendations to be implemented during proposed construction activities to avoid possible impact to this Special Concern species.

In Connecticut, eastern box turtles (*Terrapene carolina*) are restricted to low-lying areas of the state, specifically coastal areas, the Central Connecticut Lowland, and the hilly regions of southwestern Connecticut. Box turtles are widely distributed from sea level up to 500 feet, becoming increasingly scarce and localized to an elevation maximum of just above 700 feet. The eastern box turtle favors old field habitat and deciduous forest ecotones, including

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email: info@vhb.com
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J:\41604.01\reports\NDDB\Box Turtle Habitat Survey.doc powerline cuts and logged-over woodland. Although strictly terrestrial, this species is seldom found far from water, usually a small stream or pond[1].

Habitat Survey

The Property occupies a drumlinoid[2] landform situated west of New Haven Road (State Highway 69) and south of the Prospect town center. Elevations at the Property range from 550 to 810 feet. The majority of the Property is covered by second growth, upland hardwood forest, but also includes several forested hillside seep wetlands and watercourses as well as nine acres of early old field meadow habitat situated at the highest elevation on the Property. An existing telecommunications facility is located within this hilltop meadow. Please see attached Habitat Type Map.

Forest Habitat

The forested portion of the Property is dominated by hardwood poletimber (trees 4.0 to 11.9 inches diameter at breast height ["DBH"]) and small sawtimber (12 to 15 inches DBH). Generally, areas closer to the top of the cleared hilltop are dominated by hardwood poletimber comprised of early successional tree species, evidence of abandoned pastureland. Occasional wolf trees and deceased red cedar (*Juniperus virginiana*) were also noted within this area. Areas further down slope contain a larger proportion of sawtimber. Dominant species include white ash (*Fraxinus americana*), sugar maple (*Acer saccharinum*), tulip poplar (*Liriodendron tulipfera*) and yellow birch (*Betula allegheniensis*), interspersed with shagbark hickory (*Carya ovata*), black birch (*Betlua lenta*), eastern hemlock (*Tsuga canadensis*) and black cherry (*Prunus serotina*).

The upland forest understory is dominated by Japanese barberry (*Berberis thungbergii*), a non-native invasive species. The barberry cover is dense, and forms a virtual monoculture up to three feet off the ground. Due to the thick barberry cover, there is very little herbaceous cover evident in the understory. Christmas fern (*Polystichum acrostichoides)* appears occasionally. Rotting logs, woody debris, and slash are abundant throughout the Project site.

Meadow Habitat

The nine-acre, early old field meadow is situated in the southeast corner of the Property, on the highest elevation of the Site. This field is separated from a smaller, one acre field to the north by a hedgerow of saplings, shrubs, and trees, including red maple (*Acer rubrum*), white ash, gray dogwood (*Cornus racemosa*), black cherry, and Asiatic bittersweet (*Celastrus orbiculatus*). The larger field, which contains the telecommunications facility, is dominated by forbes such as goldenrod (*Solidago spp.*) and grasses including orchard grass (*Dactylis glomerata*), *Dicanthelium*, and *Agrostis* species. Patches of low shrubs approximately three to

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[1] Klemens, M. W. (1993). Amphibians and Reptiles of Connecticut and Adjacent Regions. State Geological and Natural History Survey of Connecticut, Bulletin 112.

[2] Drumlinoid is a family of landforms created as a result of glacial retreat and advance. They are generally orientated in a north-south direction and comprised of varying amounts of glacial till and bedrock.

VHB

four feet high also occur, including sweet fern (*Comptonia peregrina*) and gray dogwood. Vegetation cover in the smaller field is similar but also contains *Rubus* species.

Wetlands Resources

Several forested hillside seep (groundwater exfiltration) wetlands and watercourses were delineated on the Property. See attached Habitat Type Map. In total, four wetlands resource areas were delineated on the Property. They generally occur on the hillside where topographical gradient subsides and seasonal high groundwater persists long enough for reducing soil conditions to exist. However, several hillside seepage areas were delineated on side slopes where exfiltrated groundwater follows meandering drainage patterns downslope. Intermittent watercourse features were observed but not delineated within most of the delineated wetland areas. The tree canopies are dominated by red maple, white ash and yellow birch, while the shrub layer includes spicebush and a vigorous Japanese barberry component which forms a virtual monoculture below three feet above ground.

Digitally available soil survey information was obtained from the Natural Resources Conservation Service (NRCS). A soil type map and descriptions are attached for reference. Soil classifications present on the Site include well drained Paxton and Montauk soils, and poorly drained Ridgebury and Leicester soils. These soil types were confirmed during a wetland delineation conducted by VHB Registered Soil Scientist Matthew Davison.

Discussion

The subject Property is dominated by deciduous forest, which presents potential suitable eastern box turtle habitat. However, the elevations would suggest that portions of the subject Property would not likely provide suitable habitat. Elevations at the areas of the proposed development that would be subject to disturbance range from approximately 610 to 810 feet. As previously noted, box turtles are widely distributed from sea level to 500 feet, becoming increasingly scarce and localized to an elevation maximum of just above 700 feet[3]. In addition, upland soils on the Property are dominated by glacial till derived Paxton and Montauk soil types which would not provide an ideal nesting substrate. Despite these findings and due to the fact that Property specific surveys for eastern box turtles will not be performed, VHB recommends the following protection measures to avoid potential mortality to a State Special Concern species as a result of proposed construction activities.

Eastern Box Turtle Protection Measures

The following is a methodological plan that will avoid mortality to a State Special Concern species as a result of construction activities for the site improvements proposed if work is proposed during the turtle's active period (April 1 to November 1).

The proposed eastern box turtle species protection program consists of periodic inspection of

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[3] Klemens, M. W. (1993). Amphibians and Reptiles of Connecticut and Adjacent Regions. State Geological and Natural History Survey of Connecticut, Bulletin 112.

the construction site and mandatory education of all contractors and sub-contractors prior to initiation of work on the site.

1. **Isolation Measures**

   a. **Schedule:** On-site work is tentatively scheduled to commence upon securing of all necessary permits during the spring of 2011 with an anticipated duration of approximately six to eight months. Installation of conventional silt fencing, which will also serve as an isolation of the work zone from surrounding areas and required for erosion control compliance, will be performed prior to any earthwork. A qualified professional will inspect the work zone area prior to barrier installation to ensure the area is free of eastern box turtles.

   b. **Specifications:** The fencing will consist of conventional erosion control woven fabric, installed approximately six inches below surface grade and staked at seven- to ten-foot intervals using four-foot oak stakes or approved equivalent. The fencing will be inspected for tears or breeches in the fabric following installation and at one-week intervals or after storm events of 0.5 inch or greater by a qualified professional between April 1 and November 1. Inspections will be conducted throughout this time period.

   c. **Reports:** Monthly inspection reports (brief narrative and applicable photos) will be submitted to the Connecticut Siting Council for compliance verification. Any observations of eastern box turtle will be reported to the Connecticut Department of Environmental Protection Wildlife Division.

   d. **Location:** The extent of the barrier fencing will be shown on the Erosion Control Plan.

2. **Contractor Education:**

   a. Prior to work on-site, the Contractor shall attend an educational session with a qualified professional. This orientation and educational session will consist of an introductory session with photos as well as measures to be taken should animals be encountered.

   b. Contractors will be provided with cell phone and email contacts for the qualified professional responsible for oversight to be used immediately upon encountering an eastern box turtle. Poster materials will be provided and posted on the job site to maintain worker awareness as the season progresses. A copy of the Eastern Box Turtle caution poster is enclosed.

   c. The Contractor will search the construction area each morning prior to the start of construction and carefully move any turtles encountered out of the construction zone. Any encounters with eastern box turtle will be reported immediately to the qualified professional responsible for oversight.

3. **Reporting**

a. Following completion of the construction project, a summary report will be provided to CTDEP documenting the monitoring and maintenance of the barrier fence.

b. Any observations of the species of concern will be reported to CTDEP by the qualified professional responsible for oversight, with photo-documentation (if possible) and with specific information on the location and disposition of the animal.

The eastern box turtle protection measures detailed above will adequately protect this Special Concern species in the unlikely event that this species is encountered on the subject property during construction activities. Therefore, BNEs' proposed development at this property will not have an adverse affect on eastern box turtles.

We respectfully request a written opinion from your office regarding the potential effect of proposed activities on this State Species of Special Concern in light of documentation contained herein. At your earliest convenience, please forward correspondence to my attention. Thank you in advance for your assistance in this matter.

Very truly yours,

VANASSE HANGEN BRUSTLIN, INC.

Matthew Davison
Registered Soil Scientist
CT Certified Forester 193

Enclosures

VHB

Property Location Map

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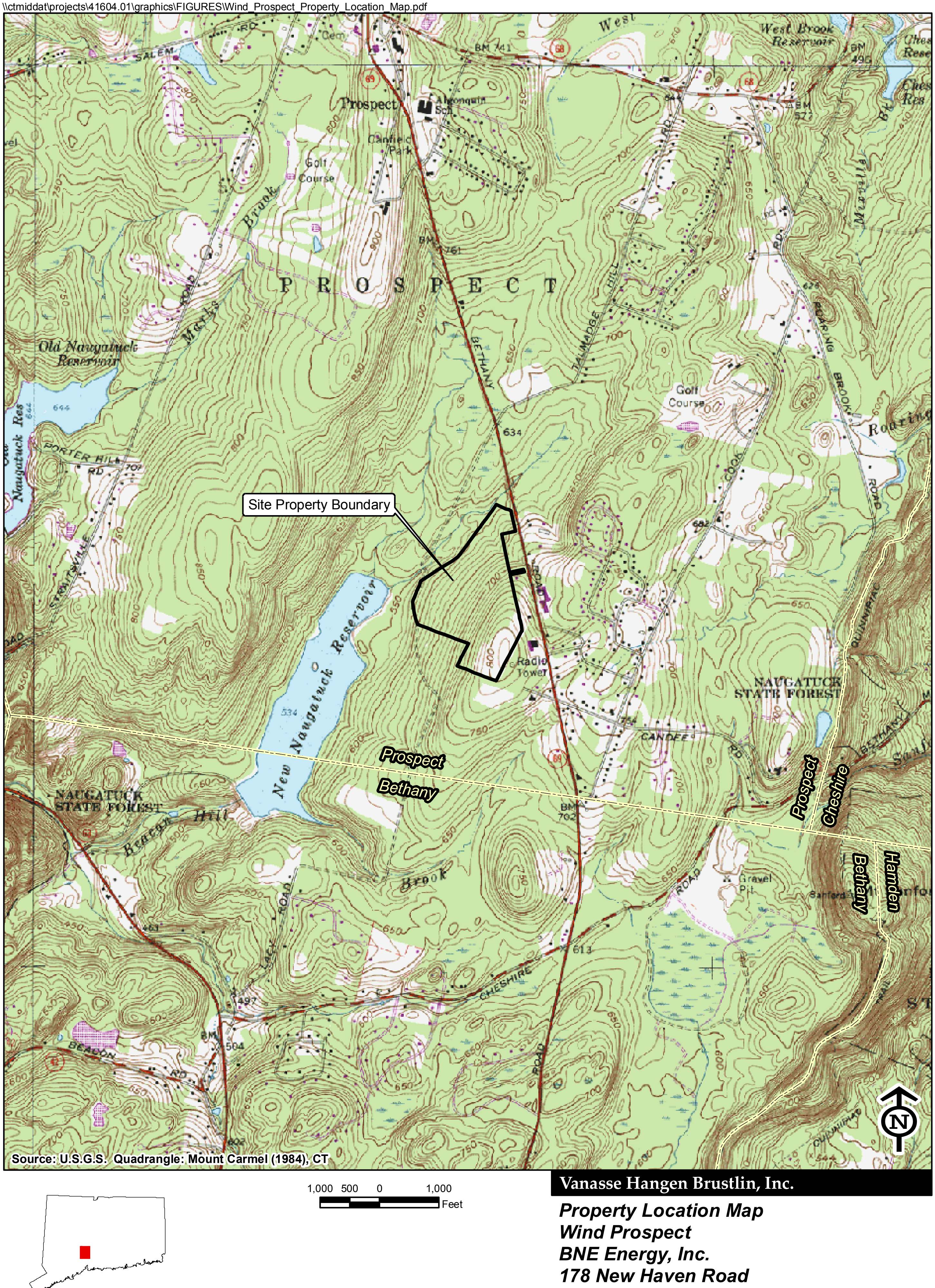
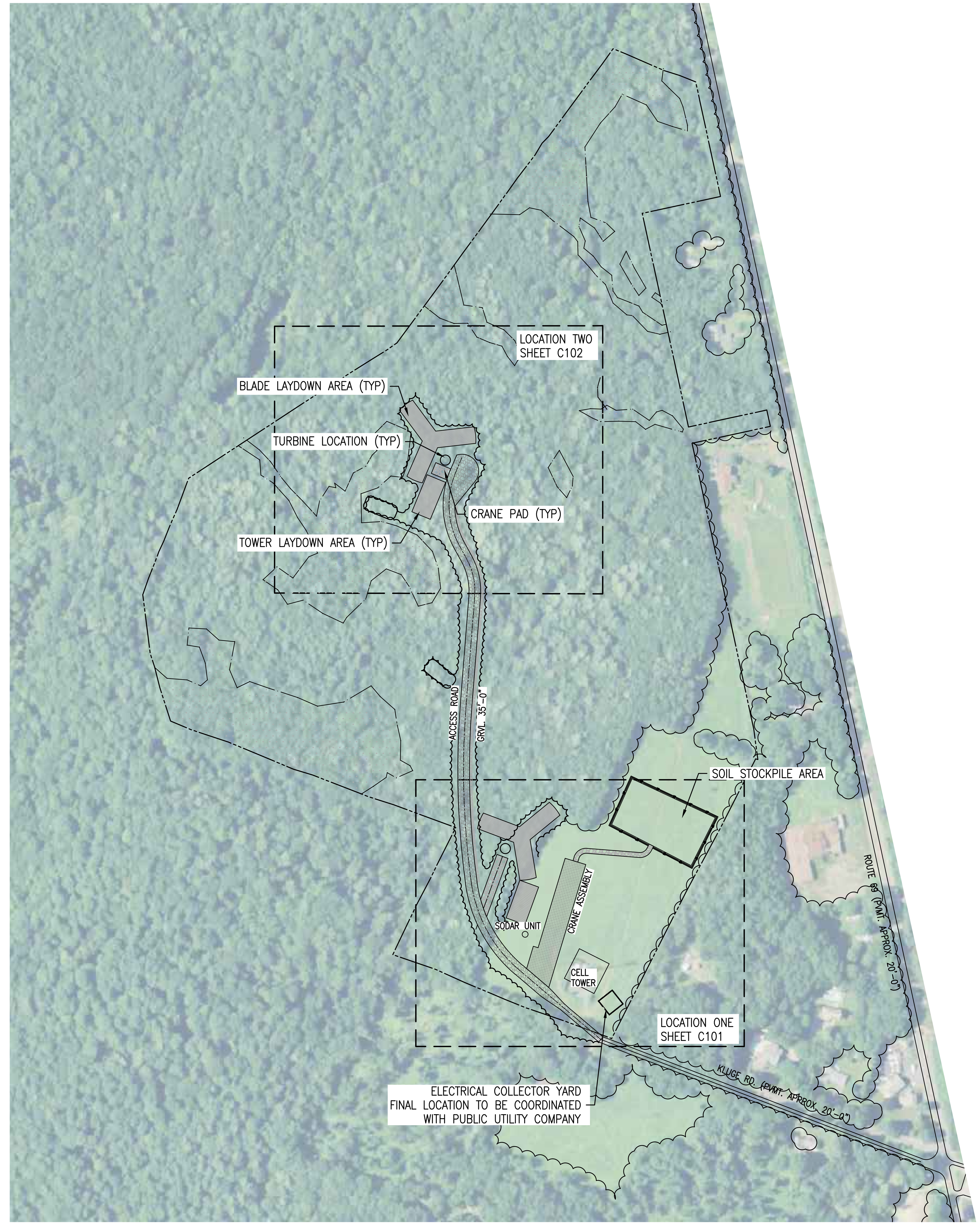


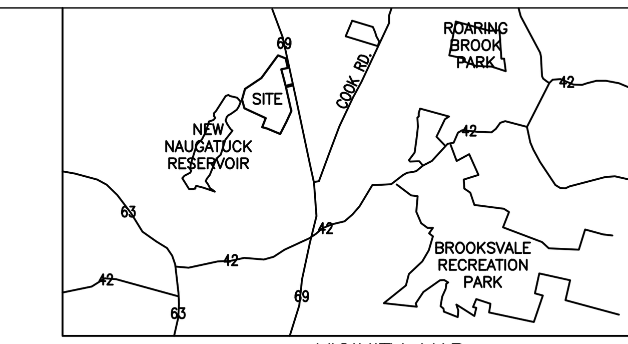
Vanasse Hangen Brustlin, Inc.

Property Location Map
Wind Prospect
BNE Energy, Inc.
178 New Haven Road
Prospect, Connecticut

Site Plan with Aerial Imagery,

Sheet C-002





VICINITY MAP

LEGEND

- PROJECT BOUNDARY LINE
- EXISTING VEGETATION
- WETLAND LIMITS
- POST CONSTRUCTION VEGETATION LINE
- COMPACTED FILL
- WETLANDS
- GRAVEL

GENERAL NOTES

1. CONTRACTOR SHALL BE RESPONSIBLE FOR SITE SECURITY AND JOB SAFETY. CONSTRUCTION ACTIVITIES SHALL BE IN ACCORDANCE WITH OSHA STANDARDS, LOCAL REQUIREMENTS AND GOVERNMENT REQUIREMENTS.
2. AREAS DISTURBED DURING CONSTRUCTION AND NOT RESTORED WITH IMPERVIOUS SURFACES (BUILDINGS, PAVEMENTS, WALKS, ETC.) SHALL RECEIVE SIX INCHES OF TOPSOIL AND SHALL BE SEEDED, UNLESS OTHERWISE NOTED.
3. UPON AWARD OF CONTRACT, CONTRACTOR SHALL MAKE NECESSARY CONSTRUCTION NOTIFICATIONS AND APPLY FOR AND OBTAIN NECESSARY PERMITS, PAY FEES, AND POST BONDS ASSOCIATED WITH THE WORK INDICATED ON THE DRAWINGS, IN THE SPECIFICATIONS, AND IN THE CONTRACT DOCUMENTS.
4. TRAFFIC SIGNAGE AND PAVEMENT MARKINGS SHALL CONFORM TO THE MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES, UNLESS OTHERWISE INDICATED.
5. AREAS OUTSIDE THE LIMITS OF PROPOSED WORK DISTURBED BY THE CONTRACTOR'S OPERATIONS SHALL BE RESTORED BY THE CONTRACTOR TO THEIR ORIGINAL CONDITION AT THE CONTRACTOR'S EXPENSE AS SOON AS PRACTICABLE.
6. IN THE EVENT THAT SUSPECTED CONTAMINATED SOILS ARE ENCOUNTERED DURING EXCAVATION AND CONSTRUCTION ACTIVITIES BASED ON VISUAL, OLFACTORY, OR OTHER EVIDENCE, THE CONTRACTOR SHALL STOP WORK IN THE VICINITY OF THE SUSPECT MATERIAL TO AVOID FURTHER SPREADING OF THE MATERIAL, AND SHALL NOTIFY THE OWNER IMMEDIATELY SO THAT THE APPROPRIATE TESTING AND SUBSEQUENT ACTION CAN BE TAKEN.
7. CONTRACTOR SHALL PREVENT DUST, SEDIMENT, AND DEBRIS FROM EXITING THE SITE AND SHALL BE RESPONSIBLE FOR CLEANUP, REPAIRS AND CORRECTIVE ACTION IF SUCH OCCURS. CONTRACTOR SHALL DISPOSE OF DEBRIS IN ACCORDANCE WITH APPLICABLE FEDERAL, STATE, AND LOCAL REGULATIONS, ORDINANCES, AND STATUTES.
8. DAMAGE RESULTING FROM CONSTRUCTION LOADS SHALL BE REPAIRED BY THE CONTRACTOR.
9. CONTRACTOR SHALL CONTROL STORMWATER RUNOFF DURING CONSTRUCTION TO PREVENT ADVERSE IMPACTS TO OFF SITE AREAS, AND SHALL BE RESPONSIBLE TO REPAIR RESULTING DAMAGES, IF ANY. ALL PAVEMENT, DITCHES, CURB AND GUTTER, UTILITIES, DRIVEWAYS, SIDEWALKS, SIGNS, FENCES, ETC. DISTURBED DURING CONSTRUCTION SHALL BE REPAIRED AND/OR RESTORED.
10. ALL ON SITE VEHICLE TRANSPORTATION ROUTES SHALL BE TEMPORARILY STABILIZED WITH STONE IMMEDIATELY AFTER GRADING TO PROVIDE READY ACCESS FOR EMERGENCY VEHICLES TO TRAVEL THROUGH AND AROUND THE CONSTRUCTION SITE DURING BOTH DRY AND WET WEATHER.
11. EXCESS EXCAVATION MATERIAL SHALL BE LEGALLY DISPOSED OF OFF SITE BY THE CONTRACTOR OR IN ON SITE AREAS APPROVED BY THE OWNER. NO SPOILS SHALL BE STORED ON SITE BEYOND SUBSTANTIAL COMPLETION.
12. DEWATERING SHALL BE THE CONTRACTOR'S RESPONSIBILITY.
13. CONTRACTOR IS RESPONSIBLE FOR THE COORDINATION AND SEQUENCING OF DEMOLITION AS DESCRIBED BY THESE DOCUMENTS AND SPECIFICATIONS. CONTRACTOR IS TO OBTAIN ALL PERMITS.
14. CONTRACTOR IS RESPONSIBLE FOR COORDINATION OF DEMOLITION OR RELOCATION WITH APPLICABLE UTILITY COMPANIES, IE, GAS, CABLE, POWER, TELEPHONE, WATER, SEWER, ETC.
15. EQUIPMENT OPERATION, ACTIVITIES, OR PROCESSES PERFORMED BY THE CONTRACTOR SHALL BE IN ACCORDANCE WITH ALL FEDERAL AND STATE AIR EMISSION AND PERFORMANCE LAWS AND STANDARDS.
16. CONTRACTOR IS RESPONSIBLE FOR TRAFFIC CONTROL DURING CONSTRUCTION.
17. BURNING WILL NOT BE ALLOWED ON THE PROJECT SITE UNLESS AUTHORIZED IN WRITING BY THE OWNER. THE SPECIFIC TIME, LOCATION AND MANNER OF BURNING SHALL BE SUBJECT TO APPROVAL.
18. SOLID WASTES (EXCLUDING CLEARING DEBRIS) SHALL BE PLACED IN CONTAINERS WHICH ARE EMPTIED ON A REGULAR SCHEDULE. HANDLING, STORAGE, AND DISPOSAL SHALL BE CONDUCTED TO PREVENT CONTAMINATION. SEGREGATION MEASURES SHALL BE EMPLOYED SO THAT NO HAZARDOUS OR TOXIC WASTE WILL BECOME CO-MINGLED WITH SOLID WASTE. THE CONTRACTOR SHALL TRANSPORT SOLID WASTE OFF SITE AND DISPOSE OF IT IN COMPLIANCE WITH FEDERAL, STATE AND LOCAL REQUIREMENTS FOR SOLID WASTE DISPOSAL. A SUBTITLE D RCRA PERMITTED LANDFILL SHALL BE THE MINIMUM ACCEPTABLE OFFSITE SOLID WASTE DISPOSAL OPTION. THE CONTRACTOR SHALL VERIFY THAT THE SELECTED TRANSPORTERS AND DISPOSAL FACILITIES HAVE THE NECESSARY PERMITS AND LICENSES TO OPERATE. THE CONTRACTOR SHALL COMPLY WITH FEDERAL, STATE AND LOCAL LAWS AND REGULATIONS PERTAINING TO THE USE OF LANDFILL AREAS.
19. PRIOR TO COMMENCING CONSTRUCTION ACTIVITIES, THE CONTRACTOR SHALL MARK THE AREAS THAT NEED NOT BE DISTURBED UNDER THIS CONTRACT. ISOLATED AREAS WITHIN THE GENERAL WORK AREA WHICH ARE NOT TO BE DISTURBED SHALL BE MARKED OR FENCED. MONUMENTS AND MARKERS SHALL BE PROTECTED BEFORE CONSTRUCTION OPERATIONS COMMENCE.
20. THE CONTRACTOR SHALL MONITOR CONSTRUCTION ACTIVITIES TO PREVENT POLLUTION OF SURFACE AND GROUND WATERS AND SHALL COMPLY WITH THE CLEAN WATER ACT SECTION 404 REGULATIONS.
21. CONTRACTOR SHALL ESTABLISH AND VERIFY POINT OF BEGINNING (P.O.B) AND STAKE SITE AS INDICATED ON CONSTRUCTION DOCUMENTS PRIOR TO COMMENCEMENT OF CONSTRUCTION. NOTIFY THE ENGINEER IMMEDIATELY OF ANY DISCREPANCIES.
22. ALL DIMENSIONS ARE TO BACK OF CURB, FACE OF BUILDING, OR CENTERLINE UNLESS OTHERWISE NOTED.
23. ALL DETAILS SHALL BE CONSTRUCTED IN STRICT COMPLIANCE WITH SPECIFICATIONS AND CONSTRUCTION DOCUMENTS.

LAYOUT AND MATERIALS NOTES

1. PRIOR TO START OF CONSTRUCTION, CONTRACTOR SHALL VERIFY EXISTING PAVEMENT ELEVATIONS AT INTERFACE WITH PROPOSED PAVEMENTS AND EXISTING GROUND ELEVATIONS TO ASSURE PROPER TRANSITIONS BETWEEN EXISTING AND PROPOSED FACILITIES.
2. SYMBOLS AND LEGENDS OF PROJECT FEATURES ARE GRAPHIC REPRESENTATIONS AND ARE NOT NECESSARILY SCALED TO THEIR ACTUAL DIMENSIONS OR LOCATIONS ON THE DRAWINGS. THE CONTRACTOR SHALL REFER TO THE DETAIL SHEET DIMENSIONS, MANUFACTURERS' LITERATURE, SHOP DRAWINGS, AND FIELD MEASUREMENTS OF SUPPLIED PRODUCTS FOR LAYOUT OF THE PROJECT FEATURES.
3. CONTRACTOR SHALL NOT RELY SOLELY ON ELECTRONIC VERSIONS OF PLANS, SPECIFICATIONS, AND DATA FILES THAT ARE OBTAINED FROM THE DESIGNERS, BUT SHALL VERIFY LOCATION OF PROJECT FEATURES IN ACCORDANCE WITH THE PAPER COPIES OF THE PLANS AND SPECIFICATIONS THAT ARE SUPPLIED AS PART OF THE CONTRACT DOCUMENTS.

0 100' 200'

BNE Energy Inc.
Producer of green clean energy

MARK	DESCRIPTION	DATE	APPR.
1	CONNECTICUT SITING COUNCIL SUBMISSION	10-21-10	TLK

NOT FOR CONSTRUCTION

ZAPATA TRUST · INTEGRITY · QUALITY
6302 FAIRVIEW ROAD #600 CHARLOTTE, NC 28210 ZAPATA@ZAPATAINC.COM PHONE: (704) 358-8240 FAX: (704) 358-8342 WWW.ZAPATAINC.COM

DESIGNED BY: RSS
DATE: 10-21-10
DWN BY: RSW
CKD BY: TLK
OWNER: BNE ENERGY
SUBMITTED BY: ZAPATA INC.
PARCEL NO.: TAX MAP 112, BLOCK 96, LOT 178
PLOT SCALE: AS SHOWN
PLOT DATE: 10-21-10
FILE NUMBER: 1355
SIZE: ANSI D
FILE NAME: W:\Projects\BNE Energy Inc\Data\CAD\1355-012 Prospect\C002_SITE W IMAGE.dwg

WIND PROSPECT
CONNECTICUT

SITE PLAN WITH AERIAL IMAGREY

SHEET IDENTIFICATION
C-002

CT DEP letter dated August 31, 2010

STATE OF CONNECTICUT
DEPARTMENT OF ENVIRONMENTAL PROTECTION

September 3, 2010

Mr. Matthew Davison
Vanasse Hangen Brustlin, Inc.
54 Tuttle Place
Middletown, CT 06457-1847

re: proposed wind energy facility, 178 New Haven Road, Prospect

Dear Mr. Davison:
Your request was forwarded to me on 9/1/10 from Dawn McKay of the Department of Environmental Protection (DEP) Natural Diversity Data Base. Their records indicate that a state species of special concern, Eastern Box Turtle (*Terrapene carolina*) occurs in the vicinity of this project. Additional populations of non-listed species may occur at this site or fly over it, please see the additional recommendations provided at the following link:
http://www.fws.gov/habitatconservation/windpower/wind_turbine_advisory_committee.html

Eastern Box Turtles require old field and deciduous forest habitats, which can include power lines and logged woodlands. They are often found near small streams and ponds, the adults are completely terrestrial but the young may be semiaquatic, and hibernate on land by digging down in the soil from October to April. They have an extremely small home range and can usually be found in the same area year after year. This species is dormant from November 1 to April 1. It has been negatively impacted by the loss of suitable habitat.

The Wildlife Division has not been provided with details or a timetable of the work to be done. Past practices do not preclude the existence of this species on this property. If this work will be conducted in this species' habitat or any staging areas or equipment or access roads will be located in this species' habitats, the Wildlife Division recommends that a herpetologist familiar with the habitat requirements of this species conduct surveys. A report summarizing the results of such surveys should include habitat descriptions, herptile species list and a statement/resume giving the herpetologist' qualifications. The DEP doesn't maintain a list of qualified surveyors. A DEP Wildlife Division permit may be required by the surveyors to conduct survey work, you should ask if your surveyor has one. The results of this investigation can be forwarded to the Wildlife Division and, after evaluation, recommendations for additional surveys, if any, will be made.

Standard protocols for protection of wetlands should be followed and maintained during the course of the project. Additionally, all silt fencing should be removed after soils are stable so that reptile and amphibian movement between uplands and wetlands is not restricted. Please be advised that the Wildlife Division has not made a field inspection of the project nor have we seen detailed timetables for work to be done. Consultation with the Wildlife Division should not be substituted for site-specific surveys that may be required for environmental assessments. The time of year when this work will take place will affect these species if they are present on the site when the work is scheduled. Please be advised that should state permits be required or should state involvement occur in some other fashion, specific restrictions or conditions relating to the species discussed above may apply. In this situation, additional evaluation of the proposal by the DEP Wildlife Division should be requested. If the proposed project has not been initiated within 12 months of this review, contact the NDDB for an updated review. If you have any additional questions, please feel free to contact me at Julie.Victoria@ct.gov , please reference the NDDB # at the bottom of this letter when you e-mail or write. Thank you for the opportunity to comment.

Sincerely,

Julie Victoria, Wildlife Biologist
Franklin Swamp Wildlife Management Area
391 Route 32
N. Franklin, CT 06254

cc: NDDB – 17982

Habitat Type Map

Habitat Type Map

Wind Prospect
178 New Haven Road
Prospect, CT

Legend

- Proposed Wind Turbine Location

Habitat Type

- Early Old Field Meadow
- Forested Wetlands
- Second Growth Upland Hardwood Forest
- Existing Telecommunications Tower Compound
- Open Water
- Site Property Boundary

Base Map Source: 2004 aerial photograph with 0.5-foot resolution.

Prospect, Connecticut

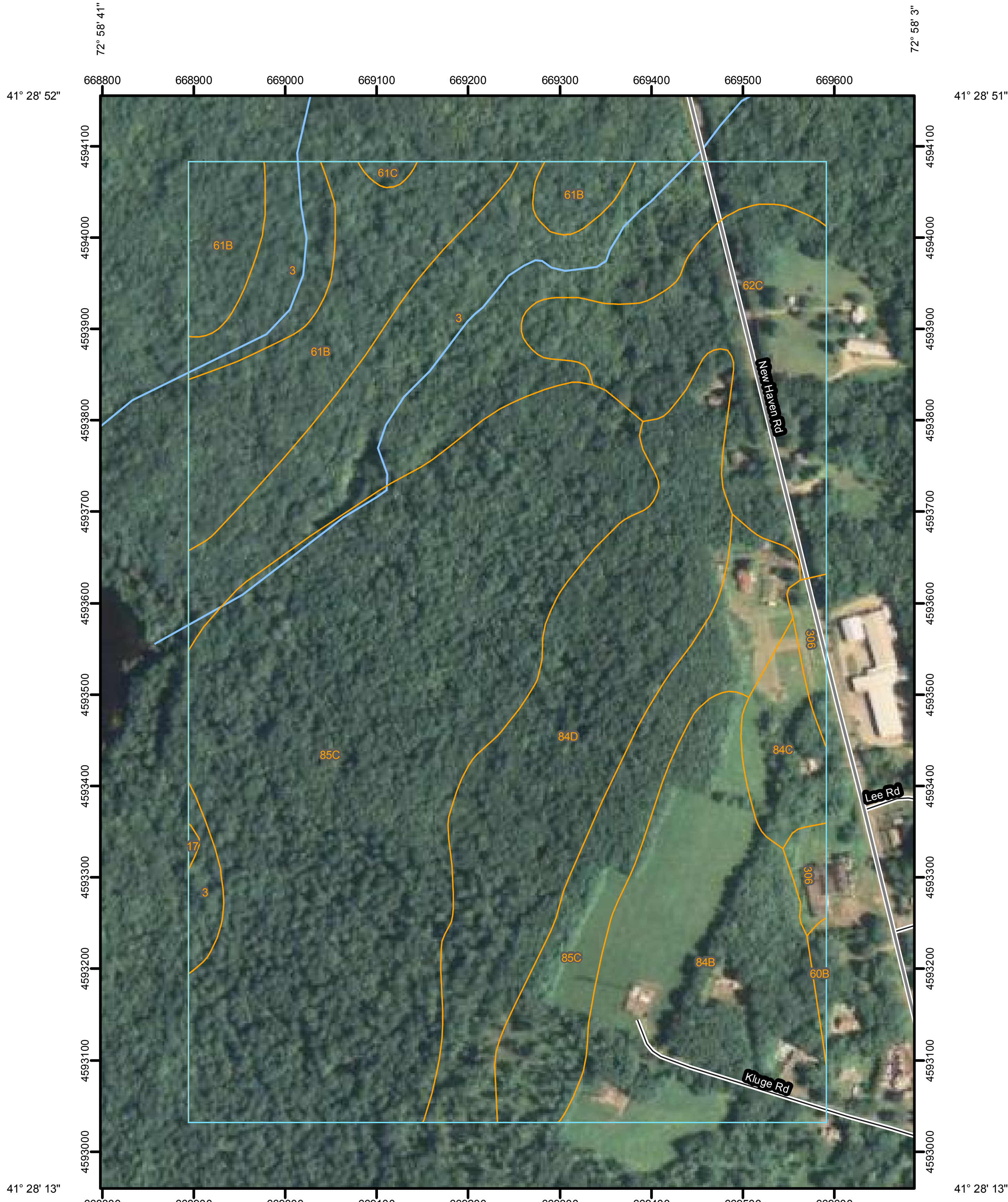
200 100 0 200
Feet

Vanasse Hangen Brustlin, Inc.

\\ctmiddat\projects\41604.01\graphics\FIGURES\Prospect_Habitat_Type_Map.pdf

Soil Type Map and Descriptions

Soil Map—State of Connecticut
(178 Hew Haven Road, Prospect)



Map Scale: 1:5,700 if printed on A size (8.5" x 11") sheet.

N

Meters: 0 50 100 200 300

Feet: 0 200 400 800 1,200

MAP LEGEND

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

Soils
- Soil Map Units

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

Special Line Features
- Gully
- Short Steep Slope
- Other

Political Features
- Cities

Water Features
- Oceans
- Streams and Canals

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

MAP INFORMATION

Map Scale: 1:5,700 if printed on A size (8.5" × 11") sheet.

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

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

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: UTM Zone 18N NAD83

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

Soil Survey Area: State of Connecticut
Survey Area Data: Version 7, Dec 3, 2009

Date(s) aerial images were photographed: 8/14/2006

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

Map Unit Legend

State of Connecticut (CT600)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
3	Ridgebury, Leicester, and Whitman soils, extremely stony	28.1	15.5%
17	Timakwa and Natchaug soils	0.1	0.0%
60B	Canton and Charlton soils, 3 to 8 percent slopes	0.4	0.2%
61B	Canton and Charlton soils, 3 to 8 percent slopes, very stony	16.7	9.2%
61C	Canton and Charlton soils, 8 to 15 percent slopes, very stony	0.3	0.2%
62C	Canton and Charlton soils, 3 to 15 percent slopes, extremely stony	15.6	8.6%
84B	Paxton and Montauk fine sandy loams, 3 to 8 percent slopes	20.9	11.6%
84C	Paxton and Montauk fine sandy loams, 8 to 15 percent slopes	3.7	2.1%
84D	Paxton and Montauk fine sandy loams, 15 to 25 percent slopes	24.0	13.2%
85C	Paxton and Montauk fine sandy loams, 8 to 15 percent slopes, very stony	69.1	38.2%
306	Udorthents-Urban land complex	2.1	1.2%
Totals for Area of Interest		**181.0**	**100.0%**

Map Unit Description (Brief)

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

The "Map Unit Description (Brief)" report gives a brief, general description of the major soils that occur in a map unit. Descriptions of nonsoil (miscellaneous areas) and minor map unit components may or may not be included. This description is written by the local soil scientists responsible for the respective soil survey area data. A more detailed description can be generated by the "Map Unit Description" report.

Additional information about the map units described in this report is available in other Soil Data Mart reports, which give properties of the soils and the limitations, capabilities, and potentials for many uses. Also, the narratives that accompany the Soil Data Mart reports define some of the properties included in the map unit descriptions.

Report—Map Unit Description (Brief)

State of Connecticut

Description Category: SOI

Map Unit: 3—Ridgebury, Leicester, and Whitman soils, extremely stony

Ridgebury, Leicester And Whitman Soils, Extremely Stony This map unit is in the New England and Eastern New York Upland, Southern Part Major Land Resource Area. The mean annual precipitation is 37 to 50 inches (940 to 1270 millimeters) and the average annual air temperature is 45 to 52 degrees F. (7 to 11 degrees C.) This map unit is 40 percent Ridgebury soils, 35 percent Leicester soils, 15 percent Whitman soils. 10 percent minor components. Ridgebury soils This component occurs on upland drainageway and depression landforms. The parent material consists of lodgement till derived from granite, schist, and gneiss. The slope ranges from 0 to 5 percent and the runoff class is very low. The depth to a restrictive feature is 20 to 30 inches to densic material. The drainage class is poorly drained. The slowest permeability within 60 inches is about 0.00 in/hr (very slow), with about 2.5 inches (low) available water capacity. The weighted average shrink-swell potential in 10 to 60 inches is about 1.5 LEP (low). The flooding frequency for this component is none. The ponding hazard is none. The minimum depth to a seasonal water table, when present, is about 3 inches. The maximum calcium carbonate within 40 inches is none. The maximum amount of salinity in any layer is about 0 mmhos/cm (nonsaline). The Nonirrigated Land Capability Class is 7s Typical Profile: 0 to 1 inches; slightly decomposed plant material 1 to 5 inches; fine sandy loam 5 to 14 inches; fine sandy loam 14 to 21 inches; fine sandy loam 21 to 60 inches; sandy loam Leicester soils This component occurs on upland drainageway and depression landforms. The parent material consists of melt-out till derived from granite, schist, and gneiss. The slope ranges from 0 to 5 percent and the runoff class is very low. The depth to a restrictive feature is greater than 60 inches. The drainage class is poorly drained. The slowest permeability within 60 inches is about 0.57 in/hr (moderate), with about 7.4 inches (high) available water capacity. The weighted average shrink-swell potential in 10 to 60 inches is about 1.5 LEP (low). The flooding frequency for this component is none. The ponding hazard is none. The minimum depth to a seasonal water table, when present, is about 9 inches. The maximum calcium carbonate within 40 inches is none. The maximum amount of salinity in any layer is about 0 mmhos/cm (nonsaline). The Nonirrigated Land Capability Class is 7s Typical Profile: 0 to 1 inches; moderately decomposed plant material 1 to 7 inches; fine sandy loam 7 to 10 inches; fine sandy loam 10 to 18 inches; fine sandy loam 18 to 24 inches; fine sandy loam 24 to 43 inches; gravelly fine sandy loam 43 to 65 inches; gravelly fine sandy loam Whitman soils This component occurs on upland drainageway and depression landforms. The parent material consists of lodgement till derived from gneiss, schist, and granite. The slope ranges from 0 to 2 percent and the runoff class is very low. The depth to a restrictive feature is 12 to 20 inches to densic material. The drainage class is very poorly drained. The slowest permeability within 60 inches is about 0.00 in/hr (very slow), with about 1.9 inches (very low) available water capacity. The weighted average shrink-swell potential in 10 to 60 inches is about 1.5 LEP (low). The flooding frequency for this component is none. The ponding hazard is occasional. The minimum depth to a seasonal water table, when present, is about 0 inches. The maximum calcium carbonate within 40 inches is none. The maximum amount of salinity in any layer is about 0 mmhos/cm (nonsaline). The Nonirrigated Land Capability Class is 7s Typical Profile: 0 to 1 inches; slightly decomposed plant material 1 to 9 inches; fine sandy loam 9 to 16 inches; fine sandy loam 16 to 22 inches; fine sandy loam 22 to 60 inches; fine sandy loam

Map Unit: 17—Timakwa and Natchaug soils

Timakwa And Natchaug Soils This map unit is in the New England and Eastern New York Upland, Southern Part Major Land Resource Area. The mean annual precipitation is 40 to 50 inches (1016 to 1270 millimeters) and the average annual air temperature is 45 to 52 degrees F. (7 to 11 degrees C.) This map unit is 45 percent Timakwa soils, 40 percent Natchaug soils. 15 percent minor components. Timakwa soils This component occurs on depression landforms. The parent material consists of woody organic material over sandy and gravelly glaciofluvial deposits. The slope ranges from 0 to 2 percent and the runoff class is negligible. The depth to a restrictive feature is greater than 60 inches. The drainage class is very poorly drained. The slowest permeability within 60 inches is about 5.95 in/hr (rapid), with about 16.2 inches (very high) available water capacity. The weighted average shrink-swell potential in 10 to 60 inches is about 3.9 LEP (moderate). The flooding frequency for this component is rare. The ponding hazard is frequent. The minimum depth to a seasonal water table, when present, is about 4 inches. The maximum calcium carbonate within 40 inches is none. The maximum amount of salinity in any layer is about 0 mmhos/cm (nonsaline). The Nonirrigated Land Capability Class is 5w Typical Profile: 0 to 10 inches; muck 10 to 21 inches; muck 21 to 24 inches; muck 24 to 37 inches; muck 37 to 47 inches; very gravelly loamy coarse sand 47 to 60 inches; gravelly loamy very fine sand Natchaug soils This component occurs on depression landforms. The parent material consists of woody organic material over loamy alluvium, loamy glaciofluvial deposits, or loamy till. The slope ranges from 0 to 2 percent and the runoff class is negligible. The depth to a restrictive feature is greater than 60 inches. The drainage class is very poorly drained. The slowest permeability within 60 inches is about 0.20 in/hr (moderately slow), with about 15.6 inches (very high) available water capacity. The weighted average shrink-swell potential in 10 to 60 inches is about 3.9 LEP (moderate). The flooding frequency for this component is rare. The ponding hazard is frequent. The minimum depth to a seasonal water table, when present, is about 0 inches. The maximum calcium carbonate within 40 inches is none. The maximum amount of salinity in any layer is about 0 mmhos/cm (nonsaline). The Nonirrigated Land Capability Class is 5w Typical Profile: 0 to 2 inches; peat 2 to 4 inches; peat 4 to 6 inches; muck 6 to 11 inches; muck 11 to 18 inches; muck 18 to 24 inches; muck 24 to 33 inches; fine sandy loam 33 to 36 inches; fine sandy loam 36 to 80 inches; loam

Map Unit: 60B—Canton and Charlton soils, 3 to 8 percent slopes

Canton And Charlton Soils, 3 To 8 Percent Slopes This map unit is in the New England and Eastern New York Upland, Southern Part Major Land Resource Area. The mean annual precipitation is 37 to 49 inches (940 to 1244 millimeters) and the average annual air temperature is 45 to 52 degrees F. (7 to 11 degrees C.) This map unit is 45 percent Canton soils, 35 percent Charlton soils. 20 percent minor components. Canton soils This component occurs on upland hill landforms. The parent material consists of melt-out till derived from schist, granite, and gneiss. The slope ranges from 3 to 8 percent and the runoff class is low. The depth to a restrictive feature is greater than 60 inches. The drainage class is well drained. The slowest permeability within 60 inches is about 1.98 in/hr (moderately rapid), with about 5.6 inches (high) available water capacity. The weighted average shrink-swell potential in 10 to 60 inches is about 1.5 LEP (low). The flooding frequency for this component is none. The ponding hazard is none. The minimum depth to a seasonal water table, when present, is greater than 6 feet. The maximum calcium carbonate within 40 inches is none. The maximum amount of salinity in any layer is about 0 mmhos/cm (nonsaline). The Nonirrigated Land Capability Class is 2e Typical Profile: 0 to 1 inches; moderately decomposed plant material 1 to 3 inches; gravelly fine sandy loam 3 to 15 inches; gravelly loam 15 to 24 inches; gravelly loam 24 to 30 inches; gravelly loam 30 to 60 inches; very gravelly loamy sand Charlton soils This component occurs on upland hill landforms. The parent material consists of melt-out till derived from granite, schist, and gneiss. The slope ranges from 3 to 8 percent and the runoff class is low. The depth to a restrictive feature is greater than 60 inches. The drainage class is well drained. The slowest permeability within 60 inches is about 0.57 in/hr (moderate), with about 6.4 inches (high) available water capacity. The weighted average shrink-swell potential in 10 to 60 inches is about 1.5 LEP (low). The flooding frequency for this component is none. The ponding hazard is none. The minimum depth to a seasonal water table, when present, is greater than 6 feet. The maximum calcium carbonate within 40 inches is none. The maximum amount of salinity in any layer is about 0 mmhos/cm (nonsaline). The Nonirrigated Land Capability Class is 2e Typical Profile: 0 to 4 inches; fine sandy loam 4 to 7 inches; fine sandy loam 7 to 19 inches; fine sandy loam 19 to 27 inches; gravelly fine sandy loam 27 to 65 inches; gravelly fine sandy loam

Map Unit: 61B—Canton and Charlton soils, 3 to 8 percent slopes, very stony

Canton And Charlton Soils, 3 To 8 Percent Slopes, Very Stony This map unit is in the New England and Eastern New York Upland, Southern Part Major Land Resource Area. The mean annual precipitation is 37 to 49 inches (940 to 1244 millimeters) and the average annual air temperature is 45 to 52 degrees F. (7 to 11 degrees C.) This map unit is 45 percent Canton soils, 35 percent Charlton soils. 20 percent minor components Canton soils This component occurs on upland hill landforms. The parent material consists of melt-out till derived from schist, granite, and gneiss. The slope ranges from 3 to 8 percent and the runoff class is low. The depth to a restrictive feature is greater than 60 inches. The drainage class is well drained. The slowest permeability within 60 inches is about 1.98 in/hr (moderately rapid), with about 5.6 inches (high) available water capacity. The weighted average shrink-swell potential in 10 to 60 inches is about 1.5 LEP (low). The flooding frequency for this component is none. The ponding hazard is none. The minimum depth to a seasonal water table, when present, is greater than 6 feet. The maximum calcium carbonate within 40 inches is none. The maximum amount of salinity in any layer is about 0 mmhos/cm (nonsaline). The Nonirrigated Land Capability Class is 6s Typical Profile: 0 to 1 inches; moderately decomposed plant material 1 to 3 inches; gravelly fine sandy loam 3 to 15 inches; gravelly loam 15 to 24 inches; gravelly loam 24 to 30 inches; gravelly loam 30 to 60 inches; very gravelly loamy sand Charlton soils This component occurs on upland hill landforms. The parent material consists of melt-out till derived from granite, schist, and gneiss. The slope ranges from 3 to 8 percent and the runoff class is low. The depth to a restrictive feature is greater than 60 inches. The drainage class is well drained. The slowest permeability within 60 inches is about 0.57 in/hr (moderate), with about 6.4 inches (high) available water capacity. The weighted average shrink-swell potential in 10 to 60 inches is about 1.5 LEP (low). The flooding frequency for this component is none. The ponding hazard is none. The minimum depth to a seasonal water table, when present, is greater than 6 feet. The maximum calcium carbonate within 40 inches is none. The maximum amount of salinity in any layer is about 0 mmhos/cm (nonsaline). The Nonirrigated Land Capability Class is 6s Typical Profile: 0 to 4 inches; fine sandy loam 4 to 7 inches; fine sandy loam 7 to 19 inches; fine sandy loam 19 to 27 inches; gravelly fine sandy loam 27 to 65 inches; gravelly fine sandy loam

Map Unit: 61C—Canton and Charlton soils, 8 to 15 percent slopes, very stony

Canton And Charlton Soils, 8 To 15 Percent Slopes, Very Stony This map unit is in the New England and Eastern New York Upland, Southern Part Major Land Resource Area. The mean annual precipitation is 37 to 49 inches (940 to 1244 millimeters) and the average annual air temperature is 45 to 52 degrees F. (7 to 11 degrees C.) This map unit is 45 percent Canton soils, 35 percent Charlton soils. 20 percent minor components Canton soils This component occurs on upland hill landforms. The parent material consists of melt-out till derived from schist, granite, and gneiss. The slope ranges from 8 to 15 percent and the runoff class is low. The depth to a restrictive feature is greater than 60 inches. The drainage class is well drained. The slowest permeability within 60 inches is about 1.98 in/hr (moderately rapid), with about 5.6 inches (high) available water capacity. The weighted average shrink-swell potential in 10 to 60 inches is about 1.5 LEP (low). The flooding frequency for this component is none. The ponding hazard is none. The minimum depth to a seasonal water table, when present, is greater than 6 feet. The maximum calcium carbonate within 40 inches is none. The maximum amount of salinity in any layer is about 0 mmhos/cm (nonsaline). The Nonirrigated Land Capability Class is 6s Typical Profile: 0 to 1 inches; moderately decomposed plant material 1 to 3 inches; gravelly fine sandy loam 3 to 15 inches; gravelly loam 15 to 24 inches; gravelly loam 24 to 30 inches; gravelly loam 30 to 60 inches; very gravelly loamy sand Charlton soils This component occurs on upland hill landforms. The parent material consists of melt-out till derived from granite, schist, and gneiss. The slope ranges from 8 to 15 percent and the runoff class is low. The depth to a restrictive feature is greater than 60 inches. The drainage class is well drained. The slowest permeability within 60 inches is about 0.57 in/hr (moderate), with about 6.4 inches (high) available water capacity. The weighted average shrink-swell potential in 10 to 60 inches is about 1.5 LEP (low). The flooding frequency for this component is none. The ponding hazard is none. The minimum depth to a seasonal water table, when present, is greater than 6 feet. The maximum calcium carbonate within 40 inches is none. The maximum amount of salinity in any layer is about 0 mmhos/cm (nonsaline). The Nonirrigated Land Capability Class is 6s Typical Profile: 0 to 4 inches; fine sandy loam 4 to 7 inches; fine sandy loam 7 to 19 inches; fine sandy loam 19 to 27 inches; gravelly fine sandy loam 27 to 65 inches; gravelly fine sandy loam

Map Unit: 62C—Canton and Charlton soils, 3 to 15 percent slopes, extremely stony

Canton And Charlton Soils, 3 To 15 Percent Slopes, Extremely Stony This map unit is in the New England and Eastern New York Upland, Southern Part Major Land Resource Area. The mean annual precipitation is 37 to 49 inches (940 to 1244 millimeters) and the average annual air temperature is 45 to 52 degrees F. (7 to 11 degrees C.) This map unit is 45 percent Canton soils, 35 percent Charlton soils. 20 percent minor components. Canton soils This component occurs on upland hill landforms. The parent material consists of melt-out till derived from schist, granite, and gneiss. The slope ranges from 3 to 15 percent and the runoff class is low. The depth to a restrictive feature is greater than 60 inches. The drainage class is well drained. The slowest permeability within 60 inches is about 1.98 in/hr (moderately rapid), with about 5.6 inches (high) available water capacity. The weighted average shrink-swell potential in 10 to 60 inches is about 1.5 LEP (low). The flooding frequency for this component is none. The ponding hazard is none. The minimum depth to a seasonal water table, when present, is greater than 6 feet. The maximum calcium carbonate within 40 inches is none. The maximum amount of salinity in any layer is about 0 mmhos/cm (nonsaline). The Nonirrigated Land Capability Class is 7s Typical Profile: 0 to 1 inches; moderately decomposed plant material 1 to 3 inches; gravelly fine sandy loam 3 to 15 inches; gravelly loam 15 to 24 inches; gravelly loam 24 to 30 inches; gravelly loam 30 to 60 inches; very gravelly loamy sand Charlton soils This component occurs on upland hill landforms. The parent material consists of melt-out till derived from granite, schist, and gneiss. The slope ranges from 3 to 15 percent and the runoff class is low. The depth to a restrictive feature is greater than 60 inches. The drainage class is well drained. The slowest permeability within 60 inches is about 0.57 in/hr (moderate), with about 6.4 inches (high) available water capacity. The weighted average shrink-swell potential in 10 to 60 inches is about 1.5 LEP (low). The flooding frequency for this component is none. The ponding hazard is none. The minimum depth to a seasonal water table, when present, is greater than 6 feet. The maximum calcium carbonate within 40 inches is none. The maximum amount of salinity in any layer is about 0 mmhos/cm (nonsaline). The Nonirrigated Land Capability Class is 7s Typical Profile: 0 to 4 inches; fine sandy loam 4 to 7 inches; fine sandy loam 7 to 19 inches; fine sandy loam 19 to 27 inches; gravelly fine sandy loam 27 to 65 inches; gravelly fine sandy loam

Map Unit: 84B—Paxton and Montauk fine sandy loams, 3 to 8 percent slopes

Paxton And Montauk Fine Sandy Loams, 3 To 8 Percent Slopes This map unit is in the New England and Eastern New York Upland, Southern Part Major Land Resource Area. The mean annual precipitation is 35 to 50 inches (889 to 1270 millimeters) and the average annual air temperature is 45 to 52 degrees F. (7 to 11 degrees C.) This map unit is 55 percent Paxton soils, 30 percent Montauk soils. 15 percent minor components. Paxton soils This component occurs on upland hill and drumlin landforms. The parent material consists of lodgement till derived from granite, gneiss, and schist. The slope ranges from 3 to 8 percent and the runoff class is medium. The depth to a restrictive feature is 20 to 40 inches to densic material. The drainage class is well drained. The slowest permeability within 60 inches is about 0.00 in/hr (very slow), with about 3.4 inches (moderate) available water capacity. The weighted average shrink-swell potential in 10 to 60 inches is about 1.5 LEP (low). The flooding frequency for this component is none. The ponding hazard is none. The minimum depth to a seasonal water table, when present, is about 24 inches. The maximum calcium carbonate within 40 inches is none. The maximum amount of salinity in any layer is about 0 mmhos/cm (nonsaline). The Nonirrigated Land Capability Class is 2e Typical Profile: 0 to 8 inches; fine sandy loam 8 to 15 inches; fine sandy loam 15 to 26 inches; fine sandy loam 26 to 65 inches; gravelly fine sandy loam Montauk soils This component occurs on upland hill and drumlin landforms. The parent material consists of sandy lodgement till derived from granite and gneiss. The slope ranges from 3 to 8 percent and the runoff class is low. The depth to a restrictive feature is 20 to 38 inches to densic material. The drainage class is well drained. The slowest permeability within 60 inches is about 0.00 in/hr (very slow), with about 3.3 inches (moderate) available water capacity. The weighted average shrink-swell potential in 10 to 60 inches is about 1.5 LEP (low). The flooding frequency for this component is none. The ponding hazard is none. The minimum depth to a seasonal water table, when present, is about 27 inches. The maximum calcium carbonate within 40 inches is none. The maximum amount of salinity in any layer is about 0 mmhos/cm (nonsaline). The Nonirrigated Land Capability Class is 2e Typical Profile: 0 to 4 inches; fine sandy loam 4 to 14 inches; fine sandy loam 14 to 25 inches; sandy loam 25 to 39 inches; gravelly loamy coarse sand 39 to 60 inches; gravelly sandy loam

Map Unit: 84C—Paxton and Montauk fine sandy loams, 8 to 15 percent slopes

Paxton And Montauk Fine Sandy Loams, 8 To 15 Percent Slopes This map unit is in the New England and Eastern New York Upland, Southern Part Major Land Resource Area. The mean annual precipitation is 35 to 50 inches (889 to 1270 millimeters) and the average annual air temperature is 45 to 52 degrees F. (7 to 11 degrees C.) This map unit is 55 percent Paxton soils, 30 percent Montauk soils. 15 percent minor components. Paxton soils This component occurs on upland hill and drumlin landforms. The parent material consists of lodgement till derived from granite, gneiss, and schist. The slope ranges from 8 to 15 percent and the runoff class is medium. The depth to a restrictive feature is 20 to 40 inches to densic material. The drainage class is well drained. The slowest permeability within 60 inches is about 0.00 in/hr (very slow), with about 3.4 inches (moderate) available water capacity. The weighted average shrink-swell potential in 10 to 60 inches is about 1.5 LEP (low). The flooding frequency for this component is none. The ponding hazard is none. The minimum depth to a seasonal water table, when present, is about 24 inches. The maximum calcium carbonate within 40 inches is none. The maximum amount of salinity in any layer is about 0 mmhos/cm (nonsaline). The Nonirrigated Land Capability Class is 3e Typical Profile: 0 to 8 inches; fine sandy loam 8 to 15 inches; fine sandy loam 15 to 26 inches; fine sandy loam 26 to 65 inches; gravelly fine sandy loam Montauk soils This component occurs on upland hill and drumlin landforms. The parent material consists of sandy lodgement till derived from granite and gneiss. The slope ranges from 8 to 15 percent and the runoff class is low. The depth to a restrictive feature is 20 to 38 inches to densic material. The drainage class is well drained. The slowest permeability within 60 inches is about 0.00 in/hr (very slow), with about 3.3 inches (moderate) available water capacity. The weighted average shrink-swell potential in 10 to 60 inches is about 1.5 LEP (low). The flooding frequency for this component is none. The ponding hazard is none. The minimum depth to a seasonal water table, when present, is about 27 inches. The maximum calcium carbonate within 40 inches is none. The maximum amount of salinity in any layer is about 0 mmhos/cm (nonsaline). The Nonirrigated Land Capability Class is 3e Typical Profile: 0 to 4 inches; fine sandy loam 4 to 14 inches; fine sandy loam 14 to 25 inches; sandy loam 25 to 39 inches; gravelly loamy coarse sand 39 to 60 inches; gravelly sandy loam

Map Unit: 84D—Paxton and Montauk fine sandy loams, 15 to 25 percent slopes

Paxton And Montauk Fine Sandy Loams, 15 To 25 Percent Slopes This map unit is in the New England and Eastern New York Upland, Southern Part Major Land Resource Area. The mean annual precipitation is 35 to 50 inches (889 to 1270 millimeters) and the average annual air temperature is 45 to 52 degrees F. (7 to 11 degrees C.) This map unit is 55 percent Paxton soils, 30 percent Montauk soils. 15 percent minor components. Paxton soils This component occurs on upland hill and drumlin landforms. The parent material consists of lodgement till derived from granite, gneiss, and schist. The slope ranges from 15 to 25 percent and the runoff class is medium. The depth to a restrictive feature is 20 to 40 inches to densic material. The drainage class is well drained. The slowest permeability within 60 inches is about 0.00 in/hr (very slow), with about 3.4 inches (moderate) available water capacity. The weighted average shrink-swell potential in 10 to 60 inches is about 1.5 LEP (low). The flooding frequency for this component is none. The ponding hazard is none. The minimum depth to a seasonal water table, when present, is about 24 inches. The maximum calcium carbonate within 40 inches is none. The maximum amount of salinity in any layer is about 0 mmhos/cm (nonsaline). The Nonirrigated Land Capability Class is 4e Typical Profile: 0 to 8 inches; fine sandy loam 8 to 15 inches; fine sandy loam 15 to 26 inches; fine sandy loam 26 to 65 inches; gravelly fine sandy loam Montauk soils This component occurs on upland hill and drumlin landforms. The parent material consists of sandy lodgement till derived from granite and gneiss. The slope ranges from 15 to 25 percent and the runoff class is low. The depth to a restrictive feature is 20 to 38 inches to densic material. The drainage class is well drained. The slowest permeability within 60 inches is about 0.00 in/hr (very slow), with about 3.3 inches (moderate) available water capacity. The weighted average shrink-swell potential in 10 to 60 inches is about 1.5 LEP (low). The flooding frequency for this component is none. The ponding hazard is none. The minimum depth to a seasonal water table, when present, is about 27 inches. The maximum calcium carbonate within 40 inches is none. The maximum amount of salinity in any layer is about 0 mmhos/cm (nonsaline). The Nonirrigated Land Capability Class is 4e Typical Profile: 0 to 4 inches; fine sandy loam 4 to 14 inches; fine sandy loam 14 to 25 inches; sandy loam 25 to 39 inches; gravelly loamy coarse sand 39 to 60 inches; gravelly sandy loam

Map Unit: 85C—Paxton and Montauk fine sandy loams, 8 to 15 percent slopes, very stony

Paxton And Montauk Fine Sandy Loams, 8 To 15 Percent Slopes, Very Stony This map unit is in the New England and Eastern New York Upland, Southern Part Major Land Resource Area. The mean annual precipitation is 35 to 56 inches (889 to 1422 millimeters) and the average annual air temperature is 45 to 52 degrees F. (7 to 11 degrees C.) This map unit is 55 percent Paxton soils, 30 percent Montauk soils. 15 percent minor components. Paxton soils This component occurs on upland hill and drumlin landforms. The parent material consists of lodgement till derived from granite, gneiss, and schist. The slope ranges from 8 to 15 percent and the runoff class is medium. The depth to a restrictive feature is 20 to 40 inches to densic material. The drainage class is well drained. The slowest permeability within 60 inches is about 0.00 in/hr (very slow), with about 3.4 inches (moderate) available water capacity. The weighted average shrink-swell potential in 10 to 60 inches is about 1.5 LEP (low). The flooding frequency for this component is none. The ponding hazard is none. The minimum depth to a seasonal water table, when present, is about 24 inches. The maximum calcium carbonate within 40 inches is none. The maximum amount of salinity in any layer is about 0 mmhos/cm (nonsaline). The Nonirrigated Land Capability Class is 6s Typical Profile: 0 to 8 inches; fine sandy loam 8 to 15 inches; fine sandy loam 15 to 26 inches; fine sandy loam 26 to 65 inches; gravelly fine sandy loam Montauk soils This component occurs on upland hill and drumlin landforms. The parent material consists of sandy lodgement till derived from granite and gneiss. The slope ranges from 8 to 15 percent and the runoff class is low. The depth to a restrictive feature is 20 to 38 inches to densic material. The drainage class is well drained. The slowest permeability within 60 inches is about 0.00 in/hr (very slow), with about 3.3 inches (moderate) available water capacity. The weighted average shrink-swell potential in 10 to 60 inches is about 1.5 LEP (low). The flooding frequency for this component is none. The ponding hazard is none. The minimum depth to a seasonal water table, when present, is about 27 inches. The maximum calcium carbonate within 40 inches is none. The maximum amount of salinity in any layer is about 0 mmhos/cm (nonsaline). The Nonirrigated Land Capability Class is 6s Typical Profile: 0 to 4 inches; fine sandy loam 4 to 14 inches; fine sandy loam 14 to 25 inches; sandy loam 25 to 39 inches; gravelly loamy coarse sand 39 to 60 inches; gravelly sandy loam

Map Unit: 306—Udorthents-Urban land complex

Udorthents-Urban Land Complex This map unit is in the New England and Eastern New York Upland, Southern Part Connecticut Valley Major Land Resource Area. The mean annual precipitation is 32 to 50 inches (813 to 1270 millimeters) and the average annual air temperature is 45 to 55 degrees F. (7 to 13 degrees C.) This map unit is 50 percent Udorthents soils, 35 percent Urban Land. 15 percent minor components. Udorthents soils This component occurs on cut (road, railroad, etc.), railroad bed, road bed, spoil pile, urban land, fill, and spoil pile landforms. The slope ranges from 0 to 25 percent and the runoff class is medium. The depth to a restrictive feature varies, but is commonly greater than 60 inches. The drainage class is typically well drained. The slowest permeability within 60 inches is about 0.00 in/hr (very slow), with about 9.0 inches (high) available water capacity. The weighted average shrink-swell potential in 10 to 60 inches is about 1.4 LEP (low). The flooding frequency for this component is none. The ponding hazard is none. The minimum depth to a seasonal water table is greater than 60 inches. The maximum calcium carbonate within 40 inches is none. The maximum amount of salinity in any layer is about 0 mmhos/cm (nonsaline). The Nonirrigated Land Capability Class is 3e Typical Profile: 0 to 5 inches; loam 5 to 21 inches; gravelly loam 21 to 80 inches; very gravelly sandy loam Urban Land Urban land is land mostly covered by streets, parking lots, buildings, and other structures of urban areas. The slope ranges from 0 to 35 percent and the runoff class is very high. The Nonirrigated Land Capability Class is 8

Data Source Information

Soil Survey Area: State of Connecticut
Survey Area Data: Version 7, Dec 3, 2009

Eastern Box Turtle Caution Poster

CAUTION

BOX TURTLES ARE KNOWN TO INHABIT THIS AREA


Identification: Eastern box turtles *(Terrapene carolina)* are small, terrestrial turtles ranging from 4.5 to 6.6 inches in length. The shell (carapace) is readily distinguished by its high domed shaped. The color of the shell is brown or black with numerous irregular yellow, orange or reddish markings. The belly (plastron) typically has a light and dark variable pattern, but may be completely tan, brown or black. The head, neck and legs also vary in color but are generally dark with orange or yellow mottling. Box turtles are terrestrial and inhabit many types of habitats including deciduous forests, brushy fields, thickets, streams, ponds and wetlands.

What to do if you find a box turtle: Box turtles are protected by Connecticut's threatened and endangered species legislation and **cannot** be injured, killed, or retained as a pet. If you find a box turtle move the turtle to a safe location away from any construction activity in the direction that the turtle was heading. Pick up the turtle by its shell (carapace) between the front and hind legs. Be sure to hold the turtle closer to their hind legs as they can reach over and bite if your hands are too close to the head. The turtle may hiss and should retract into its shell.

EXHIBIT L

Bat Acoustic Studies for the Prospect Wind Resource Area New Haven County, Connecticut

Interim Report
June 25 – August 31, 2010

Prepared for:

BNE Energy
Town Center, Suite 200
29 South Main Street
West Hartford, Connecticut 06107

Prepared by:

David Tidhar, Zapata Courage and Jeff Gruver

Western EcoSystems Technology, Inc.
PO Box 60
Waterbury, VT 05676

November 10, 2010

WEST Inc. Environmental & Statistical Consultants

NATURAL RESOURCES ◆ SCIENTIFIC SOLUTIONS

EXECUTIVE SUMMARY

Western EcoSystems Technology, Inc. initiated surveys in June 2010 on behalf of BNE Energy Inc. (BNE) designed to assess bat activity within the proposed Prospect Wind Resource Area (PWRA) in New Haven County, Connecticut. Bat activity was surveyed using Anabat™ SD1, Anabat™ SD2, and Wildlife Acoustic™ Song Meter SM2Bat™ ultrasonic detectors during the summer of 2010. The study is scheduled to continue through October 31, 2010. The purpose of this interim report is to to characterize seasonal and spatial activity by bats within the PWRA during the maternity season. This report presents only the results of data collected by the Anabat SD1 and SD2 detectors between June 25 – August 31, 2010. The final report, which will be prepared at the completion of the fall 2010 study period, will include the analysis of summer and fall data collected by the Song Meter SM2Bat detector, in addition to the analysis of the data collected by the Wildlife Acoustics SM2 detector. Additional work completed during the summer of 2010 at the PWRA included breeding bird surveys, the results of which are presented in a separate report.

The objective of the acoustic bat surveys was to characterize seasonal and spatial activity by bats within the PWRA during the maternity season. Bat activity was monitored at two fixed stations from June 25 to August 31, 2010. A total of two Anabat detectors recorded 1,751 bat passes during 123 detector-nights. Averaging bat passes per detector-night across stations, a mean of 14.11 bat passes per detector-night was recorded a value within the range of the five facilities in the eastern US where pre- and post-construction data is available (range: 0.3-38.3; mean: 19.58).

Overall, passes by low-frequency bats (45.7% of all passes) outnumbered passes by mid-frequency bats (35.3%), and high-frequency bats (19.0%). However, this pattern was not consistent between stations. The majority (73.8%) of calls recorded at station PA1 were low-frequency. In comparison, station PA2 had higher proportions of both mid- and high-frequency calls. Species identification was possible for the hoary and eastern red bat. Passes by hoary bats (48 passes) comprised 2.7% of the total bat activity, while passes by eastern red bats (21 passes) comprised 1.2% of total activity. However, given the conservative approach used for species identification, it is likely that more hoary and eastern red bat calls were recorded than were positively identified.

Bat activity levels peaked in mid-July and again in late August. Comparing peak bat activity between frequency groups within any given 7-day period during the maternity season, high-frequency bat activity peaked during the period July 16 – 22, and mid-frequency activity peaked during the period July 17 – 23. Low-frequency activity peaked during the last seven days of the study period, August 25 - 31. The mid-summer peak in bat activity likely corresponds to the time when pups are being weaned and have joined the adult population in foraging, while the increase in activity in late-August may represent movement of migrating bats through the area, which may also explain the greater number of low-frequency bat passes during this period.

There appears to be some latitudinal variation in the eastern US, such that higher numbers of fatalities are estimated for more southerly sites compared to those further north. This requires more data but may possibly reflect the migratory patterns of bats on a broad-scale in this region. Bat fatality patterns observed at facilities within the region in similar forest-dominated landscapes have been low to moderate based on regional study results. If latitudinal, landscape and patterns of bat activity rates relative to fatality rates are consistent for the PWRA with regional study results then fatality rates for bats may be low to moderate.

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INTRODUCTION

BNE Energy, Inc (BNE) is proposing to develop a wind energy facility consisting of two GE 1.6 MW turbines located on 68 acres of undeveloped land at 178 New Haven Road, in Prospect, CT in New Haven County. BNE contracted Western EcoSystems Technology, Inc. (WEST) to develop and implement a standardized protocol for a baseline study of bat activity within the Prospect Wind Resource Area (PWRA) for the purpose of estimating the impacts of the wind energy facility on bats, and to assist with siting turbines to minimize impacts to bats. The protocol for this baseline study is similar to protocols used at other wind energy facilities across the United States. The protocol has been developed based on WEST's experience studying wildlife and wind turbines at wind energy facilities throughout the US and included passive acoustic sampling using Anabat™ and Song Meter SM2Bat™ ultrasonic bat detectors to quantify bat activity in the study area.

The following is an interim report describing the results of Anabat surveys conducted at the PWRA during the summer of 2010. The purpose of the report is to characterize seasonal and spatial activity by bats within the PWRA during the maternity season. This report presents only the results of data collected by the Anabat detectors. The final report, which will be prepared at the completion of the fall study period, will include the analysis of summer and fall data collected by the Song Meter SM2Bat detector, in addition to the Song Meter SM2Bat™. Additional work completed during the summer of 2010 at the PWRA included breeding bird surveys, the results of which are presented in a separate report.

STUDY AREA

The proposed wind energy facility is located at 178 New Haven Road, Prospect, CT in New Haven County (VHB 2010a; Figure 1). The PWRA is situated in the southwest hills of Connecticut, north of the Coastal Plain and just west of the lower Connecticut River Valley (Bell 1985). The Southwest Hills is a region of rolling hills that were formed by glacial erosion and deposition (VHB 2010a).

The PWRA is situated along the top and western slope of a north-south oriented hill composed of unsorted, dense glacial till, and can be described as drumlinoid in shape. The PWRA is approximately 67 acres (0.10 square miles [mi^2]) in size, with elevations ranging from approximately 550 to 810 feet (ft; 168 to 247 meters [m]) above sea level. Land use in the region is a mix of heavy development, including the city of Waterbury, located approximately seven miles (11 kilometers [km]) away, suburban development, and forest, with occasional small agricultural areas. The New Naugatuck Reservoir (also known as Long Hill Reservoir) exists within a valley approximately one-quarter mile (About 400 m) to the west of the PWRA. The majority of the study area is covered by secondary-growth upland forest, but also includes two small forested wetlands and 10 acres (0.02 mi^2) of field habitat on the top of the hill. The forested portion of the PWRA is dominated by deciduous pole timber. The upland forest understory is dominated by Japanese barberry (*Berberis thungbergii*), a non-native invasive species (VHB 2010a).

Figure 1. Map of the Prospect Wind Resource Area.

METHODS

Bat Acoustic Surveys

The objective of the bat use surveys was to characterize seasonal and spatial bat activity within the PWRA during the majority of the maternity season. Ultrasonic detectors are a recommended method to index and compare habitat use by bats, and the use of such detectors for calculating an index to bat impacts is a primary bat risk assessment tool for baseline wind development surveys (Arnett 2007, Kunz et al. 2007). For the purpose of this report, bat activity was surveyed using ultrasonic detectors from June 25 to August 31, 2010; a period corresponding to the maternity season at this site. From June 25 to August 10, bat activity was surveyed using two Anabat™ SD1 bat detectors (Titley Scientific™, Australia). On August 11, Anabat SD1 detectors were exchanged for Anabat™ SD2 detectors (Titley Scientific™, Australia), which were used for the remainder of the study period. Bat activity at the PWRA was also surveyed using a Song Meter SM2Bat Unit (Wildlife Acoustics™, Maryland), utilizing full-spectrum recording technology, compatible with zero crossing analysis; however, results from that detector are not presented in this report. Rather, the results will be presented in the final bat report to be prepared at the completion of the fall study period.

The Anabat detectors were placed near the ground at two fixed stations (Figure 2). The first detector (PA1) was established at the base of the meteorological (met) tower within an existing meadow surrounded by deciduous woodland (Appendix A), and the second detector (PA2) was established at one of the proposed turbine locations (Turbine 2) within deciduous woodland (Appendix B).

Anabat detectors record bat echolocation calls with a broadband microphone. Calls were recorded to a compact high-capacity flash memory card, which was subsequently transferred onto a computer for analysis. The echolocation sounds were then translated into frequencies audible to humans by dividing the frequencies by a predetermined ratio. A division ratio of 16 was used for the study. Bat echolocation detectors also detect other ultrasonic sounds, such as those sounds made by insects, raindrops hitting vegetation, and other sources, therefore to try and reduce this type of interference a sensitivity level of six was used on the detectors during recording. The detection range of Anabat detectors depends on a number of factors, such as echolocation call characteristics, microphone sensitivity, habitat, the orientation of the bat, and atmospheric conditions (Limpens and McCracken 2004). Generally the effective range is less than 30 m (98 ft) due to atmospheric absorption on echolocation pulses (Fenton 1991). To ensure similar detection ranges among anabat units, microphone sensitivities were calibrated using a BatChirp ultrasonic emitter (Tony Messina, Las Vegas, Nevada) as described in Larson and Hayes (2000). Anabat detectors were placed inside plastic weather-tight containers with a hole cut in the side of the container for the microphone to extend through. To minimize the potential for water damage due to rain, microphones were encased in PVC tubing that curved skyward at 45 degrees outside the container to minimize the potential for water damage due to rain and that had drain holes at the bottom of the curve. Containers were raised approximately two m (6.6 ft) off the ground to minimize echo interference and lift the unit above vegetation. All units were programmed to turn on each night an approximate half-hour before sunset and turn off an approximate half-hour after sunrise.

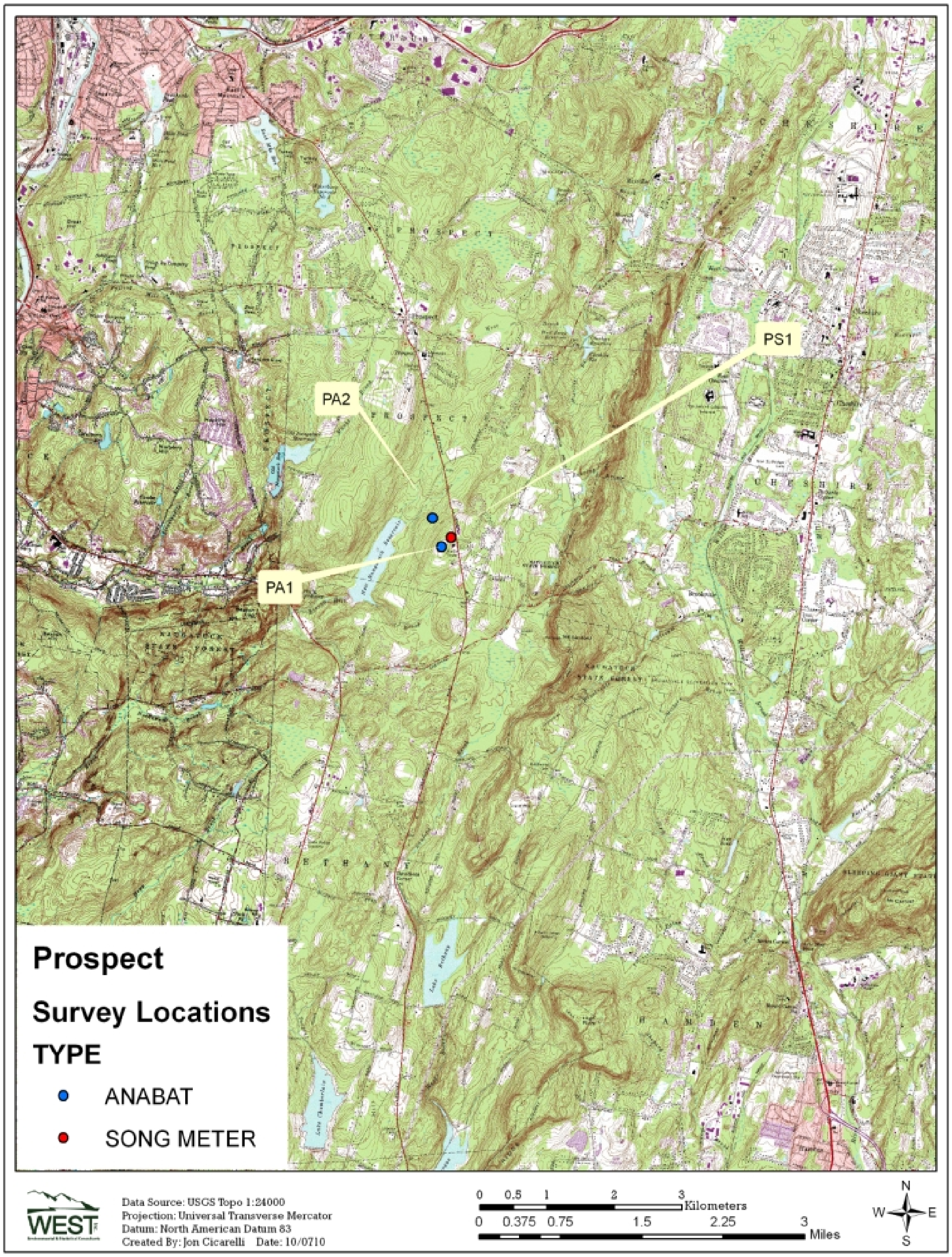

Figure 1. Study area map and Anabat sampling stations at the Prospect Wind Resource Area.

Statistical Analysis

The unit of bat activity used for analysis was the number of bat passes (Hayes 1997). A bat pass is defined as a continuous series of two or more call notes produced by an individual bat with no pauses between call notes of more than one second (White and Gehrt 2001, Gannon et al. 2003). In this report, the terms bat pass and bat call are used interchangeably. Data files were analyzed using Analook W v3.5r (2008, Chris Corben) and Analook DOS v4.9j (2004, Chris Corben) software. The Analook software displays bat calls (and extraneous noise) as a series of pixels on a time over frequency display. Analook provides a framework to build filters that constrain the values of certain call parameters. Pixels that fall outside the specified range of the filter parameters are ignored (e.g. pixels not following a smooth line, pixels below or above a specified frequency, etc.). In addition, a series of filters developed by WEST were used to quickly and effectively separate out files that contained only noise, and to sort remaining files containing bat calls into frequency groups. Filtered files were visually examined by an analyst to ensure accuracy. The total number of bat calls was then corrected for effort by dividing the number of calls by the number of detector-nights.

Depending on the species of bats that are expected to occur in an area, Anabat units can have limited use in identifying the bat species that produced the recorded call. Some bat species produce a call that has a very distinctive sonogram (shape on a frequency-time graph). However, there is much overlap between some species. For this reason, a conservative approach to species identification was used. For each station, bat passes were sorted into three groups, based on their minimum frequency, that correspond roughly to species groups of interest. For example, most species of *Myotis* bats echolocate at frequencies above 40 kilohertz (kHz), whereas species such as the eastern red bat (*Lasiurus borealis*) typically have echolocation calls that fall between 30 and 40 kHz, and species such as big brown (*Eptesicus fuscus*), silver-haired (*Lasionycteris noctivagans*), and hoary bat (*Lasiurus cinereus*), have echolocation frequencies that fall at or below 25 kHz. Therefore, passes were classified as high-frequency (HF; more than 40 kHz), mid-frequency (MF; 30 to 40 kHz), or low-frequency (LF; less than 30 kHz). To establish which species may have produced passes in each category, a list of species expected to occur in the study area was compiled from range maps (Table 1; Harvey et al. 1999, CDEF 1999). Data determined to be noise (produced by a source other than a bat) or call notes that did not meet the pre-specified criteria to be termed a pass were removed from the analysis.

Table 1. Bat species with the potential to occur within Prospect Wind Resource Area. Data from Harvey et al. (1999) and the Connecticut Department of Environmental Protection (CDEP 1999).

Common Name	Scientific Name
High-Frequency (> 40 kHz)	
tri-colored bat	*Perimyotis subflavus*
Indiana bat	*Myotis sodalist*
northern long-eared bat	*Myotis septentrionalis*
Mid-Frequency (30-40 kHz)	
eastern red bat[1,2]	*Lasiurus borealis*
little brown bat[2]	*Myotis lucifugus*
Low-Frequency (< 30 kHz)	
big brown bat[2]	*Eptesicus fuscus*
silver-haired bat[1,2]	*Lasionycteris noctivagans*
hoary bat[1,2]	*Lasiurus cinereus*

[1]long-distance migrant; [2]species known to have been killed at wind energy facilities

Within these categories, an attempt was made to identify passes made by two *Lasiurus* species: hoary bat and eastern red bat. Passes that had a distinct U-shape and that exhibited variability in the minimum frequency across the call sequence were identified as belonging to the *Lasiurus* genus (C. Corben, pers comm.). Hoary and eastern red bats were distinguished based on minimum frequency; hoary bats typically produce calls with minimum frequencies between 18 and 24 kHz, whereas eastern red bats typically emit calls with minimum frequencies between 30 and 43 kHz (J. Szewczak, pers comm.). Only sequences containing three or more calls were used for species identification. These are conservative parameters. Given the high intraspecific variability of *Lasiurus* calls and the number of call files that were too fragmented for proper identification, it is likely that more hoary and eastern red bat calls were recorded than were positively identified.

Bat activity for this report is defined as the total number of bat passes per detector-night, and was used as an index representing bat use of the PWRA. Bat pass data represented levels of bat activity rather than the numbers of individuals present because individuals could not be differentiated by their calls.

RESULTS

Bat Acoustic Surveys

Bat activity was monitored within the PWRA at two sampling locations on a total of 68 nights during the period June 25 to August 31, 2010. Anabat units recorded data for the entire nightly survey period (from 1700 to 0900 EDT) on 94.6% of the sampling period (June 25 to August 31, 2010; Figure 2). The number of noise files in a given week ranged from 8.77 to 567.43 files, significantly more than the number of bat passes recorded throughout the study period, and may have interfered with overall data collection (Figure 3). The highest level of noise recorded occurred during the last week of July 2010 (Figure 3).

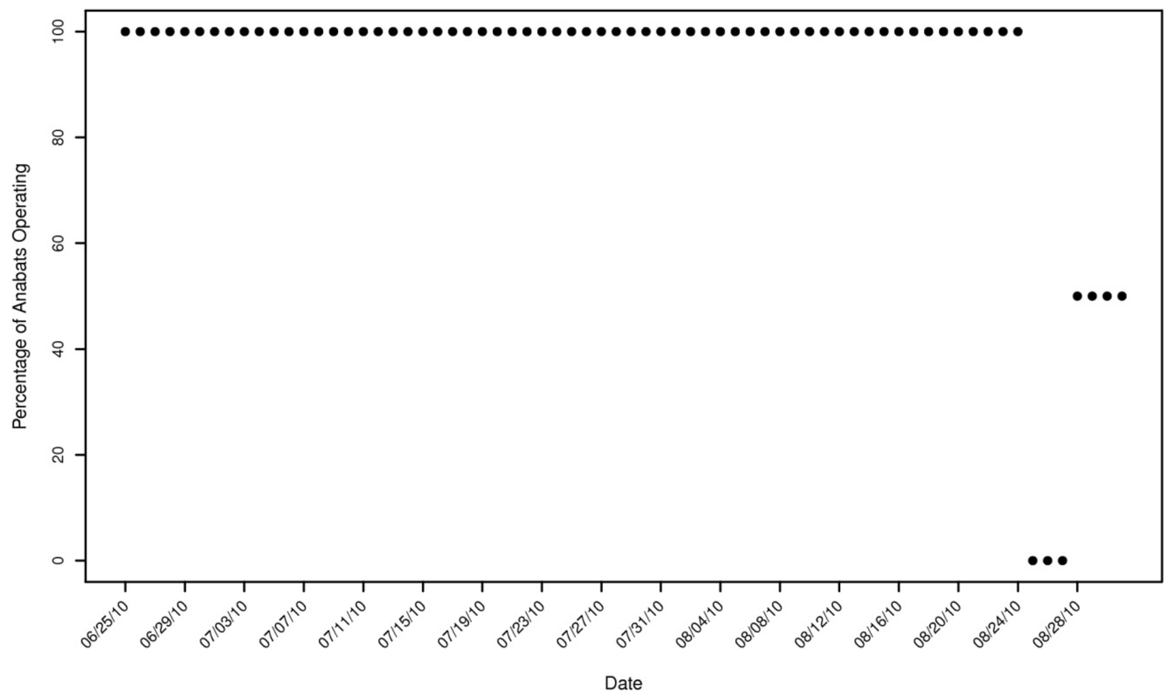

Figure 2. Proportion of Anabat detectors (n = 2) operating during each night of the study within the Prospect Wind Resource Area, June 25 – August 31, 2010.

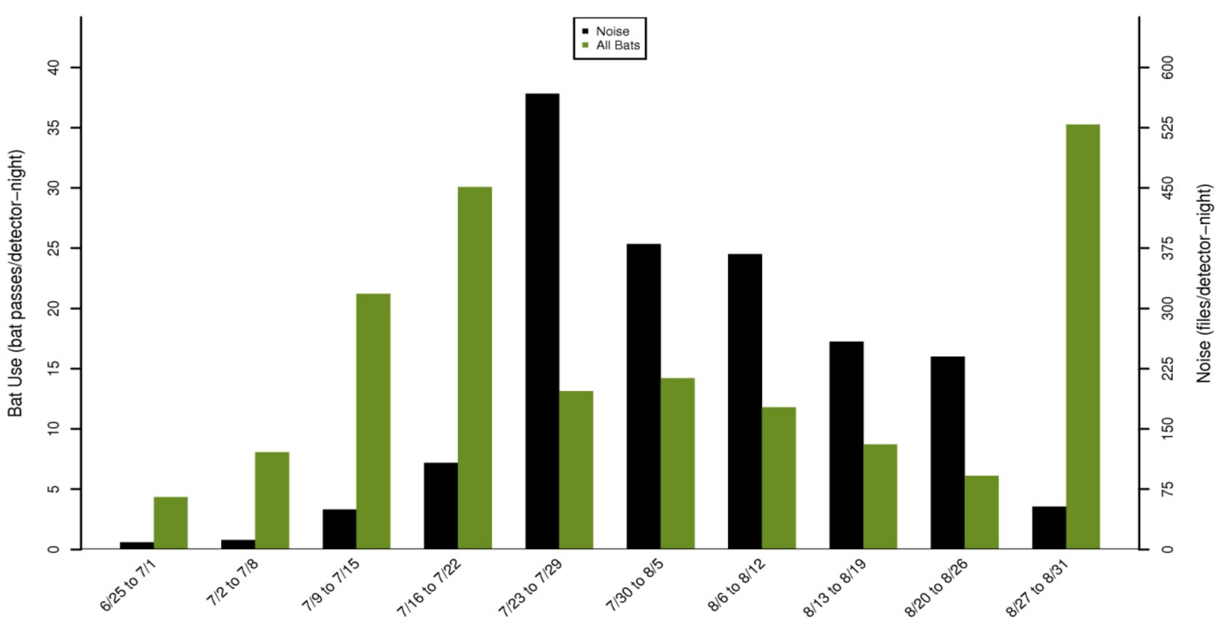

Figure 3. Bat activity and noise files recorded per detector-night within the Prospect Wind Resource Area, June 25 – August 31, 2010, presented weekly.

A total of 1,751 bat passes were recorded at the two Anabat stations on 123 detector-nights (Table 2). More passes were recorded at station PA1, which accounted for about 60% of the total calls recorded during the study period. Averaging bat passes per detector-night across stations, a mean of 14.11 bat passes/detector-night was recorded. At individual stations, bat activity was 16.40 bat passes/detector-night at station PA1 and 11.81 at station PA2 (Table 2).

Table 2. Results of acoustic bat surveys conducted at the Prospect Wind Resource Area, June 25 – August 31, 2010, separated by call frequency (high-frequency [HF], mid-frequency [MF], and low-frequency [LF]).

Station	HF-Calls	MF-Calls	LF-Calls	Eastern Red Bat Calls[a]	Hoary Bat Calls[b]	Total Bat Passes	Detector-Nights	Bat Passes / Detector-Night*
PA1	114	165	787	21	47	1,066	65	16.40±1.47
PA2	219	453	13	0	1	685	58	11.81±1.77
Total	**333**	**618**	**800**	**21**	**48**	**1,751**	**123**	**14.11±1.26**

[a]Passes by eastern red bats are included in mid-frequency (MF) numbers; [b]Passes by hoary bats included in low-frequency (LF) numbers. *± bootstrapped standard error.

The type of calls recorded varied between stations (Table 2; Figure 4). The majority of calls (73.8%; 787 passes) at station PA1 were LF calls, while 15.5% were MF calls (165 calls) and only 10.7% were HF calls (114 calls; Table 2; Figure 4). In contrast, at station PA2, MF calls comprised the majority of bat activity (66.1%; 453 MF calls), compared to HF calls (32.0%; 219 HF calls) and LF calls (1.9%; 13 LF calls; Table 2; Figure 4). The number of MF calls recorded at station PA2 was over 2.5 times higher than that recorded at station PA1 (453 and 165 MF calls, respectively), and the number of HF calls recorded at station PA2 was nearly double that recorded at station PA1 (219 and 114 HF calls, respectively; Table 2; Figure 4).

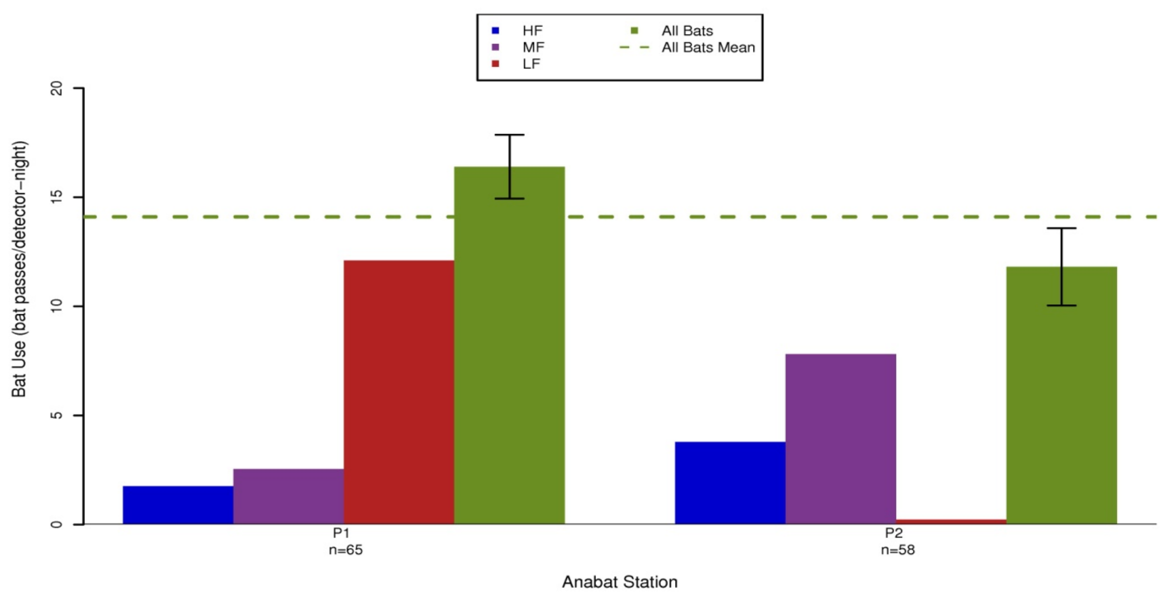

Figure 4. Bat activity (bat passes/detector-night) by frequency group recorded at Anabat stations within the Prospect Wind Resource Area from June 25 – August 31, 2010. Error bars represent standard errors.

Overall bat activity followed a bell-shaped distribution, with the exception of the last week of the study period (August 27 – 31), and this pattern was generally consistent among frequency groups (Figure 5). Bat activity for all frequency groups increased for the first four weeks of the study, reaching a summer peak in activity during July 16 – 22. Activity then decreased throughout the remainder of July and early-mid August, reaching a low during the week of August 20 – 26 and before sharply increasing during the final week of the study period, August 27 – 31 (Figure 5).

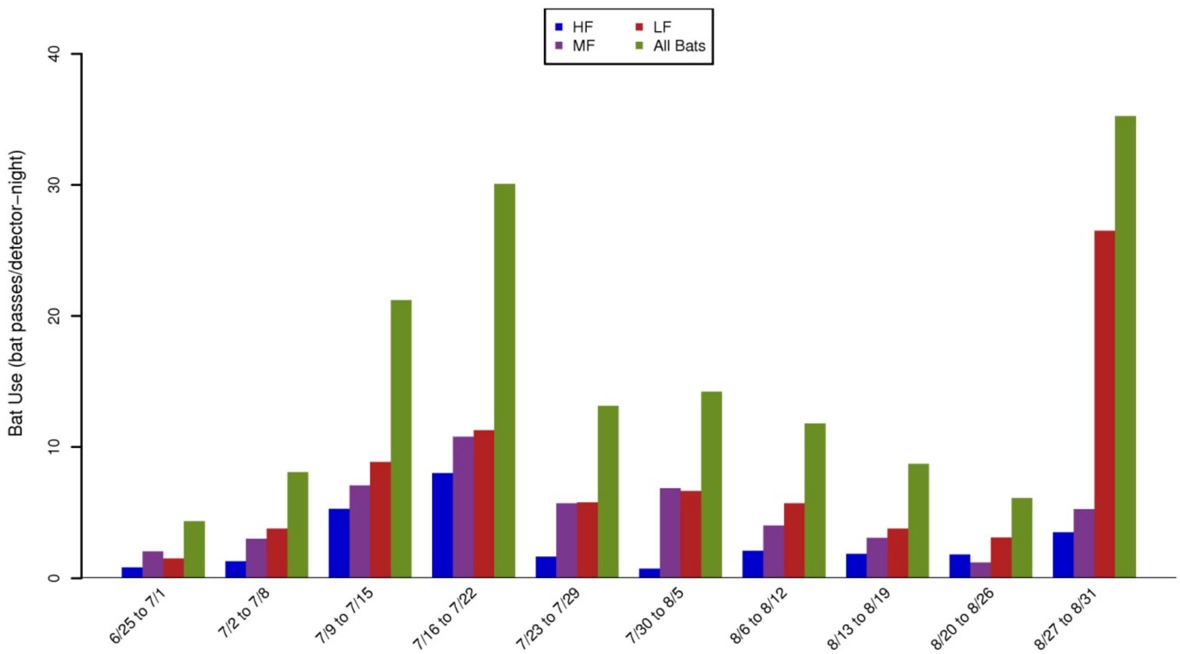

Figure 5. Weekly activity of high-frequency (HF), mid-frequency (MF), and low-frequency (LF) bats within the Prospect Wind Resource Area, based on 52 weeks during the calendar year beginning January 1, and, corresponding to the start and end dates of the study period, June 25 – August 31, 2010.

Comparing peak bat activity between frequency groups within any given seven-day period during the maternity season, HF and MF bat activity peaked almost simultaneously in mid-July, while LF activity peaked over a month later in late August (Table 3; Figure 5). High-frequency bat activity peaked during July 16 – 22 with a mean of 8.00 bat passes/detector-night, and MF activity peaked during July 17 - 23 with 10.93 passes/detector-night (Table 3). Low-frequency activity peaked during the last seven days of the study period, August 25 - 31 with a mean of 26.50 bat passes/detector-night. Overall bat activity, influenced primarily by the sharp increase in LF activity in late August, also peaked during the last week of the study period, August 25 - 31 (Table 3; Figure 5).

Table 3. Highest activity rates recorded during a seven day (week) period during the maternity season within Prospect Wind Resource Area; June 25-August 31, 2010; separated by call frequency (high frequency [HF], mid frequency [MF], low frequency [LF], and by species.

Frequency Group/Species	7-Day Period of Highest Bat Activity	Bat Passes/ Detector-Night
All Bats	08/25/10 to 08/31/10	35.25
HF Bats	07/16/10 to 07/22/10	8.00
MF Bats	07/17/10 to 07/23/10	10.93
LF Bats	08/25/10 to 08/31/10	26.50
Eastern Red Bat	08/08/10 to 08/17/10	0.64
Hoary Bat	07/11/10 to 07/17/10	1.93

Two species with distinctive call sonograms are the hoary bat and the eastern red bat (Kunz et al. 2007), and species identification was attempted for these two species. However, given the high intraspecific variability of *Lasiurus* calls and the number of call files that were too fragmented for proper identification, it is likely that more hoary and eastern red bat calls were recorded than were positively identified.

The number of passes attributable to these species compared to overall passes during the 2010 maternity season was extremely low (69 passes for the two species combined; Table 2). Passes by hoary bats (48 passes) comprised only 2.7% of total passes detected within the study area and 6.0% of all LF passes. All but one hoary bat call was recorded at station PA1 (Table 2; Figure 6). The majority of recognizable hoary bat activity occurred between July 9 and July 22 (62.7%; Figure 7), and the peak activity within a 7-day period occurred during July 11 – 17, with a mean of 1.93 bat passes/detector-night (Table 3).

Passes by eastern red bats (21 calls) accounted for 1.2 % of total passes and 3.4% of all MF calls (Table 2). All (100%) of eastern red bat activity was recorded at station PA1 (Table 2; Figure 6). The majority of recognizable eastern red bat activity occurred between August 6 and August 19 (41.2%; Figure 7) and the peak activity within a 7-day period occurred during August 8 – 17, with a mean of 0.64 bat passes/detector-night (Table 3).

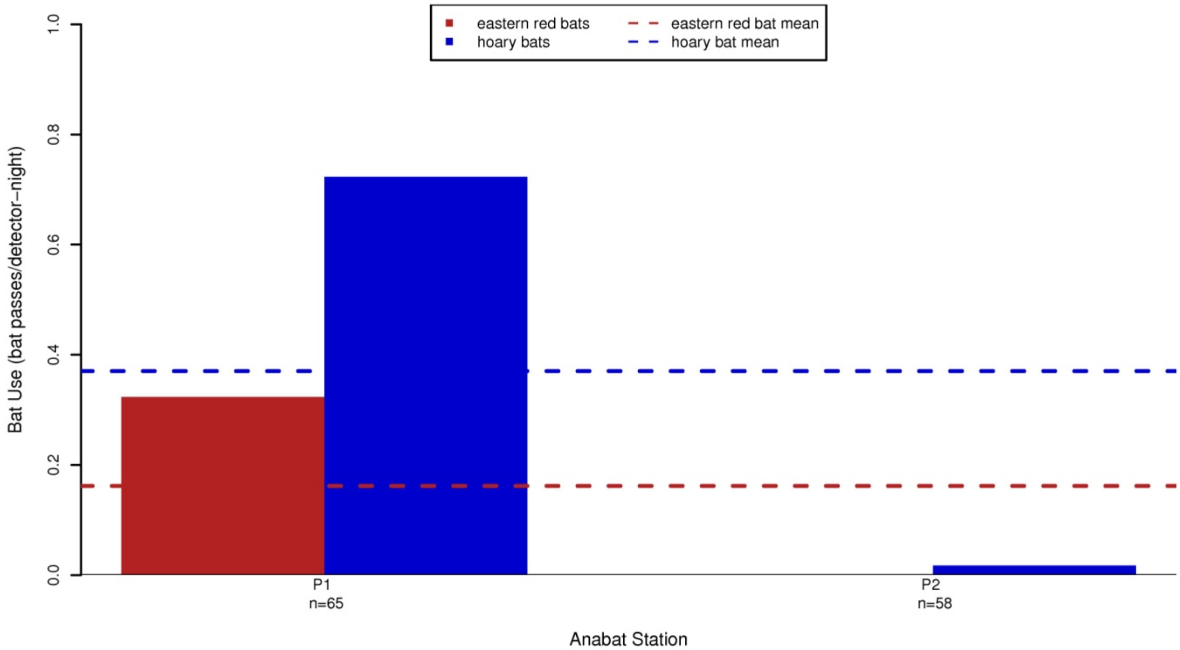

Figure 6. Hoary and eastern red bat activity (bat passes/detector-night) recorded within the Prospect Wind Resource Area, June 25 – August 31, 2010.

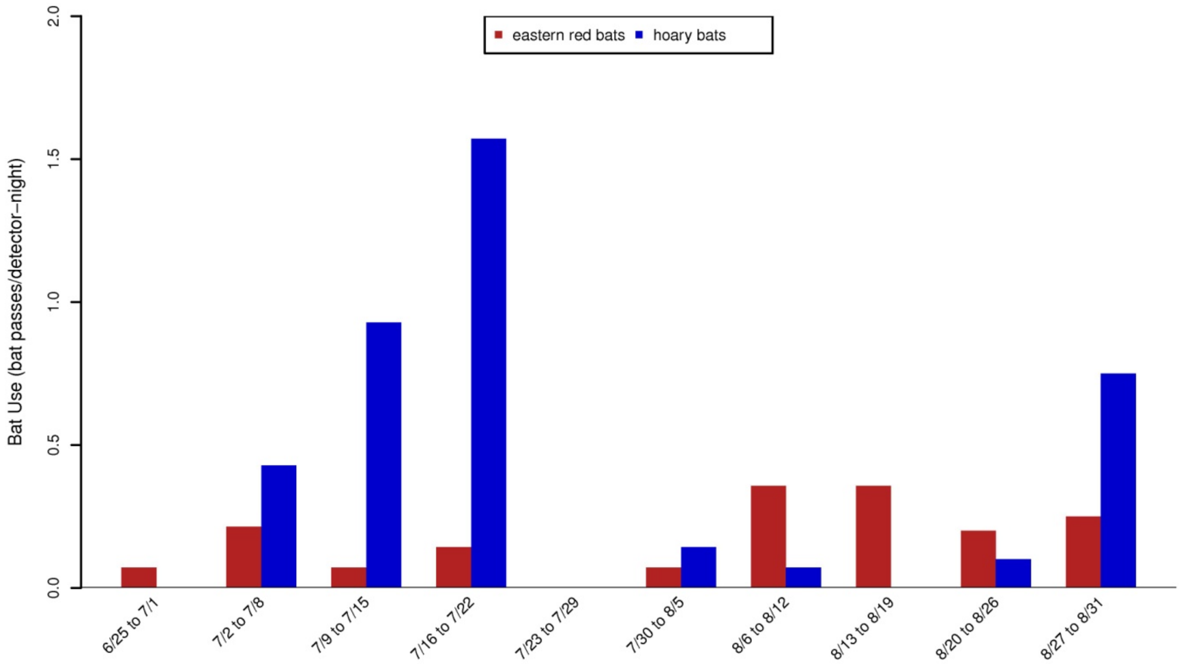

Figure 7. Weekly activity by hoary and eastern red bats recorded within the Prospect Wind Resource Area, June 25 – August 31, 2010.

DISCUSSION

Interim Findings

This interim report reviewed results from the period July 25 – August 31, 2010, a period encapsulating the majority of the bat maternity season in central Connecticut. The annual study report will include data for the June 25 – October 31, 2010 study period, and will include analysis of overall passage rates for the PWRA relative to observed patterns at other wind-energy facilities. The results reported here are subject to change based on further analysis included in the annual study report.

The PWRA is not in the vicinity of any known bat colonies or features likely to attract large numbers of bats. The site is located along a forested ridge with little variation in vegetation or topography relative to the surrounding landscape. Overall bat activity between June 25 – August 31 was over 1.5 times higher at station PA1 compared to station PA2. This is likely the result of habitat differentiation – PA1 is located in an existing forest clearing, whereas PA2 is located below canopy cover within a deciduous forest. The open field surrounded by edge habitat at PA1 provides increased foraging opportunities for bats relative to the surrounding forest.

Eight species of bat have the potential to occur within the PWRA (Table 1), all of which have been recorded as casualties at wind-energy facilities. Acoustic bat passes recorded by AnaBat detectors were classified to frequency groups. Overall, passes by LF bats (45.7% of all passes) outnumbered passes by MF bats (35.3%), and HF bats (19.0%). This suggests a higher relative abundance of LF species, such as big brown bat, silver-haired bat and hoary bat, and MF species, such as eastern red bat and little brown bat. This pattern, however, was not consistent between stations. The majority (73.8%) of calls recorded at station PA1 were LF passes, compared to only 1.9% of passes at station PA2. In comparison, station PA2 had higher proportions of both MF (66.1%) and HF (32.0%) calls than station PA1. This most likely reflects different foraging behaviors among species. Generally, LF species tend to forage in less cluttered conditions than HF species due to their wing morphology and echolocation call structure (Norberg and Rayner 1987). The open meadow and forest edge habitat at station PA1 may provide more favorable foraging opportunities or movement corridors for LF species compared to station PA2, which is situated within a largely closed forest environment.

Based on the information available concerning the ecology and habitat use of these species in New England (DeGraaf and Yamasaki 2001), it is likely that the majority of HF-bats recorded at were northern long-eared myotis, a species with the anatomy and ability to forage within forested areas (Lacki et al. 2007). Tri-colored bats tend not to utilize dense forest and are more likely to have been recorded at station PA1. Some of the calls within the HF group may also have been produced by little brown bats. Bats active at low altitudes within the forest cover dominating the site are likely to be species such as northern long-eared myotis or little brown bat which have the size and anatomy to able to maneuver between the trees and are known to forage in intact forest habitats (Lacki et al. 2007). Very few northern long-eared myotis have been recorded as casualties at wind-energy facilities (Kunz et al. 2007b). Eastern red bat is a long-distance migratory tree roosting bat and is one of the three species found most often as casualties at wind-energy facilities (Kunz et al. 2007b).

LF-bats with the potential to occur within the study area include hoary, silver-haired, and big-brown bat. This group of bats tends to be larger in size and wing-span, and as such require uncluttered air space for foraging and maneuverability (Norberg and Rayner 1987, Lacki et al. 2007). For this reason, it is not surprising that the majority of LF- bats were detected at station PA1. The very small number of recognizable hoary bat calls recorded within the study area is likely due to the conservative approach taken to determine species identification. Little is known about summer populations of silver-haired bats in Connecticut. Silver-haired bats use forest clear-cuts for foraging while big brown bats utilize less forest-dominated areas. Both are likely to forage along forest edges, with silver-haired bats using air-space closer to the ground than big brown bats (DeGraaf and Yamasaki 2001). Activity for LF-bats was highest in the third week of July, likely corresponding to the energy-intensive lactation period and the subsequent weaning period of pups. All but one hoary bat call was recorded at station PA1. The majority of recognizable hoary bat activity occurred between July 9 and July 22 and the peak activity within a 7-day period occurred during July 11 – 17. During lactation energy requirements are at their highest for female mammals and as such foraging is increased (Kurta et al. 1989, Lacki et al. 2007); in addition, juvenile bats begin to fly prior to weaning increasing the number of calls recorded. In New England, young of hoary bats, silver-haired bats, and big brown bats are typically born in late-May-early June, June-July, and June, respectively; and it is likely that weaning occurs at approximately 5-6 weeks (DeGraff and Yamasaki 2001; Barclay and Harder 2005). Calls recorded from the last week of August are likely to represent migrating bats traveling through the area.

Potential Impacts

Assessing the potential impacts of wind-energy development to bats is confounded due the proximate and ultimate causes of bat fatalities at turbines being poorly understood (Kunz et al. 2007b, Baerwald et al. 2008, Cryan 2008, Cryan and Barclay 2009). In addition, the monitoring of elusive, night-flying animals is inherently difficult (O'Shea et al. 2003) and although installed wind-energy capacity has increased rapidly in recent years, the availability of results from well-designed studies from these projects has lagged (Kunz et al. 2007b). Nonetheless, monitoring studies at constructed wind-energy facilities suggest that:

a) bat mortality shows a rough correlation with bat activity (Table 4);
b) the majority of fatalities occur during the post-breeding or fall migration season (roughly August and September);
c) migratory tree-roosting species (eastern red, hoary, and silver-haired bats) comprise almost 75 % of reported bat casualties, and;
d) some of the highest reported fatalities occur at wind-energy facilities located along forested ridge tops in the eastern and northeastern US .

Based on these patterns, current guidance on estimating potential mortality levels of a proposed wind-energy development involves the evaluation of on-site bat acoustic data including activity levels, seasonal variation, and species composition (Kunz et al. 2007b), as well as comparing overall results with regional data.

Table 4. Summary of publically available bat activity and bat fatality data from wind-energy facilities in eastern North America.

Wind Energy Facility	Bat Use Estimate[A]	Fatality Estimate[B]	No. of Turbines	Total MW
Prospect, CT	*14.1*		*2*	*3.2*
Buffalo Mountain, TN (2006)		39.70	18	29
Mountaineer, WV	38.3	31.69	44	66
Buffalo Mountain, TN (2000-2003)	23.7	31.54	3	2
Meyersdale, PA		18.00	20	30
Cohocton/Dutch Hill, NY		16.02	50	125
Casselman, PA		15.66	23	34.5
Maple Ridge, NY (2006)		15.00	120	198
Noble Bliss, NY (2008)		14.66	67	100
Mount Storm, WV (2008)	35.2	12.11	82	164
Maple Ridge, NY (2007)		9.42	195	321.75
Noble Clinton, NY (2009)		6.48	67	100
Wolfe Island, Ont.		6.42	86	197.8
Noble Bliss, NY (2009)		5.50	67	100
Noble Ellenburg, NY (2008)		5.45	54	80
Noble Ellenburg, NY (2009)		5.34	54	80
Ripley, Ont.		4.67	38	76
Noble Clinton, NY (2008)		3.63	67	100
Lempster, NH (2009)	0.4	3.08	12	24
Mars Hill, ME (2007)		2.91	28	42
Stetson Mountain, ME	0.30	1.40	38	57
Munnsville, NY		0.46	23	34.5
Mars Hill, ME (2008)		0.45	28	42

A=bat passes per detector night
B=number of bat fatalities/MW/study period
C=averaged across phases and/or study years, and may not be directly related to mortality estimates
D=bat activity not measured concurrently with bat mortality studies
Data from the following sources:

Facility	Use Estimate	Mortality Estimate	Facility	Use Estimate	Mortality Estimate
Buffalo Mountain, TN (2006)		Fiedler et al. 2007			
Mount Storm, WV (2008)	Young et. al 2009	Young et. al 2009	Lempster, NH	Stantec 2006	Tidhar et al 2010
Cohocton/Dutch Hill, NY		Stantec 2010	Noble Ellenburg, NY (2009)		Jain et. al 2010
Munnsville, NY		Stantec 2009	Ripley, Ont.		Stantec 2009
Buffalo Ridge, MN (Phases II&III; 2001)	Johnson et al. 2004	Johnson et al. 2004	Wolfe Island, Ont.		Stantec 2010
Biglow Canyon I, OR (2009)		Enk et al. 2010	Mars Hill (2008)		Stantec 2009

There are few instances where both bat activity and bat mortality have been recorded at wind-energy facilities and where results are comparable. For this reason, a definitive relationship between pre-construction bat activity and post-construction bat mortality has not been established empirically. From the data available, there appears to be a positive correlation between the two variables and there is the expectation amongst the scientific and resource management communities that when more data become available this relationship will hold (Kunz et al. 2007a). Datasets such as that provided by the current study will further contribute to our understanding of this relationship. Table 4 summarizes the results of publically-available activity and fatality data from wind-energy facilities in the eastern US and Canada. To our knowledge, activity data were collected using ground-based Anabat™ detectors.

Fatality estimates from post-construction monitoring at wind-energy facilities in eastern North America range from 0.45 to 39.7 bats/MW/year (Table 4). Activity between June 25 – August 31 within the PWRA was 14.11±1.26 bat passes/detector-night; a value within the range of the five facilities in the eastern US where pre- and post-construction data is available (range: 0.3-38.3; mean: 19.58). There appears to be some latitudinal variation in the eastern US, such that higher numbers of fatalities are estimated for more southerly sites compared to those further north. This requires more data but may possibly reflect the migratory patterns of bats on a broad-scale in this region. Bat fatality patterns observed at facilities within the region in similar forest-dominated landscapes (e.g Noble Ellenberg NY, Noble Clinton NY, Maple Ridge NY, Lempster NH, Stetson Mountain ME and Mars Hill ME) have been low to moderate based on regional study results. If latitudinal, landscape and patterns of bat activity rates relative to fatality rates are consistent for the PWRA with regional study results then fatality rates for bats may be low to moderate.

The vast majority of formal post-construction mortality studies completed in the Unites States have been completed at facilities with substantially larger numbers of turbines and MW capacity. For example, the mean project size for studies included in Table 4 is 53.8 turbines (range: 3-195). Impacts from small wind facilities such as the PWRA may be lower in terms of the number of bats killed per year compared to these facilities given only two turbines are proposed for the site.

Post-construction monitoring at wind-energy facilities throughout North America show the highest number of bat casualties during fall migration (approximately mid-August through mid-September) with lower numbers in general in the summer and spring (Johnson 2005; Arnett et al. 2008). The final annual report will include analysis of fall migration data and temporal comparison between summer and fall seasons. In addition, this report will include analysis of data collected by the full spectrum Wildlife Acoustics SM2 unit and additional analysis of acoustic data collected by Anabats for species identification.

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Appendix A. Photographs of Anabat Station PA1 Placement and Surrounding Habitat within the Prospect Wind Resource Area for the Period of June 25 – August 31, 2010.

Appendix A. Photographs of Anabat station PA1 placement and surrounding habitat within the Prospect Wind Resource Area for the period of June 25 – August 31, 2010.

Pictures taken in clockwise direction with the top picture at the front of the station.

Appendix B. Photographs of Anabat Station PA2 Placement and Surrounding Habitat within the Prospect Wind Resource Area for the Period of June 25 – August 31, 2010.

Appendix B. Photographs of Anabat station PA2 placement and surrounding habitat within the Prospect Wind Resource Area for the period of June 25 – August 31, 2010.

Pictures taken in clockwise direction with the top picture at the front of the station.

EXHIBIT M

Breeding Bird Surveys for the Prospect Wind Resource Area New Haven County, Connecticut

Final Report
June - July 2010

Prepared for:

BNE Energy

Prepared by:

David Tidhar and Kimberly Bay

Western EcoSystems Technology, Inc.
2003 Central Avenue
Cheyenne, Wyoming

November 3, 2010

NATURAL RESOURCES ◆ SCIENTIFIC SOLUTIONS

EXECUTIVE SUMMARY

Western EcoSystems Technology, Inc. initiated surveys in June 2010 on behalf of BNE Energy Inc. (BNE) designed to assess breeding bird activity within the proposed Prospect Wind Resource Area (PWRA) in New Haven County, Connecticut. The following report contains results for summer breeding bird surveys and incidental wildlife observations.

The principal objectives of the study were to: 1) provide site-specific bird resource and use data that would be useful in evaluating potential impacts from the proposed wind energy facility, 2) provide information that could be used in project planning and design of the facility to minimize impacts to birds, and 3) recommend further studies or potential mitigation measures, if warranted.

Breeding bird surveys were conducted three times between June 28 and July 12, 2010, for a total of 36 surveys. Surveys were conducted at 12 50-m radius survey points on June 28, July 5 and July 12, 2010. Mean use (17.75 birds/plot/5-min survey) and species richness (9.33 species/plot/5-min survey) were highest during the July 5, 2010 survey. A total of 525 individual bird observations within 476 separate groups were recorded, representing 35 unique bird species. Cumulatively, three species (8.6% of all species) comprised 29.9% of the individual observations: unidentified passerine (58 observations), eastern towhee (56 observations), and American robin (43 observations). All other species composed less than ten percent of the observations individually. No state or federal listed sensitive species were recorded during the breeding bird surveys.

Thirty bird species, totaling 58 individuals within 47 groups, were recorded incidentally. Three mammal species, two amphibian species and a single reptile species were also recorded incidentally. No state or federal listed sensitive species were recorded as an incidental observation.

Open grassland and forest edge areas contained both greater species richness and relative abundance compared with forested areas dominating the site and proposed for turbine locations. Bird abundance and species richness at survey points proximate to proposed turbine locations was low to moderate relative to the open meadow and forest edge points.

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INTRODUCTION

Western EcoSystems Technology, Inc. initiated surveys in June 2010 on behalf of BNE Energy Inc. (BNE) designed to assess breeding bird activity within the proposed Prospect Wind Resource Area (PWRA) in New Haven County, Connecticut. The aim of the breeding bird study is to record information about the relative abundance and species composition of breeding songbirds throughout representative habitats in the study area. .The principal objectives of the study were to: 1) provide site-specific breeding bird use and distribution data that would be useful in evaluating potential impacts from the proposed PWRA, 2) provide information that could be used in project planning and design of the facility to minimize impacts to birds, and 3) recommend further studies or potential mitigation measures, if warranted. The protocols for the breeding bird studies are similar to those used at other wind energy facilities across the nation, and follow the guidance of the National Wind Coordinating Collaborative (Anderson et al. 1999). Other wildlife surveys completed included acoustic bat monitoring; the results of which are reported elsewhere. The protocols have been developed based on WEST's experience studying wildlife at proposed wind energy facilities throughout the US and were designed to help predict potential impacts to bird species.

Summer breeding bird surveys and incidental wildlife observations were conducted from June 28 through July 12, 2010. In addition to site-specific data, this report presents existing information and results of studies conducted at other wind energy facilities.

STUDY AREA

The proposed wind energy facility is located at 178 New Haven Road, Prospect, CT in New Haven County (VHB 2010a; Figure 1). The PWRA is situated in the southwest hills of Connecticut, north of the Coastal Plain and just west of the lower Connecticut River Valley (Bell 1985). The Southwest Hills is a region of rolling hills that were formed by glacial erosion and deposition (VHB 2010a).

The PWRA is situated along the top and western slope of a north-south oriented hill composed of unsorted, dense glacial till, and can be described as drumlinoid in shape. The PWRA is approximately 67 acres (0.10 square miles [mi^2]) in size, with elevations ranging from approximately 550 to 810 feet (ft; 168 to 247 meters [m]) above sea level. Land use in the region is a mix of heavy development, including the city of Waterbury, located approximately seven miles (11 kilometers [km]) away, suburban development, and forest, with occasional small agricultural areas. The New Naugatuck Reservoir (also known as Long Hill Reservoir) exists within a valley approximately one-quarter mile (About 400 m) to the west of the PWRA. The majority of the study area is covered by secondary-growth upland forest, but also includes two small forested wetlands and 10 acres (0.02 mi^2) of field habitat on the top of the hill. The forested portion of the PWRA is dominated by deciduous pole timber. The upland forest understory is dominated by Japanese barberry (*Berberis thungbergii*), a non-native invasive species (VHB 2010a).

Figure 1. Map of the Prospect Wind Resource Area.

METHODS

Baseline studies at the PWRA consisted of breeding bird surveys and incidental observations.

Breeding Bird Surveys

Field Methods

Twelve survey points were established within potential breeding bird habitat within the PWRA (Figure 2). Points were established approximately 100 m (328 ft) apart along a survey transect along a roughly north-south oriented transect through the proposed turbine development area. Four points (pints two, three, four and five) were located within an open grassland meadow and deciduous forest edge, one point (11) was located within mixed evergreen/deciduous forest, while the remaining eight points were located within deciduous forest. Survey points were microsited to facilitate seeing and hearing birds, while avoiding potential disturbance to the habitat or nests of vireos, flycatchers, or other sensitive species. Each survey point was recorded with a global positioning system (GPS) unit.

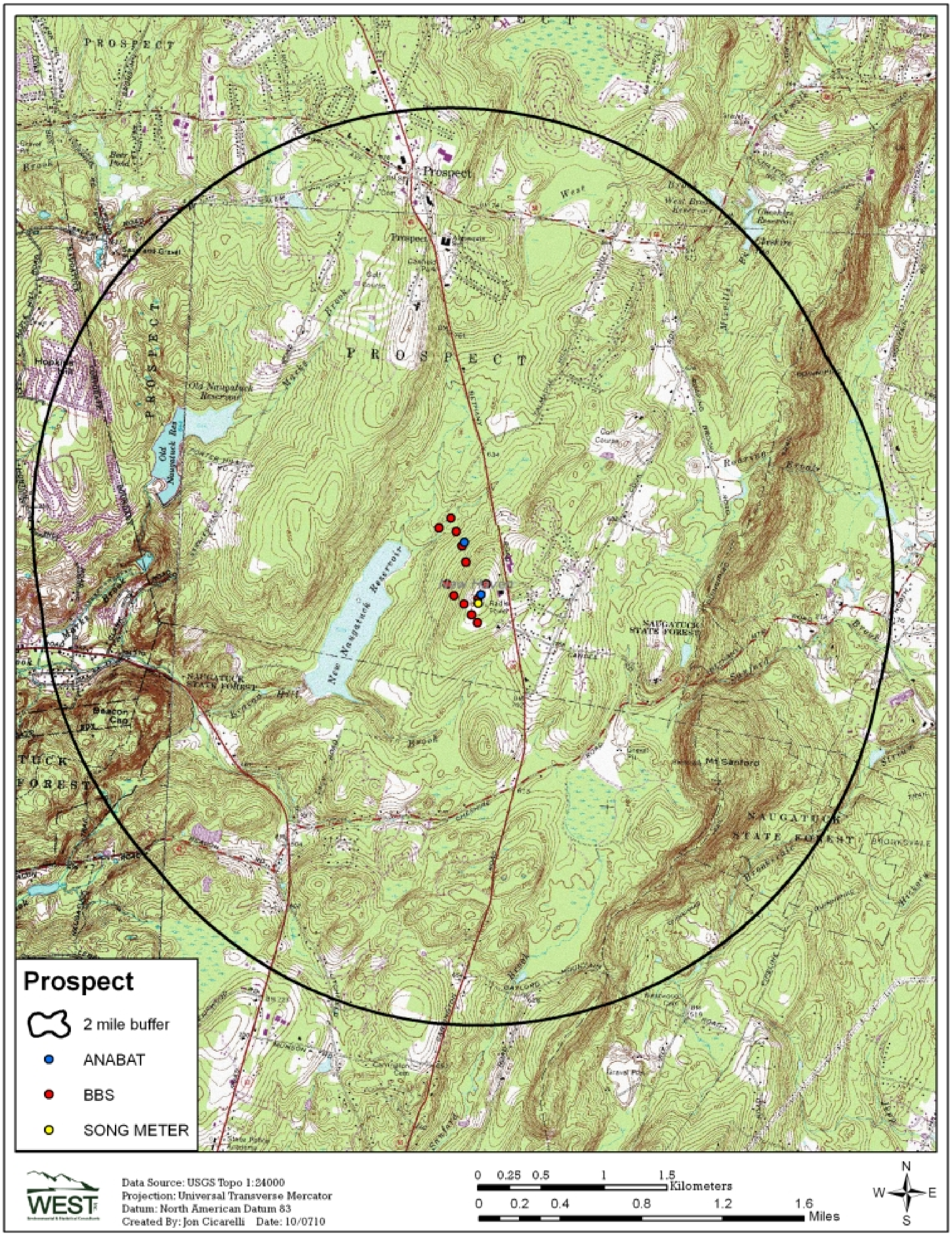

Figure 2. Breeding bird points at the Prospect Wind Resource Area.

A five-minute survey was conducted at 12 survey points by a qualified biologist between dawn and 10:00 am EDT during three survey rounds between June 28 – July 12, 2010. Surveys were not conducted during periods of excessive or abnormal heat, cold, wind (greater than 2 on Beaufort scale), or rain that may reduce the surveyor's ability to detect bird species. All birds seen or heard were recorded on a standardized data form, though only observations within 50-m (164 ft) of the survey point were included in analyses (see Statistical Analysis).

Data recorded included: date, start and end time of observation period, point number, species or best possible identification, sex, age, number of individuals, distance from point, behavior, first altitude above ground, flight direction, habitat and auditory-only observations. Recognized behavior categories were:

- NA – nesting activity (visually identified – e.g. nesting/food material delivery)
- CO – courtship display (visually identified – e.g. copulation, flight display)
- AC – alarm/warning call (auditory detection)
- SI – singing (auditory detection)
- OC – other call (auditory detection – e.g. chirp, non-breeding call)
- PE - perched
- FL – flight including flapping, soaring, gliding, hovering
- OT – other

Climate information, such as temperature, wind speed, wind direction, precipitation, and cloud cover also were also recorded for each point survey.

Statistical Analysis

Bird Diversity and Species Richness

Bird diversity was illustrated by the total number of unique species observed. Species lists (with the number of observations and the number of groups) were generated by season and included all observations of birds detected, regardless of their distance from the observer. Species richness was calculated as the mean number of species observed per plot per survey (number of species/50-m plot/5-min survey). Species diversity and richness were compared between seasons for breeding bird surveys.

Bird Use, Composition, and Frequency of Occurrence

For the standardized breeding bird use estimates, only observations within a 50 m radius were used in the analysis. Estimates of mean bird use (i.e., number of birds/plot/5-min survey) were used to compare and contrast among bird types, seasons, survey points, and other wind energy facilities. Mean use is calculated by determining the number of birds seen within each 50-m plot for each given visit and then averaging by the number of plots surveyed during that visit. A visit is defined as the required length of time to survey all of the plots once within the study area.

Percent composition was calculated as the proportion of the overall mean use for a particular bird type or species, and the frequency of occurrence was calculated as the percent of surveys in which a particular bird type or species is observed. Frequency of occurrence and percent composition provide relative estimates of species exposure to the wind energy facility. For example, a species may have high use estimates for the study area based on just a few observations of large groups; however, the frequency of occurrence will indicate that the species occurs during very few of the surveys and therefore may be less likely to be affected by the proposed wind energy facility.

Spatial Use

Data were analyzed by comparing mean use among plots.

Incidental Wildlife Observations

The objective of incidental wildlife observations was to provide record of wildlife seen outside the standardized surveys. All large birds, unusual or unique birds, sensitive species, mammals, reptiles, and amphibians were recorded in a similar fashion to standardized surveys. The observation number, date, time, species, number of individuals, sex/age class, distance from observer, activity, height above ground (for bird species), habitat, and, in the case of sensitive species, the location was recorded by Universal Transverse Mercator (UTM) or Global Positioning System (GPS) coordinates.

Quality Assurance and Quality Control

Quality assurance and quality control (QA/QC) measures were implemented at all stages of the study, including in the field, during data entry and analysis, and report writing. Following field surveys, observers were responsible for inspecting data forms for completeness, accuracy, and legibility. A sample of records from an electronic database was compared to the raw data forms and detected errors were corrected. Irregular codes or data suspected as questionable were discussed with the observer or project manager. Errors, omissions, or problems identified in later stages of analysis were traced back to the raw data forms, and appropriate changes in all steps were made.

A Microsoft® ACCESS database was developed for storing, organizing, and retrieving survey data. Data were keyed into the electronic database using a pre-defined format to facilitate subsequent QA/QC and data analysis. All data forms, field notebooks, and electronic data files were retained for reference.

RESULTS

Breeding Bird Surveys

Breeding bird use point surveys were conducted at the PWRA during three rounds: June 28, July 5, and July 12, 2010. A total of 36 five-minute breeding bird surveys were conducted (Table 1).

Table 1. Summary of overall bird use (number of birds/plot/5-min survey), species richness (species/plot/5-min survey), and sample size during the breeding bird surveys in the Prospect Wind Resource Area, June 28 – July 12, 2010.

Survey	# of Visits	Mean Use	Species Richness	# Species	# Surveys Conducted
June 28, 2010	1	10.92	6.00	27	12
July 5, 2010	1	17.75	9.33	30	12
July 12, 2010	1	14.92	8.17	24	12
	3	**14.58**	**7.89**	**35**	**36**

Bird Diversity and Species Richness

Thirty-five unique species were identified during the breeding bird surveys and species richness (the mean number of species observed per plot per survey) was 7.89 (Table 1). Mean use (17.75 birds/plot/5-min survey) and species richness (9.33 species/plot/5-min survey) were highest during the July 5, 2010 survey. A total of 525 individual bird observations within 476 separate groups were recorded (Table 2). Cumulatively, three species (8.6% of all species) comprised 29.9% of the individual observations: unidentified passerine (58 observations), eastern towhee (*Pipilo erythrophthalmus*; 56 observations), and American robin (*Turdus migratorius*; 43 observations). All other species comprised no more than ten percent of the observations individually.

Table 2. Total number of groups and individuals for each bird type and species during the summer breeding bird surveys in the Prospect Wind Resource Area, June 28 – July 12, 2010.

Species/Type	Scientific Name	# Grps	# Obs
Doves/Pigeons		**17**	**19**
mourning dove	*Zenaida macroura*	17	19
Passerines		**451**	**498**
Passerines		*56*	*58*
unidentified passerine		56	58
Blackbirds/Orioles		*28*	*31*
brown-headed cowbird	*Molothrus ater*	3	5
red-winged blackbird	*Agelaius phoeniceus*	25	26
Creepers/Nuthatches		*7*	*10*
white-breasted nuthatch	*Sitta carolinensis*	7	10

Table 2. Total number of groups and individuals for each bird type and species during the summer breeding bird surveys in the Prospect Wind Resource Area, June 28 – July 12, 2010.

Species/Type	Scientific Name	# Grps	# Obs
Finches		*25*	*37*
American goldfinch	*Carduelis tristis*	22	23
house finch	*Carpodacus mexicanus*	3	14
Flycatchers		*4*	*4*
eastern kingbird	*Tyrannus tyrannus*	1	1
eastern phoebe	*Sayornis phoebe*	3	3
Grassland/Sparrows		*112*	*114*
chipping sparrow	*Spizella passerine*	1	1
eastern towhee	*Pipilo erythrophthalmus*	56	56
field sparrow	*Spizella pusilla*	6	6
indigo bunting	*Passerina cyanea*	1	1
northern cardinal	*Cardinalis cardinalis*	14	14
song sparrow	*Melospiza melodia*	32	34
unidentified sparrow		2	2
Mimids		*10*	*10*
gray catbird	*Dumetella carolinensis*	10	10
Swallows		*3*	*11*
barn swallow	*Hirundo rustica*	3	11
Tanagers/Grosbeaks/Crossbills		*15*	*15*
rose-breasted grosbeak	*Pheucticus ludovicianus*	5	5
scarlet tanager	*Piranga olivacea*	10	10
Thrushes		*95*	*97*
American robin	*Turdus migratorius*	41	43
eastern bluebird	*Sialia sialis*	1	1
Veery	*Catharus fuscescens*	30	30
wood thrush	*Hylocichla mustelina*	23	23
Titmice/Chickadees		*26*	*40*
black-capped chickadee	*Poecile atricapillus*	23	34
tufted titmouse	*Baeolophus bicolor*	3	6
Vireos		*28*	*28*
red-eyed vireo	*Vireo olivaceus*	28	28
Warblers		*24*	*24*
black-throated green warbler	*Dendroica virens*	1	1
chestnut-sided warbler	*Dendroica pensylvanica*	1	1
common yellowthroat	*Geothlypis trichas*	7	7
Ovenbird	*Seiurus aurocapilla*	15	15
Waxwings		*1*	*1*
cedar waxwing	*Bombycilla cedrorum*	1	1
Corvids		*17*	*18*
American crow	*Corvus brachyrhynchos*	8	9
blue jay	*Cyanocitta cristata*	9	9
Woodpeckers		**8**	**8**
downy woodpecker	*Picoides pubescens*	3	3
hairy woodpecker	*Picoides villosus*	3	3
red-bellied woodpecker	*Melanerpes carolinus*	2	2

Table 2. Total number of groups and individuals for each bird type and species during the summer breeding bird surveys in the Prospect Wind Resource Area, June 28 – July 12, 2010.

Species/Type	Scientific Name	# Grps	# Obs
Overall		**476**	**525**

Bird Use, Composition, and Frequency of Occurrence

Mean bird use estimates, percent composition, and frequency of occurrence for all species and bird types are shown in Table 3. Mean use for passerines (13.83 birds/plot/5-min survey) was the highest of all major bird types; the passerine subtypes grassland/sparrows and thrushes had the highest use of all passerine subtypes (3.17 and 2.69 birds/plot/5-min survey, respectively).

Table 3. Mean bird use (number of birds/plot/5-min survey), percent of total composition, and frequency of occurrence (%) for each bird type and species during the summer breeding bird use surveys in the Prospect Wind Resource Area, June 28 – July 12, 2010.

Species	Use	% Composition	% Frequency
Doves/Pigeons	**0.53**	**3.6**	**38.9**
mourning dove	0.53	3.6	38.9
Passerines	**13.83**	**94.9**	**100**
Passerines	*1.61*	*11.0*	*72.2*
unidentified passerine	1.61	11.0	72.2
Blackbirds/Orioles	*0.86*	*5.9*	*27.8*
brown-headed cowbird	0.14	1.0	8.3
red-winged blackbird	0.72	5.0	25.0
Creepers/Nuthatches	*0.28*	*1.9*	*19.4*
white-breasted nuthatch	0.28	1.9	19.4
Finches	*1.03*	*7.0*	*33.3*
American goldfinch	0.64	4.4	33.3
house finch	0.39	2.7	8.3
Flycatchers	*0.11*	*0.8*	*11.1*
eastern kingbird	0.03	0.2	2.8
eastern phoebe	0.08	0.6	8.3
Grassland/Sparrows	*3.17*	*21.7*	*86.1*
chipping sparrow	0.03	0.2	2.8
eastern towhee	1.56	10.7	61.1
field sparrow	0.17	1.1	13.9
indigo bunting	0.03	0.2	2.8
northern cardinal	0.39	2.7	30.6
song sparrow	0.94	6.5	50.0
unidentified sparrow	0.06	0.4	2.8
Mimids	*0.28*	*1.9*	*16.7*
gray catbird	0.28	1.9	16.7
Swallows	*0.31*	*2.1*	*2.8*
barn swallow	0.31	2.1	2.8
Tanagers/Grosbeaks/Crossbills	*0.42*	*2.9*	*36.1*
rose-breasted grosbeak	0.14	1.0	11.1

Table 3. Mean bird use (number of birds/plot/5-min survey), percent of total composition, and frequency of occurrence (%) for each bird type and species during the summer breeding bird use surveys in the Prospect Wind Resource Area, June 28 – July 12, 2010.

Species	Use	% Composition	% Frequency
scarlet tanager	0.28	1.9	27.8
Thrushes	*2.69*	*18.5*	*88.9*
American robin	1.19	8.2	44.4
eastern bluebird	0.03	0.2	2.8
Veery	0.83	5.7	50.0
wood thrush	0.64	4.4	47.2
Titmice/Chickadees	*1.11*	*7.6*	*41.7*
black-capped chickadee	0.94	6.5	38.9
tufted titmouse	0.17	1.1	8.3
Vireos	*0.78*	*5.3*	*47.2*
red-eyed vireo	0.78	5.3	47.2
Warblers	*0.67*	*4.6*	*44.4*
black-throated green warbler	0.03	0.2	2.8
chestnut-sided warbler	0.03	0.2	2.8
common yellowthroat	0.19	1.3	16.7
Ovenbird	0.42	2.9	27.8
Waxwings	*0.03*	*0.2*	*2.8*
cedar waxwing	0.03	0.2	2.8
Corvids	*0.50*	*3.4*	*36.1*
American crow	0.25	1.7	16.7
blue jay	0.25	1.7	22.2
Woodpeckers	**0.22**	**1.5**	**19.4**
downy woodpecker	0.08	0.6	5.6
hairy woodpecker	0.08	0.6	8.3
red-bellied woodpecker	0.06	0.4	5.6
Overall	**14.58**	**100**	

Spatial Use

For all bird species combined, use was highest at pointfour (24.7 birds/5-min survey), and ranged from 8.33 to 19.0 at other points (Figure 3). For all bird species combined and the majority of bird types and subtypes (Figure 4), use was generally highest at survey points arrayed within the open grassland and forest edge (points two, three, four and five) compared with forested points. Among passerine subtypes, thrushes typically had the highest use at most of the observation points, ranging from 1.00 to 3.67 birds/5-min survey (Figure 4).

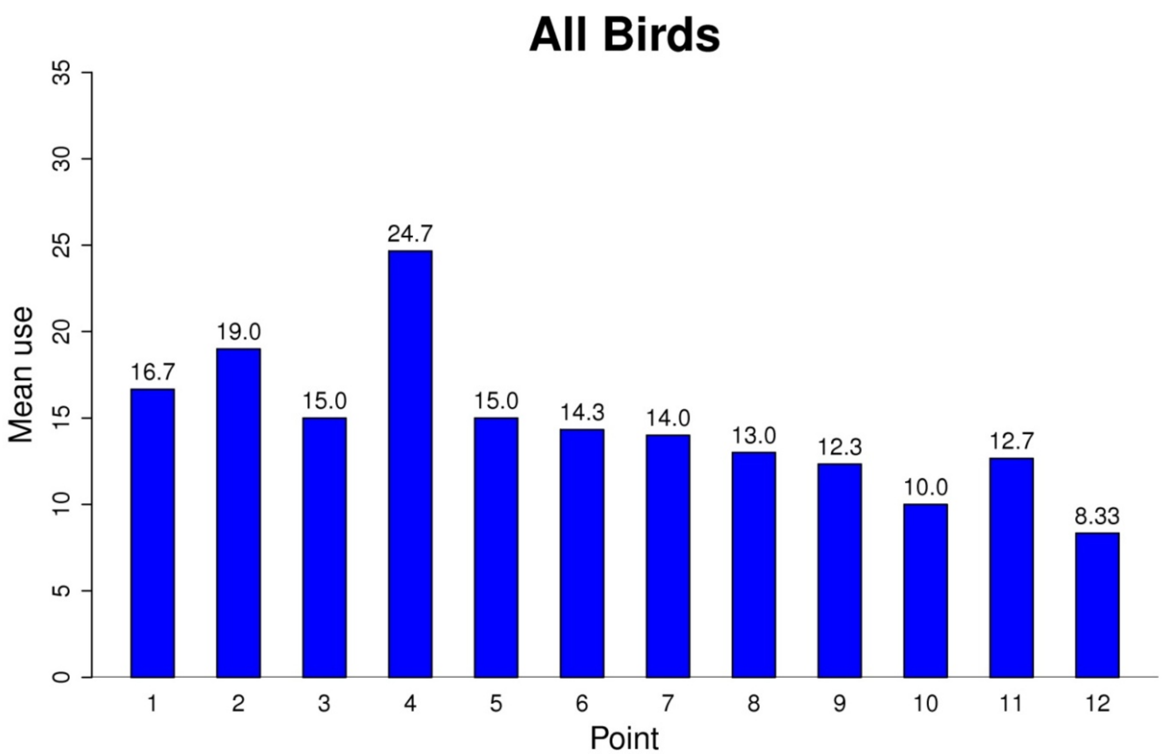

Figure 3. Mean use (number of birds/5-min survey) at each breeding bird point for all birds major bird types at the Prospect Wind Resource Area.

Sensitive Species

No sensitive or protected species were recorded during scheduled breeding bird surveys.

Incidental Wildlife Observations

Thirty bird species, totaling 58 individuals within 47 groups, were recorded incidentally, of which eight species were only observed incidentally and not during a standardized breeding bird count (Table 4). This eight species were: turkey vulture (*Cathartes aura)*, northern flicker (*Colaptes auratus)*, Baltimore oriole (*Icterus galbula)*, blue-headed vireo (*Vireo salitarius)*, Carolina wren (*Thryothorus ludovicianus)*, chimney swift (*Chaetura pelagic)*, house wren (*Troglodytes aedon*) and killdeer (*Charadrius vociferous).* Three mammal species (17 individuals), two amphibian species (three individuals) and one reptilian species (a single black racer [*Coluber constrictor]*) were also recorded incidentally within the PWRA. No state or federal listed species were recorded as an incidental observation.

Table 4. Summary of Incidental Wildlife Observations by Groups (grps) and as Individuals (obs) within the Prospect Wind Resource Area, from June 28 to July 12, 2010.

Common Name	Scientific Name	Total #grps	Total #obs
house finch	*Carpodacus mexicanus*	1	5
American goldfinch	*Carduelis tristis*	4	4
downy woodpecker	*Picoides pubescens*	4	4
eastern towhee	*Pipilo erythrophthalmus*	2	4
American robin	*Turdus migratorius*	1	3
eastern phoebe	*Sayornis phoebe*	1	3
northern cardinal	*Cardinalis cardinalis*	3	3
turkey vulture	*Cathartes aura*	3	3
blue jay	*Cyanocitta cristata*	2	2
cedar waxwing	*Bombycilla cedrorum*	1	2
eastern bluebird	*Sialia sialis*	2	2
northern flicker	*Colaptes auratus*	2	2
red-eyed vireo	*Vireo olivaceus*	2	2
Veery	*Catharus fuscescens*	2	2
white-breasted nuthatch	*Sitta carolinensis*	2	2
Baltimore oriole	*Icterus galbula*	1	1
blue-headed vireo	*Vireo salitarius*	1	1
brown-headed cowbird	*Molothrus ater*	1	1
Carolina wren	*Thryothorus ludovicianus*	1	1
chimney swift	*Chaetura pelagic*	1	1
chipping sparrow	*Spizella passerine*	1	1
common yellowthroat	*Geothlypis trichas*	1	1
field sparrow	*Spizella pusilla*	1	1
hairy woodpecker	*Picoides villosus*	1	1
house wren	*Troglodytes aedon*	1	1
Killdeer	*Charadrius vociferous*	1	1
Ovenbird	*Seiurus aurocapilla*	1	1
red-bellied woodpecker	*Melanerpes carolinus*	1	1
song sparrow	*Melospiza melodia*	1	1
tufted titmouse	*Baeolophus bicolor*	1	1
Bird Total	**30 Species**	**47**	**58**
white-tailed deer	*Odocoileus virginianus*	3	9
cottontail rabbit	*Sylvilagus floridanus*	1	4
American red squirrel	*Tamiasciurus hudsonicus*	4	4
Mammal Total	**3 Species**	**8**	**17**
wood frog	*Rana sylvatica*	2	2
American bullfrog	*Rana catasbeiana*	1	1
Amphibian Total	**2 Species**	**3**	**3**
Black racer	*Coluber constrictor*	1	1
Reptile Total	**1 species**	**1**	**1**
Overall	**36 Species**	**59**	**79**

DISCUSSION

The results of the breeding bird surveys were characteristic of deciduous forest and open grassland areas of central Connecticut. Open grassland and forest edge areas contained both greater species richness and relative abundance compared with forested areas. Bird abundance and species richness at survey points proximate to proposed turbine locations was low to moderate relative to the open meadow and forest edge points. No state- or federal-listed species were recorded during breeding bird surveys or incidentally within the PWRA.

The most probable direct impact to birds from wind energy facilities is direct mortality or injury due to collisions with turbines or guy wires of met towers. Collisions may occur with residents foraging and flying within the project area or with migrants seasonally moving through the project area. Common species such as eastern towhee and American robin comprised the majority of identified species observed during breeding bird surveys. Direct impacts to individuals may result from operation of the PWRA. Currently there is no evidence that observed impacts to individuals resulting from collisions with wind turbines have an effect on populations. Post construction mortality studies conducted at 12 wind facilities throughout the nation indicate a national avian mortality rate of 2.3 birds per turbine per year (birds/turbine/year) (NWCC 2004). Two thirds of fatalities documented during post-construction mortality monitoring studies were assumed to be migrants (NRC 2007).

Wind energy development has the potential to cause direct loss of habitat where infrastructure is located and indirect loss of habitat through behavioral avoidance and habitat fragmentation. Some research studies have shown that small scale displacement of grassland passerines from wind turbines is likely due to birds avoiding habitat disturbed by construction, turbine noise, and/or maintenance activities. Studies concerning displacement of avian species have largely concentrated on grassland passerines, raptors, and waterfowl/waterbirds (see Usgaard et al. 1997, Osborn et al. 1998, Winkelman 1990, Larsen and Madsen 2000, Johnson et al. 2000, Erickson et al. 2004, Young et al. 2005a, Young et al 2005b, Mabey and Paul 2007). The greatest concern with displacement impacts for wind projects in the U.S. has been where these facilities have been constructed in grassland or other native habitats where tall structures such as turbines do not normally occur (Leddy et al. 1999, Mabey and Paul 2007). Data on the effect of wind-energy on birds within largely forested landscapes is not currently available for analysis. Study findings from grassland or wetland habitats (see above references), suggest that indirect impacts of wind turbines on birds are small scale spatial effects, with the largest spatial scale for significant reduction in abundance noted at distances up to 400 m for a non-raptor species and 250 m for a raptor species (Pearce-Higgins 2009). Some research has also shown that the displacement effects may be temporary with birds becoming habituated to the turbines or facility cause disturbance over time, or not significantly changing their behavior in the presence of turbines (see Johnson et al 2000, Young et al. 2005b, Pearce-Higgins 2009).

Breeding bird habitats at the PWRA are regionally common and no high value bird habitats such as wetlands are located within proposed development areas. As previously mentioned, the highest breeding bird relative abundance and species richness were recorded within the grassland and forest edge portion of the study area and not within forested areas of the site proposed for turbine siting.

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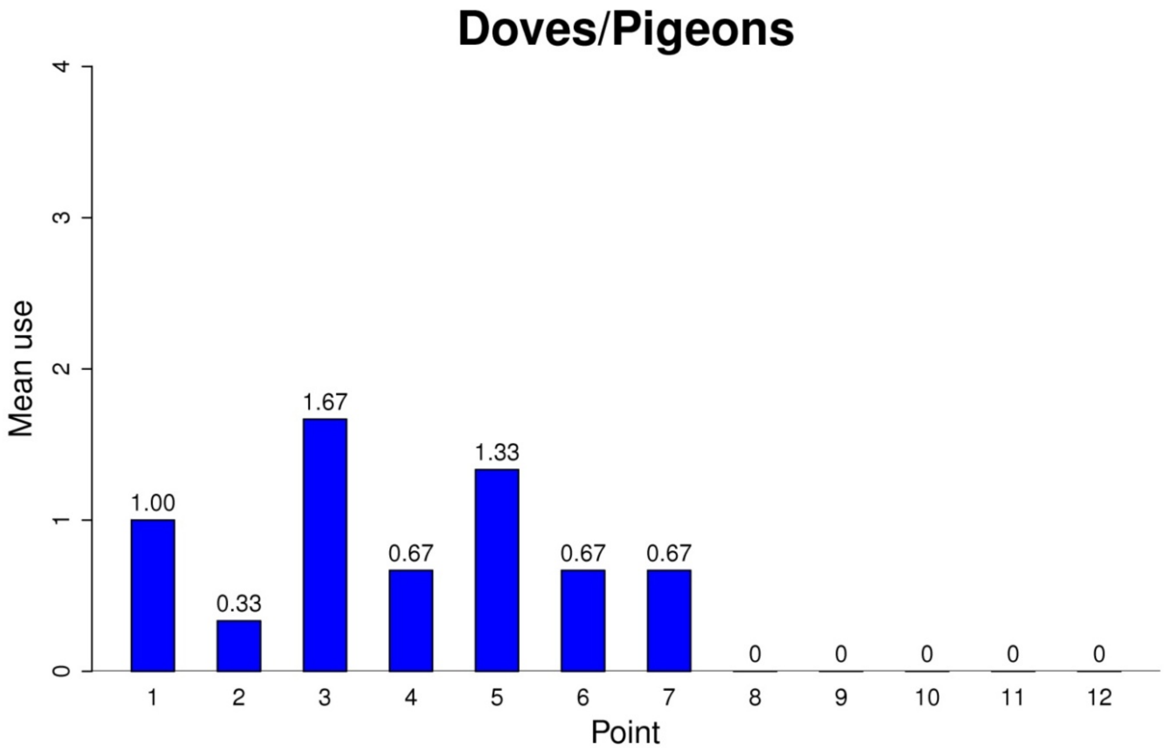

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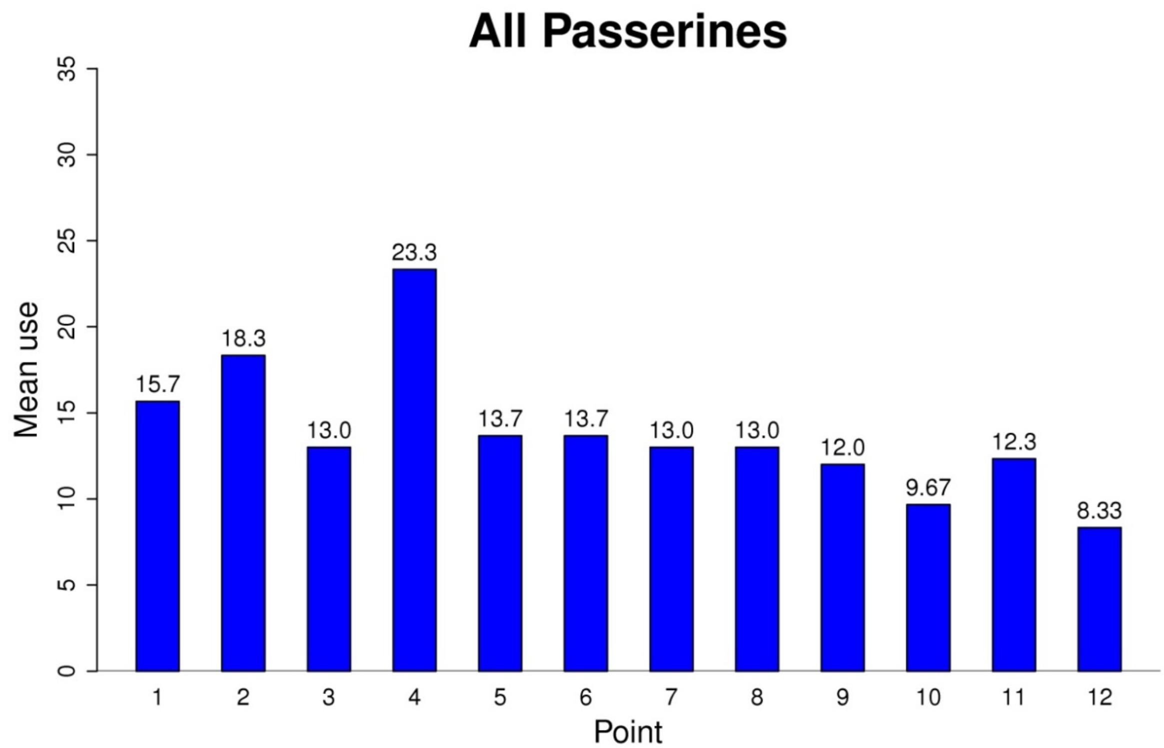

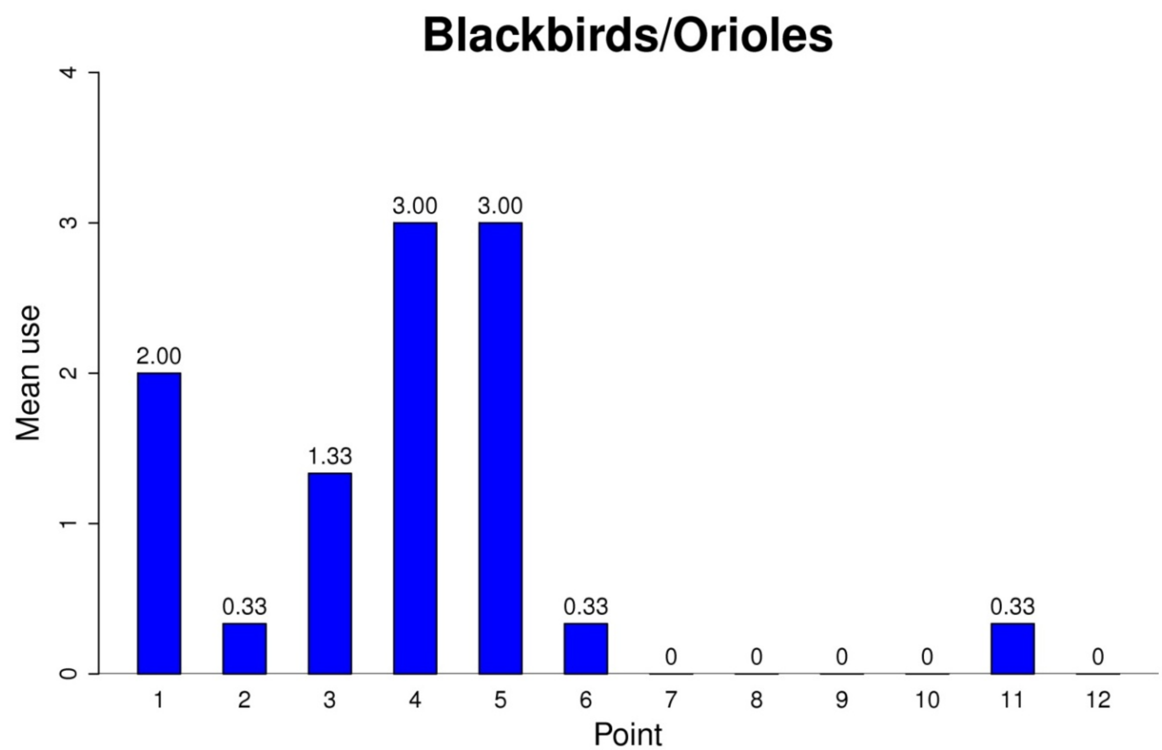

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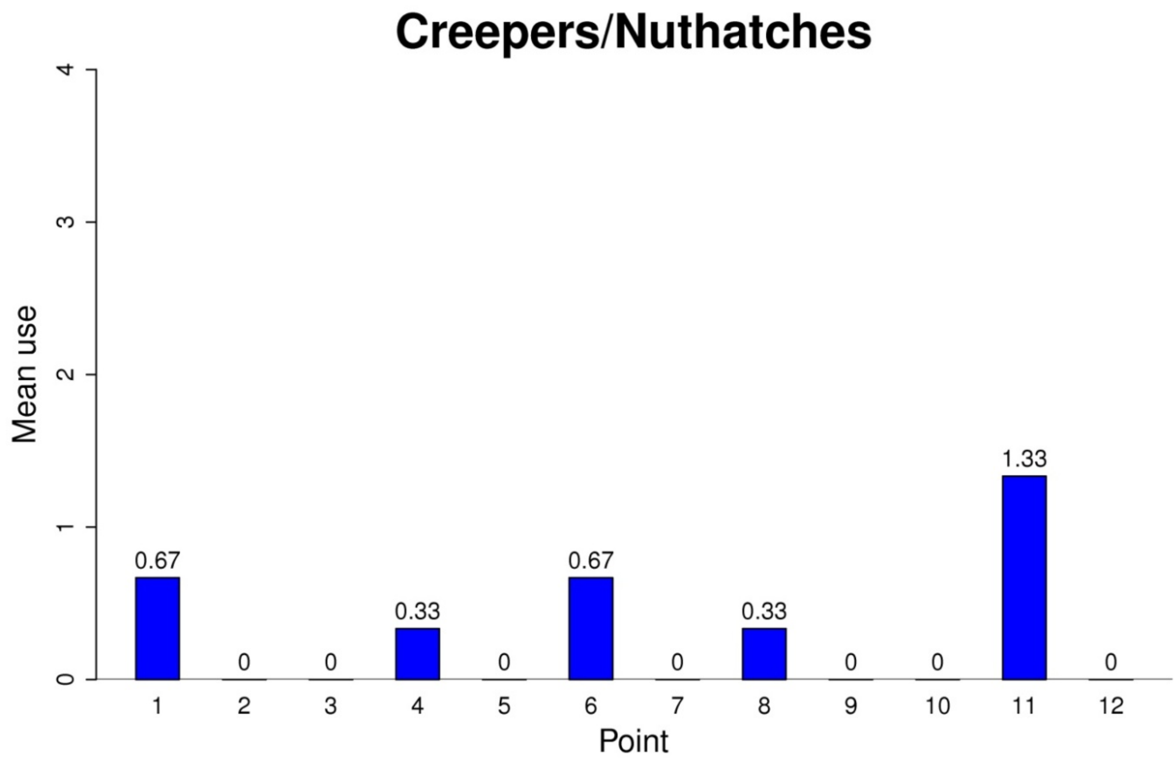

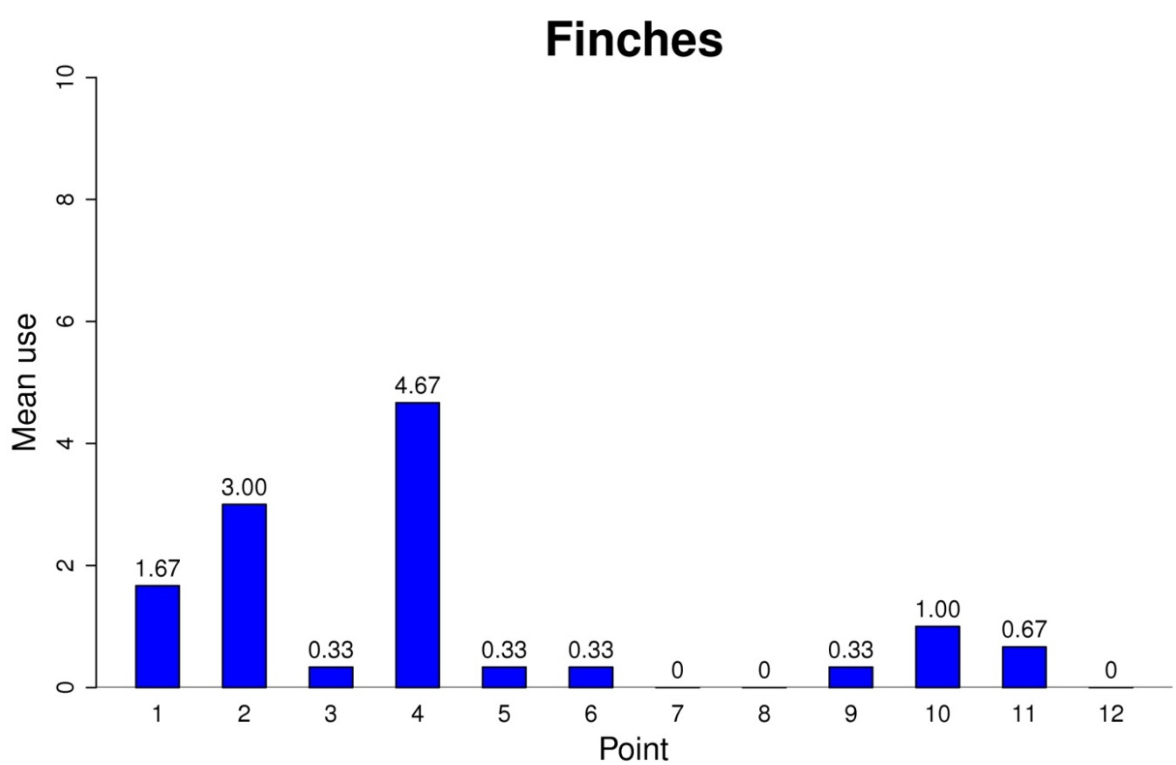

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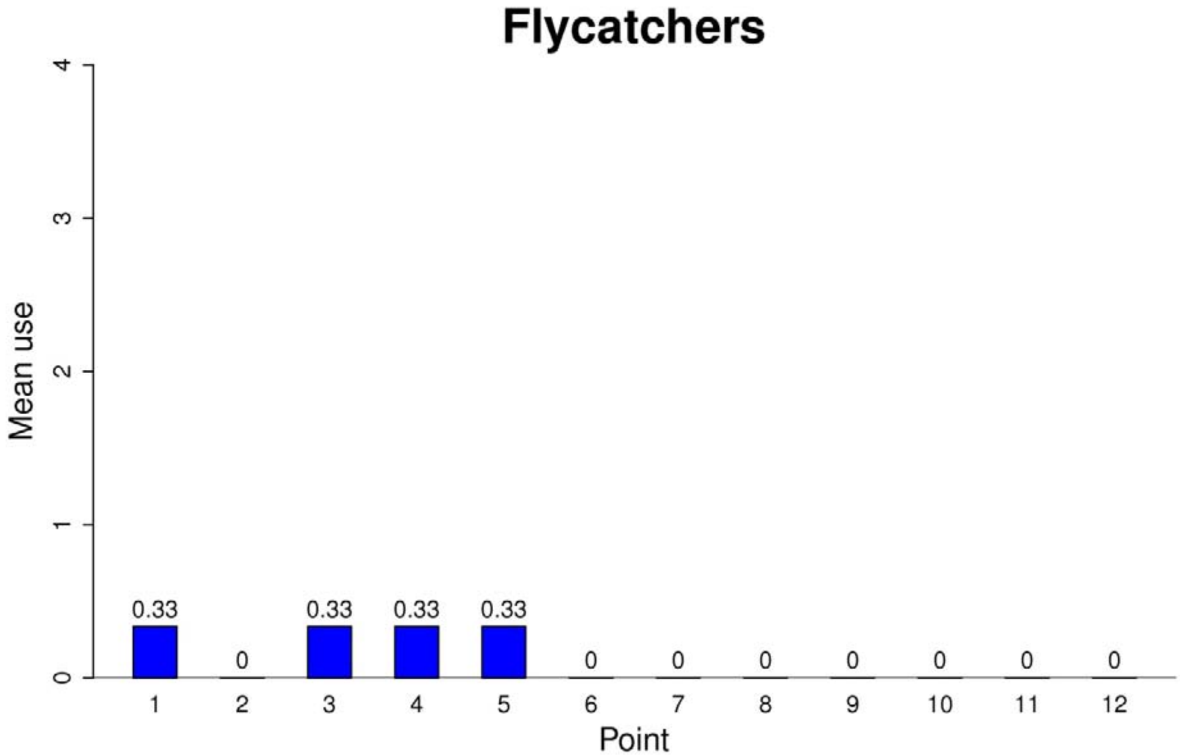

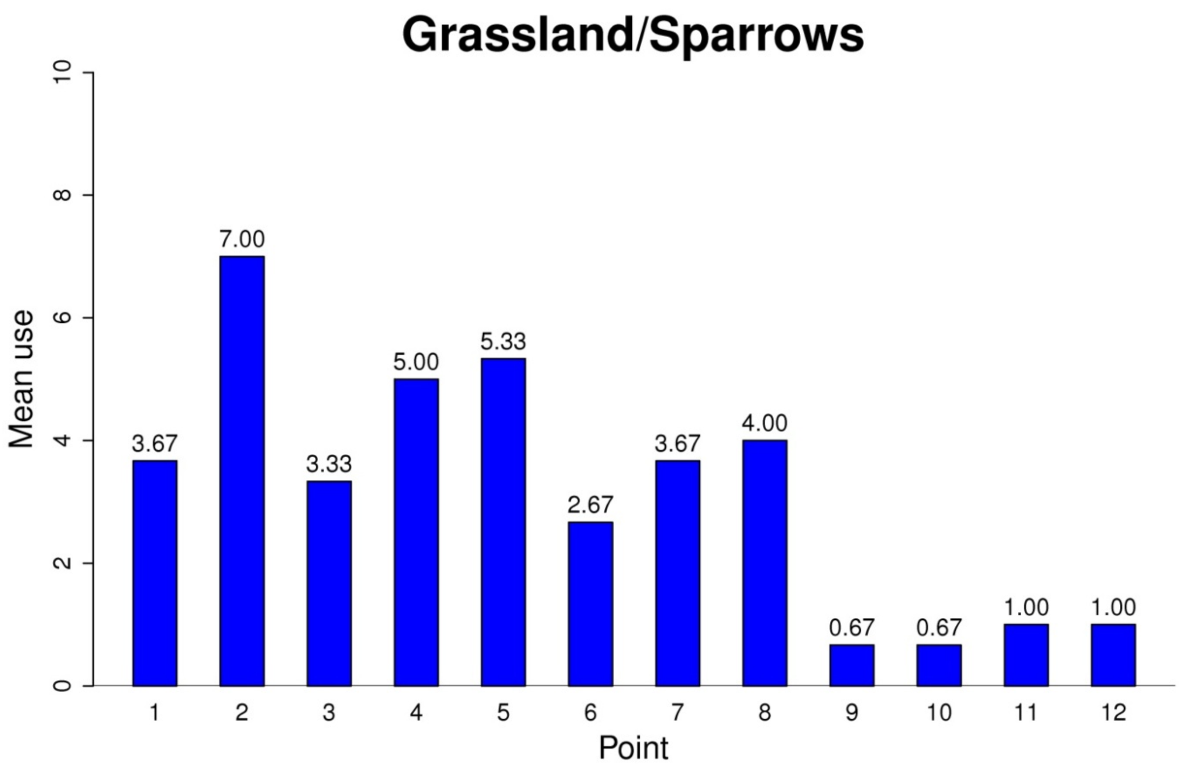

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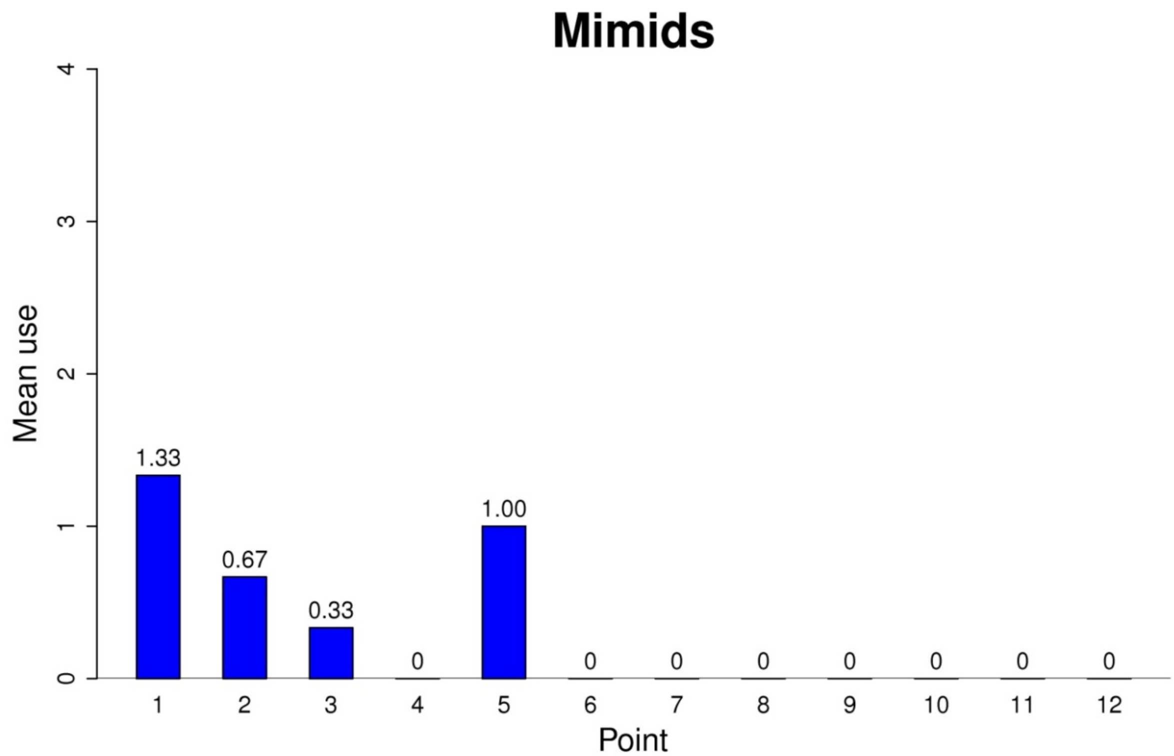

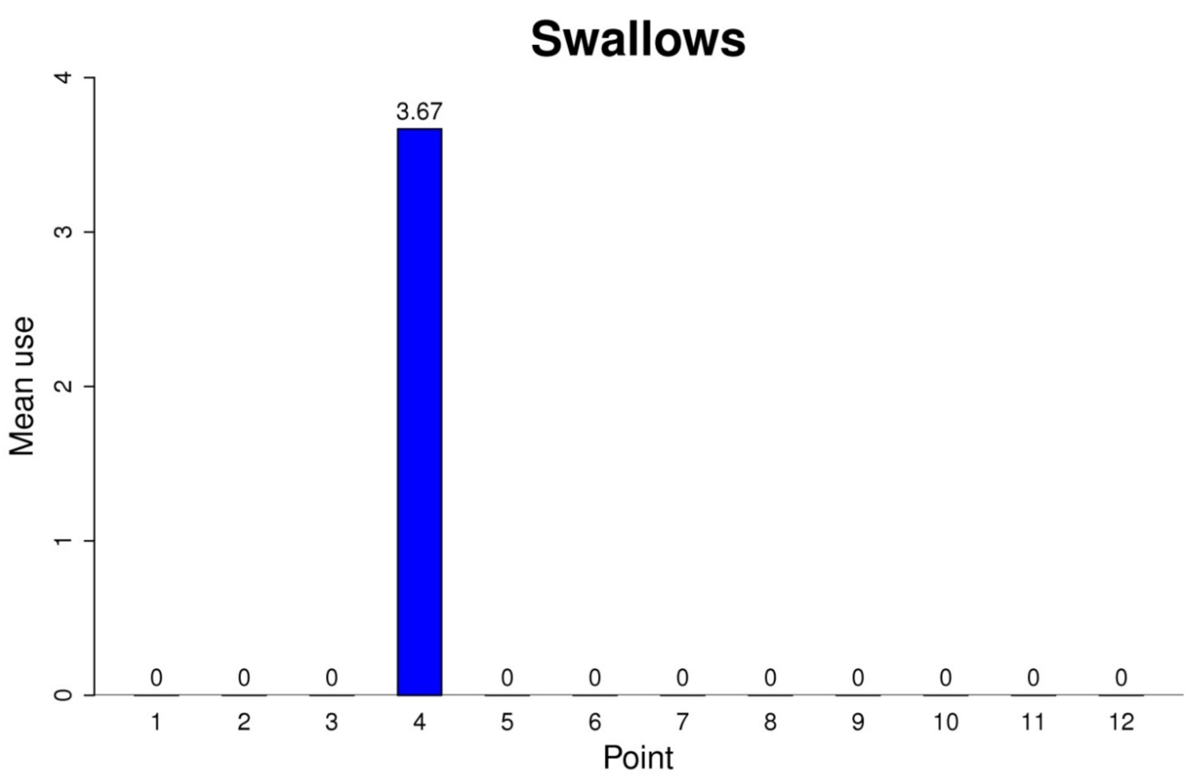

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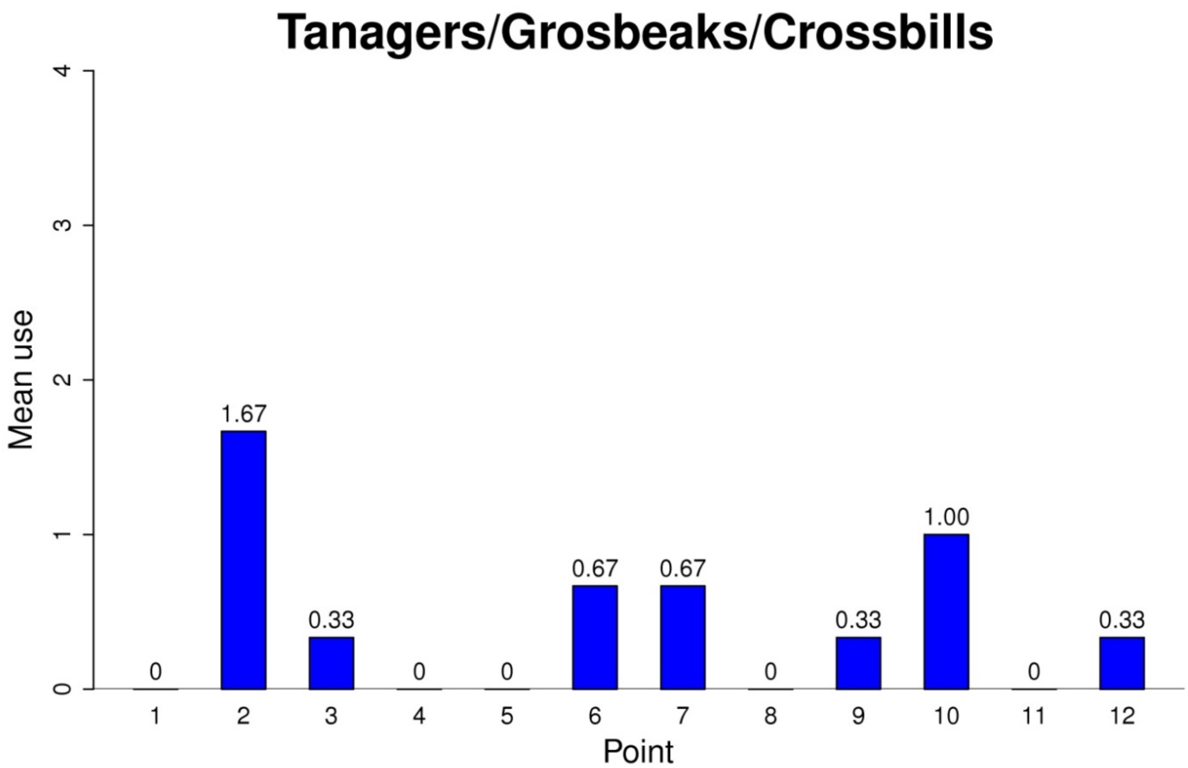

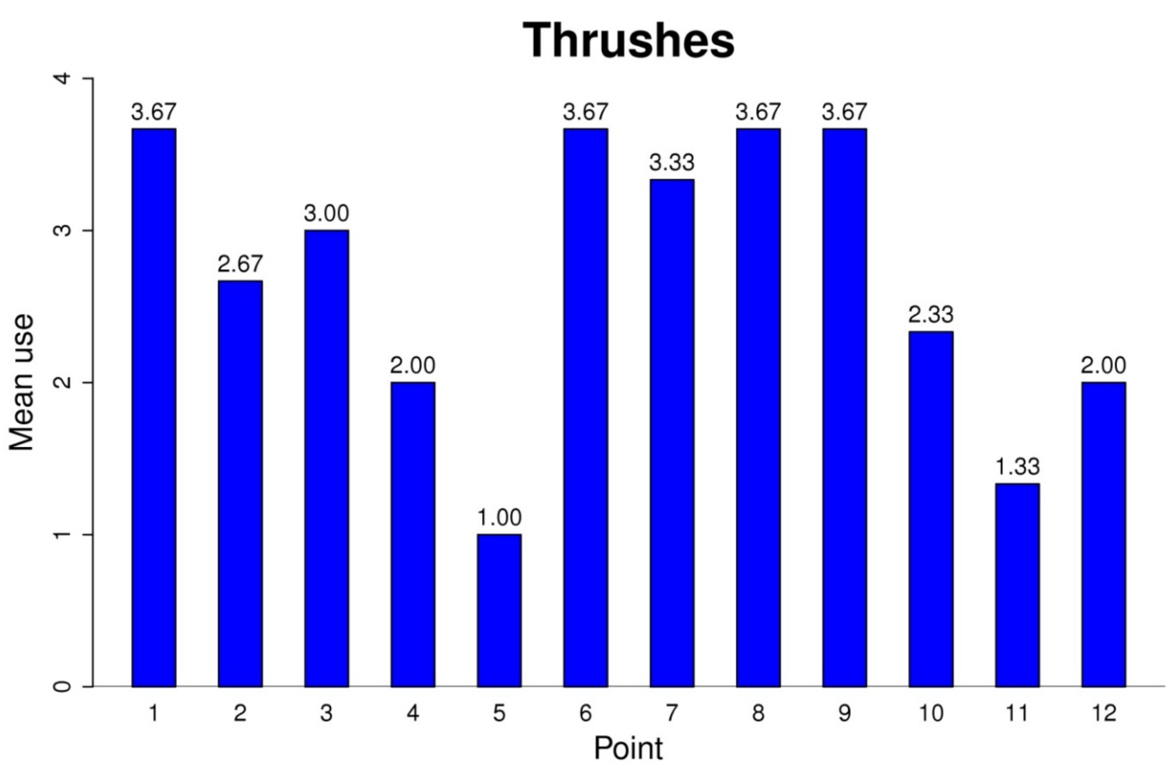

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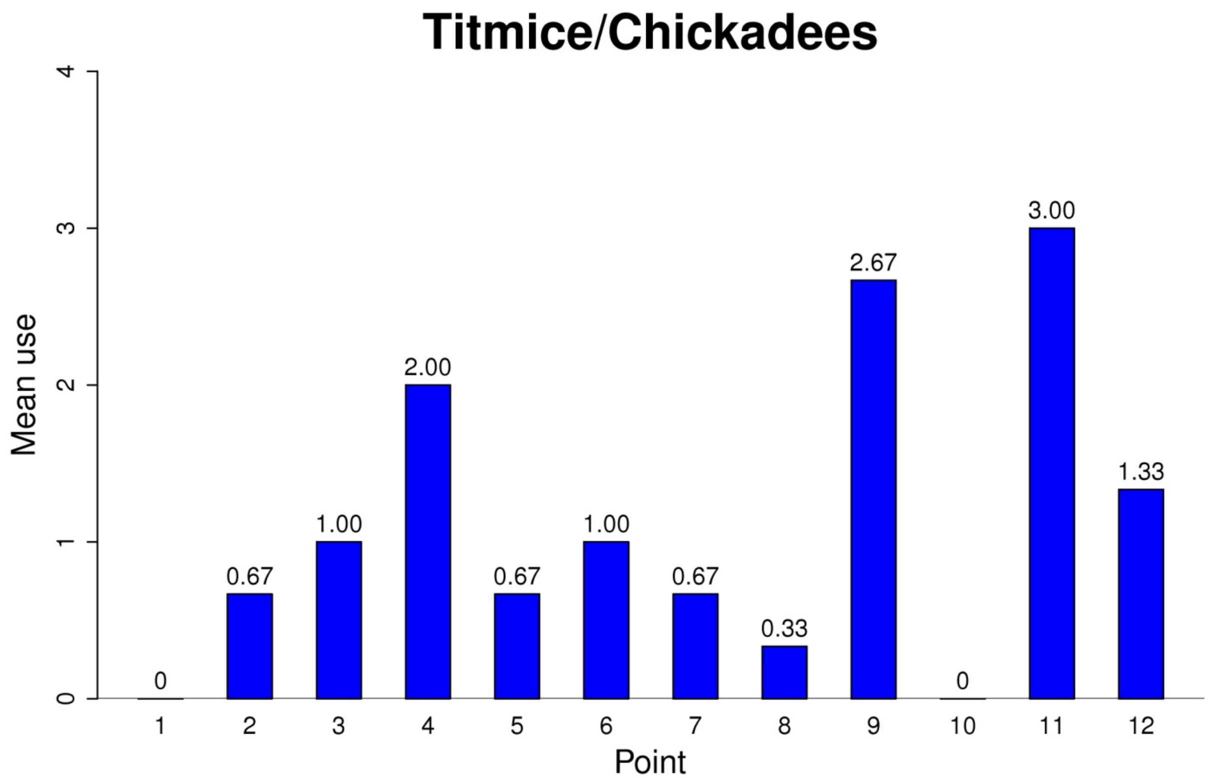

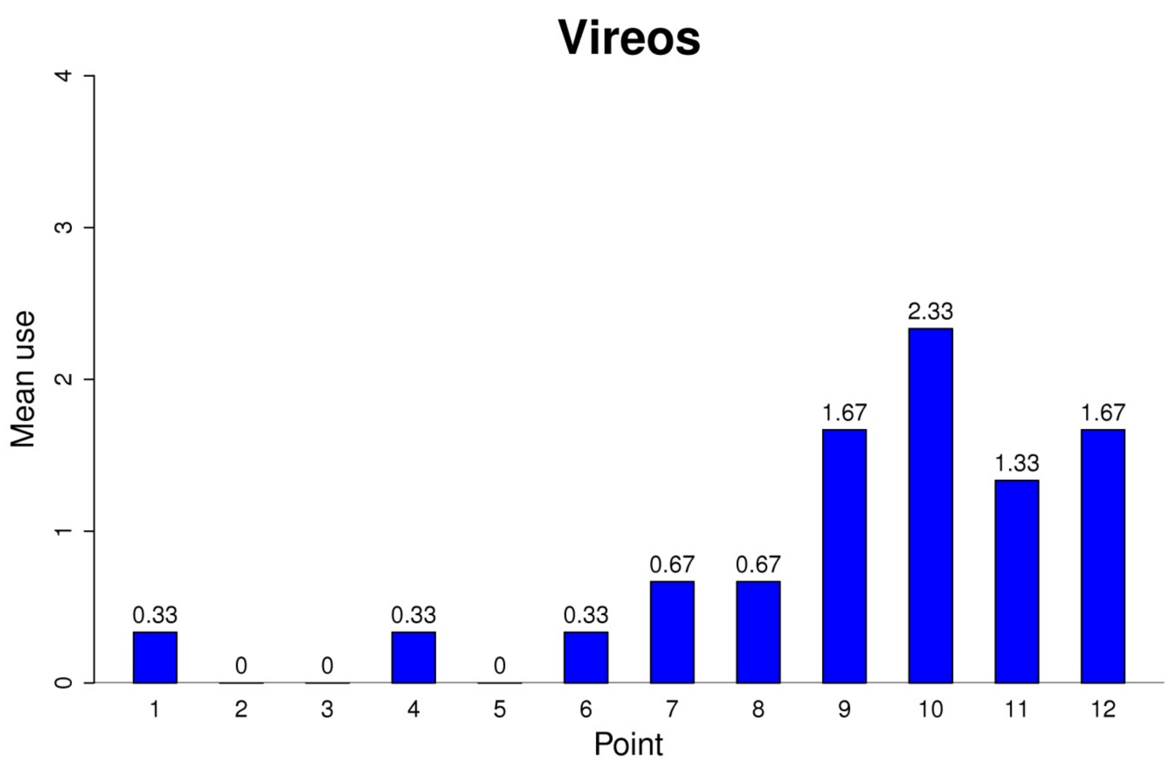

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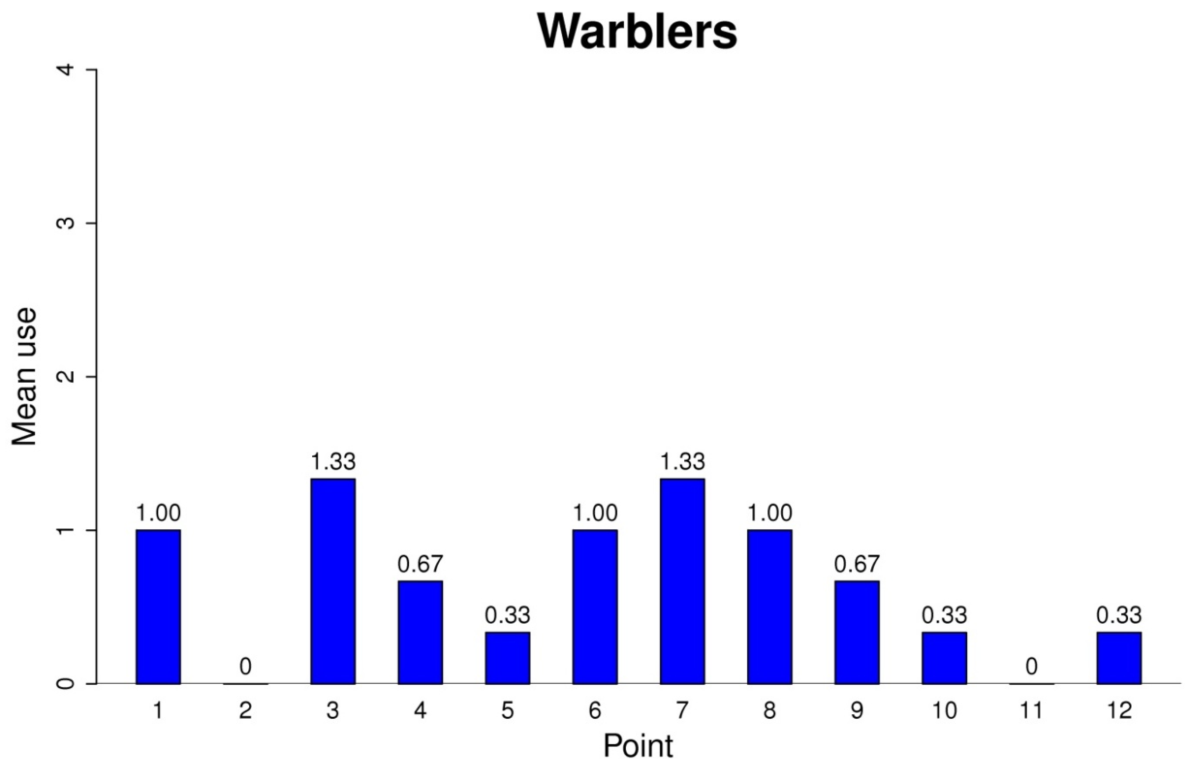

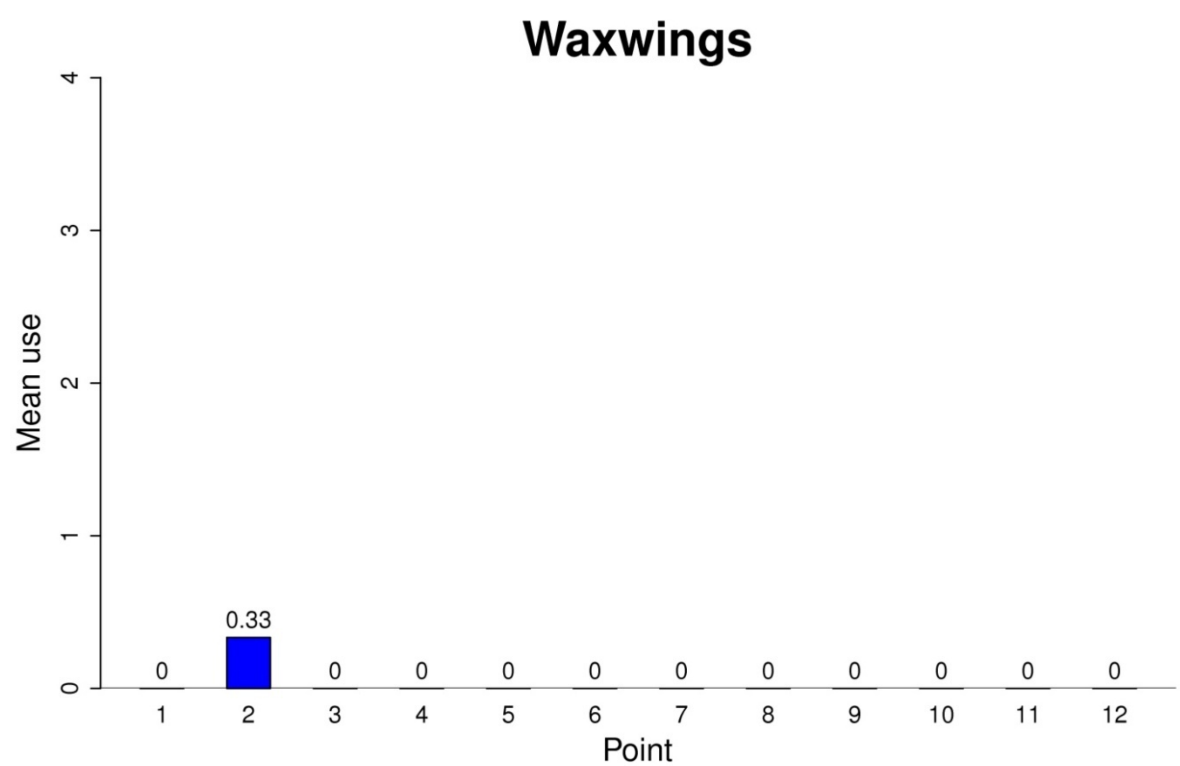

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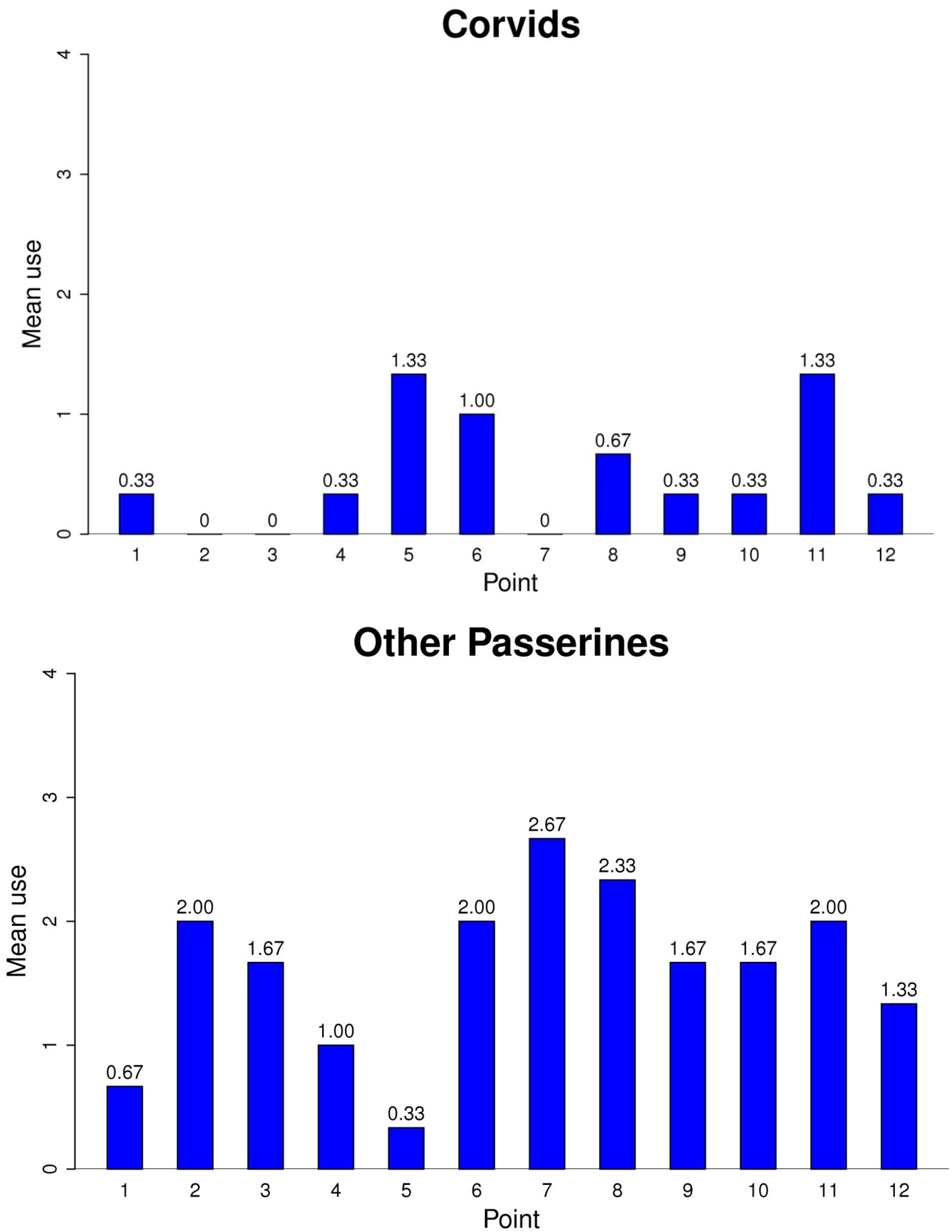

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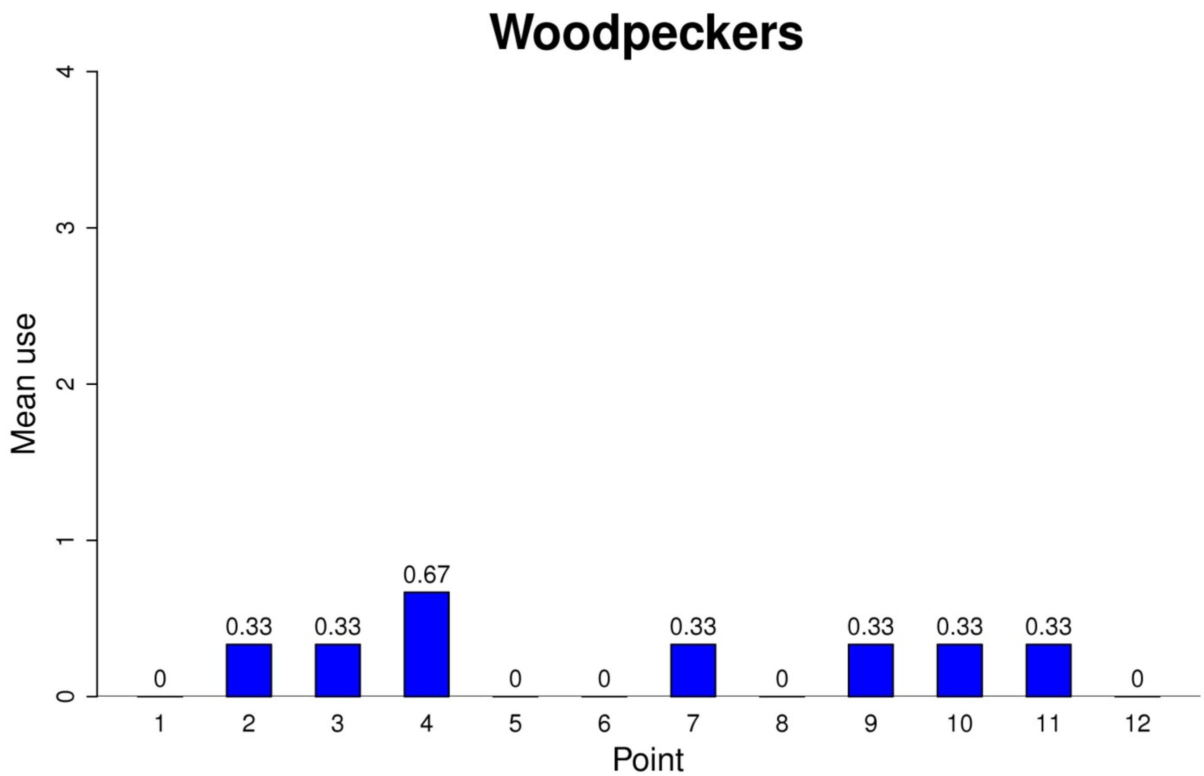

Figure 4 (*continued*). Mean use (number of birds/5-min survey) at each breeding bird point for all birds and major bird types at the Prospect Wind Resource Area. Small bird observations were focused within 100-m viewsheds.

EXHIBIT N

Noise Evaluation

Wind Prospect

178 New Haven Road
Prospect, Connecticut

Prepared for BNE Energy Inc.
Producer of green clean energy

Prepared by ***VHB***/**Vanasse Hangen Brustlin, Inc.**
Middletown, Connecticut

October 2010

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Executive Summary

The purpose of the noise analysis is to evaluate the potential noise impacts associated with the construction of two 1.6 megawatts ("MW") wind turbines proposed by BNE Energy, Inc. ("BNE") at 178 New Haven Road in Prospect, Connecticut. This noise analysis evaluated the existing and future build sound levels. Existing condition sound levels were determined by a noise monitoring program. The future build sound levels that would be generated were calculated using manufacturer's sound data for the wind turbines and the principles of acoustical propagation of sound over distance.

The sound levels were projected to nearby residential noise receptor locations around the project site. These receptor locations were selected based on land use considerations, and represent the most sensitive locations (i.e., the residential areas) that may experience changes in sound levels resulting from future operations. The results demonstrate that the future operation of two 1.6 MW wind turbines would meet the Town of Prospect's and the Connecticut Department of Environmental Protection's noise impact criteria.

Noise Impact Analysis

Introduction

The purpose of this noise analysis is to evaluate the potential noise impacts associated with construction of two 1.6 MW wind turbines ("Wind Prospect" or the "Project") to be located at 178 New Haven Road in Prospect, Connecticut (the "Property" or "Site"). This noise analysis evaluated both the existing conditions and future build condition sound levels. The sound levels were compared to the Connecticut Department of Environmental Protection's noise control regulations (Regulations of Connecticut State Agencies (RCSA), Title 22a, Section 22a-69-1 to 22a-69-7) and the Town of Prospect's Noise Ordinance.

Noise Background

Noise is defined as unwanted or excessive sound. Sound becomes unwanted when it interferes with normal activities such as sleep, work, or recreation. How people perceive sound depends on several measurable physical characteristics. These factors include:

- Intensity - Sound intensity is often equated to loudness.
- Frequency - Sounds are comprised of acoustic energy distributed over a variety of frequencies. Acoustic frequencies, commonly referred to as tone or pitch, are typically measured in Hertz. Pure tones have all their energy concentrated in a narrow frequency range.

Sound levels are most often measured on a logarithmic scale of decibels (dB). The decibel scale compresses the audible acoustic pressure levels which can vary from the threshold of hearing (0 dB) to the threshold of pain (120 dB). Because sound levels are measured in dB, the addition of two sound levels is not linear. Adding two equal sound levels creates a 3 dB increase in the overall level. Research indicates the following general relationships between sound level and human perception:

- A 3 dB increase is a doubling of acoustic energy and is the threshold of perceptibility to the average person.
- A 10 dB increase is a tenfold increase in acoustic energy but is perceived as a doubling in loudness to the average person.

The human ear does not perceive sound levels from each frequency as equally loud. To compensate for this phenomenon in perception, a frequency filter known as

A-weighted (dBA) is used to evaluate environmental noise levels.
A variety of sound level indicators can be used for environmental noise analysis. These indicators describe the variations in intensity and temporal pattern of the sound levels. The indicators used in this analysis are defined as follows:

- Lmax is the maximum A-weighted sound level measured during the time period.
- L_{10} is the A-weighted sound level, which is exceeded for 10 percent of the time during the time period.
- L_{90} is the A-weighted sound level, which is exceeded for 90 percent of the time during the time period. The L_{90} is generally considered to be the background sound level. It should be noted that the L_{90} eliminates the highest 10 percent of the sound levels that occur in the study area.

It should be noted that Connecticut Department of Environmental Protection ("CTDEP") requires that the noise analysis use the L_{90} A-weighted sound levels. Table 1 presents a list of common indoor and outdoor sound levels.

Table 1
Indoor and Outdoor Sound Levels

Outdoor Sound Levels	Sound Pressure (μPa)		Sound Level (dBA)	Indoor Sound Levels
	6,324,555	-	110	Rock Band at 5 m
Jet Over-Flight at 300 m		-	105	
	2,000,000	-	100	Inside New York Subway Train
Gas Lawn Mower at 1 m		-	95	
	632,456	-	90	Food Blender at 1 m
Diesel Truck at 15 m		-	85	
Noisy Urban Area—Daytime	200,000	-	80	Garbage Disposal at 1 m
		-	75	Shouting at 1 m
Gas Lawn Mower at 30 m	63,246	-	70	Vacuum Cleaner at 3 m
Suburban Commercial Area		-	65	Normal Speech at 1 m
	20,000	-	60	
Quiet Urban Area—Daytime		-	55	Quiet Conversation at 1 m
	6,325	-	50	Dishwasher Next Room
Quiet Urban Area—Nighttime		-	45	
	2,000	-	40	Empty Theater or Library
Quiet Suburb—Nighttime		-	35	
	632	-	30	Quiet Bedroom at Night
Quiet Rural Area—Nighttime		-	25	Empty Concert Hall
Rustling Leaves	200	-	20	
		-	15	Broadcast and Recording Studios
	63	-	10	
		-	5	
Reference Pressure Level	20	-	0	Threshold of Hearing

μPA MicroPascals describe pressure. The pressure level is what sound level monitors measure.
dBA A-weighted decibels describe pressure logarithmically with respect to 20 μPa (the reference pressure level).
Source: Highway Noise Fundamentals, Federal Highway Administration, September 1980.

Impact Criteria

The Town of Prospect and the CTDEP have developed noise impact criteria that establish noise thresholds deemed to result in adverse impacts. The noise analysis for Wind Prospect used these criteria to evaluate whether the Project will generate sound levels that result in adverse impacts.

Town of Prospect Criteria

The Town of Prospect's noise ordinance identifies the limits of sound that can be emitted from various sources and what activities are exempt. This policy states that a source located in various areas shall not emit noise exceeding the levels stated in Table 2 at the adjacent noise zones.

Table 2
Town of Prospect Noise Zone Standards, L_{90} (dBA)

	Listener Zone			
Source Zone	**Residential (Daytime)**	**Residential (Nighttime)**	**Business**	**Industrial**
Residential	55	45	55	62
Business	55	45	62	62
Industrial	61	51	66	70

Source: Town of Prospect Noise Ordinance, March 30. 1987.

An industrial zone is defined as generally industrial area where protection against damage to hearing is essential, and the necessity for conversation is limited. A business zone is where human beings converse and such conversations are essential to the intended use of the land. A residential zone is where human beings sleep or areas where serenity and tranquility are essential to the intended use of the land.

The noise analysis assumed that the Source Zone for the proposed wind turbines is Industrial and that the Listener Zone for the receptor locations is Residential.

Connecticut DEP Criteria

The CTDEP's noise control regulations identify the limits of sound that can be emitted from specific premises and what activities are exempt. The noise control regulations (Title 22a, §§ 22a-69-1 to 22a-69-7) are contained in the Regulations of Connecticut State Agencies (RCSA). This policy states that a source located in a "Class C Noise Zone" shall not emit noise exceeding the levels stated in Table 3 at the adjacent noise zones.

Table 3
DEP Noise Zone Standards, L_{90} (dBA)

	Receptor Noise Zone			
Emitter Zone	Class A (Daytime)	Class A (Nighttime)	Class B	Class C
Class A (Residential)	55	45	55	62
Class B (Commercial)	55	45	62	62
Class C (Industrial)	61	51	66	70

Source: Control of Noise (Title 22a, Section 22a-69-1 to 22a-69-7.4), Regulations of Connecticut State Agencies, June 1978.

Class C land use is defined as generally industrial where protection against damage to hearing is essential, and the necessity for conversation is limited. The land use for Class B is defined as generally commercial in nature, where human beings converse and such conversations are essential to the intended use of the land. The land use in Class A is defined as generally residential where human beings sleep or areas where serenity and tranquility are essential to the intended use of the land.

The noise analysis assumed that the Emitter Zone for the proposed wind turbines is Class C (Industrial) and that the Receptor Noise Zone for the receptor locations is Class A (Residential).

Methodology

This noise analysis evaluated the sound levels of the proposed wind turbines. The noise analysis consists of two components: existing ambient sound levels and Project contributions. The existing condition sound levels were determined by conducting noise measurements at sensitive receptor locations surrounding Wind Prospect. The Project generated sound levels were calculated using manufacturer's sound data and the principles of acoustical propagation of sound over distance.

Noise monitoring was conducted to determine the existing sound levels in the vicinity of the Project site following procedures established in Section 22a-69-4 of the CTDEP noise control regulations. Noise monitoring was conducted at locations that are representative of the study area during the weekday daytime and nighttime periods. The noise monitoring data was used to establish existing conditions in areas that may experience changes in sound levels associated with Wind Prospect.

Noise associated with wind turbines consists of two sources: the aerodynamic sound produced by air flow over the rotor blades and sound from the mechanical components that drive the blades. The Project generated sound levels were calculated for each receptor location based on manufacturer reference sound level data of the 1.6 MW wind turbines. The sound level of the proposed wind turbines is dependent upon wind speed. The noise analysis assumed that the proposed wind turbines would be operating at the maximum wind speed during the daytime period and at the mean wind speed for the nighttime period. The wind speed was based upon site-specific wind data collected by BNE to determine the property's viability for locating and operating the proposed wind turbines. The manufacturer's sound level data for these operating conditions were projected to the receptor locations using the acoustical properties of sound propagation over terrain.

The calculations of the sound level projections to the receptor locations follow the methodology outlined by the International Organization of Standardization (ISO). The following equation, from the publication *ISO 9613-2: Attenuation of sound during propagation outdoors – Part2: General method of calculation*, was used to calculate the sound levels at the receptor locations.

Lft(DW) = Lw + Dc – A, where…

- Lw is the sound power level produced by the sound source.
- Dc is the directivity correction to account for deviation of the sound power level in a specified direction. For an omni-directional sound source radiating into open space, Dc = 0.
- A is the attenuation occurring during propagation from sound source to receptor location. Attenuation may include geometrical divergences (or spherical spreading), atmospheric absorption, ground effect, barrier, and other miscellaneous effects, such density of vegetation and buildings.

The calculation of the sound levels associated with Wind Prospect took into consideration geometric divergences and atmospheric absorption due to the surrounding environment.

Receptor Locations

Ten noise receptor locations were identified in the vicinity of Wind Prospect. The receptor locations were selected based on their proximity to the site and their land use. These receptor locations represent the most sensitive locations in the immediate area that may experience changes in sound levels once Wind Prospect is in operation. These receptor locations represent the residential parcels that surround Wind Prospect. They include:

- Receptor Location 1 (R1) – Residence on Kluge Road,
- Receptor Location 2 (R2) – Residence on New Haven Road (Route 69),
- Receptor Location 3 (R3) – Residence on New Haven Road (Route 69),
- Receptor Location 4 (R4) – Residence on New Haven Road (Route 69),
- Receptor Location 5 (R5) – Residence on Talmadge Hill Road,
- Receptor Location 6 (R6) – Residence on Valley Lane,
- Receptor Location 7 (R7) – Residence on Cheshire Road (Route 42),
- Receptor Location 8 (R8) – Residence on Lacey Road,
- Receptor Location 9 (R9) – Residence on Coachlight Circle, and
- Receptor Location 10 (R10) – Residence on Putting Green Lane.

Land uses in the vicinity of the Project site are mixed commercial and residential. The most sensitive receptors (residential areas) were the focus of this evaluation. The receptor and existing conditions noise monitoring locations used in the noise analysis are presented in Figure 1.

Existing Conditions

The existing sound levels in the vicinity of the Project site were established by conducting actual measurements of sound levels at four locations, which included the neighborhood of Kluge Road to the southeast of the Project site, Lacey Lane to the southwest, Coachlight Circle to the west, and Fusco Field on Talmadge Hill Road to the north. These measured sound levels, which were used to establish a baseline for the study area, indicate that the sound levels are consistent throughout the area.

The noise monitoring was conducted using a Larson Davis 824 Type I sound level analyzer and followed noise monitoring procedures outlined in Section 22a-69-4 of the CTDEP's noise control regulations. The sound levels were measured at each location during both the weekday daytime (7 AM. to 10 PM) on April 1, 2010 and weekday nighttime periods (10:00 PM. to 7:00 AM) on April 1, 2010 to April 2, 2010. The noise sources included local vehicular traffic and natural occurrences, such as wind, birds and other animals. The sound levels represent conservative values because the wind conditions during the measurements were calm.

The existing sound levels are below the Town of Prospect's and the State's noise impact criteria of 61 dBA and 51 dBA during the daytime and nighttime, respectively. The recorded hourly L_{90} sound levels are presented in Table 4.

Table 4
Existing Sound Levels, L_{90} (dBA)

Monitoring Location	Daytime Sound Level	Nighttime Sound Level
M1 - Kluge Road	44	35
M2 – Lacey Lane*	42	35
M3 – Coachlight Circle*	41	35
M4 – Fusco Field**	44	38

Refer to Figure 1 for locations.
* Assumed nighttime values to be representative of typical night time sound levels from Kluge Road monitoring site.
** Assumed daytime value to be representative of typical daytime sound levels from Kluge Road monitoring site.

Project Generated Sound Levels

There are two noise sources associated with a wind turbine. These sources include aerodynamic noise associated with the blade movement through air and the mechanical noise associated with the interaction of parts that drive the blades. Aerodynamic sound from the movement of the blade through air is a function of wind speed, which can be controlled by the rotational speed of the blades. Existing background sound levels are also dependent of wind speed. Therefore louder background sound levels would result from higher wind conditions. With increasing wind speeds, the sound from wind turbines can often be masked by increasing wind noise.

Each of the wind turbines would consist of three blades with the hub located at 100 meters from the ground. Under operational conditions, the blades will rotate at speeds between 3 meters per second ("m/s") to 12 m/s. The maximum daytime sound levels from the proposed wind turbines would occur with the maximum wind speeds of 9 m/s. The maximum nighttime sound levels from the wind turbine would occur with the maximum wind speeds of 8 m/s. The Project generated sound levels based upon the wind speed were projected to each receptor location based upon the properties of sound propagation over distance, terrain, and geometry. Following the methodology outlined in ISO 9613-2, the calculation of Wind Prospect's sound levels included attenuation due to geometric divergences and atmospheric absorption. The Project generated hourly L_{90} sound level contribution for each receptor location is presented in Table 5.

Table 5
Project Generated Sound Levels, L_{90} (dBA)

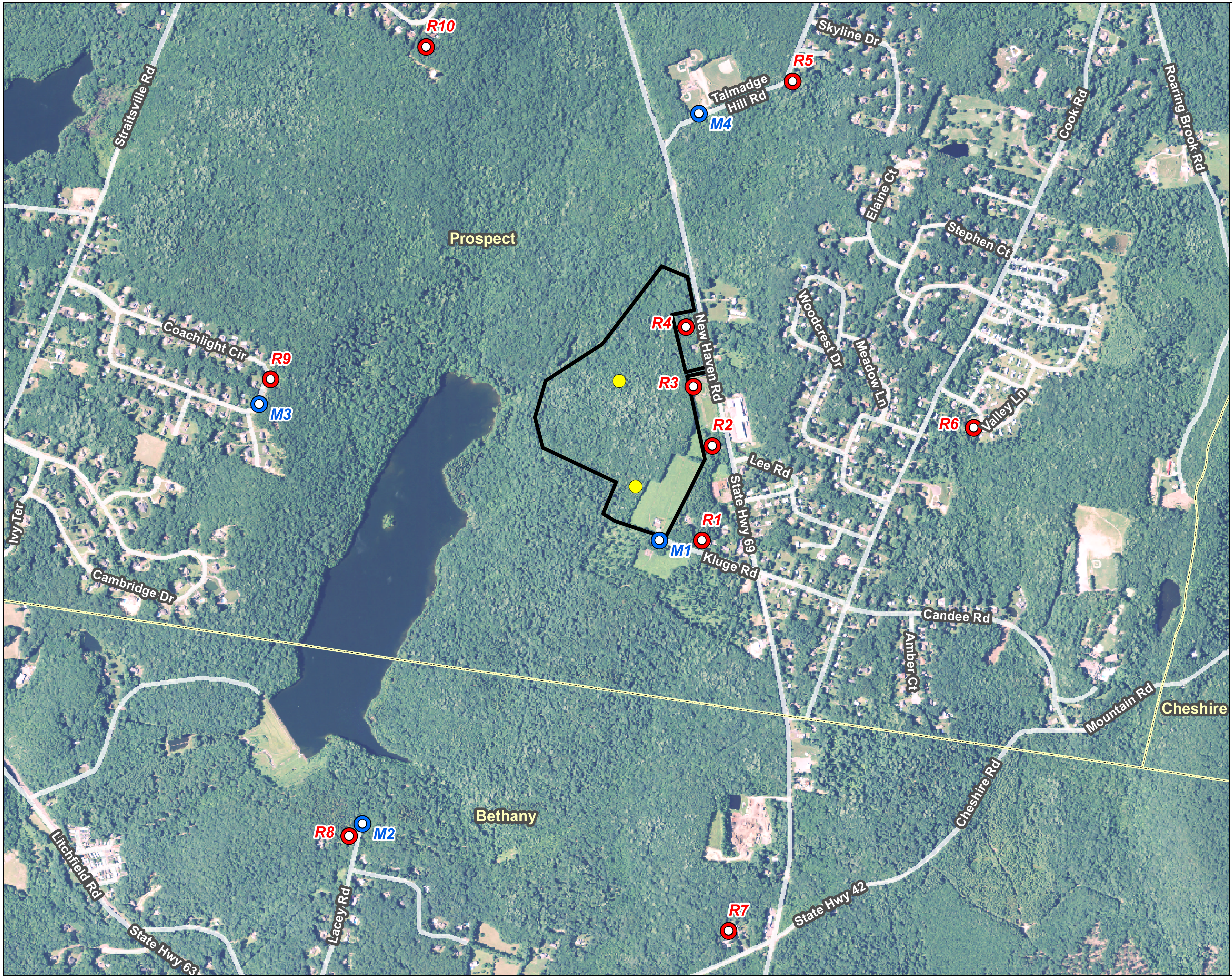
Receptor Location*	Daytime Noise Criteria**	Project Daytime Sound Levels	Nighttime Noise Criteria**	Project Nighttime Sound Levels
R1 – Kluge Road	61	45	51	43
R2 – New Haven Road (Route 69)	61	46	51	44
R3 – New Haven Road (Route 69)	61	46	51	44
R4 – New Haven Road (Route 69)	61	45	51	43
R5 – Talmadge Hill Road	61	29	51	27
R6 – Valley Lane	61	31	51	29
R7 – Cheshire Road (Route 42)	61	25	51	23
R8 – Lacey Road	61	26	51	24
R9 – Coachlight Circle	61	30	51	28
R10 – Putting Green Lane	61	28	51	26

* Refer to Figure 1 for receptor locations.
** Source /Emitter Zone (Industrial) to Listener/Receptor Zone (Residential (Class A))

The results of the noise analysis demonstrate that Wind Prospect will generate sound levels that range from 23 dBA to 46 dBA. These sound levels are below the daytime and nighttime noise criteria of 61 and 51 dBA respectively.

Conclusion

The results of the noise analysis demonstrate that the operation of two 1.6 MW wind turbines located at 178 New Haven Road in Prospect would meet the Town's noise ordinance and CTDEP's noise control regulations (Regulations of Connecticut State Agencies (RCSA), Title 22a, Section 22a-69-1 to 22a-69-7). This noise analysis evaluated the worst-case daytime and nighttime sound levels, based upon operational wind speeds, calculated sound levels for the receptor locations (residential area) adjacent to the Project site. It should be noted that the actual sound levels for the majority of operational time will be lower because the wind speeds will be lower.



Wind Prospect Noise Monitoring and Receptor Locations

178 New Haven Road
Prospect, CT

Legend

- Receptor Location
- Monitoring Location
- Proposed Wind Turbine Location
- Approximate Site Boundary
- Town Boundary

Base Map Source: 2008 aerial photograph with 1-meter resolution.

N

1,000 500 0 1,000
Feet

VHB *Vanasse Hangen Brustlin, Inc.*

\\ctmiddat\projects\41604.01\graphics\FIGURES\Wind_Prospect_Receptor_Locations_Map.pdf

Appendix

- Noise Monitoring Summary
- Sound Level Calculations
- Wind Assessment

Noise Monitoring Summary

Vanasse Hangen Brustlin, Inc.
Transportation | Land Development | Environmental Services

VHB
101 Walnut Street
Post Office Box 9151
Watertown, Massachusetts 02471
Phone (617) 924-1770
Fax (617) 924-2286

Noise Monitoring Data Sheet

Notes Taken By: Q. Tat

Date: April 1, 2010

Weather: Sunny, mid 60's F

Project Number: 41604.01

Location: Kluge Road
Prospect, CT

Start Time: 5:20 PM

Noise Monitor: Larson Davis 824

Duration: 20 min.

What is the name of the data run? Run#2

Measured Leq **48.1** **dBA**

Traffic Data	Volume	Speed
Automobiles		
Medium Trucks		
Heavy Trucks		

Sketch

Monitor setup across from gate to wireless equipment.

Notes:

What was the angle of exposure to the highway? Approximately 650 ft west of New Haven Rd (Rte 69).

Were there any objects blocking the highway noise sources? (Such as buildings or hills) ______

Were there other roadway or highway noise sources nearby? ______

Were there significant other non-highway noise sources? Birds, airplane

SLM & RTA Summary

Translated:	5-Apr-10	14:28:44		
File Translated:	Z:\41604.01\tech\Noise\Noise Monitoring Data\KlugeRd-Day.slmdl			
Model Number:	824			
Serial Number:	A0184			
Firmware Rev:	4.283			
Software Version:	3.12			
Name:	Enter Company Name			
Descr1:	Enter Address Line 1			
Descr2:	Enter Address Line 2			
Setup:	VHBGen1h.ssa			
Setup Descr:	VHB-Gen1hr-1sec			
Location:	Kluge Road			
Note 1:	Daytime			
Note 2:				

Overall Any Data

Start Time:	1-Apr-10	17:21:43
Elapsed Time:	20:01.1	

	A Weight	C Weight	Flat	
Leq:	48.1 dBA	60.2 dBC	61.6 dBF	
Spectra				
Start Time:	1-Apr-10	17:21:43	Run Time:	20:01.1
Freq Hz	Leq 1/1 Oct	Max 1/1 Oct	Min 1/1 Oct	
16	0.8	---	-7.5	
31.5	18.2	20	5.3	
63	33.2	52.7	21.7	
125	35.9	47.9	21.8	
250	36	52.1	19.3	
500	40.1	64.7	26	
1000	45.3	67.3	31.3	
2000	40.5	63.7	26.9	
4000	32.8	55.2	23.5	
8000	27.2	36.3	24.7	
16000	28.8	28.8	27.9	

L 90.00	44	dBA

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Watertown, Massachusetts 02471
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Noise Monitoring Data Sheet

Notes Taken By: Q. Tat

Date: April 1, 2010

Weather: Sunny, low 60's F

Project Number: 41604.01

Location: Coachlight Circle
Prospect, CT

Start Time: 6:00 PM

Noise Monitor: Larson Davis 824

Duration: 5 min.

What is the name of the data run? Run#3

Measured Leq **44.9** **dBA**

Traffic Data	Volume	Speed
Automobiles		
Medium Trucks		
Heavy Trucks		

Sketch

Monitor setup at northeast corner of Coachlight Circle and Cobblestone Court.

Notes:

What was the angle of exposure to the highway? N/A

Were there any objects blocking the highway noise sources? (Such as buildings or hills) N/A

Were there other roadway or highway noise sources nearby? Vehicle noise from local roadway

Were there significant other non-highway noise sources? wildlife (bird and critter noise), children playing

SLM & RTA Summary

Translated:	5-Apr-10	14:26:35		
File Translated:	Z:\41604.01\tech\Noise\Noise Monitoring Data\CoachlightCir-Day.slmdl			
Model Number:	824			
Serial Number:	A0184			
Firmware Rev:	4.283			
Software Version:	3.12			
Name:	Enter Company Name			
Descr1:	Enter Address Line 1			
Descr2:	Enter Address Line 2			
Setup:	VHBGen1h.ssa			
Setup Descr:	VHB-Gen1hr-1sec			
Location:	Coachlight Circle			
Note 1:	Daytime			
Note 2:				

Overall Any Data

Start Time:	1-Apr-10	17:58:45		
Elapsed Time:	05:11.1			
	A Weight	C Weight	Flat	
Leq:	44.9 dBA	58.4 dBC	61.4 dBF	
Spectra				
Start Time:	1-Apr-10	17:58:45	Run Time:	05:11.1
Freq Hz	Leq 1/1 Oct	Max 1/1 Oct	Min 1/1 Oct	
16	4.2	---	-7.5	
31.5	18.1	20	6.2	
63	28.1	30.7	19.4	
125	33.8	39.4	24.3	
250	38.5	35.9	21.3	
500	31.7	42.9	21.4	
1000	32.9	52.3	24.6	
2000	39.9	58.4	23.9	
4000	38.9	54.7	23.5	
8000	26.8	36.5	24.9	
16000	28.8	29.4	28.1	
L 90.00	41.3	dBA		

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101 Walnut Street
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Watertown, Massachusetts 02471
Phone (617) 924-1770
Fax (617) 924-2286

Noise Monitoring Data Sheet

Notes Taken By: Q. Tat

Date: April 1, 2010

Weather: Sunny, low 60's F

Project Number: 41604.01

Location: Lacey Road
Prospect, CT

Start Time: 6:20 PM

Noise Monitor: Larson Davis 824

Duration: 20 min.

What is the name of the data run? Run#4

Measured Leq **48.5** **dBA**

Traffic Data	Volume	Speed
Automobiles		
Medium Trucks		
Heavy Trucks		

Sketch

Monitor setup at end of Lacey Road.

Notes:

What was the angle of exposure to the highway? Approximately 2,400 ft north of Cheshire Rd (Rte 42)

Were there any objects blocking the highway noise sources? (Such as buildings or hills) N/A

Were there other roadway or highway noise sources nearby?

Were there significant other non-highway noise sources? wildlife (bird and critter noise), airplane

SLM & RTA Summary

Translated:	5-Apr-10	14:29:34		
File Translated:	Z:\41604.01\tech\Noise\Noise Monitoring Data\LaceyRd-Day.slmdl			
Model Number:	824			
Serial Number:	A0184			
Firmware Rev:	4.283			
Software Version:	3.12			
Name:	Enter Company Name			
Descr1:	Enter Address Line 1			
Descr2:	Enter Address Line 2			
Setup:	VHBGen1h.ssa			
Setup Descr:	VHB-Gen1hr-1sec			
Location:	Lacey Road			
Note 1:	Daytime			
Note 2:				

Overall Any Data

Start Time:	1-Apr-10	18:18:15
Elapsed Time:	20:04.6	

	A Weight	C Weight	Flat
Leq:	48.5 dBA	58.5 dBC	59.9 dBF

Spectra

Start Time:	1-Apr-10	18:18:15	Run Time:	20:04.6

Freq Hz	Leq 1/1 Oct	Max 1/1 Oct	Min 1/1 Oct
16	-0.2	---	---
31.5	17.7	18.8	3
63	29.1	33.4	19.6
125	35	44.4	21
250	40.7	58.5	19.8
500	35.4	44.3	23.5
1000	32.5	36.3	26.5
2000	45	41.6	25.2
4000	43.3	40	25
8000	25.9	26.1	24.7
16000	28.8	28.9	28

L 90.00 41.6 dBA

VHB
101 Walnut Street
Post Office Box 9151
Watertown, Massachusetts 02471
Phone (617) 924-1770
Fax (617) 924-2286

Noise Monitoring Data Sheet

Notes Taken By: Q. Tat

Date: April 2, 2010

Weather: Clear, mid 40's F

Project Number: 41604.01

Location: Kluge Road
Prospect, CT

Start Time: 3:30 AM

Noise Monitor: Larson Davis 824

Duration: 15 min.

What is the name of the data run? Run#9

Measured Leq **39.6** **dBA**

Traffic Data	Volume	Speed
Automobiles		
Medium Trucks		
Heavy Trucks		

Sketch

Monitor setup across from gate to wireless equipment.

Notes:

What was the angle of exposure to the highway? Approximately 650 ft west of New Haven Rd (Rte 69).

Were there any objects blocking the highway noise sources? (Such as buildings or hills)

Were there other roadway or highway noise sources nearby?

Were there significant other non-highway noise sources? Birds and critter noise

SLM & RTA Summary

Translated:	5-Apr-10	14:29:10		
File Translated:	Z:\41604.01\tech\Noise\Noise Monitoring Data\KlugeRd-Night.slmdl			
Model Number:	824			
Serial Number:	A0184			
Firmware Rev:	4.283			
Software Version:	3.12			
Name:	Enter Company Name			
Descr1:	Enter Address Line 1			
Descr2:	Enter Address Line 2			
Setup:	VHBGen1h.ssa			
Setup Descr:	VHB-Gen1hr-1sec			
Location:	Kluge Road			
Note 1:	Nighttime			
Note 2:				

Overall Any Data

Start Time:	2-Apr-10	3:32:30
Elapsed Time:	15:03.8	

	A Weight	C Weight	Flat
Leq:	39.6 dBA	48.9 dBC	51.8 dBF

Spectra

Start Time:	2-Apr-10	3:32:30	Run Time:	15:03.8

Freq Hz	Leq 1/1 Oct	Max 1/1 Oct	Min 1/1 Oct
16	-4.9	---	---
31.5	4.9	13	-7.5
63	20.7	36.2	8.1
125	24.5	43.5	11.9
250	21.9	28.2	14.6
500	30.8	41.3	21.7
1000	35.9	49.1	23.1
2000	31.7	43.8	23.8
4000	30.3	33.1	23.2
8000	26.1	26.4	25
16000	28.9	29	28.2

L 90.00	35	dBA

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Transportation | Land Development | Environmental Services

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101 Walnut Street
Post Office Box 9151
Watertown, Massachusetts 02471
Phone (617) 924-1770
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Noise Monitoring Data Sheet

Notes Taken By: Q. Tat

Date: April 2, 2010

Weather: Clear, mid 40's F

Project Number: 41604.01

Location: Fusco Field
Prospect, CT

Start Time: 3:55 AM

Noise Monitor: Larson Davis 824

Duration: 15 min.

What is the name of the data run? Run#10

Measured Leq **41.5** **dBA**

Traffic Data	Volume	Speed
Automobiles		
Medium Trucks		
Heavy Trucks		

Sketch

Monitor setup at gate on Talmadge Hill Rd.

Notes:

What was the angle of exposure to the highway? Approximately 650 ft north of New Haven Rd (Rte 69)

Were there any objects blocking the highway noise sources? (Such as buildings or hills) ____________

Were there other roadway or highway noise sources nearby? ____________

Were there significant other non-highway noise sources? Critter noise from surrounding woods.

SLM & RTA Summary

Translated:	5-Apr-10	14:28:16		
File Translated:	Z:\41604.01\tech\Noise\Noise Monitoring Data\FuscoField-Night.slmdl			
Model Number:	824			
Serial Number:	A0184			
Firmware Rev:	4.283			
Software Version:	3.12			
Name:	Enter Company Name			
Descr1:	Enter Address Line 1			
Descr2:	Enter Address Line 2			
Setup:	VHBGen1h.ssa			
Setup Descr:	VHB-Gen1hr-1sec			
Location:	Fusco Field			
Note 1:	Nighttime			
Note 2:				

Overall Any Data

Start Time:	2-Apr-10	3:53:51
Elapsed Time:	15:08.3	

	A Weight	C Weight	Flat
Leq:	41.5 dBA	49.8 dBC	52.4 dBF

Spectra

Start Time:	2-Apr-10	3:53:51	Run Time:	15:08.3

Freq Hz	Leq 1/1 Oct	Max 1/1 Oct	Min 1/1 Oct
16	-2.6	12.2	-7.5
31.5	7.6	18.4	-7.5
63	19.1	27.4	7.4
125	25.9	35.3	12.5
250	28.7	40.3	14.8
500	33	48	23
1000	36.8	50	25.7
2000	35.6	42	27.8
4000	32.1	35.1	25.4
8000	26	26.1	24.8
16000	28.9	29	28.2

L 90.00 37.8 dBA

Sound Level Calculations

Prospect Wind Turbine
Noise Model - Daytime Conditions (9 m/s)

hub height	h =	328	ft
sound power level	Lw =	106	db
absorption coefficent	a =	0.005	db/m

Background Levels, L90 (dBA)	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10
Wind Turbine 1	35.0	35.0	35.0	35.0	37.8	35.0	35.0	50.6	48.6	48.6
Wind Turbine 2	35.0	35.0	35.0	35.0	37.8	35.0	35.0	50.6	48.6	48.6

Horizontal Distance to Rec. (feet)	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10
Wind Turbine 1	948	970	1284	1856	4810	3801	5012	4983	4197	5383
Wind Turbine 2	1982	1256	829	960	3836	3957	6188	5836	3844	4267

Distance to Rec., R (feet)	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10
Wind Turbine 1	1003	1024	1325	1885	4821	3815	5023	4994	4210	5393
Wind Turbine 2	2009	1298	892	1014	3850	3971	6197	5845	3858	4280

Distance to Rec., R (meters)	306	312	404	575	1470	1163	1531	1522	1283	1644
	612	396	272	309	1174	1211	1889	1782	1176	1305

Sound pressure level	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10
with atmospheric absorp.	43.8	43.6	40.9	36.9	24.3	27.9	23.6	23.7	26.4	22.5
Lp=Lw-20logR-11-ar	36.2	41.1	45.0	43.6	27.7	27.3	20.0	21.1	27.7	26.2
	44.5	**45.5**	**46.4**	**44.5**	**29.4**	**30.6**	**25.2**	**25.6**	**30.1**	**27.7**

max 46.4 min 25.2

Prospect Wind Turbine
Noise Model - Nightime Conditions (8 m/s)

hub height	h =	328	ft	
sound power level	Lw =	104	db	Average wind speed of 8 m/s
absorption coefficent	a =	0.005	db/m	

Background Levels, L90 (dBA)	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10
Wind Turbine 1	35.0	35.0	35.0	35.0	37.8	35.0	35.0	**50.6**	**48.6**	**48.6**
Wind Turbine 2	35.0	35.0	35.0	35.0	37.8	35.0	35.0	**50.6**	**48.6**	**48.6**

Horizontal Distance to Rec. (feet)	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10
Wind Turbine 1	948	970	1284	1856	4810	3801	5012	4983	4197	5383
Wind Turbine 2	1982	1256	829	960	3836	3957	6188	5836	3844	4267

Distance to Rec., R (feet)	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10
Wind Turbine 1	1003	1024	1325	1885	4821	3815	5023	4994	4210	5393
Wind Turbine 2	2009	1298	892	1014	3850	3971	6197	5845	3858	4280

Distance to Rec., R (meters)	306	312	404	575	1470	1163	1531	1522	1283	1644
	612	396	272	309	1174	1211	1889	1782	1176	1305

Sound pressure level	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10
with atmospheric absorp.	41.8	41.6	38.9	34.9	22.3	25.9	21.6	21.7	24.4	20.5
Lp=Lw-20logR-11-ar	34.2	39.1	43.0	41.6	25.7	25.3	18.0	19.1	25.7	24.2
	42.5	**43.5**	**44.4**	**42.5**	**27.4**	**28.6**	**23.2**	**23.6**	**28.1**	**25.7**

max 44.4 min 23.2

Wind Assessment

BNE ENERGY

PROSPECT, CT WIND ASSESSMENT

The seal on this document
Authorized by
Hala Ballouz, P.E.
On April 12, 2010

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Executive Summary

Electric Power Engineers, Inc. (EPE) completed the following wind assessment for BNE Energy's (BNE) Prospect CT proposed wind project that is located in New Haven County, Connecticut. The site is shown on the maps of the section titled **"Site Layout"**. EPE used the wind data measured at the meteorological tower installed at the site approximately two miles South of Prospect town. The measurements covered nearly 14.7 months, ranging from *11-04-2008 to 01-24-2010.* The assessment was run using WindPro©.

The 14.7 month site measured wind data indicated average wind speeds of approximately 5.81 m/s at 60 m, and extrapolated wind speeds of 6.5 m/s at 80 m, and 7.1 m/s at 100 m. The predominant wind direction is from the West and the North-West as shown in the Wind Rose of ***Figure 4***.

EPE studied in this report several turbine types in order to provide insight on preliminary energy yeild capability. In this analysis, turbines were placed on the Prospect site as shown in the figures of the section titled **"Site Layout"**. The **"Energy Calculations"** section provides more details on this analysis.

This report calculated capacity factors, *using the 14.7 month site measured wind speeds*, ranging from **20% to 35%** at 80 m hub height, after the deduction of typical wind farm related losses that are assumed to be around 10%. The findings of this analysis revealed that the "**Vestas V100 1.8 MW**" provided the highest capacity factor of **35.2%** at 80 m hub height, and up to **39.8%** at 95 m hub height after the deduction of typical wind farm related losses; the "**GE 1.6 XLE 1.6 MW**" also provided high capacity factors of **30.6%** at 80 m hub height, and **36%** at 100 m hub height. The Vestas V100 are class II turbines whereas the GE XLE 1.6 are Class III turbines, and the applicability of these turbines to the Prospect site must be analyzed before assuming the adoption of these turbines in any additional studies.

Energy Yield Calculations

The following table summarizes the capacity factor analysis EPE conducted with thirteen (13) wind turbine types per BNE's request. For more details on the wind turbine placement, please refer to the figures of the section titled **"Site Layout"**.

The "**Vestas V100 1.8 MW**" produced better capacity factors than the other turbines analyzed in this report. The capacity factor figures are calculated after deduction of 10% typical electrical and other losses. The applicability of the Vestas V100 1.8 MW turbines to the Prospect site however remains to be studied with Vestas in terms of turbulence levels at the site, the Vestas V100 being a Class II turbine.

The "**GE 2.5 XL 2.5 MW**" at 100 m hub height provided the most annual energy yield of 7,070 MWhr per year after deduction of 10% typical electrical and other losses, that machine being one of the largest generators considered in this analysis. The "**Vestas V100 1.8 MW**" at 95 m hub height follows next in annual energy yield production of 6,279 MWhr per year, as shown in the following table. However, both of these machines do not meet the fall zone requirements from the project boundary, and further investigation is necessary to mitigate this requirement. Alternatively, placing two "**Fuhrlander 600 kW**" turbines at 50 m hub height within the property site will still meet the fall zone requirements and may provide as much as 2,086 MWhr per year.

The capacity factors and annual energy yeild estimates shown in the table below are calculated using the site specific 14.7 month measured data. The calculations used an air density of 1.248 kg/m^3 that was adopted from the regional reference at the New Haven/Tweed meteo station, approximately 20 km from the Prospect CT site. Note that this value is adjusted to our site internally by Windpro to be 1.21 kg/m^3.

It is to be noted that a humidity sensor was installed at the prospect tower in September 2009. Using the data recorded by the humidity, pressure as well as temperature sensors provides means to calculate the air density at site to be 1.184 kg/m^3. This air density is fairly close to the regional reference. However, the duration of the recorded data is not long enough to be adopted in the energy calculations of this report, and the regional reference continues to be adopted for air density in the analysis underlying this report.

Table 1. Annual average Capacity Factor and energy yield estimates for several turbine types using 14.7 months of measured wind data

	# of Turbines	Hub Height	Rotor Diameter	Capacity Factor Before Deduction of 10% Losses	Capacity Factor After Deduction of 10% Losses	Annual Energy Yield in MWhr after Deduction of 10% losses
GE 2.5 XL 2.5 MW	1*	100 m	100 m	**35.8%**	**32.3%**	**7,070.1**
GE 2.5 XL 2.5 MW	1*	85 m	100 m	**31.3%**	**28.2%**	**6,178.9**
GE 1.6 XLE 1.6 MW	1*	100 m	82.5 m	**40.0%**	**36.0%**	**5,053.4**
GE 1.6 XLE 1.6 MW	1*	80 m	82.5 m	**33.6%**	**30.2%**	**4,235.3**
GE 1.5 SLE 1.5 MW	1*	100 m	77 m	**35.9%**	**32.3%**	**4,249.3**
GE 1.5 SLE 1.5 MW	1*	80 m	77 m	**29.8%**	**26.8%**	**3,528.0**
Nordex N90 HS 2.5 MW	1*	80 m	90 m	**26.0%**	**23.4%**	**5,127.0**
Vestas V100 1.8 MW	1*	95 m	100 m	**44.2%**	**39.8%**	**6,279.9**
Vestas V100 1.8 MW	1*	80 m	100 m	**39.1%**	**35.2%**	**5,552.6**
Vestas V90 3.0 MW	1*	80 m	90 m	**22.5%**	**20.3%**	**5,336.5**
Vestas V90 1.8 MW	1*	95 m	90 m	**38.6%**	**34.8%**	**5,483.6**
Vestas V90 1.8 MW	1*	80 m	90 m	**33.8%**	**30.4%**	**4,797.5**
Gamesa G90 2 MW	1*	100 m	90 m	**37.8%**	**34.0%**	**5,963.4**
Gamesa G90 2 MW	1*	78 m	90 m	**31.0%**	**27.9%**	**4,889.0**
Gamesa G58 850 kW	1	65 m	58 m	**25.7%**	**23.2%**	**1,725.2**
Gamesa G58 850 kW	1	55 m	58 m	**22.9%**	**20.6%**	**1,536.4**
Fuhrlander 1250 1.3 MW	1	70 m	62 m	**19.1%**	**17.2%**	**1,884.2**
Fuhrlander 1250 1.3 MW	1	50 m	62 m	**13.6%**	**12.2%**	**1,340.1**
Fuhrlander 600 600 kW	1	75 m	50 m	**31.5%**	**28.3%**	**1,490.5**
Fuhrlander 600 600 kW	2	50 m	50 m	**22.0%**	**19.8%**	**2,086.4**
Unison U57 750 kW	1	68 m	57 m	**27.8%**	**25.0%**	**1,645.0**
Mitsubishi MWT-1000 1MW	1	69 m	61.4 m	**23.8%**	**21.4%**	**1,876.3**
Mitsubishi MWT-1000 1MW	1	60 m	61.4 m	**20.3%**	**18.3%**	**1,603.9**

This turbine does not meet fall zone requirements from the project boundary, and further investigation is necessary to mitigate this requirement.

Site Layout

The figures below show the Prospect CT meteorological tower location approximately two miles South of Prospect, Connecticut, as well as the wind turbine layout considered in this study.

EPE based turbine placement on the following criteria:

- 2 X rotor diameter spacing between turbines in 1 row (cross wind). Note that generally 4 X rotor diameter is recommended, however, for this project, and due to site limitations, a smaller spacing was assumed with the understanding of negative impact on turbine power production performance
- 5 X rotor diameter spacing in between rows of turbines. Note that generally 7 X rotor diameter is recommended, however, for this project, and due to site limitations, a smaller spacing was assumed with the understanding of negative impact on turbine power production performance
- 1.5 X total turbine height (fall height) to the boundary of the site.

Figure 1. Prospect CT meteorological location

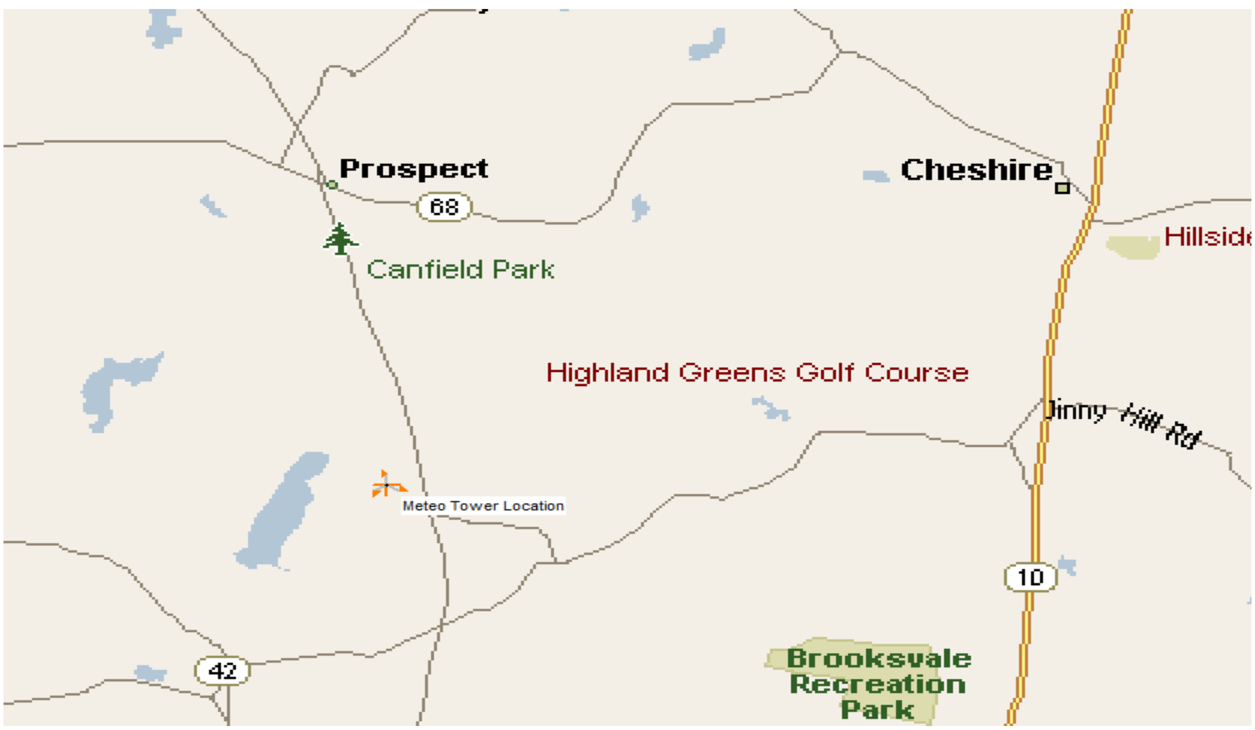
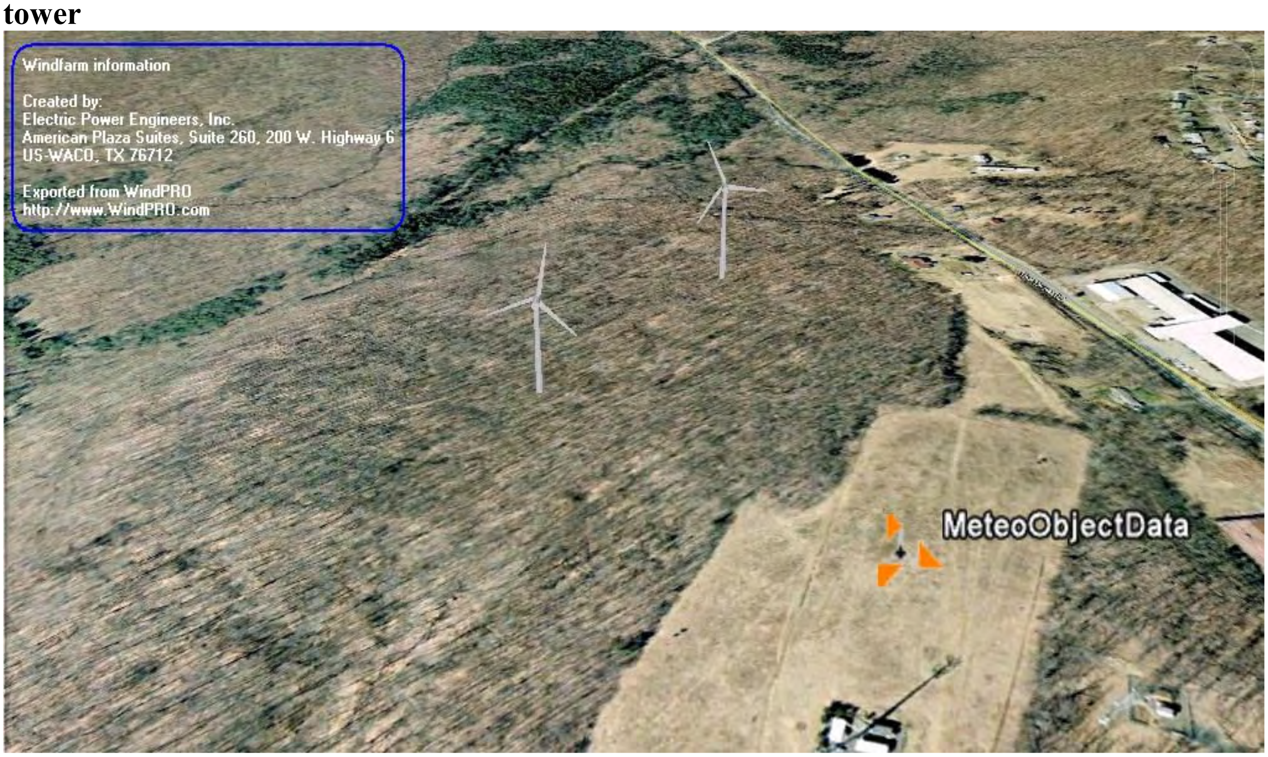


Figure 2. Map sketch of one wind turbine placement next to the meteorological tower

Figure 3. Map sketch of two wind turbines placement next to the meteorological tower



Wind Speed Analysis

The 14.7 month site measured wind data at Prospect indicated average wind speeds of approximately 5.81 m/s at 60 m, and extrapolated wind speeds of 6.5 m/s at 80 m, and 7.1 m/s at 100 m. Please refer to the monthly breakdown in ***Table 5*** for monthly average breakdown.

The gaps identified in the site measured wind data amount to about 2.30% of the total measurements. These gaps are most likely due to icing or temporary failure of any one anemometer. The gaps were replaced in this analysis according to the following methodology:

- If one of the anemometers at a certain height failed, then the gaps in the data were substituted from the data of the other working anemometer.
- If both anemometers at a certain height failed, the gaps in the data were substituted from the Colebrook CT measured data for the same time period when available, where Colebrook measurements are recorded by BNE at the site located to the West of Winsted Norfolk Road 44, approximately 55 Km from Prospect. However, if Colebrook CT measured data was not available for this time period, then the gaps in Prospect CT measured data were substituted with the data recorded on the nearest possible days at the Prospect CT site and in the same time frame.

The following table summarizes the mean wind speeds measured at the Prospect CT site in the second column corresponding to the sensors indicated in the first column.

Table 2. Mean wind speeds

Height of measurements	Mean Wind Speeds for the 14.7 months of Site Measured Wind Data
40 m – C1	5.07 m/s
40 m – C2	4.96 m/s
50 m – C3	5.49 m/s
50 m – C4	5.28 m/s
60 m – C5	5.79 m/s
60 m – C6	5.81 m/s
Extrapolated to 80 m	6.5 m/s
Extrapolated to 100 m	7.1 m/s

Table 3. Monthly site measured mean wind speeds in m/s at 60 m – C6

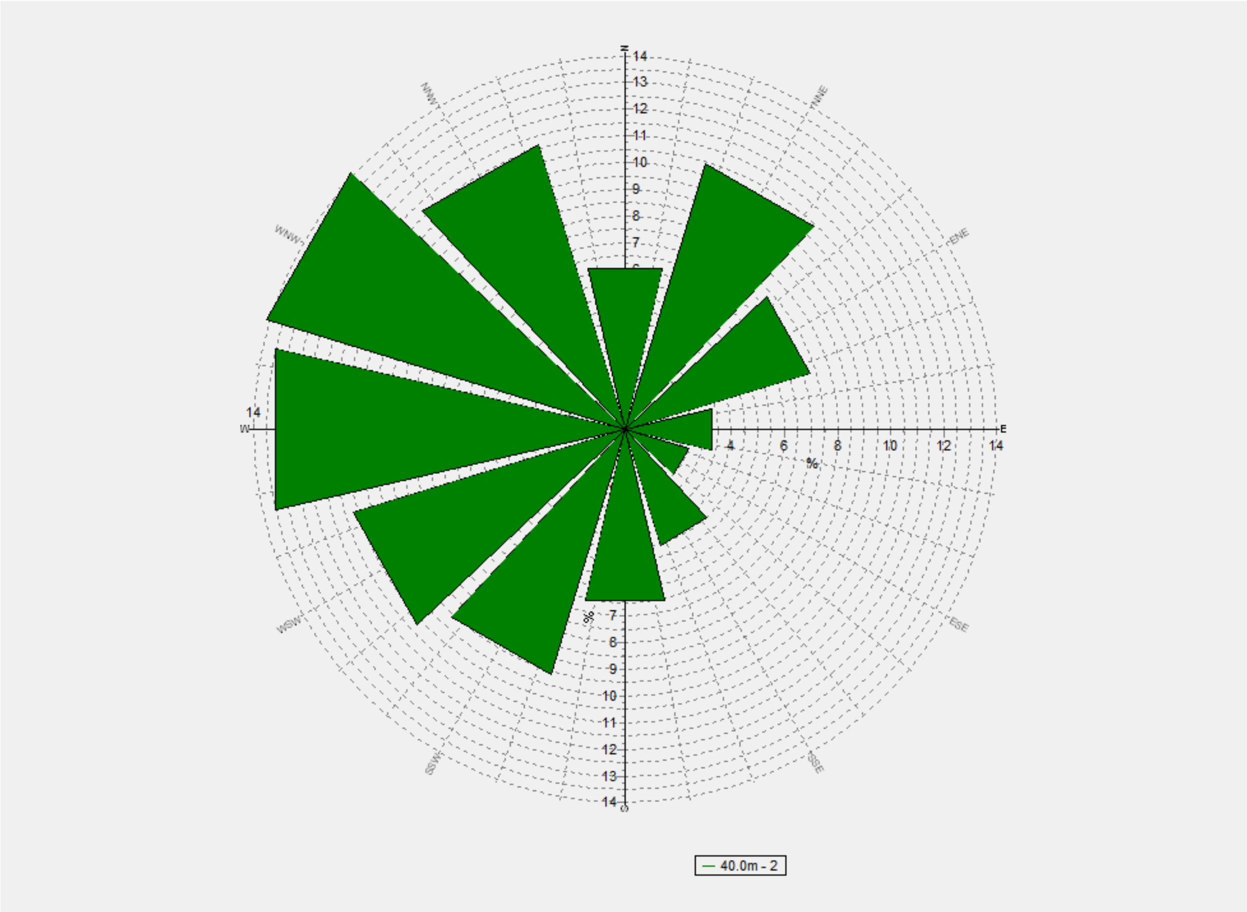
Months	Site average measured wind speeds at 60 m			Mean of all data	Mean of Months
	2008	2009	2010		
January		5.48	6.36	5.87	5.92
February		6.97		6.97	6.97
March		5.97		5.97	5.97
April		6.14		6.14	6.14
May		5.25		5.25	5.25
June		4.44		4.44	4.44
July		4.74		4.74	4.74
August		4.69		4.69	4.69
September		5.39		5.39	5.39
October		6.01		6.01	6.01
November	5.81	6.18		6.01	5.99
December	6.71	7.15		6.93	6.93
Mean of Months	5.70				
Mean of all data	**5.81**				

Note that WindPro uses the mean of all data in the calculations.

Wind Rose

The following figure shows the wind rose for the 14.7 month site measured wind data for the Prospect, CT proposed wind project.

Figure 4. Wind Rose at the height of 40 meters for the 14.7 month site measured wind data



Knowing that the winds were going to be from the West and the North West, the location of the Prospect CT wind turbine(s), in this analysis, was chosen accordingly in favor of collecting the highest possible amount of wind energy as shown in ***Figure 2*** and ***Figure 3***. The wind turbines were placed westerly facing and on a ridge which makes the collected wind speeds higher.

Wind Data Statistics

The following tables and graphs provide wind data statistics for the 14.7 month site measured wind data.

Table 4. Prospect CT site measured wind statistics from 11-04-2008 till 01-24-2010

	Signal	Unit	Mean	Std dev	Min	Max
40.0m - 1	Mean wind speed, all	m/s	5.07		0.31	19.2
40.0m - 1	Wind direction, all	Degrees	290.8		0	359
40.0m - 1	Turbulence intensity, all		0.2025	0.0998	0	2.2264
40.0m - 2	Mean wind speed, all	m/s	4.96		0.26	19.1
40.0m - 2	Wind direction, all	Degrees	290.8		0	359
40.0m - 2	Turbulence intensity, all		0.2215	0.1250	0	2.0526
50.0m - 3	Mean wind speed, all	m/s	5.49		0.23	20.2
50.0m - 3	Wind direction, all	Degrees	290.8		0	359
50.0m - 3	Turbulence intensity, all		0.1804	0.0943	0	2.6
50.0m - 4	Mean wind speed, all	m/s	5.28		0.23	20.2
50.0m - 4	Wind direction, all	Degrees	290.8		0	359
50.0m - 4	Turbulence intensity, all		0.2114	0.1345	0	1.3667
60.0m - 5	Mean wind speed, all	m/s	5.79		0.23	20.5
60.0m - 5	Wind direction, all	Degrees	290.8		0	359
60.0m - 5	Turbulence intensity, all		0.1692	0.0986	0	1.6364
60.0m - 6	Mean wind speed, all	m/s	5.81		0.23	20.6
60.0m - 6	Wind direction, all	Degrees	290.8		0	359
60.0m - 6	Turbulence intensity, all		0.1668	0.0909	0	1.7143

Figure 5. Daily average wind speeds at 60 meters – (m/s) for the site measured wind data

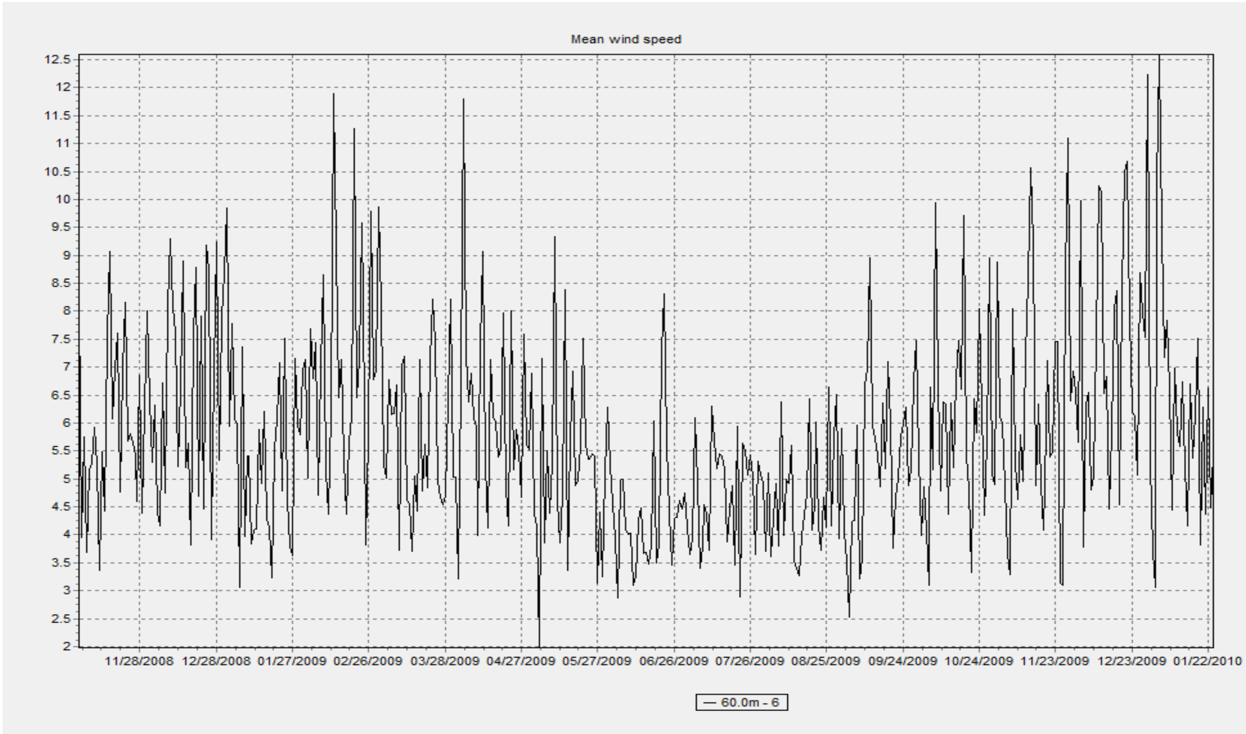


Figure 6. Monthly average wind speeds at 60 meters – (m/s) for the site measured wind data

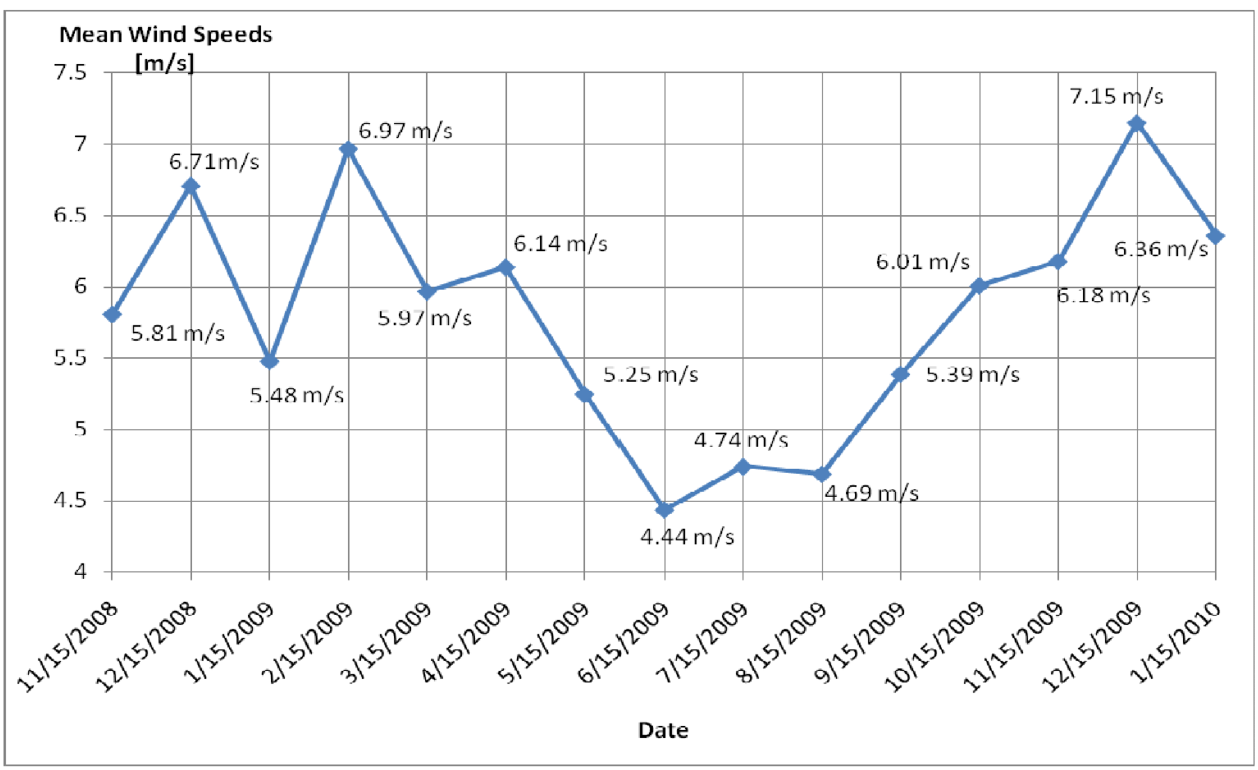


Table 5. Summary of the monthly mean wind speeds for the Prospect 14.7 months of measured data at 60, 80 and 100 meters in m/s

	60m-C6 Site measured mean wind speed	80m Extrapolated mean wind speed	100m Extrapolated mean wind speed
January	5.87	6.6	7.2
February	6.97	7.9	8.7
March	5.97	6.7	7.3
April	6.14	7.0	7.6
May	5.25	6.0	6.5
June	4.44	5.0	5.5
July	4.74	5.4	5.9
August	4.69	5.3	5.7
September	5.39	6.0	6.5
October	6.01	6.7	7.3
November	6.01	6.7	7.3
December	6.93	7.7	8.4
Mean of all data	**5.81**	**6.5**	**7.1**