DEVINE MILLIMET

ATTORNEYS AT LAW

February 14, 2013

THOMAS B. GETZ
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VIA HAND DELIVERY

NH Site Evaluation Committee
c/o Jane Murray, Secretary
NH Department of Environmental Services
29 Hazen Drive, P.O. Box 95
Concord, NH 03302-0095

Re: Petition for Jurisdiction - Timbertop Wind I, LLC
SEC Docket No. 2012-04

Dear Ms. Murray:

Enclosed please find an original and 18 copies of Timbertop Wind I, LLC's Response to Joint Petition to Intervene and Objection to Motion to Deny or Dismiss of the Boards of Selectmen of the Towns of New Ipswich and Temple.

In addition, Timbertop wishes to point out an error in its Petition for Jurisdiction at p. 6, fn. 2. The last sentence of the footnote makes a reference to Board Member Lowry, who is a member of the Temple Planning Board. The correct reference should be to New Ipswich Planning Board Member Liz Freeman.

Very truly yours,

Thomas B. Getz

TBG:aec

Enclosures

cc: Service List (Electronically)

STATE OF NEW HAMSPHIRE
SITE EVALUATION COMMITTEE

Docket No. 2012-04
Timbertop Wind I, LLC
Petition for Jurisdiction

RESPONSE TO JOINT PETITION TO INTERVENE AND OBJECTION TO MOTION TO DENY OR DISMISS OF THE BOARDS OF SELECTMEN FOR THE TOWNS OF NEW IPSWICH AND TEMPLE

On January 25, 2013, the Boards of Selectmen for the Towns of New Ipswich and Temple (Towns) filed a joint petition to intervene in the above-captioned proceeding. As part of that Joint Petition, the Towns request that the Petition for Jurisdiction of Timbertop Wind I, LLC (Timbertop) be dismissed. Timbertop does not object to the Towns' intervention but it does disagree with the Towns' statement of position in numerous respects and object to the request to dismiss. In addition, on February 5, 2013, the Towns filed a motion to dismiss or deny Timbertop's petition for jurisdiction, which restates and expands some positions set forth in their petition to intervene and makes additional arguments. Timbertop's response and objection to both documents is set forth below.

I. Project Description

The Towns assert that Timbertop "provides essentially no information concerning the design of its project, the location of its towers, its transmission lines, its access roads, or any other facilities." (emphasis in original) Joint Petition, p.1. In its December 21, 2012 Petition for Jurisdiction, Timbertop described the size and location of its proposed project, the history of its interaction with the Towns, and the development work it has undertaken. Attached hereto are documents evidencing such development work and a current map depicting property boundaries, turbine locations, wetlands and access roads.

The Site Evaluation Committee (SEC) in its order asserting jurisdiction over the Antrim Wind Energy project, issued August 10, 2011, in SEC Docket No. 2011-02, stated at p. 20 that the Committee "does not require a detailed description of the Project to decide whether the exercise of jurisdiction over the Project is consistent with the findings and purpose articulated in RSA 162-H:1. The issue of the Committee's jurisdiction is ripe for adjudication as long as the Committee has sufficient facts to determine if the exercise of the Committee's jurisdiction is consistent with the findings and purpose articulated in in RSA 162-H:1."

As explained further below, throughout their two filings the Towns appear to conflate the sufficiency of the facts alleged in a petition for jurisdiction and the sufficiency of the evidence on which the SEC makes a determination to assert jurisdiction. Each issue is addressed in turn.

First, Timbertop sufficiently described its project in its petition, both in terms of the standard espoused by the SEC, noted above, and in comparison to the project description filed by Antrim Wind, LLC in SEC Docket No. 2011-02, to warrant SEC review. See, Antrim Petition for Jurisdiction (March 11, 2011) pp.3-6. Second, the attached documents, which supplement the description of the project, constitute sufficient evidence from which the SEC may conclude it has information "adequate to make a determination as to whether or not the Committee should assert its jurisdiction and require the filing of a detailed application." See, Antrim Jurisdictional Order, p. 20.

Accordingly, Timbertop satisfied its burden of going forward by stating a claim on which relief can be granted. Furthermore, though not required at this juncture, Timbertop has provided documentary evidence, public record information, and legal argument that would satisfy its ultimate burden of proof.[1]

II. Zoning Ordinances

The Towns point out that their zoning ordinances allow for variances and provide for joint review but that Timbertop has not applied for a variance or joint review. They also state that Timbertop has not explained why it could not seek both. Joint Petition, p. 4.

Timbertop could seek variances and could seek joint review but neither effort would be an adequate remedy to the situation that Timbertop confronts. As a preliminary matter, there is no requirement that Timbertop exhaust its remedies at the municipal level before it seeks SEC review. More important, the variance procedure presumes a reasonable ordinance to which a party seeks an exception for some special circumstances. In this instance, the Towns have adopted ordinances governing large wind energy systems that do not reasonably balance the findings and purpose of RSA 162-H:1. Finally, while joint review may be permissible, that process does not require that the Towns come to the same decisions, nor does the process provide for consolidated appeals. As a result, issues would not be resolved in an integrated fashion, nor would undue delay be avoided, which the New Hampshire Supreme Court has concluded is the legislative intent of the statutory scheme underlying RSA 162-H. See, *Public Service Company of New Hampshire v. Town of Hampton*, 120 NH 68, 70 (1980).

[1] In section IV, Timbertop explains that Site 201.03 governing motions for declaratory ruling does not apply here. Nevertheless, an adequate statutory and factual basis for an SEC determination has been provided.

III. SEC Review/Certificate Required

A. Joint Petition to Intervene

The Towns assert that Timbertop "offers no explanation as to why review by the Committee is required to accomplish the purposes of RSA 162-H, as opposed to merely advantageous or convenient for its own purposes." (emphasis in original) Joint Petition, p. 4. The Towns also state that "[t]here is no 'right' to review by [the] Committee simply because a potential applicant alleges practical difficulty or inconvenience." (emphasis in original) Joint Petition, p. 5. The Towns further state that the issue to be decided by the Committee is whether "review by the Committee is required to accomplish the purposes of RSA 162-H:1." (emphasis in original) *Id.*

It is not accurate to say that Timbertop offers no explanation as to why SEC review is required. As set forth in its Petition for Jurisdiction, at p. 1, Timbertop seeks SEC jurisdiction because the Towns' ordinances "impose substantive requirements inconsistent with SEC precedent and state law" and because "separate reviews at the town level would result in duplicative, inefficient and untimely processes." Furthermore, it is not accurate to say that Timbertop seeks SEC jurisdiction because it is "merely advantageous or convenient." The Towns' characterization ignores the unreasonableness of the large wind energy system ordinances and minimizes the significant impact of those ordinances. It is fundamentally unfair, moreover, that the Towns have determined to treat wind projects differently in terms of substantive requirements than the SEC has and differently than the way the Legislature requires towns to treat projects under 5 MW. Consequently, it would be "consistent with the findings and purposes of RSA 162-H:1" for the SEC to determine that Timbertop requires a certificate of site and facility.

B. Motion to Deny or Dismiss

The Towns contend that Timbertop "fails to meet its burden to demonstrate that a certificate is required 'consistent with the findings and purposes set forth in RSA 162-H:1.'" (emphasis in original) Motion to Deny or Dismiss, p.2. In a similar vein, they also contend that Timbertop "provides no information that demonstrates its project is required under RSA 162-H:1." (emphasis in original) Id., p.4.

The Towns misinterpret the statute and, as a consequence, Timbertop's petition. RSA 162-H:2, XII defines renewable energy facility to include a project, "which the committee determines requires a certificate, consistent with the findings and purposes set forth in RSA 162-H:1." Timbertop requires a certificate because the Towns have adopted ordinances that include substantive requirements inconsistent with state law and SEC precedent and because

Timbertop's project is located in two municipalities. It would be consistent with the findings and purposes of RSA 162-H:1 for the SEC to assert jurisdiction, as they are set forth in the SEC's Jurisdictional Order issued August 10, 2011 in SEC Docket No. 2011-02, at p.21-22, namely:

1. to maintain a balance between the environment and the need for new energy facilities in New Hampshire;
2. that undue delay in the construction of needed facilities be avoided; and
3. that full and timely consideration of environmental consequences be provided;
4. that all entities planning to construct facilities in the state be required to provide full and complete disclosure to the public of such plans'
5. that the state ensure that the construction and operation of energy facilities is treated as a significant aspect of land-use planning in which all environmental, economic, and technical issues are resolved in an integrated fashion;
6. to assure that the state has an adequate and reliable supply of energy in conformance with sound environmental principles.

Clearly, the SEC's assertion of jurisdiction, essentially by definition, would be consistent with these findings and purposes inasmuch as the SEC would maintain the required balance, avoid undue delay, require full disclosure, ensure treatment as a significant aspect of land-use planning, and assure an adequate and reliable supply of energy in conformance with sound environmental principles.

The SEC's jurisdiction, and a certificate, is required because the Towns' jurisdiction would not be consistent with the findings and purposes. Most notable, leaving jurisdiction with the Towns: does not maintain the appropriate balance because of the substantive standards they have adopted; would lead to undue delay because variances would need to be pursued; and, issues are not resolved in an integrated fashion because review would be conducted by different towns with different ordinances, subject to separate appeals.

In the Antrim Jurisdictional Order, at p. 25, in asserting jurisdiction, the SEC said that "we cannot find that such an ordinance will eventually come to fruition or that it will adequately safeguard the purpose and findings of RSA 162-H:1" Ordinances have come to fruition in New Ipswich and Temple that do not adequately safeguard the purpose and findings of RSA 162-H:1. As a result, the Timbertop project requires a certificate.

IV. Declaratory Ruling

The Towns claim that Timbertop "requests that the Committee make a declaratory ruling that its project is subject to RSA 162-H." They further claim that Timbertop "fails to provide an

adequate statutory and factual basis for the Committee to make a jurisdictional ruling under Rule 203.01 and should therefore be dismissed." Towns' Motion to Deny or Dismiss Petition, p.4.

In the first place, Timbertop has not requested a declaratory ruling. Timbertop has filed a petition for jurisdiction. A motion for declaratory ruling and a petition for jurisdiction are different pleadings under SEC rules.

Site 102.13 defines "Petition" as "a request to the committee to rule on the applicability of this chapter to a particular proposed bulk power supply facility or energy facility." A petition for jurisdiction has independent statutory authorization (previously referred to in RSA 162-H:2, X-a, which has been repealed, and now referred to for purposes of this case in RSA 162-H:2, XII). Timbertop asks the SEC to assert jurisdiction pursuant to RSA 162-H:2, XII.

Site Part 203 governs motions for declaratory rulings, which are defined at RSA 541-A:1, V as "an agency ruling as to the specific applicability of any statutory provision or of any rule or order of the agency." SEC Docket No. 2008-05 provides a good example of a declaratory ruling. In that case, Florida Power and Light sought a declaratory ruling that a proposed reliability upgrade to a transmission substation at the Seabrook nuclear facility did not constitute a sizeable addition to the facility under RSA 162-H:5 (which provides that a sizeable addition requires a certificate). The SEC determined that the reliability upgrade was not a sizeable addition and therefore did not require a certificate. See Order Granting Motion for Declaratory Ruling issued December 17, 2008.

The Towns wrongly assert that Timbertop has requested a motion for declaratory ruling and mistakenly apply the rule for a motion for declaratory ruling to a petition for jurisdiction. Inasmuch as Timbertop's petition does not constitute a motion for declaratory ruling, the Towns' motion to dismiss for failure to comply with Site 203.01 should be denied.

V. Violation of RSA 541-A:39

The Towns' argument that Timbertop has violated RSA 541-A:39 misses the mark. RSA 541-A:39 is an agency requirement, which prescribes that "each agency shall give notice to and afford all affected municipalities reasonable opportunity" to participate in certain proceedings. Inasmuch as RSA 541-A:39 is an agency requirement and not a requirement of a petitioner in a proceeding before an agency, Timbertop cannot violate the statute. Moreover, putting aside the question of whether this proceeding falls under RSA 541-A:39, the Towns were provided actual notice by virtue of Timbertop's service of its petition on the Towns. Moreover, the Towns' petition to intervene indicates they are pursuing the opportunity to participate in this proceeding. As a result, the Towns' argument is moot.

VI. Conclusion

In closing, Timbertop responds to some of the Towns' more general arguments. First, the Towns in both their filings state that Timbertop is just an ordinary small wind power project. Joint Petition, p.6, and Motion to Deny or Dismiss, p.4. While Timbertop is not prepared to concede that it is ordinary, it does concede that it is smaller than 30 MW, the standard that requires SEC jurisdiction. The Towns' focus, however, is misplaced. Timbertop does not need to prove it is special. The focus should be placed instead on the Towns' ordinances and the fact that multiple jurisdictions are in play. Even ordinary small wind power projects should have the opportunity to receive a balanced, timely and integrated review.

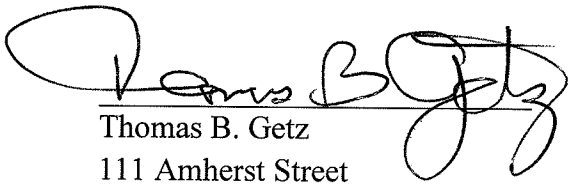
Second, the Towns point out that they "have invested substantial time and effort to adopt zoning ordinances to fairly and properly evaluate wind energy projects, while protecting legitimate local interests." Joint Petition, p. 3. They also characterize Timbertop as alleging that the Towns "are unable to apply their zoning ordinances fairly." Motion to Deny or Dismiss, p. 2. Timbertop does not allege bad faith on behalf of the Towns' planning boards in designing their large wind energy systems ordinances or in their capacity to administer those ordinances. Timbertop's focus is on the substantive requirements that have emerged in the ordinances. Timbertop's position is that the ordinances are objectively out of line with benchmarks established by state law and SEC precedent.

Third, the Towns conclude that "[t]here is no reason to begin a time consuming and expensive legal process" (Motion to Deny or Dismiss, p.4) and if jurisdiction is asserted they "would be required to participate in a costly, lengthy and uncertain legal process (Joint Petition, p.3). Timbertop shares the Towns' concern about a lengthy and expensive process but is of the opinion that proceeding before the Towns would be more costly, lengthier and more uncertain than the SEC process. It is because of concerns about time and expense, moreover, that Timbertop proposed an expedited schedule in its Petition for Jurisdiction and recommended that measures such as stipulations of fact be employed. Timbertop is hopeful that the Towns agree to a process that avoids unnecessary time and expense.

Finally, Timbertop's Petition for Jurisdiction fully complies with the SEC's governing statutes, rules and precedent. Consequently, the Towns' Motion to Deny or Dismiss and their corresponding request to dismiss in the Joint Petition should be rejected.

Respectfully submitted,

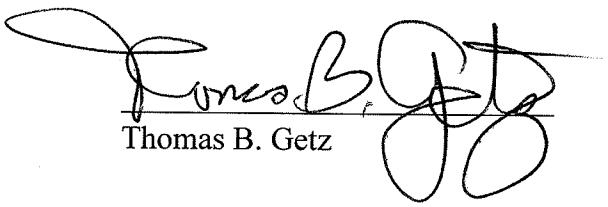
Timbertop Wind I, LLC
By Its Attorneys
Devine, Millimet & Branch, PA



Thomas B. Getz
111 Amherst Street
Manchester, NH 03101
603-695-8542
tgetz@devinemillimet.com

CERTIFICATE OF SERVICE

I hereby certify that on this 14th day of February, 2013 a copy of the foregoing Response was sent by electronic or U.S. mail, postage prepaid, to persons named on the Service List of this docket, excluding Committee Members.



Thomas B. Getz

ATTACHMENT 1

CERTIFICATE OF FORMATION

Filed
Date Filed: 08/16/2011
Business ID: 657166
William M. Gardner
Secretary of State

STATE OF NEW HAMPSHIRE

Filing fee:	$50.00
Fee for Form SRA:	$50.00
Total fees	$100.00

Form LLC 1
RSA 304-C:12

CERTIFICATE OF FORMATION
NEW HAMPSHIRE LIMITED LIABILITY COMPANY

THE UNDERSIGNED, UNDER THE NEW HAMPSHIRE LIMITED LIABILITY COMPANY LAWS, SUBMITS THE FOLLOWING CERTIFICATE OF FORMATION:

FIRST: The name of the limited liability company is Timbertop Wind I, LLC.

SECOND: The nature of the primary business or purposes are wind energy development and to engage in any and all activities related or incidental thereto, which statement of purpose will not in any way limit or restrict the activities that may be conducted by the limited liability company.

THIRD: The name of the limited liability company's registered agent is Connie Boyles Lane, Esq., and the street address, town/city (including zip code and post office box, if any) of its registered office is (agent's business address) c/o Orr & Reno, P.A., One Eagle Square, P.O. Box 3550, Concord, New Hampshire 03302-3550.

FOURTH: The limited liability company shall have perpetual existence.

FIFTH: The management of the limited liability company is vested in a manager or managers.

SIXTH: The sale or offer for sale of any ownership interests in this business will comply with the requirements of the New Hampshire Uniform Securities Act (RSA 421-B).

Pioneer Green Wind, LLC

*Signature: By: _____

Print or type name: Andrew Bowman, President

Title: Manager

Date signed: 8-15-11

*Must be signed by a manager; if no manager, must be signed by a member.

DISCLAIMER: All documents filed with the Corporate Division become public records and will be available for public inspection in either tangible or electronic form.
Mail fees, DATED AND SIGNED ORIGINAL AND FORM SR
North Main Street, Concord, NH 03301-4989.

State of New Hampshire
Form LLC 1 - Certificate of Formation 2 Page(s)

T1122831017

ATTACHMENT 2

LEASE AGREEMENT

Doc # 1127980 Jun 20, 2011 12:37 PM
Book 8326 Page 1323 Page 1 of 6
Register of Deeds, Hillsborough County
Pamela D Caughlin

GV

After recording return to:

Attn: Lease & Title Department
Pioneer Green Energy, LLC
1802 Lavaca Street, Suite 200
Austin, Texas 78701

MEMORANDUM OF WIND ENERGY LEASE AND EASEMENT AGREEMENT

THE STATE OF New Hampshire §
§
COUNTY OF Hillsboro § KNOW ALL PERSONS BY THESE PRESENTS:

THIS MEMORANDUM OF WIND ENERGY LEASE AND EASEMENT AGREEMENT (this "**Memorandum**"), is made, dated and effective as of April 1, 2011 (the "**Effective Date**"), by Walter Maki (collectively "**Owner**"), and Pioneer Green Energy, LLC a Texas limited liability company ("**Tenant**"), with regards to the following:

1. Wind Agreement. Owner and Tenant did enter into that certain Wind Energy Lease and Easement Agreement of even date herewith (the "**Agreement**"), which affects the real property located in Hillsborough County, State of New Hampshire, as more particularly described in Exhibit A attached hereto (the "**Property**"). Capitalized terms used and not defined herein have the meaning given the same in the Agreement.

2. Grant of Rights. The Agreement grants Tenant, (a) the exclusive right to develop and use the Property for converting wind energy into electrical energy and collecting and transmitting the electrical energy so converted; (b) the exclusive right to access, relocate and maintain Windpower Facilities located on the Property; (c) an exclusive easement to allow the rotors of wind turbines installed on the Property and on adjacent land to overhang other property owned by Owner; (d) an exclusive easement to capture, use and convert the unobstructed wind resources over and across the Property; (e) a non-exclusive easement for electromagnetic, audio, flicker, visual, electrical or radio interference attributable to the wind turbines, the Project or any Development Activities; (f) the right to subjacent and lateral support for the Wind Energy Projects; (g) the right of ingress to and egress from the Windpower Facilities on, under, over and across the Property by means of (A) roads and lanes thereon if existing or (B) such routes, roads and lanes as Tenant may construct from time to time; (h) the exclusive right to erect, construct, reconstruct, replace, relocate, remove, operate, maintain and use, on, under, over and across the Property, in connection with Windpower Facilities overhead and underground electric transmission and communication system lines and facilities; and (i) the right to undertake any other activities necessary to accomplish the purposes of the Agreement.

3. Term. The Agreement shall be for an initial development and construction period of up to seven (7) years, and if the terms and conditions of the Agreement are met, for a term of thirty (30) years. The easements granted pursuant to the Agreement are for a term coterminous with the Agreement.

4. Rights of Mortgagees. Pursuant to the Agreement, any Mortgagee of Tenant or Tenant's assignees has certain rights regarding notice and right to cure any default of Tenant under the Agreement, and the right to take possession of the Property, and to acquire the leasehold estate by foreclosure, as well as other rights as set forth in the Agreement.

5. Assignment. Tenant's rights and obligations under the Agreement shall be assignable without Lessor's prior written consent provided that such assignment is in furtherance of the provisions of the development of the Wind Energy Project contemplated by the Agreement.

6. Non-Interference and Setbacks. To the extent permitted by law Owner has waived any and all setbacks and setback requirements, whether imposed by applicable law or by any person or entity, including any setback requirements described in the zoning ordinance of the County or in any governmental entitlement or permit heretofore or hereafter issued to Tenant, such Sublessee or such Affiliate. Owner has agreed not to engage in any activity that might interfere with Tenant's efforts to develop, construct or operate the Wind Energy Project or cause a decrease in the output or efficiency of any Windpower Facilities without the prior written consent of Tenant.

7. Subordination. The Agreement provides that from and after its effective date, any right, title or interest created by Owner in favor of or granted to any third party shall be subject to (i) the Agreement and all of Tenant's rights, title and interests created thereby, (ii) any lien of any lender of Tenant's then in existence on the leasehold estate created by the Agreement, and (iii) Tenant's right to create a lien in favor of any lender of Tenant's. Except as set forth on Exhibit "B" hereto, as of the Effective Date, to the best of Owner's knowledge, there are no liens, encumbrances, leases, mortgages, deeds of trust, security interests, licenses or other exceptions (collectively, "Liens") encumbering or affecting all or any portion of the Property. To the extent any oral surface leases listed in Exhibit B, which exist in the calendar year of the Effective Date, are renewed or extended in future calendar years, such renewed or extended leases shall be subordinate to the Agreement in all respects.

8. Agreement Controls. This Memorandum does not supersede, modify, amend or otherwise change the terms, conditions or covenants of the Agreement, and Owner and Tenant executed and are recording this Memorandum solely for the purpose of providing constructive notice of the Agreement and Tenant's rights thereunder. The terms, conditions and covenants of the Agreement are incorporated in this Memorandum by reference as though fully set forth herein.

9. No Ownership. Owner shall have no ownership, lien, security or other interest in any Windpower Facilities installed on the Property, or except for as otherwise provided in the Agreement, any profits derived therefrom, and Tenant may remove any or all Windpower Facilities at any time.

10. Counterparts. This Memorandum may be executed in counterparts, each of which shall be deemed an original and all of which when taken together shall constitute one and the same document.

IN WITNESS WHEREOF, the parties have executed this Memorandum to be effective as of the date first written above.

[signatures appear on following page]

OWNER: Walter Maki

Print Name: Walter D Maki

STATE OF New Mexico §
COUNTY OF Santa Fe §

This instrument was acknowledged before me by, known to me to be the person whose name is subscribed to the foregoing instrument, and acknowledged to me that he/she executed the same for the purposes and consideration therein expressed.

Given under my hand and seal this 1st day of April, 2011.

Notary Public in and for the State of NM

My Commission Expires:

OFFICIAL SEAL
JENNIFER L. FLOWERS
NOTARY PUBLIC - NEW MEXICO
NOTARY BOND FILED WITH SECRETARY OF STATE
My Commission Expires 1/23/14

TENANT:
PIONEER GREEN ENERGY, LLC

By: _____

Name: Robert M. Blunt IV

Title: Vice President

STATE OF TEXAS §
§
COUNTY OF TRAVIS §

This instrument was acknowledged before me by Robert Blunt, Vice President of Pioneer Green Energy, LLC, a Texas limited liability company, on behalf of said company, and known to me to be the person whose name is subscribed to the foregoing instrument, and acknowledged to me that he executed the same for the purposes and consideration therein expressed.

Given under my hand and seal this 10th day of May, 2011.

_____
Notary Public in and for the State of Texas

My Commission Expires:

DELILAH MONTEMAYOR
Notary Public, State of Texas
My Commission Expires
February 10, 2015

EXHIBIT "A" to

MEMORANDUM OF WIND ENERGY LEASE AND EASEMENT AGREEMENT

Description of the Property

- **Tract 1: 75 acres of land, more or less, located on Map 6, Parcel 16, contained in the real property records of New Ipswich Township, Hillsborough County, New Hampshire**

EXHIBIT "B"

Liens and Third Party Rights

Doc # 1127981 Jun 20, 2011 12:37 PM
Book 8326 Page 1329 Page 1 of 6
Register of Deeds, Hillsborough County
Pamela O Caughlin

Memorandum of Wind Energy Lease and Easement Agreement

ENV

After recording return to:

Attn: Lease & Title Department
Pioneer Green Energy, LLC
1802 Lavaca Street, Suite 200
Austin, Texas 78701

MEMORANDUM OF WIND ENERGY LEASE AND EASEMENT AGREEMENT

THE STATE OF NH §
§ KNOW ALL PERSONS BY THESE PRESENTS:
COUNTY OF Hillsborough §

THIS MEMORANDUM OF WIND ENERGY LEASE AND EASEMENT AGREEMENT (this "**Memorandum**"), is made, dated and effective as of Feb. 8, 2011 (the "**Effective Date**"), by Jeremy Bradley located at PO Box 1230 Wilton NH 03086 (collectively "**Owner**"), and Pioneer Green Energy, LLC a Texas limited liability company located at 1802 Lavaca St., Austin, TX 78701("**Tenant**"), with regards to the following:

1. Wind Agreement. Owner and Tenant did enter into that certain Wind Energy Lease and Easement Agreement of even date herewith (the "**Agreement**"), which affects the real property located in Hillsborough County, State of New Hampshire, as more particularly described in Exhibit A attached hereto (the "**Property**"). Capitalized terms used and not defined herein have the meaning given the same in the Agreement.

2. Grant of Rights. The Agreement grants Tenant, (a) the exclusive right to develop and use the Property for converting wind energy into electrical energy and collecting and transmitting the electrical energy so converted; (b) the exclusive right to access, relocate and maintain Windpower Facilities located on the Property; (c) an exclusive easement to allow the rotors of wind turbines installed on the Property and on adjacent land to overhang other property owned by Owner; (d) an exclusive easement to capture, use and convert the unobstructed wind resources over and across the

Property; (e) a non-exclusive easement for electromagnetic, audio, flicker, visual, electrical or radio interference attributable to the wind turbines, the Project or any Development Activities; (f) the right to subjacent and lateral support for the Wind Energy Projects; (g) the right of ingress to and egress from the Windpower Facilities on, under, over and across the Property by means of (A) roads and lanes thereon if existing or (B) such routes, roads and lanes as Tenant may construct from time to time; (h) the exclusive right to erect, construct, reconstruct, replace, relocate, remove, operate, maintain and use, on, under, over and across the Property, in connection with Windpower Facilities overhead and underground electric transmission and communication system lines and facilities; and (i) the right to undertake any other activities necessary to accomplish the purposes of the Agreement.

3. Term. The Agreement shall be for an initial development and construction period of up to seven (7) years, and if the terms and conditions of the Agreement are met, for a term of thirty (30) years. The easements granted pursuant to the Agreement are for a term coterminous with the Agreement.

4. Rights of Mortgagees. Pursuant to the Agreement, any Mortgagee of Tenant or Tenant's assignees has certain rights regarding notice and right to cure any default of Tenant under the Agreement, and the right to take possession of the Property, and to acquire the leasehold estate by foreclosure, as well as other rights as set forth in the Agreement.

5. Assignment. Tenant's rights and obligations under the Agreement shall be assignable without Lessor's prior written consent provided that such assignment is in furtherance of the provisions of the development of the Wind Energy Project contemplated by the Agreement.

6. Non-Interference and Setbacks. To the extent permitted by law Owner has waived any and all setbacks and setback requirements, whether imposed by applicable law or by any person or entity, including any setback requirements described in the zoning ordinance of the County or in any governmental entitlement or permit heretofore or hereafter issued to Tenant, such Sublessee or such Affiliate. Owner has agreed not to engage in any activity that might interfere with Tenant's efforts to develop, construct or operate the Wind Energy Project or cause a decrease in the output or efficiency of any Windpower Facilities without the prior written consent of Tenant.

7. Subordination. The Agreement provides that from and after its effective date, any right, title or interest created by Owner in favor of or granted to any third party shall be subject to (i) the Agreement and all of Tenant's rights, title and interests created thereby, (ii) any lien of any lender of Tenant's then in existence on the leasehold estate created by the Agreement, and (iii) Tenant's right to create a lien in favor of any lender of Tenant's.

8. Agreement Controls. This Memorandum does not supersede, modify, amend or otherwise change the terms, conditions or covenants of the Agreement, and Owner and Tenant executed and are recording this Memorandum solely for the purpose of providing constructive notice of the Agreement and Tenant's rights thereunder. The terms, conditions and covenants of the Agreement are incorporated in this Memorandum by reference as though fully set forth herein.

9. No Ownership. Owner shall have no ownership, lien, security or other interest in any Windpower Facilities installed on the Property, or except for as otherwise provided in the Agreement, any profits derived therefrom, and Tenant may remove any or all Windpower Facilities at any time.

10. Counterparts. This Memorandum may be executed in counterparts, each of which shall be deemed an original and all of which when taken together shall constitute one and the same document.

IN WITNESS WHEREOF, the parties have executed this Memorandum to be effective as of the date first written above.

[signatures appear on following page]

OWNER:

Jeremy Bradler

Print Name: Jeremy Bradler

OWNER:

_____

Print Name: _____

STATE OF NH §
§
COUNTY OF Hillsborough §

This instrument was acknowledged before me by Jeremy Bradler, known to me to be the person whose name is subscribed to the foregoing instrument, and acknowledged to me that he/she executed the same for the purposes and consideration therein expressed.

Given under my hand and seal this 31st day of January, 2011.

Kimberly Reynolds

Notary Public in and for the State of NH

My Commission Expires:

KIMBERLY J. REYNOLDS, Notary Public
My Commission Expires October 11, 2011

TENANT:
PIONEER GREEN ENERGY, LLC

By: _____

Name: Adam Cohen

Title: Vice President

STATE OF New Hampshire §
§
COUNTY OF Hillsborough §

This instrument was acknowledged before me by Adam Cohen, Vice President of Pioneer Green Energy, LLC, a Texas limited liability company, on behalf of said company, and known to me to be the person whose name is subscribed to the foregoing instrument, and acknowledged to me that he executed the same for the purposes and consideration therein expressed.

Given under my hand and seal this 8th day of Feb., 2011.

_____
Notary Public in and for the State of N.H.

My Commission Expires:
June 25, 2013

EXHIBIT "A" to

MEMORANDUM OF WIND ENERGY LEASE AND EASEMENT AGREEMENT

Description of the Property

- **Tract 1: 15 acres of land, more or less, located on Map 4, Parcel 12, contained in the real property records of Temple Township, Hillsborough County, New Hampshire**

- **Tract 2: 168.5 acres of land, more or less, located on Map 4, Parcel 17, contained in the real property records of Temple Township, Hillsborough County, New Hampshire**

- **Tract 3: 191 acres of land, more or less, located on Map 4, Parcel 4, contained in the real property records of Temple Township, Hillsborough County, New Hampshire**

ATTACHMENT 3

AVIAN AND BAT SURVEY

DRAFT
Spring, Summer, and Fall 2011 Avian and Bat Survey Report

Timbertop Wind Project
Hillsborough County, New Hampshire

Prepared For:

Pioneer Green Energy, LLC
1802 Lavaca Street, Suite 200
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Prepared by

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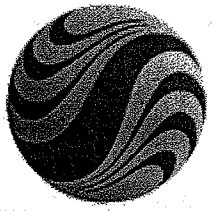

Stantec

December 2011

Executive Summary

Pioneer Green Energy, LLC (Pioneer Green) is considering the development of a wind energy project in Hillsborough County, New Hampshire. The proposed Timbertop Wind Project (Project) is in the early phases of planning, but may consist of up to 20 wind turbines and associated infrastructure (i.e., access roads, transmission lines, electrical substation, turbine lay-down/staging area, and an operations and maintenance building). The turbines will likely be 1.5 megawatt machines with a maximum rotor-swept height of approximately 125 meters (m) (410 feet). Because the Project is in the early phases of planning, the exact placement of turbines, access road(s), and transmission corridor(s) is unknown at this time; however, the current Project boundary includes Kidder Mountain, Wildcat Mountain, Conant Hill, Binney Hill, and Emerson Hill in the Town of New Ipswich. Pioneer Green contracted Stantec Consulting (Stantec) to conduct acoustic bat surveys, breeding bird surveys, and raptor migration surveys during the spring, summer, and fall of 2011. This document describes the methods and results of the 2011 field surveys.

Bat Acoustic Survey

The 2011 summer/fall bat acoustic surveys were initiated on May 25 and operated through October 20, 2011. Anabat® detectors were used to sample bat activity patterns and species composition within the Project area. Four acoustic detectors were deployed at three separate locations across the Project area. Two detectors were deployed in the guy wires of an existing 60 m meteorological tower on Binney Hill; one above and one below tree canopy height. Two additional detectors were deployed below tree canopy on Kidder Mountain and Emerson Hill, in snags and mature trees adjacent to suitable habitat.

The four detectors recorded a total of 20,821 bat call sequences yielding an overall detection rate of 37.3 bat call sequences per detector-night. Among sampling locations, detection rates ranged from 5.8 to 84.4 bat call sequences per detector-night. Typical of this type of survey, activity levels varied considerably among nights within the survey period and among detectors.

Bats within the big brown/silver-haired bat (BBSH) guild comprised the greatest overall percentage of detected call sequences (68 %, n=14,197). Combined, the Emerson Tree detector and the Binney Met Low detector recorded the majority of BBSH calls (87%). Other species such as hoary bats (*Lasiurus cinereus*) were detected at all four detectors, although in smaller numbers. Summer/fall 2011 acoustic bat surveys documented variable activity levels within the Project area, although results suggest that activity was highest in mid-June through September.

Breeding Bird Survey

To assess the species composition, relative abundance, and diversity of breeding birds within the Project area, a breeding bird survey was conducted in summer 2011. Stantec biologists conducted point count surveys during three separate rounds (one in May and two in June). The

surveys consisted of sampling 20 point count locations each with a 100-m radius in proximity to the proposed turbine areas, and 6 point count locations with a 100-m-radius in similar habitats outside of the Project area. Habitats that were sampled within the Project area and control points include mixed hardwood-conifer forest (mixed forest), field adjacent to forest edge, mixed forest/forest edge, mixed forest/forest edge adjacent to wetland, and mixed forest adjacent to natural clearing. During survey rounds, all birds detected during 10-minute counts were documented.

For points within the Project area, a total of 503 individuals and 50[1] species were documented (including birds observed beyond 100 m from the observer and birds observed as flyovers). The species with the greatest numbers of individuals detected among all project area points were ovenbird (*Seiurus aurocapilla*; n=73), red-eyed vireo (*Vireo olivaceus*; n=39), and chestnut-sided warbler (*Dendroica pensylvanica*; n = 30).

For control points, a total of 178 individuals and 39[2] species were observed (including birds observed beyond 100 m from the observer and birds observed as flyovers). Five additional species, not observed during surveys, were observed incidentally in the vicinity of control points. Similar to Project area points, the species with the greatest numbers of individuals detected among all control points were red-eyed vireo (n=26), ovenbird (n=20), and chestnut-sided warbler (n=15).

There were no state- or federally-listed species observed during point counts or incidentally during the summer surveys.

Raptor Migration Surveys

Raptor migration surveys were conducted in spring and fall of 2011 to determine the species composition and activity of seasonally local and migrant raptors. Survey methods were based on standard methodologies used for raptor migration surveys at potential wind development sites in the region. The timing of surveys targeted seasonal and daily peak periods during raptor migration. The results of the spring and fall 2011 surveys represent a subsample of raptor migration activity in the Project area, and provide baseline site-specific species composition and behavioral data for migrants and seasonally local raptors at the Project. For the purposes of this study, the Study Area is considered the observable airspace as seen from the observation sites, while the Project area includes proposed turbine areas.

Spring 2011

Spring surveys were conducted on 10 days from April 21 through May 26, 2011, for a total of 70 survey hours. Over the course of the survey period, a total of 227 observations of raptors were documented. The seasonal passage rate was 3.24 raptor observations per hour (raptors/hr). Ten species of raptors were observed (not including unidentified accipiter, unidentified buteo,

[1] Unidentified species (unidentified accipiter, nuthatch, passerine, warbler, and woodpecker) were not included in the count of the number of species; however they were included in the total number of individuals observed.
[2] Unidentified species (unidentified accipiter, passerine, warbler, and woodpecker) were not included in the count of the number of species; however they were included in the total number of individuals observed.

unidentified falcon, and unidentified raptor). Of the 227 raptor observations documented, 124 (55%) occurred within the Project area. Of these raptors, 101 raptors (44%) occurred at flight heights below the proposed maximum rotor height of 125 m. One state Endangered species, northern harrier (*Circus cyaneus*), was observed, and two state Species of Special Concern, American kestrel (*Falco sparverius*) and osprey (*Pandion haliaetus*), were observed. These state-listed species represented a relatively small percentage of total raptor observations.

Fall 2011

Fall surveys were conducted on 10 survey days from August 24 through November 1, for a total 68 survey hours. During the fall surveys, there were a total of 639 raptor observations. The seasonal passage rate was 9.4 raptors/hr. There were 11 species of raptor observed (not including unidentified accipiter, unidentified buteo, unidentified falcon, and unidentified raptor). Of those raptors documented in the Study Area, 477 observations (75%) occurred within the Project area. Of these raptors, 170 raptors (27%) occurred at flight heights below the proposed maximum rotor height of 125 m. There was one state Endangered species observed: northern harrier; two state Threatened species observed: peregrine falcon (*Falco peregrinus*) and bald eagle (*Haliaeetus leucocephalus*); and two state Species of Special Concern observed: American kestrel and osprey. These state-listed species represented a relatively small percentage of total raptor observations.

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[‡] *This report was prepared by Stantec Consulting Services Inc. for the Timbertop Wind Project/ Pioneer Green Energy, LLC. The material in it reflects Stantec's judgment in light of the information available to it at the time of preparation. Any use which a third party makes of this report, or any reliance on or decisions made based on it, are the responsibility of such third parties. Stantec accepts no responsibility for damages, if any suffered by any third party as a result of decisions made or actions based on this report.*

1.0 Introduction

1.1 PROJECT BACKGROUND

Pioneer Green Energy, LLC (Pioneer Green) is considering the development of a wind energy project in Hillsborough County, New Hampshire. The proposed Timbertop Wind Project (Project) is in the early phases of planning but may consist of up to 20 wind turbines and associated infrastructure (i.e., access roads, transmission lines, electrical substation, turbine lay-down/staging area, and an operations and maintenance building). The turbines will likely be 1.5 megawatt (MW) machines with a maximum rotor-swept height of approximately 125 meters (m) (410 feet ['']). Because the Project is in the early phases of planning, the exact placement of turbines, access road(s), and transmission corridor(s) is unknown at this time; however, the current Project boundary includes Kidder Mountain, Wildcat Mountain, Conant Hill, Binney Hill, and Emerson Hill in the Town of New Ipswich.

As part of the site evaluation process for the proposed wind energy project, Pioneer Green contracted Stantec Consulting (Stantec) to complete a natural and cultural resource site screening for the Project (Stantec 2011), as well as a work plan for wildlife field surveys. The Project was introduced to the New Hampshire Fish and Game Department (NHFGD) and the U.S. Fish and Wildlife Service (USFWS) at a meeting on March 24, 2011. The purpose of the meeting was to describe the Project location and its attributes, to identify the natural resources expected to occur at the Project area, and to outline the wildlife field surveys proposed for the Project. Stantec conducted spring, summer, and fall 2011 wildlife field surveys at the Project. The field surveys are consistent with the standard level of effort for these types of surveys at potential wind energy projects in the region and in the State of New Hampshire.

Stantec conducted acoustic bat surveys, breeding bird surveys, and raptor migration surveys during the spring, summer, and fall of 2011. This document describes the methods and results of the 2011 field surveys. The results of the surveys provide baseline data to help assess the potential risk for the proposed Project to impact birds and bats.

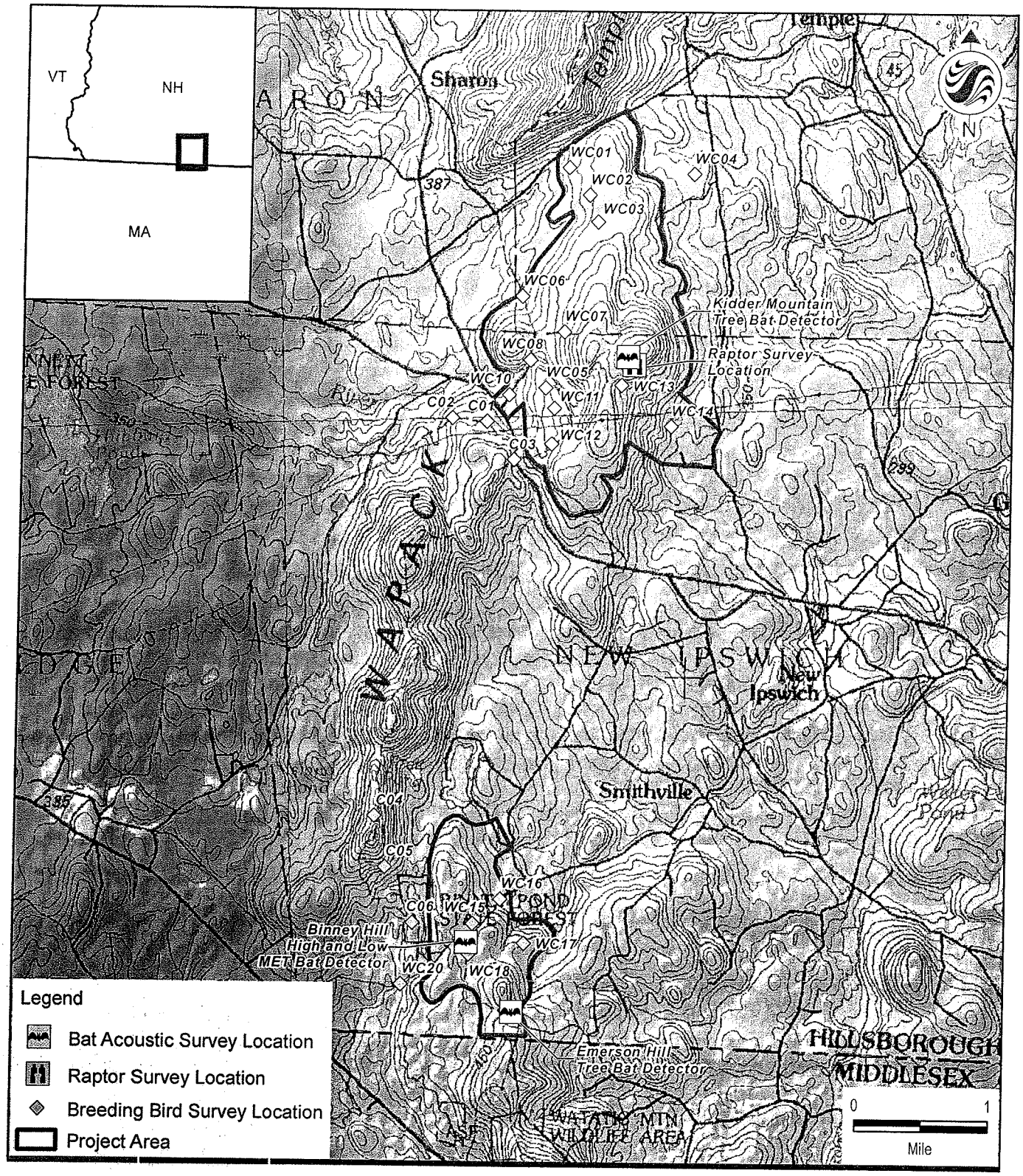
1.2 PROJECT AREA DESCRIPTION

According to the characterized ecoregions of northern New England and New Hampshire, the Project is located within the Vermont-New Hampshire Upland section and the Hillsborough Inland Hills and Plains subsection (Sperduto and Nichols 2004). This subsection is characterized by hills and peaks, mainly consisting of granite, that are interspersed with small lakes and narrow stream valleys (Sperduto and Nichols 2004). The topography of this area is generally moderate, and soils are stony and shallow with relatively low nutrients.

The Project area is located on Kidder Mountain, Wildcat Mountain, Conant Hill, Binney Hill, and Emerson Hill in the Town of New Ipswich (Figure 1-1). The peaks in the Project area range from 435 to 553 m (1,427 to 1,814). Conant Hill, Wildcat Mountain, and Kidder Mountain are

part of the Wapack Range and have an east-to-west orientation in the northern portion of the Project area. Binney Hill and Emerson Hill are also part of the Wapack Range and are arranged north-to-south in the southern portion of the Project area. The ridgeline associated with Binney Hill is generally oriented north-to-south, while a valley isolates Emerson Hill from other the ridgelines.

Tree species observed in the Project area include sugar maple (*Acer saccharum*), yellow birch (*Betula alleghaniensis)*, American beech (*Fagus grandifolia*), northern red oak (*Quercus rubra*), and eastern white pine (*Pinus strobus*). Other conifer species such as red spruce (*Picea rubens*) and balsam fir (*Abies balsamea*) are present but are generally limited to the ridge summits and are mixed with the more dominant hardwood species, or occur as small patches within the hardwood dominated landscape. According to the NH Wildlife Habitat Land Cover Map (NHFGD 2011), the dominant forest type in the Project area is northern hardwood–conifer forest and with areas of lowland spruce-fir and hemlock-hardwood-pine forest.



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Stantec

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Client/Project
Pioneer Green Energy, LLC
Timbertop Wind Project
Hillsborough County, NH

Figure No.
1-1

Title
2011 Survey Locations

December 2, 2011

2.0 Acoustic Bat Survey

2.1 INTRODUCTION

Acoustic sampling of bat activity has become a standard pre-construction survey for proposed wind-energy developments (Kunz et al. 2007). Acoustic surveys are associated with several major assumptions (Hayes 2000) and results cannot be used to determine the number of bats inhabiting an area; however acoustic surveys can provide insight into seasonal patterns in activity levels and species composition, and can examine how weather conditions influence bat activity. While these data may be useful in predicting trends in post-construction mortality rates, the current lack of data on this topic precludes quantitative prediction of risk. The objective of acoustic surveys at the Project were (1) to document bat activity patterns from late- May through mid-October in the airspace near the rotor zone of the proposed turbines, at an intermediate height, and near the ground; and (2) to document bat activity patterns in relation to weather factors including wind speed and temperature.

Eight species of bats occur in New Hampshire, based upon their normal geographical range. These are the little brown bat (*Myotis lucifugus*), northern long-eared bat, (*M. septentrionalis*), eastern small-footed bat (*M. leibii*), silver-haired bat (*Lasionycteris noctivagans*), tri-colored bat (*Perimyotis subflavus*), big brown bat (*Eptesicus fuscus*), eastern red bat (*Lasiurus borealis*), and hoary bat (*L. cinereus*) (BCI 2001). Although none of these species are federally-listed at this time, many are of interest because of recent declines caused by White Nose Syndrome (WNS). In New Hampshire, the eastern small-footed bat is state-listed as Endangered with a rank of S1 ("Critically Imperiled"[4]), and New Hampshire may soon list additional species in response to WNS (NHFGD 2008). Five species (tri-colored bat, eastern red bat, silver-haired bat, hoary bat, and northern long-eared bat) are state-listed Species of Special Concern (NHFGD 2009).

2.2 METHODS

2.2.1 Data Collection

Anabat SDI and SD2 detectors (Titley Electronics Pty Ltd.) were used for the duration of the summer/fall 2011 acoustic bat survey. Anabat detectors were selected based upon their widespread use for this type of survey, their ability to be deployed for long periods of time, and their ability to detect a broad frequency range, which allows detection of all species of bats that could occur in the Project area. Anabat detectors are frequency division detectors, dividing the frequency of echolocation sounds made by bats by a factor of 16, and then recording these sounds on removable 1 gigabyte compact flash cards for subsequent analysis. The audio sensitivity setting of each Anabat system was set between 6 and 7 (on a logarithmic scale of 1 to 10) to maximize sensitivity while limiting ambient background noise and interference. The

[4] A state ranking of S1 is assigned to species characterized as critically imperiled because of extreme rarity (generally one to five occurrences) or because some factor of its biology makes it particularly vulnerable to extinction.

sensitivity of individual detectors was then tested using an ultrasonic Bat Chirp (Reno, NV) to ensure that the detectors would be able to detect bats up to a distance of at least 10 m (33').

Each Anabat detector was powered by a 12-volt gel battery charged by a solar panel. Each solar-powered Anabat system was deployed in waterproof housing enabling the detector to record while unattended for the duration of the survey. The housing suspends the Anabat microphone downward to give maximum protection from precipitation. To compensate for the downward position, the microphone was positioned within a 90-degree PVC elbow on the bottom of the waterproof enclosure, allowing the microphone to record the airspace horizontally surrounding the detector while minimizing acoustic signal loss. Acoustic detectors were programmed to record data each night from 6 pm to 8 am. Maintenance visits were conducted approximately every two weeks to check the condition of the detectors and to download data to a computer for archiving and subsequent analysis.

2.2.2 Survey Site Selection

The Project area is divided between a large area to the north and a smaller area to the south. Four Anabat detectors were deployed in the Project area (Figure 1-1). In the northern area of the Project, one detector was deployed on Kidder Mountain in a tree at a height of approximately 5 m (16') above ground level (agl) (Figure 2-1). In the southern area, 2 detectors were deployed on Binney Hill in the guy wires of the existing 60-m (197') meteorological (met) tower at heights of approximately 10 and 35 m (33 and 115') agl (Figure 2-2). Also in the southern area, 1 detector was deployed in a tree on Emerson Hill at a height of approximately 5 m (16') agl (Figure 2-1). Table 2-1 provides information on location and placement of detectors as well as information on the surrounding habitat.

Table 2-1. Habitat descriptions of locations sampled during the spring 2011 acoustic bat surveys at the Timbertop Wind Project

Detector Name	Elevation (m)	Height (m agl)	Habitat Notes
Emerson Tree	477	5	Deployed along the edge of a forested road, in an even-aged hardwood stand, with a relatively open understory.
Kidder Tree	546	5	Deployed 10 m from forested edge in a 50 m diameter clearing, surrounded by an uneven aged hardwood forest.
Binney Met High	424	35	Deployed 10 m from forested edge, in a met tower clearing, surrounded by an uneven aged hardwood forest, with a relatively dense shrub-sapling understory.
Binney Met Low	424	10	Deployed 10 m from forested edge, in a met tower clearing, surrounded by an uneven aged hardwood forest, with a relatively dense shrub-sapling understory.

Figure 2-1. Photos of the Kidder Tree (left) and Emerson Tree (right) bat detectors.

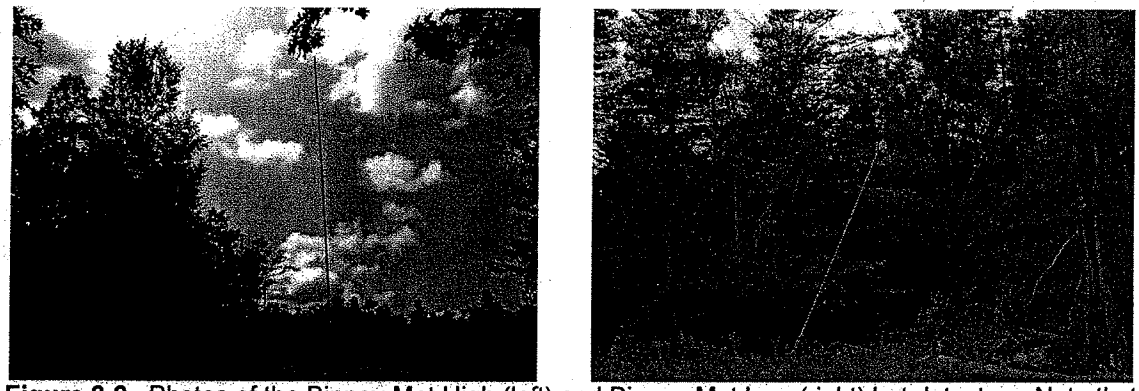

Figure 2-2. Photos of the Binney Met High (left) and Binney Met Low (right) bat detectors. Note that Binney Met Low was moved to the met tower after this picture was taken.

2.2.3 Data Analysis

Ultrasound recordings of bat echolocation may be broken into recordings of a single bat call or recordings of bat call sequences. A call is a single pulse of sound produced by a bat, while a call sequence is a combination of two or more pulses recorded in an Anabat file. Recordings containing less than two calls were eliminated from analysis as has been done in similar studies (Arnett et al. 2006). Call sequences typically include a series of calls characteristic of normal flight or prey location ("search phase") and capture periods (feeding "buzzes").

Potential call files were extracted from data files using CFCread© software. The default settings for CFCread© were used during this file extraction process, as these settings are recommended for the calls that are characteristic of bats in New Hampshire. This software screens all data recorded by the bat detector and extracts call files using a filter. Using the default settings for this initial screening also ensures comparability between data sets. Settings used by the filter include a maximum time between calls of 5 seconds, a minimum line length of 5 milliseconds,

and a smoothing factor of 50. The smoothing factor refers to whether or not adjacent pixels can be connected with a smooth line. The higher the smoothing factor, the less restrictive the filter is and the more non-bat noise files and poor quality call sequences are retained within the data set.

Following extraction of call files, each file was visually inspected for species identification and to check that only bat calls were included in the data set. Insect activity, wind, and interference can also sometimes produce Anabat files that pass through the initial filter and need to be visually inspected and removed from the data set. Call sequences are easily differentiated from other recordings, which typically form a diffuse band of dots at either a constant frequency or widely varying frequency.

Bat call sequences were individually marked and categorized by species group, or "guild," based on visual comparison to reference calls. Relatively accurate identification of bat species can be attained by visually comparing recorded call sequences of sufficient length to bat call reference libraries (O'Farrell et al. 1999, O'Farrell and Gannon 1999). Call sequences were classified to species whenever possible, based on criteria developed from review of reference calls collected by Chris Corben, the developer of the Anabat system, as well as other bat researchers. However, due to the similar call signatures of several species, classified calls were categorized into five guilds[5] that reflect the bat community in the region of the Project area:

- **Unknown (UNKN)** – All call sequences with less than five calls, or poor quality sequences (those with indistinct call characteristics or background static). These sequences were further identified as either "high frequency unknown" (HFUN) for sequences with a minimum frequency above 30 to 35 kilohertz (kHz), or "low frequency unknown" (LFUN) for sequences with a minimum frequency below 30 to 35 kHz.

- **Myotis (MYSP)** – All bats of the genus *Myotis*. While there are some general characteristics believed to be distinctive for several species in this genus, these characteristics are not sufficiently consistent to be relied upon for species identification at all times when using Anabat recordings.

- **Eastern red bat/tri-colored bat[6] (RBTB)** – These two species can produce distinctive calls; however, significant overlap in the call pulse shape, frequency range, and slope can also occur.

- **Big brown/silver-haired bat (BBSH)** – The call signatures of these species commonly overlap and are included as one guild in this report.

[5] Gannon et al. 2003 categorized bats into guilds based upon similar minimum frequency and call shape. These guilds were: Unidentified, Myotis, LABO-PISU and EPFU-LANO-LACI. To report the activity of the migratory hoary bat, it was placed into a separate guild.
[6] The scientific and common name of the eastern pipistrelle (*Pipistrellus subflavus*) has been changed to the tri-colored bat (*Perimyotis subflavus*).

- **Hoary bat (HB)** – Calls of hoary bats can usually be distinguished from those of big brown and silver-haired bats by minimum frequency extending below 20 kHz or by calls varying widely in minimum frequency across a sequence.

This method of guild identification represents a conservative approach to bat call identification. Because some species sometimes produce calls unique only to that species, all calls were identified to the lowest possible taxonomic level before being grouped into the listed guilds. Tables and figures in the body of this report will reflect those guilds. Because species-specific identification did occur in some cases, each guild will also be briefly discussed with respect to potential species composition of recorded call sequences.

Once all of the call files were identified and categorized in appropriate guilds, nightly and hourly tallies of detected calls were compiled by guild and species. Mean detection rates (number of recordings/detector-night) for the entire sampling period were calculated for each detector and for all detectors combined. Because bat activity levels are highly variable among individual nights and individual hours (Hayes 1997, Arnett et al. 2006), detection rates are summarized on both of these temporal scales. Nightly detection rates were summarized by month, as well as for the entire sampling period. Hourly detection rates were summarized by hour after sunset, as recommended by Kunz et al. (2007).

2.2.4 Weather data

Temperature and wind speed were recorded by the Binney Hill Met tower. Data at the met tower were recorded at 10-minute intervals for the survey period. Met tower weather data was collected for the duration of the survey period; however this report only includes weather data for the period from June 1 to October 15, 2011. Weather data were summarized on a nightly basis during the survey period and compared to nightly bat activity levels using a scatterplot and linear correlation analysis.

2.3 RESULTS

2.3.1 Timing of Activity

Four Anabat detectors were deployed in the Project area on May 25, 2011, and collected data through October 20, 2011. For the first week of the survey, the Binney Met High and Low detectors were deployed in trees within the met tower clearing. The following week they were relocated to the met tower. Therefore, Table 2-2 presents files recorded by the Binney Met High and Low detectors during the first week separately from files recorded once the detectors were deployed on the met tower.

During the 149-night survey period, individual detectors recorded between 120 and 149 nights of data (combining tree and met tower deployment nights at the Binney Met Low detector), for a total of 558 detector-nights surveyed out 594 available calendar-nights (Table 2-2). The Kidder Tree and Binney Met Low detectors each malfunctioned for a period of time during the data collection period. The nights on which these detectors malfunctioned represent the difference between detector-nights that were surveyed and available calendar-nights. Combined,

detectors recorded a total of 20,821 bat call sequences during the summer and fall survey period. Detection rates ranged from 5.8 sequences per detector-night at the Binney Met High detector to 84.4 sequences per detector-night at the Binney Met Low detector. The overall detection rate was 37.3 sequences per detector-night during the summer through fall 2011 survey period (Table 2-2).

Table 2-2. Summary of bat detector field survey effort and results at Timbertop, Summer/Fall, 2011.

Location	Dates Deployed	Calendar Nights	Detector-Nights*	Recorded Sequences	Detection Rate **	Maximum Sequences recorded ***
Emerson Tree	May 25 to Oct 20	149	149	7,745	52.0	309
Kidder Tree	May 25 to Oct 20	149	141	2,006	14.2	143
Binney Met High	June 1 to Oct 19	140	140	813	5.8	102
Binney Met Low	June 1 to Oct 19	140	112	9,454	84.4	504
Binney Met High (Tree)	*May 25 to June 1*	*8*	*8*	*299*	*37.4*	*102*
Binney Met Low (Tree)	*May 25 to June 1*	*8*	*8*	*504*	*63.0*	*226*
Overall Results		**594**	**558**	**20,821**	**37.3**	--

* One detector-night is equal to a one detector successfully operating throughout the night.
** Number of bat echolocation sequences recorded per detector-night.
*** Maximum number of bat passes recorded from any single detector for a detector-night.

Acoustic bat activity was sporadic throughout the survey period, but the number of nights with recorded bat activity was generally highest from July through September, indicating more consistent bat activity in late versus early summer (Figure 2-3). By detector, acoustic activity was detected on the greatest percentage of nights at the Emerson Tree detector (85% of nights surveyed), while the Kidder Tree detector recorded acoustic bat activity on the lowest percentage of nights (61% of nights surveyed). Hourly timing of acoustic activity varied among nights and detectors, although overall timing peaked during the first hour past sunset and declined steadily thereafter (Figure 2-4).

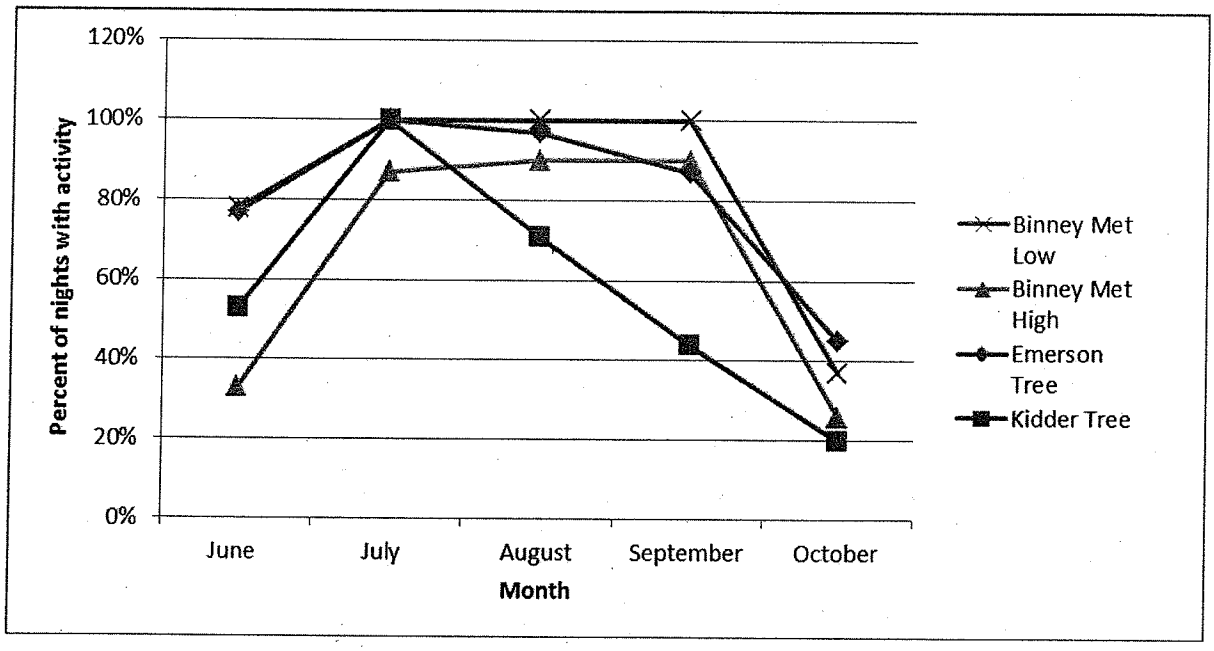

Figure 2-3. Percent of nights within each survey month having acoustic activity for four detectors deployed at the Project from June 1 through October 20, 2011. Note that May is excluded from this graph since detectors were only deployed for 6 nights in May.

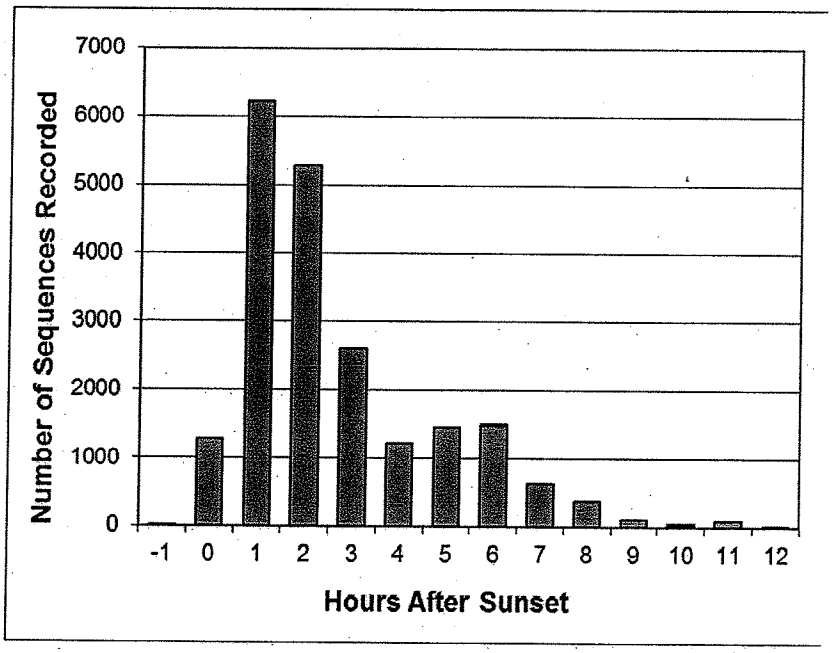

Figure 2-4. Number of call sequences recorded per hour by four detectors deployed at the Project from May 25 to October 20, 2011.

2.3.2 Species Composition

Bats were identified within each of the defined guilds during analysis, with species composition varying among detectors. Call sequences of species in the BBSH guild were the most common, comprising 68 percent of the total sequences recorded (Table 2-3). Forty-four percent of the calls within the BBSH guild were identified as big brown bats and only a small fraction were classified as silver-haired bats (0.48% of the BBSH guild; Figure 2-5). Fifty-five percent of the call sequences within the BBSH guild were not identified to species. The LFUN guild was the second most commonly identified guild, comprising 21 percent of total sequences recorded. Of the call sequences classified as LFUN, two percent appeared to be made by hoary bats and less than one percent appeared to be made by silver-haired bats; however, call sequences lacked the sufficient number of pulses to be classified to a species or guild. The remaining LFUN calls were poor-quality big brown and silver-haired bat call sequences (Table 2-3, Figure 2-5).

The MYSP guild was the third most common guild recorded and comprised four percent of the total. *Myotis* species were recorded at all detectors except the Binney Met High detector. The majority of MYSP call sequences were recorded at the Emerson Tree detector where they comprised 10 percent of bats detected at that particular location. *Myotis* species represented less than one percent of all calls recorded at each of the remaining three detectors (Table 2-3, Figure 2-5).

The RBTB and HB guilds each comprised approximately two percent of all bat call sequences recorded and were detected at all detectors (Table 2-3). Most call sequences identified to the RBTB guild were further identified as red bats (92%), with only a small fraction identified as tri-colored bats (6%) and the remainder were not identified to species (Table 2-3, Figure 2-5).

Before the High and Low Met detectors were deployed in the Binney met tower, they were deployed in trees within the met tower clearing for eight days. During this time, 73 percent of all HB calls recorded for the survey period were recorded by the Binney Met Low (Tree) detector, and 65 percent (n=204) of these HB calls were recorded in a single night (May 27, 2011).

Table 2-3. Distribution of detections by guild for detectors at Timbertop, Summer/Fall, 2011.

Detector	Guild						Total
	BBSH	HB	MYSP	RBTB	HFUN	LFUN	
Emerson Tree	5,013	4	748	192	417	1,371	7,745
Kidder Tree	1,161	9	13	17	32	774	2,006
Binney Met High	279	42	0	16	30	446	813
Binney Met Low	7,378	11	54	82	203	1,726	9,958
Binney Met High - Tree	188	19	8	6	5	73	299
Binney Met Low - Tree	178	227	28	3	19	49	504
Total	**14,197**	**312**	**851**	**316**	**706**	**4,439**	**20,821**
Guild Composition %	**68.2%**	**1.5%**	**4.1%**	**1.5%**	**3.4%**	**21.3%**	

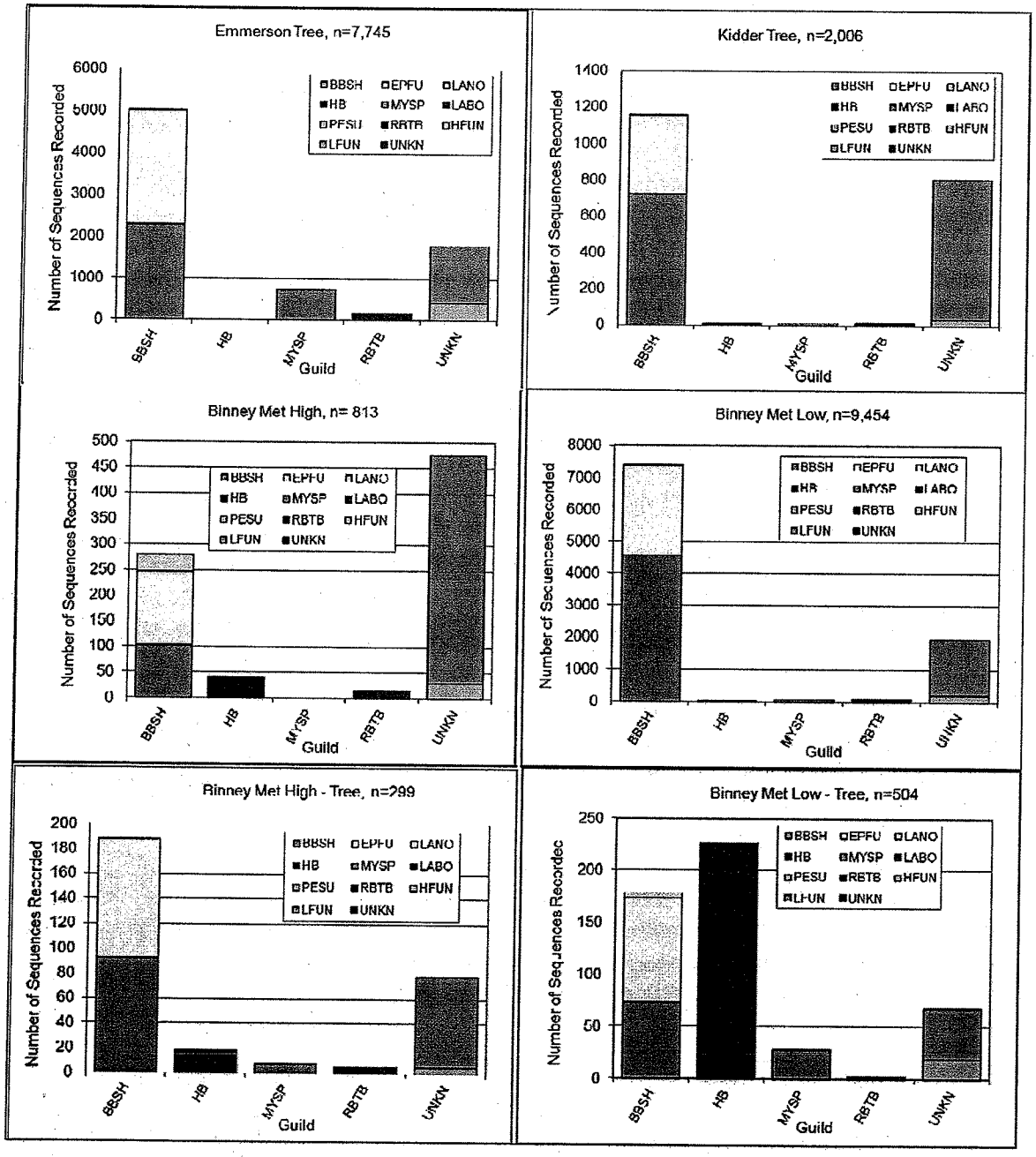

Figure 2-5. Histograms showing species composition of recorded bat call sequences. Note the differing scales on the y-axes. BBSH = big brown/silver-haired guild, EPFU = big brown bat, LANO = silver-haired bat, HB = hoary bat, MYSP = Myotis guild, RBTB = red bat/tri-colored bat guild, LABO = red bat, PESU = tri-colored bat, UNKN = unknown, LFUN = low frequency unknown, HFUN = high frequency unknown.

Appendix B provides a series of tables with more specific information on the nightly timing, number, and species composition of recorded bat call sequences. Specifically, Appendix B Tables 1 through 4 provide information on the number of call sequences by guild and suspected species recorded at each detector and the weather conditions for that night. An electronic copy of all acoustic data files can be provided upon request.

2.3.3 Activity and Weather

Mean nightly wind speed in the Project area from June 1 through October 15 varied between 1.13 and 8.39 meters per second (m/s), with an overall mean of 3.43 m/s (Figure 2-6). Mean nightly temperature varied between 2.41° Celsius (C) and 24.78°C, with an overall mean of 15.20°C (Figure 2-7). Figure 2-8 displays scatterplots of overall acoustic activity versus nightly temperature and wind speed. Combined bat activity levels showed a weak negative correlation with increasing nightly wind speed and a weak positive correlation with increasing nightly temperature (Figure 2-8).

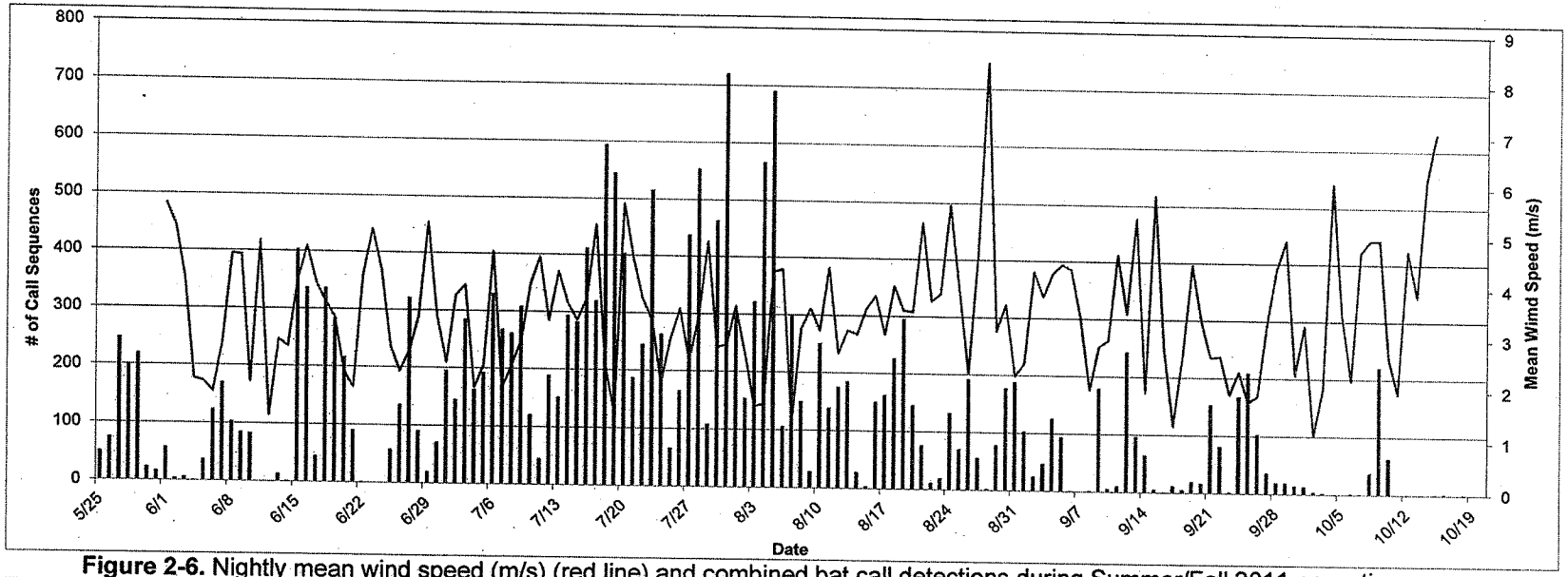

Figure 2-6. Nightly mean wind speed (m/s) (red line) and combined bat call detections during Summer/Fall 2011 acoustic surveys.

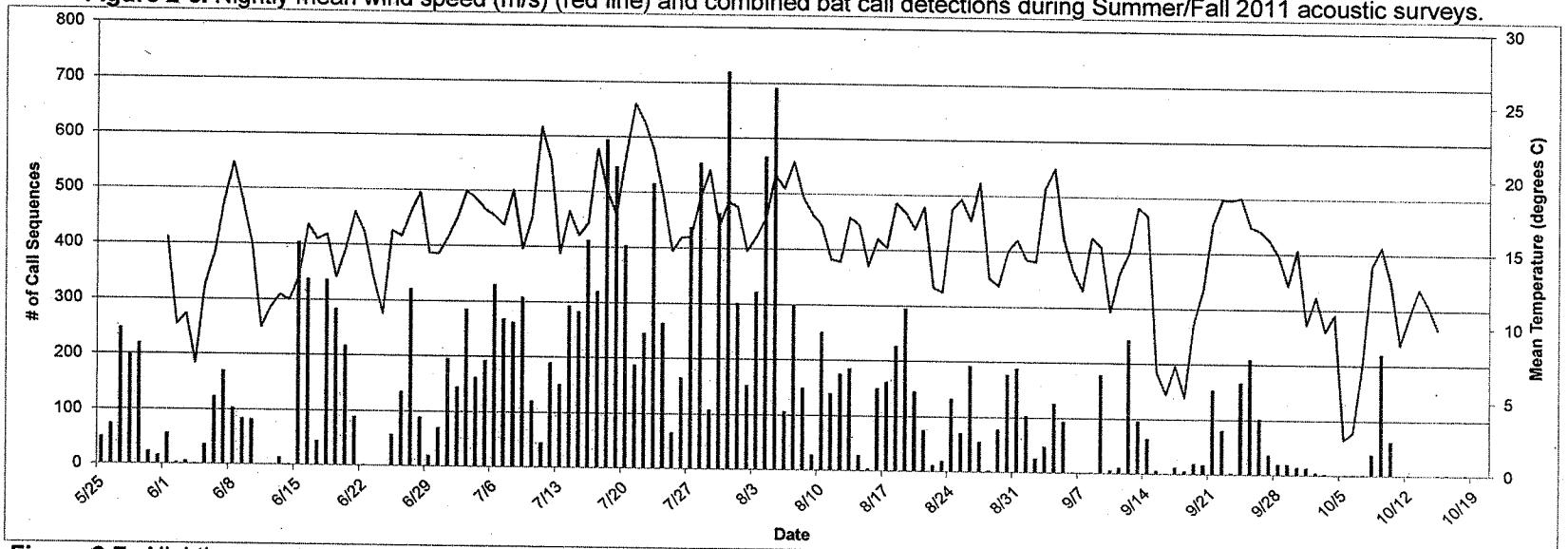

Figure 2-7. Nightly mean temperature (Celsius) (green line) and combined bat detections during the Summer/Fall 2011 acoustic surveys at the Timbertop Wind Project.

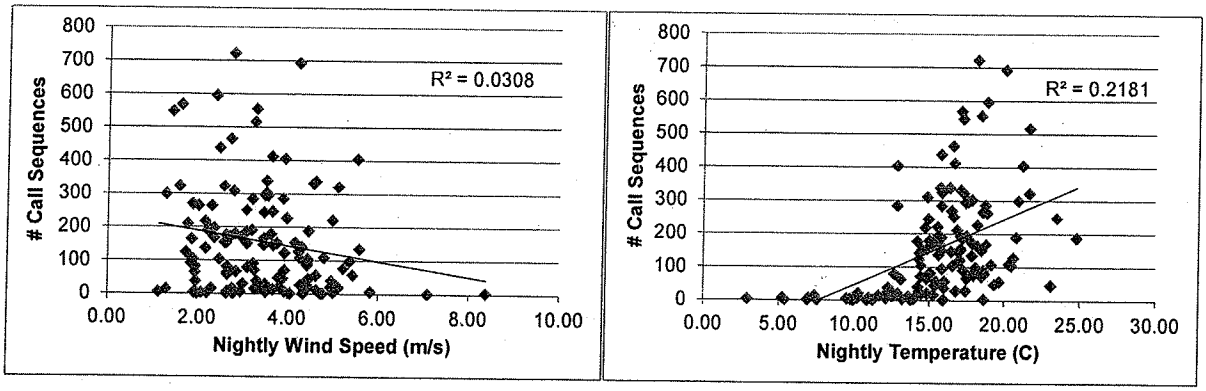

Figure 2-8. Nightly mean wind speed (left), and mean temperature (right) versus combined bat detections during Summer/Fall 2011 bat surveys at the Timbertop Wind Project

2.4 DISCUSSION

Summer/fall 2011 acoustic surveys at the Project documented variable levels of bat activity among the four detectors deployed in the Project area. Activity levels were also highly variable among nights during the May 25 to October 20 study period. However, some general trends were observed, including more consistent acoustic activity from mid-June through September (as indicated by the percentage of nights with detected activity), and overall increases in the number of call files in the second half of June as temperatures increased.

Inter-night and inter-detector variability is common in acoustic bat surveys, where roost tree location and microhabitat surrounding detectors can influence the number of calls recorded, as well as the quality of call files. Stantec made an effort to deploy acoustic detectors in similar types of locations, for example, along habitat edges that may concentrate bat activity; however, slight differences such as variable micro-habitat conditions led to inevitable differences in detection rates that do not necessarily correspond to the number of bats in the vicinity of the detectors. Additionally, because there is currently no way to differentiate individual bat passes, the passage rates observed at detectors should only be considered an index of activity and do not reflect the actual number of animals.

Comparison of acoustic bat activity documented at the Binney Met High and Binney Met Low detectors with the Emerson and Kidder tree detectors may help clarify activity patterns of bats in the air space above tree canopy and within the rotor zone of proposed wind turbines. Both the Binney Met High and Binney Met Low detectors were initially deployed in tress at heights near or below canopy height before being moved to the met tower. Once deployed in the met tower, the Binney Met High detector was located approximately 35 m above the ground, or 10 meters above tree canopy, and recorded substantially less acoustic activity than any other detector. For the eight days that this detector was deployed in a tree near canopy height, it recorded approximately 25 percent of its total calls for the 148 day survey period. This detector had the lowest proportion of BBSH calls relative to other guilds, and when deployed in the met tower it was the only detector that did not record *Myotis* calls. Since bats from the genus *Myotis* are more commonly detected beneath canopy level (Arnett et al. 2006), the absence of *Myotis* species at this detector is not unusual and corresponds to results from similar surveys in the Northeast. Other research conducted using Anabat detectors has shown that larger species

such as big brown and hoary bats are more frequently detected at greater heights (Arnett *et al.* 2006), which is not reflected in the results of this survey. The Binney Met Low detector was deployed at only 10 m above the ground, and recorded the highest proportion of BBSH calls of any detector. The higher portion of BBSH calls at this lower height suggests that some other influence such as prey availability or surrounding habitat characteristic may be influencing foraging of bats at this location. Since habitats closer to the ground are generally more structurally complex, larger bats such as those in the BBSH guild are less able to maneuver in this habitat and therefore tend to forage at greater heights (Arnett et al. 2006). In the instance of the met tower clearing where essentially all woody vegetation is removed these larger bats can more easily forage at these lower heights, which may explain the high number of call sequences recorded at the Binney Met Low detector. The majority of calls recorded at both the Emerson and Kidder Tree detectors were from the BBSH guild, with big brown bat calls representing 54 and 37 percent of calls, respectively. Although silver-haired bats were recorded at both tree detectors, they represented less than one percent of the BBSH guild. In general, Project surveys indicate that bat activity is greater below canopy height, although detection rates for bats from the genus *Myotis*, which are typically recorded below canopy height, were relatively low. This may in part reflect population declines from WNS (Brooks 2011, Watrous et al. in prep). The high number of BBSH guild bats recorded at below canopy heights may in part reflect seasonal residents foraging in the Binney Hill met tower clearing.

Bat call sequences were identified to guild, although calls were provisionally categorized by species when possible during analysis. Certain species such as the eastern red and hoary bat have easily identifiable calls. Other species such as the big brown bat and silver-haired bat are easy to separate from other bats, but are difficult to distinguish acoustically from one another. Similarly, species within the *Myotis* genus have very similar calls, and Stantec did not attempt to differentiate call sequences within this genus. *Myotis* species have been particularly affected by WNS that has become widespread in the Northeast (Brooks 2011, Watrous et al. in prep). *Myotis* sequences represented 10 percent of calls recorded at the Emerson Tree detector; however, the majority of these calls (76%) were recorded over four nights and do not necessarily reflect a large number of these bats in the Project area. The highly variable activity levels of *Myotis* species at the Project may suggest that a small number of *Myotis* are present within the Project area. Prior to WNS, *Myotis* call sequences often tended to dominate acoustic data collected from detectors deployed in trees (Stantec, unpublished data). *Myotis* call sequences represented four percent of calls recorded by Project area detectors during the summer/fall 2011 surveys, suggesting relatively few *Myotis* species within the surveyed area.

Recent studies have found that bat activity patterns are influenced by weather conditions (Arnett et al. 2006, Arnett et al. 2008, Reynolds 2006). Acoustic surveys have documented a decrease in bat activity rates as wind speed increases and temperature decreases, and bat activity has been shown to correlate negatively to low nightly mean temperatures (Hayes 1997, Reynolds 2006). Similarly, weather factors appeared to be related to bat collision mortality rates documented at two wind energy facilities in the southeastern United States, with mortality rates negatively correlated with both wind speed and relative humidity, and positively correlated to barometric pressure (Arnett 2005). These patterns suggest that bats are more likely to migrate on nights with low wind speeds (less than 4 to 6 m/s) and generally warm temperatures. Thus,

several weather variables can individually affect bat activity, as does the interaction among variables (i.e., warm nights with low wind speeds). Summer/fall 2011 acoustic sampling at the Project documented weak correlations between acoustic activity and wind speed and temperature. Raw acoustic data of the type analyzed in this study are prone to substantial variability, and it is not surprising that acoustic activity was still documented on nights with higher wind speeds and colder temperatures.

When considering the level of activity documented at the Project during the summer/fall 2011 acoustic survey, it is important to acknowledge that numbers of recorded bat call sequences cannot be correlated with the number of bats in an area because acoustic detectors do not allow for differentiation between individuals. While these data may be useful in predicting trends in post-construction mortality rates, the current lack of data on this topic precludes quantitative prediction of risk.

3.0 Breeding Bird Surveys

3.1 INTRODUCTION

Stantec conducted a breeding bird survey at the Project in summer 2011. The goal of the survey was to determine species composition, abundance, diversity, and distribution of breeding birds in the Project area. The surveys focused on documenting the occurrence of state Endangered, Threatened, or Special Concern species; however, surveys documented all species detected either acoustically or visually. Survey methods were modeled after standard methodologies for conducting breeding bird surveys in the region and the United States Geological Survey breeding bird survey methodology (Sauer et al. 2000).

The 2011 survey provides baseline data of the species present in the Project area and their abundance, as well as the community structures among the different habitats present on-site and in the surrounding area. The breeding bird survey methods were designed to be repeatable to compare count data to other sites, as well as for comparison to future data collected on-site, if necessary. Data from control points are indicative of whether the breeding bird community in the Project is representative of the surrounding area. Control point count data, collected at areas not impacted by the Project, will also provide a comparison of local breeding bird indices (as there are annual fluctuations in local populations) for future surveys for the Project, if necessary.

3.2 METHODS

3.2.1 Point Count Surveys

Stantec biologists conducted three rounds of breeding bird point count surveys: one at the end of May and two in June. Using Global Positioning System (GPS) equipment, 20 point count locations each with a 100-m-radius were established within the proposed Project area, and 6 control points with a 100-m-radius were established in similar habitats adjacent to the Project area (Figure 1-1). Survey points were positioned to sample representative habitats and landscapes (i.e., elevation and topography) that occur throughout the Project area; control points were positioned in similar habitats to those sampled in the Project area.

Surveys were timed to begin approximately 15 minutes before sunrise and end approximately 6 hours after sunrise on days with suitably clear weather, mild temperatures, and when rain or wind would not inhibit the detection of birds. During surveys, observers orientated themselves to the north and recorded the general locations of birds within the directional quadrants of a 100-m-radius count circle. Point count sample periods were broken into three periods: the first three minutes, the following two minutes, and the final five minutes. For the duration of the 10-minute count surveys, the number of individuals, listed by species, was recorded on data sheets as occurring at distances of 0-50 m, 50-100 m, or greater than 100 m from the observer, or flying overhead. Birds were documented when they were first seen or heard. During each consecutive time period, observers determined the location of previously recorded birds and

tracked any movements within the count circle to avoid recounting birds. Other notes related to breeding behavior, weather conditions, GPS location and habitat descriptions were recorded. Adult males and females were recorded (hatchlings or fledglings were not included in tallies of individuals observed). Species of birds observed before and after the point count timeframes were recorded separately as incidental observations.

3.2.2 Data summary and analysis

The habitats within the Project area and at control survey locations were grouped into five general community types based on dominant vegetation cover: mixed hardwood-conifer forest (mixed forest), field adjacent to forest edge, mixed forest/forest edge, mixed forest/forest edge adjacent to wetland, and mixed forest adjacent to natural clearing. Habitats with similar characteristics were grouped wherever possible for simplicity of statistical analysis.

Quantitative data collected for all birds during point counts were used to calculate the overall number of species observed in the study area. For those birds seen within 100 m of the observer, excluding flyovers, relative abundance, community diversity, and frequency of breeding birds was calculated for all Project and control points, and for each habitat classification among Project and control points. These indexes are described below.

- Species richness (SR) is the total number of species that were detected.
- Relative abundance (RA) is a way to quantify the number of individuals of a species in relation to other species observed. RA takes into account the total number of individuals detected, the number of times each point count location was surveyed, and the number of survey points.
- Frequency (Fr) of occurrence, expressed as a percentage, measures the percentage of points where a particular species is detected.
- Shannon Diversity Index (SDI) is a measure of species diversity in a community or habitat. SDI can provide more information about community composition than species richness alone because it takes into account relative abundance and the evenness of the distribution of species. It indicates not only the number of species, but also how abundance is distributed among all the species in the community or habitat.

Species documented beyond 100 m from the observer, as flyovers, or birds detected incidentally were not included in calculations of RA, Fr, or SDI due to the probability that they were not breeding within the direct vicinity of the point count location. However, birds observed beyond 100 m and seen as flyovers were used to determine overall SR and the total number of birds observed for Project area and control points.

3.3 RESULTS

The first round of the 2011 breeding bird survey was conducted on May 25 and 26, the second round on June 15 and 16, and the third round on June 29 and 30. Surveys were conducted

when wind or rain conditions did not adversely affect bird detection. Over the course of the surveys, wind speeds ranged from calm to approximately 7 miles per hour (mph; 12 kilometers per hour [kph]). Sky conditions generally ranged from clear to partly cloudy skies. Over the course of the surveys, temperatures ranged from 11.1° to 24.4°C (52° to 76° Fahrenheit [F]).

Table 3-1 provides a description of the Project and control survey points including habitat, elevation, percent canopy cover, and distance to forest edge.

Table 3-1. Description of project area and control point count locations

Point Count #	Habitat type	Additional description	Elevation (m)	% canopy cover	distance to forest edge (m)
WC01	forest edge/mixed forest	wide, grassy trail/past timber harvest	417	10	0
WC02	forest edge/mixed forest	wide, grassy trail/past timber harvest	431	40	10
WC03	forest edge/mixed forest	wide, grassy trail/past timber harvest	433	15	50
WC04	forest edge/mixed forest	low density residential area	372	60	0
WC05	mixed forest	Wapack trail near Rte 123/124	452	75	0
WC06	forest edge/mixed forest/wetland	forested stream along Wapack trail	405	75	2
WC07	forest edge/mixed forest	cleared lot for house constuction (not active)	468	20	10
WC08	forest edge/mixed forest/wetland	edge of Wildcat Pond adjacent to tamarak/maple/pine forest	428	30	20
WC09	field/forest edge	near summit of Kidder Mtn, forest edge/overgrown field	539	25	0
WC10	forest edge/mixed forest/wetland	near Rte 123/124, pond near residence	402	40	0
WC11	forest edge/mixed forest	Wapack trail, near powerline	460	75	0
WC12	mixed forest	Wapack trail	455	80	0
WC13	forest edge/mixed forest	man-made clearing/dirt road	475	30	50
WC14	field/forest edge	edge of hayfield/old sandpit	362	20	0
WC15	mixed forest	off of old skidder trail	410	75	0
WC16	forest edge/mixed forest/wetland	end of Binney Hill Rd/dirt road/stream	372	70	0
WC17	forest edge/mixed forest	Wapack Trail next to field/residence	408	30	50
WC18	mixed forest	Wapack trail	423	70	0
WC19	field/forest edge	Wapack trail/near peak of Emerson Hill and residence	450	50	0
WC20	forest edge/mixed forest/wetland	dirt road adjacent to pond and hemlock forest	363	75	0
CO01	forest edge/mixed forest	next to powerline/Wapack trail	430	50	0
CO02	forest edge/mixed forest	Wapack trail	419	40	0
CO03	field/forest edge	Wapack trail next to busy road/Rte 123	443	40	20
CO04	natural clearing/mixed forest	Pratt Mountain/Wapack trail - rocky clearing with low bush blueberry	531	60	10
CO05	mixed forest	Wapack trail on slope of Pratt Mountain	454	70	0
CO06	forest edge/mixed forest/wetland	mixed forest next to Binney Hill Pond in Binney Pond State Forest	394	75	0

All survey points were surveyed during the 3 survey rounds, with the exception of control point number 4 (CO04). As a result of unforeseen rerouting of the Wapack Trail near the northern

section of the Project area and survey timeframe constraints, this point was only surveyed during the two rounds in June.

At points within the Project area, a total of 503 individuals and 50 species[7] were documented (including birds observed beyond 100 m from the observer and birds observed as flyovers). The species with the greatest numbers of individuals detected among all Project area points were ovenbird (*Seiurus aurocapilla*; n=73), red-eyed vireo (*Vireo olivaceus*; n=39), and chestnut-sided warbler (*Dendroica pensylvanica*; n = 30).

At control points, a total of 178 individuals and 39[8] species were observed (including birds observed beyond 100 m from the observer and birds observed as flyovers). Five additional species not observed during surveys were observed incidentally in the vicinity of control points. Similar to Project area points, the species with the greatest numbers of individuals detected among all control points were red-eyed vireo (n=26), ovenbird (n=20), and chestnut-sided warbler (n=15).

At Project area points, the distance category from the observer at which the majority of individuals were detected was 50 to 100 m (n=262; 52 %), followed by birds seen at 0 to 50 m (n=141; 28%) (Appendix C Table 1). Fourteen percent (n=71) and 6 percent (n=29) of birds were detected greater than 100 m from the observer and as flyovers, respectively (Appendix B Table 1).

At control points, the distance category from the observer at which the majority of individuals were detected was 50 to 100 m (n=86; 48 %), followed by birds seen at 0 to 50 m (n=61; 34%) (Appendix C Table 1). Eleven percent (n=20) and 6 percent (n=11) of birds were detected greater than 100 m from the observer and as flyovers, respectively (Appendix B Table 1).

Table 3-2 summarizes the results of the surveys and analysis by habitat grouping for those birds suspected to be breeding within 100 m of survey point locations (not including birds observed greater than 100 m from the observer or flyovers).

[7] Unidentified species (unidentified accipiter, nuthatch, passerine, warbler, and woodpecker) were not included in the count of the number of species; however they were included in the total number of individuals observed.
[8] Unidentified species (unidentified accipiter, passerine, warbler, and woodpecker) were not included in the count of the number of species; however they were included in the total number of individuals observed.

Table 3-2. Summary of Project area breeding bird point-count results by habitat type, excluding observations of birds >100 m from the observer and flyovers

Habitat Type	# BBS Points	Total Birds Observed	Relative Abundance	Species Richness	Shannon Diversity Index
Project area points					
Field/Forest edge	3	84	9.33	29	3.10
Forest edge/Mixed forest	8	150	6.25	33	3.03
Forest edge/Mixed forest/Wetland	5	92	6.13	24	2.82
Mixed forest	4	77	6.42	20	2.55
All project points	**20**	**403**	**6.72**	**49**	**3.23**
Control points					
Field/Forest edge	1	28	9.33	12	2.30
Forest edge/Mixed forest	2	49	8.17	19	2.66
Forest edge/Mixed forest/Wetland	1	26	8.67	17	2.70
Mixed forest	1	36	12	15	2.38
Natural clearing	1	8	4	5	1.39
All control points	**6**	**147**	**8.17**	**37**	**3.13**

Among the Project area habitats (excluding birds seen greater than 100 m and flyovers), forest edge/mixed forest had the greatest number of individuals observed (n=150), as well as the highest value for SR (33) (Table 3-2, Appendix B Table 2). Field/Forest edge had the highest RA (9.33) and the highest SDI (3.12) (Table 3-2, Appendix B Table 2).

Among the control habitats (excluding birds seen greater than 100 m and flyovers), forest edge/mixed forest had the greatest number of individuals observed (n=49), as well as the highest value for SR (19) (Table 3-2, Appendix B Table 3). Field/Forest edge had the highest RA (9.33); Forest Edge/Mixed forest/Wetland had the highest SDI (2.70) (Table 3-2, Appendix B Table 3).

Incidental observations

Table 3-3 is a list of species that were observed in the Study Area incidentally between point count survey locations. There were five species observed incidentally in the vicinity of control points that were not observed during surveys.

Table 3-3. Species observed incidentally between point count survey locations

Observation location	Species
Binney Hill road	downy woodpecker
near CO05	brown creeper
near CO05	scarlet tanager
near CO05	hairy woodpecker
near CO05	downy woodpecker*
near CO05	turkey vulture
near CO05	common grackle*
near CO05	red-winged blackbird*
near CO06	veery
near WC03	magnolia warbler
near WC03	turkey vulture
near WC03	prairie warbler
near WC03	unidentified thrush
near WC05	broad-winged hawk
near WC06	black-throated blue warbler
near WC06	black-throated green warbler
near WC09	white-throated sparrow
near WC09	black-and-white warbler
near WC09	black-throated blue warbler
near WC11 and WC12	blackburnian warbler
near WC12	blackburnian warbler
pond near CO06	tree swallow*
pond near CO06	American black duck*
Wapack trail toward Wildcat Mtn	indigo bunting
Wapack trail toward Wildcat Mtn	brown creeper
*** Species not observed during point count surveys.**	

Sensitive Species

There was no state- or federally-listed species observed in either the Project area or control survey point locations. Additionally, no incidental observations of listed species were made.

3.4 DISCUSSION

Point-count surveys are a common method used to estimate abundance and density of birds (Reidy et al. 2011). The intent of the 2011 surveys at the Project was to document the occurrence of species of conservation concern, as well as to provide baseline data of species occurring within the Project area. There are some limitations of breeding bird surveys in detecting all species and number of individuals within count circles. Certain species of bird vocalize less frequently or have larger territories and therefore are often under-represented during breeding bird surveys (Farnsworth et al. 2002, Reidy et al. 2011). Additionally, there are several factors that can influence detection probability, including time of day and season, weather, breeding status, distance to detected individuals, habitat type, and variable observers. These biases can influence the reported density of birds (Reidy et al. 2011). However, the 2011 breeding bird surveys at the Project were conducted during the peak nesting period and were initiated in early morning when birds are typically the most vocal. In addition, these surveys

targeted optimal weather conditions that would allow for maximum detection of vocalizing birds. Further, the 2011 surveys used standard methods that are comparable to other breeding bird surveys conducted in the region; therefore, the results of the surveys provide a suitable reflection of the baseline breeding bird community in the Project and in the surrounding area. It should be noted that comparisons among breeding bird surveys at different sites are difficult to make due to highly variable habitat types and conditions among sites and variations in point-count survey methodologies. For example, Reidy et al. (2011) indicated that bird density estimates can be 27 percent higher for 10-minute verses 5-minute point count surveys.

Similar species composition and breeding bird indexes were detected at the Project area and control point habitats, indicating that the breeding bird community in the Project is representative of the surrounding area. The fact that there were fewer species detected overall at control points compared to Project area points is likely attributable to the greater number of Project area points sampled. The species detected during the survey are all generally common and regionally abundant, and are representative of the habitats in which they were observed. There was no state- or federally-listed species observed either in Project area or control survey point locations, and no incidental observations of listed species were made.

4.0 Diurnal Raptor Surveys

4.1 SURVEY OBJECTIVES

The objectives of the raptor surveys were to: 1) sample baseline raptor activity and behavior in the Project area during spring and fall migration periods; and 2) document the species composition of raptors that occur in the Project area.

Survey methods were based on standard methodologies used for raptor migration surveys at wind development sites in the region. The timing of surveys targeted seasonal and daily peak periods during which raptors are typically active.

4.2 STUDY AREA DESCRIPTION

For the purposes of this report, the Project area is the proposed turbine areas, as depicted in the Project area boundary outlined area in Figure 1-1. The Study Area is the observable airspace as seen from the observation site, also shown on Figure 1-1.

Study Area

Spring and fall 2011 raptor surveys were conducted from the northern summit of Kidder Mountain (Kidder Mountain north), located at a prominent location in the Project area (Figure 1-1). The summit of Kidder Mountain is a rocky clearing with excellent views to the south, east, and west. The view to the north from this location is somewhat obscured by the tree line. To the south, the visible Project area peaks included the southern portion of Kidder Mountain (Kidder Mountain south), Binney Hill, and Emerson Hill. The view is unrestricted between Kidder and Mount Watatic in Massachusetts. The valley in the town of New Ipswich is visible to the east. The valley north of the Wapack Range Mountains, the Wapack Mountains (including Barrett Mountain, New Ipswich Mountain, Stony Top, and Pratt Mountain), and the airspace above Conant Hill and Wildcat Mountain are visible to the west. To the north, the northern portion of the summit of Kidder Mountain is restricted to the airspace above tree height. Figure 4-1 shows the view from Kidder Mountain in each cardinal direction.

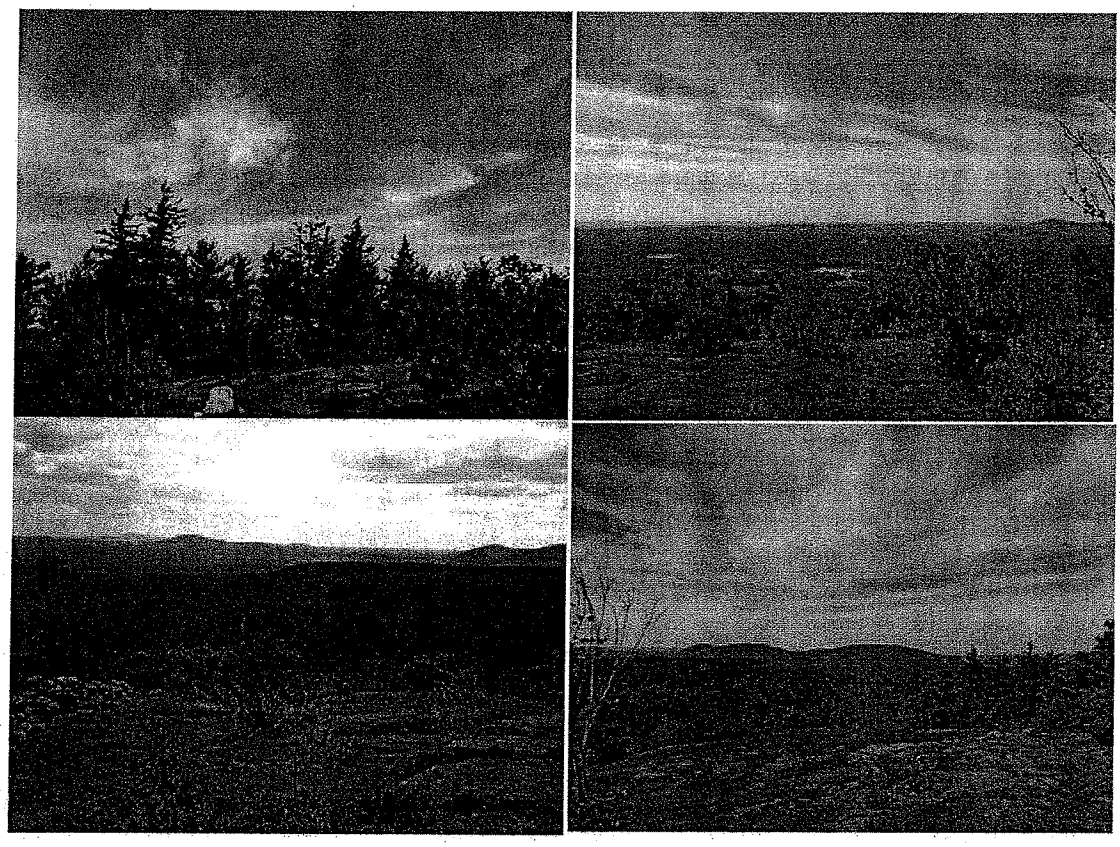

Figure 4-1. View in each cardinal direction from the summit of Kidder Mountain (North = top left, East = top right, South = bottom left, West = bottom right).

4.3 METHODS

4.3.1 Field Surveys

Survey days consisted of visual observation sampling during seven consecutive hours between 9 am and 4 pm, during the peak hours of thermal development and raptor activity. During surveys, the observer scanned the sky and surrounding landscape by naked eye or with binoculars. Each time a raptor was observed it was recorded, regardless of whether it was suspected to be a local raptor that was previously observed. Therefore, daily count totals include all passes of raptors observed throughout a survey day[9]. However, if raptors that were suspected to be seasonally local were observed multiple times within the same location during an hour period, they were only documented the first time they were observed per hour period.

[9] Hawk Migration Association of North America (HMANA) observers typically do not count birds suspected to be local or seen previously that day; therefore, this difference in survey method should be considered when comparing results among datasets.

Detailed information for each observation was recorded on standardized data sheets, including:

- Observation date and time;
- Species[10], number of individuals, and age (if possible);
- Location of each raptor depicted on a topographical map;
- Flight height[11] and behaviors observed in each of the topographical positions where raptors were observed; and
- General flight direction of each raptor.

Additionally, incidental observations of non-raptor species, including passerines and water birds, were documented by observers; however, incidental data were not collected uniformly or systematically.

Topographical flight positions were summarized into categories that describe the landscape features within the Study Area (note these positions apply to raptors observed over multiple topographical features within and outside of the Project area): A1) parallel to ridge, A2) perpendicular to ridge, A3) over saddle, B) flight path over upper slope of ridge, C) flight path over lower slope of ridge, and D) flight path over a valley (see Figure 4-2 below). As individual raptors traveled through or in the vicinity of the Project, all position categories in which a raptor occurred were recorded.

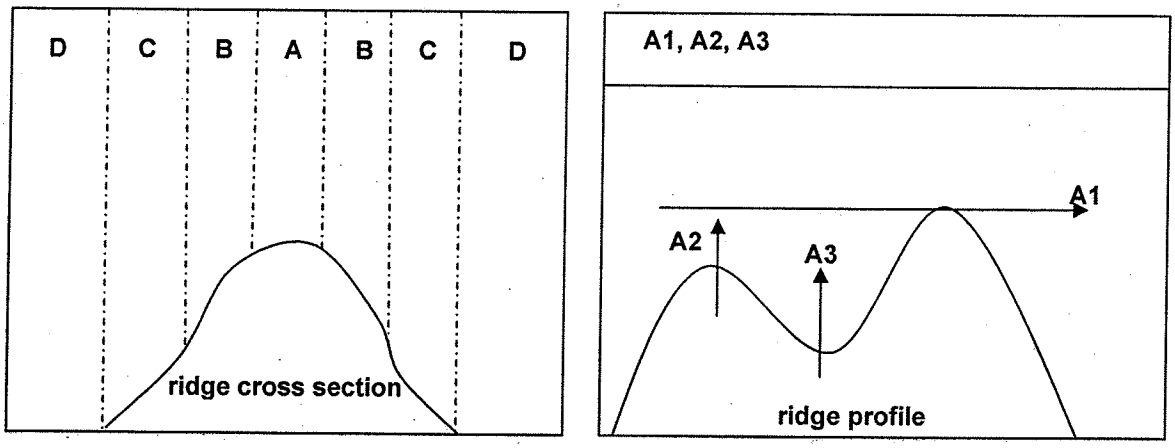

Figure 4-2. Raptor flight position categories in relation to the topography of the Study Area (codes apply to all topographical features visible within and outside of Project area). A1) parallel to ridge, A2) perpendicular to ridge, A3) over saddle, B) flight path over upper slope of ridge, C) flight path over lower slope of ridge, and D) flight path over valley.

[10] Raptors that flew too rapidly or were too far to accurately identify were recorded as unidentified to their genus or, if the identification of genus was not possible, unidentified raptor.
[11] Nearby objects with known heights, such as met towers, telecommunication towers, and trees, were used to estimate flight height.

4.3.2 Weather Data

The observer recorded hourly weather conditions, including wind speed and direction, temperature, sky conditions, percent cloud cover, cloud type, and relative cloud height throughout each survey day.

Wind direction, wind speed, and the development of thermals largely influence raptor flight behaviors and flight paths. Further, specific seasonal weather conditions result in accentuated raptor migration movements. Atmospheric instability and updrafts are conditions that accompany low pressure systems and storms, and raptors will move in advance of these conditions (Drennan 1981). Additionally, soaring on southerly winds is more efficient for northbound migrants in the spring (Drennan 1981), while soaring on northerly winds is more efficient for southbound migrants. To consider the atmospheric influences on raptor activity during the days that were sampled in spring and fall 2011, regional surface weather map images were interpreted to determine the dates that daytime pressure systems (high, low, or none) moved through the region. Surface weather maps prepared by the National Centers for Environmental Prediction, the Hydro-meteorological Prediction Center, and the National Weather Service were downloaded daily for the majority of the survey window. The Surface Weather Maps show station data and the analysis for 8:48 am and 8:48 pm eastern standard time.

4.3.3 Data Analysis Methods

Raptor observation data were summarized by survey day and for the spring and fall survey periods. Data analysis included a summary of:

- Daily and seasonal observation rates (raptors observed per hour);
- Total observations of the different species observed;
- Hourly observation totals;
- Percent of raptors observed in the Study Area that occurred specifically within the Project area;
- Percent of raptors suspected to be actively migrating;
- Summary of flight behaviors observed in the topographical positions of the different locations of the Study Area;
- Average minimum flight height of raptors within each topographical position category; and
- For raptors observed within the Project boundary, the percent of raptors seen below the proposed maximum rotor swept height of 125 m (410').

4.4 Spring Survey Effort and Results

4.4.1 Spring Survey Effort

Spring surveys were conducted on 10 days from April 21 through May 26, 2011, for a total of 70 survey hours. Table 4-1 summarizes the spring 2011 survey effort and results.

Table 4-1. A summary of the Spring 2011 survey effort and results at the Timbertop Wind Project

Survey effort	
Range of survey dates	**4/21 - 5/26**
No. survey days	**10**
No. survey hours	**70**
Raptor species observed	
No. raptor species observed	**10**
Common name	***Scientific name***
American kestrel	*Falco sparverius*
broad-winged hawk	*Buteo platypterus*
Cooper's hawk	*Accipiter cooperii*
merlin	*Falco columbarius*
northern goshawk	*Accipiter gentilis*
northern harrier	*Circus cyaneus*
osprey	*Pandion haliaetus*
red-tailed hawk	*Buteo jamaicensis*
sharp-shinned hawk	*Accipiter striatus*
turkey vulture	*Cathartes aura*
unidentified accipiter	*n/a*
unidentified buteo	*n/a*
unidentified falcon	*n/a*
unidentified raptor	*n/a*
Results	
Total no. observations of raptors	**227**
Seasonal passage rate (raptor observations/hour)	**3.24**
Total no. observations of raptors within Project area (percent of total observations)	**124 (55%)**
Total no. of observations of raptors seen in the Project area and below max rotor height (percent of total observations within Project boundary)	**101 (44%)**

4.4.2 Spring Weather Summary

During the spring surveys, temperatures ranged from 6°C to 24°C (42.8° to 75.2°F). The average hourly temperature was 15°C (62°F) on survey days. Sky conditions were generally clear to partly cloudy, with periods of drizzle on April 30 and fog on May 21. Wind direction was

variable throughout the survey season. Wind speeds ranged from calm to 19 to 24 mph (30 to 38 kph).

Analysis of regional surface weather maps indicated the timing of approaching low pressure systems, when raptor movements tend to be accentuated. Table 4-2 shows the wind direction and pressure system pattern on each survey date during the spring surveys.

Table 4-2. Wind direction and pressure systems during spring 2011 surveys at the Timbertop Wind Project

Date	Wind direction	Wind speed code (s)	Daytime Low (L) or High (H) Pressure System Around New Hampshire
4/21/2011	NW	3-5	L in am with a scatter of clear skies, H in pm
4/22/2011	N, SW	0-1	H in early am hours, no data for rest of day
4/30/2011	WSW	2	Variable cloudiness, L moving east
5/2/2011	SW	3	H in am, L moving in from the west in pm
5/7/2011	SW	2	L with scattered showers
5/10/2011	NE	5	Large L off coast of New England partly over NH
5/12/2011	NNE	1-4	H in am with large L off coast of New England, No data for pm
5/21/2011	SE	1-2	L with scattered showers and cold front from the north
5/24/2011	SSW	1	L with scattered showers and cold front from the northwest
5/26/2011	S	5	H with scattered clouds in am, L with scattered showers in pm

Wind Speed codes 1 = 1-3 mph; **2** = 4-7 mph; **3** = 9-12 mph; **4** = 13-18 mph; **5** = 19-24 mph

4.4.3 Spring Raptor Data

Over the course of the survey period, a total of 227 observations of raptors were documented. The seasonal passage rate was 3.24 raptor observations per hour (raptors/hr). Figure 4-3 and Appendix C Table 1 show the daily totals of raptors.

Daily passage rates ranged from 0.00 raptors/hr (May 21) to 7.14 raptors/hr (May 7). The day with the highest passage rate was characterized by moderate southwest winds and a low pressure system bringing unstable weather.

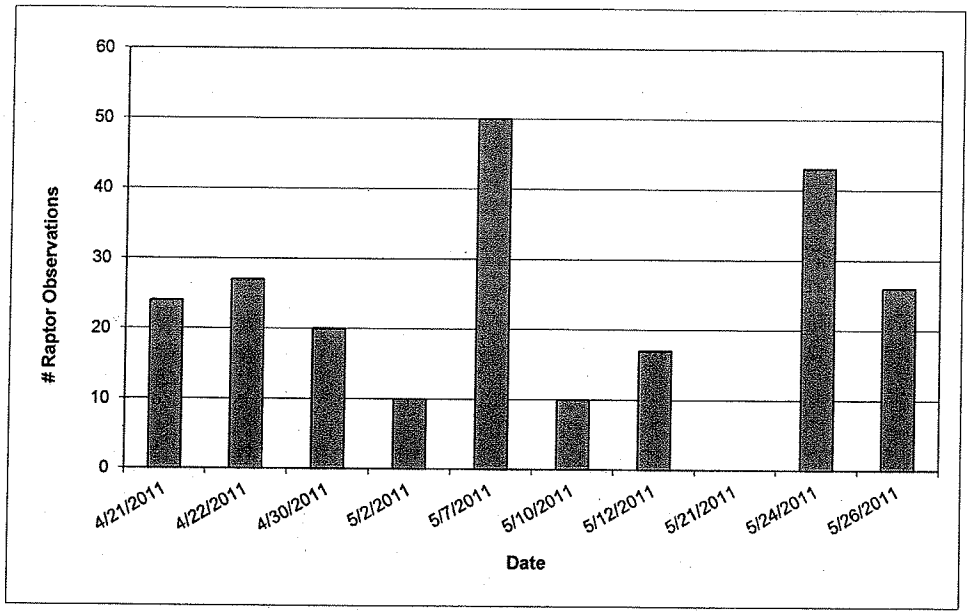

Figure 4-3. Total raptor observations by survey day during Spring 2011 surveys at the Timbertop Wind Project.

Ten species of raptors were observed (not including unidentified accipiter, unidentified buteo, unidentified falcon, and unidentified raptor) (Figure 4-4, Appendix C Table 1). For those raptors that were identifiable to species, turkey vulture (*Cathartes aura*) (n=132; 58%), followed by red-tailed hawk (*Buteo jamaicensis*) (n=15; 7%), were the species most frequently observed.

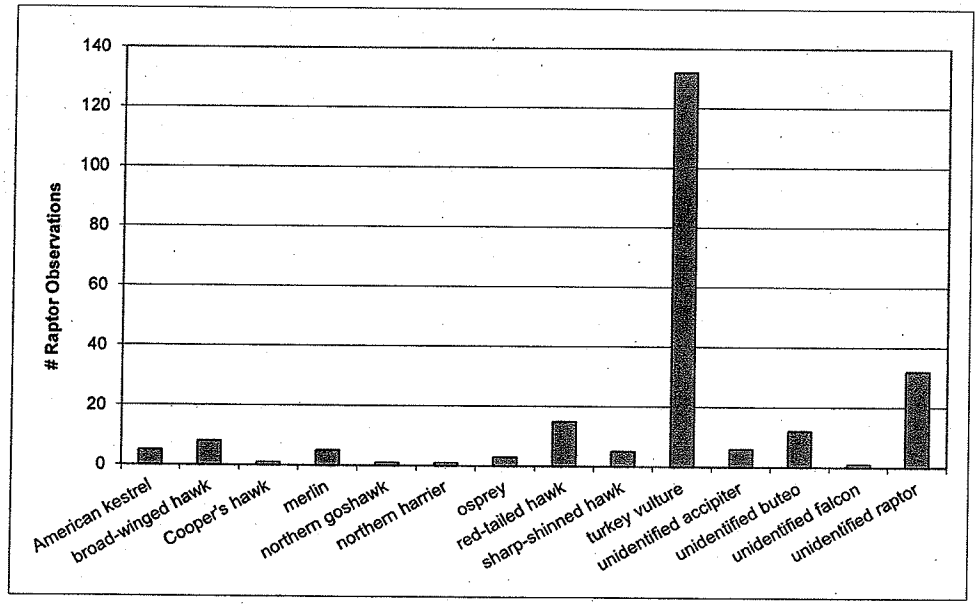

Figure 4-4. Number of observations of raptor species observed during Spring 2011 surveys at the Timbertop Wind Project.

4.4.4 Spring Hourly Observations

The timing of peak raptor movements during survey days occurred between 1:00 and 2:00 pm, with a smaller peak earlier in the day between 10:00 and 11:00 am (Figure 4-5, Appendix C Table 2).

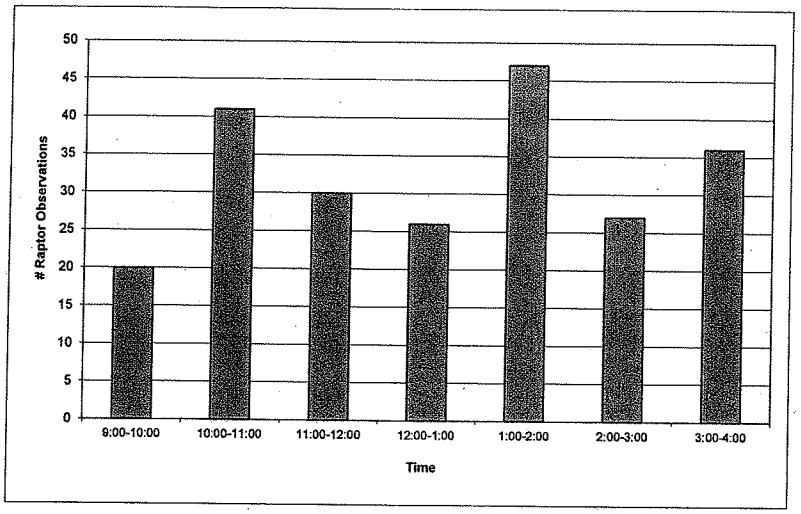

Figure 4-5. Number of observations of raptors per survey hour observed during Spring 2011 surveys at the Timbertop Wind Project.

4.4.5 Spring Raptor Flight Path Locations and Behaviors

Raptors were seen in multiple Study Area locations and topographical positions, and were often exhibiting multiple behaviors during observations; therefore, there are more behavior and position observations than there were total raptors seen. Table 4-3 describes the Study Area locations where raptors were observed in relation to the Project boundary, as well as the behaviors raptors exhibited within different topographical positions. The majority of raptor observations occurred over the peaks and side slopes and valleys associated with Wildcat Mountain (27%), followed by Kidder Mountain north (20%) and Kidder Mountain south (16%) (Table 4-3).

Table 4-3. Raptor behaviors summarized by location in Study Area and flight position at Timbertop Wind Project, Spring 2011

Location in Study Area	Soaring, Gliding						Powered Flight						Foraging Behaviors						Territorial or Courtship Behavior						Perched						TOTAL	PERCENTAGE
	A1	A2	A3	B	C	D	A1	A2	A3	B	C	D	A1	A2	A3	B	C	D	A1	A2	A3	B	C	D	A1	A2	A3	B	C	D		
Kidder Mtn North	18	3	4	8	5	2	2	0	1	0	0	0	7	1	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	53	20%
Kidder Mtn South	4	1	2	8	4	3	1	0	0	1	0	0	3	9	2	0	0	0	0	0	0	0	0	0	2	1	0	0	0	0	41	16%
Valley east of Kidder Mtn	1	1	0	0	3	3	0	0	0	0	1	1	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	12	5%
Valley southeast of Kidder Mtn	0	0	0	2	0	7	0	1	0	0	0	1	0	3	1	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	18	7%
Valley south of Kidder	0	0	0	0	4	17	0	0	0	0	0	0	0	0	0	0	0	6	0	0	0	0	0	0	0	0	0	0	0	0	27	10%
Wildcat Mtn	19	5	0	15	13	10	1	0	0	1	0	0	2	0	0	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	72	27%
Valley south of Wildcat Mtn/Conant Hill	4	0	0	2	2	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	11	4%
Valley north of Wapack Mtn	0	0	0	1	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	2%
Wapack Mountains	14	1	5	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	1	1	0	1	0	26	10%
TOTAL	60	11	11	36	34	43	4	1	1	2	1	2	12	16	4	6	2	6	0	0	0	0	0	0	3	7	1	0	1	0	264	

The majority of raptors observed were soaring or gliding over topographical features of the Project area (Table 4-3). There were no territorial or courtship behaviors observed within Study Area locations. Raptors species (including sharp-shinned hawk (*Accipiter striatus*), red-tailed hawk, unidentified accipiter, and unidentified raptor) were observed perched in different locations of the Study Area, both inside of and outside of the Project area (Table 4-3). Raptor foraging behaviors were observed both inside of and outside of the Project area (Table 4-3); species engaged in foraging behaviors over topographical features within the Project area included turkey vulture, American kestrel (*Falco sparverius*), sharp-shinned hawk, northern goshawk (*Accipiter gentilis*), red-tailed hawk, unidentified accipiter, and unidentified buteo.

Based on their flight behaviors, raptors suspected to be actively migrating or not actively migrating are summarized in Table 4-4. During spring surveys, a raptor was considered actively migrating if its flight path was generally direct and in a northerly direction. A raptor was suspected to be a stop-over or seasonally local raptor if it was traveling in a non-direct manner and in a non-migratory direction, or if it exhibited perched or foraging flight behaviors. Nineteen percent (n=43) of raptors observed in the Study Area were suspected to be actively migrating, while the majority of raptors (n=121; 53%) did not appear to be actively migrating (Table 4-4).

Table 4-4. Observations of raptors suspected to be actively migrating at Timbertop Wind Project, Spring 2011

Species	Not Actively Migrating	Actively Migrating	Unknown	TOTAL
American kestrel	2	1	2	**5**
broad-winged hawk		1	7	**8**
Cooper's hawk			1	**1**
merlin	1	3	1	**5**
northern goshawk		1		**1**
northern harrier	1			**1**
osprey		2	1	**3**
red-tailed hawk	10	2	3	**15**
sharp-shinned hawk	3	1	1	**5**
turkey vulture	80	28	24	**132**
unidentified accipiter	3		3	**6**
unidentified buteo	5	1	6	**12**
unidentified falcon		1		**1**
unidentified raptor	16	2	14	**32**
Total	**121**	**43**	**63**	**227**
% of Total Obs.	**53%**	**19%**	**28%**	

4.4.6 Spring Flight Heights and Flight Path Locations

The average minimum flight heights of raptors observed in the different topographical positions of the Study Area are summarized in Table 4-5. These summaries include raptors seen over different topographical features within and outside of the Project area. There are more behavior observations than total raptors observed because some raptors exhibited multiple behaviors while passing through multiple topographical positions. The majority of observations occurred in position A1. For raptors seen in this topographical position, the average minimum flight height was 54 m (Table 4-5).

Table 4-5. Number of observations and average minimum flight heights for each position category for raptors observed at Timbertop Wind Project, Spring 2011

	A1) flight along or parallel to ridge	A2) crossed ridge	A3) flight crossed depression or saddle	B) upper slope	C) lower slope	D) over valley
# of observations of raptors in each topographical postion (n=256)	70	31	16	44	46	49
Average minimum flight height (m)	54	84	134	95	147	221

Of those raptors documented in the Study Area, 124 observations (55%) occurred within the Project area. Of these raptors, 101 raptors (44%) occurred at flight heights below the proposed maximum rotor height of 125 m (Figure 4-6, Appendix C Table 3). Turkey vulture was the most

commonly observed raptor seen during the spring surveys and was the species most commonly observed flying below 125 m (Figure 4-6).

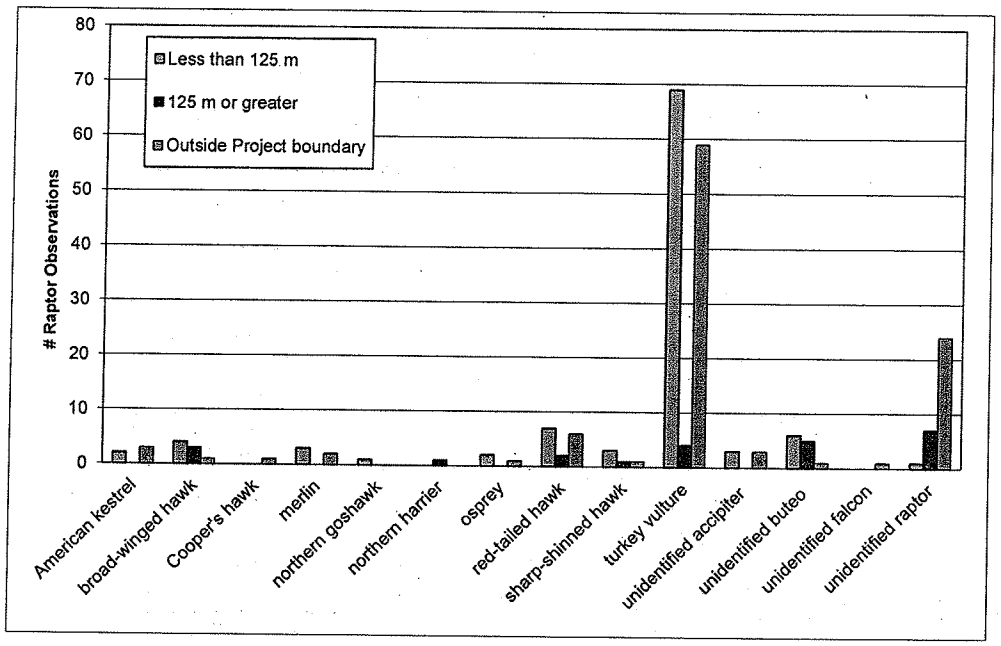

Figure 4-6. Number of observations of raptor species observed within Project area at heights above and below 125 m during Spring 2011 surveys at the Timbertop Wind Project.

4.4.7 Spring Rare Threatened and Endangered Species

A single state-listed Endangered northern harrier (*Circus cyaneus*) was observed within the Project area over Wildcat Mountain. This bird was soaring at heights between 300 and 350 m. There were two state-listed Species of Special Concern observed: American kestrel and osprey (*Pandion haliaetus*). Two kestrels were observed within the Project area over Kidder Mountain north or south, and three occurred outside of the Project area. Two ospreys were observed within the Project area over Kidder Mountain south, and one osprey occurred outside of the Project area.

4.4.8 Spring Incidental Bird Observations

There were 20 non-raptor avian species observed incidentally during the spring 2011 raptor surveys (Table 4-6). None of these species are state- or federally-listed.

Table 4-6. Non-raptor avian species observed incidentally during raptor surveys at Timbertop Wind Project, Spring 2011	
Common name	**Scientific name**
American crow	*Corvus brachyrhynchos*
black-and-white warbler	*Mniotilta varia*
black-capped chickadee	*Poecile atricapillus*
black-throated blue warbler	*Dendroica caerulescens*
black-throated green warbler	*Dendroica virens*
blue jay	*Cyanocitta cristata*
common raven	*Corvus corax*
dark-eyed junco	*Junco hyemalis*
eastern towhee	*Pipilo erythrophthalmus*
hermit thrush	*Catharus guttatus*
mourning dove	*Zenaida macroura*
orchard oriole	*Icterus spurius*
ovenbird	*Seiurus aurocapilla*
pileated woodpecker	*Dryocopus pileatus*
prairie warbler	*Dendroica discolor*
red-breasted nuthatch	*Sitta canadensis*
ruby-throated hummingbird	*Archilochus colubris*
white-breasted nuthatch	*Sitta carolinensis*
wild turkey	*Meleagris gallopavo*
winter wren	*Troglodytes hiemalis*

4.5 Fall Survey Effort and Results

4.5.1 Fall Survey Effort

Fall surveys were conducted on 10 survey days from August 24 through November 1, for a total 68 survey hours. Table 4-7 summarizes the fall 2011 survey effort and results.

Table 4-7. A summary of the Fall 2011 survey effort and results at the Timbertop Wind Project	
Survey effort	
Range of survey dates	8/24 - 11/1
No. survey days	10
No. survey hours	68
Raptor species observed	
No. raptor species observed	11
Common name	***Scientific name***
American kestrel	*Falco sparverius*
bald eagle	*Haliaeetus leucocephalus*
broad-winged hawk	*Buteo platypterus*
Cooper's hawk	*Accipiter cooperii*
northern harrier	*Circus cyaneus*
osprey	*Pandion haliaetus*
peregrine falcon	*Falco peregrinus*
red-shouldered hawk	*Buteo lineatus*
red-tailed hawk	*Buteo jamaicensis*
sharp-shinned hawk	*Accipiter striatus*
turkey vulture	*Cathartes aura*
unidentified accipiter	*n/a*
unidentified buteo	*n/a*
unidentified falcon	*n/a*
unidentified raptor	*n/a*
Results	
Total no. observations of raptors	639
Seasonal passage rate (raptor observations/hour)	9.4
Total no. observations of raptors within Project area (percent of total observations)	477 (75%)
Total no. of observations of raptors seen in the Project area and below max rotor height (percent of total observations within Project boundary)	170 (27%)

4.5.2 Fall Weather Summary

Temperatures ranged between 2° to 26°C (35° to 78°F) on fall survey days. Sky conditions were generally clear to partly cloudy; however, there was a period of fog between 9 am and 10 am on September 12 and showers between noon and 1 pm on October 5. Wind direction was variable among survey days. Wind speeds generally ranged from calm to 9 to 12 mph (20 to 29 kph).

Analysis of regional surface weather maps indicated the timing of approaching low pressure systems when raptor movements tend to be accentuated. Table 4-8 shows the wind direction and pressure system pattern for each survey date during the fall survey.

Table 4-8. Wind direction and pressure systems during fall 2011 surveys at the Timbertop Wind Project

Date	Wind direction	Wind speed code (s)	Daytime Low (L) or High (H) Pressure System Around New Hampshire
8/24/2011	SW - SSW	2-3	H in am heading offshore, L moving in from the west in pm
8/31/2011	calm	n/a	data not available
9/11/2011	S	1-3	data not available
9/12/2011	W - SW	1-2	L in the am heading offshore, H in the pm heading offshore
9/17/2011	variable	1	H approaching from west bringing increasing clouds
9/27/2011	variable	1	H in am approaching from west, approaching storm front in pm
9/28/2011	SW - SE	1-2	L approaching from west bringing scattered rain showers
10/5/2011	NNW - NW	2-3	L with scattered showers heading southeast/offshore
10/18/2011	SW - WSW	1-2	L in am and high in pm moving from southwest
11/1/2011	variable	1	L approaching from southwest

Wind Speed codes 1 = 1-3 mph; **2** = 4-7 mph; **3** = 9-12 mph; **4** = 13-18 mph; **5** = 19-24 mph

4.5.3 Fall Raptor Data

During the fall surveys, there were a total of 639 raptor observations. The seasonal passage rate was 9.4 raptors/hr. Figure 4-7 and Appendix C Table 4 show the daily totals of raptors for the fall season.

Daily passage rates ranged from 1.00 raptors/hr (October 18) to 41.29 raptors/hr (September 17). The day with the highest passage rate was characterized by variable light winds and a high pressure system approaching from the west bringing increasing clouds.

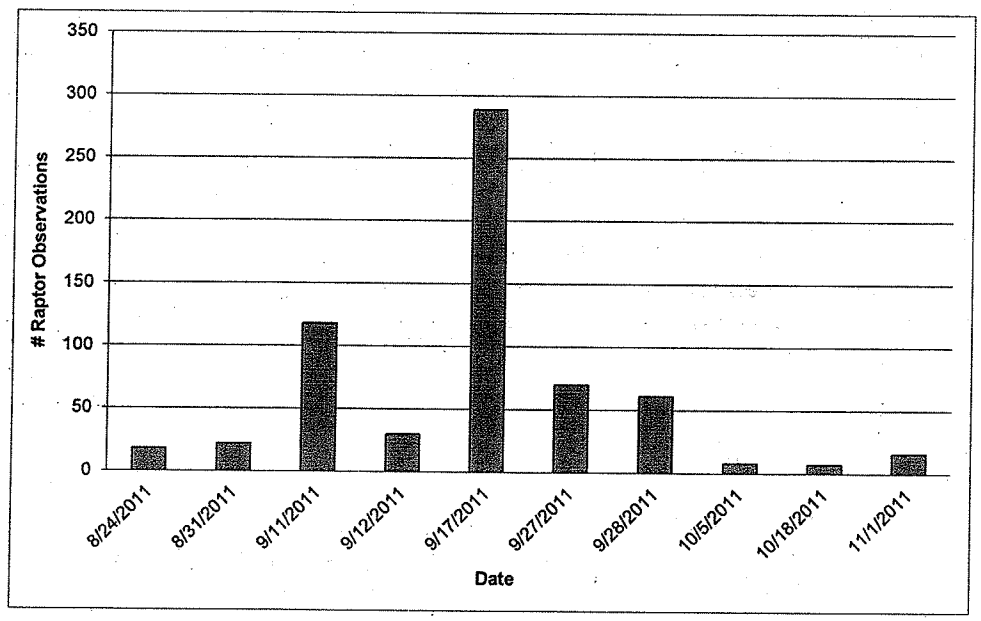

Figure 4-7. Total raptor observations by survey day during Fall 2011 surveys at the Timbertop Wind Project.

There were 11 species of raptor observed (not including unidentified accipiter, unidentified buteo, unidentified falcon, and unidentified raptor) (Figure 4-8, Appendix C Table 4).

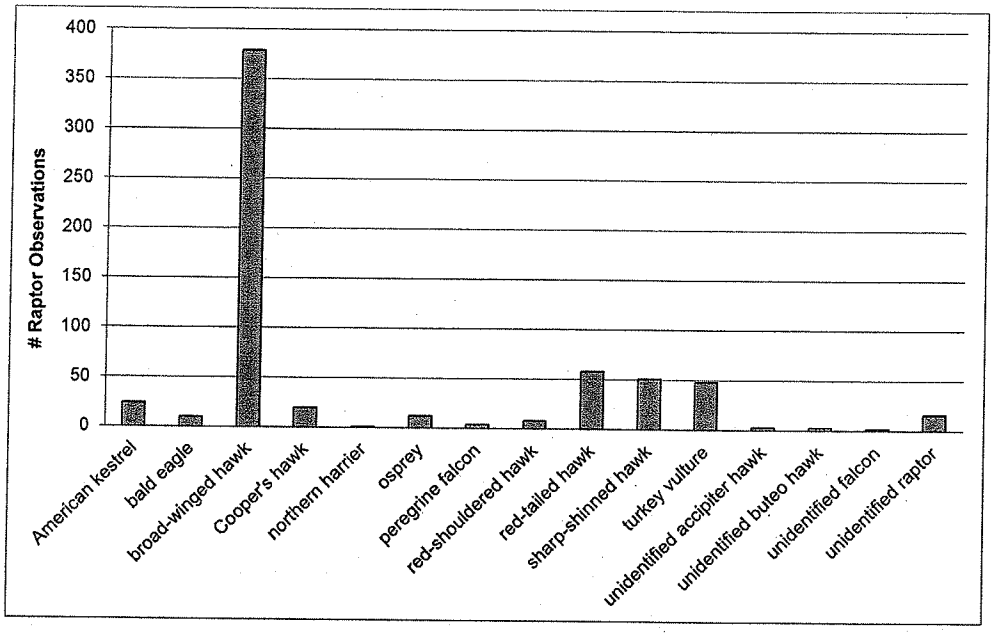

Figure 4-8. Number of observations of raptor species during Fall 2011 surveys at the Timbertop Wind Project.

During the fall surveys, broad-winged hawk (n=379, 59%) and red-tailed hawk (n=58, 9%) were the most commonly observed species.

Observations peaked between 1:00 pm and 3:00 pm (Figure 4-9, Appendix C Table 5).

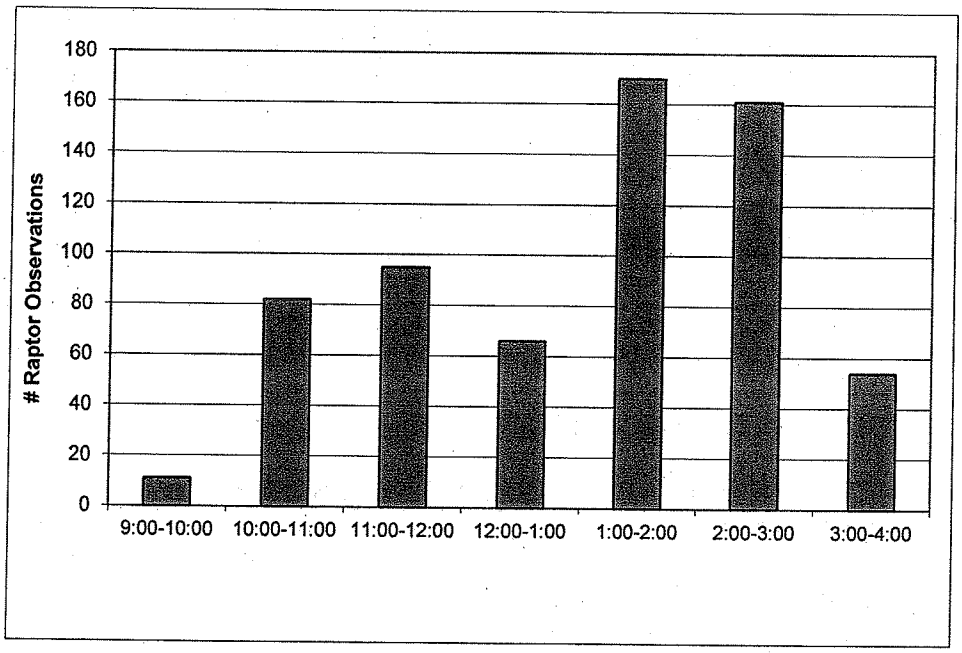

Figure 4-9. Number of observations of raptors per survey hour during Fall 2011 surveys at the Timbertop Wind Project.

4.5.4 Fall Raptor Flight Path Locations and Behaviors

Raptors were seen in multiple Study Area locations and topographical positions, and were often exhibiting multiple behaviors during observations; therefore, there are more behavior and position observations than there were total raptors seen. Table 4-9 describes the Study Area locations where raptors were observed in relation to the Project boundary, as well as the behaviors raptors exhibited within different topographical positions. The majority of raptor observations occurred over the peaks and side slopes and valleys associated with Kidder Mountain north and south (Table 4-9).

Table 4-9. Raptor behaviors summarized by location in Study Area and flight position at Timbertop Wind Project, Fall 2011

Location in Study Area	Soaring, Gliding						Powered Flight						Foraging Behaviors						Territorial or Courtship Behavior						Perched							
	A1	A2	A3	B	C	D	A1	A2	A3	B	C	D	A1	A2	A3	B	C	D	A1	A2	A3	B	C	D	A1	A2	A3	B	C	D	TOTAL	PERCENTAGE
Binney Hill	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0%
Kidder Mtn north	142	1	0	84	69	7	49	0	0	21	15	2	7	0	0	5	4	0	6	0	0	0	0	0	4	0	0	2	0	0	418	36%
Kidder Mtn south	170	1	0	146	136	16	15	0	0	23	12	5	0	0	0	3	2	0	1	0	0	0	1	0	4	0	0	1	0	0	536	46%
Kidder Mtn south (south of Project boundary)	0	0	0	0	4	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	6	1%
valley east of Kidder Mtn	0	0	0	0	0	2	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0%
valley east of Kidder Mtn (within Project boundary)	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0%
valley north of wapacks	0	0	0	0	0	99	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	99	9%
valley south of Kidder Mtn	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0%
valley south of Kidder Mtn (within Project boundary)	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0%
valley south of Wildcat Mtn/Conant Hill (south of Project boundary)	0	0	0	0	0	7	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8	1%
valley south of Wildcat Mtn/Conant Hill (within Project boundary)	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0%
valley southeast of Kidder Mtn	0	0	0	0	0	34	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	36	3%
valley southeast of Kidder Mtn (within Project boundary)	0	0	0	0	0	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	1%
Wapack Mtns	0	0	0	0	3	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0%
west of binney hill	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0%
Wildcat mtn	6	0	0	10	8	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	25	2%
TOTAL	320	2	0	240	223	178	64	0	0	44	29	11	7	0	0	8	8	0	7	0	0	0	1	0	8	0	0	3	0	0	1,153	100%

Over the majority of Project locations, raptors were observed soaring or gliding. Raptors also commonly used powered flight – behavior typical of migrating raptors, as well as seasonally local raptors that may be commuting between locations. For non-migratory behaviors, there were observations of red-tailed hawk, American kestrel, sharp-shinned hawk, and turkey vulture perching on trees or the transmission poles on Kidder Mountain north or south. American kestrel, Cooper's hawk (*Accipiter cooperii*), and red-tailed hawk demonstrated foraging behaviors over Kidder Mountain north and south, and an unidentified raptor was observed foraging in the vicinity of Wildcat Mountain. Cooper's hawk, sharp-shinned hawk, and red-tailed hawk exhibited territorial displays over Kidder Mountain north and south.

Based on their flight behaviors, raptors suspected to be actively migrating or not actively migrating are summarized in Table 4-10. During fall surveys raptors were considered actively migrating if their flight path was generally direct and in a southerly direction. Raptors were suspected to be stop-over or seasonally local raptors if they were traveling in a non-direct manner and in a non-migratory direction, or if they exhibited perched or foraging flight behaviors. The majority of raptors observed, 75 percent (n=480), were not suspected to be actively migrating (Table 4-10).

Table 4-10. Observations of raptors suspected to be actively migrating at Timbertop Wind Project, Fall 2011

Species	Not Actively Migrating	Actively Migrating	Unknown	TOTAL
American kestrel	10	8	6	24
bald eagle	9		1	10
broad-winged hawk	379			379
Cooper's hawk	10	5	5	20
northern harrier	1			1
osprey	12			12
peregrine falcon	4			4
red-shouldered hawk	1	3	4	8
red-tailed hawk	5	36	17	58
sharp-shinned hawk	38	3	10	51
turkey vulture	1	45	2	48
unidentified accipiter		1	2	3
unidentified buteo	2		1	3
unidentified falcon	1		1	2
unidentified raptor	7	3	6	16
Total	**480**	**104**	**55**	**639**
% of Total Obs.	**75%**	**16%**	**9%**	

4.5.5 Fall Flight Heights and Flight Path Locations

The average minimum flight heights of raptors observed in the different topographical positions of the Study Area are summarized in Table 4-11 below. These summaries include raptors seen over different topographical features within and outside of the Project area. There are more behavior observations than total raptors observed because some raptors exhibited multiple behaviors while passing through multiple topographical positions. The majority of observations occurred in position A1; the average minimum flight height at this position was 403 m (Table 4-11).

Table 4-11. Number of observations and average minimum flight heights for each position category for raptors observed at Timbertop Wind Project, Fall 2011

	A1) flight along or parallel to ridge	A2) crossed ridge	A3) flight crossed depression or saddle	B) upper slope	C) lower slope	D) over valley
No. of position observations (n=944)	323	2	0	229	205	184
Average minimum flight height (m)	403	200	n/a	498	603	596

Of those raptors documented in the Study Area, 477 observations (75%) occurred within the Project area. Of these raptors, 170 (27%) occurred at flight heights below the proposed maximum rotor height of 125 m (Figure 4-10, Appendix C Table 6). Broad-winged hawk was the most commonly observed raptor seen during the fall surveys and was the species most commonly observed flying below 125 m.

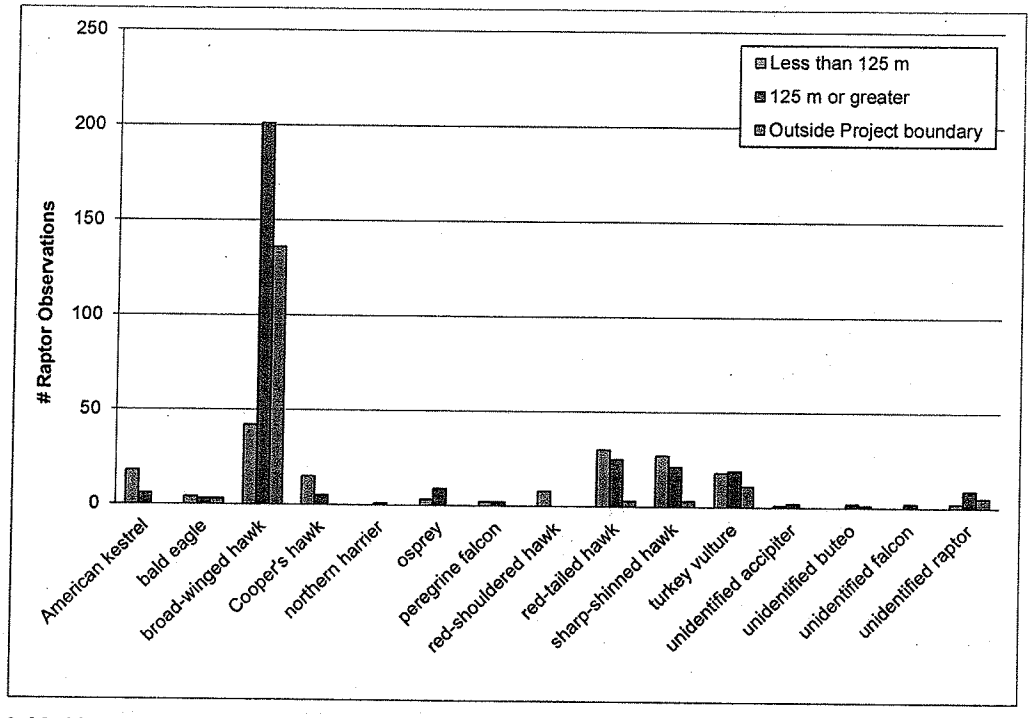

Figure 4-10. Number of observations of raptor species observed within Project area at heights above and below 125 m during Fall 2011 surveys at the Timbertop Wind Project.

4.5.6 Fall Rare Threatened and Endangered Species

There was one state-listed Endangered species observed during the fall surveys: northern harrier. It was seen on September 28 within the Project area over Kidder Mountain north and south, soaring at heights between 150 and 500 m. There were 10 observations of the state Threatened bald eagle: 7 bald eagles were seen within the Project area, and 3 were observed outside of the Project area. The bald eagles were seen over Kidder Mountain north and south; one bald eagle occurred over Kidder and Wildcat Mountains, and there were three bald eagles seen over the valley southeast of Kidder Mountain. Over peaks in the Project area, bald eagle flight heights ranged from 20 to 600 m and their behaviors included soaring and powered flight. There were four observations of state Threatened peregrine falcon (*Falco peregrinus*), each of which occurred within the Project area over Kidder Mountain north and south. Peregrine falcon flight heights ranged from 50 to 600 m, and their behaviors included soaring and powered flight. Two state-listed Species of Special Concern were observed: American kestrel (n=24), and osprey (n=12).

4.5.7 Fall Incidental Bird Observations

A total of 25 non-raptor avian species (not including unidentified flycatcher, unidentified swallow, and unidentified warbler) were documented as incidental observations during the fall raptor surveys (Table 4-12). No state- or federally-listed species were observed incidentally during the fall 2011 surveys.

Table 4-12. Non-raptor avian species observed incidentally during raptor surveys at Timbertop Wind Project, Fall 2011

Common name	Scientific name
American crow	*Corvus brachyrhynchos*
American goldfinch	*Spinus tristis*
American robin	*Turdus migratorius*
black-capped chickadee	*Poecile atricapillus*
blue jay	*Cyanocitta cristata*
Canada goose	*Branta canadensis*
cedar waxwing	*Bombycilla cedrorum*
chimney swift	*Chaetura pelagica*
common raven	*Corvus corax*
dark-eyed junco	*Junco hyemalis*
double-crested cormorant	*Phalacrocorax auritus*
downy woodpecker	*Picoides pubescens*
eastern phoebe	*Sayornis phoebe*
eastern towhee	*Pipilo erythrophthalmus*
northern flicker	*Colaptes auratus*
palm warbler	*Dendroica palmarum*
pileated woodpecker	*Dryocopus pileatus*
red-breasted nuthatch	*Sitta canadensis*
red-eyed vireo	*Vireo olivaceus*
ruby-throated hummingbird	*Archilochus colubris*
tree swallow	*Tachycineta bicolor*
tufted titmouse	*Baeolophus bicolor*
unidentified flycatcher	*n/a*
unidentified swallow	*n/a*
unidentified warbler	*n/a*
white-breasted nuthatch	*Sitta carolinensis*
white-throated sparrow	*Zonotrichia albicollis*
yellow-rumped warbler	*Dendroica coronata*

4.6 DISCUSSION

The objective of the spring and fall 2011 raptor migration surveys was to obtain baseline site-specific species composition and behavioral data for migrant and seasonally local raptors at the Project. The surveys represent a subsample of migrant and local raptor activity during spring and fall migration. Observations of raptor activity were limited to those days that were surveyed and the portions of the Project area that were visible from the observation site; therefore, the results cannot describe raptor activity for the entire migration season or describe activity across

the entire Project area. However, the surveys provide a sample of activity during the study timeframe, which extended across the peak of the raptor migration period for all species of raptors that occur in the region, including bald eagle and golden eagle (*Aquila chrysaetos*). The surveys sampled activity across the majority of the Project area. The survey effort during the spring and fall was standard for raptor migration surveys at potential wind sites in the state.

The species observed during the spring and fall surveys are typical species that occur in the region during the migration seasons. Species of conservation concern observed within the Project area during the 2011 surveys included the state Endangered northern harrier, state Threatened bald eagle and peregrine falcon, and Species of Special Concern osprey and American kestrel. Observations of these species represent a relatively small percentage of total observations for each survey season. A single observation of the northern harrier was made during each season. No bald eagles or peregrine falcons were observed during the spring surveys. During fall surveys, bald eagle and peregrine falcon observations represented two percent and one percent, respectively, of total observations. American kestrel observations represented two percent and four percent, respectively, of the total spring and fall observations. Similarly, ospreys represented one percent and two percent, respectively, of the total spring and fall observations.

During both the spring and fall surveys, the majority of raptors were observed in proximity of Kidder Mountain and Wildcat Mountain; however, the locations where raptors were observed in the Study Area are subject to observer bias. Raptors closer to the observation location on Kidder Mountain north were more likely to be seen than raptors occurring at greater distances from the observer. Also, raptors that may have traveled outside of the observer's viewshed may have gone undetected. Some species of migrating raptors may use different ridgelines and cross different valleys from year to year or season to season, depending on a variety of stochastic factors (i.e., weather).

The passage rates and general flight heights of raptors varied between survey dates and were likely influenced by varying weather conditions, as well as seasonal timing of peaks in raptor activity. Weather, particularly wind speed and direction, are significant factors that influence flight paths and flight heights during migration, as well as during non-migratory flights. Flight heights are largely influenced by raptor activity and behavior. Local raptors may fly at lower altitudes while making small scale movements between foraging locations (Barrios and Rodriguez 2004); actively migrating raptors may fly at great heights (i.e., disappearing into clouds) while soaring in thermals.

The spring and fall survey effort at the Project is comparable to survey effort at other proposed wind projects in the region (Appendix C Table 7a and 7b). The spring and fall passage rates at Timbertop were relatively high compared to the results of other studies in the region; however, the percentage of raptors observed below the proposed maximum rotor-swept height during both the spring and fall was less than that observed at other projects in the region (Appendix C Table 7a and 7b).

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Appendix A

Acoustic Bat Survey Data Tables

Appendix A Table 1. Summary of acoustic bat data and weather during each survey night at the Emmerson Tree detector – Summer/Fall, 2011

		BBSH			HB	MYSP	RBTB			UNKN					
Night of	Operational?	BBSH	Big brown	Silver-haired	Hoary	MYSP	Eastern red	Tri-colored	RBTB	HFUN	LFUN	UNKN	Total	Wind Speed (m/s)	Temperature (celsius)
05/25/11	1	2	1							1	8		**12**		
05/26/11	1	12	1								2		**15**		
05/27/11	1	1	1							1	3		**6**		
05/28/11	1	4			2	1				2	2		**11**		
05/29/11	1	8	1			1					16		**26**		
05/30/11	1	4									1		**5**		
05/31/11	1	2									4		**6**		
06/01/11	1	2								1	1		**4**	5.43	15.41
06/02/11	1												**0**	4.99	9.53
06/03/11	1									3	1		**4**	3.93	10.22
06/04/11	1												**0**	2.00	6.91
06/05/11	1	1									2		**3**	1.95	12.27
06/06/11	1	4	11			2				1	8		**26**	1.74	14.27
06/07/11	1	5	2			12					3		**22**	2.73	17.86
06/08/11	1		1							1	4		**6**	4.45	20.48
06/09/11	1	3	12							4	7		**26**	4.43	17.98
06/10/11	1	2	2								1		**5**	1.95	15.04
06/11/11	1												**0**	4.71	9.36
06/12/11	1												**0**	1.30	10.70
06/13/11	1					1					1		**2**	2.78	11.60
06/14/11	1										1		**1**	2.64	11.22
06/15/11	1	2	1			260				7	13		**283**	3.93	12.80
06/16/11	1	6	40		1	156				11	25		**239**	4.61	16.32
06/17/11	1	7	8			1				1	5		**22**	3.90	15.35
06/18/11	1	15	61			151				21	36		**284**	3.52	15.69
06/19/11	1		16							3	5		**24**	3.21	12.81
06/20/11	1	4	30			1				3	9		**47**	2.16	14.71
06/21/11	1	3	26							14			**43**	1.86	17.23
06/22/11	1												**0**	4.06	15.87
06/23/11	1												**0**	4.97	12.81
06/24/11	1												**0**	4.17	10.36
06/25/11	1	1	3								3		**7**	2.65	15.98
06/26/11	1	6	56			3	1			8	11		**86**	2.17	15.61
06/27/11	1	88	55			1				12	26		**182**	2.58	17.23
06/28/11	1	11	60							1	4		**76**	3.25	18.57
06/29/11	1	10	9				1						**20**	5.11	14.48
06/30/11	1	19	12							14	23		**68**	3.26	14.44
07/01/11	1	5	44			6				4	10		**69**	2.36	15.59
07/02/11	1	8	54							10	15		**87**	3.68	16.90
07/03/11	1	24	185			2				10	20		**241**	3.88	18.71
07/04/11	1	10	45				1			1	14		**71**	1.87	18.16
07/05/11	1	39	76							3	17		**135**	2.31	17.46
07/06/11	1	22	254			4	4			14	11		**309**	4.55	17.06
07/07/11	1	19	77			1				1	28		**126**	1.88	16.44
07/08/11	1	8	158				1			2	6		**175**	2.31	18.80
07/09/11	1	27	183								5		**215**	2.79	14.84
07/10/11	1	9	23			1					31		**64**	3.93	16.99
07/11/11	1	5	3							3	9		**20**	4.46	23.09
07/12/11	1	33	24			68				2	39		**166**	3.21	20.78
07/13/11	1	1				1	1			1	2		**6**	4.17	14.54
07/14/11	1		87			1	2						**90**	3.55	17.40
07/15/11	1	32	34			5					4		**75**	3.22	15.78
07/16/11	1	46	14			8				6	23		**97**	3.64	16.61
07/17/11	1	71	46		1		3			2	55		**178**	5.11	21.63
07/18/11	1	43	33			3					24		**103**	2.38	18.79
07/19/11	1	24	46				2			1			**73**	1.42	17.18
07/20/11	1	48	103			10	1			2	31		**195**	5.53	21.19
07/21/11	1	13	11							2	11		**37**	4.45	24.78
07/22/11	1	28	8			1					49		**86**	3.66	23.49
07/23/11	1	92	41			2				1	141		**277**	3.24	21.64
07/24/11	1	12	13			3	2			1	4		**35**	2.01	18.56
07/25/11	1	1	14				12			14	4		**45**	2.86	14.78
07/26/11	1	25	36			4	6			8	14		**93**	3.47	15.71
07/27/11	1	7	46							2	10		**65**	2.46	15.73
07/28/11	1	113	142			3	5			13	13		**289**	3.28	18.39
07/29/11	1	10	21				4			16	3		**54**	4.79	20.28
07/30/11	1	21	49			3	2			2	5		**82**	2.72	16.51

Continued on next page

Appendix A Table 1. Summary of acoustic bat data and weather during each survey night at the Emmerson Tree detector – Summer/Fall, 2011

		BBSH			HB	MYSP	RBTB			UNKN					
Night of	Operational?	BBSH	Big brown	Silver-haired	Hoary	MYSP	Eastern red	Tri-colored	RBTB	HFUN	LFUN	UNKN	Total	Wind Speed (m/s)	Temperature (celsius)
07/31/11	1	208	57				12			8	10		295	2.77	18.16
08/01/11	1	61	18				9			8	15		111	3.52	17.81
08/02/11	1		17			1	1			7	4		30	2.60	14.84
08/03/11	1	2	9			1	7			3	2		24	1.58	15.79
08/04/11	1	1	5			3				6			15	1.62	17.08
08/05/11	1	61	44			1	27			37	6		176	4.22	19.99
08/06/11	1	10	12			17	2			7			48	4.27	19.10
08/07/11	1	20	3			2				2	5		32	1.29	20.93
08/08/11	1	6	7			1				1	2		17	3.10	18.47
08/09/11	1	1									1		2	3.50	17.39
08/10/11	1		7							1			8	3.08	16.60
08/11/11	1	1	1			1	15			9			27	4.31	14.34
08/12/11	1	22	36				3			1	13		75	2.63	14.17
08/13/11	1	12	6				2			2	10		32	3.08	17.18
08/14/11	1	2					1						3	3.01	16.73
08/15/11	1						1						1	3.51	13.91
08/16/11	1	10	4				1				1		16	3.77	15.75
08/17/11	1	20	16								11		47	3.01	15.16
08/18/11	1	31	6				14			4	10		65	3.98	18.17
08/19/11	1	28	1				2			4	10		45	3.49	17.58
08/20/11	1	10	1				1			4	26		42	3.47	16.44
08/21/11	1	5	1			3	3			10			22	5.22	17.95
08/22/11	1	1								1			2	3.68	12.53
08/23/11	1	1	1				1			3			6	3.83	12.21
08/24/11	1	17	73				1			2	4		97	5.58	17.81
08/25/11	1	7	6							2	4		19	3.93	18.49
08/26/11	1	13	15				2			3	13		46	2.27	17.06
08/27/11	1												0	4.62	19.63
08/28/11	1									1			1	8.39	13.21
08/29/11	1	4					2			2	6		14	3.10	12.66
08/30/11	1	98	6							3	4		111	3.63	14.99
08/31/11	1	15	2							1	3		21	2.23	15.78
09/01/11	1	2	1				1						4	2.48	14.42
09/02/11	1	1	4								1		6	4.28	14.31
09/03/11	1	27	1							1	3		32	3.79	19.31
09/04/11	1	99	14							3	9		125	4.25	20.62
09/05/11	1	74	7	1						1	7		90	4.43	15.84
09/06/11	1						1						1	4.34	13.73
09/07/11	1												0	3.41	12.43
09/08/11	1										1		1	1.98	15.97
09/09/11	1	144	23			1				1	8		177	2.83	15.35
09/10/11	1									1			1	2.95	10.97
09/11/11	1			1		1				2			4	4.64	13.60
09/12/11	1	32	3							1	161		197	3.48	14.93
09/13/11	1	35	13								31		79	5.37	18.07
09/14/11	1	13	1							1	17		32	1.94	17.49
09/15/11	1										1		1	5.82	6.99
09/16/11	1												0	2.78	5.42
09/17/11	1										1		1	1.30	7.38
09/18/11	1												0	2.66	5.24
09/19/11	1									3			3	4.45	10.30
09/20/11	1						1			4			5	3.34	12.64
09/21/11	1	29	5							1	20		55	2.63	17.05
09/22/11	1	13	3								17		33	2.66	18.65
09/23/11	1												0	1.92	18.63
09/24/11	1	4	5								21		30	2.37	16.76
09/25/11	1	9	1								6		16	1.77	16.83
09/26/11	1	20	3							2	5		30	1.90	16.55
09/27/11	1			1						2	2		5	3.32	15.94
09/28/11	1						4			4			8	4.39	14.86
09/29/11	1	1		1			2			1	2		7	4.95	12.88
09/30/11	1	2					1			2			5	2.32	15.27
10/01/11	1	2								2	1		5	3.28	10.21
10/02/11	1			1									1	1.13	12.13
10/03/11	1												0	2.07	9.75
10/04/11	1												0	6.10	10.92
10/05/11	1												0	3.48	2.41
10/06/11	1												0	2.22	2.94
10/07/11	1									1			1	4.73	7.54
10/08/11	1	25	3								6		34	4.97	14.25
10/09/11	1	50	3				27			20	65		165	4.97	15.50
10/10/11	1	15	3								2		20	2.67	13.08
10/11/11	1												0	1.96	8.87
10/12/11	1										1		1	4.77	10.87
10/13/11	1												0	3.86	12.70
10/14/11	1												0	6.18	11.50
10/15/11	1									1			1	7.09	9.96
10/16/11	1									1			1		
10/17/11	1												0		
10/18/11	1												0		
10/19/11	1												0		
10/20/11	1												0		
By Species		2282	2726	5	4	748	192	0	0	417	1371	0	7745		
By Guild		5013			4	748	192			1788			Total		
		BBSH			HB	MYSP	RBTB			UNKN					

* 1 = Detector functioned for the entire night; 0 = Non-operational for all or part of the night

Appendix A Table 2. Summary of acoustic bat data and weather during each survey night at the Kidder Tree detector – – Summer/Fall, 2011

		BBSH			HB	MYSP	RBTB			UNKN					
Night of	Operational?	BBSH	Big brown	Silver-haired	Hoary	MYSP	Eastern red	Tri-colored	RBTB	HFUN	LFUN	UNKN	Total	Wind Speed (m/s)	Temperature (celsius)
05/25/11	1												0		
05/26/11	1												0		
05/27/11	1												0		
05/28/11	1												0		
05/29/11	1												0		
05/30/11	1										1		1		
05/31/11	1										2		2		
06/01/11	1												0		
06/02/11	1												0		
06/03/11	1												0		
06/04/11	1												0		
06/05/11	1	4	1										5		
06/06/11	1	7	3								5		15		
06/07/11	1		2										2		
06/08/11	1	2	2										4		
06/09/11	1												0		
06/10/11	1	3	3								3		9		
06/11/11	1												0		
06/12/11	1												0		
06/13/11	1												0		
06/14/11	1												0		
06/15/11	1	10	2								18		30		
06/16/11	1												0		
06/17/11	1	1	7										8		
06/18/11	1	1									8		9		
06/19/11	1	31	8								44		83		
06/20/11	1	18	15								10		43		
06/21/11	1	1	2								2		5		
06/22/11	1												0		
06/23/11	1												0		
06/24/11	1												0		
06/25/11	1	1											1		
06/26/11	1	6	1								2		9		
06/27/11	1	2				1					2		5		
06/28/11	1	2	7			1				1	1		12		
06/29/11	1												0		
06/30/11	1	1	1								1		3		
07/01/11	1	62	13	2							49		126		
07/02/11	1	19	18			5					10		52		
07/03/11	1	15	8								21		44		
07/04/11	1	40	6								42		88		
07/05/11	1	14	2								38		54		
07/06/11	1	11	3								7		21		
07/07/11	1	54	37			1					51		143		
07/08/11	1	29	44								13		86		
07/09/11	1	35	5	1							53		94		
07/10/11	1	12									44		56		
07/11/11	1	4	5								6		15		
07/12/11	1	14									7		21		
07/13/11	1	5	2								11		18		
07/14/11	1	12	1								16		29		
07/15/11	1	5	13							1	6		25		
07/16/11	1	4	2							1	6		13		
07/17/11	1		1										1		
07/18/11	1	31	5								55		91		
07/19/11	1	22	19	1			1				41		84		
07/20/11	1	2				1				1	3		7		
07/21/11	1	1								1	8		10		
07/22/11	1		2							1	2		5		
07/23/11	1	3	1		1	1					4		10		
07/24/11	1	7	17		1						5		30		
07/25/11	1	2											2		
07/26/11	1	5			1		1				7		14		
07/27/11	1	24	3								25		52		
07/28/11	1	16	24				1			1	24		66		
07/29/11	1	3	2		1		1			1			8		
07/30/11	1	20	14				2			1	20		57		
07/31/11	1	13	23							2	12		50		
08/01/11	1	21	7								28		56		

Continued on next page

Appendix A Table 2. Summary of acoustic bat data and weather during each survey night at the Kidder Tree detector – – Summer/Fall, 2011

		BBSH			HB	MYSP	RBTB			UNKN					
Night of	Operational?	BBSH	Big brown	Silver-haired	Hoary	MYSP	Eastern red	Tri-colored	RBTB	HFUN	LFUN	UNKN	Total	Wind Speed (m/s)	Temperature (celsius)
08/02/11	1	9	6								9		24		
08/03/11	1	5	6				1		4	5	4		25		
08/04/11	1	3	2		1		3		1	3	1		14		
08/05/11	1	70	60		2					1	10		143		
08/06/11	1										1		1		
08/07/11	1	12	3		1					1	3		20		
08/08/11	1	6	3								12		21		
08/09/11	1										1		1		
08/10/11	1	1	3							1			5		
08/11/11	1				1								1		
08/12/11	1	2	5			1				1	3		12		
08/13/11	1	6	7				1			1	1		16		
08/14/11	1	1	1				1				2		5		
08/15/11	1												0		
08/16/11	1	1									1		2		
08/17/11	1	1	1							1	1		4		
08/18/11	1	1								1			2		
08/19/11	1	1									1		2		
08/20/11	1												0	19.39	6.08
08/21/11	1												0	17.20	8.39
08/22/11	1												0	12.81	5.51
08/23/11	1												0	15.66	7.02
08/24/11	1									1			1	17.05	9.07
08/25/11	1												0	17.92	6.07
08/26/11	1	1								1			2	19.54	4.60
08/27/11	1												0	18.69	6.27
08/28/11	1												0	12.35	10.74
08/29/11	1												0	15.48	3.94
08/30/11	1					1					1		2	17.27	7.13
08/31/11	1										1		1	16.56	2.87
09/01/11	1												0	13.57	2.97
09/02/11	1					1					1		2	14.68	7.92
09/03/11	1												0	19.96	6.20
09/04/11	1												0	19.71	6.13
09/05/11	1		1										1	14.63	6.68
09/06/11	1												0	12.79	5.27
09/07/11	1												0	11.40	4.64
09/08/11	1												0	15.11	3.25
09/09/11	1		1										1	16.60	5.38
09/10/11	1									1			1	11.56	4.78
09/11/11	1									2			2	13.66	8.19
09/12/11	1										1		1	17.30	6.23
09/13/11	1												0	18.01	9.90
09/14/11	1												0	17.85	2.76
09/15/11	1												0	5.09	9.72
09/16/11	1												0	5.99	5.51
09/17/11	1										3		3	8.97	2.70
09/18/11	1	1	1								1		3	7.80	4.44
09/19/11	1	1											1	9.89	6.96
09/20/11	1												0	12.86	6.13
09/21/11	1												0	16.50	5.20
09/22/11	1												0	18.17	5.09
09/23/11	1			1									1	17.85	2.22
09/24/11	1												0	18.76	4.69
09/25/11	1	1											1	19.10	3.55
09/26/11	1	4		2							2		8	18.99	2.78
09/27/11	1												0	14.49	3.57
09/28/11	0												0	13.76	4.91
09/29/11	0												0	12.13	7.63
09/30/11	0												0	14.50	4.19
10/01/11	0												0	9.07	5.94
10/02/11	0												0	11.22	1.99
10/03/11	0												0	9.42	3.88
10/04/11	0												0	9.69	8.58
10/05/11	0												0	3.80	7.48
10/06/11	1									1			1	5.56	5.76
10/07/11	1												0	10.83	8.08
10/08/11	1												0	17.54	7.29
10/09/11	1												0	16.77	7.77
10/10/11	1										1		1	14.30	5.30
10/11/11	1												0	8.64	3.50
10/12/11	1												0	9.79	6.46
10/13/11	1												0	11.68	4.40
10/14/11	1												0	10.69	9.55
10/15/11	1												0	8.87	10.54
10/16/11	1	1											1		
10/17/11	1												0		
10/18/11	1												0		
10/19/11	1												0		
10/20/11	1												0		
By Species		723	431	7	9	13	12	0	6	32	774	0	2006		
By Guild		1161			9	13	17			806					
		BBSH			HB	MYSP	RBTB			UNKN			Total		

* 1 = Detector functioned for the entire night; 0 = Non-operational for all or part of the night

Appendix A Table 3. Summary of acoustic bat data and weather during each survey night at the Met High detector – – Summer/Fall, 2011

		BBSH			HB	MYSP	RBTB			UNKN					
Night of	Operational?	BBSH	Big brown	Silver-haired	Hoary	MYSP	Eastern red	Tri-colored	RBTB	HFUN	LFUN	UNKN	Total	Wind Speed (m/s)	Temperature (celsius)
**5/25/2011	1	4	7		1	4	1				6		23		
**5/26/2011	1	2	1		10	1					3		17		
**5/27/2011	1	2	1		6	1	1			1	4		16		
**5/28/2011	1	14	53		1		3			1	30		102		
**5/29/2011	1	35	16							1	14		66		
**5/30/2011	1	3	4				1			1	4		13		
**5/31/2011	1	3	1		1						4		9		
**6/1/2011	1	29	13			2				1	8		53	5.43	15.41
06/02/11	1												0	4.99	9.53
06/03/11	1												0	3.93	10.22
06/04/11	1												0	2.00	6.91
06/05/11	1												0	1.95	12.27
06/06/11	1												0	1.74	14.27
06/07/11	1		1								1		2	2.73	17.86
06/08/11	1										1		1	4.45	20.48
06/09/11	1												0	4.43	17.98
06/10/11	1		1										1	1.95	15.04
06/11/11	1												0	4.71	9.36
06/12/11	1												0	1.30	10.70
06/13/11	1												0	2.78	11.60
06/14/11	1												0	2.64	11.22
06/15/11	1									1			1	3.93	12.80
06/16/11	1										2		2	4.61	16.32
06/17/11	1												0	3.90	15.35
06/18/11	1				1								1	3.52	15.69
06/19/11	1												0	3.21	12.81
06/20/11	1												0	2.16	14.71
06/21/11	1		2								2		4	1.86	17.23
06/22/11	1												0	4.06	15.87
06/23/11	1												0	4.97	12.81
06/24/11	1												0	4.17	10.36
06/25/11	1												0	2.65	15.98
06/26/11	1												0	2.17	15.61
06/27/11	1										2		2	2.58	17.23
06/28/11	1		2										2	3.25	18.57
06/29/11	1												0	5.11	14.48
06/30/11	1												0	3.26	14.44
07/01/11	1	1											1	2.36	15.59
07/02/11	1	1	2							1	2		6	3.68	16.90
07/03/11	1						1						1	3.86	18.71
07/04/11	1		2				1				1		4	1.87	18.16
07/05/11	1		3								1		4	2.31	17.46
07/06/11	1										1		1	4.55	17.06
07/07/11	1												0	1.88	16.44
07/08/11	1	1	1										2	2.31	18.80
07/09/11	1												0	2.79	14.84
07/10/11	1		1										1	3.93	16.99
07/11/11	1	3	1		1						5		10	4.46	23.09
07/12/11	1		2								1		3	3.21	20.78
07/13/11	1		1				1						2	4.17	14.54
07/14/11	1												0	3.55	17.40
07/15/11	1												0	3.22	15.78
07/16/11	1		3								3		6	3.64	16.61
07/17/11	1		2										2	5.11	21.63
07/18/11	1	1	1							2	2		6	2.38	18.79
07/19/11	1	1	3		1								5	1.42	17.18
07/20/11	1	2	5								3		10	5.53	21.19
07/21/11	1	1	1		1						6		9	4.45	24.78
07/22/11	1	1			1						4		6	3.66	23.49
07/23/11	1		1		1		1			1	2		6	3.24	21.64
07/24/11	1	2					1			2	2		7	2.01	18.56
07/25/11	1						1						1	2.86	14.78
07/26/11	1				2					1	4		7	3.47	15.71
07/27/11	1	1		1							5		7	2.46	15.73
07/28/11	1	1	1		2						3		7	3.28	18.39
07/29/11	1										2		2	4.79	20.28
07/30/11	1				1						38		39	2.72	16.51
07/31/11	1		2		2						11		15	2.77	18.16
08/01/11	1		1		3						4		8	3.52	17.81

Continued on next page

Appendix A Table 3. Summary of acoustic bat data and weather during each survey night at the Met High detector – – Summer/Fall, 2011

		BBSH			HB	MYSP	RBTB			UNKN					
Night of	Operational?	BBSH	Big brown	Silver-haired	Hoary	MYSP	Eastern red	Tri-colored	RBTB	HFUN	LFUN	UNKN	Total	Wind Speed (m/s)	Temperature (celsius)
08/02/11	1										4		4	2.60	14.84
08/03/11	1	1	1		4						18		24	1.58	15.79
08/04/11	1	2	1		1						30		34	1.62	17.08
08/05/11	1	2			2		1				4		9	4.22	19.99
08/06/11	1												0	4.27	19.10
08/07/11	1	7	10		1					1	16		35	1.29	20.93
08/08/11	1	1	3				1				1		6	3.10	18.47
08/09/11	1				1						3		4	3.50	17.39
08/10/11	1	9		1	1						28		39	3.08	16.60
08/11/11	1	1			1					1	2		5	4.31	14.34
08/12/11	1	1								1	12		14	2.63	14.17
08/13/11	1	1	2		3						10		16	3.08	17.18
08/14/11	1										1		1	3.01	16.73
08/15/11	1				1								1	3.51	13.91
08/16/11	1				1						5		6	3.77	15.75
08/17/11	1		1		1						8		10	3.01	15.16
08/18/11	1	2	4				1				8		15	3.98	18.17
08/19/11	1		1		1					2	3		7	3.49	17.58
08/20/11	1	1	1		1						3		6	3.47	16.44
08/21/11	1	1			3		1						5	5.22	17.95
08/22/11	1			1									1	3.68	12.53
08/23/11	1										1		1	3.83	12.21
08/24/11	1			1	1						1		3	5.58	17.81
08/25/11	1												0	3.93	18.49
08/26/11	1	1	4								6		11	2.27	17.06
08/27/11	1		2		1								3	4.62	19.63
08/28/11	1												0	8.39	13.21
08/29/11	1									1	1		2	3.10	12.66
08/30/11	1	1		2									3	3.63	14.99
08/31/11	1	2	4	3							10		19	2.23	15.78
09/01/11	1										2		2	2.48	14.42
09/02/11	1		1								2		3	4.28	14.31
09/03/11	1				1								1	3.79	19.31
09/04/11	1										1		1	4.25	20.62
09/05/11	1	1	1								1		3	4.43	15.84
09/06/11	1												0	4.34	13.73
09/07/11	1												0	3.41	12.43
09/08/11	1										1		1	1.98	15.97
09/09/11	1						1				1		2	2.83	15.35
09/10/11	1	1	1							1	1		4	2.95	10.97
09/11/11	1	1					1			1	2		5	4.64	13.60
09/12/11	1	1	25	2						3	14		45	3.48	14.93
09/13/11	1	1	2	1						1	13		18	5.37	18.07
09/14/11	1	6	6							2	19		33	1.94	17.49
09/15/11	1	2		2							1		5	5.82	6.99
09/16/11	1									1			1	2.76	5.42
09/17/11	1						2			2	3		7	1.30	7.38
09/18/11	1									1	2		3	2.66	5.24
09/19/11	1	3					1				1		5	4.45	10.30
09/20/11	1	1								1	5		7	3.34	12.64
09/21/11	1	6	2								20		28	2.63	17.05
09/22/11	1	1		2							3		6	2.66	18.65
09/23/11	1												0	1.92	18.63
09/24/11	1	5	8	1							17		31	2.37	18.76
09/25/11	1	11	19	3			1			1	21		56	1.77	16.83
09/26/11	1	5	3	6							11		25	1.90	16.55
09/27/11	1	2	3	2						1	8		16	3.32	15.94
09/28/11	1	2		2							4		8	4.39	14.86
09/29/11	1	2									4		6	4.95	12.88
09/30/11	1	1		1							3		5	2.32	15.27
10/01/11	1			1							1		2	3.28	10.21
10/02/11	1										2		2	1.13	12.13
10/03/11	1	1								1			2	2.07	9.75
10/04/11	1												0	6.10	10.92
10/05/11	1												0	3.48	2.41
10/06/11	1	1											1	2.22	2.94
10/07/11	1												0	4.73	7.54
10/08/11	1												0	4.97	14.25
10/09/11	1				1								1	4.97	15.50
10/10/11	1												0	2.67	13.08
10/11/11	1												0	1.96	8.87
10/12/11	1												0	4.77	10.87
10/13/11	1												0	3.86	12.70
10/14/11	1												0	6.18	11.50
10/15/11	1												0	7.09	9.96
10/16/11	1												0		
10/17/11	1												0		
10/18/11	1												0		
10/19/11	1												0		
By Species		195	240	32	61	8	22	0	0	35	519	0	1112		
By Guild		467			61	8	22			554					
		BBSH			HB	MYSP	RBTB			UNKN			Total		

* 1 = Detector functioned for the entire night; 0 = Non-operational for all or part of the night

** = Met tower not installed, detector deployed in tree within met tower clearing

Appendix A Table 4. Summary of acoustic bat data and weather during each survey night at the Met Low detector – – Summer/Fall, 2011

		BBSH			HB	MYSP	RBTB			UNKN					
Night of	Operational?	BBSH	Big brown	Silver-haired	Hoary	MYSP	Eastern red	Tri-colored	RBTB	HFUN	LFUN	UNKN	Total	Wind Speed (m/s)	Temperature (celsius)
**5/25/2011	1	2	1		4	2	1			2	3		**15**		
**5/26/2011	1	1			18	15	1			4	3		**42**		
**5/27/2011	1	7	3	1	204	3				2	6		**226**		
**5/28/2011	1	19	46	3			1			3	16		**88**		
**5/29/2011	1	42	48	1	1	8				8	20		**128**		
**5/30/2011	1	2	2								1		**5**		
**5/31/2011	1												**0**		
**6/1/2011	1												**0**	5.43	15.41
06/02/11	1	1	3										**4**	4.99	9.53
06/03/11	1		1			1					1		**3**	3.93	10.22
06/04/11	1	1											**1**	2.00	6.91
06/05/11	1	6	10	4							9		**29**	1.95	12.27
06/06/11	1	32	33								18		**83**	1.74	14.27
06/07/11	1	41	83			2				3	16		**145**	2.73	17.86
06/08/11	1	26	53								14		**93**	4.45	20.48
06/09/11	1	32	8							6	13		**59**	4.43	17.98
06/10/11	1	13	47								8		**68**	1.95	15.04
06/11/11	1												**0**	4.71	9.36
06/12/11	1												**0**	1.30	10.70
06/13/11	1	1	5								6		**12**	2.78	11.60
06/14/11	1												**0**	2.64	11.22
06/15/11	1	18	51			1					20		**90**	3.93	12.80
06/16/11	1	78	14			1				1	3		**97**	4.61	16.32
06/17/11	1	5	8								2		**15**	3.90	15.35
06/18/11	1	16	23							2	2		**43**	3.52	15.69
06/19/11	1	95	64								18		**177**	3.21	12.81
06/20/11	1	13	96							1	17		**127**	2.16	14.71
06/21/11	1	14	20			1				1	2		**38**	1.86	17.23
06/22/11	1	1											**1**	4.06	15.87
06/23/11	1												**0**	4.97	12.81
06/24/11	1												**0**	4.17	10.36
06/25/11	1	13	25								12		**50**	2.65	15.98
06/26/11	1	11	24			1					6		**42**	2.17	15.61
06/27/11	1	19	96				1				17		**133**	2.58	17.23
06/28/11	0												**0**	3.25	18.57
06/29/11	0												**0**	5.11	14.48
06/30/11	0												**0**	3.26	14.44
07/01/11	0												**0**	2.36	15.59
07/02/11	0												**0**	3.68	16.90
07/03/11	0												**0**	3.88	18.71
07/04/11	0												**0**	1.87	18.16
07/05/11	0												**0**	2.31	17.46
07/06/11	0												**0**	4.55	17.06
07/07/11	0												**0**	1.88	16.44
07/08/11	0												**0**	2.31	18.80
07/09/11	0												**0**	2.79	14.84
07/10/11	0												**0**	3.93	16.99
07/11/11	0												**0**	4.46	23.09
07/12/11	0												**0**	3.21	20.78
07/13/11	1	21	35							2	68		**126**	4.17	14.54
07/14/11	1	122	13				1			3	36		**175**	3.55	17.40
07/15/11	1	84	43								56		**183**	3.22	15.78
07/16/11	1	202	52								42		**296**	3.64	16.61
07/17/11	1	48	30							3	59		**140**	5.11	21.63
07/18/11	1	167	169			1				4	54		**395**	2.38	18.79
07/19/11	1	198	119			3				2	62		**384**	1.42	17.18
07/20/11	1	81	26			4				10	71		**192**	5.53	21.19
07/21/11	1	69	20	2	1	2	1			3	34		**132**	4.45	24.78
07/22/11	1	46	73			1				3	26		**149**	3.66	23.49
07/23/11	1	137	26			2	1	1		5	51		**223**	3.24	21.64
07/24/11	1	102	39				3				48		**192**	2.01	18.56
07/25/11	1	5	9		1	1					2		**18**	2.86	14.78
07/26/11	1	27	9			1				1	14		**52**	3.47	15.71
07/27/11	1	139	138			1				1	35		**314**	2.46	15.73
07/28/11	1	87	56		1	3	1			4	41		**193**	3.28	18.39
07/29/11	1	24	7								14		**45**	4.79	20.28
07/30/11	1	83	166			2				5	30		**286**	2.72	16.51
07/31/11	1	208	83				1			2	67		**361**	2.77	18.16
08/01/11	1	65	30				1			5	26		**127**	3.52	17.81

Continued on next page

Appendix A Table 4. Summary of acoustic bat data and weather during each survey night at the Met Low detector – – Summer/Fall, 2011

		BBSH			HB	MYSP	RBTB			UNKN					
Night of	Operational?	BBSH	Big brown	Silver-haired	Hoary	MYSP	Eastern red	Tri-colored	RBTB	HFUN	LFUN	UNKN	Total	Wind Speed (m/s)	Temperature (celsius)
08/02/11	1	54	21			1				4	16		96	2.60	14.84
08/03/11	1	142	66		1		1			3	37		250	1.58	15.79
08/04/11	1	289	133	1			1			2	78		504	1.62	17.08
08/05/11	1	210	57							2	95		364	4.22	19.99
08/06/11	1	33	10				1			1	13		58	4.27	19.10
08/07/11	1	149	27				4	5		3	24		212	1.29	20.93
08/08/11	1	54	22			2					28		106	3.10	18.47
08/09/11	1	11	3			1	1				6		22	3.50	17.39
08/10/11	1	111	72		1	1	3			1	10		199	3.08	16.60
08/11/11	1	47	35				5			9	11		107	4.31	14.34
08/12/11	1	14	50			2	2				7		75	2.63	14.17
08/13/11	1	52	39		1	1				10	19		122	3.08	17.18
08/14/11	1	10	3			1	2			2	2		20	3.01	16.73
08/15/11	1						1			1			2	3.51	13.91
08/16/11	1	87	33		1	1	1			1	3		127	3.77	15.75
08/17/11	1	10	74			2	2			3	11		102	3.01	15.16
08/18/11	1	93	39			2				3	8		145	3.98	18.17
08/19/11	1	190	27				1			4	20		242	3.49	17.58
08/20/11	1	55	30				3				10		98	3.47	16.44
08/21/11	1	33	3		1		2				10		49	5.22	17.95
08/22/11	1	3	1	1				1		3			9	3.68	12.53
08/23/11	1					1	4	2		4	2		13	3.83	12.21
08/24/11	1	18	3		1	2	1			2	6		33	5.58	17.81
08/25/11	1	24	7				3	10		3	5		52	3.93	18.49
08/26/11	1	61	56		1		3			3	10		134	2.27	17.06
08/27/11	1	30	12		1	1	2			3	4		53	4.62	19.63
08/28/11	1						1			1			2	8.39	13.21
08/29/11	1	47	9							2	5		63	3.10	12.66
08/30/11	1	25	20	1		3	3			3	7		62	3.63	14.99
08/31/11	1	103	25	2		4				3	11		148	2.23	15.78
09/01/11	1	67	12							5	14		98	2.48	14.42
09/02/11	1	6	2	1						1	5		15	4.28	14.31
09/03/11	1	15											15	3.79	19.31
09/04/11	0										1		1	4.25	20.62
09/05/11	0												0	4.43	15.84
09/06/11	0												0	4.34	13.73
09/07/11	0												0	3.41	12.43
09/08/11	0												0	1.98	15.97
09/09/11	0												0	2.83	15.35
09/10/11	0												0	2.95	10.97
09/11/11	0												0	4.64	13.60
09/12/11	0												0	3.48	14.93
09/13/11	0												0	5.37	18.07
09/14/11	0												0	1.94	17.49
09/15/11	0												0	5.82	6.99
09/16/11	0												0	2.78	5.42
09/17/11	1	1									1		2	1.30	7.38
09/18/11	1												0	2.66	5.24
09/19/11	1	2	1							3	5		11	4.45	10.30
09/20/11	1	2								2	2		6	3.34	12.64
09/21/11	1	36	4							6	25		71	2.63	17.05
09/22/11	1	8	3				1			17	13		42	2.66	18.65
09/23/11	1									2			2	1.92	18.63
09/24/11	1	10	3			1	1			3	89		107	2.37	18.76
09/25/11	1	60	31	2			1				43		137	1.77	16.83
09/26/11	1	2	20				1			5	12		40	1.90	16.55
09/27/11	1	6	2	1						3	4		16	3.32	15.94
09/28/11	1	1		1			1			1			4	4.39	14.86
09/29/11	1	4	1	1							1		7	4.95	12.88
09/30/11	1	1		1						1	2		5	2.32	15.27
10/01/11	1	3	2							2			7	3.28	10.21
10/02/11	1		1								1		2	1.13	12.13
10/03/11	1									1			1	2.07	9.75
10/04/11	1												0	6.10	10.92
10/05/11	1												0	3.48	2.41
10/06/11	1												0	2.22	2.94
10/07/11	1												0	4.73	7.54
10/08/11	1		2				1			2			5	4.97	14.25
10/09/11	1	30	1	1						1	22		55	4.97	15.50
10/10/11	1	20	10							4	8		42	2.67	13.08
10/11/11	1												0	1.96	8.87
10/12/11	1												0	4.77	10.87
10/13/11	1												0	3.86	12.70
10/14/11	1												0	6.18	11.50
10/15/11	1												0	7.09	9.96
10/16/11	1												0		
10/17/11	1												0		
10/18/11	1									1			1		
10/19/11	1												0		
By Species		**4653**	**2879**	**24**	**238**	**82**	**66**	**19**	**0**	**222**	**1775**	**0**	**9958**		
By Guild		**7556**			**238**	**82**	**85**			**1997**					
		BBSH			**HB**	**MYSP**	**RBTB**			**UNKN**			**Total**		

* 1 = Detector functioned for the entire night; 0 = Non-operational for all or part of the night

** = Met tower not installed, detector deployed in tree within met tower clearing

Appendix B

Breeding Bird Survey Data Tables

Appendix B Table 1. Number of species, number individuals, and distance from observer at control and project area point count locations during three survey rounds at Timbertop - Summer 2011

Common name	Scientific name	0-50 m	50-100 m	> 100 m	Flyovers	Total
Project area points						
American crow	*Corvus brachyrhynchos*	1		1		2
American goldfinch	*Spinus tristis*	2	1		2	5
American robin	*Turdus migratorius*	3	4	2		9
black-and-white warbler	*Mniotilta varia*	9	7			16
blackburnian warbler	*Dendroica fusca*	3	2			5
black-capped chickadee	*Poecile atricapillus*	8	14	4	2	28
black-throated blue warbler	*Dendroica caerulescens*	9	18	2		29
black-throated green warbler	*Dendroica virens*		8			8
blue jay	*Cyanocitta cristata*	6	9	7		22
broad-winged hawk	*Buteo platypterus*		2		5	7
brown creeper	*Certhia americana*	1				1
brown-headed cowbird	*Molothrus ater*				1	1
Canada goose	*Branta canadensis*				2	2
cedar waxwing	*Bombycilla cedrorum*		1		6	7
chestnut-sided warbler	*Dendroica pensylvanica*	12	17	1		30
chipping sparrow	*Spizella passerina*		5			5
common raven	*Corvus corax*				2	2
common yellowthroat	*Geothlypis trichas*	7	15	3		25
dark-eyed junco	*Junco hyemalis*	11	16	1		28
eastern towhee	*Pipilo erythrophthalmus*	5	15	3		23
eastern wood-pewee	*Contopus virens*	1	1	1		3
field sparrow	*Spizella pusilla*			2		2
golden-crowned kinglet	*Regulus satrapa*		1			1
great crested flycatcher	*Myiarchus crinitus*	3				3
hairy woodpecker	*Picoides villosus*	1	2			3
hermit thrush	*Catharus guttatus*	1	11	4		16
house wren	*Troglodytes aedon*		1			1
indigo bunting	*Passerina cyanea*		1			1
least flycatcher	*Empidonax minimus*		1			1
magnolia warbler	*Dendroica magnolia*		2			2
mourning dove	*Zenaida macroura*		4			4
Nashville warbler	*Oreothlypis ruficapilla*	1	8	2		11
northern cardinal	*Cardinalis cardinalis*			1		1
northern flicker	*Colaptes auratus*		2			2
ovenbird	*Seiurus aurocapilla*	17	36	20		73
prairie warbler	*Dendroica discolor*	1	1			2
red-eyed vireo	*Vireo olivaceus*	8	25	6		39
red-tailed hawk	*Buteo jamaicensis*				1	1
rose-breasted grosbeak	*Pheucticus ludovicianus*	6	7	2		15
ruffed grouse	*Bonasa umbellus*	1		1		2
scarlet tanager	*Piranga olivacea*	3	2			5
song sparrow	*Melospiza melodia*	1	1	1		3
tufted titmouse	*Baeolophus bicolor*	1	1			2
turkey vulture	*Cathartes aura*				1	1
unidentified accipiter	*n/a*		1			1
unidentified nuthatch	*n/a*		2			2
unidentified passerine	*n/a*	13	3		7	23
unidentified warbler	*n/a*	2	2			4
unidentified woodpecker	*n/a*	1		1		2
veery	*Catharus fuscescens*	1	3	1		5
white-breasted nuthatch	*Sitta carolinensis*		1			1
white-throated sparrow	*Zonotrichia albicollis*	2	4	3		9
winter wren	*Troglodytes hiemalis*		3	2		5
yellow warbler	*Dendroica petechia*		1			1
yellow-rumped warbler	*Dendroica coronata*		1			1
	Total	**141**	**262**	**71**	**29**	**503**

Appendix B Table 1. (continued)						
Common name	**Scientific name**	**0-50 m**	**50-100 m**	**> 100 m**	**Flyovers**	**Total**
Control points						
American crow	*Corvus brachyrhynchos*			1		1
American goldfinch	*Spinus tristis*	3	4		5	12
American robin	*Turdus migratorius*	4	1			5
Baltimore oriole	*Icterus galbula*		1			1
black-and-white warbler	*Mniotilta varia*		3			3
black-capped chickadee	*Poecile atricapillus*	2	4			6
black-throated blue warbler	*Dendroica caerulescens*	2	3			5
black-throated green warbler	*Dendroica virens*		1			1
blue jay	*Cyanocitta cristata*	2	1	2		5
broad-winged hawk	*Buteo platypterus*		2			2
Canada goose	*Branta canadensis*				3	3
cedar waxwing	*Bombycilla cedrorum*	2	4			6
chestnut-sided warbler	*Dendroica pensylvanica*	6	8	1		15
chipping sparrow	*Spizella passerina*	3		1		4
common raven	*Corvus corax*				1	1
common yellowthroat	*Geothlypis trichas*		7			7
dark-eyed junco	*Junco hyemalis*	4	4			8
eastern phoebe	*Sayornis phoebe*		1			1
eastern towhee	*Pipilo erythrophthalmus*	1				1
eastern wood-pewee	*Contopus virens*		3	1		4
gray catbird	*Dumetella carolinensis*	2				2
great crested flycatcher	*Myiarchus crinitus*	1				1
hairy woodpecker	*Picoides villosus*	1				1
hermit thrush	*Catharus guttatus*	1		3		4
indigo bunting	*Passerina cyanea*		1			1
mourning dove	*Zenaida macroura*		1			1
northern parula	*Parula americana*		1			1
ovenbird	*Seiurus aurocapilla*	6	7	7		20
prairie warbler	*Dendroica discolor*	1	3			4
red-breasted nuthatch	*Sitta canadensis*		1			1
red-eyed vireo	*Vireo olivaceus*	12	14			26
rose-breasted grosbeak	*Pheucticus ludovicianus*	3	1	1		5
scarlet tanager	*Piranga olivacea*	1				1
song sparrow	*Melospiza melodia*	1	3			4
tufted titmouse	*Baeolophus bicolor*			1		1
unidentified passerine	*Passerformes (fam, gen, sp)*				2	2
unidentified warbler	*Parulidae (gen, sp)*		1			1
unidentified woodpecker	*Picadae (gen, sp)*	1	1	2		4
white-breasted nuthatch	*Sitta carolinensis*	1	1			2
winter wren	*Troglodytes hiemalis*		1			1
wood duck	*Aix sponsa*		1			1
yellow-bellied sapsucker	*Sphyrapicus varius*	1	2			3
	Total	**61**	**86**	**20**	**11**	**178**

Appendix B Table 2. Species, number individuals, relative abundance, frequency, and diversity at project area point count locations during three survey rounds at Timbertop - Summer 2011

Species	Field/Forest edge (3 points)			Forest edge/Mixed forest (8 points)			Forest edge/Mixed forest/Wetland (5 points)			Mixed forest (4 points)		
	Total[a]	Relative abundance[b]	Frequency[c]	Total[a]	Relative abundance[b]	Frequency[c]	Total[a]	Relative abundance[b]	Frequency[c]	Total[a]	Relative abundance[b]	Frequency[c]
American crow		0.00	0%	1	0.04	13%		0.00	0%		0.00	0%
American goldfinch	3	0.33	33%		0.00	0%		0.00	0%		0.00	0%
American robin		0.00	0%	4	0.17	25%	3	0.20	60%		0.00	0%
black-and-white warbler	3	0.33	67%	8	0.33	50%	1	0.07	20%	4	0.33	50%
blackburnian warbler		0.00	0%	2	0.08	25%	2	0.13	20%	1	0.08	25%
black-capped chickadee	4	0.44	67%	4	0.17	50%	5	0.33	40%	9	0.75	100%
black-throated blue warbler	2	0.22	33%	6	0.25	63%	6	0.40	80%	13	1.08	100%
black-throated green warbler	1	0.11	33%		0.00	0%	7	0.47	40%		0.00	0%
blue jay	9	1.00	67%	2	0.08	13%	2	0.13	40%	2	0.17	50%
broad-winged hawk		0.00	0%	1	0.04	13%		0.00	0%	1	0.08	25%
brown creeper		0.00	0%	1	0.04	13%		0.00	0%		0.00	0%
cedar waxwing	1	0.11	33%		0.00	0%		0.00	0%		0.00	0%
chestnut-sided warbler	6	0.67	100%	19	0.79	75%	4	0.27	20%		0.00	0%
chipping sparrow	3	0.33	33%	2	0.08	13%		0.00	0%		0.00	0%
common yellowthroat	4	0.44	67%	10	0.42	50%	7	0.47	60%	1	0.08	25%
dark-eyed junco	9	1.00	100%	9	0.38	50%	5	0.33	40%	4	0.33	50%
eastern towhee	5	0.56	67%	13	0.54	63%		0.00	0%	2	0.17	50%
eastern wood-pewee	1	0.11	33%		0.00	0%	1	0.07	20%		0.00	0%
golden-crowned kinglet		0.00	0%	1	0.04	13%		0.00	0%		0.00	0%
great crested flycatcher	3	0.33	33%		0.00	0%		0.00	0%		0.00	0%
hairy woodpecker		0.00	0%	2	0.08	25%	1	0.07	20%		0.00	0%
hermit thrush	3	0.33	67%	5	0.21	25%		0.00	0%	4	0.33	50%
house wren	1	0.11	33%		0.00	0%		0.00	0%		0.00	0%
indigo bunting	1	0.11	33%		0.00	0%		0.00	0%		0.00	0%
least flycatcher		0.00	0%		0.00	0%	1	0.07	20%		0.00	0%
magnolia warbler		0.00	0%	2	0.08	13%		0.00	0%		0.00	0%
mourning dove	3	0.33	33%	1	0.04	13%		0.00	0%		0.00	0%
Nashville warbler	1	0.11	33%	2	0.08	25%	2	0.13	20%	4	0.33	75%
northern flicker		0.00	0%	1	0.04	13%		0.00	0%	1	0.08	25%
ovenbird	7	0.78	100%	16	0.67	88%	13	0.87	100%	17	1.42	100%
prairie warbler	2	0.22	33%		0.00	0%		0.00	0%		0.00	0%
red-eyed vireo	2	0.22	33%	14	0.58	63%	14	0.93	100%	3	0.25	50%
rose-breasted grosbeak	2	0.22	67%	8	0.33	50%	2	0.13	40%	1	0.08	25%
ruffed grouse		0.00	0%	1	0.04	13%		0.00	0%		0.00	0%
scarlet tanager		0.00	0%		0.00	0%	3	0.20	20%	2	0.17	50%
song sparrow		0.00	0%	1	0.04	13%	1	0.07	20%		0.00	0%
tufted titmouse	1	0.11	33%		0.00	0%	1	0.07	20%		0.00	0%
unidentified accipiter	1	0.11	33%		0.00	0%		0.00	0%		0.00	0%
unidentified nuthatch		0.00	0%	1	0.04	13%		0.00	0%	1	0.08	25%
unidentified passerine	3	0.33	67%	3	0.13	25%	6	0.40	60%	4	0.33	75%
unidentified warbler		0.00	0%	2	0.08	25%	1	0.07	20%	1	0.08	25%
unidentified woodpecker		0.00	0%		0.00	0%	1	0.07	20%		0.00	0%
veery	1	0.11	33%	1	0.04	13%		0.00	0%	2	0.17	50%
white-breasted nuthatch		0.00	0%	1	0.04	13%		0.00	0%		0.00	0%
white-throated sparrow	1	0.11	33%	5	0.21	50%		0.00	0%		0.00	0%
winter wren		0.00	0%		0.00	0%	3	0.20	40%		0.00	0%
yellow warbler	1	0.11	33%		0.00	0%		0.00	0%		0.00	0%
yellow-rumped warbler		0.00	0%	1	0.04	13%		0.00	0%		0.00	0%
Total	**84**	**9.33**		**150**	**6.25**		**92**	**6.13**		**77**	**6.42**	
Species Richness	**29**			**33**			**24**			**20**		
Shannon Diversity Index	**3.10**			**3.03**			**2.82**			**2.55**		

a Total number of individuals detected (mainly singing males, also males and females that were visually observed).

b Mean number of birds observed.

c Percentage of survey points at which the species was observed.

Appendix B Table 3. Species, number individuals, relative abundance, frequency, and diversity at control point count locations during two or three survey rounds at Timbertop - Summer 2011

Species	Field/Forest edge (1 point - 3 visits)			Forest edge/Mixed forest (2 points - 3 visits)			Forest edge/Mixed forest/Wetlands (1 point - 3 visits)			Mixed forest (1 point - 3 visits)			Natural clearing/Mixed forest (1 point - 2 visits)		
	Total[a]	Relative abundance[b]	Freq[c]	Total[a]	Relative abundance[b]	Freq[c]	Total[a]	Relative abundance[b]	Freq[c]	Total[a]	Relative abundance[b]	Freq[c]	Total[a]	Relative abundance[b]	Freq[c]
American goldfinch	2	0.67	100%	1	0.17	50%	2	0.67	100%	2	0.67	100%		0.00	
American robin	2	0.67	100%	3	0.50	100%		0.00			0.00			0.00	
Baltimore oriole		0.00			0.00	0%	1	0.33	100%		0.00			0.00	
black-and-white warbler	1	0.33	100%	1	0.17	50%	1	0.33	100%		0.00			0.00	
black-capped chickadee		0.00		2	0.33	100%	4	1.33	100%		0.00			0.00	
black-throated blue warbler		0.00		2	0.33	50%	1	0.33	100%	2	0.67	100%		0.00	
black-throated green warbler		0.00		1	0.17	50%		0.00			0.00			0.00	
blue jay	1	0.33	100%	2	0.33	50%		0.00			0.00			0.00	
broad-winged hawk		0.00		2	0.33	50%		0.00			0.00			0.00	
cedar waxwing	2	0.67	100%		0.00	0%	2	0.67	100%	2	0.67	100%		0.00	
chestnut-sided warbler	5	1.67	100%	9	1.50	100%		0.00			0.00			0.00	
chipping sparrow	3	1.00	100%		0.00	0%		0.00			0.00			0.00	
common yellowthroat	1	0.33	100%	3	0.50	50%	3	1.00	100%		0.00			0.00	
dark-eyed junco		0.00		2	0.33	50%	1	0.33	100%	1	0.33	100%	4	2.00	100%
eastern phoebe		0.00		1	0.17	50%		0.00			0.00			0.00	
eastern towhee		0.00			0.00	0%		0.00			0.00		1	0.50	100%
eastern wood-pewee		0.00			0.00	0%		0.00		3	1.00	100%		0.00	
gray catbird	2	0.67	100%		0.00	0%		0.00			0.00			0.00	
great crested flycatcher		0.00			0.00	0%		0.00		1	0.33	100%		0.00	
hairy woodpecker		0.00			0.00	0%		0.00		1	0.33	100%		0.00	
hermit thrush		0.00			0.00	0%	1	0.33	100%		0.00			0.00	
indigo bunting		0.00		1	0.17	50%		0.00			0.00			0.00	
mourning dove		0.00			0.00	0%		0.00		1	0.33	100%		0.00	
northern parula		0.00		1	0.17	50%		0.00			0.00			0.00	
ovenbird	1	0.33	100%	5	0.83	100%	1	0.33	100%	5	1.67	100%	1	0.50	100%
prairie warbler		0.00		4	0.67	100%		0.00			0.00			0.00	
red-breasted nuthatch		0.00		1	0.17	50%		0.00			0.00			0.00	
red-eyed vireo	6	2.00	100%	7	1.17	100%	2	0.67	100%	10	3.33	100%	1	0.50	100%
rose-breasted grosbeak		0.00			0.00	0%	1	0.33	100%	3	1.00	100%		0.00	
scarlet tanager		0.00			0.00	0%	1	0.33	100%		0.00			0.00	
song sparrow	2	0.67	100%		0.00	0%	2	0.67	100%		0.00			0.00	
unidentified warbler		0.00			0.00	0%		0.00		1	0.33	100%		0.00	
unidentified woodpecker		0.00		1	0.17	50%	1	0.33	100%		0.00			0.00	
white-breasted nuthatch		0.00			0.00	0%		0.00		1	0.33	100%	1	0.50	100%
winter wren		0.00			0.00	0%		0.00		1	0.33	100%		0.00	
wood duck		0.00			0.00	0%	1	0.33	100%		0.00			0.00	
yellow-bellied sapsucker		0.00			0.00	0%	1	0.33	100%	2	0.67	100%		0.00	
Total	**28**	**9.33**		**49**	**8.17**		**26**	**8.67**		**36**	**12.00**		**8**	**4.00**	
Species Richness	**12**			**19**			**17**			**15**			**5**		
Shannon Diversity Index	**2.30**			**2.66**			**2.70**			**2.38**			**1.39**		

a Total number of individuals detected (mainly singing males, also males and females that were visually observed).
b Mean number of birds observed.
c Percentage of survey points at which the species was observed.

Appendix C

Raptor Survey Data Tables

Appendix C Table 1. Daily total observations of raptor species and daily passage rates at Timbertop Wind Project, Spring 2011

Species	4/21/2011	4/22/2011	4/30/2011	5/2/2011	5/7/2011	5/10/2011	5/12/2011	5/21/2011	5/24/2011	5/26/2011	Entire Season
American kestrel	2				1					2	5
broad-winged hawk		6				1				1	8
Cooper's hawk		1									1
merlin					2		3				5
northern goshawk				1							1
northern harrier	1										1
osprey		1					2				3
red-tailed hawk	1	1		2	2				6	3	15
sharp-shinned hawk				1	2				2		5
turkey vulture	20	16	5	5	30	9	9		23	15	132
unidentified accipiter		2	2						1	1	6
unidentified buteo			8	1	2				1		12
unidentified falcon							1				1
unidentified raptor			5		11		2		10	4	32
Daily Totals	**24**	**27**	**20**	**10**	**50**	**10**	**17**	**0**	**43**	**26**	**227**

Appendix C Table 2. Hourly summary of raptor observations at Timbertop Wind Project, Spring 2011

Species	9:00-10:00	10:00-11:00	11:00-12:00	12:00-1:00	1:00-2:00	2:00-3:00	3:00-4:00	Total
American kestrel		1	1		2		1	5
broad-winged hawk	1		4	1		1	1	8
Cooper's hawk					1			1
merlin				3	1		1	5
northern goshawk	1							1
northern harrier							1	1
osprey	1			1	1			3
red-tailed hawk		1	3	3	3	1	4	15
sharp-shinned hawk	2	2		1				5
turkey vulture	12	28	14	12	28	16	22	132
unidentified accipiter		1	2		1	1	1	6
unidentified buteo		2	2		2	3	3	12
unidentified falcon	1							1
unidentified raptor	2	6	4	5	8	5	2	32
Hourly totals	**20**	**41**	**30**	**26**	**47**	**27**	**36**	**227**

Appendix C Table 3. Number of individuals of species observed within Project boundary above or below 125 m, Timbertop Wind Project, Spring 2011

Species	Less than 125 m	125 m or greater	Outside Project boundary	Total
American kestrel	2		3	5
broad-winged hawk	4	3	1	8
Cooper's hawk			1	1
merlin	3		2	5
northern goshawk	1			1
northern harrier		1		1
osprey	2		1	3
red-tailed hawk	7	2	6	15
sharp-shinned hawk	3	1	1	5
turkey vulture	69	4	59	132
unidentified accipiter	3		3	6
unidentified buteo	6	5	1	12
unidentified falcon			1	1
unidentified raptor	1	7	24	32
Total	**101**	**23**	**103**	**227**
% of Total Obs.	**44%**	**10%**	**45%**	

Appendix C Table 4. Daily total observations of raptor species and daily passage rates at Timbertop Wind Project, Fall 2011

Species	8/24/2011	8/31/2011	9/11/2011	9/12/2011	9/17/2011	9/27/2011	9/28/2011	10/5/2011	10/18/2011	11/1/2011	TOTAL
American kestrel		1	8	3		7	5				24
bald eagle	1		8			1					10
broad-winged hawk	1	1	75	5	267	26	4				379
Cooper's hawk			3	1		4	9			3	20
northern harrier							1				1
osprey	1	1	1	2		3	4				12
peregrine falcon				1		2	1				4
red-shouldered hawk		1	1	3	3						8
red-tailed hawk	7	4	7		5	4	20		1	10	58
sharp-shinned hawk		1	10	8	7	12	8	3	1	1	51
turkey vulture	7	12	3	6	5	4	3	3	5		48
unidentified accipiter						2				1	3
unidentified buteo		1					2				3
unidentified falcon							2				2
unidentified raptor	1		2	1	2	5	2	2		1	16
TOTAL	**18**	**22**	**118**	**30**	**289**	**70**	**61**	**8**	**7**	**16**	**639**

Appendix C Table 5. Hourly summary of raptor observations at Timbertop Wind Project, Fall 2011

Species	9:00-10:00	10:00-11:00	11:00-12:00	12:00-1:00	1:00-2:00	2:00-3:00	3:00-4:00	TOTAL
American kestrel		5	3	2	5	5	4	24
bald eagle		7	1	1			1	10
broad-winged hawk	2	41	37	20	121	115	43	379
Cooper's hawk	1	4	9	3	1	2		20
northern harrier				1				1
osprey	1		2	1	5	3		12
peregrine falcon		1		1		2		4
red-shouldered hawk	1		3	1	2	1		8
red-tailed hawk	2	10	9	16	11	9	1	58
sharp-shinned hawk	1	8	11	7	11	12	1	51
turkey vulture	2	2	15	6	9	11	3	48
unidentified accipiter		2	1					3
unidentified buteo			1	1		1		3
unidentified falcon				2				2
unidentified raptor	1	2	3	4	5		1	16
TOTAL	**11**	**82**	**95**	**66**	**170**	**161**	**54**	**639**

Appendix C Table 6. Number of individuals of species observed within Project boundary in proposed turbine areas above or below 125 m during fall 2011 surveys, Timbertop Wind Project

Species	Less than 125 m	125 m or greater	Outside Project boundary	TOTAL
American kestrel	18	6		24
bald eagle	4	3	3	10
broad-winged hawk	42	201	136	379
Cooper's hawk	15	5		20
northern harrier		1		1
osprey	3	9		12
peregrine falcon	2	2		4
red-shouldered hawk	8			8
red-tailed hawk	30	25	3	58
sharp-shinned hawk	27	21	3	51
turkey vulture	18	19	11	48
unidentified accipiter	1	2		3
unidentified buteo		2	1	3
unidentified falcon		2		2
unidentified raptor	2	9	5	16
TOTAL	**170**	**307**	**162**	**639**
PERCENTAGE	**27%**	**48%**	**25%**	

Appendix C Table 7a. Summary of publically available spring raptor data at proposed wind sites in the East (1999-present)

Project Site	Landscape	Survey Period	# of Survey Days	# of Survey Hours	Total # Observed	# of Species Observed	Seasonal Average Passage Rate (raptors/hr)	(Turbine Ht) and % Raptors Below Turbine Height	Reference
Spring 2008									
Moresville, Delaware County, NY	Forested ridge	March 28 to May 10	8	45	170	6	3.8	n/a	New York State Department of Environmental Conservation. 2008. Publicly Available Raptor Migration Data for Proposed Wind Sites in NYS. Available at http://www.dec.ny.gov/docs/wildlife_pdf/raptorwinsum. Accessed November 7, 2008.
Sheffield, Caledonia Cty, VT	Forested ridge	April to May	10	60	98	10	1.63	(125 m) 69%	Woodlot Alternatives, Inc. 2006. Avian and Bat Information Summary and Risk Assessment for the Proposed Sheffield Wind Power Project in Sheffield, Vermont. Prepared for UPC Wind Management, LLC.
Deerfield, Bennington Cty, VT (Existing facility)	Forested ridge	April 9 to April 29	7	42	44	11 (for both sites combined)	1.05	(125 m) 83% (at both sites combined)	Woodlot Alternatives, Inc. 2005. A Spring 2005 Radar, Visual, and Acoustic Survey of Bird and Bat Migration at the Proposed Deerfield Wind Project in Searsburg and Readsboro, Vermont. Prepared for PPM Energy/Deerfield Wind, LLC.
Deerfield, Bennington Cty, VT (Western expansion)	Forested ridge	April 9 to April 29	7	42	38	11 (for both sites combined)	0.9	(125 m) 83% (at both sites combined)	Woodlot Alternatives, Inc. 2005. A Spring 2005 Radar, Visual, and Acoustic Survey of Bird and Bat Migration at the Proposed Deerfield Wind Project in Searsburg and Readsboro, Vermont. Prepared for PPM Energy/Deerfield Wind, LLC.
Spring 2006									
Mars Hill, Aroostook Cty, ME	Forested ridge	April 12 to May 18	10	60.25	64	9	1.06	(120 m) 48%	Woodlot Alternatives, Inc. 2006. A Spring 2006 Radar, Visual, and Acoustic Survey of Bird Migration at the Mars Hill Wind Farm in Mars Hill, Maine. Prepared for Evergreen Windpower, LLC.
Lempster, Sullivan County, NH	Forested ridge	Spring 2006	10	78	102	n/a	1.3	125 m (18%)	Woodlot Alternatives, Inc. 2007. A Spring 2007 Survey of Nocturnal Bird Migration, Breeding Birds, and Bicknell's Thrush at the Proposed Lempster Mountain Wind Power Project Lempster, New Hampshire. Prepared for Lempster Wind, LLC.
Spring 2007									
Stetson, Penobscot Cty, ME	Forested ridge	April 26 to May 4	9	59	34	10	0.6	(125 m) 65%	Woodlot Alternatives, Inc. 2007. A Spring 2007 Survey of Bird and Bat Migration at the Stetson Wind Project, Washington County, Maine. Prepared for Evergreen Wind V, LLC.
Laurel Mountain, Preston Cty, WV	Forested ridge	March 30 to May 17	10	63.75	266	12	4.17	(125 m) 55%	Stantec Consulting. 2008. A Spring 2007 Radar, Visual, and Acoustic Survey of Bird and Bat Migration at the Proposed Laurel Mountain Wind Energy Project near Elkins, West Virginia – November 2007. Prepared for AES Laurel Mountain, LLC.

(continued below)

Appendix C Table 7a. (spring continued)

Project Site	Landscape	Survey Period	# of Survey Days	# of Survey Hours	Total # Observed	# of Species Observed	Seasonal Average Passage Rate (raptors/hr)	(Turbine Ht) and % Raptors Below Turbine Height	Reference
Spring 2008									
Oakfield, Aroostook Cty, ME	Forested ridge	April 25-May 30	12	79	58	9	0.7	(120 m) 80%	Stantec Consulting. 2008. Spring and Summer 2008 Bird and Bat Migration Survey Report Visual, Radar, and Acoustic Bat Surveys for the Oakfield Wind Project in Oakfield, Maine. Prepared for First Wind Management, LLC.
Record Hill, Oxford Cty, ME	Forested ridge	March 11 to May 27	15	97	118	12	1.2	n/a	Stantec Consulting. 2008. Spring 2008 Bird and Bat Migration Survey Report Breeding Bird, Raptor, and Acoustic Bat Surveys for the Record Hill Wind Project Roxbury, Maine. Prepared for Record Hill Wind, LLC.
Lincoln, Penobscot Cty, ME	Forested ridge	April 3 to June 3	15	108	122	12	1.1	(125 m) 76%	Stantec Consulting. 2008. Spring 2008 Bird and Bat Migration Survey Report Visual, Radar, and Acoustic Bat Surveys for the Rollins Wind Project. Prepared for First Wind Management, LLC.
Greenland, Grant Cty, WV	Forested ridge	March 21 to May 14	10	68	212	9	3.12	(125 m) 68%	Stantec Consulting. 2008. Spring, Summer, and Fall 2008 Bird and Bat Migration Survey Report Visual, Radar, and Acoustic Bat Surveys for the New Creek Mountain Project West Virginia. Prepared for AES New Creek, LLC.
Buckeye, Champaign Cty, OH	Forested ridge	March 1 to May 15	32	216	1476	12	6.8	(15 0m) 95%	Stantec Consulting. 2009. Spring, Summer and Fall 2008 Bird and Bat Survey Report. Prepared for EverPower Wind Holdings, Inc.
Allegany, Cattaraugus Cty, NY	Forested ridge	March 23 to May 8	10	75	134	10	1.8	(150 m) 87%	Stantec Consulting. 2008. Spring 2008 Bird and Bat Migration Survey Report: Visual, Radar, and Acoustic Bat Surveys for the Allegany Wind Project. Prepared for EverPower Renewables
Rollins Mountain, Penobscot Cty, ME	Forested ridge	Apr 3 to Jun 3	15	108	122	12	1.1	(125 m) 76%	Stantec Consulting. 2008. Spring 2008 Bird and Bat Migration Survey Report: Visual, Radar and Acoustic Bat Surveys for the Rollins Wind Project. Prepared for First Wind, LLC.
Spring 2009									
Stetson, Penobscot Cty, ME	Forested ridge	April 27 to May 5	4	20	34	11	1.7	(119 m) 67% (combined spring and fall)	Stantec Consulting. 2009. Stetson I Mountain Wind Project Year 1 Post-Construction Monitoring Report, 2009. Prepared for First Wind Management, LLC
Tenney, Grafton Cty, NH	Forested ridge	March 26 to May 23	11~	125~	175~	11	1.4~	(125 m) 25% (of those in project area)	Stantec Consulting Services Inc. 2009. 2009 Spring, Summer, and Fall Avian and Bat Surveys for the Groton Wind Project. Prepared for Groton Wind, LLC.
Vermont Community Wind Farm, Orleans Cty, VT	Forested ridge	March 31 to May 20	10	78.75	114	8	1.45	(130 m) 81%	Stantec Consulting. 2009. Spring and Summer 2009 Bird and Bat Survey Report: Visual, Radar, Acoustic, Mist Net Surveys and Related Assessments for the Vermont Community Wind Farm Project. Prepared for Vermont Community Wind Farm, LLC
Highland, Somerset Cty, ME	Forested ridge	March 25 to May 19	20	139	260	10	1.87	(130.5 m) Whitham 80% Briggs 86%	Stantec Consulting Services Inc. 2009. Spring 2009 Ecological Surveys. Prepared for Highland Wind LLC.
Kingdom Community, Orleans Cty, VT	Forested ridge	April 15 to June 1	10	74	134	10	1.81	(125 m) 67%	Stantec Consulting. 2009. Spring and Summer 2009 Raptor Surveys for the Kingdom Community Wind Project. Prepared for Vermont Environmental Research Associates
Spring 2010									
Coos, Dixville Peak	Forested ridge	April 1 to May 11	10	67.52	14	8	0.21	(125 m) 64%	Stantec Consulting. 2010. Fall 2009 and Spring 2010 Raptor Migration Surveys For the Granite Reliable Power Project. Prepared for Granite Reliable Power, LLC
Coos, South Obs points	Forested ridge	April 1 to May 11	10	62.45	29	8	0.46	(125m) 76%	Stantec Consulting. 2010. Fall 2009 and Spring 2010 Raptor Migration Surveys For the Granite Reliable Power Project. Prepared for Granite Reliable Power, LLC
Bull Hill, Hancock Cty, ME	Forested ridge	March 19 to May 23	15	104.25	55	9	0.53	(145m) 100%	Stantec Consulting. 2010. Spring 2010 Avian and Bat Survey Report for the Bull Hill Wind Project. Prepared for Blue Sky East Wind, LLC
Bowers, Washington Cty, ME	Forested ridge	April 21 to May 26	12	84	131	9	1.56	(131m) 75%	Stantec Consulting. 2010. 2010 Spring Avian and Spring/Summer Bat Surveys for the Bowers Wind Project. Prepared for Champlain Wind Energy, LLC
Spring 2011									
Timbertop, Hillsborough, NH	Forested ridge	April 21 - May 26	10	70	227	10	3.24	(125m) 44% of those in Project boundary	*this report*

*Calculated for spring and fall combined.
**Calculated for spring and fall 2006 and 2007 combined.
***Non-migrants were not included in seasonal passage rates in NYSDEC 2008 table but were included in passage rates here.
~5 of the 11 survey days were conducted simultaneously by 2 observers at 2 survey locations; however, results are combined for both sites which inflates the number of raptors observed for this site.

Appendix A Table 7b. Summary of available fall raptor survey results at wind sites in the East (1996-present)

Project Site	Landscape	Survey Period	# of Survey Days	# of Survey Hours	Total # Observed	# of Species Observed	Seasonal Average Passage Rate (raptors/hr)	(Turbine Ht) and % Raptors Below Turbine Height	Reference
Fall 1996									
Searsburg, Bennington County, VT	Forested ridge	Sept. 11 - Nov. 3	20	80	430	12	5.4	n/a	Kerlinger, Paul. 1996. A Study of Hawk Migration at Green Mountain Power Corporation's Searsburg, Vermont, Wind Powered Site: Autumn 1996. Prepared for the Vermont Public Service Board, Green Mountain Power, National Renewable Ener gy Laboratory, VERA.
Fall 2004									
Deerfield, Bennington Cty, VT (Existing Facility)	Forested ridge	Sept. 2 - Oct. 31	10	60	147	n/a	2.5	n/a	Woodlot Alternatives, Inc. 2005. Fall 2004 Avian Migration Surveys at the Proposed Deerfield Wind/Searsburg Expansion Project in Searsburg and Readsboro, Vermont. Prepared for Deerfield Wind, LLC and Vermont Environmental Research Associates.
Deerfield, Bennington Cty, VT (Western Expansion)	Forested ridge	Sept. 2 - Oct. 31	10	57	725	n/a	12.7	n/a	Woodlot Alternatives, Inc. 2005. Fall 2004 Avian Migration Surveys at the Proposed Deerfield Wind/Searsburg Expansion Project in Searsburg and Readsboro, Vermont. Prepared for Deerfield Wind, LLC and Vermont Environmental Research Associates.
Sheffield, Caledonia Cty, VT	Forested ridge	Sept. 11 - Oct. 14	10	60	193	10	3.2	(125 m) 31%	Woodlot Alternatives, Inc. 2006. Avian and Bat Information Summary and Risk Assessment for the Proposed Sheffield Wind Power Project in Sheffield, Vermont. Prepared for UPC Wind Management, LLC.
Fall 2005									
New Grange, Chautauqua Cty, NY	Forested ridge	Sept. 17 - Oct. 15*	6	18	49	5	4.4	n/a	New York State Department of Environmental Conservation. 2008. Publicly Available Raptor Migration Data for Proposed Wind Sites in NYS. Available at http://www.dec.ny.gov/docs/wildlife_pdf/raptorwinsum. Accessed November 7, 2008.
Moresville, Deleware Cty, NY	Forested ridge	Aug. 31 - Nov. 3	11	72	228	11	3.2	n/a	New York State Department of Environmental Conservation. 2008. Publicly Available Raptor Migration Data for Proposed Wind Sites in NYS. Available at http://www.dec.ny.gov/docs/wildlife_pdf/raptorwinsum. Accessed November 7, 2008.
Mars Hill, Aroostook Cty, ME	Forested ridge	Sept. 9 - Oct. 13	8	42.5	115	13	1.5	(120 m) 42%	Woodlot Alternatives, Inc. 2005. A Fall 2005 Radar, Visual, and Acoustic Survey of Bird and Bat Migration at the Proposed Mars Hill Wind Project in Mars Hill, Maine. Prepared for UPC Wind Management, LLC.
Lempster, Sullivan County, NH	Forested ridge	Fall 2005	10	80	264	10	3.3	(125 m) 40%	Woodlot Alternatives, Inc. 2007. Lempster Wind Farm Wildlife Habitat Summary and Assessment. Prepared for Lempster Wind, LLC.
Fall 2006									
Stetson, Penobscot Cty, ME	Forested ridge	Sept. 14 - Oct. 26	7	42	86	11	2.1	(125 m) 63%	Woodlot Alternatives, Inc. 2007. A Fall 2006 Survey of Bird and Bat Migration at the Proposed Stetson Mountain Wind Power Project in Washington County, Maine. Prepared for Evergreen Wind V, LLC.
Lincoln, Penobscot Cty, ME	Forested ridge	Sept. 13 - Oct. 16	12	89	144	12	1.8	(120 m) 82%	Woodlot Alternatives, Inc. 2007. Fall 2006 Survey of Bird and Bat Migration at the Proposed Stetson Wind Power Project in Washington County, Maine. Prepared for Evergreen Wind V.
Rollins, Penobscot Cty, ME	Forested ridge	Sept. 13 - Oct. 16	12	89	144	12	1.8	(120 m) 82%	Stantec Consulting. 2008. Fall 2007 Bird and Bat Migration Survey Report: Visual, Radar and Acoustic Bat Surveys for the Rollins Wind Project. Prepared for First Wind, LLC.

(continued below)

Appendix A Table 7b. (fall continued)

Project Site	Landscape	Survey Period	# of Survey Days	# of Survey Hours	Total # Observed	# of Species Observed	Seasonal Average Passage Rate (raptors/hr)	(Turbine Ht) and % Raptors Below Turbine Height	Reference
Fall 2007									
Roxbury, Oxford Cty, ME	Forested ridg	Sept. 3 - Oct. 15	14	86	96	12	1.1	n/a	Stantec Consulting. 2008. Fall 2007 Migration Survey Report Visual, Acoustic, and Radar Surveys of Bird and Bat Migration conducted at the proposed Record Hill Wind Project In Roxbury, Maine. Prepared for Independence Wind, LLC.
Errol, Coos Cty, NH	Forested ridg	Sept. 5 - Oct. 16	11	68	44	9	0.7	n/a	Stantec Consulting. 2007. Fall 2007 Radar, Visual, and Acoustic Survey of Bird and Bat Migration at the Proposed Windpark in Coos County, New Hampshire by Granite Reliable Power, LLC. Prepared for Granite Reliable Power, LLC.
Laurel Mountain, Preston Cty, WV	Forested ridg	Sept. 12 - Dec. 1	24	147	769	12	5.2	(125 m) 65%	Stantec Consulting Services Inc. 2007. A Fall 2007 Radar, Visual, and Acoustic Survey of Bird and Bat Migration at the Proposed Laurel Mountain Wind Energy Project near Elkins, West Virginia. Prepared for AES Laurel Mountain, LLC.
Greenland, Grant Cty, WV	Forested ridg	Sept. 12 - Dec. 1	27		858	13	5.9	(125 m) 67%	Stantec Consulting Services Inc. 2008. A Fall 2007 Survey of Bird and Bat Migration at the New Creek Wind Project, West Virginia. Prepared for AES New Creek, LLC.
New Grange, Chautauqua Cty, NY	Forested ridge	Sept. 21 - Oct. 28	6	n/a	n/a	n/a	4.4	n/a	New York State Department of Environmental Conservation. 2008. Publicly Available Raptor Migration Data for Proposed Wind Sites in NYS. Available at http://www.dec.ny.gov/docs/wildlife_pdf/raptorwinsum. Accessed November 7, 2008.
Allegany, Cattaraugus Cty, NY	Forested ridge	Sept. 8 - Oct. 11	11	63.78	125	10	2.0	(150 m) 78%	New York State Department of Environmental Conservation. 2008. Publicly Available Raptor Migration Data for Proposed Wind Sites in NYS. Available at http://www.dec.ny.gov/docs/wildlife_pdf/raptorwinsum. Accessed November 7, 2008.
Fall 2008									
Moresville, Deleware Cty, NY	Forested ridg	Oct 14 - Dec 18	19	132	100	12	0.8	(125m) 74%	Stantec Consulting. 2009. 2008 Late-Fall Raptor Migration Survey Report. Prepared for Moresville Energy LLC.
Buckeye, Champaign Cty, OH	Forested ridg	Sept 1 - Nov 15	24	84	581	7	3.5	(150m) 93%	Stantec Consulting. 2009. Spring, Summer and Fall 2008 Bird and Bat Survey Report. Prepared for EverPower Wind Holdings, Inc.
Highland, Somerset Cty, ME	Forested ridge	Sept 3 to Oct 31	15	135	301	10	2.2	(128m) 43%	Stantec Consulting Services. 2009. Fall 2008 Bird and Bat Migration Survey Report: Radar and Acoustic Avian and Bat Surveys for the Highland Wind Project Highland Plantation, Maine. Prepared for Highland Wind LLC.
Fall 2009									
Granite Reliable Power, Coos County, NH (Dixville peak)	Forested ridge	Aug 27 to Oct 27	10	68.33	113	11	1.65	(125m) 76% (of those in project turbine areas)	Stantec Consulting Services Inc. 2009. Summary of Fall 2009 Raptor Survey Results at the Proposed Granite Reliable Power Project. Prepared for Noble Environmental Power.
Granite Reliable Power, Coos County, NH (Owl head mtn)	Forested ridge	Aug 27 to Oct 27	10	70	129	10	1.84	(125m) 82% (of those in project turbine areas)	Stantec Consulting Services Inc. 2009. Summary of Fall 2009 Raptor Survey Results at the Proposed Granite Reliable Power Project. Prepared for Noble Environmental Power.
Vermont Community Wind Farm, Orleans Cty, VT	Forested ridge	Sept 3 to Oct 23	10	77	83	12	1.08	(130m) 88%	Stantec Consulting. 2009. Fall 2009 Bird and Bat Survey Report: Nocturnal Radar, Acoustic, and Diurnal Raptor Surveys performed for the Vermont Community Wind Farm Project. Prepared for Vermont Community Wind Farm, LLC
Groton Wind, Grafton Cty, NH (Tenney ridge)	Forested ridge	Aug 24 to Oct 26	10	79	326	11	4.13	(121m) 58% (of those in project turbine areas)	Stantec Consulting Services Inc. 2009. 2009 Spring, Summer, and Fall Avian and Bat Surveys for the Groton Wind Project. Prepared for Groton Wind, LLC.
Groton Wind, Grafton Cty, NH (Crosby and Bald Mtns)	Forested ridge	Aug 24 to Oct 26	10	78	370	14	4.74	(121m) 79% (of those in project turbine areas)	Stantec Consulting Services Inc. 2009. 2009 Spring, Summer, and Fall Avian and Bat Surveys for the Groton Wind Project. Prepared for Groton Wind, LLC.
Stetson, Penobscot Cty, ME	Forested ridge	Sept 2 to Oct 14	8	50	45	11	0.9	n/a	Stantec Consulting. 2009. Stetson I Mountain Wind Project Year 1 Post-Construction Monitoring Report, 2009. Prepared for First Wind Management, LLC
Bowers, Washington Cty, ME	Forested ridge	Sept 9 to Oct 14	15	105	95	9	0.9	(119m) 69%	Stantec Consulting. 2009. Fall 2009 Avian and Bat Surveys for the Bowers Wind Project in Washington County, Maine. Prepared for Champlain Wind Energy, LLC.
Bull Hill, Hancock Cty, ME	Forested ridge	Sept 2 to Oct 14	12	87	124	11	1.43	(145m) 98%	Stantec Consulting. 2009. Summer and Fall 2009 Avian and Bat Survey Report for the Bull Hill Project in T16 MD, Maine. Prepared for Blue Sky East Wind, LLC.
Fall 2010									
Bingham, Somerset Cty, ME (Kingsbury Ridge)	Forested ridge	Sept 2 to Oct 13	12	84	57	11	0.68	(150m) 85% (of those in project turbine areas)	Stantec Consulting Services Inc. 2010. 2010 Spring Avian and Spring/Summer Bat Surveys for the Bowers Wind Project. Prepared for Champlain Wind Energy, LLC.
Bingham, Somerset Cty, ME (Johnson Ridge)	Forested ridge	Sept 2 to Oct 13	5	35	61	9	1.74	(150m) 92% (of those in project turbine areas)	Stantec Consulting Services Inc. 2010. 2010 Spring Avian and Spring/Summer Bat Surveys for the Bowers Wind Project. Prepared for Champlain Wind Energy, LLC.
Highland Wind Project, Cambria Cty, PA	Mined Ridgeline	Sept 10 to Dect 15	55	404	327	13	0.81	(125m) 91% (of those in project turbine areas)**	Stantec Consulting Services Inc. 2010. 2010 Avian Survey Report for the Highland Wind Project. Prepared for Krayn Wind LLC.
Fall 2011									
Timbertop, Hillsborough, NH	Forested ridge	8/24 - 11/1	10	68	639	11	9.4	(125m) 27% of those in Project boundary	*this report*

*Non-migrants were not included in seasonal passage rates in NYSDEC 2008 table but were included in passage rates here.

~Surveys were conducted simultaneously by 2 observers at 2 survey locations; however, results are combined for both sites which inflates the number of raptors observed for this site.

**Calculated within this table from the data within the report

ATTACHMENT 4

SYSTEM IMPACT STUDY

Public Service of New Hampshire

PSNH Energy Park
780 North Commercial Street, Manchester, NH 03101

Public Service Company of New Hampshire
P.O. Box 330
Manchester, NH 03105-0330
(603) 669-4000
www.psnh.com

The Northeast Utilities System

April 25, 2012

Stojan Nikolov
Project Manager – Transmission Planning Group
ISO New England, Inc
1 Sullivan Road, Holyoke, MA 01040-2751

Subject: Distribution System Impact Study – Timbertop Wind (16.1 MW) – QP #368

Mr. Nikolov,

Public Service of New Hampshire (PSNH) has completed the distribution system impact study for the subject facility in accordance with the Interconnection System Impact Study Agreement executed August 24, 2011.

Provided with this cover letter are two attachments which document the study results:

1) A report titled "PSNH Distribution System Impact Study – 16.1 MW - IPP 262 Timbertop Wind", dated April 20, 2012 that was prepared by the PSNH System Planning & Strategy department. This report identified a number of PSNH system upgrades that will be required in order to interconnection this facility. The budgetary estimate for these upgrades is $3.3 million.

2) A report titled "PSNH Impact Study Report for Customer Generation Distribution Protection and Control Aspects Only", dated April 19, 2012 that was prepared by the PSNH Protection & Controls Engineering department. This report provides a $0.71 million budgetary estimate of the major protective equipment that will be required to provide for feasible interconnection of the proposed facility. This $0.71 million is in addition to the $3.3 million noted above.

All cost estimates provided in these reports are preliminary and non-binding and were developed using typical equipment and construction cost benchmarks. Detailed estimates can be prepared at the appropriate time in the interconnection process.

Note: an additional distribution interconnection facilities study will be required should the developer elect to move forward. The facilities study would evaluate in detail the impact of the proposed facility on the PSNH electrical distribution system including the protection and control design and configuration, interface transformer configuration, required upgrades to local PSNH facilities, metering and supervisory control and data acquisition (SCADA) requirements, and in some cases operating constraints.

When all studies have been completed an Interconnection Agreement will finalize and document the terms and conditions of interconnection. Those terms and conditions will include language that addresses the following:

- Distribution facilities are designed to serve customers. The full impact of a large-scale intermittent power resource on all aspects of circuit performance has not, and can not, be

completely analyzed using typical system planning and protection models. The project will be required to install disturbance monitoring equipment. To the extent the project is determined to be causing unanticipated interference with PSNH facilities or issues with customer power quality, the mitigation of same will be at the cost of the project owner.

- Distribution facilities are inherently less reliable than transmission facilities. The project owner must acknowledge and anticipate periods of circuit outages, both planned and unplanned. During such periods, PSNH will use Good Utility Practice to restore interconnection service. However, PSNH will not be liable for any facility costs including, but not limited to, reduced project revenues related to these outage events.

- PSNH operates, maintains, and restores distribution facilities in order to optimize service to our customers. In some situations, this may require switching operations that reconfigure power flows. This may be for extended periods of time. During these periods of reconfiguration, the project may be subject to curtailments (i.e. operating restrictions or disconnection).

Please contact me with any questions.

Sincerely,

Michael D. Motta – Senior Engineer
PSNH Supplemental Energy Sources

Public Service of New Hampshire
The Northeast Utilities System

Intra Company Memo

From: Steven D. Hall
X720-3211

Date: April 20, 2012

Subject: PSNH Distribution System Impact Study
IPP 262 Timbertop Wind

To: Russel D. Johnson

cc: James C. Eilenberger
Thelma J. Brown
Krista J. Butterfield
Mark F. Fraser
Richard C. Labrecque
Robert W. Mission
Dennis M. Mullen
Michael D. Motta
Marc W. Pilotte
Jeffery W. Smith
Dennis J. Western

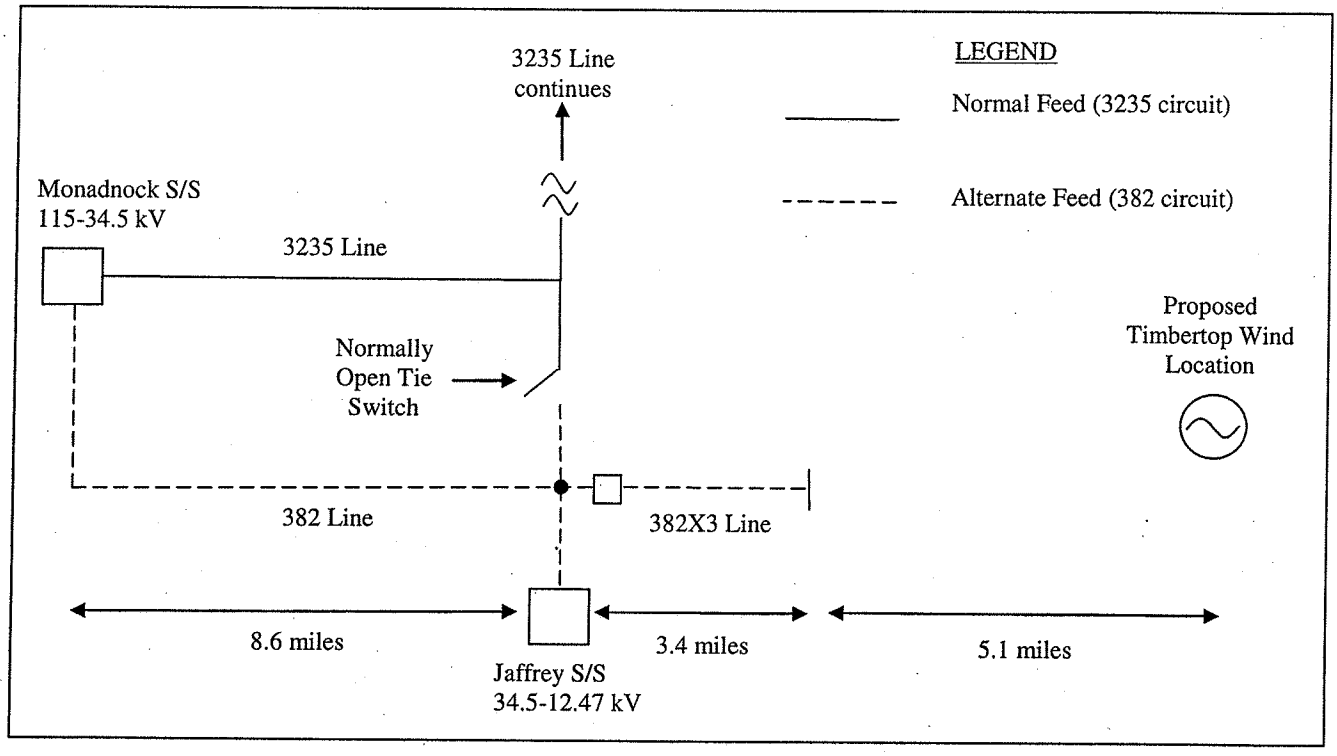
PSNH's System Planning and Strategy Department performed a Distribution System Impact Study for Independent Power Producer 262-Timbertop Wind. This study, based on initial data provided by the developer, is conducted to determine the impact and operating constraints for a proposed 16.1 MW (net) wind generation facility to be located in Temple, NH.

This report, based on a preliminary study performed on the PSNH 34.5kV distribution system, is intended to provide project feasibility and guidance for interconnection onto the PSNH distribution system. A more detailed interconnection study is required by PSNH to identify specific interconnection requirements based upon detailed project data provided by the developer.

Background:

The IPP interconnection point is requested on a new 34.5 kV line extension off the existing 3235 circuit, which is fed out of PSNH's Monadnock Substation. During rare contingent operation, the 3235 circuit can be alternatively fed from the 382 circuit, which is also fed out of PSNH's Monadnock Substation. Geographically, the IPP interconnection point will be at West Road in Temple, NH, which is located approximately 17.1 miles east of Monadnock Substation. See Figure 1 below for existing configuration of the PSNH system as described above (proposed Timbertop Wind location shown for reference).

Figure 1: Existing System Configuration



Power Technologies Inc.'s PSS/E 30.3 software was used for modeling PSNH's system and the interconnection. Steady state and transient analyses were performed on varying PSNH load levels to determine impact.

Steady state analysis is performed to verify that the proposed generation facility does not adversely affect system voltages or exceed thermal limits of the distribution system. PSNH is required by the New Hampshire Public Utilities Commission to maintain specific nominal customer voltages.

Transient analysis is performed to verify that the proposed generation facility does not adversely affect customer power quality. This is completed by studying the loss of the complete generating facility, simulating a sudden separation from the utility at the facility metering point (see Figure 2). This simulates the voltage fluctuation seen by customers on that system. To limit exposure to its customers from power quality problems caused by Independent Power Producers, PSNH allows no greater than a 3% voltage variation.

An IPP will increase or decrease line losses for PSNH based on its size and location. Line losses on the line between the generating facility's Delivery Point and the ISO/NE Transmission Node are examined in this study. A meter will be installed at the Delivery Point to determine the actual amount of power delivered to the system.

Assumptions:

The following assumptions were made in order to conduct this Distribution System Impact Study for IPP 262 Timbertop Wind:

1. The proposed IPP interconnection point will be at the end of a new 34.5 kV line extension (beginning on NH Route 124 near PSNH's Jaffrey Substation and ending at West Road in Temple), which will normally be fed from the 3235 circuit out of PSNH's Monadnock Substation but could alternatively be fed from the 382 circuit out of PSNH's Monadnock Substation during contingent operation.

2. The study is based on the projected 2013 peak and minimum load conditions.

3. For budgetary purposes, an estimate has been provided. This value is in addition to and separate from typical generation facility site requirements and equipment. This estimate is for budgetary purposes only; the results have not been engineered or designed. Note that additional system upgrades, beyond what is identified in this report, may be required based on the results of additional analysis (i.e. protection and transmission impact studies).

4. The generation facility requires machines with voltage control, remote fault ride-through, and equipment with state-of-the-art control capabilities.

Results:

Interconnection at West Road in Temple requires the following line construction for the new 34.5 kV line extension off the existing 3235 circuit:

1. Overbuild along Route 124 from Jaffrey Substation to just beyond the Jaffrey/Sharon town line (approximately 3.4 miles) with 477 kcmil aluminum spacer cable, bypassing PSNH's existing 382X3 circuit.

2. Build new line in existing gap (no electrical facilities presently exist) along Route 124 from just beyond the Jaffrey/Sharon town line to Swamp Road in Sharon (approximately 1.4 miles) with 477 kcmil aluminum spacer cable.

3. Rebuild existing line along Route 124 in Sharon between Swamp Road and Nashua Road (approximately 1.0 mile) with 477 kcmil aluminum spacer cable, integrating PSNH's existing customer load served directly off this line segment.

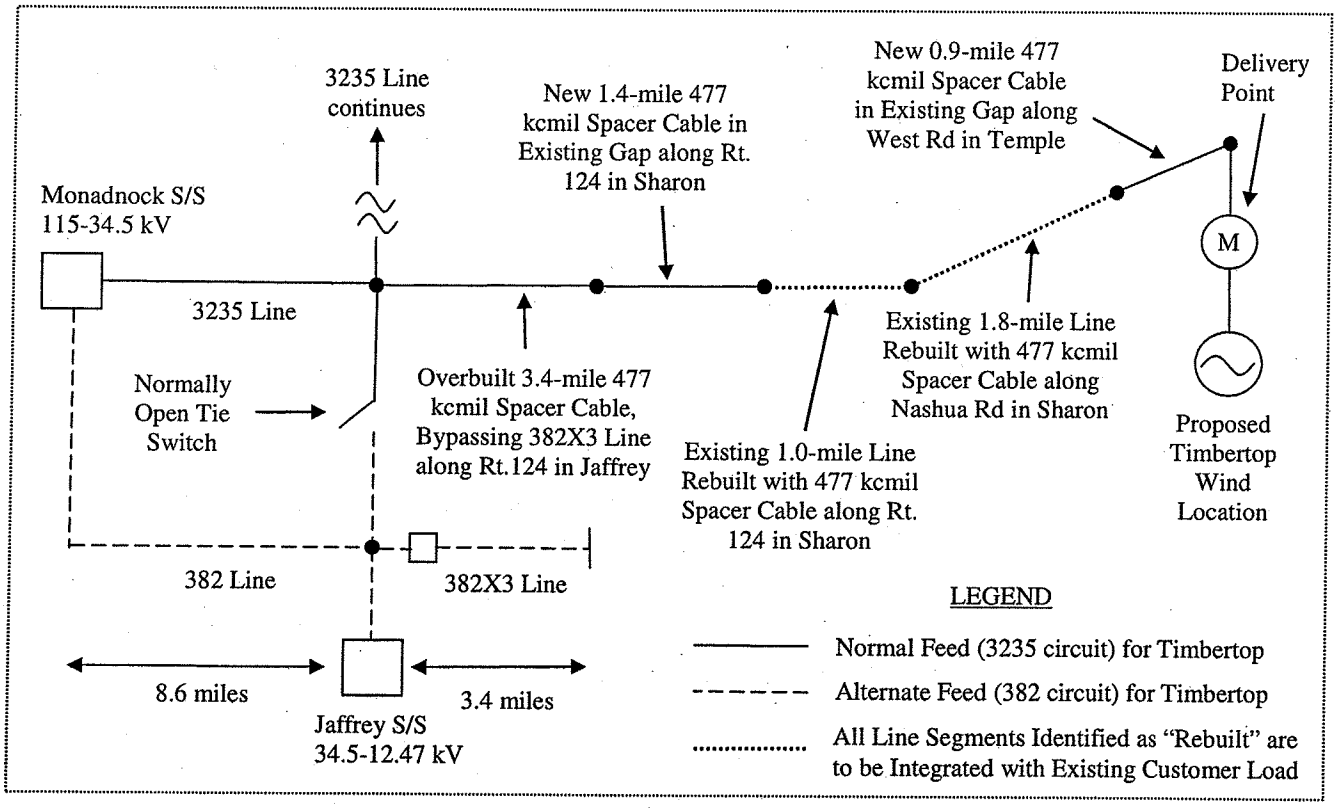
4. Rebuild existing line along Nashua Road in Sharon from Route 124 to existing end-of-line on West Road just beyond the Sharon/Temple town line (approximately 1.8 miles) with 477 kcmil aluminum spacer cable, integrating PSNH's existing customer load served directly off this line segment.

5. Build new line along West Road in Temple from existing end-of-line to proposed interconnection point for Timbertop Wind (approximately 0.9 miles) with 477 kcmil aluminum spacer cable.

Implementing these upgrades to PSNH's distribution system will result in a maximum allowable generation of 16.1 MW. See Figure 2 for system configuration with generator interconnection under this scenario.

The budgetary estimate for the aforementioned system upgrades is $3,300,000. This estimate is for budgetary purposes; the upgrades have not been engineered or designed. The actual cost and ultimately the successful construction of the new line along the path described above is dependent upon the development of a workable design, obtaining all licenses and permits required by local, state and federal agencies, and the granting of adequate construction trimming permissions.

Figure 2: System Configuration for Generator Interconnection



The interconnection shall not interfere with PSNH's requirement to maintain system voltage levels in accordance with New Hampshire Public Utilities Commission (NHPUC) Rules. In order to accomplish this, an automatic voltage controlled set point of 102.5 % shall be scheduled at the delivery point. The generation facility shall have enough regulation capacity to produce or absorb VARS to hold the scheduled voltage. The generator control system shall maintain the system operating voltage at the delivery point between 101.5 % and 103.5 % of nominal voltage under normal operating conditions. If Timbertop Wind is not able to maintain the system operating voltage as described, PSNH reserves the right to require system enhancements at the generator's expense. The results of the loadflow study, although identifying a calculated power factor requirement of 0.98 leading under certain system

conditions, shall only be used as a guide to predict system response. Actual system performance shall be verified when the installation has been completed.

Reduced transformer and line losses will be incurred by PSNH when the generation output of Timbertop Wind is less than 7.2 MW. However, increased transformer and line losses will be incurred by PSNH when the generation output of Timbertop Wind exceeds 7.2 MW. For the purposes of this study, the Delivery Point is at the 34.5 kV side of the generation facility terminals (see Figure 2) while the net generation input is at the 115 kV ISO-NE Transmission Node at PSNH's Monadnock Substation. Below is a chart indicating the approximate impact of losses at varying generation levels. For each MW measured at the Delivery Point, the generation input experienced at the ISO-NE Transmission Node will be the generator MW multiplied by the generation Loss Adjustment Factor.

Chart 1: Loss Evaluation

Generator Level	Approximate Loss Adjustment
4.0 MW	1.0090
7.2 MW	1.0000
8.0 MW	0.9976
12.0 MW	0.9863
16.1 MW	0.9747

This study is based upon initial data provided by the developer. The results stated above have not been engineered nor designed; therefore, this Distribution System Impact Study shall only be used for project feasibility and guidance. A more detailed interconnection study is required by PSNH to identify specific interconnection requirements based upon detailed project data provided by the developer.

Finally, this is a 34.5kV distribution system impact study only. PSNH did not study any possible transmission issues, as that is not considered part of an impact analysis for a distribution interconnection. The findings in this distribution study are contingent upon review by the transmission provider. The developer will need to arrange for a separate transmission study to determine the impact of the generation on the transmission system. It should be noted that, at light load periods, the Timbertop Wind generation will exceed local load served by Monadnock Substation and will be exporting to the transmission system.

PSNH Impact Study Report for Customer Generation Distribution Protection and Control Aspects Only

Timbertop Wind - SESD #262

By
PSNH Distribution Protection and Controls Engineering
April 19, 2012

A. Introduction

A study has been performed to determine the protection and control impact of interfacing the proposed generation facility at the location specified by the developer. This study was intended to identify any major protection and control issues as well as to identify the higher cost protection and control upgrades necessary to properly interface the proposed facility. The study was limited to evaluating the impact that the proposed generation would have on the PSNH distribution system only.

This study was based upon initial, tentative data provided by the developer. The results have been neither engineered nor designed, therefore, this Impact Study shall be used only for project feasibility and guidance. No attempt has been made to provide detailed PSNH requirements for this interconnection. A more detailed Interconnection Study is required by PSNH to identify such detailed requirements based upon final project data provided by the developer and the developer's authorization to proceed with such an analysis.

All related costs for materials, labor, engineering and administration, whether at the Timbertop site or remote from Timbertop, are the responsibility of the developer.

B. Description of Proposed Facilities

An approximate 16.1 MW wind generating facility is proposed to be located primarily in Temple, New Hampshire.

C. Study Assumptions – Primary Interconnection

The following description expands the results of the study done by the PSNH System Planning and Strategy department to include a summary of the primary equipment required for system protection and control.

All fault study electrical data for the site was based on technical data received from the developer on March 12, 2012. Any significant changes in the technical data could change some of the conclusions described in this impact study.

1. A new distribution line will be constructed beginning at a new tap point of the PSNH 3235 line near Jaffrey, NH. At the tap point, a new fault sensing and interrupting device, recloser "A", will be installed. Present plans are for this device to be a G&W Viper recloser paired with a SEL 651R control.
2. From the tap point to the Timbertop generation site, a 34.5 KV distribution line will be constructed. It will be approximately 8.5 miles long and will use 477 aluminum spacer cable.
3. Another fault interrupting device, recloser "B", will be required in the existing 3235/313 line, tentatively just beyond the existing 313X2 tap. This is required to resolve fault sensitivity requirements of the 3235 relaying with infeed from the Timbertop generation and grounding bank.
4. At the Timbertop location, a 34.5 KV interrupting device (52M) will be required on the line coming in from PSNH, with dedicated protective relaying described later in this document.

A Transmission P&CE impact review will also be conducted by PSNH Transmission Protection and Controls Engineering.

D. Study Methodology

The proposed facility and all system modifications listed in Section C. were modeled in the PSNH system base case Aspen OneLiner short circuit and system protection analysis program model. Simulations were then performed for the normal all-in system configuration as well as credible contingent system arrangements. Impacts of the proposed site on existing short circuit interrupting devices and existing protection schemes were then evaluated. No attempt was made to perform a detailed coordination study on all elements. Instead, the intent of the effort was to identify any protection and control issues which could preclude the installation of Timbertop Wind as well as to identify the likely high cost PSNH protection and control system modifications necessary to interface the proposed facility. This analysis was then used to provide high level estimates for the installed cost of protection and control equipment required remote from the Timbertop Wind site to allow the proposed facility to be properly integrated into the PSNH

grid. In the event that this project moves forward, the costs of any and all such equipment ultimately required will be the responsibility of the developer of this site.

E. Protection and Control Results Remote From The Timbertop Site

1. Based on the upgrades in section "C", no circuit breakers or reclosers were found to be above their interrupting rating.

2. With the upgrades summarized in section "C", and outlined in the attached one-line diagram SK-PCM-262-2, no other distribution protection and control issues were identified which would preclude the installation and operation of the proposed facility. This presumes, however, that relay and control systems as described below are installed.

3. Related to the new recloser "B" just beyond the 313X2 tap, preliminary site data and the resulting impact analysis suggests that the existing electromechanical relaying on 3235 at Monadnock might not have the required setting flexibility, even with the new recloser. As a result, this impact study will include the tentative cost of replacing the existing 3235 relaying. Final determination of this requirement will depend on the final site design and the resulting detailed setting analysis.

4. Direct transfer trip will be required from Monadnock S/S to Timbertop Wind main interrupting device 52M. The cost at Monadnock S/S for the transfer trip terminal addition on breakers 3235, 382, and 3120 will be estimated as a conceptual level estimate supplied for planning purposes only, and assumes a single transfer trip system which can be switched from 3235 (base case) to either 382 or 3120 breakers when required for contingency operation.

5. A direct transfer trip transmitter will also be required from Viper recloser "A" to trip the Timbertop main breaker 52M.

6. The process of preparing the detailed Interconnection Report for this site may identify additional PSNH system modifications required to interface and operate the site.

F. Minimum Requirements at the Timbertop Site

1. As shown on the attached one-line diagram, a main interrupting device (52M), either a circuit breaker or recloser will be required at the beginning of the developer's bus where it attaches to the PSNH circuit.

2. In addition to its own protection, independent relaying and controls will be required on 52M to detect events on the PSNH system. These must be independent and dedicated for use as specified by PSNH.

- Time overvoltage (59)
- Time undervoltage (27)
- Time overfrequency (81O)
- Time underfrequency (81U)
- Voltage-controlled (not voltage-restrained) time overcurrent (51V) with appropriate phase angle correction to control voltage.
- Ground time overcurrent (51N) sensing at the 34.5 KV level.
- Long-term system time overvoltage protection (59L). This device requires a very high dropout/pickup ratio and will be configured to trip all site generation.

These elements are typical, and further requirements could result from the formal interconnection study.

3. Transfer trip receiver terminals, associated with the transmitters at Monadnock and with Viper recloser "A", will be required at the Timbertop generating facility to trip 52M. The receivers and the required communication line (including continuing channel costs and maintenance) between the remote transmitters and the proposed generating plant will also be the developer's responsibility.

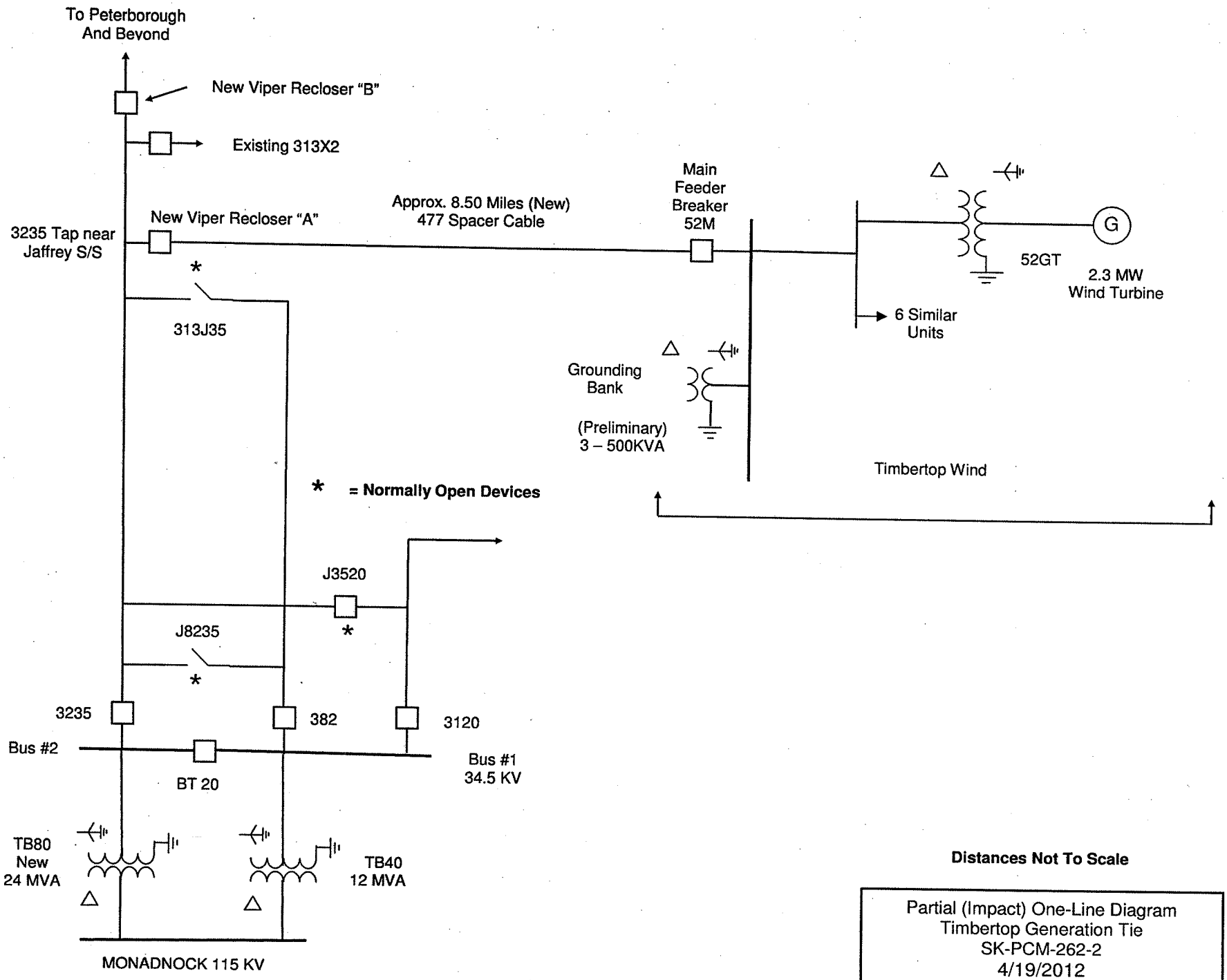
4. A supervisory control RTU will be required at Timbertop along with a communication line to the PSNH Control Center in Manchester, NH. The purchase and maintenance of both items will be the developer's responsibility.

5. PSNH engineering, review of drawings, as well as the development of any settings for the above will be required.

Costs

The following are rough order of magnitude cost estimates which were determined only for protection and control requirements remote from the Timbertop site. More accurate costs will be developed as part of the Final Interconnection Study should one be authorized by the developer.

- Transfer trip from Monadnock S/S:	$150,000
- Possible Monadnock 3235 relaying replacement:	$180,000
- Viper "A" With Transfer trip transmitter:	$300,000
- Viper "B":	$80,000
Estimated P&CE Total:	$710,000



Distances Not To Scale

Partial (Impact) One-Line Diagram
Timbertop Generation Tie
SK-PCM-262-2
4/19/2012

ISO new england

Stojan Nikolov
Project Manager

August 22, 2012

Mr. Adam Cohen
Pioneer Green Energy, LLC
1802 Lavaca Street, Suite 200
Austin, TX 78701

Dear Adam:

I am enclosing one copy of the Facility Study Agreement for the Timbertop Wind I Project, which you can keep for your records, and three copies of the signature page. Please execute all copies of the signature page and return them to me along with all of the necessary data to initiate the study and the study deposit in the amount of $50,000 by September 21, 2012.

We have estimated that the study will cost $145,000 in total. This includes the costs of ISO New England and its consultants who will perform the study. It also includes the costs of NU to provide input to the study and review results.

Tentative Payment Schedule:		
2nd Payment	due 10/22/12:	$35,000
3rd Payment	due 11/21/12:	$30,000
4th Payment	due 12/24/12:	$30,000
Total (without deposit)		$95,000
Total Study Cost (including $50,000 deposit)		$145,000

We have estimated that a draft study report will be available to you approximately six months after study initiation. This requires you have executed the study agreement, provided the study deposit, and provided all required data to initiate the effort by September 21, 2012.

If you have any questions concerning the above information, please contact me.

Sincerely,

Stojan Nikolov
Project Manager

Enclosure

ISO New England Inc.
One Sullivan Road, Holyoke, MA 01040-2841
www.iso-ne.com T 413 540 4796 F 413 540 4203

Attachment 8

Interconnection Facilities Study Agreement

THIS AGREEMENT is made and entered into this _____day of_____2012 by and between Timbertop Wind I, LLC, a company organized and existing under the laws of the State of Texas, ("Interconnection Customer,") and ISO New England Inc., a non-stock corporation existing under the laws of the State of Delaware ("System Operator"), and Northeast Utilities Service Company (NUSCO), on behalf of Public Service Company of New Hampshire, ("Interconnecting Transmission Owner"). Interconnection Customer, System Operator and Interconnecting Transmission Owner each may be referred to as a "Party," or collectively as the "Parties."

RECITALS

WHEREAS, the Interconnection Customer is proposing to develop a Small Generating Facility or generating capacity addition to an existing Small Generating Facility consistent with the Interconnection Request completed by the Interconnection Customer on June 13, 2011; and

WHEREAS, the Interconnection Customer desires to interconnect the Small Generating Facility with the Administered Transmission System;

WHEREAS, the System Operator and Interconnecting Transmission Owner have completed an Interconnection System Impact Study and provided the results of said study to the Interconnection Customer; and

WHEREAS, the Interconnection Customer has requested the System Operator and Interconnecting Transmission Owner to perform an Interconnection Facilities Study to specify and estimate the cost of the equipment, engineering, procurement and construction work needed to implement the conclusions of the Interconnection System Impact Study in accordance with Good Utility Practice to physically and electrically connect the Small Generating Facility with the facilities that are part of the Interconnecting Transmission Owner's Administered Transmission System.

NOW, THEREFORE, in consideration of and subject to the mutual covenants contained herein the Parties agreed as follows:

1.0 When used in this Agreement, with initial capitalization, the terms specified shall have the meanings indicated or the meanings specified in the standard Small Generator Interconnection Procedures, or in the other provisions of the ISO New England Inc. Transmission, Markets and Services Tariff (the "Tariff").

2.0 The Interconnection Customer elects and the System Operator and Interconnecting Transmission Owner shall cause an Interconnection Facilities Study consistent with the standard Small Generator Interconnection Procedures to be performed in accordance with the Open Access Transmission Tariff.

3.0 The scope of the Interconnection Facilities Study shall be subject to data provided in

Attachment A to this Agreement.

4.0 The Interconnection Facilities Study shall specify and estimate the cost of the equipment, engineering, procurement and construction work (including overheads) needed to implement the conclusions of the Interconnection System Impact Study(s). The Interconnection Facilities Study shall also identify (1) the electrical switching configuration of the equipment, including, without limitation, transformer, switchgear, meters, and other station equipment, (2) the nature and estimated cost of the Interconnecting Transmission Owner's Interconnection Facilities and Upgrades necessary to accomplish the interconnection, and (3) an estimate of the time required to complete the construction and installation of such facilities.

5.0 The System Operator and Interconnecting Transmission Owner may propose to group facilities required for more than one Interconnection Customer in order to minimize facilities costs through economies of scale, but any Interconnection Customer may require the installation of facilities required for its own Small Generating Facility if it is willing to pay the costs of those facilities.

6.0 A deposit, paid to the System Operator, of the good faith estimated Interconnection Facilities Study costs shall be required from the Interconnection Customer.

7.0 In cases where Upgrades are required, the Interconnection Facilities Study must be completed within 45 Business Days of the receipt of this Agreement. In cases where no Upgrades are necessary, and the required facilities are limited to Interconnection Facilities, the Interconnection Facilities Study must be completed within 30 Business Days. The Interconnecting Transmission Owner has estimated that it will take six months to complete the Facility Study.

8.0 Once the Interconnection Facilities Study is completed, an Interconnection Facilities Study report shall be prepared and transmitted to the Interconnection Customer. Barring unusual circumstances, the Interconnection Facilities Study must be completed and the Interconnection Facilities Study report transmitted within 30 Business Days of the Interconnection Customer's agreement to conduct an Interconnection Facilities Study.

9.0 The total estimated cost of the performance of the Interconnection Facility Study consists of $ 145,000, which is comprised of the System Operator's cost of $18,000 and the Interconnecting Transmission Owner's cost of $127,000. The Interconnection Customer may be invoiced on a monthly basis for work to be conducted.

10.0 The Interconnection Customer must pay any study costs that exceed the deposit without interest within 30 calendar days on receipt of the invoice or resolution of any dispute. If the deposit exceeds the invoiced fees, the System Operator or Interconnecting Transmission Owner, as applicable, shall refund such excess within 30 calendar days of the invoice without interest.

11.0 Miscellaneous.

11.1 Accuracy of Information. Except as a Party ("Providing Party") may otherwise specify in writing when it provides information to the other Parties under this

Agreement, the Providing Party represents and warrants that, to the best of its knowledge, the information it provides to the other Parties shall be accurate and complete as of the date the information is provided. The Providing Party shall promptly provide the other Parties with any additional information needed to update information previously provided.

11.2 Disclaimer of Warranty. In preparing and/or participating in the Interconnection Facilities Study, as applicable, each Party and any subcontractor consultants employed by it shall have to rely on information provided by the Providing Party, and possibly by third parties, and may not have control over the accuracy of such information. Accordingly, beyond the commitment to use Reasonable Efforts in preparing and/or participating in the Interconnection Facilities Study (including, but not limited to, exercise of Good Utility Practice in verifying the accuracy of information provided for or used in the Interconnection Facilities Study), as applicable, no Party nor any subcontractor consultant employed by it makes any warranties, express or implied, whether arising by operation of law, course of performance or dealing, custom, usage in the trade or profession, or otherwise, including without limitation implied warranties of merchantability and fitness for a particular purpose, with regard to the accuracy of the information considered in conducting the Interconnection Facilities Study, the content of the Interconnection Facilities Study, or the conclusions of the Interconnection Facilities Study. Interconnection Customer acknowledges that it has not relied on any representations or warranties not specifically set forth herein and that no such representations or warranties have formed the basis of its bargain hereunder.

11.2 Force Majeure, Liability and Indemnification.

11.3.1 Force Majeure. Neither System Operator, Interconnecting Transmission Owner nor an Interconnection Customer will be considered in default as to any obligation under this Agreement if prevented from fulfilling the obligation due to an event of Force Majeure; provided that no event of Force Majeure affecting any entity shall excuse that entity from making any payment that it is obligated to make hereunder. However, an entity whose performance under this Agreement is hindered by an event of Force Majeure shall make all Reasonable Efforts to perform its obligations under this Agreement, and shall promptly notify the System Operator, the Interconnecting Transmission Owner or the Interconnection Customer, whichever is appropriate, of the commencement and end of each event of Force Majeure.

11.3.2 Liability. System Operator shall not be liable for money damages or other compensation to the Interconnection Customer for action or omissions by System Operator in performing its obligations under this Agreement, except to the extent such act or omission by System Operator is found to result from its gross negligence or willful misconduct. Interconnecting Transmission Owner shall not be liable for money damages or other compensation to the Interconnection Customer for action or omissions by

Interconnecting Transmission Owner in performing its obligations under this Agreement, except to the extent such act or omission by Interconnecting Transmission Owner is found to result from its gross negligence or willful misconduct. To the extent the Interconnection Customer has claims against System Operator or Interconnecting Transmission Owner, the Interconnection Customer may only look to the assets of System Operator or Interconnecting Transmission Owner (as the case may be) for the enforcement of such claims and may not seek to enforce any claims against the directors, members, shareholders, officers, employees or agents of System Operator or Interconnecting Transmission Owner or Affiliate of either who, the Interconnection Customer acknowledges and agrees, have no personal or other liability for obligations of System Operator or Interconnecting Transmission Owner by reason of their status as directors, members, shareholders, officers, employees or agents of System Operator or Interconnecting Transmission Owner or Affiliate of either. In no event shall System Operator, Interconnecting Transmission Owner or Interconnection Customer be liable for any incidental, consequential, multiple or punitive damages, loss of revenues or profits, attorneys fees or costs arising out of, or connected in any way with the performance or non-performance under this Agreement. Notwithstanding the foregoing, nothing in this section shall diminish an Interconnection Customer's obligations under the Indemnification section below.

11.3.3 Indemnification. Interconnection Customer shall at all times indemnify, defend, and save harmless System Operator and the Interconnecting Transmission Owner and their respective directors, officers, members, employees and agents from any and all damages, losses, claims and liabilities ("Losses") by or to third parties arising out of or resulting from the performance by System Operator or Interconnecting Transmission Owner under this Agreement, any bankruptcy filings made by the Interconnection Customer, or the actions or omissions of the Interconnection Customer in connection with this Agreement, except in the case of System Operator, to the extent such Losses arise from the gross negligence or willful misconduct by System Operator or its directors, officers, members, employees or agents, and, in the case of Interconnecting Transmission Owner, to the extent such Losses arise from the gross negligence or willful misconduct by Interconnecting Transmission Owner or its directors, officers, members, employees or agents. The amount of any indemnity payment hereunder shall be reduced (including, without limitation, retroactively) by any insurance proceeds or other amounts actually recovered by the indemnified party in respect of the indemnified action, claim, demand, cost, damage or liability. The obligations of Interconnection Customer to indemnify System Operator and Interconnecting Transmission Owner shall be several, and not joint or joint and several. The liability provisions of the Transmission Operating Agreement ("TOA") or other applicable operating agreements shall apply

to the relationship between the System Operator and the Interconnecting Transmission Owner.

11.4 Third-Party Beneficiaries. This Agreement is not intended to and does not create rights, remedies, or benefits of any character whatsoever in favor of any persons, corporations, associations, or entities other than the Parties, and the obligations herein assumed are solely for the use and benefit of the Parties, their successors in interest and where permitted, their assigns. Notwithstanding the foregoing, and without limitation of Sections 11.2 and 11.3 of this Agreement, the Parties agree that subcontractor consultants hired by them to conduct, participate in, or review, or to assist in the conducting, participating in, or reviewing of, an Interconnection Facilities Study shall not be deemed third party beneficiaries of Sections 11.2 and 11.3.

11.5 Term and Termination. This Agreement shall be effective from the date hereof and unless earlier terminated in accordance with this Section 11.5, shall continue in effect for a term of one year or until the Interconnection Facilities Study is completed. This Agreement shall automatically terminate upon the withdrawal of Interconnection Request under Section 1.8 of the SGIP. The System Operator or the Interconnecting Transmission Owner may terminate this Agreement fifteen (15) days after providing written notice to the Interconnection Customer that it has breached one of its obligations hereunder, if the breach has not been cured within such fifteen (15) day period.

11.6 Governing Law, Regulatory Authority, and Rules. The validity, interpretation and enforcement of this Agreement and each of its provisions shall be governed by the laws of the state of New Hampshire (where the Point of Interconnection is located), without regard to its conflicts of law principles. This Agreement is subject to all Applicable Laws and Regulations. Each Party expressly reserves the right to seek changes in, appeal, or otherwise contest any laws, orders, or regulations of a Governmental Authority.

11.7 Severability. If any provision or portion of this Agreement shall for any reason be held or adjudged to be invalid or illegal or unenforceable by any court of competent jurisdiction or other Governmental Authority: (1) such portion or provision shall be deemed separate and independent; (2) the Parties shall negotiate in good faith to restore insofar as practicable the benefits to each Party that were affected by such ruling; and (3) the remainder of this Agreement shall remain in full force and effect.

11.8 Counterparts. This Agreement may be executed in counterparts, and each counterpart shall have the same force and effect as the original instrument.

11.9 Amendment. No amendment, modification or waiver of any term hereof shall be effective unless set forth in writing and signed by the Parties hereto.

11.10 Survival. All warranties, limitations of liability and confidentiality provisions provided herein shall survive the expiration or termination hereof.

11.11 No Partnership. This Agreement shall not be interpreted or construed to create an association, joint venture, agency relationship, or partnership between the Parties or to impose any partnership obligation or partnership liability upon either Party. Neither Party shall have any right, power or authority to enter into any agreement or undertaking for, or act on behalf of, or to act as or be an agent or representative of, or to otherwise bind, the other Party.

11.12 No Implied Waivers. The failure of a Party to insist upon or enforce strict performance of any of the provisions of this Agreement shall not be construed as a waiver or relinquishment to any extent of such Party's right to insist or rely on any such provision, rights and remedies in that or any other instance; rather, the same shall be and remain in full force and effect. Any waiver at any time by any Party of its rights with respect to this Agreement shall not be deemed a continuing waiver or a waiver with respect to any other failure to comply with any other obligation, right, duty of this Agreement. Termination or default of this Agreement for any reason by Interconnection Customer shall not constitute a waiver of the Interconnection Customer's legal rights to obtain an interconnection from the System Operator and the Interconnecting Transmission Owner. Any waiver of this Agreement shall, if requested, be provided in writing.

11.13 Successors and Assigns. This Agreement may not be assigned, by operation of law or otherwise, without the prior written consent of the other Parties hereto, such consent not to be unreasonably withheld. Notwithstanding the foregoing, this Agreement, and each and every term and condition hereof, shall be binding upon and inure to the benefit of the Parties hereto and their respective successors and assigns, to the extent the same are authorized hereunder.

11.14 Due Authorization. Each Party to this Agreement represents and warrants that it has full power and authority to enter into this Agreement and to perform its obligations hereunder, that execution of this Agreement will not violate any other agreement with a third party, and that the person signing this Agreement on its behalf has been properly authorized and empowered to enter into this Agreement.

11.15 Subcontractors. Nothing in this Agreement shall prevent a Party from utilizing the services of any subcontractor as it deems appropriate to perform its obligations under this Agreement; provided, however, that each Party shall 1require its subcontractors to comply with all applicable terms and conditions of this Agreement in providing such services and each Party shall remain primarily liable to the other Parties for the performance of such subcontractor.

11.15.1 The creation of any subcontract relationship shall not relieve the hiring Party of any of its obligations under this Agreement. The hiring Party shall be fully responsible to the other Parties for the acts or omissions of any subcontractor the hiring Party hires as if no subcontract had been made; provided, however, that in no event shall the System Operator or Interconnecting Transmission Owner be liable for the actions or inactions of the Interconnection Customer or its subcontractors with respect to

obligations of the Interconnection Customer under this Agreement. Any applicable obligation imposed by this Agreement upon the hiring Party shall be equally binding upon, and shall be construed as having application to, any subcontractor of such Party.

11.15.2 The obligations under this article will not be limited in any way by any limitation of subcontractor's insurance.

11.16 Reservation of Rights. Subject to the TOA, the System Operator and the Interconnecting Transmission Owner shall have the right to make a unilateral filing with the Commission to modify this Agreement with respect to any rates, terms and conditions, charges, classifications of service, rule or regulation under section 205 or any other applicable provision of the Federal Power Act and the Commission's rules and regulations thereunder, and the Interconnection Customer shall have the right to make a unilateral filing with the Commission to modify this Agreement under any applicable provision of the Federal Power Act and the Commission's rules and regulations; provided that each Party shall have the right to protest any such filing by the other Party and to participate fully in any proceeding before the Commission in which such modifications may be considered. Nothing in this Agreement shall limit the rights of the Parties or of the Commission under sections 205 or 206 of the Federal Power Act and the Commission's rules and regulations, except to the extent that the Parties otherwise agree as provided herein.

IN WITNESS WHEREOF, the Parties have caused this Agreement to be duly executed by their duly authorized officers or agents on the day and year first above written.

ISO New England Inc.	**Timbertop Wind I, LLC** **By: Pioneer Green Wind, LLC, Its Manager**
Signed_____	Signed_____
Name (Printed):_____	Name (Printed):_____
Title_____	Title_____
Date_____	Date _____

NUSCO on behalf of Public Service Company of New Hampshire

Signed_____

Name (Printed):_____

Title_____

Date_____

Attachment A to
Interconnection Facilities Study Agreement

Data to Be Provided by the Interconnection Customer
with the Interconnection Facilities Study Agreement

Provide location plan and simplified one-line diagram of the plant and station facilities. For staged projects, please indicate future generation, transmission circuits, etc.

On the one-line diagram, indicate the generation capacity attached at each metering location. (Maximum load on Current Transformer/Power Transformer ("CT/PT")

On the one-line diagram, indicate the location of auxiliary power. (Minimum load on CT/PT) Amps

One set of metering is required for each generation connection to the new ring bus or existing Transmission Provider station. Number of generation connections: _____

Will an alternate source of auxiliary power be available during CT/PT maintenance?
Yes _____ No _____

Will a transfer bus on the generation side of the metering require that each meter set be designed for the total plant generation? Yes _____ No _____
(Please indicate on the one-line diagram).

What type of control system or Power Line Carrier ("PLC") will be located at the Small Generating Facility?

_____

_____

What protocol does the control system or PLC use?

_____

_____

Please provide a 7.5-minute quadrangle map of the site. Indicate the plant, station, transmission line, and property lines.

Physical dimensions of the proposed interconnection station:

_____

Bus length from generation to interconnection station:

_____

Line length from interconnection station to Administered Transmission System.

_____

Tower number observed in the field. (Painted on tower leg)*:

_____

Number of third party easements required for transmission lines*:

_____

* To be completed in coordination with Transmission Provider.

Is the Small Generating Facility located in Transmission Provider's service area?

Yes _____ No _____ If No, please provide name of local provider:

_____

Please provide the following proposed schedule dates:

Begin Construction	Date:_____
Generator step-up transformers receive back feed power	Date:_____
Generation Testing	Date:_____
Commercial Operation	Date:_____

ATTACHMENT 5

MICROWAVE REPORT

Wind Power GeoPlanner™

Licensed Microwave Report

Timbertop Wind

Prepared on Behalf of
Timbertop Wind I, LLC

September 24, 2012

COMSEARCH
A CommScope Company

Table of Contents

1. Introduction

The use of wind energy, one of the oldest forms of harnessing a natural energy source, is now one of the world's fastest growing alternative energy sources. The United States is committed to the use of wind energy, and over the next several years billions of dollars will be spent on wind power projects. However, as new wind turbine generators are installed around the country, it is important to note that they may pose an interference threat to existing microwave systems and broadcast stations licensed to operate in the United States.

Wind turbines can interfere with microwave paths by physically blocking the line-of-sight between two microwave transmitters. Additionally, wind turbines have the potential to cause blockage and reflections ("ghosting") to television reception. Blockage is caused by the physical presence of the turbines between the television station and the reception points. Ghosting is caused by multipath interference that occurs when a broadcast signal reflects off of a large reflective object—in this case a wind turbine—and arrives at a television receiver delayed in time from the signal that arrives via direct path.

Many states and other jurisdictions recognize the need for regulations addressing interference to radio signal transmissions from the wind turbine installations. Specifically, local planning authorities typically require project developers to ensure wind turbines will not cause interference. In some cases they require developers to notify the telecommunication operators in the area of the proposed wind turbine installation. Other factors prompting developers to undertake proactive investigation into potential interference include the need to prevent legal and regulatory problems and the desire to promote goodwill within the community—a good neighbor approach.

Comsearch has developed and maintains comprehensive technical databases containing information on licensed microwave networks throughout the United States. Microwave bands that may be affected by the installation of wind turbine facilities operate over a wide frequency range (900 MHz – 23 GHz). These systems are the telecommunication backbone of the country, providing long-distance and local telephone service, backhaul for cellular and personal communication service, data interconnects for mainframe computers and the Internet, network controls for utilities and railroads, and various video services.

This report focuses on the potential impact of wind turbines on licensed non-federal government microwave systems. Comsearch provides additional wind energy services, a description of which is available upon request.

2. Summary of Results

A summary of results appears below.

Project Information

Name: Timbertop Wind

County: Hillsborough

State: New Hampshire

Total Microwave Paths	Paths with Obstructions	Total Turbines	Turbine Obstructions
0	0	N/A	N/A

Our obstruction analysis was performed using Comsearch's proprietary microwave database, which contains all non-government licensed paths from 0.9 - 23 GHz[1]. The first step is to determine all microwave paths that intersect the area of interest[2]. A depiction of the area of interest can be found in the Tables and Figures section, and is also included on the enclosed shapefiles[3]. In this case, Comsearch identified no microwave paths that intersect the project area. Thus, there are no potential obstructions at this time[4].

[1] Please note that this analysis does not include unlicensed microwave paths or federal government paths that are not registered with the FCC.

[2] We use FCC-licensed coordinates to determine which paths intersect the area of interest. It is possible that as-built coordinates may differ slightly from those on the FCC license.

[3] The ESRI® shapefiles enclosed are in NAD 83 UTM Zone 19 projected coordinate system.

[4] Comsearch makes no warranty as to the accuracy of the data included in this report beyond the date of the report. The data provided in this report is governed by Comsearch's data license notification and agreement located at http://www.comsearch.com/files/data_license.pdf.

3. Tables and Figures

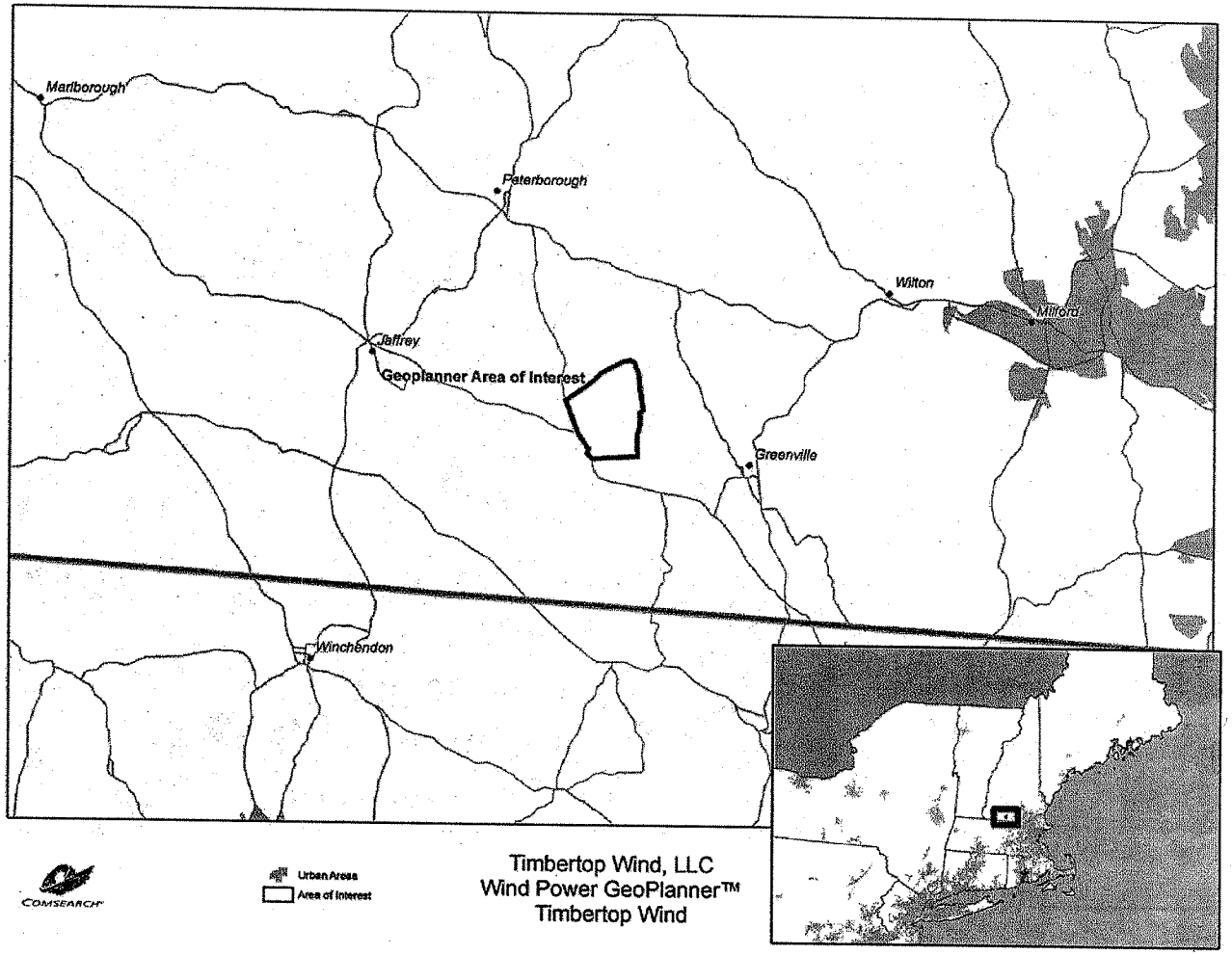


Figure 1: Area of Interest

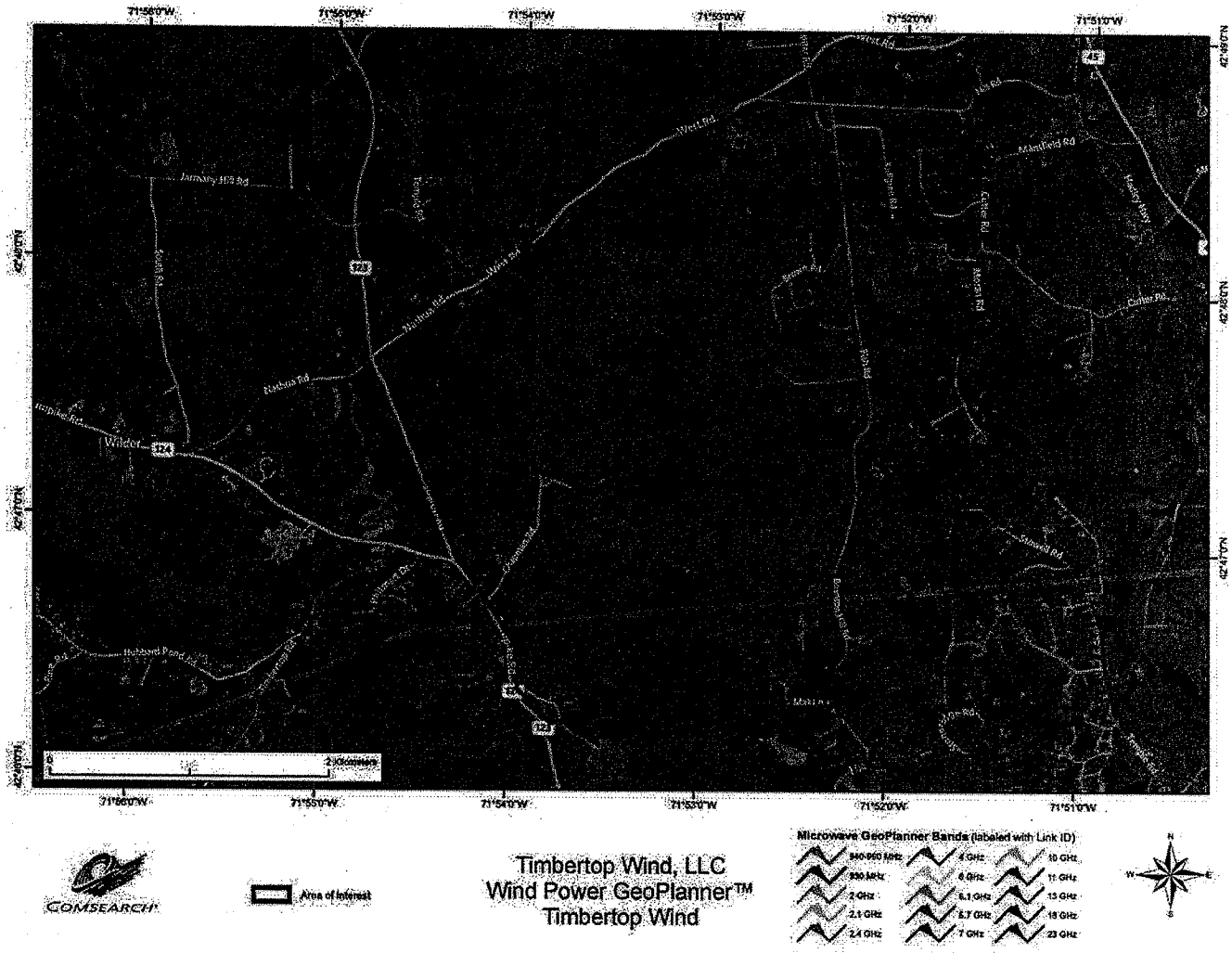


Figure 2: Area of Interest

4. Contact Us

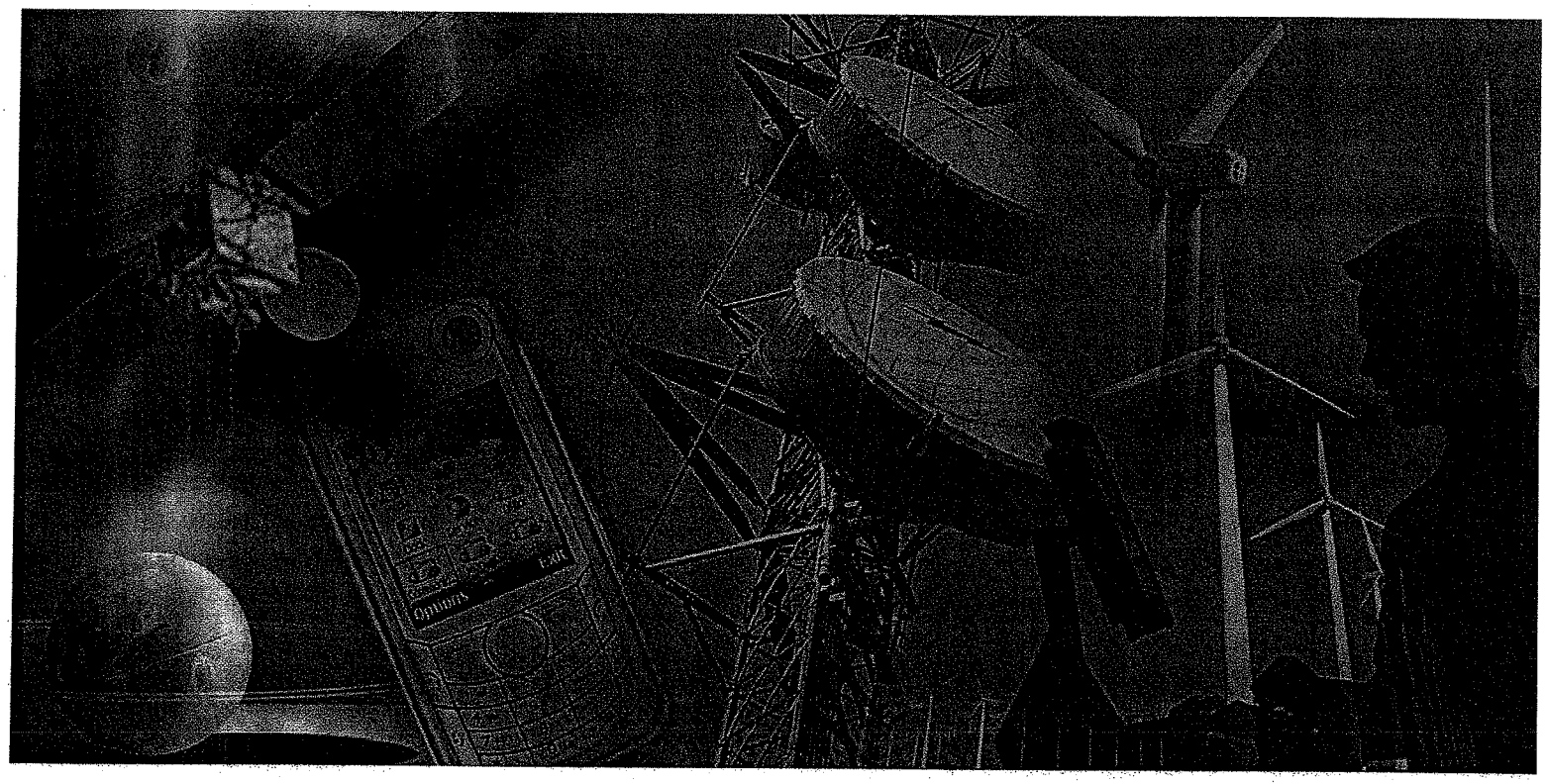
For questions or information regarding the Licensed Microwave Report, contact:

Contact person:	Denise Finney
Title:	Account Manager
Company:	Comsearch
Address:	19700 Janelia Farm Blvd., Ashburn, VA 20147
Telephone:	703-726-5650
Fax:	703-726-5595
Email:	dfinney@comsearch.com
Web site:	www.comsearch.com

Wind Power GeoPlanner™

Land Mobile Report

Timbertop



Prepared on Behalf of
Pioneer Green

January 8, 2013

COMSEARCH
A CommScope Company

Table of Contents

1. Introduction

Comsearch compiles and provides information on land mobile sites identified within or near a defined area of interest related to proposed wind energy facilities. This information is useful in the planning stages of the wind energy facilities to identify fixed land mobile stations where critical telecommunication services are provided such as emergency response (police, fire, 911, etc.), public safety and local government communications, and industrial and business wireless radio operations. This data can be used in support of the wind energy facilities communications needs or to avoid any potential impact to the current land mobile services provided in that region.

2. Summary of Results

Methodology

Our land mobile report is derived from the FCC's Universal Licensing System (ULS). The data is imported into GIS software and the land mobile sites are geographically mapped with the wind energy area of interest defined by the customer. Each site on the map is identified by an ID number associated with site information provided in a data table.

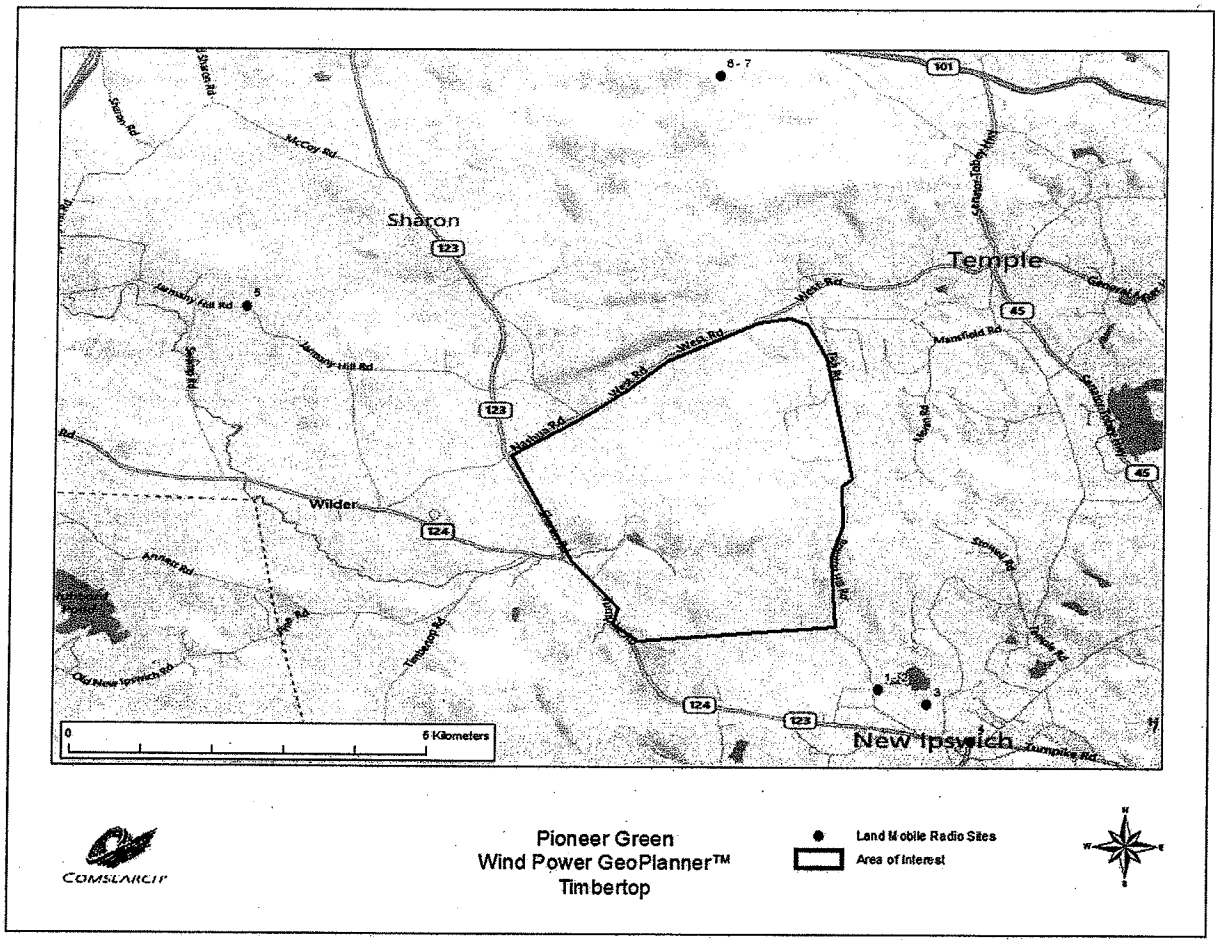


Figure 1: Land Mobile Sites in the Area of Interest

Results

Figure 1 identifies seven land mobile sites near the wind energy project area of interest using the data sources described in our methodology above. Specific information about these sites is provided in Table 1, including location coordinates, frequency band, antenna height above ground level, and licensee name.

ID	Call Sign	Frequency Band (MHz)	Licensee	Antenna Height AGL (m)	City/State	Latitude (NAD83)	Longitude (NAD83)	Distance to Center of AOI (km)
1	WQBA994	25-50, 150-174	New Ipswich, Town of	27.4	New Ipswich, NH	42.764889	-71.865639	3.25
2	WQLB470	150-174	New Ipswich Highway Dept	30.5	New Ipswich, NH	42.764889	-71.865639	3.25
3	WPZX309	150-174	Hillsborough County Sheriff	12.1	New Ipswich, NH	42.763056	-71.859389	3.71
4	KNJM515	25-50	New Ipswich, Town of	11.0	New Ipswich, NH	42.758417	-71.853694	4.40
5	WPQK990	150-174	Sharon, Town of	9.0	Sharon, NH	42.813139	-71.945639	5.45
6	KIL506	150-174	SWNH District Fire Mutual Aid	19.0	Temple, NH	42.842306	-71.886194	5.88
7	KIL506	450-470	SWNH District Fire Mutual Aid	20.0	Temple, NH	42.842306	-71.886194	5.88

Table 1: Summary of Land Mobile Sites

3. Impact Assessment

The land mobile sites as described in this report are typically unaffected by the presence of wind turbines and we do not anticipate any significant harmful effect to these services. The frequencies of operation for these services have characteristics that allow the signal to propagate through wind turbines. As a result, very little, if any, change in their coverage should occur when the wind turbines are installed.

When planning the wind energy turbine locations in the area of interest, a conservative approach would dictate not locating any turbines within 77.5 meters of land mobile fixed-base stations to avoid any possible impact to the communications services provided by these stations. This distance is based on FCC interference emissions from electrical devices in the land mobile frequency bands. As long as the turbines are located more than 77.5 meters from the land mobile stations, they will meet the setback distance criteria for FCC interference emissions in the land mobile bands.

4. Recommendations & Mitigation Measures

In the unlikely event that a land mobile licensee believes its coverage has been compromised by the presence of the wind energy facility, it has many options to improve its signal coverage to the area through optimization of a nearby base station or by adding a repeater site. Utility towers, meteorological towers, and even the turbine towers within the wind project area can serve as the platform for a land mobile base station or repeater site.

5. Contact Us

For questions or information regarding the Land Mobile Report, please contact:

Contact person:	Denise Finney
Title:	Account Manager
Company:	Comsearch
Address:	19700 Janelia Farm Blvd., Ashburn, VA 20147
Telephone:	703-726-5650
Fax:	703-726-5595
Email:	dfinney@comsearch.com
Web site:	www.comsearch.com

Wind Power GeoPlanner™

AM and FM Radio Report

Timbertop

Prepared on Behalf of
Pioneer Green

January 8, 2013

COMSEARCH
A CommScope Company

Table of Contents

1. Introduction

In this report, Comsearch analyzed AM and FM radio broadcast stations whose service could potentially be affected by the proposed Snow Hill wind energy project in Hillsborough County, New Hampshire.

2. Summary of Results

AM Radio Analysis

Comsearch found thirteen database records[1] for AM stations within approximately 30 kilometers of the project, as shown in Table 1 and Figure 1. Of these stations, only three are licensed and operating: WPKZ, WFGL, and WGAW. The first two of these, WPKZ and WFGL, are licensed separately for daytime and nighttime operations.

ID	Call Sign	Status[2]	Frequency (kHz)	Transmit ERP[3] (kW)	City	State	Distance to Center of Project (km)
1	WXNH	CP	540	0.25	JAFFREY	NH	9.13
2	WXNH	CP	540	0.33	JAFFREY	NH	9.13
3	WXNH	APP	540	0.22	JAFFREY	NH	18.80
4	WXNH	APP	540	0.35	JAFFREY	NH	18.80
5	WZNH	CP	870	0.78	FITZWILLIAM DEPOT	NH	18.92
6	WZNH	CP	870	0.4	FITZWILLIAM DEPOT	NH	18.92
7	WPKZ	LIC	1280	5.0	FITCHBURG	MA	22.05
8	WPKZ	LIC	1280	1.0	FITCHBURG	MA	22.05
9	WFGL	LIC	960	2.5	FITCHBURG	MA	22.66
10	WFGL	LIC	960	1.0	FITCHBURG	MA	22.66
11	WGAW	LIC	1340	1.0	GARDNER	MA	23.40
12	WSMN	CP	1590	5.0	NASHUA	NH	29.77
13	WSMN	CP	1590	5.0	NASHUA	NH	29.77

Table 1: AM Radio Stations

[1] Comsearch makes no warranty as to the accuracy of the data included in this report beyond the date of the report. The data presented in this report is derived from the AM/FM station's FCC license and governed by Comsearch's data license notification and agreement located at http://www.comsearch.com/files/data_license.pdf.

[2] LIC = Licensed and operational station; APP = Application for construction permit; CP=Construction permit granted; CP MOD = Modification of construction permit

[3] ERP = Transmit Effective Radiated Power

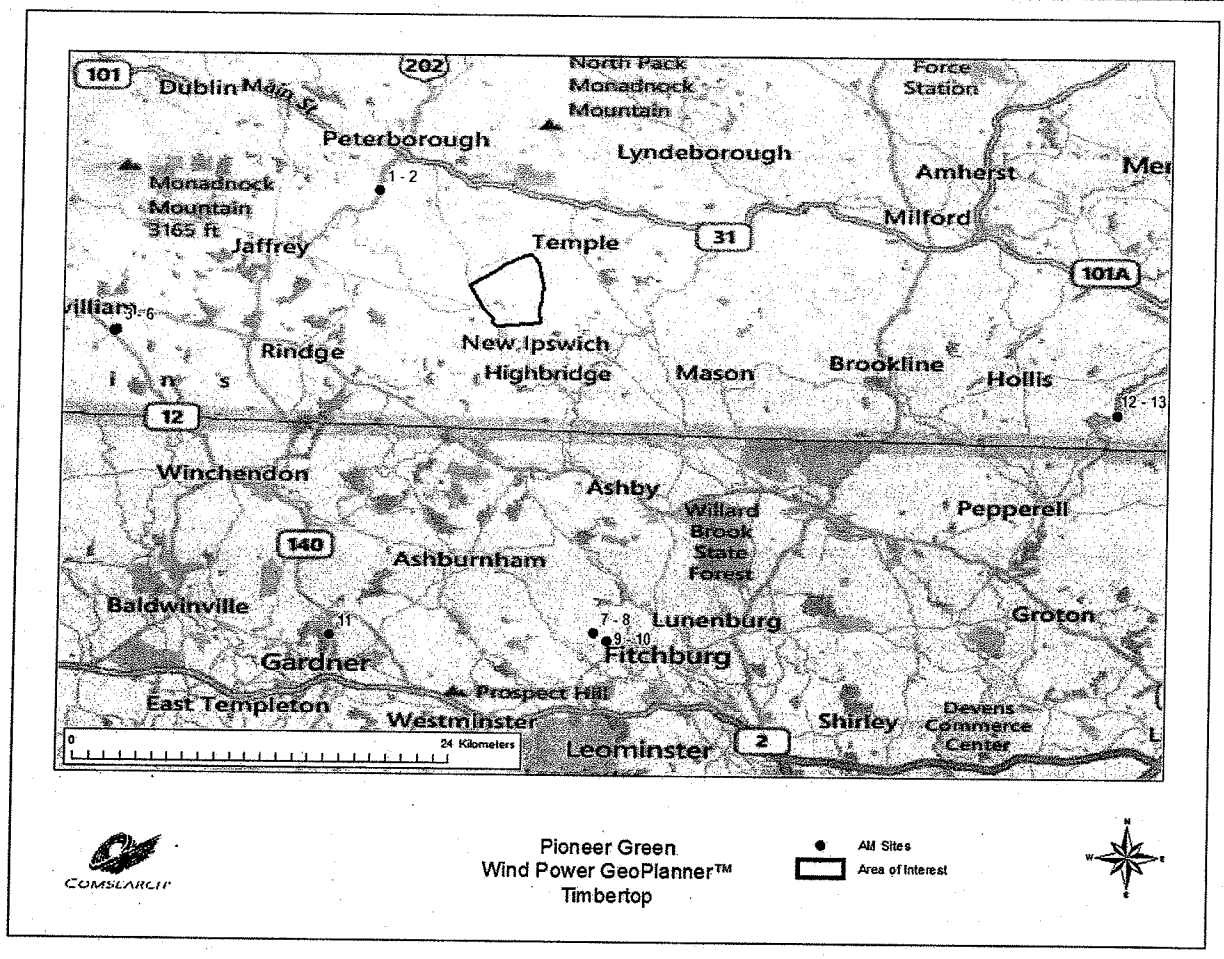


Figure 1: Plot of AM Radio Stations

FM Radio Analysis

Comsearch determined that there were fourteen database records for FM stations within a 30 kilometer radius of the Timbertop wind energy project, as shown in Table 2 and Figure 2. Tthirteen of these stations are currently licensed and operational, four of which are translator stations that operate at low power and have limited range.

ID	Call Sign	Status	Frequency (MHz)	Transmit ERP (kW)	City	State	Distance to Center of Project (km)
1	W232AJ	LIC	94.3	0.005	GREENVILLE	NH	7.61
2	WDER-FM	LIC	92.1	0.17	PETERBOROUGH	NH	8.03
3	WUMV	LIC	88.7	0.67	MILFORD	NH	13.80
4	WFPC-LP	LIC	105.3	0.1	RINDGE	NH	13.93
5	WKMY	LIC	91.1	0.06	WINCHENDON	MA	15.69
6	W287BT	LIC	105.3	0.15	FITCHBURG	MA	22.05
7	WVKJ	LIC	89.9	4.5	DUBLIN	NH	22.69
8	WXPL	LIC	91.3	0.1	FITCHBURG	MA	23.70
9	WQPH	LIC	89.3	0.58	SHIRLEY	MA	27.28
10	WJXP	LIC	90.1	0.75	FITCHBURG	MA	27.53
11	WTYN	LIC	91.7	1.0	LUNENBURG	MA	28.07
12	NEW	APP	99.9	0.01	NASHUA	NH	28.81
13	WJWT	LIC	91.7	0.85	GARDNER	MA	29.01
14	W228AU	LIC	93.5	0.005	NORTH BENNINGTON	VT	29.57

Table 2: FM Radio Stations

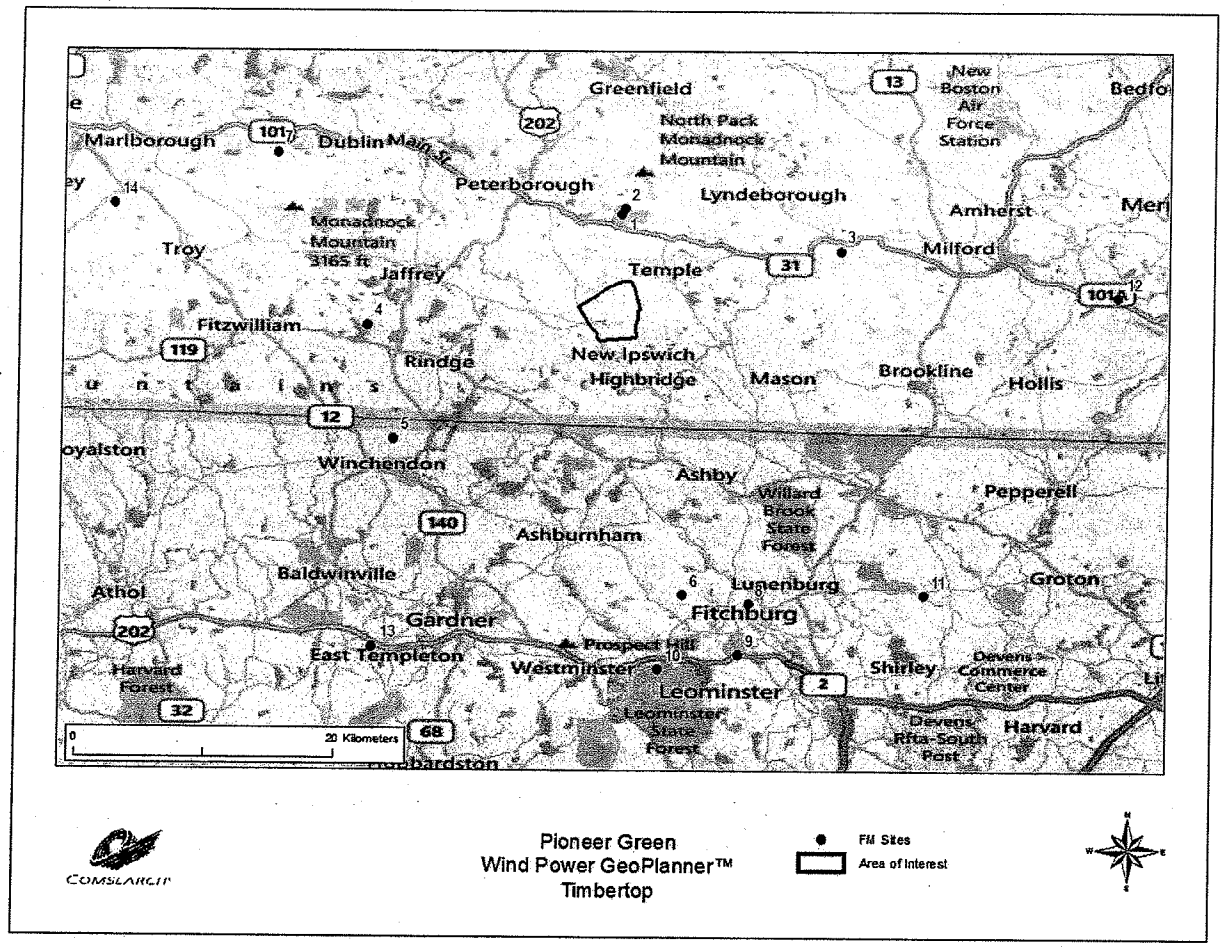


Figure 2: Plot of FM Radio Stations

3. Impact Assessment

Potential problems with AM broadcast coverage are only anticipated when AM broadcast stations with directive antennas are within 3.2 kilometers of wind turbine towers and AM broadcast stations with non-directive antennas are within 0.8 kilometers. The closest operational station to the Timbertop wind energy project, WPKZ, is directive and located more than 22.0 kilometers from the center of the project area of interest. Therefore, the proposed wind farm should not impact the coverage of local AM stations.

The coverage of FM stations, when the stations are at distances greater than 4.0 kilometers from wind turbines, is not subject to degradation. The closest station to the Timbertop wind energy project, W232AJ, is more than 7.6 kilometers from the project center, and falls outside the area potentially impacted by the turbines.

4. Recommendations

Since no impact on the AM or FM broadcast stations was identified in our analysis, no recommendations or mitigation techniques are required for this project.

5. Contact Us

For questions or information regarding the AM and FM Radio Report, please contact:

Contact person:	Lester Polisky
Title:	Senior Principal Engineer
Company:	Comsearch
Address:	19700 Janelia Farm Blvd., Ashburn, VA 20147
Telephone:	703-726-5860
Fax:	703-726-5595
Email:	lpolisky@comsearch.com
Web site:	www.comsearch.com

Wind Power GeoPlanner™

Off-Air TV Analysis

Timbertop

Prepared on Behalf of
Pioneer Green

January 8, 2013

COMSEARCH
A CommScope Company

Table of Contents

1. Introduction

In this report, Comsearch analyzed the off-air television stations whose service could potentially be affected by the proposed Timbertop wind energy project in Hillsborough County, New Hampshire. Off-air stations are television broadcasters that transmit signals that can be received directly on a television receiver from terrestrially located broadcast facilities. Comsearch examined the coverage of the off-air TV stations and the communities in the area that could potentially have degraded television reception because of the location of the proposed wind energy projects.

2. Summary of Results

The proposed wind energy project area and local communities are depicted in Figure 1, below.

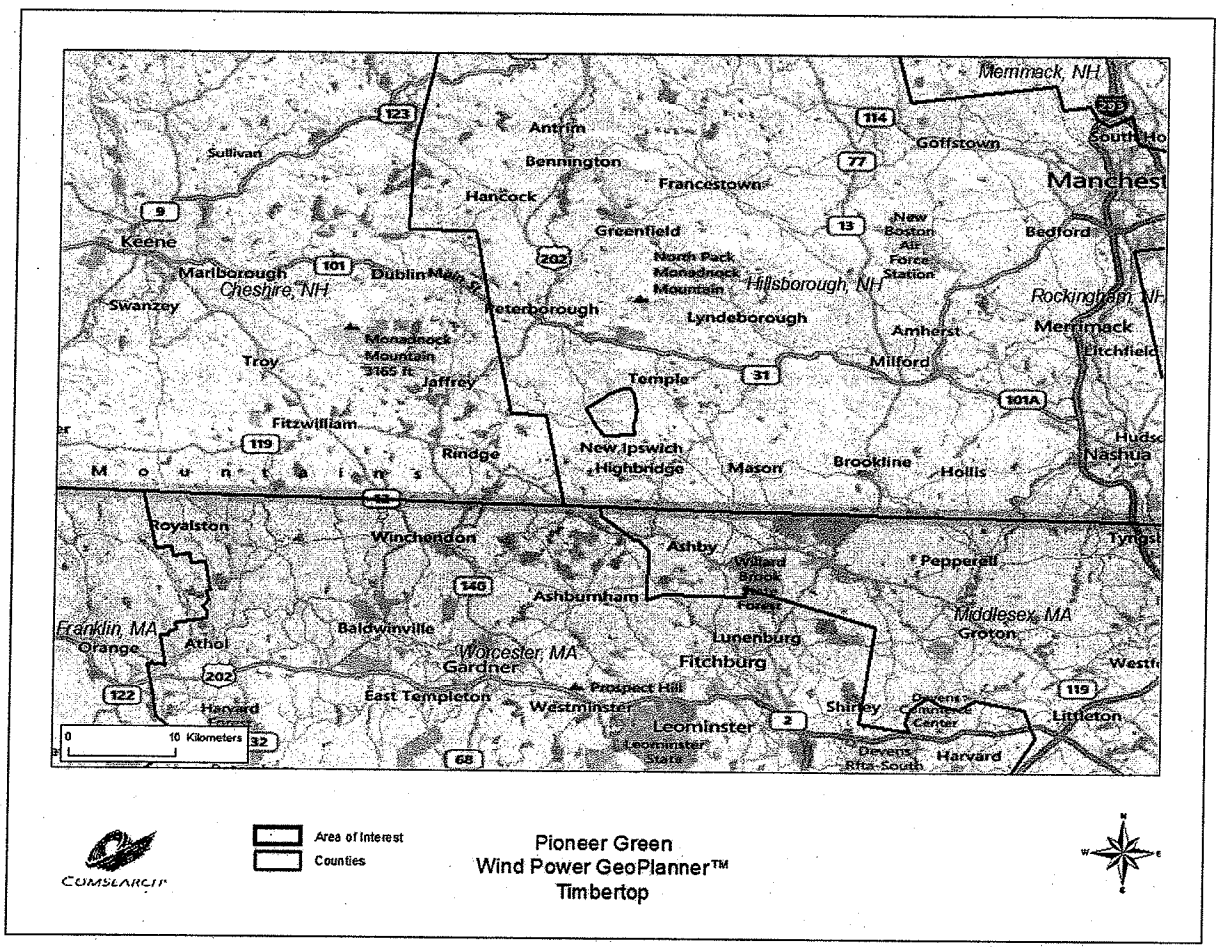


Figure 1: Wind Farm Project Area and Local Communities

To begin the analysis, Comsearch compiled all off-air television stations[1] within 150 kilometers of the wind project area of interest (AOI). Appendix A contains a tabular summary of these stations. A plot depicting their locations appears in Figure 2, below.

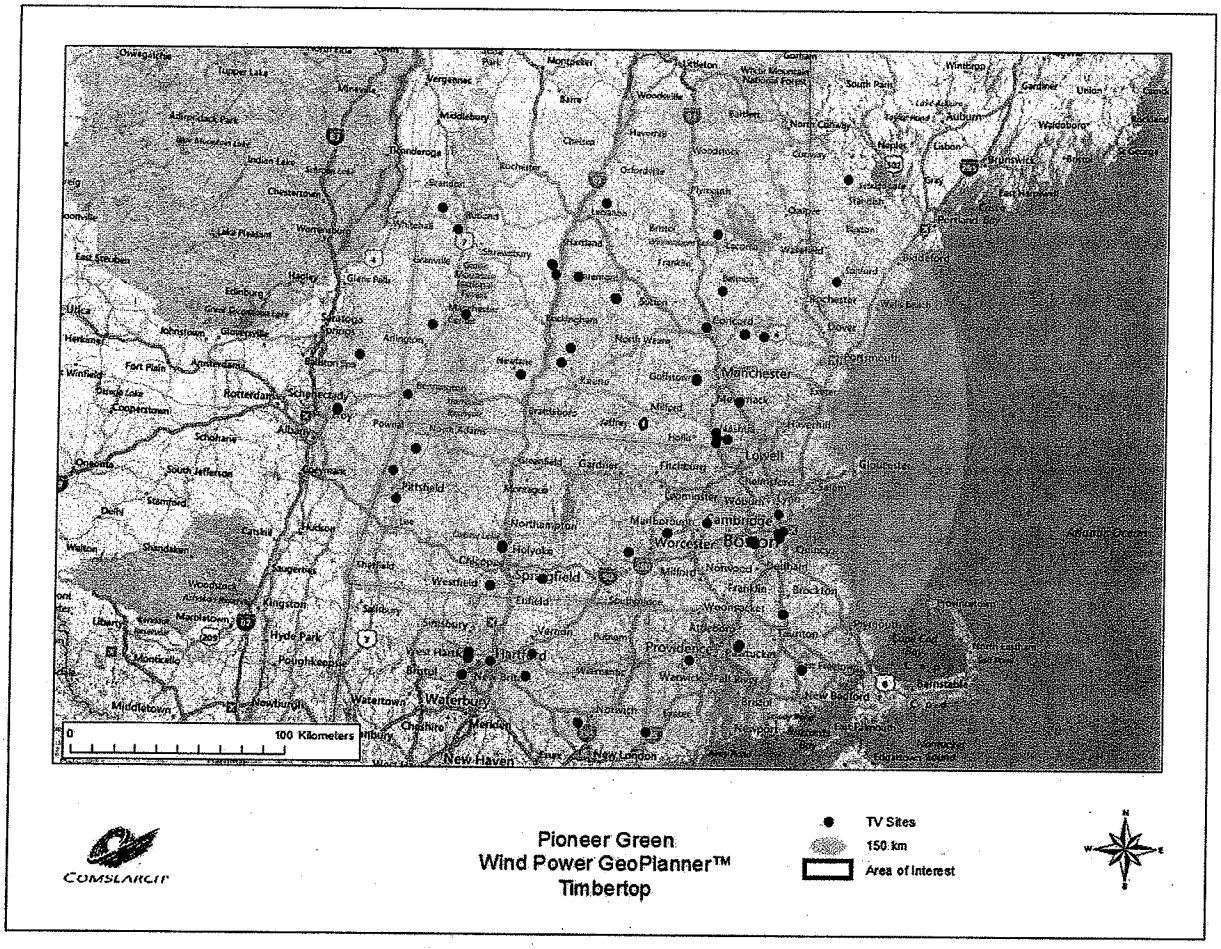


Figure 2: Plot of Off-Air TV Stations within 150 Kilometers of Project Area

TV stations at a distance of 65 kilometers or less are the most likely to provide off-air coverage to the project area and neighboring communities. These stations are listed in Table 1, below, and a plot depicting these locations is provided in Figure 3. There are a total of twenty-nine database records for stations within approximately 65 kilometers of the wind energy project. Of these stations, thirteen are currently licensed and operating, six of which are low-power stations

[1] Comsearch makes no warranty as to the accuracy of the data included in this report beyond the date of the report. The data presented in this report is derived from the TV station's FCC license and governed by Comsearch's data license notification and agreement located at http://www.comsearch.com/files/data_license.pdf.

or translators. Translator stations are low-power stations that receive signals from distant broadcasters and retransmit the signal to a local audience. These stations serve local audiences and have limited range, which is a function of their transmit power and the height of their transmit antenna. The seven remaining operational stations in Table 1 broadcast at full power and are licensed under call signs WMUR-TV, WNEU, WBIN-TV, WEKW-TV, WUNI, WUTF-DT, and WPXG-TV.

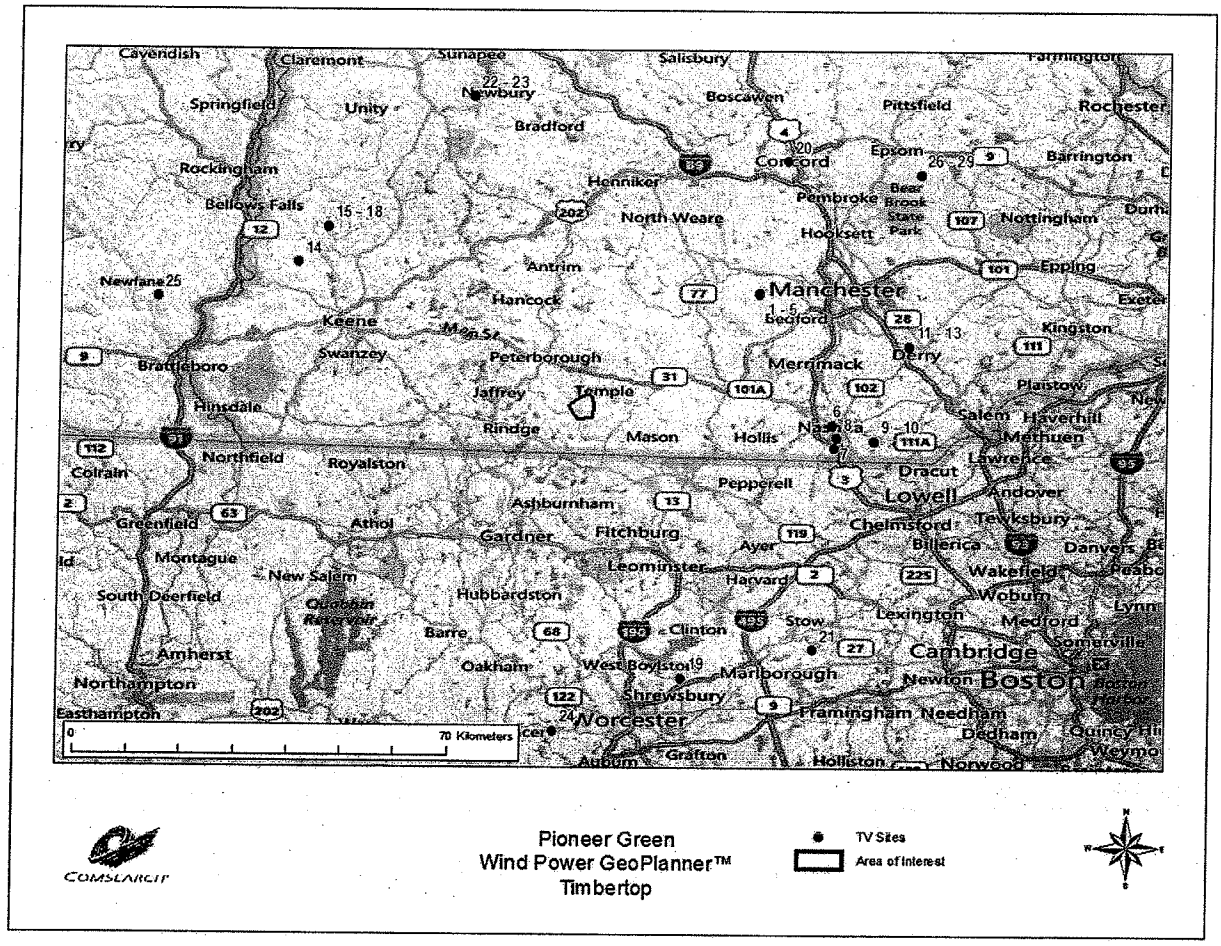


Figure 3: Plot of Off-Air TV Stations within 65 Kilometers of Project Area

ID	Call Sign	Status	Service[2]	Channel	City	State	Distance to Center of Project (km)
1	W28CM	APP	LD	7	MANCHESTER	NH	32.40
2	W07DR-D	CP	LD	7	MANCHESTER	NH	32.40
3	WMUR-TV	LIC	DT	9	MANCHESTER	NH	32.47
4	WMUR-TV	LIC	DX	9	MANCHESTER	NH	32.51
5	WNEU	LIC	DT	34	MERRIMACK	NH	32.58
6	WORK-LP	LIC	TX	33	NASHUA	NH	34.80
7	W28CM	LIC	TX	28	MANCHESTER	NH	35.68
8	WYCN-LP	LIC	CA	13	NASHUA	NH	35.73
9	WBIN-TV	LIC	DT	35	DERRY	NH	40.86
10	WYCN-LP	CP	DC	36	NASHUA	NH	40.88
11	WORK-LP	APP	LD	3	NASHUA	NH	46.56
12	W39AR	APP	LD	4	CONCORD	NH	46.56
13	W07DR-D	APP	LD	7	MANCHESTER	NH	46.56
14	WEKW-TV	LIC	DT	49	KEENE	NH	47.69
15	NEW	APP	LD	15	WESTMORELAND	NH	48.75
16	NEW	APP	LD	20	WESTMORELAND	NH	48.75
17	NEW	APP	LD	38	WESTMORELAND	NH	48.75
18	NEW	APP	LD	44	WESTMORELAND	NH	48.75
19	WUNI	LIC	DT	29	WORCESTER	MA	52.32
20	W39AR	LIC	TX	39	CONCORD	NH	54.12
21	WUTF-DT	LIC	DT	27	MARLBOROUGH	MA	55.44
22	W40DC-D	CP	LD	40	MANCHESTER	NH	60.18
23	W22EK-D	CP	LD	22	CONCORD	NH	60.20
24	WCRN-LP	LIC	TX	34	LEICESTER	MA	60.42
25	WVBK-CA	CP MOD	DC	2	MANCHESTER	VT	61.96
26	WORK-LP	CP	LD	3	NASHUA	NH	63.77
27	W39AR	CP	LD	4	CONCORD	NH	63.77
28	WPXG-TV	LIC	DT	33	CONCORD	NH	63.77
29	WPXG-TV	CP	DT	33	CONCORD	NH	63.77

Table 1: Off-Air TV Stations within 65 Kilometers of Project Area

[2] Definitions of service and status codes:
DT – Digital television broadcast station
LD – Low power digital television broadcast station
TX – Translator station
CA – Class A analog television broadcast station
DC – Class A digital television broadcast station
LIC – Licensed and operational station
CP – Construction permit granted
CP MOD – Modification of construction permit
APP – Application for construction permit, not yet operational

3. Impact Assessment

The seven full-power digital stations may have their reception disrupted in and around the Timbertop project, primarily in locations on the opposite side of the project area, relative to the station antennas. Communities and homes directly to the southwest of the project may have degraded reception of stations WMUR-TV, WNEU, and WPXG-TV, which are located to the northeast of the project area, after the wind turbines are installed. Similarly, station WBIN-TV may have diminished reception in communities directly to the west of the project; WEKW-TV in the southeast; and WUNI and WUTF-DT in the northwest.

However, based on the wide geographic distribution of the of full-power TV stations available in the vicinity of the project area, it is unlikely that the local communities will lose all available channels. Recent surveys show that off-air television stations are typically not the primary mode of television service for most communities. TV cable service, where available, and direct broadcast satellite service (DBS) are more likely the dominant modes of service delivery.

4. Recommendations

Both cable service and direct broadcast satellite service will be unaffected by the presence of the wind turbine facility and may be offered to those residents who can show that their off-air TV reception has been disrupted by the presence of the wind turbines after they are installed.

5. Contact Us

For questions or information regarding the Off-Air TV Analysis, please contact:

Contact person:	Lester Polisky
Title:	Senior Principal Engineer
Company:	Comsearch
Address:	19700 Janelia Farm Blvd., Ashburn, VA 20147
Telephone:	703-726-5860
Fax:	703-726-5595
Email:	lpolisky@comsearch.com
Web site:	www.comsearch.com

6. Appendix A

ID	Call Sign	Status	Service[3]	Channel	City	State	Distance to Center of Project (km)
1	W28CM	APP	LD	7	MANCHESTER	NH	32.40
2	W07DR-D	CP	LD	7	MANCHESTER	NH	32.40
3	WMUR-TV	LIC	DT	9	MANCHESTER	NH	32.47
4	WMUR-TV	LIC	DX	9	MANCHESTER	NH	32.51
5	WNEU	LIC	DT	34	MERRIMACK	NH	32.58
6	WORK-LP	LIC	TX	33	NASHUA	NH	34.80
7	W28CM	LIC	TX	28	MANCHESTER	NH	35.68
8	WYCN-LP	LIC	CA	13	NASHUA	NH	35.73
9	WBIN-TV	LIC	DT	35	DERRY	NH	40.86
10	WYCN-LP	CP	DC	36	NASHUA	NH	40.88
11	WORK-LP	APP	LD	3	NASHUA	NH	46.56
12	W39AR	APP	LD	4	CONCORD	NH	46.56
13	W07DR-D	APP	LD	7	MANCHESTER	NH	46.56
14	WEKW-TV	LIC	DT	49	KEENE	NH	47.69
15	NEW	APP	LD	15	WESTMORELAND	NH	48.75
16	NEW	APP	LD	20	WESTMORELAND	NH	48.75
17	NEW	APP	LD	38	WESTMORELAND	NH	48.75
18	NEW	APP	LD	44	WESTMORELAND	NH	48.75
19	WUNI	LIC	DT	29	WORCESTER	MA	52.32
20	W39AR	LIC	TX	39	CONCORD	NH	54.12
21	WUTF-DT	LIC	DT	27	MARLBOROUGH	MA	55.44
22	W40DC-D	CP	LD	40	MANCHESTER	NH	60.18
23	W22EK-D	CP	LD	22	CONCORD	NH	60.20
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26	WORK-LP	CP	LD	3	NASHUA	NH	63.77
27	W39AR	CP	LD	4	CONCORD	NH	63.77
28	WPXG-TV	LIC	DT	33	CONCORD	NH	63.77

[3] Definitions of service and status codes :
TV – Analog television broadcast station
DT – Digital television broadcast station
DS – Digital special temporary authority (STA)
LP – Low power analog television broadcast station
LD – Low power digital television broadcast station
CA – Class A analog television broadcast station
DC – Class A digital television broadcast station
TX – Translator station
LIC – Licensed and operational station
CP – Construction permit granted
CP MOD – Modification of construction permit
APP – Application for construction permit, not yet operational
STA – Special transmit authorization, usually granted by FCC for temporary operation

ID	Call Sign	Status	Service[3]	Channel	City	State	Distance to Center of Project (km)
29	WPXG-TV	CP	DT	33	CONCORD	NH	63.77
30	WENH-TV	LIC	DT	11	DURHAM	NH	70.09
31	DK02CG	STA	LD	39	LOUDON	NH	72.52
32	WYCU-LD	CP MOD	LD	26	CHARLESTOWN	NH	75.24
33	WYCU-LD	APP	LD	26	CHARLESTOWN	NH	75.24
34	WGBH-TV	LIC	DT	19	BOSTON	MA	75.39
35	WCVB-TV	LIC	DT	20	BOSTON	MA	75.39
36	WCVB-TV	LIC	DX	20	BOSTON	MA	75.39
37	WCVB-TV	CP	DX	20	BOSTON	MA	75.39
38	WCVB-TV	APP	DS	20	BOSTON	MA	75.39
39	WBZ-TV	LIC	DT	30	BOSTON	MA	75.39
40	WBZ-TV	APP	DS	30	BOSTON	MA	75.39
41	WSBK-TV	LIC	DT	39	BOSTON	MA	75.39
42	WSBK-TV	APP	DS	39	BOSTON	MA	75.39
43	WGBX-TV	LIC	DT	43	BOSTON	MA	75.39
44	WTMU-LP	CP	LD	46	BOSTON	MA	75.39
45	WYDN	APP	DS	47	WORCESTER	MA	75.39
46	WYDN	CP	DT	47	WORCESTER	MA	75.39
47	WMFP	LIC	DT	18	LAWRENCE	MA	76.37
48	WFXZ-CD	CP	DC	24	BOSTON	MA	76.37
49	WFXZ-CD	LIC	DC	25	BOSTON	MA	76.37
50	WBPX-TV	LIC	DT	32	BOSTON	MA	76.37
51	W40BO	CP	LD	40	BOSTON	MA	76.37
52	WYDN	LIC	DT	47	WORCESTER	MA	76.37
53	W40BO	LIC	TX	40	BOSTON	MA	76.40
54	WHDH	LIC	DT	42	BOSTON	MA	76.51
55	WFXT	LIC	DT	31	BOSTON	MA	77.06
56	WFXT	LIC	DX	31	BOSTON	MA	77.06
57	WBPX-TV	CP	DT	32	BOSTON	MA	77.06
58	WLVI	LIC	DT	41	CAMBRIDGE	MA	77.06
59	WTMU-LP	APP	TX	46	BOSTON	MA	76.68
60	WVBQ-LP	LIC	TX	47	NEWPORT-CHARLESTOWN	NH	81.19
61	WTMU-LP	LIC	TX	32	BOSTON	MA	82.30
62	WCEA-LD	LIC	LD	45	BOSTON	MA	82.69
63	WHDN-LD	LIC	LD	38	BOSTON	MA	83.14
64	WCEA-LP	LIC	TX	58	BOSTON	MA	83.73
65	WVTA	LIC	DT	24	WINDSOR	VT	85.42
66	W17CI	LIC	CA	17	CLAREMONT	NH	85.43
67	WNNE	LIC	DT	25	HARTFORD	VT	85.43
68	W28DQ-D	APP	LD	21	WINDSOR	VT	86.14
69	W28DQ-D	LIC	LD	28	WINDSOR	VT	86.14

ID	Call Sign	Status	Service[3]	Channel	City	State	Distance to Center of Project (km)
70	WSHM-LD	LIC	LD	21	SPRINGFIELD	MA	85.95
71	WTXX-LP	LIC	TX	34	SPRINGFIELD	MA	85.95
72	WTXX-LP	CP	LD	34	SPRINGFIELD	MA	85.95
73	WFXQ-CD	LIC	DC	28	SPRINGFIELD	MA	86.32
74	WGGB-TV	LIC	DT	40	SPRINGFIELD	MA	87.30
75	WGBY-TV	LIC	DT	22	SPRINGFIELD	MA	87.31
76	WSHM-LD	APP	TX	45	SPRINGFIELD	MA	87.33
77	WSHM-LD	APP	LD	49	SPRINGFIELD	MA	87.33
78	NEW	APP	TX	15	LACONIA	NH	95.03
79	WVBK-CA	LIC	CA	2	MANCHESTER	VT	97.46
80	WDMR-LD	LIC	LD	51	SPRINGFIELD	MA	103.08
81	WWLP	LIC	DT	11	SPRINGFIELD	MA	103.16
82	WFXQ-CD	CP	CA	28	SPRINGFIELD	MA	103.16
83	DW27CP	CP	TX	27	WHITE RIVER JUNCTION	VT	104.36
84	W50DP-D	LIC	LD	50	HANOVER	NH	104.36
85	WCDC-TV	LIC	DT	36	ADAMS	MA	106.34
86	W38DL-D	LIC	LD	38	ADAMS	MA	106.34
87	W30DM-D	LIC	LD	30	MANCHESTER	VT	108.59
88	W46EW-D	LIC	LD	46	POWNAL	VT	110.34
89	WWDP	APP	DM	10	NORWELL	MA	110.88
90	WWDP	CP MOD	DT	10	NORWELL	MA	110.88
91	WWDP	LIC	DT	10	NORWELL	MA	110.88
92	WMEA-TV	LIC	DT	45	BIDDEFORD	ME	112.35
93	WRIW-CA	LIC	CA	50	PROVIDENCE	RI	112.85
94	WNAC-TV	LIC	DT	12	PROVIDENCE	RI	112.97
95	WPRI-TV	LIC	DT	13	PROVIDENCE	RI	112.97
96	WSBE-TV	LIC	DT	21	PROVIDENCE	RI	113.96
97	WLNE-TV	LIC	DT	49	NEW BEDFORD	MA	113.96
98	WJAR	LIC	DT	51	PROVIDENCE	RI	113.96
99	WRIW-CA	CP	DC	50	PROVIDENCE	RI	113.97
100	WRIW-CA	APP	DC	50	PROVIDENCE	RI	113.97
101	WRGB	CP	LD	19	PITTSFIELD	MA	118.02
102	WHCT-LP	APP	TX	6	HARTFORD	CT	118.75
103	W28DA-D	LIC	LD	28	PITTSFIELD	MA	120.19
104	W20CS-D	LIC	LD	20	RUTLAND	VT	125.68
105	WUTH-CA	LIC	CA	47	HARTFORD	CT	129.45
106	WUTH-CA	CP	DC	47	HARTFORD	CT	129.54
107	DWHTX-LP	LIC	TX	10	HARTFORD	CT	131.14
108	WHCT-LD	CP MOD	LD	7	HARTFORD	CT	133.41
109	WRDM-CA	CP	DC	19	HARTFORD	CT	133.41
110	WRDM-CA	APP	DC	19	HARTFORD	CT	133.41
111	WHCT-LP	LIC	TX	38	HARTFORD	CT	133.41

ID	Call Sign	Status	Service[3]	Channel	City	State	Distance to Center of Project (km)
112	WHCT-LD	CP MOD	LD	38	HARTFORD	CT	133.41
113	WRNT-LP	LIC	TX	48	HARTFORD	CT	133.41
114	WRNT-LP	CP MOD	LD	48	HARTFORD	CT	133.41
115	WRDM-CA	LIC	CA	50	HARTFORD	CT	133.41
116	WUVN	LIC	DT	46	HARTFORD	CT	135.56
117	WFSB	LIC	DT	33	HARTFORD	CT	135.77
118	WFSB	CP	DT	33	HARTFORD	CT	135.77
119	WFSB	APP	DX	33	HARTFORD	CT	135.77
120	W21CQ	LIC	TX	21	BENNINGTON	VT	136.16
121	WLWC	LIC	DT	22	NEW BEDFORD	MA	137.45
122	WLWC	CP	DT	22	NEW BEDFORD	MA	137.45
123	WVER	LIC	DT	9	RUTLAND	VT	138.36
124	WNYT	LIC	LD	18	TROY	NY	142.48
125	WNGN-LP	CP	LD	23	TROY	NY	142.48
126	WNGX-LD	CP	LD	25	SCHENECTADY	NY	142.48
127	WNGN-LP	APP	TX	26	TROY	NY	142.53
128	WNGN-LP	LIC	TX	38	TROY	NY	142.53
129	WEDN	LIC	DT	9	NORWICH	CT	142.82
130	WCCT-TV	APP	DT	20	WATERBURY	CT	143.63
131	WCCT-TV	LIC	DT	20	WATERBURY	CT	143.63
132	WTIC-TV	LIC	DT	31	HARTFORD	CT	143.63
133	WEDH	LIC	DT	45	HARTFORD	CT	143.63
134	WVIT	LIC	DT	35	NEW BRITAIN	CT	143.92
135	WPXQ-TV	LIC	DT	17	BLOCK ISLAND	RI	144.05
136	WMTW	LIC	DT	8	POLAND SPRING	ME	148.67

Table A: Off-Air TV Stations within 150 Kilometers of Project Area

ATTACHMENT 6

FAA DETERMINATIONS

Mail Processing Center
Federal Aviation Administration
Southwest Regional Office
Obstruction Evaluation Group
2601 Meacham Boulevard
Fort Worth, TX 76137

Aeronautical Study No.
2012-WTE-5255-OE

Issued Date: 11/15/2012

Paul Harris
Timbertop Wind I, LLC
1802 Lavaca St.
Suite 200
Austin, TX 78701

**** DETERMINATION OF NO HAZARD TO AIR NAVIGATION ****

The Federal Aviation Administration has conducted an aeronautical study under the provisions of 49 U.S.C., Section 44718 and if applicable Title 14 of the Code of Federal Regulations, part 77, concerning:

Structure:	Wind Turbine Timbertop WTG 1
Location:	Nashua, NH
Latitude:	42-46-55.40N NAD 83
Longitude:	71-53-06.50W
Heights:	1668 feet site elevation (SE)
	499 feet above ground level (AGL)
	2167 feet above mean sea level (AMSL)

This aeronautical study revealed that the structure does not exceed obstruction standards and would not be a hazard to air navigation provided the following condition(s), if any, is(are) met:

As a condition to this Determination, the structure is marked/lighted in accordance with FAA Advisory circular 70/7460-1 K Change 2, Obstruction Marking and Lighting, white paint only - Chapters 12&13(Turbines).

It is required that FAA Form 7460-2, Notice of Actual Construction or Alteration, be e-filed any time the project is abandoned or:

_____ At least 10 days prior to start of construction (7460-2, Part I)
__X__ Within 5 days after the construction reaches its greatest height (7460-2, Part II)

This determination expires on 05/15/2014 unless:

(a) the construction is started (not necessarily completed) and FAA Form 7460-2, Notice of Actual Construction or Alteration, is received by this office.
(b) extended, revised, or terminated by the issuing office.

NOTE: REQUEST FOR EXTENSION OF THE EFFECTIVE PERIOD OF THIS DETERMINATION MUST BE E-FILED AT LEAST 15 DAYS PRIOR TO THE EXPIRATION DATE. AFTER RE-EVALUATION OF CURRENT OPERATIONS IN THE AREA OF THE STRUCTURE TO DETERMINE THAT NO

SIGNIFICANT AERONAUTICAL CHANGES HAVE OCCURRED, YOUR DETERMINATION MAY BE ELIGIBLE FOR ONE EXTENSION OF THE EFFECTIVE PERIOD.

Additional wind turbines or met towers proposed in the future may cause a cumulative effect on the national airspace system. This determination is based, in part, on the foregoing description which includes specific coordinates and heights . Any changes in coordinates will void this determination. Any future construction or alteration requires separate notice to the FAA.

This determination does include temporary construction equipment such as cranes, derricks, etc., which may be used during actual construction of the structure. However, this equipment shall not exceed the overall heights as indicated above. Equipment which has a height greater than the studied structure requires separate notice to the FAA.

This determination concerns the effect of this structure on the safe and efficient use of navigable airspace by aircraft and does not relieve the sponsor of compliance responsibilities relating to any law, ordinance, or regulation of any Federal, State, or local government body.

Any failure or malfunction that lasts more than thirty (30) minutes and affects a top light or flashing obstruction light, regardless of its position, should be reported immediately to (877) 487-6867 so a Notice to Airmen (NOTAM) can be issued. As soon as the normal operation is restored, notify the same number.

If we can be of further assistance, please contact our office at (404) 305-7081. On any future correspondence concerning this matter, please refer to Aeronautical Study Number 2012-WTE-5255-OE.

Signature Control No: 172793193-177053017 (DNE -WT)
Michael Blaich
Specialist

Mail Processing Center
Federal Aviation Administration
Southwest Regional Office
Obstruction Evaluation Group
2601 Meacham Boulevard
Fort Worth, TX 76137

Aeronautical Study No.
2012-WTE-5256-OE

Issued Date: 11/15/2012

Paul Harris
Timbertop Wind I, LLC
1802 Lavaca St.
Suite 200
Austin, TX 78701

**** DETERMINATION OF NO HAZARD TO AIR NAVIGATION ****

The Federal Aviation Administration has conducted an aeronautical study under the provisions of 49 U.S.C., Section 44718 and if applicable Title 14 of the Code of Federal Regulations, part 77, concerning:

Structure:	Wind Turbine Timbertop WTG 2
Location:	Nashua, NH
Latitude:	42-47-03.20N NAD 83
Longitude:	71-52-56.40W
Heights:	1804 feet site elevation (SE)
	499 feet above ground level (AGL)
	2303 feet above mean sea level (AMSL)

This aeronautical study revealed that the structure does not exceed obstruction standards and would not be a hazard to air navigation provided the following condition(s), if any, is(are) met:

As a condition to this Determination, the structure is marked/lighted in accordance with FAA Advisory circular 70/7460-1 K Change 2, Obstruction Marking and Lighting, white paint/synchronized red lights - Chapters 4,12&13(Turbines).

It is required that FAA Form 7460-2, Notice of Actual Construction or Alteration, be e-filed any time the project is abandoned or:

_____ At least 10 days prior to start of construction (7460-2, Part I)
__X__ Within 5 days after the construction reaches its greatest height (7460-2, Part II)

This determination expires on 05/15/2014 unless:

(a) the construction is started (not necessarily completed) and FAA Form 7460-2, Notice of Actual Construction or Alteration, is received by this office.
(b) extended, revised, or terminated by the issuing office.

NOTE: REQUEST FOR EXTENSION OF THE EFFECTIVE PERIOD OF THIS DETERMINATION MUST BE E-FILED AT LEAST 15 DAYS PRIOR TO THE EXPIRATION DATE. AFTER RE-EVALUATION OF CURRENT OPERATIONS IN THE AREA OF THE STRUCTURE TO DETERMINE THAT NO

SIGNIFICANT AERONAUTICAL CHANGES HAVE OCCURRED, YOUR DETERMINATION MAY BE ELIGIBLE FOR ONE EXTENSION OF THE EFFECTIVE PERIOD.

Additional wind turbines or met towers proposed in the future may cause a cumulative effect on the national airspace system. This determination is based, in part, on the foregoing description which includes specific coordinates and heights . Any changes in coordinates will void this determination. Any future construction or alteration requires separate notice to the FAA.

This determination does include temporary construction equipment such as cranes, derricks, etc., which may be used during actual construction of the structure. However, this equipment shall not exceed the overall heights as indicated above. Equipment which has a height greater than the studied structure requires separate notice to the FAA.

This determination concerns the effect of this structure on the safe and efficient use of navigable airspace by aircraft and does not relieve the sponsor of compliance responsibilities relating to any law, ordinance, or regulation of any Federal, State, or local government body.

Any failure or malfunction that lasts more than thirty (30) minutes and affects a top light or flashing obstruction light, regardless of its position, should be reported immediately to (877) 487-6867 so a Notice to Airmen (NOTAM) can be issued. As soon as the normal operation is restored, notify the same number.

If we can be of further assistance, please contact our office at (404) 305-7081. On any future correspondence concerning this matter, please refer to Aeronautical Study Number 2012-WTE-5256-OE.

Signature Control No: 172793194-177052585 (DNE -WT)
Michael Blaich
Specialist

Mail Processing Center
Federal Aviation Administration
Southwest Regional Office
Obstruction Evaluation Group
2601 Meacham Boulevard
Fort Worth, TX 76137

Aeronautical Study No.
2012-WTE-5257-OE

Issued Date: 11/15/2012

Paul Harris
Timbertop Wind I, LLC
1802 Lavaca St.
Suite 200
Austin, TX 78701

**** DETERMINATION OF NO HAZARD TO AIR NAVIGATION ****

The Federal Aviation Administration has conducted an aeronautical study under the provisions of 49 U.S.C., Section 44718 and if applicable Title 14 of the Code of Federal Regulations, part 77, concerning:

Structure:	Wind Turbine Timbertop WTG 3
Location:	Nashua, NH
Latitude:	42-47-18.20N NAD 83
Longitude:	71-53-11.40W
Heights:	1619 feet site elevation (SE)
	499 feet above ground level (AGL)
	2118 feet above mean sea level (AMSL)

This aeronautical study revealed that the structure does not exceed obstruction standards and would not be a hazard to air navigation provided the following condition(s), if any, is(are) met:

As a condition to this Determination, the structure is marked/lighted in accordance with FAA Advisory circular 70/7460-1 K Change 2, Obstruction Marking and Lighting, white paint/synchronized red lights - Chapters 4,12&13(Turbines).

It is required that FAA Form 7460-2, Notice of Actual Construction or Alteration, be e-filed any time the project is abandoned or:

_____ At least 10 days prior to start of construction (7460-2, Part I)
__X__ Within 5 days after the construction reaches its greatest height (7460-2, Part II)

This determination expires on 05/15/2014 unless:

(a) the construction is started (not necessarily completed) and FAA Form 7460-2, Notice of Actual Construction or Alteration, is received by this office.
(b) extended, revised, or terminated by the issuing office.

NOTE: REQUEST FOR EXTENSION OF THE EFFECTIVE PERIOD OF THIS DETERMINATION MUST BE E-FILED AT LEAST 15 DAYS PRIOR TO THE EXPIRATION DATE. AFTER RE-EVALUATION OF CURRENT OPERATIONS IN THE AREA OF THE STRUCTURE TO DETERMINE THAT NO

SIGNIFICANT AERONAUTICAL CHANGES HAVE OCCURRED, YOUR DETERMINATION MAY BE ELIGIBLE FOR ONE EXTENSION OF THE EFFECTIVE PERIOD.

Additional wind turbines or met towers proposed in the future may cause a cumulative effect on the national airspace system. This determination is based, in part, on the foregoing description which includes specific coordinates and heights . Any changes in coordinates will void this determination. Any future construction or alteration requires separate notice to the FAA.

This determination does include temporary construction equipment such as cranes, derricks, etc., which may be used during actual construction of the structure. However, this equipment shall not exceed the overall heights as indicated above. Equipment which has a height greater than the studied structure requires separate notice to the FAA.

This determination concerns the effect of this structure on the safe and efficient use of navigable airspace by aircraft and does not relieve the sponsor of compliance responsibilities relating to any law, ordinance, or regulation of any Federal, State, or local government body.

Any failure or malfunction that lasts more than thirty (30) minutes and affects a top light or flashing obstruction light, regardless of its position, should be reported immediately to (877) 487-6867 so a Notice to Airmen (NOTAM) can be issued. As soon as the normal operation is restored, notify the same number.

If we can be of further assistance, please contact our office at (404) 305-7081. On any future correspondence concerning this matter, please refer to Aeronautical Study Number 2012-WTE-5257-OE.

Signature Control No: 172793195-177052587 (DNE -WT)
Michael Blaich
Specialist

Mail Processing Center
Federal Aviation Administration
Southwest Regional Office
Obstruction Evaluation Group
2601 Meacham Boulevard
Fort Worth, TX 76137

Aeronautical Study No.
2012-WTE-5258-OE

Issued Date: 11/15/2012

Paul Harris
Timbertop Wind I, LLC
1802 Lavaca St.
Suite 200
Austin, TX 78701

**** DETERMINATION OF NO HAZARD TO AIR NAVIGATION ****

The Federal Aviation Administration has conducted an aeronautical study under the provisions of 49 U.S.C., Section 44718 and if applicable Title 14 of the Code of Federal Regulations, part 77, concerning:

Structure:	Wind Turbine Timbertop WTG 4
Location:	Nashua, NH
Latitude:	42-47-28.10N NAD 83
Longitude:	71-53-17.30W
Heights:	1465 feet site elevation (SE)
	499 feet above ground level (AGL)
	1964 feet above mean sea level (AMSL)

This aeronautical study revealed that the structure does not exceed obstruction standards and would not be a hazard to air navigation provided the following condition(s), if any, is(are) met:

As a condition to this Determination, the structure is marked/lighted in accordance with FAA Advisory circular 70/7460-1 K Change 2, Obstruction Marking and Lighting, white paint only - Chapters 12&13(Turbines).

It is required that FAA Form 7460-2, Notice of Actual Construction or Alteration, be e-filed any time the project is abandoned or:

_____ At least 10 days prior to start of construction (7460-2, Part I)
__X__ Within 5 days after the construction reaches its greatest height (7460-2, Part II)

This determination expires on 05/15/2014 unless:

(a) the construction is started (not necessarily completed) and FAA Form 7460-2, Notice of Actual Construction or Alteration, is received by this office.
(b) extended, revised, or terminated by the issuing office.

NOTE: REQUEST FOR EXTENSION OF THE EFFECTIVE PERIOD OF THIS DETERMINATION MUST BE E-FILED AT LEAST 15 DAYS PRIOR TO THE EXPIRATION DATE. AFTER RE-EVALUATION OF CURRENT OPERATIONS IN THE AREA OF THE STRUCTURE TO DETERMINE THAT NO

SIGNIFICANT AERONAUTICAL CHANGES HAVE OCCURRED, YOUR DETERMINATION MAY BE ELIGIBLE FOR ONE EXTENSION OF THE EFFECTIVE PERIOD.

Additional wind turbines or met towers proposed in the future may cause a cumulative effect on the national airspace system. This determination is based, in part, on the foregoing description which includes specific coordinates and heights . Any changes in coordinates will void this determination. Any future construction or alteration requires separate notice to the FAA.

This determination does include temporary construction equipment such as cranes, derricks, etc., which may be used during actual construction of the structure. However, this equipment shall not exceed the overall heights as indicated above. Equipment which has a height greater than the studied structure requires separate notice to the FAA.

This determination concerns the effect of this structure on the safe and efficient use of navigable airspace by aircraft and does not relieve the sponsor of compliance responsibilities relating to any law, ordinance, or regulation of any Federal, State, or local government body.

Any failure or malfunction that lasts more than thirty (30) minutes and affects a top light or flashing obstruction light, regardless of its position, should be reported immediately to (877) 487-6867 so a Notice to Airmen (NOTAM) can be issued. As soon as the normal operation is restored, notify the same number.

If we can be of further assistance, please contact our office at (404) 305-7081. On any future correspondence concerning this matter, please refer to Aeronautical Study Number 2012-WTE-5258-OE.

Signature Control No: 172793196-177053019 (DNE -WT)
Michael Blaich
Specialist

Mail Processing Center
Federal Aviation Administration
Southwest Regional Office
Obstruction Evaluation Group
2601 Meacham Boulevard
Fort Worth, TX 76137

Aeronautical Study No.
2012-WTE-5259-OE

Issued Date: 11/15/2012

Paul Harris
Timbertop Wind I, LLC
1802 Lavaca St.
Suite 200
Austin, TX 78701

**** DETERMINATION OF NO HAZARD TO AIR NAVIGATION ****

The Federal Aviation Administration has conducted an aeronautical study under the provisions of 49 U.S.C., Section 44718 and if applicable Title 14 of the Code of Federal Regulations, part 77, concerning:

Structure:	Wind Turbine Timbertop WTG 5
Location:	Nashua, NH
Latitude:	42-47-38.50N NAD 83
Longitude:	71-53-11.80W
Heights:	1524 feet site elevation (SE)
	499 feet above ground level (AGL)
	2023 feet above mean sea level (AMSL)

This aeronautical study revealed that the structure does not exceed obstruction standards and would not be a hazard to air navigation provided the following condition(s), if any, is(are) met:

As a condition to this Determination, the structure is marked/lighted in accordance with FAA Advisory circular 70/7460-1 K Change 2, Obstruction Marking and Lighting, white paint/synchronized red lights - Chapters 4,12&13(Turbines).

It is required that FAA Form 7460-2, Notice of Actual Construction or Alteration, be e-filed any time the project is abandoned or:

_____ At least 10 days prior to start of construction (7460-2, Part I)
__X__ Within 5 days after the construction reaches its greatest height (7460-2, Part II)

This determination expires on 05/15/2014 unless:

(a) the construction is started (not necessarily completed) and FAA Form 7460-2, Notice of Actual Construction or Alteration, is received by this office.
(b) extended, revised, or terminated by the issuing office.

NOTE: REQUEST FOR EXTENSION OF THE EFFECTIVE PERIOD OF THIS DETERMINATION MUST BE E-FILED AT LEAST 15 DAYS PRIOR TO THE EXPIRATION DATE. AFTER RE-EVALUATION OF CURRENT OPERATIONS IN THE AREA OF THE STRUCTURE TO DETERMINE THAT NO

SIGNIFICANT AERONAUTICAL CHANGES HAVE OCCURRED, YOUR DETERMINATION MAY BE ELIGIBLE FOR ONE EXTENSION OF THE EFFECTIVE PERIOD.

Additional wind turbines or met towers proposed in the future may cause a cumulative effect on the national airspace system. This determination is based, in part, on the foregoing description which includes specific coordinates and heights . Any changes in coordinates will void this determination. Any future construction or alteration requires separate notice to the FAA.

This determination does include temporary construction equipment such as cranes, derricks, etc., which may be used during actual construction of the structure. However, this equipment shall not exceed the overall heights as indicated above. Equipment which has a height greater than the studied structure requires separate notice to the FAA.

This determination concerns the effect of this structure on the safe and efficient use of navigable airspace by aircraft and does not relieve the sponsor of compliance responsibilities relating to any law, ordinance, or regulation of any Federal, State, or local government body.

Any failure or malfunction that lasts more than thirty (30) minutes and affects a top light or flashing obstruction light, regardless of its position, should be reported immediately to (877) 487-6867 so a Notice to Airmen (NOTAM) can be issued. As soon as the normal operation is restored, notify the same number.

If we can be of further assistance, please contact our office at (404) 305-7081. On any future correspondence concerning this matter, please refer to Aeronautical Study Number 2012-WTE-5259-OE.

Signature Control No: 172793197-177052586 (DNE -WT)
Michael Blaich
Specialist

Mail Processing Center
Federal Aviation Administration
Southwest Regional Office
Obstruction Evaluation Group
2601 Meacham Boulevard
Fort Worth, TX 76137

Aeronautical Study No.
2012-WTE-5260-OE

Issued Date: 11/15/2012

Paul Harris
Timbertop Wind I, LLC
1802 Lavaca St.
Suite 200
Austin, TX 78701

**** DETERMINATION OF NO HAZARD TO AIR NAVIGATION ****

The Federal Aviation Administration has conducted an aeronautical study under the provisions of 49 U.S.C., Section 44718 and if applicable Title 14 of the Code of Federal Regulations, part 77, concerning:

Structure:	Wind Turbine Timbertop WTG 6
Location:	Nashua, NH
Latitude:	42-47-48.90N NAD 83
Longitude:	71-53-06.00W
Heights:	1480 feet site elevation (SE)
	499 feet above ground level (AGL)
	1979 feet above mean sea level (AMSL)

This aeronautical study revealed that the structure does not exceed obstruction standards and would not be a hazard to air navigation provided the following condition(s), if any, is(are) met:

As a condition to this Determination, the structure is marked/lighted in accordance with FAA Advisory circular 70/7460-1 K Change 2, Obstruction Marking and Lighting, white paint only - Chapters 12&13(Turbines).

It is required that FAA Form 7460-2, Notice of Actual Construction or Alteration, be e-filed any time the project is abandoned or:

_____ At least 10 days prior to start of construction (7460-2, Part I)
__X__ Within 5 days after the construction reaches its greatest height (7460-2, Part II)

This determination expires on 05/15/2014 unless:

(a) the construction is started (not necessarily completed) and FAA Form 7460-2, Notice of Actual Construction or Alteration, is received by this office.
(b) extended, revised, or terminated by the issuing office.

NOTE: REQUEST FOR EXTENSION OF THE EFFECTIVE PERIOD OF THIS DETERMINATION MUST BE E-FILED AT LEAST 15 DAYS PRIOR TO THE EXPIRATION DATE. AFTER RE-EVALUATION OF CURRENT OPERATIONS IN THE AREA OF THE STRUCTURE TO DETERMINE THAT NO

SIGNIFICANT AERONAUTICAL CHANGES HAVE OCCURRED, YOUR DETERMINATION MAY BE ELIGIBLE FOR ONE EXTENSION OF THE EFFECTIVE PERIOD.

Additional wind turbines or met towers proposed in the future may cause a cumulative effect on the national airspace system. This determination is based, in part, on the foregoing description which includes specific coordinates and heights . Any changes in coordinates will void this determination. Any future construction or alteration requires separate notice to the FAA.

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If we can be of further assistance, please contact our office at (404) 305-7081. On any future correspondence concerning this matter, please refer to Aeronautical Study Number 2012-WTE-5260-OE.

Signature Control No: 172793198-177053018 (DNE -WT)
Michael Blaich
Specialist

Mail Processing Center
Federal Aviation Administration
Southwest Regional Office
Obstruction Evaluation Group
2601 Meacham Boulevard
Fort Worth, TX 76137

Aeronautical Study No.
2012-WTE-5261-OE

Issued Date: 11/15/2012

Paul Harris
Timbertop Wind I, LLC
1802 Lavaca St.
Suite 200
Austin, TX 78701

**** DETERMINATION OF NO HAZARD TO AIR NAVIGATION ****

The Federal Aviation Administration has conducted an aeronautical study under the provisions of 49 U.S.C., Section 44718 and if applicable Title 14 of the Code of Federal Regulations, part 77, concerning:

Structure:	Wind Turbine Timbertop WTG 7
Location:	Nashua, NH
Latitude:	42-47-59.90N NAD 83
Longitude:	71-53-05.80W
Heights:	1450 feet site elevation (SE)
	499 feet above ground level (AGL)
	1949 feet above mean sea level (AMSL)

This aeronautical study revealed that the structure does not exceed obstruction standards and would not be a hazard to air navigation provided the following condition(s), if any, is(are) met:

As a condition to this Determination, the structure is marked/lighted in accordance with FAA Advisory circular 70/7460-1 K Change 2, Obstruction Marking and Lighting, white paint/synchronized red lights - Chapters 4,12&13(Turbines).

It is required that FAA Form 7460-2, Notice of Actual Construction or Alteration, be e-filed any time the project is abandoned or:

_____ At least 10 days prior to start of construction (7460-2, Part I)
__X__ Within 5 days after the construction reaches its greatest height (7460-2, Part II)

This determination expires on 05/15/2014 unless:

(a) the construction is started (not necessarily completed) and FAA Form 7460-2, Notice of Actual Construction or Alteration, is received by this office.
(b) extended, revised, or terminated by the issuing office.

NOTE: REQUEST FOR EXTENSION OF THE EFFECTIVE PERIOD OF THIS DETERMINATION MUST BE E-FILED AT LEAST 15 DAYS PRIOR TO THE EXPIRATION DATE. AFTER RE-EVALUATION OF CURRENT OPERATIONS IN THE AREA OF THE STRUCTURE TO DETERMINE THAT NO

SIGNIFICANT AERONAUTICAL CHANGES HAVE OCCURRED, YOUR DETERMINATION MAY BE ELIGIBLE FOR ONE EXTENSION OF THE EFFECTIVE PERIOD.

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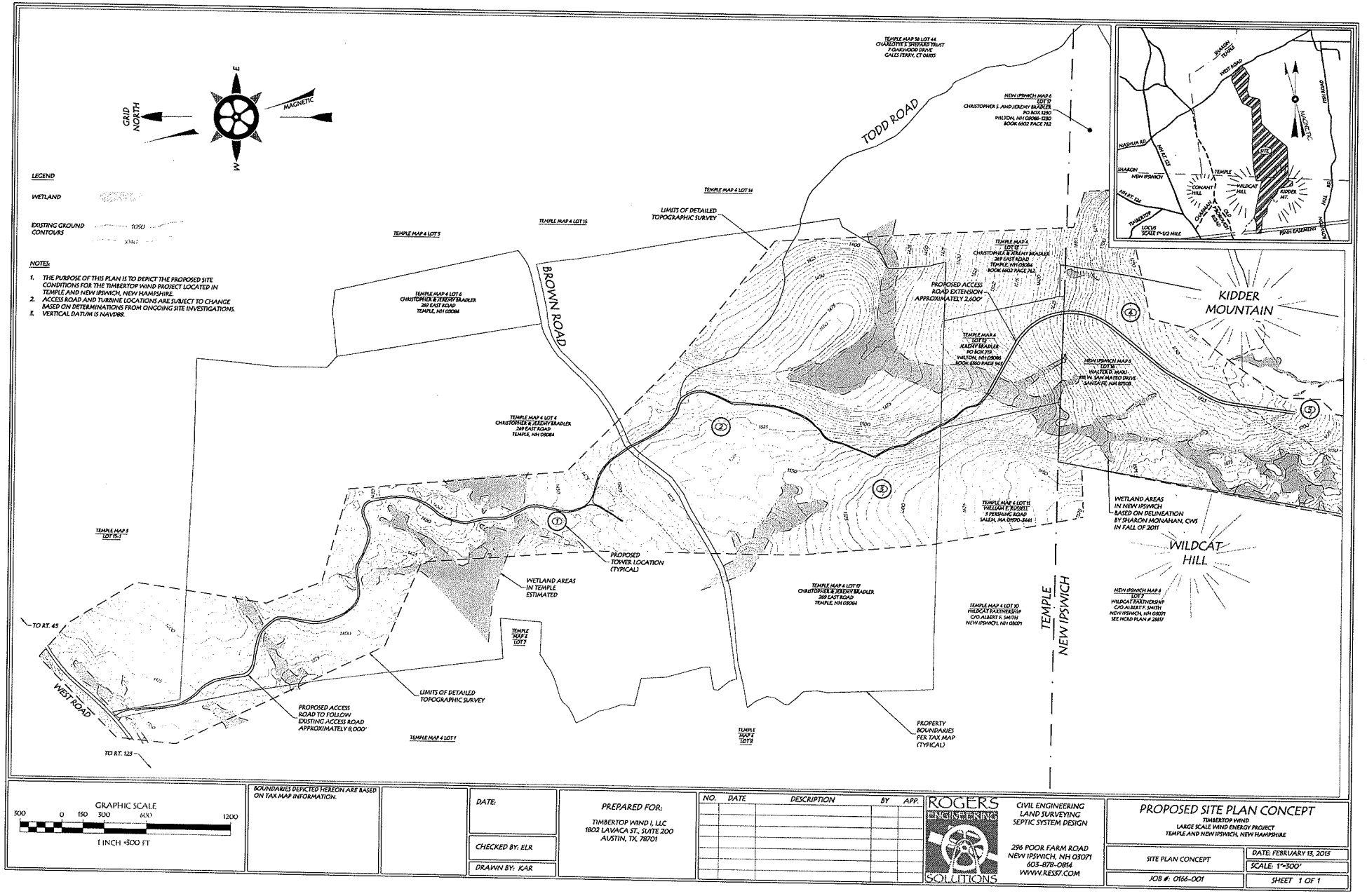
Any failure or malfunction that lasts more than thirty (30) minutes and affects a top light or flashing obstruction light, regardless of its position, should be reported immediately to (877) 487-6867 so a Notice to Airmen (NOTAM) can be issued. As soon as the normal operation is restored, notify the same number.

If we can be of further assistance, please contact our office at (404) 305-7081. On any future correspondence concerning this matter, please refer to Aeronautical Study Number 2012-WTE-5261-OE.

Signature Control No: 172793199-177052588 (DNE -WT)
Michael Blaich
Specialist

ATTACHMENT 7

CURRENT MAP


GRID NORTH
MAGNETIC
LEGEND
WETLAND
EXISTING GROUND CONTOURS
NOTES:
1. THE PURPOSE OF THIS PLAN IS TO DEPICT THE PROPOSED SITE CONDITIONS FOR THE TIMBERTOP WIND PROJECT LOCATED IN TEMPLE AND NEW IPSWICH, NEW HAMPSHIRE.
2. ACCESS ROAD AND TURBINE LOCATIONS ARE SUBJECT TO CHANGE BASED ON DETERMINATIONS FROM ONGOING SITE INVESTIGATIONS.
3. VERTICAL DATUM IS NAVD88.
TODD ROAD
BROWN ROAD
WEST ROAD
TO RT. 45
TO RT. 123
KIDDER MOUNTAIN
WILDCAT HILL
TEMPLE
NEW IPSWICH
LIMITS OF DETAILED TOPOGRAPHIC SURVEY
PROPOSED ACCESS ROAD EXTENSION APPROXIMATELY 2,600'
PROPOSED ACCESS ROAD TO FOLLOW EXISTING ACCESS ROAD APPROXIMATELY 8,000'
PROPOSED TOWER LOCATION (TYPICAL)
WETLAND AREAS IN TEMPLE ESTIMATED
WETLAND AREAS IN NEW IPSWICH BASED ON DELINEATION BY SHARON MONAHAN, CWS IN FALL OF 2011
PROPERTY BOUNDARIES PER TAX MAP (TYPICAL)
TEMPLE MAP 4 LOT 5
TEMPLE MAP 4 LOT 6 CHRISTOPHER & JEREMY BRADLER 269 EAST ROAD TEMPLE, NH 03084
TEMPLE MAP 4 LOT 14
TEMPLE MAP 4 LOT 15
TEMPLE MAP 4 LOT 4 CHRISTOPHER & JEREMY BRADLER 269 EAST ROAD TEMPLE, NH 03084
TEMPLE MAP 4 LOT 1
TEMPLE MAP 4 LOT 17 CHRISTOPHER & JEREMY BRADLER 269 EAST ROAD TEMPLE, NH 03084
TEMPLE MAP 4 LOT 10 WILDCAT PARTNERSHIP C/O ALBERT F. SMITH NEW IPSWICH, NH 03071
TEMPLE MAP 4 LOT 11 WILLIAM F. ROBERT 9 PERSHING ROAD SALEM, MA 01970-3441
TEMPLE MAP 4 LOT 12 CHRISTOPHER & JEREMY BRADLER PO BOX 1230 WILTON, NH 03086 BOOK 6602 PAGE 762
TEMPLE MAP 4 LOT 13 CHRISTOPHER & JEREMY BRADLER 269 EAST ROAD TEMPLE, NH 03084 BOOK 6603 PAGE 762
TEMPLE MAP 4 LOT 12 HARVEY BRADLER PO BOX 775 WILTON, NH 03086 BOOK 6560 PAGE 943
TEMPLE MAP 58 LOT 44 CHARLOTTE S. SHEPARD TRUST 7 OAKWOOD DRIVE OAKS FERRY, CT 06035
NEW IPSWICH MAP 6 LOT 17 CHRISTOPHER S. AND JEREMY BRADLER PO BOX 1230 WILTON, NH 03086-1230 BOOK 6602 PAGE 762
NEW IPSWICH MAP 6 LOT 18 WALTER D. MANN PER IN. SAN MATEO DRIVE SANTA FE, NM 87505
NEW IPSWICH MAP 6 LOT 7 WILDCAT PARTNERSHIP C/O ALBERT F. SMITH NEW IPSWICH, NH 03071 SEE HCRD PLAN # 25651
TEMPLE MAP 5 LOT 16.1
TEMPLE MAP 5 LOT 7
TEMPLE MAP 5 LOT 8
TEMPLE MAP 5 LOT 9
SHARON
NEW IPSWICH
NASHUA RD
WEST RD
MONT. RT. 124
TEMPLE
CONANT HILL
WILDCAT HILL
KIDDER MT.
OLD TEMPLE ROAD
CHERRY HILL ROAD
TIMBERTOP
LOCUS SCALE 1"=1/2 MILE
PSNH EASEMENT
GRAPHIC SCALE
300 0 150 300 600 1200
1 INCH =300 FT
BOUNDARIES DEPICTED HEREON ARE BASED ON TAX MAP INFORMATION.
DATE:
CHECKED BY: ELR
DRAWN BY: KAR
PREPARED FOR:
TIMBERTOP WIND I, LLC
1802 LAVACA ST., SUITE 200
AUSTIN, TX, 78701
NO. DATE DESCRIPTION BY APP.
ROGERS ENGINEERING SOLUTIONS
CIVIL ENGINEERING
LAND SURVEYING
SEPTIC SYSTEM DESIGN
296 POOR FARM ROAD
NEW IPSWICH, NH 03071
603-878-0814
WWW.RES37.COM
PROPOSED SITE PLAN CONCEPT
TIMBERTOP WIND
LARGE SCALE WIND ENERGY PROJECT
TEMPLE AND NEW IPSWICH, NEW HAMPSHIRE
SITE PLAN CONCEPT
DATE: FEBRUARY 13, 2013
SCALE: 1"=300'
JOB #: 0166-001
SHEET 1 OF 1