NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

Division of Fish and Wildlife, New York Natural Heritage Program
625 Broadway, Fifth Floor, Albany, NY 12233-4757
P: (518) 402-8935 | F: (518) 402-8925
www.dec.ny.gov

May 25, 2021

Leigh McEntire
Borrego Solar
30 Century Hill Drive, Suite 301
Latham, NY 12110

Re: 0 Forest Ave - installation of two wind turbines
County: Madison Town/City: City Of Oneida

Dear Leigh McEntire:

In response to your recent request, we have reviewed the New York Natural Heritage Program database with respect to the above project.

We have no records of rare or state-listed animals or plants, or significant natural communities at the project site or in its immediate vicinity.

The absence of data does not necessarily mean that rare or state-listed species, significant natural communities, or other significant habitats do not exist on or adjacent to the proposed site. Rather, our files currently do not contain information that indicates their presence. For most sites, comprehensive field surveys have not been conducted. We cannot provide a definitive statement on the presence or absence of all rare or state-listed species or significant natural communities. Depending on the nature of the project and the conditions at the project site, further information from on-site surveys or other resources may be required to fully assess impacts on biological resources.

This response applies only to known occurrences of rare or state-listed animals and plants, significant natural communities, and other significant habitats maintained in the Natural Heritage database. Your project may require additional review or permits; for information regarding other permits that may be required under state law for regulated areas or activities (e.g., regulated wetlands), please contact the NYS DEC Region 7 Office, Division of Environmental Permits, at dep.r7@dec.ny.gov.

Sincerely,

Heidi Krahling
Environmental Review Specialist
New York Natural Heritage Program

349

EXHIBIT F

7/1/2021

To Whom It May Concern

Borrego Solar Systems, Inc. and its employees and affiliates are hereby authorized to act as our agent for submission of applications and related plans and documents, and to appear before boards and other officials, with respect to obtaining approvals for wind generating installations to be constructed on my property located at 4949 Forest Avenue, Oneida, NY.

Sincerely,

DocuSigned by:

Patrick Starke

E6338EF1BF2A490...

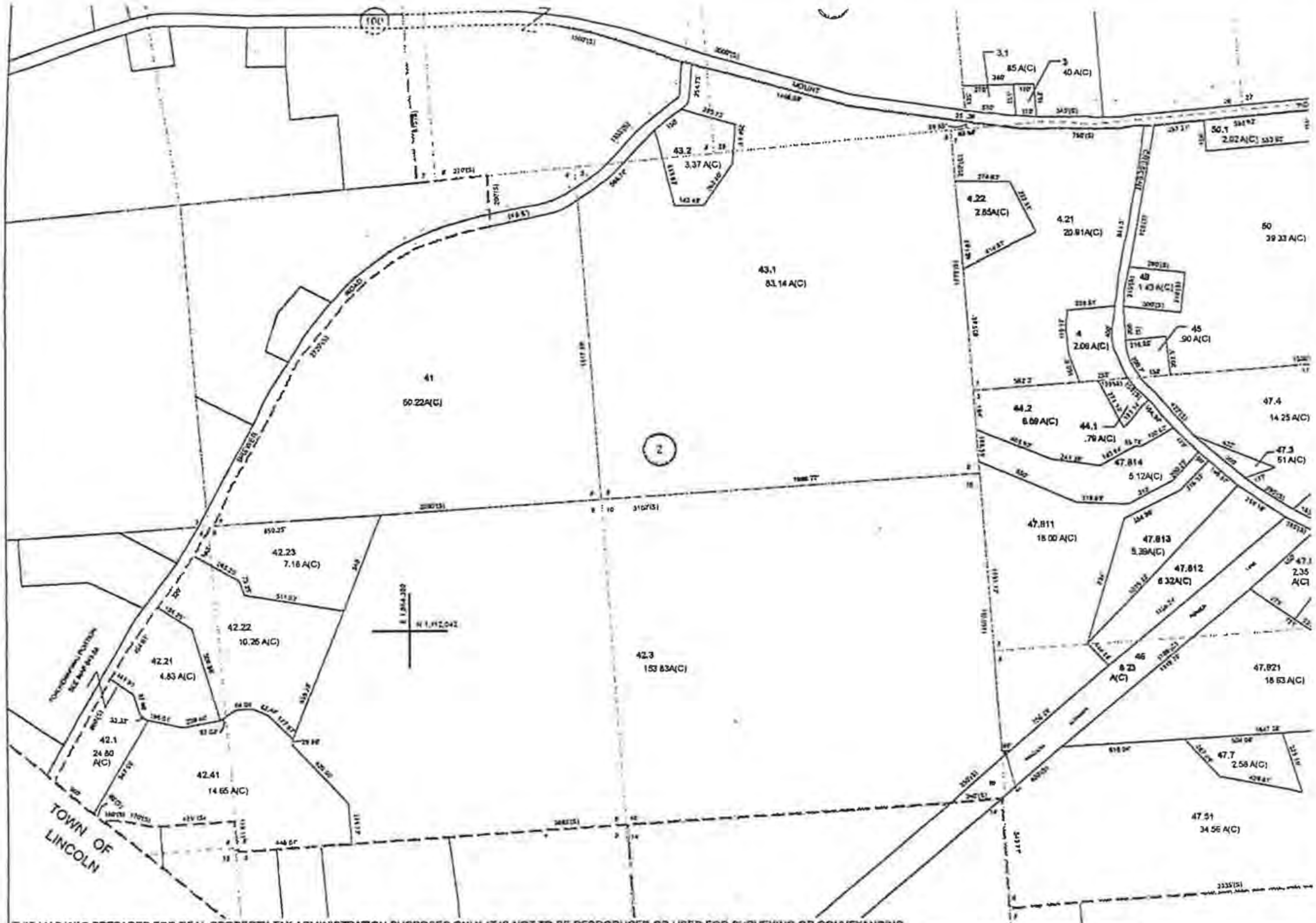
Patrick G.Starke

DocuSigned by:

Nancy Starke

C6338EF1BF2A490...

Nancy L. Starke



THIS MAP WAS PREPARED FOR REAL PROPERTY TAX ADMINISTRATION PURPOSES ONLY. IT IS NOT TO BE REPRODUCED OR USED FOR SURVEYING OR CONVEYANCING.

REAL PROPERTY MAP

PREPARED BY: MADISON COUNTY TAX DEPARTMENT
WAMPSVILLE, NEW YORK

PHOTOGRAMMETRY BY: L. ROBERT KIMBALL
EBENSBURG, PENNA

DATE MAP CREATED: MARCH 1, 1977
DATE CONVERTED TO GIS FORMAT: NOVEMBER 18, 1991
DATE CONVERTED TO GEODATABASE FORMAT: JULY 1, 2010

REVISION TABLE

DATE	MADE BY	CHANGES OR ADDITIONS
7/27/2021	EJC	[illegible]
7/15/2021	EJC	[illegible]
4/14/2021	EJC	[illegible]
4/14/2021	EJC	[illegible]
1/21/2020	EJC	[illegible]
1/25/2014	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]

SPI

SCHOOL: 251100 ONEIDA CITY SD

FIRE: F0171 ONEIDA FIRE DISTRICT

United States Department of the Interior

FISH AND WILDLIFE SERVICE
New York Ecological Services Field Office
3817 Luker Road
Cortland, NY 13045-9385
Phone: (607) 753-9334 Fax: (607) 753-9699
http://www.fws.gov/northeast/nyfo/es/section7.htm

In Reply Refer To: April 12, 2021
Consultation Code: 05E1NY00-2021-SLI-2240
Event Code: 05E1NY00-2021-E-07053
Project Name: 0 Forest Ave - Oneida

Subject: List of threatened and endangered species that may occur in your proposed project location or may be affected by your proposed project

To Whom It May Concern:

The enclosed species list identifies threatened, endangered, proposed and candidate species, as well as proposed and final designated critical habitat, that may occur within the boundary of your proposed project and/or may be affected by your proposed project. The species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. 1531 *et seq*.). This list can also be used to determine whether listed species may be present for projects without federal agency involvement. New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list.

Please feel free to contact us if you need more current information or assistance regarding the potential impacts to federally proposed, listed, and candidate species and federally designated and proposed critical habitat. Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the ESA, the accuracy of this species list should be verified after 90 days. This verification can be completed formally or informally as desired. The Service recommends that verification be completed by visiting the ECOS-IPaC site at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through the ECOS-IPaC system by completing the same process used to receive the enclosed list. If listed, proposed, or candidate species were identified as potentially occurring in the project area, coordination with our office is encouraged. Information on the steps involved with assessing potential impacts from projects can be found at: http://www.fws.gov/northeast/nyfo/es/section7.htm

Please be aware that bald and golden eagles are protected under the Bald and Golden Eagle Protection Act (16 U.S.C. 668 *et seq*.), and projects affecting these species may require development of an eagle conservation plan (http://www.fws.gov/windenergy/eagle_guidance.html). Additionally, wind energy projects should follow the Services wind energy guidelines (http://www.fws.gov/windenergy/) for minimizing impacts to migratory birds and bats.

Guidance for minimizing impacts to migratory birds for projects including communications towers (e.g., cellular, digital television, radio, and emergency broadcast) can be found at: http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/towers.htm; http://www.towerkill.com; and http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/comtow.html.

We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to include conservation of threatened and endangered species into their project planning to further the purposes of the ESA. Please include the Consultation Tracking Number in the header of this letter with any request for consultation or correspondence about your project that you submit to our office.

Attachment(s):

- Official Species List

Official Species List

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

This species list is provided by:

New York Ecological Services Field Office
3817 Luker Road
Cortland, NY 13045-9385
(607) 753-9334

Project Summary

Consultation Code: 05E1NY00-2021-SLI-2240
Event Code: 05E1NY00-2021-E-07053
Project Name: 0 Forest Ave - Oneida
Project Type: POWER GENERATION
Project Description: wind power generation
Project Location:

Approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/@43.045699049999996,-75.66869116892852,14z

Counties: Madison County, New York

Endangered Species Act Species

There is a total of 0 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries[1], as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

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1. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

Critical habitats

THERE ARE NO CRITICAL HABITATS WITHIN YOUR PROJECT AREA UNDER THIS OFFICE'S JURISDICTION.

EDR

Memorandum

To: Brandon Smith and Lydia Lake (Borrego Solar Systems, Inc.)

From: Environmental Design & Research, D.P.C. (EDR)

Date: January 11, 2022

Reference: Oneida Wind Project Listed Species Investigation

EDR Project No: 21176

Introduction

On behalf of Borrego Solar Systems, Inc. (the Client), Environmental Design & Research, Landscape Architecture, Engineering & Environmental Services, D.P.C. (EDR) conducted a desktop review of publicly available data to provide information about the potential for state-listed threatened or endangered species to occur in the vicinity of the proposed Oneida Wind Project (the Project) located in the Town of Oneida, Madison County, New York (see Attachment 1, Figure 1).

On May 25, 2021, the Client received a letter in response to a request submitted to the New York Natural Heritage Program (NYNHP) indicating that there were no known records of state-listed threatened or endangered species in the vicinity of the Project. To investigate this issue further, EDR reviewed data from eBird, the New York State Department of Environmental Conservation (NYSDEC) Environmental Resource Mapper (ERM), the NYSDEC Environmental Assessment Form (EAF) Mapper, the New York State Breeding Bird Atlas, and the U.S. Fish and Wildlife Service (USFWS) online Information for Planning and Consultation (IPaC) system to determine if there were other records of state-listed threatened or endangered species occurring in the vicinity of the Project Site (see Attachment 1, Figure 2).

In addition, EDR conducted a reconnaissance-level site visit on November 18, 2021 to evaluate habitat conditions on the Project Site. This memorandum summarizes the publicly available databases considered by EDR and the findings of the desktop review. This memorandum also identifies the existing habitat conditions and features evaluated for listed species within the proposed Project Site during the reconnaissance-level site visit.

Findings

Avian Species

The eBird database, managed by the Cornell Laboratory of Ornithology, is an on-line database of bird observations collected by citizen scientists around the world and vetted by regional experts. Data are used to document bird distribution, abundance, habitat use, and trends within a simple, scientific framework to help inform bird research worldwide (eBird, 2021a). The nearest eBird hotspot, Mount Hope Park, is located approximately 2 miles northeast of the Project Site. Since 2016, a total of 74 bird species have been observed at this hotspot. Within the last five years, one state-listed threatened bird species (northern harrier [*Circus cyaneus*; also known as *Circus hudsonius*]) and one state-listed bird species of special concern (Cooper's hawk [*Accipiter cooperii*]) have been observed at this hotspot. EDR's habitat assessment for these species is provided below.

- The northern harrier is a slender-bodied hawk with long wings and a long tail. Key identifying characteristics include a facial ruff that gives the species an owl-like appearance, a white rump, and specialized foraging behavior (coursing and gliding low over fields and marshes). This species' diet consists of rodents and small birds. Northern harriers use a wide range of habitats including open grasslands, agricultural fields, prairies, shrubland, successional old fields, and both saltwater and freshwater marshes (Cornell Lab of Ornithology, 2021; NYNHP, 2021). Both wet and dry habitats are suitable where there is good ground cover. During the breeding season, nests are built of grasses and sticks on the ground in grassland or marshes within areas of tall, dense cover. In New York State, northern harriers are confirmed breeders in the western Great Lakes plains, open habitats of the Adirondacks, the western Finger Lakes, Long Island, and within the Hudson, St. Lawrence, and Lake Champlain valleys. Their winter range is similar, and use of specific areas for foraging and/or roosting typically depends on remnant vegetation height and density, prey abundance, and snow cover.

- The reconnaissance-level site visit indicated that there are some open field areas within the proposed Project Site that could potentially be suitable for use grassland bird species, including northern harriers. However, in general, these open areas are: (1) relatively small in size; surrounded by advancing successional shrubland and/or forestland; and (3) are broken up or partially isolated by wooded hedgerows/islands. Therefore, large expanses of open, contiguous grassland are not present within the Project Site, and suitability of on-site fields and shrubland for use by northern harriers may be relatively limited. Open areas within the Project Site are shown in Attachment 2. Beyond the Project Site boundaries, EDR identified an open field area to the west/southwest that may be more suitable for use by northern harriers given its current successional condition and size (approximately 31 acres).

- The Cooper's hawk is a woodland raptor that uses deciduous, mixed, and coniferous woodlands for nesting and feeding, as well as urban and suburban areas (Cornell Lab of Ornithology, 2021). Forested habitat that could potentially support nesting and/or foraging Cooper's hawks was identified within and adjacent to the proposed Project Site (see Attachment 2, Photos 3 and 6).

The second-closest eBird hotspot is the Madison County Landfill, which is located approximately 4 miles west of the proposed Project Site. Since 2016, a total of 34 bird species have been observed at this hotspot. Within the last five years, one state-listed endangered bird species (peregrine falcon [*Falco peregrinus*]) and one state-listed threatened bird species (bald eagle [*Haliaeetus leucocephalus*]) have been observed. EDR's habitat assessment for these species is provided below.

- The peregrine falcon often nests on ledges or holes on the faces of rocky cliffs, and in more urban areas, on artificial structures such as bridges and tall buildings (NYNHP, 2021b). Wintering peregrine falcons frequently utilize buildings, towers, and steeples in urban areas, and open areas with plentiful prey in more natural settings (NYNHP, 2021b). Based on the results of EDR's site visit, suitable habitat for peregrine falcons (i.e., cliffs or tall structures) does not appear to be present on or adjacent to the proposed Project Site (see Attachment 2, Photos 1 and 9).

- In New York State, bald eagles usually winter and breed in undisturbed areas with large bodies of water that support high populations of fish and waterfowl, their primary food sources. Large, heavy nests are typically built in tall pine, spruce, fir, cottonwood, oak, poplar, or beech trees (NYNHP, 2021c). Although the proposed Project Site contains deciduous forests composed of oak and beech trees, these areas do not appear to provide suitable breeding or wintering habitat for bald eagles, as there are no nearby areas of open water that could provide their primary food sources.

The ERM is an interactive mapping application developed by the NYSDEC that can be used to identify some of New York State's natural resources and environmental features that are state or federally protected, or of conservation concern (NYSDEC, 2021a). Specifically, the maps display general areas where rare animals and rare plants have been documented by the NYNHP. The ERM desktop analysis did not indicate the known presence of any state-listed species in the vicinity of the Project Site. However, the ERM did identify an area approximately 2 miles south of the proposed Project Site where unspecified animals listed as endangered or threatened had been identified.

The EAF Mapper is a tool developed by the NYSDEC that searches multiple Geographic Information System (GIS) data sets within a user-defined project area. Review of the EAF Mapper did not identify any state-listed species or endangered and threatened species habitat occurring in the vicinity of the proposed Project Site.

The New York State Breeding Bird Atlas (BBA) is a statewide inventory of all breeding birds (eBird, 2021b). The first atlas inventory was conducted from 1980 – 1985, the second from 2000 – 2005 (BBA II), and NYSDEC is currently working with agency and conservation partners to conduct the third atlas inventory from 2020 – 2024. Field work is conducted by dividing the state into blocks of approximately 9 square miles, within which volunteers record all the bird species observed during the breeding season and document evidence of breeding activity (NYSDEC, 2021b). The proposed Project is located in Block 4476A. The only data available for review on the NYSDEC website was from BBA II efforts (2000 – 2005). Most of the species recorded are common birds of the field and forest habitats present in the region, and no state-listed threatened or endangered species were identified.

Other Listed Species

A shapefile of the Project Site was upload to the USFWS IPaC system on January 6, 2022. According to the IPaC system, no federally listed threatened or endangered species were identified as occurring within the boundaries of the Project Site.

Conclusions

In summary, publicly available data sources were queried to identify threatened and endangered species that have the potential to be present within the Project Site. This review suggested that the proposed Project Site is likely to include a wildlife community dominated by relatively common species typically found in agricultural, scrub-shrub, and forested habitats. Based on state-listed species with documented occurrences in the vicinity of the proposed Project Site within the past five years, and a reconnaissance-level site visit conducted to evaluate habitat suitability, EDR determined that potential habitat may be present within and/or adjacent to the Project Site for two listed species: Cooper’s hawk and northern harrier. Specifically, suitable habitat for Cooper’s hawk appears to be present within forestland located on and adjacent to the Project Site. Potentially suitable habitat for northern harrier may be present within some on-site open areas, although an open field area located west/southwest of (and adjacent to) the Project Site may be more suitable given its larger size and more open character. The suitability of on-site open areas appears to be limited by small open field patch size, relatively high woody vegetation cover (and advancing succession), and the presence of wooded hedgerows that may serve to isolate open fields. Suitable habitat for peregrine falcon and bald eagle is unlikely to be present within the Project Site given these species' more specialized habitat requirements and the lack of required features (e.g., tall structures or cliffs for nesting, open water areas for foraging).

Attachments: Attachment 1: Figures
Attachment 2: Representative Photographs

REFERENCES

Cornell Lab of Ornithology. 2021. *All About Birds*. Ithaca, New York. Available at: https://www.allaboutbirds.org/news/ (Accessed November 2021).

eBird. 2021a. *Hotspots*. Cornell Lab of Ornithology, Ithaca, New York. Available at: https://ebird.org/ hotspots (Accessed November 2021).

eBird. 2021b. *New York State Breeding Bird Atlas III*. Cornell Lab of Ornithology, Ithaca, New York. Available at: https://ebird.org/atlasny (Accessed November 2021).

NYNHP. 2021a. *Online Conservation Guide for Circus hudsonius*. Available at: https://guides.nynhp.org/northern-harrier (Accessed November 2021).

NYNHP. 2021b. *Online Conservation Guide for Falco peregrinus.* Available at: https://guides.nynhp.org/peregrine-falcon (Accessed November 2021).

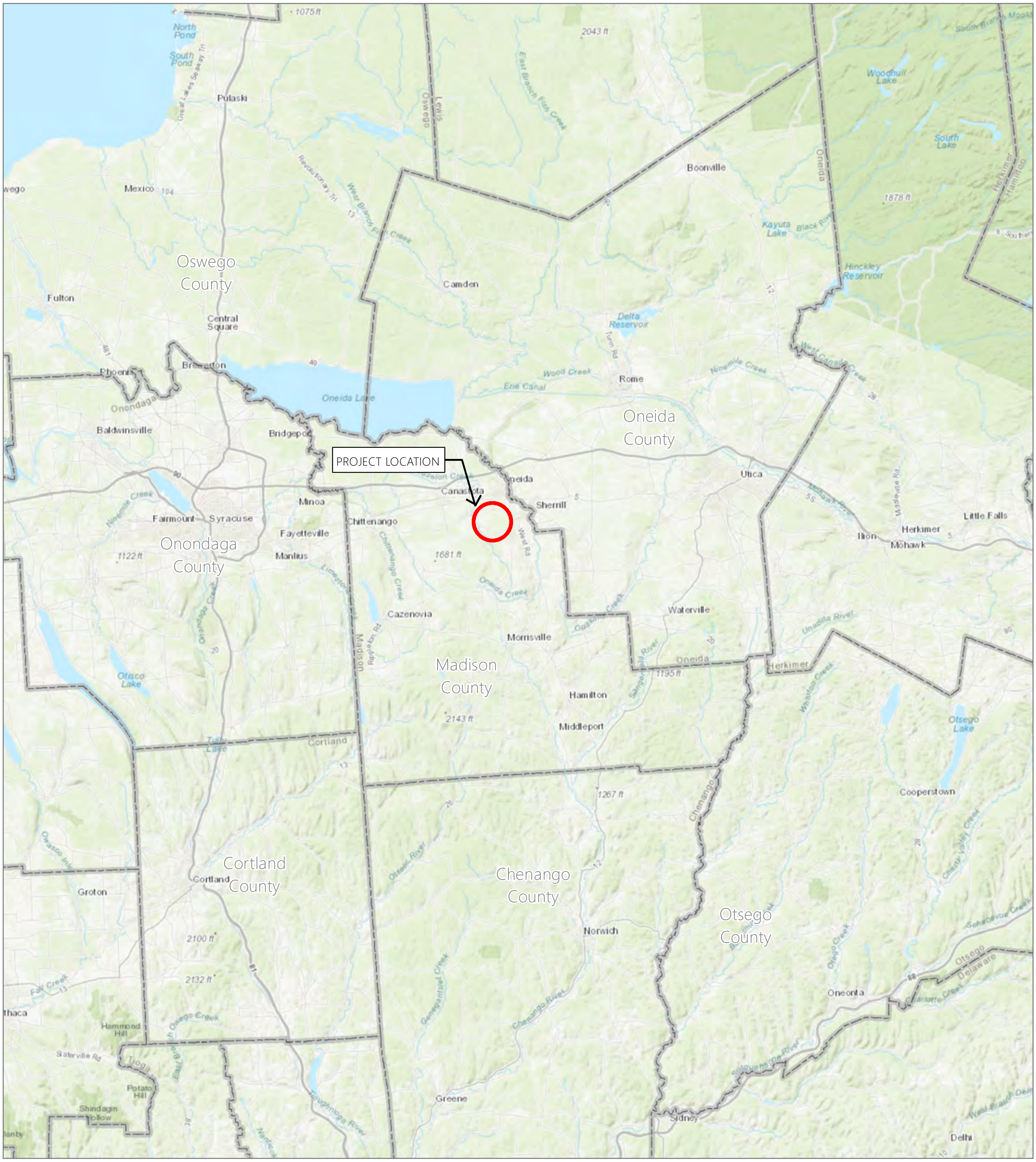
NYNHP. 2021c. *Online Conservation Guide for Haliaeetus leucocephalus.* Available at: https://guides.nynhp.org/bald-eagle (Accessed November 2021).

NYSDEC. 2021a. *Environmental Resource Mapper*. Division of Fish and Wildlife. Available at: https://www.dec.ny. gov/animals/38801.html (Accessed November 2021).

NYSDEC. 2021b. *New York State Breeding Bird Atlas*. Bureau of Wildlife. Available at: https://www.dec.ny.gov/animals/7312.html (Accessed November 2021).

Attachment 1: Figures

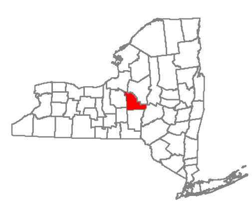
Figure 1. Regional Project Location



Oneida Wind

Town of Oneida, Madison County, New York

Listed Species Investigation



0 2.5 5 10
Miles

Prepared December 10, 2021
Basemap: ESRI ArcGIS Online "World Topographic Map" map service

EDR

Figure 1. Study Area

Oneida Wind

Town of Oneida, Madison County, New York

Listed Species Investigation

EDR

Prepared January 4, 2022
Basemap:Esri ArcGIS Online "World Imagery" map service.

Attachment 2: Representative Photographs

Photo 1

Representative photo of mowed trails found throughout the Southern portion of the proposed Project Site

Photo 2

Representative photo of successional old field/shrubland communities within the Northwest portion of the Project Site

Photo 3

Representative photo of open pastureland within the Western portion of the proposed Project Site and adjacent white pine stand.

Photo 4

Representative photo of adjacent property pastureland West of Project Site.

Photo 5

Representative photo of deciduous hardwood forest within the Northern portion of the Project Site

Photo 6

Mowed meadow with adjacent deciduous forest habitat in the Northern portion of Project Site

Photo 7

Representative photo of a mowed area within the Northwestern portion of the Project Site

Photo 8

Representative photo of successional old field/shrubland communities within the Northeastern portion of the Project Site

SOUND LEVEL MODELING REPORT

Forest Avenue Wind Project
City of Oneida, New York

Prepared for:

New Leaf Energy, Inc.
55 Technology Drive Suite 102
Lowell, MA 01851

Prepared by:

Epsilon Associates, Inc.
3 Mill & Main Place, Suite 250
Maynard, MA 01754

March 22, 2023

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LIST OF APPENDICES

LIST OF FIGURES

1.0 EXECUTIVE SUMMARY

The Forest Ave Wind Project (the Project) is a proposed wind power generation facility expected to consist of one (1) wind turbine in the City of Oneida, New York. The Project is being developed by New Leaf Energy, Inc. (New Leaf). Epsilon Associates Inc. (Epsilon) has been retained by New Leaf to conduct a sound level modeling study for this Project. This report presents results of the sound level modeling of the proposed wind turbine.

This sound level assessment includes computer modeling to predict worst-case future L_{eq} sound levels from the Project and a comparison of operational sound levels to the City of Oneida Local Law Audible Noise Standard for wind turbines of 45 dBA at the project boundary line. This assessment also presents additional information about several aspects of sound from wind turbines including infrasound, low frequency sound, pure tones, repetitive and impulsive sounds. New Leaf is considering three potential wind turbine models for the Project, therefore the analysis was conducted for three different scenarios: one (1) Vestas V150-4.3 wind turbine; one (1) GE 3.4-140 wind turbine; and one (1) Vensys 163-3.5 wind turbine.

Using the mitigation described in this report, the 45 dBA sound contour is entirely contained within the Project boundary with any of the three potential wind turbine models; therefore, the Project meets the City's Audible Noise Standard for wind turbines.

2.0 INTRODUCTION

The proposed Project will consist of one (1) wind turbine. New Leaf is considering three different wind turbines: a Vestas V150-4.3 unit with a hub height of 90 meters, a GE 3.4-140 unit with a hub height of 98 meters, or a Vensys 136 3.5 unit with a hub height of 100 meters. Figure 2-1 shows the location of the wind turbine in the City of Oneida over aerial imagery.

A detailed discussion of sound from wind turbines is presented in a white paper prepared by the Renewable Energy Research Laboratory.[1] A few points are repeated herein. Wind turbine sound can originate from two different sources: mechanical sound from the interaction of turbine components, and aerodynamic sound produced by the flow of air over the rotor blades. Prior to the 1990's, both were significant contributors to wind turbine sound. However, recent advances in wind turbine design have greatly reduced the contribution of mechanical sound. Aerodynamic sound has also been reduced from modern wind turbines due to slower rotational speeds and changes in materials of construction. Aerodynamic sound, in general, is broadband (has contributions from a wide range of frequencies). It originates from encounters of the wind turbine blades with localized airflow inhomogeneities and wakes from other turbine blades and from airflow across the surface of the blades, particularly the front and trailing edges. Aerodynamic sound generally increases with increasing wind speed up to a certain point, then typically remains constant, even with higher wind speeds. However, sound levels in general also increase with increasing wind speed with or without the presence of wind turbines.

This report presents the findings of a sound level modeling analysis for the Project. The Project wind turbine was modeled in CadnaA using sound data from Vestas, GE, and Vensys technical reports. The results of this analysis are found within this report.

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1 Renewable Energy Research Laboratory, Department of Mechanical and Industrial Engineering, University of Massachusetts at Amherst, Wind Turbine Acoustic Noise, June 2002, amended January 2006.

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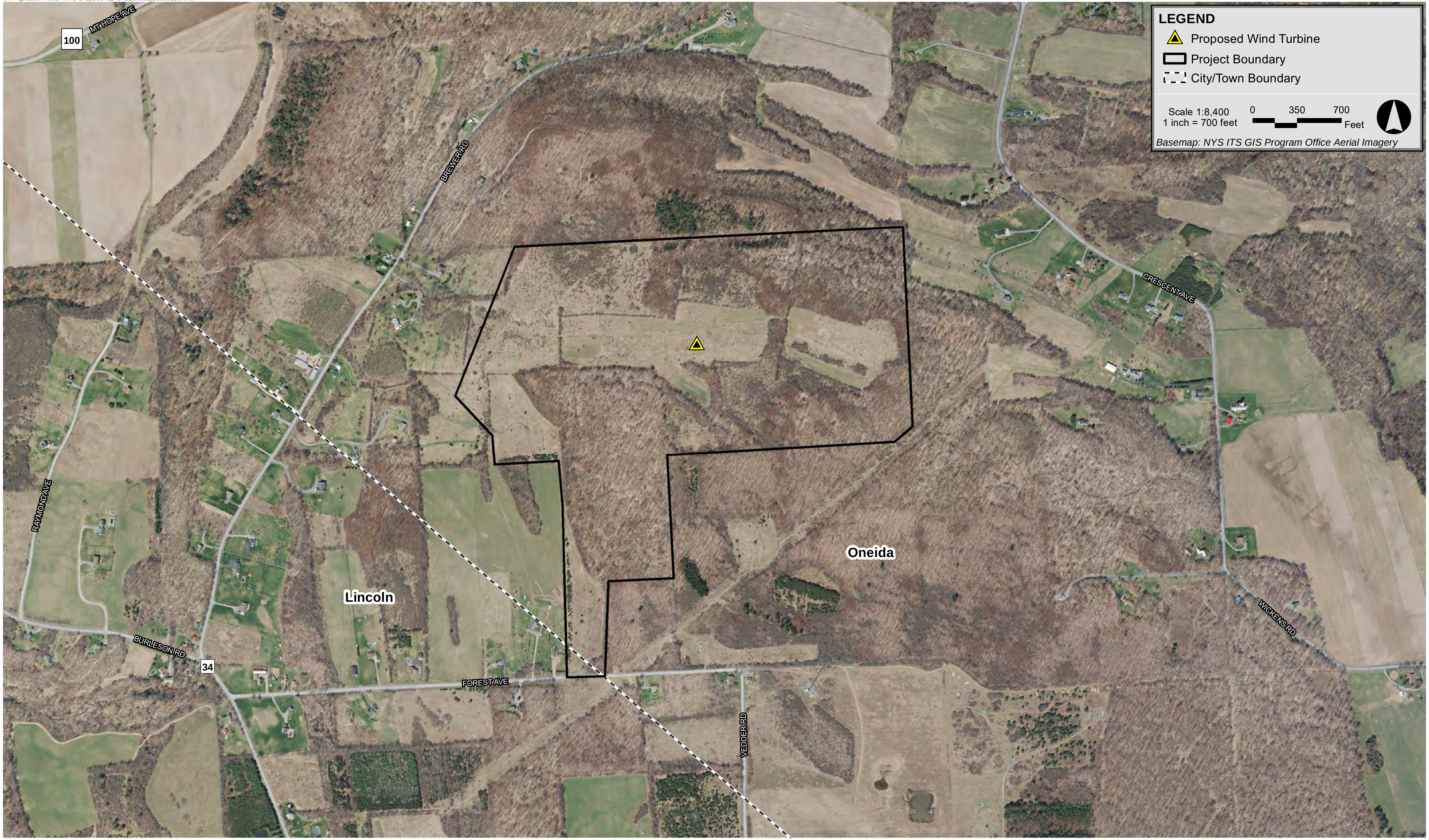

Forest Ave Wind **City of Oneida, New York**

Epsilon ASSOCIATES INC.

Figure 2-1

Aerial Locus

3.0 SOUND TERMINOLOGY

There are several ways in which sound levels are measured and quantified. All of them use the logarithmic decibel (dB) scale. The following information defines the sound level terminology used in this analysis.

The decibel scale is logarithmic to accommodate the wide range of sound intensities found in the environment. A property of the decibel scale is that the sound pressure levels of two or more separate sounds are not directly additive. For example, if a sound of 50 dB is added to another sound of 50 dB, the total is only a 3-decibel increase (53 dB), which is equal to doubling in sound energy, but not equal to a doubling in decibel quantity (100 dB). Thus, every 3-dB change in sound level represents a doubling or halving of sound energy. The human ear does not perceive changes in the sound pressure level as equal changes in loudness. Scientific research demonstrates that the following general relationships hold between sound level and human perception for two sound levels with the same or very similar frequency characteristics[2]:

- 3 dBA increase or decrease results in a change in sound that is just perceptible to the average person,
- 5 dBA increase or decrease is described as a clearly noticeable change in sound level, and
- 10 dBA increase or decrease is described as twice or half as loud.

Another mathematical property of decibels is that if one source of sound is at least 10 dB louder than another source, then the total sound level is simply the sound level of the higher-level source. For example, a sound source at 60 dB plus another sound source at 47 dB is equal to 60 dB.

A sound level meter (SLM) that is used to measure sound is a standardized instrument.[3] It contains "weighting networks" (e.g., A-, C-, Z-weightings) to adjust the frequency response of the instrument. Frequencies, reported in Hertz (Hz), are detailed characterizations of sounds, often addressed in musical terms as "pitch" or "tone". The most commonly used weighting network is the A-weighting because it most closely approximates how the human ear responds to sound at various frequencies. The A-weighting network is the accepted scale used for community sound level measurements; therefore, sounds are frequently reported as detected with a sound level meter using this weighting. A-weighted sound levels emphasize middle frequency sounds (i.e., middle pitched – around 1,000 Hz), and de-emphasize low and high frequency sounds. These sound levels are reported in decibels designated as "dBA". The C-weighting network has a nearly flat response for frequencies between 63 Hz and 4,000 Hz and is noted as dBC. Z-weighted sound levels are measured sound levels without any weighting curve and are otherwise referred

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2 Bies, David, and Colin Hansen. 2009. *Engineering Noise Control: Theory and Practice*, 4th Edition. New York: Taylor and Francis.

3 *American National Standard Specification for Sound Level Meters*, ANSI S1.4-1983 (R2006), published by the Standards Secretariat of the Acoustical Society of America, Melville, NY.

to as “unweighted”. Sound pressure levels for some common indoor and outdoor environments are shown in Figure 3-1.

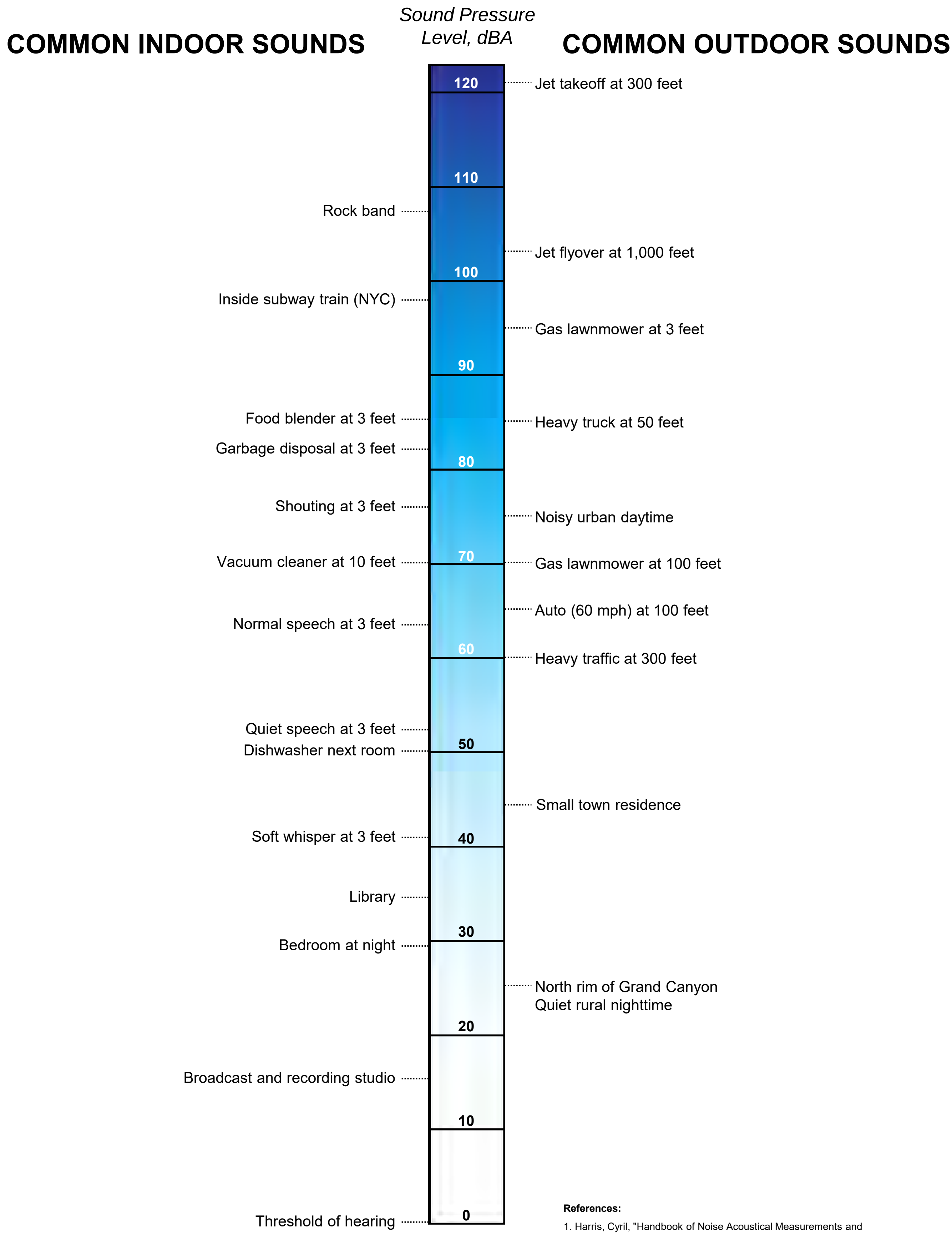
Because the sounds in our environment vary with time they cannot simply be described with a single number. Two methods are used for describing variable sounds. These are exceedance levels and the equivalent level, both of which are derived from some number of moment-to-moment A-weighted sound level measurements. Exceedance levels are values from the cumulative amplitude distribution of all of the sound levels observed during a measurement period. Exceedance levels are designated L_n, where n can have a value between 0 and 100 in terms of percentage. Several sound level metrics that are commonly reported in community sound level monitoring are described below.

- L_{10} is the sound level exceeded only 10 percent of the time. It is close to the maximum level observed during the measurement period. The L_{10} is sometimes called the intrusive sound level because it is caused by occasional louder sounds like those from passing motor vehicles.

- L_{50} is the sound level exceeded 50 percent of the time. It is the median level observed during the measurement period. The L_{50} is affected by occasional louder sounds like those from passing motor vehicles; however, it is often found comparable to the equivalent sound level under relatively steady sound level conditions.

- L_{90} is the sound level exceeded 90 percent of the time during the measurement period. The L_{90} is close to the lowest sound level observed. It is essentially the same as the residual sound level, which is the sound level observed when there are no obvious nearby intermittent sound sources.

- L_{eq}, the equivalent level, is the level of a hypothetical steady sound that would have the same energy (*i.e.,* the same time-averaged mean square sound pressure) as the actual fluctuating sound observed. The equivalent level is designated L_{eq} and is typically A-weighted. The equivalent level represents the time average of the fluctuating sound pressure, but because sound is represented on a logarithmic scale and the averaging is done with linear mean square sound pressure values, the L_{eq} is mostly determined by loud sounds if there are fluctuating sound levels.



References:

1. Harris, Cyril, "Handbook of Noise Acoustical Measurements and Noise Control", p 1-10., 1998
2. "Controlling Noise", USAF, AFMC, AFDTC, Elgin AFB, Fact Sheet, August 1996
3. California Dept. of Trans., "Technical Noise Supplement", Oct, 1998

Figure 3-1

Common Indoor and Outdoor Sound Levels

4.0 REGULATIONS

4.1 Federal Regulations

There are no federal community noise regulations applicable to this Project.

4.2 New York State Regulations

There are no state community noise regulations applicable to this Project.

4.3 City of Oneida Local Law

The Project is subject to the following requirements in Chapter 190-26.2 of the Oneida City Code:

(8) Noise Requirements. The applicant shall adhere to the following noise requirements:

a) Compliance with noise regulations is required. A WECS permit shall not be granted unless the applicant demonstrates that the proposed project complies with all noise regulations.

b) Noise study required. The applicant shall submit a noise study based on the requirements set out in Subsection B of this section. The Director of Planning with the assistance of a technical consultant, or City Engineer shall determine the adequacy of the noise study and, if necessary, may require further submissions. The noise study shall consider the following:

1) Low-frequency noise.

2) Infrasound noise.

3) Pure tone.

4) Repetitive/impulsive sound.

c) Noise setbacks. The Joint Zoning Board of Appeals/Planning Commission may impose a noise setback that exceeds the other setbacks out in this section if it deems that such greater setbacks are necessary to protect the public health, safety and welfare of the community.

d) Audible noise standard. The audible noise standard due to wind turbine operations shall not be created which causes the noise level at the boundary of the proposes project site to exceed the greater of 45 dB(A) for more than five minutes out of any one-hour time period or 6 dB(A) greater than the prevailing background noise.

e) *Operations, low frequency noise. A WECS facility shall not be operated so that impulsive sound below 20 Hz adversely affects the habitability or use of any dwelling unit, hospital, school, library, nursing home, or other sensitive noise receptors.*

f) *Noise complaint and investigation process required. The applicant shall submit a noise complaint and investigation process. The Joint Zoning Board of Appeals/Planning Commission shall determine the adequacy of the noise complaint and investigation process.*

5.0 MODELED SOUND LEVELS

5.1 Sound Sources

5.1.1 Project Wind Turbine

The sound level analysis for the Project includes one (1) wind turbine. The Project will consist of either one Vestas V150-4.3 unit with Serrated Trailing Edge (STE) blades, one GE 3.4-140 unit with Low Noise Trailing Edge (LNTE) blades, or one (1) Vensys 136-3.5 unit.

The V150-4.3 wind turbine has a rotor diameter of 150 meters. The wind turbine has a hub height of 90 meters. A technical report from Vestas[4] was provided to Epsilon which documented the expected sound power levels associated with the V150-4.3 under normal operation and also for low noise modes.

The GE 3.4-140 wind turbine has a rotor diameter of 140 meters. The wind turbine has a hub height of 98 meters. A technical report from GE[5] was provided to Epsilon which documented the expected sound power levels associated with the GE 3.4-140 under normal operation and also for Noise Reduced Operation (NRO) modes.

The Vensys 136-3.5 wind turbine has a rotor diameter of 136 meters. The wind turbine has a hub height of 100 meters. A technical report from Vensys[6] was provided to Epsilon which documented the expected sound power levels associated with the Vensys 136-3.5 under normal operation and also for low noise modes.

5.2 Modeling Methodology

The sound impacts associated with the proposed wind turbine was predicted using the CadnaA sound level calculation software developed by DataKustik GmbH. This software uses the ISO 9613-2 international standard for sound propagation.[7] The benefits of this software are a more refined set of computations due to the inclusion of topography, ground attenuation, multiple building reflections (if applicable), drop-off with distance, and atmospheric absorption. The CadnaA software allows for octave band calculation of sound from multiple sources as well as computation of diffraction.

Inputs and significant parameters employed in the model are described below.

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[4] Restricted V150-4.3 MW Third Octave Noise Emission, 2-8-2023.

[5] General Electric Company, Technical Documentation Wind Turbine Generator Systems Sierra 140 – 60 Hz Product Acoustic Specifications, 2022.

[6] Power Curves and Sound Power Levels Vensys 136-3.5 MW, 2020.

[7] *Acoustics – Attenuation of sound during propagation outdoors – Part 2: General method of calculation,* International Standard ISO 9613-2:1996 (International Organization for Standardization, Geneva, Switzerland, 1996).

- *Project Layout:* This analysis is for the wind turbine location provided to Epsilon by New Leaf. The proposed Project layout is identified in Figure 5-1 and location coordinates are provided in Appendix A.
- *Modeling Receptor Locations:* Epsilon generated a modeling receptor dataset consisting of 661 receptors via desktop analysis. The dataset is representative of structures within two miles of the project. All modeling receptors were input as discrete points at a height of 1.5 meters above ground level to mimic the ears of a typical standing person.
- *Modeling Grid:* A modeling grid with 20-meter spacing was calculated for the entire Project Area and the surrounding region. The grid was modeled at a height of 1.5 meters above ground level for consistency with the discrete modeling points. This modeling grid allowed for the creation of sound level isolines.
- *Terrain Elevation:* Elevation contours for the modeling domain were directly imported into CadnaA which allowed for consideration of terrain shielding where appropriate. The terrain height contour elevations for the modeling domain were generated from elevation information derived from the National Elevation Dataset (NED) developed by the U.S. Geological Survey.
- *Source Sound Levels:* Sound power levels used in the modeling were described in Section 4.1. Documentation from Vestas, GE, or Vensys provided levels that represent "worst-case" operational sound level emissions for the Project's proposed wind turbine.
- *Meteorological Conditions:* A temperature of 10°C (50°F) and a relative humidity of 70% was assumed in the model.
- *Ground Attenuation:* Spectral ground absorption was calculated using a G-factor of 0 which corresponds to "hard ground" consisting of a hard ground surface. The model, consistent with the standard, allows inputs between 0 (hard ground) and 1 (porous ground). This is a conservative approach as the vast majority of the area is actually agricultural.

Octave band sound power levels corresponding to the highest available wind turbine broadband sound power level for the wind turbine were input into CadnaA to model wind turbine generated broadband sound pressure levels during conditions when worst-case sound power levels are expected. Sound pressure levels were modeled at 661 receptors within the vicinity of the Project. In addition to modeling at discrete points, sound levels were also modeled throughout a large grid of points, each spaced 20 meters apart to allow for the generation of sound level isolines.

Several modeling assumptions inherent in the ISO 9613-2 calculation methodology, or selected as conditional inputs by Epsilon, were implemented in the CadnaA model to ensure conservative results (i.e., higher sound levels), and are described below:

- All modeled sources were assumed to be operating simultaneously and at the design wind speed corresponding to the greatest sound level impacts.

- As per ISO 9613-2, the model assumed favorable conditions for sound propagation, corresponding to a moderate, well-developed ground-based temperature inversion, as might occur on a calm, clear night or equivalently downwind propagation.
- Meteorological conditions assumed in the model (T=10℃/RH=70%) were selected to minimize atmospheric attenuation in the 500 Hz and 1 kHz octave bands where the human ear is most sensitive.
- No additional attenuation due to tree shielding, air turbulence, or wind shadow effects was considered in the model.

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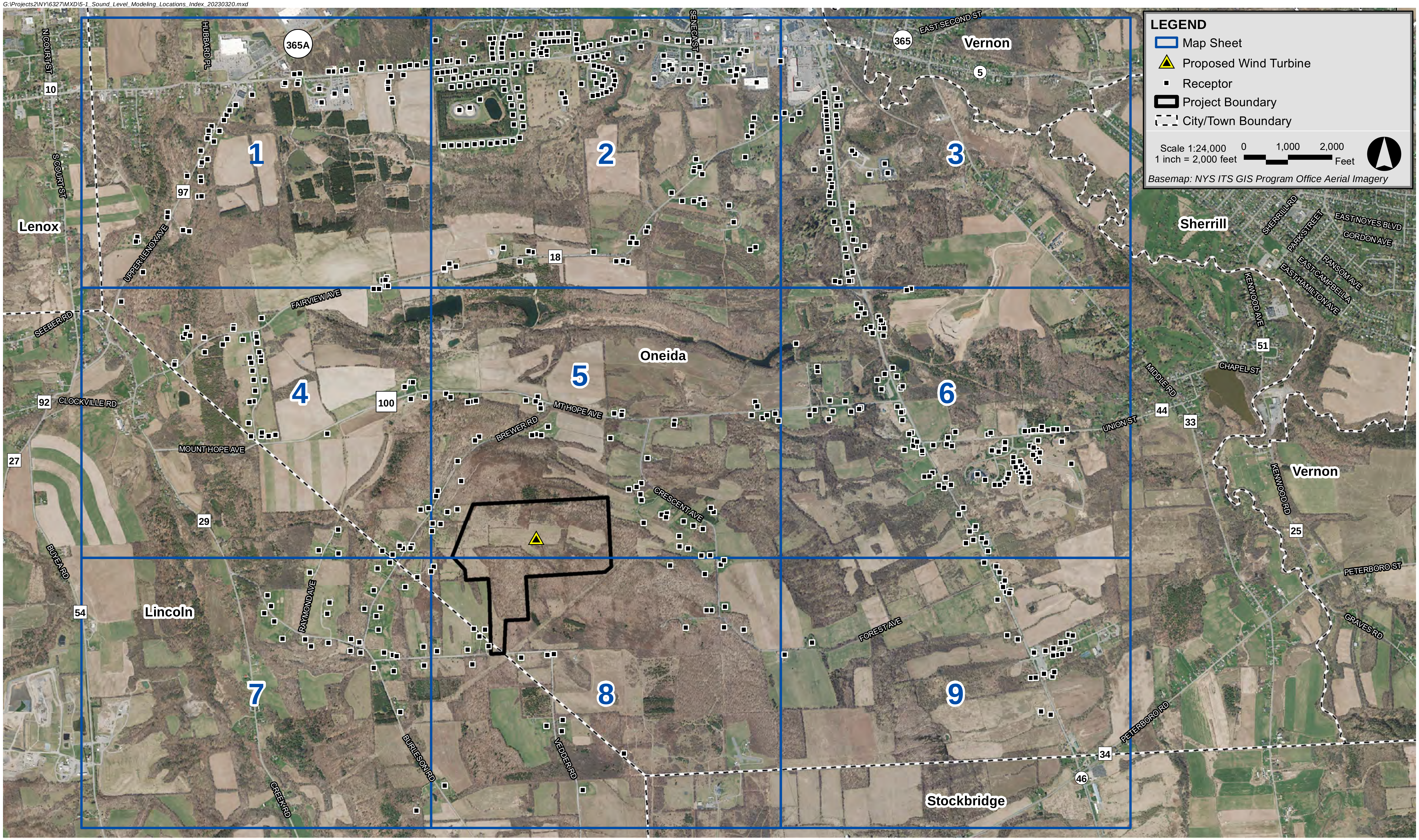

Forest Ave Wind City of Oneida, New York

Epsilon ASSOCIATES INC.

Figure 5-1
Sound Level Modeling Locations

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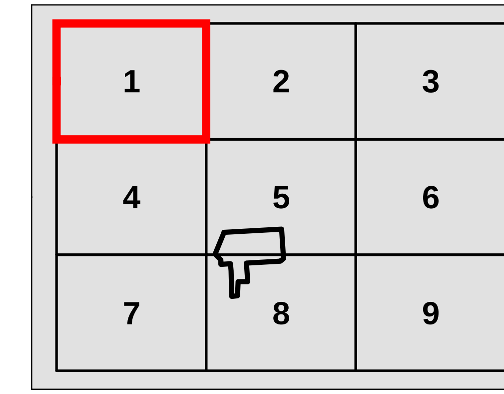
LOCUS



SCALE

1:7,200
1 inch = 600 feet
0 300 600 Feet

Basemap: NYS ITS GIS Program Office Aerial Imagery

LEGEND

- Proposed Vestas V150-4.3 90 HH Mode SO12 Wind Turbine
- Receptor
- Project Boundary
- City/Town Boundary

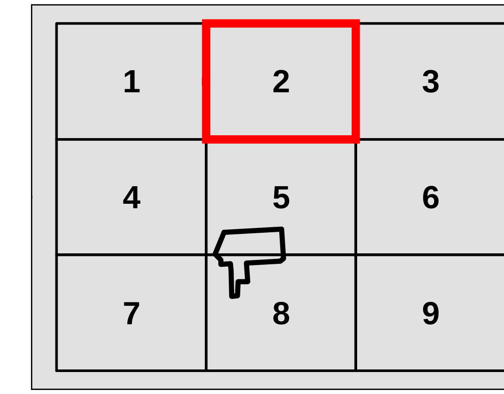
Epsilon ASSOCIATES INC.

Figure 5-1

Sound Level Modeling Locations
Sheet 1 of 9

G:\Projects2\NY\6327\MXD\5-1_Sound_Level_Modeling_Locations_MapSet_202303201.mxd

LOCUS



SCALE

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1 inch = 600 feet

0 300 600 Feet

Basemap: NYS ITS GIS Program Office Aerial Imagery

LEGEND

Proposed Vestas V150-4.3 90 HH Mode SO12 Wind Turbine

Receptor

Project Boundary

City/Town Boundary

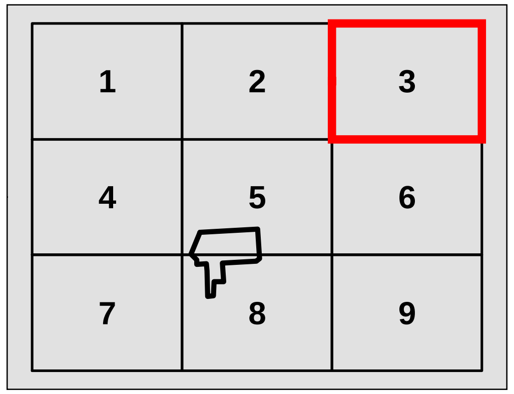
Epsilon ASSOCIATES INC.

Figure 5-1

Sound Level Modeling Locations
Sheet 2 of 9

G:\Projects2\NY\6327\MXD\5-1_Sound_Level_Modeling_Locations_MapSet_20230201.mxd

LOCUS



SCALE

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1 inch = 600 feet

0 300 600 Feet

Basemap: NYS ITS GIS Program Office Aerial Imagery

LEGEND

- Proposed Vestas V150-4.3 90 HH Mode SO12 Wind Turbine
- Receptor
- Project Boundary
- City/Town Boundary

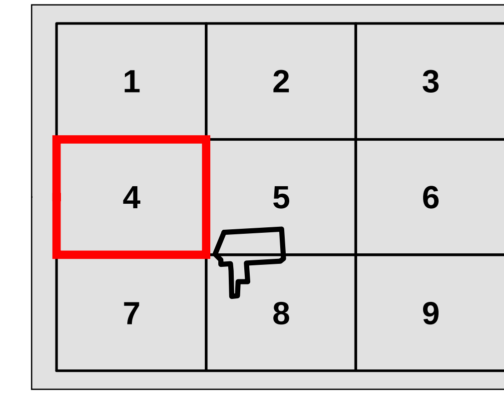
Epsilon ASSOCIATES INC.

Figure 5-1

Sound Level Modeling Locations
Sheet 3 of 9

G:\Projects2\NY\6327\MXD\5-1_Sound_Level_Modeling_Locations_MapSet_202303201.mxd

LOCUS



SCALE

1:7,200
1 inch = 600 feet
0 300 600 Feet

Basemap: NYS ITS GIS Program Office Aerial Imagery

LEGEND

- Proposed Vestas V150-4.3 90 HH Mode SO12 Wind Turbine
- Receptor
- Project Boundary
- City/Town Boundary

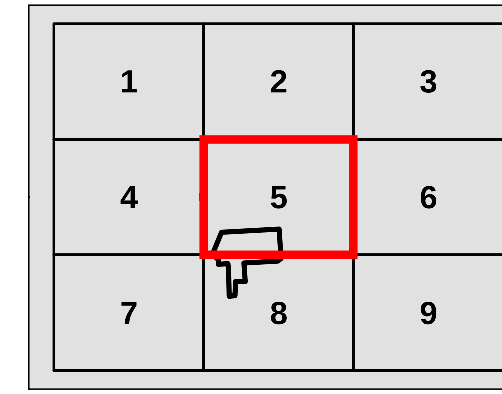
Epsilon ASSOCIATES INC.

Figure 5-1

Sound Level Modeling Locations
Sheet 4 of 9

G:\Projects2\NY\6327\MXD\5-1_Sound_Level_Modeling_Locations_MapSet_202303201.mxd

LOCUS



SCALE

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1 inch = 600 feet

0 300 600 Feet

Basemap: NYS ITS GIS Program Office Aerial Imagery

LEGEND

- Proposed Vestas V150-4.3 90 HH Mode SO12 Wind Turbine
- Receptor
- Project Boundary
- City/Town Boundary

Epsilon ASSOCIATES INC.

Figure 5-1

Sound Level Modeling Locations
Sheet 5 of 9

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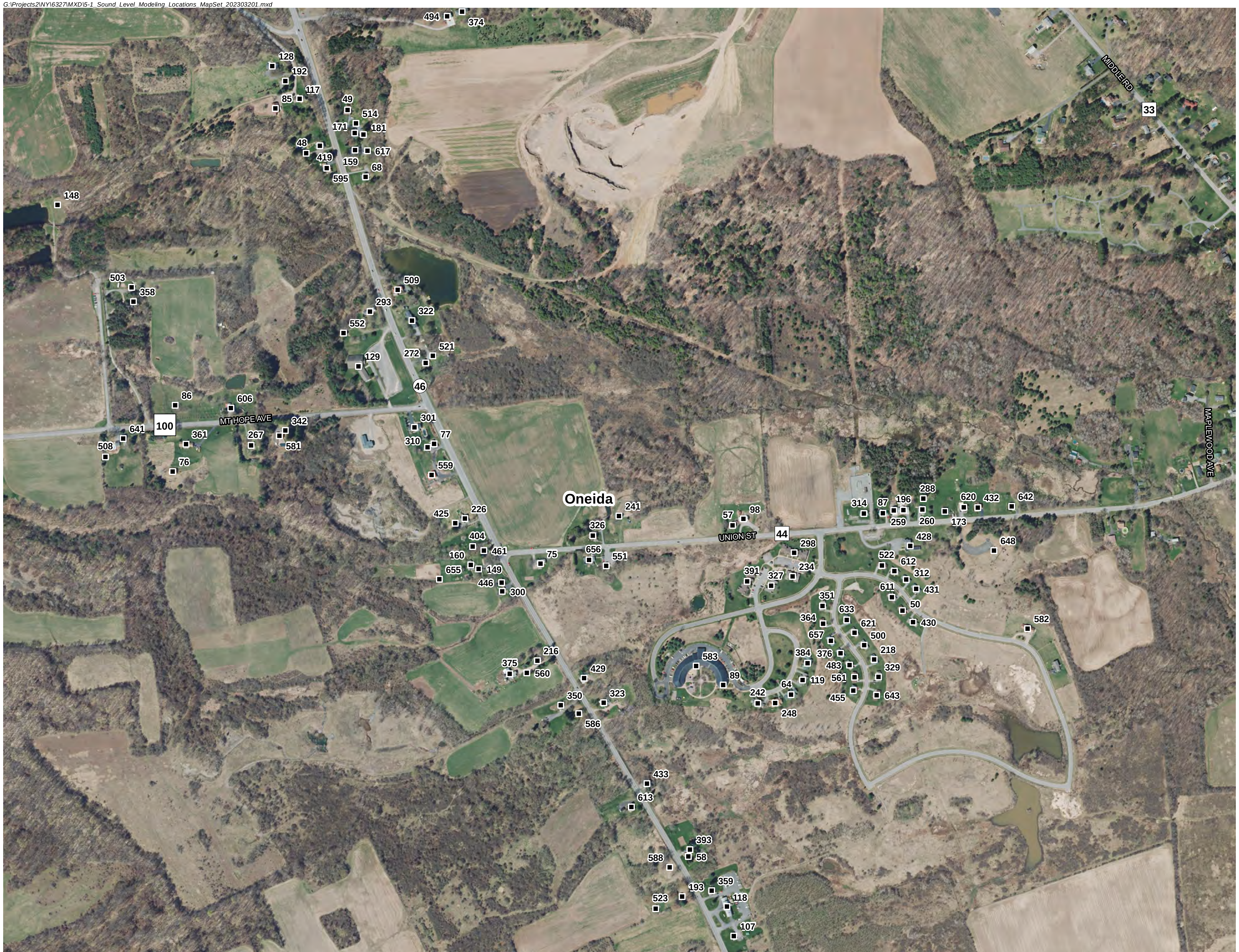
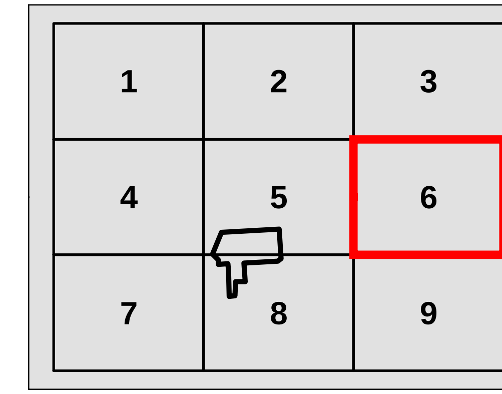


LOCUS



SCALE

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1 inch = 600 feet

0 300 600 Feet

Basemap: NYS ITS GIS Program Office Aerial Imagery

LEGEND

- Proposed Vestas V150-4.3 90 HH Mode SO12 Wind Turbine
- Receptor
- Project Boundary
- City/Town Boundary

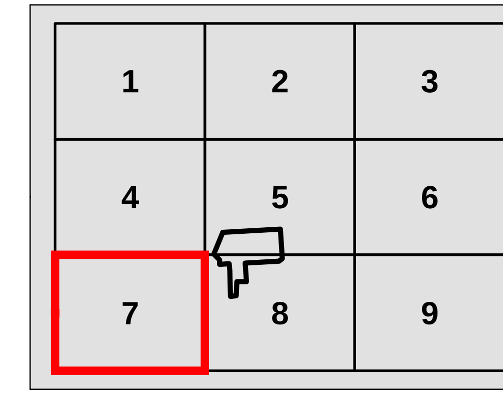
Epsilon ASSOCIATES INC.

Figure 5-1

Sound Level Modeling Locations
Sheet 6 of 9

G:\Projects2\NY\6327\MXD\5-1_Sound_Level_Modeling_Locations_MapSet_202303201.mxd

LOCUS



SCALE

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1 inch = 600 feet

0 300 600 Feet

Basemap: NYS ITS GIS Program Office Aerial Imagery

LEGEND

- Proposed Vestas V150-4.3 90 HH Mode SO12 Wind Turbine
- Receptor
- Project Boundary
- City/Town Boundary

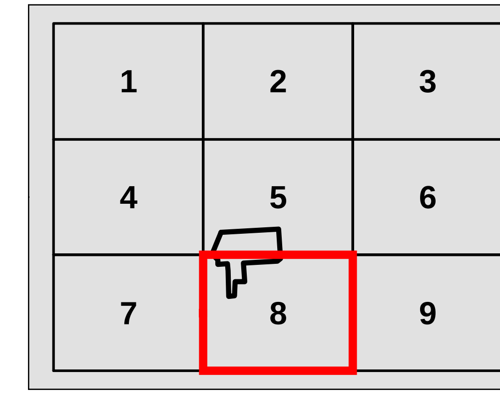
Epsilon ASSOCIATES INC.

Figure 5-1

Sound Level Modeling Locations
Sheet 7 of 9

G:\Projects2\NY\6327\MXD\5-1_Sound_Level_Modeling_Locations_MapSet_202303201.mxd

LOCUS



SCALE

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1 inch = 600 feet

0 300 600 Feet

Basemap: NYS ITS GIS Program Office Aerial Imagery

LEGEND

- Proposed Vestas V150-4.3 90 HH Mode SO12 Wind Turbine
- Receptor
- Project Boundary
- City/Town Boundary

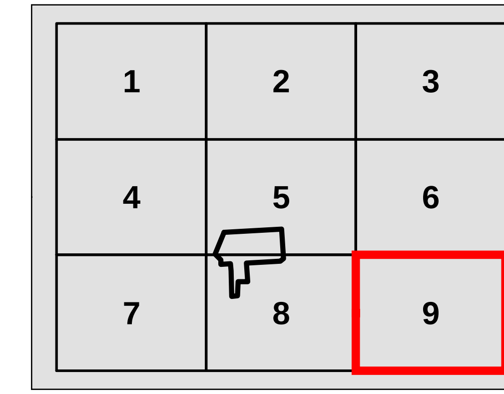
Epsilon Associates Inc.

Figure 5-1

Sound Level Modeling Locations
Sheet 8 of 9

G:\Projects2\NY\6327\MXD\5-1_Sound_Level_Modeling_Locations_MapSet_202303201.mxd

LOCUS



SCALE

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1 inch = 600 feet

0 300 600 Feet

Basemap: NYS ITS GIS Program Office Aerial Imagery

LEGEND

- Proposed Vestas V150-4.3 90 HH Mode SO12 Wind Turbine
- Receptor
- Project Boundary
- City/Town Boundary

Epsilon ASSOCIATES INC.

Figure 5-1

Sound Level Modeling Locations
Sheet 9 of 9

5.3 Sound Level Modeling Results

All modeled sound levels, as output from CadnaA are A-weighted equivalent sound levels (Leq, dBA). Calculations were conducted at the 661 receptors modeled within the project area. In addition to the discrete modeling points, sound level isolines were generated from the modeling grid.

5.3.1 Project Only Results – V150-4.3 Mode SO12

Table B-1 in Appendix B shows the predicted "Project Only" broadband (L_{eq}, dBA) sound levels at the 661 receptors modeled in the vicinity of the Project assuming the Vestas wind turbine is operated in Mode SO12. These broadband sound levels range from 7 to 35 dBA and represent the worst-case sound levels produced solely by the Project. The highest predicted sound level of 35 dBA occurs at receptor #343. In addition to the discrete modeling points, sound level isolines generated from the modeling grid are presented in Figure 5-2.

5.3.2 Project Only Results – GE 3.4-140 NRO 100

Table B-2 in Appendix B shows the predicted "Project Only" broadband (Leq, dBA) sound levels at the 661 receptors modeled in the vicinity of the Project assuming the GE wind turbine is operated in NRO 100. These broadband sound levels range from 4 to 34 dBA and represent the worst-case sound levels produced solely by the Project. The highest predicted sound level of 34 dBA occurs at receptor #343. In addition to the discrete modeling points, sound level isolines generated from the modeling grid are presented in Figure 5-3.

5.3.3 Project Only Results – Vensys 136-3.5 Mode 4

Table B-3 in Appendix B shows the predicted "Project Only" broadband (L_{eq}, dBA) sound levels at the 661 receptors modeled in the vicinity of the Project assuming the Vensys wind turbine is operated in Mode 4. These broadband sound levels range from 9 to 37 dBA and represent the worst-case sound levels produced solely by the Project. The highest predicted sound level of 37 dBA occurs at receptor #343. In addition to the discrete modeling points, sound level isolines generated from the modeling grid are presented in Figure 5-4.

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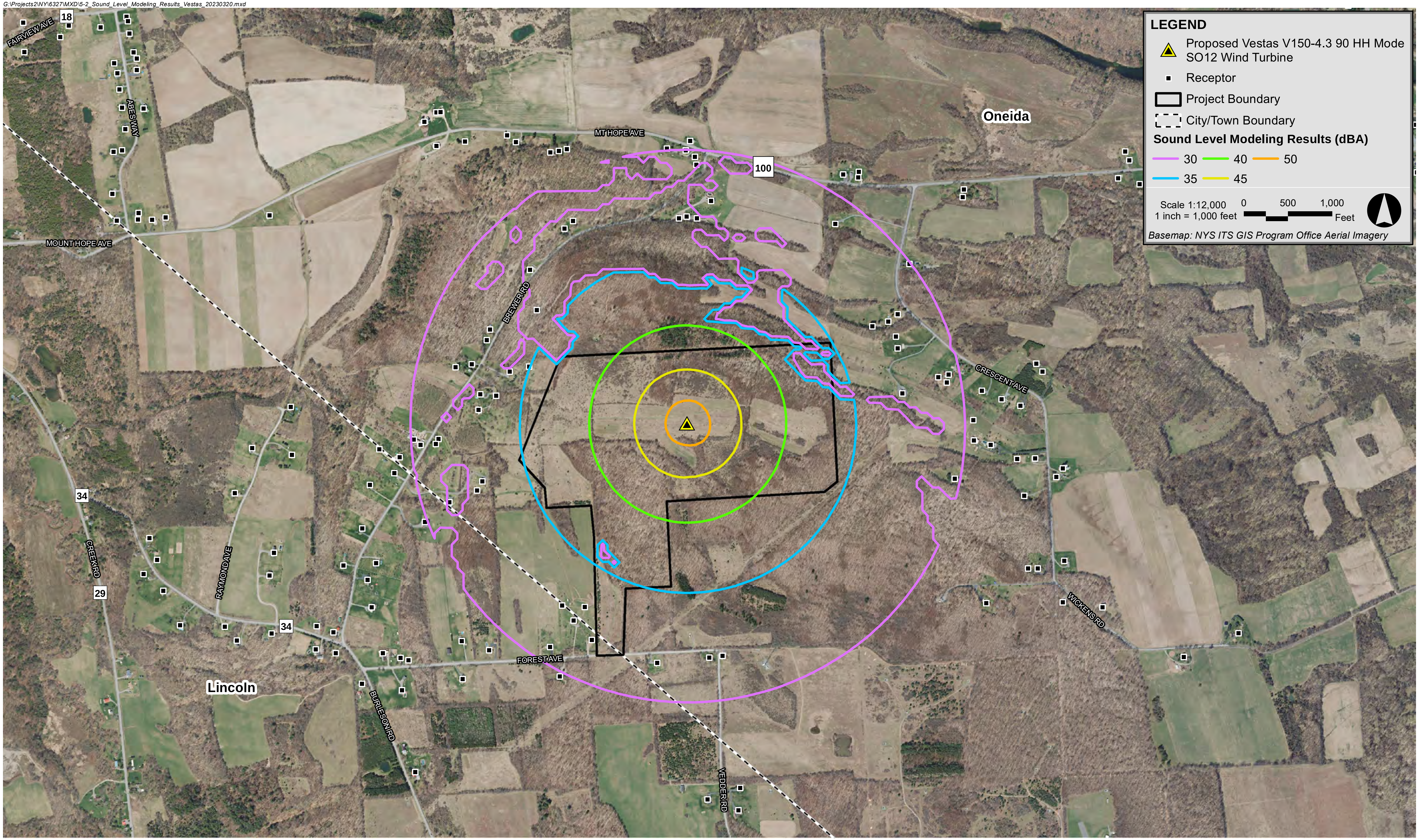


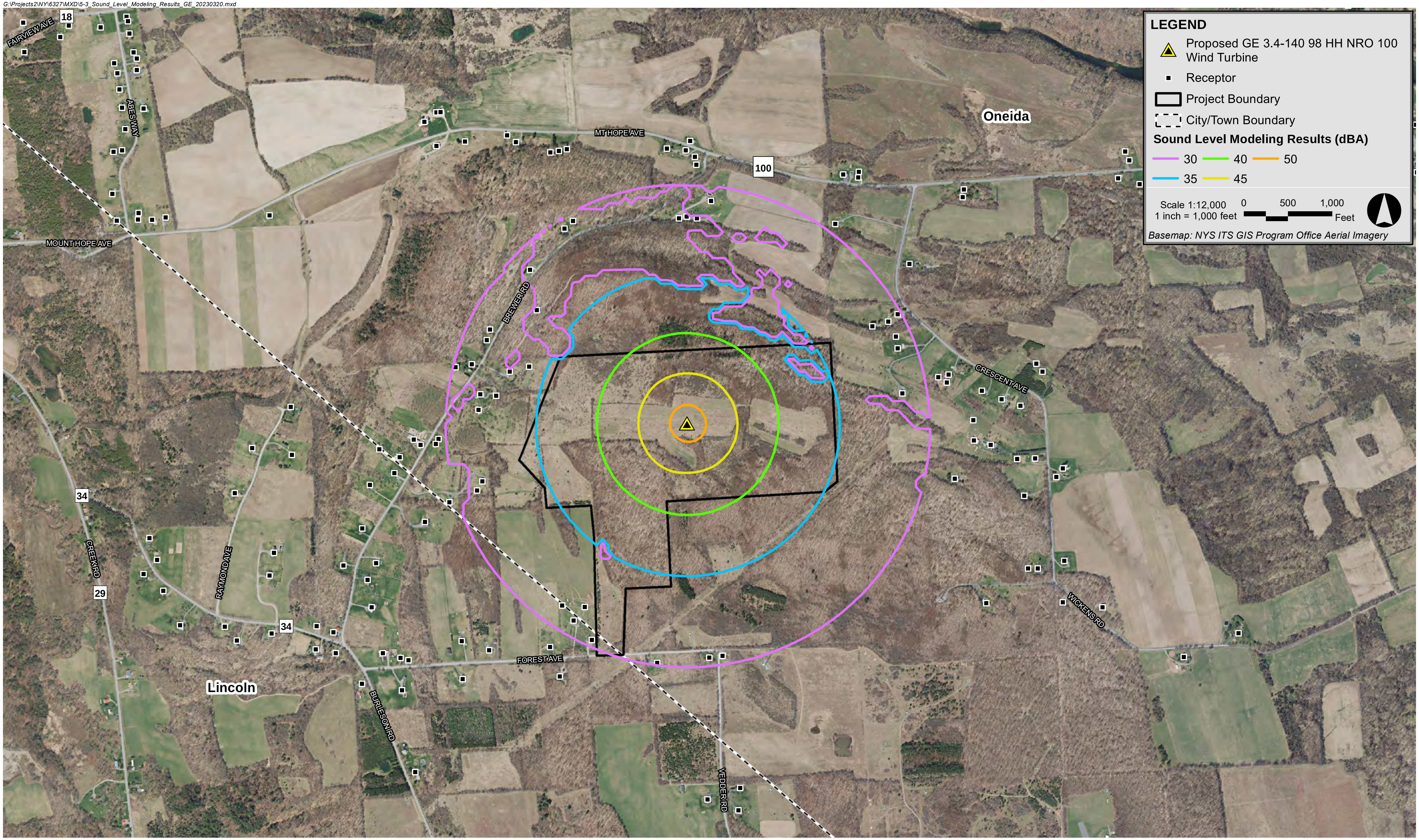
Forest Ave Wind City of Oneida, New York

Epsilon ASSOCIATES INC.

Figure 5-2

Project Only Sound Level Modeling Results – Vestas V150-4.3 Mode SO12

G:\Projects2\NY\6327\MXD\5-3_Sound_Level_Modeling_Results_GE_20230320.mxd



Forest Ave Wind City of Oneida, New York

Epsilon

Figure 5-3

Project Only Sound Level Modeling Results – GE 3.4-140 NRO 100

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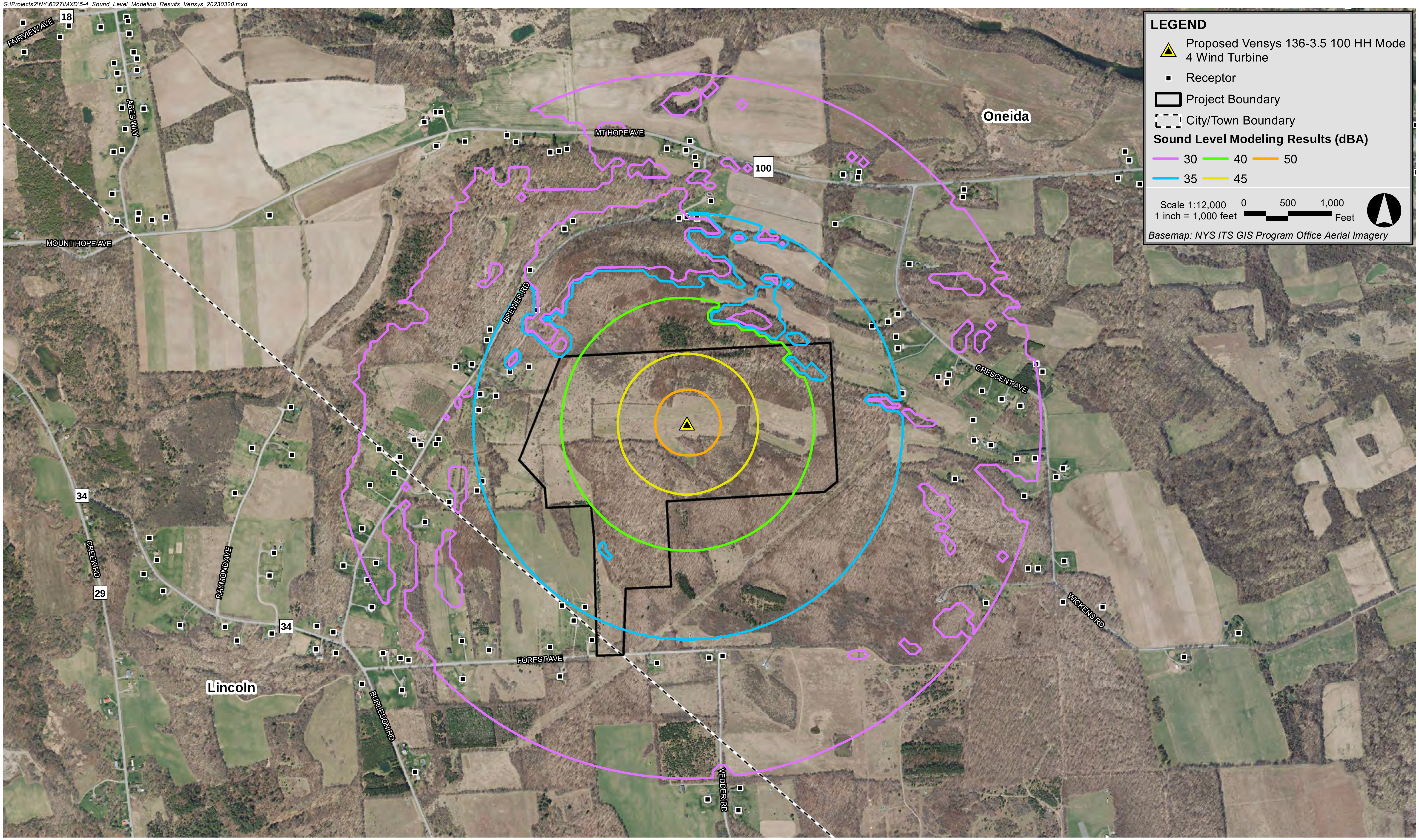

Forest Ave Wind City of Oneida, New York

Epsilon ASSOCIATES INC.

Figure 5-4

Project Only Sound Level Modeling Results – Vensys 136-3.5 Mode 4

6.0 EVALUATION

The Project is subject to the requirements contained in the Oneida City Code. Sound levels from operation of the Project are limited by these regulations as discussed in Section 4 and evaluated in the subsections below.

6.1 Audible Noise Standard

The Oneida City Code limits the sound level produced by wind turbines to 45 dBA at the boundary of the proposed project site. All modeled sound levels, as output from CadnaA are A-weighted equivalent sound levels (L_{eq}, dBA). These levels may be used in evaluating measured sound pressure levels over typical averaging durations, (i.e., ten (10) minutes or one (1) hour).

A review of Figure 5-2, Figure 5-3, and Figure 5-4 shows that the 45 dBA sound level contour is contained within the proposed Project site. Therefore, with the low noise modes described in Section 5.3, the Project is in compliance with The Oneida City Code Audible Noise Standard.

6.2 Low Frequency and Infrasound Noise

A discussion of low frequency and infrasound, as it pertains to wind turbines, is provided below for informational purposes.

Low frequency (LF) and infrasound are present in the environment due to other sources besides wind turbines. For example, refrigerators, air conditioners, and washing machines generate infrasound and low frequency sound as do natural sources such as ocean waves. The frequency range of low frequency sound is generally from 20 Hz to 200 Hz, and the range below 20 Hz is often described as "*infrasound*". However, audibility can extend to frequencies below 20 Hz if the energy is high enough. Since there is no sharp change in hearing at 20 Hz, the division between "low-frequency sound" and "infrasound" should only be considered "practical and conventional." The threshold of hearing is standardized for frequencies down to 20 Hz.[8] Based on extensive research and data, Watanabe and Moeller have proposed normal hearing thresholds for frequencies below 20 Hz.[9] These sound levels are so high that infrasound is generally considered inaudible. For example, the sound level at 8 Hz would need to be 100 dB to be audible.

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8 Acoustics - Normal equal-loudness-level contours, International Standard ISO 226:2003, International Organization for Standardization, Geneva, Switzerland, (2003).

9 T. Watanabe, and H. Moeller, "Low Frequency Hearing Thresholds in Pressure Field and in Free Field", J. Low Frequency Noise and Vibration, 9(3), 106-115, (1990).

A detailed infrasound and low frequency noise measurement program of wind turbines was conducted from 2013-2015 by the Ministry for the Environment, Climate and Energy of the Federal State of Baden-Wuerttemberg, Germany.[10] The conclusions of the German study were:

> *"Infrasound and low-frequency noise are an everyday part of our technical and natural environment. Compared with other technical and natural sources, the level of infrasound caused by wind turbines is low. Already at a distance of 150 m (~500 ft), it is well below the human limits of perception. Accordingly, it is even lower at the usual distances from residential areas. Effects on health caused by infrasound below the perception thresholds have not been scientifically proven. Together with the health authorities, we in Baden-Württemberg have come to the conclusion that adverse effects relating to infrasound from wind turbines cannot be expected on the basis of the evidence at hand."*

The Massachusetts Department of Environmental Protection (MA DEP) and the Massachusetts Department of Public Health commissioned an expert panel who found that: "Claims infrasound from wind turbines directly impacts the vestibular system have not been demonstrated scientifically. Available evidence shows that the infrasound levels near wind turbines cannot impact the vestibular system."[11]

Health Canada, in collaboration with Statistics Canada, conducted one of the most extensive studies to understand the impacts of wind turbine noise to-date.[12] A cross-section epidemiological study was carried out in 2013 in the provinces of Ontario and Prince Edward Island on randomly selected participants living near and far from operating wind turbines. Many peer-reviewed publications have been written based on the Health Canada research, including an analysis of low frequency and infrasound data. For example, Keith et al concluded that there was no advantage of using C-weighting to measure low frequency sound since the relationship between A-weighting and C-weighting are so highly correlated.[13] In other words, acceptable A-weighted limits also eliminate low frequency and infrasound impacts.

Low frequency and infrasound have also been studied extensively in Japan. Tachibana et al conducted extensive measurements of 34 wind farms nationwide and concluded that infrasound from wind turbines is not audible/sensible, and that wind turbine noise is not a problem in the infrasound region.[14]

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[10] *Low frequency noise incl. infrasound from wind turbines and other sources*, LUBW, Baden-Wuerttemberg, Germany, September 2016.

[11] *Wind Turbine Health Impact Study: Review of Independent Expert Panel,* Massachusetts Department of Environmental Protection and Massachusetts Department of Public Health, January 2012.

[12] Health Canada website: http://www.hc-sc.gc.ca/ewh-semt/noise-bruit/turbine-eoliennes/summary-resume-eng.php

[13] *Wind turbine sound pressure level calculations at dwellings,* S. E. Keith et al, J. Acoustical Society of America, 139(3), March 2016.

[14] *Nationwide field measurements of wind turbine noise in Japan,* H. Tachibana et al, Noise Control Engineering Journal, 62(2), March-April 2014.

As noted in the 2011 NARUC report, "the widespread belief that wind turbines produce elevated or even harmful levels of low frequency and infrasonic sound is utterly untrue as proven repeatedly and independently by numerous investigators."[15]

Additionally, ANSI S12.2 states that acceptable sound levels in the 16 Hz and 31.5 Hz octave bands is 65 dB or lower; and that acceptable sound levels in the 63 Hz octave band is 70 dB or lower. All modeled sound levels for each of the three potential wind turbine models are well below this threshold at the closest residential structures. Therefore, low frequency or infrasound from the Project will not adversely affect the habitability or use of any nearby noise sensitive structure.

6.3 Pure Tone

A paper by Pedersen and Persson Waye states that modern wind turbines with upwind blades do not have prominent discrete tones from aerodynamic sources and that mechanical equipment associated with the wind turbine may emit prominent discrete tones; however, tones due to mechanical equipment can be reduced "efficiently".[16] In addition, Epsilon has measured sound levels at residences near existing wind farms and has not found any prominent discrete tones from wind turbines. Therefore, no PDT resulting from the operation of the proposed wind turbine is expected in the community.

6.4 Repetitive and Impulsive Sound

The current body of work on amplitude modulation indicates that it is not possible to predict or forecast its occurrence. Design considerations for minimization, and practical post-construction operational mitigation options are in the early phases of development.

The Massachusetts Study on Wind Turbine Acoustics measured amplitude modulation (AM) in detail and provides a description of the phenomenon.[17] With respect to wind turbines, amplitude modulation is a recurring variation in the overall level of sound over time. The modulation sound is typically broadband, and it comes from interactions of the blade with the atmosphere, wind turbulence, directionality of the broadband sound of the blades, or tower interaction with the wake of the blade. This modulation is not infrasound; rather, it is variation in audible sound that is synchronized to the passage of the turbine blades.

The fundamental frequency of the modulations is usually coincident with the rotational speed of the turbine multiplied by the number of blades:

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15 Assessing Sound Emissions from Proposed Wind Farms & Measuring the Performance of Completed Projects, NARUC, prepared by Hessler Associates, Inc., October 2011.

16 Eja Pedersen and Kerstin Persson Waye, Dept of Environmental Medicine, Goteborg University, Sweden, "Perception and annoyance due to wind turbine noise-a dose-relationship," published by the Journal of the Acoustical Society of America, Melville, NY. JASA 116(6), December 2004, pgs 3460-3470.

17 *Massachusetts Study on Wind Turbine Acoustics,* Massachusetts Clean Energy Center and Massachusetts Department of Environmental Protection, RSG et al., 2016.

Modulation frequency = (RPM x Number of blades)/60 seconds per minute

The rotor speed (RPM) varies according to the type of wind turbine and operating conditions. For example, if a three-bladed turbine is turning at 15 rpm, the fundamental modulation frequency would be 0.75 Hz. The time it takes for a complete modulation cycle (the period) is 1/frequency. In this case, the cycle time would be about 1.33 seconds.

The greater the modulation in sound level, the greater the "modulation depth." The modulation depth is often measured from the minimum sound level to the maximum sound level, or "crest-to trough level". Half of this level is called the *amplitude* of the sine wave. For the perfect sine wave, the rms value defined above is equal to the modulation depth multiplied by the square root of two (1.414). The standard deviation is also approximately equal to the rms average level of the signal. This is important, as some of the methods used to quantify amplitude modulation of a signal use the rms of standard deviations.

Normal amplitude modulation from wind turbines is generally characterized as "swishing," which is a broadband modulated sound. Under some circumstances, it is characterized as "thumping," which has a faster rise time and is composed of sound at lower frequencies. A "churning" sound has also been described, which is made up of broadband mid-frequency sound, but with a faster rise-and-fall rate.

The primary conclusions with respect to amplitude modulation from the *Massachusetts Study on Wind Turbine Acoustics*[18] are as follows:

- Data analyzed for this study indicate that low-frequency sound and infrasound from the wind turbines are not modulated for the most part, and sounds in the frequency range from about 250 Hz to 2 kHz are amplitude-modulated.
- The technique of calculating a spectrogram from A-weighted sound levels and one-third octave band levels is very effective at revealing the signature of amplitude modulated wind turbine sound. A logging interval of 125 milliseconds or faster is required.
- The maximum observed increase in modulation depth was at 500 Hz.
- The measured sound level, wind speed, and distance to turbine have the greatest impact on modulation depth.
- Approximately 90% of all measured AM depth was 2 dB or less while over 99.9% was 4.5 dB or less.
- Wind turbulence, wind shear, and yaw error have a lesser, but statistically significant, effect on amplitude modulation depth compared to distance and sound level.
- The turbulence intensity does not show any trend with respect to the sound levels.

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18 *Massachusetts Study on Wind Turbine Acoustics,* Massachusetts Clean Energy Center and Massachusetts Department of Environmental Protection, RSG et al., 2016.

Cooper and Evans analyzed several weeks of sound data approximately 1500 meters from a wind turbine in flat terrain for evidence of AM.[19] They found zero periods with an amplitude modulation depth of 5 dBA or more which is defined as "excessive" AM in New Zealand. These findings are consistent with the *Massachusetts Study on Wind Turbine Acoustics*. Their data set did not find any significant trend in the level of AM and wind shear.

6.5 Noise Complaint Resolution

Appendix C provides a Noise Complaint Resolution plan.

6.6 Construction Noise

The Oneida City Code includes consideration for construction noise impacts. Noise due to construction is an unavoidable outcome of construction. The Applicant will communicate with the public to notify them of the beginning of construction of the Facility. Most of the construction will occur at significant distances to sensitive receptors, and therefore noise from most phases of construction is not expected to result in impacts to sensitive receptors. Nonetheless construction noise will be minimized through the use of best management practices (BMP) such as those listed below.

- Construction will be limited to daytime hours.
- Utilizing construction equipment fitted with exhaust systems and mufflers that have the lowest associated noise whenever those features are available and maintaining functioning mufflers on all transportation and construction machinery.
- Maintaining equipment and surface irregularities on construction sites to prevent unnecessary noise.
- Configuring, to the extent feasible, the construction in a manner that keeps loud equipment and activities as far as possible from noise-sensitive locations.
- Using back-up alarms with a minimum increment above the background noise level to satisfy the performance requirements of the current revisions of Standard Automotive Engineering (SAE) J994 and OSHA requirements.
- Developing a staging plan that establishes equipment and material staging areas away from sensitive receptors when feasible.

Contractors shall use approved haul routes to minimize noise at residential and other sensitive noise receptors.

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19 Automated detection and analysis of amplitude modulation at a residence and wind turbine, J. Cooper & T. Evans, Proceedings of Acoustics 2013 – Victor Harbor, Australia.

7.0 CONCLUSIONS

A comprehensive sound level modeling assessment was conducted for the Forest Avenue Wind Project within the City of Oneida, New York. Sound levels resulting from the operation of the wind turbine were calculated at 661 modeling receptors, and isolines were generated from a grid encompassing the area surrounding the wind turbine. The predicted 45 dBA sound contour is contained within the Project site for the Vestas V150-4.3 SO12, GE 3.4-140 NRO 100, and Vensys 136-3.5 Mode 4 wind turbines; therefore, with the low noise modes described above, the Project is in compliance with The Oneida City Code Audible Noise Standard.

Appendix A

Wind Turbine Coordinates

Table A-1.1: Wind Turbine Coordinates - V150

Wind Turbine ID	Wind Turbine Type	Hub Height (m)	Coordinates NAD83 UTM Zone 18N (meters)	
			X (Easting)	Y (Northing)
1	Vestas V150-4.3	90	445810.97	4766358.80

Table A-1.2: Wind Turbine Coordinates - GE 3.4-140

Wind Turbine ID	Wind Turbine Type	Hub Height (m)	Coordinates NAD83 UTM Zone 18N (meters)	
			X (Easting)	Y (Northing)
1	GE 3.4-140	98	445810.97	4766358.80

Table A-1.3: Wind Turbine Coordinates - Vensys 136-3.5

Wind Turbine ID	Wind Turbine Type	Hub Height (m)	Coordinates NAD83 UTM Zone 18N (meters)	
			X (Easting)	Y (Northing)
1	Vensys 136-3.5	100	445810.97	4766358.80

Appendix B

Project Only Sound Level Modeling Results at Discrete Points

Table B-1: Sound Level Modeling Results Sorted by Receptor ID - V150-4.3 Mode SO12

Receptor ID	Coordinates UTM NAD83 Zone 18N		Source Only L_{eq} Broadband Sound Level (dBA)
	X (m)	Y (m)	
1	445338.33	4765587.17	31
2	445371.41	4765485.72	30
3	445419.72	4765678.90	32
4	444801.00	4766187.94	29
5	444716.74	4766146.77	28
6	444906.80	4766018.66	30
7	444689.69	4765996.71	28
8	444737.53	4765876.68	28
9	444624.88	4765868.20	27
10	444708.54	4765818.14	27
11	444722.44	4765724.65	27
12	444590.45	4765638.26	26
13	444532.59	4765659.58	18
14	444529.15	4765579.19	25
15	444598.27	4765565.75	26
16	444384.63	4765912.45	25
17	444369.77	4765834.37	25
18	444249.58	4766118.61	25
19	444309.59	4766273.96	25
20	444446.61	4766250.68	26
21	444443.16	4766416.38	26
22	444376.64	4765633.67	24
23	444257.33	4765609.62	24
24	444215.56	4765657.18	16
25	444060.85	4765662.32	15
26	444002.78	4765781.52	15
27	443934.84	4765839.30	15
28	443981.29	4765887.52	15
29	443955.43	4765963.26	15
30	444688.90	4765459.54	26
31	444761.19	4765565.89	27
32	444822.25	4765549.69	19
33	444848.92	4765541.60	19
34	444827.04	4765438.13	26
35	444872.88	4765155.05	25
36	445178.72	4764648.33	23
37	444985.00	4764475.56	22
38	445033.72	4765607.41	29
39	445036.45	4765475.80	28
40	445127.36	4765575.86	29
41	445482.51	4765611.06	32
42	445881.95	4765061.00	27

Table B-1: Sound Level Modeling Results Sorted by Receptor ID - V150-4.3 Mode SO12

Receptor ID	Coordinates UTM NAD83 Zone 18N X (m)	Y (m)	Source Only L_{eq} Broadband Sound Level (dBA)
43	445994.31	4765100.04	19
44	445988.27	4765023.52	19
45	446132.65	4764617.89	23
46	443871.67	4767375.42	13
47	444748.55	4766269.29	29
48	448093.19	4767801.79	18
49	448174.25	4767886.28	18
50	449261.02	4766905.64	16
51	449029.25	4766037.62	8
52	443655.64	4769243.51	16
53	446794.67	4769514.01	17
54	447273.14	4769132.91	17
55	446503.82	4768393.83	21
56	446961.94	4766420.20	28
57	448928.19	4767072.27	17
58	448841.68	4766423.61	9
59	445116.45	4769795.72	16
60	445231.12	4769580.30	17
61	446281.54	4769676.45	16
62	443415.21	4768475.74	9
63	447323.05	4767298.19	23
64	449042.48	4766741.12	17
65	447242.74	4769586.88	16
66	447800.71	4769278.53	16
67	445104.95	4766159.08	33
68	448209.15	4767755.41	18
69	445508.90	4769702.89	16
70	446245.20	4769762.58	16
71	445821.89	4767334.56	30
72	447819.07	4769211.19	16
73	447913.00	4769345.14	15
74	445809.35	4767073.17	25
75	448552.04	4766997.82	18
76	447831.69	4767178.16	21
77	448343.38	4767232.44	19
78	449316.01	4765419.14	7
79	445682.29	4769613.48	17
80	445962.41	4769787.11	16
81	445164.69	4769573.05	17
82	446828.60	4766471.96	29
83	446859.88	4769789.03	16
84	444946.28	4767433.57	26

Table B-1: Sound Level Modeling Results Sorted by Receptor ID - V150-4.3 Mode SO12

Receptor ID	Coordinates UTM NAD83 Zone 18N		Source Only L_{eq} Broadband Sound Level (dBA)
	X (m)	Y (m)	
85	448032.79	4767889.41	18
86	447836.66	4767307.95	21
87	449222.85	4767096.21	16
88	449010.80	4766121.28	9
89	448909.72	4766759.66	17
90	445651.39	4769692.54	16
91	443935.30	4767445.91	13
92	445368.32	4767299.69	21
93	444329.30	4769366.09	16
94	445825.20	4769723.04	16
95	445385.81	4769077.46	18
96	443647.52	4767693.55	11
97	445269.11	4766889.54	25
98	448949.45	4767085.03	17
99	445128.42	4769569.87	17
100	445280.07	4769069.02	18
101	445228.26	4769472.23	17
102	447816.88	4769231.07	16
103	446970.07	4769376.45	17
104	447174.87	4769509.34	16
105	447871.25	4769456.84	15
106	443827.03	4767152.03	21
107	448930.61	4766267.67	9
108	443549.82	4769134.90	16
109	447498.11	4769651.17	15
110	443062.52	4768413.65	16
111	446441.28	4768262.13	22
112	448077.68	4768373.08	17
113	445379.14	4769675.78	8
114	446945.67	4768696.84	19
115	447301.87	4769158.82	17
116	443876.21	4767763.28	20
117	448080.10	4767908.24	18
118	448917.06	4766325.45	9
119	449065.61	4766769.41	17
120	445994.97	4769843.18	16
121	445226.98	4769069.57	18
122	443860.93	4767301.69	13
123	445787.65	4768332.47	22
124	449326.10	4765578.06	7
125	445132.15	4769644.43	16
126	446029.37	4769791.01	16

Table B-1: Sound Level Modeling Results Sorted by Receptor ID - V150-4.3 Mode SO12

Receptor ID	Coordinates UTM NAD83 Zone 18N		Source Only L_{eq} Broadband Sound Level (dBA)
	X (m)	Y (m)	
127	447820.33	4769178.11	16
128	448026.51	4767972.11	18
129	448195.46	4767383.83	19
130	445883.07	4769695.59	16
131	446110.23	4769671.11	16
132	445293.11	4769536.54	17
133	443523.97	4767640.97	11
134	444075.49	4769487.14	16
135	446271.42	4769605.94	17
136	446228.30	4769500.74	17
137	446207.42	4768332.80	22
138	446553.77	4766462.91	33
139	447021.42	4765858.56	27
140	444785.74	4769488.79	17
141	446165.31	4769659.58	16
142	445436.05	4769082.86	18
143	446404.98	4769668.88	16
144	446356.57	4769516.22	17
145	448012.70	4769010.88	16
146	447892.60	4769396.54	15
147	444891.42	4766285.01	30
148	447606.10	4767700.18	13
149	448430.93	4766986.92	19
150	445292.46	4766750.40	26
151	447817.45	4769252.63	16
152	447810.15	4769320.43	16
153	444953.48	4766304.89	31
154	447175.38	4768538.20	19
155	444068.58	4769487.21	16
156	445571.28	4769738.77	16
157	446904.22	4768911.57	18
158	444772.14	4768098.43	22
159	448188.58	4767807.96	18
160	448415.20	4766994.80	19
161	445130.62	4766683.45	32
162	446537.90	4766735.99	32
163	444410.05	4769578.82	16
164	445512.31	4769668.22	16
165	446690.74	4769617.58	16
166	445682.52	4769464.42	17
167	446265.86	4769478.97	17
168	447888.90	4769248.73	16

Table B-1: Sound Level Modeling Results Sorted by Receptor ID - V150-4.3 Mode SO12

Receptor ID	Coordinates UTM NAD83 Zone 18N		Source Only L_{eq} Broadband Sound Level (dBA)
	X (m)	Y (m)	
169	443057.76	4768437.16	16
170	443722.19	4767820.13	19
171	448188.04	4767841.10	18
172	446987.92	4765858.25	19
173	449343.70	4767100.04	16
174	445700.07	4769406.30	17
175	445044.26	4767332.88	19
176	444868.01	4766302.83	30
177	446450.59	4766694.25	33
178	445793.45	4769717.27	16
179	445120.08	4766646.65	32
180	446582.85	4768501.49	21
181	448205.26	4767838.27	18
182	446677.79	4766518.22	31
183	449406.07	4765549.29	7
184	445218.40	4769655.80	8
185	446329.58	4769578.42	17
186	446205.13	4769683.61	16
187	446533.56	4769750.38	16
188	446087.66	4769773.55	16
189	446348.41	4769482.89	17
190	447784.40	4769023.38	16
191	445417.73	4767058.46	24
192	448052.47	4767943.04	18
193	448829.39	4766345.04	9
194	445642.53	4769344.99	17
195	445011.95	4766553.06	32
196	449262.64	4767102.14	16
197	447797.95	4769400.45	16
198	443267.98	4768607.01	8
199	445339.13	4767295.37	21
200	449487.47	4765690.56	15
201	445792.09	4769770.17	16
202	445666.84	4769825.96	16
203	445878.47	4769837.41	16
204	445351.45	4769330.41	17
205	445521.86	4769511.14	17
206	447830.23	4768900.88	17
207	447827.18	4769118.68	16
208	446349.70	4767218.45	29
209	447985.19	4768133.74	10
210	448013.81	4768412.08	17

Table B-1: Sound Level Modeling Results Sorted by Receptor ID - V150-4.3 Mode SO12

Receptor ID	Coordinates UTM NAD83 Zone 18N		Source Only L_{eq} Broadband Sound Level (dBA)
	X (m)	Y (m)	
211	445198.57	4766537.83	34
212	446819.60	4768685.75	19
213	447125.98	4769669.95	16
214	447239.99	4769725.54	15
215	447191.93	4769553.74	16
216	448545.70	4766807.26	18
217	447244.66	4765724.60	17
218	449205.62	4766809.67	16
219	449375.18	4765402.51	7
220	446569.80	4769835.72	16
221	446123.13	4769494.13	17
222	446939.36	4768918.10	18
223	443861.17	4767449.20	13
224	443373.16	4767742.16	10
225	443390.82	4767766.70	10
226	448403.96	4767085.67	19
227	443494.36	4769033.57	16
228	445789.62	4769696.65	16
229	445507.14	4769743.95	16
230	445347.39	4769484.86	17
231	447834.46	4768836.10	17
232	443317.68	4767570.08	10
233	445758.75	4768336.90	22
234	449045.79	4766972.39	17
235	449491.97	4765587.95	15
236	443674.23	4769280.57	16
237	444314.22	4769458.72	16
238	445365.40	4769655.79	16
239	445496.59	4769081.52	18
240	446859.09	4766285.37	29
241	448705.62	4767090.91	17
242	448977.48	4766723.61	17
243	445252.95	4769584.50	17
244	443911.30	4767619.23	13
245	445583.60	4768361.33	22
246	447141.52	4768655.37	19
247	446798.98	4766370.41	30
248	449011.78	4766724.57	17
249	446692.19	4769689.38	16
250	445649.03	4769098.94	18
251	446009.61	4769396.18	17
252	446209.38	4769546.99	17

Table B-1: Sound Level Modeling Results Sorted by Receptor ID - V150-4.3 Mode SO12

Receptor ID	Coordinates UTM NAD83 Zone 18N X (m)	Coordinates UTM NAD83 Zone 18N Y (m)	Source Only L_{eq} Broadband Sound Level (dBA)
253	446967.51	4768675.35	19
254	447302.06	4769200.82	17
255	447888.14	4769220.12	16
256	444689.45	4768077.72	22
257	447299.43	4767205.39	24
258	446843.95	4765738.31	28
259	449244.23	4767101.89	16
260	449299.93	4767103.68	16
261	449433.41	4765632.83	15
262	443479.73	4768716.82	8
263	446344.51	4769805.45	16
264	443313.79	4767554.78	10
265	443911.34	4767579.24	13
266	443519.00	4767743.33	11
267	447985.15	4767229.40	20
268	444739.81	4769606.45	16
269	446968.49	4768665.91	19
270	449227.07	4765391.01	7
271	448027.15	4768345.04	18
272	448326.99	4767390.56	18
273	446713.31	4766528.30	30
274	445933.26	4765556.71	32
275	444946.27	4767317.64	19
276	446476.58	4768431.84	21
277	445173.14	4769064.76	18
278	447465.76	4769260.91	16
279	447621.01	4769492.26	16
280	446015.26	4769366.05	17
281	447196.44	4769597.85	16
282	446364.68	4768268.15	22
283	443585.57	4769095.77	16
284	443693.60	4769311.46	16
285	445712.39	4769701.36	16
286	445905.42	4769784.59	16
287	447862.60	4768666.96	9
288	449301.67	4767124.73	16
289	444419.00	4769427.71	16
290	445280.52	4769312.24	17
291	446997.84	4769607.24	16
292	447813.74	4769305.14	16
293	448217.74	4767491.29	19
294	449063.21	4765686.02	8

Table B-1: Sound Level Modeling Results Sorted by Receptor ID - V150-4.3 Mode SO12

Receptor ID	Coordinates UTM NAD83 Zone 18N X (m)	Y (m)	Source Only L_{eq} Broadband Sound Level (dBA)
295	445179.80	4768212.22	22
296	446579.17	4766909.80	30
297	446505.08	4766711.09	32
298	449048.97	4767018.64	17
299	444814.78	4769391.01	17
300	448477.28	4766943.00	18
301	448305.16	4767264.55	19
302	449387.94	4765432.97	7
303	443542.57	4769118.52	16
304	447085.71	4766174.00	27
305	449443.12	4765555.63	7
306	445486.02	4769583.47	17
307	446240.31	4769612.32	17
308	445335.57	4769546.97	17
309	443842.20	4767059.15	22
310	448330.46	4767225.73	19
311	447037.70	4766537.47	27
312	449268.47	4766966.72	16
313	447483.66	4767167.55	23
314	449185.14	4767095.61	16
315	444610.71	4769637.96	16
316	444169.97	4769510.48	16
317	446832.20	4769594.69	16
318	445721.69	4769200.77	18
319	445240.63	4769530.15	17
320	445391.77	4769566.30	17
321	446266.66	4769427.08	17
322	448300.46	4767473.79	18
323	448675.54	4766724.76	18
324	446090.40	4769830.40	16
325	447100.33	4769653.62	16
326	448654.60	4767052.54	18
327	449003.84	4766954.06	17
328	448904.01	4766188.26	9
329	449214.18	4766775.70	16
330	444895.85	4769555.72	16
331	445437.46	4769573.61	17
332	445543.81	4769086.98	18
333	447817.72	4769274.39	16
334	443833.73	4767603.15	12
335	449467.46	4765636.79	15
336	448996.43	4765932.33	9

Table B-1: Sound Level Modeling Results Sorted by Receptor ID - V150-4.3 Mode SO12

Receptor ID	Coordinates UTM NAD83 Zone 18N		Source Only L_{eq} Broadband Sound Level (dBA)
	X (m)	Y (m)	
337	445995.21	4769789.16	16
338	446086.61	4769802.94	16
339	445332.34	4769072.93	18
340	446957.61	4768869.72	18
341	448111.21	4768868.47	16
342	448052.07	4767258.21	20
343	445266.26	4766555.48	35
344	449259.40	4765393.51	7
345	446915.40	4768974.06	18
346	447215.80	4769701.24	16
347	447253.73	4768987.56	9
348	447991.15	4768664.71	17
349	447337.80	4767267.44	23
350	448591.79	4766720.01	18
351	449104.40	4766914.58	16
352	449382.07	4765594.85	7
353	446385.82	4769799.87	16
354	445422.37	4769385.80	17
355	446278.83	4769523.36	17
356	446949.94	4769586.24	16
357	447952.60	4768298.40	10
358	447754.70	4767510.84	21
359	448887.16	4766357.11	9
360	444781.14	4768156.22	22
361	447857.48	4767231.84	21
362	446735.50	4766168.45	30
363	446708.15	4766500.47	31
364	449105.37	4766880.12	16
365	445911.73	4769839.44	16
366	445212.80	4768251.79	22
367	446411.38	4768273.73	22
368	447867.38	4768541.03	17
369	444078.09	4769501.11	16
370	445545.67	4769576.78	17
371	446731.56	4769624.43	16
372	443719.73	4767802.94	19
373	445837.96	4767280.14	30
374	448398.15	4768078.80	17
375	448491.73	4766781.54	18
376	449139.59	4766822.17	16
377	444871.97	4769612.61	16
378	443497.35	4768937.39	16

Table B-1: Sound Level Modeling Results Sorted by Receptor ID - V150-4.3 Mode SO12

Receptor ID	Coordinates UTM NAD83 Zone 18N		Source Only L_{eq} Broadband Sound Level (dBA)
	X (m)	Y (m)	
379	445311.89	4769774.69	16
380	443915.52	4767063.64	22
381	449054.04	4765987.05	8
382	445963.93	4769841.10	16
383	446711.61	4769805.08	16
384	449075.02	4766802.20	17
385	445651.10	4769280.27	18
386	446235.61	4769416.19	17
387	446326.09	4769455.88	17
388	447731.60	4768901.85	17
389	443831.48	4767296.88	13
390	447108.09	4766203.31	27
391	448957.09	4766963.07	17
392	449033.78	4766019.73	8
393	448844.53	4766437.20	9
394	444472.47	4769581.65	16
395	445586.47	4769812.90	16
396	445714.82	4769337.64	18
397	443964.21	4767062.44	22
398	446900.05	4768682.52	19
399	446971.35	4769510.42	8
400	445395.93	4767306.18	21
401	445189.59	4767353.82	20
402	447325.25	4768365.88	19
403	447962.72	4768534.16	17
404	448419.12	4767031.30	19
405	443569.57	4769201.04	16
406	446485.07	4769848.79	16
407	443851.90	4767512.49	13
408	443786.41	4767726.76	20
409	445782.66	4767067.32	25
410	449515.07	4765683.68	15
411	445572.45	4769706.50	16
412	446150.76	4769676.28	16
413	445656.53	4769213.35	18
414	444011.06	4767070.23	22
415	445219.85	4767329.97	20
416	446950.73	4766235.79	28
417	444499.60	4769444.64	16
418	445586.24	4769508.40	17
419	448119.83	4767815.92	18
420	449084.87	4765992.71	8

Table B-1: Sound Level Modeling Results Sorted by Receptor ID - V150-4.3 Mode SO12

Receptor ID	Coordinates UTM NAD83 Zone 18N		Source Only L_{eq} Broadband Sound Level (dBA)
	X (m)	Y (m)	
421	445631.08	4769397.42	17
422	446949.64	4769627.09	16
423	447744.77	4769379.42	16
424	447373.24	4767184.84	23
425	448385.29	4767076.50	19
426	446801.28	4766299.76	30
427	447525.75	4765552.44	23
428	449275.97	4767032.04	16
429	448637.32	4766773.27	18
430	449281.93	4766882.67	16
431	449287.64	4766947.88	16
432	449408.25	4767107.21	15
433	448760.43	4766566.43	18
434	445387.92	4767031.56	24
435	445574.78	4769675.74	16
436	445850.86	4769692.20	16
437	446766.13	4767167.08	27
438	445888.20	4765549.98	32
439	445048.71	4769641.17	16
440	446183.41	4769762.20	16
441	447991.75	4769032.81	16
442	444726.94	4768077.38	22
443	443885.95	4767705.68	20
444	443420.91	4767753.88	10
445	446762.17	4767140.26	20
446	448475.56	4766960.56	18
447	444798.84	4769609.65	16
448	445772.57	4769615.29	17
449	446750.77	4769594.01	16
450	445717.07	4769260.04	18
451	446626.58	4769530.54	8
452	443097.28	4768194.19	8
453	446570.75	4768473.60	21
454	447016.43	4766565.02	27
455	449164.58	4766749.06	16
456	446863.67	4769690.64	16
457	447627.61	4769291.96	16
458	443918.08	4767085.38	22
459	443676.97	4767732.66	11
460	445086.65	4766127.13	32
461	448441.00	4767022.83	18
462	447714.63	4765635.07	22

Table B-1: Sound Level Modeling Results Sorted by Receptor ID - V150-4.3 Mode SO12

Receptor ID	Coordinates UTM NAD83 Zone 18N X (m)	Coordinates UTM NAD83 Zone 18N Y (m)	Source Only L_{eq} Broadband Sound Level (dBA)
463	444499.54	4769591.80	16
464	443500.75	4768718.03	8
465	443851.37	4769418.14	16
466	445594.25	4769092.15	18
467	447971.30	4768132.34	10
468	447462.47	4767216.86	23
469	445518.80	4769808.77	16
470	445848.28	4769836.85	16
471	447151.32	4769584.15	16
472	446954.44	4769785.85	16
473	447835.11	4768722.07	9
474	443264.51	4768573.40	8
475	446403.95	4767227.46	29
476	447903.73	4768124.15	11
477	446975.01	4766109.64	20
478	447107.49	4765741.71	18
479	446360.20	4769794.17	16
480	446297.89	4769437.68	17
481	446863.21	4769516.93	16
482	447841.82	4768862.94	17
483	449157.30	4766798.72	16
484	444179.70	4769564.57	16
485	444379.63	4769580.32	16
486	445700.08	4769832.20	16
487	445592.05	4769452.71	17
488	444818.97	4766242.81	30
489	445770.04	4769591.90	17
490	446030.65	4769844.83	16
491	447314.93	4769261.13	17
492	443047.87	4768404.39	16
493	446322.84	4767047.63	31
494	448369.39	4768069.93	17
495	446416.99	4764869.80	25
496	445854.31	4769739.74	16
497	446305.63	4769698.53	16
498	447576.49	4769246.15	16
499	445893.46	4767127.47	32
500	449185.91	4766837.82	16
501	445871.32	4769781.23	16
502	448238.42	4768877.89	16
503	447751.18	4767538.59	21
504	445200.56	4769577.31	17

Table B-1: Sound Level Modeling Results Sorted by Receptor ID - V150-4.3 Mode SO12

Receptor ID	Coordinates UTM NAD83 Zone 18N		Source Only L_{eq} Broadband Sound Level (dBA)
	X (m)	Y (m)	
505	446882.85	4769595.83	16
506	446931.53	4769681.92	16
507	443881.13	4767748.31	20
508	447699.55	4767206.50	22
509	448272.47	4767533.91	18
510	444807.70	4769549.85	16
511	446300.31	4769594.12	17
512	444903.95	4767400.18	26
513	446401.70	4767208.61	29
514	448190.44	4767860.14	18
515	448218.28	4768943.68	16
516	443916.10	4767877.16	20
517	444990.78	4766087.31	23
518	445175.41	4768221.01	22
519	447289.13	4768348.05	20
520	447989.26	4768608.53	17
521	448341.17	4767404.53	18
522	449221.00	4766993.94	16
523	448777.69	4766321.65	10
524	445271.79	4769644.66	16
525	446209.54	4769620.24	17
526	447810.87	4769366.52	16
527	443372.38	4768484.43	8
528	445806.81	4767302.30	30
529	446157.03	4769749.12	16
530	446898.08	4768890.85	18
531	446538.00	4766618.43	32
532	449295.79	4765159.31	7
533	447839.45	4768668.70	9
534	445707.87	4765532.18	32
535	447265.02	4769721.22	15
536	446977.58	4769531.39	8
537	447965.09	4768185.29	10
538	447993.37	4768653.16	17
539	444903.44	4769615.41	16
540	444141.69	4769560.91	16
541	445844.08	4769706.95	16
542	445406.69	4769496.12	17
543	444960.34	4767434.34	26
544	447996.34	4768195.38	10
545	447998.96	4768417.90	17
546	447404.48	4767206.74	23

Table B-1: Sound Level Modeling Results Sorted by Receptor ID - V150-4.3 Mode SO12

Receptor ID	Coordinates UTM NAD83 Zone 18N		Source Only L_{eq} Broadband Sound Level (dBA)
	X (m)	Y (m)	
547	449136.08	4765658.56	8
548	446940.79	4769564.13	16
549	442946.23	4767990.05	8
550	445097.22	4766459.24	33
551	448680.38	4766993.49	18
552	448165.92	4767449.03	19
553	443495.56	4768847.38	16
554	443401.62	4768858.54	16
555	443541.45	4768972.99	16
556	447888.68	4769192.90	16
557	445067.82	4766563.80	32
558	445842.97	4767252.13	31
559	448338.61	4767171.46	11
560	448525.26	4766783.26	18
561	449167.42	4766774.81	16
562	446136.97	4769744.67	16
563	447334.26	4769503.74	16
564	447853.08	4768800.42	17
565	447835.40	4768980.33	16
566	445091.32	4766405.41	33
567	446459.59	4768395.90	21
568	445631.92	4769828.25	16
569	446200.80	4769411.14	17
570	447012.76	4769783.91	16
571	447840.21	4768754.82	17
572	447840.38	4768912.57	17
573	447831.26	4769093.61	16
574	444788.34	4768097.69	22
575	444369.74	4767077.91	24
576	447972.53	4768494.37	17
577	445284.34	4769478.43	17
578	443401.94	4767812.78	10
579	444751.76	4768137.36	22
580	445255.77	4768231.68	22
581	448040.84	4767248.31	20
582	449506.27	4766870.28	15
583	448856.66	4766797.00	17
584	447883.61	4769344.47	16
585	443844.45	4767567.70	13
586	448626.90	4766703.79	18
587	447113.39	4765884.18	26
588	448805.13	4766402.51	9

Table B-1: Sound Level Modeling Results Sorted by Receptor ID - V150-4.3 Mode SO12

Receptor ID	Coordinates UTM NAD83 Zone 18N		Source Only L_{eq} Broadband Sound Level (dBA)
	X (m)	Y (m)	
589	445195.67	4769653.53	16
590	445513.64	4769773.91	16
591	445575.61	4769773.04	16
592	446432.61	4769807.70	16
593	445697.02	4769122.01	18
594	444770.48	4768141.64	22
595	448133.30	4767772.38	18
596	445152.05	4766454.16	34
597	446531.80	4766659.07	32
598	445380.26	4765730.36	32
599	447012.92	4766237.87	28
600	448987.27	4766162.06	9
601	449076.71	4765976.64	8
602	444940.78	4769625.05	16
603	445882.66	4769722.11	16
604	445935.16	4769785.80	16
605	445150.30	4769520.03	17
606	447945.79	4767302.36	20
607	449045.48	4766064.42	8
608	444162.86	4769493.41	16
609	445741.10	4767308.60	30
610	447891.25	4768488.61	10
611	449240.53	4766931.74	16
612	449245.17	4766983.05	16
613	448730.10	4766520.85	10
614	449380.21	4765546.70	7
615	443497.26	4768823.01	16
616	443736.08	4769348.12	16
617	448212.83	4767806.22	18
618	443624.55	4769168.78	16
619	446094.35	4769734.84	16
620	449381.21	4767107.86	15
621	449167.15	4766861.95	16
622	443502.26	4768952.14	16
623	445845.22	4767067.45	25
624	447942.59	4768356.02	10
625	444989.36	4769622.27	16
626	446277.57	4769772.98	16
627	446789.46	4769793.23	16
628	446745.82	4768742.90	19
629	447525.52	4769293.60	16
630	447852.56	4768779.89	17

Table B-1: Sound Level Modeling Results Sorted by Receptor ID - V150-4.3 Mode SO12

Receptor ID	Coordinates UTM NAD83 Zone 18N		Source Only L_{eq} Broadband Sound Level (dBA)
	X (m)	Y (m)	
631	447881.14	4769276.52	16
632	445698.01	4768267.47	23
633	449152.12	4766887.32	16
634	444603.22	4769594.83	16
635	443548.99	4769171.19	16
636	444788.72	4769508.68	16
637	446234.81	4769688.46	16
638	446350.86	4769551.49	17
639	443900.36	4767640.50	13
640	447874.54	4768131.74	11
641	447734.72	4767242.59	21
642	449474.84	4767109.64	15
643	449210.26	4766739.80	16
644	444819.67	4769366.85	17
645	444788.73	4769459.27	17
646	446897.10	4766442.63	29
647	445457.80	4765725.41	33
648	449440.37	4767023.14	15
649	449363.65	4765137.11	7
650	449247.31	4765567.03	7
651	445600.56	4769581.45	17
652	445665.54	4769567.19	17
653	447798.09	4769430.36	15
654	444944.02	4766288.03	31
655	448353.72	4766966.79	19
656	448647.06	4767004.76	18
657	449120.95	4766846.22	16
658	445492.73	4769806.64	16
659	445987.48	4769428.58	17
660	445460.24	4769499.75	17
661	447830.27	4769033.20	16

Table B-2: Sound Level Modeling Results Sorted by Receptor ID - GE 3.4-140 NRO 100

Receptor ID	Coordinates UTM NAD83 Zone 18N		Source Only L_{eq} Broadband Sound Level (dBA)
	X (m)	Y (m)	
1	445338.33	4765587.17	29
2	445371.41	4765485.72	28
3	445419.72	4765678.90	31
4	444801.00	4766187.94	28
5	444716.74	4766146.77	27
6	444906.80	4766018.66	28
7	444689.69	4765996.71	26
8	444737.53	4765876.68	26
9	444624.88	4765868.20	25
10	444708.54	4765818.14	26
11	444722.44	4765724.65	25
12	444590.45	4765638.26	24
13	444532.59	4765659.58	16
14	444529.15	4765579.19	23
15	444598.27	4765565.75	24
16	444384.63	4765912.45	23
17	444369.77	4765834.37	23
18	444249.58	4766118.61	23
19	444309.59	4766273.96	23
20	444446.61	4766250.68	24
21	444443.16	4766416.38	24
22	444376.64	4765633.67	22
23	444257.33	4765609.62	22
24	444215.56	4765657.18	14
25	444060.85	4765662.32	13
26	444002.78	4765781.52	13
27	443934.84	4765839.30	12
28	443981.29	4765887.52	13
29	443955.43	4765963.26	13
30	444688.90	4765459.54	24
31	444761.19	4765565.89	25
32	444822.25	4765549.69	25
33	444848.92	4765541.60	18
34	444827.04	4765438.13	25
35	444872.88	4765155.05	23
36	445178.72	4764648.33	21
37	444985.00	4764475.56	19
38	445033.72	4765607.41	27
39	445036.45	4765475.80	26
40	445127.36	4765575.86	28
41	445482.51	4765611.06	30
42	445881.95	4765061.00	25

Table B-2: Sound Level Modeling Results Sorted by Receptor ID - GE 3.4-140 NRO 100

Receptor ID	Coordinates UTM NAD83 Zone 18N		Source Only L_{eq} Broadband Sound Level (dBA)
	X (m)	Y (m)	
43	445994.31	4765100.04	18
44	445988.27	4765023.52	17
45	446132.65	4764617.89	21
46	443871.67	4767375.42	11
47	444748.55	4766269.29	27
48	448093.19	4767801.79	16
49	448174.25	4767886.28	15
50	449261.02	4766905.64	13
51	449029.25	4766037.62	6
52	443655.64	4769243.51	13
53	446794.67	4769514.01	14
54	447273.14	4769132.91	14
55	446503.82	4768393.83	19
56	446961.94	4766420.20	26
57	448928.19	4767072.27	14
58	448841.68	4766423.61	14
59	445116.45	4769795.72	13
60	445231.12	4769580.30	14
61	446281.54	4769676.45	13
62	443415.21	4768475.74	6
63	447323.05	4767298.19	21
64	449042.48	4766741.12	14
65	447242.74	4769586.88	13
66	447800.71	4769278.53	13
67	445104.95	4766159.08	31
68	448209.15	4767755.41	16
69	445508.90	4769702.89	13
70	446245.20	4769762.58	13
71	445821.89	4767334.56	28
72	447819.07	4769211.19	13
73	447913.00	4769345.14	12
74	445809.35	4767073.17	24
75	448552.04	4766997.82	15
76	447831.69	4767178.16	19
77	448343.38	4767232.44	16
78	449316.01	4765419.14	4
79	445682.29	4769613.48	14
80	445962.41	4769787.11	13
81	445164.69	4769573.05	14
82	446828.60	4766471.96	28
83	446859.88	4769789.03	13
84	444946.28	4767433.57	24

Table B-2: Sound Level Modeling Results Sorted by Receptor ID - GE 3.4-140 NRO 100

Receptor ID	Coordinates UTM NAD83 Zone 18N		Source Only L_{eq} Broadband Sound Level (dBA)
	X (m)	Y (m)	
85	448032.79	4767889.41	16
86	447836.66	4767307.95	18
87	449222.85	4767096.21	13
88	449010.80	4766121.28	6
89	448909.72	4766759.66	14
90	445651.39	4769692.54	13
91	443935.30	4767445.91	11
92	445368.32	4767299.69	20
93	444329.30	4769366.09	13
94	445825.20	4769723.04	13
95	445385.81	4769077.46	16
96	443647.52	4767693.55	9
97	445269.11	4766889.54	23
98	448949.45	4767085.03	14
99	445128.42	4769569.87	14
100	445280.07	4769069.02	16
101	445228.26	4769472.23	14
102	447816.88	4769231.07	13
103	446970.07	4769376.45	14
104	447174.87	4769509.34	13
105	447871.25	4769456.84	12
106	443827.03	4767152.03	19
107	448930.61	4766267.67	14
108	443549.82	4769134.90	13
109	447498.11	4769651.17	12
110	443062.52	4768413.65	13
111	446441.28	4768262.13	20
112	448077.68	4768373.08	14
113	445379.14	4769675.78	5
114	446945.67	4768696.84	16
115	447301.87	4769158.82	14
116	443876.21	4767763.28	17
117	448080.10	4767908.24	16
118	448917.06	4766325.45	14
119	449065.61	4766769.41	14
120	445994.97	4769843.18	13
121	445226.98	4769069.57	16
122	443860.93	4767301.69	11
123	445787.65	4768332.47	20
124	449326.10	4765578.06	4
125	445132.15	4769644.43	13
126	446029.37	4769791.01	13

Table B-2: Sound Level Modeling Results Sorted by Receptor ID - GE 3.4-140 NRO 100

Receptor ID	Coordinates UTM NAD83 Zone 18N		Source Only L_{eq} Broadband Sound Level (dBA)
	X (m)	Y (m)	
127	447820.33	4769178.11	13
128	448026.51	4767972.11	16
129	448195.46	4767383.83	16
130	445883.07	4769695.59	13
131	446110.23	4769671.11	13
132	445293.11	4769536.54	14
133	443523.97	4767640.97	9
134	444075.49	4769487.14	13
135	446271.42	4769605.94	14
136	446228.30	4769500.74	14
137	446207.42	4768332.80	20
138	446553.77	4766462.91	31
139	447021.42	4765858.56	25
140	444785.74	4769488.79	14
141	446165.31	4769659.58	13
142	445436.05	4769082.86	16
143	446404.98	4769668.88	13
144	446356.57	4769516.22	14
145	448012.70	4769010.88	13
146	447892.60	4769396.54	12
147	444891.42	4766285.01	29
148	447606.10	4767700.18	11
149	448430.93	4766986.92	16
150	445292.46	4766750.40	25
151	447817.45	4769252.63	13
152	447810.15	4769320.43	13
153	444953.48	4766304.89	30
154	447175.38	4768538.20	17
155	444068.58	4769487.21	13
156	445571.28	4769738.77	13
157	446904.22	4768911.57	16
158	444772.14	4768098.43	20
159	448188.58	4767807.96	15
160	448415.20	4766994.80	16
161	445130.62	4766683.45	31
162	446537.90	4766735.99	30
163	444410.05	4769578.82	13
164	445512.31	4769668.22	13
165	446690.74	4769617.58	13
166	445682.52	4769464.42	14
167	446265.86	4769478.97	14
168	447888.90	4769248.73	13

Table B-2: Sound Level Modeling Results Sorted by Receptor ID - GE 3.4-140 NRO 100

Receptor ID	Coordinates UTM NAD83 Zone 18N		Source Only L_{eq} Broadband Sound Level (dBA)
	X (m)	Y (m)	
169	443057.76	4768437.16	13
170	443722.19	4767820.13	17
171	448188.04	4767841.10	15
172	446987.92	4765858.25	25
173	449343.70	4767100.04	13
174	445700.07	4769406.30	14
175	445044.26	4767332.88	18
176	444868.01	4766302.83	29
177	446450.59	4766694.25	32
178	445793.45	4769717.27	13
179	445120.08	4766646.65	31
180	446582.85	4768501.49	18
181	448205.26	4767838.27	15
182	446677.79	4766518.22	29
183	449406.07	4765549.29	12
184	445218.40	4769655.80	5
185	446329.58	4769578.42	14
186	446205.13	4769683.61	13
187	446533.56	4769750.38	13
188	446087.66	4769773.55	13
189	446348.41	4769482.89	14
190	447784.40	4769023.38	13
191	445417.73	4767058.46	23
192	448052.47	4767943.04	16
193	448829.39	4766345.04	7
194	445642.53	4769344.99	15
195	445011.95	4766553.06	30
196	449262.64	4767102.14	13
197	447797.95	4769400.45	12
198	443267.98	4768607.01	5
199	445339.13	4767295.37	20
200	449487.47	4765690.56	12
201	445792.09	4769770.17	13
202	445666.84	4769825.96	13
203	445878.47	4769837.41	13
204	445351.45	4769330.41	15
205	445521.86	4769511.14	14
206	447830.23	4768900.88	14
207	447827.18	4769118.68	13
208	446349.70	4767218.45	28
209	447985.19	4768133.74	8
210	448013.81	4768412.08	14

Table B-2: Sound Level Modeling Results Sorted by Receptor ID - GE 3.4-140 NRO 100

Receptor ID	Coordinates UTM NAD83 Zone 18N		Source Only L_{eq} Broadband Sound Level (dBA)
	X (m)	Y (m)	
211	445198.57	4766537.83	33
212	446819.60	4768685.75	17
213	447125.98	4769669.95	13
214	447239.99	4769725.54	12
215	447191.93	4769553.74	13
216	448545.70	4766807.26	16
217	447244.66	4765724.60	15
218	449205.62	4766809.67	13
219	449375.18	4765402.51	4
220	446569.80	4769835.72	13
221	446123.13	4769494.13	14
222	446939.36	4768918.10	15
223	443861.17	4767449.20	11
224	443373.16	4767742.16	8
225	443390.82	4767766.70	8
226	448403.96	4767085.67	16
227	443494.36	4769033.57	13
228	445789.62	4769696.65	13
229	445507.14	4769743.95	13
230	445347.39	4769484.86	14
231	447834.46	4768836.10	14
232	443317.68	4767570.08	16
233	445758.75	4768336.90	20
234	449045.79	4766972.39	14
235	449491.97	4765587.95	12
236	443674.23	4769280.57	13
237	444314.22	4769458.72	13
238	445365.40	4769655.79	13
239	445496.59	4769081.52	16
240	446859.09	4766285.37	28
241	448705.62	4767090.91	15
242	448977.48	4766723.61	14
243	445252.95	4769584.50	14
244	443911.30	4767619.23	10
245	445583.60	4768361.33	20
246	447141.52	4768655.37	16
247	446798.98	4766370.41	28
248	449011.78	4766724.57	14
249	446692.19	4769689.38	13
250	445649.03	4769098.94	16
251	446009.61	4769396.18	14
252	446209.38	4769546.99	14

Table B-2: Sound Level Modeling Results Sorted by Receptor ID - GE 3.4-140 NRO 100

Receptor ID	Coordinates UTM NAD83 Zone 18N		Source Only L_{eq} Broadband Sound Level (dBA)
	X (m)	Y (m)	
253	446967.51	4768675.35	16
254	447302.06	4769200.82	14
255	447888.14	4769220.12	13
256	444689.45	4768077.72	19
257	447299.43	4767205.39	22
258	446843.95	4765738.31	26
259	449244.23	4767101.89	13
260	449299.93	4767103.68	13
261	449433.41	4765632.83	12
262	443479.73	4768716.82	5
263	446344.51	4769805.45	13
264	443313.79	4767554.78	16
265	443911.34	4767579.24	10
266	443519.00	4767743.33	8
267	447985.15	4767229.40	18
268	444739.81	4769606.45	13
269	446968.49	4768665.91	16
270	449227.07	4765391.01	4
271	448027.15	4768345.04	15
272	448326.99	4767390.56	16
273	446713.31	4766528.30	29
274	445933.26	4765556.71	30
275	444946.27	4767317.64	17
276	446476.58	4768431.84	19
277	445173.14	4769064.76	16
278	447465.76	4769260.91	13
279	447621.01	4769492.26	13
280	446015.26	4769366.05	14
281	447196.44	4769597.85	13
282	446364.68	4768268.15	20
283	443585.57	4769095.77	13
284	443693.60	4769311.46	12
285	445712.39	4769701.36	13
286	445905.42	4769784.59	13
287	447862.60	4768666.96	6
288	449301.67	4767124.73	13
289	444419.00	4769427.71	13
290	445280.52	4769312.24	15
291	446997.84	4769607.24	13
292	447813.74	4769305.14	13
293	448217.74	4767491.29	16
294	449063.21	4765686.02	5

Table B-2: Sound Level Modeling Results Sorted by Receptor ID - GE 3.4-140 NRO 100

Receptor ID	Coordinates UTM NAD83 Zone 18N		Source Only L_{eq} Broadband Sound Level (dBA)
	X (m)	Y (m)	
295	445179.80	4768212.22	20
296	446579.17	4766909.80	29
297	446505.08	4766711.09	31
298	449048.97	4767018.64	14
299	444814.78	4769391.01	14
300	448477.28	4766943.00	16
301	448305.16	4767264.55	16
302	449387.94	4765432.97	4
303	443542.57	4769118.52	13
304	447085.71	4766174.00	25
305	449443.12	4765555.63	12
306	445486.02	4769583.47	14
307	446240.31	4769612.32	14
308	445335.57	4769546.97	14
309	443842.20	4767059.15	19
310	448330.46	4767225.73	16
311	447037.70	4766537.47	26
312	449268.47	4766966.72	13
313	447483.66	4767167.55	21
314	449185.14	4767095.61	13
315	444610.71	4769637.96	13
316	444169.97	4769510.48	13
317	446832.20	4769594.69	13
318	445721.69	4769200.77	15
319	445240.63	4769530.15	14
320	445391.77	4769566.30	14
321	446266.66	4769427.08	14
322	448300.46	4767473.79	16
323	448675.54	4766724.76	15
324	446090.40	4769830.40	13
325	447100.33	4769653.62	13
326	448654.60	4767052.54	15
327	449003.84	4766954.06	14
328	448904.01	4766188.26	6
329	449214.18	4766775.70	13
330	444895.85	4769555.72	13
331	445437.46	4769573.61	14
332	445543.81	4769086.98	16
333	447817.72	4769274.39	13
334	443833.73	4767603.15	10
335	449467.46	4765636.79	12
336	448996.43	4765932.33	6

Table B-2: Sound Level Modeling Results Sorted by Receptor ID - GE 3.4-140 NRO 100

Receptor ID	Coordinates UTM NAD83 Zone 18N X (m)	Y (m)	Source Only L_{eq} Broadband Sound Level (dBA)
337	445995.21	4769789.16	13
338	446086.61	4769802.94	13
339	445332.34	4769072.93	16
340	446957.61	4768869.72	16
341	448111.21	4768868.47	13
342	448052.07	4767258.21	17
343	445266.26	4766555.48	34
344	449259.40	4765393.51	4
345	446915.40	4768974.06	15
346	447215.80	4769701.24	12
347	447253.73	4768987.56	7
348	447991.15	4768664.71	14
349	447337.80	4767267.44	21
350	448591.79	4766720.01	15
351	449104.40	4766914.58	13
352	449382.07	4765594.85	12
353	446385.82	4769799.87	13
354	445422.37	4769385.80	14
355	446278.83	4769523.36	14
356	446949.94	4769586.24	13
357	447952.60	4768298.40	7
358	447754.70	4767510.84	18
359	448887.16	4766357.11	14
360	444781.14	4768156.22	19
361	447857.48	4767231.84	18
362	446735.50	4766168.45	29
363	446708.15	4766500.47	29
364	449105.37	4766880.12	13
365	445911.73	4769839.44	13
366	445212.80	4768251.79	20
367	446411.38	4768273.73	20
368	447867.38	4768541.03	15
369	444078.09	4769501.11	13
370	445545.67	4769576.78	14
371	446731.56	4769624.43	13
372	443719.73	4767802.94	17
373	445837.96	4767280.14	29
374	448398.15	4768078.80	14
375	448491.73	4766781.54	16
376	449139.59	4766822.17	13
377	444871.97	4769612.61	13
378	443497.35	4768937.39	13

Table B-2: Sound Level Modeling Results Sorted by Receptor ID - GE 3.4-140 NRO 100

Receptor ID	Coordinates UTM NAD83 Zone 18N		Source Only L_{eq} Broadband Sound Level (dBA)
	X (m)	Y (m)	
379	445311.89	4769774.69	13
380	443915.52	4767063.64	20
381	449054.04	4765987.05	6
382	445963.93	4769841.10	13
383	446711.61	4769805.08	13
384	449075.02	4766802.20	14
385	445651.10	4769280.27	15
386	446235.61	4769416.19	14
387	446326.09	4769455.88	14
388	447731.60	4768901.85	14
389	443831.48	4767296.88	11
390	447108.09	4766203.31	25
391	448957.09	4766963.07	14
392	449033.78	4766019.73	6
393	448844.53	4766437.20	14
394	444472.47	4769581.65	13
395	445586.47	4769812.90	13
396	445714.82	4769337.64	15
397	443964.21	4767062.44	20
398	446900.05	4768682.52	17
399	446971.35	4769510.42	5
400	445395.93	4767306.18	20
401	445189.59	4767353.82	18
402	447325.25	4768365.88	17
403	447962.72	4768534.16	14
404	448419.12	4767031.30	16
405	443569.57	4769201.04	13
406	446485.07	4769848.79	13
407	443851.90	4767512.49	10
408	443786.41	4767726.76	17
409	445782.66	4767067.32	24
410	449515.07	4765683.68	12
411	445572.45	4769706.50	13
412	446150.76	4769676.28	13
413	445656.53	4769213.35	15
414	444011.06	4767070.23	20
415	445219.85	4767329.97	19
416	446950.73	4766235.79	27
417	444499.60	4769444.64	13
418	445586.24	4769508.40	14
419	448119.83	4767815.92	16
420	449084.87	4765992.71	5

Table B-2: Sound Level Modeling Results Sorted by Receptor ID - GE 3.4-140 NRO 100

Receptor ID	Coordinates UTM NAD83 Zone 18N		Source Only L_{eq} Broadband Sound Level (dBA)
	X (m)	Y (m)	
421	445631.08	4769397.42	14
422	446949.64	4769627.09	13
423	447744.77	4769379.42	13
424	447373.24	4767184.84	21
425	448385.29	4767076.50	16
426	446801.28	4766299.76	28
427	447525.75	4765552.44	20
428	449275.97	4767032.04	13
429	448637.32	4766773.27	15
430	449281.93	4766882.67	13
431	449287.64	4766947.88	13
432	449408.25	4767107.21	12
433	448760.43	4766566.43	15
434	445387.92	4767031.56	23
435	445574.78	4769675.74	13
436	445850.86	4769692.20	13
437	446766.13	4767167.08	25
438	445888.20	4765549.98	30
439	445048.71	4769641.17	13
440	446183.41	4769762.20	13
441	447991.75	4769032.81	13
442	444726.94	4768077.38	20
443	443885.95	4767705.68	18
444	443420.91	4767753.88	8
445	446762.17	4767140.26	26
446	448475.56	4766960.56	16
447	444798.84	4769609.65	13
448	445772.57	4769615.29	14
449	446750.77	4769594.01	13
450	445717.07	4769260.04	15
451	446626.58	4769530.54	6
452	443097.28	4768194.19	6
453	446570.75	4768473.60	18
454	447016.43	4766565.02	26
455	449164.58	4766749.06	13
456	446863.67	4769690.64	13
457	447627.61	4769291.96	13
458	443918.08	4767085.38	20
459	443676.97	4767732.66	17
460	445086.65	4766127.13	31
461	448441.00	4767022.83	16
462	447714.63	4765635.07	20

Table B-2: Sound Level Modeling Results Sorted by Receptor ID - GE 3.4-140 NRO 100

Receptor ID	Coordinates UTM NAD83 Zone 18N		Source Only L_{eq} Broadband Sound Level (dBA)
	X (m)	Y (m)	
463	444499.54	4769591.80	13
464	443500.75	4768718.03	5
465	443851.37	4769418.14	12
466	445594.25	4769092.15	16
467	447971.30	4768132.34	8
468	447462.47	4767216.86	21
469	445518.80	4769808.77	13
470	445848.28	4769836.85	13
471	447151.32	4769584.15	13
472	446954.44	4769785.85	13
473	447835.11	4768722.07	6
474	443264.51	4768573.40	5
475	446403.95	4767227.46	27
476	447903.73	4768124.15	8
477	446975.01	4766109.64	18
478	447107.49	4765741.71	16
479	446360.20	4769794.17	13
480	446297.89	4769437.68	14
481	446863.21	4769516.93	13
482	447841.82	4768862.94	14
483	449157.30	4766798.72	13
484	444179.70	4769564.57	13
485	444379.63	4769580.32	13
486	445700.08	4769832.20	13
487	445592.05	4769452.71	14
488	444818.97	4766242.81	28
489	445770.04	4769591.90	14
490	446030.65	4769844.83	13
491	447314.93	4769261.13	14
492	443047.87	4768404.39	13
493	446322.84	4767047.63	30
494	448369.39	4768069.93	14
495	446416.99	4764869.80	23
496	445854.31	4769739.74	13
497	446305.63	4769698.53	13
498	447576.49	4769246.15	13
499	445893.46	4767127.47	31
500	449185.91	4766837.82	13
501	445871.32	4769781.23	13
502	448238.42	4768877.89	13
503	447751.18	4767538.59	18
504	445200.56	4769577.31	14

Table B-2: Sound Level Modeling Results Sorted by Receptor ID - GE 3.4-140 NRO 100

Receptor ID	Coordinates UTM NAD83 Zone 18N		Source Only L_{eq} Broadband Sound Level (dBA)
	X (m)	Y (m)	
505	446882.85	4769595.83	13
506	446931.53	4769681.92	13
507	443881.13	4767748.31	18
508	447699.55	4767206.50	19
509	448272.47	4767533.91	16
510	444807.70	4769549.85	13
511	446300.31	4769594.12	14
512	444903.95	4767400.18	24
513	446401.70	4767208.61	28
514	448190.44	4767860.14	15
515	448218.28	4768943.68	13
516	443916.10	4767877.16	17
517	444990.78	4766087.31	30
518	445175.41	4768221.01	20
519	447289.13	4768348.05	17
520	447989.26	4768608.53	14
521	448341.17	4767404.53	16
522	449221.00	4766993.94	13
523	448777.69	4766321.65	7
524	445271.79	4769644.66	13
525	446209.54	4769620.24	14
526	447810.87	4769366.52	13
527	443372.38	4768484.43	6
528	445806.81	4767302.30	29
529	446157.03	4769749.12	13
530	446898.08	4768890.85	16
531	446538.00	4766618.43	31
532	449295.79	4765159.31	4
533	447839.45	4768668.70	6
534	445707.87	4765532.18	30
535	447265.02	4769721.22	12
536	446977.58	4769531.39	5
537	447965.09	4768185.29	8
538	447993.37	4768653.16	14
539	444903.44	4769615.41	13
540	444141.69	4769560.91	13
541	445844.08	4769706.95	13
542	445406.69	4769496.12	14
543	444960.34	4767434.34	24
544	447996.34	4768195.38	7
545	447998.96	4768417.90	14
546	447404.48	4767206.74	21

Table B-2: Sound Level Modeling Results Sorted by Receptor ID - GE 3.4-140 NRO 100

Receptor ID	Coordinates UTM NAD83 Zone 18N		Source Only L_{eq} Broadband Sound Level (dBA)
	X (m)	Y (m)	
547	449136.08	4765658.56	5
548	446940.79	4769564.13	13
549	442946.23	4767990.05	5
550	445097.22	4766459.24	32
551	448680.38	4766993.49	15
552	448165.92	4767449.03	16
553	443495.56	4768847.38	13
554	443401.62	4768858.54	13
555	443541.45	4768972.99	13
556	447888.68	4769192.90	13
557	445067.82	4766563.80	31
558	445842.97	4767252.13	29
559	448338.61	4767171.46	8
560	448525.26	4766783.26	16
561	449167.42	4766774.81	13
562	446136.97	4769744.67	13
563	447334.26	4769503.74	13
564	447853.08	4768800.42	14
565	447835.40	4768980.33	13
566	445091.32	4766405.41	32
567	446459.59	4768395.90	19
568	445631.92	4769828.25	13
569	446200.80	4769411.14	14
570	447012.76	4769783.91	12
571	447840.21	4768754.82	14
572	447840.38	4768912.57	14
573	447831.26	4769093.61	13
574	444788.34	4768097.69	20
575	444369.74	4767077.91	22
576	447972.53	4768494.37	14
577	445284.34	4769478.43	14
578	443401.94	4767812.78	8
579	444751.76	4768137.36	19
580	445255.77	4768231.68	20
581	448040.84	4767248.31	17
582	449506.27	4766870.28	12
583	448856.66	4766797.00	14
584	447883.61	4769344.47	12
585	443844.45	4767567.70	10
586	448626.90	4766703.79	15
587	447113.39	4765884.18	24
588	448805.13	4766402.51	15

Table B-2: Sound Level Modeling Results Sorted by Receptor ID - GE 3.4-140 NRO 100

Receptor ID	Coordinates UTM NAD83 Zone 18N X (m)	Coordinates UTM NAD83 Zone 18N Y (m)	Source Only L_{eq} Broadband Sound Level (dBA)
589	445195.67	4769653.53	13
590	445513.64	4769773.91	13
591	445575.61	4769773.04	13
592	446432.61	4769807.70	13
593	445697.02	4769122.01	16
594	444770.48	4768141.64	19
595	448133.30	4767772.38	16
596	445152.05	4766454.16	32
597	446531.80	4766659.07	31
598	445380.26	4765730.36	31
599	447012.92	4766237.87	26
600	448987.27	4766162.06	6
601	449076.71	4765976.64	6
602	444940.78	4769625.05	13
603	445882.66	4769722.11	13
604	445935.16	4769785.80	13
605	445150.30	4769520.03	14
606	447945.79	4767302.36	18
607	449045.48	4766064.42	14
608	444162.86	4769493.41	13
609	445741.10	4767308.60	28
610	447891.25	4768488.61	7
611	449240.53	4766931.74	13
612	449245.17	4766983.05	13
613	448730.10	4766520.85	15
614	449380.21	4765546.70	12
615	443497.26	4768823.01	13
616	443736.08	4769348.12	12
617	448212.83	4767806.22	15
618	443624.55	4769168.78	13
619	446094.35	4769734.84	13
620	449381.21	4767107.86	12
621	449167.15	4766861.95	13
622	443502.26	4768952.14	13
623	445845.22	4767067.45	24
624	447942.59	4768356.02	7
625	444989.36	4769622.27	13
626	446277.57	4769772.98	13
627	446789.46	4769793.23	13
628	446745.82	4768742.90	17
629	447525.52	4769293.60	13
630	447852.56	4768779.89	14

Table B-2: Sound Level Modeling Results Sorted by Receptor ID - GE 3.4-140 NRO 100

Receptor ID	Coordinates UTM NAD83 Zone 18N		Source Only L_{eq} Broadband Sound Level (dBA)
	X (m)	Y (m)	
631	447881.14	4769276.52	13
632	445698.01	4768267.47	20
633	449152.12	4766887.32	13
634	444603.22	4769594.83	13
635	443548.99	4769171.19	13
636	444788.72	4769508.68	13
637	446234.81	4769688.46	13
638	446350.86	4769551.49	14
639	443900.36	4767640.50	10
640	447874.54	4768131.74	8
641	447734.72	4767242.59	19
642	449474.84	4767109.64	12
643	449210.26	4766739.80	13
644	444819.67	4769366.85	14
645	444788.73	4769459.27	14
646	446897.10	4766442.63	27
647	445457.80	4765725.41	32
648	449440.37	4767023.14	12
649	449363.65	4765137.11	4
650	449247.31	4765567.03	5
651	445600.56	4769581.45	14
652	445665.54	4769567.19	14
653	447798.09	4769430.36	12
654	444944.02	4766288.03	30
655	448353.72	4766966.79	16
656	448647.06	4767004.76	15
657	449120.95	4766846.22	13
658	445492.73	4769806.64	13
659	445987.48	4769428.58	14
660	445460.24	4769499.75	14
661	447830.27	4769033.20	13

Table B-3: Sound Level Modeling Results Sorted by Receptor ID - Vensys 136-3.5 Mode 4

Receptor ID	Coordinates UTM NAD83 Zone 18N X (m)	Coordinates UTM NAD83 Zone 18N Y (m)	Source Only L_{eq} Broadband Sound Level (dBA)
1	445338.33	4765587.17	33
2	445371.41	4765485.72	32
3	445419.72	4765678.90	35
4	444801.00	4766187.94	32
5	444716.74	4766146.77	31
6	444906.80	4766018.66	32
7	444689.69	4765996.71	30
8	444737.53	4765876.68	30
9	444624.88	4765868.20	30
10	444708.54	4765818.14	30
11	444722.44	4765724.65	30
12	444590.45	4765638.26	28
13	444532.59	4765659.58	20
14	444529.15	4765579.19	28
15	444598.27	4765565.75	28
16	444384.63	4765912.45	28
17	444369.77	4765834.37	28
18	444249.58	4766118.61	27
19	444309.59	4766273.96	28
20	444446.61	4766250.68	29
21	444443.16	4766416.38	29
22	444376.64	4765633.67	27
23	444257.33	4765609.62	26
24	444215.56	4765657.18	18
25	444060.85	4765662.32	18
26	444002.78	4765781.52	18
27	443934.84	4765839.30	17
28	443981.29	4765887.52	18
29	443955.43	4765963.26	17
30	444688.90	4765459.54	28
31	444761.19	4765565.89	29
32	444822.25	4765549.69	30
33	444848.92	4765541.60	30
34	444827.04	4765438.13	29
35	444872.88	4765155.05	28
36	445178.72	4764648.33	26
37	444985.00	4764475.56	24
38	445033.72	4765607.41	31
39	445036.45	4765475.80	30
40	445127.36	4765575.86	32
41	445482.51	4765611.06	34
42	445881.95	4765061.00	29

Table B-3: Sound Level Modeling Results Sorted by Receptor ID - Vensys 136-3.5 Mode 4

Receptor ID	Coordinates UTM NAD83 Zone 18N		Source Only L_{eq} Broadband Sound Level (dBA)
	X (m)	Y (m)	
43	445994.31	4765100.04	22
44	445988.27	4765023.52	21
45	446132.65	4764617.89	26
46	443871.67	4767375.42	16
47	444748.55	4766269.29	31
48	448093.19	4767801.79	21
49	448174.25	4767886.28	21
50	449261.02	4766905.64	19
51	449029.25	4766037.62	11
52	443655.64	4769243.51	18
53	446794.67	4769514.01	19
54	447273.14	4769132.91	20
55	446503.82	4768393.83	24
56	446961.94	4766420.20	31
57	448928.19	4767072.27	19
58	448841.68	4766423.61	20
59	445116.45	4769795.72	18
60	445231.12	4769580.30	19
61	446281.54	4769676.45	19
62	443415.21	4768475.74	11
63	447323.05	4767298.19	26
64	449042.48	4766741.12	19
65	447242.74	4769586.88	18
66	447800.71	4769278.53	18
67	445104.95	4766159.08	35
68	448209.15	4767755.41	21
69	445508.90	4769702.89	19
70	446245.20	4769762.58	19
71	445821.89	4767334.56	32
72	447819.07	4769211.19	19
73	447913.00	4769345.14	18
74	445809.35	4767073.17	27
75	448552.04	4766997.82	21
76	447831.69	4767178.16	24
77	448343.38	4767232.44	21
78	449316.01	4765419.14	10
79	445682.29	4769613.48	19
80	445962.41	4769787.11	19
81	445164.69	4769573.05	19
82	446828.60	4766471.96	32
83	446859.88	4769789.03	18
84	444946.28	4767433.57	29

Table B-3: Sound Level Modeling Results Sorted by Receptor ID - Vensys 136-3.5 Mode 4

Receptor ID	Coordinates UTM NAD83 Zone 18N		Source Only L_{eq} Broadband Sound Level (dBA)
	X (m)	Y (m)	
85	448032.79	4767889.41	21
86	447836.66	4767307.95	23
87	449222.85	4767096.21	19
88	449010.80	4766121.28	19
89	448909.72	4766759.66	20
90	445651.39	4769692.54	19
91	443935.30	4767445.91	16
92	445368.32	4767299.69	24
93	444329.30	4769366.09	19
94	445825.20	4769723.04	19
95	445385.81	4769077.46	21
96	443647.52	4767693.55	14
97	445269.11	4766889.54	27
98	448949.45	4767085.03	19
99	445128.42	4769569.87	19
100	445280.07	4769069.02	21
101	445228.26	4769472.23	19
102	447816.88	4769231.07	18
103	446970.07	4769376.45	19
104	447174.87	4769509.34	19
105	447871.25	4769456.84	18
106	443827.03	4767152.03	24
107	448930.61	4766267.67	20
108	443549.82	4769134.90	18
109	447498.11	4769651.17	18
110	443062.52	4768413.65	19
111	446441.28	4768262.13	25
112	448077.68	4768373.08	20
113	445379.14	4769675.78	11
114	446945.67	4768696.84	22
115	447301.87	4769158.82	19
116	443876.21	4767763.28	23
117	448080.10	4767908.24	21
118	448917.06	4766325.45	20
119	449065.61	4766769.41	19
120	445994.97	4769843.18	19
121	445226.98	4769069.57	21
122	443860.93	4767301.69	16
123	445787.65	4768332.47	25
124	449326.10	4765578.06	18
125	445132.15	4769644.43	19
126	446029.37	4769791.01	19

Table B-3: Sound Level Modeling Results Sorted by Receptor ID - Vensys 136-3.5 Mode 4

Receptor ID	Coordinates UTM NAD83 Zone 18N		Source Only L_{eq} Broadband Sound Level (dBA)
	X (m)	Y (m)	
127	447820.33	4769178.11	19
128	448026.51	4767972.11	21
129	448195.46	4767383.83	22
130	445883.07	4769695.59	19
131	446110.23	4769671.11	19
132	445293.11	4769536.54	19
133	443523.97	4767640.97	14
134	444075.49	4769487.14	18
135	446271.42	4769605.94	19
136	446228.30	4769500.74	19
137	446207.42	4768332.80	25
138	446553.77	4766462.91	35
139	447021.42	4765858.56	29
140	444785.74	4769488.79	19
141	446165.31	4769659.58	19
142	445436.05	4769082.86	21
143	446404.98	4769668.88	19
144	446356.57	4769516.22	19
145	448012.70	4769010.88	19
146	447892.60	4769396.54	18
147	444891.42	4766285.01	33
148	447606.10	4767700.18	16
149	448430.93	4766986.92	21
150	445292.46	4766750.40	36
151	447817.45	4769252.63	18
152	447810.15	4769320.43	18
153	444953.48	4766304.89	34
154	447175.38	4768538.20	22
155	444068.58	4769487.21	18
156	445571.28	4769738.77	19
157	446904.22	4768911.57	21
158	444772.14	4768098.43	25
159	448188.58	4767807.96	21
160	448415.20	4766994.80	21
161	445130.62	4766683.45	35
162	446537.90	4766735.99	34
163	444410.05	4769578.82	18
164	445512.31	4769668.22	19
165	446690.74	4769617.58	19
166	445682.52	4769464.42	20
167	446265.86	4769478.97	19
168	447888.90	4769248.73	18

Table B-3: Sound Level Modeling Results Sorted by Receptor ID - Vensys 136-3.5 Mode 4

Receptor ID	Coordinates UTM NAD83 Zone 18N X (m)	Coordinates UTM NAD83 Zone 18N Y (m)	Source Only L_{eq} Broadband Sound Level (dBA)
169	443057.76	4768437.16	19
170	443722.19	4767820.13	22
171	448188.04	4767841.10	21
172	446987.92	4765858.25	30
173	449343.70	4767100.04	18
174	445700.07	4769406.30	20
175	445044.26	4767332.88	22
176	444868.01	4766302.83	33
177	446450.59	4766694.25	35
178	445793.45	4769717.27	19
179	445120.08	4766646.65	35
180	446582.85	4768501.49	23
181	448205.26	4767838.27	21
182	446677.79	4766518.22	33
183	449406.07	4765549.29	18
184	445218.40	4769655.80	11
185	446329.58	4769578.42	19
186	446205.13	4769683.61	19
187	446533.56	4769750.38	19
188	446087.66	4769773.55	19
189	446348.41	4769482.89	19
190	447784.40	4769023.38	19
191	445417.73	4767058.46	26
192	448052.47	4767943.04	21
193	448829.39	4766345.04	20
194	445642.53	4769344.99	20
195	445011.95	4766553.06	34
196	449262.64	4767102.14	18
197	447797.95	4769400.45	18
198	443267.98	4768607.01	11
199	445339.13	4767295.37	24
200	449487.47	4765690.56	18
201	445792.09	4769770.17	19
202	445666.84	4769825.96	19
203	445878.47	4769837.41	19
204	445351.45	4769330.41	20
205	445521.86	4769511.14	19
206	447830.23	4768900.88	19
207	447827.18	4769118.68	19
208	446349.70	4767218.45	32
209	447985.19	4768133.74	13
210	448013.81	4768412.08	20

Table B-3: Sound Level Modeling Results Sorted by Receptor ID - Vensys 136-3.5 Mode 4

Receptor ID	Coordinates UTM NAD83 Zone 18N		Source Only L_{eq} Broadband Sound Level (dBA)
	X (m)	Y (m)	
211	445198.57	4766537.83	36
212	446819.60	4768685.75	22
213	447125.98	4769669.95	18
214	447239.99	4769725.54	18
215	447191.93	4769553.74	19
216	448545.70	4766807.26	21
217	447244.66	4765724.60	20
218	449205.62	4766809.67	19
219	449375.18	4765402.51	10
220	446569.80	4769835.72	18
221	446123.13	4769494.13	19
222	446939.36	4768918.10	21
223	443861.17	4767449.20	16
224	443373.16	4767742.16	13
225	443390.82	4767766.70	13
226	448403.96	4767085.67	21
227	443494.36	4769033.57	18
228	445789.62	4769696.65	19
229	445507.14	4769743.95	19
230	445347.39	4769484.86	19
231	447834.46	4768836.10	19
232	443317.68	4767570.08	21
233	445758.75	4768336.90	25
234	449045.79	4766972.39	19
235	449491.97	4765587.95	18
236	443674.23	4769280.57	18
237	444314.22	4769458.72	19
238	445365.40	4769655.79	19
239	445496.59	4769081.52	21
240	446859.09	4766285.37	32
241	448705.62	4767090.91	20
242	448977.48	4766723.61	19
243	445252.95	4769584.50	19
244	443911.30	4767619.23	15
245	445583.60	4768361.33	25
246	447141.52	4768655.37	21
247	446798.98	4766370.41	32
248	449011.78	4766724.57	19
249	446692.19	4769689.38	19
250	445649.03	4769098.94	21
251	446009.61	4769396.18	20
252	446209.38	4769546.99	19

Table B-3: Sound Level Modeling Results Sorted by Receptor ID - Vensys 136-3.5 Mode 4

Receptor ID	Coordinates UTM NAD83 Zone 18N		Source Only L_{eq} Broadband Sound Level (dBA)
	X (m)	Y (m)	
253	446967.51	4768675.35	22
254	447302.06	4769200.82	19
255	447888.14	4769220.12	18
256	444689.45	4768077.72	24
257	447299.43	4767205.39	26
258	446843.95	4765738.31	30
259	449244.23	4767101.89	18
260	449299.93	4767103.68	18
261	449433.41	4765632.83	18
262	443479.73	4768716.82	11
263	446344.51	4769805.45	19
264	443313.79	4767554.78	21
265	443911.34	4767579.24	16
266	443519.00	4767743.33	14
267	447985.15	4767229.40	23
268	444739.81	4769606.45	19
269	446968.49	4768665.91	22
270	449227.07	4765391.01	10
271	448027.15	4768345.04	20
272	448326.99	4767390.56	21
273	446713.31	4766528.30	33
274	445933.26	4765556.71	34
275	444946.27	4767317.64	22
276	446476.58	4768431.84	24
277	445173.14	4769064.76	21
278	447465.76	4769260.91	19
279	447621.01	4769492.26	18
280	446015.26	4769366.05	20
281	447196.44	4769597.85	18
282	446364.68	4768268.15	25
283	443585.57	4769095.77	18
284	443693.60	4769311.46	18
285	445712.39	4769701.36	19
286	445905.42	4769784.59	19
287	447862.60	4768666.96	12
288	449301.67	4767124.73	18
289	444419.00	4769427.71	19
290	445280.52	4769312.24	20
291	446997.84	4769607.24	19
292	447813.74	4769305.14	18
293	448217.74	4767491.29	21
294	449063.21	4765686.02	11

Table B-3: Sound Level Modeling Results Sorted by Receptor ID - Vensys 136-3.5 Mode 4

Receptor ID	Coordinates UTM NAD83 Zone 18N		Source Only L_{eq} Broadband Sound Level (dBA)
	X (m)	Y (m)	
295	445179.80	4768212.22	25
296	446579.17	4766909.80	33
297	446505.08	4766711.09	34
298	449048.97	4767018.64	19
299	444814.78	4769391.01	19
300	448477.28	4766943.00	21
301	448305.16	4767264.55	21
302	449387.94	4765432.97	10
303	443542.57	4769118.52	18
304	447085.71	4766174.00	30
305	449443.12	4765555.63	18
306	445486.02	4769583.47	19
307	446240.31	4769612.32	19
308	445335.57	4769546.97	19
309	443842.20	4767059.15	24
310	448330.46	4767225.73	21
311	447037.70	4766537.47	30
312	449268.47	4766966.72	18
313	447483.66	4767167.55	25
314	449185.14	4767095.61	19
315	444610.71	4769637.96	19
316	444169.97	4769510.48	18
317	446832.20	4769594.69	19
318	445721.69	4769200.77	21
319	445240.63	4769530.15	19
320	445391.77	4769566.30	19
321	446266.66	4769427.08	20
322	448300.46	4767473.79	21
323	448675.54	4766724.76	20
324	446090.40	4769830.40	19
325	447100.33	4769653.62	18
326	448654.60	4767052.54	20
327	449003.84	4766954.06	19
328	448904.01	4766188.26	12
329	449214.18	4766775.70	19
330	444895.85	4769555.72	19
331	445437.46	4769573.61	19
332	445543.81	4769086.98	21
333	447817.72	4769274.39	18
334	443833.73	4767603.15	15
335	449467.46	4765636.79	18
336	448996.43	4765932.33	11

Table B-3: Sound Level Modeling Results Sorted by Receptor ID - Vensys 136-3.5 Mode 4

Receptor ID	Coordinates UTM NAD83 Zone 18N		Source Only L_{eq} Broadband Sound Level (dBA)
	X (m)	Y (m)	
337	445995.21	4769789.16	19
338	446086.61	4769802.94	19
339	445332.34	4769072.93	21
340	446957.61	4768869.72	21
341	448111.21	4768868.47	19
342	448052.07	4767258.21	23
343	445266.26	4766555.48	37
344	449259.40	4765393.51	10
345	446915.40	4768974.06	21
346	447215.80	4769701.24	18
347	447253.73	4768987.56	12
348	447991.15	4768664.71	19
349	447337.80	4767267.44	26
350	448591.79	4766720.01	21
351	449104.40	4766914.58	19
352	449382.07	4765594.85	18
353	446385.82	4769799.87	19
354	445422.37	4769385.80	20
355	446278.83	4769523.36	19
356	446949.94	4769586.24	19
357	447952.60	4768298.40	13
358	447754.70	4767510.84	23
359	448887.16	4766357.11	20
360	444781.14	4768156.22	24
361	447857.48	4767231.84	23
362	446735.50	4766168.45	33
363	446708.15	4766500.47	33
364	449105.37	4766880.12	19
365	445911.73	4769839.44	19
366	445212.80	4768251.79	25
367	446411.38	4768273.73	25
368	447867.38	4768541.03	20
369	444078.09	4769501.11	18
370	445545.67	4769576.78	19
371	446731.56	4769624.43	19
372	443719.73	4767802.94	22
373	445837.96	4767280.14	33
374	448398.15	4768078.80	20
375	448491.73	4766781.54	21
376	449139.59	4766822.17	19
377	444871.97	4769612.61	19
378	443497.35	4768937.39	19

Table B-3: Sound Level Modeling Results Sorted by Receptor ID - Vensys 136-3.5 Mode 4

Receptor ID	Coordinates UTM NAD83 Zone 18N		Source Only L_{eq} Broadband Sound Level (dBA)
	X (m)	Y (m)	
379	445311.89	4769774.69	19
380	443915.52	4767063.64	25
381	449054.04	4765987.05	11
382	445963.93	4769841.10	19
383	446711.61	4769805.08	18
384	449075.02	4766802.20	19
385	445651.10	4769280.27	20
386	446235.61	4769416.19	20
387	446326.09	4769455.88	20
388	447731.60	4768901.85	19
389	443831.48	4767296.88	16
390	447108.09	4766203.31	29
391	448957.09	4766963.07	19
392	449033.78	4766019.73	11
393	448844.53	4766437.20	20
394	444472.47	4769581.65	19
395	445586.47	4769812.90	19
396	445714.82	4769337.64	20
397	443964.21	4767062.44	25
398	446900.05	4768682.52	22
399	446971.35	4769510.42	11
400	445395.93	4767306.18	24
401	445189.59	4767353.82	23
402	447325.25	4768365.88	22
403	447962.72	4768534.16	20
404	448419.12	4767031.30	21
405	443569.57	4769201.04	18
406	446485.07	4769848.79	18
407	443851.90	4767512.49	15
408	443786.41	4767726.76	22
409	445782.66	4767067.32	28
410	449515.07	4765683.68	18
411	445572.45	4769706.50	19
412	446150.76	4769676.28	19
413	445656.53	4769213.35	21
414	444011.06	4767070.23	25
415	445219.85	4767329.97	23
416	446950.73	4766235.79	31
417	444499.60	4769444.64	19
418	445586.24	4769508.40	19
419	448119.83	4767815.92	21
420	449084.87	4765992.71	11

Table B-3: Sound Level Modeling Results Sorted by Receptor ID - Vensys 136-3.5 Mode 4

Receptor ID	Coordinates UTM NAD83 Zone 18N		Source Only L_{eq} Broadband Sound Level (dBA)
	X (m)	Y (m)	
421	445631.08	4769397.42	20
422	446949.64	4769627.09	19
423	447744.77	4769379.42	18
424	447373.24	4767184.84	26
425	448385.29	4767076.50	21
426	446801.28	4766299.76	32
427	447525.75	4765552.44	25
428	449275.97	4767032.04	18
429	448637.32	4766773.27	21
430	449281.93	4766882.67	18
431	449287.64	4766947.88	18
432	449408.25	4767107.21	18
433	448760.43	4766566.43	20
434	445387.92	4767031.56	27
435	445574.78	4769675.74	19
436	445850.86	4769692.20	19
437	446766.13	4767167.08	30
438	445888.20	4765549.98	34
439	445048.71	4769641.17	19
440	446183.41	4769762.20	19
441	447991.75	4769032.81	19
442	444726.94	4768077.38	25
443	443885.95	4767705.68	23
444	443420.91	4767753.88	13
445	446762.17	4767140.26	30
446	448475.56	4766960.56	21
447	444798.84	4769609.65	19
448	445772.57	4769615.29	19
449	446750.77	4769594.01	19
450	445717.07	4769260.04	20
451	446626.58	4769530.54	11
452	443097.28	4768194.19	11
453	446570.75	4768473.60	23
454	447016.43	4766565.02	30
455	449164.58	4766749.06	19
456	446863.67	4769690.64	18
457	447627.61	4769291.96	19
458	443918.08	4767085.38	25
459	443676.97	4767732.66	22
460	445086.65	4766127.13	35
461	448441.00	4767022.83	21
462	447714.63	4765635.07	25

Table B-3: Sound Level Modeling Results Sorted by Receptor ID - Vensys 136-3.5 Mode 4

Receptor ID	Coordinates UTM NAD83 Zone 18N		Source Only L_{eq} Broadband Sound Level (dBA)
	X (m)	Y (m)	
463	444499.54	4769591.80	19
464	443500.75	4768718.03	11
465	443851.37	4769418.14	18
466	445594.25	4769092.15	21
467	447971.30	4768132.34	13
468	447462.47	4767216.86	25
469	445518.80	4769808.77	19
470	445848.28	4769836.85	19
471	447151.32	4769584.15	18
472	446954.44	4769785.85	18
473	447835.11	4768722.07	12
474	443264.51	4768573.40	11
475	446403.95	4767227.46	31
476	447903.73	4768124.15	13
477	446975.01	4766109.64	23
478	447107.49	4765741.71	21
479	446360.20	4769794.17	19
480	446297.89	4769437.68	20
481	446863.21	4769516.93	19
482	447841.82	4768862.94	19
483	449157.30	4766798.72	19
484	444179.70	4769564.57	18
485	444379.63	4769580.32	18
486	445700.08	4769832.20	19
487	445592.05	4769452.71	20
488	444818.97	4766242.81	32
489	445770.04	4769591.90	19
490	446030.65	4769844.83	19
491	447314.93	4769261.13	19
492	443047.87	4768404.39	19
493	446322.84	4767047.63	33
494	448369.39	4768069.93	20
495	446416.99	4764869.80	27
496	445854.31	4769739.74	19
497	446305.63	4769698.53	19
498	447576.49	4769246.15	19
499	445893.46	4767127.47	34
500	449185.91	4766837.82	19
501	445871.32	4769781.23	19
502	448238.42	4768877.89	18
503	447751.18	4767538.59	23
504	445200.56	4769577.31	19

Table B-3: Sound Level Modeling Results Sorted by Receptor ID - Vensys 136-3.5 Mode 4

Receptor ID	Coordinates UTM NAD83 Zone 18N		Source Only L_{eq} Broadband Sound Level (dBA)
	X (m)	Y (m)	
505	446882.85	4769595.83	19
506	446931.53	4769681.92	18
507	443881.13	4767748.31	23
508	447699.55	4767206.50	24
509	448272.47	4767533.91	21
510	444807.70	4769549.85	19
511	446300.31	4769594.12	19
512	444903.95	4767400.18	29
513	446401.70	4767208.61	32
514	448190.44	4767860.14	21
515	448218.28	4768943.68	18
516	443916.10	4767877.16	22
517	444990.78	4766087.31	34
518	445175.41	4768221.01	25
519	447289.13	4768348.05	22
520	447989.26	4768608.53	20
521	448341.17	4767404.53	21
522	449221.00	4766993.94	19
523	448777.69	4766321.65	12
524	445271.79	4769644.66	19
525	446209.54	4769620.24	19
526	447810.87	4769366.52	18
527	443372.38	4768484.43	11
528	445806.81	4767302.30	33
529	446157.03	4769749.12	19
530	446898.08	4768890.85	21
531	446538.00	4766618.43	35
532	449295.79	4765159.31	10
533	447839.45	4768668.70	12
534	445707.87	4765532.18	34
535	447265.02	4769721.22	18
536	446977.58	4769531.39	11
537	447965.09	4768185.29	13
538	447993.37	4768653.16	19
539	444903.44	4769615.41	19
540	444141.69	4769560.91	18
541	445844.08	4769706.95	19
542	445406.69	4769496.12	19
543	444960.34	4767434.34	29
544	447996.34	4768195.38	13
545	447998.96	4768417.90	20
546	447404.48	4767206.74	26

Table B-3: Sound Level Modeling Results Sorted by Receptor ID - Vensys 136-3.5 Mode 4

Receptor ID	Coordinates UTM NAD83 Zone 18N		Source Only L_{eq} Broadband Sound Level (dBA)
	X (m)	Y (m)	
547	449136.08	4765658.56	11
548	446940.79	4769564.13	19
549	442946.23	4767990.05	11
550	445097.22	4766459.24	35
551	448680.38	4766993.49	20
552	448165.92	4767449.03	22
553	443495.56	4768847.38	19
554	443401.62	4768858.54	19
555	443541.45	4768972.99	19
556	447888.68	4769192.90	18
557	445067.82	4766563.80	35
558	445842.97	4767252.13	33
559	448338.61	4767171.46	14
560	448525.26	4766783.26	21
561	449167.42	4766774.81	19
562	446136.97	4769744.67	19
563	447334.26	4769503.74	18
564	447853.08	4768800.42	19
565	447835.40	4768980.33	19
566	445091.32	4766405.41	35
567	446459.59	4768395.90	24
568	445631.92	4769828.25	19
569	446200.80	4769411.14	20
570	447012.76	4769783.91	18
571	447840.21	4768754.82	20
572	447840.38	4768912.57	19
573	447831.26	4769093.61	19
574	444788.34	4768097.69	25
575	444369.74	4767077.91	27
576	447972.53	4768494.37	20
577	445284.34	4769478.43	19
578	443401.94	4767812.78	13
579	444751.76	4768137.36	24
580	445255.77	4768231.68	25
581	448040.84	4767248.31	23
582	449506.27	4766870.28	18
583	448856.66	4766797.00	20
584	447883.61	4769344.47	18
585	443844.45	4767567.70	15
586	448626.90	4766703.79	21
587	447113.39	4765884.18	29
588	448805.13	4766402.51	20

Table B-3: Sound Level Modeling Results Sorted by Receptor ID - Vensys 136-3.5 Mode 4

Receptor ID	Coordinates UTM NAD83 Zone 18N		Source Only L_{eq} Broadband Sound Level (dBA)
	X (m)	Y (m)	
589	445195.67	4769653.53	19
590	445513.64	4769773.91	19
591	445575.61	4769773.04	19
592	446432.61	4769807.70	18
593	445697.02	4769122.01	21
594	444770.48	4768141.64	24
595	448133.30	4767772.38	21
596	445152.05	4766454.16	36
597	446531.80	4766659.07	34
598	445380.26	4765730.36	35
599	447012.92	4766237.87	30
600	448987.27	4766162.06	19
601	449076.71	4765976.64	11
602	444940.78	4769625.05	19
603	445882.66	4769722.11	19
604	445935.16	4769785.80	19
605	445150.30	4769520.03	19
606	447945.79	4767302.36	23
607	449045.48	4766064.42	19
608	444162.86	4769493.41	18
609	445741.10	4767308.60	32
610	447891.25	4768488.61	12
611	449240.53	4766931.74	19
612	449245.17	4766983.05	19
613	448730.10	4766520.85	20
614	449380.21	4765546.70	18
615	443497.26	4768823.01	19
616	443736.08	4769348.12	18
617	448212.83	4767806.22	21
618	443624.55	4769168.78	18
619	446094.35	4769734.84	19
620	449381.21	4767107.86	18
621	449167.15	4766861.95	19
622	443502.26	4768952.14	19
623	445845.22	4767067.45	28
624	447942.59	4768356.02	13
625	444989.36	4769622.27	19
626	446277.57	4769772.98	19
627	446789.46	4769793.23	18
628	446745.82	4768742.90	22
629	447525.52	4769293.60	19
630	447852.56	4768779.89	19

Table B-3: Sound Level Modeling Results Sorted by Receptor ID - Vensys 136-3.5 Mode 4

Receptor ID	Coordinates UTM NAD83 Zone 18N		Source Only L_{eq} Broadband Sound Level (dBA)
	X (m)	Y (m)	
631	447881.14	4769276.52	18
632	445698.01	4768267.47	25
633	449152.12	4766887.32	19
634	444603.22	4769594.83	19
635	443548.99	4769171.19	18
636	444788.72	4769508.68	19
637	446234.81	4769688.46	19
638	446350.86	4769551.49	19
639	443900.36	4767640.50	15
640	447874.54	4768131.74	13
641	447734.72	4767242.59	24
642	449474.84	4767109.64	18
643	449210.26	4766739.80	19
644	444819.67	4769366.85	19
645	444788.73	4769459.27	19
646	446897.10	4766442.63	31
647	445457.80	4765725.41	35
648	449440.37	4767023.14	18
649	449363.65	4765137.11	9
650	449247.31	4765567.03	10
651	445600.56	4769581.45	19
652	445665.54	4769567.19	19
653	447798.09	4769430.36	18
654	444944.02	4766288.03	33
655	448353.72	4766966.79	22
656	448647.06	4767004.76	20
657	449120.95	4766846.22	19
658	445492.73	4769806.64	19
659	445987.48	4769428.58	20
660	445460.24	4769499.75	19
661	447830.27	4769033.20	19

Appendix C

Complaint Resolution Plan

<u>Construction-Related Complaints</u>

Noise

- If the noise complaint location is more than one mile from active construction activity, the complaint will be logged, but no action will be taken.
- If the noise complaint is less than one mile from active construction activity, the following steps will be taken:

  Step 1: A representative from the construction firm will visit the site of the complaint during construction activity to listen and observe.

  Step 2: The representative will determine if any unusually loud or unusually disturbing noises can be heard (i.e. sounds not typical of a construction site) or if project personnel have deviated from any plans, schedules or routes.

  Step 3: Construction personnel will try to determine if any equipment is not functioning properly and thus creating unusual sound. If so, this equipment will be replaced as soon as practical. If feasible, the equipment may alternatively be repaired and/or moved to a less noise sensitive location, provided the repairs or relocation resolve the issues and do not create new issues at other locations. In the latter case, the equipment will be replaced as soon as possible.

  Step 4: A written response will be provided to the complainant detailing the results of the investigation and any mitigation or remedial actions that have or will be taken.

<u>Operation-Related Complaints</u>

Noise

- If the complaint represents a residence within one mile of any project component
  The proponent will:
  - Investigate whether equipment near the complainant was operating on the date, and at the time and location identified;
  - Determine if the sound is related to Project maintenance or abnormal operational conditions;
  - Determine if there is a reasonable possibility that the sound level induced by the Project is likely to be within 5 dBA of any applicable sound limit; and
  - Review pre-construction sound modeling and any available post-construction sound data to determine whether the sound level at the complaint location is within 5 dBA of a sound level limit

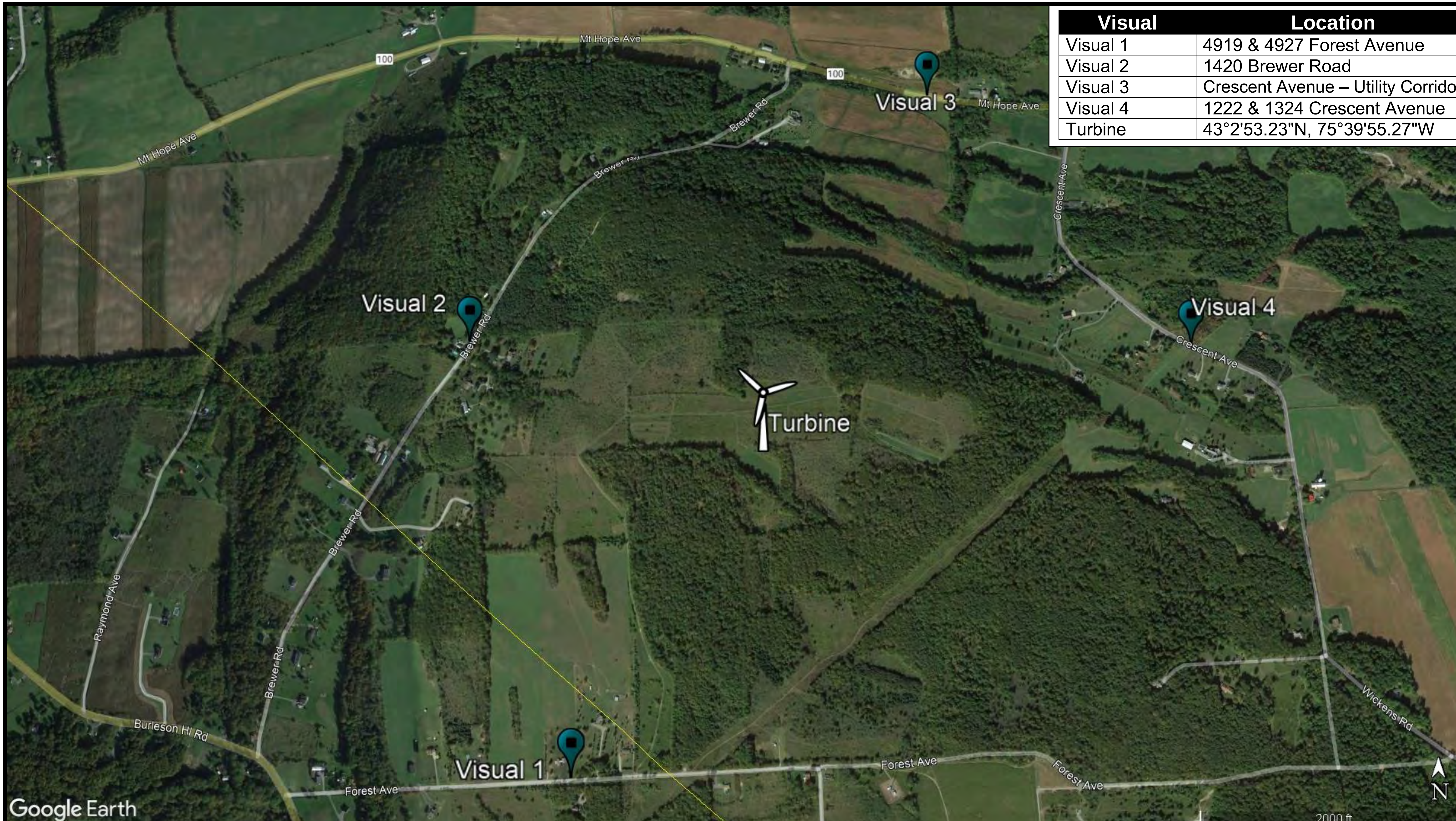
The results and findings of the aforementioned will be promptly communicated to the complainant in writing.

- The proponent will conduct additional sound monitoring using an independent acoustical or noise consultant if:
    - The complaint location is closer than 0.5 miles of a previously tested monitoring location and the modeled sound levels are higher, or expected to be higher, than the position(s) previously evaluated, or if the complaint location is not representative of the same conditions as the positions previously evaluated (e.g. vegetation, geography, other ambient sound); or
    - If there is a reasonable possibility that conditions have changed that affect Project sound levels; or
    - The last sound monitoring was conducted more than three years ago.

- The proponent will not conduct sound monitoring if:
    - The modeled sound level, or any post construction sound levels, if such data is available, is more than 5 dBA lower than any applicable sound limit or
    - The complaint has occurred because of Project maintenance or abnormal operational conditions. In this case, the Proponent will complete necessary repairs.
    - Following the reports the Proponent will conduct additional sound monitoring to demonstrate the results of the repairs and compliance with any applicable sound limits. The results and findings of the monitoring will be promptly communicated to the complainant in writing.

The Proponent may request that a complainant maintain a written log of potentially offending sound events over some reasonable period to assist in identifying influences that may affect the sound from the facility. If an independent acoustical or noise consultant determines that the identified factors demonstrate that follow-up sound monitoring is warranted, the Proponent will make reasonable efforts to conduct such monitoring under conditions like those existing at the time the complaint arose.

The proponent will inform a resident when it intends to conduct any exterior sound monitoring and cooperate with the resident to determine an appropriate location for the monitoring equipment.



Visual	Location
Visual 1	4919 & 4927 Forest Avenue
Visual 2	1420 Brewer Road
Visual 3	Crescent Avenue – Utility Corridor
Visual 4	1222 & 1324 Crescent Avenue
Turbine	43°2'53.23"N, 75°39'55.27"W

GHD

New Leaf Energy

New Leaf Solar Wind Projects

0 Brewer Road
TM#46-2-42.3

Wind Project Simulated Visuals

VISUALS MAP

Project No. **11227527**
Date **March 03, 2023**

New Leaf Energy 4949 Forest Ave
Turbine Location: 43°2'53.23"N & 75°39'55.27"W
Viewpoint Location: 4919 & 4927 Forest Avenue
Date: January 26, 2023

New Leaf Energy

New Leaf Solar Wind Projects

0 Brewer Road
TM#46-2-42.3
Wind Project
Simulated Visuals

VISUAL 1

EXISTING CONDITIONS

Project No. **11227527**
Date **March 03, 2023**

New Leaf Energy 4949 Forest Ave
Turbine Location: 43°2’53.23”N & 75°39’55.27”W
Viewpoint Location: 4919 & 4927 Forest Avenue
Date: January 26, 2023

New Leaf Energy

New Leaf Solar Wind Projects

0 Brewer Road
TM#46-2-42.3

Wind Project

Simulated Visuals

VISUAL 1
450 FT
TIP HEIGHT

Project No. **11227527**
Date **March 03, 2023**

New Leaf Energy 4949 Forest Ave
Turbine Location: 43°2’53.23”N & 75°39’55.27”W
Viewpoint Location: 4919 & 4927 Forest Avenue
Date: January 26, 2023

New Leaf Energy

New Leaf Solar Wind Projects

0 Brewer Road
TM#46-2-42.3

Wind Project

Simulated Visuals

VISUAL 1
550 FT
TIP HEIGHT

Project No. **11227527**
Date **March 03, 2023**

New Leaf Energy

New Leaf Solar Wind Projects

0 Brewer Road TM#46-2-42.3

Wind Project

Simulated Visuals

VISUAL 2

EXISTING CONDITIONS

Project No. **11227527**
Date **March 03, 2023**

GHD

New Leaf Energy

New Leaf Solar Wind Projects

0 Brewer Road
TM#46-2-42.3

Wind Project

Simulated Visuals

VISUAL 2
450 FT
TIP HEIGHT

Project No. **11227527**
Date **March 03, 2023**

New Leaf Energy 4949 Forest Ave
Turbine Location: 43°2’53.23”N & 75°39’55.27”W
Viewpoint Location: 1420 Brewer Road
Date: January 26, 2023

New Leaf Energy

New Leaf Solar Wind Projects

0 Brewer Road
TM#46-2-42.3

Wind Project

Simulated Visuals

VISUAL 2
550 FT
TIP HEIGHT

Project No. **11227527**
Date **March 03, 2023**

New Leaf Energy 4949 Forest Ave
Turbine Location: 43°2’53.23”N & 75°39’55.27”W
Viewpoint Location: Crescent Avenue – Utility Corridor
Date: January 26, 2023

New Leaf Energy

New Leaf Solar Wind Projects

0 Brewer Road
TM#46-2-42.3

Wind Project

Simulated Visuals

VISUAL 3

EXISTING CONDITIONS

Project No. **11227527**
Date **March 03, 2023**

New Leaf Energy 4949 Forest Ave
Turbine Location: 43°2’53.23”N & 75°39’55.27”W
Viewpoint Location: Crescent Avenue – Utility Corridor
Date: January 26, 2023

New Leaf Energy

New Leaf Solar Wind Projects

0 Brewer Road
TM#46-2-42.3

Wind Project

Simulated Visuals

VISUAL 3
450 FT
TIP HEIGHT

Project No. **11227527**
Date **March 03, 2023**

New Leaf Energy 4949 Forest Ave
Turbine Location: 43°2’53.23”N & 75°39’55.27”W
Viewpoint Location: Crescent Avenue – Utility Corridor
Date: January 26, 2023

New Leaf Energy

New Leaf Solar Wind Projects

0 Brewer Road
TM#46-2-42.3
Wind Project
Simulated Visuals

VISUAL 3
550 FT
TIP HEIGHT

Project No. **11227527**
Date **March 03, 2023**

New Leaf Energy

New Leaf Solar Wind Projects

0 Brewer Road
TM#46-2-42.3

Wind Project

Simulated Visuals

VISUAL 4

EXISTING CONDITIONS

Project No. **11227527**
Date **March 03, 2023**

New Leaf Energy 4949 Forest Ave
Turbine Location: 43°2’53.23”N & 75°39’55.27”W
Viewpoint Location: 1222 & 1324 Crescent Avenue
Date: January 26, 2023

New Leaf Energy

New Leaf Solar Wind Projects

0 Brewer Road
TM#46-2-42.3

Wind Project

Simulated Visuals

VISUAL 4
450 FT
TIP HEIGHT

Project No. **11227527**
Date **March 03, 2023**

GHD

New Leaf Energy

New Leaf Solar Wind Projects

0 Brewer Road
TM#46-2-42.3

Wind Project

Simulated Visuals

VISUAL 4
550 FT
TIP HEIGHT

Project No. **11227527**
Date **March 03, 2023**

Wind Power GeoPlanner™

Communication Tower Study

Forest Ave – Oneida Wind

Prepared on Behalf of
New Leaf Energy

February 14, 2023

COMSEARCH
A CommScope Company

Table of Contents

1. Introduction

This Communication Tower Study was performed for the Forest Ave – Oneida Wind project in Madison County, New York to identify the tower structures as well as FCC-licensed communication antennas that exist within two miles of the project area. This information is useful in the planning stages of the wind energy facilities to identify turbine setbacks and to prevent disruption to the services provided by the tenants on the towers. This data can be used in support of the wind energy facilities communications needs in addition to avoiding any potential impact to the current communications services provided in the region.

2. Summary of Results

The communication towers and antennas in the study area were derived from a variety of sources including the FCC's Antenna Structure Registration (ASR) database, Universal Licensing System (ULS), national and regional tower owner databases, and the local planning and zoning boards. The data[1] was imported into GIS software and the structures mapped in the wind energy area of interest. Each tower location is identified with a unique ID number associated with detailed structure and contact information provided in a spreadsheet attachment.

Seven tower structures and twenty-eight communication antennas were identified within two miles of the Forest Ave – Oneida Wind project area using the data sources described in our methodology above. Five of the structures found were registered with the FCC, four of which contain sixteen of the twenty-eight communication antennas. The remaining antennas may be located on a variety of structure types such as guyed towers, monopoles, silos, rooftops or portable structures. The specific type of structure would normally need to be determined by an on-site visit.

Detailed information about the tower structures and communication antennas is provided in Table 1 and Table 2 including location coordinates, structure height above ground level, and owner-operator name[2].

A discussion of turbine setback distances is provided in section three.

[1] 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.

[2] Please note that this report analyzes all known operators on the towers from data sources available to Comsearch. Unidentified operators may exist on the towers due to unlicensed or federal government systems, mobile phone operators with proprietary locations, erroneous data on the FCC license, and other factors beyond our control.

Tower ID	ASR Number	Owner	Structure Height AGL (m)	Latitude (NAD83)	Longitude (NAD83)	Distance the Proposed Turbine (km)
Tower001	1049862	CORNEYS ELECTRONICS INC	106.7	43.04055556	-75.62916667	3.06
Tower002	1268273	County of Madison, New York	110.0	43.04061111	-75.66238889	0.85
Tower003	1003980	AT&T Mobility Spectrum LLC	61.9	43.04252778	-75.65466667	1.06
Tower004	1003577	Family Life Ministries, Inc.	97.5	43.04666667	-75.66583333	0.15
Tower005	N/A	KGI	45.7	43.06589167	-75.66579722	1.99
Tower006	N/A	KGI	30.5	43.07472222	-75.69111111	3.64
Tower007	1217251	STATE OF NEW YORK, DIVISION OF STATE POLICE	60.6	43.07805556	-75.64872222	3.60

Table 1: Summary of Tower Structures

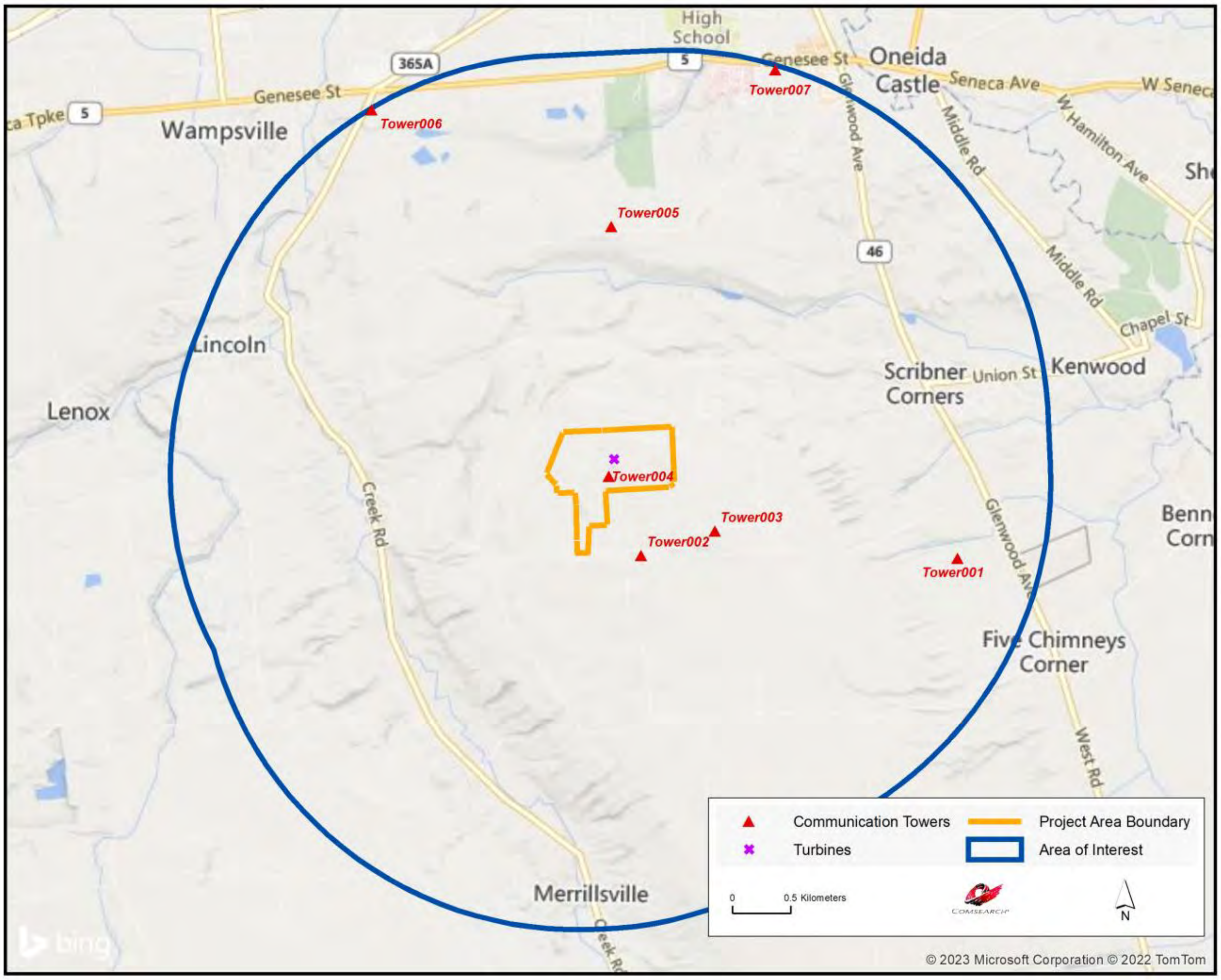


Figure 1: Towers within the Area of Interest

ID	Tower ID	Callsign	Service Type	Licensee	Antenna Height AGL (m)	Latitude (NAD83)	Longitude (NAD83)	Distance the Proposed Turbine (km)
1	Tower001	WPZP732	Microwave	New York State Thruway Authority	30.48	43.04055556	-75.62916667	3.06
2	Tower001	WPNR417	Land Mobile	CORNEYS ELECTRONICS INC	49.0	43.04055556	-75.62916667	3.06
3		KJP482	Land Mobile	CITY OF ONEIDA	27.0	43.04061111	-75.66713889	0.83
4	Tower002	WQNH536	Microwave	Madison, County Of	22.86-86.87	43.04061111	-75.66238889	0.85
5	Tower002	WQOS614	Land Mobile	County of Madison	55.0	43.04061111	-75.66238889	0.85
6	Tower002	WQLN443	Land Mobile	County of Madison	84.0	43.04061111	-75.66238889	0.85
7	Tower002	WQLN992	Land Mobile	County of Madison	84.0	43.04061111	-75.66238889	0.85
8	Tower002	WQOS614	Land Mobile	County of Madison	55.0	43.04061111	-75.66238889	0.85
9	Tower002	WQRE873	Land Mobile	County of Madison	55.0	43.04061111	-75.66238889	0.85
10	Tower003	WPZU510	Microwave	JPJ Electronic Communications Inc.	24.38	43.04252778	-75.65466667	1.06
11	Tower003	KNKA294	Cellular	NEW CINGULAR WIRELESS PCS, LLC	None	43.04252778	-75.65466667	1.06
12	Tower003	WQYK289	Land Mobile	BOARD OF COOPERATIVE EDUCATIONAL SERVICES MADISON & ONEIDA COUNTIES DISTRICT	30.0	43.04252778	-75.65466667	1.06
13	Tower004	WPUQ258	Land Mobile	MADISON, COUNTY OF	45.7	43.04666667	-75.66583333	0.15
14	Tower004	KA59023	Land Mobile	MADISON, COUNTY OF	7.0	43.04666667	-75.66583333	0.15
15	Tower004	WPPU436	Land Mobile	CORNEYS ELECTRONICS INC	59.0	43.04672222	-75.66575000	0.14
16		WPMD527	Land Mobile	ONEIDA HEALTH SYSTEMS INC DBA ONEIDA HEALTH CARE CENTER	21.0	43.04672222	-75.66575000	0.14
17		WPVZ482	Land Mobile	NEW YORK POWER AUTHORITY	51.0	43.06588889	-75.66741667	1.99
18		W268AE	FM	CRAM COMMUNICATIONS, LLC	27.0	43.06588900	-75.66766700	2.00
19		W279CK	FM	WOLF RADIO, INC.	38.0	43.06588900	-75.66766700	2.00
20		WTKO-CD	TV	ACME TV CORP.	33.5	43.06588900	-75.66738900	1.99
21		WPRF782	Land Mobile	Mobiletech Communications	45.7	43.06611111	-75.66583333	2.01
22		WPRG946	Land Mobile	Mobiletech Communications	45.7	43.06611111	-75.66583333	2.01
23		KEI616	Land Mobile	SULLIVAN, TOWN OF	12.0	43.07505556	-75.67463889	3.10
24		WQKS883	Land Mobile	Oneida Healthcare Center	20.4	43.07766667	-75.65425000	3.42

ID	Tower ID	Callsign	Service Type	Licensee	Antenna Height AGL (m)	Latitude (NAD83)	Longitude (NAD83)	Distance the Proposed Turbine (km)
25	Tower007	KTK752	Land Mobile	STATE OF NEW YORK DIVISION OF STATE POLICE	60.6	43.07805556	-75.64872222	3.60
26	Tower007	WQVL932	Microwave	Madison, County Of	51.82	43.07805556	-75.64872222	3.60
27		WPXW475	Land Mobile	ONEIDA HEALTHCARE CENTER	3.0	43.07863889	-75.65469444	3.51
28		WQKX699	Land Mobile	ONEIDA HEALTHCARE CENTER	21.0	43.07866667	-75.65463889	3.52

Table 2: Summary of Communication Antennas

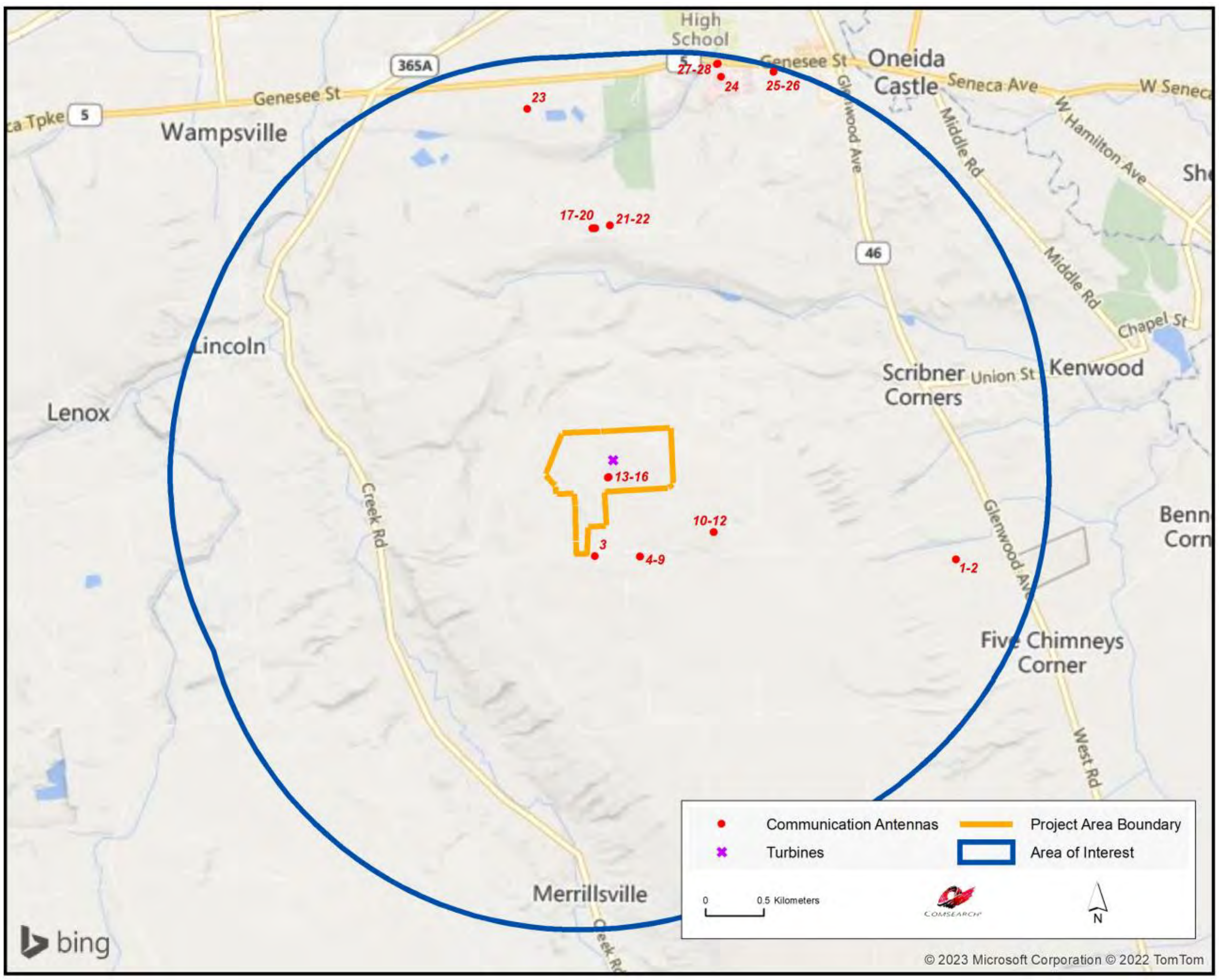


Figure 2: Communication Antennas within the Area of Interest

3. Discussion of Separation Distances

In planning the wind energy turbine locations, a conservative approach would dictate not locating any turbines in close proximity to existing tower structures to avoid any possible impact to the communications services provided by the structures. Reasonable distance between communication towers and wind turbine towers is a function of two things: (1) the physical turning radius of the wind turbine blades and (2) the characteristics of the communication systems on the communication tower.

Since wind turbine blades can rotate 360º in both the vertical and horizontal planes, the first consideration of separation distance to other structures is clearance of the rotating blades. If the blade radius is 50 meters, then a separation distance greater than 50 meters is necessary. From a practical standpoint, a setback distance greater than the maximum height of the turbine is necessary to ensure a "fall" safety zone in the unlikely event of a turbine tower failure. Setback requirements for "fall" safety are typically specified by the local zoning ordinances.

The separation distance required based on the characteristics of the communication systems will vary depending on the type(s) of communication antennas located on the tower. For example, AM, FM and TV communication antennas should be separated by distances that allow for normal coverage. For RADAR and microwave systems, line-of-sight (LOS) is used as the criteria for separation distance as well as the physical clearance necessary for the turbine blades. For land mobile, mobile phone, and wireless Internet systems, setback distances are based on FCC interference emissions from electrical devices according to their respective frequency bands.

Finally, the communication tower structures identified herein could be a potential benefit in support of communications network needs for the wind energy facility. An example would be the implementation of a Supervisory Control and Data Acquisition (SCADA) system that monitors and provides communications access to the wind energy facility.

4. Conclusions

Our study identified seven tower structures and twenty-eight communication antennas within two miles of the project area. They are used for microwave, FM, TV, and land mobile services in the area.

5. Contact Us

For questions or information regarding the Communication Tower Study, please contact:

Contact person: David Meyer
Title: Senior Manager
Company: Comsearch
Address: 21515 Ridgetop Circle, Suite 300, Sterling, VA 20166
Telephone: 703-726-5656
Fax: 703-726-5595
Email: David.Meyer@CommScope.com
Web site: www.comsearch.com

Oneida Wind Construction Sequencing

Nature of the Construction Activities

The construction of the community wind project in Oneida, NY will be similar in many ways to a typical construction project. Access road construction, site grading, erosion and sediment control measures will all be typical to any construction project in New York. Additionally, utility work associated with the project will be conducted to local utility standards. The unique feature of this project is the installation and wiring of the wind turbine. The community wind project in Oneida will consist of a single wind turbine. Associated developments for access and interconnection of the project include a gravel access road, laydown areas, a crane pad, utility communication structure, and utility pole mounted interconnection equipment. The following section of this document identifies the phases and durations expected for construction of the Oneida community wind project.

Construction Sequencing

The sequence of major activities is expected to be as follows:

- **Preconstruction –** A building permit will be applied for with the local Building Department. Any conditions of the projects Special Permit that are required to be addressed prior to construction will be submitted to the town during this phase. Additionally, this time will be used to survey and inventory the turbine delivery route. This will document the existing conditions of the roadway to allow for remediation/repair as needed upon completion of construction.

- **Site Mobilization and Environmental Controls -** Prior to any earth disturbances, erosion control measures will be installed on site. These will initially consist primarily of silt fence and silt sock, which will not only serve as erosion control measures, but also denote limits of work to prevent unintended impacts to existing trees and vegetation.

- **Tree Clearing –** Areas requiring the removal of trees will be cleared prior to other construction activity. This site has minimal tree clearing required and so this phase will run in parallel with Access Road Construction.

- **Access road construction -** The proposed access road will be installed once the area has been cleared of trees and stumps. The road will extend north from Forest Avenue and follow an existing dirt access path. Culverts will be installed to ensure stormwater runoff is managed properly.

- **Site earthwork -** Once site access has been established, earthwork will commence. The turbine area will be leveled as needed to provide the slopes and grades shown on the construction plans. Additionally, road grading and stormwater features will be shaped and installed early in the project construction. This phase is estimated to take approximately 2 months.

- **Foundation Work and conduit installation -** As the final grades of the turbine area and road are completed the excavation and concrete work for the turbine foundation will begin. Rebar work, construction of the foundation forms, and concrete placement will likely partially overlap with the previous phase and last approximately 1 month.

- **Delivery and Installation of Turbine –** Upon completion of civil site work, the turbine delivery will commence. Components will be delivered, including delivery of the primary crane to be utilized for construction. With the crane delivered and assembled, and turbine components delivered, the actual installation of the turbine will begin. The turbine assembly is anticipated to be performed in 1 month.

- **Electrical wiring including Installation of transformers and inverters -** As electrical equipment is installed, the various electrical connections and wiring will be pulled. This includes utility poles, utility communication structure, and associated interconnection equipment located off Forest Avenue. This phase will be the final significant construction on site.

- **Final site seeding and stabilization –** Throughout construction, the site will be stabilized to ensure no sediment is transported offset. Upon completion of major site work, the site will be seeded with the permanent seed mix, as designated on the site plans.

Commissioning

Upon completion of the sequencing listed above, which is anticipated to take approximately 6 months in total, the project will reach mechanical completion. Significant construction activities will cease, and the site will begin the commissioning phase. During this period, a limited number of personnel will be on site, with the purpose of testing and commissioning equipment. Final project completion will be obtained once all equipment is commissioned, and Permission To Operate (PTO) is obtained from the utility. Upon final completion, the site will be unmanned, with personnel on site only for routine operation and maintenance.

Compliance Testing and Final Road Inspection & Remediation

Upon commissioning of the turbine, regular operation will begin. During the initial operation of the turbine, any conditions or compliance testing required will be performed. At this time, any special conditions or post-construction monitoring or reporting as required in the Special Use Permit will be completed. At this stage, construction traffic will have ceased, and so a final road inspection will be performed to identify areas that may have been damaged during turbine component delivery. The final phase will include remediation of any road damage, as outlined in the project's Road Use Agreement.

Permit # ___/___

Date: 3/17/23

UNAPPROVED

Dig Safely New York
800-962-7962
www.digsafelyny.com

CITY OF ONEIDA
OFFICE OF CODE ENFORCEMENT
Building Permit Application

Application is hereby made to the Codes Department for the issuance of a Building/Zoning Permit pursuant to the NYS Uniform Fire Prevention & Building Code for the construction of buildings, additions, or alterations, as herein described. The applicant or owner agrees to comply with all applicable laws, ordinances, regulations and all conditions expressed on the back of this application, which are part of these requirements and also will allow all inspectors to enter the premises for the required inspections.

NOTE – PLEASE READ INSTRUCTIONS (on next page)

Owner/s Name: Patrick Starke

Address: 143 Prospect Street, Sherill, NY 13461

Tel#: (315) 794-4075

Tax Map # 46-2-42.3

Property Location of Proposed Construction:
4949 Forest Avenue

Existing Use of Property: Vacant

Explain work being done: Applicant is seeking approval to construct a single wind turbine with associated features and infrastrucure, which includes a gravel access road, crane pad, underground electrical lines, utility communication tower, and overhead electrical poles and lines off Forest Ave.

Contractors Name: TBD

Address: TBD

Zip TBD

Tel#: (TBD)

Name of Compensation or General Liability

Carrier: TBD

Policy #: TBD

Zoning District: A-Ag

Lot Size 154.5 acres Area ______

Existing Building Size: None

New Building Size: 560'Hx18'Wx18'L

New Building Yards: Zoning Set Backs *(Fill in plot diagram)*

Front Set Back 852 Feet 2,550' from Forest Ave

Right Side Yard Width 1656 Feet

Left Side Yard Width 1607 Feet

Rear Yard Depth: 827 Feet

Bldg. Height 560 Feet ______ Stories

ESTIMATED COST: $ 5,000,000

Floor Area ~300 Sq. Ft.

Building Permit Fee: $ $8,500

C/O Fee: $ NA

Sewer Permit Fee: $ NA

Residential Electric Only Fee: $ NA

Truss Identification Fee: $ NA

Late Fee: $ NA (refer to information page)

Late Fee: $ NA (refer to information page)

TOTAL FEE: $ $8,500

NOTE: Inspections by Code Department are required at the following schedule: (You must call for inspections)

UNAPPROVED

1. Footings before pouring concrete.
2. Foundation inspection before backfill
3. Framing, plumbing, heating and electrical inspections before closing any framework.
4. Insulation Inspection
5. When work is completed, final inspection is required by: Sewer, Electrical and the Codes Department. No occupancy of building is permitted without a Certificate of Occupancy issued by the Codes Department.

NOTE: THIS BUILDING PERMIT IF FOR RESIDENTIAL OR COMMERCIAL WORK EXPIRES SIX (6) MONTHS FROM THE DATE ISSUED.

[signature]
SIGNATURE OF THE OWNER, APPLICANT OR AGENT

Brandon Smith, New Leaf Energy
PRINT NAME OF OWNER, APPLICANT OR AGENT

INSTRUCTIONS

1. This application must be completely filled in by typewriter or in ink and submitted to the Codes Office.
2. Plot plan showing location of lot and of building on premises, relationship to adjoining premises or public streets or areas, and giving a detailed description of layout of property must be drawn on the diagram, which is part of this application.
3. ★ This application must be accompanied by one complete set of **plans/detailed drawings** showing proposed construction. ★
4. The work covered by this application may not be commenced before the issuance of Building and Zoning Permit.
5. Upon approval of this application, the Codes Department will issue a Building/Zoning Permit to the applicant. Such permit and approved plans shall be kept on the premises available for inspection throughout the progress of the work.
6. No building shall be occupied or used in whole or in part for any purposed whatever, until a Certificate of Occupancy shall have been granted by the Codes Department
7. Costs for the work described in the Application for Building Permit, include the cost of all the construction and other work done in connection therewith, exclusive of the cost of the land. If final cost shall exceed estimated cost, an additional fee may be required before the issuance of a Certificate of Occupancy.
8. Any deviation from the approved plans must be authorized, by the approval of revised plans, subject to the same procedure established for the examination of the original plans. An additional permit fee may be charged predicated on the variation from the original plans.

LATE CHARGE FEE SCHEDULE
Effective January 1, 2013

Failure to obtain a proper permit will result in the following late charge fees added to the cost of the permit:

1. **Failure to obtain a permit minimum late charge fee shall be $100.00 for permits up to $50.00.**
2. **Failure to obtain permit for any permits over $50.01, the late charge fee shall DOUBLE the amount of the permit.**
3. **Failure to pick up and pay for permit within 10 days after issuance, a late charge fee of $100.00 will be assessed.**

Above Late Charge Fees Adopted by Common Council 12/4/12 Resolution 12-319
EFFECTIVE JANUARY 1, 2013.

For Official Use Only

The application of Patrick Starke dated 3/17/23 is hereby ~~approved~~ (disapproved) and permission ~~granted~~ (refused) for the construction, reconstruction or alteration of a building and/or accessory structure, as set forth above.

Reason for refusal of permit: Per Oneida City Zoning Code 190 A conditional Use Permit is Required

Dated: 3/20/23

[signature]
Codes Department Officer

Mail Processing Center
Federal Aviation Administration
Southwest Regional Office
Obstruction Evaluation Group
10101 Hillwood Parkway
Fort Worth, TX 76177

Aeronautical Study No.
2022-WTE-1145-OE

Issued Date: 09/08/2022

Brandon Smith
Borrego Solar Systems, Inc.
55 Technology Drive
Suite 102
Lowell, MA 01851

**** PUBLIC NOTICE ****

The Federal Aviation Administration is conducting an aeronautical study concerning the following:

Structure:	Wind Turbine Oneida Wind Location 3
Location:	Oneida, NY
Latitude:	43-02-53.43N NAD 83
Longitude:	75-39-50.79W
Heights:	1250 feet site elevation (SE)
	650 feet above ground level (AGL)
	1900 feet above mean sea level (AMSL)

The structure above exceeds obstruction standards. To determine its effect upon the safe and efficient use of navigable airspace by aircraft and on the operation of air navigation facilities, the FAA is conducting 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.

** SEE REVERSE SIDE FOR ADDITIONAL INFORMATION **

In the study, consideration will be given to all facts relevant to the effect of the structure on existing and planned airspace use, air navigation facilities, airports, aircraft operations, procedures and minimum flight altitudes, and the air traffic control system.

Interested persons are invited to participate in the aeronautical study by submitting comments to the above FAA address or through the electronic notification system. To be eligible for consideration, comments must be relevant to the effect the structure would have on aviation, must provide sufficient detail to permit a clear understanding, must contain the aeronautical study number printed in the upper right hand corner of this notice, and must be received on or before 10/15/2022.

This notice may be reproduced and circulated by any interested person. Airport managers are encouraged to post this notice.

If we can be of further assistance, please contact our office at (816) 329-2526, or bill.kieffer@faa.gov. On any future correspondence concerning this matter, please refer to Aeronautical Study Number 2022-WTE-1145-OE.

Signature Control No: 513813416-552611174 (CIR -WT)

Bill Kieffer
Specialist

Attachment(s)
Part 77
Additional Information
Map(s)

Additional Information for ASN 2022-WTE-1145-OE

Proposal: To construct and/or operate a(n) Wind Turbine to a height of 650 feet above ground level, 1900 feet above mean sea level.

Location: The structure will be located 12.44 nautical miles south of K16 Airport reference point.

Part 77 Obstruction Standard(s) Exceeded:
Section 77.17 (a) (1) by 151 feet - a height more than 499 feet above ground level.

Additional information for ASN 2022-WTE-1145-OE

TITLE 14 CFR PART 77 - AERONAUTICAL STUDY - PUBLIC COMMENTS

This additional information provides details on the results of an Aeronautical Study for a notice of proposed construction/alteration filed with the FAA. The purpose of this notice is to solicit aeronautical comments from the public concerning the physical effect of these proposed wind turbines on the safe and efficient use of airspace by aircraft. Please submit your comments through the FAA's public website at https://oeaaa.faa.gov. This will ensure your comments are submitted directly to the case file. Comments submitted by email are strongly discouraged. Email comments could be directed to an FAA Specialist that is away from the office, reassigned or no longer with the organization and therefore may not be considered.

Begin by completing the "New User Registration". Login to your portal page and select the link, "View Circularized Cases". Search for the case in the appropriate state and then select "Submit Public Comments". If you need further assistance, contact the helpdesk at phone: 202-580-7500 / email: oeaaa_helpdesk@cghtech.com.

All FAA determinations and circularized cases are public record and available at the FAA's public website; https://oeaaa.faa.gov. The distribution for proposals circularized for public comments includes all "known" aviation interested persons and those who do not have an aeronautical interest but may become involved with specific aeronautical studies. Notification includes both postcard mailers and email notifications to those with registered FAA accounts. The FAA does not have a database for all persons with an aeronautical and non-aeronautical interest. Therefore, the public is encouraged to re-distribute and forward notices of circularized cases to the maximum extent possible. Additionally, it is incumbent upon local state, county and city officials to share notice of circularized cases with their concerned citizens.

A list of commonly used acronyms and abbreviations is available at the end of this document. A full list is available at the FAA's public website at https://oeaaa.faa.gov/oeaaa/downloads/external/content/FAA_Acronyms.pdf.

1. PROPOSAL DESCRIPTION

Proposed are 3 wind turbines for a project that lies approximately 13.1 NM north-northwest of the airport reference point (ARP) of the Hamilton Municipal Airport (VGC), Hamilton, New York. The wind turbines are being circularized for public comment under this Aeronautical Study Number (ASN) 2022-WTE-1145-OE. Comments on any of the proposed wind turbines in this project must be submitted under this ASN. All comments received from this circularization will be considered in completing the separate determinations for each wind turbine.

The proposed wind turbines' described heights and locations are expressed in Above Ground Level (AGL) height, Above Mean Sea Level (AMSL) height and latitude (LAT)/longitude (LONG).

ASN / AGL / AMSL / LAT / LONG

2022-WTE-1143-OE / 650 / 1899 / 43-02-53.29N / 75-39-55.26W
2022-WTE-1144-OE / 650 / 1908 / 43-02-53.57N / 75-39-46.31W
2022-WTE-1145-OE / 650 / 1900 / 43-02-53.43N / 75-39-50.79W

2. TITLE 14 CFR PART 77 - OBSTRUCTION STANDARDS EXCEEDED

a. Section 77.17(a)(1): Exceeds a height of 499 feet AGL at the site of the object. All proposed wind turbines would exceed this standard by 151 feet.

3. TITLE 14 CFR PART 77 - EFFECT ON AERONAUTICAL OPERATIONS

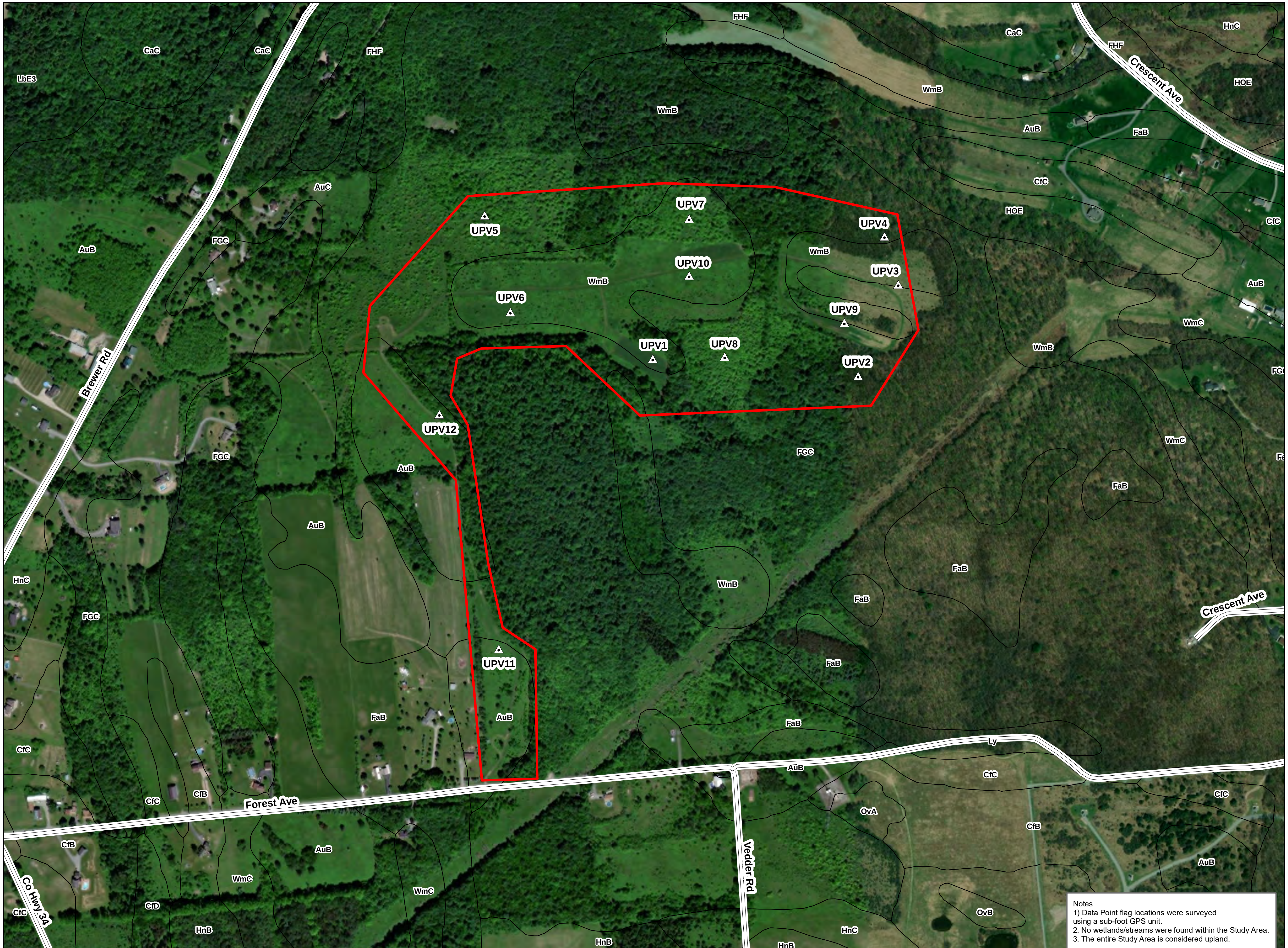
a. Section 77.29 (a)(1): the impact on arrival, departure, and en route procedures for aircraft operating under visual flight rules.

At a height greater than 499 feet AGL, the proposed wind farm would extend into airspace normally used for VFR en route flight and may be located within 2 statute miles (SM) of potential VFR Routes as defined by FAA Order 7400.2, Section 6-3-8. The turbines within 2 SM of a VFR Route would have an adverse effect upon VFR air navigation.

ACRONYMS & ABBREVIATIONS
AGL, Above Ground Level
AMSL, Above Mean Sea Level
ARP, Airport Reference Point
ARSR, Air Route Surveillance Radar
ARTCC, Air Route Traffic Control Center
ASN, Aeronautical Study Number
ASR, Airport Surveillance Radar
ATC, Air Traffic Control
ATCT, Air Traffic Control Tower
CARSR, Common Air Route Surveillance Radar
CAT, Category
CFR, Code of Federal Regulations
CG, Climb Gradient
DA, Decision Altitude
DME, Distance Measuring Equipment
FAA, Federal Aviation Administration
FUS, Fusion
GPS, Global Positioning System
IAF, Initial Approach Fix
IAP, Instrument Approach Procedure
ICA, Initial Climb Area
IFR, Instrument Flight Rules
INT, Intersection
LAT, Latitude
LNAV, Lateral Navigation
LOC, Localizer
LONG, Longitude
LP, Localizer Performance
LPV, Localizer Performance with Vertical Guidance
MDA, Minimum Descent Altitude
MEA, Minimum En route Altitude
MET, Meteorological Evaluation Tower
MIA, Minimum IFR Altitude
Min, Minimum

MOCA, Minimum Obstruction Clearance Altitude
MSA, Minimum Safe Altitude
MSL, Mean Sea Level
MVA, Minimum Vectoring Altitude
NA, Not Authorized
NAS, National Airspace System
NAVAID, Navigational Aid
NDB, Non-Directional Radio Beacon
NEH, No Effect Height
NM, Nautical Mile
NOTAM, Notice to Airmen
NPF, Notice of Preliminary Findings
OCS, Obstacle Clearance Surface
OE, Obstruction Evaluation
OEG, Obstruction Evaluation Group
Part 77 - Title 14 Code of Federal Regulations (CFR) Part 77, Safe, Efficient Use and Preservation of the Navigable Airspace.
P-NOTAM, Permanent Notice to Airmen
RLOS, Radar Line of Sight
RNAV, Area Navigation
RNP, Required Navigation Performance
RWY, Runway
S-, Straight-in
SE, Site Elevation
S-LOC, Straight-in Localizer
SM, Statute Miles
Std., Standard
TAA, Terminal Arrival Area
TACAN, Tactical Air Navigation System
TERPS, Terminal Instrument Procedures
TPA, Traffic Pattern Airspace
TRACON, Terminal Radar Approach Control
V, Victor Airway
VFR, Visual Flight Rules
VHF, Very High Frequency
VOR, VHF Omnidirectional Radio Range System
VORTAC, VOR/TACAN System
WTE, Wind Turbine East
WTW, Wind Turbine West

Map for ASN 2022-WTE-1145-OE



Creator: MT Reviewer: LD

I:\Borrego Solar\2213066 - 4949 Forest Ave Wetland Delin\Drawings\Wetlands\Figure 1 - Wetland Delineation

LaBella
Powered by partnership.

Borrego Solar

Wetland and Stream Delineation

Oneida Wind
Oneida, NY

N

0 250 500 Feet

1 inch = 500 feet

Legend

- Study Area
- Data Point Location
- Road
- Soil

Sources:
1. Study Area: Created by LaBella using information provided by the client.
2. Basemap: Esri, DigitalGlobe, GeoEye, Earthstar, Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and GIS User Community 2018, and 2020.
3. Mapped soil data were obtained from the NRCS online Soil Data (soildatamart.nrcs.usda.gov).

Wetland and Stream Delineation Survey

FIGURE 1

LaBella Project No: 2213066
Date: September 2021

Restricted
Document no.: 0090-4692 V00
19 April 2021

General Description
Ice Impact on operation of Wind Turbines
- Risk and Mitigation -

Table of contents

See general reservations, notes and disclaimers (including, Section 8 General Reservations, Notes and Disclaimers) to this general specification.

1 References

Ref.	Document title
[1]	*Wind Turbine Icing and Public Safety – a Quantifiable Risk?.* Colin Morgan and Ervin Bossanyi, Garrad Hassan, 1996.
[2]	*Risk Analysis of Ice Throw From Wind Turbines.* Henry Seifert, Annette Westerhellweg and Jürgen Kröning, DEWI, 2003.
[3]	*Wind Energy Projects in Cold Climates.* IEA Wind – Expert Group Study on Recommended Practices May 22, 2012
[4]	*Wind Energy Production in Cold Climate.* Tammelin, Cavaliere, Holttinen, Hannele, Morgan, Seifert and Säntti, 1997.
[5]	*General Specification VID.* Vestas Wind Systems A/S, DMS 0049-7921.
[6]	*General Description VAS* Vestas Wind Systems A/S, DMS 0068-6577
[7]	*General Specification VDS.* Vestas Wind Systems A/S, DMS 0060-8398.

2 General Description

Modern wind turbines are large structures with large surface areas where ice can form and accumulate under certain atmospheric conditions, such as ambient temperatures near 0°C, in combination with high relative humidity and precipitation. This is no different than for other large structures, such as transmission lines, bridges, buildings etc. The adhesion of the ice to the surface of the wind turbine varies depending on the formation conditions and the surface state, but since tower, nacelle, hub and blade surfaces are smooth, accumulated ice can shed from the turbine and fall to ground due to gravity. Accumulated ice can impact the power performance of the wind turbine.

In addition, and specifically for the blades of the wind turbine, ice accumulation is accelerated if the required atmospheric conditions are present and the turbine is in operation (i.e. the rotor is turning). This is because in rotation, the blades are forced into contact with increased amounts of moisture in the air and experience an increased surface wind chill. Ice accumulation on the blades can lead to ice throw in addition to ice shedding, where ice is not only falling approximately vertically down from the turbine, depending on wind speeds, but is also sliding off the rotating blades due to the rotational forces and thrown some distance from the wind turbine. This distance depends on the rotor speed, the wind speed and the constitution of the ice accumulation.

The related safety aspects of ice shedding and ice throw must be taken into account during project development, site operation and service.

The purpose of this General Description is to present information on the risk and offer recommendations for how to mitigate the risk, including explaining what turbine options are available for ice performance impact and ice risk mitigation

3 Icing Risk

Formation and accumulation of ice on the wind turbine structure is dependent on atmospheric conditions at the wind turbine installation site and the operation mode of the wind turbine. Fall of accumulated ice from a wind turbine at standstill or ice throw from a wind turbine in operation, can be caused by sudden changes in atmospheric conditions, such as ambient temperature, precipitation, wind or solar radiation.

It can also be caused by mechanical movement of the wind turbine structure due to vibrations, operating mode state changes, such as acceleration/deceleration, emergency stops etc. and it is impossible to predict when the individual discrete ice fall event or ice throw event occurs. Ice fragments, blocks, sheets or icicles may loosen and fall or slide off the turbine, making the area directly under the nacelle and rotor the highest risk zone [1].

The second highest risk zone is a surrounding circular area around the wind turbine, where ice throw may propel ice fragments away from the turbine. While the turbine will yaw around its tower vertical axis 360 degrees, there is typically a predominant wind direction for a given site and installation pad, so the ice throw risk is not uniform 360 degrees around the turbine but will be higher in some wind sectors than others. General guidance about this risk distribution is not possible since it depends on the site conditions for each project.

The distance ice fragments may be thrown from the wind turbine can be up to several hundred meters, depending on the conditions [1,2]. Any persons (general public or site personnel), buildings, installations, infrastructure, transport equipment etc. that are hit by falling ice fragments may sustain injury or damage respectively, if adequate protective measures are not ensured.

4 Icing Risk Mitigation

Risk of ice fall and ice throw must be considered during project scoping, project planning, project permitting as well as wind power plant operation and service. This includes wind power plants installed in densely populated areas, recreational areas, near roads, industrial areas etc.

Vestas has installed more than 69,000 wind turbines in more than 80 countries over the last 40 years (per September 2019), many of which are experiencing icing conditions for significant parts of the year. With this field experience combined with guidance from recognized industry practice [3], Vestas proposes the following actions to minimize the risk and impact of ice fall and ice throw for ice-prone wind power plant sites:

4.1 Managing Turbine Location

In the siting and permitting phase of a project, it should be made sure that the individual turbines are located a safe distance from general public recreational or occupational use areas, roads, buildings, installations, infrastructure, etc, or mitigations are in place to reduce risk under icing conditions to an acceptable level. Vestas always recommends a site-specific icing risk assessment, but if this is not possible, then general guidelines may be useful.

Certifying bodies DNVGL and DEWI recommend use of the reference “Wind Energy Production in Cold Climate” [4], which proposes the following rule for calculating a safe distance “d” for ice fall and ice throw, respectively:

$$\text{Ice fall: } d = v \cdot (D/2 + H) / 15$$

$$\text{Ice throw: } d = (D + H) \cdot 1.5$$

where d = safe radial, horizontal distance from turbine tower in m, D = rotor diameter in m, v = wind speed at hub height in m/s and H = hub height in m.

Site-specific safe distances may deviate from this general rule, depending on the design of the turbine, wind speed, rotor speed, blade surface state, atmospheric conditions and many other factors. The siting restrictions that an icing risk assessment may infer or which this general rule may infer, can be reduced by implementing an ice detection system to the turbine, which allows the turbine to be shut down in the event ice build-up is detected on specific locations of the turbine structure. The extent of such a reduction depends on the local conditions at a specific site.

4.2 Applying Guards and Visual Warnings

Shielding off a wind turbine or wind power plant with fences and warning signs can be a means of providing appropriate protection of site personnel and the general public [3]. Only a full access restriction with a surrounding fence will provide physical protection but may not be feasible for certain sites. Hence, site-specific risk assessments with appropriately scaled, site-specific risk mitigation measures should always be undertaken.

4.3 Assuring Safety of Operators

Accessing and working in and around a wind turbine under icing conditions always have to be based on a risk assessment and should be limited to the largest possible extent to minimize risk. Appropriate safety precautions for accessing a wind turbine under icing conditions include:

- Shutting down the wind turbine remotely
- Yawing nacelle to position the rotor opposite the side of the tower where the tower door is placed
- Observe if and where the ice is built up, taking this into consideration together with the direction of the wind, when approaching the turbine
- Starting the wind turbine remotely when work is complete.

4.4 Vestas Ice Detection™ System

To reduce the risk of ice throw (but not ice fall), the wind turbine can be shut down remotely when site personnel observe icing conditions and ice formation on the wind turbine. In practise, turbines are not subject to onsite surveillance so Vestas also offers automatic detection and shutdown of a wind turbine, through installation of either a conventional nacelle-based ice detector such as Goodrich or Labkotec or Vestas Ice Detection™ system (VID).

Vestas Ice Detection™ system (VID) employs state-of-the-art DNV-GL certified sensing technology including full integration with VestasOnline® SCADA for operation and alarm. A master-slave functionality is offered such that one ice detection system can control the automatic shutdown and restart of all wind turbines in a wind power plant. Master-slave functionality is available for use in regions where regulations permit it.

Ice detection is offered in two variants: a nacelle based system and a blade based system: Vestas Ice Detection™ system (VID). While the nacelle based system is simple, it does not provide the same detection level as a blade based system, because the correlation between nacelle ice formation and blade ice formation is weak. For this reason, nacelle based ice detection is only recognized in some countries. Also the nacelle based ice detection does not have the same DNVGL certification as Vestas Ice Detection™ system (VID).

The blade based ice detection is more sophisticated. It comprises an accelerometer in each blade which is connected to a hub mounted control box (Ice Detection Cabinet), which in turn is connected to the turbine's hub controller. The system will provide information on ice build-up on the full blade and stop the turbine operation (production) when certain conditions are met, primarily that the ice build-up is above an adjustable threshold and the temperature is below 5°C.

Ice detection on the blade is measured as a mass increase of the blade. Mass changes lead to deviations of natural frequencies of lower modes of the blade. With the accelerometers in each rotor blade, the system continuously and automatically monitors specific natural blade frequencies. When the detected frequency deviations exceed predefined thresholds, warning and alert signals are issued to the turbine controller.

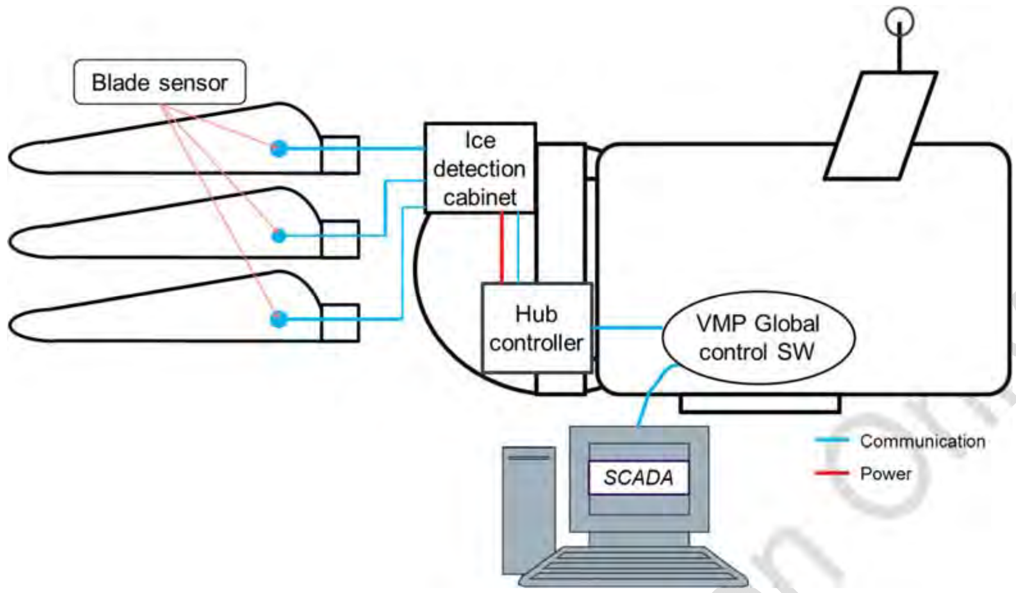
Ice detection thresholds based on the achievable frequency resolution of the system is set to default values, but may be adjusted to local climatic characteristics and regulations to further reduce ice throw risk.

Ice detection is executed continuously with the turbine in operation / production and at standstill, leading to a real-time detection of ice formation on the blades.

The blade based ice detection system continuously signals the icing condition of the blades as well as its own system status to the turbine controller. According to these signals the controller can automatically shut-down the turbine in the case of an ice alert signal and automatically restart the turbine after the ice-alert has been lifted. Via the provided signals the controller can also check the validity of the received ice status signals and react accordingly.

After turbine shutdown due to detected ice formation, the system continues its measurements at standstill. Thus, prior to a restart of the turbine, the absence (or just a noncritical remainder) of ice can be confirmed and the controller can then automatically start-up the turbine.

The layout of the blade based ice detection system is shown in the figure below.



Other means of ice detection exists, such as power curve degradation monitoring, detection of rotor imbalance caused by blade ice formation by a main shaft vibration sensor, but since ice can build up in a symmetrical manner such a situation will not trigger the sensor. Since, Vestas' blade based ice detection system has an individual sensor in each blade, symmetric ice formation will still be detected.

IMPORTANT Ice detection technology is still new and relatively immature, so despite carrying certification, ice detection systems that cause the turbine to shut down do not provide a detectability of 100%. Therefore, equipping a wind turbine with an ice detection system cannot be regarded as a guarantee of prevention of ice throw. It will, however, reduce the ice throw risk as also recognized by authorities in several countries.

When ice formation is detected and trigger levels exceeded, the turbine performs the following actions:

1. Ice warning to wind turbine controller and VestasOnline® SCADA but no change of wind turbine operating mode.
2. Ice alarm to wind turbine controller and VestasOnline® SCADA triggering shutdown of the wind turbine.
3. Revocation of the ice alarm state when icing conditions disappear and blade mass is reduced below triggering threshold and automatic or manual restart of the wind turbine, depending on the control settings.
4. Optionally, and provided that either the Vestas Anti-icing™ system or the Vestas De-icing™ system is installed, the ice detection signal can be used by the turbine controller to trigger their activation.

The ice detection system signals the hub controller to shut down the turbine. If the ice detection system is not able to measure ice (for example due to a sensor failure) the turbine will be stopped automatically if the ambient temperature is below 5°C.

A 24 VDC output is available in the ground controller which can signal to connected customer installed external equipment (warning sound, warning light etc.) when the wind turbine is stopped by the ice detection system.

For further details on Vestas Ice Detection™ system, please refer to the General Specification [5] or contact Vestas.

5 Cold Climate Effects on the Wind Turbine

Vestas has wind turbines that are designed for survival in temperatures as low as -40°C and operation down to -20°C. A Low Temperature package is available as an option that allows the wind turbine to operate down to -30°C. These temperature ranges are applicable irrespective of icing.

Ice loads are considered in the wind turbine design loads according to DIBt 2012 and reflected in the loads evaluation. The DIBt 2012 ice load cases are also applied to the IEC design loads.

The wind turbine is equipped as standard with a tower top accelerometer that protects the structure from overloads. Similarly, each blade is equipped with load sensors that will stop the turbine if loads or rotor balance are not within threshold limits. While these protection features are in place and will protect the turbine from all load events, including icing, they are not expected to be triggered by icing events as it is very unlikely that ice accumulation can be severe enough to approach the trigger levels of the tower and blade load sensors.

Icing on wind sensors or blades will affect the power production of the turbine. Icing on wind sensors will lead to a wrong measurement and correspondingly wrong operating response from the wind turbine that affects power production negatively. Ice build-up on the blades will affect the lift and drag coefficients of the blade and reduce the power production.

For mitigating power production deterioration due to icing on wind sensors, Vestas employs heating elements in the ultrasonic wind sensors.

For mitigating power production deterioration due to icing on blades Vestas offers either the Vestas Anti-icing™ system (VAS), or the Vestas De-icing™ system (VDS) – dependent on turbine model. These are explained in further detail in the next sections.

6 Vestas Anti-icing™ System

The Vestas Anti-icing System™ (VAS) is a fully integrated turbine system designed to prevent and actively remove ice build-up on wind turbine blades. The VAS heats targeted areas of the blade to prevent and remove any ice accretion when activated, thereby limiting blade aerodynamic performance degradation and consequent sub-optimal wind turbine generator (WTG) power production.

.

IMPORTANT The Vestas Anti-icing™ system is designed to improve turbine power production in cold climate conditions and is a performance enhancement. It is not designed for eliminating or reducing ice fall and ice throw risks.

The VAS comprises of:

- A number of electro-thermal heating (ETH) elements embedded within the blade shell laminate in targeted areas.

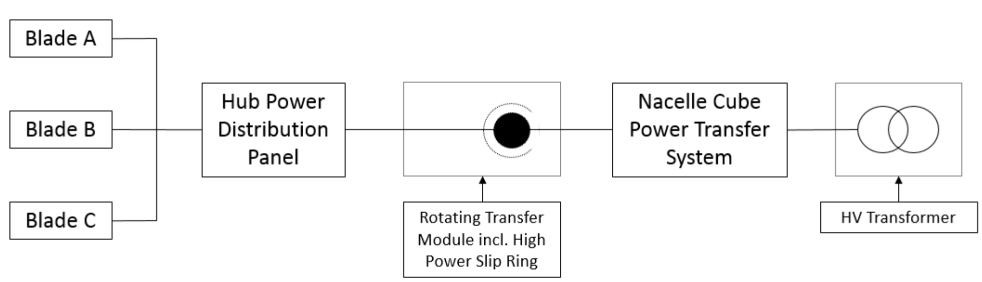
- The ETH elements are controlled by the turbine controller in the WTG, which will identify and switch on and control the power the ETH elements dependent on the severity of the icing conditions.

- The control method permits the opportunity to vary the power dependent on the environmental conditions in which the WTG operates.

- The VAS is activated automatically based on a detected degradation in turbine performance (Power Curve Ice Detection (PCID)) and environmental factors (e.g. below a threshold operating temperature), a signal is sent to the turbine in order to activate the heating system. Provision of manual activation is provided for specific operational needs.

- The system operates while the WTG is in production and rotating, so called anti-ice mode, or in the most severe conditions the WTG is stopped and the heating performed on the stationary rotor, so called de-ice mode.

- The power is provided by the turbine through a nacelle-hub power transfer system that allows the ETH elements to be powered whilst the rotor is spinning or when it is stationary.



- The control and monitoring of the VAS is fully integrated into the turbine controller. Safety monitoring functions run continuously in parallel to ensure that the VAS operates within appropriate heating and environmental limits.

The VAS is automatically triggered via the use of Power Curve Ice Detection (PCID), with an additional option for manual activation by the operator.

The PCID is a software (SW) algorithm that is located in the VestasOnline® Supervisory Control and Data Acquisition (SCADA) system which compares the current WTG power performance to a nominal reference power curve delivered by Vestas, ambient conditions (i.e. temperature and wind speed), and general logging information from the WTG.

The reference curve, is configured to match individual turbine performance, and is based on ice-free data.

Based on a detected degradation in WTG power performance compared to the reference power curve, an activation command is sent to the WTG. This feature can be both enabled and disabled. In cases where it is disabled, it is possible to send a manual activation trigger signal from SCADA to the WTG.

The power curve degradation level at which the system will trigger an anti--icing command is configurable, together with the minimum wind speed and maximum ambient temperature at which automatic triggers can happen. The degradation level can be configured for individual wind speed intervals, to allow for lower trigger levels at low wind speeds, to compensate for increased statistical variance in the power curve.

The sequence of operation of the VAS (Operational Mode):

1. A Power Curve based Ice Detection (PCID) operating via the VestasOnline® SCADA system, detects a reduction in turbine performance below a set threshold.
2. The park level VestasOnline® SCADA system issues an anti-icing command to the turbine.
3. Based on the anti-icing command, the turbine controller activates the anti-ice heating.
4. At recovery of the grid power production to a defined fraction of the nominal reference power curve, the turbine will halt the heating process.

The anti-icing system can operate within the following ambient conditions:

- Ambient temperature between -20°C and +10°C.
- Wind speed below WTG cut-out - 25 m/s (anti-ice operational mode)
- Wind speed below 13m/s (de-ice operational mode).

7 Vestas De-icing™ System

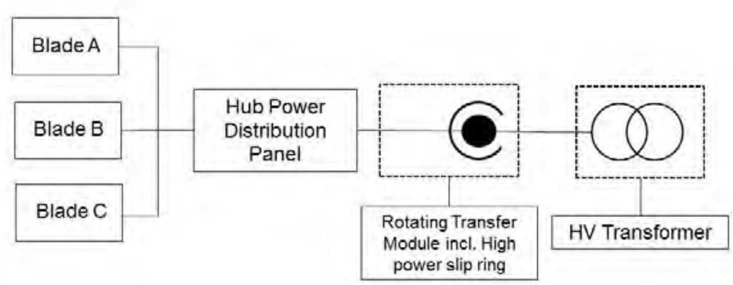
Vestas De-icing™ system (VDS) maximizes energy production in icy conditions, by employing air heaters to force hot air through the blade interior volume heat up the blade surface. With full VestasOnline® SCADA integration, the system continuously monitors turbine power curve performance. Via the systems' automatic control, the wind turbine will only engage in de-icing when there is a net power production gain from doing so.

The basis for a de-icing blade is a standard blade. Modifications are made to allow for circulating hot air inside the blade cavities. Additionally a Hot Air Installation unit (HAI) is integrated in the root of each blade. The HAI unit comprises of ducting, a fan unit and heater units. Air inlet and outlet from the HAI are connected via flexible ducting to the blade cavities of the de-icing blades. To ensure optimal efficiency, the Vestas De-icing™ system is designed to de-ice the outer third of the turbine blade full chord and the remaining two-thirds of the leading edge towards the tip.
.

IMPORTANT The Vestas De-icing™ system is designed to improve turbine power production in cold climate conditions and is a performance enhancement. It is not designed for eliminating or reducing ice fall and ice throw risks.

All mechanical and electrical parts of the system are accessible from the turbine hub and root of the blade itself, making it safer and more convenient from a service perspective to maintain the system. The fan and heaters are serviceable parts, each of them individually removable from the HAI. Service can be bundled into the annual service schedule of the turbine.

The de-icing system draws power directly from the high voltage transformer (a step-down transformer is used in the Mk3E to allow for the increase in voltage on the HV transformer on that platform). The layout of the VDS power system is as indicated in the figure below:



The VDS can be configured for automatic activation via VestasOnline® SCADA, with an additional option to activate manually by a VestasOnline® SCADA operator. The automatic activation is based on a power curve degradation algorithm, comparing current turbine power performance to a previously defined turbine-specific reference curve, which is delivered by Vestas. Based on a detected degradation in turbine performance compared to the reference curve, a de-icing command is sent to the turbine, provided all turbine safety and operational envelope checks are okay.

The reference curve can be configured to match individual turbine performance, and is based on ice-free data.

The power curve degradation level at which the system will trigger a de-icing command is configurable, together with the minimum wind speed and maximum ambient temperature at which automatic triggers can happen. The degradation level can be configured for individual wind speed intervals, to allow for lower trigger levels at low wind speeds, to compensate for increased statistical variance in the power curve.

Additional to VestasOnline® SCADA activation, the VDS can be activated locally in the turbine, via the turbines operator panel.

The turbine will be paused with the rotor stationary during a de-icing cycle. All three blades will be heated up at the same time.

The sequence of operation of the VDS is as follows:

1. A Power Curve based Ice Detection (PCID) operating via the VestasOnline® SCADA system, detects a reduction in turbine performance below a set threshold.
2. The park level VestasOnline® SCADA system issues a de-icing command to the turbine.
3. Based on the de-icing command, the turbine enters into its de-icing cycle.
4. After the end of the de-icing cycle, the turbine may be manually or automatically put back into operation (Customer setting).

The de-icing system can only be activated when the following conditions are met:

- Ambient temperature between -15°C and +7°C.
- Wind speed below 13 m/s.

Automatic activation of the de-icing system will only allow 3 de-icing cycles within a 24 hours period; however manual activation can be done more frequently.

For more information about the Vestas De-icing™ system and the operational envelope, please refer to the General Specification [6] or contact Vestas.

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8 General Reservations, Notes and Disclaimers

-
- This document, General Description, is not an offer for sale, and does not contain any guarantee, warranty, promise, commitment, representation and/or verification by Vestas, whether express or implied, including, without limitation, in respect of the effect of icing events on the wind turbine performance and structural integrity, are hereby expressly disclaimed by Vestas.
- Images and illustrations in this document may differ from the actual design.
- VID supports reducing the risk of ice throw, but is not designed to reduce the risk of ice fall, ice drops and/or ice fall; any use of, or reliance on, the system for such purpose is at recipients own risk. The risk of ice throw, ice drops and/or ice fall caused by operation of the wind turbine and operation of the VID is solely the responsibility of the customer.
- VAS and VDS are not designed to reduce the risk of ice throw, ice drops and/or ice fall; any use of, or reliance on, the system for such purpose is at recipients own risk. The risk of ice throw, ice drops and/or ice fall caused by operation of the turbine and operation of the VAS or VDS is solely the responsibility of the customer.
- For VID, actual icing and site conditions have many variables and states (for instance ice storms or ice due to rime accretion) and these differences when compared to the threshold level of VID may have an impact on VID performance.
- For VAS or VDS, actual climate and site conditions have many variables and should be considered in evaluating VAS or VDS performance. The design and operating parameters, as well as any estimated power curve performance, do not constitute warranties, guarantees, or representations as to VAS or VDS performance at actual sites.

Wind Power GeoPlanner™

Microwave Study

Forest Ave – Oneida Wind

Prepared on Behalf of
New Leaf Energy

February 14, 2023

COMSEARCH
A CommScope Company

Table of Contents

1. Introduction

Microwave bands that may be affected by the installation of wind turbine facilities operate over a wide frequency range (900 MHz – 23 GHz). Comsearch has developed and maintains comprehensive technical databases containing information on licensed microwave networks throughout the United States. 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, proposed and applied non-federal government microwave systems.

2. Project Overview

Project Information

Name: Forest Ave – Oneida Wind

County: Madison

State: New York

Number of Turbines: 1

Blade Diameter: 140 meters

Hub Height: 169 meters

Figure 1: Area of Interest

3. Two-Dimensional Fresnel Zone Analysis

Methodology

Our obstruction analysis was performed using Comsearch's proprietary microwave database, which contains all non-government licensed, proposed and applied paths from 0.9 - 23 GHz[1]. First, we determined all microwave paths that intersect the area of interest[2] and listed them in Table 1. These paths and the area of interest which represents two miles of the turbine project area are shown in Figure 2.

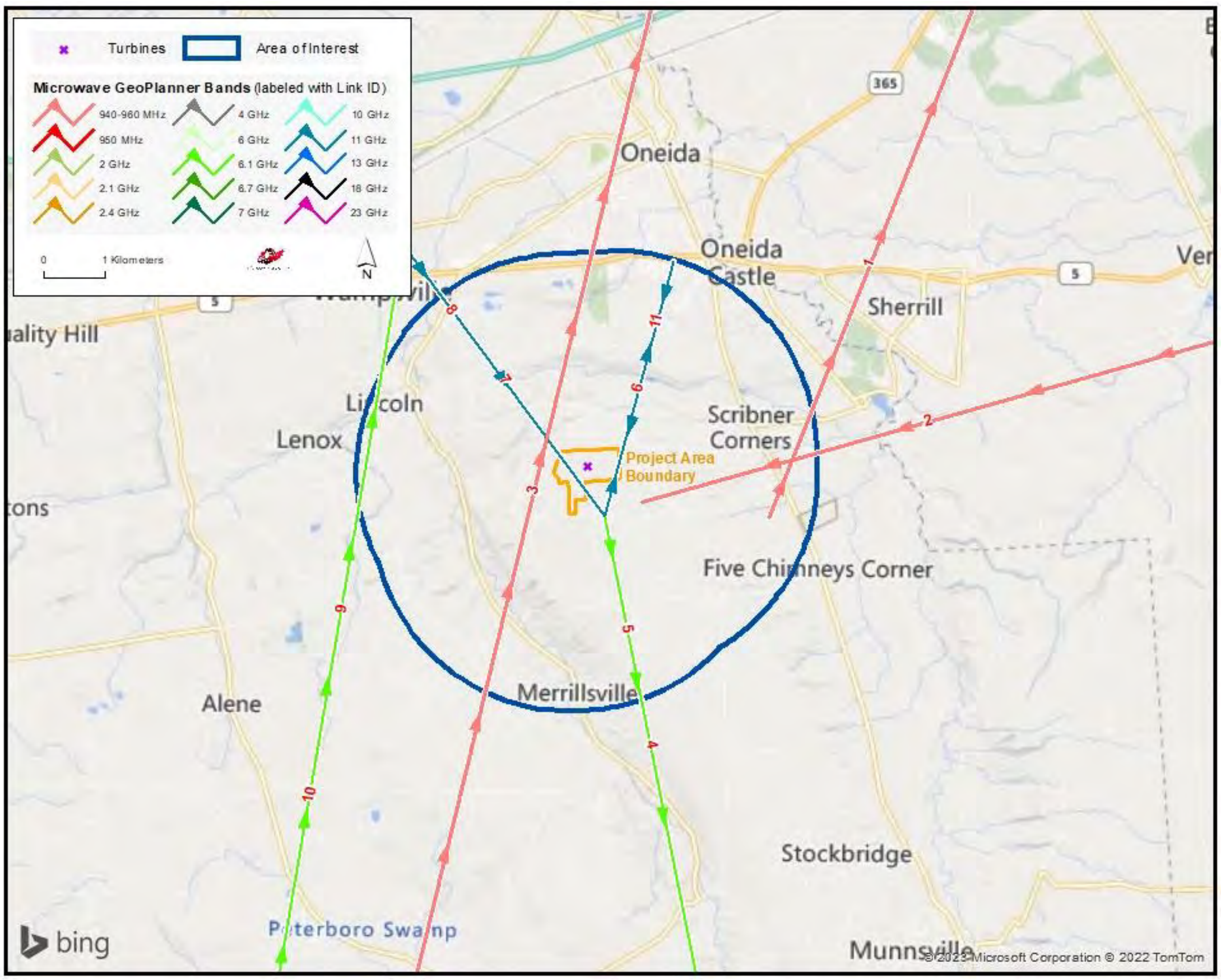


Figure 2: Microwave Paths that Intersect the Area of Interest

[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.

ID	Status	Callsign 1	Callsign 2	Band	Path Length (km)	Licensee
1	Licensed	WPZP732	WPZP734	940-960 MHz	9.53	New York State Thruway Authority
2	Licensed	WPZU506	WPZU510	940-960 MHz	40.55	JPJ Electronic Communications Inc.
3	Licensed	WQBX986	WQCB227	940-960 MHz	95.51	New York, State of
4	Licensed	WQNH536	WQNH563	6.1 GHz	15.39	Madison, County Of
5	Licensed	WQNH536	WQNH563	6.1 GHz	15.39	Madison, County Of
6	Licensed	WQNH536	WQVL932	11 GHz	4.31	Madison, County Of
7	Licensed	WQNH547	WQNH536	11 GHz	5.51	Madison, County Of
8	Licensed	WQNH547	WQNH536	11 GHz	5.51	Madison, County Of
9	Licensed	WQNH560	WQNH547	6.1 GHz	14.52	Madison, County Of
10	Licensed	WQNH560	WQNH547	6.1 GHz	14.52	Madison, County Of
11	Licensed	WQVL932	WQNH536	11 GHz	4.31	Madison, County Of

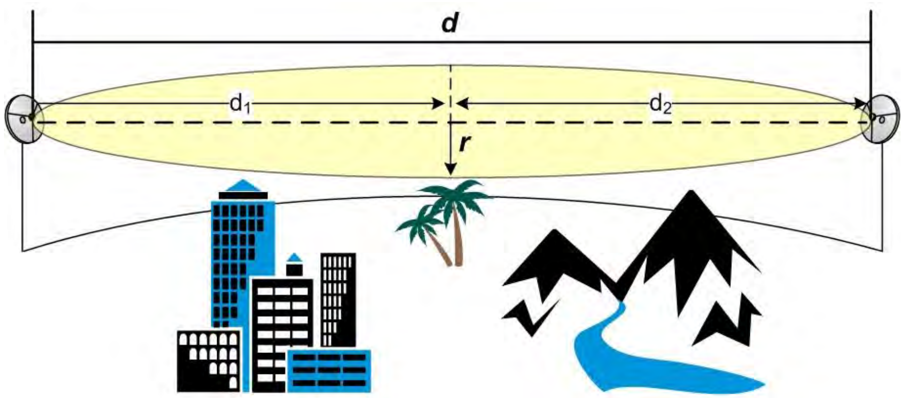
Table 1: Summary of Microwave Paths that Intersect the Area of Interest

(See enclosed mw_geopl.xlsx for more information and GP_dict_matrix_description.xls for detailed field descriptions)

Verification of Coordinate Accuracy
It is possible that as-built coordinates may differ from those on the FCC license. For this project, four paths cross within close proximity of the proposed turbine and the tower locations for these paths will have a critical impact on the result. Therefore, we verified these locations using aerial photography. Some of the towers were found to be slightly off and were moved to their locations based on the aerial photos[3].

Next, we calculated a Fresnel Zone for each path based on the following formula:

$$r \cong 17.3\sqrt{\frac{n}{F_{GHz}}\left(\frac{d_1 d_2}{d_1 + d_2}\right)}$$



Where,

r	=	Fresnel Zone radius at a specific point in the microwave path, meters
n	=	Fresnel Zone number, 1
F_{GHz}	=	Frequency of microwave system, GHz
d_1	=	Distance from antenna 1 to a specific point in the microwave path, kilometers
d_2	=	Distance from antenna 2 to a specific point in the microwave path, kilometers

In general, this is the area where the planned wind turbines should be avoided, if possible. Likewise, Comsearch recommends that an area directly in front of each microwave antenna should be avoided. This corresponds to the Consultation Zone which measures 1 kilometer along the main beam of the antenna and 24 ft (7.3 meters) wide. A depiction of the Fresnel Zones and Consultation Zones for each microwave path listed can be found in Figure 3, and is also included in the enclosed shapefiles[4,5].

[3] See enclosed mw_geopl.shp (adjusted locations based on aerial photography/basis for report images and results) and mw_geopl_fcc.shp (locations solely based on FCC licensed information) for details.

[4] The ESRI® shapefiles enclosed are in NAD 83 UTM Zone 18 projected coordinate system.

[5] 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.

Figure 3: Microwave Paths with Fresnel Zones

4. Conclusion

Total Microwave Paths	Paths with Affected Fresnel Zones	Total Turbines	Turbines intersecting the Fresnel Zones
11	0	1	0

Table 2: Fresnel Zone Analysis Result

Our study identified eleven microwave paths within two miles of the the Forest Ave – Oneida Wind project area boundary. The Fresnel and Consultation Zones for these microwave paths were calculated and mapped in order to assess the potential impact from the turbine. One turbine was considered in the analysis, with a blade diameter of 140 meters and a hub height of 169 meters. The turbine was not found to have potential obstruction with the microwave systems in the area.

5. Contact

For questions or information regarding the Microwave Study, please contact:

Contact person:	David Meyer
Title:	Senior Manager
Company:	Comsearch
Address:	21515 Ridgetop Circle, Suite 300, Sterling, VA 20166
Telephone:	703-726-5656
Fax:	703-726-5595
Email:	David.Meyer@CommScope.com
Web site:	www.comsearch.com

Appendix: Turbine Locations

Turbine ID	Lat	Lon
1	43.047990	-75.665345

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

Division of Environmental Permits
625 Broadway, 4th Floor, Albany, New York 12233-1750
P: (518) 402-9167 | F: (518) 402-9168 | deppermitting@dec.ny.gov
www.dec.ny.gov

April 12, 2022

Jill Prusak
LaBella Associates
4104 Vestal Road, Suite 105
Vestal, NY 13850

Re: Jurisdictional Review
(Borrego) Forest Ave. Oneida Wind Project
LaBella Project Number 2213066 4949 Forest Ave.
Town of Oneida, Madison County

Dear Ms. Prusak,

The New York State Department of Environmental Conservation (DEC) has reviewed the Jurisdictional Determination Request letter dated October 25, 2021, prepared by LaBella Associates for the 80-acre site located at 4949 Forest Ave. Oneida, Madison County, New York for the Forest Ave. Oneida Wind Project.

Department Staff offer the following comments:

Department staff have reviewed the project study area and concur that there are no jurisdictional wetlands or streams in the project study area.

If you have any questions, please contact me by phone at (518) 402-1274, or by email at Emily.Thiel@dec.ny.gov.

Sincerely,

Emily Thiel
Environmental Analyst 1

Cc: Morgan Melokos, LaBella Associates
Elizabeth Tracy, NYSDEC
Michael Higgins, NYSDEC

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

Division of Environmental Permits
625 Broadway, 4th Floor, Albany, New York 12233-1750
P: (518) 402-9167 | F: (518) 402-9168 | deppermitting@dec.ny.gov
www.dec.ny.gov

April 12, 2022

Jill Prusak
LaBella Associates
4104 Vestal Road, Suite 105
Vestal, NY 13850

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Sincerely,

Emily Thiel
Environmental Analyst 1

Cc: Morgan Melokos, LaBella Associates
Elizabeth Tracy, NYSDEC
Michael Higgins, NYSDEC

April 26, 2023

Christopher Henry
Director of Planning and Development
109 N. Main Street
Oneida, New York

RE: Oneida Wind Consistency with Local and County Plans

Mr. Henry,

New Leaf Energy has reviewed the applicable local and county land use plans regarding the proposed wind turbine project located off of Brewer Rd. The two applicable land use plans for this site are the City of Oneida Comprehensive Plan and the Madison County Economic Development Strategy. We believe that the proposed wind project is consistent with these plans. Please see below for more details on how this project can help further the goals of these community plans.

City of Oneida Comprehensive Plan

A review of the City of Oneida Comprehensive plan identified several key efforts for the city to focus on. The Comprehensive Plan is a document that presents goals, objectives, guidelines and policies for the immediate and long-range protection, enhancement, growth, and community development. Areas of focus were identified, and then goals were established to help further those areas. The goals identified are:

> **Goal 1: Provide a transportation system that alleviates congestion while providing adequate provisions for pedestrians.**
>
> **Goal 2: Upgrade and maintain the City's infrastructure.**
>
> **Goal 3: Reestablish the downtown as the City's central business district.**
>
> **Goal 4: Provide a variety of high quality housing opportunities.**
>
> **Goal 5: Improve land management by updating the City's Zoning Ordinance.**
>
> **Goal 6: Develop a focused city-wide economic development plan.**

Goal 7: Utilize potential and existing recreational and educational facilities to support opportunities for youth and area residents.

Goals 1, 2, 3, 4, and 7 are not directly applicable to the proposed wind project. However, New Leaf Energy would like to enter into a Host Community Agreement with the City of Oneida that can provide funds to support some of the initiatives identified in the Comprehensive plan to further these goals. A Host Community Agreement can be structured in many ways, potentially earmarking funds for specific projects. For example, a specific activity identified in the Comprehensive Plan to help achieve Goal 1 is to "Create attractive gateways at the major entrances to the city". Funds from the Host Community Agreement could be used to support this project.

Goals 5 and 6 are more applicable to this project. To achieve Goal 5, the city has recently enacted a wind bylaw identifying the zoning districts where wind energy projects are allowed. This project is an allowed use in the zoning district where it is located.

Goal 6 is related to the economic development of the city. This project will contribute directly and indirectly to the local economy and municipal budget. Areas of focus listed in the Comprehensive Plan include "Encourage growth and development" and "Recognize that tax base is critical". Most types of traditional development produce some stress on public services and resources such as city water, sewer, additional children in the school district, or traffic generation. In contrast, this project will provide an additional tax base to the city, while requiring none of the city services and public resource demands most development needs.

Although the Comprehensive Plan does not contemplate wind energy projects specifically, this project is not only consistent with the goals listed, but can help further progress towards achieving many of them.

Madison County Economic Development Strategy

Madison county does not have a detailed land use plan, but it does have a number of strategic plans that have been created to guide county decisions. The most relevant plan for projects such as the wind project proposed is the Madison County Economic Development Strategy. This document is meant to provide the community with a clear understanding of the current economic situation, identify potential opportunities as well as challenges for economic growth, and define the efforts required to achieve specific goals.

The Economic Development Strategy identified wind as one of the county's natural resources. Oneida is on the edge of the areas with enough wind resources, with most of the windiest areas of the county located further south in towns such as Fenner. While the strategic plan does not specifically list wind energy as a goal, it does identify the renewable energy sector as a growth market and indicates that this is an opportunity.

It also identified the following overarching goal: "**Madison County must direct its efforts to the growth of a diverse economic base that will provide employment opportunities for a broad cross section of its citizens across the entire county".** The proposed wind project supports this goal by being a source of investment into the city and county from outside. This project will funnel investment into the county in a range of ways; from direct investment to the host landowner, to more indirect means. While the facility itself is unmanned, the design, construction, and operation of the turbine will support a wide range of employment opportunities within the county. Many services, specifically construction services, will be pulled from local companies, funneling outside investment dollars into the local economy. Additionally, even those specialized services and workers that will need to be brought in from outside of the county will require lodging, food, and other services. This will provide additional revenue for local businesses.

Given the above, and in the context of the larger New York State Climate Leadership and Community Protection Act, we believe this project is consistent with the goals and plans of the City of Oneida, County of Madison, and State of New York. In fact, this type of project is a critical part of achieving those goals.

Sincerely,

New Leaf Energy, Inc.

Brandon Smith, PE
bsmith@newleafenergy.com
Ph: (978) 221-3093

April 26, 2023

Christopher Henry
Director of Planning and Development
109 N. Main Street
Oneida, New York

RE: Oneida Wind Geotechnical and Foundation Considerations

Mr. Henry,

Please see below for additional information as requested regarding preliminary geotechnical information and turbine foundations. A full geotechnical investigation and structural design of the foundation will be performed prior to construction, but this level of design is not available currently. However, preliminary investigation of the site has been performed. Additionally, information is provided on the types of foundations that may be required, the types of construction necessary, and examples of mitigation that can be taken to ensure wells and water supplies in the area are not impacted.

Existing Conditions

The location of the proposed turbine is currently a meadow surrounded by wooded areas. Nearby areas consist of agricultural land, forest, and low density rural residential land. No residential structures exist on site. Neighboring residences are closest along Brewer Road to the west, Forest Ave to the south, and Crescent Ave to the west. The topography of the site slopes down from a high point of 1245 feet above mean sea level in the center of the property, to an elevation of less than 1180 feet above sea level in the west.

Preliminary Geotechnical Review and Site Investigation

The United States Department of Agriculture Natural Resources Conservation Services (NRCS) maintains a database of soil and subsurface data. This data has been reviewed to provide an estimate of what the subsurface conditions may be on site. Please see the report attached. The report characterizes the soil near the turbine as partially Farmington-Wassaic-Rock outcrop complex (FGC) and partially Wassaic silt loam (WmB). These soils have high bedrock tables. After review of the NRCS data, a site walk was performed. Some small areas of bedrock outcropping were identified during this site walk. These areas were very small, most of the site was covered in thick vegetation. These observations support the NRCS data that bedrock is at a shallow depth on site.

Proposed Work

The proposed project features a single Wind Turbine located approximately 2,575 feet north of Forest Ave. The turbine will be interconnected to the distribution grid along Forest Ave. The turbine tower will have a total tip height of approximately 560 feet above finished grade. Ancillary equipment installed will include a utility communication tower, gravel crane pad, ground mounted electrical equipment, and a series of underground conduit and utility poles running south from the turbine location to the interconnection area on Forest Ave.

The proposed location of the turbine is on the southern edge of the existing field, at approximately 1240 feet above mean sea level. Please see Figure 1 below for a locus map of the turbine location.

Figure 1: Locus Map

Turbine

The turbine to be constructed consists of a foundation, tower, nacelle, and blades. The tower component is anchored to the foundation and supports the nacelle. The nacelle houses the gearbox and electrical generator. The only fluids with a spill potential that will be on site are the lubrication oils held within the turbine nacelle. This fluid is gear oil and is not considered a hazardous material. The volume of gear oil contained in the nacelle is approximately 400 gallons.

Expected Foundation

Any potential impact to water sources would be related to the wind turbine foundation. There are a variety of technologies and designs that may be employed to support a wind turbine. The preferred option depends on the site location and geotechnical conditions. Generally, the foundation options fall into three types that may be employed;

Shallow foundations - The most common type of foundation, a shallow foundation consists of a concrete gravity base about 50-75 feet wide and 10-15 feet deep. It is made up of reinforced concrete. The construction of these types of foundations consist of surface excavation, concrete forming, rebar work, and concrete placement. The foundation is then backfilled so that only a circular pedestal is exposed. The turbine is anchored via bolted connections to this concrete pedestal. Below is an example of a shallow foundation. Note the circular pedestal which will be the only portion exposed upon completion of the foundation.

<u>Figure 2: Shallow Foundation</u>

To achieve the depth required for this foundation, solid and bedrock must be excavated to a depth of approximately 15 feet. The primary method to achieve this depth is through traditional excavation using an excavator. If bedrock is encountered, other methods may be employed. Significantly weathered bedrock may be broken up and removed with the use of an excavator-mounted impact hammer. However, if solid bedrock is encountered, the use of blasting may be necessary to meet the design depths. Several mitigation techniques will be utilized to ensure this work does not affect off-site properties. These include:

- Containment: The contractor shall berm around the excavation to redirect surface water run-off from entering the excavation and bedrock.

- If voids or large fractures are identified at the bedrock surface indicative of karst conditions, the contractor will pack the void/fracture surface with no-slump concrete.
- Placement of geotextile separation blanket at the base of the foundation and placement of concrete above the fabric to keep concrete from entering fractures or voids in the bedrock

Other Types of Foundation

Other foundation types are sometimes necessary for wind turbine projects, but are not anticipated to be used for the 0 Brewer Road turbine, unless recommended by the structural engineer after final geotechnical investigations are complete.

Deep foundations - These foundations include drilled piles, drilled shafts and piers.

Anchored foundations - These foundations are used as required based on site conditions. They consist of a shallow reinforced concrete mat that has anchors installed by drilling a shaft and filling the shaft with a high strength anchor bolt and grout. These foundations provide overturning resistance via tension in the anchors.

Blasting

Blasting shall be used only as needed and closely coordinated with the city and neighbors. If required, several steps and procedures will be followed to ensure the work is completed safely and without impacts to neighbors. New Leaf Energy is amenable to including the following as conditions of approval for the issuance of a Conditional Use Permit.

Licensing - Blasting contractor shall possess a valid New York State Explosives License and Blaster Certificate of Competence.

Submittal of Written Blast Plan - Prior to any blasting, a blasting plan shall be prepared and filed with the City, as well as any other relevant parties or agencies. The plan shall also provide contractor license information, details on the proposed pre-blast survey methodology, and identify pre-blast survey locations. Blasting shall be conducted between 7:00 am and 8:00 pm, Monday through Friday.

Notifications - The City of Oneida, Oneida Fire Department, and property owners within 3,000 feet of the blast area shall be notified of blasting activities at least 10 but not more than 30 days prior to commencement of blasting. This notice must contain at minimum:

1) the name, address, and telephone number of the operator,

2) notice of how to sign up for optional pre and post-blasting well water testing,

3) identification of the specific area in which blasting will take place,

4) dates and time periods when explosives are to be detonated,

5) methods to be used to control access to the blasting areas, and

6) types and patterns of audible warning and all-clear signals to be used before and after blasting.

Well Water Testing - Any landowner within 3,000 feet of the blast site may request pre and post well water quality testing be performed at the project proponents expense. Notification that blasting will occur shall be provided to all owners of wells within 3,000 feet of the blasting area, as noted above. Upon the completion of blasting, well water from each well tested shall be tested again. If this testing reveals that blasting has negatively impacted water quality, the project proponent shall work with the landowner and the City of Oneida in good faith to rectify the situation. The figure below indicates potential well locations of homes that may request testing.

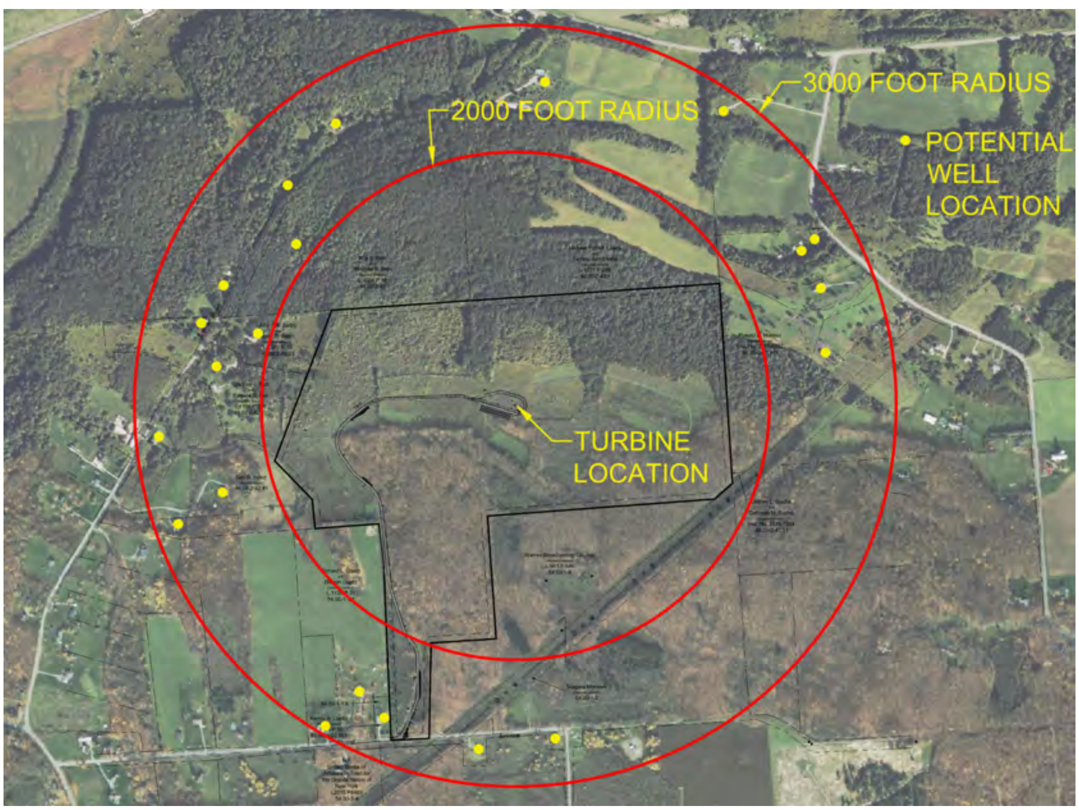


Figure 3: Potential Well Testing Locations

It should be noted that the above precautions are not exhaustive, and any work shall be performed in accordance with applicable state, local, and industry standards.

Proximity to Water Sources

There are no known water wells on the subject parcel. The turbine is set back from the property line more than 840 feet in all directions. Any water source is therefore at least 840 feet from the turbine base. An analysis of the surrounding properties identified the nearest likely existing well to be on the residential properties along Brewer Road, over two thousand feet west of the proposed location. Construction activities requiring blasting, typically for road construction, are regularly performed closer to residential wells than this site. For context on acceptable distances for a variety of land uses, please see Table 1. Table 1 is from The New York Department of Health Drinking Water Regulations Section 5-B.7 Separability:

Table 1: New York Department of Health Required Minimum Separation Distance to Protect Water Wells From Contamination

Contaminant Source	Distance (Feet)[1]
Chemical storage sites not protected from the elements (e.g., salt and sand/salt storage)[2]	300
Landfill waste disposal area, or hazardous or radiological waste disposal area[2]	300
Land surface application or subsurface injection of effluent or digested sludge from a Municipal or public wastewater treatment facility	200
Land surface application or subsurface injection of septage waste	200
Land surface spreading or subsurface injection of liquid or solid manure [3]	200
Storage Areas for Manure piles [4]	200
Barnyard, silo, barn gutters and animal pens [5, 6]	100
Cesspools (i.e. pits with no septic tank pretreatment)	200
Wastewater treatment absorption systems located in coarse gravel or in the Direct path of drainage to a well	200
Fertilizer and/or pesticide mixing and/or clean up areas	150
Seepage pit (following septic tank) [5]	150
Underground single walled chemical or petroleum storage vessels	150
Absorption field or bed [5]	100
Contained chemical storage sites protected from the elements (e.g. salt and sand/salt storage within covered structures) [7]	100
Septic system components (non-watertight) [5]	100
Intermittent sand filter without a watertight liner [5]	100
Sanitary Privy pit [5]	100
Surface wastewater recharge absorption system constructed to discharge storm water from parking lots, roadways or driveways [5]	100
Cemeteries	100
Sanitary privy with a watertight vault	50
Septic tank, aerobic unit, watertight effluent line to distribution box	50
Sanitary sewer or combined sewer	50
Surface water recharge absorption system with no automotive-related Wastes (e.g., clear-water basin, clear-water dry well)	50
Stream, lake, watercourse, drainage ditch, or wetland	25
All known sources of contamination otherwise not shown above	100

Notes for Table 1:

1. The listed water well separation distances from contaminant sources shall be increased by 50% whenever aquifer water enters the water well at less than 50 feet below grade. If a 50% increase in separation distances can not be achieved, then the greatest possible increase in separation distance shall be provided with such additional measures as needed to prevent contamination. See also Note 6 to Table 2.

2. Water wells shall not be located in a direct line of flow from these items, nor in any contaminant plume created by these items, except with such additional measures (e.g., sentinel groundwater monitoring, hydraulic containment, source water treatment) as needed to prevent contamination.
3. Based upon on-site evaluations of agricultural properties done per agricultural environmental management (AEM) or comprehensive nutrient management plan (CNMP) programs by a certified nutrient management planner or soil and water conservation district (SWCD) official, water wells may be located a minimum of 100 feet from areas subject to land spreading of manure.
4. Water wells may be located 100 feet from temporary (30 days or less) manure piles/staging areas that are controlled to preclude contamination of surface or groundwater or 100 feet from otherwise managed manure piles that are controlled pursuant to regulation in a manner that prevents contamination of surface or groundwater.
5. When these contamination sources are located in coarse gravel or are located upgrade and in the direct path of drainage to a water well, the water well shall be located at least 200 feet away from the closest part of these sources.
6. Animal pen does not include small pet shelters or kennels housing 3 or fewer adult pets.
7. Chemical storage sites as used in this entry do not include properly maintained storage areas of chemicals used for water treatment nor areas of household quantities of commonly used domestic chemicals.

Conclusion

Final foundation design cannot be completed without subsurface investigation, however, available site data has been compiled and reviewed to provide an understanding of expected foundation design and construction. This data indicates that the site likely has a high bedrock table, and that a spread footing is the expected foundation type. This will require excavation of approximately 15 feet. Blasting will be utilized as a last resort, but due to the high bedrock expected, may be necessary. The distance from neighboring properties provides a significant buffer to prevent impact to neighboring properties. If blasting is required, the city and neighbors will be notified, and mitigation measures will be taken during construction to ensure impacts to wells or water supplies are minimized.

Attachments:

1. Natural Resources Conservation Service Soil Report
2. GZA Desktop Assessment of Subsurface Conditions

United States Department of Agriculture

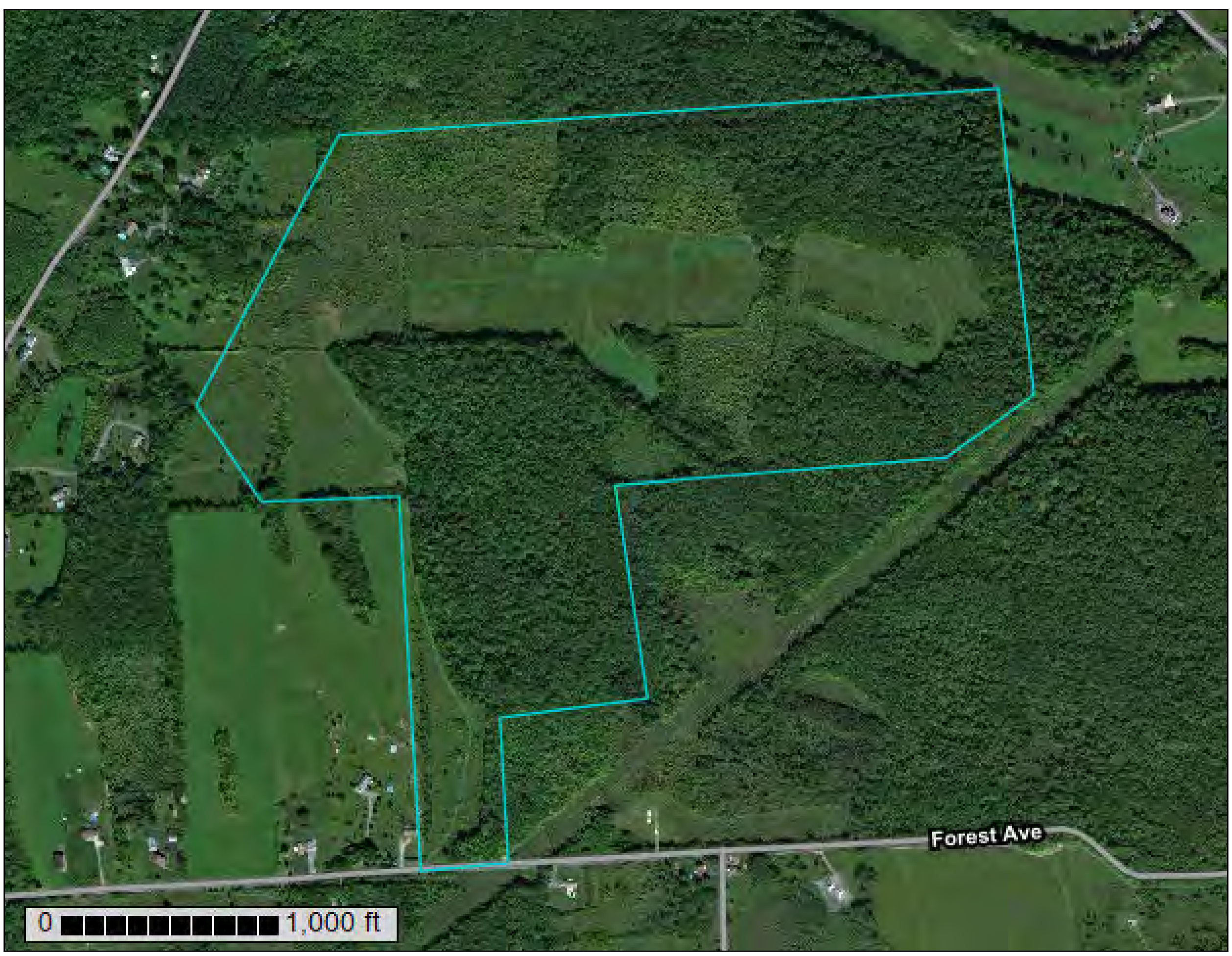
Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for

Madison County, New York

4949 Forest Avenue



July 26, 2021

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD). To file a complaint of discrimination, write to USDA, Director, Office of Civil Rights, 1400 Independence Avenue, S.W., Washington, D.C. 20250-9410 or call (800) 795-3272 (voice) or (202) 720-6382 (TDD). USDA is an equal opportunity provider and employer.

Contents

How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Soil Map

Map Scale: 1:9,270 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0, 100, 200, 400, 600

Feet: 0, 450, 900, 1800, 2700

Map projection: Web Mercator   Corner coordinates: WGS84   Edge tics: UTM Zone 18N WGS84

MAP LEGEND

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

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

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

Water Features
- Streams and Canals

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

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:15,800.

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

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

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

Soil Survey Area: Madison County, New York
Survey Area Data: Version 19, Jun 11, 2020

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

Date(s) aerial images were photographed: Aug 29, 2012—Sep 27, 2016

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

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
AuB	Aurora silt loam, 3 to 8 percent slopes	18.4	11.1%
AuC	Aurora silt loam, 8 to 15 percent slopes	0.4	0.2%
CfC	Cazenovia silt loam, 8 to 15 percent slopes	0.8	0.5%
FGC	Farmington-Wassaic-Rock outcrop complex, sloping	110.4	66.6%
HOE	Honeoye-Farmington complex, 25 to 65 percent slopes, rocky	4.5	2.7%
WmB	Wassaic silt loam, 3 to 8 percent slopes	31.3	18.9%
Totals for Area of Interest		**165.8**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

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

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Madison County, New York

AuB—Aurora silt loam, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: 9td5
Elevation: 1,000 to 1,300 feet
Mean annual precipitation: 38 to 44 inches
Mean annual air temperature: 45 to 48 degrees F
Frost-free period: 110 to 190 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Aurora and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Aurora

Setting

Landform: Benches, ridges, till plains
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Crest
Down-slope shape: Concave
Across-slope shape: Convex
Parent material: Loamy till derived mainly from calcareous shale, with some limestone and sandstone

Typical profile

H1 - 0 to 9 inches: silt loam
H2 - 9 to 28 inches: channery silty clay loam
C - 28 to 34 inches: channery silt loam
R - 34 to 41 inches: weathered bedrock

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)
Depth to water table: About 18 to 24 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Available water capacity: Low (about 4.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: D
Ecological site: F101XY013NY - Moist Till
Hydric soil rating: No

Minor Components

Angola

Percent of map unit: 5 percent
Hydric soil rating: No

Wassaic

Percent of map unit: 5 percent
Hydric soil rating: No

Cazenovia

Percent of map unit: 5 percent
Hydric soil rating: No

Lima

Percent of map unit: 5 percent
Hydric soil rating: No

AuC—Aurora silt loam, 8 to 15 percent slopes

Map Unit Setting

National map unit symbol: 9td6
Elevation: 1,000 to 1,300 feet
Mean annual precipitation: 38 to 44 inches
Mean annual air temperature: 45 to 48 degrees F
Frost-free period: 110 to 190 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Aurora and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Aurora

Setting

Landform: Benches, ridges, till plains
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Crest
Down-slope shape: Concave
Across-slope shape: Convex
Parent material: Loamy till derived mainly from calcareous shale, with some limestone and sandstone

Typical profile

H1 - 0 to 9 inches: silt loam
H2 - 9 to 28 inches: channery silty clay loam
C - 28 to 34 inches: channery silt loam
R - 34 to 41 inches: weathered bedrock

Properties and qualities

Slope: 8 to 15 percent
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)
Depth to water table: About 18 to 24 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Available water capacity: Low (about 4.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: D
Ecological site: F101XY013NY - Moist Till
Hydric soil rating: No

Minor Components

Cazenovia

Percent of map unit: 5 percent
Hydric soil rating: No

Lima

Percent of map unit: 5 percent
Hydric soil rating: No

Angola

Percent of map unit: 5 percent
Hydric soil rating: No

Farmington

Percent of map unit: 5 percent
Hydric soil rating: No

CfC—Cazenovia silt loam, 8 to 15 percent slopes

Map Unit Setting

National map unit symbol: 9tdl
Elevation: 410 to 1,660 feet
Mean annual precipitation: 38 to 44 inches
Mean annual air temperature: 45 to 48 degrees F
Frost-free period: 110 to 190 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Cazenovia and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Cazenovia

Setting

Landform: Reworked lake plains, till plains
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Crest
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loamy till that contains limestone with an admixture of reddish lake-laid clays or reddish clay shale

Typical profile

H1 - 0 to 11 inches: silt loam
H2 - 11 to 29 inches: silty clay loam
H3 - 29 to 52 inches: gravelly silt loam

Properties and qualities

Slope: 8 to 15 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 24 to 48 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Available water capacity: Moderate (about 7.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: C
Ecological site: F101XY013NY - Moist Till
Hydric soil rating: No

Minor Components

Odessa

Percent of map unit: 5 percent
Hydric soil rating: No

Ovid

Percent of map unit: 5 percent
Hydric soil rating: No

Honeoye

Percent of map unit: 5 percent
Hydric soil rating: No

Schoharie

Percent of map unit: 5 percent
Hydric soil rating: No

FGC—Farmington-Wassaic-Rock outcrop complex, sloping

Map Unit Setting

National map unit symbol: 9tf6
Elevation: 100 to 1,750 feet
Mean annual precipitation: 38 to 44 inches
Mean annual air temperature: 45 to 48 degrees F
Frost-free period: 110 to 190 days
Farmland classification: Not prime farmland

Map Unit Composition

Farmington and similar soils: 50 percent
Wassaic and similar soils: 20 percent
Rock outcrop: 20 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Farmington

Setting

Landform: Benches, ridges, till plains
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Crest
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loamy till or congeliturbate derived from limestone, dolomite, shale, and sandstone, and in many places mixed with wind and water deposits

Typical profile

H1 - 0 to 7 inches: gravelly silt loam
H2 - 7 to 17 inches: gravelly silt loam
H3 - 17 to 21 inches: unweathered bedrock

Properties and qualities

Slope: 5 to 15 percent
Depth to restrictive feature: 10 to 20 inches to lithic bedrock
Drainage class: Somewhat excessively drained
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 5 percent
Available water capacity: Very low (about 2.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: D
Hydric soil rating: No

Description of Rock Outcrop

Properties and qualities

Slope: 5 to 15 percent
Depth to restrictive feature: 0 inches to lithic bedrock
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydric soil rating: Unranked

Description of Wassaic

Setting

Landform: Benches, ridges, till plains
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Crest
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loamy till derived mainly from limestone, with varying amounts of sandstone, shale, and crystalline rock

Typical profile

H1 - 0 to 8 inches: silt loam
H2 - 8 to 10 inches: gravelly silt loam
H3 - 10 to 29 inches: gravelly silty clay loam
H4 - 29 to 33 inches: unweathered bedrock

Properties and qualities

Slope: 5 to 15 percent
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)
Depth to water table: About 19 to 39 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Low (about 4.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: C
Hydric soil rating: No

Minor Components

Aurora

Percent of map unit: 5 percent
Hydric soil rating: No

Honeoye

Percent of map unit: 3 percent
Hydric soil rating: No

Conesus

Percent of map unit: 2 percent
Hydric soil rating: No

HOE—Honeoye-Farmington complex, 25 to 65 percent slopes, rocky

Map Unit Setting

National map unit symbol: 2w3pc
Elevation: 360 to 1,990 feet
Mean annual precipitation: 31 to 57 inches
Mean annual air temperature: 41 to 50 degrees F
Frost-free period: 100 to 190 days
Farmland classification: Not prime farmland

Map Unit Composition

Honeoye, rocky, and similar soils: 45 percent
Farmington and similar soils: 40 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Honeoye, Rocky

Setting

Landform: Till plains, ridges, drumlins
Landform position (two-dimensional): Backslope, shoulder, summit
Landform position (three-dimensional): Side slope, crest
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Calcareous loamy lodgment till derived from limestone, sandstone, and shale

Typical profile

Ap - 0 to 8 inches: silt loam
E - 8 to 10 inches: silt loam
Bt/E - 10 to 14 inches: loam
Bt1 - 14 to 23 inches: loam
Bt2 - 23 to 29 inches: gravelly loam
C - 29 to 79 inches: gravelly loam

Properties and qualities

Slope: 25 to 65 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately high (0.00 to 1.42 in/hr)
Depth to water table: More than 80 inches

Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 40 percent
Available water capacity: Moderate (about 7.6 inches)

Interpretive groups
Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: B
Hydric soil rating: No

Description of Farmington

Setting
Landform: Hills, till plains, drumlins
Landform position (two-dimensional): Backslope, summit, shoulder
Landform position (three-dimensional): Crest, side slope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Calcareous loamy lodgment till derived from limestone, sandstone, and shale

Typical profile
H1 - 0 to 7 inches: gravelly silt loam
H2 - 7 to 17 inches: gravelly silt loam
H3 - 17 to 21 inches: unweathered bedrock

Properties and qualities
Slope: 25 to 65 percent
Depth to restrictive feature: 10 to 20 inches to lithic bedrock
Drainage class: Somewhat excessively drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 5 percent
Available water capacity: Very low (about 2.1 inches)

Interpretive groups
Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: D
Hydric soil rating: No

Minor Components

Wassaic
Percent of map unit: 9 percent
Landform: Benches, ridges, till plains
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Crest
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

Lima

Percent of map unit: 5 percent
Landform: Drumlins, ridges, till plains
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Crest
Down-slope shape: Linear
Across-slope shape: Convex
Hydric soil rating: No

Rock outcrop

Percent of map unit: 1 percent
Hydric soil rating: Unranked

WmB—Wassaic silt loam, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: 9tjc
Elevation: 800 to 1,750 feet
Mean annual precipitation: 38 to 44 inches
Mean annual air temperature: 45 to 48 degrees F
Frost-free period: 110 to 190 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Wassaic and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Wassaic

Setting

Landform: Benches, ridges, till plains
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Crest
Down-slope shape: Concave
Across-slope shape: Convex
Parent material: Loamy till derived mainly from limestone, with varying amounts of sandstone, shale, and crystalline rock

Typical profile

H1 - 0 to 8 inches: silt loam
H2 - 8 to 10 inches: gravelly silt loam
H3 - 10 to 29 inches: gravelly silty clay loam
H4 - 29 to 33 inches: unweathered bedrock

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Drainage class: Moderately well drained

Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)
Depth to water table: About 19 to 39 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Low (about 4.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: C
Hydric soil rating: No

Minor Components

Farmington

Percent of map unit: 10 percent
Hydric soil rating: No

Honeoye

Percent of map unit: 5 percent
Hydric soil rating: No

Rock outcrop

Percent of map unit: 5 percent
Hydric soil rating: Unranked

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May 3, 2023
File No. 01.0177169.00

New Leaf Energy, Inc.
55 Technology Drive, Suite 102
Lowell, Massachusetts 01851

Attn: Mr. Brandon Smith

Re: Desktop Assessment of Subsurface Conditions
Proposed Wind Turbine
4949 Forrest Avenue
Oneida, New York

Dear Mr. Smith:

In accordance with your request, GZA GeoEnvironmental of New York (GZA) is pleased to submit this letter to you regarding results of a desktop assessment of subsurface conditions at the proposed wind turbine location (Site). As requested by New Leaf Energy, Inc. (NLE) and on its behalf, we have reviewed our in-house documents from previous work performed at nearby sites, and readily available public geological maps. NLE has identified a concern regarding the Site's geology and the potential to encounter limestone-related karst conditions at the proposed wind turbine location. The presence of limestone and karst features encountered during foundation construction may have an impact on both the turbine foundation and groundwater at local springs and wells.

In doing our desktop assessment, GZA reviewed the following:

1. Custom Soil Resource Report, Madison County, New York, 4949 Forest Avenue; U.S. Department of Agriculture, Natural Resources Conservation Services; July 2021.

2. Surficial Geologic Map of New York, Finger Lakes Sheet; 1986; Compiled and Edited by Mueller, E.H. and Cadwell, D.H.; New York State Museum – Geologic Survey, Map and Chart Series No 40.

3. Geologic Map of New York, 1970, Finger Lakes Sheet; Compiled and Edited by Rickard, L.V. and Fisher, D.W.; New York State Museum and Science Service, Map and Chart Series No 15.

4. Statewide Assessment of Karst Aquifers in New York with an Inventory of Closed-Depression and Focused-Recharge Features, Scientific Investigation Report 2020-5030; Kappel, W.M., Reddy, J.E., and Root, J.C.; U.S. Geologic Survey, U.S. Department of the Interior; 2020.

5. Stratigraphy of the Upper Silurian Salina Group, New York, Pennsylvania, Ohio, Ontario; Rickard, L.V.; New York State Museum and Science Service, Map and Chart Series Number 12; 1969.

The Soil Resource Report identifies surficial soils as Wassaic Silt Loam or Farmington-Wassaic-Rock consisting of silt loam, gravelly silt loam, gravelly silty clay loam and/or unweathered bedrock. Bedrock is anticipated to be within 5-feet of ground surface at the planned wind turbine foundation location. Based on the photo log prepared for the Site by NLE, surficial bedrock was observed near the entrance to the Site in the south. The Geologic Map of New York, Finger Lakes Sheet identifies bedrock in the area as either part of the Coblestone Limestone Formation, consisting of the Bertie Group and Camillus Formation which are predominately shale bedrock; or the Syracuse Formation consisting of dolostone and shale. The presence of limestone and karst conditions is documented in the Statewide Assessment of Karst Aquifers within this general area of New York. Therefore, in our opinion and based on the information reviewed, the surficial bedrock at the wind turbine foundation location is likely a shale and/or dolomite rock type, which is less susceptible than limestone to water erosion and the formation of karst features. These conditions can impact the wind turbine foundation via the formation or presence of voids and depressions. In addition, local wells may depend on the water within the bedrock aquifer that potentially flows through cracks, voids and other open areas of the bedrock.

Foundations for the wind turbine are expected to be a spread foundation consisting of an approximately 60-foot-wide reinforced concrete pad buried below the surface, with a concrete pedestal where the turbine shaft will connect with a bolted connection. We anticipate that the mat will bear at about 10 to 15 feet below the final ground surface. Based on the information reviewed, it is likely that the wind turbine foundation will be founded on bedrock or anchored within bedrock; this condition can be confirmed with a subsurface investigation at the site.

If the wind turbine foundations bear on overburden soils, it is unlikely that foundations would noticeably impact the area's groundwater conditions once backfilled. Also, during construction, temporary measures will be used to reduce the amount of surface water run-off (from rainfall) into and/or from construction areas including, but not be limited to the following:

- Construct small berms to divert and/or reduce the amount of surface water flowing over exposed subgrades during construction;

- Maintain general site grading to promote surface run-off and limit ponding; and

- Use a smooth drum compactor in static mode or back drag areas with a smooth bucket to help seal exposed soil surfaces prior to inclement weather.

To limit potential impacts from the wind turbine foundation construction, and related possible impact to the underlying bedrock and groundwater, we would recommend supporting the wind turbine on a spread (or mat) foundation if near-surface bedrock is encountered during the subsurface investigation. Assuming shallow bedrock is encountered and bedrock removal is required to accommodate the proposed mat foundation depth, a few options may be employed to limit the movement of sediment or grout into possible rock fractures/voids during construction.

- As with most construction sites, the contractor would berm around the excavation to redirect surface water run-off from entering it.

- If voids or large fractures are identified at the bedrock surface indicative of karst conditions, the contractor could pack the void / fracture surface with no-slump concrete.

- Then, we would recommend placement of a geotextile separation blanket at the base of the foundation and placement of concrete above the fabric, this would keep the concrete from entering fractures / voids within the bedrock.

Alternatively, drilled deep foundations or a more-shallow pad foundation with rock anchors may be used to support the proposed wind turbines. If deep foundations are installed within the bedrock, there may be impacts to the groundwater that travels through the karst formations (if present) if a grout slurry is pumped as a part of the deep foundation construction. Deep foundations, such as drilled shafts and rock anchors, will require drilling fluid and grout/concrete to be in contact with the rock. Excessive loss of drilling fluid or grout/concrete may mix with groundwater or impede/block fracture seams in the bedrock. If deep foundations are proposed, the quantities of such material will need to be closely monitored during construction to avoid excessive material use. The comparison of theoretical deep foundation volume versus actual pumped quantities will need to be performed to confirm that excessive grout is not being pumped into the foundation. These measurements will provide quality control so potential impacts to the groundwater can be limited.

To further control impacts, GZA could set-up a monitoring program of existing wells within a certain distance of the work, say 500 feet, where pre-construction and post-construction tests of well water is performed to confirm no impacts.

Surface water impacts should be limited due to the relatively small footprint of the planned project construction and its associated regrading and site clearing. Access roads will be unpaved and allow for water filtration. Surface water impacts to local springs, if any, will more likely be affected by nearby farming and regional activities, which are less regulated than the proposed wind turbine project. Such farming and regional activities are more expansive and have been documented as impacting soil, surface water, and/or groundwater.

The extent of the potential impacts is difficult to quantify at this time and would depend on the results of geotechnical drilling at the turbine location to positively evaluate subsurface conditions (including the depth and type of rock encountered), the flow and depth of water at the site, the extent of the disturbance to the rock from construction, and the number of residences that currently have wells located nearby. The intent and procedures followed would focus on limiting any impact to nearby wells.

We recommend performing two borings at the proposed wind turbine location to further investigate the potential of shallow bedrock and the presence of karst features. If warranted, a geophysical survey may aid in detecting potential karst features at the wind turbine locations.

A stormwater pollution prevention plan (SWPPP) will also help provide adequate control of surface water runoff near disturbed areas and identified karst features or springs that may be impacted by construction. New York State and federal regulations require that a SWPPP and erosion sediment control plan be completed for construction projects that disturb more than 1 acre of land.

We hope that this response to your request is suitable for your needs. GZA looks forward to our continued association on this project.

Sincerely,

GZA GEOENVIRONMENTAL of NY

Joseph Benoit
Project Manager

Bruce W. Fairless, P.E.
Consultant/Reviewer

Ernest R. Hanna, P.E.
Principal

GE Renewable Energy

– Original –

Technical Documentation
Wind Turbine Generator Systems
All Onshore Turbine Types

General Description

Setback Considerations for Wind Turbine Siting

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Table of Contents

1 Introduction

This document provides setback guidance for the siting of wind turbines. This guidance considers potential safety risks associated with wind turbines such as objects (maintenance tools, ice, etc.) directly falling from the wind turbine, unlikely occurrences such as tower collapse and blade failure, and environmental / operational risks such as ice throw. The guidance is general in nature, and is based on the published advice of recognized industry associations. Local codes and other factors may dictate setbacks greater than the guidance in this document. The owner and the developer bear ultimate responsibility to determine whether a wind turbine should be installed at a particular location, and they are encouraged to seek the advice of qualified professionals for siting decisions. It is strongly suggested that wind developers site turbines so that they do not endanger the public.

2 Falling Objects

There is the potential for objects to directly fall from the turbine. The objects may be parts dislodged from the turbine, or dropped objects such as tools. Falling objects create a potential safety risk for anyone who is within close proximity to the turbine, i.e., within approximately a blade length from the turbine.

3 Tower Collapse

In very rare circumstances a tower may collapse due to unstable ground, a violent storm, an extreme earthquake, unpredictable structural fatigue, or other catastrophic events. Tower collapse presents a possible risk to anyone who is within the distance equal to the turbine tip height (hub height plus ½ rotor diameter) from the turbine.

4 Ice Shedding and Ice Throw

As with any structure, wind turbines can accumulate ice under certain atmospheric conditions. A wind turbine may shed accumulated ice due to gravity, and mechanical forces of the rotating blades. Accumulated ice on stationary components such as the tower and nacelle will typically fall directly below the turbine. Ice that has accumulated on the blades will likewise typically fall directly below the turbine, especially during start-up. However, during turbine operation under icing conditions, the mechanical forces of the blades have the potential to throw the ice beyond the immediate area of the turbine.

5 Blade Failure

During operation, there is the remote possibility of turbine blade failure due to fatigue, severe weather, or other events not related to the turbine itself. If one of these events should occur, pieces of the blade may be thrown from the turbine. The pieces may or may not break up in flight, and are expected to behave similarly to ice thrown from the blade. Blade failure presents a possible risk for anyone beyond the immediate area of the turbine.

6 Industry Best Practices

Recognized industry practices suggest the following actions be considered when siting turbines in order to mitigate risk resulting from the hazards listed above:

- Place physical and visual warnings such as fences and warning signs as appropriate for the protection of site personnel and the public.
- Remotely stop the turbine when ice accumulation is detected by site personnel or other means. Additionally, the wind turbine controller may have the capability to shut down or curtail an individual turbine based on the detection of certain atmospheric conditions or turbine operating characteristics.
- Restrict site personnel access to a wind turbine if ice is present on any turbine surface such as the tower, nacelle or blades. If site personnel absolutely must access a turbine with ice accumulation, safety precautions should include but are not limited to remotely shutting down the turbine, yawing the turbine to position the rotor on the side opposite from the tower door, parking vehicles at a safe distance from the turbine, and restarting the turbine remotely when the site is clear. As always, appropriate personnel protective gear must be worn.

7 Setback Considerations

Setback considerations include adjoining population density, usage frequency of adjoining roads, land availability, and proximity to other publicly accessed areas and buildings. Table 1 provides setback guidance for wind turbines given these considerations. GE recommends using the generally accepted guidelines listed in Table 1, in addition to any requirements from local codes or specific direction of the local authorities, when siting wind turbines.

Setback Distance from center of turbine tower	Objects of concern within the setback distance

All turbine sites (blade failure/ice throw):
1.1 x tip height[1], with a minimum setback distance of 170 meters
	- Public use areas
	- Residences
	- Office buildings
	- Public buildings
	- Parking lots
	- Public roads
	  - Moderately or heavily traveled roads if icing is likely
	  - Heavily traveled multi-lane freeways and motorways if icing is not likely
	- Passenger railroads

All turbine sites (tower collapse): 1.1 x tip height[1]	- Public use areas - Residences - Office buildings - Public buildings - Parking lots - Heavily traveled multi-lane freeways and motorways - Sensitive above ground services[2]
All turbine sites (rotor sweep/falling objects): 1.1 x blade length[3]	- Property not owned by wind farm participants[4] - Buildings - Non-building structures - Public and private roads - Railroads - Sensitive above ground services

Table 1: Setback recommendations

The wind turbine buyer should perform a safety review of the proposed turbine location(s). Note that there may be objects of concern within the recommended setback distances that may not create a significant safety risk, but may warrant further analysis. If the location of a particular wind turbine does not meet the Table 1 recommended guidelines, contact GE for guidance, and include the information listed in Table 2 as applicable.

1 The maximum height of any blade tip when the blade is straight up (hub height + ½ rotor diameter).

2 Services that if damaged could result in significant hazard to people or the environment or extended loss of services to a significant population. Examples include pipelines or electrical transmission lines.

3 Use ½ rotor diameter to approximate blade length for this calculation.

4 Property boundaries to vacant areas where there is a remote chance of future development or inhabitancy during the life of the wind farm.

Condition/object within setback circle	Data Required
If icing is likely at the wind turbine site	- Annual number of icing days
Residences	- Number of residences within recommended setback distance - Any abandoned residences within setback distance
For industrial buildings (warehouse/shop)	- Average number of persons-hours in area during shift - Number of work shifts per week - Any abandoned buildings within setback distance
For open industrial areas (storage/parking lot)	- Average number of persons-hours in area during shift - Number of shifts per week. - Any abandoned buildings within setback distance
For sports/assembly areas	- Average number of persons in area per day - Average number of hours occupied per day - Number of days area occupied per week - If area covered, what type of cover
For roads/waterways	- Plot of road/waterway vs. turbine(s) - Average number of vehicles per day - Type of road and speed limit (residential, country, # of lanes, etc.)
For paths/trails (walk, hike, run, bike, ski)	- Plot of paths/trails vs. turbine(s) - Average number # of persons per day by type of presence (walk, hike, etc.) - Flat or uneven/hilly terrain

Table 2: Setback recommendations