SOUND LEVEL MODELING REPORT

Forest Avenue Wind Project
City of Oneida, New York

Prepared for:

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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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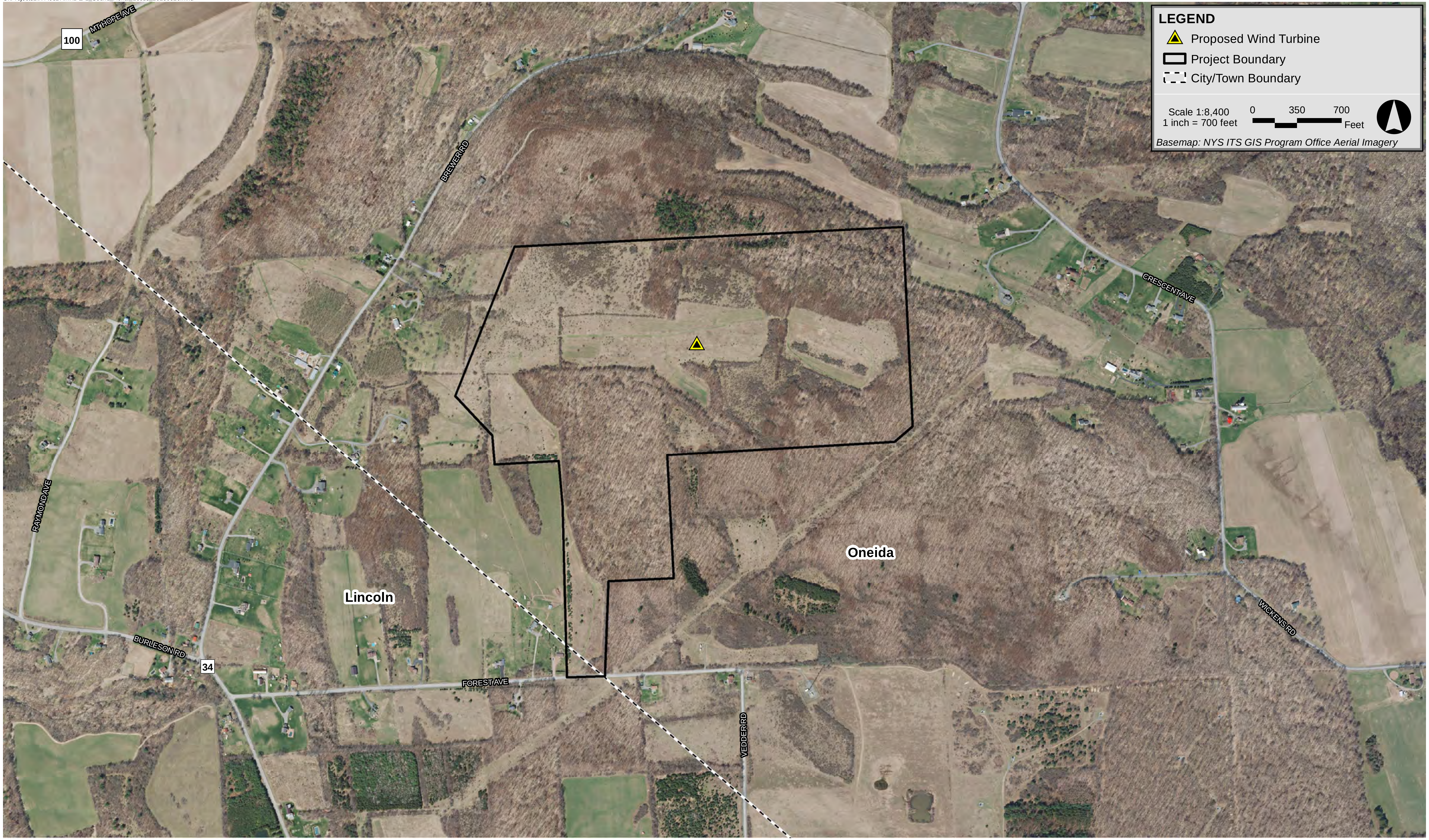

Forest Ave Wind **City of Oneida, New York**

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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.

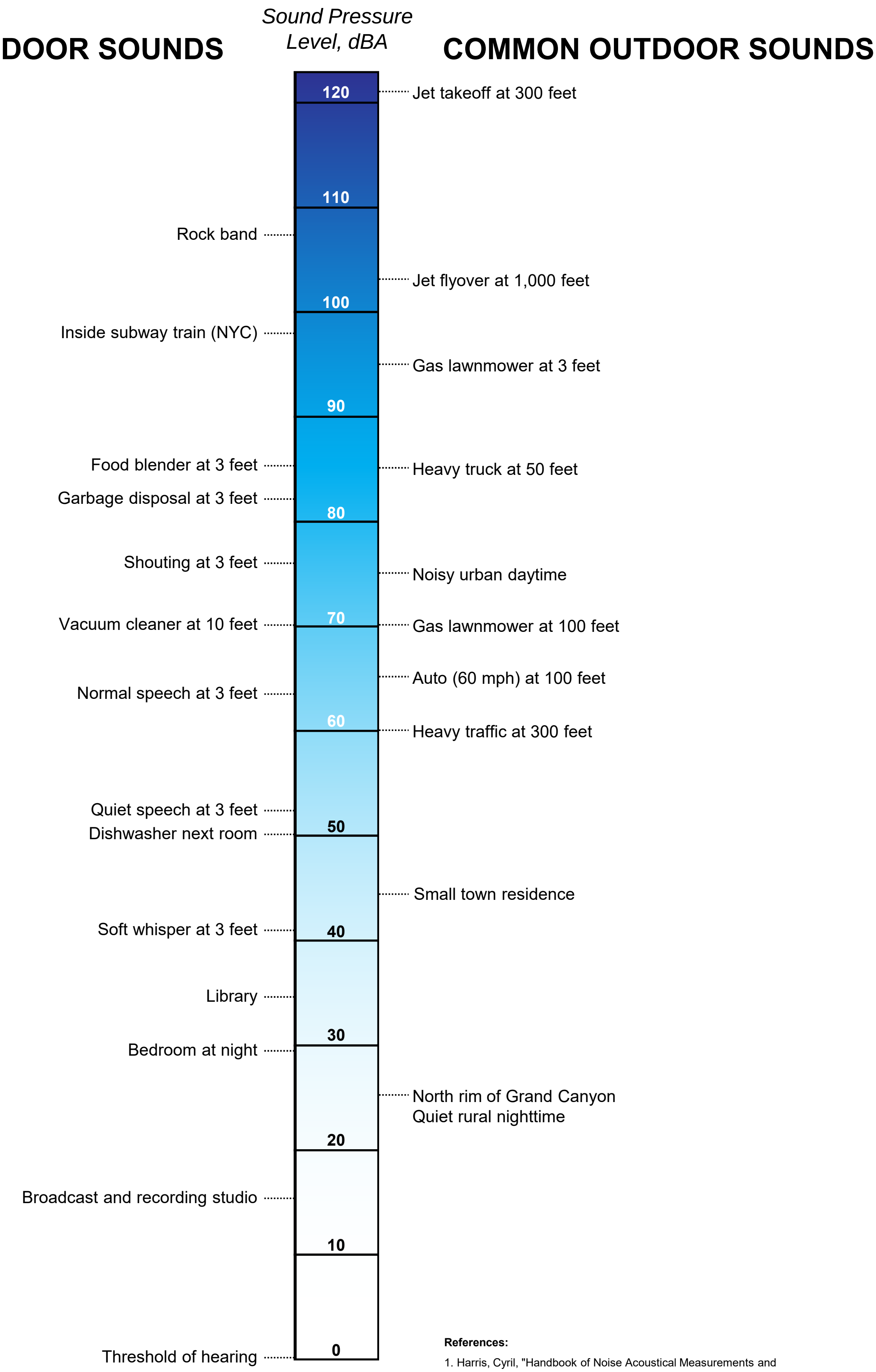
Because the sounds in our environment vary with time they cannot simply be described with a single number. Two methods are used for describing variable sounds. These are exceedance levels and the equivalent level, both of which are derived from some number of moment-to-moment A-weighted sound level measurements. 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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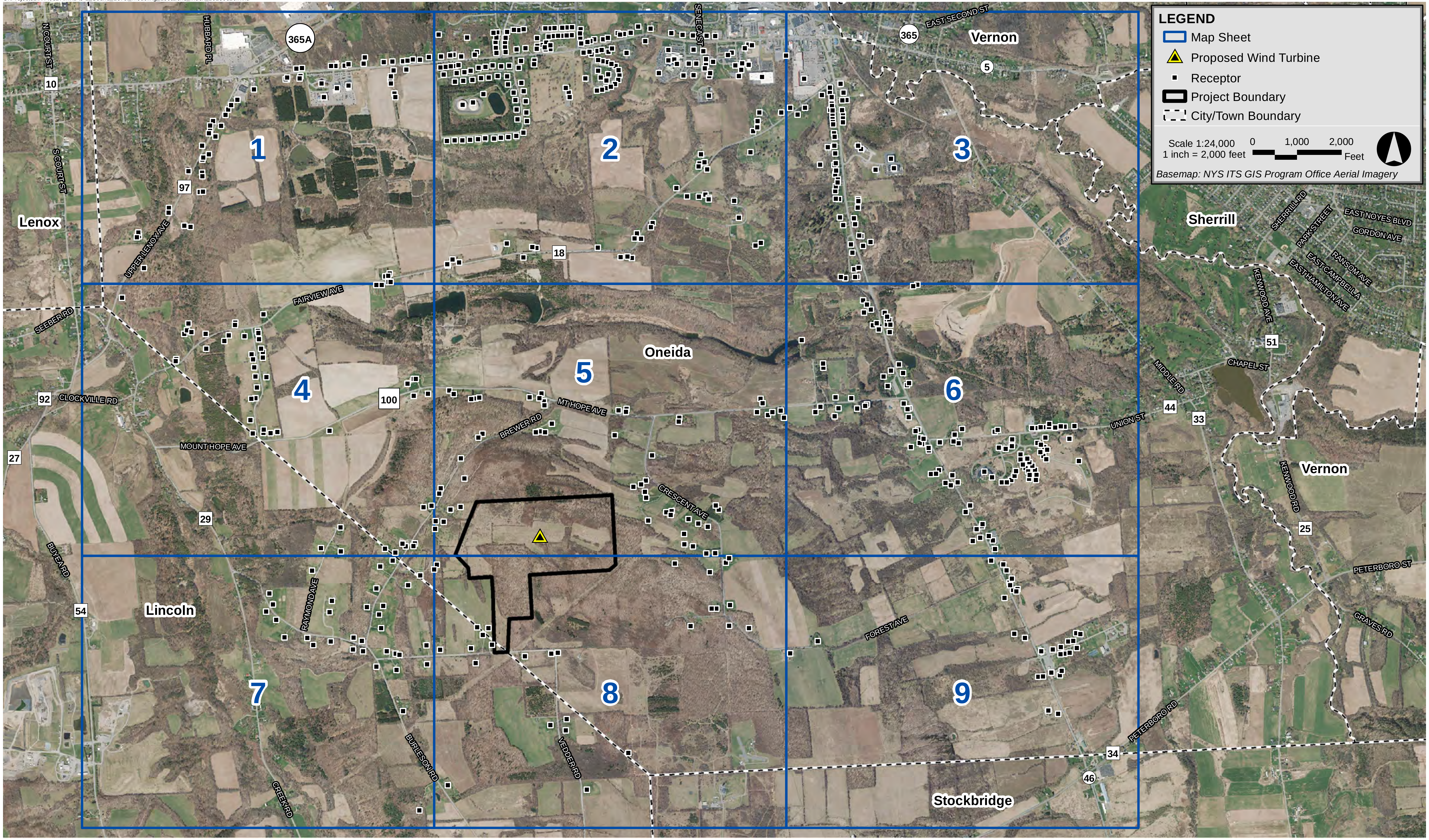

Forest Ave Wind   City of Oneida, New York

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Figure 5-1

Sound Level Modeling Locations

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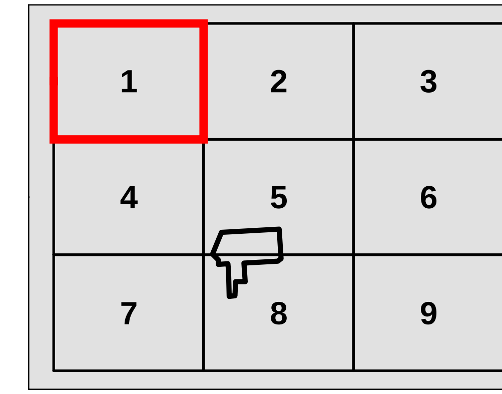
LOCUS



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

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Figure 5-1

Sound Level Modeling Locations
Sheet 1 of 9

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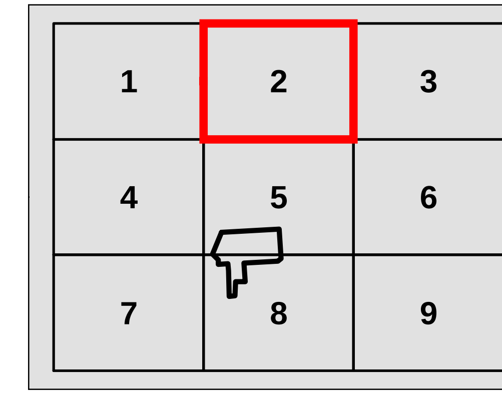

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1 inch = 600 feet

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

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Figure 5-1

Sound Level Modeling Locations
Sheet 2 of 9

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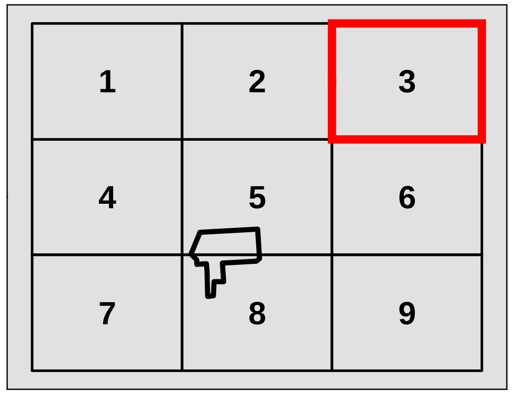

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Basemap: NYS ITS GIS Program Office Aerial Imagery

LEGEND

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

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Figure 5-1

Sound Level Modeling Locations
Sheet 3 of 9

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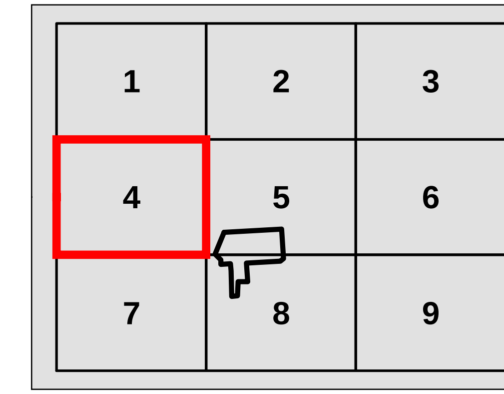

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Basemap: NYS ITS GIS Program Office Aerial Imagery

LEGEND

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

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Figure 5-1

Sound Level Modeling Locations
Sheet 4 of 9

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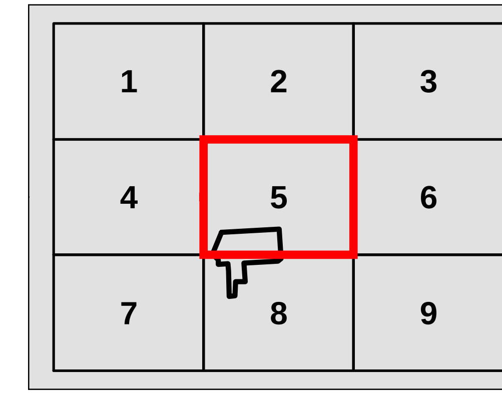

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Basemap: NYS ITS GIS Program Office Aerial Imagery

LEGEND

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

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Figure 5-1

Sound Level Modeling Locations
Sheet 5 of 9

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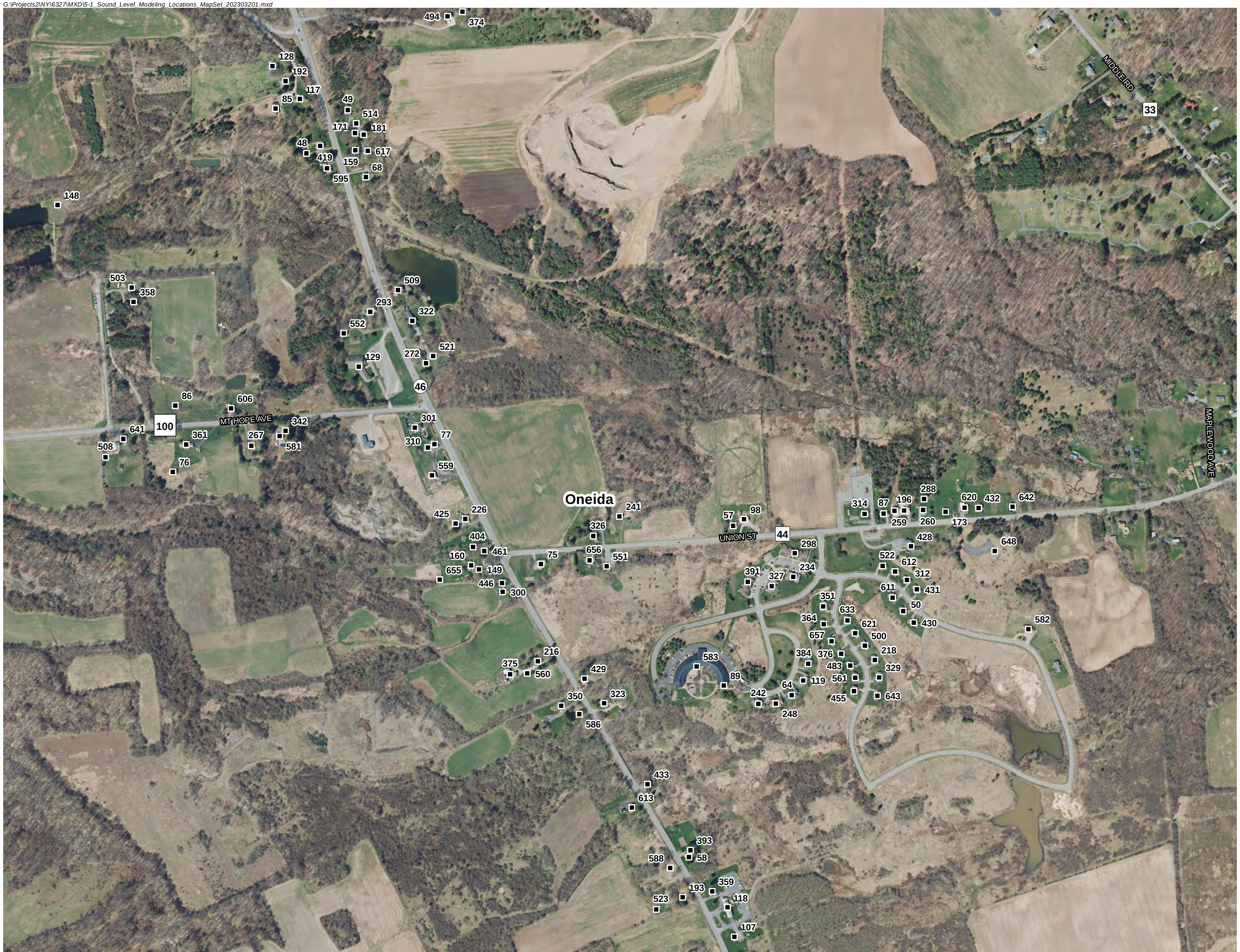

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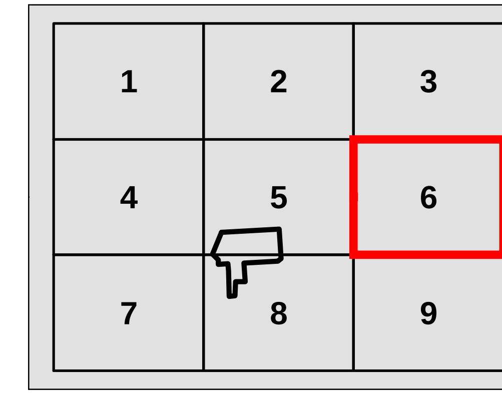

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Basemap: NYS ITS GIS Program Office Aerial Imagery

LEGEND

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

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Figure 5-1

Sound Level Modeling Locations
Sheet 6 of 9

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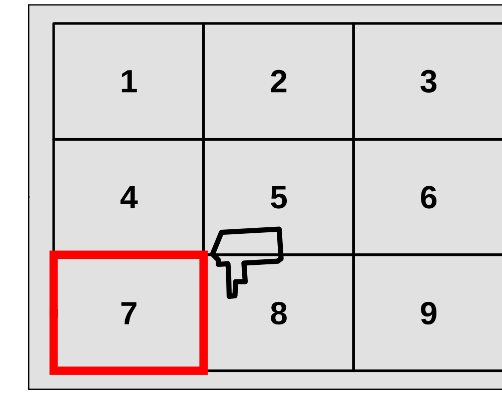

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Basemap: NYS ITS GIS Program Office Aerial Imagery

LEGEND

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

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Figure 5-1

Sound Level Modeling Locations
Sheet 7 of 9

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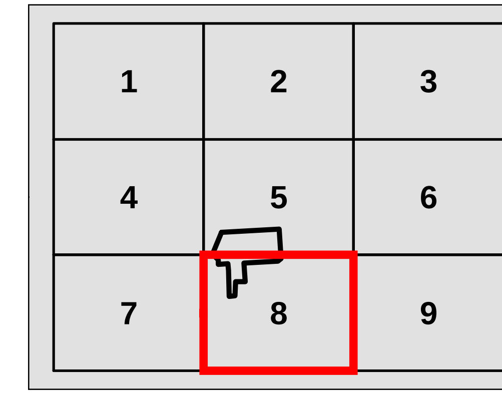
LOCUS



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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

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Figure 5-1

Sound Level Modeling Locations
Sheet 8 of 9

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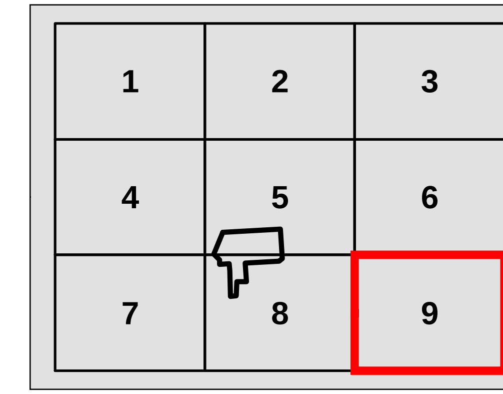

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Basemap: NYS ITS GIS Program Office Aerial Imagery

LEGEND

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

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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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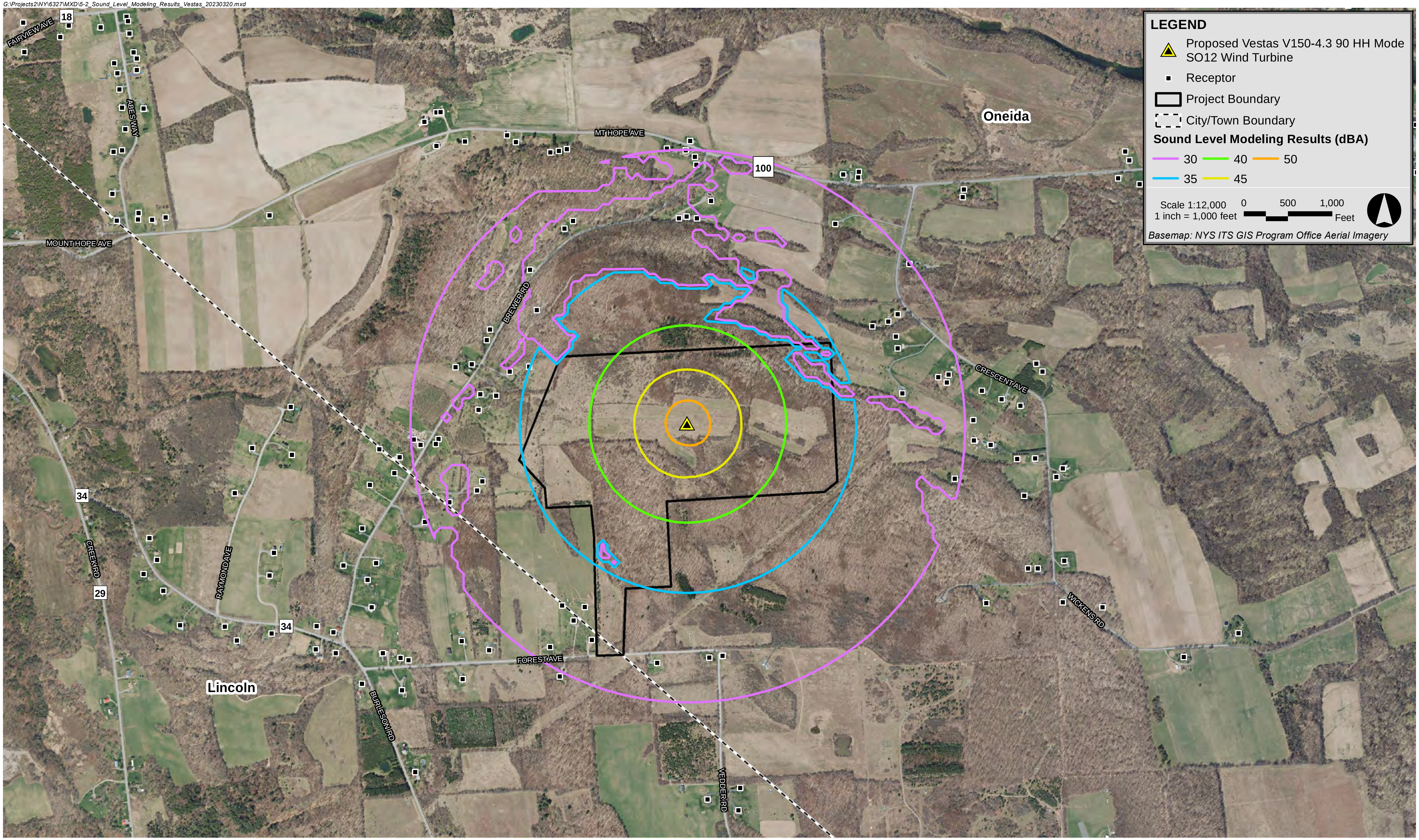

Forest Ave Wind City of Oneida, New York

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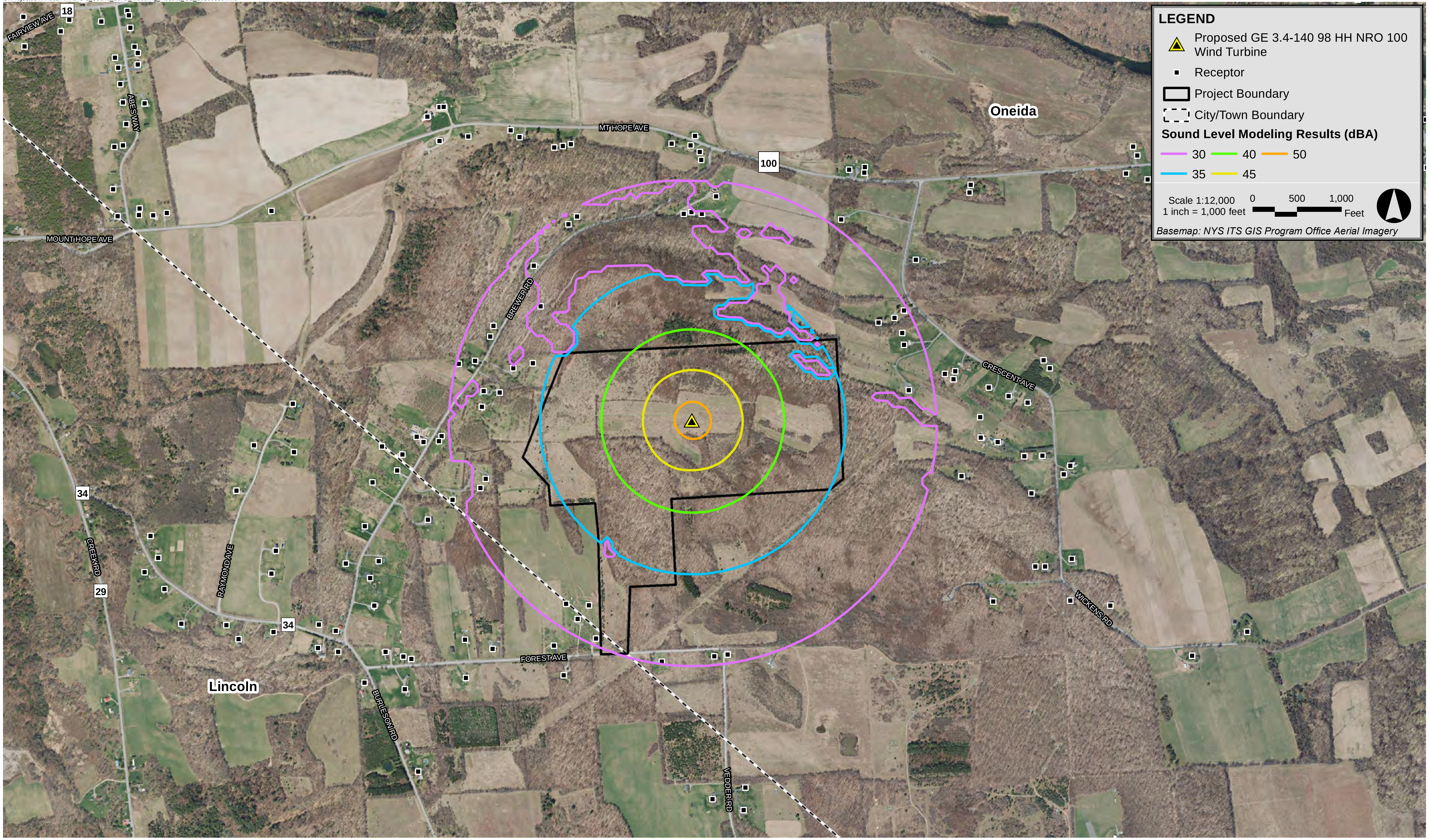
Figure 5-2

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



Forest Ave Wind City of Oneida, New York

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Figure 5-3

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

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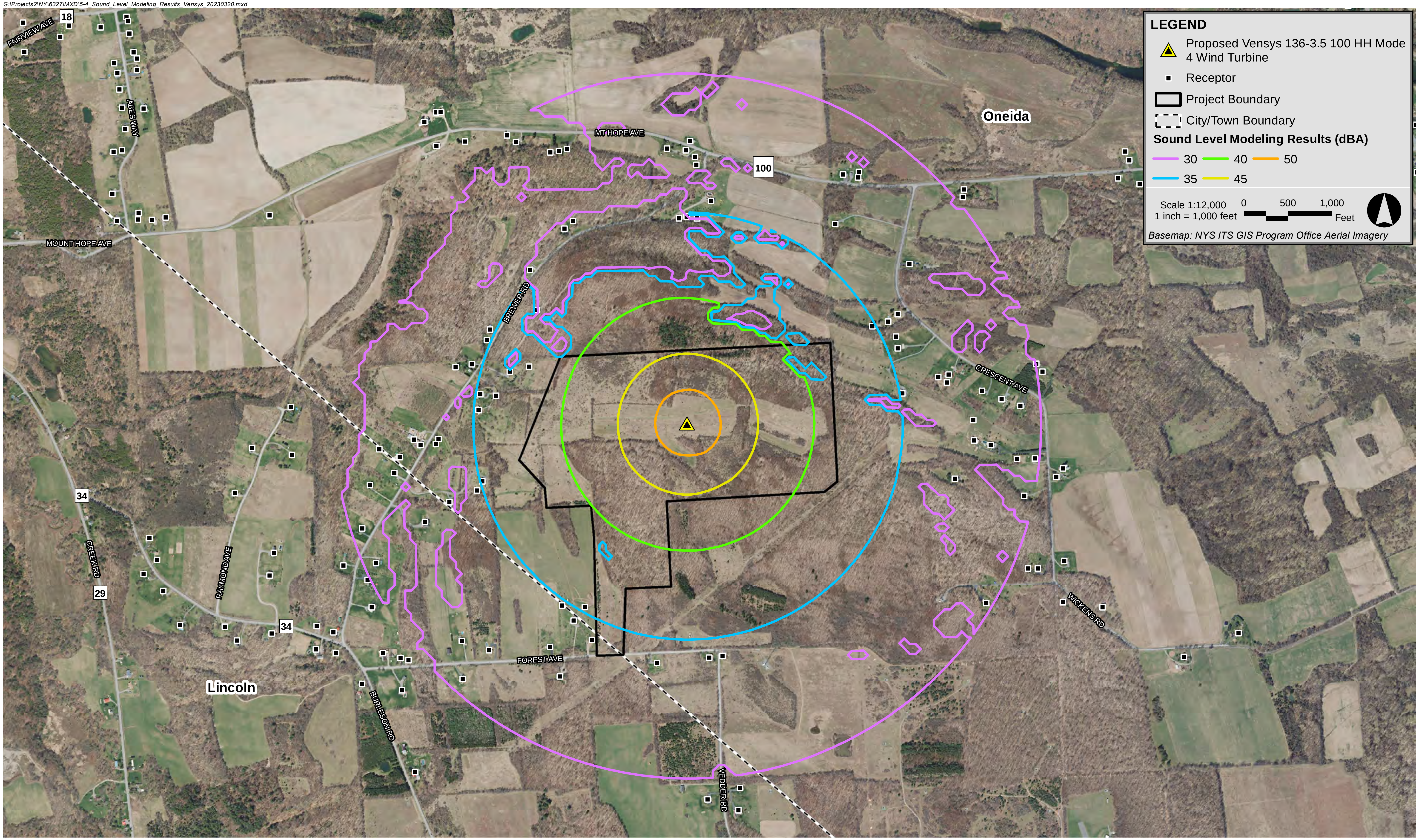

Forest Ave Wind   City of Oneida, New York

Epsilon

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.

[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		Source Only L_{eq} Broadband Sound Level (dBA)
	X (m)	Y (m)	
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		Source Only L_{eq} Broadband Sound Level (dBA)
	X (m)	Y (m)	
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		Source Only L_{eq} Broadband Sound Level (dBA)
	X (m)	Y (m)	
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 X (m)	Coordinates UTM NAD83 Zone 18N Y (m)	Source Only L_{eq} Broadband Sound Level (dBA)
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		Source Only L_{eq} Broadband Sound Level (dBA)
	X (m)	Y (m)	
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 X (m)	Y (m)	Source Only L_{eq} Broadband Sound Level (dBA)
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 X (m)	Y (m)	Source Only L_{eq} Broadband Sound Level (dBA)
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		Source Only L_{eq} Broadband Sound Level (dBA)
	X (m)	Y (m)	
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 X (m)	Coordinates UTM NAD83 Zone 18N Y (m)	Source Only L_{eq} Broadband Sound Level (dBA)
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		Source Only L_{eq} Broadband Sound Level (dBA)
	X (m)	Y (m)	
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		Source Only L_{eq} Broadband Sound Level (dBA)
	X (m)	Y (m)	
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 X (m)	Coordinates UTM NAD83 Zone 18N Y (m)	Source Only L_{eq} Broadband Sound Level (dBA)
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		Source Only L_{eq} Broadband Sound Level (dBA)
	X (m)	Y (m)	
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 X (m)	Coordinates UTM NAD83 Zone 18N Y (m)	Source Only L_{eq} Broadband Sound Level (dBA)
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 X (m)	Coordinates UTM NAD83 Zone 18N Y (m)	Source Only L_{eq} Broadband Sound Level (dBA)
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 X (m)	Coordinates UTM NAD83 Zone 18N Y (m)	Source Only L_{eq} Broadband Sound Level (dBA)
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

Construction-Related Complaints

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.

Operation-Related Complaints

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.