Noise Impact Study for Saddleback Ridge Wind Farm Revised April 2013

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RSG INC.
ENVIRONMENT, ENERGY, & ACOUSTICS

Noise Impact Study for Saddleback Ridge Wind Farm

Carthage, Maine

Revised April 2013

DATA ■ ANALYSIS ■ SOLUTIONS

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1.0 INTRODUCTION

Patriot Renewables is developing a wind energy facility on the ridge of Saddleback Mountain in Carthage, Maine - the Saddleback Ridge Wind project ("SRW").

This report is an update to the October 2010, "Noise Impact Study for Saddleback Ridge Wind Farm," March 2011 revision and May 2012 revision, all prepared by RSG. The October 2010 report was based on a project consisting of 12 GE 2.75-100 2.75 MW turbines, with 100-meter rotors, the March 2011 report was based on a project consisting of 12 GE 2.75-103 2.75 MW turbines with 103-meter rotors, and the May 2012 report was based on a project using 12 Siemens 3.0-113 3.0 MW turbines. This report is based on the updated sound profile from 12 GE 2.75-103 2.75 MW turbines.

With the revised report, we are assessing the potential for SRW's compliance with a 42 dBA sound limit at nighttime protected locations, as ordered on March 5, 2013 by the Maine Supreme Court. The report also updates the list of participating properties.

The report includes:

1) A description of the project site (revised)
2) A noise primer
3) A discussion of noise issues specific to wind turbines (revised)
4) A discussion of applicable noise limits (revised)
5) The results of background sound level monitoring
6) The results of computer sound propagation modeling (revised)
7) A summary and conclusions (revised)

2.0 PROJECT AREA

The proposed turbines would be located in the Town of Carthage in Franklin County, Maine.

The area largely consists of forested areas, with some agricultural land. The terrain is mountainous. The project borders Winter Hill Road to the west and approaches US Route 2 to the south. The proposed turbines are located along Saddleback Ridge, which runs from the southwest portion of the project area to the northeast.

The distance between the turbines and the closest non-participating[1] residence to the east is approximately 4,200 feet (Receptor 12). The closest non-participating residence to the southwest of the turbine string is approximately 3,120 feet (Receptor 29).[2]

A map of the project area is provided in Figure 1.

[1] Non-participating residences are those for which SRW has not obtained a sound easement or other property interest. Participating residences are those for which SRW has obtained a sound easement or other property interest and are accordingly not subject to noise limits contained in Chapter 375(10). Sound easements and other property interests obtained by SRW are attached as part of Appendix B.

[2] These distances are from the residence to the nearest turbine nacelle.

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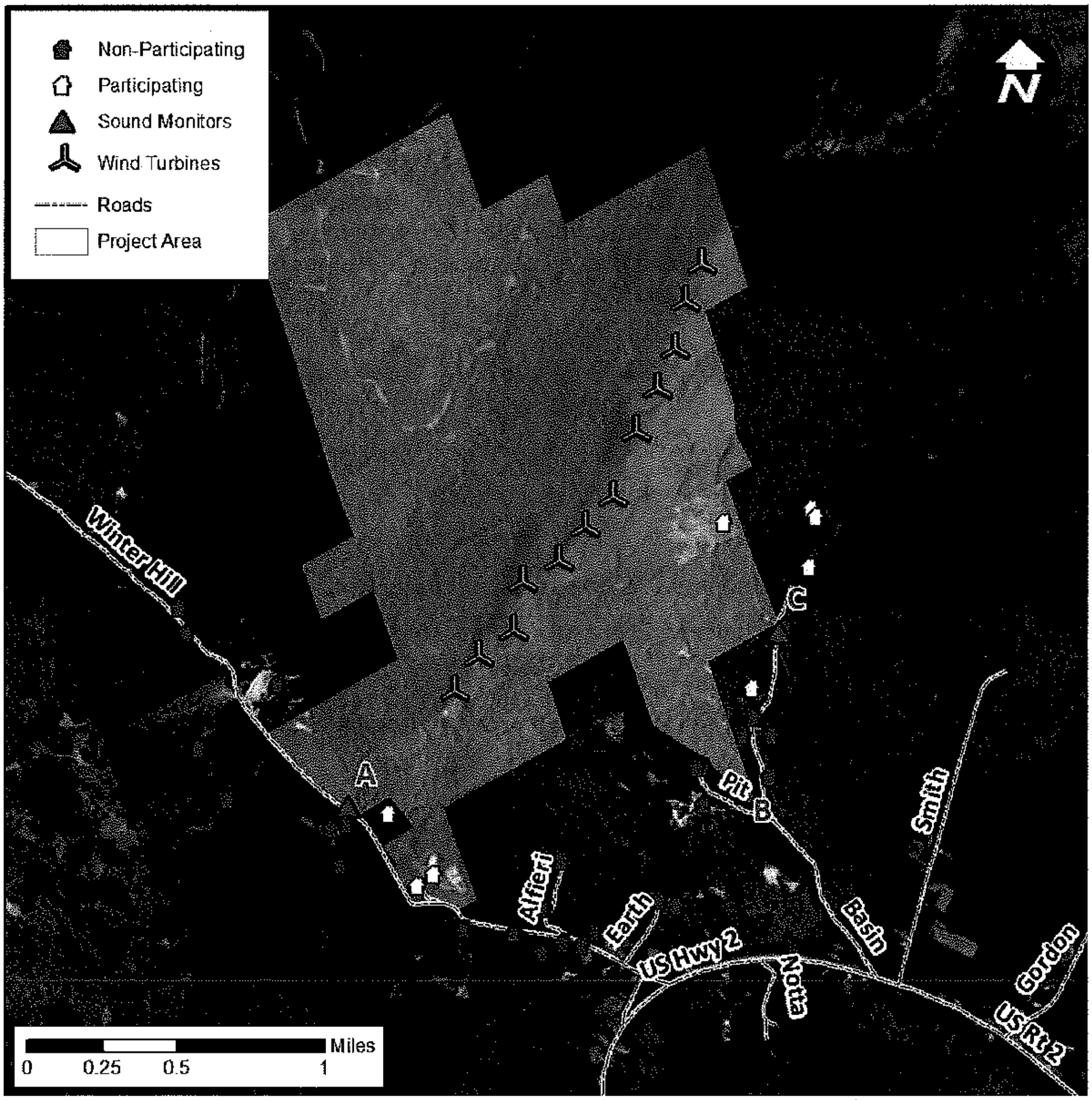
Figure 1: Proposed Project Area with Wind Turbine & Ambient Sound Monitoring Locations



3.0 A Noise Primer

3.1 What is Noise?

Noise is defined as "a sound of any kind, especially when loud, confused, indistinct, or disagreeable."[1] Passing vehicles, a noisy refrigerator, or an air conditioning system are sources

[1] "The American Heritage Dictionary of the English Language," Houghton Mifflin Company, 1981.

of noise which may be bothersome or cause annoyance. These sounds are a part of generally accepted everyday life, and can be measured, modeled, and, if necessary, controlled.

3.2 How is Sound Described?

Sound is caused by variations in air pressure at a range of frequencies. Sound levels that are detectable by human hearing are defined in the decibel (dB) scale, with 0 dB being the approximate threshold of human hearing, and 135 dB causing pain and permanent damage to the ear. Figure 2 shows the sound levels of typical activities that generate noise.

The decibel scale can be weighted to mimic the human perception of certain frequencies. The most common of these weighting scales is the "A" weighting, and this scale is used most frequently in environmental noise analysis. Sound levels that are weighted by the "A" scale have units of dBA or dB(A).

To account for changes over time, a weighted average sound level called the "equivalent continuous" sound level (L_{eq}) is often used. L_{eq} averages sound pressure rather than decibels, and results in weighting the levels of loud and infrequent noises more heavily than quieter and more frequent noises. For example, a train passing by for one minute out of an hour could produce sound levels around 90 dBA while passing by, but the equivalent continuous sound level for the entire hour would be 72 dBA, compared to the arithmetic decibel average of 1.3 dB. The equivalent average sound level is often used in environmental noise analysis.

3.3 What is the Difference between Sound Pressure Levels and Sound Power Levels?

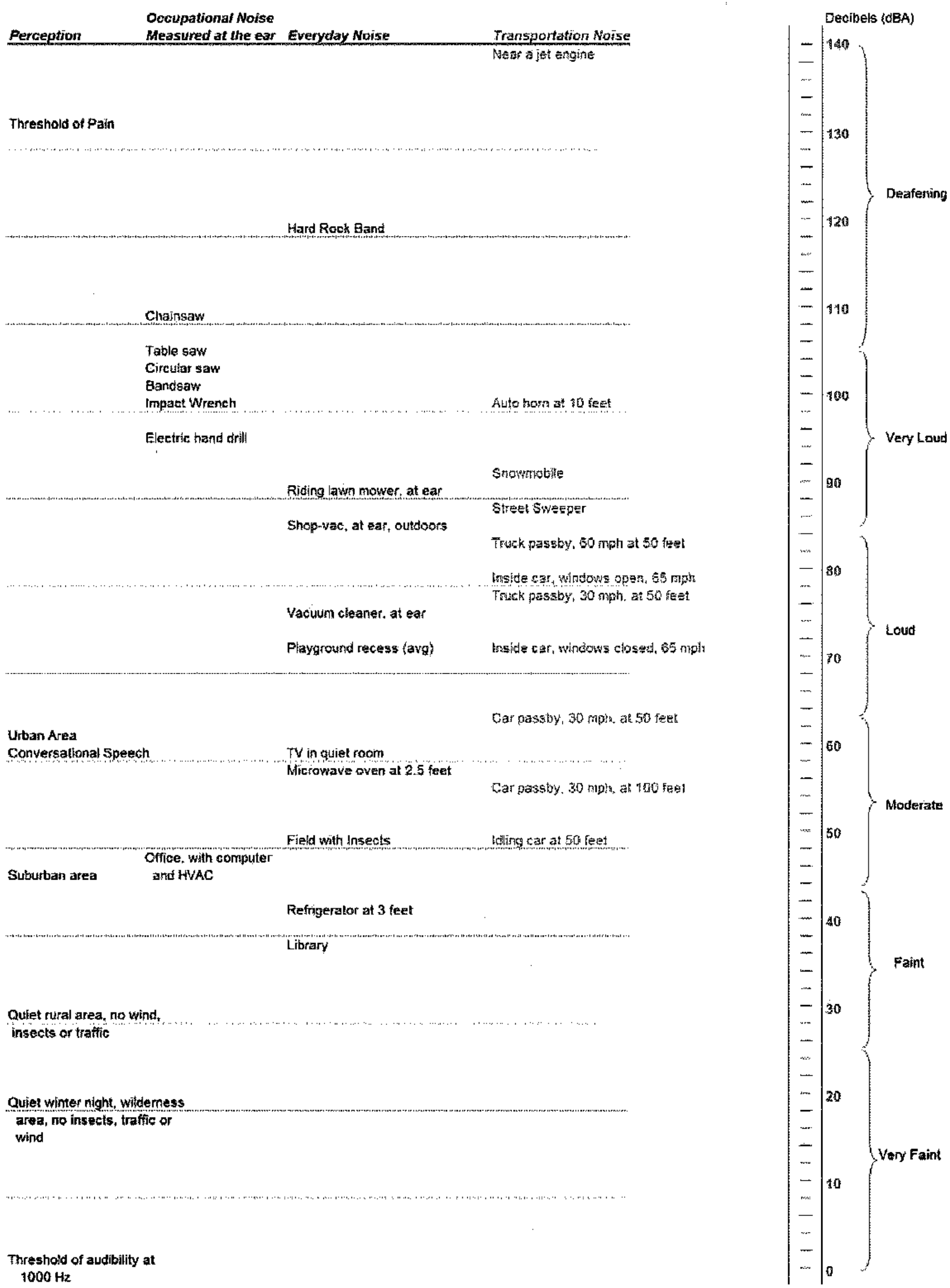
Both sound power and sound pressure levels are described in terms of decibels, but they are not the same thing. Sound power is a measure of the acoustic power emitted or radiated by a source. The sound power level of a source does not change with its surrounding conditions.

Sound pressure level is observed at a specific location and is related to the difference in air pressure above or below atmospheric pressure. This fluctuation in air pressure is a result of the sound power of a source, the distance at which the sound pressure level is being observed, and the characteristics of the path and environment around the source and receiver. When one refers to sound level, they are generally speaking of the perceived level, or sound pressure level.

For example, a coffee grinder will have the same sound power whether or not it is grinding indoors or outdoors. The amount of sound the coffee grinder generates is always the same. However, if you are standing six feet away from the coffee grinder indoors, you would experience a higher sound pressure level than you would if you were six feet away from the coffee grinder outdoors in an open field. The reason for this is that the sound being emitted from the coffee grinder would bounce off walls and other surfaces indoors which would cause sound to build up and raise the sound pressure level.

Sound power cannot be directly measured. However, since sound pressure and sound power are related, sound power can be calculated by measurements of sound pressure and sound intensity. It can be helpful to note that over soft ground outside, the sound pressure level of a small source observed 50 feet away is roughly 33 dB lower than its sound power level.

Figure 2: Basic Theory: Common Sounds in Decibels



3.4 How is Sound Modeled?

The decibel sound level is described on a logarithmic scale. One manifestation of this is that sound *power* increases by a factor of 10 for every 10 dB increase. However, for every 10 dB increase in sound pressure, we *perceive* an approximate doubling of loudness. Small changes in sound level, below 3 dB, are generally not perceptible.

For a point source, sound level diminishes or attenuates by 6 dB for every doubling of distance due to geometrical divergence. For example, if an idling truck is measured at 50 feet as 66 dBA, at 100 feet the level will decline to 60 dBA, and at 200 feet, 54 dBA, assuming no other influences. From a line source, like a gas pipeline or from closely spaced point sources, like a roadway or string of wind turbines, sound attenuates at approximately 3 dB per doubling distance. These "line sources" transition to an attenuation of 6 dB per doubling at a distance of roughly a third of the length of the line source.

Other factors, such as intervening vegetation, terrain, walls, berms, buildings, and atmospheric absorption will also further reduce the sound level reaching the listener. In each of these, higher frequencies will attenuate faster than lower frequencies. Finally, the ground can also have an impact on sound levels. Harder ground generally increases and softer ground generally decreases the sound level at a receiver. Reflections off of buildings and walls can increase broadband sound levels by as much as 3 dB.

If we add two equal sources together, the resulting sound level will be 3 dB higher. For example, if one machine registers 76 dBA at 50 feet, two co-located machines would register 3 dB more, or 79 dBA at that distance. In a similar manner, at a distance of 50 feet, four machines, all operating at the same place and time, would register 82 dBA and eight machines would register 85 dBA. If the two sources differ in sound level then 0 to 3 dB will be added to the higher level as shown in Table 1.

Table 1: Decibel Addition

If Two Sources Differ By	Add
0-1 dB	3 dB
2-4 dB	2 dB
5-9 dB	1 dB
>9 dB	0 dB

3.5 Description of Terms

Sound can be measured in many different ways. Perhaps the simplest way is to take an instantaneous measurement, which gives the sound pressure level at an exact moment in time. The level reading could be 62 dB, but a second later it could 57 dB. Sound pressure levels are constantly changing. It is for this reason that it makes sense to describe noise and sound in terms of time.

The most common ways of describing noise over time is in terms of various statistics. Take, as an example, the sound levels measured over time shown in Figure 3. Instantaneous measurements are shown as a ragged grey line. The sound levels that occur over this time can be described verbally, but it is much easier to describe the recorded levels statistically. This is done using a variety of "levels" which are described below.

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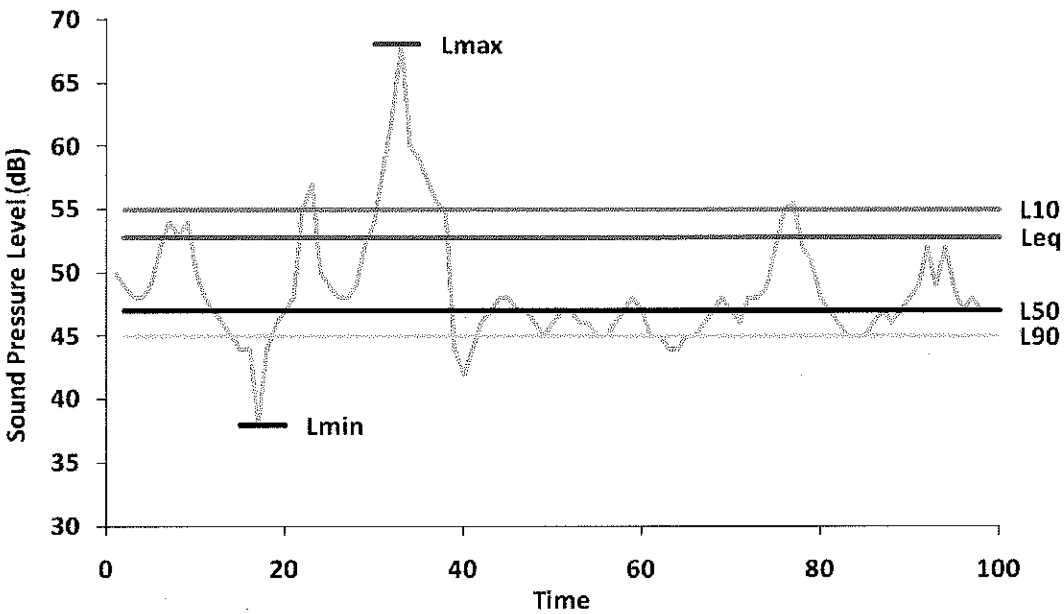
Figure 3: Example of Noise Measurement over Time and Descriptive Statistics



3.5.1 Equivalent Average Sound Level - Leq

One of the most common ways of describing noise levels is in terms of the continuous equivalent sound level (Leq). The Leq is the average of the sound pressure over an entire monitoring period and expressed as a decibel. The monitoring period could be for any amount of time. It could be one second ($Leq_{1\text{-sec}}$), one hour ($Leq_{(1)}$), or 24 hours ($Leq_{(24)}$). Because Leq describes the average pressure, loud and infrequent noises have a greater effect on the resulting level than quieter and more frequent noises. For example, in Figure 3, the median sound level is about 47 dBA, but the equivalent average sound level (Leq) is 53 dBA. Because it tends to weight the higher sound levels and is representative of sound that takes place over time, the Leq is the most commonly used descriptor in noise standards and regulations.

3.5.2 Percentile Sound Level - Ln

Ln is the sound level exceeded *n* percent of the time. This type of statistical sound level, also shown in Figure 3, gives us information about the distribution of sound levels over time. For example, the L10 is the sound level that is exceeded 10 percent of the time, while the L90 is the sound level exceeded 90% of the time. The L50 is exceeded half the time. The L90 is a residual base level which most of the sound exceeds, while the L10 is representative of the peaks and higher, but less frequent levels. When one is trying to measure a continuous sound, like a wind turbine, the L90 is often used to filter out other short-term environmental sounds that increase the level, such as dogs barking, vehicle passbys, wind gusts, and talking. That residual sound, or L90, is then the sound that is occurring in the absence of these noises.

3.5.3 Lmin and Lmax

Lmin and Lmax are simply the minimum and maximum sound level, respectively, monitored over a period of time.

4.0 NOISE STANDARDS

SRW falls under the regulatory jurisdiction of the Maine Department of Environmental Protection (DEP), which has set out its regulations for noise in Control of Noise, Chapter 375.10. Generally speaking, commercial, industrial, and other non-residential areas are subject to hourly equivalent average $Leq_{(1)}$ sound level limits of 70 dBA in the daytime (7am to 7pm) and 60 dBA during the night (7pm to 7am).

The most restrictive DEP standards apply to quiet areas where pre-development hourly sound levels are 45 dBA or less during the day and 35 dBA or less during the night. Under the DEP standards that were in effect at the time the project applied for and received its permit from DEP, quiet areas were subject to hourly sound level limits of 55 dBA during the day (7am to 7pm) and 45 dBA during the night (7pm to 7am). A recent order from the Maine Supreme Court lowered the nighttime standard applied to this project to 42 dBA. Therefore, this project will be evaluated against a limit of 55 dBA day and 42 dBA night $LAeq_{(1\text{-hour})}$, respectively.

The DEP noise rules also apply various penalties to the overall sound levels of projects that emit certain tonal and short duration repetitive sounds.

5.0 SOUND MONITORING

5.1 Soundscapes around the Project

Soundscapes are the combination of sounds that characterize a listening environment. Soundscapes can be distinguished by the types and levels of ambient sound over time. In a rural project area, differences in soundscapes are often a function of the distance from roadways of varying traffic volumes. For SRW, pre-construction sound level monitoring locations were chosen to represent distinctive soundscapes around the project area. These characteristic soundscapes include the:

1. Residences southwest of the project area. These residences are accessible by a dirt road or ATV trail. They lie to the southwest of the ridge line.
2. Residences southeast of the project area. These residences are closer to Route 2 and may be subject to more traffic noise. They lie to the south of the ridge line.
3. Residences east of the project area. These residences are at a higher elevation than the others and are farthest from Route 2. They lie to the east of the ridge line.

Sound level monitors were installed around these areas.

5.2 Sound Monitoring

To determine ambient sound levels in the area, RSG conducted sound level monitoring for three locations in the representative areas around the project (see Figure 1). The monitoring took place from September 14 to 21, 2010.

All sites were monitored with ANSI Type 1 Cesva SC310 sound level meters set to log 1/3 octave band sound levels every second. Each sound level meter was calibrated before and after the measurements and fitted with seven-inch diameter windscreens. The windscreens reduce the self-noise created by wind passing over the meter's microphone. Each microphone was placed approximately 1.4 meters above the ground. Table 2 shows the specifics of each measurement position and Table 3 displays summarized results from the background sound monitoring.

Table 3 displays four different sound levels: the Leq, L90, L50, and L10. The values given for each statistic correspond to the average daytime or nighttime sound levels throughout the entire monitoring period. As defined in Section 3, the Leq is the equivalent average sound level. This measure weights louder sound levels more than quieter levels because it is based on a logarithm of the squared sound pressure. The L90, L50, and L10 are the sound levels exceeded 90%, 50%, and 10% of the time, respectively. In this table, "daytime" refers to the period between 7am and 7pm and "nighttime" refers to the period between 7pm and 7am. This is in accordance with the Maine DEP regulations outlined in Section 4 of this report.

Table 2: Background Sound Monitoring Summary

Monitor	Meter	Start Time	End Time
A	Cesva SC310	9/14/10 2:00 PM	9/21/10 10:10 AM
B	Cesva SC310	9/14/10 2:30 PM	9/21/10 1:40 PM
C	Cesva SC310	9/14/10 4:20 PM	9/21/10 1:30 PM

Table 3: Background Monitoring Results Summary (dBA)

	Daytime				Nighttime			
	Leq	L90	L50	L10	Leq	L90	L50	L10
Monitor A	41	25	31	41	47	19	28	42
Monitor B	40	22	31	43	42	20	31	40
Monitor C	39	26	32	41	45	23	27	41

Figure 1 identifies the monitoring locations in reference to the project area. Each monitoring location and logged sound levels are shown in greater detail in the figures that follow.

5.2.1 Monitor A

Monitor A was located in the southwest of the project area, set back about 50 feet from Winter Hill Road. The monitor was placed 0.5 miles from the nearest proposed wind turbine and 300 feet from the nearest residential building. Its location is shown in Figure 4 and monitoring results are provided in Figure 5.

An anemometer with a temperature sensor was also placed here at a height of one meter above the ground. This equipment was damaged by a vandal on the evening of September 20th. It ceased to log data after that time.

Figure 4: Monitor A Location

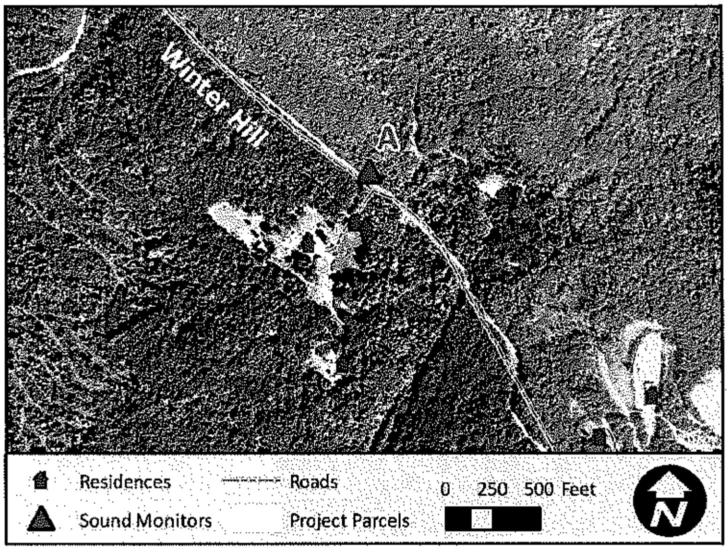
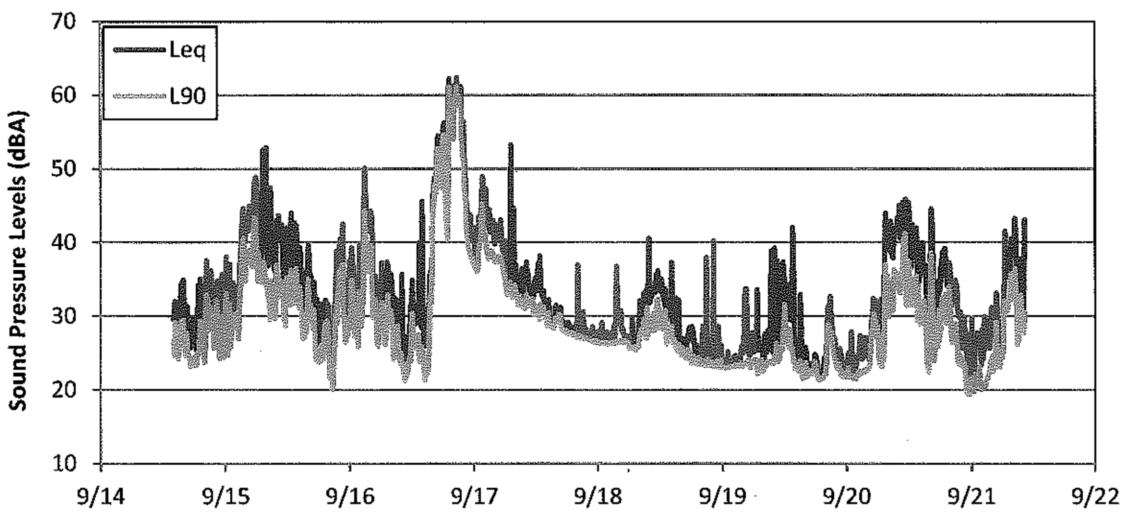


Figure 5: Monitor A Results, 10-minute Periods



5.2.2 Monitor B

Monitor B was located in the southeast of the project area, between Cliff Road and Basin Road. The monitor was placed about 250 feet from the nearest public road, 500 feet from the nearest house, and 1.0 miles from the nearest proposed wind turbine. Its location is shown in Figure 6 and monitoring results are provided in Figure 7.

Figure 6: Monitor B Location

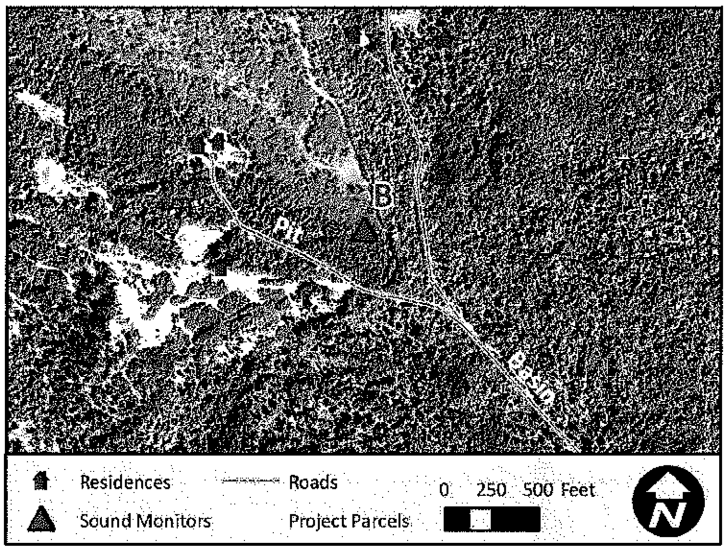
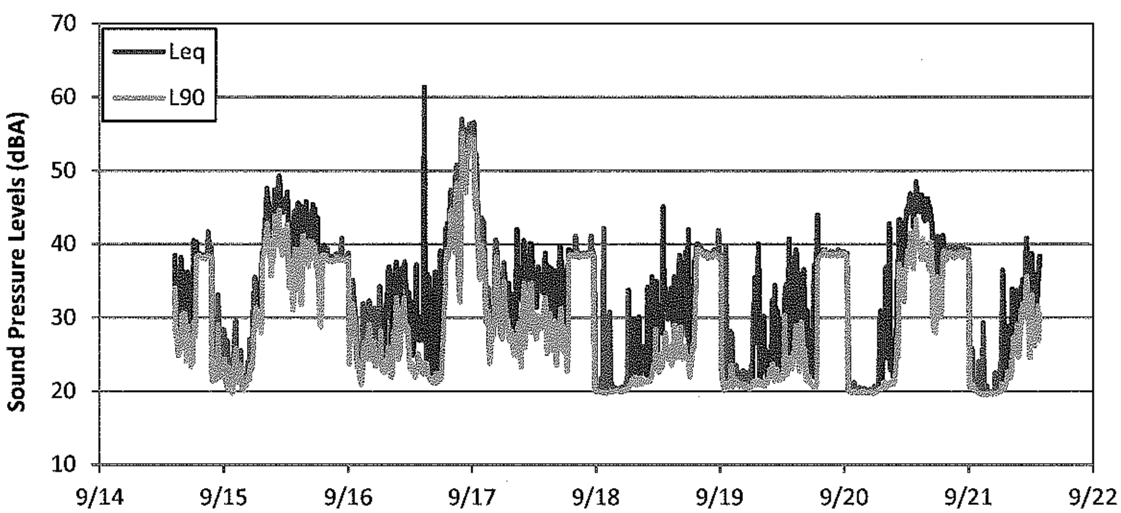


Figure 7: Monitor B Results, 10-minute Periods



5.2.3 Monitor C

Monitor C was located to the east of the project area, about 60 feet east from Basin Road. The monitor was placed 1,100 feet (0.2 miles) from the nearest residence and 0.7 miles from the nearest proposed wind turbine. An anemometer was set up at a height of one meter to record wind speeds at Monitor C. The location of the equipment is shown in Figure 8 and monitoring results are provided in Figure 9.

Figure 8: Monitor C Location

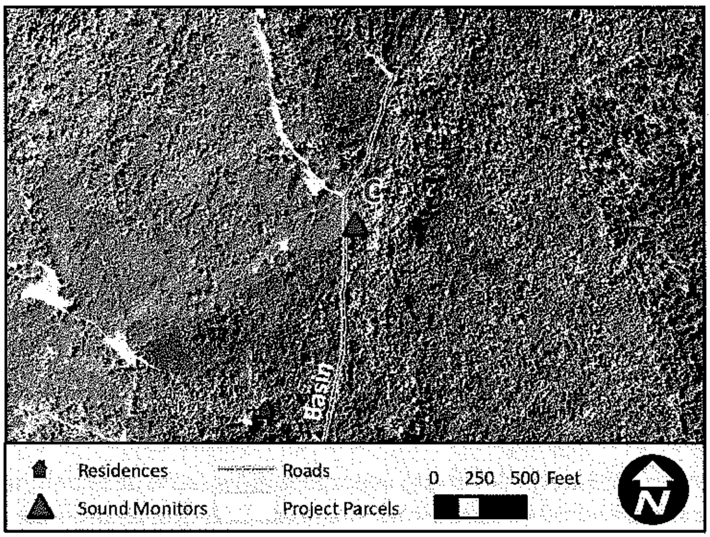
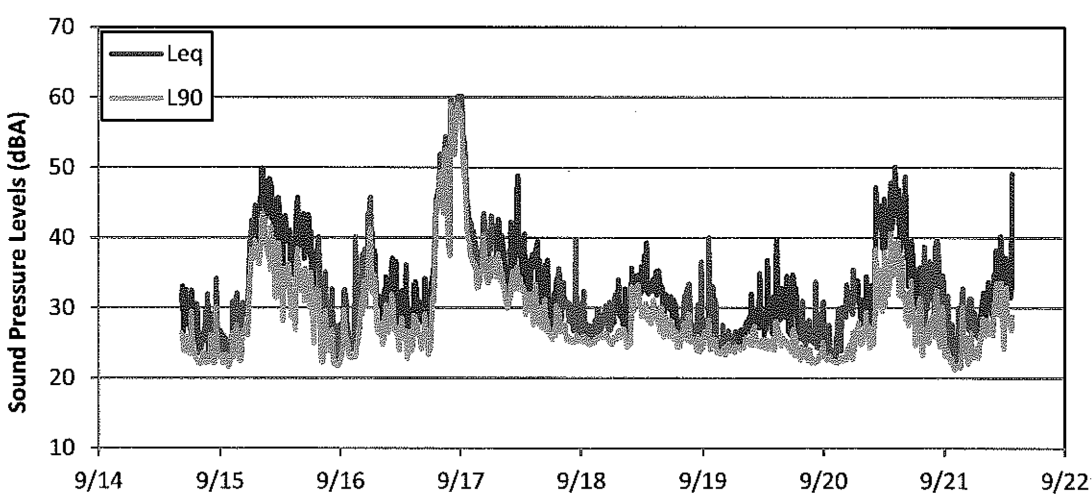


Figure 9: Monitor C Results, 10-minute Periods



6.0 Meteorological Data

6.1 Weather Events

RSG installed a meteorological station near both Monitor A and Monitor C. The station at Monitor A recorded wind speed, gust speed, temperature and relative humidity at 1 meter above ground throughout the monitoring period. On average, persistent calm winds were detected by this met station, and very small wind gust speeds were recorded. The average temperature during the monitoring period of met station A was 53°F, ranging from a low of 39°F to a high of 55°F. The average relative humidity was 79%.

The met station at Monitor C monitored wind speed, gust speed, and wind direction at 1 meter above ground throughout the monitoring period. Very minor wind and gust speeds were detected by this met station.

Data were also collected by the project met tower at 60 meters above ground level. The 10-minute average wind speeds collected from this station ranged from calm conditions to 17 meters/second during the monitoring period.

Additional meteorological data for the monitoring period were collected from WeatherUnderground.com for the nearest reporting met station, Auburn, Maine[1]. This station recorded no precipitation events during the monitoring period.

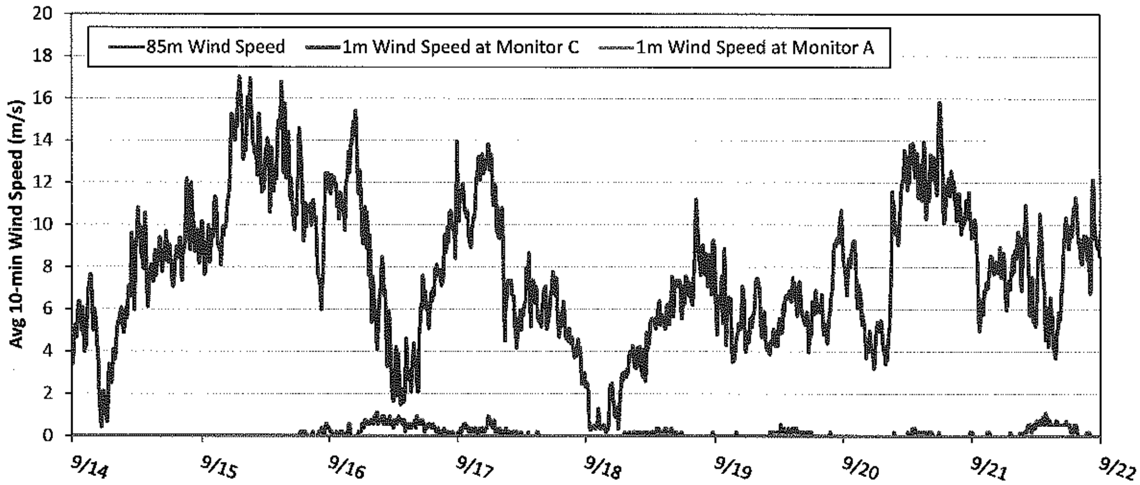
6.2 Wind Speeds

A long-term project met tower collected 10-minute average wind speeds at anemometer heights of 40 meters, 50 meters, and 60 meters. From this data, RSG determined the wind shear for each time period and used it to calculate average wind speeds at a relative elevation of 85 meters, which is the hub height of the turbines under consideration.

Figure 10 shows wind speeds during the monitoring period for the project met tower and the met stations at Monitor A and Monitor C.

[1] Auburn is located 45 miles south of Carthage

Figure 10: Wind Speed (10-min Averages) at Ground Stations and Projected Hub Height from Project Met Tower



6.3 Correlation of Wind Speed and Ambient Sound Level

Wind speeds at hub height and sound pressure levels at ground-level receivers in the project area are typically correlated. The more they are correlated, the more there is a chance that the wind turbines will be masked by background sound generated by wind. Figures 11 through 13 depict the relationship between wind speed and 10-minute Leqs and L90s at each monitoring station.

The hub-height wind speed and measured sound levels are well correlated ($p<0.05$). Monitor A and Monitor B show increases in sound level only after 4 to 6 m/s wind speeds, which indicate that masking could occur, but only at higher wind speeds.

Figure 11: Wind Speed and Sound Pressure Levels at Monitor A

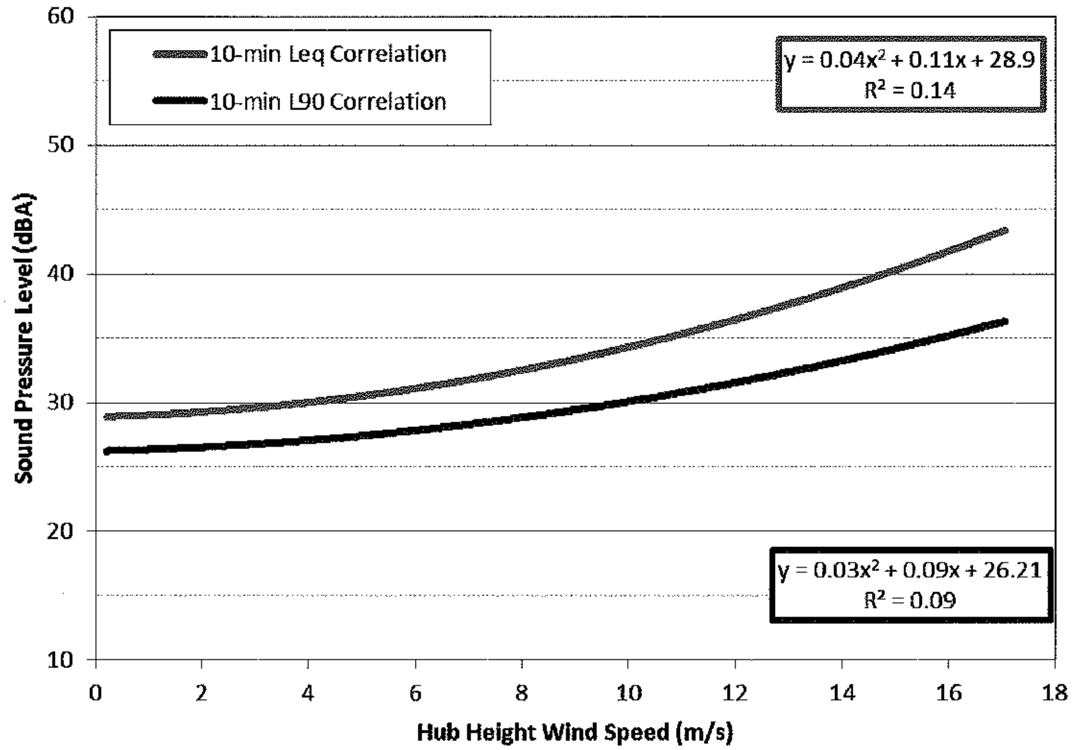


Figure 12: Wind Speed and Sound Pressure Levels at Monitor B

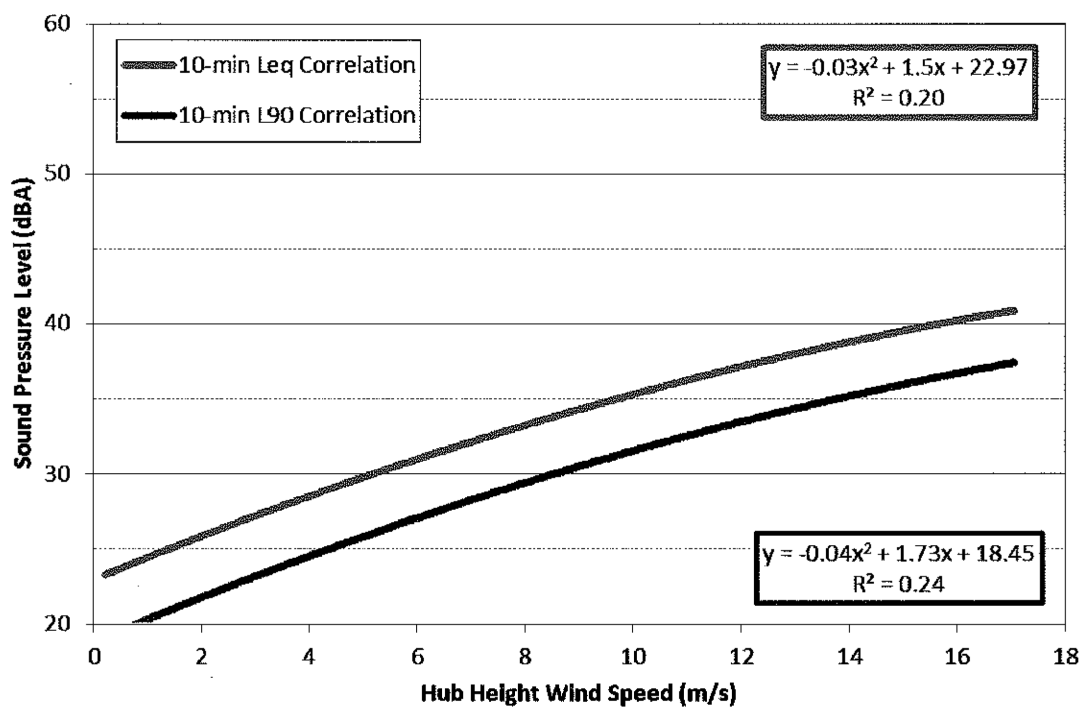
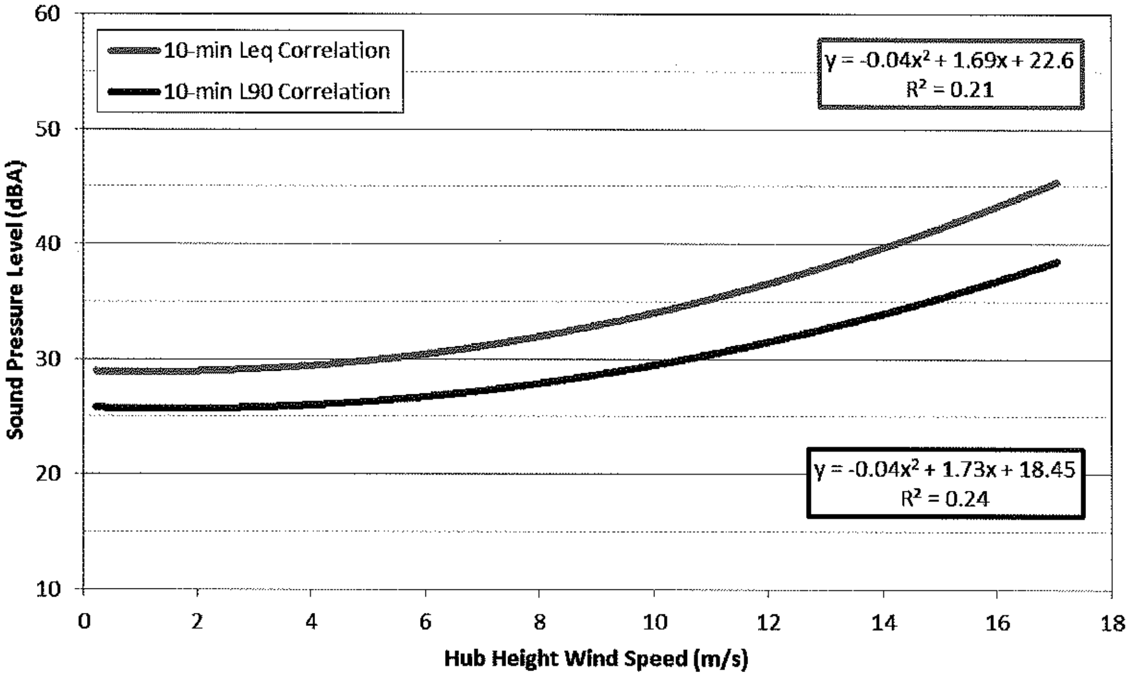


Figure 13: Wind Speed and Sound Pressure Levels at Monitor C



7.0 Sound Levels Produced by Wind Turbines

7.1 Standards Used to Measure Wind Turbine Sound Emissions

A manufacturer of a wind turbine must test its turbines using two international standards:

1. International Electrotechnical Commission standard IEC 61400-1w1:2002(E), "Wind Turbine Generator Systems – Part 11: Acoustic Noise Measurement Techniques"
2. International Electrotechnical Commission standard IEC 61400-14:2005(E), "Wind Turbine Generator Systems – Part 14: Declaration of Apparent Sound Power Level and Tonality Values"

These standards provide sound power emission levels from a turbine, by wind speed and frequency. They also provide a confidence interval.

7.2 Manufacturer Sound Emissions Estimates

The project proposes to use 12 GE 2.75-103 wind turbines with a hub height of 85 meters.

Sound emissions from a source are described in units of sound *power.* This is different from the sound *pressure* that one measures on a sound level meter. Sound *power* is the acoustical energy emitted by an object, and sound *pressure* is the measured change in pressure caused by acoustic waves at an observer location.

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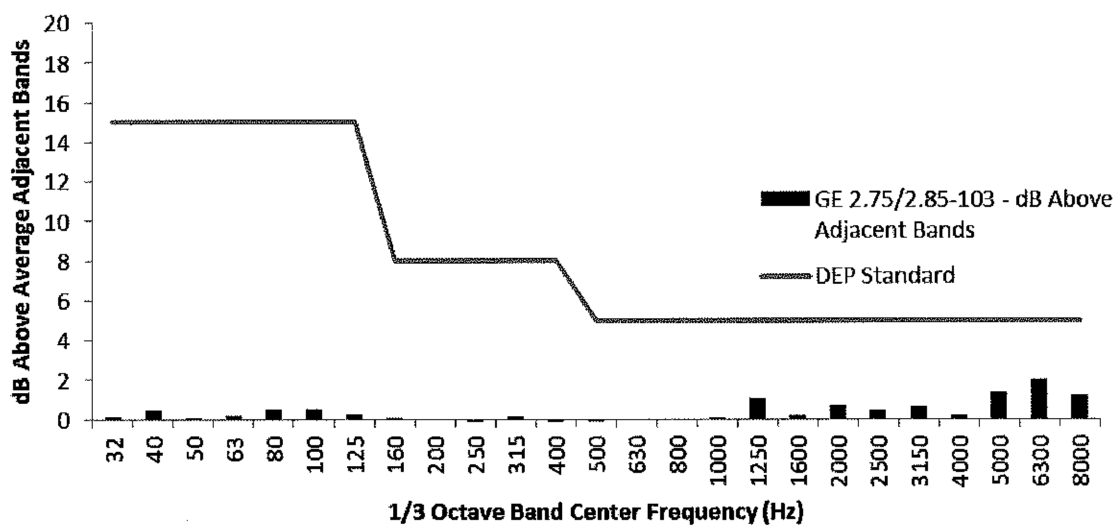
The maximum sound *power* level from a GE 2.75-103 and GE 2.85-103 turbine is 105 ± 2 dBA with wind speeds of 7 m/s and greater (10-meter anemometer height). The modeled sound power level used for modeling in this report is 108 dBA, as it adds 3 dB to account for both sound power[1] and sound propagation uncertainty according to the current DEP noise rules. The octave band sound power levels are shown in Table 4. In the time that has elapsed since SRW's initial sound level assessment for the GE 2.75-103 turbines, GE has updated its sound power curves for that turbine model. The current GE 2.75-103/GE 2.85-103 has the same overall sound power level, but less sound energy in the lower frequencies and more sound energy in the higher frequencies. This has the effect of lowering sound levels at a distance, since higher frequency sound attenuates more quickly than low frequency sound. The updated sound power curve from GE is attached as Appendix C.

The maximum tonal audibility level as measured by the IEC 61400-11 methodology is less than 4 dB, irrespective of wind speed. No 1/3 octave band exceeds the arithmetic average of adjacent 1/3 octave bands by more than 5 dB, and thus the turbine has no "tonal sound" according to Maine DEP standards (Figure 14).

Table 4: Spectral Sound Power Levels (dBA)

		Octave Band Center Frequency								
Turbine Model and 10-m Height Wind Speed	Nominal Sound Power (dBA)	*31.5 Hz*	*63 Hz*	*125 Hz*	*250 Hz*	*500 Hz*	*1 kHz*	*2 kHz*	*4 kHz*	*8 kHz*
GE 2.75/2.85-103 for 7 m/s to cutout	105.0	80.7	90.3	94.5	94.6	95.8	100.3	99.6	90.7	71.9

Figure 14: Comparison of 1/3 Octave Band Sound Power with Maine DEP Tonal Noise Definition



[1] Manufacturer sound power uncertainty for each turbine is ±2 dB.

8.0 SOUND FROM WIND TURBINES – SPECIAL ISSUES

8.1 Wind Turbine Noise

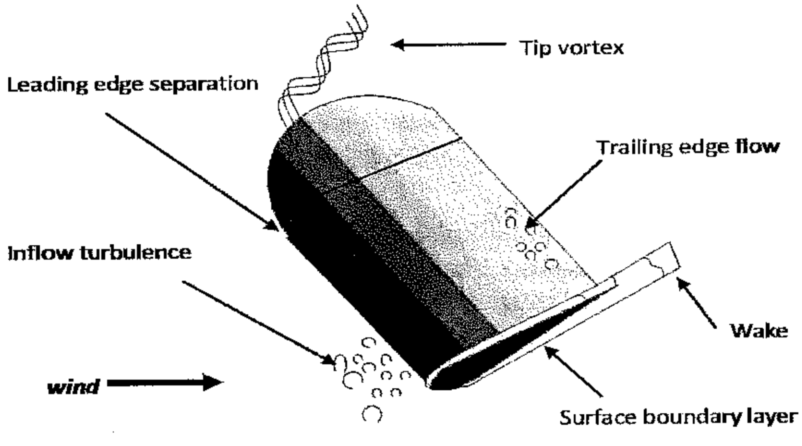
Wind turbines generate two principal types of noise: aerodynamic noise, produced from the flow of air around the blades, and mechanical noise, produced from mechanical and electrical components within the nacelle.

Aerodynamic noise is the primary source of noise associated with wind turbines. These acoustic emissions can be either tonal or broadband. Tonal noise occurs at discrete frequencies, whereas broadband noise is distributed with little peaking across the frequency spectrum. Low frequency aerodynamic tonal noise is typically associated with downwind rotors on horizontal axis wind turbines. In this configuration, the rotor plane is behind the tower relative to the oncoming wind. As the turbine blades rotate, each blade crosses behind the tower's aerodynamic wake and experiences brief load fluctuations. This causes short, low-frequency pulses or thumping sounds called *blade impulsive noise*. Large modern wind turbines, such as those proposed by SRW, are "upwind," where the rotor plane is upwind of the tower. As a result, this type of low frequency noise does not occur in all but the most swirling winds.

Wind turbines emit aerodynamic broadband noise as the spinning blades interact with atmospheric turbulence and as air flows along their surfaces. This produces a characteristic "whooshing" sound through several mechanisms (Figure 15):

- *Inflow turbulence noise* occurs when the rotor blades encounter atmospheric turbulence as they pass through the air. Uneven pressure on a rotor blade causes variations in the local angle of attack, which affects the lift and drag forces to cause aerodynamic loading fluctuations. This generates noise that varies across a wide range of frequencies but is most significant at levels below 500 Hz.
- *Trailing edge noise* is produced as boundary-layer turbulence around the airfoil passes into the wake, or trailing edge, of the blade. This noise is distributed across a wide frequency range but is most notable at high frequencies between 700 Hz and 2 kHz.
- *Tip vortex noise* occurs when tip turbulence interacts with the surface of the blade tip. While this is audible near the turbine, it tends to be a small component of the overall noise further away.
- *Stall* or *separation noise* occurs due to the interaction of turbulence with the blade surface.

Figure 15: Airflow around a Rotor Blade



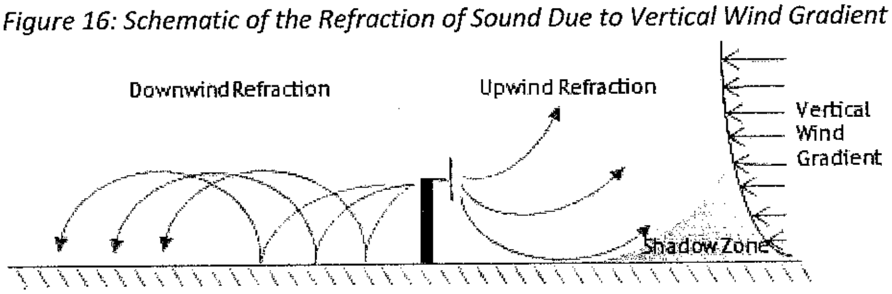
Tonal noise can originate from unstable air flows over holes, slits, or blunt trailing edges on blades. These tend to be of higher frequencies and diminish rapidly over distance. Well-maintained blades do not generate tonal noise.

Mechanical noise tends to be tonal in nature but can also have a broadband component. Potential sources of mechanical noise include the gearbox, generator, yaw drives, cooling fans, and auxiliary equipment. These components are housed within the nacelle, whose surfaces, if untreated, radiate the resulting noise. However modern wind turbines have nacelles that are designed to reduce internal noise, and rarely is the mechanical noise a significant portion of the total noise from a wind turbine.

8.2 Meteorology

Meteorological conditions can significantly affect sound propagation. The two most important conditions to consider are wind shear and temperature lapse. Wind shear is the difference in wind speeds by elevation and temperature lapse rate is the temperature gradient by elevation. In conditions with high wind shear (large wind speed gradient), sound levels upwind from the source tend to decrease and sound levels downwind tend to increase due to the refraction, or bending, of the sound (Figure 16).

Figure 16: Schematic of the Refraction of Sound Due to Vertical Wind Gradient (Wind Shear)



With temperature lapse, when ground surface temperatures are higher than those aloft, sound will tend to refract upwards, leading to lower sound levels near the ground. The opposite is true when ground temperatures are lower than those aloft (an inversion condition).

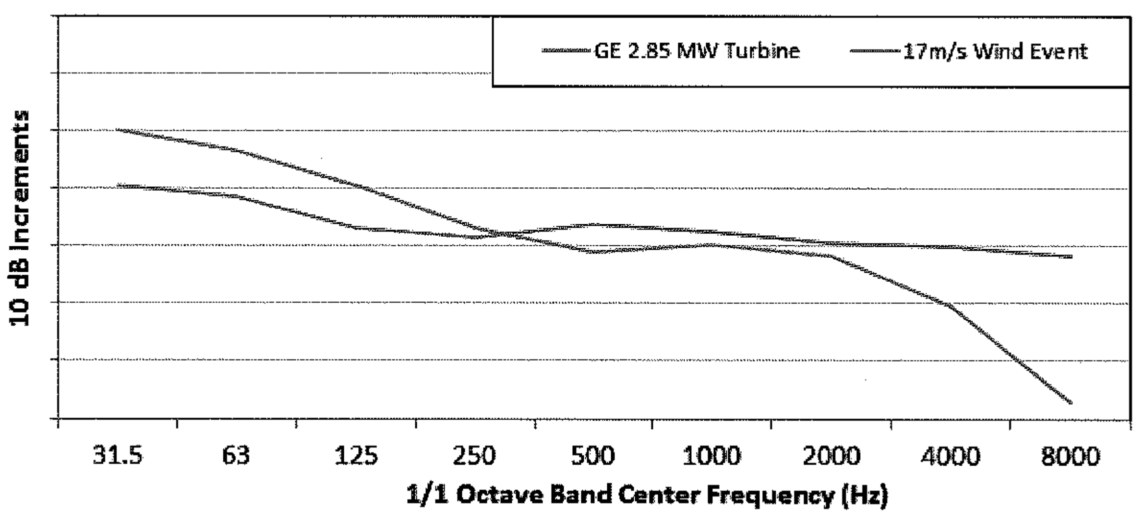
The term "Stability Class" is used to describe how stable the atmosphere is. Unstable atmospheres can be caused by high winds and/or high solar radiation. This creates turbulence and tends to break up and dissipate sound energy. Highly stable atmospheres, which tend to occur on clear nights with low ground-level wind speeds, tend to minimize atmospheric turbulence and are generally more favorable to down-wind propagation.

In general terms, sound propagates best under stable conditions with a strong temperature inversion. This occurs during the night and is characterized by low ground level winds.[1] Wind speeds under very stable conditions (Stability Class G) can be too low to generate electricity, therefore the turbines are not spinning, unless this inversion happens during a time with high wind shear. As a result, worst-case conditions for wind turbines tend to occur under moderate nighttime temperature inversions. Therefore, this is the default condition for modeling wind turbine sound.

8.3 Masking

As mentioned above, sound levels from wind turbines are a function of wind speed. Background sound is also a function of wind speed, i.e., the stronger the winds, the louder the resulting background sound. This effect is amplified in areas covered by trees and other vegetation. The sound from a wind turbine can often be masked by wind noise at downwind receivers because the frequency spectrum from wind is very similar to the frequency spectrum from a wind turbine. Figure 17 compares the sound spectrum measured at Monitor C during a 17 m/s wind event to a GE 2.75/2.85-103 wind turbine. As shown, the shapes of the spectra are very similar at the lower frequencies. At higher frequencies, the sounds from the masking wind noise are higher than the wind turbine. As a result, the masking of turbine noise is possible at higher wind speeds.

Figure 17: Comparison of Frequency Spectra from Wind at Monitor C and a GE 2.75/2.85-103 Wind Turbine



[1] The amount of propagation is highly dependent on surface conditions and the frequency of the sound. Under some circumstances highly stable conditions can show lower sound levels.

It is important to note that while winds may be blowing at turbine height, there may be little to no wind at ground level. This is especially true during strong wind gradients (high wind shear), which mostly occur at night. This can also occur on the leeward side of ridges where the ridge blocks the wind.

Given the correlation of wind speed and background sound level at Monitors B and C (Figure 12 and 13), we would expect some masking of wind turbine sound, especially with residences on the eastern side of the project at higher wind speeds.

8.4 Infrasound and Low Frequency Sound

Infrasound is sound pressure fluctuations at frequencies below about 20 Hz. Sound below this frequency is generally not audible. Low frequency sound is in the audible range of human hearing, that is, above 20 Hz, but below 100 to 200 Hz depending on the definition.

At very high sound levels, infrasound can cause health effects and rattle light-weight building partitions.[1] However, modern wind turbines, with the hub upwind of the tower, do not create this level of infrasound.[2] As a result, infrasound analysis is not necessary.

Low frequency sound is a component of the sound generated by wind turbines. As with infrasound, high levels of low frequency sound can induce rattling in light-weight partitions in buildings. The American National Standards Institute standard, ANSI S12.2, "Criteria for Evaluating Room Noise", recommends that levels be kept below 65 dB at 16 Hz, 65 dB at 31.5 Hz, and 70 dB at 70 Hz inside the building to prevent moderately perceptible vibration and rattles. As discussed below, low frequency sound from SRW is modeled to be well below these parameters.

Low frequency sound is primarily generated by the generator and mechanical components. Much of the mechanical noise has been reduced in modern wind turbines through improved sound insulation at the hub. Low frequency sound can also be generated at higher wind speeds when the inflow air is very turbulent. However, at these wind speeds, low frequency sound from the wind turbine blades is often masked by wind noise at the downwind receivers.

Finally, low frequency sound is absorbed less by the atmosphere and ground than higher frequency sound. Our modeling took into account downward diffraction under a moderate nighttime inversion and differential atmospheric absorption of low and high frequency sound.

9.0 SOUND MODELING

9.1 Modeling Software

Modeling was completed for the project using standard, ISO 9613, "Acoustics – Attenuation of sound during propagation outdoors," parts 1 and 2. ISO 9613 is an internationally accepted acoustical methodology, used by many other noise control professionals in the United States and abroad. The method has a high level of reliability. Part 2 of the standard states,

[1] See, for instance, Berglund, B., Hassmen, P., Job, R., "Sources and effects of low-frequency noise," Journal of the Acoustical Society of America 99(5) 1996; and American National Standards Institute, ANSI S12.2-2008, "Criteria for Evaluating Room Noise".

[2] See, for instance, "Turnbull, C., Turner, J. and Walsh, D., "Measurement and level of infrasound from wind farms and other sources," Acoustics Australia, 40(1), 2012 and O'Neal, R., Hellweg, R., and Lampeter, R., "Low frequency noise and infrasound from wind turbines," Noise Control Eng. J., 59(2), 2011.

> This part of ISO 9613 specifies an engineering method for calculating the attenuation of sound during propagation outdoors in order to predict the levels of environmental noise at a distance from a variety of sources. The method predicts the equivalent continuous A-weighted sound pressure level ... under meteorological conditions favorable to propagation from sources of known sound emissions. These conditions are for downwind propagation ... or, equivalently, propagation under a well-developed moderate ground-based temperature inversion, such as commonly occurs at night.

The method takes into account source sound power levels, surface reflection and absorption, atmospheric absorption, geometric divergence, meteorological conditions, walls, and barriers.

For this study, we modeled the sound propagation in accordance with ISO 9613-2 for omnidirectional wind, using spectral ground attenuation and a ground absorption factor of 0.5 (to represent mixed ground). In addition, 3 dB was added to the mean manufacturer sound power to account for sound power and propagation uncertainty. The Cadna A software, made by Datakustik GMBH was used to implement the model.

A 10-meter by 10-meter grid of 1.5 meter high receivers was set up in the model covering 7.2 square miles around the site. This accounts for a total of about 176,866 modeled receivers. A receiver is a point above the ground at which the computer model calculates a sound level. Separate discrete receivers were added to the model in addition to the grid to represent 34 seasonal or year-round residences in proximity to the proposed wind turbines, with an additional 11 receivers representing the worst case locations within a 500 foot radius of homes near the project (or the project property line, whichever was closer). The discrete receivers representing homes were modeled at a height of 4.0 meters, and those representing other locations were modeled at a height of 1.5 meters.

9.2 Modeling results

9.2.1 Overall Results

The overall modeling results under normal operating conditions (full sound power) are shown as a sound contour map in Figure 18. Within the figure, brown and cream house symbols represent non-participating and participating structures, respectively, and the colored lines emanating from the wind turbines are color-coded isolines, where red represents the highest sound level and purple represents the lowest. The highest sound pressure level within 500 feet of a non-participating residence (a protected location) is 40.3 dBA at Receiver 012 B. The sound level at that actual residence (Receiver 012) is 40 dBA.

Sound levels over 55 dBA only occur within a radius of about 110 meters (360 feet) from the wind turbines. Therefore, all daytime and nighttime standards are met at protected locations.

Source information, receiver results, and modeling parameters are included in Appendix A.

The worst-case modeled sound levels are lower than the October 2010, "Noise Impact Study for Saddleback Ridge Wind Farm," March 2011 revision and May 2012 revision. This is due to three factors: 1) additional landowner agreements obtained by SRW, 2) the use of a wind turbine that has more energy in the higher frequencies, which attenuate more over distance, and 3) using the DEP's current modeling parameters.

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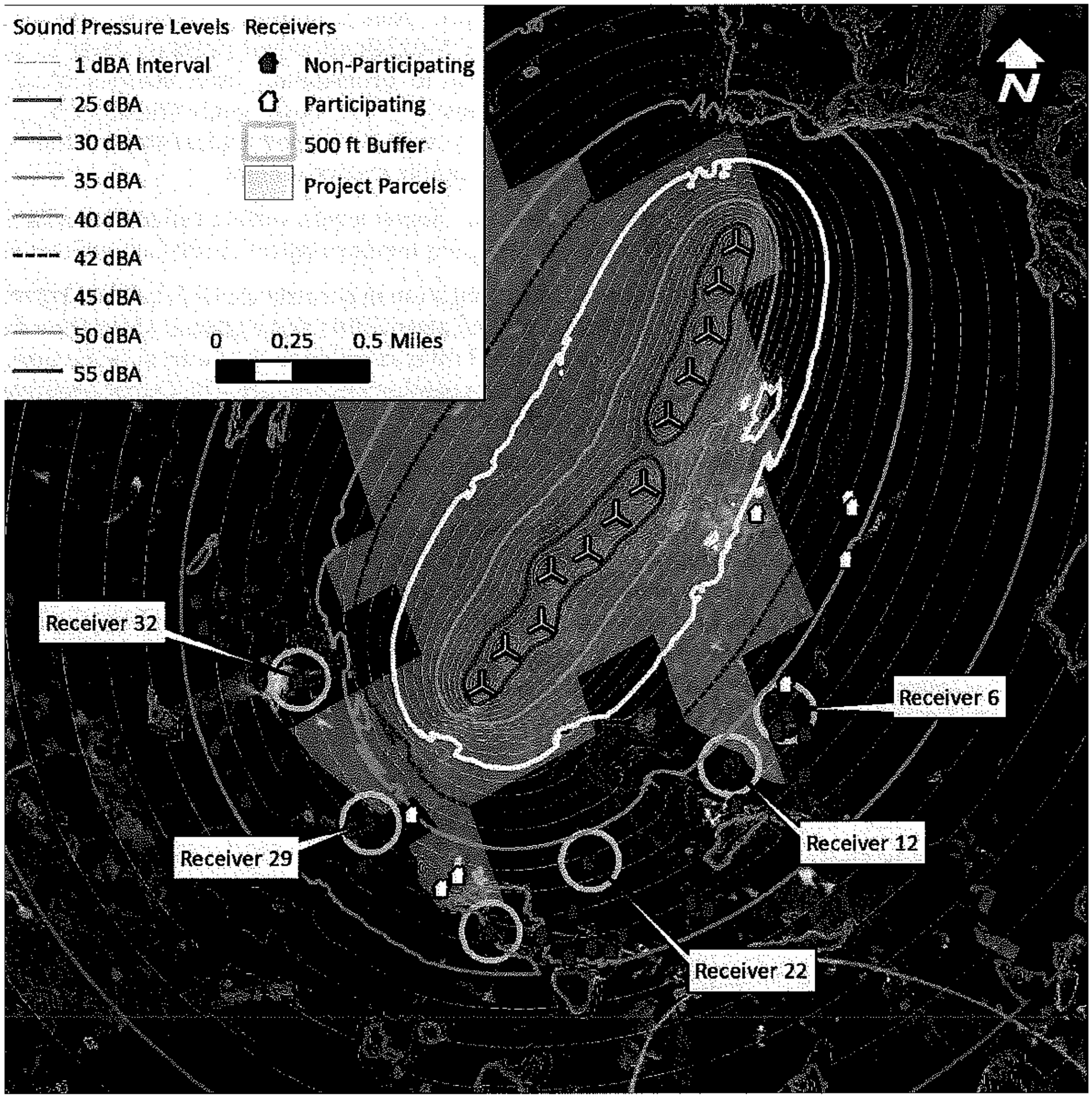
Figure 18: Modeled Sound Pressure Levels (dBA) under Normal Operating Conditions[1]



9.2.2 Low Frequency Sound

Criteria for noise induced building vibration at the interior of buildings can be found in ANSI S12.2-2008, "Criteria for evaluating room noise." The thresholds for "moderately perceptible vibration and rattle likely" are 65 dB at 16 and 31.5 Hz, and 70 dB at 63 Hz. Of all permanently occupied participating and non-participating residences the highest sound level outside at 31.5 Hz is 63 dB and at 63 Hz is 59 dBA. This modeled sound level is below the noise-

[1] These results are shown using 1.5 meter receiver heights. Sound levels at homes may be different, as these are modeled at 4.0 meters.

induced vibration threshold. Modeling at infrasound frequencies was not conducted, as modern wind turbines typically do not generate problematic infrasound levels.

10.0 SHORT-DURATION REPETITIVE SOUNDS

The Chapter 375.10 Maine DEP regulations in effect during the time the original application for this project was submitted and the DEP permit was granted defined short duration repetitive sound as:

> "A sequence of repetitive sounds which occur more than once within an hour, each clearly discernible as an event and causing an increase in the sound level of at least 6 dBA on the fast meter response above the sound level observed immediately before and after the event, each typically less than ten seconds in duration, and which are inherent to the process or operation of the development and are foreseeable." 06-096 CMR 375(10)(G)(19).

Under these generally applied standards, a 5 dB penalty would be added to any portion of a monitoring period that contained a short duration repetitive sound event. 06-096 CMR 375(10)(C)(1)(e). For example, if five seconds of a 10-minute period contained short duration repetitive sounds, only those five seconds would receive a 5 dB penalty. That procedure, as it relates to wind projects, was changed after the application for this project was submitted. The procedure that applies to all new wind projects is as follows:

> "(4) Short Duration Repetitive Sounds ("SDRS"). For the purposes of this subsection SDRS is defined as a sequence of repetitive sounds that occur within a 10-minute measurement interval, each clearly discernible as an event resulting from the development and causing an increase in the sound level of 5 dBA or greater on the fast meter response above the sound level observed immediately before and after the event, each typically ±1 second in duration, and which are inherent to the process or operation of the development.
>
>> (a) When routine operation of a wind energy development produces short duration repetitive sound, a 5 dBA penalty shall be arithmetically added to each average 10-minute sound level ($Leq_{A\ 10\text{-}min}$) measurement interval in which greater than 5 SDRS events are present." 06-096 CMR 375(10)(I)(4).

This report does not make an assumption as to which application of the standard will be applied to this project. As discussed below in Section 10.4, SRW evaluates SDRS events under both frameworks.

In the subsections that follow, we focus on the possible causes of sound amplitude modulation in relation to the specific terrain and meteorological conditions at SRW, the turbine design, and measurements of short duration repetitive sound at Patriot Renewables' Spruce Mountain Wind project.

10.1 Causes of amplitude modulation

There are currently no ANSI, IEC, or other standards used to predict short-duration-repetitive-sounds (SDRS) from wind turbines. The cause of SDRS is debated, but it is likely a function of the different wind speeds at the top and bottom of the rotor (wind shear) and turbulence (Bowdler 2008, Dunbabin 1996, Oerlemans and Mendez, 2005, van den Berg 2005). The turbulence can be naturally occurring or created by wakes from upwind turbines.

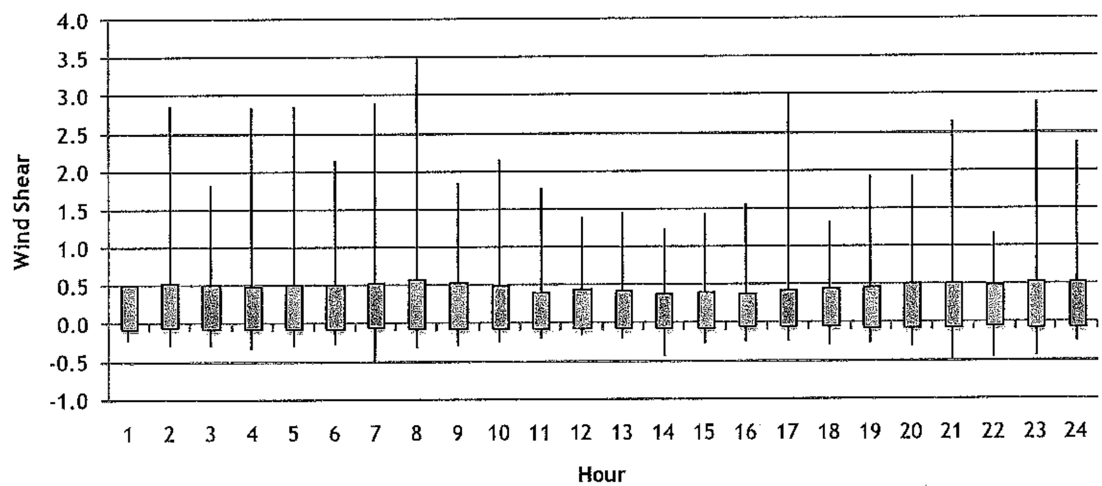
10.1.1 Wind shear

Several papers have studied the theoretical effect of wind shear on the "swishing" sound from wind turbines (Lee, et al. 2009, Oerlemans and Schepers, 2009). They found that much of this amplitude modulation can be explained simply by the difference in broadband blade noise created by higher wind speeds at the top versus the bottom of the rotor rotation. Higher wind shear would result in higher amplitude modulation. This amplitude modulation is broadband and not infrasonic.

Terrain breaks up the tendency to create stable wind layers. As a result, in turbine locations such as those found along the Saddleback Ridge, there tends to be fewer instances of excessive wind shear.

To evaluate whether this area is subject to very high wind shear, we reviewed a year of data from the Saddleback Ridge meteorological tower. The blue box in Figure 19 represents 90% of the hour with hub-height wind speeds of 4 m/s or greater. As shown, instances of high wind shear ($\alpha > 0.55$) occur about 2% of the time for all hours. This is less than the 3.8% at the nearby Spruce Mountain Wind project.

Figure 19: Wind profile power law exponent by time of day for 90 meter predicted wind speeds above 4 m/s. Boxes show 90% of data and "whiskers" are the +5% and -5% outliers



10.1.2 Wind Turbulence

Excessive turbulence can increase the level of sound from a wind turbine and it may also contribute to SDRS. Turbulence may be naturally occurring, caused by thermal mixing and ground roughness, for example. Or, it can be caused by the wake from upwind turbines. To evaluate naturally occurring turbulence, we reviewed one year of meteorological data and plotted turbulence intensity for 52,560 10-minute data points. As shown on Figure 19, higher turbulence occurs during the day, due to higher solar radiation. Overall, 76% of the data points are below 0.20 turbulence intensity, with most of those periods above this figure occurring during the day.

Turbulence intensity is highest at the lowest wind speeds, when sound output from the wind turbines is lower. Figure 20 shows seasonal turbulence intensity from the Saddleback Ridge met tower plotted against wind speed.

Figure 20: Turbulence intensity by time of day. Boxes show 90% of data and "whiskers" are the +5% and -5% outliers

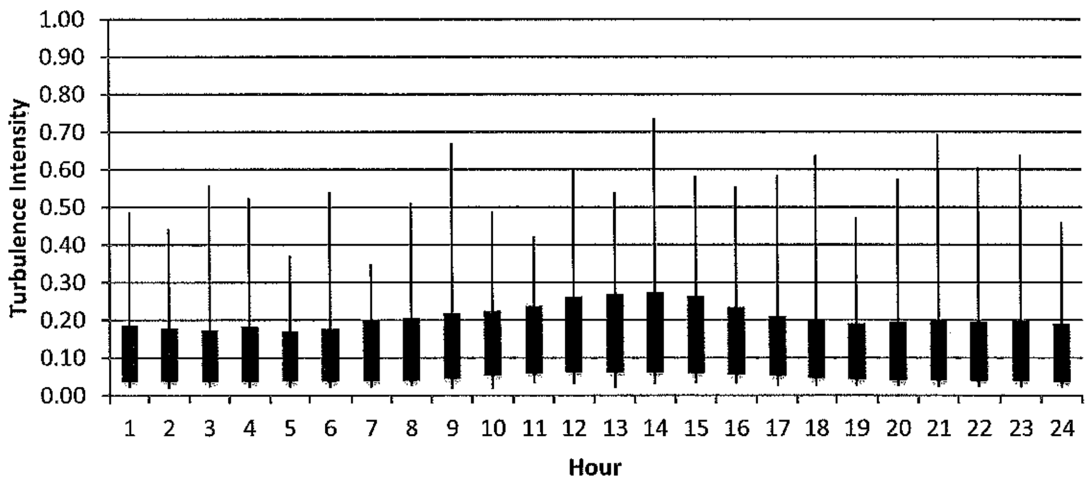
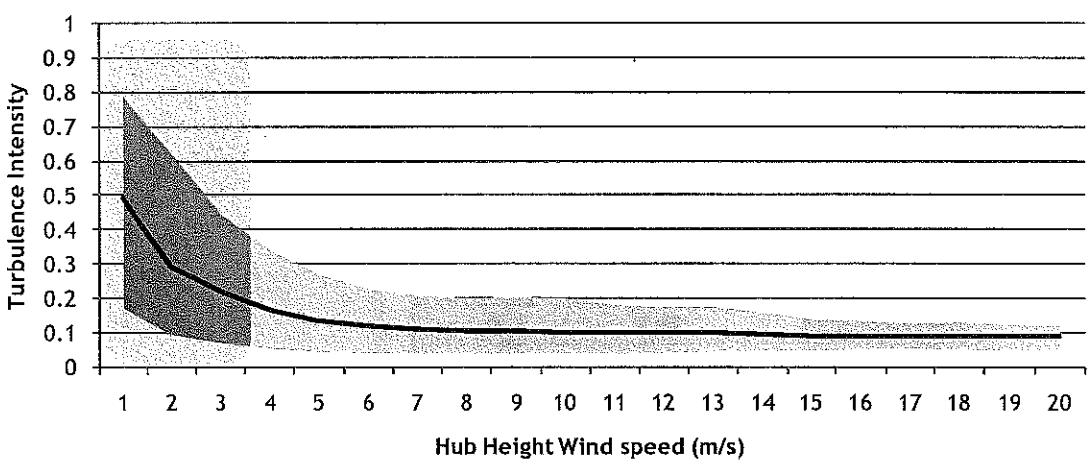


Figure 21: Turbulence Intensity by Wind Speed.

Green area bounds the 5th percentile and 95th percentile turbulence intensities by hub height wind speed. Shaded area shows wind speeds too low for turbine operation. Blue line shows the average.



While it is not possible to precisely calculate the extent of SDRS at wind projects prior to construction, the analysis shown above indicates that the site characteristics at Saddleback Ridge are not condusive to common occurences of SDRS.

Inflow turbulence between turbines in a turbine string can also affect noise from the wind farm. Proper turbine siting and operation minimizes this type of turbine wake impact.

10.2 Analysis of short duration repetitive sound measurements for Spruce Mountain Wind

In 2012, RSG conducted compliance monitoring at Spruce Mountain Wind, an operating Patriot Renewables wind energy project in Woodstock, Maine. The original compliance report showed more than six potential SDRS events for each of the valid monitoring periods. However, since those events did not lead to violations of the sound standard, they were not reviewed to determine whether the events were the result of wind turbines or other sources of sound, such as birds and insects. By definition under the DEP noise rules, in order for amplitude modulation to constitute SDRS it must be the result of wind turbine sound. For this study, we conducted a more detailed screening of that data to assess the actual number of SDRS events resulting from the Spruce Mountain Wind project during the Year 1 compliance period.

Results from the first year of compliance monitoring at Spruce Mountain Wind, which took place in late March/early April 2012 are shown in Table 5. The SDRS analysis shown below was based on the 50 ms LA_f, in accordance with DEP Noise Regulations, Chapter 375.10. The results published in the 2012 compliance report were based on a 50 ms LA_{eq}, which has the effect of overstating the occurrence of SDRS (the results still indicated compliance under the old standard).

Table 5: Spruce Mountain Wind Year 1 Compliance Monitoring Results as Assessed using the New Chapter 375 Regulation[1]

Date/Time	Unadjusted Leq (dBA)	SDRS Seconds
3/30/2012 22:00	40.9	2
4/2/2012 8:20	40.6	5
4/2/2012 8:30	39.5	3
4/2/2012 8:40	36.9	1
4/2/2012 9:30	37.9	0
4/2/2012 23:20	39.9	1
4/3/2012 1:20	28.1	2
4/3/2012 2:20	29.5	0
4/3/2012 4:40	40.2	1
4/3/2012 6:20	39.1	0
4/3/2012 6:30	39.0	8*
4/3/2012 6:50	39.0	10*
4/3/2012 8:10	41.7	73*

*SDRS caused by birds

The higher levels of SDRS events that are shown during the 6:30, 6:50, and 8:20 am periods on April 3rd were found to be largely due to high frequency non-turbine sound sources (birds, insects, etc.).

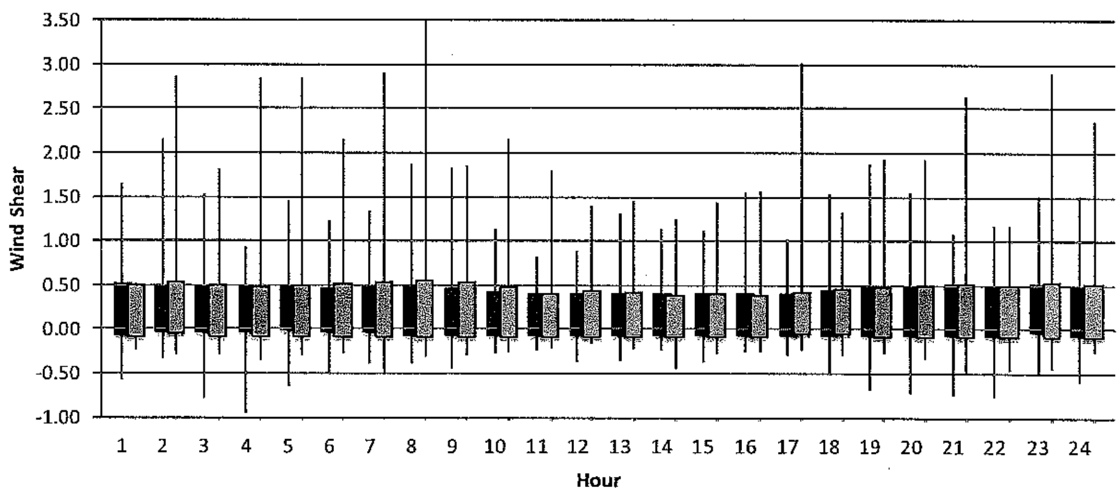
[1] Other than the last three periods, tonal minutes were not reviewed to assess whether they were caused by the wind turbine generators (WTGs) or by biogenic activity (birds and insects, in particular) at the time the Spruce Mountain Wind compliance report was released.

The results show that, generally, SDRS events are not a frequent occurrence at Spruce Mountain Wind, with all periods containing fewer than six events per 10-minute period. Using the former Chapter 375 method, this would generally result in less than 0.1 dB of penalty for a single 10-minute period. Using the current method, this would result in no SDRS penalty.

We note that the closest protected location to SRW is farther from the closest turbine than the monitoring location at Spruce Mountain Wind is to the closest turbine at that project. As one moves farther from a wind farm, the modulation of one turbine gets diminished as more turbines contribute to a greater degree to the overall sound level. In addition, as the distance increases, sound levels from the turbines are attenuated and the turbine sound level gets closer to the background sound level. Therefore, all else equal, we would expect the instances of SDRS events to be even fewer at the Saddleback Ridge Wind monitoring location than at the Spruce Mountain Wind monitoring location.

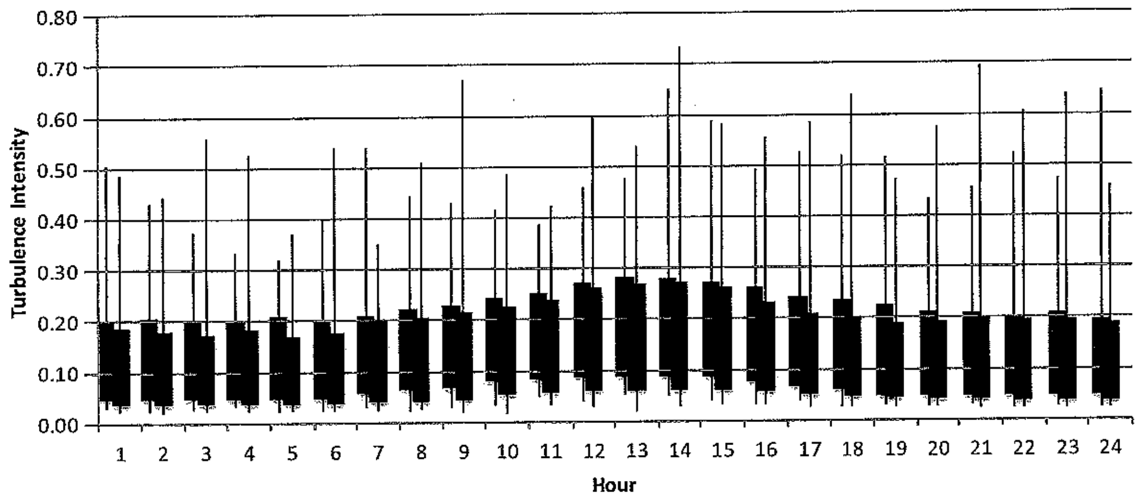
As noted in Section 10.1, SDRS will also be affected by turbulence and wind shear. Figure 22 compares the wind shear by time of day between the Spruce Mountain Wind and SRW projects. The "box and whiskers" have the same meaning as in Figure 19. The wind profiles between Spruce Mountain Wind and SRS show similar patterns and almost the same 95th percentile bounding boxes within each hour.

Figure 22: Comparison of shear exponents between Spruce Mountain Wind (brown) and SRW (blue)



A comparison of turbulence between Spruce Mountain Wind and SRW is shown in Figure 23. Like wind shear, the two projects show very similar patterns, with lower upper bounds at SRW. The average turbulence intensity at SRW is 0.10 compared with 0.18 at Spruce Mountain Wind.

Figure 23: Comparison of 60 m turbulence intensity between Spruce Mountain Wind (brown) and Saddleback (teal) for winds greater than 4 m/s at hub height.



10.3 Turbine design

The GE turbines proposed for this project include Advanced Loads Control (or ALC), a relatively new technology that allows the pitch of each blade to operate independently. In older designs, including the design installed at Spruce Mountain Wind, where the angle of attack of each blade is identical, the blade pitch was optimized only for the wind speed at the hub. Using independent pitch control, each blade can react to changes in wind speed and turbulence intensity, and optimize its angle of attack to specific wind conditions, no matter where it is in the rotor path. Since noise increases with pitch error, we expect that this technology would result in lower occurrences of SDRS compared with other pitch control technologies (stall and common pitch control).

10.4 Short duration repetitive sound penalty

We note that the new Chapter 375 approach to SDRS is very strict, and that small, temporary, short-term deviations can lead to full 5 dB SDRS penalties for select 10-minute periods. If SDRS does become an issue that creates violations of the noise standard, the GE turbines have the capability of implementing "Noise Reduced Operations", which lowers the sound power and electric power output of selected turbines during specified periods.

Even though excessive SDRS is unlikely at SRW, if SDRS does occur, there is currently a 2 dB buffer between the highest modeled sound level and the 42 dBA nighttime standard for this project. Assuming constant sound levels over 12 ten-minute periods, this would allow three ten-minute periods with a 5 dB penalty under the new regulations, and 2.5 minutes of SDRS in one ten-minute period under the old regulations before exceeding 42 dBA.

The level of turbine sound modulation is a dynamic process, dependent on instantaneous turbulence, shear, contribution from other turbines, and relative location of the listener, among other factors. As a result, computer models that can predict the precise number, duration, and level of short duration repetitive sounds from a wind project in any 10-minute period do not exist. Currently, the best way to estimate the extent to which SDRS may occur is to make comparisons with other similar sites and to evaluate specific site characteristics that contribute to the amplitude modulation. In this case, based on comparisons with the nearby Spruce Mountain Wind project, consideration of the monitored shear and turbulence at the Saddleback met tower, and our expectations of reduced amplitude modulation from independent pitch control turbines proposed to be used, we conclude that SDRS events are not expected to be a frequent occurrence at Saddleback Ridge Wind, under the old or new Chapter 375.10 standard. Therefore, we have added no SDRS penalties into the results of our sound propagation modeling for Saddleback.

The applicant has stipulated that post-construction monitoring data will be collected to evaluate SDRS events.

11.0 Construction Impacts

The construction of the turbines will take place primarily on the ridge line. While there may be activity closer to residences for road construction and utility work, such work will be of a relatively short duration.

The equipment used for the construction will be varied. Some of the louder pieces of equipment are shown in Table 4 along with the approximate maximum sound pressure levels at 50 feet (15.2 m) and 2,445 feet (745 m), the approximate distance of the nearest protected location. Sound levels at this distance are likely to be lower due to the presence of dense vegetation between the construction areas and the nearest residences.

Table 6: Maximum sound levels from various construction equipment

Equipment	Sound Pressure Level at 50 feet (dBA)	Sound Pressure Level at 2,445 feet (dBA)[1]
M-250 Liftcrane	82.5	43
2250 S3 Liftcrane	78	38
Excavator	83	45
Dump truck being loaded	86	49
Dump truck at 25 mph accelerating	76	37
Tractor trailer at 25 mph accelerating	80	43
Concrete truck	81	41
Bulldozer	85	45
Rock drill	100	55
Loader	80	37
Backhoe	80	38
Chipper	96	59

Blasting may be required. However, the amount of blasting will be limited. Blasts will be warned as per federal requirements. Blasts will be designed by a licensed blasting company and

[1] Assumes hard ground around construction site, and ISO 9614-2 propagation with no vegetation reduction. Actual sound levels will likely be lower given the prevalence of dense vegetation and soft ground around the site.

charges and delays will be set such that Bureau of Mines standards for vibration and airblast will be complied with.

Construction will take place over approximately nine months. Major construction work, such as clearing for the access roads, will occur primarily during the day; however, minor construction work may extend earlier or later.

Due to the setbacks involved and the limited duration of the activities, construction noise should not pose concerns.

12.0 Summary and Conclusions

Patriot Renewables proposes to construct and operate 12 GE 2.75-103 2.75 MW wind turbines in Carthage, Maine. These turbines have a nominal sound power rating of 105 dBA. The project will generate up to 33 MW of electricity.

This report evaluated the potential noise impacts of the project and concluded the following:

1) A 42 dBA nighttime (7 pm-7 am) noise limit as ordered on March 5, 2013 by the Maine Supreme Court and a 55 dBA daytime (7 am to 7 pm) noise limit apply to the project.
2) The proposed wind turbine does not generate any tonal sound according the Maine DEP standard.
3) Sound propagation modeling was conducted using conservative assumptions, including a ground absorption factor of 0.5 (to represent mixed hard and soft ground), and 3 dB added to the modeled results to account for sound power and propagation uncertainty.
4) The modeled levels of low frequency sound will be below recognized standards for low frequency sound intended to protect against perceptible building vibration.
5) The highest modeled sound level at a non-participating residence was 40.3 dBA (Buffer B-012), 1.7 dBA below the 42 dBA nighttime noise limit. Sound levels from the turbines do not exceed 55 dBA at any protected location. The worst-case modeled sound levels are lower than the October 2010, "Noise Impact Study for Saddleback Ridge Wind Farm," March 2011 revision and May 2012 revision. This is due to the additional landowner agreements obtained by SRW; the use of updated sound power curves with more sound energy in the higher frequencies and less sound energy in the lower frequencies, which results in faster attenuation over distance; and the use of DEP's current modeling parameters.
6) The analyses described in this report indicate the Saddleback Ridge Wind project will meet the noise standards under the new and old Chapter 375.10 standard with all turbines at full sound power during the day and at night.

APPENDIX A: MODELING INPUTS AND RESULTS

Table A 1: Manufacturer Turbine Mean Sound Power Spectrum (dBA)

Turbine Model	Octave Band Frequency (Hz)									dBA
	31.5	*63*	*125*	*250*	*500*	*1000*	*2000*	*4000*	*8000*	
GE 2.75/2.85-103	80.7	90.3	94.5	94.6	95.8	100.3	99.6	90.7	71.9	105.0

Table A 2: Modeling Parameters

Parameter	Setting
Ground Absorption	Spectral for all sources, G=0.5
Atmospheric Absorption	Based on 10 Degrees Celsius, 70 % Relative Humidity
Reflections	None
Receiver Height	4 m for residences, 1.5 meters for grid and other locations

Table A 3: Modeled Turbine Source Data (includes +3 dB to account for uncertainty factor)

Turbine ID	Modeled Sound Power (dBA)	Relative Turbine Hub Height (m)	Coordinates (UTM NAD 83 Z19N)		
			X (m)	Y (m)	Z (m)
T01	108	85	390484	4939603	569
T02	108	85	390610	4939795	584
T03	108	85	390798	4939930	614
T04	108	85	390849	4940197	635
T05	108	85	391043	4940306	660
T06	108	85	391190	4940491	655
T07	108	85	391339	4940651	655
T08	108	85	391463	4941004	700
T09	108	85	391577	4941231	700
T10	108	85	391672	4941447	691
T11	108	85	391730	4941704	702
T12	108	85	391818	4941907	730

Table A 4: Modeled Residences and 500-foot Buffer Locations

Receiver ID	Description*	Relative Height (m)	Coordinates (UTM NAD83 Z19N)		Elevation (m)	Modeled Sound Level (dBA)	Closest Turbine	Distance to Closest Turbine (m)**	Distance to Closest Turbine (ft)**
			X (m)	Y (m)					
001	Participating	4	391938	4940511	379	45.4	T07	713	2339
B 001	Participating	1.5	391783	4940550	421	46.2	T07	556	1825
002	Participating	4	392419	4940590	341	42.0	T08	1133	3718
B 002	Participating	1.5	392361	4940686	349	41.8	T08	995	3264
003	Participating	4	392444	4940545	333	41.6	T08	1174	3851
004	Participating	4	392407	4940273	307	41.0	T07	1213	3980
B 004	Participating	1.5	392263	4940346	316	41.3	T07	1062	3484
005	Participating	4	392094	4939622	278	40.5	T06	1336	4383
B 005	Participating	1.5	391993	4939740	291	40.7	T06	1187	3895
006	Non-Participating	4	392084	4939473	266	39.9	T05	1416	4646
B 006	Non-Participating	1.5	391958	4939559	280	39.9	T05	1269	4164
007	Non-Participating	4	392107	4939470	264	39.7	T05	1436	4710
008	Non-Participating	4	392048	4939374	266	39.6	T03	1435	4707
009	Non-Participating	4	392196	4939369	255	38.8	T05	1565	5133
010	Non-Participating	4	392192	4939147	243	37.9	T03	1663	5455
011	Non-Participating	4	391828	4939202	286	39.9	T03	1327	4355
012	Non-Participating	4	391795	4939197	287	40.0	T03	1304	4278
B 012	Non-Participating	1.5	391679	4939311	299	40.3	T03	1149	3768
013	Non-Participating	4	391832	4939000	271	38.8	T03	1455	4774
014	Non-Participating	4	391687	4938452	279	36.5	T01	1706	5598
015	Non-Participating	4	391595	4938484	282	36.9	T01	1620	5316
016	Non-Participating	4	391246	4938318	314	36.8	T01	1532	5025
017	Non-Participating	4	391177	4938244	319	36.4	T01	1562	5124
018	Non-Participating	4	391074	4938252	331	36.6	T01	1509	4952
019	Non-Participating	4	390977	4938441	358	38.0	T01	1296	4253
020	Non-Participating	4	390961	4938206	341	36.5	T01	1509	4951
021	Non-Participating	4	390815	4938311	351	37.0	T01	1368	4488
022	Non-Participating	4	391063	4938700	343	39.7	T01	1117	3666
B 022	Non-Participating	1.5	391000	4938847	346	40.1	T01	966	3168
023	Participating	4	390132	4938946	310	40.6	T01	821	2694
B 023	Participating	1.5	390156	4939007	318	40.6	T01	759	2489
024	Participating	4	390287	4938558	349	38.1	T01	1106	3628
025	Participating	4	390372	4938626	373	39.2	T01	1023	3357
026	Non-Participating	4	390540	4938330	358	35.2	T01	1308	4292
027	Non-Participating	4	389870	4938675	304	37.6	T01	1166	3827
028	Non-Participating	4	389816	4938869	304	38.4	T01	1053	3455
029	Non-Participating	4	389908	4938895	300	38.9	T01	979	3213

Receiver ID	Description*	Relative Height (m)	Coordinates (UTM NAD83 Z19N)		Elevation (m)	Modeled Sound Level (dBA)	Closest Turbine	Distance to Closest Turbine (m)**	Distance to Closest Turbine (ft)**
			X (m)	Y (m)					
B 029	Non-Participating	1.5	389933	4938951	297	38.6	T01	925	3036
030	Non-Participating	4	389259	4939023	256	36.5	T01	1413	4635
031	Non-Participating	4	389097	4939299	243	36.3	T01	1478	4850
032***	Non-Participating	4	389532	4939645	269	39.4	T01	1028	3373
B 032***	Non-Participating	1.5	389676	4939640	290	38.9	T01	887	2910
033	Non-Participating	4	389037	4939922	232	36.7	T01	1541	5055
034	Non-Participating	4	389000	4940058	234	36.5	T01	1608	5276
B 034	Non-Participating	1.5	389156	4940058	252	36.4	T01	1461	4792

* "Participating" and "Non-participating" denotes a residence location; "Buffer" is the highest level with a 500-foot buffer or the property line, whichever is closer. Buffers are shown for the closest residences to the project. Where the residences are clustered, only the closest buffer to the project is shown.

** Distances are from the receiver to the turbine nacelle and take into account elevation.

*** Receptor 032 and buffer B 032 is a commercial building and does not qualify as a protected location

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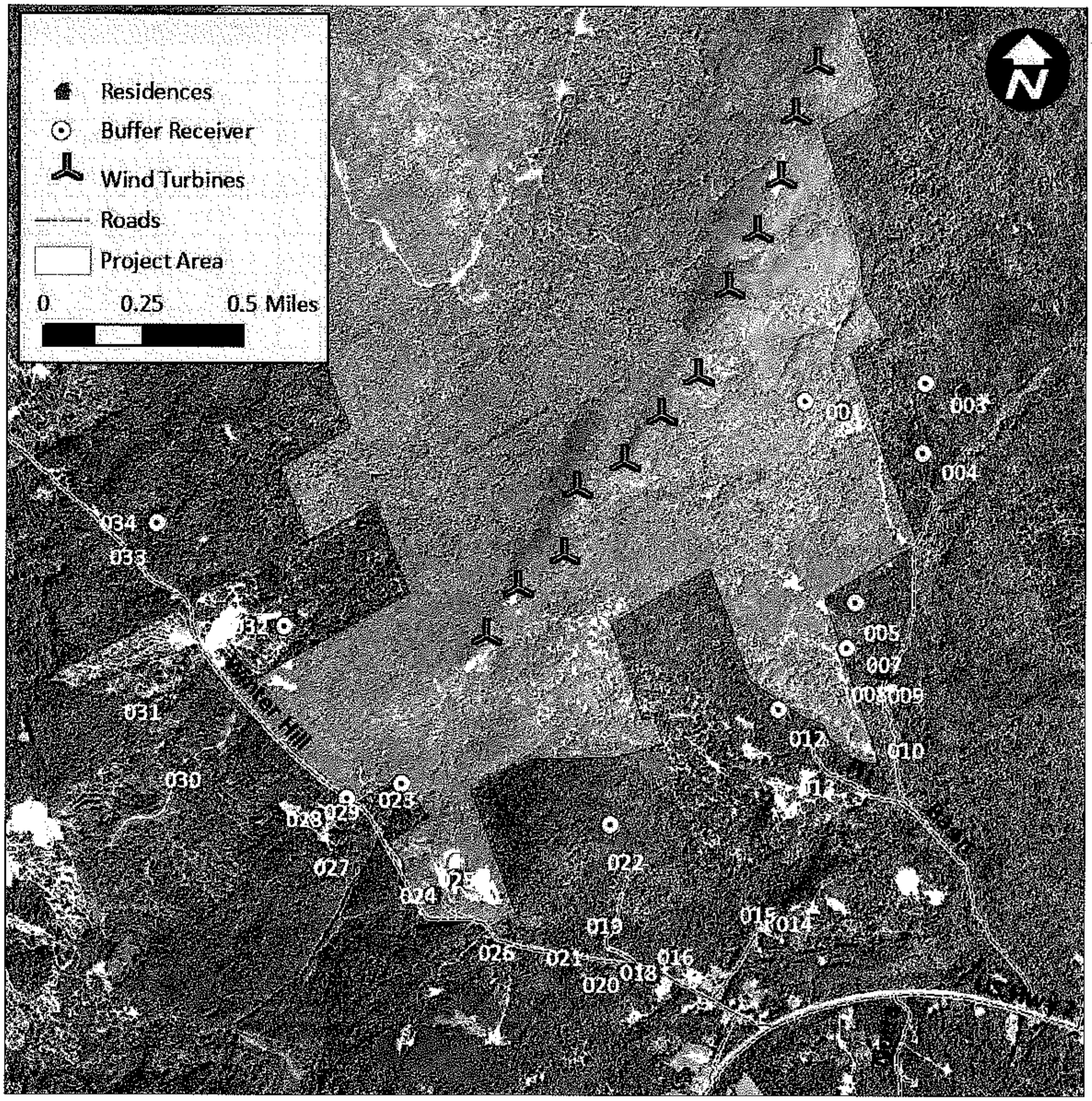
Figure A1: Receiver Locations



**Receivers 002 and 003 are in close proximity to each other and are indistinguishable from each other on this map.

APPENDIX B: NOISE EASEMENTS

Saddleback Ridge Wind Project Participating Receptors

Receptor ID	Landowner	Agreement
001	Western Maine Realty, LLC	Sound Easement
002	William Kremer	Sound Easement
003	Dennis & Diane McAlister	
004	Wilfred & Teresa Deane	
005	Keith & Karen Potts	Sound Easement
023	Erlon Gill	Sound Easement
024 and 025	Phillip & Janet McIntyre	Lease

WIND POWER PROJECT EASEMENT

THIS EASEMENT is made by and between Western Maine Realty, LLC, a Maine limited liability company with an address of 549 South Street, Quincy, MA 02169 ("Grantor"), the owner(s) of a certain lot or parcel of land situated in the Town of Carthage, Franklin County, Maine more particularly described in the deed to Grantor from Betsy L. Macine, dated November 26, 2012 and recorded at the Franklin County Registry of Deeds in Book 3499, Page 76, and shown on the attached Exhibit A (hereinafter referred to as the "Property"), and **SADDLEBACK RIDGE WIND, LLC**, a Massachusetts limited liability company having a mailing address at 549 South Street, Quincy, MA 02169 ("Grantee"), or its successors and assigns.

WHEREAS Grantee plans to operate a wind power project, including wind turbine generators and towers on Saddleback Mountain in Carthage, Maine and related equipment, facilities, infrastructure and substructures (hereinafter referred to as the "Wind Power Project"), on lands near the Property that are further described in a lease to Grantee dated November 15, 2012, memorandum of which is recorded in the Franklin County Registry of Deeds in Book 3500, Page 195; a lease to Grantee dated June 2, 2009, recorded in Book 3215, Page 42; a lease to Grantee dated October 8, 2008 , recorded in Book 3124, Page 349; a lease to Grantee dated February 17, 2009 , recorded in Book 3124, Page 345; and a lease to Grantee to be recorded for land described in deeds dated September 14, 2011 and recorded in Book 3384, Page 94 and dated January 14, 2013 and recorded in Book 3518, Page 276, all as the same may be reconfigured from time to time ("Grantee's Land"); and

WHEREAS, the Wind Power Project may emit sound at levels that may exceed current or future Maine Department of Environmental Protection quiet nighttime sound limits for the Property, and additionally may cast shadows onto or produce a shadow flicker effect on the Property;

NOW, THEREFORE, for good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged, Grantor hereby grants, with Quitclaim covenant, a perpetual easement to Grantee for: (a) the right to have sound generated from the Wind Power Project impact the Property and exceed otherwise applicable federal, state, local or other maximum sound level limits applicable to locations on the Property; (b) the right to have any audio, visual, light, vibration, electromagnetic, ice or weather hazard resulting from Wind Power Project operations or activities impact the Property; and (c) the right to cast shadows or shadow flicker from the Wind Power Project onto the Property.

If the Wind Power Project is not constructed and delivering energy to the electrical grid within ten (10) years of the date of this Easement, this easement shall automatically expire, without any written release by Grantee. This Easement shall also automatically expire, without any written release by Grantee, in the event the Wind Power Project shall be decommissioned or abandoned and then remain inoperative for a period of five (5) consecutive years.

This Easement shall extend to, be binding upon and shall inure to the benefit of heirs, personal representatives, successors and assigns of the parties hereto. The burden of the easement and rights hereby granted shall run with the Property and shall pass automatically to successor owners of the Property. The benefit of the easement and rights hereby granted is appurtenant to and shall initially benefit the leasehold interest of Grantee in Grantee's Land, but may, at the option of Grantee be further transferred in whole or in part, and may be sold, leased, assigned, pledged, and mortgaged by Grantee in gross, it being the specific intent of the parties that such benefit may be transferred to any successors or assignees of Grantee that own or operate the Wind Power Project, as it may be modified, divided or expanded from time to time.

The benefit of the Easement hereby granted and the covenants and agreements contained herein may be enforced by Grantee, its successors and assigns, by any appropriate legal or equitable remedy. In the event that Grantee, its successors or assigns, shall bring an action against Grantor, its successors or assigns, by reason of a breach or violation of this Easement by Grantor or its successors and assigns, to enforce its rights hereunder, the substantially prevailing party in such action shall be entitled to recover its reasonable attorneys' fees and court costs incurred in such action from the non-prevailing party.

Grantor acknowledges that it has been fully and fairly compensated for any and all claims of damages or harm (including diminished property value) related to the foregoing and Grantor, for itself, its successors and assigns, hereby releases Grantee, its successors and assigns and any operating entities claiming by, through or under any of them, all of whom are expressly intended as beneficiaries of this release, from and for any and all claims, demands, causes of action, losses, liabilities, costs and expenses arising in any way out of emissions or emanations or other manners of disturbance or nuisance associated with the Wind Power Project, including, without limitation, claims or causes of action relating to public or private nuisance.

Each party agrees that they shall execute such additional documents or instruments, and shall undertake such actions as are necessary and appropriate to effectuate the intent of this Easement, including but not limited to, executing and delivering such additional documents as may be reasonably required by any lenders or assignees.

(SIGNATURE ON NEXT PAGE)

WITNESS our hands and seals this 20 day of March, 2013.

In the presence of: GRANTOR

Lindsay Galbraith

Western Maine Realty, LLC
By Jay M. Cashman, its Manager

STATE OF MASSACHUSETTS
COUNTY OF NORFOLK March 20, 2013

Personally appeared the above-name Jay Cashman, Manager of Western Maine Realty, LLC, a Maine limited liability company, and acknowledged the foregoing instrument to be his free act and deed in his said capacity and the free act and deed of said limited liability company.

Notary Public
Print Name: Diane C Williams
Date Commission Expires: 10/11/2013

DIANE C WILLIAMS
Notary Public
COMMONWEALTH OF MASSACHUSETTS
My Commission Expires
October 11, 2013

160

EXHIBIT A

Bk 3499 Pg76 #9949
11-28-2012 @ 11:23a

SHORT FORM WARRANTY DEED

Betsy L. Mancine of Wilton, Maine ("Grantor"), FOR CONSIDERATION PAID, grants to **Western Maine Realty, LLC**, a Maine limited liability company with a mailing address of 549 South Street, Quincy, MA 02269 ("Grantee") WITH WARRANTY COVENANTS certain real property, together with any improvements thereon, located in the Town of Carthage, Franklin County, Maine, and more particularly described on Exhibit A attached hereto and made a part hereof.

Maine Real Estate Transfer Tax Paid

Being the same premises conveyed to the Grantor by deed from Laura Ann Gould dated April 23, 2010 and recorded in the Franklin County Registry of Deeds in Book 3242, Page 242.

WITNESS my hand and seal this 26th day of November, 2012.

WITNESS:

____
Name:

Betsy L. Mancine

State of Maine
County of Cumberland

November 26, 2012

PERSONALLY APPEARED the above-named Betsy L. Mancine and acknowledged the foregoing instrument to be her free act and deed.

Before me,

Print Name: Hawley Strout
~~Notary Public~~ Atty at Law
~~Notary Commission Expires:~~

EXHIBIT A

A certain lot or parcel of land, together with any improvements thereon, in the Town of Carthage, County of Franklin and State of Maine, more particularly described as follows:

Being Lot #5, containing 28.1 acres, on a certain plan entitled "Subdivision Plan Rocky Ridge Basin Property Located off Basin Road, Carthage, Maine", dated October 27, 2006, revised November 29, 2006, and recorded in the Franklin County Registry of Deeds as Carthage Plan #4777.

Also hereby conveying a right of way from U.S. Route 2 over and along the discontinued Old County Road, now known as Basin Road, for all purposes, including the installation and maintenance of utilities, to the southeasterly corner of Lot #7 as depicted on the aforesaid plan, and further conveying a right of way over the sixty (60) foot right of way depicted on the aforesaid plan as traveling northerly through Lot #7 and Lot #6 to Lot #5 herein conveyed. Also hereby conveying a right of way over all roads depicted within the Rocky Ridge Basin Subdivision on Plan 4777, including the right of way leading northeasterly to the southeasterly corner of Lot #1 from the Old County Road.

The property herein conveyed is SUBJECT TO the following matters:

1. Such state of facts disclosed on plan entitled "Subdivision Plan Rocky Ridge Basin, Property Located off Basin Road, Carthage, Maine" prepared for Wayne & Joe Buck by Geo-Systems dated October 27, 2006 last revised November 29, 2006 and recorded in Franklin County Registry of Deeds in Plan File #4777.
2. The rights and easements described in the deed from Laura Ann Gould to Betsy L. Mancine dated April 23, 2010 and recorded in Franklin County Registry of Deeds in Book 3242, Page 242.
3. The rights and easements set forth in the deed from Edward R. Ellis and Marylyn L. Ellis to C. Harvey Calden et al dated June 16, 1977 recorded in said Registry of Deeds in Book 517, Page 161.

FRANKLIN COUNTY
Susan O. Black
Register of Deeds

EXHIBIT C

WIND POWER PROJECT EASEMENT

THIS EASEMENT is made by and between **Wilfred J. Deane, Jr. and Teresa E. Deane** with an address of P.O. Box 97, Buckfield, ME 04220 ("Deane") **Dennis and Diane McAlister** of 20 J&A Lane, Buckfield, ME 04220 ("McAlister"), **William F. Kremer**, with a mailing address of 38 North Buckfield Road, Buckfield, ME 04220 ("Kremer") (Deane, McAlister and Kremer collectively herein referred to as "Grantor"), as the owners of certain lots or parcels of land situated in the Town of Carthage, Franklin County, Maine more particularly described in deeds to Grantor recorded in the Franklin County Registry of Deeds in Book 2871, Page 233 (Deane), Book 3528, Page 33 (McAlister), and Book 3528 Page 36 (Kremer) (hereinafter referred to as the "Property"), and **SADDLEBACK RIDGE WIND, LLC**, a Massachusetts limited liability company having a mailing address at 549 South Street, Quincy, MA 02169 ("Grantee"), or its successors and assigns.

WHEREAS Grantee plans to operate a wind power project, including wind turbine generators and towers on Saddleback Mountain in Carthage, Maine and related equipment, facilities, infrastructure and substructures (hereinafter referred to as the "Wind Power Project"), on lands near the Property that are further described in a lease to Grantee dated November 15, 2012, memorandum of which is recorded in the Franklin County Registry of Deeds in Book 3500, Page 195; a lease to Grantee dated June 2, 2009, recorded in Book 3215, Page 42; a lease to Grantee dated October 8, 2008 , recorded in Book 3124, Page 349; a lease to Grantee dated February 17, 2009 , recorded in Book 3124, Page 345; and a lease to Grantee to be recorded for land described in deeds dated September 14, 2011 and recorded in Book 3384, Page 94 and dated January 14, 2013 and recorded in Book 3518, Page 276, all as the same may be reconfigured from time to time ("Grantee's Land"); and

WHEREAS, the Wind Power Project may emit sound at levels that may exceed current or future Maine Department of Environmental Protection quiet nighttime sound limits for the Property, and additionally may cast shadows onto or produce a shadow flicker effect on the Property;

NOW, THEREFORE, for good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged, Grantor hereby grants, with Quitclaim covenant, a perpetual easement to Grantee for: (a) the right to have sound generated from the Wind Power Project impact the Property and exceed otherwise applicable federal, state, local or other maximum sound level limits applicable to locations on the Property; and (b) the right to cast shadows or shadow flicker from the Wind Power Project onto the Property.

If the Wind Power Project is not constructed and delivering energy to the electrical grid within ten (10) years of the date of this Easement, this easement shall automatically expire, without any written release by Grantee. This Easement shall also automatically expire, without any written release by Grantee, in the event the Wind Power Project shall be decommissioned or abandoned and then remain inoperative for a period of five (5) consecutive years.

This Easement shall extend to, be binding upon and shall inure to the benefit of heirs, personal representatives, successors and assigns of the parties hereto. The burden of the easement and rights hereby granted shall run with the Property and shall pass automatically to successor owners of the Property. The benefit of the easement and rights hereby granted is appurtenant to and shall initially benefit the leasehold interest of Grantee in Grantee's Land, but may, at the option of Grantee be further transferred in whole or in part, and may be sold, leased, assigned, pledged, and mortgaged by Grantee in gross, it being the specific intent of the parties that such benefit may be transferred to any successors or assignees of Grantee that own or operate the Wind Power Project, as it may be modified, divided or expanded from time to time.

The benefit of the Easement hereby granted and the covenants and agreements contained herein may be enforced by Grantee, its successors and assigns, by any appropriate legal or equitable remedy. In the event that Grantee, its successors or assigns, shall bring an action against Grantor, its successors or assigns, by reason of a breach or violation of this Easement by Grantor or its successors and assigns, to enforce its rights hereunder, the substantially prevailing party in such action shall be entitled to recover its reasonable attorneys' fees and court costs incurred in such action from the non-prevailing party.

Grantor acknowledges that it has been fully and fairly compensated for any and all claims of damages or harm (including diminished property value) related to the foregoing and Grantor hereby releases Grantee from and for any and all claims of disturbance or nuisance associated with the Wind Power Project. Notwithstanding the foregoing, however, in the event that any of Grantee's construction activity in connection with the Wind Power Project shall, within two years of the completion of construction, affect the structural integrity of existing structures on the Property as of the date hereof, including but not limited to foundations and footings, or shall cause contamination or drawdown (depletion) of any drinking water well serving the current improvements on the Property, Grantee shall be responsible for and shall either conduct repairs or pay for the reasonable costs of any repairs or replacements that may be necessary as a result.

By its acceptance hereof, Grantee, as the operator of the Wind Power Project referenced above, hereby covenants and agrees that it shall not use the Property for operational access to the Wind Power Project, provided, however, that the foregoing limitation shall not affect any access by Grantee (or its successors, assigns, or permitted licensees) for timber management, hunting, recreational use, or any other use for which access over the Property has historically been used. Grantee further covenants and agrees that in the event Grantee, or its successors or assigns (including contractors, agents, or employees of Grantee) shall cause damage to the primary access road serving the Property (i.e., the Old County Road) by use of logging trucks, heavy equipment operations or otherwise, Grantee shall be responsible for and shall reasonably repair and restore the road to its immediately prior condition. The foregoing shall in no way obligate Grantee to repair any damages or conditions caused by any other users of the road, nor shall it obligate Grantee to repair ordinary or customary wear and tear on the road for the benefit of Grantor or any other party.

Each party agrees that they shall execute such additional documents or instruments, and shall undertake such actions as are necessary and appropriate to effectuate the intent of this

Easement, including but not limited to, executing and delivering such additional documents as may be reasonably required by any lenders or assignees.

It is expressly acknowledged and agreed that the Property may become subject to certain corrective deeds by or between Deane, McAlister or Kremer to correct lot line or boundary descriptions in the deeds referenced herein, and that the rights and easements set forth herein shall burden the entirety of the land of the parties hereto being (collectively among all Grantor parties) all of Lot 8 in the SST Subdivision as shown on a Map of Land of S.S.T., Inc. dated May 27, 1981 and recorded in the Franklin County Registry of Deeds in Plan File P-29.

(SIGNATURES ON FOLLOWING PAGES)

WITNESS our hands and seals this 1st day of April, 2013.

In the presence of:

B. A. Reed

to both

GRANTOR

Wilfred J. Deane, Jr.

Teresa E. Deane

STATE OF MAINE
COUNTY OF OXFORD

APRIL 1, 2013

Personally appeared the above-named WILFRED J. DEANE, JR + TERESA E. DEANE and acknowledged the foregoing instrument to be his/her/their free act and deed.

Before me,

B. A. Reed

~~Notary Public~~ - ATTORNEY AT LAW
Print:
My commission expires:

1666

WITNESS our hands and seals this 1st day of april, 2013.

In the presence of: GRANTOR

B. A. Rood

to both

Dennis I McAlister

Dennis McAlister

Diane P McAlister

Diane McAlister

STATE OF MAINE

COUNTY OF OXFORD APRIL 1, 2013

Personally appeared the above-named DENNIS I MCALISTER & DIANE P. MCALISTER and acknowledged the foregoing instrument to be his/her/their free act and deed.

Before me,

B. A. Rood

~~Notary Public~~ ATTORNEY AT LAW - ME

Print: BRUCE A. ROOD

My commission expires:

WITNESS our hands and seals this 1ST day of APRIL, 2013.

In the presence of: GRANTOR

William F. Kremer

STATE OF MAINE
COUNTY OF OXFORD APRIL 1, 2013

Personally appeared the above-named WILLIAM F. KREMER and acknowledged the foregoing instrument to be his/her/their free act and deed.

Before me,

~~Notary Public~~ ATTORNEY AT LAW
Print: BRUCE A. ROOD
My commission expires:

1168

Bk 3534 Pg141 #2689
04-04-2013 @ 12:59p

WIND POWER PROJECT EASEMENT

THIS EASEMENT is made by and between **Keith R. Potts and Karen D. Potts** of 5 Harriet Circle Gorham, ME 04038 ("Grantor"), the owner(s) of a certain lot or parcel of land situated in the Town of Carthage, Franklin County, Maine recorded at the Franklin County Registry of Deeds in Book 2342, Page 92, and Book 2822, Page 273 and shown on the attached Exhibit A (hereinafter referred to as the "Property"), and **SADDLEBACK RIDGE WIND, LLC**, a Massachusetts limited liability company having a mailing address at 549 South Street, Quincy, MA 02169 ("Grantee"), or its successors and assigns.

WHEREAS Grantee plans to operate a wind power project, including wind turbine generators and towers on Saddleback Mountain in Carthage, Maine and related equipment, facilities, infrastructure and substructures (hereinafter referred to as the "Wind Power Project"), on lands near the Property that are further described in a lease to Grantee dated November 15, 2012, memorandum of which is recorded in the Franklin County Registry of Deeds in Book 3500, Page 195; a lease to Grantee dated June 2, 2009, recorded in Book 3215, Page 42; a lease to Grantee dated October 8, 2008 , recorded in Book 3124, Page 349; a lease to Grantee dated February 17, 2009 , recorded in Book 3124, Page 345; and a lease to Grantee to be recorded for land described in deeds dated September 14, 2011 and recorded in Book 3384, Page 94 and dated January 14, 2013 and recorded in Book 3518, Page 276, all as the same may be reconfigured from time to time ("Grantee's Land"); and

WHEREAS, the Wind Power Project may emit sound at levels that may exceed current or future Maine Department of Environmental Protection quiet nighttime sound limits for the Property, and additionally may cast shadows onto or produce a shadow flicker effect on the Property;

NOW, THEREFORE, for good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged, Grantor hereby grants, with Quitclaim covenant, a perpetual easement to Grantee for: (a) the right to have sound generated from the Wind Power Project impact the Property and exceed otherwise applicable federal, state, local or other maximum sound level limits applicable to locations on the Property, provided, however, that sound generated from the Wind Power Project between 7:00 p.m. and 7:00 a.m. shall not exceed the limit of 45 dBA as set forth and as measured under former MDEP regulations at 2 C.M.R. 06 096 375-7 § 10(C)(1)(a)(v) (2001 ed.) ; and (b) the right to cast shadows or shadow flicker from the Wind Power Project onto the Property.

If the Wind Power Project is not constructed and delivering energy to the electrical grid within ten (10) years of the date of this Easement, this easement shall automatically expire, without any written release by Grantee. This Easement shall also automatically expire, without any written release by Grantee, in the event the Wind Power Project shall be decommissioned or abandoned and then remain inoperative for a period of four (4) consecutive years.

This Easement shall extend to, be binding upon and shall inure to the benefit of heirs, personal representatives, successors and assigns of the parties hereto. The burden of the easement and rights hereby granted shall run with the Property and shall pass automatically to successor owners of the Property. The benefit of the easement and rights hereby granted is appurtenant to and shall initially benefit the leasehold interest of Grantee in Grantee's Land, but may, at the option of Grantee be further transferred in whole or in part, and may be sold, leased, assigned, pledged, and mortgaged by Grantee in gross, it being the specific intent of the parties that such benefit may be transferred to any successors or assignees of Grantee that own or operate the Wind Power Project, as it may be modified, divided or expanded from time to time.

The benefit of the Easement hereby granted and the covenants and agreements contained herein may be enforced by Grantee, its successors and assigns, by any appropriate legal or equitable remedy. In the event that Grantee, its successors or assigns, shall bring an action against Grantor, its successors or assigns, by reason of a breach or violation of this Easement by Grantor or its successors and assigns, to enforce its rights hereunder, the substantially prevailing party in such action shall be entitled to recover its reasonable attorneys' fees and court costs incurred in such action from the non-prevailing party.

Grantor acknowledges that it has been fully and fairly compensated for any and all claims of damages or harm (including diminished property value) related to the foregoing and Grantor hereby releases Grantee from and for any and all claims of disturbance or nuisance associated with the Wind Power Project.

By its acceptance hereof, Grantee, as the operator of the Wind Power Project referenced above, hereby covenants and agrees that it shall not use the Property for operational access to the Wind Power Project, provided, however, that the foregoing limitation shall not affect any access by Grantee (or its successors, assigns, or permitted licensees) for timber management, hunting, recreational use, or any other use for which access over the Property has historically been used in the location of the "Woods Road" (so-called) on the Map of Land of S.S.T., Inc. dated May 23, 1981 and recorded in the Franklin County Registry of Deeds as Plan P-29.

Each party agrees that they shall execute such additional documents or instruments, and shall undertake such actions as are necessary and appropriate to effectuate the intent of this Easement, including but not limited to, executing and delivering such additional documents as may be reasonably required by any lenders or assignees.

(SIGNATURE ON NEXT PAGE)

WITNESS our hands and seals this _____ day of ___________, 2013.

In the presence of:

Keith Potts
Karen Potts

GRANTOR

Keith Potts

Karen Potts

STATE OF Maine
COUNTY OF Cumberland

3/21, 2013

Personally appeared the above-named Keith + Karen Potts and acknowledged the foregoing instrument to be his/her/their free act and deed.

SEAL

Before me,

Jennifer Elliott

Notary Public

Print: JENNIFER C. ELLIOTT
Notary Public, Maine
My Commission Expires May 25, 2014

My commission expires:

EXHIBIT A

(Deed)

172

Bk 2342 Pg92 #10310
09-04-2003 @ 01:31p

WARRANTY DEED

Joint Tenancy
Maine Statutory Short Form

KNOW ALL PERSONS BY THESE PRESENTS, That

Bruce W. Charles and Linda J. Cunningham

of Standish , County of Cumberland , State of Maine,

for consideration paid, grant to Karen Potts and Keith Potts

of Gorham , County of Cumberland , State of Maine,

whose mailing address is 5 Harriet Circle, Gorham, Maine 04038

with **warranty covenants**, as joint tenants the land in Carthage, County of Franklin, and State of Maine, described on the attached **EXHIBIT A.**

Maine Real Estate Transfer Tax Paid

WITNESS our/my hand(s) and seal(s) this 29th day of August, 2003

Signed, Sealed and Delivered in presence of:

Bruce W. Charles

Linda J. Cunningham

STATE OF MAINE

August 29, 2003

COUNTY OF Cumberland

Then personally appeared the above named Bruce W. Charles and Linda J. Cunningham and acknowledged the foregoing instrument to be their free act and deed.

Before me,

Notary Public
Printed Name: Fred Oxton
My Commission Expires: 5.16.2007

Order No: 39757 ()

EXHIBIT 'A'

The land with any buildings thereon, located in Carthage, Franklin County, Maine bounded and described as follows, to wit:

Beginning at an iron pin set in the westerly sideline of the discontinued county road known as the Carthage Basin Road at the southerly line of land now or formerly of Kenneth D. Perkins; thence south 80° west one thousand one hundred forty-three (1,143) feet along line of said Perkins land to an iron pin; thence due south two hundred eighty-five (285) feet along line of land now or formerly of Harvey Calden and W. Orman Calden to an iron pin; thence south 85° east eight hundred eighty (880) feet along line of land now or formerly of John J. McHugh and Kathleen S. Luke to an iron pin set in the westerly sideline of the aforementioned discontinued county road; thence continuing south 85° east fifteen (15) feet to the center line of said road; thence northerly along the center line of the road six hundred thirty (630) feet to a point; thence south 80° west fifteen (15) feet to the place of beginning. These premises are shown as Lot Four (4) on a map of land of S.S.T., Inc. by D. Bruce Verrill Associates, Inc. dated May 29, 1981 and recorded in the Franklin County Registry of Deed as Plan #29.

This conveyance is made subject to any and all rights of way which may cross the above described premises.

Being the same premises conveyed to Bruce W. Charles and Linda J. Cunningham by virtue of a warranty deed from Charlene Mandile and James C. Hay dated October 25, 1994 recorded in the Franklin County Registry of Deeds in Book 1488, Page 200.

Rec: Atlantic Title, So. Port.

FRANKLIN COUNTY
Susan O. Black
Register of Deeds

174

BK 2822 Pg273 #11067
10-16-2006 @ 01:57p

Maine Real Estate
Transfer Tax Paid

JOINT TENANCY WARRANTY DEED

I, JAMES A. BARNETT, of 114 South Rumford Road, Rumford, ME 04276,

FOR CONSIDERATION PAID, grant to KEITH R. POTTS and KAREN D. POTTS, Husband and Wife, both of 5 Harriet Circle, Gorham, ME 04038,

with WARRANTY COVENANTS, as JOINT TENANTS, the land in CARTHAGE, FRANKLIN County, MAINE, to wit,

A certain lot or parcel of land situated in the Town of CARTHAGE, County of FRANKLIN, State of MAINE, bounded and described as follows:

BEGINNING at an iron pin set in the westerly sideline of the discontinued county road known as the Carthage Basin Road, at line of land now or formerly of Harvey Calden and W. Orman Calden;

THENCE North 71 Degrees East, 10 FEET, along line of said Calden land, to the center of said discontinued road;

THENCE southerly, along the center of the discontinued road, 550 FEET, to a point;

THENCE South 80 Degrees West, 15 FEET, to an iron pin set in the westerly sideline of said road;

THENCE continuing South 80 Degrees West, 1143 FEET, along line of land RESERVED by S.S.T., Inc., to an iron pin set in line of the aforementioned Calden land;

THENCE due North, 450 FEET, along line of said Calden land, to an iron pin;

THENCE North 71 Degrees East, 1350 FEET, along line of said Calden land, to the PLACE OF BEGINNING.

These premises are shown as LOT 5 on a map of land of S.S.T., Inc., by D. Bruce Verrill Associates, Inc., dated May 29, 1981, and recorded in the Franklin County Registry of Deeds as Plan No.P-29.

This conveyance is made SUBJECT to any and all rights of way which may cross the above described premises.

Being the same property conveyed to James Barnett and Don Hamann by William J. Maillet, also known as William J. Mailett, by his warranty deed dated October 7, 1998, and recorded in the Franklin

JOINT TENANCY WARRANTY DEED
Barnett to Potts
Page 2.

County Registry of Deeds on October 8, 1998, in Book 1790, at Page 332.

Also, being PARCEL TWO as described in the release deed from Don J. Hamann to James A. Barnett, dated Augsut 31, 2006, and recorded in the Franklin County Registry of Deeds on September 22, 2006, in Book 2813, at Pages 96 and 97.

WITNESS my hand and seal this 12th day of October, 2006.

Carol A. Sweatt　　　James A. Barnett
JAMES A. BARNETT

State of Maine
County of Oxford, ss.　　　October 12, 2006

Then personally appeared the above named JAMES A. BARNETT and acknowledged the foregoing instrument to be my free act and deed.

Before me,

Carol A. Sweatt
Carol A. Sweatt
Notary Public

My Commission Expires: 12/28/2011

04-04-2013
FRANKLIN COUNTY
Susan O. Black
Register of Deeds

FRANKLIN COUNTY
Susan O. Black
Register of Deeds

Enf.
DAVID W. AUSTIN - ATTORNEY AT LAW - 104 CONGRESS STREET - RUMFORD, MAINE 04276

Ret: Patriot Renewables
MA - Env.

Bk 3534 Pg136 #2688
04-04-2013 @ 12:59p

WIND POWER PROJECT EASEMENT

THIS EASEMENT is made by and between by Erlon J. Gill, Trustee of Erlon J. Gill Revocable Trust of 2009 of 14 Brown Avenue, Greenland, NH 03840 ("Grantor"), the owner(s) of a certain lot or parcel of land situated in the Town of Carthage, Franklin County, Maine recorded at the Franklin County Registry of Deeds in Book 3159, Page 237, and shown on the attached Exhibit A (hereinafter referred to as the "Property"), and **SADDLEBACK RIDGE WIND, LLC**, a Massachusetts limited liability company having a mailing address at 549 South Street, Quincy, MA 02169 ("Grantee"), or its successors and assigns.

WHEREAS Grantee plans to operate a wind power project, including wind turbine generators and towers on Saddleback Mountain in Carthage, Maine and related equipment, facilities, infrastructure and substructures (hereinafter referred to as the "Wind Power Project"), on lands near the Property that are further described in a lease to Grantee dated November 15, 2012, memorandum of which is recorded in the Franklin County Registry of Deeds in Book 3500, Page 195; a lease to Grantee dated June 2, 2009, recorded in Book 3215, Page 42; a lease to Grantee dated October 8, 2008 , recorded in Book 3124, Page 349; a lease to Grantee dated February 17, 2009 , recorded in Book 3124, Page 345; and a lease to Grantee to be recorded for land described in deeds dated September 14, 2011 and recorded in Book 3384, Page 94 and dated January 14, 2013 and recorded in Book 3518, Page 276, all as the same may be reconfigured from time to time ("Grantee's Land"); and

WHEREAS, the Wind Power Project may emit sound at levels that may exceed current or future Maine Department of Environmental Protection quiet nighttime sound limits for the Property, and additionally may cast shadows onto or produce a shadow flicker effect on the Property;

NOW, THEREFORE, for good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged, Grantor hereby grants, with Quitclaim covenant, a perpetual easement to Grantee for: (a) the right to have sound generated from the Wind Power Project impact the Property and exceed otherwise applicable federal, state, local or other maximum sound level limits applicable to locations on the Property; (b) the right to have any audio, visual, light, vibration, electromagnetic, ice or weather hazard resulting from Wind Power Project operations or activities impact the Property; and (c) the right to cast shadows or shadow flicker from the Wind Power Project onto the Property.

If the Wind Power Project is not constructed and delivering energy to the electrical grid within ten (10) years of the date of this Easement, this easement shall automatically expire, without any written release by Grantee. This Easement shall also automatically expire, without any written release by Grantee, in the event the Wind Power Project shall be decommissioned or abandoned and then remain inoperative for a period of four (4) consecutive years.

This Easement shall extend to, be binding upon and shall inure to the benefit of heirs, personal representatives, successors and assigns of the parties hereto. The burden of the easement and rights hereby granted shall run with the Property and shall pass automatically to successor owners of the Property. The benefit of the easement and rights hereby granted is appurtenant to and shall initially benefit the leasehold interest of Grantee in Grantee's Land, but may, at the option of Grantee be further transferred in whole or in part, and may be sold, leased, assigned, pledged, and mortgaged by Grantee in gross, it being the specific intent of the parties that such benefit may be transferred to any successors or assignees of Grantee that own or operate the Wind Power Project, as it may be modified, divided or expanded from time to time.

The benefit of the Easement hereby granted and the covenants and agreements contained herein may be enforced by Grantee, its successors and assigns, by any appropriate legal or equitable remedy. In the event that Grantee, its successors or assigns, shall bring an action against Grantor, its successors or assigns, by reason of a breach or violation of this Easement by Grantor or its successors and assigns, to enforce its rights hereunder, the substantially prevailing party in such action shall be entitled to recover its reasonable attorneys' fees and court costs incurred in such action from the non-prevailing party.

Grantor acknowledges that it has been fully and fairly compensated for any and all claims of damages or harm (including diminished property value) related to the foregoing and Grantor, for itself, its successors and assigns, hereby releases Grantee, its successors and assigns and any operating entities claiming by, through or under any of them, all of whom are expressly intended as beneficiaries of this release, from and for any and all claims, demands, causes of action, losses, liabilities, costs and expenses arising in any way out of emissions or emanations or other manners of disturbance or nuisance associated with the Wind Power Project, including, without limitation, claims or causes of action relating to public or private nuisance.

Each party agrees that they shall execute such additional documents or instruments, and shall undertake such actions as are necessary and appropriate to effectuate the intent of this Easement, including but not limited to, executing and delivering such additional documents as may be reasonably required by any lenders or assignees.

(SIGNATURE ON NEXT PAGE)

WITNESS our hands and seals this 13 day of MARCH, 2013.

In the presence of:

Marguerite F. Morgan

GRANTOR

Erlon J. Gill

STATE OF New Hampshire
COUNTY OF Rockingham

March 13, 2013

Personally appeared the above-named Erlon Gill and acknowledged the foregoing instrument to be his/~~her/their~~ free act and deed.

Before me,

SEAL

Marguerite F. Morgan
Notary Public Marguerite F. Morgan
Print:
My commission expires: 10-22-2013

Bk 3159 Pg237 #5545
07-01-2009 @ 12:00p

Maine Real Estate
Transfer Tax Not Necessary

QUIT-CLAIM DEED

I, ERLON J. GILL, of 14 Brown Avenue, Greenland, NH 03840,

FOR CONSIDERATION PAID, grant to ERLON J. GILL, TRUSTEE OF THE ERLON J. GILL REVOCABLE TRUST OF 2009, DATED FEBRUARY 19, 2009, of 14 Brown Avenue, Greenland, NH 03840, his successors and/or assigns,

with QUIT-CLAIM COVENANT, the land in CARTHAGE, FRANKLIN County, State of MAINE, to wit,

A certain lot or parcel of land, together with the buildings and improvements thereon, bounded and described as follows:

BEGINNING at a point on the northeasterly side of the old County Road which leads from the Wilton-East Dixfield Road to the Berry-Mills-Weld Road, said old County Road leading over Winter Hill, so-called, said point being marked by a cedar post and a pile of stones near the foot of Winter Hill;

THENCE running northeasterly along a wire fence line, and bounded by land of Ralph Winter, approximately 550 FEET, to a white birch tree, blazed, with an iron pipe set in the ground near its base;

THENCE running in a straight line in a northwesterly direction and parallel with said old County Road approximately 675 FEET to the point where said line intersects the line of a stone wall;

THENCE running southwesterly along said stone wall approximately 550 FEET to said northeasterly line of the old County Road; THENCE running southeasterly along said road approximately 675 FEET to the POINT OF BEGINNING.

TOGETHER with a right of way at all times and for all legal purposes over and along the road now leading from said old County Road and running along said stone wall to the above described parcel of land, all as now traveled.

Being the same property conveyed to Erlon J. Gill and Ronald Gill by Erlon R. Gill by his warranty deed dated March 16, 1986, and recorded in the Franklin County Registry of Deeds on March 20, 1986, in Book 885, at Page 54.

Ronald Gill died, intestate, on January 17, 1993, survived by his widow, Margaret Gill, and four children, Tina Jackson, Douglas Gill, Denise Rezende and Deborah Soares, his sole heirs-at-law.

Reference is also made to a quit-claim deed with covenant from Margaret Gill and Tina Jackson to Erlon J. Gill, dated April 24, 2007, and recorded in the Franklin County Registry of Deeds on May 7, 2007, in Book 2898, at Page 238.

Bk 3534 Pg140 #2688

Bk 3159 Pg238 #5545

QUIT-CLAIM DEED
Gill to Gill Trust
Page 2.

WITNESS my hand and seal this 26 day of June, 2009.

Danielle Faye Corbett

ERLON J. GILL

State of New Hampshire
County of

June 26, 2009

Then personally appeared the above named ERLON J. GILL and acknowledged the foregoing instrument to be his free act and deed.

Before me,

Danielle Faye Corbett

Notary Public/~~Attorney-at-Law~~

DANIELLE FAYE CORBETT MY COMMISSION EXPIRES APR. 19, 2011 NOTARY PUBLIC NEW HAMPSHIRE

04-04-2013 FRANKLIN COUNTY Susan A. Black Register of Deeds

Rtt: Patriot Renewables MA-Env.

FRANKLIN COUNTY
Susan A. Black
Register of Deeds

DAVID W. AUSTIN - ATTORNEY AT LAW - 104 CONGRESS STREET - RUMFORD, MAINE 04276

EXHIBIT C
To Amended and Restated Wind Energy Land Lease
(Memorandum of Lease)

Amended Memorandum of Lease

This Amended Memorandum of Lease is made as of this 15 day of November, 2012 by **Phillip McIntyre and Janet McIntyre**, whose mailing address is P.O. Box 60, East Dixfield, Maine 04227, (the "Owner" or "**Landlord**").

Background

A. PATRIOT RENEWABLES, LLC and **Phillip McIntyre and Janet McIntyre,** whose mailing address is P.O. Box 60, East Dixfield, Maine 04227, (the "Owner" or "**Landlord**") entered into a Wind Energy Land Lease with an Effective Date of October 21, 2008 as amended by First Addendum to Wind Energy Land Lease effective date September 20, 2010 for and concerning the Property identified below (as amended, the "**Lease**") which Lease (Tenant's interest and rights) was subsequently assigned to **SADDLEBACK RIDGE WIND, LLC**, a Massachusetts limited liability company), of 549 South Street, Quincy, MA 02169 ("Company" or "**Tenant**").

B. A Notice of Lease was recorded in the Franklin County Registry of Deeds in Book 3124, Page 341 ("**Notice of Lease**").

1. **Premises Leased pursuant to the Lease:**

The Property that is the subject of the Lease is described as follows, this description to substitute for all purposes for the description in the Lease including existing Exhibit A:

> Landlord owns property on Saddleback Mountain in the Town of Carthage, Maine, identified in the municipal tax records as Range 9, Lot 11. Being the same premises described in a deed to Phillip A. McIntyre and Janet F. McIntyre from Hurchial E. Noyes, dated April 1, 1993 and recorded in Book 1527, Page 257 and more particularly described as follows:
> A certain lot or parcel of land located on the Winter Hill Road, in the Town of Carthage, County of Franklin and State of Maine as depicted as a 39.39 acre +/- parcel on plan entitled "Boundary Survey of the Philip & Janet McIntyre Property for Saddleback Ridge Wind, LLC, Location: Winter Hill Road, Carthage, Maine," by Lane H. Gray PLS, dated February 28, 2012 and recorded in the Franklin County Registry of Deeds on April 17, 2012 as Plan File No. 5543 (the "Plan"), a reduced copy of which is attached as Exhibit A and made a part hereof. Further reference is made to the Affidavit of Lane Gray dated April 11, 2012 and recorded in said Registry

of Deeds in Book 3432, Page 220. The Property includes all rights owned or controlled by Landlord in Winter Hill Road, so-called.

2. **Term.** Development Term of FOUR (4) years commencing on the Effective Date of the Lease, October 21, 2008, with an option to extend for up to TWO (2) additional years, the first year of which has been exercised; and a successive Operation Term of **FORTY (40) years**, unless earlier terminated.

3. **Assignment and Exclusive.** Tenant can assign or pledge the Lease or sublet the Property that is the subject of the Lease in whole or in part, without consent of Landlord. During the term of this Lease, Landlord may at any time sell the entirety of the Property, which sale shall be subject to and under the terms of the Lease and the rights and privileges of the Tenant hereunder. Landlord shall not be permitted to sell any portion of the Property or divide the Property by any other means constituting a "division" pursuant to the subdivision laws of the State of Maine and/or any other body or authority that governs subdivision, including the municipality where the Property is located, or any other applicable statute, law, ordinance, by-law or rule, without the prior written consent of Tenant in each instance.

    a. The interests granted to the Tenant under this Lease are exclusive and Landlord will not grant to any party other than Tenant any lease, easement, interest, option and/or right in or upon the Property that is in any way related to converting wind energy to electrical energy and/or delivering or transmitting electrical energy, to another person or entity, for so long as this Lease is in effect.

4. **Addresses.** The parties' addresses as set forth in the Lease are set out above.

THIS AMENDED MEMORANDUM OF LEASE is intended to amend, restate and replace the Notice of Lease and is prepared for recording and for the purpose of making a public record of said Lease, and it is intended that the parties shall be subject to all of the provisions of the Lease and that nothing herein shall be construed or deemed to alter or change any of the terms or provisions of the Lease.

(Signature Page to Follow)

LANDLORD

Phillip McIntyre

[signature]

LANDLORD

Janet McIntyre

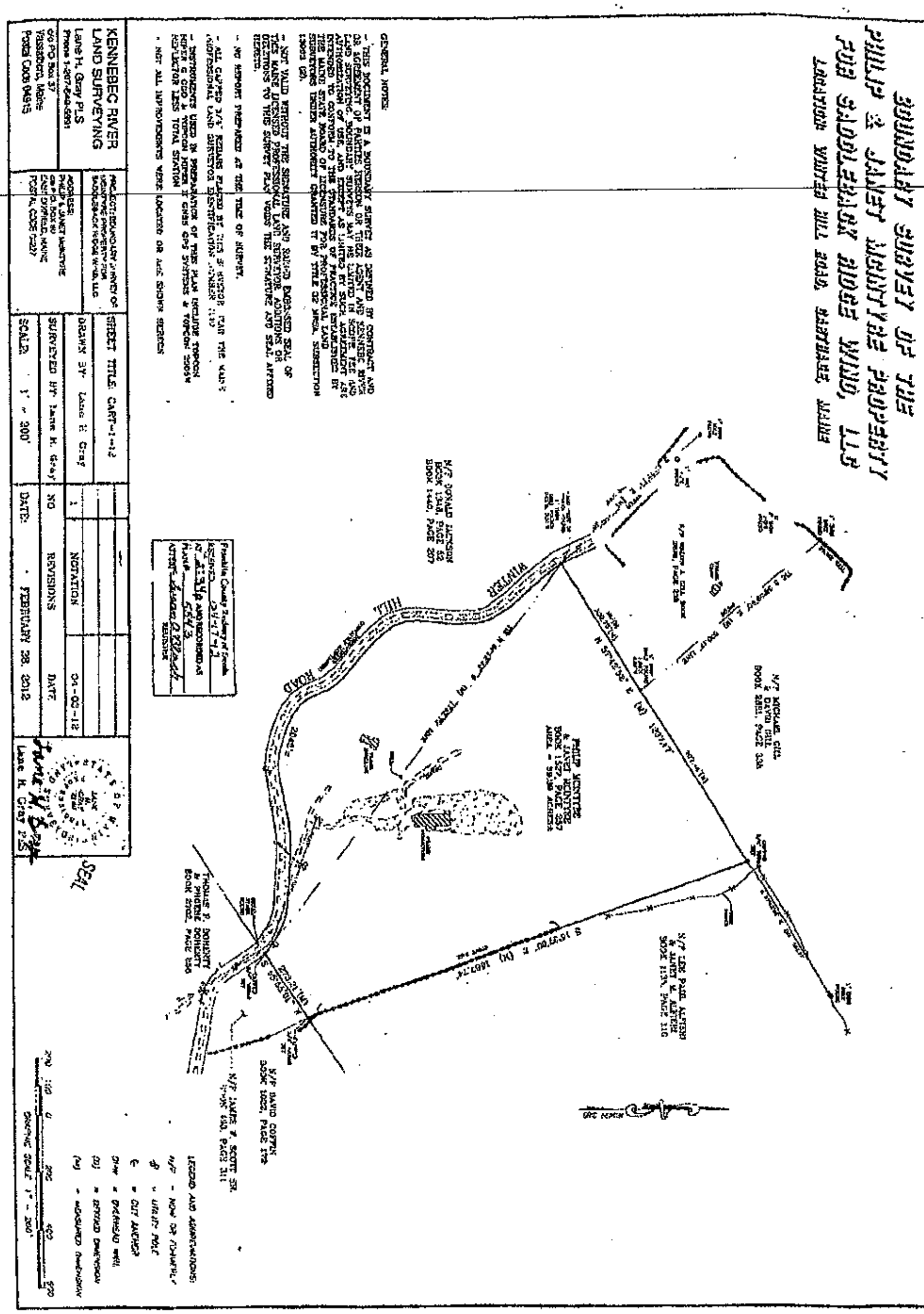
[signature]

STATE OF MAINE
OXFORD COUNTY, SS.

On this 15 day of November, 2012, before me, the undersigned notary public, personally appeared **Phillip McIntyre** and **Janet McIntyre**, and acknowledged that their signatures are their free act and deed.

[signature]
Notary Public
PRINT NAME: Ronald J Cullenberg
My Commission Expires:

Exhibit A
to Amended Memorandum of Lease
Property Description



FRANKLIN COUNTY
Susan A. Black
Register of Deeds

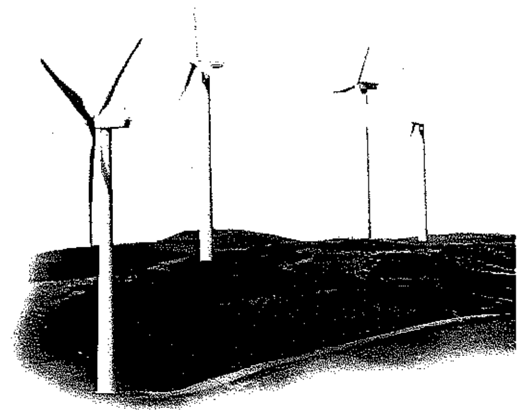
Bernstein Shur
Portland

APPENDIX C: GE 2.75-103/2.85-103 SOUND POWER CURVE

GE Power & Water

- Original Instructions -

Technical Documentation Wind Turbine Generator Systems 2.75-103 and 2.85-103 - 60 Hz



Product Acoustic Specifications

Normal Operation according to IEC Incl. Octave Band Spectra and 1/3rd Octave Band Spectra

Patriot Renewables – Saddleback Ridge

imagination at work

GE Power & Water

– Original Instructions –

www.ge-energy.com

Visit us at
www.ge-renewable-energy.com/en/home

imagination at work

Table of Contents

1 Introduction

This document summarizes acoustic emission characteristics of the 2.75-103 and 2.85-103 wind turbines for normal operation, including calculated apparent sound power levels $L_{WA,k}$, as well as uncertainty levels associated with apparent sound power levels, tonal audibility, and calculated $1/3^{rd}$ octave band apparent sound power level.

All provided sound power levels are A-weighted.

Seller verifies specifications with measurements, including those performed by independent institutes. If a wind turbine noise performance test is carried out, it needs to be done in accordance with regulations of the international standard IEC 61400-11, ed. 2.1: 2006 and Machine Noise Performance Test document.

2 Normal Operation Calculated Apparent Sound Power Level and Octave Band Spectra

Calculated apparent sound power levels $L_{WA,k}$ and associated octave-band spectra are given in Table 1. Values are provided as mean levels for V_{85m} 14 m/s-cutout speed for Normal Operation (NO). Uncertainties for octave sound power levels are generally higher than for total sound power levels. Guidance is given in IEC 61400-11, Annex D.

Normal Operation Octave Band Spectra		
Hub height wind speed at 85 m (m/s)		**14-Cutout**
Frequency (Hz)	31.5	80.7
	63	90.3
	125	94.5
	250	94.6
	500	95.8
	1000	100.3
	2000	99.6
	4000	90.7
	8000	71.9
	16000	28.3
Total apparent sound power level L_{WA} (dB)		**105.0**

Table 1: Normal Operation Calculated Apparent Sound Power Level 2.75-103/2.85-103 with 85 m hub height

At hub height wind speeds above 14 m/s turbine has reached rated power and blade pitch regulation acts in a way that tends to decrease noise levels.

The highest normal operation calculated apparent sound power level for the 2.75-103 and 2.85-103 is $L_{WA,k}$ = 105.0 dB.

3 Uncertainty Levels

Apparent sound power levels in Table 1 are calculated mean levels. Uncertainty levels associated with measurements are described in IEC/TS 61400-14.

Per IEC/TS 61400-14, L_{WAd} is the maximum apparent sound power level for 95 % confidence level resulting from n measurements performed according to IEC 61400-11 standard: $L_{WAd} = L_{WA} + K$, where L_{WA} is the mean apparent sound power level from IEC 61400-11 testing reports and $K = 1.645\ \sigma_T$.

Testing standard deviation values σ_T, σ_R and σ_P for measured apparent sound power level are described by IEC/TS 61400-14, where σ_T is the total standard deviation, σ_P is the standard deviation for product variation and σ_R is the standard deviation for test reproducibility.

Assuming $\sigma_R < 0.8$ dB and $\sigma_P < 0.8$ dB as typical values leads to a calculated $K < 2$ dB for 95 % confidence level.

4 Tonal Audibility

At the reference measuring point R_0 the 2.75-103 and 2.85-103 wind turbines have a value for tonality of $\Delta L_{a,k} \leq$ **4 dB.**

5 IEC 61400-11 and IEC/TS 61400-14 Terminology

- $L_{WA,k}$ is wind turbine apparent sound power level (referenced to 10^{-12}W) measured with A-weighting as function of reference wind speed v_{10m}. Derived from multiple measurement reports per IEC 61400-11, it is considered as a mean value
- σ_P is the product variation i.e. 2.75-103 and 2.85-103 unit-to-unit product variation; typically < 0.8 dB
- σ_R is the overall measurement testing reproducibility as defined per IEC 61400-11; typically < 0.8 dB with adequate measurement conditions and sufficient amount of data samples
- σ_T is the total standard deviation combining both σ_P and σ_R
- **K = 1.645** σ_T is defined per IEC/TS 61400-14 for 95 % confidence level
- R_0 is the ground measuring distance from the wind turbine tower axis per IEC 61400-11, which shall equal the hub height plus half the rotor diameter
- $\Delta L_{a,k}$ is the tonal audibility according to IEC 61400-11, described as potentially audible narrow band sound

6 1/3rd Octave Band Spectra

Table 2 shows the 1/3rd octave band values for 85m hub height for wind speeds 14 m/s – cut out.

Normal Operation 1/3rd Octave Band Spectra		
Hub height wind speed at 85 m [m/s]		14-Cutout
Frequency [Hz]	25	70.4
	32	74.8
	40	78.9
	50	82.1
	63	85.1
	80	87.7
	100	89.3
	125	89.9
	160	90.0
	200	89.9
	250	89.8
	315	89.9
	400	89.7
	500	90.7
	630	92.2
	800	93.8
	1000	95.4
	1250	96.8
	1600	96.1
	2000	95.0
	2500	92.5
	3150	89.1
	4000	84.5
	5000	79.5
	6300	71.7
	8000	59.9
	10000	45.7
	12500	28.3
	16000	3.3
	20000	-23.7
Total apparent sound power level L_{WA} [dB]		105.0

Table 2: Calculated Apparent 1/3rd Octave Band Sound Power Level (A-weighted) 2.75-103/2.85-103 with 85 m hub height for wind speeds 14 m/s-cut out