Appendix E

Town of Swampscott
Wind Turbine Noise Study

Town of Swamps ott Wind Turbine oise Study

Swamps ott, assa husetts

Report No. 11-3

May 2011

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Fi ures

Tables

e uti e Summary

Howard Quin Consulting (HQC), in association with Harris Miller Miller & Hanson Inc. (HMMH), has completed a detailed noise study for three possible types of wind turbines ranging from 600 KW to 1.5 MW. The proposed turbine location is in the town of Swampscott near the baseball diamonds located between Parsons Drive, Burke Drive, Nason Road, and Davenport Drive. In this report, we have reviewed applicable noise standards and criteria and described the modeling used to project noise emissions from the selected wind turbines to assess potential noise impacts from the project. In addition, background measurements were made at five nearby locations, three short-term, and two long-term.

Based on this study, we conclude the following:

- The Massachusetts Department of Environmental Protection (DEP) noise guideline of 10 dB(A) increases in noise levels will not be exceeded by the proposed wind turbine operation at all noise-sensitive areas for the EWT 900 KW and Unison 750 KW turbines; for the Hyundai 1.5 MW and Elecon 600 KW turbines, exceedances may occur under design speed operating conditions.
- The Project will be in compliance with the DEP noise guidance for a pure tone condition for all turbines.

1 Introdu tion

Town of Swampscott in Swampscott is exploring the opportunity of constructing a utility-scale wind turbine near the town baseball diamonds. Figure 1 shows the locations of each of the noise measurement sites on an aerial photograph of the study area, with the proposed wind turbine location shown for context. The Project being considered is a wind turbine with a capacity of .6-1.5 MW. The turbines examined include an Elecon 600 KW, a Unison 750 KW, an EWT 900 KW turbine, and a Hyundai 1.5 MW turbine. The wind turbine would provide the town of Swampscott with clean renewable energy to support their electricity needs.

Howard Quin Consulting in association with HMMH was contracted by Meridian Associates to perform a noise study for the proposed wind turbine installation. In this report, we review applicable noise standards and criteria, describe the modeling used to project noise emissions from the selected wind turbine, and the background measurements used in order to assess noise impacts from the project. We modeled both the cut-in speed sound level for each turbine (the speed with the quietest background), where available, and the 8 m/sec wind speed sound level for all turbines, as being the speed where the turbine usually most greatly exceeds the background sound level. Appendix A provides a description of the various noise metrics used in this report.

2 oise Standards and riteria

Applicable noise standards for the proposed wind turbine are the Massachusetts Department of Environmental Protection (DEP) noise guidelines. The City of Swampscott has no relevant noise ordinances.

The Code of Massachusetts Regulations (Title 310, Section 7.10, amended September 1, 1972) empowers the Division of Air Quality Control (DAQC) of the Department of Environmental Protection (DEP) to enforce its noise standards. According to DAQC Policy 90-001 (February 1, 1990), a source of sound will be considered to be violating the Department's noise regulation if the source (1) increases the broadband sound level by more than 10 dBA above ambient, or (2) produces a "pure tone condition," when any octave-band center frequency sound pressure level exceeds the two adjacent frequency sound pressure levels by 3 decibels or more. Ambient is defined as the background A-weighted sound level that is exceeded 90 percent of the time (i.e. L90) measured during equipment operating hours. A wind turbine only operates when there is sufficient wind speed to run it, which is generally 4 meters per second (m/s) (9 mph) measured at a height of 10 meters (m). Therefore, it is appropriate to estimated likely background L90 when winds are blowing at speeds of 4 m/s or higher, for purposes of comparison to the turbine noise emissions.

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Proposed Wind Turbine Location

Long Term Measurement Site

Short Term Measurement Site

Swampscott Wind Project

Swampscott, Massachusetts

Figure 1: Wind Turbine Noise Study Area

Source: Office of Geographic and Environmental Information (MassGIS), Commonwealth of Massachusetts, Executive Office of Energy and Environmental Affairs

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easured mbient oise e els

Noise measurements of existing conditions in the project study area were conducted by HMMH from April 30, 2011 to May 2, 2011. A total of two noise measurement sites were chosen for long-term measurements of three days, and three sites for short-term measurements of 45 to 60 minutes in duration each. Noise measurements were conducted with Bruel & Kjaer 2250 sound level meters/noise analyzers owned by HMMH. Field calibrations with acoustic calibrators were conducted for all of the measurements. All instrumentation components, including microphones, preamplifiers and field calibrators have current laboratory certified calibrations traceable to the National Institute of Standards and Technology.

Noise measurement sites focused on residential areas, which would potentially have the most significant noise impacts from wind turbine operation. Measurement locations ranged from the closest residential properties to the proposed turbine location (LT-1, LT-2) to other homes located nearby (ST-2, ST-3), and the baseball diamond (ST-1), where daytime activity would be expected when the wind turbines would be operating.

1 Short Term oise easurements

Table 1 provides a summary of the measured noise levels at the short-term sites. Several standard descriptors of the time-varying A-weighted noise level are shown in the table. These descriptors include the Leq, which is the average sound level with equivalent sound energy as a continuous sound at that level, the Lmax, which is the maximum sound level that occurred during the measurement period and the L90, representing the background level. Temperatures during the short-term measurements were around about 50 degrees F, the sky was clear, and winds were light, except on the first night when they were moderate (3-5 mph).

Table 1.

Noise Measurement Results at Short-term Sites

Site ame	ddress	es ription	Start ate	Start Time	uration	wei hted sound le el metri s d		
						e	ma	0
ST-1	Baseball Diamonds	Home Plate	5/2/2011	2:00 P.M.	60 min	46.5	66.0	41.9
ST-2	4 Burke Dr.	Front Yard	5/2/2011	2:15 A.M.	45 min	31.1	51.6	28.5
ST-2	4 Burke Dr.	Front Yard	5/2/2011	3:14 P.M.	45 min	49.1	70.5	42.9
ST-3	19 Parsons Dr.	Back Yard	5/2/2011	1:00 A.M.	45 min	35.1	57.5	32.1
ST-3	19 Parsons Dr.	Back Yard	5/2/2011	4:14 P.M.	45 min	46.7	61.1	43.1

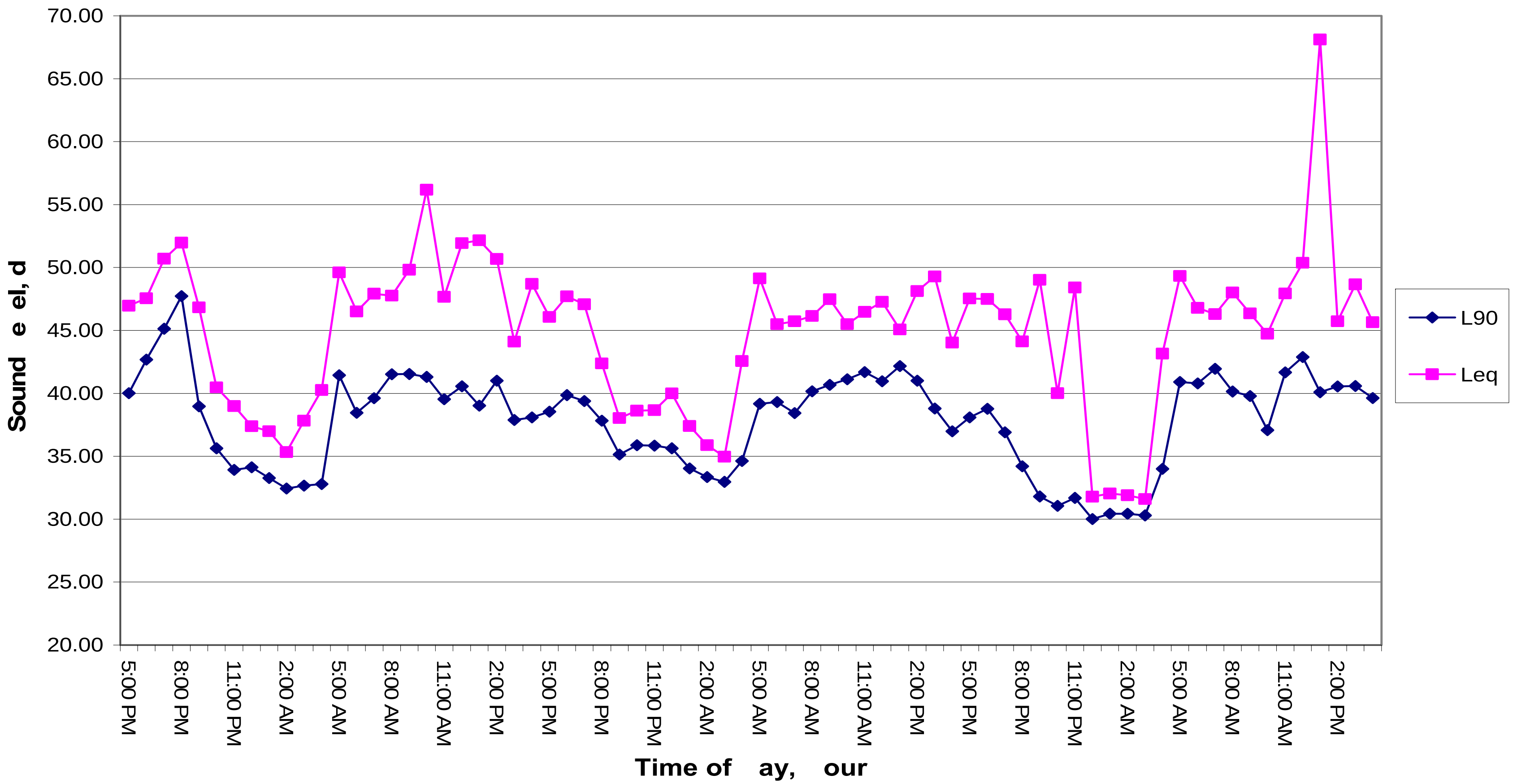
2 on Term oise easurements

The long term Measurements were made at two locations. Location LT-1 was on Nason St. directly southeast of the ball fields. Location LT-2 was behind Davenport Drive to the northeast of the turbine location. Figures 2 and 3 represent graphs of the varying sound level descriptors at sites LT-1 and LT-2 for each one hour period. In addition to the L90, the descriptors shown include the Leq levels. The graph shows that during the defined daytime periods, typical Leqs varied from approximately 38 to 68 dBA. At night, Leqs ranged from 32 to 49 dBA, The L90 background values varied from about 34 to 47 dBA during the day and 29 to 36 dBA at night.

Figure 4 shows the wind speed data normalized to a height of 10 meters collected at location LT-1. This shows that the wind speed was fairly low during the time when the data was collected. The actual average wind speed on Friday night was about 1.3 m/sec, which is somewhat higher than was recorded on subsequent days. However, an examination of local activity indicates that sound levels on Friday and Saturday night at location LT-1 were influenced by greater outside human activity during these periods, which is consistent with higher levels both nights regardless of the wind speed. Consequently, we have used the data from Sunday night, when it appears that human activity was at a lower level more typical of weeknights, to get a more typical worst case background noise scenario. A conservative correction of 1 to 1.5 decibels was added to the lowest L90 sound level data at each location to correct for the effect of wind noise during turbine operations at 8 m/sec wind speed. For cut-in speed operation, the L90 background levels have been conservatively rounded up by .5 dbA.

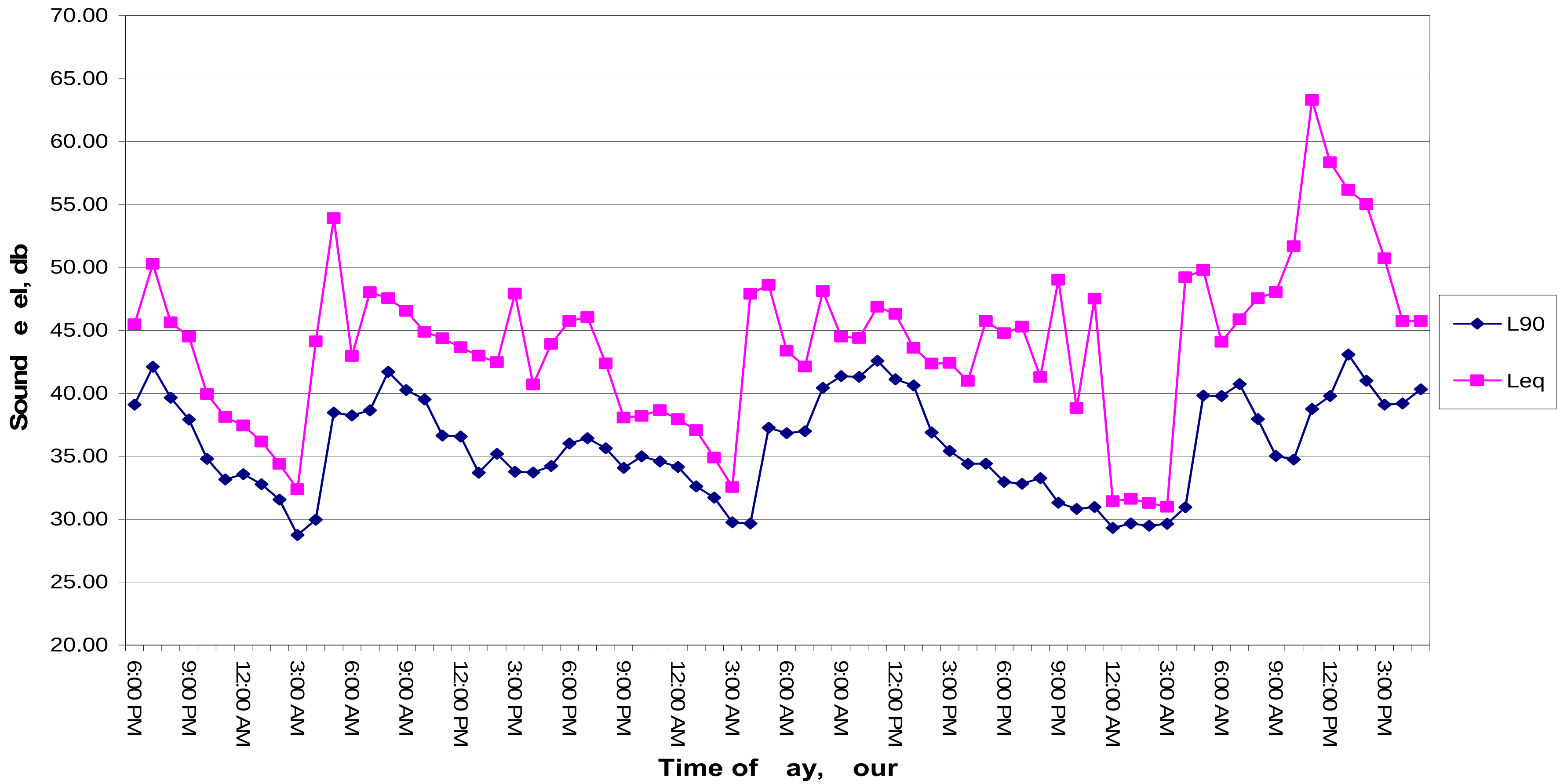
Fi ure 2

Sound ata olle ted at o ation T 1



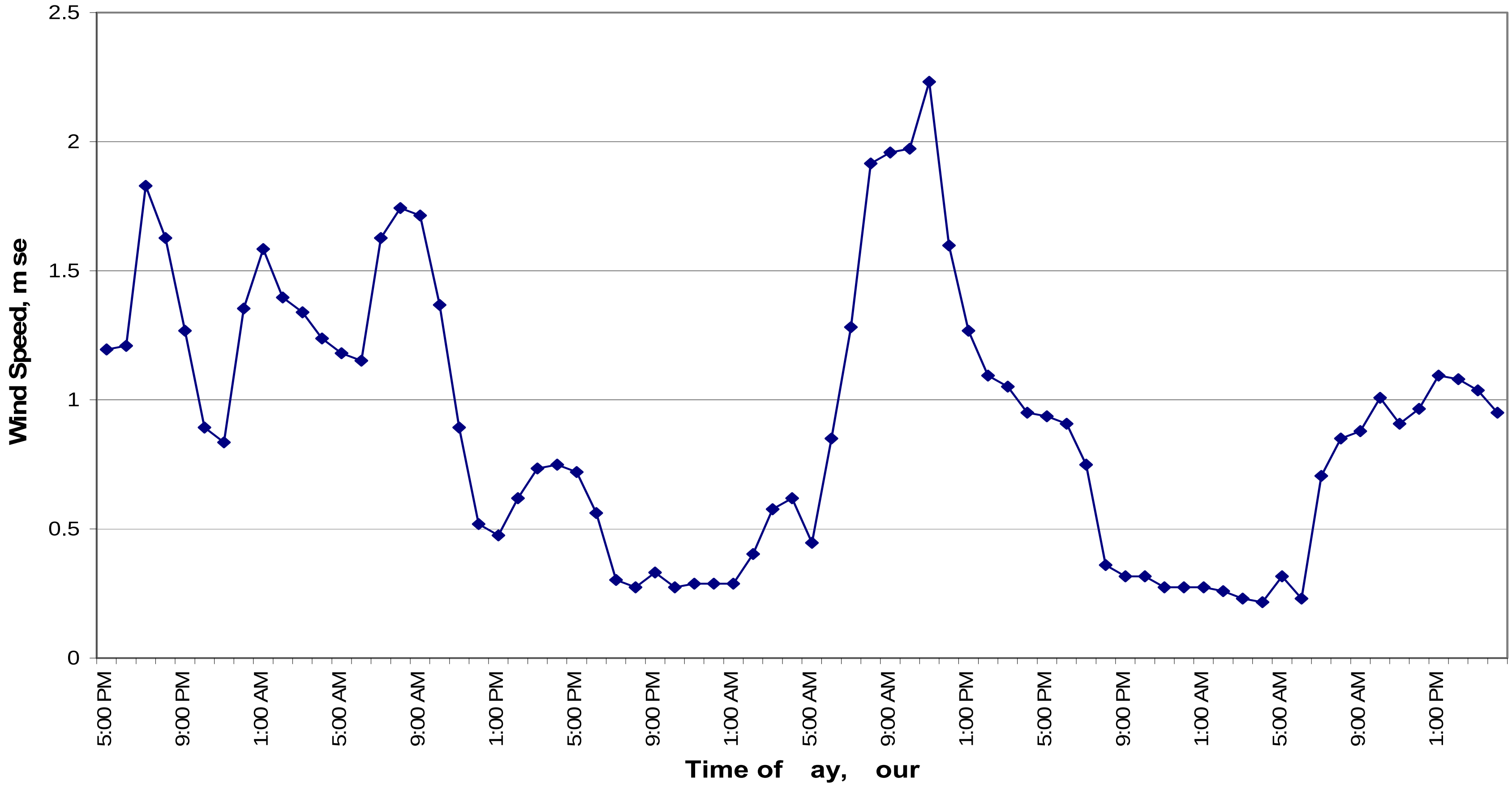
Fi ure

Sound ata olle ted at o ation T 2



Fi ure

stimated ourly era e 10 meter hei ht wind speed



Predi ted Wind Turbine oise e els and Impa t

The operational noise levels from the proposed wind turbine were predicted in the Swampscott study area using 1) reference noise emissions information for the three proposed turbines provided from available literature, 2) aerial photography and digital terrain information from MassGIS, and 3) the SoundPLAN® noise prediction model.

1 oise Predi tion odel and oise Sour e hara teristi s

The SoundPLAN® computer noise model was used for computing sound levels from the proposed wind turbine throughout the surrounding community. An industry standard, SoundPLAN was developed by Braunstein + Berndt GmbH to provide estimates of sound levels at distances from specific noise sources taking into account the effects of terrain features including relative elevations of noise sources, receivers, and intervening objects (buildings, hills, trees), and ground effects due to areas of hard ground (pavement, water) and soft ground (grass, field, forest). In addition to computing sound levels at specific receiver positions, SoundPLAN can compute noise contours showing areas of equal and similar sound level.

As input, SoundPLAN incorporated a *geometric model* of the study area, reference *noise source* levels. SoundPLAN uses a *sound propagation model* to project noise levels from turbine operations into the surrounding community. The three-dimensional geometric model of the study area was developed from aerial photography and digital terrain information (with 1-m contour intervals) provided through the MassGIS Executive Office of Energy and Environmental Affairs.

The reference noise source levels were obtained from publicly published data for each turbine (Tables 2 and 3). The Elecon turbine has a sound power rating of 102.7 dBA (no cut in speed data were available). The EWT turbine has a cut in speed (5 m/sec wind speed) sound power level of 97.8 dBA and an 8 m/sec sound power level of 100.9 dBA, which is identical to that of the Unison (no cut in speed data were available for the Unison) The Hyundai turbine has a cut in speed (6 m/sec) sound power level of 98.0 and an 8 m/sec level of 102.0 dbA. Two decibels have been added to these levels to be used in the model to obtain a conservative estimate of the turbine sound power levels (shown below) consistent with more recent standard practice. The A-weighted spectrum levels sum are shown in Table 1 as included in the SoundPLAN noise prediction model. The octave band data for the Hyundai were obtained from another similar sized turbine, and has been normalized to give a sound power level of 104.0 dBA.

The sound propagation model within SoundPLAN that was used for this study was ISO 9613-2.[1] This international standard propagation model is used nearly universally in the U.S. for wind turbine noise studies, due to its conservative propagation equations. ISO 9613-2 uses “worst-case” downwind propagation conditions in all directions, and accounts for variations in terrain and ground type. In order to be conservative about noise attenuation from ground effects, we have used a ground attenuation G factor of 0.8 at soft ground locations, which is slightly “harder” than the standard recommendation of 1.0.

[1] International Organization for Standardization (ISO), International Standard ISO 9613-2, “Acoustics – Attenuation of Sound during Propagation Outdoors”, Part 2: General Method of Calculation, 1996-12-15.

Table 2.

Reference Cut-In Speed Sound Power Level Spectra for EWT 900 KW and Hyundai 1.5 MW Turbines

ta e band enter Fre uen y	WT 00 W Sound Power e el, d	yundai 1 W Sound Power e el, d
63	79	83.1
125	88	92.0
250	94	95.2
500	94	96.6
1000	92	95.9
2000	91	92.5
4000	88	85.3
8000	78	76
A-weighted, total		**100 0**

Table 3.

Reference 8 m/sec Speed Sound Power Level Spectra for Elecon 600 KW, EWT 900 KW, Unison 750 KW, and Hyundai 1.5 MW Turbines

ta e band enter Fre uen y	le on 00 W Sound Power e el, d	WT 00 and nison 0 W Sound Power e el, d	yundai 1 W Sound Power e el, d
63	83.9	83	87.1
125	93.8	91	96.0
250	97.1	96	99.2
500	95.5	98	100.6
1000	94.7	95	99.9
2000	98.5	93	96.5
4000	98.8	91	89.3
8000	86.2	85	80.0
A-weighted, total	**10**	**102**	**10 0**

2 Predi ted Turbine oise e els in the ommunity

Tables 4 and 5 show the predicted Leq noise levels from the proposed wind turbines at the closest locations. The noise level predictions are based on the standard reference wind speed of 8 m/s (18 mph) as measured at a height of 10 m (33 ft). Figures 5-9 shows the predicted turbine noise levels in the form of noise contours on the aerial photograph of the study area.

Table 4.

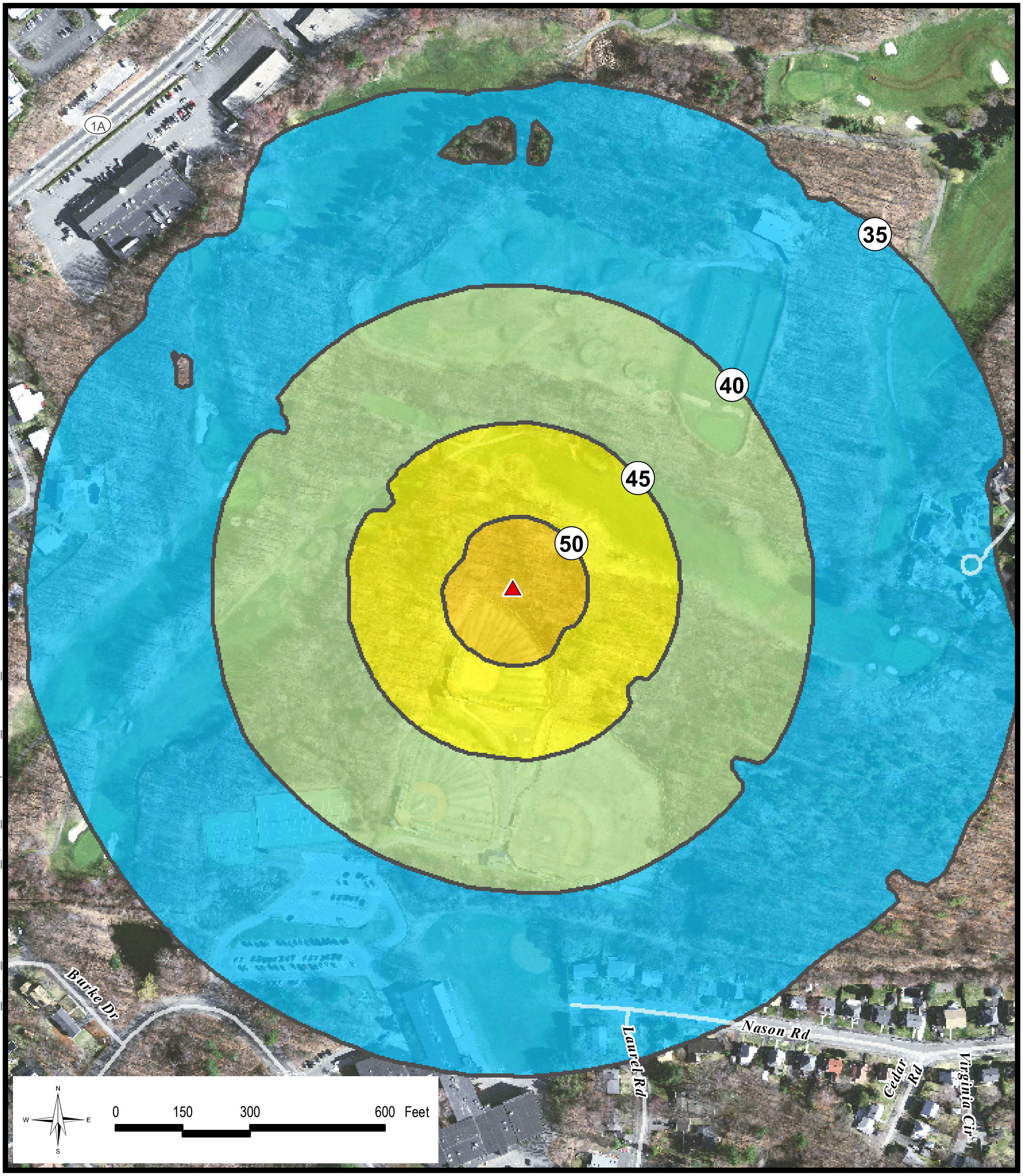
Predicted Cut-In Wind Speed Noise Levels from Proposed Wind Turbines

Site ame	WT 00 W e d	yundai 1 W e d
Davenport Road, Closest Residence	36.0	36.1
Davenport Road, 2nd Closest Residence	34.9	35.5
Nason Road, Closest Residence	36.8	37.4
Nason Road, 2nd Closest Residence	36.5	37.0
Parsons Drive Closest Residence	36.9	38.0
Burke Drive, Closest Residence	32.6	33.4

Table 5.

Predicted 8 m/sec Wind Speed Noise Levels from Proposed Wind Turbines

Site ame	le on 00 e d	WT 00 and nison 0 W e d	yundai 1 e d
Davenport Road, Closest Residence	40.5	39.2	40.9
Davenport Road, 2nd Closest Residence	39.3	38.1	39.8
Nason Road, Closest Residence	41.6	40.1	41.8
Nason Road, 2nd Closest Residence	41.2	39.7	41.4
Parsons Drive Closest Residence	41.5	40.0	41.8
Burke Drive, Closest Residence	37.0	35.7	37.2



Proposed Wind Turbine Location

< 30
30 - 35
35 - 40
40 - 45
45 - 50
50 - 55
> 55
dB(A)

Swampscott Wind Project

Swampscott , Massachusetts

Figure 5: Predicted Wind Turbine Noise Contours for EWT 900 Cut-In Wind Speed

Source: Office of Geographic and Environmental Information (MassGIS), Commonwealth of Massachusetts, Executive Office of Energy and Environmental Affairs

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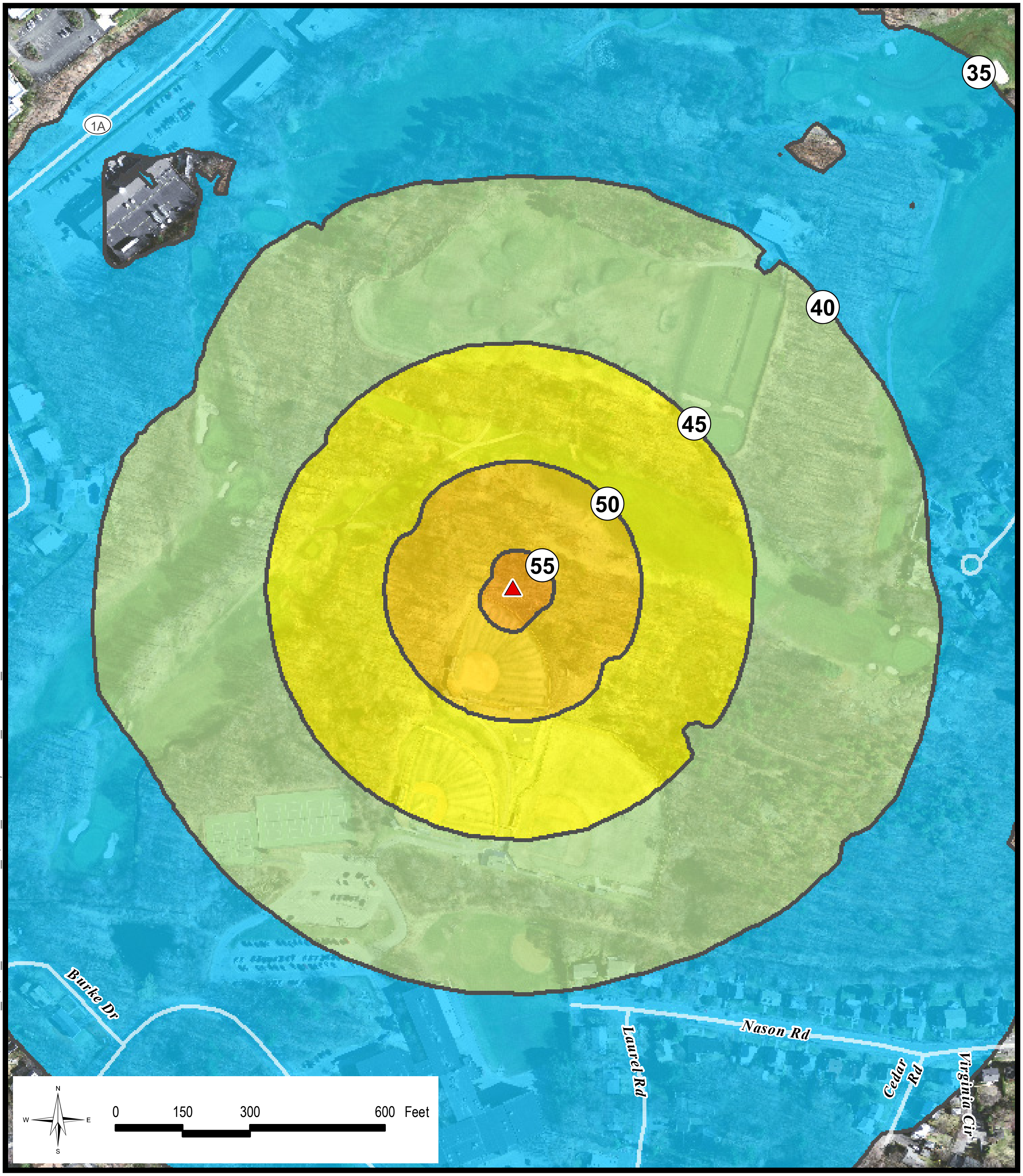

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Proposed Wind Turbine Location

< 30
30 - 35
35 - 40
40 - 45
45 - 50
50 - 55
> 55

dB(A)

Swampscott Wind Project

Swampscott , Massachusetts

Figure 6: Predicted Wind Turbine Noise Contours for EWT 900 and Unison 750 at 8 m/sec Wind Speed

Source: Office of Geographic and Environmental Information (MassGIS), Commonwealth of Massachusetts, Executive Office of Energy and Environmental Affairs

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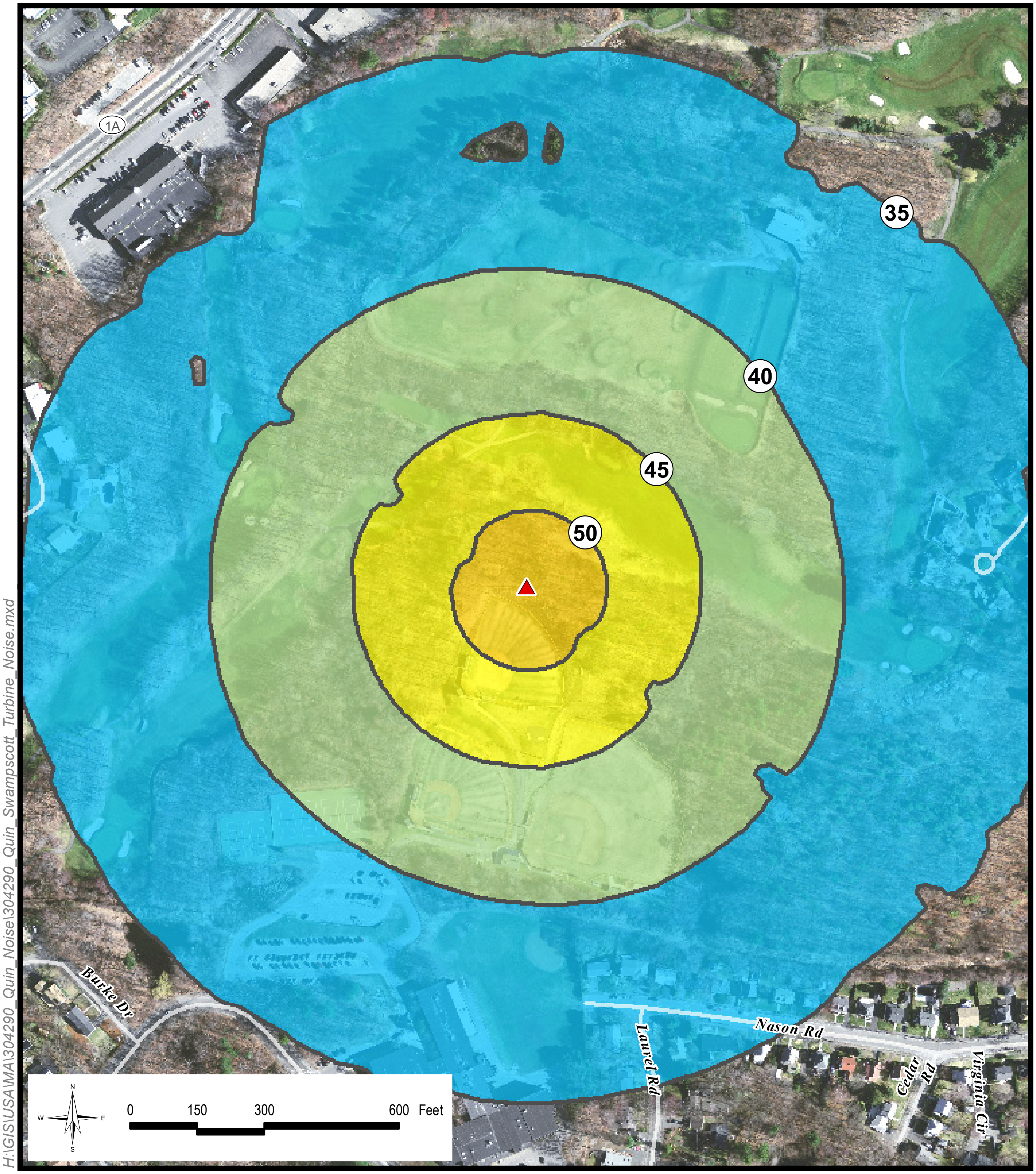

Proposed Wind Turbine Location

dB(A)
- < 30
- 30 - 35
- 35 - 40
- 40 - 45
- 45 - 50
- 50 - 55
- > 55

Swampscott Wind Project

Swampscott , Massachusetts

Figure 7: Predicted Wind Turbine Noise Contours for Hyundai 1.5 MW Cut in Wind Speed

Source: Office of Geographic and Environmental Information (MassGIS), Commonwealth of Massachusetts, Executive Office of Energy and Environmental Affairs

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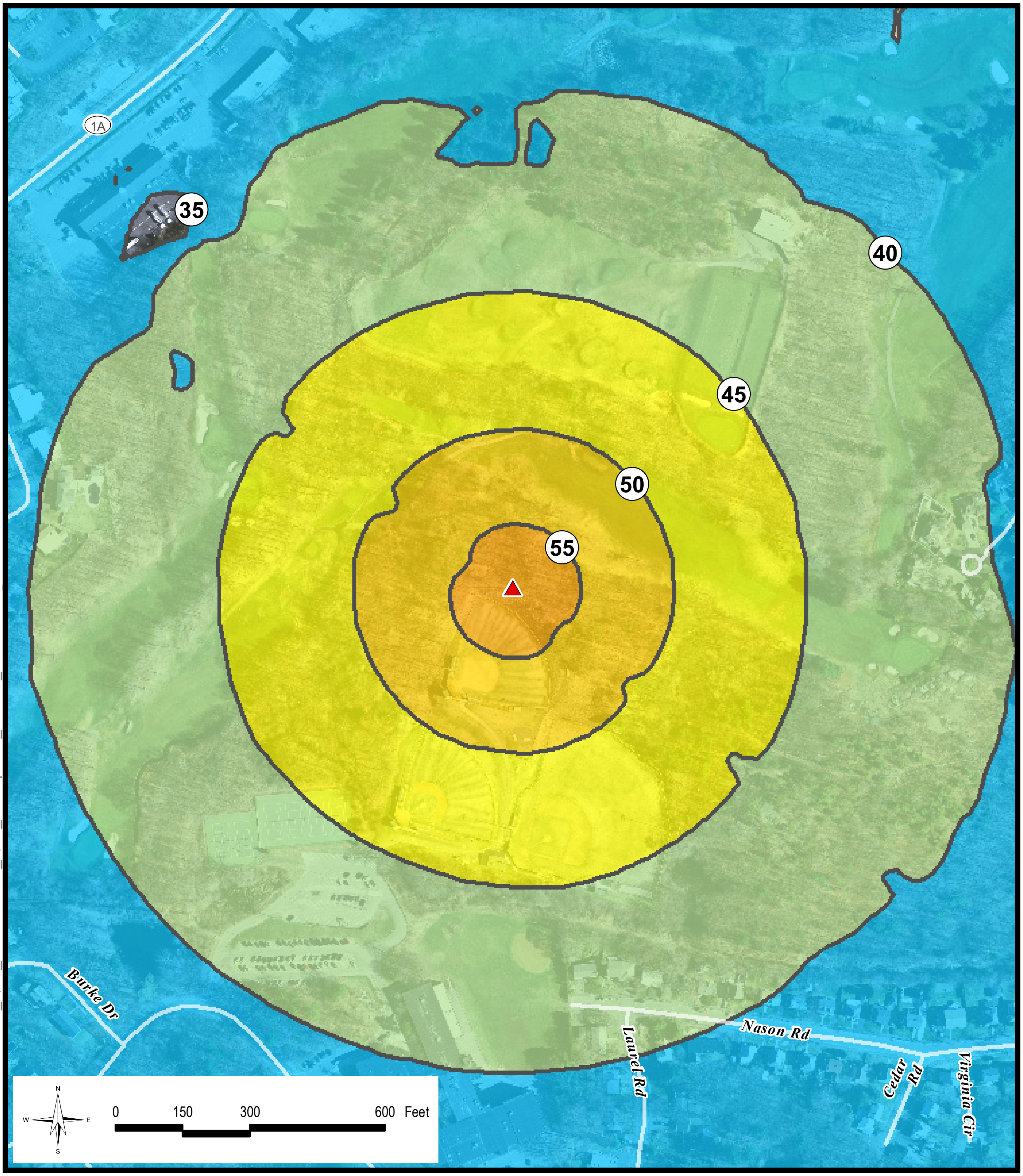

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Proposed Wind Turbine Location

Legend	dB(A)
< 30	
30 - 35	
35 - 40	
40 - 45	dB(A)
45 - 50	
50 - 55	
> 55	

Swampscott Wind Project
Swampscott , Massachusetts

Figure 8: Predicted Wind Turbine Noise Contours for Hyundai 1.5 MW 8 m/sec Wind Speed

Source: Office of Geographic and Environmental Information (MassGIS), Commonwealth of Massachusetts, Executive Office of Energy and Environmental Affairs

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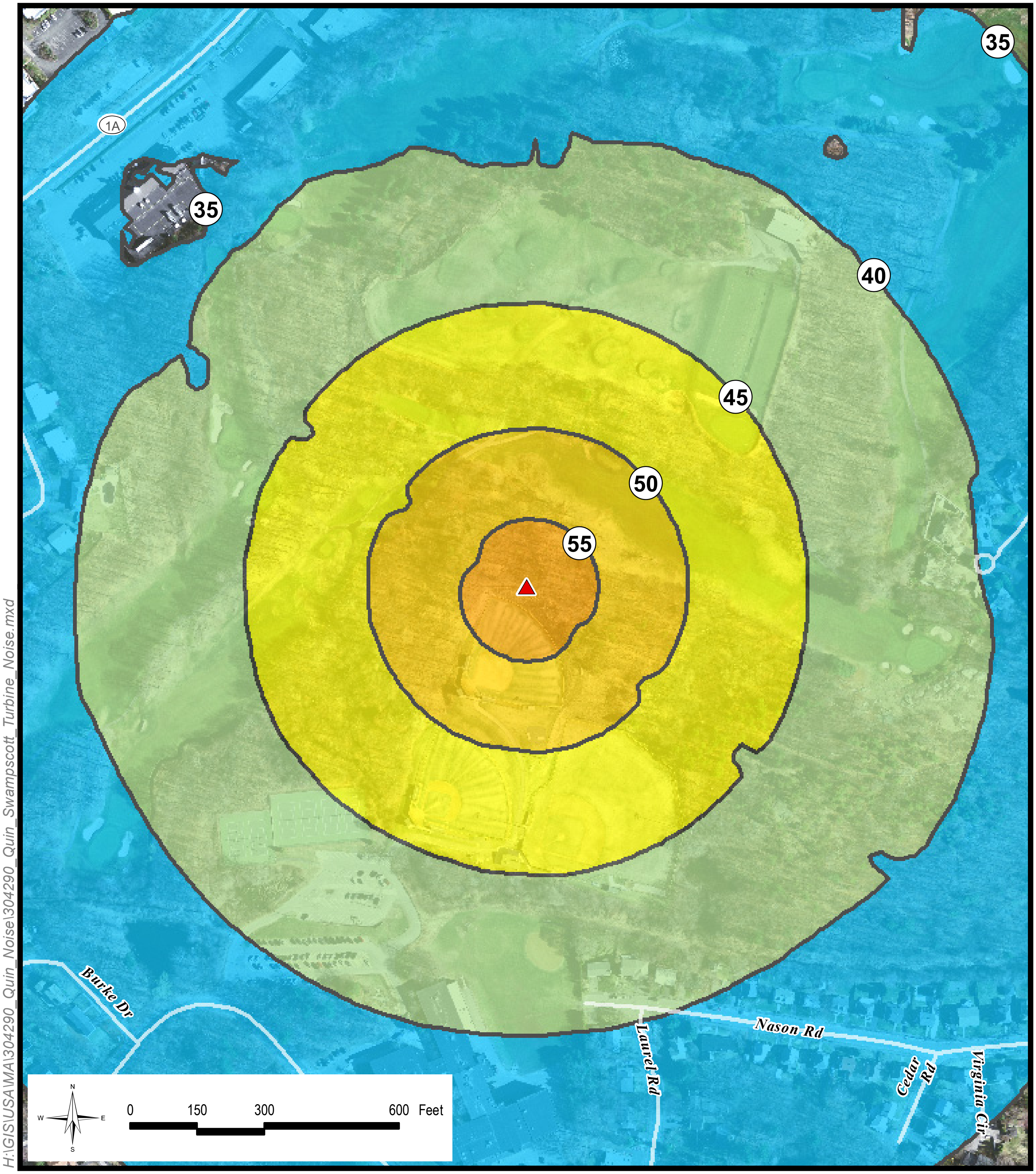


Proposed Wind Turbine Location

< 30
30 - 35
35 - 40
40 - 45
45 - 50
50 - 55
> 55
dB(A)

Swampscott Wind Project
Swampscott , Massachusetts

Figure 9: Predicted Wind Turbine Noise Contours for Elecon 600 KW 8 m/sec Wind Speed

Source: Office of Geographic and Environmental Information (MassGIS), Commonwealth of Massachusetts, Executive Office of Energy and Environmental Affairs

HARRIS MILLER MILLER & HANSON INC.

omparison with mbient 0 le els

As discussed above in Section 2, the Mass DEP noise guidelines state that a noise source should not increase the broadband sound level by more than 10 dBA above ambient. Ambient is defined as the background L90 measured during equipment operating hours. A wind turbine only operates when there is sufficient wind speed to run it, which is generally 4 m/s (9 mph) measured at a height of 10 m. Tables 6-10 show the expected noise levels from the turbines compared with the MA DEP guidelines. These results show that the cut in speed levels will comply for the turbines examined; however, only the EWT 900 and Unison 750 KW turbines will comply for the design speed of 8 m/sec measured at 10 meters height.

Table 6.

Predicted Total Noise Levels from Proposed EWT 900 KW Wind Turbine, Cut-in Speed

Site ame	Predi ted Turbine e d	easured a round 0 d	Predi ted Total e d	ifferen e d
Davenport Road, Closest Residence	36.0	30	37.0	7.0
Davenport Road, 2nd Closest Residence	34.9	30	36.1	6.1
Nason Road, Closest Residence	36.8	31	37.6	6.6
Nason Road, 2nd Closest Residence	36.5	31	37.4	6.4
Parsons Drive Closest Residence	36.9	32	37.7	5.7
Burke Drive, Closest Residence	32.6	29	34.2	5.2

Table 7.

Predicted Total Noise Levels from Proposed EWT 900 and Unison 750 KW Wind Turbines, 8 m/sec Wind Speed

Site ame	Predi ted Turbine e d	orre ted a round 0 d	Predi ted Total e d	ifferen e d
Davenport Road, Closest Residence	39.2	31	39.8	8.8
Davenport Road, 2nd Closest Residence	38.1	31	38.9	7.9
Nason Road, Closest Residence	40.1	32	40.7	8.7
Nason Road, 2nd Closest Residence	39.7	32	40.4	8.4
Parsons Drive Closest Residence	40.0	33	40.8	7.8
Burke Drive, Closest Residence	35.7	30	36.7	6.7

Table 8.

Predicted Total Noise Levels from Proposed Hyundai 1.5 MW Wind Turbine, Cut-in Speed

Site ame	Predi ted Turbine e d	easured a round 0 d	Predi ted Total e d	ifferen e d
Davenport Road, Closest Residence	36.1	30	37.9	7.9
Davenport Road, 2nd Closest Residence	35.5	30	36.6	6.6
Nason Road, Closest Residence	37.4	31	38.3	7.3
Nason Road, 2nd Closest Residence	37.0	31	38.0	7.0
Parsons Drive Closest Residence	38.0	32	39.0	7.0
Burke Drive, Closest Residence	33.4	29	34.7	5.7

Table 9.

Predicted Total Noise Levels from Proposed Hyundai 1.5 MW Wind Turbine, 8 m/sec Wind Speed

Site ame	Predi ted Turbine e d	orre ted a round 0 d	easured Total e d	ifferen e d
Davenport Road, Closest Residence	40.9	31	41.3	10.3
Davenport Road, 2nd Closest Residence	39.8	31	40.3	9.3
Nason Road, Closest Residence	41.8	32	42.2	10.2
Nason Road, 2nd Closest Residence	41.4	32	41.9	9.9
Parsons Drive Closest Residence	41.8	33	42.3	9.3
Burke Drive, Closest Residence	37.2	30	38.0	8.0

Table 10.

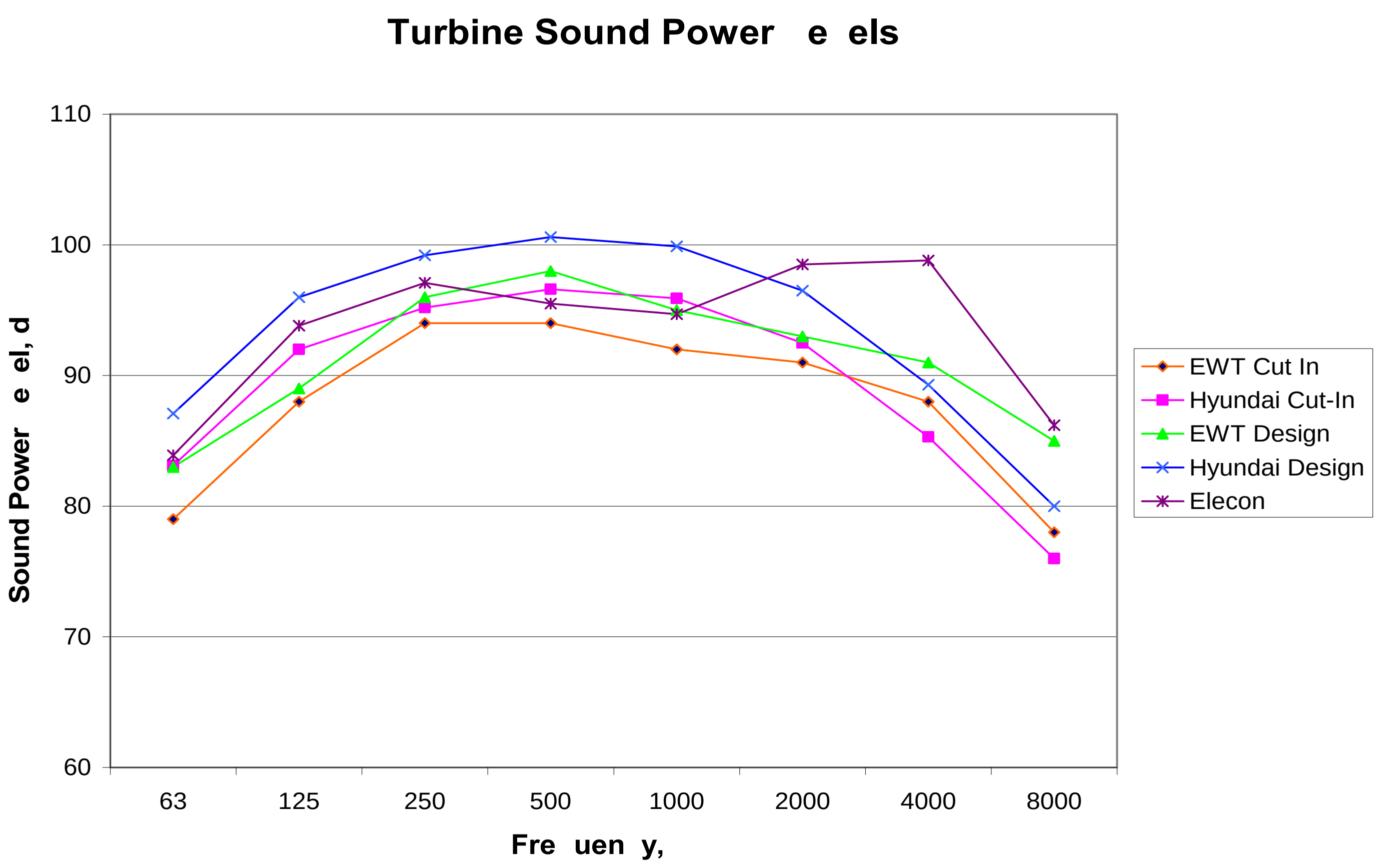
Predicted Total Noise Levels from Proposed Elecon 600 KW Wind Turbine, 8 m/sec Wind Speed

Site ame	Predi ted Turbine e d	orre ted a round 0 d	easured Total e d	ifferen e d
Davenport Road, Closest Residence	40.5	31	41.0	10.0
Davenport Road, 2nd Closest Residence	39.3	31	39.9	8.9
Nason Road, Closest Residence	41.6	32	42.0	10.0
Nason Road, 2nd Closest Residence	41.2	32	41.7	9.7
Parsons Drive Closest Residence	41.5	33	42.1	9.1
Burke Drive, Closest Residence	37.0	30	37.8	7.8

Pure tone e aluation

A sound is said to have a “pure tone component” if one octave band in the frequency spectrum is 3 dB or more higher than the two adjacent octave bands. Figure 10 shows the frequency plot of likely unweighted sound power level of each turbine. The data for the Hyundai turbine was obtained from another similar sized turbine, and has been normalized to give the sound power level expected from a Hyundai turbine. The data for the EWT and Elecon are from the manufacturers. This shows the spectrum shape of the noise emanating from the turbines at the cut-in wind speed of 4 m/sec and at a wind speed of 8m/s measured at 10-m height; the spectrum shape throughout the surrounding community would be similar.

Fi ure 10



An examination of the actual octave band levels at each receptor indicated that there would not be a pure tone, as defined by a 3 dB exceedance of the level in each adjacent band. Therefore, the turbines’ noise would comply with the MA DEP pure tone requirements.

ppendi es ription of oise etri s

This Appendix describes the noise metrics used in this report.

1 wei hted Sound e el, d

Loudness is a subjective quantity that enables a listener to order the magnitude of different sounds on a scale from soft to loud. Although the perceived loudness of a sound is based somewhat on its frequency and duration, chiefly it depends upon the sound pressure level. Sound pressure level is a measure of the sound pressure at a point relative to a standard reference value; sound pressure level is always expressed in decibels (dB), a logarithmic quantity.

Another important characteristic of sound is its frequency, or “pitch.” This is the rate of repetition of sound pressure oscillations as they reach our ears. Frequency is expressed in units known as Hertz (abbreviated “Hz” and equivalent to one cycle per second). Sounds heard in the environment usually consist of a range of frequencies. The distribution of sound energy as a function of frequency is termed the “frequency spectrum.”

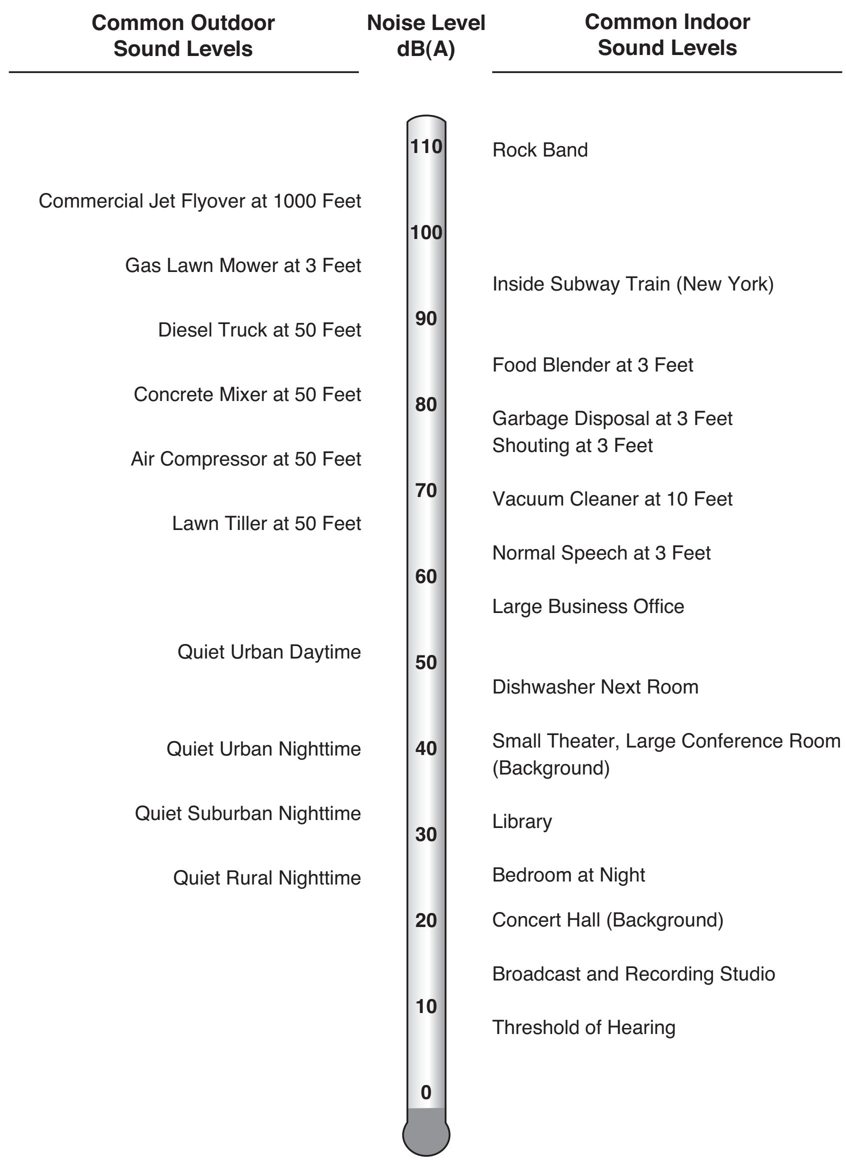
The human ear does not respond equally to identical noise levels at different frequencies. Although the normal frequency range of hearing for most people extends from a low of about 20 Hz to a high of 10,000 Hz to 20,000 Hz, people are most sensitive to sounds in the voice range, between about 500 Hz to 2,000 Hz. Therefore, to correlate the amplitude of a sound with its level as perceived by people, the sound energy spectrum is adjusted, or “weighted.”

The weighting system most commonly used to correlate with people's response to noise is “A-weighting” (or the “A-filter”) and the resultant noise level is called the “A-weighted noise level” (dBA). A-weighting significantly de-emphasizes those parts of the frequency spectrum from a noise source that occurs both at lower frequencies (those below about 500 Hz) and at very high frequencies (above 10,000 Hz) where we do not hear as well. The filter has very little effect, or is nearly “flat,” in the middle range of frequencies between 500 and 10,000 Hz. A-weighted sound levels have been found to correlate better than other weighting networks with human perception of “noisiness.” One of the primary reasons for this is that the A-weighting network emphasizes the frequency range where human speech occurs, and noise in this range interferes with speech communication. The figure below shows common indoor and outdoor A-weighted sound levels and the environments or sources that produce them.

2 ui alent Sound e el, e

The Equivalent Sound Level, abbreviated L_{eq}, is a measure of the total exposure resulting from the accumulation of A-weighted sound levels over a particular period of interest -- for example, an hour, an 8-hour school day, nighttime, or a full 24-hour day. However, because the length of the period can be different depending on the time frame of interest, the applicable period should always be identified or clearly understood when discussing the metric. Such durations are often identified through a subscript, for example L_{eq1h}, or $L_{eq(24)}$.

L_{eq} may be thought of as a constant sound level over the period of interest that contains as much sound energy as (is “equivalent” to) the actual time-varying sound level with its normal peaks and valleys. It is important to recognize, however, that the two signals (the constant one and the time-varying one) would sound very different from each other. Also, the “average” sound level suggested by L_{eq} is not an



arithmetic value, but a logarithmic, or “energy-averaged” sound level. Thus, the loudest events may dominate the noise environment described by the metric, depending on the relative loudness of the events.

Statisti al Sound e el es riptors

Statistical descriptors of the time-varying sound level are often used instead of, or in addition to L_{eq} to provide more information about how the sound level varied during the time period of interest. The descriptor includes a subscript that indicates the percentage of time the sound level is exceeded during the period. The L_{50} is an example, which represents the sound level exceeded 50 percent of the time, and equals the median sound level. Another commonly used descriptor is the L_{10}, which represents the sound level exceeded 10 percent of the measurement period and describes the sound level during the louder portions of the period. The L_{90} is often used to describe the quieter background sound levels that occurred, since it represents the level exceeded 90 percent of the period.

Project:
5247Windpro

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Diane Gagnon / dgagnon@meridianassoc.com

Calculated:
3/3/2011 11:53 AM/2.7.473

DECIBEL - Main Result

Calculation: Elecon T600

Noise calculation model:
ISO 9613-2 General
Wind speed:
6.3 m/s
Ground attenuation:
None
Meteorological coefficient, C0:
1.0 dB
Type of demand in calculation:
2: WTG plus ambient noise is compared to ambient noise plus margin (FR etc.)
Noise values in calculation:
All noise values are 90% exeedance values (L90)
Pure tones:
Pure and Impulse tone penalty are added to WTG source noise
Height above ground level, when no value in NSA object:
60.0 m Don't allow override of model height with height from NSA object
Deviation from "official" noise demands. Negative is more restrictive, positive is less restrictive.:
0.0 dB(A)

Scale 1:12,500
New WTG   Noise sensitive area

WTGs

	UTM NAD83 Zone: 19				WTG type						Noise data								
	East	North	Z	Row data/Description	Valid	Manufact.	Type-generator	Power, rated	Rotor diameter	Hub height	Creator	Name	Wind speed	Status	LwA,ref	Pure tones	Octave data	
UTM NAD83 Zone: 19			[m]					[kW]	[m]	[m]			[m/s]		[dB(A)]			
1	343,656	4,704,476	27.7	Elecon T600	Yes	TURBOWINDS	T600-48-600/120	600	48.0	60.0	EMD	Level 0 - measured octave - ECN - 08-1999	6.3	From slope	101.0	0 dB	Yes	*)

***)Notice: One or more noise data for this WTG is generic or input by user**

Calculation Results

Sound Level

Noise sensitive area		UTM NAD83 Zone: 19					Demands			Sound Level			Demands fulfilled ?
No.	Name	East	North	Z	Imission height	Ambient noise	Additional exposure	Ambient+WTGs	From WTGs	Ambient+WTGs	Additional exposure	Noise
				[m]	[m]	[dB(A)]	[dB(A)]	[dB(A)]	[dB(A)]	[dB(A)]	[dB(A)]	
A	Tedesco Country Club	343,854	4,704,716	28.7	60.0	32.0	10.0	42.0	38.7	39.6	7.6	Yes
B	Davenport Drive	343,962	4,704,501	14.0	60.0	32.0	10.0	42.0	38.8	39.7	7.7	Yes
C	Route 1A	343,416	4,704,739	16.1	60.0	32.0	10.0	42.0	37.4	38.5	6.5	Yes
D	Parsons Drive	343,368	4,704,506	36.6	60.0	32.0	10.0	42.0	39.5	40.2	8.2	Yes
E	Middle School	343,623	4,704,177	24.3	60.0	32.0	10.0	42.0	39.1	39.9	7.9	Yes
F	End of Nason Road	343,727	4,704,197	18.6	60.0	32.0	10.0	42.0	39.5	40.2	8.2	Yes
G	Burke Drive	343,332	4,704,234	23.8	60.0	32.0	10.0	42.0	36.1	37.5	5.5	Yes
H	End of Neighborhood Road	344,154	4,704,182	13.2	60.0	32.0	10.0	42.0	32.4	35.2	3.2	Yes

Distances (m)

	WTG
NSA	1
A	311
B	308
C	356
D	289
E	301
F	288
G	404
H	579

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Calculated:
3/3/2011 11:53 AM/2.7.473

DECIBEL - Detailed results

Calculation: Elecon T600**Noise calculation model:** ISO 9613-2 General 6.3 m/s

Assumptions

Calculated L(DW) = LWA,ref + K + Dc - (Adiv + Aatm + Agr + Abar + Amisc) - Cmet
(when calculated with ground attenuation, then Dc = Domega)

LWA,ref:	Sound pressure level at WTG
K:	Pure tone
Dc:	Directivity correction
Adiv:	the attenuation due to geometrical divergence
Aatm:	the attenuation due to atmospheric absorption
Agr:	the attenuation due to ground effect
Abar:	the attenuation due to a barrier
Amisc:	the attenuation due to miscellaneous other effects
Cmet:	Meteorological correction

Calculation Results

Noise sensitive area: A Tedesco Country Club

WTG **Wind speed: 6.3 m/s**

No.	Distance [m]	Sound distance [m]	Calculated [dB(A)]	LwA,ref [dB(A)]	Dc [dB]	Adiv [dB]	Aatm [dB]	Agr [dB]	Abar [dB]	Amisc [dB]	A [dB]	Cmet [dB]
1	311	311	**38.73**	99.0	3.00	60.87	2.38	0.00	0.00	0.00	63.25	0.00

Sum 38.73

Noise sensitive area: B Davenport Drive

WTG **Wind speed: 6.3 m/s**

No.	Distance [m]	Sound distance [m]	Calculated [dB(A)]	LwA,ref [dB(A)]	Dc [dB]	Adiv [dB]	Aatm [dB]	Agr [dB]	Abar [dB]	Amisc [dB]	A [dB]	Cmet [dB]
1	308	308	**38.85**	99.0	3.00	60.77	2.37	0.00	0.00	0.00	63.13	0.00

Sum 38.85

Noise sensitive area: C Route 1A

WTG **Wind speed: 6.3 m/s**

No.	Distance [m]	Sound distance [m]	Calculated [dB(A)]	LwA,ref [dB(A)]	Dc [dB]	Adiv [dB]	Aatm [dB]	Agr [dB]	Abar [dB]	Amisc [dB]	A [dB]	Cmet [dB]
1	356	356	**37.38**	99.0	3.00	62.03	2.58	0.00	0.00	0.00	64.60	0.00

Sum 37.38

Noise sensitive area: D Parsons Drive

WTG **Wind speed: 6.3 m/s**

No.	Distance [m]	Sound distance [m]	Calculated [dB(A)]	LwA,ref [dB(A)]	Dc [dB]	Adiv [dB]	Aatm [dB]	Agr [dB]	Abar [dB]	Amisc [dB]	A [dB]	Cmet [dB]
1	289	289	**39.48**	99.0	3.00	60.22	2.28	0.00	0.00	0.00	62.50	0.00

Sum 39.48

Noise sensitive area: E Middle School

WTG **Wind speed: 6.3 m/s**

No.	Distance [m]	Sound distance [m]	Calculated [dB(A)]	LwA,ref [dB(A)]	Dc [dB]	Adiv [dB]	Aatm [dB]	Agr [dB]	Abar [dB]	Amisc [dB]	A [dB]	Cmet [dB]
1	301	301	**39.08**	99.0	3.00	60.57	2.33	0.00	0.00	0.00	62.90	0.00

Sum 39.08

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DECIBEL - Detailed results

Calculation: Elecon T600**Noise calculation model:** ISO 9613-2 General 6.3 m/s

Noise sensitive area: F End of Nason Road

WTG **Wind speed: 6.3 m/s**

No.	Distance [m]	Sound distance [m]	Calculated [dB(A)]	LwA,ref [dB(A)]	Dc [dB]	Adiv [dB]	Aatm [dB]	Agr [dB]	Abar [dB]	Amisc [dB]	A [dB]	Cmet [dB]
1	288	288	**39.52**	99.0	3.00	60.19	2.27	0.00	0.00	0.00	62.47	0.00

Sum 39.52

Noise sensitive area: G Burke Drive

WTG **Wind speed: 6.3 m/s**

No.	Distance [m]	Sound distance [m]	Calculated [dB(A)]	LwA,ref [dB(A)]	Dc [dB]	Adiv [dB]	Aatm [dB]	Agr [dB]	Abar [dB]	Amisc [dB]	A [dB]	Cmet [dB]
1	404	404	**36.09**	99.0	3.00	63.13	2.77	0.00	0.00	0.00	65.90	0.00

Sum 36.09

Noise sensitive area: H End of Neighborhood Road

WTG **Wind speed: 6.3 m/s**

No.	Distance [m]	Sound distance [m]	Calculated [dB(A)]	LwA,ref [dB(A)]	Dc [dB]	Adiv [dB]	Aatm [dB]	Agr [dB]	Abar [dB]	Amisc [dB]	A [dB]	Cmet [dB]
1	579	579	**32.39**	99.0	3.00	66.25	3.34	0.00	0.00	0.00	69.59	0.00

Sum 32.39

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Calculated:
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DECIBEL - Assumptions for noise calculation

Calculation: Elecon T600**Noise calculation model:** ISO 9613-2 General 6.3 m/s

Noise calculation model:
ISO 9613-2 General
Wind speed:
6.3 m/s
Ground attenuation:
None
Meteorological coefficient, C0:
1.0 dB
Type of demand in calculation:
2: WTG plus ambient noise is compared to ambient noise plus margin (FR etc.)
Noise values in calculation:
All noise values are 90% exeedance values (L90)
Pure tones:
Pure and Impulse tone penalty are added to WTG source noise
Height above ground level, when no value in NSA object:
60.0 m Don't allow override of model height with height from NSA object
Deviation from "official" noise demands. Negative is more restrictive, positive is less restrictive.:
0.0 dB(A)
Octave data required
Air absorption

63	125	250	500	1,000	2,000	4,000	8,000
[db/km]	[db/km]	[db/km]	[db/km]	[db/km]	[db/km]	[db/km]	[db/km]
0.1	0.4	1.0	1.9	3.7	9.7	32.8	117.0

WTG: TURBOWINDS T600-48 600-120 48.0 !O!
Noise: Level 0 - measured octave - ECN - 08-1999

Source	Source/Date	Creator	Edited
ECN	8/1/1999	EMD	6/27/2005 2:40 PM

Based on ECN report ECN-CX--99-093 dated August 1999 and the use of Rotorline blades.

Status	Hub height	Wind speed	LwA,ref	Pure tones		Octave data 63	125	250	500	1000	2000	4000	8000
	[m]	[m/s]	[dB(A)]			[dB]	[dB]	[dB]	[dB]	[dB]	[dB]	[dB]	[dB]
From slope		6.3	101.0	No	From nearest other wind speed	78.2	88.1	91.4	89.8	89.0	92.8	93.1	80.5
From slope	65.0	6.3	101.0	No	From nearest other wind speed	78.2	88.1	91.4	89.8	89.0	92.8	93.1	80.5

NSA: Tedesco Country Club-A
Predefined calculation standard:
Imission height(a.g.l.): Use standard value from calculation model

Ambient noise: 32.0 dB(A)
Margin or Allowed additional exposure: 10.0 dB(A)
Sound level always accepted: 42.0 dB(A)
Distance demand: 0.0 m

NSA: Davenport Drive-B
Predefined calculation standard:
Imission height(a.g.l.): Use standard value from calculation model

Ambient noise: 32.0 dB(A)
Margin or Allowed additional exposure: 10.0 dB(A)
Sound level always accepted: 42.0 dB(A)
Distance demand: 0.0 m

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DECIBEL - Assumptions for noise calculation

Calculation: Elecon T600**Noise calculation model:** ISO 9613-2 General 6.3 m/s

NSA: Route 1A-C
Predefined calculation standard:
Imission height(a.g.l.): Use standard value from calculation model

Ambient noise: 32.0 dB(A)
Margin or Allowed additional exposure: 10.0 dB(A)
Sound level always accepted: 42.0 dB(A)
Distance demand: 0.0 m

NSA: Parsons Drive-D
Predefined calculation standard:
Imission height(a.g.l.): Use standard value from calculation model

Ambient noise: 32.0 dB(A)
Margin or Allowed additional exposure: 10.0 dB(A)
Sound level always accepted: 42.0 dB(A)
Distance demand: 0.0 m

NSA: Middle School-E
Predefined calculation standard:
Imission height(a.g.l.): Use standard value from calculation model

Ambient noise: 32.0 dB(A)
Margin or Allowed additional exposure: 10.0 dB(A)
Sound level always accepted: 42.0 dB(A)
Distance demand: 0.0 m

NSA: End of Nason Road-F
Predefined calculation standard:
Imission height(a.g.l.): Use standard value from calculation model

Ambient noise: 32.0 dB(A)
Margin or Allowed additional exposure: 10.0 dB(A)
Sound level always accepted: 42.0 dB(A)
Distance demand: 0.0 m

NSA: Burke Drive-G
Predefined calculation standard:
Imission height(a.g.l.): Use standard value from calculation model

Ambient noise: 32.0 dB(A)
Margin or Allowed additional exposure: 10.0 dB(A)
Sound level always accepted: 42.0 dB(A)
Distance demand: 0.0 m

NSA: End of Neighborhood Road-H
Predefined calculation standard:
Imission height(a.g.l.): Use standard value from calculation model

Ambient noise: 32.0 dB(A)
Margin or Allowed additional exposure: 10.0 dB(A)
Sound level always accepted: 42.0 dB(A)
Distance demand: 0.0 m

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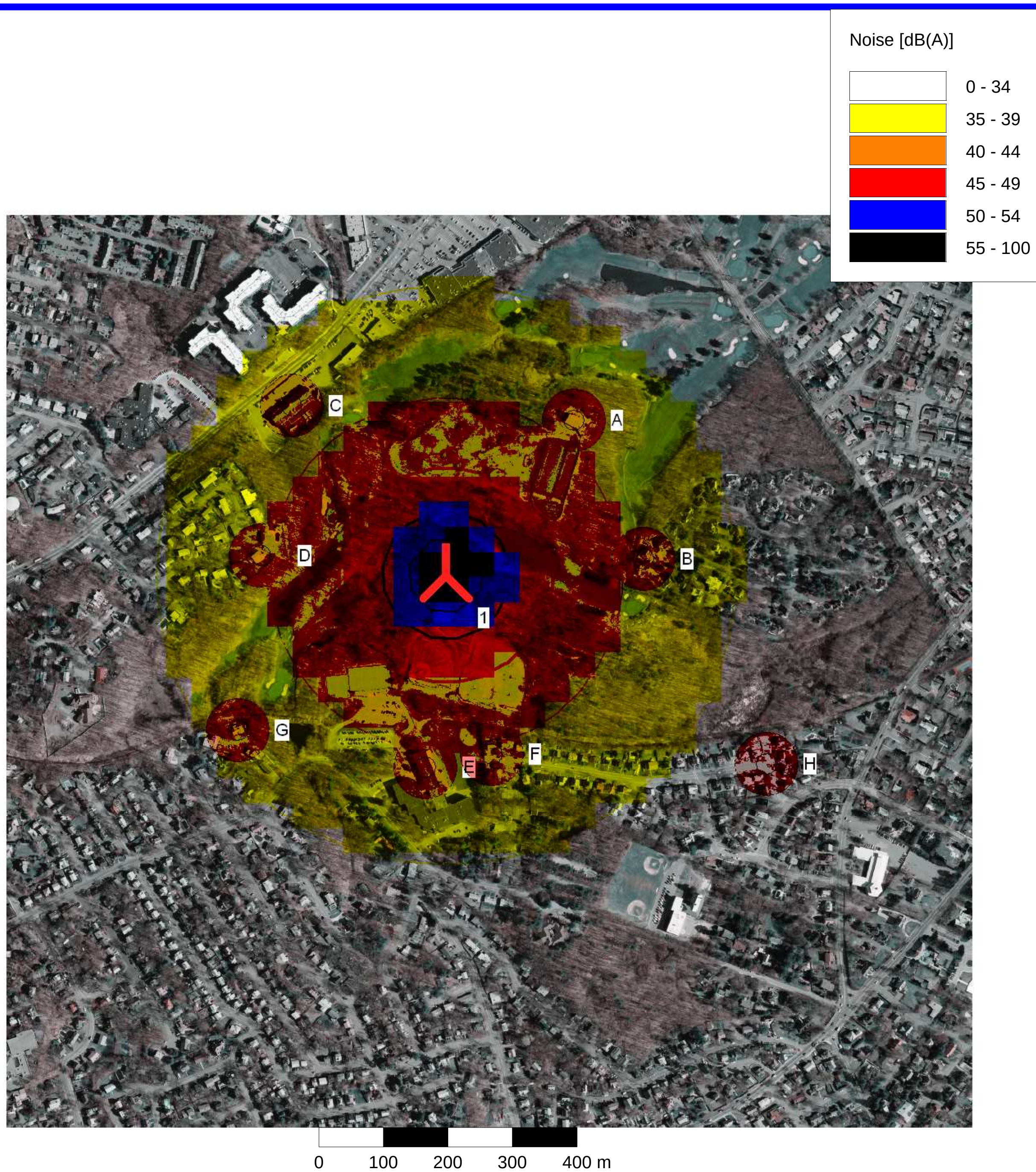
DECIBEL - Map 6.3 m/s

Calculation: Elecon T600**Noise calculation model:** ISO 9613-2 General 6.3 m/s



Map: , Print scale 1:10,000, Map center UTM NAD 83 Zone: 19 East: 343,656 North: 4,704,476
Noise calculation model: ISO 9613-2 General. Wind speed: 6.3 m/s

New WTG   Noise sensitive area

Height above sea level from active line object

35.0 dB(A)   40.0 dB(A)   45.0 dB(A)   50.0 dB(A)   55.0 dB(A)

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Calculated:
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DECIBEL - Main Result

Calculation: GE 1.5sle

Noise calculation model:
ISO 9613-2 General
Wind speed:
7.1 m/s
Ground attenuation:
None
Meteorological coefficient, C0:
1.0 dB
Type of demand in calculation:
2: WTG plus ambient noise is compared to ambient noise plus margin (FR etc.)
Noise values in calculation:
All noise values are 90% exeedance values (L90)
Pure tones:
Pure and Impulse tone penalty are added to WTG source noise
Height above ground level, when no value in NSA object:
80.0 m Don't allow override of model height with height from NSA object
Deviation from "official" noise demands. Negative is more restrictive, positive is less restrictive.:
0.0 dB(A)

Scale 1:12,500
New WTG Noise sensitive area

WTGs

	UTM NAD83 Zone: 19 East	North	Z	Row data/Description	WTG type Valid	Manufact.	Type-generator	Power, rated	Rotor diameter	Hub height	Noise data Creator	Name	Wind speed	Status	Hub height	LwA,ref	Pure tones	Octave data	
	UTM NAD83 Zone: 19		[m]					[kW]	[m]	[m]			[m/s]		[m]	[dB(A)]			
1	343,656	4,704,476	27.7	GE 1.5sle	Yes	GE WIND ENERGY	GE 1.5sle-1,500	1,500	77.0	80.0	EMD	Level 0 - - Standard operation - 01-2005	7.1	From slope	80.0	103.1	0 dB	Generic	*)

***)Notice: One or more noise data for this WTG is generic or input by user**

Calculation Results

Sound Level

Noise sensitive area No.	Name	UTM NAD83 Zone: 19 East	North	Z [m]	Imission height [m]	Demands Ambient noise [dB(A)]	Additional exposure [dB(A)]	Ambient+WTGs [dB(A)]	Sound Level From WTGs [dB(A)]	Ambient+WTGs [dB(A)]	Additional exposure [dB(A)]	Demands fulfilled ? Noise
A	Tedesco Country Club	343,854	4,704,716	28.7	80.0	32.0	10.0	42.0	42.1	42.5	10.5	No
B	Davenport Drive	343,962	4,704,501	14.0	80.0	32.0	10.0	42.0	42.2	42.6	10.6	No
C	Route 1A	343,416	4,704,739	16.1	80.0	32.0	10.0	42.0	40.8	41.3	9.3	Yes
D	Parsons Drive	343,368	4,704,506	36.6	80.0	32.0	10.0	42.0	42.8	43.1	11.1	No
E	Middle School	343,623	4,704,177	24.3	80.0	32.0	10.0	42.0	42.4	42.8	10.8	No
F	End of Nason Road	343,727	4,704,197	18.6	80.0	32.0	10.0	42.0	42.8	43.2	11.2	No
G	Burke Drive	343,332	4,704,234	23.8	80.0	32.0	10.0	42.0	39.6	40.3	8.3	Yes
H	End of Neighborhood Road	344,154	4,704,182	13.2	80.0	32.0	10.0	42.0	36.0	37.4	5.4	Yes

Distances (m)

NSA	WTG 1
A	311
B	308
C	356
D	289
E	301
F	288
G	404
H	579

Project:
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Calculated:
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DECIBEL - Detailed results

Calculation: GE 1.5sle**Noise calculation model:** ISO 9613-2 General 7.1 m/s

Assumptions

Calculated L(DW) = LWA,ref + K + Dc - (Adiv + Aatm + Agr + Abar + Amisc) - Cmet
(when calculated with ground attenuation, then Dc = Domega)

LWA,ref:	Sound pressure level at WTG
K:	Pure tone
Dc:	Directivity correction
Adiv:	the attenuation due to geometrical divergence
Aatm:	the attenuation due to atmospheric absorption
Agr:	the attenuation due to ground effect
Abar:	the attenuation due to a barrier
Amisc:	the attenuation due to miscellaneous other effects
Cmet:	Meteorological correction

Calculation Results

Noise sensitive area: A Tedesco Country Club

WTG			Wind speed: 7.1 m/s									
No.	Distance	Sound distance	Calculated	LwA,ref	Dc	Adiv	Aatm	Agr	Abar	Amisc	A	Cmet
	[m]	[m]	[dB(A)]	[dB(A)]	[dB]	[dB]	[dB]	[dB]	[dB]	[dB]	[dB]	[dB]
1	311	311	**42.08**	101.1	3.00	60.87	1.15	0.00	0.00	0.00	62.01	0.00

Sum 42.08

Noise sensitive area: B Davenport Drive

WTG			Wind speed: 7.1 m/s									
No.	Distance	Sound distance	Calculated	LwA,ref	Dc	Adiv	Aatm	Agr	Abar	Amisc	A	Cmet
	[m]	[m]	[dB(A)]	[dB(A)]	[dB]	[dB]	[dB]	[dB]	[dB]	[dB]	[dB]	[dB]
1	308	308	**42.19**	101.1	3.00	60.77	1.14	0.00	0.00	0.00	61.90	0.00

Sum 42.19

Noise sensitive area: C Route 1A

WTG			Wind speed: 7.1 m/s									
No.	Distance	Sound distance	Calculated	LwA,ref	Dc	Adiv	Aatm	Agr	Abar	Amisc	A	Cmet
	[m]	[m]	[dB(A)]	[dB(A)]	[dB]	[dB]	[dB]	[dB]	[dB]	[dB]	[dB]	[dB]
1	356	356	**40.79**	101.1	3.00	62.03	1.27	0.00	0.00	0.00	63.30	0.00

Sum 40.79

Noise sensitive area: D Parsons Drive

WTG			Wind speed: 7.1 m/s									
No.	Distance	Sound distance	Calculated	LwA,ref	Dc	Adiv	Aatm	Agr	Abar	Amisc	A	Cmet
	[m]	[m]	[dB(A)]	[dB(A)]	[dB]	[dB]	[dB]	[dB]	[dB]	[dB]	[dB]	[dB]
1	289	289	**42.79**	101.1	3.00	60.22	1.08	0.00	0.00	0.00	61.30	0.00

Sum 42.79

Noise sensitive area: E Middle School

WTG			Wind speed: 7.1 m/s									
No.	Distance	Sound distance	Calculated	LwA,ref	Dc	Adiv	Aatm	Agr	Abar	Amisc	A	Cmet
	[m]	[m]	[dB(A)]	[dB(A)]	[dB]	[dB]	[dB]	[dB]	[dB]	[dB]	[dB]	[dB]
1	301	301	**42.41**	101.1	3.00	60.57	1.11	0.00	0.00	0.00	61.68	0.00

Sum 42.41

Project:
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DECIBEL - Detailed results

Calculation: GE 1.5sle**Noise calculation model:** ISO 9613-2 General 7.1 m/s

Noise sensitive area: F End of Nason Road

WTG			Wind speed: 7.1 m/s									
No.	Distance	Sound distance	Calculated	LwA,ref	Dc	Adiv	Aatm	Agr	Abar	Amisc	A	Cmet
	[m]	[m]	[dB(A)]	[dB(A)]	[dB]	[dB]	[dB]	[dB]	[dB]	[dB]	[dB]	[dB]
1	288	288	**42.82**	101.1	3.00	60.19	1.08	0.00	0.00	0.00	61.27	0.00

Sum 42.82

Noise sensitive area: G Burke Drive

WTG			Wind speed: 7.1 m/s									
No.	Distance	Sound distance	Calculated	LwA,ref	Dc	Adiv	Aatm	Agr	Abar	Amisc	A	Cmet
	[m]	[m]	[dB(A)]	[dB(A)]	[dB]	[dB]	[dB]	[dB]	[dB]	[dB]	[dB]	[dB]
1	404	404	**39.55**	101.1	3.00	63.13	1.41	0.00	0.00	0.00	64.54	0.00

Sum 39.55

Noise sensitive area: H End of Neighborhood Road

WTG			Wind speed: 7.1 m/s									
No.	Distance	Sound distance	Calculated	LwA,ref	Dc	Adiv	Aatm	Agr	Abar	Amisc	A	Cmet
	[m]	[m]	[dB(A)]	[dB(A)]	[dB]	[dB]	[dB]	[dB]	[dB]	[dB]	[dB]	[dB]
1	579	579	**35.98**	101.1	3.00	66.25	1.86	0.00	0.00	0.00	68.11	0.00

Sum 35.98

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Calculated:
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DECIBEL - Assumptions for noise calculation

Calculation: GE 1.5sle**Noise calculation model:** ISO 9613-2 General 7.1 m/s

Noise calculation model:
ISO 9613-2 General
Wind speed:
7.1 m/s
Ground attenuation:
None
Meteorological coefficient, C0:
1.0 dB
Type of demand in calculation:
2: WTG plus ambient noise is compared to ambient noise plus margin (FR etc.)
Noise values in calculation:
All noise values are 90% exeedance values (L90)
Pure tones:
Pure and Impulse tone penalty are added to WTG source noise
Height above ground level, when no value in NSA object:
80.0 m Don't allow override of model height with height from NSA object
Deviation from "official" noise demands. Negative is more restrictive, positive is less restrictive.:
0.0 dB(A)
Octave data required
Air absorption

63	125	250	500	1,000	2,000	4,000	8,000
[db/km]	[db/km]	[db/km]	[db/km]	[db/km]	[db/km]	[db/km]	[db/km]
0.1	0.4	1.0	1.9	3.7	9.7	32.8	117.0

WTG: GE WIND ENERGY GE 1.5sle 1500 77.0 !O!
Noise: Level 0 - - Standard operation - 01-2005

Source	Source/Date	Creator	Edited
Manufacturer	1/7/2005	EMD	6/27/2005 11:37 AM

+/- 2dB per IEC 61400-14 CDV

Status	Hub height	Wind speed	LwA,ref	Pure tones		Octave data 63	125	250	500	1000	2000	4000	8000
	[m]	[m/s]	[dB(A)]			[dB]	[dB]	[dB]	[dB]	[dB]	[dB]	[dB]	[dB]
From slope	80.0	7.1	103.1	No	Generic data	82.7	89.7	93.1	95.7	95.5	92.6	87.8	78.3

NSA: Tedesco Country Club-A
Predefined calculation standard:
Imission height(a.g.l.): Use standard value from calculation model

Ambient noise: 32.0 dB(A)
Margin or Allowed additional exposure: 10.0 dB(A)
Sound level always accepted: 42.0 dB(A)
Distance demand: 0.0 m

NSA: Davenport Drive-B
Predefined calculation standard:
Imission height(a.g.l.): Use standard value from calculation model

Ambient noise: 32.0 dB(A)
Margin or Allowed additional exposure: 10.0 dB(A)
Sound level always accepted: 42.0 dB(A)
Distance demand: 0.0 m

NSA: Route 1A-C
Predefined calculation standard:
Imission height(a.g.l.): Use standard value from calculation model

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Diane Gagnon / dgagnon@meridianassoc.com

DECIBEL - Assumptions for noise calculation

Calculation: GE 1.5sle**Noise calculation model:** ISO 9613-2 General 7.1 m/s

Ambient noise: 32.0 dB(A)
Margin or Allowed additional exposure: 10.0 dB(A)
Sound level always accepted: 42.0 dB(A)
Distance demand: 0.0 m

NSA: Parsons Drive-D
Predefined calculation standard:
Imission height(a.g.l.): Use standard value from calculation model

Ambient noise: 32.0 dB(A)
Margin or Allowed additional exposure: 10.0 dB(A)
Sound level always accepted: 42.0 dB(A)
Distance demand: 0.0 m

NSA: Middle School-E
Predefined calculation standard:
Imission height(a.g.l.): Use standard value from calculation model

Ambient noise: 32.0 dB(A)
Margin or Allowed additional exposure: 10.0 dB(A)
Sound level always accepted: 42.0 dB(A)
Distance demand: 0.0 m

NSA: End of Nason Road-F
Predefined calculation standard:
Imission height(a.g.l.): Use standard value from calculation model

Ambient noise: 32.0 dB(A)
Margin or Allowed additional exposure: 10.0 dB(A)
Sound level always accepted: 42.0 dB(A)
Distance demand: 0.0 m

NSA: Burke Drive-G
Predefined calculation standard:
Imission height(a.g.l.): Use standard value from calculation model

Ambient noise: 32.0 dB(A)
Margin or Allowed additional exposure: 10.0 dB(A)
Sound level always accepted: 42.0 dB(A)
Distance demand: 0.0 m

NSA: End of Neighborhood Road-H
Predefined calculation standard:
Imission height(a.g.l.): Use standard value from calculation model

Ambient noise: 32.0 dB(A)
Margin or Allowed additional exposure: 10.0 dB(A)
Sound level always accepted: 42.0 dB(A)
Distance demand: 0.0 m

Project:
5247Windpro

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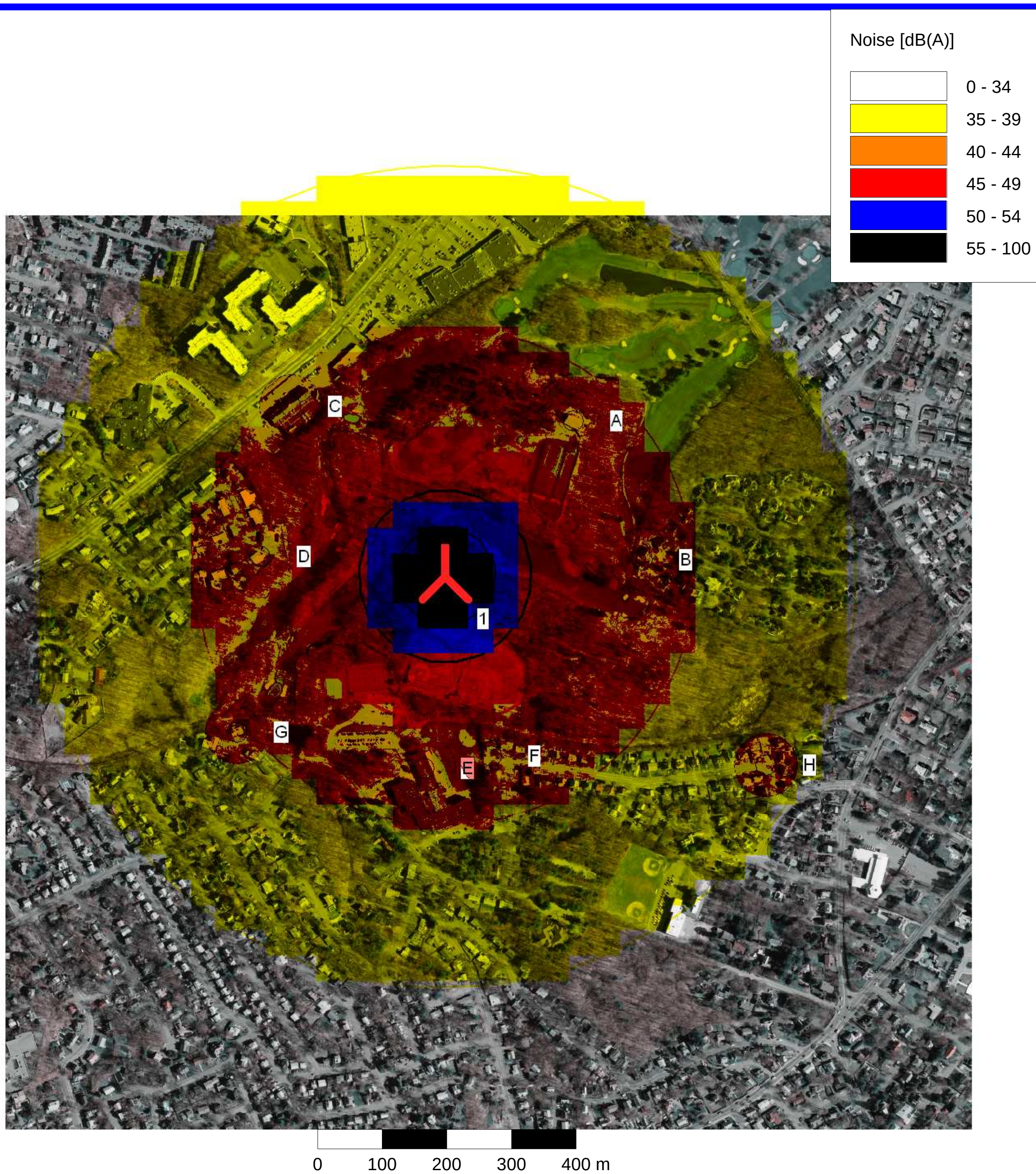
Calculated:
3/2/2011 2:30 PM/2.7.473

DECIBEL - Map 7.1 m/s

Calculation: GE 1.5sle**Noise calculation model:** ISO 9613-2 General 7.1 m/s



Map: , Print scale 1:10,000, Map center UTM NAD 83 Zone: 19 East: 343,656 North: 4,704,476
Noise calculation model: ISO 9613-2 General. Wind speed: 7.1 m/s

New WTG Noise sensitive area

Height above sea level from active line object

35.0 dB(A) 40.0 dB(A) 45.0 dB(A) 50.0 dB(A) 55.0 dB(A)