CONESTOGA-ROVERS & ASSOCIATES

651 Colby Drive, Waterloo, Ontario, Canada N2V 1C2
Telephone: (519) 884-0510 Fax: (519) 884-0525
www.CRAworld.com

MEMORANDUM

TO:	David Britton Camie McGraw	REF. NO.:	630631
FROM:	Gordon Reusing/Tim Wiens/ca/3	DATE:	September 27, 2010
CC:	Town Planning Board Carol Horowitz, Town Planner Daniel A. Spitzer, Esq.		
RE:	**Ambient Sound Level Assessment Town of Allegany, New York**		

1.0 INTRODUCTION

Conestoga-Rovers & Associates was retained by the Town of Allegany, New York (Allegany) to conduct an Ambient Sound Level Assessment (Assessment) to determine the current ambient sound level in the area of the proposed EverPower Renewables (EverPower) Allegany Wind Farm Project (Project). Specifically, the typical ambient sound levels that occur during meteorological conditions when the proposed wind turbines will operate were of interest.

The Assessment used long-term noise monitoring data obtained at three (3) locations along with the relevant local meteorological data to evaluate the ambient sound level.

The long-term sound level data was collected from May 28, 2010, to June 15, 2010. Noise monitoring locations were chosen based on three geographically distinct areas of sensitive receptors located around the Project. The sensitive receptors are identified in CRA's April 2010 memo entitled "Allegany Wind Farm – Noise Impact Modelling at Residences" (Noise Impact Study).

The meteorological station and monitoring locations are identified on Figure 1.

2.0 BACKGROUND

Noise is defined as unwanted sound. The degree of disturbance or annoyance depends on perception and sensitivity and environmental factors including the magnitude and nature of the intruding noise, the magnitude of the background or ambient sound present without the intruding noise, and the nature of the activity of people in the area where the noise is heard. People relaxing or sleeping inside of their homes prefer a quiet environment whereas factory employees may be accustomed to relatively high noise levels when at work.

The magnitude, or loudness, of sound waves (pressure oscillations) is described quantitatively by the terms sound pressure level. The magnitude of a sound is measured in decibels, abbreviated "dB". Decibels are used as the metric to quantify sound pressure levels. The average whisper is approximately 20 dBA, a moderate sound level is about 50 dBA, and a loud sound level is about 100 dBA. Various common sound levels are listed below.

130 dBA	Loud siren at 100 feet
110 dBA	Rock band at 15 feet
95 dBA	Pile driver at 100 feet
80 dBA	Truck at 100 feet
65 dBA	Lawn mower at 100 feet
60 dBA	Average speech
55 dBA	Automobile 30 mph at 100 feet
40 dBA	Empty theater or library

Sound energy spreads or propagates as it travels away from its source causing the sound level to diminish. Other factors that reduce sound include absorption in the atmosphere, diffraction and refraction in the atmosphere, and terrain.

Sound level meters are typically equipped with electronic filters to simulate the frequency response characteristics of the human ear. Sound levels measured using the A-weighting filter are designated by "dBA". The A-weighting filter emphasizes the mid-frequency components of sounds to approximate the frequency response of the human ear.

The background or ambient acoustic environment experienced in communities varies based on location and with time and is the composite result of nearby and distant sound sources. The ambient environment includes high sound level single-events such as the pass by of an airplane or car, the barking of a dog, thunder, or a siren. The ambient acoustic environment also includes relatively steady residual or background sounds caused by sources such as distant traffic from arterial roadways and ventilation equipment on industry rooftops. The quantity of the single-event sounds and the amplitude of the background sounds are usually least during the late nighttime hours (11:00 p.m. to 7:00 a.m.).

3.0 METHODOLOGY

Various noise measurement methodologies exist to quantify and qualify the ambient sound level respective of the source and in accordance with the requirements of the local jurisdiction.

It is common practice to measure the equivalent sound level in order to evaluate time varying ambient sound levels. The equivalent sound level (Leq) is the level of a steady-state sound that has the same (equivalent) energy as the time-varying sound of interest, taken over a specified time period. The equivalent sound level is a single-value that expresses the time-averaged total energy of the entire ambient sound energy and it includes both the high-level single event sounds and the relatively steady background sounds. Since the 1974 publication of the "Levels Document", the Leq sound level has been selected by regulatory agencies such as the U.S. Environmental Protection Agency (USEPA) as a common descriptor for the purpose of identifying and evaluating levels of environmental noise exposure.

Additional statistical parameters that are commonly used to characterize the ambient sound environment include: L10 (sound level exceeded 10% of the time) and L90 (sound level exceeded 90% of time period).

In Ontario, ambient sound levels are evaluated in accordance with Ontario Ministry of the Environment (MOE) guidance document NPC-233 "Information to be Submitted for Approval of Stationary Sources of Sound" and NPC-103 "Procedures". Continuous data logging Type 1 equipment is used to evaluate one-hour Leqs and other noise statistics of interest. A minimum unattended data collection period of 48-hours is suggested.

American National Standards Institute (ANSI) Section 12.9 Part 3 "Quantities and Procedures for Description and Measurement of Environmental Sound, Part 3: Short-term Measurements with an Observer Present" is recognized as an acceptable guidance document for evaluating background noise using attended short-term measurements. The L90 noise level is defined by ANSI as the long-term background sound level (i.e. the sounds one hears in the absence of the noise source under consideration and without short term or near-by sounds from other sources). Measurements are conducted using Precision Class 1/ Type 1 instruments.

CRA conducted unattended sound level measurements for an extended 17-day time period. Class 1 (Type 1) sound level meters (SLMs) were used in accordance with ANSI requirements. CRA's equipment is calibrated on an annual basis and pre and post measurement calibration was also completed. The equipment collected sound level data on a continuous basis and statistical data were calculated based on a one-hour interval. Data anomalies and periods of rain were omitted from the data set only.

CRA measured 1-hour Leq sound levels and various statistics for the duration of the monitoring period. The L90 sound level data is most meaningful since background noise will vary greatly due to man-made as well as natural influences. The L90 value is an appropriate metric for determining the ambient pre-construction background sound level since it less influenced by short-term noise sources.

Hourly wind speed data was obtained from an on-site 55 meter tall (180 feet) tall Everpower meteorological tower for the monitoring period. The hourly wind speed data was normalized for a 10 meter (33 feet) height using the wind profile power law relationship equation:

$u/u_r = (z/z_r)^\alpha$

where u is the wind speed (in meters per second[m/s]) at height z (in meters), and u_r is the known wind speed at a reference height z_r. The exponent (α) is an empirically derived coefficient that varies dependent upon the stability of the atmosphere. For neutral stability conditions, α is approximately 1/7, or 0.143, and has been used in this report as a reasonable coefficient because stability data was not readily available.

The normalized wind speed data was used to evaluate the 1-hour Leq sound levels and L10 and L90 statistical data for each monitoring location when the wind speed was in the critical range of interest: ≥ the wind turbine cut in speed of 3 m/s and ≤ the critical design level of 7 m/s when the wind induced sound power level from the wind turbine is typically at the maximum relative to background noise from the wind.

4.0 EQUIPMENT SETUP AND PROCEDURE

The Assessment was carried out using Type 1 precision sound level meters (SLMs) complete with data logging systems. The three monitoring locations are described as follows:

Location 1 (L1)

A Larson-Davis 820 SLM was set up along the property line of 143 Chipmunk Run Road, a residence adjacent to the intersection of Chipmunk Run Road and Nichols Run. The residence is identified as R3 in the Noise Impact Study. L1 is 1.26 kilometers [km] (0.78 miles) from the closest proposed wind turbine (18E).

Photograph 1: L1

Location 2 (L2)

A Larson-Davis 820 SLM was set up along the property line of 1041 Chipmunk Run Road. The residence is identified as R5 in the Noise Impact Study. L2 is 1.37 km (0.85 miles) from the closest proposed wind turbine (8E).

Photograph 2: L2

Location 3 (L3)

A Larson-Davis 820 SLM was set up on the property of 300 Hawthorn Lane, a residence located at the dead end of Hawthorn Lane. The residence is identified as R8 in the Noise Impact Study. L3 is 3.76 km (2.34 miles) from the closest proposed wind turbine (8E).

Photograph 3: L3

The locations of L1, L2, L3, and Everpower's Met Tower are shown in Figure 1.

5.0 RESULTS AND DISCUSSION

To determine the ambient sound level at the three monitoring locations, sound level data was continuously collected and sound levels and statistics of interest were automatically calculated for each one-hour period. The sound pressure level exceeded 10 percent of the time (L10) in each hour, the sound pressure level exceeded 90 percent of the time (L90) in each hour, and the one-hour equivalent sound level (Leq) were collected.

The sound level data collected for L1, L2, and L3 are presented on Figures 2, 3, and 4, respectively.

The sound levels measured during rain and/or thunderstorms were identified in the assessment due to the recording of uncharacteristically high sound levels. Other hours that are considered uncharacteristically loud which could not be associated with precipitation were also identified because they do not properly represent the acoustic character of the area. The unknown influences are most likely due to human activity at the residence such as lawn mowing or idling vehicles. The sound levels due to precipitation and unknown acoustic influence are indicated with the wind speed statistic in Figures 2, 3, and 4 for L1, L2, and L3, respectively.

In each figure, the L10 statistic values follow the one-hour Leq sound levels very closely. The L90 statistic values are much lower. This pattern indicates that high sound producing events that occur less frequently and/or for a short duration through a given hour are the predominant influence on the one-hour Leq values.

The minimum, maximum and logarithmic average sound levels (overall, 12-hour day – 7:00 a.m. to 7:00 p.m. and 12-hour night – 7:00 p.m. to 7:00 a.m.) for the critical wind speed range of interest (3 m/s to 7 m/s) are summarized for each monitoring location as follows:

	L1 (R3)			*L2 (R5)*			*L3 (R8)*		
	Leq	***L10***	***L90***	***Leq***	***L10***	***L90***	***Leq***	***L10***	***L90***
Minimum (dBA)	22.1	21.0	18.3	27.9	28.7	27.1	24.3	25.7	20.2
Maximum (dBA)	56	60.5	45.5	59.7	63.7	47.6	58.5	61.8	46.6
Overall Average (dBA)	**44.8**	**47.3**	**32.7**	**46.8**	**49.7**	**35.1**	**41.6**	**44.1**	**33.0**
Day (dBA)	**46.7**	**49.2**	**34.7**	**48.0**	**51.8**	**36.6**	**41.6**	**45.0**	**33.9**
Night (dBA)	**41.6**	**44.3**	**29.6**	**43.5**	**46.2**	**32.9**	**41.6**	**42.9**	**32.0**

The environmental sound levels including the ambient background + human noise influences are represented by the one-hour Leq values. The higher background sound levels experienced at Locations L1 and L2 were due to greater road traffic noise influence from Chipmonk Road during the daytime period. Location L3 does not experience the same amount of traffic noise, which explains the lower daytime sound levels overall.

The L90 statistic is a good indicator of the absolute minimum ambient sound level when there are no external human influences. The minimum to maximum L90 statistical values calculated for all monitoring locations ranged from 18.3 to 47.6 dBA. By definition, higher background sound levels existed 90% of the time. For example, when an L90 of 18.3 dBA was calculated at 1:00 a.m. on May 30th at L1, the corresponding Leq value was 25 dBA; when an L90 of 47.6 dBA was calculated at 10:00 a.m. on June 6th at L2, the corresponding Leq value was 54.1 dBA.

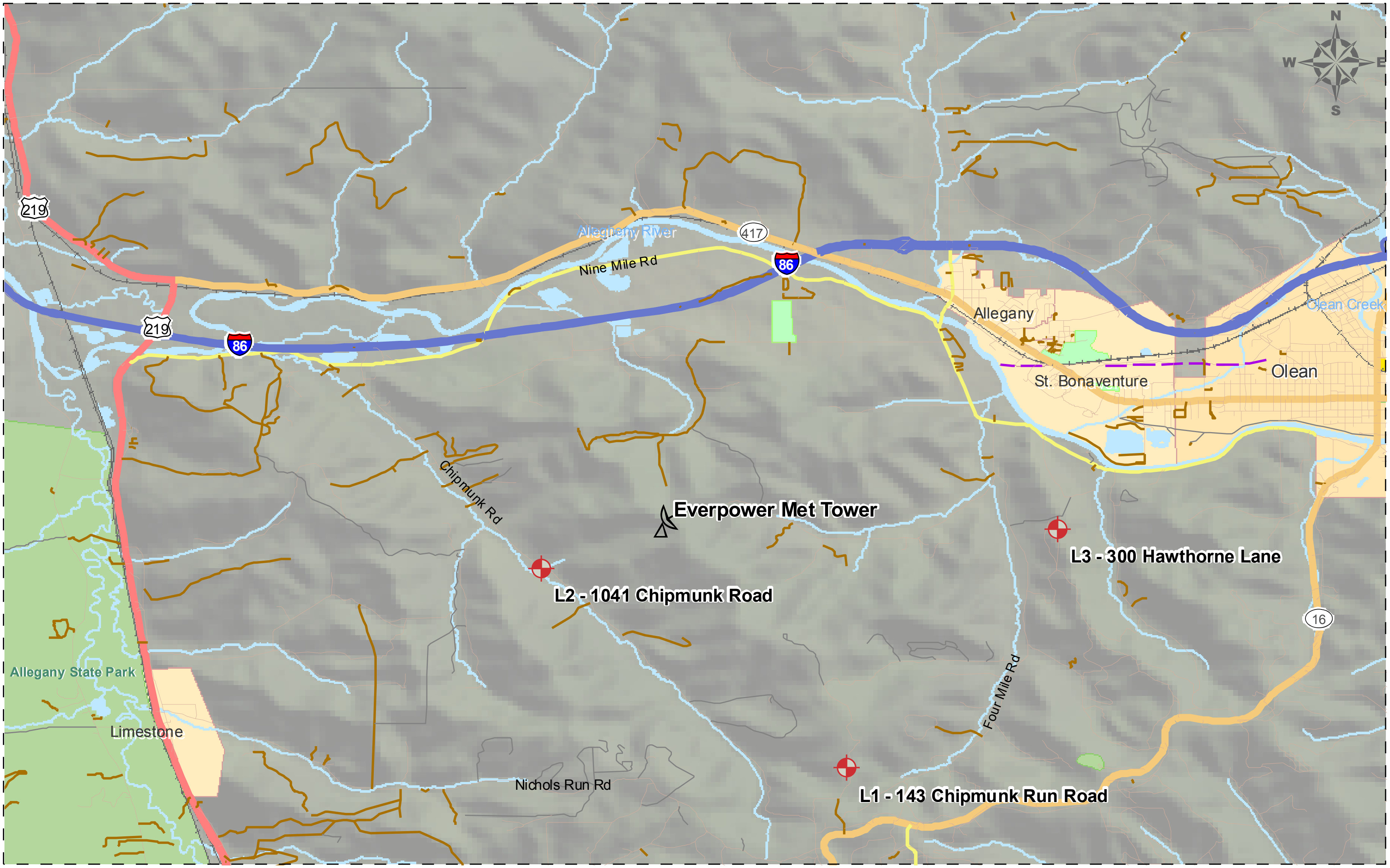
The significant range in sound level data shows that it is not appropriate to simply select the absolute minimum or maximum Leq or L90 values as representative of the typical background measured for the monitoring period.

Based on the sound level data presented above, the overall logarithmic average L90 statistics of 33 to 35 dBA better represent a reasonable metric of the existing ambient noise at these monitoring locations during the critical wind speed range of interest. An L90 range of 35 to 37 dBA and 30 to 33 dBA can be used to characterize the daytime and nighttime periods, respectively. The L90 statistical data for all monitoring locations are clearly representative of a typical rural acoustic environment.

6.0 CONCLUSIONS

It is CRA's opinion that the L90 statistic provides a reasonable metric for establishing the pre-turbine minimum ambient sound levels for the Project. The overall average L90 values range from 33 to 35 dBA during the wind conditions of interest, which are similar to Hessler's previous background study that established the overall L90 background levels as a function of the 7 m/s wind speed design value (valley = 35 dBA, exposed ridge = 37 dBA). The findings are documented in the January 27, 2010 "Environmental Sound Survey and Noise Impact Assessment".

Should you have any questions on the above, please do not hesitate to contact us.



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CRA Infrastructure & Engineering, Inc.

Ambient Sound Level Assessment
Town of Allegany, New York

Figure No. 1
Test Locations

Figure 2 - Sound Level Statistics at L1 vs. Wind Speed

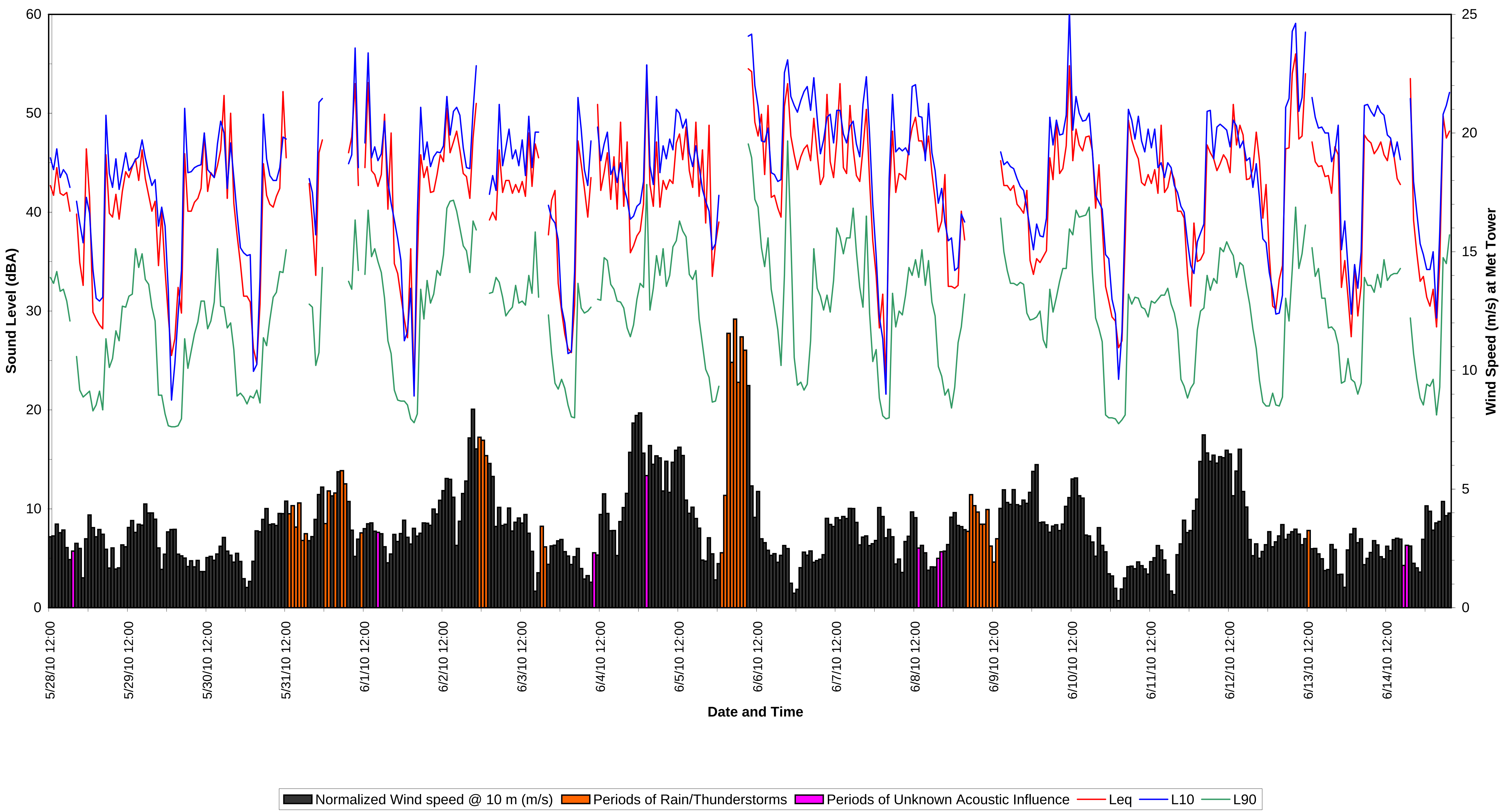

Figure 3 - Sound Level Statistics at L2 vs. Wind Speed

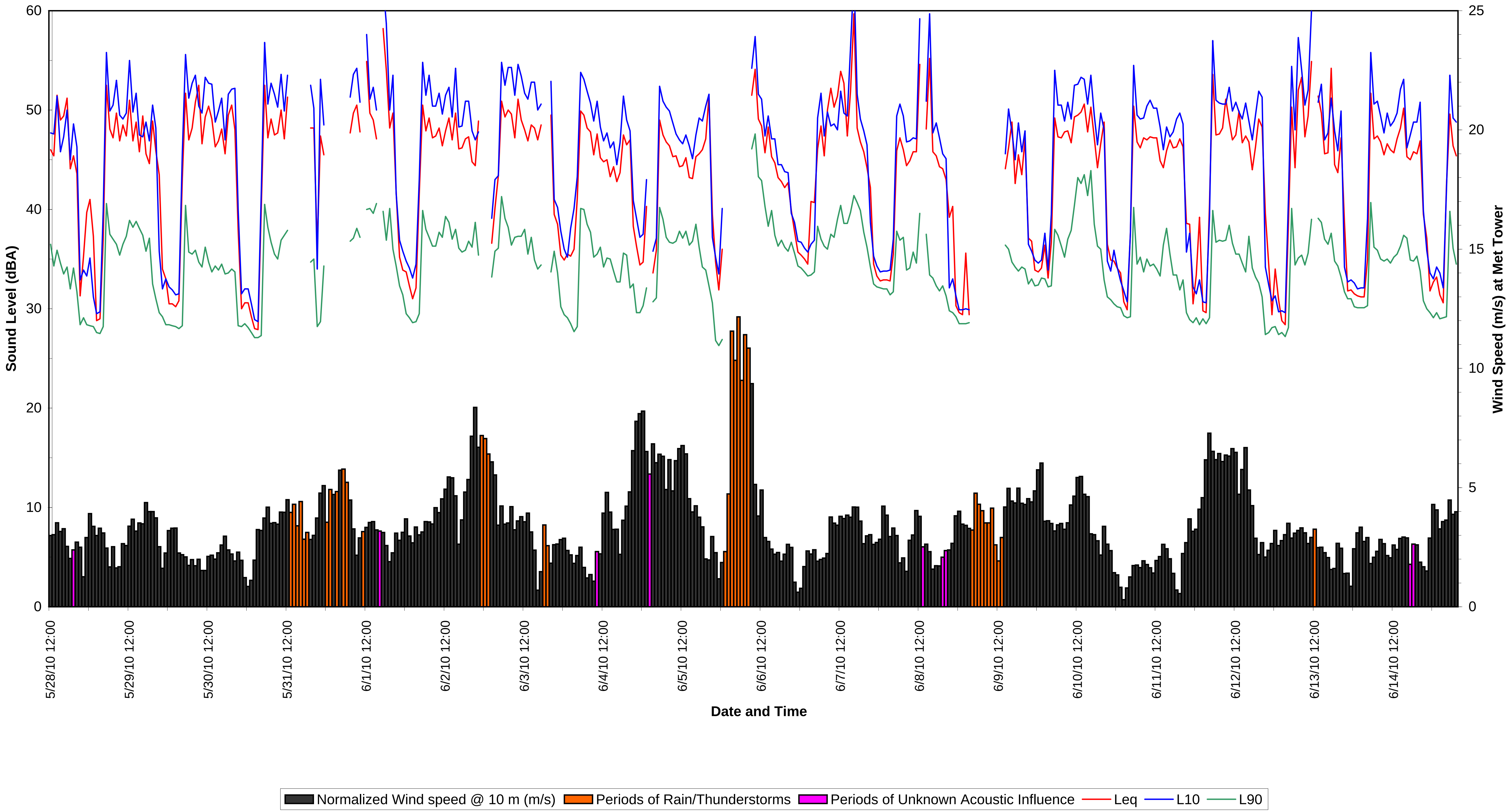

Figure 4 - Sound Level Statistics at L3 vs. Wind Speed