October 24, 2016

To: Vermont Public Service Board

From: Vermonters for a Clean Environment, prepared by Stephen Ambrose, SE Ambrose & Assoc.

Re: Proposal and Comments for implementing a rule regarding sound from wind generation projects

There is an unsaid purpose and intent for this request. Might it be an acknowledgement that "Vermont's wind turbine noise rule does not protect neighbors from excessive noise and adverse health impacts"? This is obviously due to persistent complaints, and at least one home abandonment. This solicitation for public comments should not be used to divert-delay-deny public attention. Wind turbine neighbors want the PSB to correct the current flawed regulations based on accepting for regulatory rules those the wind industry recommends. If the PSB sought advice from truly independent sources they would have learned that 45 dBA is only applicable for urban-residential areas and even for those communities is not sufficient to protect people. Ontario, and other Canadian provinces have regulations setting 40 dBA as the not-to-exceed threshold. Yet, recent studies have shown strong evidence that 40 dBA is not preventing adverse health impacts. Even 40 dBA is too loud. Somehow the cautionary warnings of the 1970s about 35 dBA for quiet rural-residential environments have been ignored. Standards such as ISO 1996 and ANSI's S12.9 still support 35 dBA for nighttime noise in quiet rural regions.

The noise rule needs a large scale reduction in its permitted noise limits to protect and minimize noise complaints. Anything less will only continue the endless discussions for equivocating with fudging, quibbling, and evading the need to lower to 35 dBA. Adding superfluous and complicated measurements, procedures or protocols around the 45 dBA will only continue to result in failure. The PSB should understand this after receiving reams of unfathomable data from acousticians closely aligned with developers that has no connection to a human response.

The PSB should seek assistance from independent experts to establish a noise rule that minimizes adverse human responses. This noise limit must be easy to understand and enforce. The PSB should not have to deal with the intricacies of acoustic science, noise sources, propagation, and weather. These are the concerns for the noise consultants who are responsible to their wind developer clients, who need to advise their clients on how not to harm the public. The PSB should focus on public health and enforcing compliance; and not be negotiating mitigating options with developers, operators, or consultants.

The current wind turbine sound rule should be abandoned and replaced with the previous noise limits. The Environmental Board used Lmax for its regulations and that has been upheld by the Vermont Supreme Court [1] (see page 11). The Lmax refers to the instantaneous maximum level (LAmax) relative to the background (LA90). People hear the instantaneous variations above the background and respond accordingly, which cannot be substituted with a time-weighted average. Adverse public reactions are shown to occur when the Lmax exceeds the background L90 by 10 dB.

Answers for most of the questions start on the next page;

[1] Letter to the STATE OF VERMONT PUBLIC SERVICE BOARD, Response to Comments and Proposals for implementing temporary sound level, Stephanie Kaplan, July 6, 2016.

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1. **Question;**

a. Should the sound rule include a sound-attenuation level for residences?

No, residential construction varies; different materials, sizes, and orientations to the noise source. People have the right to live in any type of home from a screened in patio to a brick bunker. They should not be expected to close their windows. If they wish to sleep at night with windows wide open that is their right. The PSB should not try to impose its opinions on others. The developers and operators need to design projects that operate without complaints from anyone not the other way around.

b. If so, should the attenuation level be an assumed figure?

No, must be based on actual measurements at the home and wind turbine. Staged speaker noise tests are inadequate; performed too close to walls, excludes roof, and inability to produce low-frequencies with fully formed pressure waves. Close-up tests using faux noise have proven not to work and fail when compared to distant low frequency noise sources.

c. or should attenuation be measured?

Must be measured at each home with owner's *cooperation, and the wind turbine operator must provide full access to all operating wind turbine SCADA data relating to noise complaints.*

d. Please provide evidence of attenuation levels for typical residences to support any proposed figure.

Low frequency noise dates to the 1950s with the advent of jet powered aircraft. One of the first recognized studies for home noise reduction was in 1978 by Sutherland and later in 1991 by Hubbard. These studies were noteworthy by using one-third octave-band transfer-function analysis for open windows. Epsilon presented this research results from a 2005 report published by the Department of Environment, Food and Rural Affairs (DEFRA). Therein, DEFRA proposed an outdoor-criteria for assessing non-steady low-frequency sound disturbance. [2]

DEFRA / Epsilon Low Frequency Noise Reduction -- Windows Open

Frequency (Hz)	**10**	**12.5**	**16**	**20**	**25**	**31.5**	**40**	**50**	**63**	**80**	**100**	**125**	**160**
Indoor Leq, dB	92	87	83	74	64	56	49	43	42	40	38	36	34
Outdoor Leq, dB	94	89	86	78	68.5	61	56	51	51	49	47	45	43
House NR, dB	2	2	3	4	4.5	5	7	8	9	9	9	9	9

Note: These are the same frequency bands used by the Danish Indoor Noise Limits

[2] *A Study of Low Frequency Noise and Infrasound from Wind Turbines,* by Epsilon Associates Inc., from Table 4.3-1 presented inc., (Robert O'Neal, Robert Helleg, & Richard Lampeter), Maynard, MA, July 2009.

Acentech performed an 'ASTM Standard Guide E966-04' using the 'Calibrated Source Method' and 'Nearby Average Method' to determine the noise reduction using one-third octave-band analysis at the Brouha home in Vermont [3]. Their report results were presented in Table 2, which included more complexity than required, which is on the next table.

Acentech Noise Reduction – Windows Closed, Partial & Fully Open from Table 2

Line	Description	Octave Band Center Frequencies in Hz								
		31	63	125	250	500	1000	2000	4000	8000
1	Outside	60	87	89	89	88	88	87	87	84
2	windows fully closed >	37	68	68	64	59	57	54	43	37
3	Noise Reduction (Line 1-2) >	23	19	21	25	29	31	33	44	47
4	windows partially open >	44	80	80	85	82	77	77	75	70
5	Noise Reduction (Line 1-4) >	16	7	9	4	6	11	10	12	14
6	windows fully open >	46	82	84	88	88	86	86	84	82
7	Noise Reduction (Line 1-6) >	14	5	5	1	0	2	1	3	2

The noise reduction test results could be determined directly, without computing a representative wind turbine spectrum at 9290-ft. Their method revealed that CadnaA predictions are unreliable when the distance and height limitations are exceeded; accuracy of ± 3 dB out to 3300-ft and >110-ft height difference for source-to-receiver. Twenty (20) plus dB had to be added in Acentech's Table 2 to compensate for CadnaA's erroneous predictions.

Acentech's test is not representative for wind turbines because the sound from elevated noise sources primarily enters through the roof. This may account for significant differences with DEFRA results.

A universal noise reduction value is not possible due to differences in home construction, which best could be established by actual measurements specific to frequency bands that are unique to wind turbines. DEFRA's low frequency spectrum from 10 to 160 Hz is a good starting point. Measurements should be performed by qualified professionals with home owner permission.

The World Health Organization's (WHO) 2009 Nighttime Noise Guidelines set 40 dBA (did not consider wind turbines) as the maximum sound level outside a home at night. Additionally, WHO stated that the presumption should be that people can choose to live with their homes windows wide open.

2. Question;

a. Should the sound rule include a setback distance from a residential property to the nearest turbine?

The problem is excessive wind turbine noise due to insufficient separation distance from the residential property.

3 *Vermont Wind/Sheffield Wind/Brouha Noise Complaint (PSB Docket 7156) Acentech Project No. 624219, Sept 25, 2015.*

b. If so, what setback distance should the rule include?

Several EU countries have discarded sound measurement regulations in favor of using setback distances. Countries, including Poland and the German State of Bavaria have established setback distances based on established health recommendations from groups such as the Polish Institutes of Health. Setbacks were imposed after years of using noise limits that did not protect, as in Vermont. The predominant regulatory setback distances in some EU countries are established by multiples of turbine height; at least 10 times the total wind turbine height or 10 times the blade diameter. These are referred to as 10H or 10X, respectively. These rules are applied to all new projects and modifications to any existing project.

c. and should it be measured from a residential structure, a property line, or some other location?

Measured from the wind turbine base to the residential property line. Otherwise, the property owners' enjoyment for peace and tranquility of place is invaded. There may be exceptions for land not suitable for building an inhabited structure or accessible for owners' use. This should be open for economic compensation to the receiving property owner for leasing rights to allow a noise trespass.

d. Please provide examples of best practices for setback standards that have been adopted in other jurisdictions.

These are only a few of many;

1) *Poland; The National Institute of Public Health – National Institute of Hygiene on 8 March 2016 issued recommendations for "2 km [kilometers] as the minimum distance of wind farms from buildings." The Polish Legislature enacted these setback requirements June 2016.*
2) *Bavaria; the Bavarian Constitutional Court upheld the wind energy siting law of 10 times the total height turbine and highest blade sweep for the minimum setback distance from residential areas. This law is applicable for wind project planning and development' effective November 2014.*
3) *Massachusetts; the Cape Cod Commission established a minimum setback distance of 10 times the rotor diameter measured from the wind turbine base (2014).*

3. Question;

a. In past certificates of public good issued for wind generation facilities, the Board has established sound level standards that include a not-to-exceed interior standard. Should the sound rule include an interior standard?

Yes.

b. If so, what should the interior standard be?

20 dBA Lpa,lf 10-160 Hz (per Danish industrial noise limit) indoors night maximum, with the added protection of no averaging, example 1 second Lmax Fast.

30 dBA , 45 dBC (full frequency range 0.125 to 10,000Hz, Lmaxfast, no averaging) with windows closed; (per the World Health Organization; WHO),

35 dBA, 50 dBC (full frequency range.125 to 10,000Hz, Lmaxfast, no averaging) with windows open including partially (per WHO 2009 Table 1 Thresholds for Observed Effects).

The preferred standard is the Danish because it directly addresses low-frequency noise, which has the advantage for excluding noise sources controlled by frequency bands greater than 160 Hz.

c. Please provide examples of best practices for interior sound-level standards that have been adopted in other jurisdictions.

1) World Health Organization (WHO Nighttime Noise Guidelines 2009) 40 dBA

Sound Level; LAeq nighttime-outside	Observed Health Effects
Up to 30 dB(A)	No substantial biological effects, no observed effect level; **NOEL**
30 to 40 dB(A)	Affects sleep, body movements, awakening, self-reported sleep disturbance, arousals, vulnerable groups; children, chronically ill & elderly are more susceptible to adverse health effects; **AHEs**.
40 dB(A)	Night noise guideline (NNG), lowest observed adverse effect level; **LOAEL** for the general population.
40 to 55 dB(A)	**AHEs** are observed and many have to adapt lives to cope with noise at night. Vulnerable groups are more severely affected.
Above 55 dB(A)	Increasingly dangerous for public health. **AHEs** occur frequently; sizeable proportion of population highly annoyed and sleep-disturbed; increased risk of cardiovascular disease.

4. Question;

a. What frequency weighting(s) should the sound rule apply to any sound measurement requirement (e.g., A-weighted, C-weighted, etc.)?

dBA, dBAi, dBC, and dBL

b. Please provide relevant studies that address this question, as well as examples of best practices that have been adopted in other jurisdictions**.**

ISO 1996 and ANSI S12.9 Parts 3.

5) Question;

a. To the extent that the sound rule includes any not-to-exceed sound level standards, over what time interval should such standards be measured (e.g., Lmax, Ldn, Lnight, Leq l0-min., Leq 1-hour, etc.)?

A not-to-exceed noise limit has no time-weighting (averaging); it is the Lmax produced by the noise source. The measurement interval is either 1/8 second (fast) or 1-second (slow). The primary noise source identification is by observations from a first-person witness, and secondarily by a "qualified individual" from high-quality "calibrated audio recordings". Average sound levels only open the door to arguments about compliance. A speeding ticket is given for exceeding the speed limit at any time, not for the driver's average speed. Averaging hides non-compliance and complicates enforcement.

b. Please provide examples of best practices for sound measurement time interval standards that have been adopted in other jurisdictions.

Massachusetts Air Pollution Regulation 310 CMR 7.00, 710 U Noise.

The MassDEP noise pollution policy describes (Lmax) criteria that MassDEP uses to evaluate noise impacts at both the property line and the nearest occupied residence or another sensitive receptor. When noise is found to be a nuisance or a threat to health, MassDEP requires the source to mitigate its noise.

Noise levels that exceed the criteria at the source's property line by themselves do not necessarily result in a violation or a condition of air pollution under MassDEP regulations (see 310 CMR 7.10 U). The agency also considers the effect of noise on the nearest occupied residence and/or building housing sensitive receptors:

- *In responding to complaints, MassDEP measures noise levels at the complainant's location and at other nearby locations that may be affected (e.g., residences and/or buildings with other sensitive receptors). If the noise level at a sensitive receptor's location is more than 10 dB(A) above ambient, MassDEP requires the noise source to mitigate its impact.*

- *A new noise source will be required to mitigate its sound emissions if they are projected to cause the broadband sound level at a residence or building housing sensitive receptors to exceed ambient background by more than 10 dB(A).*

- *A new noise source that would be located in an area that is not likely to be developed for residential use in the future (e.g., due to abutting wetlands or similarly undevelopable areas), or in a commercial or industrial area with no sensitive receptors may not be required to mitigate its noise impact on those areas, even if projected to cause noise levels at the facility's property line to exceed ambient background by more than 10 dB(A). However, a new noise source that would be located in an area in which housing or buildings containing other sensitive receptors could be developed in the future may be required to mitigate its noise impact in these areas.*

This policy has been designed to protect affected residents and other sensitive occupants of nearby property, but not necessarily uninhabited areas in and around the source's property. Sources of noise may need to implement mitigation if residences or buildings occupied by sensitive receptors are developed where they may be affected by the source's noise.

ANSI 12.9, Part 4, Annex D.2, Estimated percentage of a population highly annoyed as a function of adjusted day-night sound level. (cited below)

Analysis of sounds with strong low-frequency content is based on the following three factors:

1) Generally, annoyance is minimal when octave-band sound pressure levels are less than 65 dB at 16, 31.5, and 63-Hz mid-band frequencies. However, low-frequency sound sources characterized by rapidly fluctuating amplitude, such as rhythm instruments for popular music, may cause annoyance when these octave-band sound pressure levels are less than 65 dB.

2) Annoyance grows quite rapidly with sound pressure level at very low frequencies. A "squared" function represents this phenomenon in this annex.

3) Annoyance to sounds with strong low-frequency content is virtually only an indoor problem. Although windows and house walls have significant high-frequency sound transmission loss, sounds in the 16, 31.5 and 63-Hz octave bands pass through these structures to the interior with relative ease. The low-frequency sound pressure level within these structures is nearly equal to the outdoor sound pressure level because the minimal sound transmission loss of the windows and walls often is offset by modal resonance amplification in enclosed rooms.

The 2011 report to the Minnesota Public Utilities Commission funded by the U.S. Department of Energy, prepared by Hessler Associates, analyzing their many years of experience developing and monitoring wind turbine projects, documented short-term increases of 15 to 20 dB over average.

6. Question;

a. Should the sound rule include sound level standards that are adjusted for wind speed (i.e., impose a lower sound level requirement at lower wind speeds than at higher wind speeds)?

The sound rule should not consider wind speed to assess wind turbine noise measurements. Wind should be excluded from all compliance measurements. This is an idea the wind industry introduced in its ETSU-R-1997 industry sponsored guidelines. It has been a problem in assessment of compliance ever since. The wind industry likes to call this "industry standard practice" but the reason they like it is that it has worked for them in defending complaints.

7. Question;

a. Should the sound rule include a sound level limit relative to background levels (i.e., projects shall not result in an increase of X dB above the L90 background level)?

Currently, the background L90 is not used. The baseline noise level (LAeq or LA90) must be established prior to permitting and should represent the quietest nighttime; the 90th percentile of LAeq or LA90. It is not possible to measure the background (LAeq or LA90) near operating wind turbines. Best estimates are not an equivalent substitute; therefore predicting background L90s are only best estimates. The maximum sound level increase is 10 dB above the baseline L90 established prior to permitting. The baseline. Averaging L90s measured with contaminating sounds from wind and flowing water negate the effectiveness for 10 dB increase criteria.

ANSI S12.9-2005, Part 4, A.1.3 Background sound situations. There are at least two situations when background sound may influence or alter the presumed relation between annoyance and a physical measure of the sound for a given type of noise: [the 2nd is not relevant for wind turbines]

1) *Masking is present when the threshold of detection of one sound is raised by the presence of another (masking) sound. Masking may be of varying degree, with complete masking resulting in the inaudibility (and resulting absence of annoyance) of the sound signal under evaluation. Given the time varying nature of many community sounds and their differences in spectral composition, the degree of masking is difficult to determine in most situations unless the differences between the time-average sound levels of the different sources are at least 20 dB.*

ANSI S12.9 (2013), Part 3,

Provides two procedures to determine background sound levels

7.3 Requires the operator to cooperate fully for an On/Off test. The PSB should stipulate that acousticians not affiliated with the wind industry and the operator must provide full disclosure of the SCADA data for the periods before, during, and after the On/Off test.

7.4.2. (a) is for a "Proxy" test at a location without wind turbines. This does not require the operator to shut down all turbines.

ANSI S12.9, Part 4

A quiet rural area with new unfamiliar intrusive noise source, outdoors night average should not exceed 30 dBA (S12.9 part 4, F.3.4.1) for compatibility or 35 dBA (F.3.4.2) for marginal compatibility. A new unfamiliar industrial noise source should be considered incompatible when sited in a quiet rural area, which can produce annoyance equivalent to a 15 dB increase above measured or predicted levels.

Compatibility; ISO 1996-1971

Recommendations for Community Noise Limits

District Type	Daytime Limit (7 AM – 7 PM)	Evening Limit (7 -11 PM)	Night limit (11 PM – 7 AM)
Rural	**35 dB(A)**	**30 dB(A)**	**25 dB(A)**
Suburban	40 dB(A)	35 dB(A)	30 dB(A)
Urban residential	45 dB(A)	40 dB(A)	35 dB(A)
Urban Mixed	50 dB(A)	45 dB(A)	40 dB(A)

b. If so, please address what level should not be exceeded and provide examples of best practices adopted in other jurisdictions.

See Attachment I beginning on page 11 at the end of this report.

8. **Question;**

   a. Please identify any applicable protocols for conducting sound measurements that should be incorporated into the rule. Please provide examples of best practices for conducting sound measurement that have been adopted in other jurisdictions.

      ANSI S12. 9, Part 3;

      c. *Requires proxy measurements for noise sources that vary in level and frequency content.*
      d. *Appropriate for noise sources where all sources cannot be turned off.*

9. **Question;**

   a. Should the sound rule address low-frequency sound or infrasound?

      Yes

   b. Please provide relevant studies that address this question, as well as examples of best practices that have been adopted in other jurisdictions.

      The Bruce McPherson Infrasound and Low Frequency Noise Study Adverse Health Effects Produced By Large Industrial Wind Turbines Confirmed December 14, 2011 Stephen E. Ambrose, INCE (Brd. Cert.) Robert W. Rand, INCE Member
      http://www.acousticecology.org/wind/winddocs/health/Ambrose%20Rand_Bruce%20McPherson%20Infrasound%20and%20Low%20Frequency%20Noise%20Study.pdf

      Analysis of Low Frequency and Infrasound at the Shirley Wind Farm
      A Cooperative Measurement Survey and Analysis of Low Frequency and Infrasound at the Shirley Wind Farm in Brown County, Wisconsin
      http://windvictimsontario.com/uploads/3/1/4/3/3143767/12-12-28_number_122412-1final_as_submitted_by_clean_wisconsin_without_final_updates_by_rand.pdf

      Cape Bridgewater Wind Farm Acoustic Study
      Report
      The results of an acoustic testing program – Cape Bridgewater Wind Farm was released publicly on 21 January 2015.
      http://www.pacifichydro.com.au/english/our-communities/communities/cape-bridgewater-acoustic-study-report/

      The Danish standard is the best practice for low-frequency sound and some infrasound. This is a technical discussion for the workshop.

10. **Question;**

    a. Should the sound rule prescribe pre-construction sound modeling requirements?

       Yes, Sound levels should be computed from the 10 Hz to 8000 Hz 1/3 octave bands. Propagation below 100 Hz (10,12.5,16,20,25,31,5,40,50,63, and 80 Hz 1/3 octave bands) should use 3 dB per doubling of distance (Health Canada Edwards study and HC statements for low frequency noise

propagation (EDIT)). Existing sound modeling software does not account for the Health Canada findings, software will have to be modified to properly account for low frequency propagation.

b. Please provide specific examples of best practices for pre-construction sound modeling that have been adopted in other jurisdictions.

Sound modeling has specific limitations for distance and source-to-receiver distances as stipulated in ONTARIO 2008 Noise Guidelines. Only problem is they need to be bolstered with a requirement to apply all tolerances IEC and ISO plus a 5 dB adder to account for safety factor.

The problem in Ontario is not the rules and guidance it is the fact that the acousticians are allowed to apply tolerances or not as needed to make a project appear compliant and then the same set of consultants do the follow up work for compliance testing. Thus their tricks are never exposed.

STATE OF VERMONT
PUBLIC SERVICE BOARD

Response to Comments and Proposals for implementing temporary sound level standards for wind generation projects	)))	July 6, 2016

My name is Stephanie Kaplan. I offer these responsive comments for consideration as the Public Service Board undertakes rulemaking on wind turbine noise standards pursuant to S.260.

I am an attorney who has practiced law in Vermont since 1982. For four years I worked as an Assistant Attorney General representing the Agency of Natural Resources and the former Vermont Environmental Board, and then for eight years I was Executive Officer and General Counsel for that Board, in which capacity I drafted many of the Board's decisions. In 1994 I left state employment and opened my own practice. The majority of my practice has consisted of representing Vermont citizens who oppose inappropriate development in their communities, for the most part through Act 250 and zoning. Thus I have had more than 30 years experience with the Act 250 process and am familiar with the statute, rules, and case law as it has evolved over the years.

I have not been directly involved in any Public Service Board cases, but I have read the statute and rules and have reviewed the CPGs that have approved development of industrial wind in Vermont. I have also reviewed some of the comments filed in this Docket, in particular those filed by the Department of Public Service on June 27, 2016.

In discussing its proposed rule, the Department states that it has not proposed a recommendation for the sound measurement interval time and metric, that a one-hour measurement interval and Leq metric are used at the Sheffield, KCQ and GMCW facilities, and that "[t]he Department is exploring whether the continued use of a onehour Leq measurement metric is enforceable and appropriate. However, it is not in a position to offer an alternative interval and metric at this time."

In fact, contrary to the Department's uncertainty, a simple resolution to the question of the appropriate sound measurement interval time and metric is found by turning to Act 250. The use of the Lmax standard rather than Leq has long been applied in Act 250 and upheld by the Vermont Supreme Court.

Act 250 criteria and their interpretation and precedent are already used by the PSB. 30 V.S.A. § 248(b)(5) provides that before issuing a CPG for a wind project that falls under the PSB's jurisdiction, the Board must find that the project will not have an undue adverse effect on, among other natural resource issues, esthetics, "with due consideration having been given to the criteria specified in 10 V.S.A. § . . . 6086(a)(1) through (8) and

(9)(K). . .” These provisions of 10 V.S.A. § 6086(a) are commonly known as the Act 250 criteria.

In its many years administering Act 250, the former Environmental Board developed a substantial body of case law. Since 2004, the Superior Court, Environmental Division (E Court), has taken over the role of hearing appeals from the Act 250 district commissions. 10 V.S.A. § 8504(m) provides that in Act 250 appeals, prior decisions of the Environmental Board “shall be given the same weight and consideration as prior decisions of the Environmental Division.” The Vermont Supreme Court also continues to cite former Environmental Board decisions as Act 250 precedent. See, generally, In re Lathrop L.P., 2015 VT 49.

The former Environmental Board considered noise under two separate criteria: 10 V.S.A. § 6086(a) 1 (air pollution) and 8 (aesthetics). Noise as a health problem is reviewed under Criterion 1, while noise as an aesthetic issue is reviewed under Criterion 8. See In re Lathrop L.P., 2015 VT 49, ¶ 74; In re Chaves A250 Permit Reconsider, 2014 VT 5, ¶¶ 23-24. With respect to compliance with Criterion 8 for both visual effects and noise, the methodology used is the Quechee Test that was developed by the former Environmental Board in an attempt to reduce the subjectivity that is inherent in evaluating aesthetics. Re: Quechee Lakes Corp., #3W0411-EB and #3W0439-EB, slip op. at 17 -19 (Vt. Envtl. Bd. Nov. 4, 1985). The Quechee Test used for evaluating aesthetics has been upheld by the Vermont Supreme Court. E.g., In re Times & Seasons, LLC, 2008VT 7, ¶ 8; In re McShinsky, 153 Vt. 586, 591-92.

In reviewing the visual aesthetics of wind projects under 30 V.S.A. § 248(b)(5), the PSB has adopted the Quechee Test, In re Halnon, 174 Vt. 514, 515 (2002) (mem.), although a slightly modified version.1

The Vermont Supreme Court has recently ruled in the context of an Act 250 case involving noise from truck traffic that the Lmax, which measures the peak level of instantaneous noise, is more appropriate than the Leq standard, which measures the average noise over some period of time. When noise from a sound source is variable, and especially when it is higher than the normal background noise, the higher levels are often the ones that affect people and therefore in order to be protective the Lmax is the proper standard. In re Lathrop L.P., 2015 VT 49, ¶ 86 (Instantaneous noise levels (Lmax) are the appropriate standard by which to judge noise impacts from trucks, since that is what people experience.).

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1 While the PSB has accepted and applied the Quechee Standards to evaluate aesthetics, it has rejected the Environmental Board’s long-standing consideration of a municipality’s zoning as a community standard under the second prong of the Quechee Test. Joint Petition of Green Mountain Power, et al., No. 7628, slip op. (Vt. PSB Order May 31, 2011).

In fact, for many years Lmax has been the consistent standard for evaluating whether noise from a particular project would create an undue adverse effect on aesthetics under Criterion 8 of Act 250. See, e.g., Hannaford Brothers Co. and Southland Enterprises, Inc., #4C0238-5-EB, slip op. at 20 (Vt. Envtl. Bd. Ap. 9, 2002) (City ordinance's use of one-hour average Leq measurement does not protect residents from sudden noises, as a noise source can be quiet for 59 minutes and loud for one minute and yet still comply with the hourly average standard.) See also In Re: OMYA, Inc. and Foster Brothers Farm, Inc., #9A0107-2-EB, slip op. at 15-16 (Vt. Envtl. Bd. May 25, 1999), in which the former Environmental Board rejected a proposed sound measurement scheme that averaged truck traffic sound levels over 24 hours. Rather, the Board found that

> [w]hen evaluating the real effect on people from the noise of passing trucks, it is more appropriate to consider the instantaneous noise from the trucks as they pass because that is what people experience. . . .
> While the average noise levels may not increase significantly with OMYA's proposed additional truck traffic, each additional instance of a truck passing results in an additional instantaneous loud noise, or an additional annoyance that interferes with sleep and conversations. . . .
>
> The instantaneous noise level that a person experiences when a truck passes is considerably higher than the 24-hour or hourly average.

The Environmental Board also consistently applied the maximum rather than average sound levels for commercial operations such as quarries. See, e.g., Re: Alpine Stone Corporation, ADA Chester Corporation, and Ugo Quazzo, #2S1103-EB, slip op. at 33 (Vt. Envtl. Bd. Feb. 4, 2002).

It is furthermore significant to note that the former Environmental Board recognized the need for flexibility when determining appropriate noise standards to protect the public and thereby not create an undue adverse impact under Criterion 8. The factors that would also need to be taken into account – in addition to an Lmax standard – included the relative difference between existing background noise and the proposed maximum noise levels, the type of noise, and its frequency and duration. E.g., Lathrop at ¶¶ 81-88; In re McLean Enters. Corp., No. 2S1147-1-EB, slip op. at 64-66 (Vt. Envtl. Bd. Nov. 24, 2004) ("[T]he Board recognizes the need to consider a relative approach that would adjust the standard upward in areas with loud existing background noise yet preserve the quiet in rural residential areas removed from busy highways.")

The former Environmental Board's and the Supreme Court's reasoning about the noise from truck traffic and quarrying and its potential to create an undue adverse impact on aesthetics because of its negative effect on people is just as applicable to noise from wind turbines. All the reasons that the former Environmental Board determined -- and the Supreme Court upheld -- that the instantaneous Lmax rather than the average Leq is the appropriate standard to use apply equally to wind developments. The similarities are

obvious when reading the descriptions of the noise from the turbines that has been experienced by neighbors to existing wind turbine projects in Vermont.

Summary

The appropriate noise standard for measuring what people actually hear is the maximum (Lmax) rather than the average (Leq) and thus when determining noise standards that will protect the public, the PSB should use Lmax. This was recognized long ago by the Environmental Board and has been confirmed by the Supreme Court. The PSB is charged with considering Criterion 8 aesthetics in reviewing projects, and Criterion 8 aesthetics includes noise. In light of the statutory incorporation of Act 250 criteria into the PSB review of proposed wind developments, it is reasonable for the PSB to be consistent with the Environmental Board's standards and methodology, which were developed over years of that Board's experience reviewing different types of projects with different types of noise and concluding time and again that the maximum and not the average noise level is the appropriate standard. The PSB should therefore require that any numerical standards in its proposed rule be based upon the Lmax noise measurement rather than the Leq.

Dated at Calais, Vermont, this 6th day of July, 2016.

Stephanie J. Kaplan

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