Liberty | Renewables
354 Davis Rd, Suite 100
Oakville, Ontario, Canada L6J 2X1

TO: Mr Jeff Furness, Township Supervisor & Township Trustees

CC: Mr Richard Mee, Chair of Planning Commission

FROM: Roberto Caputo

DATE: November 10th, 2022

SUBJECT: Riverbend Wind Energy Comments on New Proposed Ordinance

---

Dear Mr. Furness and Township Trustees,

Liberty is providing this letter and the accompanying materials for review by the Township Board in connection with proposed wind ordinance amendments being considered by the Township Board on November 22nd, 2022.

Liberty previously provided two letters (dated August 3, 2022, and August 12, 2022) to the Fremont Township Planning Commission to show the impact and exclusionary nature of the proposed amendments. This document provided a detailed constraints and siting analysis for the turbines proposed for this site which demonstrated that these ordinance amendments would effectively prevent the development of this and future wind projects within the Township.

As you may be aware, the project team attended the Fremont Township Planning Commission public hearing on September 29th, 2022 regarding the proposed amendments. During the meeting, several experts (acoustics, shadow flicker, H&S) presented their opinions that the existing ordinance aligns with other municipal and industry standards throughout the country and provides appropriate protection to the local communities' health and safety. Further, our company prides itself on developing projects that ensure the protection and welfare of the local communities in which it operates.

We understand that Byron Neal (Contractor of UL) offered an opinion to a few local inquiries regarding appropriate setbacks from wind farms that was read aloud during the meeting on September 29th. This opinion has since been discounted by UL through a formal letter dated October 14th which was sent to the Township and is appended here as Attachment A. Additionally, Mr Neal himself shared a recent commentary, see Attachment A-1, with Sanilac County

wherein he disclaimed his expertise as a siting expert and indicated that his opinion should not be used for making local zoning decisions.

On October 18th, Liberty provided a letter outlining the same concerns to the County with expert opinion letters from those experts mentioned above further confirming that the proposed Fremont Township Zoning Ordinance amendments are not in line with other municipal and industry standards, and do not provide added health and safety benefit to the community. These letters are attached here as Attachment B.

Finally, since the 18th of October the project has obtained additional expert opinions from DNV on sound, and WSP on sound and shadow flicker, as well as a letter from the turbine manufacturer Vestas to supplement that the current ordinance provides sufficient protection for siting turbines. These documents can be found in Attachment C.

Should you have any questions please feel free to contact me.

Regards,

Liberty Power Co

(on behalf of Algonquin Power (MI Energy Developments) LLC)

Roberto Caputo

Director, Project Development

Cell: 416-220-9154

Email: Roberto.Caputo@algonquinpower.com

Liberty | Renewables
354 Davis Rd, Suite 100
Oakville, Ontario, Canada L6J 2X1

Attachment A – UL Letter to Township

Energy and water for life

Safety. Science. Transformation.™

October 14, 2022

Mr. Rich Mee, Planning Commission Chair
Mr. Jeff Furness, Township Supervisor
Fremont Township Board
2512 East Galbraith Line
Yale, MI 48097

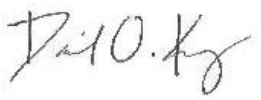
Via email:
Rich Mee: rjmee@greatlakes.net
Jeff Furness: fremont@greatlakes.net

Dear Mr. Mee and Mr. Furness,

UL Solutions has become aware of personal opinions expressed by Mr. Byron Neal in regard to sound in and around wind plants. Please be advised that Mr. Neal is not an employee of UL Solutions and does not in any way represent the view of UL Solutions in this matter. The comments Mr. Neal provided are his own and not attributable to UL Solutions. UL Solutions respectfully requests the minutes/record be made clear on this point.

Furthermore, it should be recorded that UL does not currently have sound expertise in-house and cannot opine on this project.

Sincerely,



Daniel Kurz
Engineering Leader - Wind Testing
UL Solutions
333 Pfingsten Road
Northbrook, IL 60062 USA

CC:
Jon Block, Chairperson, Sanilac County: blockequip@yahoo.com
Joel Wyatt, Jr., Vice Chairperson, Sanilac County: jwyatt@sanilaccounty.net

UL Services Group, LLC
UL Solutions
463 New Karner Rd.
Albany, NY 12205

T +1. 518.213.0044

Liberty | Renewables
354 Davis Rd, Suite 100
Oakville, Ontario, Canada L6J 2X1

Attachment A – 1 Email From Byron Neal to Sanilac County

Energy and water for life

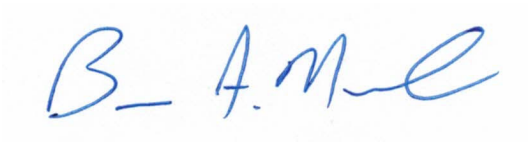
October 10, 2022

To: Board of Commissioners - Sanilac County Michigan
Courthouse, 60 West Sanilac Ave Room 105
Sandusky, Michigan 48471

I have been made aware that an email I sent to Carolyn Fairman was presented in a county meeting and was possibly submitted as expert testimony. I would like to make it known that I am not an acoustics expert nor am I a wind turbine siting expert. I also do not have the required technical information about the project, location, equipment and local environment that would be required to make specific, scientific based recommendations on turbine setbacks.

The content of the email conversation with Carolyn Fairman is my personal opinion based on my experience with power performance and mechanical loads testing at the Canyon, TX testing facility. I can offer no insight regarding turbine performance in Michigan. This conversation was not intended – nor should it be interpreted- as a reference for changing any local county ordinances.

Sincerely,



Byron A. Neal

Liberty | Renewables
354 Davis Rd, Suite 100
Oakville, Ontario, Canada L6J 2X1

Attachment B – Oct 18, 2022 Expert opinions provided

Energy and water for life

HANKARD ENVIRONMENTAL
ACOUSTICS AND VIBRATION CONSULTING

October 18, 2022

Board of Supervisors
Fremont Township
Sanilac County, Michigan

Re: Review of Proposed Ordinance Changes with Respect to Noise

Dear Board of Supervisors,

The following comments are provided based on my 32 years of experience as an acoustic expert and testifying at numerous township, county, and state proceedings. The introduction of L_{max} into the discussion of wind farms was done by opposition groups to confuse all involved, introduce uncertainty and risk into the process, and otherwise stymie wind farm development. It is not based on science, quite the opposite in fact. All relevant guidelines, standards, laws, and research related to noise exposure utilize the L_{eq} or something similar.

My recommendation to the Fremont Township Board is to interpret the 45 dBA limit as an L_{eq} measured during full turbine operations (worst-case or loudest condition). Forty-five dBA is a low limit relative to those applied in other U.S. states and locales. Applying 45 dBA at the property line, as Fremont does, makes it even more stringent. This is a protective limit, and when expressed as an L_{eq} a proposed wind turbine project can be designed to meet it and post-construction measurements can be conducted to verify the limit is being met.

On the other hand, there are no established methods to accurately predict or measure noise from wind turbines when the limit is expressed as an L_{max}. Manufacturers provide noise data for their turbines using L_{eq} (because the applicable standard requires them to do so), the international standard used to predict noise levels at residences is based on the L_{eq}, and virtually all research conducted to date regarding human reaction to environmental noise used the L_{eq}. With regard to measurements, the L_{max} fluctuates constantly in the environment due to wind gusts, local and distant traffic, dogs barking, and residents working in their yards. Relevant acoustic standards recognize this and utilize the L_{eq} to focus on the constant source of noise in question (turbines) and reduce the effect of the non-turbine sources on the reported result. In other words, with L_{max} there is no standard or effective methods to predict and measure noise from wind turbines.

The other proposed noise-related changes, such as requiring a baseline noise emission study, providing estimated noise levels at property lines at the time of Special Land Use application, and requiring a post-construction noise measurement survey are all reasonable requests.

Sincerely,

Michael Hankard
Owner and Principal Acoustical Consultant
Full Member INCE and ASA

Stantec Consulting Services Inc.
1165 Scheuring Road
De Pere WI 54115-1001

October 14, 2022

Fremont Township Board
2512 Galbraith Line Rd,
Yale, MI, 48097

RE: Review of Wind Energy Conversion Systems, Proposed Zoning Ordinance Amendment to – with Respect to Shadow Flicker

Mr. Chairman and Fremont Township Board Members,

Thank you for allowing me to take this opportunity to address the proposed amendment to the Fremont Township Zoning Ordinance No. 100, adopted December 15, 2016 (Ordinance). I fully understand the desires of the Township Board to protect the health and safety of the township constituents, and therefore, the consideration of appropriate changes to the current Ordinance.

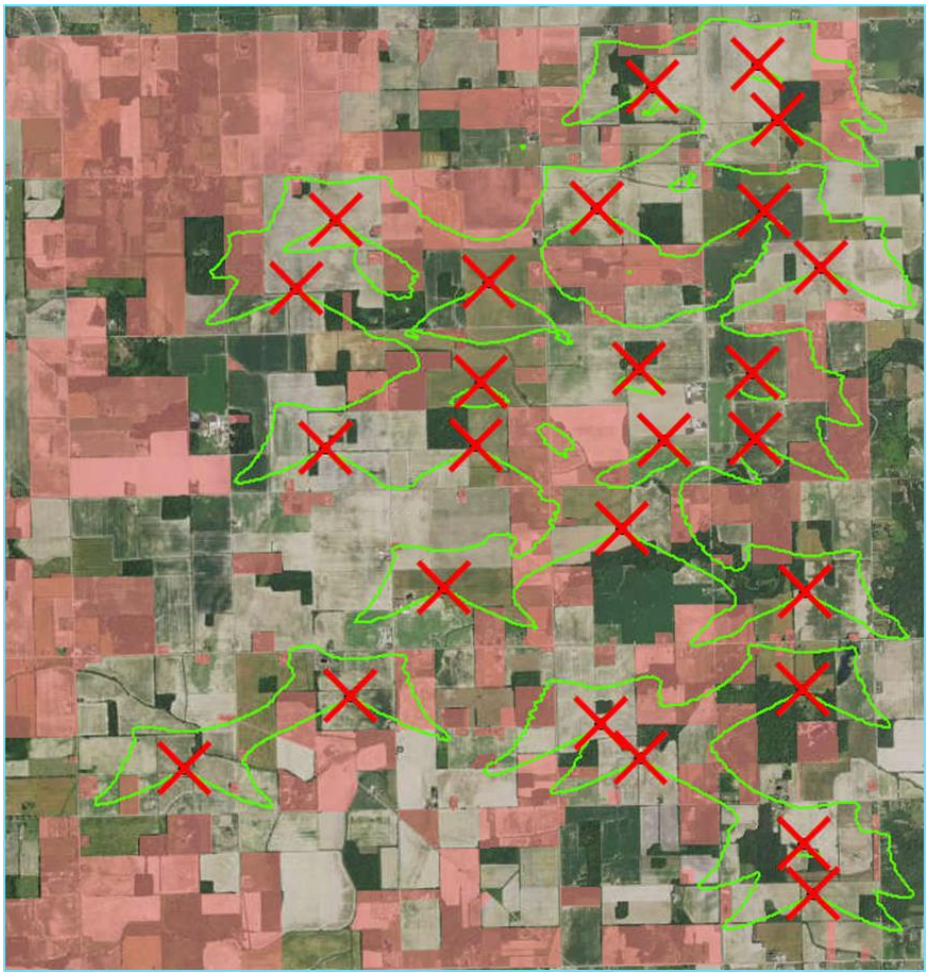
With regard to the proposed modifications to the limits on shadow flicker due to the operation of wind energy conversion systems (WECS), I offer below the reasons why I feel the shadow flicker limits currently in place (Section 13.12(B)(20)) offer the health and safety protections needed, and why proposed changes are not required.

- The proposed amendment places the restriction on property boundaries, rather than on an inhabited structure. This modification is not necessary, as passing shadows from wind turbines in the outdoor environment are not experienced the same as shadow within an enclosed structure. The shadow from blades turning in the outdoors is similar to shadow from overhead features, such as clouds passing or branches on trees moving. Animals are documented to be peacefully grazing, eating, and resting within the turbine blades' shadow zone. Shadow flicker limitations should be placed on non-participating inhabited structures, as they are in the current Ordinance.
- As noted by numerous government-funded and/or peer-reviewed studies and stated by Dr. McCunney in the September 29, 2022, Township meeting, shadow flicker is recognized as an annoyance; however, there is no supporting documentation or research that it is a direct health risk or should be considered as such.
- The current shadow flicker limit of 30 hours per year on non-participating structures is a proven reasonable limit to avoid annoyance and, where regulated, is the most frequently stated shadow flicker limitation in the US.

In summary, the restriction of no shadow flicker on a non-participating property line would not further the protection of the health or safety of the Township inhabitants; however, it would have the effect of stopping future wind development within the town's borders, if imposed

RE: Review of Wind Energy Conversion Systems, Proposed Zoning Ordinance Amendment to – with Respect to Shadow Flicker

The effect of restricting shadow flicker on adjacent non-participating properties would render all proposed turbine locations (red X's depicted below) non-viable:



Respectfully,

STANTEC CONSULTING SERVICES INC.

JoAnne J. Blank
Senior Associate, Senior Scientist
Mobile: (920) 634-8258
joanne.blank@stantec.com

Robert J. McCunney, M.D., M.P.H., MS
Occupational & Environmental Medicine

Mailing address
PO Box 290777
Charlestown, MA 02129

Rob Nadolny
Liberty Power
Director Project Planning and Permitting
354 Davis Road; Suite 100
Oakville, Ontario L6J2X1

October 6, 2022

Dear Mr. Nadolny,

At your request, I will present an overview of potential health implications to residents living in the vicinity of wind turbines and more specifically address whether the current ordinance related to the River Bend wind project regarding the placement of wind turbines is protective of human health.

By way of background, I am a practicing physician at the Brigham and Women's Hospital in Boston, a flagship hospital of Harvard Medical School. After graduation from medical school, I underwent 5 years of post-graduate training in internal medicine and occupational and environmental medicine. This latter specialty assesses the impact of occupational and environmental hazards on human health- it has been the focus of my clinical, research and teaching responsibilities for the past 40 years. Thus, as an occupational/environmental physician, I have had substantial experience in addressing the impact of noise on human health in evaluating patients by reviewing audiometric tests, in writing three book chapters and in lecturing to graduate students at the Harvard School of Public Health.

About 12 years ago, I was invited to be part of an expert panel along with six other health professionals who were charged with developing a report on potential health implications of living near wind turbines. The report, entitled, 'Wind Turbine Sound and Health Effects- An Expert Panel Review' was published in 2009 and has been cited 135 times around the world in other publications. I then served as lead author of research paper published under the auspices of the Massachusetts Institute of Technology, where I served as a research scientist in MIT's Department of Biological Engineering. This review addressed numerous concerns related to living near wind turbines, based on a comprehensive assessment of 162 research reports. The study was co-authored by five other professionals including an epidemiologist, public health physician, an otolaryngologist, a clinical psychologist and noise engineer. This peer reviewed study, entitled 'Wind Turbines and Health-A Critical Review of the Scientific Literature' was published in the Journal of Occupational and Environmental Medicine, and has since been cited nearly 100 times around the world. Based on our assessment, my co-authors and I drew the following conclusions:

1.Measurements of low-frequency sound, infrasound, tonal sound emission, and amplitude-modulated sound show that infrasound is emitted by wind turbines. The levels of infrasound at customary distances to homes are typically well below audibility thresholds.

2. There is no clear or consistent association between wind turbine noise and any reported disease or other indicator of harm to human health.

3. Components of wind turbine sound, including infrasound and low frequency sound, do not present unique health risks to people living near wind turbines.

4. Annoyance associated with living near wind turbines is a complex phenomenon related to personal factors. Noise from turbines plays a minor role in comparison with other factors in leading people to report annoyance in the context of wind turbines.

5. Shadow flicker is not a risk to health, including photosensitive epilepsy. The blades do not rotate fast enough to trigger an epileptic seizure.

Since the publication of these reports, I have kept abreast of the scientific literature regarding wind turbines and health. The conclusions we drew in the reports described above remain current and applicable to this project.

In summary, the main health risk potentially associated with living near wind turbines is noise and its impact on sleep. At the sound levels required in the current ordinance, it is not expected that there would be any adverse effect on sleep. This conclusion is supported by numerous field studies of residents living near wind turbines that have been published over the past 8 -10 years in many areas of the world, including US, Canada, Europe and Japan, among others. In fact, the Health Canada study, one of the world's most comprehensive detailed analysis of sleep in the context to proximity to wind turbines, has shown no adverse impact on sleep.

In conclusion, based on my professional experience and a review of the current ordinance regarding the placement of wind turbines, no changes are necessary to further protect public health and that the Leq measurement is the most appropriate metric to assess sound levels from the turbines and is used universally in the study of potential health effects of living near wind turbines.

Sincerely,

Robert J. McCunney, MD, MPH, MS

OLLSON
Environmental Health Management

October 14, 2022

Fremont Township Board
2512 Galbraith Line Rd,
Yale, MI, 48097

RE: Review of Township of Fremont Zoning Ordinance Amendment to Wind Energy Conversion Systems (WECS) with Respect to Public Health & Safety

Mr. Chairman and Board Members,

Liberty has retained Dr. Christopher Ollson, Ph.D., of Ollson Environmental Health Management (OEHM) to review the proposed Township of Fremont Zoning Ordinance Amendment to Wind Energy Conversion Systems (WECS) (the Amendments) to evaluate its adequacy to protect the public health and safety of township residents.

As with any energy facility, it is important that proper setbacks and guidelines are in place for wind turbines to ensure public health and safety. Dr. Ollson attended the Fremont Township Planning Committee meeting on July 18, 2022 and September 29th, 20200, and the Fremont Township Board meetings on July 21, 2022 and August 26th, 2022. During those meetings he provided his experience and expertise on issues surrounding appropriate shadow flicker, sound and setback distances from participating and non-participating homes. He also provided a detailed written scientific account of his views on the proposed Amendments to the Planning Commission on August 3, 2022.

Over the past fifteen years there has been considerable research conducted around the world evaluating health concerns of those living in proximity to wind turbines. This independent research by university professors, consultants and government medical agencies has taken place in many different countries on a variety of models of turbines that have been in communities for numerous years. There are now over 100 scientific articles that allow us to understand the proper siting of wind turbines.

Commissioners, you will hear of other Township or County Ordinances that have adopted unreasonably restrictive setbacks. Although it is true that these ordinances do exist, you will not find wind projects in these counties or townships. This is simply because these unreasonable restrictions do not allow for siting of turbines, yet they would provide no greater protection for public health than your existing ordinance requirements.

Review of the proposed Amendments indicates that it contains a mixture of reasonable additions to the Ordinance and those that are unnecessary to protect public health and safety and would restrict wind energy development in the township. From the outset it is important to understand that the existing Township of Fremont Zoning Ordinance is protective of public health and safety and does not require any changes. That said, the following provides comments on the proposed changes recommended by the Planning Commission.

OEHM Supported Amendments

OEHM supports the adoption of the following proposed Amendments. They are reasonable, continue to ensure the protection of public health and safety, and still allow the development of wind projects in the Township.

Section 13.12(B)(5) a. Public road setbacks b. Inhabited structures on participating parcels – these proposed changes are reasonable and add an appropriate multiplier on turbine height to ensure the protection of public health and safety.

Section 13.12(B)(14) c. Post-Construction Sound Survey – this provision is keeping in line with other jurisdictions in the United States. It ensures that predicted levels in the modeling report are actually realized.

OEHM Unsupported Amendments

The following proposed Amendments are not supported by scientific need to protect public health and safety.

Section 13.12(B)(5) c) Non-Participating Property Lines – the proposed Amendment is excessive. It is far beyond the requirements of many States, Counties, and Townships that require no more than a 1.1x tip height setback to protect public safety. This distance ensures that if tower collapse, blade failure, ice throw, or fire occur that it will not impact neighboroing properties. The existing ordinance requires a 1.5x setback to neighboring properties and is already greater than the minimum required setback.

Section 13.12(B)(14)(a) Noise emissions. As demonstrated by the letter by Hankard, the most appropriate metric for assessing sound is the 45 dBA Leq (average) sound level at the property line. It is wholly inappropriate to set the sound metric as an Lmax. The entire body of literature on sound, sleep and health impacts on those living near wind turbines is based on an Leq at the non-participating home. To the best of my knowledge there is no operating wind project that has been sited to an Lmax standard. It is certainly not necessary to protect public health and would result in ensuring that a wind project could not be built in Fremont Township.

Section 13.12(B)(20) Shadow Flicker. There is absolutely no need to restrict shadow on non-participating property to protect health or even to avoid annoyance. As previously described to the Board the most common American standard is no more than 30 hours of actual shadow flicker at non-participating homes. Shadow flicker does not occur outdoors, rather it is just a lazy shadow on the ground. Flicker can only occur in an occupied structure. Such a restriction as proposed in the Amendment does not afford additional protection on health, and would unnecessarily restrict wind development.

During this undertaking OEHM would encourage Fremont Township Board to make its decisions based on sound scientific evidence. OEHM has reviewed the existing Fremont Township Zoning Ordinance for WECS and believes that it already contains siting requirements that will ensure the protection of Township residents. That said there a several recommendations proposed by the Planning Commission that could be adopted by the Board.

Sincerely,

OLLSON ENVIRONMENTAL HEALTH MANAGEMENT

Christopher Ollson, PhD

Liberty | Renewables
354 Davis Rd, Suite 100
Oakville, Ontario, Canada L6J 2X1

Attachment C – Additional Expert Opinion and Vestas letter

Energy and water for life

Roberto Caputo
Director, Project Development
Algonquin Power, LLC
354 Davis Rd
Oakville, ON L6J 2X1
Canada

DNV Energy USA Inc.
9665 Chesapeake Dr., Suite 435
San Diego, CA 92123 USA
Phone: +1 619 340 1800
Enterprise No.: 23-2625724
www.dnv.com

Date:	DNV reference:	Customer reference:	Confidentiality Classification:
2022-10-25	10383651-HOU-L-01-B	10726805	Customer's Discretion

Subject: Project Proposed Acoustics Regulations for Fremont Township

Dear Roberto:

Algonquin Power, LLC. requested that DNV Energy USA Inc. ("DNV") review and respond to the proposed amendment to Section 13.12(B)(14)(a) of the Fremont Township Zoning Ordinance. The proposed amendment is shown as follows:

> *Noise emissions from the operation of a WECS and Testing Facility shall not exceed forty-five (45) decibels LMax on the DBA scale as measured at the nearest property line of a non-Participating Property or road. A baseline noise emission study of the proposed site and impact upon all areas within one mile of the proposed WECS and/or Testing Facility location must be done (at the WECS Applicant's cost) prior to any placement of a WECS and/or Testing Facility and submitted to the Township. The WECS Applicant must also provide estimated noise levels to property lines at the time of Special Land Use application. The Applicant shall provide a predictive sound modeling study of all turbine noise to verify that ordinance requirements can be met. The sound modeling study shall be submitted to the PC with the Special Land Use Application.*

The proposed amendment contains additions regarding the submission of a sound modeling study, which DNV considers to be an industry standard and is typical of wind energy project development and permitting processes. The part of the proposed amendment discussed in this section is the use of Lmax as stated in the zoning ordinance amendment instead of using the industry standard Leq metric.

The Leq is defined as the equivalent continuous sound level or energy average of the sound pressure levels measured over a given period of time. The Leq formula averages sound levels such that the sound energy over a time varying sound source would be made equivalent to the Leq for a constant sound source over the same time period. For example, the Leq calculated for a sound source emitting levels varying between 30-40 decibels over 1 hour would be the sound energy equivalent to a constant sound source at value of the Leq. In this case, it may be 32 decibels if sound levels were closer to the lower end of the range for the 1-hour period or closer to 38 decibels if the sound levels were closer to higher end of the range for the 1-hour period.

The Lmax is defined as the maximum sound level measured over a given period of time. Depending on the settings of the sound level meter during a sound measurement, the Lmax could be the maximum sound level measured for a second or even fraction of a second over the whole period. For instance, in the aforementioned 1-hour example of sound levels between 30-40 decibels, the Lmax would be 40 decibels and could reflect one second or less of the entire 1 hour period even if sound levels were 32 decibels for 59 minutes and 59 seconds but 40 decibels for the remaining second.

Based on the information described above regarding Lmax and Leq, it is evident that the Lmax does not reasonably reflect the sound environment measured. As a result, the majority of environmental sound regulations within the US and worldwide (including World Health Organization and International Finance Corporation guidelines) use Leq based metrics. Apart from a misrepresentation of the sound environment which will occur with Lmax measurement methodology, especially over larger measurement periods, there are several practical issues with measuring Lmax accurately for wind turbine sound emissions. Most noticeably, extraneous noise would be very difficult to filter for most wind turbine measurements made at distance especially considering that wind turbines are measured in periods of high winds. At a typical residence or nearby property line, Lmax would be almost entirely influenced by wind gusts on the microphone or other components of the measurement assembly, and impacts of the wind blowing objects surrounding the microphone. For example, under high wind conditions, leaves blowing from trees and impact noise from loose building components nearby a residence are frequent occurrences during measurement campaigns at wind farms. In addition to this, sound emitted by wind turbines is relatively constant in character, with no sudden loud sound sources that would be able to be measured consistently with the Lmax metric.

Modeling Lmax sound levels for wind energy projects would also cause issues during the pre-construction phase. Published manufacturer sound levels commonly used in sound studies are intended to be used as Leq sound levels and would therefore not be able to be used for an Lmax study. As Lmax is rarely used for these studies around the world, acoustic consultants and manufacturers will not have these data readily available. In addition to this, manufacturers may not be willing to publish the data as they would be highly unreliable to gather and verify with post-construction measurements due to high variability of the Lmax metric in a real-world situation. This would present significant legal risk for the turbine manufacturers.

The Lmax metric proposed retains the magnitude of the sound pressure level referenced in the current ordinance of 45 decibels as measured on the A-weighting scale. For reference, a human voice during normal conversation at 5 feet would typically be between 60-65 dBA Leq. In terms of Lmax, this would vary highly depending on the nature of the conversation and the vocal habits of the speaker but could be greater than 75 dBA. Utilizing a stringent precedent of 45 dBA Lmax as a threshold is restrictive to the development of an economically viable wind project . For instance, it would only require a measurement duration of one second or less out of a long term measurement dataset to yield greater than 45 dBA triggering non-compliance. Although 45 dBA is a common sound limit encountered in regulations for wind energy projects in North America, it is more commonly interpreted or required to be an Leq metric.

In conclusion, based upon DNV's extensive experience conducting measurement campaigns for wind energy projects in North America, DNV does not believe that using Lmax is appropriate for a wind energy related zoning ordinance and believes that the Leq metric should remain. Changing the ordinance to Lmax would introduce extreme difficulty in modeling and measurement to determine compliance with the ordinance, reducing its usefulness in the future. Leq is largely regarded as the most useful and adequate metric for prescribed sound level limits, while Lmax is not used in the industry as it is inadequate for several reasons mentioned above.

I hope this letter is consistent with your expectations. Please contact me if you have any questions regarding this letter.

Best regards,

Justin Puggioni
Siting and Acoustics Engineer
DNV Energy USA Inc.
justin.puggioni@dnv.com

28 October 2022

Mr. Roberto Caputo, B.Eng, M.Eng, Director, Project Development
Liberty Power
Submitted Via Email

PROPOSED AMENDMENT TO TOWNSHIP OF FREMONT ZONING ORDINANCE NOISE AND SHADOW FLICKER LIMITS

Dear Mr. Caputo,

This correspondence presents WSP's opinion regarding the proposed Ordinance to amend the Fremont Township Zoning Ordinance No. 100 regarding noise emissions and shadow flicker. Specifically, the amendments to Section 13.12(B)(14)(a) and Section 13.12(B)(20) of the Fremont Township Zoning Ordinance. Our consensus is that the amended ordinances would prevent the development of most, if not all, wind turbine projects in the township. Moreover, the amendments are not presenting amended limits that are based on protecting the public's health, safety, and welfare above that of the original ordinance when it comes to noise and shadow flicker. The opinions expressed here are technical opinions and are not to be construed as legal opinions. They are based on our knowledge and experience in the industry and with local, state, federal, and international regulations.

Our qualifications to provide an opinion include: a Bachelor's of Science degrees in Environment Science, Engineering and a Masters of Sciences in Environmental Engineering, and Doctoral course work in environmental engineering; combined 70+ years' experience on hundreds of projects involving environmental assessments, including noise studies for various industries including renewable energy; experience in 27 states and 24 foreign countries; testimony and have been accepted as an experts in over 50 cases that includes Georgia, Florida, South Carolina, Louisiana, Maryland, Pennsylvania, Oregon, California and Hawaii.

It is our opinion that the amendment to Section 13.12(B)(14)(a) which amends the noise emission limit to "not exceed forty-five (45) decibels LMax on the DBA scale as measured at the nearest property line of a non-Participating Property or road" is overly burdensome and has no relationship to noise levels established to protect the public's health, safety, and welfare. The basis for opinion is listed as follows:

- LMax decibels represent transient or instantaneous source of noise. Such noise sources are routine and common and include many sounds of nature (bird calls, wind rustling leaves, insect noise) and common anthropogenic noises (car door slam, airplane fly overs, yard equipment). An LMax can be measured as a one second or 1/8 of a second maximum noise average by a sound level meter.
- LMax 45 dBA does not represent an instantaneous noise level that would cause health or safety concerns to receptors receiving this sound. OSHA has set a noise exposure level of 85 dBA as an average noise level that if exceeded over an 8-hour workday could cause hearing loss. EPA guidelines have identified a 24-hour exposure level of 70 dBA as the level of environmental noise that will prevent a measurable hearing loss over a lifetime if exceeded. There is no study provided as to an LMax of 45 dBA protecting the health and safety of human receivers. These EPA guidelines are also mirrored the Michigan Siting

WSP
6026 NW 1st Place, Gainesville, Florida, USA 32607 T: +1 352 336-5600 F: +1 352 336-6603

Guidelines for Wind Energy Systems developed by the Energy Office, Michigan Dept. of Labor and Economic Growth in 2007.

- LMax 45 dBA at a property boundary does not represent a noise level that would interfere with human interactions or otherwise interfere with the public's general welfare. EPA guidelines have also identified the noise levels of 55 dBA outdoors and 45 dBA indoors as preventing activity interference and annoyance as studies have concluded that these noise levels may interfere with spoken conversation and other activities such as sleeping, working, and recreation. These noise levels represent an average noise level over time, not an instantaneous (LMax) noise level experience.
- Wind turbines emit a constant noise level during normal operations, therefore an LMax has no relationship to actual wind turbine operations. Noise emissions would not change, and therefore the LMax emitted by a turbine would be the same as the average noise. Using actual noise measurements identifying the source of LMax levels would not be practical due to the short-term natural of transient noise sources in the vicinity of the measurements.

It is our opinion that the amendment to Section 13.12(B)(20) which amends the shadow flicker limit from 30 minutes per year at an occupied structure to zero shadow flicker "beyond the property boundaries of the participating property" is overly burdensome and does not further the protection the public's health, safety, and welfare for the following reasons:

- The amended standard is not based on a typical or industry standard and no supporting studies or documentation has been presented to support that this limitation will protect public health, safety, or welfare.
- Shadow flicker has not been shown to create a health or safety issue.
- Industry standards have been set and followed by international, state, and local regulators to reduce interference to human activity and protect general welfare of off-site receptors. These standards are similar to the Township's original shadow flicker exposure level of 30 hours per year.
- Shadow flicker analysis typically includes several conservative assumptions such as the sun is always shining, turbines are always moving, and there is no foliage or other barriers to shadow flicker. Real world conditions vary, therefore there is an inherent over-estimation of shadow flicker impact when compared with real world conditions. Due to this inherent over-estimation, the extent where there will be shadow flicker greater than zero based on analysis is much greater than extent of shadow flicker while operating.
- The proposed limit of zero shadow flicker at the property boundary would significantly increase the amount of land required for any wind turbine project. The distance to zero shadow flicker beyond the property varies with the wind turbine project design, location, shape of the property, and time of day and year. However, the distance to zero shadow would likely range from up to one-half mile to potentially over a mile from the closest wind turbine to the eastern and/or western property boundary (depending on the height and location of the turbine and location). This could more than double the acreage of land needed to meet this new standard and would severely limit if not eliminate the ability to locate a wind turbine in this township. The amount of land to meet the proposed limit has no relationship to protecting human health and welfare. Having a shadow flicker limit of zero at the project boundary and not at a human receptor does not further the protection of human welfare over the existing ordinance.

In conclusion, based on our knowledge and experience in the industry and with regulatory norms and standard practices, the amended noise and shadow flicker ordinances do not protect the public's health, safety, and welfare above that of the original ordinance. The amended ordinance would be one of the most

restrictive in the nation and would likely constrain and restrict domestic wind development within township, if not eliminate it completely.

Sincerely,

WSP

Gage Miller
Senior Scientist

Kennard F. Kosky, M.S., P.E.
Practice Leader

GBM/KFK

https://wsponlinenam-my.sharepoint.com/personal/gage_miller_wsp_com/documents/projects/liberty power noise/letter/rev_01/liberty noise opinion letter_v02.docx

October 24, 2022

Algonquin
354 Davis Road, Oakville, Ontario
Canada L6J 2X1

To whom it may concern,

Vestas is the energy industry's global partner on sustainable energy solutions with more than +154GW of installed wind power in 87 countries around the world. Every day, we leverage our global experience to continuously improve the design and performance of our turbine offerings and our customer's wind power plants over the long term. Through our industry-leading smart data capabilities and +132 GW of wind turbine under service, we use data to interpret, forecast, and exploit wind resources and deliver best-in-class wind power solutions. In addition to our wealth of field experience, Vestas also utilizes our state-of-the-art testing facilities to complete Highly Accelerated Life Testing (HALT) to further validate and improve our new product designs.

Based on this knowledgebase, Vestas has reviewed the Fremont Township Zoning Ordinance No. 100, effective date of June 22nd, 2021 as provided by Algonquin Power. Vestas finds no concerns for the surrounding health and public safety. The wind turbines intended for the Riverbend wind site are sufficient to meet public safety standards within county ordinances.

This letter is for discussion purposes only and is not an offer of any commitment or additional warranty on our part, nor is it intended to be legally binding or to give rise to any legal or fiduciary relationship between Vestas or its affiliates and any other person.

Respectfully,

Shane Kelley

Shane F. Kelley
Head of Technical Bid Management
Vestas-American Wind Technology, Inc.

Vestas-American Wind Technology, Inc. 1417 NW Everett Street, Portland, OR 97209, USA
Tel: +1 503 327 2000, Fax: +1 503 327 2001, vestas-americas@vestas.com, www.vestas.com