

Wind Energy Development Noise Regulations Across Michigan

Community	Sound Pressure Level	Location of Sound Measurement	Additional Regulations
Shiawassee County	55 dB(A) or 45 dB(A) for <u>non-participating properties</u> .	55 dB(A) if measured at a property line, 45 dB(A) if measured at the exterior of a structure.	Strictly in reference to non-participating properties, no outlined standards for participating properties.
Akron Township (2009)	Sound pressure level shall not exceed 55 dB(A) for more than 3 minutes in any hour of the day.	Taken at the property lines between leased and non-leased property.	Modeling and analysis, from a qualified professional, which confirms the proposal will not exceed the permitted sound pressure level. Modeling and analysis shall conform to the standards of IEC 61400 and ISO 9613 as well as procedures outlined in the most current version of ANSI S12.18. The sound meter used shall meet or exceed standards outlined in ANSI S1.4 for a Type II meter. All documentation shall be submitted within 60 days of commencement of the commercial operation.
Banks Township, Antrim County (Amended 2010)	Sound pressure level shall not exceed 60 dB(A) .	Measured at property lines of the site in question.	Limitation may be increased to 70 dB(a) at property owners request if: 1) based on data <u>provided by a qualified professional</u> which is specific to the proposed tower and takes into consideration <u>prevailing winds, topography, existing vegetation and other relevant factors</u> ; 2) the increased sound levels <u>will not have a substantial negative impact</u> to properties in the immediate area; 3) Owners of abutting lots directly impacted <u>agree in writing to the increased sound levels and agree to impose a deed restriction</u> (running with the land) which accepts increased noise levels.
Bridgehampton Twp., Sanilac County (Draft Ordinance, 2005)	Sound pressure level shall not exceed 50 dB(a) or (the ambient sound pressure level) + 5dB(a) for more than 10% of any hour of the day.	Measured at any residence, school, hospital, church, or public library.	1) If a wind energy development produces a steady pure tone, noise standards will be reduced by 5 dB(a). A steady pure tone exists when one-third (1/3) octave band sound pressure level in the band, including the tone, exceeds the arithmetic average of the sound pressure levels of the two (2) contiguous one-third (1/3) octave bands by five (5) dB(A) for center frequencies of five hundred (500) Hz and above, by eight (8) dB(A) for center frequencies between one hundred and sixty (160) Hz and four hundred (400) Hz, or by fifteen (15) dB(A) for center frequencies less than or equal to one hundred and twenty-five (125) Hz. 2) Ambient noise shall be measured at the exterior of a potentially affected structure at a time <u>when wind velocity does not exceed 30 mph</u> . 3) Any noise level falling between two whole decibels shall be considered the lower of the two. 4) Noise requirements may be waved with written consent of affected property owners.
Centerville Township, Leelanau County	Shall not exceed 35dB(A) or <u>the ambient noise level plus 5 dB(A)</u> (the greater of the two).	Measured at the closest property line to the proposed wind energy development and at <u>all locations within a mile of the proposed development</u> .	1) No wind energy system shall exceed noise levels <u>within the project boundary and a one mile radius beyond the project boundary</u> exceeding the limits noted on page two ¹ . 2) In the event a wind development produces a repetitive pure tone/ tonality the audible noise standard shall be <u>reduced by 5 dB(A)</u> . 3) <u>The Zoning Administrator shall maintain a noise complaint log</u> to be reviewed by the Planning Commission annually. The Township may require additional sound studies, prepared by an acoustic engineer, to mitigate reported complaints. 4) Noise measurement, modeling, and analysis shall follow the most current version of ANSI S12.18, IEC 61400 and ISO 9613. All sound pressure level measurements must be made by a Type I or Type II sound meter and a third party, qualified professional, following standards of ANSI 12.18.

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City of Ionia, Ionia County	Shall not exceed 55 dB(A) or <u>the ambient noise level</u> (the greater of the two).	Measured at any property line of the parcel containing a wind energy system.	1) Sound pressure may be exceeded during short-term events, such as thunderstorms. 2) If a wind energy system exists under single ownership but involves more than one property, the sound pressure level shall be measured at the closest outside boundary to the wind energy system of all property used for development. 3) If required by the Planning Commission or Administrator, the applicant shall provide documentation that demonstrates a wind energy system will not exceed acceptable sound pressure levels. 4) For developments which require a Special Use Permit, a baseline noise emission study of the proposed site and all areas within one quarter mile of the proposed site may be required at the time of submitting a request for Special Use Permit.
City of Walker, Kent County (FOR MEDIUM AND LARGE WIND ENERGY OPERATIONS)	IF an adjacent parcel contains a residential use a wind energy development shall not exceed the lowest ambient sound level measured between 9:00 PM and 9:00 AM. IF an adjacent parcel <u>does not</u> contain a residential use, the same shall apply except the development may exceed the ambient noise level by 5 dB(A).	Measured along any adjacent property line to a wind energy development.	1) A sound pressure level analysis shall be conducted from a reasonable number of sampled locations at the perimeter and interior of the property containing the wind energy development. 2) Proof of compliance with the noise standards is required within 90 days of operation. Sound pressure levels shall be measured by a qualified 3rd party professional with costs covered by the applicant. 3) Upon complaint, the city shall notify law enforcement to attest to a violation. If the noise test indicates a violation the owner/ applicant shall reimburse the City for the cost of a noise test and may be forced to cease operations until compliance is achieved.
Claybanks Township, Oceana County	The noise level for participating properties is to be 47 dB(A), the noise level for non-participating properties is to be 40 dB(A)	Measured along any adjacent property line to a wind energy development.	1) A sound impact study shall be preformed including the following: the wind turbine manufacturer's specifications (outlined in subsection D), sound level information showing contours in 5 dB increments (both dB(A) and dB(C)) for 2 miles surrounding the development, predictions indicating wind speed, direction, operating mode, and night time sound levels. 2) a background sound level study (in dB(A) and dB(C)) for all inhabited structures within 2 miles of the proposed site. 3) Any person conducting noise measurements or enforcement actions against wind energy developments must retain full membership in the Institute of Noise Control Engineers (INCE) or demonstrate experience in the field measurement of wind energy development noise emission. A professional engineer does not, by itself, qualify for competence. Any person who fulfills this role must not have any financial ties to the applicant. 4) The standardized protocol for noise measurement is described on page 2 ⁴ . 5) To measure ambient noise the wind speed shall be less than 4.5 mph, to measure noise levels pertinent to wind energy developments a measurement shall be taken with wind speeds less than 9 mph.
Cleveland Township, Leelanau County	No more than 50 dB(A)	Measured at the property lines of the site in question.	1) A noise report must be submitted with any application for anemometer towers or wind energy facility. 2) Satisfactory mitigation measures must also be provided in a noise report to assure no nearby properties are subjected to unreasonable noise impacts.

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Clinton County (FOR UTILITY SCALE OPERATIONS)	No more than 45 dB(A) at the exterior of a non-participating principal residential structure. No more than 55 dB(A) at a non-participating property line.	Either at the exterior of a non-participating principal residential structure or at a non-participating property line.	1) Noise limitations are increased by 5 dB(A) during short term events such as severe thunderstorms. 2) A registered sound engineer, licensed within the State of Michigan shall create a sound report meeting ANSI standards and including the following: a description and map of the project's sound producing features, a description and map of existing land uses and structures including the location of the structure/ land use, distances from the source of the sound and ambient decibel readings, a description of the project's sound control features.
Emmet County	No more than 35 dB(A).	Measured at the property lines of the site in question.	1) A noise report must be submitted with any application for wind energy facility including: a) a description and map of the project's noise producing features b) a description and map of noise sensitive environments such as, residences, hospitals, libraries and other facilities where quiet is important, within 2 miles of a proposed wind facility c) a survey and report prepared by a qualified engineer shall examine preexisting ambient noise and affected sensitive environments within 2 miles of the proposed project d) a description and map of cumulative noise impacts and proposed noise control features to mitigate impacts.
Fenton Charter Township, Genesee County	No more than 55 dB(A), if ambient sound pressure level exceeds 55 dB(A) the standard shall be <u>the ambient dB(A) plus 5 dB(A)</u> .	Measured at the closest property line or lease unit boundary to the wind energy system.	1) Sound pressure may be exceeded for short term events (severe storms) by an additional 5 dB(A) by no more than 3 minutes of any hour of the day.
Gratiot County	No more than 55 dB(A), if ambient sound pressure level exceeds 55 dB(A) the standard shall be <u>the ambient dB(A) plus 5 dB(A)</u> .	Measured at the habitable structure closest to the wind energy system.	None.

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Huron County	Participating Properties - No more than 50 dB(A) , if ambient sound pressure level exceeds 50 dB(A) the standard shall be <u>the ambient dB(A) plus 5 dB(A)</u> . Whatever is greater.	Measured at any residence.	1) In the event audible noise from the wind development produces a steady pure tone <u>the maximum sound pressure level is reduced by 5 dB(A)</u> . 2) Standards are altered for low frequency noise and are displayed on page two ² . 3) Any noise measurement falling between two whole decibels shall be the lower of the two 4) A written letter of consent from affected property owners allows a wind development to exceed the maximum limits stated 5) A permanent noise impact easement may be recorded with the register of deeds to apply the previously described waiver to succeeding property owners.
	Non-Participating Properties - No more than 45 dB(A) , if the ambient sound pressure exceeds 45 dB(A) the standard shall be <u>the ambient dB(A) plus 5 dB(A)</u> . Whatever is greater.	Measured at any residence, school, hospital, church, or public library.	
Lowell Township, Kent County (DRAFT ORDINANCE)	Shall not exceed 55 dB(A) or the <u>ambient noise level plus 5 dB(A)</u> . Whatever is greater.	Measured at the closest property line to a wind energy development that is not occupied by the development.	1) The stated sound pressure levels may be exceeded for short-term events, such as high or severe winds. 2) The applicant shall provide modeling and analysis that demonstrates the wind energy development will not exceed the maximum permitted sound pressure level.
Manchester Township, Washtenaw County	Shall not exceed 55 dB(A) .	Measured at the property line of the property where a wind energy development is installed.	None.
Oliver Township, Huron County	Shall not exceed 55 dB(A) or <u>the ambient noise level plus 5 dB(A)</u> . Whatever is greater.	Measured at the property lines between leased and non-leased property.	1) The stated sound pressure level shall not be exceeded for more than 3 minutes in any hour of the day. 2) Exceptions to the maximum sound pressure level may be exceeded with the written consent of property owners. 3) The applicant shall provide modeling and analysis to confirm that the wind energy development does not exceed the maximum permitted sound pressure level. 4) Modeling shall conform to IEC 61400 and ISO 9613. 5) Sound pressure level measurements are to be performed by a third party qualified professional and in accordance with the most current version of ANSI S12.18. 6) All sound measurements must be performed with a Type II sound meter to the current specifications of ANSI S1.4. 7) All documentation must be provided to the local government within 60 days of completion of construction.

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Osceola Township, Osceola County	Shall not exceed 50 dB(A)	Measured at the external property line of a parcel on which the wind energy development is installed.	The following shall be submitted with application for Special Use Permit: 1) data which demonstrates the placement and design of the wind turbines can meet the prescribed noise levels, 2) a wind rose chart which describes 12 months of wind data from the proposed parcel and demonstrates direction, duration and intensity of the wind. 3) a site plan showing the relationship of all dwellings at the external property lines of the proposed wind development, 4) a sound chart or data which shows the sound levels in dB(A) at the base of all turbines and at the nacelle; the reduction in sound levels should be demonstrated up to and including 7 rotor diameters away from the base of the turbine.
Otsego County	Regular sound pressure levels are described on the following page³. Following the submission of a noise study regular sound pressure levels may be altered to: No more than 10 dB(A) above the original ambient noise level or that level which is exceeded 90% of the time beyond the wind energy development's property line pursuant to submitted propagation model. Night and daytime limits may differ.	Measured at an adjacent property line or adjoining public/ private road	<u>Analysis, measurements and projections of wind energy developments shall include the following:</u> 1) a survey of the existing ambient background noise levels, including: daytime noise measurements, 2 noise measurements between 9:00 PM and 11:59 PM, and 2 noise measurements between 1:00 AM and 5:00 AM. 2) a prediction of noise levels at the wind development's property border. A prediction may be made from manufacturer's data, data from a 3rd party testing agency, or by direct measurement for wind developments in place. Measurements must be conducted to the most recent version of IEC and 61400-11. Infrasound and low frequency noises between 20 and 100 Hz must be noted as well as any pure tone sources. 3) the sound model provided may be hemispherical or spherical but attention must be paid to noise propagation downward of the proposed wind energy development site and propagation of sound at differing atmospheric densities. 4) a comparison of calculated wind sound pressure levels with and without wind energy developments. This shall confirm the baseline for permitted sound levels once the development is operating. 5) Pure tones emitted by the development <u>shall be no more than 3 dB(A) above the permitted level.</u>
White River Township, Muskegon County	Shall not exceed 45 dB(A).	Measured at the nearest property line or road.	1) A noise emission study of the proposed site must be performed prior to the installation of any wind turbines. The study shall include impacts of the development on the proposed site, all areas within 1 mile of the proposed site, and estimated noise levels at all property lines in question.
Wilson Township, Charlevoix County	Shall not produce sound levels above 50 dB(A).	Measured at the property lines of the site in question.	A detailed written statement, with supporting evidence, must be provided to the local governmental unit that the proposed wind energy development will comply with all of the standards for its approval.

Supplemental Information

Centerville Township¹	Low Frequency Noise Level	
	Octave Band Center Frequency (Hz)	Sound Pressure Level (dB)
	1 to 2	70
	16	60
	31.5	65
	63	57
	125	50
	250	47

Claybanks Township⁴	Standardized acoustical instrumentation and sound measurement protocol shall conform
	ANSI S1.43 Integrating Averaging Sound Level Meters: Type-1 (or IEC 61672-1)
	ANSI S1.11 Specification for Octave and One-third Octave-Band Filters (or IEC 61260)
	ANSI S1.40 Verification Procedures for Sound Calibrators
	ANSI S12.9 Part 3 Procedures for Measurement of Environmental Sound
	ANSI S12.18 Measurement of Outdoor Sound Pressure Level
	IEC 61400-11 WTG systems –Part 11: Acoustic noise measurements

Huron County²	Low Frequency Noise Level	
	Octave Band Center Frequency (Hz)	Sound Pressure Level (dB)
	500 and above	Reduced by 5 dB(A)
	160 - 400	Reduced by 8 dB(A)
	1 - 125	Reduced by 15 dB(A)

Otsego County³	Standard Sound Pressure Levels		
	Zoning District	Day dB(A)	Night dB(A)
	R1, R2, R3, RR, B1	Not Permitted	Not Permitted
	FR, AR	40	35
	B2, B3, HX	Not Permitted	Not Permitted
	I	60	50