

Section 402:15 Wind Energy Systems (WES's) (adopted 6/9/09)

A. Definitions – For purposes of this section, the following definitions shall apply:

ANEMOMETER TOWER or MET means a freestanding meteorological tower containing instrumentation such as anemometers that is designed to provide present moment wind data for use by the supervisory control and data acquisition (SCADA) system which is an accessory land use to a WIND ENERGY SYSTEM

AMBIENT means the sound pressure level exceeded 90% of the time or L90

ANSI means the American National Standards Institute

dB(A) means the sound pressure level in decibels. It refers to the “a” weighted scale defined by ANSI. A method for weighting the frequency spectrum to mimic the human ear

DECIBEL means the unit of measure used to express the magnitude of sound pressure and sound intensity

HAWT means a horizontal axis wind turbine tower or building mount; one type of WIND ENERGY SYSTEM. See also VAWT

IEC means the International Electrotechnical Commission

ISO means the International Organization for Standardization

LEASE UNIT BOUNDARY means boundary around property leased for purposes of a Wind Energy System, including adjacent parcels to the parcel on which the Wind Energy System tower or equipment is located. For purposes of setback, the Lease Unit Boundary shall not cross road right-of-ways

ON-SITE WIND ENERGY SYSTEM means a land use for generating electric power from wind and is an accessory use that is intended to primarily serve the needs of the consumer at that site

ROTOR means an element of a wind energy system that acts as a multi-bladed airfoil assembly, thereby extracting through rotation, kinetic energy directly from the wind

SHADOW FLICKER means alternating changes in light intensity caused by the moving blade of a wind energy system casting shadows on the ground and stationary objects, such as but not limited to a window at a dwelling

SOUND PRESSURE means an average rate at which sound energy is transmitted through a unit area in a specified direction. The pressure of the sound measured at a receiver

SOUND PRESSURE LEVEL means the sound pressure mapped to a logarithmic scale and reported in decibels (dB)

UTILITY GRID WIND ENERGY SYSTEM means a land use designed and built to provide electricity to the electric utility grid by use of wind and includes accessory uses such as but not limited to an ANEMOMETER TOWER, electric substation, and related appurtenances

VAWT means a vertical axis wind turbine tower or building mount; one type of WIND ENERGY SYSTEM. See also HAWT

WIND ENERGY SYSTEM means a land use for generating power by use of wind; use of a wind turbine generator and includes the turbine, blades, and tower as well as related electrical

equipment. This does not include wiring to connect the wind energy system to the grid. See also ON-SITE WIND ENERGY SYSTEM and UTILITY GRID WIND ENERGY SYSTEM

WIND SITE ASSESSMENT SYSTEM means a land use using a MET or ANEMOMETER TOWER to determine the wind speeds at a specific site and the feasibility of using that site for construction of a wind energy system.

B. Wind Energy Systems (WES's or WES singular) and wind site assessment systems may be located and permitted only if all of the following standards are complied with:

1. **Planning Commission Review.** The Planning Commission shall review all applications for Wind Energy Systems and Wind Site Assessment Systems. Notification of the review shall be sent to all property owners within 300' of the property boundary where the WES and/or Wind Site Assessment System is proposed.
2. **Minimum Site Area.** The minimum site area for a WES shall be as necessary to meet required setbacks and any other applicable standards of this ordinance.
3. **Setbacks.** All WES's shall be set back a distance equal to one and one-half times the height of the WES from the owner's property line (for on-site WES's) or from the property lines of adjacent non-leased properties including public rights-of-way (for utility grid WES's).
4. **Maximum Height.** The maximum height for On-site WES's and Wind Site Assessment Systems shall be sixty (60) feet from the ground to the top of the blade or tower, whichever is greater. The Planning Commission, following a duly noted Public Hearing and notification of every land owner within 300' of the parcel where the WES or Wind Site Assessment system will be located, may approve an increased height for On-site WES's and Wind Site Assessment Systems not to exceed one hundred twenty (120) feet, if the following conditions are met:
 - a. The increased height will result in the preservation of a substantial stand of trees, existing land forms or structures that would otherwise be removed to increase wind velocity and/or reduce turbulence.
 - b. The increased height is the minimum necessary to achieve a reasonable rate of return on the operation of the WES given the documented wind speeds and other site conditions. A reasonable rate of return is not equivalent to maximizing economic return to the operator. The Planning Commission shall not grant the increased height if economic return is not met due to the use of inefficient equipment that does not utilize current commercial technologies.
 - c. The increased height will not result in increased intensity of lighting on the tower due to FAA requirements.

On-site WES or Wind Assessment System over 120 feet in height shall require a Special Use Permit according to Section 501 of this zoning ordinance, the system

shall be treated as a Utility Grid System, and shall follow all requirements of Section 501:5.

The maximum height for Utility Grid WES's and Wind Assessment Systems shall be as described in Section 501:5 (8), "Height for Utility Grid System(s)".

5. **Minimum Rotor Wind Vane or Blade Clearance.** The lowest point of the arc created by rotating wind vanes or blades on a Wind Energy System shall be no less than sixteen (16) feet. Additional clearance may be required by the Planning Commission if potential safety concerns are identified.
6. **Maximum Noise Levels.** Any proposed Wind Energy System shall produce sound pressure levels that are no more than fifty-five (55) decibels as measured on the dB(A) scale at the property lines of the site in question. A noise report shall be submitted with any application for a WES.
7. **Maximum Vibrations.** Any proposed Wind Energy System shall not produce vibrations humanly perceptible beyond the property on which it is located.
8. **Shadow Flicker.** The facility shall be designed such that shadow flicker will not fall on, or in, an existing off-site dwelling. Shadow flicker expected to fall on a roadway or a portion of a residential parcel may be acceptable under the following circumstances:
 - 1) The flicker will not exceed 30 hours per year; and
 - 2) The flicker will fall more than 100 feet from an existing residence; or
 - 3) The traffic volumes are less than 500 vehicles per day on the roadway.
9. **Transmission Lines.** The on-site electrical transmission lines connecting the Wind Energy System to the public utility electricity distribution system shall be located underground.
10. **Interference with Commercial/Residential Reception.** Any Wind Energy Systems shall be constructed and operated so that they do not interfere with television, microwave, navigational or radio reception.
11. **Landscaping.** Existing natural land forms on the site which effectively screen the base of the WES from adjacent property used for residential purposes shall be preserved to the maximum extent possible.
12. **State or Federal Requirements.** Any proposed Wind Energy System or anemometer tower shall meet or exceed any standards and regulations of the FAA, the Michigan Public Service Commission, National Electric Safety Code, and any other agency of the state or federal government with the authority to regulate Wind Energy Systems or other tall structures in effect at the time the permit is approved.
13. **Safety.** All WES's shall have automatic braking, governing, or a feathering system to prevent uncontrolled rotation or over speeding. All WES's shall have lightning protection.

- 14. Visual Impact.** All WES's shall meet the following requirements:
- a. Each WES shall either be white or maintain a galvanized steel finish.≠
 - b. Each WES shall be sited on the property in a location that reduces to the maximum extent possible any adverse impacts on significant view corridors from adjacent properties, while at the same time maintaining contact with economically viable wind resources.
 - c. Each WES, except for anemometer towers, shall be monopole or monotube style construction (as distinguished from a lattice-style tower) and shall not utilize guy wires. Anemometer towers may, for up to 3 years, be lattice type towers and may use guy wires.
 - d. Each WES shall be designed to aesthetically complement the color and design of any existing WES within a one-mile radius
- 15. On-site use WES's** On-site WES's are intended to primarily serve the needs of the consumer on the site of the WES. If the total height exceeds one hundred twenty (120) feet, a Special Use Permit is required and must follow the procedures in Section 501 of this zoning ordinance.
- 16. Utility Grid WES's** Utility Grid WES's are designed and built to provide electricity to the electric utility grid. Utility Grid WES's shall be considered a Special Land Use and require a Special Use Permit according to Section 501 of this zoning ordinance.
- 17. Complaint Resolution:** The applicant shall develop a process to resolve complaints from nearby residents concerning the construction or operation of the project. The process may use an independent mediator or arbitrator and shall include a time limit for acting on a complaint. The process shall not preclude West Traverse Township from acting on a complaint.
-
-

**SECTION 501: 5 Utility Grid Wind Energy System(s)
Utility Grid WES's applications and projects, and Wind Site
Assessment systems, shall comply with the following standards in
addition to the standards of Section 402:15.**

1 Site Plan Review:

A site plan and a site plan review, meeting the requirements of Section 403 of the West Traverse Zoning Ordinance, shall be required. The application shall also include:

- a. A copy of an Environment Analysis by a third party qualified professional to identify and assess any potential impacts on the natural environment including, but not limited to wetlands and other fragile ecosystems, historical and cultural sites, and antiquities. The applicant shall take appropriate measures to minimize, eliminate or mitigate adverse impacts and shall show those measures on the site plan. The applicant shall identify and evaluate the significance of any net effects or concerns that will remain after mitigation efforts.
- b. A copy of the Avian and Wildlife Impact Analysis by a third party qualified professional to identify and assess any potential impacts on wildlife and endangered species. The applicant shall take appropriate measures to minimize, eliminate or mitigate adverse impacts, and shall show those measures on the site plan. The applicant shall identify and evaluate the significance of any net effects or concerns that will remain after mitigation efforts.

2. Maps shall be presented showing all of the following:

- a. The physical features and land uses of the project area, both before and after construction of the proposed project;
- b. Project area boundaries;
- c. The location, height, dimensions, color, and materials of all existing and proposed structures and fencing;
- d. The location, grades, and dimensions of all temporary and permanent on-site and access roads from the nearest county or state maintained road; and
- e. All new infrastructure above ground related to the project.

3. Insurance: Proof of the applicant's public liability insurance. This insurance shall be maintained throughout the life of the project.

4. Sound Pressure Level: Copies of modeling and analysis report.

5. Certifications: Certification that applicant has complied with or will comply with all applicable state and federal laws and regulations. Copies of all such permits and approvals that have been obtained or applied for at time of the application.

6. Visual Impact: Visual simulations of how the completed project will look from a minimum of four viewable angles.

Each WES, except for anemometer towers, shall be monopole or monotube style construction (as distinguished from a lattice-style tower) and shall not utilize guy wires. Anemometer towers may, for up to 3 years, be lattice type towers and may use guy wires.

7. **Shadow Flicker:** The applicant shall provide a shadow flicker model for any proposed WES. The model shall:
 - a. Map and describe within a one-mile radius of the proposed project site the topography, existing residences, locations of other structures, wind speeds and directions, existing vegetation and roadways;
 - b. The model shall represent the most probable scenarios of wind constancy, sunshine constancy, and wind directions and speeds;
 - c. Calculate the locations of shadow flicker caused by the proposed project and the expected durations of the flicker at these locations;
 - d. Calculate the total number of hours per year of flicker at all locations;
 - e. Identify problem areas where shadow flicker will interfere with existing or future residences and roadways and describe proposed measures to mitigate these problems, including, but not limited to, a change in siting of the facility, a change in the operation of the facility, or grading or landscaping mitigation measures.
 - f. The facility shall be designed such that shadow flicker will not fall on, or in, any existing dwelling. Shadow flicker expected to fall on a roadway or a portion of a residential parcel may be acceptable under the following circumstances:
 - 1) The flicker will not exceed 30 hours per year; and
 - 2) The flicker will fall more than 100 feet from an existing residence; or
 - 3) The traffic volumes are less than 500 vehicles per day on the roadway.
8. **Height.** The minimum vertical blade tip clearance from grade shall be forty (40) feet for a WES employing a horizontal axis rotor. The maximum height for Utility Grid Wind Energy Systems and Wind Site Assessment Systems is one hundred ninety-nine (199) feet.
9. **Maximum Noise Levels.** Any proposed Wind Energy System shall produce sound pressure levels that are no more than fifty-five (55) decibels as measured on the dB(A) scale at the property lines of the site in question. A noise report shall be submitted with any application for a WES. A noise report shall be prepared by a qualified professional and shall include the following, at a minimum:
 - a. A description and map of the project's noise producing features, including the range of noise levels expected, and the basis of the expectation.
 - b. Description and map of the noise sensitive environment, including any sensitive noise receptors, i.e. residences, hospitals, libraries, schools, places of worship, parks, areas with outdoor workers and other facilities where quiet is important or where noise could be a nuisance within two (2) miles of the proposed facility.

- c. A survey and report prepared by a qualified engineer that analyzes the preexisting ambient noise (including seasonal variation) and the affected sensitive receptors located within two (2) miles of the proposed project site. Potential sensitive receptors at relatively less windy or quieter locations than the project shall be emphasized and any problem areas identified;
 - d. A description and map of the cumulative noise impacts with any problem areas identified; and
 - e. A description of the project's proposed noise control features and specific measures proposed to mitigate noise impacts for sensitive receptors as identified above to a level of insignificance.
- 10. Soil Conditions.** A proposal for any Wind Energy System or anemometer tower shall be accompanied by a report of the soils present on the site based on soil borings, and a description of the proposed foundation size, materials, and depth.
- 11. Sign.** A sign no more than four (4) square feet in area displaying an address and telephone number for emergency calls and informational inquiries shall be posted at the WES. The emergency telephone number shall allow a caller to contact a responsible individual to address emergencies at any time during or after regular business hours, on weekends or holidays. No Wind Energy System tower or anemometer tower or site shall include any advertising sign.
- 12. Lighting.** WES's shall not be artificially lighted, unless required by the FAA or other applicable governmental authority. If lighting is required, the lighting alternatives and design chosen:
- a. Shall be the lowest intensity allowable under FAA regulations.
 - b. Shall not be strobe lighting or other intermittent white lighting fixtures, unless expressly required by the FAA. Such intermittent lighting shall be alternated with steady red lights at night if acceptable to the FAA.
 - c. May be a red top light that does not pulsate or blink.
 - d. All tower lighting required by the FAA shall be shielded to the extent possible and acceptable to the FAA to reduce glare and visibility from the ground.
 - e. Where acceptable to the FAA, the Township will approve white lights over red lights, and steady lights over strobed or intermittent lights.
 - f. The Planning Commission may require design changes in order to lessen the visual clutter associated with the siting of multiple wind turbines with non-complementary, inconsistent design within sight of each other.
- 13. Removal of Abandoned or Unsafe WES's**
Any WES that is not operated for a continuous period of twelve (12) months shall be considered abandoned. Any tower found by the Planning Commission to be unsafe or not in compliance with the standards related to noise or shadow flicker shall be found to be in violation of the permit. The owner of any WES that is abandoned or in violation of the permit shall remove the same within twelve (12)

months of receipt of notice from the Township of such abandonment or violation. In addition to removing the Wind Energy System or anemometer tower, the owner shall restore the site of the WES to its original condition prior to location of the WES, subject to reasonable wear and tear. Any foundation associated with a WES shall be removed to a minimum depth of five (5) feet below the final grade and site vegetation shall be restored. Failure to remove an abandoned WES within the twelve (12) month period provided in this subsection shall be grounds for the Township to remove the WES at the owner's expense. The Planning Commission shall require the applicant to provide a performance guarantee equal to the reasonable cost of removing the WES and attendant accessory structures as a condition of a permit given pursuant to this section.

14. **Complaint Resolution**: The applicant shall develop a process to resolve complaints from nearby residents concerning the construction or operation of the project. The process may use an independent mediator or arbitrator and shall include a time limit for acting on a complaint. The process shall not preclude West Traverse Township from acting on a complaint.