

## 4.23 CENTERVILLE TOWNSHIP ZONING ORDINANCE FOR COMMERCIAL WIND ENERGY SYSTEMS

### 4.23.1 PURPOSE

The purpose of this Ordinance is to define standards and procedures governing installation and operation of commercial wind energy systems as a special use in Centerville Township. Standards and procedures are necessary to:

- Protect public health, safety and welfare;
- Ensure that the location and scale of commercial wind energy systems within the Township are consistent with the vision and goals of the master plan;
- Protect all areas of the Township and the Township's natural resources from potential adverse impacts of wind energy systems, including adverse visual and environmental impacts;
- Avoid potential damage to adjacent property from hazards associated with and/or failure of commercial wind energy ~~conversion~~ systems;
- Ensure the compatibility of adjacent land uses;
- Protect property values;
- Define regulatory requirements and procedures for:
  - Permit application and review
  - Monitoring and compliance
  - Revocation and/or decommissioning

### 4.23.2 GENERAL PROVISIONS

#### 4.23.2.1 Applicability:

Commercial wind energy systems shall not be regulated or permitted as essential services, public utilities, or private utilities. Commercial wind energy systems are allowed as a special land use within Agricultural Districts in Centerville Township subject to the requirements of this Ordinance. All interconnected wind energy systems, except those that meet the definition of private wind energy systems, shall be considered commercial and subject to special land use permit and requirements within this ordinance.

**4.23.2.2 Total Generating Capacity:** The total rated generating capacity for all commercial wind energy systems allowed in Centerville Township shall not exceed two times the amount of electricity used by the Township in the calendar year preceding the application.

#### 4.23.2.3 Application for Special Land Use Permit:

- An owner/applicant may apply for a Special Land Use Permit to ~~c~~Construct and ~~o~~Operate a ~~c~~Commercial ~~w~~Wind ~~e~~Energy ~~s~~System subject to all of the requirements of this Ordinance.
- Centerville Township shall have the right to impose other discretionary criteria, including time-related conditions such as phased development, to effectuate the purpose and intent of this Ordinance, to protect the health, safety and welfare of the Township residents, to protect the social and economic well-being of nearby residents and landowners, and to protect against pollution, impairment or destruction of the Township's natural resources.
- Procedures for application and site plan review shall comply with requirements set forth for Major Projects in "Procedures for Site Plan Review" of the *Centerville Township Zoning Ordinance* except that the Planning Commission may require more than one public hearing. Notice of the public hearing will be made according to the Michigan Zoning Enabling Act.

#### 4.23.2.4 Approval Standards:

The Centerville Township Planning Commission shall not approve a Special Land Use Permit unless it finds that:

- The applicant/owner has demonstrated compliance with the General Provisions, Performance and Regulatory Standards, and Application Requirements of this Ordinance, as well as “Standards for Granting Site Plan Approval” from the *Centerville Township Zoning Ordinance*.
- The Township shall have the right to impose other discretionary criteria in order to effectuate the purpose and intent of this Ordinance, to protect the health, safety, and welfare of the Township residents, or to protect against pollution, impairment or destruction of the Township’s natural resources.

#### 4.23.2.5 Issuance of Special Land Use Permit for Construction and Operation:

- If the Centerville Township Planning Commission finds that the applicant/owner has met the approval standards, it may issue a Special Land Use Permit for ~~c~~Construction of a ~~w~~Wind ~~e~~Energy ~~s~~System that shall be valid for two years from the date of issue.
- Upon completion of construction, the applicant/owner shall submit to the Centerville Township Zoning Administrator proofs of compliance with all requirements of the Ordinance. If such submission does not occur within two years, the Special Land Use Permit is no longer valid.
- The Centerville Township Planning Commission shall determine that all provisions, requirements, standards, and discretionary criteria have been complied with fully before issuing a final Special Land Use Permit for ~~o~~Operation of the ~~w~~Wind ~~e~~Energy ~~s~~System that shall be valid for five years from the date of issue.
- Six months prior to the expiration of the Special Land Use Permit for ~~o~~Operation of the ~~w~~Wind ~~e~~Energy ~~s~~System, the applicant/owner/operator shall submit to the Centerville Township Zoning Administrator proofs of continued compliance, including safety and maintenance records, records of environmental impacts and records on the useful life of similar equipment. The Centerville Township Planning Commission may reissue the Special Land Use Permit for ~~o~~Operation of the ~~w~~Wind ~~e~~Energy ~~s~~System for another five-year period if it finds sufficient evidence of continued compliance.
- In the event that the Special Land Use Permit for ~~o~~Operation of the ~~w~~Wind ~~e~~Energy ~~s~~System is not reissued, the wind energy system shall be considered in violation of the Ordinance.
- The Township reserves the right of review of compliance with the conditions and limitations imposed upon such use, and any failure to comply may result in termination of the permit by action of the Planning Commission.

#### 4.23.2.6 Revocation

The Township Board shall have the authority to revoke any special use permit if (a) it was granted in part because of a material misrepresentation by the applicant or an agent of the applicant; or (b) the holder of the special use permit violates any term of the special use permit, including any condition, or any applicable requirement of the ordinance. In either event, the Township shall give written notice to the holder of the special use permit, by ordinary mail to the last address provided to the Township by the holder of the special use permit. If the subject of the notice is a violation of a term or condition of the special use permit or the ordinance, the permit holder shall have 30 days from the date of the notice to correct the violation, unless the time period is extended at the sole discretion of the Township Supervisor. If the violation is not corrected in time, or if the subject of the notice was a material misrepresentation by the applicant or its agent, the Township Board may revoke the special use permit with cause after a hearing. The Township Board shall establish notice requirements and such other conditions for the hearing as the Township Board deems appropriate, including but not limited to the subpoena of persons and/or documents. The holder of the special use permit shall reimburse the Township for its costs, including expert consultant and attorney fees, associated with or resulting from a revocation proceeding. This paragraph shall not prevent the Township from seeking any appropriate relief in any other venue,

including but not limited to civil infraction proceedings, criminal proceedings, or proceedings in civil court.

#### **4.23.2.7 Enforcement and Penalties:**

- The enforcement of the Ordinance shall be the responsibility of the Centerville Township Zoning Administrator, unless otherwise specified in the ordinance or designated by the Township.
- An owner/operator, landowner, firm, association, corporation or representative agent of any wind energy system that is found by Centerville Township, or its designee, to be in violation of the special use permit, or to be abandoned, inoperable, or unsafe as defined in this Ordinance, or to have a serious adverse impact as defined in this Ordinance:
  - Shall provide abatement by shut down, repair, or removal of the wind energy system upon written notification from the Zoning Administrator (or other Township designee).
  - Is a civil infraction, the penalty for which shall be \$500 per occurrence. For violations that continue after a written demand for correction by the Township, each day shall be considered a separate occurrence.
  - May be subject to revocation of the special use permit for excessive and continued violations.
  - May be required to reimburse Centerville Township for cost(s) and expenses of obtaining other relief including a temporary or permanent injunction; such reimbursement may include costs and reasonable attorney fees.

#### **4.23.2.8 Certification of Insurance:**

- Applicant/owner/operator/landowners shall indemnify and hold harmless the applicant/owner/operator/landowners itself and Centerville Township, all as additional named insureds, against any and all claims arising out of the existence and operation of the wind energy system.
- Applicant/owner/operator/ shall procure comprehensive general liability, casualty, wrongful acts insurance policies, and any other policies customary to the wind energy system industry. This insurance shall be in the amount of \$5 million per wind energy system but not to exceed \$100 million in the aggregate if the applicant/owner/operator/ own(s) more than one wind energy system in Centerville Township. The Planning Commission may adjust these amounts periodically to reflect inflation.
- The applicant/owner/operator/ shall maintain these insurances for the duration of the construction, operation, decommissioning, removal and site restoration of the wind energy system. The insurance carrier shall be instructed to provide Centerville Township with certificates of the existence of such insurances, and shall be instructed to notify the Township if such insurances expire for any reason.
- Failure of the applicant/owner/operator/landowners to maintain these insurances at all times shall result in termination of the permit.
- Cancellation Notice – all insurances described shall include an endorsement stating the following: It is understood and agreed that thirty (30) days advanced written notice of cancellation, non-renewal, reduction and/or material change shall be sent to the township zoning administrator.

#### **4.23.2.9 Removal Cost Guarantee:**

The cost of removal and site restoration is the full responsibility of the applicant and/or owner/operator. In order to provide the greatest possible financial assurance that there will be sufficient funds to remove the wind energy system and to restore the site, the following steps shall be followed:

- For each wind energy system, the applicant/owner/operator shall determine an amount of money equal to the estimated removal and restoration cost. The Planning Commission shall require independent verification of the adequacy of this amount.

- This money shall be deposited in an escrow account specified by Centerville Township, which may be an interest-bearing account. There shall be no alternative to such an account. A surety bond, letter of credit, or other financial promise shall not be accepted.
- Withdrawals will be made from this account, solely by Centerville Township or its designee, only to pay for removal and site restoration of the wind energy system as provided for in this Ordinance ~~or as determined by the owner/operator.~~
- Any money left in the account for each wind energy system after removal and site restoration shall be returned by Centerville Township to the then owner/operator.

**4.23.2.10 Separation and Management of Each Removal Cost Account:**

If more than one wind energy system is owned by the same applicant/owner/operator, the removal/restoration guarantee accounts may be joined together by Centerville Township into a single account for that applicant/owner/operator. However, accounts for different applicant/owner/operators shall be kept separate. Centerville Township may, from time to time, change the financial institution in which such accounts are deposited.

**4.23.2.11 Administration Costs—Initial Application and Ongoing:**

- For each wind energy system, the applicant/owner/operator shall deposit into an escrow account the amount of \$25,000. The purpose of this joint escrow account is:
  - To reimburse Centerville Township for its costs incurred to hire consultants and experts as the Township, at its sole discretion, deems desirable to examine, evaluate and verify the data and statements presented by the applicant/owner/operator
  - For the life of each wind energy system, to cover the administrative and legal costs incurred by Centerville Township in monitoring and enforcing the owner/operator’s ongoing compliance with the Ordinance.
- The account shall be managed as follows:
  - Funds can be withdrawn from this account only by the signature of a Township designee.
  - If at any time the balance of this account shall fall below \$15,000, the applicant/owner/operator shall deposit an additional \$10,000 into the account.
  - If at any time the balance of this fund shall fall below \$15,000 for a continuous period of thirty days, the application shall be considered to have been withdrawn, or the Permit for the wind energy system may be terminated.
  - The township zoning administrator or township designee shall be charged with monitoring the escrow account and giving quarterly reports to the Planning Commission.

After the wind energy system has been removed and site restoration has been completed, as defined in this Ordinance, any balance remaining in this account shall be returned to the applicant/owner/operator.

**4.23.2.12 Insufficiency of Removal and Administrative Cost Accounts:**

During the useful life and operation of the wind energy system, Centerville Township may from time to time determine, in its sole discretion, whether the amounts deposited for removal, site restoration, and administration costs are adequate for these purposes. (Costs of removal, restoration and administration may change due to technology, environmental considerations, inflation, and many other causes.) If the Township determines that these amounts, including any interest earned to date, are not adequate, the Township shall require the owner/operator to make additional deposits to the accounts to cure such inadequacy. The Township shall consider the wind energy system in violation of the Ordinance if the owner/operator fails to cure the inadequacy within sixty (60) days of notification.

**4.23.2.13 Road Repair Costs:**

Any damage to a public road within Centerville Township resulting from the construction, maintenance or operation of a wind energy system shall be repaired at the applicant/owner/operator's expense. For each wind energy system:

- The applicant/owner/operator, Centerville Township and the Leelanau County Road Commission shall agree upon and document construction routes and public road conditions before construction begins.
- The applicant/owner/operator shall provide security in an amount to be agreed upon by the applicant/owner/operator and Centerville Township with guidance from applicable experts, including the Leelanau County Road Commission, to be used by the Township and/or the Leelanau County Road Commission to pay for the repair of damage to public roads.
- Failure of the applicant/owner/operator to provide these funds shall result in termination of the Permit.

#### 4.23.3 PERFORMANCE AND REGULATORY STANDARDS

All commercial wind energy systems and testing structures shall comply with the performance and regulatory standards set forth in this section.

##### 4.23.3.1 Height Limit:

The maximum permitted height of an anemometer tower or a horizontal axis wind energy system shall be one hundred ninety-nine (199) feet. The Planning Commission may set a lower height limit for other types of wind turbines.

##### 4.23.3.2 Setbacks:

- **Property line and road setback:** The setback of an anemometer tower or a wind energy system from any adjoining property line and any adjoining private or public road shall be no less than ten (10) times the diameter of the rotor. If necessary, the owner/operator shall secure recorded lease agreements or easements with adjoining property owners to achieve the setback requirements.
- ~~**Property line and road setback:** The setback of an anemometer tower or a wind energy system from any adjoining property line and any adjoining private or public road shall be no less than ten (10) times the diameter of the rotor, except that this requirement shall not apply if:
  - The owner/operator owns the adjoining property or
  - The owner/operator has recorded lease agreements or easements with adjoining property owners.~~
- **Inhabited structure setback:** The setback of an anemometer tower or a wind energy system from any inhabited structure shall be no less than five (5) times the total height of the wind energy system.
- **Lake Leelanau Setback:** The setback of an anemometer tower or a wind energy system from Lake Leelanau, as measured from the ordinary high water mark, shall be no less than ten (10) times the diameter of the rotor.
- **Wetland Setbacks:** The setback of an anemometer tower or a wind energy system from the delineated boundary of wetlands shall be no less than ten (10) times the diameter of the rotor.
- **Setbacks to Other Sensitive Areas:** The setback of an anemometer tower or a wind energy system from other sensitive areas, except as specified herein shall be no less than ten (10) times the diameter of the rotor.
- **Sleeping Bear Dunes National Lakeshore Setback:** The setback of a wind energy system from the boundary of Sleeping Bear Dunes National Lakeshore shall be no less than three (3) miles.

##### 4.23.3.3 Spacing:

Adjacent wind energy systems must be spaced at least one-half (1/2) mile apart.

##### 4.23.3.4 Tower and Turbine Design:

The wind energy system tower shall be a monopole or monotube style construction (as distinguished from

a lattice-style tower) with no guy wires, exterior ladders or platforms.

**4.23.3.5 Color and Finish:**

Wind energy systems shall have a non-reflective finish and shall be a non-obtrusive, neutral color that is compatible with the natural environment, such as white, gray, or beige. Wind energy systems shall not display logos, advertising or promotional materials.

**4.23.3.6 Lighting:**

The Centerville Township Planning Commission shall not permit any wind energy system that requires Federal Aviation Administration-mandated lighting. Continuous nighttime lighting onsite shall not be permitted. Lighting shall be used only as needed for maintenance and inspection. Lighting shall be shielded to minimize glare, visibility and impact on wildlife and shall comply with Section 4.22 Outdoor Lighting Ordinance.

**4.23.3.7 Construction Codes, Towers and Interconnection Standards:**

Wind energy systems together with all related components, including but not limited to transmission lines and transformers, shall comply with all federal, state and county requirements and standards, including applicable construction and electrical codes, local permit requirements, and applicable utility, Michigan Public Service Commission, and Federal Energy Regulatory Commission interconnection standards and IEC61400. Wind energy systems including towers shall comply with Federal Aviation Administration requirements, the Michigan Airport Zoning Act (Public Act 23 of 1950, MCL 259.431 et seq.), the Michigan Tall Structures Act (Public Act 259 of 1959, MCL 259.481 et seq.), and local jurisdiction airport overlay zone regulations.

**4.23.3.8 Interconnection and Electrical Distribution Facilities:**

All electrical transmission lines associated with the wind energy site shall be located and maintained underground, in accordance with best practice guidelines. This requirement applies to transmission lines connecting the wind energy system(s) to the transmission provider’s distribution system, but does not apply to the transmission provider’s distribution system that constitutes the public electrical grid.

**4.23.3.9 Safety:**

- All utility grid wind energy systems shall be designed to prevent unauthorized access to electrical and mechanical components and shall have access doors that are kept securely locked at all times when service personnel are not present.
- Signs no more than four (4) square feet in area and without advertising or promotional materials shall be posted at the wind energy system tower and at the wind energy system service drive entrance at the minimum setback distance. Signs shall display:
  - Address and telephone numbers that allow a caller to directly contact a responsible individual to deal with emergencies at any time during or after business hours and on weekends and holidays.
  - A warning about the dangers of falling ice.
- All spent lubricants and cooling fluids shall be properly and safely removed in a timely manner from the site of the wind energy system.
- The minimum vertical blade tip clearance from grade shall be twenty-five (25) feet for a wind energy system employing a horizontal axis rotor.

**4.23.3.10 Impacts on Wildlife Species and Habitat:**

- **Site Selection:** Applicants shall follow the U.S. Fish and Wildlife Service *Interim Guidelines to Avoid and Minimize Wildlife Impacts from Wind Turbines (2003)* for selecting appropriate wind energy system site(s) including completing a potential impact checklist and calculating the potential impact index.

- **Endangered or Threatened Species:** Development and operation of a wind energy system shall not have a significant adverse impact on endangered or threatened fish, wildlife, or plant species, as defined by *US Endangered Species Act of 1973* and *Michigan Endangered Species Protection, Part 365 of the Natural Resources and Environmental Protection Act (Act 451 of 1994)* and identified in the Michigan Natural Features Inventory, or their critical habitats, or other significant habitats identified in studies and plans of local, regional, and federal governmental bodies. The setback of an anemometer tower or a wind energy system from designated critical habitat for any endangered species shall be five (5) miles.
- **Migratory Birds:** Development and operation of a wind energy system shall not have a significant adverse impact on migratory bird species.
- **Eagles:** Development and operation of a wind energy system shall not have a significant adverse impact on eagles. The setback of an anemometer tower or a wind energy system from any known eagle's nest shall be five (5) miles.
- **Imposed Conditions for Monitoring and Operation:** The Centerville Township Planning Commission may impose special conditions for monitoring bird and bat fatalities and may impose special mitigation measures such as blade feathering limiting rotational speed or shut down during periods of high seasonal concentrations of migrating birds and bats and or low visibility weather conditions.
- **Monitoring:**
  - Avian and bat impact reporting: The owner/operator shall submit a quarterly report to the Centerville Township Zoning Administrator or the Township's designee that identifies all dead birds and bats found within five hundred (500) feet of the wind turbine generator. Reporting shall continue for at least three (3) years after turbine operations begin, or longer if required by the Centerville Township Planning Commission. Monitoring shall follow protocols referenced in this Ordinance under "Application Requirement: Avian, Bat and Wildlife Impact Analysis and Plan," and results shall be adjusted for predation and observer bias.
  - Notification and mitigation: In the event of extraordinary mortality of threatened or endangered species, or discovery of an unexpected large number of dead birds and bats of any variety on site, the US Fish and Wildlife Service, Michigan [Department of Natural Resources and the Environment \(MDNRE\)](#)~~DNR~~ and the Centerville Township Zoning Administrator or the Township's designee shall be notified within twenty-four (24) hours. The owner/operator shall, within thirty (30) days, submit a report to the Centerville Township Zoning Administrator describing the cause of the occurrence and the steps taken to avoid future occurrences.

#### 4.23.3.11 Noise Regulatory Standards:

- **Audible Noise Standard:**

From 6:00 A.M. until 10:00 P.M., for wind speeds from cut-in to rated-power of the wind energy system, the A scale equivalent noise level due to the wind energy system at the property line closest and at locations within one (1) mile of the wind energy system shall not exceed the greater of:

  - Thirty-five (35) dB(A) or
  - The established outdoor background sound level by more than five (5) dB(A).
- From 10:00 P.M. until 6:00 A.M., the A scale equivalent noise level due to the wind energy system at the property line closest and at locations within one (1) mile of the wind turbine generator shall not exceed the established outdoor background sound level by more than three (3) dB(A). Background sound level shall be established separately for daytime (6:00 A.M.-10:00 P.M.) and for nighttime (10:00 P.M.-6:00 A.M.) values. **Low Frequency Noise or Infrasound Noise:** No low frequency noise or infrasound noise from wind energy system operations shall be created which causes the noise level both within the project boundary and a one-mile radius beyond the project boundary to exceed the following limits:

Octave Band Center Frequency, Hz	Sound Pressure Level (dB)
1-2	70
16	60
31.5	65
63	57
125	50
250	47

- **Tonality and/or Repetitive, Impulsive Tone Penalty:** In the event the audible noise due to wind turbine operations exhibits tonality, contains a pure tone and/or repetitive, impulsive\_noise, the Audible Noise Standard shall be reduced by a total of five (5) dB(A).
- **Noise Complaint Investigation and Resolution:** Centerville Township Zoning Administrator shall maintain a Noise Complaint Log. The Township Board shall review this log at least once a year to identify and address potential adverse noise impacts. During the review process, the Township can require additional sound studies to be prepared by an acoustic engineer approved by Centerville Township. Complaints shall be reported, documented and resolved in accordance with the “Complaint Resolution” section of this Ordinance.
- **Noise Measurement, Analysis and Applicable Noise Control Engineering Standards:** Measurement, modeling and analysis shall follow “Appendix Noise Measurement Protocols” and shall conform to the most current version of ANSI S12.18, IEC 61400 and ISO 9613. Background sound pressure level measurements and post-construction sound pressure level measurements made after installation of the wind energy system shall be done by a third party, qualified professional and shall follow “Appendix Noise Measurement Protocols” and be done according to the procedures in the most current version of ANSI S12.18. All sound pressure levels shall be measured with a certified Type I or Type II sound meter that meets or exceeds the most current version of ANSI S1.4 specifications for a sound meter. Meters shall be calibrated on site before and after any measurement period.

#### 4.23.3.12 Shadow Flicker and Blade Glint:

- A wind energy system shall be designed to minimize shadow flicker from moving blades or reflected blade glint occurring off the site on which the facility is located. Should shadow flicker or blade glint be expected to fall on a portion of an off-site property, the system may be operated within the following conditions:
  - The flicker or glint will not exceed thirty (30) hours per year; or
  - The flicker or glint will fall more than one hundred (100) feet from an existing residence, unless the affected property owner has signed a written agreement with the owner-operator.

• If shadow flicker or blade glint violate any of these conditions, violations shall be handled by the township zoning administrator or township designee. ~~the problem should be reported to Centerville Township Zoning Administrator.~~

#### 4.23.3.13 Ice Throw:

The ice throw or ice shedding for the wind energy system shall not cross the property lines of the site on which the facility is located and shall not impinge on any public right-of-way or overhead utility line.

Violations shall be handled by the township zoning administrator or township designee. ~~Violations shall be reported to the Centerville Township Zoning Administrator or the Township’s designee.~~



#### **4.23.3.14 Maintenance and Compliance:**

In order to ensure safety and compliance with the Ordinance:

- The owner/operator shall conduct regular monitoring, physical inspections and maintenance of the wind energy system. Copies of monitoring and inspection reports and maintenance logs shall be submitted to the Centerville Township Zoning Administrator or the Township's designee at least once a year or more often if requested in writing by the Centerville Township Zoning Administrator or the Township's designee.
- Centerville Township shall have the right to inspect the premises on which the wind energy system is located and to hire a consultant to assist with any such inspection at the applicant/owner/operator's expense.

#### **4.23.3.15 Abandoned, Inoperable and Unsafe Wind Energy Systems and Adverse Impacts:**

- Abandoned: Any wind energy system or anemometer tower that is not operated for a continuous period of nine (9) months shall be considered abandoned and subject for removal.
- Unsafe: Any wind energy system or anemometer tower that is found to present an imminent physical threat of danger to life or a significant threat of damage to property shall be shut down immediately and removed or repaired or otherwise made safe. A Michigan professional engineer shall certify its safety prior to resumption of operation. The owner/operator shall notify the Centerville Township Zoning Administrator or the Township's designee within twenty-four (24) hours of an occurrence of tower collapse, turbine failure, fire, thrown blade or hub, collector or feeder line failure, or injury.

#### **4.23.3.16 Removal and Site Restoration:**

- Within ninety (90) days of receipt of written notification from the Township, the owner/operator shall begin to remove any wind energy system or anemometer tower
  - If the owner/operator determines the system is at the end of its useful life, or
  - If the Township determines the system is subject for removal because it is unsafe or abandoned, or
  - If the Township determines the special use permit is expired or has been revoked.
- Failure to begin to remove a wind energy system or anemometer tower within the 90-day period provided in this subsection shall be grounds for the Township to remove the wind turbine generator or anemometer tower at the owner's expense.
- All equipment associated with the wind energy system or anemometer tower including all materials above and below ground shall be removed, and the site shall be restored to a condition that reflects the specific character of the site including topography, vegetation, soils, drainage, and any unique environmental features. The restoration shall include: road repair, if any, and all re-grading, soil stabilization, and re-vegetation necessary to return the subject property to a stable condition consistent with conditions existing prior to establishment of the wind energy system. The restoration process shall comply with all state, county, or local erosion control, soil stabilization and/or runoff requirements or ordinances and shall be completed within one year.

#### **4.23.3.17 Construction Activities:**

Construction activities shall be organized and timed to minimize impacts on township residents and wildlife from noise, disruption (including disruption of wildlife habitat), and the presence of vehicles and people.

#### **4.23.3.18 Complaint Resolution:**

- Any individual, group of individuals or reasonably identifiable entity may file a signed and dated written complaint with the owner/operator of the wind energy system. Any complaints received directly by Centerville Township Zoning Administrator shall be referred to the owner/operator.

- The owner/operator of the wind energy system shall report to Centerville Township Zoning Administrator all complaints received concerning any aspect of the wind energy system construction or operation as follows:
  - Complaints received by the applicant/owner/operator shall be reported to Centerville Township Zoning Administrator or its designee within five business days, except that complaints regarding unsafe wind energy systems and serious violations of this ordinance as defined in this ordinance shall be reported to Centerville Township Zoning Administrator or its designee the following business day.
  - The applicant/owner/operator shall document each complaint by maintaining a record including at least the following information:
    - Name of the wind energy system and the owner/operator
    - Name of complainant, address, phone number
    - A copy of the written complaint
    - Specific property description (if applicable) affected by complaint
    - Nature of complaint (including weather conditions if germane)
    - Name of person receiving complaint, date received
    - Date reported to Centerville Township Zoning Administrator
    - Initial response, final resolution and date of resolution
- The applicant/owner/operator shall maintain a chronological log of complaints received, summarizing the above information. A copy of this log, and a summary of the log by type of complaint, shall be sent on or before January 15, March 15, July 15, and October 15 to Centerville Township Zoning Administrator, covering the previous calendar quarter. An annual summary shall accompany the January 15 submission.
- All complaints regarding unsafe wind energy systems and serious violations of this ordinance as defined in this ordinance shall be investigated on site. The complainant and a Township designee shall be invited to the investigatory meeting(s).
- The Township may designate a person to seek a complaint resolution that is acceptable to the complainant, the Township and the owner/operator. If such a resolution cannot be obtained, the Township may take action as authorized by the enforcement section of the Ordinance.
- The Township may at any time determine that a complaint shall be subject to enforcement and penalties as defined in this ordinance.

#### **4.23.4 APPLICATION REQUIREMENTS**

An application for a special use permit for a wind energy system or an anemometer tower shall meet requirements of "Procedures for Site Plan Review" and "Requirements for Site Plan" in the *Centerville Township Zoning Ordinance* and shall also include all of the following information, unless expressly indicated otherwise:

##### **4.23.4.1 Registered in Michigan:**

The applicant shall provide evidence of being registered to do business in Michigan.

##### **4.23.4.2 Wind Resources:**

The applicant shall submit information showing adequate wind resources and summarizing site wind characteristics, including minimum, maximum and average wind speeds, directions, seasonal variations and dominant wind direction in the direction from which 50 percent or more of the energy contained in the wind flows.

##### **4.23.4.3 Wind Energy System Information:**

The applicant shall supply the following information pertaining to the wind energy system: type, manufacturer and model, total installed height, rotor material, rated power output, performance history,

safety history, electrical system, and rotor over-speed control system(s). The Township may require, at its discretion, complete wind energy system specifications and drawings and professional certification of these data.

**4.23.4.4 Manufacturers' Material Safety Data Sheet(s):**

Documentation shall include the type and quantity of all materials used in the operation of all equipment including, but not limited to, all lubricants and coolants.

**4.23.4.5 List of Experts and Evidence of Qualifications:**

The applicant shall supply the name, address and resumé or other written summary of the education, experience, and other qualifications of each expert providing information concerning the wind energy system or anemometer tower project.

**4.23.4.6 Certification of Compliance:**

The applicant shall provide certification that the applicant has complied or will comply with all applicable county, state and federal laws and regulations including but not limited to:

- Copies of all such permits and approvals that have been obtained or applied for at time of the application.
- Written documentation that the applicant has notified the Federal Aviation Administration and any other applicable state and federal regulatory agencies of the proposed wind energy system or anemometer tower.

**4.23.4.7 Copies of Leases, Agreements and Recorded Easements:**

The applicant shall provide written permission from the property owner(s) or from multiple property owner(s) if that is necessary to meet setback requirements. Before a special land use permit shall be granted by the Planning Commission, the applicant shall submit copies of leases and all recorded agreements and easements, such as non-development agreements within a specified setback and/or easements for rights-of-way, from all affected landowners and governmental units. Easements shall be recorded prior to a special land use permit being issued.

**4.23.4.8 Site Plan:**

The applicant shall submit vicinity maps and site plans showing the physical features and land uses of the project area. The vicinity maps and site plan drawings shall meet requirements listed in the *Centerville Township Ordinance* under "Requirements for Site Plan" for special uses. The vicinity maps and site plans shall also include maps, plans, section and elevation drawings and written specifications in sufficient detail to clearly describe the following: *(The following are either not included or included to a lesser standard in Section 13.1)*

- With vicinity map(s)
  - Existing zoning districts, land uses, including all dwellings, public and private airstrips within two (2) miles of the boundary of the property upon which the commercial wind energy facility is to be located.
  - Planned land uses (based on the current *Leelanau General Plan* and the *Centerville Township Master Plan*) within two (2) miles of the boundary of the property upon which the commercial wind turbine generator facility is to be located.
- With vicinity map(s), site plan(s) and written specifications as required
  - Location of all proposed new infrastructure above and below ground related to the project including meteorological and wind testing towers
  - Location of existing and proposed electrical lines and facilities.
  - Proposed setbacks
  - Location of all known active or abandoned wells within 1300 feet of any proposed construction.

- Identification and location of sensitive areas and sensitive environmental resources that are in the vicinity of the proposed wind turbine, including but not limited to endangered or threatened flora or fauna or their critical habitats, and other significant habitats identified by government and other authoritative sources. The vicinity map and site plan shall cover a radius that is large enough to address all setbacks required by the Zoning Ordinance.
- Ingress and egress information including:
  - Location, grades, dimensions and surfacing materials of all temporary and permanent on-site and access roads.
  - Distances from the nearest county or state maintained road.
  - Evidence of compliance with standards required for year-round emergency access.
- With site plan, plan, section and elevation drawings, and with written specifications and reports as required
  - Project area boundaries and physical dimensions of the proposed project area.
  - Soils on site delineated and described in a soil survey map accompanied by a report of the soil conditions based on soil borings prepared by a firm that specializes in soil borings and is approved to perform such work for the Michigan Department of Transportation. The report shall include soil and geologic characteristics of the site based upon on-site sampling and testing. The soil boring reports and the proposed plans for the foundation shall be certified by a registered Professional Engineer licensed in the State of Michigan, who is practicing in his or her area of competency.
  - Location, height, and dimensions of all existing and proposed structures and fencing.
  - Drawings and specifications, bearing the seal of a professional engineer licensed in Michigan, of all proposed new infrastructure above and below ground related to the project including meteorological and wind testing towers.
  - Lighting on site described with a lighting plan and specifications that show location, color, type, intensity, direction, shielding and control of all on-site lighting.

**4.23.4.9 Electrical Interconnection Plan:**

The applicant shall provide a plan for electrical interconnection showing methods and standards for interconnection and copies of contracts or letters of intent with the electric utility and the electric transmission service provider.

**4.23.4.10 Visual Simulations and Drawings and Viewshed Analysis:**

The applicant shall provide elevation drawings, detailed computer and/or photographic simulations and other models and visual aids showing the wind energy system with all related facilities as they will appear on the proposed site from vantage points north, south, east, and west of the project starting at a ¼ mile of the site and at 2 miles, 3 miles and 5 miles of this site.

**4.23.4.11 Hazard Plan:**

An application for a wind turbine generator shall be accompanied by a hazard prevention plan. At a minimum such a plan shall include the following:

- Certification by an engineer licensed in the State of Michigan that the electrical wiring between turbines and between turbines and the utility right-of-way does not pose a fire or stray voltage hazard.
- A landscape plan designed to avoid spread of fire from any source on the turbine.
- A listing of any hazardous fluids that may be used on site and manufacturers’ material safety data sheet(s) as specified herein.
- Certification by an engineer licensed in the State of Michigan that the turbine has been designed to contain any hazardous fluids and a statement certifying that the turbine shall be routinely inspected to ensure that no fluids are released or leaked from the turbine or any other equipment or on the site.

- A Hazardous Materials Waste Plan complying with all federal, state, and county laws and regulations. Further, approvals or waivers, by the state Department of Environmental Quality, the state Department of Natural Resources and/or the US Army Corp of ~~Army~~ Engineers shall also be submitted prior to the issuance of any permit.

**4.23.4.12 Environmental Impact Analysis and Plan:**

The applicant shall submit a report demonstrating compliance with development, design and operation recommendations contained in the current version of U.S. Fish and Wildlife Service *Interim Guidelines to Avoid and Minimize Wildlife Impacts from Wind Turbine*. The applicant shall have a third party, qualified professional, approved by the Centerville Township Planning Commission, conduct a site characterization and evaluation study and an analysis following accepted scientific procedures 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 site characterization report shall include:

- A description of the environmental characteristics of the site prior to development, i.e., topography, soils, vegetative cover, drainage, streams, creeks or ponds.
- Natural features that will be retained, removed and/or modified including vegetation, drainage, hillsides, streams, wetlands, woodlands, wildlife and water. A description of the areas to be changed shall include their effect on the site and adjacent properties. An aerial photo may be used to delineate the areas of change.
- Identify natural resources that may be potentially impacted and associated mitigations.

The applicant shall provide a plan and take appropriate measures to minimize, eliminate or mitigate adverse impacts identified in the analysis and to demonstrate compliance with applicable parts of the *Michigan Natural Resources and Environmental Protection Act* (Act 451 of 1994, MCL 324.101 et seq.). The applicant shall identify and evaluate the significance of any net effects or concerns that will remain after mitigation efforts.

**4.23.4.13 Avian, Bat and Wildlife Impact Analysis and Plan:**

The applicant shall have a third-party, qualified professional, approved by the Centerville Township Planning Commission, conduct a site wildlife characterization and evaluation study and an analysis to identify and assess any potential impacts on wildlife, especially birds, bats and endangered species, following accepted scientific procedures. Avian studies shall follow protocols described in the National Wind Coordinating Committee, *Studying Wind/Energy Interactions: A Guidance Document, 1999* and the U.S. Fish and Wildlife Service *Interim Guidelines to Avoid and Minimize Wildlife Impacts from Wind Turbines*, Federal Register: July 10, 2003 (Volume 68, Number 132). The applicant shall submit this study and shall provide a plan and take appropriate measures to minimize, eliminate or mitigate adverse impacts identified in the analysis and to demonstrate compliance with *Michigan Endangered Species Protection, Part 365 of the Natural Resources and Environmental Protection Act* (Act 451 of 1994). The applicant shall identify and evaluate the significance of any net effects or concerns that will remain after mitigation efforts.

**4.23.4.14 Noise Report:**

The applicant shall submit a noise report prepared by an acoustic engineer approved by the Centerville Township Planning Commission that includes, at a minimum, the following:

- Measurements of the existing sound environment.
- Modeling and analysis in order to confirm the wind energy system will not exceed the maximum permitted sound pressure levels.
- A sound and vibration assessment as specified in the Appendix of this Ordinance.
- A description of the wind energy system’s noise characteristics, including manufacturer’s noise data, and the project’s proposed noise control features, including specific measures proposed to

mitigate noise impacts for sensitive receivers. .

- Evidence of compliance with Noise Measurement, Analysis and Applicable Noise Control Engineering Standards referenced herein.

During the review and approval process, the Centerville Township Planning Commission may seek independent professional verification of information presented by the applicant.

#### **4.23.4.15 Shadow Flicker and Blade Glint:**

The applicant shall submit:

- A shadow flicker and blade glint analysis and computer simulation or model including topography and structures. The analysis and model shall identify the locations of shadow flicker and blade glint caused by the wind energy system and the expected durations of the shadow flicker and blade glint at these locations from sunrise to sunset over the course of a year. The analysis and model shall identify problem areas where shadow flicker or blade glint may affect parcels of land, roadways, and existing or future structures. The analysis and model also shall describe measures that shall be taken to eliminate or mitigate the 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.
- Copies of agreements signed with adjacent property owners affected by shadow flicker and/or blade glint.

#### **4.23.4.16 Ice Throw and Blade Throw:**

The applicant shall submit:

- A report on the incidence of blade throw and ice throw for similar equipment,
- An analysis and calculations of blade and ice throw potential, and

A plan showing locations likely to be affected by blade throw and by ice throw under a variety of conditions.

#### **4.23.4.17 Decommissioning Removal and Restoration Plan:**

The applicant shall submit a decommissioning removal and restoration plan describing the intended disposition of the wind energy system and all equipment associated with the system upon termination of the lease, revocation of the permit, or at the end of the system's useful life. The plan shall include:

- The anticipated life of the project,
- Any agreement with the landowner regarding equipment,
- The estimated decommissioning costs in current dollars, and
- The anticipated manner in which the project will be decommissioned and the site restored.

#### **4.23.4.18 Complaint Resolution Plan:**

The applicant shall submit to Centerville Township Zoning Administrator the procedures it will use to receive and respond to complaints about its wind energy system(s) and facilities. Procedures shall include provisions for immediate response to complaints regarding unsafe wind energy system(s) and serious violations of this ordinance as defined in this ordinance.

#### **4.23.4.19 Separability:**

If any part of this ordinance is determined by a court of competent jurisdiction to be invalid, that judgment shall not affect the remainder of this ordinance. The invalid part of the ordinance shall be considered to be separated from the rest, which shall remain in effect.

## **4.23.5 APPENDIX NOISE MEASUREMENT PROTOCOLS**

### **4.23.5.1 Measurement Protocol for Sound and Vibration Assessment of Proposed and Existing Wind Energy System:**

The purpose is first to establish a consistent and scientifically sound procedure for estimating existing (ambient) background sound and vibration levels in a project area, and second to determine the likely impact that operation of a new wind energy system will have on the existing sound and vibration environment.

The characteristics of the proposed wind energy system and the features of the surrounding environment will influence the design of the sound and vibration study. Site layout, types of wind turbine generators selected and the existence of significant local sound and vibration sources and sensitive receivers should be taken into consideration when designing a sound and vibration study. It will be necessary to have a qualified consultant conduct the sound and vibration study.

Note: Consult with Centerville Township Planning Commission prior to conducting any sound and vibration measurements. These guidelines are meant to be general in nature and may need to be modified (with approval of the Centerville Township Planning Commission) to accommodate unique site characteristics. Consult with Centerville Township Planning Commission for guidance on study design before beginning the sound and vibration study. During consultation, good quality maps or diagrams of the site will be necessary. Maps and diagrams should show the proposed project area layout and boundaries and identify important landscape features as well as significant local sound and vibration sources and sensitive receivers.

### **4.23.5.2 Sound level Estimate for Proposed Wind Energy System:**

- A suitable model must be selected (or developed) to predict the worst-case noise level at all relevant and sensitive receivers. The report should include:
  - The propagation model used for prediction;
  - An estimate of model accuracy;
  - Assumptions used as input, including allowances for wind direction, noise absorptions due to air, ground, topographical and wind effects.
- In order to estimate the sound and vibration impact of the proposed wind energy system on the existing environment an estimate of the sound and vibration produced by the proposed wind turbine generator(s) must be provided.
  - Provide the manufacturer's sound level characteristics for the proposed wind energy system(s) operating from cut-in speeds to the rated power wind speed of the wind turbine generator(s). Include an unweighted octave-band (16, 31.5, 63, 125, 250, 500, 1K, 2K, 4K, and 8K Hz) analysis for the wind energy system(s) operating from cut-in speeds to full rated power at sensitive receivers, at property lines and for distances from adjacent property lines to 5,000 feet from the wind energy system(s) using 500 foot intervals. For locations beyond 2,500 feet from the wind energy system, the Planning Commission may increase the interval size if applicant can demonstrate low likelihood of noise problems.
  - Estimate the sound levels for the proposed wind energy system(s) in dB(A) and dB(C) at sensitive receivers, at adjacent property lines and for distances from adjacent property lines to 5,000 feet from wind energy system (s). For locations beyond 2,500 feet from the wind energy system, the Planning Commission may increase the interval size if the applicant can demonstrate low likelihood of noise problems. For projects with multiple wind energy systems, the combined sound level impact for all wind energy system(s) operating at cut-in speeds and full rated power must be estimated.
  - Estimate the sound levels for the proposed wind energy system(s) at sensitive receivers, at

property lines and for distances from the wind energy system(s) of 500 to 5,000 feet using 500 foot intervals allowing for the propagating effect of wind downwind from the wind energy system(s) at integer wind speeds from cut-in wind speed to the rated power wind speed of the wind energy system(s).

- Provide a contour map of the expected sound level from the new wind energy system(s), using 5dB(A) increments created by the proposed wind energy system(s) extending out to a distance of 5000 feet.
- Determine the impact of the new sound and vibration source on the existing environment. For each measuring point used in the ambient study:
  - Identify if the point is a sensitive receiver
  - Report expected changes to existing sound levels for  $L_{ave}$ ,  $L_{10}$ ,  $L_{50}$ , and  $L_{90}$  in DB(A).
  - Report expected changes to existing sound levels for  $L_{ave}$ ,  $L_{10}$ ,  $L_{50}$ , and  $L_{90}$ , in DB(C).
  - Identify and describe impulsive noise and pure tone noise components.
  - Report all assumptions made in arriving at the estimate of impact and any conclusions reached regarding the potential effects on people living near the project area.
  - Include an estimate of the number of hours of operation expected from the proposed wind energy system(s) and under what conditions the wind energy system(s) would be expected to run.

#### **4.23.5.3 Measurement of the Existing Sound and Vibration Environment:**

An assessment of the proposed wind energy system project area's existing background sound and vibration environment is necessary in order to predict the likely impact resulting from a proposed project. The following guidelines must be used in developing a reasonable estimate of an area's existing sound and vibration environment. All testing is to be performed by an acoustical testing engineer approved by the Centerville Township Planning Commission. All measurements are to be conducted with industry certified testing equipment. All test results must be reported to the Centerville Township Planning Commission.

- Sites with no existing wind energy systems
  - Background sound level measurements shall be taken as follows:
    - At all properties within the proposed wind energy system project boundaries
    - At all properties within a one mile radius of the proposed wind energy system project boundaries.
  - One test must be performed during each season of the year.
    - Spring March 15 – May 15
    - Summer June 1 – September 1
    - Fall September 15- November 15
    - Winter December 1- March 1
  - All measurement points shall be located in consultation with the property owner(s) and shall be located such that no significant obstruction (building, trees, etc.) blocks sound and vibration from the site.
  - Duration of measurements shall be a minimum of ten continuous minutes for each criterion at each location.
  - One set of measurements shall be taken during each of the following four periods:
    - Morning (6 - 8 a.m.)
    - Midday (12 noon – 2 p.m.)
    - Evening (6 – 8 p.m.)
    - Night (10 p.m. – 12 midnight)
  - Background sound level measurements must be made on a weekday of a non-holiday week. Background sound shall not be measured during sporadic noise events such as seasonal farming activities, unusual traffic or weather events that would distort the establishment of a baseline level



- representative of the L<sub>90</sub> rural environment.
- Measurements must be taken at 6 feet above the ground and at least 15 feet from any reflective surface.
- For each measuring point and for each measurement period, provide each of the following measurement criteria:
  - Unweighted octave-band analysis (16.2, 31.5, 63, 125, 250, 500, 1K, 2K, 4K, and 8K Hz)
  - L<sub>ave</sub>, L<sub>10</sub>, L<sub>50</sub>, and L<sub>90</sub> in dB(A)
  - L<sub>ave</sub>, L<sub>10</sub>, L<sub>50</sub>, and L<sub>90</sub> in dB(C)
  - A narrative description of any intermittent sounds registered during each measurement
  - Wind speed at time of measurement
  - Wind direction at time of measurement
  - Description of the weather conditions during the measurement including atmospheric pressure, temperature, humidity, and precipitation.
- Provide a map and/or diagram clearly showing:
  - The layout of the project area, including topography, the project boundary lines, and property lines
  - The locations of the measuring points
  - The minimum and maximum distance between any measuring points
  - The location of significant local sound and vibration sources
  - The distance between all measuring points and significant local sound and vibration sources
  - The location of all sensitive receivers including but not limited to: schools, day-care centers, residences, residential neighborhoods, places of worship, and elderly care facilities.
- Sites with existing wind energy systems
  - Two complete sets of sound level measurements must be taken as defined below:
    - One set of background sound level measurements with the wind energy system(s) off
    - One set of sound level measurements with the wind energy system(s) running.
  - Sound level measurements shall be taken as for sites with no existing wind energy systems.

#### **4.23.5.4 Post-Construction Measurements:**

- Within twelve months of the date when the wind energy system is fully operational, and within two weeks of the anniversary date of the pre-construction background sound level measurements, repeat the existing sound and vibration environment measurements taken before the project approval. Post-construction sound level measurements shall be taken both with all wind turbine generator(s) running and with all wind turbine generator(s) off. Measurements should include sound levels for the wind energy system(s) at sensitive receivers downwind from the wind energy system(s) at a range of wind speeds from cut-in wind speed to the rated power wind speed of the wind energy system.
- Report post-construction measurements to the Centerville Township Planning Commission in the same format used for the pre-approval sound and vibration studies. Measurements shall be available for public review.

**Note: These definitions will be moved to the Definitions Section of the Zoning Ordinance**

## DEFINITIONS

For purposes of this section of the Ordinance, the following terms shall be interpreted or defined below:

**Background sound:** The sound level that exists in the absence of and unrelated to wind turbine sound being evaluated for compliance with this ordinance and includes sounds that would normally be present at least 90 percent of the time. Intermittent noise events such as from aircraft flying over, dogs barking, mobile farm or construction machinery, and the occasional vehicle traveling along a nearby road are all part of the ambient noise environment but would not be considered part of the background sound unless they were present for at least 90 percent of the time. In terms of sound measurements, background sound is defined as being the sound level exceeded 90 percent of the time, and it is statistically referred to as  $L_{90}$ . Background sound shall not be measured during sporadic noise events such as seasonal farming activities, traffic or weather events that would distort the establishment of a baseline level representative of the  $L_{90}$  rural environment.

**Blade Glint:** The intermittent reflection of the sun off the surface of the blades of a single or multiple wind energy system.

**Commercial Wind Energy System:** a wind energy system that exceeds the maximum thirty (30) kilowatt generator size limit allowed for net metering by the public utility.

**Height:** The distance between the ground at the base of the wind energy system and the highest point of the wind energy system with the blade in the uppermost vertical position.

**Impulsive Noise:** Short acoustical impulses or thumping sounds, which vary in amplitude. Impulsive noise may be a single noise event or an intermittent repetitive noise event with an impulse rate of one or more per second.

**Infrasound:** Sound frequency less than twenty (20) Hz.

**Low frequency (sound):** Sound frequency range from twenty (20) Hz to two hundred (200) Hz.

**Noise:** Any sound that would be unwanted by a reasonable person.

**Private Wind Energy System:** Wind energy system that is used to generate electricity or produce mechanical energy for use on the property where located. A wind energy system that does not exceed the maximum thirty (30) kilowatt generator size, and sale of excess electric power is allowed only via net metering.

**Pure tone:** A pure tone consists of a single frequency or a combination of a single frequency and its harmonics. A pure tone is defined to exist if the 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.

**Sensitive Areas:** Sleeping Bear Dunes National Lakeshore, or an identified habitat for threatened or endangered species, or other designated areas, including those with important natural resources, as identified by Centerville Township, Leelanau County, state, or federal authorities such as:

- Floodplains
- Designated environmental areas, such as wetlands and migration routes
- High risk erosion areas
- Designated sand dunes
- Priority habitat areas (if any, from Michigan Natural Features Inventory)
- State/federal/county/township owned lands
- Known water well locations from District Health Department
-

- Historic and other cultural resources

**Sensitive receiver(s):** Places that are likely to be more sensitive to the exposure of the noise or vibration generated by wind energy system(s), including but not limited to schools, day-care centers, parks, residences, residential neighborhoods, churches, and elderly care facilities.

**Shadow Flicker:** The effect produced when the blades of an operating wind energy system pass between the sun and an observer, casting a readily observable, moving shadow on the observer and his/her immediate environment.

**Wetland:** Land characterized by the presence of water at a frequency and duration sufficient to support, and that under normal circumstances does support, wetland vegetation or aquatic life, and is commonly referred to as a bog, swamp, or marsh. (from Michigan Natural Resources and Environmental Protection Act 451 of 1994: Section 30301(p) of the Act, 1994 PA 451, MCL 324.30301(p).) Wetlands not protected by the Michigan Natural Resources Environmental Protection Act shall be regulated by Centerville Township and shall include isolated wetlands smaller than 5 acres that are not contiguous to the Great Lakes or Lake Leelanau, an inland lake or pond, or a river or stream.

**Wind Energy System:** A commercial wind energy ~~conversion~~ system that converts wind energy into electricity through the 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.