

Wind Energy Conversion System Ordinance

1. General Provisions

1.1 Title

These regulations shall officially be known, cited and referred to as the Wind Energy Conversion System (WECS) Ordinance of Shawano County, and hereinafter will be referred to as “The Ordinance.”

1.2 Purposes

- 1.2.1 State Regulatory History: Pursuant to Wisconsin Act 204, (enacted in 1998) state regulation and oversight (by the PSCW and DNR) of “small” electrical generating facilities less than 100 MW was virtually eliminated. As a direct result, the responsibility for review and approval of these facilities was shifted from Wisconsin state agencies to local units of government.
- 1.2.2 Local Regulatory History: Shawano County ordinances did not address wind energy conversion systems prior to this ordinance and therefore lacked the appropriate standards to ensure public health and safety.
- 1.2.3 Local Authority: Wisconsin state statutes preserve local authority regarding zoning related to wind energy conversion systems and allow for reasonable restrictions.
- 1.2.4 Visual Impact: It is in the public interest to minimize the visual impact of wind energy conversion units through careful design and siting standards, particularly in circumstances in which the community places a high value on its visual quality.
- 1.2.5 Minimize Conflict Between Incompatible Land Uses: It is in the public interest to ensure that conflict between incompatible land uses is minimized by limiting wind energy conversion system development in the vicinity of existing or planned residential or development and certain sensitive or high value environmental areas.
- 1.2.6 Public Health, Safety, and Welfare: Government officials have a duty to protect the public health, safety and welfare of its citizens and their environment and enact appropriate ordinances as they relate to the public health and safety issues associated with wind energy conversion systems. The quality and integrity of the environment are paramount to good health and impact many factors related to the safety of watersheds and water quality.
- 1.2.7 Decommissioning: Wind energy conversion systems are expected to have a useful life of 20 or more years. Decommissioning and removal of wind energy conversion systems and restoring the site at some point years into the future has proven to be very expensive, therefore it is in the public interest that the developer provide financial security to insure the removal of these facilities at some point in the future.

1.3 Ordinance: THEREFORE BE IT ORDAINED, that it is the intent of the Shawano County Board of Supervisors, in adopting this ordinance, to permit the use of proven wind energy conversion systems for energy production, and to promote safeguards ensuring the maintenance of the health and safety of the citizens of the Shawano County. Furthermore, it is the intent of the Shawano County Board of Supervisors that site-specific application of this Ordinance shall occur only in a manner that provides a harmonious balance between the suitability of a project site with existing land use and physical surroundings.

1.4 Authority: The Planning Development and Zoning Committee of Shawano County, is vested with the authority, after consultation with affected municipalities, to review and recommend approval, conditional approval, and rejection of applications for wind energy conversion systems, including preliminary and final plans.

1.5 Jurisdiction: This ordinance applies to all WECSs, as defined in table 1-1 and Section 2, proposed after June 22, 2005, to be developed within the boundaries of Shawano County. Furthermore, no WECS shall be constructed without obtaining the approval of the Shawano County Planning, Development, and Zoning Committee and duly issued permit(s). This ordinance supersedes any provisions of Shawano County Ordinance 102 that refers to windmills, or other wind driven devices.

Table 1-1

Wind driven machine on a tower or other support that produces electricity.	<ul style="list-style-type: none"> • Greater than 20 kw or • Over 125 ft. total height or • Produces power for commercial resale. 	Subject to WECSO
	<ul style="list-style-type: none"> • 20 kw or less and • Less than 125 ft. total height and • Produces power for personal use. 	<ul style="list-style-type: none"> • Requires conditional use permit • WECSO setbacks section 5.1.2 applies, but is not subject to the 500 ft. minimum setback. • Section 5.18 also applies.
Wind driven machine that does not produce electricity.	Total height of 50 ft. or less.	<ul style="list-style-type: none"> • Not subject to WECSO • Land Use Permit required
	A meteorological or wind test tower.	<ul style="list-style-type: none"> • Requires conditional use permit • WECSO sections 3.1.5, 5.1.2 and 5.18 apply.

1.6 Enactment: In order that all WECUs be constructed in accordance with the purposes and policies, these regulations are hereby adopted and made effective as of June 22, 2005. All applications submitted after this date shall be reviewed pursuant to these regulations.

1.7 Interpretation, Conflict and Separability

1.7.1 Interpretation: In interpreting these regulations and their application, the provisions of these regulations shall be held to be the requirements for the protection of public health and safety. These regulations shall be construed broadly to promote the purposes for which they are adopted.

- 1.7.2 Conflict: These regulations are not intended to interfere with, abrogate, or annul any other ordinance, rule or regulation, statute, or other provision of law except as provided in these regulations. Any other provision of these regulations that imposes restrictions different from any other ordinance, rule or regulation, statute, or other provision of law, the provision that is more restrictive or imposes higher standards shall control.
- 1.7.3 Separability: If any part, provision, or appendices of these regulations or the application of these regulations to any developer or circumstances is adjudged invalid by any court of competent jurisdiction, the judgment shall be confined in its operation to the part, provision or application directly involved in the controversy in which the judgment shall be rendered and shall not affect or impair the validity of the remainder of these regulations or the application of them to other developers or circumstances. The Shawano County Board of Supervisors hereby declares that it would have enacted the remainder of these regulations even without any such part, provision or application, which is adjudged to be invalid.
- 1.8 Amendments: For the purpose of protecting the public health and safety, the Planning Development and Zoning Committee may from time to time recommend amendments to these regulations which shall be approved, approved with modifications or disapproved by the Shawano County Board of Supervisors at a public meeting following public notice. As technology advances, some or all of these regulations may become obsolete. Therefore, periodic review and revision of these regulations will be necessary.
- 1.9 Public Purpose: Regulation of the siting of WECSs is an exercise of valid police power delegated by the state of Wisconsin. The developer has the duty to comply with reasonable conditions set forth by the Shawano County Planning, Development, and Zoning Committee and/or Board of Supervisors.

1.10 Enforcement, Violations and Penalties

- 1.10.1 Enforcement authority shall be the responsibility of the Shawano County Zoning Enforcement Officer or her/his designees. See Appendix B.
- 1.10.2 Violations. It shall be unlawful to construct, install, reconstruct, substantially repair, improve, extend, enlarge, relocate, or convert any wind energy conversion unit (WECU) in violation of the provisions of this Ordinance. It shall also be unlawful to fail to obtain wind access permits as required by this ordinance.
- 1.10.3 There shall be penalties for any person, owner/operator, landowner, firm, association, corporation or representative agent who fails to comply with the provisions of this Ordinance or orders from the Zoning Enforcement Officer. Upon written notification from the Zoning Enforcement Officer, the initial penalty may be to cease operation of the applicable WECU(s) and/or a fine of not less than \$1,000 per occurrence for the first day. This penalty shall be doubled from that of the previous day for each day of continued violation. Shawano County shall also be entitled to other relief including a temporary or permanent injunction, costs and reasonable attorney fees.
- 1.10.4 Excessive or continued violations of this ordinance may result in the revocation of the WECS CUP under Section 3.4 of this ordinance.

2. Definitions

Ampacity: The current carrying capacity of conductors or equipment expressed in Amperes.

Ampere: The basic unit measuring the quantity of electricity.

Anemometer: A device for measuring the speed and direction of the wind.

Applicant: The person, firm, corporation, company, limited liability corporation or other entity which applies for approval under this ordinance, as well as the applicant's successor(s), assign(s) and/or transferee(s) as to any approved WECS or testing facility. An applicant must have the legal authority to represent and bind the landowner or lessee who will construct, own, and operate the WECS or testing facility. The duties and obligations regarding a zoning approval for any approved WECS or testing facility shall be with the owner of the WECS or testing facility, and jointly and severally with the owner and operator or lessee of the WECS or testing facility. Also known as owner or operator.

Aerodynamic noise: A noise that is caused by the flow of air over and past the blades of a WECU.

Ambient noise: 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 noise unless they were present for at least 90% of the time.

Background noise: Sounds that would normally be present at least 90% of the time. The lull in the ambient noise environment.

Blade Glint: The intermittent reflection of the sun off the surface of the blades of a single or multiple WECUs.

Broadband noise: The “swishing” or “whooshing” sound emitted as a function of a WECU(s) operation.

Cultural Resources: The structural and cultural evidence of the history of human development. They include both prehistoric and historic archaeological resources, as well as ethnographic and ethnic resources.

CUP: Conditional Use Permit

Ethnographic resources: The material important to the heritage of a particular ethnic or cultural group. Cultural resources may be encountered as sub-surface deposits or as surface trails, sites, artifacts, or structures.

High Voltage Electrical Termination: Connecting of conductors to a device or system where the voltage exceeds 600 volts.

Inoperable: A WECU shall be determined inoperable if it has not generated power within the preceding two calendar quarters equal to at least 60% of the expected production.

Ice Throw: Accumulated frozen moisture or ice buildup on the rotor and/or blades of a WECU that is or can be thrown during normal spinning or rotation.

Impermissible Interference: the blockage of wind from a wind energy conversion unit or system for which a permit has been granted under this ordinance during a use period if such blockage is by any structure or vegetation on property, an owner of which was notified in advance by certified mail or delivered by hand of any property which the applicant proposed to be restricted by the permit. Impermissible interference does not include: 1) Blockage by a narrow protrusion, including but not limited to a pole or wire, which does not substantially block the wind from a wind energy conversion unit or system. 2) Blockage by any structure constructed, under construction or for which a building permit has been applied for before the date the last notice was mailed or delivered. 3) Blockage by any vegetation planted before the date the last notice was mailed or delivered.

Impulsive noise: Short acoustical impulses or thumping sounds, which vary in amplitude and are caused by the interaction of wind turbine blades with distributed air flow around the tower of downwind WECU's.

Livestock Facility: A confinement area designed specifically for raising, controlling, feeding, and providing care for livestock. This may include but is not limited to: dairy barns, pastures, feedlots, freestall barns, calf hutches, horse barns, veal barns, feed storage areas, brooder and laying barns, farrowing and finishing barns, veterinary care .

Low Frequency noise: An ongoing debilitation sound emitted during periods of turbulence as the blades are buffeted by changing winds that can cause structural vibration.

Measurement Point (MP): Location where sound and/or vibration measurements are taken such that no significant obstruction blocks sound and vibration from the site.

Mechanical noise: Sound produced as a byproduct of the operation of the mechanical components of a WECU(s). Also known as “tonal noise”. Tonal noises are distinct and tend to be more noticeable at the same relative loudness of other types of noises.

Meteorological Tower: used for the measurement of wind speed and direction, also known as a MET tower or wind test tower.

Nacelle: The enclosure located at the top of a WECU tower that houses the gearbox, generator and other equipment.

Noise: Any unwanted sound.

Ownership Property Line: A continuous line surrounding all contiguous adjacent parcels of property owned by a single individual, company, corporation, partnership or other legal entity.

Paleontological resources: The fossilized remains or trace evidence of prehistoric plants, animals, or very ancient humans preserved in soil or rock.

Prehistoric archaeological resources: The materials relating to prehistoric human occupation and use of an area. Historic archaeological resources usually are associated with Euro-American exploration and settlement of an area and the beginning of a written historical record.

Project Area: All of the properties within the project boundary and within a one-mile radius beyond the project boundary of a proposed or approved WECS project.

Project Boundary: A continuous line, which encompasses all WECU's and related equipment to be used in association with a WECS project.

Property Line: The recognized and mapped property parcel boundary line.

Related equipment: Transformers, tower, electrical conductors, termination points, switches, fences, substations, and any other equipment necessary to operate a WECS.

Sensitive Environmental Area: Navarino Wildlife Area, or an identified habitat for endangered species, or other designated area as identified by the county, state, or federal authorities.

Sensitive receptor: Places that are likely to be more sensitive to the exposure of the noise or vibration generated by WESC(s). This includes but is not limited to; schools, day-care centers, hospitals, parks, residences, residential neighborhoods, places of worship, and elderly care facilities.

Setback: The minimum allowable horizontal distance from a given point or line of reference, such as a thoroughfare right-of way, water line, or prospective line to the nearest vertical wall or other element of building or structure.

Setback Area: The land base that falls within a specified setback.

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

Shadow Flicker and Blade Glint Zone: The land area that falls within the setback for shadow flicker or blade glint.

Structures: Residences, livestock facilities, communications towers, commercial businesses, and all sensitive receptors.

Total Height: The distance between the ground at normal grade and the highest point of the installed WECU (being the tip of the blade when the blade is in the full vertical position).

Turbine: A wind driven machine that converts wind energy into electrical power, also known as a wind energy conversion unit.

Wetland: an area of land, which regularly persists in a wet state, or as, otherwise defined by the WDNR.

Wind Energy Conversion Unit (WECU): A wind driven machine with an output rating greater than 20 Kilowatts (kW) or with a total height of greater than 125 feet that converts wind energy into electrical power for the primary purpose of sale, resale, or off-site use. The WECU includes the tower, turbine, footings, and all equipment associated with individual units including the land area beneath encompassing the equivalent area of the circumference of the rotors.

Wind Energy Conversion System (WECS): All WECUs, related transformers, electrical conductors substations, and connection points to transmission or distribution lines.

Windmill: A wind-driven machine that does not produce electricity.

Wind test tower: The tower on which meteorological equipment is located to measure wind speed, direction, strength, etc., for the purpose of evaluating a potential for WECS siting.

3. Procedure and Application: A public hearing is required in order to obtain a conditional use permit (CUP) for each wind test tower. A CUP is required for a WECS. A public hearing is required for preliminary approval of a WECS and a second public hearing for final approval of a WECS.

3.1 Procedure:

- 3.1.1 Preliminary consultation. Applicant must meet with Shawano County Planning and Development Department staff to verify application materials and procedures.
- 3.1.2 Applicant shall submit proof of sufficient liability insurance and all other insurances necessary so as to indemnify or otherwise hold the applicable governmental authorities harmless to any and all claims.
- 3.1.3 Applicant shall notify affected local municipalities and the Shawano County Planning, Development, and Zoning Committee of intent to apply for a CUP for a WECS.
- 3.1.4 At least one public informational meeting held in consultation with any and all affected local municipalities.
- 3.1.5 A conditional use permit is required for installing a meteorological or wind test tower.
- 3.1.5.1 Conditions may include but are not limited to setbacks, height limitations, and limited term use; funds in escrow for potential damage to roads, installation and removal of the tower and legal, consulting, and committee fees.
- 3.1.6 Notice of hearing for preliminary approval of the WECS project shall be given by first class mail to owners of real property located within the project boundary and a two mile radius beyond the project boundary, as such owners are reflected on the last tax assessment roll and any update.
- 3.1.7 A public hearing shall be held on an application for a WECS CUP in accordance with the provisions of this ordinance and all of the procedural requirements and rights of appeal set forth herein shall apply. A hearing shall be held first with the affected local municipalities and then with the Shawano County Planning Development and Zoning Committee.

- 3.2 Application: Every application for a WECS and/or wind test tower shall be made in writing to the Shawano County Shawano County Planning and Development Department on forms provided by the Department and shall be accompanied by the filing fee set forth in the Shawano County Services and Ordinance Fee Schedule. The CUP application shall include the following information:

- 3.2.1 Applicant: WECS owner/operator name and address.
- 3.2.2 Property owner(s): Name and address of owners for all properties on which a WECU will be located.
- 3.2.3 Proof of Permission: Evidence that the applicant is the owner of the property involved or has the written permission of the owner(s) to make such an application.
- 3.2.4 Affected Property Owners: Name and address of property owners within WECS setback areas. Considering that development rights of adjacent property owners may be forfeited due to these setbacks as per this ordinance, a written agreement for non-development within the specified setback must be obtained and recorded on the affected properties' deeds. Copies of the agreements must be submitted with the application.
- 3.2.5 Impermissible Interference Notification: The applicant shall deliver by certified mail or by hand a notice to the owner of any property, which the applicant proposes to be restricted by the permit. The applicant shall submit to the Shawano County Planning and Development Department a copy of a signed receipt for every notice delivered in addition to the following information:
- 3.2.5.1 The name and address of the applicant, and the address of the land upon which the WECU is or will be located.
- 3.2.5.2 That the applicant has filed an application.
- 3.2.5.3 That the permit, if granted, may affect the rights of the notified owner to develop his or her property and to plant vegetation.
- 3.2.5.4 The telephone number, address, and office hours of the Shawano County Planning and Development Department.
- 3.2.5.5 That any person may request a hearing within 30 days after receipt of the notice, and the address and procedure for filing the request.
- 3.2.6 Wind Access Agreements: Evidence (a signed statement from the applicant) that the applicant has negotiated with adjacent landowners and has obtained written agreements with all landowners who could potentially interfere with the applicant's access to the wind.

- 3.2.7 Agricultural Impact Statement: Prepared by the Department of Agriculture Trade and Consumer Protection (DATCP) for the proposed WECS project area.
- 3.2.8 Avian and Bat Impact Study Plan: The applicant shall submit a plan for monitoring the avian and bat impact of the WECS to the Shawano County Planning and Development Department for its review and approval. Such plan shall document and follow accepted scientific study procedures. In addition, the applicant shall agree to submit a quarterly report to the Shawano County Planning and Development Department that identifies the number of bird and bat fatalities found within 500 feet of the WECU.
- 3.2.9 Site Plans and Reports: Plat map drawings and development plans in sufficient detail to clearly describe the following:
 - 3.2.9.1 Physical dimensions of the proposed project area, existing properties, existing structures and proposed facilities/structures.
 - 3.2.9.2 Location of meteorological or wind testing towers.
 - 3.2.9.3 Location of all wells active or abandoned within the project boundary and a one-mile radius beyond the project boundary.
 - 3.2.9.3.1 Before any construction activities commence, testing of all wells shall be completed to provide a baseline inventory of existing water quality conditions.
 - 3.2.9.3.1.1 All property owners or occupants with wells within the project boundary and a one-mile radius beyond the project boundary shall be notified at least (60) sixty days in advance of planned commencement of well testing and offered permission forms.
 - 3.2.9.3.1.2 Applicant shall receive written permission from property owners prior to sampling any wells. It shall be understood that when permission is denied, all responsibility for water quality remains with the property owner.
 - 3.2.9.3.1.3 Tests shall be performed in accordance with all applicable laboratory standards and protocols by a state-approved testing laboratory. Testing shall include, but is not limited to, levels of arsenic, nitrates, phosphorus, calcium, magnesium, iron, lead, atrazine, bacteria, total dissolved solids and documentation of flow rates.
 - 3.2.9.3.1.4 Test results shall be submitted to the Shawano County Planning and Development Department and the well owner.
 - 3.2.9.4 Location of existing and proposed electrical lines and facilities. Denote underground and overhead installation method on existing lines. (Note: all proposed electrical lines shall be located underground.)
 - 3.2.9.4.1 Easement: Applicant must submit copies of signed letters of intent to grant easements from all involved landowners and any governmental units responsible for the affected rights-of-way.
 - 3.2.9.5 Erosion Control Plan Required: The Plan shall comply with all state statutes, county and local ordinances to minimize the potential adverse impacts on wetlands and Class I and II streams and the banks and vegetation along those streams and wetlands and to minimize erosion or sedimentation. The Plan should include but is not limited to the following practices:
 - 3.2.9.5.1 Structures and access roads should use natural contours and avoid areas of steep slopes where high cuts and fills are required. If fills are required, the fill shall be compacted to at least 90% density, and finished grades shall not exceed a gradient of 2:1. Cut slope shall not exceed a gradient of 1½:1.
 - 3.2.9.5.2 The smallest practical area of land should be exposed for the shortest practical time during development. The amount of vegetation removed during construction shall be the minimum necessary to operate equipment. Areas where vegetation is removed during construction shall be replanted prior to project startup.
 - 3.2.9.5.3 Measures shall be used to prevent erosion until vegetation is re-established on areas from which it is removed, such as seeding and sodding, stockpiling and reuse of topsoil, temporary use of straw or fabric cover, aggregate cover, diversions authorized by state permit, sediment basins and filters.
 - 3.2.9.5.4 No soils shall remain un-stabilized for more than two days during the period from October 1 through April 30. From May 1 through September 30, no soils shall remain un-stabilized for more than seven days.
 - 3.2.9.6 Proposed plan for site restoration after construction.

- 3.2.9.7 Location of public and private airports and approaches.
- 3.2.9.8 All applicable setbacks from proposed WECUs.
- 3.2.9.9 Methods of electrical interconnection.
- 3.2.9.10 Plan for ingress and egress to the proposed WECU site(s) identifying the following:
 - 3.2.9.10.1 A description of the specific access route(s) to include:
 - 3.2.9.10.1.1 All State, County and/or Town-maintained roads
 - 3.2.9.10.1.2 A pre-construction inventory of road conditions paid for by applicant. Identify road surface materials stating the type and amount of surface cover, PASER ratings, and photographic or video documentation, performed by a Wisconsin certified professional engineer mutually agreed upon by applicant and municipality.
 - 3.2.9.10.1.3 Dust control procedures.
 - 3.2.9.10.1.4 A road maintenance schedule or program.
 - 3.2.9.10.1.5 New road development associated with the project.
 - 3.2.9.10.1.5.1 Any new roads shall comply with appropriate municipal construction standards.
- 3.2.10 Maps: All maps shall include the location of all proposed WECUs and related structures/facilities and access roads without obscuring map details. The Planning Development and Zoning Committee may require additional studies or maps, as it deems necessary.
 - 3.2.10.1 Wind Resource Map: A map identifying wind characteristics including prevailing wind direction and minimum, maximum, and average wind speeds.
 - 3.2.10.2 Land Use Maps: A location map to scale of current and planned land uses (based on the current land use plan and/or comprehensive plan) within the project boundary and a one-mile radius beyond the project boundary on which the WECS is to be located.
 - 3.2.10.3 Zoning Maps: A location map to scale of the existing zoning districts including all dwellings within the project boundary and a one-mile radius beyond the project boundary on which the WECS is to be located.
 - 3.2.10.4 USGS Topographic Maps: (scale of 1:24,000), original WDNR wetland maps.
 - 3.2.10.5 Plat Maps: showing land ownership.
 - 3.2.10.6 Flood Plain Maps: flood Insurance Rate Maps (FIRM) if the site is within one-half mile of a flood plain.
 - 3.2.10.7 Soil Survey Map
 - 3.2.10.8 Sensitive Environmental Resources Maps: A location map to scale identifying the sensitive environmental resources that are located in the vicinity of the proposed WECS, including but not limited to endangered or threatened fish, wildlife, or plant species or their critical habitats, and other significant habitats identified in Shawano County comprehensive plan, regional planning commission plans or studies, Natural Heritage Inventory, Wisconsin Breeding Bird Atlas and similar authoritative sources. The map shall include all sensitive environmental areas within the project boundary and a 5-mile radius beyond the project boundary.
 - 3.2.10.9 Historical, Cultural, Archeological, and Paleontological Resource Map: A map identifying sensitive historical, cultural, or archeological resources.
- 3.2.11 WECU Information and Certification: Specific information on the type, size, total installed height, rotor material, rated power output, performance history, safety history, and noise characteristics of each type of WECU, tower and electrical transmission equipment. Identify the length of service of the proposed components. The following information shall also be provided:
 - 3.2.11.1 A structural safety certificate from a professional engineer stating that the structure has been designed to operate in cold weather conditions and is safe.
 - 3.2.11.2 Certification of Structural Components: The compatibility of the foundation, tower, and generating unit (including the rotor and rotor-related equipment) shall be certified in writing by a professional engineer registered in Wisconsin. The Engineer shall certify compliance with sound engineering practices and compliance with the appropriate provisions of the Wisconsin building codes.
 - 3.2.11.3 Certification of Electrical System: The electrical system design shall be certified in writing by an electrical engineer registered in Wisconsin as a Professional Engineer. The Engineer shall certify compliance with good engineering practices and with the appropriate provisions of the National Electric Code that have been adopted by the State.

- 3.2.11.4 Certification of Rotor Over-speed Control: The rotor over-speed control system shall be certified in writing by a mechanical engineer registered in Wisconsin as a Professional Engineer. The Engineer shall certify compliance with good engineering practices.
- 3.2.11.5 Ice Throw Calculations: A report from a Wisconsin professional engineer that: a) calculates the maximum distance that ice from the turbine blades could be thrown. (The basis of the calculation and all assumptions must be disclosed.); and b) the incidence of reported ice throws and the conditions reported at the time of the ice throw.
- 3.2.11.6 Blade Throw Calculations: A report from a Wisconsin professional engineer that: a) calculates the maximum distance that pieces of the turbine blades could be thrown (the basis of the calculation and all assumptions must be disclosed) and b) the incidence of reported blade throws and the conditions at the time of the blade throw.
- 3.2.11.7 WECU Specifications: Photographs or detailed drawings of each wind turbine model including the tower and foundation. Foundation at and around the tower base shall be designed so that no surface water or runoff can access subsurface aquifer at any time during construction, operation or decommissioning.
- 3.2.12 Computer Simulation or Drawings: Detailed computer and photographic simulation(s) overlaid on existing environment showing the proposed WECS project area fully developed with all proposed wind energy conversion units and related facilities. Contact the Shawano County Planning and Development Department for approved formats.
- 3.2.13 Abandonment, Removal and Site Restoration Plan Required: The applicant shall submit a removal and site restoration plan and removal and site restoration plan cost estimate to the Shawano County PD and Z Committee for its review and approval. The restoration plan shall identify the specific properties it applies to and shall indicate removal of all materials above and below ground; road repair costs, if any; and all re-grading and re-vegetation necessary to return the subject property to the condition existing prior to establishment of the wind energy facility. The restoration shall reflect the site-specific character including topography, vegetation, drainage, and any unique environmental features and shall be completed within one year. The plan shall include a certified estimate of the total cost (by element) of implementing the removal and site restoration plan.
- 3.2.14 Abandonment Liability: Signed and notarized legal document stating the landowner will be held liable for removal of the wind turbine(s) should the owner or operators' LLC (or other corporate distinction) become liquidated or the posted bond not be sufficient to cover the costs associated with removal.
- 3.2.15 Noise Report: A noise report that shall at a minimum include the following and be prepared by an acoustic engineer:
 - 3.2.15.1 A sound and vibration assessment as identified in Appendix A.
 - 3.2.15.2 A description of the project's proposed noise control features, including specific measures proposed to protect workers, and specific measures proposed to mitigate noise impacts for sensitive receptors to a level of insignificance.
 - 3.2.15.3 A report that outlines issues and considerations for individuals that use hearing aids.
- 3.2.16 Soils Report: A geotechnical report that shall at a minimum include the following:
 - 3.2.16.1 Soils engineering and engineering geologic characteristics of the site based on on-site sampling and testing.
 - 3.2.16.2 Foundation design criteria for all proposed structures.
 - 3.2.16.3 Slope stability analysis.
 - 3.2.16.4 Grading criteria for ground preparation, cuts and fills, soil compaction.
- 3.2.17 Shadow flicker and blade glint zone map: The applicant shall provide a shadow flicker and blade glint model for any proposed wind energy conversion unit. The model shall:
 - 3.2.17.1 Model and describe the zones where shadow flicker and blade glint will likely be present within the project boundary and a one-mile radius beyond the project boundary. Include the topography, existing residences and locations of their windows, locations of other structures, wind speeds and directions, and existing vegetation and roadways. The model shall represent the most probable scenarios of wind constancy, sunshine constancy, and wind directions and speeds.
 - 3.2.17.2 Calculate the locations of shadow flicker caused by the proposed project and the expected durations of the flicker at these locations, calculate the total number of hours per year of flicker at all locations.
 - 3.2.17.3 Identify problem zones 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.

- 3.2.17.4 Name and address of property owners within shadow flicker and/or blade glint zones. Considering that development rights of adjacent property owners may be forfeited due to these zones as per this ordinance, a written agreement for non-development within the specified zone must be obtained and recorded on the affected properties' deeds. Copies of the agreements must be submitted with the application.
- 3.2.18 Fire prevention, emergency rescue and control program: A statement of the potential fire and rescue scenarios and a plan to identify, fund and provide rescue service agencies to ensure readiness and appropriate response.
- 3.2.19 Engineering schematics and specifications: Complete system-wide specifications including but not limited to: power collection and electric interconnection system, towers, generating units, controls, transformers, grounding, terminations and provisions for possible expansion.
- 3.2.20 Catastrophic Failure Report and Test Results: Data from the tower and turbine manufacturers stating the wind speed and conditions that the turbine and tower are designed to withstand (including all assumptions), the incidence of catastrophic failures and the conditions reported at the time of failure, and the effectiveness of all automatic electrical and mechanical shutdown devices.
- 3.2.21 Air Navigation Plan: A plan to minimize potential "clutter" on airport radar facilities from the proposed WECUs.
- 3.2.22 FAA Notification: A copy of written notification to the Federal Aviation Administration of intent to construct a WECS and the project proposal. Applicant must also include any responses from the Federal Aviation Administration.
- 3.2.23 Lighting Plan: A plan showing lighting on and around all WECUs and related facilities. Lighting on WECUs shall be lit to FAA minimal standards only. Lighting shall be shielded from ground view to FAA maximum standards.
- 3.2.24 Utility Interconnection: Plan for interconnection and copy of written notification to the utility.
- 3.2.25 Microwave Communications Link Operators Notification: A copy of written notification of intent to construct a WECS with project details to any microwave communications link operators that are located within the project boundary and a two-mile radius beyond the boundary of a WECS.
- 3.2.26 Flood Plain Delineation: If a WECU is located within a 100-year flood plain area, as such flood hazard areas are shown on Federal Emergency Management Agency maps, there shall be a report to identify the potential for wind erosion, water erosion, sedimentation and flooding, and to propose mitigation measures for such impacts.
- 3.2.27 Sufficient Wind Resource Study Results: Since the site shall have documented annual wind resources sufficient for the operation of the WECU (this requirement shall not apply to an anemometer tower), a study indicating these resources for a minimum of one year is required. Said study shall indicate the long-term commercial economic viability of the project. Anemometers to be placed shall be calibrated regularly to ensure a measurement of error of 1% or less. All anemometers shall be placed at the expected hub height of the wind turbine to be used. Sufficient wind resources, as described by the U.S. Department of Energy, include areas with a wind power class 4 or higher. The county shall retain the services of an independent, recognized expert to review the results of the wind resources study prior to acting on the application for a CUP.
- 3.2.28 Communications Interference Test Results: The applicant for a WECS shall pay for and perform pre-project testing of television signal strength and video taping of all channels in all residences and businesses within the project boundary and a three-mile radius beyond the project boundary. The applicant shall submit a report summarizing the findings and identifying any potential interference of television, telephone (including cellular and digital), microwave, satellite (dish), navigational, or radio reception.
- 3.2.28.1 Applicant shall receive written permission from property owners prior to communications interference testing. It shall be understood that when permission is denied, all responsibility for communications reception quality remains with the property owner.
- 3.2.29 Stray Voltage Test Results: The applicant must perform two pre-construction stray voltage tests on all livestock facilities within the project boundary and a one-mile radius beyond the project boundary. The tests shall be performed by a mutually acceptable Wisconsin certified stray voltage investigator once in the spring and once in the fall. The tests shall be performed according to PSCW Phase II Stray Voltage Testing Protocol identified in Appendix C. A copy of the test results shall be sent to each of the following: property owners and PSCW Rural Electric Power Services staff and Shawano County Planning and Development Department.

- 3.2.29.1 Applicant shall receive written permission from property owners prior to stray voltage testing. It shall be understood that when permission is denied, all responsibility for stray voltage remains with the property owner.
- 3.2.30 HAZMAT Reports: Copies of all HAZMAT reports shall be submitted.
- 3.2.31 Financial security to cover the following shall be provided by the applicant prior to preliminary project approval:
- 3.2.31.1 Legal and Consultant Fees. The applicant shall deposit in a joint escrow account with the appropriate municipal authorities a sum of \$25,000, as partial payment for the appropriate town and county planning commissions' expenses in hiring consultants and experts, as these authorities shall, at their discretion, deem desirable. At any time the balance of this fund shall fall below \$15,000, the applicant shall submit an additional \$15,000 so that the applicable municipal authority's full and actual expenses of examining and verifying the data presented shall be covered in total by the applicant. This deposit shall accompany the initial application and be considered a part thereof. If at any time the balance of this fund shall fall below \$15,000 for a period of 30 days, the application shall be considered to have been withdrawn.
- 3.2.31.2 Road repair costs for all classes of roads. The amount to be agreed upon by the applicant and the appropriate municipal authority with guidance from applicable experts to be deposited in a joint escrow account. When determining the amount of such required security, the governing authorities may also require an annual escalator or increase based on current construction costs and/or the Federal Consumer Price Index. Such financial security shall be deposited or filed with the appropriate governing authorities prior to commencement of construction. This security shall be kept in full force and effect during the entire time that a WECS is in existence. Such security shall be irrevocable or non-cancelable (except by written consent by both the governing authorities and the current owner of the WECS) for the life of the approved permit. Failure to comply will subject the applicant to all available remedies of the governing authority, including possible enforcement action and revocation of the conditional use permit.
- 3.2.31.3 Advance payment for WECS site reclamation and restoration is to be placed in joint escrow account or surety bond, the amount to be determined by the appropriate municipal governing authorities to be sufficient to have the WECS fully removed and all components properly disposed of and the land returned to its original state should such structures become abandoned, dangerous, or not in compliance with this ordinance. Such financial security shall be kept in full force and effect during the entire time while a WECS facility exists or is in place. Such financial security shall be irrevocable and non-cancelable until such time as appropriate municipalities certify that reclamation and restoration are complete and release the obligation.
- 3.2.32 Complaint Resolution Procedure: Applicant shall submit a Complaint Resolution Procedure per Appendix B.
- 3.2.33 Other Information: The applicant shall submit such additional information as may be reasonably requested by the Shawano County PD and Z Committee or their designees.
- 3.3 Use of Permit:
- 3.3.1 Project Start: Any WECS CUP that is granted shall be used not later than (2) two years from the date of issuance, or within such additional time as may be set in the conditions of approval, which shall not exceed a total of five (5) years; otherwise the permit shall be null and void. Notwithstanding the foregoing, if a permit is required to be used within less than five (5) years, the applicant may, prior to its expiration, request an extension of time to use the permit. A request for extension of time shall be made to the Shawano County PD and Z Committee with recommendation of the local municipality. Extensions of time shall be made on forms provided by the Shawano County Zoning Enforcement Officer or his or her designees and shall be accompanied by the filing fee set forth in the Shawano County Ordinance and Services Fee Schedule. Within 30 days following the filing of a request for an extension, the Shawano County Zoning Enforcement Officer or his/her designee shall review the application, make a recommendation thereon, and forward the matter on the regular agenda of PD and Z Committee. An extension of time may be granted upon a determination that valid reason(s) exist for applicant not using the permit within the required period of time. If an extension of time is granted, the total time allowed for the use of the permit shall not exceed a period of five (5) years, calculated from the effective date of the issuance of the permit.
- 3.3.2 Term of Permit: A WECS CUP shall be valid for the useful life of the equipment described in the permit. The term of the permit shall be determined at the time of approval, and shall not exceed 20 years. The Shawano County PD and Z Committee shall review the permit every 5 years to ensure compliance with this ordinance and the provisions of the CUP. The owner/operator who seeks to extend the permit of an existing WECS

beyond the original 20 years shall meet the requirements of this ordinance, as amended from time to time, as if the WECS were a new facility.

- 3.4 Revocation of Permit: Grounds for revocation of a WECS CUP shall be limited to one of the following findings as determined by the Shawano County PD and Z Committee.
- 3.4.1 The owner or operator of the facility fails to comply with the requirements of this ordinance at the time of issuance of the applicable permit.
 - 3.4.2 The owner/operator has failed to comply with the conditions of approval imposed.
 - 3.4.3 The facility has not been maintained in accordance with the standards of this ordinance.
 - 3.4.4 There have been excessive or continued violations.
- 3.5 Revocation Process:
- 3.5.1 The owner/operator of a WECS shall be notified, by certified mail with return receipt requested, of noncompliance by the Shawano County Zoning Enforcement Officer or his/her designee.
 - 3.5.2 The owner/operator shall comply within 30 days to the satisfaction of the Shawano County Zoning Enforcement Officer or his/her designee.
 - 3.5.3 If compliance is not obtained within 30 days, the Shawano County Zoning Enforcement Officer or his/her designee shall notify the Shawano County PD and Z Committee of the noncompliance and request permission to proceed with the revocation process. This time period may be extended by staff to adjust for seasonal limitations.
 - 3.5.4 The Shawano County Zoning Enforcement Officer or his/her designee shall appear at the hearing before the Shawano County PD and Z Committee to present the evidence of noncompliance. All other interested parties may also give testimony to the Committee.
 - 3.5.5 A written decision of the Shawano County PD and Z Committee will be made. In instances where compliance with this ordinance cannot be established, the matter may be forwarded to the Shawano County Corporation Counsel for appropriate legal action.
- 3.6 Appeals Procedures:
- 3.6.1 Administrative Decisions and Ordinance Interpretations
 - 3.6.1.1 Any person aggrieved or affected by any action of the Shawano County Zoning Enforcement Officer or his/her designees may take appeals to the PD and Z Committee.
 - 3.6.1.2 Appeals shall be taken within ten (10) calendar days of the date of the decision in which the party is aggrieved, by filing with the Planning and Development Department a notice of appeal specifying the grounds thereof. The Shawano County Zoning Enforcement Officer or his/her designees shall forthwith transmit to the Committee all the papers constituting the record upon which the action appealed from was taken. The PD and Z Committee is empowered to hear and decide appeals to:
 - 3.6.1.2.1 Grant or deny appeals of administrative decisions of the Shawano County Zoning Enforcement Officer or his/her designees.
 - 3.6.1.2.2 Grant or deny appeals of administrative interpretation of the ordinance by the Shawano County Zoning Enforcement Officer or his/her designees.
 - 3.6.2 Variance Procedure and Appeals of Shawano County PD and Z Committee Decisions
 - 3.6.2.1 The Shawano County Board of Adjustment shall hear variance Requests to the provisions of this ordinance and appeals of Shawano County PD and Z Committee decisions. Variance and appeal requests to the Board of Adjustment may be taken by any person requesting a variance from the standards set forth in this ordinance or who may be aggrieved or affected by any decision of the PD and Z Committee. Variance requests will be heard at the regularly scheduled meetings of the Board of Adjustment.
 - 3.6.2.2 Appeals shall be taken within ten (10) calendar days of the date of the decision in which the party is aggrieved by filing with the Planning and Development Department, a notice specifying the grounds thereof. The Shawano County Zoning Enforcement Officer or his/her designees shall forthwith transmit to the Board all the papers constituting the record upon which the action appealed from was taken. The Board of Adjustment may:
 - 3.6.2.2.1 Grant relief by variance when hardship results from strict application of the provisions of the ordinance.
 - 3.6.2.2.2 Grant or deny appeals of Shawano County PD and Z Committee decisions.
 - 3.6.3 Principles Guiding Board Decisions. The following are principles that shall guide the County Board of Adjustment:

- 3.6.3.1 The burden is upon the appellant to prove the need for a variance.
- 3.6.3.2 Pecuniary hardships, loss of profit, self-imposed hardships, such as that caused by ignorance, deed restrictions, proceeding without a permit, or illegal sales, are not sufficient reasons for granting a variance.
- 3.6.3.3 The board is bound to accept the WECS Ordinance as being correct.
- 3.6.3.4 The plight of the appellant must be unique, such as a shallow or steep parcel of land, or situation caused by other than her/his own action.
- 3.6.3.5 The hardship justifying a variance must apply to individual appellants parcel or structure and not generally to other properties in the same district.
- 3.6.3.6 The variance must not be detrimental to adjacent properties.
- 3.6.3.7 The Board of Adjustment in fulfilling its duties may modify, alter, or change any application.

4. Findings Necessary to Grant a WECS CUP: A WECS CUP shall not be granted unless the Shawano County PD and Z Committee makes the following findings based on substantial evidence:

- 4.1.1 In Accordance with the Purpose and Intent of this Ordinance: The proposed WECS is in accordance with the purpose and intent of this ordinance.
- 4.1.2 Will Not Unreasonably Interfere With the Orderly Land Use and Development Plans: The proposed WECS will not unreasonably interfere with the orderly land use and development plans of Shawano County and/or affected municipalities.
- 4.1.3 Benefits to the Public Shall Exceed Any Burdens: The benefits to the public of the proposed WECS shall exceed any burdens.
- 4.1.4 Not Detrimental to the Public Health and Safety of the Community: The proposed WECS will not be detrimental to the public health and safety of the community.
- 4.1.5 Not Otherwise Adverse to the Environment, Neighborhood or Community: The proposed WECS will not be hazardous or harmful to the environment or the neighborhood or community.
- 4.1.6 Complies With All Required Provisions of the Zoning Ordinance: The proposed WECS shall comply with all required provisions of this zoning ordinance, unless variances have been properly applied for and granted pursuant to Section 3.6.2 of this Ordinance.
- 4.1.7 No Person With Building Plans Affected: No person has demonstrated that she or he has present plans to build a structure that would create an impermissible interference by showing that she or he has applied for a building permit prior to receipt of a notice pursuant to Section 3.2.5 of this Ordinance, or has expended at least \$500 on planning or designing such a structure or by submitting any other credible evidence that she or he has made substantial progress toward planning or constructing a structure that would create an impermissible interference.

5. Development/Performance Standards All WECS and testing structures shall comply with the Development/Performance Standards set forth in this section.

5.1 Safety Setbacks

- 5.1.1 Structure Setbacks: 4 times the total height of the WECU from all sensitive receptors and livestock facilities, but in no case less than 1,000 feet.
- 5.1.2 Property Line Setbacks: 2 times the total height of the WECU from all ownership property lines, but in no case less than 500 feet.
- 5.1.3 Public Roads and Highways Setbacks: 4 times the total height of the WECU from the right-of-way line of any public road or highway, but in no case less than 1,000 feet.
- 5.1.4 Railroad Setbacks: 1.5 times the total height of the WECU from all railroad right-of-ways, but in no case less than 500 feet.
- 5.1.5 Above Ground Transmission Lines Greater than 12 kV Setbacks: 1.5 times the total height of the WECU from the edge of the easement, but in no case less than 500 feet.
- 5.1.6 Water bodies Setbacks: 4 times the total height of the WECU from the ordinary high water mark of the water body, but in no case less than 1,000 feet.
- 5.1.7 Wetland Setbacks: 4 times the total height of the WECU from the delineated boundary of the wetland, but in no case less than 1,000 feet.

- 5.1.8 Sensitive Environmental Areas Setbacks: WECUs shall be located a minimum of two miles from the Navarino Wildlife Area or other identified sensitive environmental areas.
- 5.1.9 Historical, Cultural and Archeological Resource Setbacks: Four times the total height of the WECU from all historical, cultural and archeological resources, but in no case less than 1,000 feet.
- 5.1.10 Turbine spacing: Minimum setback distances between turbines shall be 2 times the total height of each WECU
- 5.1.11 Scenic Setbacks: No WECU shall be located within one mile of any State, County, Village or Town Park or designated recreation area. For setbacks from the Navarino Wildlife area, see section 5.1.8 above.

5.2 Evidence of Development Restrictions

- 5.2.1 Affected Property Owners: Name and address of property owners within WECS setback areas, shadow flicker zones, and blade glint zones. Copies of the affected property owners' deeds with appropriate development restrictions must be submitted after preliminary approval to the Shawano County Planning and Development Department prior to final approval.
- 5.2.2 Impermissible Interference: A signed agreement with adjacent landowners who agree to restrict development on their land in such a way as to avoid decreasing wind velocity or increasing wind turbulence or otherwise create an impermissible interference at the location of the proposed WECU.

5.3 Easement: A signed agreement with all affected landowners and governing municipalities permitting right-of-way easements for all overhead and underground control and distribution systems. Landowners who have signed easement agreements related to the WECS have the following specific rights. These rights are applicable for power lines for the distribution or transmission of power from a WECS.

- 5.3.1 In constructing and maintaining high-voltage transmission lines on the property covered by the easement the owner/operator of a WECS shall:
 - 5.3.1.1 If excavation is necessary, ensure that the topsoil is stripped, piled and replaced upon completion of the operation.
 - 5.3.1.2 Restore to its original condition any slope, terrace, or waterway which is disturbed by the construction or maintenance.
 - 5.3.1.3 Insofar as is practicable and when the landowner requests, schedule any construction work in an area used for agricultural production at times when the ground is frozen in order to prevent or reduce soil compaction.
 - 5.3.1.4 Clear all debris and remove all stones and rocks resulting from construction activity upon completion of construction.
 - 5.3.1.5 Satisfactorily repair to its original condition any fence damaged as a result of construction or maintenance operations. If cutting a fence is necessary, a temporary gate shall be installed. Any such gate shall be left in place at the landowner's request.
 - 5.3.1.6 Repair any drainage tile line within the easement damaged by such construction or maintenance.
 - 5.3.1.7 Pay for any crop damage caused by such construction or maintenance.
 - 5.3.1.8 Supply and install any necessary grounding of a landowner's fences, machinery or buildings.
- 5.3.2 The landowner shall be afforded a reasonable time prior to commencement of construction to harvest any trees located within the easement boundaries, and if the landowner fails to do so, the landowner shall nevertheless retain title to all trees cut by the owner/operator of a WECS.
- 5.3.3 The landowner shall not be responsible for any injury

5.4 Safety and Security

- 5.4.1 Safety Shutdown: Each WECU shall be equipped with both manual and automatic controls to limit the rotational speed of the blade within the design limits of the rotor. All turbines shall be equipped with redundant braking systems. This includes both aerodynamic (including variable pitch) over speed controls, and mechanical brakes. Mechanical brakes shall be operated in a fail-safe mode, whereby they are engaged in the case of loss of load on the generator. Stall regulation should not be considered a sufficient braking system for over speed protection. A manual electrical and/or overspeed shutdown disconnect switches shall be provided and clearly labeled on/in the WECU structure.
- 5.4.2 Grounding: All structures associated with a WECS, which may be charged with lightning, shall be grounded.

- 5.4.3 Wiring: All electrical conductors, telecommunications, and fiber-optics cables associated with the WECS shall be underground.
- 5.4.4 Ground Clearance: The blade tip of any WECU shall, at its lowest point, have ground clearance of not less than 75 feet.
- 5.4.5 Climbability: WECU's shall not be climbable up to 15 feet above ground level.
- 5.4.6 Access Doors Locked: All access doors to WECU's and electrical equipment shall be lockable and shall remain locked at all times when operator personnel are not present.
- 5.4.7 Self-Supporting Structures: All structures shall be self-supporting. No guy wire supported structures shall be permitted with the exception of meteorological towers.
- 5.4.8 Signage: Only appropriate warning signage shall be placed on WECUs, electrical equipment, and WECS entrances. No advertising or promotional signage is permitted. See Section 5.16.
- 5.4.9 Fencing: Fencing or other appropriate measures at the periphery of the WECU site may be required to prevent unauthorized access to the WECU.
- 5.4.10 Post-construction Road Conditions and Repair: The applicant/owner/operator of the WECS shall reimburse the municipality for any and all maintenance, repairs and reconstruction to the public roads resulting directly from the construction and any subsequent maintenance of the WECS.
 - 5.4.10.1 A post-construction inventory of road conditions paid for by applicant shall be performed within 30 days of WECS completion. Identify road surface materials stating the type and amount of surface cover, PASER ratings, and photographic or video documentation, performed by a Wisconsin certified professional engineer mutually agreed upon by applicant and municipality.
 - 5.4.10.2 Applicant agrees to confine construction traffic to previously agreed upon routes.
 - 5.4.10.3 Roads shall be repaired or reconstructed to equivalent pre-construction PASER rating or better.
 - 5.4.10.4 The municipality shall determine when and who maintains, repairs or reconstructs the applicable roads.

5.5 Noise and Vibration

- 5.5.1 Noise Regulations Compliance: A WECS shall be considered in violation of the CUP unless the applicant demonstrates that the project complies with all noise level limits. Noise levels in excess of the limits established in this ordinance shall be grounds for the Zoning Enforcement Officer or his/her designee to order immediate shut down of all non-compliant WECUs.
- 5.5.2 Post construction noise and vibration measurements: Within twelve months of the date when the project is fully operational, and within two weeks of the anniversary date of the pre-construction background noise 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 WECUs running and with all WECUs off. Report post-construction measurements to the Shawano County Shawano County Planning and Development Department (available for public review) using the same format as used for the pre-construction sound and vibration studies.
- 5.5.3 Noise Setbacks: The Shawano County Planning, Development, and Zoning Committee may impose a noise setback that exceeds the other setbacks set out in this ordinance if it deems that such greater setbacks are necessary to protect the public health, safety, and welfare of the community.
- 5.5.4 Noise Standard: The noise due to WECU operations shall not be greater than 5 dBA above the established background noise level for more than five 5 minutes out of any one hour time period as measured per Appendix A.
- 5.5.5 Low Frequency Noise or Infrasonic Noise: No low frequency noise or infrasonic noise from wind turbine 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:

<u>1/3 Octave Band Center Frequency (Hz)</u>	<u>Sound Pressure Level (dB)</u>
2 to 1	70 (each band)
16 ²	68
20	68
25	67
31.5	65

40	62
50	60
63	57
80	55
100	52
125	50
250	47
500	45
1000	42
2000	40
4000	37
8000	35

- 5.5.6 Pure Tone Penalty: In the event audible noise due to wind turbine operations contains a steady pure tone, such as a whine, screech, or hum, the standards for Audible Noise shall be reduced by five (5) dB(A). A pure tone is defined to exist when: the one-third octave band sound pressure level in the band, including the tone, exceeds the arithmetic average of the sound pressure levels on the two (2) contiguous one-third octave bands by five (5) dB(A) for center frequencies of 500 Hz and above, and eight (8) dB(A) for center frequencies between 160 and 400 Hz, and by fifteen (15) dB(A) for center frequencies less than or equal to 125 Hz.
- 5.5.7 Repetitive, Impulsive Sound Penalty: In the event the audible noise due to wind turbine operations contains repetitive impulsive sounds, the standards for Audible Noise shall be reduced by five (5) dB(A).
- 5.5.8 Pure Tone and Repetitive, Impulsive Tone Penalty: In the event the audible noise due to wind turbine operations contains both a pure tone and repetitive impulsive sounds, the standards for Audible Noise shall be reduced by a total of five (5) dB(A).
- 5.5.9 Operations – Low Frequency Noise: A WECU that emits impulsive sound below 20 Hz that adversely affects the habitability or use of any existing dwelling unit, hospital, school, library, nursing home, or other sensitive noise receptor shall be deemed unsafe and must be shut down immediately.
- 5.5.10 Noise Complaint and Investigation Process: See Appendix B.

5.6 Rescue, Fire and Hazard Protection: Owner/operator shall assure that the WECS complies with the following fire control and Prevention measures and incurs associated costs.

- 5.6.1 Fireproof or fire resistant building materials and buffers or fire retardant landscaping.
- 5.6.2 Maintain firebreak areas cleared of vegetation and maintained as a fire/fuel break as long as the WECU is in operation. Firebreaks shall be 30 feet around the periphery of the proposed WECU site, 10 feet around all transformers and 30 feet around all buildings.
- 5.6.3 Fire fighting and rescue services, including programs and costs associated with equipment and training, for local fire protection and rescue personnel.
- 5.6.4 The owner/operator shall be responsible for compliance with all laws applicable to the generation, storage, clean up, transportation and disposal of hazardous wastes generated during any phase of the project’s life.

5.7 Impacts on Wildlife Species and Habitat

- 5.7.1 Development Prohibited in PSCW “Exclusion/Constraint” Zones: WECUs shall be prohibited within areas designated on the PSCW’s Wind Energy Biological Resources Map as the 5-mile “Exclusion/Constraint” zones surrounding significant sensitive environmental areas.
- 5.7.2 Endangered or Threatened Species: Development and operation of a WECS shall not have a significant adverse impact on endangered or threatened fish, wildlife, or plant species or their critical habitats, or other significant habitats identified in the Shawano County comprehensive plan and/or the studies and plans of the regional planning commissions.
- 5.7.3 Migratory Birds: Development and operation of a WECS shall not have an adverse impact on migratory bird species.
- 5.7.4 Avian Impact Reporting: The owner/operator shall submit a quarterly report to the Shawano County Shawano County Planning and Development Department that identifies all dead birds found within 500 feet of the WECU.
 - 5.7.4.1 In the event of an extraordinary avian mortality kill of threatened or endangered species, or discovery of an unexpected large number of dead birds of any variety on site, the WDNR shall also be notified

within 24 hours. The owner/operator shall, within 30 days of the occurrence, submit a report to the Shawano County Shawano County Planning and Development Department describing the cause of the occurrence and the steps taken to avoid future occurrences.

5.8 Interconnection and Electrical Distribution Facilities

- 5.8.1 All conductors associated with the distribution, control, and transmission of energy from WECUs shall be installed underground.
- 5.8.2 All underground conductors, including neutral conductors, shall be insulated for the applicable voltage and of the same ampacity.
- 5.8.3 Underground installations regardless of voltage must comply with all right-of-way requirements and clearances as identified in this ordinance.
 - 5.8.3.1 Rights of way width for distances greater than 100 feet of underground installation in unpaved areas shall be a minimum of 30 feet and a maximum of 50 feet unless otherwise specifically agreed to by the property owner.
 - 5.8.3.2 Rights of way width for distances of 100 feet or less of underground installation in unpaved areas shall be a minimum of 20 feet unless otherwise specifically agreed to by the property owner.
 - 5.8.3.3 Wherever practical, easements shall be placed immediately adjacent to the outside edge of road rights of way.
- 5.8.4 Owner/operator must submit copies of signed and recorded easements from all involved landowners and any governmental units responsible for the affected rights-of-way.

5.9 Stray Voltage

- 5.9.1 The owner/operator of the WECS shall respond within (5) five business days to any request for a stray voltage investigation by a property owner within the project boundary and a one-mile radius beyond the project boundary.
- 5.9.2 The tests shall be performed by a mutually acceptable Wisconsin certified stray voltage investigator.
- 5.9.3 The tests shall be performed according to PSCW Phase II Stray Voltage Testing Protocol identified in Appendix C.
- 5.9.4 Testing shall commence within (10) ten working days of the request. If testing cannot be initiated within (10) days, the WECU(s) in question shall be shut down until the testing can be started.
- 5.9.5 The investigation shall be provided to the property owner at no cost up to a maximum of two investigations within a 12-month period. See Appendix C.
- 5.9.6 At no time shall the operation of a WECS increase the measured cow contact voltage (Vcc) or primary neutral to remote voltage (Vpn) on a livestock facility within the project boundary and a one-mile radius beyond the project boundary, above the maximum pre-construction levels.
- 5.9.7 The owner/operator agrees to abide by all rules, procedures, standards, and reporting established by the PSCW for stray voltage and related electrical phenomena.
- 5.9.8 Owner/operator is responsible for mitigating within five working days from determination any net increase in cow contact voltages (Vcc) or primary neutral to remote voltages (Vpn) attributed to the operation of the WECS. If corrections cannot be initiated within (5) five working days, the WECU(s) in question shall be shut down until the voltages in question are mitigated.
- 5.9.9 A copy of the test results shall be sent to the property owner, PSCW Rural Electric Power Services staff, and the Planning and Development Department within (30) days of test completion.

5.10 Unsafe and Inoperable WECUs; Site Reclamation:

- 5.10.1 Inoperable: A WECU shall be deemed inoperable if it has not generated power within the preceeding two calendar quarters equal to at least 50% of the expected production, and shall be promptly dismantled and removed from the property.
- 5.10.2 Unsafe: Any WECU that is found to present an imminent physical threat of danger to life or significant threat of damage to property shall be immediately shut down and repaired or otherwise made safe and certified so by a Wisconsin professional engineer prior to resumption of operation.
 - 5.10.2.1 If a serious adverse unforeseen impact develops due to the operation of one or more WECU that has a serious detrimental effect on the affected municipality or a particular resident, the affected municipality has a right to request the Shawano County Shawano County Planning and Development Department to order the cessation of the operation of the WECU(s) in question until the situation has been corrected.

5.10.2.2 Within 24 hours of an occurrence of a tower collapse, turbine failure, fires, thrown blade or hub, collector or feeder line failure, injured WECS worker or private person, the owner/operator shall notify the Shawano County Planning and Development Department.

5.10.3 Removal and Site Restoration: The owner/operator shall remove all equipment associated with the WECUs and restore the site to its original condition at the end of the permit or when any WECU is deemed inoperable or unsafe. The restoration shall include removal of all materials above and below ground; road repair, if any; and all re-grading and re-vegetation necessary to return the subject property to the condition existing prior to establishment of the WECS. The restoration shall reflect the site-specific character including topography, vegetation, drainage, and any unique environmental features and shall be completed within one year. The owner/operator shall incur all costs associated with implementing the removal and site restoration plan.

5.10.3.1 Erosion Control: Owner/operator shall comply with all state, county, or local erosion control, soil stabilization and/or runoff requirements or ordinances as pertains to WECS removal and site restoration.

5.10.4 Public Nuisance: Every unsafe WECU and every inoperable WECU is hereby declared a public nuisance, which shall be subject to abatement by repair, rehabilitation, demolition, or removal. An inoperable WECU shall not be considered a public nuisance provided the owner can demonstrate that modernization, rebuilding or repairs are in progress or planned and will be completed within no more than six months.

5.11 Communications Interference: Any WECU shall be sited and operated so that they do not interfere with television, telephone (including cellular and digital), microwave, satellite (dish), navigational, or radio reception to neighboring areas. The applicant and/or operator of the facility shall be responsible for the full cost of any remediation necessary to provide equivalent alternate service or correct any problems; including relocation or removal of the facility, caused or exacerbated by the operation of such equipment and any and all related transmission lines, transformers, and other components related thereto. The owner/operator of the WECS shall respond within five business days to any request for a communications interference investigation by a property owner within the project boundary and a three-mile radius beyond the project boundary. Testing shall commence within ten working days of the request. Owner/operator is responsible for mitigating within ten working days from determination of interference cause attributed to the operation of the WECS.

5.12 Interference with Aviation Navigational Systems

5.12.1 No interference with Aviation Facilities: No WECS shall be installed or operated in a manner that causes interference with the operation of any aviation facility.

5.12.2 Compliance with FAA Regulations: All wind energy siting shall comply with Federal Aviation Administration ("FAA") regulations for siting structures near an airport.

5.12.3 Locking Mechanisms to Limit Radar Interference Required: All WECSs shall include a locking mechanism that prevents the blades from rotating when not producing power, in order to limit airport radar interference or "clutter." The PD and Z committee may modify or eliminate the requirement for a locking mechanism if sufficient evidence is presented that no significant airport radar interference or "clutter" will be caused by the WECS.

5.13 Certification of Insurance: Owner/operator shall maintain liability and other insurances as specified in Section 3.1.2 for the duration of the WECS project including decommissioning and reclamation. The insurance carrier shall be instructed to notify all applicable governmental authorities of any delinquency in payment of premiums. Failure to provide such insurances shall be considered abandonment and full and sufficient grounds for termination of the permit and disposal of the equipment and appurtenances as stated herein.

5.14 Monitoring

5.14.1 Right to Enter Premises for Monitoring: Upon reasonable notice, Shawano County officials or their designated representatives may enter a lot on which a WECS CUP has been granted for the purpose of monitoring noise, environmental impacts, and other impacts, which may arise. Twenty-four hours advance notice shall be deemed reasonable notice.

5.14.2 Post-construction Well Testing: All previously tested wells shall be tested again within (30) thirty days of WECS start-up. Pre-construction notification and testing procedures shall be followed (see Section 3.2.9.3). Applicant/owner/operator is responsible for all costs associated with well testing and corrective action if necessary.

5.14.2.1 Corrective Action: Adverse changes in flow rate or adverse changes in water quality that cause any of the tested wells that were previously in compliance with the applicable Wisconsin DNR drinking water

quality standards for such substances in NR 809 to come out of compliance with such standards will be considered evidence of damage caused by WECS construction and require corrective action by the applicant. If any such well owners contact the applicant after construction commences but prior to the end of one year from WECS project completion and provide applicant with evidence that the integrity of their well or water quality in their well has been damaged by applicant's construction, the applicant shall promptly investigate all such complaints. If such investigation demonstrates that the likely cause of such damage was the construction, then applicant shall correct the problem by implementing reasonable corrective measures. Applicant's obligation to take corrective action or implement reasonable corrective measures shall be deemed satisfied if applicant provides the affected well owner with a reasonable emergency water supply immediately and commences measures to implement a permanent fix of the problem with the damaged well within (30) thirty days.

- 5.14.3 Termination Testing: After installation of the WECS, the applicant/operator shall perform annual thermal imaging on all high voltage electrical terminations. Testing shall be performed according to industry standards to include a photographic/digital record. A copy of the results including documentation of any maintenance performed shall be sent to the Planning and Development Department.
- 5.14.4 Insulation Testing: After installation of the WECS, the applicant/operator shall perform an annual evaluation of high voltage electrical conductor insulation known in the electrical industry as HIPOT. All insulated high voltage conductors must be tested. Testing shall be performed according to industry standards. A copy of the results including documentation of any maintenance performed shall be sent to the Planning and Development Department.
- 5.14.5 Noise Testing: After installation of the WECS, the applicant/operator shall perform noise testing according to section two of appendix A, Sites with Existing WECUs.
- 5.14.6 Periodic Reporting: The owner/operator shall submit periodic monitoring reports to the Shawano County Planning and Development Department. The report shall contain data on the operations and environmental impacts, and shall be in the form prescribed by the Planning and Development Department.
- 5.14.7 Power Production Report: The owner/operator shall submit a quarterly power production report to the Shawano County Planning and Development Department. The power production report shall cover the proceeding calendar quarter, and shall be in the form prescribed the Shawano County Planning and Development Department and shall include actual power production in kilowatt-hours for each WECU.

5.15 Time Related Conditions

- 5.15.1 Phased Development May Be Required: A WECS CUP may require phased development in order to mitigate adverse impacts from such factors including but not limited to; the number of WECUs, the location of the wind energy conversion units and construction schedules.
 - 5.15.2 Demonstration of Performance Characteristics May Be Required: The granting of a WECS CUP may be conditioned upon the installation and operation of one or more WECU for a period not to exceed six months in order to demonstrate the performance characteristics of the WECU. If such monitoring condition is imposed, the permit shall specify the standards which must be met in order to continue development. If a standard has not met at the expiration of the required monitoring period, the applicant and the Shawano County PD and Z Committee may agree to an extension. The time within which the permit must be used shall be extended to include the period of the required monitoring.
- 5.16 Signage Limited: No advertising sign or logo shall be placed or painted on any WECU. A WECS CUP may allow the placement of no more than two advertising signs relating to the development of the project site, but no sign shall exceed 15 square feet in surface area or eight feet in height.
- 5.17 Shadow Flicker or Blade Glint: The facility shall be designed such that shadow flicker or blade glint will not fall on, or in any existing sensitive receptor. Shadow flicker or blade glint expected to fall on a roadway or a portion of a residential parcel may be acceptable under the following circumstances;
- 5.17.1 The flicker or glint will not exceed 10 hours per year; and
 - 5.17.2 The flicker or glint will fall more than 100 feet from an existing residence; or
 - 5.17.3 The traffic volumes are less than 500 vehicles per day on the roadway.
 - 5.17.4 The flicker or glint shall not fall onto an intersection.
 - 5.17.5 If shadow flicker or blade glint exceeds any of the conditions listed in Sections 5.17.1-5.17.4, the source WECU(s) shall be shut down until the flicker or glint problem is remedied.

5.18 Color, Finish, Lighting

- 5.18.1 Color and Finish: Wind energy conversion units shall be painted a non-obtrusive (e.g., light environmental color such as white, gray, or beige) color that is non-reflective.
 - 5.18.2 Camouflage Facilities: The design of WECS buildings and related structures shall, to the extent reasonably possible use materials; colors, textures, screening and landscaping that will blend the facility to the natural setting and the existing environment.
 - 5.18.3 Lighting Requirements: Shall be lit to FAA minimal standards only. Where acceptable to the FAA the Shawano County Planning, Development, and Zoning Committee will approve red lights over white lights, and steady lights over strobed or intermittent lights. Lighting shall be shielded from ground view to FAA maximum standards. Area and security lighting shall not exceed 175 watts each and 25 feet in height and shielded from neighboring sensitive receptors.
- 5.19 Conditions May Be Imposed: Shawano County may grant a WECS CUP subject to any condition that it deems necessary to minimize the possibility that the future development of nearby property will create an impermissible interference or to minimize any burden on any person affected by granting the permit. Such conditions or exemptions may include but are not limited to restrictions on the location of the WECS and requirements for the compensation of persons affected by the granting of the permit.

REFERENCES

National Wind Coordinating Committee’s Permitting of Wind Energy Facilities: A Handbook
Commercial Wind Energy Facility & Wind Access Model Ordinance
Wisconsin Model Wind Ordinance Reference Guide
Wisconsin State Statutes
Wind Ordinance: White River Township, Michigan
Wind Ordinance: Eveline Township, Michigan
Wind Ordinance: Otsego Township, Michigan
Wind Ordinance: Door County, Wisconsin
Wind Ordinance: Dodge County, Wisconsin
Wind Ordinance: Riley County, Kansas
Conditional Use Permit: Town of Lincoln, Wisconsin
Study Committee Report: Town of Lincoln, Wisconsin

Site Permit for Large Wind Energy Conversion System: Murray County, Minnesota

U.S. Department of the Interior (Fish and Wildlife Service): Guidelines for Considering Wind Turbine Siting on Easement Lands

Highland County, Virginia: What Highland Needs to Learn About Wind Energy Projects

Australia Environment Protection Authority: Environmental Noise Guidelines: Wind Farms

Public Service Commission of Wisconsin:

PSC Overview Series: Renewable Energy Resources

PSC Overview Series: Underground Electric Transmission Lines

PSC Overview Series: Right-of-Way and Easements for Electric Facility Construction

Measurement Protocols – Facts and Misconceptions

Measurement Protocol for Sound and Vibration Assessment of Proposed and Existing Electric Power Plants

Information Requirements for Electric Generation Construction Projects over 100 MW

Policies and Procedures Concerning Stray Voltage for Electric Distribution Utilities in Wisconsin

The Phase II Stray Voltage Testing Protocol