

# **Wind Energy Task Force of Lake County Communities**

## **Wind Energy Systems Model Ordinance**

---

### **1.0 INTRODUCTION**

This Model Ordinance was developed by the Wind Energy Task Force of Lake County Communities, a cooperative effort by representatives from over twenty local jurisdictions and two consulting firms. Lake County Communities include the different jurisdictions of the local municipalities and unincorporated areas of Lake County. The Wind Energy Task Force encourages each Lake County Community to evaluate the separate provisions of this Model Ordinance, with attorney review, to assure that the guidelines will suit their own particular needs, including decision to allow their Wind Energy Systems as permitted or as Conditional or Special Use uses.

Separate regulations are designated for different scales of wind energy devices: Building-Mounted, Small and Large Wind Energy Systems, in Sections 4.0, 5.0, and 6.0 respectively. Definitions are provided in Section 8.0.

### **2.0 AUTHORITY**

Lake County Communities may adopt provisions of this Model Ordinance pursuant to the powers granted and limitations imposed by the Constitution and laws of the State of Illinois, including the statutory authority granted in Chapter 55 ILCS 5/5-12020 for counties and Chapter 65 ILCS 5/11-13-26 for municipalities.

### **3.0 PURPOSE AND INTENT**

- 3.1 To establish reasonable and uniform regulations for the location, installation, operation, maintenance, and decommissioning of Building-Mounted, Small and Large Wind Energy Systems.
- 3.2 To assure that any development and production of wind-generated electricity in [the Lake County Community] is safe and to minimize any potentially adverse effects on the community.
- 3.3 To promote the supply of sustainable and renewable energy resources, in support of national, state, and local goals.
- 3.4 To facilitate energy cost savings and economic opportunities for [Lake County Community] residents and businesses.

## **4.0 REQUIREMENTS FOR BUILDING-MOUNTED WIND ENERGY SYSTEMS (BWES)**

### **4.1 BUILDING-MOUNTED WIND ENERGY SYSTEMS (BWES) BUILDING PERMIT APPLICATION REQUIREMENTS**

#### **A. Zoning Districts**

Building-Mounted Wind Energy Systems (BWES) shall be allowed as a permitted use in any zoning district, provided that all building permit requirements and general regulations are met, as defined in [the Lake County Community] building and zoning codes and in this section below.

#### **B. Project Proposal**

- 1) Name, address and phone number of Owner and Applicant.
- 2) Project summary including the manufacturer information and number of proposed turbines.
- 3) Photos of the proposed location of BWES.
- 4) A front elevation depiction of the building showing location and proposed height of the top of the turbine from the top of the building.

#### **C. Engineering**

- 1) Manufacturer's engineering specifications of the turbine, nameplate wattage capacity, dimensions of the turbine unit, mounting mechanisms, expected load and expected sound level production that must fit within the Sound Level standards below.
- 2) All BWES facilities shall be designed to withstand a minimum wind velocity of one hundred (100) miles per hour, with an impact pressure of forty (40) pounds per square foot.
- 3) Each BWES shall conform to applicable industry standards, including those of the American National Standards Institute (ANSI). Applicants shall submit certificates of design compliance that equipment manufacturers have obtained from Underwriters Laboratories (UL), National Renewable Energy Laboratories (NREL), Det Norske Veritas (DNV), Germanischer Lloyd Wind Energie (GL), or an equivalent third party.

#### **D. Braking Systems**

- 1) BWES facilities shall be equipped with automatic and manual braking systems.
- 2) The Owner shall be required to immediately cease operations as reasonably requested by [the Lake County Community].

#### **E. Insurance**

Proof of homeowner or business liability insurance, as appropriate.

**F. Electric Utility**

Approval letter from the local electric utility company, if the system is to be tied to the energy grid.

**4.2 ADDITIONAL STANDARDS (BWES)**

**A. Installation**

- 1) BWES facilities must be installed according to manufacturer specifications.
- 2) BWES devices may be structurally attached either on the roof or on the side of a building, in accordance with [the Lake County Community's] Building Code.
- 3) Electrical connections must be made by a licensed electrician.

**B. Height**

BWES facilities shall be allowed at the height of fifteen (15) feet above the highest point of the building structure, but in no case shall exceed forty-five (45) feet above the ground in a residentially zoned district.

**C. Sound Levels**

- 1) The average sound level from a BWES shall not exceed fifty-five (55) dB(A) during daytime hours or forty-five (45) dB(A) during nighttime hours at any point within neighboring, residentially zoned or used property. For neighboring industrial properties the sound level limit is sixty-five (65) dB(A) and for other neighboring nonresidential properties, the sound level limit is sixty (60) dB(A) at any time of the day.
- 2) Five (5) dB shall be added to the average sound level from a BWES as a penalty when its sound emissions have an adverse character that includes prominent tones (e.g., a humming sound) or an amplitude fluctuation in synchronicity with the blade revolution (e.g., a periodic swishing sound).
- 3) No BWES shall operate with an average sound level more than 5 dB(A) above the non-operational ambient level, as measured within any neighboring residentially zoned or used property.
- 4) To limit the level of low-frequency sound, the average C-weighted sound level during BWES operation shall not exceed the A-weighted ambient sound level by more than twenty (20) dB.
- 5) Sound level meters used for sound measurement must be a Type 2 or better grade per ANSI S1.4 and must have an integrating feature that meets ANSI S1.43. Procedures must meet the applicable portions of ANSI S12.9. Measurements must be made when ground level winds do not exceed 5 mph.
- 6) [The Lake County Community] may require, at the Owner's expense, field tests or sound propagation modeling, conducted by or supervised by an acoustics specialist certified by the Institute of Noise Control Engineering as may be necessary, to determine whether a violation of said sound

regulations is occurring or has occurred. The Owner shall be promptly remedy any such violations by or discontinue operation.

**D. Shadow Flicker**

- 1) The BWES shall be sited such that shadow flicker will not fall on any window of an existing residential dwelling of an abutting nonparticipating property for more than one hour a day.
- 2) The Applicant may commit to a schedule for turning BWES turbines off during periods when shadow flicker would affect any nonparticipating residential dwelling.
- 3) Subsequently constructed or modified residences shall not compromise the existing approval and operation of the BWES, as a legal non-conforming use, subject to the applicable regulations.

**E. Silhouette**

- 1) The diameter of the BWES shall not exceed twenty (20) percent of the width of the building's front elevation, for residential buildings and non-residential buildings abutting residentially used properties.
- 2) The diameter of the BWES shall not exceed fifty (50) percent of the width of a non-residential building, not abutting residentially used properties.

**F. Color and Sun Glint**

BWES facilities shall be finished in a neutral color, as approved by [the Lake County Community] zoning code administrator. The finish shall be flat or matte, so as to reduce incidence of sun glint. The required coloration and finish shall be maintained throughout the life of the system.

**G. Electronic Interference**

BWES facilities shall not operate so as to cause electromagnetic degradation in performance of microwave, television, radio, internet or other wireless transmissions, including public emergency communications systems, contrary to Federal Communication Commission (FCC) or other state or local laws.

**H. Signage**

No BWES shall have any advertising material, writing, picture, or signage, other than warning information or manufacturer identification.

**4.3 MAINTENANCE, COMPLAINTS AND DECOMMISSIONING**

**A. Maintenance and Complaints**

- 1) BWES facilities shall be maintained in Operational Condition at all times, except for reasonable maintenance and repair outages.
- 2) Should a BWES become inoperable, or should any part of the BWES become damaged, or should a BWES violate a permit condition, the Owner shall cease operations immediately and remedy the condition promptly.

**B. Decommissioning Plan**

- 1) Any BWES that has not been in Operable Condition within the above timeframe, [the Lake County Community] zoning compliance officer shall notify the Owner of the finding of Abandonment. The Owner shall remove all BWES structures within ninety (90) days of receipt of the finding of Abandonment.
- 2) If such abandoned facility is not removed within ninety (90) days, [the Lake County Community] may remove all structures at the Owner's expense. In the case of such removal [the Lake County Community] has the right to file a lien for reimbursement, or any and all expenses incurred by [the Lake County Community] without limitation, including attorney fees and accrued interest.
- 3) Upon removal, the site shall be restored to its original pre-construction condition. See photos presented with Project Proposal.

**4.4 HISTORIC DISTRICTS AND LANDMARKS**

BWES facilities within five hundred (500) feet of the Local Historic District or Landmark or a National Historic District or Landmark must receive a recommendation from the Historical and Architectural Sites Commission prior to submitting an application to the Plan Commission and [Lake County Community] Board/Council.

**5.0 REQUIREMENTS FOR SMALL WIND ENERGY SYSTEMS (SWES)**

**5.1 SMALL WIND ENERGY SYSTEMS (SWES) BUILDING PERMIT APPLICATION REQUIREMENTS**

**A. Zoning Districts**

- 1) One SWES shall be allowed as a permitted use in any zoning district, provided that all building permit requirements and general regulations are met, as defined in [the Lake County Community] building and zoning codes and in this section below.
- 2) Application for more than one SWES or for any SWES with a system height that exceeds the limits identified below in Section 5.2 C. in residentially zoned districts, shall require the application for a Conditional/Special Use permit.

**B. Project Proposal**

- 1) Name, address and phone number of Owner and Applicant.
- 2) Photos of existing conditions for proposed SWES tower.
- 3) Project summary including the manufacturer information, number of proposed turbines, and proposed height to the top of the turbine.

**C. Engineering**

- 1) Manufacturer's engineering specifications of the tower, turbine and foundation, detailed drawing of electrical components and installation details, and expected sound level production (see Sound Level standards below).
- 2) For turbines greater than twenty (20 kW) kilowatts of nameplate capacity, an Illinois licensed structural engineer's seal shall be required.
- 3) All SWES facilities shall be designed to withstand a minimum wind velocity of one hundred (100) miles per hour, with an impact pressure of forty (40) pounds per square foot.
- 4) Each SWES shall conform to applicable industry standards, including those of the American National Standards Institute (ANSI). Applicants shall submit certificates of design compliance that equipment manufacturers have obtained from Underwriters Laboratories (UL), National Renewable Energy Laboratories (NREL), Det Norske Veritas (DNV), Germanischer Lloyd Wind Energie (GL), or an equivalent third party.

**D. Braking Systems**

- 1) SWES facilities shall be equipped with automatic and manual braking systems.
- 2) The Owner shall be required to immediately cease operations as reasonably requested by [the Lake County Community].

**E. Soil Studies**

Turbines greater than 100 ft. total height OR greater than 5,000 lbs structural weight shall require a soil analysis at base of the tower and a stamped drawing by an Illinois licensed Structural Engineer. Structural weight shall be defined as the tower, wind turbine generator, and any other component(s) otherwise supported by the base foundation.

**F. Insurance**

Proof of homeowner, farm or business insurance, as appropriate.

**G. Electric Utility**

Approval letter from the local electric utility company, if the system is to be tied to the energy grid.

**5.2 SITE PLANNING AND SITE CAPACITY (SWES)**

**A. Site plan, drawn to scale, including**

- 1) Existing and proposed contours, at a minimum of two foot intervals.
- 2) Location, setbacks, exterior dimensions and square footage of all structures on the owner's property and abutting properties within one hundred (100) ft.

- 3) Location and size of existing waterways, wetlands, one hundred-year floodplains, sanitary sewers, storm sewer systems, and water distribution systems.
- 4) Location of any overhead or underground power lines and utility easements.
- 5) The locations and the expected duration of shadow flicker caused by the SWES facility.

**B. Setbacks**

- 1) Setbacks shall be measured from the base of the SWES tower.
- 2) SWES facilities may not be constructed within or over (including the blades) any utility, water, sewer, or other type of recorded easement.
- 3) SWES facilities may not be constructed within 50 ft. of all water bodies and wetlands and 100 ft. of High Quality Aquatic Resources.
- 4) SWES facilities shall be set back a distance equal to one hundred ten percent, or 1.1 times the system height, from base to all property lines, third party transmission lines, and communication towers.
- 5) The blade tip, at its lowest point, shall have ground clearance of not less than fifteen (15) feet.
- 6) Guy wires and anchoring systems shall not extend closer than thirty (30) feet from the property line or public right-of-way.

**C. Height**

- 1) Unless otherwise specified, the system height for SWES shall be limited to a maximum of one hundred seventy-five (175) feet. WES facilities exceeding this limit shall be considered Large Wind Energy Systems (LWES) and regulated under Section 6.0 below.
- 2) SWES facilities shall be further limited to one hundred (100) feet in height within five hundred (500) feet of a residentially zoned or used nonparticipating property. Rezoning and subsequently constructed residences shall not compromise the existing approval and operation of the SWES, as a legal non-conforming use, subject to the applicable regulations.

Applications for SWES in residentially zoned districts, exceeding the following system height limitations, shall be subject to Conditional/Special Use permit procedures:

Residential Property Size	SWES System Height
Under one acre	45 feet
One – five acres	75 feet
Over five acres	125 feet

**D. Accessory Use**

- 1) The primary purpose of the SWES shall be the production of energy for local distribution and consumption.

- 2) SWES facilities shall not be constructed for the sole purpose of energy production for wholesale or retail sale purposes. See Section 6.0 Requirements for Large Wind Energy Systems.
- 3) It is permissible to sell excess energy that is produced by a SWES to the local electric utility company.

### **5.3 ADDITIONAL STANDARDS (SWES)**

#### **A. Installation**

- 1) SWES facilities must be installed according to manufacturer specifications.
- 2) Electrical connections must be made by a licensed electrician.

#### **B. Sound Levels**

- 1) The average sound level from a SWES shall not exceed fifty-five 55 dB(A) during daytime hours or forty-five (45) dB(A) during nighttime hours at any point within neighboring, residentially zoned or used property. For neighboring industrial properties the sound level limit is sixty-five (65) dB(A) and for other neighboring nonresidential properties, the sound level limit is sixty (60) dB(A) at any time of the day.
- 2) Five (5) dB shall be added to the average sound level from a SWES as a penalty when its sound emissions have an adverse character that includes prominent tones (e.g., a humming sound) or an amplitude fluctuation in synchronicity with the blade revolution (e.g., a periodic swishing sound).
- 3) No SWES shall operate with an average sound level more than 5 dB(A) above the non-operational ambient level, as measured within any neighboring residentially zoned or used property.
- 4) To limit the level of low-frequency sound, the average C-weighted sound level during SWES operation shall not exceed the A-weighted ambient sound level by more than twenty (20) dB.
- 5) Sound level meters used for sound measurement must be a Type 2 or better grade per ANSI S1.4 and must have an integrating feature that meets ANSI S1.43. Procedures must meet the applicable portions of ANSI S12.9. Measurements must be made when ground level winds do not exceed 5 mph.
- 6) [The Lake County Community] may require, at the Owner's expense, field tests or sound propagation modeling, conducted or supervised by an acoustics specialist certified by the Institute of Noise Control Engineering as may be necessary, to determine whether a violation of said sound regulations is occurring or has occurred. The Owner shall be promptly remedy any such violations by or discontinue operation.

#### **C. Shadow Flicker**

- 1) The SWES facility shall be sited such that shadow flicker will not fall on, any existing residential building of a nonparticipating property within 500 feet of the SWES property for more than one hour a day.



- 2) The Applicant may commit to a schedule for turning SWES turbines off during periods when shadow flicker would affect any nonparticipating residential dwelling.
- 3) Subsequently constructed or modified residences shall not compromise the existing approval and operation of the SWES, as a legal non-conforming use, subject to the applicable regulations.

**D. Color and Sun Glint**

- 1) SWES facilities shall be finished in either off white, light gray, other neutral color, or a color as approved by [the Lake County Community] zoning compliance officer.
- 2) The finish shall be flat or matte, so as to reduce incidence of sun glint.
- 3) The required coloration and finish shall be maintained throughout the life of the system.

**E. Electronic Interference**

SWES facilities shall not operate so as to cause electromagnetic degradation in performance of microwave, television, radio, internet or other wireless transmissions, including public emergency communications systems, contrary to Federal Communication Commission (FCC) or other state or local laws.

**F. Signage**

- 1) No SWES shall have any advertising material, writing, picture, or signage other than warning, turbine tower identification, or manufacturer or ownership information.
- 2) This prohibition shall include the attachment of any flag, decorative sign, streamers, pennants, ribbons, spinners or waiving, fluttering or revolving devices, but not including meteorological/weather devices.
- 3) One warning sign, no less than eighteen square inches and no greater than two square feet in area, shall be posted at the base of the tower. The sign shall include a notice of no trespassing, a warning of high voltage, and 911 and the phone number of the Owner to call in case of emergency.
- 4) Manufacturer's identification or ownership information signs shall be no larger than one square foot.

**G. Climb Prevention**

The base of the tower shall not be climbable for a vertical distance of fifteen (15) feet from the base, unless enclosed with an eight (8) feet tall locked fence.

**H. Lighting**

- 1) SWES facilities shall comply with all applicable Federal Aviation Administration (FAA) and any other Federal, State or local requirements.
- 2) SWES facilities shall not be artificially lighted unless required by the FAA or appropriate authority.

- 3) Any required lighting shall be shielded so that no glare extends substantially beyond the boundaries of the facility.

#### **5.4 MAINTENANCE, COMPLAINTS AND DECOMMISSIONING (SWES)**

##### **A. Maintenance and Complaints**

- 1) SWES facilities shall be maintained in Operational Condition at all times, except for reasonable maintenance and repair outages.
- 2) Should a SWES become inoperable, or should any part of the SWES become damaged, or should a SWES violate a permit condition, the Owner shall cease operations immediately and remedy the condition promptly.

##### **B. Decommissioning Plan**

- 1) Any SWES that has not been in Operable Condition within the above timeframe, [the Lake County Community] zoning compliance officer shall notify the Owner of the finding of Abandonment. The Owner shall remove all SWES structures within ninety (90) days of receipt of notice.
- 2) If such abandoned facility is not removed within ninety (90) days, [the Lake County Community] may remove all structures at the Owner's expense. In the case of such removal [the Lake County Community] has the right to file a lien for reimbursement, for any and all expenses incurred by the [Lake County Community] without limitation, including attorney fees and accrued interest.
- 3) Upon removal, the site shall be restored to its original pre-construction condition. See photos presented with Project Proposal.

#### **5.5 HISTORIC DISTRICTS AND LANDMARKS**

SWES facilities within five hundred (500) feet of the Local Historic District or Landmark or a National Historic District or Landmark must receive a recommendation from the Historical and Architectural Sites Commission prior to submitting an application to the Plan Commission and [Lake County Community] Board/Council.

### **6.0 REQUIREMENTS FOR LARGE WIND ENERGY SYSTEMS (LWES)**

#### **6.1 CONDITIONAL/SPECIAL USE PERMIT APPLICATION REQUIREMENTS FOR LARGE WIND ENERGY SYSTEMS (LWES)**

##### **A. Zoning Districts**

LWES shall be a Conditional/Special Use in all zoning districts as listed in [the Lake County Community] zoning ordinance.

**B. Project Proposal**

- 1) Name, company, address and phone number of Owner and Applicant
- 2) Photos of existing conditions for proposed LWES towers.
- 3) Project summary including the nameplate generating capacity, number of proposed turbines and the LWES equipment manufacturer.
- 4) Evidence from a wind study that site is feasible location for LWES facilities.

**C. Notice and Public Hearings**

- 1) Public notice shall be given pursuant to procedures specified in Chapter 55 ILCS 5/5-12001 or Chapter 65 ILCS 5/11-13-26, of the Illinois Compiled Statutes, [the Lake County Community] Zoning Ordinance, and the Community Zoning Board of Appeals Rules of Procedure.
- 2) Public hearings shall be conducted pursuant to procedures specified in Chapter 55 ILCS 5/5-12001 and 12020 or Chapter 56 ILCS 5/11-13-26, of the Illinois Compiled Statutes, [the Lake County Community] Zoning Ordinance, and the Zoning Board of Appeals Rules of Procedure.
- 3) There shall be at least one public hearing held not more than thirty (30) days prior to a siting decision by [the Lake County Community] board or council.

**D. Conformance with Approved Application and Plans**

- 1) The Owner shall construct the LWES project in substantial accordance with submitted Conditional/Special Use Permit application and all accompanying documents.
- 2) The Owner shall be bound by any and all proposals and representations made under oath at the public hearing before [the Lake County Community] Zoning Board of Appeals, which shall be considered supplementary conditions of the Conditional/Special Use Permit granted by [the Lake County Community] board, even if not directly specified in the Conditional/Special Use Permit.
- 3) Following the granting of a Conditional/Special Use Permit, a Professional Structural Engineer shall certify, as part of the final approval, that the foundation and tower design of the LWES is within accepted professional standards, given local soil and climate conditions.

**6.2 SITE PLANNING AND SITE CAPACITY REQUIREMENTS (LWES)**

**A. A site map or survey, drawn to scale by a Professional Engineer, showing:**

- 1) Existing and proposed contours, at a minimum of 2 foot intervals.
- 2) Location, setbacks, exterior dimensions and square footage of all structures on the Owner's property.
- 3) Location of each of the LWES turbines and the corresponding identification numbers.
- 4) Location of existing and planned Met Towers.
- 5) Location of proposed access roads.

- 6) Location and size of existing waterways, wetlands, floodplains, sanitary sewers, storm sewerage systems, and water distribution systems.
- 7) Location of any overhead power lines.

**B. Lot size:**

- 1) The minimum lot size for a LWES shall be five (5) acres.
- 2) The maximum number of LWES facilities that may be installed on a lot shall be determined by setback, sound limitations, and other requirements of this ordinance, as determined by the [Lake County Community] zoning officer and the Zoning Board of Appeals.

**C. Height**

- 1) The maximum permitted system height of a LWES shall be no more than four hundred (400) feet, as measured from the base to the highest point, including the top of the extended blade.
- 2) The system height of each LWES turbine shall be further limited to one hundred (100) feet if located within five hundred (500) feet of a nonparticipating residentially zoned or used property. Rezoning and subsequently constructed residences shall not compromise the existing approval and operation of the LWES, as a legal non-conforming use, subject to the applicable regulations.

**D. Clearance**

- 1) The minimum distance from the lowest point of the arc of the LWES blades to the ground shall be fifty (50) feet.
- 2) The minimum distance from the lowest point of the arc of the LWES blades to the top of any structure shall be twenty (20) feet, within fifty (50) feet of the base.

**E. Setbacks**

- 1) Setbacks for LWES shall be measured from the base of the LWES tower.
- 2) LWES shall be set back a minimum distance equal to one hundred fifty (150) percent of the system height, or 1.5 times the system height, to all property lines, third party transmission lines, and communication towers.
- 3) LWES facilities (including horizontally extended blades) may not be constructed within or over any utility, sewer, or other type of recorded easement.
- 4) LWES facilities may not be constructed within fifty (50) ft. of all water bodies and wetlands and within one hundred (100) ft. of High Quality Aquatic Resources.
- 5) LWES facilities shall be set back a minimum distance equal to one hundred ten (110) percent of the system height from any other LWES.

**F. Stormwater and Drainage**

- 1) The Applicant/Owner shall design and install all necessary stormwater facilities as required by the Lake County Watershed Development Ordinance and all other regulations pertaining to stormwater management.
- 2) The Owner shall repair any and all field tiles or other drainage and stormwater structures damaged by the construction or installation of the LWES at their own expense.
- 3) The Owner shall maintain any and all drainage and stormwater systems on the subject property and keep them in good working order.

**G. Wind Study and Met Towers**

- 1) [The Lake County Community] may allow the construction and/or installation of a Met Tower for the sole purpose of collecting wind generation data.
- 2) The Applicant shall provide summary documentation of research and study that clearly demonstrates that the site has sufficient wind resources to be economically beneficial.
- 3) Met Towers shall be limited to no more than one per square quarter mile.
- 4) Met Towers must be dismantled within 3 years of their installation.
- 5) The removal of the Met Towers shall coincide with the Decommissioning Plan.

**6.3 ADDITIONAL APPLICATION REQUIREMENTS (LWES)**

**A. Engineering**

- 1) Detailed drawing of electrical components and installation details, as supplied by the manufacturer, which conform to the National Electrical Code.
- 2) A Structural Engineer's seal and manufacturer's engineering specifications of the tower, turbine and foundation.
- 3) All LWES facilities shall be designed to withstand a minimum wind velocity of one hundred (100) miles per hour, with an impact pressure of forty (40) pounds per square foot.
- 4) Each LWES shall conform to applicable industry standards, including those of the American National Standards Institute (ANSI). Applicants shall submit certificates of design compliance that equipment manufacturers have obtained from Underwriters Laboratories (UL), National Renewable Energy Laboratories (NREL), Det Norske Veritas (DNV), Germanischer Lloyd Wind Energie (GL), or an equivalent third party.
- 5) All electrical wires and liens connecting each LWES to other LWES facilities shall be installed underground.

**B. Coordination with Local Fire Department**

- 1) LWES operators shall provide emergency services access to the facility twenty four (24) hours a day, and all drives and access points shall remain unobstructed at all times.
- 2) The Applicant shall submit a copy of the site plan to the local fire protection district.
- 3) Upon request by the local fire department, the Owner shall cooperate with the local fire department to develop the fire department's emergency response plan.
- 4) Nothing in this section shall alleviate the need to comply with all other applicable fire, life safety and/or emergency response laws and regulations.

**C. Insurance**

- 1) The Applicant shall provide proof of a current general liability policy covering bodily injury and property damage with limits of at least \$1 million per occurrence and \$1 million in the aggregate at the time of the Conditional/Special Use permit application and at the annual renewal.
- 2) The amount of coverage may be changed upon consultation with the State's Attorney's Office or other attorney representing [the Lake County Community].

**D. Electric Utility**

Approval letter from the local electric utility company must be provided with permit application.

**E. Signage**

- 1) No LWES shall have any advertising material, writing, picture, or signage other than warning, turbine tower identification, or manufacturer or ownership information.
- 2) This prohibition shall include the attachment of any flag, decorative sign, streamers, pennants, ribbons, spinners or waiving, fluttering or revolving devices, but not including meteorological/weather devices.
- 3) Warning signs, no less than four square feet and no greater than six square feet in area, shall be posted at the base of each tower and at access points to the property. The sign shall include a notice of no trespassing, warnings of high voltage and the potential of falling ice, and the phone number of the Owner to call in case of emergency.
- 4) Each LWES tower shall be marked with a visible identification number to assist with emergency services.

**F. Complaint Hotline**

- 1) The Applicant shall establish a telephone number hotline for the general public to call with any complaints or questions.

- 2) The hotline number shall be publicized to the satisfaction of [the Lake County Community] zoning compliance officer, to insure that the general public is aware of it.
- 3) The hotline number shall also be posted at the operations and maintenance center and the construction marshalling yard.
- 4) The Owner shall man the hotline during usual business hours, and shall have an answering recording service during other hours.

**G. Decommissioning Plan**

- 1) The Applicant shall develop the Decommissioning Plan for the eventual removal of LWES structures and Met Towers at the time of application.
- 2) Describe the triggering events for Decommissioning the LWES Project.
- 3) Identify provisions for the removal of structures, debris and cabling, including those below the soil surface.
- 4) Identify provisions for the restoration of the soil and vegetation to pre-construction conditions, referencing photos submitted at Project Proposal.
- 5) Provide an estimate of the decommissioning costs, certified by a Professional Engineer.
- 6) Provide Financial Assurance, secured by the Owner, for the purpose of adequately performing decommissioning, in an amount equal to the Professional Engineer's certified estimate of the decommissioning costs.
- 7) Identify procedures for [Lake County Community] access to Financial Assurances.
- 8) Verify that the terms of the Decommissioning Plan shall be binding upon the Owner and any of their successors, assigns, or heirs.
- 9) Verify that [Lake County Community] shall have access to the site, pursuant to reasonable notice, to affect or complete decommissioning of the LWES.
- 10) Verify that procedures under Section 6.6 Road, Access and the Transportation System will assure that impact on roads is addressed during the decommissioning process.

**6.4 ADDITIONAL STUDIES FOR APPLICATION (LWES)**

**A. Soil Studies**

- 1) Provide manufacture's specifications for the tower construction, indicating that the LWES is designed to withstand the soil conditions.
- 2) A full soil boring/sampling analysis to a depth equal/greater than the actual LWES foundation depth is required at each turbine location.
- 3) LWES towers shall be embedded in an approved concrete foundation, stamped by a licensed Illinois Structural Engineer.

**B. Sound Levels**

- 1) The Applicant shall provide an environmental sound impact study that gives:

- a) Certified manufacturer's specifications of the sound emissions from similar turbines that specifically state the overall sound level as well as the 1/3-octave band levels measured in accordance with IEC 61400-11.
  - b) The expected maximum 1-minute averaged A- and C-weighted sound level at the nearest surrounding, nonparticipating, residentially zoned or used properties with all turbines operating.
  - c) The daytime and nighttime quiescent ambient sound levels at representative, non-participating residential properties adjacent to the proposed development as measured by an environmental acoustics expert (board certified by the Institute of Noise Control Engineering).
- 2) The average sound level from operating LWES facilities shall not exceed fifty-five (55) dB(A) during daytime hours or forty-five (45) dB(A) during nighttime hours at any point within neighboring, residentially zoned or used property. For neighboring industrial properties the sound level limit is sixty-five (65) dB(A) and for other neighboring nonresidential properties, the sound level limit is sixty (60) dB(A) at any time of the day.
  - 3) Five (5) dB shall be added to the average recorded sound level from a LWES as a penalty when its sound emissions have an adverse character that includes prominent tones (e.g., a humming sound) or an amplitude fluctuation in synchronicity with the blade revolution (e.g., a periodic swishing sound).
  - 4) No LWES shall operate with an average sound level more than 5 dB(A) above the non-operational ambient level, as measured within any residentially zoned or used property and no more than 10 dB(A) on a neighboring non-residential property.
  - 5) To limit the amount of audible low-frequency sound, the average C-weighted sound level during LWES operation shall not exceed the A-weighted ambient sound level by more than twenty (20) dB at any receiving, non-participating residential property use.
  - 6) Sound Measurement Requirements: Sound level meters used for measurement must be a Type 2 or better grade per ANSI S1.4 and must have an integrating feature that meets ANSI S1.43. Procedures must meet the applicable portions of ANSI S12.9. Measurements must be made when ground level winds do not exceed 5 mph.
  - 7) [The Lake County Community] may require, at the Owner's expense, field tests or sound propagation modeling, conducted or supervised by an acoustics specialist certified by the Institute of Noise Control Engineering as may be necessary, to determine whether a violation of said sound regulations is occurring or has occurred. The Owner shall be promptly remedy any such violations by or discontinue operation.

**C. Shadow Flicker Study**

- 1) Using available software, the Applicant shall show calculated locations of shadow flicker caused by the LWES facility and the expected duration in



total number of hours per year of the flicker on nonparticipating residentially zoned or used properties within one half mile.

- 2) The LWES shall not produce shadow flicker on any dwelling, or fall within fifty (50) feet of a dwelling for more than fifty (50) hours a year, on a property that is residentially zoned or used at the time of approval.
- 3) The Applicant may commit to a schedule for turning LWES turbines off during periods when shadow flicker would affect any nonparticipating residential dwelling.
- 4) Subsequent rezoning shall not compromise the existing approval and operation of the LWES, as a legal non-conforming use, subject to the applicable regulations.

**D. Wildlife**

- 1) A thorough wildlife study must be provided with the application, as carried out by a qualified professional. Lake County is located within an avian migratory flyway and has a significant number of threatened and endangered species.
- 2) In cases where the wildlife study indicates that it is likely that a protected natural resource may adversely affected by the proposed LWES, [the Lake County Community] shall consult with the IDNR in accordance with Title 17 Illinois Administrative Code Part 1075.

**6.5 ADDITIONAL STANDARDS FOR APPLICATION AND OPERATION (LWES)**

**A. Electronic Interference**

- 1) LWES facilities shall not cause electromagnetic degradation in performance of microwave, television, radio, internet or other wireless transmissions, including public emergency communications systems.
- 2) The determination of degradation of performance and of quality and proper design shall be made in accordance with good engineering practices as defined in the latest principles and standards of the American Institute of Electrical Engineers, the Institute of Radio Engineers and Electrical Industries Association. In case of any conflict between the latest standards and principles of these groups, the precedence in the interpretation of the standards and principles shall be in their order of listing (with the first listed group granted highest priority).
- 3) All LWES shall utilize nonmetallic rotor blades unless the Applicant can supply documentation from an appropriate testing laboratory certifying that any metallic blade rotor proposed to be used will not cause electromagnetic interference.

**B. Color and Sun Glint**

- 1) LWES turbines, towers and blades, except as may be required by the FAA or other authority, shall be finished in off-white, light gray, or other neutral color, as approved in the Conditional Use Permit.

- 2) The finish shall be flat or matte, so as to reduce incidence of sun glint.
- 3) The required coloration and finish shall be maintained throughout the life of the system and may be changed, with approval from [Lake County Community] zoning administration officer.

**C. Lighting**

- 1) LWES shall not be artificially lighted, except as required by the Federal Aviation Administration (FAA) or appropriate authority and lighting necessary for workers involved in maintenance or repairs.
- 2) A lighting plan, including photometrics to establish compliance with regulations prohibiting glare and light spillage, must be approved as part of the Conditional/Special Use Permit.
- 3) Any required lighting shall be shielded so that no glare extends substantially beyond the boundaries of the facility.
- 4) Security lighting and any emergency lighting must be approved as part of the CUP

**D. Climb Prevention**

- 1) The base of the tower shall not be climbable for a vertical distance of fifteen (15) feet from the base.
- 2) The Owner shall lock all access doors to turbine towers and electrical components, to prevent unauthorized access.

**E. Braking Systems**

- 1) The Owner shall be required to immediately cease operations for the duration of any emergency, as determined by [the Lake County Community]. Emergency shall mean a proven condition or situation caused by the facility or natural / manmade disasters that presents an imminent physical threat of danger to life or significant threat to property.
- 2) All LWES facilities shall be equipped with a redundant braking system. This includes both aerodynamic over-speed controls (including variable pitch, tip, and other similar systems) and mechanical brakes. Mechanical brakes shall be operated in a fail-safe mode. Stall regulation shall not be considered a sufficient braking system for over-speed protection.

**6.6 ROADS, ACCESS AND THE TRANSPORTATION SYSTEM (LWES)**

The Applicant, as a condition of use of any public road(s), for the purpose of transporting LWES or Substation parts and/or equipment for construction, operation, or maintenance of the LWES facilities or Substation(s), shall comply with the following, as required by the appropriate highway authority, be it the Illinois Department of Transportation, Lake County Division of Transportation, township or municipality.

**A. Preliminary Submittals**

- 1) A map showing a proposed traffic control plan to be used for the duration of the project. Included with the map shall be sufficient information about the signs to be installed and maintained throughout the project.
- 2) All designated routes shall be documented for their current condition using a video camera. Video recording will be done by the Applicant to the satisfaction of the appropriate highway authority, which shall be given a copy of said video. To determine the condition of the roads following the completion of the project, and to determine if damage beyond the normal rate of deterioration has occurred to the designated routes, the designated routes will be inspected by the appropriate highway authority at project completion.
- 3) Based upon the review of the proposed routes and the susceptibility of the designated routes to damage, a corporate surety bond or irrevocable letter of credit to insure the repairs to the damaged portions of the roads will be repaired and to insure the post project road improvements are made to the satisfaction of the appropriate highway authority. The amount of the surety bond or irrevocable letter of credit for this project shall be determined by the appropriate highway authority, based on the potential amount of damage and/or repair of the highway.
- 4) Upon selection of a contractor and prior to beginning construction, the Applicant and his/her contractor shall coordinate non-oversized material delivery routes with the appropriate highway authorities.
- 5) The Applicant shall provide plans to each appropriate road authority for any improvement that need to be made to the road network to accommodate the LWES project. These plans must be approved by the road authority(ies) prior to the commencement of construction. The Applicant shall be responsible for the construction and/or maintenance of said improvements for the duration of the project. Upon completion of the project all said road improvements shall become the property of the road authority.

#### **B. Highway/Road Permits**

- 1) Oversized Load Permits. The Applicant shall obtain all necessary oversized load permits from the appropriate road authority prior to the use of the road network by such loads.
- 2) Utility Permits. The Applicant shall obtain all necessary utility permits from the appropriate authorities. All utility installations for the LWES Project shall be accurately shown on a construction drawing prior to construction. This drawing will be submitted to each appropriate highway authority for review and acceptance prior to installation of the utility. The appropriate highway authority shall be notified at least 2 business days prior to beginning any work within the right-of-way for each installation location. No open cuts of roadway surfaces will be allowed. The Applicant or its contractor(s) shall be responsible for all traffic control devices related to any road closures, following approval by the appropriate highway authority.

- 3) Driveway Access Permits. All new entrances proposed for the LWES sites will also require the issuance of a Driveway Access Permit which will be issued by LCDOT or appropriate road authority. Again, although not all permits have to be obtained before any construction begins, individual permits must be obtained before beginning the construction of those individual access locations.

**C. General Transportation Requirements**

- 1) While the project is under construction, the maintenance of the roads and all construction traffic control devices shall be the responsibility of the Applicant. The Applicant shall provide the name and phone number of a contact person who shall be responsible for responding immediately to any maintenance needs of either the road or the traffic control devices. The Applicant is responsible for having sufficient and appropriate equipment available at all times to be used for maintenance activities. While it is not necessary that the equipment be on site, it must be available within a 2 hour period.
- 2) The Applicant and contractors shall abide by all posted weight limits unless permission is granted. All over weight loads shall obtain permission and/or permits from the appropriate road authorities prior to use of the road network.
- 3) Construction will not be allowed to begin until all traffic control devices have been installed in accordance with the approved plan.
- 4) The Applicant will be responsible for completing the permit process.

**D. Maintenance**

- 1) The Applicant shall be responsible for the maintenance of roads, including asphalt patching and shoulder maintenance during construction.
- 2) Should the Applicant not respond to a required maintenance request within 2 hours, the appropriate highway authority is permitted to perform the maintenance and the Applicant will reimburse the highway authority for 100% of their cost of performing such maintenance. Should the Applicant not make reimbursement to the highway authority, upon receipt of a written reimbursement request, for the cost of said maintenance within 30 days, no further permits will be granted until such reimbursement is received by the highway authority.

**E. Project Completion**

- 1) As soon as the construction activity has been completed on the entire project, the Applicant shall contact the appropriate highway authority(ies) to notify that the road(s) will no longer be needed for any material hauling or delivery of equipment. The highway authority(ies) will then proceed to evaluate the condition of the road as soon as possible following the notification. The highway authority(ies) will then notify the Applicant of any sections of the road or right-of-way that have been damaged and that need to be repaired.

- 2) With every effort being made to keep construction traffic on designated routes, it is acknowledged that with the volume of construction traffic involved, sporadically construction traffic may have used non-designated routes. With this in mind, the Applicant shall be responsible for repairs to any roads used in such a manner. The appropriate road authority shall determine which roads are affected and which repairs are needed.

## **6.7 REPORTING (LWES)**

### **A. Complaint Log**

- 1) The Owner shall log each complaint or call made to the hotline, identifying the name, address and reason for the call.
- 2) The Owner shall notify [the Lake County Community] of any complaints.

### **B. Quarterly Reports**

- 1) The Owner shall keep a Quarterly Report, at the Owner's expense and in coordination with [the Lake County Community].
- 2) The Quarterly Report shall summarize the operation and maintenance of the LWES.

### **C. Periodic Review**

- 1) Complaint Logs and Quarterly Reports shall be provided to [the Lake County Community], as part of the periodic review of the Conditional/Special Use Permit.
- 2) Complaint Logs and Quarterly Reports must be made available, as reasonably requested by [the Lake County Community].

## **6.8 MAINTENANCE, DEFAULTS AND PERMIT SUSPENSION (LWES)**

### **A. Maintenance and Investigation**

- 1) The Owner of the LWES Project shall maintain and promptly repair the LWES and its components, consistent with sound utility practice, as necessary to keep the LWES project in good repair and operating condition.
- 2) The Owner shall promptly investigate any complaints of potential permit violations, within ten (10) days.
- 3) The results of the investigation shall be provided to [the Lake County Community] and the person making the complaint, within thirty (30) days of the complaint.

### **B. Remedies and Defaults**

- 1) Should an LWES become inoperable, or should any part of the LWES become damaged, or should an LWES violate a permit condition, the Owner shall cease operations immediately and remedy the condition promptly.

- 2) The Owner must remedy the condition within sixty (60) days upon written notice from [the Lake County Community] or be considered to be in default and the LWES considered to be abandoned.
- 3) A thirty (30) day extension may be authorized by [the Lake County Community] zoning compliance officer.

**C. Suspension and Decommissioning**

- 1) If [the Lake County Community] determines that the Owner cannot resolve the alleged default(s) within the good faith negotiation period identified above, [the Lake County Community] shall suspend the Conditional/Special Use Permit and the Decommissioning Plan shall be put into effect.
- 2) If the abandoned facility is not removed within six (6) months of written notice, [the Lake County Community] may remove all structures at the owner's expense. In the case of such removal [the Lake County Community] has the right to file a lien for reimbursement, for any and all expenses incurred by the [Lake County Community] without limitation, including attorney fees and accrued interest.

**6.9 HISTORIC DISTRICTS AND LANDMARKS**

LWES facilities within one mile of the Local Historic District or Landmark or a National Historic District or Landmark must receive a recommendation from the Historical and Architectural Sites Commission prior to submitting an application to the Plan Commission and [Lake County Community] Board/ Council.

**7.0 INDEMNIFICATION**

The Owner of the BWES, SWES, or LWES project shall defend, indemnify and hold harmless [the Lake County Community] and their officials from and against any and all claims, demands, losses, suits, causes of action, damages, injuries, costs, expenses and liabilities whatsoever including attorney's fees arising out of the acts or omissions of the Owner concerning the operation of the WES project without limitation, whether said liability is premised on contract or on tort.

## 8.0 DEFINITIONS

**Abandonment:** Any Wind Energy System (WES) that has not been repaired to operating condition within the reasonable timeframe identified by [the Lake County Community], as provided in this ordinance.

**Ambient Sound:** The all-encompassing sound at a given location, usually a composite of sounds from many sources near and far. For the purpose of this ordinance, the “ambient sound level” shall mean the quiescent background level, that is, the quietest of ten 10-second average sound levels measured when there are no nearby or distinctly audible sound sources (e.g., dogs, cars in line-of-sight, or jets). Daytime ambient measurements should be made during mid-morning, weekday hours while nighttime measurements should be made after midnight.

**Applicant:** The Owner, who is in the process of submitting or has submitted an application to install a Wind Energy System project in [the Lake County Community].

**Building-Mounted Wind Energy Systems (BWES):** Wind Energy Systems that are structurally attached either onto the roof of or to the side of a building.

**Daytime hours:** The hours of the day from 7:00 am to 10:00 pm, local time.

**Decibel (dB):** The unit of sound level based on a reference where 0 dB represents the threshold of hearing at 1000 Hz for a healthy young adult.

**Decommissioning:** Once a WES has been deemed inoperable or abandoned its components must be disassembled and removed from the premises, including the foundation. Upon removal, the site shall be restored to its original pre-construction condition.

**FAA:** The Federal Aviation Administration of the United States Department of Transportation.

**FCC:** The Federal Communications Commission.

**Financial Assurance:** A reasonable assurance from a credit worthy party, examples of which include a surety bond, trust instrument, cash escrow, or irrevocable letter of credit.

**Grid-Intertie WES System:** A system that converts wind energy to electrical energy that is connected to an electric circuit served by an electric utility company.

**High Quality Aquatic Resource:** Waters of the United States or Isolated Waters of Lake County that are determined to be critical due to their uniqueness, scarcity, function and/or value.

**Horizontal Axis Wind Turbine (HAWT):** This is the most typical type of turbine used. They have the main rotor shaft and generator at the top of the tower, and must be pointed into the wind. Small turbines are pointed by a simple wind vane, while large turbines generally use a wind sensor coupled with a servo motor. Most have a gearbox, which turns the slow rotation of the blades into a quicker rotation that is more suitable to drive an electrical generator.

**IDNR:** The Illinois State Department of Natural Resources.

**Large Wind Energy Systems (LWES):** Wind Energy Systems with turbine towers and fully extended blades measuring taller than 175 ft. from the ground. LWES include one or more wind turbines, electronic conversion and distribution systems. They typically produce energy to be sold commercially and have a nameplate capacity of 750 kW to 2.5 MW.

**Met Tower:** A meteorological tower with an anemometer, used for the measurement of wind speed.

**Nacelle:** The part containing the shaft, gear box, and generator in a typical horizontal axis turbine.

**Nameplate Wattage:** The amount of energy produced from a Wind Energy System at maximum or optimum wind speeds within one hour, as indicated by the manufacturer.

**Neighboring Property:** Any property within 500 feet of a BWES or SWES, or within 1 mile of a LWES.

**Nighttime hours:** The time of the day after 10:00 pm until 7:00 am, local time.

**Noise:** Sound that adversely affects the psychological or physiological well-being of people.

**Nonparticipating Property:** A property that is not owned by the Owner of the property on which the WES is proposed or installed.

**Operational condition:** WES facilities being capable of operating at full capacity while meeting all sound, shadow flicker and other permit conditions.

**Operator:** The entity responsible for the day-to-day operation and maintenance of the WES, including any third party subcontractors.



**Owner:**

- The person(s), who hold(s) title of the property on which a BWES or SWES facility is installed.
- The entity or entities with an equity interest in the LWES facilities, including their respective successors and assigns.

**Participating Property:** A property that is owned by the Owner of the property on which the WES is proposed or installed.

**Professional Engineer:** A qualified individual who is licensed as a professional engineer in the State of Illinois.

**Shadow Flicker:** The on-and-off strobe light effect caused by the shadow of moving blades cast by the sun passing above the turbine. Shadow flicker intensity is defined as the difference or variation in brightness at a given location in the presence and absence of a shadow.

**Silhouette:** The area covered by moving blades of WES turbine, as viewed from the front elevation, described in square feet.

**Small Wind Energy Systems (SWES):** Free-standing, tower-mounted Wind Energy Systems with a system height measuring less than 175 ft. from the ground. SWES facilities are accessory structures that generate power for local distribution and consumption. Generators typically range from 1 kW to 100 kW in nameplate wattage.

**Sound:** A disturbance or oscillation that propagates outwardly as acoustic waves through the air.

**Sound Frequency:** The number of oscillations per second expressed in hertz (Hz). How we perceive sound is partly dependant on frequency. High frequency sound has more oscillations per second, whereas low frequency sound has fewer.

- **Audible or tonal sound:** Sound frequencies between 20-20,000 Hz. With WES, this may include mechanical sounds from rotating machinery experienced as "hum" or "pitch" occurring at distinct frequencies.
- **Broadband:** A wide range of frequencies above 100 Hz. With WES, the aerodynamics from the displacement of air from the turning blades of a wind turbine creates a "swishing" or "whooshing" sensation.
- **Low-frequency:** Sound with frequencies below 100 Hz, including audible sound and infrasound.
- **Infrasound:** Sound frequencies below 20 Hz, which if sufficiently intense, can be perceived by many individuals.

**Sound Level:** The A-weighted sound pressure level in decibels (dB) (or the C-weighted level if specified) as measured using a sound level meter that meets the requirements of a Type 2 or better precision instrument according to ANSI S1.4.

The “average” sound level is time-averaged over a suitable period (say 1-minute) using an integrating sound level meter that meets the requirements of ANSI S12.43.

**Structural Engineer:** An Engineer who is licensed and registered to practice structural engineering in the State of Illinois under the Illinois Structural Engineering Act and whose principal professional practice is in the field of structural engineering.

**Structural Weight:** The combined weight of the tower, wind turbine generator, and any other component(s) otherwise supported by the base foundation.

**Substation:** The apparatus that connects the electrical collection system of the WES facilities and increases the voltage for connection with the utility’s transmission lines.

**Sun Glint:** The reflection of sunlight off of a surface of the blades, tower, or other component of the wind energy system.

**System Height:** The distance from the ground to the highest point of the WES, including the highest reach of the blades. See local zoning code to see how measurement from the ground is determined.

**Vertical Axis Wind Turbine (VAWT):** A small scale wind turbine, in which the main rotor shaft is arranged vertically creating an “egg beater” appearance. The generator and gearbox are located near the ground so the tower does not have to support it and it is more accessible for maintenance.

**Watt:** (Symbol: W) A derived unit of power in the International System of Units (SI). It measures rate of energy conversion. One watt is equivalent to 1 joule (J) of energy per second. The kilowatt (symbol: kW) is equal to one thousand watts. The megawatt (symbol: MW) is equal to one million watts.

**Wind Energy System (WES):** A wind energy production, conversion and distribution system consisting of a wind turbine, tower, and associated electronics equipment. In other publications this is known as Wind Energy Conversion System (WECS).

**Wind Farm:** More than one Large Wind Energy Systems (LWES) on a given site, constructed for the commercial generation of electrical power.

**Tower:** The structure on which the wind system is mounted.

**Turbine:** The parts of a WES including the blades, nacelle and tail.