AN ORDINANCE AMENDING THE WORCESTER ZONING ORDINANCE ADOPTED APRIL 2, 1991, RELATIVE TO WIND ENERGY CONVERSION FACILITIES, RENEWABLE AND ALTERNATIVE ENERGY

Be it ordained by the City Council of the City of Worcester as follows:

1. The Worcester Zoning Ordinance, adopted April 2, 1991, be and is hereby amended by deleting Section 13 of Article IV in its entirety and inserting the following new Section 13 in lieu thereof.

Section 13 – Wind Energy Conversion Facilities

A. Purpose and Intent

The purpose of this Section is to provide for the construction and operation of Wind Energy Conversion Facilities (WECF) in the city of Worcester, and to provide standards for the placement, design, installation, modification, monitoring and decommissioning of these facilities subject to reasonable conditions that will protect the public health, safety and welfare while providing for the production of clean, renewable energy.

B. Administration

Special Permit Granting Authority (SPGA) shall be the Planning Board.

C. Definitions

APPLICANT: the person or entity filing an application under this Section.

AMBIENT SOUND LEVEL: the background A-weighted sound level that is exceeded 90% of the time.

A-WEIGHTED SOUND LEVEL - dB(A): a measurement of sound pressure level, which has been filtered or weighted to progressively de-emphasize the importance of frequency components below 1,000 Hz and above 5,000 Hz. This range corresponds to the human speech band and reflects that human hearing is more sensitive to the mid-range frequencies within this range than the frequencies below and above this range.

DECIBEL (dB): the measurement of a sound pressure relative to the logarithmic conversion of the sound pressure reference level – often set as 0 dB(A). In general, this means the quietest sound humans can hear is near 0 dB(A) and the loudest humans can hear without pain is near 120 dB(A). Most sounds range from 30 to 100 dB(A). Normal speech at 3 feet averages about 65 dB(A).

eCO2: Carbon Dioxide Equivalent: Emissions of greenhouse gases are typically expressed in a common metric, so that their impacts can be directly compared, as some gases are more potent (have a higher global warming potential or GWP) than others. The international standard practice is to express greenhouse gases in carbon dioxide (CO_2) equivalents. Emissions of gases other than CO_2 are translated into CO_2 equivalents using global warming potentials according to the following schedule, as amended by the United States Department of Environmental Protection:

	GWP
Carbon dioxide (CO_2)	1
Methane (CH_4)	21
Nitrous oxide (N_2O)	310
Hydrofluorocarbon (HFC)-134a	1,300
(used in mobile source air conditioning)	

FACILITY OWNER: the entity or entities having an equity interest in the wind energy conversion facility, including their respective successors and assigns.

HUB HEIGHT: the distance measured from the base of the tower foundation at grade to the height of the wind turbine hub, to which the blade is attached.

METEOROLOGICAL TOWER (MET): a facility consisting of a tower and related wind-measuring devices that is solely used to measure the characteristics of winds.

NACELLE: the enclosure located at the top of a wind turbine tower that houses the gearbox, generator and other equipment.

PARTICIPATING LANDOWNER: a landowner on whose property all or a portion of a WECF is located.

OCCUPIED BUILDING: a church, hospital, library, residence, school, or other building used for public gathering that is occupied or in use when the permit application is submitted. Accessory structures and businesses are not considered occupied buildings.

OPERATOR: the entity responsible for the day-to-day operation and maintenance of the wind energy conversion facility.

OVERSPEED CONTROL: the action of a control system, or part of such system, that prevents excessive rotor speed.

ROTOR: the rotating part of a wind turbine, including turbine blades.

ROTOR DIAMETER: for propeller-blade design WECF, the diameter of the circle swept by the furthest outreaching part of the rotor blades; for vertical-axis WECF, the diameter of the cross sectional circle encompassing the furthest outreaching part of the rotating parts of the WECF.

SHADOW FLICKER: the moving shadows cast by rotating wind turbine blades that cause a flickering effect.

STALL CONTROL: a braking mechanism on wind turbines where the rotor blades are bolted onto the hub at a fixed angle. The rotor blade profile is aerodynamically designed to ensure that the moment wind speed becomes too high it creates turbulence on the side of the rotor blade which is not facing the wind. This "stall" prevents the lifting force of the rotor blade from acting on the rotor.

TOWER: with regard to WECF, the structure on which a wind turbine is mounted.

TURBINE: an electric generator that converts wind energy into electrical power - see wind turbine.

TURBINE HEIGHT: the distance measured from the surface of the tower foundation to the highest point of the turbine rotor plane (tip of blade at highest point).

WECF: see Wind Energy Conversion Facility.

WIND ENERGY CONVERSION FACILITY (WECF), LARGE OR SMALL: an electricity generating facility whose main purpose is to supply electricity, consisting of one or more wind turbines and other accessory structures and buildings, including substations, meteorological towers, electrical infrastructure, transmission lines and other appurtenant structures and facilities.

WIND ENERGY CONVERSION FACILITY (WECF), LARGE: A WECF with a Rotor Diameter greater than twenty (20) feet.

WIND ENERGY CONVERSION FACILITY (WECF), SMALL: A WECF with a Rotor Diameter equal to or less than twenty (20) feet.

WIND ENERGY CONVERSION SYSTEM: see the definition for wind turbine.

WIND TURBINE: a wind energy conversion system, including but not limited to propeller-shaped blade and vertical-axis design facilities, that converts wind energy into electricity through the use of a turbine, and includes the nacelle, rotor, tower, and pad transformer, if any.

D. Use Regulations

Wind Energy Conversion Facilities (WECF) and Meteorological Towers (METs) shall be permitted in accordance with **Article IV-Section 2, Table 4.1** subject to the provisions of this Section 13.

1) No WECF requiring guy wires for support shall be permitted.

2) No WECF with a rotor diameter in excess of one hundred sixty-five (165') feet shall be permitted.

3) Multiple wind turbines are allowed on a single parcel only if the WECF as a whole, and each wind turbine within it, complies with the provisions of subsections E, F, G and H governing sound and shadow flicker respectfully.

4) No WECF shall be erected until evidence has been provided that the electric utility company has been informed of the applicant's intent to install an interconnected customer-owned generator. Off-grid systems shall be exempt from this requirement.

5) An applicant who is not a participating landowner shall submit an executed lease or purchase and sale agreement, or power purchase agreement, documenting the applicant's contingent property interest and legal right to install, operate and maintain the WECF and MET on the affected property(ies).

6) To the extent that the foundation of a WECF affects the dimensions or the number, or both, of required off-street parking spaces, said parking requirement shall be reduced by the number of spaces directly affected for the purposes of calculating minimum parking requirements.

7) Meteorological towers (MET): Provided that it does not exceed the height recommended by the manufacturer of the meteorological tower and equipment:

    a) Guy wires are permitted for temporary METs only.

b) All special permits related to METs shall be issued pursuant to the criteria set forth in **Article II**.

c) Term:

i) METs may be erected for a period not to exceed twenty-seven months. A longer period may be considered by the Director of Code Enforcement or the SPGA, for by-right and specially permitted METs respectively.

ii) Permanent METs are permitted regardless of height only in association with and accessory to a permitted WECF provided that said MET does not have guy wires.

d) Setbacks:

i) METs eighty-five (85) feet or less shall be subject to regulations regarding setbacks for Small WECFs with the exception that guy wires, if any, shall be setback at least (10) ten feet from a property line.

ii) METs more than eighty-five (85) feet in height shall be subject to regulations regarding setbacks for Large WECFs with the exception that guy wires, if any, shall be setback at least twenty (20) feet from a property line.

E. Dimensional Requirements

1. **Large WECFs**. Notwithstanding anything to the contrary in **Article IV-Section 4, Table 4.2**, Large WECFs shall comply with the following requirements:

a) Height

i) Turbine height shall not exceed the height recommended by the manufacturer of the wind turbine and tower, or both, or two hundred and sixty-five (265) feet, whichever is less.

ii) The minimum distance between the ground and any part of a rotor, or turbine blade, shall be thirty (30) feet.

b) Setbacks

i) Wind turbines shall be set back:

(aa) a distance not less than six hundred and fifty (650) feet from the nearest non-participating landowner's occupied building. This setback distance shall be measured from the center of the wind turbine tower at its base to the nearest point on the foundation of a non-participating landowner's occupied building.

(bb) a distance not less than one-hundred and sixty-five (165) feet or 1.25 times the turbine height, whichever is greater, from the nearest participating landowner's occupied building. This setback distance shall be measured from the center of the wind turbine tower foundation to the nearest point on the foundation of a participating landowner's occupied building.

(cc) a distance not less than 1.1 times the turbine height from the nearest wind turbine, right-of-way line of the nearest public way, property line, or existing above ground utility transmission line(s).

2. **Small WECF**. Notwithstanding anything to the contrary in **Article IV-Section 4, Table 4.2**, Small WECFs shall comply with the following requirements:

a) Height

i) Turbine height shall not exceed the height recommended by the manufacturer of the wind turbine and tower, or both, or ninety-five (95) feet, whichever is less.

ii) The minimum distance between the ground and any part of a rotor, or turbine blade at its lowest position, shall be twenty (20) feet.

b) Setbacks

i) Wind turbines shall be setback a distance not less than one-hundred and sixty-five (165) feet from the nearest non-participating landowner's occupied building. This setback distance shall be measured from the center of the wind turbine tower at its base to the nearest point on the foundation of a non-participating landowner's occupied building.

ii) Wind turbines shall be setback a distance not less than 1.1 times the turbine height from the nearest wind turbine, abutting property owner's property line, or existing above ground utility transmission line(s).

F. Sound

1. All WECFs shall comply with the provisions of the Department of Environmental Protection's Division of Air Quality Noise Regulations (310 CMR 7.10) and associated policies.

2. For all WECFs allowed by Special Permit in Table 4.1: Audible sound generated by a WECF shall not exceed fifty-five (55) dB(A), as measured at the exterior of any non-participating landowner's occupied building except during short-term events such as utility outages and/or uncharacteristically windy periods.

3. Notwithstanding anything to the contrary within this Section, for Small WECFs listed as of right in Table 4.1 and within 650 feet of the nearest non-participating landowner's occupied building located within a residential district: Audible sound generated by a WECF shall not exceed fifty-five (55) dB(A), as measured at the exterior of any non-participating landowner's occupied building, located in a residential district, except during short-term events such as utility outages and/or uncharacteristically windy periods.

G. Shadow Flicker

The facility owner and operator shall make reasonable efforts to minimize shadow flicker to any occupied building on a non-participating landowner's property.

H. Signal Interference

1. The WECF shall be certified by the manufacturer to be in conformance with the regulations of the Federal Communications Commission (47 CFR Part 15 as revised) relating to harmful interference with radio or television reception.

2. The WECF owner or operator shall make reasonable efforts to avoid any disruption or loss of radio, telephone, television or similar signals, and shall mitigate any harm caused by the WECF.

I. Waiver of Setbacks, Sound, Shadow Flicker, Height, and Rotor Diameter, Provisions

1. Notwithstanding anything to the contrary in **Article IV**, one or more waivers may be granted by the SPGA in accordance with this subsection provided that all such waivers are part of a special permit approval for a WECF and in accordance with this subsection. To the extent that any waiver effects compliance with setback and shadow flicker requirements, those items shall also require a waiver.

2. To the extent these provisions affect a participating property, the SPGA, in its discretion, shall be authorized to waive the setback, sound and shadow flicker provisions of this Section provided that:

    a. The applicant submits the request in writing, and if the applicant is not the property owner, the property owner's written consent to the waiver(s) shall also be submitted.

3. To the extent these provisions affect a non-participating property, the SPGA, in its discretion, shall be authorized to waive the setback, sound and shadow flicker provisions of this Section provided that:

    a. The applicant submits the request in writing, accompanied by an affidavit signed by the affected non-participating property owner(s) in support of the applicant's request for waiver.

    b. The affidavit shall contain the non-participating property owner's acknowledgement of the setback, sound or shadow flicker requirements of this Section and what is proposed in lieu thereof, describe the impact on the non-participating property owner(s), and state the non-participating property owner's support for the applicant's waiver request. A non-participating property owner's affidavit shall be made a part of the special permit decision and shall be separately recorded with the Worcester District Registry of Deeds at the same time that the special permit decision is recorded to provide notice to all subsequent purchasers of the non-participating property of the waiver(s) granted.

4. To the extent these provisions affect a public way, the SPGA, in its discretion, shall be authorized to waive the setback, sound and shadow flicker provisions of this Section provided that:

    a. The applicant submits the request in writing, provided further however, that no waiver may be granted to the extent it would affect an existing above ground utility transmission line unless the utility company owning such line consents to the waiver in writing.

5. To the extent these provisions affect the turbine height of a WECF, the SPGA, in its discretion, shall be authorized to waive the turbine height provisions of this Section provided that:

    a. For any WECF, the applicant provide a comparison of the proposal with the alternative in terms of energy produced and greenhouse gases prevented, measured in tons of eCO2, that demonstrates that the increased height will significantly increase the energy produced by the WECF; and

    b. For Small WECFs, the applicant demonstrates that obstacles within five-hundred (500) feet of the proposed location of a WECF will significantly reduce the available wind resource, or is likely to cause wind turbulence that would result in unsafe conditions for the operation of the proposed wind turbine. The SPGA shall be limited to a waiver of thirty (30) feet above the highest obstruction identified or one-hundred and twenty-five (125) feet, whichever is less.

6. To the extent these provisions affect the rotor diameter of a Large WECF, the SPGA, in its discretion, shall be authorized to waive the rotor diameter provisions of this Section provided that:

    a. The applicant provide a comparison of the proposal with, and without, the waiver in terms of energy produced and greenhouse gases prevented, measured in tons of eCO2, that demonstrates that the increased rotor diameter will significantly increase the energy produced by the WECF.

J. Design and Installation

1. Compliance and Certifications: Prior to the operation of any WECF, the facility owner and operator must submit a signed affidavit to the director of Code Enforcement's satisfaction verifying that the WECF, and all of its equipment, was designed and installed in accordance with the following standards:

    a) The design and installation of the WECF complies with the most current applicable industry safety standards, including those of the American National Standards Institute, related to all wind turbine subsystems such as control and protection mechanisms, internal electrical systems, mechanical systems and support structures.

    b) To the extent applicable, the WECF complies with Massachusetts State Building Code and International Conference of Building Officials Building Code.

    c) All electrical components of the WECF comply with relevant and applicable local, state and national codes, and relevant and applicable international standards.

    d) All wind turbines are equipped with the following systems and controls: redundant braking systems, aerodynamic overspeed controls (including variable pitch, tip, and other similar systems), and mechanical brakes. Mechanical brakes shall be operated in a fail-safe mode and stall control regulation shall not be considered a sufficient braking system for overspeed protection. Except for Small WECFs, which shall provide adequate redundant (primary and fail safe) automatic overspeed protection.

    e) The design and installation of the WECF complies with applicable Federal Aviation Administration and Federal Communications Commission regulations as applicable.

    f) To the extent applicable, WECFs shall be adequately protected from impact by vehicles through use of a physical barrier whether included as part of the foundation design or as separate elements including, but not limited to, bollards or guardrails.

2. Security and Warnings:

    a) WECFs and METs shall not be climbable up to fifteen (15) feet above ground surface.

    b) All access doors to wind turbines and electrical equipment shall be locked or fenced, as appropriate, to prevent entry by non-authorized persons.

    c) Visible, reflective, colored objects, such as flags, reflectors, or tape shall be placed on the anchor points of guy wires and along the guy wires up to a height of ten (10) feet from the ground (pertains to METs only, see subsection D – Use Regulations).

    d) A clearly visible warning sign concerning voltage must be placed at the base of all pad-mounted transformers and substations.

3. Visual Appearance:

    a) Wind turbines and associated structures shall be a non-obtrusive color such as white, off-white, gray or light-blue.

    b) No WECF shall be artificially lit, except to the extent required by the Federal Aviation Administration, or other applicable governmental authority that regulates air safety.

    c) Wind turbines shall not be used for the location of accessory or non-accessory signs except for reasonable identification of the turbine manufacturer, host site, or both.

d) On-site transmission and power lines between wind turbines shall, to the maximum extent practicable, be placed underground (not applicable to Small WECFs).

e) Inverters and pendant power cables shall be located inside the wind turbine tower, nacelle or structure.

f) No telecommunication dishes, antennas, cellular telephone repeaters or other similar devices shall be attached to wind turbine towers, except for accessory antenna associated with the operation of the WECF.

g) All appurtenant structures to such WECF shall be subject to reasonable regulations concerning the bulk and height of structures and for determining lot area, setbacks, open space, parking and building coverage requirements. All such appurtenant structures, including but not limited to equipment shelters, storage facilities, transformers, and substations shall be screened from view by vegetation and clustered to minimize visibility.

K. Maintenance

WECF owners and operators shall provide for the ongoing maintenance by appropriately certified professionals in accordance with manufacturer's specifications and all governmental regulations for all structural, electrical and mechanical components of the WECF to ensure the safe operation of the WECF.

L. Emergency Services Plan

Upon request, the applicant shall cooperate with emergency services providers to develop and coordinate implementation of an emergency response plan for the WECF(s).

M. Use Of Public Streets Plan (not applicable to Small WECFs)

1. At least sixty (60), but no greater than ninety (90), days prior to construction, the applicant shall obtain the requisite permit from the Department of Public Works and Parks approving the route and method of transporting the equipment and parts for the construction, operation or maintenance of the WECF. In addition to the permit requirements promulgated by the commissioner of DPWP, the applicant shall submit, with its request for a permit, a report identifying all state and city streets within the city of Worcester to be used as its transport route. A copy of the report shall also be submitted to the Division of Planning and Regulatory Services.

2. An engineer or a qualified third party engineer hired by the City of Worcester and paid for by the applicant, shall document road conditions along the route chosen prior to construction. Said engineer shall document road conditions again thirty (30) days after construction is complete or as weather permits. This documentation shall be provided to the commissioner of Public Works and Parks for review.

3. The applicant shall demonstrate to the satisfaction of the commissioner of Public Works and Parks that the applicant has adequate financial resources to ensure the prompt repair of damaged roads.

4. Any road damage caused by the applicant or its contractors shall be promptly repaired at the applicant's expense.

N. Abandonment, Discontinuation of Use Or Repair

1. Notification:

a) The WECF owner or operator shall notify the Director of Code Enforcement by certified U.S. Mail thirty (30) days prior to the proposed date of abandonment or discontinuation of

use of any WECF or individual wind turbine.

b) On a yearly basis, from the date of the issuance of a building permit, the WECF owner or operator shall provide the Director of Code Enforcement a report indicating the total electricity generated by each wind turbine by month of service.

c) The use of a WECF or individual wind turbine will be considered discontinued if no electricity is generated for a continuous period of twelve (12) months.

2. Decommissioning:

a) Upon abandonment or discontinuation of use of a WECF, the facility owner, operator or landowner shall, at its expense, remove wind turbines, and all above ground structures, buildings, cabling, electrical components, roads, and any other associated facilities within twelve (12) months.

b) All waste materials from a decommissioning shall be disposed of in accordance with local and state solid waste disposal regulations.

c) Disturbed earth shall be graded and re-seeded, unless the landowner requests in writing that the access roads or other land surface areas not be restored.

d) If neither the WECF owner or operator nor the landowner, if different, completes decommissioning within the period prescribed in this subsection, the City of Worcester may take such measures as necessary to complete the decommissioning. The costs incurred by the city shall constitute a debt due the city upon completion of the decommissioning activities and the rendering of an account to the facility owner, operator and the landowner, if applicable, and shall be recoverable from such party(ies) in an action of contract. For Large WECFs only, the Special Permit Granting Authority may require the applicant to post a bond at the time of construction equal to the estimated costs associated with the removal of the WECF in the event the City of Worcester must remove the WECF.

3. Repair:

a) Any WECF determined to be unsafe by the Director of Code Enforcement shall be turned off immediately upon notice and repaired as soon as practicable by the WECF owner or operator to meet federal, state and local safety standards. Evidence of such repair shall be reviewed and approved, if deemed satisfactory, by the Director of Code Enforcement prior to resuming use of the WECF. If the Director of Code Enforcement deems the timetable for corrective action as unreasonable or inadequate to ensure proper safety, the WECF owner or operator shall decommission the WECF in accordance with subsection N(2) except that the period of time shall be prescribed by the Director of Code Enforcement.

O. Public Inquiries and Complaints

1. The WECF owner and operator shall maintain a phone number and identify a responsible person for the public to contact with inquiries and complaints throughout the life of the project. The applicant shall notify all abutters within three-hundred (300) feet of this phone number prior to the operation or testing of any WECF.

2. The WECF owner and operator shall post an emergency telephone number so that the appropriate people may be contacted should any wind turbine need immediate attention. This telephone number shall be clearly visible on a permanent structure(s) or post(s) located at a distance at least 1.25 times the turbine height. (Not applicable to Small WECFs, which shall provide a number on tower.)

3. The WECF owner and operator shall make reasonable efforts to respond to the public's inquiries and complaints.

4. Upon receipt of a complaint by the Code Enforcement Division regarding sound from an existing WECF, the division will investigate the complaint. If the director of Code Enforcement determines the complaint to be reasonable, the WECF owner or operator shall be required, at its expense, to have prepared, by an independent professional acoustical engineer approved by the city, an acoustical study that measures sound levels and demonstrates compliance with the sound standards in this Section.

5. Methods for measuring and reporting acoustic emissions from wind turbines and the WECF shall be equal to or exceed the minimum standards for precision described in American Wind Energy Association Standard 2.1 - 1989 titled *Procedures for the Measurement and Reporting of Acoustic Emissions from Wind Turbine Generation Systems Volume I: First Tier as revised.*

P. Special Permit Approval Criteria

1. After notice and public hearing, and after due consideration of the evidence submitted, including the reports and recommendations of city departments, the SPGA, in addition to the special permit criteria under **Article II**, may grant such a special permit provided that it finds that:

   a) The proposed WECF does not derogate from the purposes and intent of this Section and the Zoning Ordinance.

   b) The application information submitted is adequate for the SPGA to consider approving the special permit request.

   c) The proposed design, installation and operation of the WECF will meet the requirements of this Section.

   d) The acoustical assessment provided adequately predicts resulting sound levels as may be measured in accordance with the provisions of this Section. (Not applicable to Small WECFs)

2. Reasonable efforts have been made to minimize shadow flicker on neighboring or adjacent uses.

3. The maintenance plan proposed adequately provides for the ongoing safe operation of the WECF.

4. There will be no substantial adverse affect on the environment or wildlife. (Not applicable to Small WECFs)

5. The documentation and information for setback, sound and shadow flicker waiver requests, if any, provide sufficient assurance that the affected participating and non-participating property owners are fully informed and consent to the waiver requests.

6. That documentation and information for height and rotor diameter (as applicable) waiver requests, if any, are sufficient to demonstrate the requirements of subsection I.

Q. Term of Special Permit

A special permit issued for any WECF shall be valid for no more than twenty (20) years, but in no event, if the applicant is a lessee of the property owner, shall a special permit be granted for a term greater than the term of the lease. No more than six months prior to the expiration of a special permit granted hereunder, the applicant, or its successor in interest, may apply for an extension of the term through a special permit amendment. The SPGA may grant one or more extensions of the term, of up to five (5) years per extension, provided it finds that the WECF is operating in accordance with this Section, and that the WECF has been, and will continue to be, properly maintained. The applicant

shall provide documentation regarding ongoing maintenance of the WECF in accordance with the maintenance plan proposed, and an inspection report verifying that the WECF can continue to operate safely.

R. Application Requirements

1. All applicants are encouraged to contact the SPGA staff to schedule a pre-application meeting.

2. In addition to all application requirements related to special permits under **Article II**, the applicant shall include the following at the time of application submittal:

   a) Project Overview: A narrative describing the proposed WECF including an overview of the project with the following information: the project location, the number, representative types, generating capacity, cut-in and cut-out wind speed, overspeed controls, materials, dimensions and respective manufacturers of each wind turbine to be constructed, and a detailed description of all ancillary facilities. This overview shall also include a comparison of estimated electric generation vs. on-site electric consumption, a cost-benefit analysis demonstrating that the proposed hub height and turbine height are necessary to achieve economic viability (including the variation of electricity generated at alternative heights), and an estimate of the number of tons of pollution prevented.

   b) Vicinity Plan: A vicinity plan shall be prepared by a registered engineer and must show the scale, a north arrow, legend or annotation (for each symbol used) and identify the sheet number in sequence. Use separate sheets for various layers as appropriate to improve clarity – include overview sheet will all layers. (Not Applicable to Small WECFs)

      i) Vicinity plans shall depict the following information for the subject property and all adjacent properties within 300 feet:

         (aa) Property lines, layout of existing buildings (including their use status - e.g., occupied buildings), accessory structures, location and name of all public, private roads, and railroads.

         (bb) Any significant natural, topographical or physical features of the area including existing contours at two (2) feet in one hundred (100) feet.

         (cc) Lines representing the sight line showing viewpoint and visible point from "sight lines" subsection below.

         (dd) Annotation(s) identifying all parcels and occupied buildings affected by waivers, if any.

         (ee) Area of estimated wind turbine shadow flicker.

      ii) The vicinity plan shall depict the proposed location of each wind turbine(s), street address, property lines, wind turbine setback lines (depicted as a radius from the center of the wind turbine), access road and turnout locations, substation(s), electrical cabling from the WECF to substation(s), ancillary equipment, buildings, and structures, including permanent meteorological towers, associated transmission lines (including whether they are above or below ground), and layout of all structures within the geographical boundaries of any applicable setback.

   c) Site Plan: A site plan to a scale of not less than forty (40) feet to the inch, on one or more sheets, prepared by a registered engineer, and indicate the scale used, a north arrow, legend or annotation (for each symbol used), and identify the sheet number in sequence. Use separate sheets for various layers as appropriate to improve clarity – include overview sheet with all layers. The site plan shall also include the following information:

i) Title block information that identifies location, applicant, property owner, WECF owner/operator, and party responsible for preparing the plan.

ii) A table that compares all required dimensional requirements of this Section with those proposed for the WECF when an applicant seeks one of more dimensional waivers.

iii) Annotation(s) identifying all parcels and occupied buildings affected by waivers, if any.

iv) The boundary lines and dimensions of the subject property, existing subdivision lots, available utilities, easements, roadways, railroads, rail lines and public rights-of-way, crossing and adjacent to the subject property.

v) Any proposed re-grading of the subject property and any significant natural, topographical or physical features of the property including, at least, watercourses, marshes, floodplain and wetlands, trees in excess of nine (9) inches in diameter, soil types, and existing contours at two (2) feet in one hundred (100) feet. (Not Applicable to Small WECFs)

vi) Location of each wind turbine, WECF setback lines (measured at grade and depicted as a radius from the center of the wind turbine), access road and turnout locations, substation(s), electrical cabling from the WECF to substation(s), ancillary equipment, buildings, and structures, including permanent meteorological towers, associated transmission lines (including whether they are above or below ground).

vii) Layout of all existing buildings (including their use status - e.g., occupied buildings), and structures within the geographical boundaries of any applicable setback.

viii) All existing and proposed surface and subsurface drainage facilities, including detention or retention ponds. Drainage circulation with data on predevelopment and post-development condition should be provided. (Not Applicable for Small WECFs)

ix) Location and size of all signs (including emergency phone number signs) and lighting as it pertains to the WECF.

x) Proposed landscaping (noting how the existing vegetation is to be retained and used) including type, location and quantity of all plant materials, location and height of fences or screen plantings and the type or kind of building materials or plantings to be used for fencing and screening of the WECF.

xi) Methods and locations of erosion and sedimentation control devices used during and after construction of the WECF.

d) Wind Map: A map showing the wind characteristics of the general area and the dominant wind direction – the direction from which fifty (50) percent or more of the energy contained in the wind flows. (Not Applicable to Small WECFs)

e) Sightline Analysis: Photographs shall be provided depicting views from a reasonable number of key vantage points as determined by the applicant in consultation with the Division of Planning and Regulatory Services. Sites for the view representations shall be selected from areas within a two (2) mile radius of the site. (Not Applicable to Small WECFs)

i) Existing (before condition) photographs. Each sightline shall be illustrated by one (1) four-inch by six-inch color photograph of what can currently be seen from any public way within 300 feet of the subject property.

ii) Proposed (after condition) photographs. Each of the existing condition photographs shall have the proposed WECF superimposed on it to show what will be seen from public roads if the proposed facility is built.

iii) A sightline map depicting the points from which sightline photographs were taken.

iv) A description of the technical procedures followed in producing the visualization (distances, angles, lens, etc.).

f) Balloon or Crane Test: The applicant will provide a statement proposing a date, time and location of such test. (Not Applicable to Small WECFs)

i) Within ten (10) days of filing an application, the applicant shall arrange with the Division of Planning and Regulatory Services for a balloon or crane test at the proposed site to illustrate the height of the proposed WECF. The date, time and location of such test shall be advertised by the applicant in a newspaper of general circulation in the City of Worcester at least seven (7) days, but not more than fourteen (14) days prior to the test. Evidence of this advertisement must be provided to the SPGA at the time of public hearing.

g) Compliance Certificates and Statements:

i) Certificate(s) of design compliance obtained from the equipment manufacturers that the system's wind turbine and other components meet or exceed the standards of one of the following national and international certification programs: American National Standards Institute (ANSI), Det Norske Veritas Germanishcer Llloyd Wind Energies, International Electrotechnical Commission (IEC), National Electrical Code (NEC), Underwriters Laboratories (UL), or other certification program recognized by the American Wind Energy Association.

ii) Standard drawings and a structural engineering analysis of tower(s) showing compliance with applicable Massachusetts State Building Codes and certification by a Commonwealth of Massachusetts licensed professional engineer.

iii) A determination from the Federal Aviation Administration of no hazard to air navigation, and that the WECF as proposed complies with all applicable Federal Aviation Administration regulations. (Not Applicable to Small WECFs unless height waiver is requested or, is located within an A-1 District, Airport Environs Overlay District, or both.)

iv) The applicant shall provide a statement certified and signed by an acoustical engineer stating that the sound estimates and measurements provided meet industry professional standards for accuracy, and that the WECF as proposed will be in conformance with the performance standards of this Section related to sound. (Not Applicable to Small WECF)

v) Evidence that the proposed hub height and turbine height do not exceed the height recommended by the manufacturer or distributor of the wind energy conversion system.

vi) Evidence, certified by the manufacturer, that the WECF and its accessory equipment is in conformance, as applicable, with the Regulations of the Federal Communication Commission (47 CFR Part 15 as revised) relating to harmful interference with radio or television reception.

h) Maintenance Plan: The applicant shall provide a detailed maintenance plan in accordance with manufacturer's specifications and all governmental regulations to ensure the safe operation of the WECF. Plan shall include but not be limited to: preventative and periodic maintenance, routine checks and testing, and cleaning, associated with all structural, electrical and mechanical components of the WECF.

    i) Notifications: The applicant shall provide notification letters and evidence that a notice to construct a WECF has been received by the appropriate electric utility company and the Federal Aviation Administration.

i) Sound Assessment:

    i) The applicant shall provide a report estimating current ambient sound at appropriate locations and maximum projected sound from the proposed WECF, measured in dB(A) (decibels A-weighted), including but not limited to the following: (Not Applicable to Small WECF)

        (aa) An estimation or measurement of the existing ambient background sound levels.

        (bb) Identification of a model for sound propagation (sound modeling software will include a propagation model).

        (cc) A prediction or measurement of sound levels from the WECF(s) at the nearest non-participating landowner's occupied building(s), at all participating landowner's occupied building(s), and the nearest property line.

        (dd) A comparison of calculated sound pressure levels from the WECF with background sound pressure levels at the locations of concern.

        (ee) An estimate of the maximum total sound in the environment after the WECF is operational.

        (ff) All sound data and information provided by the wind turbine manufacturer.

    ii) For Small WECFs the applicant shall provide a letter or report from the WECF manufacturer indicating compliance with sound standards of this ordinance as they relate to Small WECFs.

j) Shadow Flicker Assessment: The applicant shall provide a report estimating the area of shadow flicker from wind turbine(s). (Not Applicable to Small WECF)

k) Environmental and Wildlife Impact Assessment: The applicant shall provide a report assessing the impact of the proposed project on avian and non-avian wildlife, public safety, quality of life, culturally/historically significant areas, scenic areas, sedimentation, runoff and watershed. As part of these assessments the applicant shall consult the local chapter of the Audubon Society prior to application. (Not Applicable to Small WECF)

l) Waiver Requests and Supporting Documentation: The applicant shall provide all waiver requests along with supporting agreement documentation as required under this Section.

m) Documents related to decommissioning: The applicant, if other than the property owner, shall provide an affidavit signed by the property owner that he/she understands and acknowledges the provisions of subsection N(2)(d), above.

n) Fees: The permit application or amended permit application shall be accompanied with a fee in accordance with the SPGA's fee schedule, as revised.

o) Other Information: Other relevant studies, reports, certifications and approvals as may be reasonably requested by the SPGA to ensure compliance with this Section and the Zoning Ordinance.

p) Application Requirement Waivers: Upon written request, the SPGA may waive one or more of the application requirements listed above if the SPGA determines, in its discretion, that the information is not needed to consider a specific WECF.

S. Building Permit Application Requirements

1. All by-right WECFs shall provide the following information at the time of application for a building permit:

a) Project Overview: A narrative describing the proposed WECF including an overview of the project with the following information: the project location, the number, representative types, generating capacity, cut-in and cut-out wind speed, overspeed controls, materials, dimensions and respective manufacturers of each wind turbine to be constructed, and a detailed description of all ancillary facilities.

b) Site Plan: A site plan to a scale of not less than forty (40) feet to the inch, on one or more sheets, prepared by a registered engineer, and indicate the scale used, a north arrow, legend or annotation (for each symbol used), and identify the sheet number in sequence. Use separate sheets for various layers as appropriate to improve clarity – include overview sheet with all layers. The site plan shall also include the following information:

i) Title block information that identifies location, applicant, property owner, WECF owner/operator, and party responsible for preparing the plan.

ii) The boundary lines and dimensions of the subject property, existing subdivision lots, available utilities, easements, roadways, railroads, rail lines and public rights-of-way, crossing and adjacent to the subject property.

iii) Location of each wind turbine, WECF setback lines (measured at grade and depicted as a radius from the center of the wind turbine), access road and turnout locations, substation(s), electrical cabling from the WECF to substation(s), ancillary equipment, buildings, and structures, including permanent meteorological towers, associated transmission lines (including whether they are above or below ground).

iv) Layout of all existing buildings (including their use status - e.g., occupied buildings), and structures within the geographical boundaries of any applicable setback.

v) Location and size of all signs (including emergency phone number signs) and lighting as it pertains to the WECF.

vi) Proposed landscaping (noting how the existing vegetation is to be retained and used) including type, location and quantity of all plant materials, location and height of fences or screen plantings and the type or kind of building materials or plantings to be used for fencing and screening of the WECF.

vii) Methods and locations of erosion and sedimentation control devices used during and after construction of the WECF.

c) Compliance Certificates and Statements:

i) Certificate(s) of design compliance obtained from the equipment manufacturers that the system's wind turbine and other components meet or exceed the standards of one of the following national and international certification programs: American

National Standards Institute (ANSI), Det Norske Veritas Germanishcer Llloyd Wind Energies, International Electrotechnical Commission (IEC), National Electrical Code (NEC), Underwriters Laboratories (UL), or other certification program recognized by the American Wind Energy Association.

ii) Standard drawings and a structural engineering analysis of tower(s) showing compliance with applicable Massachusetts State Building Codes and certification by a Commonwealth of Massachusetts licensed professional engineer.

iii) A determination from the Federal Aviation Administration of no hazard to air navigation, and that the WECF as proposed complies with all applicable Federal Aviation Administration regulations. (Not Applicable to Small WECFs unless located within an A-1 District or the Airport Environs Overlay Zone.)

iv) Evidence that the proposed hub height and turbine height do not exceed the height recommended by the manufacturer or distributor of the wind energy conversion system.

v) Evidence, certified by the manufacturer, that the WECF and its accessory equipment is in conformance, as applicable, with the Regulations of the Federal Communication Commission (47 CFR Part 15 as revised) relating to harmful interference with radio or television reception.

d) Maintenance Plan: The applicant shall provide a detailed maintenance plan in accordance with manufacturer's specifications and all governmental regulations to ensure the safe operation of the WECF. Plan shall include but not be limited to: preventative and periodic maintenance, routine checks and testing, and cleaning, associated with all structural, electrical and mechanical components of the WECF.

e) Notifications: The applicant shall provide notification letters and evidence that a notice to construct a WECF has been received by the appropriate electric utility company and the Federal Aviation Administration.

f) Sound Assessment: Adequate evidence that the proposed installation is compliant with the applicable sound standards of this Section.

g) Documents related to decommissioning: The applicant, if other than the property owner, shall provide an affidavit signed by the property owner that he/she understands and acknowledges the provisions of subsection N(2)(d), above.

h) Other Information: Other relevant studies, reports, certifications and approvals as may be reasonably requested by the Director of Code Enforcement to ensure compliance with this Section and the Zoning Ordinance.

2. The City of Worcester Zoning Ordinance, adopted April 2, 1991, be and is hereby amended by inserting in Article I-Section 2, the following new definitions in the pertinent alphabetized locations.

ENERGY, BIOMASS: Energy derived from plant origin, considering only those plants that have been harvested within the recent past, and including wood, food crops, grassy and woody plants, agricultural or forestry residue, organic components of municipal and industrial wastes and fumes from landfills.

ENERGY, ALTERNATIVE: Combined Heat and Power (CHP) or electric and hydrogen powered vehicles and associated technologies including advanced batteries and recharging stations.

ENERGY, RENEWABLE: Energy whose supply is replenished through natural processes and, subject to those natural processes, remains relatively constant, including, but not limited to, solar, wind, hydroelectric, geothermal, and biomass conversion, and excluding those sources of energy used in the fission and fusion processes.

RESEARCH AND DEVELOPMENT FACILITY: A structure or group of structures used primarily for applied and developmental research, where product testing is an integral part of the operation, and goods or products may be manufactured as necessary for testing, evaluation, and test marketing. Research development functions related to alternative and/or renewable energy industry and similar fields of endeavor shall be included. The activities produced in such a facility shall not involve the mass manufacture, fabrication, processing, or sale of products.

3. The City of Worcester Zoning Ordinance, adopted April 2, 1991, be and is hereby amended by adding in Article IV-Section 2, Table 4.1, Notes to Table 4.1 – <u>Permitted Uses by Zoning District</u>, the following new note 12.

Note 12. The permitting process for Research and Development Facilities related to alternative and/or renewable energy industry and for manufacturing of the alternative and/or renewable energy systems will be carried out using a framework of the Massachusetts General Laws, Chapter 43D: Expedited Permitting, except that the permit review and decision period shall be completed within 365 days and shall not require designation as a Priority Development Site.

4. The City of Worcester Zoning Ordinance, adopted April 2, 1991, be and is hereby amended by deleting from Article IV-Section 2, Table 4.1 – <u>General Uses</u>, line 25 and inserting the following new lines 25, 26,27 and 28.

	RS 10	**RS 7**	**RL 7**	**RG 5**	**BO 1**	**BO 2**	**BL 1**	**BG 2**	**BG 3**	**BG 4**	**BG 6**	**ML 0.5**	**ML 1**	**ML 2**	**MG 0.5**	**MG 1**	**MG 2**	**IP 0.33**	**INS**	**INH**	**A 1**
25. Wind Energy Conversion Facilities, Large	SP	SP	SP	SP	SP	SP	SP	SP	SP	SP	SP	SP	SP	SP	SP	SP	SP	SP	SP	SP	SP
: 26. Wind Energy Conversion Facilities, Small	SP	SP	SP	SP	SP	SP	SP	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	SP
27. Meteorological Tower (MET) – 85' or less in height	SP	SP	SP	SP	SP	SP	SP	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Sp
28. Meteorological Tower (MET) – greater than 85'in height	SP	SP	SP	SP	SP	SP	SP	SP	SP	SP	SP	SP	SP	SP	SP	SP	SP	SP	SP	SP	SP

5. The City of Worcester Zoning Ordinance, adopted April 2, 1991, be and is hereby amended by deleting lines 5 and six from Article IV-Section 2, Table 4.1 – Manufacturing Uses, and inserting the following new lines 5, 6 and 16.

	RS 10	RS 7	RL 7	RG 5	BO 1	BO 2	BL 1	BG 2	BG 3	BG 4	BG 6	ML 0.5	ML 1	ML 2	MG 0.5	MG 1	MG 2	IP 0.33	IN S	IN H	A 1
5. Manufacturing, assembly, processing, packaging, research and other industrial operations, including alternative and/or renewable energy systems provided standards in Notes to Table 4.1, Note (7) are met. (See, Notes to Table 4.1, Note 12).	N	N	N	N	N	N	SP	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	N	Y
6. Manufacturing, assembly, processing, packaging or other industrial operations not otherwise permitted above, including alternative and/or renewable energy systems (See, Notes to Table 4.1, Note 12), provided there will not be a nuisance of such magnitude as to prevent a reasonable use of nearby premises for the purpose for which they are zoned.	N	N	N	N	N	N	N	N	N	N	N	SP	SP	SP	SP	SP	SP	SP	N	N	N
11. Research and Development Facility with Manufacturing Abilities (See, Notes to Table 4.1, Note 12)	N	N	N	N	N	N	SP	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y

In City Council January 5, 2010

Passed to be ordained by a yea and nay vote of Ten Yeas and One Nay.

A Copy. Attest: **David J. Rushford, Clerk**

David J. Rushford

City Clerk