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Sample Zoning for Wind Energy Systems

April 16, 2008

Introduction

These guidelines have been developed by the Energy Office, Michigan Dept. of Labor and Economic Growth (DLEG) to assist local governments to develop siting requirements for wind energy systems. This material is not intended to apply in urban areas. These guidelines have been developed with the intention of striking an appropriate balance between the need for clean, renewable energy resources and the necessity to protect the public health, safety, and welfare. The guidelines represent recommended zoning language for local governments to use if they amend their zoning ordinance to address wind energy systems. The Energy Office, DLEG has no authority to issue regulations related to siting wind energy systems.

Electricity generation is responsible for 36% of carbon dioxide pollution, 64% of sulfur dioxide pollution, 26% of nitrogen oxide pollution, and 34% of mercury pollution in the United States. Electricity generation from clean, renewable energy resources will reduce air pollution, increase the fuel diversity of our electric system, save natural resources, and provide a hedge against increases in the price of fossil fuels used for electric generation.

Different requirements are recommended for On-site Use (generally small) and Utility Grid (generally large) wind energy systems. On-site Use wind energy systems are sized to primarily serve the needs of a home, farm, or small business. Usually there is a single turbine – in contrast to a large, utility-scale wind farm that may include dozens or even hundreds of turbines. Utility Grid wind energy systems are sized to provide power to wholesale or retail customers using the electric utility transmission and distribution grid to transport and deliver the wind generated electricity. On-site Use wind energy systems can have towers up to 40 meters and Utility Grid wind energy systems can have towers up to 90 meters.

The guidelines have been developed with input from members of the Michigan Wind Working Group. The members of the Michigan Wind Working Group have not endorsed these guidelines. Professor Robert Fletcher, Ph.D. and Daniel Alberts, graduate student from Lawrence Technological University helped in the development of these guidelines by providing briefings on technical issues related to siting. Mr. Alberts also helped by conducting a modified Delphi study related to wind energy siting issues. For the Delphi study final report see:
http://www.ltu.edu/engineering/mechanical/delphi_wind.asp .

The guidelines were placed in typical sample zoning ordinance language by Kurt H. Schindler, Regional Land Use Educator with Michigan State University Extension.

Comments or questions are welcome and should be directed to John Sarver, Energy Office at 517-241-6280 or sarverj@michigan.gov.

Sample Zoning Amendments for Wind Energy Systems

The following is offered as sample zoning amendment language. It is intended as a starting point for a community to use when considering this issue.

- **If zoning exists:** If this is being done in a city, village, township, or county with its own existing zoning, then these provisions must be adopted pursuant to the Michigan Zoning Enabling Act.¹ A step-by-step checklist of procedures to amend the zoning ordinance is available from Michigan State University Extension's *Land Use Series*: "Checklist # 4: For Adoption of a Zoning Ordinance Amendment (including some PUDs) in Michigan" is available from www.msue.msu.edu/lu.
- **Township with county zoning:** If this is being done in a township that relies on county zoning, then the township must work with the county planning commission so these provisions are placed in the county's zoning ordinance pursuant to the Michigan Zoning Enabling Act.²
- **Zoning does not exist:** If this is being done in a township, village or city where zoning does not exist, then it is not possible to adopt these regulations concerning wind energy systems without first adopting zoning.

There are many different ways for a zoning ordinance to deal with the issues outlined here. The sample provided here is just one. It is written with the following assumptions:

1. The municipality already has site plan review in its zoning ordinance.
 2. The section numbering system follows the standard system of codification presented in Michigan State University Extension's *Land Use Series*: "Organization and Codification of a Zoning Ordinance", available from www.msue.msu.edu/lu.
 3. The municipality's attorney will review any proposed amendments before they are adopted.
- Following are the sample zoning amendments with commentary.

Definitions

Add the following definitions to Section 503 (the section of the zoning ordinance for definitions of words).

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

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

ANSI means the American National Standards Institute.

¹P.A. 110 of 2006, as amended, (being the Michigan Zoning Enabling Act, M.C.L. 125.3101 *et seq.*)

²P.A. 110 of 2006, as amended, (being the Michigan Zoning Enabling Act, M.C.L. 125.3101 *et seq.*). A step-by-step checklist of procedures to amend the zoning ordinance is available from Michigan State University Extension's *Land Use Series*: "Checklist # 4: For Adoption of a Zoning Ordinance Amendment (including some PUDs) in Michigan" is available from www.msue.msu.edu/lu.

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

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

IEC means the International Electrotechnical Commission.

ISO means the International Organization for Standardization.

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

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

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

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

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

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

UTILITY GRID WIND ENERGY SYSTEM means a land use for generating power by use of wind at multiple tower locations in a community and includes accessory uses such as but not limited to a SCADA TOWER, electric substation. A UTILITY GRID WIND ENERGY SYSTEM is designed and built to provide electricity to the electric utility grid.

WIND ENERGY SYSTEM means a land use for generating power by use of wind; utilizing use of a wind turbine generator and includes the turbine, blades, and tower as well as related electrical equipment. This does not include wiring to connect the wind energy system to the grid. See also ON-SITE WIND ENERGY SYSTEM and UTILITY GRID WIND ENERGY SYSTEM.

WIND SITE ASSESSMENT means an assessment to determine the wind speeds at a specific site and the feasibility of using that site for construction of a wind energy system.

The IEC is the leading global organization that prepares and publishes international standards for all electrical, electronic and related technologies.

ISO is a network of the national standards institutes of 156 countries.

General Provisions

Add to Article 10 subpart 107 (a part of the general provisions of the zoning ordinance dealing with structures and accessory structures) the following provisions for small wind energy systems with short towers as a use by right. That means a special use permit is not required.

1074. On-site Use Wind Energy Systems and Anemometer Tower.

An On-site Use wind energy system is an accessory use which shall meet the following standards:

- A. Designed to primarily serve the needs of a home, farm, or small business.

- B. Shall have a tower height of 20 meters or less.
- C. Property Set-back: The distance between an On-site Use wind energy system and the owner's property lines shall be equal to the height of the wind energy system tower including the top of the blade in its vertical position. The distance between an anemometer tower and the owner's property lines shall be equal to the height of the tower. No part of the wind energy system structure, including guy wire anchors, may extend closer than ten feet to the owner's property lines, or the distance of the required setback in the respective zoning district, whichever results in the greater setback.
- D. Sound Pressure Level: On-site Use wind energy systems shall not exceed 55 dB(A) at the property line closest to the wind energy system. This sound pressure level may be exceeded during short-term events such as utility outages and/or severe wind storms. If the ambient sound pressure level exceeds 55 dB(A), the standard shall be ambient dB(A) plus 5 dB(A).
- E. Construction Codes, Towers, & Interconnection Standards: On-site Use wind energy systems including towers shall comply with all applicable state construction and electrical codes and local building permit requirements. On-site Use wind energy systems including towers shall comply with Federal Aviation Administration requirements, the Michigan Airport Zoning Act (Public Act 23 of 1950, MCL 259.431 *et seq.*), the Michigan Tall Structures Act (Public Act 259 of 1959, MCL 259.481 *et seq.*), and local jurisdiction airport overlay zone regulations. An interconnected On-site Use wind energy system shall comply with Michigan Public Service Commission and Federal Energy Regulatory Commission standards. Off-grid systems are exempt from this requirement.
- F. Safety: An On-site Use wind energy system shall have automatic braking, governing, or a feathering system to prevent uncontrolled rotation or over speeding. All wind towers shall have lightning protection. If a tower is supported by guy wires, the wires shall be clearly visible to a height of at least six feet above the guy wire anchors. The minimum vertical blade tip clearance from

Commentary: Another way to differentiate between On-Site Use and Utility Grid wind energy systems is size of the generators. Early drafts of this sample language made a distinction between a small wind energy system which has a rated capacity of not more than 300 kW and a large wind energy system greater than 300 kW. It was decided that use rather than size was a better way to classify wind energy systems for siting purposes.

Commentary: The property set-back requirement is designed to protect neighbors in the unlikely event of a tower failure. A setback equal to the tower's height should be adequate, but some communities require 1½ times the tower height as the setback.

Commentary: Normal conversation is in the range of 50-65 dB(A). There is more commentary under the Utility Grid section of this document.

Commentary: Safety issues are addressed by reference to state construction and electrical codes and federal and state requirements related to towers. Safety issues are also addressed by provisions related to property set-backs, lowest point of blade, wind energy system controls, lightning protection, guy wire visibility, and interconnection standards.

grade shall be 20 feet for a wind energy system employing a horizontal axis rotor.

Special Use Standards

Add a section to Article 16 (the part of the zoning ordinance for specific special use permit standards).

1609. Utility Grid Wind Energy System, On-site Use Wind Energy System over 20 meters high, and Anemometer Towers over 20 meters high.

An Utility Grid Wind Energy System, On-site Use Wind Energy System over 20 meters high, and Anemometer Towers over 20 meters high shall meet the following standards in addition to the general special use standards (section 8608 of this ordinance):

A. Property Set-Back:

1. Anemometer Tower setback shall be the greater distance of the following:
 - a. The setback from property lines of the respective zoning district;
 - b. The setback from the road right-of-way; and
 - c. A distance equal to the height of the tower from property lines or from the lease unit boundary, which ever is less.
2. Utility Grid and On-site Use Wind Energy System setback shall be greater distance the following:
 - a. The setback from property lines of the respective zoning district;
 - b. The setback from the road right-of-way; and
 - c. A distance equal to the height of the tower including the top of the blade in its vertical position from property lines or from the lease unit boundary, which ever is less.
3. An Operations and Maintenance Office building, a sub-station, or ancillary equipment shall comply with any property set-back requirement of the respective zoning district. Overhead transmission lines and power poles shall comply with the set-back and placement requirements applicable to public utilities.

Background: Prior to construction of a Utility Grid wind energy system, a wind site assessment is conducted to determine the wind speeds and the feasibility of using the site. Installation of anemometer towers is considered a Special Land Use in this sample.

Commentary: Utility Grid wind energy systems may be treated as Special Land Uses under local zoning ordinances. Local governments may also decide to enter into a “Development Agreement” with a wind energy company that also incorporates suitable conditions or may develop a “Wind Overlay Zone” as an addition to or amendment of their existing zoning ordinances. For example, Huron County has developed a Wind Energy Conversion Facility Overlay Zoning Ordinance.

Commentary: The property set-back requirement is designed to protect neighbors in the unlikely event of a tower failure. A setback equal to the tower’s height should be adequate, but some communities require 1½ times the tower height as the setback.

- B. Sound Pressure Level: The sound pressure level shall not exceed 55 dB(A) measured at the property lines or the lease unit boundary, whichever is farther from the source of the noise. This sound pressure level shall not be exceeded for more than three minutes in any hour of the day. If the ambient sound pressure level exceeds 55 dB(A), the standard shall be ambient dB(A) plus 5 dB(A).

Commentary: Safety issues are addressed by reference to state construction and electrical codes and federal and state requirements related to towers. Safety issues are also addressed by provisions related to property set-backs, lowest point of blade, interconnection standards, falling ice, access doors, and handling of materials.

- C. Safety: Shall be designed to prevent unauthorized access to electrical and mechanical components and shall have access doors that are kept securely locked at all times when service personnel are not present. All spent lubricants and cooling fluids shall be properly and safely removed in a timely manner from the site of the wind energy system. A sign shall be posted near the tower or Operations and Maintenance Office building that will contain emergency contact information. Signage placed at the road access shall be used to warn visitors about the potential danger of falling ice. The minimum vertical blade tip clearance from grade shall be 20 feet for a wind energy system employing a horizontal axis rotor.
- D. Post-Construction Permits: Construction Codes, Towers, and Interconnection Standards: Shall comply with all applicable state construction and electrical codes and local building permit requirements.
- E. Pre-Application Permits:
1. Utility Infrastructure: Shall comply with Federal Aviation Administration (FAA) requirements, the Michigan Airport Zoning Act (Public Act 23

Commentary: Noise issues are complex and many communities do not have any detailed noise standards. Normal conversation is in the range of 50-65 dB(A). Noise standards may consider the potential for bodily injury, long term health effects, interference with speech and other activities, and sleep disturbance. EPA and World Health Organization documents indicate that 55 dB(A) is too low to produce hearing loss or long-term health effects.^{1&2} Related to speech interference, would 55 dB(A) interfere with speech at the property line? EPA has estimated that the distance between persons would have to be 4 meters before there would be any interference.¹ Related to sleep disturbance, the World Health Organization notes that “80-90% of the reported cases of sleep disturbance in noisy environments are for reasons other than noise originating outdoors” and “habituation to night-time noise events occurs.”² EPA has noted that the typical sound level reduction of buildings in cold climates is 17 dB (windows opened) and 27 dB (windows closed) so 55 dB outdoors would be reduced to no more than 28-38 dB indoors.¹

References:

1. EPA, 1974. Protective Noise Levels: Condensed Version of EPA Levels Document.
2. World Health Organization, 1999. Guidelines for Community Noise. The guidelines recommend basic standards for sound pressure levels. The standards can be more detailed and sophisticated. Separate standards can be developed for infranoise and low-frequency sound pressure levels. Separate standards can be developed for residential and non-residential areas. Sound pressure levels characterized as tonal can have lower limits. For example, the Huron County ordinance reduces their standard by 5 dB(A) in the event audible noise from the wind energy system contains a steady pure tone. Local governments who desire a more refined standard may want to consider developing a noise ordinance that would cover all generators of sound pressure levels not just wind systems in a fair and consistent manner.

of 1950 as amended, M.C.L. 259.431 *et seq.*), the Michigan Tall Structures Act (Public Act 259 of 1959 as amended, M.C.L. 259.481 *et seq.*), and local jurisdiction airport overlay zone regulations. The minimum FAA lighting standards shall not be exceeded. All tower lighting required by the FAA shall be shielded to the extent possible to reduce glare and visibility from the ground. The tower shaft shall not be illuminated unless required by the FAA. Utility Grid wind energy systems shall comply with applicable utility, Michigan Public Service Commission, and Federal Energy Regulatory Commission interconnection standards.

2. Environment:
 - a. The site plan and other documents and drawings shall show mitigation measures to minimize potential impacts on the natural environment including, but not limited to wetlands and other fragile ecosystems, historical and cultural sites, and antiquities, as identified in the Environmental Analysis.
 - b. Comply with applicable parts of the Michigan Natural Resources and Environmental Protection Act (Act 451 of 1994, M.C.L. 324.101 *et seq.*) (including but not limited to:
 - i. Part 31 Water Resources Protection (M.C.L. 324.3101 *et seq.*),
 - ii. Part 91 Soil Erosion and Sedimentation Control (M.C.L. 324.9101 *et seq.*),
 - iii. Part 301 Inland Lakes and Streams (M.C.L. 324.30101 *et seq.*),
 - iv. Part 303 Wetlands (M.C.L. 324.30301 *et seq.*),
 - v. Part 323 Shoreland Protection and Management (M.C.L. 324.32301 *et seq.*),
 - vi. Part 325 Great Lakes Submerged Lands (M.C.L. 324.32501 *et seq.*), and
 - vii. Part 353 Sand Dunes Protection and Management (M.C.L. 324.35301 *et seq.*)) as shown by having obtained each respective permit with requirements and limitations of those permits reflected on the site plan.
- F. Performance Security: Performance Security, pursuant to section 8611 of this Ordinance, shall be provided for the applicant making repairs to public roads damaged by the construction of the wind energy system.

Commentary: Environmental issues are complex. These guidelines identify areas that should be addressed in an Environmental Impact Analysis, but do not specify how the analysis should be conducted. Site specific issues should determine which issues are emphasized and studied in-depth in the analysis. There are a number of state and federal laws that may apply depending on the site.

- G. Utilities: Power lines should be placed underground, when feasible, to prevent avian collisions and electrocutions. All above-ground lines, transformers, or conductors should comply with the Avian Power Line Interaction Committee (APLIC, <http://www.aplic.org/>) published standards to prevent avian mortality.
- H. The following standards apply only to Utility Grid Wind Energy Systems:
1. Visual Impact: Utility Grid wind energy system projects shall use tubular towers and all Utility Grid wind energy systems in a project shall be finished in a single, non-reflective matte finished color. A project shall be constructed using wind energy systems of similar design, size, operation, and appearance throughout the project. No lettering, company insignia, advertising, or graphics shall be on any part of the tower, hub, or blades. Nacelles may have lettering that exhibits the manufacturer's and/or owner's identification. The applicant shall avoid state or federal scenic areas and significant visual resources listed in the local unit of government's Plan.
 2. Avian and Wildlife Impact: Site plan and other documents and drawings shall show mitigation measures to minimize potential impacts on avian and wildlife, as identified in the Avian and Wildlife Impact analysis.
 3. Shadow Flicker: Site plan and other documents and drawings shall show mitigation measures to minimize potential impacts from shadow flicker, as identified in the Shadow Flicker Impact Analysis.
 4. Decommissioning: A planning

Commentary: These guidelines identify areas that should be addressed in an Avian and Wildlife Impact Analysis but do not specify how the analysis should be conducted. Site specific issues should determine which issues are emphasized and studied in-depth in the analysis. To assist applicants to minimize, eliminate, or mitigate potential adverse impacts, the U.S. Fish and Wildlife Service has developed Interim Guidance on Avoiding and Minimizing Wildlife Impacts from Wind Turbines which can be found at <http://www.fws.gov/habitatconservation/wind.pdf>. If the local government desires more structure to the analysis requirements, the Potential Impact Index developed by the U.S. Fish and Wildlife Service provides a framework for evaluating a project's impact on wildlife.

Applicants must comply with applicable sections of the federal Endangered Species Act and Michigan's Endangered Species Protection Law. The applicant should be aware that taking of these species is prohibited by State and/or Federal law unless the proper permits or exemptions are acquired. Early coordination with state and federal agencies is recommended. The applicant or the applicant's impact analyst should contact the U.S. Fish and Wildlife Service's East Lansing Field Office regarding federally-listed species and the Michigan Dept. of Natural Resources for state-listed species.

Commentary: Visual impact issues are difficult to address. Individuals seem to either like or dislike the look of wind energy systems. These guidelines try to address visual impact issues by providing some design standards and by restricting commercial advertising.

commission approved decommissioning plan indicating 1) the anticipated life of the project, 2) the estimated decommissioning costs net of salvage value in current dollars, 3) the method of ensuring that funds will be available for decommissioning and restoration, and 4) the anticipated manner in which the project will be decommissioned and the site restored.

5. Complaint Resolution: A planning commission approved process to resolve complaints from nearby residents concerning the construction or operation of the project
6. Electromagnetic Interference: No Utility Grid wind energy system shall be installed in any location where its proximity to existing fixed broadcast, retransmission, or reception antennae for radio, television, or wireless phone or other personal communication systems would produce electromagnetic interference with signal transmission or reception unless the applicant provides a replacement signal to the affected party that will restore reception to at least the level present before operation of the wind energy system. No Utility Grid wind energy system shall be installed in any location within the line of sight of an existing microwave communications link where operation of the wind energy system is likely to produce electromagnetic interference in the link's operation unless the interference is insignificant.

Zoning Districts

Add, where appropriate, to each land use district's list of possible special land uses the following:

1. Anemometer Tower over 20 meters high.
2. Utility Grid Wind Energy System.
3. On-site Use Wind Energy System over 20 meters high.

Site Plan Review

Add a section to Article 94 (the part of the zoning ordinance covering what is included in a site plan) to include additional items which should be shown on a site plan, and included in supporting documents for wind energy systems.

9407. Site Plans for Anemometer Tower, Utility Grid Wind Energy System, and On-site Use Wind Energy System.

In addition to the requirements for a site plan found in sections 9404, 9405, and 9406 of this Ordinance, site plans and supporting documents for Anemometer Tower, Utility Grid Wind Energy System, and On-site Use Wind Energy Systems which are over 20 meters high shall include

Comment: As indicated earlier, this sample is written with the assumption the requirement for site plans is already a requirement in the zoning ordinance. Further, that the site plan and/or permit application already requires basic information such as applicant identification; parcel identification including boundaries; scale; north point, natural features, location of structures and drives (existing and proposed); neighboring drives, buildings, etc.; topography; existing and proposed utilities; open spaces, landscaping, buffering features; soils data; and so on.

Also it is assumed the zoning ordinance requires all other applicable permits to be obtained prior to submission of the site plan, or at least the site plan prepared as will be required by other permitting agencies (when concurrent permitting will take place).

Finally it is assumed the ordinance already provides for an application fee and a site plan review fee in an amount specified in a published fee schedule adopted by the legislative body of the local unit of government. As with all fees, the amount must be set to cover anticipated actual cost of the application review.

the following additional information:

- A. Documentation that sound pressure level, construction code, tower, interconnection (if applicable), and safety requirements have been reviewed and the submitted site plan is prepared to show compliance with these issues.
- B. Proof of the applicant's public liability insurance for the project.
- C. A copy of that portion of all the applicant's lease(s) with the land owner(s) granting authority to install the the Anemometer Tower and/or Utility Grid Wind Energy System; legal description of the property(ies), Lease Unit(s); and the site plan shows the boundaries of the leases as well as the boundaries of the Lease Unit Boundary.
- D. The phases, or parts of construction, with a construction schedule.
- E. The project area boundaries.
- F. The location, height, and dimensions of all existing and proposed structures and fencing.
- G. The location, grades, and dimensions of all temporary and permanent on-site and access roads from the nearest county or state maintained road.
- H. All new infrastructure above ground related to the project.
- I. A copy of Manufacturers' Material Safety Data Sheet(s) which shall include the type and quantity of all materials used in the operation of all equipment including, but not limited to, all lubricants and coolants.
- J. For Utility Grid Wind Energy Systems only:
 1. A copy of a noise modeling and analysis report and the site plan shall show locations of equipment identified as a source of noise which is placed, based on the analysis, so that the wind energy system will not exceed the maximum permitted sound pressure levels. The noise modeling and analysis shall conform to IEC 61400 and ISO 9613. After installation of the Utility Grid wind energy system, sound pressure level measurements shall be done by a third party, qualified professional according to the procedures in the most current version of ANSI S12.18. All sound pressure levels shall be measured with a sound meter that meets or exceeds the most current version of ANSI S1.4 specifications for a Type II sound meter. Documentation of the sound pressure level measurements shall be provided to the local government within 60 days of the commercial operation of the project.
 2. A visual impact simulation showing the completed site as proposed on the submitted site plan. The visual impact simulation shall be from four viewable angles.
 3. A copy of an Environment Analysis by a third party qualified professional to identify and assess any potential impacts on the natural environment including, but not limited to wetlands and other fragile ecosystems, historical and cultural sites, and antiquities. The applicant shall take appropriate measures to minimize, eliminate or mitigate adverse impacts identified in the analysis, and shall show those measures on the site plan. The applicant shall identify and evaluate the significance of any net effects or concerns that will remain after mitigation efforts.
 4. A copy of an Avian and Wildlife Impact Analysis by a third party qualified professional to identify and assess any potential impacts on wildlife and endangered species. The applicant shall take appropriate measures to minimize, eliminate or mitigate adverse impacts identified in the analysis, and shall show those measures on the site plan. The applicant shall identify and evaluate the significance of any net effects or concerns that will remain after mitigation efforts.

(Sites requiring special scrutiny include wildlife refuges, other areas where birds are highly concentrated, bat hibernacula, wooded ridge tops that attract wildlife, sites that are frequented by federally and/or state listed endangered species of birds and bats, significant bird migration pathways, and areas that have landscape features known to attract large numbers of raptor.)

(At a minimum, the analysis shall include a thorough review of existing information regarding species and potential habitats in the vicinity of the project area.. Where appropriate, surveys for bats, raptors, and general avian use should be conducted. The analysis shall include the potential effects on species listed under the federal

Endangered Species Act and Michigan's Endangered Species Protection Law.)

(The analysis shall indicate whether a post construction wildlife mortality study will be conducted and, if not, the reasons why such a study does not need to be conducted.)

5. A copy of a shadow flicker analysis at occupied structures to identify the locations of shadow flicker that may be caused by the project and the expected durations of the flicker at these locations from sun-rise to sun-set over the course of a year. The site plan shall identify problem areas where shadow flicker may affect the occupants of the structures and show measures that shall be taken to eliminate or mitigate the problems.
6. A second site plan, which includes all the information found in sections 9404, 9405, and 9406 of this Ordinance, and shows the restoration plan for the site after completion of the project which includes the following supporting documentation:
 - a. The anticipated life of the project.
 - b. The estimated decommissioning costs net of salvage value in current dollars.
 - c. The method of ensuring that funds will be available for decommissioning and restoration.
 - d. The anticipated manner in which the project will be decommissioned and the site restored.
7. A description of the complaint resolution process developed by the applicant to resolve complaints from nearby residents concerning the construction or operation of the project. The process may use an independent mediator or arbitrator and shall include a time limit for acting on a complaint. The process shall not preclude the local government from acting on a complaint. During construction the applicant shall maintain and make available to nearby residents a telephone number where a project representative can be reached during normal business hours.

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