

SHADOW FLICKER AND BLADE GLINT

Cary Weed

11/03/06

EXAMPLES FROM OTHER ORDINANCES

Shawano

Regulation

- 5.17 Shadow Flicker or Blade Glint: The facility shall be designed such that shadow flicker or blade glint will not fall on, or in any existing sensitive receptor. Shadow flicker or blade glint expected to fall on a roadway or a portion of a residential parcel may be acceptable under the following circumstances;
 - 5.17.1 The flicker or glint will not exceed 10 hours per year; and
 - 5.17.2 The flicker or glint will fall more than 100 feet from an existing residence; or
 - 5.17.3 The traffic volumes are less than 500 vehicles per day on the roadway.
 - 5.17.4 The flicker or glint shall not fall onto an intersection.
 - If shadow flicker or blade glint exceeds any of the conditions listed in Sections 5.17.1-5.17.4, the source WECU(s) shall be shut down until the flicker or glint problem is remedied.

Application Requirements

- Shadow flicker and blade glint zone map: The applicant shall provide a shadow flicker and blade glint model for any proposed wind energy conversion unit. The model shall:
 - Model and describe the zones where shadow flicker and blade glint will likely be present within the project boundary and a one-mile radius beyond the project boundary. Include the topography, existing residences and locations of their windows, locations of other structures, wind speeds and directions, and existing vegetation and roadways. The model shall represent the most probable scenarios of wind constancy, sunshine constancy, and wind directions and speeds.
 - Calculate the locations of shadow flicker caused by the proposed project and the expected durations of the flicker at these locations, calculate the total number of hours per year of flicker at all locations.
 - Identify problem zones where shadow flicker will interfere with existing or future residences and roadways and describe proposed measures to mitigate these problems, including but not limited to a change in siting of the facility, a change in the operation of the facility, or grading or landscaping mitigation measures.
 - Name and address of property owners within shadow flicker and/or blade glint zones. Considering that development rights of adjacent property owners may be forfeited due to these zones as per this ordinance, a written agreement for non-development within the specified zone must be obtained and recorded on the affected properties' deeds. Copies of the agreements must be submitted with the application

Eveline

Regulation

d. The facility shall be designed such that shadow flicker will not fall on, or in, any existing dwelling. Shadow flicker expected to fall on a roadway or a portion of a residential parcel may be acceptable under the following circumstances:

- i. The flicker will not exceed 30 hours per year; and
- ii. The flicker will fall more than 100 feet from an existing residence; or
- iii. The traffic volumes are less than 500 vehicles per day on the roadway.

Application Requirement

16. Shadow Flicker. The applicant shall provide a shadow flicker model for any proposed wind turbine generator tower. The model shall:

- a. Map and describe within a one-mile radius of the proposed project site the topography, existing residences and location of their windows, locations of other structures, wind speeds and directions, existing vegetation and roadways. The model shall represent the most probable scenarios of wind constancy, sunshine constancy, and wind directions and speeds;
- b. Calculate the locations of shadow flicker caused by the proposed project and the expected durations of the flicker at these locations, calculate the total number of hours per year of flicker at all locations;
- c. Identify problem areas where shadow flicker will interfere with existing or future residences and roadways and describe proposed measures to mitigate these problems, including, but not limited to, a change in siting of the facility, a change in the operation of the facility, or grading or landscaping mitigation measures.

State Guidelines

Regulations

10. Shadow Flicker: The applicant shall conduct an analysis on potential shadow flicker at occupied structures. The analysis shall 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 analysis shall identify problem areas where shadow flicker may affect the occupants of the structures and describe measures that shall be taken to eliminate or mitigate the problems.

Application Requirement

Shadow Flicker: Copy of the Shadow Flicker analysis

PROPOSAL FOR CENTERVILLE TOWNSHIP

Definitions

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

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

Regulation

Shadow Flicker and Blade Glint:

- A wind energy system shall be designed and operated so that shadow flicker from moving blades or reflected blade glint will not occur off the site on which the facility is located. Shadow flicker or blade glint expected to fall on a roadway or a portion of an off-site parcel may be acceptable under the following conditions

- The flicker or glint will not exceed 30 hours per year (*In Germany there has been a court case in which the judge tolerated 30 hours of actual shadow flicker per year at a certain neighbour's property* <http://www.windpower.org/en/tour/env/shadow/index.htm>); and
- The flicker or glint will fall more than 100 feet from an existing or future residence; or
- The affected property owner has signed a written agreement with the owner-operator
- The traffic volumes are less than 500 vehicles per day on the roadway.
- If shadow flicker or blade glint violate any of these conditions, the problem should be reported to the Township Planning Commission.

Application Requirements

- The applicant shall submit a shadow flicker and blade glint analysis and computer simulation or model including topography and structures. The analysis and model shall identify the locations of shadow flicker and blade glint caused by the wind energy system and the expected durations of the shadow flicker and blade glint at these locations from sun-rise to sun-set over the course of a year. The analysis and model shall identify problem areas where shadow flicker or blade glint may affect parcels of land, roadways, and existing or future structures. The analysis and model also shall describe measures that shall be taken to eliminate or mitigate the problems, including, but not limited to, a change in siting of the facility, a change in the operation of the facility, or grading or landscaping mitigation measures.
- The applicant shall submit copies of agreements signed with adjacent property owners affected by shadow flicker and/or blade glint.

(These regulations and application requirements are a combination of Shawano, Eveline Township, and State Guidelines.)