DOE/EA-1800D

DRAFT
ENVIRONMENTAL ASSESSMENT

FOR

MONARCH
WARREN COUNTY WIND TURBINE PROJECT

LENOX TOWNSHIP
WARREN COUNTY, ILLINOIS

US Department of Energy
Office of Energy Efficiency and Renewable Energy
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COVER SHEET

RESPONSIBLE AGENCY: U.S. Department of Energy

TITLE: *Draft Environmental Assessment: Monarch Warren County Wind Turbine Project, Lenox Township, Warren County, Illinois* (DOE/EA-1800D)

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ABSTRACT: The U.S. Department of Energy (DOE) has provided Federal funding to the Illinois Department of Commerce and Economic Opportunity (DCEO) under the State Energy Program (SEP). DCEO is seeking to provide $5 million of its SEP funds to Monarch Wind Power (MWP), who would use these funds for the design, permitting and construction of 12, 1.6-megawatt wind turbines, for a combined generation capacity of 19.2 megawatts.

Prior to DOE deciding whether to authorize DCEO to provide SEP funds to the Monarch Warren County Wind Turbine Project (proposed project; MWTP), DOE must first complete review under the *National Environmental Policy Act* (NEPA). This Draft EA analyzes the environmental impacts of the construction, operation, and decommissioning of the proposed project and the alternative of not implementing this project (the No-Action Alternative).

DOE has authorized DCEO to use a percentage of the Federal funding for preliminary activities, which include the EA preparation and studies. Such activities are associated with the proposed project and would not significantly impact the environment nor represent an irreversible or irretrievable commitment of resources in advance of DOE completing the NEPA process for the proposed project.

The proposed project would provide 64,551 megawatt-hours of renewable energy per year that is currently obtained from primarily fossil fuel sources. MWP has selected the General Electric (GE) 1.6xle turbine model with a 271-foot rotor diameter and a 328-foot tower height. Overall, the turbine would stand 464 feet at its tallest blade extent. The project would include approximately 2.3 miles of access roads, an electrical substation, and 2.5 miles of underground electrical transmission cables to connect the project to an existing distribution line that intersects the site. The proposed project would be located on approximately 600 acres of land leased in Lenox Township, Warren County, Illinois.

PUBLIC INVOLVEMENT: The public is provided with an opportunity to comment on this Draft EA by sending comments via email, mail, or fax marked to the attention of the NEPA Document Manager listed above. Envelopes and the subject line of emails should be labeled "Monarch Warren County Wind Project Draft EA Comments." Letters and emails should be postmarked or dated, respectively, no later than March 29, 2011. Use of email to submit comments will avoid processing delays associated with delivery of mail to Federal agencies in Washington, D.C.

AVAILABILITY: This EA is available for review on the DOE Golden Field Office Reading Room Website, http://www.eere.energy.gov/golden/Reading_Room.aspx, and the DOE NEPA Website, http://nepa.energy.gov/draft_environmental_assessments.htm.

ACRONYMS AND ABBREVIATIONS

APE	area of potential effect
BMP	best management practice
CFR	Code of Federal Regulations
dBA	Decibel on an A-weighted scale, used to approximate the human ear's response to sound
DCEO	Department of Commerce and Economic Opportunity
DNL	Day-Night Average Sound Level
DOE	U.S. Department of Energy
EA	Environmental Assessment
EcoCAT	Ecological Compliance Assessment Tool
EIS	Environmental Impact Statement
EMF	electromagnetic field
EPA	U.S. Environmental Protection Agency
FAA	Federal Aviation Administration
FONSI	Finding of No Significant Impact
GE	General Electric
GHG	greenhouse gas
GPS	global positioning system
IDNR	Illinois Department of Natural Resources
IDOA	Illinois Department of Agriculture
IHPA	Illinois Historic Preservation Agency
IPCB	Illinois Pollution Control Board
MBTA	*Migratory Bird Treaty Act*
MWP	Monarch Wind Power
MWTP	Monarch Warren County Wind Turbine Project
NEPA	*National Environmental Policy Act*
NHPA	*National Historic Preservation Act*
NOA	Notice of Availability
NPDES	National Pollutant Discharge Elimination System
NRHP	National Register of Historic Places
NTIA	National Telecommunications and Information Administration
OSHA	Occupational Safety and Health Administration
SEP	State Energy Program
SHPO	State Historic Preservation Office(r)
Recovery Act	*American Recovery and Reinvestment Act of 2009*
TCNS	Tribal Consultation Notification System
U.S.C.	United States Code
USFWS	U.S. Fish and Wildlife Service

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1. INTRODUCTION

1.1 National Environmental Policy Act and Related Procedures

The *National Environmental Policy Act* (42 U.S.C. 4321 *et seq*.; NEPA), the Council on Environmental Quality's NEPA regulations [40 *Code of Federal Regulations* (CFR) Parts 1500 to 1508], and the U.S. Department of Energy (DOE) NEPA implementing procedures (10 CFR Part 1021) require that DOE consider the potential environmental impacts of a proposed action before making a decision. This requirement applies to decisions about whether to provide different types of financial assistance to States and private entities.

This Environmental Assessment (EA):

- Examines the potential environmental impacts of the Proposed Action and the No-Action Alternative;
- Identifies unavoidable adverse environmental impacts of the Proposed Action;
- Describes the relationship between local short-term uses of the environment and the maintenance and enhancement of long-term productivity; and
- Characterizes any irreversible and irretrievable commitments of resources that would be involved should DOE decide to implement its Proposed Action.

This EA provides DOE and other decisionmakers the information needed to make an informed decision about the installation, operation, and eventual decommissioning of the proposed wind project. The EA evaluates the potential individual and cumulative impacts of the proposed project. For purposes of comparison, this EA also evaluates the impacts that could occur if DOE did not provide funding (the No-Action Alternative); under which DOE assumes the project would not proceed. The EA does not analyze other action alternatives.

1.2 Background

Monarch Wind Power (MWP) proposes to construct, operate, and eventually decommission a 12-turbine, 19.2-megawatt wind energy project on approximately 600 acres of land leased in Warren County, Illinois, in collaboration with General Electric (GE) Energy (the turbine supplier) and WPCS International Incorporated (the development and installation contractor). The site is about 4 miles south of Monmouth in west central Illinois along both sides of U.S. Highway 67 (Figure 1-1). The entire 19.2-megawatt facility would be interconnected to an existing Ameren (the local utility) radial 69-kilovolt distribution line that runs along Highway 67 (line #6630) and traverses the site. Each wind turbine would have a hub height of approximately 328 feet and a rotor diameter of roughly 271 feet, for a total overall wind turbine height of 464 feet.

The current estimated project cost is approximately $37 million. The Illinois Department of Commerce and Economic Opportunity (DCEO) selected MWP to receive a $5 million grant for this project. This grant would come from money that Illinois received from the DOE State

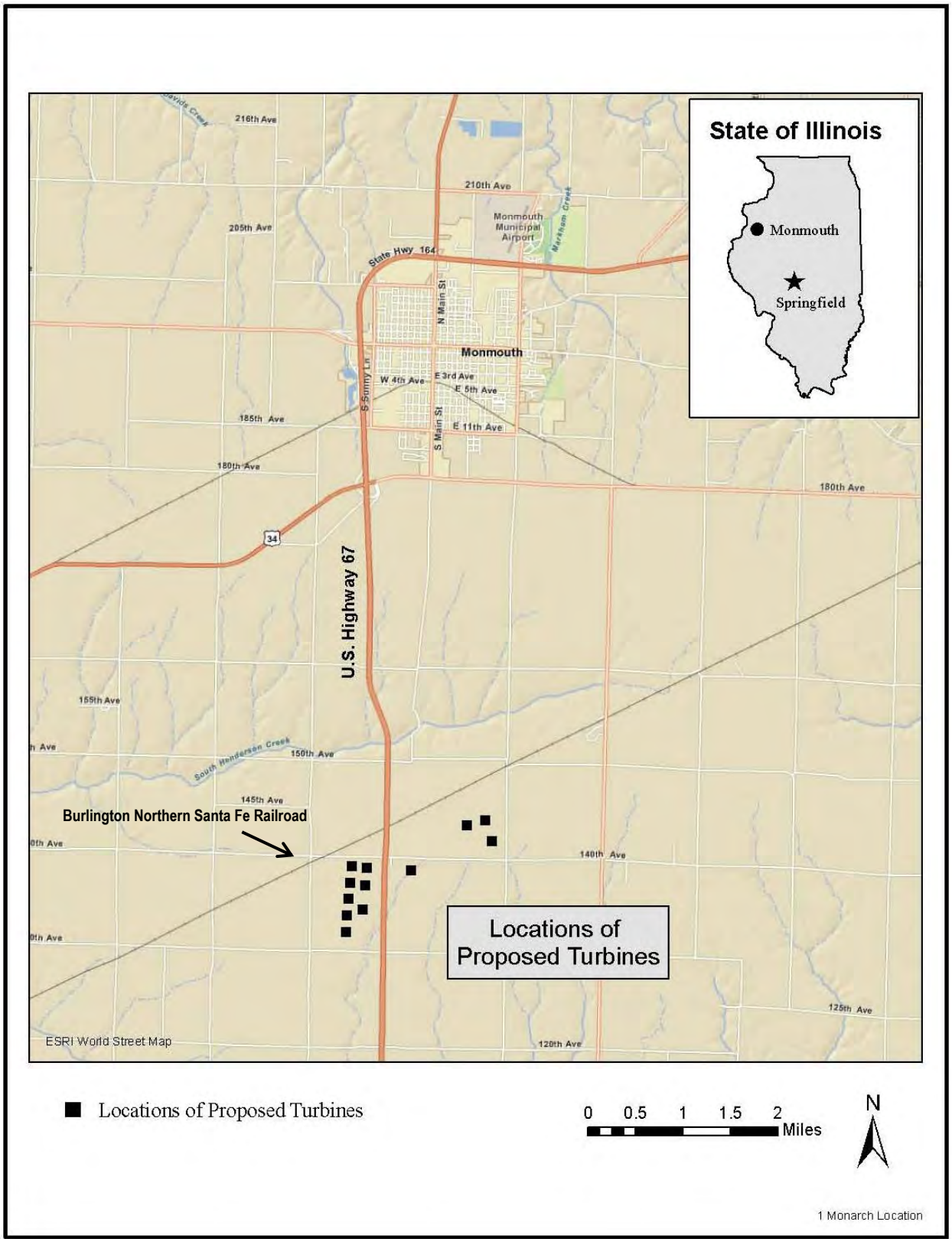

Figure 1-1. Project Location

Energy Program (SEP) under the *American Recovery and Reinvestment Act of 2009* (Pub. L. 111-5, 123 Stat. 115; Recovery Act).

The purpose of the DOE SEP is to promote the conservation of energy and reduce dependence on imported oil by helping States develop comprehensive energy programs and by providing them with technical and financial assistance. SEP is authorized under the *Energy Policy and Conservation Act*, as amended (42 U.S.C. 6321 *et seq*.). States can use SEP funds for a wide variety of activities related to energy efficiency and renewable energy (42 U.S.C. 6321 *et seq*. and 10 CFR Part 420). In the Recovery Act, Congress appropriated $3.1 billion to the DOE SEP, and the State of Illinois received $101,321,000 pursuant to a Federal statutory formula for distributing these funds.

The State of Illinois selected the Monarch Warren County Wind Turbine Project (MWTP) because it meets SEP criteria for selection by reducing fossil fuel use and deploying renewable energy technologies. The potential use of Federal SEP funds to assist in the financing of this project constitutes a Federal action subject to review under NEPA.

In compliance with NEPA regulations, this Draft EA examines the potential environmental impacts of DOE's Proposed Action (authorizing funding for the design, permitting, and construction of the MWTP) and the No-Action Alternative. This EA also describes options that MWP (sub-recipient) considered during development of its application to the State of Illinois, the recipient of Federal funding under the DOE SEP. When complete, this EA will provide DOE with the information needed to make an informed decision about whether allowing the recipient to provide some of its Federal funds for the proposed project may result in significant environmental impacts. Based on the Final EA, DOE either will issue a Finding of No Significant Impact (FONSI), which may include mitigation measures, or determine that additional study is needed in the form of a more detailed EIS.

1.3 Purpose and Need

1.3.1 DOE'S PURPOSE AND NEED

DOE's purpose and need is to ensure that SEP funds are used for activities that meet congressional statutory aims to improve energy efficiency, reduce dependence on imported oil, decrease energy consumption, create and retain jobs, and promote renewable energy. Providing funding as part of the Illinois SEP grant to MWP would partially satisfy the need of the DOE SEP to assist U.S. cities, counties, states, territories, and American Indian tribes to develop, promote, implement, and manage energy efficiency and conservation projects and programs designed to:

- Reduce fossil fuel emissions;
- Reduce the total energy use of the eligible entities;
- Improve energy efficiency in the transportation, building, and other appropriate sectors; and
- Create and retain jobs

Congress enacted the Recovery Act to create jobs and restore economic growth through measures that, among other things, modernize the nation's infrastructure and improve energy efficiency. Provision of SEP funds for the proposed project would partially meet these goals.

1.3.2 ILLINOIS' PURPOSE AND NEED

Illinois' purpose and need is to grow the economy of the state by connecting companies and communities to financial and technical resources to deploy renewable energy technologies, and to support the goals of SEP and the Recovery Act to reduce energy costs, reduce reliance on imported energy, and to preserve and create jobs.

1.4 Illinois' SEP Selection Process

The Illinois SEP is using its Recovery Act funding for programs to increase the energy efficiency of businesses and industry while promoting deployment of clean energy projects that will help improve the cost effectiveness and economic stability of businesses and industry in the state. The Illinois DCEO is using its Recovery Act funds for four sub-programs:

- Energy Efficiency Development
- Renewable Energy Development
- Green Manufacturing
- Biofuels Development

Illinois DCEO issued a Request for Proposal for the "Renewable Energy Development" sub-program on August 20, 2009, and used the following criteria for selection: project readiness; matching capabilities, financing, and cost effectiveness; economic impact for Illinois; project characteristics and potential for innovation; and a project's ability to: (1) provide emission-free energy; and (2) create jobs during the construction of the project.

A criterion of the SEP grant to Ohio is that funds must be obligated by September 30, 2010 and fully expended by March 31, 2012. The MWTP was one of many renewable energy grant applicants selected for SEP funds by Illinois DCEO in 2009. For this proposed project, DOE is the Federal agency proposing to provide financial assistance, while the Illinois DCEO is the recipient of Federal funding and MWP is the sub-recipient of this funding. The project would be implemented on land leased from private landowners and on Warren County property.

1.5 Public and Agency Involvement

1.5.1 DOE PUBLIC SCOPING PROCESS

On September 14, 2010, DOE sent notices of public scoping to stakeholders and interested parties including local, State, and Federal agencies and organizations; tribes; and neighboring landowners to solicit comments on the scope of potential environmental issues to be examined in the EA. The scoping letter described the Proposed Action and requested assistance in identifying potential issues to be evaluated in this EA. DOE published the scoping letter on the DOE Golden Field Office Public Reading Room website to solicit comments. The notice of public scoping and stakeholder mailing list are included in Appendix E, Attachment E-2. The comment period was

originally scheduled to last 15 days and end on September 28, 2010. DOE received a request to extend the comment period, and DOE extended the scoping period until October 8, 2010. In response to the scoping letter, DOE received seven comment letters (Appendix E, Attachment E-3). The comments received are also summarized in Table 1-1.

Table 1-1. Scoping Comments and Responses

Issue Raised in Public Comment	**DOE Response**
Turbine ice buildup and shedding	The turbines that would be used (GE 1.6xle) include sensors that would register the presence of ice; the turbine would not operate until ice had melted. See Section 3.2.2.7.
Prime farmland	An agricultural study conducted by the Illinois Department of Agriculture concluded that the project complies with the Illinois Farmland Preservation Act. See discussion in Section 3.2.2.1.
Surface water/runoff	MWTP structures would not be large enough to substantially alter surface water flows other than on the leased property. A National Pollutant Discharge Elimination System permit from the Illinois Environmental Protection Agency would be obtained prior to construction to ensure protection of surface water resources. See discussion under the subheading –Surface Water" in Section 3.2.1.1.
Electromagnetic field (EMF) effects	Available scientific literature does not support concerns regarding EMF effects. The MWTP collection lines would be underground; no new aboveground lines are proposed. See Section 3.2.2.7.
Soil chemistry impacts due to road materials	The road materials that would be used are commonly used in agricultural areas, and effects would be limited to the property being leased for the project.
Soil compaction	Soil would be compacted at location of structures and roads; all other soil compacted during construction would be plowed and returned to original use. See Section 2.2.2.
Aerial application of pesticides	MWP has committed to reimburse certain land owners for any additional cost, not to exceed 50 percent of the standard fee, incurred due to the presence of the wind farm. See Section 3.2.2.1.
Lightning strikes	Appropriate lightning protection would be included on all equipment. See Section 3.2.2.7.
Driver distraction due to wind turbine presence	Available scientific literature did not indicate that vehicular accidents commonly result from the simple presence or operation of turbines near roads.
Rescue helicopter operations	Helicopter landings would be practicable around the periphery of the MWTP, though maybe not within a —cluster" of turbines. Given the relatively small size of the facility, no effect on emergency operations is anticipated.
Blasting	The proposed project does not involve blasting.

Table 1-1. Scoping Comments and Responses (continued)

Issue Raised in Public Comment	DOE Response
Acoustics	As a condition to the Special Use Permit, MWP has committed to comply with all applicable Illinois Pollution Control Board regulations. A detailed discussion of potential noise-related impacts is provided in Section 3.2.2.4.
Property values	There is no supporting evidence that the installation of wind turbines negatively impact property values of the wind turbine site or adjacent properties. Property values are discussed in Section 3.2.2.9.
Radio/television interference	While turbines can cause some radio and/or television interference, such interference would not likely be widespread or severe due to the facility's small size. The National Telecommunications and Information Administration indicated no concerns regarding blockage of radio frequency transmissions. This is further discussed in Section 3.2.2.12.
Interference with radar and global positioning systems.	The MWTP is not expected to interfere with any radar or global positioning systems. Potential radar and global positioning system interference is addressed in Section 3.2.2.9.
Shadow flicker	Based on the shadow flicker assessment prepared for this project, shadow flicker is not expected to exceed 22 hours per year for any potential receptor. A detailed discussion of shadow flicker is provided in Section 3.2.2.2.

In addition, DOE contacted the following agencies and organizations regarding the proposed project:

- U.S. Fish and Wildlife Service (USFWS)
- U.S. Department of Commerce – National Telecommunications and Information Administration (NTIA)
- Illinois Historic Preservation Agency (IHPA)
- Illinois Environmental Protection Agency
- The 21 tribal representatives that indicated a geographical preference for Warren County

Other agencies were contacted by MWTP, as discussed in Section 1.5.2.

1.5.2 MWP PUBLIC INVOLVEMENT

Three public hearings were held by local authorities on the MWTP. The first meeting was held at Monmouth Roseville High School (325 W. 1st Avenue Monmouth, Illinois) on May 18, 2010, and was hosted by the Warren County Zoning Board (Chairman Ron Moore). The second meeting was held at the Warren County Courthouse (100 W. Broadway Monmouth) on June 21, 2010, and was, again, hosted by the Warren County Zoning Board. At both of these meetings, members of the public were invited to provide oral comments regarding the project. A third meeting was held at the Warren County Courthouse on June 22, 2010, as a continuance of the

June 21 meeting. On June 22, 2010, members of the public were invited to attend, but public statements on the record were not accepted. At the end of the June 22nd meeting, the County Zoning Board voted to recommend the project to the County Board for approval. On August 5, 2010, the County Board voted to approve the special use permit for the project.

In February 2010, representatives of MWP sent letters providing notice of the proposed project to Federal, State, and local agencies and tribal governments. A public notice inviting the public to comment on any potential effects to historic properties was published in the Monmouth, Illinois *Daily Review Atlas* in the July 31, 2010 edition. One comment was received as a result of the MWP notifications. The comment from the Illinois Environmental Protection Agency stated that it had no objections to the project (Appendix C, Attachment C-7).

MWP or its representatives have contacted the following agencies and organizations:

- USFWS
- Federal Aviation Administration (FAA)
- U.S. Department of Agriculture – Natural Resources Conservation Service
- IHPA
- Illinois Environmental Protection Agency
- Illinois Department of Natural Resources (IDNR), Division of Ecosystems and Environment
- Illinois Department of Transportation, Division of Aeronautics
- Western Illinois Economic Development Partnership
- Warren County Zoning Office

On June 22, 2010, a letter was submitted to 21 tribes that have indicated a geographical preference for the area. To date, the Kickapoo Tribe of Indians of the Kickapoo Reservation in Kansas, the Ottawa Tribe of Oklahoma, the Peoria Tribe of Indians, the Shawnee Tribe of Oklahoma, the Iowa Tribe of Kansas and Nebraska and the Winnebago Tribe of Nebraska have stated they have no objections to the proposed project. Responses from the tribes have been included in Appendix E, Attachment E-6.

1.5.3 DRAFT ENVIRONMENTAL ASSESSMENT

A Notice of Availability (NOA) for this Draft EA and public comment procedures for the EA were prepared and sent to Federal, State, tribal, and local agencies, as well as members of the public. The EA and NOA were posted on the DOE Golden Field Office Reading Room Website (http://www.eere.energy.gov/golden/Reading_Room.aspx) and DOE's NEPA Website (http://nepa.energy.gov/draft_environmental_assessments.htm) on February 28, 2011, and is open for public comment for 30 days. Additionally, the NOA was published in the Monmouth, Illinois *Daily Review Atlas* on March 1, 2011. The NOA describes how the public may comment on the proposed project's potential effects on social, environmental, and economic factors pursuant to the NEPA process.

The public is invited to comment via email or written correspondence mailed to the postal or email address provided in the Cover Sheet. DOE will consider all submitted comments when

preparing the Final EA. After completion of the Final EA, DOE will determine whether to issue a FONSI or to prepare an EIS.

2. PROPOSED ACTION AND ALTERNATIVES

2.1 DOE's Proposed Action

DOE has provided a grant to the State of Illinois under the DOE State Energy Program. DCEO, which administers the State of Illinois SEP, selected MWP to receive a sub-grant for its Monarch Warren County Wind Turbine Project, a proposed 19.2-megawatt wind facility located four miles south of Monmouth in Warren County, Illinois. DOE is proposing to authorize the State of Illinois to expend such Federal funding to design, permit, and construct the Monarch Warren County Wind Turbine Project. DOE has already authorized Illinois DCEO to allow MWP to use a percentage of the Federal funding for preliminary activities, including the preparation of this EA and associated analyses. These activities are associated with the proposed project and would not significantly impact the environment nor represent an irreversible or irretrievable commitment of resources in advance of DOE completing the NEPA process for the proposed project.

2.2 Illinois' Proposed Project

The DCEO selected MWP for a $5,000,000 grant based on the following criteria: project readiness; matching capabilities, financing, and cost effectiveness; economic impact for Illinois; project characteristics and potential for innovation; and the project's ability to: (1) provide emission-free energy; and (2) create jobs during the construction of the project. The project would be implemented on land leased from Warren County and private landowners in Warren County, Illinois.

The project would involve the construction, operation, and eventual decommissioning[1] of 12, 1.6-megawatt wind turbines along with 2.5 miles of underground electrical transmission cables, and an electrical substation. The substation and surrounding fencing would occupy 1.5 acres. A 16 foot wide road to each turbine would be constructed, for a total of 4.4 acres of new roads. The 2.5 miles of electrical cables would be installed underground and would connect to an existing 69-kilovot Ameren distribution line that intersects the site on the western side of U.S. Highway 67. Figure 2-1 provides a site plan depicting the turbine locations, access roads, and the substation location.

The project originally included 13 turbines; however, one (Turbine 12) was subsequently eliminated due to technical concerns. The remaining turbines are numbered 1 through 13, with the number 12 omitted to be consistent with FAA review/approval documentation and documents associated with other regulatory compliance processes.

MWP has chosen the GE 1.6xle turbine model for the proposed project. The proposed turbine configuration would include 328-foot towers, and the rotor diameter would be 271 feet, resulting in an overall configuration that would reach approximately 464 feet above the land surface at its

[1] DOE's Proposed Action includes the design, permitting, and construction of the Monarch Warren County Wind Turbine Project, whereas the MWP project also includes the operation and decommissioning of the project. While the DOE Proposed Action does not include authorizing Federal funding for operation and decommissioning, this EA analyzed those actions as connected actions.

tallest extent. The proposed monopole towers would be made of tubular conical steel sections that are self-supporting without guy wire support. This would eliminate a potential hazard for birds and bats, since they have difficulty locating and maneuvering around guy wires. The proposed turbine design does not involve the use of self-supporting lattice towers, which at other wind projects have been attractive roosting sites for birds, further reducing potential for adverse impacts to birds.

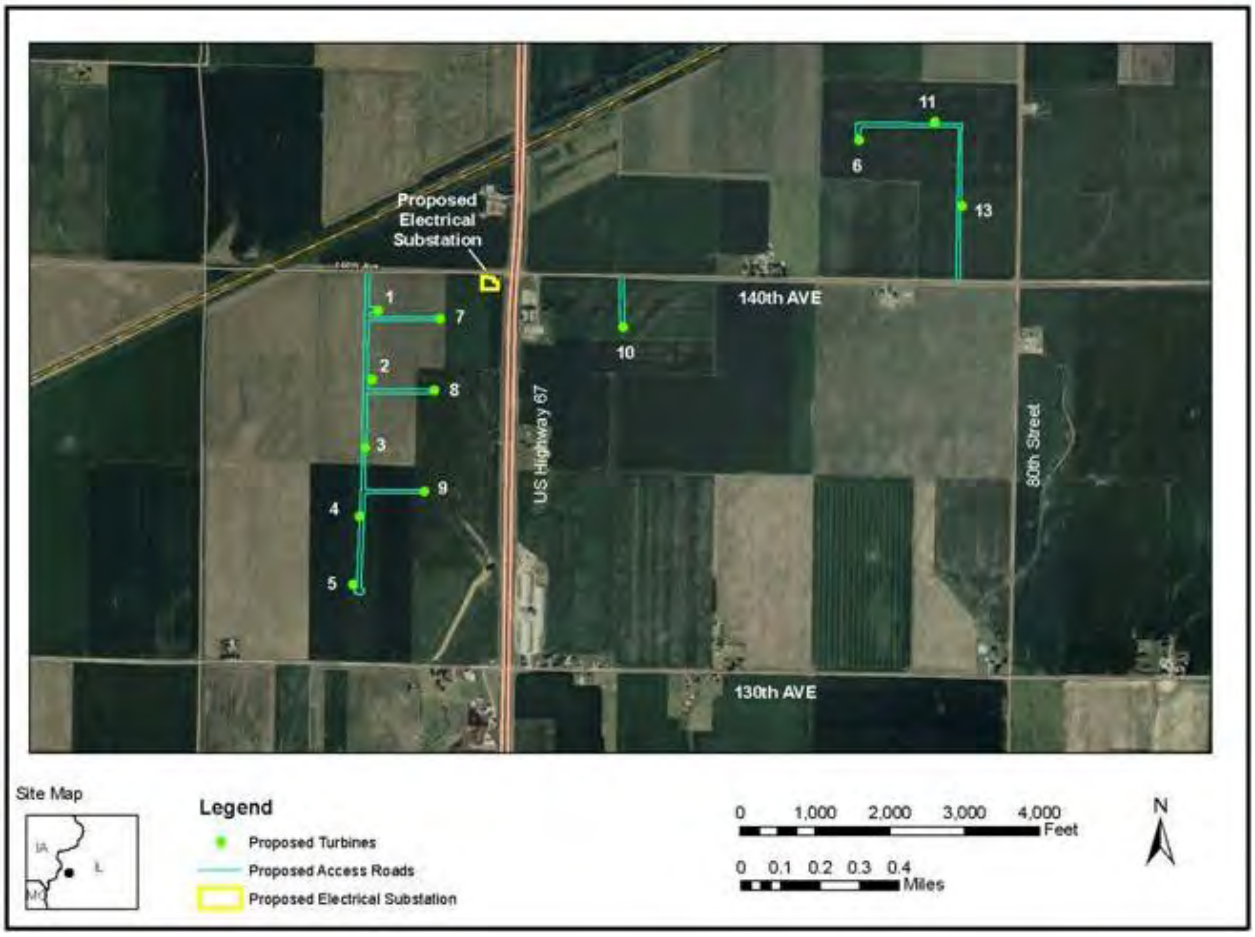

Figure 2-1. Site Plan

Turbine heights are driven by two primary factors that influence efficiency: laminar air flow and higher wind speeds. Laminar air flow occurs when air moves essentially in a uniform, horizontal direction, and this is a high efficiency condition for wind turbines. When turbulence is introduced into the wind environment, both the vertical and horizontal directions of wind may fluctuate rapidly; in such conditions, turbines operate at lower efficiency. Manmade structures and natural features of the landscape create turbulence, and raising the height of the turbine above the land surface decreases the influence of disturbances caused by surface-level obstructions. In addition, mounting the turbine on a tall tower takes advantage of higher wind speeds, which occur at greater heights above the ground. Power generated by a wind turbine

increases exponentially with wind speed, and wind speed generally increases substantially as height above land surface increases.

2.2.1 PROJECT LOCATION

The proposed project would be located on 600 acres of land in Sections 20, 29, and 30 of Lenox Township, Warren County, Illinois. The project would be located south and northeast of the intersection of U.S. Highway 67 and 140th Avenue, 4 miles south of Monmouth. The approximate center point of the project area is 40º50′1″ north latitude and 90º39′29″ west longitude. Seven turbines would be constructed on land leased from private landowners and the other five turbines would be constructed on Warren County property. The proposed project area is located within existing agricultural fields (currently planted with row corn and soybeans), and has been extensively disturbed by human activity. The site is bounded on the north by the Burlington Northern Santa Fe railroad line, and is surrounded by agricultural land in every direction. Highway 67, a four-lane highway, intersects the site. Areas of ground disturbance would be limited to a total of 16 acres, including access roads and equipment staging/laydown areas. Once installed, the final ground level footprint of the project, including the turbine foundations, access roads, substation, and associated electrical wiring, would be approximately 7 acres.

2.2.2 CONSTRUCTION AND INSTALLATION

Site construction would include installation of the turbine, tower, tower foundation, transformers, electrical distribution equipment, access roads and road improvements, crane pads, concrete truck/equipment staging areas, and fencing.

The site would be surveyed and a soil boring would be completed at each of the 12 wind turbine locations. The substation area would be cleared and grubbed, and a temporary crane pad, consisting of compacted soil and measuring approximately 50 feet by 100 feet, would be created approximately 50 to 100 feet from the base of each turbine site. A 16-foot-wide gravel access road to each turbine site, for a total of approximately 2.5 miles of access roads, would be constructed. Tower foundations, each 55 feet in diameter and 15 feet deep, would be installed. Trenching for electrical lines would occur throughout the property, though surface activities could continue once the lines were in place. Construction fencing would be installed around each turbine site during construction and would be removed after the turbines are installed. Fencing surrounding the electrical substation would remain in place. After the completion of construction activities, construction laydown and crane pad areas would be reclaimed as appropriate and the surrounding agricultural fields would be restored to their previous condition.

The turbine towers and blades would be transported to the site by tractor trailers. The turbine nacelle (the housing which contains the generator, heat exchanger, parking brake, drives, shafts, gearbox, and other generating components) would be delivered from Greensboro, North Carolina by tractor trailers. Access to each turbine site would be via a proposed access drive, to be constructed at the start of the project. The tractor trailers would continue on these access drives to each proposed turbine site. All other construction vehicles would access the site via U.S. Highway 67 or 140th Avenue. All material staging would be at each turbine site at concrete truck staging areas.

The electrical system of the GE turbines would consist of a full converter system and power would be sent to the substation where it would be transferred to the distribution line to be available for use.[2] A unit substation, located outside each turbine base at ground level, transforms the turbine output from 138 kilovolts to 69 kilovolts. A remote communication facility would be necessary at this site for metering and relaying the transfer-trip scheme [if a problem occurred with a transmission line or grid, the transfer-trip scheme would allow the power to be transferred from one transmission line to another or to signal the control system to trip the turbine – as in "trip the breaker" (turn off the turbine)]. Ameren, the local electrical utility, would specify detailed requirements for metering and electrical telemetry. A substation to be located on the southwest corner of 140th Street and U.S. Highway 67 would connect the MWTP to an existing 69-kilovolt distribution line on the western side of Highway 67.

All construction activities are contingent on temperature and weather conditions. Turbine nacelle and blade installation require calm wind conditions. These and similar factors determine the final construction timeline. The turbine installation timeline, including site preparation, tower erection, commissioning, generator installation, and system tie-in and start-up would be scheduled for completion 12 months after initial groundbreaking.

2.2.3 AVIATION MARKING

Aviation marking would be in compliance with the FAA standards (FAA 2007). In accordance with the FAA Determination of No Hazard to Air Navigation (Appendix C, Attachment C-1) for each turbine, synchronized red lights would be used for the 8 turbines on the perimeter of the project. Flash intervals of any lighting scheme for these turbines would be synchronized over the entire project. Lighting would not be installed on the remaining four turbines to minimize visual impacts to nearby receptors. Although daytime lighting of wind turbine farms is not required, FAA recommends that turbines be painted with bright white or light off-white paint (FAA 2007). All turbines in the MWTP would be painted in accordance with this requirement.

2.2.4 OPERATIONS AND MAINTENANCE

The GE 1.6xle turbines would be operated year-round, 24 hours a day (except during maintenance), when wind speeds are suitable. The turbines are designed to start operating at a minimum wind speed of 6.7 miles per hour and to shut down when wind speeds exceed 74 miles per hour. MWP would operate and maintain the wind energy project according to operating, maintenance, and safety procedures and requirements specifically recommended by GE (the turbine's manufacturer). Routine maintenance of the turbine would be needed for maximum performance and identification of potential problems or maintenance issues. Each turbine would be monitored on a daily basis to ensure that turbines are operating efficiently. This would be accomplished by having a MWP employee trained in wind turbine maintenance visit the site and conduct an auditory and visual inspection of the turbines. In addition, the turbine would be remotely monitored continuously (24 hours per day, 7 days per week) from the GE office in New

[2] To prevent island creation, anti-island protection would be required at this site. Island creation occurs when the grid is not receiving electricity and the turbines continue to create energy, creating an "island" of energy between the turbine and the distribution line. To prevent this, the control system at each turbine would contain software to turn off the turbine if the distribution line is not functioning correctly.

York. Turbines could be shut down remotely from New York if necessary, and any problems would be reported to MWP operations and maintenance personnel. Most servicing would be performed without a crane, by accessing the nacelle up-tower, through a ladder located within the tubular tower. A crane would only be required for large-scale repairs, such as that necessary to repair a broken blade. Should use of a crane be required, concrete "crane mats" would be transported to the site, placed near the turbine, and removed upon completion of repair activities. All access roads would be regularly inspected and maintained to minimize erosion.

2.2.5 DECOMMISSIONING

Megawatt-scale wind turbine generators typically have a life expectancy of 20 to 25 years. It is in MWP's long-term financial interest to maximize the operational lifespan of the wind turbine generators. MWP would employ a proactive maintenance regime to ensure the turbines are in good repair for at least the full 20 years of expected life. As the turbines approach the anticipated end of life, technological advances would likely make it advantageous to replace the existing turbines with newer models.

Decommissioning would occur at the end of the project life or facility abandonment. For the purposes of this section, "facility abandonment" would mean the ceasing of electricity generation for a period of 12 continuous months or more, unless the company produces evidence of mitigating circumstances beyond the control of MWP (for example, long delays in spare parts procurement, natural disasters, strikes or labor disputes, war).

The decommissioning and restoration process would include the removal of aboveground structures (turbines, transformers, aboveground electrical collection lines, and the substation); removal of belowground structures (foundations and underground cables); topsoil restoration; and return to original condition. MWP would be responsible for carrying out the decommissioning and restoration process consistent with the steps set forth in Sections 2.2.5.1 – 2.2.5.5 of this EA.

2.2.5.1 Aboveground Structures

Wind Turbines

Dismantling the wind turbines would require the use of cranes and heavy equipment. Electronic components, controls and internal cables would be disconnected and removed. The rotor and nacelle would be lowered to the ground for disassembly. The tower sections would be lowered to the ground where they would be further disassembled for transporting. The Project Sponsor would attempt to identify a purchaser of the intact wind turbine components. If a buyer cannot be found, the rotor, nacelle, and tower sections would be reduced to shipping dimensions for transport to an offsite facility for reconditioning, salvage, recycling, or disposal. If resold and not scrapped, tower sections and rotors would be transported in the same manner as that used for their delivery to the site.

Transformers

Transformer removal would consist of disconnecting the electrical connection system from the base transformer. Any sellable components would be removed and transported offsite.

Aboveground cables would be removed and the copper conductor materials possibly would be salvaged for scrap value.

Aboveground Electrical Collection Lines

Any aboveground electrical collection lines and associated components would be dismantled and the materials would be disposed, recycled or sold. Poles would be removed and holes backfilled with clean topsoil.

Substation

At the end of the project lifespan, the county or MWP may elect to keep the substation for alternative use, in which case the substation would not be decommissioned. However, in the event that the entire facility were to be decommissioned, components and materials would be sold, reused, or recycled to the extent practicable, and remaining solid waste would be transported offsite for disposal.

2.2.5.2 Belowground Structures

Turbine Foundations

Turbine foundations would be excavated to a depth of 36 inches below grade (48 inches in agricultural fields) or to bedrock, whichever would be less, to sufficiently expose and remove all anchor bolts, rebar, conduits and concrete. The excavation would be filled with clean below grade material, compacted to a density similar to surrounding sub-grade material, and finished with topsoil.

Underground Cables

All underground cables at depths less than 4 feet below finished grade would be removed. All underground cables at depths greater than 4 feet below finished grade would be abandoned in place if it would be determined that their presence does not adversely impact land use and they do not pose a safety hazard.

2.2.5.3 Soil Restoration

Once all of the above- and belowground components designated for disposal or salvage have been removed, the remaining decommissioning work would consist of grading and reseeding disturbed areas. All disturbed areas would be restored to conditions and contours existing at that time.

2.2.5.4 Road Materials

All project-related access roads and town, county, or state roads impacted by project decommissioning activity, if any, would be restored to original condition upon completion of decommissioning.

2.2.5.5 Access

During decommissioning activities, Warren County shall have access to the site, pursuant to reasonable notice, to inspect the results of complete decommissioning. All decommissioning and

restoration activities would be in accordance with all applicable Federal, State, and local permits and requirements.

A copy of the Decommissioning Plan is included in Appendix D, Attachment D-5.

2.3 Alternatives

2.3.1 DOE ACTION ALTERNATIVE

The State of Illinois' Recovery Act SEP funds intended for this project are from a formula grant – the amount of which is determined pursuant to a formula established in the DOE SEP grant procedures (10 CFR 420.11). Allocation of funds among the states is based on population and other factors. Recipients of these formula grants have broad discretion in how they use these funds.

This Draft EA examines the potential environmental impacts of DOE's Proposed Action (authorizing the expenditure of Federal funding for the design, permitting and construction of the wind turbine project) and the No-Action Alternative. This EA also describes options that MWP (the sub-recipient) considered during the development of its application to the State of Illinois, which is the recipient of Federal funding under the SEP. When complete, this EA will provide DOE with the information needed to make an informed decision about whether authorizing the State of Illinois to provide some of its Federal funds for the proposed project may result in significant environmental impacts. Based on the Final EA, DOE will either issue a FONSI, which may include mitigation measures, or determine that additional study is needed in the form of a more detailed EIS.

2.3.2 DOE NO-ACTION ALTERNATIVE

Under the No-Action Alternative, DOE would not allow Illinois to use its SEP funds for the proposed project. For purposes of this EA, DOE assumes for the No-Action Alternative that the project, therefore, would not proceed without Federal funding. This assumption allows a comparison between the potential impacts of the project as proposed and the impacts of not proceeding with the project. Without the proposed project, the operations and energy usage of the nearby community would continue as otherwise planned but without the proposed wind project; therefore, the community would continue to use electricity primarily generated using fossil fuels and the potential reduction in greenhouse gases would not be realized. The ability of the State of Illinois to use its SEP funds for energy efficiency and renewable energy activities would be impaired, as would its ability to create jobs and invest in the nation's infrastructure in furtherance of the goals of the Recovery Act.

2.3.3 SITING OPTIONS MWP CONSIDERED

For the proposed project, MWP considered the following for site selection:

- Warren County support for the project location,
- Ease of access and adequate room for construction and maintenance,
- Minimizing disturbance to existing site activities,

- Minimizing wind turbulence from surrounding structures, adjacent turbines, and natural vegetation,
- Adequate room for a winter ice clear,
- Absence of residential structures within 1000 feet of any turbine location, and
- Ideal location for wind energy based on topography/absence of surrounding interferences.

No other locations for the wind farm were considered, as the initial proposed location was optimal based on siting criteria. The proposed project area is situated within existing agricultural fields, with minimal to no vegetation taller than 8 feet above ground level. After site restoration, the proposed turbine locations are compatible with the existing land use, creating only a minimal disturbance to the agricultural use of the properties. Additionally, the proposed turbine locations are situated to minimize interference with each other and are in line with the prevailing winds of the area. A map depicting the proposed turbine locations is included in Figure 2-1.

2.4 Required Agency Permits and Approval Types

Prior to construction, all required Federal, State and local permits and approvals would be obtained. The required permits and approvals are listed in Table 2-1. All completed permit documentation and approval letters are contained in Appendix C.

Table 2-1. Federal, State, and Local Permits and Approvals

Agency	Permit Approval/Type
Federal	
FAA	FAA Aeronautical Determination (issued September 9, 2010)
USFWS	Compliance with the Endangered Species Act, the Migratory Bird Treaty Act, and the Bald and Golden Eagle Protection Act (in process)
NTIA	Radio Frequency Transmission Approval (received October 19, 2010)
State	
Illinois Department of Transportation	Utility Access Permit (to be obtained prior to construction)
	Highway Access Permit (to be obtained prior to construction)
IDNR	State Threatened or Endangered Species consultation and natural resource review (letter received March 19, 2010)
Illinois Environmental Protection Agency	NPDES Storm Water Permit (to be obtained prior to construction)
IHPA	Compliance with the National Historic Preservation Act (letter received September 23, 2010)
County	
Warren County	Road Agreement (Executed November 14, 2010)
	Conditional Use Permit (approved August 15, 2010)
	Building Permit (received August 15, 2010)

2.5 Project Proponent-Committed Practices

MWP has committed to the following measures and procedures to minimize or avoid environmental impacts if the proposed project is implemented.

2.5.1 BIRD, BAT, AND RAPTOR AVOIDANCE AND MINIMIZATION MEASURES

Project coordination occurred with the USFWS and IDNR concerning the project's location and potential impacts on birds, bats, and other wildlife; rare, threatened and endangered species, and other protected natural features.

MWP would consider the USFWS *Interim Guidelines to Avoid and Minimize Wildlife Impacts From Wind Turbines* (USFWS 2003) and would take actions to minimize any potential adverse effects on wildlife associated with the proposed project through the following actions: use of a previously developed site, a smooth monopole tower, absence of guy wires in turbine design, choice of lighting equipment and operation procedures, placement of turbines in group configuration, installment of all electrical collection equipment underground, soil erosion/run-off prevention measures; proper recycling and waste management procedures; minimization of construction areas; and contractual obligation of contractors and subcontractors to all above procedures.

DOE is currently preparing a Biological Assessment to assess the potential impacts of the project to Federally listed threatened and endangered species. At the completion of its review of the Biological Assessment, the USFWS will issue a Biological Opinion for the project which will contain terms and conditions required for the construction and operation of the MWTP.

2.5.2 HUMAN HEALTH AND SAFETY

The construction contractor and MWP would prepare a Health and Safety Plan per Occupational Safety and Health Administration (OSHA) requirements, and all construction would be performed in compliance with this plan and the GE guidelines. Construction facilities would be marked by fencing and no-trespassing signs. The construction of the proposed wind energy project would comply with all applicable Federal, State, and local requirements.

The proposed turbines would be equipped with lightning receptors in the turbine blades and would be grounded and shielded to protect against lightning. The turbines would have an automated shut-off capability in the event of a fire. MWP would develop a fire protection plan and would meet with all fire departments responsible for providing fire protection to the wind farm prior to beginning construction.

2.5.3 NOISE

All construction activities, with the exception of equipment delivery and towers, nacelles, and blades erection, would occur between the hours of 6:00 a.m. and 9:00 p.m. to avoid noise and other disturbances to surrounding areas. If noise becomes a source of complaint, MWP has agreed to mediate complaints regarding turbine noise as a condition of the special use permit. MWP would comply with all applicable Illinois Pollution Control Board (IPCB) regulations.

2.5.4 HISTORIC, ARCHITECTURAL, ARCHAEOLOGICAL, AND CULTURAL RESOURCES

Discussed further in Section 3.2.2.4, historical maps indicate the previous existence of the Warren County Alms House cemetery located on the southwest corner of U.S. Highway 67 and

140th Avenue. This former cemetery was near the location of the proposed electrical substation. The cemetery burials were relocated to the Lenox Union Cemetery in 1991 prior to the widening of Highway 67 to a four-lane divided highway. However, all clearing, excavation, and construction work performed in the vicinity of the former cemetery would be monitored by a qualified archaeological expert.

2.5.5 SOIL

MWP would use best management practices (BMPs) and employ erosion-control techniques required under the National Pollutant Discharge Elimination System (NPDES) permit during construction and operation to protect topsoil and to minimize soil erosion. Construction would be performed in accordance with a soil and erosion control plan (to be developed during detailed engineering design) and in compliance with all other Federal, State, and local requirements. BMPs would include at a minimum the following: containing excavated material, protecting exposed soil, stabilizing restored material, and revegetating disturbed areas. An NPDES permit would be obtained prior to the initiation of construction activities.

2.5.6 WASTE MANAGEMENT

Any waste generated during construction, operation, and decommissioning, including used lubricants, would be handled, collected, transferred, and disposed of or reused/recycled in accordance with applicable Federal, State, and local regulations.

2.5.7 LAND USE

Implementation of the proposed project could result in a reduction, delay, or elimination of aerial application of agricultural chemicals due to applicators charging additional fees, assigning higher priority to crops without wind turbine sites, or refusing to treat crops on and adjacent to wind turbine sites. MWP has committed to reimburse certain land owners who own parcels of land identified by the 18 tax identification numbers listed in the special use permit conditions (Appendix D, Attachment D-3). The reimbursement would be for any additional cost related to the application of agricultural chemicals, not to exceed 50 percent of the standard fee, incurred due to the presence of the wind farm. MWP would also provide a notification form and map of the turbine locations to the Illinois Agricultural Aviation Association and all aerial spraying companies who have operated in the area in the past five years.

2.5.8 TRANSPORTATION

MWP would repair any roads or other infrastructure damaged by the construction or maintenance of the MWTP, in accordance with the Road Agreement that has been executed with the Lenox Township Road Commissioner.

2.5.9 FLICKER EFFECTS

Based on the shadow flicker assessment prepared for this project, shadow flicker is not expected to exceed 22 hours per year for any potential receptor. However, if shadow flicker exceeds 30 hours per year for any residence whose owner is not a participant in the project, MWP would use

commercially reasonably efforts to remedy the problem on a case-by-case basis by undertaking measures such as tree plantings or awning installation.

3. AFFECTED ENVIRONMENT & ENVIRONMENTAL IMPACTS

This chapter examines in detail the potential environmental impacts of the proposed project and the No-Action Alternative for the affected environmental resources areas.

3.1 No-Action Alternative

Under the No-Action Alternative, DOE would not authorize the use of Federal funds for the design, construction, and operation of the MWTP; therefore, there would not be any impacts to the resource areas analyzed in this Draft EA. For the purposes of this EA, DOE assumes that the project would not proceed without SEP funding. The No-Action Alternative would result in the continued use of fossil fuel energy to meet the electricity demands of the nearby community. Without the proposed project, the nearby community would continue receiving electricity from Ameren Energy. Ameren currently generates or purchases electricity from the following fuel sources (EPA 2005):

- Coal: 83.2 percent (compared with 49.6 percent nationally)
- Nuclear: 11.9 percent (compared with 19.3 nationally)
- Oil: 0.3 (compared with 3.0 nationally)
- Gas: 3.5 percent (compared with 18.8 nationally)
- Hydropower: 1.0 percent (compared with 6.5 nationally)
- Non-Hydropower renewable: 0.1 percent (compared with 2.1 nationally)

If the MWTP was not implemented, the 64,551 megawatt-hours per year that could be provided by the project would continue to be provided by the sources listed above. Carbon dioxide emissions from electricity generation to serve the region would remain at current levels under the No-Action Alternative, and neither the Illinois DCEO nor MWP would meet their objective of providing renewable energy.

The jobs created by construction and operation of the wind turbine would not be realized and the local area would forego the economic benefit associated with these new jobs. Local landowners, including Warren County, would not receive lease payments for the turbine sites.

3.2 Illinois' Proposed Project

3.2.1 CONSIDERATIONS NOT CARRIED FORWARD FOR FURTHER ANALYSIS

Consistent with the CEQ and DOE NEPA implementing regulations and guidance, DOE focuses the analysis in an EA on topics with the greatest potential for significant environmental impact. For the reasons discussed below, the proposed project is not expected to have any measurable effects on certain resources, and therefore these resources are not carried forward for further analysis.

3.2.1.1 Water Resources

MWP requested natural heritage information, including the presence of any State- or Federally designated Wild and Scenic Rivers in the project vicinity from the IDNR Ecological Compliance

Assessment Tool (EcoCAT) system. The Illinois Natural Heritage Database contains no record of State-listed threatened or endangered species, Illinois Natural Area Inventory sites, dedicated Illinois Nature Preserves, or registered Land and Water Reserves in the vicinity of the project (Appendix C, Attachment C-3).

Wild and Scenic Rivers

The closest Illinois State-designated scenic river is the Mississippi River, which is in Henderson County (approximately 17 miles west of the proposed project site at its closest point) and the closest national scenic river is the Middle Fork of the Vermilion River, located in Vermilion County, approximately 160 miles from the proposed project site. Based on the distance between the project site and the two water bodies, the proposed project would not impact any State- or Federal-designated wild and scenic rivers.

Groundwater

Surficial materials in Warren County are primarily glacial drift deposits. The upper bedrock surface consists principally of beds of limestone and shale. Surficial deposits are underlain by the Burlington-Keokuk Limestone in much of the west-central part of the County; this formation may be capable of yielding adequate water for domestic and farm use and, in places, small community systems. It is underlain by the New Albany Shale Group, which separates it from deeper water-yielding units. The City of Monmouth obtains its water supply from deeper wells (Woller et al. 1978).

The proposed project would not affect groundwater resources. Excavation activities would be very limited, both in terms of surface area and depth, and operations would not require use of water or discharge of liquid effluents. Any fuel storage vessels kept onsite during construction and/or operations would be held with secondary containment.

Surface Water

In compliance with the *Clean Water Act*, MWP investigated the proposed project site for surface water. The nearest surface water body is South Henderson Creek, located more than 1 mile to the north of the closest turbine. There are no surface water sources such as ponds, wetlands, streams, or drainage channels at or immediately adjacent to the proposed turbine locations. No runoff or discharges from the proposed project construction area would directly enter South Henderson Creek. Since ground-disturbing activity would exceed 1 acre, MWP would obtain an NPDES permit prior to any construction-related earthwork. The construction would be carried out in accordance with an approved soil erosion and sedimentation control plan and the associated NPDES permit, and in compliance with all other applicable requirements, regulations, and sediment and erosion pollution control BMPs. Turbine foundations would be small (approximately 0.05 acre) in comparison with the overall property size. Given the small size of the turbine footprint and the fact that the land is graded flat for agricultural purposes, no effect on surface water flow is anticipated to occur as a result of the proposed project.

3.2.1.2 Waste Management

Solid wastes anticipated to be generated during construction include equipment packaging materials and construction-related material debris. Solid wastes generated during operation of the turbines would be minimal. Solid wastes anticipated to be generated during decommissioning

include dismantled equipment and construction-type material debris. Hazardous, regulated nonhazardous, and universal wastes are not anticipated to be generated during construction, operation, or decommissioning. All wastes generated over the life of the proposed project would be handled, collected, transferred, and disposed of in accordance with all applicable Federal, State, and local regulations. All used oil from the wind turbine would be handled, collected, transferred, and reused/recycled in accordance with applicable Federal, State, and local regulations.

3.2.1.3 Intentional Destructive Acts

DOE considers intentional destructive acts (i.e., acts of sabotage or terrorism) in all its EAs and EISs (DOE 2006). Construction and operation of this wind energy project would not involve the transportation, storage, or use of radioactive, explosive, or toxic materials. The proposed project would not offer any particularly attractive targets of opportunity for terrorists or saboteurs to inflict adverse impacts to human life, heath, or safety. Impacts resulting from intentional destructive acts would be those resulting from the acts themselves, and would not be magnified by any aspect of the proposed project or alternatives.

3.2.2 CONSIDERATIONS CARRIED FORWARD FOR FURTHER ANALYSIS

This section examines the potential environmental impacts of the proposed project for the following resource areas:

- Land Use
- Visual Quality
- Noise
- Historic, Architectural, Archaeological, and Cultural Resources
- Geology and Soils
- Biological Resources
- Human Health and Safety
- Transportation
- Socioeconomics and Environmental Justice
- Air Quality and Climate Change
- Utilities and Energy

3.2.2.1 Land Use

The project site is located within the immediate vicinity of the Burlington Northern Santa Fe Railroad, U.S. Highway 67, and 140th Avenue. In addition, a large-scale grain distribution operation is located at the intersection of Highway 67 and 130th Avenue. Five residences are located within the project vicinity. Each turbine would be located more than 1,500 feet from these residences.

The area of the proposed project is currently used as agricultural fields, and Warren County has zoned the project area and surrounding land for agricultural use. The proposed project area is located entirely within existing agricultural fields (currently use for row corn and soybeans), and has been extensively disturbed by decades of cultivation. The overall project area encompasses

about 600 acres, but areas of ground disturbance would be limited to approximately 16 acres. Much of this acreage could be reclaimed for agricultural purposes after construction activities, as the area of the wind turbine site, associated access drives, and substation would only occupy a total of approximately 7 acres. The land is considered to be prime farmland, and Form AD-1006 (Farmland Conversion Impact Rating) has been filed with the Warren County Soil and Water Conservation District. Additionally, the Illinois Department of Agriculture (IDOA) conducted a Study of Agriculture Impacts for the proposed project (Appendix C, Attachment C-4), concluding that the MWTP would be consistent with the DCEO Agricultural Land Preservation Policy and complies with the *Illinois Farmland Preservation Act*.

Aerial application is a common practice used to seed fields, apply fertilizer, and apply chemicals to protect crops from pests and disease (NAAA 2010a). Aerial application is preferred in some situations over ground spray application because aerial application can quickly cover substantial areas without disturbing the soil or crops (NAAA 2010b). Aerial application can be impacted by wind tower and turbine sites in several ways, including increased obstacles to navigate, visual distractions and wake turbulence caused by rotating blades, and unlighted/unpainted meteorological data collection towers.

The Warren County Zoning Board held a public hearing on May 18, 2010 to discuss MWP's Variance and Special Use Exception application to install 13 wind turbines (one of which has subsequently been removed from the project scope due to potential wind interference among the turbines), construct access and maintenance roads, install underground and aboveground electrical cables, and construct one electrical substation on the proposed project site. The Zoning Board voted on June 22, 2010 to recommend the project for final approval to the Warren County Board. On August 5, 2010, the Warren County Board voted to approve the Zoning Board recommendation for a special use permit for the project. A copy of the Warren County Board meeting minutes is included Appendix E, Attachment E-1.

Direct and Indirect Impacts

Implementation of the proposed project would commit a total of approximately 7 acres of previously disturbed agricultural land to wind energy development for the life of the project. This includes foundations, access drives, and the proposed substation. Each of the project's turbine pad sites and access roads have been designed to acquire and convert the least possible amount of agricultural land.

Implementation of the proposed project could result in a reduction, delay, or elimination of aerial application of agricultural chemicals due to applicators charging additional fees, assigning higher priority to crops without wind turbine sites, or refusing to treat crops on and adjacent to wind turbine sites (NAAA 2010c). Options are available to reduce the impact of wind turbine sites to aerial application and include, but are not limited to, placing towers in linear fashion rather than in clusters, properly marking wind towers and meteorological towers (lights and paint) (NAAA 2010b), operational shutdown (stop blade rotation) during aerial application, and developer commitment to cover increased fees. MWP has committed to pay increases in application costs up to 50 percent of the applicator's standard fee.

The overall use of the general area is and would continue as agricultural. The IDOA Agricultural Study concluded that the project is consistent with DCEO Agricultural Land Preservation Policy

and complies with the Illinois Farmland Preservation Act. Additionally, the study (Appendix C, Attachment C-4) found that the conversion of agricultural land from the proposed project would result in a potential loss of $9,854 cash receipts from crops and livestock.

3.2.2.2 Visual Resources

Visual resources include natural and manmade physical features that provide the landscape its character and value as an environmental resource. The proposed project site is located south and northeast of the intersection of U.S. Highway 67 and 140th Avenue, in Lenox Township, Warren County, Illinois. The proposed turbine locations are shown in Figure 2-1. Highway 67 transverses the project site from north to south. The Burlington Northern Santa Fe Railroad transverses the project area from the southwest to the northeast.

The area consists primarily of relatively flat agricultural land. Agricultural developments, typically consisting of a residence and several agricultural buildings (e.g., sheds, silos), are scattered throughout the area. Aboveground power lines are present along the majority of the roadsides. The most prominent power lines in the vicinity run along U.S. Highway 67. A large commercial grain elevator (approximately 60 feet tall) is situated at the northeast corner of Highway 67 and 130th Avenue. Deciduous trees are present intermittently throughout the area; however, there are no large patches of trees. No other notable vertical structures are present in the area.

The nearest populated areas are the cities of Monmouth (to the north), Kirkwood (to the west-northwest), Smithshire (to the west-southwest), Media (beyond Smithshire to the west-southwest), Roseville (to the south), Cameron (to the northeast), and Berwick (to the southeast). Five residences are located between 1,500 and 2,000 feet from any proposed turbine. Section 3.3.2.4 describes the historic, architectural, archaeological, and cultural resources near the proposed project.

There are no existing wind farms within the vicinity to the proposed project. The nearest wind farms are located at the Marshall and Stark county line and in Bureau County, approximately 50 to 60 miles to the northwest.

Shadow Flicker

Shadow flicker is defined as alternating changes in light intensity caused by a moving object (such as a spinning rotor blade) casting shadows on another object. Shadow flicker from wind turbines can occur when moving turbine blades pass in front of the sun, creating alternating changes in light intensity or shadows. These flickering shadows can cause an annoyance when cast on nearby receptors, such as residences, schools, and hospitals. The spatial relationship between a wind turbine and a receptor; the location of trees, topography, buildings, and other obstacles; and weather characteristics such as wind speed/direction, and cloud cover are key factors related to shadow flicker impacts. The effect is most pronounced when the sun is at a low angle.

The farther an observer is from the wind turbine, the smaller the portion of the sun being blocked and, as a result, the weaker the shadows. Efforts to model shadow flicker are generally limited to an area within about 3,280 feet of the wind turbines and many references set 10 rotor diameters

as the distance beyond which shadow flicker is of little concern. The wind turbines MWP selected for the proposed project (the GE 1.6xle) have a rotor diameter of 271 feet; therefore, the impact area of primary concern would lie within about 2,707 feet of the proposed turbines. This distance would put several individual residences in the project area but none of the populated areas listed above within the vicinity of the project.

Shadow flicker may be considered annoying by those exposed. The locations where shadow flicker would occur are dependent on the relative positions of the sun and the wind turbine. Further, impacts depend on the position of observers relative to the line of sight to the sun through the turning rotor. Once a wind turbine location is set, the changing position of the sun by time of day and time of year can be used along with geometric relationships to determine the locations and duration of shadow flicker under ideal conditions for flicker generation. These ideal conditions (or worst-case conditions in terms of impacts) include no cloud cover or fog (that is, the sun is shining), a continuously rotating turbine, and the wind direction relative to the wind turbine is directly into or away from the sun. If the wind is blowing at a 90-degree angle to the sun's relative position, for example, the sun would shine on the narrow side or silhouette of the rotor, and no moving shadow would be generated. Software programs have been developed to generate predictions of shadow flicker and can be used to support analyses at various levels of detail. A shadow flicker analysis was conducted for the MWTP (Appendix B, Attachment B-2).

Direct and Indirect Impacts

The proposed project would cause minor, short-term visual impacts resulting from ground disturbance; the presence of workers, vehicles, and equipment; and the generation of dust and vehicle exhaust associated with construction. Areas of ground disturbance would be limited to approximately 16 acres, including access roads and equipment staging/laydown areas. MWP estimates the construction period would last 12 months. Once construction was complete, reclamation of disturbed areas would remove these visual impacts.

In the long term, the proposed project would introduce a strong vertical element into the landscape, as the surrounding area is predominantly level. The construction of 12 wind turbines would introduce structures substantially taller than any currently found within the immediate vicinity into the viewshed.

The proposed wind turbine configuration would include 328-foot towers, a rotor diameter of 271 feet, resulting in an overall height of 464 feet above the land surface at its tallest extent. The perceived dominance of the turbine on the landscape would vary during time of day, time of year, and weather conditions. When the angle of the sun is lower, sunlight striking the turbines would make them more visible. Reactions to the turbine would likely vary. Some would prefer the setting as it now exists without the turbines. Others may consider the turbines to be points of visual interest on the landscape.

To illustrate the potential visibility of the MWTP, a visual resources analysis was conducted. The visual resources analysis includes photo simulations depicting the turbines as they would be seen from several locations (Appendix B, Attachment B-1). The visual simulations contained within the report illustrate unmasked visibility of the turbines from various locations throughout the area. Locations for the simulations were chosen at major intersections within approximately 1 mile of any turbine and from several residential dwellings within the immediate vicinity. From

approximately 2 to 3 miles from the proposed turbines, simulations were created for views that would encompass the entire wind farm in one view from three locations. Visual simulations were also created to simulate the view from populated municipalities within the surrounding area including Monmouth, Kirkwood, Smithshire, Roseville, Berwick, and Cameron. In addition, a simulation was created for the intersection of State Highway 116 and Highway 15, approximately 10 miles from the proposed turbines. As shown by the simulations, the absence of mature trees in the surrounding area would allow views of the wind turbines in excess of 5 miles.

The wind turbines would be lit at night due to required FAA lighting. In accordance with FAA requirements, synchronized red lights would be used for the 8 turbines on the perimeter of the project. Flash intervals of any lighting scheme would be synchronized over the entire project. Lighting would not be installed on the remaining four turbines to minimize visual impacts to nearby receptors.

Shadow Flicker

At certain times during the evening, as the sun sets, there may be a flickering effect of the turning wind turbine blades if viewed from the nearest residences located between 1,500 and 2,000 feet from any turbine. MWP has sited the turbines to reduce the possibility of shadow flicker affecting surrounding inhabited structures. MWP conducted a shadow flicker study using worst-case assumptions that showed minimal or no effects on the five neighboring residences, all located over 1,500 feet from the nearest turbine. Two of the five houses had zero flicker (that is, shadow flicker would not be possible); the remaining three houses would experience 0 to 22 hours per year of flicker (assuming no cloudy days and unvarying wind conditions that positioned blades in constant juxtaposition to each residence). The blades were modeled as an opaque disk with the blade sweep as the diameter. Although there is no established maximum standard for acceptable levels of exposure to shadow flicker, the Danish Wind Industry Association cites a court case in which the judge determined that 30 hours of shadow flicker per year as a tolerable level of shadow flicker (DWIA 2003). Therefore, shadow flicker effects would be below the threshold of potential concern at the closest receptor locations.

Because of the strobe-like effect of shadow flicker, there have been investigations into whether it might have the potential to produce epileptic seizures in individuals with photosensitivity. It has been determined that modern utility-scale wind turbines do not have the potential to cause these types of problems because of their relatively slow blade rotation. One study (Harding et al. 2008) reported that flickers with a frequency greater than 3 hertz could pose a potential for inducing photosensitive seizures; that is, a light flashing at a rate of more than 3 times per second. The American Epilepsy Foundation reports that lights flashing in the range of 5 to 30 hertz are most likely to trigger seizures and recommends that flash rates of visual alarms be kept under 2 hertz (Epilepsy Foundation 2010). A wind turbine with three blades would have to make a full revolution every second (or 60 revolutions per minute) to reach a frequency of 3 hertz. The GE 1.6xle wind turbine selected for this project operates within the range of 9.8 to 18.7 revolutions per minute (GE 2010). This would put the flicker frequency created by this wind turbine well below rates identified with photosensitivity issues.

Based on the shadow flicker assessment prepared for this project, shadow flicker is not expected to exceed 22 hours per year for any potential receptor. However, if shadow flicker exceeded 30 hours per year for any residence whose owner is not a participant in the project, MWP would

make reasonable efforts to remedy the problem by planting trees or installing awnings on a case-by-case basis.

3.2.2.3 Noise

Noise is any unwanted, undesirable sound. It has the potential to interfere with communication, damage hearing, and, in many cases, it is viewed as an annoyance. Noise can occur at different levels and frequencies, depending on the type of source and the distance away from the listener.

The standard unit of measure for sound pressure levels is the decibel. A decibel is a unit describing the amplitude of sound, equal to 20 times the logarithm to the base 10 of the ratio of the measured pressure to the reference pressure, which is 20 micropascals. Typically, environmental and occupational sound pressure levels are measured in decibels on an A-weighted scale (dBA). The A-weighted scale deemphasizes the very low and very high frequency components of the sound in a manner similar to the frequency response of the human ear [i.e., using the A-weighting filter adjusts certain frequency ranges (those that humans detect poorly)] (Colby et al. 2009). Figure 3-1 shows common outdoor and indoor sound sources and associated A-weighted noise levels.

Background Information on Wind Turbines

An operating wind turbine generator can generate two types of sound: mechanical sound from components such as gearboxes, generators, yaw drives, and cooling fans, and aerodynamic sound from the flow of air over and past the rotor blades. Modern wind turbine design has greatly reduced mechanical sound and it generally can be ignored in comparison to the aerodynamic sound, which is often described as a "swishing" or "whooshing" sound (BLM 2005b).

Wind turbines produce a broadband sound; that is, the sound occurs over a wide range of frequencies, including low frequencies. Low-frequency sounds are in the range of 20 to 100 hertz and infrasonic sound (or infrasound) is low-frequency sound of less than 20 hertz (generally outside of the range of human hearing). Compared to higher frequency sound, low-frequency sound propagates over longer distances, is transmitted through buildings more readily, and can excite structural vibrations (for example, rattling windows or doors).

Older designs of wind turbines, particularly those in which the blades were on the downwind side of the turbine tower, produced more low frequency sound as a result of the blades passing through more turbulent air as a result of the tower blocking wind flow. Modern, upwind turbines produce a broad band sound emission that includes low-frequency sounds, but not at substantially high levels. A primary cause for low-frequency sounds in modern turbines is the blade passing through the change in airflow at the front of the tower and this can be aggravated by unusually turbulent wind conditions.

The University of Massachusetts at Amherst reported (Rogers 2006) on noise measurements made at four different wind turbines ranging in size from 450 kilowatts to 2 megawatts. The results indicated that at distances of no more than 387 feet from the turbines, all infrasound levels were below human perception levels. The report further states that there is "no reliable evidence that infrasound below the hearing threshold produces physiological or psychological

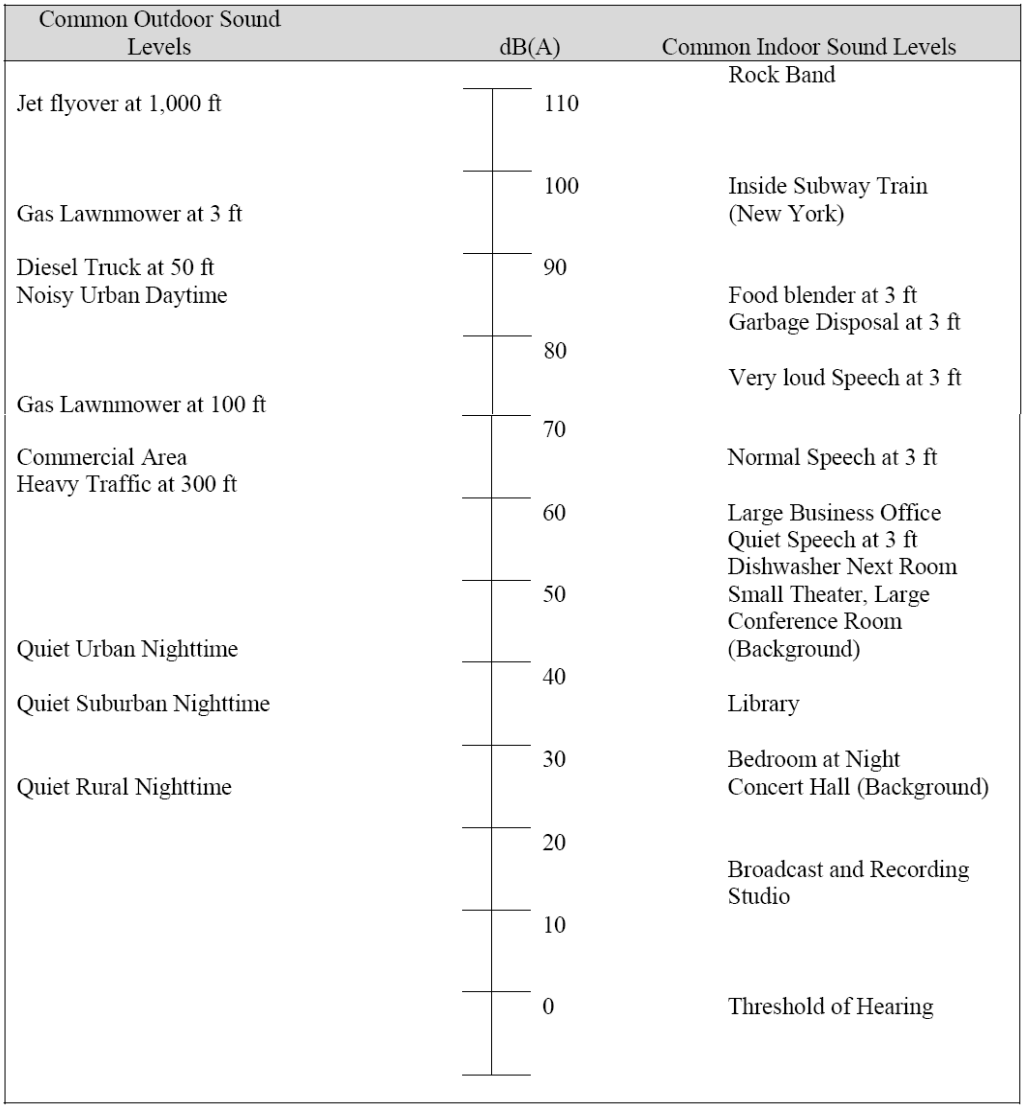

Figure 3-1. Common Outdoor and Indoor Sound Sources

effects." This lack of effects at levels below the hearing threshold was supported by a scientific advisory panel comprised of medical doctors, audiologists, and acoustic professionals established by the American and Canadian Wind Energy Associations to review wind turbine sound and health effects (Colby et al. 2009). It was also supported by the findings from Canadian and Australian government reviews of available scientific literature (CMOH 2010; Australia NHMRC 2010).

Existing Noise Conditions

The project site is located within the immediate vicinity of the Burlington Northern Santa Fe Railroad, U.S. Highway 67, and 140th Avenue. In addition, a large-scale grain distribution operation is located at the intersection of Highway 67 and 130th Avenue.

Industrial facilities and businesses along U.S. Highway 67 are major contributors to overall ambient noise levels. During day time hours, local traffic and agricultural work in the area also contribute to ambient noise levels. Summer time noise sources also include insects and birds during the day and evening.

The study area has several neighboring residences. Baseline ambient (without wind turbines) noise measurements were conducted in the study area. Baseline noise measurements are important for two reasons: (1) noise impact is in part based on the extent to which project noise would exceed ambient noise, and (2) audibility of wind turbine noise depends on its relationship to ambient noise. For example, if wind turbine noise levels are sufficiently below ambient noise levels, wind turbine noise would not be audible.

Environmental noise monitoring and sampling account for spatial and temporal variation. Spatial sampling would include receptors in the vicinity of turbine as well as a variety of ambient noise environments. Twenty-four hour monitoring is typical for environmental noise studies in order to report the Day Night Average Sound Level (DNL) as well as determine low L_{90} (L_{90} is the level exceeded 90 percent of the time within the measurement period) values during the nighttime hours. Ambient noise measurements were conducted for twenty four hours at three locations and for one hour at six additional locations (two at which monitoring was conducted during an initial study, and four that were monitored during the same study as that in which the 24-hour measurements were taken). Figure 3-2 shows the locations of the noise measurements relative to residences and proposed wind turbine locations. Appendix B, Attachment B-3 contains the results of this measurement program.

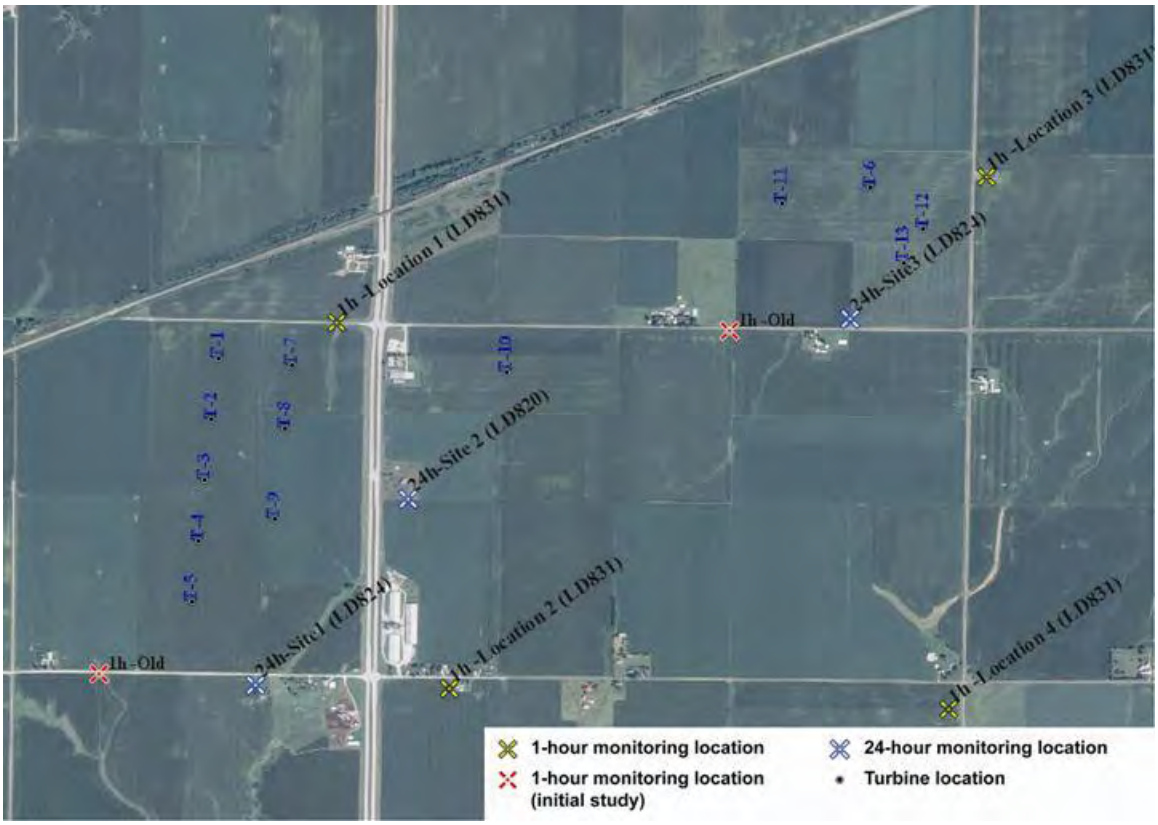

Figure 3-2. Noise Measurement Locations

Direct and Indirect Impacts

Noise Guidelines and Regulations

The U.S. Environmental Protection Agency (EPA) has an existing design goal DNL less than or equal to 65 dBA and a future design goal DNL of 55 dBA for exterior sound levels for residential areas (EPA 1977). The EPA noise guidelines are design goals and not enforceable regulations.

Formerly regulated by the EPA, noise is now regulated by state and local governments. EPA recommendations are, however, still useful for assessing the affected environment. EPA has also evaluated general public response to changes in noise levels. An increase of ambient noise levels of less than 3 dBA is generally considered inconsequential. In general, an increase to ambient or average noise levels of 5 decibels would be noticeable to most people and would be expected to elicit widespread complaints. An increase of 20 decibels would be expected to result in vigorous community response (EPA 1974).

The IPCB has developed a comprehensive approach to the measurement and assessment of commercial and industrial noise, and this approach is relevant to the development and operation of wind energy projects, with maximum allowable noise levels specified for each octave band within the audible frequency range. The octave frequency bands span from 31 to 8,000 hertz which provides detailed information about the frequency spectrum. The A-weighted octave band values add logarithmically to a single overall A-weighted decibel value. The frequency for each octave band is approximately twice that of the next lower octave band and half that of the next

higher octave band. The IPCB daytime and nighttime octave band noise level limits are shown in Table 3-1.

Table 3-1. Illinois Pollution Control Board Noise Standards

Frequency (hertz)	31	63	125	250	500	1,000	2,000	4,000	8,000
Daytime Standard	75	74	69	64	58	52	47	43	40
Nighttime Standard	69	67	62	54	47	41	36	32	32

Construction Noise

Construction of the MWTP would result in a temporary increase in noise and vibration. Construction of the turbine would involve the use of heavy construction including some of the equipment listed in Table 3-2. Table 3-2 also shows summarizes typical noise levels (expressed as equivalent continuous sound level or L_{eq}) produced by this equipment.

Table 3-2. Typical Construction Noise Emission Levels

Equipment	Typical Noise Level (L_{eq})
Compactor (ground)	76
Dozer	78
Dump Truck	72
Excavator	77
Generator	78
Grader	81
Pickup Truck	71
Warning Horn	70
Crane	73

L_{eq} = equivalent sound level.

Construction noise would likely be audible in the study area, but it would also be temporary and intermittent and, therefore, not consequential.

Wind Turbine Generator Noise Modeling

The GE 1.6xle wind turbine selected for this project has a 3-blade rotor, is 271 feet in diameter, and mounted on a tubular steel monopole with a hub height of 328 feet. The overall height of the wind turbine is 464 feet. According to the manufacturer's specifications, the maximum sound power level at the nacelle is 104 decibels. The MWTP would involve installation of 12 wind turbines in the area.

MWP performed noise modeling using WindFarmer software to assess the potential noise impacts as a result of the operation of the proposed project. Figure 3-3 shows predicted noise contours based on the manufacturer's Sound Power Level data. The contour interval for the figure is 1 decibel, meaning that each line represents a decrease of 1 decibel as distance increases from the turbines.

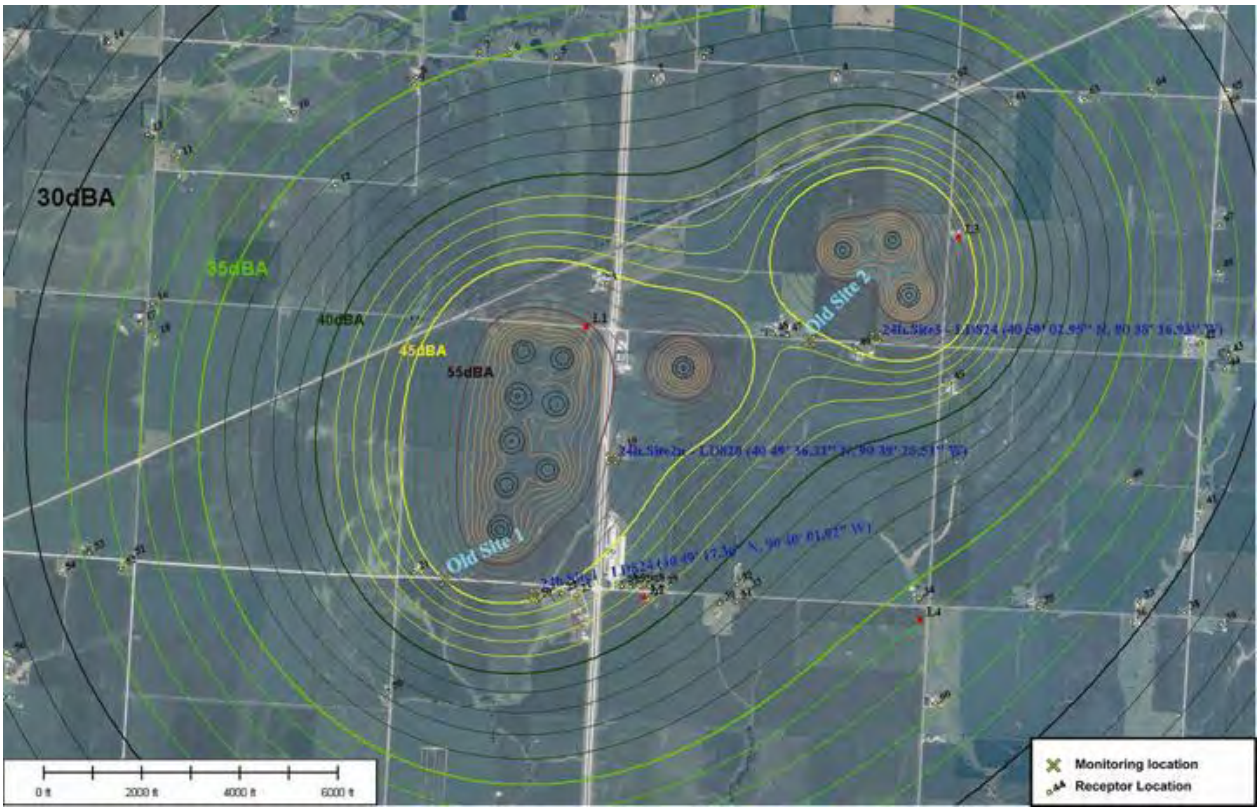

Figure 3-3. Predicted Wind Turbine Noise Level Contours

Comparison of predicted turbine noise levels to ambient L90 data (indicates that wind turbine noise could be audible at times, particularly at certain times at night, in the study area. However, in general, since turbine noise levels increase as a function of wind speed, wind noise tends to increase ambient noise levels and mask turbine noise.

WindFarmer software accounts for atmospheric absorption in an approximate fashion by subtracting a single overall value, and this approach is accurate from an overall A-weighted noise level perspective. However, high frequencies actually attenuate (decrease) much more than this method would indicate. Using the WindFarmer atmospheric absorption approach, five receptors would slightly exceed the nighttime IPCB standard at certain mid to high frequencies. Table 3-3 shows a more detailed breakdown of these five receptors. ANSI S1.26 – 1995 provides the detailed octave band atmospheric absorption coefficients for a wide range of temperatures and humidity. Assuming –standard day" meteorology (15 degrees Celsius and 50 percent humidity), mid- to high-frequency atmospheric absorption would substantially reduce the predicted mid- to high-frequency turbine noise levels shown in Table 3-3. Accounting for this would result in the noise level of all receptors except Receptor 19 being consistently below the IPCB standards. With regard to Receptor 19, only the predicted wind turbine noise level at 1,000 hertz would be slightly above the nighttime IPCB standard (43.2 decibels vs. 41 decibels). All other frequencies would be below the IPCB standard at this location.

Table 3-4 shows the two worst-case receptors (closest to the wind turbines), Receptors 19 and 20. The first part of the calculation is to undo the atmospheric absorption calculation in WindFarmer by adding 2 decibels per kilometer (0.6 mile) (WindFarmer subtracts 2 decibels per

kilometer). The second step is to subtract the ANSI atmospheric attenuation coefficients, which increase as a function of frequency.

The results show that only Receptor 19 would be slightly above the nighttime IPCB standard at 1,000 hertz. Receptor 20 would be below the standard as well as Receptors 1, 22, and 28 since wind turbine noise levels at those locations are lower than those of Receptor 20.

Table 3-3. Detailed Noise Data at Five Receptor Locations

Monarch Wind - Ambient to WTG noise comparison Day/Night/Total

WES Engineering Inc.
10/21/2010

Day Time is assumed to be from 7:00am to 9:59pm
Night Time is from 10:00pm to 6:59am

Record #	Receptor ID	Distance to the Nearest Turbine [m]	Distance to the Nearest Turbine [ft]	dBA Day Time WTG LAeq	Day Time Ambient LAeq	Day Time Ambient L90	Night Time WTG LAeq	Night Time Ambient LAeq	Night Time Ambient L90	TOTAL WTG LAeq	TOTAL Ambient LAeq	TOTAL Ambient L90	TOTAL Ambient Increase
1	19	471.5	1546.52	48.15	57.8	48.4	48.15	52.62	43.8	48.14	56.49	47.3	0.5927
2	1	530.2	1739.06	45.81	54.38	49.1	45.81	49.2	44.4	45.81	53.07	47.8	0.7479
3	20	496.6	1628.85	44.76	54.88	44.6	44.76	49.7	39.5	44.76	53.57	43.3	0.5366
4	22	554.2	1817.78	44.43	54.88	44.6	44.43	49.7	39.5	44.43	53.57	43.3	0.5050
5	48	595.6	1953.57	44.35	50.31	43.1	44.35	54.4	38.6	44.35	52.31	41.9	0.6444

IPCB Limit by Day and Night

	Day Time - from 7:00am to 9:59pm									Night Time – from 10:00pm to 6:59am								
Hz	31.5	63	125	250	500	1000	2000	4000	8000	31.5	63	125	250	500	1000	2000	4000	8000
PCB-dBA	36	47.8	52.9	55.4	54.8	52	48.2	44	38.9	30	40.8	45.9	45.4	43.8	41	37.2	33	30.9
	Modeled Maximum WTG Noise / Ambient Noise									Modeled Maximum WTG Noise / Ambient Noise								
Hz	31.5	63	125	250	500	1000	2000	4000	8000	31.5	63	125	250	500	1000	2000	4000	8000
WTG.dBA	-12.5	3.7	22.6	35.7	42.7	44.2	41.1	34.1	30.2	-12.5	3.7	22.6	35.7	42.7	44.2	41.1	34.1	30.2
Ambient	24.9	38.4	44.4	46.7	50.4	54.0	50.5	45.3	41.3	28.8	36.1	40.5	44.3	47.9	47.8	41.7	33.5	25.0
SUM	24.9	38.4	44.4	47.1	51.1	54.5	51	45.6	41.7	28.8	36.1	40.5	44.8	49.1	49.4	44.4	36.8	31.3
Increase	0.0	0.0	0.0	0.3	0.7	0.4	0.5	0.3	0.3	0.0	0.0	0.1	0.6	1.1	1.6	2.7	3.3	6.3
WTG.dBA	-14.8	1.4	20.3	33.4	40.4	41.9	38.8	31.8	27.9	-14.8	1.4	20.3	33.4	40.4	41.9	38.8	31.8	27.9
Ambient	21.5	35.0	41.0	43.3	47.0	50.6	47.1	41.8	37.9	25.4	32.7	37.0	40.9	44.5	44.4	38.3	30.1	21.6
SUM	21.5	35	41	43.7	47.8	51.1	47.7	42.3	38.3	25.4	32.7	37.1	41.6	45.9	46.3	41.6	34	28.8
Increase	0.0	0.0	0.0	0.4	0.9	0.5	0.6	0.4	0.4	0.0	0.0	0.1	0.7	1.4	1.9	3.2	3.9	7.2
WTG.dBA	-15.9	0.3	19.2	32.3	39.3	40.8	37.7	30.7	26.8	-15.9	0.3	19.2	32.3	39.3	40.8	37.7	30.7	26.8
Ambient	22.0	35.5	41.5	43.8	47.5	51.1	47.6	42.3	38.4	25.9	33.2	37.5	41.4	45.0	44.9	38.8	30.6	22.1
SUM	22	35.5	41.5	44.1	48.1	51.5	48	42.6	38.7	25.9	33.7	37.6	41.5	46.1	46.3	41.3	33.7	28.1
Increase	0.0	0.0	0.0	0.3	0.6	0.4	0.4	0.3	0.3	0.0	0.0	0.1	0.5	1.0	1.4	2.5	3.1	6.0
WTG.dBA	-16.2	0.0	18.9	32.0	39.0	40.5	37.4	30.4	26.5	-16.2	0.0	18.9	32.0	39.0	40.5	37.4	30.4	26.5
Ambient	22.0	35.5	41.5	43.8	47.5	51.1	47.6	42.3	38.4	25.9	33.2	37.5	41.4	45.0	44.9	38.8	30.6	22.1
SUM	22	35.5	41.5	44.1	48	51.5	48	42.6	38.7	25.9	33.2	37.6	41.8	46	46.2	41.2	33.5	27.9
Increase	0.0	0.0	0.0	0.3	0.6	0.4	0.4	0.3	0.3	0.0	0.0	0.1	0.5	1.0	1.4	2.4	2.9	5.8
WTG.dBA	-16.3	-0.1	18.8	31.9	38.9	40.4	37.3	30.3	26.4	-16.3	-0.1	18.8	31.9	38.9	40.4	37.3	30.3	26.4
Ambient	21.4	31.2	37.3	38.1	44.3	44.7	38.5	43.3	39.5	27.8	35.6	39.1	43.8	50.7	50.3	40.9	29.3	22.8
SUM	21.4	31.2	37.3	39	45.4	46.1	40.9	43.5	39.7	27.8	35.6	39.2	44.1	51	50.7	42.5	32.9	28
Increase	0.0	0.0	0.1	0.9	1.1	1.4	2.5	0.2	0.2	0.0	0.0	0.0	0.3	0.3	0.4	1.6	3.6	5.2

Note: The predicted high WTG in the high frequency range is due to the used assumption that all frequencies have the same absorption in air. In reality the higher frequencies will experience higher absorption in air and at such significant distance will be greatly reduced. Consequently, the wind turbines will be in compliance with the IL PCB standards and will not significantly increase the ambient noise level at the receptors.

In the table above where the assumption that all frequencies have the same absorption in air was used, it can be seen in the frequencies where the WTG exceeds the IL PCB limit, the ambient noise level exceeds it as well (Red Numbers).

Table 3-4. Noise levels at Receptors 19 and 20 (corrected for atmospheric absorption)

	Frequency(hertz)								
	31.5	63	125	250	500	1,000	2,000	4,000	8,000
Receptor 19	**12.5**	**3.7**	**22.6**	**35.7**	**42.7**	**44.2**	**41.1**	**34.1**	**30.2**
Add 2 dB/km from WindFarmer results (global assumed atm. Absorption)	**11.6**	**4.6**	**23.5**	**36.6**	**43.6**	**45.1**	**42.0**	**35.0**	**31.1**
ANSI Atmospheric Absorption	0	0.142	0.479	1.22	2.24	4.16	10.8	36.2	129
Decibel attenuation	0.0	0.1	0.2	0.6	1.1	2.0	5.1	17.1	60.8
	11.6	4.6	23.3	36.1	42.6	43.2	36.9	18.0	-29.7
IPCB Nighttime Standard	**30**	**40.8**	**45.9**	**45.4**	**43.8**	**41**	**37.2**	**33**	**30.9**
Receptor 20	**15.9**	**0.3**	**19.2**	**32.3**	**39.3**	**40.8**	**37.7**	**30.7**	**26.8**
Add 2 dB/km from WindFarmer results (global assumed atm. Absorption)	**14.9**	**1.3**	**20.2**	**33.3**	**40.3**	**41.8**	**38.7**	**31.7**	**27.8**
ANSI Atmospheric Absorption	0	0.142	0.479	1.22	2.24	4.16	10.8	36.2	129
Decibel attenuation	0.0	0.1	0.2	0.6	1.1	2.1	5.4	18.0	64.1
	14.9	1.2	20.0	32.7	39.2	39.7	33.3	13.7	-36.3
IPCB Nighttime Standard	**30**	**40.8**	**45.9**	**45.4**	**43.8**	**41**	**37.2**	**33**	**30.9**

ANSI = American National Standards Institute.
dB/km = decibel per kilometer
IPCB = Illinois Pollution Control Board

Noise Effects

The degree of intrusiveness of a new environmental noise source is measured in terms of —Absolute" and —Relative" noise impact. Absolute impacts refer to a new noise source exceeding a certain local, state, or Federal noise standard stated in terms of an absolute numeric limit (in decibels). Relative impacts refer to the degree to which the new noise source exceeds existing ambient noise levels.

The data shows that wind turbine noise levels would exceed the nighttime IPCB standard only at one receptor and only slightly at one frequency (1,000 hertz). However, ambient noise levels (without the turbines) already exceed the IPCB standards at this location (as well as the other four receptor locations shown in Table 13). In addition, the analysis shows that predicted wind turbine noise levels would increase ambient noise levels at these locations by less than 1 decibel (1 dBA). A 3-decibel change is the threshold of perception of change for most people, so noise generation resulting from turbine operations would not noticeably increase ambient noise levels and would not likely be intrusive from the standpoint of relative noise impact.

It should be noted that the modeling results are based on the turbines operating at maximum speed. Further, modeling is at best an approximation of potential real-world conditions that may result from MWP's operations. As a condition to the Special Use Permit, MWP has committed to comply with all applicable IPCB regulations; therefore, adverse impacts associated with the proposed project are not anticipated.

3.2.2.4 Historic, Architectural, Archaeological, and Cultural Resources

The *National Historic Preservation Act of 1966* (16 U.S.C. 470 *et seq*.; NHPA) is the primary Federal law protecting cultural, historic, American Indian, and Native Hawaiian resources. Section 106 of the NHPA (36 CFR Part 800) requires Federal agencies to assess and determine

the potential effects of their proposed undertakings on prehistoric and historic resources (e.g., sites, buildings, structures, and objects) and to develop measures to avoid or mitigate any adverse effects. Compliance with Section 106 requires consultation with the State Historic Preservation Officer (SHPO).

On August 28, 2009, DOE executed a Memorandum authorizing its Recovery Act grant applicants under the Energy Efficiency and Conservation Block Grant Program, Weatherization Assistance Program, and SEP to initiate Section 106 consultations pursuant to 36 CFR 800.2(c)(4) (DOE 2009). On May 6, 2010, the Illinois Programmatic Agreement was executed with the DOE, which further solidified a recipient's ability to initiate consultation with the SHPO. As of that date, applicants and their authorized representatives could consult with the SHPOs to initiate the review process established under 36 CFR Part 800. In accordance with this authorization, representatives of MWP initiated Section 106 consultation with IHPA on February 12, 2010.

Archaeological and Aboveground Area of Potential Effect

The area of potential effect (APE) is the geographic area or areas within which the project may directly or indirectly cause alterations in the character or use of historic properties, if such properties exist. For the MWP project, the following APEs were established to examine the potential impacts to and aboveground historic properties:

- For aboveground resources, the aboveground APE was developed based on a recommendation by the IHPA during a telephone conversation.

- For archaeological resources, the APE is defined as the footprint of the wind turbine foundations, substations, and access roads, as well as any surrounding area that would be potentially disturbed during its construction or installation of electrical wiring.

Aboveground Historic Resources

In response to MWP's initial submission, the IHPA requested that an architectural survey be completed for the proposed project (Appendix B, Attachment B-5). From May 24 to June 18, 2010, MWP commissioned a field survey and records review of the area within a 0.75-mile radius collective visual APE from each proposed turbine location. In addition, MWP examined the National Register of Historic Places (NRHP), National Historic Landmark, and Historic Architectural and Archaeological Resources Geographical Information System (HAARGIS) records, as well as historic plat maps to identify the origins of historic buildings. Additionally, photographs of the principle façade and unique building elements were taken of buildings older than 50 years of age or for which an age could not be determined.

The survey identified seven buildings older than 50 years in age in the collective visual APE. Four of these buildings were determined to be ineligible for inclusion on the NRHP because the buildings are not a good example of a particular architectural style and/or because modifications have resulted in a loss of architectural characteristics (modified resources). The remaining three buildings (architectural resources) may be eligible for listing on the NRHP under criterion C (properties that "embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that

represent a significant and distinguishable entity whose components may lack individual distinction").

An evaluation of the potential visual effects of the proposed wind turbines on the three remaining properties determined that an observer on the public right-of-way viewing the primary façade of two structures would have no view of the proposed turbine locations. It was therefore concluded that the proposed project would have no effect on these properties. The remaining architectural resource is located on 130th Avenue immediately south of Turbine 10. While viewing the primary façade of this building, Turbine 10 would be visible in the background. However, due to the significant distance between this property and turbine 10 (over 4,500 feet), the turbine would not be a dominant element in the viewshed of this property. Additionally, the siding and roof of this property do not appear to be original, and may exclude this building from being eligible for listing in the NRHP.

Belowground Archaeological Resources

From May 24 to June 17, 2010, a Phase 1 Literature Review and Archaeological Reconnaissance Survey was conducted to assess the potential for intact archaeological deposits located within the boundaries on the proposed project (Appendix B, Attachment B-4). As part of this survey, early plats, atlases, regional histories and soil surveys were consulted, and a site survey consisting of a site walk-through was conducted. Historical maps indicate the previous existence of the Warren County Alms House cemetery located on the southwest corner of U.S. Highway 67 and 140th Avenue, near the location of a proposed electrical substation.

This cemetery was relocated prior to the widening of U.S. Highway 67 to a four-lane highway in 1991. Though 105 cemetery burials were removed from this location and reinterred at the Lenox Union Cemetery, there is still potential for unmarked graves to be located at the site.

Tribal Consultation

MWP used the Tribal Consultation Notification System (TCNS) to identify tribes that have indicated a geographical preference for Warren County. The TCNS is an interactive, login and password-protected system that enables tower builders to notify tribal governments and Native Hawaiian Organizations of proposed construction, and provides a means for these governments and organizations to reply to tower builders. When a project is uploaded to TCNS, a list of tribes who have selected the area as being within their area of geographic preference is returned. This list was cross-referenced with the Native American Consultation Database for any additional tribes that may not subscribe to TCNS. DOE sent a notice of scoping to each tribe identified through the above two methods on September 14, 2010. MWP also sent letters to each of the tribal representatives on June 22, 2010. The list of tribes is as follows:

- Absentee-Shawnee Tribe of Indians
- Citizen Potawatomi Nation
- Forest County Potawatomi Community of Wisconsin
- Hannahville Indian Community of Michigan
- Iowa Tribe of Kansas and Nebraska
- Iowa Tribe of Oklahoma
- Keweenaw Bay Indian Community
- Kickapoo Tribe of Indians of the Kickapoo Reservation in Kansas

- Kickapoo Tribe of Oklahoma
- Menominee Indian Tribe of Wisconsin
- Miami Tribe of Oklahoma
- Ottawa Tribe of Oklahoma
- Peoria Tribe of Indians
- Pokagon Band of Potawatomi Indians
- Prairie Band Potawatomi Nation
- Sac & Fox Tribe of the Mississippi in Iowa
- Sac and Fox Nation of Missouri
- Sac and Fox Nation of Oklahoma
- Shawnee Tribe
- Winnebago Tribe of Nebraska
- Wyandotte Nation

To date, the Kickapoo Tribe of Indians of the Kickapoo Reservation in Kansas, the Ottawa Tribe of Oklahoma, the Peoria Tribe of Indians, the Shawnee Tribe, and the Winnebago Tribe of Nebraska have responded with no objections to the proposed project (Appendix E, Attachment E-6).

Direct and Indirect Impacts

The proposed project is not anticipated to result in adverse impacts related to historical, architectural, archaeological, or cultural resources. An examination of potential historic properties within the cumulative visual APE identified 3 historic properties that may be eligible for listing on the NRHP. However, to an observer on the public right-of-way facing these structures, the turbine would not be visible in two locations and scarcely visible in the third.

Additionally, although the former Warren County Alms House cemetery is located on the northeastern corner of the project site, the removal of 105 deceased individuals was carefully monitored by state and county officials and it is unlikely that unmarked graves would be encountered during installation of the substation. However, in response to a request from IHPA, MWP has committed to having an archaeologist present during the excavation at the northeast portion of the lease area to ensure that any human remains (if discovered) are appropriately managed in accordance with the *Human Skeletal Remains Protection Act* (20 ILCS 3440; 17 IAC 4170).

In a letter dated September 23, 2010, the IHPA stated that agreement to and implementation of archaeological monitoring of the construction of the proposed substation constitutes compliance with Section 106 of NHPA. Based on the responses received from IHPA and on the analysis conducted by MWP, DOE has concluded that the proposed project would not have an adverse effect on historic or archaeological resources.

3.2.2.5 Geology and Soils

The project site is located on a loess-covered till plain, part of the Winnebago formation of the Illinois Episode of glaciation (Edge Consulting 2010). The depth to bedrock is greater than 6 feet. Bedrock is commonly sedimentary rock of the Pennsylvanian Age (NRCS 2010).

Native soils typically consist of Muscatine silt loam (51A). This soil type is typically gently sloping and is poorly drained. Other soils within the project area include 68A (Sable silty clay), 86B (Osco silt loam), 86B2 (Osco silt loam), and 86C2 (Osco silt loam) (NRCS 2010). All soils with the exception of 86C2 are considered prime farmland. Prime farmland is defined in part as land that has the best combination of physical and chemical characteristics for producing food, feed, fiber, and oilseed crops and that is available for these uses. Congress enacted the *Farmland Protection Policy Act* as a subtitle of the 1981 Farm Bill to minimize the extent to which Federal programs contribute to the unnecessary conversion of farmland to nonagricultural uses. MWP submitted a request for an evaluation of impacts to prime farmland at the MWTP location to the IDOA and filed Form AD-1006 with the Warren County Soil and Water Conservation District.

Seismic activity in Warren County is not considered a significant risk. Illinois has experienced approximately 200 earthquakes since 1795, only nine of which were strong enough to even cause minor damage. The majority of these earthquakes occurred in Southern Illinois. The largest earthquake ever recorded in Illinois occurred November 9, 1968 and measured a magnitude of 5.4 on the Richter scale (ISGS 1995).

Direct and Indirect Impacts

Soil disturbance would occur as a result of site preparation and project construction. The MWTP would permanently commit approximately 7 acres of prime farmland to project uses during the lifetime of the project. Foundations for the towers would extend to a depth of approximately 15 feet below land surface. After construction, land not committed to MWTP operations would be graded and returned to agricultural use. The locations proposed for the site features (towers, roads, substations) are currently used for agriculture and have been repeatedly plowed and planted, eliminating surface soil features to a substantial degree, and the area to be disturbed is relatively minor; therefore, few if any impacts to soils are anticipated. The response received from IDOA concludes that the MWTP would be consistent with the DCEO Agricultural Land Preservation Policy and complies with the *Illinois Farmland Preservation Act*. The IDOA response and Form AD-1006 are in Appendix C, Attachment C-4 of this EA.

The depth of foundations is similarly limited, and again of limited surface area; therefore, no impacts to geologic features would result from the proposed project. A review of information managed by the Illinois State Geological Survey indicated that there is a low risk of seismic activity in Warren County that could jeopardize the structural integrity of the wind turbines and foundations.

3.2.2.6 Biological Resources

Biological resources include the plants, animals, and other organisms, as well as the various habitats, ecological communities, and ecosystems, within the region of a proposed project. In this section, biological resources are discussed in the following sub-sections: vegetation, wetlands, waters of the United States, wildlife, and special status species. After the biological resources are described, an analogous section follows that discusses the environmental impacts that could occur as a result of the proposed project. This information is partially based on a report by biologist Dr. Kenneth Cramer, who conducted a site visit in June 2010 and performed a wildlife assessment of the proposed project area (Appendix B, Attachment B-6). The Phase I

Archaeological Reconnaissance Survey (Appendix B, Attachment B-4) also served as an ancillary source of information.

The topography of Warren County consists of gently rolling upland plains, resulting from glacial deposition, and dissected valley sides and flood plains, which resulted from postglacial stream erosion. The proposed project site consists of 600 acres of highly disturbed land, mainly of existing agricultural fields (currently planted with row corn and soybeans), with a small amount of pasture and small drainages (Cramer 2010). Located south and northeast of the intersection of U.S. Highway 67 and 140th Avenue in Lenox Township, slightly north of central Warren County in western Illinois, the project area is in an area heavily utilized for agriculture. The proposed project area sits approximately 15 miles east of the Mississippi River and approximately 45 miles west of the Illinois River. Both of these major rivers are situated roughly north-to-south (flowing generally southward) and represent important landscape features for resident and migratory wildlife, despite their heavy historical use by humans.

Vegetation

As with much of Warren County, the proposed project site lies in the Western Forest-Prairie Natural Division, Galesburg Section, one of 14 natural divisions in Illinois classified based on rainfall and water availability, the kinds of native animals and plants present, topography, and types of geologic materials visible near the surface. This division is typified by a strongly dissected glacial till plain with open woodland as predominant vegetation and considerable prairie on level uplands. The division is characterized by well-developed natural drainage systems consisting of major streams that have substantial flood plains. Native vegetation consists of forest in the river and creek valleys with open forest patches of trees, including oaks and hickories, and prairie on the uplands. The soil composition corresponds to the historic native vegetation at the project site, most likely consisting of native plants of the tall grass prairie ecoregion.

Most of the 600 acres of proposed project area is currently developed agricultural land, predominantly planted in row crops of corn and soybean. The remainder, less than 12 contiguous acres, contains pasture and small drainages (Cramer 2010). Agricultural conversion and development of the area have eliminated historical native vegetation on the project site where pasture row crops now dominate. Vegetation on the proposed project site currently consists of a mowed mixture of grasses and other roadside herbaceous plants (Edge Consulting 2010).

Wetlands and Other Waters of the United States

Wetlands are classified by the U.S. Army Corp of Engineers based on three criteria: hydrology, soil type, and vegetation. Specifically, wetlands are defined as those areas that are saturated or inundated by water that is sufficient to support vegetation typically adapted to saturated soils (USACE 1987). Wetlands and other surface water features, which may include intermittent and perennial streams, are generally considered ―waters of the United States" by the U.S. Army Corps of Engineers, and, under its definition of jurisdictional waters/features, are protected under Section 404 of the *Clean Water Act*. Pursuant to 10 CFR Part 1022, which requires that DOE consider potential impacts to floodplains and wetlands, DOE reviewed the U.S. Geological Survey wetland maps, the USFWS National Wetlands Inventory maps, and Federal Emergency Management Agency floodplain maps for this site location. Initial consultation with the IDNR through EcoCAT (Appendix C, Attachment C-3), an online system that uses databases,

geographic information system mapping, and a set of programmed decision rules to determine if a proposed project may be in the vicinity of protected natural resources. Entering a project into this system initiates consultation with the IDNR, which submits a letter terminating consultation, requesting additional information, or recommending methods to minimize potential adverse effects. Copies of the IDNR correspondence are provided in Appendix C, Attachment C-3 of this EA.

The review included a Wetland Review (Part 1090), which indicated that the National Wetlands Inventory depicted known wetlands within 250 feet of the property boundary. Additional information from the National Wetland Inventory shows freshwater emergent and freshwater forested/scrub wetlands north of the proposed project site (USFWS 2010a). While the National Wetlands Inventory map depicts wetlands along the railroad tracks near the property boundary (Figure 3-4), all construction and operating activities would be performed in areas currently utilized for agricultural purposes, and the construction activities closest to these wetlands (associated with the substation) would be approximately 1,400 feet away from the designated wetlands. In June 2010, Dr. Kenneth Cramer, Chair of the Biology Department at Monmouth College, However, in June 2010, Dr. Kenneth Cramer conducted field reconnaissance and verified the absence of wetlands and surface water at locations where turbines would be placed (Cramer 2010).

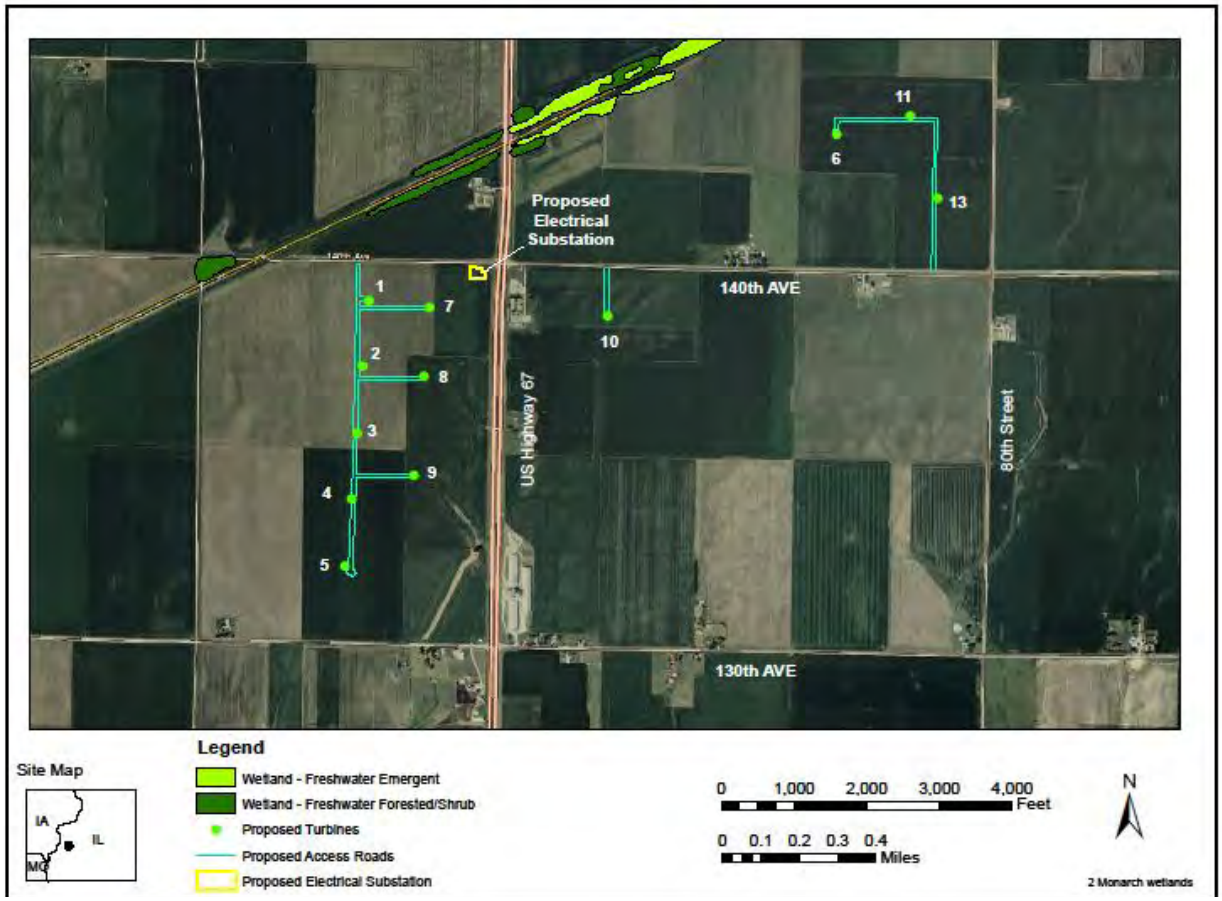

Figure 3-4. Wetlands in the Project Vicinity

Wildlife

This section discusses the wildlife that is known to exist in the vicinity of the proposed project area. The IDNR indicated that, as with most wind power projects, migratory birds and bats are the primary concern with the proposed project. Therefore, this section analyzes the flying vertebrates with special consideration.

Herpetofauna

According to the Illinois Natural History Survey, thirteen species of amphibians and reptiles are known from 30 herpetological collections across the country to occur in Warren County: tiger salamander (*Ambystoma tigrinum*), American toad (*Bufo americanus*), cricket frog (*Acris crepitans*), western chorus frog(*Pseudacris triseriata*), plains leopard frog(*Rana blairi*), bullfrog (*Rana catesbeiana*), green frog (*Rana clamitans*), northern leopard frog (*Rana pipiens*), snapping turtle (*Chelydra serpentina*), fox snake (*Elaphe vulpina*), northern water snake(*Nerodia sipedon*), common garter snake(*Thamnophis sirtalis*) and massasauga (*Sistrurus catenatus*) (Illinois Natural History Survey 2009a).

Non-Flying Mammals

Non-flying mammals is a division intended to include all mammal species besides bats, as bats are addressed in a separate section below. While no direct field studies were conducted to determine the presence of non-flying mammals, the mammals that are likely to reside on or visit the proposed project area include red fox (*Vulpes vulpes*), raccoons (*Procyon lotor*), opossum (*Didelphis virginiana*), white-tailed deer (*Odocoileus virginianus*), rabbit (*Sylvilagus floridanusf*), coyote (*Canis latrans*), skunk (*Mephitis mephitis*), and other small mammals. All of the non-flying mammalian species that could possibly occur on or near the project site are those that have adapted to high levels of disturbance from agriculture. Small mammals serve as food for raptors, snakes, coyote and fox.

Migratory Birds and Bald Eagles

The *Migratory Bird Treaty Act* (16 U.S.C. 703-7012; MBTA) implements four treaties that provide for international protection of migratory birds. The MBTA prohibits taking, killing, possessing, transporting, or importing migratory birds, their eggs, parts, and nests, except when specifically authorized by the U.S. Department of the Interior. While the MBTA has no provision for allowing unauthorized take, USFWS recognizes that some migratory birds may be taken during activities such as wind turbine operation even if all reasonable measures to avoid a take have been implemented. Bald and golden eagles are included under the MBTA, and are afforded additional legal protection under the *Bald and Golden Eagle Protection Act* (16 U.S.C. 668-668d).

Both migratory birds and resident (non-migratory) birds could be associated with the proposed site and its surroundings. The proposed project lies within the Mississippi migratory flyway (Figure 3-4), a very important corridor for large numbers of migrating birds in spring and fall. Migrants may pass over the proposed site and some could descend, but in average weather conditions, they would not likely descend or attempt a rest stop due to the lack of attractive natural habitat such as ponds or forest. During inclement weather, migrating birds may fly lower or attempt to stop on the site (Cramer 2010).

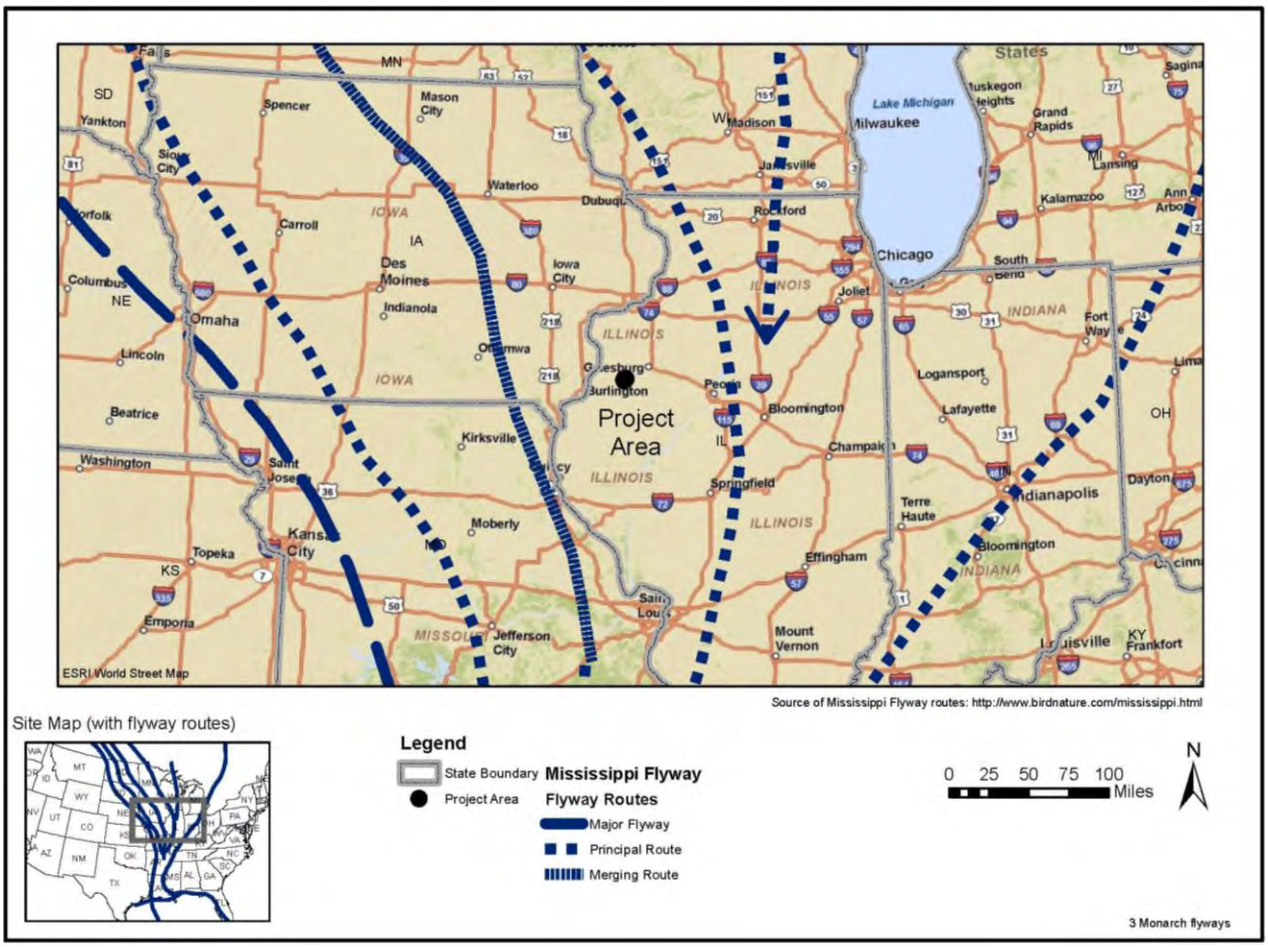

Figure 3-5. Major Migratory Bird Flyways, Principal Routes, and Merging Routes in the Project Vicinity

According to the Illinois Natural History Survey (2009b), 72 bird species are known to or are likely to breed in north-central Warren County. It is possible that some of these birds breed on or near the site or could traverse the proposed project site in their normal travels. Of these species, there is a possibility that some species of concern, particularly ground-nesting grassland birds, could nest in the area where the groundcover is pasture (rather than plowed row crops) or on land recognized under the Natural Resources Conservation Service Conservation Reserve Program. These species include Henslow's sparrow (*Ammodramus henslowii*), northern harrier (*Circus cyaneus*), short-eared owl (*Asio flammeus*), and upland sandpiper (*Bartramia longicauda*) (Herkert 1992; Cramer 2010). Since Henslow's sparrow, northern harrier, and short-eared owl all require areas of pasture or grassland greater than 50 hectares (124 acres) for breeding, and since no fragments approaching this size exists within the project area (Cramer 2010), individuals of these species are unlikely to occur there. Although upland sandpipers are more commonly found in grasslands greater than 50 hectares in size (USFWS 2001), they typically use smaller patches of grassland, pasture, or idle cropland; therefore, this species could be found within the vicinity of the proposed project. They do not nest in row crop agriculture (NBII 2011), thus most of the proposed project area would not support them and they are unlikely to be present.

Other species of note could be present in the vicinity of the proposed project. Loggerhead shrike (*Lanius ludovicianus*) nests in hedgerows, primarily with Osage orange (*Maclura pomifera*), multiflora rose (*Rosa multiflora*), or other spiny or thorny plants. In addition, red-shouldered hawk (*Buteo lineatus*) and Swainson's hawk (*Buteo swainsoni*) are protected raptors potentially migrating through the area, though they are generally associated with forested areas in the eastern part of the state. No records of bald eagle nesting in Warren County were identified.

Bats

Twelve species of bats regularly occur in Illinois, though not all may be present in the vicinity of the proposed project area (University Illinois Extension 2010). Two of the species are Federally endangered; however, only one species, the Indiana bat (*Myotis sodalis*), may potentially occur in Warren County and is discussed in section 3.6.4. The southeastern bat (*M. austroriparius*) and Rafinesque's big-eared bat (*Corynorhinus rafinesquii*) are state-listed species but do not occur in Warren County.

Those species known to hibernate within the state and that are year round residents include: little brown bat (*M. lucifugus*), northern long-eared myotis (*M. septentrionalis*), eastern pipistrelle (*Pipistrellus subflavus*), and big brown bat (*Eptesicus fuscus*). Of these species, the northern long-eared myotis and eastern pipistrelle mostly use caves for roosting, although maternal colonies of the northern long-eared myotis can also be found in hollows and loose bark of trees. Caves in Illinois are associated with karst type geology, which occurs in several places in the state, but not in Warren County, although there are two sites in Henderson County, just to the west of Warren County (Illinois State Geological Survey, 2010). Bat species that obligatorily use caves during any part of their life history may therefore be in the vicinity of the proposed project area while migrating, but would not be there during times of hibernation. The other two Illinois resident species rely on trees for summer nursery colonies and, although required habitat is limited to parts outside the proposed project area, these species may traverse the area during migration.

Two bat species are considered potential year-round residents in Illinois, eastern red bat (*Lasiurus borealis*) and silver-haired bat (*Lasionycteris noctivagans*). During the winter, some individuals of these species hibernate in Illinois while the rest migrate to adjacent states or farther south. These two species mainly roost in tree cavities, although the silver-haired bat occasionally occupies buildings or caves during the winter (University of Illinois Extension 2010). These species are not likely to occur on the proposed project site but may migrate through the area.

The hoary bat (*Lasiurus cinereus*) and the evening bat (*Nycticeius humeralis*) migrate seasonally and are found in Illinois in the summer roosting in trees. These species are typically not found in Illinois during the winter (University of Illinois Extension 2010). The paucity of trees surrounding the proposed project site reduces the probability of summer roosting on the proposed project site. Since (1) no endangered bats have been recorded in Warren County, and (2) the intensively farmed area of the proposed project area and vicinity has few roosting sites, a survey for bats in the project area was unwarranted. The Indiana bat, a Federally listed endangered species, is discussed below.

Federally and State-Listed Species

The USFWS administers the *Endangered Species Act of 1973*, as amended. This law provides Federal protection for species designated as Federally endangered or threatened. An endangered species is "in danger of extinction throughout all or a significant portion of its range," and a threatened species "is likely to become an endangered species within the foreseeable future" (USFWS 1988). Two species protected under the Endangered Species Act of 1973 are known to occur or potentially occur in Warren County (Appendix C, Attachment C-6): Federally listed endangered Indiana bat (*Myotis sodalis*) and Federally listed threatened eastern prairie fringed orchid (*Platanthaera leucophaea*). Additionally, although not included on the list of threatened, endangered, and candidate species that could occur in Warren County, a nonessential experimental population of whooping crane (*Grus americana*) can occur statewide during migration.

Indiana Bat

The Indiana bat is present in Illinois throughout the year and is known to hibernate at sites within the state. Though it is a migratory species, females may stay close to their hibernacula (typically caves, in which the bats hibernate) or migrate great distances to their summer habitat. Breeding individuals are colonial, with both sexes roosting in caves and mines during winter. During the summer, females form small maternity colonies and roost underneath exfoliating bark of trees. Infrequently, they may also use artificial roosts, such as utility poles with crevices or brackets, and are rarely found in buildings or bat houses (University of Illinois Extension 2010). Most maternity colonies that are known exist in fragmented landscapes with low to moderate forest cover, including agricultural areas. However, Indiana bats are more likely to occur in areas with higher densities of potential roost trees. They travel up to 5 miles (most stay within 2 miles) each evening to forage areas, using the same areas throughout the season and year after year, and commuting preferentially along tree-lined paths (or other linear features) rather than crossing large, open areas (USFWS 2007). Indiana bats appear to forage preferentially within 150 feet of a forest edge, rather than over expansive open areas (Brack 1983; Menzel et al. 2001) and typically forage at a height of 6.5 to 98.4 feet (USFWS 2007). During migration, they appear again to follow tree lines, avoid open areas, and fly at low altitudes (Turner 2007).

According to the USFWS Draft Recovery Plan, Warren County, Illinois is not considered a priority area for conservation of this species due to the lack of documented hibernacula. There is a record of a maternity colony in adjacent Henderson County, and adult males are found throughout the range of the species (USFWS 2007). The closest and only designated critical habitat for the Indiana bat in Illinois is the Blackball Mine (Priority 1), located in LaSalle County, over 90 miles east-northeast of the MWTP site (USFWS 2007). The closest known Indiana bat hibernaculum is a Priority 4 cave, Burton Cave, 72 miles southwest of the project site in southern Adams County, Illinois (USFWS 2007). The Illinois State Geological Survey (2010) has also identified a cave site in adjacent Henderson County, approximately 13 miles west-northwest of the project site. Even though USFWS has not identified this cave as providing a hibernaculum, its potential for use as a hibernaculum cannot be ruled out.

Roost tree habitat is not available on the proposed project site. The only stand of trees near the proposed project site lies along the rail line, approximately 0.4 mile from the nearest turbine locations. This stand of trees is isolated from other stands of trees, such as those located on Henderson Creek, by more than 4,000 feet. The stand of trees along Henderson Creek, north of

the proposed project area, is small and isolated: very few other trees exist along the creek within one mile of that stand. The only other trees in or near the proposed project area are those found at or near residences or barns.

Eastern Prairie Fringed Orchid
The eastern prairie fringed orchid occurs in a variety of habitats ranging in moisture from mesic (essentially —moderately moist") prairie to sedge meadows and bogs, none of which are found in or near the proposed project site. Its decline has resulted from a loss of habitat, particularly conversion of natural habitats to cropland and pasture, and more recently, due to intrusion of woody vegetation, competition from nonnative species, and over-collection (USFWS 2010b).

Whooping Crane
The nonessential experimental population of whooping crane is afforded protection under the ESA and Federal agencies are required to informally confer with the Service on actions that are likely to jeopardize the continued existence of the species for listing. In their letter dated July 12, 2010, USFWS noted the potential presences of the species in Illinois during migration. The experimental population of whooping crane begins its migration in mid-September toward Florida. Along this migration, the crane may stop at any freshwater feature or agricultural field adjacent to such feature. To date, they have stopped mainly in wetlands and agricultural areas on the eastern border of Illinois and western Indiana and not in Warren County [USFWS response letter dated July 12, 2010 (Attachment 6, Appendix C)].

State-Listed Species
There are only two State-listed threatened or endangered species in Warren County, bunchflower (*Melanthium virginicum*) and Eastern massasauga or massasauga rattlesnake (*Sistrurus catenatus*) (IDNR 2010). Results from a natural resources review of the proposed project location using EcoCAT indicates that there are no records of State-listed threatened or endangered species, Illinois Natural Area Inventory sites, dedicated Illinois Nature Preserves, or registered Land and Water Reserves in the vicinity of the project location (Appendix C, Attachment C-3). Additionally, the massasauga is considered a Federal candidate species in some Illinois Counties but is not designated in Warren County.

Indirect and Direct Impacts
This section discusses the potential environmental impacts of the proposed project on the biological resources discussed above. The proposed project would add large, industrial structures with moving parts, within a landscape that is otherwise gently sloping and devoid of such structures. Direct disturbance is limited to a cumulative total of 16 acres, though the overall project spans 600 acres.

Vegetation
Potential impacts of the proposed project to vegetation would include loss of small areas of vegetation along the footprint of the project and further disturbance resulting in soil exposure that could favor ruderal (first to colonize disturbed areas), often nonnative, invasive species. Due to the fact that the proposed project area and its surroundings have already undergone intensive agricultural development, impacts to vegetation are expected to be short-term during construction and inconsequential in the longer term.

Wetlands and Other Waters of the United States

In a letter dated March 19, 2010 in response to the EcoCAT review, the IDNR stated that wetlands may exist along the railroads in the area and that ―a wetlands delineation needs to be conducted to document baseline conditions.‖ While the National Wetlands Inventory also identified these wetlands, the existing nearby railroads and associated wetlands are not within the proposed 600-acre project area (USFWS 2010a) and are located approximately 1,400 feet from the nearest proposed construction. Dr. Cramer's follow-up findings also indicate there would be no construction of roads or pads in the area of forested riparian zones.

Wildlife

Herpetofauna

Other than loss of a small amount of vegetated area and additional vehicular traffic during construction and occasional maintenance, amphibian and reptile species are not expected to be substantially impacted by the proposed project. However, it is possible for individuals of this species to be killed along the project roads by collision with vehicles. This could be more likely on the side roads stemming from the main road of the southwestern area of the proposed project, as these side roads and the turbines at which they would terminate lie near drainage areas, places where many amphibians and reptiles live or visit regularly.

Non-Flying Mammals

Potential impacts to non-flying mammals could include collision with construction or operational vehicular traffic, habitat loss, or further fragmentation due to the addition of roads. They could also include adverse effects of the operation of the turbine. Animals could be driven from the area due to the addition of large, vertical structures perceived as predator roosting sites, the sound that the turbine would emit, the flicker of sunlight on surrounding ground due to the rotation of the blades, or the activity in general. The non-flying mammalian species in this area have been subjected to intensive agricultural activities for decades and are accustomed to intensive human impact. Furthermore, all of these species are common. Therefore, the proposed project is not anticipated to cause substantial adverse impacts to non-flying mammals.

Migratory Birds and Bats

There is a potential for the wind turbines to adversely impact birds and bats. Since topics related to potential impacts to the two taxa from the proposed project overlap, this section discusses some of the general and common features to both before addressing each separately. While numerous species of birds and several species of bats could be present at any time in the vicinity of the proposed project, most of the mortality at wind power sites has involved migrating bats and birds, not resident species (Johnson et al. 2002, 2004). Therefore, this analysis considers birds and bats that migrate in addition to residents. Since migration is seasonal, there is a seasonal component to such considerations. Furthermore, each species responds differently to turbine variables (e.g., height, diameter, speed).

Structures that rise suddenly in the landscape, such as wind turbines, communication towers and skyscrapers, are known to cause mortality to these taxa due to collisions. Birds and bats may be killed or injured if they collide with rotors, tower guy wires, or other structures. They may also be impacted through changes in their behavior such as avoiding wind energy developments or the surrounding habitat. In addition, the development activities or structures may directly impact

bird and bat habitat. Factors that appear to influence bird and bat mortality from wind turbines include placement, local habitats, species present, design of turbine, height, speed, lighting, weather, and season (Schwartz 2004; IDNR 2007).

The proposed turbine would have a 328 foot tower height and a rotor diameter of 271 feet, totaling 464 feet above ground level at its tallest extent. The project was designed to include certain features known to reduce bird mortality; namely, the monopole steel tube that lacks guy wires, both of which deter birds from approaching in an effort to perch. The GE 1.6xle turbine model turbine is designed for a monopole mounting application. The proposed monopole tower would be made of tubular conical steel sections. This design eliminates the need for guy wire support of the proposed tower structure. Guy wires can be a challenge for birds and bats to locate and maneuver around, and collisions with the wires can lead to injury or death. The proposed turbine design also does not involve the use of self-supporting lattice towers, which have been attractive as roosting sites for birds at other wind projects. The GE 1.6xle turbine model has a relatively large rotor, which have been associated with a higher mortality of raptors (Smallwood and Thelander 2004), though rotor diameter does not appear to relate to bat mortality (Horn et al. 2008). In addition, higher turbine heights are related to increased bird mortality (Winegrad 2004) and turbine tower heights above 213 feet are associated with an exponential increase in bat mortality (Barclay et al. 2007).

Rotor speed appears to be an important factor in bird and bat mortality. In general, very high rotor speeds are associated with greater bird mortality and very low speeds are associated with high bat mortality. While rotor speeds have become slower with technological advancements, the turbines have generally become larger with longer blades, resulting in blade tip speeds that are still very fast. Relatively slow turbines may operate at rotor speeds below 30 revolutions per minute, but blade tips on large turbines, such as those proposed, can reach speeds in excess of 200 miles per hour under windy conditions, making the blades deceptively transparent, and causing birds to attempt to fly through the arc and be struck and killed (USFWS 2003). Rotor speed adjustment can reduce potential impacts by considering which species are likely to be present, the conditions and time of year, and what speed would minimize risks to the various species of birds and bats likely to be present.

While lighting does not appear to have an effect on bats (e.g., Horn et al. 2008), lighting can have adverse impacts on birds. Lighting choices include either white or red lights, and either pulsating (strobe) or solid (steady). The USFWS (2003) guidelines regarding lighting on turbines specify that only white strobe lights be used at night, and that only a minimum number, intensity, and frequency of flashes allowable by FAA be used. Erickson et al.(2005) suggest that red lights, both solid and pulsating, appear to more attractive to birds at night when the weather is inclement than white strobe lights. However, more recent research on guyed communication towers and wind turbines within the height range of the proposed Monarch turbines has demonstrated that avian fatalities can be reduced, possibly 50 to 71percent, by using only flashing lights and not using any solid or steady lights (Gehring et al. 2009). While Gehring et al. (2009) advocate using flashing lights of red or white, Kerlinger et al. (2010) strongly suggest that wind turbines be equipped only with flashing red lights and that steady, burning red lights not be used on turbines. They further report no significant difference in mortality between unlit towers and towers fitted only with flashing red lights and note that the FAA does not require all turbines to be fitted with lights. Therefore, limiting the project's lighting to flashing red lights on the 8

turbines at the perimeter of the project is in keeping with current knowledge on minimizing avian mortality. In addition to lighting, other visual deterrents could include painting one of the blades, or part of a blade, on a rotor, a substantially different color, such as black, or installing noise-making devices such as infrasound, or devices that frighten birds, such as certain buoys (USFWS 2003).

Birds may be impacted by wind energy development through collision, electrocution on power lines, or through behavioral avoidance of the development (Winegrad 2004). Taller towers, larger rotor diameters, and slow to intermediate tip speeds are also associated with high risk to many kinds of birds, notably certain raptors (Smallwood and Thelander 2004). The availability of perching spots on turbine towers appears less important than previously believed. Studies also suggest that higher raptor mortality is associated with the presence of rock piles left near turbines during construction. The rock piles serve as habitat for small mammals, which attract predatory raptors, which can then collide with the turbine (Thelander 2004). Since as much of the land as possible would be reclaimed after construction and no large rock piles are expected to remain on the sites, increased attraction by predators to the site is not expected.

Birds migrating along the Mississippi flyway could pass over the proposed project area and could potentially attempt to stop and rest on or near the site. This is not highly likely as, in this section of the flyway, birds tend to adhere close to the river on the eastern side of the Mississippi (Birdnature.org 2011), and the proposed project lies 15 miles from the Mississippi River. Further, the proposed project area's lack of substantial natural habitat features, such as open water or forest patches in the vicinity, makes the area unenticing as stopover habitat. Compared with average weather conditions, the presence of migrating birds in the project area is more likely during times of inclement weather conditions when birds may fly at lower altitudes and/or seek out a place to rest. Times of inclement weather during migration season, therefore, present higher risk to birds; if migrating birds do descend, they could collide with the wind turbine. However, the substantial distance from the eastern edge of the Mississippi River makes this less likely than if it were in closer range.

Winegrad (2004) advises conducting a thorough review for potential avian mortality and disturbance of critical habitat, habitat fragmentation, and other impacts. Winegrad specifies that attention be paid to impacts on specific species, not just general numbers of kills, avoiding the use of guy wires, and locating transmission wires underground. The proposed project design includes underground transmission cables and a tubular tower design that would not have to use guy wires.

Bats

Most, but not all, of the bats killed at energy facilities across North America are migratory tree bats, including hoary bats, eastern red bats, and silver-haired bats (Kunz et al. 2007), and the bats were killed during fall migration. While wind energy development in the grassland/agricultural landscape has lower risk of mortality to bats than other landscapes, there is still risk of bat mortality.

In a study of hoary bats in California, the number of migrating bats peaked in autumn and increased with increasing cloud cover, decreasing wind speeds, and the presence of moonlight (Cryan and Brown 2007). Another study found that spring bat migration was higher on days with

lower wind speeds and warmer weather (Reynolds 2006). Unlike birds, bat mortality does not seem to be related to aviation lighting or ultraviolet paint. Bat mortality is affected by turbine height, geographic location, seasonality, weather, and wind speed, with high mortality on nights with low wind speeds. One study found higher bat mortality during fog than clear skies (Kerns and Kerlinger 2003). In addition, more bat fatalities occur at low wind speeds, which may be explained by new evidence suggesting that bats die from barotrauma, in which their lungs burst due to a sudden drop in air pressure as they arrive within a meter or two of the moving turbine (Baerwald et al. 2009). Why the bats are especially attracted to the turbines when the rotors are turning relatively slowly is not understood; they may simply be foraging or they may see the structures as potential roosting or mating sites and come to investigate. Whatever the cause of the attraction, stopping the blades from moving at low wind speeds (increasing cut-in speeds) reduces mortality and, by increasing the wind speed threshold required to start the turbines, it was shown that bat mortality can be reduced 56 to 92 percent (Baerwald et al. 2009; Caputo 2009). Bat mortality also increases exponentially with increasing height of the turbine above 65 meters (213 feet). In addition, recent research shows that bat mortality may be reduced up to 53 percent by installing ultrasonic speakers on the turbines, which floods the turbine area with white high frequency noise, deterring bats (Curry 2010). Increasing cut-in speeds was proposed as part of the Biological Assessment currently under review by USFWS as part of the Endangered Species Act Section 7 Consultation.

Based on site development recommendations from the USFWS (2003) *Interim Guidelines to Avoid and Minimize Wildlife Impacts from Wind Turbines* impacts to wildlife species are expected to be minimal due to: (1) limited concentration of birds in the area (roosting, migration route); (2) absence of bat roosting or maternal colonies; (3) absence of geological features attractive to wildlife; (4) turbine spatial configuration is grouped (within 16 acres of the 600-acre project site); and (5) the proposed site is already located on and surrounded by altered land that does not provide much in habitat value.

Federally and State-listed Species

Indiana Bat

Although Warren County is within the range of the Indian bat, there is no suitable roosting, foraging, or hibernating habitat within the MWTP site or surrounding action area. No summer or winter records, hibernacula, or summer reproductive records of Indiana bats have been identified in Warren County (USFWS 2007). It should be noted that lack of summer reproductive records may reflect lack of surveys and not necessarily that the species is not present in the county.

The project area is dominated by developed agricultural land. The only stand of trees within or near the area is small and distant from other isolated stands. The nearest forested areas with connectivity to the larger riparian forests in the region are more than 2 miles to the southeast along Cedar Creek and about 2 miles to the northwest along Henderson Creek. The USFWS describes suitable summer habitat for the Indiana bat in Illinois as areas within a 0.5-mile radius around a project site with forest cover of 15 percent or greater, permanent water, and potential roost trees with 10 percent or more peeling or loose bark (USFWS 2010). Based on this information, DOE concludes that there is no suitable roosting or foraging habitat within or immediately adjacent to the action area. However, because of the seasonal life characteristics of

migratory bats and uncertainty associated with migrating Indiana bat patterns, the only time that the project may result in adverse impacts to Indiana bats is during migration.

To determine potential impacts to Indiana bats, DOE has prepared a Biological Assessment for the proposed project in accordance with Section 7 of the *Endangered Species Act*. DOE submitted the Biological Assessment to USFWS on February 22, 2011, and a copy is contained in Appendix F of this EA. At the completion of their review, the USFWS will issue a Biological Opinion for the project which may contain mitigation requirements.

Eastern Prairie Fringed Orchid
As mesic to wet, unplowed tallgrass prairies and meadows, bogs, fens, or sedge meadows do not occur on the project site, no habitat exists for this species. Additionally, there are no existing populations of this species in Illinois (USFWS 2010b). DOE therefore determined that the project would have no effect on the eastern prairie fringed orchid.

Whooping Crane
The nearest wetlands or ponds that might be used as stopover habitat by whooping cranes are 1.3 and 1.5 miles northeast of the MWTP site, and all electrical connection lines required for this project would be buried. DOE, therefore, determined that the proposed project *would not result in jeopardy* to the NEP of the whooping crane.[3]

State-Listed Species
None of the State-listed species are listed as present in the project area. Therefore, State-listed species would not be impacted by the proposed project.

3.2.2.7 Human Health and Safety

Workers can be injured or killed during construction, operation and decommissioning of wind turbines through industrial accidents such as falls, fires and dropping or collapsing equipment. Such accidents are uncommon in the wind industry and are avoidable through implementation of proper safety practices and equipment maintenance.

The fall zone is defined as the approximate area around the base of the turbine that would likely receive the tower and/or turbine if it were to fall. In the event of wind turbine collapse, wind turbine towers tend to buckle or bend prior to collapse. Therefore, for this analysis, the fall-zone radius was determined to be 1.1 times the total turbine height or approximately 510 feet.

The potential for the proposed turbines to fall over or collapse causing damage, injury, or death would be remote; however, collapses do occur. For example, in March and October 2009, 1.5-megawatt GE turbines collapsed in Altona and Fenner, New York, respectively. GE has indicated that only 5 of the 13,000, or 0.0004 percent, of GE turbines operating globally have collapsed since 2002 (Bogdan 2009). While tower collapses are rare, reported instances have been due to circumstances including blade strikes, rotor over speed, cyclonic winds and poor or

[3] Jeopardy occurs when an action is reasonably expected, directly or indirectly, to diminish a species' numbers, reproduction, or distribution so that the likelihood of survival and recovery in the wild is considerably reduced (USFWS

improper maintenance (Global Energy Concepts 2005). No occupied structures are located within the fall zone of the turbine locations proposed for the MWTP.

Collapse of a turbine or breakage (and throwing) of one or more turbine blades are possible, but are very unlikely occurrences. Estimates of blade throw vary; MacQueen et al. (1983) estimate the probability of being struck outside of a one blade diameter (271 feet, in this case) of the tower base is about one chance in ten million (10^{-7}) per year for a fixed building, and substantially less for people who are mobile. Another potential source of accidents is ice shedding and ice throw. Ice shedding, or ice throw, refers to the phenomenon that can occur when ice accumulates on rotor blades and subsequently breaks free or melts and falls to the ground. Although a potential safety concern, it is important to note that while more than 90,000 wind turbines have been installed worldwide, there has been no reported injury caused by ice thrown from a turbine (Tetra Tech EC, Inc. 2007). The proposed project is to be supplied with ice sensors on the turbine blades. When ice forms the sensors would engage and the turbine would not be permitted to rotate until the ice has melted. This technology is intended to prevent ice throws. Ice that has accumulated on the blades would fall to the foot of the turbine as it melts. To prevent accident or injury from ice that falls as it melts, the turbine requires the area directly underneath to be a clear zone.

A study conducted for the National Renewable Energy Laboratory was successful in identifying damage mechanisms due to direct and indirect effects of lightning strikes on wind turbines. Lightning strikes can cause extensive damage to the turbine blades, controllers, and power electronics. However, this damage can be reduced by protection from tall nearby communication towers, integral blade protection in the form of conductors, bonding to minimize arcing, good turbine grounding, controller cable and controller shielding, and transient voltage surge suppression. The amount of lightning damage is a factor of the lightning activity in the area, the height and prominence of the turbine, the terrain, and the lightning protection system in place. According to the National Oceanic and Atmospheric Organization, Illinois has mid-range lightning activity (between 40 and 50 annual thunderstorm days).

Because no fuel is used in wind energy projects, there would be no process waste streams generated during operation of the wind turbine that could cause health and safety concerns. Some lubricants are used in wind turbines, including gearbox oil, hydraulic fluid, and gear grease that require periodic replacement. These lubricants would be managed in accordance with Federal and State regulations. Two 100-gallon fuel containers would be stored on site in a temporary spill containment area.

Electromagnetic fields (EMFs) include both electric fields and magnetic fields, invisible lines of force produced by, but not limited to, power lines, electrical transmission wiring, and electrical devices. Voltage in electrical devices or wires produces electric fields that increase in strength as the voltage increases. Note that the device does not have to be turned on for electrical fields to exist. The flow of electric current through electrical devices or wires produces magnetic fields which increase in strength as the current increases. The device must be turned on (current flowing) for magnetic fields to exist. Electrically conductive materials and even poor conductors such as structures, plants/trees, and human skin, shield electric fields. Magnetic fields are more difficult to shield as they pass through most materials. EMFs rapidly decrease with distance from the source (NIEHS 2002).

The project area is not located in the immediate vicinity of a local or regional airport or a military air base. The closest airport to the project site is the Monmouth Municipal Airport, roughly 5 to 6 miles away from the proposed turbine sites. All structures more than 200 feet tall must have aircraft warning lights in accordance with requirements specified by the FAA.

Direct and Indirect Impacts

All contractors, subcontractors and their personnel are required to comply with all Federal and State worker-safety requirements, specifically all of the applicable OSHA requirements. Safety procedures specific to the GE 1.6xle turbine would be observed whenever work is being done on the turbine.

No adverse security impacts are anticipated due to the project. The turbines for the proposed project are a monopole design and access to the turbines is through a lockable steel door at the base of the tower. Safety signage would be posted around the towers (where necessary); transformers and other high-voltage facilities would be in conformance with applicable Federal and State regulations. MWP employees would be educated as to security procedures to be observed when they are in the vicinity of the turbine. As the nearest occupied structure is over 1,000 feet from any turbine, the potential for injury within the fall zone and/or by icing is minimal. Due to the extreme rarity of tower collapse or blade throw and the fact that Warren County and MWP control all of the blade impact zone and the vast majority of the tower collapse zones, the risks to public safety due to such occurrences can be mitigated by management of access within these zones. The same access management strategies can mitigate the risks to public safety due to ice throw or shedding conditions, which are in effect only on a very limited temporal basis.

The potential for fire or explosion from the wind energy facility is minimal. The turbines would be equipped with lightning sensors in the turbine blades and would be grounded and shielded to protect against lightning (GE 2010). The electrical effects of the proposed distribution line can be characterized as current-induced magnetic fields and voltage-induced electrical fields. There are no Federal standards governing electric or magnetic fields; however, no turbine would be closer than 1,500 feet to occupied residential structures where the EMF would be at background levels. EMF sources expected at the Monarch site include interconnection to the power grid, wind turbine generators, electrical transformers, and the underground connector network. The interconnection to the power grid is the same arrangement as any other connection in the existing transmission system. EMF levels are similar to that experienced in common household appliances and are considered negligible (Windrush Energy 2004). Generator windings are enclosed in conductive metal to reduce effective EMF generated to zero. The EMF generated by the electrical transformer is negligible a short distance from the transformer and similar to any other transformer encountered (Windrush Energy 2004; Synergy 2009). Underground power lines forming the connector network generate effectively no EMF due to conductor spacing and shielding (NCCEH 2010; Synergy 2009). Based on the most current research on EMFs, and the distance between any turbine and occupied residences, the turbine would have no impact to public health and safety due to EMFs.

Additionally, it is not anticipated that contaminated soils would be encountered, as the project location is within active agricultural fields that have historically been used for agricultural or

residential purposes. Production of hazardous wastes as a result of operation or maintenance of the wind turbine is not expected.

The FAA issued a Determination of No Hazard to Air Navigation for each of the 13 originally proposed wind turbines, one of which has subsequently been removed from project consideration. This aeronautical determination issued by the FAA indicated that the 13 originally proposed structures would have no substantial adverse effect on the safe and efficient utilization of navigable airspace by aircraft or on the operation of air navigation facilities.

3.2.2.8 Transportation

The project site is served by U.S. Highway 67 and 140th Avenue. Access to the Interstate transportation system is available at the U.S. Highway 34/Interstate-74 junction just north of Galesburg, 18 miles northeast of the proposed project site. The turbine nacelle would be delivered from Greensboro, North Carolina via tractor trailers designed for the proposed loading. Nacelles would be transported via Business I-40W to U.S. Highway 52N. South of Mt. Airy, NC, the trailers would merge onto I-74W, which eventually becomes I-77N. The route would continue by keeping left onto I-64W near Charleston, West Virginia. A right turn would be taken onto WV-34, staying on US-35 (left) until Dayton, Ohio, when the trailers would merge onto I-70W toward Indianapolis, Indiana. North of Indianapolis, travel on I-70W would cease and the tractor trailers would travel on I-65N, I-465S, and I-74W. Northeast of Galesburg, Illinois, the trailers would turn onto U.S. Highway 34 and travel southwesterly into Monmouth, Illinois, where they would merge on to Highway 67 and travel to their final destination near the intersection of Highway 67 and 140th Avenue.

The turbine towers and blades would be transported by tractor trailers designed for the proposed loading. These trailers would travel to the proposed site via major interstates and highways; the route would be determined once the receiving port is designated.

At the start of the project, a 16 foot wide permanent gravel access road would be constructed leading to each turbine. A total of 192,000 square feet (4.4 acres) of roads would be constructed for this project. The tractor trailers would continue on these access drives to each proposed turbine site. All other construction vehicles would access the site via U.S. Highway 67 or 140th Avenue.

The site is located approximately 1,150 feet at its closest point from the Burlington Northern Santa Fe railroad line.

Direct and Indirect Impacts

During the heavy construction phase of the project, which is anticipated to last approximately four months, a temporary increase in vehicular traffic on U.S. Highway 67 and 140th Avenue is anticipated. No long-term or permanent impacts to the local transportation systems would occur as a result of this project.

Large pieces of equipment such as the turbine tower, rotor blade, and nacelle would be designated oversized loads and would temporarily slow traffic on the I-74 freeway, US 34, and U.S. Highway 67. Some minor disruption of traffic could occur during construction of the access road, particularly the portion which leads on to the existing thoroughfare. However, these would

be short-term impacts only. All access roads would be regularly inspected and maintained to minimize erosion.

3.2.2.9 Socioeconomics and Environmental Justice

Executive Order 12898 (February 11, 1994) directs Federal agencies to identify and address "disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations." The 2005-2009 racial makeup of Monmouth (Bureau of the Census 2010a) was 86.9 percent white with the remainder minorities, compared with 91.9 percent for Warren County as a whole (Bureau of the Census 2010b). The median household income and median family income in 2009 dollars for a household in Monmouth in 2000 were $29,959 and $36,505, respectively, compared with $38,433 and $46,650, respectively, for Warren County as a whole. About 18.6 percent of Monmouth and 14.5 percent of Warren County residents were below the poverty level in 2009. (Bureau of the Census 2010a, 2010b).

As described in Table 1-1, a concern for stakeholders is the potential for property values of the wind turbine site and adjacent properties to be adversely impacted as a result of implementation of the proposed project. A recent study identified the following categories of concern (DOE 2009):

- Area Stigma: A concern that the general area surrounding a wind energy facility will appear more developed, which may adversely affect home values in the local community regardless of whether any individual home has a view of the wind turbines.

- Scenic Vista Stigma: A concern that a home may be devalued because of the view of a wind energy facility, and the potential impact of that view on an otherwise scenic vista.

- Nuisance Stigma: A concern that factors that may occur in close proximity to wind turbines, such as sound and shadow flicker, will have a unique adverse influence on home values.

Direct and Indirect Impacts

The proposed wind project would be located within an agricultural and residential area and over 1500 feet from the nearest occupied residential structure. No potential high and adverse impacts to human health or environmental resources have been identified in this EA. Therefore, there would be no disproportionately high and adverse human health or environmental impacts on minority populations or low-income populations.

Results of the 2009 DOE study are strongly consistent in that each model fails to uncover conclusive evidence of the presence of any of the three property value stigmas. Based on the data and analysis presented in this report, no evidence is found that home prices surrounding wind facilities are consistently, measurably, and adversely affected by either the view of wind facilities or the distance of the home to those facilities (DOE 2009). Note that this study included two wind facilities located in Lee County, Illinois, approximately 100 miles northeast of the proposed project location.

An even more recent publication looks at the Twin Groves wind farm (Phases I and II), located in McLean County, Illinois (approximately 100 miles to the southeast) to examine whether it "has impacted nearby residential property values and whether any impact on nearby property values changes over the different stages of wind farm development." The author found that even before approval was granted, properties located near the proposed wind farm were devalued when compared to other areas. Further, the author found that impacts to property values varied based on the development progress; and that property values corresponded to perceived levels of risk by the community and homebuyers. However, the author concluded that once the wind farm began operations, and the community members living in close proximity to the wind farm gained information regarding the extent of aesthetic and noise impacts to evaluate their earlier concerns, "property values rebounded and soared higher in real terms than they were prior to wind farm approval. Thus, this study presents evidence that demonstrates close proximity to an operating wind farm does not necessarily negatively influence property values or property value appreciation rates" (Hinman 2010).

As demonstrated in the above two references, there appears to be no supporting evidence that implementation of the proposed project would negatively impact property values of the wind turbine site or adjacent properties.

MWP estimates that the MWTP would create 89 jobs and result in the retention of 25 jobs (direct and indirect combined). WPCS International, the primary subcontractor for construction, engineering, and post-installation operations and maintenance services, maintains an office in nearby Moline, Illinois. Local subcontractors and professionals would be utilized wherever possible. Upon completion, MWP would hire 4 to 5 new professional employees in addition to 1 to 2 local operations staff. County revenues associated with the project would amount to about $250,000 at the beginning of operations (plus $100,000 for the special use permit fees) and approximately $200,000 per year (based on current prices for electricity) for the life of the project.

3.2.2.10 Air Quality and Climate Change

The affected air environment can be characterized in terms of concentrations of the criteria pollutants carbon monoxide, sulfur dioxide, particulate matter, nitrogen dioxide, and nitrogen oxides, ozone, and lead. The EPA has established National Ambient Air Quality Standards for these pollutants. There are two standards for particulate matter: one for particulates with an aerodynamic diameter less than or equal to a nominal 10 micrometers (PM_{10}) and one for particulates with an aerodynamic diameter less than or equal to a nominal 2.5 micrometers ($PM_{2.5}$). According to the EPA's online air quality maps and monitoring data, Warren County is in attainment for carbon monoxide, sulfur dioxide, nitrogen dioxide, ozone, lead, $PM_{2.5,}$ and PM_{10}, which means that the levels of these pollutants in the air are below the EPA standards.

Electricity generated by the proposed project would be purchased by Ameren, a local utility serving Illinois and Missouri. Currently, Ameren obtains its electricity through the following energy sources: coal (83.2 percent), nuclear (11.9 percent), gas (3.5 percent), hydropower (1.0 percent) oil (0.3 percent) and non-hydropower renewable energy (0.1 percent). Therefore, fossil fuels are the primary source of energy for Ameren customers.

Direct and Indirect Impacts

The proposed project would be a renewable energy generation project that would not degrade air quality. Aside from temporary dust generated during construction and decommissioning, which would be minimized to the extent practicable (for example, by keeping gravel on roads and watering dry unpaved roads), this project would not result in any adverse impacts to air quality. The project would not require any air permits.

Greenhouse gases (GHGs) such as carbon dioxide contribute to climate change. The proposed project is expected to generate approximately 64,551 megawatt-hours per year of renewable energy that was previously obtained from primarily fossil fuel sources, which emit carbon dioxide. According to RETScreen, a widely used global model provided by the Ministry of Natural Resources of Canada, with calculations and support from the National Aeronautics and Space Agency, United Nations Environmental Programme, and the Renewable Energy and Energy Efficiency Partnership, a 19.2-megawatt project with a net capacity factor of 36 percent would have the potential to reduce annual gross GHG emissions by 36,582 tons of carbon dioxide, if replacing a mix of energy sources (coal, petroleum, natural gas, other gases, nuclear, hydroelectric conventional, wind, wood and wood derived fuels, other biomass), or as much as 61,725 tons of carbon dioxide, if replacing coal-only power plants. These numbers are equivalent to taking 6,700 and 11,305 cars and trucks off the road, respectively. Thus, GHG and carbon dioxide emissions from electricity generation to serve the region would be higher without the proposed wind project.

3.2.2.11 Utilities and Energy

The MWTP would produce 64,551 megawatt-hours of clean renewable energy per year. Based on information from the Energy Information Administration's statewide aggregates, the current annual retail electricity sales in Warren County total approximately 63,500,000 kilowatt-hours, almost identical to MWP's expected production. Because of a large number of other sources of energy consumption (i.e., line losses, the commercial and industrial sectors), per capita total energy use in the area is actually higher. Because the electricity from the proposed project would feed into the nearest node, which is in Galesburg, the pool of energy to which it would be added is much larger than Warren County, or even Lenox Township, alone. The proposed project, while not satisfying all the needs of the nearby community, would potentially make a substantial contribution to the sustainability of the fuel mix in the region.

Communication, Radar and Navigation Systems

The global positioning system (GPS) consists of a satellite constellation in constantly moving orbit above the earth transmitting signal information to earth for land, sea, and air based receivers. GPS receivers use the transmitted signal to triangulate an exact location. The use of additional land based transmissions such as Wide Area Augmentation System and Differential GPS allows for improved accuracy. Several sources of potential GPS signal and ultimately positional error exist. Potential GPS signal errors include, but are not limited to, ionosphere and troposphere delays, signal multipath, receiver lock error, orbital error, number of satellites visible, satellite geometry/shading, and intentional signal degradation.

Wind turbines have the potential to impact National Weather Service NEXRAD radar in a number of ways – including the radar base data, algorithms, and derived products – due to

movement of turbine blades in the radar line of sight. Additionally, if turbines are located close enough to the radar, they could physically block the radar or reflect the beam back, causing hardware damage. The moving blades of wind turbines in the radar line of sight can potentially reflect radar energy, which would "visually contaminate the reflectivity, velocity, and spectrum width data" used by forecasters to determine storm intensity (NOAA 2010). Furthermore, the radar energy return from wind turbines may resemble that returned from showers or thunderstorms, or may alter the appearance of a return from actual weather activity. The result is visually corrupted data introducing uncertainty to analysis and resulting forecasts. Base reflectivity, velocity, and spectrum width data are used by radar processing algorithms to detect potentially damaging or dangerous weather activity; corrupted return data could potentially result in false or missed alerts. Wind turbines located in close proximity to radar could return energy strong enough to exceed the radar receiver's protector resulting in damage to the receiver. Additionally, wind turbines sited close to radar could shadow or block returns that would otherwise come from behind the turbines, resulting in loss of radar coverage (NOAA 2010).

Electromagnetic interference to electrical devices or systems is caused by EMFs disrupting their operation. EMFs generated at wind facilities can potentially impact television, radio, wireless communications, and private fixed link communication systems.

NTIA is responsible for managing the Federal electromagnetic spectrum and is involved in resolving technical telecommunications issues for the Federal Government and private sector. This information aids in siting wind turbines, so they do not cause interference in radio, microwave, radar, and other frequencies, disrupting critical lines of communication. While a voluntary process, upon submittal by a wind project proponent, the NTIA provides project specific information to the members of the Administration's Interdepartmental Radio Advisory Committee for review and comment on whether the proposed project could potentially interfere with Federal radio communication links.

Direct and Indirect Impacts

The proposed project is not anticipated to result in adverse impacts related to energy supply, but rather would benefit the environment by potentially reducing reliance on and use of fossil fuels. The turbines would produce up to 19.2 megawatts of electricity, which would be transferred to distribution lines in the project area; therefore, most of the energy produced by the project would likely be consumed locally. The Ameren Feasibility and System Impact Study suggests that most, if not all, of the power from the project would service the local area, especially during the peak periods of electricity demand during the spring and autumn. Currently, almost all of the electricity used by Monmouth residents comes from the Galesburg node. However, if the proposed project is implemented, some of that load would be replaced by electricity generated locally by the project. Supplying energy to the distribution lines in this area may result in some additional benefit by reducing line loss otherwise resulting from transmission of energy from distant sources.

Communication, Radar, and Navigation Systems

Of the potential GPS signal errors, only signal multipath, number of satellites visible, and satellite geometry/shading could potentially be increased by implementation of the proposed project. Signal multipath error results when the transmitted GPS signal is reflected off an object such as a wind turbine prior to reaching the GPS receiver, resulting in increased signal travel

time and resulting positional error. The number of satellites visible at a location could be impacted when a GPS receiver is located close to a structure such as a wind turbine, resulting in a loss of view of constellation and available satellites. Satellite geometry/shading of the constellation is similar to the error associated with the number of satellites visible in that the potential for the wind turbine to alter available satellite geometry.

GPS signal multipath errors are corrected by the use of sophisticated signal rejection techniques (software) available in modern GPS receivers (Trimble 2010). Errors potentially associated with the number of satellites visible and the satellite geometry/shading are easily avoided by modern GPS receivers tracking multiple satellites simultaneously to use as many available satellites as possible as well as the best satellite geometry available. With the use of modern GPS receivers there would be little to no potential impacts to GPS navigation associated with implementation of the proposed project.

The three closest NEXRAD radar locations to the proposed project include KDVN (Quad Cities, Iowa), KILX (Lincoln, Illinois), and KLSX (St. Louis, Missouri). The FAA –DoD Preliminary Screening Tool" was used to evaluate the proposed project location with respect to the three closest NEXRAD radar locations and their individual radar line of sight. The tool shows that the proposed projects would have minimal to no impact to NEXRAD radar or NEXRAD derived products such as weather alerts. (FAA 2010)

Siting towers out of the line of sight of communications services broadcast towers would eliminate interference. Synthetic blade design of modern towers also reduces interference. Several simple mitigation measures are available for those instances when residential units are located in such proximity to towers that interference is unavoidable (higher quality or directional antennas, amplifiers, relocating antennas, repeaters) (Wind Energy The Facts 2010).

On October 19, 2010, DOE received a letter from NTIA indicating that no Federal agencies identified any concerns regarding the blockage of their radio frequency transmissions. No microwave communications exist in the areas surrounding the project site.

3.3 Irreversible and Irretrievable Commitment of Resources

A commitment of resources is irreversible when its primary or secondary impacts limit the future options for a resource or limit those factors that are renewable only over long periods of time. Examples of nonrenewable resources are minerals, including petroleum. An irretrievable commitment of resources refers to the use or consumption of a resource that is neither renewable nor recoverable for use by future generations. Examples of irretrievable resources are the loss of a recreational use of an area. While an action may result in the loss of a resource that is irretrievable, the action may be reversible. Irreversible and irretrievable commitments of resources are primarily related to construction activities.

For the proposed project, resources consumed during construction of the project, including labor, fossil fuels and construction materials, would be committed for the life of the project. Nonrenewable fossil fuels would be irretrievably lost through the use of gasoline- and diesel-powered construction equipment during construction. Approximately 7 acres of land would be irreversibly committed during the functional life of the project.

3.4 Unavoidable Adverse Impacts

Unavoidable adverse impacts associated with the proposed project include:

- Long-term loss of approximately 7 acres of agricultural land resulting from the construction of the turbine foundations, substation, and access roads
- An increase in noise levels during construction and operation
- Introduction of dominant vertical elements into the existing viewshed

These impacts are both temporary, in the case of the construction noise, and long-term in regard to the loss of agricultural land and visual impacts. Overall, impacts of the proposed project on the environment and human health are minimal as described in the relevant sections in Chapter 3.

3.5 The Relationship between Local Short-Term Uses of the Human Environment and the Maintenance and Enhancement of Long-Term Productivity

Short-term use of the environment, as used here, is that used during the life of the project, whereas long-term productivity refers to the period of time after the project has been decommissioned, the equipment removed, and the land reclaimed and stabilized. The short-term use of the project area for the proposed project would not affect the long-term productivity of the area. If it is decided at some time in the future that the project has reached its useful life, the turbines, towers, and foundations could be decommissioned and removed, and the site reclaimed and returned to agricultural production. The installation of wind turbines at this site would not preclude using the land for purposes that were suitable prior to this project.

4. CUMULATIVE IMPACTS

Cumulative impacts are those potential environmental impacts that result ―from the incremental impact of the action when added to other past, present, or reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time" (40 CFR 1508.7).

4.1 Reasonably Foreseeable Projects

DOE reviewed information on past, present, and reasonably foreseeable future projects and actions that could result in impacts to a particular resource over the same period and in the same general location as the proposed project. To determine cumulative impacts from past, existing, and reasonably foreseeable projects, DOE conducted online research to identify current and future projects in to the vicinity of the MWTP location. No pending or planned projects were identified within the area to be affected by the turbine's land use, visual impacts, or noise impacts. Additionally no past projects have been identified that could have a cumulative impact when combined with the impacts of the proposed project.

As the initial step in addressing cumulative impacts, DOE determined that the resource area that encompasses all potential cumulative impacts of the wind energy project would be determined by potential impacts to biological resources, i.e., migratory birds and bats, and threatened and endangered species. To evaluate the cumulative impacts to biological resources, DOE reviewed the USFWS *Indiana Bat* (Myotis sodalis) *Draft Recovery Plan* (USFWS 2007). The Draft Recovery Plan notes that Indiana bat migration and swarming patterns have not been extensively studied and are poorly understood and summarizes existing data (USFWS 2007). Eight fall swarming period studies indicated a migratory range of 0.32 to 30.6 kilometers (0.2 to 19 miles). Eight spring emergence studies indicated a migratory range of 16.1 to 96.6 kilometer (10 to 60 miles) and two spring emergence studies indicated migratory distances of 477 and 575 kilometers (296 and 357 miles) (USFWS 2007). Based on this data, DOE determined that 96.5 kilometers (60 miles) is a reasonable distance for evaluating the potential for cumulative impacts to migrating individuals.

DOE identified the following wind energy projects that are within a 60-mile radius around the site.

Existing Projects (data as of July 24, 2010 from the Illinois Working Group)

- Camp Grove Wind Farm (Marshall and Stark Counties) – Operating 100 wind turbines for a total capacity of 150 megawatts
- Bureau Valley School District (Bureau County) – Operating 1 wind turbine for a total capacity of 660 kilowatts
- Crescent Ridge Wind Farm (Bureau County) – Operating 33 wind turbines for a total capacity of 54.45 megawatts

- AgriWind Wind Farm (Bureau County) – Operating 4 wind turbines for a total capacity of 8.4 megawatts

- Providence Heights Wind Farm (Bureau County) – Operating 36 wind turbines for a total capacity of 72 megawatts

- Sharrod High School Wind Turbine (Rock Island/Mercer County) – Operating 1 wind turbine for a total capacity of 600 kilowatts

- Pigeon Creek Wind Turbine (Adams County) – Operating 1 wind turbine for a total capacity of 900 kilowatts

- City of Genesco Wind Turbines (Henry County) – Operating 2 wind turbines for a total capacity of 3 megawatts

Permitted Projects

- Adams Electric Cooperative II (Brown County) – Operating 1 wind turbine for a total capacity of 900 kilowatts

- Spring Creek Wind Farm (Henry County) – Operating 135 wind turbines for a total capacity of 200 megawatts

- Midland Wind Farm (Henry County) – Operating 70 wind turbines for a total capacity of 104 megawatts capacity

- Bishop Hill Wind Energy Center (Henry County) – Operating 266 wind turbines for a total capacity of 400 megawatts

In addition, two other wind projects are currently proposed for Warren County and were examined in connection with this project with respect to potentially cumulative impacts. The Coldbrook-Alexis Wind Farm would have a 200-megawatt capacity with 134 turbines. The project would be located near Coldbrook Township in Warren, Mercer, and Knox Counties, over 10 miles northeast of the proposed project site. The EcoPoint Wind Farm would have a 200-megawatt capacity with 134 turbines. The Coldbrook-Alexis Wind Farm is located in Point Pleasant, Swan and Sciota Townships, over 10 miles south and southwest of the proposed MWTP.

4.2 Summary of Cumulative Impacts

4.2.1 CUMULATIVE GREENHOUSE GAS IMPACTS

While the scientific understanding of climate change continues to evolve, *the Intergovernmental Panel on Climate Change Fourth Assessment Report* has stated that warming of the earth's climate is unequivocal, and that warming is very likely attributable to increases in atmospheric GHGs caused by human activities (anthropogenic) (IPCC 2007). The Panel's Fourth Assessment Report indicates that changes in many physical and biological systems, such as increases in

global temperatures, more frequent heat waves, rising sea levels, coastal flooding, loss of wildlife habitat, spread of infectious disease, and other potential environmental impacts are linked to changes in the climate system, and that some changes may be irreversible (IPCC 2007).

The release of anthropogenic GHGs and their potential contribution to global warming are inherently cumulative phenomena. It was assumed that this wind energy project would displace fossil fuel electricity currently used by the municipality, resulting in potential annual gross GHG reductions of 36,582 tons of carbon dioxide, if replacing a mix of energy sources, or as much as 61,725 tons of carbon dioxide, if replacing coal-only power plants. These numbers are equivalent to taking 6,700 and 11,305 cars and trucks off the road, respectively. The proposed project would neither reduce the concentration of GHGs in the atmosphere nor reduce the annual rate of GHG emissions. Rather, it would potentially decrease the rate at which GHG emissions are increasing every year and contribute to efforts ongoing globally to reduce GHGs and slow climate change.

4.2.2 VISUAL RESOURCES

The proposed project would affect the viewshed in the project area. The turbines would be dominant vertical components in the landscape due to their height, but would not obstruct views in the way that a large building might. Because the proposed site would be within a relatively open, flat setting, visual impact would be anticipated to be substantial. However, because of the developed nature of the area (commercial grain elevator, aboveground utilities, highways and railroads), the wind turbines would fit in with regards to the developed nature of the area. Additionally, the area as a whole is absent of focal points, significant landforms, and converging landscapes, and would therefore have no impact a unique landscape.

As shown by the visual simulations completed for this project, the absence of mature trees in the surrounding area would allow views of the wind turbines in excess of 5 miles. As the closest proposed turbine, Coldbrook-Alexis Wind Farm in Coldbrook Township, is located over 10 miles northeast of the proposed project site, there may be a few isolated locations where turbines from both wind projects are visible. However, due to the significant distance between these properties, the turbines would not be dominant elements in the viewshed of the viewer. None of the other projects listed above could be seen from the MWTP. Thus, cumulative impacts on visual resources are not expected.

4.2.3 BIOLOGICAL IMPACTS

The USFWS lists all of Illinois as potential habitat for the Indiana bat, an endangered species (http://www.fws.gov/midwest/endangered/lists/illinois-spp.html). However, there have been no known occurrences of the Indiana bat in Warren County. The closest known location of an Indiana bat maternal colony and critical habitat is the Blackball Mine, which is approximately 90 miles to the east northeast of the proposed project site.

Although some recent studies have shown that Indiana bat may migrate to hibernacula up to 357 miles, USFWS (2007) also indicates that Indiana bat's typical migration is within a distance of 60 miles. Based on the existing 241 turbines operating (396 megawatts) and the other reasonably foreseeable projects [estimated to be greater than 900 turbines (1,152 megawatts)] within 60 miles of the proposed project, the potential for cumulative impacts to the Indiana bat cannot be

ruled out. However, the proposed project includes the installation of twelve turbines, which would provide only a small increment to any potential cumulative impact. Additionally, to determine potential impacts to Indiana bats and, DOE has prepared a Biological Assessment for the proposed project in accordance with Section 7 of the Endangered Species Act. USFWS Region 3 office recently began preparation of a Regional Habitat Conservation Plan. Although this plan likely will take several years to complete, it is intended to address cumulative impacts to the Indiana bat and develop avoidance, minimization, and mitigation measures for existing and proposed wind turbines.

The only wildlife species that are likely to be impacted by the proposed project are birds and bats due to the possibility of collisions with the turbine. Birds and bats, but birds in particular, are known to collide with numerous manmade structures such as vehicles, buildings and windows, power lines, communication towers, as well as wind turbines. It has been estimated that from 100 million to 1-plus billion birds are killed annually in the United States due to collisions with manmade structures (Erickson et al. 2001). Bat mortality rates vary from 0.1 to 69.6 bats per turbine per year depending on the habitat type, physical characteristics of the area, and time of year (Arnett et al. 2008). Bat mortalities in open areas like the Midwest usually fall between the low values in the West (1 to 2 bats per turbine per year) and the high values in the Appalachians and Alleghenies (46 or more bats per turbine per year; IDNR 2007); although recently higher bat mortality rates were noted (40.7 to 70.7 bats per turbine) in a few Wisconsin studies (Gruver et al. 2009; BHE Environmental 2010; Drake et al. 2010). Avian mortality rates at Midwest sites, particularly agricultural ones, generally average 1 to 2 birds killed per turbine per year (Erickson et al. 2008) but have been documented as high as 7 birds/turbine/year at one project site in Wisconsin (Gruver et al. 2009). The proposed project would add 12 more structures into the project area with which birds and bats may collide. The wind-generation industry estimates Illinois can provide up to 9,000 megawatts from up to 6,000 turbines (IDNR 2007). However, the installation of 12 turbines is a small contribution to the projected 900 turbines in the area, and the turbines are scattered across the landscape with the nearest wind facility over 10 miles north of the proposed project site. Additionally, although the proposed project lies within the Mississippi flyway, the lack of suitable stop-over habitat and water reduces the likelihood of large concentrations of migratory birds in the area. Therefore, cumulative impacts from the 12 turbines on wildlife are expected to be minimal.

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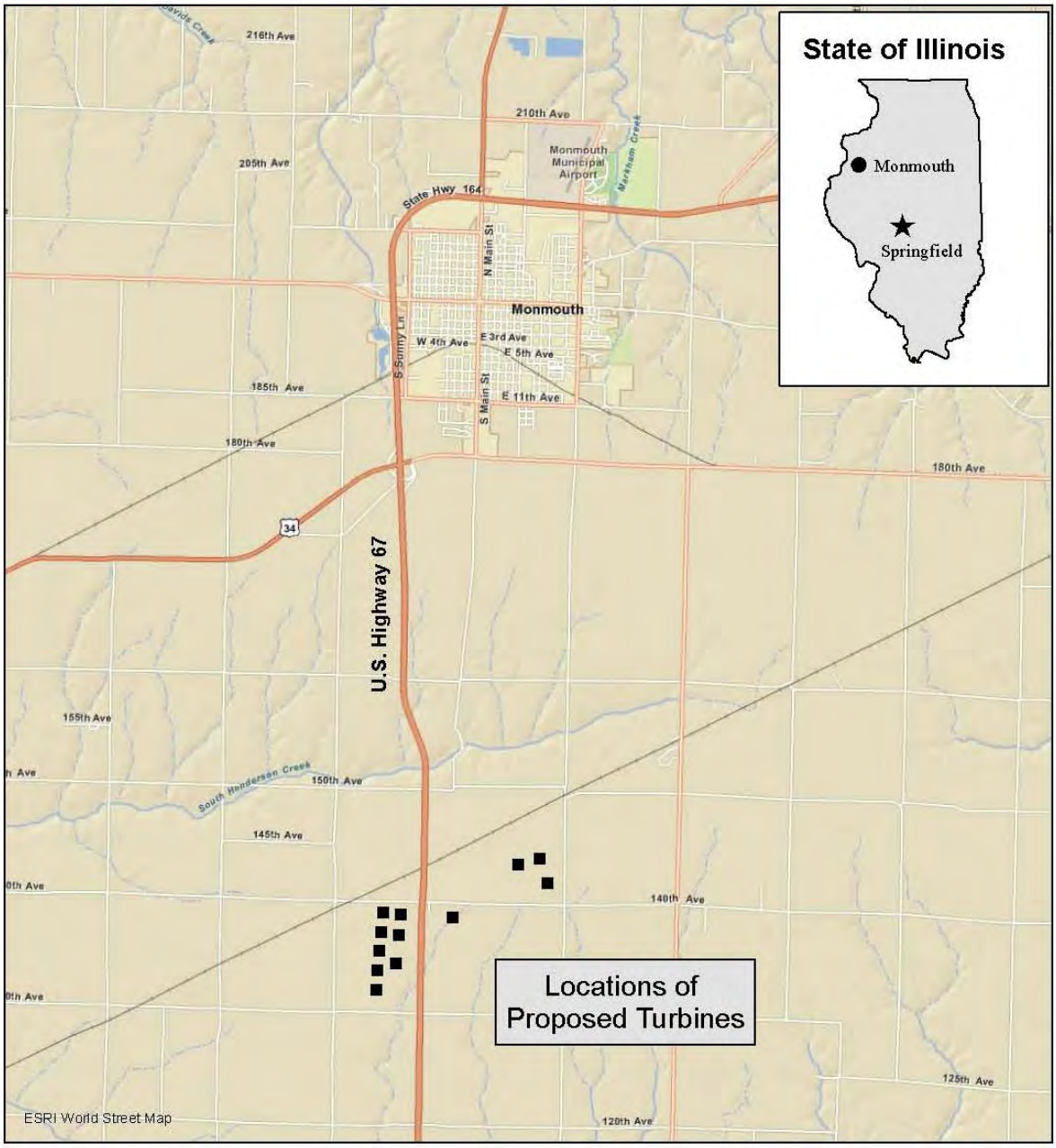
6. AGENCIES AND PERSONS CONSULTED

Name	Organization
Blaich, Michael	Federal Aviation Administration
Edgett-Baron, Sheri	Federal Aviation Administration
Sailor, Matthew	U.S. Fish and Wildlife Service
Nelson, Richard	U.S. Fish and Wildlife Service
Millar, Jody	U.S. Fish and Wildlife Service
Henry, Joyce	National Telecommunications and Information Agency
Davison, Edward	National Telecommunications and Information Agency
Branham, Michael	Illinois Department of Natural Resources, Division of Ecosystem and Environment
Haaker, Anne	Illinois Historic Preservation Agency
Eggemeyer, Emilie	Illinois Historic Preservation Agency
Chard, Steve	Illinois Department of Agriculture
Salvo, Terry	Illinois Department of Agriculture
Winbigler, Rick	Warren County Soil and Water Conservation District
Bonnett, Lisa	Illinois Environmental Protection Agency
Grady, Alyson	Illinois Department of Commerce and Economic Opportunity

Appendix A: Figures

Figure A-1

Project Location



■ Locations of Proposed Turbines

0 0.5 1 1.5 2 Miles

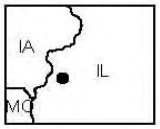
N

1 Monarch Location

Figure A-2

Site Plan

Site Map



Legend

- Proposed Turbines
- Proposed Access Roads
- Proposed Electrical Substation

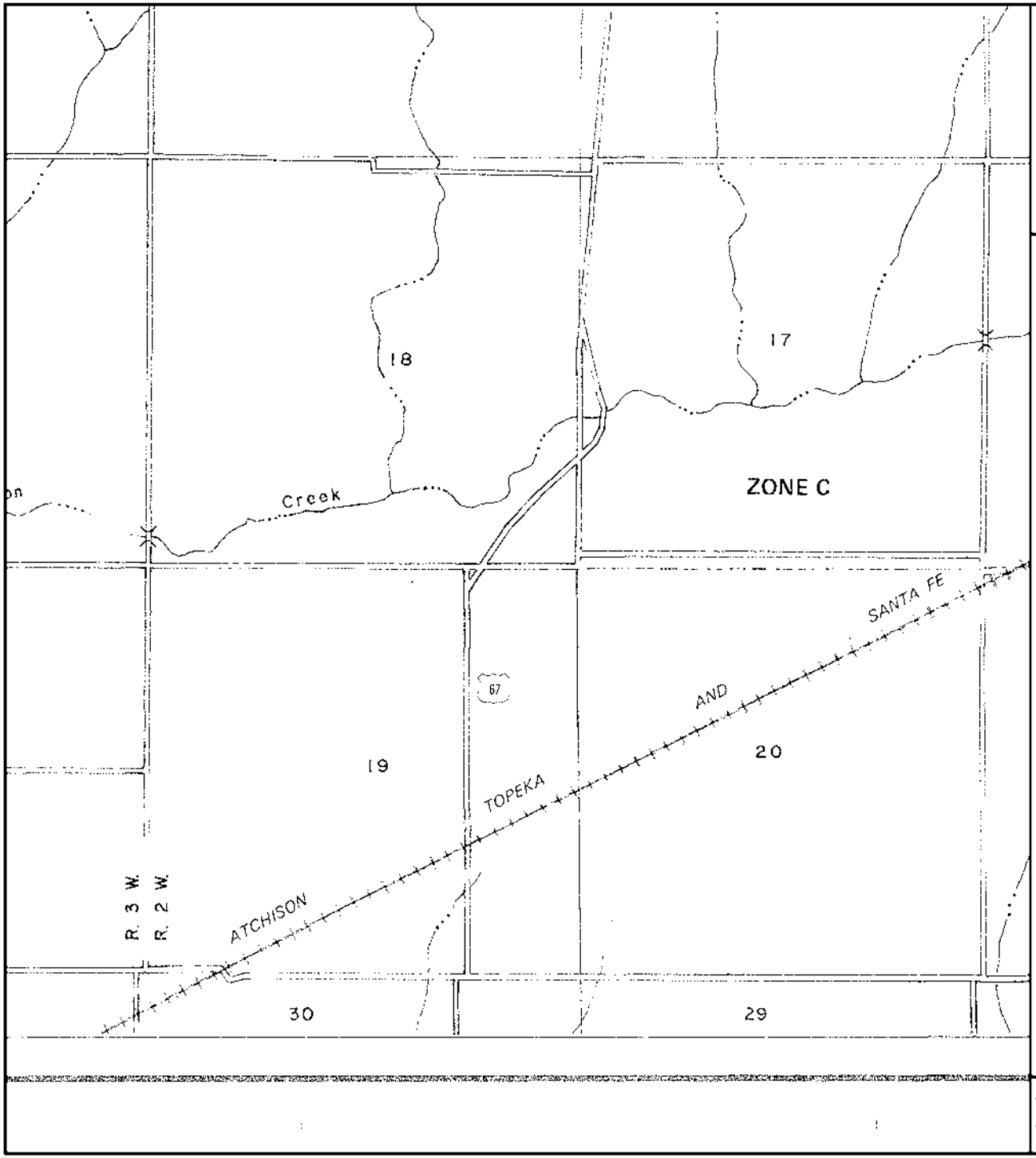
0 1,000 2,000 3,000 4,000 Feet

0 0.1 0.2 0.3 0.4 Miles

N

Figure A-3

FEMA Floodplain Map



APPROXIMATE SCALE

2000 0 2000 FEET

NATIONAL FLOOD INSURANCE PROGRAM

FIRM

FLOOD INSURANCE RATE MAP

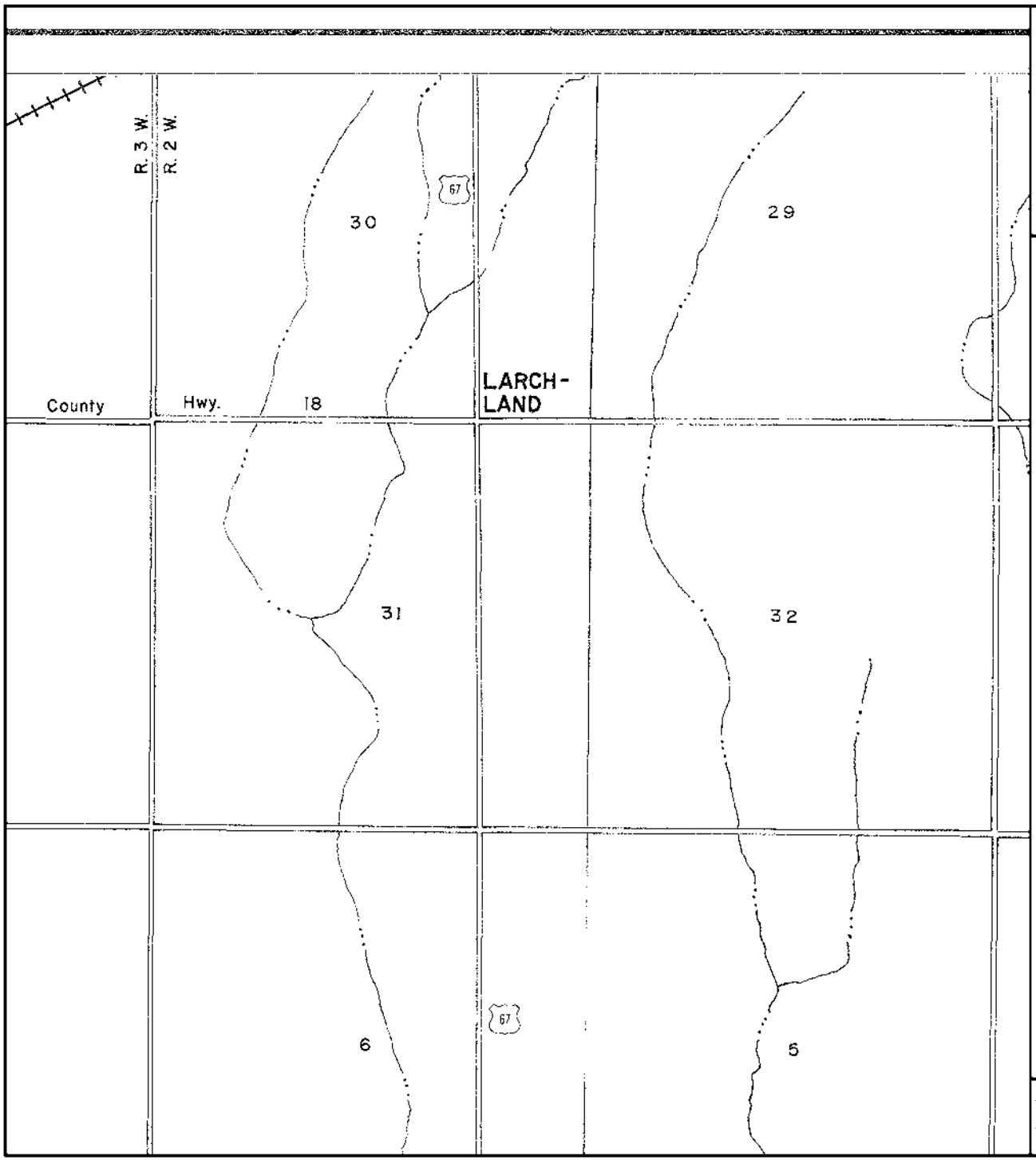
COUNTY OF
WARREN,
ILLINOIS
(UNINCORPORATED AREAS)

PANEL 75 OF 200

COMMUNITY-PANEL NUMBER
170673 0075 B

EFFECTIVE DATE:
MAY 25, 1984

Federal Emergency Management Agency



N

APPROXIMATE SCALE

2000 0 2000 FEET

NATIONAL FLOOD INSURANCE PROGRAM

FIRM

FLOOD INSURANCE RATE MAP

COUNTY OF
WARREN,
ILLINOIS
(UNINCORPORATED AREAS)

PANEL 125 OF 200

COMMUNITY-PANEL NUMBER
170673 0125 B

EFFECTIVE DATE:
MAY 25, 1984

Federal Emergency Management Agency

Figure A-4

Wetlands Map

Site Map

Legend

- Wetland - Freshwater Emergent
- Wetland - Freshwater Forested/Shrub
- Proposed Turbines
- Proposed Access Roads
- Proposed Electrical Substation

0 1,000 2,000 3,000 4,000 Feet

0 0.1 0.2 0.3 0.4 Miles

N

2 Monarch wetlands

Figure A-5

Major Migratory Bird Flyways in the Project Vicinity

Site Map (with flyway routes)

Legend

State Boundary

Project Area

Mississippi Flyway

Flyway Routes

Major Flyway

Principal Route

Merging Route

0 50 100 150 200 Kilometers

0 25 50 75 100 Miles

N

3 Monarch flyways

Appendix B: Simulations and Studies

Attachment B-1

Visual Simulation

PHOTO SIMULATION NOTES:

THESE PHOTO SIMULATIONS ARE AN INTERPRETATION OF THE GENERAL APPEARANCE OF THE PROPOSED INSTALLATION. EACH PHOTO SIMULATION IS BASED ON THE SCALING CRITERIA OR ASSUMPTIONS IDENTIFIED:

- THE FINAL TURBINE DESIGN WAS NOT AVAILABLE AT THE TIME THE PHOTO SIMULATION WAS PREPARED. THEREFORE, TYPICAL TURBINES OF SIMILAR SIZE WERTE UTILIZED FOR SIMULATION PURPOSES

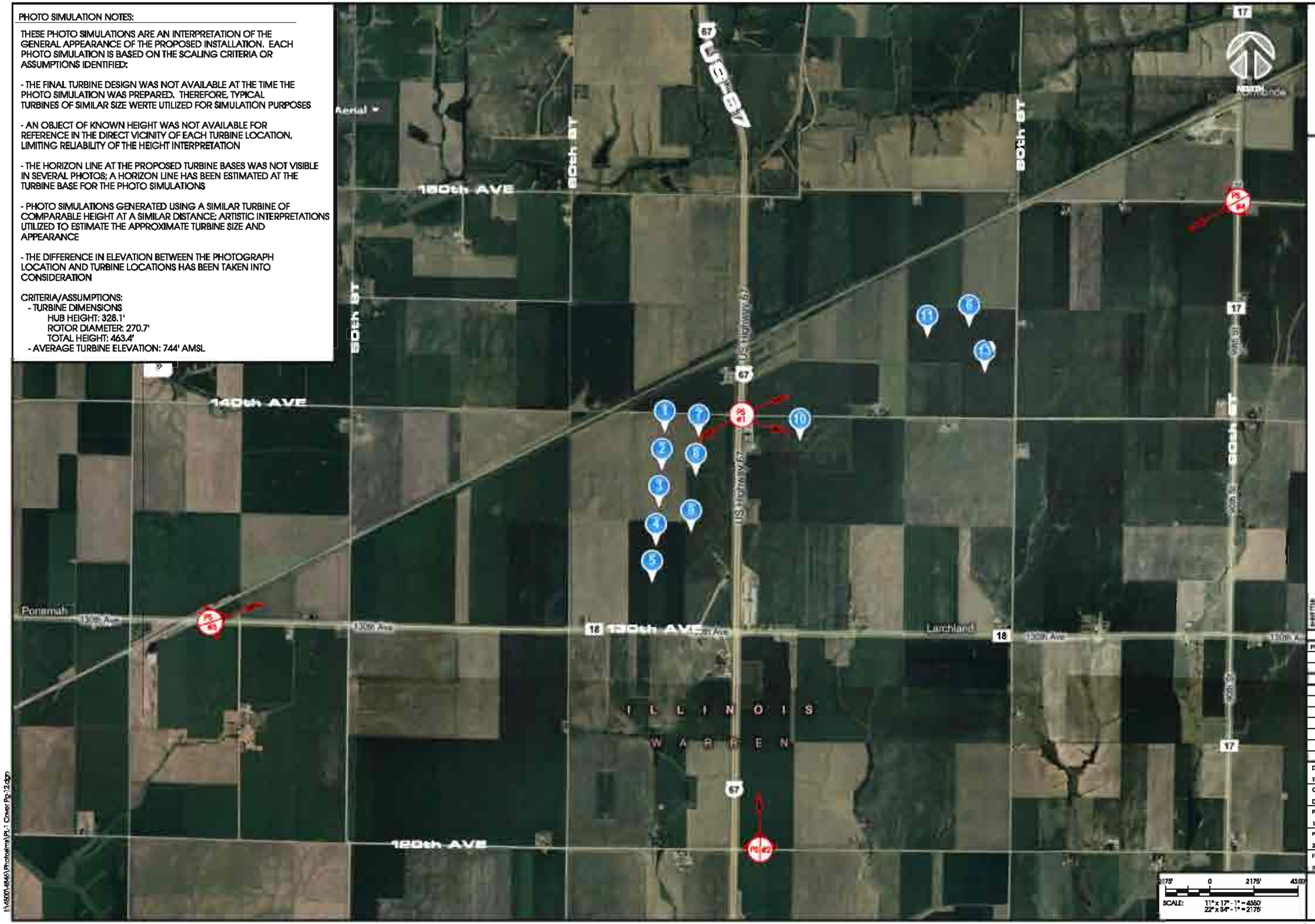
- AN OBJECT OF KNOWN HEIGHT WAS NOT AVAILABLE FOR REFERENCE IN THE DIRECT VICINITY OF EACH TURBINE LOCATION, LIMITING RELIABILITY OF THE HEIGHT INTERPRETATION

- THE HORIZON LINE AT THE PROPOSED TURBINE BASES WAS NOT VISIBLE IN SEVERAL PHOTOS; A HORIZON LINE HAS BEEN ESTIMATED AT THE TURBINE BASE FOR THE PHOTO SIMULATIONS

- PHOTO SIMULATIONS GENERATED USING A SIMILAR TURBINE OF COMPARABLE HEIGHT AT A SIMILAR DISTANCE; ARTISTIC INTERPRETATIONS UTILIZED TO ESTIMATE THE APPROXIMATE TURBINE SIZE AND APPEARANCE

- THE DIFFERENCE IN ELEVATION BETWEEN THE PHOTOGRAPH LOCATION AND TURBINE LOCATIONS HAS BEEN TAKEN INTO CONSIDERATION

CRITERIA/ASSUMPTIONS:
- TURBINE DIMENSIONS
  - HUB HEIGHT: 328.1'
  - ROTOR DIAMETER: 270.7'
  - TOTAL HEIGHT: 463.4'
- AVERAGE TURBINE ELEVATION: 744' AMSL



SCALE: 11" x 17" - 1" = 4360'
22" x 34" - 1" = 2175'

Edge
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434 Water Street
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608.644.1549 fax
www.edgeconsult.com

PHOTO SIM. LOCATIONS
MONARCH WIND FARM
WARREN CO.
KIRKWOOD, ILLINOIS

SHEET TITLE

ISSUE DATE:
PHOTO SIMULATION - SEPT 2010

REVISIONS:

DRAWN BY: TLD
CHECKED BY: DLL
PLOT DATE: 10/13/2010
PROJECT NUMBER: 3376
FILE NAME: PL-1 Cover Pg-12.dgn

SHEET NUMBER:
PL-2

I:\3600\3646\Photosim\PL-1 Cover Pg-12.dgn

PHOTO SIMULATION DESCRIPTION:

FOLLOWING UTILIZED FOR PHOTO SIMULATION
- PHOTOGRAPH OF EXISTING TOWER AT SIMILAR DISTANCE USED TO SCALE PHOTOGRAPH
- PHOTOGRAPH OF EXISTING WIND TURBINE RENDERED TO REPRESENT A 100m TURBINE AT LISTED DISTANCES

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SHEET TITLE

PHOTO SIMULATION 1

MONARCH WARREN CO. WIND FARM

KIRKWOOD, ILLINOIS

ISSUE DATE:
PHOTO SIMULATION - SEPT 2010
REVISIONS:
DRAWN BY: TLD
CHECKED BY: DLL
PLOT DATE: 9/30/2010
PROJECT NUMBER: 3376
FILE NAME: PS-1.dgn
SHEET NUMBER: **PS-1a**

L:\3300\3376\Photosims\PS-1.dgn

PHOTO SIMULATION DESCRIPTION:

FOLLOWING UTILIZED FOR PHOTO SIMULATION
- PHOTOGRAPH OF EXISTING TOWER AT SIMILAR DISTANCE USED TO SCALE PHOTOGRAPH
- PHOTOGRAPH OF EXISTING WIND TURBINE RENDERED TO REPRESENT A 100m TURBINE AT LISTED DISTANCES

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SHEET TITLE:
PHOTO SIMULATION 1
MONARCH WARREN CO. WIND FARM
KIRKWOOD, ILLINOIS

ISSUE DATE:
PHOTO SIMULATION - SEPT 2010
REVISIONS:
DRAWN BY: TLD
CHECKED BY: DLL
PLOT DATE: 10/13/2010
PROJECT NUMBER: 3376
FILE NAME: PS-1 -12.dgn
SHEET NUMBER: **PS-1b**

I:\3300\3376\Photosims\PS-1 -12.dgn

PHOTO SIMULATION DESCRIPTION:

FOLLOWING UTILIZED FOR PHOTO SIMULATION
- PHOTOGRAPH OF EXISTING TOWER AT SIMILAR DISTANCE USED TO SCALE PHOTOGRAPH
- PHOTOGRAPH OF EXISTING WIND TURBINE RENDERED TO REPRESENT A 100m TURBINE AT LISTED DISTANCE

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Prairie du Sac, WI 53578
608.644.1449 voice
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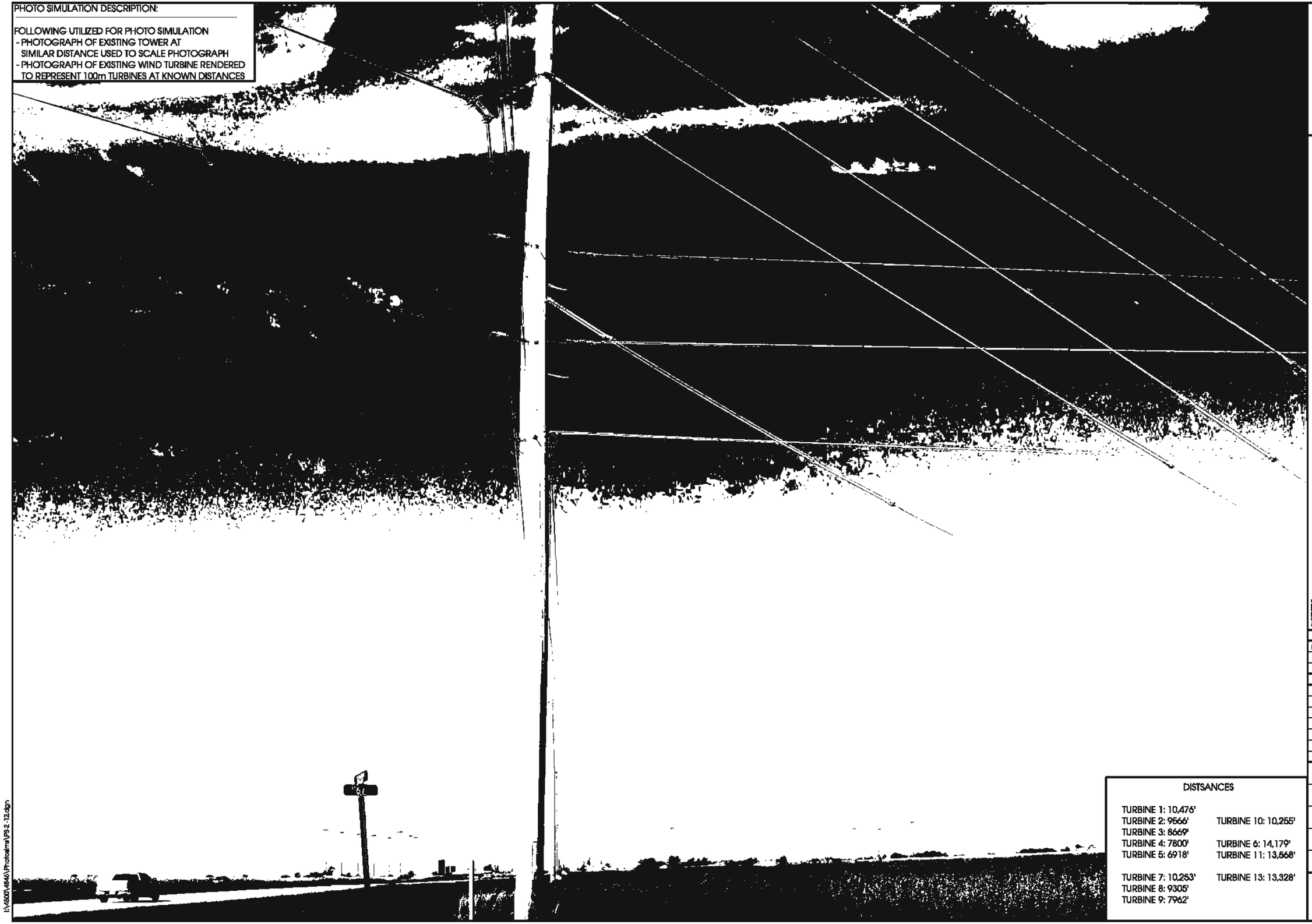
SHEET TITLE:
PHOTO SIMULATION 1
MONARCH WARREN CO. WIND FARM
KIRKWOOD, ILLINOIS

ISSUE DATE:
PHOTO SIMULATION - SEPT 2010
REVISIONS:
DRAWN BY: TLD
CHECKED BY: DLL
PLOT DATE: 9/16/2010
PROJECT NUMBER: 3376
FILE NAME: PS-1.dgn
SHEET NUMBER: **PS-1c**

I:\3376\Misc\Photosims\PS-1.dgn

PHOTO SIMULATION DESCRIPTION:

FOLLOWING UTILIZED FOR PHOTO SIMULATION
- PHOTOGRAPH OF EXISTING TOWER AT SIMILAR DISTANCE USED TO SCALE PHOTOGRAPH
- PHOTOGRAPH OF EXISTING WIND TURBINE RENDERED TO REPRESENT 100m TURBINES AT KNOWN DISTANCES



DISTSANCES

TURBINE 1: 10,476'
TURBINE 2: 9566'
TURBINE 3: 8669'
TURBINE 4: 7800'
TURBINE 5: 6918'
TURBINE 6: 14,179'
TURBINE 7: 10,253'
TURBINE 8: 9305'
TURBINE 9: 7962'
TURBINE 10: 10,255'
TURBINE 11: 13,568'
TURBINE 13: 13,328'

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SHEET TITLE
PHOTO SIMULATION 2
MONARCH WARREN CO. WIND FARM
KIRKWOOD, ILLINOIS

ISSUE DATE:
PHOTO SIMULATION - SEPT 2010
REVISIONS:
DRAWN BY: TLD
CHECKED BY: DLL
PLOT DATE: 10/13/2010
PROJECT NUMBER: 3376
FILE NAME: PS-2 -12.dgn

SHEET NUMBER:
PS-2

I:\3600\3646\Photosims\PS-2 -12.dgn

PHOTO SIMULATION DESCRIPTION:

FOLLOWING UTILIZED FOR PHOTO SIMULATION
- PHOTOGRAPH OF EXISTING TOWER AT SIMILAR DISTANCE USED TO SCALE PHOTOGRAPH
- PHOTOGRAPH OF EXISTING WIND TURBINE RENDERED TO REPRESENT A 100m TURBINE AT LISTED DISTANCES

DISTSANCES

TURBINE 1: 11,988'	
TURBINE 2: 11,595'	TURBINE 10: 15,045'
TURBINE 3: 11,228'	
TURBINE 4: 10,963'	TURBINE 6: 19,949'
TURBINE 5: 10,775'	TURBINE 11: 18,908'
TURBINE 7: 12,730'	TURBINE 13: 19,907'
TURBINE 8: 12,354'	
TURBINE 9: 11,901	

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SHEET TITLE:
PHOTO SIMULATION 3
MONARCH WARREN CO. WIND FARM
KIRKWOOD, ILLINOIS

ISSUE DATE:
PHOTO SIMULATION - SEPT 2010

REVISIONS:

DRAWN BY:
TLD

CHECKED BY:
DLL

PLOT DATE:
10/13/2010

PROJECT NUMBER:
3376

FILE NAME:
PS-3 -12.dgn

SHEET NUMBER:
PS-3

I:\45001-49461\Photosim\PS-3 -12.dgn

PHOTO SIMULATION DESCRIPTION:

FOLLOWING UTILIZED FOR PHOTO SIMULATION
- PHOTOGRAPH OF EXISTING TOWER AT SIMILAR DISTANCE USED TO SCALE PHOTOGRAPH
- PHOTOGRAPH OF EXISTING WIND TURBINE RENDERED TO REPRESENT A 100m TURBINE AT LISTED DISTANCES

DISTANCES

TURBINE 1: 15,334'
TURBINE 2: 15,768'
TURBINE 3: 16,279'
TURBINE 4: 16,791'
TURBINE 5: 17,342'
TURBINE 7: 14,600'
TURBINE 8: 15,072'
TURBINE 9: 15,850'
TURBINE 10: 12,412'
TURBINE 6: 7384'
TURBINE 11: 8417'
TURBINE 13: 7628'

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SHEET TITLE:

PHOTO SIMULATION 4

MONARCH WARREN CO. WIND FARM

KIRKWOOD, ILLINOIS

ISSUE DATE:
PHOTO SIMULATION - SEPT 2010

REVISIONS:

DRAWN BY:
TLD

CHECKED BY:
DLL

PLOT DATE:
10/13/2010

PROJECT NUMBER:
3376

FILE NAME:
PS4-12.dgn

SHEET NUMBER:
PS-4

I:\6600\4846\Photosims\PS4-12.dgn

PHOTO SIMULATION NOTES:

THESE PHOTO SIMULATIONS ARE AN INTERPRETATION OF THE GENERAL APPEARANCE OF THE PROPOSED INSTALLATION. EACH PHOTO SIMULATION IS BASED ON THE SCALING CRITERIA OR ASSUMPTIONS IDENTIFIED:

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- THE HORIZON LINE AT THE PROPOSED TURBINE BASES WAS NOT VISIBLE IN SEVERAL PHOTOS; A HORIZON LINE HAS BEEN ESTIMATED AT THE TURBINE BASE FOR THE PHOTO SIMULATIONS

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CRITERIA/ASSUMPTIONS:
- TURBINE DIMENSIONS
  - HUB HEIGHT: 328.1'
  - ROTOR DIAMETER: 270.7'
  - TOTAL HEIGHT: 463.4'
- AVERAGE TURBINE ELEVATION: 744' AMSL

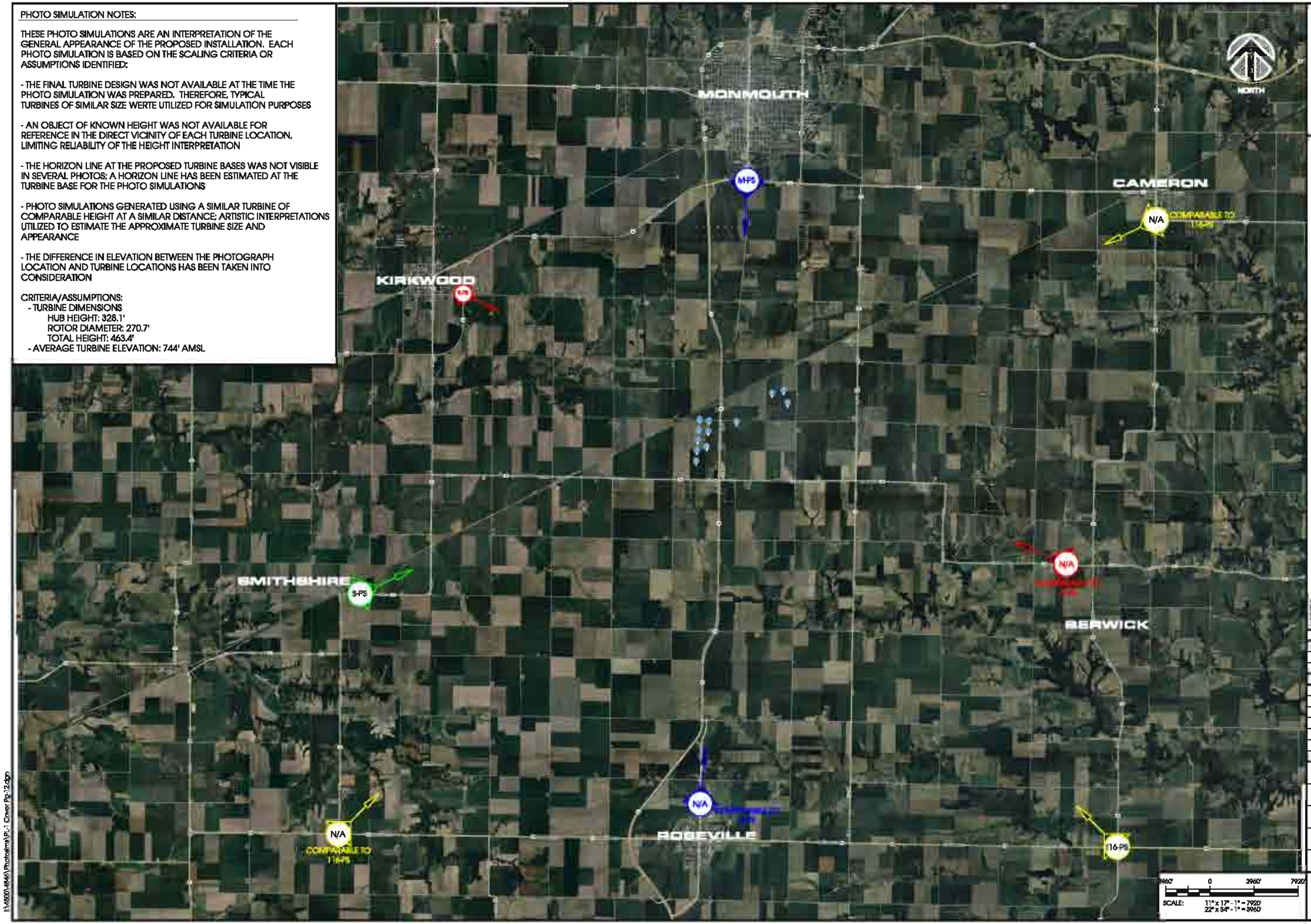

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PHOTO SIM. LOCATIONS
MONARCH WARREN CO. WIND FARM
KIRKWOOD, ILLINOIS

ISSUE DATE:	
PHOTO SIMULATION - SEPT 2010	
REVISIONS:	
DRAWN BY:	TLD
CHECKED BY:	DLL
PLOT DATE:	10/14/2010
PROJECT NUMBER:	3376
FILE NAME:	PL-1 Cover Pg-12.dgn

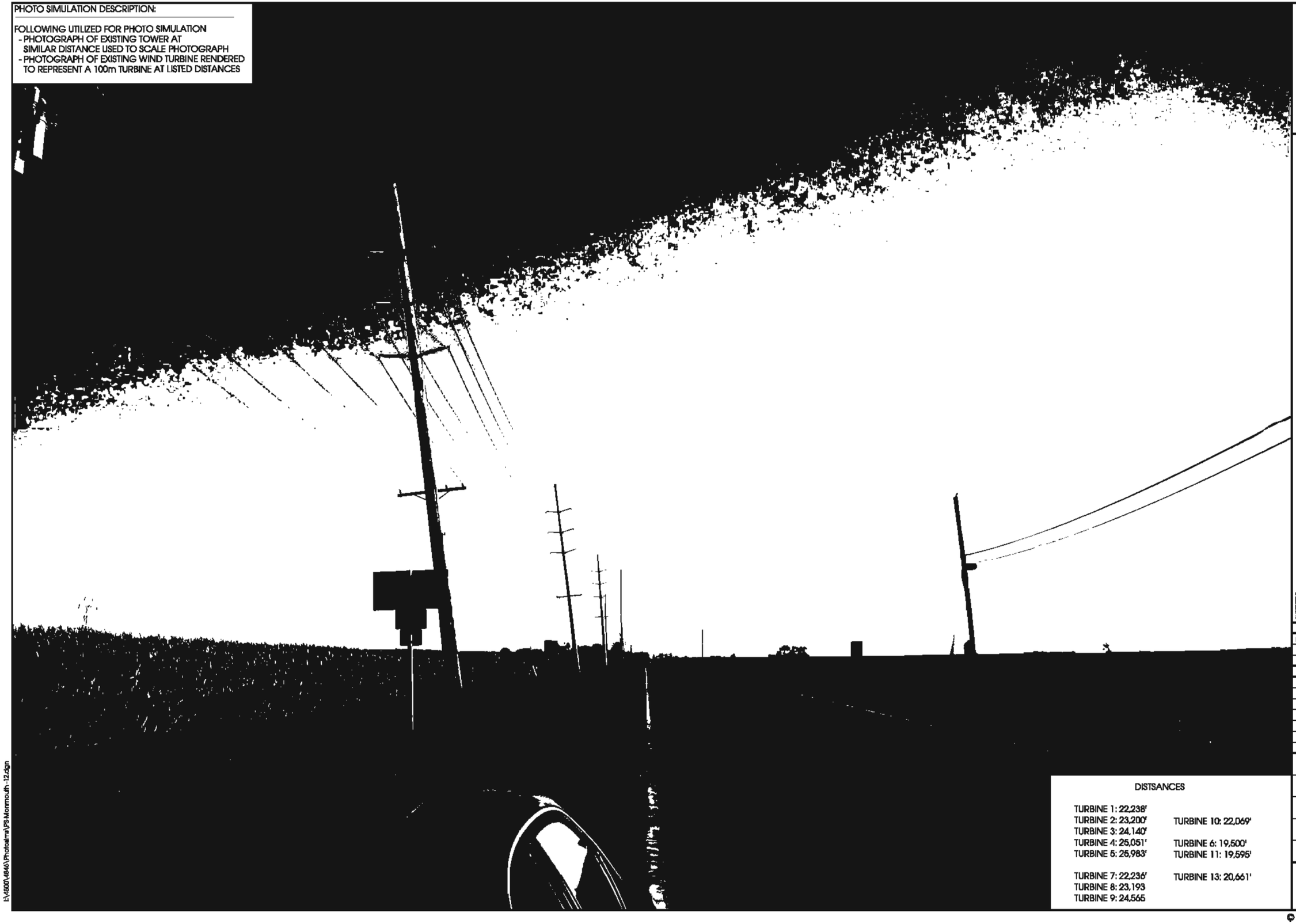
SCALE: 11" x 17" - 1" = 7920'
22" x 34" - 1" = 3960'

SHEET NUMBER:
PL-W

I:\3300\3376\Photosims\PL-1 Cover Pg-12.dgn

PHOTO SIMULATION DESCRIPTION:

FOLLOWING UTILIZED FOR PHOTO SIMULATION
- PHOTOGRAPH OF EXISTING TOWER AT SIMILAR DISTANCE USED TO SCALE PHOTOGRAPH
- PHOTOGRAPH OF EXISTING WIND TURBINE RENDERED TO REPRESENT A 100m TURBINE AT LISTED DISTANCES



DISTSANCES

TURBINE 1: 22,238'
TURBINE 2: 23,200'
TURBINE 3: 24,140'
TURBINE 4: 25,051'
TURBINE 5: 25,983'
TURBINE 7: 22,236'
TURBINE 8: 23,193
TURBINE 9: 24,565
TURBINE 10: 22,069'
TURBINE 6: 19,500'
TURBINE 11: 19,595'
TURBINE 13: 20,661'

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SHEET TITLE
MONMOUTH PHOTOSIM
MONARCH WARREN CO. WIND FARM
KIRKWOOD, ILLINOIS

ISSUE DATE:
PHOTO SIMULATION - SEPT 2010

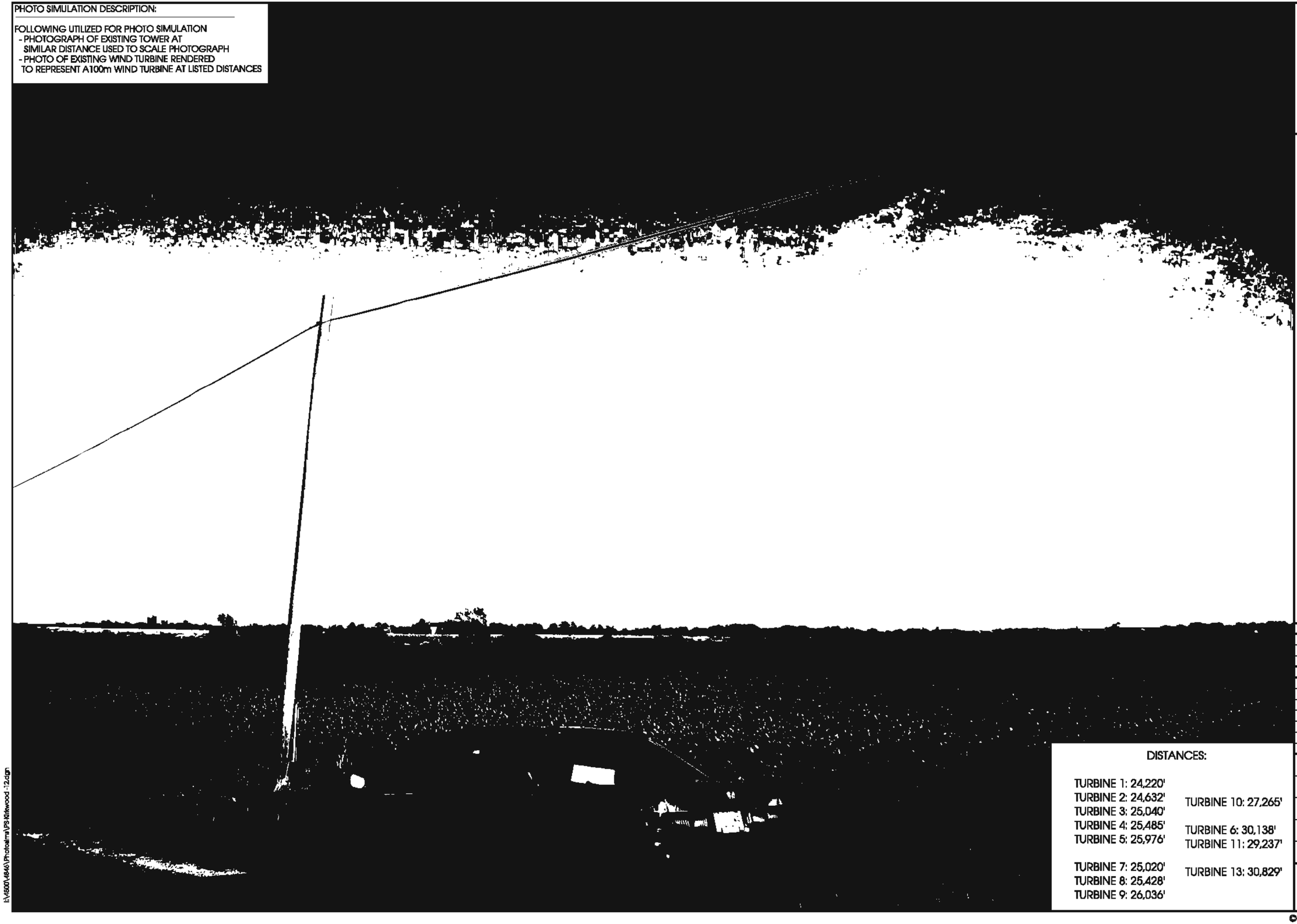
REVISIONS:

DRAWN BY:
TLD
CHECKED BY:
DLL
PLOT DATE:
10/13/2010
PROJECT NUMBER:
3376
FILE NAME:
PS-Monmouth - 12.dgn
SHEET NUMBER:
M-PS

I:\3300\3376\Photosim\PS-Monmouth - 12.dgn

PHOTO SIMULATION DESCRIPTION:

FOLLOWING UTILIZED FOR PHOTO SIMULATION
- PHOTOGRAPH OF EXISTING TOWER AT SIMILAR DISTANCE USED TO SCALE PHOTOGRAPH
- PHOTO OF EXISTING WIND TURBINE RENDERED TO REPRESENT A100m WIND TURBINE AT LISTED DISTANCES



DISTANCES:

TURBINE 1: 24,220'
TURBINE 2: 24,632'
TURBINE 3: 25,040'
TURBINE 4: 25,485'
TURBINE 5: 25,976'
TURBINE 6: 30,138'
TURBINE 7: 25,020'
TURBINE 8: 25,428'
TURBINE 9: 26,036'
TURBINE 10: 27,265'
TURBINE 11: 29,237'
TURBINE 13: 30,829'

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KIRKWOOD PHOTOSIM

MONARCH WARREN CO. WIND FARM
KIRKWOOD, ILLINOIS

SHEET TITLE

ISSUE DATE:
PHOTO SIMULATION - SEPT 2010

REVISIONS:

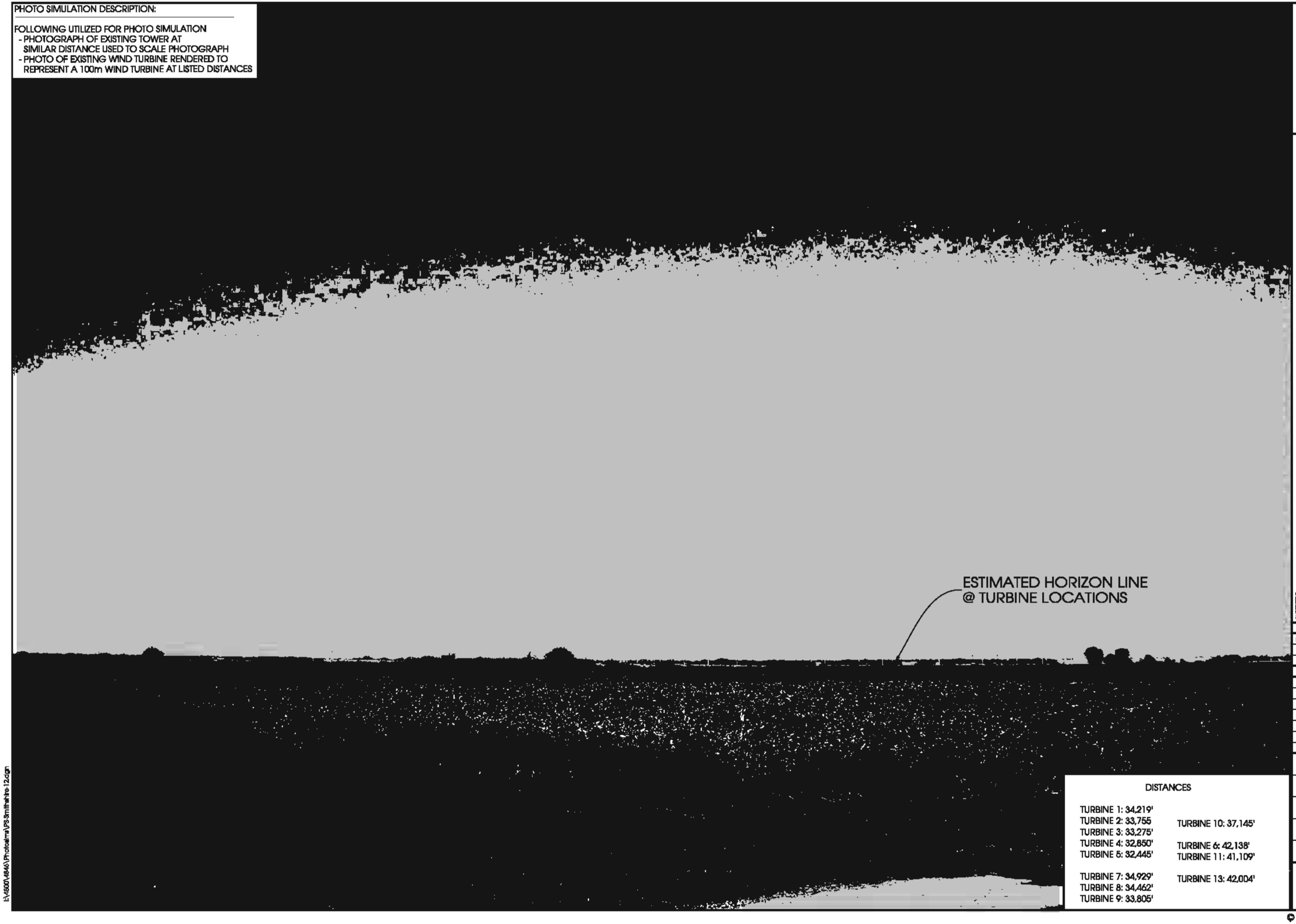
DRAWN BY:
TLD
CHECKED BY:
DLL
PLOT DATE:
11/3/2010
PROJECT NUMBER:
3376
FILE NAME:
PS-Kirkwood -12.dgn

SHEET NUMBER:
K-PS

I:\6001\4646\Photosim\PS-Kirkwood -12.dgn

PHOTO SIMULATION DESCRIPTION:

FOLLOWING UTILIZED FOR PHOTO SIMULATION
- PHOTOGRAPH OF EXISTING TOWER AT SIMILAR DISTANCE USED TO SCALE PHOTOGRAPH
- PHOTO OF EXISTING WIND TURBINE RENDERED TO REPRESENT A 100m WIND TURBINE AT LISTED DISTANCES



DISTANCES

TURBINE 1: 34,219'
TURBINE 2: 33,755
TURBINE 3: 33,275'
TURBINE 4: 32,850'
TURBINE 5: 32,445'
TURBINE 6: 42,138'
TURBINE 7: 34,929'
TURBINE 8: 34,462'
TURBINE 9: 33,805'
TURBINE 10: 37,145'
TURBINE 11: 41,109'
TURBINE 13: 42,004'

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SHEET TITLE
SMITHSHIRE PHOTOSIM
MONARCH WARREN CO. WIND FARM
KIRKWOOD, ILLINOIS

ISSUE DATE:
PHOTO SIMULATION - SEPT 2010

REVISIONS:

DRAWN BY:
TLD
CHECKED BY:
DLL
PLOT DATE:
11/3/2010
PROJECT NUMBER:
3376
FILE NAME:
PS-Smithshire-12.dgn
SHEET NUMBER:
S-PS

I:\3800\3846\Photosims\PS-Smithshire-12.dgn

PHOTO SIMULATION DESCRIPTION:

FOLLOWING UTILIZED FOR PHOTO SIMULATION
- PHOTOGRAPH OF EXISTING TOWER AT SIMILAR DISTANCE USED TO SCALE PHOTOGRAPH
- PHOTO OF EXISTING WIND TURBINE RENDERED TO REPRESENT A 100m WIND TURBINE AT LISTED DISTANCES

DISTANCES

TURBINE 1: 53,180'
TURBINE 2: 52,562'
TURBINE 3: 51,980'
TURBINE 4: 51,406'
TURBINE 5: 50,820'

TURBINE 7: 52,505'
TURBINE 8: 51,8687'
TURBINE 9: 50,997'

TURBINE 10: 50,753'

TURBINE 6: 50,277'
TURBINE 11: 50,701'

TURBINE 13: 49,168'

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SHEET TITLE
HWY 116/130TH ST PHOTOSIM
MONARCH WARREN CO. WIND FARM
KIRKWOOD, ILLINOIS

ISSUE DATE:
PHOTO SIMULATION - SEPT 2010

REVISIONS:

DRAWN BY:
TLD
CHECKED BY:
DLL
PLOT DATE:
11/3/2010
PROJECT NUMBER:
3376
FILE NAME:
PS-HWY 116-12.dgn
SHEET NUMBER:
116-PS

I:\3300\4846\Photosim\PS-HWY 116-12.dgn

Attachment B-2

Shadow Flicker Report

Shadow Flicker Analysis – Monarch Wind Turbine Project

As part of our preparation for the zoning hearings for the Monarch Wind project in Monmouth, IL, we have developed a very simple method for estimating the shadow flicker effects at occupied houses near the site. This analysis is a "worst-case" scenario analysis and its focus is on explaining flicker in a simple way that homeowners can understand.

The goals of this method are:

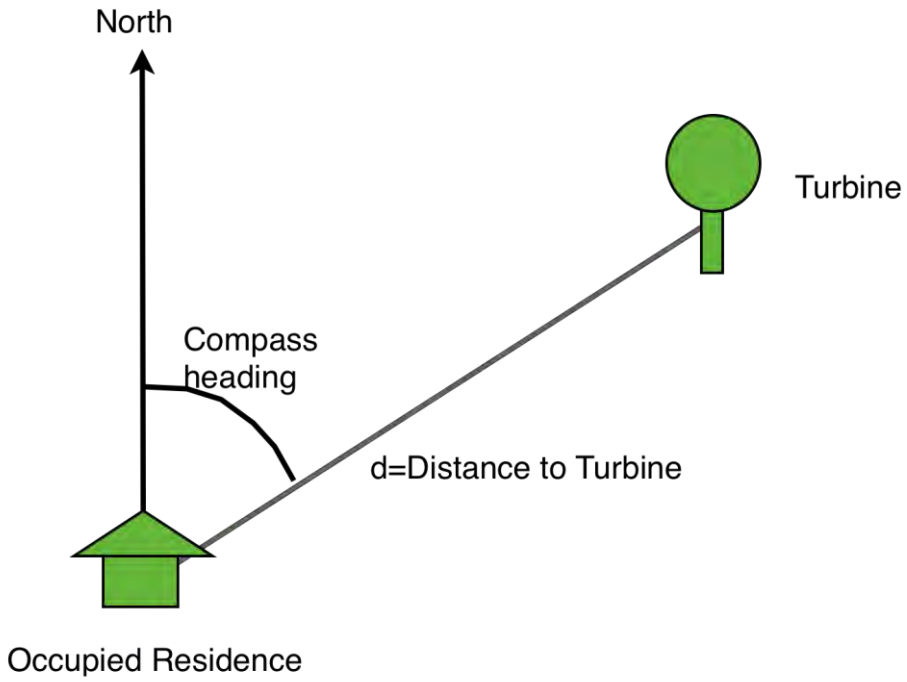
- Determine the maximum number of hours of shadow flicker that are possible for a given occupied residence due to nearby turbines
- Be able to present the results of this shadow flicker study in a clear and understandable ways to interested non-scientists (residents, zoning board members, and others).

We believe that the ability to present and explain our results to non-scientists is a very important part of this effort

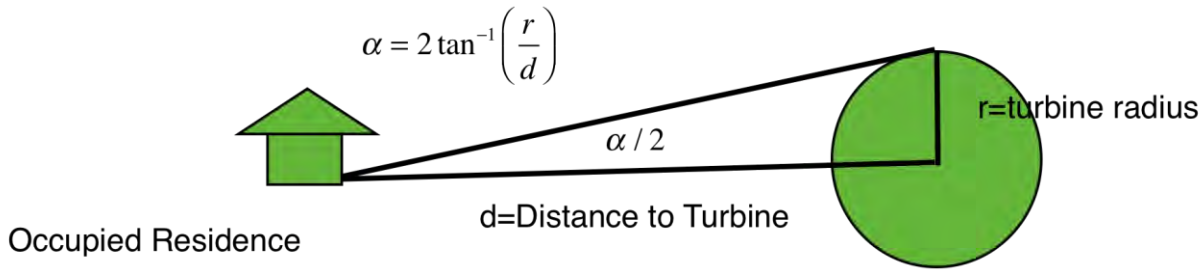
To achieve these goals, we have used the open source Astronomy/Planetarium program known as "Stellarium." Stellarium allows a user to view the sky from any location on the surface of the earth. A simple scripting language allows a user to place simple objects in the sky.

For our analysis, we

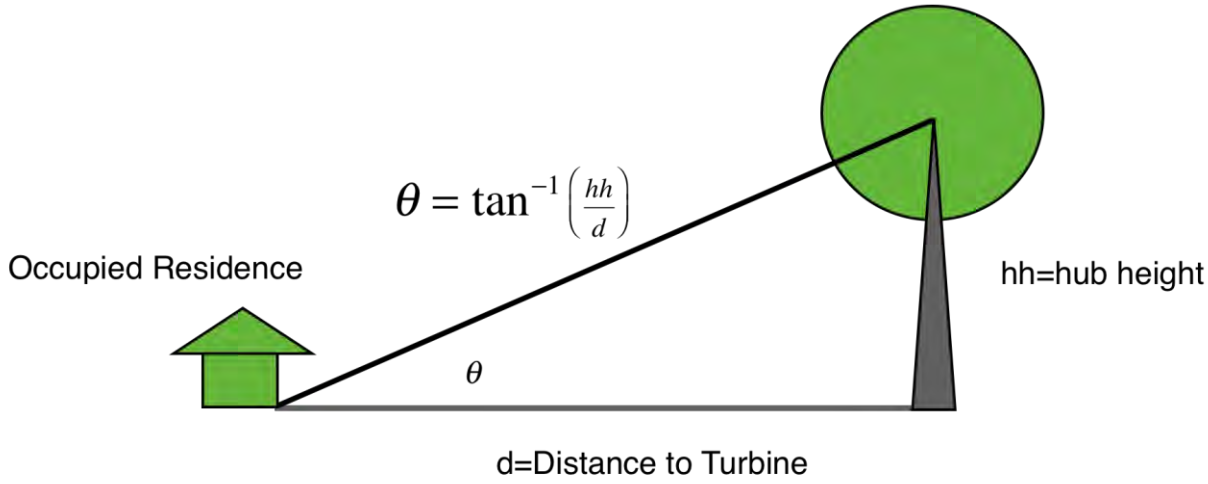
- Place the viewer at the location of the house being analyzed.
- From that location, we measure the location of each turbine to be considered (compass heading). This is shown below.



- Using the distance from the turbine to the house and the diameter of the turbine, we compute the angular size of a circle made by the blades (shown below).



- Using the height of the turbine hub, compute the angular position above the horizon of the center of the turbine hub.



- Using the Stellarium scripting language place a circle at the location (compass location and height) that correctly represents the disk of the turbine blades.
- With turbine disk in place, run Stellarium to see if, when, and for how long the sun passes behind the disk of the turbine.

Our assumptions make this a worst-case scenario. :

- We assume that there are no obstructions between the turbine and the house.
- We assume that every day is perfectly clear. More realistic computations would include the average cloud cover.
- A more realistic treatment would only produce flicker when a turbine blade covers 20% of the solar disk. We do not include the fraction of the solar disk that is covered and we assume that any part of the blade will cause flicker.

- We assume that the turbine disk is oriented to produce the maximum angular size. A more realistic calculation would incorporate a wind rose to properly weight the orientation of the turbine disk.

Detailed Analysis specific to the Monarch Site:

We describe the location of the houses considered, the turbines considered, and the results.

House 1 *Lat* 40°49′12.0116″ *Long* – 90°40′16.5758″	Compass Heading in degrees	Distance to Turbine in feet	Hub Height: angle above horizon in degrees	Angular size of disk of blades in degrees	Predicted flicker in hours
Turbine 5	62°	1908 ft	$\theta = 9.76°$	$\alpha = 8.12°$	0
Total for House 1					0

Notes on House 1: House 1 is south and west of turbine 5. No flicker is predicted. Because of the position of the turbine, the sun only passes under the blade disk near the summer solstice.

House 2 *Lat* 40°49′7.7800″ *Long* – 90°39′49.9734″	Compass Heading in degrees	Distance to Turbine in feet	Hub Height: angle above horizon in degrees	Angular size of disk of blades in degrees	Predicted flicker in hours
Turbine 5	330°	1544 ft	-	-	0
Total					0

Notes on House 2: House 2 is south and east of turbine 5. No flicker predicted. Turbine 5 is too far north of west to cast a shadow on house 2.

House 3 *Lat* 40°49′38.9246″ *Long* − 90°39′23.1075″	Compass Heading in degrees	Distance to Turbine in feet	Hub Height: angle above horizon in degrees	Angular size of disk of blades in degrees	Predicted flicker in hours
Turbine 1	310°	2776 ft	$\theta = 6.74°$	$\alpha = 5.58°$	0
Turbine 2	292°	2361 ft.	$\theta = 7.91°$	$\alpha = 6.56°$	10
Turbine 4	248°	2465 ft.	$\theta = 7.58°$	$\alpha = 6.29°$	Aligned with turbine 9
Turbine 5	232°	2984 ft	$\theta = 6.27°$	$\alpha = 5.19°$	5
Turbine 8	300°	1525 ft	$\theta = 12.14°$	$\alpha = 10.14°$	0
Turbine 9	248°	1520 ft	$\theta = 12.18°$	$\alpha = 10.18°$	7
Total for House 3					22

Notes on House 3: House 3 is located on Rte. 67. Since turbine 4 is aligned with turbine 9 and turbine 9 is closer, only turbine 9 has been included. All of the flicker hours for house 3 are near sunset.

Houses 4 and 5 *Lat* 40°50′2.5398″ *Long* − 90°38′42.8622″	Compass Heading in degrees	Distance to Turbine in feet	Hub Height: angle above horizon in degrees	Angular size of disk of blades in degrees	Predicted flicker in hours
Turbine 10	250°	2022 ft.	$\theta = 9.22°$	$\alpha = 7.66°$	0
Turbine 12	65°	3140 ft.	$\theta = 5.97°$	$\alpha = 4.94°$	10
Turbine 13	70°	2621 ft.	$\theta = 7.14°$	$\alpha = 5.91°$	5
Total for Houses 4 and 5					15

Notes on Houses 4 and 5: Since houses 4 and 5 are physically close, we have considered them together. Calculation of predicted flicker hours does not include the effect of the large tree(s) that are on the east side of the property. These trees will serve to reduce the visible flicker.

House 6 *Lat* 40°50′0.7953″ *Long* − 90°38′22.7792″	Compass Heading in degrees	Distance to Turbine in feet	Hub Height: angle above horizon in degrees	Angular size of disk of blades in degrees	Predicted flicker in hours
Turbine13	46°	1511ft	-	-	0
Total for House 6					0

Notes on Houses 6: Turbine 13 is too far north of east to cast a shadow on House 6

Conclusion:

We predict that the maximum flicker observed at any occupied residence will be 22 hours or less. The uncertainty in this prediction arises from the uncertainties in our ability to measure inputs for our analysis. Our ability to precisely and accurately determine the compass heading of each turbine as viewed from a residence is likely the most uncertain input. Nevertheless, we believe that the observed flicker will be less than or equal to our prediction given the overall conservative nature of our analysis.

Attachment B-3

Noise Report

WES Engineering Inc.

211 S. Paterson Street, Suite 380, Madison, WI 53703, phone 608-338-0552, e-mail: Kiril@WESengineering.com

Monarch Wind Noise Analysis

WES Engineering Inc.
Ph# 608-259-9304

Created October 2010

ACRONYMS

dB	decibel
dBA	decibel on an A-weighted scale, used to approximate the human ear's response to sound
DNL	Day Night Average Sound Level
DOE	U.S. Department of Energy
hz	Hertz
IPCB	Illinois Pollution Control Board
MWP	Monarch Wind Project
WTG	wind turbine generator

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WES Engineering Inc.
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SUMMARY OF RESULTS

Predicted Wind Turbine Generator (WTG) noise levels would be below Illinois Pollution Control Board (IPCB) noise standards at all residential (receptor) locations in the study area except for one (Receptor 19). At this location, predicted WTG noise levels are slightly higher than the nighttime standard at one specific frequency [1,000 hertz (Hz)]. However, 24-hour noise monitoring also conducted in the study area revealed that ambient noise levels already exceed IPCB standards at this and other receptor locations. In addition, WTG noise levels would increase overall ambient noise levels at this receptor location by less than 1 A-weighted decibel (dBA), which is an insignificant increase in noise level. Depending on a number of factors, including fluctuating ambient noise levels, WTG noise would be audible sometimes in the study area.

1. BACKGROUND

Sound is a result of fluctuating air pressure. The standard unit for measuring sound pressure levels is the decibel (dB). A decibel is a unit that describes the amplitude (or difference between levels) of sound, equal to 20 times the logarithm to the base 10 of the ratio of the measured pressure to the reference pressure, which is 20 micropascals. Typically, environmental and occupational sound pressure levels are measured in dBA. The A-weighted scale de-emphasizes the very low and very high frequency components of the sound in a manner similar to the frequency response of the human ear. The Day Night Average Sound Level (DNL) is a standard environmental noise descriptor that is essentially a 24- hour average noise level with ten decibels added to the nighttime noise levels. This 10 dBA penalty accounts for increased sensitivity to noise at night.

Sound levels decrease significantly with distance from the source. For example, the sound pressure level at 25 feet from a wind turbine hub drops by a factor of 4 at 50 feet, and by a factor of 16 at 100 feet. In the logarithmic scale of decibels, this equates to a drop of approximately 6 dBA for each doubling of the distance from a point sound source. At a distance of approximately 1,150 feet, the sound pressure level from a wind turbine is around 45 dBA, while the sound pressure level at the nacelle is 104 dBA.

Modern wind turbines have been designed to significantly reduce the noise of mechanical components, so the most audible noise is the sound of the wind interacting with the rotor blades, often resulting in what can be described as a “whooshing” sound (BLM 2005). Noise generated by a wind turbine usually stems from two mechanisms: mechanical or aerodynamic. The aerodynamic noise, generated by the interaction of air flow across rotating turbine blades, is typically the dominant source. The aerodynamic noise has a frequency range approximately between 500 to 1,000 Hz.

In addition, maximum WTG noise levels occur when wind speeds are above 18 miles per hour. Thus, high wind speeds generally increase ambient noise levels, which tends to mask WTG noise. Modern wind turbines are anticipated to be less noticeable when compared to sound from road traffic, agricultural machines and industrial buildings in the area.

Table 1 shows the sound pressure levels from a variety of sources in the environment.

Table 1. Typical Sound Pressure Levels in the Environment

TYPICAL SOUND PRESSURE LEVELS MEASURED IN THE ENVIRONMENT AND INDUSTRY

Noise Source At a Given Distance	A-Weighted Sound Level in Decibels	Qualitative Description
Carrier deck jet operation	140	
	130	Pain threshold
Jet takeoff (200 feet)	120	
Auto horn (3 feet)	110	Maximum vocal effort
Jet takeoff (1000 feet) Shout (0.5 feet)	100	
N.Y. subway station Heavy truck (50 feet)	90	Very annoying Hearing damage (8-hour, continuous exposure)
Pneumatic drill (50 feet)	80	Annoying
Freight train (50 feet) Freeway traffic (50 feet)	70 to 80	
	70	Intrusive (Telephone use difficult)
Air conditioning unit (20 feet)	60	
Light auto traffic (50 feet)	50	Quiet
Living room Bedroom	40	
Library Soft whisper (5 feet)	30	Very quiet
Broadcasting/Recording studio	20	
	10	Just audible

Adapted from Table E, "Assessing and Mitigating Noise Impacts", NY DEC, February 2001.
Table 3-2 is cited in Colby et al. 2009.

1.1 Absolute and Relative Noise Impacts

The degree of intrusiveness of a new environmental noise source is measured in terms of "absolute" and "relative" noise impact. An absolute impact refers to a new noise source exceeding a certain local, State, or Federal noise standard stated in terms of an absolute numeric limit (in decibels). A relative impact refers to the degree to which the new noise source exceeds existing ambient noise levels.

2. EXISTING NOISE REGULATIONS

2.1 Environmental Protection Agency

The U.S. Environmental Protection Agency has an existing design goal of a DNL less than or equal to 65 dBA and a future design goal DNL of 55 dBA for exterior sound levels (EPA 1977). It is important to note that the Federal noise guidelines are design goals and not enforceable regulations. However, these guidelines and design goals are useful tools for assessing the sound environment.

2.2 Illinois Pollution Control Board

The IPCB has developed a comprehensive approach to the measurement and assessment of commercial and industrial noise, and thus is relevant to the development and operation of wind energy projects.

Section 901.101 Classification of Land According to Use
Illinois defines land as one of three types: Class A is residential; Class B is mixed use and Class C is industrial. The below rules apply to noise regulation from Class C land, which includes alternative energy sources (the wind project), to Class A land (residential).

> "Except as elsewhere provided in this Part, no person shall cause or allow the emission of sound during daytime hours from any property-line-noise-source located on any Class A, B or C land to any receiving Class A land which exceeds any allowable octave band sound pressure level specified in the following tables [Tables 2 and 3], when measured at any point within such receiving Class A land, provided, however, that no measurement of sound pressure levels shall be made less than 25 feet from such property-line-noise-source."

For the nearby residential areas, noise monitoring was done near the property line of the houses on small lots and near the residence on larger parcels of land. These ambient noise measurements were made to assess the potential audibility of WTG noise in residential areas near proposed WTG locations. In addition, it is important to determine whether or not ambient noise levels already exceed IPCB noise level limits.

For this assessment, the first column is used from the nighttime limits, as the wind turbine is assumed to be Class C land, and the night limits are lower than the day limits. The IL PCB 35 IAC 901 regulations contain tables of land class, and an "alternative energy source" function code 4314 is a land class C[1].

There are also limits to any "tonal" conditions, which are defined as sound spectra in which any one-third linear octave band sound pressure level exceeds the arithmetic average of the two adjacent one-third octave bands by the following amounts:

- 5 dB for such one-third octave band with a center frequency from 500 to 10,000 Hz, inclusive
- 8 dB for such one-third octave band with a center frequency from 160 to 400 Hz, inclusive
- 15 dB for such one-third octave band with a center frequency from 25 to 125 Hz, inclusive

The wind turbine does not have any tonal conditions per this definition, as can be seen in Table 4, in terms of sound power levels.

Table 2. IPCB Allowable Daytime Octave Band Sound Pressure Level Limits

Octave Band Center Frequency (hertz)	Allowable Octave Band Sound Pressure Levels (dB) of Sound Emitted to any Receiving Class A Land from		
	Class C Land	Class B Land	Class A Land
31.5	75	72	72
63	74	71	71
125	69	65	65
250	64	57	57

1. Title 35 Environmental Protection, Subtitle H: Noise Chapter I: Pollution Control Board Part 901 Sound Emission Standards and Limitations for Property Line-Noise-Sources.

500	58	51	51
1000	52	45	45
2000	47	39	39
4000	43	34	34
8000	40	32	32

Source: Sec. 901.102 of the Illinois State Noise Regulation, Amended at 30 Ill. Reg.5533, effective March 10, 2006.

Table 3. IPCB Allowable Nighttime Octave Band Sound Pressure Level Limits

Octave Band Center Frequency (hertz)	Allowable Octave Band Sound Pressure Levels (dB) of Sound Emitted to any Receiving Class A Land from		
	Class C Land	Class B Land	Class A Land
31.5	69	63	63
63	67	61	61
125	62	55	55
250	54	47	47
500	47	40	40
1000	41	35	35
2000	36	30	30
4000	32	25	25
8000	32	25	25

Source: Sec. 901.102 of the Illinois State Noise Regulation, Amended at 30 Ill. Reg.5533, effective March 10, 2006.

Table 4 shows the octave band values at nominal turbine operation, typically corresponding to wind speeds greater than 10 meters per second at a 10-meter height. Octave band spectra as a function of smaller wind speeds at a 10-meter height depend on hub height and surface roughness.

Table 4. GE XLE Wind Turbine Generator Octave Band Sound Power Level

Octave (hertz)	Sound Power Level (dB)
63	83.4
125	92.2
250	97.8
500	99.4
1,000	97.7
2,000	93.4
4,000	86.6
8,000	84.8
Sum	**104.0**

Note: The octave band spectra are informative only.

Indicative octave band values can be derived using the table below thereby multiplying the tabled values below with the L_{WA} level for a given wind speed at a height of 10 meters and dividing this by 104 dBA, as indicated in the equation:

Octave band value ($V_{i,\ 10\text{-}m}$) = Octave band value (nominal operation): L_{WA} ($V_{i,\ 10\text{-}m}$) / 104 dBA

3. AMBIENT NOISE MEASUREMENTS

3.1 Ambient Noise Measurements

The existing noise environment in this area is characterized by traffic from U.S. Highway 67 (a 4-lane highway) and occasional trains from the Burlington Northern Sante Fe railroad line north of the proposed WTG location. Industrial facilities and businesses along Highway 67 are major contributors to overall ambient noise levels. During daytime hours, local traffic and agricultural work in the area also contribute to ambient noise levels. Summertime noise sources also include insects and birds during the day and evening.

The study area has several neighboring residences, all at a significant distance from the proposed WTG. The noise level from the turbines at each residence was modeled and is presented in the Noise Modeling section of this document. WES Engineering performed a preliminary ambient noise measurement in August 2010 by taking three 1-hour-long noise measurement samples at two locations (see Figure 2). Based on the results of this measurement, a decision was made to expand the background noise measurement study and collect 24- hour data at three locations. The 24- hour noise measurement study was performed on September 27 and September 28, 2010. Twenty-four-hour noise measurements were conducted simultaneously at three locations, and a fourth sound level meter was used to collect 1-hour noise measurements at various locations in the study area. The collected data were analyzed and are presented in the following section.

The noise measurements were conducted between approximately 2:40 p.m. on September 27th and 5:20 p.m. on September 28th. WES Engineering used Larson Davis Sound Level Meters (LD 824 and LD 820), calibrated to a known reference sound level.

3.2 Ambient Noise Measurement Locations

Ambient noise measurements were conducted to determine the potential audibility of WTG noise at nearby sensitive receptors and for comparison with IPCB criteria. Ambient noise levels are an important consideration, particularly if levels already exceed IPCB criteria at certain receptor locations. Figure 1 shows the ambient noise measurement locations.

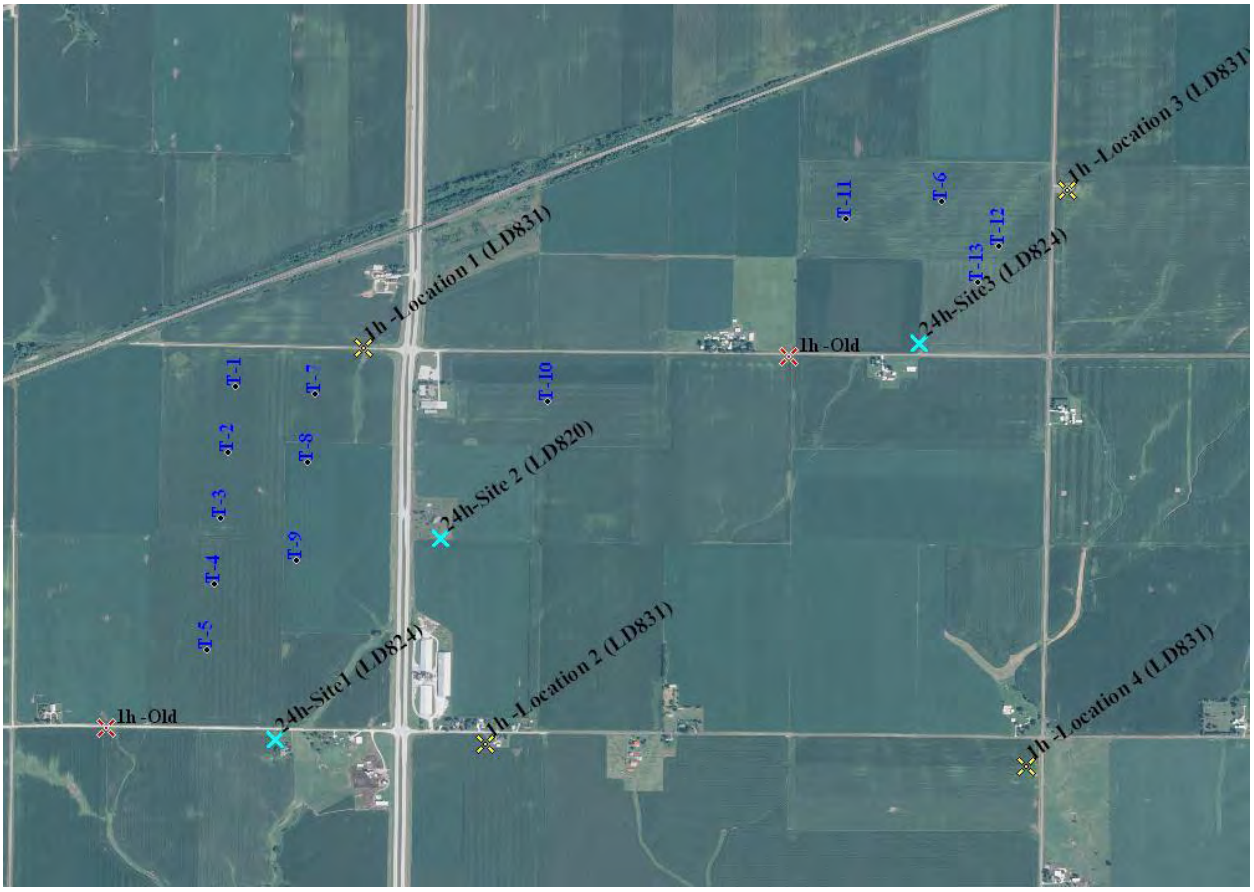

Figure 1. Study Area and Ambient Noise Measurement Locations

The WTG locations are marked with black dots and blue labels (from T-1 to T-13). The twenty-four-hour noise measurement locations are marked with the light blue **"X"** and a label showing the site number and the instrument used for the measurement. All four of the current 1-hour measurements are marked with a yellow "X" and are labeled with the location number and the instrument used. The two red "X" marks identify the two locations used in the measurement performed in August and are labeled "1h-Old."

3.3 Methodology

The following noise measurement guidelines were used:

- A minimum distance of 120 feet was kept from the main roads
- A minimum distance of 25 feet was kept from buildings and other sound-reflecting objects
- The 24-hour measurements were performed at a 9.8-foot height
- The instruments were calibrated before each measurement
- The microphones were protected with a windscreen.

The start and end times for the 24-hour noise measurements are shown in Table 5.

Table 5. Dates/Times of 24-Hour Ambient Noise Measurements

	Start Date/Time	End Date/Time
Site 1 – LD824		
	September 27, 16:45	September 28, 17:25
Site 2 – LD820		
	September 27, 15:25	September 28, 16:55
Site 3 – LD824		
	September 27, 15:35	September 28, 17:10

The start and end times for the 1-hour noise measurements are shown in Table 6.

Table 6. Dates/Times of 1-Hour Ambient Noise Measurements

	Start Date/Time	End Date/Time
Location-1 – LD831		
	September 27, 17:15	September 27, 18:15
Location-2 – LD831		
	September 28, 8:20	September 28, 9:20
Location-3 – LD831		
	September 28, 11:00	September 28, 12:06
Location-4 – LD831		
	September 28, 12:20	September 28, 13:20

Photographs of the ambient noise measurement sites are shown in the attachment to this analysis.

3.4 Wind Conditions

The average wind speed during the period of measurement was between 1 mile per hour and 8 miles per hour on September 27th and between 2 miles per hour and 9 miles per hour on September 28th (Figure 2).

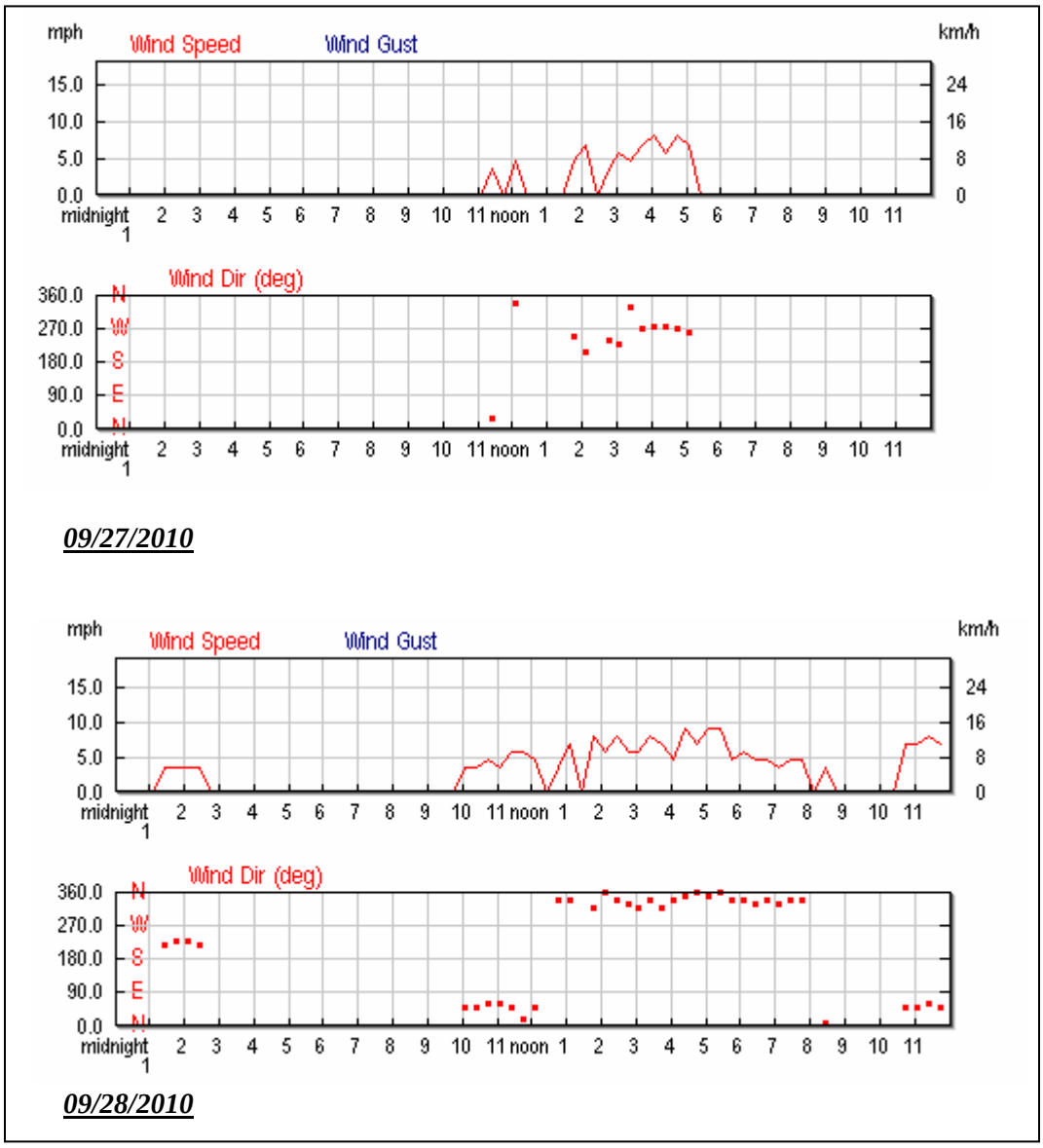

Figure 2. Wind Speed and Direction during Ambient Noise Measurements

4. RESULTS AND ANALYSIS

The results of the data analysis for each site are presented in Table 7 through 9.

4.1 24-Hour Ambient Noise Measurement Data

Table 7. Site 1 – 24-Hour Measurement – 09/27/2010 from 16:15 to 09/28/2010 17:25

Time	L_{eq}	L_{Min}	L_{Max}	L_1	L_{10}	L_{33}	L_{50}	L_{90}	L_{99}
0:00	**48.5**	36.6	61.6	57.2	53.1	45.7	42.6	**38.2**	37.2
1:00	**49.9**	35.2	59.5	58.2	54.2	49.3	45.8	**39.1**	36.5
2:00	**47.7**	34.8	58.6	57.3	51.5	46.3	40.8	**37.2**	35.6
3:00	**43.1**	35.0	57.6	55.0	44.7	39.2	37.9	**35.8**	35.3
4:00	**48.5**	37.1	60.0	59.5	52.4	44.2	41.6	**38.6**	37.4
5:00	**49.6**	38.5	62.4	60.3	53.3	46.2	44.1	**40.7**	39.4
6:00	**53.2**	39.0	68.6	63.6	56.8	50.6	47.7	**43.2**	40.0
7:00	**55.2**	43.8	67.7	65.3	58.6	52.7	50.6	**46.9**	44.5
8:00	**53.4**	44.1	67.8	63.9	56.9	51.1	48.5	**45.9**	44.7
9:00	**51.9**	44.4	69.8	63.6	52.6	48.6	47.8	**45.9**	44.8
10:00	**54.7**	45.6	69.9	66.6	56.1	49.6	48.5	**46.6**	45.8
11:00	**53.5**	43.5	74.3	65.4	53.4	47.4	46.7	**45.3**	44.2
12:00	**59.4**	43.2	73.1	69.9	64.5	54.5	49.5	**44.9**	43.9
13:00	**57.1**	43.9	69.9	67.3	61.4	52.8	48.2	**45.3**	44.5
14:00	**52.7**	41.4	69.4	63.8	55.6	49.3	46.9	**44.0**	42.2
15:00	**53.7**	43.4	70.3	65.0	55.8	49.1	47.4	**44.9**	44.0
16:00	**53.5**	42.9	72.5	65.5	54.9	48.7	47.3	**44.7**	43.6
17:00	**59.6**	40.5	72.2	69.4	64.5	54.4	48.3	**42.7**	41.3
18:00	**52.2**	38.1	73.8	63.9	50.9	44.4	42.4	**40.4**	39.1
19:00	**47.7**	37.1	63.2	57.8	50.1	45.4	43.5	**39.9**	38.2
20:00	**49.9**	39.9	66.4	60.5	52.1	46.7	44.5	**41.8**	40.4
21:00	**47.0**	40.4	59.3	54.0	49.9	46.8	45.0	**42.4**	41.0
22:00	**51.1**	37.5	64.9	59.9	54.9	49.7	46.9	**40.0**	38.0
23:00	**48.5**	38.4	59.7	56.6	52.5	47.0	44.5	**41.4**	38.7

Location: South of 130th Avenue and West of U.S. Highway 67.
Coordinates: 40° 49.150' N, 90° 39.749' W.

Table 8. Site 2 – 24 Hour Measurement – 09/27/2010 from 15:25 to 09/28/2010 16:55

Time	L_{eq}	L_{Min}	L_{Max}	L_1	L_{10}	L_{33}	L_{50}	L_{90}	L_{99}
0:00	**55.3**	70.2	47.9	64.7	58.4	53.4	52.1	**50.1**	48.3
1:00	**56.4**	66.8	47.3	65	59.9	54.9	52.3	**49.5**	48.1
2:00	**53.3**	67.2	45.5	61.1	56.3	52.6	51.2	**48**	46.2
3:00	**54**	72.5	45	64.9	57.1	49.8	48.7	**47.1**	46
4:00	**56.5**	73.1	44.3	67.8	60.5	51.3	48.9	**45.7**	44.5
5:00	**58.4**	69.7	47.1	67	62.5	57.3	54.8	**49.6**	48
6:00	**59.9**	69.4	51.9	66.5	63	60.1	58.4	**54.6**	53.1
7:00	**61.4**	73.1	47.7	70.3	64.6	60.9	58.9	**53.4**	49.6
8:00	**54.7**	69.5	45.8	63.8	58.6	53	51.2	**47.8**	46.3
9:00	**52.7**	74.9	44.3	61.3	54.3	50.5	49	**46.3**	45
10:00	**50.5**	68.3	42.5	61.8	52.4	48.2	47	**44.5**	43.2
11:00	**51.8**	76.9	40.2	58.7	52.2	48.1	46.7	**43.9**	42
12:00	**52.6**	74.7	40.7	63.5	53.3	49	47.5	**44.5**	42.7
13:00	**52**	71.5	41.3	59.8	55	50.8	48.9	**45.1**	42.8
14:00	**53.2**	75.7	41.6	61	55.9	51.8	49.9	**46.1**	43.9
15:00	**54.1**	69.2	43.1	61.8	57.3	53.7	51.7	**47.1**	44.6
16:00	**54.7**	66.9	43.6	62.5	57.9	54.6	52.9	**47.7**	44.9
17:00	**57.3**	74	46.6	64.1	60.3	57.2	55.7	**50.8**	48.2

Table 8. Site 2 – 24 Hour Measurement – 09/27/2010 from 15:25 to 09/28/2010 16:55 (continued)

Time	L_{eq}	L_{Min}	L_{Max}	L_1	L_{10}	L_{33}	L_{50}	L_{90}	L_{99}
18:00	**57.5**	67.9	45.9	65.1	60.8	57.4	55.9	**50**	47.1
19:00	**57.3**	68.2	47.1	65.5	61	57	54.8	**48.6**	47.3
20:00	**57.7**	67.2	47.5	65	61.7	57.4	55.4	**50.3**	48.1
21:00	**56.4**	69.6	46.3	65.5	59.6	55.7	53.7	**48.9**	47.2
22:00	**58.4**	69.7	47.4	66.9	62.8	57.1	54.6	**50.2**	48.4
23:00	**57.1**	73	47.2	67.9	59.9	55.1	52.2	**49.4**	48.1

Location: South of 130th Avenue and West of U.S. Highway 67.
Coordinates: 40° 49.608' N, 90° 39.373' W.

Table 9. Site 3 – 24 Hour Measurement – ***09/27/2010 from 15:35 to 09/28/2010 17:10***

Time	L_{eq}	L_{Min}	L_{Max}	L_1	L_{10}	L_{33}	L_{50}	L_{90}	L_{99}
0:00	**47.6**	34.9	65.9	57.1	52.1	44.8	40.2	**36.2**	35.1
1:00	**58**	36	77	71.1	60.4	52.1	45.3	**38.3**	36.6
2:00	**53.7**	36.5	75.1	63.4	57.9	49.6	42.3	**38.8**	37.4
3:00	**49.9**	36.4	77.3	59.7	43.9	40.5	39.7	**37.9**	36.8
4:00	**52.9**	35.9	72.8	63.9	56.4	43.2	41.5	**38.5**	36.4
5:00	**55.5**	37.3	79.7	65.8	56.1	44.6	43.3	**40.5**	38.4
6:00	**54.7**	38.4	76.1	67.1	57.0	46.5	44.0	**40.6**	39.2
7:00	**54.9**	38.8	75.6	68.9	55.2	46.1	44.8	**41.3**	39.7
8:00	**53.1**	39.6	74.4	64.5	53.6	48.1	46.7	**42.5**	41.0
9:00	**49.7**	39.5	72	62.0	48.1	46.4	45.1	**41.4**	40.2
10:00	**46.7**	41.1	61.4	53.7	49.0	46.4	45.7	**43.7**	42.1
11:00	**46.9**	41.8	58.5	52.6	50.7	45.9	45.2	**43.5**	42.3
12:00	**51.4**	41.1	77.3	55.5	51.2	48.4	46.6	**43.6**	42.2
13:00	**51.5**	43.1	74.1	58.9	51.8	50.1	48.2	**45.8**	44.3
14:00	**49.5**	43.2	67.9	54.8	50.9	49.8	48.9	**45.8**	44.2
15:00	**46.9**	42.5	63.1	53.5	49.3	46.3	45.5	**44.1**	43.1
16:00	**48.4**	42.8	61.9	56.4	49.4	46.7	45.9	**44.3**	43.2
17:00	**49.7**	42.4	70.3	60.0	48.3	47.2	46.6	**44.6**	43.2
18:00	**47.2**	39.8	67.7	54.8	49.8	45.5	44.4	**41.6**	40.2
19:00	**44.4**	38.5	60	55.4	45.0	42.8	41.9	**40.1**	39.1
20:00	**49.6**	39.1	62.6	60.4	54.0	45.1	42.5	**40.5**	39.5
21:00	**50.9**	37.1	72.3	63.4	52.8	42.1	40.2	**38.4**	37.4
22:00	**55.8**	36.3	75.2	68.0	58.0	49.7	43.1	**38.0**	36.3
23:00	**52.8**	34.9	77.9	63.0	53.0	39.7	38.1	**35.7**	35.1

Location: South of 130th Avenue and West of U.S. Highway 67.
Coordinates: 40° 50.053' N, 90° 38.279' W.

4.2 1-Hour Ambient Noise Measurement Data

The data from the four additional measurement locations are summarized in the following section.

Location 1 – 1-hour data
At this additional testing location, the measured ambient noise level was significantly higher than Sites 1 and 3, but lower than Site 2.

Based on the comparison of the simultaneous measurements at all the locations and the L90 comparison graph below, the 24-hour sites are representative of Location 1 and the dwellings near it.

Location 2 – 1-hour data
At this additional testing location, the measured ambient noise level was significantly higher than all three sites.

Based on the comparison of the simultaneous measurements at all the locations and comparing the L90 values, the 24-hour sites are representative of or at lower noise levels than Location 2 and the dwellings near it.

Location 3 – 1-hour data
At this additional testing location, the measured ambient noise level was significantly lower than all three sites.

Based on the comparison of the simultaneous measurements at all the locations and comparing the L90 values, the 24-hour sites are not representative of Location 3. This does not affect the overall ambient noise measurement results because there are no dwellings near Location 3.

Location 4 – 1-hour data
At this additional testing location, the measured ambient noise level was significantly lower than all three sites.

Based on the comparison of the simultaneous measurements at all the locations and comparing the L90 values, the 24-hour sites are not fully representative of Location 4. This does not affect the overall ambient noise measurement campaign because the dwellings near Location 4 are far away from the proposed turbines. The maximum turbine noise level at the dwelling nearest to Location 4 would be 35 dBA, and ambient noise levels are even lower for the dwellings that are farther east or south.

5. NOISE MODELING

MWP has selected the GE xle 1.6 MW model turbine for the proposed project. The GE xle turbine consists of a 82-meter (270-foot) diameter, three-blade rotor mounted on a tubular steel monopole with a hub height of 80 meters (262 feet). The overall height of the wind turbine is 121 meters (397 feet). According to the manufacturer's specifications, the maximum sound power level at the nacelle is 104 dB. MWP intends to install 12 GE xle wind turbines in the area.

Some of the major sources of noise in the vicinity of the proposed project are the railroad tracks northwest of the site, the traffic on U.S. Highway 67 crossing through the middle of the project, the traffic on the smaller roads, the noise from the wind blowing in the fields, and the few small businesses in the area. The existing noise environment for this area is characterized by local tractor-trailer traffic, passenger vehicles traffic, and rail traffic.

WES Engineering performed noise modeling with WindFarmer software to assess the potential noise impacts from operation of the proposed wind turbines. Tables 10 and 11 list the WTG and receptor locations, respectively, where the noise samples were taken.

Table 10. WTG Latitude and Longitude

Turbine ID	Eastings (meters)	Northings (meters)	Height of base (meters)
1	191043.8	4526638	225
2	191008.2	4526357.9	225
3	190973	4526080.4	225
4	190939.2	4525802.9	224
5	190903	4525525.7	223
6	193341.1	4527326	233
7	191296.9	4526594.8	225
8	191260.6	4526305.7	225
9	191206.3	4525894.6	225
10	192041.5	4526534	226
11	193029.9	4527261.6	232
13	193441.7	4526980.7	232

The wind turbine locations used in the WindFarmer model are in the Universal Transverse Mercator, or UTM, coordinate system (WGS72).

Table 11. Modeled WTG Noise Levels by Receptor Number

Receptor ID	Name	Distance to nearest turbine (meters)	Eastings (meters)	Northings (meters)	Noise Prediction (dBA)
19	Dwelling 19	471.5	191660	4526023	48.14
1	Dwelling 1	530.2	191567	4527051	45.81
46	Dwelling 46	471.2	193109	4526647	45.11
20	Dwelling 20	496.6	191132	4525085	44.76
22	Dwelling 22	554.2	191289	4525128	44.48
48	Dwelling 48	595.6	192600	4526741	44.35
47	Dwelling 47	629.2	192687	4526734	44.29
23	Dwelling 23	628.1	191380	4525117	43.83
21	Dwelling 21	590.6	190375	4525261	43.54
24	Dwelling 24	833.9	191660	4525176	42.66
25	Dwelling 25	885	191713	4525169	42.29
26	Dwelling 26	919.8	191778	4525174	41.95
49	Dwelling 49	602.6	193693	4526433	41.86
28	Dwelling 28	954.8	191835	4525176	41.63
27	Dwelling 27	1011.6	191826	4525095	41.16
29	Dwelling 29	1016.4	191914	4525165	41.12
32	Dwelling 32	1369.6	192379	4525187	38.92
30	Dwelling 30	1349.3	192272	4525067	38.82
33	Dwelling 33	1441.9	192438	4525145	38.46
31	Dwelling 31	1422.9	192373	4525080	38.44
4	Dwelling 4	1080	193001	4528351	38.24
62	Dwelling 62	1060.5	193716	4528318	37.56
50	Dwelling 50	1226.6	190208	4524515	37.21
61	Dwelling 61	1116.9	194076	4528167	37
2	Dwelling 2	1593.8	191860	4528344	36.57
3	Dwelling 3	1470.6	192172	4528456	36.35
12	Dwelling 12	1545.9	189883	4527659	36.3
5	Dwelling 5	1830.5	191257	4528456	35.47
6	Dwelling 6	1845.7	190965	4528482	35.01
9	Dwelling 9	1778.7	190372	4528285	34.92

Table 11. Modeled WTG Noise Levels by Receptor Number (continued)

Receptor ID	Name	Distance to nearest turbine (meters)	Eastings (meters)	Northings (meters)	Noise Prediction (dBA)
8	Dwelling 8	1820.9	190381	4528334	34.7
7	Dwelling 7	1872.5	190781	4528492	34.69
34	Dwelling 34	1884.8	193507	4525097	34.53
63	Dwelling 63	1481.4	194535	4528203	34.38
10	Dwelling 10	2048.7	189624	4528115	33.42
58	Dwelling 58	1857.6	190844	4523669	33.38
18	Dwelling 18	2272.4	188765	4526721	33.14
16	Dwelling 16	2313.1	188749	4526928	32.81
59	Dwelling 59	1989.2	190981	4523538	32.77
40	Dwelling 40	1785.9	194805	4525827	32.64
17	Dwelling 17	2372.8	188677	4526807	32.63
51	Dwelling 51	2298.6	188611	4525351	32.22
57	Dwelling 57	2062	190027	4523659	32.22
35	Dwelling 35	2096.6	194252	4525047	32.21
60	Dwelling 60	2537.1	193607	4524449	32.15
42	Dwelling 42	1833.8	195251	4526682	32.11
64	Dwelling 64	1858.1	194948	4528259	32.1
52	Dwelling 52	2363.3	188552	4525285	31.88
11	Dwelling 11	2451.7	188903	4527833	31.73
45	Dwelling 45	1926.9	195363	4527128	31.68
67	Dwelling 67	1977.8	195371	4527416	31.5
53	Dwelling 53	2548.2	188359	4525380	31.2
44	Dwelling 44	2017.1	195406	4526522	31.13
43	Dwelling 43	2018.6	195426	4526610	31.12
13	Dwelling 13	2681.3	188719	4527974	30.8
37	Dwelling 37	2379.3	194873	4525080	30.38
54	Dwelling 54	2738.6	188178	4525253	30.36
41	Dwelling 41	2245.9	195264	4525668	30.35
36	Dwelling 36	2448.8	194825	4524960	30.23
66	Dwelling 66	2225.7	195407	4528154	30.2
65	Dwelling 65	2269.3	195420	4528236	29.97
38	Dwelling 38	2611.3	195155	4525010	29.34
55	Dwelling 55	3093.4	187811	4525433	29.13
14	Dwelling 14	3201.3	188477	4528551	28.72
15	Dwelling 15	3228.2	188795	4528954	28.59
56	Dwelling 56	3140.1	187860	4524751	28.54
39	Dwelling 39	2813.1	195378	4524940	28.5

GE xle 1.6 MW specifications state that the maximum sound power level of the wind turbine is 104 dB when operating at full power. With this guaranteed value at the source, the maximum sound pressure levels due to the operation of the wind turbine can be calculated for the surrounding area. Figures 3 and 4 show the contour maps of the calculated sound pressure levels. The calculated sound pressure levels are conservative and can be viewed as the upper-bound limit, in that the model does not account for attenuation for a number of environmental factors (e.g., atmospheric absorption, and ground absorption).

The modeling results show that WTG noise levels at the closest building would be a maximum 48.1 dBA. Noise levels at the second closest building would be 45.8 dBA. There are nine other buildings close to

where the turbines would be located with maximum sound levels between 42 and 45.1 dBA. Five more buildings in the vicinity would have maximum noise levels ranging from 41 to 42 dBA.

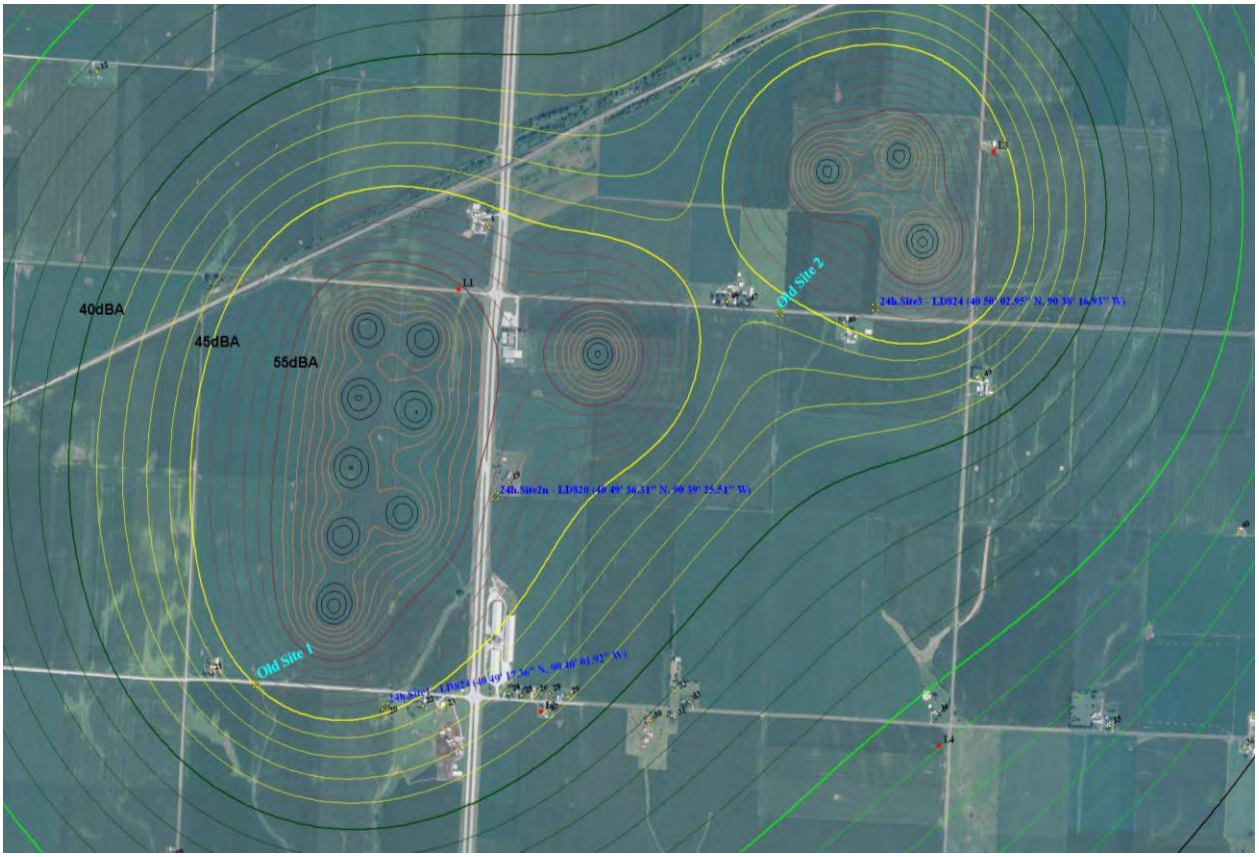

Figure 3. Monarch Wind Project Noise Contours in dBA: Small Scale

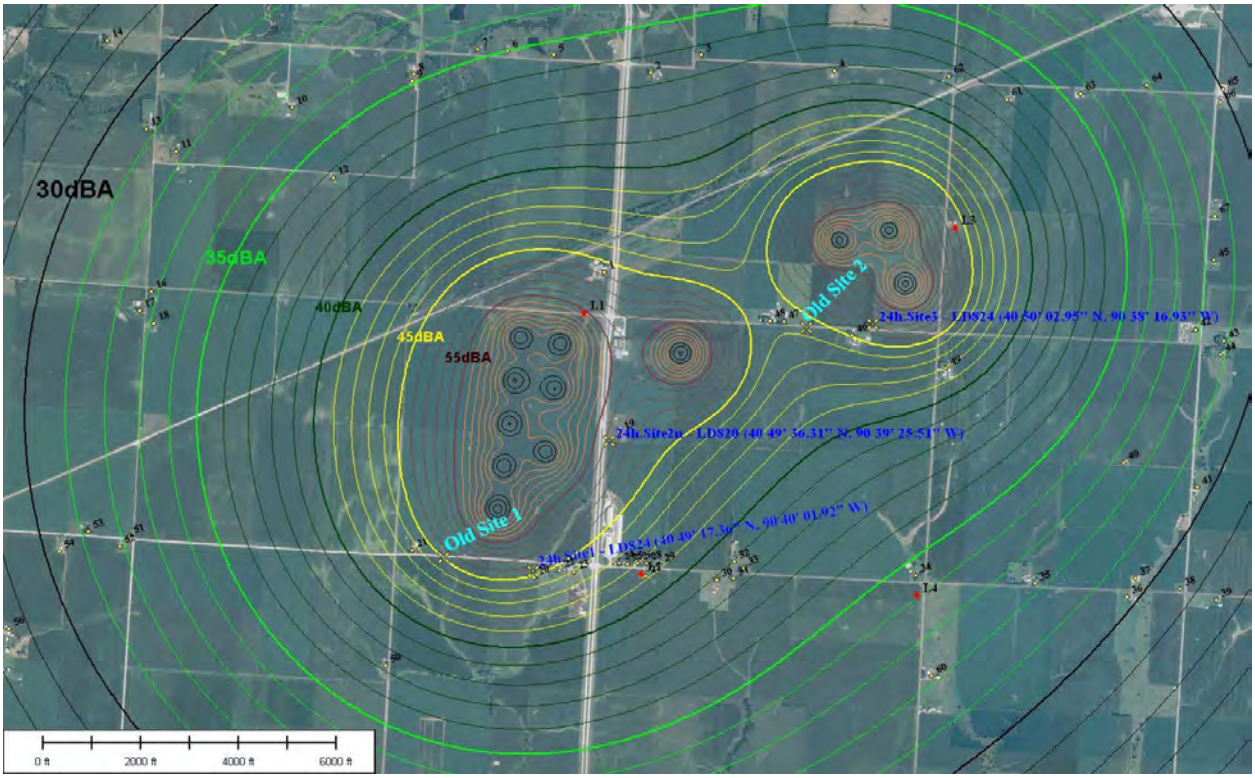

Figure 4. Monarch Wind Project Noise Modeling in dBA: Large Scale

The GE xle 1.6 MW turbine can operate on reduced speeds (with lower power generation) which will reduce noise levels. Table 12 lists such noise-reduced operation modes.

Table 12. GE XLE Noise Reduction Options

NRO Label	Nominal Power (kW)	Nominal Rotor Speed (RPM)	Reduced Reference Value L_{WA} (dB)
Baseline	1,500	16.8	104
NRO 103-Rev. 3	1,400	16.0	103
NRO 102-Rev. 3	1,240	15.3	102
NRO 101-Rev. 3	1,080	14.6	101
NRO 100-Rev. 3	935	14.0	100

dB = decibel; kW = kilowatt; NRO = noise reduction option; RPM = revolutions per minute.

6. ASSESSMENT OF IMPACTS

6.1 Summary of Noise Impact Criteria

The following criteria were used to evaluate the wind turbine noise impacts at nearby sensitive receptors (e.g., residences, churches, and schools):

- DNL values less than or equal to 65 dBA and a future design goal DNL of 55 dBA for exterior sound levels. Assuming the wind turbine is operating at steady state sound level at the receiver location, the DNL is approximately 6.4 dB above the measured L_{eq}, so DNL 55 dBA corresponds to maximum L_{eq} of 48.6 dBA.

- IPCB nighttime octave frequency band decibel limits for Class A land from Class C land (see Table 3).

- Comparison of WTG noise levels with ambient levels (less than a 3-dBA increase).

6.2 Comparison of WTG Projected Noise Levels to IPCB Standards and Measured Ambient Noise Levels

Table 13 contains the modeled noise prediction for the turbines at the 29 closest receptor locations in comparison with the IPCB limits. The table notes five receptor locations at which the turbine noise output would exceed IPCB standards for at least one octave band (this is conservative since modeling did not fully account for atmospheric absorption). WTG noise levels in octave bands were also compared with ambient L90 data in octave bands. Where WTG noise levels would meet or exceed ambient L90 data, WTG could be audible at certain times at certain locations, as noted in the table.

Table 13. Summary of Noise Levels for the 29 Closest Receptors to WTGs

Receptor ID	Predicted Turbine Noise Level (dBA)	Exceeds the IPCB Limit by dBA	Exceeds the IPCB Limit by Octave	Notes and Comments for the GE xle 1.6 MW Without Noise Reduction Option
19	48.14	No	Yes	*Exceeds IPCB levels at 1000, 2000 and 4000 Hz - Could be audible*
1	45.81	No	Yes	*Exceeds IPCB levels at 1000 and 2000 Hz- Could be audible*
20	44.76	No	Yes	*Exceeds IPCB level at 2000 Hz - Could be audible*
22	44.48	No	Yes	*Exceeds IPCB level at 2000 Hz - Could be audible*
48	44.35	No	Yes	*Exceeds IPCB level at 2000 Hz - Could be audible*
46	45.11	No	No	Fully complies to the IL-PCB limits - Could be audible
47	44.29	No	No	Equals to the IPCB level at 2000 Hz - Could be audible
23	43.83	No	No	Fully complies to the IL-PCB limits - Could be audible
21	43.54	No	No	Fully complies to the IL-PCB limits - Could be audible
24	42.66	No	No	Fully complies to the IL-PCB limits - Could be audible
25	42.29	No	No	Fully complies to the IL-PCB limits - Could be audible
26	41.95	No	No	Fully complies to the IL-PCB limits - Could be audible
49	41.86	No	No	Fully complies to the IL-PCB limits - Could be audible
28	41.63	No	No	Fully complies to the IL-PCB limits - Could be audible
27	41.16	No	No	Fully complies to the IL-PCB limits - Could be audible
29	41.12	No	No	Fully complies to the IL-PCB limits - Could be audible
32	38.92	No	No	Fully complies to the IL-PCB limits - Not likely to be audible
30	38.82	No	No	Fully complies to the IL-PCB limits - Not likely to be audible
33	38.46	No	No	Fully complies to the IL-PCB limits - Not likely to be audible
31	38.44	No	No	Fully complies to the IL-PCB limits - Not likely to be audible
4	38.24	No	No	Fully complies to the IL-PCB limits - Could be audible
62	37.56	No	No	Fully complies to the IL-PCB limits - Could be audible
50	37.21	No	No	Fully complies to the IL-PCB limits - Not likely to be audible
61	37	No	No	Fully complies to the IL-PCB limits - Could be audible
2	36.57	No	No	Fully complies to the IL-PCB limits - Not likely to be audible
3	36.35	No	No	Fully complies to the IL-PCB limits - Not likely to be audible
12	36.3	No	No	Fully complies to the IL-PCB limits - Not likely to be audible
5	35.47	No	No	Fully complies to the IL-PCB limits - Not likely to be audible
6	35.01	No	No	Fully complies to the IL-PCB limits - Not likely to be audible

WindFarmer software accounts for atmospheric absorption in an approximate fashion by subtracting a single overall value that is accurate from an overall A-weighted noise level perspective; however, high frequencies are attenuated much more than what this method would indicate. As a result of this

approximation, WindFarmer indicates that five receptors would slightly exceed the nighttime IPCB standard at certain middle to high frequencies. Table 14 shows a more-detailed breakdown of these five receptors. The standard on calculating absorption of sound (ANSI S1.26 – 1995) provides the detailed octave band atmospheric absorption coefficients for a wide range of temperatures and humidity. Assuming "standard day" meteorology (15 degrees Celsius and 50 percent humidity), mid- to high-frequency atmospheric absorption would substantially reduce the predicted mid- to high-frequency WTG noise levels shown in Table 14. Accounting for this would result in all receptors except Receptor 19 being below the IPCB standards. With regard to Receptor 19, only the predicted WTG noise level at 1,000 Hz would be slightly above the nighttime IPCB standard (43.2 dB versus 41 dB). All other frequencies would be below the IPCB standard at this location.

Table 14. Detailed Noise Data at Five Receptors

Monarch Wind - Ambient to WTG noise comparison Day/Night/Total

WES Engineering Inc
10/21/2016

Day Time is assumed to be from 7:00am to 9:59pm
Night Time is from 10:00pm to 6:59am

Receptor ID	Distance to the Nearest Turbine [m]	[ft]	dBA Day Time WTG LAeq	Day Time Ambient LAeq	Day Time Ambient L90	Night Time WTG LAeq	Night Time Ambient LAeq	Night Time Ambient L90	TOTAL WTG LAeq	TOTAL Ambient LAeq	TOTAL Ambient L90	TOTAL Ambient Increase	Hz	31.5	63	125	250	500	1000	2000	4000	8000
													PCB-dBA	36	47.8	52.9	55.4	54.8	52	48.2	44	38.9
													Hz	Modeled Maximum WTG Noise / Ambient Noise								
1	19	471.5	1546.52	48.15	57.8	48.4	46.27	52.62	42.8	48.14	56.49	47.2	0.5927	WTG dBA	-12.5	3.7	22.6	35.7	42.7	44.2	41.1	34.1	30.2
														Ambient	24.9	38.4	44.4	46.7	50.4	54.0	50.5	45.3	41.3
														SUM	24.9	38.4	44.4	47.1	51.1	54.9	51.0	45.6	41.7
														Increase	0.0	0.0	0.0	0.3	0.7	0.4	0.5	0.3	0.3
2	1	530.2	1739.06	45.91	54.38	49.1	45.33	49.2	44.3	45.81	53.07	47.8	0.7479	WTG dBA	-14.8	1.4	20.3	33.4	40.4	41.9	38.8	31.8	27.9
														Ambient	21.5	35.0	41.0	43.3	47.0	50.6	47.1	41.8	37.9
														SUM	21.5	35.0	41.0	43.7	47.8	51.1	47.7	42.3	38.3
														Increase	0.0	0.0	0.0	0.4	0.9	0.5	0.6	0.4	0.4
3	20	496.6	1629.85	44.76	54.88	44.6	44.76	49.7	39.9	44.76	53.57	43.3	0.5366	WTG dBA	-15.9	0.3	19.2	32.3	39.3	40.8	37.7	30.7	26.8
														Ambient	22.0	35.5	41.5	43.8	47.5	51.1	47.6	42.3	38.4
														SUM	22.0	35.5	41.5	44.1	48.1	51.5	48.0	42.6	38.7
														Increase	0.0	0.0	0.0	0.3	0.6	0.4	0.4	0.3	0.3
4	22	554.2	1817.78	44.48	54.88	44.6	44.48	49.7	39.9	44.48	53.57	43.3	0.5058	WTG dBA	-16.2	0.0	18.9	32.0	39.0	40.5	37.4	30.4	26.5
														Ambient	22.0	35.5	41.5	43.8	47.5	51.1	47.6	42.3	38.4
														SUM	22.0	35.5	41.5	44.1	48.0	51.5	48.0	42.6	38.7
														Increase	0.0	0.0	0.0	0.3	0.6	0.4	0.4	0.3	0.3
5	48	595.6	1953.57	44.39	50.31	48.1	44.39	54.4	38.6	44.39	52.31	41.9	0.6444	WTG dBA	-16.3	-0.1	18.8	31.9	38.9	40.4	37.3	30.3	26.4
														Ambient	21.4	31.2	37.3	39.1	44.3	44.7	38.5	43.3	39.5
														SUM	21.4	31.2	37.3	39.8	45.4	46.2	40.9	43.5	39.7
														Increase	0.0	0.0	0.1	0.9	1.1	1.4	2.5	0.2	0.2

IPCB Limit by Day and Night									
Day Time - from 7:00am to 9:59pm									
Hz	31.5	63	125	250	500	1000	2000	4000	8000
PCB-dBA	36	47.8	52.9	55.4	54.8	52	48.2	44	38.9
Hz	Modeled Maximum WTG Noise / Ambient Noise								
WTG dBA	-12.5	3.7	22.6	35.7	42.7	44.2	41.1	34.1	30.2
Ambient	24.9	38.4	44.4	46.7	50.4	54.0	50.5	45.3	41.3
SUM	24.9	38.4	44.4	47.1	51.1	54.9	51.0	45.6	41.7
Increase	0.0	0.0	0.0	0.3	0.7	0.4	0.5	0.3	0.3
WTG dBA	-14.8	1.4	20.3	33.4	40.4	41.9	38.8	31.8	27.9
Ambient	21.5	35.0	41.0	43.3	47.0	50.6	47.1	41.8	37.9
SUM	21.5	35.0	41.0	43.7	47.8	51.1	47.7	42.3	38.3
Increase	0.0	0.0	0.0	0.4	0.9	0.5	0.6	0.4	0.4
WTG dBA	-15.9	0.3	19.2	32.3	39.3	40.8	37.7	30.7	26.8
Ambient	22.0	35.5	41.5	43.8	47.5	51.1	47.6	42.3	38.4
SUM	22.0	35.5	41.5	44.1	48.1	51.5	48.0	42.6	38.7
Increase	0.0	0.0	0.0	0.3	0.6	0.4	0.4	0.3	0.3
WTG dBA	-16.2	0.0	18.9	32.0	39.0	40.5	37.4	30.4	26.5
Ambient	22.0	35.5	41.5	43.8	47.5	51.1	47.6	42.3	38.4
SUM	22.0	35.5	41.5	44.1	48.0	51.5	48.0	42.6	38.7
Increase	0.0	0.0	0.0	0.3	0.6	0.4	0.4	0.3	0.3
WTG dBA	-16.3	-0.1	18.8	31.9	38.9	40.4	37.3	30.3	26.4
Ambient	21.4	31.2	37.3	39.1	44.3	44.7	38.5	43.3	39.5
SUM	21.4	31.2	37.3	39.8	45.4	46.2	40.9	43.5	39.7
Increase	0.0	0.0	0.1	0.9	1.1	1.4	2.5	0.2	0.2

Night Time - from 10:00pm to 6:59am									
Hz	31.5	63	125	250	500	1000	2000	4000	8000
PCB-dBA	30	40.8	45.9	45.4	43.8	41	37.2	33	30.9
Hz	Modeled Maximum WTG Noise / Ambient Noise								
WTG dBA	-12.5	3.7	22.6	35.7	42.7	44.2	41.1	34.1	30.2
Ambient	20.8	36.1	40.5	44.3	47.9	47.8	41.7	33.5	25.0
SUM	20.8	36.1	40.5	44.9	48.1	48.4	41.8	36.8	31.2
Increase	0.0	0.0	0.1	0.6	1.1	1.6	2.7	3.3	6.3
WTG dBA	-14.8	1.4	20.3	33.4	40.4	41.9	38.8	31.8	27.9
Ambient	25.4	32.7	37.0	40.9	44.5	44.4	38.3	30.1	21.6
SUM	25.4	32.7	37.1	41.6	45.3	45.3	39.1	34.0	28.8
Increase	0.0	0.0	0.1	0.7	1.4	1.5	3.2	3.9	7.2
WTG dBA	-15.9	0.3	19.2	32.3	39.3	40.0	37.7	30.7	26.8
Ambient	25.9	33.2	37.5	41.4	45.0	44.9	38.8	30.6	22.1
SUM	25.9	33.2	37.6	42.0	46.1	46.0	41.0	33.7	28.1
Increase	0.0	0.0	0.1	0.5	1.0	1.0	2.5	3.1	6.0
WTG dBA	-16.2	0.0	18.9	32.0	39.0	40.5	37.4	30.4	26.5
Ambient	25.9	33.2	37.5	41.4	45.0	44.9	38.8	30.6	22.1
SUM	25.9	33.2	37.6	41.8	46.0	46.0	41.0	33.8	27.5
Increase	0.0	0.0	0.1	0.5	1.0	1.4	2.4	2.9	5.8
WTG dBA	-16.3	-0.1	18.8	31.9	38.9	40.4	37.3	30.3	26.4
Ambient	27.8	35.6	39.1	43.0	50.7	50.3	40.8	29.3	22.8
SUM	27.8	35.6	39.2	44.1	51.0	50.7	42.5	32.7	28.0
Increase	0.0	0.0	0.0	0.3	0.3	0.4	1.6	3.5	5.2

Note:

The predicted high WTG in the high frequency range is due to the used assumption that all frequencies have the same absorption in air. In reality the higher frequencies will experience higher absorption in air and at such significant distance will be greatly reduced.

Values in red indicate an exceedence of the IPCB standards, for both ambient and WTG noise levels.

7. CONCLUSION

The data show that WTG noise levels would exceed the nighttime IPCB standard at one receptor location and only slightly at one frequency (1,000 Hz). However, ambient noise levels (without the turbines) already exceed the IPCB standards at this location (as well as the other four receptor locations shown in Table 14). In addition, the analysis shows that predicted WTG noise levels would increase ambient noise levels at these locations by less than 1 dB (1 dBA). A 3-dB change is the threshold of perception of change for most people; therefore, WTG noise levels would not significantly increase ambient noise levels. Consequently, DOE no significant noise impacts are expected as a result of MWP's proposed project.

8. REFERENCES

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Kamperman, G. W. and R. R. James. 2008. "Simple Guidelines for Siting Wind Turbines to Prevent Health Risks." Proceedings *NoiseCon* 2008. Dearborn, Michigan: Institute of Noise Control Engineering.

WES Engineering Inc.

706 S. Orchard St, Madison, WI 53715, Ph# 608-259-9304; 608-338-0552 www.WESengineering.com

Attachment: Photographs of Ambient Noise Measurement Locations


24h - Site3


1h-Location1


1h-Location2


1h-Location3


1h-Location4

Attachment B-4

Archaeological Survey

Edge
Consulting Engineers, Inc.

624 Water Street
Prairie du Sac, WI 53578
608.644.1449 phone
www.edgeconsult.com

Phase I Archaeological Reconnaissance Survey
Monarch Wind Farm Project
Lenox Township, Warren County, Illinois
IHPA Log # 038021610

Prepared for:
Monarch Wind Power LLC
1455 Delbrook Way
Marco Island, Florida 34145-4603

Edge Project Number 4846

June 17, 2010

INTRODUCTION

From May 24 through June 17, 2010, Mr. Richard Johnson, Archaeologist with Edge Consulting Engineers, Inc. completed a Phase I Literature Review and Archaeological Reconnaissance Survey in order to assess the potential for intact archaeological deposits located within the boundaries of the proposed Monarch Wind Farm project comprising 13 turbines, turbine access roads and an electrical substation (IHPA Log # 038021610). The proposed undertaking is located east and west sides of U.S. Route 67, in portions of Sections 20, 29 and 30, Township 10 North, Range 2 West of the Forth Principle Meridian (Lenox Township) in Warren County, Illinois (Appendix A: Figure 1).

The project included a review of historic maps, local and regional histories, aerial photographs, topographic quadrangles, soil surveys and physiographic data, inventories of previously recorded archaeological sites, burial sites, and historic structures, NRHP listings, and inventories of previous archeological surveys within the area of potential effect. The project also included a Phase I field survey of all areas where ground disturbance is proposed.

Historical plats and a 1982 topographic map indicate the presence of a cemetery located on the southwest corner of U.S. Route 67 and 140th Avenue. The cemetery was associated with the Warren County Alms House. The cemetery location is near the location of a proposed electrical substation. Cemetery burials were relocated in 1991 prior to the widening of Route 67 to a four lane divided highway. The former cemetery location is now occupied by a portion of the highway and adjacent drainage swale. The reconnaissance survey did not locate any cultural material. No further archaeological work is necessary. It is recommended that the undertaking proceed.

PHYSICAL SETTING

The undertaking is located in portions of Sections 20, 29 and 30 in Township 10 North, Range 2 West (Lenox Township) in Warren County, Illinois. The survey areas are located in nearly level agricultural fields along the southern edge of the upland interfluve between the Illinois River and Mississippi River watersheds. The center of the survey areas (Turbine No. 10 location) is located at UTM coordinates: Zone 15, 4522763 North, 697986 East (Latitude 40˚49' 55.2721" N, Longitude 90˚ 39' 7.6629" W).

The study area is on a loess-covered till plain, part of the Winnebago formation of the Illinois Episode of glaciation (ISGS 2009). The undertaking is located within the Western Forest-Prairie Division, Galesburg Section (Schwegman 1973). This section comprises a dissected Illinoisan till plain. Native vegetation consisted of forest in the river and creek valleys with open forest and prairie on the uplands. The soil composition within the study parcels can be found in Table 1 and Appendix A: Figure 2 (NRCS 2009).

Table 1. Soils found within the survey areas.

Soil Type	Drainage	Native vegetation	Location
Osco silt loam 2-5% slopes(86), eroded (86B)	well drained	tall grass prairie	loess-covered till plains
Muscatine silt loam 0-2% slopes (51A)	poorly drained	tall grass prairie	loess-covered till plains
Sable silty clay loam 0-2% slopes (68A)	poorly drained	marsh grass & sedges	inter-stream divides on loess-covered till plains

The pre-settlement vegetation in the area surrounding the proposed undertaking consisted of forest in dissected river and creek valleys grading to open forest and tall grass prairie on the uplands. Shallow upland depressions were covered by marsh grass and sedge. Prehistoric people would have focused their long-term habitation on the valleys and used the prairie for hunting and foraging excursions. This pattern appears to be verified by the fact that all of the recorded prehistoric sites in the area are located at the edges of drainages leading into Henderson and Cedar Creeks.

BACKGROUND

Archival background research was conducted online using the HAARGIS, CRM Report Archive Database and Illinois Site File databases. The HAARGIS database did not list any buildings within the boundaries of the proposed project. The site file search did not identify any archaeological resources within one mile of the current undertaking. The CRM Report Archive Database listed two surveys within one mile of the undertaking. These surveys were conducted prior to improvements to U.S. Route 67.

Research was also conducted at the Warren County Library in Monmouth, Illinois. Early plats, atlases and regional histories were consulted in order to ascertain the potential for unrecorded historic period resources located within the undertaking (Appendix A: Figures 4-8). The 1844 General Land Office plat of Lenox Township shows the location of the current undertaking within a large area of prairie with no cultural resources present within or immediately adjacent the property.

The proposed wind farm will occupy portions of three sections of Lenox Township. The proposed turbine sites and access roads for Turbines Nos. 6 and11-13 are located in the NW, NE and SE quarters of the SE quarter of Section 20. Ownership of the parcels containing proposed turbine and access road locations changes through time but no buildings are shown within the portion of the proposed undertaking in Section 20 on any of the plats.

The proposed turbine site and access road for Turbine No. 10 is located in the NW quarter of the NW quarter of Section 29. The plats show this location within property owned by the Warren County Farm. Warren County is the current property owner. The St. Louis branch of the Chicago, Burlington and Quincy Railroad ran just to the west side of the proposed Turbine No. 10 location. The CB&Q tracks were taken up in 1958 (Warren County Genealogical Society 2003). No buildings are shown within the portion of the proposed undertaking in Section 29 on any of the plats.

The proposed turbine sites and access roads for Turbines Nos. 1-5 and 7-9 and a proposed substation are located in the E1/2 of the NW and SW quarters and the W1/2 of the NE and SE quarters of Section 30. Ownership of the parcels containing proposed turbine and access road locations changes through time but no buildings are shown within the portion of the proposed undertaking in Section 30 on any of the plats.

The proposed location of an electrical substation is in an agricultural field on the southwest corner of U.S. Route 67 and 140th Avenue. The 1893 plat of Lenox Township depicts a cemetery on that corner (Appendix A: Figure 6). On the plat, the cemetery is within the boundaries of the Warren County Farm. Maps and local histories verify that the cemetery was associated with that facility. The facility was established in 1859 and closed in 1970. The County Farm residence was located on the east side of U.S. Route 67, almost opposite the cemetery. The cemetery appear s

on the 1982 edition of the Kirkwood East Quadrangle (Appendix A: Figure 9) but does not appear on the 1998 edition. Prior to a U.S. Route 67 widening project in 1991, state and county officials supervised the removal of the cemetery burials (Appendix C). One hundred burials were reinterred at the Lenox Union Cemetery and a marker was placed at the former cemetery location (Warren County Genealogical Society 2003).

FIELD SURVEY

A phase I reconnaissance survey of the proposed Monarch Wind Farm project in Lenox Township, Warren County, Illinois was conducted on May 25-27, 2010. Field methods employed during the survey were in accordance with the Illinois Historic Preservation Agency's *Protecting Illinois Cultural Resources - An Introduction to Archaeological Surveys* Cultural Resources guidelines and the *Survey and Reporting Requirements Addendum* memorandum dated 1 January 2005.

The project comprises 13 wind turbine locations, turbine access roads and an electrical substation, all to be located in agricultural fields (Appendix A: Figure 3). The fields are nearly level and were planted with soybeans and corn at the time of the survey. Young plants were 2-4 inches high. Ground surface visibility ranged from 50-90%. That part of the proposed undertaking to undergo ground disturbance, and that part considered here for archaeological investigations includes the wind turbine locations and surrounding 40 meter by 40 meter (131 foot by131 foot) area temporary work areas (40 meter by 80 meter (262 foot) areas for Turbines Nos. 7-9), 3.6 meter (12 foot) wide turbine access roads and a 1.4 acre electrical substation area. Turbine and access road locations had been staked prior to the survey.

Because ground surface visibility was greater than 25%, pedestrian survey methods were used. The access roads were surveyed by walking two parallel transects at a five meter interval. The turbine areas were walked on transects at five meter intervals, centered on each turbine location. The substation area was also walked on transects at five meter intervals. The field survey discussion is divided into four sections based on the grouping of elements of the proposed wind farm.

Area A

This survey area included Turbines Nos. 1-5 and 7-9, turbine access roads and a main access road connecting the turbine locations (Appendix B: Photo 1). The main access road runs between 130th and 140th Avenues. These wind farm elements are located in three fields with varying conditions. The amount of land surveyed in Area A totaled 9.9 acres. Pedestrian survey of Area A did not locate any cultural materials.

Field 1

This survey area included Turbines Nos. 4 and 5, the access road to Turbine No. 9 and 805 meters (2641 feet) of the main access road. There is a shallow drainage swale and a couple of small, shallow depressions along the southern end of the main access. Soil in these areas was wet but soils in the remainder of the survey area were dry. The field was planted in soybeans. Surface visibility was 70%. The survey was conducted parallel to the planted rows.

Field 2

This survey area included Turbines Nos. 8 and 9. The field was planted in corn. Surface visibility was 90%. The survey was conducted parallel to the planted rows.

Field 3
This survey area included Turbines Nos. 1-3 and 7, the 220 meter (722 feet) access roads for Turbines Nos. 7 and 8 and 805 meters (2641 feet) of the main access road. The field was planted in corn and some crop debris was present. Surface visibility was 60%. The survey was conducted parallel to the planted rows.

Area B
This approximately 2.4 acre survey area is the proposed location of an electrical substation (Appendix B: Photo 2). Area B is located in an agricultural field on the southwest corner of U.S. Route 67 and 140th Avenues. The ground slopes down gradually from the east field edge and then moderately into a wet drainage along the west edge of Area B. The soils in the area were somewhat eroded due to the slope. The field was planted in corn and some crop debris was present. Surface visibility ranged from 50-90%. The survey was conducted parallel to the planted rows. Pedestrian survey of Area B did not locate any cultural materials.

Historical plats and the 1982 USGS 7.5' Quadrangle indicate that the location of the Warren County Farm Cemetery was on the southwest corner of U.S. Route 67 and 140th Avenues. The cemetery was moved in 1991 prior to the widening of U.S. Route 67. A stone monument marks the former cemetery location (Appendix B: Photos 3 and 4). The original cemetery location is now occupied by the shoulder and southbound lane of U.S. Route 67 and a grass-covered drainage swale along the roadway edge (Appendix B: Photos 5 and 6). The former cemetery grounds were disturbed by highway construction.

Area C
This 0.9 acre survey area included Turbine No. 10 and its 150 meter (492 foot) access road (Appendix B: Photo 7). The access road extends south from 140th Avenue. The nearly flat field was planted in corn and some crop debris was present. Surface visibility was 60%. Pedestrian survey of Area C did not locate any cultural materials.

Area D
This 4.3 acre survey area included Turbines Nos. 6 and 11-13 (Appendix B: Photo 8). The1029 meter (3375 foot) access road connecting the turbine locations extends north from 140th Avenue. The survey area is nearly flat with scattered shallow depressions. The field was planted in corn and some crop debris was present. Surface visibility was 60%. Pedestrian survey of Area C did not locate any cultural materials.

SUMMARY AND RECOMMENDATIONS

In May and June of 2009, Edge Consulting Engineers, Inc. conducted a Phase I Archaeological Reconnaissance Survey and Literature Review of several parcels of land located in portions of Sections 20, 29 and 30 of Lenox Township, Warren County, Illinois. The land comprises the proposed Monarch Wind Farm project. The study parcels are located in cultivated fields.

Historical maps indicate the presence of the Warren County Alms House cemetery located on the southwest corner of U.S. Route 67 and 140th Avenue. This is near the location of a proposed electrical substation. The cemetery burials were relocated in 1991 prior to the widening of Route 67 to a four lane divided highway. The former cemetery grounds were disturbed by highway construction. No cultural material was recovered by the survey. No further archaeological work is necessary. It is recommended that the undertaking proceed.

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Anonymous

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1912 *Standard Atlas of Warren County, Illinois*. George A Ogle & Company, Chicago.
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1877 *Past and Present of Warren County, Illinois*. H.F. Kett and Company, Chicago.
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Clark, Carol

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McClure Engineering Associates, Inc.

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Warren County Genealogical Society

2003 *Warren County, Illinois; History and Families*. Turner Publishing Company. Paducah, Kentucky

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2009 *Quaternary Deposits Map.* Viewed online at http://www.isgs.uiuc.edu/sections/quat/deposit-map.shtml on May 21, 2010.

Appendix A

Figures and Maps

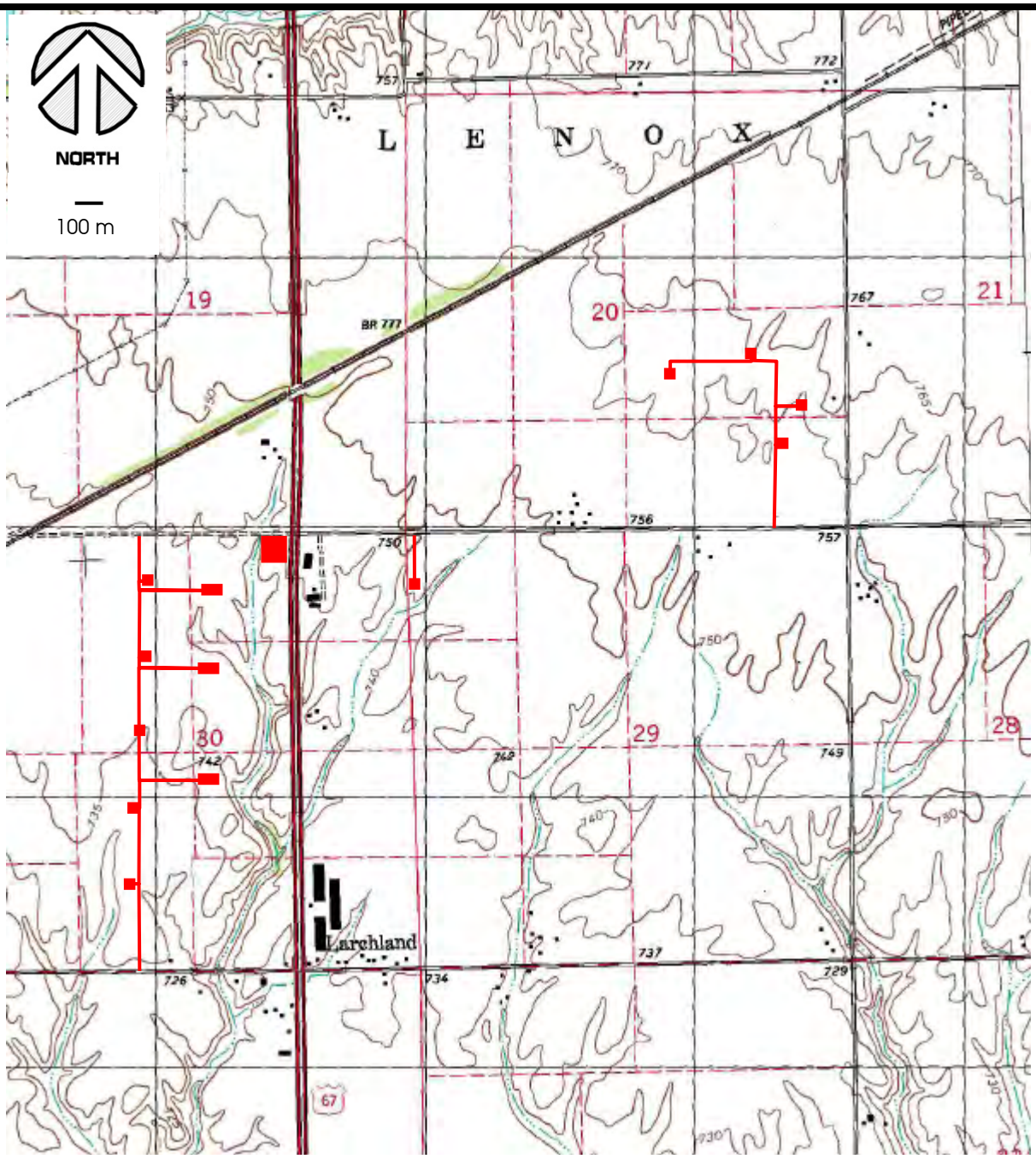


Figure #1 Portion of 1998 USGS 7.5' Kirkwood East Quadrangle showing the survey areas.	Phase I Archaeological Survey # 4846 Monarch Wind Farm Lenox Township, Warren County, Illinois	Edge Consulting Engineers, Inc.

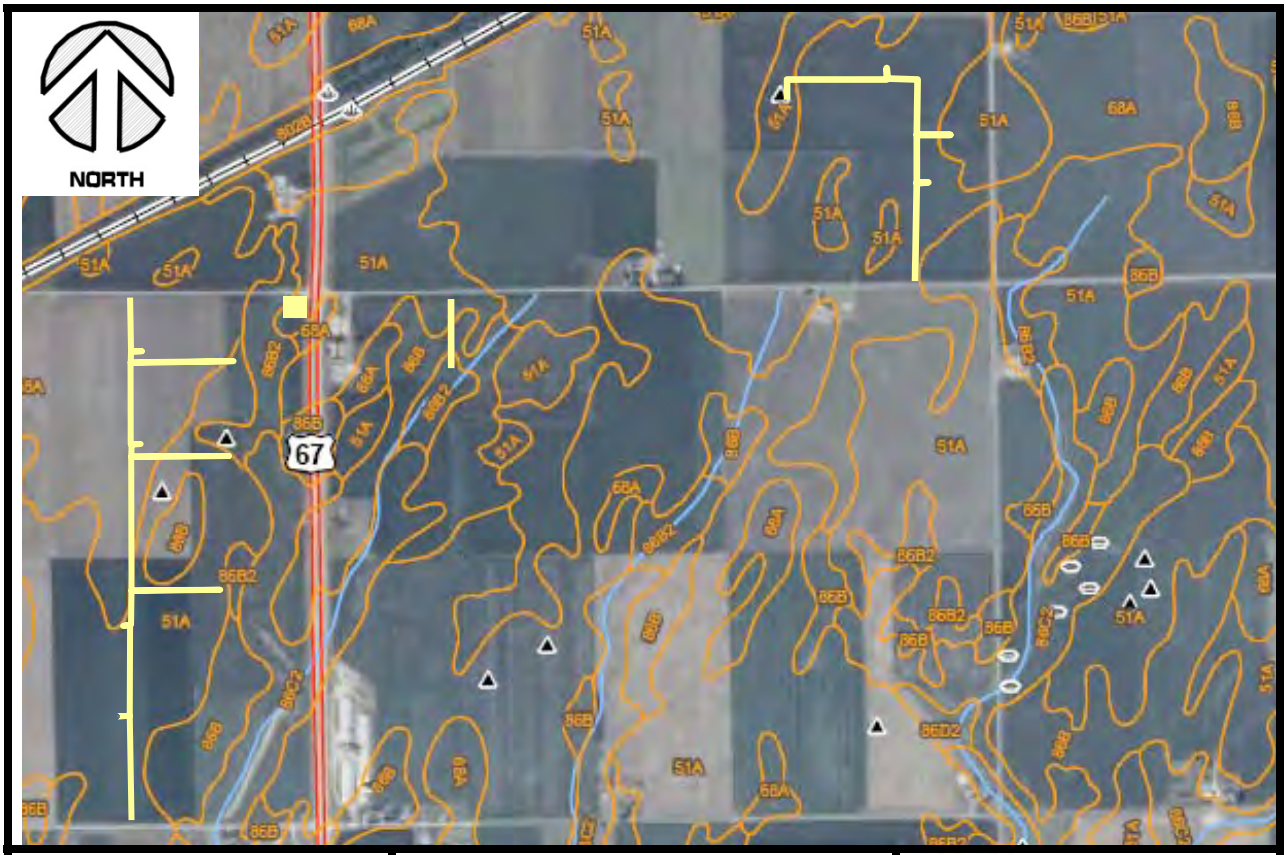


Figure #2 Aerial photograph showing soil series in the survey areas.	Phase I Archaeological Survey # 4846 Monarch Wind Farm Lenox Township, Warren County, Illinois	Edge Consulting Engineers, Inc.

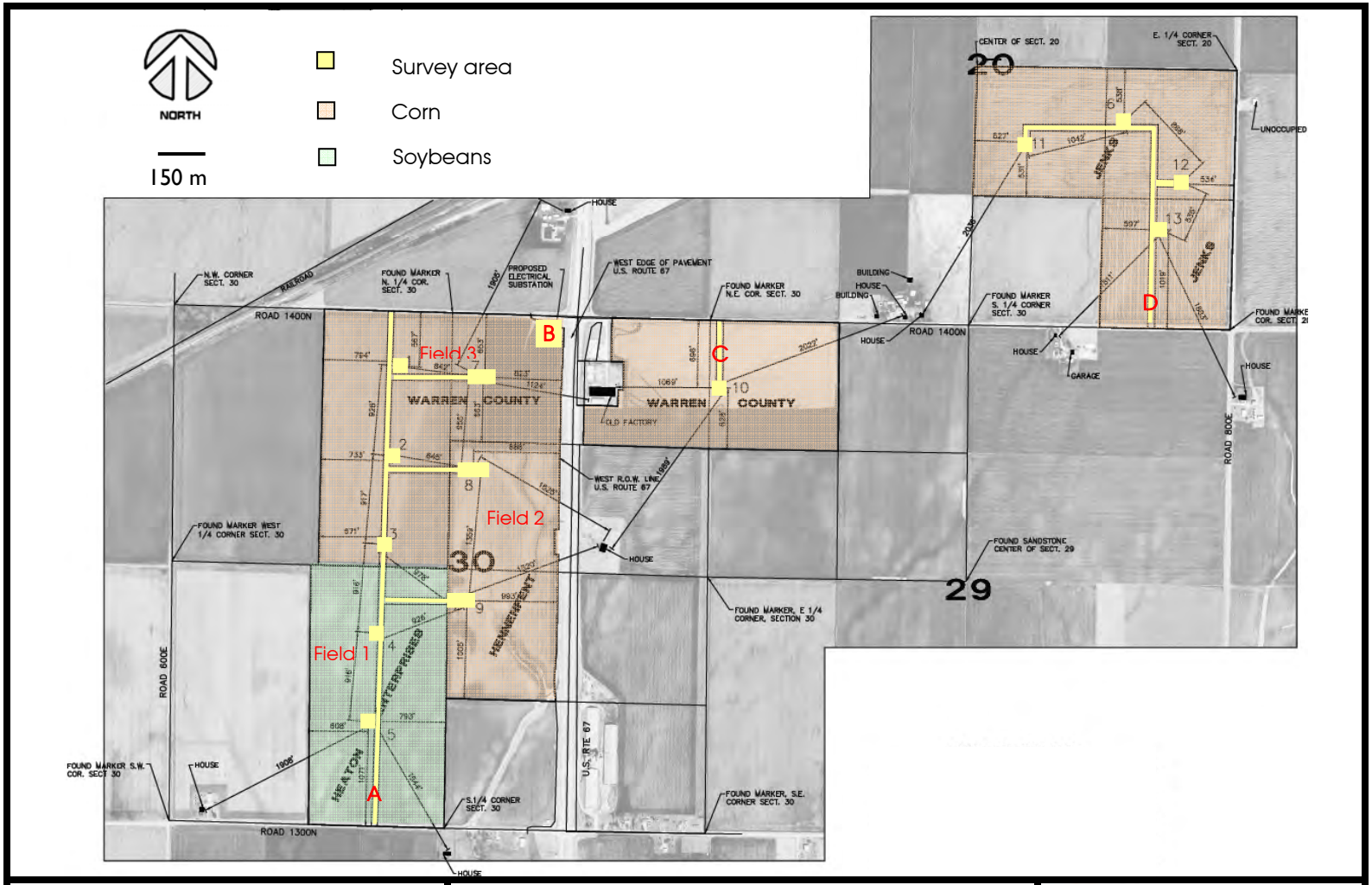


Figure #3
Project Plan showing the survey areas and crop types.

Phase I Archaeological Survey
4846 Monarch Wind Farm
Lenox Township,
Warren County, Illinois

Edge
Consulting Engineers, Inc.

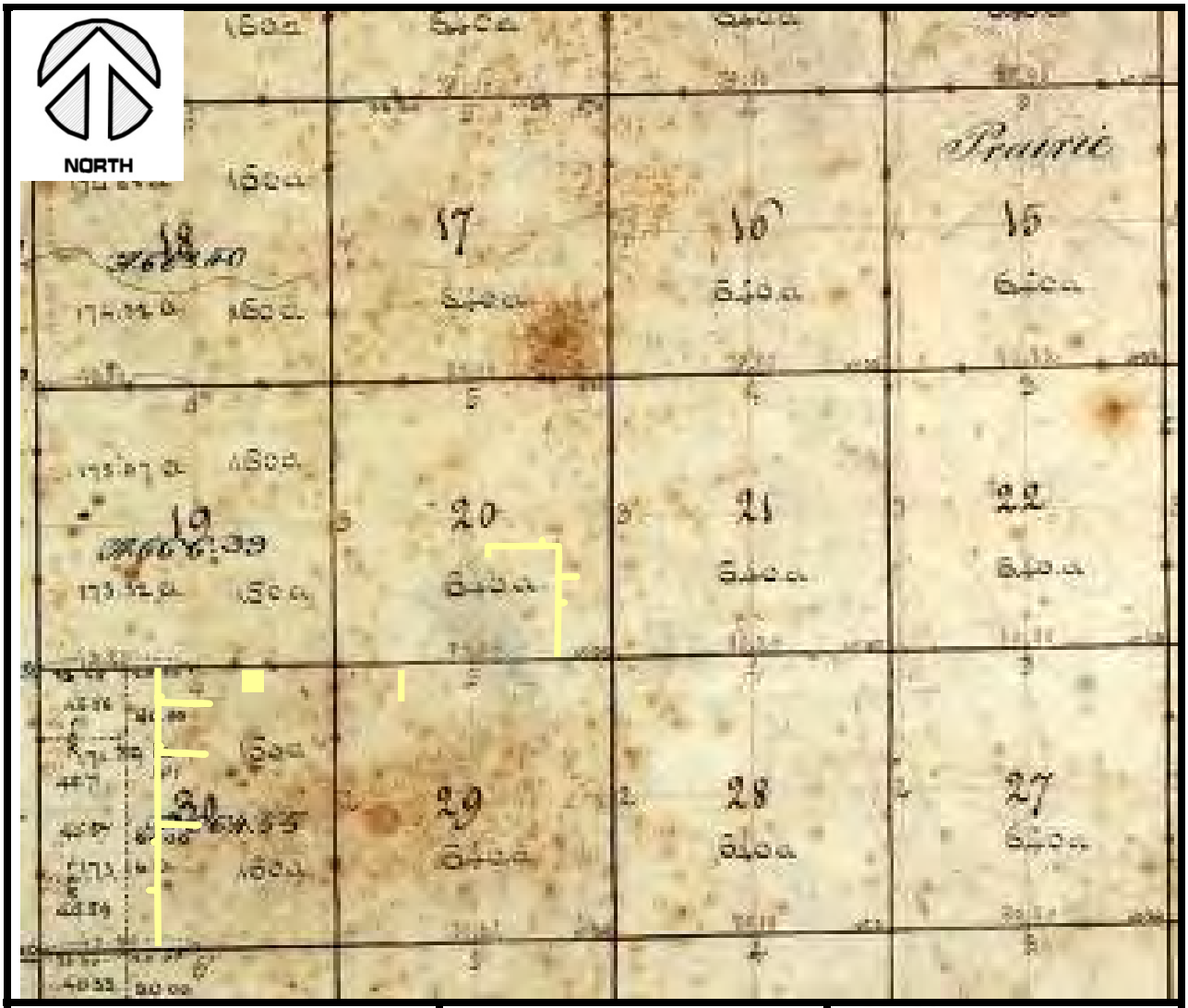


Figure #4 Portion of ca.1844 GLO plat of Lenox Township showing the approximate location of the survey areas.	Phase I Archaeological Survey # 4846 Monarch Wind Farm Lenox Township, Warren County, Illinois	Edge Consulting Engineers, Inc.

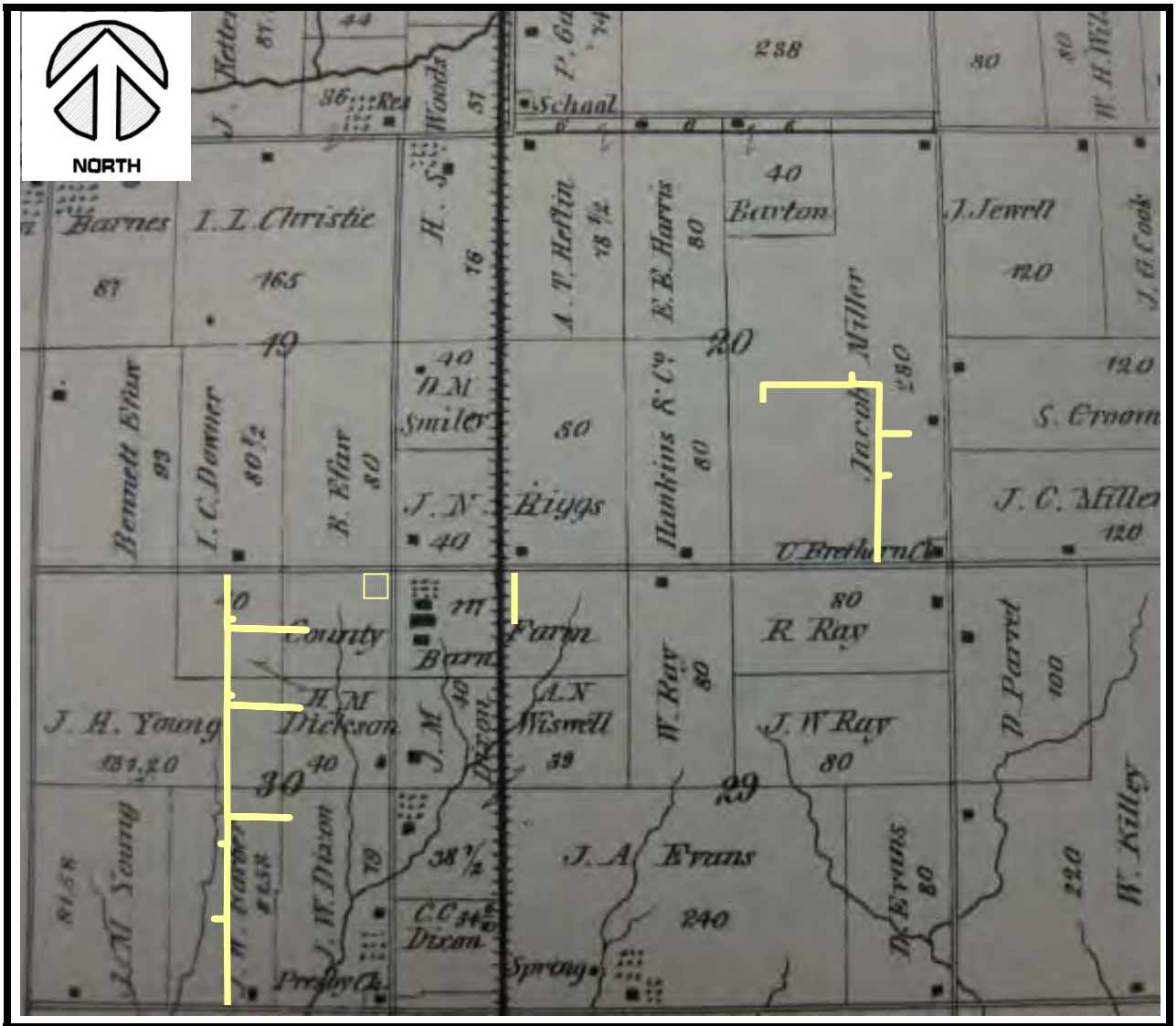


Figure # 5 Portion of 1872 plat of Lenox Township showing the survey areas.	Phase I Archaeological Survey # 4846 Monarch Wind Farm Lenox Township, Warren County, Illinois	Edge Consulting Engineers, Inc.

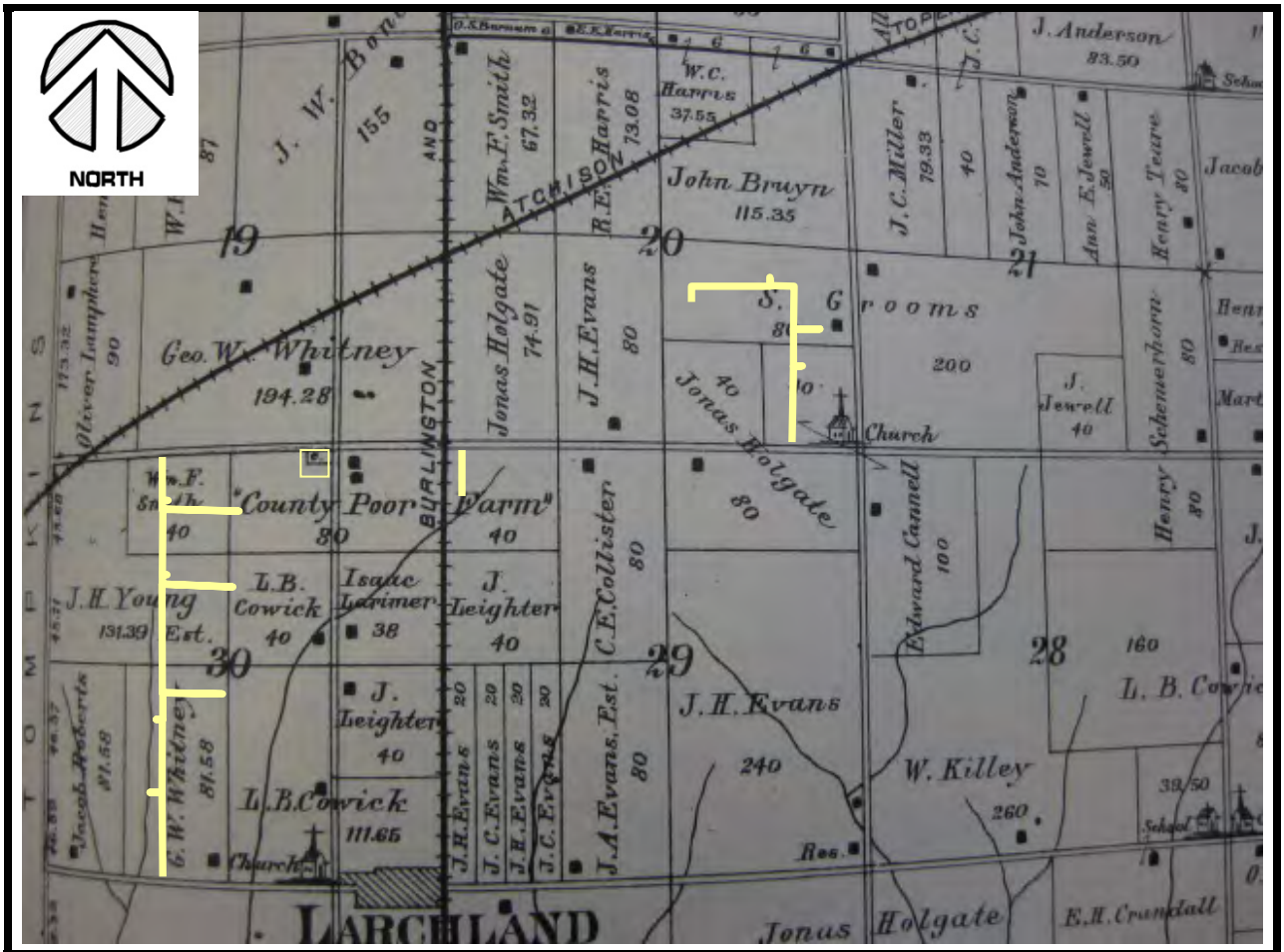


Figure # 6 Portion of 1893 plat of Lenox Township showing the survey areas.	Phase I Archaeological Survey # 4846 Monarch Wind Farm Lenox Township, Warren County, Illinois	Edge Consulting Engineers, Inc.

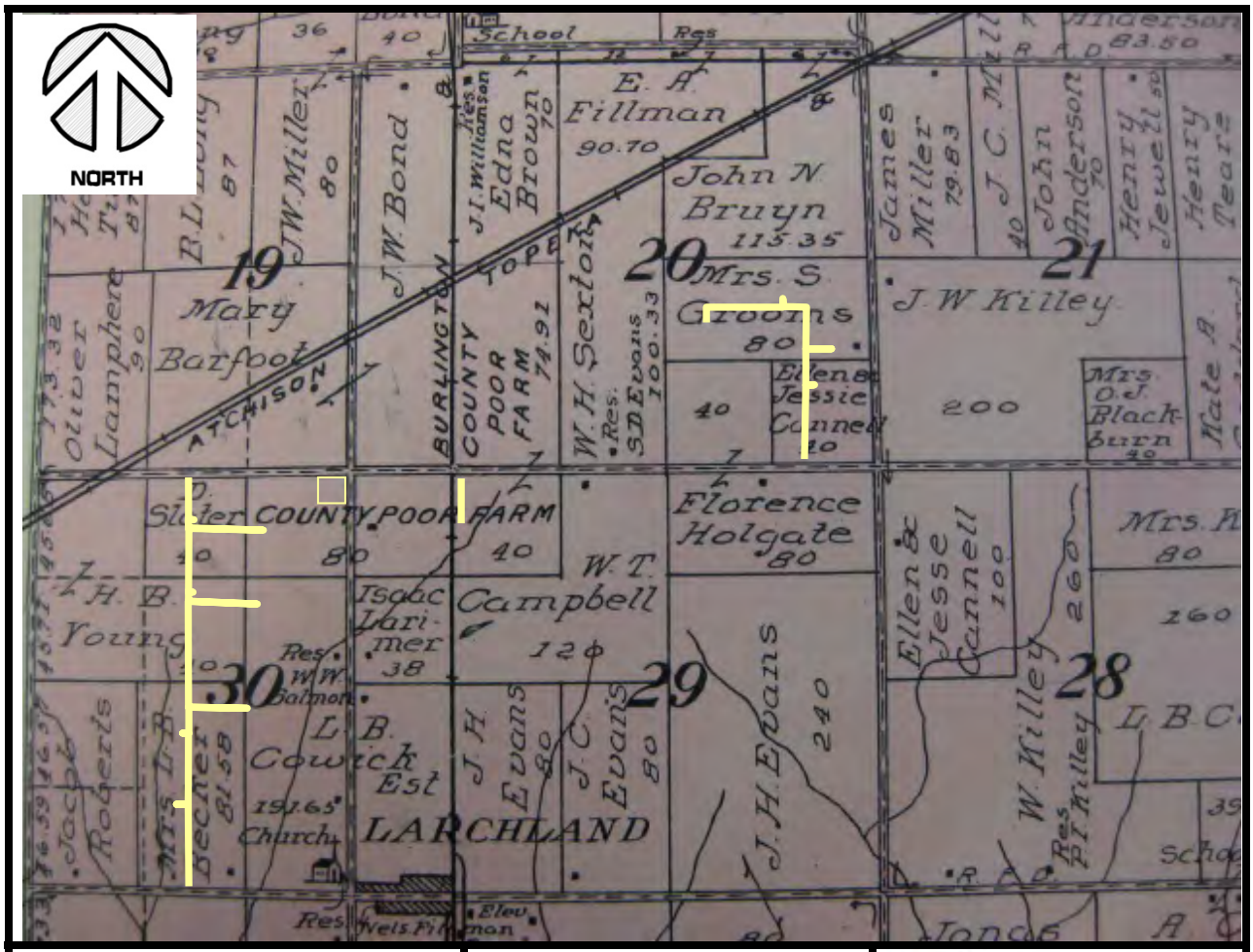


Figure # 7
Portion of 1912 plat of Lenox Township showing the survey areas.

Phase I Archaeological Survey
4846 Monarch Wind Farm
Lenox Township,
Warren County, Illinois

Edge
Consulting Engineers, Inc.

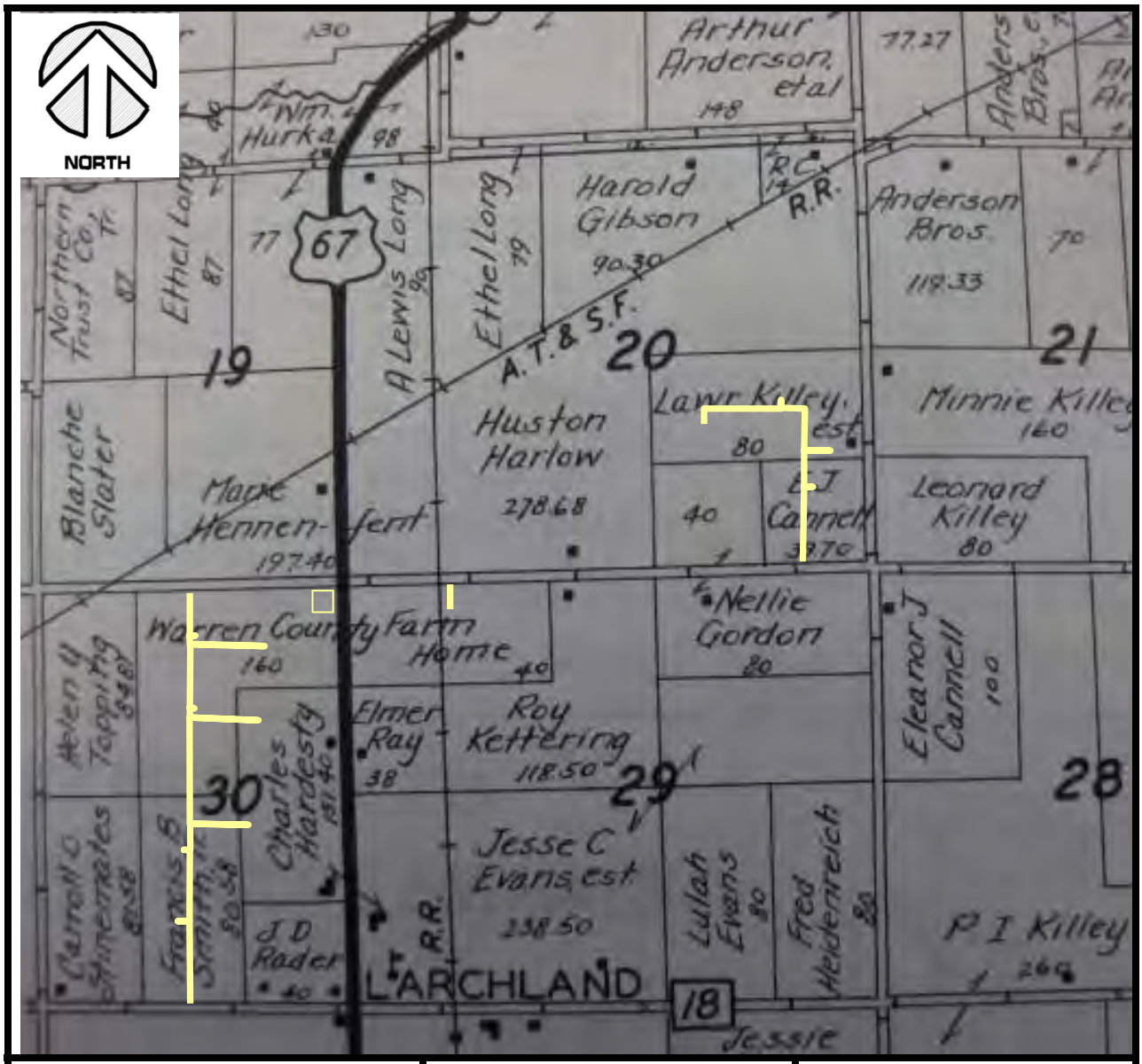


Figure # 8
Portion of 1956 plat of Lenox Township showing the survey areas.

Phase I Archaeological Survey
4846 Monarch Wind Farm
Lenox Township,
Warren County, Illinois

Edge
Consulting Engineers, Inc.

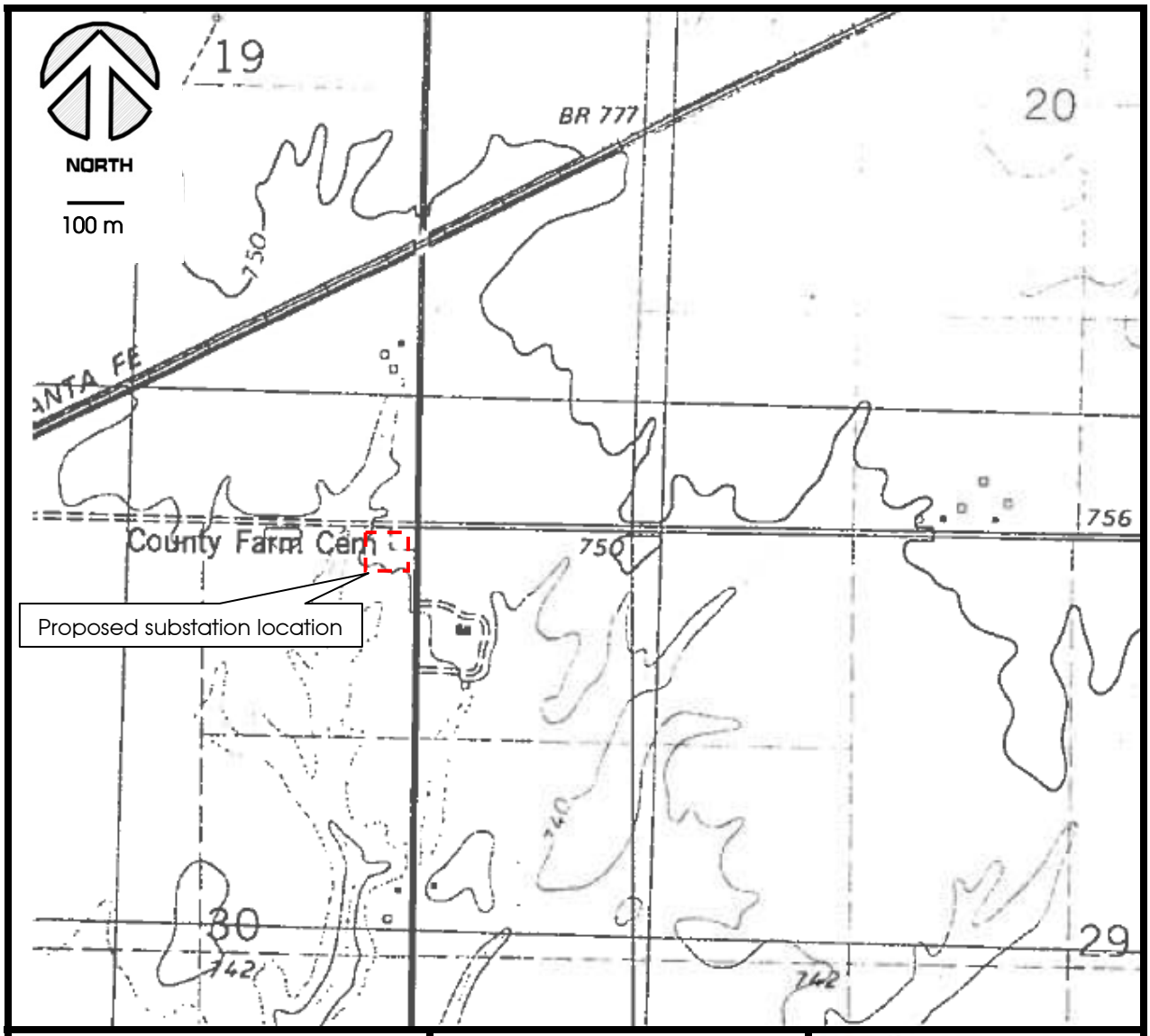


Figure # 9 Portion of 1982 USGS 7.5' Kirkwood East Quadrangle.	Phase I Archaeological Survey # 4846 Monarch Wind Farm Lenox Township, Warren County, Illinois	Edge Consulting Engineers, Inc.

Appendix B

Project Photographs

Photo 1 – Survey Area A looking south.

Photo 2 – Survey Area B looking south.

Site Photographs	Phase I Archaeological Survey # 4846 Monarch Wind Farm Lenox Township, Warren County, Illinois	Edge Consulting Engineers, Inc.

Photo 3 – Warren County Farm Cemetery relocation marker.

Photo 4 – Warren County Farm Cemetery relocation marker facing south.

Photo 5 – Former Warren County Farm Cemetery location facing south.

Photo 6 – Former Warren County Farm Cemetery location facing north.

Site Photographs	Phase I Archaeological Survey # 4846 Monarch Wind Farm Lenox Township, Warren County, Illinois	Edge Consulting Engineers, Inc.

Photo 7 – Survey Area C looking south.

Photo 8 – Survey Area D looking north.

Site Photographs	Phase I Archaeological Survey # 4846 Monarch Wind Farm Lenox Township, Warren County, Illinois	Edge Consulting Engineers, Inc.

Appendix C

Warren County Farm Cemetery Background Documents

Hoover-Hall Memorial Chapel, P.C.

Stephen S. Hall — Directors — Aloysius J. McGuire

900 North Main Street
Monmouth, Illinois 61462-1205
Telephone 309/734-7730
Fax 309/734-7044

200 East Hunt
Alexis, Illinois 61412
Telephone 309/482-6142

To whom it may concern,

During the months of June, July and August, 1991, human remains were disinterred from the Warren County Cemetery located on the Warren County, Illinois, farm at the intersection of U.S. Route 67 and 140th Avenue. This action came about because of the expansion of U.S. Route 67 from a two (2) lane to a four (4) lane highway. The remains were re-interred in Union Cemetery located in rural Warren County, Illinois.

I was a funeral director with Hoover Memorial Chapel at the time and oversaw the operation that was undertaken by the three Warren County funeral homes (Hoover Memorial Chapel, Corman Memorial Home and Turnbull Funeral Home). To the best of our abilities all human remains were removed from the site based on the technology and equipment available at the time. All due diligence was used during the operation but I cannot guarantee that no human remains are not still present at the site.

This letter was prepared on my behalf and the request of Warren County State's Attorney, Albert G. Algren. If you have any questions you may contact me at:

Hoover-Hall Memorial Chapel
900 North Main Street
Monmouth, Illinois 61462
(309) 734-7730.

Sincerely,

Stephen S. Hall
Funeral Director

Sworn to before me this 8th day of June, 2010.

Notary Public

OFFICIAL SEAL
TAMMY L DAVIS
NOTARY PUBLIC, STATE OF ILLINOIS
MY COMMISSION EXPIRES 4-5-2013

Making way for a highway

Register Mail

State to begin exhuming burials in old 'poor farm'

By CAROL CLARK
Staff Writer

MONMOUTH — Years ago, before public aid and welfare, many indigent citizens were shuttled off to county poor farms to spend their remaining days.

Their existence depended on the township where they had lived for monetary support and on the food products raised at the farm.

Warren County had such a poor farm, and across the road from the county farm was the cemetery where many of its residents were buried.

The lives of many of those who lived at the poor farm were filled with hardship, and it is those same men and women who will have to endure hardship even in death — the exhumation and reburial of their remains.

The relocation of those remains is the price to be paid for progress — a four-lane road linking Monmouth and Macomb.

The state will soon begin the monumental task of locating, exhuming and reburying the remains of 40 or so individuals buried in the County Farm Cemetery, commonly called the paupers cemetery, located west of the former Warren County Home.

Most of the burials there were pre-1900, which makes the task "a logistical nightmare," Dan Turner, chief negotiator for land acquisition for the Illinois Department of Transportation, told members of the Warren County Board last week.

Relocating the cemetery is necessary because it lies in the path of a new four-lane roadway. The land where the cemetery is located is owned by Warren County, and at its Dec. 10 meeting, the county board agreed to sell that land and a small portion of land on the east side of the roadway to the state for a right-of-way. In all, the state will buy 9.798 acres of land for $21,100.

The major problem facing the state and local funeral homes who will be doing the work is identifying the grave sites.

"I'd be surprised if there were more than stains in the ground" Richard B. Cridlebaugh, chief appraiser for land acquisition for the IDOT told the county board Dec. 13.

Cridlebaugh said that once the exhumation begins, the local funeral homes will dig down six feet and put whatever is there in a casket for reburial.

History books on Warren County all mention in some detail how the county farm, or the "poor farm" as it was most often called, was formed. But there is little written information on who is buried in that cemetery, and when or where the burials were made.

The most complete information on the cemetery was compiled in 1981 by the Warren County Genealogical Society and it is that information state officials will be using when relocating the remains.

Turner said last week that all the information the state has on the cemetery is from the local genealogical society.

"The county farm, in its earlier time known as the Warren County Alms House, was established to care for and give shelter to those individuals who either had not the ability or were without the resources for maintaining themselves," the genealogical society wrote in a history of the county farm cemetery. "The cemetery was for inmates of the farm who died without the means for burial elsewhere. Most of the burials were prior to 1900."

There is one large monument near the front of the cemetery bearing the names of 20 individual.

The earliest burial on that marker is that of A. Vandermarker who died April 17, 1863. The last burial listed on that marker is A. Johnson who died Jan. 8, 1884.

In the shadow of that monument are two small stones in memory of Oscar Young, 1844-1931 and Jennie Bebee, 1871-1936. Bebee's burial appears to be the last one in the cemetery.

There are 18 other small monuments behind the large marker.

The earliest grave among those markers appears to be J. Peterson who died April 30, 1885, and the latest is that of Ellen Chandler, who died Jan. 27, 1893.

The late Ralph Eckley, a newspaper man and Monmouth historian, said in the October 1988 issue of LifeTimes Magazine, "The history of the county farm goes back 125 years, for at the June term of the county court, in 1853, a petition was presented by Abner C. Harding asking the court to purchase land and to use it for the care of the poor. It was four years later, in June 1857, before the court took the step and bought 120 acres of land in Lenox Township for $3,360.

"A building was presently erected and became available in the fall of 1859. A century ago it housed 27 inmates, 12 males and 15 females. Before the new building became available in 1904, there were 40 inmates. The greatest number of inmates in the old building was 63 and then the 1904 building had as many as 80 as recently as 1922."

The History of Warren County, published in 1903, said, "It was not until the June session of the county court, in 1853, that any definite steps were taken to provide a home for the poor of the county. Prior to that date, Warren County, in common with other counties, let out its poor to the person who could maintain them at the lowest expense to the county."

After the formation of townships, the individual townships farmed out the poor. At the Dec. 10, 1856, meeting of the county board of supervisors, a committee was appointed to purchase a tract of land which would be suitable for the county farm.

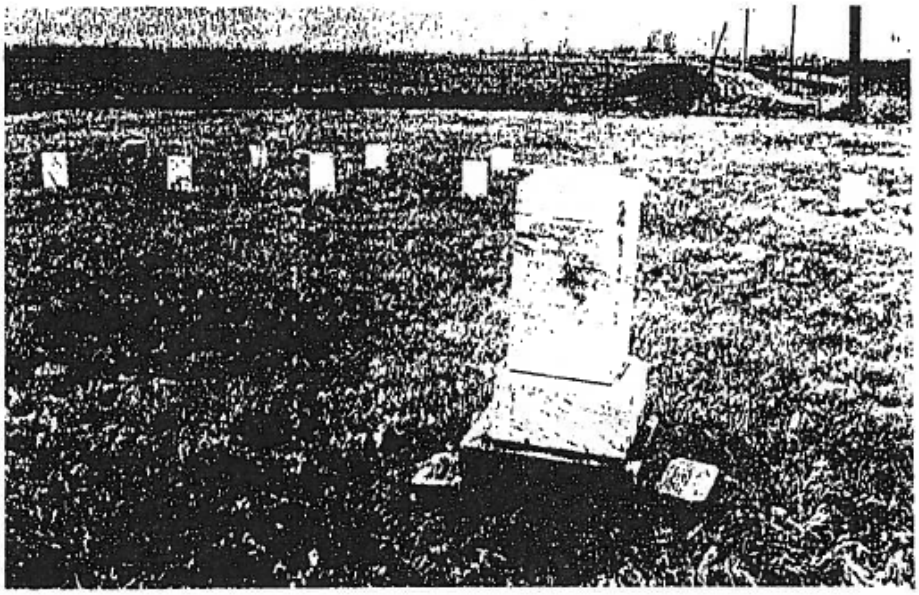
That same month, the committee recommended that 120 acres in Lenox Township, five miles south of Monmouth, be purchased from Luther Dickson for $3,360, or $28 per acre.

The first Warren County Alms House, as it was originally called, opened in the fall of 1858 and cost about $3,000 to build. The second, larger Alms House cost about $50,000. It closed around 1970 and was torn down shortly after.

The home was nearly self-sufficient. The barns included a model dairy barn and feeding floors, an up-to-date poultry house and vegetable cellar.

Milk came from 15 purebred Holstein cows, and 250 hogs and 800 chickens furnished eggs, poultry and pork.

Eckley reported that the county did not pay for the care of the men and women who lived there because the various townships levied a house tax to support those township residents who lived at the county farm. Other income was generated from the rental of the farm, he said.



Register-Mail photo by Carol Clark

County Farm Cemetery

The remains of about 40 individuals buried in the County Farm Cemetery west of the former Warren County Home will be exhumed and relocated to make way for a four-lane road linking Monmouth with Macomb. This large marker, which bears 20 names, dwarfs about 20 smaller stones throughout the paupers cemetery. Residents of the county's "poor farm" are buried in the cemetery.

1991 Galesburg Register Mail article.

Appendix D

Illinois Archaeological Survey Short Report

Project Correspondence

ARCHAEOLOGICAL SURVEY SHORT REPORT
Illinois Historic Preservation Agency
Old State Capital Building
Springfield, Illinois 62701 (217/785-4997)

REVIEWER_____
Date: _____
_____Accepted _____Rejected
IHPA USE ONLY (Form ASSR0886)

IHPA Log # 038021610

Locational Information and Survey Conditions

County: Warren

Quadrangle: Kirkwood East

ProjectType/Title: New Construction, Monarch Wind Farm, East and West sides of U.S. Route 67 between 130th Ave. and 150th Ave.

Funding and/or Permitting Federal/State Agencies: DOE
(i.e., CoE, HUD, IEPA, FmHA, etc.)

Sec: 20, 29 and 30 T.: 10N R.: 2W Natural Division (No.): 7a

U.T.M.: Zone 15, 697986 E, 4522763 N near center of survey areas (Turbine # 10 location)

Project Description: Phase I archaeological reconnaissance survey for a proposed wind farm project on agricultural land approx.. four miles south of Monmouth Illinois

Topography: Uplands

(Soils) Osco silt loam, Muscatine silt loam and Sable silty clay loam

Drainage: Cedar Creek to Spoon River

Land Use/Ground Cover (Include % Visibility): Agriculture/young row crops, 50-90% visibility

Survey Limitations: None

Archaeological and Historical Information

Historic Plats/Atlases/Sources: 1872, 1893, 1912 and 1956 plats and atlases

Previously Reported Sites: None within 1 mile

Previous Surveys: ASSR # 2959, 1158 within 1 mile

Regional Archaeologists Contacted: Mark Branstner

Investigation Techniques: Pedestrian survey at 5 m intervals within 40 m by 40 m areas around wind tubine locations (40 m by 80 m for turbines 7-9), double pedestrian transects at 5 m intervals along access corridors.

Time Expended: 3 person days

Sites/Find Spots Located: None

Cultural Material: N/A

(Curated at) N/A

Collection Techniques: N/A

Area Surveyed (Acres & Square Meters): 17.5 acres/70767 square meters

(OVER)

Results Of Investigation And Recommendations: *(Check One)*

☒ Phase I Archaeological Reconnaissance Has Located No Archaeological Material; Project Clearance Is Recommended.

☐ Phase I Archaeological Reconnaissance Has Located Archaeological Materials; Site(s) Does (Do) Not Meet Requirements For National Register Eligibility; Project Clearance Is Recommended.

☐ Phase I Archaeological Reconnaissance Has Located Archaeological Materials; Site(s) May Meet Requirements for National Register Eligibility; Phase II Testing Is Recommended.

☐ Phase II Archaeological Investigation Has Indicated That Site(s) Does (Do) Not Meet Requirements for National Register Eligibility; Project Clearance Is Recommended.

☐ Phase II Archaeological Investigation Has Indicated That Site(s) Meet Requirements For National Register Eligibility; Formal Report Is Pending And A Determination Of Eligibility Is Recommended.

Comments:

Archaeological Contractor Information:

Archaeological Contractor: Edge Consulting Engineers, Inc.

Address/Phone: 624 Water Street

Prairie du Sac, WI 53578 (608) 644-1449

Surveyor(s): Richard B. Johnson Survey Dates(s): May 25-27, 2010

Report Completed By: Richard B. Johnson Date: 6/17/2010

Submitted By (Signature And Title): Archaeologist

Attachment Check List*: (#1 Through #4 Are **MANDATORY**)*

☒ 1) Relevant Portion Of USGS 7.5' Topographic Quadrangle Map(s) Showing Project Location And Any Recorded Sites;

☒ 2) Project Map(s) Depicting Survey Limits And, When Applicable, Approximate Site Limits, And Concentrations Of Cultural Materials;

☐ 3) Site Form(s): Two Copies Of Each Form;

☒ 4) All Relevant Project Correspondence;

☒ 5) Additional Information Sheets As Necessary.

Address Of Owner/Agent/Agency To Whom SHPO Comment Should Be Mailed:

Edge Consulting Engineers, Inc.

624 Water Street

Prairie du Sac, WI 53578

Contact Person: Ms. Tracy Drunasky , Phone Number: (608) 644-1449

Reviewers Comments:

_____

_____

_____

_____

Illinois Historic
Preservation Agency

FAX (217) 782-8161

1 Old State Capitol Plaza • Springfield, Illinois 62701-1512 • www.illinois-history.gov

Warren County
Larchland
New Construction, Monarch Wind Farm
East and West sides of U.S. Route 67 between 130th Ave. and 150th Ave.
MEAI-03-15-10014
IHPA Log #038021610

March 5, 2010

MACOMB RECEIVED
MAR 09 2010

Chris Firof
McClure Engineering Associates, Inc.
714 E. Jackson
Macomb, IL 61455

Dear Mr. Firof:

Thank you for requesting comments from our office concerning the possible effects of your project on cultural resources. Our comments are required by Section 106 of the National Historic Preservation Act of 1966, as amended, and its implementing regulations, 36 CFR 800: "Protection of Historic Properties".

Our staff has reviewed the specifications of the referenced project as submitted by your office. We cannot adequately review this proposed project until the following additional documentation has been submitted to our Agency:

Architectural survey of project area documenting structures within the viewshed of any proposed turbine, clearly labeled and keyed to a site map.

In your reply, please refer to IHPA Log #038021610. If you have any further questions, please contact me at 217/785-5027.

Sincerely,

Anne E. Haaker

Anne E. Haaker
Deputy State Historic
Preservation Officer

Attachment B-5

Architectural Survey

Edge
Consulting Engineers, Inc.

624 Water Street
Prairie du Sac, WI 53578
608.644.1449 phone
www.edgeconsult.com

Architectural Survey
Monarch Wind Farm Project
Lenox Township, Warren County, Illinois
IHPA Log # 038021610

Prepared for:

Monarch Wind Power LLC
1455 Delbrook Way
Marco Island, Florida 34145-4603

Edge Project Number 4846

June 18, 2010

INTRODUCTION

On From May 24 through June 18, 2010, Mr. Richard Johnson, Archaeologist with Edge Consulting Engineers, Inc. completed an architectural review within the visual Areas of Potential Effects (APE) surrounding the proposed turbine locations of the Monarch Wind Farm (IHPA Log # 038021610). The project will consist of 13 turbines and an electrical substation. The proposed undertaking is located east and west of U.S. Route 67, in portions of Sections 20, 29 and 30, Township 10 North, Range 2 West of the Forth Principle Meridian (Lenox Township) in Warren County, Illinois (Appendix A: Figure 1).

The review included a field survey and a records review of the area within a 0.75 mile (1.2 kilometer) radius collective visual APE from each proposed turbine location. The field survey comprised photographing all buildings older than 50 years of age. These buildings were evaluated for their eligibility for inclusion on the National Register of Historic Places (NRHP). If a building was determined to have potential eligibility, an assessment was made of visual effects on the historic resource by proposed wind turbine positions.

The field survey and records review of the Monarch Wind Farm collective visual APE identified seven buildings older than 50 years in age. Four of these were determined to be ineligible for inclusion on the NRHP because the buildings are not a good example of a particular architectural style and/or because modifications have resulted in a loss of architectural characteristics. The remaining three buildings may be eligible for listing on the NRHP. An examination was made to determine whether any of the proposed wind turbine locations resulted in visual effects on these architectural resources. It was determined that observers of the primary facades of Architectural Resources A1 and A3 would have no view of proposed turbine locations but an observer of the primary facade of Architectural Resource A2 would have a view of Turbine No. 10.

METHODS

A 0.75 mile collective visual APE that included the individual visual APE of each turbine was mapped onto the USGS Kirkwood East 7.5' Quadrangle (Appendix A: Figure 2). Current NRHP, National Historic Landmark and Historic Architectural and Archaeology Resources Geographical Information System (HAARGIS) records were examined to identify any listed buildings in the Monarch Wind Farm collective visual APE. Historical plats were examined to identify the origins of extant buildings. Local histories were searched to reveal any significant events or persons associated with extant buildings.

Using the USGS/APE map, the field survey was conducted along all public roads within the collective visual APE. Photographs of the principle facade and any unique elements of buildings older than 50 years of age and any buildings for which an age determine could not be made were taken from the public right-of-way. Buildings that were obviously modern or buildings that were not accessible from a public right-of-way were not photographed. Photography logs and field notes were taken. Building locations and orientation of the principle facades were plotted on the map.

Photographs and notes were examined to determine if a building might be eligible for inclusion on the NRHP. Building age determinations were made by comparing extant building locations with building locations on historical plats and by examining architectural style and building materials. If it was determined that a building might be eligible, potential visual effects resulting from proposed wind turbine locations were analyzed.

RESULTS

A review of national, state and local documents pertaining to historical buildings in the vicinity of the proposed undertaking did not reveal any extant listed buildings within the collective visual APE of the current undertaking. The HAARGIS database did list one structure within the collective visual APE of the current undertaking. Property Information Report # 303923 describes the residence and hospital building of the Warren County Farm located near the southeast corner of the intersection of 140th Avenue and US Route 67. This building was constructed in 1903 and facility was closed in 1970. The property surrounding the facility was sold and the building was razed and replaced by a factory, now vacant.

Also, the review did not locate any buildings with a potential for NRHP eligibility under Criterion A) association with events that have made a significant contribution to the broad pattern of history or Criterion B) association with the lives of significant persons or Criterion D) have yielded, or may be likely to yield important information in history or prehistory. Evaluation of eligibility for historical buildings identified within the current undertaking focused on Criterion C) buildings that embody the distinctive characteristics of a type, period or method of construction or that represent the work of a master or that possess high artistic value or that represent a significant and distinguishable entity whose components may lack individual distinction.

Integrity of the original design was considered when evaluating a building. A building was not considered NRHP eligible if modifications have altered the design to a point where the building is no longer a good example of its type. The four buildings in this category identified within the collective visual APE of the current undertaking are included in Appendix A as Modified Resources (Appendix B: Photos 7-14).

There has been a great deal of redevelopment on the farmsteads in the region surrounding the proposed wind farm and in the community of Larchland. Many old residences and outbuildings have been razed and replaced by modern buildings or have been left as vacant spaces. All of the outbuildings within the project collective visual APE are either of modern construction or are common types that do not display distinctive characteristics. The three architectural resources within the Monarch Wind Farm collective visual APE that may be eligible for listing on the NRHP are described below.

Architectural Resource A1: This building is a Queen Anne style residence located just east of the northeast corner of 140th Avenue and 60th Street (Appendix B: Photos 1 and 2). A building first appears in this location on the 1872 plat (Appendix A: Figure 4). It is likely that the extant residence dates to at least that period. The residence has been modernized (windows, roof and siding) and a single-story addition has been added to the back (north elevation) of the residence. Much of the original architectural design and some of the exterior decoration still remain including cutaway and overhanging bays and gable detailing. Architectural Resource A1 may be eligible for listing on the NRHP under Criterion C as a relatively unaltered example of a Queen Anne farmhouse.

The primary facade of Architectural Resource A1 fronts 130th Avenue. An observer viewing the primary facade from the public right-of-way would be facing north and have no view of the proposed wind turbine locations (Appendix A: Figure 2).

Architectural Resource A2: This is a single-story brick commercial building on the north side of 130th Avenue in the unincorporated community of Larchland (Appendix B: Photos 3-5). The

building has a new metal roof and new siding on the front gable end but the rest of the building does not appear altered. The front of the building is shaded by a metal shed roof and has an entrance centered on the elevation. There is a large window to the left of the entrance and an overhead garage door to the right. Although the window is boarded, it probably fronts an office area. There is a mechanics bay behind the garage door. Windows in the north half of the building have arched white brick lintels and sills. The large front window is trimmed in white brick. A small brick chimney extends from the roof ridge near the north end of the building. The north end of the building has a hipped roof. A small brick structure with shed roof behind the larger building may be a privy.

Plats do not depict individual buildings within Larchland but a local history describes a gas station operated in the early 1930s in which the operator lived in the north part of the building (Warren County Genealogical Society 2003). The description in the local history fits with the characteristics of Architectural Resource A2 with the office and mechanics bay fronting 130th Avenue representing the commercial enterprise and the windowed north portion with chimney and possible privy representing the living quarters. Architectural Resource A2 may be eligible for listing on the NRHP under Criterion C as a local example of a historic commercial building.

The primary facade of Architectural Resource A2 fronts 130th Avenue. An observer viewing the primary facade from the public right-of-way would be facing north. To the observer, the proposed location of Turbine No. 10 would be a couple degrees east of north at a distance of 0.9 miles. The observer would have a view of the proposed wind turbine location (Appendix A: Figure 3).

Architectural Resource A3: This building is a vernacular cross-gabled residence located on the west side of US Highway 67 between 140th Avenue and the BNSF railroad (Appendix B: Photo 6). A building first appears in this location on the 1893 plat (Appendix A: Figure 5). There is no building depicted in the location on the 1872 plat indicating that the extant residence was constructed between those two dates. Although there have been some modernizations to the building (windows, roof), the residence retains most of its original design including flared eaves and a wrap-around porch. Architectural Resource A3 may be eligible for listing on the NRHP under Criterion C as a relatively unaltered example of a vernacular farmhouse.

The primary facade of Architectural Resource A3 fronts US Highway 67. An observer viewing the primary facade from the public right-of-way would be facing west and have no view of the proposed wind turbine locations (Appendix A: Figure 3).

RECOMMENDATIONS

In May and June, 2010, Edge Consulting Engineers, Inc. completed an architectural review within the visual Areas of Potential Effects (APE) surrounding the proposed turbine locations of the Monarch Wind Farm located east and west of U.S. Route 67, in portions of Sections 20, 29 and 30, Township 10 North, Range 2 West of the Forth Principle Meridian (Lenox Township) in Warren County, Illinois

A field survey and records review of the Monarch Wind Farm 0.75 mile (1.2 kilometer) collective visual APE identified seven buildings older than 50 years in age. Four of these were determined to be ineligible for inclusion on the NRHP because the buildings are not a good example of a particular architectural style and/or because modifications have resulted in a loss of architectural characteristics. The remaining three buildings may be eligible for listing on the NRHP.

An evaluation of potential visual effects the proposed wind turbine might have on these architectural resources determined that an observer on the public right-of-way viewing the primary facades of Architectural Resources A1 and A3 would have no view of proposed turbine locations. An observer on the public right-of-way viewing the primary facade of Architectural Resource A2 would have a view of proposed Turbine No. 10 at a distance of 0.9 miles. It is recommended that the location of Monarch Wind Farm Turbine No. 10 will have a visual effect on Architectural Resource A2. No other effects associated with the proposed Monarch Wind Farm were identified.

REFERENCES CITED

Illinois Architectural and Archaeological Resources Geographic Information System (HAARGIS)
2010 Viewed online at http://gis.hpa.state.il.us/hargis on June 14, 2010.

McAlester, Virginia and Lee McAlester
1984 *A Field Guide to American Houses*. Alfred A. Knopf, Inc., New York

National Park Service
2010 National Historic Landmark Program (NHLP). Viewed online at http://tps.cr.nps.gov/nhl/default.cfm on June 14, 2010.
2010 National Register of Historic Places (NRHP). Viewed online at http://nrhp.focus.nps.gov/natreghome.do on June 14, 2010.

United States Geologic Survey
1998 7.5' Kirkwood East, Illinois Quadrangle.
1998 7.5' Berwick, Illinois Quadrangle.

Warren County Genealogical Society
2003 *Warren County, Illinois; History and Families*. Turner Publishing Company. Paducah, Kentucky

Appendix A

Project Maps and Plats

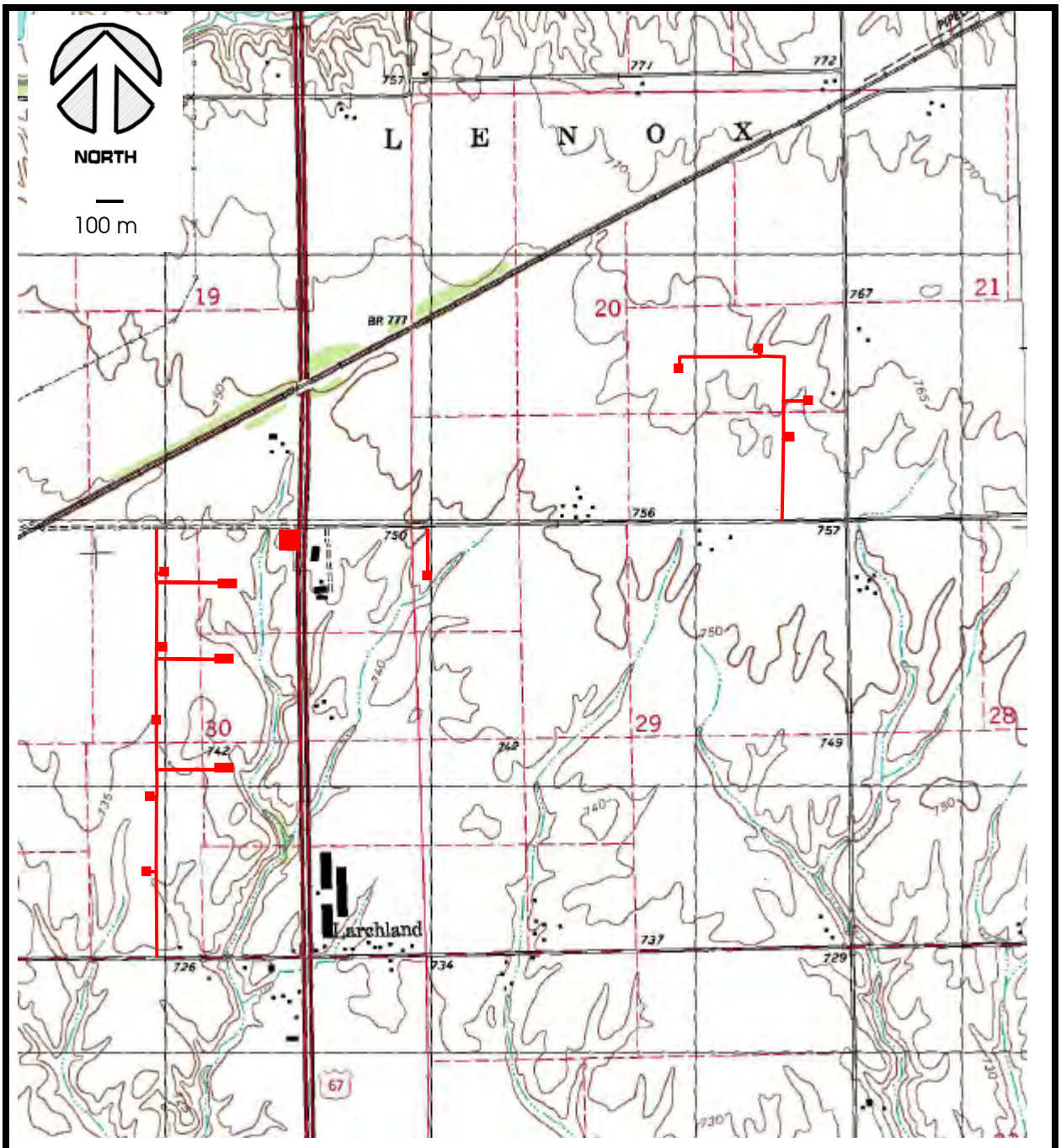


Figure #1 Portion of 1998 USGS 7.5' Kirkwood East Quadrangle showing the project location.	# 4846 Monarch Wind Farm Lenox Township, Warren County, Illinois	Edge Consulting Engineers, Inc.

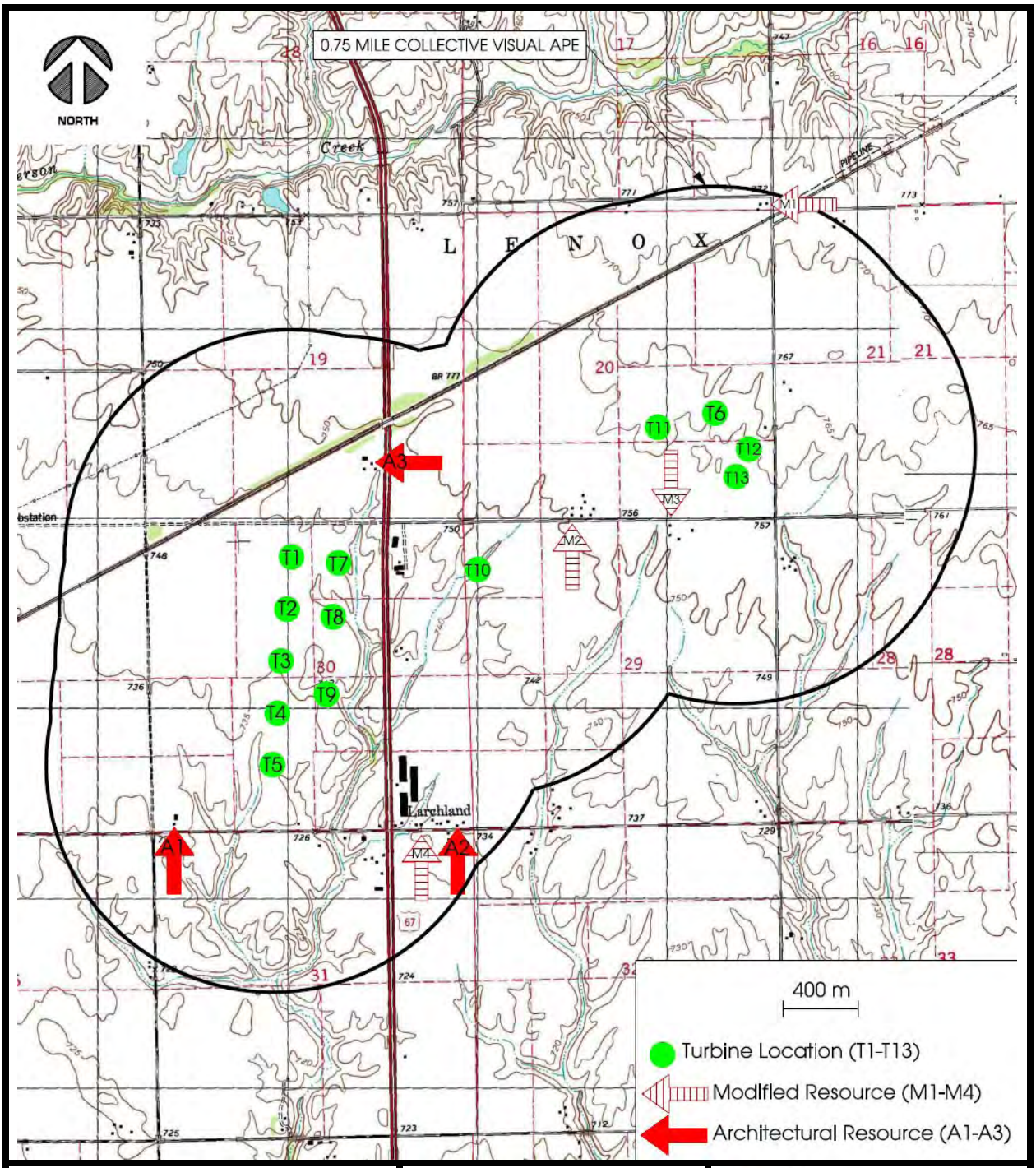


Figure #2
Portions of Kirkwood East & Berwick 7.5' Quadrangles showing the collective visual APE, turbine locations and resource view direction.

4846 Monarch Wind Farm Lenox Township, Warren County, Illinois

Edge
Consulting Engineers, Inc.

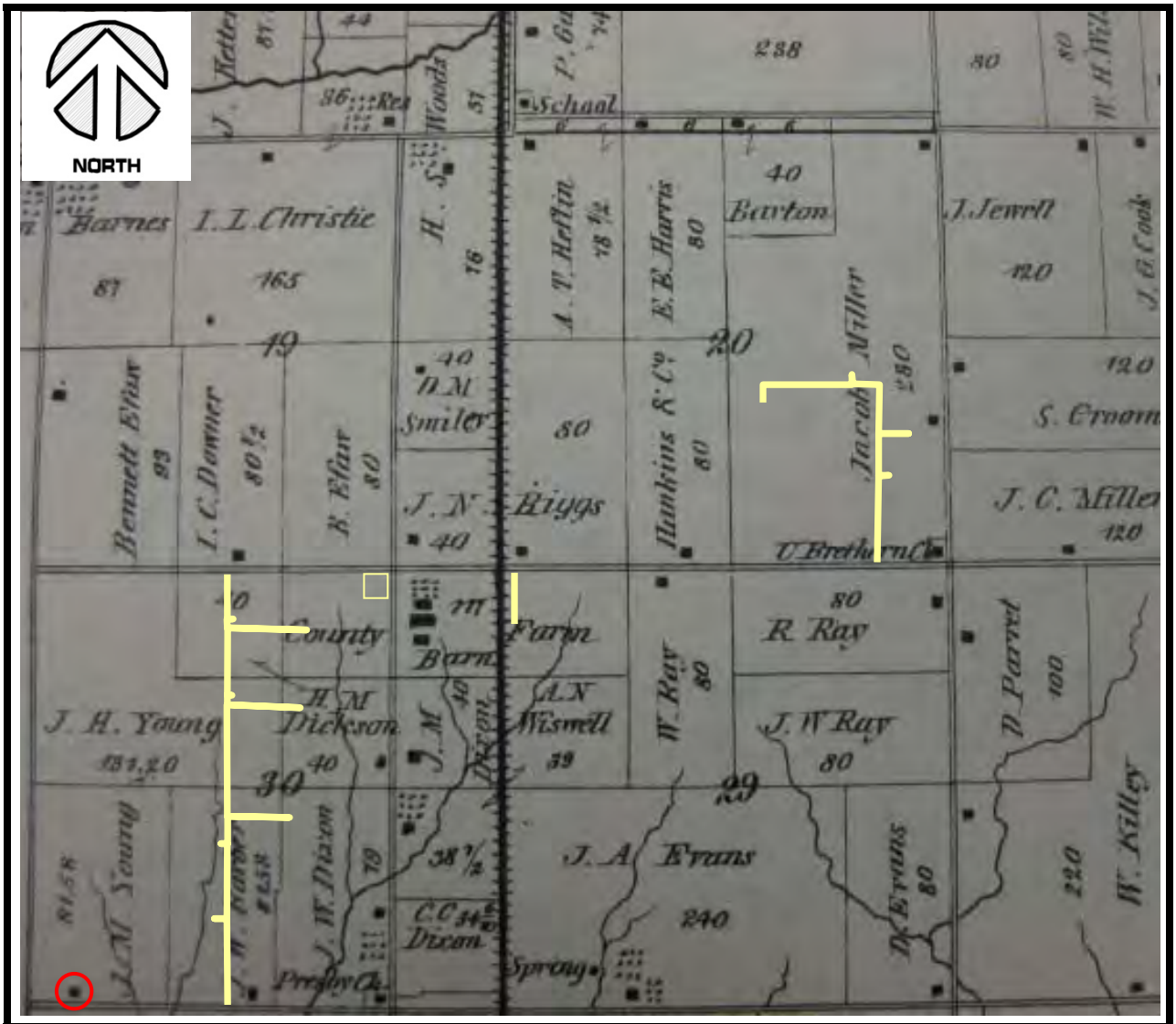


Figure # 3
Portion of 1872 plat of Lenox Township showing the project location and Architectural Resource A1 (red circle).

4846 Monarch Wind Farm
Lenox Township,
Warren County, Illinois

Edge
Consulting Engineers, Inc.

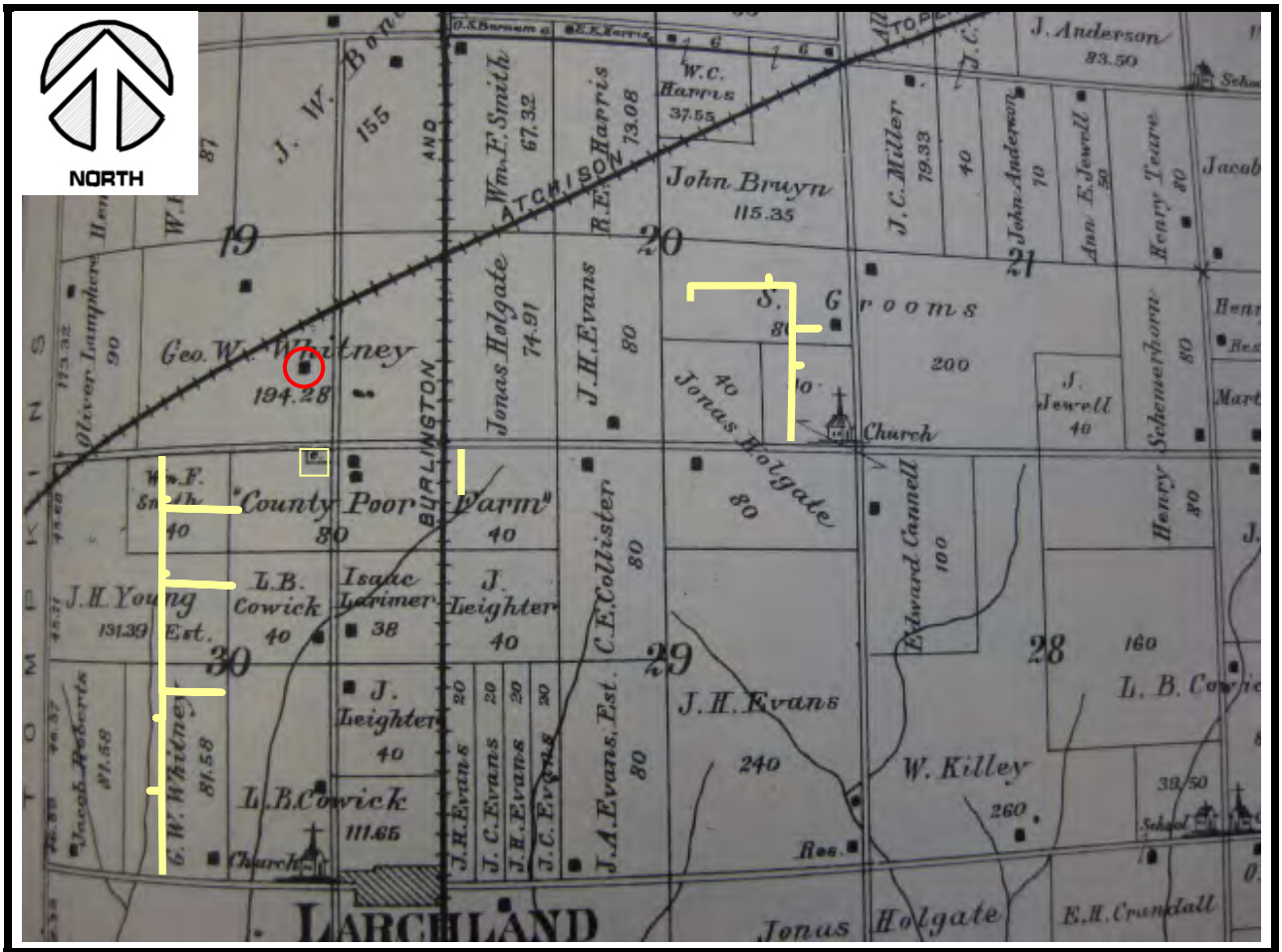


Figure # 4
Portion of 1893 plat of Lenox Township showing the project location and Architectural Resource A3 (red circle).

4846 Monarch Wind Farm
Lenox Township,
Warren County, Illinois

Edge
Consulting Engineers, Inc.

Appendix B

Project Photographs

Photo 1 – Architectural Resource A1, south elevation.

Photo 2 – Architectural Resource A1, west elevation.

Site Photographs	# 4846 Monarch Wind Farm Lenox Township, Warren County, Illinois	Edge Consulting Engineers, Inc.

Photo 3 – Architectural Resource A2, south elevation.

Photo 4 – Architectural Resource A2, west elevation.

Site Photographs	# 4846 Monarch Wind Farm Lenox Township, Warren County, Illinois	Edge Consulting Engineers, Inc.

Photo 5 – Architectural Resource A2, east elevation.

Photo 6 – Architectural Resource A3, east elevation.

Site Photographs	# 4846 Monarch Wind Farm Lenox Township, Warren County, Illinois	Edge Consulting Engineers, Inc.

Photo 7 – Modified Resource M1, east elevation.

Photo 8 – Modified Resource M1, north elevation.

Site Photographs	# 4846 Monarch Wind Farm Lenox Township, Warren County, Illinois	Edge Consulting Engineers, Inc.

Photo 9 – Modified Resource M2, south elevation.

Photo 10 – Modified Resource M2, east elevation.

Site Photographs	# 4846 Monarch Wind Farm Lenox Township, Warren County, Illinois	Edge Consulting Engineers, Inc.

Photo 11 – Modified Resource M3, north elevation.

Photo 12 – Modified Resource M3, east elevation.

Site Photographs	# 4846 Monarch Wind Farm Lenox Township, Warren County, Illinois	Edge Consulting Engineers, Inc.

Photo 13 – Modified Resource M4, south elevation.

Photo 14 – Modified Resource M4, east and south elevations.

Site Photographs	# 4846 Monarch Wind Farm Lenox Township, Warren County, Illinois	Edge Consulting Engineers, Inc.

Attachment B-6

Wildlife Report

Wildlife Study – Monarch Wind Farm Proposal, Warren County, IL

Kenneth L. Cramer, Ph.D.

Modified, 13 February 2010

This study was commissioned by Clean Energy Concepts to assess the potential for the proposed Monarch Wind Farm in Warren Co., IL to impact wildlife populations, and specifically to comply with state and federal regulations regarding threatened and endangered species and habitats.

1) EcoCAT analysis

The project description and area covered was submitted to the on-line service EcoCAT of the Illinois Department of Natural Resources. The automatically generated report (attached) indicated no state-listed threatened or endangered species and no Illinois Nature Preserves or registered Land and Water Reserves in the vicinity of the project location.

Further consultation via e-mail with Keith Shank of the Illinois DNR indicates that migratory birds and bats are the principal concern with the project proposal as with most wind power projects. He also mentioned the nearby prairie remnant that was originally established for a relict population of Massasauga rattlesnakes. These wildlife populations will be addressed below in section 3 on potential wildlife impacts.

2) Site inspection

I drove the area to confirm the habitat types within the study area as identified on aerial and topographic maps, to be sure that no unique or potential valuable habitats were overlooked. More than 95% of the area is developed agricultural land predominantly planted in row crops of corn and soybean with the remainder in small areas (less than 5 ha contiguous) of pasture and small drainages. The entire area of the proposed study is highly modified by human use, principally agricultural.

3) Potential for Wildlife Impacts

a) <u>Threatened and Endangered species</u>

<u>Non-flying species</u> – *Terrestrial wildlife* impact will be minimal. Wildlife remaining in this highly developed agricultural area is highly adapted to human impact and rare species have been extirpated. Row crops do not provide adequate habitat for threatened or endangered species. There is a 6.2 acre Massasauga Prairie Nature Preserve approximately 2 miles southeast of the southeastern corner of the study area which at one time held a relict population of Eastern Massasauga rattlesnakes (*Sistrurus catenatus*). The current status of this endangered species in the area is unknown but they have probably been extirpated. In any case, only building of access roads through prairie habitat would potentially impact this endangered reptile, and given the final proposed locations of the turbines, the closest access road would occur more than 2.5 miles in a direct line from the nature preserve. Thus, there would be no direct impact on this species should it still occur at the site. Since there are no significant wetland areas within the proposed project area, impacts on *aquatic species* will also be negligible. As with any construction project, care should be taken in the design and construction of access roads and turbine tower pads to minimize erosion and runoff into nearby waterways.

Flying species

Residents. There is a remote possibility that some endangered species of grassland ground-nesting birds could nest in the area on pasture or Conservation Reserve Program (CRP) lands. Four species of concern that have been recorded in Illinois and that prefer grassland habitats include Henslow's sparrow (*Ammodramus henslowii*), upland sandpiper (*Bartramia longicauda*), northern harrier (*Circus cyaneus*), and short-eared owls (*Asio flammeus*) (Herkert 1992). However, nearly all of these species except the upland sandpiper require areas of pasture or grassland greater than 50 ha in size for breeding and no fragments approaching this size exist within the project area. If construction of access roads and turbines will intersect large areas of pasture or CRP lands, a breeding bird survey is recommended in these areas to check for these species. Should any be identified, delaying construction in these areas to outside of the breeding season would mitigate impacts. Alternatively, moving access roads or the turbine site to avoid these areas is preferable. Another nesting species of potential concern is the loggerhead shrike (*Lanius ludovicianus*), a species that nests in hedgerows, primarily with Osage orange, multiflora rose, or other spiny or thorny plants. The potential for impact here is even less than with the grassland birds, assuming that fence lines will not be disrupted during construction.

Migrants. Red-shouldered hawks (*Buteo lineatus*) and Swainson's hawks (*Buteo swainsoni*) are the only threatened or endangered raptors potentially migrating through the area, though they are generally associated with forested areas in the eastern part of the state. Whooping cranes (*Grus americana*) from a breeding population established in Wisconsin have been observed at a various localities in Illinois during the fall and spring migrations, but none have occurred in Warren county where wetlands used as migration stopovers are rare. More will be addressed below on the threat to migrating birds in general. Gray bats (*Myotis grisescens*) use caverns in west-central Illinois during late summer early fall as staging areas for migration to over-wintering caves in Missouri (Herkert 1992). Indiana bats (*Myotis sodalis*) are primarily associated with riparian habitat, but migrating to and from winter cave sites could expose them to mortality at the proposed site. However, it is important to note that although hundreds of bat mortalities have been documented at wind farms, no documented mortalities of protected bats have ever been recorded (Kunz et al. 1997).

b) Potential for Bird and Bat Mortality

The impact of wind turbines on birds and bats is the most significant area for potential concern. Any structure rising significantly above the landscape has the potential to cause bird/bat mortality as has been shown in previous studies of television towers, communication towers and tall buildings (Avery and Clement 1972, Crawford and Baker 1981, Hazard 1982, Timm 1989). Because of the high speed of turbine blades (greater than 200 km/h at the tip), however, the potential for evasion by both bats and birds is reduced compared to stationary towers and buildings (Barclay et al. 2007, Horn et al. 2008). Most of the mortality at wind power sites has involved migrating bats and birds, not resident species (Johnson et al. 2002, Johnson et al. 2004)

Birds. Although much concern was raised about large rates of bird mortality from one early project in California that killed large numbers of raptors (Orloff and Flannery 1992), newer monopole construction and careful location of towers away from daily migratory routes has shown this to be an anomaly. Bird mortality at wind turbine installations varies from 0 to 11 birds/MW/year with the highest mortality occurring at forested ridgetop sites (Kunz et al. 2007a). Songbirds (passerines) are most

commonly killed. At a site in Minnesota in habitat similar to that at the proposed project (Johnson et al. 2002), the majority of bird mortalities were passerines. Over 70% were migrants and the remainder were breeding birds (20%) or permanent residents (9%). Only one raptor (large predatory birds such as hawks, eagles, owls) was killed during the 3-year study period. Radar data indicated that over 3.5 million birds migrate over the area each year. Birds generally migrate at heights much above the level of even new, taller turbines. Inclement weather can sometimes drive birds lower so that often much of the kill at turbine sites can be from a single, rare event. At the Minnesota site, 25% of the observed mortality occurred in a single night during a severe thunderstorm that killed 14 birds (Johnson et al. 2002). More than 90% of the mortality was attributed to inclement weather such as fog, gusty winds, or thunderstorms. Another study at the same area estimated avian mortality at <1 bird/turbine/year (Osborn et al. 2000).

The proposed Monarch wind facility lies within the Mississippi migratory flyway and as such has the potential to intercept migrants during inclement weather or when birds are landing or taking off (Kunz et al. 2007a). However, because the sites are not located near any significant habitat such as ponds, lakes or large forested tracts that would be sought by resting migrants, the potential for collision with turbines while ascending or descending is probably very low. Most migratory birds would fly over the predominantly agricultural habitat. Thus, inclement weather forcing birds to migrate at lower altitudes would carry the most potential for causing mortality.

Bats. Although studies of bird and bat mortality at wind facilities is in its infancy, there is a growing literature on the subject that has been recently summarized by Arnett et al.. (2008) and Kunz et al.. (2007a, 2007b). While early studies focused on avian mortality, recent studies have shown that bats are more at risk than birds at most wind turbine installations. Bat mortality varies from 15 to 41 bats/MW/ year depending on the habitat type and time of year (Kunz et al.. 2007a). The highest mortality was recorded at a mountain top installation in a forested area where 0.24 bats per *night* per turbine were found dead, or about 90 bats/year/turbine (Kerns et al. 2005).

Three species of lasiurine bats (hoary bat, *Lasiurus cinereus*; red bat, *Lasiurus borealis*; and silver-haired bat, *Lasionycteris noctivagans*) comprise the bulk of mortality at wind turbine sites (Kunz et al. 2007b). It is unknown why this specific group is more vulnerable but multiple studies have shown that these migratory, tree-roosting bats are much more likely to be killed (Johnson et al. 2003, 2004). At a Minnesota wind farm, 76% of bats killed were hoary bats; 90% were hoary or red bats (genus *Lasiurus*). However, other bat species are affected. For instance, Arnett et al. (2008) note that at one Iowa site, 25% of bat mortality was comprised of big brown bats (*Eptesicus fuscus*). In general, bat activity is lower over crop and CRP land (Johnson et al. 2004) and shows no relationship to distance of turbines from nearby woodlots. Mortality rates were about 1-3 bats/turbine/year. Reynolds (2006) reported that most foraging bat activity is below the height of turbine towers (but see Horn et al. 2008 below). His study reinforces the supposition that migrating bats are most at risk.

Cryan and Brown (2007) offer clues to conditions under which migrating bats may be more vulnerable in their study of hoary bat migration past an island stopover point on their migration route in California. Numbers of migrating bats increased with increasing cloud cover and decreasing wind speeds and moonlight. Migration peaked in autumn, a fact that corresponds with information on bat mortality data from wind turbine installations that also peaks in the late summer and early fall (Johnson et al. 2004; Kunz et al. 2007a). Reynolds (2006) also noted that spring bat migration was higher on days with lower wind speeds and warmer weather.

Barclay et al. (2007) showed that at turbine tower heights above 65 meters bat mortality increased exponentially. The diameter of the rotor had no effect on mortality rates. Horn et al. (2008)

used thermal imaging to conclude that bats foraged between 20 and 111m of the ground but were concentrated in the rotor-swept zone (nacelle at 70 m). Two-thirds of the bats observed foraging near the towers entered the rotor-swept zone and some individual bats had repeated near misses with the blade suggesting they were perhaps returning to investigate the blade, possibly attracted by the sound. Lighting on towers had no effect on bat activity or mortality. No bats struck a stationary blade, the nacelle or the monopole, but bats investigated all aspects of the turbine towers even alighting briefly on the monopole and stationary blades. Horn et al. (2008) suggest that bats were sometimes trapped in the vortices of the blade as they flew nearby and determined that *slower* rotor speeds increased mortality rates, a fact confirmed by other studies (Arnett et al. 2008, Kunz et al. 2007b).

In sum, most bat mortality occurs among tree-roosting lasiurine species during migration. However, foraging bats are also at risk, particularly in forested areas on mountain ridges. Both birds and bats are most vulnerable during periods of bad weather during migration; resident species are at lower risk but foraging bats do fly in the rotor-swept zone and are most threatened by towers over 65 m in height. The proposed project is in a grassland/agricultural habitat type that has generally shown the lowest risk to bats and birds compared to other sites, but the proposed height of the towers (80 m) does indicate bats in the area will be susceptible to collisions. Bats not currently considered endangered are declining (e.g. red bats) and even apparently minor mortality rates can have significant impacts on these slowly reproducing animals which normally produce only 1-2 offspring per female per year. In addition, because of the potential occurrence of several endangered species of birds and bats in the project area, pre-construction surveys should be conducted as well as post-construction monitoring for several years to adequately assess and minimize risk to endangered birds and bats.

4) Long-term Bird and Bat Mortality Monitoring Plan

Sampling methods for accurately determining levels of bird and bat mortality at wind turbine sites are now fairly well-established after more than a decade of experience at various facilities. Smallwood (2007) has summarized the best practices and suggested methodology for monitoring studies and we suggest following his prescriptions with some modifications based on the location of the study site.

The two most significant variables affecting estimates of mortality from wind turbines are searcher bias (the ability of searchers to find dead birds and bats) and scavenger removal rates (Smallwood 2007). In his survey of 24 earlier studies he found that 12 estimates were biased low and only 3 high, largely because of inaccurate assumptions of searcher efficiency and scavenger removal. We will use the formula $M_A = M_U/Rp$ where M_U is the unadjusted mortality (number of birds/bats found) expressed preferably as number/MW/year for consistency across studies; R is the proportion of fatalities remaining since the last carcass search; and p is the proportion of carcasses found by searchers during detection trials.

Bats persist from 2-12 days after mortality (Arnett et al. 2008) but an average of 10 days in an area similar to the proposed site (Johnson et al. 2003). Birds can persist up to 23 days but are more likely to be removed completely by large scavengers than bats, which are most frequently scavenged by insects than larger animals (Johnson set al. 2003). The more often an area is searched, the less loss is due to scavenger removal and therefore the potential of underestimating mortality is lowered.

Searcher efficiency ranges from 25-75% and is highest in more open habitats (Arnett et al. 2008). However, short vegetation such as pasture or grassland is often more dense and actually reduces

searcher efficiency (Smallwood 2007). Not surprisingly, larger birds are found more easily than smaller birds and bats in all studies. The longer scavenger removal trials are run, the lower the scavenger removal rates appear to be, probably because of "swamping" with large numbers of dead birds/bats placed in the field initially. After a few days, those not initially removed by a scavenger (swamped by an abundance of carcasses) will decrease in quality and never be removed by scavengers. Such long trials with large numbers of carcasses will thus bias mortality estimates lower than reality, so shorter trials are recommended. Finally, searcher efficiency must be determined for each wind turbine installation and at various times during the year.

To reduce the variability introduced by the various factors mentioned above and increase the reliability of our mortality estimates, I propose the following protocol:

a) *Scavenger removal rates*. I suggest three studies in spring, summer, and fall as vegetation height at these times in agricultural areas is highly variable and will influence rates of removal by scavengers (as well as searcher detection). To minimize scavenger swamping, I recommend placing no more than 5 bird and 5 bat carcasses per turbine per trial. The trials will last for two weeks.

b) *Searcher detection rates*. Likewise, searcher detection trials should be run three times during the year, but not simultaneously with scavenger removal trials. To accurately mimic conditions searchers are likely to encounter, I recommend placing no more than 3 birds or bats per turbine. Species likely to be encountered during the study and also with injuries or fragmentation should be randomly placed for searcher trials (Smallwood 2007).

c) *Estimation of mortality*. Searching for carcasses beneath turbines after calculating appropriate R and p values above should be done within a 30 m radius of each turbine, creating a square 60 x 60 m plot. Plots will be searched every five to seven days from May through October by walking 10 transects and visually searching 3 meters to each side of the transect. A typical plot could be searched in 45-60 minutes, requiring one full person/day of field work per week for each search at the eight proposed turbines. From these data, estimated mortality rates for birds and bats can be calculated after Smallwood (2007) using the formula above.

5) Recommendations

I recommend two primary actions for wildlife mitigation. First, a pre-construction survey for breeding birds should be conducted. A survey in June lasting two weeks should be able to identify if any endangered or threatened species are nesting in the area, a prospect that is unlikely but that should be checked. Since 1) no endangered bats have been recorded in Warren County, 2) the intensively farmed area to be used has few, if any roosting sites, and 3) endangered bats have never been recorded killed by a wind turbine (tree-roosting lasiurine species seem to be most susceptible), a survey for bats in the project area is unwarranted.

Second, post-construction monitoring of bird and bat mortality at turbines should be conducted as described above in section 4, accurately accounting for scavenger removal rates and searcher detection rates to obtain reliable estimates of mortality.

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Monarch Wind Power
Attn: Robert Gay 4 June 2010

Dear Sir or Madam:

I am writing to convey my modification of my recommendations for a breeding bird survey on the sites of the turbines being planned south of Monmouth, IL by your company. I drove through the area on June 1, 2010, with the updated map of final turbine pad and access road locations and see no need to pursue a breeding bird survey as I originally suggested. The area I was concerned with in my initial report is to the southeast of the specific localities you are actually using. This area has some forested riparian zones and open grasslands that could potentially harbor rare or threatened species. The current map of final turbine locations indicates there will be no construction of roads or pads in this area, and that construction will impact only agricultural fields with no substantial wetland or grassland habitat for some of the rare species that might be encountered. Thus, a breeding bird survey is not necessary.

Sincerely,

Kenneth L. Cramer, Ph.D.
Dept. of Biology
Monmouth College
700 E. Broadway
Monmouth, IL 61462

Appendix C: Agency Coordination and Approvals

Attachment C-1

Federal Aviation Administration

Federal Aviation Administration
Air Traffic Airspace Branch, ASW-520
2601 Meacham Blvd.
Fort Worth, TX 76137-0520

Aeronautical Study No.
2010-WTE-11799-OE

Issued Date: 09/20/2010

Robert Gay
Monarch Wind Power
96 Mendota Ave
Rye, NY 10580

**** DETERMINATION OF NO HAZARD TO AIR NAVIGATION ****

The Federal Aviation Administration has conducted an aeronautical study under the provisions of 49 U.S.C., Section 44718 and if applicable Title 14 of the Code of Federal Regulations, part 77, concerning:

Structure:	Wind Turbine Monmouth1
Location:	Kirkwood, IL
Latitude:	40-49-57.29N NAD 83
Longitude:	90-39-36.30W
Heights:	463 feet above ground level (AGL) 1202 feet above mean sea level (AMSL)

This aeronautical study revealed that the structure does not exceed obstruction standards and would not be a hazard to air navigation provided the following condition(s), if any, is(are) met:

As a condition to this Determination, the structure is marked and/or lighted in accordance with FAA Advisory circular 70/7460-1 K Change 2, Obstruction Marking and Lighting, white paint/synchronized red lights - Chapters 4,12&13(Turbines).

It is required that FAA Form 7460-2, Notice of Actual Construction or Alteration, be completed and returned to this office any time the project is abandoned or:

_____ At least 10 days prior to start of construction (7460-2, Part I)
__X__ Within 5 days after the construction reaches its greatest height (7460-2, Part II)

This determination expires on 09/20/2012 unless:

(a) extended, revised or terminated by the issuing office.
(b) the construction is subject to the licensing authority of the Federal Communications Commission (FCC) and an application for a construction permit has been filed, as required by the FCC, within 6 months of the date of this determination. In such case, the determination expires on the date prescribed by the FCC for completion of construction, or the date the FCC denies the application.

NOTE: REQUEST FOR EXTENSION OF THE EFFECTIVE PERIOD OF THIS DETERMINATION MUST BE E-FILED AT LEAST 15 DAYS PRIOR TO THE EXPIRATION DATE. AFTER RE-EVALUATION OF CURRENT OPERATIONS IN THE AREA OF THE STRUCTURE TO DETERMINE THAT NO

SIGNIFICANT AERONAUTICAL CHANGES HAVE OCCURRED, YOUR DETERMINATION MAY BE ELIGIBLE FOR ONE EXTENSION OF THE EFFECTIVE PERIOD.

Additional wind turbines or met towers proposed in the future may cause a cumulative effect on the national airspace system. This determination is based, in part, on the foregoing description which includes specific coordinates and heights . Any changes in coordinates will void this determination. Any future construction or alteration requires separate notice to the FAA.

This determination does include temporary construction equipment such as cranes, derricks, etc., which may be used during actual construction of the structure. However, this equipment shall not exceed the overall heights as indicated above. Equipment which has a height greater than the studied structure requires separate notice to the FAA.

This determination concerns the effect of this structure on the safe and efficient use of navigable airspace by aircraft and does not relieve the sponsor of compliance responsibilities relating to any law, ordinance, or regulation of any Federal, State, or local government body.

If we can be of further assistance, please contact our office at (404) 305-7081. On any future correspondence concerning this matter, please refer to Aeronautical Study Number 2010-WTE-11799-OE.

Signature Control No: 129659857-131078342 (DNE -WT)
Michael Blaich
Specialist

Federal Aviation Administration
Air Traffic Airspace Branch, ASW-520
2601 Meacham Blvd.
Fort Worth, TX 76137-0520

Aeronautical Study No.
2010-WTE-11800-OE

Issued Date: 09/20/2010

Robert Gay
Monarch Wind Power
96 Mendota Ave
Rye, NY 10580

**** DETERMINATION OF NO HAZARD TO AIR NAVIGATION ****

The Federal Aviation Administration has conducted an aeronautical study under the provisions of 49 U.S.C., Section 44718 and if applicable Title 14 of the Code of Federal Regulations, part 77, concerning:

Structure:	Wind Turbine Monmouth2
Location:	Kirkwood, IL
Latitude:	40-49-48.18N NAD 83
Longitude:	90-39-51.38W
Heights:	463 feet above ground level (AGL) 1201 feet above mean sea level (AMSL)

This aeronautical study revealed that the structure does not exceed obstruction standards and would not be a hazard to air navigation provided the following condition(s), if any, is(are) met:

As a condition to this Determination, the structure is marked and/or lighted in accordance with FAA Advisory circular 70/7460-1 K Change 2, Obstruction Marking and Lighting, white paint/synchronized red lights - Chapters 4,12&13(Turbines).

It is required that FAA Form 7460-2, Notice of Actual Construction or Alteration, be completed and returned to this office any time the project is abandoned or:

_____ At least 10 days prior to start of construction (7460-2, Part I)
__X__ Within 5 days after the construction reaches its greatest height (7460-2, Part II)

This determination expires on 09/20/2012 unless:

(a) extended, revised or terminated by the issuing office.
(b) the construction is subject to the licensing authority of the Federal Communications Commission (FCC) and an application for a construction permit has been filed, as required by the FCC, within 6 months of the date of this determination. In such case, the determination expires on the date prescribed by the FCC for completion of construction, or the date the FCC denies the application.

NOTE: REQUEST FOR EXTENSION OF THE EFFECTIVE PERIOD OF THIS DETERMINATION MUST BE E-FILED AT LEAST 15 DAYS PRIOR TO THE EXPIRATION DATE. AFTER RE-EVALUATION OF CURRENT OPERATIONS IN THE AREA OF THE STRUCTURE TO DETERMINE THAT NO

SIGNIFICANT AERONAUTICAL CHANGES HAVE OCCURRED, YOUR DETERMINATION MAY BE ELIGIBLE FOR ONE EXTENSION OF THE EFFECTIVE PERIOD.

Additional wind turbines or met towers proposed in the future may cause a cumulative effect on the national airspace system. This determination is based, in part, on the foregoing description which includes specific coordinates and heights . Any changes in coordinates will void this determination. Any future construction or alteration requires separate notice to the FAA.

This determination does include temporary construction equipment such as cranes, derricks, etc., which may be used during actual construction of the structure. However, this equipment shall not exceed the overall heights as indicated above. Equipment which has a height greater than the studied structure requires separate notice to the FAA.

This determination concerns the effect of this structure on the safe and efficient use of navigable airspace by aircraft and does not relieve the sponsor of compliance responsibilities relating to any law, ordinance, or regulation of any Federal, State, or local government body.

If we can be of further assistance, please contact our office at (404) 305-7081. On any future correspondence concerning this matter, please refer to Aeronautical Study Number 2010-WTE-11800-OE.

Signature Control No: 129659898-131078345 (DNE -WT)
Michael Blaich
Specialist

Federal Aviation Administration
Air Traffic Airspace Branch, ASW-520
2601 Meacham Blvd.
Fort Worth, TX 76137-0520

Aeronautical Study No.
2010-WTE-11801-OE

Issued Date: 09/20/2010

Robert Gay
Monarch Wind Power
96 Mendota Ave
Rye, NY 10580

**** DETERMINATION OF NO HAZARD TO AIR NAVIGATION ****

The Federal Aviation Administration has conducted an aeronautical study under the provisions of 49 U.S.C., Section 44718 and if applicable Title 14 of the Code of Federal Regulations, part 77, concerning:

Structure:	Wind Turbine Monmouth3
Location:	Kirkwood, IL
Latitude:	40-49-39.15N NAD 83
Longitude:	90-39-52.38W
Heights:	463 feet above ground level (AGL) 1199 feet above mean sea level (AMSL)

This aeronautical study revealed that the structure does not exceed obstruction standards and would not be a hazard to air navigation provided the following condition(s), if any, is(are) met:

As a condition to this Determination, the structure is marked and/or lighted in accordance with FAA Advisory circular 70/7460-1 K Change 2, Obstruction Marking and Lighting, white paint only - Chapters 12&13(Turbines).

It is required that FAA Form 7460-2, Notice of Actual Construction or Alteration, be completed and returned to this office any time the project is abandoned or:

_____ At least 10 days prior to start of construction (7460-2, Part I)
__X__ Within 5 days after the construction reaches its greatest height (7460-2, Part II)

This determination expires on 09/20/2012 unless:

(a) extended, revised or terminated by the issuing office.
(b) the construction is subject to the licensing authority of the Federal Communications Commission (FCC) and an application for a construction permit has been filed, as required by the FCC, within 6 months of the date of this determination. In such case, the determination expires on the date prescribed by the FCC for completion of construction, or the date the FCC denies the application.

NOTE: REQUEST FOR EXTENSION OF THE EFFECTIVE PERIOD OF THIS DETERMINATION MUST BE E-FILED AT LEAST 15 DAYS PRIOR TO THE EXPIRATION DATE. AFTER RE-EVALUATION OF CURRENT OPERATIONS IN THE AREA OF THE STRUCTURE TO DETERMINE THAT NO

SIGNIFICANT AERONAUTICAL CHANGES HAVE OCCURRED, YOUR DETERMINATION MAY BE ELIGIBLE FOR ONE EXTENSION OF THE EFFECTIVE PERIOD.

Additional wind turbines or met towers proposed in the future may cause a cumulative effect on the national airspace system. This determination is based, in part, on the foregoing description which includes specific coordinates and heights . Any changes in coordinates will void this determination. Any future construction or alteration requires separate notice to the FAA.

This determination does include temporary construction equipment such as cranes, derricks, etc., which may be used during actual construction of the structure. However, this equipment shall not exceed the overall heights as indicated above. Equipment which has a height greater than the studied structure requires separate notice to the FAA.

This determination concerns the effect of this structure on the safe and efficient use of navigable airspace by aircraft and does not relieve the sponsor of compliance responsibilities relating to any law, ordinance, or regulation of any Federal, State, or local government body.

If we can be of further assistance, please contact our office at (404) 305-7081. On any future correspondence concerning this matter, please refer to Aeronautical Study Number 2010-WTE-11801-OE.

Signature Control No: 129660062-131078388 (DNE -WT)
Michael Blaich
Specialist

Federal Aviation Administration
Air Traffic Airspace Branch, ASW-520
2601 Meacham Blvd.
Fort Worth, TX 76137-0520

Aeronautical Study No.
2010-WTE-11802-OE

Issued Date: 09/20/2010

Robert Gay
Monarch Wind Power
96 Mendota Ave
Rye, NY 10580

**** DETERMINATION OF NO HAZARD TO AIR NAVIGATION ****

The Federal Aviation Administration has conducted an aeronautical study under the provisions of 49 U.S.C., Section 44718 and if applicable Title 14 of the Code of Federal Regulations, part 77, concerning:

Structure:	Wind Turbine Monmouth4
Location:	Kirkwood, IL
Latitude:	40-49-30.12N NAD 83
Longitude:	90-39-53.33W
Heights:	463 feet above ground level (AGL) 1196 feet above mean sea level (AMSL)

This aeronautical study revealed that the structure does not exceed obstruction standards and would not be a hazard to air navigation provided the following condition(s), if any, is(are) met:

As a condition to this Determination, the structure is marked and/or lighted in accordance with FAA Advisory circular 70/7460-1 K Change 2, Obstruction Marking and Lighting, white paint only - Chapters 12&13(Turbines).

It is required that FAA Form 7460-2, Notice of Actual Construction or Alteration, be completed and returned to this office any time the project is abandoned or:

_____ At least 10 days prior to start of construction (7460-2, Part I)
__X__ Within 5 days after the construction reaches its greatest height (7460-2, Part II)

This determination expires on 09/20/2012 unless:

(a) extended, revised or terminated by the issuing office.
(b) the construction is subject to the licensing authority of the Federal Communications Commission (FCC) and an application for a construction permit has been filed, as required by the FCC, within 6 months of the date of this determination. In such case, the determination expires on the date prescribed by the FCC for completion of construction, or the date the FCC denies the application.

NOTE: REQUEST FOR EXTENSION OF THE EFFECTIVE PERIOD OF THIS DETERMINATION MUST BE E-FILED AT LEAST 15 DAYS PRIOR TO THE EXPIRATION DATE. AFTER RE-EVALUATION OF CURRENT OPERATIONS IN THE AREA OF THE STRUCTURE TO DETERMINE THAT NO

SIGNIFICANT AERONAUTICAL CHANGES HAVE OCCURRED, YOUR DETERMINATION MAY BE ELIGIBLE FOR ONE EXTENSION OF THE EFFECTIVE PERIOD.

Additional wind turbines or met towers proposed in the future may cause a cumulative effect on the national airspace system. This determination is based, in part, on the foregoing description which includes specific coordinates and heights . Any changes in coordinates will void this determination. Any future construction or alteration requires separate notice to the FAA.

This determination does include temporary construction equipment such as cranes, derricks, etc., which may be used during actual construction of the structure. However, this equipment shall not exceed the overall heights as indicated above. Equipment which has a height greater than the studied structure requires separate notice to the FAA.

This determination concerns the effect of this structure on the safe and efficient use of navigable airspace by aircraft and does not relieve the sponsor of compliance responsibilities relating to any law, ordinance, or regulation of any Federal, State, or local government body.

If we can be of further assistance, please contact our office at (404) 305-7081. On any future correspondence concerning this matter, please refer to Aeronautical Study Number 2010-WTE-11802-OE.

Signature Control No: 129660255-131078390 (DNE -WT)
Michael Blaich
Specialist

Federal Aviation Administration
Air Traffic Airspace Branch, ASW-520
2601 Meacham Blvd.
Fort Worth, TX 76137-0520

Aeronautical Study No.
2010-WTE-11803-OE

Issued Date: 09/20/2010

Robert Gay
Monarch Wind Power
96 Mendota Ave
Rye, NY 10580

**** DETERMINATION OF NO HAZARD TO AIR NAVIGATION ****

The Federal Aviation Administration has conducted an aeronautical study under the provisions of 49 U.S.C., Section 44718 and if applicable Title 14 of the Code of Federal Regulations, part 77, concerning:

Structure:	Wind Turbine Monmouth5
Location:	Kirkwood, IL
Latitude:	40-49-21.10N NAD 83
Longitude:	90-39-54.38W
Heights:	463 feet above ground level (AGL) 1193 feet above mean sea level (AMSL)

This aeronautical study revealed that the structure does not exceed obstruction standards and would not be a hazard to air navigation provided the following condition(s), if any, is(are) met:

As a condition to this Determination, the structure is marked and/or lighted in accordance with FAA Advisory circular 70/7460-1 K Change 2, Obstruction Marking and Lighting, white paint/synchronized red lights - Chapters 4,12&13(Turbines).

It is required that FAA Form 7460-2, Notice of Actual Construction or Alteration, be completed and returned to this office any time the project is abandoned or:

_____ At least 10 days prior to start of construction (7460-2, Part I)
__X__ Within 5 days after the construction reaches its greatest height (7460-2, Part II)

This determination expires on 09/20/2012 unless:

(a) extended, revised or terminated by the issuing office.
(b) the construction is subject to the licensing authority of the Federal Communications Commission (FCC) and an application for a construction permit has been filed, as required by the FCC, within 6 months of the date of this determination. In such case, the determination expires on the date prescribed by the FCC for completion of construction, or the date the FCC denies the application.

NOTE: REQUEST FOR EXTENSION OF THE EFFECTIVE PERIOD OF THIS DETERMINATION MUST BE E-FILED AT LEAST 15 DAYS PRIOR TO THE EXPIRATION DATE. AFTER RE-EVALUATION OF CURRENT OPERATIONS IN THE AREA OF THE STRUCTURE TO DETERMINE THAT NO

SIGNIFICANT AERONAUTICAL CHANGES HAVE OCCURRED, YOUR DETERMINATION MAY BE ELIGIBLE FOR ONE EXTENSION OF THE EFFECTIVE PERIOD.

Additional wind turbines or met towers proposed in the future may cause a cumulative effect on the national airspace system. This determination is based, in part, on the foregoing description which includes specific coordinates and heights . Any changes in coordinates will void this determination. Any future construction or alteration requires separate notice to the FAA.

This determination does include temporary construction equipment such as cranes, derricks, etc., which may be used during actual construction of the structure. However, this equipment shall not exceed the overall heights as indicated above. Equipment which has a height greater than the studied structure requires separate notice to the FAA.

This determination concerns the effect of this structure on the safe and efficient use of navigable airspace by aircraft and does not relieve the sponsor of compliance responsibilities relating to any law, ordinance, or regulation of any Federal, State, or local government body.

If we can be of further assistance, please contact our office at (404) 305-7081. On any future correspondence concerning this matter, please refer to Aeronautical Study Number 2010-WTE-11803-OE.

Signature Control No: 129660314-131078343 (DNE -WT)
Michael Blaich
Specialist

Federal Aviation Administration
Air Traffic Airspace Branch, ASW-520
2601 Meacham Blvd.
Fort Worth, TX 76137-0520

Aeronautical Study No.
2010-WTE-11804-OE

Issued Date: 09/20/2010

Robert Gay
Monarch Wind Power
96 Mendota Ave
Rye, NY 10580

**** DETERMINATION OF NO HAZARD TO AIR NAVIGATION ****

The Federal Aviation Administration has conducted an aeronautical study under the provisions of 49 U.S.C., Section 44718 and if applicable Title 14 of the Code of Federal Regulations, part 77, concerning:

Structure:	Wind Turbine Monmouth6
Location:	Monmouth, IL
Latitude:	40-50-22.66N NAD 83
Longitude:	90-38-13.69W
Heights:	463 feet above ground level (AGL) 1226 feet above mean sea level (AMSL)

This aeronautical study revealed that the structure would have no substantial adverse effect on the safe and efficient utilization of the navigable airspace by aircraft or on the operation of air navigation facilities. Therefore, pursuant to the authority delegated to me, it is hereby determined that the structure would not be a hazard to air navigation provided the following condition(s) is(are) met:

As a condition to this Determination, the structure is marked and/or lighted in accordance with FAA Advisory circular 70/7460-1 K Change 2, Obstruction Marking and Lighting, white paint/synchronized red lights - Chapters 4,12&13(Turbines).

It is required that FAA Form 7460-2, Notice of Actual Construction or Alteration, be completed and returned to this office any time the project is abandoned or:

_____ At least 10 days prior to start of construction (7460-2, Part I)
__X__ Within 5 days after the construction reaches its greatest height (7460-2, Part II)

See attachment for additional condition(s) or information.

This determination expires on 09/20/2012 unless:

(a) extended, revised or terminated by the issuing office.
(b) the construction is subject to the licensing authority of the Federal Communications Commission (FCC) and an application for a construction permit has been filed, as required by the FCC, within 6 months of the date of this determination. In such case, the determination expires on the date prescribed by the FCC for completion of construction, or the date the FCC denies the application.

NOTE: REQUEST FOR EXTENSION OF THE EFFECTIVE PERIOD OF THIS DETERMINATION MUST BE E-FILED AT LEAST 15 DAYS PRIOR TO THE EXPIRATION DATE. AFTER RE-EVALUATION OF CURRENT OPERATIONS IN THE AREA OF THE STRUCTURE TO DETERMINE THAT NO SIGNIFICANT AERONAUTICAL CHANGES HAVE OCCURRED, YOUR DETERMINATION MAY BE ELIGIBLE FOR ONE EXTENSION OF THE EFFECTIVE PERIOD.

This determination is subject to review if an interested party files a petition that is received by the FAA on or before October 20, 2010. In the event a petition for review is filed, it must contain a full statement of the basis upon which it is made and be submitted in triplicate to the Manager, Airspace and Rules Division - Room 423, Federal Aviation Administration, 800 Independence Ave., Washington, D.C. 20591.

This determination becomes final on October 30, 2010 unless a petition is timely filed. In which case, this determination will not become final pending disposition of the petition. Interested parties will be notified of the grant of any review. For any questions regarding your petition, please contact Office of Airspace and Rules via telephone -- 202-267-8783 - or facsimile 202-267-9328.

This determination is based, in part, on the foregoing description which includes specific coordinates, heights, frequency(ies) and power. Any changes in coordinates, heights, and frequencies or use of greater power will void this determination. Any future construction or alteration, including increase to heights, power, or the addition of other transmitters, requires separate notice to the FAA.

This determination does include temporary construction equipment such as cranes, derricks, etc., which may be used during actual construction of the structure. However, this equipment shall not exceed the overall heights as indicated above. Equipment which has a height greater than the studied structure requires separate notice to the FAA.

This determination concerns the effect of this structure on the safe and efficient use of navigable airspace by aircraft and does not relieve the sponsor of compliance responsibilities relating to any law, ordinance, or regulation of any Federal, State, or local government body.

This aeronautical study considered and analyzed the impact on existing and proposed arrival, departure, and en route procedures for aircraft operating under both visual flight rules and instrument flight rules; the impact on all existing and planned public-use airports, military airports and aeronautical facilities; and the cumulative impact resulting from the studied structure when combined with the impact of other existing or proposed structures. The study disclosed that the described structure would have no substantial adverse effect on air navigation.

An account of the study findings, aeronautical objections received by the FAA during the study (if any), and the basis for the FAA's decision in this matter can be found on the following page(s).

If we can be of further assistance, please contact Michael Blaich, at (404) 305-7081. On any future correspondence concerning this matter, please refer to Aeronautical Study Number 2010-WTE-11804-OE.

Signature Control No: 129660333-131078776 (DNH -WT)
Sheri Edgett-Baron
Manager, Obstruction Evaluation Service

Attachment(s)
Additional Information
Map(s)

The proposed construction would be located approximately 5.41 nautical miles (NM) south of the Monmouth Municipal Airport (C66). It would exceed the Obstruction Standards of Title 14, Code of Federal Regulations (14 CFR), Part 77 as follows:

Section 77.23(a)(2) by 23 feet - a height that exceeds 440 feet above ground level within 5.41 NM as applied to C66.

The proposal was not circularized for public comment because current FAA obstruction evaluation policy exempts from circularization those proposals that exceed the above cited obstruction standard. This is provided the proposal does not lie within an airport traffic pattern. This policy does not affect the public's right to petition for review determinations regarding structures, which exceed the subject obstruction standards.

AERONAUTICAL STUDY FOR POSSIBLE INSTRUMENT FLIGHT RULES (IFR) EFFECT DISCLOSED THE FOLLOWING:

> The proposed structure would have no effect on any existing or proposed IFR arrival/departure routes, operations, or procedures.

> The proposed structure would have no effect on any existing or proposed IFR en route routes, operations, or procedures.

> The proposed structure would have no effect on any existing or proposed IFR minimum flight altitudes.

AERONAUTICAL STUDY FOR POSSIBLE VISUAL FLIGHT RULES (VFR) EFFECT DISCLOSED THE FOLLOWING:

> The proposed structure would have no effect on any existing or proposed VFR arrival or departure routes, operations or procedures.

> The proposed structure would not conflict with airspace required to conduct normal VFR traffic pattern operations at any known public use or military airports.

> The proposed structure would not penetrate those altitudes normally considered available to airmen for VFR en route flight.

> The proposed structure will be appropriately obstruction marked and lighted to make it more conspicuous to airmen flying in VFR weather conditions at night.

The cumulative impact of the proposed structure, when combined with other existing structures is not considered significant. Study did not disclose any adverse effect on existing or proposed public-use or military airports or navigational facilities. Nor would the proposal affect the capacity of any known existing or planned public-use or military airport.

Therefore, it is determined that the proposed construction would not have a substantial adverse effect on the safe and efficient utilization of the navigable airspace by aircraft or on any air navigation facility and would not be a hazard to air navigation.

Sectional Map for ASN 2010-WTE-11804-OE

Federal Aviation Administration
Air Traffic Airspace Branch, ASW-520
2601 Meacham Blvd.
Fort Worth, TX 76137-0520

Aeronautical Study No.
2010-WTE-11805-OE

Issued Date: 09/20/2010

Robert Gay
Monarch Wind Power
96 Mendota Ave
Rye, NY 10580

**** DETERMINATION OF NO HAZARD TO AIR NAVIGATION ****

The Federal Aviation Administration has conducted an aeronautical study under the provisions of 49 U.S.C., Section 44718 and if applicable Title 14 of the Code of Federal Regulations, part 77, concerning:

Structure:	Wind Turbine Monmouth7
Location:	Kirkwood, IL
Latitude:	40-49-56.23N NAD 83
Longitude:	90-39-39.50W
Heights:	463 feet above ground level (AGL) 1202 feet above mean sea level (AMSL)

This aeronautical study revealed that the structure does not exceed obstruction standards and would not be a hazard to air navigation provided the following condition(s), if any, is(are) met:

As a condition to this Determination, the structure is marked and/or lighted in accordance with FAA Advisory circular 70/7460-1 K Change 2, Obstruction Marking and Lighting, white paint only - Chapters 12&13(Turbines).

It is required that FAA Form 7460-2, Notice of Actual Construction or Alteration, be completed and returned to this office any time the project is abandoned or:

_____ At least 10 days prior to start of construction (7460-2, Part I)
__X__ Within 5 days after the construction reaches its greatest height (7460-2, Part II)

This determination expires on 09/20/2012 unless:

(a) extended, revised or terminated by the issuing office.
(b) the construction is subject to the licensing authority of the Federal Communications Commission (FCC) and an application for a construction permit has been filed, as required by the FCC, within 6 months of the date of this determination. In such case, the determination expires on the date prescribed by the FCC for completion of construction, or the date the FCC denies the application.

NOTE: REQUEST FOR EXTENSION OF THE EFFECTIVE PERIOD OF THIS DETERMINATION MUST BE E-FILED AT LEAST 15 DAYS PRIOR TO THE EXPIRATION DATE. AFTER RE-EVALUATION OF CURRENT OPERATIONS IN THE AREA OF THE STRUCTURE TO DETERMINE THAT NO

SIGNIFICANT AERONAUTICAL CHANGES HAVE OCCURRED, YOUR DETERMINATION MAY BE ELIGIBLE FOR ONE EXTENSION OF THE EFFECTIVE PERIOD.

Additional wind turbines or met towers proposed in the future may cause a cumulative effect on the national airspace system. This determination is based, in part, on the foregoing description which includes specific coordinates and heights . Any changes in coordinates will void this determination. Any future construction or alteration requires separate notice to the FAA.

This determination does include temporary construction equipment such as cranes, derricks, etc., which may be used during actual construction of the structure. However, this equipment shall not exceed the overall heights as indicated above. Equipment which has a height greater than the studied structure requires separate notice to the FAA.

This determination concerns the effect of this structure on the safe and efficient use of navigable airspace by aircraft and does not relieve the sponsor of compliance responsibilities relating to any law, ordinance, or regulation of any Federal, State, or local government body.

If we can be of further assistance, please contact our office at (404) 305-7081. On any future correspondence concerning this matter, please refer to Aeronautical Study Number 2010-WTE-11805-OE.

Signature Control No: 129660982-131078389 (DNE -WT)
Michael Blaich
Specialist

Federal Aviation Administration
Air Traffic Airspace Branch, ASW-520
2601 Meacham Blvd.
Fort Worth, TX 76137-0520

Aeronautical Study No.
2010-WTE-11806-OE

Issued Date: 09/20/2010

Robert Gay
Monarch Wind Power
96 Mendota Ave
Rye, NY 10580

**** DETERMINATION OF NO HAZARD TO AIR NAVIGATION ****

The Federal Aviation Administration has conducted an aeronautical study under the provisions of 49 U.S.C., Section 44718 and if applicable Title 14 of the Code of Federal Regulations, part 77, concerning:

Structure:	Wind Turbine Monmouth8
Location:	Kirkwood, IL
Latitude:	40-49-46.83N NAD 83
Longitude:	90-39-40.53W
Heights:	463 feet above ground level (AGL) 1201 feet above mean sea level (AMSL)

This aeronautical study revealed that the structure does not exceed obstruction standards and would not be a hazard to air navigation provided the following condition(s), if any, is(are) met:

As a condition to this Determination, the structure is marked and/or lighted in accordance with FAA Advisory circular 70/7460-1 K Change 2, Obstruction Marking and Lighting, white paint only - Chapters 12&13(Turbines).

It is required that FAA Form 7460-2, Notice of Actual Construction or Alteration, be completed and returned to this office any time the project is abandoned or:

_____ At least 10 days prior to start of construction (7460-2, Part I)
__X__ Within 5 days after the construction reaches its greatest height (7460-2, Part II)

This determination expires on 09/20/2012 unless:

(a) extended, revised or terminated by the issuing office.
(b) the construction is subject to the licensing authority of the Federal Communications Commission (FCC) and an application for a construction permit has been filed, as required by the FCC, within 6 months of the date of this determination. In such case, the determination expires on the date prescribed by the FCC for completion of construction, or the date the FCC denies the application.

NOTE: REQUEST FOR EXTENSION OF THE EFFECTIVE PERIOD OF THIS DETERMINATION MUST BE E-FILED AT LEAST 15 DAYS PRIOR TO THE EXPIRATION DATE. AFTER RE-EVALUATION OF CURRENT OPERATIONS IN THE AREA OF THE STRUCTURE TO DETERMINE THAT NO

SIGNIFICANT AERONAUTICAL CHANGES HAVE OCCURRED, YOUR DETERMINATION MAY BE ELIGIBLE FOR ONE EXTENSION OF THE EFFECTIVE PERIOD.

Additional wind turbines or met towers proposed in the future may cause a cumulative effect on the national airspace system. This determination is based, in part, on the foregoing description which includes specific coordinates and heights . Any changes in coordinates will void this determination. Any future construction or alteration requires separate notice to the FAA.

This determination does include temporary construction equipment such as cranes, derricks, etc., which may be used during actual construction of the structure. However, this equipment shall not exceed the overall heights as indicated above. Equipment which has a height greater than the studied structure requires separate notice to the FAA.

This determination concerns the effect of this structure on the safe and efficient use of navigable airspace by aircraft and does not relieve the sponsor of compliance responsibilities relating to any law, ordinance, or regulation of any Federal, State, or local government body.

If we can be of further assistance, please contact our office at (404) 305-7081. On any future correspondence concerning this matter, please refer to Aeronautical Study Number 2010-WTE-11806-OE.

Signature Control No: 129661645-131078391 (DNE -WT)
Michael Blaich
Specialist

Federal Aviation Administration
Air Traffic Airspace Branch, ASW-520
2601 Meacham Blvd.
Fort Worth, TX 76137-0520

Aeronautical Study No.
2010-WTE-11807-OE

Issued Date: 09/20/2010

Robert Gay
Monarch Wind Power
96 Mendota Ave
Rye, NY 10580

**** DETERMINATION OF NO HAZARD TO AIR NAVIGATION ****

The Federal Aviation Administration has conducted an aeronautical study under the provisions of 49 U.S.C., Section 44718 and if applicable Title 14 of the Code of Federal Regulations, part 77, concerning:

Structure:	Wind Turbine Monmouth9
Location:	Kirkwood, IL
Latitude:	40-49-33.45N NAD 83
Longitude:	90-39-42.11W
Heights:	463 feet above ground level (AGL) 1199 feet above mean sea level (AMSL)

This aeronautical study revealed that the structure does not exceed obstruction standards and would not be a hazard to air navigation provided the following condition(s), if any, is(are) met:

As a condition to this Determination, the structure is marked and/or lighted in accordance with FAA Advisory circular 70/7460-1 K Change 2, Obstruction Marking and Lighting, white paint/synchronized red lights - Chapters 4,12&13(Turbines).

It is required that FAA Form 7460-2, Notice of Actual Construction or Alteration, be completed and returned to this office any time the project is abandoned or:

_____ At least 10 days prior to start of construction (7460-2, Part I)
__X__ Within 5 days after the construction reaches its greatest height (7460-2, Part II)

This determination expires on 09/20/2012 unless:

(a) extended, revised or terminated by the issuing office.
(b) the construction is subject to the licensing authority of the Federal Communications Commission (FCC) and an application for a construction permit has been filed, as required by the FCC, within 6 months of the date of this determination. In such case, the determination expires on the date prescribed by the FCC for completion of construction, or the date the FCC denies the application.

NOTE: REQUEST FOR EXTENSION OF THE EFFECTIVE PERIOD OF THIS DETERMINATION MUST BE E-FILED AT LEAST 15 DAYS PRIOR TO THE EXPIRATION DATE. AFTER RE-EVALUATION OF CURRENT OPERATIONS IN THE AREA OF THE STRUCTURE TO DETERMINE THAT NO

SIGNIFICANT AERONAUTICAL CHANGES HAVE OCCURRED, YOUR DETERMINATION MAY BE ELIGIBLE FOR ONE EXTENSION OF THE EFFECTIVE PERIOD.

Additional wind turbines or met towers proposed in the future may cause a cumulative effect on the national airspace system. This determination is based, in part, on the foregoing description which includes specific coordinates and heights . Any changes in coordinates will void this determination. Any future construction or alteration requires separate notice to the FAA.

This determination does include temporary construction equipment such as cranes, derricks, etc., which may be used during actual construction of the structure. However, this equipment shall not exceed the overall heights as indicated above. Equipment which has a height greater than the studied structure requires separate notice to the FAA.

This determination concerns the effect of this structure on the safe and efficient use of navigable airspace by aircraft and does not relieve the sponsor of compliance responsibilities relating to any law, ordinance, or regulation of any Federal, State, or local government body.

If we can be of further assistance, please contact our office at (404) 305-7081. On any future correspondence concerning this matter, please refer to Aeronautical Study Number 2010-WTE-11807-OE.

Signature Control No: 129661723-131078346 (DNE -WT)
Michael Blaich
Specialist

Federal Aviation Administration
Air Traffic Airspace Branch, ASW-520
2601 Meacham Blvd.
Fort Worth, TX 76137-0520

Aeronautical Study No.
2010-WTE-11808-OE

Issued Date: 09/20/2010

Robert Gay
Monarch Wind Power
96 Mendota Ave
Rye, NY 10580

**** DETERMINATION OF NO HAZARD TO AIR NAVIGATION ****

The Federal Aviation Administration has conducted an aeronautical study under the provisions of 49 U.S.C., Section 44718 and if applicable Title 14 of the Code of Federal Regulations, part 77, concerning:

Structure:	Wind Turbine Monmouth10
Location:	Kirkwood, IL
Latitude:	40-49-55.27N NAD 83
Longitude:	90-39-07.66W
Heights:	463 feet above ground level (AGL) 1209 feet above mean sea level (AMSL)

This aeronautical study revealed that the structure does not exceed obstruction standards and would not be a hazard to air navigation provided the following condition(s), if any, is(are) met:

As a condition to this Determination, the structure is marked and/or lighted in accordance with FAA Advisory circular 70/7460-1 K Change 2, Obstruction Marking and Lighting, white paint/synchronized red lights - Chapters 4,12&13(Turbines).

It is required that FAA Form 7460-2, Notice of Actual Construction or Alteration, be completed and returned to this office any time the project is abandoned or:

_____ At least 10 days prior to start of construction (7460-2, Part I)
__X__ Within 5 days after the construction reaches its greatest height (7460-2, Part II)

This determination expires on 09/20/2012 unless:

(a) extended, revised or terminated by the issuing office.
(b) the construction is subject to the licensing authority of the Federal Communications Commission (FCC) and an application for a construction permit has been filed, as required by the FCC, within 6 months of the date of this determination. In such case, the determination expires on the date prescribed by the FCC for completion of construction, or the date the FCC denies the application.

NOTE: REQUEST FOR EXTENSION OF THE EFFECTIVE PERIOD OF THIS DETERMINATION MUST BE E-FILED AT LEAST 15 DAYS PRIOR TO THE EXPIRATION DATE. AFTER RE-EVALUATION OF CURRENT OPERATIONS IN THE AREA OF THE STRUCTURE TO DETERMINE THAT NO

SIGNIFICANT AERONAUTICAL CHANGES HAVE OCCURRED, YOUR DETERMINATION MAY BE ELIGIBLE FOR ONE EXTENSION OF THE EFFECTIVE PERIOD.

Additional wind turbines or met towers proposed in the future may cause a cumulative effect on the national airspace system. This determination is based, in part, on the foregoing description which includes specific coordinates and heights . Any changes in coordinates will void this determination. Any future construction or alteration requires separate notice to the FAA.

This determination does include temporary construction equipment such as cranes, derricks, etc., which may be used during actual construction of the structure. However, this equipment shall not exceed the overall heights as indicated above. Equipment which has a height greater than the studied structure requires separate notice to the FAA.

This determination concerns the effect of this structure on the safe and efficient use of navigable airspace by aircraft and does not relieve the sponsor of compliance responsibilities relating to any law, ordinance, or regulation of any Federal, State, or local government body.

If we can be of further assistance, please contact our office at (404) 305-7081. On any future correspondence concerning this matter, please refer to Aeronautical Study Number 2010-WTE-11808-OE.

Signature Control No: 129661832-131078344 (DNE -WT)
Michael Blaich
Specialist

Federal Aviation Administration
Air Traffic Airspace Branch, ASW-520
2601 Meacham Blvd.
Fort Worth, TX 76137-0520

Aeronautical Study No.
2010-WTE-13723-OE
Prior Study No.
2010-WTE-11809-OE

Issued Date: 09/24/2010

Robert Gay
Monarch Wind Power
96 Mendota Ave
Rye, NY 10580

**** DETERMINATION OF NO HAZARD TO AIR NAVIGATION ****

The Federal Aviation Administration has conducted an aeronautical study under the provisions of 49 U.S.C., Section 44718 and if applicable Title 14 of the Code of Federal Regulations, part 77, concerning:

Structure:	Wind Turbine Monmouth 11
Location:	Monmouth, IL
Latitude:	40-50-20.15N NAD 83
Longitude:	90-38-26.84W
Heights:	463 feet above ground level (AGL) 1227 feet above mean sea level (AMSL)

This aeronautical study revealed that the structure would have no substantial adverse effect on the safe and efficient utilization of the navigable airspace by aircraft or on the operation of air navigation facilities. Therefore, pursuant to the authority delegated to me, it is hereby determined that the structure would not be a hazard to air navigation provided the following condition(s) is(are) met:

As a condition to this Determination, the structure is marked and/or lighted in accordance with FAA Advisory circular 70/7460-1 K Change 2, Obstruction Marking and Lighting, white paint/synchronized red lights - Chapters 4,12&13(Turbines).

It is required that FAA Form 7460-2, Notice of Actual Construction or Alteration, be completed and returned to this office any time the project is abandoned or:

_____ At least 10 days prior to start of construction (7460-2, Part I)
__X__ Within 5 days after the construction reaches its greatest height (7460-2, Part II)

See attachment for additional condition(s) or information.

This determination expires on 09/24/2012 unless:

(a) extended, revised or terminated by the issuing office.
(b) the construction is subject to the licensing authority of the Federal Communications Commission (FCC) and an application for a construction permit has been filed, as required by the FCC, within 6 months of the date of this determination. In such case, the determination expires on the date prescribed by the FCC for completion of construction, or the date the FCC denies the application.

NOTE: REQUEST FOR EXTENSION OF THE EFFECTIVE PERIOD OF THIS DETERMINATION MUST BE E-FILED AT LEAST 15 DAYS PRIOR TO THE EXPIRATION DATE. AFTER RE-EVALUATION OF CURRENT OPERATIONS IN THE AREA OF THE STRUCTURE TO DETERMINE THAT NO SIGNIFICANT AERONAUTICAL CHANGES HAVE OCCURRED, YOUR DETERMINATION MAY BE ELIGIBLE FOR ONE EXTENSION OF THE EFFECTIVE PERIOD.

This determination is subject to review if an interested party files a petition that is received by the FAA on or before October 24, 2010. In the event a petition for review is filed, it must contain a full statement of the basis upon which it is made and be submitted in triplicate to the Manager, Airspace and Rules Division - Room 423, Federal Aviation Administration, 800 Independence Ave., Washington, D.C. 20591.

This determination becomes final on November 03, 2010 unless a petition is timely filed. In which case, this determination will not become final pending disposition of the petition. Interested parties will be notified of the grant of any review. For any questions regarding your petition, please contact Office of Airspace and Rules via telephone -- 202-267-8783 - or facsimile 202-267-9328.

This determination is based, in part, on the foregoing description which includes specific coordinates, heights, frequency(ies) and power. Any changes in coordinates, heights, and frequencies or use of greater power will void this determination. Any future construction or alteration, including increase to heights, power, or the addition of other transmitters, requires separate notice to the FAA.

This determination does include temporary construction equipment such as cranes, derricks, etc., which may be used during actual construction of the structure. However, this equipment shall not exceed the overall heights as indicated above. Equipment which has a height greater than the studied structure requires separate notice to the FAA.

This determination concerns the effect of this structure on the safe and efficient use of navigable airspace by aircraft and does not relieve the sponsor of compliance responsibilities relating to any law, ordinance, or regulation of any Federal, State, or local government body.

This aeronautical study considered and analyzed the impact on existing and proposed arrival, departure, and en route procedures for aircraft operating under both visual flight rules and instrument flight rules; the impact on all existing and planned public-use airports, military airports and aeronautical facilities; and the cumulative impact resulting from the studied structure when combined with the impact of other existing or proposed structures. The study disclosed that the described structure would have no substantial adverse effect on air navigation.

An account of the study findings, aeronautical objections received by the FAA during the study (if any), and the basis for the FAA's decision in this matter can be found on the following page(s).

If we can be of further assistance, please contact Michael Blaich, at (404) 305-7081. On any future correspondence concerning this matter, please refer to Aeronautical Study Number 2010-WTE-13723-OE.

Signature Control No: 131151753-131267064 (DNH -WT)
Sheri Edgett-Baron
Manager, Obstruction Evaluation Service

Attachment(s)
Additional Information
Map(s)

Additional information for ASN 2010-WTE-13723-OE

The proposed construction would be located approximately 5.46 nautical miles (NM) south of the Monmouth Municipal Airport (C66). It would exceed the Obstruction Standards of Title 14, Code of Federal Regulations (14 CFR), Part 77 as follows:

Section 77.23(a)(2) by 17 feet - a height that exceeds 446 feet above ground level within 5.46 NM as applied to C66.

The proposal was not circularized for public comment because current FAA obstruction evaluation policy exempts from circularization those proposals that exceed the above cited obstruction standard. This is provided the proposal does not lie within an airport traffic pattern. This policy does not affect the public's right to petition for review determinations regarding structures, which exceed the subject obstruction standards.

AERONAUTICAL STUDY FOR POSSIBLE INSTRUMENT FLIGHT RULES (IFR) EFFECT DISCLOSED THE FOLLOWING:

> The proposed structure would have no effect on any existing or proposed IFR arrival/departure routes, operations, or procedures.

> The proposed structure would have no effect on any existing or proposed IFR en route routes, operations, or procedures.

> The proposed structure would have no effect on any existing or proposed IFR minimum flight altitudes.

AERONAUTICAL STUDY FOR POSSIBLE VISUAL FLIGHT RULES (VFR) EFFECT DISCLOSED THE FOLLOWING:

> The proposed structure would have no effect on any existing or proposed VFR arrival or departure routes, operations or procedures.

> The proposed structure would not conflict with airspace required to conduct normal VFR traffic pattern operations at any known public use or military airports.

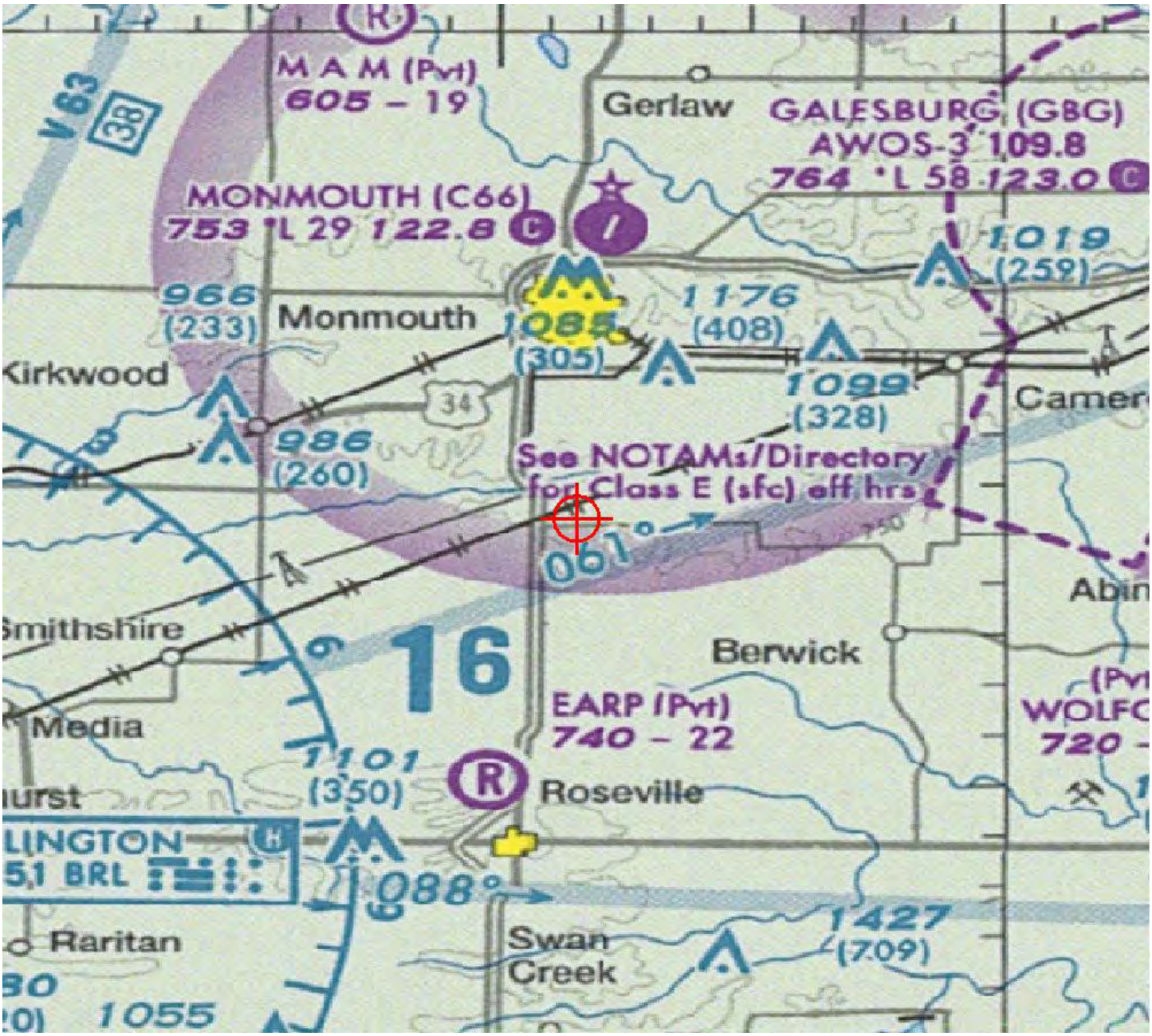
> The proposed structure would not penetrate those altitudes normally considered available to airmen for VFR en route flight.

> The proposed structure will be appropriately obstruction marked and lighted to make it more conspicuous to airmen flying in VFR weather conditions at night.

The cumulative impact of the proposed structure, when combined with other existing structures is not considered significant. Study did not disclose any adverse effect on existing or proposed public-use or military airports or navigational facilities. Nor would the proposal affect the capacity of any known existing or planned public-use or military airport.

Therefore, it is determined that the proposed construction would not have a substantial adverse effect on the safe and efficient utilization of the navigable airspace by aircraft or on any air navigation facility and would not be a hazard to air navigation.

Sectional Map for ASN 2010-WTE-13723-OE



Federal Aviation Administration
Air Traffic Airspace Branch, ASW-520
2601 Meacham Blvd.
Fort Worth, TX 76137-0520

Aeronautical Study No.
2010-WTE-11810-OE

Issued Date: 09/20/2010

Robert Gay
Monarch Wind Power
96 Mendota Ave
Rye, NY 10580

**** DETERMINATION OF NO HAZARD TO AIR NAVIGATION ****

The Federal Aviation Administration has conducted an aeronautical study under the provisions of 49 U.S.C., Section 44718 and if applicable Title 14 of the Code of Federal Regulations, part 77, concerning:

Structure:	Wind Turbine Monmouth12
Location:	Monmouth, IL
Latitude:	40-50-16.43N NAD 83
Longitude:	90-38-05.52W
Heights:	463 feet above ground level (AGL) 1224 feet above mean sea level (AMSL)

This aeronautical study revealed that the structure would have no substantial adverse effect on the safe and efficient utilization of the navigable airspace by aircraft or on the operation of air navigation facilities. Therefore, pursuant to the authority delegated to me, it is hereby determined that the structure would not be a hazard to air navigation provided the following condition(s) is(are) met:

As a condition to this Determination, the structure is marked and/or lighted in accordance with FAA Advisory circular 70/7460-1 K Change 2, Obstruction Marking and Lighting, white paint only - Chapters 12&13(Turbines).

It is required that FAA Form 7460-2, Notice of Actual Construction or Alteration, be completed and returned to this office any time the project is abandoned or:

_____ At least 10 days prior to start of construction (7460-2, Part I)
__X__ Within 5 days after the construction reaches its greatest height (7460-2, Part II)

See attachment for additional condition(s) or information.

This determination expires on 09/20/2012 unless:

(a) extended, revised or terminated by the issuing office.
(b) the construction is subject to the licensing authority of the Federal Communications Commission (FCC) and an application for a construction permit has been filed, as required by the FCC, within 6 months of the date of this determination. In such case, the determination expires on the date prescribed by the FCC for completion of construction, or the date the FCC denies the application.

NOTE: REQUEST FOR EXTENSION OF THE EFFECTIVE PERIOD OF THIS DETERMINATION MUST BE E-FILED AT LEAST 15 DAYS PRIOR TO THE EXPIRATION DATE. AFTER RE-EVALUATION OF CURRENT OPERATIONS IN THE AREA OF THE STRUCTURE TO DETERMINE THAT NO SIGNIFICANT AERONAUTICAL CHANGES HAVE OCCURRED, YOUR DETERMINATION MAY BE ELIGIBLE FOR ONE EXTENSION OF THE EFFECTIVE PERIOD.

This determination is subject to review if an interested party files a petition that is received by the FAA on or before October 20, 2010. In the event a petition for review is filed, it must contain a full statement of the basis upon which it is made and be submitted in triplicate to the Manager, Airspace and Rules Division - Room 423, Federal Aviation Administration, 800 Independence Ave., Washington, D.C. 20591.

This determination becomes final on October 30, 2010 unless a petition is timely filed. In which case, this determination will not become final pending disposition of the petition. Interested parties will be notified of the grant of any review. For any questions regarding your petition, please contact Office of Airspace and Rules via telephone -- 202-267-8783 - or facsimile 202-267-9328.

This determination is based, in part, on the foregoing description which includes specific coordinates, heights, frequency(ies) and power. Any changes in coordinates, heights, and frequencies or use of greater power will void this determination. Any future construction or alteration, including increase to heights, power, or the addition of other transmitters, requires separate notice to the FAA.

This determination does include temporary construction equipment such as cranes, derricks, etc., which may be used during actual construction of the structure. However, this equipment shall not exceed the overall heights as indicated above. Equipment which has a height greater than the studied structure requires separate notice to the FAA.

This determination concerns the effect of this structure on the safe and efficient use of navigable airspace by aircraft and does not relieve the sponsor of compliance responsibilities relating to any law, ordinance, or regulation of any Federal, State, or local government body.

This aeronautical study considered and analyzed the impact on existing and proposed arrival, departure, and en route procedures for aircraft operating under both visual flight rules and instrument flight rules; the impact on all existing and planned public-use airports, military airports and aeronautical facilities; and the cumulative impact resulting from the studied structure when combined with the impact of other existing or proposed structures. The study disclosed that the described structure would have no substantial adverse effect on air navigation.

An account of the study findings, aeronautical objections received by the FAA during the study (if any), and the basis for the FAA's decision in this matter can be found on the following page(s).

If we can be of further assistance, please contact Michael Blaich, at (404) 305-7081. On any future correspondence concerning this matter, please refer to Aeronautical Study Number 2010-WTE-11810-OE.

Signature Control No: 129662081-131079003 (DNH -WT)
Sheri Edgett-Baron
Manager, Obstruction Evaluation Service

Attachment(s)
Additional Information
Map(s)

The proposed construction would be located approximately 5.51 nautical miles (NM) south of the Monmouth Municipal Airport (C66). It would exceed the Obstruction Standards of Title 14, Code of Federal Regulations (14 CFR), Part 77 as follows:

Section 77.23(a)(2) by 13 feet - a height that exceeds 450 feet above ground level within 5.51 NM as applied to C66.

The proposal was not circularized for public comment because current FAA obstruction evaluation policy exempts from circularization those proposals that exceed the above cited obstruction standard. This is provided the proposal does not lie within an airport traffic pattern. This policy does not affect the public's right to petition for review determinations regarding structures, which exceed the subject obstruction standards.

AERONAUTICAL STUDY FOR POSSIBLE INSTRUMENT FLIGHT RULES (IFR) EFFECT DISCLOSED THE FOLLOWING:

> The proposed structure would have no effect on any existing or proposed IFR arrival/departure routes, operations, or procedures.

> The proposed structure would have no effect on any existing or proposed IFR en route routes, operations, or procedures.

> The proposed structure would have no effect on any existing or proposed IFR minimum flight altitudes.

AERONAUTICAL STUDY FOR POSSIBLE VISUAL FLIGHT RULES (VFR) EFFECT DISCLOSED THE FOLLOWING:

> The proposed structure would have no effect on any existing or proposed VFR arrival or departure routes, operations or procedures.

> The proposed structure would not conflict with airspace required to conduct normal VFR traffic pattern operations at any known public use or military airports.

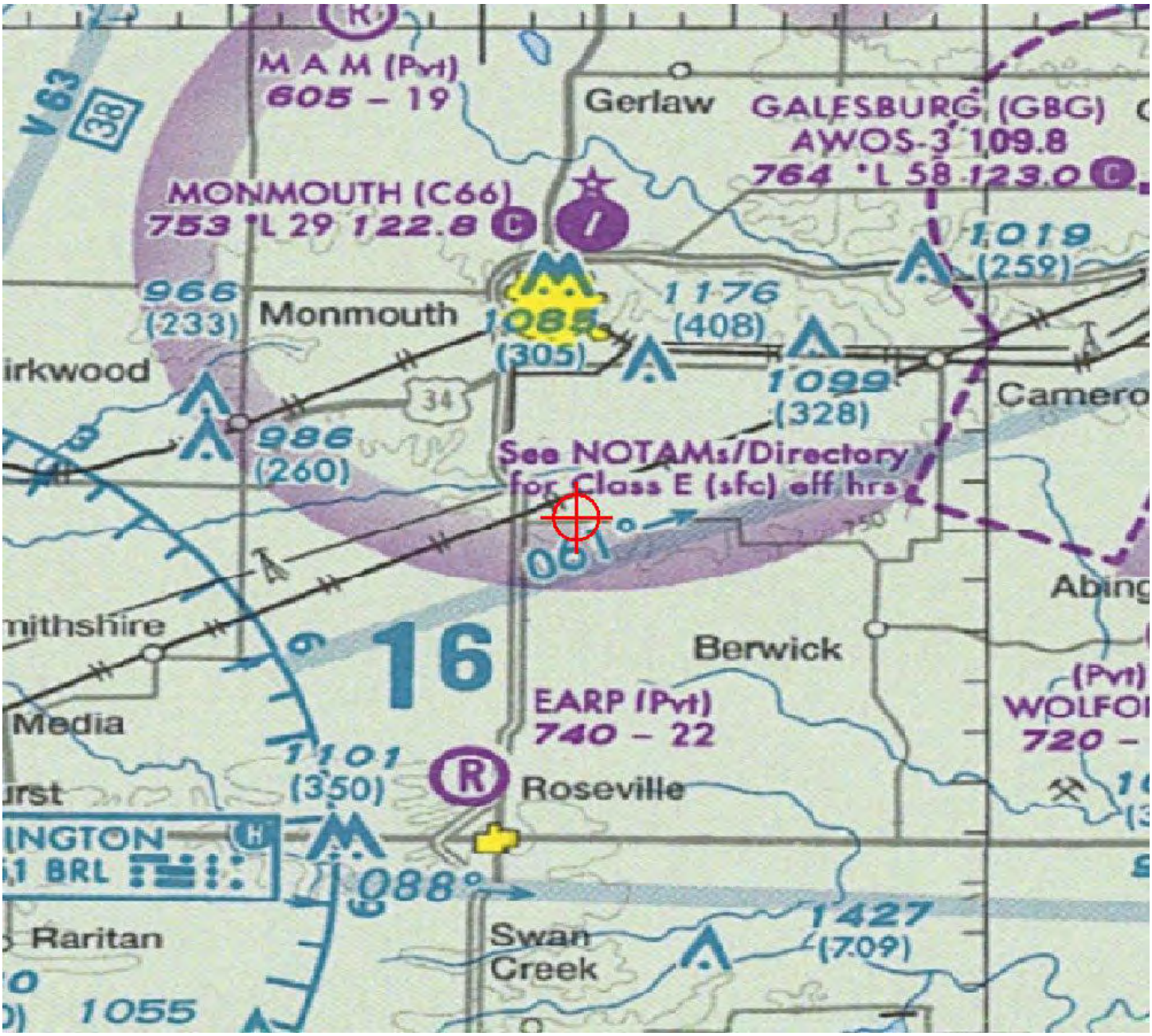
> The proposed structure would not penetrate those altitudes normally considered available to airmen for VFR en route flight.

> The proposed structure will be appropriately obstruction marked and lighted to make it more conspicuous to airmen flying in VFR weather conditions at night.

The cumulative impact of the proposed structure, when combined with other existing structures is not considered significant. Study did not disclose any adverse effect on existing or proposed public-use or military airports or navigational facilities. Nor would the proposal affect the capacity of any known existing or planned public-use or military airport.

Therefore, it is determined that the proposed construction would not have a substantial adverse effect on the safe and efficient utilization of the navigable airspace by aircraft or on any air navigation facility and would not be a hazard to air navigation.

Sectional Map for ASN 2010-WTE-11810-OE



Federal Aviation Administration
Air Traffic Airspace Branch, ASW-520
2601 Meacham Blvd.
Fort Worth, TX 76137-0520

Aeronautical Study No.
2010-WTE-11811-OE

Issued Date: 09/20/2010

Robert Gay
Monarch Wind Power
96 Mendota Ave
Rye, NY 10580

**** DETERMINATION OF NO HAZARD TO AIR NAVIGATION ****

The Federal Aviation Administration has conducted an aeronautical study under the provisions of 49 U.S.C., Section 44718 and if applicable Title 14 of the Code of Federal Regulations, part 77, concerning:

Structure:	Wind Turbine Monmouth13
Location:	Monmouth, IL
Latitude:	40-50-11.62N NAD 83
Longitude:	90-38-08.79W
Heights:	463 feet above ground level (AGL) 1222 feet above mean sea level (AMSL)

This aeronautical study revealed that the structure would have no substantial adverse effect on the safe and efficient utilization of the navigable airspace by aircraft or on the operation of air navigation facilities. Therefore, pursuant to the authority delegated to me, it is hereby determined that the structure would not be a hazard to air navigation provided the following condition(s) is(are) met:

As a condition to this Determination, the structure is marked and/or lighted in accordance with FAA Advisory circular 70/7460-1 K Change 2, Obstruction Marking and Lighting, white paint/synchronized red lights - Chapters 4,12&13(Turbines).

It is required that FAA Form 7460-2, Notice of Actual Construction or Alteration, be completed and returned to this office any time the project is abandoned or:

_____ At least 10 days prior to start of construction (7460-2, Part I)
__X__ Within 5 days after the construction reaches its greatest height (7460-2, Part II)

See attachment for additional condition(s) or information.

This determination expires on 09/20/2012 unless:

(a) extended, revised or terminated by the issuing office.
(b) the construction is subject to the licensing authority of the Federal Communications Commission (FCC) and an application for a construction permit has been filed, as required by the FCC, within 6 months of the date of this determination. In such case, the determination expires on the date prescribed by the FCC for completion of construction, or the date the FCC denies the application.

NOTE: REQUEST FOR EXTENSION OF THE EFFECTIVE PERIOD OF THIS DETERMINATION MUST BE E-FILED AT LEAST 15 DAYS PRIOR TO THE EXPIRATION DATE. AFTER RE-EVALUATION OF CURRENT OPERATIONS IN THE AREA OF THE STRUCTURE TO DETERMINE THAT NO SIGNIFICANT AERONAUTICAL CHANGES HAVE OCCURRED, YOUR DETERMINATION MAY BE ELIGIBLE FOR ONE EXTENSION OF THE EFFECTIVE PERIOD.

This determination is subject to review if an interested party files a petition that is received by the FAA on or before October 20, 2010. In the event a petition for review is filed, it must contain a full statement of the basis upon which it is made and be submitted in triplicate to the Manager, Airspace and Rules Division - Room 423, Federal Aviation Administration, 800 Independence Ave., Washington, D.C. 20591.

This determination becomes final on October 30, 2010 unless a petition is timely filed. In which case, this determination will not become final pending disposition of the petition. Interested parties will be notified of the grant of any review. For any questions regarding your petition, please contact Office of Airspace and Rules via telephone -- 202-267-8783 - or facsimile 202-267-9328.

This determination is based, in part, on the foregoing description which includes specific coordinates, heights, frequency(ies) and power. Any changes in coordinates, heights, and frequencies or use of greater power will void this determination. Any future construction or alteration, including increase to heights, power, or the addition of other transmitters, requires separate notice to the FAA.

This determination does include temporary construction equipment such as cranes, derricks, etc., which may be used during actual construction of the structure. However, this equipment shall not exceed the overall heights as indicated above. Equipment which has a height greater than the studied structure requires separate notice to the FAA.

This determination concerns the effect of this structure on the safe and efficient use of navigable airspace by aircraft and does not relieve the sponsor of compliance responsibilities relating to any law, ordinance, or regulation of any Federal, State, or local government body.

This aeronautical study considered and analyzed the impact on existing and proposed arrival, departure, and en route procedures for aircraft operating under both visual flight rules and instrument flight rules; the impact on all existing and planned public-use airports, military airports and aeronautical facilities; and the cumulative impact resulting from the studied structure when combined with the impact of other existing or proposed structures. The study disclosed that the described structure would have no substantial adverse effect on air navigation.

An account of the study findings, aeronautical objections received by the FAA during the study (if any), and the basis for the FAA's decision in this matter can be found on the following page(s).

If we can be of further assistance, please contact Michael Blaich, at (404) 305-7081. On any future correspondence concerning this matter, please refer to Aeronautical Study Number 2010-WTE-11811-OE.

Signature Control No: 129662234-131079186 (DNH -WT)
Sheri Edgett-Baron
Manager, Obstruction Evaluation Service

Attachment(s)
Additional Information
Map(s)

The proposed construction would be located approximately 5.59 nautical miles (NM) south of the Monmouth Municipal Airport (C66). It would exceed the Obstruction Standards of Title 14, Code of Federal Regulations (14 CFR), Part 77 as follows:

Section 77.23(a)(2) by 5 feet - a height that exceeds 458 feet above ground level within 5.59 NM as applied to C66.

The proposal was not circularized for public comment because current FAA obstruction evaluation policy exempts from circularization those proposals that exceed the above cited obstruction standard. This is provided the proposal does not lie within an airport traffic pattern. This policy does not affect the public's right to petition for review determinations regarding structures, which exceed the subject obstruction standards.

AERONAUTICAL STUDY FOR POSSIBLE INSTRUMENT FLIGHT RULES (IFR) EFFECT DISCLOSED THE FOLLOWING:

> The proposed structure would have no effect on any existing or proposed IFR arrival/departure routes, operations, or procedures.

> The proposed structure would have no effect on any existing or proposed IFR en route routes, operations, or procedures.

> The proposed structure would have no effect on any existing or proposed IFR minimum flight altitudes.

AERONAUTICAL STUDY FOR POSSIBLE VISUAL FLIGHT RULES (VFR) EFFECT DISCLOSED THE FOLLOWING:

> The proposed structure would have no effect on any existing or proposed VFR arrival or departure routes, operations or procedures.

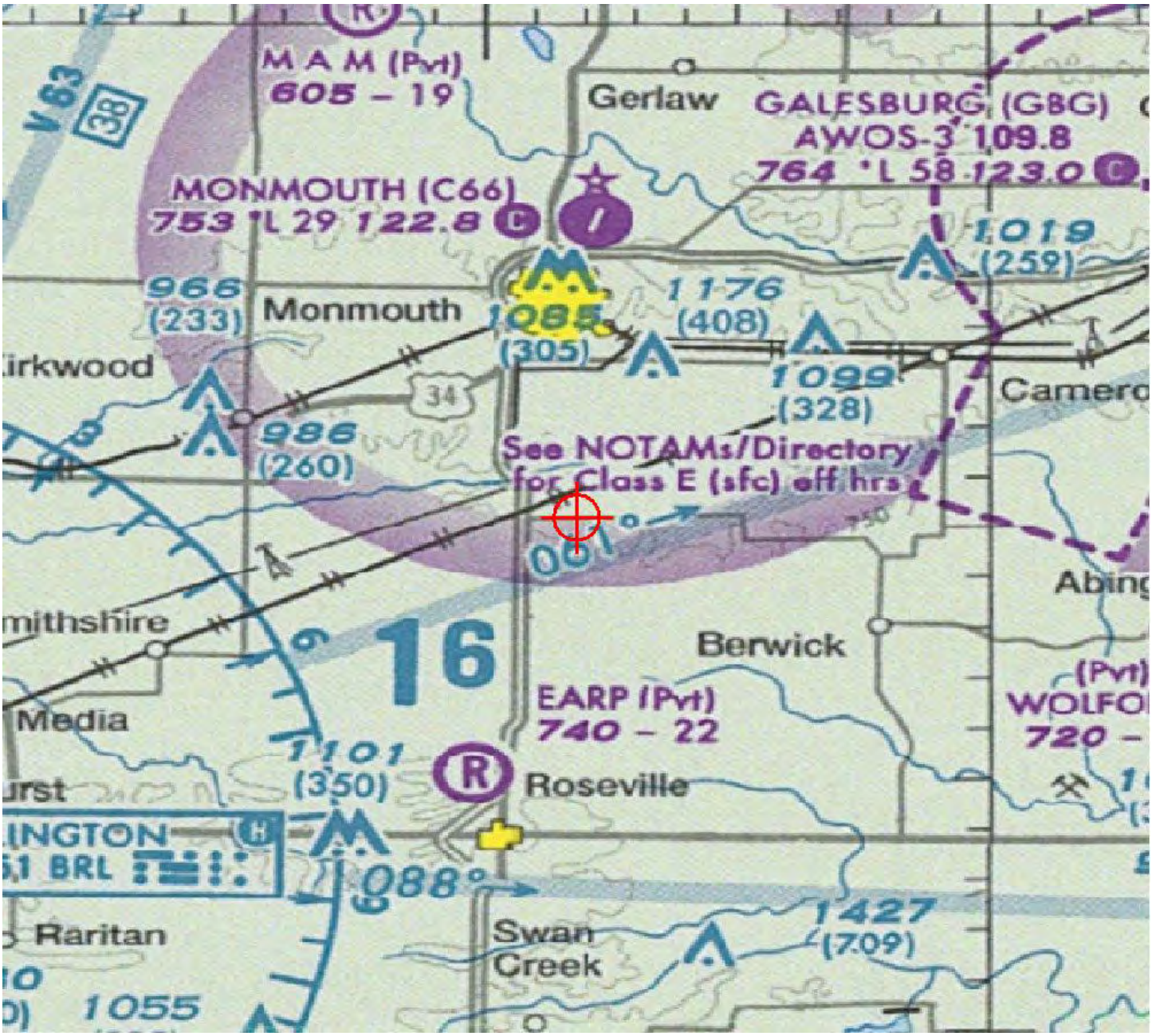
> The proposed structure would not conflict with airspace required to conduct normal VFR traffic pattern operations at any known public use or military airports.

> The proposed structure would not penetrate those altitudes normally considered available to airmen for VFR en route flight.

> The proposed structure will be appropriately obstruction marked and lighted to make it more conspicuous to airmen flying in VFR weather conditions at night.

The cumulative impact of the proposed structure, when combined with other existing structures is not considered significant. Study did not disclose any adverse effect on existing or proposed public-use or military airports or navigational facilities. Nor would the proposal affect the capacity of any known existing or planned public-use or military airport.

Therefore, it is determined that the proposed construction would not have a substantial adverse effect on the safe and efficient utilization of the navigable airspace by aircraft or on any air navigation facility and would not be a hazard to air navigation.


M A M (Pvt)
605 – 19
Gerlaw
GALESBURG (GBG)
AWOS-3 109.8
764 'L 58 123.0
MONMOUTH (C66)
753 'L 29 122.8
1019
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966
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Monmouth
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(408)
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(328)
986
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See NOTAMs/Directory
for Class E (sfc) off hrs
16
Berwick
Media
EARP (Pvt)
740 – 22
1101
(350)
Roseville
088°
Raritan
Swan
Creek
1427
(709)
1055
V63
38
34

Attachment C-2

National Telecommunications and Information Administration

UNITED STATES DEPARTMENT OF COMMERCE
National Telecommunications and Information Administration
Washington, D.C. 20230

OCT 19 2010

Ms. Caroline Mann
Office of Energy Efficiency and Renewable Energy (EE-40)
US Department of Energy
1000 Independence Avenue, SW
Washington, DC 20585

Re: Monarch Wind Project, in Warren County, IL

Dear Ms. Mann:

In response to your request on August 20, 2010, the National Telecommunications and Information Administration provided to the federal agencies represented in the Interdepartment Radio Advisory Committee (IRAC) the plans for the Monarch Warren County Wind Project, located in Warren County, Illinois.

After a 45 day period of review, no federal agencies identified any concerns regarding blockage of their radio frequency transmissions.

While the IRAC agencies did not identify any concerns regarding radio frequency blockage, this does not eliminate the need for the wind energy facilities to meet any other requirements specified by law related to these agencies. For example, this review by the IRAC does not eliminate any need that may exist to coordinate with the Federal Aviation Administration concerning flight obstruction.

Thank you for the opportunity to review these proposals.

Sincerely,

Edward M. Davison

Edward M. Davison
Deputy Associate Administrator
Office of Spectrum Management

Type of Notification: **NEW**

Project: **Monarch Warren County Wind Turbine Project**

County: **Warren**

State: **Illinois**

Project Sponsor: **U.S Department of Energy: Energy Efficiency and Renewable Energy**

DOE NEPA Document Manager:

Caroline Mann
Caroline.Mann@ee.doe.gov
(202) 287-5380

DOE Support NEPA Document Manager:

John Weckerle
johnw@ageiss.com
(505) 286-4278

Turbine Description:

Number of Turbines:	13
Turbine Size:	1.5 MW
Turbine Hub Height AGL (m):	100.0 m
Maximum Blade Tip Height AGL (m):	141.3 m
Turbine Blade Diameter (m):	82.5 m

Turbine Locations:

GPS: Approximate Center Point: 40.832169, -90.651106 (Google Earth)

Street Address: U.S Highway 67 and 140th Avenue, Kirkwood, IL 61462

Turbines	Latitude	Longitude
Turbine #1	40-49-57.29N	90-39-50.36W
Turbine #2	40-49-48.18N	90-39-51.38W
Turbine #3	40-49-39.15N	90-39-52.38W
Turbine #4	40-49-30.12N	90-39-53.33W
Turbine #5	40-49-21.10N	90-39-54.38W
Turbine #6	40-50-22.66N	90-38-13.69W
Turbine #7	40-49-56.23N	90-39-39.50W
Turbine #8	40-49-46.83N	90-39-40.53W
Turbine #9	40-49-33.45N	90-39-42.11W
Turbine #10	40-49-55.27N	90-39-07.66W
Turbine #11	40-50-20.15N	90-38-26.84W
Turbine #12	40-50-16.43N	90-38-05.92W
Turbine #13	40-50-11.62N	90-38-08.79W

Maps: Please see attached maps and microwave report

Submitted to:

Edward Davison

Email: edavison@ntia.doc.gov
Work Phone: (202) 482-5526
National Telecommunications & Information Administration (NTIA)
Domestic Spectrum Policies & IRAC Support Division (DSID)

&

Joyce C. Henry

Email: jhenry@ntia.doc.gov
Work Phone: (202) 482-1850/51
National Telecommunications & Information Administration (NTIA)
Office of Spectrum Management/HQ

Attachment C-3

Illinois Department of Natural Resources

Illinois Department of
Natural Resources
One Natural Resources Way Springfield, Illinois 62702-1271
http://dnr.state.il.us

Pat Quinn, Governor
Marc Miller, Director

March 19, 2010

Alyson Grady
Illinois Department of Commerce and Economic Opportunity
620 East Adams
Springfield, IL 62701

Re: Monarch Wind Power ARRA REPP
Project Number(s): 1006013 [0811635]
County: Warren

Dear Applicant:

This letter is in reference to the project you recently submitted for consultation. The natural resource review provided by EcoCAT identified protected resources that may be in the vicinity of the proposed action. The Department has evaluated this information and concluded that adverse effects are unlikely. Therefore, consultation under 17 Ill. Adm. Code Part 1075 and 1090 is terminated.

Wetlands may exist along the railroad tracks that transect this property. A wetland delineation needs to be conducted to document baseline conditions. The grant should be conditioned to require the avoidance of any state jurisdictional wetlands when possible. Unavoidable impacts will require coordination with the Department to determine the amount of mitigation required under the IWPA.

Consultation for Part 1075 is valid for two years unless new information becomes available that was not previously considered; the proposed action is modified; or additional species, essential habitat, or Natural Areas are identified in the vicinity. If the project has not been implemented within two years of the date of this letter, or any of the above listed conditions develop, a new consultation is necessary. Consultation for Part 1090 (Interagency Wetland Policy Act) is valid for three years.

The natural resource review reflects the information existing in the Illinois Natural Heritage Database and the Illinois Wetlands Inventory at the time of the project submittal, and should not be regarded as a final statement on the site being considered, nor should it be a substitute for detailed site surveys or field surveys required for environmental assessments. If additional protected resources are encountered during the project's implementation, you must comply with the applicable statutes and regulations. Also, note that termination does not imply IDNR's authorization or endorsement of the proposed action.

Please contact me if you have questions regarding this review.

Michael Branham
Division of Ecosystems and Environment
217-785-5500

EcoCAT
Ecological Compliance Assessment Tool

Applicant:	Illinois Department of Commerce and Economic Opportunity	*IDNR Project #:*	1006013
Contact:	Alyson Grady	Date:	02/08/2010
Address:	620 East Adams Springfield, IL 62701		

Project: Monarch Wind Power ARRA REPP
Address: US 67 and 140th Ave, Monmouth

Description: The project will construct a 10 turbine, 17 MW wind farm on approximately 750 acres in Warren County.

Natural Resource Review Results

Consultation for Endangered Species Protection and Natural Areas Preservation (Part 1075)
The Illinois Natural Heritage Database contains no record of State-listed threatened or endangered species, Illinois Natural Area Inventory sites, dedicated Illinois Nature Preserves, or registered Land and Water Reserves in the vicinity of the project location.

Wetland Review (Part 1090)
The National Wetlands Inventory shows wetlands within 250 feet of the project location.

An IDNR staff member will evaluate this information and contact you within 30 days to request additional information or to terminate consultation if adverse effects are unlikely.

Location
The applicant is responsible for the accuracy of the location submitted for the project.

County: Warren
Township, Range, Section:
10N, 2W, 19
10N, 2W, 20
10N, 2W, 29
10N, 2W, 30

IL Department of Natural Resources Contact
Michael Branham
217-785-5500
Division of Ecosystems & Environment

Local or State Government Jurisdiction
IL Department of Commerce and Economic Opportunity
Alyson Grady
620 East Adams
Springfield, Illinois 62701

Disclaimer

The Illinois Natural Heritage Database cannot provide a conclusive statement on the presence, absence, or condition of natural resources in Illinois. This review reflects the information existing in the Database at the time of this inquiry, and should not be regarded as a final statement on the site being considered, nor should it be a substitute for detailed site surveys or field surveys required for environmental assessments. If additional protected resources are encountered during the project's implementation, compliance with applicable statutes and regulations is required.

Terms of Use

By using this website, you acknowledge that you have read and agree to these terms. These terms may be revised by IDNR as necessary. If you continue to use the EcoCAT application after we post changes to these terms, it will mean that you accept such changes. If at any time you do not accept the Terms of Use, you may not continue to use the website.

1. The IDNR EcoCAT website was developed so that units of local government, state agencies and the public could request information or begin natural resource consultations on-line for the Illinois Endangered Species Protection Act, Illinois Natural Areas Preservation Act, and Illinois Interagency Wetland Policy Act. EcoCAT uses databases, Geographic Information System mapping, and a set of programmed decision rules to determine if proposed actions are in the vicinity of protected natural resources. By indicating your agreement to the Terms of Use for this application, you warrant that you will not use this web site for any other purpose.

2. Unauthorized attempts to upload, download, or change information on this website are strictly prohibited and may be punishable under the Computer Fraud and Abuse Act of 1986 and/or the National Information Infrastructure Protection Act.

3. IDNR reserves the right to enhance, modify, alter, or suspend the website at any time without notice, or to terminate or restrict access.

Security

EcoCAT operates on a state of Illinois computer system. We may use software to monitor traffic and to identify unauthorized attempts to upload, download, or change information, to cause harm or otherwise to damage this site. Unauthorized attempts to upload, download, or change information on this server is strictly prohibited by law. Unauthorized use, tampering with or modification of this system, including supporting hardware or software, may subject the violator to criminal and civil penalties. In the event of unauthorized intrusion, all relevant information regarding possible violation of law may be provided to law enforcement officials.

Privacy

EcoCAT generates a public record subject to disclosure under the Freedom of Information Act. Otherwise, IDNR uses the information submitted to EcoCAT solely for internal tracking purposes.

EcoCAT
Ecological Compliance Assessment Tool

Applicant:	Edge Consulting Engineers, Inc.	*IDNR Project #:*	1010648
Contact:	Tracy Drunasky	Alternate #:	4846, 1006013
Address:	624 Water Street Prairie du Sac, WI 53578	Date:	06/23/2010

Project: Monarch Wind Power ARRA REPP
Address: US Hwy 67 and 140th Avenue, Kirkwood

Description: The project will consist of the construction of thirteen (13) wind turbines and a substation on approximately 750 acres in Warren County, IL.

Natural Resource Review Results

The Illinois Natural Heritage Database contains no record of State-listed threatened or endangered species, Illinois Natural Area Inventory sites, dedicated Illinois Nature Preserves, or registered Land and Water Reserves in the vicinity of the project location.

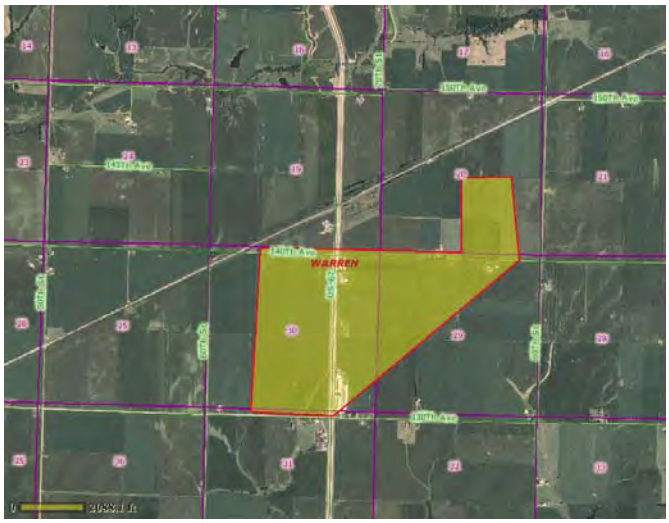
Location

The applicant is responsible for the accuracy of the location submitted for the project.

County: Warren

Township, Range, Section:

10N, 2W, 19
10N, 2W, 20
10N, 2W, 29
10N, 2W, 30
10N, 2W, 31



IL Department of Natural Resources Contact
Rick Pietruszka
217-785-5500
Division of Ecosystems & Environment

Local or State Government Jurisdiction
Federal Energy Regulatory Commission

Disclaimer

The Illinois Natural Heritage Database cannot provide a conclusive statement on the presence, absence, or condition of natural resources in Illinois. This review reflects the information existing in the Database at the time of this inquiry, and should not be regarded as a final statement on the site being considered, nor should it be a substitute for detailed site surveys or field surveys required for environmental assessments. If additional protected resources are encountered during the project's implementation, compliance with applicable statutes and regulations is required.

Terms of Use

By using this website, you acknowledge that you have read and agree to these terms. These terms may be revised by IDNR as necessary. If you continue to use the EcoCAT application after we post changes to these terms, it will mean that you accept such changes. If at any time you do not accept the Terms of Use, you may not continue to use the website.

1. The IDNR EcoCAT website was developed so that units of local government, state agencies and the public could request information or begin natural resource consultations on-line for the Illinois Endangered Species Protection Act, Illinois Natural Areas Preservation Act, and Illinois Interagency Wetland Policy Act. EcoCAT uses databases, Geographic Information System mapping, and a set of programmed decision rules to determine if proposed actions are in the vicinity of protected natural resources. By indicating your agreement to the Terms of Use for this application, you warrant that you will not use this web site for any other purpose.

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Privacy

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Attachment C-4

Illinois Department of Agriculture

Illinois Department of Agriculture

Pat Quinn, Governor
Thomas E. Jennings, Director

Bureau of Land and Water Resources

State Fairgrounds • P.O. Box 19281 • Springfield, IL 62794-9281 • 217/782-6297 • TDD 217/524-6858 • Fax 217/557-0993

September 23, 2010

Ms. Tracy Drunasky
Edge Consulting Engineers, Inc.
624 Water Street
Prairie du Sac, Wisconsin 53578

Re: Monarch Wind Power LLC
Monarch Wind Farm: ±22 acres
Warren County, Illinois
DCEO High Impact Business Wind Energy Program

Dear Ms. Drunaksy:

Thank you for notifying the Illinois Department of Agriculture (IDOA) of the Monarch Wind Power LLC's request to receive the "High Impact Business" designation as established by the Illinois Department of Commerce and Economic Opportunity (DCEO). The IDOA conducted a Study of Agricultural Impacts (copy enclosed) associated with the renewable energy project. The proposal has been examined to determine its potential impact to agricultural land as well as its compliance with Illinois' Farmland Preservation Act (505 ILCS 75/1 et seq.).

Monarch Wind Power plans to construct 13 wind turbine generators in Lenox Township in Warren County. It is our understanding that the new wind farm development will be limited to the wind turbine sites, connector lines, access roads and one electrical substation. As a result of the wind farm's construction, ±7 acres will be permanently converted from agricultural production.

Based upon our study, the IDOA would not object to the DCEO's designation of Monarch Wind Power into its High Impact Business Program. The IDOA would consider such an action to be consistent with the DCEO's Agricultural Land Preservation Policy and the Illinois Farmland Preservation Act.

Should you have any questions regarding our review of this project or our study, please contact Terry Savko of my staff at 217-785-4458.

Sincerely,

Steven D. Chard, Acting Chief
Bureau of Land and Water Resources

Enclosure

SDC:TS

cc: Governor Pat Quinn
Sen. John Cullerton
Sen. Christine Radogno
Rep. Michael Madigan
Rep. Tom Cross
Sen. John Sullivan
Rep. Richard Myers
Dominic Saebeler, IDOA
Jared Thornley, IDOA
Jeff Williams, IDOA
Mark Gauss, DCEO
Inter-Agency Committee
Warren Co. SWCD
Agency project file

ILLINOIS DEPARTMENT OF AGRICULTURE
STUDY OF AGRICULTURAL IMPACTS

Monarch Wind Power LLC
Monarch Wind Farm – ±7 acres
Warren County, Illinois
DCEO High Impact Business Wind Energy Program

The Illinois Department of Agriculture (IDOA) conducted a study of agricultural impacts on the request by the Monarch Wind Power LLC to construct 13 wind turbines and related appurtenances in Warren County. The results of our study are as follows.

- **Prime status of soils** - According to the Warren County Soil Survey, which was mapped by the USDA Natural Resources Conservation Service, the turbine sites are comprised of Prime soils. The farmland that is adjacent to the area is of similar quality.

- **Proximity to corporate boundaries** - Turbine sites will be located in unincorporated areas of Lenox Township in Warren County.

- **Current land use** - All of the wind turbine sites are cropland. The connector strips and substations involve agricultural land and road right-of-way. Six of the 13 structures will be constructed on county-owned property.

- **Adjacent land use** - All sides are in agricultural use.

- **Zoning** - Warren County has zoned the affected property for agricultural use. Land surrounding the turbine sites is zoned for agricultural use.

- **Planned land use** – Warren County does not possess a comprehensive land use plan. However, Warren County has issued the project a special use permit, with the surrounding area to remain in agricultural use.

- **Land in an Agricultural Conservation and Protection Area (505 ILCS 5/1 et seq.)** – None of the property is within a county designated Agricultural Area.

- **Loss of gross agricultural receipts** - The conversion of all agricultural land within the 13 wind turbine sites would result in a **potential annual loss of $9,854 cash receipts from crops and livestock** based upon statistics from the *Illinois Agricultural Statistics Service's 2009 Annual Bulletin.* ***(Warren County Total Cash Receipts) ÷ (Land in Farms in Warren County) = ($758)/acre x (±7 ac) in ag use.***

IDOA Opinion - The Monarch Wind Farm project will construct 13 wind turbines in rural Warren County. Each of the project's 13 turbine pad sites and access lanes have been designed to acquire and convert the least possible amount of agricultural land. Upon completion, the project results in the permanent conversion of ±7 cropland acres to a non-agricultural use.

Because the project will convert only the acreage needed for the turbine pads and access roads, and the surrounding rural area that contains Illinois' most productive Prime farmland soils will remain in agricultural use, the IDOA has determined that the project is consistent with the DCEO Agricultural Land Preservation Policy and complies with the Illinois Farmland Preservation Act.

U.S. Department of Agriculture

FARMLAND CONVERSION IMPACT RATING

PART I *(To be completed by Federal Agency)*	Date Of Land Evaluation Request 08/11/2010
Name Of Project Monarch Warren County Wind Turbine Project	Federal Agency Involved US Department of Energy (US DOE)
Proposed Land Use 13-Turbine Wind Energy Farm	County And State Warren County, Illinois
PART II *(To be completed by NRCS)*	Date Request Received By NRCS

Does the site contain prime, unique, statewide or local important farmland? *(If no, the FPPA does not apply – do not complete additional parts of this form).*	Yes ☒	No ☐	Acres Irrigated 0	Average Farm Size
Major Crop(s) CORN / SOYBEANS	Farmable Land In Govt. Jurisdiction Acres: 347 375 %		Amount Of Farmland As Defined in FPPA Acres: 323825 %	
Name Of Land Evaluation System Used Illinois	Name Of Local Site Assessment System Statewide WARREN COUNTY LESA		Date Land Evaluation Returned By NRCS 8-23-10	

PART III *(To be completed by Federal Agency)*	Alternative Site Rating Site A	Site B	Site C	Site D
A. Total Acres To Be Converted Directly	7			
B. Total Acres To Be Converted Indirectly	None			
C. Total Acres In Site	750			
PART IV *(To be completed by NRCS)* Land Evaluation Information				
A. Total Acres Prime And Unique Farmland	7			
B. Total Acres Statewide And Local Important Farmland	7			
C. Percentage Of Farmland In County Or Local Govt. Unit To Be Converted	>1%			
D. Percentage Of Farmland In Govt. Jurisdiction With Same Or Higher Relative Value	>1%			
PART V *(To be completed by NRCS)* Land Evaluation Criterion Relative Value Of Farmland To Be Converted *(Scale of 0 to 100 Points)*	99.8			

PART VI *(To be completed by Federal Agency)* Site Assessment Criteria *(These criteria are explained in 7 CFR 658.5(b)*	Maximum Points	
1. Area In Nonurban Use		See attached WARREN COUNTY LESA Site Assessment Factors
2. Perimeter In Nonurban Use		
3. Percent Of Site Being Farmed		
4. Protection Provided By State And Local Government		
5. Distance From Urban Builtup Area		
6. Distance To Urban Support Services		
7. Size Of Present Farm Unit Compared To Average		
8. Creation Of Nonfarmable Farmland		
9. Availability Of Farm Support Services		
10. On-Farm Investments		
11. Effects Of Conversion On Farm Support Services		
12. Compatibility With Existing Agricultural Use		
TOTAL SITE ASSESSMENT POINTS	200* ~~160~~	
PART VII *(To be completed by Federal Agency)*		
Relative Value Of Farmland *(From Part V)*	100	100
Total Site Assessment *(From Part VI above or a local site assessment)*	200* ~~160~~	165
TOTAL POINTS *(Total of above 2 lines)*	300* ~~260~~	265

Site Selected:	Date Of Selection	Was A Local Site Assessment Used? Yes ■ No ☐

Reason For Selection:

* When using the Warren County Site Assessment factors, 200 points are assigned to the Site Assessment section of the LESA system for a maximum score of 300 points.

(See Instructions on reverse side)

This form was electronically produced by National Production Services Staff

Form AD-1006 (10-83)

Warren County Site Assessment Factors

Monarch Wind Farm
Warren County, Illinois

	Maximum Points	Site Score
Agricultural Land Use		
1. Land in Agriculture within 0.5 miles of the Site	20	20
2. Contiguous Land in Agriculture	20	20
3. Percentage of Site in Agriculture	10	10
Compatibility/Impact of Uses		
4. County Sector	20	20
5. Soil Suitability for On-site Waste Disposal	20	20
6. Environmental Impact of Proposed Use	15	0
7. Impact on Unique Historical/Cultural Features	10	0
Existing Infrastructures		
8. Transportation Accessibility	20	10
9. Availability of Central Sewer	15	15
10. Public Water Supply	20	20
11. Distance from Firehouse	20	20
12. Distance from School	10	10
TOTAL SITE ASSESSMENT POINTS	**200**	**165**
Relative Value of Farmland	100	100
Total Site Assessment	200	165
TOTAL Warren County LESA Score	**300**	**265**

090310
JL

McClure
Engineering Associates, Inc.

February 12, 2010

Terry J. Salvo, Soil Conservation Planner
Illinois Department of Agriculture
Bureau of Farmland Protection
State Fairgrounds
Springfield, IL 62701-9281

Re: Monarch Wind Farm
MEAI #03-15-10014

Dear Terry:

Monarch Wind Farms has recently begun design on a new wind farm in Warren County. This project will be privately funded and is estimated to have a construction cost of approximately $20,000,000.00.

This project includes the construction of 13 wind turbine generators (80 meter hub height and 82.5 meter blade diameter) on concrete spread footings; access roads for construction equipment and materials, equipment delivery and construction of buried electrical cables. The construction road will be partially removed and a maintenance access road will be left in place. I am attaching copies of the agricultural review information form, a USGS map with the project site highlighted, and a site map.

I am hereby requesting that your agency review the project and transmit a sign-off letter indicating that there are no objections to the project. If you have any questions or concerns, please feel free to contact me. Thank you for your time and prompt attention to this matter.

Sincerely,

McCLURE ENGINEERING ASSOCIATES, INC.

Chris Firof

Chris Firof, EIT, SIT
Project Engineer
CTF/lb

Enc.
Cc: Robert Gay, Monarch Wind Power LLC

M:\DOC\LINDA61\Monarch Wind Farm\Ltr to Dept of Ag Requesting Sign-off.doc

714 East Jackson | Macomb, IL 61455 | Phone: 309.833.4594 | Fax: 309.837.4909

ATTACHMENT C-2

AGRICULTURAL REVIEW INFORMATION
Requested for the
Illinois Department of Commerce and Economic Opportunity Grants
Including **CDAP, AFPI, BDPI,** and **LBDP** Projects

Return this information to: Illinois Department of Agriculture **(Terry Savko)**
Bureau of Land and Water Resources
State Fairgrounds, P.O. Box 19281
Springfield, Illinois 62794-9281
Telephone 217-785-4458 FAX 217-557-0993

Attach this Agricultural Site Review Information sheet and the DCEO Project Summary to the project's cover letter and send it to the address listed above. The **Project Summary sheet,** which is part of the DCEO Application Packet, **must accompany** the initial review request to the Illinois Department of Agriculture (IDA) because it provides an overview of the project as well as relevant background information. Be sure to **include** a location map delineating the site in relation to the city/village's corporate boundaries.

TYPE OF DCEO or CDAP FUNDS REQUESTED ***Date of Submittal*** 02/12/10

Check one:

CDAP ☐ Economic Development Financial Assistance ☐ Public Facilities/Infrastructure
☐ Emergency Public Facilities ☐ Flood Related ☐ In Support of Economic Development

☐ Affordable Financing Public Infrastructure **(AFPI)**
☐ DCEO Business Development Public Infrastructure **(BDPI)**
☐ DCEO Large Business Development Program **(LBDP)**

PROJECT INFORMATION REQUESTED

Name of
APPLICANT Monarch Wind Farm County Warren

Local Official Robert Gay Telephone 914-9674684

List the project's contact person should additional information be required. It is preferable to list the project's consultant and/or engineer rather than the mayor since they usually possess the more detailed information we need in order to complete our review. Remember, the IDA has a ***30-day review period*** in which to provide comments to the applicant once all pertinent information has been received.

Consultant /Engineer Eric Moe / McClure Engineering Assoc. Inc.
Address 714 East Jackson Street
City Macomb, IL 61455

Telephone 309-833-4594 FAX 309-837-4909

1. Number of acres in the site 23.1 acres 1a. Actual size of entire project site 23.1 acres
2. Will the site be converted from an agricultural to a non-agricultural use? [X] Yes ☐ No
3. Is the site located within municipality's corporate boundaries? ☐ Yes [X] No
4. If no, how far is the site from the nearest incorporated municipal boundaries? 3.2 miles (to nearest tenth-mile increment)

LAND USE

5. Current land use on site is [X] Row Crop ☐ Pasture ☐ Forest ☐ Other *(check all that apply)*

If Other, specify land use and land cover residential land covered by pavement

6. List the current land use for the parcel's four adjacent sides.
   North agricultural _____
   East agricultural _____
   South agricultural _____
   West agricultural _____

ZONING

☐ ***Check if site is not zoned***

0. Site is zoned by the ☐ city or [X]Warren _____County for agricultural _____ use.
   (name)

8. List the designated zoning for each of the site's four sides.
   Zoning north of site agricultural _____ by ☐ city or [X] county
   Zoning east of site agricultural _____ by ☐ city or [X] county
   Zoning south of site agricultural _____ by ☐ city or [X] county
   Zoning west of site agricultural _____ by ☐ city or [X] county

COMPREHENSIVE LAND USE PLAN

9. Does the city or county comprehensive land use plan designate land use at t he project site?
   ☐ Yes ***If Yes,*** city, county or both? _____
   Include the name of city, county or both entities

   [X]No

10. The comprehensive land use plan was officially adopted in (year) _____
    ☐ by city or village ☐ the county ☐ both

11. The designated land use for the site is _____by the ☐ city ☐ county

12. List the comprehensive land use plan's designated land uses for each of the site's four sides.
    North _____
    East _____
    South _____
    West _____

Will other state or federal funds be used

for this project?_____ ☐ Yes ☒ No ***If YES,*** list the name(s) of participating agencies:

	state $	*federal $*
1) _____	☐	☐
2) _____	☐	☐
3) _____	☐	☐

Edge
Consulting Engineers, Inc.

624 Water Street
Prairie du Sac, WI 53578

608.644.1449 phone
608.644.1549 fax

August 11, 2010

Warren County SWCD
Attn: Rick Winbigler
701 North Main Street
Monmouth, IL 61462

SUBJECT: NRCS AD-1006 SYNOPSIS LETTER
MONARCH WARREN COUNTY WIND TURBINE PROJECT

Dear Mr. Winbigler:

Monarch Wind Power (MWP) is proposing to construct and operate a 13-turbine, 20 MW wind energy project on approximately 750 acres of land leased in Warren County, Illinois in collaboration with GE Energy (turbine supplier) and WPCS International (the contractor). The site is located about four miles south of Monmouth in West Central Illinois along both sides of Route 67 (see Figure 1 – Project Map). The entire 20 MW facility would be interconnected to an existing Ameren radial 69kv line that runs along Route 67 (line #6630) and traverses the site. The hub height of each tower would to be 100 meters and the rotor diameter is to be 82.5 meters, for a total overall wind turbine height of 141.25 meters.

The area of the proposed project is developed as agricultural fields, which in spring 2010 was planted with either corn or bean crops. The proposed project area is located entirely within existing agricultural fields (row corn and soybeans), and has been extensively disturbed by decades of cultivation. The overall project area is 750 acres in size, but areas of ground disturbance are limited to 16 acres. Much of this acreage could be reclaimed for agricultural purposes after construction activities, as the area the wind turbine base/fenced area, associated access drives, and substation will only occupy a total of approximately 6.7 acres.

Native soils typically consist primarily of Muscatine silt loam (51A). This soil type is typically gently sloping and is poorly drained. The depth to bedrock is greater than 6 feet. Bedrock is commonly sedimentary rock of the Pennsylvanian Age. Other soils within the project area include 68A (Sable silty clay), 86B (Osco silt loam), 86B2 (Osco silt loam), and 86C2 (Osco silt loam). A map of the soils is included as Figure 2 – Soils Map. All soils with the exception of 86C2 are considered prime farmland.

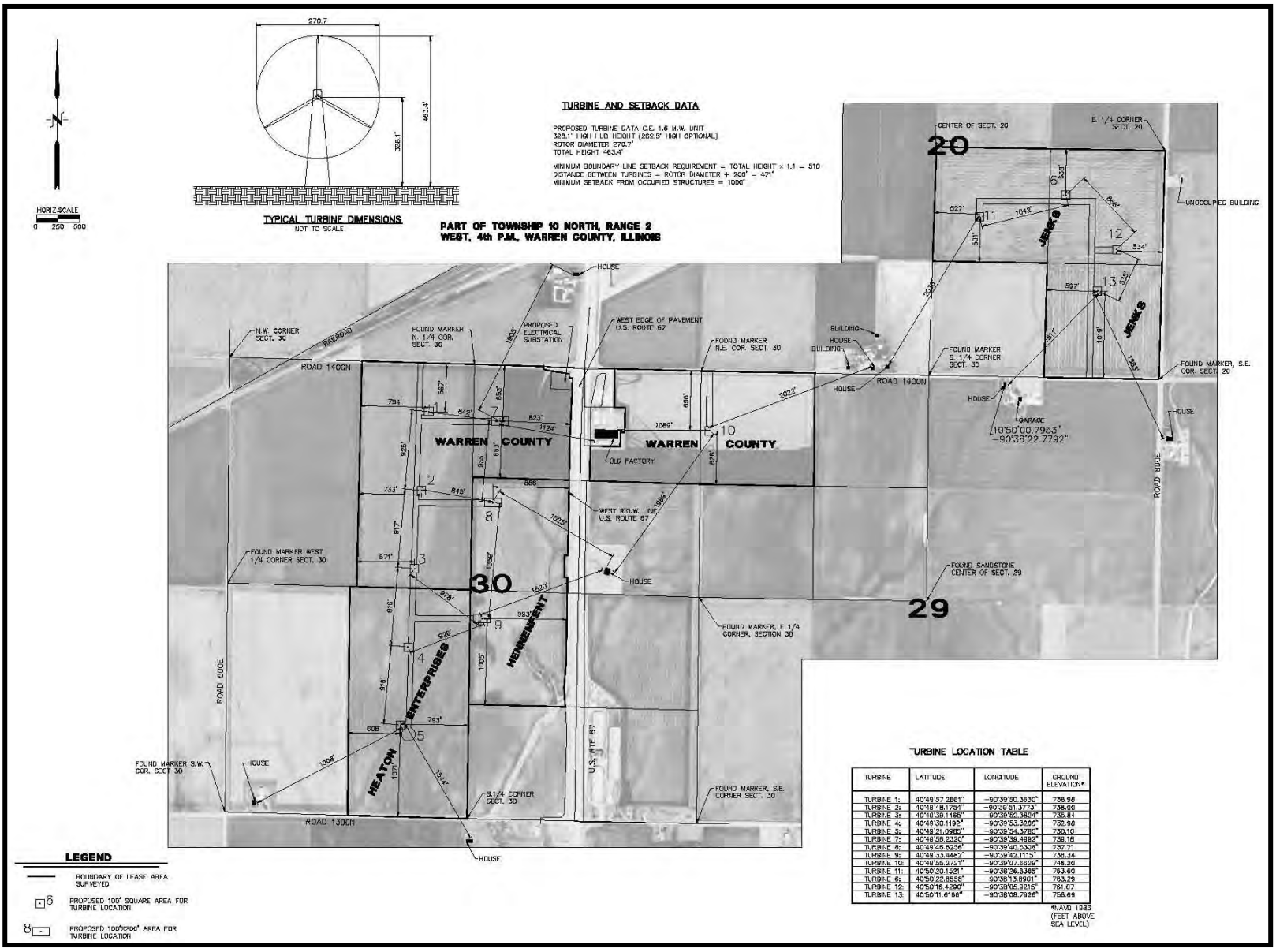

Figure 1 – Project Map

Warren County, Illinois (IL187)

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
51A	Muscatune silt loam, 0 to 2 percent slopes	456.5	40.4%
68A	Sable silty clay loam, 0 to 2 percent slopes	422.8	37.4%
86B	Osco silt loam, 2 to 5 percent slopes	136.9	12.1%
86B2	Osco silt loam, 2 to 5 percent slopes, eroded	42.3	3.7%
86C2	Osco silt loam, 5 to 10 percent slopes, eroded	72.0	6.4%
Totals for Area of Interest		**1,130.6**	**100.0%**

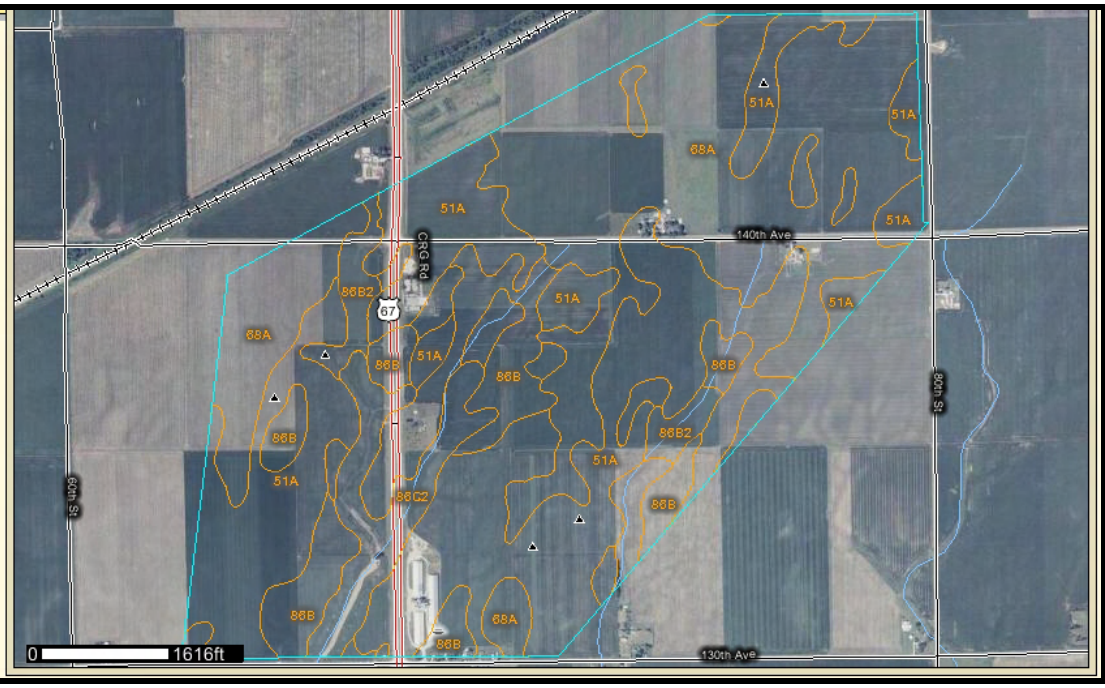

Figure 2 – Soils Map

Enclosed is Form AD-1006. Parts II, IV, V, VI, and VII are to be filled out by your office. Upon completion, the form will need to be sent to the DOA, as outlined in the letter attached to this letter.

Please feel free to contact me if you have any questions.

Sincerely,
Edge Consulting Engineers, Inc.

Tracy L. Drunasky
Environmental Professional/Scientist

U.S. Department of Agriculture

FARMLAND CONVERSION IMPACT RATING

PART I *(To be completed by Federal Agency)*		Date Of Land Evaluation Request 08/11/2010	
Name Of Project Monarch Warren County Wind Turbine Project		Federal Agency Involved US Department of Energy (US DOE)	
Proposed Land Use 13-Turbine Wind Energy Farm		County And State Warren County, Illinois	
PART II *(To be completed by NRCS)*		Date Request Received By NRCS	
Does the site contain prime, unique, statewide or local important farmland? *(If no, the FPPA does not apply -- do not complete additional parts of this form).*	Yes ☐ No ☐	Acres Irrigated	Average Farm Size
Major Crop*(s)*	Farmable Land In Govt. Jurisdiction Acres: %	Amount Of Farmland As Defined in FPPA Acres: %	
Name Of Land Evaluation System Used Illinois	Name Of Local Site Assessment System Statewide	Date Land Evaluation Returned By NRCS	

PART III *(To be completed by Federal Agency)*	Alternative Site Rating Site A	Site B	Site C	Site D
A. Total Acres To Be Converted Directly	6.7			
B. Total Acres To Be Converted Indirectly	16			
C. Total Acres In Site	750			
PART IV *(To be completed by NRCS)* Land Evaluation Information				
A. Total Acres Prime And Unique Farmland				
B. Total Acres Statewide And Local Important Farmland				
C. Percentage Of Farmland In County Or Local Govt. Unit To Be Converted				
D. Percentage Of Farmland In Govt. Jurisdiction With Same Or Higher Relative Value				
PART V *(To be completed by NRCS)* Land Evaluation Criterion Relative Value Of Farmland To Be Converted *(Scale of 0 to 100 Points)*				
PART VI *(To be completed by Federal Agency)* Site Assessment Criteria *(These criteria are explained in 7 CFR 658.5(b)*	Maximum Points			
1. Area In Nonurban Use				
2. Perimeter In Nonurban Use				
3. Percent Of Site Being Farmed				
4. Protection Provided By State And Local Government				
5. Distance From Urban Builtup Area				
6. Distance To Urban Support Services				
7. Size Of Present Farm Unit Compared To Average				
8. Creation Of Nonfarmable Farmland				
9. Availability Of Farm Support Services				
10. On-Farm Investments				
11. Effects Of Conversion On Farm Support Services				
12. Compatibility With Existing Agricultural Use				
TOTAL SITE ASSESSMENT POINTS	160			
PART VII *(To be completed by Federal Agency)*				
Relative Value Of Farmland *(From Part V)*	100			
Total Site Assessment *(From Part VI above or a local site assessment)*	160			
TOTAL POINTS *(Total of above 2 lines)*	260			

Site Selected:	Date Of Selection	Was A Local Site Assessment Used? Yes ☐ No ☐

Reason For Selection:

(See Instructions on reverse side)

Form AD-1006 (10-83)

This form was electronically produced by National Production Services Staff

Completion of USDA Natural Resources Conservation Service (NRCS) Form AD-1006, Farmland Conversion Impact Rating

The completion of the USDA-NRCS Form AD-1006 Farmland Conversion Impact Rating is required whenever any project receiving federal monies will convert Prime and Statewide Important agricultural land to a non-agricultural land use on property located **outside** a municipality's corporate boundaries. ***It should also be initiated for property within the corporate boundaries if it is zoned for agricultural use.*** This includes **all** agricultural land (crop, hay, pasture and timber land). Land outside the corporate boundaries, often classified as idle or vacant by developers, is considered to be in agricultural use unless it is specifically zoned for non-agricultural use by the county. The USDA-NRCS Form AD-1006 is available locally through the county Soil and Water Conservation District /USDA-NRCS office.

The attached list shows the 38 Illinois counties that have their own State NRCS-approved Land Evaluation and Site Assessment (LESA) systems. Projects in these counties should have the Form AD-1006 completed at the county level. A copy of the completed AD-1006 form should be submitted to the Illinois Department of Agriculture (IDOA) when the applicant requests comments on the proposal. All other projects in the remaining counties will be evaluated at the state level, and forms should be sent to the State NRCS Office in Champaign, Illinois. Regardless whether a county has an official LESA System in place, ***all road projects OUTSIDE the corporate limits must be sent to the State NRCS office*** for completion.

The applicant should complete Parts I and III of the AD-1006 form and send it to Mr. Bob McLeese with the Illinois NRCS State Office. In your notification letter to Mr. McLeese, include the AD-1006 form, the project summary sheet(s) explaining the project, a detailed soil mapping unit sheet from the county's Soil Survey delineating the site (or road corridor), a list of affected soil mapping units with their respective acreage, and a site map showing its location to the entity's corporate limits. Please mention to Mr. McLeese to forward the completed AD-1006 form and a copy of the project information to Terry Savko with the Illinois Department of Agriculture. This information packet should be mailed to:

Mr. Bob McLeese, State Soil Conservationist
USDA-Natural Resources Conservation Service
2118 W. Park Court
Champaign, IL 61821
(217) 353-6641

NRCS will complete Parts II, IV, and V before forwarding the form and the accompanying information to the IDOA. Two copies of the completed Form AD-1006 will be returned by the IDOA to the person/consultant/agency who initiated its completion along with our written comments as to whether the project complies with the intent of the Illinois Farmland Preservation Act. Completion of this form is necessary so that federal funds can be released in a timely manner and does not interfere with a project's implementation.

One copy of the Form AD-1006 must be included in the project's Environmental Assessment; the other is for your project file. Questions regarding its completion may be directed to Terry Savko with the IDOA, Bureau of Land and Water Resources at 217-785-4458.

Attachment C-5

Illinois Historic Preservation Agency

Edge
Consulting Engineers, Inc.

624 Water Street
Prairie du Sac, WI 53578

608.644.1449 phone
608-644-1549 fax

October 11, 2010

Illinois Historic Preservation Agency
Ms. Anne Haaker
1 Old State Capitol Plaza
Springfield, Illinois 62701-1507

SUBJECT: **SECTION 106 REVIEW**
MONARCH WIND POWER LLC WIND FARM PROJECT
MONARCH WIND FARM
WARREN COUNTY, IL
IHPA LOG #038021610

Dear Ms. Haaker:

This letter is being sent on behalf of Monarch Wind Power and is to serve as a response to the letter received from your office on September 23, 2010, requesting the following three items for the above referenced project:

1) Archaeological monitoring of all ground disturbing activities in the Northeast corner of the leases space for the planned electrical substation
    - Monarch Wind Power will use Mr. Mark Branstner of Great Lakes Research, Inc. to perform the archaeological monitoring.

2) Written response that your office agrees with the above condition
    - This letter shall serve as a written response that Monarch Wind Power agrees with the above condition.

3) Findings from the archaeological investigation report are submitted to your office for review and acceptance.
    - Upon completion of Mr. Branstner's on-site monitoring, Mr. Branstner will compose an archaeological investigation report describing the outcome of the excavation activities. Edge Consulting, on behalf of Monarch Wind Power, will submit the findings to your office for review and acceptance.

Per our previous conversations with your office, it is our understanding that the Illinois Historic Preservation Agency concurs with the determination of *No Effect* for indirect effects to properties listed or eligible for listing on the National Register as a result of this project. Further, we seek your concurrence for the *Conditional No Adverse Effect* determination for direct effects.

If there are any questions, or if you need additional information to provide comments, please feel free to contact our office.

Respectfully,

Tracy L. Drunasky
Environmental Scientist
Edge Consulting Engineers, Inc

Illinois Historic
Preservation Agency

FAX (217) 782-8161

1 Old State Capitol Plaza • Springfield, Illinois 62701-1512 • www.illinois-history.gov

Warren County
Larchland
New Construction, Monarch Wind Farm
East and West sides of U.S. Route 67 between 130th Ave. and 150th Ave.
Warren County Poor Farm Cemetery - Intersection of U.S. Route 67 and 140th Ave., Kirkland
Edge-4846
IHPA Log #038021610

September 23, 2010

Tracy L. Drunasky
Edge Consulting Engineers, Inc.
624 Water Street
Prairie du Sac, WI 53578

Dear Ms. Drunasky:

We have reviewed the documentation provided for the above referenced project. The Warren County Poor Farm Cemetery is considered eligible for listing on the National Register of Historic Places.

In our opinion the project meets the Secretary of the Interior's "Standards for Rehabilitation and Guidelines for Rehabilitating Historic Buildings" and we concur in a finding of no adverse effect pursuant to 36 CFR Part 800 provided that the following conditions are met:

1. Archaeological monitoring of all ground disturbing activities in the Northeast corner of the leased space for the planned electrical substation.
2. Written response that your office agrees with the above condition.
3. Findings from the archaeological investigation report are submitted to our office for review and acceptance.

Notifying our office of agreement with these conditions and their subsequent implementation constitutes compliance with Section 106 of the National Historic Preservation Act of 1966, as amended.

If you have any questions, please contact me at 217/785-5027.

Sincerely,

Anne E. Haaker

Anne E. Haaker
Deputy State Historic
Preservation Officer

Attachment C-6

U.S. Fish and Wildlife Service

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Rock Island Field Office
1511 47th Avenue
Moline, Illinois 61265
Phone: (309) 757-5800 Fax: (309) 757-5807

IN REPLY REFER TO: FWS/RIFO

July 12, 2010

Ms. Tracy L. Drunasky
Environmental Scientist
Edge Consulting Engineers, Inc.
624 Water Street
Prairie du Sac, Wisconsin 53578

Dear Ms. Drunasky:

This responds to your letter dated June 23, 2010, requesting our comments on the proposed development of a wind farm in west-central Illinois. The U.S. Fish and Wildlife Service (Service) appreciates the opportunity to review the proposed wind energy project location and provide technical assistance to Edge Consulting Engineers, Inc. and Monarch Wind Power, LLC as it relates to federally threatened and endangered species, as well as non-listed migratory bird species possibly occurring within your project area in Warren County, Illinois. A list and habitat descriptions of all federally threatened and endangered species potentially occurring in your project area are provided in Attachment 1.

Federally Protected Bats

The project boundary is located less than 2.5 miles (average maximum foraging distance of summering Indiana bats) away from the nearest potential maternity habitat and contains other suitable habitats that could be used by Indiana bats. Nonetheless, no continuity exists between these habitats and the nearest maternity habitat, providing no pathway for take of this endangered species during the summer. Current literature indicates open expanses greater than 1000 feet are not typically spanned by foraging Indiana bats. Therefore, even if suitable habitat exists in the project vicinity, it is unlikely the habitat will be utilized as it is part of a non-contiguous landscape. However, because of the seasonal life history characteristics of migratory bats, the Monarch Wind Farm may affect the Indiana bat during spring and fall migrations. We recommend participation in the Regional Habitat Conservation Plan, further discussed below, because of the possibility of taking migratory individuals of this species.

We further recommend your client acquire additional information that could be used to determine the level of take anticipated for the endangered Indiana bat at this project location. At a minimum, we recommend passive monitoring with acoustic recording devices during the spring and fall migration seasons. This data should be analyzed yearly in an attempt to decipher species activity within the project area. If Indiana bats are detected, an Incidental Take Permit is needed. Furthermore, this office should be promptly informed of the record to assist in the development of additional, more complex research that thoroughly indicates the spatial and temporal patterns of Indiana bat usage near the project. Lastly, this office would appreciate the opportunity to assist you with the acoustic survey design and should be provided with the survey results at the conclusion of the study.

Habitat Conservation Plan

The lethal take of an Indiana bat by a wind turbine near the Indiana border has confirmed the Service's suspicions that this species may be affected by wind farms during migration. However, the cumulative impacts of wind farms on migrating Indiana bats are unclear at this point because of our lack of knowledge surrounding this species migration routes. Your client should consider participating in the Regional Habitat Conservation Plan (HCP) because of these uncertainties. The HCP will support the issuance of incidental take permits by the Service that will provide take coverage for construction, operation, and maintenance of wind energy and ancillary facilities in the Midwest region, provided that the anticipated take does not rise to the level of jeopardizing the continued existence of the species. Your partnership in this project will ensure the development of a document that meets both industry and wildlife recovery standards.

Federally Protected Birds

Individuals of an experimental population of endangered whooping cranes have used wetlands and agricultural lands as stop-over habitat in Illinois in recent years. Habitats within your project that area likely to be used by this population should be free of disturbance and void of any infrastructure, including above-ground transmission lines, which may harm or alter a whooping crane's normal biological behavior. We refer you to the Whooping Crane Eastern Partnership located at the following webpage for further avoidance recommendations: http://www.bringbackthecranes.org/

Raptors have also exhibited difficulty traversing through and around wind projects. The golden eagle and the newly delisted bald eagle are among these and are additionally protected under the Bald and Golden Eagle Protection Act. Under this act it is illegal to pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, destroy, molest, or disturb eagles. Should avian surveys indicate high levels of eagle activity near your project area, it is possible that your project may require an eagle take permit. For more information on how to avoid impacts to these species go to our website: http://www.fws.gov/midwest/eagle/guidelines/index.html

Conservation Measures

Lastly, we recommend that an avian and bat protection plan be drafted. This plan should address the use of conservation practices that would alleviate adverse effects on all protected species occurring within the project area. We would be pleased to assist in the development or review of any wildlife monitoring or protection plan you establish for this project.

Wetlands

Wetlands are valuable for flood and groundwater retention, filtration, and fish and wildlife habitat. Priority consideration should be given to avoid impacts to wetland areas. Any future activities in the study areas that would alter wetlands may require a Section 404 permit. Unavoidable impacts will require a mitigation plan to compensate for any losses of wetland functions and values. The U.S. Army Corps of Engineers, Clock Tower Building, P.O. Box 2004, Rock Island, Illinois 61201-2004, should be contacted for information about the permit process.

These comments provide technical assistance only and do not constitute the report of the Secretary of the Interior on the project within the meaning of Section 2(b) of the Fish and Wildlife Coordination Act, do not fulfill the requirements under Section 7 of the Endangered Species Act, nor do they represent the review comments of the U.S. Department of the Interior on any forthcoming environmental statement.

If you have any questions, please contact Matt Sailor of my staff at (309) 757-5800, extension 216.

Sincerely,

Richard C. Nelson
Field Supervisor

Enclosure

cc: ILDNR (Shank)

s:\office users\matt\technical assistance\edge\monarchwindwarrencoil(7-8-10).docx

Attachment 1:

Threatened and Endangered Species

Classification	Common and Scientific Name	County	Habitat
Endangered	Indiana bat (*Myotis sodalis*)	Warren	Caves, mines; small stream corridors with well developed riparian woods; upland forests
Endangered (*Experimental Population*)	Whooping Crane (*Grus americana*)	Warren	Wetlands, shallow water sand and gravel bars, various croplands
Threatened	Eastern prairie fringed orchid (*Platanthaera leucophaea*)	Warren	Mesic to wet prairies

Habitat Descriptions for Federally Threatened, Endangered and Candidate Species in Warren County, Illinois

The federally endangered **Indiana bat** (*Myotis sodalis*) is listed statewide in Illinois and maternity colonies have been found adjacent to your project area in Warren County, Illinois. Indiana bats in Illinois may use a variety of caves and abandoned mines for hibernation, and use the hibernacula's adjacent woodlands during spring emergence and fall swarming. During the summer female Indiana bats form maternity colonies and males, mostly solitary, will typically roost in trees with loose, peeling bark or cavities. Indiana bats will forage close to their roost or hibernaculum where they frequent wooded riparian corridors, mature upland forests, clearings with early successional vegetation (old fields), borders of croplands, wooded fencerows, farm ponds, and pastures. Altogether, Indiana bats establish several differing home ranges, depending on seasonal requirements. The area that constitutes a home range can be relatively large due to the animal's energetic requirements.

Suitable summer habitat in Illinois is considered to have the following characteristics within a ½ mile radius of a project site:

1) forest cover of 15% or greater;
2) permanent water;
3) potential roost trees with 10% or more peeling or loose bark

An experimental population of federally endangered **whooping cranes** (*Grus americana*) can occur statewide in Illinois during migration. Each year this experimental population migrates from its breeding grounds in Wisconsin (mid-September), to its wintering grounds off the Gulf Coast of Florida (late December). Any freshwater environment, or any agricultural field adjacent to such an environment, that provides ample foraging opportunities and low levels of disturbance can be utilized as stop-over habitat by individuals of this population during spring and fall migrations. To date they have principally used wetlands and agricultural areas on the

eastern border of Illinois and western Indiana. For further information on this species see the Whooping Crane Eastern Partnership webpage: http://www.bringbackthecranes.org/

The threatened **eastern prairie fringed orchid** (*Platanthera leucophaea*) may potentially occur in Warren County, Illinois. It occupies wet to mesic grassland habitats. There is no critical habitat designated for this species. Federal regulations prohibit any commercial activity involving this species or the destruction, malicious damage, or removal of this species from Federal land or any other lands in knowing violation of State law or regulation, including State criminal trespass law. This species should be searched for whenever wet prairie remnants are encountered.

Attachment C-7

Illinois Environmental Protection Agency

ILLINOIS ENVIRONMENTAL PROTECTION AGENCY

1021 North Grand Avenue East, P.O. Box 19276, Springfield, Illinois 62794-9276 • (217) 782-2829
James R. Thompson Center, 100 West Randolph, Suite 11-300, Chicago, IL 60601 • (312) 814-6026

PAT QUINN, GOVERNOR DOUGLAS P. SCOTT, DIRECTOR

217-782-0547

February 25, 2010

Mr. Chris Firof, EIT, SIT
Project Engineer
McClure Engineering Associates, Inc.
714 East Jackson
Macomb, IL 61455

Dear Mr. Firof:

We have reviewed the information received on the proposed project for the Monarch Wind Farm in Warren County.

The Agency has no objections to the project; however a construction site activity stormwater NPDES permit may be required from the Division of Water Pollution Control for more than one acre being disturbed during construction. For information concerning the NPDES permit, you may contact Al Keller, 217-782-0610.

Solid and hazardous waste must be properly disposed of or recycled.

Sincerely,

Lisa Bonnett

Lisa Bonnett
Acting Deputy Director

McClure
Engineering Associates, Inc.

February 12, 2010

Linda Laws
Illinois Environmental Protection Agency
Deputy Directors Office, #1
P. O. Box 19276
Springfield, IL 62701-9276

Re: Monarch Wind Farm
MEAI #03-15-10014

Dear Ms. Laws:

Monarch Wind Farms has recently begun design on a new wind farm in Warren County. This project will be privately funded and is estimated to have a construction cost of approximately $20,000,000.00.

This project includes the construction of 13 wind turbine generators (80 meter hub height and 82.5 meter blade diameter) on concrete spread footings; access roads for construction equipment and materials, equipment delivery and construction of buried electrical cables. The construction road will be partially removed and a maintenance access road will be left in place. I am attaching copies of a USGS map with the project site highlighted and a site map.

I am hereby requesting that your agency review the project and transmit a sign-off letter indicating that there are no objections to the project. If you have any questions or concerns, please feel free to contact me. Thank you for your time and prompt attention to this matter.

Sincerely,

McCLURE ENGINEERING ASSOCIATES, INC.

Chris Firof

Chris Firof, EIT, SIT
Project Engineer
CTF/lb

Enc.

Cc: Robert Gay, Monarch Wind Power LLC

M:\DOC\LINDA61\Monarch Wind Farm\Ltr to EPA Requesting Sign-off.doc

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Appendix D: Analysis and Supporting Documentation

Attachment D-1

EA Determination

PMC-EF2a
(2.04.02)

U.S. DEPARTMENT OF ENERGY
EERE PROJECT MANAGEMENT CENTER
NEPA DETERMINATION

RECIPIENT: Monarch Wind Power LLC **STATE:** IL

PROJECT TITLE : Monarch Warren County Turbine Project

Funding Opportunity Announcement Number	Procurement Instrument Number	NEPA Control Number	CID Number
			GO0

Based on my review of the information concerning the proposed action, as NEPA Compliance Officer (authorized under DOE Order 451.1A), I have made the following determination:

CX, EA, EIS APPENDIX AND NUMBER:

Description:

A9 Information gathering (including, but not limited to, literature surveys, inventories, audits), data analysis (including computer modeling), document preparation (such as conceptual design or feasibility studies, analytical energy supply and demand studies), and dissemination (including, but not limited to, document mailings, publication, and distribution; and classroom training and informational programs), but not including site characterization or environmental monitoring.

B3.1 Onsite and offsite site characterization and environmental monitoring, including siting, construction (or modification), operation, and dismantlement or closing (abandonment) of characterization and monitoring devices and siting, construction, and associated operation of a small-scale laboratory building or renovation of a room in an existing building for sample analysis. Activities covered include, but are not limited to, site characterization and environmental monitoring under CERCLA and RCRA. Specific activities include, but are not limited to:

C12 Siting, construction, and operation of energy system prototypes including, but not limited to, wind resource, hydropower, geothermal, fossil fuel, biomass, and solar energy pilot projects.

Rational for determination:

The proposed project consists of the development and construction of a 20MW wind generation facility on approximately 750 acres of land leased in Warren County, Illinois in collaboration with GE Energy (turbine supplier). The site is located about four miles south of Monmouth in West Central Illinois along both sides of Route 67. Eight turbines are proposed to be constructed on land leased from private landowners, with the other five turbines to be installed on County property. Monarch Wind Power has completed a wind study that uses two years of site-specific data and provides estimates of renewable energy generation for various turbines, as well as an avian/environmental study. The entire 20MW facility will be interconnected to an Ameren 69kv distribution line that runs along Route 67. The line bifurcates the site.

The turbines will be located on active agricultural fields. The five parcels are flat in topography and are undeveloped aside from agricultural uses. No structures or buildings are present at the proposed locations. The existing vegetation consists completely of agricultural crops. No undeveloped areas containing non-agricultural vegetation are present within the project extents. According to the applicant, no wildlife preserves or natural areas are located in the vicinity of the proposed project, and no mapped wetland areas are depicted in the USGS map for the area. No listed floodplains are depicted in the FEMA Flood Insurance Rate Maps (FIRMs) for the project. The current site plan complies with the Warren County zoning statutes for wind energy systems, and Monarch's land leases comply with the County's decommissioning statute. A County side road runs the depth of the County property and all the other turbine sites are close to existing roads, with most of them within easy access to Route 67 itself. With some upgrading and culverts, all the turbine sites will be easily accessible with a minimal amount of roadwork. The County will handle most of the construction and erection permits in compliance with its Wind Ordinance.
The project description and area covered was submitted to the on-line service EcoCAT of the Illinois Department of Natural Resources (DNR). The report generated indicated no state-listed threatened or endangered species and no Illinois Nature Preserves or registered Land and Water Reserves in the vicinity of the project location. Further consultation with the Illinois DNR indicates that migratory birds and bats will be the principal concern with the proposed project. Also of possible concern is the nearby prairie remnant that was originally established for a relict population of Massasauga rattlesnakes.

The impact of wind turbines on birds and bats is the most significant area for potential concern. The proposed Monarch wind facility lies within the Mississippi migratory flyway and as such has the potential to intercept migrants during inclement weather or when birds are landing or taking off. However, because the sites are not located near any significant habitat such as ponds, lakes or large forested tracts that would be sought by resting migrants, it is believed the potential for collision with turbines while ascending or descending is probably very low. Thus, inclement weather forcing birds to migrate at lower altitudes
would carry the most potential for causing mortality.

Although studies of bird and bat mortality at wind facilities is in its infancy, recent studies have shown that bats are more at risk than birds. At the time of the EcoCAT study, no endangered bats had been recorded in Warren County and the intensively farmed area reduces the likelihood of any roosting sites. Although the EcoCAT report is a good first step in assessing wildlife impact, a pre-construction survey for breeding birds should be conducted. The survey is recommended for the June timeframe and to last for a minimum of two weeks.

Finally, the size of the wind towers will require FAA review and permitting. There are no airports in the immediate area, but a municipal airport is in the vicinity.

The sheer size of the project (i.e., 13 399ft tall wind turbines spread over 750 acres) raises the potential for public concern and environmental impact. Similarly, the nature of the project does not lend itself to any listed categorical exclusion applicable to general agency actions. As a result, an EA is recommended. In review of the environmental studies already completed, there is little reason to suspect that the project will require an EIS.

NEPA PROVISION

DOE has made a final NEPA determination for this award

Insert the following language in the award:

DOE has made a conditional NEPA determination for this award, and funding for certain tasks under this award is contingent upon the final NEPA determination.

Insert the following language in the award:

You are restricted from taking any action using federal funds, which would have an adverse affect on the environment or limit the choice of reasonable alternatives prior to DOE/NNSA providing either a NEPA clearance or a final NEPA decision regarding the project.

Prohibited actions include:
Construction of the Monarch Warren County Turbine Wind Farm. An Environmental Assessment must be completed and approved by DOE prior to initiating construction of the facility.
This restriction does not preclude you from:
Performing work to collect information and generate data required for the Environmental Assessment including, but not limited to, conducting environmental studies and public meetings in regard to the proposed project.
If you move forward with activities that are not authorized for federal funding by the DOE Contracting Officer in advance of the final NEPA decision, you are doing so at risk of not receiving federal funding and such costs may not be recognized as allowable cost share.

Insert the following language in the award:

You are required to:
Submit an Environmental Assessment to the Golden Field Office. A Finding of No Significant Impact (FONSI) is required before funds will be release for construction of the facility.

Note to Specialist :

According the the Project Officer, $30,000 should be made available to the State and Applicant to support completion of the Environmental Assessment (EA). Additional funds are to be withheld pending review of the EA and issuance of a FONSI.

SIGNATURE OF THIS MEMORANDUM CONSTITUTES A RECORD OF THIS DECISION.

NEPA Compliance Officer Signature: Steve Blazek Date: 3/17/2010
NEPA Compliance Officer

FIELD OFFICE MANAGER DETERMINATION

☑ Field Office Manager review required

NCO REQUESTS THE FIELD OFFICE MANAGER REVIEW FOR THE FOLLOWING REASON:

☐ Proposed action fits within a categorical exclusion but involves a high profile or controversial issue that warrants Field Office Manager's attention.
☐ Proposed action falls within an EA or EIS category and therefore requires Field Office Manager's review and determination.

BASED ON MY REVIEW I CONCUR WITH THE DETERMINATION OF THE NCO :

Field Office Manager's Signature: _____ Date: 5/13/2010

Field Office Manager

Attachment D-2

GE 1.6 xle Model Specifications Sheet

GE Energy

Technical Documentation Summary

Wind Turbine Generator Systems

GE 1.6xle – 50 Hz / 60 Hz

1 Introduction

This document summarizes the technical description and specifications of the GE Energy (GE) 1.6xle wind turbine generator system.

2 Technical Description of the Wind Turbine and Major Components

The wind turbine is a three bladed, upwind, horizontal-axis wind turbine with a rotor diameter of 82.5 m. The turbine rotor and nacelle are mounted on top of a tubular tower giving a rotor hub height of 80 or 100 m. The machine employs active yaw control (designed to steer the machine with respect to the wind direction), active blade pitch control (designed to regulate turbine rotor speed), and a generator/power electronic converter system.

The wind turbine features a distributed drive train design wherein the major drive train components including main shaft bearings, gearbox, generator, yaw drives, and control panel are attached to a bedplate.

2.1 Rotor

The rotor diameter is 82.5 m, resulting in a swept area of 5,346 m_2, and is designed to operate between 9.8 and 18.7 revolutions per minute (rpm). Rotor speed is regulated by a combination of blade pitch angle adjustment and generator/converter torque control. The rotor spins in a clock-wise direction under normal operating conditions when viewed from an upwind location.

Full blade pitch angle range is approximately 90°, with the 0°-position being with the airfoil chord line flat to the prevailing wind. The blades being pitched to a full feather pitch angle of approximately 90° accomplishes aerodynamic braking of the rotor; whereby the blades “spill” the wind thus limiting rotor speed.

2.2 Blades

There are three rotor blades used on each wind turbine. The airfoils transition along the blade span with the thicker airfoils being located in-board towards the blade root (hub) and gradually tapering to thinner cross sections out towards the blade tip.

2.3 Blade Pitch Control System

The rotor utilizes three (one for each blade) independent electric pitch motors and controllers to provide adjustment of the blade pitch angle during operation. Blade pitch angle is adjusted by an electric drive that is mounted inside the rotor hub and is coupled to a ring gear mounted to the inner race of the blade pitch bearing.

GE's active-pitch controller enables the wind turbine rotor to regulate speed, when above rated wind speed, by allowing the blade to "spill" excess aerodynamic lift. Energy from wind gusts below rated wind speed is captured by allowing the rotor to speed up, transforming this gust energy into kinetic which may then be extracted from the rotor.

Three independent back-up units are provided to power each individual blade pitch system to feather the blades and shut down the machine in the event of a grid line outage or other fault. By having all three blades outfitted with independent pitch systems, redundancy of individual blade aerodynamic braking capability is provided.

2.4 Hub

The hub is used to connect the three rotor blades to the turbine main shaft. The hub also houses the three electric blade pitch systems and is mounted directly to the main shaft. Access to the inside of the hub is provided through a hatch.

2.5 Gearbox

The gearbox in the wind turbine is designed to transmit power between the low-rpm turbine rotor and high-rpm electric generator. The gearbox is a multi-stage planetary/helical gear design. The gearbox is mounted to the machine bedplate. The gearing is designed to transfer torsional power from the wind turbine rotor to the electric generator. A parking brake is mounted on the high-speed shaft of the gearbox.

2.6 Bearings

The blade pitch bearing is designed to allow the blade to pitch about a span-wise pitch axis. The inner race of the blade pitch bearing is outfitted with a blade drive gear that enables the blade to be driven in pitch by an electric gear-driven motor/controller.

The main shaft bearing is a roller bearing mounted in a pillow-block housing arrangement.

The bearings used inside the gearbox are of the cylindrical, spherical and tapered roller type. These bearings are designed to provide bearing and alignment of the internal gearing shafts and accommodate radial and axial loads.

2.7 Brake System

The electrically actuated individual blade pitch systems act as the main braking system for the wind turbine. Braking under normal operating conditions is accomplished by feathering the blades out of the wind. Any single feathered rotor blade is designed to slow the rotor, and each rotor blade has its own back-up to provide power to the electric drive in the event of a grid line loss.

The turbine is also equipped with a mechanical brake located at the output (high-speed) shaft of the gearbox. This brake is only applied as an auxiliary brake to the main aerodynamic brake and to prevent rotation of the machinery as required by certain service activities.

2.8 Generator

The generator is a doubly-fed induction type. The generator meets protection class requirements of the International Standard IP 54 (totally enclosed). The generator is mounted to the bedplate and the mounting is designed so as to reduce vibration and noise transfer to the bedplate.

2.9 Flexible Coupling

Designed to protect the drive train from excessive torque loads, a flexible coupling is provided between the generator and gearbox output shaft this is equipped with a torque-limiting device sized to keep the max. allowable torque below the maximum design limit of the drive train.

2.10 Yaw System

A roller bearing attached between the nacelle and tower facilitates yaw motion. Planetary yaw drives (with brakes that engage when the drive is disabled) mesh with the outside gear of the yaw bearing and steer the machine to track the wind in yaw. The automatic yaw brakes engage in order to prevent the yaw drives from seeing peak loads from any turbulent wind.

The controller activates the yaw drives to align the nacelle to the average wind direction based on the wind vane sensor mounted on top of the nacelle.

IA cable twist sensor provides a record of nacelle yaw position and cable twisting. After the sensor detects excessive rotation in one direction, the controller automatically brings the rotor to

a complete stop, untwists the cable by counter yawing of the nacelle, and restarts the wind turbine.

2.11 Tower

The wind turbine is mounted on top of a tubular tower. The tubular tower is manufactured in sections from steel plate. Access to the turbine is through a lockable steel door at the base of the tower. Service platforms are provided. Access to the nacelle is provided by a ladder and a fall arresting safety system is included. Interior lights are installed at critical points from the base of the tower to the tower top.

2.12 Nacelle

The nacelle houses the main components of the wind turbine generator. Access from the tower into the nacelle is through the bottom of the nacelle. The nacelle is ventilated. It is illuminated with electric light. A hatch at the front end of the nacelle provides access to the blades and hub. The rotor can be secured in place with a rotor lock.

2.13 Anemometer, Wind Vane and Lightning Rod

An anemometer, wind vane and lightning rod are mounted on top of the nacelle housing. Access to these sensors is accomplished through a hatch in the nacelle roof.

2.14 Lightning Protection

The rotor blades are equipped with a lightning receptors mounted in the blade. The turbine is grounded and shielded to protect against lightning, however, lightning is an unpredictable force of nature, and it is possible that a lightning strike could damage various components notwithstanding the lightning protection deployed in the machine.

2.15 Wind Turbine Control System

The wind turbine machine can be controlled automatically or manually from either an interface located inside the nacelle or from a control box at the bottom of the tower. Control signals can also be sent from a remote computer via a Supervisory Control and Data Acquisition System (SCADA), with local lockout capability provided at the turbine controller.

Service switches at the tower top prevent service personnel at the bottom of the tower from operating certain systems of the turbine while service personnel are in the nacelle. To override any machine operation, Emergency-stop buttons located in the tower base and in the nacelle can be activated to stop the turbine in the event of an emergency.

2.16 Power Converter

The wind turbine uses a power converter system that consists of a converter on the rotor side, a DC intermediate circuit, and a power inverter on the grid side.

The converter system consists of a power module and the associated electrical equipment. Variable output frequency of the converter allows operation of the generator.

3 Technical Data for the 1.6xle

3.1 Rotor

Diameter	82.5 m
Number of blades	3
Swept area	5346 m2
Rotor speed range	9 – 18 rpm
Rotational direction	Clockwise looking downwind
Maximum tip speed	77.2 m/s
Orientation	Upwind
Speed regulation	Pitch control
Aerodynamic brakes	Full feathering

Attachment D-3

Special Use Conditions

SPECIAL USE EXCEPTIONS CONDITIONS

The following conditions shall apply to the special use exceptions granted to Monarch Wind Power LLC (hereinafter "Applicant") by the Warren County Board of Supervisors on August 5, 2010, for the construction and operation of a "wind farm" in Warren County, Illinois. Applicant agrees to comply with the following conditions unless specifically exempt before any building or construction permits shall be issued.

1. Applicant will comply with all of the provisions of the Warren County Zoning Code for which a variance has not been allowed.

2. Applicant will provide the design specifications for the turbines it shall use and such will be at a minimum the 1.5 megawatt size and shall not have a total height of more than 500 feet from ground level to the tip of the rotor at its highest apex.

3. Applicant will construct and operate turbines only within the demarcated areas described in the site plan it included as part of its applications and must provide exact legal location for each turbine and substation location after construction.

4. All electrical lines that are not associated with the interconnection with the power grid will be run underground. Applicant, after completion of construction, will become a member of the Joint Utility Location Information for Excavation ("JULIE") and agrees to identify the location of any underground electrical lines, to provide a list of the same to County, and to register the same with JULIE.

5. Applicant will repair drain tile breaks and damage within 15 days of actual notice of break or damage unless affected persons and entities agree otherwise. Applicant will maintain records of each drain tile repair, including photo and GPS location. Tile repair records will be available for inspection by the County.

6. Applicant will meet with all fire departments responsible for providing fire protection to the wind farm with respect to its fire protection plan prior to beginning construction. Applicant further agrees that it shall where reasonably possible link the wind farms detection system with the appropriate local fire districts for immediate emergency response to potentially dangerous conditions and that it will comply with the existing fee structure associated with false alarms.

7. Applicant will undertake all construction activities associated with the Project only between the hours of 6:00 a.m. and 9:00 p.m. excluding for delivery of equipment and erection of towers and installation of nacelles and blades.

8. All wind turbines constructed as part of the wind farm will be set back at least 1,500 feet from any inhabited residence as provided in the application, except where landowner consents to less restrictive setbacks.

9. All towers and blades of turbines will be painted a non-reflective and unobtrusive color which will be uniform in style and color, and that all colors, finishes, and designs will conform to Federal Aviation Administration requirements. Any onsite building or other structures will be designed so that they are unobtrusive. Applicant shall not place any lettering, insignia, advertising, or graphics on any part of the towers, hubs or blades, with the exception of required safety warnings, and manufacturer supplied identification.

10. All blades of turbines will rotate in the same direction.

11. Applicant will comply with all Federal Aviation Administration lighting guidelines and will work with the Federal Aviation Administration to establish an effective lighting plan to minimize visual impacts, both on and off site. In addition, Applicant agrees the flash intervals of any lighting scheme shall be synchronized over the entire project.

12. A monopole tower will be used on all turbines and they will be constructed without guy wires.

13. Applicant will execute a road use and maintenance agreement with Lenox Township and provide appropriate financial assurances related thereto acceptable to Lenox Township.

14. Applicant will comply with all applicable Illinois Pollution Control Board regulations.

15. Applicant will respond to all complaints from person directly affected by the Project within 48 hours and will attempt to resolve all complaints in a prompt and responsible manner. Applicant will keep a log of all complaints and the method of resolution, and will make the log available to the County. Applicant shall submit all unresolved complaints to non-binding mediation provided the complainant agrees to pay one-half (1/2) of the cost of the non-binding mediation.

16. Applicant will provide Storm Water Pollution Prevention Plan for the Project prior to the start of construction and a determination of whether a National Pollutant Discharge Elimination System (NPDES) or any other permit is required and receive such permit(s) before commencing construction.

17. Applicant will use commercially reasonable efforts to remedy or mitigate any reported and verifiable interference with radio, microwave path, TV or wireless phone interference caused by the wind farm.

18. Applicant will provide annually to the Warren County Zoning Office, within 60 days of its issuance, a certificate indicating that all facilities included in the Project have been inspected by a qualified third party engineer and are in good working condition.

19. Applicant shall provide Warren County with an estimate of decommissioning costs for the wind farm and post adequate financial assurance commensurate with the estimate, by escrow, bond, irrevocable letter of credit, or corporate surety bond in the name of Warren County. Should applicant elect to include the salvage value of turbines in applicant's estimate of decommissioning costs, salvage value will be reviewed every five (5) years for the life of the wind farm. Said review shall be completed on or before the five (5) years anniversary date of the onset of commercial operations and for each subsequent five (5) years period. Applicant shall adjust the financial assurance to Warren County to adequately reflect any changes in the salvage value.

20. Payment to non-participating residents upon completion of the wind farm shall consist of a one-time payment of $1,000 for each residence within one mile of a turbine and $1,500 for each residence within one-half mile of a turbine. Said payment shall not limit in any manner recipients right to bring any claim or cause of action against applicant.

21. It is the Applicant's intention to sustain Warren County's tax revenue from the facility at least equivalent to what the County would receive under the existing Illinois turbine tax statute. Pursuant to this aim, the Applicant shall pay to Warren County each year of the life of the wind farm not less than the amount of property tax that would have paid to Warren County pursuant to 35 ILCS 200/10-600, 35 ILCS 200/10-605, 35 ILCS 200/10-610, 35 ILCS 200/10-615, and 35 ILCS 20010-620. Should such tax be repealed, revoked or otherwise made inapplicable to the Project, the Applicant agrees to continue to pay Warren County an amount equal to the turbine tax that would have been paid to Warren County under the current law as codified in 35 ILCS 200/10 *et seq* for the remaining life of the project. If, subsequent to repeal or revocation of the current turbine tax, an alternative or substitute fee or tax on turbines or the wind energy facility is imposed by the County or State of Illinois, the amount paid under this condition will be reduced by the value of the new or alternative tax or fee. The turbine tax as now constituted less any new alternative fees or taxes shall be paid to Warren County on or before the first day of June in the year following the accrual of the said tax or fee. This condition shall not prohibit the United States, State of Illinois, Warren County or any other taxing body from collecting from applicant any tax, fee, assessment or other financial obligation as allowed by United States or Illinois law. Warren County shall distribute the fee collected pursuant to this condition to local taxing bodies as required by law in the same manner as prescribed by 35 ILCS 200/18 *et seq* or as may be amended.

22. Applicant will identify a primary point of contact for community relations, complaint resolution, and public reporting.

23. Applicant shall indemnify and hold harmless the County and the County's elected officials, officers, Board of Supervisors, agents and employees ("Indemnities")

from and against any and all claims, demands, appeals, losses, attorneys' fees and expenses to the extent arising out of or resulting from Applicant's zoning, development, construction and operation of the wind farm.

24. Applicant will provide evidence that the exact location of the wind turbines and meteorological tower was provided to the County, to the IAAA and to all aerial sprayers in the County who have operated in the area in the past five years including the exact GPS coordinates, township, section number and tower heights. The County will provide to the Applicant a listing of all of the known aerial sprayers in Warren County on an annual basis.

25. Applicant will provide a notification form to all aerial spraying companies who have operated in the area in the past five years. The form may be utilized to notify Applicant when aerial crop dusting is going to occur.

26. Applicant will provide a map to all aerial sprayers showing the exact location of all turbines and meteorological towers.

27. Applicant will comply with all applicable laws and regulations and will allow County officials or their agents to investigate any issues arising from the Project at any time by entering the special use area and providing any requested documentation.

28. Applicant shall obtain all required permits from other governmental agencies (such as the Federal Aviation Administration) prior to commencing construction or as otherwise required by the applicable laws and regulations. Copies or evidence of such permits shall be submitted to the County on or before issuance of the first Building Permit for an individual wind tower. Building Permits shall be obtained from Warren County for the wind towers.

29. Should shadow flicker in excess of 30 hours per year affect any occupied residence whose owner is not a participant in the project, Applicant shall use commercially reasonable efforts to remedy the problem on a case-by-case basis by undertaking measures such as tress or vegetation plantings or awning installation.

30. Applicant shall provide to the County the following:

a. A site plan depicting the exact location of each turbine, substation, access road, electrical line or other components(s) of the project.

b. Location and description of all existing structures located within a radius equal to two times the height of the proposed tower where the wind tower site is proposed.

c. Location of all above ground utility lines within a radius equal to two (2) times the height of the proposed wind tower.

d. Location of all underground utility lines on the wind tower site.

e. Dimensional representation of the structural components of the tower construction including the case and footings.

f. Schematic of electrical systems associated with the wind tower including all existing and proposed electrical connections.

g. Manufacturer's specifications and installation and operation instructions or specific wind tower design information.

h. Certification by a registered professional engineer that the tower design is sufficient to withstand wind load requirements for the structure as defined by ICC.

i. Other information as reasonably required by the County Zoning Administrator.

31. The Applicant shall provide dust control measurers as may be commercially and reasonably required by the County during construction, and shall repair any roads or other infrastructure damaged by the construction or maintenance in accordance with the Road Agreement approved by Lenox Township. Any roads or bridge damage caused by the Applicants construction or maintenance of the wind farm as determined by the process set forth in the Road Agreement shall be repaired per the terms of those Agreements. Furthermore, the Road Agreement shall provide provisions to insure that costs for future decommissioning repairs to Lenox Township roads are completed to the commercially reasonable satisfaction of those bodies as described and in the amount determined by the Road Agreement.

32. All solid waste, whether generated from supplies, equipment, parts, packaging, or operation or maintenance of the wind farm, including old parts and equipment, shall be removed from the site in a timely manner consistent with industry standards.

33. All hazardous waste generated by the operation and maintenance of the wind farm, including but not limited to lubrication materials, shall be handled in a manner consistent with all local ordinances, and state and federal laws, rules and regulations.

34. The Applicant shall reimburse non-participating owners of farmland for any additional cost of aerial chemical application due to the presence of the wind farm. The reimbursement shall not exceed fifty (50) percent of the ordinary and customary cost for such aerial application. This reimbursement is limited to those parcels of farmland that are contiguous with the turbine site as identified by the following tax identification numbers:

0801900500	0801900510	0801900600	0802000100	0802000500
0802000800	0802100400	0802100500	0802100600	0802900110
0802900200	0802900300	0803000110	0803000600	0803000800
0803000900	0803001200	0803100100		

No property north of the Burlington Northern/Santa Fe Railroad line near the property is included. A person claiming reimbursement pursuant to this paragraph shall submit to Applicant a verifiable expense invoice for the effected aerial application.

35. The Applicant shall reimburse non participating landowners of farmland with property adjoining the wind farm the monetary value of the loss of agricultural production that is demonstrably the consequence of changes in drainage attributable to the construction and presence of any wind tower. This reimbursement is limited to those parcels of farmland that are contiguous with the turbine site as identified by the tax identification numbers included in Condition 34.

36. An engineer's certificate shall be completed for each wind turbine by an engineer registered in the State of Illinois certifying that the foundation for the wind turbine to be installed is adequate to support such wind turbine, the specific soils at the site of each turbine are able to support the wind turbine to be installed upon them, and the foundation will not settle to a degree more than a reasonable and acceptable industry standard allows.

37. All wind turbines must utilize self-supporting, tubular towers with an internal ladder and locked door and a sign shall be placed on each tower stating "No Trespassing. No Unauthorized Person Allowed on or In Tower. Warning Electrical Shock Hazard."

38. Substation lighting shall be limited to that necessary to provide safety and security. Normal substation nighttime operation shall utilize minimal lighting.

39. These Special Use Permits may be transferred or assigned by Monarch Wind Power LLC only upon the transferee's or assignee's execution and delivery to the Warren County Zoning Office of a letter agreeing to be bound by the foregoing conditions. Said letter shall be delivered by personal service or certified mail with return receipt.

Attachment D-4

Ameren Interconnect Study

Ameren
Illinois Utilities

Interconnection Impact & Facilities Study

Monarch Wind Power LLC

20.8 MW Generating Facility

near Roseville, IL

(DG-23)

December, 2010

Table of Contents

This generation Interconnection Impact and Facilities Study fulfills the agreement made between Ameren Services Company and Monarch Wind Power LLC.

Purpose

Monarch Wind Power LLC has requested that an interconnection study be performed to determine the impact on the Ameren distribution system for connecting a 19.5 MW wind generation facility near Roseville, Illinois. Ameren owns a 69 KV line in the area. The point of interconnection will be on a circuit known to Ameren as Line 6630, a short distance from the Roseville Switching Station near a customer owned substation, the East Ponemah REA Substation.

Study Overview

The scope of this study includes the following:

- Analysis of the Ameren 69 KV system for the year 2010, for the normal and single contingency peak load conditions, as well as normal and single contingency light loading conditions (approximately 30% of peak loading).
- A short circuit study and an analysis of the equipment interrupting rating and protection requirements.
- Identification of any equipment on the Ameren distribution system requiring changes due to any thermal overload or voltage limit violations resulting from the generation interconnection.
- Non-binding cost estimates for any system modifications necessary to connect the generating facility to Ameren's electric distribution system, along with the time required to complete those modifications.
- A determination of any operating constraints required of Monarch Wind Power.

Study Assumptions and Inputs

1. 20.8 MW wind farm generation consisting of 13 wind turbines of 1.6MW each (GE 1.6xle NAMTS doubly fed asynchronous wind turbines), with capability to operate at power factors ranging from 0.9 lagging to 0.9 leading.
2. The customer site for distribution service is adjacent to Line 6630 on the west side of Rte 67, just south of the 1400 N Rd.
3. Monarch Wind Power (DG23) total cable charging capacitance assumed to be 1.03 Mvar.
4. Monarch Wind Power (DG23) total "plant load" assumed to be about 0.15 MW and 0.053 Mvar.
5. Monarch Generators will be requested to regulate the 69 kV at 1.0 per unit voltage, but only so far as the generation facility can do so within a power factor

range of 0.95 leading (absorbing vars from the system) or 0.95 lagging (supplying vars to the system) at the Point of Interconnection (POI).

Need for Transmission Analysis

While dispatched at 20.8 MW during the light load study, no MW flowed to the 138 kV system. Consequently, no need for Transmission Analysis is presently indicated.

Load Flow Analysis

The Impact & Facilities Study analysis did not identify any thermal overloads or voltage violations. The load flow analysis did model the Monarch Generators as regulating the 69 kV at 1.0 per unit voltage.

The Monarch Generators are requested to regulate the 69 kV at 1.0 per unit voltage, but only so far as the generation facility can do so within a power factor range of 0.95 leading (absorbing vars from the system) or 0.95 lagging (supplying vars to the system) at the Point of Interconnection (POI). For 20.8 MW being delivered from this facility to the system at the POI, that is ±6.84 MVAR.

It is understood by Ameren and should be understood by Monarch Wind Power that after operational experience is gained, the 1.0 p.u. voltage regulation level, may need to be adjusted. The models used in load flow analyses resulted in Monarch Wind Power facility absorbing vars at Ameren system light load and contributing vars at peak load during normal operating conditions.

The previous Feasibility Analysis was performed with both situations of 13 and 4 wind generators installed. For the Impact & Facilities Study analyses only 13 wind generators were studied since Monarch has stated that they will install all 13 wind generators.

In the Feasibility Analysis, the contingent operating condition studied with 4 wind generators did show that the 4 wind generators were not by themselves able to regulate voltage within ±0.95 PF at 1.0 p.u. at the 69 kV POI. This is illustrative of the fact that under some operating condition(s), Monarch will not be able to maintain 1.0 p.u. voltage regulation.

There is a significant possibility that this project, Monarch Wind Power (DG23), at 20.8 MW of generation, can support local load during off peak load times and create an island. Therefore, transfer trip protection will be required with the customer's 69 kV tie breaker, on the high side of the customer's transformer, from facilities identified in the Protection Requirements section of this report. As system loading, configuration and/or operational experience change in the future, protection requirement details may need to change.

Fault Analysis

At this time, no protective equipment was identified as overdutied.

Because the generator's MW output is greater than the local distribution load, a transfer-trip relaying scheme will be required for system protection upon loss of the 69kV source. This scheme will require a transfer trip signal to be sent from locations identified in the Protection Requirements section of this report to the customer's main 69 kV breaker. If feasible, radio can be used for the transfer trip signal. The customer will have to install compatible equipment for transfer trip to their 69 kV breaker.

Ameren requires that Monarch install a transformer with a DELTA connected 69 kV high side for compatibility with Ameren's system protection scheme.

Stability Analysis

A system stability assessment is not required since islanded operation is not planned for.

Protection Requirements

Transfer Trip Requirements:

The transfer trip relaying scheme will include transmitters at Ameren's Monmouth Substation and Monmouth Switching Station. At those locations a radio signal will be keyed to send a direct transfer trip signal when the breaker serving the lines to DG23 is open. Both Monmouth Substation and Monmouth Switching Station will be sending a direct transfer trip signal, so the DG23 69 kV tie breaker will need to be opened when a direct transfer trip is received from either location. Details of changes at the locations follow:

1. At the Monmouth Substation, a SEL-2411 will need to be installed to close a contact to the direct transfer trip communication equipment whenever breaker 6628 is open. The reclosing sequence will be revised to a single reclose after 30 seconds. The reclosing of the remote terminal at the Galesburg Monmouth Blvd Substation will be changed to single reclose after 5 seconds for compatibility. A new cabinet will be required at the Monmouth Substation to install the relay and communication equipment at this location. The cost estimate is $100,000.
2. At the Monmouth Switching Station, a SEL-2411 will need to be installed to close a contact to the direct transfer trip communication equipment whenever breaker 6622 is open. The reclosing relay will be revised for a two shot reclosing scheme

with 5 second and 30 second intervals. The panel has space available to mount the relay equipment. The cost estimate is $50,000.

3. At the DG23 station there will be required a radio and associated auxiliary and testing equipment to be installed by the applicant. The radio will be as per specification from Ameren for compatibility with the remote ends. The applicant will need to build testing provisions into the control output of the radio so that periodic testing of the channel can be done.
    a. Even with the above transfer trip equipment, DG23 will be required to install the 81OU equipment shown in the Attachment 1, "Typical Protection and Metering Installation for Generators Greater than 100kW". The overfrequency trip should be set for 61Hz with 0.5 seconds delay, and the underfrequency trip should be set for 58.3Hz with 0.5 seconds delay.
4. If repeater stations are required for a reliable communication channel, there will be additional costs.

It is Applicant's responsibility to:

1. Design, install, operate, protect, and maintain all necessary equipment for connection to Ameren's electric system, unless otherwise stated in the contractual agreement.

   The Customer is responsible for protecting Customer-owned equipment in such a manner that faults or other disturbances on the Ameren electric system or on Customer's system do not cause damage to his equipment.

2. Comply with all local, state, and federal rules, regulations and codes which are applicable; including, but not limited to, National Electrical Safety Code (NESC) and Article 705 of the National Electrical Code (NEC) latest revision or the requirements of this document, if more restrictive.

   Applicant's interconnecting transmission and/or distribution lines shall be designed, constructed and maintained in accordance with applicable National Electrical Safety Code standards except that in no case shall applicant utilize a standard less than adhered to by Ameren.

3. Submit specifications and detailed plans to Ameren for the installation of the control and protective devices for review and written approval prior to the purchase and installation of such equipment as summarized in Attachment 1.

Attachment 1 shows a typical protection and metering installation for generators greater than 100 KW connected to Ameren's system. It lists the minimum protective equipment which Ameren requires for operation of its electric system in parallel with a generating source greater than 100 KW. A transfer-trip relaying scheme will be required. The high-

side interconnection breaker, as well as all of the relay and protection equipment, is owned and installed by the customer. The equipment specifications and relay settings for coordination with Ameren's system will be determined during the Interconnection Facilities Study. The Figure for Attachment 1 is out of date with respect to the Meter and Disconnect sequence. Attachment 2 correctly shows the metering first, followed by the disconnect to the customer's facilities.

Ameren will tap the 69 KV line for connecting to the generating facilities. It is assumed that no significant line extension is necessary for connecting Ameren's line to customer's facilities. A lockable 3-phase gang-operated load-break switch will have to be installed by the customer as a means for electrically isolating the customer's generating facility from the Ameren system. The disconnecting devices will be furnished and installed by the customer as part of customer's wiring, and is subject to the following requirements:

a. Only devices specifically approved by Ameren for this purpose may be used. The device must provide a visible means of disconnection and be capable of being locked open with Ameren's padlocks.
b. The device shall be located for ease of access and visibility.
c. Ameren personnel shall inspect and approve the installation before initial parallel operation will be permitted.
d. Customer is responsible for all labor and material costs to maintain, repair, or replace the disconnecting device.

Air break switches on the source side of the tap and on the downstream side of the tap point are required to provide a means for isolating the circuit for repairs and maintenance. Ameren will install these switches as a part of tapping the line.

Metering & Telemetry Requirements

Remote communication facility (RTU) is necessary at the site for metering and relaying transfer-trip scheme. Detailed requirements for metering and telemetry will be specified as a part of the Interconnection System Impact Study or the Facilities Study. If on poles, a minimum of a two pole structure is expected for a 69 kV installation.

Cost Estimate

1. Install a 69 KV line tap and air break switches on the source and downstream sides of the generator interconnect tap point. This assumes the installation of two new poles and the reuse of an existing pole. = $120,000.
2. Metering costs include the 69kV Intertie meter at the tap point. Estimate includes instrument transformers, meter, cabinet, conduit/cable, cell phone,

and miscellaneous equipment. This cost does not include the costs of structures for mounting the equipment which are to be provided by Monarch Wind Power. = $75,000.

3. Transfer-trip relaying and radio communication between the customer high side 69 kV breaker and the Monmouth Substation. = $100,000
4. Transfer-trip relaying and radio communication between the customer high side 69 kV breaker and Breaker 6622 at Monmouth Switching Station. = $50,000

Total Project Cost Estimate = $ 345,000.

The cost estimate provided does not include an additional charge to cover the ongoing operation, maintenance, and replacement costs associated with the facilities added for Monarch's benefit. An additional 0.9 (90%) is to be assessed to the Total Project Cost Estimate above for this purpose.

The cost estimate provided herein also does not include costs related to taxes, otherwise referred to as the tax gross-up. At this time, depending on the timing of construction start and construction completion, the total project cost, the length of service of the facility and other factors, the tax could be either ~17% or ~30%. We should be able to provide a refined tax estimate after further project details are confirmed.

Lead Time

The lead time to install the required facilities is a minimum of 1 year from the time the authorization to proceed with the interconnection is received, based on the lead time for the equipment for the tap metering. The overall lead time is also affected by the project timing and schedule. Ameren will avoid construction that will require taking facilities out of service during peak summer months.

Contractual Requirements

Ameren will require preliminary review of protection documents, such as the one line relay and metering, during the first month of the project.

Final one-line drawings that show all required Interconnection control functions must be submitted to Ameren for review before the project is to be placed in-service.

Ameren will only accept design drawings specifically involving the interface protection. Ameren will not sort through customer's design set to find what is needed. Information desired will be clarified during design review discussions to help define the very limited number of customer documents Ameren needs for review.

The actual relay settings for the interface protection are required to be submitted to Ameren for review and compliance at least 2 months before the equipment is to be placed in service. Ameren will review ALL settings from the specific relays used for the interface, but will only comment on the settings and logic that assure meeting interface requirements.

Ameren requires at least one month notice before testing and startup, to alert us to schedule field personnel to witness on site customers test, contractor actual testing of the relays settings and results found. Ameren is only concerned with those items related to the interface requirements.

Ameren requires final impedance data from customer transformer and actual generator(s) data as-shipped from the factory to model in our system. This must be issued to Ameren as soon as available and prior to startup.

Ameren will not provide any specific design, settings, testing, nor maintenance for customer owned equipment at the customer's site.

Ameren requires a copy of actual relay final test records and as-left full settings must be submitted to Ameren within 30 days of startup. The easiest means is to simply give a copy of the test data to the Ameren Field Technician supporting the project at the end of the witness test, or to email test reports and actual settings to Ameren's customer contact personnel.

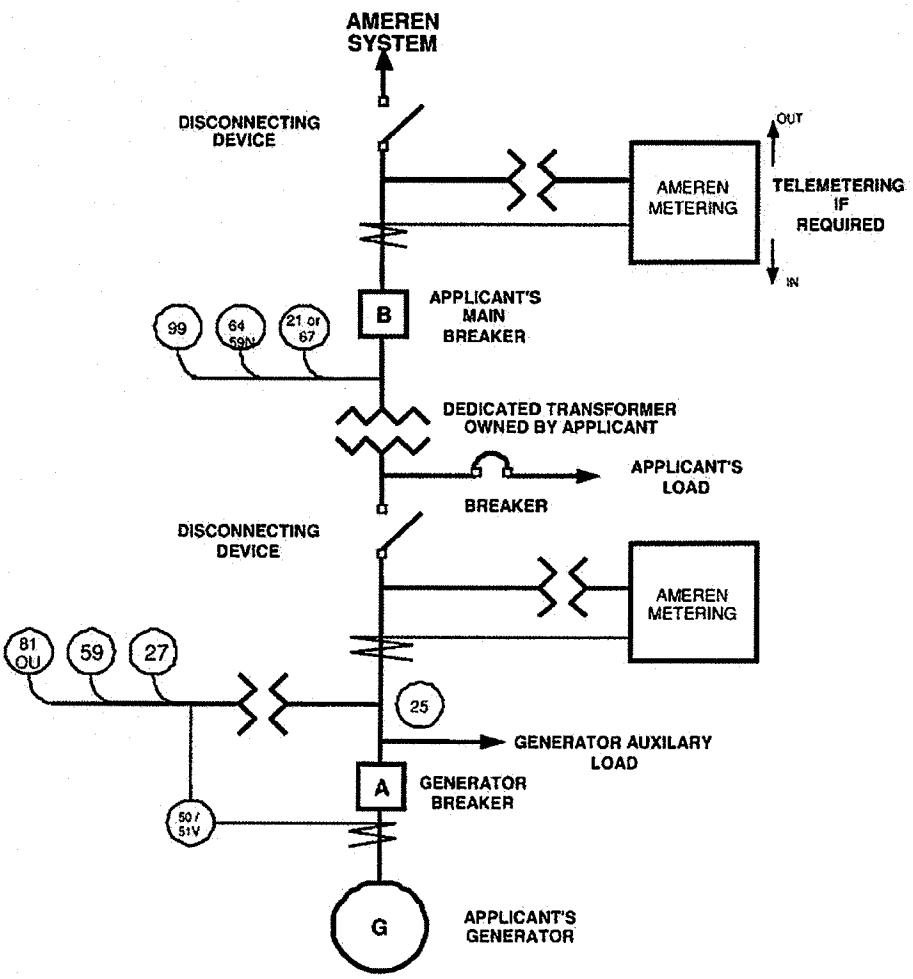
Disclaimer

Any changes to the facility data provided by the Applicant for this study may nullify the study findings. All provisions contained herein are subject to revision to maintain Ameren's compliance with NERC. The Information contained herein was developed, in part, based upon information provided by, or caused to be provided by, the intended recipient and/user of this information. Use of the Information contained herein should be undertaken after an independent review of the facts and circumstances of the particular project for which this Information was developed. Although Ameren has made all commercially reasonable efforts to develop the Information in an accurate manner consistent with the exercise of Good Utility Practice, NO GUARANTEES OR WARRANTIES OF ANY KIND, INCLUDING EXPRESS OR IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS ARE MADE WITH RESPECT TO THE INFORMATION BY AMEREN COMPANY, ITS AFFILIATES, ITS OFFICERS, DIRECTORS, EMPLOYEES OR AGENTS, WHO ALSO ASSUME NO LEGAL RESPONSIBILITY FOR THE ACCURACY OF THE INFORMATION CONTAINED HEREIN. IN ADDITION, NO LIABILITY IS ASSUMED AND ALL LIABILITY IS EXPRESSLY DISCLAIMED FOR NEGLIGENCE OR DAMAGES OF ANY KIND, ANY DECISIONS, CONTRACTS, COMMITMENTS, OBLIGATIONS

OR ANY OTHER ACTIONS UNDERTAKEN OR MADE ON THE BASIS OF THE INFORMATION CONTAINED HEREIN.

Attachment 1: Protection and Metering Diagram

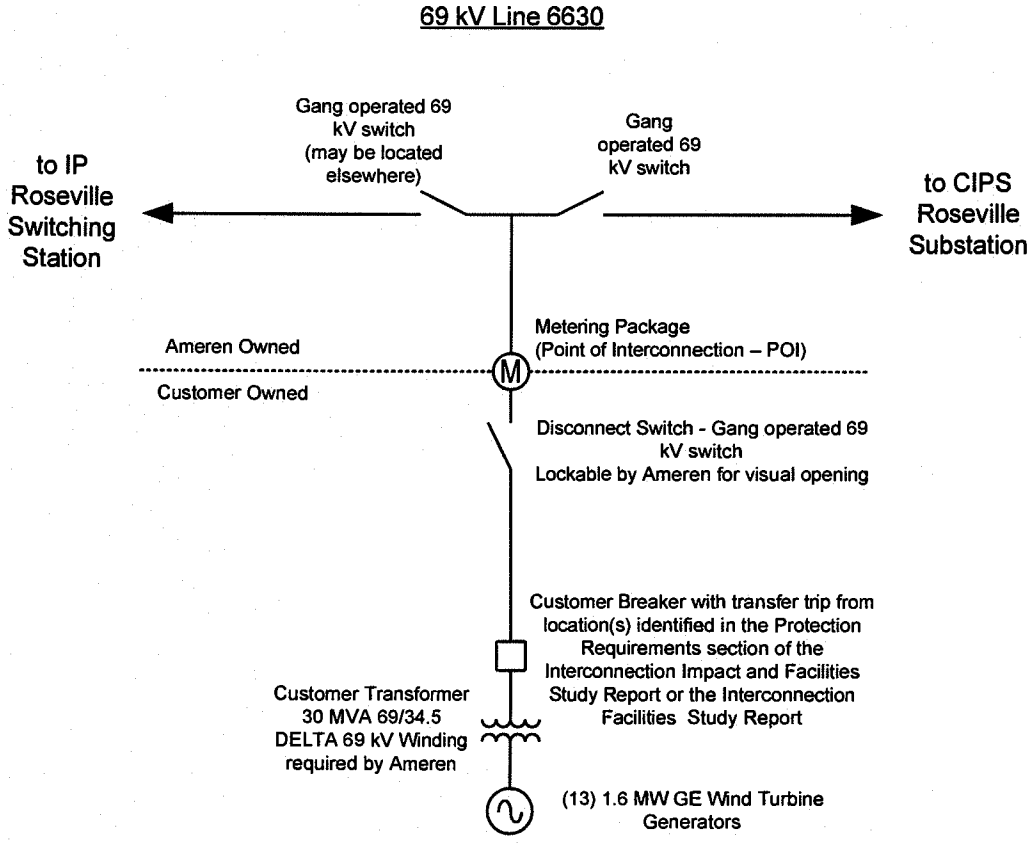
TYPICAL
PROTECTION AND METERING INSTALLATION
FOR GENERATORS GREATER THAN 100KW
(WHEN APPLICANT OWNS THE DEDICATED TRANSFORMER)



GENERATOR AND SYSTEM PROTECTION

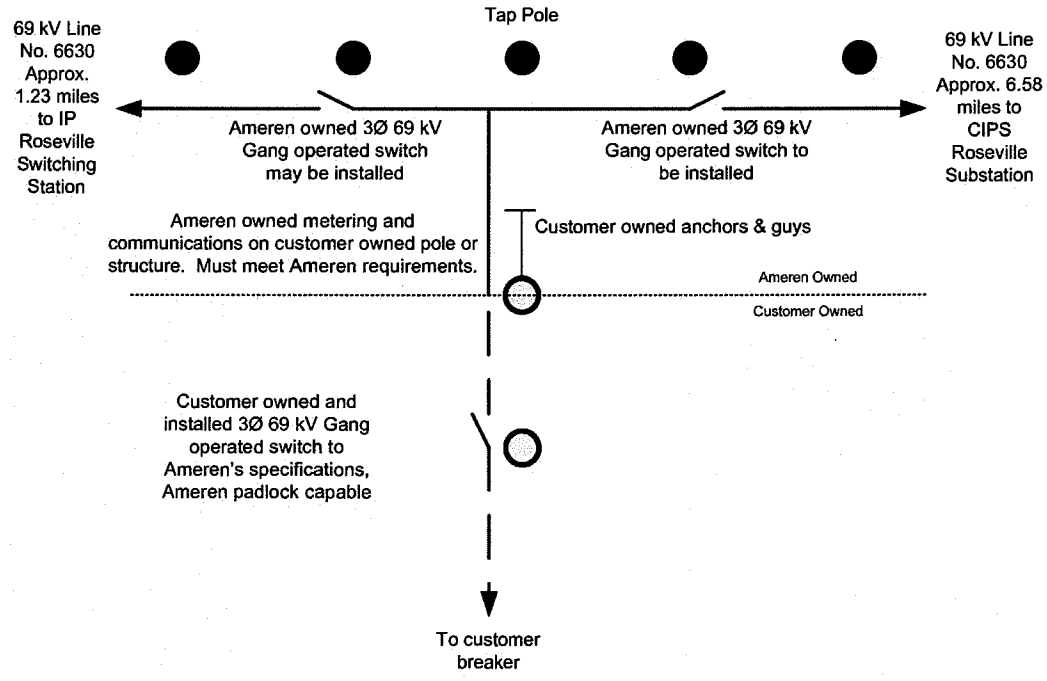
DEVICE NO.	FUNCTION	TRIPS
BREAKER		
21	DISTANCE	B
25	SYNCHRONIZING	-
27	UNDERVOLTAGE	A
50/51	OVERCURRENT W/VOLTAGE RETRAINT	A
59	OVERVOLTAGE	A
64 (59N)	GROUND DETECTOR	B
67	DIRECTIONAL OVERCURRENT	B
81OU	OVER & UNDER FREQUENCY	A
99	LOSS OF AMEREN'S SYSTEM	B

Attachment 2: Functional One-Line



Attachment 3: 69 kV Tap

This is a conceptual arrangement. The actual physical arrangement is to be determined after actual connection details are defined. E.g., does Monarch plan to run a pole line along 140th, or run a tap line across a field?



Attachment 4: Typical Meter Installation – Outdoor Pole Mounted

METER INSTALLATIONS
Outdoor Pole Mounted

25 00 01 01
Sheet 1 of 1

GENERAL

Standard installations of secondary and primary pole mounted metering installations are specified in this section.

1. Secondary Installations

   Secondary pole mounted metering installations are normally customer owned. This type of installation is particularly applicable to farm distribution centers.

2. Primary Installations

   Primary pole mounted metering installations may be either Company owned or customer owned. These installations are generally applicable to large light and power loads.

A. Company Owned

   If the station being primary metered is to be owned by Ameren, all necessary equipment will be furnished and installed by Ameren.

B. Customer Owned

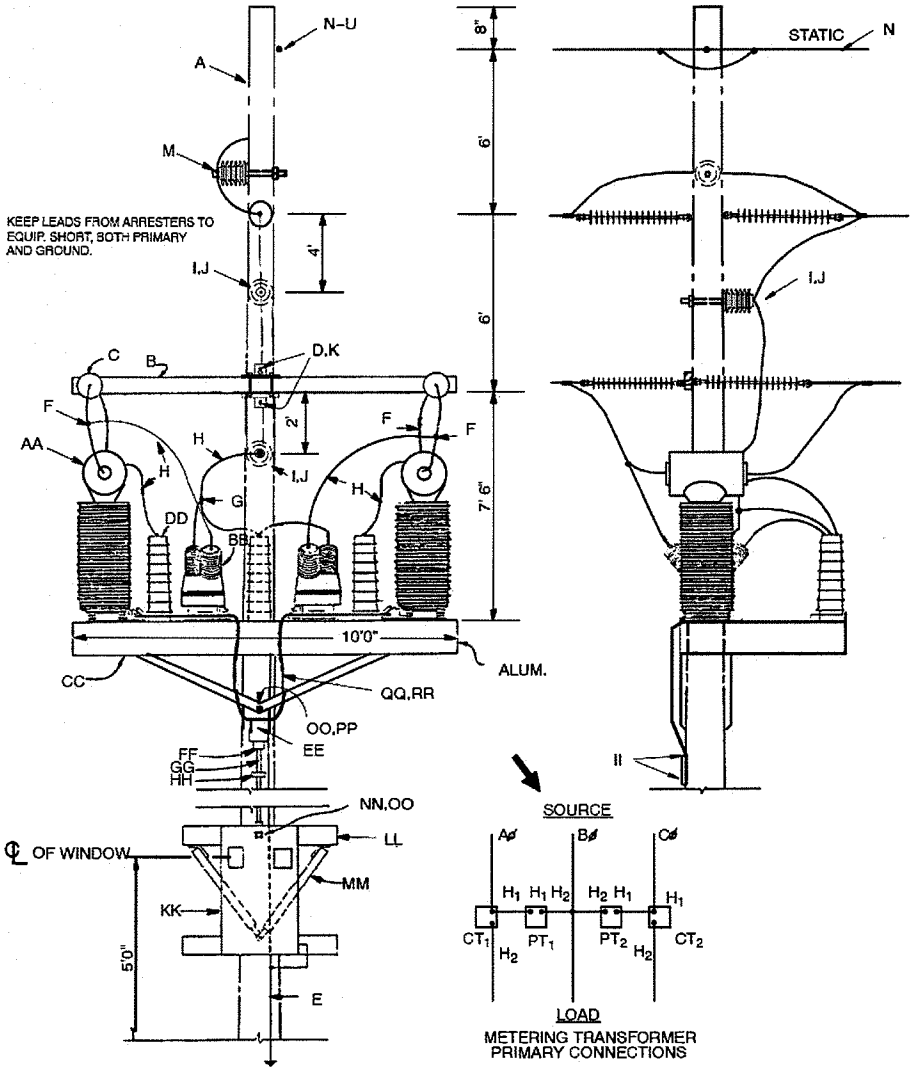
1. If the station being primary metered is to be owned by the customer, the customer must furnish and install the following equipment. This equipment shall be installed in accordance with appropriate Ameren Primary Metering Standards.
   a. Pole.
   b. Pole framing and steps.
   c. Switches.
   d. Lightning arresters.
   e. All primary wiring including fiber conduit when required, except that Ameren will connect the customer's primary leads to the supply conductors and to the current and potential transformers. The customer must leave sufficient lengths of wire for making these connections.
   f. Secondary wiring when required; Ameren will make connections to Secondary Supply. The customer must leave sufficient lengths of wire for making these connections.
2. Ameren will furnish and install the following equipment, and will complete metering connections.
   a. Primary or secondary supply conductors with deadend devices.
   b. Devices to connect customer's primary or secondary leads to the supply conductors.
   c. Current, potential transformers, and bracket.
   d. Devices to connect customer's primary wiring to current and potential transformers.
   e. Meter enclosure, meter, and mounting framework.
   f. All metering wiring including conduit to connect current and potential transformers to the meter.

C. Ameren's Meter Department must be notified of job as early as possible to insure availability of equipment to be provided; includes metering enclosures and transformers - cluster mounts or units, are shop wired.

Attachment 5: Typical Meter Installation – Primary Metering 69 kV

METER INSTALLATIONS **25 69 01 ****
Primary Metering Sheet 1 of 4
69 kV & 34.5kV, 3 Phase, 3 Wire

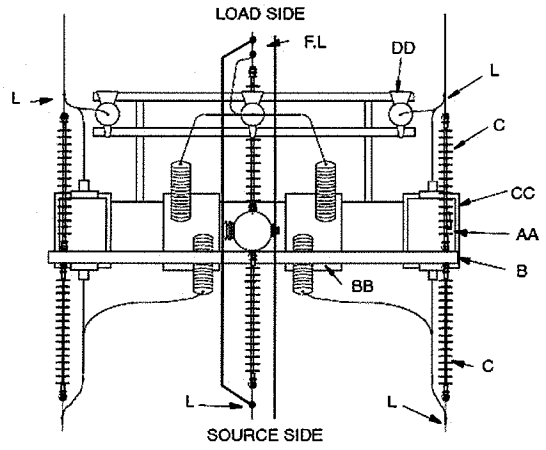
CIPS ONLY **CIPS ONLY** **CIPS ONLY**



METER INSTALLATIONS
Primary Metering
69 kV & 34.5kV, 3 Phase, 3 Wire

25 69 01 **
Sheet 2 of 4

CIPS ONLY **CIPS ONLY** **CIPS ONLY**



NOTES:

1. Ground all instrument transformers, arrestors, and aluminum mounting assembly to the grounding unit.
2. Install barriers for protection against vehicular traffic where necessary.
3. Maintain a minimum of 36" clearance between 69kV phases. Maintain a minimum of 22" clearance between 34kV phases or phase to ground.
4. Maintain minimum of 7 1/2' clearance between the aluminum mounting platform and the crossarm. This clearance may be reduced to 6' for 34kV installations.
5. Maintain a minimum of 17" between the energized conductors and the pole.
6. Maintain a minimum of 40" between any part of the aluminum mounting platform and conductors of 4 or 12 kV underbuild.
7. If disconnect switches are required, they may be installed on adjacent poles.
8. For wire color coding on PT and CT secondaries, refer to system meter drawings.

METER INSTALLATIONS **25 69 01 ****
Primary Metering Sheet 3 of 4
69 kV & 34.5kV, 3 Phase, 3 Wire

CIPS ONLY **CIPS ONLY** **CIPS ONLY**

Normally Provided By Customer

		Stnd. / Stk. No.	Description 25 69 01	01	02
	A		Pole	1	1
	B	41 01 188	Crossarm, 10 ft. Fiberglass, Double Deadend	1	1
	C	06 34 66 04	Insulator, Deadend, Polymer, 69kV	6	
		06 34 66 02	Insulator, Deadend, Polymer, 34kV		6
	D	23 66 027	Washer, 5/8", Square	2	2
	E	12 00 10 01	Grounding Unit	1	1
	F	17 51 139	Clamp, P.G., 336-795 kcmil to #6-2/0	5	5
	G	17 51 032	Clamp, P.G.,,#6-1/0 to #6-1/0	1	1
	H	18 53 109	Wire, #2 Cov., 5 kV, 7 str., S.D., (Ft.)	36	36
	I	25 05 098	Insulator, Line Post, 69 kV, Pole Top	2	
		25 05 064	Insulator, Line Post, 34kV, Pole Top		2
	J	23 53 058 to 064	Bolt – Double Arming, 3/4", Various Lengths	2	2
	K	23 52 065	Bolt, Mach., 5/8" x 12"	2	2
	L	PG*	Clamp, Parallel Grove (See Std. 07 00 25 00)	6	6
	M	06 34 70 03	Pole Looparound, 69kV	1	
		06 34 70 01	Pole Looparound, 34kV		1
	N	18 05 117	Wire, ACSR, 110.8kcmil, 12/7, EHS	-	-
	O	23 68 454 or 455	Support, Shield Wire, 5/8", 14" or 16" Length	1	1
	p	23 65 043	Nut, Lock, 5/8" Bolt	1	1
	Q	23 66 027	Washer, Square, Flat	1	1
	R	23 18 342	Clamp, Suspension, AL	1	1
	S	23 59 095	Eyelet, Galv, For 3/4" Bolt	2	2
	T	23 52 ---	Bolt, Machine, Glav, 3/4" Bolt, Lenght As Req'd	1	1
	U	23 18 401	Clamp, Strain, AL	2	2

METER INSTALLATIONS **25 69 01 ****
Primary Metering Sheet 4 of 4
69 kV & 34.5kV, 3 Phase, 3 Wire

CIPS ONLY **CIPS ONLY** **CIPS ONLY**

Normally Provided By Ameren

		Stnd. / Stk. No.	Description 25 69 01	01	02
@	AA		Current Transformer, 69 kV or 34 kV	2	2
@	BB		Potential Transformer, 69 kV or 34 kV, Phase to Phase	2	2
	CC	23 17 349	Mounting Assembly, 69 kV Meter Transformers with Arrester Mounting Kit	1	1
	DD	71 10 121	Arrester, 57 kV MCOV, 72 kV Duty Cycle	3	
		71 10 113	Arrester, 31.5kV MCOV, 39kV Duty Cycle		3
	EE	40 01 120	Box, Secondary Connection	1	1
→	FF	40 53 612	Connector, 1" Conduit	2	2
	GG	12 51 303	Conduit, Flex, 1", (Ft.)	20	20
	HH	23 64 033	Staple	3	3
	II	21 66 039	Screw, Hex head cap, 3/8" x 2"	2	2
	JJ	Meter Shop	Wire Pack of 10 ea. #12 solid Cu wires of Individual colors	30	30
	KK	40 04 043	Metering, Enclosure Assembly	1	1
	LL	41 01 014	Crossarm, 8 Ft. (Cut in Half)	1	1
	MM	41 56 063	Brace, 37" V	1	1
	NN	23 52 066	Bolt, Mach., 5/8" x 14"	2	2
	OO	23 66 027	Washer, 5/8" Square	5	5
	PP	23 52 065	Bolt, Mach., 5/8" x 12"	1	1
	QQ	23 52 097	Bolt, Mach., 3/4" x 12"	2	2
	RR	23 66 031	Washer, 3/4" Curved Square	2	2
→	SS	40 73 200	Reducer, 1 1/4" to 1"	1	1
→	TT	40 83 425	Reducer, 1 1/2" to 1"	6	6
		286	Install Primary Metering	1	1

25 69 01 01 69kV Primary Metering

25 69 01 02 34kV Primary Metering

Attachment D-5

Decommissioning Plan

Decommissioning Plan – Monarch 1

DRAFT

1. Introduction

The purpose of this decommissioning plan is to identify the methodology that Monarch Wind Power (the Project Sponsor) will use to mitigate potential impacts resulting from the cessation of operation of the facility at the end of the Project's useful life. The plan identifies decommissioning triggers; specific Project components that will be removed; estimated decommissioning costs; and financial assurance

2. Anticipated Life of the Project

Megawatt-scale wind turbine generators typically have a life expectancy of 20 to 25 years. The proposed GE 1.6MW xle wind turbine generators are certified by independent agencies as having an expected useful life of at least 20 years. It is in Project Sponsor's long-term financial interest to maximize the operational lifespan of the wind turbine generators. The Project Sponsor therefore plans to employ a proactive maintenance regime to ensure the turbines are in good repair for at least the full 20 years of expected life. As the turbines approach the anticipated end of life, it is expected that technological advances will economically drive the replacement of the existing turbines with newer models.

3. Trigger for Implementing the Decommissioning Plan

Decommissioning will occur at the end of the project life or facility abandonment. For the purposes of this section, "facility abandonment" shall mean the ceasing of electricity generation for a period of not less than 12 continuous months, unless the company produces evidence of mitigating circumstances. Such evidence may include long delays in spare part procurement or a force majeure event that interrupts the generation of electricity. As used here, a "force majeure" event means an instance such as fire, earthquake, flood, tornado, or other act of God and natural disasters; strikes or labor disputes; war; any law, order, proclamation, regulation, ordinance, action, demand or requirement of any government agency; suspension of operations of all or a portion of the project for routine maintenance, overhaul, upgrade, or reconditioning; or any other act or condition beyond the reasonable control of the Project Sponsor.

All decommissioning and restoration activities will adhere to requirement of appropriate governing authorities and will be in accordance with all applicable federal, state, and local laws.

4. Decommissioning Plan

The decommissioning and restoration process includes the removal of above-ground structures (turbines, transformers, overhead collection lines, and the substation); removal of below-ground structures (foundations and underground cables); and topsoil restoration.

4.1 Wind Turbines

Dismantling the wind turbines will require the use of cranes and heavy equipment. Electronic components, controls and internal cables will be disconnected and removed. The rotor and nacelle will be lowered to the ground for disassembly. The tower sections will be lowered to the ground where they will be further disassembled for transporting. The Project Sponsor will attempt to identify a purchaser of the intact wind turbine components. If a buyer cannot be found, the rotor, nacelle, and tower sections will be reduced to shipping dimensions for transport to an offsite facility for reconditioning, salvage, recycling, or disposal.

If resold and not scrapped, tower sections and rotors will be transported in the same manner as their delivery to the site. It is assumed that transportation costs will be the responsibility of the purchaser.

4.2 Transformers

Transformer removal will consist of disconnecting the electrical connection system from the base transformer. Any sellable components will be removed and transported offsite. Aboveground cables will be removed and the copper conductor materials may be salvaged for scrap value.

4.3 Aboveground Electrical Collection Lines

Aboveground electrical collection liens and associated components will be dismantled and the materials will be disposed, recycled or sold. Poles will be removed and holes backfilled with clean topsoil.

4.4 Turbine foundations

Turbine foundations will be excavated to a depth of 36 inches below grade (48 inches in agricultural fields) or to bedrock whichever is less to sufficiently expose and remove all anchor bolts, rebar, conduits and concrete. The excavation will be filled with clean sub-grade material, compacted to a density similar to surrounding sub-grade material, and finished with topsoil.

4.5 Substation

The Project Sponsor does not intend to decommission the substation.

4.6 Underground Cables

All underground cables at depths less than 4 feet below finished grade will be removed. All underground cables at depths greater than 4 feet below finished grade

will be abandoned in place if it is determined that their presence does not adversely impact land use and they do not pose a safety hazard.

4.7 Road Materials

All Project-related access roads and town, county, or state roads, impacted by Project decommissioning activity, if any, will be restored to original condition upon completion of decommissioning as pursuant the Lease and Road Agreements between the Project Manager and Warren County.

4.8 Soil Restoration

Once all of the above and below ground components designated for disposal or salvage have been removed, the remaining decommissioning work will consist of regarding and reseeding disturbed areas. All disturbed areas will be restored to pre-existing conditions and contours.

4.9 Access

During decommissioning activities, Warren County shall have access to the site, pursuant to reasonable notice, to inspect the results of complete decommissioning. All decommissioning and restoration activities will be in accordance will all applicable federal, state, and local permits and requirements.

5. Summary of Decommissioning Costs

The estimated cost to decommission Monarch 1 was provided by Fagen Inc. in a letter to Monarch Wind Power dated [June 15,2010]. The estimate is considered to be the current dollar value (at time of approval) of salvage value and removal costs.

The estimated [$61,200] salvage value of each turbine will be based upon the worse case scenario assuming the only salvage value of the turbine is from scrapping the steel. The estimate was based upon the total weight of one turbine, which is 306 tons consisting primarily of steel. Because it does not separate the scrap value of all the constituent materials, the estimate is very conservative. Also, it is highly likely that there would be opportunities for re-sale for reuse all or some of the turbines or turbine components.

Based on the current estimate, the cost of decommissioning is $364,054.

6. Financial Assurance

To provide financial assurance, the Project Sponsor agrees to deliver to the County at the end of the first year of commercial operations a letter of credit or a cash deposit with an aggregate initial face amount equal to 10% of the decommissioning cost estimate (minus salvage value). A further 10% of the decommissioning cost estimate will be funded out of Project cash flow and funded at the end of each Project fiscal year such that the decommissioning fund will be fully funded by the end of the tenth year of the Project's commercial operation. Any interest paid on

cash deposits will go toward meeting the decommissioning cost estimate. Once the decommissioning costs are fully funded, interest on cash deposits shall revert back to the Project Sponsor.

The amount of the decommissioning fund will be sufficient to decommission the site as outlined in this plan. The budget estimate, as described in Section 5, will be based on an independent estimate to remove all identified components (less salvage value), remove foundations to the specified depths and provide restoration services as outlined above. The cash deposit, letter of credit or other form of acceptable security will provide an immediate source of cash to fund decommissioning.

Upon complete decommissioning of the site, any remaining balance of the Decommissioning Fund shall be returned to the Project Sponsor.

7. Estimate Review of Decommissioning Costs

This decommissioning plan and anticipated costs shall be reviewed and updated every 5 years by a licensed engineer.

Appendix E: Public Involvement

Attachment E-1

Warren County Board Meeting Minutes

SPECIAL MEETING of the Warren County Board
August 5, 2010

A special meeting of the Warren County Board was called to discuss and consider 1) a hiring freeze 2)Zoning Board of Appeals recommendation for wind project 3) use of the Annex.

County Board Chairman called the meeting to order at 7:00 p.m.
Present: Bresnahan, Cokel, Harper, Hawk, Heaton, Jenks, Johnson, Pearson, Schar, Schreck, Stanton, Starbuck, Thompson, Turnbull, Winkler

Mr. Reichow noted that the "use of the Annex" will be removed from the agenda and add letters from United School District, WIEDP & Tiffany Cole. Mr. Pearson motioned to approve the changes in the agenda. Mrs. Schreck seconded the motion and on voice vote, motion carried.

Mr. Pearson motioned to approve a 1 year hiring freeze, effective immediately, with an exception clause on a case by case basis. Mr. Jenks seconded the motion. After some discussion a roll call vote was taken:
AYES: Cokel, Harper, Hawk, Heaton, Jenks, Johnson, Pearson, Reichow, Schar, Schreck, Stanton, Starbuck, Thompson, Turnbull, Winkler, Bresnahan

Building and Grounds Chairman Stanton called on Ron Moore, Chairman of the Zoning Board of Appeals to update the Board on the ZBA public hearings. Board members Schreck voiced her concerns about point #8 of the 39 requirements that Monarch Wind Farms has agreed to, noting that it should be changed to 1500 feet. Mr. Hawk also had a question about the setback and robbing a neighbors wind. There was some discussion on electrical contamination. Mr. Gay explained how the cables are insulated and contained. Mr. Jenks questioned why the road agreement was not brought before the board. Mr. Moore explained that the ZBA did not approve a road agreement, but an agreement had to be established before a permit would be issued, so the County Board will have to handle the approval of the road agreement. Mr. Stanton motioned to approve the ZBA recommendation for a special use permit to Monarch Wind Farms. Mr. Thompson seconded the motion. States Attorney Algren answered a few questions on some of the 39 requirements.

Mrs. Schreck motioned to amend item #8 of the 39 requirements to 1500 feet. Mr. Thompson seconded the motion. After much discussion, Mr. Pearson called for a vote for the motion on the floor. A roll call vote was taken:
AYES: Harper, Heaton, Pearson, Reichow, Schar, Schreck, Stanton, Thompson, Turnbull, Winkler, Bresnahan, Cokel
NAYS: Jenks, Starbuck
Hawk, and Johnson abstained.

Board members continued to ask questions of decommissioning, repairing roads, meeting with the fire protection district, real estate values, liability, severe weather,

Mr. Reichow began to read the ground rules for public speakers. Mr. Jenks questioned why the county board did not approve the ground rules. Mr. Pearson motioned to limit speakers to 5 minutes. Mr. Jenks argued "any" presenter. Mr. Hawk objected to the rules, he explained his objection. Mr. Turnbull seconded the motion, a roll call vote was taken:
Ayes: Heaton, Jenks, Johnson, Pearson, Reichow, Schar, Schreck, Stanton, Starbuck, Thompson, Turnbull, Winkler, Bresnahan, Cokel, Harper
NAYS: Hawk

Mr. Reichow motioned to allow only new presenters to speak. The motion died for lack of a second.

The following persons testified before the board for or against the proposed wind project:
Jane Young, Timothy Campus, Wood Stortzum, David Stinemates, Mark Gillen, Mike Zugmaier, Ruth Harlow, Mary Coates, Andy Jenks, Dean Stewart and letters read from Jeff Whitsitt, United School District, Tiffany Cole and Western Illinois Economic Development.

Mr. Campus presented a petition in opposition of the wind project.

Mr. Gay then responded to some of the testimony.

A roll call vote was taken on the motion to approve the ZBA recommendation to approve the special use permit for a wind farm project.
Ayes: Pearson, Reichow, Schar, Stanton, Thompson, Turnbull, Bresnahan, Cokel, Harper, Heaton
NAYS: Jenks, Johnson, Schreck, Starbuck, Winkler, Hawk

Mr. Johnson motioned to approve per diem and mileage. Mr. Cokel seconded the motion and on voice vote motion carried.

The meeting adjourned on a motion by Mr. Pearson and seconded by Mr. Thompson.

Attachment E-2

DOE Scoping Letter, Notice of Scoping, and Stakeholder Mailing List

Department of Energy
Washington, DC 20585

September 13, 2010

TO: Distribution List

SUBJECT: Notice of Scoping – Monarch Warren County Wind Turbine Project, Lenox Township, Warren County, Illinois

The U.S. Department of Energy (DOE) is proposing to provide "Recovery Act" federal funding to the Illinois Department of Commerce and Economic Opportunity (DCEO) for the Monarch Warren County Wind Turbine Project. The project will consist of a 20 MW wind generation facility on approximately 750 acres of land leased in Warren County, Illinois. Thirteen (13) 1.5 MW turbines, turbine access roads, and an electrical substation will be installed on active agricultural fields. The turbines will be a GE 1.6xle model and have a tower height of 328 feet and a rotor diameter of 271 feet, reaching an overall height of 464 feet. The proposed site is approximately 4 miles south of Monmouth in West Central Illinois along both sides of Route 67 (see attached map of turbine locations). Eight of the proposed turbines would be constructed on land leased from private landowners and the other five turbines would be constructed on Warren County property. The proposed wind facility will be connected to an existing distribution line that traverses the site and will provide electricity to local consumers. Pursuant to the requirements of the National Environmental Policy Act (NEPA), the Council on Environmental Quality regulations for implementing the procedural provisions of NEPA (40 CFR Parts 1500-1508), and DOE's implementing procedures for compliance with NEPA (10 CFR Part 1021), DOE is preparing a draft Environmental Assessment (EA) to:

- Identify any adverse environmental effects and potential associated mitigation measures should this proposed action be implemented;
- Evaluate viable alternatives to the proposed action, including a no action alternative;
- Describe the relationship between local short-term uses of the environment and the maintenance and enhancement of long-term productivity; and
- Characterize any irreversible and irretrievable commitments of resources that would be involved should this proposed action be implemented.

The EA will describe and analyze any potential impacts on the environment that would be caused by the project and will identify possible mitigation measures to reduce or eliminate those impacts. The EA will describe the potentially affected environment and the impacts that may result to:

- Air Quality and Climate;
- Geology/Soils;
- Biological Resources;
- Water Resources;

- Waste Management and Hazardous Materials;
- Cultural and Historical Resources;
- Land Use;
- Noise;
- Infrastructure;
- Transportation and Traffic;
- Aesthetics;
- Human Health and Safety; and
- Socioeconomics and Environmental Justice.

DOE will make this letter available to all interested federal, state and local agencies to provide input on issues to be addressed in the EA. Agencies are invited to identify the issues, within their statutory responsibilities that should be considered in the EA. The general public is also invited to submit comments on the scope of the EA.

No formal public scoping meeting is planned for this project. Figures showing the proposed project area are attached to this letter. This letter, as well as the draft EA, when available, will be posted on the DOE Golden Field Office online reading room: http://www.eere.energy.gov/golden/Reading_Room.aspx.

The DOE Golden Field Office welcomes your input throughout the NEPA process. Please provide any comments on this scoping letter on or before September 28, 2010 to:

Caroline Mann
NEPA Document Manager
Department of Energy
Energy Efficiency and Renewable Energy
1000 Independence Avenue
Washington, DC, 20585
caroline.mann@ee.doe.gov

Sincerely,

Caroline Mann
NEPA Document Manager

NOTICE OF PUBLIC SCOPING

The U.S. Department of Energy (DOE) is proposing to provide federal funding to the Illinois Department of Commerce and Economic Opportunity (DCEO) for the Monarch Warren County Wind Turbine Project.

DOE's Proposed Financial Assistance to Illinois DCEO –

Monarch Warren County Wind Turbine Project
Lenox Township, Warren County, IL
DOE/EA: 1800

Monarch Wind Power is proposing to install 13 1.5 MW wind turbines, turbine access roads, and an electrical substation on active agricultural fields in Warren County, IL. DOE's Golden Field Office is preparing an Environmental Assessment (EA) in accordance with the National Environmental Policy Act (NEPA).

The complete scoping letter, with attachments, is available for review on the DOE Golden Field Office website: **http://www.eere.energy.gov/golden/reading_room.aspx**

Public comments on any potential issues and/or associated environmental impacts of implementing the proposed action will be accepted until ***September 28th, 2010*****.** Please mail comments to the **DOE Headquarters**, c/o Caroline Mann, 1000 Independence Ave., SW, Washington, DC 20585, or send them by email to caroline.mann@ee.doe.gov.

NOTICE OF PUBLIC SCOPING

The U.S. Department of Energy (DOE) is proposing to provide federal funding to the Illinois Department of Commerce and Economic Opportunity (DCEO) for the Monarch Warren County Wind Turbine Project.

DOE's Proposed Financial Assistance to Illinois DCEO –

Monarch Warren County Wind Turbine Project
Lenox Township, Warren County, IL
DOE/EA: 1800

Monarch Wind Power is proposing to install 13 1.5 MW wind turbines, turbine access roads, and an electrical substation on active agricultural fields in Warren County, IL. DOE's Golden Field Office is preparing an Environmental Assessment (EA) in accordance with the National Environmental Policy Act (NEPA).

The complete scoping letter, with attachments, is available for review on the DOE Golden Field Office website: **http://www.eere.energy.gov/golden/reading_room.aspx**

Public comments on any potential issues and/or associated environmental impacts of implementing the proposed action will be accepted until ***October 8th, 2010***. Please mail comments to the **DOE Headquarters**, c/o Caroline Mann, 1000 Independence Ave., SW, Washington, DC 20585, or send them by email to caroline.mann@ee.doe.gov.

Richard Nelson
US Fish and Wildlife Service
Rock Island Field Office
1511 47th Avenue
Moline, IL 61265

Edward Davison
National Telecommunications and Information Administration
Herbert Clark Hoover Building 1401 Constitution Ave NW
Washington, DC 20230

Michael Branham
IL Department of Natural Resources
One Natural Resources Way
Springfield, IL 62702

Anne Haaker, Cultural Resources Manager
Illinois Historic Preservation Agency
1 Old State Capital Plaza
Springfield, IL 62701-1507

Warren County Historical Society
238 South Sunnylane
Monmouth, IL 61462

Steven S. Hall, Funeral Director
Hoover Hall Memorial Chapel
900 North Main Street
Monmouth, IL 61462

Tammy Davis, Zoning Administrator
Warren County Courthouse
100 West Broadway
Monmouth, IL 61462

Chip Algren, Warren County States Attorney
Warren County Courthouse
100 West Broadway
Monmouth, IL 61462

Eric Hanson, City Administrator
Monmouth City Hall
100 East Broadway
Monmouth, IL 61462

Milo Sprout
Lenox Township Road Commissioner
Warren County Courthouse
100 West Broadway
Monmouth, IL 61462

Bill Reichow, Warren County Board Chairman
Warren County Courthouse
100 West Broadway
Monmouth, IL 61462

Dewayne Fender, Warren County Engineer
Warren County Courthouse
100 West Broadway
Monmouth, IL 61462

Ron Moore, Warren County Zoning Officer
Warren County Courthouse
100 West Broadway
Monmouth, IL 61462

Mark Pruitt
Illinois Power Agency
100 W. Randolph, 6-100 James R. Thompson Center
Chicago, IL 60601

Mauri Ditzler, President
Monmouth College
700 E. Broadway
Monmouth, IL 61462

Jolene Willis
Illinois Institute for Rural Affairs
Western Illinois University
318 A, 1 University Circle
Macomb, IL 61455

Terry J. Salvo, Soil Conservation Planner
Illinois Department of Agriculture
Bureau of Farmland Protection
State Fairgrounds
Springfield, IL 62701-9218

Rick Winbigler
Warren County SWCD
701 North Main Street
Monmouth, IL 61462

Eric Hanson, City Administrator
100 East Broadway
Monmouth, IL 61462

Sarah Sheehan
Office of the Governor
100 W. Randolph, 6-100 – James R. Thompson Center
Chicago, IL 60601

Alyson Grady
IL Department of Commerce and Economic Opportunity
500 E. Monroe
Springfield, IL 62701

Wayne Hartel
IL Department of Commerce and Economic Opportunity
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Linda Laws
Illinois Environmental Protection Agency
1021 North Grand Avenue East
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Lisa Bonnett, Acting Deputy Director
Illinois Environmental Protection Agency
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Monmouth, IL 61462

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Dennis Endicott
Peoria Audubon Society
c/o Peoria Academy of Science
677 E. High Point Terrace
Peoria, IL 61614

Michelle P. Scott
National Audubon Society
225 Varick Street, 7th floor
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Phil Wallis
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New York, NY 10014

Kim Van Fleet
National Audubon Society
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Eric Glitzenstein
Meyer Glitzenstein & Crystal
1601 Connecticut Ave. NW, Suite 700
Washington, DC 20009-1056

William Eubanks
Meyer Glitzenstein & Crystal
1601 Connecticut Ave. NW, Suite 700
Washington, DC 20009-1056

Tribes:

Tribal Historic Preservation Office
Attn: Karen Kaniatobe
Absentee-Shawnee Tribe of Indians of Oklahoma
2025 South Gordon Cooper
Shawnee, OK 74801

Tribal Historic Preservation Office
Attn: David Smith
Winnebago Tribe of Nebraska
100 Bluff Street
PO Box 687
Winnebago, NE 68071

Tribal Historic Preservation Office
Attn: Joseph Hale Jr.
Prairie Band Potawatomi Nation
16281 Q Road
Mayetta KS 66509-8970

Tribal Historic Preservation Office
Attn: Deanne Bahr
Sac and Fox Nation of Missouri
1322 US Hwy 75
Powhattan, KS 66527

Tribal Historic Preservation Office
Attn: Karen Phillips
Citizen Potawatomi Nation
1601 South Gordon Cooper Drive
Shawnee, OK 74801

Tribal Historic Preservation Office
Attn: Kent Collier
Kickapoo Tribe of Oklahoma
PO Box 70
McLoud, OK 74851-0070

Tribal Historic Preservation Office
Attn: Sandra Massey
Sac and Fox Nation of Oklahoma
920883 S. Hwy 99 Bldg A
Stroud, OK 74079

Tribal Historic Preservation Office
Attn: Johnathan Buffalo
Sac & Fox Tribe of the Mississippi in Iowa
349 Meskwaki Road
Tama, IA 52339

KBIC Tribal Historic Preservation Office
Attn: Joseph Jacker
Keweenaw Bay Indian Community
16429 Beartown Road
Baraga, MI 49908

Tribal Historic Preservation Office
Attn: Michael Zimmerman Jr.
Pokagon Band of Potawatomi Indians
58620 Sink Road
Dowagiac, Michigan 49047

Tribal Historic Preservation Office
Attn: George Strack
Miami Tribe of Oklahoma
PO Box 1326
Miami, OK 74355

Tribal Historic Preservation Office
Attn: Rhonda Hayworth
Ottawa Tribe of Oklahoma
P.O. Box 110
Miami, OK 74355

Tribal Historic Preservation Office
Attn: Sherri Clemons
Wyandotte Nation
64700 East Highway 60
Wyandotte, OK 74370

Tribal Historic Preservation Office
Attn: Mandie Ferguson
Peoria Tribe of Indians of Oklahoma
118 S. Eight Tribes Trail, P.O. Box 1527
Miami, OK 74355

Tribal Historic Preservation Office
Attn: Kim Jumper
Shawnee Tribe
29 South Highway 69A
Miami, OK 74354

Tribal Historic Preservation Office
Attn: David Grignon
Menominee Indian Tribe of Wisconsin
P.O. Box 910
Keshena, WI 54135

Tribal Historic Preservation Office
Attn: Mike Alloway Sr.
Forest County Potawatomi Community of Wisconsin
PO BOX 340
Crandon, WI 54520

Tribal Historic Preservation Office
Attn: Earl Meshigaud.
Hannahville Indian Community of Michigan
N14911 Hannahville B-1 Rd
Wilson MI 49896 54520

Tribal Historic Preservation Office
Attn: Louis Deroin
Iowa Tribe of Kansas and Nebraska
3345 B Thrasher
White Cloud, KS 66094

Tribal Historic Preservation Office
Attn: Janice Rowe-Kurak
Iowa Tribe of Oklahoma
R.R. 1, Box 721
Perkins, OK 74059

Tribal Historic Preservation Office
Attn: Arlan Whitebird
Kickapoo Tribe of Indians of the Kickapoo Reservation in Kansas
1107 Goldfinch Road
Horton, KS 66439

Owners of Properties in the Vicinity

Gilbert and Victoria Hennenfent
1412 US Hwy 67
Monmouth, IL 61462

William and Cynthia Gillen
617 130th Avenue
Monmouth, IL 61462

Mark and Stefani Gillen
617 130th Avenue
Monmouth, IL 61462

Marian Gillen
C/O John E. Gillen, Executor
614 120th Avenue
Monmouth, IL 61462

David and Carol Stinemates
602 130th Avenue
Monmouth, IL 61462

Pattee Foundation
C/O Spear and Spears
Box 377
Monmouth, IL 61462

Michael (Deane) and Helen Slater
100 West Detroit
Monmouth, IL 61462

State of Illinois Department of Transportation
401 Main Street
Peoria, IL 61602

Huston Harlow, Jr
736 140th Avenue
Monmouth, IL 61462

Kenneth Reick
c/o Emma Reick
5 Berseem Court
Oak Brook, IL 60521

John and Mary Walters
549 15oth Avenue
Monmouth, IL 61462

Gerald Way
1344 US Hwy 67
Monmouth, IL 61462

Twomey Company
PO Box 158
Smithshire, IL 61478

James Harlow
698 140th Avenue
Monmouth, IL 61462

Ronald and Renee Mowen
410 Buttercup Drive
Savoy, IL 61874

Raymond and Cindy Brinkman
123 210th Avenue
Monmouth, IL 61462

Jane Young Trust
200 North Main Street
Roseville, IL 61473

Beulah Jenks
1377 80th Street
Monmouth, IL 61462

Heaton Enterprises, Ltd
c/o Keith Heaton
1147 40th Street
Roseville, IL 61473

McDonough Power Cooperative
PO Box 352
Macomb, IL 61455

C.P. Cole Family Trust
c/o Charles Cole
PO Box 719
Media, IL 61460

George Brown
702 130th Avenue
Monmouth, IL 61462

Sam Wheeler
721 130th Avenue
Monmouth, IL 61462

John McIntyre
695 130th Avenue
Monmouth, IL 61462

Dave McIntyre
696 130th Avenue
Monmouth, IL 61462

Lonnie Darnell
720 130th Avenue
Monmouth, IL 61462

Amy Greer
682 130th Avenue
Monmouth, IL 61462

Jim Heidenreich
792 130th Avenue
Monmouth, IL 61462

E. Crain
757 130th Avenue
Monmouth, IL 61462

Lynn Shimmin
733 90th Avenue
Roseville, IL 61473

Corman Trust c/o Jane Young
200 North Main
Roseville, IL 61473

Charles Rennick
973 140th Avenue
Monmouth, IL 61462

Tom Missavage
655 120th Avenue
Monmouth, IL 61462

Marshall Schrader
580 120th Avenue
Monmouth, IL 61462

George Sipes
743 150th Avenue
Monmouth, IL 61462

Craig Long
687 150th Avenue
Monmouth, IL 61462

Judy Miller
1496 80th Street
Monmouth, IL 61462

Attachment E-3

DOE Scoping Comments

Mann, Caroline

From: Gordon & Jane Young [gjyoung@mediacombb.net]
Sent: Monday, September 27, 2010 5:51 PM
To: Mann, Caroline
Subject: Monarch Warren County Wind Turbine Project, Lenox Township, Warren County, IL DOE/EA: 1800

I am a landowner in Lenox Township, Warren County, IL. I am opposed to the Monarch Warren County Wind Turbine Project.
My reasons being the availability for aerial application for crop dusting, the potential decrease in property valuation, and for
all health concerns such as noise, air pressure that the blades create and shadow flicker. I would not want to live in close
proximity to a wind turbine farm.

Mann, Caroline

From: Jackie Jenks [jenks@monmouthnet.net]
Sent: Friday, October 08, 2010 11:45 AM
To: Mann, Caroline
Subject: Monarch Warren County Wind Turbine Project

Dear Ms. Mann,
Thank you for taking the time for public comment on the Monarch Warren County Wind Turbine Project in Lenox Township, Warren County, Illinois. I am a resident of Lenox Township and a will be two miles from the nearest turbine. My husband is a farmer and we have ground that we farm adjacent to 6, 11, 12, and 13. We do not support this project in our neighborhood and ask that you deny funding for this project for the developer, Mr. Gay for the following reasons:

1) Negative impact on agriculture – Farmers once feed their families and now they feed the world. Crop yields are dependent on proper pest and disease management. Many products used to control this are applied with the help of crop dusters. With the construction of the turbines, local crop dusters have already said that the cost of this service will double, that is IF they are even able to spray. The fields of some non-participating landowners will be at great risk for severe crop losses due to the presence of the turbines right next to their field. If yields are affected, that means our income is affected. On a personal note, we do not have any off-farm income. We have a son who takes very expensive medication necessary for his growth. We rely on our crops to be able to afford his medication. If our yields are down due to the lack of pest and disease management because of the turbines, who will make up for this financial loss?

2) Noise, flicker – Wind turbines make noise and cause sleep deprivation! I think the best way to illustrate this is to take you to the website of a nice young family that we have recently met. Their names are Dave and Stephanie Hulthen. They built their dream home in the country to raise their four young kids…then the turbines went up. Please read their blog from the beginning and watch the videos. This is the reality of the negative impact that turbines have on a community. It can be found at http://www.lifewithdekalbturbines.blogspot.com. I will note that the turbines that surround their home are also GE models and only put in last year.

3) Lack of support from local homeowners. Lenox township is rather populated for a rural area. In just one mile there are approx 29 homes! Many of those homes also include children who will be affected by the negative impacts of the turbines. Local community members went around with a questionnaire to see how many people were opposed to this project. The vast majority are opposed and most did not even know about the project. Lenox township does not support this project!

I do want to add that I am not against wind energy, but for its use when properly sited away from homes and with community involvement. Neither of those have happened here. Wind energy can have its proper place in filling our energy needs when properly placed, but the negative impact that these structures can have on a local community and farm economy can be devastating. There is a real, negative human impact to this project and for that reason I ask that you deny Mr. Gay funding. Please feel free to contact me through email or at 309-297-0143 if you have further questions. Thank you for your time and consideration in this matter.

Jackie Jenks

Caroline Mann
NEPA Document Manager
Department of Energy
Energy Efficiency and Renewable Energy
1000 Independence Avenue
Washington, DC, 20585

Dear Ms. Mann,

This correspondence is in response to the "Notice of Scoping – Monarch Warren County Wind Turbine Project, Lenox Township, Warren County, Illinois". Upon reviewing the scoping letter and corresponding attachments I would like to offer the following comments.

First of all, I am a non-participating resident and farm land owner directly adjacent to the proposed wind project. My property (85 acres) lies directly west of the turbine numbers 4 and 5. My property line is approximately 600 ft. from these two turbines and my residence is located 1,900 ft. southwest of turbine 5.

My first concern is with the environmental impact this project can possibly have on the physical lives of my wife and myself. This has to do with the well documented negative effects of sub-audible sound pressure levels or what has been termed as "Wind Turbine Syndrome". Granted this phenomenon does not affect everyone living in close proximity to large industrial wind turbines; however, it does effect a large number of people world-wide. If we would be ones who are affected, what would be our recourse? I am the 4th generation who has farmed and lived at this location and am not of a mind to move.

Another concern is the economic impact this project WILL have on my farming operation. This has to do with aerial application of crop pesticides. Farming has become a highly technical and scientific business. With all the latest breakthroughs in plant genetics, the proper timing and use of these pesticides has become very critical. In discussion with a couple of aerial applicators who do the bulk of this process in our region, they will not fly within a minimum of ½ mile (2,640ft.) of a large wind turbine. This is not only due to their physical presence, but also due to the air current turbulence generated by the rotating blades. The Warren County Zoning Board, with subsequent approval by the Warren County Board of Supervisors, negotiated with the Monarch Wind Co. that for land owners directly adjacent to properties containing wind turbines, the Monarch Wind Co. would reimburse the property owner up to an additional 50% for the cost of aerial application. This, however, is a mute point. The adjacent land owner will not be able to find anyone to apply the pesticides no matter what the price of application. The bottom line is that in the event of a disease outbreak or weather related conditions that require the use of aerial application I will not have any options to protect my crop and as a result could suffer a total failure without any recourse.

The last concern that I will mention here has to do with degradation of property values and property rights adjacent to large industrial wind turbines. The Wind industry will

show studies that there is not a loss of property value associated with the presence of these turbines; however, who conducts these studies? The property owner who hosts wind turbines on their land may not suffer property value loss due to the income that the turbines can generate. If adjacent land is solely used for agriculture purposes, the aerial application issue alone will have a negative effect on property values. With respect to property rights, as a non-participant and having to abide with zoning laws that are in place I am limited as to what I can do with my land. As an example, if one of our children wanted to build their home on our property not only would they be controlled as to where it could be located based on setback requirements but the greater question would be "why would they be willing to build in close proximate to a 465 ft. industrial wind turbine?"

In all of the public meetings which have been held to date concerning this project, one Zoning Board meeting which required two nights due to citizen objection of the project and one full County Board of Supervisors meeting, there was very little emphasis on Green energy and its benefits. The prominence of those who supported the project were mainly influenced by the money it would generate for local governments and local schools. In other words, it was all about the money and not about energy generation.

In summary, I live on some of the most productive agricultural land in this country and in a rural setting that historically has been void of objectionable structures such as these large industrial wind turbines. I do not believe that it is in the best interest of my family or neighbors to be needlessly subjected to negative impacts that this project will place on our lives. Particularly with the use of our federal tax dollar being used to offset the cost of its construction.

For the above reasons, my wife and myself are strongly requesting the granting of federal "Recovery Act" monies for the Monarch Warren county Wind Turbine Project NOT be approved.

David and Carol Stinemates
602 130th Ave.
Monmouth, IL 61462

P.S. – One technical question, on the second attached page of the 'Notice of Scoping' letter where it illustrates turbine access roads, the map shows the access road south of turbine no. 5 intersecting with the east/west road (130th. Ave.) which passes through the village of Larchland. The last project map that I saw, the site plan approved by the Warren County Board of Supervisors, was that the access road for turbine no. 5 would come from the north and terminated at the no. 5 turbine. In other words 130th Ave. would not be impacted by this project. Which is true? As Monarch Wind Power is an elusive company I find it impossible to obtain information from them.

DOE · Notice of Public Scoping

Lenox Township, Warren County, Monmouth, IL

Monarch Wind, LLC

The natural resources of Illinois - land, minerals, water and air – are both finite and fragile. In the absence of wise use and consistent management practices, these resources are threatened by irreversible damage or loss. Protection of Illinois' natural resources is essential to guard the public health, safety, and welfare, and to assure an adequate natural resources supply and quality for use and enjoyment by future generations.

Farmland Preservation Act, *P.A. 82-945, § 5, effective August 19, 1982*

Jim and Ruth Harlow
698 · 140th Avenue
Monmouth, IL 61462
(309)734-2059
harlow@monmouthnet.net

Jim and Ruth Harlow
698 · 140th Avenue
Monmouth, IL 61462

October 7, 2010

DOE Headquarters
% Caroline Mann
1000 Independence Ave., SW
Washington, DC 20585

Dear Caroline and the DOE:

Let me begin by thanking you for allowing us and our township residents to respond to the Notice of Public Scoping regarding the proposed financial assistance of the Monarch Wind, LLC turbine project in Lenox Township, Warren County, IL. This is a proposed project that we are very passionate about (as you will see), that needs strong guidelines due to the circumstances.

In addition to that and on a personal note, thank you very much for listening to my concerns on the telephone and including additional residents from our township, that were not on the developers compiled list, in the Public Scoping mailing. It is very much appreciated.

Although we would enjoy telling the story of Lenox Township and Monarch Wind, LLC, we're sure that you have many other things to do than listen to one more sad story. As you can see, we are not in favor of Monarch Wind, LLC being our neighbor.

Please don't misunderstand. It is not that we are opposed to wind energy and a greener environment – but we ARE opposed to improper siting of such large scale wind turbines near the homes and business in our small rural, but somewhat densely populated, township. There are approximately 20 homes/60 residents within a one mile "footprint" of this project.

In addition to opposing the wind farm project due to siting issues, we feel that it would be an injustice to our local farming area of Warren County. You see, the earth where we live is flat, high in nutrients for successful plant growth, excellent for high yields in both soybeans and corn and is ranked #3 in prime farmland nationally. In order to sustain the production of the crops and livestock in our beautiful prairie land, we need to impose greater restrictions. It's a fact, since 1959, Illinois has had a decrease of 88,000 farm operators. One who doesn't know the land, needs to appreciate and respect this gift we use to grow on, it is our way of life; how we make a living, trying to provide for a hungry nation. While holding on to family legacies.

Best Regards-

Jim and Ruth Harlow

Enc:

We feel that there could be potential social, environmental, health and safety impacts should Monarch Wind, LLC receive funding to finalize the proposed wind farm. We will list our concerns and briefly give facts.

- Location
- Prime farm ground
- Flat tillable acreage
- Natural run off
- Broken field tiles
- Excessive lime buildup
- Ground compaction
- Aerial applications
- GPS interference
- Decommissioning
- Lightning strikes
- Stray voltage
- Fire
- Ice shedding
- Transportation
- Life flight
- Acoustics
- Property values/assurance
- Radio & Television Interference
- Possible blasting
- Socio Economics
- Lessor's

Location

The proposed site is approximately 4 miles south of Monmouth in West Central Illinois along both sides of Route 67. Eight of the proposed turbines would be constructed on land leased from private landowners and the other five turbines would be constructed on Warren County property.

Four of the proposed turbines will be located on the east side on Rte 67 and the west side of township road 80th Street. One turbine will be located on the east side of Rte 67 and the south side of township road 140th Avenue. And the remaining Eight of the proposed turbines will be located on the west side of Rte 67 between the township roads of 140th and 130th Avenue. Our concerns are of safety and proper setback from the roadways in the chance of ice throw, blade breakage or turbine collapse due to mechanical failure or manufacturer defects.

Turbine #1 sited at 567' from 140th Avenue W
Turbine #7 sited at 823' from US Hwy 67 and 653' from 140th Avenue W
Turbine #8 sited 886' from US Hwy 67
Turbine #9 sited 993' from US Hwy 67
Turbine #10 sited at 696' from 140th Avenue E
Turbine #12 sited at 534' from 80th Street
Turbine #13 sited at under 600' from 80th Street

Route 67 is a highly traveled roadway. Semi trucks transporting goods and services, students traveling to University and College in both Monmouth and Macomb, buses transporting elementary and junior high age

students to/from school daily. Not to mention any extracurricular events and daily motorists driving for business or pleasure.

Township road 80th Street is mostly used by school buses, locals driving to/from work, bicyclists and agricultural use. We feel that even though 80th Street is a secondary road, it is still a public route and is in need of proper setbacks for safety reasons.

—.. . Pieces of broken blade and ice can be thrown hundreds of meters away. Although no member of the public has been killed by a malfunctioning turbine, there have been close calls, including injury by falling ice. Large pieces of debris, up to several tons, have dropped in populated areas, residential properties, and roads, damaging cars and homes. . . —

Wikipedia; Environmental Effects of Wind Power

Prime Farm Ground

We fear that if Monarch Wind, LLC develops a wind farm in the Lenox Township area, the physical and chemical characteristics of the ground will be lost and the crop yields will be less than expected. It is the American farmer that spends tireless days in the outdoors maintaining his fields to raise crops that we hope will feed nations of people & animals. The farmer depends on natures wind, rain and sun to help him plant and grow good strong crops to harvest.

In viewing the enclosed maps please note;

- ✓ *Prime Farmland* - 68% of Illinois is Prime with 14% noted as "Important" – Lenox Township in Warren County is fortunate to be located in both categories on the map.
- ✓ *Soil Order Classification* – Warren County has one of the best soil classifications in our nation with 45% Mollisols and 43% Alfisols.
- ✓ *Predicted Native Vegetation* – looking at this map, Lenox Township in Warren County is comprised of 40% Prairie. Outstanding for growing corn and soybeans.

". . . as a designation assigned by U.S. Department of Agriculture, is land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops and is also available for these uses. It has the soil quality, growing season, and moisture supply needed to produce economically sustained high yields of crops when treated and managed according to acceptable farming methods, including water management. In general, prime farmlands have an adequate and dependable water supply from precipitation or irrigation, a favorable temperature and growing season, acceptable acidity or alkalinity, acceptable salt and sodium content, and few or no rocks. They are permeable to water and air. Prime farmlands are not excessively erodible or saturated with water for a long period of time, and they either do not flood frequently or are protected from flooding."

Wikipedia: Prime farmland; http://en.wikipedia.org/wiki/Prime_farmland

Flat tillable acreage

Our Warren County is made of mostly flat tillable acreage. We won't hesitate to say that in Warren County there are a few "rolling hills" and "timber" areas, but for the most part and especially in Lenox Township – we are of flat tillable acreage that was once Prairieland. Due to the nature of the level ground, much of this area requires field tiling for drainage purposes, as you will see in the *Tile Drainage Probability* map.

Natural run off

Huge concerns have been raised as to natural drainage issues and broken field tiles should the wind turbines be placed in our township/county. We count on nature to remove the excess rainwater's from our fields through the natural flow of water to the creeks and rivers beds. If a 464' turbine is erected, which may

require a 15' deep by 100' square concrete base, and is placed in the way of that "natural drainage", how long will it take to relieve the fields of the excess waters?

As you can see by the enclosed *Tile Drainage Probability* map – this area of Warren County is not that of rolling hills and multi level landscape. Concerns of turbine placement could be an obstruction of the direction of the earth's natural flow to relieve the fields of excess rain, as we had this past spring and into the summer of 2010.

Broken field tiles

With the level land that Lenox Township is fortunate to have; many fields require clay or plastic tiling. Concerns have been voiced that if field tile is broken during the construction phase of the proposed project, it will not be discovered until we receive a large amount of precipitation. This not only affects the field that may have the broken tiles, it will also disrupt the natural flow of water of fields from the north.

No proposed plan of action is in place with the wind developer.

Excessive lime buildup

It has been considered that access roads and construction sites will require many inches of lime for the base. Too much lime prevents proper growth for productive crop yields. It has been noted that it may take up to 20 years to get the grounds pH back to where it once was. Have we considered future agricultural growth in this area?

Soil pH and micronutrient availability are interrelated. Too much lime can raise soil pH to a point where micronutrients become unavailable to plants. Micronutrients affected by pH include iron (Fe), manganese (Mn), zinc (Zn) and, to a lesser extent, copper (Cu). Problems caused by applying too much lime are more difficult to correct than those that result from having applied too little. You can always apply more lime, but you cannot remove it if you put out too much.

NCDA & CS http://www.ncagr.gov/agronomi/stfaqs.htm#q16

Ground compaction

This is actually an annual concern for a farmer. During harvest, tractors with wagons full of grain compact the end rows. For best growth, it is wise to plow those sections to aerate the soil prior to planting of the next crop year.

With the large equipment that is needed to erect the tall turbines, major compaction of the soil is bound to occur. It is very possible that the weight of the trucks and cranes will compact the earth further than 6 feet deep, the typical length of a healthy corn stalk root, which could decrease yields in crops production and unstable corn stalks. *(See aerial photo of construction site)*

The developer claims to only disturb one acre. Is that in addition to the acre for the turbine? Additional ground is sure to be compacted during the excavating and construction phases. How much crop losses will there be?

Aerial applications

State Ag aviation associations that have adopted wind placement policies are encouraging members to do the same and inform their customers that aerial spraying could be reduced or eliminated if wind turbines are erected on their property.

National Agricultural Aviation Association; November/December 2009; "Can Aerial Applicators and Wind Energy Developers Learn to Coexist?"

Wind turbines located in agricultural areas may create concerns by operators of crop dusting aircraft. Operating rules may prohibit approach of aircraft within a stated distance of the turbine towers; turbine operators may agree to curtail operations of turbines during crop dusting operations.

Wikipedia: Environmental Effects of Wind Power; http://en.wikipedia.org/wiki/Wind_turbine_syndrome#cite_note-60

Farm Implement GPS Interference

Many tractors and combines are equipment today with a GPS enhanced system. Concerns are raised of interference from turbines and incomplete information to the GPS monitoring system.

These effects could be substantial for an individual operator. Farming equipment continues to become larger and more automated while crops become more "high tech" requiring more precise application and timing of pesticides and fertilization. Farmers run the risk of costly damage to their equipment if it strikes a structure. Depending on the location, farming method, and type of structure, areas would be taken out of production around the base of support structures, and the support structures would be in the way of all equipment.

GPS and Weather Doppler interference

It has been noted that the constant movement and height of the turbines interfere with weather Doppler radar. In the past, this area has been prone to sudden thunderstorms and tornado activity. In such a case, it may be possible that Doppler radar does not have time to notify and protect the individuals living and working in the area to take shelter.

During the December 2007-March 2008 cold season, Illinois experienced a record-tying number of winter storms, a record number of rainstorms, three tornadoes, and every form of severe weather that can occur in Illinois (Changnon and Kunkel, 2006). As a result, the state had 28 weather-related deaths, double the normal number, and very costly damages to vehicles, residences, and businesses. Communities and state agencies faced costly repair efforts, and many people lost their homes because of flooding.

Illinois State Water Survey; "Winter 2007-2008: Record-Setting Storms Caused Major Damages in Illinois"; Pg 37;
http://www.isws.illinois.edu/pubdoc/DCS/ISWSDCS2008-02.pdf

Decommissioning

The developer has mentioned that this project is "temporary". What does that mean? That he plans to sell the project after constructing it? That he will own it as long as is necessary per the Grant with the DOE and then shut them down to become ghosts? "Temporary" with this project is very disturbing.

Lightning strikes

I have personally spoken with an electrician from Schneider Electric, Frank Waterer. His concern was the protection of the homes, appliances and outdoor structures in this area being properly grounded. He explained to me what would need to be done to keep our properties safe from risk of lightning strikes and fire. It is a fact that turbines attract lightning, due to their height and constant movement.

Our fire protection districts are rural. There are two fire districts responsible for this area. Both are approximately 10+ miles away. We stand a great chance to lose our properties and livestock. There are no hydrants that a fire department can hook a proper hose into.

This needs to be considered thoroughly.

Lightning strikes are a common problem, also causing rotor blade damage and fires.

Wikipedia; Environmental Effects of Wind Power; Safety

According to the handbook, —wind turbines are particularly complicated to protect because they have so many different components — including non-conducting composite materials like glass-reinforced plastic. Any lightning protection system must therefore be sufficiently comprehensive to take account for all of the parts."

—While physical blade damage is the most expensive and disruptive damage caused by lightning," the handbook states, —by far the most common is damage to the control system."

The massive blades will often have a receptor at the tip, which can channel the lightning into the proper wires and onward to the ground. Two receptors might be necessary for larger blades.

Without the system, though, it's not pretty: —A lightning strike on an unprotected blade can lead to temperature increases of up to 30,000 degrees Celsius, and result in an explosive expansion of the air within the blade," LM Glasfiber states.

The New York Times, April 13, 2009; "When Lightning Strikes Wind Turbines II"; By KATE GALBRAITH

Stray voltage

Dr. Pettegrew, testifying before the Bureau County Zoning Board of Appeals, said he would be remiss as a doctor if he didn't tell the board that he thought the weaknesses and illness he saw in the cows in the video were most likely caused by EMFs or electrical pollution. Dr. Pettegrew also said the risk would be greater in Indiantown and Milo for animals and humans to become ill than in Wisconsin because the proposed turbines would be taller and would produce more electricity

Even if a wind developer may claim that the wind factories, substations and power grids will not contribute to stray voltage or electrical pollution because (1) insulated cable will be used, (2) all cable will be buried several feet beneath the surface, and (3) cables are laid in thick beds of sand -- these statements should be viewed with suspicion because of poor project track records, according to Larry Neubauer, a master electrician with Concept Electric in Appleton, Wisconsin. Mr. Neubauer, who has customers who are dairy producers, homeowners with stray voltage problems, and farmers with turbines on their property, said that currents from each ground on the cables and project substations, as well as the regional transmission lines that receive electrical energy and that are electrically tied together, do not harmlessly dissipate into the soil. Energy disperses in all directions through the soil and these currents seek out other grounded facilities, such as barns, mobile homes and nearby residences. Only in California is it illegal to use the ground as an electricity conductor. In the rest of the country, including Wisconsin and Illinois, power companies are allowed to dump currents into the ground, according to Mr. Neubauer.

Residential properties that are in a direct line between substations and the ground conduits are particularly at high risk since electricity takes the path of least resistance. Mr. Neubauer said that burying the cables, as the Illinois Wind Energy project intends to do, makes it worse, citing the short lifespans of buried cables, frosts that wreak havoc on the cables, and the problems of locating trouble spots that cannot be seen without digging up the cables.

Two of Mr. Neubauer's clients, who were interviewed in October, are dairy farmers who have spent over $250,000 and $300,000 trying to rewire their farms to reduce stray voltage. That cost does not included herd loss or losses from diminished milk production. Mr. Russ Allen owns 550 dairy cows in DePere, Wisconsin. His farm is in a direct line between nearby WPSC turbines and a substation. Mr. Russ said he was losing one or two cows a day during the three years prior to his installing electrical equipment to help reduce currents on his farm. About 600 cows died, he said. Mr. Russ said he has so much electrical current on his farm that he laid a No. 4 copper wire around his farm for 5,000 feet. The wire is not attached to any building or additional wires; yet it can light up a light bulb from contact with the soil alone. Mr. Russ has scheduled a media day on October 24 to draw awareness to the problems of stray voltage and he said to encourage everyone in Bureau County to attend.

Excerpts from the Final Report of the Township of Lincoln Wind Turbine Moratorium Committee

[Prepared by Elise Bittner-Mackin for presentation to the Bureau County, Illinois, Zoning Board of Appeals regarding the 54.5-MW 33-turbine Crescent Ridge wind facility proposed for Indiantown and Milo by Stefan Noe (Illinois Wind Energy)]

Fire

Again, our fire protection districts are 10+ miles away. Fire personnel are volunteers. To date there has been no communication with the developer and the fire protection districts.

The majority of turbine fires are started by a lightning strike, brought about by their exposed and often high-altitude location and the height of the structure; turbines are now being built that are up to 320 feet high. Mechanical failure or electrical malfunction also account for a significant percentage of fires that can be fuelled by up to 200 gallons of hydraulic fluid and lubricants in the nacelle, which itself is constructed from highly-flammable resin and glass fiber. Internal insulation in the nacelle, which can become contaminated by oil deposits, adds to the fuel load.

Electrical equipment is another high-risk area. Capacitors, transformers, generators, electrical controls, and transmission equipment all have the potential to catch fire, as do Supervisory Control and Data Acquisition (SCADA) systems. There is also the risk of fire due to loose or broken electrical connections or the overloading of electrical circuits.

Braking systems pose a particularly high fire risk. Overheating can cause hot fragments of the disc brake material to break off, rupturing hydraulic hoses and resulting in highly combustible hydraulic fluid being expelled under pressure and coming into contact with the hot disk brake fragments. Hydraulic pumps and connections have also been known to fail, allowing the fluid to erupt into flames when it comes into contact with a hot surface.

August 2010; Turbine Fire Protection Magazine; “Turbine Fire Protection”; By: Scott Starr

Often turbine fires cannot be extinguished because of the height, and are left to burn themselves out. In the process, they generate toxic fumes and can scatter flaming debris over a wide area, starting secondary fires below. Several turbine-ignited fires have burned hundreds of acres of vegetation each, and one burned 800 square kilometers (200,000 acres) of Australian National Park.

Wikipedia: Environmental Effects of Wind Power; http://en.wikipedia.org/wiki/Wind_turbine_syndrome#cite_note-60

Ice shedding

—Developers and owners of wind turbines have a duty to ensure the safety of the general public and their own staff. However there are no guidelines for dealing with potential dangers arising from ice thrown off of wind turbines. This puts developers, owners, planning authorities and insurers in a difficult position."

(Assessment of Safety Risks Arising From Wind Turbine Icing; by Morgan, Bossanyi, Grand Hassan and Partners Ltd. Bristol BS18 9JB and Seifert, Westerhellweg, Kroning; DEWI, Deutches Windenergie-InstitutGmbH Ebertstr. 96, D-26382 Wilhelmshaven, Germany, presentation to BOREAS IV, April 1998)

Transportation

Farming: concerns are present in regards to how close turbines are located to roadways. Obviously they are something to look at. Many times in rural area's much attention isn't given to the farmer hauling their grain to the elevator, bales of hay to livestock, pulling implements behind the tractor, moving the combine (with or without the head attachment on). When a farmer's on the road, there are many things to consider . . . how fast is he moving? Will he be turning? Stopping? Is there enough room for him to move over to let me pass? Does he see me? You see, these are concerns that area farmers have every day when they are on the road – because in today's agricultural marketplace, you may several fields that are not directly around your homestead and traveling is a must.

Unfortunately, there are times that the motorist does pay attention to the farmer on the road and accidents have happened. Semi truck/trailer running into the back of a hayrack being pulled by a tractor; motorist running into the back of a grain wagon, again being pulled by a tractor; motorist couldn't see tractor turning signals on and ran into the side of the equipment being pulled; are just a few of the accidents that have been known to happen in our area.

School children: school buses travel Hwy 67 Monday through Friday – we wouldn't want the same to happen to them.

Motorists: imagine the motorist eyeing the view of these spectacular turbines – but his eye and mind isn't on the road watching for the school bus, the farmer, the crossing animal. What might happen?

Other public fatalities have been blamed on collisions with transport vehicles and motorists distracted by the sight and shadow flicker of wind turbines along highways.

Wikipedia: Environmental Effects of Wind Power; http://en.wikipedia.org/wiki/Wind_turbine_syndrome#cite_note-60

Life flight

Now that I have laid out some ground work of our concerns of transportation, let's consider how we are going to take care of these motorists, passengers or farmer's if they are critically injured and need transportation to a hospital that can accommodate their injuries.

Our local hospital does have an emergency room and a helipad. In a severe accident, they would assess the patient, stabilize them and have them transported to the nearest hospital that can save the patient. The closest hospitals for trauma care are an hour or more away, driving time.

Isn't time of the essence in healthcare and saving a life in the instance of a trauma accident? If it is a major trauma accident, doesn't the medical helicopter need to land near the scene for the sake of time and the best chance of survival for the critical?

— . .Herbert expressed concern about the impact of turbines on flying at night, since the diameter of the blades proposed in the project could be up to 328 feet and Care Flight responds to a large number of severe crashes when visibility isn't optimal due to time of day or weather conditions.

"How do I determine a turbine from a tower?" Herbert asked. "Towers are lit at the top and don't move or create turbulence; turbines are lit 100 feet or more below the actual top and have rotating blades that cannot be seen in a wide area. We are a 12-hour-a-day minimum facility with many 24-hour days, often with flights in the dark. With too many altitude restrictions and too many (turbines) in a small area, where do you go?"

Herbert said the prospect of turbines worries him and other air ambulance pilots. . . —

Turbine proposal prompts concern by Care Flight pilot, OSP commander
October 16, 2009 by Breanne Parcels in Urbana Daily Citizen – OH

Acoustics

*The World Health Organization has found that to protect children's health **sound levels should be less than 30 dBA during sleeping periods**. They note that a child's autonomous nervous system is 10 to 15 dB more sensitive to noise than adults (WHO night time recommendations for the general public are 30dB inside bedrooms, and 45dB outside open bedroom windows). Even for adults, health effects are first noted in some studies when the sound levels exceed 32 dBA, 10-20 dBA lower than the levels needed to cause awakening. The WHO researchers found that sound levels of 50 dBA or more strongly disrupted hormone secretion cycles. For sounds that contain a strong low frequency component, which is typical of wind turbines, WHO says that the limits may need to be even lower than 30 dBA to not put people at risk.*

*There are certainly many suitable sites for wind farms that are remote enough to avoid even the possibility of noise issues in people's homes. At this crucial stage in the development of the wind power industry, it would be sadly short-sighted to insist on placement of turbines in the —**g**ey area" between what noise models suggest is enough (perhaps 1500 feet) and the zone in which complaints have cropped up (up to a mile or so). Taking a big-picture view, the power generating potential in areas that are marginally close to people's homes is a very small proportion of the nation's wind power capacity. Let's start where we know turbines will not disturb neighbors, rather than risk a generation of vocal complaints that may impede future development as turbines become quieter.*

The Acoustic Ecology Institute;
http://www.acousticecology.org/docs/AEI%20Wind%20Turbine%20Noise%20FactSheet.pdf

Property values

*The purpose of the Realtor survey was to learn from the people who are on the first tier of the buying and selling of real estate what they thought of wind turbines and their impact to residential property value. This survey was designed to measure what type of impact (positive, negative or no impact) that wind turbines have on vacant residential land and improved property. The questions were designed to measure three different visual field proximity situations to wind turbines. These three were **bordering** proximity (defined as 600ft from the turbine), **close** proximity (defined as 1,000ft from the turbine) and **near** proximity (defined as ½ mile from the wind turbines). In all situations the wind turbines were visible from the property.*

The answers showed that bordering proximity showed the greatest loss of value at -43% for 1-5 acre vacant land and -39% for improved properties. Next in line was the close proximity showing a -36% value loss for 1-5 acre vacant land and -33% for improved property. Last in line was the near proximity, showing a -29% loss of value for a 1-5 acre vacant parcel and -24% loss in value for improved parcels. These losses show a close relationship between vacant land and improved land. This pattern was replicated regarding the bordering proximity for a hobby farm, whereas 70% believed it would be negatively impacted. Lastly, the opinions regarding the impact of the wind turbines due to placement, that being in front of the residence or behind the residence, showed that in both situations most participants believed there would a negative impact (74% said negative to the front placement and 71% said negative to the rear placement).

Appraisal Group One: Wind Turbine Impact Study 2009; released 09-09-09
http://windconcernsontario.files.wordpress.com/2009/09/ago-wind-turbine-impact-study.pdf

Radio & Television Interference

Large wind turbines, such as those typically installed at wind farms, can interfere with radio or TV signals if a turbine is in the "line of sight" between a receiver and the signal source, but this problem can usually be easily dealt with improving the receiver's antenna or installing relays to transmit the signal around the wind farm. Use of satellite or cable television is also an option.

American Wind Energy Association; http://www.awea.org/faq/wwt_environment.html

Possible blasting

A concern that was never brought the to attention of the zoning, county board or the developer is the Oil Pipeline that runs parallel with the Burlington Northern/Santa Fe Railroad. If the excavation crew hits rock, will they need to blast? Won't a blast possibly crack a pipe to the oil line? Shouldn't there be study compiled regarding the proximately of the oil pipeline? *(See aerial Mapping of Pipeline)*

Socio Economics

We didn't have to read the articles from the New York Times or from the Wisconsin residents to know that our neighborhood and friendships have been divided. This project is one that either tugs at your heart or your wallet. We understand the need for farmers to create more income for themselves and their families. But we don't understand the need to construct such large obstacles in this beautiful Prairie land that provides for us.

Monmouth is a small community. There are few restaurants/businesses. We will meet one property owner/lessor in a restaurant, they won't look our way. There is another property owner/lessor that had a friendly relationship with an adjoining homeowner – now they don't speak. The final property owner/lessor isn't being told of all of the opposition, the family thinks it wouldn't be good for her health and they don't want her to feel bad.

The bottom line is money. And in this economy, of course it is. The county is in debt, as many probably are. They see this as a way out. We see it as a way of loosing good acreage that produces strong crops.

We mentioned earlier in our letter that we are NOT opposed to Wind Energy and a greener environment – we meant that! If the turbines were located in areas that were not tillable and the inhabitants were kept safe from proper siting – there would be no need to argue the point. We need to keep tillable acreage . . . tillable.

Mr. Gay won't be here for long. Our neighbors will. We pray, in time, relationships will be healed, families will be healthy and crops will be prosperous.

Lessor's

There are four lease holders at this time. Three of the lessor's are over the age of 75, the final lessor is the County itself.

Legitimate concern has been raised that the Developer took advantage of the elderly; sufficient time was not allowed before signing the contracts, pressure was applied, and landowners lied to. This information is factual, as it comes from one who was asked to sign. After having our attorney view the lease, we declined. One landowner was told "Harlow's are prepared to sign", so they signed.

The concern with the final lease holder is simple. Since the county owns the property, should it not go to a legitimate county vote? 16 elected county officials decide the fate of the township/county? Elected *township* officials have no say? The 109 signatures on petitions that were collected in a two mile radius of the project don't mean anything? It seems like a conflict of interest, a project that has not been thoroughly reviewed, and the concerns of many individuals who are passionate about proper siting of turbines for safety reasons are being overlooked.

Environmental Justice is the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. EPA has this goal for all communities and persons across this Nation. It will be achieved when everyone enjoys the same degree of protection from environmental and health hazards and equal access to the decision-making process to have a healthy environment in which to live, learn, and work.

Mann, Caroline

From: Dave and Alyce [djenks@monmouthnet.net]

Sent: Friday, October 08, 2010 1:49 PM

To: Mann, Caroline

Subject: Monarch Wind Farm Grant Application Concerns

Dear Ms Mann,
I am writing in regards to the Monarch Wind Farm Grant Application to the DOE with some of the concerns that I have in hopes that his request for $5 million will be denied. Although I think wind is a viable source of energy, I feel that Mr. Gay's proposed project of 13 turbines in Lenox Township, Warren County is located in the wrong area. Twenty-nine homes are within a one mile radius of this project. After attending our zoning board's hearing concerning Mr. Gay's application I am convinced that no turbine should be closer than 3/4 to 1 mile from any inhabited structure or neighboring property line due to legitimate health and safety concerns. As I live in a prime agricultural area, I am also concerned about the impact to our farming operation--especially in regards to aerial spraying and property values. I ask that you deny Monarch Wind Farm and Mr. Gay's request for $5million.

Sincerely,
Alyce Jenks
1316 100th Street
Monmouth, Illinois 61462

ILLINOIS ENVIRONMENTAL PROTECTION AGENCY

1021 North Grand Avenue East, P.O. Box 19276, Springfield, Illinois 62794-9276 • (217) 782-2829
James R. Thompson Center, 100 West Randolph, Suite 11-300, Chicago, IL 60601 • (312) 814-6026

PAT QUINN, GOVERNOR DOUGLAS P. SCOTT, DIRECTOR

217-782-0547

September 22, 2010

Ms. Caroline Mann
US Dept. of Energy Headquarters
1000 Independence Avenue, SW
Washington, DC 20585
Office of Field Operations (EE-40)

Dear Ms. Mann:

We have reviewed the information received on the proposed project for the Monarch Wind Farm (Lenox Township) in Warren County, Illinois.

The Agency has no objections to the project; however a construction site activity stormwater NPDES permit will be required from the Division of Water Pollution Control for more than one acre being disturbed during construction. For information concerning the NPDES permit, you may contact Al Keller, 217-782-0610.

Solid and hazardous waste must be properly disposed of or recycled.

Sincerely,

Lisa Bonnett

Lisa Bonnett
Acting Deputy Director

Rockford • 4302 N. Main St., Rockford, IL 61103 • (815) 987-7760
Elgin • 595 S. State, Elgin, IL 60123 • (847) 608-3131
Bureau of Land – Peoria • 7620 N. University St., Peoria, IL 61614 • (309) 693-5462
Collinsville • 2009 Mall Street, Collinsville, IL 62234 • (618) 346-5120
Des Plaines • 9511 W. Harrison St., Des Plaines, IL 60016 • (847) 294-4000
Peoria • 5415 N. University St., Peoria, IL 61614 • (309) 693-5463
Champaign • 2125 S. First St., Champaign, IL 61820 • (217) 278-5800
Marion • 2309 W. Main St., Suite 116, Marion, IL 62959 • (618) 993-7200

Mann, Caroline

From: Stefani Gillen [gillens@derbytech.net]
Sent: Tuesday, October 12, 2010 1:08 PM
To: Mann, Caroline
Subject: Re: Emailing: wind

Hi - thank you so much for your patience! I have tried the fax number a couple of times and is telling me the line is busy. I am going to type my letter in this email to you so I know you will have.

I am writing to you with my concerns regarding the Monarch Wind Farm looking to come to my neighborhood which is in Lenox Township. My family lives on 130th ave and some of the proposed wind towers will be in the fields across the road from our home and cattle feed lot that my husband owns and operates. Our livelihood is the feed lot, which puts the roof over our heads and food on our table. It has been found that livestock has suffered from the erection of wind turbines. Farmers have had to deal with herd decline due to diseases not present before turbines were put up. They have also found change in well water causing cattle not to drink, resulting in dehydration, illness and death. More importantly our lives, which are our 2 small children. Health problems have been reported with the wind turbines that include headaches, sleep loss, ringing in the ears, bloody noses, and inability to conceive. My children are still developing and growing. I do not want them subjected to these daily health issues when they are going to school to learn and grow their minds and bodies. I would be devastated that when my daughter grows up and wants to start a family of her own that she is unable to conceive because she grew up with wind turbines in her front yard. It has been shown that property values decrease and families not being able to sell their homes to move away from the turbines. My husband's family has farmed and lived in this area for generations. We wanted our children to grow up in the country where they are surrounded by peace, quiet, and safety. There has been reports of lightening strikes, blade throw, fire, ice shedding, shadow flicker, and noise. I cannot have my children playing in the yard now if there is potential for blade throw or fire at any given time. There is also a highway that will be adjacent to the wind towers where school buses travel regularly on them transporting children to and from school. There is potential to see these safety hazards on the highway also. Our family and neighbors are not against wind energy though we are opposed to the improper sighting of the turbines in proximity to inhabited structures. We ask that the Department of Energy deny the wind developers request to the $5million grant. Thank you very much for your time!

Sincerely,
Stefani Gillen
649 130th Ave Monmouth, IL 61462

Findings documented in my letter were found from: www.powernaturally.org, www.aweo.org/windlincoln.htlml and information on Wind Turbine Syndrome by Nina Piermont, MD, Ph.D

> ----- Original Message -----
> **From:** Mann, Caroline
> **To:** 'Stefani Gillen'
> **Sent:** Tuesday, October 12, 2010 10:46 AM
> **Subject:** RE: Emailing: wind
>
> Hi Stefani,
>
> Do you mind trying to fax it to 202-586-6551?
>
> Thanks!
> Caroline
>
> ---
>
> **From:** Stefani Gillen [mailto:gillens@derbytech.net]
> **Sent:** Tuesday, October 12, 2010 11:10 AM
> **To:** Mann, Caroline

Subject: Re: Emailing: wind

Hi Caroline, thank you for letting me know you were not able to open. I am thinking you may not be able to open again as I just resent. Is there any way I can fax my letter to you? I live in Monmouth, IL in Lenox Township where Monarch wind is looking to build a wind farm. Much Thanks!

Stefani Gillen

----- Original Message -----
From: Mann, Caroline
To: 'Stefani Gillen'
Sent: Tuesday, October 12, 2010 10:00 AM
Subject: RE: Emailing: wind

Hi Stefani,

I was unable to open the attachment to your email. Could you please try resending or send the file in a word or pdf version?

Thank you,
Caroline Mann

Caroline Mann
Office of Energy Efficiency and Renewable Energy
U.S. Department of Energy

Desk Phone: 202-287-5380
Blackberry: 202-340-7304

From: Stefani Gillen [mailto:gillens@derbytech.net]
Sent: Saturday, October 09, 2010 1:04 PM
To: Mann, Caroline
Subject: Emailing: wind

Attachment E-4

Example of Monarch Wind Public Outreach Letter and Mailing List

Edge
Consulting Engineers, Inc.

624 Water Street
Prairie du Sac, WI 53578

608.644.1449 phone
608.644.1549 fax

June 22, 2010

Tribal Historic Preservation Office
Attn: Joseph Hale Jr.
Prairie Band Potawatomi Nation
16281 Q Road
Mayetta KS 66509-8970

SUBJECT: SECTION 106 REVIEW
MONARCH WIND POWER WIND TURBINE PROJECT
LENOX TOWNSHIP, WARREN COUNTY, IL

Dear Mr. Hale Jr.:

Attached is a copy of the archaeological survey completed for the proposed project. The scope of the project, location, etc. is further described in the sections below.

Entity Submitting Request: Monarch Wind Power LLC
Property Address: 140th Avenue / US Hwy 67 Kirkwood, IL 61447
T-R-S: Sections 20, 29 and 30 in Township 10 North, Range 2 West (Lenox Township)

Further Description:
The project comprises thirteen (13) wind turbine locations, turbine access roads, and an electrical substation, all to be located in agricultural fields. The fields are nearly level and were planted with soybeans and corn in Spring 2010. The proposed wind farm will occupy portions of three sections of Lenox Township. The proposed turbine sites and access roads for Turbines Nos. 6 and11-13 are located in the NW, NE and SE quarters of the SE quarter of Section 20. The proposed turbine site and access road for Turbine No. 10 is located in the NW quarter of the NW quarter of Section 29. The proposed turbine sites and access roads for Turbines Nos. 1-5 and 7-9 and a proposed substation are located in the E1/2 of the NW and SW quarters and the W1/2 of the NE and SE quarters of Section 30. The proposed location of an electrical substation is in an agricultural field on the southwest corner of U.S. Route 67 and 140th Avenue.

A Phase 1 Archaeological Survey of the project was conducted by Mr. Richard Johnson, Archaeologist, of Edge Consulting Engineers, Inc. This report concluded that "No cultural material was recovered by the survey. No further archaeological work is necessary. It is recommended that the undertaking proceed." A copy of the report has been included.

If there are any questions, or if you need additional information to provide comments, please feel free to contact me at tdrunasky@edgeconsult.com.

Respectfully,

Tracy L. Drunasky
Environmental Scientist
Edge Consulting Engineers, Inc.

Tribal Historic Preservation Office
Attn: Karen Kaniatobe
Absentee-Shawnee Tribe of Indians of Oklahoma
2025 South Gordon Cooper
Shawnee, OK 74801

Tribal Historic Preservation Office
Attn: David Smith
Winnebago Tribe of Nebraska
100 Bluff Street
PO Box 687
Winnebago, NE 68071

Tribal Historic Preservation Office
Attn: Joseph Hale Jr.
Prairie Band Potawatomi Nation
16281 Q Road
Mayetta KS 66509-8970

Tribal Historic Preservation Office
Attn: Deanne Bahr
Sac and Fox Nation of Missouri
1322 US Hwy 75
Powhattan, KS 66527

Tribal Historic Preservation Office
Attn: Karen Phillips
Citizen Potawatomi Nation
1601 South Gordon Cooper Drive
Shawnee, OK 74801

Tribal Historic Preservation Office
Attn: Kent Collier
Kickapoo Tribe of Oklahoma
PO Box 70
McLoud, OK 74851-0070

Tribal Historic Preservation Office
Attn: Sandra Massey
Sac and Fox Nation of Oklahoma
920883 S. Hwy 99 Bldg A
Stroud, OK 74079

Tribal Historic Preservation Office
Attn: Johnathan Buffalo
Sac & Fox Tribe of the Mississippi in Iowa
349 Meskwaki Road
Tama, IA 52339

KBIC Tribal Historic Preservation Office
Attn: Joseph Jacker
Keweenaw Bay Indian Community
16429 Beartown Road
Baraga, MI 49908

Tribal Historic Preservation Office
Attn: Michael Zimmerman Jr.
Pokagon Band of Potawatomi Indians
58620 Sink Road
Dowagiac, Michigan 49047

Tribal Historic Preservation Office
Attn: George Strack
Miami Tribe of Oklahoma
PO Box 1326
Miami, OK 74355

Tribal Historic Preservation Office
Attn: Rhonda Hayworth
Ottawa Tribe of Oklahoma
P.O. Box 110
Miami, OK 74355

Tribal Historic Preservation Office
Attn: Sherri Clemons
Wyandotte Nation
64700 East Highway 60
Wyandotte, OK 74370

Tribal Historic Preservation Office
Attn: Mandie Ferguson
Peoria Tribe of Indians of Oklahoma
118 S. Eight Tribes Trail, P.O. Box 1527
Miami, OK 74355

Tribal Historic Preservation Office
Attn: Kim Jumper
Shawnee Tribe
29 South Highway 69A
Miami, OK 74354

Tribal Historic Preservation Office
Attn: David Grignon
Menominee Indian Tribe of Wisconsin
P.O. Box 910
Keshena, WI 54135

Tribal Historic Preservation Office
Attn: Mike Alloway Sr.
Forest County Potawatomi Community of
Wisconsin
PO BOX 340
Crandon, WI 54520

Tribal Historic Preservation Office
Attn: Earl Meshigaud.
Hannahville Indian Community of Michigan
N14911 Hannahville B-1 Rd
Wilson MI 49896 54520

Tribal Historic Preservation Office
Attn: Louis Deroin
Iowa Tribe of Kansas and Nebraska
3345 B Thrasher
White Cloud, KS 66094

Tribal Historic Preservation Office
Attn: Janice Rowe-Kurak
Iowa Tribe of Oklahoma
R.R. 1, Box 721
Perkins, OK 74059

Tribal Historic Preservation Office
Attn: Arlan Whitebird
Kickapoo Tribe of Indians of the Kickapoo
Reservation in Kansas
1107 Goldfinch Road
Horton, KS 66439

Attachment E-5

Monmouth Review Atlas Notice

Publish 7-31, 2010

Invitation to Comment on a Proposed Wind Facility

All interested persons are invited to comment on any potential effects that may be caused to historic properties, if any such properties are or may be located at or near the site, from a proposed 13-turbine wind farm with associated equipment to be constructed near the intersection of U.S. Route 67 and 140th Avenue in Lenox Township, Warren County, Illinois (center of turbine 10: Lat 40-49-55.27N, Long 90-39-7.6W). Comments regarding historic properties may be submitted to the following contact as follows: Tracy L. Drunasky, Edge Consulting Engineers, Inc., 624 Water Street, Prairie du Sac, WI 53578, Phone: 608-644-1449, Email: tdrunasky@edgeconsult.com.

CERTIFICATE OF PUBLICATION

Monmouth, Illinois July 31 2010

I, the undersigned, of the Review Atlas Printing Company, do hereby certify that I am duly authorized agent in this behalf, and I further certify that a notice of which the annexed printed notice is a true copy, was published in the **Daily Review Atlas,** a daily secular newspaper of general circulation, printed and published by the said Review Atlas Printing Company, at the City of Monmouth, Warren County, Illinois, and that the said notice was published once each day/week for the space of
days/weeks successively, and was contained in each and every copy of the several issues in which the same was published, and that the first publication of said notice was in the issue of said paper bearing date July 31 2010

and the last publication in the issue thereof bearing date July 31 20 10

and that said Monmouth Review Atlas has been regularly published in said Warren County for at least 12 months prior to the first publication of said notice.

The Monmouth Review Atlas is a newspaper as defined in Act — Chapter 100, Sections 1 and 5, Illinois Revised Statutes.

Dated this 31 St. day of July 20 10

Mary Lefler

Authorized Agent Review Atlas Printing Company.

Printer's Fee $ 13.20

Received above fee _____

this _____ day of _____ 20___

_____

Per Review Atlas

4846

Attachment E-6

Other Comments Received

SHAWNEE TRIBE
HISTORIC PRESERVATION DEPARTMENT
29 SOUTH HIGHWAY 69A
MIAMI, OKLAHOMA 74354
918▲542▲2441 PHONE 918▲542▲9915 FAX

FACSIMILE COVER PAGE

TO: Tracy
FIRM/AGENCY: Edge
FAX NUMBER: 608-644-1549
PHONE NUMBER:

FROM: Kim Jumper
DATE/TIME: 7/21/10
NO. OF PAGES, INCLUDING COVER: 1
MEMO: Monarch Wind Power Wind Turbine Project

Message: The Shawnee Tribe's Tribal Historic Preservation Officer concurs that no known historic properties will be negatively impacted by construction of this tower site (see memo line above for TCNS number/s). The Shawnee Tribe's archives do not reveal any issues of concern at this tower location. In the event that archaeological materials are encountered later during construction, use, or maintenance of this tower location, please re-notify us at that time as we would like to resume consultation under such a circumstance.

The Shawnee Tribe's Environmental and Natural Resources Department takes this opportunity to express its concerns that telecommunication towers can have a potentially destructive impact on bats and migratory birds, particularly those that migrate at night, including species listed as threatened and endangered by both states and the federal government, as well as other species. The Shawnee Tribe suggests that this tower be constructed in accordance with the guidelines available from the US Fish and Wildlife Service to reduce the adverse effects of telecommunications towers on migratory birds. these guidelines may be found at: www.fws.gov/migratorybirds/issues/towers/comtow.html.

The Shawnee Tribe's Environmental and Natural Resources Department is further concerned that the proliferation of cell towers may play a role in honey bee Colony Collapse Disorder. We acknowledge that cell phone technology may not be to blame, especially by itself, as other potential causative factors for the decline have been noted, such as insecticides, tracheal and varroa mites [an immunosuppressant], other parasites, pesticides used on hives to eliminate parasites, genetically modified plants, *Nosema* fungus, Israeli Acute Paralysis Viris (IAPV) perhaps introduced from Australia in 2004 Kashmir Bee Virus [KBV], climate change, and drought.

Finally, the Shawnee Tribe's Environmental and Natural Resources Department requests that cell tower sites, whenever remotely feasible, be restored to native vegetation. In all cases, habitat restoration can protect a variety of species, even in small project areas. The large number of cell tower sites provides an as yet unrealized opportunity for region-wide habitat restoration. The Tribe urges the cell phone industry to provide a model for native habitat restoration for other industries.

Please do not hesitate to call us for additional comment.

PEORIA TRIBE OF INDIANS OF OKLAHOMA
118 S. Eight Tribes Trail (918) 540-2535 FAX (918) 540-2538
P.O. Box 1527
MIAMI, OKLAHOMA 74355

CHIEF
John P. Froman

SECOND CHIEF
Jason Dollarhide

June 24, 2010

Edge Consulting Engineers, Inc.
Attn: Tracy L. Drunasky
Environmental Specialist
624 Water Street
Prairie du Sac, WI 53578

RE: Monarch Wind Power Wind Turbine Project
Lenox Township, Warren County, IL

Thank you for notice of the referenced project. The Peoria Tribe of Indians of Oklahoma is currently unaware of any documentation directly linking Indian Religious Sites to the proposed construction. In the event any items falling under the Native American Graves protection and Repatriation Act (NAGPRA) are discovered during construction, the Peoria Tribe request notification and further consultation.

The Peoria Tribe has no objection to the proposed construction. However, if human skeletal remains and/or any objects falling under NAGPRA are uncovered during construction should stop immediately, and the appropriate persons, including state and tribal NAGPRA representatives contacted.

John P. Froman
Chief

xc: Bud Ellis, Repatriation/NAGPRA Committee Chairman

OTTAWA TRIBE OF OKLAHOMA
HISTORIC PRESERVATION DEPARTMENT
P.O. Box 110
Miami, Oklahoma 74355
918▲542▲6162 PHONE (NEW NUMBER)
918▲542▲9007 Fax (NEW Number)

FACSIMILE COVER PAGE

TO: T. Drunasky
FROM: RHONDA HAYWORTH
FIRM/AGENCY: EDGE
DATE/TIME: 7/15/10
FAX NUMBER: 608 644 1549
NO. OF PAGES, INCLUDING COVER: 1
PHONE NUMBER:
MEMO: 57324, EP# 4846, 64189, 63662, 63720

MESSAGE: THE OTTAWA TRIBE OF OKLAHOMA CONCURS THAT NO KNOWN HISTORIC PROPERTIES WILL BE NEGATIVELY IMPACTED BY CONSTRUCTION OF THIS TOWER SITE OR SITES (SEE MEMO LINE ABOVE FOR TCNS NUMBER OR NUMBERS). OUR RESEARCH AND REVIEW EFFORTS DO NOT REVEAL ANY ISSUES CURRENTLY KNOWN TO BE OF CONCERN TO US AT THIS TOWER LOCATION OR LOCATIONS.

IN THE EVENT THAT ARCHAEOLOGICAL MATERIALS – INCLUDING HUMAN REMAINS – ARE ENCOUNTERED LATER DURING CONSTRUCTION, USE, OR MAINTENANCE OF THIS TOWER LOCATION OR LOCATIONS, PLEASE RE-NOTIFY US AT THAT TIME, AS WE WOULD LIKE TO RESUME CONSULTATION UNDER SUCH A CIRCUMSTANCE.

THE OTTAWA TRIBE OF OKLAHOMA TAKES THIS OPPORTUNITY TO EXPRESS ITS CONCERNS THAT TELECOMMUNICATIONS TOWERS CAN HAVE A POTENTIALLY DESTRUCTIVE IMPACT ON BATS AND BIRDS, ESPECIALLY MIGRATORY BIRDS. IMPACTED BIRDS AND BATS COULD INCLUDE SPECIES THAT ARE LISTED AS THREATENENED OR ENDANGERED BY BOTH STATES AND THE FEDERAL GOVERNMENT. THE OTTAWA TRIBE STRONGLY SUGGESTS THAT THIS/THESE TOWER/TOWERS BE CONSTRUCTED IN ACCORDANCE WITH THE GUIDELINES AVAILABLE FROM THE US FISH AND WILDLIFE SERVICE IN ORDER TO REDUCE THE ADVERSE EFFECTS OF TELECOMMUNICATIONS TOWERS ON BIRDS AND BATS. THESE GUIDELINES MAY BE FOUND AT:

WWW.FWS.GOV/MIGRATORYBIRDS/ISSUES/TOWERS/COMTOW.HTML

PLEASE DO NOT HESITATE TO CALL US FOR ADDITIONAL COMMENT.

RHONDA DIXON HAYWORTH
RHONDA DIXON, HISTORIC PRESERVATION OFFICER

If you have difficulty receiving this fax, please contact us at 918-540-1536.
The contents of this fax may contain confidential information, please distribute only to addressee.

KIKAAPOA - He who moves about
KICKAPOO TRIBE IN KANSAS

1107 Goldfinch Road • Horton, Kansas 66439
phone 785.486.2131 • fax 785.486.2801

SUBJECT: SECTION 106 RESPONSE

REGARDING: Section 106 Review

LOCATION: Warren County, IL

DATE OF MAILING: June 22 2010

TO: Tracy Drunasky

☐ No further Section 106 consultation is required Concurrence of "no effect" or "no adverse effect" to historic structures or culturally significant sites (as defined in 36 CFR 800) is granted.

☑ You may proceed with construction, but if there are any burial sites or other cultural properties discovered in the area, please notify this office immediately and your state or local historical agency.

☐ Additional information is required, including:

_____

_____

FROM: Kickapoo Tribe in Kansas (Consulting Party)

Mark Kahbeah (Designated Contact)

Mark Kahbeah (Signature)

28 June 10 (Date)

Tracy Drunasky

From: Emily Smith [emily68071@hotmail.com]
Sent: Tuesday, July 13, 2010 10:38 AM
To: Tracy Drunasky
Subject: Winnebago Tribe of NE

Winnebago Tribe of Nebraska Repatriation

P.O. Box 687 Winnebago, NE 68071 * (402) 878-2976

July 13, 2010

Re: Warren County, IL

Dear Mr. Gerald Berning,

Thank you for your recent letter. The Cultural Preservation Office of the Winnebago Tribe of Nebraska would like to inform you that the Winnebago Tribe has cultural properties in the area of your proposed construction. According to the oral tradition, the Winnebago Tribe has lived in the area in the pre-historic period. The tribe had lived in the area in the early years of the historic period before the depopulation of the tribe.

You may proceed with your proposed construction, but if there are any burial sites or other cultural properties discovered in the area, please notify my office right away. Thank you.

Sincerely,

David Lee Smith

Cultural Preservation Officer

(402)878-2976

theking@huntel.net

_____

Iowa Tribe of Kansas and Nebraska

3345 B Thrasher Road
White Cloud, Kansas 66094
(785) 595-3258 or (785) 595-3259
Fax (785) 595-6610

August 11, 2010

Tracy L. Drunasky
Edge Consulting Engineers, Inc.
624 Water Street
Prairie du Sac, Wisconsin 53578

Thank you for your correspondence dated June 22, 2010, concerning the following project:

RE: Section 106 Review Monarch Wind Power Wind Turbine Project Lenox Township, Warren County, IL

The Iowa Tribe of Kansas and Nebraska has:

___ No interest in the area geographically

___ No comment on the proposed undertaking

__X__ No objections to the project as proposed if cleared through the SHPO. However, if human skeletal remains and/or any objects falling under NAGPRA are uncovered during construction, please stop immediately and notify the proper NAGPRA Representative.

___ An objection requires additional project information. Please send the following:

Sincerely,

Alan Kelley

Alan Kelley, Vice Chairman
Iowa Tribe Executive Committee

ILLINOIS ENVIRONMENTAL PROTECTION AGENCY

1021 North Grand Avenue East, P.O. Box 19276, Springfield, Illinois 62794-9276 • (217) 782-2829
James R. Thompson Center, 100 West Randolph, Suite 11-300, Chicago, IL 60601 • (312) 814-6026

PAT QUINN, GOVERNOR DOUGLAS P. SCOTT, DIRECTOR

217-782-0547

February 25, 2010

Mr. Chris Firof, EIT, SIT
Project Engineer
McClure Engineering Associates, Inc.
714 East Jackson
Macomb, IL 61455

Dear Mr. Firof:

We have reviewed the information received on the proposed project for the Monarch Wind Farm in Warren County.

The Agency has no objections to the project; however a construction site activity stormwater NPDES permit may be required from the Division of Water Pollution Control for more than one acre being disturbed during construction. For information concerning the NPDES permit, you may contact Al Keller, 217-782-0610.

Solid and hazardous waste must be properly disposed of or recycled.

Sincerely,

Lisa Bonnett
Acting Deputy Director

BIOLOGICAL ASSESSMENT

THE MONARCH WARREN COUNTY WIND TURBINE PROJECT

LENOX TOWNSHIP WARREN COUNTY, ILLINOIS

U.S. Department of Energy
Office of Energy Efficiency and Renewable Energy
Golden Field Office

FEBRUARY 2011

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CONTENTS

LIST OF FIGURES

ACRONYMS AND ABBREVIATIONS

ARRA	*American Recovery and Reinvestment Act of 2009*
BMPs	best management practices
CFR	*Code of Federal Regulations*
dBA	decibel on an A-weighted scale, used to approximate the human ear's response to sound
DOE	U.S. Department of Energy
DNR	Illinois Department of Natural Resources
EISA	*Energy Independence and Security Act*
ESA	*Endangered Species Act*
FAA	Federal Aviation Administration
FEMA	Federal Emergency Management Agency
HCP	Habitat Conservation Plan
IGBT	insulated-gate bipolar transistor
MISO	Midwest Independent Transmission System Operator
MWP	Monarch Wind Power
MWTP	Monarch Warren County Wind Turbine Project
NEP	nonessential experimental population
SEP	State Energy Program
U.S.C.	United States Code
USFWS	U.S. Fish and Wildlife Service
WNS	white nose syndrome

1. INTRODUCTION

1.1 Purpose of Document

The U.S. Department of Energy (DOE) is proposing to provide Federal funding to the Illinois Department of Commerce and Economic Opportunity for the Monarch Warren County Wind Turbine Project (MWTP). Monarch Wind Power (MWP), the operator of the MWTP, in collaboration with GE Energy, is proposing to construct 12 1.6-megawatt wind turbines, for a combined generation capacity of 19.2 megawatts, on approximately 600 acres of land leased in Warren County, Illinois.

DOE has prepared this Biological Assessment in order to comply with the *Endangered Species Act of 1973*, as amended (16 U.S.C. 1531 *et seq*. ESA) and its implementing regulations (50 C.F.R. Part 402). ESA provides for the listing, conservation, and recovery of endangered and threatened species of plants and wildlife. ESA mandates the USFWS to monitor and protect listed species. Section 7(a)(2) of the ESA requires Federal agencies to insure that any action they authorize, fund, or otherwise carry out is not likely to jeopardize the continued existence of any listed species or result in the destruction or adverse modification of critical habitat.

Pursuant to ESA and its implementing regulations, where, as here, DOE determines that its proposed funding action may affect listed species or critical habitat, DOE is required to consult with the USFWS to insure that the proposed action is not likely to jeopardize the continued existence of an endangered or threatened species or further destroy or adversely modify its habitat (50 C.F.R. 402.13-14). As a first step in the consultation process, DOE obtained the list of threatened, endangered, and candidate species for Warren County from the U.S. Fish and Wildlife Service (USFWS) Midwest Region 3 Section 7(a)(2) Technical Assistance Website. DOE also reviewed the USFWS Environmental Conservation Online System to determine whether there is critical habitat at the project site. According to the Technical Assistance Website, the following two threatened or endangered species (but no candidate species) could occur in Warren County:

- Indiana bat (*Myotis sodalis*) – endangered
- Eastern prairie fringed orchid (*Platanthaera leucophaea*) – threatened

The eastern prairie fringed orchid occurs in mesic to wet, unplowed tallgrass prairies and meadows, bogs, fens, or sedge meadows with moist soil near the surface (USFWS 1996, 2009). There is no critical habitat designated for this species. There are no existing populations of this species in Illinois (USFWS 2009) and no potential habitat for this species within or near the MWTP site. **DOE, therefore, determined that the project would have *No Effect* on the eastern prairie fringed orchid,** and this species in not further addressed in this Biological Assessment**.**

Although not included in the list of threatened, endangered, and candidate species that could occur in Warren County, the USFWS Rock Island Field Office stated in a letter dated July 12, 2010, that a nonessential experimental population (NEP) of whooping crane (*Grus americana*) (66 FR 33903-33917) can occur statewide in Illinois during migration (Nelson 2010). The NEP migrates from its breeding grounds in Wisconsin to wintering grounds off the Gulf Coast of California. The USFWS summarized Federal agencies' responsibilities for consultation regarding this NEP as follows (66 FR 33904):

> When NEPs are located outside a National Wildlife Refuge or National Park, only two provisions of section 7 [of the Endangered Species Act] would apply: Section 7(a)(1) and section 7(a)(4). Federal agencies are not required to consult with us under section 7(a)(2). Section 7(a)(4) requires Federal agencies to informally confer with the Service on actions that are likely to jeopardize the continued existence of the species for listing. However,

> since we determined that the NEP is not essential to the continued existence of the species, it is very unlikely that we would ever determine jeopardy for a project impacting a species within an NEP.

The nearest wetlands or ponds that might be used as stopover habitat by whooping cranes are 1.3 and 1.5 miles northeast of the MWTP site. **DOE, therefore, determined that the proposed project *would not result in jeopardy* to the NEP of the whooping crane,** and this species is not further addressed in this Biological Assessment**.**

The purpose of this Biological Assessment is to is to determine the effects on the Federally endangered Indiana bat from the construction, operation, and decommissioning of 12 wind turbines in Warren County, Illinois, for the MWTP. By the submittal of this Biological Assessment, DOE is initiating formal consultation pursuant to Section 7 of the Endangered Species Act of 1973.

1.2 Brief Description of DOE's Proposed Action

MWP proposes to construct and operate 12 1.6-MW wind turbines to generate electricity. The project includes turbine installation, underground electrical collection lines, access roads, crane pads, fencing, and an electrical substation. Sixteen acres of cultivated fields would be disturbed to install the turbines and other equipment. MWP plans to begin construction in the spring or summer of 2011, start generating electricity in 2012, and operate the turbines for 20 to 25 years.

The grant for this project would come from money that Illinois has received from DOE pursuant to DOE's State Energy Program (SEP). The purpose of the SEP is to promote the conservation of energy and reduce dependence on imported oil by helping states develop comprehensive energy programs and by providing them with technical and financial assistance. States can use their SEP funds for a wide variety of activities related to energy efficiency and renewable energy (United States Code [U.S.C.] § 6321 *et seq*. and 10 Code of Federal Regulations [CFR] Part 420). In the *American Recovery and Reinvestment Act* of 2009 (Public Law 111-5, 123 Statute 115), Congress appropriated $3.1 billion to DOE's SEP and the State of Illinois received $101 million pursuant to a Federal statutory formula for distributing these funds. A criterion of the Illinois SEP funding from the Recovery Act is that funds must be obligated by September 30, 2010 and expended by April 30, 2012. Following a competitive grant process, Illinois DCEO selected the MWTP to receive $5.0 million of its SEP funds for the design, planning, and construction of this project. The potential use of Federal SEP funds to assist in the financing of this project constitutes a Federal action.

2. PROPOSED PROJECT AND ACTION AREA

The MWTP would involve the construction and installation of twelve 1.6-megawatt wind turbines. MWP has selected the GE 1.6xle model turbine, which has a rotor diameter of 271 feet and a tower height of 328 feet. The turbines would be installed on monopole steel towers and would have a maximum height of 463 feet from the bottom of the tower to the blade tip at its highest point. Underground cables would be installed to conduct electricity from the turbines to a new electrical substation. The facility would connect via the substation to a 69-kilovolt Ameren distribution line that intersects the site on the western side of U.S. Highway 67.

2.1 Monarch Wind Turbine Project

2.1.1 Project Site

The MWTP would be located on 600 acres of land in Lenox Township, Warren County, Illinois (Figure 1). The turbines would be located south and northeast of the intersection of U.S. Highway 67 and 140th Avenue (Figure 2), 4 miles south of Monmouth. Seven turbines would be installed on land leased from private landowners and the remaining five would be installed on land leased from Warren County.

The project site consists of agricultural fields where corn and soybeans are usually grown. The site is bounded on the north by the Burlington Northern Santa Fe railroad line and surrounded by cultivated land in every direction. Route 67, a four-lane highway, intersects the site (Figure 2). Areas of ground disturbance would be limited to approximately 16 acres, including access roads and equipment staging/laydown areas. The approximate center point of the project area is 40º50'1" N, 90º39'29" W.

2.1.2 Construction and Installation

Site construction would include installation of the tower foundation, tower, turbine, transformers, electrical distribution equipment, substation, access roads and road improvements, crane pads, concrete truck staging areas, and fencing.

MWP would survey the site and complete a soil boring at each of the turbine locations prior to construction. The turbine foundations would be about 55 feet in diameter (2,330 square feet) and 15 feet deep. Temporary, 50- by 100-foot crane pads consisting of compacted soil would be created approximately 50 to 100 feet away from the base of each turbine site. Installation of each turbine and crane pad would result in conversion of approximately 0.16 acre of cultivated land. Crane pads would be returned to agricultural use following the installation of the turbines, and the total amount of land permanently converted for each turbine would be 0.05 acre.

Access to each turbine site would be via a new 16-foot-wide access road (Figure 2). A total of approximately 4.4 acres of cultivated land would be converted to create the 2.5 miles of new access roads required for the project.

Construction fencing would be installed around each tower/turbine site during construction and would be removed after the turbines are installed.

Underground electrical cables would be installed to connect each turbine to a new substation to be located near the intersection of U.S. Highway 67 and 140th Avenue (Figure 2). Output from that substation would be connected to the adjacent 69-kilovolt distribution line on the western side of Highway 67.

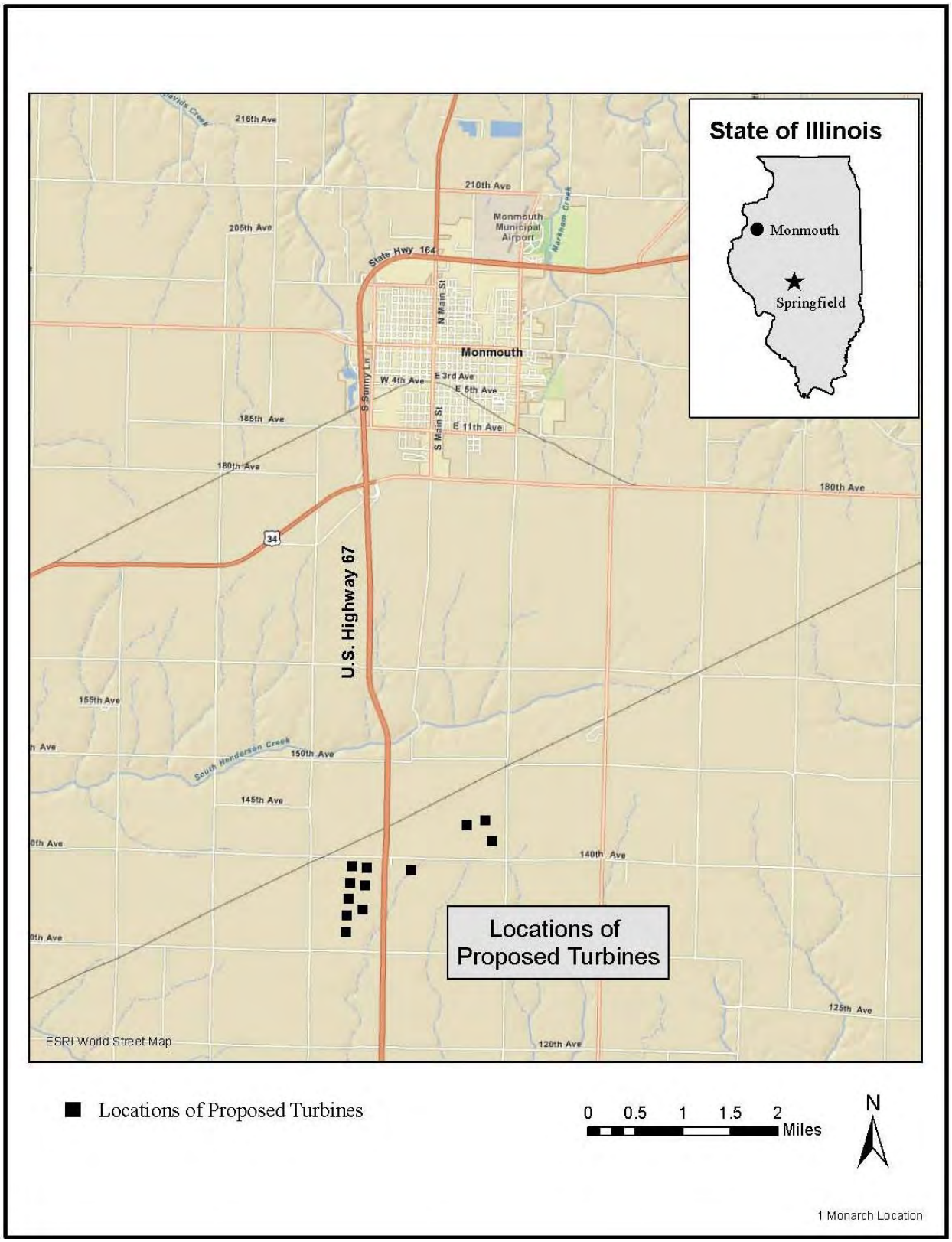

Figure 1. Location of the Monarch Wind Turbine Project in Warren County, Illinois

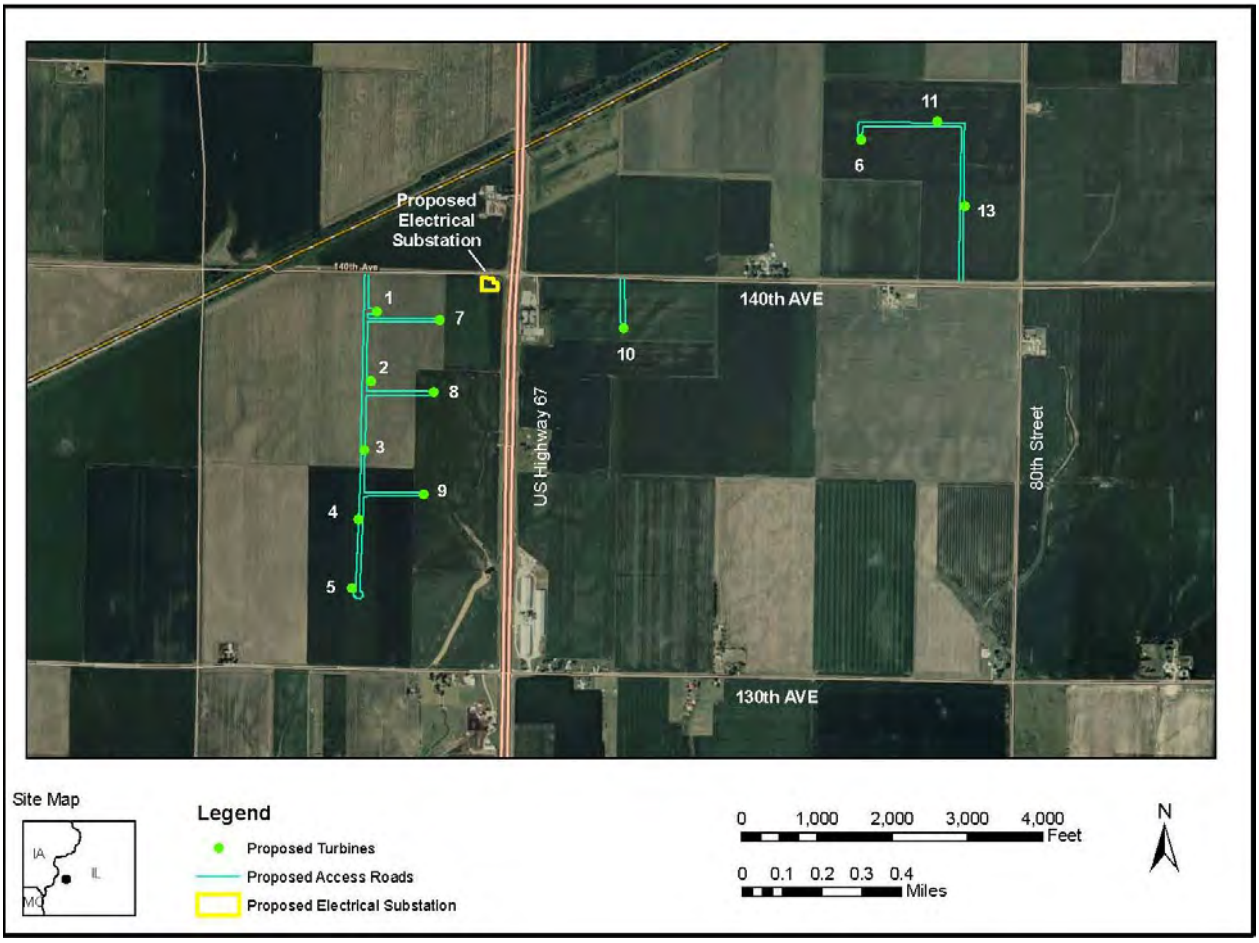

Figure 2. Monarch Wind Turbine Project site layout

After installation of the turbines and associated infrastructure, land not required for operation of the turbines would be graded and returned to agricultural production. Approximately 7 acres would be converted for the MWTP during the lifetime of the project.

Construction would be performed in accordance with a soil and erosion control plan and in compliance with Federal, State, and local requirements. Total ground disturbance at the site would exceed 1 acre; therefore; a National Pollutant Discharge Elimination System permit would be obtained.

MWP anticipates that construction would begin in the spring or summer of 2011 – once all regulatory approvals are obtained and turbine and equipment are procured. The timing of construction activities is contingent on weather conditions, as the turbine nacelles and blades cannot be installed in high winds. MWP estimates that installation of all turbines, underground electrical cables, the substation, and other infrastructure required for this project would take approximately 12 months, and that the project would be operational and generating power in 2012.

2.1.3 Aviation Marking

Aviation marking would be in compliance with the Federal Aviation Administration (FAA) standards (FAA 2007). In accordance with the FAA Determination of No Hazard to Air Navigation for each turbine in the MWTP, synchronized red lights would be used for the eight turbines on the perimeter of the project. Flash intervals of any lighting scheme for these turbines would be synchronized over the entire

project. To minimize visual impacts to nearby receptors, lighting would not be installed on the remaining four turbines. Although daytime lighting of wind turbine farms is not required, FAA recommends that turbines be painted with bright white or light off-white paint. All turbines in the MWTP would be painted in accordance with this standard.

2.1.4 Operations and Maintenance

MWP would operate and maintain the wind turbines and other equipment in accordance with the operating, maintenance, and safety procedures and requirements specifically recommended by the turbine's manufacturer. The GE model 1.6xle turbines would be operated year-round, 24 hours a day (except during maintenance), when wind speeds are suitable. The turbines are designed to start operating at a minimum wind speed of 3 meters per second (6.7 miles per hour) and to shut down when wind speeds exceed 33 meters per second (74 miles per hour). Section 6 of this Biological Assessment describes DOE's proposed plan to evaluate whether increasing the minimum operating wind speed (i.e., the cut-in speed) would result in fewer Indiana bats and other bats killed by the wind turbines during fall migration.

Onsite personnel would monitor each turbine daily by conducting an auditory and visual inspection. In addition, GE would continuously monitor the turbines remotely from the GE facilities in New York. Turbines could be shut down remotely from the New York facilities if necessary. Most servicing would be performed up-tower, without using a crane. In addition, MWP would regularly inspect and maintain all access roads to minimize erosion.

2.1.5 Decommissioning

Megawatt-scale wind turbine generators such as those to be used for the MWTP typically have an operational expectancy of 20 to 25 years. When the turbines have reached the end of their functional operational period, MWP might replace the turbines with newer models or remove the turbines and decommission the project area.

Decommissioning would include the removal of the turbines, towers, and other aboveground structures, as well as removal of below-ground structures (foundations and underground cables). Turbine foundations would be excavated to a depth of 36 inches below grade (48 inches in cultivated fields) or to bedrock, whichever is less, to sufficiently expose and remove anchor bolts, rebar, conduits, and concrete. Excavations would be filled, and disturbed or compacted soil would be decompacted, graded, and restored as appropriate for use in agricultural production or other land uses identified at that time.

2.2 Action Area

The project action area is defined as all areas to be affected directly or indirectly by the proposed project and not merely the area immediately adjacent to the project location. Therefore, the project action area includes the project footprint and geographic extent of area that could be affected by construction or operational activities either directly, indirectly, or through interrelated or interdependent actions.

As described above, about 16 acres of cultivated land would be disturbed within a 600-acre area during development of access roads and installation of the wind turbines, electrical cables, and substation (Figure 2).

Direct effects to Indiana bats during operation of the wind turbines would occur primarily within and very near the rotor-swept area of the turbines. Bats have the potential to collide with the rotating blades or stationary nacelles and towers, or experience pulmonary barotrauma from low air pressure surrounding the spinning blades.

The maximum geographic extent of the MWTP's potential effect on the natural environment during operation of the wind turbines would be the result of noise generated during turbine operation. To identify the area within which noise generated from the operating turbines could be detectable, DOE compared ambient sound measurements taken within or near the project area with modeled predictions of noise at increasing distances from the turbines. Ambient sound levels were measured for 24-hour periods at three locations near the proposed turbine locations in September 2010 and for 1-hour periods at four additional locations (WES Engineering 2010). The sound level exceeded 90 percent of the time (i.e., L_{90}) during the measurement periods ranged from 43.1 to 49.1 decibels on an A-weighted scale (dBA) during the day and 38.6 to 44.4 dBA during the night. Thus, additional sources of noise in the area that are less than about 40 dBA generally would not be detectible, as they would be below ambient noise levels. Noise generated by the operating turbines would decrease to 40 dBA at about 3,000 to 4,000 feet from the turbines, and would decrease to 35 dBA by about 4,500 to 6,000 feet (depending on how many turbines were near a specific location) (WES Engineering 2010).

Rapidly flickering shadows cast by the spinning blades (i.e., shadow flicker) also can be detected at substantial distances from wind turbines under some conditions. Changes in light intensity caused by shadow flicker are greatest near, and immediately to the east and west of, operating turbines. Changes in light intensity decrease with distance and to the north and south of turbines. Shadows caused by spinning turbine blades generally are so diffuse that they cannot be detected at distances of about 10 times the diameter of the rotor blades. At such long distances, any shadows cast by the turbines would only occur for very short periods immediately before sunrise and after sunset. For the MWTP, the rotor blades would have a diameter of about 270 feet; therefore, the maximum distance at which the effects of shadow flicker are likely to occur is about 2,700 feet.

Based on this information, DOE concludes that an action area of 1 mile surrounding the 12 turbines is the maximum geographic extent of areas that could be affected by the construction and operation of the MWTP. This action area includes all sites that would be temporarily or permanently disturbed during construction, as well as areas that may be affected during operations. Figure 3 shows the bounds of the action area.

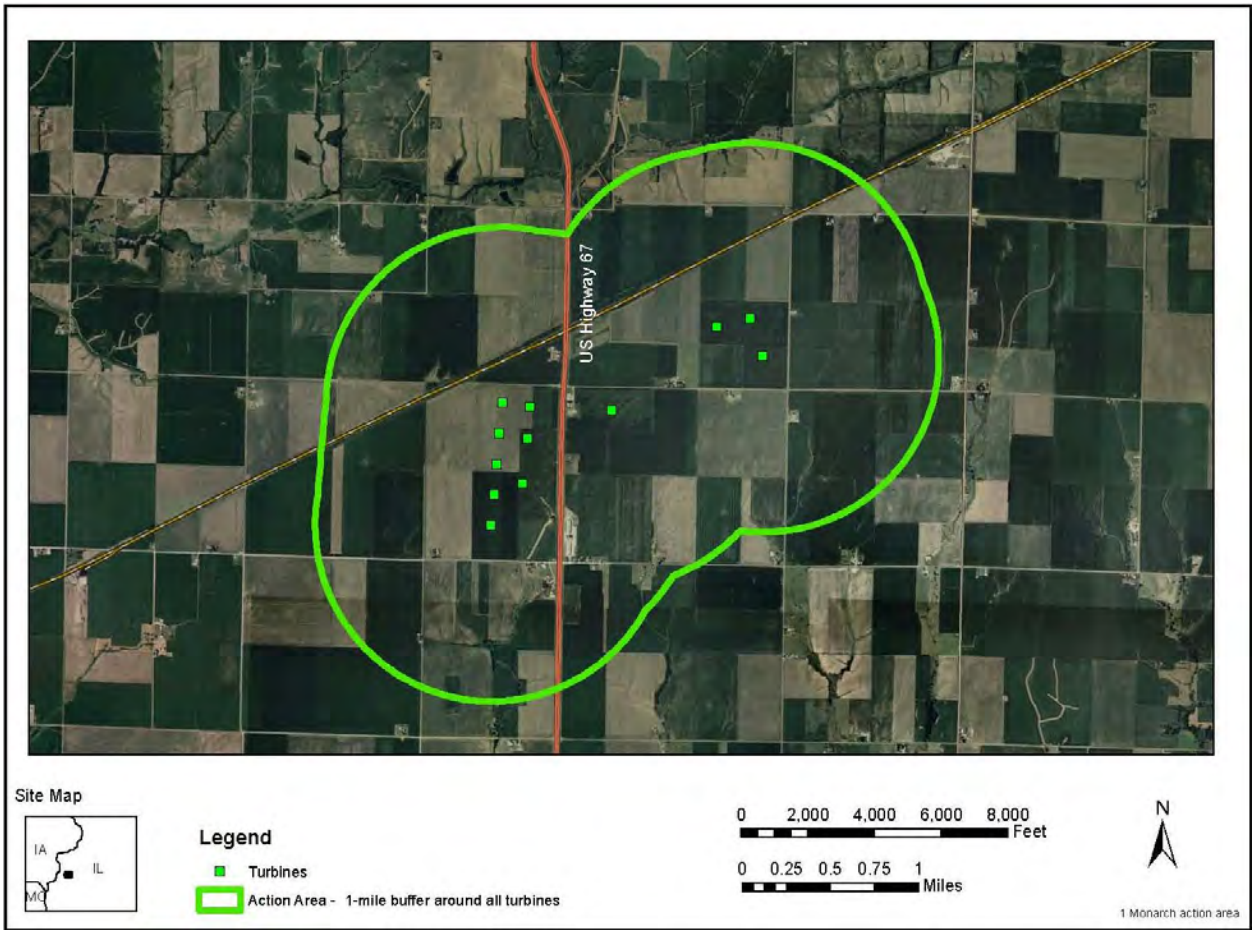

Figure 3. Action Area for the Monarch Wind Turbine Project

3. INDIANA BAT STATUS, HABITAT, AND BEHAVIOR

During informal consultation with the USFWS Rock Island Illinois Field Office, the primary concern identified was with the potential impact of the MWTP on Indiana bats that might migrate through the project area, especially during the fall. Therefore, this Biological Assessment focuses on the potential operational impacts of the wind turbines on migrating Indiana bats. Much of the following review of information on the status and ecology of Indiana bats was taken from the Biological Assessment for the Southern Illinois University Carbondale Wind Energy Project (DOE 2010), which was prepared for DOE by Copperhead Environmental Consulting, Inc.

3.1 Species Description and Status

The Indiana bat was first described by Miller and Allen (1928). The species was originally listed as "in danger of extinction" under the *Endangered Species Preservation Act in 1966* (80 Stat. 926; 16 U.S.C. 668aa[c]) and formally attained endangered species status under the *Endangered Species Act* in March 1967 (32 FR 4001). The Indiana bat is currently listed under the *Illinois Endangered Species Protection Act* (520 ILCS 10/11) as endangered by the Illinois Division of Natural Resources.

The USFWS has assigned the Indiana bat a Recovery Priority of 8 (USFWS 2007), indicating that the species has a moderate degree of threat and high recovery potential. As of October 2006, the USFWS reported records of extant winter populations at approximately 281 hibernacula in 19 states and 269 maternity colonies in 16 states. The 2005 winter census estimate of the range-wide population was 457,374 individuals (USFWS 2007). Its distribution includes most of the eastern United States from Oklahoma, Iowa, and Wisconsin east to Vermont and south to northwestern Florida (Barbour and Davis 1969; Hall 1981; Kurta and Kennedy 2002; USFWS 2007).

The USFWS, in cooperation with the Indiana Bat Recovery Team, developed an Indiana Bat Recovery Plan in 1976, followed by a revised document in 1983. The Plan has since undergone further revisions: one in 1996 and another in 2007. The most recent document, entitled the *Indiana Bat (*Myotis sodalis*) Draft Recovery Plan: First Revision*, was published for review in April 2007.

The historic winter range of the Indiana bat likely was restricted to areas of cavernous limestone in the karst limestone regions of the east-central and northeastern United States, including Alabama, Arkansas, Georgia, Illinois, Indiana, Iowa, Kentucky, Maryland, Massachusetts, Missouri, New Jersey, New York, North Carolina, Oklahoma, Pennsylvania, Tennessee, Vermont, Virginia, and West Virginia (Hall 1962; Miller and Allen 1928; Thomson 1982; USFWS 2007). Evidence suggests that vast numbers of Indiana bats "historically converged" at a relatively small number of large cave systems to hibernate, including Wyandotte Cave in Indiana; Bat, Coach, and Mammoth caves in Kentucky; Great Scott Cave in Missouri; and Rocky Hollow Cave in Virginia (Tuttle and Kennedy 1999; USFWS 2007). However, because their winter habitat requirements are so specialized, it is likely that the Indiana bats used most caves that offered suitable habitat, at least on a periodic basis or in small numbers. The disturbance associated with increased human use of many winter hibernacula over subsequent decades has reduced the numbers of available hibernacula and bats that use them.

The historic summer distribution and range for the Indiana bat is poorly documented but is assumed to be at least as expansive as the current range for the species. Changes in land use practices implemented soon after European colonization began a pattern of habitat modification and loss that has continued through the present. Suitable maternity habitat has undoubtedly been excluded, as forest was converted to agriculture or lost to urban development and mineral extraction activities. It wasn't until 1971 that the first maternity colony was discovered when a farmer in Indiana inadvertently felled a roost tree with his tractor (Cope et al. 1974; USFWS 2007).

3.2 Habitat and Behavior

3.2.1 Winter

Indiana bats use caves and abandoned mine portals as winter hibernacula throughout the karst region in the south-central portion of the range (USFWS 1999). They have very specific hibernation requirements and occupy areas in caves that maintain a narrow temperature and humidity range. As such, very few caves provide adequate microclimate for hibernating Indiana bats (USFWS 1999). In addition, a large portion of the population hibernates in large clusters within a handful of sites. Many of the larger Indiana bat hibernacula have been designated as critical habitat.

Winter critical habitat was designated for the Indiana bat in September 1976 (41 FR 41914). The current draft of the recovery plan (USFWS 2007) lists 11 caves and 2 mines in 6 states as critical habitat. The only designated critical habitat for the Indiana bat in Illinois is Blackball Mine (Priority 2), located in LaSalle County.

3.2.2 Spring Emergence/Staging

Spring emergence is a dynamic time for Indiana bats and the onset and duration of this period is highly variable. Depending on local weather patterns, the movement of bats (both inside and in the vicinity of hibernacula) increases during the spring staging period as bats begins to arouse from hibernation. The start of emergence is dependent on latitude and local weather conditions, but evidence suggests that peak emergence occurs some time during late March to early April across the species' range (Butchkoski and Hassinger 2002; Cope and Humphrey 1977; Hall 1962; LaVal and LaVal 1980).

After emerging from hibernation, Indiana bats may loiter near hibernacula for several days, often returning to roost either in the hibernacula or in surrounding trees. While the majority of mating takes place during the fall swarming period, opportunistic males may mate with unfertilized females as they emerge from hibernation (Hall 1962).

Studies characterizing the specific habitat preferences of Indiana bats following emergence from winter hibernacula are limited, but roost choice appears to be influenced by seasons (Britzke et al. 2006; Gumbert 2001). Indiana bats probably use roosts in spring as places to rest as they recover from hibernation. Bats will also forage when prey is available in an effort to replenish fat reserves used over the winter. Britzke et al. (2006) found 39 Indiana bat roost trees for female bats during spring in the Lake Champlain Valley of New York and Vermont. The distance of these trees from their hibernaculum ranged from 9.1 to 24.8 miles. Bats in this study used both live (n = 14) and dead (n = 25) trees and preferentially used shagbark hickories. The mean diameter of live and dead trees in this study was 18.6 ± 1.6 inches and 17.6 ± 2.2 inches, respectively. Gumbert (2001) radio-tracked 13 male Indiana bats to 34 day roosts during spring after hibernation on the Daniel Boone National Forest, Kentucky. During this time, bats used roosts with a range of 0.3 to 2.8 miles from the hibernacula. An increase in crevice roosts and the use of live trees was documented in this study during the spring over other seasons (Gumbert 2001).

3.2.3 Summer

Roosting

Summer habitat preferences of Indiana bats have been studied in detail and can be described in specific terms. For example, Rommé et al. (1995) developed a habitat suitability model for the Indiana bat that identified environmental variables considered indicative of optimal summer habitat. This model suggested that optimal habitat is that within 1 kilometer (0.6 mile) of open water, greater than 30 percent forested

with 60- to 80-percent overstory canopy closure containing trees averaging 39.3 centimeters (15.7 inches) diameter at breast height, at a density greater than 16 stems per acre.

Indiana bats roost in a variety of habitats including riparian zones, bottomland and floodplain habitats, wooded wetlands, and upland communities (USFWS 2007). Humphrey et al. (1977) suggested that floodplain forests were the significant habitat for Indiana bats, but more recent studies indicate that this species also uses upland habitats (Britzke et al. 2003; Gumbert 2001; Kiser and Elliott 1996; MacGregor et al. 1999; Sewell et al. 2007). Carter et al. (2002) found that roosting areas contained more patches of water (e.g., ponds, lakes) than randomly chosen sites. Throughout most of the Indiana bat range, water sources are typically not a limiting factor. In general, sources of drinking water are well within range of resident bats, making the energy expenditures required to fly to such sites insignificant. As such, resident bats probably consider the relative amount of available water sources across the landscape in their choice of home range rather than day-to-day roost locations (USFWS 2007).

Roosts are typically located within canopy gaps, in a fence line, or along wooded edges (USFWS 2007). In the Midwest, maternity colonies are commonly associated with bottomland, riparian, wetland, or other hydric forest types, possibly because these areas have the most numerous snags, or possibly because of restriction to these habitats due to intensive agriculture (Carter 2006). Most maternity roosts have been located in or near wooded areas where some light gap is present allowing full or partial sun exposure to the roost site. Carter et al. (2002) attempted to clarify roost preferences of Indiana bats in Illinois and found that plots centered on roosts differed from random plots by containing fewer and small urban patches as well as more and larger patches of closed-canopy deciduous forest. Roosts typically occurred in highly fragmented forests, and roosting areas contained more patches of bottomland forest and agriculture than randomly chosen plots.

Rangewide, Indiana bats have been found to roost in over 33 species of trees (Kurta 2005). However, summer roost suitability could depend on many factors (USFWS 2007). While Indiana bats probably utilize tree species according to their availability, roost choice is probably more a reflection of roost character (i.e., condition, usable bark, amount of solar exposure, tree size, distance to water resources, elevation) than species (Callahan et al.1997; Gardner et al. 1991a; Humphrey et al. 1977; USFWS 2007). Roosting typically occurs under the exfoliating bark of dead or live trees, but cavities or crevices of live-damaged trees have also been used (Callahan 1993; Gardner et al. 1991a; Gumbert 2001; Kurta and Williams 1992). In rare cases, Indiana bats have also been found using human-made structures as maternity roosts (Butchkoski and Hassinger 2002; GAI and ESI 2006; Ritzi et al. 2005; USFWS 2007). In addition, there is some evidence that suggests Indiana bats exhibit fidelity to summer roosting areas and even specific trees from year to year (Gardner and Gardner 1992; Gumbert et al. 2002; Kurta and Murray 2002).

Foraging

Foraging home ranges of Indiana bats vary by habitat, sex, region, and time of year. During summer, Kurta (1995) found that the home ranges of pregnant females encompassed 52 hectares (128 acres) of foraging habitat. Following birth of young, the ranges increased to 94 hectares (232 acres). More recent surveys by Butchkoski and Hassinger (2002) indicate that females use a minimum of 20 to 39 hectares (50 to 96 acres) for foraging during summer. Documented foraging range for the species varies greatly by population. Gardner et al. (1991a) reported foraging range in Illinois to be 16 hectares (40 acres), while Rommé et al. (2002) reported a foraging range of 61 hectares (151 acres) in Missouri. USFWS (2007) reported the mean summer foraging range for females throughout the range at 68 hectares (167 acres).

Although additional studies are needed to determine the preferred foraging habitat for Indiana bats, foraging is apparently concentrated in wooded areas (Butchkoski and Hassinger 2002; Gardner et al. 1991a; LaVal et al. 1977). LaVal et al. (1976, 1977) found that during summer, females and juveniles

forage within or near the tree foliage of riparian and floodplain areas, but adult males typically forage over densely wooded areas along ridges and hillside forests (Kiser and Elliott 1996). A study in Indiana determined that Indiana bats preferred to forage within upper forest canopy layers where overstory canopy cover ranged from 50 to 70 percent (Rommé et al. 1995). This species also forages over clearings with early successional habitat, such as clearcuts, and along the edges of forest openings (Clark et al. 1987; Gardner et al. 1991b). An early Indiana bat recovery plan (USFWS 1983) states that optimum foraging habitat consists of streams lined on both sides with mature trees that overhang the water by more than 3 meters (9.8 feet). Another study indicated that ideal habitat occurs within 20 meters (65 feet) of permanent water within an area with at least 30 percent forest cover (3D/Environmental 1995). Cope et al. (1978) reported that streams without riparian vegetation do not appear to be suitable. However, Gardner et al. (1991b) and Gardner and Garner (1992) radio-tracked foraging adult females in Illinois and compared foraging habitat with the availability of all habitats. They found that floodplain forest was the most preferred habitat, followed by ponds, old fields, row crops, upland woods, and pastures. Visual observations suggest that foraging over open fields or bodies of water more than 50 meters (150 feet) from a forest edge does occur, although less commonly than in forested sites or along edges (Brack 1983; Menzel et al. 2001). Based on the results of mist net captures and light tagging studies, Indiana bats typically forage at a height of 2 to 30 meters (6.5 to 98 feet) (Humphrey et al. 1977).

The Indiana bat is insectivorous, consuming a variety of small, soft-bodied flying insects. Food sources are predominately *Lepidoptera* (moths), *Coleoptera* (beetles), occasionally *Diptera* (flies), *Tichoptera* (caddisflies), and *Plecoptera* (stoneflies) (LaVal and LaVal 1980; Thomson 1982). While they are known to establish and exhibit fidelity to feeding areas, Indiana bats probably feed opportunistically as they transition to and from these areas. This, coupled with the fact that these bats are highly mobile fliers, often traveling as far as 5 kilometers (3 miles) over a given night, suggests that they likely utilize a number of habitat types during their nightly movements. Although Indiana bats typically forage in the uncluttered understories of forested habitats, along forest edges, and in riparian areas (USFWS 2007), ultimately, where they forage is likely dependent on a number of factors including terrain, weather, densities of competitors and prey, and the location and juxtaposition of available resources.

3.2.4 Migration

Indiana bats are considered a short-distance migratory species, migrating within the United States from winter hibernaculum to summer habitat. In general, migratory patterns of male and female Indiana bats differ. Evidence suggests that males are less migratory and have been shown to remain much closer to their hibernacula during summer (Gardner and Cook 2002; Gumbert 2001; Hawkins et al. 2008; Whitaker and Brack 2002). By comparison, females might migrate much greater distances. Direction of migrating female Indiana bats from winter to summer sites is not well understood, but has long been believed to be generally in a south to north direction (Bowles 1982; Gardner and Cook 2002; Hall 1962; Kurta and Murray 2002; LaVal and LaVal 1980). However, populations of Indiana bats in New York, Pennsylvania, and Vermont tend to travel shorter distances during migration than individuals in the Midwest and move southeast or southwest rather than north in the spring (Butchkoski et al. 2008). Gardner and Cook (2002) suggest that Indiana bats in northeastern states are geographically isolated from major populations in the core range and they encourage increasing the knowledge base of distribution patterns from peripheral populations.

Knowledge of female Indiana bat movement from summer to winter habitat is a result of banded bats being located during winter hibernacula surveys. Despite the small sample size of band recoveries, long distance movements from north to south of 520 to 575 kilometers (323 to 357 miles) have been documented (Gardner and Cook 2002; Kurta and Murray 2002; Winhold and Kurta 2006).

There is evidence that migrating bats fly at lower altitudes than migrating birds (Barclay et al. 2007) and appear to do most of their migration between dusk and 1 AM. John Chenger of Bat Conservation and Management (in Carlisle, Pennsylvania) believes Indiana bats migrate at low altitudes, which he defines as treetop level or lower (Johnson and Strickland 2004). There is also evidence that Indiana bats follow landscape features such as mountain ridges, rivers and streams, roads, and power lines to navigate (Sanders and Chenger 2001, Butchkoski 2004, Hawkins and Gumbert 2009, Gumbert et al. 2010). Another study reported that Indiana bats tend to forage and fly from 2 to 30 meters (6.6 to 98 feet) above ground (Humphrey et al. 1977).

Along with hearing and echolocation, bats use vision to navigate the landscape, likely employing it to assess landscape outlines and silhouettes in low light (Layne 1967; Griffin 1970; Eklof 2003). Loss of vision was shown to reduce the homing performance in Indiana bats and other M*yotis* species (Davis and Barbour 1970). High-frequency sounds attenuate rapidly with distance, so echolocation is limited to a few meters in practice. Background echoes, called clutter, (which arise from many other sources, including other bats) also can limit the utility of sonar alone (Eklof 2003). The frequency of bats crashing into windows of buildings during migration (Timm 1988) suggests that they rely mainly on visual cues when both acoustic and visual cues are available. Bats can use distant low-frequency sounds for orientation of moderate distances, which they would sense through passive hearing (Griffin 1970; Buchler and Childs 1981; Eklof 2003). Recent research in which speaker systems emitting ultrasonic noise were installed on windmills have been shown to reduce bat fatalities 20 to 53 percent, indicating that at some distance, bats respond to high frequency (Curry 2010). There is also evidence that bats possess magnetic material; however, whether it is connected to a sense and whether they use this to navigate during migration is unknown (Buchler and Wasilewski 1985).

Spring Migration

Indiana bats generally emerge from hibernacula in late March to early April and might immediately start migration or remain in the general vicinity of the hibernaculum for several days (USFWS 2007). Some individuals have been documented at maternity trees as early as April 9th (Gumbert et al. 2010). Recent migration studies on Indiana bats have begun to shed light on movement between hibernacula and summer habitat (Butchkoski 2004; Gumbert et al. 2010; Hawkins and Gumbert 2009; Sanders and Chenger 2001). Dr. John Whittaker of Indiana State University reported that they fly in a V formation (Johnson and Strickland 2004). Movements from winter to summer habitat appears to happen quickly; for example, one female released in New York flew 56 kilometers (35 miles) in approximately 85 minutes (Sanders and Chenger 2001). Indiana bats migrating from a cave in Tennessee generally traveled north, but one bat flew 261 kilometers (162 miles) southwest over a three-night period (Gumbert et al. 2010). Bats that have been tracked over multiple nights during spring migration appeared to migrate in the same general direction in which they began from the hibernaculum (i.e., initial azimuths flown upon emergence were maintained), although some minor directional changes have been documented. Nevertheless, Indiana bats appear to leave hibernacula and migrate directly to summer habitat, reducing the time they migrating across the landscape during the spring (Gumbert et al. 2010).

During spring migration, Indiana bats appear to navigate by using natural landscape features and are most likely flying near the top of the forest canopy in order to take advantage of these navigational features. A study based in Pennsylvania, Turner (2007) reported that female Indiana bats migrating during spring went out of their way to follow tree lines, avoiding open areas, and that they may fly at low altitudes, noting that one flew under highway I-80. In addition, manmade structures such as highways and powerline corridors are likely used to aide in navigation (Butchkoski 2004, Sanders and Changer 2001). One female Indiana bat radiotracked during spring migration was documented changing direction abruptly to fly through a gap in a mountain ridge (Gumbert et al. 2010). Sanders and Changer (2001) also documented an Indiana bat using a powerline corridor to cross a mountain ridge during spring migration.

According to studies in New York, female Indiana bats have been shown to avoid urban areas during spring migration (Hicks 2007).

The use of roosts during spring migration is temporary in nature (as bats move on to their maternity grounds) and is probably limited to the provision of shelter and protection from predators. Research documenting the habitat preferences of specific roost trees used during migration is limited, but roost choice probably reflects local forest community composition. Because bats are yet to be saddled with the care of offspring, migrating Indiana bats may be less choosy of roosts along migratory routes.

Fall Migration and Swarming

Although Indiana bats might migrate in a direct path from winter to summer habitat, evidence suggests that the same may not occur while migrating from summer to winter habitat. In late summer/early fall, maternity colonies begin to break up and disperse (USFWS 2007). Some male bats arrive at hibernacula as early as July, with females typically arriving later, and both sexes present in equal numbers by September (Cope and Humphrey 1977). Fall is the swarming season for Indiana bats. During that period, bats migrate toward their hibernacula where both sexes gather in large numbers at the entrance to mate. Cope and Humphrey (1977) described swarming as "…a phenomenon in which large numbers of bats fly in and out of cave entrances from dusk to dawn, while relatively few roost in the caves during the day." During this time, they forage to build up fat reserves to sustain them during the winter hibernation and they mate (Thomson 1982). Cryan (2008) postulates that bats in general are drawn to the tallest tree in the area where they engage in mating behaviors. The dynamics of swarming are not fully understood, but it appears that not all hibernacula experience the same amount of swarming activity within a given year or between years (pers. obs. M. Gumbert, Copperhead Environmental Consulting, Inc.).

Swarming is a dynamic time for Indiana bats that must meet and mate before hibernation. It is likely that weather and social factors play a major role in the timing of swarming behavior in Indiana bats. Parsons et al. (2003) suggest that swarming sites function as "stop-offs" during migration or between hibernacula. At many caves, individual bats arrive as the swarming season progresses but depart at intervals to recuperate from the stress of mating and/or to sample other swarming caves for prospective mates. Cope and Humphrey (1977), citing studies of the Indiana bat at Wind Cave in Kentucky and Wyandotte Cave in Indiana, iterated that "…waves of migratory *M. sodalis* arrived at predictable times each year in response to changing seasonal conditions, were active in the vicinity of the cave to mate and feed, and then either entered hibernation or moved elsewhere." It is possible that Indiana bats visit one or more hibernacula as they move through to their winter hibernacula in an effort to find mating partners along the way. This behavior can serve to ensure optimal outbreeding and also provide bats with alternative choices of where and when to hibernate.

Although swarming occurs at the entrances of caves and mines, it does not occur at every known Indiana bat hibernaculum. Thus, migration from the maternity colony might not be in a direct line to a single hibernaculum but could be more sporadic as the female visits several known hibernacula to participate in swarming activity. Male Indiana bats might also make several stops to visit multiple hibernacula during the fall swarming period (Cope and Humphrey 1977; LaVal and LaVal 1980). During this time, temperature correlates with nightly activity, as both bats and their prey become increasingly constrained by colder temperatures (USFWS 2007). By late September, many females have begun their hibernation, but males may continue swarming well into October (Thomson 1982).

Swarming and migration have not been studied extensively and are poorly understood (USFWS 2007). However, research has shown that Indiana bats travel hundreds of miles between maternity colony sites and their winter hibernacula. Twelve female Indiana bats migrated an average of 477 kilometers (296 miles) to their hibernacula in Indiana and Kentucky. Kurta and Murray (2002) tracked Indiana bats from

summer habitat in southeastern Lower Michigan to hibernacula in southern Indiana and northern Kentucky, a maximum of 532 kilometers (331 miles).

In some instances, bats have been reported to switch hibernacula from one winter to the next (Barbour and Davis 1969) and evidence suggests that Indiana bat winter populations might operate through some form of metapopulation (Hanski 1998 and Cronin 2003 in USFWS 2007). After mating occurs, females generally enter the hibernacula, storing the sperm through the winter and inseminating themselves in the spring prior to migration (Barbour and Davis 1969).

3.2.5 Causes of Decline

The largest declines in numbers of Indiana bats can be attributed to a variety of human activities, including: (1) commercialization of roosting caves, (2) vandalism of hibernating colonies, (3) disturbance by spelunkers, (4) bat banding programs, (5) use of bats as laboratory experimental animals, and (6) installation of improper cave gates (Reynoldsburg Ohio Ecological Services 2007; Thomson 1982).

Secondary causes of population declines are associated with: (1) pesticides, (2) summer habitat loss/degradation, and (3) natural disasters (Thomson 1982). Although no studies have documented the role of pesticides in population declines, some scientists have hypothesized that both quality and quantity of the food supply could be impacted by these chemicals. In addition, drinking contaminated water could contribute to Indiana bat population declines. Summer habitat loss/degradation impacts maternity colonies. Reduction in numbers of suitable roosting trees can negatively impact reproductive success and, subsequently, population levels. Loss/degradation of winter hibernacula has resulted from natural geological events such as ceiling collapse, cave flooding, and other negative changes to mine/cave structure. In addition, white nose syndrome (WNS), which was first documented near Albany, New York in 2006 (Blehart et al. 2009) is also a relatively recent contributor to the decline of Indiana bats.

As of June 2010, WNS had been documented in 11 U.S. states, 3 Canadian provinces, and is considered likely in an additional 3 U.S. states (Butchkoski 2010). The causal agent of WNS is widely accepted to be a newly described, cold-loving fungus (*Geomyces destructans*) and is thought to be European in origin. Although no cases of WNS have been reported or are suspected in the state of Illinois or in the states surrounding the MWTP site, it is suspected in caves south of Illinois in Kentucky (USFWS 2010). Given the distance that Indiana bats have been documented migrating (up to 357 miles), it is possible that Indiana bats in Illinois could migrate that far (Kurta and Murray 2002; Winhold and Kurta 2006; Gardner and Cook 2002). The syndrome causes erosion of the epidermis of the ears and wings, and bat mortality within infected hibernacula has been documented between 80 and 97 percent of a cave's hibernating population (Blehert et al. 2009). Biologists have estimated that bat mortality from WNS likely exceeds one million animals since 2007, representing the largest wildlife mortality from an infectious disease in recorded history (Sleeman 2009). While bats are believed to be the primary mode of transmission, evidence also supports the probability of spread of the fungus by humans (by movement of conidia on infected caving gear and clothing) who are thought to be responsible for some of the major "jumps" in the spread of the disease (Dixon 2010).

3.2.6 Effects of Wind Farm Operations on Bats

Information on bat mortalities at wind energy project has been summarized by Arnett et al. (2008) and Kunz et al. (2007a, 2007b). While early studies of impact to biological resources at wind farms focused on avian mortality, recent studies have shown that bats are more at risk than birds at most installations. Bat mortality varies from 15 to 41 bats per megawatt per year depending on the habitat type and time of year (Kunz et al. 2007a). The highest mortality was recorded at a mountaintop installation in a forested

area where 0.24 bats per night per turbine was found dead, or about 90 bats per year per turbine (Kerns and Kerlinger 2004).

Arnett et al. (2008) reviewed 21 post-construction wind turbine mortality studies in the United States and Canada and identified five key unifying patterns associated with bat fatalities at wind facilities: (1) fatalities were heavily skewed toward migratory bats and were dominated by lasiurine species in most studies; (2) studies consistently reported peak turbine collision fatalities in midsummer through fall from all studies in North America; (3) fatalities were not concentrated at individual turbines (i.e., fatalities were distributed among turbines at facilities), and current studies have not identified consistent relationships with habitat variables (e.g., distance to water); (4) red strobe lights recommended by the FAA did not influence bat fatality; and (5) bat fatalities were highest during periods of low wind speed, and they were related to weather variables associated with the passage of weather fronts.

A review of information on bat mortalities at wind energy projects identified late summer and early fall as the peak period for bat mortalities (Arnett et al. 2008):

- Iowa – Bat fatalities peaked in August, with a substantial number of fatalities also occurring in July and September (Arnett et al 2008).

- Alberta –The number of bat fatalities increased in early August, peaked in late August, and ended in early October (Arnett et al 2008).

- Buffalo Mountain Tennessee – 75 percent of bat fatalities occurred between August 1st and September 15th. In 2005, the peak was very pronounced, with 61 percent of fatalities occurring between August 15th and 30th, whereas fatalities were more dispersed during 2000 to 2003, with 96 percent occurring during an 88-day period centered on August 22nd and 23rd (Fiedler et al. 2007). Trends in bat activity during 2002 and 2003, measured using acoustic detectors, supported seasonal patterns of fatality: bat activity levels quadrupled by mid-August, after beginning to increase in mid-July to early August, and then decreased to previous levels by early to mid-September (Fiedler 2004).

- New York – Bat fatalities were low in June, peaked from mid-July to mid-August, and then declined precipitously through mid-November (Arnett et al 2008).

Conversely, very few bats have been killed at wind energy facilities during spring migration. The following review of mortality data collected during spring through fall at wind energy facilities in the Midwestern U.S. indicates that mortality rates are substantially less during spring migration than during the fall.

- Of 475 bat fatalities documented during 2003 at the Mountaineer Backbone Mountain Facility in West Virginia, 17 were found in the spring. All others were found during August through November (Kerns and Kerlinger 2004).

- At the Blue Sky Green Field Wind Energy Center, Fond du Lac County, Wisconsin, 242 bats were killed during fall of 2008 and 5 were killed during the spring of 2009 (Gruver et al. 2009).

- At the Top of Iowa facility, Worth County, two of 75 bat mortalities during 2003 and 2004 occurred during the spring (Jain 2005).

- Three of 44 bats killed during 2009 at the Forward Energy Center, Fond du Lac and Dodge Counties, Wisconsin, were killed during the spring (Drake et al. 2010).

In addition, in a supplement to the Biological Assessment for the NedPower Mount Storm Wind Project, Grant County, West Virginia, Johnson and Strickland (2003) tabulated the timing of bat mortalities at nine wind energy projects in the U.S. prior to 2003. They concluded that "Of 1,021 bat collision mortalities reported at wind plants across the U.S., only 27 (2.6%) were killed in April and May. The only wind plant studied in the U.S. with several bat fatalities in the spring is the Backbone Mountain site in West Virginia…".

This pattern generally is consistent with findings reported from wind facilities in Europe (Du¨ rr and Bach 2004 and Brinkmann 2006 in Arnett et al. 2008). The most consistent theme is that fatalities of bats at wind farms were heavily skewed toward migratory bats and a dominance of lasiurine species killed during midsummer through fall in North America, coinciding with the timing of fall migration (Cryan 2003 in Arnett et al. 2008).

Three species of lasiurine bats (hoary bat, *Lasiurus cinereus*; red bat, *Lasiurus borealis*; and silver-haired bat, *Lasionycteris noctivagans*) comprise the bulk of mortalities at wind turbine sites (Kunz et al. 2007b). It is unknown why this group is more vulnerable, but multiple studies have shown that these migratory, tree-roosting bats are much more likely to be killed (Johnson et al. 2003, 2004). At a Minnesota wind farm, 76 percent of bats killed were hoary bats; 90 percent were hoary or red bats. However, other bat species also are affected. For instance, Arnett et al. (2008) note that at one Iowa site, 25 percent of bat mortality was composed of big brown bats (*Eptesicus fuscus*). In general, bat activity is lower over crop and Conservation Resource Program land (Johnson et al. 2004) and shows no relationship to distance of turbines from nearby woodlots. Mortality rates were about 1 to 3 bats per turbine per year. Reynolds (2006) reported that most foraging bat activity is below the height of turbine towers (but see Horn et al. 2008 below). Reynolds (2006) reinforces the supposition that migrating bats are most at risk.

Cryan and Brown (2007) offer clues to conditions under which migrating bats may be more vulnerable in their study of hoary bat migration past an island stopover point on their migration route in California. Numbers of migrating bats increased with increasing cloud cover and decreasing wind speeds and moonlight. Migration peaked in autumn, a fact that corresponds with information on bat mortality data from wind turbine installations that also peaked in the late summer and early fall (Johnson et al. 2004; Kunz et al. 2007a). Reynolds (2006) also noted that spring bat migration was higher on days with lower wind speeds and warmer weather.

Migration research projects have helped increase the understanding of spring migration including altitude of migrating Indiana bats. Although altitudes used by migrating Indiana bats are not specifically known, evidence suggests that Indiana bats fly within close proximity to canopy height (Butchkoski 2004; Gumbert et al. 2010; Sanders and Chenger 2001), which is similar to where Indiana bats forage during the summer (LaVal et al. 1976, 1977). Migrating at or near tree canopy height supports the idea that Indiana bats may be using landscape features to navigate during spring migration. This would place Indiana bats at a lower altitude while migrating than species typically killed at wind facilities (Arnett et al. 2008). The documentation of short duration and relatively straight migration pathways (Butchkoski 2004; Gumbert et al. 2010; Sanders and Chenger 2001) may also contribute to the reduced likelihood of Indiana bat fatalities at wind farms during the spring simply because of the reduced amount of time they are actively migrating.

Barclay et al. (2007) showed that at turbine tower heights above 65 meters (213 feet), bat mortality increased exponentially. The diameter of the rotor had no effect on mortality rates. Horn et al. (2008) used thermal imaging to conclude that bats foraged between 20 and 111 meters (66 to 324 feet) off the ground but were concentrated in the rotor-swept zone (nacelle at 70 meters). Two-thirds of the bats observed foraging near the towers entered the rotor-swept zone and some individual bats had repeated near misses with the blade, suggesting they were returning to investigate the blade, possibly attracted by the sound.

Lighting on towers had no effect on bat activity or mortality. No bats struck a stationary blade, the nacelle, or the monopole, but bats investigated all aspects of the turbine towers, even alighting briefly on the monopole and stationary blades. Horn et al. (2008) suggest that bats were sometimes trapped in the vortices of the blade as they flew nearby and determined that slower rotor speeds increased mortality rates, a fact confirmed by other studies (Arnett et al. 2008, Kunz et al. 2007b).

In summary, most bat mortality occurs among tree-roosting lasiurine species during migration and in late summer through early fall, and few mortalities occur during spring migration. However, foraging bats are also at risk, particularly in forested areas on mountain ridges. Both birds and bats are most vulnerable during periods of bad weather during migration; resident species are at lower risk but foraging bats do fly in the rotor-swept zone and are most threatened by towers over 65 meters high.

Bat mortality is affected by turbine height, geographic location, seasonality, weather, and wind speed, with high mortality on nights with low wind speeds. Why bats may be attracted to the turbines is not well understood; they may simply be foraging or they may see the structures as potential roosting sites and have come to investigate.

It has been suggested that noise generated by operation of the turbines may affect the behavior of bats. For example, Arnett et al. (2008) speculated that collisions with turbines for species such as big brown bats and little brown myotis may be due to, among other things, sound attraction. However, Anabats® placed at turbines have not been found to pick up any ultrasonic sounds (Johnson et al. 2003b), indicating that the turbines do not emit any ultrasonic noises that might confuse or attract bats. In Szewczak and Arnett 2006, it was found that any ultrasonic sounds generated by wind turbines have a very low likelihood of attracting bats as ultrasonic sounds are barely detectable above ambient levels as close as 10 meters (33 feet) away, and were not detectable past 20 or 25 meters (66 to 82 feet). At this time, no definitive conclusions have been made regarding bats and noise as an attractant, but it not does appear to have an important influence on bat mortalities at wind turbines.

In Johnson et al (2003b), it was suggested that bats may also be attracted to turbines, as aerial insects upon which bats feed may take advantage of lower wind speeds on the lee side of wind turbines.

The proposed project is in cultivated agriculture, a habitat type that has generally shown the lowest risk to bats compared with other sites. However, the proposed height of the towers does increase potential that bats in the area would be susceptible to collisions, and the risk of bat mortality exists. The presence of wind turbines, especially taller than 213 feet, are known to cause mortality to bats due to collisions with rotors and other structures associated with the wind turbine. The proposed turbine would have a 328-foot tower height and rotor diameter of 271 feet, for a maximum height of 463 feet above ground level at its tallest extent. Higher turbine heights are related to increased bird mortality (Winegrad 2004) and turbine tower heights above 213 feet are associated with an exponential increase in bat mortality (Barclay et al. 2007). The proposed wind turbines do have a relatively large rotor and such large diameters appear to be associated with higher mortality of raptors (Smallwood and Thelander 2004), though rotor diameter does not appear to relate to bat mortality (Horn et al. 2008). Rotor speed appears to be an important factor in bat mortality as well. In general, very low rotor speeds are associated with high bat mortality. In fact, more bat fatalities occur at low wind speeds, which may be explained by new evidence suggesting that bats die from barotrauma, in which their lungs burst due to a sudden drop in air pressure as they arrive within a meter or two (3 to 7 feet) of the moving turbine without actually being struck by the turbine (Baerwald et al. 2008).

4. ENVIRONMENTAL BASELINE

4.1 Project Setting

MWP proposes to install 12 wind turbines in central Warren County, Illinois. The County consists of gently rolling upland plains, resulting from glacial deposition, and dissected valley sides and flood plains, which resulted from postglacial stream erosion. The turbines would be installed in an area heavily utilized for agriculture that is approximately 16 miles east of the Mississippi River and 45 miles west of the Illinois River. Both of these major rivers are situated roughly north-to-south (flowing generally southward) and are important landscape features for resident and migratory wildlife, despite their heavy historical use by humans.

As with much of Warren County, the MWTP site is in the Western Forest-Prairie Natural Division, Galesburg Section, one of 14 natural divisions in Illinois based on rainfall and water availability, the kinds of native animals and plants present, topography, and types of geologic materials visible near the surface. This division is typified by a strongly dissected glacial till plain with open woodland as predominant vegetation and considerable prairie on undisturbed level uplands. The division is characterized by well-developed natural drainage systems consisting of major streams that have significant floodplains. Native vegetation consists of forest in the river and creek valleys with open forest patches of trees, including oaks and hickories, and prairie on the uplands. Currently, large forested areas in the County generally are restricted to the major drainages.

4.2 PROJECT ACTION AREA

The project action area and surrounding land is dominated by developed agricultural land. Most of the action area, including the locations where the turbines would be installed, is cultivated fields. Most of the fields are used to grow corn and soybean. Agricultural conversion and development of the area have eliminated historical native prairie and forest vegetation. There are less than 20 acres of non-cultivated pastures and small drainages within the area. Other vegetation within the action area consists of a mowed mixture of grasses and other roadside herbaceous plants (Edge Consulting 2010).

There are no floodplains, perennial streams, or other vegetated drainage channels in the action area. Henderson Creek is the nearest stream to the action area. It is located just to the north of the action area, about 1.1 miles north of the northern-most turbine location.

The only stand of trees and shrubs within the action area is along the Burlington Northern Santa Fe railroad line, approximately 0.4 mile from the nearest turbine location. That stand of trees and shrubs is narrow (about 300 feet wide and 4,500 feet long) and is isolated from forested areas, such as those located along Henderson Creek, by more than 4,000 feet. There also is a small, isolated stand of trees along Henderson Creek just north of the action area; there are very few other trees along the creek within 1 mile of this stand. Almost all other trees in the action area are at or near residences or barns.

4.3 Indiana Bat Habitat in Action Area

Although Warren County is within the range of the Indian bat, there is no suitable roosting, foraging, or hibernating habitat within the MWTP site or surrounding action area. No summer or winter records, hibernacula, or summer reproductive records of Indiana bats have been identified in Warren County (USFWS 2007). It should be noted that lack of summer reproductive records may reflect lack of surveys and not necessarily that the species is not present in the county.

The closest and only designated critical habitat for the Indiana bat in Illinois is the Blackball Mine (Priority 1), located in LaSalle County, over 90 miles east-northeast of the MWTP site (USFWS 2007). The closest known Indiana bat hibernacula is a Priority 4 cave, Burton Cave, 72 miles southwest of the project site in southern Adams County, Illinois (USFWS 2007). The Illinois State Geological Survey (2010) identified a cave site in adjacent Henderson County, approximately 13 miles west-northwest of the project site. Even though USFWS has not identified this cave as providing hibernacula, its potential for use as a hibernaculum cannot be ruled out.

The action area is dominated by developed agricultural land. The only stand of trees within or near the area is small and distant from other isolated stands (Section 4.2). The nearest forested areas with connectivity to the larger riparian forests in the region are more than 2 miles to the southeast along Cedar Creek and about 2 miles to the northwest along Henderson Creek. The USFWS (Nelson 2010) describes suitable summer habitat for the Indiana bat in Illinois as areas within a 0.5-mile radius of a project site that have forest cover of 15 percent or greater, permanent water, and potential roost trees with 10 percent or more peeling or loose bark. Based on this information, **DOE concludes that there is no suitable roosting or foraging habitat within or immediately adjacent to the action area that would be affected by the MWTP and that the only time that Indiana bats are likely to be present within the area is during migration**.

This conclusion is supported by a review of habitat within and near the project site conducted by the USFWS Rock Island Field Office (Nelson 2010):

> The project boundary is located less than 2.5 miles (average maximum foraging distance of summering Indiana bats) away from the nearest potential maternity habitat and contains other suitable habitats that could be used by Indiana bats. Nonetheless, no continuity exists between these habitats and the nearest maternity habitat, providing no pathway for take of this endangered species during the summer. Current literature indicates open expanses greater than 1000 feet are not typically spanned by foraging Indian bats. Therefore, even if suitable habitat exists in the project vicinity, it is unlikely the habitat will be utilized as it is part of a non-contiguous landscape. However, because of the seasonal life history characteristics of migratory bats, the Monarch wind farm may affect the Indiana bat during spring and fall migrations.

In subsequent discussions between DOE and the USFWS, the Service indicated that the MWTP was most likely to result in adverse effects to Indiana bats during the fall migration period (Pers. Comm. with Rick Nelson, Matt Sailor and Jody Miller, November 2010). **Based on this input from the USFWS; the lack of suitable roosting, foraging, or winter habitat in the vicinity of the MWTP area; the timing of bat mortalities documented at other wind energy facilities in the Midwest (see Section 3.2.6); and the lack of documented occurrences of Indiana bats in Warren County, DOE concludes that the only bats likely to be affected are those that are migrating through the action area, and such impacts are most likely to occur during the fall migration**.

DOE has not conducted any field investigations to determine the presence of Indiana bats at the MWTP site because the likelihood of capturing a migrating Indiana bat in a mist net during migration is very low. Furthermore, acoustic monitoring cannot be used to reliably differentiate between Indiana bats and other *Myotis* bats. Therefore, in lieu of carrying out a bat survey, DOE assumes that migrating Indiana bats could be present in the action area.

5. EFFECTS ANALYSIS

This section describes and justifies DOE's conclusions of the direct, indirect, interrelated and independent, and cumulative effects of the MWTP on Indiana bats. Information on the effects of wind energy project on bats that is relevant to this analysis is in Section 3.2.6.

5.1 Direct Effects

Direct effects are defined as the direct or immediate effects of the project. Direct effects include all immediate impacts (negative and beneficial) from project-related actions (e.g., construction-related impacts such as loss of habitat) and those disturbances that are directly related to project elements that occur very close to the time of the action itself (e.g., sedimentation). Direct effects typically are considered to occur during the construction or habitat-disturbance phase of a project, with indirect effects occurring later in time. However, because the MWTP involves the long-term operation of wind turbines that might directly kill or injure Indiana bats, DOE has included mortality of bats during operation of the project in the following consideration of direct effects.

- Construction of the MWTP, including installation of the wind turbines, electrical distribution lines, substation, and other required infrastructure would not result in any disturbance or loss of habitat used by Indiana bats for hibernating, foraging, or roosting.

- Construction activities would not result in morality, modification of behavior, or other adverse impacts to migrating or other Indiana bats because construction activities would not occur during nighttime hours when bats are active.

- During the operation phase of the MWTP, migrating Indiana bats could be directly affected when struck or otherwise harmed by spinning turbine blades, as has been documented at many other wind energy projects (see Section 3.2.5).

- Migrating bats may change their behavior in response to the operating turbines. For example, it has been suggested that bats may modify their flying pattern, for example, due to sound generated by operating turbines (Arnett et al. 2008). However, as discussed in Section 3.2.5, wind turbines do not appear to emit ultrasonic sounds that might confuse or attract bats. In addition, although aerial insects upon which Indiana bats feed are known to take advantage of windbreaks on the lee side of wind turbines, the MWTP action area does not include suitable foraging habitat. Therefore, the abundance of insects near turbines would not be a contributing factor to risks to the Indiana bat from the MWTP.

- Because there are no hibernacula and no roosting or foraging habitat within or near the action area, DOE concludes that the possibility of Indiana bats being harmed or killed by operation of the turbines at any time other than during migration is discountable.

- As summarized in Section 3.2.6, a very small portion of bat mortalities has occurred during the spring at other wind energy projects. Although the reasons for a substantially higher number of mortalities in the fall is not fully understood, it has been suggested that more direct flights to breeding areas during the spring, differences in flight altitude and/or flight patterns, and behavior associated with swarming and breeding, may make bats more vulnerable to wind turbines during fall.

Based on this information, DOE concluded that the only likely direct effects to Indiana bats would occur during the fall migration. Specifically, migrating Indiana bats may be adversely affected during operation of the MWTP from: (1) collisions with operating turbines; (2) changes in migration behavior due to the presence of operating turbines or the noise they generate; and (3) pulmonary barotrauma, a fatal condition caused by low pressure zones near turbines that cause the lungs of bats to hemorrhage.

As described in Section 5.5, a relatively large number of bats have been killed at some wind energy projects. Most bats killed were three species of lasiurine bats (hoary bat, red bat, and silver-haired bat,). Substantially fewer *Myotis* bats have been found dead at wind energy project sites, and DOE is aware of only two documented mortalities of Indiana bats killed by wind turbines. In both of these cases, Indiana bats were found during fall migration under wind turbines located in cultivated fields. Because bat mortalities are monitored at only a small percentage of the wind energy projects within the range of the Indiana bat, and because not all bats killed are detected during those surveys, it is likely that substantially more individuals of this species are killed annually by wind turbines. **Nonetheless, given the lack of forested areas near the project site and the small number of turbines to be installed for the MWTP, DOE anticipates that few or no bats would be killed each year by this project. This low rate of mortality would have a negligible effect on population dynamics or the regional abundance of Indiana bats.**

Because a very small portion of bat moralities at wind energy facilities occur during the spring, and because DOE anticipates that few or no bats would be killed each year by this project, **DOE also concludes that it is possible, but very unlikely, that an Indiana bat would be killed by the MWTP during spring migration.**

Although methods have been suggested and used to model and predict the annual and total incidental take of Indiana bats from wind energy projects, those methods likely would not be meaningful or accurate for the MWTP because no bat habitat (other than airspace using during migration) would be disturbed, there is very little data about the relative abundance of Indiana bats and other bats in the vicinity of the project, and because the probability of a bat being harmed in any year is low. DOE has therefore used the information presented in this Biological Assessment to qualitatively estimate that no more than three Indiana bats are anticipated to be incidentally taken during a year, and no more than ten Indiana bats are anticipated to be incidentally taken over the 20- to 25-year life of the project. The annual estimate of three bats accounts for a low-probability event of more than one Indiana bat being killed at the same time or close in time (for example, while migrating together through the project area following a storm front). Because such an event would not occur often, the total amount of take is anticipated to be less than the annual take estimate extended over the life of the project

5.2 Indirect Effects

Indirect effects include those effects that are caused by or would result from the proposed project and are later in time, but are still reasonably certain to occur. **DOE does not anticipate any indirect effects to Indiana bats from the MWTP**. Because there are no hibernacula and no roosting or foraging habitat within or near the action area, the project would not cause Indiana bats to avoid any important winter or summer habitat or otherwise adversely modify their behavior in response to noise, shadow flicker, or other effects of turbine operation. No air pollutants would be released during operation of the project and the release into the environment of lubricants and other hazardous materials used during operation is very unlikely; thus, there would be no indirect adverse harm to Indiana bats or their habitat.

5.3 Effects of Interrelated and Interdependent Actions

Interdependent actions have no independent utility apart from the proposed project and interrelated actions are part of a larger action and depend on the larger action for their justification. No interdependent or interrelated actions would be associated with the proposed project. **The proposed project would be a single and complete action; therefore, no effects from interdependent or interrelated actions would occur.**

5.4 Effects from Cumulative Actions

As defined under the implementing regulations of the *Endangered Species Act*, cumulative effects are those effects of future State or private activities, not involving Federal activities, that are reasonably certain to occur within the action area of the Federal action subject to consultation (USFWS and NMFS 1998).

There are no other planned non-Federal (or Federal) actions that are reasonably certain to occur within the action area shown in Figure 3. However, two additional wind projects are proposed for Warren County, each with 134 wind turbines and a capacity of 134 megawatts. The Coldbrook-Alexis Wind Farm would be located in Coldbrook Township, over 10 miles northeast of the proposed MWTP site. The EcoPoint Wind Farm would be located in Point Pleasant, Swan, and Sciota townships, over 10 miles south and southwest of the MWTP site (Illinois State University 2010).

No cumulative impacts within the action area are anticipated, as no other reasonably foreseeable projects are planned to occur within its boundaries. The potential exists for cumulative impacts to occur outside the action area from installation of wind turbines in the region.

6. AVOIDANCE AND MINIMIZATION MEASURES

As discussed in Section 5, DOE concludes that Indiana bats would be in the project area only when migrating. Further, because a very small portion of bat moralities at other wind energy facilities have occurred during the spring (see Section 3.2.6), and because the probability of any Indiana bats being killed by the MWTP during a year is low, DOE concludes that it is possible, but very unlikely, that an Indiana bat would be killed during spring migration. The following avoidance and minimization measures, therefore, focus on the fall migration period.

DOE and MWP, the operator of the MWTP project, propose a three-year evaluation of the effectiveness of modifying the operational cut-in speed for reducing mortalities of Indiana bats. At the end of the three-year study, MWP and USFWS would use the results of the study to develop an operating scheme, and mortalities during fall migration would be monitored for an additional two years.

The following is a summary of the proposed evaluation. MWP will develop the study in cooperation with USFWS staff and will prepare a detailed study design for review and approval by the USFWS prior to installation of the facility. This approach will allow the USFWS and MWP an opportunity to maximize the amount of useful information to be obtained from the monitoring effort.

Cut-in Speeds

A subset of turbines would be operated with a cut-in speed of 5 meters per second (11 miles per hour), with the remaining turbines operated at the manufacturer's recommended operational wind speed. The modified cut-in speed would be used from 0.5 hour before sunset until 0.5 hour after sunrise during the fall migration period. It should be noted the MWTP would generate a substantial portion of the electricity used by local residents and businesses, including nearby grain elevators whose peak power usage occurs in the spring and fall. As a result, cut-in speeds greater than 5 meters/second would neither be consistent with the utilities' requirement of continuous operations for the facility, especially during peak load periods, nor economically feasible for MWTP.

Study Period

Use of cut-in speeds, and monitoring of mortality, will be conducted initially from 15 July through 30 September. Terminating use of cut-in speeds at the end of September is proposed for the following reasons. First, mortality studies have shown that most bat fatalities occur in August into September with a spike in mid to late July to early August (Arnett et al 2008). Second, because the project site is distant from Indiana bat hibernacula, it is likely that there will be few swarming or migrating Indiana bats in the vicinity of the MWTP turbines late in the migration period and thus a very low probability of mortality during that time. And finally, October is a very important time financially for electricity generation for the MWTP.

Carcass Searches

MWP would conduct searches for dead bats at all turbines at least three times a week from July 15 through October 1 for five years. The study design and searches will developed and conducted under the direction of staff from the Biology Department of Monmouth College, or other similarly qualified personnel. The detailed protocol for searches, training of personnel, and measuring searcher efficiency and carcass removal rates would be presented in the study design and reviewed and approved by the USFWS.

Reporting

MWP would prepare a report summarizing and interpreting the results of the study by the end of each year and submitted to USFWS and DOE. Any changes in the design of the study for the following year would be proposed in the report.

Long-term Use of Cut-in Speeds

At the end of the third year of the study, MWP and USFWS would examine the data collected on mortalities of Indiana bats to determine whether a 5 meter per second cut-in speed should be used during fall migration for the remainder of the operational life of the MWTP. MWP would propose a long-term operations plan in the third annual report and request feedback and approval from USFWS. USFWS would then provide feedback to MWP by April 1st, which would give MWP time to prepare for the operation of the project in advance of the fall migration period.

7. CONCLUSION

The information and analysis presented in this Biological Assessment indicates that Indiana bats may migrate through the action area and was the basis for the finding by DOE that the proposed project warrants an effect determination of **May Affect** for the Indiana bat.

DOE concludes that a determination of **Likely** to **Adversely Affect** is warranted based on the following rationale:

- Migrating Indiana bats might be present in the action area.

- During operation of the MWTP, migrating Indiana bats could be directly affected when struck or otherwise harmed by spinning turbine blades.

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